REVISIONS

REV	DESCRIPTION	DATE	DR	CHK	APPR
-	ERN 6-RE PREPRODUCTION RELEASE	8-16-74	AV	BL	BL
	ERN 6-T U PRODUCTION RELEASE	10.14.74	AV	BL	BL

SIGNATURES	DATE
DR Helen Lewis	7/25/74
CHK BL	8/20/4
ENGR [illegible]	8-20-74
APPR [illegible]	8/20/4

PERTEC PERIPHERAL EQUIPMENT

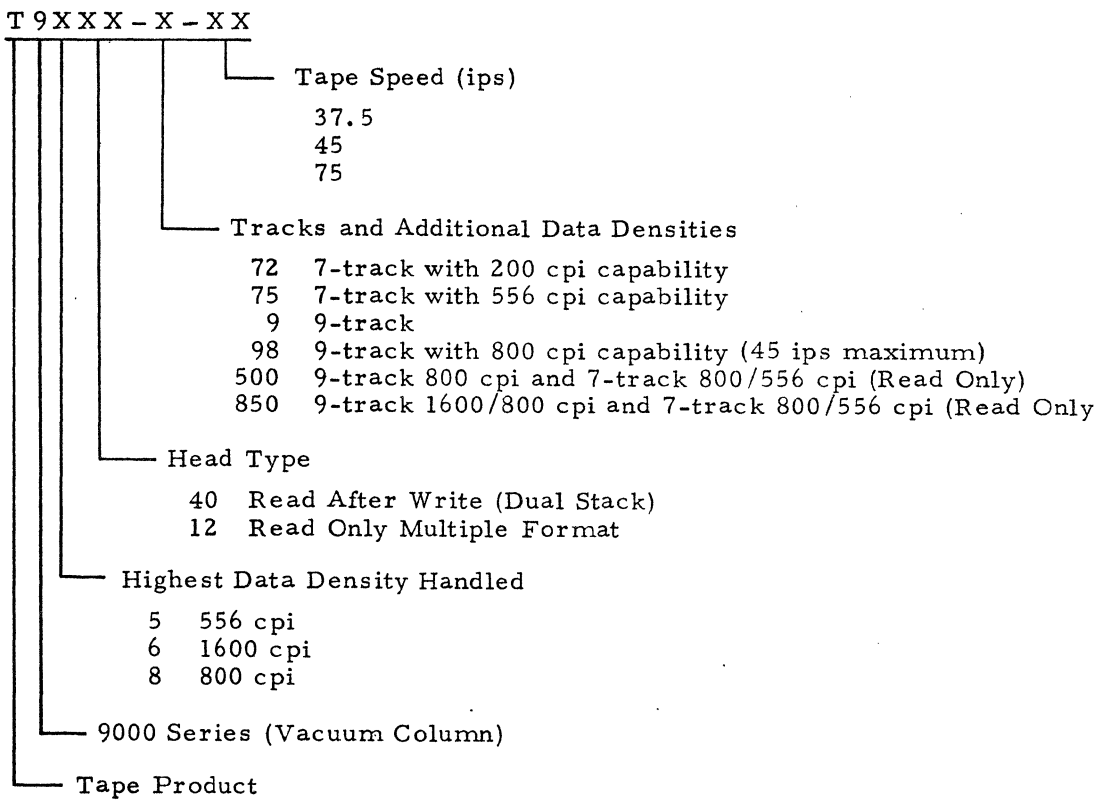
TITLE

9XXX MAGNETIC TAPE TRANSPORT ENGINEERING SPECIFICATION

NEXT ASSY	USED ON	SIZE	CODE IDENT	SHT	DWG NO	REV
—	—	A		1 OF 27	103870	A
APPLICATION						

1.0 SCOPE

This specification describes the functional capabilities of the PERTEC OEM Model 9XXX Magnetic Tape Transports. Both 60-Hz and 50-Hz versions of the transport are available and are included in this specification. These units are designated by equipment model identification numbers, as noted below.



2.0 APPLICABLE DOCUMENTS

ANSI X3.39. Recorded Magnetic Tape For Information Interchange (1600 cpi, Phase Encoded).

ANSI X3.22. Recorded Magnetic Tape For Information Interchange (800 cpi, NRZI).

ANSI X3.40. Unrecorded Magnetic Tape For Information Interchange (9-Track, 200 and 800 cpi, NRZI, and 1600 cpi, PE).

3.0 GENERAL

3.1 DESCRIPTION

The PERTEC 9XXX Magnetic Tape Transports are designed for use as an external storage device for a digital data processing system. The 9XXX operates at tape speeds of 37.5 to 75 ips and uses one-half-inch, 1.5 mil magnetic recording tape. The 9XXX utilizes a nine or seven track head and records in PE or NRZI mode resulting in 1600 (9 bit), 800 (9 bit or 7 bit), 800/556 (7 bit), 800/200 (7 bit), or 556/200 (7 bit) characters per inch (cpi). The tape transport operation is entirely under external control except "Rewind" and "Rewind and Unload" which, after being initiated, are controlled within the tape unit. The transport is designed to be plug-to-plug compatible with the existing PERTEC 6000 Series transports.

4.0 PERFORMANCE CHARACTERISTICS

4.1 OPERATING SPEEDS (At Nominal 60/50 Hz Input Power)

Model No.	**Forward	**Reverse	Nominal Rewind Time (2400 Ft)
*9XXX	80	80	115 second
9XXX	75	75	115 second
9XXX	45	45	115 second
9XXX	37.5	37.5	115 second

*Forward to reverse turnaround repetition rate not to exceed 70 commands per second.

**Long term speed variation ±1% Forward and Reverse.
Short term speed variation ±3% Forward and Reverse.

4.2 CHARACTER RATE

1600 characters/inch – 120,000 char/sec at 75 ips. Proportionally lower at lower speeds and/or lower densities.

4.3 RECORDING CHARACTERISTICS

4.3.1 Mode

The PERTEC 9XXX Tape Transports meet the requirements of ANSI X3.39 Standard for 1600 cpi, PE, 9-track recording and ANSI X3.22 Standard for 800 cpi, NRZI, 9-track recording.

4.3.2 Tape Characteristics

4.3.2.1 Type

The 9XXX is designed to meet the requirements of this specification when used with magnetic tape that meets ANSI X3.40 Unrecorded Magnetic Tape Standard.

4.3.2.2 Dimensions

Width: 0.498 (±0.002) inches
Base: Polyester, 0.00142 inches nominal thickness
Coating: Nominal thickness 0.00048 inches, 0.0006 inch maximum
Length: The transports are designed to utilize any diameter reel up to 10-1/2 inches on 2,400 ft. of 1.5 mil. base tape.

4.3.2.3 Tape Format

Nine Track

Nominal track width, read:	0.040 in.
Nominal track width, write:	0.044 in.
Nominal track-to-track spacing:	0.055 in.
Nominal record gap:	0.60 in.
Minimum record gap:	0.50 in.
Write gap to erase gap spacing:	0.34 in. max.
Nominal Photo-Tab Sensor to write gap spacing; Read After Write:	1.40 in.

Seven Track

Nominal track width, read:	0.030 in.
Nominal track width, write:	0.048 in.
Nominal track-to-track spacing:	0.070 in.
Nominal record gap:	0.75 in.
Minimum record gap:	0.68 in.
Write gap to erase gap spacing:	0.34 in. max.
Nominal Photo-Tab Sensor to write gap spacing; Read After Write	1.40 in.

4.3.2.4 Track Format

Nine Track

Data Bit	Track	Data Bit	Track
2^0	2	2^5	5
2^1	8	2^6	6
2^2	1	2^7	7
2^3	9	P	4
2^4	3		

Seven Track

2^0	1
2^1	2
2^2	3
2^3	4
2^4	5
2^5	6
P	7

4.4 TAPE MOTION CHARACTERISTICS

4.4.1 Start Time

The nominal start time at 75 ips is 5.0 ± 0.35 milliseconds and is defined as the time from the set of the drive flip-flop to 90% nominal amplitude output from the read amplifiers when reading a pre-recorded gapless tape. Other start times inversely proportional to tape speed.

4.4.2 Stop Time

The nominal stop time at 75 ips is 5.0 ± 0.35 milliseconds and is defined as the time from the clear of the drive flip-flop to 10% output from the read amplifiers when reading a pre-recorded gapless tape. Other stop times inversely proportional to tape speed.

4.4.3 Start/Stop Distances

The start/stop distances within the specified start/stop time is 0.19 ± 0.02 inch.

4.4.4 Program Restrictions

There are no program restrictions for the capstan or reel servos at or below 75 ips. However, to preserve the nominal start/stop times and distances, and to guarantee complete erasure of the gaps, care must be taken to ensure that tape motion has ceased before changing the tape direction when switching from read to write or write to read status.

4.4.5 Tape Creepage

The tape transport is capable of standing indefinitely with "power-on" in either On-line or Off-line operations, with no tape creepage across the read/write head.

4.5 ERROR RATES

The error rate limits of this specification apply in the forward direction with tape that meets ANSI X3.40 Unrecorded Magnetic Tape Standard, or equivalent, over an operating ambient temperature of 60°F to 90°F and a relative humidity level of 30% to 80%. The error rates apply when PERTEC or equivalent quality read recovery electronics are used in the tape transport controller or formatter. Errors caused by damaged oxide or included foreign particles shall not be counted. Any error means a record error and the entire record in which the error is detected is counted as one error.

4.5.1 Read Error

4.5.1.1 The recoverable read error rate will not exceed one error in 10^8 bits in the forward direction. Errors caused by damaged oxide or included foreign particles are not counted.

4.5.2 Write Error

4.5.2.1 All PERTEC 9XXX Tape Transports write information with a recoverable read-after-write error rate not to exceed one error in 10^8 bits. Errors caused by damaged oxide or included foreign particles are not counted.

4.5.3 Irrecoverable Errors

4.5.3.1 An irrecoverable error is defined as an error that exists after five retries and errors due to damaged oxide or included foreign particles have been eliminated. The irrecoverable error rate will not exceed one error in 10^9 bits when reading a tape that was recorded on the same tape transport.

4.6 TIME DISPLACEMENT (SKEW)

The maximum time displacement between the earliest and latest data bit within any data character is within those limits specified by ANSI X3.22 or X3.39 Standards for NRZI or PE recording. The time displacement at 800 cpi when reading an IBM master tape is 150 μinches, maximum.

4.7 INTERFERENCE

The 9XXX is designed so that the amount of interference inherently generated and propagated through space or over-associated conductors is minimized and shall not interfere with the information transmitted to or received from the system. Filtering, shielding, and bonding shall conform to good engineering practices.

5.0 COMPATIBILITY

5.1 The PERTEC 9XXX Tape Transport is compatible with those systems that meet the requirements of the ANSI X3.22 and X3.39 Standards for NRZI and PE recording.

6.0 PHYSICAL SPECIFICATIONS

6.1 DIMENSIONS AND WEIGHTS (Without Shipping Containers or Packaging)

Height:	24.0 inches
Width:	19.0 inches (rack mount)
Depth from Mounting Surface	16.0 inches maximum
Total from Front Surface	20.0 inches maximum
Weight	155 pounds maximum

6.2 MOUNTING

The PERTEC 9XXX tape transport shall be designed to fit into 19.0 inches consistent with EIA requirements. The exterior of the tape transport shall be finished as specified in Figure 1.

6.3 CONTROLS

6.3.1 Operator Control Panel Switches and Indicators (See Figure 2)

Name	Type	Function
POWER	Sw	Removes power from and applies power to components.
	Ind	AC power is available to the power supplies.
LOAD	Sw	Pulls tape into vacuum loop boxes and tape moves forward. Tape motion is stopped when the load point marker is sensed.
	Ind	Indicates when the tape unit is at the load point marker.
REWIND	Sw	Rewinds tape at high speed. Motion stops when load point is detected. Depressing rewind switch at load point will cause tape to be rewound at low speed until all tape is removed from the take-up reel.
	Ind	Indicates when the tape is moving in the reverse direction at high speed.
ON LINE	Sw	Places unit under external control.
	Ind	Indicates when the transport is under external control.
DATA DENSITY	Sw	Conditions the read electronics for the density selected on multi density versions.
	Ind	Indicates that the read electronics is conditioned to operate in the high density mode on multi density versions.

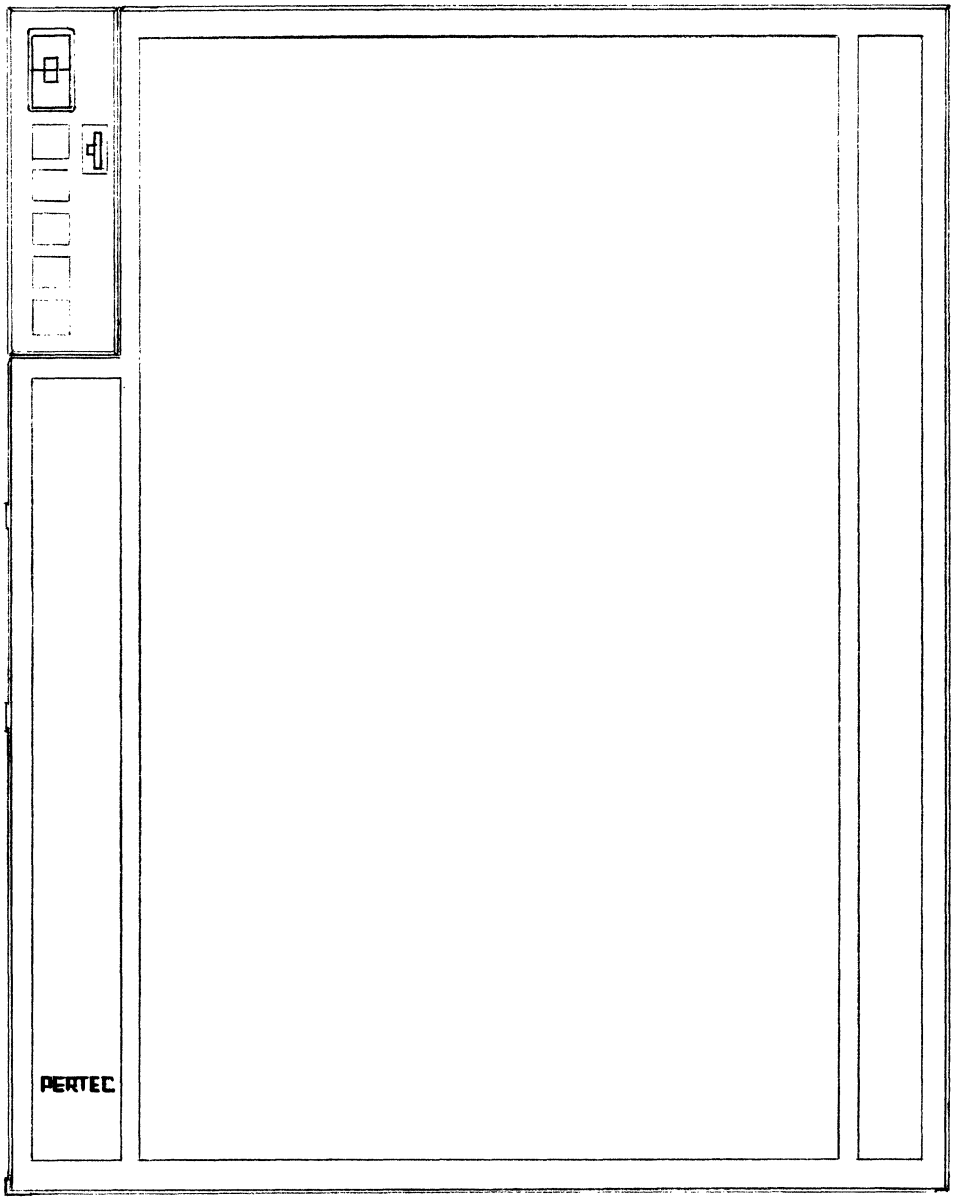


Figure 1. Tape Transport Front

PERTEC PERIPHERAL EQUIPMENT		
DWG. NO. 103870		ISSUE H
SIZE A	SHEET 11 OF 27	

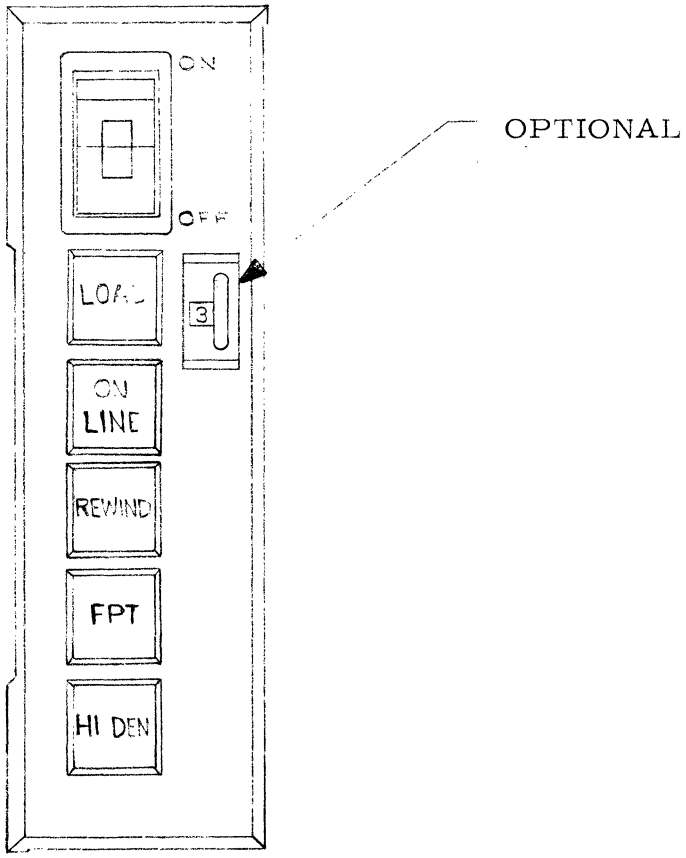


Figure 2. Operator Control Panel

PERTEC PERIPHERAL EQUIPMENT		
DWG. NO. 103870		ISSUE A
SIZE A	SHEET 12 OF 27	

FILE PROTECT	Ind	Indicates that a Write Enable ring is not in place on the supply reel and, therefore, a write operation can not be executed.
SELECT SWITCH (Optional)	Sw	Selects the tape transport physical address. Switch has four active positions (0 through 3).

6.3.2 Rear Maintenance Controls

Name	Type	Function
FORWARD/ REVERSE	Sw	Three position switch which initiates tape travel in either the Forward or Reverse direction. Center position is the Off condition.

6.4 MAGNETIC HEAD ASSEMBLIES

6.4.1 Number of tracks: Nine

6.4.1.1 Track width spacing for read and write heads are compatible with ANSI X3.22 and X3.39 standards for NRZI and PE recording.

6.4.2 Number of Tracks: Seven

6.4.2.1 Track width spacing for read and write heads are compatible with those systems that satisfy IBM requirements for seven track NRZI recording.

6.4.3 Erase Head

A full-width dc erase head gap is located not more than 0.34 inches in front of the write head gap, relative to the normal "forward" direction of tape travel. The erase head gap width is 9/16 inches (full tape width).

6.4.4 Tape Cleaner

A vacuum-operated tape cleaner is provided to contact the oxide side of tape in front of the write head gap, relative to the normal "forward" direction of tape travel.

6.5 TAPE REELS

The tape transport is designed to handle standard reels up to and including the 10-1/2 inch diameter reel.

6.6 ENVIRONMENTAL

The environmental specifications for the media used in the tape unit will determine the temperature and humidity requirements at the site where that tape unit is installed. The tape units, however, are designed to meet the specifications defined below in order to be able to take advantage of any improvements in the style or design of their particular form of media.

6.6.1 Temperature

Operating: 40°F (5°C) to 110°F (43°C) with a maximum gradient of 0.2°F per minute, to be operated after eight hours in ambient environment.

Non-Operating: -50°F (-45°C) to 160°F (71°C) (with a maximum gradient of 60°F per hour).

6.6.2 Relative Humidity

Operating: 30 to 80% RH (providing there is no condensation)

Non-Operating: 5 to 95% RH (providing there is no condensation)

6.6.3 Shock

Non-Operating: The equipment, when prepared for shipment by PERTEC, shall not suffer damage or fail to perform as specified herein after being subjected to 18 impact shocks of 5g (±10%) consisting of 3 shocks in opposite directions along each of 3 mutually perpendicular axes. Each shock impulse shall have a time duration of 11 (±1) millisecond.

6.6.4 Vibration

Non-Operating: The equipment, when prepared for shipment by PERTEC, shall withstand a peak displacement of ±0.005 inch for the frequency range from 5 to 60 Hz and 2g for the range from 60 to 500 Hz.

6.6.5 Altitude

Operating: From sea level to 4000 feet above sea level. Operation from 4000 to 7000 feet requires the following transport modifications:

(1) Pulley and belt change on blower drive motor
(2) Readjust buffer box vacuum pressure (tape tension)

Non-Operating: From sea level to 50,000 feet above sea level.

6.6.6 Tape Deck Pressurization

The tape deck compartment is pressurized using filtered, ambient air such that the compartment is maintained above atmospheric pressure at all times.

7.0 ELECTRICAL SPECIFICATIONS

7.1 PRIMARY POWER REQUIREMENTS

A tapped primary winding on the power transformer provides the following input voltages: 95, 105, 115, 125, 190, 200, 210, 220, 230, 240, and 250v ac. The system is capable of operation with a line voltage variation of ±10 percent of nominal. The input power frequency is 50 ±2 Hz or 60 ±2 Hz. The nominal power consumption is:

	Total Power Consumption (Watts)	Power Factor	BTU/Hr
Standby (Unloaded)	75	.80	260
Standby (Loaded)	325	.86	1115
Tape in Motion (75 ips)	450	.85	1540
Maximum	850	.87	2900

7.2 AC CONNECTORS

7.2.1 For 60 Hz operation a plug (PERTEC P/N 692-0001) is provided which has the following pole assignments:

Line Hot — Black

Line Neutral — White

Power Ground — Green

7.3 OVERLOAD PROTECTION

All circuits and components are protected by fuses, thermal cutouts, or circuit breakers from damage due to overload.

7.4 SAFETY

7.4.1 Terminals or other exposed components whose potential to ground or to other circuits exceeds 29v are covered or shielded to safe-guard operating personnel.

7.4.2 Frame ground within the 9XXX are connected to the chassis to conduct leakage currents and short circuit currents for the protection of personnel shock and fire hazards. Provision shall be made to easily isolate chassis and logic ground.

7.4.3 The 9XXX is designed and constructed to meet Underwriters Laboratories and Canadian Standards Association's requirements.

8.0 SERVICEABILITY AND RELIABILITY GOALS

8.1 SERVICE LIFE

The PERTEC 9XXX is designed and constructed to provide a useful life of five years or 24,000 hours, whichever occurs first before the unit requires replacement or a major overhaul or rebuilding is required. Repair or replacement of major parts will be permitted during useful life.

8.2 MEAN-TIME-BETWEEN-FAILURE (MTBF)

Following an initial break-in period of 200 hours, MTBF exceeds 2500 hours provided the proper preventive maintenance procedures are followed as specified in the 9XXX manual. The following expression defines MTBF.

$$\text{MTBF} = \frac{\text{Operating Hours}}{\text{Number of Equipment Failures}}$$

Operating hours means the total power-on hours less any maintenance time, and equipment failures means any stoppage or substandard performance of the equipment because of equipment malfunction. This shall exclude stoppages or substandard performance caused by operator error, adverse environment, power failure, controller/formatter failure, cable failure, or other failure not caused by the equipment. To establish a meaningful MTBF, operating hours shall be greater than 2500 hours and shall include all sites where the tape transports are used.

For the purpose of this specification, equipment failures are defined as those failures necessitating repairs, adjustments, or replacements on an unscheduled basis. Essentially, the term equipment failure implies that emergency maintenance is required because of hardware failure or sub-standard performance.

8.3 MEAN-TIME-TO-REPAIR (MTTR)

The MTTR will not exceed 1.0 man-hours. Mean-time-to-repair is defined as the time for an adequately trained serviceman to diagnose and correct a malfunction following service procedures.

8.4 Preventive Maintenance rate for units will not exceed 1.5 hours per 100 hours of unit usage.

8.4.1 Preventive maintenance is defined as that maintenance performed by a trained personnel according to the 9XXX manual.

9.0 LOGIC

9.1 GENERAL

The logic section receives information (such as photocell and interlock conditions) and converts it to status information which is sent to the tape controller/formatter. Commands from the tape controller/formatter are received and executed. The major functions are:

9.1.1 Position Sensing

Means are provided to sense when the tape is positioned on the load point tab and the end of tape tab.

9.1.2 Motion Control

The tape transport responds to motion commands from the controller/formatter provided the tape unit is in "On-line" status.

9.1.3 Order Execution

Means are provided to execute the "Rewind" or "Rewind and Unload" commands without further intervention from the controller/formatter.

10.0 INPUT/OUTPUT (I/O) SIGNAL INTERFACE

10.1 I/O SIGNAL DEFINITION

10.1.1 Steady State "1" Level

A logical "1" level is represented on the I/O line by a 0v nominal signal.

10.1.2 Steady State "0" Level

A logical "0" level is represented on the I/O line by a +3v nominal signal.

10.1.3 Noise Margins

The noise margins of the circuit shown in Figure 3 is as follows.

			0°C	25°C	50°C
"1" level	= true	= 0v	450 mv	250 mv	200 mv
"0" level	= false	= +3v	300 mv	450 mv	550 mv

The above margins are in excess of the maximum crosstalk on a 20-foot long continuous cable without shielding.

10.1.4 I/O Components

All driver circuits are DTL 944 (or the TTL equivalent) and all receiver circuits are DTL 936 or 946 (or the TTL equivalent).

10.1.5 Cable Characteristics

The cable characteristics are defined as follows (either (1) or (2)).

(1) Twisted Pair Cable

- (a) Twisted pairs with returns grounded.
- (b) Maximum cable length of 20 feet.
- (c) Not less than 1 twist per inch.
- (d) 22- or 24-gauge conductors with a minimum insulation thickness of 0.01 inch.
- (e) Twisted pairs with the returns grounded within a few inches of the signal source or destination.

(2) PERTEC-approved Flat Ribbon Cable

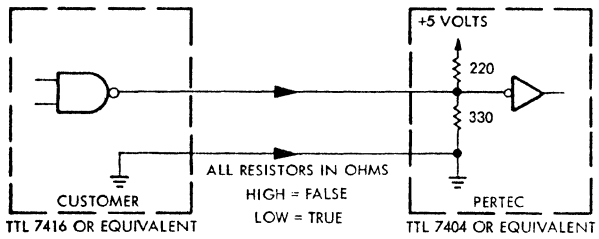
- (a) Equivalent electrically with 3M cable No. 3365.

10.1.6 Connectors

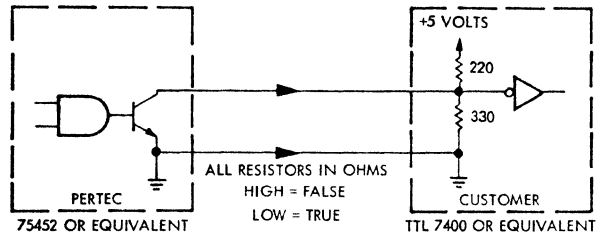
The edge board signal connector pin arrangement is shown in Figure 4. An ac power cable, 6 feet long, is permanently connected to the tape transport.

10.2 INTERFACE SIGNAL DEFINITION

10.2.1 All signals and statements exist or occur when a logical "1" (0v) appears on the line and represents steady-state inputs and outputs except when otherwise noted.



FORMATTER/CONTROLLER TO TAPE TRANSPORT



TAPE TRANSPORT TO FORMATTER/CONTROLLER

Figure 3. Transport/Controller Interface Circuits

Transport Connector	36 Pin Etched PC Edge Connector
Mating Connector	36 Pin ELCO 00-6007-036-980-002

Connector	Live Pin	Ground Pin	Signal
J101 Tape Control PCBA	J	8	→ SELECT 0 (ISLT0)
	A	8	→ SELECT 1 (ISLT1)
	18	8	→ SELECT 2 (ISLT2)
	V	8	→ SELECT 3 (ISLT3)
	C	3	→ SYNCHRONOUS FORWARD Command (ISFC)
	E	5	→ SYNCHRONOUS REVERSE Command (ISRC)
	D	4	→ DATA DENSITY SELECT (IDDS) (Optional)
	H	7	→ REWIND Command (IRWC)
	L	10	→ REWIND & UNLOAD (IRWU)
	K	9	→ SET WRITE STATUS (ISWS)
	B	2	→ OVERWRITE Command (IOVW)
	T	16	← READY (IRDY)
	M	11	← ON-LINE (IOL)
	N	12	← REWINDING (IRWD)
	U	17	← END OF TAPE (IEOT)
	R	14	← LOAD POINT(ILDP)
	P	13	← FILE PROTECT (IFPT)
	F	6	← DATA DENSITY INDICATOR (IDDI)
	S	-	← +5v POWER (Optional)
J102 Data PCBA	A	1	→ WRITE DATA STROBE (IWDS)
	C	3	→ WRITE AMPLIFIER RESET (IWARS)
	E	5	→ READ HIGH MARGIN (IRTH1) } Select Units
	F	6	→ READ LOW THRESHOLD (IRTH2) } Select Units
	L	10	→ WRITE DATA PARITY (IWDP)
	M	11	→ WRITE DATA 0 (IWD0) } Omit for 7-Track
	N	12	→ WRITE DATA 1 (IWD1) } Omit for 7-Track
	P	13	→ WRITE DATA 2 (IWD2)
	R	14	→ WRITE DATA 3 (IWD3)
	S	15	→ WRITE DATA 4 (IWD4)
	T	16	→ WRITE DATA 5 (IWD5)
	U	17	→ WRITE DATA 6 (IWD6)
	V	18	→ WRITE DATA 7 (IWD7)
J103 Data PCBA	2	B	← READ DATA STROBE (IRDS)
	1	A	← READ DATA PARITY (IRDP)
	3	C	← READ DATA 0 (IRD0) } Omit for 7-Track
	4	D	← READ DATA 1 (IRD1) } Omit for 7-Track
	8	J	← READ DATA 2 (IRD2)
	9	K	← READ DATA 3 (IRD3)
	14	R	← READ DATA 4 (IRD4)
	15	S	← READ DATA 5 (IRD5)
	17	U	← READ DATA 6 (IRD6)
	18	V	← READ DATA 7 (IRD7)
	10	L	← NRZI (INRZ) } Read Only Units
	11	M	← 7 TRACK (I7TR) } Read Only Units
	13	P	← SPEED (ISPEED) } Read Only Units

Figure 4. Interface Lines

10.2.2 Tape Controller/Formatter to Tape Unit

10.2.2.1 Select Transport (ISLT)

When true, the transport will accept requests and output data, and provide status and input information. The 9XXX must be in the "On-Line" condition before selection is accepted. When the Select Switch is installed on the tape unit, the select line activated must agree with the Select Switch position.

10.2.2.2 Synchronous Forward Command (ISFC)

When true, this line causes the tape to move in the forward direction provided the unit is selected and On-Line. During a write or read operation this line will be held true for as long as tape motion is desired.

10.2.2.3 Synchronous Reverse Command (ISRC)

When true, this line causes the tape to move in the reverse direction provided the unit is Selected and On-Line. This line will be held true for as long as tape motion is desired.

If the load point tab is detected during a ISRC, the ISRC command is terminated. When this happens, the tape shall not necessarily come to rest with the load point tab in the same position as after a load or rewind sequence. The maximum variation is approximately 1 inch.

If a ISRC command is given when the tape is at the Load Point, the command is ignored.

10.2.2.4 Rewind Command (IRWC)

When true, this line initiates a tape rewind operation at high speed to load point provided the unit is Selected and On-Line. A rewind command, when tape is at load point, will not be accepted. This line will nominally be held true for 1 microsecond. However, if the controller/formatter resets IRWC with the rewinding status line (IRWD), the resultant IRWC to the transport can be a minimum of 150 nanoseconds.

10.2.2.5 Rewind and Unload (IRWU)

When true, and the unit is Selected and On-Line, this line initiates a tape rewind operation at high speed to load point. Upon reaching load point the tape unit will cause the tape to be rewound at low speed until all tape is removed from the take-up reel and the vacuum system is turned off. Upon receipt of this command, the Transport Ready (IRWD) status signal to the tape controller/formatter goes false. This line will be held true for a minimum of 1 microsecond.

10.2.2.6 Write Data Strobe (IWDS)

This is a pulse of a minimum width of 1 microsecond for each flux transition (character) to be written on tape. The frequency of the WDS is equal to the character rate in NRZI and twice the character rate in PE. In NRZI recording, the trailing edge of this pulse is used to trigger the write waveform generator in the tape unit. In PE recording, the trailing edge of this pulse is used to copy the PE data into the transport.

10.2.2.7 Write Data (IWD), IWDP, IWD0 – IWD7 (NRZI Only)

When these lines are true at the trailing edge of IWDS, the tape transport will cause a flux transition to be recorded on tape if the transport is in the Write mode. Write information will correspond to the following track identification.

Nine Track

Track	1	2	3	4	5	6	7	8	9
Write Bit	2^2	2^0	2^4	2^8	2^5	2^6	2^7	2^1	2^3
ANSI Bit No.	3	1	5	P	6	7	Z	2	4

Seven Track

Track	1	2	3	4	5	6	7
Write Bit	2^0	2^1	2^2	2^3	2^4	2^5	P

10.2.2.8 Write Data (IWD), IWDP, IWD0 – IWD7 (PE Only)

These are the phase-encoded data lines which are copied into the transport flip-flops on the trailing edge of IWDS.

10.2.2.9 Set Write Status (ISWS)

When true, this line sets the write flip-flop (write current on) provided the unit is Selected, On-Line, and write enable is present.

This signal must be true for a minimum duration of 20 microseconds after the leading edge of ISFC (or ISRC) becomes true.

If a Read mode operation is to be selected, ISWS must be false for a minimum of 20 microseconds after the leading edge of ISFC (or ISRC) becomes true.

The 9XXX will remain in a Write condition until a rewind, rewind and unload, loss of a transport interlock, or switching to the Off-Line mode is made.

10.2.2.10 Overwrite (IOVW)

When true, this line is used during write operations to facilitate the editing of tapes. This signal must be true for a minimum of 20 microseconds after the leading edge of ISFC (or ISRC) becomes true. The transport will revert

to a normal Write mode when the IOVW signal is false for a minimum of 20 microseconds after the leading edge of ISFC (or ISRC) becomes true.

10.2.2.11 Write Amplifier Reset (IWARS) (NRZI Only)

When true, the leading edge resets the write amplifier circuits causing the LRCC characters to be written at the end of the record. The leading edge of IWARS must occur 8 character times after the trailing edge of the last data character's WRITE DATA STROBE (IWDS) in 9-track systems. In 7-track systems, IWARS must occur four character times after the trailing edge of the last data character's IWDS. This line must be true for a minimum of 1 microsecond.

10.2.2.12 Write Amplifier Reset (IWARS) (PE Only)

When true, this signal turns off the write current in the transport. The leading edge of this signal must be coincident with the last flux transition of the postamble. This line must be true for a minimum of 1 microsecond. (This signal is used only in conjunction with the Overwrite mode of operation.)

10.2.2.13 Data Density Select (IDDS) (Optional)

If the 9XXX has the external density option installed, this line, when true, selects the higher of the two possible densities. In addition, when this line is true, the density status line (IDDI) to the controller/formatter will go true and the high density indicator on the operator's panel will light. Conversely, when IDDS is false, the lower of the two densities is selected.

10.2.2.14 Read Low Threshold (IRTH2) (Available on Select Units Only)

This is a level which sets one of two read circuit threshold levels in the transport. When this line is true, the low threshold level is selected. IRTH2 must be held steady for the duration of each record. NRZI thresholds are approximately 20 percent and 10 percent, while PE thresholds are approximately 10 percent and 5 percent.

10.2.2.15 Read High Margin (IRTH1) (Available on Select Units Only)

This is a level which selects a higher than normal (i.e., nominally 46 percent) character gate period. When this line is true, the higher margin (60 percent of bit period) is selected. IRTH1 must be held steady for the duration of each record.

10.2.3 Tape Unit To Tape Controller/Formatter

(These lines are active only when the transport is On-Line and Selected.)

10.2.3.1 On-Line

When true, this line indicates that the transport is under external control; when On-Line is false, the transport is under local control.

10.2.3.2 Read Data (IRD) IRDP, IRD0 – IRD7 for 9-Track;
IRDP, IRD2 – IRD7 for 7-Track

NRZI Output – The individual bits of each character are deskewed in the data register from which the outputs drives the read data lines, IRDP, IRD0 – IRD7. The read data lines should be strobed into the tape controller on the trailing edge of the READ DATA STROBE (IRDS).

PE Output – The signals on these lines are the outputs of the 9 peak detectors, individually gated with the outputs of a threshold detector associated with each channel. These signals are a replica of the waveform used to drive the write amplifiers.

10.2.3.3 Read Data Strobe (IRDS) (NRZI Only)

The READ DATA lines are strobed into the tape controller/formatter on the trailing edge of this signal. The signal shall be a minimum of 1 microsecond in duration.

10.2.3.4 End of Tape (IEOT)

When true, this line indicates that the end of tab marker is under the tape transport sensor.

10.2.3.5 Load Point (ILDP)

When true, this signal indicates that all transport interlocks have been made, the load point marker is under the tape transport sensor, the initial load sequence has been completed, and the transport is not rewinding. This signal will remain true until the load point marker leaves the sensor.

10.2.3.6 Transport Ready (IRDY)

When true, this line indicates that the tape unit is Ready and capable of accepting requests. For this line to be true, the tape transport's interlocks have been made, the initial load sequence has been completed, the unit is On-Line, and is not rewinding.

10.2.3.7 Rewinding (IRWD)

When true, this line indicates that the tape unit is rewinding or in the Load sequence following a rewind operation.

10.2.3.8 File Protect (IFPT)

When true, this line indicates that power is on and the supply reel is not equipped with a Write Enable ring.

10.2.3.9 Data Density Indicator (IDDI)

When true, this line indicates that the high density mode of operation has been selected.

10.2.3.10 NRZI (INRZ) (Read Only)

This is a level which is true only when the transport is conditioned to read NRZI tape. When false, the transport is conditioned to read PE tape.

10.2.3.11 Seven Track (I7TR) (Read Only)

This is a level which is true only when the transport is conditioned to read 7-track tape. When false, the transport is conditioned to read 9-track tape.

10.2.3.12 Speed (ISPEED) (Read Only)

This is a level which is true only when a dual speed transport is conditioned to read at the low speed (PE mode). When false, the transport is conditioned to read at the high speed (nominal). This level is false for all single speed transports.

10.3 INTERFACE TIMING

The 9XXX tape transport conforms to the following timing diagrams (see Figures 5, 6, 7).

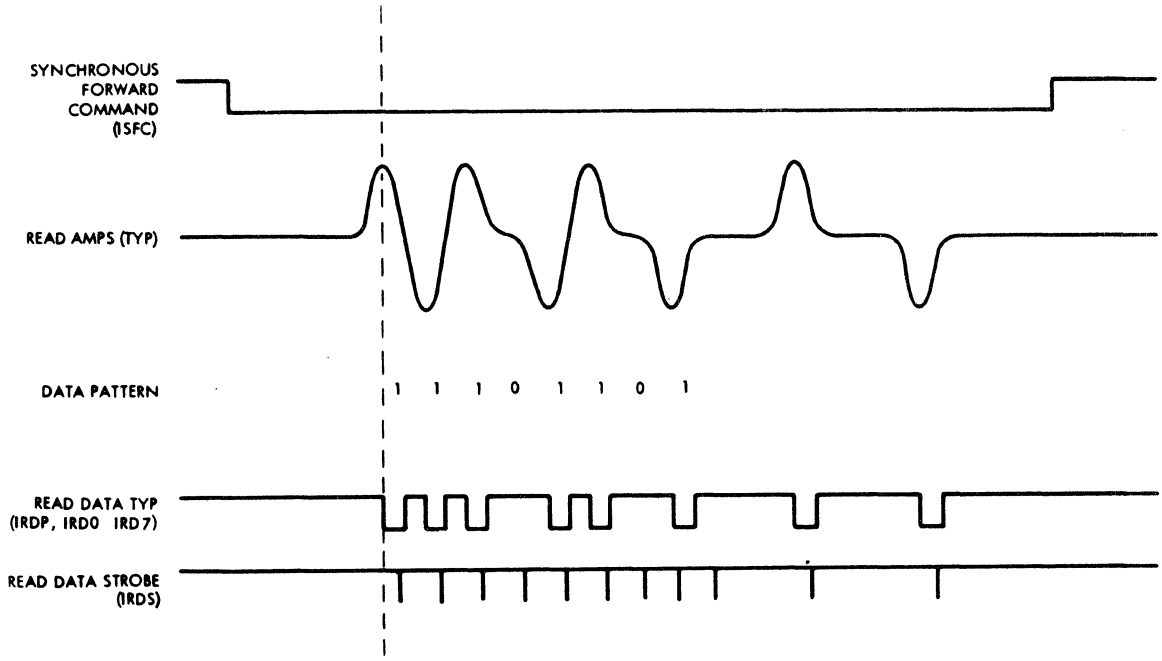
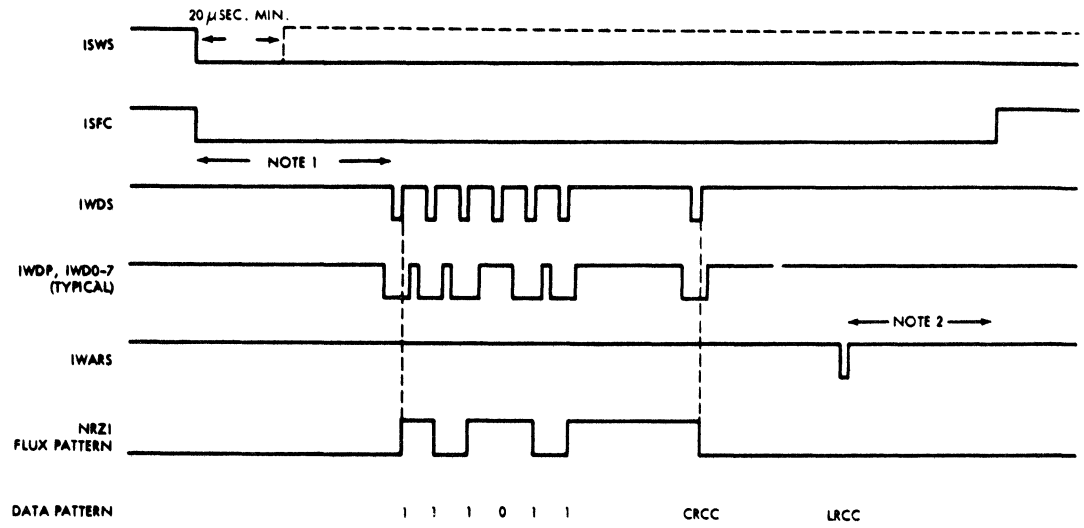


Figure 5. Typical Read Timing Diagram



NOTES:

1. PRE-RECORD DELAY SHOULD BE CALCULATED TO PRODUCE 3.5 INCHES OF TRAVEL WHEN STARTING FROM BOT; OTHERWISE 0.4 INCH IN A 9-CHANNEL TRANSPORT AND 0.51 INCH IN A 7-CHANNEL TRANSPORT.
2. THE POST-RECORD DELAY SHOULD BE CALCULATED TO PRODUCE 0.075 INCH OF TRAVEL AFTER THE LRCC HAS BEEN DETECTED BY THE READ ELECTRONICS, BEFORE REMOVING THE SFC.

Figure 6. Typical Write Timing Diagram

PERTEC PERIPHERAL EQUIPMENT		
DWG. NO. 103870		ISSUE
SIZE A	SHEET 26 OF 27	

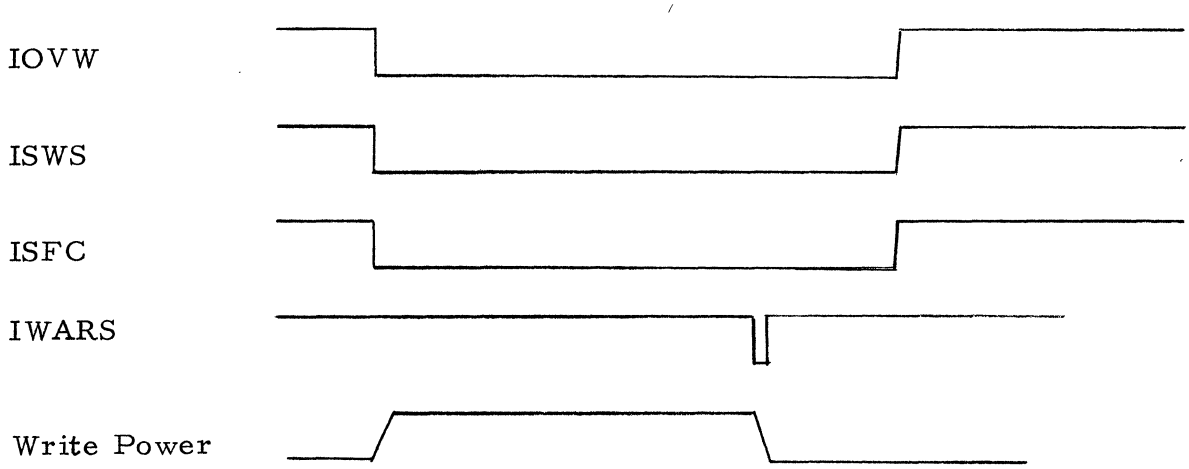


Figure 7. Overwrite Timing Diagram

PERTEC PERIPHERAL EQUIPMENT		
DWG. NO. 103870		ISSUE 4
SIZE A	SHEET 27 OF 27	