Model STA-1

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-1 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-1 may be necessary.

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

SECTION 1.0 PRODUCT OVERVIEW - Fully describes the STA-1 features, capabilities, specifications, and power and interface requirements.

SECTION 2.0 INSTALLATION - Describes and illustrates the procedures required to install the STA-1.

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

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

1.0 PRODUCT OVERVIEW

1.1 GENERAL DESCRIPTION

The STA-1 Tape Interface Adapter allows connection of a Pertec-interfaced tape coupler to an STC-interfaced tape drive. STA-1 operation is transparent to the host system during operation. The STA-1 is perceived from the tape coupler as a Pertec-interfaced tape drive, while from the tape drive's perspective, the STA-1 appears to be an STC-interfaced tape coupler.

1.2 PERFORMANCE

The implementation of a FIFO buffer in the STA-1 allows for independent data transfer, from either the Pertec or STC side of the STA-1, 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 STC-interfaced tape drive.

1.3 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.

1.4 CONFIGURABILITY

The STA-1 supports a maximum of 8 tape drives. The STA-1 may be configured for addressing units 0-3, 4-7 or 0-7. This configurability allows a mix of both STC and Pertec-interfaced tape drives using the same tape coupler.

1.5 RACK-MOUNTABLE ENCLOSURE

The physical enclosure of the STA-1 conforms to a standard 19 inch rack-mountable configuration. Height of the enclosure is 3.5 inches and depth 23 inches. Appropriate mounting hardware is supplied with the STA-1.

1.6 FRONT PANEL

FIGURE 1.1 Front Panel

1.6.1 POWER SWITCH

The front panel has a lighted power switch indicating when power is on.

1.6.2 FORMATTER ENABLE INDICATOR

The FORMATTER ENABLE indicator lights when the tape coupler resident in the host activates its FORMATTER ENABLE line, enabling the tape drives for normal operation.

1.6.3 BUSY INDICATOR

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.

1.6.4 DENSITY 6250 INDICATOR

The DENSITY 6250 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.

1.6.5 ERROR INDICATOR

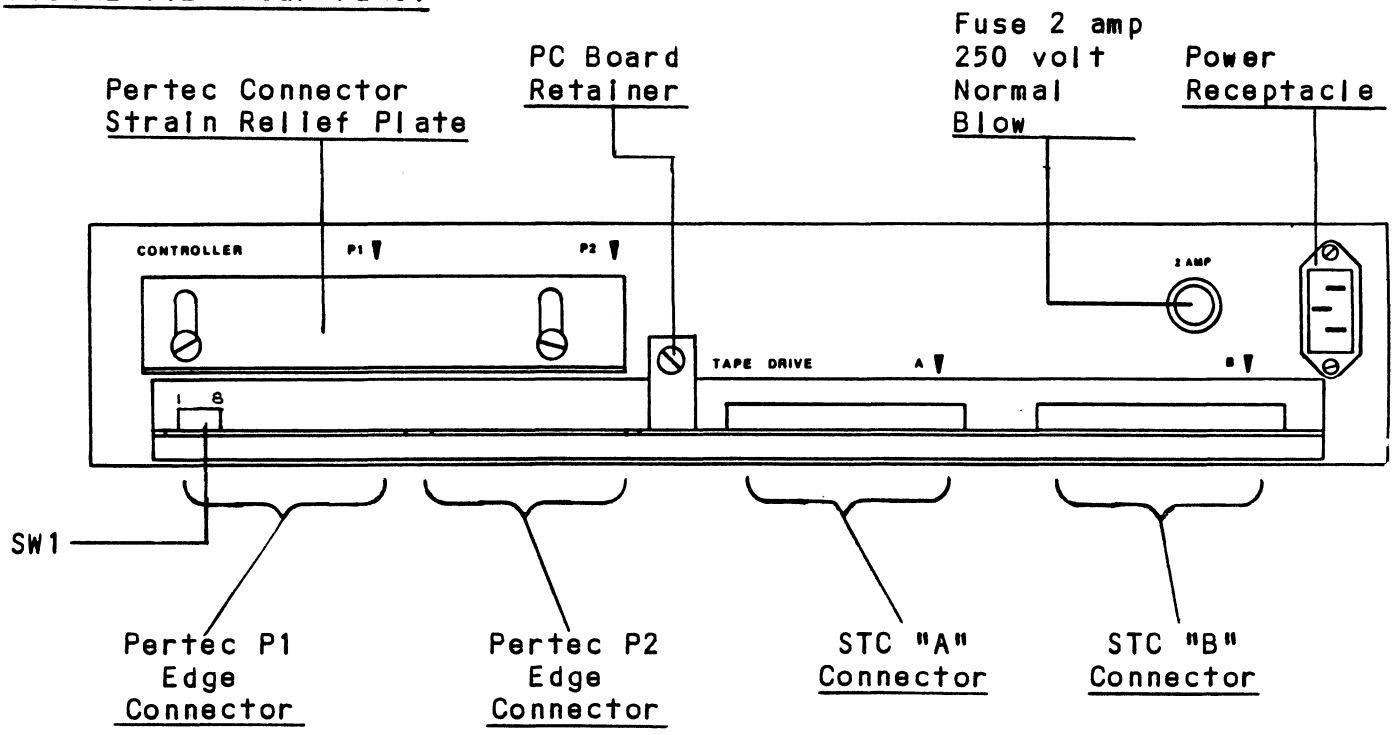
The ERROR indicator lights if any one of four error status lines on the STC interface become active. ERROR will become active due to a command reject, bus parity, data check, or a data overrun error. Re-initiation of a new command will clear the error. Errors will be reported to the system as Hard Errors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

1.7 STA-1 REAR PANEL

The rear panel facilitates connection to both Pertec and STC interfaces via 50 and 60-pin flat ribbon cables. The rear panel also includes a fuse holder and a standard international power line receptacle. Strain reliefs are provided for all interface connections via headers with ejectors for the STC side, and a plate that slides down restraining the movement of the Pertec board edge connectors.

A retainer between the Pertec and STC connections holds the circuit board in place. The PC board is easily removable from the rear. Setup of board options are accomplished from the rear, via an 8-position switch (SW1) located behind Pertec connector P1.

FIGURE 1.2 Rear Panel



1.8 CABLING

The Pertec interface uses 50-pin edge connectors with flat ribbon cable and is limited in length to the maximum Pertec standard of 20 feet.

Connection to the STC interface uses 60-pin flat, twisted pair ribbon cable with 60-pin headers and is limited to a maximum of 20 feet, per STC specifications.

1.9 INTERFACE CIRCUITRY

All drivers and receivers used in the STA-1 adhere to Pertec and STC specifications and are active low. All drivers have open collector outputs. All receivers have Schmitt Trigger inputs.

1.10 MECHANICAL DIMENSIONS

STA-1 Enclosure: 3.5" H X 17" W X 23" D
(8.9 cm X 43.2 cm X 58.4 cm)
(rack-mountable tabs extend an additional 1" (2.5 cm) beyond the 17" width.)

1.11 POWER REQUIREMENTS

Standard: .5 amps, 120 VAC, 60 Hz
European: .25 amps, 240 VAC, 50 Hz

NOTE: Refer to chart on STA-1 power supply for transformer jumper options if power input requirements change from shipped configurations.

1.12 ENVIRONMENTAL REQUIREMENTS

Operating temperature: 0° to 55° C

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

2.0 INSTALLATION

2.1 UNPACKING AND INSPECTION

After unpacking the STA-1, make sure that no damage has occurred during shipping. The STA-1 logic board should be tightly secured in the chassis. This can be checked by viewing the unit from the rear and checking for proper board positioning and mounting. STC cables, power cord and mounting hardware are included.

2.2 PROGRAMMABLE STA-1 OPTIONS

Programmable switches are provided on the STA-1 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 that is accessible from the rear of the unit by removing the P1 connector (Figure 1.2). Make sure power is off when removing or installing connectors.

If the STA-1 is to be used with a ZETACO BMX-2 tape coupler, refer to the configuration section of the BMX-2 Technical Manual for specifying the STA-1 as the drive type. If the STA-1 is to be used with a coupler other than a BMX-2, configuration of the coupler may be necessary if support of dual speed or remote density selection is desired.

2.2.1 FACTORY SETTINGS

The STA-1 has been initially set up at the factory for the following parameters.

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

If any alterations of the setup need to be made, refer to Figures 1.2 and 2.2 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 setup 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).

The table below shows the different data rate options allowable.

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

*STANDARD FACTORY SETTING

2.2.3 PERTEC READ AND WRITE STROBE TIMING

Selection of SW1-5 "DOWN" yields a read and write strobe timing of 150 ns. SW1-5 "UP" doubles the read and write strobe timing to 300 ns, which may be a requirement for couplers with less bandwidth than the ZETACO BMX-2. Only 150 ns strobe periods are allowed above a 1.25 MBytes/sec. data rate selection.

2.2.4 DEVICE ADDRESS SELECTION

The STA-1 can be configured to allow tape drive unit addressing selection. The STA-1 can be programmed to select drives 0-3, 4-7, or 0-7. If multiple drives are to be daisy-chained on the Pertec interface, only the last unit physically connected to the 50-pin ribbon cables should have 220/330 ohm DIP terminators installed. All STA-1's are shipped with terminators installed and socketed. Refer to Figure 2.1 for typical STA-1 configurations and Figure 2.2 for terminator locations.

TAPE DRIVE ADDRESS SELECTION

SW1-6	SW1-7	DRIVES SELECTED
DOWN	UP	0-3
UP	DOWN	4-7
*UP	*UP	*0-7

*STANDARD FACTORY SETTING

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 "DOWN". If this option is not to be used, the switch must be "UP".

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.

2.2.6 REMOTE DENSITY SELECT

Remote density select is automatically supported in the STA-1. Density selection is defined in the Pertec command repertoire and is translated to STC density select lines. No switch set up of the STA-1 is necessary to support remote density select.

Pertec command lines are listed below showing the state in which they must be no less than 100 ns 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

2.3 INSTALLATION OF THE RACK MOUNT ENCLOSURE

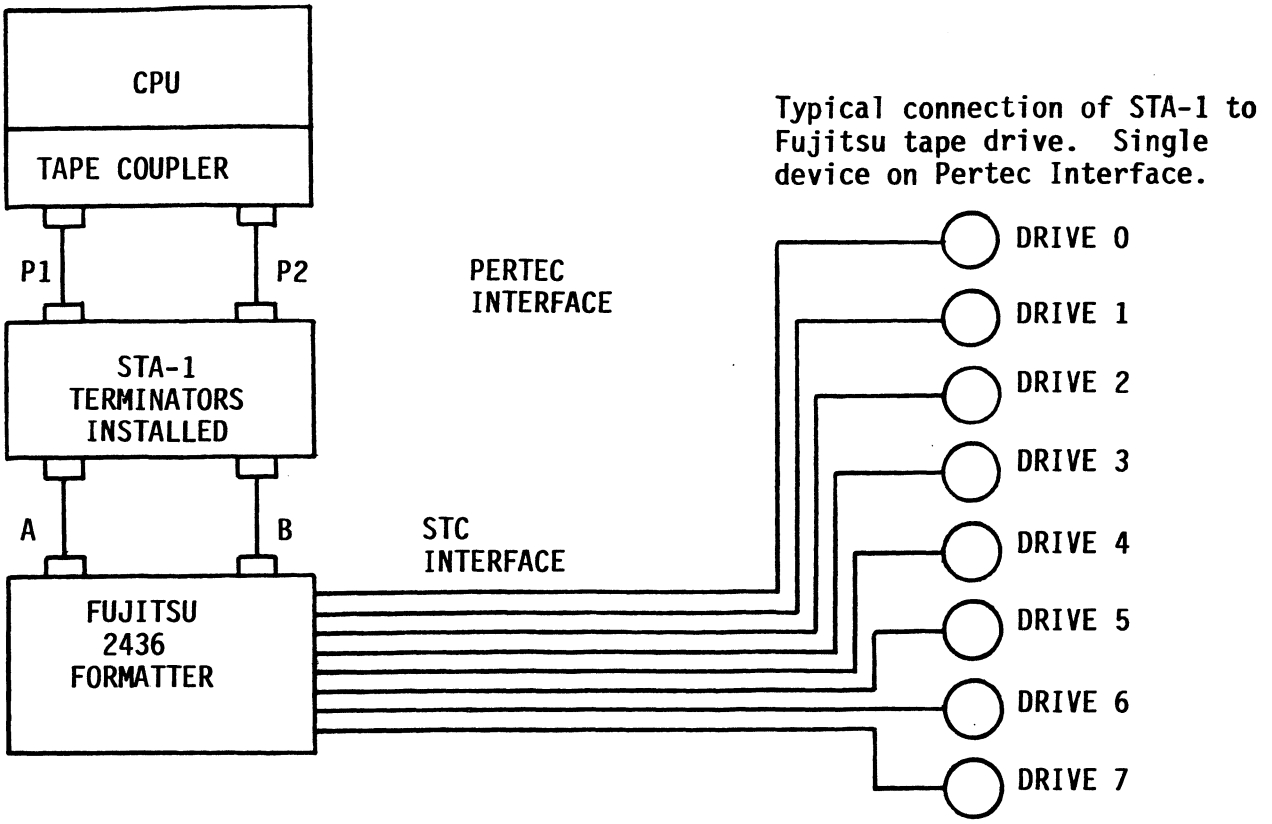
The main body of the enclosure attaches to a standard 19" rack mount via slotted tabs in the front and slotted adjustable "L" brackets in the rear. Mounting hardware (bolts, nut plates, washers etc.) are supplied by ZETACO. Slide the enclosure body into its designated space on the rack. Bolt on the front of the enclosure using the two slots on each tab (note that the tabs should be on the outside of the rail). Adjust the fore-aft position of the slotted "L" brackets at the rear of the enclosure. When they are in proper position, tighten them down to the enclosure and bolt them to the rack-mount rails.

2.4 INSTALLATION OF THE FRONT PANEL

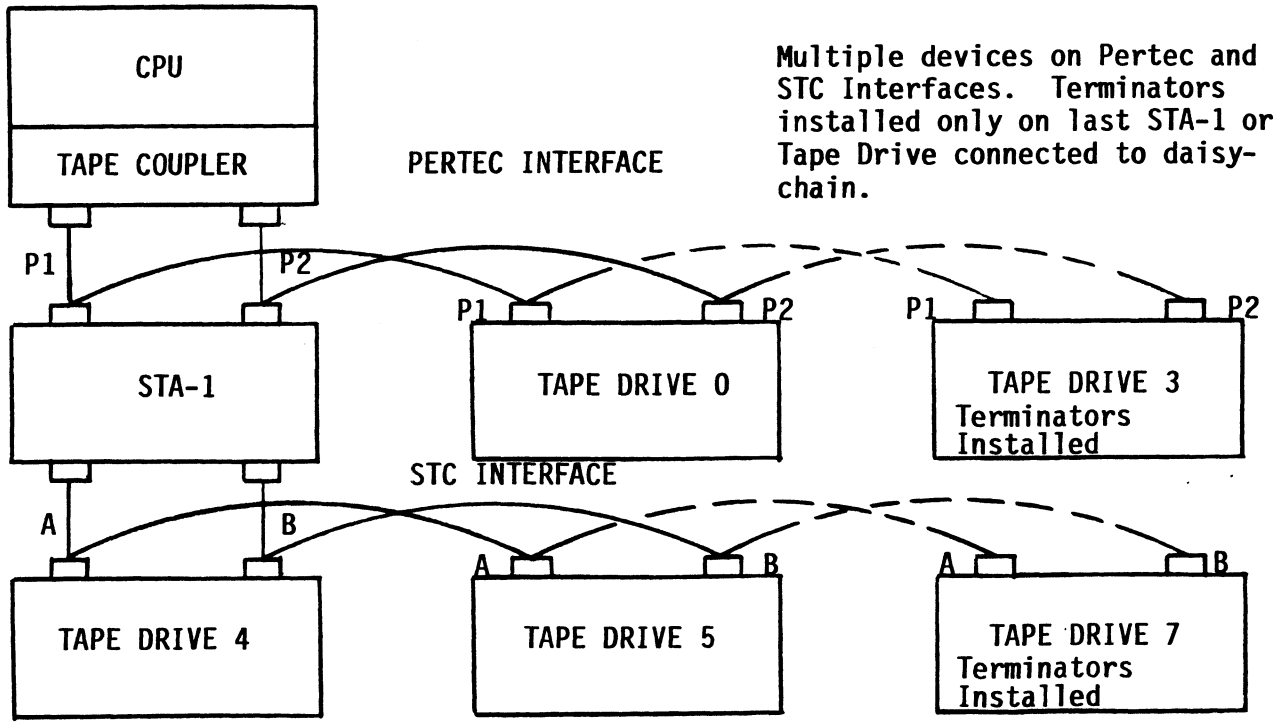
WARNING: Ensure that the power cord is not yet connected to the AC receptacle on the rear panel of the STA-1.

Bolt the front panel onto the cabinet's mounting rails.

Figure 2.1 STA-1 Cabling Configurations



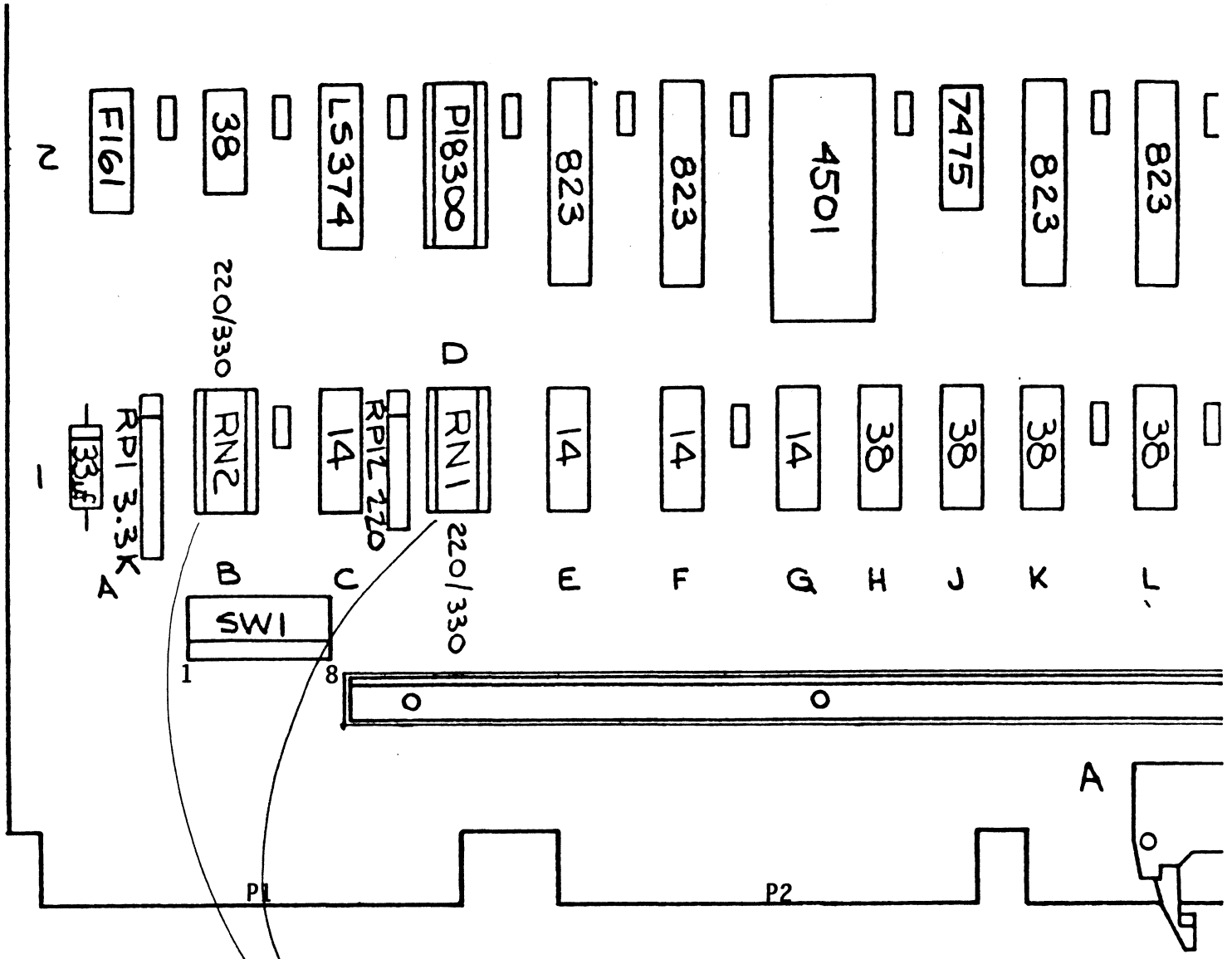
Typical connection of STA-1 to Fujitsu tape drive. Single device on Pertec Interface.



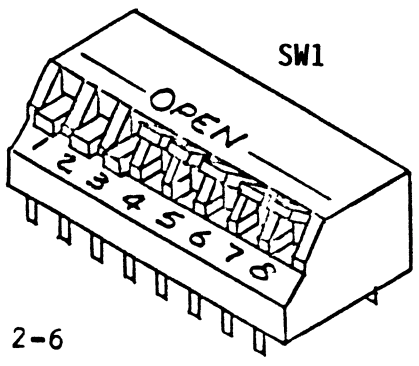
Multiple devices on Pertec and STC Interfaces. Terminators installed only on last STA-1 or Tape Drive connected to daisy-chain.

STC 2920 TAPE DRIVES

Figure 2.2 STA-1 Switch and Terminator Locations



*Switch shown in Standard Configuration.



SWITCH	POSITION
1	DOWN
2	DOWN
3	DOWN
4	UP
5	UP
6	UP
7	UP
8	UP

2.5 CONNECTING THE CABLES

Refer to Figures 2.1 and 2.4 for cable routing. The connectors at the rear panel that are labled 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 upper right corner. By sliding the plate down over the connectors and tightening the screws, strain relief will be provided.

Table 2.1 defines the pin assignment of the P1 and P2 connectors.

The connectors at the rear panel labled "A" and "B" are the STC connectors for cabling to the tape drive. Insert the 60-pin connectors making sure pin 1 is in the upper right corner. Ejector handles provide strain relief.

2.6 BOARD REMOVAL AND INSERTION

If the STA-1 logic board ever needs to be removed it can be done from the rear of the unit. Power must be disconnected completely and interface cables removed. There is a quarter-turn quick release board retainer centrally located between the Pertec and STC connectors. After releasing the retainer slide the board out the back just far enough to allow removal of the J1 connector located behind the STC "B" connector. With everything disconnected the board should slide out the back.

Installation of the board is the reverse order of board removal. Make sure when inserting the board that it is pushed in until it encounters a stop inside the chassis and will move no further.

FIGURE 2.3 Top View (Cover Removed)

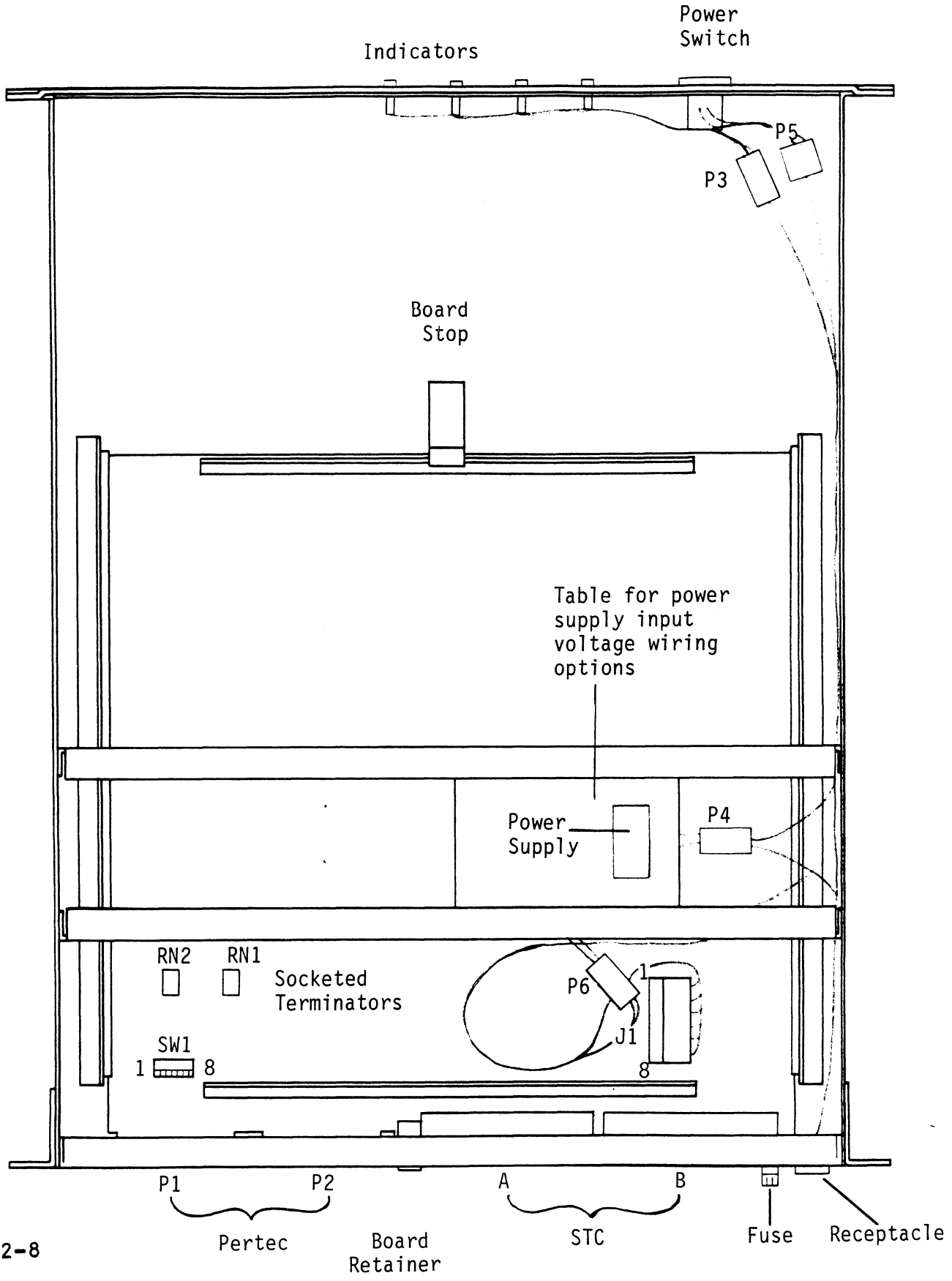
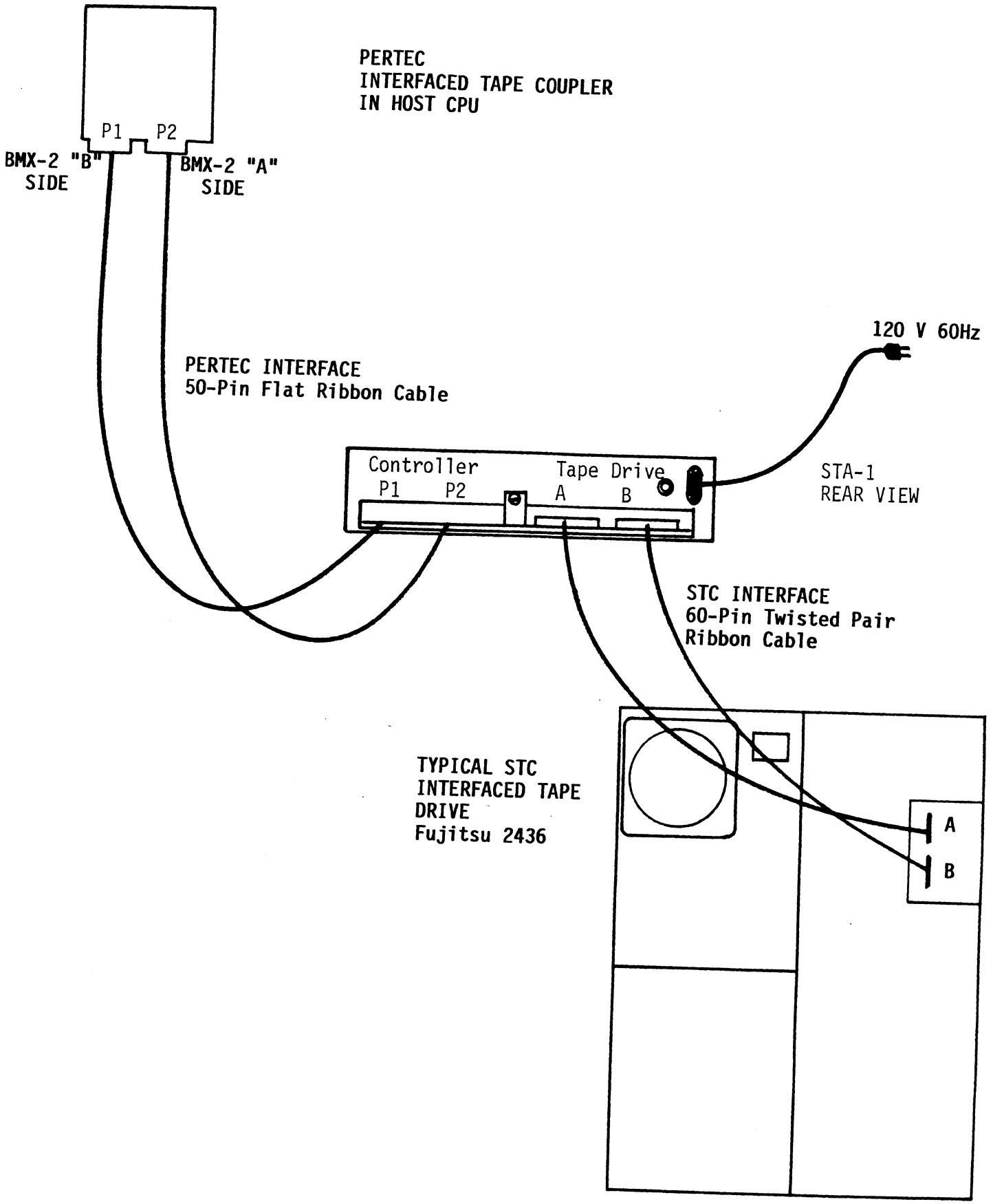


FIGURE 2.4 Cabling For STA-1



2.7 GROUNDING

Make sure that the receptacle used for the STA-1 power source is properly grounded. If proper grounding is not maintained, the chance of electrical shock exists. An improperly grounded system may also be susceptible to electrical noise that may cause data errors.

2.8 SYSTEM POWER-UP

Power-up sequence of the CPU, STA-1, or the tape drive is not important. After power up of all equipment and after the tape coupler successfully completes Self-test, the FORMATTER ENABLE indicator on the STA-1 front panel should be lit. The system is now ready for tape operations.

It is suggested that a tape diagnostic program be run on the system to assure proper operation. If the tape coupler is a ZETACO BMX-2, run the BMX-2 diagnostic and reliability programs.

TABLE 2.1 Pertec 50-Position Ribbon Cable Pin Assignments

P1 PIN #	NAME	P2 PIN #	NAME
1	GND	1	RP
2	FBY	2	R0
3	GND	3	R1
4	LWD	4	BOT
6	W4	6	R4
8	GO	8	R7
10	W0	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	TAD0	46	TAD1
48	R2	48	FAD
50	R3	50	HISP

P1 5-49 AND P2 5-49 = GND

TABLE 2.2 STC 60-Position Ribbon Cable Pin Assignments

CABLE "A"		CABLE "B"	
Pin #	Name	Pin #	Name
A1	AD0	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	NRZI
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 2.3 STA-1 J1 Pin Assignments

PIN #	DESCRIPTION
1	FORMATTER ENABLE Indicator
2	BUSY Indicator
3	DENSITY 6250 Indicator
4	ERROR Indicator
5	Ground
6	POWER Indicator
7	+5 Volt Input
8	Indicator Power

3.0 TROUBLE-SHOOTING AND CUSTOMER SERVICE

3.1 POWER-UP PROBLEMS

Upon power-up of the STA-1, the power indicator on the power switch should be lit. If it is not, try the following sequence of steps:

1. Be sure the AC power cord is securely plugged into both the AC wall receptacle and the STA-1.

2. With the power switch in the OFF position disconnect the power cord from the unit and remove the fuse. Examine the fuse for electrical continuity.

3. If it is blown, replace it with a 2 amp fuse. Remove the logic board from the rear of the unit. Turn the power back ON for several seconds. The LED will not light when powerd up since its power is derived from the logic board. Now turn the power OFF again and check the fuse. If it is intact, a short on the logic board is indicated; if it is blown, the short is elsewhere in the unit. Provide this information to Customer Support for further assistance.

4. If it is intact, reinstall the fuse, making sure that the fuse cap locks tightly in place. Re-connect the power cord and turn the unit back on. If the LED is still not lit, turn the unit OFF and again disconnect the power cord from the STA-1. Remove the top cover and referring to Figure 2.1, verify that there are no unplugged connectors. Tug gently on the wires and connectors to ensure all connections are sound. Replace the top of the enclosure, re-connect the power cord, and turn the unit ON.

5. If the LED is still not lit, contact ZETACO Customer Support (see Section 3.4) for assistance.

3.2 FORMATTER ENABLE INDICATOR

If the STA-1 is powered on, and the tape coupler has passed its Self-test routine, the FORMATTER ENABLE indicator should be active. If it never activates, follow the procedure below:

1. Switch the STA-1 power switch off and disconnect the AC power. Make sure that all interface cables are connected correctly. Verify that pin 1 of all connectors is in the upper right hand corner. Also make sure that P1 is not swapped with P2 or that A is not swapped with B. Refer to the cable installation section for further detail.

2. If the FORMATTER ENABLE indicator still does not light, check if the tape coupler is operating correctly. Did it pass its Self-test? Is it installed correctly? Are the P1 and P2 connectors on wrong?

3. Consult ZETACO's Customer Support if problem persists.

3.3 PERFORMANCE PROBLEMS

"Performance" refers to the normal command and data transfer operations of the peripheral subsystems in use. For example, an ending memory address error message issued by the BMX-2 reliability program during a data transfer to or from the tape drive is a problem related to the performance of the tape subsystem.

1. Make sure that the data rate capability of the controller is sufficient to handle the average data rate of the tape drive. A Data General CPU with a BMX-2 tape coupler connected to a fast tape drive (Fujitsu 200 IPS at 6250 BPI) will only run on the Burst Multiplexor Channel. The Data Channel is not of sufficient performance and Data Late errors will occur.

2. Is the data rate set up correctly on the STA-1?

3. Is there a problem with the unit addressing, remote density, or remote speed selection set up on either the STA-1 or the tape coupler?

4. Is the tape coupler configured properly to handle all desired STA-1 command functions?

5. Are the proper cables being used? Do they exceed the maximum specified length?

3.4 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.

1-612-890-5135

3.5 WARRANTY INFORMATION

The STA-1 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 of 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.