

### FEATURES

- Automatic reel seating hold-down hubs
- 200 ips rewind speed
- Tape speed to 45 ips
- Automatic retracting buffer arms
- Contoured head cover
- Overwrite (edit) capability
- Single adjustment digital write deskew
- Optional electronically switchable NRZI/PE read after write capability
- Front accessible, tilt out electronic boards



### LOW COST, HIGH PERFORMANCE 10½ INCH REEL TRANSPORT DESIGNED TO MAXIMIZE DATA RELIABILITY AND CUSTOMER CON- VENIENCE WHILE MINIMIZING MAINTENANCE REQUIREMENTS

The T8000 Series tape transport represents the fourth generation of 10½ inch diameter reel transports developed by the Peripheral Equipment Division of Pertec. Packed with customer inspired features, the T8000 Series offers the utmost in operator convenience, data reliability and maintenance simplicity. Besides providing exceptional performance and reliability in reading or writing 7- or 9-track NRZI or phase-encoded data, these transports offer an option of electronically switching between NRZI/PE data formats. The transports are IBM and ANSI compatible and are available in read-after-write, and read/write models. Tape speeds to 45 ips and data

transfer rates up to 72,000 characters per second are offered.

The T8000 Series offers superior reliability and ease of operation in applications including:

- Key-to-Tape
- Optical Character Recognition
- Point of Sale Devices
- Mini Computers
- Data Communications
- Data Terminals
- Data Acquisition
- Off-Line Systems

## FUNCTIONAL DESCRIPTION

Toggle action, automatic reel seating hold-down hubs, automatically retracted buffer arms, and uncluttered simple operator controls provide real operation convenience in the T8000 Series tape transports. The transports are designed to ensure compliance with IBM and ANSI tape interchangeability standards, whether the application requires read/write single gap head models or read-after-write dual gap head versions. Head and spring loaded guide geometry are configured to be compatible with IBM's requirements, minimizing dynamic skew components caused by normal tape edge irregularities. Constant tape tension is also carefully controlled to conform with IBM standards in order to minimize potential interchange hazards arising from excessive tape stretching or cinching.

T8000 Series read/write and read-after-write transports are available in 9-track versions with data densities of 800 cpi (NRZI) or 1600 cpi (Phase Encoded) or in a dual electronically switchable 800/1600 NRZI/PE version. 7-track NRZI versions are available in any two standard densities (800, 556 and 200 cpi).

To guarantee utilization of existing designs, all models incorporate Pertec's industry standard interface which provides plug compatibility with the entire family of Pertec synchronous tape transports.

The simple single capstan, uncluttered tape path, contoured head cover, and automatically retracted buffer arms of the T8000 Series provide the ultimate in tape handling while requiring only 24 inches of rack height. The standard unit includes data electronics, load point logic, tape motion control electronics, and a number of high performance features such as single adjustment electronic deskewing, and photo-electric buffer arm sensors. For safety purposes, the product is designed to qualify for both UL and CSA approval.

Printed circuit boards are mounted in a rotatable card cage such that extender boards are not required for maintenance. Local tape motion control switches are located on the printed circuit card for maintenance purposes, thereby simplifying the operator control panel.

In support of its tape drive users, Pertec offers an auxiliary data formatter unit which contains the necessary data timing and control functions normally provided in an external tape control unit. Through the straight forward data formatter interface, a user can transfer data to and from phase encoded and/or NRZI transports without having to concern himself with any of the tape related housekeeping or data recovery logic. Since the formatter interface is the same for NRZI or PE, only one basic coupler need be designed.

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## EQUIPMENT DESCRIPTION

The T8000 Series transport consists of four major assemblies: the deck assembly, power supply, tape control logic with power and servo control electronics, and data electronics. To ease troubleshooting and repair, the tape deck assembly swings out to provide front access to all major electro-mechanical components and printed circuit boards.

All electronics required for operation of the T8000 Series drives are mounted in two printed circuit boards which are housed in a rotatable card cage for ease of maintenance without extender cards. One of these printed circuit boards contains all data functions while the other pro-

vides for power and control functions. Based on the experience of producing over 20,000 tape transports, these electronics reflect Pertec's continuing efforts to improve data reliability through careful circuit design and layout. Power and control boards are designed to minimize localized heat problems and marginal operation.

### **Basic Deck Assembly**

The basic deck assembly is a precision aluminum casting, carefully heat treated and aged to minimize thermal distortion. The precision casting serves as an extremely stable base for the mounting of the following subassemblies:

- **Head and Guide Plate Assembly**

These important tape guiding elements are precisely aligned on a precision plate, allowing both forward and reverse reading without cumbersome and unreliable single-shot adjustments. The critical skew adjustment is factory pre-aligned and is not considered a field adjustment.

- **Single Capstan Drive**

Tape motion is controlled by a single capstan drive using a low-inertia, dc servo motor. Velocity feedback from a dc tachometer provides the stable speed control required to generate IBM- and ANSI-compatible tapes. For operator convenience and preventative maintenance, the capstan is equipped with a built-in strobe disk allowing speed checks to be made using either 50- or 60-Hz ambient light.

- **Reel Drive System**

All T8000 Series transports feature an indirect reel drive servo — a field-proven principle resulting in minimum power consumption and, therefore, higher reliability for servo electronics. Another benefit — the replacement of a reel motor is greatly simplified and can be accomplished from the rear of the transport. The alignment and perpendicularity of the motor shaft is no longer critical—a big savings by minimizing overall system down time. Tension arm position information is provided using an optical sensor which generates a reference voltage proportional to the angular position of the tension arm. This analog signal drives the reel servo amplifier to maintain controlled tape tension and reel servo speed.

- **Power Supply**

Mounted on the rear of the deck is a modular power supply with easily accessible multiple transformer taps. This allows the system to operate on 47 to 400 Hz power over voltage ranges from 95 vac to 250 vac for European applications.

- **Power and Control Board**

This printed circuit board contains all motion control logic, reel servo amplifier, and power supply regulator. The printed circuit board assembly is connected through plug-in cables for serviceability and easy replacement. Multi-board spares are virtually eliminated, as well as the numerous inter-connectors required when using smaller printed circuit board assemblies.

- **Data Electronics**

Nine or seven full channels of read/write electronics are provided on data electronics printed circuit board. For NRZI transports, input or write data is presented to the transport as nine or seven data lines plus a clock, and the transport presents the equivalent output or read channels plus a clock to the controller interface.

In phase encoded versions, input or write data is presented to the transport through nine data lines with a double-frequency clock line, and the output or read signals are presented to the interface as nine distinct phase-encoded waveforms. All input and output lines are TTL- and DTL-compatible incorporating ground true levels.

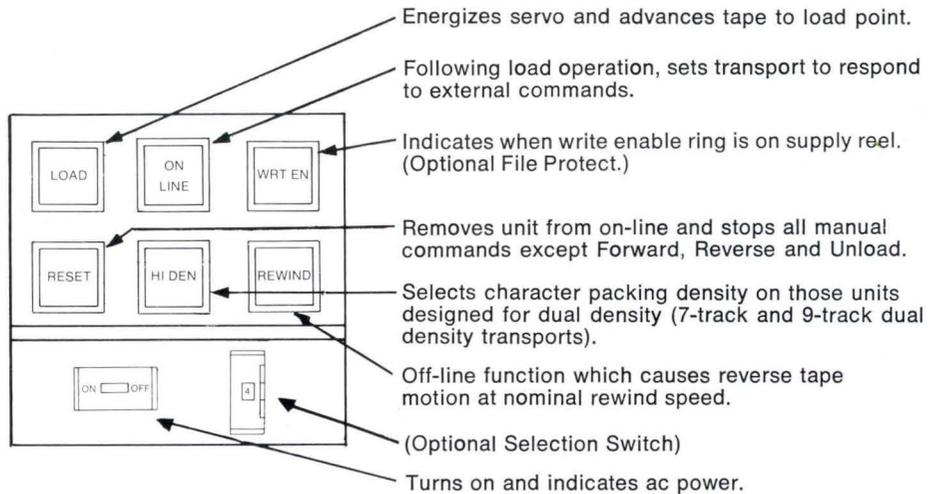
Also available are dual PE/NRZI electronics which allow the user to change recording modes electronically.

Pertec's exclusive "Edit" capability is offered as a standard feature on all T8000 Series transports. Without this feature, attempts at selective record updating results in spurious signals being detected when reading such tapes on a high speed IBM transport. The T8000 controls the critical turn-on and turn-off of write and erase currents to prevent these spurious signals from being recorded on the tape.

In deskewing the single-gap head transport (Model T8X60), the emphasis is placed on the precise alignment of the guides with relation to the read/write head. This permits doing away with adjustable single shots, providing an ideal transport from the standpoint of service and tape interchangeability. In read-after-write, dual-gap head versions of the transport (Model T8X40), electronic write deskewing is provided through a unique digital deskewing technique which requires only one potentiometer adjustment at very infrequent intervals. When reading IBM compatible tapes, precision factory-set guides and head provide minimal skew in both forward and reverse directions without using any single-shots. Another innovation introduced by Pertec is "SKEW-SCAN", designed to reduce preventive maintenance and service time. With this feature, the serviceman can adjust the total channel skew while observing a single test point.

## FRONT PANEL SWITCHES/ INDICATORS

Note: Forward/Reverse controls are provided through a three position toggle switch located on the back of the deck. This switch is used for maintenance purposes and allows local control of forward, stop and reverse.



## AVAILABLE MODELS

T8000 Series transports are available in five basic models—T8X40, T8X60, T8640-9, T8660-9 and T8640-98. A number of options are provided with each to meet any industry standard requirements. Table 1 outlines the basic model numbers and specific capabilities regarding speed, densities, and the number of tracks. All units are shipped with a set of input/output connectors and a maintenance manual.

### Model T8X60 Read/Write

Model T8X60 is a single-gap head unit available in 7- or 9-track NRZI, or 9-track phase-encoded. This model provides select capability and has appropriate input/output gating for multi-transport daisy-chain operation. Output data (NRZI) from a deskew register in the transport is clocked with the read data strobe to provide simultaneous pulse for the user's controller. Available speeds are 12.5, 18.75, 25, 37.5, and 45 ips. The transport includes motion and control electronics, read/write electronics, read/write head, power supply, and dust-sealed cover door.

### Model T8X40 Read-After-Write

For read-after-write applications requiring 7- or 9-track NRZI or phase-encoded capability, the Model T8X40 is available in speeds between 12.5 and 45 ips. The model uses a dual-gap head with automatic dual-level read thresholds, and has select capability and input/output gating for multi-transport daisy-chain operation. The basic transport includes motion and control electronics, read/write electronics, dual-gap read-after-write head, power supply, and dust-sealed cover door.

### Model T8640-98

Model T8640-98 is a 9-track dual format, electronically switchable, 1600 cpi phase-encoded and 800 cpi NRZI transport. Featuring the same basic characteristics described above, this model provides the added benefits and flexibility derived through using either PE or NRZI formats.

## OPTIONAL FEATURES (which must be defined at the time of order) are:

- **Color coordination panel.** An adhesive-backed front panel insert lets the customer adapt the transport to his own color scheme. Pertec's standard transport deck is cast aluminum with bronze-color acrylic door and with pearl white color coordinated panels.
- **Special speeds.** For speeds other than the standard 12.5, 18.75, 25, 37.5, 45 ips, consult factory.
- **Customer logo.**
- **220 vac operation.** Normally wired for 115 vac operation. Customer may specify 220 vac for European operation.
- **Status gating.** Provides transport status when the transport is off-line.
- **Transport ready.** Forces transport-ready status without completing load sequence (i.e. on-line mid-tape).
- **Multiple transport adapter (MTA).** Provides the cabling and terminations, and adapts transports for daisy-chaining. Supplied with 10 feet of ribbon cable for each transport.
- **Power interrupt power supply.**
- **Transport address select switch.** Allows the transport to be remotely selected when on-line and the input address corresponds to the setting of the select switch.
- **Remote load and on-line.** Allows for remotely restoring tape tension and placing the transport on-line.

TABLE 1

	MODEL NO.	NO. OF TRACKS	DATA DENSITY CPI	DATA TRANSFER RATE (KHZ)				
				12.5 ips	18.75 ips	25 ips	37.5 ips	45 ips
READ- WRITE	T8860-9	9	800	10	15	20	30	36
	T8860-75	7	800/556	10/6.95	15/10.43	20/13.9	30/20.9	36/25.02
	T8860-72	7	800/200	10/2.5	15/3.75	20/5	30/7.5	36/9
	T8560-72	7	556/200	6.95/2.5	10.43/3.75	13.9/5	20.9/7.5	25.02/9
	T8660-9	9	1600	20	30	40	60	72
READ- AFTER-WRITE	T8840-9	9	800	10	15	20	30	36
	T8840-75	7	800/556	10/6.95	15/10.43	20/13.9	30/20.9	36/25.02
	T8840-72	7	800/200	10/2.5	15/3.75	20/5	30/7.5	36/9
	T8540-72	7	556/200	6.95/2.5	10.43/3.75	13.9/5	20.9/7.5	25.02/9
	T8640-9	9	1600	20	30	40	60	72
	T8640-98	9	1600/800	20/10	30/15	40/20	60/30	72/36

## SPECIFICATIONS

Data Density	9 Track — 1600 cpi phase-encoded or 800 cpi NRZI
Tape Velocity	45, 37.5, 25, 18.75, or 12.5 ips standard
Instantaneous Speed Variation	±3% max
Long Term Speed Variation	±1% Forward, ±3% Reverse
Start/Stop Displacement	0.19 inch ±0.02 (4.83 mm ±0.51)
Start/Stop Time	8.0 ms ±0.55 at 45 ips Inversely proportional to tape speed
Number of Tracks	7- or 9-track IBM compatible (Models 2400, 729, and others)
Recording Mode	NRZI is IBM-compatible Phase-encoded units IBM- and ANSI-compatible
Tape Format	IBM-compatible
Tape Specifications	0.5 inch (12.7 mm) wide 1.5 mil (38.1 microns) thick. Computer grade
Tape Tension	8 ounces (226.7 grams)
Electronics	Silicon solid state and 930-Series DTL logic
Tape Unit Interface	DTL-, TTL-compatible logic (low true)
Rewind Speed	200 ips (nominal)
Reel Size	10½ inch
Weight	85 lbs. (38.6 kg)
Power	95/250 vac, 47 to 400 Hz, 300 watts
Operating Temperature	35° to 122°F (2° to 50°C)
Relative Humidity	15 to 95% non-condensing
Altitude	0 to 20,000 feet
Mounting	Standard EIA rack mount
Dimensions	
Height	24 inches (supplied with ½ " filter panel)
Width	19 inches
Depth (behind panel)	11.87 inches

## INTERFACE DESCRIPTION

All Pertec synchronous transports are connected through three interface connectors. The interface allows multi-transport daisy-chained operation and, therefore, the true logic condition is set at ground level and the false condition set at +3v dc. See interface diagram for appropriate drivers, receivers, and terminating resistors.

The input/output lines are considered in four functional groups as follows:

### 1. TRANSPORT CONTROL INPUTS.

**SELECT (SLTO-3).** Level, when true, remotely select and condition transport and enables all input/output signals (only SLTO is required if optional select switch is omitted).

**SYNCHRONOUS FORWARD COMMAND (SFC).** Level, when true, causes forward tape motion.

**SYNCHRONOUS REVERSE COMMAND (SRC).** Level, when true, causes reverse tape motion.

**REWIND COMMAND (RWC).** Pulse, when true, initiates reverse tape motion at rewind speed.

**OFF-LINE COMMAND (OFFC).** Pulse, when true, causes tape transport to be placed under manual control.

**SET WRITE STATUS (SWS).** Level, when true, 20  $\mu$ sec after SFC conditions write current.

**DATA DENSITY SELECT (DDS).** Level, when true, remotely selects high density.

**OVERWRITE (OVW).** Level, when true, controls write and erase current turn-on and turn-off for selective record updating.

**READ THRESHOLD 1 (RTH1).** Level, when true, selects high threshold when verifying a record on single-gap systems.

**READ THRESHOLD 2 (RTH2).** Level, when true, selects extra low threshold to recover very-low-amplitude data (not available on T8X40 and T8X60 transports).

### 2. TRANSPORT STATUS SIGNALS.

**READY (RDY).** Level, when true, indicates transport is on-line and not rewinding.

**ON-LINE (ONLINE).** Level, when true, indicates tape unit is ready for on-line operation.

**NRZI INDICATION (NRZ).** Level, when true, indicates transport is conditioned to read and write NRZI tape. When false, indicates transport is conditioned to read and write phase-encoded tape.

**SEVEN TRACK (7 CH).** Level, when true, indicates the transport is a 7-channel unit; when false indicates transport is a 9-channel unit.

**REWINDING (RWD).** Level, when true, indicates unit is in rewind cycle.

**END OF TAPE (EOT).** Level, when true, indicates end of tape photo tab is being detected.

**LOAD POINT (LDP).** Level, when true, indicates tape unit is at load point.

**FILE PROTECT (FPT).** Level, when true, indicates reel of tape with write enable ring removed has been loaded on tape unit.

**DATA DENSITY INDICATOR (DDI).** Level, when true, indicates the selection of high density.

### 3. TRANSPORT DATA INPUTS.

**WRITE DATA STROBE (WDS).** Pulse, when true, causes data on input lines to be recorded on tape. In phase-encoded transports, two clocks are required for each character to copy the waveform on tape.

**WRITE AMPLIFIER RESET (WARS).** Pulse, when true, generates LRC character on NRZI tape. In addition, it is used to signal current turn off when in the "edit" mode.

**DATA INPUTS (WDP, WDO-7).** Levels, one input line for each track on tape. Used in conjunction with write clock to record data.

### 4. TRANSPORT DATA OUTPUTS.

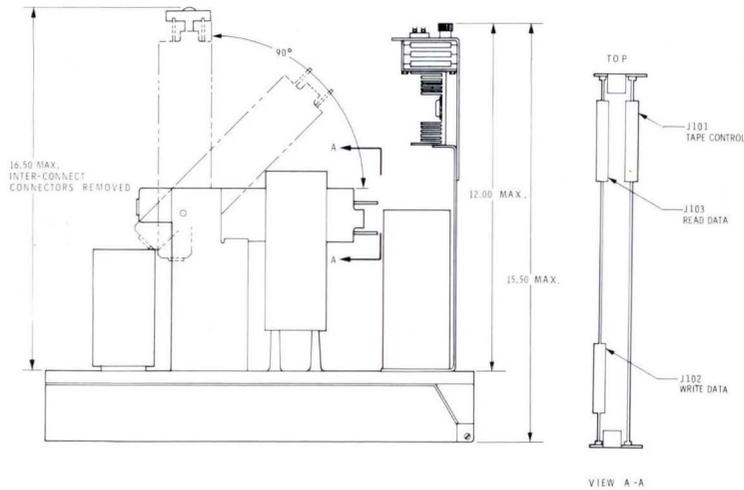
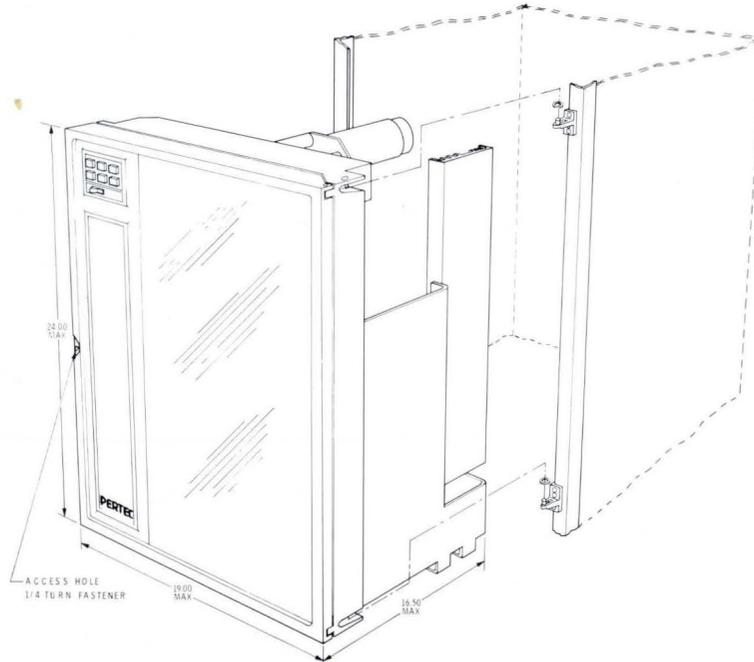
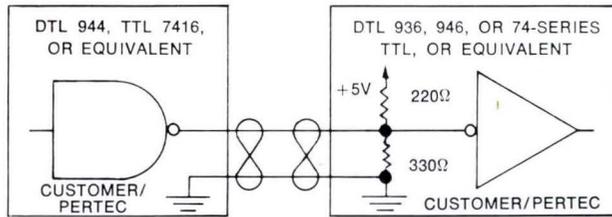
**READ DATA STROBE (RDS).** Pulse, when true, is used for clocking data lines out of transport (not available on phase-encoded models).

**READ DATA OUTPUT (RDP RDO-7).** Levels, one line for each track of data on tape. Data is assembled in parallel form and clocked out of tape unit with read clock. If phase-encoded, the output signal is a replica of the data input.

**LEVELS:** True = Low = 0 to 0.4v dc  
False = High = +3v dc

**PULSES:** Amplitudes as above, 1  $\mu$ sec typical width. Edge transmission delay over 20 feet of twisted cable is less than 200 nsec.

## INTERFACE CHARACTERISTICS



**PERTEC**  
PERIPHERAL  
EQUIPMENT  
DIVISION

Policy Note:

Perlec reserves the right to change specifications at any time. It is Perlec policy to improve products as new techniques and components become available.

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