

REVISIONS

REV	DESCRIPTION	DATE	DR	CHK	APPR
B	ERN 1-VA	3/5/69			
C	ECN 690	5/6/69			EMD
D	ECN 913	7/23/69		Sbk	EMD
E	ECN 980	8/27/69	EMD	EMD	EMD
F	ECN 1121	10/23/69			BA
G	ECN 1532	3-16-70	TB	KJA	BA
H	ECN 1913	8-20-70	JP	KTR	EMD
J	ECN 2050	10.14.70	T.B	KJA	EMD

SIGNATURES		DATE	PEC	PERIPHERAL EQUIPMENT CORPORATION		
DR		2/26/69		TITLE 6X40 SERIES TAPE TRANSPORT ENGINEERING SPECIFICATION		
CHK Sbk		2/27/69				
ENGR EMD						
APPR EMD						
Specification		SIZE	CODE IDENT	SHT 1	DWG NO.	
NEXT ASSY	USED ON	A		OF 17	100911	
APPLICATION					REV J	

1. MODEL SPECIFICATIONS.

<u>Model Number</u>	<u>Reel Size</u>	<u>Packing Density (Bits per Inch)</u>	<u>Maximum Character Transfer Rate</u>	<u>No. of Channels</u>
6840-9	10.5"	800	36 KHz	9
6840-75	10.5"	800/556	36 KHz/25 KHz	7
6840-72	10.5"	800/200	36 KHz/9 KHz	7
6540-72	10.5"	556/200	25 KHz/9 KHz	7

2. FUNCTIONAL CHARACTERISTICS.

- 2.1 The transport can record 9 (7) track NRZI IBM compatible magnetic tape formats capable of being reliably read by any 9 (7) track IBM compatible tape transport.
- 2.2 The transport can reliably read any 9 (7) track magnetic tape that has been recorded in IBM compatible format.
- 2.3 The transport provides Read After Write and Erase capability.

3. MECHANICAL AND ELECTRICAL SPECIFICATIONS.

3.1 Tape.

- 3.1.1 The tape used is computer grade certified at 800 cpi 3M777 or equivalent.
- 3.1.2 The tape width is 0.498 ±.002 inches.
- 3.1.3 The tape thickness is nominally 1.5 mil.
- 3.1.4 The tape tension is nominally 8 ounce in the normal data transfer mode and in the rewind mode.

3.2 Reels.

- 3.2.1 The transport can accept reels up to a diameter of 10.5 inches.

3.3 Motion Characteristics.

- 3.3.1 The transport can operate at each of the following standard speeds: 45 ips, 37.5 ips, 25 ips, 18.75 ips and 12.5 ips.
- 3.3.2 The long term speed variation in the forward direction is ±1% of the specified speed.
- 3.3.3 The speed in the reverse direction may differ from that in the forward direction by ±3%.

PERIPHERAL EQUIPMENT CORP.			
DWG. NO.			ISSUE
100911			J
SIZE	SHEET 2 OF 17		
A			

- 3.3.4 The instantaneous speed variation is $\pm 1\%$ at speeds from 12.5 ips to 37.5 ips and $\pm 2\%$ at 45 ips.
- 3.3.5 The start and stop time of the transport is 8 ± 0.55 milliseconds at 45 ips and is inversely proportional to speed.
- 3.3.6 The start and stop displacement of the transport is 0.19 ± 0.02 inches.
- 3.3.7 The transport has a rewind speed of 150 ips.

3.4 Interchannel Displacement Error.

- 3.4.1 The maximum displacement between any two bits of a character when reading on IBM master tape using the READ section of the Read After Write stack is 150 microinches.
- 3.4.2 The maximum displacement between any two bits of a character on tape written with all ones using the WRITE section of the Read After Write head is 150 microinches.

3.5 Program Restrictions.

- 3.5.1 There are no program restrictions for the capstan and reel servos. However, to preserve the normal Start/Stop times and distances, and to guarantee complete erasure of gap, the customer should ensure that the tape motion has ceased before changing the the direction of the Read Write status.

3.6 Magnetic Tape Head.

- 3.6.1 The transport has a dual stack Read-After-Write head with a separation of 0.150 ± 0.005 inch.
- 3.6.2 An erase head mounted to the Read-After-Write stack provides a full width erase capability. The separation between the WRITE and ERASE gaps is nominally 0.34 inch.

3.7 EOT, BOT Detection.

- 3.7.1 The transport has a photo electric EOT, BOT detector suitable for detecting IBM compatible EOT and BOT tabs.
- 3.7.2 The detector is located approximately 1.2 inches from the center of the Read After Write head. This enables IBM compatible tape formats to be recorded and read.

PERIPHERAL EQUIPMENT CORP.			
DWG. NO.		100911	ISSUE
SIZE	SHEET 3 OF 17		
A			
			J

3.8 Tape Cleaner.

3.8.1 The transport has a tape cleaner consisting of a curved perforated plate.

3.8.2 The tape cleaner is located between the supply reel and the supply tension arm.

3.9 Physical Description.

3.9.1 Height: 24.0 inches

3.9.2 Width: 19.0 inches

3.9.3 Depth from Mounting Surface: 12.5 inches

3.9.4 Depth from Front Surface: 15.0 inches

3.9.5 Mounting: 19.0 inch consistant with EIA requirements.

3.9.6 Weight: 85 lbs.

3.9.7 A 1/2 inch filler panel is provided to make up a total height of 24.5 inches.

3.10 Power.

3.10.1 The transport power transformer is provided with the following nominal input voltage combinations: 105, 115, 125, 210, 220, 230, 240 and 250. The system can accept variations of the mean line voltage up to $\pm 10\%$.

3.10.2 The transport operates on AC power at any frequency between 48 Hz and 400 Hz.

3.10.3 The system requires 400 watts maximum power.

3.11 Electronics.

3.11.1 All silicon.

3.12 The transport is designed to qualify for U. L. Approval.

4. ENVIRONMENTAL.

4.1 Non-Operating.

4.1.1 Temperature: -45°C (-50°F) to 71°C (160°F)

4.1.2 Altitude: 0 - 50,000 feet.

PERIPHERAL EQUIPMENT CORP.		
DWG. NO.		ISSUE
100911		J
SIZE	SHEET 4 OF 17	
A		

4.1.3 Shock:

The unit withstands shock and vibration encountered during normal installation, maintenance and shipping. Shipping package conforms to the National Safety Transit Committee Pre-Shipment Test Procedure.

4.2 Operating.

4.2.1 Temperature:

2°C (35°F) to 50°C (122°F)

4.2.2 Altitude:

0 to 20,000 feet

4.2.3 Humidity:

15% to 95% (without condensation)

5. MANUAL CONTROLS.

Eight operational controls with indicators are provided which are accessible externally. Figure 4.1 shows the physical ordering of the switches.

5.1 Power.

Alternate action pushbutton/indicator which turns AC power to the transport ON and OFF.

5.2 Load.

A momentary action pushbutton switch/indicator.

5.2.1 When Load is momentarily depressed for the first time after power is switched on:

(a) An interlock relay in the transport is energized which completes the ground returns of all the motors thereby energizing the servo system.

(b) Tension is applied to the tape.

(c) A manual Load or Rewind command can now be executed.

5.2.2 When Load is momentarily depressed a second time, the tape automatically advances to the photosensor and stops with the leading edge of the BOT tab approximately 1.2" from the Write/Read head gap. There will be no movement if the BOT marker is already at Load Point.

PERIPHERAL EQUIPMENT CORP.			
DWG. NO.		100911	ISSUE
SIZE	SHEET 5 OF 17		J
A			

The Load switch is disabled once the first Load or manual Rewind command has been given following Power On and can only be re-enabled by loss of tape tension or restoration of Power after the Power has been off.

The indicator is lit when the BOT tab is positioned under the photosense head and:

- (a) The interlock is made.
- (b) The initial Load or Rewind command has been completed.
- (c) There is not a subsequent Rewind in progress.

When the switch indicator is lit, the transport is ready for use.

5.3 Rewind.

A momentary action pushbutton switch/indicator enabled only when the transport is Off-Line. When Rewind is momentarily depressed, the tape moves in reverse at a nominal speed of 150 ips. On reaching the BOT tab, the rewind drive ceases and the Load Sequence is automatically entered. The BOT tab will overshoot the photosensor in the reverse direction and then move forward until the BOT tab reaches the photosensor and stops with the BOT tab at Load Point.

If already at Load Point when Rewind is depressed, tape will run in reverse at 150 ips until tape tension is lost.

The Rewind indicator is illuminated throughout any Rewind operation including the subsequent Load Sequence where relevant.

NOTE: A Manual Rewind command will override the Load Sequence. Thus, for example, if a Load Sequence is initiated (in error) after the BOT tab has passed the photosensor, depressing the Rewind pushbutton will cause the transport to Rewind until the BOT tab is detected and then enter a Load Sequence which terminates with the BOT tab at the photosensor.

PERIPHERAL EQUIPMENT CORP.			
DWG. NO.		100911	ISSUE J
SIZE	SHEET	6 OF 17	
A			

5.4 On-Line.

A momentary action pushbutton switch/indicator. This switch is only enabled after an initial Load or Rewind sequence has been initiated.

If the switch is depressed after an initial Load or Rewind sequence has been initiated, the transport is switched to an On-Line mode and the indicator is illuminated. In this condition the transport is capable of receiving external commands provided it is also Ready and Selected. The transport will revert to the Off-Line mode if:

- (a) On-Line is depressed a second time.
- (b) As a result of an Off-Line Command (OFFC). (If transport is selected.)
- (c) Interlock is lost.

5.5 Write Enable.

Indicator only. The indicator is illuminated whenever Power is ON and a reel of tape with a Write Enable ring installed is mounted on the transport.

5.6 Data Density Select Switch.

Alternate action pushbutton switch/indicator which determines the character packing density at which the Read Electronics operates. The indicator is marked HIGH DEN and when illuminated indicates that the Read Electronics is conditioned to operate in the HIGH DENSITY mode.

If the indicator is not illuminated the transport will be in the LOW DENSITY mode. The following represents the possible mode combination:

<u>Model</u>	<u>Density Combination (Characters per Inch)</u>
6840-9	800 only. (Hard wired - indicator permanently illuminated)
6840-75	800/556
6840-72	800/200
6540-72	556/200

An optional feature provides for the external selection of packing density by means of an interface line, DDS, instead of by the HIGH DEN switch (see Section 6.1.10). (Not for 6840-9).

PERIPHERAL EQUIPMENT CORP.		
DWG. NO.	100911	ISSUE
SIZE	SHEET 7 OF 17	J
A		

5.7 Forward.

Alternate action pushbutton/indicator which is enabled only in the Off-Line mode. When pressed, the indicator will light and the tape will move forward at nominal speed. When pressed again tape motion stops and the lamp is extinguished. If the EOT tab is encountered while moving forward tape motion ceases but the indicator will remain lit.

5.8 Reverse.

Alternate action pushbutton/indicator which is enabled only in the Off-Line mode. When pressed the indicator will light and the tape will move in the reverse direction at nominal speed. When pressed again tape motion stops and the indicator is extinguished. If the BOT tab is encountered while moving in reverse, tape motion will cease but the indicator will remain lit.

6. CONTROLLER/TRANSPORT INTERFACE.

6.1 Interface Inputs.

6.1.1 Select Transport (SLT).

This is a level which when true, enables all the interface drivers and receivers in the transport thus connecting the transport to the controller. It is assumed that all the interface lines described in Section 6.1 and 6.2 are gated with Select.

6.1.2 Synchronous Forward Command (SFC).

This is a level which, when true, and the transport is Ready and On-Line, causes tape to move forward at the specified speed. When the level goes false, tape motion ceases. The velocity profile is trapezoidal with nominally equal rise and fall times.

6.1.3 Synchronous Reverse Command (SRC).

This is a level which, when true, and the transport is Ready and On-Line, causes tape to move in reverse direction at the specified speed. When the level goes false, tape motion ceases. The velocity profile is trapezoidal with nominally equal rise and fall times.

PERIPHERAL EQUIPMENT CORP.			
DWG. NO. 100911			ISSUE
SIZE A	SHEET	8 OF 17	J

POWER

LOAD

ONLINE

REWIND

WRT EN

HI DEN

FORWARD

REVERSE

Figure 4.1

Layout of Manual Controls.

PERIPHERAL EQUIPMENT CORP.		
DWG. NO. CD	100911	ISSUE J
SIZE A	SHEET 9 of 17	

If the BOT tab is detected during an SRC, the SRC will be terminated. Note:

The tape will not necessarily come to rest with the BOT tab in the same position as after a Load Sequence. The maximum variation possible is approximately 1".

If a SRC is given when the tape is at Load Point it will be ignored.

6.1.4 Rewind Command (RWC).

This is a pulse which, if the transport is Ready and On-Line, causes tape to move in reverse at 150 ips. Upon passing BOT, rewind tape drive will cease and the Load Sequence will be automatically initiated. If already at Load Point when the Rewind command is given the command will be ignored by the transport.

The velocity profile is trapezoidal with equal rise and fall times of approximately half a second.

The pulse should be a minimum of 2 usec width under normal conditions.

6.1.5 Off-Line Command (OFFC).

This is a level or pulse (minimum width 2 usec) which resets the On-Line flip-flop to the zero state, placing the transport under manual control. It is gated only by Select in the transport logic allowing an Off-Line command to be given while a rewind is in progress. OFFC should be separated from a rewind command by at least 2 usec.

6.1.6 Write Data Strobe (WDS).

This is a pulse of minimum width 2 usec for each character to be written. The trailing edge of this pulse triggers the NRZI code generator in the transport. It is assumed that the data lines have settled at least 0.5 usec before the leading edge of the pulse occurs and will remain steady until 0.5 usec after the trailing edge of the WDS pulse.

PERIPHERAL EQUIPMENT CORP.		
DWG. NO.	100911	ISSUE
SIZE	SHEET 10 OF 17	J
A		

6.1.7 Write Data (WD). WDP, WD0-7 for 9 channel.
WDP, WD2-7 for 7 channel.

These are levels which if true from 0.5 usec before the leading edge of WDS to 0.5 usec after the trailing edge of WDS will result in a flux transition being recorded if the transport is in the Write mode.

The CRCC is written by providing the correct character together with a WDS four character times after the WDS associated with the last data character of the record.

The LRCC is written using the WARS signal.

6.1.8 Set Write Status (SWS).

This is a level which must be true for a minimum period of 20 usec after the front edge of a SFC (or SRC) when the Write mode of operation is required.

The front edge of the SFC (or SRC) delayed is used to sample the SWS signal and sets the Write/Read flip-flop in the transport to the Write state.

If the Read mode of operation is required, the SWS signal must be false for a minimum period of 20 usec after the front edge of a SFC (or SRC) in which case the Write/Read flip-flop will be set to the Read state.

The Write/Read flip-flop will also be reset to the Read state by:

- (a) A RWC or OFFC.
- (b) Loss of interlock.
- (c) Switching to the Off-line mode.

6.1.9 Write Amplifier Reset (WARS).

This is a pulse of minimum width 2 usec which, when true, resets the write amplifier circuits on the leading edge. The purpose of this signal is to write the LRCC at the end of a record causing all channels to be erased in the IBM compatible direction in the IBG.

In a 7 track system the front edge of the WARS pulse will occur 4 character times after the trailing edge of the WDS associated with the last data character.

PERIPHERAL EQUIPMENT CORP.			
DWG. NO.		100911	ISSUE
SIZE			J
A	SHEET	11 OF 17	

In a 9 track system the front edge of the WARS pulse will occur 8 character times after the trailing edge of the WDS associated with the last data character.

6.1.10 Data Density Select (Optional 7 channel only).

This line is used only when the external density select option has been specified.

When true, DDS selects the higher of two possible data packing densities as described in Section 5.6. This causes the density status line DDI to go true and the HIGH DEN indicator to light. When DDS is false the lower of the two densities is selected.

6.1.11 Overwrite (OVW).

This line is used during write operations to facilitate the editing of tapes.

It must be true for a minimum period of 20 microseconds after the front edge of a SFC (or SRC) when the overwrite mode of operation is required. (In addition to selecting the Write mode).

The front edge of the SFC (or SRC) delayed is used to sample the OVW signal and set an Overwrite flip-flop in the transport to the Overwrite state.

If the OVW signal is false for a minimum period of 20 microseconds after the front edge of a SFC (or SRC) the transport reverts to a normal write mode of operation. (When the Write mode is selected).

This signal shall be used in addition to the SWS signal when isolated records are to be updated.

6.2 Interface Outputs.

6.2.1 On-Line.

This is a line which is true when the On-Line flip-flop is set.

When true the transport is under remote control.
When false the transport is under local control.

PERIPHERAL EQUIPMENT CORP.		
DWG. NO.		ISSUE
100911		J
SIZE	SHEET 12 OF 17	
A		

- 6.2.2 Read Data (RD) RDP, RD0-7 for 9 channel.
RDP, RD2-7 for 7 channel.

The individual bits of each data character are assembled into parallel form in a one-stage deskewing register. The register outputs drive the read data interface lines RDP, RD0-7.

The complete character is available by sampling RDP, RD0-7 simultaneously on the trailing edge of the read strobe waveform, RDS.

- 6.2.3 Read Data Strobe (RDS).

This waveform consists of a pulse of minimum width 2 usec for each data character read from tape.

RDP, RD0-7 should be sampled simultaneously at the trailing edge of each pulse. Note that although the time between adjacent RDS pulses averages $\frac{1}{BV}$, where B = density and V = tape velocity, this may vary considerably due to the combined effects of bit crowding and skew.

- 6.2.4 End of Tape Output (EOTO).

This is a level which is true for the duration of the EOT tab. Circuitry using this output should not assume that the transitions to and from the true state are clean.

- 6.2.5 Data Density Indicator (DDI).

This is a level which is true only when the high density mode of operation is selected.

- 6.2.6 Transport Ready (RDY).

This is a level which is true only when all of the following conditions exist: Interlocks are made, the initial Load Sequence is complete, the transport is On-Line and not Rewinding. That is, the transport is ready to receive a remote command.

- 6.2.7 Load Point (LDP).

This is a level which is true when the interlocks are made, the BOT tab is under the photosensor, the initial Load Sequence is complete and the transport is not Rewinding. After receipt of a SFC the signal will remain true until the BOT tab leaves the photosense area.

PERIPHERAL EQUIPMENT CORP.			
DWG. NO.		100911	ISSUE
SIZE			J
A	SHEET	13 OF 17	

6.2.8 Rewinding (RWD).

This is a level which is true only when the transport is engaged in any Rewind operation or the Load Sequence following a Rewind operation.

6.2.9 File Protect (FPT).

This is a level which is true when the following conditions exist: Power is on and a reel of tape without a Write ring installed is mounted on the transport.

6.3 Interface Electronics Specifications.

6.3.1 Circuits used (refer to Figure 5.1).

All drivers will be DTL 944 or equivalent.
All receivers will be DTL 936, DTL 946 or equivalent.

6.3.2 Logic Levels.

+3V	=	High	=	False)	On Interface
OV	=	Low	=	True)	
+5V	=	High	=	True)	Into drivers or
OV	=	Low	=	False)	out of receivers

6.3.3 Noise Margins using Circuit of Figure 5.1.

	0°C	25°C	50°C
High	300MV	450MV	550MV
Low	450MV	250MV	200MV

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

6.3.4 Cable Characteristics.

Twisted pairs with returns grounded.
Maximum length 20 feet.
Not less than 1 twist per inch.
22 gauge or 24 gauge conductor with minimum insulation thickness of 0.01 inch.
Twisted pairs with returns grounded with a few inches of the signal source and destination.

6.4 Connectors.

6.4.1 Signal connector pin assignment is shown in Table 5.1.

6.4.2 AC power cable, six feet long, permanently connected.

PERIPHERAL EQUIPMENT CORP.		
DWG. NO.	100911	ISSUE
SIZE	SHEET 14 OF 17	J
A		

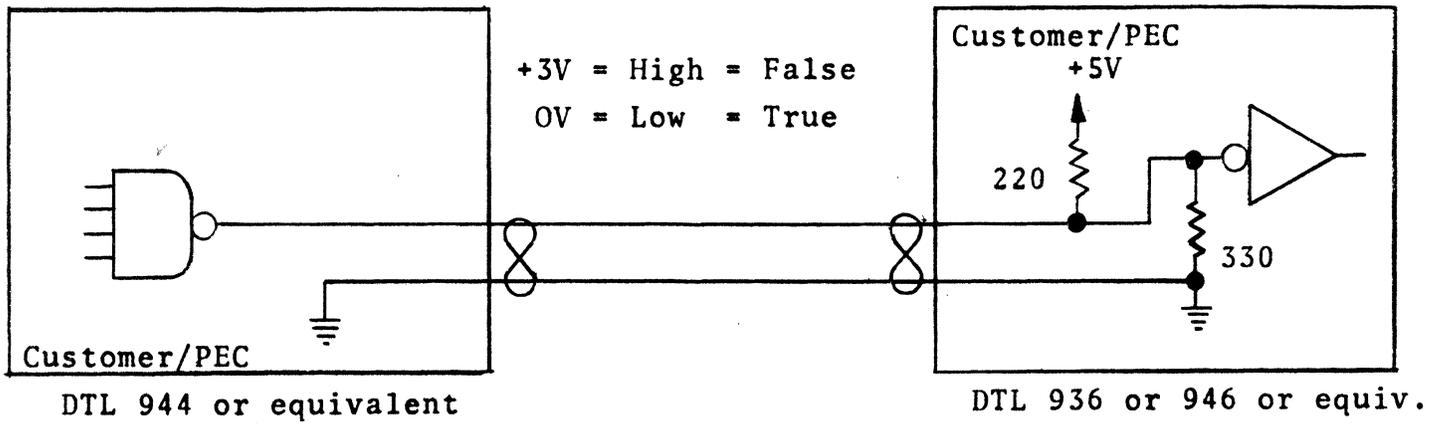
Table 5.1
Interface Connections Model 6X40

Transport Connector
Mating Connectors

36 Pin Etched P.C. Edge Connector
36 Pin ELCO 00-6007-036-980-002

Connector See Fig. 6.1	Live Pin	Ground Pin	Signal
J101 Tape Control C1 PCBA	J	8	SLT
	C	3	SFC
	E	5	SRC
	H	7	RWC
	L	10	OFFC
	K	9	SWS
	D	4	DDS (Optional)
	B	2	OVW
	T	16	RDY
	M	11	ONLINE
	N	12	RWD
	U	17	EOT
	R	14	LDP
P	13	FPT	
F	6	DDI	
J102 Data E PCBA	A	1	WDS
	C	3	WARS
	L	10	WDP
	M	11	WD0) omit for
	N	12	WD1) 7 channel
	P	13	WD2
	R	14	WD3
	S	15	WD4
	T	16	WD5
	U	17	WD6
V	18	WD7	
J103 Data E PCBA	2	B	RDS
	1	A	RDP
	3	C	RD0) omit for
	4	D	RD1) 7 channel
	8	J	RD2
	9	K	RD3
	14	R	RD4
	15	S	RD5
	17	U	RD6
18	V	RD7	

PERIPHERAL EQUIPMENT CORP.		
DWG. NO. CD	100911	ISSUE J
SIZE A	SHEET 15 OF 17	



All Resistors in Ohms

Figure 5.1 - Transport/Controller Interface Circuit

PERIPHERAL EQUIPMENT CORP.		
DWG. NO. CD	100911	ISSUE
SIZE A	SHEET 16 OF 17	J

7. OPTIONS.

The following options are available if selected in the original purchase specification.

7.1 Daisy Chain Facility.

7.1.1 This option consists of a Multiple Transport Adaptor assembly which facilitates the connection of more than one transport.

7.1.2 A maximum of four (4) transports shall be connected in this way. Each transport is addressed by a separate select line. The total interface cable length is not to exceed 20 feet.

7.2 Color Coordination.

7.2.1 Standard color is PEC off-white with smoked glass colored cover door.

7.2.2 Color coordinated panel insets may be specified in the original purchase specification.

7.3 Gating of Status Interface Lines.

7.3.1 An option exists whereby the status information is available when the transport is Selected but not On-Line.

7.4 Transport Ready Option.

7.4.1 An option exists whereby the transport can be brought to the Ready status by pressing the On-Line switch when the transport is not at BOT.

PERIPHERAL EQUIPMENT CORP.		
DWG. NO.		ISSUE
100911		J
SIZE	SHEET	
A	17 OF 17	