

MODEL 2540
PERFORATED TAPE READER
OPERATION AND MAINTENANCE MANUAL

DIGITRONICS[®] CORPORATION
Albertson, Long Island, New York

Tel: (516) 484-1000



COPYRIGHT © 1971 BY DIGITRONICS CORPORATION.
PRINTED IN THE UNITED STATES OF AMERICA. ALL
RIGHTS RESERVED. THIS BOOK OR PARTS THEREOF
MAY NOT BE REPRODUCED IN ANY FORM WITHOUT
PERMISSION OF THE PUBLISHERS.

Address comments regarding this publication to Digitronics Publication Dept., Albertson, L. I., N. Y. 11507

TABLE OF CONTENTS

<i>Paragraph</i>	SECTION I INTRODUCTION	<i>Page</i>
1.1	General	1-1
1.2	Model Descriptions	1-1
1.3	Applications	1-1
1.4	Basic Unit	1-1
1.4.1	Specifications	1-2
1.4.2	Interface Requirements	1-2
1.4.2.1	Pinch Roller and Brake Solenoids	1-2
1.4.2.2	Exciter Lamp	1-2
1.4.2.3	Readhead	1-2
1.5	Electronics Unit	1-2
1.5.1	Specifications	1-5
1.5.2	Circuit Characteristics	1-5
1.5.2.1	Data Channels	1-5
1.5.2.2	Sprocket Channel	1-5
1.5.2.3	Pinch Roller and Brake Circuits	1-5
1.5.2.4	Lamp Voltage Regulator	1-7
1.5.3	Electronics Unit Interface Requirements	1-7
1.5.3.1	Data Outputs	1-7
1.5.3.2	Sprocket Output	1-7
1.5.3.3	Tape Control	1-7
1.5.3.4	Operating Voltage Requirements	1-8
1.5.4	Data Gating Facilities	1-8
1.5.4.1	Data Control Common	1-8
1.5.4.2	C12345	1-8
1.5.4.3	C6, C7, C8	1-8
1.5.4.4	Sprocket Control	1-9
1.6	Power Supply	1-9
1.7	Manual Controls	1-9
1.7.1	Power Switch	1-9
1.7.2	Tape Width Selector	1-9
1.7.3	Tape Load Lever	1-9
1.8	Options	1-9
1.9	Compatible Tape Handlers	1-10
SECTION II INSTALLATION		
2.1	General	2-1
2.2	Unpacking	2-1
2.3	Mechanical Installation	2-1
2.4	Electrical Installation	2-1
2.4.1	Mating Connector Wiring	2-1
2.4.1.1	Models 2540T and B2540T	2-1
2.4.1.2	Models 2540E, B2540E, 2540EP, B2540EP	2-1

TABLE OF CONTENTS (Cont'd.)

<i>Paragraph</i>	SECTION II INSTALLATION (Cont'd.)	<i>Page</i>
2.4.2	AC Power	2-1
2.5	Initial Installation Checks	2-1
2.5.1	Voltage Checks.	2-1
2.5.2	Performance Checks	2-3
SECTION III OPERATING PROCEDURES		
3.1	General	3-1
3.2	Operating Controls	3-1
3.3	Operating Procedures.	3-1
3.3.1	Loading Tape	3-1
3.3.2	Tape Read.	3-1
SECTION IV THEORY OF OPERATION		
4.1	General	4-1
4.2	Logic Symbols	4-1
4.3	Functional Description	4-1
4.3.1	Basic Unit.	4-1
4.3.2	Electronics Unit	4-3
4.4	Circuit Description.	4-4
4.4.1	Basic Unit, Detailed Analysis	4-4
4.4.1.1	Tape Drive System	4-4
4.4.1.2	Tape Read System	4-4
4.4.2	Electronics Unit, Detailed Analysis	4-4
4.4.3	Power Supply, Detailed Analysis.	4-5/6
4.4.4	End-of-Tape Sensor, Detailed Analysis.	4-5/6
SECTION V MAINTENANCE		
5.1	General	5-1
5.2	Preventive Maintenance.	5-1
5.2.1	Periodic Inspection.	5-1
5.2.2	Periodic Component Replacement	5-1
5.2.3	Lubrication	5-1
5.2.4	Cleaning.	5-1
5.3	Corrective Maintenance.	5-1
5.4	Component Removal Procedures	5-1
5.4.1	Exciter Lamp	5-4
5.4.2	Drive Belt.	5-4
5.4.3	Pinch Roller Solenoid.	5-4
5.4.4	Brake Coil.	5-5
5.4.5	Capstan Assembly	5-7
5.4.6	Drive Motor Assembly	5-7
5.4.7	Readhead Assembly.	5-8

TABLE OF CONTENTS (Cont'd.)

<i>Paragraph</i>	SECTION V MAINTENANCE (Cont'd.)	<i>Page</i>
5.5	Adjustment Procedures	5-8
5.5.1	Exciter Lamp	5-8
5.5.2	Drive Belt Tension	5-9
5.5.3	Pinch Roller Assembly	5-9
5.5.4	Brake Assembly	5-10

SECTION VI ILLUSTRATED PARTS BREAKDOWN

6.1	General	6-1/2
6.2	Figure and Index Number	6-1/2
6.3	Part Number.	6-1/2
6.4	Description	6-1/2
6.5	Units Per Assembly	6-1/2
6.6	Usable On Code	6-1/2
6.7	Alternate Parts	6-1/2

SECTION VII REFERENCE DRAWINGS

APPENDIX A - WARRANTY

APPENDIX B - MANUFACTURING SPECIFICATIONS

APPENDIX C - TRANSISTOR AND DIODE SPECIFICATIONS

LIST OF TABLES

<i>Table</i>		<i>Page</i>
1-1	Model Descriptions	1-1
1-2	Basic Unit Specifications	1-3
1-3	Electronics Unit Specifications.	1-6
1-4	Model 2540 Series Options.	1-9
1-5	Compatible Tape Handlers.	1-10
1-6	Tape Handler Interface Wiring.	1-10
1-7	Alternate Tape Handler Interface Wiring	1-10
2-1	Electronics Unit Interface.	2-3
2-2	Electronics Unit Voltage Measurements.	2-3
3-1	Operating Controls	3-1
4-1	Logic Symbols	4-1
5-1	Periodic Inspection Schedule.	5-3
5-2	Component Replacement Schedule	5-3
5-3	Circuit Waveforms	5-4
5-4	Trouble Isolation Guide	5-6

<i>Figure</i>	LIST OF ILLUSTRATIONS	<i>Page</i>
1-1	Model 2540	1-1
1-2	Recommended Solenoid Drive Circuit, Schematic Diagram	1-2
1-3	Solenoid Current Waveforms.	1-2
1-4	Typical Preamplifier Circuit, Simplified Schematic	1-5
1-5	Relative Coincidence of Sprocket and Data Channel Outputs	1-5
1-6	Recommended Sprocket and Data Channel Interface Wiring	1-7
1-7	Channel Output Circuit, Simplified Schematic Diagram	1-8
1-8	Tape Load and Rewind Control, Interface Wiring.	1-8
1-9	Alternate Tape Load and Rewind Control, Interface Wiring	1-8
2-1	Outline Drawing	2-2
2-2	Interface Schematic Diagram, Basic Unit	2-4
3-1	Operating Controls	3-1
3-2	Tape Path	3-2
4-1	Basic Unit, Functional Block Diagram	4-1
4-2	Electronics Unit, Logic Diagram.	4-2
5-1	Component Locations	5-2
5-2	Solenoid Radial Gap Adjustment	5-5
5-3	Capstan Bearing Preload Adjustment	5-7
5-4	Exciter Lamp Vertical Positioning	5-8
5-5	Drive Belt Tension Adjustment.	5-9
5-6	Pinch Roller/Capstan Centerline Adjustment	5-9
5-7	Pinch Roller and Capstan Parallelism	5-10
5-8	Brake Armature Positioning.	5-10
6-1	Reader Panel Assembly (Sheet 1 of 2).	6-4
6-1	Reader Panel Assembly (Sheet 2 of 2).	6-12
6-2	Pinch Roller Assembly	6-13
6-3	Brake Assembly	6-15
6-4	Photo Head Assembly, Standard 5-8 Channel	6-17
6-5	Photo Head Assembly, Standard/Teletypesetter	6-19
6-6	Power Supply Assembly.	6-23
6-7	Printed Circuit Board Assembly	6-25
6-8	End of Tape Assembly	6-26
6-9	Connector Assembly	6-27/28
7-1	Model (B)2540T, Schematic Diagram	7-3
7-2	Model (B)2540EP, Schematic Diagram	7-4
7-3	End of Tape Sensor, Schematic Diagram	7-5

SECTION I INTRODUCTION

1.1 GENERAL

The Digitronics Model 2540 Series Perforated Tape Reader (Figure 1-1) is designed to read 5-, 6- and 7-, or 8-level perforated tape in the forward or reverse direction at speeds to 600 characters per second. The Model 2540 combines a patented-design readhead with integrated circuit channel amplifiers and results in a modern, accurate, and reliable means for high-speed reading of perforated tape. The Model 2540 converts information punched on tape into dc signal levels which are fully compatible with integrated circuit logic.

This section describes the models of the 2540 series and outlines the applications, specifications, options, and systems requirements. In addition, a physical description of the unit and information on compatible tape handlers is provided.

1.2 MODEL DESCRIPTIONS

The basic Model 2540 is a unidirectional or bidirectional tape transport available on a 10- or 19-inch wide panel, to which one or both of the following sub-assemblies may be added:

- a. Electronics Unit (unidirectional or bidirectional): features integrated circuit channel amplifiers and discrete component drive circuits.
- b. Power Supply: supplies all of the operating and drive voltages required by the basic reader and the electronics unit.

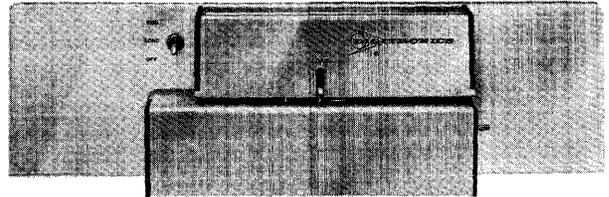


Figure 1-1. Model 2540

The model numbers for the different configurations of the 2540 Series Reader are given in Table 1-1.

1.3 APPLICATIONS

The Model 2540 Series Readers may be used in the assembly of digital computers or numerically controlled machine tools. The units can also be used with ground support equipment, high-speed printers, and other instrumentation systems.

1.4 BASIC UNIT

The basic unit includes the readhead assembly which consists of an exciter lamp, collimating lens, and the readhead with built-in discrete component preamplifiers for the sprocket channel and the data channels. Standard 200, 300, 400, and 600 character-per-second unidirectional units have direct-drive capstans; other speeds have indirect-drive capstans. Bidirectional units have indirect-drive forward capstans at speeds

Table 1-1. Model Descriptions

MODEL NUMBER	DESCRIPTION
	<u>Unidirectional Unit</u>
2540T	Unidirectional tape transport; includes built-in readhead amplifiers
2540E	Unidirectional tape transport with electronics; includes integrated circuit channel amplifiers and drive circuits
2540EP	Unidirectional tape transport with electronics and power supply
	<u>Bidirectional Unit</u>
B2540T	Bidirectional tape transport; includes built-in readhead amplifiers
B2540E	Bidirectional tape transport with electronics; includes integrated circuit channel amplifiers and drive circuits
B2540EP	Bidirectional tape transport with electronics and power supply

to 600 characters per second, and direct-drive reverse capstans. Bidirectional units are available with a reverse speed of 200, 300, 400, or 600 characters per second which is determined by the selected forward speed.

1.4.1 Specifications

For the Model 2540 Series basic unit technical specifications, refer to Table 1-2.

1.4.2 Interface Requirements

External equipment interface requirements consist of a drive voltage and control signals for the pinch roller and brake solenoids to control tape movement, exciter lamp voltage, and readhead voltage.

The readhead input voltage and output signals are routed through a 12/24-pin printed circuit connector, and all other input signals and voltages are routed through a 22/44-pin printed circuit connector. Both interface connectors are supplied with hoods.

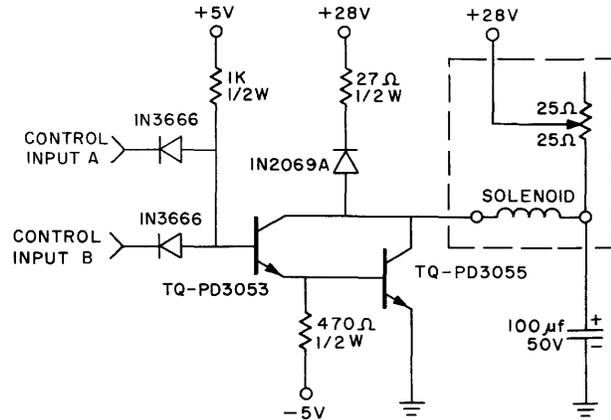
1.4.2.1 Pinch Roller and Brake Solenoids. The pinch roller and brake solenoids require a drive voltage of $+28 \pm 4$ volts. Control of tape movement requires that one side of each solenoid winding be connected to a drive circuit similar to the one shown in Figure 1-2. The pinch roller and brake solenoid current requirements are 1.0 ampere (holding) for both solenoids, with a 1.8 ampere surge for the pinch roller solenoid, and 1.4 ampere surge for the brake solenoid. (See Figure 1-3.)

1.4.2.2 Exciter Lamp. The exciter lamp is wired in series with a 15-ohm, 20-watt adjustable resistor (R1), and requires an input operating voltage of 24 ± 1.2 volts dc nominal with a maximum variation of 0.5%. The adjustable resistor is used to compensate for error in nominal voltage and lamp variation. Resistor R1 is adjusted to achieve a duty cycle of 60 to 80% on for the data channel outputs, and 35 to 45% on for the sprocket channel output while the reader is reading a fully punched test tape. With resistor R1 properly adjusted, the voltage across the lamp should be 16 to 20 volts.

1.4.2.3 Readhead. The built-in preamplifier circuits in the readhead require an operating voltage of $+5 \pm 0.5$ volts at 60 milliamperes (total), with a maximum ripple of 0.1 volt. This voltage should be regulated to 0.1 volt (or 2%). The readhead outputs are at +5 volts (open circuit) for a hole condition, and between 0 and +0.5 volts at 1.67 milliamperes maximum for a no-hole condition. During a hole condition, the readhead amplifiers pull to +5 volts through a 10,000-ohm resistor (Figure 1-4).

The readhead output duty cycles are 60 to 80% on, 40 to 20% off for the data outputs; 35 to 45% on, 65 to 55% off for the sprocket output.

The maximum variations to the relative coincidence



PARAMETERS @ 25°C	TQ-PD3053 (2N3053 Selected)	TQ-PD3055 (2N3055 Selected)
P _c	1W	100W
I _c (max)	0.5 a	10 a
BV _{cb} (min)	70v @ 1ma	100v @ 5ma
BV _{ces} (min)	60v @ 1ma	70v @ 5ma
BV _{eb} (min)	5v @ 1ma	5v @ 5ma
I _{cBO} (max)	0.25ma @ V _{ce} = 30v	10ma @ V _{ce} = 30v, T = 100°C
h _{FE} (min)	80 @ I _{ce} = 200ma	30 @ I _{ce} = 4 a
V _{ce} (max) *	1.5v @ I _{ce} = 200ma	1.2v @ I _{ce} = 4 a
V _{be} (max) *	1.2v @ I _{ce} = 200ma, V _{ce} < 1.5v	1.0v @ I _{ce} = 4 a, V _{ce} < 1.2v

* @ Saturation

Figure 1-2. Recommended Solenoid Drive Circuit, Schematic Diagram

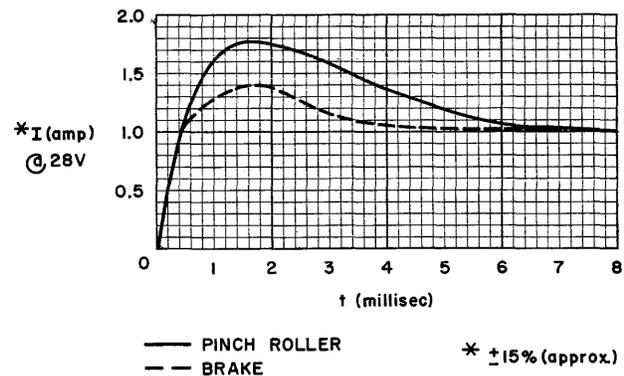


Figure 1-3. Solenoid Current Waveforms

of the sprocket and data channel outputs are -5 to +10% between the sprocket and any data channel (Figure 1-5).

1.5 ELECTRONICS UNIT

The electronics unit provides: (1) the additional features of sprocket and data channel amplifiers, and (2) solenoid drive circuits for the basic reader. The electronics unit attaches directly to a bracket assembly behind the reader panel, and consists of a single printed circuit board having integrated circuit sprocket and data channel amplifiers. Discrete solid-state

Table 1-2. Basic Unit Specifications

GENERAL

Read Mode

2540T Unidirectional.

B2540T Bidirectional.

Read Speeds (in characters/second;
given at 60 Hz line frequency)*Unidirectional 200, 300, 400, or 600
(direct drive)Unidirectional 100 to 600.
(indirect drive)

Bidirectional	Forward	Reverse
	100-200	200
150-300	300	
200-400	400	
300-600	600	

Asynchronous On units with slew speed of 300 characters/second or more;
up to 150 characters/second maximum (forward), or 75
characters/second maximum (reverse).Start Response The start response (time to advance one character) for units
with slew speeds of 300 characters/second or more, using
12% oiled, 0.0035 to 0.005 inch thick paper tape, is 10
milliseconds maximum.Stop Response. At 600 characters/second, on data holes of stop character or
in space following stop character (provided stop command is
applied within 50 microseconds of leading edge of sprocket
associated with stop character).Type of Tape Paper, paper-mylar, aluminized mylar, or solid mylar;
.0025 to .005 inch thick with no adjustment to pinch roller.
Tapes with up to 40 per cent transmissivity are acceptable
without electrical adjustments.Tape Width A three-position, operator adjustable tape guide enables
reading 11/16-to 1-inch (5- to 8-channel) tapes interchange-
ably. The tape guide is provided with a locking feature
which prevents accidental moving of the guide.

Input Tape Form Strip, reeled, fan-folded or loop with butt joints.

Tape Perforations According to EIA standards.

Tape Loading In-line.

Tape Leader Required 4 inches minimum.

*Speeds vary proportionally with line frequency.

Table 1-2. Basic Unit Specifications (Cont'd.)

READHEAD PREAMPLIFIER OUTPUTS

Hole	Pulls to +5 volts through a 10,000-ohm resistor.
No Hole	0 ^{+0.5} / _{-0.0} volts at 1.67 milliamperes maximum.
Duty Cycle	Data Outputs: 60 to 80% on. Sprocket Output: 35 to 45% on.
Coincidence	Sprocket center line occurs from -5% to +10% of centerline of any data channel.

POWER AND ENVIRONMENTAL

Readhead Circuits	+5 ± 0.5 volts at 60 milliamperes with 0.1 volt maximum ripple. Voltage must be regulated to 0.1 volt (2%).
Exciter lamp	24 ± 1.2 volts dc nominal at 1 ampere, with maximum variation of 0.5%.
Pinch Roller and Brake Solenoids	+28 ± 4 volts at 1.8 amperes maximum.
Drive motor	117 ± 10 volts 48 to 62 Hz, single phase ac at 0.65 amperes.
Power Dissipation	150 watts maximum.
Temperature	
Operating	0° to 55° Centigrade.
Storage	-55° to +65° Centigrade.
Humidity	
Operating	10 to 90%.
Storage	0 to 100% without condensation.
Underwriters Laboratories Specification	Unit designed to meet Underwriters Laboratories specification.

PHYSICAL CHARACTERISTICS

Front Panel Width	19 inches or 10 inches. (10-inch panel for use with rack adapter).
Front Panel Thickness:	
19-inch panel	$\frac{1}{2}$ inch.
10-inch panel	$\frac{1}{8}$ inch.
Front Panel Height	5 $\frac{1}{4}$ inches.
Mounting Holes	Spaced to fit RETMA rack (19-inch panel and 10-inch panel with rack adapter).

Table 1-2. Basic Unit Specifications (Cont'd.)

PHYSICAL CHARACTERISTICS (Cont'd.)

- Depth Behind Front Panel 7 inches.
- Protrusion From Front Panel 2 3/4 inches.
- Weight. 23 pounds net.
- Rack Adapter:
- Width 19 inches.
- Height. 7 inches.
- Thickness 3/8 inch.
- Weight. 5 pounds.

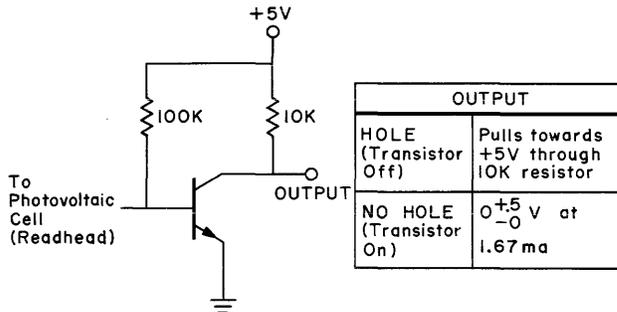


Figure 1-4. Typical Preamplifier Circuit, Simplified Schematic

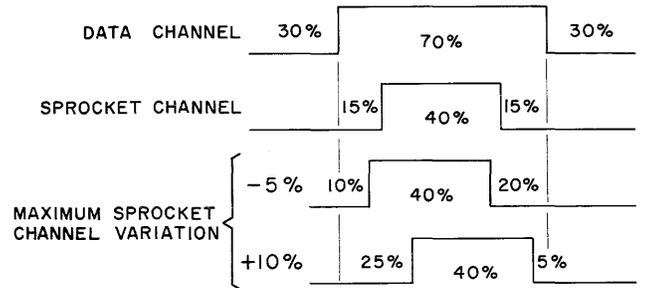


Figure 1-5. Relative Coincidence of Sprocket and Data Channel Outputs

component solenoid drive circuits and an exciter lamp voltage regulator are also contained on the printed circuit board.

1.5.1 Specifications

For technical specifications of the electronics unit, refer to Table 1-3.

1.5.2 Circuit Characteristics

The sprocket and eight data channel circuits amplify and shape the readhead outputs, providing sprocket and data outputs that are fully compatible with integrated circuit logic.

1.5.2.1 Data Channels. Each data output of the readhead is shaped by a Schmitt trigger circuit. The output of this circuit is applied to the interface connector for use by the external equipment. The output of the Schmitt trigger circuit in parallel with a 1000-ohm resistor tied to +5 volts, pulls toward +5 volts during a hole condition, and is at 0 volts during a no-hole condition. Connections are available at the interface connector for gating the data outputs internally using the internal sprocket (SPKTA) or externally.

The different gating choices are described in Paragraph 1.5.4.

1.5.2.2 Sprocket Channel. The sprocket output of the readhead is applied to two Schmitt trigger circuits which shape the sprocket signal into a square wave, permitting (at user's discretion) the use of the sprocket to gate the data outputs. The output of the first Schmitt trigger circuit is applied to the interface connector for use as an internal gating signal (SPKTA) and to the second Schmitt trigger circuit. The output of the second Schmitt trigger circuit, which is in parallel with a 1000-ohm resistor tied to +5 volts, pulls toward +5 volts during a hole condition and is at 0 volts during a no-hole condition. Both sprocket outputs (SPKTA and SPKTB) or, just the external sprocket output (SPKTB) may be controlled (enabled or inhibited) by the external equipment.

1.5.2.3 Pinch Roller and Brake Circuits. The electronics unit contains two identical drive circuits; one for the brake solenoid and one for the pinch-roller solenoid. Bidirectional units have a third drive circuit for the reverse pinch roller solenoid. The pinch roller and brake solenoids are mutually exclusive under control of run (forward or reverse)

Table 1-3. Electronics Unit Specifications

OUTPUTS

Hole	Pulls to +5 volts through 1000-ohm resistor in parallel with TTL output.
No Hole	
Data Channel	0 $\begin{matrix} +0.4 \\ -0.0 \end{matrix}$ volts at 5 milliamperes
Sprocket Channel	0 $\begin{matrix} +0.4 \\ -0.0 \end{matrix}$ volts at 15 milliamperes.
Output Duty Cycle	Data Outputs: 60 to 80% on. Sprocket Output: 35 to 45% on.
Output Signal Coincidence	Sprocket center line occurs from -5% to +10% of centerline of any data channel.

CONTROL SIGNAL REQUIREMENTS

Pinch Roller

Forward	Energize; 5 $\begin{matrix} +1.0 \\ -1.5 \end{matrix}$ volts. Deenergize; 0 $\begin{matrix} +0.4 \\ -0.0 \end{matrix}$ volts at 5 milliamperes.
Reverse (Bidirectional Unit)	Same as forward pinch roller.
Brake	Same as pinch roller.

POWER AND ENVIRONMENTAL

Logic Circuits	+5 \pm 0.25 volts at 150 milliamperes maximum with 0.1 volt maximum ripple and 0.2 volt maximum variation. -5 \pm 1 volts at 20 milliamperes maximum.
Solenoid and Lamp Circuits	28 \pm 4 volts dc at 2.8 amperes maximum.
Power Dissipation	25 watts maximum (card only).
Temperature	
Operating	0° to +55° Centigrade.
Storage	-55° to +65° Centigrade.
Humidity	
Operating	10 to 90%
Storage	0 to 100% without condensation.
Weight	0.5 pound (card only).

and stop signal inputs from the external equipment. The solenoids are energized when +5 volts is applied to their respective input, and deenergized when the input is at 0 volts.

1.5.2.4 Lamp Voltage Regulator. The lamp voltage regulator provides a regulated 24 volts dc to the exciter lamp.

1.5.3 Electronics Unit Interface Requirements

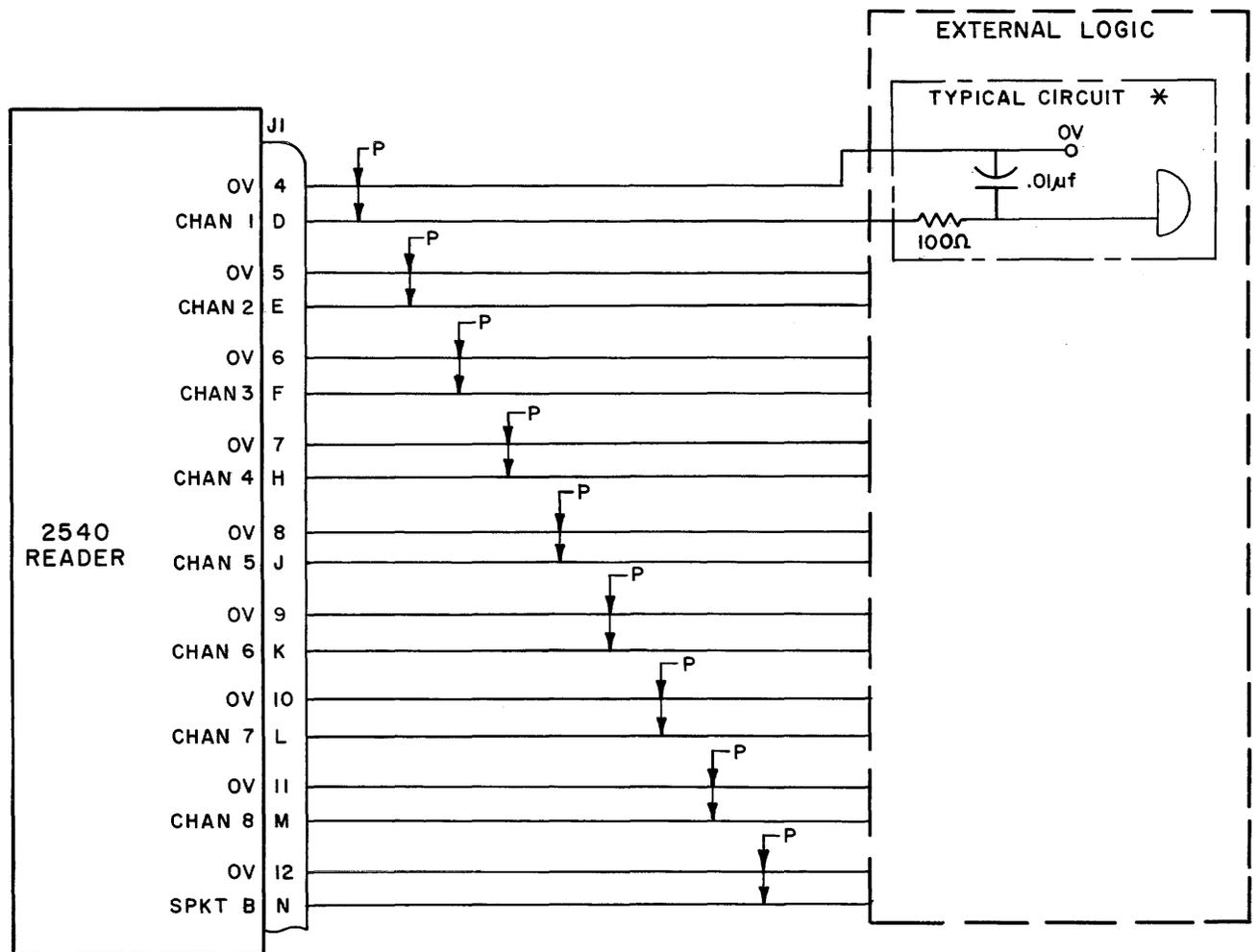
When the electronics unit is used, all input and output signals and voltages are routed through a 25/50-pin printed circuit interface connector (J1). The wires interfacing the data and sprocket outputs with the external logic should each be twisted with another wire connected to 0 volts for the suppression of noise. If the signal wires are one to ten feet long, it is recommended that an rc filtering network also be used. (See Figure 1-6.)

1.5.3.1 Data Outputs. The data channel outputs

are derived from a TTL Schmitt trigger circuit (Figure 1-7). For a hole condition, the output is connected to +5 volts through a 1000-ohm resistor in parallel with the TTL output. For a no-hole condition, the output is 0 ± 0.4 volts at 5 milliamperes (maximum).

1.5.3.2 Sprocket Output. Two sprocket outputs are available at the interface connector (SPKTA and SPKTB). Sprocket signal SPKTA is available as an internal gating signal. Sprocket signal SPKTB is available for use by the external equipment and its outputs are the same as the data channels except that for a no-hole condition, the output circuit is capable of handling a maximum current for 15 milliamperes instead of 5 milliamperes.

1.5.3.3 Tape Control. Control of tape movement requires the application of control signals to the brake drive circuit input (STOP) and each pinch roller drive circuit input (FWD and REV). The control



* R C NETWORK USED WITH SIGNAL LEADS 1-10 FT. LONG.

Figure 1-6. Recommended Sprocket and Data Channel Interface Wiring

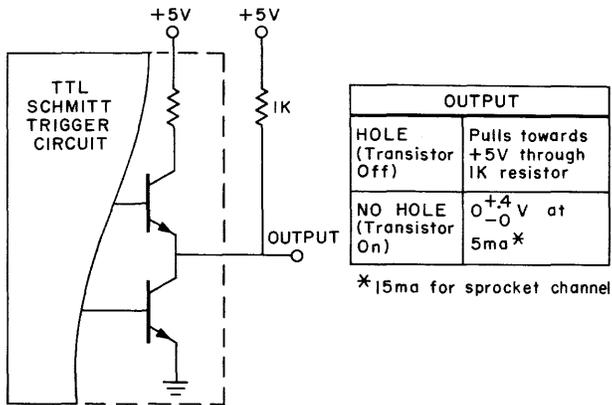


Figure 1-7. Channel Output Circuit, Simplified Schematic Diagram

signal requirements are: energize, $+5_{-1.5}^{+1}$ volts; deenergize, $0_{-0}^{+0.4}$ volts at 5 milliamperes. The input line to each drive circuit is gated with another input line (STOP CONTR, FWD CONTR, and REV CONTR) which is provided for additional control; e.g., tape load and rewind.

Deenergization of the brake and pinch roller solenoids for tape load and tape handler rewind can be provided by wiring the reader and interfacing it with the tape handler as shown in Figure 1-8 or, if permitted by the customer's application, wired as shown in Figure 1-9. When wired in this manner, the pinch roller and brake solenoids are inhibited, thereby preventing the solenoids from being energized when the reader Power switch is in the LOAD position or when the tape handler is in the rewind mode.

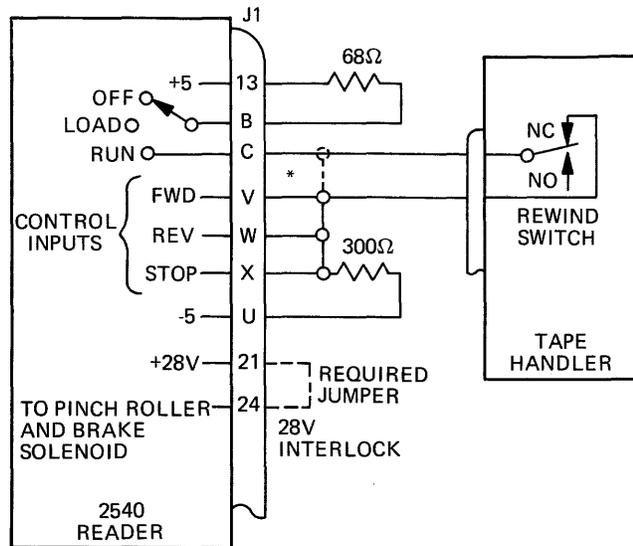
1.5.3.4 Operating Voltage Requirements. The electronics unit requires the following operating voltage inputs:

- a. $+5 \pm 0.25$ volts at 150 milliamperes maximum; ripple, 0.1 volt maximum; variation, 0.2 maximum
- b. -5 ± 1 volts at 20 milliamperes maximum
- c. 28 ± 4 volts dc at 2.8 amperes maximum

1.5.4 Data Gating Facilities

The different choices available (for gating of data) are described in the paragraphs which follow. Gating is accomplished by wiring sprocket signal SPKTA to the appropriate pin of J1 (for internal gating with sprocket) or by an external signal. All gating lines are enabled when left floating.

1.5.4.1 Data Control Common. The data control common line is used to gate all eight data channels.



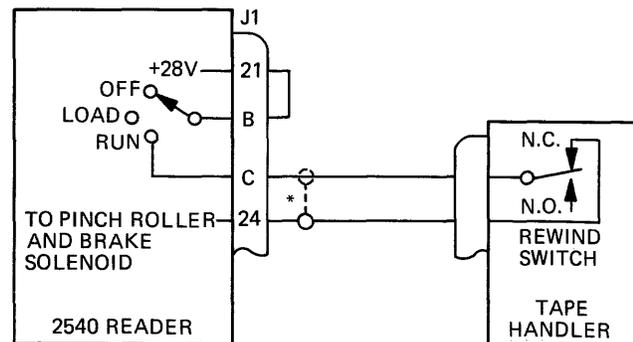
* IF READER IS NOT WIRED TO TAPE HANDLER, OR IF USED WITH MODEL 6012 TAPE HANDLER, J1-C AND J1-V MUST BE WIRED TOGETHER.

Figure 1-8. Tape Load and Rewind Control Interface Wiring

The external gating signal requirements are: inhibit, $0_{-0}^{+0.4}$ volts at 15 milliamperes; enable, $5_{-1.5}^{+0}$ volts.

1.5.4.2 C12345. The C12345 gating line is used to gate data channels 1 through 5. The external gating signal requirements are: inhibit, $0_{-0}^{+0.4}$ volts at 9.3 milliamperes; enable, $5_{-1.5}^{+0}$ volts.

1.5.4.3 C6, C7, C8. The C6, C7, and C8 gating lines are used for gating data channels 6, 7, and 8 individually. The external gating signal requirements



* IF READER IS NOT WIRED TO TAPE HANDLER, OR IF USED WITH MODEL 6012 TAPE HANDLER, J1 - C AND J1 - 24 MUST BE WIRED TOGETHER.

Figure 1-9. Alternate Tape Load and Rewind Control, Interface Wiring

are: inhibit, $0^{+0.4}_{-0}$ volts at 1.9 milliamperes, enable:
 $+5^0_{-1.5}$ volts.

1.5.4.4 Sprocket Control. Two lines (CSA and CSB) are available at the interface connector for external control of sprocket. Both sprocket outputs (SPKTA and SPKTB) are controlled by CSA and sprocket output SPKTB only is controlled by CSB.

The control signal requirements are: inhibit, $0^{+0.4}_{-0}$ volts at 1.9 milliamperes; enable, $5^{+0}_{-1.5}$ volts.

The sprocket outputs are enabled when CSA and CSB are left floating.

1.6 POWER SUPPLY

The power supply is a self-contained assembly that mounts to the rear of the reader panel or rack adapter. It provides all of the operating and drive voltages required by the basic reader and the electronics unit. The primary of the power supply transformer contains a dual winding which is wired for operation with either 115 or 230 volts ac, 48-62 Hz. When the power supply is used, the 19-inch reader or rack adapter (with 10-inch panel) is required. The specifications of the power supply are:

Power Requirements. . . 117 or 230 volts $\pm 10\%$,

48-62 Hz. single phase ac.

Power Dissipation. . . . 135 watts maximum.

Weight 7.5 pounds.

1.7 MANUAL CONTROLS

1.7.1 Power Switch

Three-position (OFF, LOAD, RUN). two-pole toggle switch. Section A contacts, closed in RUN position only, may be used to deenergize pinch roller and brake solenoids for loading tape. Section B contacts apply ac power to drive motor when switch is in LOAD or RUN position.

1.7.2 Tape Width Selector

Adjustable tape guide mechanism allows reading 11/16-, 7/8-, or 1-inch tapes. A locking feature prevents accidental moving of the tape guide control.

1.7.3 Tape Load Lever

Disengages front tape guides to allow insertion and removal of tape.

1.8 OPTIONS

The options for the Model 2540 Series are listed in Table 1-4.

Table 1-4. Model 2540 Series Options

OPTIONS	DESCRIPTION
Teletypesetter Head	Enables reading of 6 channel Teletypesetter tapes with advanced sprocket.
Teletypesetter/Standard Head	Enables reading of 6 channel Teletypesetter tapes with advanced sprocket and all standard tapes.
End-of-Tape Sensor	Provides indication for end-of-tape condition with all size tapes without adjustment.
Load Lever Status Switch	Indicates position of load lever via contact closure.
Tape Width Status Switch	Provides external indication of tape guide position via contact closure.
220-230 Volt, 50 Hz Unit	Operates on 220 to 230 volt, 48 to 62 Hz ac line power.
Rack Adapter (19 x 5-1/4 inch)	For mounting reader with 10-inch wide panel in 19-inch wide RETMA rack.
Rack Adapter (19 x 7 inch)	For mounting reader with 10-inch wide panel in 7-inch high space on 19-inch wide RETMA rack.
Fan-Fold Tape Bins	Fan-Fold tape bins on 19-inch wide by 7-inch high rack adapter, for reading fan-fold tapes at speeds to 300 characters per second.
Line Cord	For connecting ac line power.

1.9 COMPATIBLE TAPE HANDLERS

The Digitronics Tape Handlers which are compatible with the Model 2540 Series Readers are listed in Table 1-5. When used with the Model 2540E, B2540-

E, 2540EP or B2540EP, the Model 6040 tape handlers listed in Table 1-5 should be wired to the reader as shown in Table 1-6 so that the reader solenoids are deenergized during rewind (as described in Paragraph 1.5.3.3).

Table 1-5. Compatible Tape Handlers

TAPE HANDLER MODEL	TAPE SERVO	REWIND	REEL SIZE AND CAPACITY
6012	Unidirectional; up to 300 characters per second	Unidirectional 40 inches/second	4-5/8 inch outside diameter, 300 feet of 4.5 mil tape
6040A	Bidirectional; up to 700 characters per second	Bidirectional 180 inches/second	8-inch outside diameter, 600 feet of 4.5 mil tape
6040B	Bidirectional; up to 700 characters per second	Bidirectional 180 inches/second	10-1/2-inch outside diameter, 1200 feet of 4.5 mil tape

Table 1-6. Tape Handler Interface Wiring

FROM	TO
READER CONNECTOR J1	6040 J1-
C	6
V	4

Table 1-7. Alternate Tape Handler Interface Wiring

FROM	TO
READER CONNECTOR J1	6040 J1-
C	6
24	4

SECTION II INSTALLATION

2.1 GENERAL

This section describes the procedures for the proper installation of the equipment. Initial checkout procedures are also provided.

2.2 UNPACKING

The perforated tape reader is shipped in a reinforced packing case designed to provide maximum protection during handling and transportation. This packing case is reusable and should be retained for possible future reshipment of the equipment. Care should be exercised while unpacking to prevent damage to the equipment.

Note

On bidirectional units, a shipping spacer is inserted between the drive motor and the front panel. This spacer should be removed prior to the reader being put into service.

All parts of the equipment should be checked against the packing list to ensure that the shipment is complete. A visual check should be performed to verify that the equipment sustained no damage in transit. This check may avoid excessive down time after installation. Should this inspection result in the discovery of damage or an incomplete shipment, the carrier and Digitronics Corporation should be notified immediately.

CAUTION

Do not apply ac power to the reader with tape in position, unless external control signals are present to prevent simultaneous energizing of the pinch roller and brake solenoids.

2.3 MECHANICAL INSTALLATION

The unit is designed to be mounted in a 10-inch wide space (with 10-inch panel), or a 19-inch RETMA equipment rack (with 19-inch panel or 10-inch panel with rack adapter). Complete dimensions of the unit are given in Figure 2-1. Natural cooling is sufficient to ventilate the unit when mounted in an open rack; however, mounting in a closed cabinet with other heat producing equipment requires that forced air or other methods of cooling be provided.

2.4 ELECTRICAL INSTALLATION

The electrical installation of the equipment consists

of wiring the interface mating connector(s) and applying ac line power.

CAUTION

Do not apply ac power to the reader with tape in position, unless external control signals are present to prevent simultaneous energizing of the pinch roller and brake solenoids.

2.4.1 Mating Connector Wiring

2.4.1.1 Models 2540T and B2540T. Wire the 12/24-pin readhead mating connector (P2) and the 22/44-pin interface connector (P3) to the external equipment using Figure 2-2 as a guide. (Refer to Paragraph 1.4.2 for reader interface requirements.)

2.4.1.2 Models 2540E, B2540E, 2540EP, B2540EP. Wire the 25/50-pin interface mating connector (J1) to the external equipment using Table 2-1 as a guide. (Refer to Paragraphs 1.5.3 and 1.9 for special interface wiring considerations.)

2.4.2 AC Power

Apply 117 volts, 50 or 60 Hz line power to reader terminal board TB1 as follows:

AC Hot - TB1-2
AC Neutral - TB1-3
AC Gnd. - TB1-1

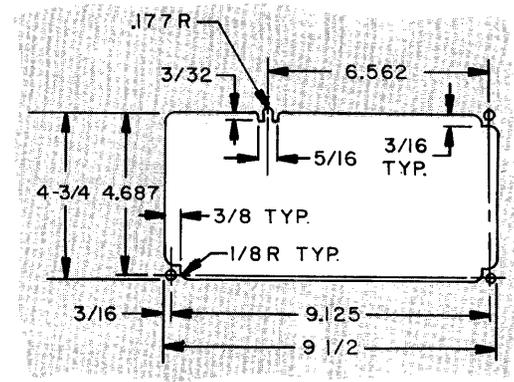
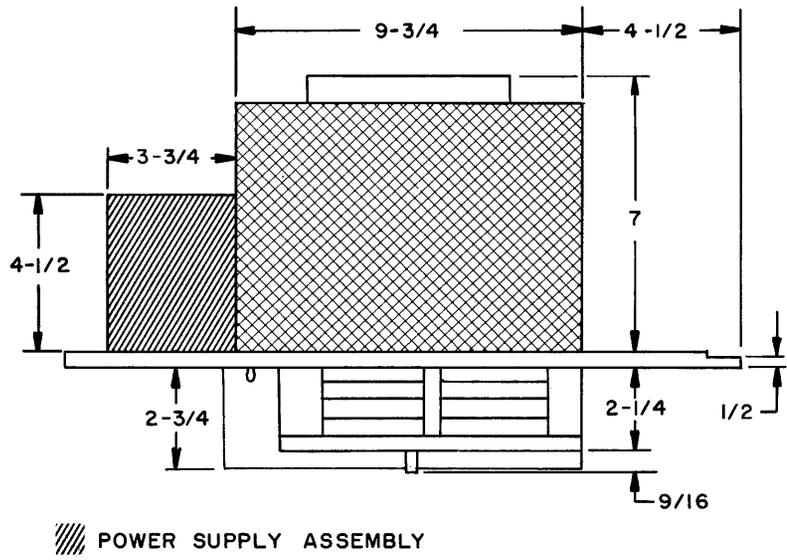
2.5 INITIAL INSTALLATION CHECKS

Following the installation of the equipment it is recommended that the following checks be performed to verify the proper operation of the equipment.

2.5.1 Voltage Checks

The reader operating voltages (from the external equipment or power supply) should be checked to ensure that they are within specified tolerances.

Externally supplied voltages to the basic unit should be checked at their external source. (Refer to Paragraph 1-4 for voltage requirements). The electronics unit voltages (given in Table 2-2) can be checked at their respective edgeboard connections (refer to Figure 5-1).



CUTOUT FOR MOUNTING
READER WITH IO-INCH PANEL

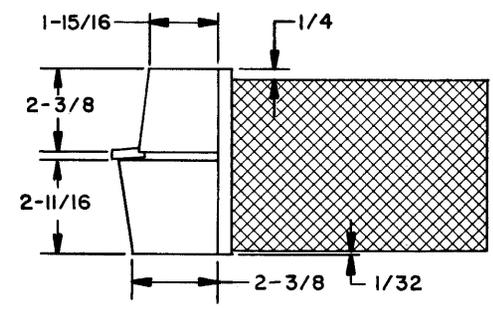
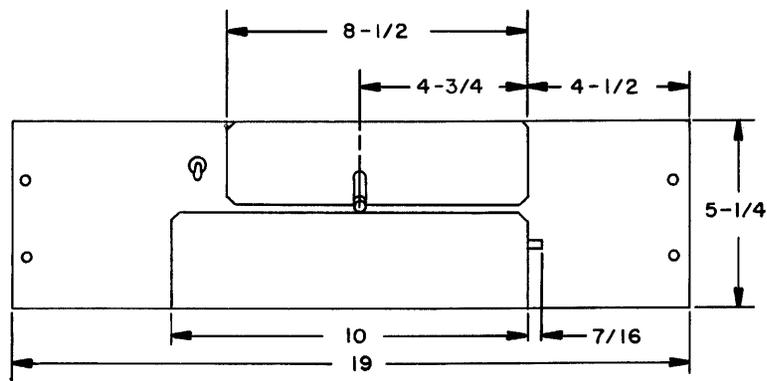
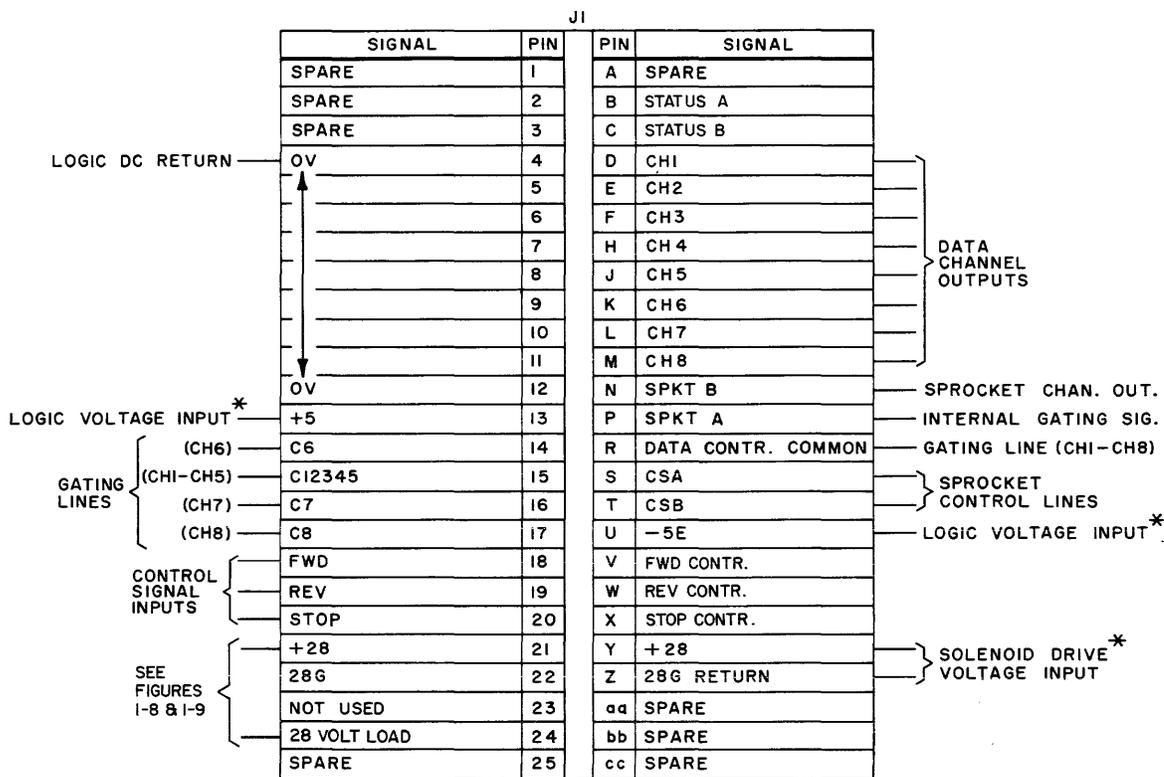


Figure 2-1. Outline Drawing

Table 2-1. Electronics Unit Interface



* SUPPLIED BY POWER SUPPLY ON (B)2540EP.

2.5.2 Performance Checks

The following checks should be performed to verify the proper overall operation of the equipment.

- a. With ac power applied, and the Power switch in the RUN position, swing open top door (see Figure 3-2) and observe that the capstan(s) rotate.
- b. Load tape and prepare reader for operation in accordance with Section III.
- c. Operate external equipment to obtain succes-

sive run and stop control signals and observe that tape motion follows the control signals.

Table 2-2. Electronics Unit Voltage Measurements

VOLTAGE	TOLERANCE
-5	± 1
+5	± 0.25
+28	± 4

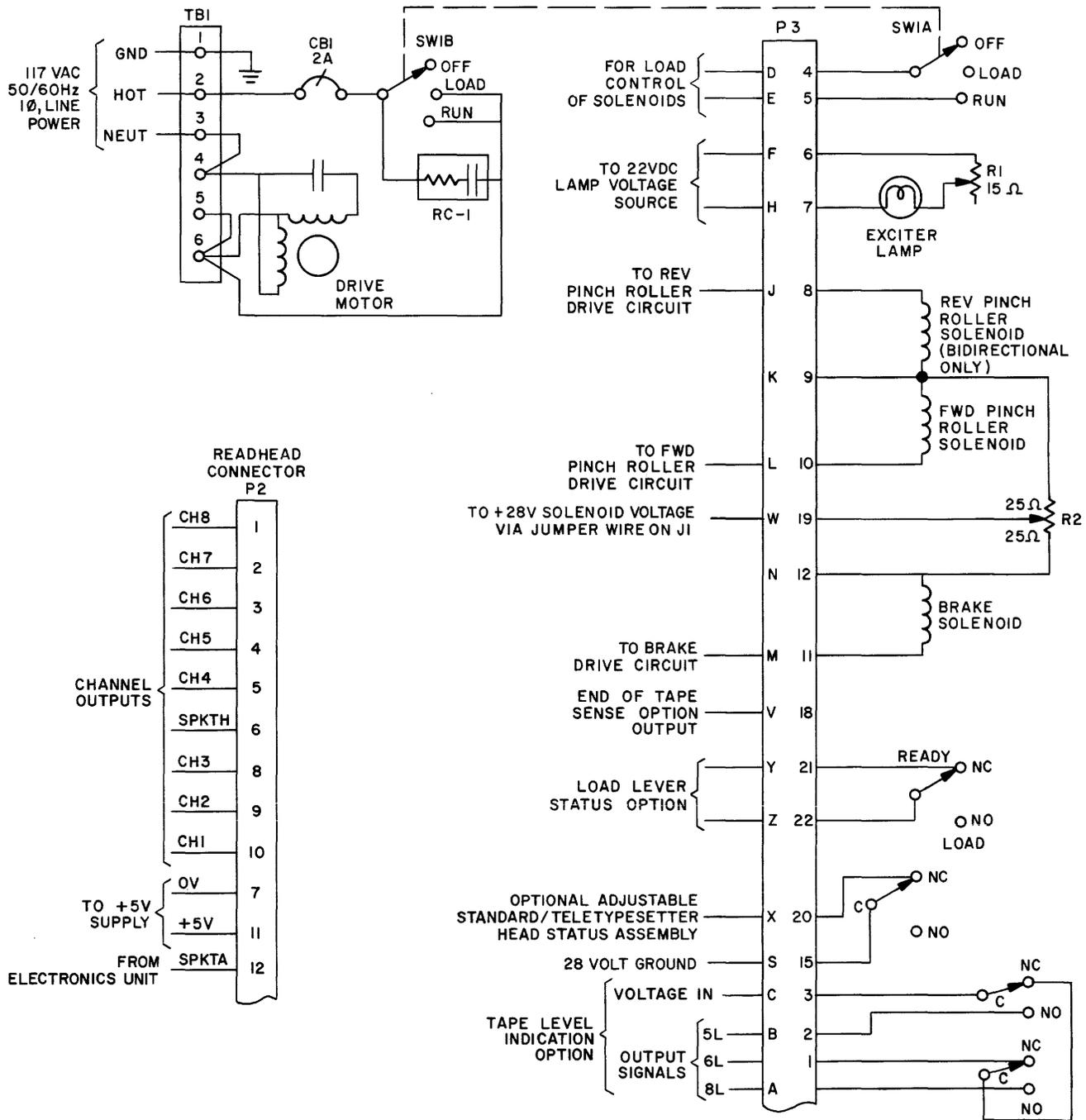


Figure 2-2. Interface Schematic Diagram, Basic Unit

SECTION III OPERATING PROCEDURES

3.1 GENERAL

This section describes the operating controls, and the operating procedures for the equipment. It is assumed that the equipment has been properly installed and that the initial installation checks have been performed as described in Section II.

3.2 OPERATING CONTROLS

The operating controls (see Figure 3-1) and their functions are described in Table 3-1.

3.3 OPERATING PROCEDURES

The operating procedures consist of loading tape, and controlling the reading of tape.

3.3.1 Loading Tape

- a. Move Power switch to LOAD position.

- b. Move Tape Width selector to correct tape width position.
- c. Disengage front tape guides by moving Tape Load lever up (to LOAD position).
- d. Thread tape through reader with channel one side of tape nearest panel (see Figure 3-2).
- e. Engage front tape guides by moving Tape Load lever down.
- f. Move Power switch to RUN position.

The unit is now prepared for tape read operation.

3.3.2 Tape Read

Tape reading is controlled by the application of run and stop control signals from the external equipment. The control signal requirements are discussed in Section I.

Table 3-1. Operating Controls

CONTROL	FUNCTION
Power Switch	Three-position (OFF, LOAD, RUN), two-pole toggle switch. Section A contacts, closed in RUN position only, are used to deenergize pinch roller and brake solenoids for loading tape. Section B contacts apply ac power to motor when switch is in LOAD or RUN position.
Tape Width Selector	Adjustable tape guide mechanism allows reading 5 channel (11/16"), 6 and 7 channel (7/8") or 8 channel (1") tape. A locking feature prevents accidental moving of the tape guide control.
Tape Load Lever	Disengages front tape guides to allow insertion and removal of tape.

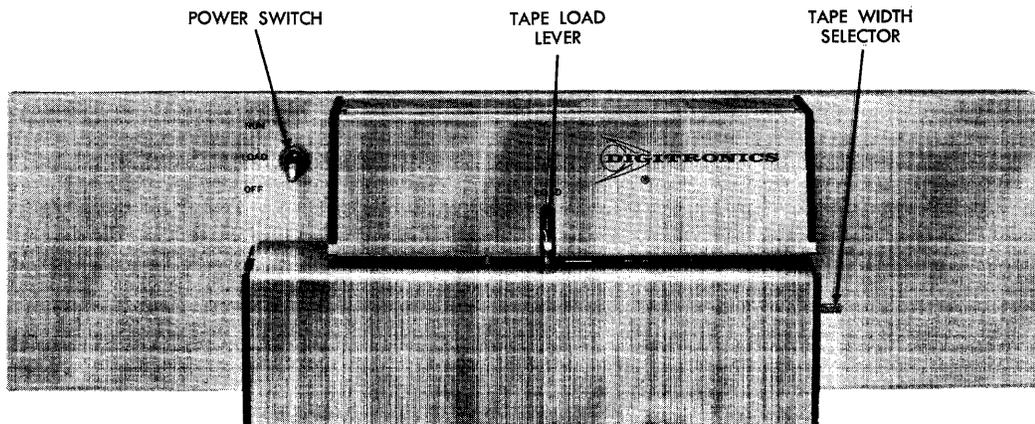


Figure 3-1. Operating Controls

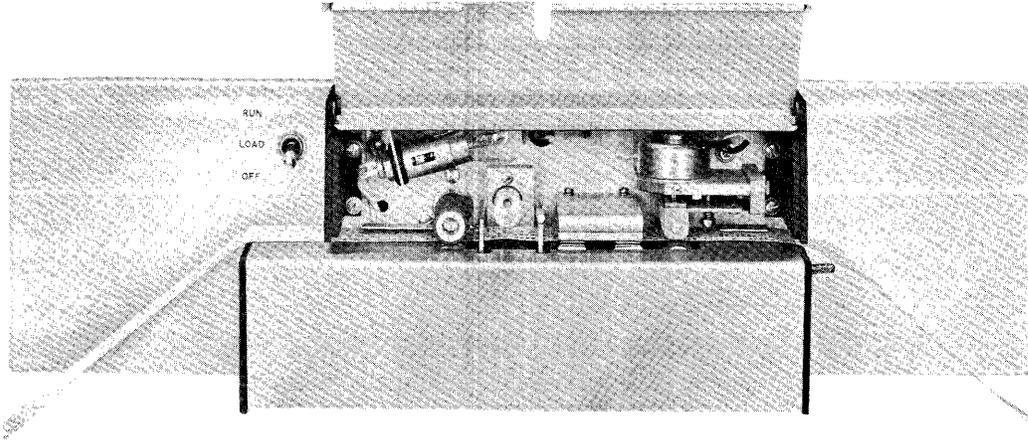


Figure 3-2. Tape Path

SECTION IV THEORY OF OPERATION

4.1 GENERAL

This section describes the mechanical and electrical operation of the basic Model 2540 and its two major subassemblies; the electronics unit and the power supply. In addition, the optional end-of-tape sensor is discussed.

4.2 LOGIC SYMBOLS

The logic symbols used in this section are illustrated and described in Table 4-1.

Table 4-1. Logic Symbols

SYMBOL	DESCRIPTION
	AND gate
	Inverting amplifier (inverter)
	Non-inverting amplifier

4.3 FUNCTIONAL DESCRIPTION

4.3.1 Basic Unit

The basic unit (Model 2540T) consists of a tape transport, photovoltaic readhead and solid-state preamplifier. (See Figure 4-1.) When the Power switch is set to the LOAD or RUN position, input ac power is applied through the switch to the drive motor. The drive motor turns the drive capstan. When the control circuits (external to the basic unit) energize the pinch roller solenoid, the pinch roller presses the tape against the rotating capstan, driving the tape across the readhead.

The light emitted by the exciter lamp is focused by a lens onto the readhead. Since the lamp has two filaments and the lens is cylindrical, the light is focused into two lines. The alignment of the lamp, lens, and readhead is such that the lines of light run through the photovoltaic cells in the readhead.

There are nine photovoltaic cells mounted in the

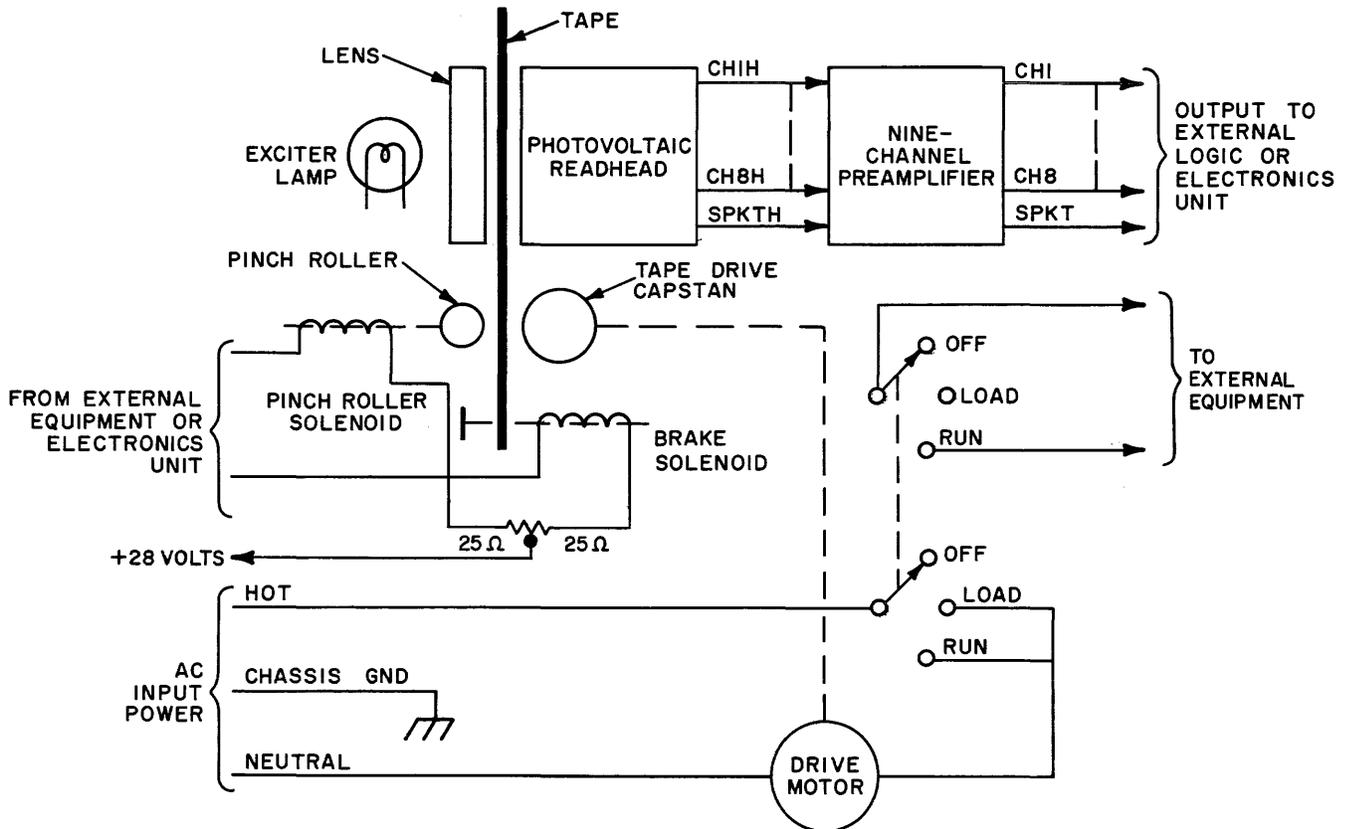


Figure 4-1. Basic Unit, Functional Block Diagram

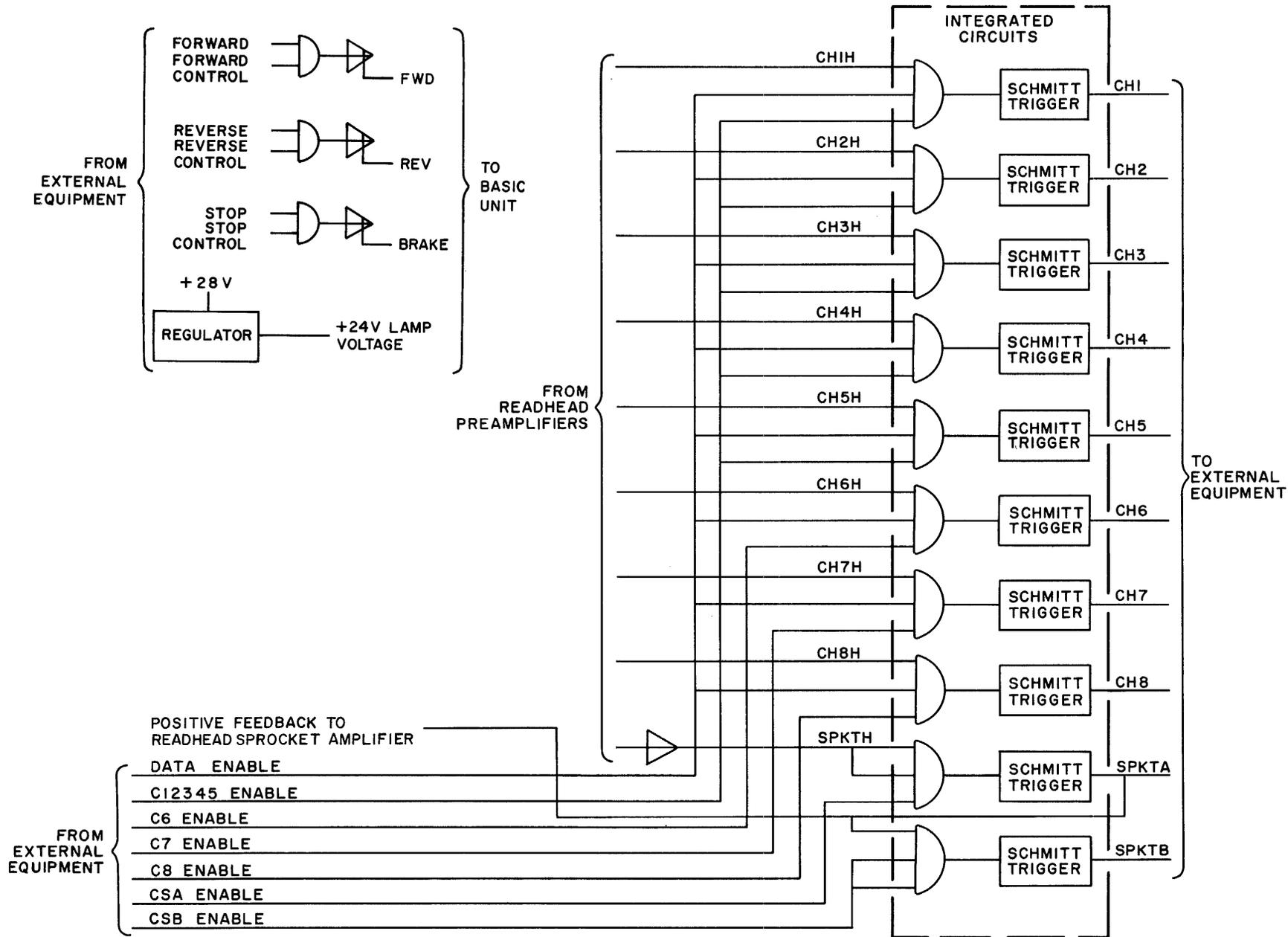


Figure 4-2. Electronics Unit, Logic Diagram

readhead, one for each channel on the tape. (The 2540 can read five through eight-level tape so that, when reading eight-level tape, nine cells are required, one for each data channel and one for the sprocket channel.) As the tape moves across the readhead, it prevents the light from striking the cells. However, each time a perforation (hole) in the tape passes over the readhead, light is allowed to pass and strike a cell, causing the cell to generate a voltage. The voltage is applied to the preamplifier. The preamplifier amplifies and inverts the photo-voltaic cell output and applies it to the external logic to indicate that a ONE bit has been read from the tape. As long as the hole in the tape is over the cell, the preamplifier output corresponding to that cell remains at +5 volts. When the hole has passed over the cell, the light is cut off, the cell voltage is turned off, and the preamplifier output is returned to 0 volts. As long as the pinch roller solenoid is energized, the tape is moved across the readhead and data is read from the tape.

To stop tape motion, the pinch roller solenoid is deenergized and the brake solenoid is energized. The pinch roller now moves away from the capstan, so that drive power is no longer applied to the tape, and the brake armature squeezes the tape between itself and the poles of the brake coil, sharply increasing the friction drag on the tape and stopping the tape. To start tape motion again, the brake solenoid is deenergized and the pinch roller solenoid is energized.

The bidirectional reader operates in the same manner as just described for the unidirectional unit, except that the motor drives two capstans (forward and reverse), and two pinch roller assemblies control tape motion. To drive the tape forward, the forward pinch roller solenoid is energized; to drive the tape in reverse, the reverse pinch roller solenoid is energized.

4.3.2 Electronics Unit

Note

The following discussion assumes that the reader is familiar with standard logic terminology.

The electronics unit performs two distinct functions: tape motion control and output data control. In addition, the electronics unit provides regulated +24 volts dc for the readhead exciter lamp in the basic unit.

To enable external control of tape motion, the electronics unit uses three AND-gate/inverter circuits. (See Figure 4-2.) Since all three circuits operate in the same manner, only the "forward" circuit is described.

The FORWARD control signal is applied to the AND gate in the forward circuit by the external equipment. If this signal is at logical ONE (+5 volts or floating), the AND gate is enabled. (This signal may be controlled by the Power switch through the external

circuits.) If the FORWARD signal now goes to logical ONE, the AND gate is satisfied and its output goes to logical ONE, turning on the inverter. The output of the inverter energizes the forward pinch roller solenoid in the basic unit. As long as both AND gate inputs remain at ONE, the inverter is held on and the pinch roller solenoid is energized. If either one of the AND gate inputs goes to logical ZERO (0 volts), the AND gate output goes to ZERO, the inverter is turned off, and the pinch roller solenoid is deenergized.

The electronics unit provides gating and pulse shaping for the data and sprocket pulses generated by the readhead in the basic unit. Each data channel output of the readhead is applied directly to an AND-gate/Schmitt trigger circuit. The sprocket channel output is amplified by a non-inverting amplifier and then applied to an AND-gate/Schmitt trigger circuit.

All three inputs of an AND gate must be at logical ONE for that gate to be satisfied. One input of each data gate (channels 1 through 8) is connected to the data control line. Therefore, to permit data from the readhead to be gated through the electronics unit, the external equipment must place a logical ONE (+5 volts or floating) on the data control line. (A control line inhibits a gate when it is grounded.) In addition, control lines are provided to set up the electronics unit for the level of tape being read. If five-level tape is being read, control line C12345 is placed at logical ONE. Control line C6 is used to enable data to be gated through the channel 6 AND gate; control lines C7 and C8 are used to enable the gating of data in channels 7 and 8 respectively. A sprocket signal (SPKTA) generated by the electronics unit is applied to the readhead sprocket circuit, as a positive feedback signal; reducing the time required for the sprocket preamplifier to reset. SPKTA may also be routed to the control lines to gate the data through the electronics unit.

The sprocket channel AND gates are controlled by the signals placed on control lines CSA and CSB. To enable the SPKTA (Sprocket A) signal to be generated, the CSA control line is placed at logical ONE. Both the CSA and CSB control lines are put at logical ONE to enable generation of both the SPKTA and SPKTB signals. (Since signal SPKTA is used to satisfy the AND gate which provides the SPKTB signal, SPKTB can never be generated without SPKTA being present and both CSA and CSB are required to generate SPKTB.)

The AND-gate/Schmitt-trigger circuit used in channel 1 operates in the following manner (since all 10 AND-gate/Schmitt-trigger circuits contained in the electronics unit operate in the same manner, only the channel 1 circuit is described).

When a hole is detected in the tape, the basic unit preamplifier places signal CH1 at a logical ONE. (See Figure 4-2.) If the data and C12345 control lines are at logical ONE, the output of the channel 1 AND gate goes to logical ONE, triggering its associated Schmitt trigger. The Schmitt trigger shortens the rise and fall times of the input signal. When the

hole has passed the readhead, signal CH1 returns to ZERO, causing the AND-gate and Schmitt-trigger outputs to go to ZERO.

4.4 CIRCUIT DESCRIPTION

4.4.1 Basic Unit, Detailed Analysis

4.4.1.1 Tape Drive System. Primary mechanical power for the tape drive system is provided by drive motor M1. (See Figure 7-1.) When Power switch SW1 is set to the LOAD or RUN position, the input ac line power is applied to the motor through circuit breaker CB1 and section B of SW1. (Network RC-1 suppresses arcing across the switch terminals when the switch setting is changed.) Since the input power is single-phase and M1 is a two-phase motor, motor capacitor C1 is supplied to provide a two-phase input to the motor.

In unidirectional units operating at 200, 300, or 400 characters per second, the capstan is mounted directly on the output shaft of M1. In unidirectional units operating at other speeds, the capstan is driven by M1 via a belt-and-pulley arrangement. In bidirectional units, the reverse capstan is mounted directly on the shaft of M1, while the forward capstan is driven via a belt and pulley arrangement.

To move tape, the pinch roller solenoid (forward or reverse) must be energized and the brake solenoid must be deenergized by the external circuits controlling the 2540; to stop tape motion, the brake solenoid must be energized and the pinch roller solenoid (forward or reverse) must be deenergized by the external circuits. Since all solenoids in the 2540 operate in the same manner, only the forward pinch roller solenoid is described.

The forward pinch roller solenoid is connected to pins L and 10 on connector P3 and to one side of resistor R2. The slider of R2 is connected to pins W and 19 of P3. A +28 volt dc supply voltage is applied through pins W and 19 to the slider of R2 by either the external equipment or (on Models 2540 EP and B2540EP) by the power supply contained in the 2540. To energize the forward pinch roller solenoid, the external equipment grounds either pin L or 10 of P3, thereby connecting the solenoid and one-half of R2 across the 28-volt supply. To deenergize the solenoid, the ground is removed.

4.4.1.2 Tape Read System. When a hole (ONE bit) in the tape passes over the readhead, light strikes a photovoltaic cell in the readhead (as described in Paragraph 4.3.1) causing the cell to produce a voltage. The positive side of each cell is held slightly positive by CR1 and R23 (as shown in Figure 7-1); while the negative side of each cell applies a negative voltage to the preamplifier when it is struck

by light. The data channel cells drive transistors Q1 through Q8; the output of the sprocket channel cell is applied to Q9. Since all the data channel amplifiers (Q1 through Q8) are identical, only the channel 1 (Q1) and sprocket channel (Q9 and Q10) amplifiers are described.

In the quiescent state, with no light applied to the channel 1 cell, the positive voltage applied to the base of Q1 through resistor R1 maintains Q1 saturated so that the output voltage of Q1 (at the collector) is 0 volts. In addition, the voltage applied to the common side of the cells by CR1 and R23 keep the leakage current at a minimum. When light strikes the channel 1 cell, the cell applies a negative voltage to the base of Q1; Q1 is turned off and its collector voltage goes to +5 volts, indicating that a ONE bit has been read from the tape.

With no light applied to the sprocket channel cell, the positive voltage applied to the base of Q9 maintains Q9 saturated, and the voltage at the collector of Q9 is 0 volts. This 0-volt level is applied to the electronics unit or external equipment, through connector P2 pin 6, SPKTH. In addition, the 0-volt level of SPKTA (from the electronics unit or external equipment) applied to the base of Q10, through resistor R20, maintains Q10 saturated. When light strikes the sprocket channel cell, the cell applies a negative voltage to the base of Q9. As the base voltage of Q9 begins to go negative, this voltage change is inverted and amplified, causing the collector voltage of Q9 to go positive. This positive voltage is fed to the electronics unit or external equipment as SPKTH; causing SPKTA, at P2 pin 12, to go positive. This positive going voltage is amplified and inverted by Q10, and applied to the base of Q9, reinforcing the original input and aiding in turning off Q9. In this way, Q10 reduces the time required to turn off Q9. When Q9 is off, its collector voltage rises to +5 volts indicating that a sprocket hole has been detected.

When the light is removed from the sprocket channel cell, the base voltage of Q9 is driven positive. When Q9 again begins to conduct and its collector voltage goes negative, Q10 again provides positive feedback, reducing the time required to saturate Q9 and drive its collector voltage to 0 volts.

4.4.2 Electronics Unit, Detailed Analysis

The electronics unit contains four discrete component circuits (three solenoid control circuits and a voltage regulator) and 10 integrated circuits (AND-gate/Schmitt-trigger combinations). Since all three solenoid control circuits are identical, only the circuit that controls the forward pinch roller solenoid is described.

The forward pinch roller solenoid control circuit consists of an AND gate (CR1-CR2) and a solenoid driver (Q1-Q2). (See Figure 7-1.) Inputs from the external control circuits are applied to the cathodes

of diodes CR1 and CR2. If the voltage on the cathode of CR1 is 0 volts, that diode is forward biased, and the output of the AND gate (taken from the anodes of CR1 and CR2) is clamped to 0 volts. If the voltages on the cathodes of both CR1 and CR2 are driven to +5 volts (or if the cathodes are left floating), the diodes are no longer forward biased and the output of the AND gate goes positive.

The output of the AND gate is applied to the base of transistor Q1. Transistors Q1 and Q2 form a Darlington amplifier which functions as follows; Q1 acts as an emitter-follower circuit, and therefore reproduces the voltage on its base at its emitter and provides current amplification for the base circuit of transistor Q2. (During the time Q2 is cut off the collector current of Q1 passes through the pinch roller solenoid, but this current is not large enough to energize the solenoid.) When the voltage at the emitter of Q1 is approximately 0 volts, Q2 is turned off. Under these conditions capacitor C1 charges to +28 volts through resistor R2, in the basic unit. (See Figures 7-1 and 7-2.) When the emitter voltage of Q1 goes positive, Q2 is turned on and saturated. When Q2 first turns on, C1 discharges through Q2 and the pinch roller solenoid, providing a large initial current pulse through the solenoid and reducing the time required for the solenoid to become energized. The collector current of Q2 then maintains the solenoid energized as long as Q2 is held on.

When the AND-gate output returns to 0 volts, the emitter voltage of Q1 goes to approximately 0 volts, turning off Q1. The solenoid current path is now interrupted and the solenoid is deenergized; however, because a magnetic field was built up around the solenoid when it was energized, voltage is induced in the solenoid by the collapsing field. The voltage induced in the solenoid forward biases diode CR3, causing an induced current to flow through CR3 and resistor R3, and thereby dissipating the energy contained in the solenoid magnetic field and preventing large voltage spikes from being induced in the solenoid.

The lamp voltage regulator maintains the voltage supplied to the exciter lamp in the basic unit at 24 volts. The +28 volt power from the dc power supply is applied to the voltage divider composed of resistor R10 and Zener diode CR10. Zener diode CR10 maintains the base voltage of transistor Q7 constant, eliminating the voltage variations which appear in the +28 volt supply power. If the 28-volt supply voltage goes more positive, the emitter voltage of Q7 goes more positive; however, in going more positive, the emitter voltage reduces the forward bias on the base of Q7, increasing the emitter-to-collector resistance to Q7 and causing the voltage change on the emitter to be virtually eliminated. (The change on the emitter is not eliminated, but the magnitude of the change is limited so that the change is negligible.) If the supply voltage becomes less positive, the effect is to increase the bias on the base of Q7, reduce the emitter-to-collector resistance of Q7, and again make the voltage change on the emitter negligible. Emitter-follower Q7 provides current amplification for the

base circuit of transistor Q8. Emitter-follower Q8 operates in the same manner as Q7 and provides the constant supply voltage to the exciter lamp.

The integrated circuits which gate and shape the output pulses of the preamplifier in the basic unit are contained in five dual in-line packages. Since these circuits are not repairable, a detailed analysis of these circuits is not presented. (For a functional description of the integrated circuits, refer to Paragraph 4.3.2.)

4.4.3 Power Supply, Detailed Analysis

The ac input power is applied to the primary windings of transformer T1. (See Figure 7-2.) Connected to the secondary of T1 are two full-wave rectifiers. One rectifier (composed of diodes CR1 and CR2) provides a positive dc output, while the other rectifier (diodes CR3 and CR4) provides a negative output.

The output of the negative rectifier is filtered by the RC filter composed of resistor R3 and capacitor C2. Resistor R3 and Zener diode CR6 form a voltage divider which reduces the -28-volt level available at the rectifier output to -5 volts.

The output of the positive rectifier is filtered by capacitor C1. The +28-volt power at the positive plate of C1 is made available at the output of the power supply. (Resistor R6 functions as a bleeder resistor for the positive supply.) The circuit composed of resistors R1, and R2, and Zener diode CR5, regulates the +5-volt output of the supply. Zener diode CR5 and R1 form a voltage divider which provides a constant reference voltage of +5.6 volts. Capacitor C3 filters the +5 volt output.

4.4.4 End-of-Tape Sensor, Detailed Analysis

The end-of-tape sensor consists of a photoconductive cell, a cell exciter lamp, a lamp voltage regulator, and a transistor amplifier. (See Figure 7-3.)

The lamp voltage regulator consists of transistor Q1 and diodes CR1 and CR2. This circuit and the lamp are connected in series with the readhead exciter lamp and lamp rheostat R1, located in the basic unit. The diodes and the base-emitter junction of Q1 drop approximately 1.2 volts, providing this voltage to the lamp.

The end-of-tape sensor is mounted on the 2540 so that the tape passes between the lamp and the photoconductive cell. When there is tape between the lamp and the cell, the light striking the cell is reduced, causing the cell to exhibit a high resistance. The voltage across the cell forward biases transistor Q2 and the output of the end-of-tape sensor (taken from the collector of Q2) is 0 volts.

When the end of the tape has passed through the end-of-tape sensor, the light from the lamp is allowed to strike the cell. The cell resistance falls, causing the voltage drop across the cell to become approximately 0 volts. Transistor Q2 is not cut off, and the output of the end-of-tape sensor rises to approximately +5 volts.

SECTION V

MAINTENANCE

5.1 GENERAL

This section contains preventive maintenance, component removal, and adjustment procedures. In addition, circuit waveforms and a trouble isolation guide are also provided.

The Illustrated Parts Breakdown, Section VI, should be used in conjunction with this section. Figure 5-1 shows the location of components in the Model 2540.

5.2 PREVENTIVE MAINTENANCE

Preventive maintenance should be performed to ensure trouble-free operation and to minimize equipment down time. Preventive maintenance of the Model 2540 consists of inspecting the equipment at periodic intervals, replacing certain components which have been in service for a specified time, and keeping the equipment clean and lubricated.

5.2.1 Periodic Inspection

The equipment should be inspected before being put into service and at periodic intervals thereafter. A complete inspection involves examination of electrical wiring and mechanical details, and a check of voltages and data and sprocket channel outputs. Table 5-1 is provided as a guide for periodic inspection; it is based on 40 hours of equipment operation per week. If equipment usage exceeds 40 hours per week, adjustments should be made to the schedule. If defects are evident during inspection, e.g., pinch roller worn or out of adjustment, component replacement and/or adjustment procedures should be performed immediately.

5.2.2 Periodic Component Replacement

Although the Model 2540 is designed for trouble-free operation, a certain amount of wear must be expected. For this reason, it is recommended that specified components be replaced in accordance with the schedule given in Table 5-2. The Component Replacement Schedule (Table 5-2) should be followed to ensure reliable, trouble-free operation.

5.2.3 Lubrication

Lubrication of the pinch roller solenoid shaft is provided by two oilite brushings and a felt pad saturated with SAE 10 oil. The felt pad should be replenished with oil after every 10,000,000 start/stop operations. The lubrication is more easily performed with the use of a hypodermic needle as follows:

a. Remove fillister head screw from front edge of pinch roller mounting bracket.

b. With hypodermic needle inject SAE 10 oil into hole until oil begins to overflow; replace fillister head screw.

Note

Care should be taken to prevent oil from spilling onto other components of the reader.

No other parts of the reader require lubrication. All bearings are permanently lubricated and double-shielded to prevent the entry of dust.

5.2.4 Cleaning

The reader components should be cleaned as often as required, depending on environmental conditions and operational intervals. The recommended solvent and a convenient brush for cleaning the components of the unit are provided in Digitronics Cleaning Kit MS-133. A solvent such as N-AMYL alcohol with a cotton swab or lint-free cloth can also be used.

5.3 CORRECTIVE MAINTENANCE

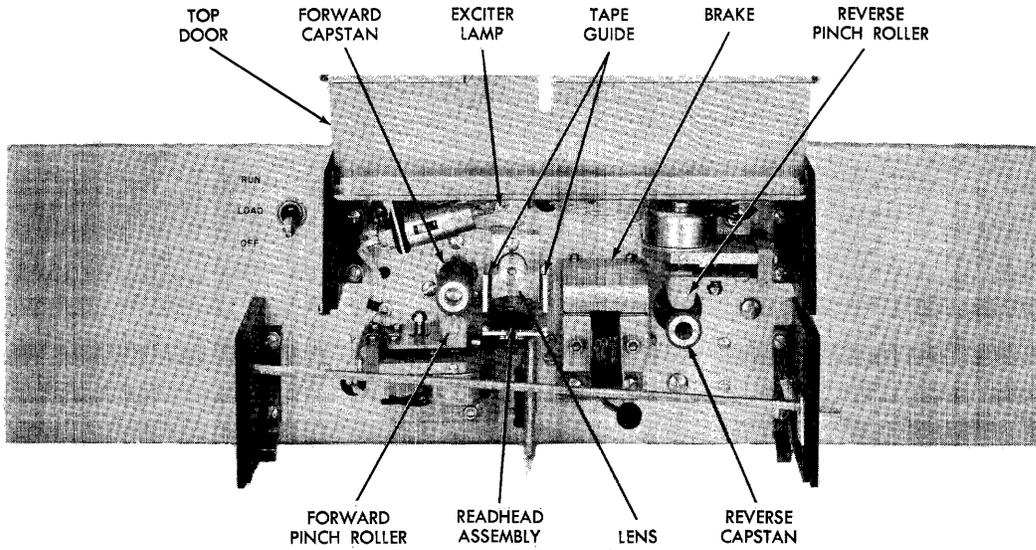
When the equipment has been properly installed and preventive maintenance has been carried out, any irregularities that occur in the performance of the equipment can be attributed to the failure of some component part. Since the unit has been factory adjusted, the adjustment procedures should not be undertaken until after corrective maintenance has proven ineffective or has resulted in replacement of parts.

When it becomes necessary to trouble-shoot the equipment, locate the defective circuit or component, using conventional trouble-shooting techniques. The Circuit Waveforms (Table 5-3) and Trouble Isolation Guide (Table 5-4) are provided as aids in localizing the trouble.

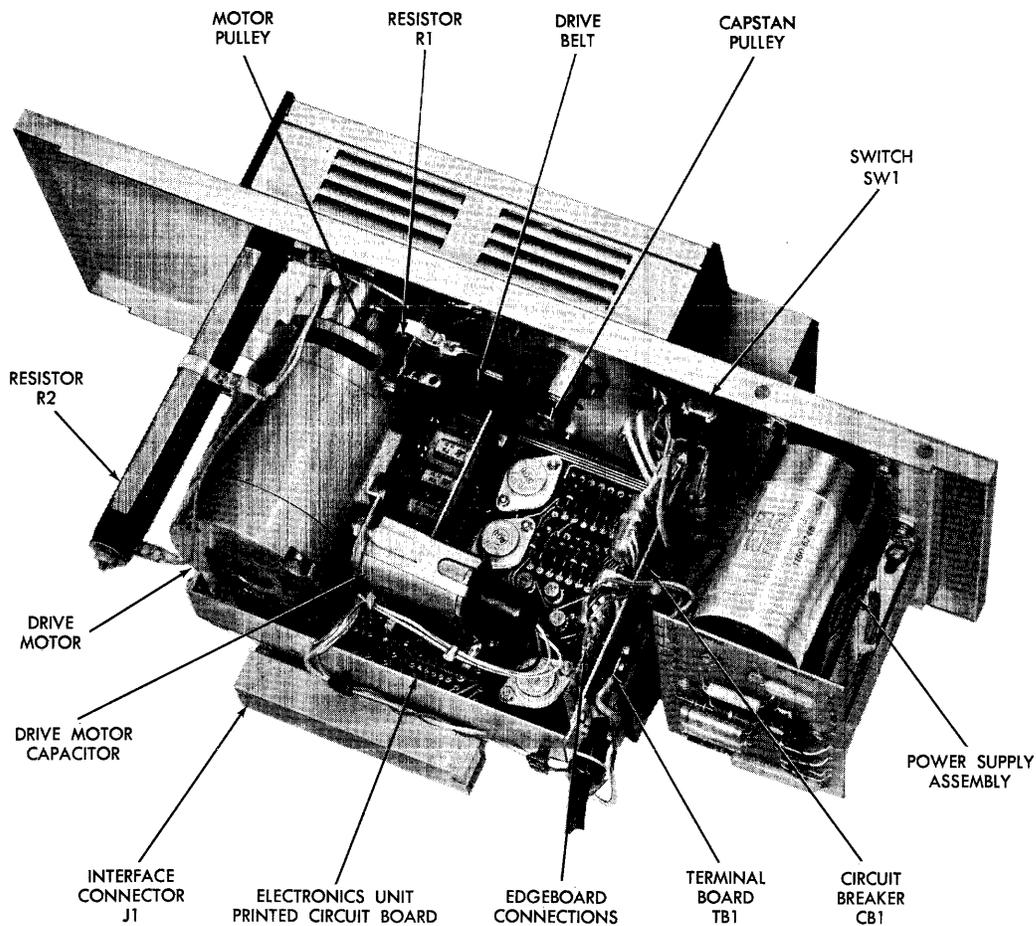
5.4 COMPONENT REMOVAL PROCEDURES

The procedures contained in the paragraphs which follow are included to aid service personnel in the removal and replacement of the exciter lamp, drive belt, pinch roller solenoid, brake solenoid, indirect drive capstan, drive motor, and readhead assembly.

The remaining replaceable components of the Model 2540 require no subsequent adjustments, extraordinary precautions, or other special attention beyond normal good practice. Unless otherwise indicated, replacement procedures are the reverse of removal procedures.



FRONT VIEW



REAR VIEW

Figure 5-1. Component Locations

Table 5-1. Periodic Inspection Schedule

DAILY	
Readhead, Lens and Lamp	Clean as required. (Refer to Paragraph 5.2.4.)
Pinch Roller	
Capstan	
Brake	
MONTHLY	
Pinch Roller Assembly	Check adjustments. (Refer to Paragraph 5.5.3.)
Drive Belt	Check for wear and slippage.
Brake	Check brake assembly adjustment. (Refer to Paragraph 5.5.4.)
SEMI-ANNUALLY	
All moving parts	Check for wear.
Operating Voltages	Check for proper levels. (Refer to Section II, Paragraph 2.5.1.)
Exciter Lamp	Check exciter lamp adjustment. (Refer to Paragraph 5.5.1.)

Table 5-2. Component Replacement Schedule
(Refer to Paragraph 5.4)

ITEM	REPLACE AFTER	APPROXIMATE REPLACEMENT TIME
Drive Belt	20,000 hrs.	3 min.
Exciter Lamp Bulb	2,000 hrs.	20 min.
Capstan Bearing (indirect drive capstan only)	20,000 hrs. or 500 million start/stop operations	18 min.
Capstan(s)	8,000 hrs. or 500 million start/stop operations	5 min.
Pinch Roller Bearings	20,000 hrs. or 500 million start/stop operations	15 min.
Pinch Roller Solenoid(s)	10,000 hrs. or 500 million start/stop operations	20 min.
Motor	30,000 hrs.	25 min.
Brake Assembly	10,000 hrs.	12 min.

5.4.1 Exciter Lamp

The exciter lamp has a bayonet type base and is removed by applying pressure toward the lamp socket and twisting the lamp counterclockwise.

Replacement of the exciter lamp may require that the lamp holder assembly be repositioned, and the lamp voltage be readjusted to compensate for lamp to lamp variation. (See Paragraph 5.5.1.)

5.4.2 Drive Belt

Replacement of the drive belt (indirect drive unidirectional, and bidirectional units) may require that the tension of the new belt be adjusted.

To replace the drive belt, proceed as follows:

- a. Slip belt off (forward) capstan pulley.
- b. Slide belt off motor shaft (and reverse capstan on bidirectional units) by working belt through motor shaft/capstan hole in front panel.
- c. Install new belt and refer to drive belt tension adjustment procedure (Paragraph 5.5.2).

5.4.3 Pinch Roller Solenoid

- a. Remove lower cover by lifting top ends of cover and sliding cover forward.

Table 5-3. Circuit Waveforms

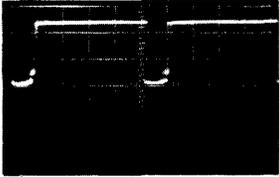
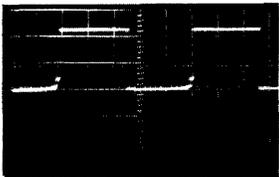
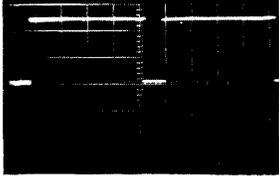
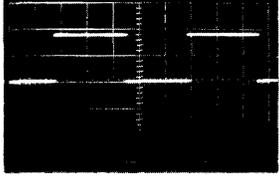
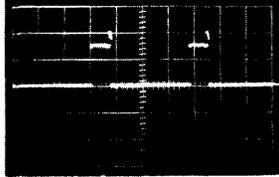
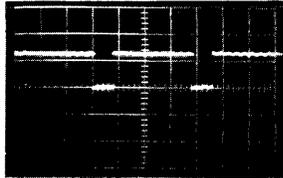
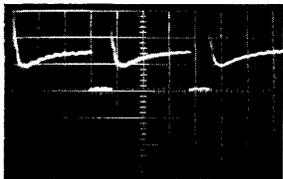
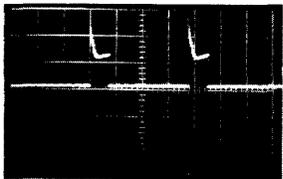
Waveform (Refer to Fig. 7-2)	Oscilloscope Setting			Trigger	Oscilloscope Presentation
	Vert. (v/cm)	Horiz. (ms/cm)	Trigger Mode		
W1	2.0	0.5	Ext. (-)	Channel 1 output (CH1)	
W2	2.0	0.5	Ext. (-)	Channel 1 output (CH1)	
W3	2.0	0.5	Ext. (-)	Channel 1 output (CH1)	
W4	2.0	0.5	Ext. (-)	Channel 1 output (CH1)	
W5	2.0	5.0	Ext. (-)	Forward run signal (FWD)	

Table 5-3. Circuit Waveforms (Cont'd.)

Waveform (Refer to Fig. 7-2)	Oscilloscope Setting			Trigger	Oscilloscope Presentation
	Vert. (v/cm)	Horiz. (ms/cm)	Trigger Mode		
W6	2.0	5.0	Ext. (-)	Forward run signal (FWD)	
W7	20.0	5.0	Ext. (-)	Forward run signal (FWD)	
W8	20.0	5.0	Ext. (-)	Forward run signal (FWD)	

b. Remove two solenoid leads from edgeboard connections PR-F1 and PR-F2 (forward) or PR-R1 and PR-R2 (reverse); separate from harness and pull leads through hole in front panel.

c. Remove pinch roller assembly from front panel by removing two socket head mounting screws, lockwashers, and flatwashers from front of solenoid mounting bracket.

d. Remove locknut, compression spring, and flatwasher from spring stud.

e. Remove two screws and lockwashers (Figure 6-2, items 12 and 13) which attach pinch roller spring to roller mount block and remove roller-bracket assembly.

f. Remove pinch roller solenoid by removing two hexagonal mounting nuts and lockwasher; retain felt oil pad and solenoid spacer.

g. Mount replacement solenoid with retained spacer and felt oil pad to mounting bracket; hand tighten mounting hardware.

h. Observing bottom of solenoid, apply a radial force to armature hub in all directions; adjust gap between solenoid hub and body for maximum clearance on all sides without binding (see Figure 5-2), by tapping solenoid body to shift its position on

mounting bracket relative to oilite bushing.

i. Tighten solenoid mounting nuts securely; recheck adjustment.

j. Reassemble and remount pinch roller solenoid to panel; route and connect solenoid leads to edgeboard.

k. Perform pinch roller assembly adjustment procedures (Paragraph 5.5.3).

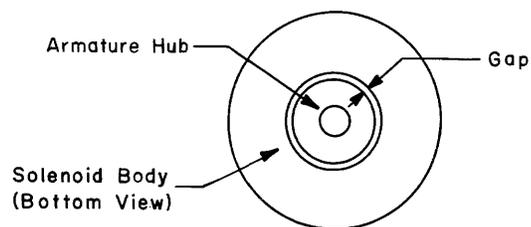


Figure 5-2. Solenoid Radial Gap Adjustment

5.4.4 Brake Coil

a. Remove lower cover by lifting top ends of cover and sliding cover forward.

b. Disconnect brake coil leads from edgeboard

Table 5-4. Trouble Isolation Guide

SYMPTOM	PROBABLE CAUSE	REMEDY
Capstan(s) do not rotate	Drive belt off pulley	Replace drive belt on pulley
	Drive belt broken	Replace drive belt
	Defective motor	Replace motor
Run signal applied but pinch roller does not energize	Defective pinch roller circuit	Check circuit and repair as required
	Defective pinch roller solenoid	Replace solenoid
Pinch roller energizes but tape does not run	Pinch roller/capstan gap too wide	Adjust pinch roller assembly
Tape skews	Pinch roller assembly out of adjustment	Adjust pinch roller assembly
	Brake assembly out of adjustment	Adjust brake assembly
Tape runs too slow	Pinch roller/capstan gap too wide	Adjust pinch roller assembly
	Drive belt loose	Increase belt tension or replace belt if necessary
	Defective drive motor	Replace drive motor
Brake does not energize	Brake circuit defective	Check circuit and repair as required
	Defective brake coil	Replace brake coil
Erratic start/stop times	Pinch roller solenoid armature binding	Adjust solenoid radial gap
	Improper pinch roller return spring tension	Adjust pinch roller assembly
	Brake armature improperly positioned	Adjust brake assembly
	Capstan has excessive radial play	Check capstan bearing block assembly (or motor) and repair as required
Nonexistent bit consistently being read (in same channel)	Defective photovoltaic cell	Check output and replace head assembly if necessary
	Defective channel amplifier	Check amplifier and repair as required
One bit consistently not being read (in same channel)	Dirty glass over photovoltaic cell	Clean glass
	Defective photovoltaic cell	Check output and replace head assembly if necessary
	Defective channel amplifier	Check amplifier and repair as required

Table 5-4. Reader Trouble Isolation Guide (Cont'd.)

SYMPTOM	PROBABLE CAUSE	REMEDY
One bit intermittently not being read, or non-existent bit intermittently being read	Tape improperly punched	Use new tape
	Incorrect exciter lamp adjustment	Adjust exciter lamp
	Readhead	Clean readhead
	Dc voltages not properly regulated	Check dc supply and repair as required
	Intermittent photovoltaic cell	Check cell and replace head assembly if necessary
	Intermittent data channel amplifier	Check amplifier and repair as required

connections BRK-1 and BRK-2; separate wires from harness and pull through hole in front panel.

c. Remove two phillips head cover and spring mounting bracket mounting screws and associated washers from top of brake assembly; remove cover and spring mounting bracket (with spring and armature).

d. Remove brake coil from base plate by removing two socket head mounting screws and associated washers from front of coil.

e. Mount replacement brake coil to base plate leaving mounting screws hand tight.

f. Route and connect coil leads to edgeboard.

g. Perform brake assembly adjustment procedures (Paragraph 5.5.4).

5.4.5 Capstan Assembly

This procedure is for the replacement of the capstan and/or capstan bearings on indirect drive capstan assemblies. Replacement of direct drive capstans require no special attention except that when mounted to the motor shaft, the capstan should protrude 1-11/16 inches from the front of the panel.

To replace capstan bearings, perform all of the following steps. To replace capstan only, omit steps b, c, and d.

a. Loosen capstan setscrew and slide capstan off shaft.

b. Slide capstan shaft (with pulley) out of bearing block assembly from rear of panel; retain wave washer.

c. Replace two capstan bearings.

d. With wave washer on shaft, reinsert capstan shaft (with pulley) in bearing block assembly.

e. Remount capstan to shaft; leave capstan setscrew loose.

f. Apply 2 pound force to rear of capstan shaft (see Figure 5-3) to preload wave washer; tighten capstan setscrew securely.

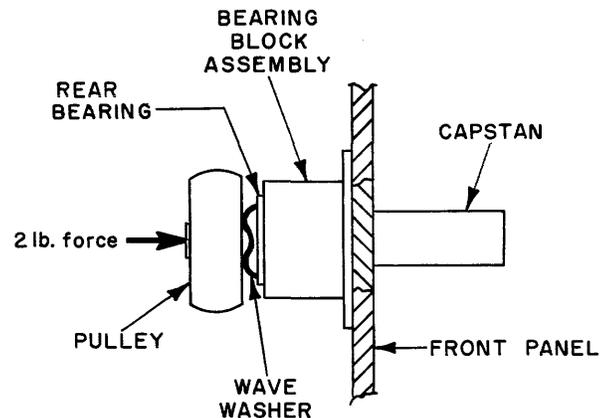


Figure 5-3. Capstan Bearing Preload Adjustment

5.4.6 Drive Motor Assembly

This procedure is intended for the replacement of the motor assembly (Digitronics Part Number CC7073) as a unit. For direct drive unidirectional units, omit steps b, e, h, and i. For indirect drive unidirectional units, omit steps c and g.

a. Disconnect motor leads from terminal board TB1-4 and -6; remove wires from wire clips.

b. Slip drive belt off capstan pulley.

c. Loosen setscrew and slide capstan off motor shaft.

d. Remove motor assembly by removing three mounting screws from front panel.

CAUTION

On readers with electronics units, care should be taken when replacing motor assembly to insure that no damage is done to components of printed circuit board.

e. Transfer motor pulley from old motor to replacement motor shaft.

f. Mount replacement motor assembly with motor shaft visually centered in hole in front panel; tighten mounting screws.

g. Mount capstan to replacement motor shaft with capstan protruding 1-11/16 inch from front of front panel.

h. Slip drive belt onto motor and capstan pulleys.

i. Perform drive belt tension adjustment procedure (Paragraph 5.5.2).

5.4.7 Readhead Assembly

In order to replace any major component of the readhead assembly, it is necessary that the readhead assembly first be removed from the reader as a unit. This procedure is for the removal of the readhead assembly (as a unit) from the reader.

Note

Removal (and replacement) of the readhead assembly requires that the exciter lamp adjustment procedure be performed.

a. Remove lower cover by lifting top ends of cover and sliding cover forward.

b. Remove lower right end bell (and tape level adjusting rod assembly) by loosening two end bell mounting screws and moving end bell and rod to the right.

c. Remove readhead connector P2 (Models 2540T or B2540T) or, remove electronics unit printed circuit board by removing six mounting screws and associated washers.

d. Remove screw attaching readhead assembly printed circuit board to head connector bracket.

e. Remove two readhead assembly mounting screws from front of readhead base plate and bring assembly forward (away from panel) until printed

circuit board clears panel.

f. After mounting replacement head assembly, perform exciter lamp adjustment procedure (Paragraph 5.5.1).

5.5 ADJUSTMENT PROCEDURES

This paragraph contains procedures for all of the adjustments pertinent to the satisfactory performance of the reader which can be performed in the field. The adjustment procedures should be performed only after preventive or corrective maintenance has proven that a component requires adjustment, or has resulted in the replacement of parts.

5.5.1 Exciter Lamp

The exciter lamp adjustments consist of properly positioning the lamp over the readhead assembly and adjusting the exciter lamp voltage to achieve the proper on-off ratio of the readhead outputs. The lamp voltage adjustment requires the use of an oscilloscope with a calibrated display.

a. Loosen two lamp mount assembly mounting screws.

b. Adjust position (vertical and horizontal) of lamp so that:

1. Two lamp filaments straddle black line located on front panel directly behind lamp (see Figure 5-4).

Note

The two filaments must not be in same vertical line. If necessary rotate lamp 180° in socket.

2. When lamp is lighted, two light beams are centered over head tunnels in readhead.

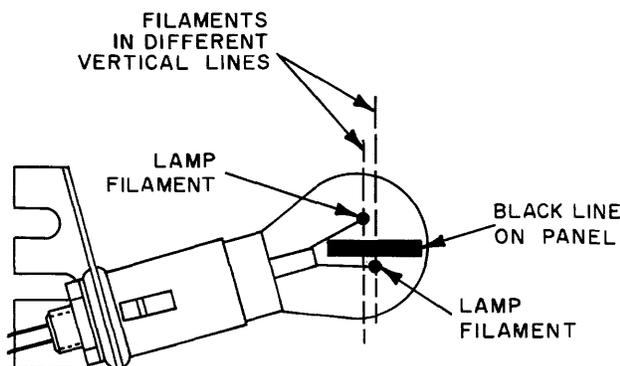


Figure 5-4. Exciter Lamp Vertical Positioning

- c. Tighten lamp assembly mounting screws and recheck adjustment.

CAUTION

Do not tighten lamp assembly mounting screws excessively as this may force soundcoat from between mounting bracket and panel.

- d. Connect oscilloscope to monitor reader outputs (P2-1 through -10 on Models 2540T and B2540T; J1-D through -N on readers with electronics unit); adjust oscilloscope for +5 volt signal.

- e. Load a fully punched test tape (refer to Section III) and operate reader to slew tape.

- f. Adjust exciter lamp resistor R1 so that all data channels outputs have a 60 - 80% "on", 40 - 20% "off" ratio. Sprocket channel output should be 35 - 45% "on", 65 - 55% "off" ratio.

- g. Check that voltage across exciter lamp (edge-board connections L1 and L2) is 16 - 20 volts.

Note

If the conditions in steps f and g cannot be met by adjusting resistor R1, the lamp position must be readjusted until the conditions of both steps can be met. If the lamp filaments are too far off to adjust, replace lamp.

5.5.2 Drive Belt Tension

The drive belt tension on indirect unidirectional, and bidirectional units should be adjusted to deflect 1/4-inch when a force of 3 - 4 pounds is applied perpendicular to the belt line at the midpoint of its span (see Figure 5-5).

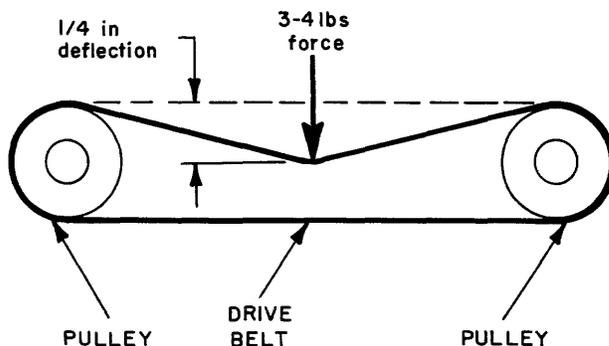


Figure 5-5. Drive Belt Tension Adjustment

- a. Loosen three capstan bearing block assembly mounting screws and position assembly in center of its adjustment range; tighten mounting screws.

- b. Loosen three motor mounting screws and shift motor until belt tension is approximately correct; tighten mounting screws securely.

Note

Clearance between motor and electronics unit printed circuit board must be a minimum of .015 inch.

- c. Loosen three capstan bearing block assembly mounting screws again and position assembly to achieve correct drive belt tension; tighten mounting screws securely.

- d. Perform pinch roller assembly adjustment procedure (Paragraph 5.5.3).

5.5.3 Pinch Roller Assembly

- a. With Power switch in OFF position, loosen two pinch roller assembly mounting screws on front of mounting bracket and adjust pinch roller/capstan gap to approximately .007 inch; leave mounting screws snug (not tight).

- b. Loosen two screws (Figure 6-2, item 4) which attach pinch roller bracket to flat-spring and adjust so that pinch roller centerline falls directly under (or above for reverse pinch roller assembly) centerline of capstan (see Figure 5-6); retighten screws securely.

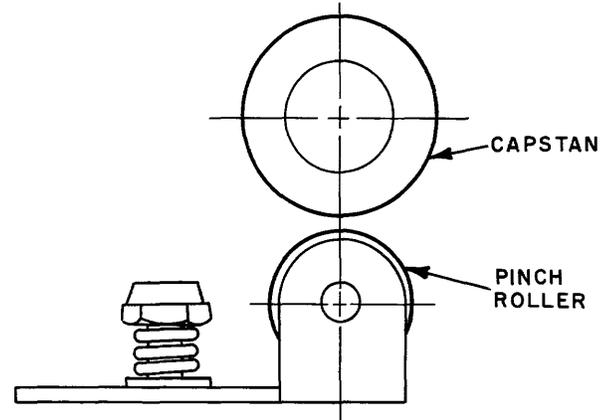


Figure 5-6. Pinch Roller/Capstan Centerline Adjustment

- c. Rock pinch roller bracket assembly by pushing on front and back of bracket with finger to ensure that assembly is properly seated on solenoid shaft.

- d. Check front to back parallelism of pinch roller and capstan (see Figure 5-7).

- e. If required, loosen hexagonal head screws (Figure 6-2, item 15) attaching roller bracket and

flat-spring to mounting bracket and adjust; retighten screws securely.

Note

When performing adjustment, care should be taken to maintain parallelism between pinch roller bracket and pinch roller assembly mounting bracket.

f. Adjust pinch roller/capstan gap so that with finger pressure applied to pinch roller (against solenoid) a .007 inch feeler gage inserted in direction of tape motion fits snug but does not force pinch roller to turn. Note that when sliding feeler gage in and out, a light drag should be felt.

g. Insert .008 inch feeler gage in direction of tape path and note that this forces capstan and pinch roller to rotate with drag; slide gage in and out to test for high drag.

h. Tighten pinch roller assembly mounting screws and recheck adjustment.

i. Load fully punched .004 inch mylar test tape loop in accordance with Section III and operate reader to slew tape.

j. Loosen one screw attaching pinch roller bracket to flat-spring and pivot pinch roller bracket on other screw until tape rides squarely and does not run up sides of tape guide; tighten screw securely.

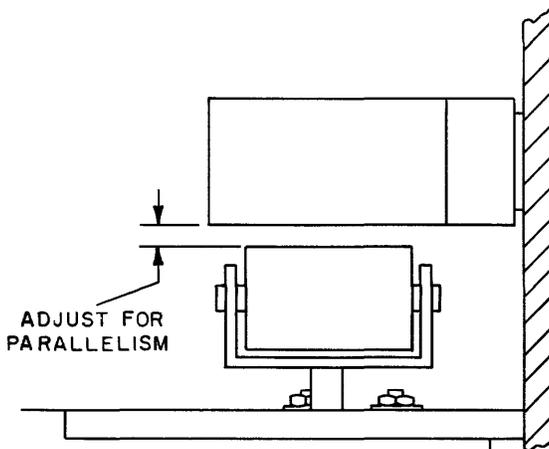


Figure 5-7. Pinch Roller and Capstan Parallelism

k. Check and readjust (if required) pinch roller capstan gap adjustment (steps f and g).

l. Apply proper tension to return spring by turning locknut (Figure 6-2, item 2) until top of locknut is flush with stud.

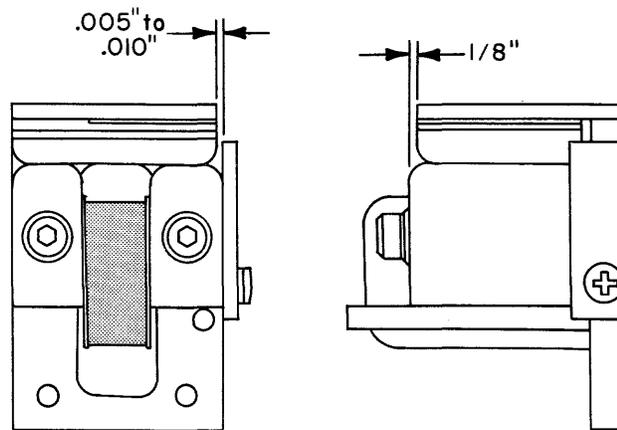
5.5.4 Brake Assembly

The brake assembly adjustment should be performed when the brake coil has been replaced. The following procedure is intended to be performed following the brake coil replacement procedure and assumes that the brake cover and spring mounting bracket with spring and armature have been removed.

a. Assemble spring mounting bracket (with spring and armature attached) to baseplate with back of bracket flush to back of baseplate; position armature to be .005 to .010 inch from guide bar (see Figure 5-8a) and 1/8-inch back from front edge of coil assembly (see Figure 5-8b).

b. With two armature support bracket screws loose, insert brake cover on top of bracket and tighten screws securely.

c. With bracket assembly in upright position and coil assembly mounting screws loose, slide coil upward (against baseplate and guide bar) from lowest position until poles of coil just contact dimples on bottom of armature; tighten coil mounting screws securely.



a. front view

b. right side view

Figure 5-8. Brake Armature Positioning

SECTION VI

ILLUSTRATED PARTS BREAKDOWN

6.1 GENERAL

This section lists and illustrates the component parts of the Model 2540 Reader. A system of indention is used throughout the parts list to show the relationship between the detailed parts and the subassemblies, and between the subassemblies and the main assemblies. The parts list is presented in a tabular form containing the information given in the following paragraphs.

6.2 FIGURE AND INDEX NUMBER

The figure and index number column provides a cross reference between each list and its associated illustration. The figure number to which the parts list is keyed is followed by a dash and appears at the beginning of the listing and at the first line of continuing pages. The index numbers are preceded by a dash and correspond to those numbers on the associated illustration.

6.3 PART NUMBER

The part number column provides the Digitronics part number for each part.

6.4 DESCRIPTION

The description column lists the name and the descriptive information for each part and component listed. All components are listed in order of disassembly with the exception of the attaching parts. They are preceded by the legend "ATTACHING PARTS". The symbol "---*---" denotes end of the attaching parts.

6.5 UNITS PER ASSEMBLY

The units per assembly column indicates the quantity of the part required for the assembly or subassembly in which the part appears. "NP" indicates that the part is nonprocurable.

6.6 USABLE ON CODE

An alphabetical code of capital letters is used in this column to indicate the interchangeability of parts for similar assemblies. The usable on codes are defined at the beginning of each applicable list. When this column is left blank, the part is used on all assemblies.

6.7 ALTERNATE PARTS

When another manufacturer's part may be substituted for a Digitronics part, the code for that manufacturer and the part number appears in parenthesis as the last item in the description of the part. The following

is a list of manufacturers and their codes as used in the parts list.

Code	List of Manufacturers Manufacturer
00656	Aerovox Corp. Bedford, Mass.
00779	AMP, Inc. Harrisburg, Pa.
06229	Electrovert, Inc. Mount Vernon, N. Y.
06402	E-T-A Products Co. of America Chicago, Ill.
08805	General Electric Co. Large Lamp Division Cleveland, Ohio
08806	General Electric Miniature Lamp Division Cleveland, Ohio
13103	Thermalloy Co. Dallas, Texas
15605	Cutler-Hammer, Inc. Milwaukee, Wis.
21810	Federal Pacific Electric Co. Newark, N. J.
21845	Solitron Devices, Inc. Transistor Division Riviera Beach, Fla.
28520	Heyman Mfg. Corp. Kenilworth, N. J.
56289	Sprague Electric Co. North Adams, Mass.
63743	Ward Leonard Electric Co. Mount Vernon, N. Y.
70485	Atlantic India Rubber Work, Inc. Chicago, Ill.
71785	Cinch Mfg. Co., Division United-Carr Fastener Corp. Chicago, Ill.
73445	Amperex Electronic Co., Division North American Philips Co. Inc. Hicksville, N. Y.
73559	Carling Electric Inc. West Hartford, Conn.

List of Manufacturers (Cont'd.)

Code	Manufacturer	Code	Manufacturer
75382	Kulka Electric Mfg. Co., Inc. Mount Vernon, N. Y.	91506	Augat Bros., Inc. Attleboro, Mass.
78189	Shakeproof Division Illinois Tool Works, Inc. Elgin, Ill.	93332	Sylvania Electric Products, Inc. Semiconductor Products Division Woburn, Mass.
79136	Waldes Kohinoor, Inc. Long Island City, N. Y.	95263	Leecraft Mfg. Co., Inc. Long Island City, N. Y.
81840	Ledex, Inc. Dayton, Ohio	95303	Radio Corp. Of America, Commercial Receiving Tube and Semiconductor Division Cincinnati, Ohio
83086	New Hampshire Ball Bearings, Inc. Peterborough, N. H.	98978	International Electronic Research Corp. Burbank, Calif.
83330	Herman H. Smith Co. Brooklyn, N. Y.		
84411	TRW Capacitor Division Ogallala, Nebr.		

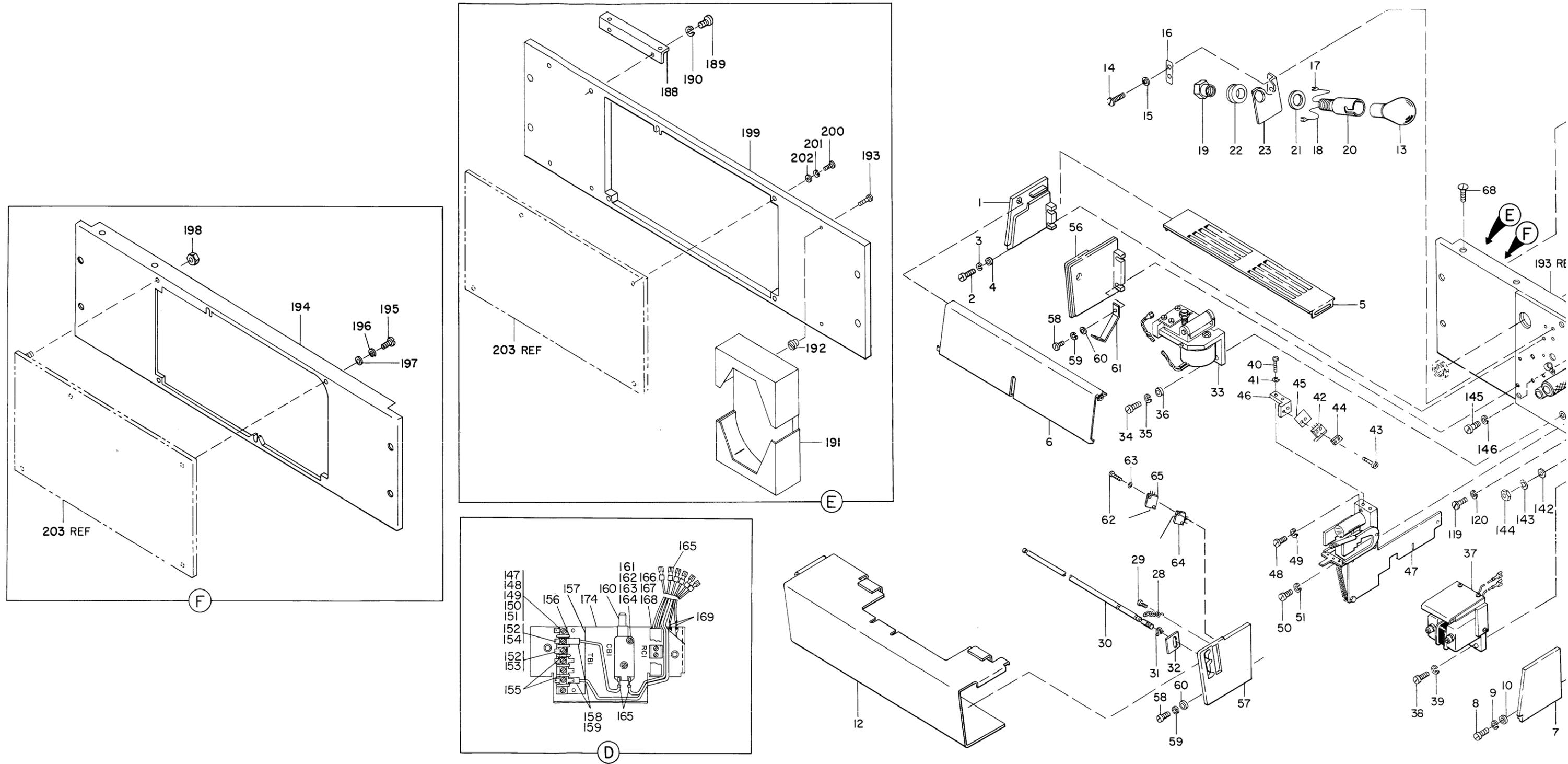


Figure 6-1. Reader Panel Assembly (Sheet 1 of 2)

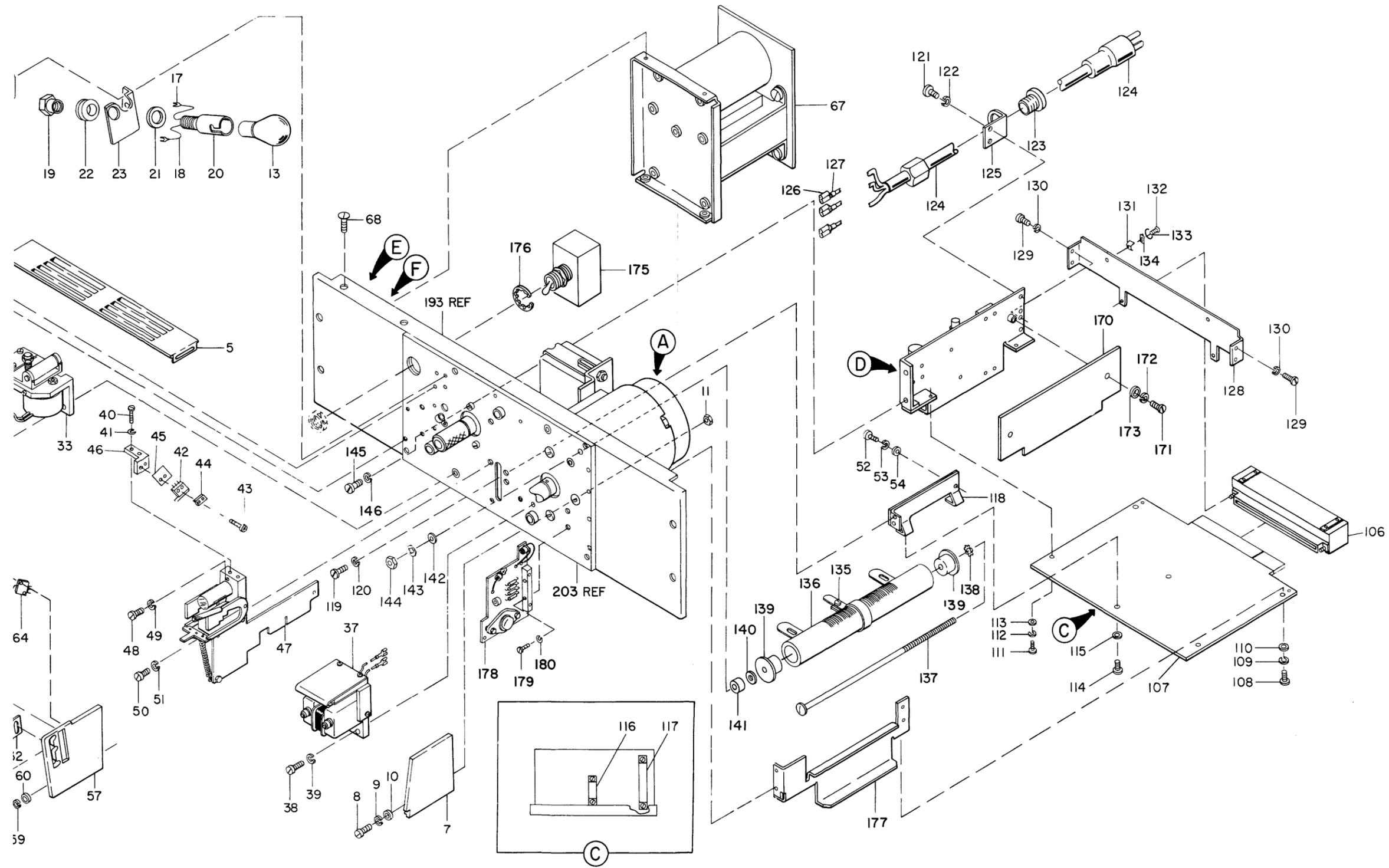


FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS	USABLE
			PER ASSY	ON CODE
READER PANEL ASSEMBLY				
6-1-	DC7052-1	READER PANEL ASSEMBLY	1	
-1	BA7016-1	. END BELL, Upper left (ATTACHING PARTS)	1	
-2	TH-SI0806	. SCREW, Machine, bd hd, No. 4-40 x 7/16 in. lg.	2	
-3	TH-WB0403	. WASHER, Lock, split, No. 4	2	
-4	TH-WA0409	. WASHER, Flat, plain, No. 4 ---*---	2	
-5	BA7020-1	. COVER, Top	1	
-6	CE949-1	. DOOR, Top, plain	1	
	CE949-2	. DOOR, Top, screened	1	
	CE949-3	. DOOR, Top, plain (Used with Model 6012 Tape Handler)	1	
	CE949-4	. DOOR, Top, screened (Used with Model 6012 Tape Handler)	1	
-7	BA7018-1	. END BELL, Upper right (ATTACHING PARTS)	1	
-8	TH-SI0835	. SCREW, Machine, bd hd, No. 4-40 x 9/16 in. lg.	2	
-9	TH-WB0403	. WASHER, Lock, split, No. 4	2	
-10	TH-WA0409	. WASHER, Flat, plain, No. 4	2	
-11	TH-ZA0704	. NUT, Hex, self-locking, No. 4-40 ---*---	2	
-12	CX202-1	. COVER, Lower (used with standard and fixed teletype- setter head assembly)	1	
	CX202-2	. COVER, Lower (used with adjustable standard/ teletypesetter head assembly)	1	
-13	TLNBF0009	. LAMP, Incandescent (08805 P/N 1638)	1	
6-1-	CC7070-1	. LAMP SOCKET ASSEMBLY (ATTACHING PARTS)	1	
-14	TH-SI1206	. SCREW, Machine, bd hd, No. 6-32 x 7/16 in. lg.	2	
-15	TH-WB0605	. WASHER, Lock, split, No. 6	2	
-16	AA-7315-1	. WASHER, Plate ---*---	1	
-17	TH-LJ1053	. . CONNECTOR, Plug, electrical	2	
-18	TW-K18000	. . WIRE, Insulated, 18 gauge	A/R	
-19	BA7717-1	. . NUT, Hexagon, lamp socket	1	
-20	TSKT0401	. . SOCKET, Lamp	1	
-21	TH-WL0010	. . WASHER, Flat, light, 7/16 in.	1	
-22	TGRSM1013	. . GROMMET, Rubber (70485 P/N 2295)	1	
-23	CA7720-1	. . BRACKET, Lamp	1	
-24	THRMC0202	. CLAMP, Cable (ATTACHING PARTS)	1	
-25	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	1	
-26	TH-WB0403	. WASHER, Lock, split, No. 4	1	
-27	TH-WA0409	. WASHER, Flat, plain, No. 4 ---*---	1	
-28	TSPCC0002	. SPRING, Extension (ATTACHING PARTS)	1	
-29	TH-SI0809	. SCREW, Machine, bd hd, No. 4-40 x 3/4 in. lg. ---*---	1	
-30	BA7208-1	. ROD, Adjusting (ATTACHING PARTS)	1	
-31	TTRFA1209	. RING, Retaining (79136 P/N 5133-15) ---*---	1	
-32	AA6989	. LOCK, Guide	1	
-33	CC7078-1	. PINCH ROLLER ASSEMBLY (See Figure 6-2 for detailed breakdown)	*1	

*Dependent on speed package. Refer to Tables 6-1 a or 6-1 b.

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
READER PANEL ASSEMBLY (Cont'd.)				
6-1-33	CC7078-1	. PINCH ROLLER ASSEMBLY (See Figure 6-2 for detailed breakdown) (ATTACHING PARTS)	*2	
-34	TH-SL1407	. SCREW, Machine, soc hd cap, No. 8-32 x 1/2 in. lg.	2	
-35	TH-WB0708	. WASHER, Lock, split, No. 8	2	
-36	TH-WA0712	. WASHER, Flat, plain, No. 8 ---*---	2	
-37	CC7060-1	. BRAKE ASSEMBLY (See Figure 6-3 for detailed breakdown) (ATTACHING PARTS)	1	
-38	TH-SI1208	. SCREW, Machine, bd hd, No. 6-32 x 5/8 in. lg.	2	
-39	TH-WB0605	. WASHER, Lock, split, No. 6 ---*---	2	
6-1-	BC7580-1	. LOAD SWITCH ASSEMBLY (Optional) (ATTACHING PARTS)	1	
-40	TH-SI0805	. SCREW, Machine, bd hd, No. 4-40 x 3/8 in. lg.	2	
-41	TH-WB0403	. WASHER, Lock, split, No. 4 ---*---	2	
-42	TDB01CS05	. . SWITCH, Miniature (ATTACHING PARTS)	1	
-43	TH-SF0305	. . SCREW, Machine, fil hd, No. 2-56 x 3/8 in. lg.	2	
-44	BA7386-2	. . PLATE, Locking ---*---	1	
-45	BA7285-1	. . INSULATOR	1	
-46	BA7281-1	. . BRACKET, Switch	1	
-47	CC7054-1	. PHOTO HEAD ASSEMBLY, Standard 5-8 channel (See Figure 6-4 for detailed breakdown)	1	
	CC7054-2	. PHOTO HEAD ASSEMBLY, Teletypesetter, fixed (See Figure 6-4 for detailed breakdown)	1	
	DC7582-1	. PHOTO HEAD ASSEMBLY, Standard/teletypesetter, adjustable (See Figure 6-5 for detailed breakdown) (ATTACHING PARTS)	1	
-48	TH-SI0835	. SCREW, Machine, bd hd, No. 4-40 x 9/16 in. lg.	1	
-49	TH-WB0403	. WASHER, Lock, split, No. 4	1	
-50	TH-SE0805	. SCREW, Machine, fil hd, No. 4-40 x 3/8 in. lg.	1	
-51	TH-WB0403	. WASHER, Lock, split, No. 4	1	
-52	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	1	
-53	TH-WB0403	. WASHER, Lock, split, No. 4	1	
-54	TH-WA0409	. WASHER, Flat, plain, No. 4 ---*---	1	
-55	TSEBN04002	. BUSHING, Nylon (28520 P/N SB-375)	3	
-56	BA7047	. END BELL, Lower left	1	
-57	AX184-1	. END BELL, Lower right (ATTACHING PARTS)	1	
-58	TH-SI0806	. SCREW, Machine, bd hd, No. 4-40 x 7/16 in. lg.	4	
-59	TH-WB0403	. WASHER, Lock, split, No. 4	4	
-60	TH-WA0409	. WASHER, Flat, plain, No. 4 ---*---	4	
-61	BA7776-1	. SPRING	1	
6-1-	BN1079-1	. SWITCH COMPLEMENT, Tape level (optional)	4	
-62	TH-SI0307	. . SCREW, Machine, bd hd, No. 2-56 x 1/2 in. lg.	A/R	
-63	TH-YA0206	. . WASHER, Fiber, No. 2	A/R	
-64	AB1097-1	. . SWITCH, Modified	1	
-65	AB1097-2	. . SWITCH, Modified	1	
-66	CA4899-1	. PLATE, Identification	1	

*Dependent on speed package. Refer to Tables 6-1 a or 6-1 b.

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
READER PANEL ASSEMBLY (Cont'd.)				
6-1-67	BC7138-1	. POWER SUPPLY ASSEMBLY, Models 2540EP and B2540EP (See Figure 6-6 for detailed breakdown) (ATTACHING PARTS)	1	
-68	TH-SU0603	. SCREW, Machine, fil hd, undercut, No. 6-32 x 1/4 in. lg. ---*---	4	
-69	TR-AI150D	. RESISTOR, Variable, wirewound, 15 ohms \pm 10%, 25W (ATTACHING PARTS)	1	
-70	TH-SI1445	. SCREW, Machine, bd hd, No. 8-32 x 2-3/8 in. lg.	1	
-71	TH-WB0708	. WASHER, Lock, split, No. 8	1	
-72	TH-WA0712	. WASHER, Flat, plain, No. 8	1	
-73	TH-YD0812	. WASHER, Nonmetallic, fiber (83330 P/N 2164) ---*---	2	
6-1-	BC985-3	. CAPSTAN ASSEMBLY	*1	
	BC985-3	. CAPSTAN ASSEMBLY	*2	
-74	TH-SS1202	. . SETSCREW, Soc hd knurled, cup pt, No. 6-32 x 3/16 in. lg.	1	
-75	NO NUMBER	. . CAPSTAN, Machined	1	
-76	*BA7019-1	. PULLEY, Capstan	1	
	*BA7019-2	. PULLEY, Capstan	1	
	*BA7019-3	. PULLEY, Capstan	1	
	*BA7019-4	. PULLEY, Capstan	1	
	*BA7019-5	. PULLEY, Capstan	1	
	*BA7019-6	. PULLEY, Capstan	1	
	*BA7019-7	. PULLEY, Capstan	1	
	*BA7019-9	. PULLEY, Capstan (ATTACHING PARTS)	1	
-77	TH-SS1402	. SETSCREW, Soc hd knurled, cup pt, No. 8-32 x 3/16 in. lg. (used for all except BA7019-3)	2	
	TH-XC1401	. SETSCREW, Soc hd, cup pt, No. 8-32 x 1/8 in. lg. (used for BA7019-3 only) ---*---	2	
-78	TH-WW3510	. WASHER, Wave (78189 P/N 3515-18-14)	1	
-79	AA6980-1	. SHAFT, Capstan	1	
6-1-	BC7077-1	. BEARING BLOCK ASSEMBLY (ATTACHING PARTS)	1	
-80	TH-SI1206	. SCREW, Machine, bd hd, No. 6-32 x 7/16 in. lg.	3	
-81	TH-WB0605	. WASHER, Lock, split, No. 6 ---*---	3	
-82	TB-KM2013	. . BEARING, Ball, annular (83086 P/N SFR1810PPEEK25)	2	
-83	AA6981-1	. . HOUSING, Bearing	1	
6-1-	*CC7073-1	. MOTOR AND CAPACITOR ASSEMBLY	1	
	*CC7073-2	. MOTOR AND CAPACITOR ASSEMBLY	1	
	*CC7073-3	. MOTOR AND CAPACITOR ASSEMBLY	1	
	*CC7073-4	. MOTOR AND CAPACITOR ASSEMBLY	1	
	*CC7073-5	. MOTOR AND CAPACITOR ASSEMBLY	1	
	*CC7073-6	. MOTOR AND CAPACITOR ASSEMBLY	1	
	*CC7073-7	. MOTOR AND CAPACITOR ASSEMBLY	1	
	*CC7073-8	. MOTOR AND CAPACITOR ASSEMBLY (ATTACHING PARTS)	1	
-84	*TH-SI1648	. SCREW, Machine, bd hd, No. 10-24 x 1-5/8 in. lg.	3	
	*TH-SI1608	. SCREW, Machine, bd hd, No. 10-24 x 5/8 in. lg.	3	
-85	TH-WB0810	. WASHER, Lock, split, No. 10	3	
-86	*AA6982-1	. SPACER, Motor mounting	3	
	AA6983-1	. SPACER, Motor mounting ------	3	

*Dependent on speed package. Refer to Tables 6-1 a or 6-1 b.

FIG. & INDEX NO.	DIGITRONICS PART NO.	1	2	3	4	5	6	7	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
READER PANEL ASSEMBLY (Cont'd.)											
6-1-87	TH-LF1030	.	.						RECEPTACLE, Faston (00779 P/N 4245-2)	2	
-88	TE-HIA12A	.	.						POD, Terminal insulation	2	
-89	TH-LJ1052	.	.						LUG, Amp, quick connect (00779 P/N 42599-2)	3	
-90	TTUBK0017	.	.						TUBING, Clear, No. 6 PVC, 2-1/4 in. lg.	1	
-91	TLBCR0001	.	.						BOOT, Rubber	1	
-92	TMBMP0001	.	.						BRACKET, Capacitor (ATTACHING PARTS)	2	
-93	TH-SI1405	.	.						SCREW, Machine, bd hd, No. 8-32 x 3/8 in. lg.	2	
-94	TH-NA-1307	.	.						NUT, Hex, plain, No. 8-32	2	
-95	TH-WB0708	.	.						WASHER, Lock, split, No. 8	2	
-96	TH-WA0712	.	.						WASHER, Flat, plain, No. 8	2	
-97	*TC-XA0088	.	.						CAPACITOR, Fixed, 1 uf ± 10%, 660 vac (21810 P/N KKA66P105Q)	1	
	*TC-XA0090	.	.						CAPACITOR, Fixed, 2 uf ± 10%, 236 vac (56289 P/N 200P1639)	1	
	*TC-XA0057	.	.						CAPACITOR, Fixed, 3 uf ± 10%, 236 vac (56289 P/N 200P1215)	1	
-98	BA7493-1	.	.						BRACKET, Capacitor (ATTACHING PARTS)	1	
-99	TH-SI1705	.	.						SCREW, Machine, bd hd, No. 10-32 x 3/8 in. lg.	2	
-100	TH-WB0810	.	.						WASHER, Lock, split, No. 10	2	
-101	TH-WA0814	.	.						WASHER, Flat, plain, No. 10	2	
									---*---		
-102	*CT381-1	.	.						MOTOR, Synchronous, 600 rpm, 115 vac	1	
	*CT381-2	.	.						MOTOR, Synchronous, 900 rpm, 115 vac	1	
	*CT381-3	.	.						MOTOR, Synchronous, 1200 rpm, 115 vac	1	
	*CT381-4	.	.						MOTOR, Synchronous, 1800 rpm, 115 vac	1	
	*CT381-5	.	.						MOTOR, Synchronous, 600 rpm, 220 vac	1	
	*CT381-6	.	.						MOTOR, Synchronous, 900 rpm, 220 vac	1	
	*CT381-7	.	.						MOTOR, Synchronous, 1200 rpm, 220 vac	1	
	*CT381-8	.	.						MOTOR, Synchronous, 1800 rpm, 220 vac	1	
-103	*AT374-2	.	.						BELT, Endless	1	
	*AT374-3	.	.						BELT, Endless	1	
	*AT374-6	.	.						BELT, Endless	1	
	*AT374-8	.	.						BELT, Endless	1	
	*AT374-9	.	.						BELT, Endless	1	
	*AT374-10	.	.						BELT, Endless	1	
	*AT374-11	.	.						BELT, Endless	1	
	*AT374-12	.	.						BELT, Endless	1	
-104	*BA7019-2	.	.						PULLEY, Motor (ATTACHING PARTS)	1	
-105	TH-SS1402	.	.						SETSCREW, Knurled cup pt, No. 8-32 x 3/16 in. lg. ---*---	2	
-106	BC7611-3	.	.						CONNECTOR ASSEMBLY, Hooded (See Figure 6-9 for detailed breakdown)	1	
-107	DQ63-1	.	.						PRINTED CIRCUIT BOARD ASSEMBLY, Models 2540E(P) and B2540E(P) (see Figure 6-7 for detailed breakdown) (ATTACHING PARTS)	1	
-108	TH-SI0803	.	.						SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	2	
-109	TH-WB0403	.	.						WASHER, Lock, split, No. 4	2	
-110	TH-WA0409	.	.						WASHER, Flat, plain, No. 4	2	
-111	TH-SI0806	.	.						SCREW, Machine, bd hd, No. 4-40 x 7/16 in. lg.	2	
-112	TH-WB0403	.	.						WASHER, Lock, split, No. 4	2	
-113	TH-WA0409	.	.						WASHER, Flat, plain, No. 4	2	
-114	TH-SI0806	.	.						SCREW, Machine, bd hd, No. 4-40 x 7/16 in. lg.	2	
-115	TH-YA0406	.	.						WASHER, Fiber, No. 4 ---*---	2	

*Dependent on speed package. Refer to Tables 6-1 a or 6-1 b.

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE		
1	2	3	4	5	6	7
READER PANEL ASSEMBLY (Cont'd.)						
6-1-	AN1050-1	. CONNECTOR COMPLEMENT, Models 2540T and B2540T	1			
-116	BC7611-1	. . CONNECTOR, Receptacle, electrical	1			
-117	BC7611-2	. . CONNECTOR, Receptacle, electrical	1			
-118	BC7059-1	. BRACKET, Head connector (ATTACHING PARTS)	1			
-119	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	2			
-120	TH-WB0403	. WASHER, Lock, split, No. 4 ---*---	2			
6-1-	BC7074-1	. LINE CORD ASSEMBLY (Optional) (ATTACHING PARTS)	1			
-121	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	2			
-122	TH-WB0403	. WASHER, Lock, split, No. 4 ---*---	2			
-123	TSRAA0001	. . BUSHING, Strain relief (28520 P/N SR6PL)	1			
-124	TLCMC0003	. . LINE CORD	1			
-125	AA7048	. . BRACKET, Line cord	1			
-126	TH-LJ1030	. . RECEPTACLE, Faston (00779 P/N 4245-2)	3			
-127	TE-HIA12A	. . POD, Terminal insulation	3			
-128	CA7013-1	. BRACKET, Support (ATTACHING PARTS)	1			
-129	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	4			
-130	TH-WB0403	. WASHER, Lock, split, No. 4 ---*---	4			
-131	THRCC0829	. CRADLE, Cable (06229, Type CO) (ATTACHING PARTS)	2			
-132	TH-SE0302	. SCREW, Machine, fil hd, No. 2-56 x 3/16 in. lg.	2			
-133	TH-WB0201	. WASHER, Lock, split, No. 2 ---*---	2			
-134	THRCL0830	. CLIP, Cable (06229, Type NO)	2			
-135	TH-SE1206	. SCREW, Machine, fil hd, No. 6-32 x 7/16 in. lg.	1			
-136	TR-AN500D	. RESISTOR, Variable, wirewound, 50 ohm \pm 10%, 100W (ATTACHING PARTS)	1			
-137	AT435-7	. SCREW, Machine, No. 10-32 x 7-5/16 in. lg.	1			
-138	TH-WD0813	. WASHER, Lock, external tooth, No. 10	1			
-139	TH-WR1010	. WASHER, Centering	2			
-140	TH-WA1020	. WASHER, Flat, plain, No. 1/4	1			
-141	AA6983-1	. POST	1			
-142	THWA0814	. WASHER, Flat, plain, No. 10 (used with 19" panel DA7824-1 only)	1			
-143	TH-WC0812	. WASHER, Lock, internal tooth, No. 10 (used with 19" panel DA7824-1 only)	1			
-144	TH-NA1608	. NUT, Hex, No. 10 (used with 19" panel DA7824-1 only) ---*---	1			
6-1-	CC7055-1	. SUPPORT BRACKET ASSEMBLY, Left hand (ATTACHING PARTS)	1			
-145	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	2			
-146	TH-WB0403	. WASHER, Lock, split, No. 4 ---*---	2			
6-1-	CTA594-1	. . BARRIER STRIP (ATTACHING PARTS)	1			
-147	TE-EA1A10	. . TAB, Barrier strip (75382 P/N KT34)	1			
-148	TE-EA1A20	. . TAB, Barrier strip (75382 P/N KT35)	1			
-149	TH-WC0609	. . WASHER, Lock, internal tooth, No. 6	A/R			
-150	TH-SF1206	. . SCREW, Machine, fil hd, No. 6-32 x 7/16 in. lg.	A/R			
-151	TH-SF1205	. . SCREW, Machine, fil hd, No. 6-32 x 3/8 in. lg. ---*---	A/R			

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION							UNITS PER ASSY	USABLE ON CODE
		1	2	3	4	5	6	7		
READER PANEL ASSEMBLY (Cont'd.)										
6-1-152	TE-EA1A20	.	.	.	TAB, Barrier strip (75382 P/N KT35)				5	
-153	TE-EA1A10	.	.	.	TAB, Barrier strip (75382 P/N KT34)				2	
-154	TE-EA1A11	.	.	.	TAB, Barrier strip (75382 P/N KT28)				3	
-155	TTJAA0101	.	.	.	JUMPER, Terminal board (75382 P/N 600-J)				2	
-156	TE-BB1A05	.	.	.	BARRIER STRIP (75382 P/N 599-5)				1	
-157	TE-M27A05	.	.	.	MARKER STRIP				1	
-158	TH-LJ1030	.	.	.	RECEPTACLE, Faston (00779 P/N 4245-2)				2	
-159	TE-HIA12A	.	.	.	POD, Terminal insulation				2	
-160	TDT01BA72	.	.	.	CIRCUIT BREAKER (06402 SERIES 44-100-P20, 2 amp.) (ATTACHING PARTS)				1	
-161	TH-SI0308	.	.	.	SCREW, Machine, bd hd, No. 2-56 x 5/8 in. lg.				A/R	
-162	TH-YJ0401	.	.	.	WASHER, Flat, nylon, No. 4				A/R	
-163	TH-WD0408	.	.	.	WASHER, Lock, ext. tooth, No. 4				A/R	
-164	TH-WA0206	.	.	.	WASHER, Flat, plain, No. 2				A/R	
----*----										
-165	TH-LJ1059	.	.	.	LUG, Electrical tab (00779 P/N 60972-2)				8	
-166	TSSBB0005	.	.	.	SPARK SUPPRESSOR (00656 P/N INR-272)				1	
-167	TCLAA0003	.	.	.	CLIP, Spring tension (91506 P/N 6014-24A) (ATTACHING PARTS)				1	
-168	TH-SI0802	.	.	.	SCREW, Machine, bd hd, No. 4-40 x 3/16 in. lg.				A/R	
----*----										
-169	TH-LJ1002	.	.	.	CONNECTOR, Edge (00779 P/N 42263-2)				2	
-170	DX353-1	.	.	.	PRINTED CIRCUIT BOARD (ATTACHING PARTS)				1	
-171	TH-SI0804	.	.	.	SCREW, Machine, bd hd, No. 4-40 x 5/16 in. lg.				A/R	
-172	TH-WB0403	.	.	.	WASHER, Lock, split, No. 4				A/R	
-173	TH-WA0409	.	.	.	WASHER, Flat, plain, No. 4				A/R	
----*----										
-174	CS135-1	.	.	.	BRACKET, Support				1	
-175	TDT02DD93	.	.	.	SWITCH, Toggle (73559 P/N 2GG52-73WXR1)				1	
-176	TH-WX1527	.	.	.	WASHER, Lock, internal tooth				1	
-177	CA7012-1	.	.	.	SUPPORT, Printed circuit card, right hand				1	
-178	CQ24-1	.	.	.	END OF TAPE ASSEMBLY (Optional) (see Figure 6-8 for detailed breakdown) (ATTACHING PARTS)				1	
-179	TH-SI0803	.	.	.	SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg. (used on units with no End of Tape Assembly)				2	
	TH-SI0805	.	.	.	SCREW, Machine, bd hd, No. 4-40 x 3/8 in. lg. (used on units with End of Tape Assembly)				2	
-180	TH-WB0403	.	.	.	WASHER, Lock, split, No. 4				2	
----*----										
-181	THRCC0829	.	.	.	CRADLE, Cable (06229 Type CO) (ATTACHING PARTS)				3	
-182	TH-SE0302	.	.	.	SCREW, Machine, fil hd, No. 2-56 x 3/16 in. lg.				3	
----*----										
-183	THRCL0830	.	.	.	CLIP, Cable (06229 Type NO)				3	
-184	THRMCB203	.	.	.	CLAMP, Cable (ATTACHING PARTS)				1	
-185	TH-SE0303	.	.	.	SCREW, Machine, fil hd, No. 2-56 x 1/4 in. lg.				1	
-186	TH-WA0201	.	.	.	WASHER, Lock, split, No. 2				1	
-187	TH-WA0206	.	.	.	WASHER, Flat, plain, No. 2				1	
----*----										
-188	AA7194-1	.	.	.	BRACKET, Mounting, power supply (ATTACHING PARTS)				2	
-189	TH-SI1404	.	.	.	SCREW, Machine, bd hd, No. 8-32 x 5/16 in. lg.				4	
-190	TH-WB0708	.	.	.	WASHER, Lock, split, No. 8				4	
----*----										

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION							UNITS PER ASSY	USABLE ON CODE	
		1	2	3	4	5	6	7			
READER PANEL ASSEMBLY (Cont'd.)											
6-1-	BN1080	.								1	
-191	CC7591-1	.	.							1	
	CC7591-2	.	.							1	
-192	BA6743	.	.							4	
											(ATTACHING PARTS)
-193	TH-SG1408	.	.							A/R	
-194	DA7824-1	.								1	
											brushed nickel
											(ATTACHING PARTS)
-195	TH-SL1408	.								A/R	
-196	TH-WB0708	.								A/R	
-197	TH-WA0712	.								A/R	
-198	THNA1307	.								A/R	
											---*---
-199	DA7009-2	.								1	
	DA7009-12	.								1	
											brushed nickel
	DA7257-1	.								1	
	DA7257-2	.								1	
	DA7257-11	.								1	
											brushed nickel
	DA7257-12	.								1	
											brushed nickel
											(ATTACHING PARTS)
-200	TH-SL1408	.								A/R	
-201	TH-WB0708	.								A/R	
-202	TH-WA0712	.								A/R	
											---*---
-203	DX314-1	.								1	

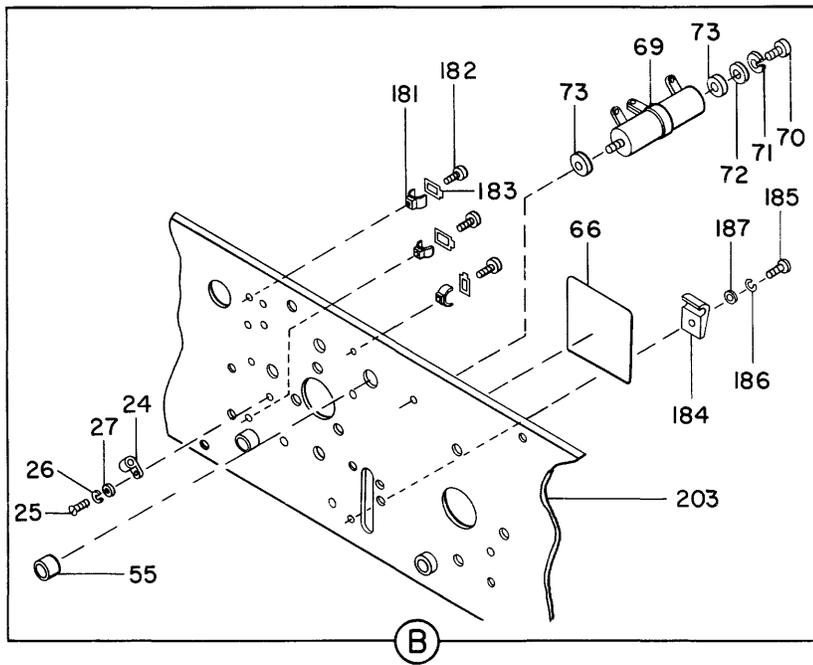
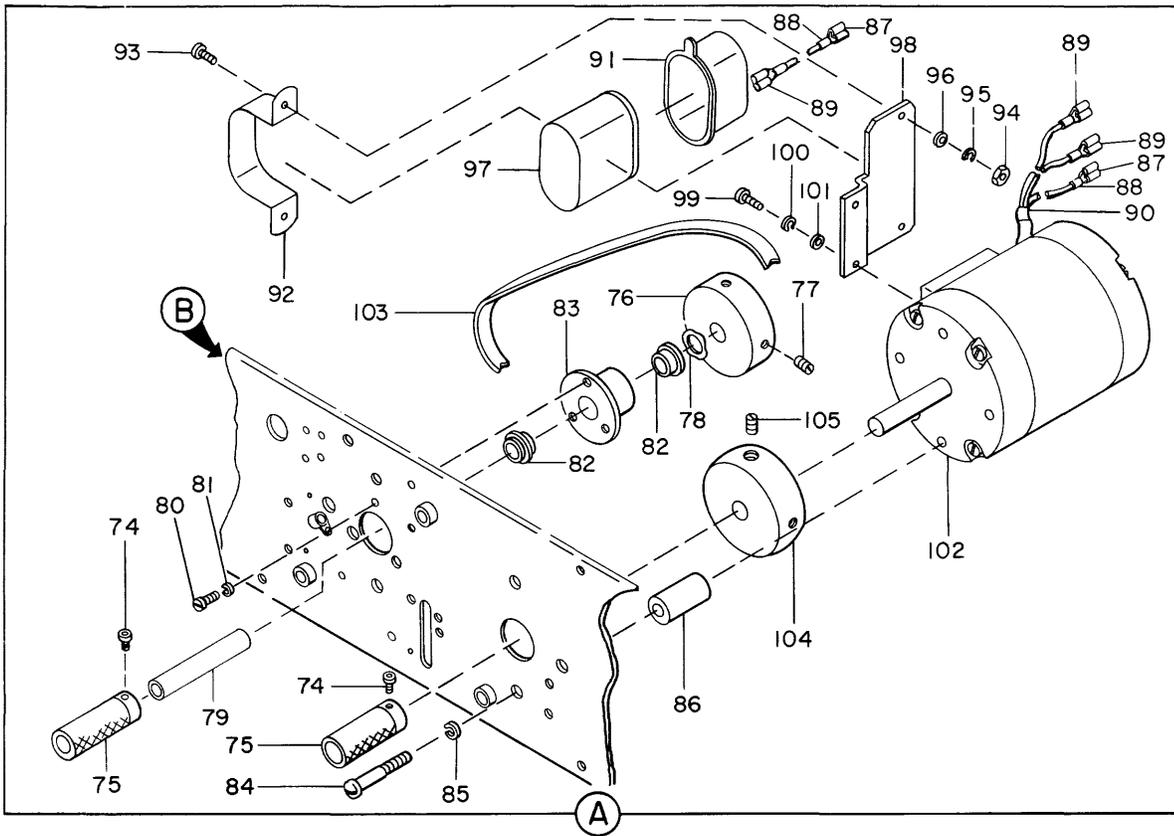


Figure 6-1. Reader Panel Assembly (Sheet 2 of 2)

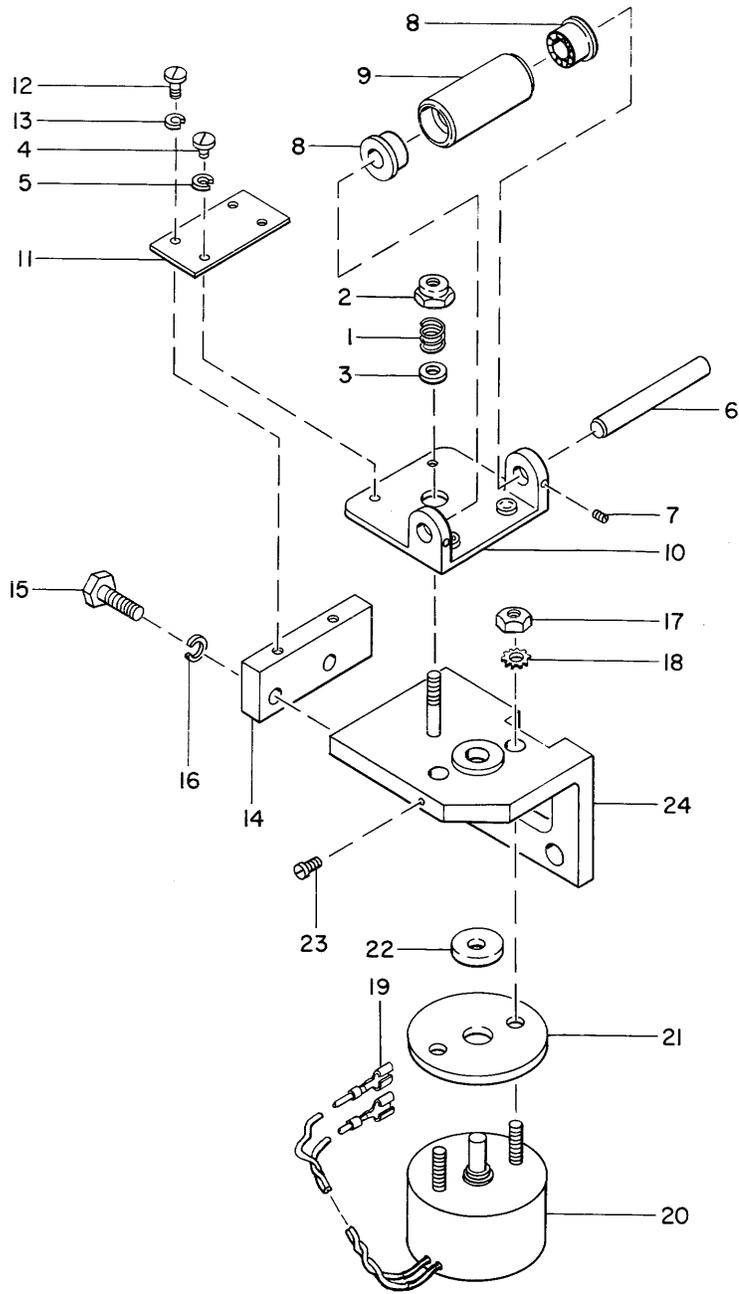


Figure 6-2. Pinch Roller Assembly

FIG & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
PINCH ROLLER ASSEMBLY				
6-2-	CC7078-1	PINCH ROLLER ASSEMBLY (See Figure 6-1, item 33 for NHA)	REF	
-1	AA2900	. SPRING, Compression (ATTACHING PARTS)	1	
-2	TH-ZA0905	. NUT, Self-locking, hex, No. 5-40 ---*---	1	
-3	TH-WA0612	. WASHER, Flat, Plain, No. 6	1	
6-2-	BC7064-1	. ROLLER-BRACKET ASSEMBLY (ATTACHING PARTS)	1	
-4	TH-SI0801	. SCREW, Machine, bd hd, No. 4-40 x 1/8 in. lg.	2	
-5	TH-WB0403	. WASHER, Lock, split, No. 4 ---*---	2	
-6	AA7026-1	. . SHAFT, Roller (ATTACHING PARTS)	1	
-7	TH-SS0802	. . SETSCREW, Soc hd knurled, cup pt., No. 4-40 x 3/16 in. lg. ---*---	2	
-8	TB-KJ2010	. . BEARING, Flanged (83086 P/N SFR166PPEE)	2	
-9	AA7023-1	. . ROLLER, Tape	1	
-10	AC7062-1	. . BRACKET, Roller	1	
-11	AA2144	. SPRING, Flat, pinch roller (ATTACHING PARTS)	1	
-12	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	2	
-13	TH-WB0403	. WASHER, Lock, split, No. 4 ---*---	2	
-14	BA7089-1	. BLOCK, Roller mount (ATTACHING PARTS)	1	
-15	TH-SK1207	. SCREW, Machine, hex hd, No. 6-32 x 1/2 in. lg.	2	
-16	TH-WB0605	. WASHER, Lock, split, No. 6 ---*---	2	
6-2-	AC7116-1	. SOLENOID ASSEMBLY (ATTACHING PARTS)	1	
-17	TH-NA0905	. NUT, Plain, hex, No. 5-40	2	
-18	TH-WD0610	. WASHER, Lock, external tooth, No. 6 ---*---	2	
-19	TH-LJ1005	. . CONNECTOR, Plug, electrical (00779 P/N 42263-2)	1	
-20	TDE01AS13	. . SOLENOID (81840 P/N A37240-002)	1	
-21	AA2080-5	. SPACER, Solenoid	1	
-22	AA7028-2	. PAD, Felt	1	
6-2-	BC7115-1	. BRACKET-STUD ASSEMBLY	1	
-23	TH-SE0802	. . SCREW, Machine, fil hd, No. 4-40 x 3/16 in. lg.	1	
-24	NO NUMBER	. . BRACKET AND STUD	1	

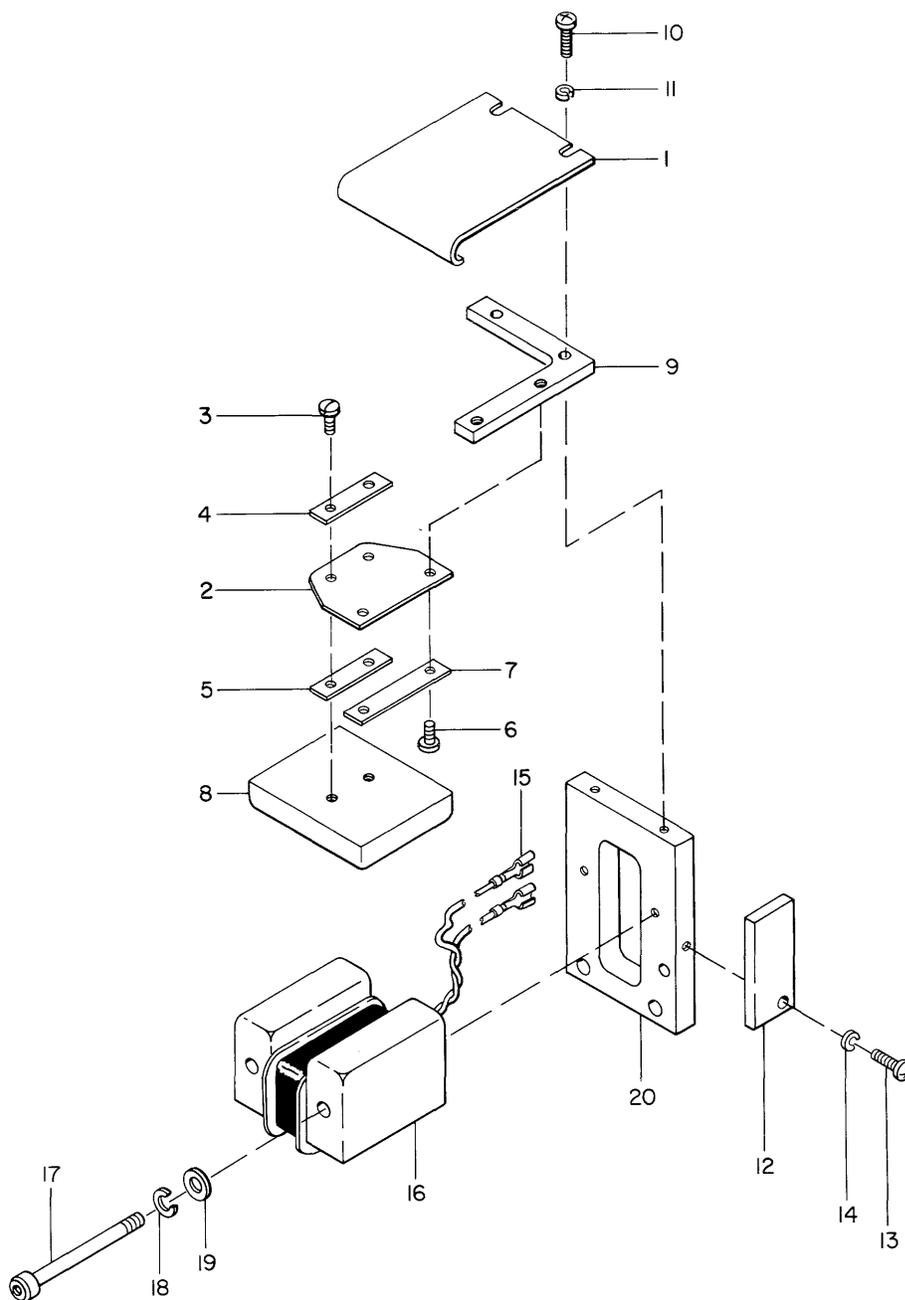


Figure 6-3. Brake Assembly

FIG. & INDEX NO.	DIGITRONICS PART NO.	1	2	3	4	5	6	7	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
BRAKE ASSEMBLY											
6-3-	CC7060-1	BRAKE ASSEMBLY (See Figure 6-1, item 37 for NHA)							REF		
-1	AA7033-1	. COVER							1		
-2	AA7027-1	. SPRING, Armature (ATTACHING PARTS)							1		
-3	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.							2		
-4	BA7689-1	. KEEPER PLATE							1		
-5	BA7688-1	. SPACER BAR							1		
-6	TH-SI0801	. SCREW, Machine, bd hd, No. 4-40 x 1/8 in. lg.							2		
-7	BA7689-2	. KEEPER PLATE							1		
		---*---									
-8	BA7189-1	. ARMATURE							1		
-9	AA7132	. BRACKET, Spring mounting (ATTACHING PARTS)							1		
-10	TH-SF0805	. SCREW, Machine, fil hd, Phillips, No. 4-40 x 3/8 in. lg.							2		
-11	TH-WB0403	. WASHER, Lock, split, No. 4							2		
		---*---									
-12	AA6600-2	. GUIDE (ATTACHING PARTS)							1		
-13	TH-SF0805	. SCREW, Machine, fil hd, Phillips, No. 4-40 x 3/8 in. lg.							1		
-14	TH-WB0403	. WASHER, Lock, split, No. 4							1		
		---*---									
-15	TH-LJ1005	. CONNECTOR, Plug, electrical (07779 P/N 42263-2)							2		
-16	BC7063-1	. COIL, Brake (ATTACHING PARTS)							1		
-17	TH-SL1442	. SCREW, Machine, soc hd cap, No. 8-32 x 1-11/16 in. lg.							2		
-18	TH-WB0708	. WASHER, Lock, split, No. 8							2		
-19	TH-WA0712	. WASHER, Flat, plain, No. 8							2		
-20	BA7094-1	. BASE PLATE, Brake							1		

PHOTO HEAD ASSEMBLY

6-4-	CC7054-1	PHOTO HEAD ASSEMBLY, Standard 5-8 channel (See Figure 6-1, item 47 for NHA)							REF	A
	CC7054-2	PHOTO HEAD ASSEMBLY, Teletypesetter Fixed (See Figure 6-1, item 47 for NHA)							REF	B
-1	AA6979-1	. LENS (ATTACHING PARTS)							1	
-2	TH-SI1204	. SCREW, Machine, bd hd, No. 6-32 x 5/16 in. lg.							1	
-3	TH-WB0605	. WASHER, Lock, split, No. 6							1	
		---*---								
-4	AA7091	. SPRING, Extension							1	
-5	BAR0007-1	. HARP, Tape guide (ATTACHING PARTS)							1	
-6	TH-SI0302	. SCREW, Machine, bd hd, 2-56 x 3/16 in. lg.							2	
		---*---								

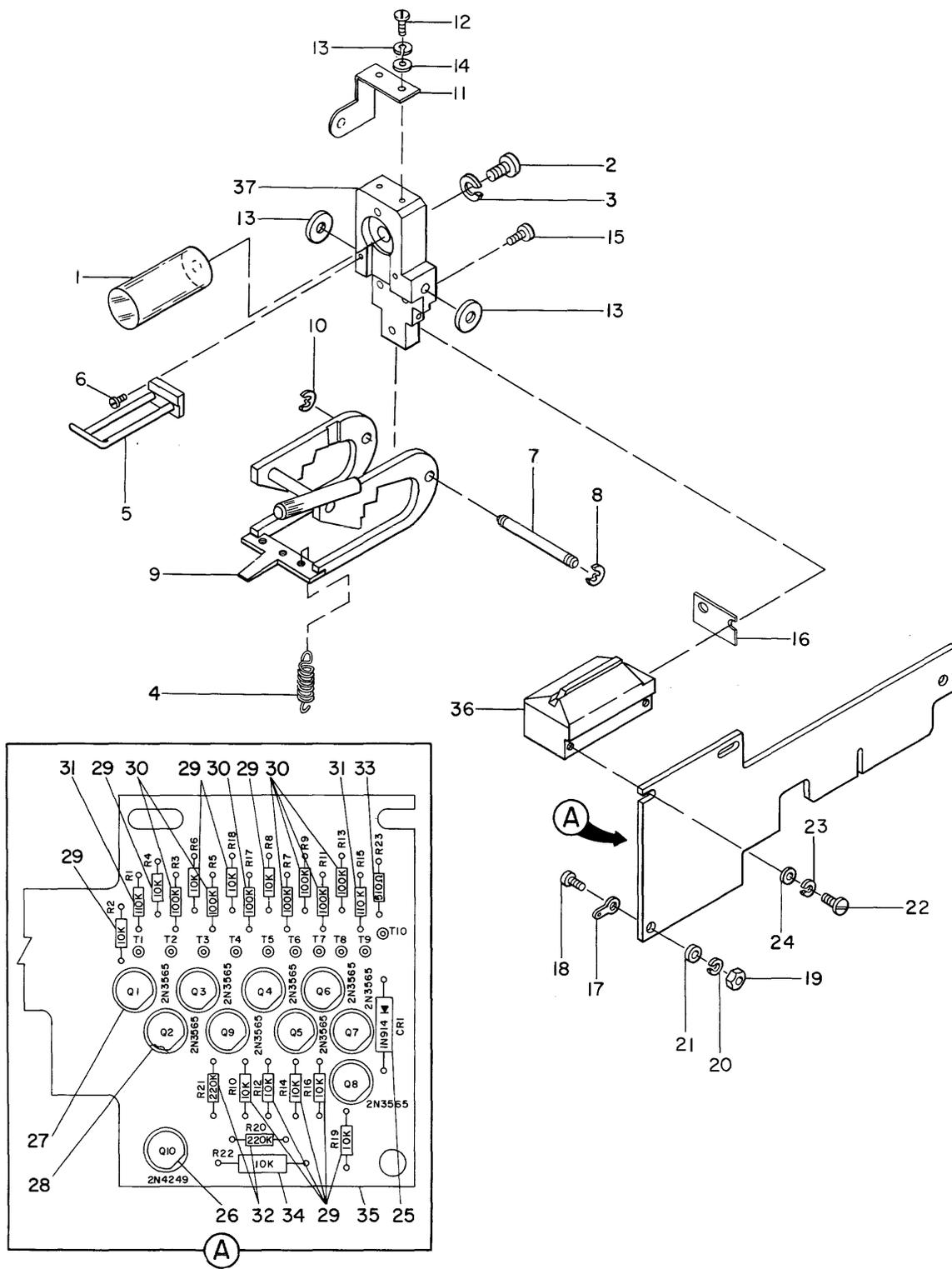


Figure 6-4. Photo Head Assembly, Standard 5-8 Channel

FIG. & INDEX NO.	DIGITRONICS PART NO.	1	2	3	4	5	6	7	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
PHOTO HEAD ASSEMBLY (Cont'd.)											
6-4-7	AA6977-1	.							SHAFT, Adjustable guide (ATTACHING PARTS)	1	
-8	TTRFA1206	.							RING, Retaining (79136 P/N 5133-12) ----*----	2	
-9	BX140-1	.							GUIDE, Adjustable	1	
-10	TH-WA0509	.							WASHER, Flat, plain, No. 5	2	
-11	BA7839-1	.							SPRING, Detent (ATTACHING PARTS)	1	
-12	TH-SI0803	.							SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	A/R	
-13	TH-WB0403	.							WASHER, Lock, split, No. 4	2	
-14	TH-WA0409	.							WASHER, Flat, plain, No. 4	2	
6-4-	CC8315-1	.							HEAD BLOCK AND PHOTO CARD ASSEMBLY (ATTACHING PARTS)	1	
-15	TH-SE0850	.							SCREW, Machine, fil hd, No. 4-40 x 9/32 in. lg. ----*----	2	
-16	AA7310-1	.							SHIM	1	B
-17	TH-LA1002	.	.						LUG, Terminal, No. 4 (ATTACHING PARTS)	1	
-18	TH-SI0803	.	.						SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	1	
-19	TH-NA0704	.	.						NUT, Plain, hex, No. 4-40	1	
-20	TH-WB0403	.	.						WASHER, Lock, split, No. 4	1	
-21	TG-WA0409	.	.						WASHER, Flat, plain, No. 4 ----*----	1	
6-4-	DQ62-1	.	.						PRINTED CIRCUIT BOARD, Photo head (ATTACHING PARTS)	1	
-22	TH-SI0303	.	.						SCREW, Machine, bd hd, No. 2-56 x 1/4 in. lg.	2	
-23	TH-WB0201	.	.						WASHER, Lock, split, No. 2	2	
-24	TH-WA0206	.	.						WASHER, Flat, plain, No. 2 ----*----	2	
-25	TCRSS0914	.	.	.					SEMICONDUCTOR DEVICE, Diode (Type 1N914)	1	
-26	TQ-AC4249	.	.	.					TRANSISTOR (Type 2N4249)	1	
-27	TQ-AD3565	.	.	.					TRANSISTOR (Type 2N3565)	9	
-28	TQSA00002	.	.	.					SPACER, Transistor	10	
-29	TR-CE103C	.	.	.					RESISTOR, Fixed, composition, 10K ± 5%, 1/8W (RC08GF103J)	10	
-30	TR-CE104C	.	.	.					RESISTOR, Fixed, composition, 100K ± 5%, 1/8W (RC08GF104J)	7	
-31	TR-CE114C	.	.	.					RESISTOR, Fixed, composition, 110K ± 5%, 1/8W (RC08GF114J)	2	
-32	TR-CE224C	.	.	.					RESISTOR, Fixed, composition, 220K ± 5%, 1/8W (RC08GF224J)	2	
-33	TR-CE514C	.	.	.					RESISTOR, Fixed, composition, 510K ± 5%, 1/8W (RC08GF514J)	1	
-34	TR-CA103C	.	.	.					RESISTOR, Fixed, composition, 10K ± 5%, 1/4W (RC07GF103J)	1	
-35	DA7921-1	.	.	.					PRINTED CIRCUIT BOARD	1	
-36	BC7057-1	.	.	.					HEAD BLOCK	1	
-37	CA7193-1	.	.	.					BASE PLATE	1	

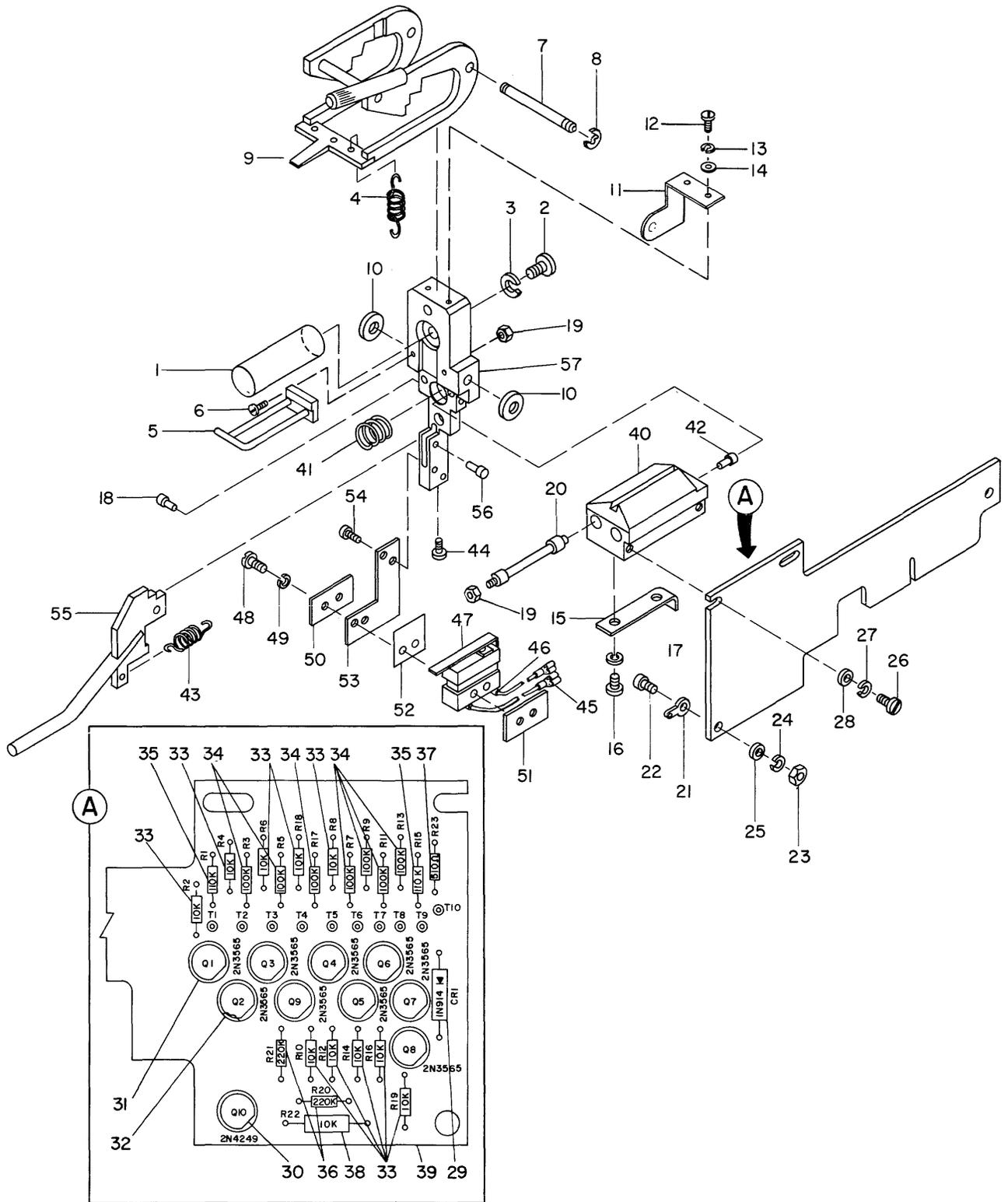


Figure 6-5. Photo Head Assembly, Standard/Teletypesetter

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
PHOTO HEAD ASSEMBLY				
6-5-	DC7582-1	PHOTO HEAD ASSEMBLY, Standard/teletypesetter, adjustable (See Figure 6-1, item 47 for NHA)	REF	
-1	AA6979-1	. LENS (ATTACHING PARTS)	1	
-2	TH-SI1204	. SCREW, Machine, bd hd, No. 6-32 x 5/16 in. lg.	1	
-3	TH-WB0605	. WASHER, Lock, split, No. 6 ---*---	1	
-4	AA7091-1	. SPRING, Extension	1	
-5	BAR0007-1	. HARP, Tape guide (ATTACHING PARTS)	1	
-6	TH-SI0302	. SCREW, Machine, bd hd, 2-56 x 1/8 in. lg. ---*---	2	
-7	AA6977-1	. SHAFT, Adjustable guide (ATTACHING PARTS)	1	
-8	TTRFA1206	. RING, Retaining (79136 P/N 5133-12) ---*---	2	
-9	BX140-1	. GUIDE, Adjustable	1	
-10	TH-WA0509	. WASHER, Flat, plain, No. 5	2	
-11	BA7839-1	. SPRING, Detent (ATTACHING PARTS)	1	
-12	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	2	
-13	TH-WB0403	. WASHER, Lock, split, No. 4	2	
-14	TH-WA0409	. WASHER, Flat, plain, No. 4 ---*---	2	
-15	BA7280-1	. SPRING (ATTACHING PARTS)	1	
-16	TH-SI0802	. SCREW, Machine, bd hd, No. 4-40 x 3/16 in. lg.	2	
-17	TH-WB0403	. WASHER, Lock, split, No. 4 ---*---	2	
6-5-	CC8315-2	. HEAD BLOCK AND PHOTO CARD ASSEMBLY (ATTACHING PARTS)	1	
-18	TH-SL0803	. SCREW, Machine, soc hd cap, No. 4-40 x 1/4 in. lg.	1	
-19	TH-ZA0704	. NUT, Hexagon, plain, No. 4-40	1	
-20	CA7258-1	. BAR, Guide ---*---	1	
-21	TH-LA1002	. . LUG, Terminal, No. 4 (ATTACHING PARTS)	1	
-22	TH-SI0803	. . SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.	1	
-23	TH-NA0704	. . NUT, Hexagon, plain, No. 4-40	1	
-24	TH-WB0403	. . WASHER, Lock, split, No. 4	1	
-25	TH-WA0409	. . WASHER, Flat, plain, No. 4 ---*---	1	
6-5-	DQ62-1	. . PRINTED CIRCUIT BOARD, Photo head (ATTACHING PARTS)	1	
-26	TH-SI0304	. . SCREW, Machine, bd hd, No. 2-56 x 3/8 in. lg.	2	
-27	TH-WB0201	. . WASHER, Lock, split, No. 2	2	
-28	TH-WA0206	. . WASHER, Flat, plain, No. 2 ---*---	2	
-29	TCRSS0914	. . . SEMICONDUCTUR DEVICE, Diode (Type 1N914)	1	
-30	TQ-AC4249	. . . TRANSISTOR (Type 2N4249)	1	
-31	TQ-AD3565	. . . TRANSISTOR (Type 2N3565)	9	
-32	TQSA00002	. . . SPACER, Transistor	10	
-33	TR-CE103C	. . . RESISTOR, Fixed, composition, 10K ± 5%, 1/8W (RC08GF103J)	10	

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION							UNITS PER ASSY	USABLE ON CODE
		1	2	3	4	5	6	7		
PHOTO HEAD ASSEMBLY (Cont'd.)										
6-5-34	TR-CE104C	.	.	.	RESISTOR, Fixed, composition, 100K \pm 5%, 1/8W (RC08GF104J)					7
-35	TR-CE114C	.	.	.	RESISTOR, Fixed, composition, 110K \pm 5%, 1/8W (RC08GF114J)					2
-36	TR-CE224C	.	.	.	RESISTOR, Fixed, composition, 220K \pm 5%, 1/8W (RC08GF224J)					2
-37	TR-CE514C	.	.	.	RESISTOR, Fixed, composition, 510K \pm 5%, 1/8W (RC08GF511J)					1
-38	TR-CA103C	.	.	.	RESISTOR, Fixed, composition, 10K \pm 5%, 1/4W (RC07GF103J)					1
-39	DA7921-1	.	.	.	PRINTED CIRCUIT BOARD					1
-40	CB1091-1	.	.	.	HEAD BLOCK					1
-41	BA7256-1	.	.	.	SPRING, Drive, compression					1
-42	BA7283-1	.	.	.	PIN, Guide					1
-43	BA7286-1	.	.	.	SPRING, Extension					1
-44	TH-SE0805	.	.	.	SCREW, Machine, fil hd, No. 4-40 x 3/8 in. lg.					1
-45	TH-LJ1005	.	.	.	LUG, Terminal (00779 P/N 42263-5)					2
-46	TTUEC0016	.	.	.	TUBING, Teflon					A/R
-47	TDB01CS05	.	.	.	SWITCH, Miniature (ATTACHING PARTS)					1
-48	TH-SF0305	.	.	.	SCREW, Machine, fil hd, No. 2-56 x 3/8 in. lg.					2
-49	TH-WB0201	.	.	.	WASHER, Lock, split, No. 2					2
-50	BA7386-2	.	.	.	PLATE, Locking, switch mount					1
-51	BA7386-1	.	.	.	PLATE, Locking, switch mount ---*---					1
-52	BA7285-1	.	.	.	INSULATOR					1
-53	BA7284-2	.	.	.	BRACKET, Switch (ATTACHING PARTS)					1
-54	TH-SH0303	.	.	.	SCREW, Machine, fil hd, No. 2-56 x 1/4 in. lg. ---*---					2
-55	BC7610-1	.	.	.	HANDLE PLATE ASSEMBLY (ATTACHING PARTS)					1
-56	TTACC1003	.	.	.	ROLL PIN, 3/32 diameter ---*---					1
-57	CA7282-1	.	.	.	BASE PLATE					1

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE		
					1	2
POWER SUPPLY ASSEMBLY						
6-6-	BC7138-1	POWER SUPPLY ASSEMBLY (See Figure 6-1, item 67 for NHA)	REF			
6-6-	CQ13-1	. PRINTED CIRCUIT CARD ASSEMBLY (ATTACHING PARTS)	1			
-1	TH-SI1404	. SCREW, Machine, bd hd, No. 8-32 x 5/16 in. lg.	4			
-2	TH-NA1307	. NUT, Plain, hex, No. 8-32	4			
-3	TH-WB0708	. WASHER, Lock, split, No. 8	8			
-4	TH-WA0712	. WASHER, Flat, plain, No. 8	8			
-5	BA2495-15	. SPACER	4			
---*---						
-6	TR-WF301C	. . RESISTOR, Fixed, composition, 300 ohms \pm 5%, 5W (63743 Series 5X)	1			
-7	TR-WF221C	. . RESISTOR, Fixed, composition, 220 ohms \pm 5%, 5W (63743 Series 5X)	2			
-8	TR-CD102C	. . RESISTOR, Fixed, composition, 1K \pm 5%, 2W (RC42GF102J)	1			
-9	TC-WE167V	. . CAPACITOR, Fixed, paper dielectric, 160 uf \pm 5%, 25 wvdc (73445 P/N C437-AR/F160)	1			
-10	TC-WA257V	. . CAPACITOR, Fixed, paper dielectric, 250 uf \pm 5%, 16 wvdc (73445 P/N C437-AR/E250)	1			
-11	TCRS2069A	. . SEMICONDUCTOR DEVICE, Diode (Type 1N2069A)	2			
-12	TCRZS5338	. . SEMICONDUCTOR DEVICE, Diode (Type 1N5338B)	1			
-13	TCRZ5231B	. . SEMICONDUCTOR DEVICE, Diode (Type 1N5231B)	1			
-14	TCRPS3A20	. . SEMICONDUCTOR DEVICE, Diode (21845 P/N 3A200)	2			
-15	DX178-1	. . PRINTED CIRCUIT BOARD	1			
-16	TH-WD0813	. WASHER, Lock, external tooth, No. 10	2			
-17	AT382	. CAPACITOR, Fixed, electrolytic, 9000 uf, 40 wvdc	1			
-18	BT383	. TRANSFORMER (ATTACHING PARTS)	1			
-19	TH-SI1406	. SCREW, Machine, bd hd, No. 8-32 x 5/16 in. lg.	4			
-20	TH-WB0708	. WASHER, Lock, split, No. 8	4			
-21	TH-WA0712	. WASHER, Flat, plain, No. 8	4			
---*---						
-22	TMBBD0004	. BRACKET, Capacitor (ATTACHING PARTS)	1			
-23	TH-SI1209	. SCREW, Machine, bd hd, No. 6-32 x 3/4 in. lg.	3			
-24	TH-WB0605	. WASHER, Lock, split, No. 6	3			
-25	TH-WA0612	. WASHER, Flat, plain, No. 6	3			
---*---						
-26	BX142-1	. CHASSIS SUBASSEMBLY	1			

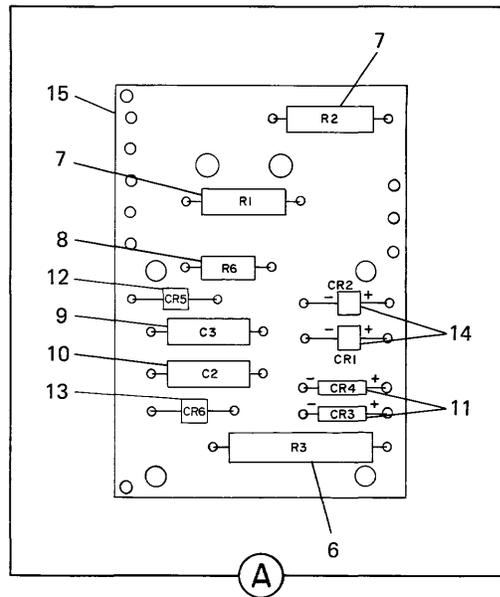
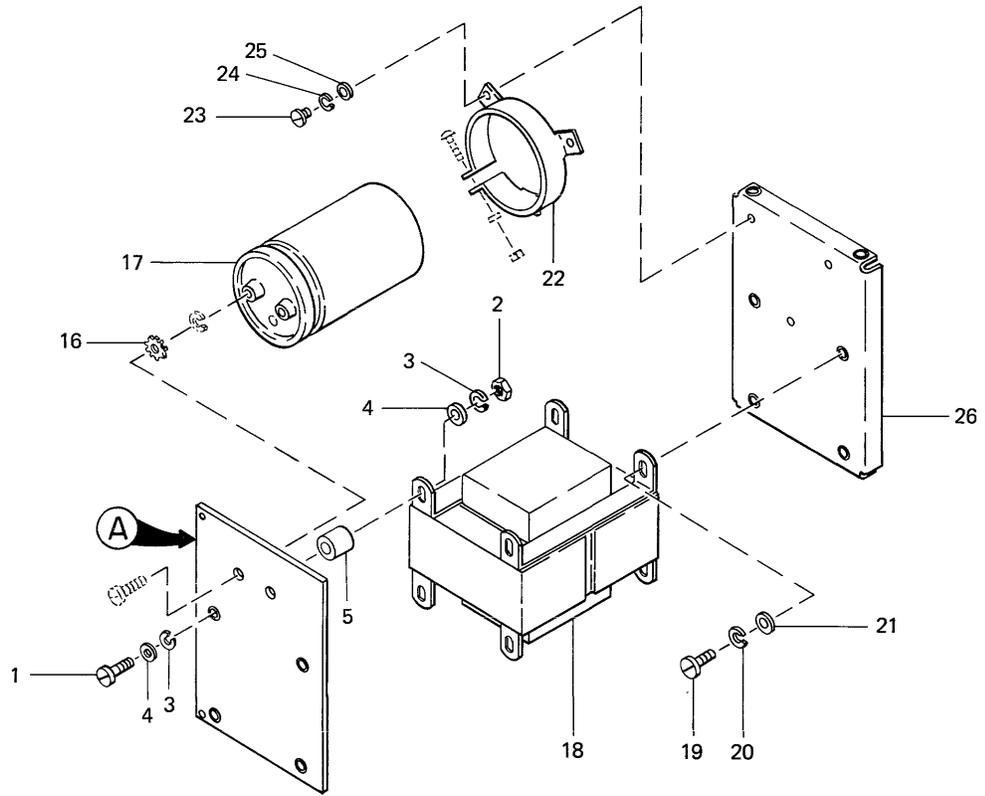


Figure 6-6. Power Supply Assembly

FIG. & INDEX NO.	DIGITRONICS PART NO.	1	2	3	4	5	6	7	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
PRINTED CIRCUIT BOARD ASSEMBLY											
6-7-	DQ63-1	PRINTED CIRCUIT BOARD ASSEMBLY (See Figure 6-1, item 107 for NHA)							REF		
-1	TC-HH506E	.	CAPACITOR, Fixed, paper dielectric, 50 uf \pm 10%, 50 wvdc							2	
-2	TC-NJ103D	.	CAPACITOR, Fixed, paper dielectric, 0.01 uf \pm 10%, 100 wvdc (84411 Series 663UW)							1	
-3	TCRS2069A	.	SEMICONDUCTOR DEVICE, Diode (Type 1N2069A)							3	
-4	TCRSU0125	.	SEMICONDUCTOR DEVICE, Diode (Type 125)							6	
-5	TCRZS748A	.	SEMICONDUCTOR DEVICE, Diode, zener, (Type 1N4748A)							1	
-6	TR-CA102C	.	RESISTOR, Fixed, composition, 1K \pm 5%, 1/4W (RC07GF102J)							9	
-7	TR-CA222C	.	RESISTOR, Fixed, composition, 2.2K \pm 5%, 1/4W (RC07GF222J)							1	
-8	TR-CA472C	.	RESISTOR, Fixed, composition, 4.7K \pm 5%, 1/4W (RC07GF472J)							1	
-9	TR-CA471C	.	RESISTOR, Fixed, composition, 470 ohms \pm 5%, 1/4W (RC07GF471J)							1	
-10	TR-CA223C	.	RESISTOR, Fixed, composition, 22K \pm 5%, 1/4W (RC07GF223J)							5	
-11	TR-CA302C	.	RESISTOR, Fixed, composition, 3K \pm 5%, 1/4W (RC07GF302J)							1	
-12	TR-CB102C	.	RESISTOR, Fixed, composition, 1K \pm 5%, 1/2W (RC20GF102J)							3	
-13	TR-CB562C	.	RESISTOR, Fixed, composition, 5.6K \pm 5%, 1/2W (RC20GF562J)							1	
-14	TR-CB270C	.	RESISTOR, Fixed, composition, 27 ohms \pm 5%, 1/2W (RC20GF270J)							3	
-15	TR-CB471C	.	RESISTOR, Fixed, composition, 470 ohms \pm 5%, 1/2W (RC20GF471J)							4	
-16	TQ-AD3565	.	TRANSISTOR (Type 2N3565)							1	
-17	TQ-PD3053	.	TRANSISTOR (Type 2N3053)							4	
-18	TQSAB0002	.	SPACER, Transistor							5	
-19	TQ-PD3055	.	TRANSISTOR (Type 2N3055) (ATTACHING PARTS)							3	
-20	TH-SI0805	.	SCREW, Machine, bd hd, No. 4-40 x 3/8 in. lg.							6	
	TH-WD0408	.	WASHER, Lock, ext. tooth, No. 4							12	
	TH-YA0406	.	WASHER, Nonmetallic, fiber, No. 4							6	
	TH-NA0704	.	NUT, Plain, hex, No. 4-40							6	
		.	---*---								
-21	TQ-PD3055	.	TRANSISTOR (Type 2N3055) (ATTACHING PARTS)							1	
-22	TH-SI1207	.	SCREW, Machine, bd hd, No. 6-32 x 1/2 in. lg.							2	
	TH-YA0606	.	WASHER, Nonmetallic, fiber, No. 6							3	
	TH-WD0610	.	WASHER, Lock, ext. tooth, No. 6							2	
	TH-NA1106	.	NUT, Plain, hex, No. 6-32							2	
	TH-WB0605	.	WASHER, Lock, split, No. 6							1	
		.	---*---								
-23	TQSCZ0003	.	HEAT SINK, Transistor (98978 P/N UP1-T03B)							1	
-24	TCK16DSTL	.	CIRCUIT, Integrated (93332 P/N SG83)							4	
-25	TCK16DSTH	.	CIRCUIT, Integrated (93332 P/N SG82)							1	
-26	TPKEYPC02	.	KEY, Polarizing							2	

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
		1 2 3 4 5 6 7		
PRINTED CIRCUIT BOARD ASSEMBLY (Cont'd.)				
6-7-27	TPFP01213	. CONNECTOR, Receptacle, electrical (71785 P/N 252-12-30-160)	1	
-28	TPFP02212	. CONNECTOR, Receptacle, electrical (71785 P/N 252-22-30-160)	1	
6-7-	DX348-1	. PRINTED CIRCUIT BOARD	1	
-29	TY-SA0002	. . EYELET, Metallic, small	46	
-30	TY-SA0001	. . EYELET, Metallic, large	34	
-31	DX348-11	. . PRINTED CIRCUIT BOARD, Blank	1	

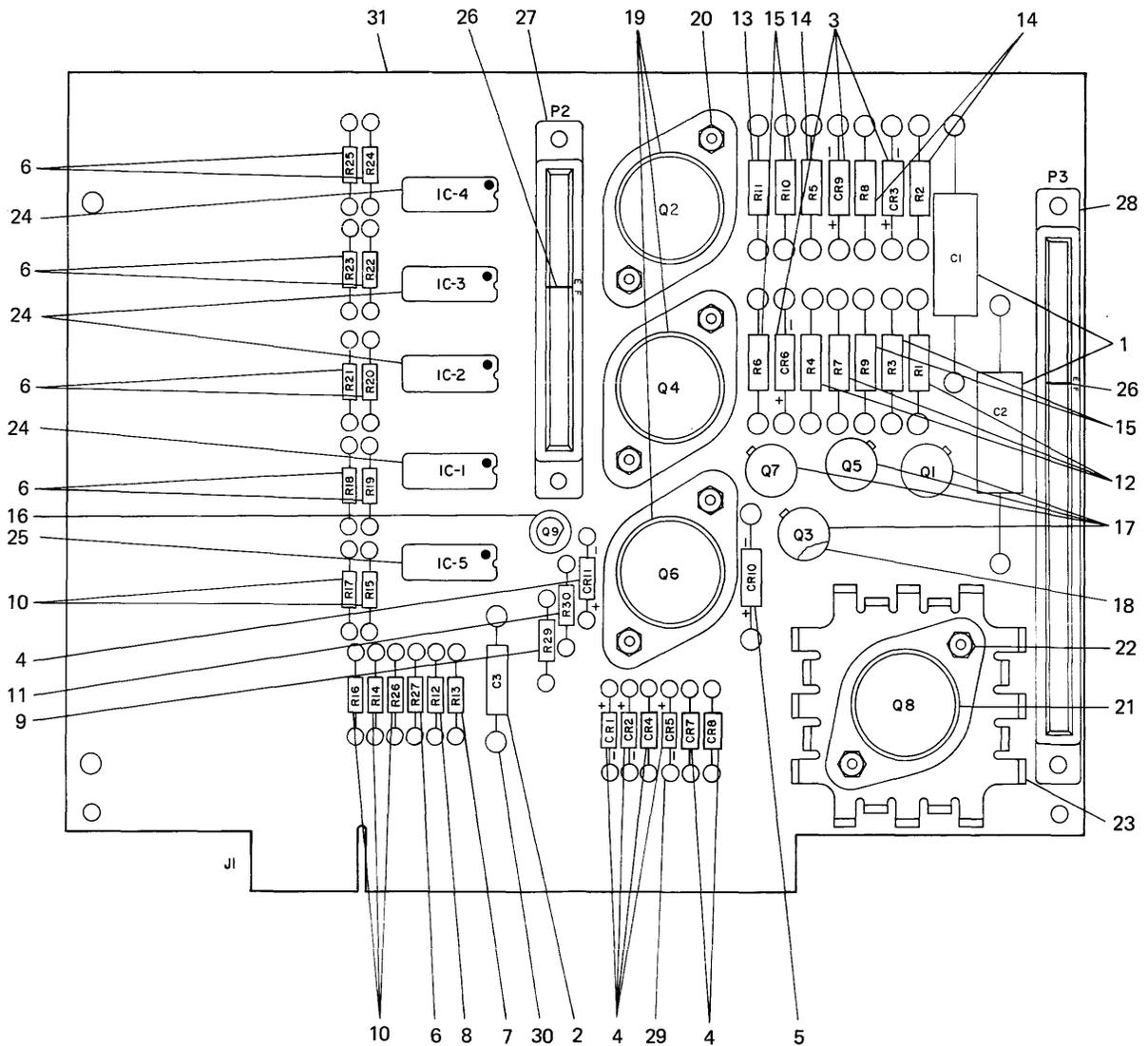


Figure 6-7. Printed Circuit Board Assembly

FIG. & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION							UNITS PER ASSY	USABLE ON CODE
		1	2	3	4	5	6	7		
END OF TAPE ASSEMBLY										
6-8-	CQ24-1	END OF TAPE ASSEMBLY (See Figure 6-1 item 178 for NHA)							REF	
-1	TQ-PD3055	. TRANSISTOR (Type 2N3055) (ATTACHING PARTS)							1	
-2	TH-SI0807	. SCREW, Machine, bd hd, No. 4-40 x 1/2 in. lg.							2	
-3	TH-WA0409	. WASHER, Flat, plain, No. 4							2	
-4	TH-WD0408	. WASHER, Lock, ext. tooth, No. 4							4	
-5	TH-YA0406	. WASHER, Fiber							2	
-6	TH-NA0704	. NUT, Plain, hex, No. 4-40							2	
----*----										
-7	TLNHB0002	. LAMP, Miniature, (08806 P/N 253)							1	
-8	TTUEF0006	. SLEEVING, Teflon, No. 20							1	
-9	TCRQS710P	. PHOTOVOLTAIC CELL							1	
-10	TTUEC004	. SLEEVING, Teflon, No. 24							2	
-11	TR-VF104D	. RESISTOR, Variable, 100K ± 10%, 1/2W							1	
-12	TQ-AD3565	. TRANSISTOR, (Type 2N3565)							1	
-13	TQSA00001	. SPACER, Transistor							1	
-14	TR-CA103C	. RESISTOR, 10K, ± 5%, 1/4W							1	
-15	TR-CA123C	. RESISTOR, 12K, ± 5%, 1/4W							1	
-16	TCRSS0914	. SEMICONDUCTOR DEVICE, Diode							2	
-17	AA7319	. MOUNT, Printed Circuit Board (ATTACHING PARTS)							1	
-18	TH-SI0803	. SCREW, Machine, bd hd, No. 4-40 x 1/4 in. lg.							2	
-19	TH-WA0409	. WASHER, Flat, plain, No. 4							2	
-20	TH-WD0408	. WASHER, Lock, ext. tooth, No. 4							2	
----*----										
-21	TH-LJ1002	. CONNECTOR, Edge							1	
-22	CX186	. PRINTED CIRCUIT BOARD							1	

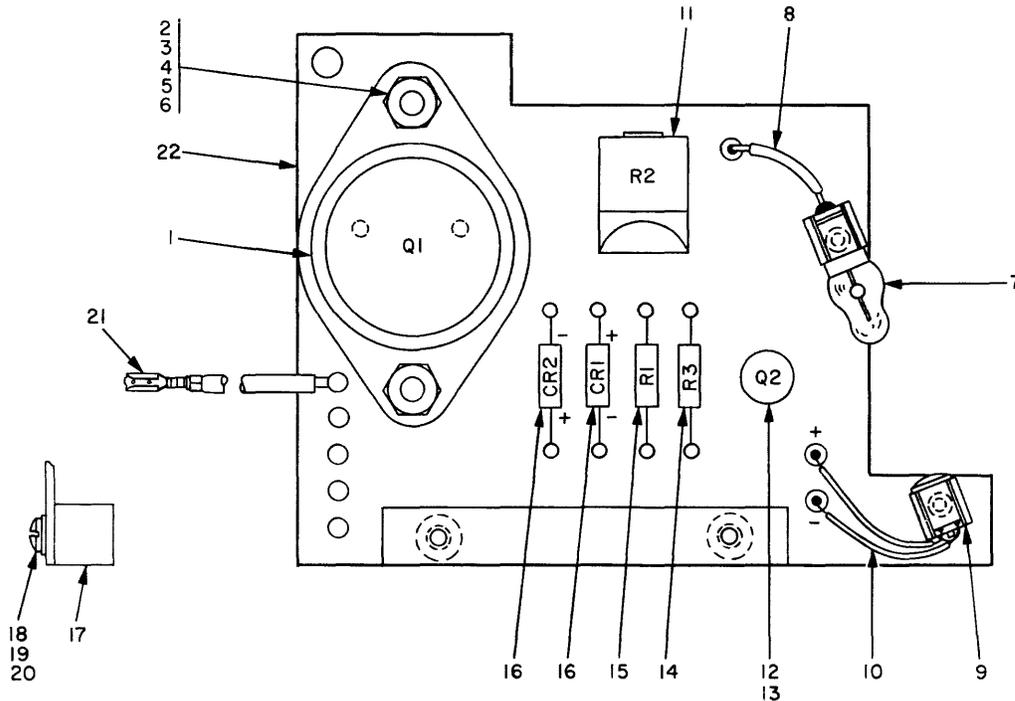


Figure 6-8. End of Tape Assembly

FIG & INDEX NO.	DIGITRONICS PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
CONNECTOR ASSEMBLY				
6-9-	BC7611-3	CONNECTOR ASSEMBLY, Hooded (See Figure 6-1, item 106 for NHA)	REF	
-1	BA7301-3	. HOOD, Connector (ATTACHING PARTS)	1	
-2	TH-SG0303	. SCREW, Machine, fil hd, No. 2-56 x 1/4 in. lg. ---*---	4	
-3	TH-SE0307	. SCREW, Machine, fil hd, No. 2-56 x 1/2 in. lg.	2	
-4	AB1094-1	. STRAP, Nylon	1	
-5	TTRRA1201	. RING; Retaining	2	
-6	BB1093-1	. SCREW, Modified	2	
-7	BA7302-1	. BLOCK	2	
-8	TPFP02517	. CONNECTOR, Electrical, keyed (71785 P/N 251-25-30-160)	1	

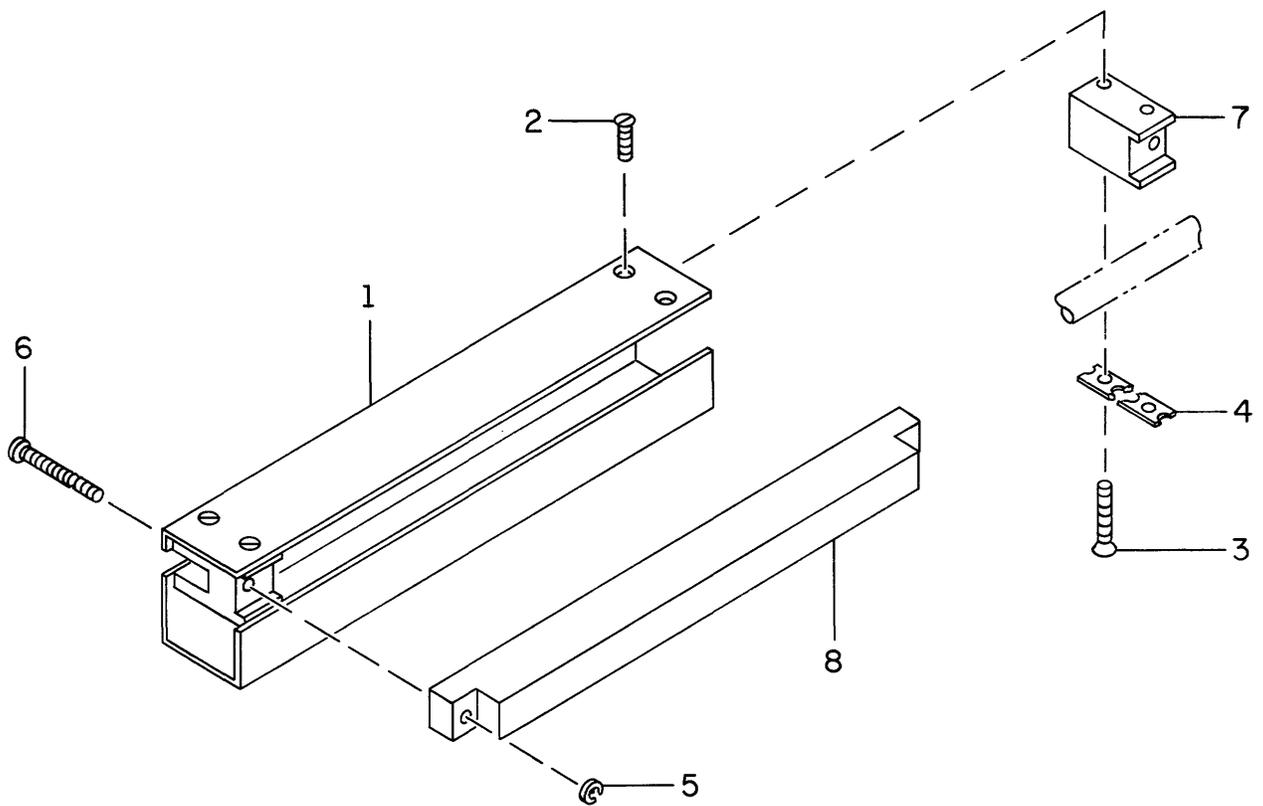
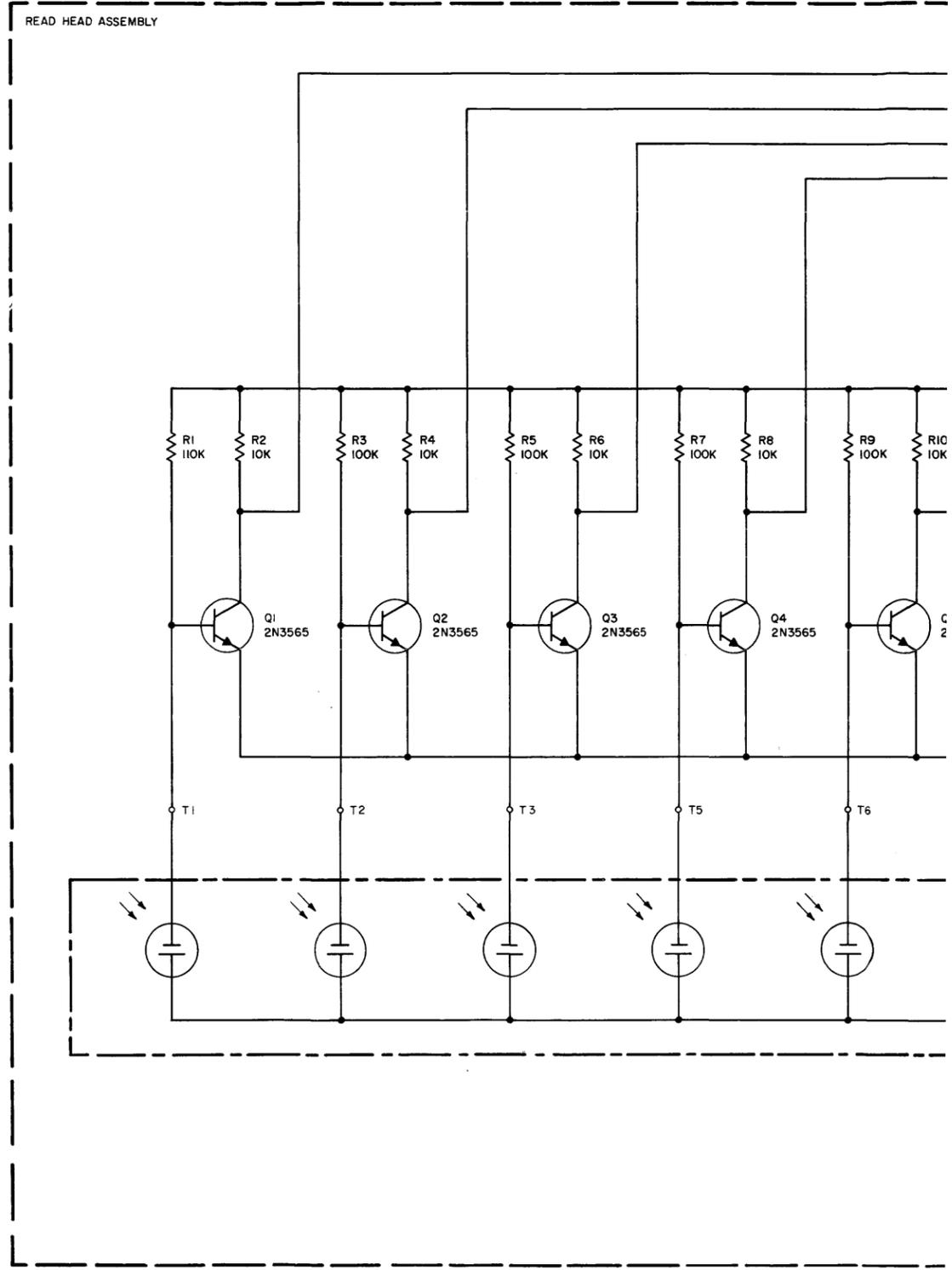
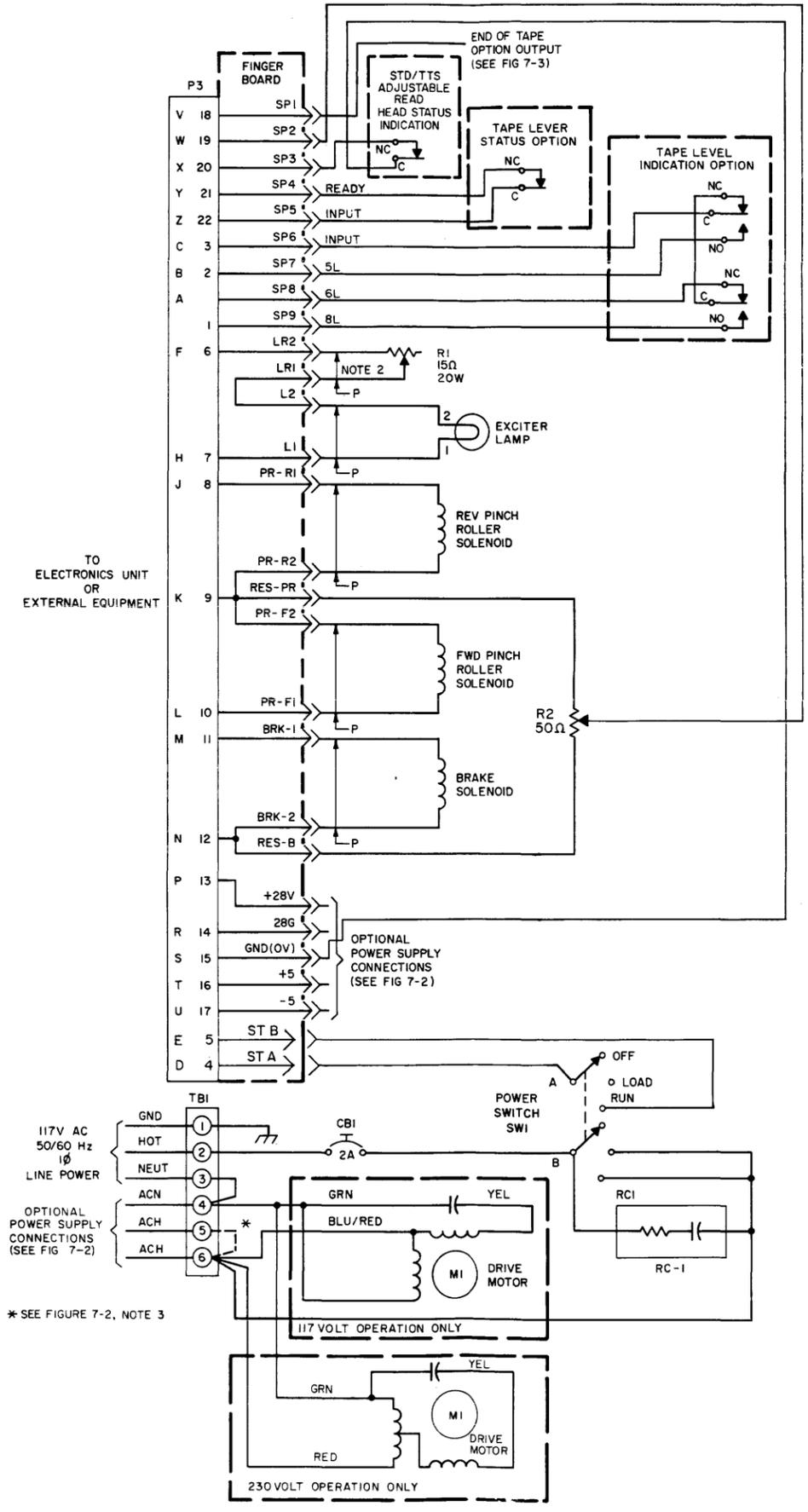
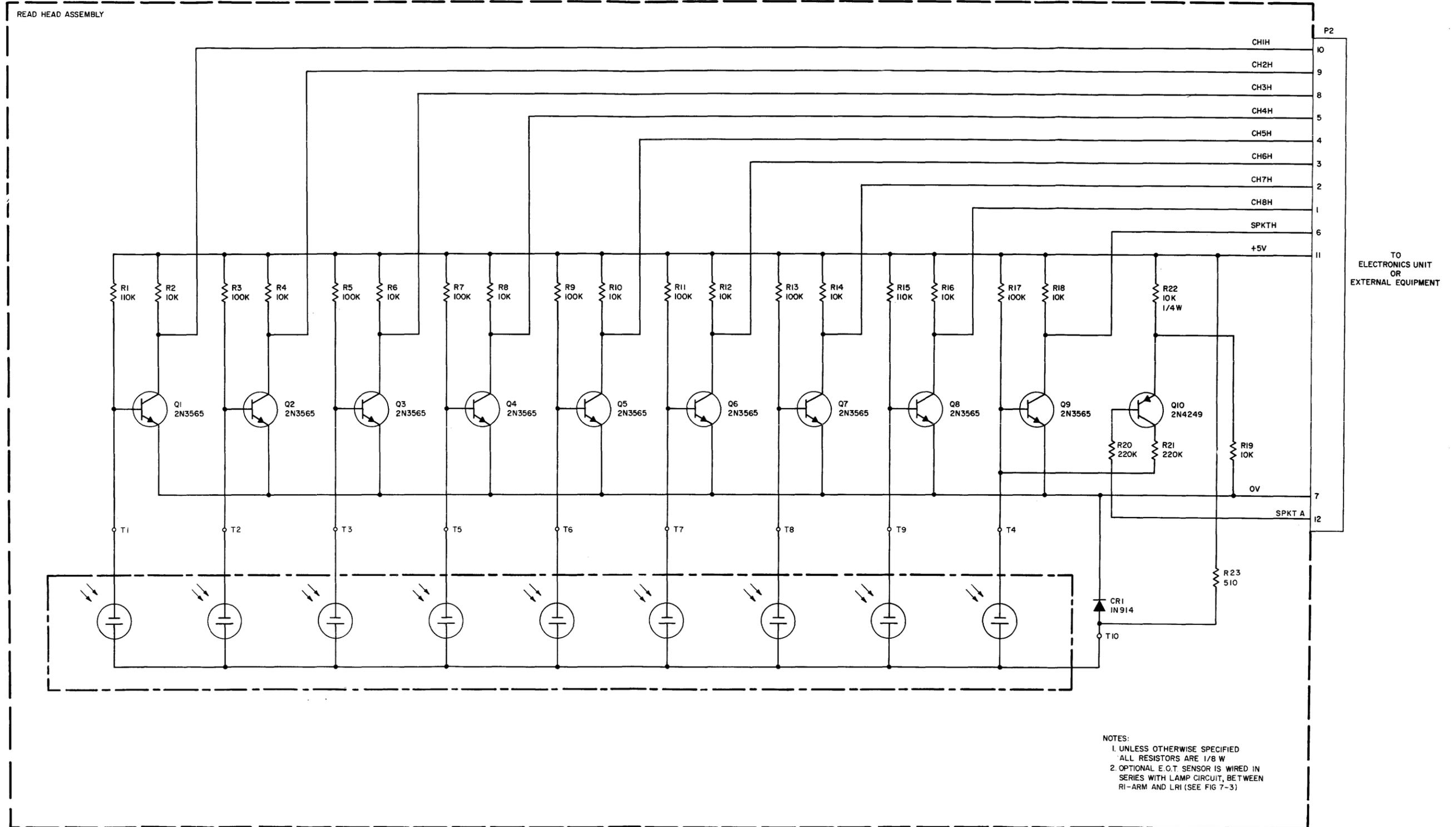
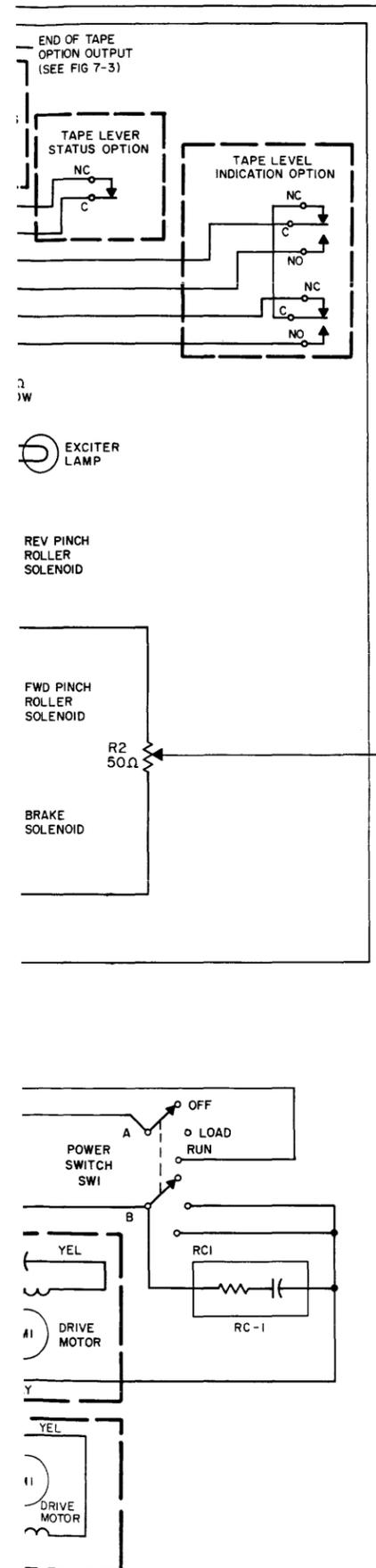


Figure 6-9. Connector Assembly

**SECTION VII
REFERENCE DRAWINGS**

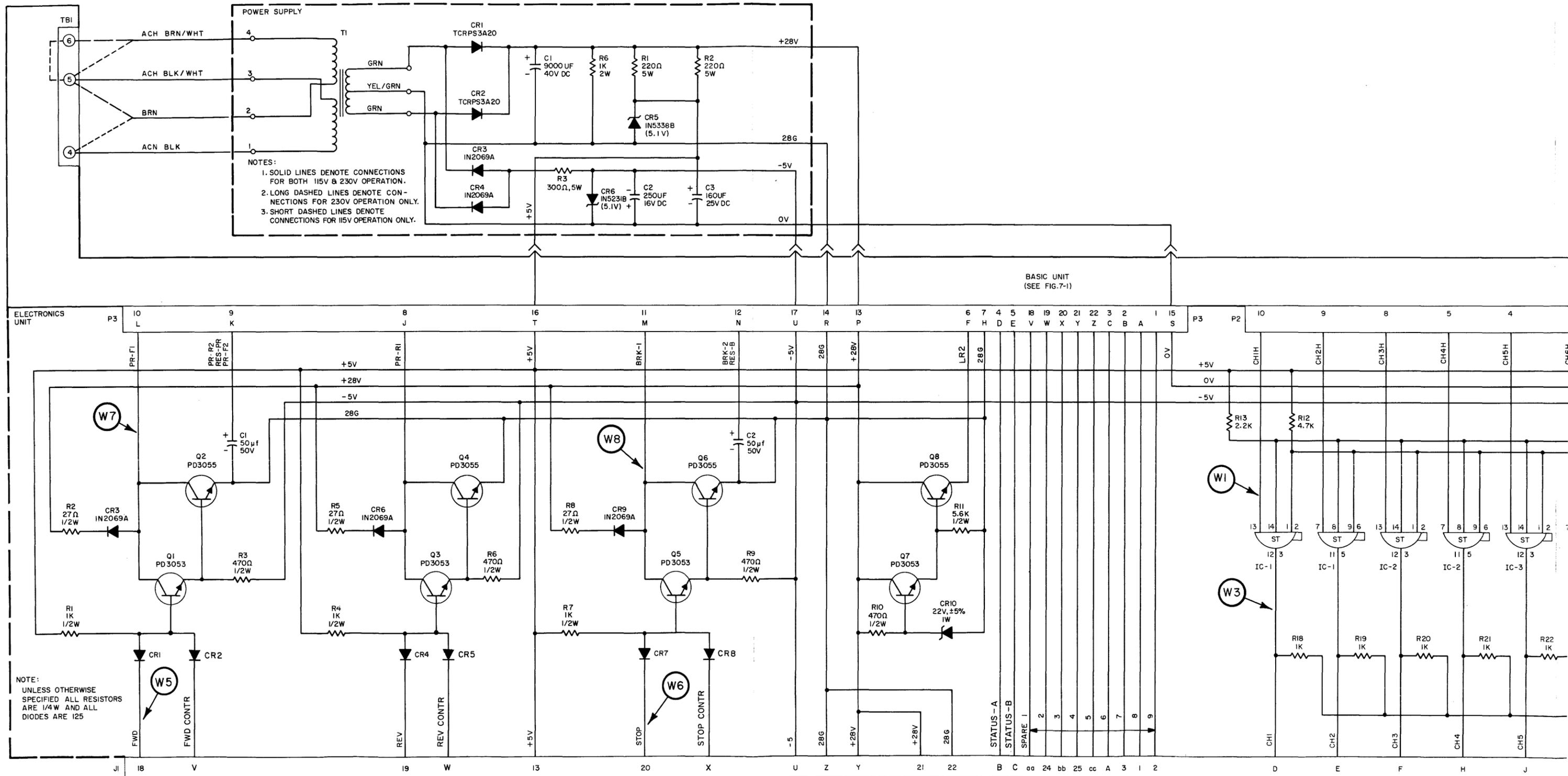
This section contains the reference Schematic Diagrams for the Model 2540 Series Perforated Tape Readers.





NOTES:
 1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/8 W
 2. OPTIONAL E.O.T. SENSOR IS WIRED IN SERIES WITH LAMP CIRCUIT, BETWEEN RI-ARM AND LRI (SEE FIG 7-3)

Figure 7-1. Model (B)2540T, Schematic Diagram



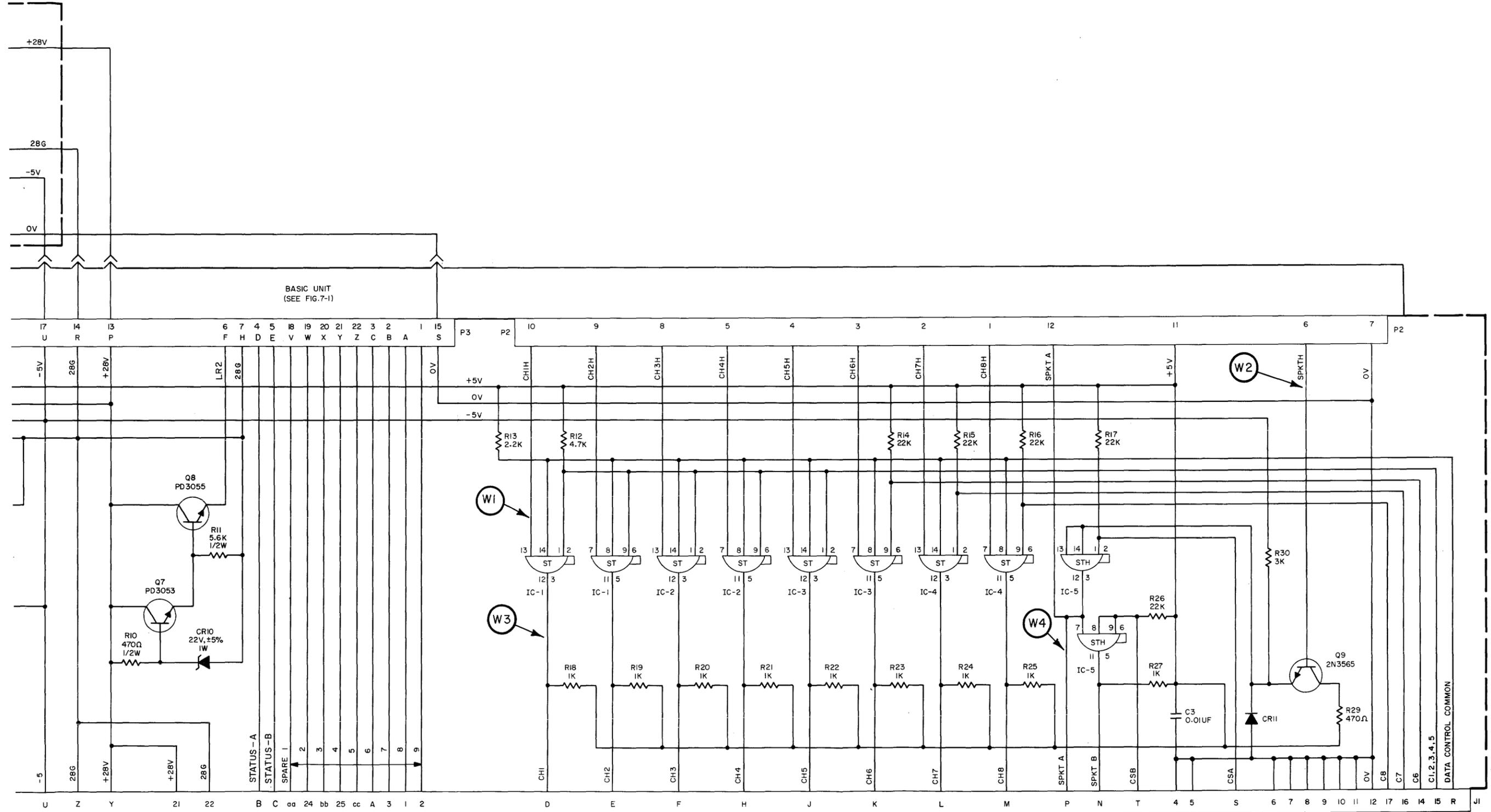


Figure 7-2. Model (B)2540EP, Schematic Diagram

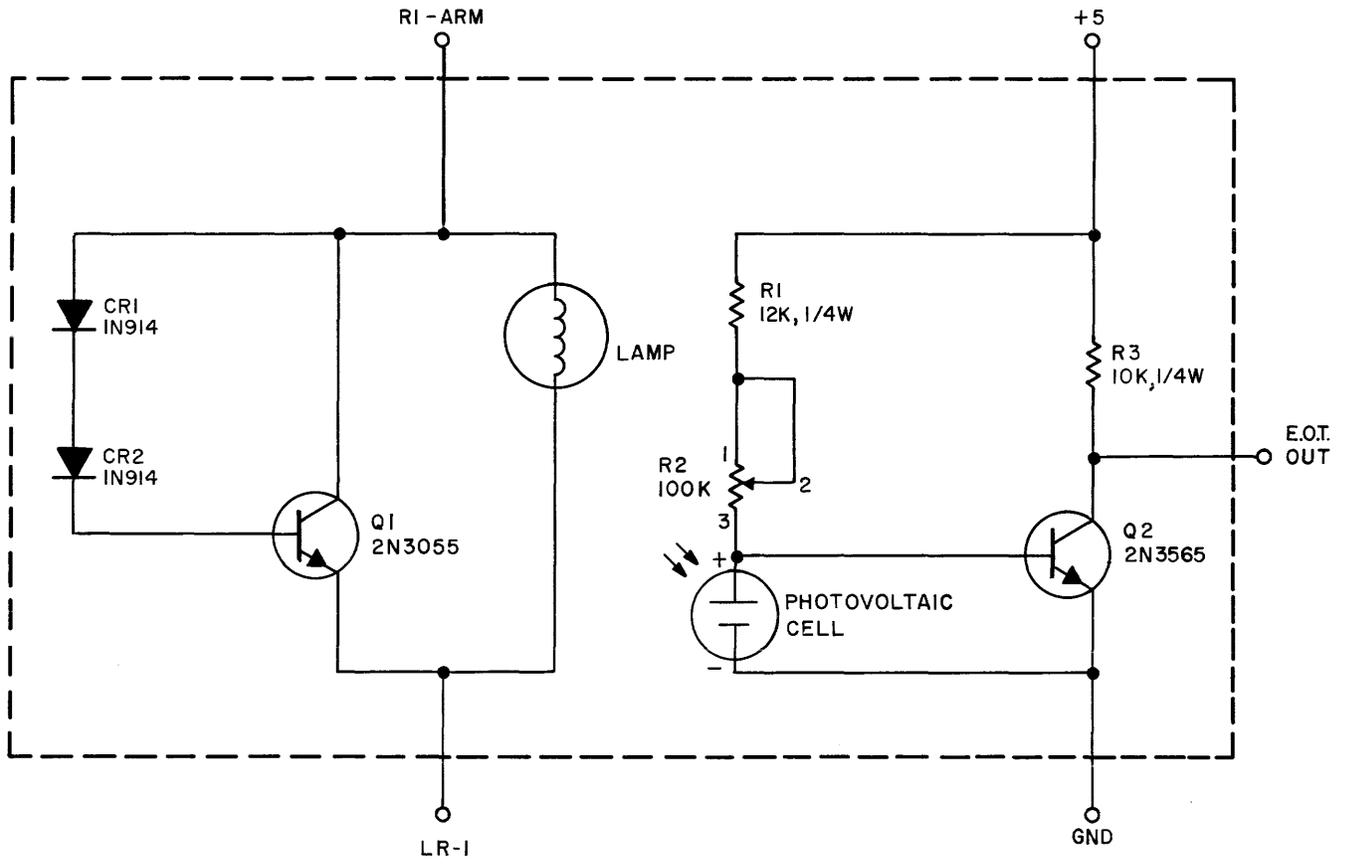


Figure 7-3. End-of-Tape Sensor, Schematic Diagram

APPENDIX A

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be tested as soon as it is received. If it fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to us. We will then advise you of the disposition to be made of the equipment and arrange for repair or replacement. Include model number, type number, and serial number when referring to this instrument for any reason.

WARRANTY

Digitronics warrants that all equipment, spare components and piece parts furnished hereunder will be free and clear of all liens and encumbrances, and that all such equipment, spare components and piece parts shall be free from defects in design, workmanship and material under normal use and service provided, however, that no warranty is made with respect to any equipment if any change or modification has been made therein without the written consent of Digitronics. No other warranty, either expressed or implied, is made by Digitronics. If Digitronics is advised within twelve months from date of delivery to the customer that component parts furnished hereunder do not meet the warranties hereunder, Digitronics will supply replacement part(s) to the customer or will repair the defective part(s) at Digitronics' main plant or factory service center. When Digitronics elects to repair defective part(s) at main plant or factory service centers and Digitronics has been advised of part(s) being defective within ninety (90) days from date of delivery of component part(s) to the customer, there will be no labor charge to the customer. Mechanical and electrical items which are of an expendable nature including (but not limited to) capstans, fuses, lamps, transistors, and/or crystal diodes, are specifically excluded from any warranty; however, Digitronics will extend to the customer any applicable warranty which Digitronics may have received from its suppliers for such excluded items. If any fault develops, the following steps should be taken:

1. Notify Digitronics Corporation at the address given below, giving full details of the difficulty, and include the model number, type number, and serial number. On receipt of this information, we will give you service instructions or shipping data.

Digitronics Corporation
53 John Street
Cumberland, Rhode Island 02864
Attention: Factory Service Center

2. On receipt of shipping instructions, forward the instrument prepaid, and repairs will be made at the factory service center. If requested, an estimate will be made before work begins provided the instrument is not covered by the warranty.

SHIPPING

All shipments of Digitronics Corporation instruments should be made via Railway Express. The instruments should be packed in their original shipping container or (as a minimum) a wooden box, and should be surrounded by 2 or 3 inches of excelsior or similar shock absorbing material.

APPENDIX B

MANUFACTURING SPECIFICATIONS

The Manufacturing Specification (MS) number, located on the equipment nameplate, presents in skeleton form the specification to which the equipment was manufactured. It identifies the speed of the unit, type of head assembly, etc. From this MS number, you can readily determine the major characteristics and assembly part numbers of your particular unit by comparing it with the detailed Manufacturing Specifications provided on the following page. Use the following as a guide for interpreting the characteristics of your unit from the MS number.

MS number from nameplate 2540 - A1 - B2 - C3 - D1 - E201 - F2 - H1 - J1 - J2 - K2

MS2540-A1	Basic unit and general assembly
B2	10-inch wide panel
C3	5-1/4-inch high rack adapter
D1	Standard Head assembly
E201	300 char/sec bidirectional unit, 115 volt, 60 Hz.
F2	Screened top door
H1	Electronics card
J1	Power supply
J2	Line Cord
K2	Shipping carton assembly (for unit with 5-1/4 x 19 inch panel)

APPENDIX B (Cont'd.)

MANUFACTURING SPECIFICATION MS2540

ITEM	DESCRIPTION	DWG. NUMBER
A	Reader Assembly	
A1	Basic Unit and General Assembly	DC7052-1
B	Panel	
B1	19 inches wide	DA7824-1 DX314-1
B2	10 inches wide	DX314-1
C	Rack Adapter	
C3	5-1/4 inches high, painted	DA7009-2
C4	7 inches high, painted (used with fan fold bins)	DA7257-2
C5	7 inches high, painted	DA7257-1
C6	Special	_____
C7	7 inches high, brushed nickel (used with fan fold bins)	DA7257-12
C8	7 inches high, brushed nickel	DA7257-11
C9	5-1/4 inches high, brushed nickel	DA7009-12
D	Head Assembly and Lower Cover	
D1	Standard head Lower cover	CC7054-1 CX202-1
D2	Teletypesetter, fixed Lower cover	CC7054-2 CX202-1
D3	Teletypesetter, adjustable Lower cover	DC7582-1 CX202-2
E	Speed Package	
E __	Number following letter E in item column represents dash number of speed package drawing; refer to Table 6-1 for description.	BN1078-
F	Top Door	
F1	Top door, plain	CE949-1
F2	Top door, screened	CE949-2
F3	Top door, plain (used with 2540/6012)	CE949-3
F4	Top door, screened (used with 2540/6012)	CE949-4
H	Electronics Card or Basic Unit only	
H1	Electronics Card, standard	DQ63-1
H2	Connector/Hood Assembly	BC7611-3
H3	Connector Complement, basic unit	AN1050-1
J	Standard Options	
J1	Power Supply Assembly	BC7138-1
J2	Line Cord Assembly	BC7074-1
J3	End of Tape Assembly	CQ24-1
J4	Load Switch Assembly	BC7580-1
J5	Tape Level Switch Complement	BN1079-1
J6	Cleaning Kit	_____
J7	Power Supply Mounting Bracket (for use with rack adapter)	AA7194-
J8	Fan Fold Complement	BN1080-1
K	Shipping Carton Assembly	
K1	Shipping carton assembly (for units with 5-1/4 x 10 inch panel)	DC7661-1
K2	Shipping carton assembly (for units with 5-1/4 x 19 inch panel)	DC7661-2
K3	Shipping carton assembly (for units with 7 x 19 inch panel)	DC7661-3

APPENDIX C

TRANSISTOR AND DIODE SPECIFICATIONS

The transistors and diodes used in the Model 2540 Tape Reader are listed below. The number which is indicated with an asterisk (*) is a component which is manufactured to Digitronics specifications and is not commercially available. The following page contains the electrical and physical specifications for this component.

<u>TRANSISTORS</u>	<u>DIGITRONICS PART NUMBER</u>
2N3053	TQ- PD3053
2N3055	TQ- PD3055
2N3565	TQ- AD3565
2N4249	TQ- AC4249
<u>DIODES</u>	<u>DIGITRONICS PART NUMBER</u>
1N2069A	TCRS2069A
1N4734	TCRPS734A
1N4749A	TCRZS749A
1N5231B	TCRZ5231B
3A200	TCRS3A20
*125	TCRSU0125

I. DIODE
125

CLASS
SWITCHING

MATERIAL
GERMANIAM

CATAGORY
GOLD BONDED
JUNCTION
(UNIVERSAL TYPE)

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 80 mw @ $\theta - 1 = 1$ mw/°C

PIV 35V (min) @ 100 ua

I reverse 10 ua @ 10V (min)

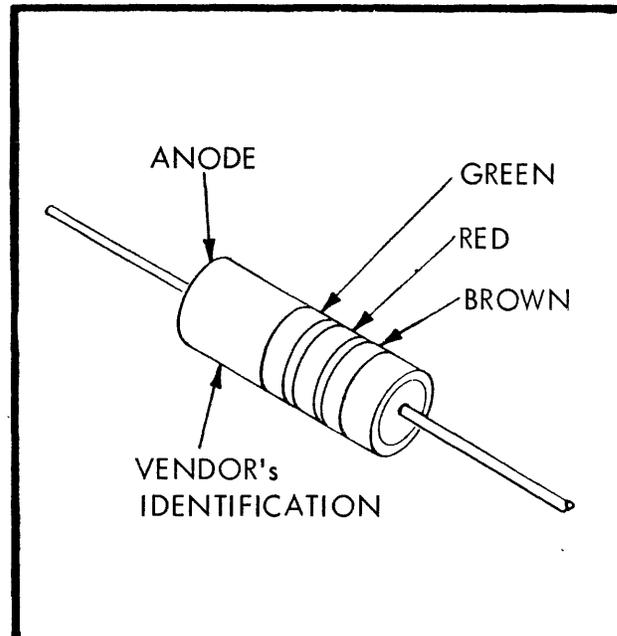
V forward 0.45 @ 50 ua @ 55°C

I peak 70 ma @ 0.7V (max)

I average 10 ma @ _____

I surge 300 ma @ $V_f \leq 1.5V$ for 100 ms @ 5 cps (5% duty cycle)

- NOTE: 1. Recovery as per ED-10
with $t_r \leq 0.3$ usec
2. Environmental as per ED 67
3. Replaces DX2 (S-151)
DX3 (S-152)
4. GTD230 (S-153)



 DIGITRONICS  ALBERTSON, NEW YORK	
TITLE: DIODE 125	
USED ON:	DRAWING NO TCRSU0125

A				
REV	E.C.O.	CHKD.	APP'D.	MO. DAY YR.

2540 DATA SHEET

W/O 503040-78
 S/N C7213-770
 DATE 3-29-72

TESTED BY MT

1.1 Power Requirements

115 VAC / 230 VAC _____
 60 Cps / 50 Cps _____

1.2 Options

Uni	Bi	PS	EC	LC	SPEED	FWD	REV
/		/	/	/	E 121	300	

Pre-Final

	Result
1.4 Belt Tension	<u>NA</u>
1.5 Tape Line	<u>/</u>
1.6 Motor to PC clearance	<u>NA</u>
1.7 Brake gap	<u>/</u>
1.8A PR gap & Parallelism FWD	<u>/</u>
1.8B PR gap & Parallelism REV	<u>NA</u>

Power Supply (J1 Option Only)

2.4 @ 115 VAC Line +5 VDC 5.0 v 28 VDC 29.5 v - 5 VDC 4.9 v
 +4.3 +5.5v 24-31v -4-5.5v

Final

2.5 Capstan & P.R. Eccentricity FWD & REV	<u>/</u>
3.3 Lamp height & alignment	<u>/</u>
4.2.3 Tracking FWD	<u>/</u>
REV	<u>NA</u>
4.3 Brake Force 8 lbs. Min.	<u>/</u>
4.4 PR Force FWD 4.5 to 7.0 lbs.	<u>/</u>
4.5 PR Force REV 2.25 to 5.75 lbs.	<u>NA</u>
4.6 Capstan Radial Play	<u>↓</u>
	<u>↓</u>
5.4 Anti-Static applied	<u>/</u>
6.4 Duty cycle	
Spkt <u>40</u> %	5 <u>74</u> %
1 <u>73</u> %	6 <u>75</u> %
2 <u>72</u> %	7 <u>74</u> %
3 <u>71</u> %	8 <u>70</u> %
4 <u>73</u> %	
6.6 Lamp Voltage <u>17.2</u> volts	
15 to 20 v	
7.3 Coincidence LE <u>17</u> %	TE <u>11</u> %
10% min.	5% min.
7.4 Speed	
Low Line 103.5 VAC <u>302</u> Cps	<u>NA</u> Cps
High Line 126.5 VAC <u>303</u> Cps	<u>↓</u> Cps
Required <u>300</u> 5%	
7.7.2 Control Switch	
Status A & B	<u>/</u>
8.0 Stepping	
8.4 Run (Time to First Character)	FWD <u>4.7</u> ms
Jitter under 5% to Min. Rate	<u>/</u>
Max step rate attained	<u>/</u>
9.0 Data Recognition	
Stops on Data 1 thru 8	<u>/</u>
10.0 Torque Seal Applied	<u>/</u>
	REV <u>NA</u> ms
	<u>↓</u>

Comments (use reverse side if required)



March, 1966

Revised January, 1967

ANTIAMBIGUITY LOGIC

Antiambiguity logic in perforated tape reader interface circuitry assures that a character is only read once. Without antiambiguity logic, "false sprockets" generated by fibrous tape conditions or tape jitter may cause a character to be read twice and thus introduce errors. Basically, antiambiguity logic controls the generation of the data strobe pulse which samples the data channel outputs of the tape reader. It generates a data strobe pulse on the leading edge of a sprocket and inhibits additional data strobe pulses until all the data channels for that character have passed the read head.

To fully understand how antiambiguity logic operates,

it is necessary to review some of the basic characteristics of standard punched paper tape.

- ① Data channel holes are larger than sprocket channel.
- ② Data channels lead sprocket channel.
- ③ Packing density is ten (10) char/inch.

Figure 1 shows a simple arrangement of standard logical elements which provide antiambiguity. When a character is read by the tape reader, the leading edge of the sprocket channel triggers a one-shot

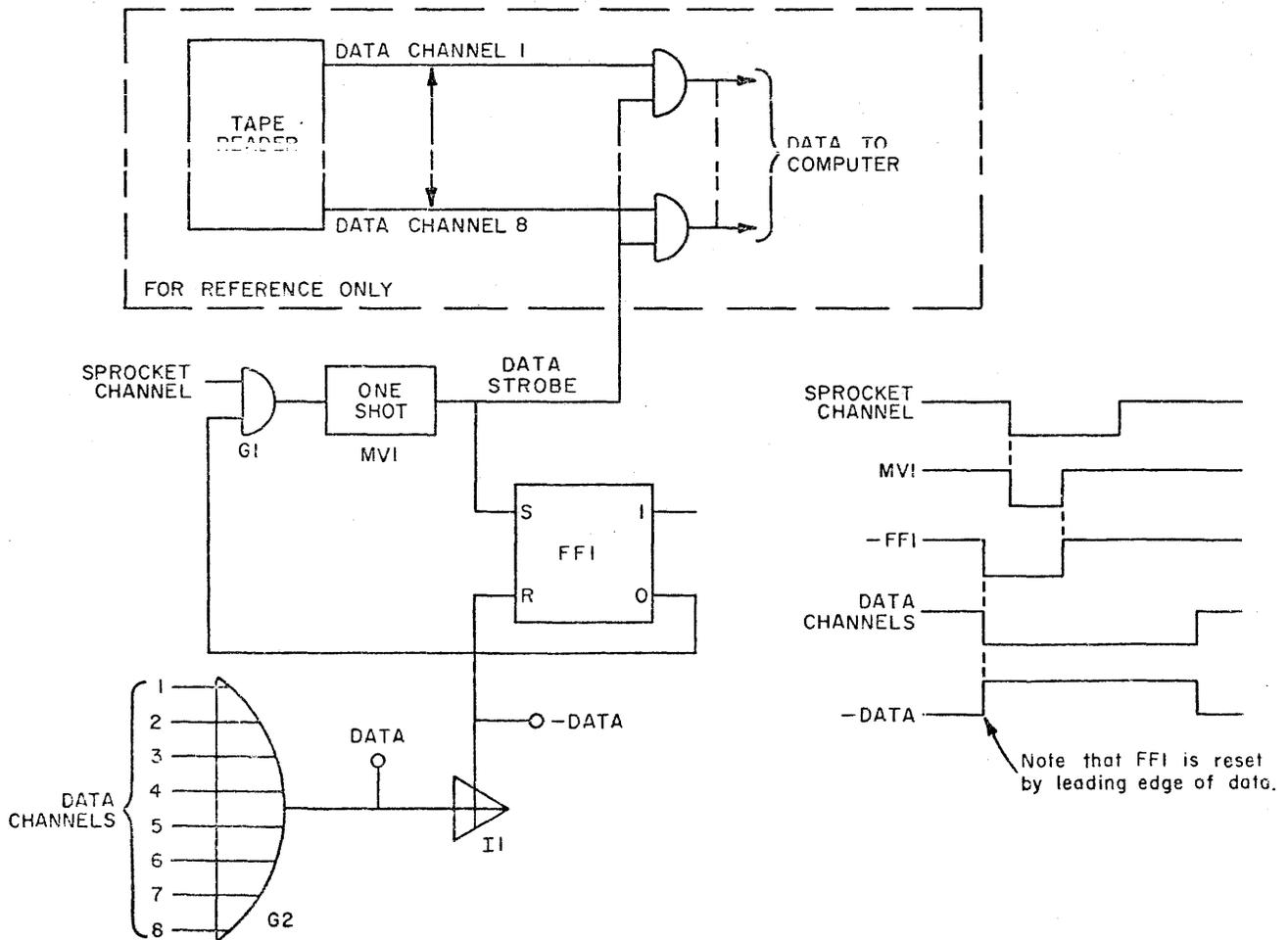


Figure 1. Simple Antiambiguity Circuit

multivibrator producing the DATA STROBE pulse. The DATA STROBE pulse samples the data channel outputs of the tape reader and also sets flip-flop FF1. With flip-flop FF1 set, normally closed gate G1 is opened preventing additional DATA STROBE pulses from being generated. Flip-flop FF1 will remain set until the next character is read. Thus, "false sprockets" produced by tape jitter or fibrous tape conditions in between characters do not initiate a DATA STROBE pulse and are consequently ignored. Another feature of this circuit is that flip-flop FF1 does not require an initial clear at the start of operations. It is reset by the leading edge of data.

The above antiambiguity arrangement is limited to applications which only require recognition of the sprocket channel when accompanied with data. For applications that require that the sprocket channel alone be recognized, the circuit shown in Figure 2 may be used. Additional logic is added which states that if the sprocket channel appears without data, it must remain on for a definite period before it is recognized and a DATA STROBE pulse is generated. This is accomplished by the addition of a resettable delay flip-flop and a few other standard logic elements. Essentially, the resettable delay flip-flop is a monostable multivibrator with an additional reset input. Reviewing, a monostable multivibrator has two possible states; a stable and an astable state. The leading edge of a negative pulse applied to the input drives the multivibrator into its astable state

and logical one appears at its output. The circuit remains in this state for a period of time which is determined by internal timing elements (RC components). Then, the circuit returns to its stable state. The reset capability allows the monostable multivibrator to be forced back in its stable state before the internal timing elements automatically do so. The trailing edge of a negative pulse will "force reset" the multivibrator.

In the logic diagram given in Figure 2, if a sprocket appears without data, gate G3 is enabled and the delay flip-flop is triggered. The sprocket must remain true until the delay flip-flop times out and allows one-shot MV2 to be triggered generating the DATA STROBE.

Should the sprocket channel go off before the delay flip-flop times out, its trailing edge resets the delay flip-flop and the circuit returns to initial state. On low speed reader (speeds less than 300 characters/second), the delay flip-flop can be set to time out after 500 microseconds. On high-speed readers (500 to 1000 characters/second), you cannot exceed 300 microseconds because at 1000 characters/second, the sprocket hole itself is not much longer in duration.

Since "false sprockets" generated by tape jitter are usually much shorter than 300 microseconds, they are inhibited from generating DATA STROBE pulses. Also, the circuit prevents "false sprockets" resulting from fibrous tape conditions (pin holes).

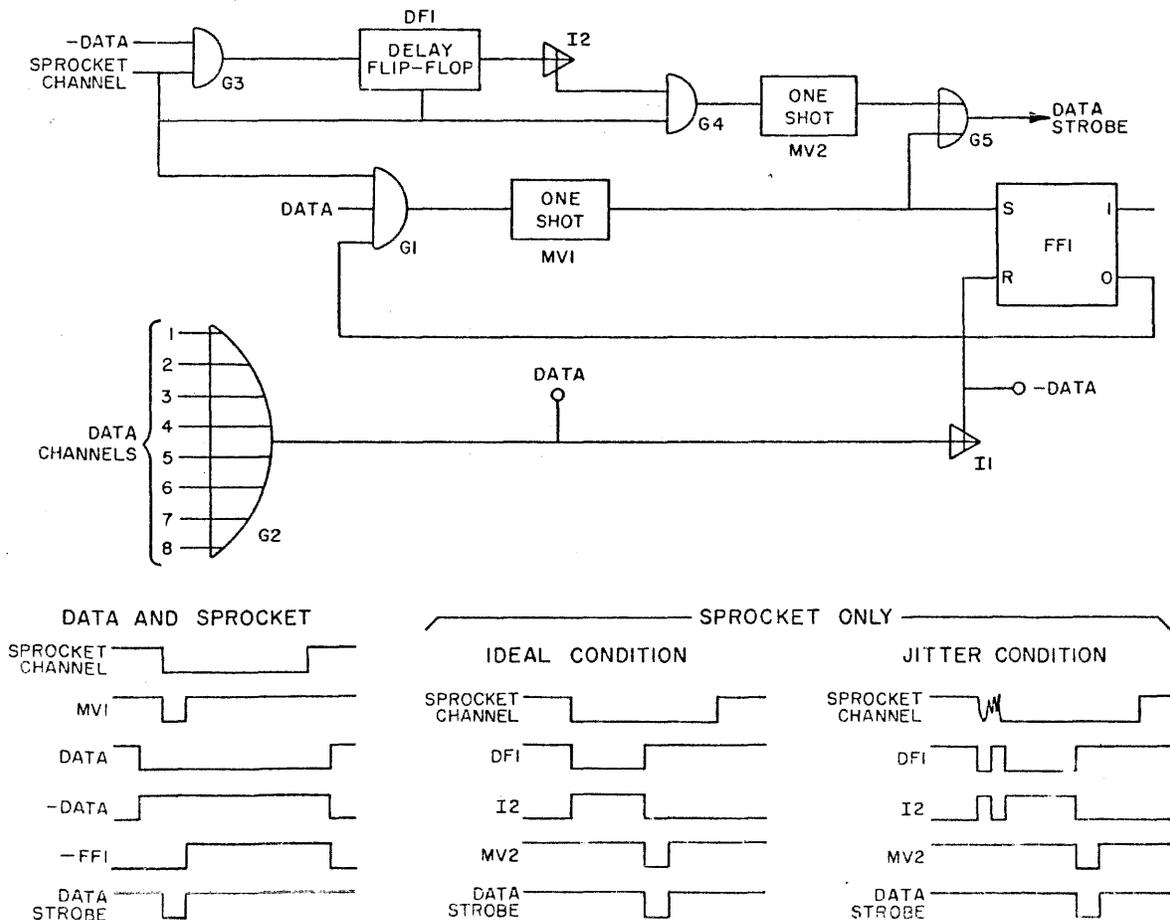
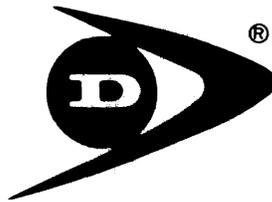


Figure 2. Expanded Antiambiguity Circuit



DIGITRONICS CORPORATION
Albertson, Long Island, New York

Tel: (516) 484-1000