

Operation and maintenance manual

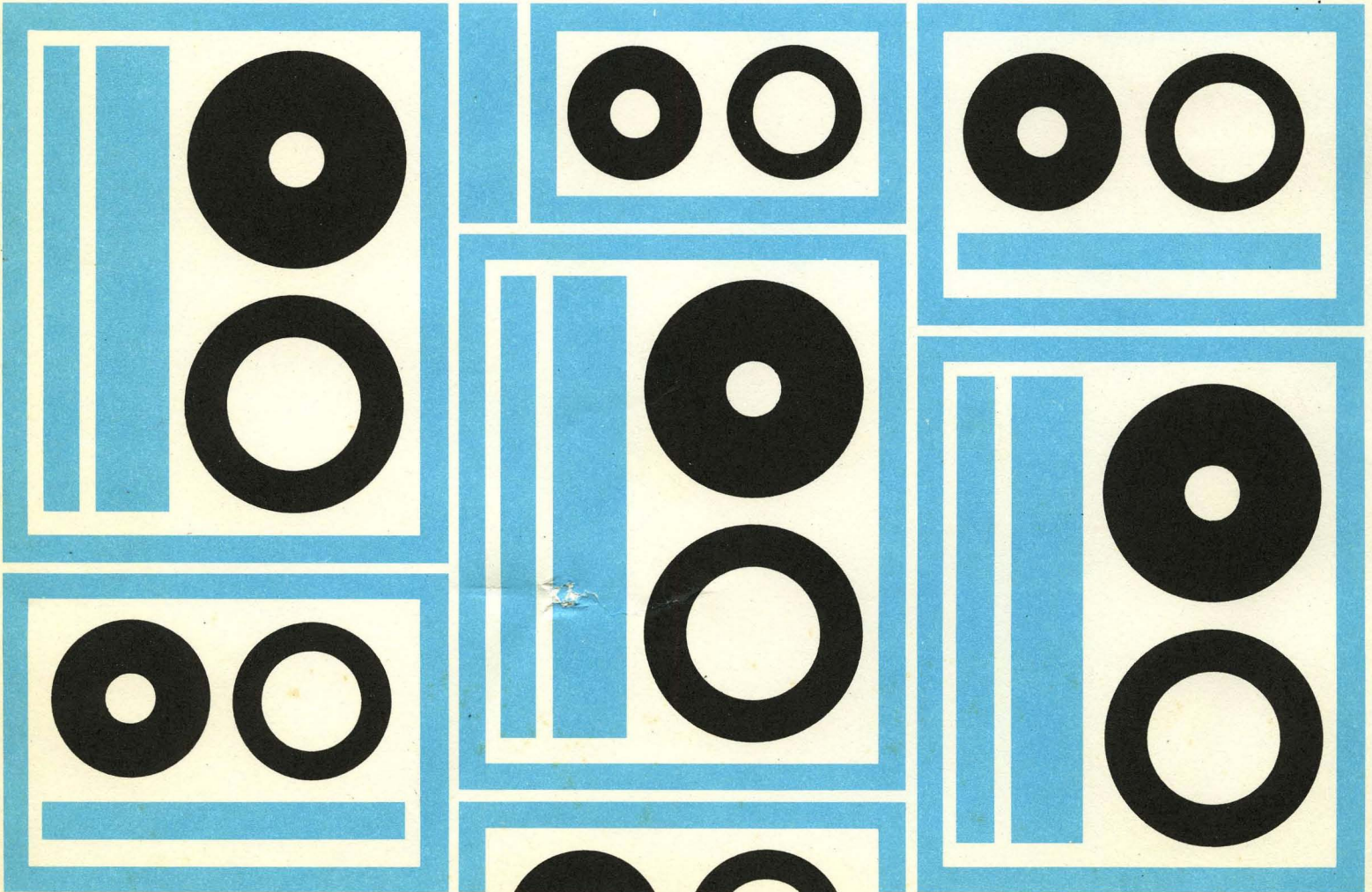
MODEL 334
DIGITAL CARTRIDGE RECORDER



KENNEDY CO.

K **KENNEDY CO.**
540 WEST WOODBURY ROAD, ALTADENA, CALIFORNIA 91001

MODEL 334
DIGITAL CARTRIDGE RECORDER



SECTION I APPLICATION DATA

1.1 INTRODUCTION

The Kennedy Model 334 Cartridge Recorder incorporates the 3M DC300A quarter-inch data cartridge into a rugged tape handler expressly designed for high reliability digital data recording.

The data cartridge utilizes a unique isoelastic drive system which maintains tape tension and tape motion with a single drive motor. Drive power is provided by a high quality DC motor/tachometer velocity servo system which provides both tape and reel drive. The cartridge contains 300 feet of 0.25 inch computer grade tape as well as internal tape guides that ensure reliable recording.

The Model 334 is fully bidirectional at 25 ips normal speed resulting in a data transfer rate of 160,000 bits per second at 1600 bpi recording density. Forward and reverse search modes as well as rewind speed are at 90 ips.

The drive is equipped with a dual gap read-after-write head for optimum performance. It is equipped for operation in parallel four-track configuration. The data should be available simultaneously on all four channels, both in the read and write modes. Every track is equipped with a separate erase gap to ensure against inadvertent data erasure.

The Model 334 is designed to meet the requirements of the proposed ANSI standard for quarter-inch cartridges. The standard provides for a recording density of 1600 bpi written in a phase encoded format. A 16 character preamble precedes the data for read synchronization. Data is followed immediately by a 16 character CRC and then a 16 character postamble. Record gaps are 1.2 inches.

The write electronics in the Model 334 consists only of head drivers. The proper phase encoded data including preamble, CRC, and postamble must be presented to the unit in the correct order.

Read electronics consists of preamplifiers, crossover detectors, and phase-lock electronics. Outputs are in digital form, each with its own read clock. A data detect signal is also provided. This line, when false, signals the beginning of a record gap. In the search mode no read outputs are presented but the data detect signal is active.

Manual controls of the Model 334 are designed for simplicity. Upon insertion the cartridge automatically advances to the load point with no operator intervention. An unload button (active only at load point) rewinds cartridge to the BOT holes and automatically ejects the cartridge.

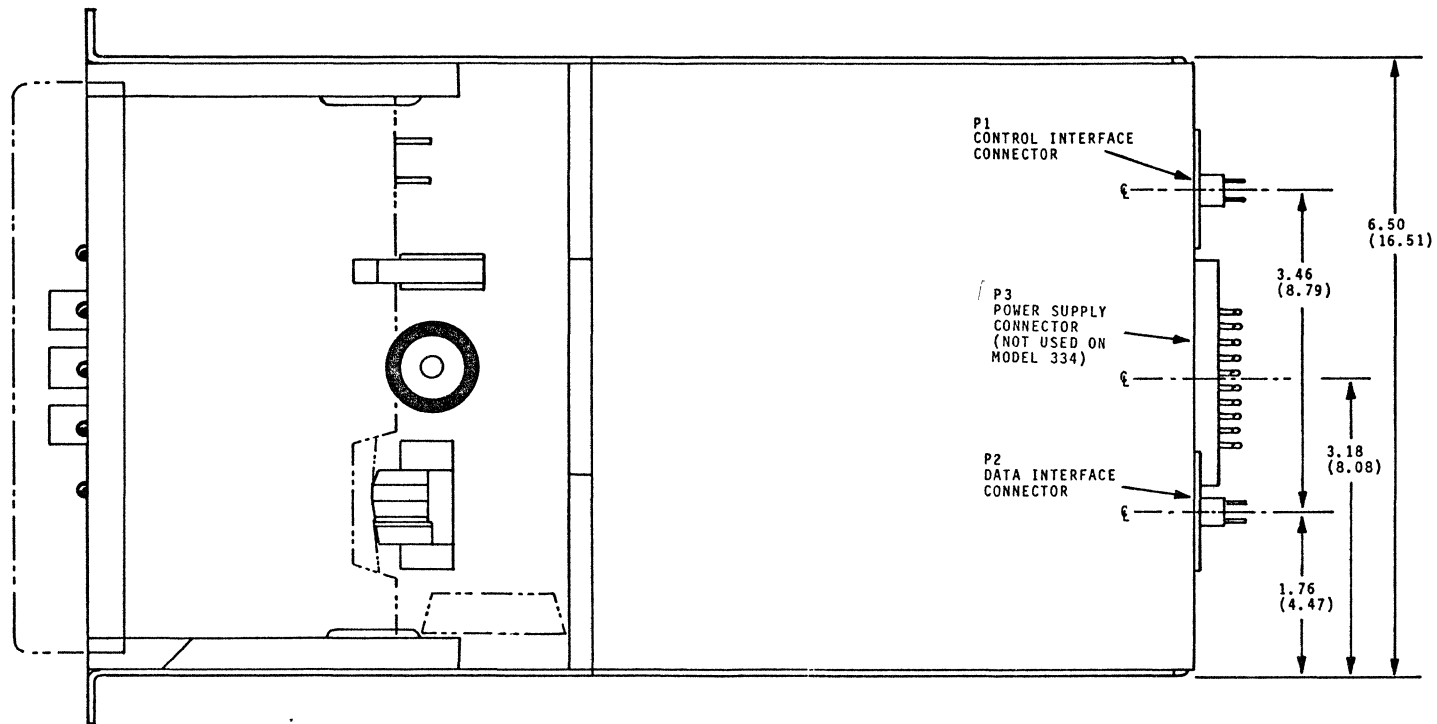
Model 334 will provide an extremely reliable means of storing digital data. It is well suited to use as a programming device for minicomputers, a storage device for terminal and point-of-sale systems, and any other data processing applications that require maximum capability in minimum space.

1.2 ELECTRICAL AND MECHANICAL SPECIFICATIONS

Table 1-1 lists the general specifications for the Model 334 magnetic tape unit. Figure 1-1 is an outline and installation drawing.

Cartridge type	3M, DC300A Isoelastic Data Cartridge
Tape width	0.25 inch, 1.0 mil
Tape length	300 feet
Recording density	1600 bpi
Number of tracks	Four
Recording head	Dual gap read-after-write with separate erase bar for each track
Record format	Four track, phase encoded
Record mode	Four track, parallel
Normal tape speed	25 ips
Rewind/search tape speed	90 ips nominal
Start/stop time	At 25 ips, 30 ms \pm 1 ms; at 90 ips, 60 ms nominal
Start/stop displacement	At 25 ips, 0.190 inch; at 90 ips, 2.7 inches nominal
Transfer rate	160,000 bits per second
Instantaneous speed variation	\pm 3 percent
Long term speed variation	\pm 1 percent
Write	Parallel — forward direction only
Read	Bidirectional — parallel
Power requirements	+5v dc at 1.0 amp \pm 15v dc at 0.1 amp \pm 24v dc at 6 amps peak
Interface	DTL/TTL low true
Weight	7 pounds
Dimensions	6.5 inches wide, 4.75 inches high, 12 inches deep

Table 1-1. Specifications



FIRST DIMENSIONS ARE IN INCHES
DIMENSIONS IN PARENTHESES ARE IN CENTIMETERS

WEIGHT: 7 POUNDS (3.175kg)

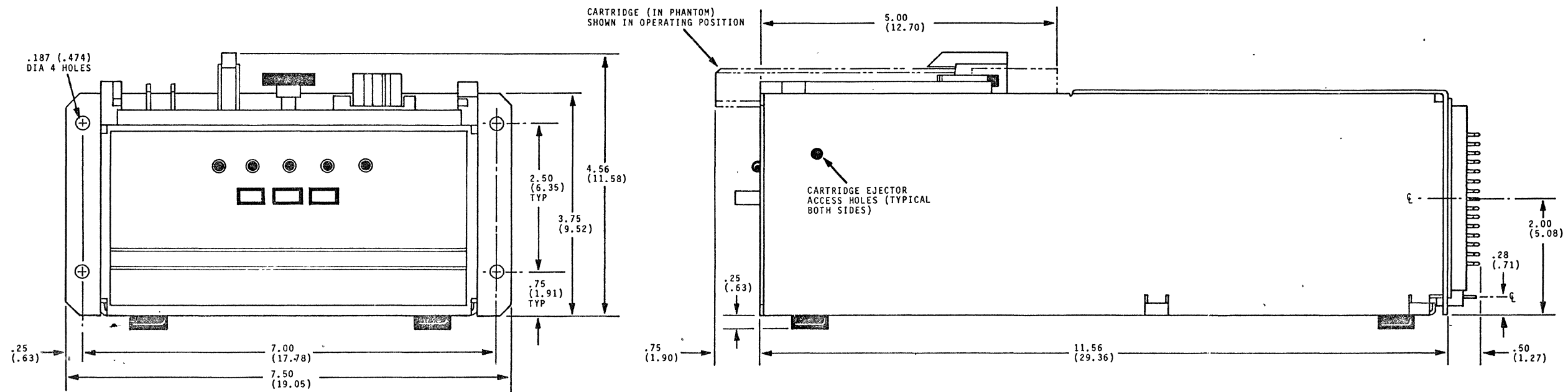


Figure 1-1. Outline and Installation Drawing

1.3 INSTALLATION

1.3.1 Mounting

Physical dimensions and outline of the transport are shown in Figure 1-1. The transport requires 4.56 inches of mounting space on a 7.5 inch rack. The transport should be located so that the cabling length between the transport and the format control unit is no longer than 20 feet.

1.3.2 Service Access

For access to the control and data electronics, loosen the top four retaining screws and remove the top cover. For access to the transport electronics, including the capstan servo controls, loosen the bottom retaining screws and remove the bottom cover; the transport electronics PC board is located underneath the deck. For access to the deck mechanical parts, remove the transport electronics board by unplugging the board and disconnecting the molex connectors to it; alternately, one of the side panels may be removed.

1.3.3 Intercabling and Power Connections

The connector pin assignments and cable requirements are specified in Section II of this manual. An external power supply is required for the tape transport. It may be purchased directly from the Kennedy Company or may be acquired elsewhere. The power supply connections and specifications are detailed in Section II.

1.4 OPERATION

Before placing the unit in operation, make certain that the interface connection procedures outlined in Section II have been performed, and that the power supply is connected as required.

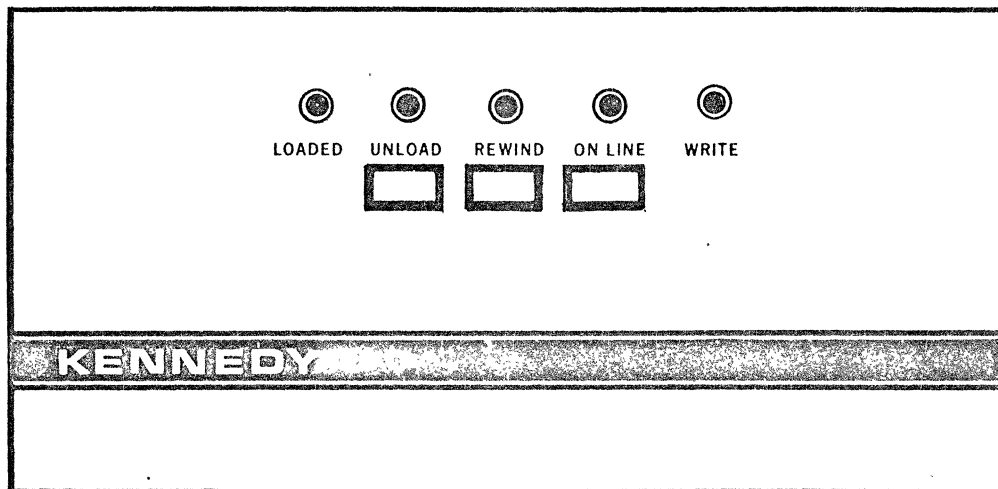
1.4.1 Controls and Indicators

The controls and indicators provided on the Model 334 front panel are shown and described in Figure 1-2.

1.4.2 Operating Procedure

After the interface connections are made as required and the power supply is connected to the transport, proceed as follows:

- a. Clean the transport read/write head to prevent degradation of magnetic tape.
- b. Using a screwdriver, rotate the write enable plug on the cartridge to the SAFE indication for the read mode, or away from the SAFE indication for the write mode. When in the write mode, the WRITE indicator on the front panel will be illuminated.



LOADED INDICATOR

This indicator is illuminated when the cartridge is inserted properly, activating the interlock switches.

UNLOAD PUSHBUTTON AND INDICATOR

This momentary pushbutton is active only when the tape is at load point and the recorder is off line. When activated it causes the tape to rewind to the BEGINNING OF TAPE holes and the cartridge to be ejected.

REWIND PUSHBUTTON AND INDICATOR

When activated this momentary pushbutton, active only when the recorder is off line, causes the tape to rewind to load point. The indicator is illuminated during either a locally or remotely initiated REWIND command.

ON LINE PUSHBUTTON AND INDICATOR

When first activated this momentary pushbutton places the recorder on line, enabling the interface inputs and outputs while disabling the other two front panel pushbuttons. The indicator is illuminated when the recorder is on line. When the pushbutton is activated again the unit is taken off line, disabling the interface inputs and outputs while enabling the other front panel pushbuttons.

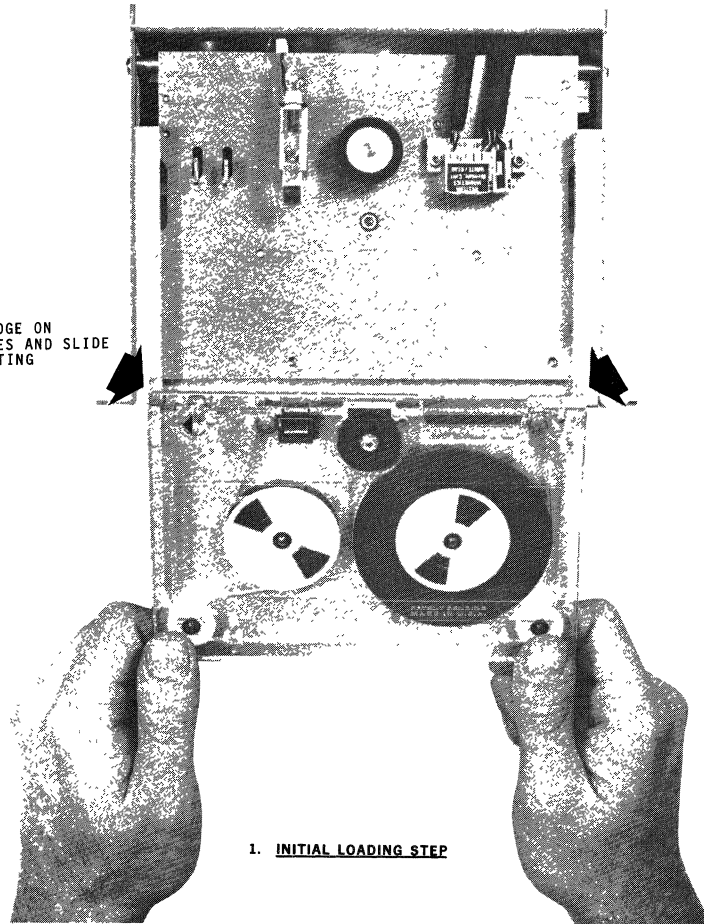
WRITE INDICATOR

This indicator is illuminated when the write plug on the cartridge is in the write position, the arrow pointing away from the SAFE indication.

Figure 1-2. Controls and Indicators

- c. To insert cartridge, place bottom plane of the cartridge on the lower ridge of the cartridge guides, as shown in Figure 1-3. Slide cartridge all the way in and press until cartridge is engaged, as shown in Figure 1-3. When cartridge is properly inserted with the power ON, the LOADED indicator on the front panel will be illuminated, the cartridge will rewind to the first set of double holes detected, and will then advance to load point, placing the cartridge ON TAPE. If the cartridge is inserted with the power OFF, turning the power ON will simulate load point internally, and the recorder will "assume" cartridge is ON TAPE, regardless of tape location.
- d. When cartridge is properly loaded and ON TAPE, activate the ON LINE pushbutton to enable the interface inputs and outputs. The recorder is then ready to be selected and to respond to interface commands.
- e. To eject the cartridge, return tape to load point by issuing either a remote REWIND COMMAND, a SYNCHRONOUS REVERSE COMMAND, a SEARCH REVERSE COMMAND, or by taking the recorder off line and issuing a local REWIND command. When the tape is at load point, take recorder off line (by a remote or a local command) and activate the UNLOAD pushbutton. Tape will then rewind to the first set of double holes and the cartridge will be ejected.

TO LOAD
REST CARTRIDGE ON
LOWER NOTCHES AND SLIDE
IN TO OPERATING
POSITION.

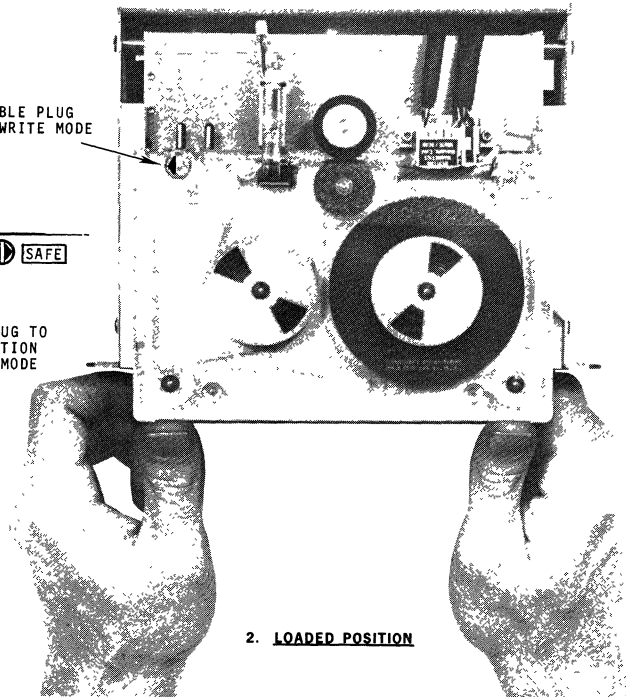


1. INITIAL LOADING STEP

WRITE ENABLE PLUG
SHOWN IN WRITE MODE



ROTATE PLUG TO
SAFE POSITION
FOR READ MODE



2. LOADED POSITION

Figure 1-3. Cartridge Loading

SECTION II INTERFACE CHARACTERISTICS

2.1 INTERFACE CONNECTORS

The interface connectors on the Kennedy Model 334 cartridge transport are designed for twisted pair inputs and outputs. The mating interface connectors consist of two 30-pin Cinch Jones edge connectors. An additional 6-pin Cinch Jones terminator board is used to connect the transport to the power supply. Connector P1 is the control interface connector, including the interface control signals and output status signals; connector P2 is the data interface connector, and terminator TB1 is the power supply connector. The mating connectors for all three are supplied with the transport. The connector pin assignments are given in Figure 2-3.

2.2 INTERFACE SIGNAL CHARACTERISTICS

The tape unit responds to zero-volt true inputs and provides zero-volt true outputs. Logic 1 = 0v to +0.4v dc, while logic 0 = +2.8v dc to +5v dc. Each signal input is terminated in such a manner as to provide matching for twisted pair cables (see Figure 2-1). Each output line is driven with an open collector driver. For best results the typical interfacing circuit configurations shown in Figure 2-1 should be used. The recommended twisted pair cable will reduce the magnitude of intercable crosstalk. Unless otherwise specified, all wires should be 24 AWG minimum, with a minimum insulation thickness of 0.01 inch. Each pair should have not less than one twist per inch, and cable length between transport and control unit should be no more than 20 feet.

The input receiver circuits, due to zero true current sinking logic design, will interpret a disconnected wire or removal of power at the format control unit as a logic zero or false condition. The logic 1 or true state requires 25 mA current sink with less than 0.4 volt. The logic 0 or false state will be +3 volts due to the input matching resistors. (See Figure 2-1.) Each output line is driven with an open collector current sinking logic driver which is capable of sinking up to 40 milliamperes in the true state. All outputs are disabled when the tape unit is not on line and selected.

2.3 TAPE MOTION COMMANDS

The Model 334 responds to five input tape motion commands: SYNCHRONOUS FORWARD COMMAND (SFC), SYNCHRONOUS REVERSE COMMAND (SFC), SEARCH FORWARD COMMAND (SCHF), SEARCH REVERSE COMMAND (SCHR), and REWIND. The transport includes a linear ramp generator which drives the capstan servo and provides linear acceleration from full stop to required speed, and linear deceleration from run to stop. Start and stop operations occur within the interrecord gaps. The ramp time is 30 milliseconds for the standard synchronous speed (25 ips). Ramp time for 25 ips is adjusted so that the amount of tape travel during the ramp-up or ramp-down is always 0.1875 inch.

The ramp time and the tape travel during the ramp must be taken into consideration when writing and gapping. A delay is required before writing to insure that the tape is up to speed, and to allow read after write. An additional delay is required before terminating SFC during a write mode to allow for the spacing between the read and write heads. The timing diagram, Figure 2-2, provides the necessary information to produce properly formatted tapes.

*2.4 CONTROL SIGNALS (P1 CONNECTOR)

Pin E — OFF LINE COMMAND (OFFC). A true level or pulse that resets the ON LINE flip-flop to the zero state placing the transport under manual control. An OFFC should be separated from a rewind command by at least 2 microseconds.

Pin D — SET WRITE STATUS (SWS). A level that must be true at the leading edge of an SFC when the write mode is to be selected and must remain true for a minimum of 10 microseconds after the leading edge of the SFC. SWS is sampled at the leading edge of the SFC or SRC toggling the read/write flip-flop to the appropriate state.

Pin H — SELECT (SLT). A level that when true enables all the interface drivers and receivers in the transport, thus connecting the transport to the controller.

Pin C — SYNCHRONOUS FORWARD COMMAND (SFC). A level that when true and the transport is ready and on line causes tape to move forward at the normal speed. When the level goes false, tape motion ramps down and ceases. If the EOT is detected during an SFC it will be terminated and a rewind sequence instituted.

Pin J — SYNCHRONOUS REVERSE COMMAND (SRC). A level that when true and the transport is ready and on line causes tape to move in the reverse direction at the normal speed. When the level goes false tape motion ceases. If the load point is detected during an SRC, the SRC will be terminate. If an SRC is given at load point, it will be ignored.

Pin A — REWIND COMMAND (RWC). A pulse input will rewind the tape past the load point and stop. The transport will then initiate a load forward sequence and return the tape to the load point.

Pin B — SEARCH REVERSE (SCHR). A level that when true and the transport is ready and on line causes tape to move in the reverse direction at the search speed. When the level goes false, tape motion ceases. If the load point is detected during an SCHR, the SCHR will be terminated. If the SCHR is given at load point, it will be ignored.

Pin F — SEARCH FORWARD (SCHF). A level that when true and the transport is ready and on line causes tape to move in the forward direction at the search speed. When the level goes false, tape motion ceases. If the EOT is detected during an SCHF, the SCHF is terminated and a rewind sequence is initiated.

* All motion control command lines to the transport must be kept false whenever the transport READY status is false.

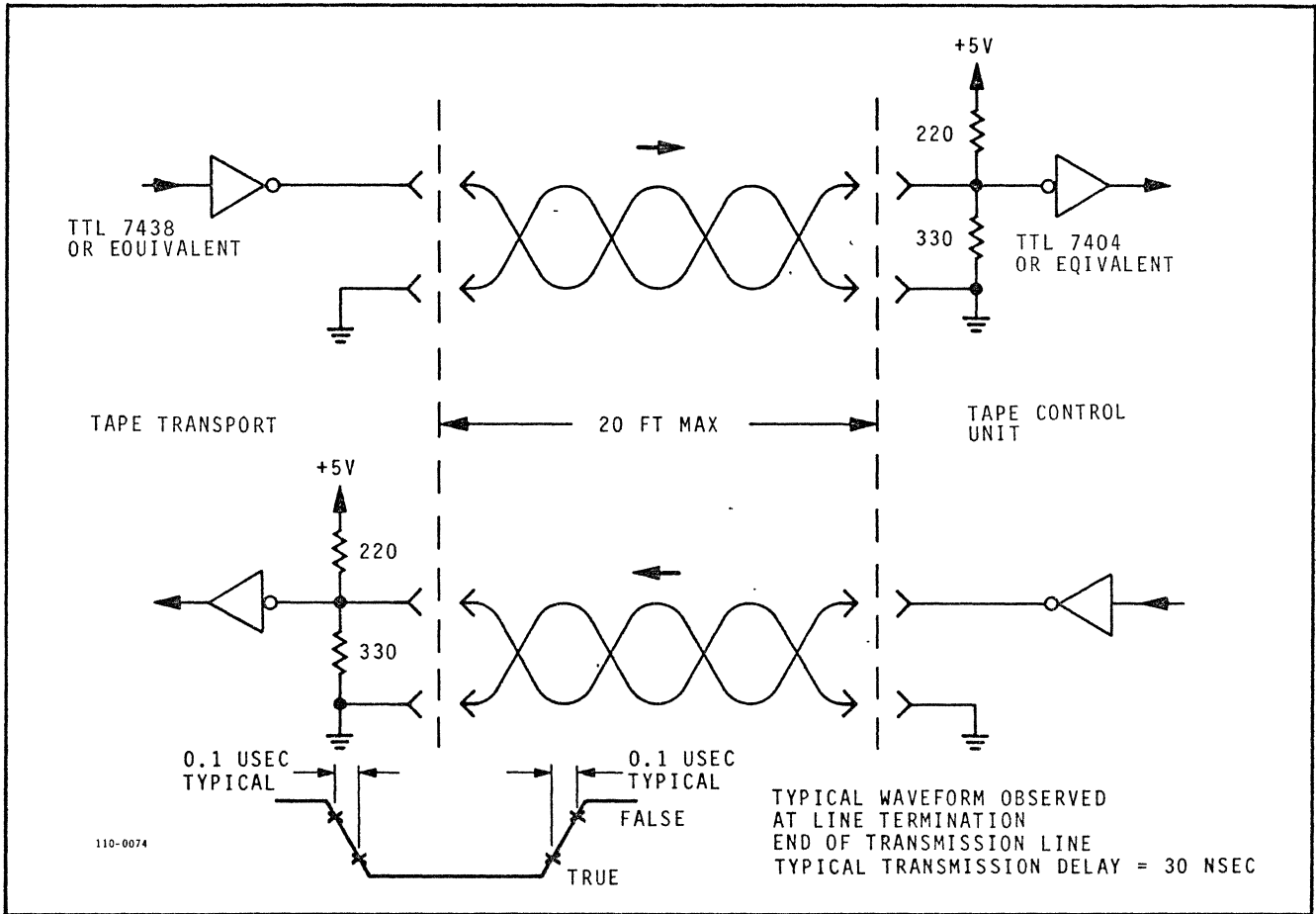


Figure 2-1. Typical Interface Circuit

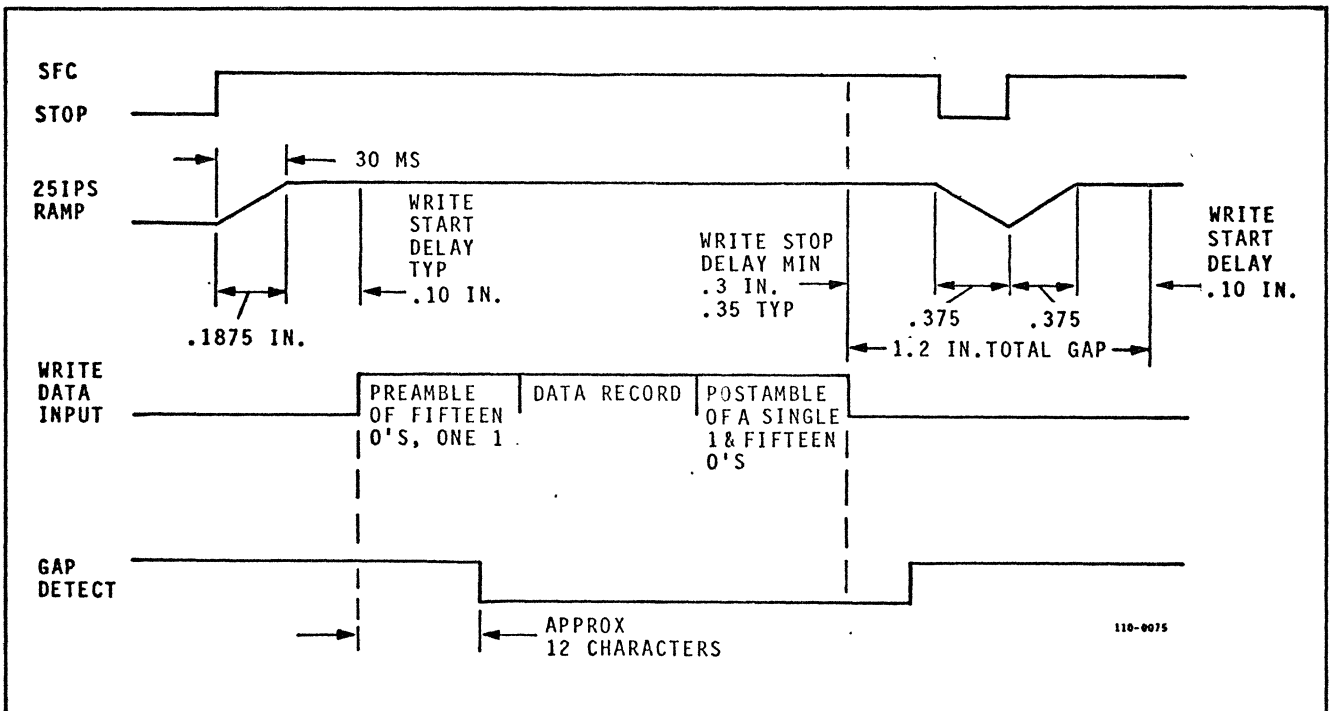


Figure 2-2. Write Motion Command Timing

2.5 STATUS OUTPUTS (P1 CONNECTOR)

Pin K — WRITE ENABLE (WEN). A level that is true when a cartridge with the WRITE PLUG in the write position has been mounted on the transport.

Pin L — TAPE RUNNING (TNG). A level that is true when tape is being moved under capstan control and remains true until tape motion has ceased.

Pin M — LOAD POINT (LP). A level that is true when the load point hole is under the photocell.

Pin 15 — WRITE READY (WRDY). A level that is true when the tape transport is on tape and the write mode of operation has been selected.

Pin P — ON LINE (ONL). A level that 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.

PIN S — END OF TAPE WARNING (EOTW). A level that is true when the end of tape warning hole is detected. It remains true until the EOTW hole is detected during a reverse operation.

PIN R — REWINDING (RWDG). A level that is true when the transport is engaged in a rewind operation or returning to the load point.

Pin N — READY (RDY). A level that is true when the tape transport is on tape; that is, when the load sequence is complete and the transport is not rewinding. When true, the transport is ready to receive a remote command.

2.6 READ/WRITE SECTION (P2 CONNECTOR)

Pin A — WRITE DATA TRACK 1 (WD1)
Pin B — WRITE DATA TRACK 2 (WD2)
Pin C — WRITE DATA TRACK 3 (WD3)
Pin D — WRITE DATA TRACK 4 (WD4)

Parallel input data in the proper phase encoded format, including preamble, CRC, and postamble, must be presented on these lines. The transport electronics consists only of head drivers.

Pin E — READ DATA STROBE TRACK 1 (RDS1)
Pin F — READ DATA STROBE TRACK 2 (RDS2)
Pin H — READ DATA STROBE TRACK 3 (RDS3)
Pin J — READ DATA STROBE TRACK 4 (RDS4)

Pulses of 1 microsecond minimum width for each bit read from tape.

- Pin K — READ DATA TRACK 1 (RD1)
- Pin L — READ DATA TRACK 2 (RD2)
- Pin M — READ DATA TRACK 3 (RD3)
- Pin N — READ DATA TRACK 4 (RD4)

Levels that are in the appropriate state 0.5 microsecond before the read data strobe of the respective track and remain in that state until 0.5 microsecond before the next read data strobe of that track.

- Pin P — DATA DETECT TRACK 1 (DD1)
- Pin R — DATA DETECT TRACK 2 (DD2)
- Pin S — DATA DETECT TRACK 3 (DD3)
- Pin 15 — DATA DETECT TRACK 4 (DD4)

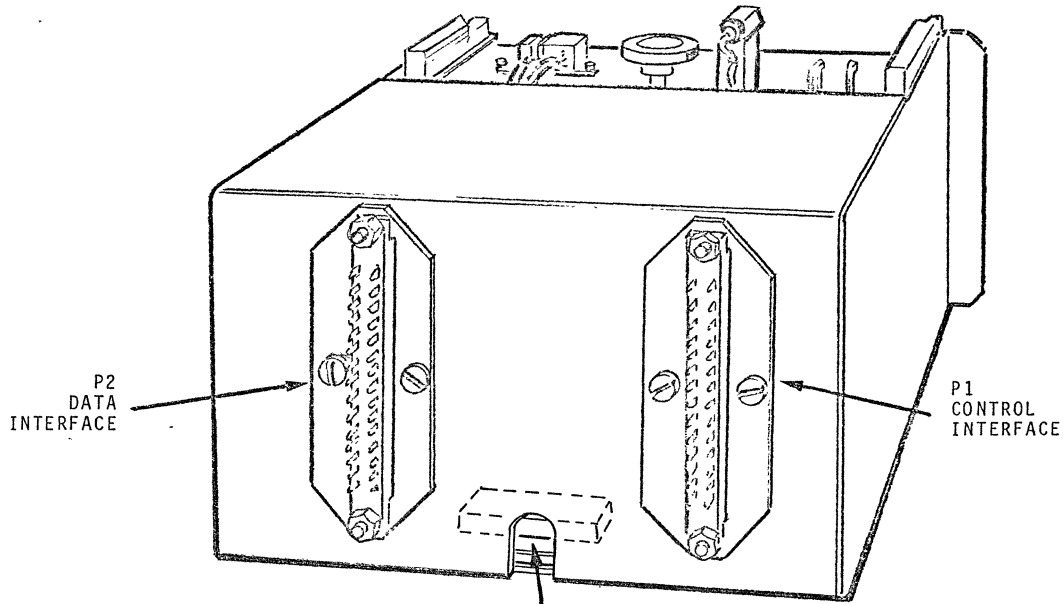
A level that is true when data is being read by the respective transport channel. False levels indicate that the read head is in a gap.

2.7 POWER SUPPLY

The Model 334 requires a separate power supply. The power supply may be purchased directly from the Kennedy Company or may be acquired elsewhere. The connections of the power supply terminal board TB1, located on the rear of the deck, are given in Figure 2-3. The power supply requirements are tabulated below.

Voltage	Current
+5v $\pm 1\%$	Maximum 0.95A
+15v $\pm 1\%$	Maximum 0.2A
-15v $\pm 1\%$	Maximum 0.1A
+24v +20% -10%	Maximum 6.0A (100 ms surge when ramping - average 1.0A)
-24v +20% -10%	Maximum 6.0A (100 ms surge when ramping - average 1.0A)

Table 2-1. Power Supply Requirements



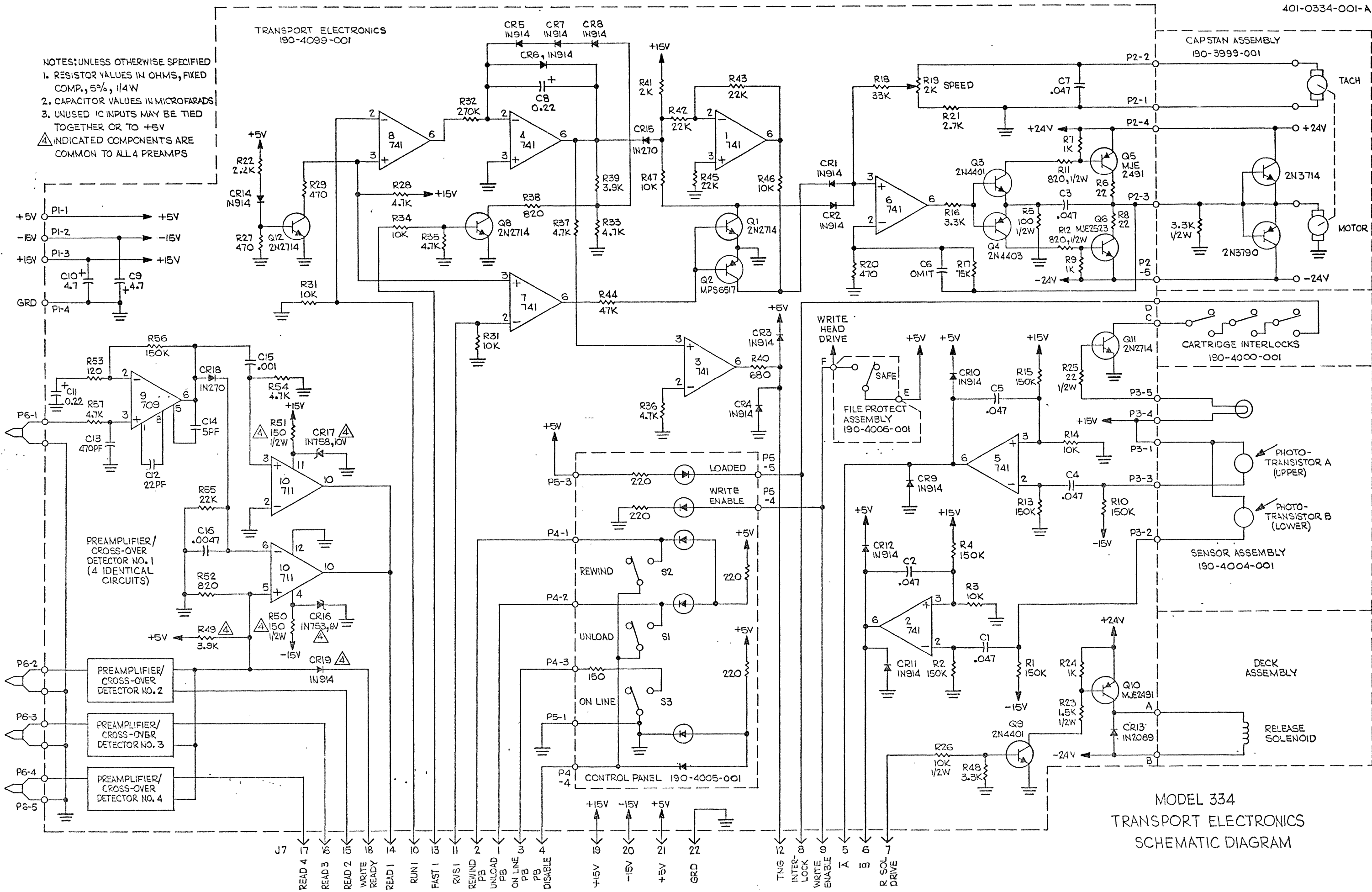
TB1 POWER SUPPLY
TERMINAL BOARD

CARTRIDGE UNIT CONNECTOR		SIGNAL		MNEMONIC
ACTIVE PIN	GROUND PIN	INPUT	OUTPUT	
<u>P1 CONTROL INTERFACE</u>				
A	1	→	REWIND COMMAND	RWC
B	2	→	SEARCH REVERSE	SCHR
C	3	→	SYNCHRONOUS FORWARD COMMAND	SFC
D	4	→	SET WRITE STATUS	SWS
E	5	→	OFF LINE COMMAND	OFFC
F	6	→	SEARCH FORWARD	SCHF
H	7	→	SELECT	SLT
J	8	→	SYNCHRONOUS REVERSE COMMAND	SRC
K	9	←	WRITE ENABLE	WEN
L	10	←	TAPE RUNNING	TNG
M	11	←	LOAD POINT	LP
N	12	←	READY	RDY
P	13	←	ON LINE	ONL
R	14	←	REWINDING	RWDG
S	13	←	END OF TAPE WARNING	EOTW
15	14	←	WRITE READY	WRDY
<u>P2 DATA INTERFACE</u>				
A	1	→	WRITE DATA TRACK 1	WD1
B	2	→	WRITE DATA TRACK 2	WD2
C	3	→	WRITE DATA TRACK 3	WD3
D	4	→	WRITE DATA TRACK 4	WD4
E	5	←	READ DATA STROBE TRACK 1	RDS1
F	6	←	READ DATA STROBE TRACK 2	RDS2
H	7	←	READ DATA STROBE TRACK 3	RDS3
J	8	←	READ DATA STROBE TRACK 4	RDS4
K	9	←	READ DATA TRACK 1	RD1
L	10	←	READ DATA TRACK 2	RD2
M	11	←	READ DATA TRACK 3	RD3
N	12	←	READ DATA TRACK 4	RD4
P	13	←	DATA DETECT TRACK 1	DD1
R	14	←	DATA DETECT TRACK 2	DD2
S	13	←	DATA DETECT TRACK 3	DD3
15	14	←	DATA DETECT TRACK 4	DD4

TB1 POWER SUPPLY	
TERM.	VOLTAGE
1	GRD
2	-15V
3	-24V
4	+5V
5	+15V
6	+24V

Figure 2-3. Interface Characteristics Summary

- NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTOR VALUES IN OHMS, FIXED COMP., 5%, 1/4W
 2. CAPACITOR VALUES IN MICROFARADS
 3. UNUSED IC INPUTS MAY BE TIED TOGETHER OR TO +5V
- △ INDICATED COMPONENTS ARE COMMON TO ALL 4 PREAMPS



MODEL 334
TRANSPORT ELECTRONICS
SCHEMATIC DIAGRAM

TAPE MOTION CONTROL A CIRCUIT DESCRIPTION

MOTION CONTROL COMMANDS

The interface control commands are supplied to this module and are terminated by a matching impedance. These include motion commands SYNCHRONOUS REVERSE (SRC), SEARCH REVERSE (SCHR), REWIND (RWC), SYNCHRONOUS FORWARD (SFC), SEARCH FORWARD (SCHF) and control commands SELECT (SLT), SET WRITE STATUS (SWS) and OFF LINE (OFFC).

The transport must be on line and selected before it responds to any motion control commands. When both SELECT and ON LINE are true NAND gate IC8-6 is activated, generating SELECT 1 (SLT1) true, enabling the command gates located on IC10 and IC13. The reverse motion commands are also preconditioned by ON TAPE (OT) true and LOAD POINT (LP) false, both supplied from Tape Motion Control B module, inhibiting any reverse commands (with the exception of locally initiated (UNLOAD) when the tape is at load point or before it.

The motion control commands are encoded into three lines: RUN, a line that goes true whenever any motion command is given; FAST, a line that becomes true when a high speed command is given (a search or a rewind) and is false for synchronous speed commands; REVERSE, a line that goes true for the reverse motion commands. These three lines determine the mode of operation of the motor. For example, SEARCH FORWARD would set RUN and FAST high and REVERSE low, initiating fast forward motion; SYNCHRONOUS REVERSE would set RUN and REVERSE high and FAST low, initiating low speed reverse motion. The three command lines are supplied to Tape Motion Control B where they may be overridden by internal controls.

PUSHBUTTON FLIP-FLOPS

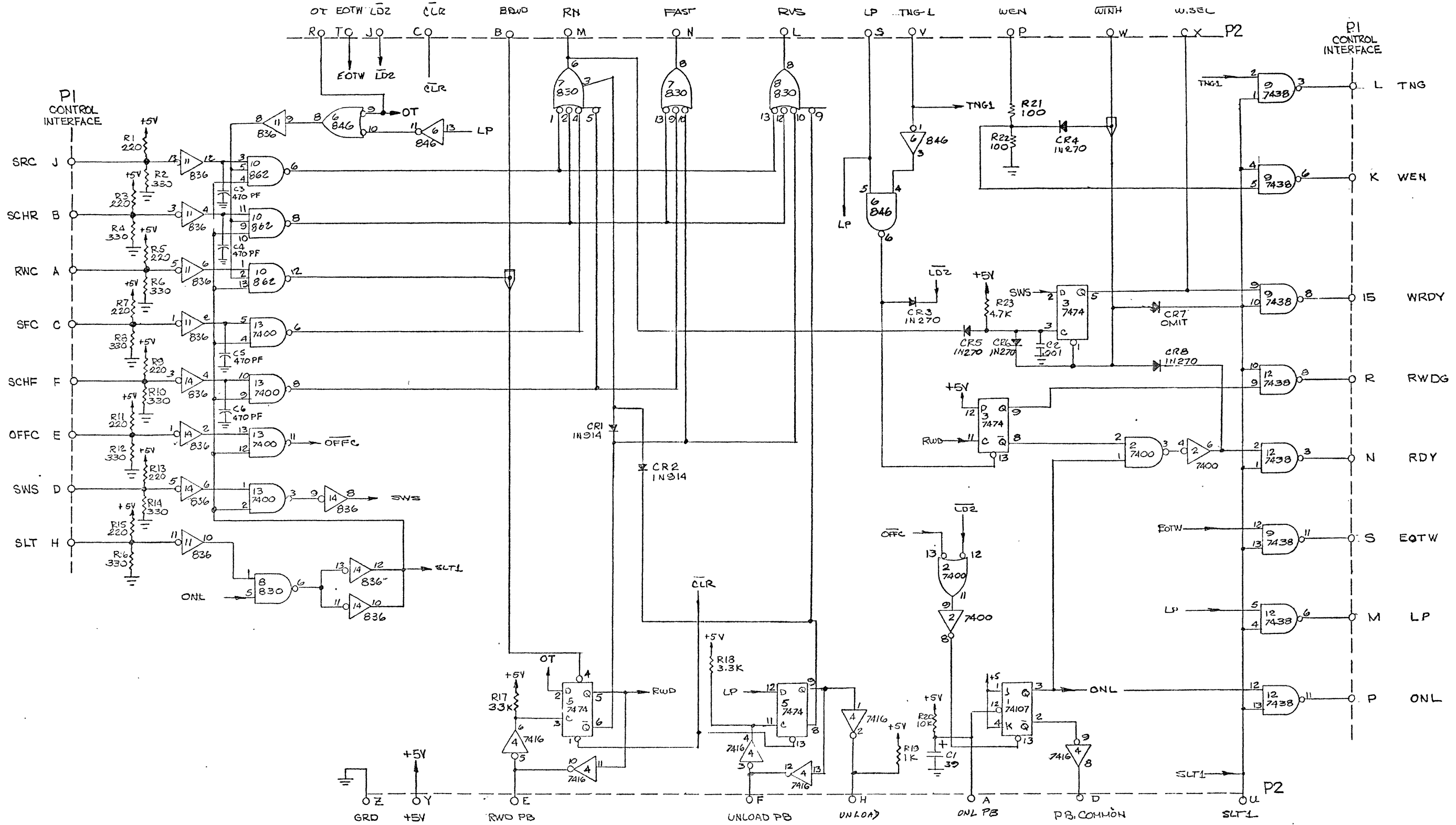
This module also includes three flip-flops used in the operation of the front panel pushbuttons. The line from the ON LINE pushbutton is supplied at pin A to the toggle input of J-K flip-flop IC1. When the cartridge is first loaded LD2 clears the flip-flop. Consequently, when the pushbutton is pressed the first time the flip-flop is set, ON LINE going true and the pushbutton common going high at output pin D. ONL high enables the interface command gates IC10 and IC13 when SELECT goes true, while the pushbutton common high disables the other two front panel pushbuttons. When pressed a second time, the ON LINE pushbutton will toggle IC1 to the clear state, setting ONL false and the pushbutton common low. The ON LINE flip-flop may also be direct-cleared by the OFF LINE COMMAND OFFC supplied from the interface.

The REWIND pushbutton line is input at pin E of this module, and clocks D flip-flop IC5-3 to the set condition; a feedback is used from the Q output to the clock input of the flip-flop to keep it set after the button is released. The rewind flip-flop can also be direct-set by either a B REWIND supplied from Tape Motion Control B or by REWIND COMMAND RWC supplied from the interface. When the rewind flip-flop is set, it forces RUN, FAST, and REVERSE true, initiating a rewind to the first set of double holes detected. The flip-flop is then cleared by $\overline{\text{CLR}}$ supplied from Tape Motion Control B.

The line from the UNLOAD pushbutton is input at pin F and is supplied to the clock input of D flip-flop IC5-11; the flip-flop can be set only if the tape is at load point, setting LP (supplied from Tape Motion Control B) high at the D input of the flip-flop. When the unload flip-flop is set, its $\overline{\text{Q}}$ output sets RUN and REVERSE true, initiating a slow speed reverse from load point to the BOT double holes. The Q output of the flip-flop is then inverted and is supplied as UNLOAD to Tape Motion Control B. UNLOAD clocks a flip-flop which causes the solenoid to be activated and the cartridge to be ejected when the BOT double set of holes is detected.

STATUS OUTPUTS

This module contains a set of drivers which supply the status outputs to the interface. The status outputs include TAPE RUNNING (TNG), WRITE ENABLE (WEN), WRITE STATUS, REWINDING (RWDG), READY (RDY), END OF TAPE WARNING (EOTW), LOAD POINT (LP), and ON LINE (ONL). The status outputs are all gated with SELECT 1, generated by combining ON LINE with SELECT. READY is generated by combining ON LINE with the $\overline{\text{Q}}$ output of the rewind flip-flop, setting RDY true whenever the transport is selected, on line and not rewinding. The WRITE STATUS is generated by flip-flop IC3-5. The flip-flop is set by SET WRITE STATUS SWS provided that SLT1, RDY are true and WRITE INHIBIT $\overline{\text{WINH}}$ and RUN are false. Whenever either $\overline{\text{WINH}}$ goes true or SLT1 goes false, the write status flip-flop is direct cleared, terminating WRITE STATUS.



Tape Motion Control A Type 3977 Schematic, Diagram

TAPE MOTION CONTROL B

CIRCUIT DESCRIPTION

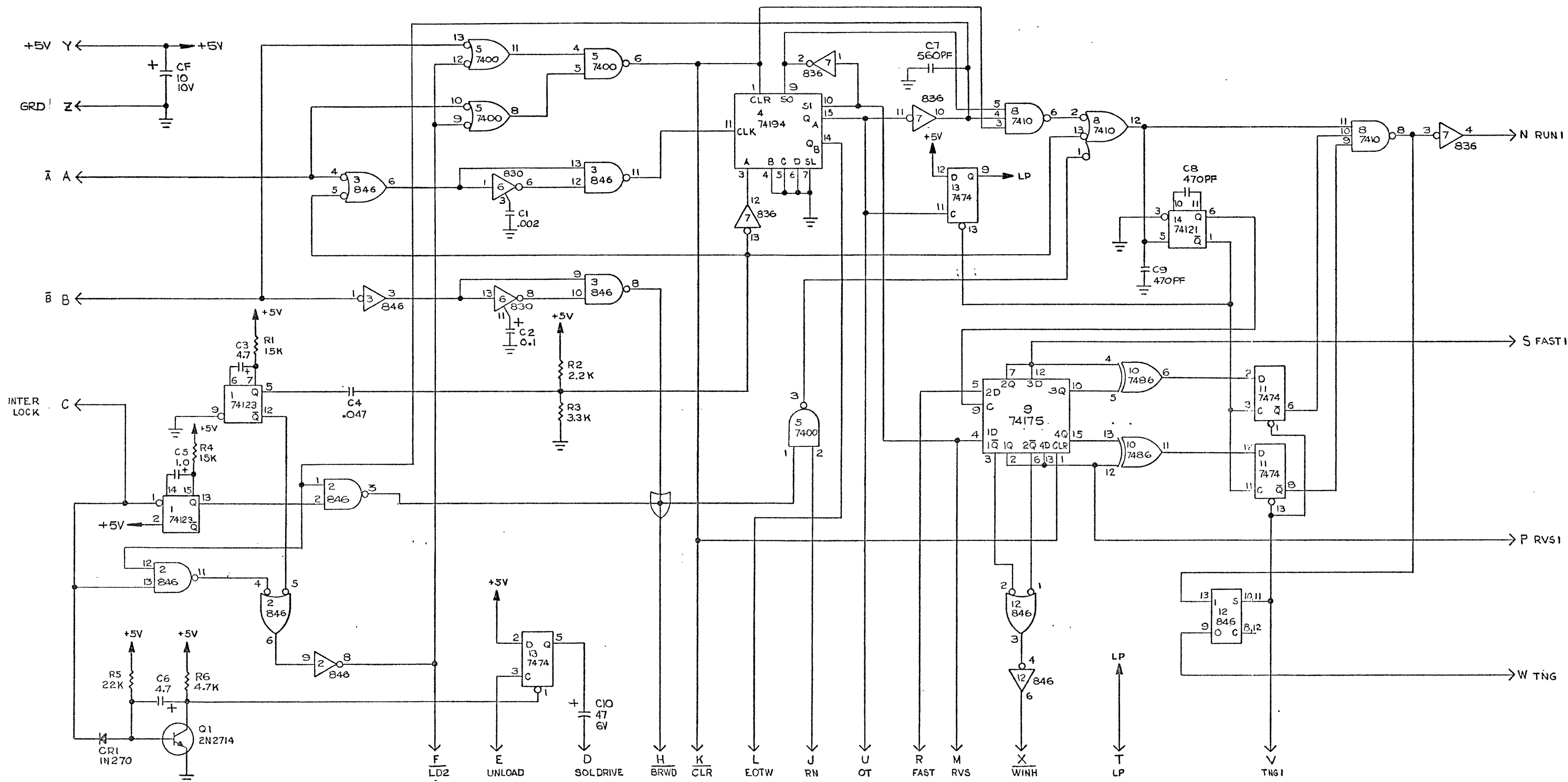
This module generates internal motion control functions which override any interface commands. These functions include automatic rewind to load point upon cartridge insertion, automatic rewind at EOT, issuing of EOT warning to the interface, and others. The following paragraphs offer a detailed explanation of these operations.

When the power is first turned on, one-shot IC1-5 generates a pulse that direct-sets tape locator shift register IC4 to Q_A true, the ON TAPE position. The purpose of this circuitry is to inhibit the automatic rewind if the power is turned on and a cartridge is already loaded. If the cartridge is not loaded when the power is turned on, INTERLOCK high is inverted by IC2-11 and is gated through IC2-6 and IC2-8 through both IC5 NOR gates and NAND gate IC5-6 to clear the tape locator IC4, also generating a CLEAR \overline{CLR} output at pin K to tape motion control A. When the cartridge is inserted INTERLOCK goes true (low) and fires one-shot IC1. The Q output of the one-shot generates a pulse which is inverted by IC2-2 and is output as B REWIND \overline{BRWD} at output pin H. \overline{BRWD} is supplied to tape motion control A where it generates a rewind operation to the first set of BOT double holes detected. At this point both \overline{A} and \overline{B} hole indications from the transport electronics board are supplied at pins A and B, activating the two IC5 NOR gates and NAND gate IC5-6, generating a \overline{CLR} output to tape motion control A to terminate the rewind operation. At this time tape locator IC4 is cleared, its Q_A output low generates ON TAPE false. This output is inverted by IC7-10, enabling NAND gate IC8-4. After the double set of holes has been detected, \overline{CLR} false enables NAND gate IC8-3; when RVS goes false (input pin M from tape motion control A) at the end of the rewind operation, IC8-6 is activated, its output is inverted by IC8-12 and activates NAND gate IC8-8, since the \overline{Q} outputs of both IC11 flip-flops are high. IC8-8 then generates RUN1 true at output pin N to the transport electronics board, initiating a synchronous forward tape motion until load point is detected. When the load point A hole is detected, the \overline{A} input at pin A is inverted by IC3-6 and generates a pulse through the edge circuit consisting of inverter IC6-6, capacitor C1 and NAND gate IC3-11. The pulse output by IC3-11 clocks the tape locator IC4. At this time RVS is false (high) at the S_1 input of IC4, consequently IC4- Q_A goes high, generating ON TAPE true at output pin U. The Q_A output high also inhibits the RUN1 output to the transport electronics board, causing the tape to stop at load point. This completes the rewind to load point operation. If the interface then issues a forward command from load point, the tape will move forward until the EOT warning A hole will be detected, which will shift IC4 from Q_A to Q_B true, issuing END OF TAPE WARNING EOTW to tape motion control A. If forward motion is continued until the EOT B hole is detected, the B hole input would generate a B REWIND command at output pin H to tape motion control A, causing the tape to rewind to the BOT double holes, followed by forward motion to the load point, as described above. The EOT warning output will remain true until the EOTW A hole is detected in reverse, shifting

IC4 from Q_B true to Q_A true. Thus each time an A hole is detected during forward tape motion, IC4 will be shifted to the left, from 0 to Q_A to Q_B true; each time an A hole is detected during reverse motion, IC4 will be shifted to the right, going from Q_B to Q_A to 0.

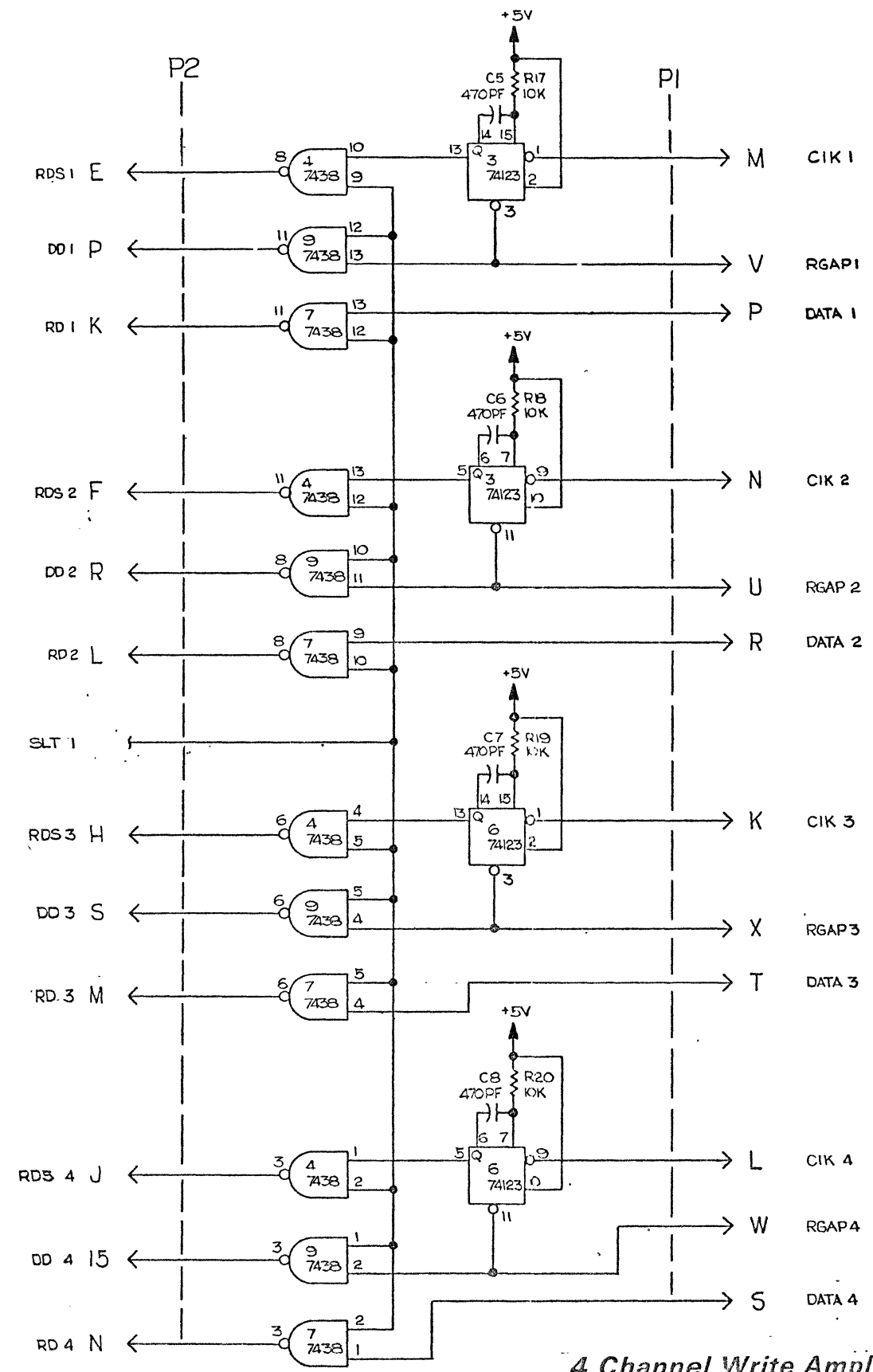
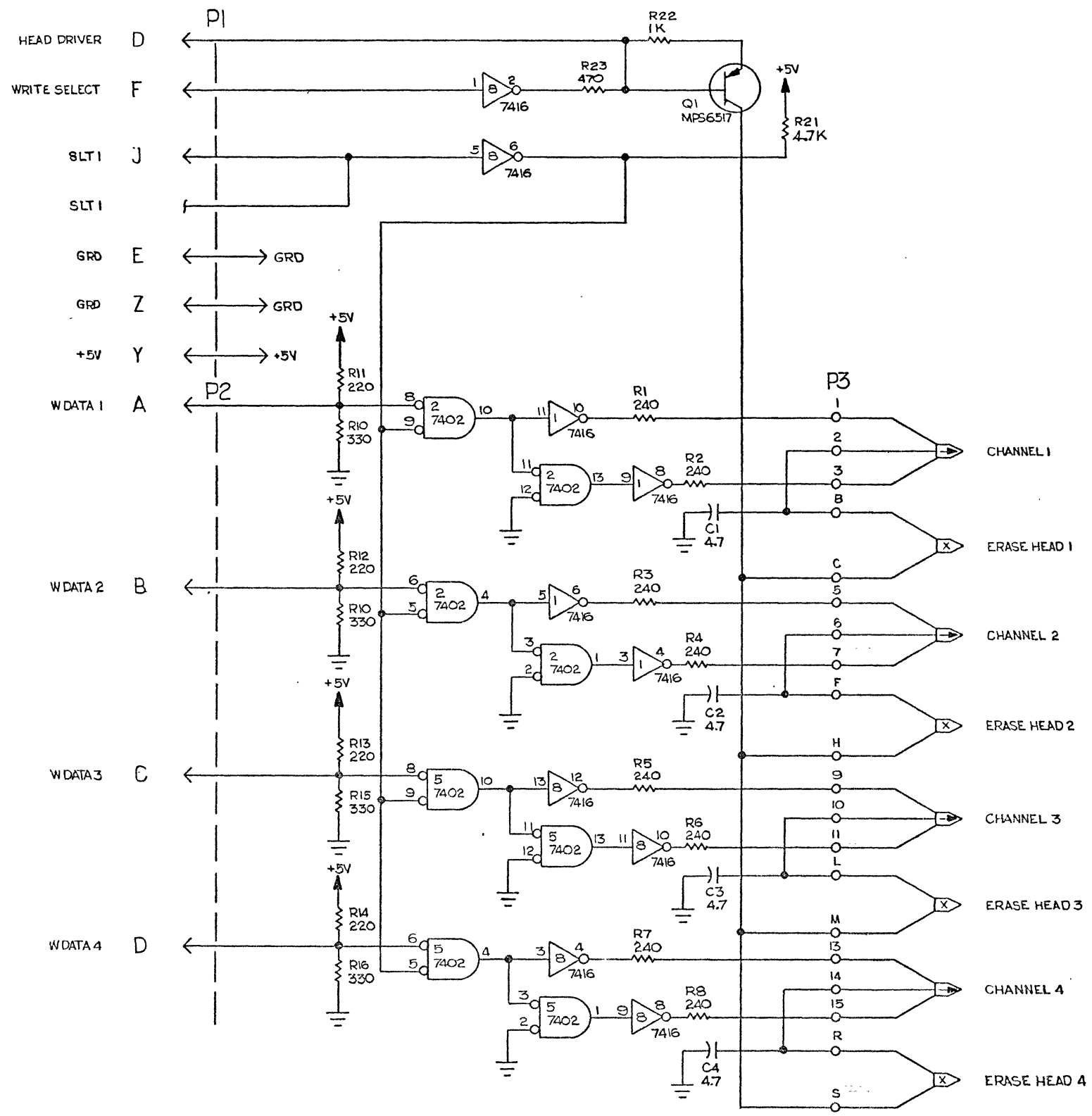
The tape motion commands supplied from tape motion control A are supplied to a network consisting of one-shot IC14, flip-flops IC9, exclusive-OR gates IC10 and flip-flops IC11. This network is used to provide a stop delay when tape motion direction or speed is changed, and outputs the commands as FAST1 and RVS1 to the transport electronics board. For example, when RUN NORMAL RN command (input pin J) is followed by RUN FAST, one-shot IC14 is triggered twice, once for each command. This clocks the IC9 flip-flops twice, but they change states only when the FAST command is given, setting the 2D input high; the 2Q output then goes high while all the other IC9 Q outputs remain low. This causes the output of exclusive-OR gate IC10-8 to swing high, setting the D input of flip-flop IC11-2 high. Flip-flop IC11-3 is clocked on the trailing edge of the pulse supplied by the \bar{Q} output of IC14. The \bar{Q} output of IC11 is then toggled to the low state and disables NAND gate IC8-10, inhibiting the RUN1 command. When the tape comes to a stop following the first command, TAPE RUNNING TNG1 at input pin V clears the IC11 flip-flops, enabling IC8-10 and allowing the FAST command to be carried out. Similarly, if a reverse command is followed by a forward command, the lower IC10 exclusive-OR gate would be activated, again inhibiting RUN1 until the tape comes to a stop following the first of the two commands. Note that when either a fast or a reverse motion command is given, the $1\bar{Q}$ or $2\bar{Q}$ output of IC9 activates NOR gate IC12-3, issuing WRITE INHIBIT WINH true to tape motion control A. This prevents the write mode during either reverse or fast tape motion.

This module also generates the solenoid drive output to eject the cartridge. When the UNLOAD flip-flop on tape motion control A is cleared at the BOT double holes, UNLOAD goes high at input pin E of this module and clocks flip-flop IC13. The Q output of the flip-flop goes high, generating SOL DRIVE high to the transport electronics board, activating the release solenoid and ejecting the cartridge. After the cartridge is ejected, INTERLOCK goes high at input pin C. After a short delay capacitor C6 is charged enough to turn transistor Q1 on, clearing flip-flop IC13 and terminating the solenoid drive output.

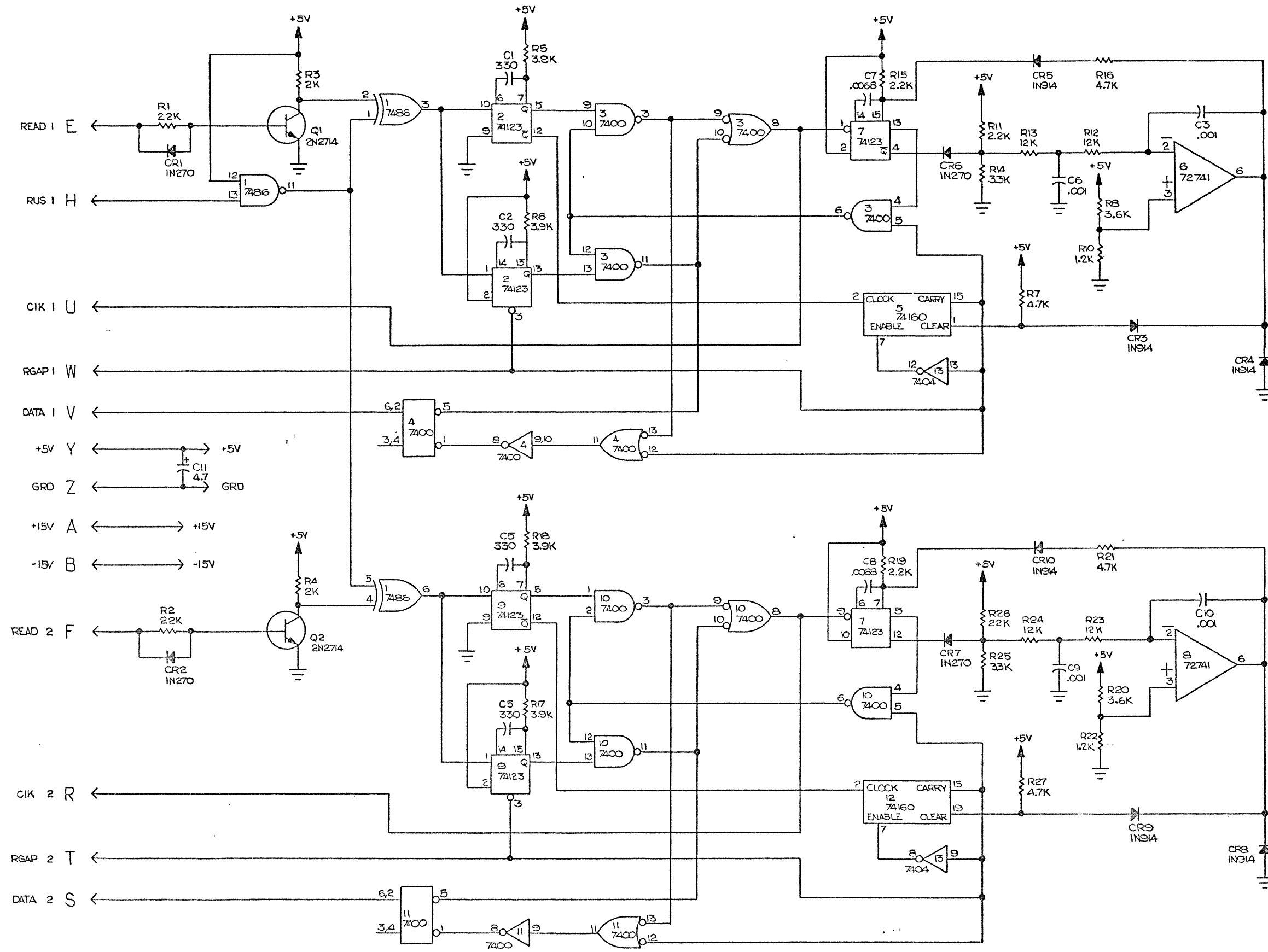


- NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTOR VALUES IN OHMS, FIXED COMP. 5%, 1/4W
 2. CAPACITOR VALUES IN MICROFARADS.
 3. ▽ DENOTES TEST POINT.
 4. UNUSED IC INPUTS MAY BE TIED TOGETHER OR TO +5V.
 5. (*) DENOTES FACTORY TEST SELECT. VALUE, IF SHOWN, IS TYPICAL.
 6. FILTER CAPACITORS ARE NOT SHOWN ON THE SCHEMATIC AND ARE DESIGNATED "CF" ON THE P.C.BOARD

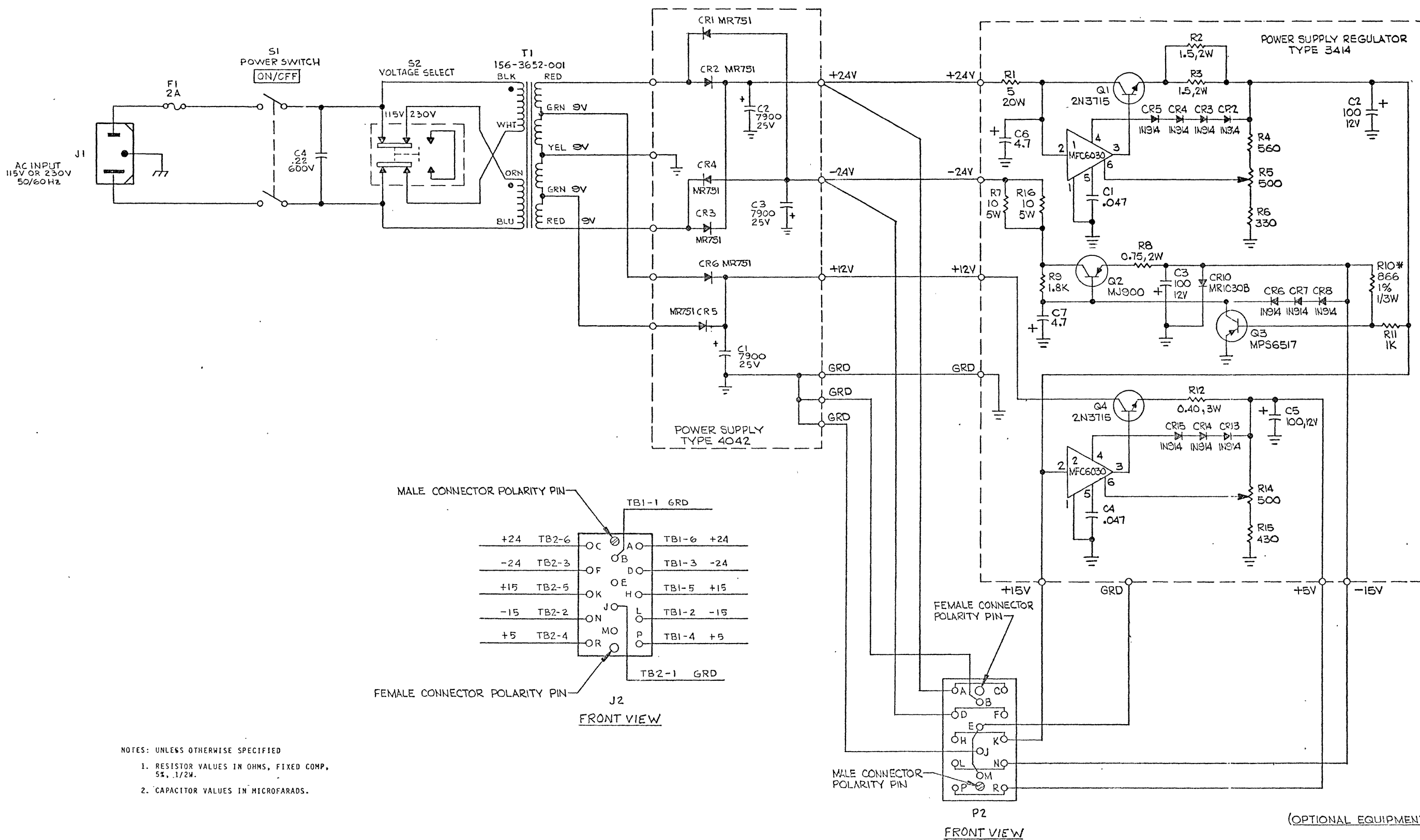
Tape Motion Control B Type 3978
Schematic Diagram



**4 Channel Write Amplifier
Type 4100 - 001A
Schematic Diagram**



Dual Read Detector
Type 4101-001A
Schematic Diagram



- NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTOR VALUES IN OHMS, FIXED COMP, 5%, 1/2W.
 2. CAPACITOR VALUES IN MICROFARADS.

(OPTIONAL EQUIPMENT)
MODEL 339 POWER SUPPLY
SCHEMATIC DIAGRAM

UPDATES AND MODIFICATIONS

In the continuing effort to improve the performance and reliability of our product line, the Kennedy Company occasionally incorporates changes in existing models. The changes incorporated since the manual was printed are described in this section. Your particular model may or may not include these changes. Should you wish to incorporate these changes it is advisable to contact our Customer Engineering Department regarding available retrofit kits and application information.

This section also describes any special features and modifications included in your model which distinguish it from the standard model described in the manual.

Model 334

Interface Characteristics Clarification

Note that while the Model 334 transport accepts write data and provides read data in all four tracks simultaneously, the different tracks are not to be treated as four bit characters. Instead, the tracks are independent of each other, each having its own data strobe during the read mode, and each should be treated separately by the interface. Should the data be treated as parallel data, a skew delay of at least six characters should be provided.

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Model 334

ECN 4785

The following component changes were made on Dual Read Detector Type 4101: Resistors R8 and R20 were changed from 3.6K ohms to 3.3K ohms, and R10 and R22 were changed from 1.2K ohms to 1.0K ohms.

The purpose of these changes was to decrease the duty cycle of the phase lock loop from 75 percent to 72 percent, eliminating spurious errors.

Warranty

Kennedy Company products are warranted to be free from defects in materials and workmanship for a period of one year.

Kennedy Company reserves the right to inspect any defective parts or material to determine damage and cause of failure.

This warranty does not apply to any Kennedy equipment that has been subject to neglect, misuse, improper installation and maintenance, or accident.

Liability under warranty is limited to no charge repair of defective units when equipment is shipped prepaid to factory or authorized service center after authorization from Kennedy Company to make such return.

Kennedy Company is continually striving to provide improved performance, value and reliability in their products, and reserves the right to make these improvements without being obligated to retrofit delivered equipment.

KENNEDY CO.

KENNEDY CO.

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