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CHAPTER I
INTRODUCTION

GENERAL DESCRIPTION

The TermiNet 300 Printer is a quiet, compact, high speed Printer designed for printing or sending information from or to computer systems or other Printers using the ASCII code*. The Printer can send information originating from its own keyboard or information from a paper punch or other external devices. The Printer can receive and send all 128 ASCII characters at speed rates of 10, 15, and 30 characters per second.

KEYBOARD

Keyboard operation is based on the coupling of a signal with ferrite magnetic cores to the appropriate logic (sense) lines when a key is pressed. A ferrite bar is connected to each keybar. When a key is pressed, the ferrite bar makes contact with a ferrite "U" core. The resulting transformer action couples a signal from a built-in oscillator to the selected outgoing sense lines. The sense lines are routed around and through the ferrite "U" cores in such a way as to generate the correct ASCII code for each key pressed. Electronic circuits are used to prevent false codes when more than one key is pressed at the same time.

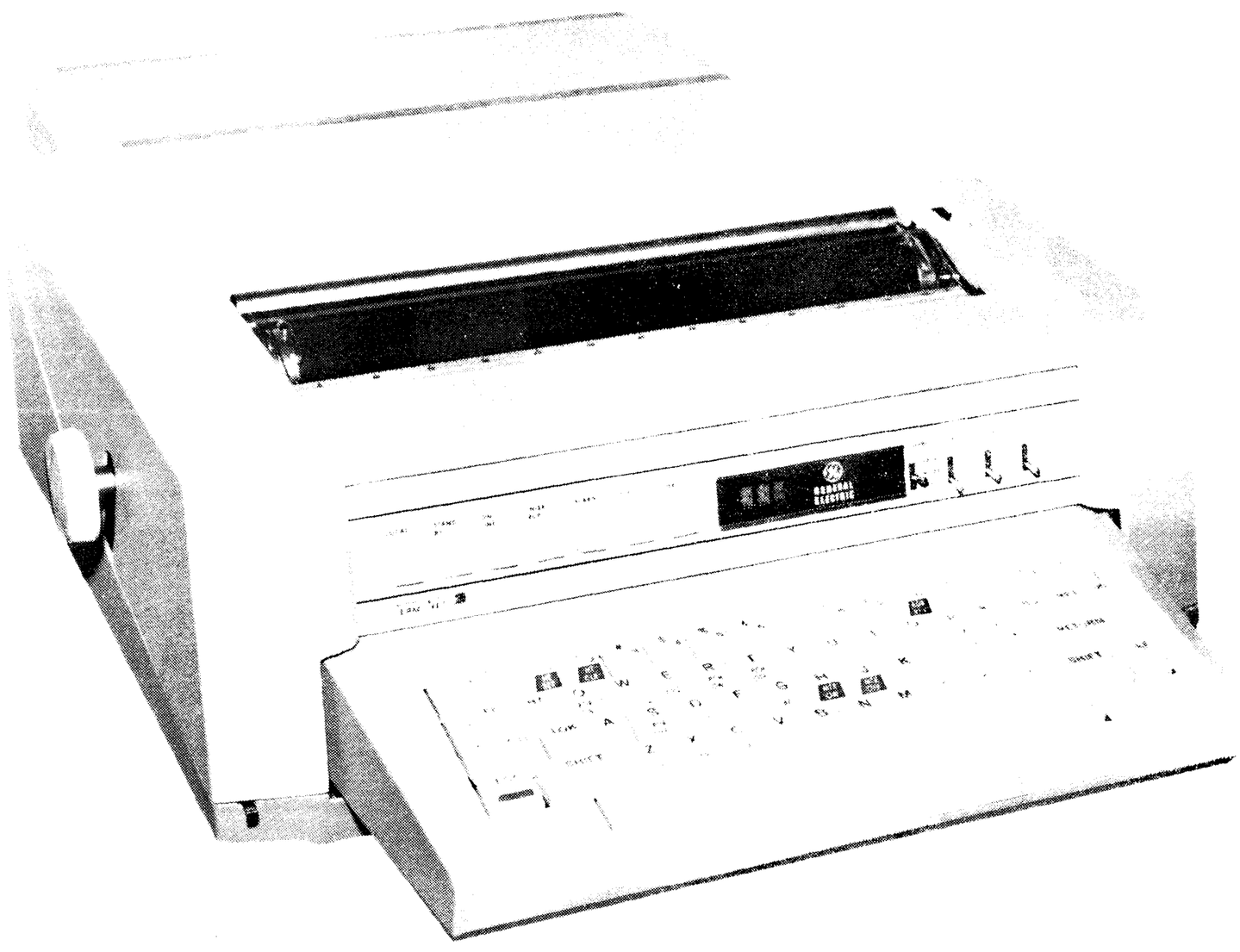
PRINT MECHANISM

The Printer uses a belt printing concept to achieve its high speed and reliability. A belt carrying print fingers rotate horizontally past a bank of hammers. Each finger has a type character or symbol embossed on the upper end. There are two complete sets of characters (type fonts) on the belt.

Printing takes place by firing a hammer at the correct time to hit the selected print finger to be printed. The print finger is driven against the ribbon and paper to accomplish printing. The print finger and hammer rebound back to their correct positions after contacting the platen.

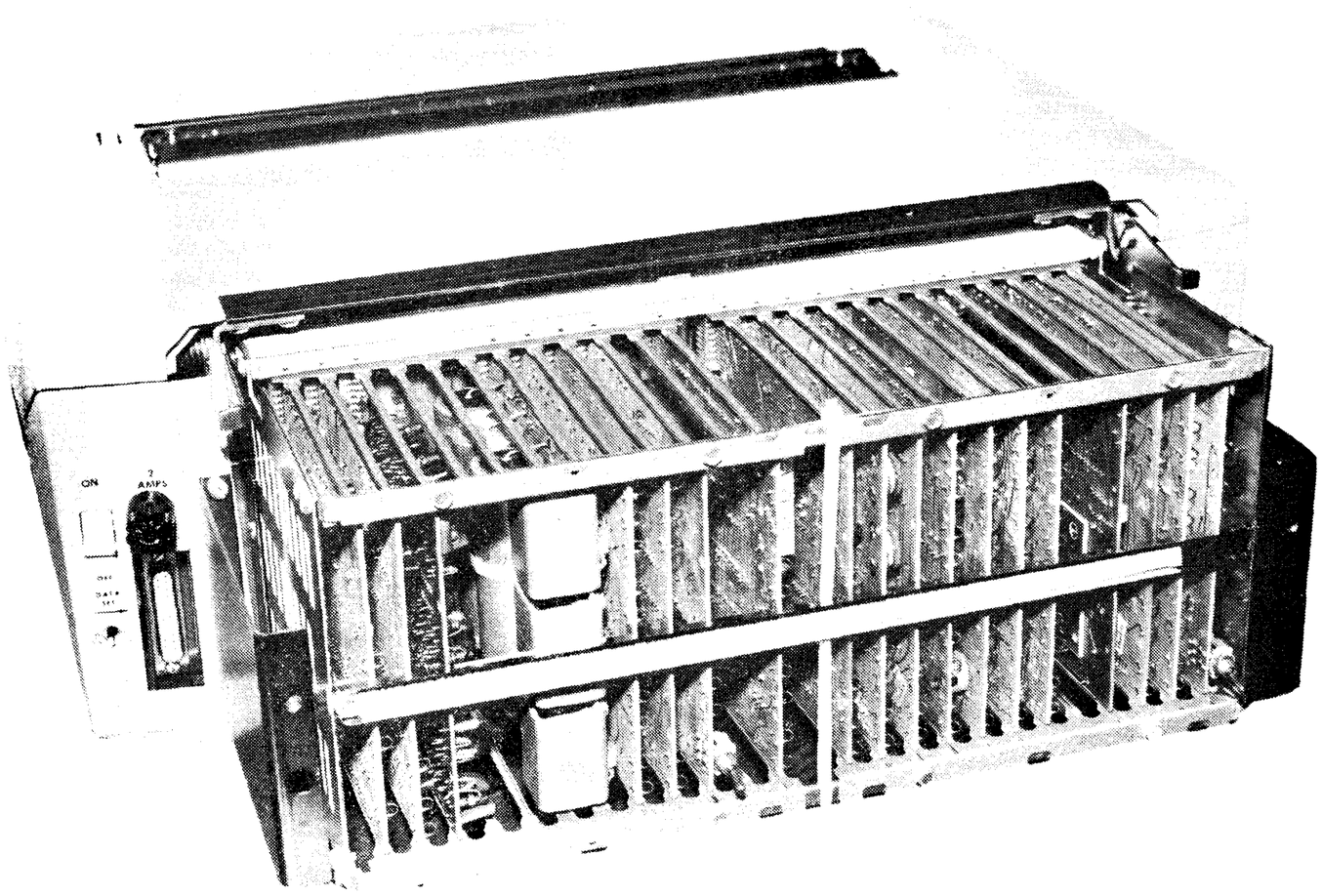
PRINTER SYNCHRONIZATION

Precise synchronization permits the belt printing concept to work. The Printer's electronics compares the positions of the print fingers in front of the hammers. The hammer is fired when the "called for" print finger is in the correct position. Timing and synchronization of the comparison process is maintained by means of timing pulses. Timing pulses are generated as each print finger passes a photocell: thus, the control logic is continuously informed of the position of the print fingers with respect to the hammers.



TermiNet 300 Printer
Figure 1-1

*American Standard Code for Information Interchange.



Electronic Logic Module (Bustle)
Figure 1-2

ELECTRONIC LOGIC MODULE

The electronic logic module (bustle) is mounted at the rear of the printer (see figure 1-2). The bustle contains large-scale integrated circuits on printed circuit boards to provide the necessary circuits for printer operation. The printed circuit boards are designed for interchangeability to keep maintenance and service to a minimum. The logic circuits are designed so that most of the basic functions and options are on one printed circuit board and can be replaced or added as needed. Horizontal tabulation, and parity are examples of options that can be added at a later date as needs change. A detailed description of each option will be in Chapter 3. The function of certain printed circuit boards can be changed by changing jumpers (see Printed Circuit Boards. Chapter 4, Section 3).

SPECIFICATIONS

NOISE

Standby noise is virtually non-existant and operating noise is much lower than similar terminals.

SIZE

Overall dimensions of the TermiNet 300 Printer are approximately 7" high (from desk top), 19.75 inches wide, and 26.5 inches long.

WEIGHT

Approximately 65 pounds.

ENVIRONMENT

- Operating Temperatures, 32°F to 110°F.

- Humidity, 0-95 percent relative humidity, both operating and non operating.

INPUT POWER

- 105-127 volts, 60 Hertz, single phase, 1.5 amps.

PRINTABLE CHARACTERS

The 94 printable characters in the American Standard Code for Information Interchange (ASCII) are all provided in the TermiNet 300 Printer.

PRINTING SPEED

10 characters per second. Each character is processed at a 110 baud (bits per second) rate. (One start bit, seven information bits, 1 parity bit, and two stop bits).

15 characters per second. Same as 10 characters per second except only one stop bit is used and information processed is at a 150 baud rate.

30 characters per second. Same as 15 characters per second except information is processed at a 300 baud rate.

CHARACTER SPACING

Horizontal, 10 characters per inch.

LINE SPACING

6 lines per inch

PRINT LINE LENGTH

75 or 118 print positions

COPY

An original and six copies can be obtained from normal weight paper.

PAPER REQUIRED

Continuous rolls or sheets:

Long Roll - 3" diameter, 12 1/2" wide and 7/16" center hole.

Short Roll - 5" diameter, 8 1/2" wide, and 1" center hole.

Long Pin Feed - Fan Fold, 12 27/32" wide.

Short Pin Feed - Fan Fold, 8 1/2" wide.

Single Sheets may be inserted.

NOTE

Total thickness of multiple form paper should not exceed .025 inches.

RIBBON

Recommended - Underwood, Catalog #210-4617AAB/ DP Long Life Ribbon.

- Columbia 3202-20005 (Silk Guage) #40 inking.

DATA RECEIVED AND TRANSMITTED

Data Communication Code - ASCII (see figure 1-3).

b_7 b_6 b_5 → / Bits b_4 b_3 b_2 b_1 ↓ / Column → / Row ↓	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
	0	1	2	3	4	5	6	7
0 0 0 0	0 NUL	DLE	SP	0	@	P	`	p
0 0 0 1	1 SOH	DC1	!	1	A	Q	a	q
0 0 1 0	2 STX	DC2	"	2	B	R	b	r
0 0 1 1	3 ETX	DC3	#	3	C	S	c	s
0 1 0 0	4 EOT	DC4	$	4	D	T	d	t
0 1 0 1	5 ENQ	NAK	%	5	E	U	e	u
0 1 1 0	6 ACK	SYN	&	6	F	V	f	v
0 1 1 1	7 BEL	ETB	'	7	G	W	g	w
1 0 0 0	8 BS	CAN	(	8	H	X	h	x
1 0 0 1	9 HT	EM	)	9	I	Y	i	y
1 0 1 0	10 LF	SUB	*	:	J	Z	j	z
1 0 1 1	11 VT	ESC	+	;	K	[	k	{
1 1 0 0	12 FF	FS	,	<	L	\	l	|
1 1 0 1	13 CR	GS	-	=	M	]	m	}
1 1 1 0	14 SO	RS	.	>	N	^	n	~
1 1 1 1	15 SI	US	/	?	O	_	o	DEL

American Standard Code for Information Interchange (ASCII)

Code Chart
Figure 1-3

PARITY

A parity option allows the Printer to check for "Even" parity of data from the keyboard, phonelines, and auxiliary devices. By changing a jumper in the parity board, "Odd" parity on data from the phone lines and auxiliary devices can be checked. "Even" parity is always generated by the Printer when the keyboard is operated.

DATA SET INTERFACE

The TermiNet 300 Printer can be applied to voice grade line by using Bell 103 type data sets or GE DigiNet* data sets. Acoustic couplers also provide satisfactory interconnection to transmission circuits. An Internal Modem, an option available with the TermiNet 300 Printer, allows the Printer to be directly connected to the transmission equipment.

TIMING

Transmission and receiving clocking is accomplished by a crystal oscillator which is accurate to ±.05%.

TYPE OF DATA TRANSMISSION

All transmission is asynchronous. Full duplex telephone lines may be used; or two-way alternate transmission over half duplex telephone lines may be controlled automatically.

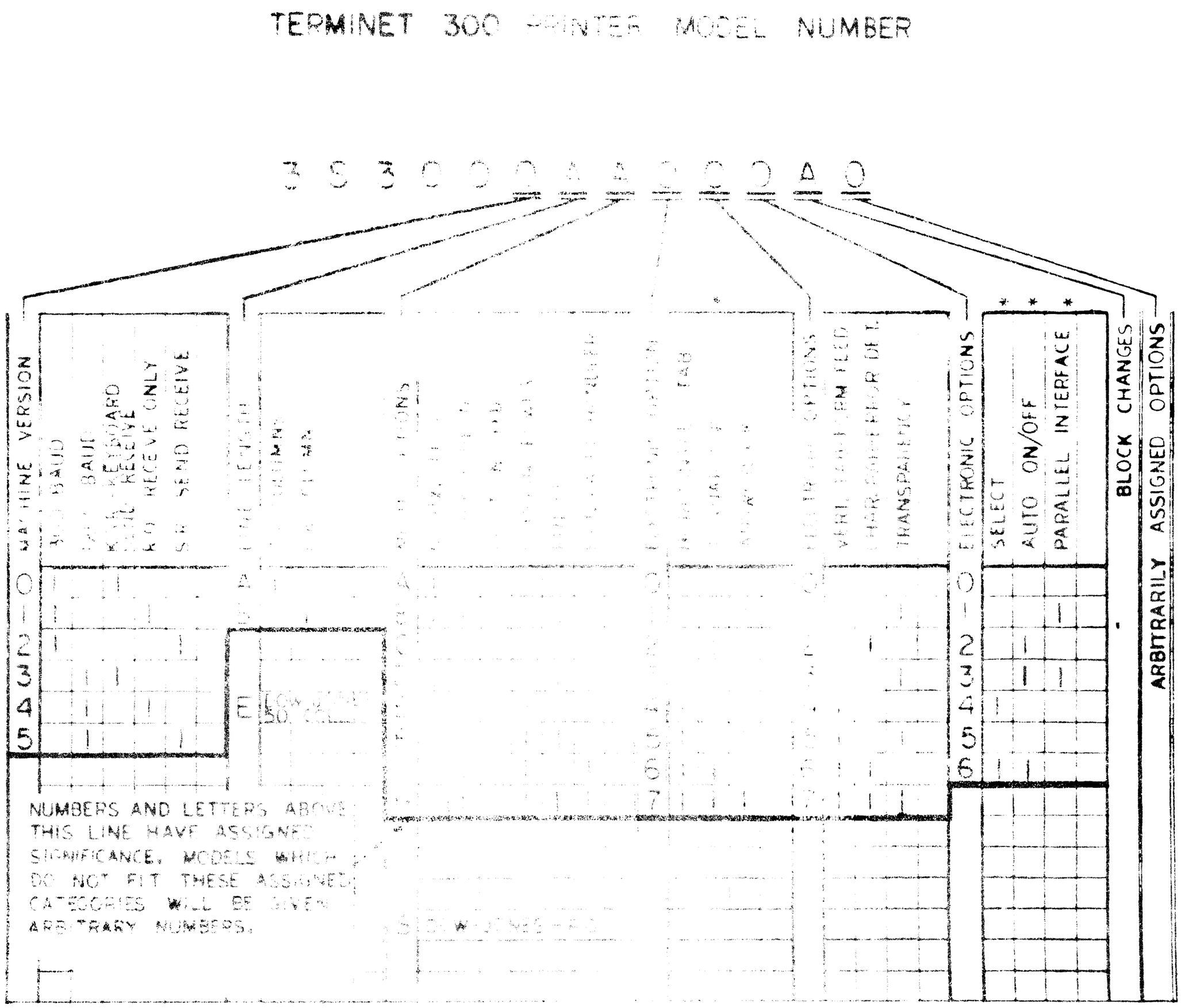
MODEL NUMBER

The model number on all Printers is codedto indicate model and options. Figure 1-4 is a chart that illustrates how to interpret the code. For example, Printer model number 3S3001BB513B0 would be a keyboard send-receive "B" model having 118 print positions, pin feed platen, horizontal tab, answer-back, transparency, auto on-off, parallel interface, standard tan color, and standard type.

NOTE

It is recommended that a notation be made next to the nameplate when field options are added.

*Trademark of General Electric Company, USA.



*- Turnaround option is incompatable with Auto On/Off option.
- Select option is incompatable with Parallel Interface option.

CHAPTER 2
PACKING AND INSTALLATION

UNPACKING

Examine shipping carton for possible damage. Immediately report any damage to shipper. Do not damage or discard shipping carton or polyurethane packing pads. They should be used if it is necessary to return the Printer or ship to another location.

[illegible] top of the shipping carton.

[illegible] manuals and papers in the recessed [illegible] case.

[illegible] the tape wrapped around the polyurethane [illegible] lift off top half of case.

[illegible] the power cord from the pocket in the [illegible] of the packing case.

[illegible] each side through the [illegible] remove the Printer from the lower [illegible] packing case.

[illegible] Set the Printer on a firm flat surface. Tilt the Printer until it is resting vertically on the bustle.

7. Remove the four shipping screws on the bottom of the Printer's case.

8. To prevent damage, the keyboard is locked before shipment. Unlock the keyboard as follows:

A MODEL

- Remove the two forward screws holding the [illegible] plate located on the underside of the [illegible]. Loosen the two rear cover screws.
- [illegible] cover plate and remove wood block from [illegible] end.
- Re-install bottom keyboard plate and tighten the four screws.

ASR MODEL

- [illegible] the two thumb screws located on each [illegible] of the bottom of keyboard
- Push screws forward as far as they will go.
- Retighten the two thumb screws in the forward position.
- The keyboard is now in the unlocked condition and is ready for use.

To lock keyboard, reverse the procedure.

9. Remove the tape used to secure the ribbon spools during shipment.

10. Remove the two short pieces of sponge rubber under the platen as follows:

- Release platen latch lever on each side.
- Remove platen.
- Remove two sponge rubber pieces.
- Replace platen and close platen latch levers.

11. The KIF printed circuit board is removed from the Printer to prevent shipping damage. The KIF board is packed in a shipping container in the Printer. Install KIF board as follows:

- Remove [illegible] from the [illegible] and [illegible] the KIF board.
- [illegible] the KIF board [illegible] connector [illegible] the KIF board [illegible] [illegible] connector.

NOTE

While bustle is in [illegible] make certain that all printed circuit boards are inserted in their card cage in the correct slot.

- Re-install [illegible] and bustle cover.

INSPECTION AND INSTALLATION

1. Make certain that ribbon spools are [illegible] gaged on ribbon hubs. Ribbon should be properly routed over guides and between print fingers and platen (see Chapter 3).

2. Make certain that drive belts are in place and routed properly.

3. Make certain that print [illegible] are free of foreign material.

4. Inspect Printer for broken [illegible] missing parts, and accumulations of [illegible] grease.

5. Install paper (see Chapter 3).

6. Install Printer in area where it is to be used and connect to power. To connect an ASR Model, See Punch & Reader Service Manual GEK-[illegible].

CAUTION

Make certain that the power [illegible] has a ground. The absence of a ground can result in damage to the Printer and cause erroneous operation.

CHECKOUT PROCEDURE

This checkout procedure checks the general operation of the Printer. This procedure does not check every possible operating condition. Ignore those steps that apply to an option that you do not have.

ACTION	RESULT
1. Set the following switches to: INHIBIT - NORM position RATE - 30 position LINE FEED - 1 position AUTO L. F. - OFF position TRANSPARENCY - OFF position	
2. Press "Power On" switch (located on back of terminal, right side) to the ON position.	Audible tone sounds momentarily. ALARM indicator lights momentarily. STANDBY indicator / switch lights.
3. Press LOCAL indicator/switch.	LOCAL indicator/switch lights. STANDBY indicator/switch goes out. Motor starts.
4. Press each key with a printable character on it.	Tone sounds when each key is pressed. Appropriate character prints. PPI (Print Position Indicator) count advances by one as each key is pressed.
5. Press RETURN key.	PPI indicates "1"
6. Press LF (Line feed) key.	Printer line-feeds one line.
7. Press shift LOK key and press each key with printable character on it.	Appropriate upper case character prints.
8. Press SHIFT key, which unlocks the shift.	
9. Set AUTO L.F. (Automatic Line feed) switch. to the ON position.	
10. Press RETURN key	Printer line-feeds one line. PPI indicates "1".
11. Press ON LINE indicator/switch.	ON LINE indicator/switch lights. LOCAL indicator/switch goes out.
12. Press STANDBY indicator/switch	STANDBY indicator/switch lights ON LINE indicator goes out. Motor stops
13. Press LOCAL indicator/switch	LOCAL indicator/switch lights. STANDBY indicator/switch goes out. Motor starts.
14. Lift paper shield	Alarm tone sounds momentarily. ALARM indicator lights. Motor stops. LOCAL indicator/switch stays lit.
15. Return paper shield to normal position.	ALARM indicator goes out.

ACTION	RESULT
[illegible] LOCAL indicator switch.	Motor starts.
[illegible] LINE FEED switch to the "2" position and press LF key.	Printer Line-feeds two lines each time LF Key is pressed.
[illegible] LINE FEED switch to the "1" position	
[illegible] RATE switch to the "15" position and press any character key several times.	Characters should print.
[illegible] RATE switch to the "10" position and press any character key several times	Characters should print.
[illegible] RATE switch to the "30" position.	
[illegible] Press RETURN key	PPI indicates "1". Printer line-feeds one line.
[illegible] key repeatedly and observe PPI	PPI increments by one up to 76 (short print line Printer) or 119 (long print line Printer). The alarm should sound at counts 68 and 76 (short print line) or 111 and 119 (long print line).
24. Press BS (Backspace) key several times and observe PPI.	PPI count should decrease by one each time BS key is pressed.
25. Press RETURN key	PPI indicates "1". Printer line-feeds one line.
26. Press any character key and press RPT (Repeat) key at same time.	The printer repeatedly prints the character (at 5 characters per second rate) as long as the RPT key is pressed.
27. Press RETURN key.	PPI indicates "1". Printer line-feeds one time.
28. Set EXHIBIT switch to the PRINT position and press any character key several times	Characters will not print.
[illegible] Set EXHIBIT switch to the TRANS position and press any character key several times	Characters should print.
[illegible] Set EXHIBIT switch to the NORM position.	
[illegible] Press RETURN key.	PPI indicates "1". Printer line-feeds one line.
32. Press CTL (Control) key and D (EOT) key at same time.	Motor stops. PPI goes out.
33. Press ESC (escape) key and H (Motor on) key at the same time.	Motor starts. PPI Indicates "1".
34. Press CTL key and G (BEL) key at the same time.	Tone sounds approximately one half second.
TRANSPARENCY	
35. Set TRANSPARENCY switch to ON position and press any character key several times.	Characters will not print.

ACTION	RESULT
36. Set TRANSPARENCY switch to the OFF position.	
HORIZONTAL TAB	
37. Press RETURN key.	PPI indicates "1". Printer line-feeds one line.
38. Press space bar repeatedly until 10 appears on PPI.	
39. Press ESC key and HT SET (Horizontal Tab Set) key at same time.	Beep tone.
40. Press space bar until PPI indicates 20.	
41. Press ESC key and HT SET key at the same time.	Beep Tone.
42. Press RETURN key.	PPI indicates "10".
43. Press HT(Horizontal Tab) key.	PPI indicates "20".
44. Press HT key.	PPI indicates 76 (short print line) or 119 (long print line).
45. Press RETURN key.	PPI indicates "10". Printer line-feeds one line.
46. Press ESC key and HT CLR (horizontal Tab Clear) key simultaneously.	Beep tone.
47. Press Return Key.	PPI indicates "1".
ANSWERBACK	
48. Press HERE IS pushbutton switch.	Printer should print Answerback Test message coded in Answerback Board.

SYSTEM CHECK

If you have a problem after installing the Printer in the system, a test plug can be fabricated to simulate an "On Line" condition. The problem can then be isolated to the Printer or external equipment. If the problem is isolated to the Printer, the test plug can assist further troubleshooting. Refer to Chapter 4, Section 2 (Functional Troubleshooting, Test Plug) for information on fabricating and using the test plug.

CHAPTER 3
PRINCIPLES OF OPERATION

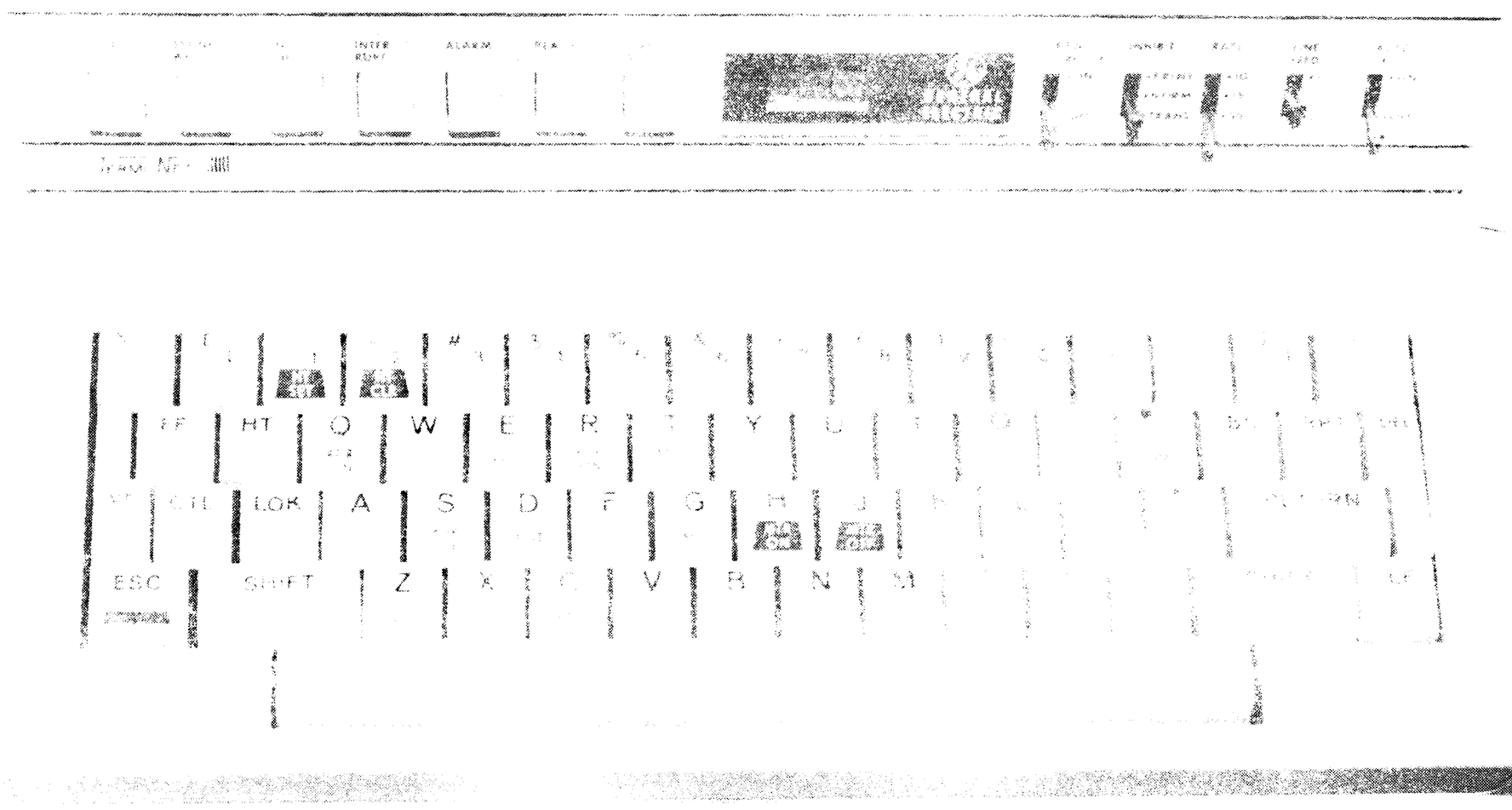
SECTION 1
GENERAL OPERATING INSTRUCTIONS AND INFORMATION

SWITCHES AND INDICATORS

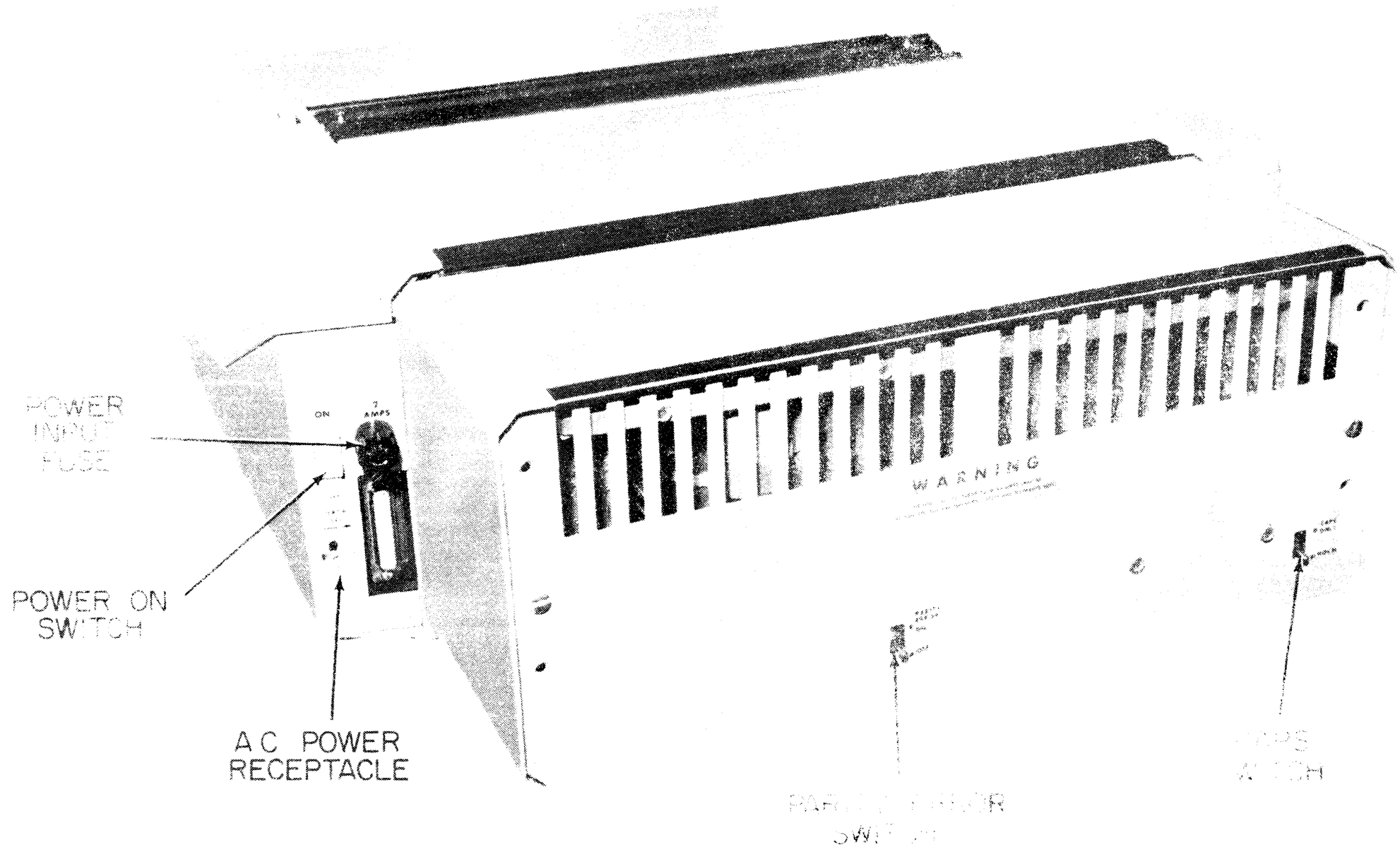
The following photographs and table point out the locations and explain the [illegible] indicators on the control panel and the switches at the rear of the Printer (see figures [illegible]).

NAME	TYPE	FUNCTION
ALARM	Indicator	Indicates - Low [illegible] - Paper [illegible] - Print [illegible] - Printer [illegible]
[illegible] Line-Feed	Toggle Switch	When in the [illegible] vanced automatic [illegible] RETURN key is pressed.
CAPS (Upper Case)	Toggle Switch	When placed [illegible] printing will [illegible] rear of bustle.
HERE IS (Optional)	Pushbutton Switch	Trigger [illegible] Section 2 of this [illegible]
INHIBIT	3 position Toggle Switch	- PRINT position [illegible] - NORM position [illegible] - TRAN [illegible]
INTERRUPT	Pushbutton Indicator/Switch	- Lights when [illegible] is received [illegible] transmitted. - When pressed [illegible] data [illegible] - When pressed [illegible] is transmitted.
LINE FEED	Toggle Switch	- Set on "1", [illegible] - Set on "2", [illegible]
LOCAL	Pushbutton Indicator/Switch	Lights when pressed [illegible] Printer operation but does [illegible] transmission and reception of data.
ON LINE	Pushbutton Indicator/Switch	Lights when pressed [illegible] on and enables the [illegible] reception of data.

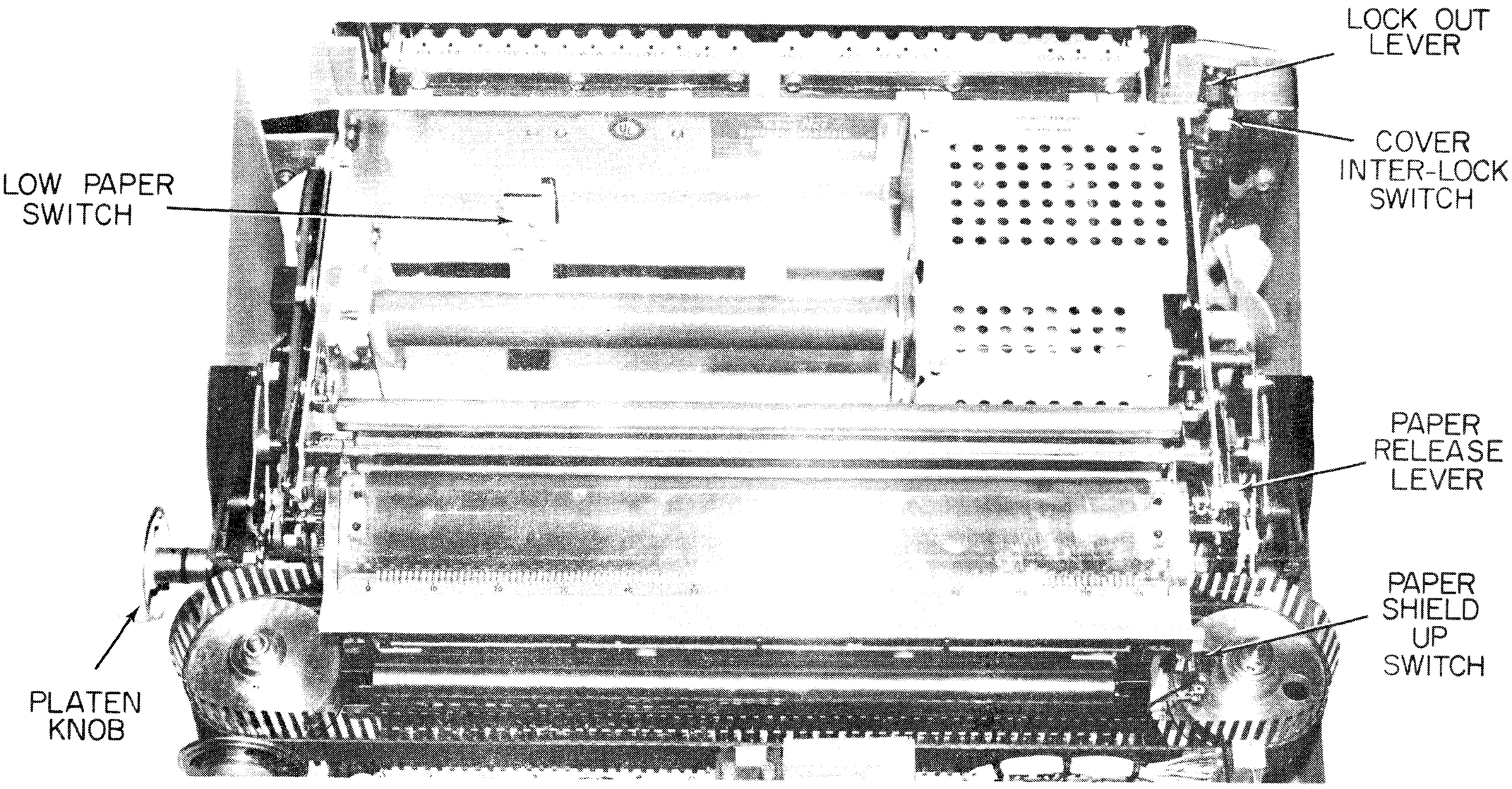
NAME	TYPE	FUNCTION
PARITY ERROR (Optional)	Toggle Switch	Checks for parity error. Located at rear of bustle (see Section 2 of this chapter).
Print Position Indicator	Digital Display	Shows position of next character to be printed.
POWER ON	Switch	Turns on power to terminal (located at right rear of terminal).
RATE	3 Position Toggle Switch	Selects "10", "15" or "30" characters per second receiving and transmitting speed. (60 and 120 characters per second transmitting speed is available as an option.)
READY	Indicator	Indicates data set is ready for transmission.
STANDBY	Pushbutton Indicator/Switch	Lights when pressed. Turns motor off but leaves electronics turned on which enables the transmission and reception of data.
TRANSPARENCY (Optional)	Toggle Switch	Allows the Printer to process (receive or transmit) codes other than ASCII but inhibits printing (see Section 2 of this chapter).
Low Paper	Switch	Detects low paper condition and causes an alarm. Switch can be placed in a locked out position.
Cover Inter-lock	Switch	Disconnects power from Printer when cover is lifted. Can be locked out with lock-out lever.
Paper Shield Up	Switch	Causes an alarm condition when the paper shield is in the up position.



Keyboard And Control Panel
Figure 3-1



Rear View of Printer
Figure 3-2



Switch Locations and Manual Controls
Figure 3-3

AUDIBLE INDICATORS

- Beep tone each time key is pressed.

- High pitch beep tone at print position 69 (111, long print line) and after print position 75 (118, long print line)

- Beep tone when ALARM indicator lights.

- Beep tone when INTERRUPT indicator lights.

KEYBOARD

(See figure 3-1)

GENERAL DESCRIPTION - The keyboard of the Printer can generate all of the 128 ASCII codes. Special codes are generated by pressing the ESC (Escape) key or the CTL (Control) key and another appropriate key. The ESC key and its associated keys are shaded. Most of the control keys are identified on their front edge.

NOTE

The ESC, CTL, or RPT (Repeat) key must be held while the associated key is pressed.

PRINTER OPERATION KEYS

BS (Backspace) - This key moves the print position one position to the left without printing a character.

LF (Line Feed) - This key advances the paper one or two print lines depending on the setting of the LINE FEED switch.

FF (Form Feed) - Optional - This key causes the paper to advance to a predetermined line (see Section 2 of this Chapter).

HT (Horizontal Tab) - Optional - This key moves the print position to a predetermined print position (see Section 2 of this Chapter).

RPT (Repeat) - Holding this key will cause any other pressed key to be repeated at the rate of five characters per second.

RETURN - With the AUTO LF switch in the OFF position, pressing the RETURN key returns the Printer to print position "1". With the AUTO LF switch in the ON position, pressing the RETURN key returns the Printer to print position "1" and causes a line feed.

SHIFT LOCK (Shift Lock) - Holding the SHIFT key down in conjunction with other keys causes the upper case characters to be printed and transmitted. The SHIFT LOCK mechanically locks the SHIFT key until the SHIFT key is pressed.

SPACE BAR - This bar moves the printing position to the right without printing character.

Tab Key (Tab) - Optional - This key causes the printer to space to a predetermined line (see Section 2 of this Chapter).

ESCAPE (ESC) KEYS

Horizontal Tab Set - With the ESC key and "1" (HT SET) key pressed, a tab will be set at the position indicated by the Print Position Indicator. Any number of tabs can be set on a print line (see Section 2 of this Chapter).

Horizontal Tab Clear - With the ESC key and "2" (HT CLR) key pressed, all set tabs will be cleared (see Section 2 of this Chapter).

Motor Off - With the ESC key and "J" (MTR OFF) key pressed, the motor stops.

Motor On - With ESC key and "H" (MTR ON) key pressed, the motor starts.

CONTROL CODE KEYS

Because the control codes are numerous and an explanation of their use is beyond the scope of this manual, detailed information on control codes is not included. Refer to the Programmers Manual (GEK-15002) for detailed information.

MANUAL PAPER HANDLING

PLATEN KNOB (See Figure 3-3) - To manually rotate the platen, push Platen Knob in and turn.

PAPER RELEASE LEVER (See figure 3-3) - To release the pressure on the platen, move the Paper Release Lever to its forward position (toward the keyboard). To apply pressure to the platen for normal operation, move the Paper Release Lever to its rear position. The Paper Release Lever must be in its forward position when a pinfeed platen is used.

RIBBON INSTALLATION

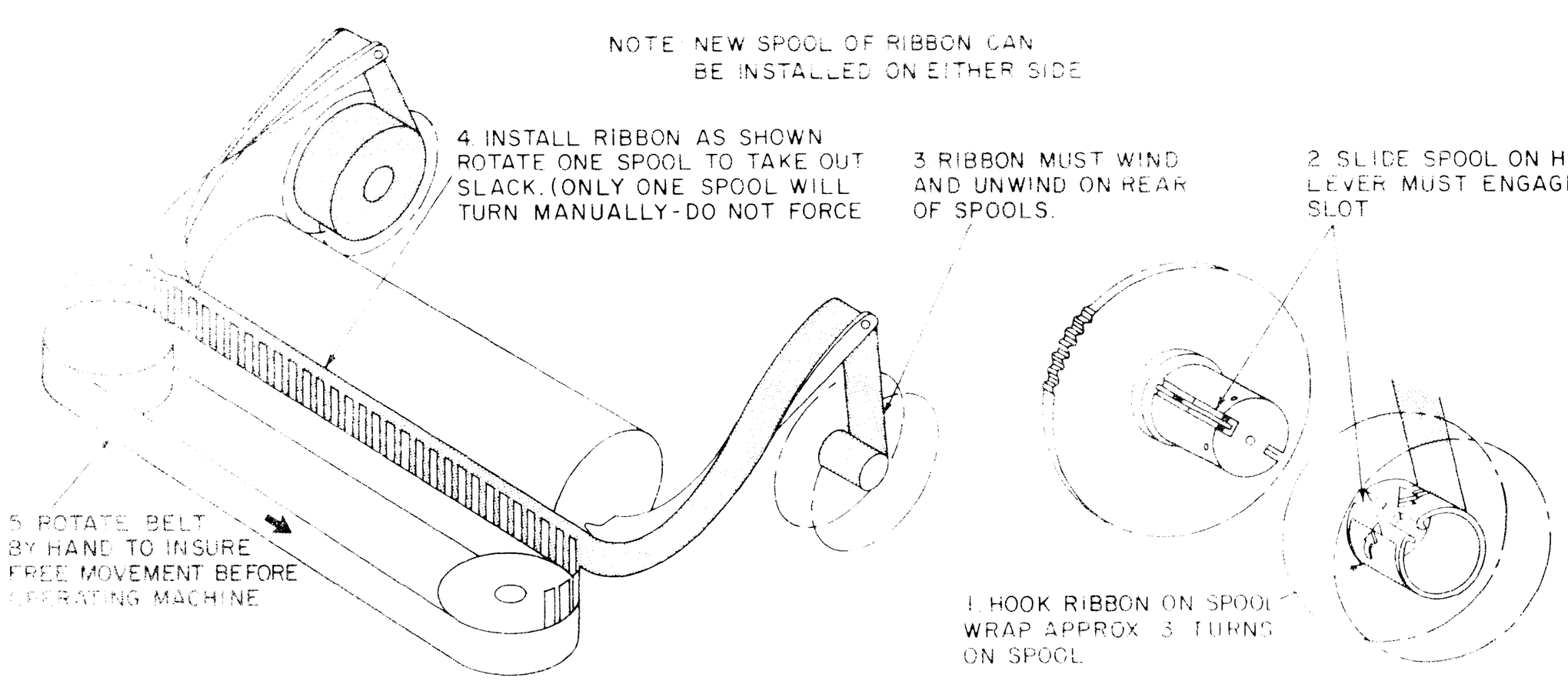
1. Figure 3-4 shows the proper procedure for installing the ribbon. The spools used are a 150 FS Underwood style that has slotted hubs to fit the Printer. If spool substitution is made, make certain that equivalent spools are used.

PAPER INSTALLATION

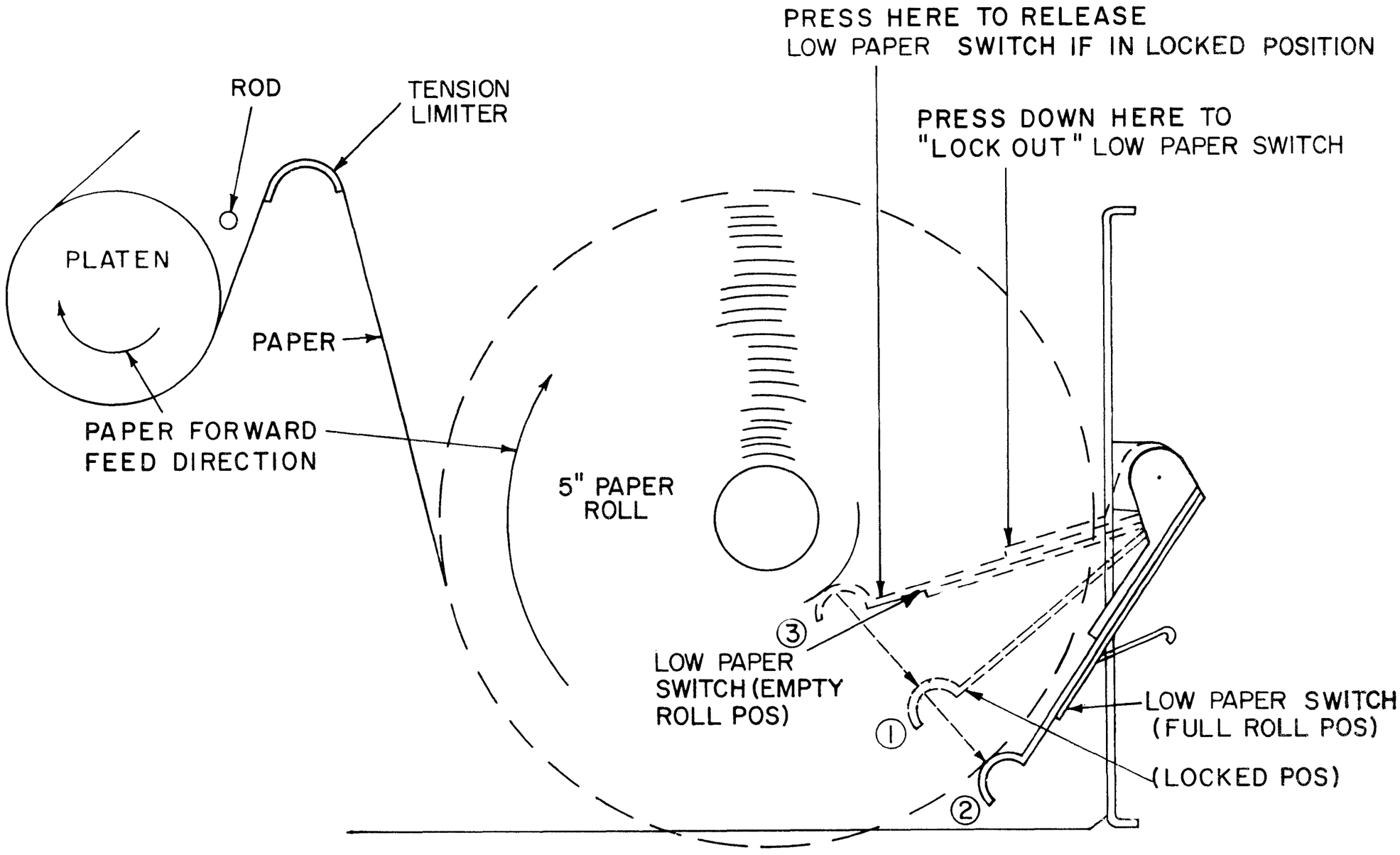
(See Figure 3-5)

FRICTION FEED

1. Place the paper tube in the center of the paper roll.



Ribbon Installation
Figure 3-4



Paper Installation
Figure 3-5

2. Set the paper roll and tube in place.

3. Feed the paper from the bottom of the roll, over the tension limiter, and under the platen.

4. Push the Platen Knob in and rotate to advance the paper.

5. To align the paper, move the Paper Release Lever to its forward (toward the keyboard) position and align the left edge of the paper with the red line on the paper shield.

6. Move the Paper Release Lever to its most rear (toward the bustle) position.

PINFEED PAPER
(To be used with pinfeed option)

1. Place the paper tube in the center of the paper roll.

2. Set the paper roll and tube in place.

NOTE

The Paper Release Lever must be in its' forward position (toward the keyboard) when using the pinfeed option. This lever should be locked in the forward position with a release lever lock which is included in current pinfeed option installations.

3. Feed the paper from the bottom of the roll, over the tension limiter and under the platen. When inserting the paper under the platen, align paper holes with the sprocket pins.

4. Push the Platen Knob in and rotate to advance the paper.

NOTE

When wide paper, single sheets, or forms are used (friction or pinfeed), the low paper switch should be placed in the "Locked Out" position (see figure 3-5).

SECTION 2
OPTIONS, GENERAL OPERATING INSTRUCTIONS AND INFORMATION

ANSWERBACK

The automatic answerback option on the TermiNet 300 Printer consists of an answerback printed circuit board (ANS) with a special encoding block. Diodes can be inserted in the block to form up to 20 code characters (see figure 3-6). To encode the ANS board, perform the following steps:

1. Place the Answerback board before you with the non-component side toward you and the contact fingers to the left.

2. Remove the four screws attaching the encoding block to the board. DO NOT remove the four countersunk screws in the metal cover on the other side.

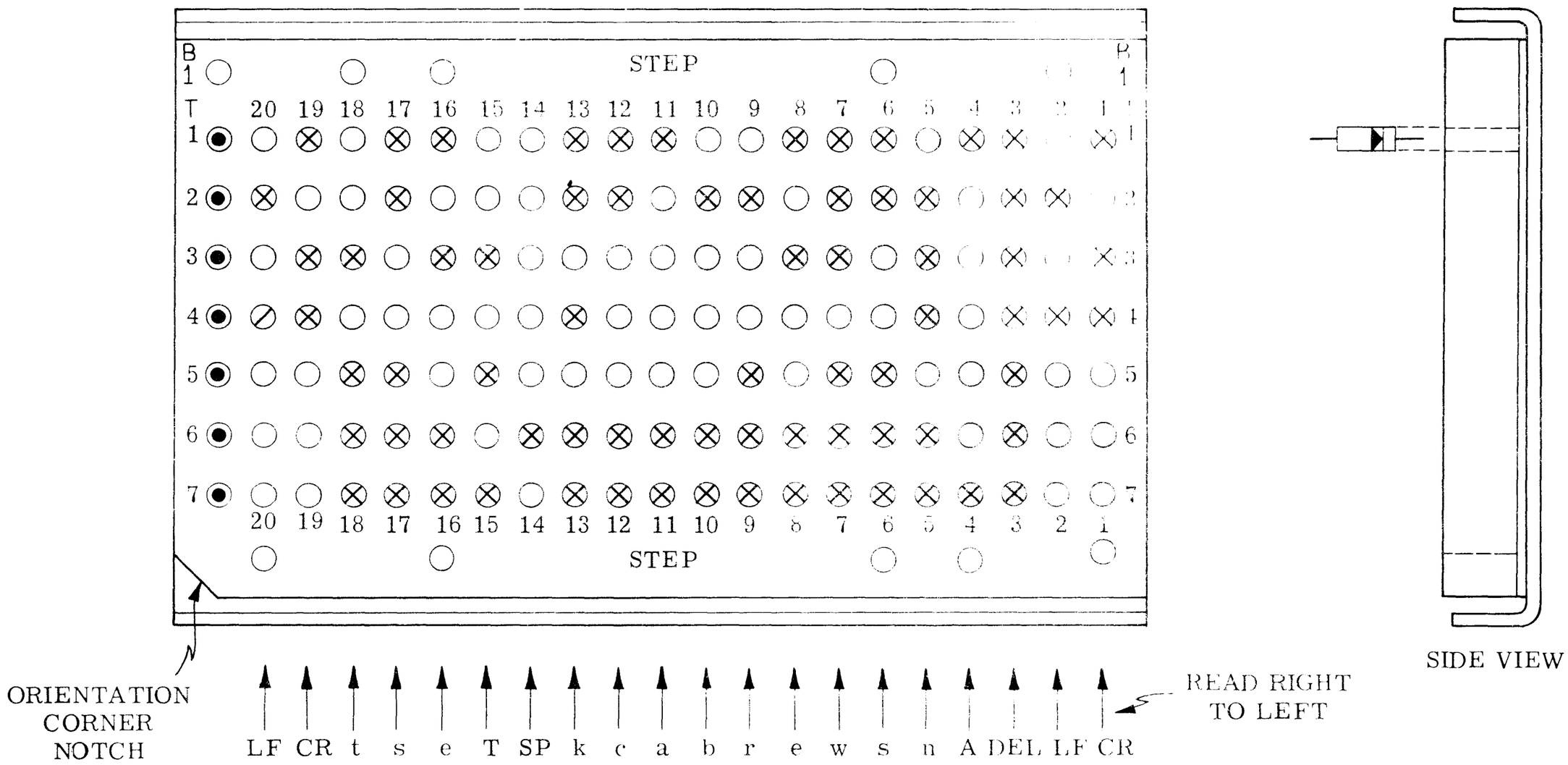
3. Lift the printed circuit board from the block.

4. With the orientation corner notch of the encoding block to your lower left, note the 21 by 7 array of holes. The rows are labeled BIT 1, BIT 2, etc. The columns are labeled STEP 1, STEP 2, etc. The rows correspond with the bits of the standard ASCII code. The columns correspond to the order in which the characters are executed. By following the ASCII code chart (see figure 1-3 in Chapter 1), you can determine where to place diodes to obtain the desired message

NOTE

Diodes must be inserted with the ring or arrow pointing into the hole and toward the metal cover.

5. Insert the diodes provided into the appropriate holes to provide the desired message.



1. Diode positions are indicated with symbol ⊗ for sample message shown below block drawing.
2. Insert diodes in block, as shown in side view.
3. Insert pins in positions indicated with symbol ◉ to make connection between block and printed circuit board.
4. Start 1st character in row No. 1 at extreme right.
5. Use diodes Catalog No. 44A410259-001 having special tips.

Encoding Block
Figure 3-6

6. Replace the board and the four screws.

7. Reposition the coiled wire jumper on the component side of the board so that it connects to the last column used.

The answerback option is triggered by a received ENQ code or by pressing the HERE IS pushbutton switch.

AUTOMATIC CARRIAGE RETURN

Any signal which causes the column count to advance beyond the last print position will be converted to a carriage return signal and cause the print position to automatically return to column one. The signal causing this carriage return will be lost. The automatic carriage return option is obtained by installing a Group 2 MEM board.

AUTOMATIC MOTOR CONTROL

This option is accomplished with the addition of a Group 2 DAT board or DATB board. It allows use of the interface circuit CB (clear to send) to control the motor. When CB comes on, the motor turns on; and when CB turns off, the motor turns off. The DATB board also offers other strapping options including "Status".

BUILT-IN-MODEM

The Modem (MOD) board serves the same purpose as an "originate only" dataset. It allows direct connection between the 25 pin interface connectors on the rear of the Printer and a data line using a MDAA (Manual Data Access Arrangement). It is suited for two-way simultaneous data flow (full duplex), at rates of 110, 150, and 300 baud, using frequency shift modulation.

Operating frequencies are as follows:

Transmit:	Mark- 1270 Hz.
	Space- 1070 Hz.
Receive:	Mark- 2225 Hz.
	Space- 2025 Hz.

Straps are provided on the MOD board to allow setting initial transmit level. See Chapter 4, Section 3 for strapping information.

ERROR DETECTION(PARITY)

The Error Detection (parity error) option is accomplished by adding the PAR printed circuit board. This option checks even or odd parity depending on the strap position. If parity is incorrect, the following action takes place:

1. Interrupt lamp is turned on and keyboard operation is inhibited.

2. A diamond (◊) will be typed in place of the invalid character (if the character would normally have been printed).

Further action can be initiated by adding a jumper. When this jumper is in, no diamond will be printed, but the following will occur.

1. Momentary alarm sounds.
2. "Break" signal is transmitted.
3. Motor turned off.
4. Reader turned off.

NOTE

See Chapter 4, Section 3 for PAR board strapping options.

EXTERNAL PAPER HANDLER

The External Paper Handler (see figure 3-7) provides a means to guide various widths (up to 12-27/32 inches) friction-feed, pin-feed, fan-fold, or roll paper, and to hold wide friction-feed or pin-feed paper rolls.

The wide roll paper holder, included in the external paper handler, provides a shaft mounted on the rear of the logic rack to hold wide friction-feed or pin-feed paper rolls. Adjustable collars are provided to accomdate any width paper up to the maximum of 12-27/32". Roll diameters may be as large as four inches.

The paper guide pans, mounted above the logic rack, are adjustable to a maximum width of 12-27/32".

The paper-out switch senses when incoming paper is no longer at the top of the logic rack and causes an "Alarm" condition. Approximately 16" of paper remain available when the "Alarm" occurs.

The paper, either from the roll or from a form-feed stack, is installed as follows:

1. Route paper under the paper rack and over the paper guide pan so the paper out switch arm is pressed down.

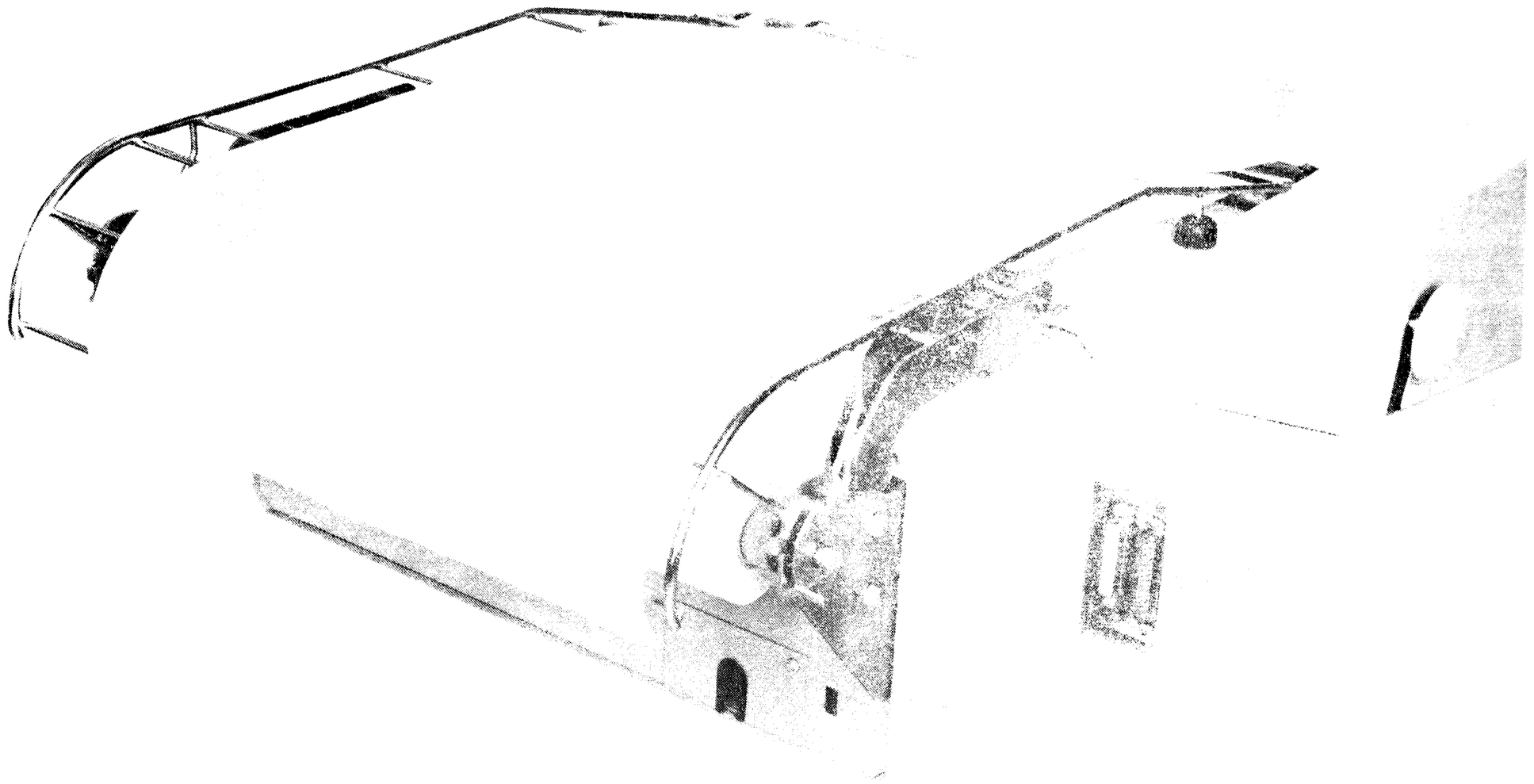
2. Adjust paper pan for width of paper allowing approximately 1/16 inch clearance on each side.

3. Route paper over the tension limiter and under the platen.

4. Route paper over the top of the paper rack toward the back of the machine.

NOTE

See Chapter 5, Section 2 for adjustment procedures.



External Paper Handl
Figure 3-7

HIGH SPEED TRANSMISSION

One of the rate selections can be changed to 120. This option allows the Printer to transmit information on tape at the rate of 120 characters per second (1200 baud). All printing is inhibited during this operation and Printer goes to "Standby" status.

HORIZONTAL TABULATION

This option is accomplished by adding the Horizontal Tabulation (HTB) printed circuit board.

TAB SET- A tab is set when the two codes Escape and 1 (one) are recognized at the same time (ESC and HT SET (1) keys on the keyboard). Any number of tabs can be set on a print line.

TAB CLEARING- All tabs are cleared when the Escape and 2 (two) codes are recognized at the same time (ESC and HT CLR (2) keys on the keyboard).

NOTE

When power is turned off, all tabs are dropped. The tabs do not drop when the Printer goes to the "Standby" status.

OPERATING CHARACTERISTICS- When a Horizontal Tab code is recognized (HT key on keyboard) the print position moves to the next tab set to the right. If no tabs [illegible] position moves to the last print position. [illegible] Return code is recognized (RETURN [illegible] key), the print position moves to the tab set furthest left. If no tabs are set, the print position [illegible]

LINE TURN-AROUND

This option is [illegible] installing a Group 2 PSC printed circuit board. The following functions take place with this option:

1. [illegible] Printer recognizes control codes [illegible] lead CA. The following [illegible] cause this function:

ACK

ETX

NAK

2. Wait before transmit:

-Control "READY" lamp by DLE?

-ENQ [illegible]

3. Mandatory disconnect - Forced disconnect when Printer recognizes [illegible]-BOT

4. Printer recognizes NAK as equivalent to "Break" or "Interrupt

5. Terminal status - Printer responds to ENQ with ACK or NAK to show Printer status. If answerback is included, ACK or NAK will be last character after answerback.

LONG PRINT LINE

The standard TermiNet 300 Printer has 75 print positions. The long print line unit has 118 print positions. This is a factory installed option that must be designated when ordering.

PARALLEL INTERFACE

This option consists of the AUX printed circuit board that permits parallel of an auxiliary device to the Printer.

PRINTER REQUIREMENTS SUPPLIED BY AUX BOARD

Definition of Signals

- Logic "1" is more negative than -10 volts and a maximum negative voltage of -27 volts.

- Logic "0" is between 0 and -1 volts.

- The logic status of a barred signal is "1".

- The logic status of an unbarred signal is "0".

Signal Loads - All incoming signals to the Printer drive a 10,000 ohm load. All outputs from the Printer have a source impedance of less than 2,000 ohms.

CAUTION

A positive voltage applied to the input of the Printer can cause equipment damage.

Signal Requirements Auxiliary Device Interface.

INPUTS FROM AUXILIARY DEVICE		MINIMUM DURATION
$\overline{AI1}$ - $\overline{AI7}$	7 data bits	Open Loop: One baud bit* + 48 microseconds after strobe begins
$\overline{AI8}$	8th or parity bit	Closed Loop: Until 15 microseconds after $\overline{ASTIN}$ begins
$\overline{AISWOP}$	Strobe for data to which TermiNet is to add parity bit	15 microseconds
$\overline{AISWIP}$	Strobe for data where $\overline{I8}$ is to be used as 8th bit	15 microseconds
AUXRDY	Auxiliary device ready signal	15 microseconds
AINH	Inhibit printing and control function decoding, permit punching and transmitting	Static
OV	Isolated signal ground	Static

OUTPUTS TO AUXILIARY DEVICE		MINIMUM DURATION
$\overline{ASTIN}$	This signals auxiliary device to present new data	One baud bit
ATON	Turnon-the Escape sequence (ESC K or k) provides a momentary signal to turn auxiliary device on	12 microseconds
ATOFF	Turnoff-the Escape sequence (ESC L or l) or receipt of a break provides a momentary signal to turn auxiliary device off	12 microseconds

*One Baud Bit: One bit time at the data transmission rate.

OPERATING CHARACTERISTICS OF INTERFACE FUNCTION

General- When the auxiliary device is active no other data input should be used: i.e., keyboard, tape reader of answerback.

If the auxiliary device is presenting 8 bits of data, the strobe supplied by the device should go to AISWIP. If the auxiliary device is presenting 7 bits of data and wants the Printer to add the 8th bit as even parity. AISWOP should be used.

Any time a "Break" signal is received the ATOFF line will be energized.

Character rate will be determined by the RATE SELECTOR switch on the front panel of the Printer.

The auxiliary device may provide a signal to the Printer on the AUXRDY lead. The Printer will treat this the same as a "paper out" and the resetting must be in the auxiliary device.

ASCII Input (AINH line should be at "0")- If the transparency switch is included on the Printer, the switch position should be OFF.

If printing is desired, all timing characteristics of the Printer must be satisfied.

The auxiliary device may be turned ON by its own local control or by receiving from the transmission line "ESC K" or "ESC k". Devices may be turned off by local control or recognizing "ESC L" or "ESC l". This means the ESC L sequence will have effect either when received from the transmission line or when generated locally.

Closed-Loop Operation- Auxiliary device data is presented to the Printer on input lines A11 through A18.

Upon presentation of the data, a strobe is to be supplied from the auxiliary device.

The Printer responds with ASTIN when it is ready for the next data character. Input strobes to the Printer should occur after the end of ASTIN.

Open-Loop Operation- Auxiliary device data is presented to the Printer on input lines A11 through A18.

Data must be held for a minimum time as specified in "Signal Requirements Auxiliary Device Interface". The data rate must be less than the transmission rate.

Non-ASCII Input- AINH line should be at "1". This logic affects the Printer to inhibit printing and recognition of all control codes (either transmitted or received), but punching will be allowed. Auxiliary device ON and OFF codes will not be recognized. The transparency switch, if included, should be in the OFF position.

Either closed or open-loop operation is the same as with ASCII input.

PINFEED PLATENS

The pinfeed platen option permits the use of pinfeed paper or forms. This option is available in 8 1/2" length, 9.0" length, 9 1/2" length and 12 27/32" length. The pinfeed option consists mainly of:

- Pinfeed platen.
- Absence of pressure rollers.
- Different paper guide.
- Different platen knobs.
- Release lever kit.

With this option, the paper pressure release lever should always be in the forward position (toward the keyboard).

PAPER TAPE OPTION

A Desk, Tape Punch, and Tape Reader is available as an option to be added to any KSR TermiNet 300 Printer and can be installed in the field. A Reader and Punch board B and P is necessary to interface the reader and punch with the Printer.

READER

Type:	Photoelectric, fully reversible
Tape:	One inch EIA, fully perforated, range from oiled paper to Mylar.
Speed:	Up to 120 characters/second

PUNCH

Type:	Step and Punch - Solenoid driven.
Tape:	One inch EIA, range from oiled paper to Mylar.
Speed:	10, 15, 30 characters/second determined by RATE selector switch on Printer.

For operating and service information pertaining to this option, refer to Service Manual, Model B Punch and Reader, GEK-14776.

TRANSPARENCY SWITCH- The Transparency option allows the Printer to process codes other than ASCII when the TRANSPARENCY switch is in the ON position. All Printer decoding is inhibited. The Transparency option is normally used with either a tape reader and punch or with an auxiliary device that is using a code other than ASCII. Remote control of the punch or reader is not possible but a received "Break" will stop a transmitting tape reader.

VERTICAL TAB AND FORM FEED (VTFF)

DESCRIPTION - This option allows the Printer to rapidly feed paper (6 3/4 inches per second) to a predetermined line position upon recognition of a locally or remotely generated form feed (FF) or vertical tabulation (VT) code.

A programmable disc (see figure 3-8) containing 66 divisions (corresponding to the number of print lines on a 11 inch sheet of paper) is coupled to the line feed drive shaft.

For form-feed operation, this disc can be punched with the disc punch (see figure 3-8) so that the recognition of a FF code causes the line feed drive to run quickly to the first line of printing on a new form.

The vertical tabulation operates in the same manner as the form feed. The programmable disc controls the response of the Printer to a recognized VT code. This operation is used for rapid consecutive line-feeds within a particular form.

The VTFF is designed to help prevent mis-indexing of a form if the operator should inadvertently press the VT rather than the FF key. Recognition of a VT code causes either vertical tabulation or form feed indexing depending on which hole appears next on the programmed disc. If there are no holes punched in the disc or there is a malfunction in the sensing mechanism, a timer will stop paper feeding within a few seconds.

PROGRAMMING THE DISC

1. Mount disc on punch so that disc-key protrudes through the disc key hole (see figure 3-9).

2. By rotating the disc, set the desired number in line with the VT and FF holes. This number should coincide with the line position where the form is to be started.

3. Press punch in the FF hole to punch a hole in the disc in line with the desired numbered position.

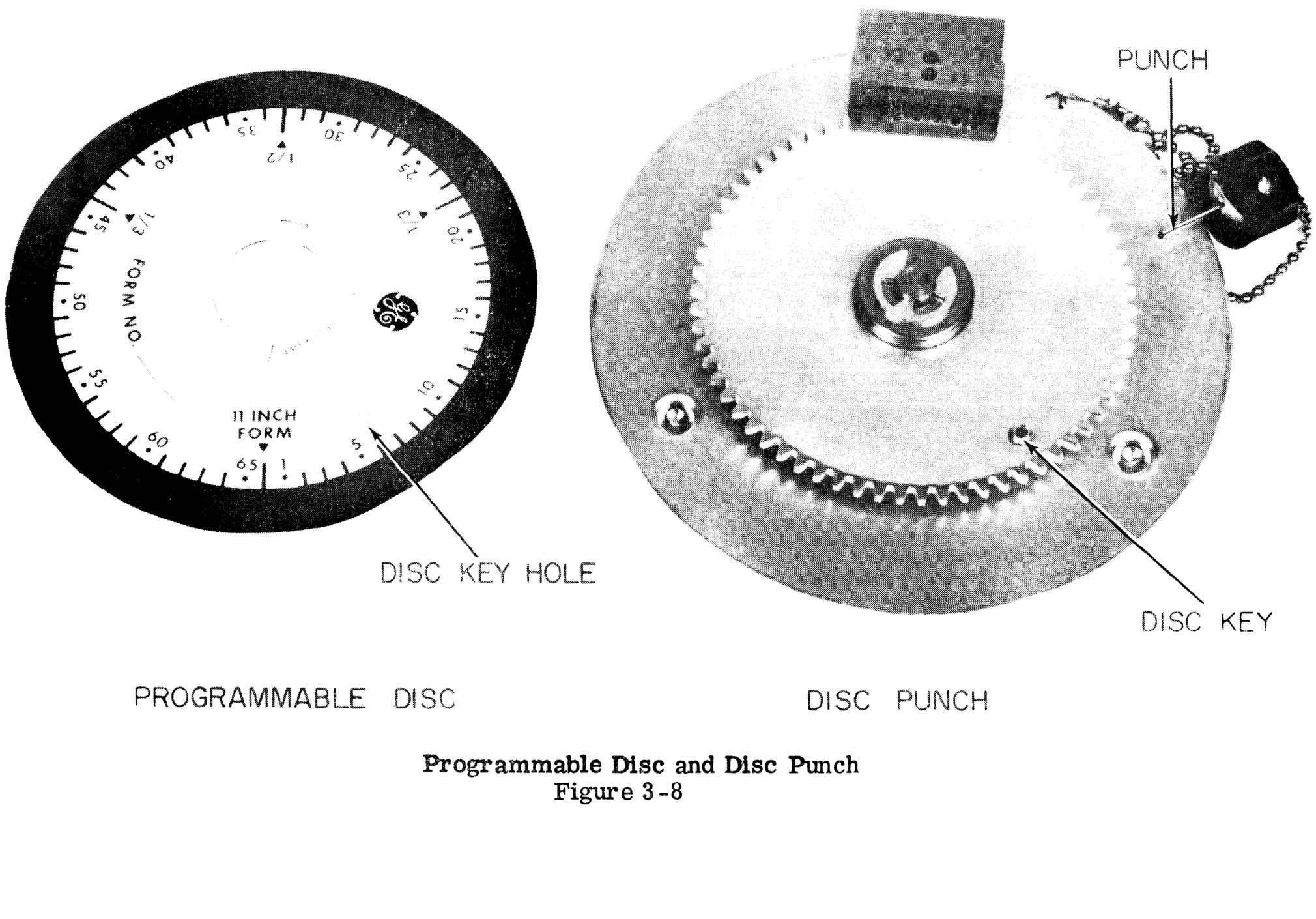
4. Rotate the disc and punch a hole at each VT position where the form is to have a vertical tab stop.

OPERATING THE VTFF OPTION
(See figure 3-10)

1. Press a pre-punched disc over the keyed hub of the disc wheel until it can be rotated. Rotate disc until key on wheel protrudes through the disc keyhole.

2. Press the FF key. The Printer will line feed to the first line position that is to be printed.

3. Advance the form so the first line to be printed is under the embossed characters on the fingers. The Printer is now ready to print.



Programmable Disc and Disc Punch
Figure 3-8

VT & FF KIT

PROGRAM 35300

HPTR PAR FF&VT FF&VT 4HTB LMP — TN1200 MB, TN300 MB

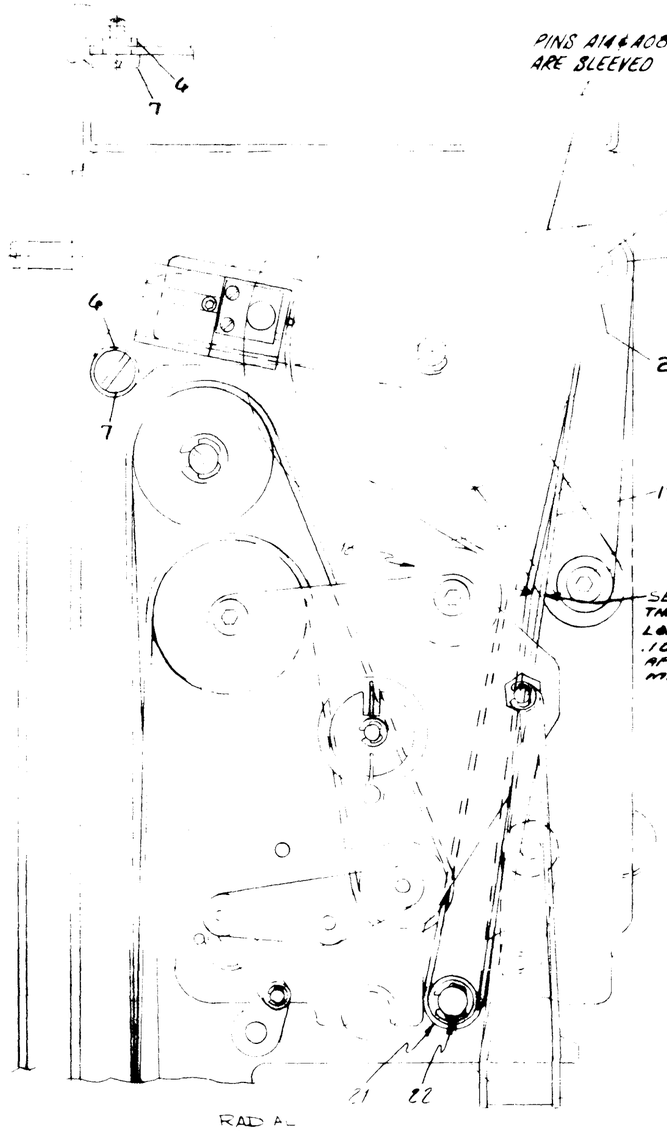
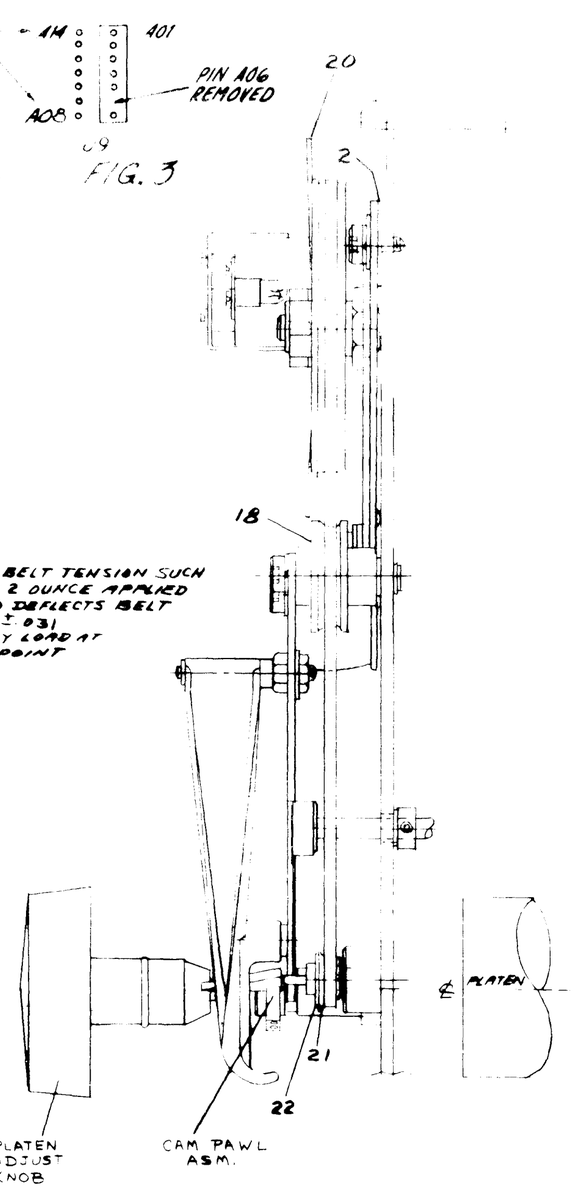


FIG. 3



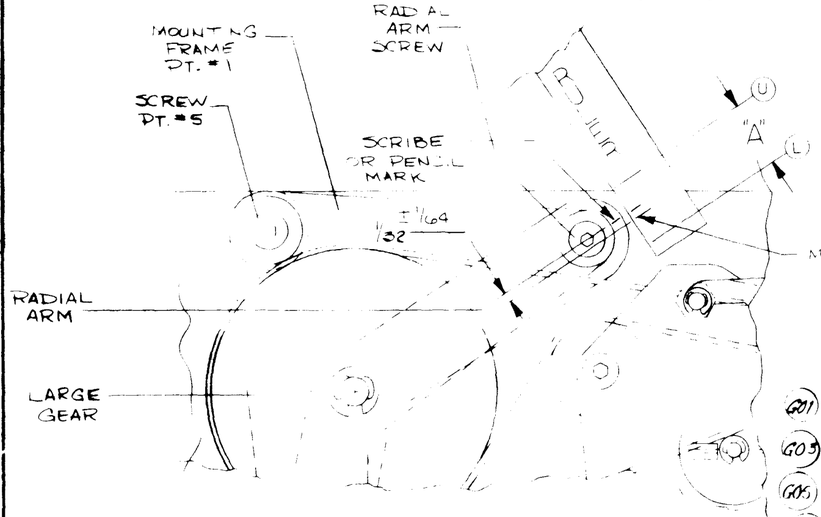


FIG. 2

NOTES:

1. READ THESE INSTRUCTIONS COMPLETELY BEFORE STARTING ASSEMBLY OF THE KIT TO THE PRINTER.
2. REMOVE THE PRINTER FROM THE CASE.
3. REMOVE THE LEFT RIBBON MECHANISM. LOOSEN THE CAM PAWL ASM. SCREW AND ROTATE THE ASSY. DOWN.
4. INSTALL THE VT-FF ASSY., STARTING WITH PART NO. 1 (CONTINUE IN SEQUENCE 1, 2, 3, . . . 18, 21, 2[illegible] & 19). INSTALL AS SHOWN PICTORIALLY.
5. READJUST THE CAM PAWL ASM. ROTATE THE PAWL TO A POSITION IN ALIGNMENT WITH THE CENTER OF THE SPRING LOADED SHAFT. THE ASM. SHOULD BE PLACED TOWARD THE SIDE FRAME ENOUGH FOR DISENGAGEMENT OF THE GEAR & AWAY FROM THE SIDE FRAME ENOUGH TO A) REMOVE THE RIBBON DRIVE MECHANISM AND B) PUT LITTLE FORCE ON THE PLATEN KNOB SO IT WILL "POP" OUT FREELY.
6. REPLACE THE RIBBON MECHANISM & HARDWARE.
7. REMOVE [illegible] WARE & COVER FROM BACK OF THE BUSTLE. INSTALL THE PRINTED CIRCUIT BOARD (PART NO. 26) IN THE SLOT MARKED VT-FF.
8. PLUG THE CONNECTOR FROM THE PHOTOCELL INTO J9 ON THE MOTHER BOARD (SEE FIG. 3)
9. REPLACE THE BUSTLE COVER, HARDWARE, AND MACHINE IN THE CASE.
10. ADJUSTMENTS:
    - A. PLACE A PREPUNCHED DISC (PUNCHED AS SHOWN IN FIGURE 1) PT. #20, ON THE LARGE GEAR.

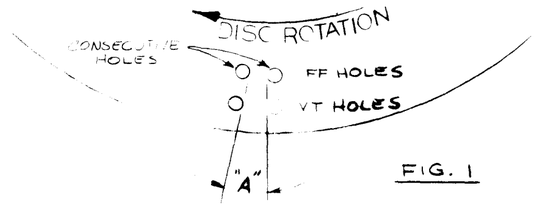


FIG. 1

    - B. SCRIBE OR PENCIL A MARK ON THE END OF THE RADIAL ARM AND POSITION A RULE AS SHOWN IN FIGURE 2.
    - C. APPLY POWER TO THE MACHINE & PUT INTO LOCAL MODE. LOOSEN THE RADIAL ARM SCREW & WITH AT LEAST 8000 OHM/VOLT MULTIMETER OR OSCILLOSCOPE ATTACHED TO TP 8 (VT OUTPUT) ON THE VTFF BOARD - REFERENCING TO GROUND-MOVE THE RADIAL ARM UNTIL THE VOLTAGE DROPS TO APPROX. - 20 V. - NOTE THE RULER READING AS INDICATED BY MARK ON RADIAL ARM. NOW MOVE THE RADIAL ARM IN THE OPPOSITE DIRECTION AND AGAIN NOTE THE RULER READING. THESE READINGS ESTABLISH THE RANGE OF "A" AS SHOWN IN FIGURES 1 & 2. IF "A" CANNOT BE ESTABLISHED SEE STEP F.
    - D. OPTIONAL: RECHECK EACH END OF "A" BY NOW USING TP 9 ON VTFF BOARD INSTEAD OF TP 8 THUS READING FF INSTEAD OF VT HOLES.
    - E. FINALLY, MOVE RADIAL ARM TO A POSITION ABOVE THE MIDPOINT OF "A", SEE FIGURE 2, AND TIGHTEN RADIAL ARM SCREW.
    - F. IF BY MOVING THE RADIAL ARM IN BOTH DIRECTIONS THE RANGE OF "A" CANNOT BE ESTABLISHED THE FOLLOWING MAY BE NECESSARY: THE LARGE GEAR MUST BE SLIPPED A TOOTH IN RELATION TO THE TIMING BELT, PT. #19, IN THE PROPER DIRECTION IF VOLTAGE AT TEST POINT DOES NOT DROP TO - 20 V. WHEN APPROACHING THE U (UPPER) END OF "A" SLIP GEAR IN THE CLOCKWISE DIRECTION, SLIP GEAR COUNTERCLOCKWISE IF VOLTAGE DOES NOT DROP AS YOU APPROACH L (LOWER) END OF "A". TO SLIP BELT LOOSEN SCREW, PT. #5, AND MOVE MOUNTING FRAME, PT. #1, IN A CLOCKWISE DIRECTION TO PROVIDE SLACK IN THE BELT. SLIP GEAR AND NOW MOVE MOUNTING FRAME IN COUNTERCLOCKWISE DIRECTION TO RETIGHTEN BELT - RETIGHTEN SCREW PT. #5. DETERMINE "A" BY AGAIN FOLLOWING c THRU e MENTIONED ABOVE.
    - G. SYNCHRONIZATION OF PLATEN WITH DISC - PRESS FF BUTTON AND ALLOW MECHANISM TO ADVANCE PAPER TO BEGINNING OF FORM AS DETERMINED BY USER. MOVE PAPER FORM BY USING THE MANUAL PLATEN ADJUST KNOB.

CAUTION: IT IS EXTREMELY IMPORTANT THE SETTING OF THE SOLENOID ARM IN RELATION TO THE LINE FEED CLUTCH BE WITHIN THE INDICATED TOLERANCE RANGE - PREFERRABLE THE BOTTOM END (.005") OF THE SPECIFIED TOLERANCE RANGE. THIS IS NECESSARY FOR ERROR FREE OPERATION OF THE VT & FF MECHANISM.

-PARTS LIST ISSUED-

(G01) 66 LINE 11" FORM "E" MODEL (G02) 46 LINE 8.5" FORM "E" MODEL (G10) 51 LINE 8.5 FORM, LESS PCB
(G03) 66 LINE 11 FORM "C" MODEL (G04) 48 LINE 8.5" FORM "C" MODEL (G11) 66 LINE 11 FORM LESS PCB
(G05) 66 LINE 11" FORM MECHANISM ONLY (G06) 48 LINE 8.5 MODEL (SPECIAL) MECHANISM ONLY (G12) CONVERSION KIT-11" FORM TO 8.5" FORM (MECH ONLY)
(G08) 66 LINE 11" FORM (SPECIAL) PWB (G07) 51 LINE 8.5" FORM "C" MODEL (G13) CONVERSION KIT-FORM TO 8.5" FORM (MECH ONLY)
PUNCH & DISC ONLY "C" MODEL
(G09) 48 LINE 8 FORM SPECIAL PWB PUNCH & DISC ONLY
"C" MODEL

REVISIONS			PRINTS TO	
1	ANTI-STAT Canc	2-23-71	18	413
2	[illegible]	3-29-71	33	37
3	74-5560 ZCB	FOR 2T	34	
			35	
			36	
			38	

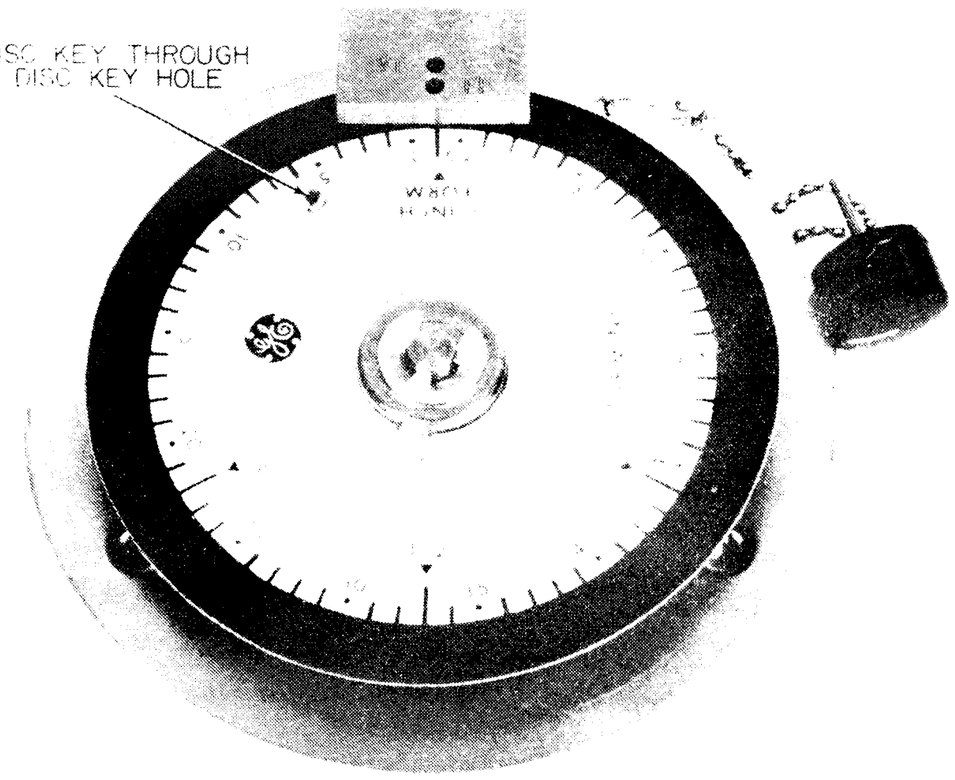
DRAWING NO 44C414110 SH NO 1 REV NO

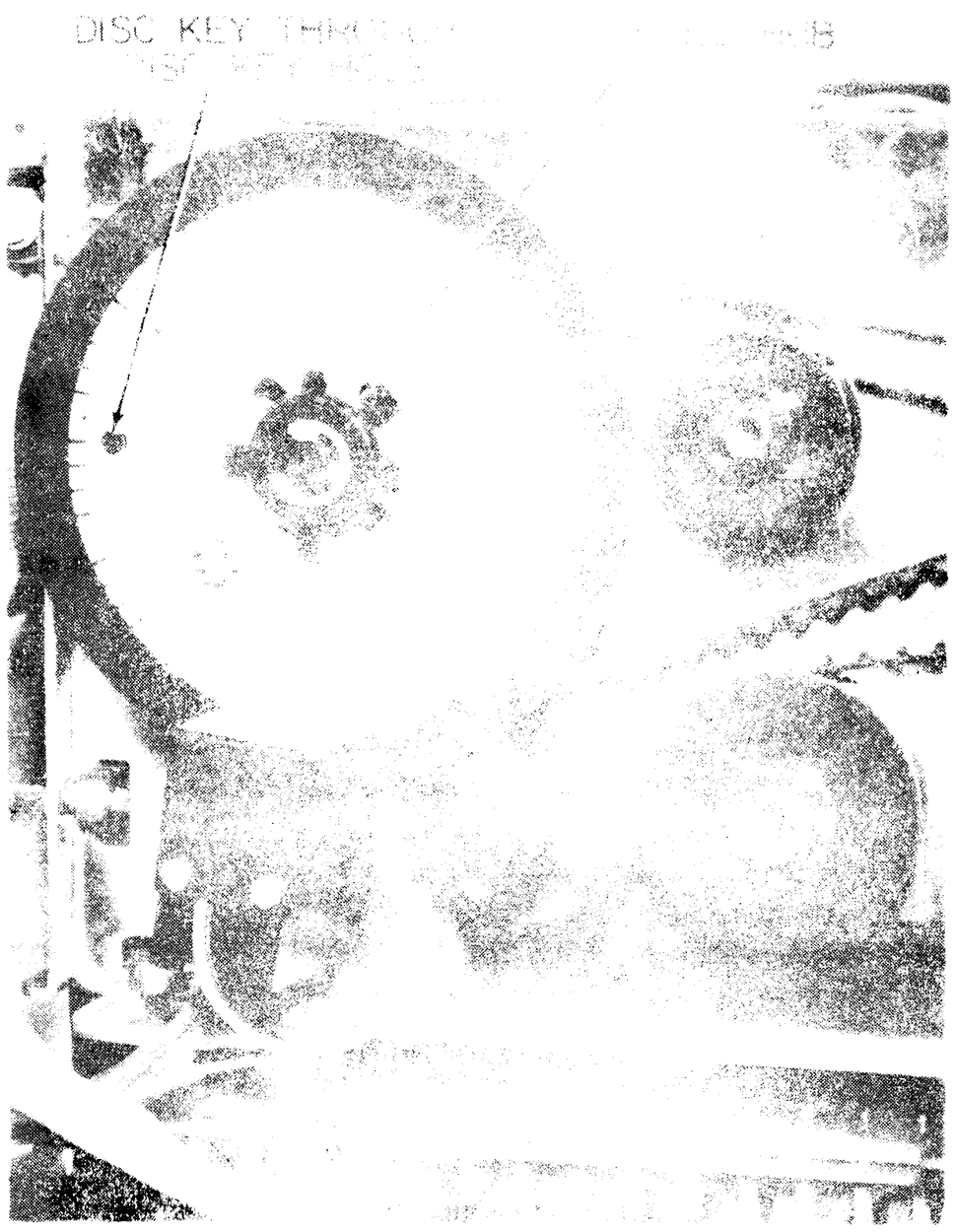
MADE BY C.W. [illegible] 3-29-1970
ISSUED E. Ryder 3/5/70
APPROVALS 3-9-70
[illegible], VA., LOCATION
44C414110 COPY ON SH 1

FF-809-F (2-68) PRINTED IN U.S.A.

WIDE PAPER ROLL HOLDER KIT

This option provides a means to mount roll paper (up to 12 27/32"wide) at the rear of the Printer. Adjustable collars are provided to accommodate different width paper. Roll diameters may be as large as four inches.





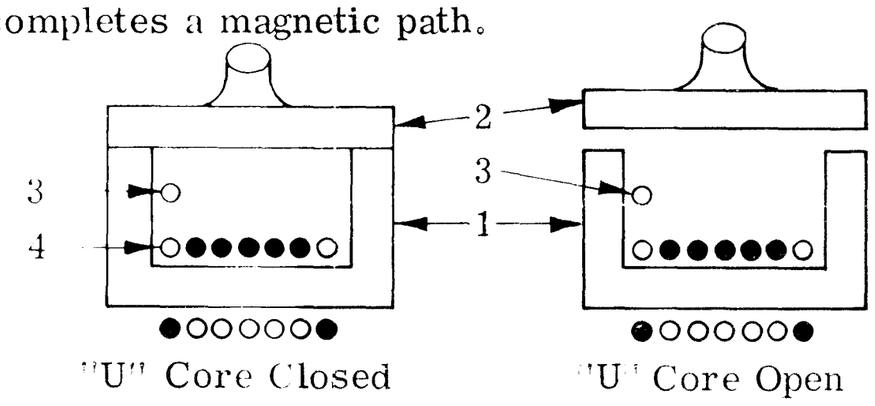
Programmable Disc on Disc Punch
Figure 3-9

SECTION 3
MECHANICAL OPERATION

KEYBOARD

Each key is encoded by electromagnetic coupling a drive signal through magnetic "U" cores to two sets of conductors threaded through and around these "U" cores. This encoding process also detects the simultaneous pressing of two or more keys and inhibits the generation of erroneous codes. If more than one key is pressed, the first key to make contact will produce a code and the last key released will produce a code.

Figure 3-11 shows the general shape of two ferrite "U" cores and ferrite bars; one with the "U" core closed and the other with the "U" core open. Each ferrite bar is connected to a key. When a key is pressed, the ferrite bar mates with the "U" core and completes a magnetic path.



1. "U" Cores
2. Ferrite Bars
3. Drive Line
4. "True" Sense Lines (0)
5. "Reverse" Sense Lines (1)

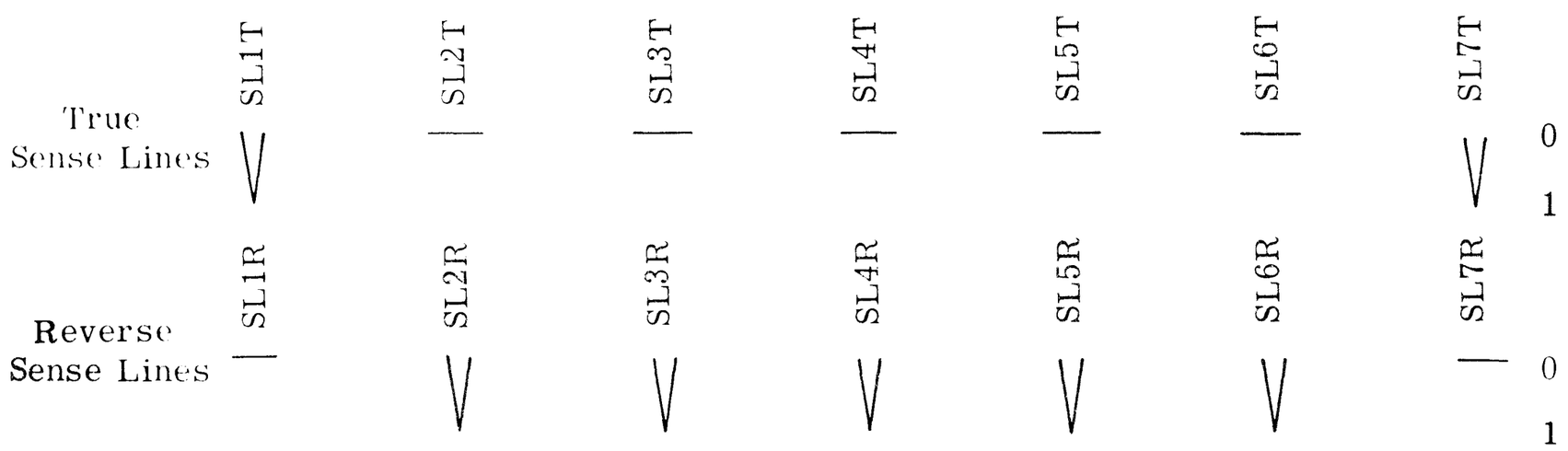
"U" Core Mechanics
Figure 3-11

The "U" cores are mounted through a multilayer printed circuit board referred to as a Sense Line Driver board. One line, the drive line, is routed through all the cores. A set of seven conductors ("True" sense lines, SL1T thru SL7T) are routed through and around each core depending on the code the core is supposed to generate. A set of seven "Reverse" sense lines (SL1R thru SL7R) are routed through and around each core in the opposite threading scheme of the "True" sense lines. Also mounted on the Sense Line Driver board is an oscillator which produces a 1 microsecond pulse every 600 to 800 microseconds along the drive line.

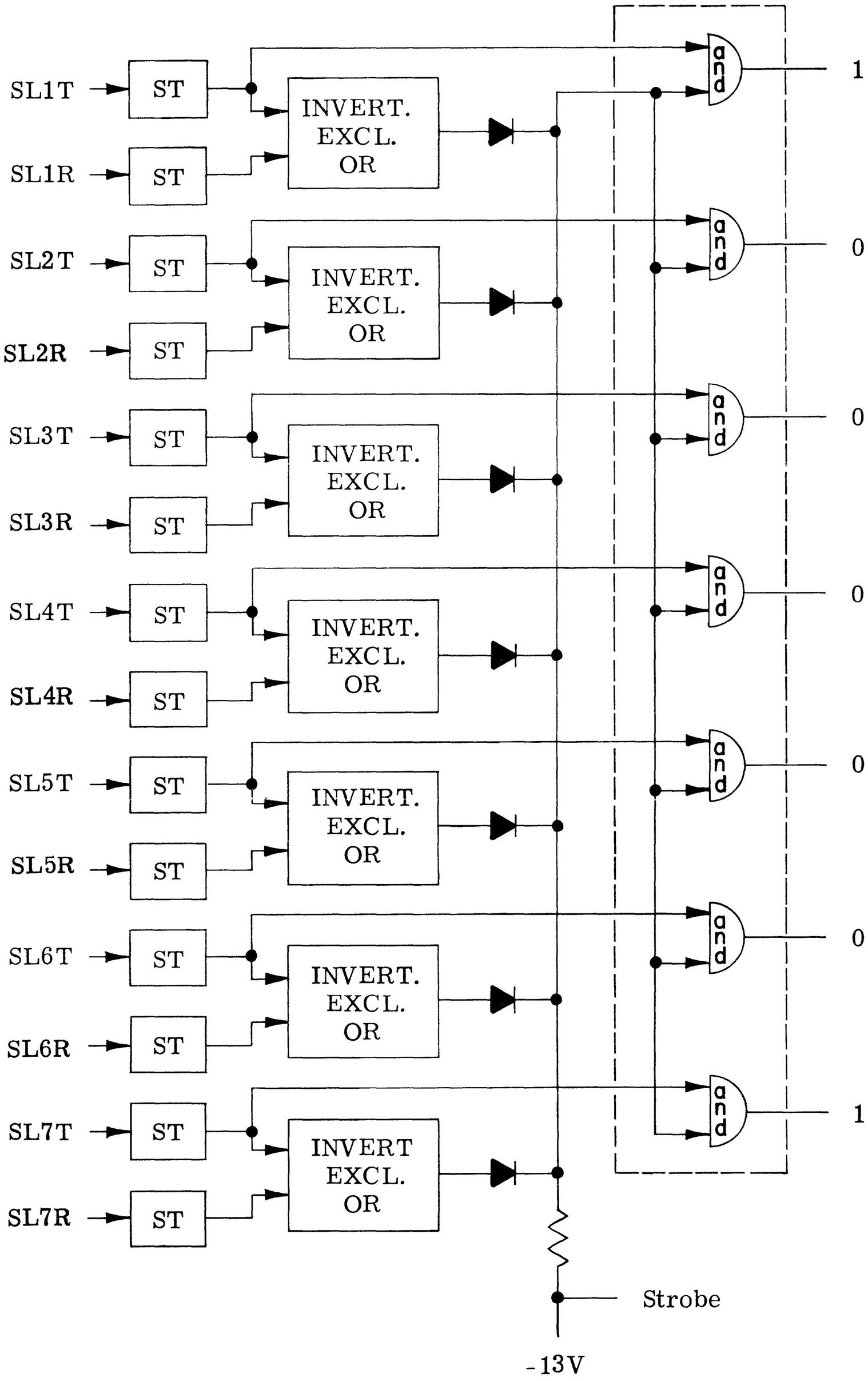
When a key is pressed, the associated ferrite bar closes the magnetic path in the associated "U" core. Through transformer action, the next drive pulse in the drive line is coupled to the sense lines routed through the core. Those sense lines through the core that pick up the pulse represent binary 1's; and those sense lines outside the core represent binary 0's. Therefore, the "True" sense lines pick up a 7 bit code depending on how the sense lines are threaded through the core. The "Reverse" sense lines pick up a 7 bit code that is the opposite of the "True" sense lines. The purpose of two sets of sense lines is to allow keyboard circuits to inhibit an erroneous digital code produced by simultaneously pressing two or more keys.

Assuming that the "U" core shown in Figure 3-11 is arranged so that the character "A" (ASCII code 1000001) is generated in the "True" sense lines; and the "Reverse" sense lines are arranged so the opposite code (0111110) is generated, Figure 3-12 shows the outputs of the sense lines when character "A" is pressed.

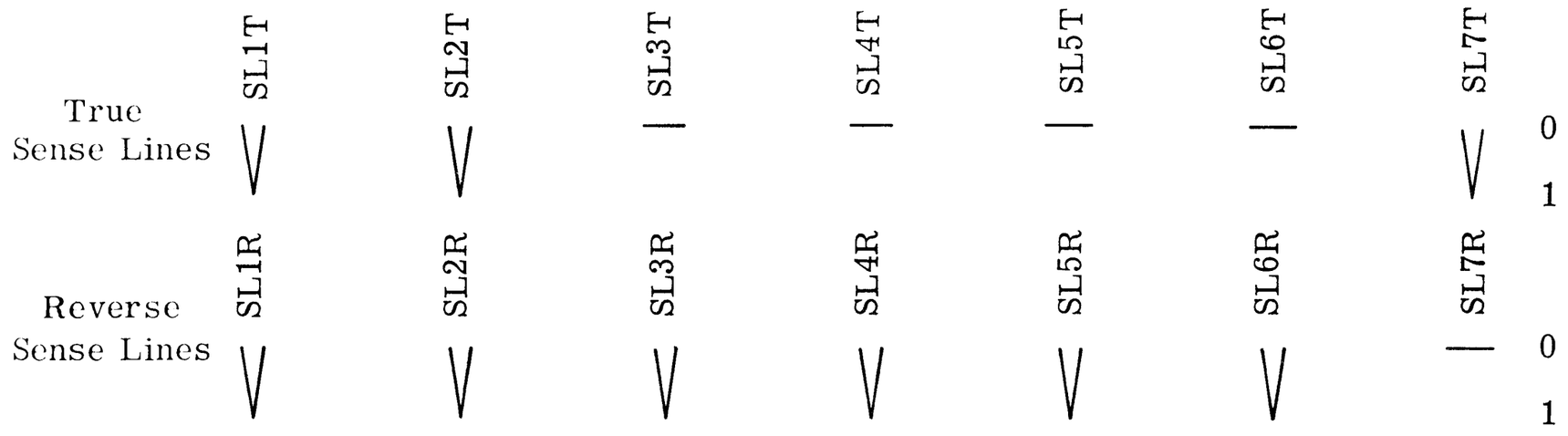
The sense line signals are inputs to an integrated circuit on the KIF board where they are gated, by character, for further processing. Figure 3-13 is a simplified block diagram of the "Exclusive OR" gating circuits. When one key is pressed, signals are generated as shown in Figure 3-12; and there will be a binary 1 at each pair of the gate inputs (SL1T and SL1R, etc.) but not two binary 1's at a pair of inputs at the same time. Under these conditions, the gating arrangement will pass the code on the "True" sense Lines. If more than one key is pressed, a possible variation of sense line outputs could be as shown in Figure 3-14. In this case, there are binary ones on lines SL1T, SL1R, SL2T, and SL2R. Under these conditions, the gating arrangements will not let the code on the "True" sense line to pass. This action prevents the keyboard circuits from generating erroneous codes when more than one key is pressed at the same time.



Possible Codes with Single Key Pressed
Figure 3-12



Simplified Block Diagram of Exclusive "OR" Gating Circuit
Figure 3-13



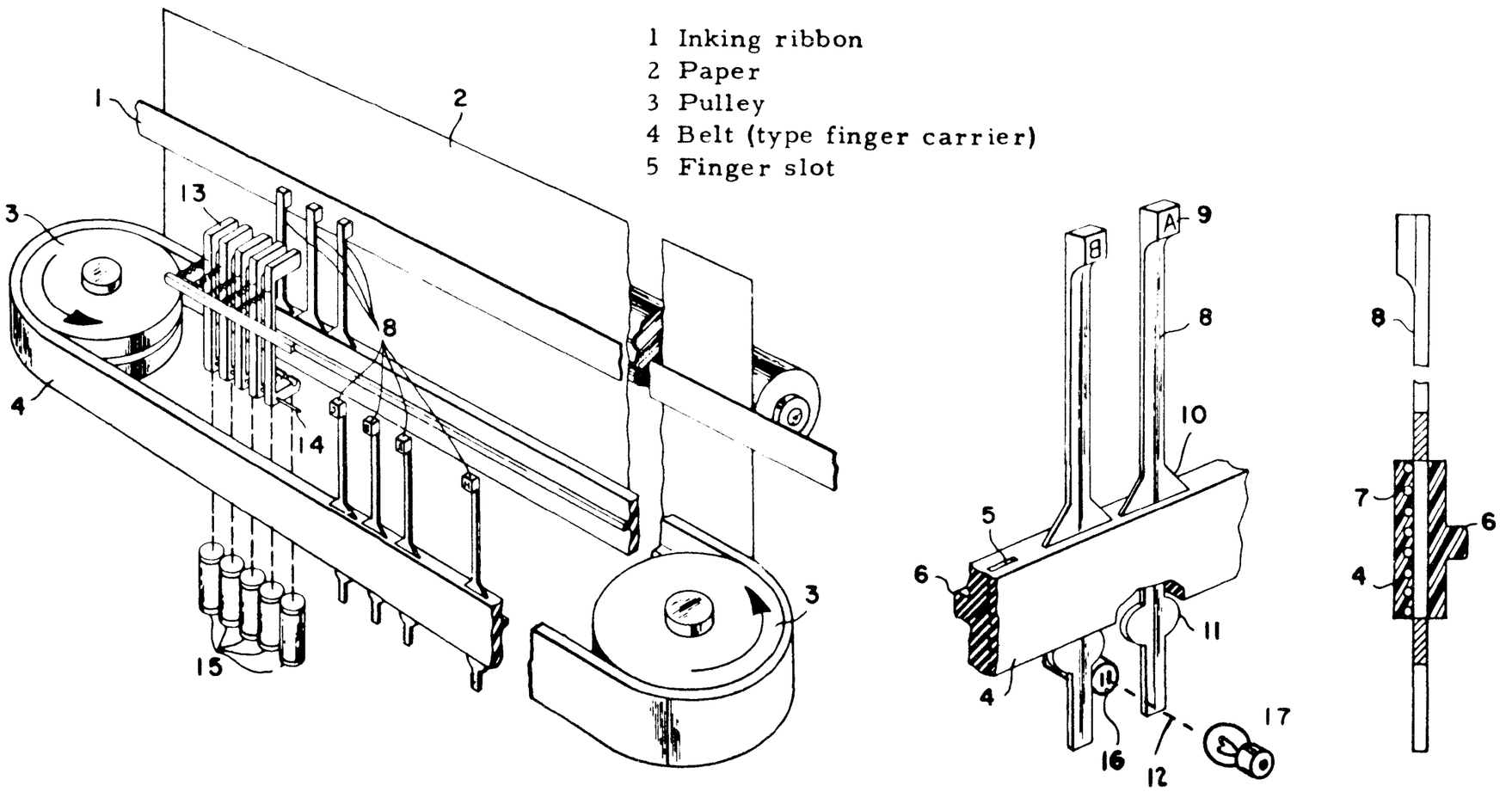
Possible Codes With More Than One Key Pressed
Figure 3-14

HAMMER AND PRINT BELT ASSEMBLY

The Printer (see figure 3-15) uses a flexible belt to carry the type fingers used for printing. The fingers are mounted in vertical slots in the belt. Each finger has a type character or symbol embossed on the upper end. The belt holds two sets of 96 characters. Ninety-four of the 96 characters are printable in each set. The fingers can be replaced by lifting them vertically out of the finger slot in the belt. Note that two of the fingers are special index fingers and cannot be removed from the belt. These two fingers are wider at the bottom and serve as a reference point to trigger an electronic counting circuit used in the hammer and print finger actuation.

The print belt is driven by an AC motor and belt-drive system. The print belt travels counterclockwise at a constant rate of approximately 94 inches per second in front of the paper and platen. An inking ribbon passes between the type finger and the paper. Printing takes place when a type finger is driven by a hammer against the ribbon and paper.

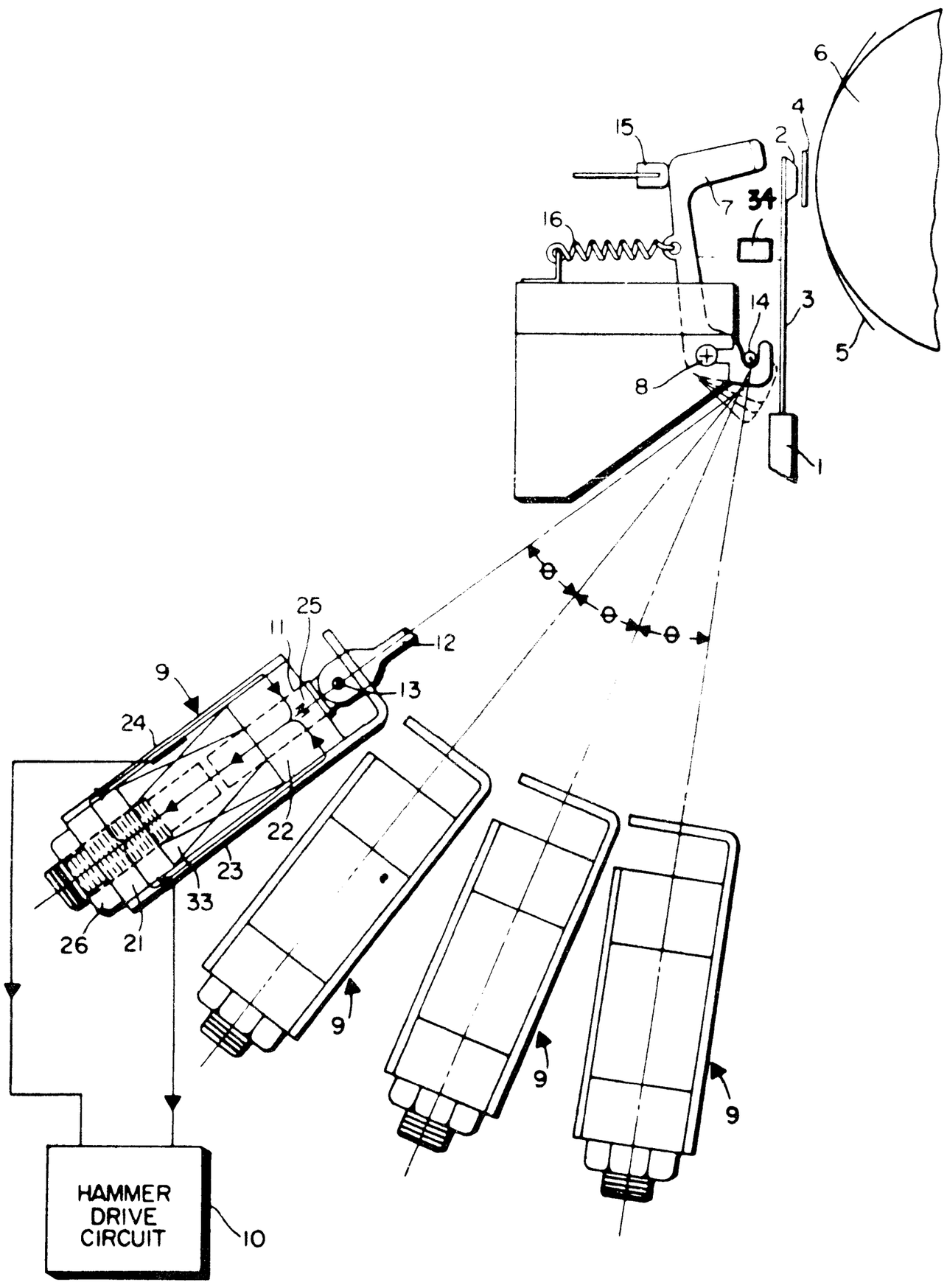
The actuation of a hammer against a print finger is electronically controlled by a timing process which uses an electronic buffer storage and counting system. When a character printout is "called for" by input data, the Printer buffers or stores the input data and permits multiple hammer firing when "called for" characters are in the required position.



Belt, Print Finger, and Hammer Mechanics
Figure 3-15

The position of each character in the belt is relative to the special wide index finger which is detected by the photocell light beam. This wide index finger triggers an electronic counting circuit which runs at a rate directly proportional to the character movement of belt speed. As the characters in the belt move past each possible print column position, the column position is compared with the stored input data to determine when a character is to be printed. When this comparison indicates that the "called for" character is in the correct column position, the appropriate hammer is fired. There is a hammer in each print position (column), for a total of 75 (short print line) or 118 (long print line).

All of the individual hammers (see figure 3-16) are mounted on a common pivot rod. Each hammer is connected by an individual clevis to a solenoid plunger. The clevis engages a curved slot at the base of the hammer. The other end of the clevis is linked to the solenoid plunger. When the solenoid coil is energized by the hammer drive circuit, the clevis is pulled down by the plunger, causing the hammer to pivot forward about the pivot rod. The face of the hammer travels forward approximately .077 inch. The curved slot at the base of the hammer serves a dual purpose. It provides an easy means for disconnecting the clevis and allows a means of overtravel (free-flight) for the hammer.



1 Belt (type finger carrier)
2 Type Face
3 Type Finger
4 Inking Ribbon
5 Paper
6 Platen
7 Hammer
8 Pivot Rod
9 Coil Bar
10 Hammer Drive Circuit
11 Solenoid Plunger
12 Clevis
13 Clevis Pin
14 Clevis Pin
15 Hammer Backstop Bracket
16 Hammer Spring
21 Coil Bar, bottom
22 Coil Bar, top
23 Coil Bar, side
24 Coil Bar, side
25 Pole Piece
26 Nut
33 Coil Winding
34 Rebound Bar

Hammer Actuation Mechanics
Figure 3-16

The solenoids are mounted and spaced uniformly in banks on the coil bar assemblies. There are four coil bar assemblies mounted parallel to each other with a slight angular displacement. Each coil bar assembly consists of a top and bottom piece and two side pieces. The bars are supported at the ends by the belt pulley casting.

The solenoid plunger enters a hole in the top member of the coil bar. The bottom portion of the coil bar has a threaded hole to receive a threaded solenoid pole piece. The penetration of the pole piece in the coil bar is adjustable, and its position or depth is secured by a locking nut. This allows a travel adjustment of the upper plunger. The timing process of actuating a hammer is effected by the photocell position. The time from coil energization to hammer strike is approximately 1.3 milliseconds. When the hammer is at rest, it is held against the hammer backstop bracket by the hammer spring. Located between the hammers and the fingers is the rebound bar. The rebound bar acts as a stop for a finger after a character has been printed. This prevents the fingers from oscillating and snagging on the hammers.

RIBBON SPOOL DRIVE SYSTEM

The ribbon drive system (see figure 3-17) uses a pair of reversible, constant tension drive mechanisms to transport the ribbon back and forth across the machine between the paper and the print fingers.

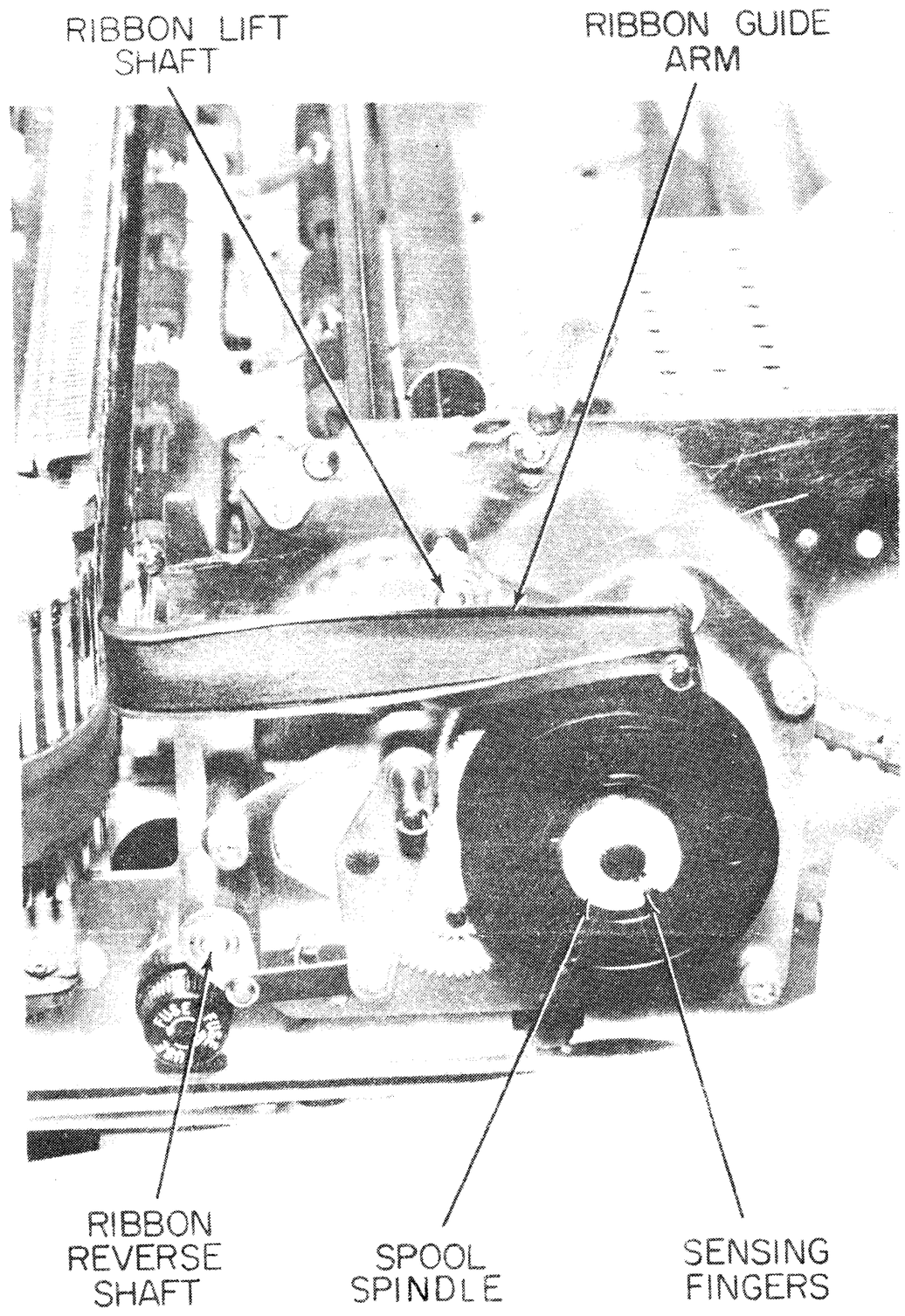
The ribbon mechanisms are mounted on each side of the printer frame. The mechanisms handle an inking ribbon and two spools. The full ribbon spool is mounted on the spindle of one drive assembly (either one) and the empty spool on the spindle of the other drive assembly. While the printer is in operation, the empty spool, which is driven by power from the jackshaft, will take up the ribbon from the full spool as it unwinds under constant tension.

When the initially full spool is empty, a sensing finger senses the ribbon-out condition and moves to engage an interposer arm and gear which causes reversal of the spool. A ribbon reverse shaft connects the two ribbon drive mechanisms and causes the opposite side to reverse at the same time. In this way, the ribbon (approximately 16 yards) moves back and forth from one spool to the other.

The ribbon leaves and enters the spools via ribbon guide arms mounted on each side of the printer frame. The guide arms support the ribbon as it stretches under tension across the machine in front of the paper.

RIBBON LIFT

The ribbon guide arms (see figure 3-17) pivot up and down. The arms are connected together by a ribbon lift shaft. The ribbon lift solenoid is connected to the shaft so that when the solenoid is energized, the ribbon is lifted in front of the type font. The ribbon only lifts when the terminal is printing. With the ribbon dropped, the printed material can be seen.

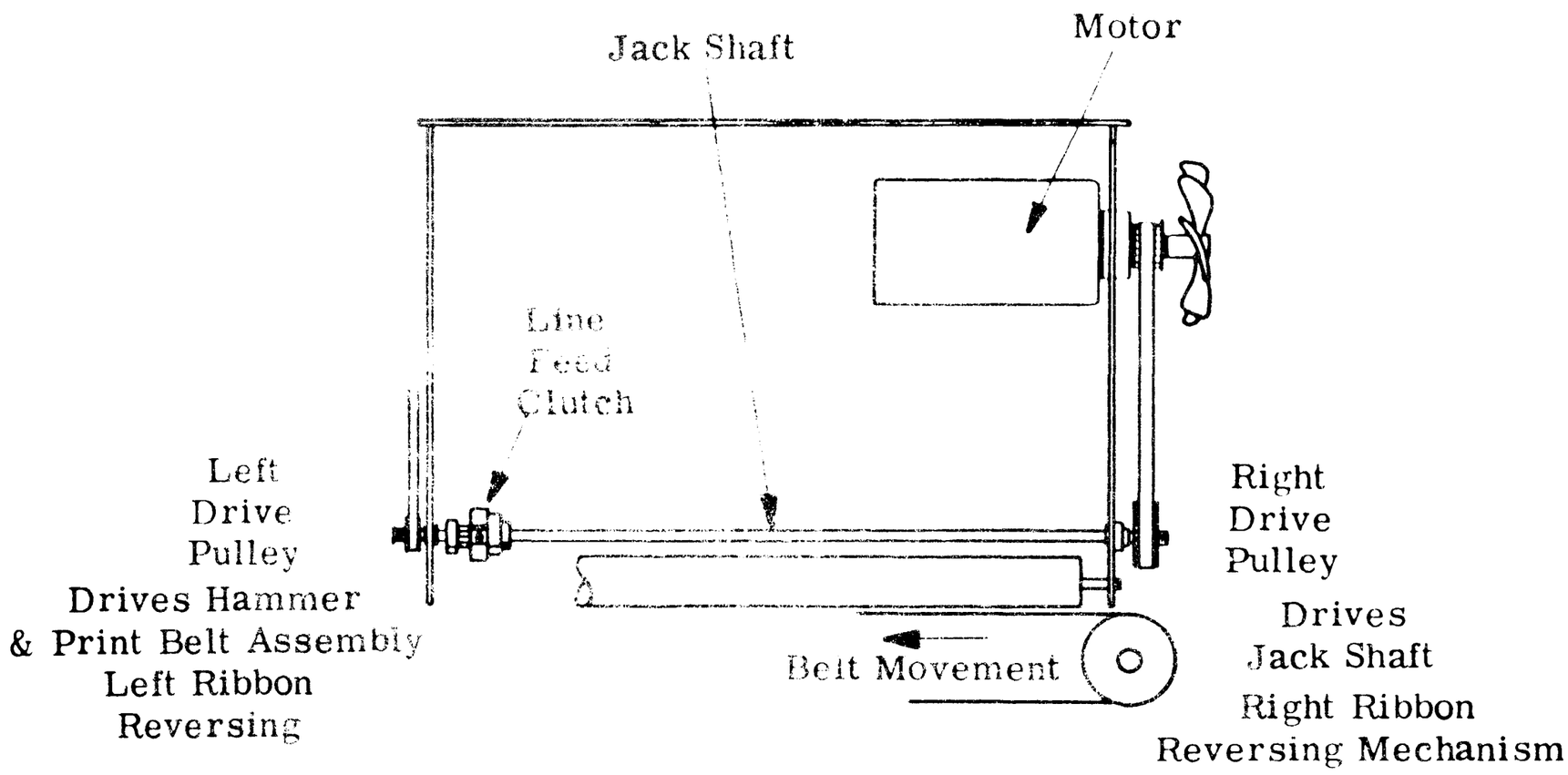


Ribbon Spool Drive System
Figure 3-17

MAIN DRIVE

The drive power (see figure 3-18) for the printer is provided by a motor located under the TXP board at the right side of the printer. The power from the motor is transmitted by means of the right drive belt to the right drive pulley on the jackshaft. At this point the power goes to the right ribbon reversing mechanism by means of a coupling, and across the machine by the jackshaft. The left side of the jackshaft transmits the power to three separate areas. The first being the line feed clutch used for advancing the paper.

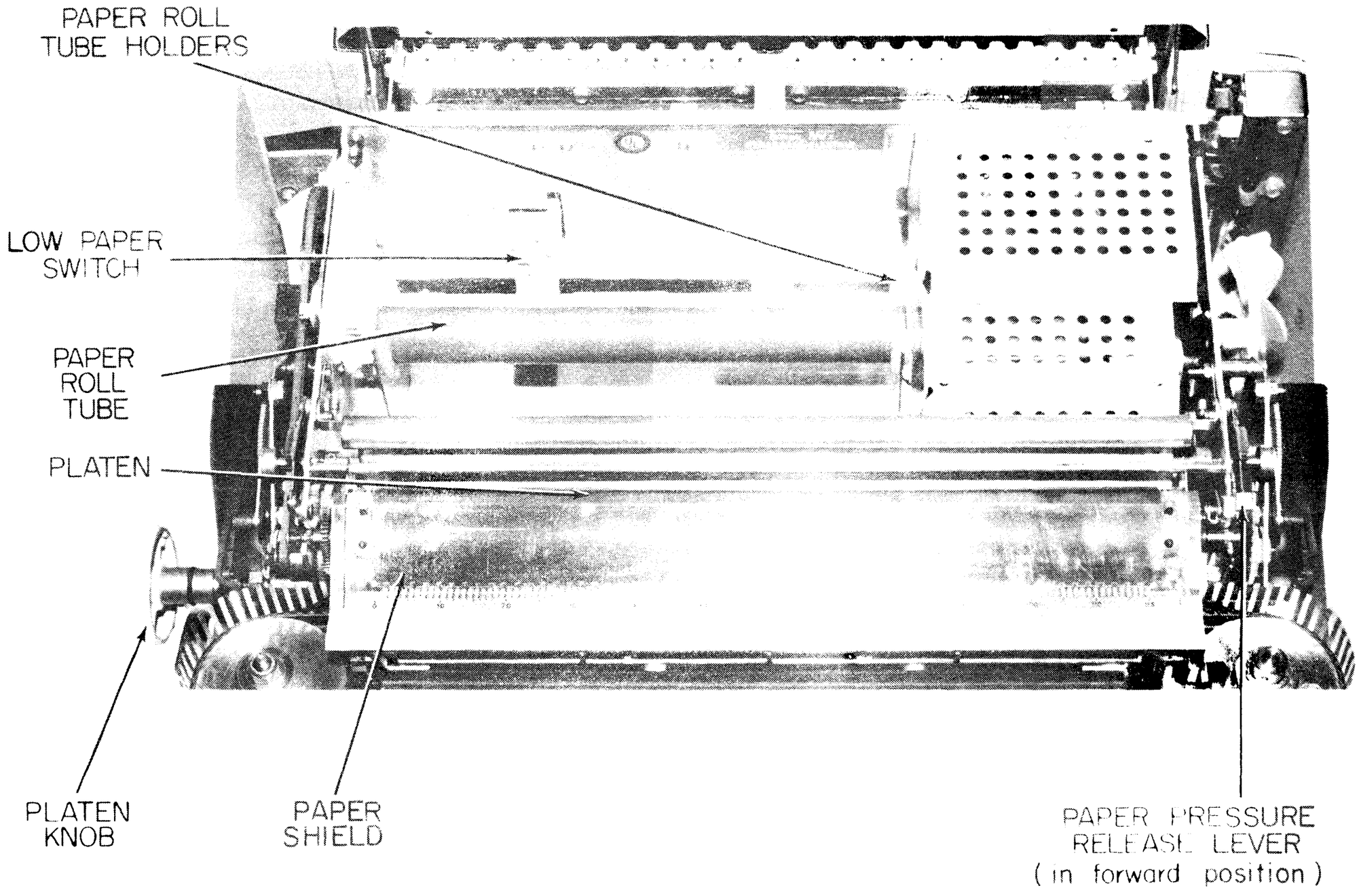
The second output from the jackshaft goes to the left ribbon reversing mechanism which is connected in a similar manner as the right ribbon reversing mechanism. The third output goes to the left drive pulley which transmits power to the print belt by means of the left drive belt. Anytime the motor is running the print belt will rotate and the ribbon will travel from one ribbon spool to the other. The line feed clutch only operates when a line feed is called for.



Drive Mechanism
Figure 3-18

PAPER HANDLING

GENERAL. The paper is held in place by the paper roll tube (see figure 3-19) which is mounted in the paper roll tube holders directly behind the dancer bar. Low paper is sensed by the low paper switch which rides against the paper roll. When low paper is sensed, an alarm condition will exist. This causes the motor to stop and the ALARM indicator to light. The Printer cannot be turned on when this condition exists unless a new roll of paper is installed, or the low-paper switch is placed in the locked-out position.

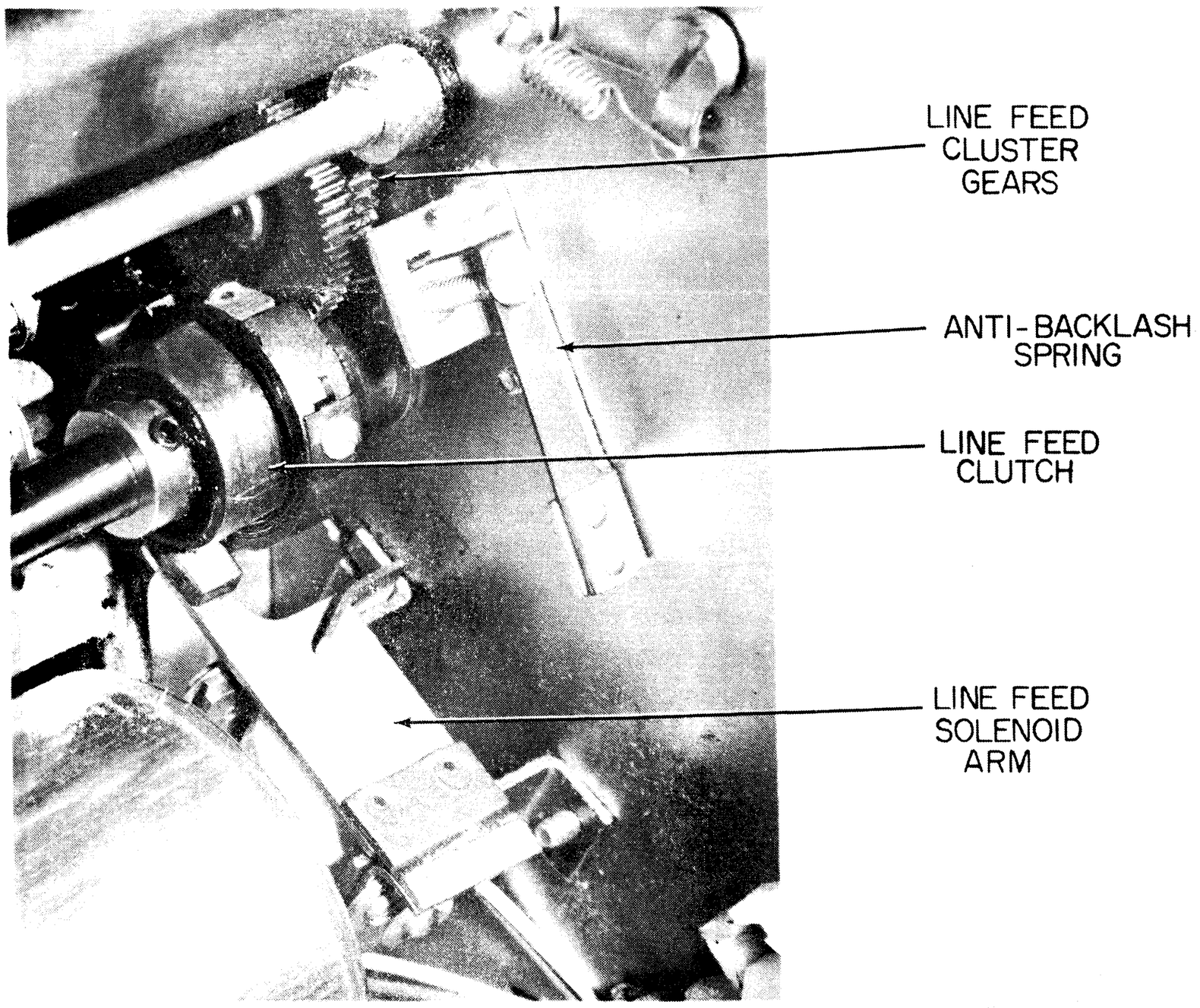


Paper Handling Mechanics
Figure 3-19

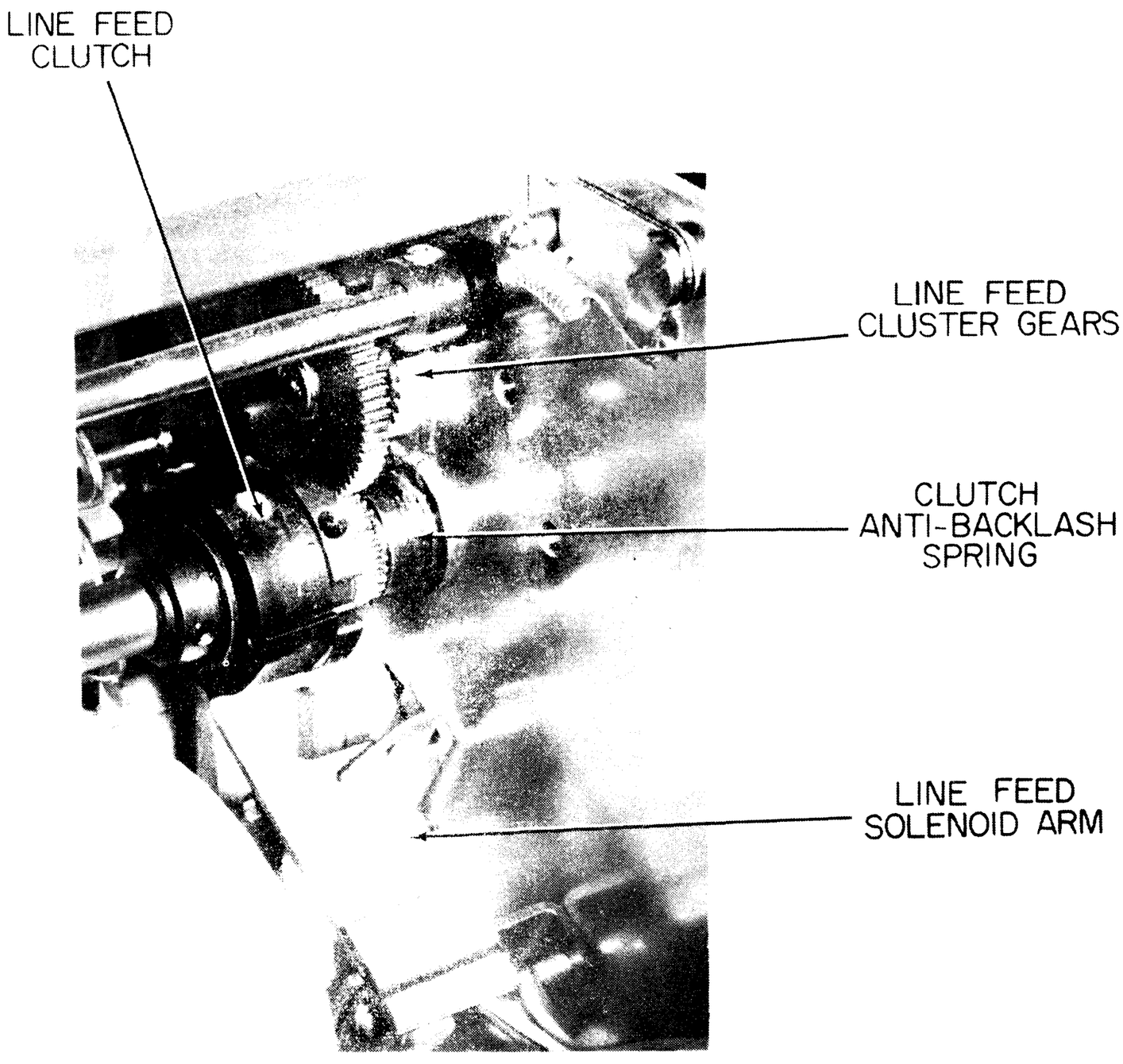
PAPER TENSION. The pressure rollers apply pressure to the paper on the platen, when the paper pressure release lever (see figure 3-19) is in its rearmost position. The release lever in the forward position lowers the pressure rollers for alignment of the paper or when pin feed platens are used.

LINE FEED. Paper advancement is accomplished by manually rotating the platen knob or by electrical/mechanical feed. When advancing the paper manually the platen knob is pushed in. This disengages the platen gears from the gears connected to the line feed clutch and allows the platen to be moved manually with the platen knob.

The line feed solenoid, line feed clutch and anti-backlash spring (not used in Model B Printer) are the components used for normal line feeds (see figure 3-20 and 3-21). When a line feed is "called for" the line solenoid is energized with +95 volts for 8.3 milliseconds. This pulls the line feed solenoid arm away from the line feed cam allowing the clutch to rotate 1/3 of a revolution. This causes gears connected to the line feed drive gear to advance the paper one line. (The anti-backlash spring holds the line feed clutch securely in position and prevents clutch oscillation and wear).



Line Feed Mechanics ("A" Model)
Figure 3-20



Line Feed Mechanics ("B" Model)
Figure 3-21

SECTION 4
FUNCTIONAL DESCRIPTION OF PRINTED CIRCUIT BOARDS

The following diagrams and text describe the majority of functions performed by each printed circuit board. Figure 3-22 is a functional block diagram of the TermiNet 300 Printer. The remainder of the figures and associated text describe the functions of each circuit board and the functional relationship between printed circuit boards.

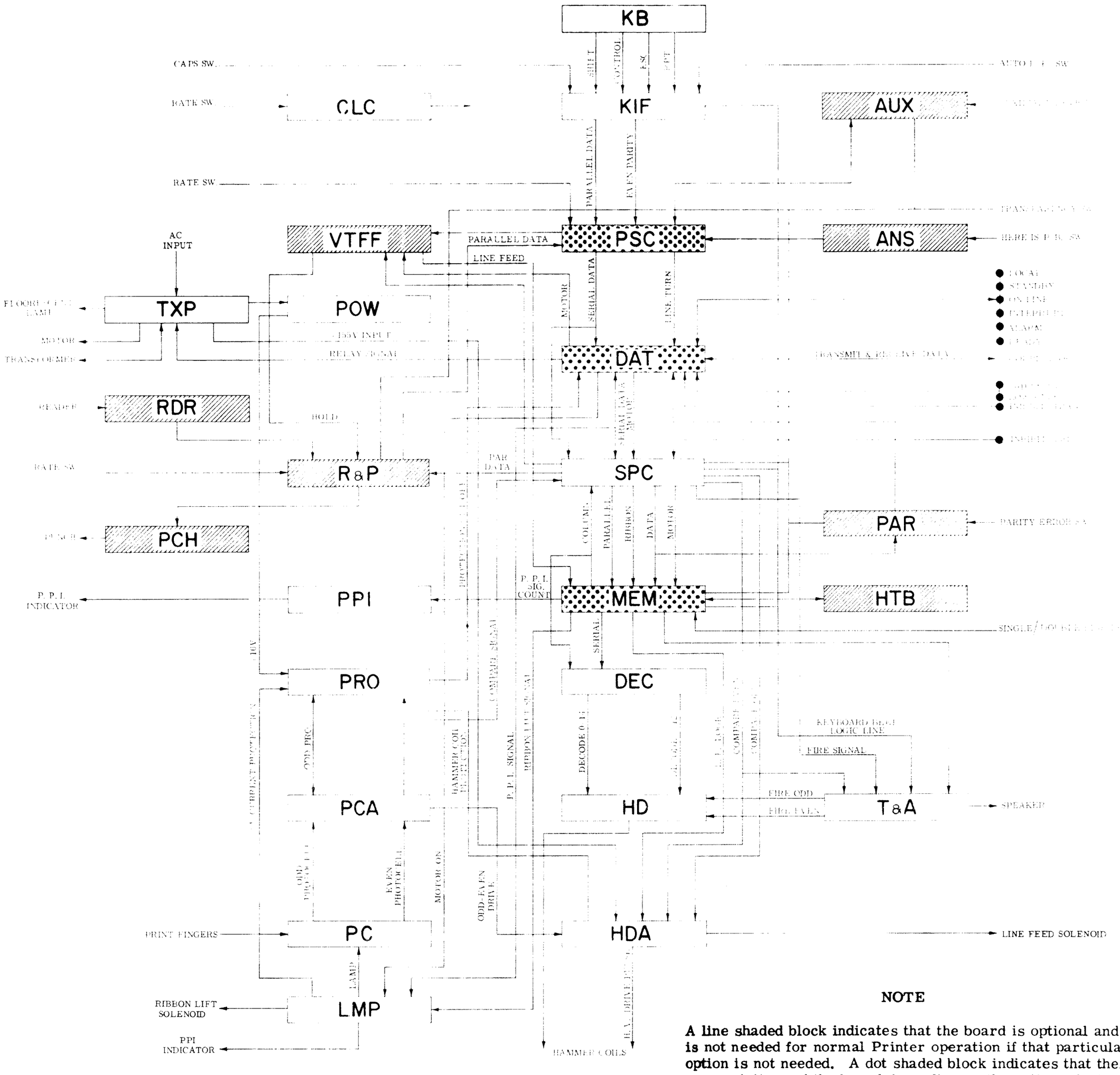
POWER SUPPLY

(See Figure 3-23)

Power is routed through the interlocks and the 2A line fuse to the motor and motor relay circuit. Power then passes through the line filter on the TXP board to eliminate line noise. The Power out of the line filter is applied to the power transformer 1T.

The secondary of 1T has three sets of windings. The 116 volt winding through a full wave bridge supplies the unregulated +155 Vdc for the HDA board. The center-top winding supplies power to the POW board for the regulated +16.6 Vdc and -15.6 Vdc. The third winding supplies power for the regulated -27.6 Vdc.

To protect for overvoltage, a "crowbar" circuit is used in the -27.6 Vdc circuit. When -27.6 Vdc exceeds -32.5 Vdc, the "crowbar" circuit short circuits the -27.6 Vdc and causes 3FU to blow. Under-voltage protection is accomplished by monitoring the +16 Vdc on the PRO board.

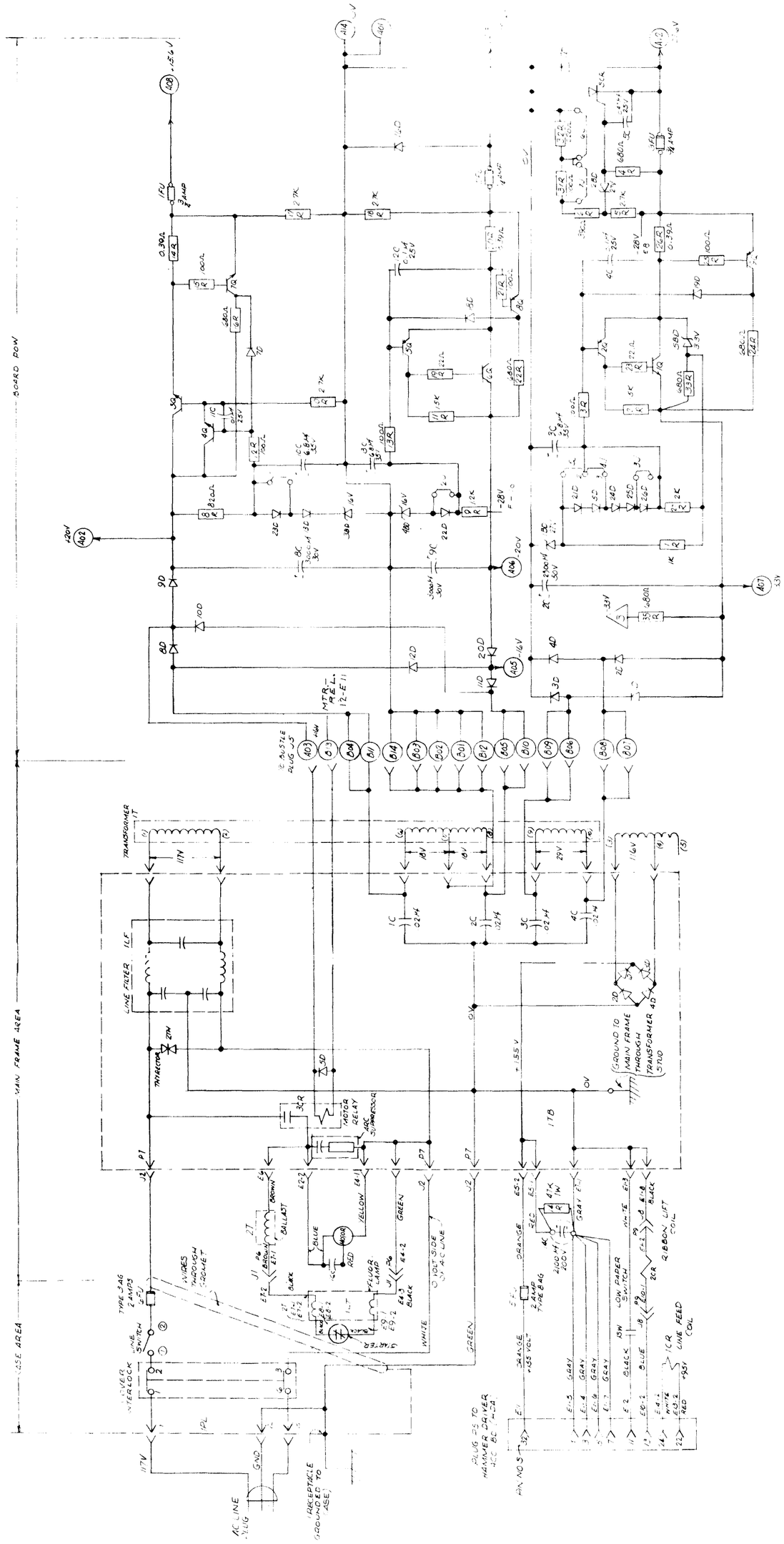


NOTE

A line shaded block indicates that the board is optional and **is not needed** for normal Printer operation if that particular **option is not needed.** A dot shaded block indicates that there **are variations** of the board depending on the options desired. **These boards** are necessary for normal Printer operation.

Functional Block Diagram of TermiNet 300 Printer

Figure 3-22



Power Supply
Figure 3-23

CLOCK (CLC)

(See Figure 3-24)

This board has a crystal controlled oscillator which generates clock signals used throughout the system for timing and control purposes.

The clock outputs of this board are Ø1, T1, X (Transmit), R (Receive) and outputs for 10, 15, 30 and 120 characters per second.

The board may be strapped for combinations of any three of the 10, 15, 30 or 120 cps clock rates.

KEYBOARD INTERFACE (KIF)

(See Figure 3-24)

1. Receives the keyboard sense line signals and converts them to logic levels.

2. Senses single-key-down condition.

3. Generates a keyboard strobe pulse to initiate the use of the codes produced by keyboard.

4. When the RPT is pressed, the KIF board allows the strobe pulse to repeat as each font of the fingers pass the photocell.

5. Provides "Automatic line feed" code after a "Carriage Return" code if the Auto LF Switch is set to the ON position.

6. Provides the "Escape" function for several device control codes. (An Escape function is a two character code.)

7. Provides a "Control" code when CTL key is pressed. ("Control" codes do not generate bits 6 and 7.)

8. Provides standard "Shift" function when SHIFT key is pressed. The changes of characters are indicated on the keys.

9. Contains the CAPS ONLY switch for the capability of generating upper-case letters without use of the SHIFT key.

10. Provides even parity bit generation used for error detection.

11. Provides delete override of control and shift.

12. Inhibits the keyboard during "Answerback" or "Interrupt" condition.

13. Transmits parallel data to the PSC board.

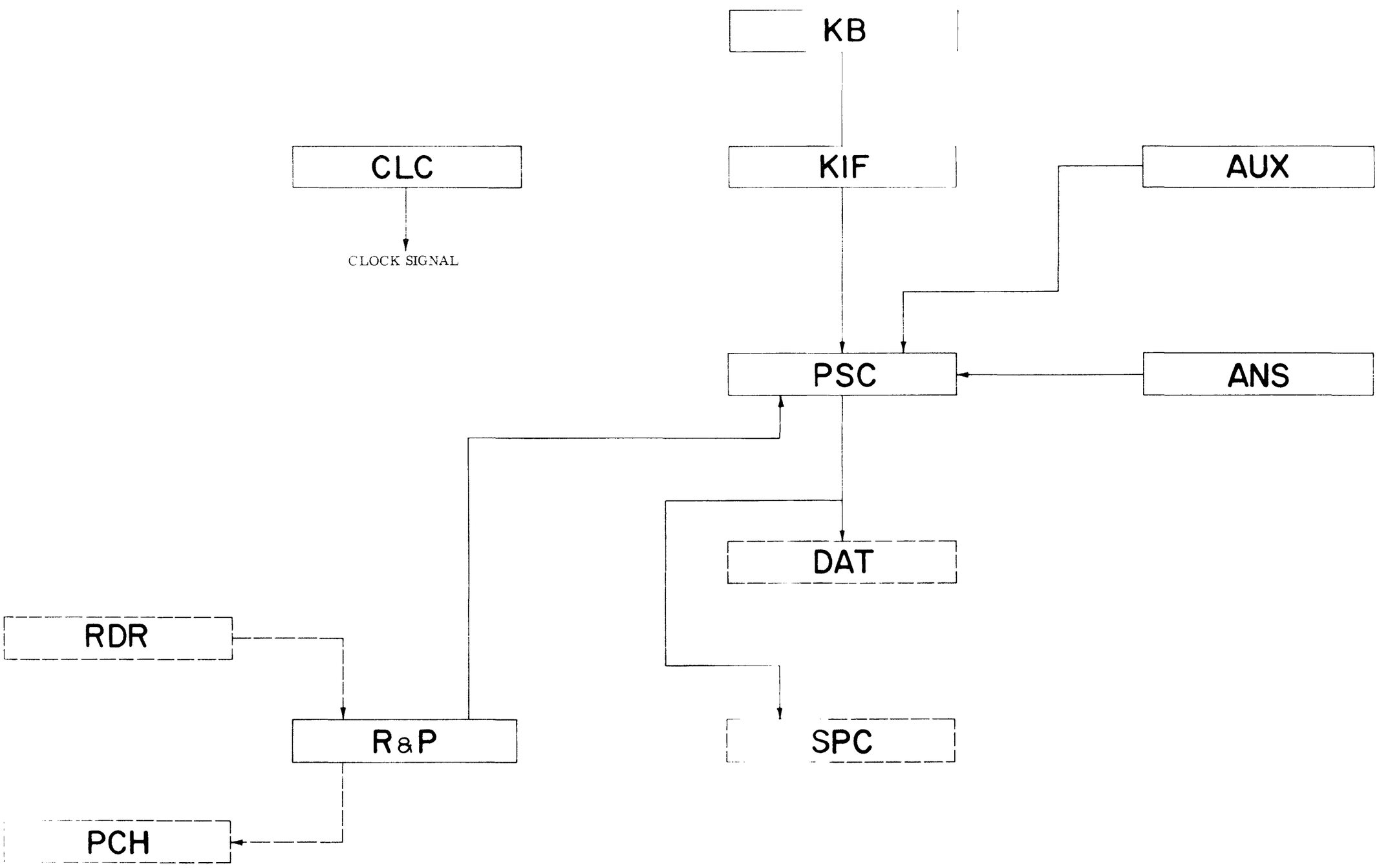


Figure 3-24

SENSE LINE DRIVER (SLD)

(See Figure 3-24)

The SLD board is located in the keyboard. The input power of +95 Vdc is received from the single white wire from the HDA board.

The SLD board contains a clock for signal generation when a key is pressed. When a key is pressed the SLD board transmits signals through seven true and seven false sense lines to the KIF board.

There are separate lines that transmit a signal to the KIF board whenever an ESC, CTL, RPT or SHIFT key is pressed.

ANSWERBA

(See Figure 3-24)

1. Generates a code up to 20 characters when HERE IS button is pressed, ENQ is received or ENQR (enquiry received and delayed during turnaround).

2. Produces a keyboard inhibit (KINH) during "Answerback".

3. Can be strapped at last character to inhibit transmission of remaining character spaces. If strapped, the remaining character spaces must have diodes removed.

4. "Answerback" code is transmitted in parallel form to the PSC board.

AUXILIARY INTERFACE (AUX)

(See Figure 3-24)

1. Receives parallel data from an auxiliary device.

2. Provides strobe pulse for the auxiliary parallel data.

3. Contains outputs to turnon and turnoff the auxiliary device.

4. Transmits the parallel data to the PSC board.

READER AND PUNCH (R&P

(See Figure 3-24)

1. This board controls the operation of both the reader and punch.

2. Receives parallel data from the RDR board and transmits this received data to the PSC board.

3. Receives parallel data to be punched from the SPC board and transmits this parallel data to the PCH board.

PARALLEL TO SERIAL CONVERTER (PSC)

(See Figure 3-24)

1. Receives 7 or 8 bit codes in parallel form from the KIF board, ANS board, R&P board or AUX board.

2. Converts data from parallel form to serial form.

3. Adds eighth bit for even parity.

4. Generates start and stop bits. Can be strapped for two stop bits at 10, 15 and 30 cps.

5. Sends generated data to SPC board for Printer; also sends to DAT board for dataset.

6. Generates a signal to start Answerback when an ENQ is received.

7. Produces bits 2 and 3 to generate an ACK if no fault is present during enquiry; produces bits 1 and 3 to generate a NAK if a fault is present during enquiry.

8. Receives Control codes ACK, NAK, and ETX to generate line turnaround signals.

DATASET CONTROL (DAT)

(See Figure 3-25)

1. Receives serial data from PSC board, and transmits this data to BA of the dataset.

2. Connected to INHIBIT switch to inhibit transmission of data.

3. Provides a signal to CA of the dataset.

4. Receives a signal CB from the dataset to indicate that it is prepared to transmit data.

5. Generates a signal to CD of the dataset.

6. Receives MOTOR ON-OFF signals and transmits them to the motor relay.

7. Receives signals from LOCAL, STANDBY and ON LINE indicator switches.

8. Receives signals from fault condition to light ALARM indicator.

9. When strapped with 1J, control code EOT will stop motor.

10. Generates a BREAK signal when an "Interrupt" is received.

11. Transmits received data to the SPC board.

12. See Printed Circuit Boards, Chapter 4, Section 3, for various straps that may be used.

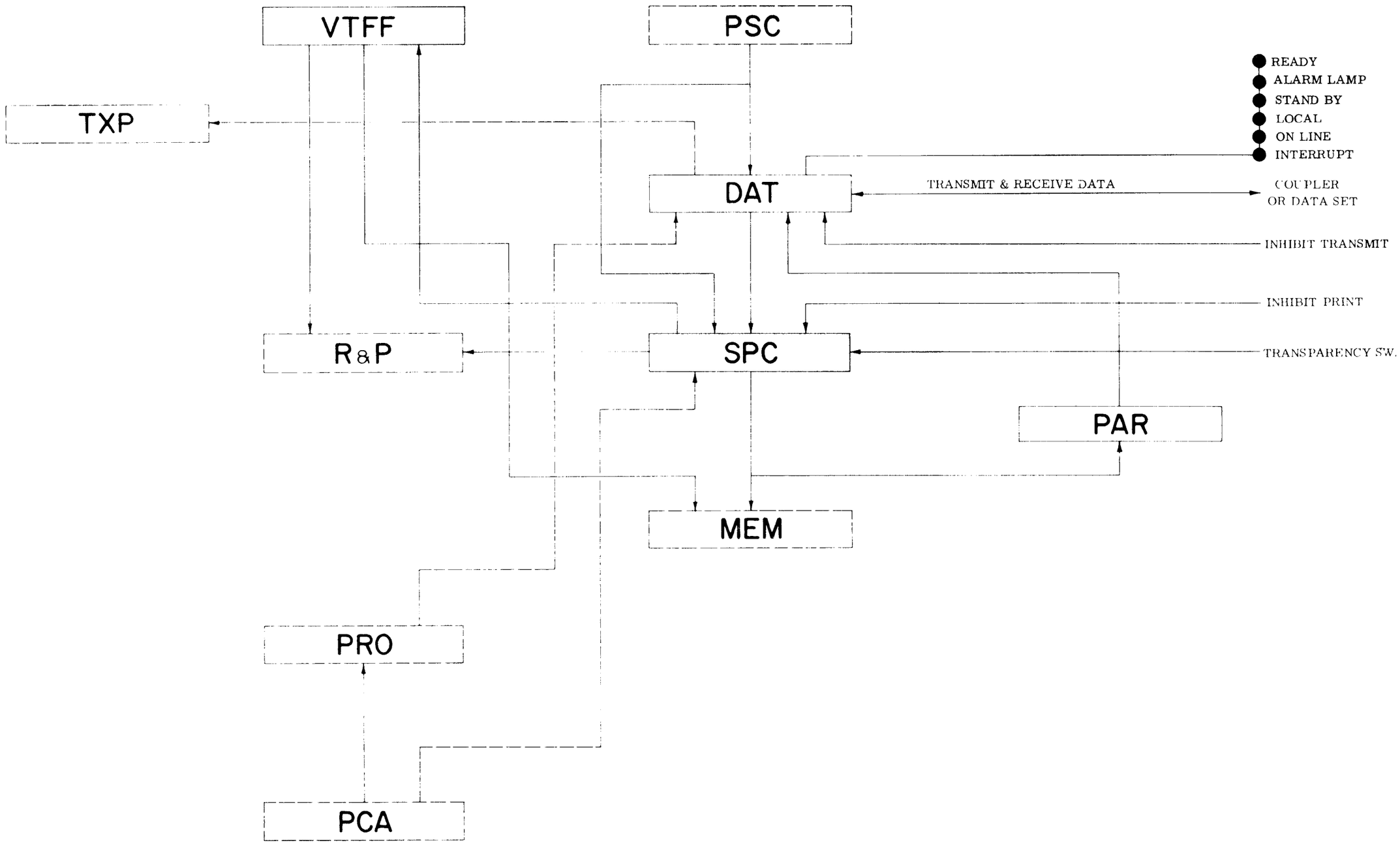


Figure 3-25

SERIAL TO PARALLEL CONVERTER (SPC)

(See Figure 3-25)

1. Receives data in a serial form from the PSC board and the DAT board.

2. Decodes the data to recognize escape codes, control codes and characters to be printed.

3. Inhibits printing when the INHIBIT switch is in the PRINT position or when the TRANSPARENCY switch is in the ON position.

4. Detects breaks.

5. Converts the incoming serial data to parallel data.

6. Transmits the parallel data to the MEM board and R&P board.

7. Contains the belt reference counter to keep track of the fingers passing the photocell.

8. Adds one half of the column memory to the belt count and compares the output with the character memory.

9. Generates even-odd compare pulses to allow only even number during compare even permissive time or odd number during compare odd permissive time.

10. Generates an erase signal to erase space or other non-print characters immediately, and printable characters when printed.

11. Sends COMPARE signal to the T&A board.

12. Send RIBBON UP signal to MEM board whenever a character is put in memory.

PARITY ERROR DETECTION (PAR)

(See Figure 3-25)

The PAR board reacts to a parity error by sending a signal to the DAT board to light the INTERRUPT indicator. This signal also allows printing of an unused print character when a parity error is detected. Strapping option 1J or 2J allows selection of odd or even parity error detection. Jumper 4J allows sending a break, go to standby, and stop tape reader. When 4J is removed all effects of parity error detection is eliminated except the lamp.

VERTICAL TAB AND FORM FEED (VT&FF)

(Figure 3-25)

1. Receives VT or FF code from SPC board and initiates VT or FF.

2. Transmits signal to the MEM board to start VT or FF.

3. Stops VT or FF when signal is received from the VT or FF photocell.

4. Inhibits the reader when VT or FF is in operation.

MEMORY BOARD (MEM)

(See Figure 3-26)

1. Receives character and column to be printed from SPC board.

2. Stores up to eight characters of information.

3. Send column number to be printed to SPC board, PPI board and DEC board.

4. Information is erased when character has been printed.

5. Keeps track of next column to be printed.

6. Has strapping option if machine has 118 useable spaces.

7. Generates the Print and Space Inhibit (PSI) signal when a non-printable code is received.

8. Send signal to HDA board when line-feed is called for.

9. Connected to Line Feed switch to produce single or double line-feed when LF signal is recognized.

10. Adds an eighth bit to every new character after a line-feed. The eighth bit serves as a flag to delay print until the next line.

11. Provide a signal to the LMP board to pick up ribbon when a character is called for.

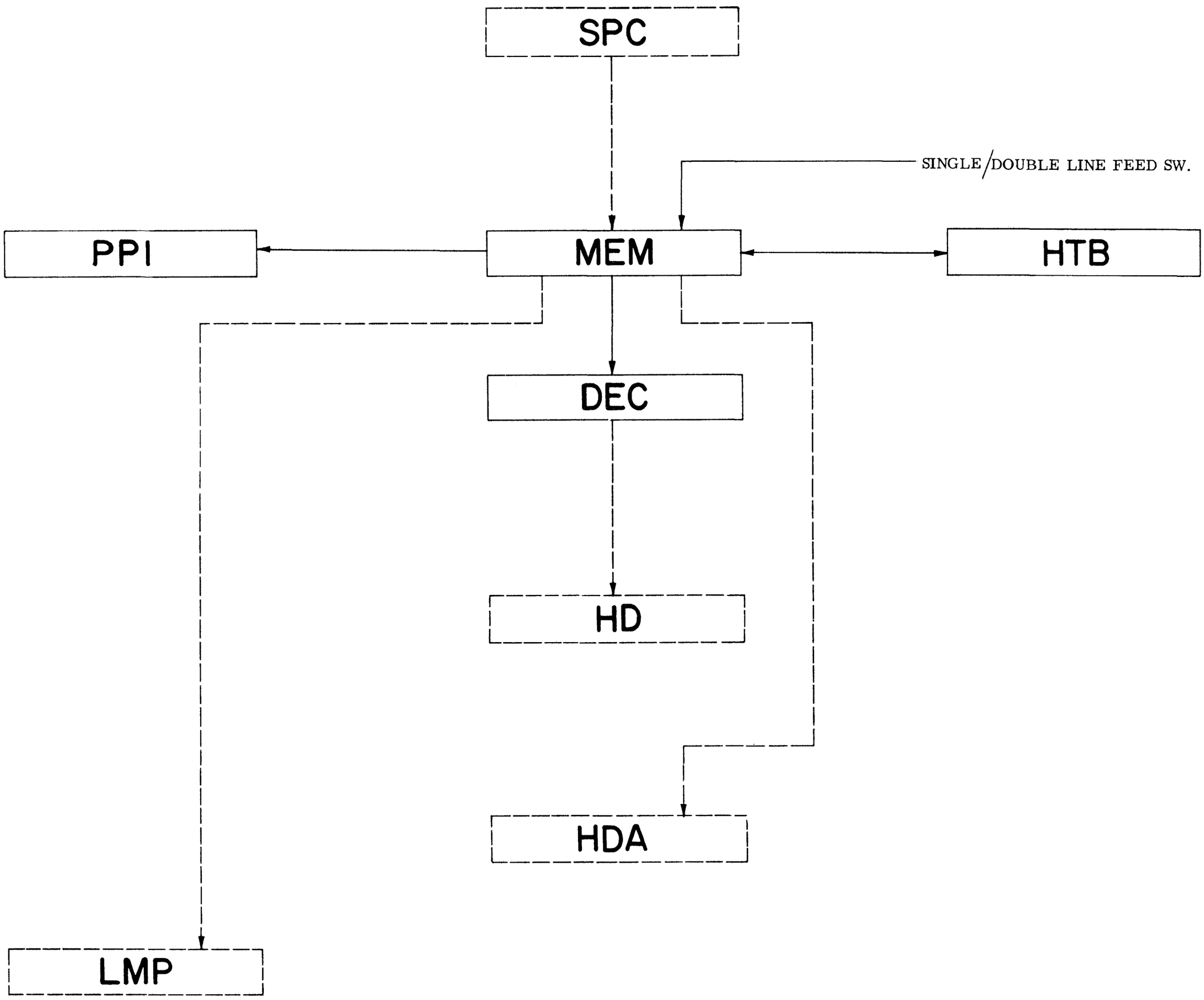


Figure 3-26

SERIAL DECODER (DEC)

(See Figure 3-26)

1. Receives serial information from the column memory section of the MEM board.

2. The information is decoded into two set lines; one 0-14 in multiples of two and the other 0-112 in multiples of 16. Each output from these lines is amplified and sent to the HD board.

HORIZONTAL TAB (HTB)

(See Figure 3-26)

1. Enables tabs to be set at each and every column position.

2. Sends a signal to the MEM board when horizontal tabing to advance the column counter to the correct position.

PRINT POSITION INDICATOR (PPI)

(See Figure 3-26)

1. Receives the column count from the MEM board.

2. Applies a signal to the Print Position Indicator lamps to illuminate number of next position to be printed.

HAMMER DECODER (HD)

(See Figure 3-27)

1. The HD board contains a SCR for each hammer position.

2. Receives the fire even (FEH) and the fire odd (FOH) signals from the T&A board. Even hammers may only fire during FEH time and odd hammers may only fire during FOH time.

3. Receives the "called for" column position from the DEC board.

HAMMER DRIVER ACCESSORY BOARD (HDA)

(See Figure 3-27)

1. Receives signals from MEM board and amplifies to operate the line feed solenoid.

2. Amplifies the received compare signals and places +2.4 Vdc through the hammer coils to the anodes of the SCR's as a holding current. This allows the SCR's to stay turned on after the appropriate signals are received at the SCR gates.

3. Takes the +155 Vdc supplied from the TXP board and regulates this to +92-97 Vdc.

4. Receives "odd" and "even" drive signals from the PCA board. Amplifies this signal through a switcher circuit to obtain the high voltage and current necessary to operate the hammer coils. The "even" pulse is applied to the coils of the even numbered hammers and the "odd" pulse is applied to the coils of the odd numbered hammers.

5. Contains a pull-down circuit to remove the current from the coils after the hammers have fired.

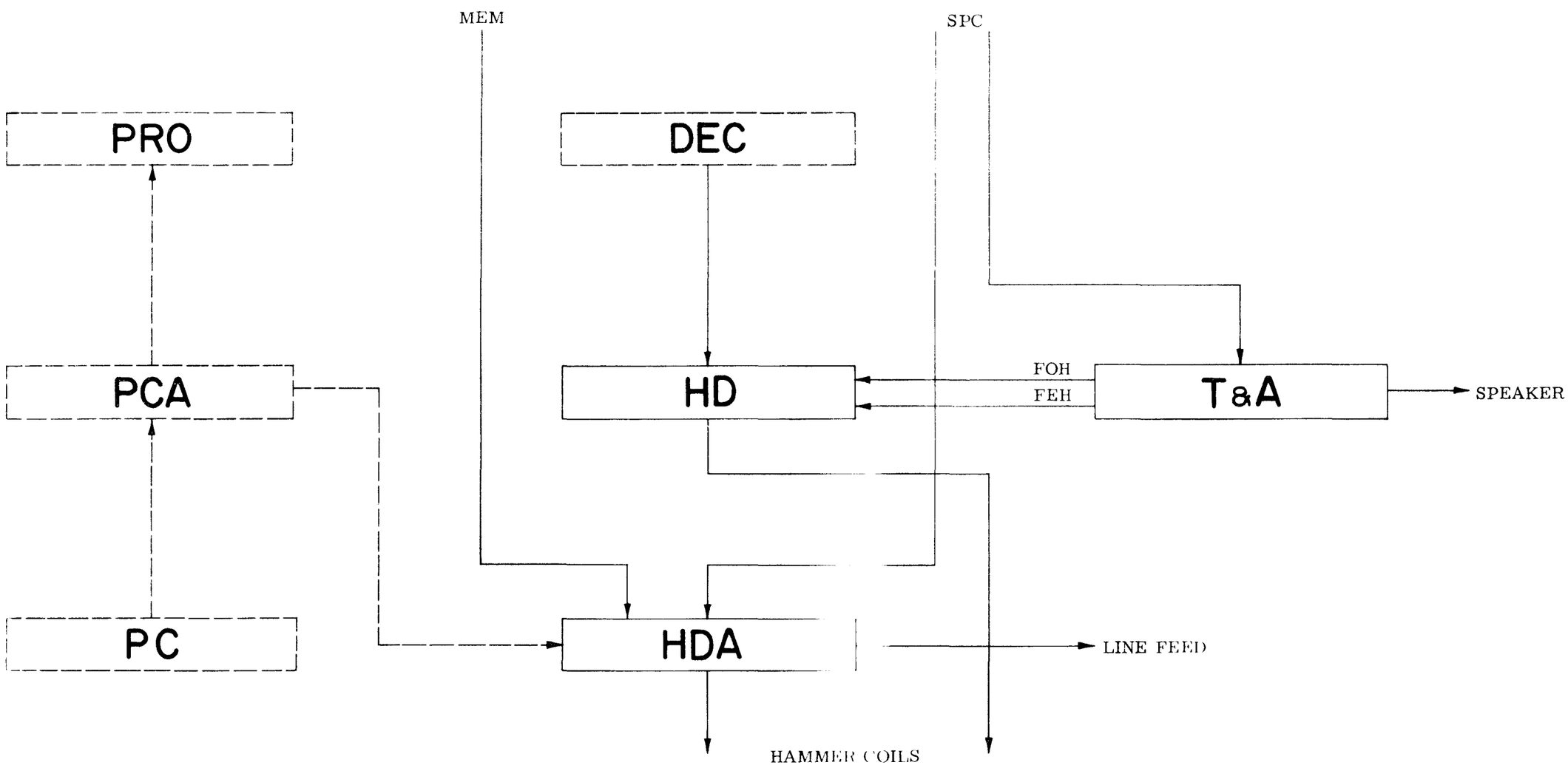


Figure 3-27

TIMING AND ALARM (T&A)

(See Figure 3-27)

1. Receives input from INHIBIT switch (SPSW) to suppress local printing.

2. Receives "Fire" signal from serial-parallel converter board (SPC). Gates this signal with "compare even" ($\overline{CE}$) and amplifies the results to produce "fire even hammer" (FEH) and "fire odd hammer" (FOH). Sends the resultant signal to hammer decoder (HD) board.

3. Contains potentiometers to control speaker volume.

4. Generates 500 cycle signal for keyboard sound and 1000 cycle signal for beeping end of line, margin alarm, bell, machine faults and received break.

5. Contains fuse 1FU for Ø2 of the clock.

LAMP REGULATOR (LMP)

(See Figure 3-28)

1. Supplies power to the ribbon lift solenoid.

2. Supplies power(+2.4 Vdc)to the photocell lamp.

3. Supplies power for Print Position Indicator.

4. Supplies comparison voltage (+3 Vdc) to HD board.

5. Has a time meter to indicate hours of operation.

6. Contains 1FU for PPI lamps and photocell lamp.

PHOTOCELL BOARD (PC BD)

(See Figure 3-28)

1. Detects the fingers passing between two photocells and lamp.

2. Detects wide finger by the absence of light on both cells simultaneously.

3. Amplifies "odd" and "even" signal and sends to PCA board.

PHOTOCELL AMPLIFIER BOARD (PCA)

(See Figure 3-28)

1. Receives "odd" and "even" photocell output.

2. Amplifies and squares "odd" and "even" pulses and limits each pulse to 0.9 msec.

3. Sends amplified "odd" and "even" photocell output to SPC board for comparison and the HDA board for hammer firing.

PROTECTION (PRO)

(See Figure 3-29)

1. Detects momentary drop in line voltage below 105 Vdc. The 105 Vdc detection level is adjustable by potentiometer P-2 (factory adjustment).

2. Holds Motor Off to allow all voltages to reach their respective level after power is first applied.

3. Disables logic circuitry of machine approximately 0.5 seconds to allow all voltages to reach their respective level after power is first applied.

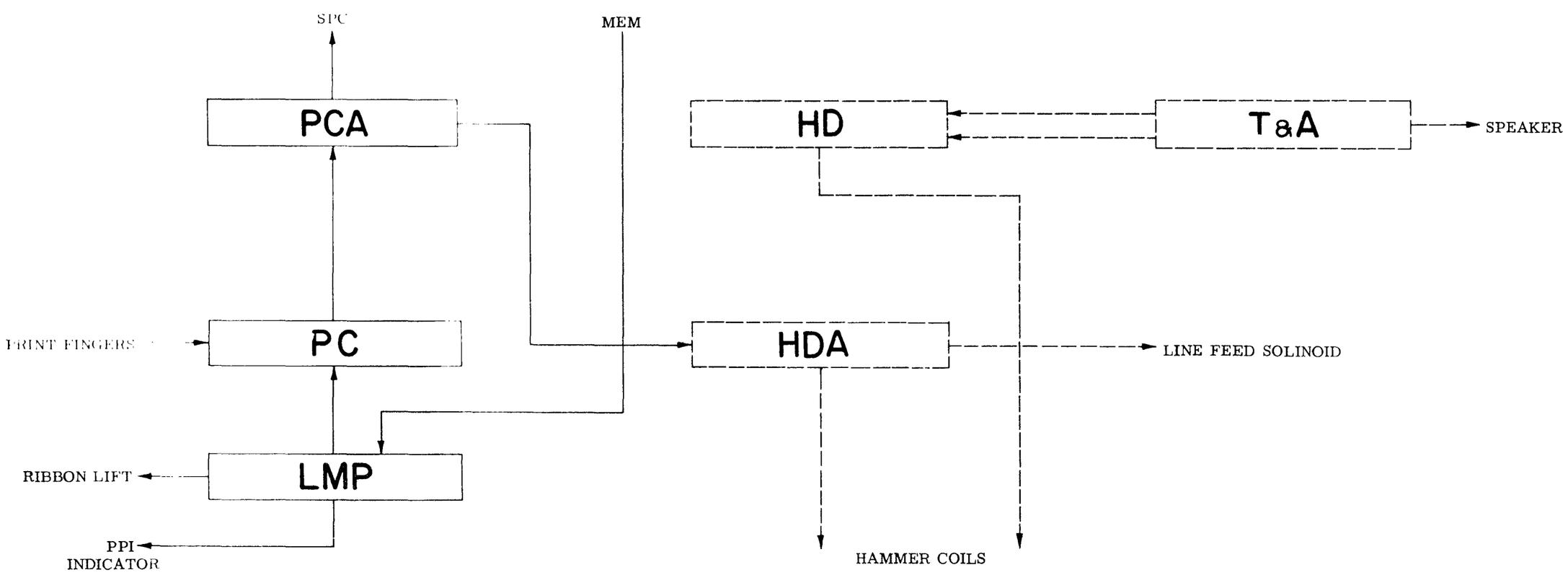


Figure 3-28

4. Prevents power being applied to hammer drive buss during fault condition.

5. Stops motor if more than six hammer SCR's conduct.

6. Stops motor if belt slows more than 10%. The 10% tolerance is adjustable by potentiometer P-1.

7. Delays motor cut-off during hammer fire time.

TRANSFORMER POWER SUPPLY (TXP)

(See Figure 3-29)

1. Contains filtering for input power lines.

2. Contains relay for the motor which is controlled from the DAT board.

LOW VOLTAGE POWER SUPPLY (POW)

(See Figure 3-29)

1. Receives input voltages from TXP board.

2. Contains filtering and regulation for +15 Vdc, -15 Vdc and -27 Vdc and has unregulated +20 Vdc, -33Vdc and +16 Vdc which is used by the PRO board to sample input voltage.

3. Contains 1FU, 2FU and 3FU for the +15 Vdc, -15 Vdc and -27 Vdc outputs.

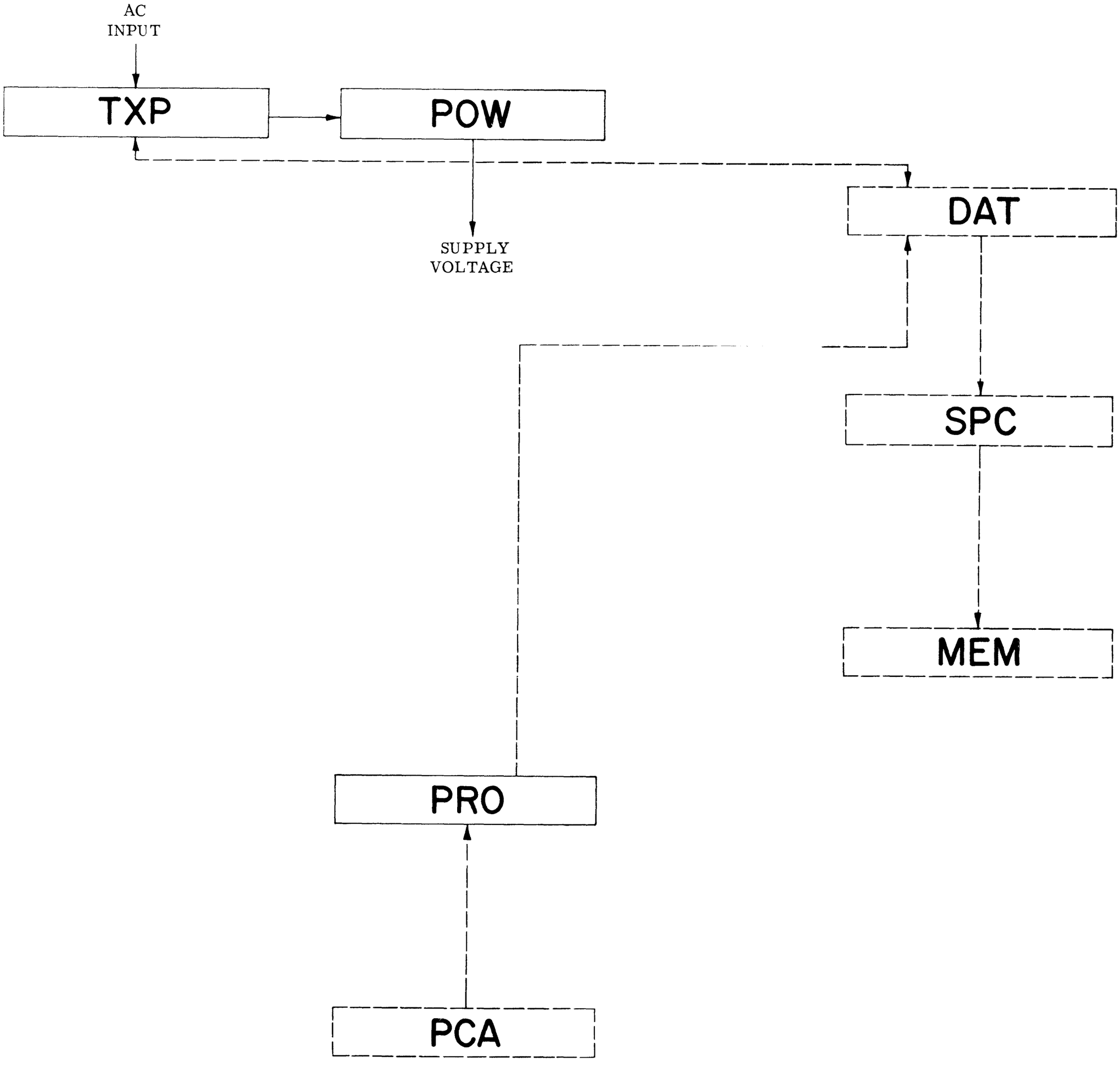


Figure 3-29

READER BOARD (RDR)

(See Figure 3-30)

1. Supplies the three phase voltage to the reader motor.

2. Receives a low voltage from the photocells, amplifies this voltage and sends it to the R&P board.

3. Contains a potentiometer to adjust the bias voltage for the photocell signals.

PUNCH BOARD (PCH)

(See Figure 3-30)

1. Receives signals from the R&P board for holes to be punched, amplifies signals and transmits voltage to the correct punch solenoids.

2. Controls voltage for the punch bail solenoids.

3. Controls voltage to advance solenoid after a character has been punched.

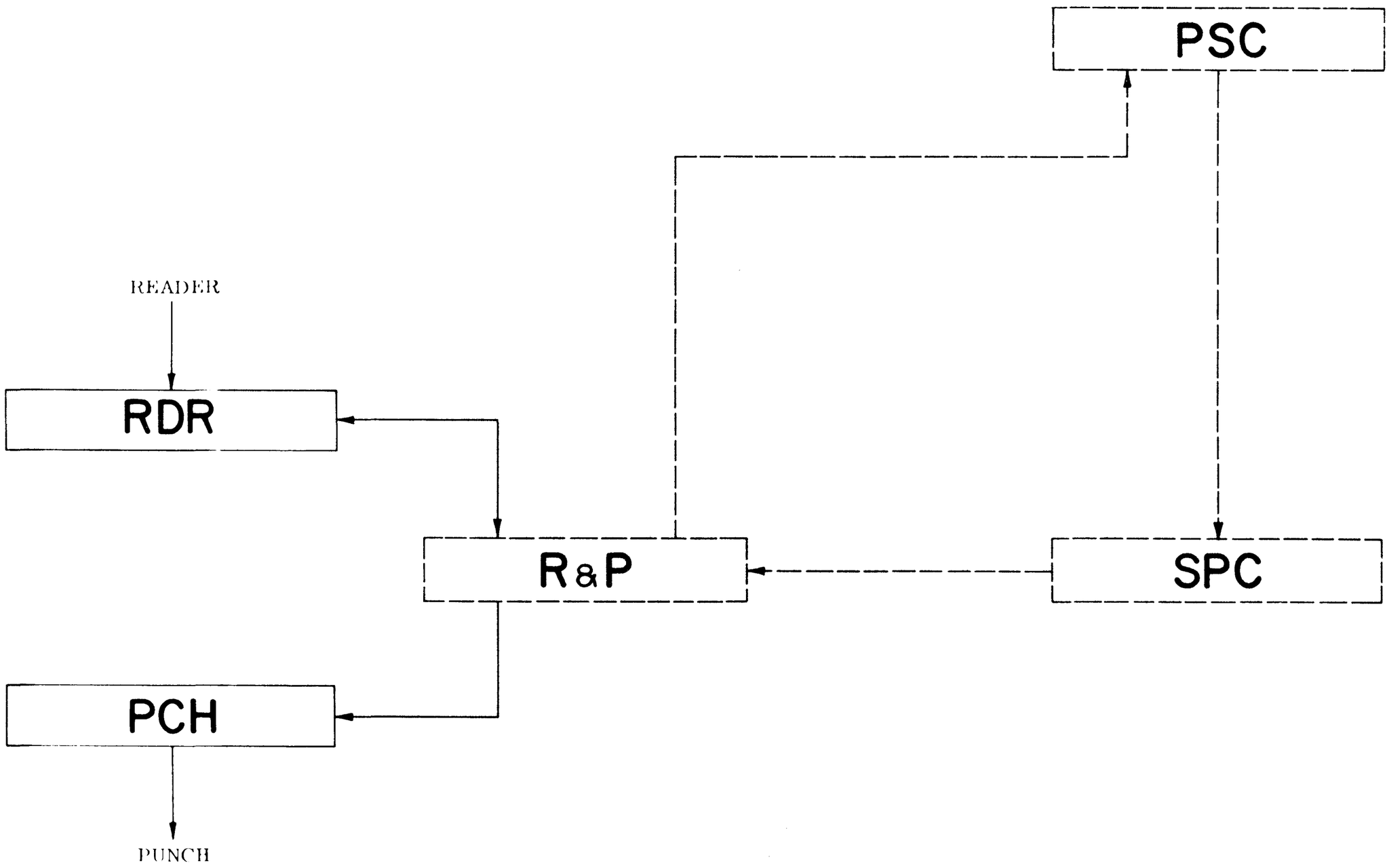


Figure 3-30

CHAPTER 4
TROUBLESHOOTING

SECTION 1
TROUBLESHOOTING GUIDE

Before using the following Troubleshooting Guide, determine what the problem is and determine what functions are operating correctly. Find the problem description in the center of the guide that best describes your problem. Under the problem description, find the conditions in the left hand column of the guide that best describes the conditions related with your problem. In the right hand column, across from the appropriate condition, you will find a possible cause to your problem.

CONDITIONS	POSSIBLE CAUSE
PRINTER WILL NOT TURN ON	
No Lamps, Beep, Motor, etc.	1. Printer not plugged into outlet. 2. Primary fuse missing or blown. 3. -15V fuse (F1) on POW missing or blown. 4. Loose plug on control panel. 5. Cut control panel cable. 6. TXP board. 7. -15V Fuse (F2) on POW board missing or blown.
Lamps, Beep, But No Motor Alarm Light ON	1. Shield switch. 2. Low paper switch 3. Low voltage (AC Input). 4. DAT board. 5. PRO board. 6. Cut control panel cable. 7. CLC board.
Lamps, Beep, But No Motor Alarm Light Off	1. Print belt tight in guides. 2. Line feed clutch. 3. Relay on TXP board. 4. Push-button switch. 5. Starting capacitor - shorted or leads off. 6. TXP board. 7. Defective motor. 8. Print fingers caught. 9. Hammer caught in fingers.
MOTOR WILL NOT KEEP RUNNING	
2 - 3 Seconds Only	Electrical 1. Photocell board. 2. Lamp on photocell board. 3. Loose plug to photocell board. 4. Broken wire to photocell board. 5. 3/8A fuse on LMP board. 6. PRO board. 7. PCA board. 8. Open run on HDA board or cable. Mechanical 1. Print belt tight in belt guide. 2. Right or left drive belt tight. 3. Print finger missing. 4. Print finger bent or catching. 5. Misalignment of pulleys and belt guide. 6. Drive belt off. 7. Print finger not seated in belt. 8. Photocell bulb holder bent.

CONDITIONS	POSSIBLE CAUSE
MOTOR WILL NOT KEEP RUNNING (CONTINUED)	
	Electrical Static Noise
Runs Minutes to Hours	1. Update Modifications. 2. Open ground lead. 3. Loose or intermittent connection.
	Electrical
	1. Photocell board. 2. PCA board. 3. LMP board. 4. PRO board. 5. MB board. 6. TXP board.
	Mechanical
	1. Print belt dirty. 2. Belt guide needs adjusting. 3. Right or left drive belts tight. 4. No clearance at right jackshaft pulley (.012") 5. Rear idler pulley binding on shaft. 6. Misalignment between pulleys and belt guide.
MOTOR RUNS BUT NO PRINTING	
No Keyboard Beep	1. 100V fuse missing or blown. 2. Keyboard 100V lead not connected. 3. KIF board missing. 4. T&A board. 5. HDA board.
Keyboard Beep - No Printing	1. Four blown or missing fuses on HDA board. 2. No plug connection to HDA board. 3. HD board unplugged. 4. HDA board. 5. PCA board. 6. SPC board. 7. T&A board. 8. CLC board.
No Printing In Some Columns	1. Missing or blown fuse on HDA board. 2. Broken common wire on coil bank. 3. PCA board (missing all odd or all even hammers). 4. Loose HD board (missing a group of columns). 5. DEC board (missing a group of columns). 6. HDA board (missing all odd or all even hammers). 7. Broken wire on coil bank (missing one column).
A Specific Character Does Not Print Or Is Smudged	1. Bent print finger. 2. Top part of print finger missing.
Prints But Snags Fingers -On Particular Character Only	Bent Print finger
-On Particular Column Only	1. Hammer throw adjustment. 2. Bent clevis. 3. Plunger binding in coil bank.
-On Odd Or Even Columns	HDA board.

CONDITIONS	POSSIBLE CAUSE
MOTOR RUNS BUT NO PRINTING (CONTINUED)	
-At Any Column Or Character	1. Bent print finger. 2. Photocell timing. 3. HDA board.
PRINTS LIGHT ON ONE PART OF CHARACTER	
Light On Top Or Bottom All Columns	Hammer bank too low or too high.
Light On Top One Character Only	Finger not seated in belt.
Light On Left	1. Photocell timing. 2. Hammer throw adjustment. 3. Bent clevis. 4. Plunger binding in coil bank.
Light On Right	1. Bent print finger. 2. Photocell timing.
PRINTS COLUMN CALLED FOR PLUS ADDITIONAL COLUMNS	
	1. DEC board. 2. HD board. 3. HDA board.
LINE FEED PROBLEMS	
Uneven Line-Feeds Tension Limiter does Not Bottom	1. Adjust paper tension. 2. Worn platen rollers. 3. Platen roller missing.
Uneven Line-Feeds Tension Limiter Bottoms	1. Adjust horizontal freedom of paper roll. 2. Paper-out switch pressure. 3. Uneven paper roll. 4. Obstruction holding paper roll.
Double Line-Feed When Single Called For	Electrical 1. MEM board. 2. Control panel wiring. 3. Control panel switch. Mechanical 1. Line feed solenoid too far from clutch. 2. Line feed solenoid defected.
Single Line-Feed When Double Called For	Electrical 1. MEM board. 2. Control panel wiring. 3. Control panel switch. 4. Remove jumper on HDA (call Waynesboro). Mechanical 1. Line feed solenoid too close to clutch. 2. Line feed solenoid pick-up incorrect.

CONDITIONS	POSSIBLE CAUSE
LINE FEED PROBLEMS (CONTINUED)	
Continuous Line-Feeds When Power is applied	1. -15V fuse (F2) on POW board. 2. -15V on POW board. 3. -27V fuse (F3) on POW board. 4. Ø2 fuse (F1) on T&A board.
	Electrical
Continuous Line-Feeds After Going "On-Line" Or "Local"	1. MEM board. 2. HDA board.
	Mechanical
	1. Line feed solenoid. 2. Clutch
RIBBON DOES NOT LIFT OR LIFTS SLOWLY	
	Electrical
	1. LMP board. 2. HDA board. 3. Open wire to solenoid. 4. Open wire in HDA cable.
	Mechanical
	1. Lifting arm shafts binding in bearings. 2. Lifting arms loose on shaft. 3. Ribbon lift solenoid link disconnected. 4. Ribbon lift solenoid plunger sticking to plunger stop. 5. Ribbon arms adjusted too low. 6. Ribbon folding. 7. Ribbon missing.
RIBBON WILL NOT DROP	
	Electrical
	LMP board.
	Mechanical
	1. Ribbon lifting shaft binding. 2. Plunger sticking in ribbon lift solenoid. 3. Return spring missing. 4. Ribbon adjusted too high.
RIBBON SAGS	
When Ribbon Moves to Right	Replace left ribbon reverse mechanism.
When Ribbon Moves To Left	Replace right ribbon reverse mechanism.
RIBBON WILL NOT REVERSE	
Reverse Mechanism Oscillates	1. Reversing shaft binding in bearings. 2. Horseshoe spring missing from reverse mechanism. 3. Ribbon mechanism interposer arm binding. 4. Worn gear in reverse mechanism.

CONDITIONS	POSSIBLE CAUSE
RIBBON WILL NOT REVERSE (CONTINUED)	
Reverse Mechanism Hangs up	1. Reversing shaft binding in bearings. 2. Horseshoe spring missing from reverse mechanism. 3. Worn gear in reverse mechanism.
Ribbon Tears At End	1. Wrong ribbon used. 2. Old ribbon needs replacement. 3. Ribbon tension high. Replace reverse mechanism.
RIBBON FRAYS EASILY	
	1. Incorrect ribbon used. 2. Old ribbon needs replacing. 3. Ribbon adjusted too close to fingers. 4. Ribbon adjusted too high. 5. Ribbon adjusted too low.
PAPER HANDLING	
Will Not Feed Correctly	See line feed section.
Tracks To One Side	1. Damaged paper roll. 2. No horizontal freedom of paper roll. 3. Obstruction holding paper roll. 4. Dirty or worn platen rollers. 5. Dirty or worn platen. 6. Paper holder adjustment. 7. Platen not locked at ends. 8. Platen rollers missing.
KEYBOARD AND LOCAL OPERATION	
No Upper Case Printing From Keyboard	1. SLD board. 2. KIF board.
No lower Case Printing From Keyboard	1. SLD board 2. KIF board. 3. MEM board.
Some Characters Will Not Print And There Is No Beep	1. Broken ferrite "U" core. 2. Missing ferrite "I" core.
Keyboard Locks Up At Certain Print Position	MEM board.
Keyboard is Locked Up When Power Is First Applied. Closes After Typing Several Characters.	PRO board.

CONDITIONS	POSSIBLE CAUSE
KEYBOARD AND LOCAL OPERATION (CONTINUED)	
Keyboard Locked Up	1. 100V fuse. 2. Clear interrupt. 3. SPC board. 4. MEM board. 5. SLD board 6. HDA board.
Keyboard Locks Up After Pressing One Key	1. SPC board. 2. MEM board.
Will Not Back Space From Keyboard	1. Broken ferrite "U" core. 2. MEM board.
Blows 100V Fuse And/Or 3A Fuses At Every Other Print Position	HDA board.
ON-LINE OPERATION	
Received Information Causes INTERRUPT Indicator To Light	1. CLC board. 2. Speed setting. 3. Loose data plug. 4. Coupler noisy. 5. Computer clock timing drifting. 6. Noisy telephone line.
STANDBY Indicator Lights When Data Is Received	1. DAT board. 2. SPC board.
INTERRUPT Indicator Lights When Operating From Keyboard	Typing while receiving information while in half duplex.
ON-LINE OR LOCAL OPERATION	
Hammer Fires repeatedly in Column 1.	Font tab missing.
Hammer Fires Each Time Finger Passes Photocell.	1. HD board shorted SCR. 2. HDA board short on PC runs from HD board.
Random Hammer Misfire	1. TXP arc suppression. 2. Insufficient grounding. 3. HDA board.
100V Fuse Blows	1. HDA board. 2. SPC board. 3. DEC board.
Primary Fuse Blows when Power Applied	1. TXP board short. 2. 2100 MFD capacitor shorted. 3. Wiring short from TXP.
Blows Primary Fuse, 100V Fuse or 3A Fuse at Particular Hammer Position	Shorted coil.
LMP Fuse Blows	1. LMP board oscillator shorted. 2. -15V Fuse on POW board. 3. -27V Fuse on POW board.
ALARM Indicator Lights Only - No Beep	CLC board 1FU fuse missing or blown.

CONDITIONS	POSSIBLE CAUSE
ON-LINE OR LOCAL OPERATION (CONTINUED)	
Power On - INTERRUPT Indicator Lights	1. SPC board. 2. MEM board.
Power On - INTERRUPT and STANDBY Indicators Light	T&A board.
Constant Speaker Alarm	1. T&A board. 2. DAT board.
Motor Runs When Power is Applied	DAT board.
Motor Runs Only When On Line or LOCAL Button is Held.	CLC board.
Constant READY Light	DAT board.
PPI Counts Beyond 119	T&A board.
Garbled Printing	1. R&P bd in machine with reader disconnected. 2. MEM board. 3. SPC board

SECTION 2
FUNCTIONAL TROUBLESHOOTING

Figure 4-1 is a functional diagram showing the major control signals and data flow in the TermiNet 300 Printer. Figures 4-2 through 4-10 show the control signals and data flow involved in a single function, operation or related functions and operations.

By noting the conditions of the Printer concurrent with the problem, these functional diagrams should be used as an aid to isolate the cause of the problem to a specific assembly or circuit board.

TEST PLUG

To facilitate testing and checkout of the Printer, a test plug can be fabricated to create an "On Line" condition without using an external device (e.g. coupler, dataset, etc.). This simulated "On Line" condition allows you to exercise the send and receive circuits of the Printer with the keyboard. At the same time, a problem can be isolated to the Printer or external equipment.

Simulate the "On Line" condition as follows:

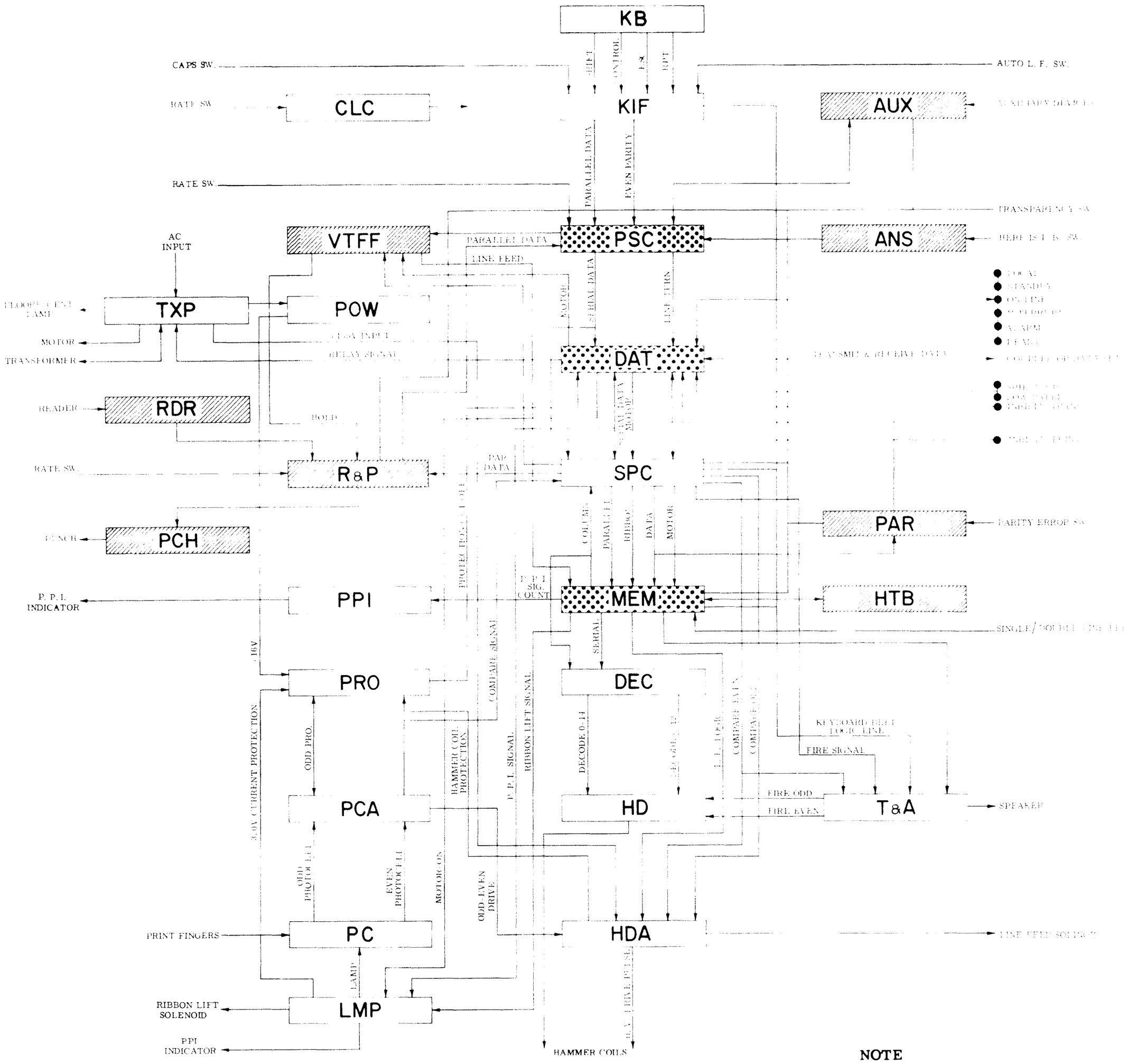
1. Fabricate a test plug by jumpering pin 2 to pin 3 and pin 5 to pin 20 of an RS-232B type of connector plug (20 pin "cinch DB-51226-1" data connector plug or equivalent).

2. Insert this plug into the dataset connector on the right rear of the Printer.

3. Set the INHIBIT switch on the control panel to the PRINT position.

4. Apply power; the STANDBY and READY indicators should light.

5. Press the ON LINE Indicator/switch; the Printer should go in an "On Line" condition and in "Full-Duplex" operation.



NOTE

A line shaded block indicates that the board is optional and is **not needed** for normal Printer operation if that particular option **is not needed.** A dot shaded block indicates that there **are variations of the** board depending on the options desired. **These boards are** necessary for normal Printer operation.

Functional Block Diagram of TermiNet 300 Printer

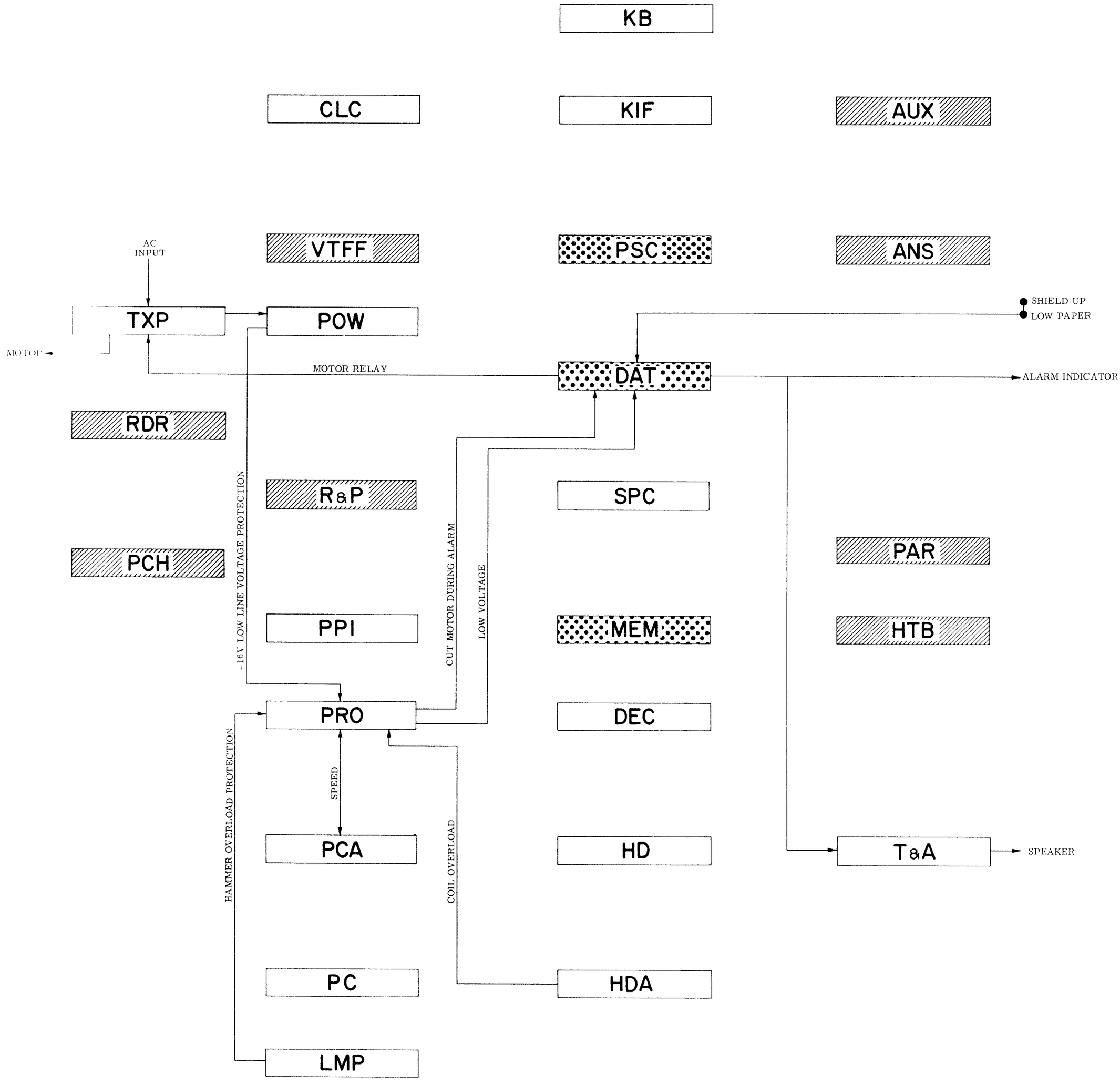
Figure 4-1

PROTECTION CIRCUITS

(See Figure 4-2)

The PRO board is the central area for all protection circuits. This board receives information from the POW board as to the condition of the incoming voltage. If the 115 Vac input drops below 105V, the +16 volts from the POW board will drop accordingly. A signal will be sent from the PRO board to the PCA board to cut off the drive pulses. At the same time two signals will be sent to the DAT board; one as a LV (low voltage) signal to light the ALARM light and sound a beep at the speaker, and the other to de-energize the relay on the TXP board, which will cut off the drive motor. Other inputs are handled in the same way.

Low paper and shield up does not go through the PRO board. This signal is handled by the DAT board, which lights the alarm, sounds the speaker, and drops the motor relay.



Protection Circuits
Figure 4-2

MOTOR AND LINE FEED CIRCUITS

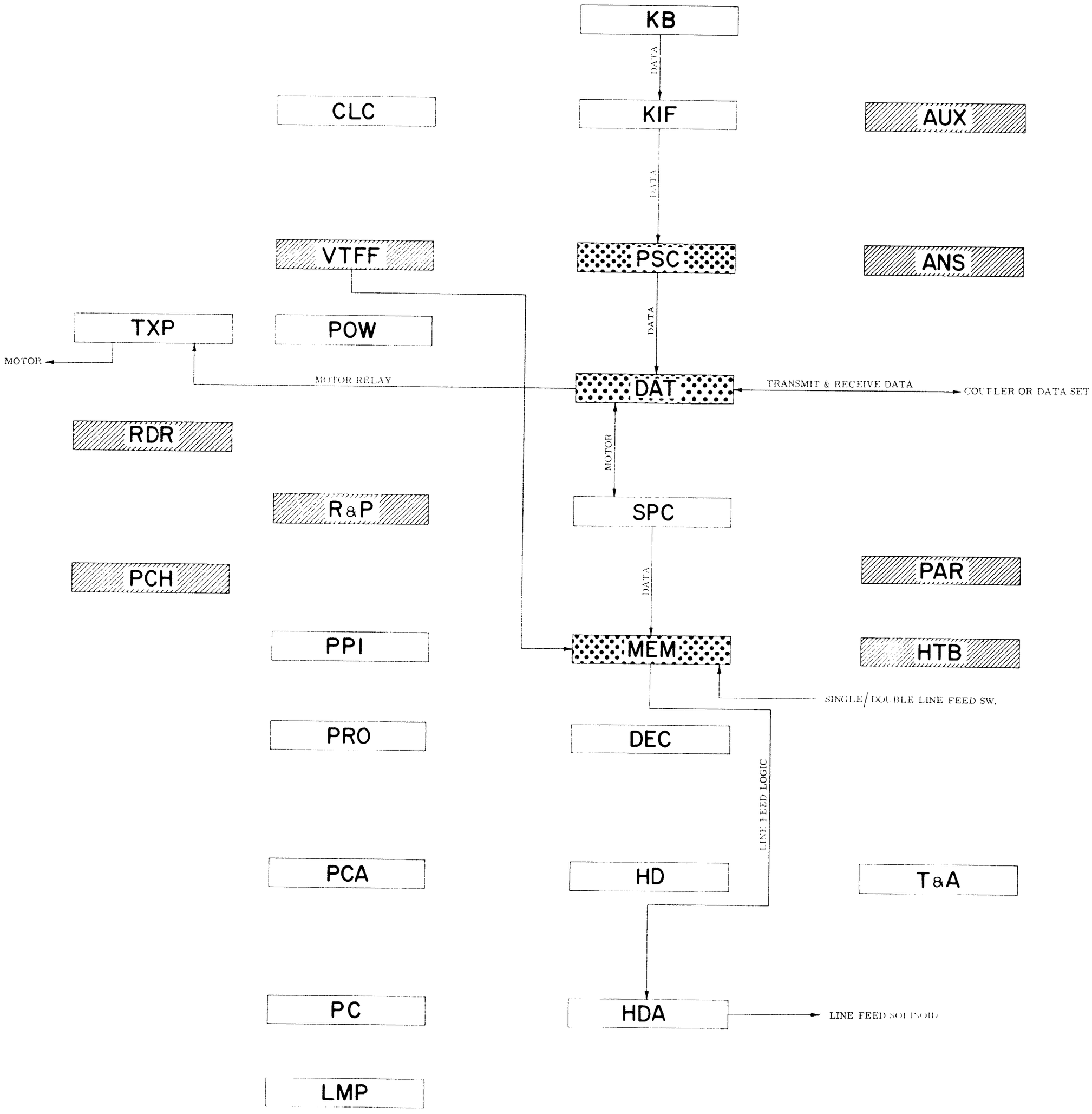
(See Figure 4-3)

MOTOR CIRCUITS

Parallel data from the keyboard or serial data from the phone line is processed through the Printer to the SPC board. Here, the signal is decoded as a motor on signal and sent to the DAT board. The logic signal is changed to a relay drive signal and sent to the relay on the TXP board. The relay is energized which starts the motor.

LINE FEED CIRCUITS

Data received at the SPC board is decoded as a line feed signal and sent to the MEM board. The Single/Double line feed switch determines if this signal is for a single or double space. The logic signal is then sent to the HDA board where it is processed through an amplifier to drive the line feed solenoid.



Motor and Line Feed Circuits
Figure 4-3

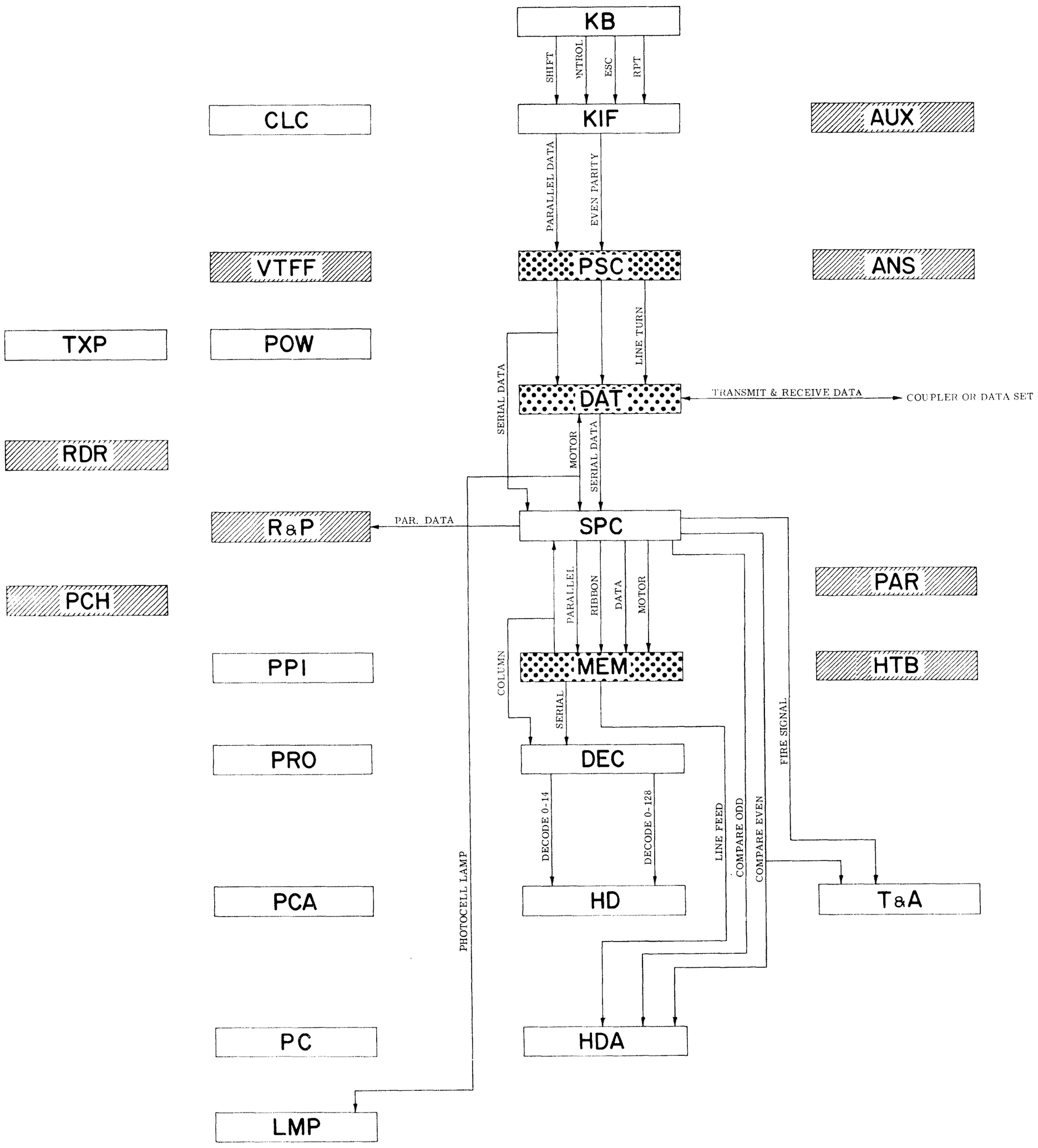
DATA SIGNALS

Figure 4-4 shows a simplified data signal flow to help determine where a problem exists.

Using an example of occasional garbled printing, the first thing to determine is if the problem exists only with local printing from the keyboard or only from incoming data, or both.

It can be seen from the block diagram that if the problem exists only with received data, then the keyboard, KIF board and PSC board can be eliminated. If the problem exists only when using the keyboard, but is not encountered when receiving incoming data, the problem is reduced to the PSC, KIF or keyboard. If the answerback or reader is included, information can be checked from these points. Since the signals from these two options are fed to the PSC board, the PSC board can be eliminated or assumed as the problem.

If the problem exists no matter where the data is coming from, it can be seen by the block diagram that only the SPC and MEM boards are associated with data under all incoming conditions. Here again, if the punch option is included and the information is correct at the punch, the SPC board can be eliminated as the problem area. This leaves only the MEM board.



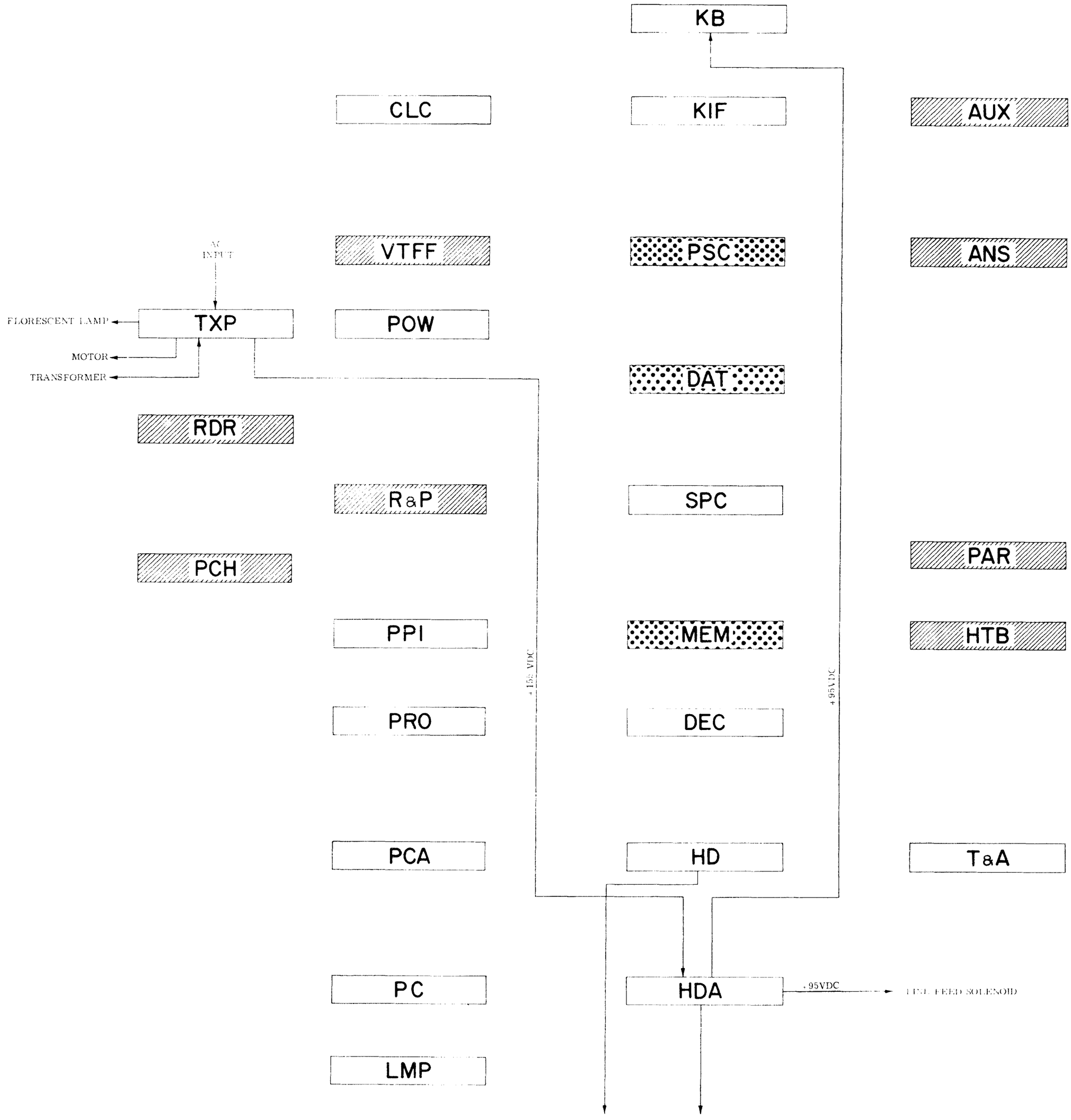
Data Signals
Figure 4-4

HIGH VOLTAGE CIRCUITS

(See Figure 4-5)

The 105 Vac to 129 Vac input, when applied to the Printer is fed to and across the TXP board to the transformer. One side of the line is tied through the relay contacts to the motor and fluorescent lamp. The voltage from the transformer secondary is again brought to the TXP board where the rectified voltage is wired to the large 2100 MFD capacitor for regulation and then to the HDA board.

The +155 Vdc is regulated to +95 volts and is used at the keyboard oscillator, the line feed relay, and after passing through a switcher, is used to drive the hammer coils.



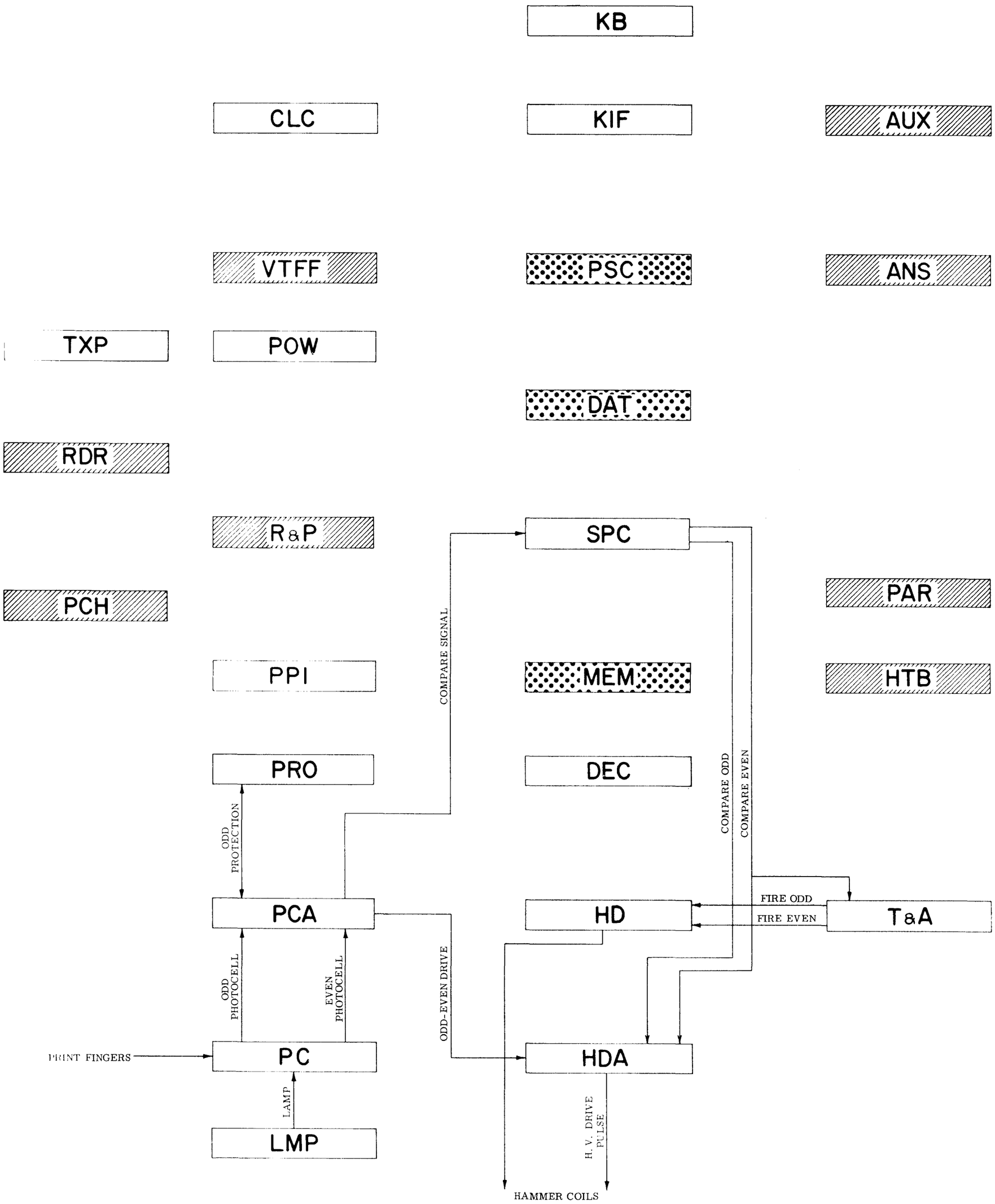
High Voltage Circuits
Figure 4-5

ODD-EVEN PULSE CIRCUITS

(See Figure 4-6)

The pulse circuits originate from the PC board. The lamp signal is chopped by the lower portion of the print fingers passing between two photocells and the photocell lamp. From one cell the "Odd" photocell signal is derived, and from the other cell the "Even" photocell signal. Each signal is sent to the PCA board where it is squared, amplified and timed to create a .96 msec drive signal. A sample of the "Odd" photocell signal is sent to the PRO board where it is used to detect low belt speed. Both "Odd" and "Even" drive signals are sent to the HDA board where they pass through a power switcher and then separated into two SCR drive signals for the odd and even numbered hammer coils.

The PCA also generates compare signals which are sent to the SPC board. Signals from the SPC are sent to the HDA for logic comparison. The compare even signal is also sent to the T&A board and passes through an "OR" circuit. From this is generated a fire odd and a fire even signal which is sent to the HD board to allow the odd numbered SCR's to turn on at the appropriate time.

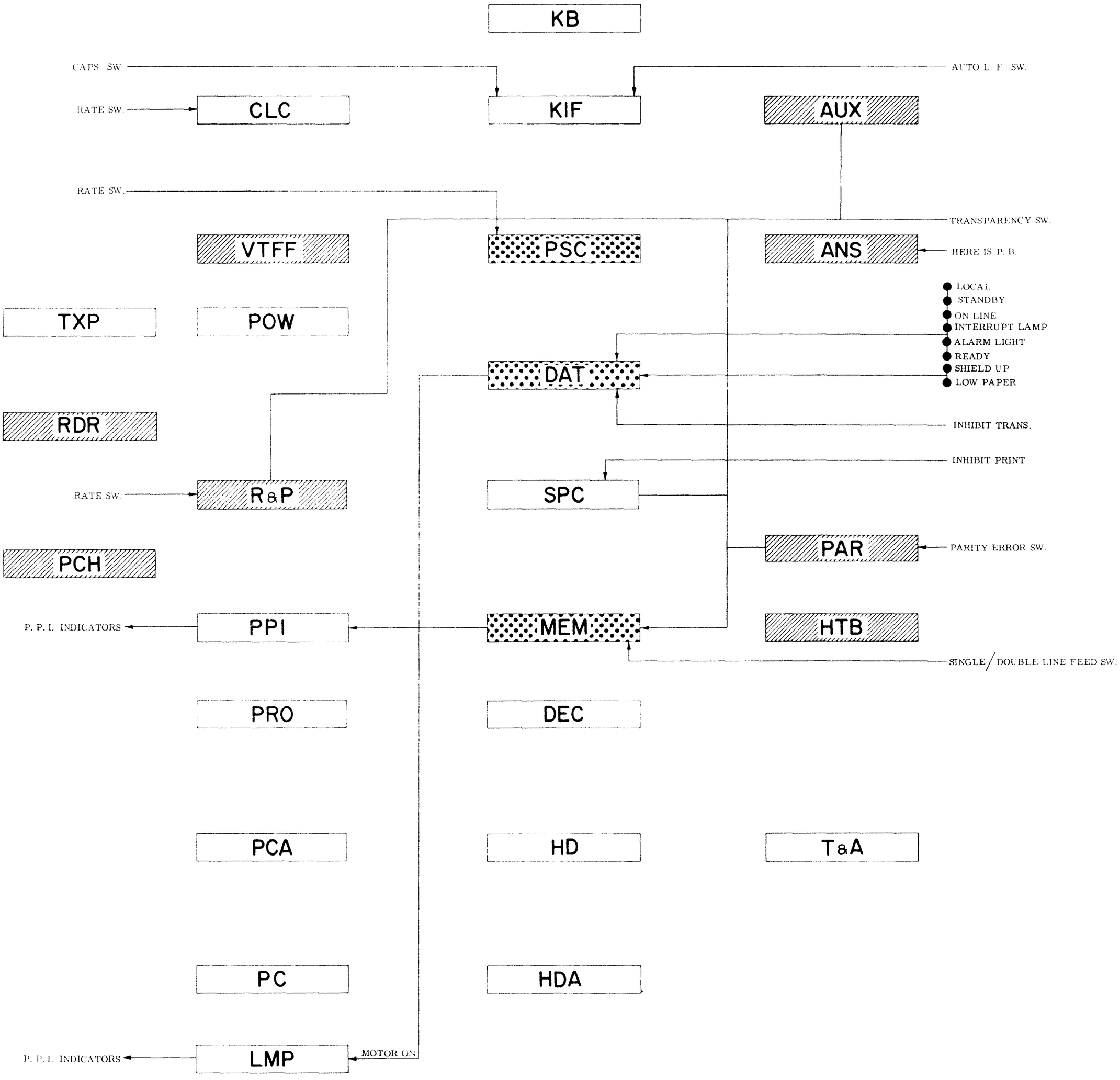


Odd - Even Pulse Circuit
Figure 4-6

AUXILIARY LAMPS AND SWITCHES
(See Figure 4-7)

Figure 4-7 shows the boards that affect, or are affected by the different lamps and switches on the Printer.

Notice in particular the direction of the arrows which indicate if the switches are doing the controlling or if the boards are controlling the lamps.



Auxiliary Lamps and Switches
Figure 4-7

SPEAKER CIRCUIT

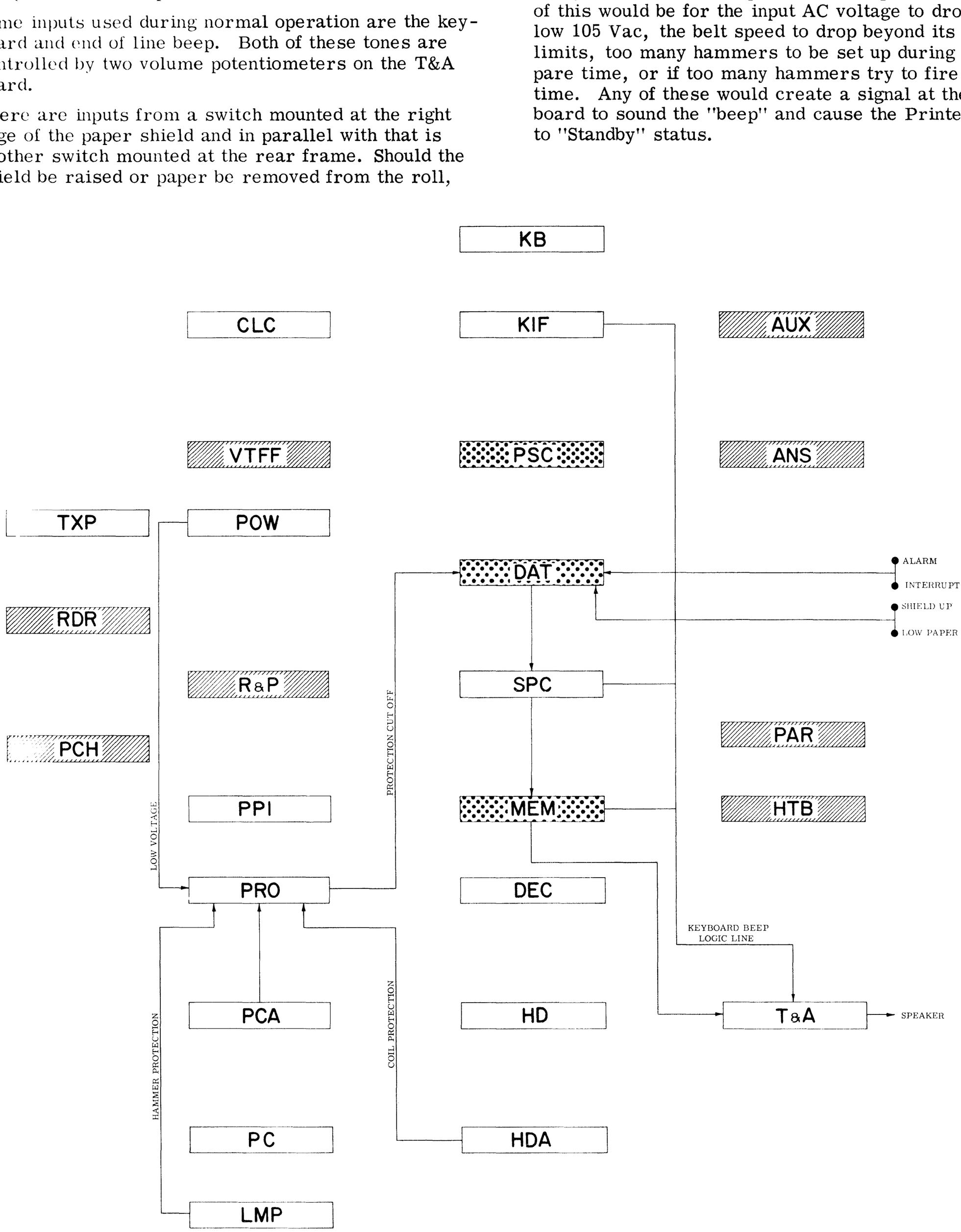
(See Figure 4-8)

There are several inputs to the speaker to cause it to "beep". Some during normal operation and others to bring attention to a problem.

Some inputs used during normal operation are the keyboard and end of line beep. Both of these tones are controlled by two volume potentiometers on the T&A board.

There are inputs from a switch mounted at the right edge of the paper shield and in parallel with that is another switch mounted at the rear frame. Should the shield be raised or paper be removed from the roll, a "beep" will sound. If an interrupt signal is received the INTERRUPT indicator will light and the beep will sound.

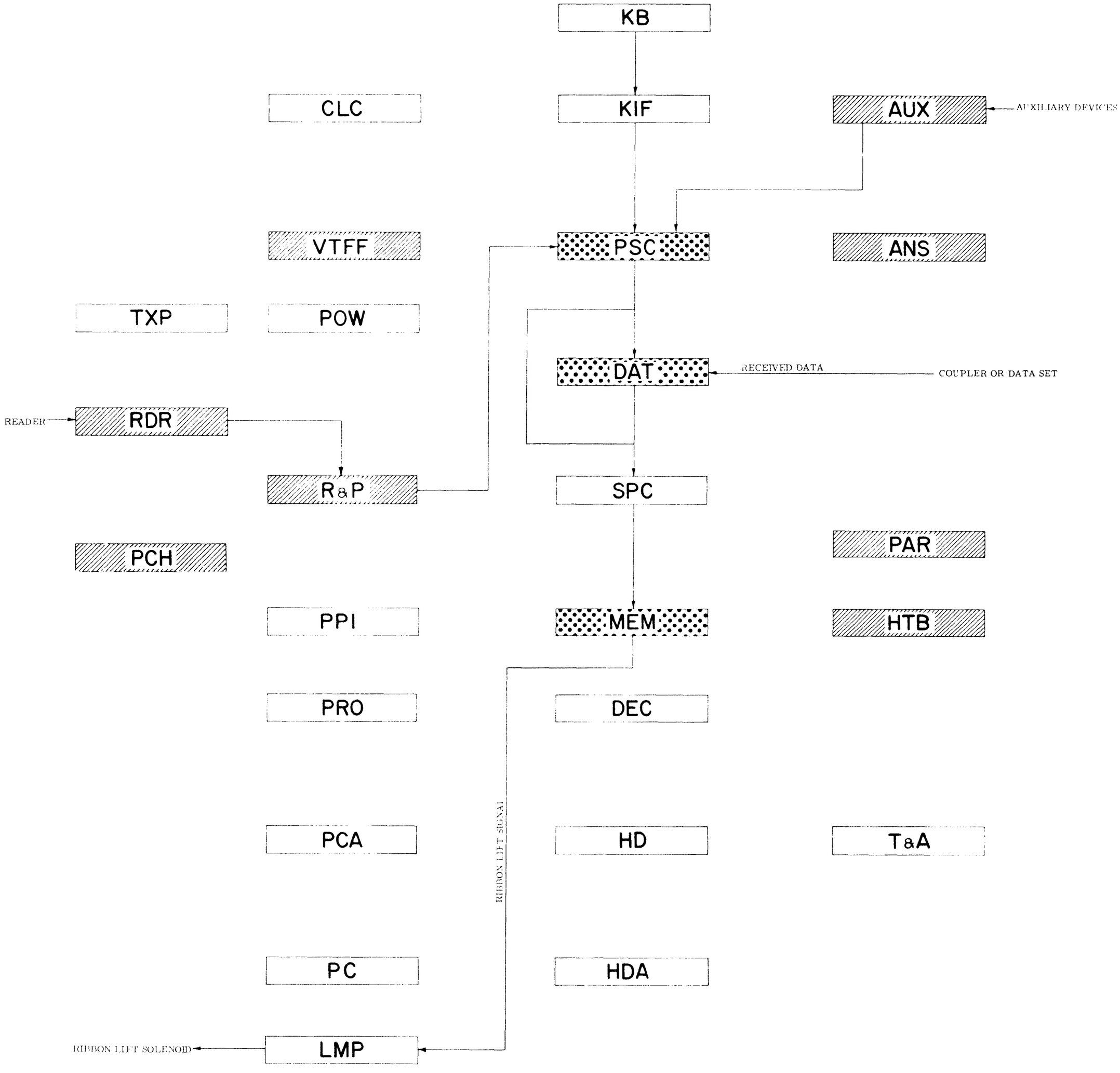
Any condition that would cause the ALARM indicator to light will cause the speaker to "beep". Examples of this would be for the input AC voltage to drop below 105 Vac, the belt speed to drop beyond its present limits, too many hammers to be set up during compare time, or if too many hammers try to fire at one time. Any of these would create a signal at the PRO board to sound the "beep" and cause the Printer to go to "Standby" status.



Speaker Circuit
Figure 4-8

RIBBON LIFT
(See Figure 4-9)

Any incoming information, either serial or parallel, when decoded at the MEM board as a printable character will create a ribbon up logic signal. This signal is sent to the LMP board, through a transistor driver circuit, then across the HDA board to the ribbon lift solenoid.



Ribbon Lift
Figure 4-9

OPTION BOARDS
(See Figure 4-10)

The option boards used in the Printer are shown in the shaded blocks. In addition three blocks are shown with a dot shading to indicate optional boards of this type are available; however, these boards are necessary for the proper operation of the Printer and only through the different group boards will the option be available.

The RDR board and PCH board are used on an ASR unit and must be used with R&P board. Parallel information from the reader is amplified at the RDR board and sent to the R&P board. The incoming signals are converted to logic form and sent in parallel form to the PSC board to be converted to serial information.

Parallel information from the SPC board is sent to the R&P board and then to the punch driver on the PCH board. If the reader and punch are not used as in an ASR unit, the R&P board should be removed from the Printer.

The Vertical Tab-Form Feed (VTFF) option consists of a VTFF bustle board and mechanical parts. A Printer with a mother board which includes a VTFF board slot must be included before the VTFF option can be added.

The Auxiliary option consists of a AUX bustle board to allow the input of parallel information.

The Answerback option consists of an ANS bustle board which needs only to be plugged into the bustle for operation. The Answerback option can be programmed with a message up to twenty characters.

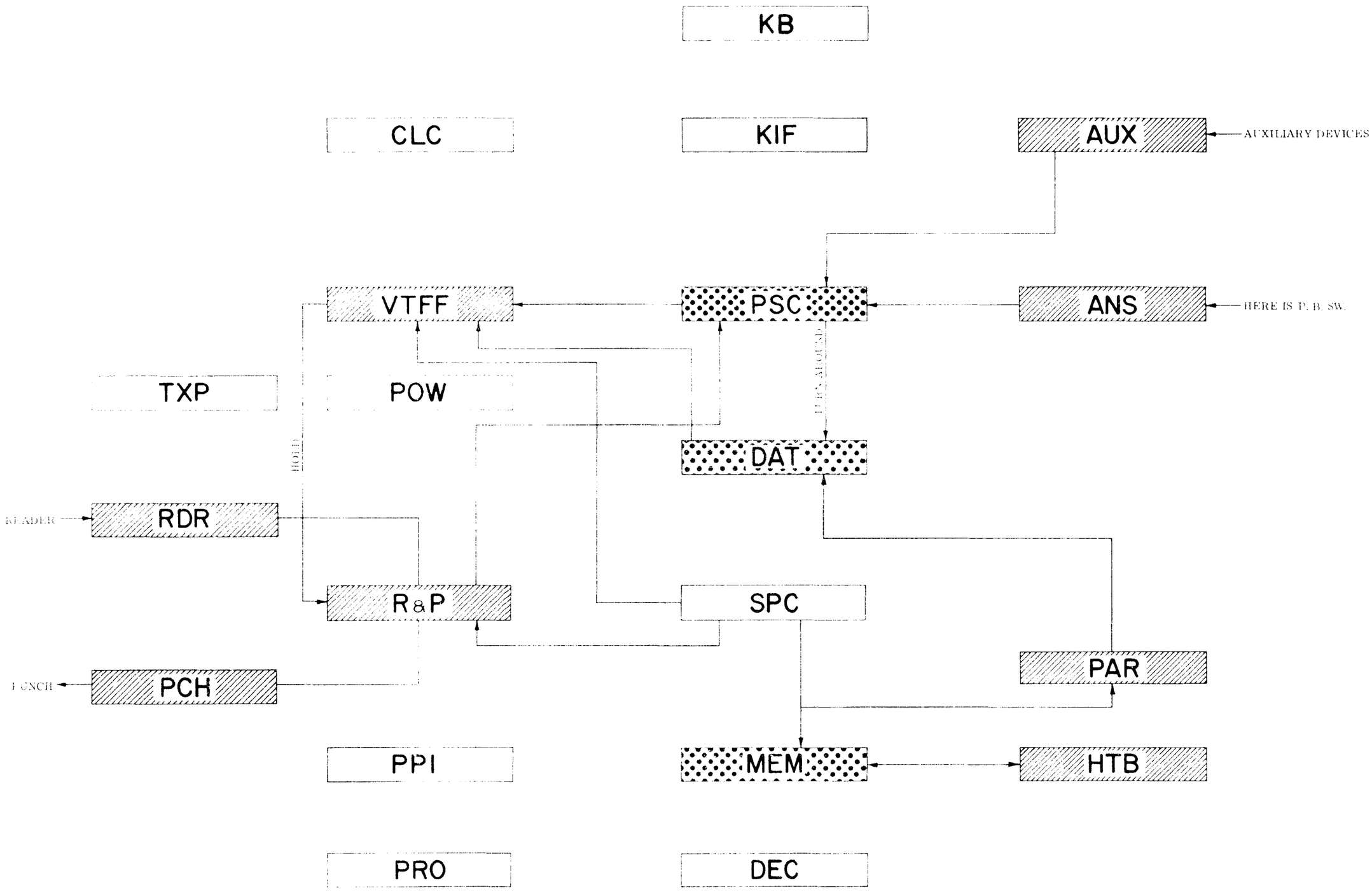
The Parity Error Detection option consists of a PAR bustle board. A switch is installed on the board that will disable the parity option even though the board is installed.

The Horizontal Tab option consists of an HTB bustle board that requires only to be plugged into the Printer for operation.

The "Turnaround" option, which allows the use of a lower cost, single line, telephone system, consists of a group two (G02) PSC board.

The Automatic Motor Control option consists of a group two (G02) DAT board. Also available is a DATB board which will replace both the G01 and G02 DAT boards and allows the addition of other options by strapping.

The Automatic Carriage Return option consists of a group 2 (G02) MEM board.



Option Boards
Figure 4-10

SECTION 3
PRINTED CIRCUIT BOARDS

This section covers test points, waveforms, fuses and strapping options. Detailed information is given on the facing page of the board in question. A list of the information in short form follows:

NOTE

Reference to "Short" and "Long" in this section applies to print line length. (Short = 75, Long = 118).

BUSTLE BOARDS

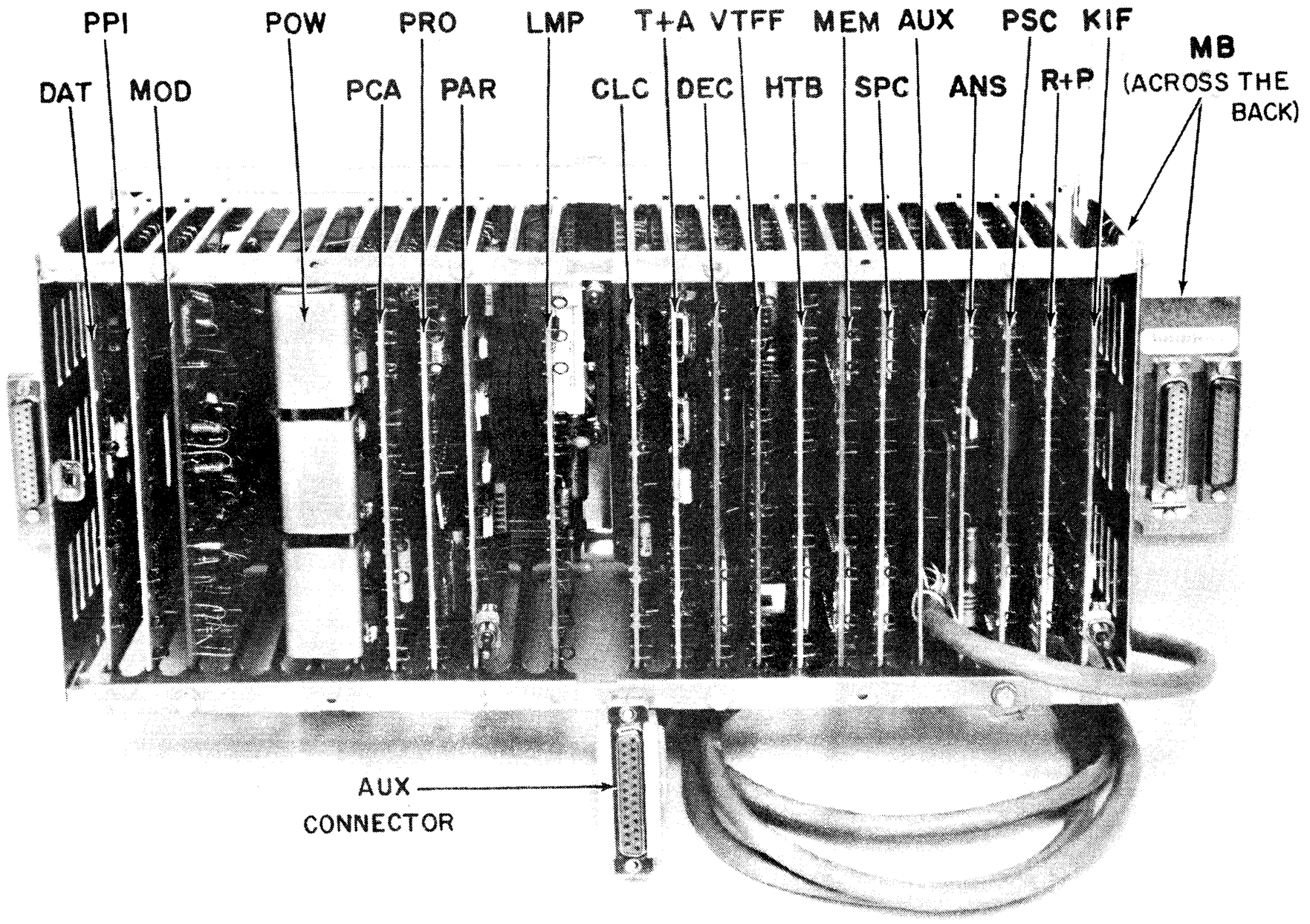
ANS	Answerback Board
AUX	Auxiliary Board
CLC	Clock Board
DAT/1	Dataset Board
DAT/2	Dataset Board, (w/Auto Motor On/Off)
DATB	Dataset Board, B Model
DEC/1	Serial Decoder Board, Short
DEC/2	Serial Decoder Board, Long
HTB	Horizontal Tab Board
KIF	Keyboard Interface Board
LMP	Lamp Regulator Board
MEM	Memory Board
MOD	Modem Board
PAR	Parity Error Board
PCA	Photocell Amplifier Board
POW/1,/2,/3	Low Voltage Power Supply Board
PPI	Print Position Indicator Board
PRO	Protection Board
PSC/1	Parallel to Serial Converter Bd.
PSC/2	Parallel to Serial Converter Bd. with Turnaround
R&P	Reader and Punch Board
SPC	Serial to Parallel Converter Bd.
T&A	Timing and Alarm Board
VT&FF	Vertical Tab and Form Feed Bd.

NON-BUSTLE BOARDS

HD	Hammer Decoder Board
HDA	Hammer Driver Accessory Board
PC	Photocell Board
SLD	Senseline Driver Board
TXP	Transformer Power Supply Board

NOTE

Boards of more than one type are necessary for the operation of the TermiNet 300 Printer, but have different options on each board (e.g., DAT/1, DAT/2, DATB).



Bustle With Boards
Figure 4-11

FUSE CHART

Board	Fuse	Size	Circuit Name	Part Number
CLC	1FU	1/8A Pico	Phase One Clock	44A417087-001
HDA	1FU	3A Pico	Odd Hammer Bank #1	44A417087-009
	2FU	3A Pico	Even Hammer Bank #2	44A417087-009
	3FU	3A Pico	Odd Hammer Bank #3	44A417087-009
	4FU	3A Pico	Even Hammer Bank #4	44A417087-009
LMP	1FU	3/8A Pico	+20V	44A417087-003
POW/1	1FU	3/4A Pico	+15V	44A417087-005
	2FU	3/4A Pico	-15V	44A417087-005
	3FU	3/4A Pico	-27V	44A417087-005
POW/2 & POW/3	1FU	1 1/2A Pico	+15V	44A417087-007
	2FU	1 1/2A Pico	-15V	44A417087-007
	3FU	1 1/2A Pico	-27V	44A417087-007
T&A	1FU	1/8A Pico	Phase Two Clock	44A417087-001
VT&FF	1FU	3/8A Pico	+20V	44A417087-003
Right Side Frame	2A	1" AGX	+100V	44A417073-001
Right Rear Cover	2A	1 1/4" 3AG	Input Power	K9774740P5

NOTE

Pico Fuses ARE NOT SOLDERED into the Board.

STRAPPING OPTIONS

Addition or Removal of hand-installed straps (jumpers) between points on printed circuit boards will change the function or operation of the terminal as listed below and described on each Board page. All other straps are factory settings and must not be changed.

Board	Strap	Function
ANS	1J	Answerback Message Length
AUX	1J	Device Reaction to LV Alarm
	2J	Device Reaction to DET BK Alarm
	3J	Device Reaction to PSVI Alarm
CLC	3J-5J	Speed Selection
DAT/1	1J	Motor Stop on "EOT"
	2J	Auto Motor ON/OFF
DAT/2	1J	Motor Stop on "EOT"
	2J	Auto Motor ON/OFF
DATB	1J	Terminal Reaction to Low Paper Alarm
	2J	Transmit Control from CA
	3J	Line Control from CA
	4J	Status Monitor from CA
	5J	Auto Motor On/Off
	6J	Motor Stop on "EOT"
MEM	1J	Print Line Length
MOD	A	Receive Sensitivity
	B	Transmitter Level Selection
	C	Test Jumper
	D	Request to Send (CA) Selection
PAR	1J-2J	Even or Odd Parity
	3J	See Correct PAR Board Page
	4J	See Correct PAR Board Page

Board	Strap	Function
PSC/1	1J	One/Two Stop Bits at 10 cps
	2J	One/Two Stop Bits at 15 cps
	3J	One/Two Stop Bits at 30 cps
PSC/2	1J	One/Two Stop Bits at 10 cps
	2J	One/Two Stop Bits at 15 cps
	3J	One/Two Stop Bits at 30 cps
R&P	1J	Reader reaction to RDR OFF
	1-2	Inhibits Reader delays at LO Speed
	3-4	Inhibits Reader delays at MED Speed
	5-6	Inhibits Reader delays at HI Speed
SPC	1J-2J	Echo-Plex Operation
	3J	Motor On/Off by received ESC H/J

NOTE

Straps ARE NOT SOLDERED into the Board.

TEST POINTS

ANS

TP9	Answerback Signal
TP10	Keyboard Inhibit

AUX

None

CLC

TP1	Phase One Clock
TP2	T1
TP3	Transmit Clock
TP5	Receive Clock
TP6	Phase Two Clock

DAT

TP2	Receive Data
TP4	Paper, Speed, Voltage Inhibit
TP6	67 msec Clock

DEC

TP1	$\overline{O}$
TP2	$\overline{Z}$
TP3	$\overline{1}$

HD

None

HDA

TP1	Odd Hammer Drive
TP2	+95V
TP3	+155V
TP4	Zener Ref.
TP5	Odd Even Drive
TP6	Even Hammer Drive

HTB

TP1	Serial Write B
TP4	Tab Column Advance
TP5	Serial Write A
TP6	Tab Column Store
TP7	Tab
TP8	Tab Count
TP9	T64.01
TP10	T128.02

KIF

TP5	Time Constant #1
TP6	Strobe Filter Capacitor
TP7	Sense Line #6 True
TP8	Sense Line Leading Pulse

LMP

TP1	Ribbon Lift Coil
TP2	+2.3V
TP3	+21V
TP4	+15.6V
TP5	+16V
TP6	+3V (PRT 1)
TP7	-33V
TP8	-27.6V
TP9	-15.6V
TP10	Ground

MEM

TP1	Clock Pulse
TP2	Character Strobe Modified
TP3	Print Space Inhibit
TP5	Serial Character Count
TP6	Bit 1 of Parallel Code
TP8	Write Pulse A Section
TP9	Line Feed G0
TP10	Serial Column Count

MOD

None

PAR

TP3	Interrupt Error Code
TP4	Valid Parity
TP5	Word 127

PC

None

PCA

TP1	Hammer Bus Sync Signal
TP2	Odd Photocell Input
TP3	Odd/Even Drive Time
TP4	Error Signal
TP5	Fault Signal
TP7	Even Photocell Input
TP8	Even Drive Time
TP9	Even Hammer Coil
TP10	Hammer Coil

PPI

TP1	Count Down
TP2	Command [illegible]
TP3	Reset Counter #1

POW

None

PRO

TP1	Hammer Bias Protection (PRT3)
TP2	Drive +15 (PRT3)
TP8	Low Voltage (PRT3)
TP9	Speed Voltage Fault Signal
TP10	Hammer Coil Protection (PRT2)

PSC

TP1	Generated Data
TP2	Input Strobe without Parity
TP3	Input Strobe with Parity
TP4	Strobe 0
TP5	Transmit Turn Control
TP8	Keyboard Strobe
TP9	Part Turn to Receive

R&P

TP1	Read Tape and Advance
TP2	Reader GO
TP3	Motor Phase C
TP4	Motor Phase B
TP5	Motor Phase A
TP6	Sprocket
TP7	536 msec Clock
TP8	Advance Tape
TP9	Tape Out Flip Flop

SLD

None

SPC

TP1	Reset Break
TP2	Decoded Output 0
TP3	Incoming Data
TP4	Bell Count
TP5	Compare Odd
TP6	Compare Even
TP7	Font Reset
TP8	Decoder Output
TP9	Decoder Output
TP10	Erase Store Flip-Flop

SPI

TP1	Select Even Hammers
TP2	Select Odd Hammers
TP3	Select Hammer
TP4	Clock 2 kHz

SPP

None

VT&FF

TP1	Bounce Eliminator
TP2	Logic Voltage Oscillator
TP3	VT Decoder Output
TP4	VT&FF Start
TP5	Fault Timer Input
TP6	FF Decoder Output
TP7	VT&FF Stored
TP8	VT Photocell
TP9	FF Photocell
TP10	Reflective Lamp Supply

INFORMATION

The waveforms on the following pages were obtained using a Tektronix 564 Dual Trace Oscilloscope. All waveforms were taken internally from observed test points. Waveforms and voltages are approximate.

Test Conditions are with motor on and at a 30 character per second rate unless otherwise stated.

Unless otherwise stated, all logic levels have amplitudes that are negative, between -10 and -15 volts, and 0 volts. A bit pulse may be from negative to 0 or 0 to negative. Circled numbers to the left of dual waveforms refer to the channel and probe number of the oscilloscope.

ANSWERBACK BOARD (ANS)

44B412153-G01

FUSES None

STRAPS 1J = Installed at last position coded. With all diodes past the jumper removed.

TEST POINTS

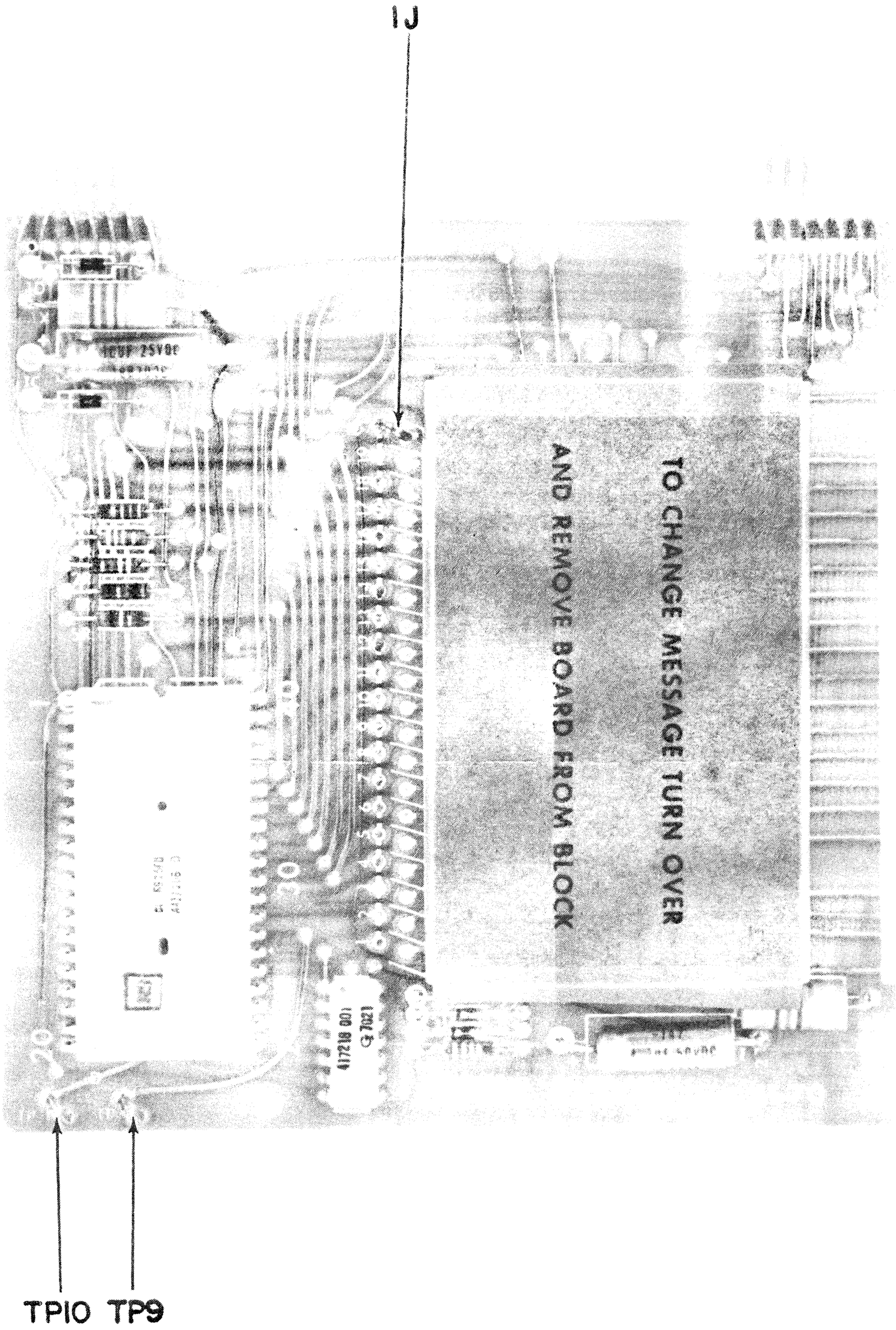
TP9 = Answerback Signal (ANS)

One 12 μs pulse at completion of answerback

Sync: -

TP10 = Keyboard Inhibit ($\overline{KINH}$) -Starts at the begining of first character of ANS message, and ends after last character of ANS message.

Sync: +


IJ
TO CHANGE MESSAGE TURN OVER
AND REMOVE BOARD FROM BLOCK
TP10
TP9

ANS

AUXILIARY BOARD (AUX)

44B412261-G01

FUSES None

STRAPS
1J Installed = Turns off device with LV
2J Installed = Turns off device with "Detect Break"
3J Installed = Turns off device with PSVI.

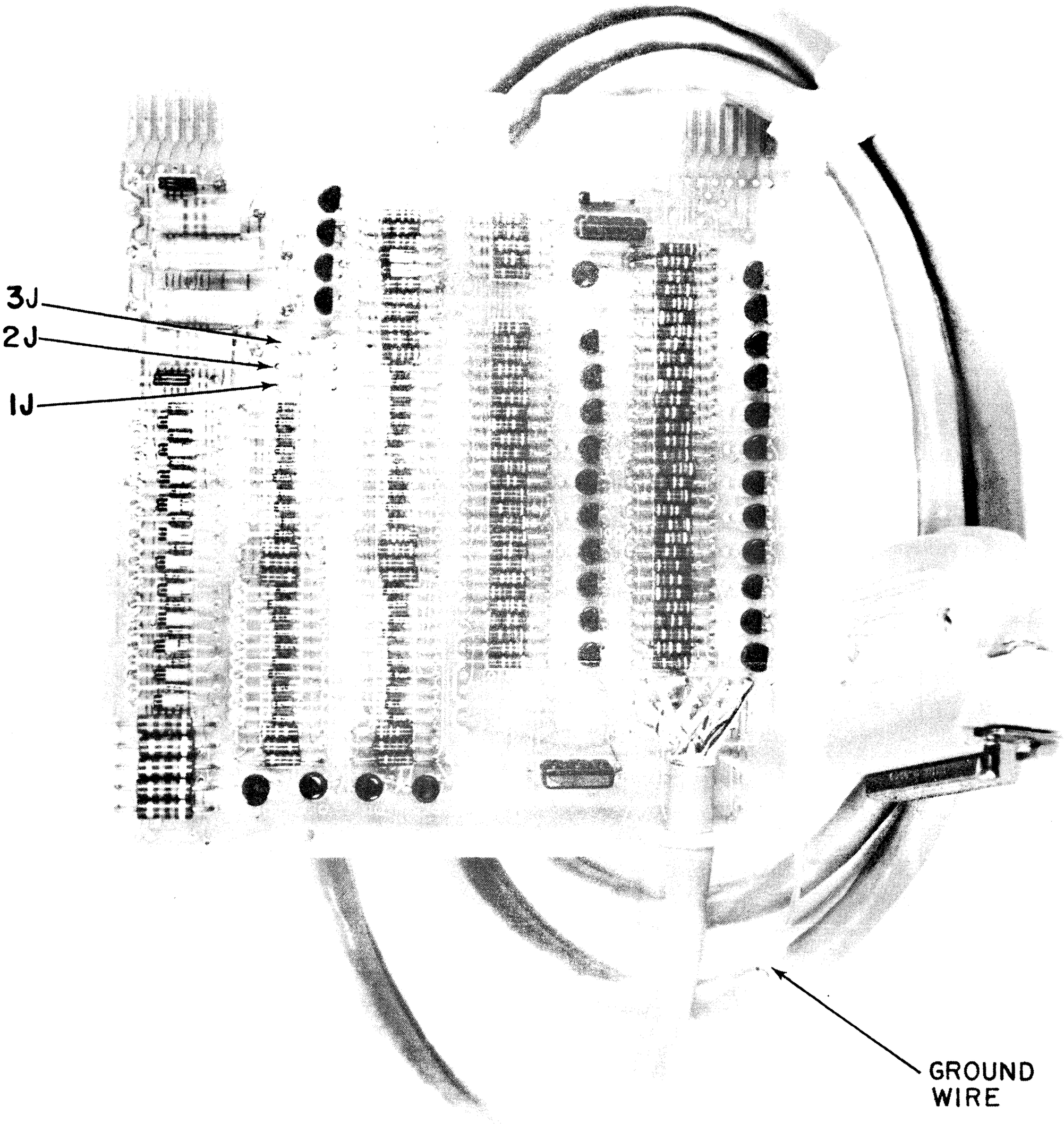
TEST POINTS None

CONNECTOR PINS

Logic Levels are 0 V or -10 to -15 Vdc.
Unbarred signals are "ON" at -10 to -15 Vdc.
Barred signals are "ON" at 0 V.

**	1.	Level 1 Input	14.	*Turn Device ON (Esc K)	
	2.	Level 2 Input	15.	*Turn Device OFF (Esc L)	
	3.	Level 3 Input	16.	N. C.	
	4.	Level 4 Input	17.	N. C.	
	5.	Level 5 Input	18.	N. C.	
	6.	Level 6 Input	19.	N. C.	
	7.	Level 7 Input	20.	N. C.	
	8.	Level 8 Input	21.	Inhibit Print	
	9.	*TermiNet Acknowledge (ACK)	22.	*TermiNet No Acknowledge (NAK)	
**	10.	*Strobe Pulse	23.	N. C.	
	11.	Aux Device "Ready"	**	24.	Input Strobe Without Parity
	12.	Signal Ground		25.	Input Strobe With Parity
	13.	N. C.			

*Pins marked with asterisks are Outputs to the Auxiliary Device.
**Barred Signals


3J
2J
1J
GROUND WIRE

CLOCK BOARD (CLC)

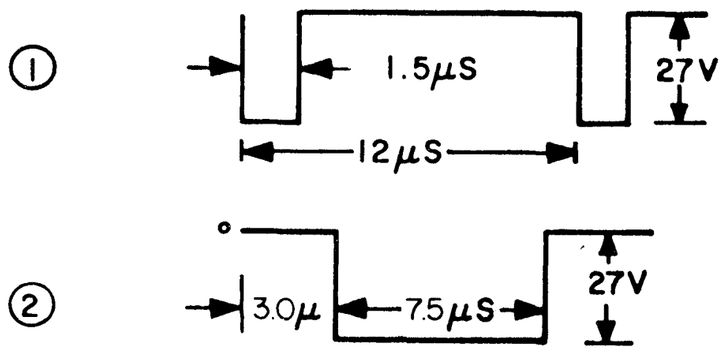
44B412159-G01

FUSES 1FU = 1/8A Pico, Phase One (01) Clock Signal

STRAPS
1J = Factory Jumper - DO NOT REMOVE
2J = Factory Jumper -DO NOT REMOVE
3J = 5J 1 = 15 cps Rate 5 = High Rate (HI)
2 = 30 cps Rate 6 = Medium Rate (MED)
3 = 60 cps Rate 7 = Low Rate (LO)
4 = 120 cps Rate Normal = 1 - 6, 2 - 5

TEST POINTS

TP1 = Phase One, (Ø1) (Probe 1)
TP6 = Phase Two, (Ø2) (Probe 2)



Sync: -

TP2 = T1

12 μs pulse every 96 μs.

Sync: -

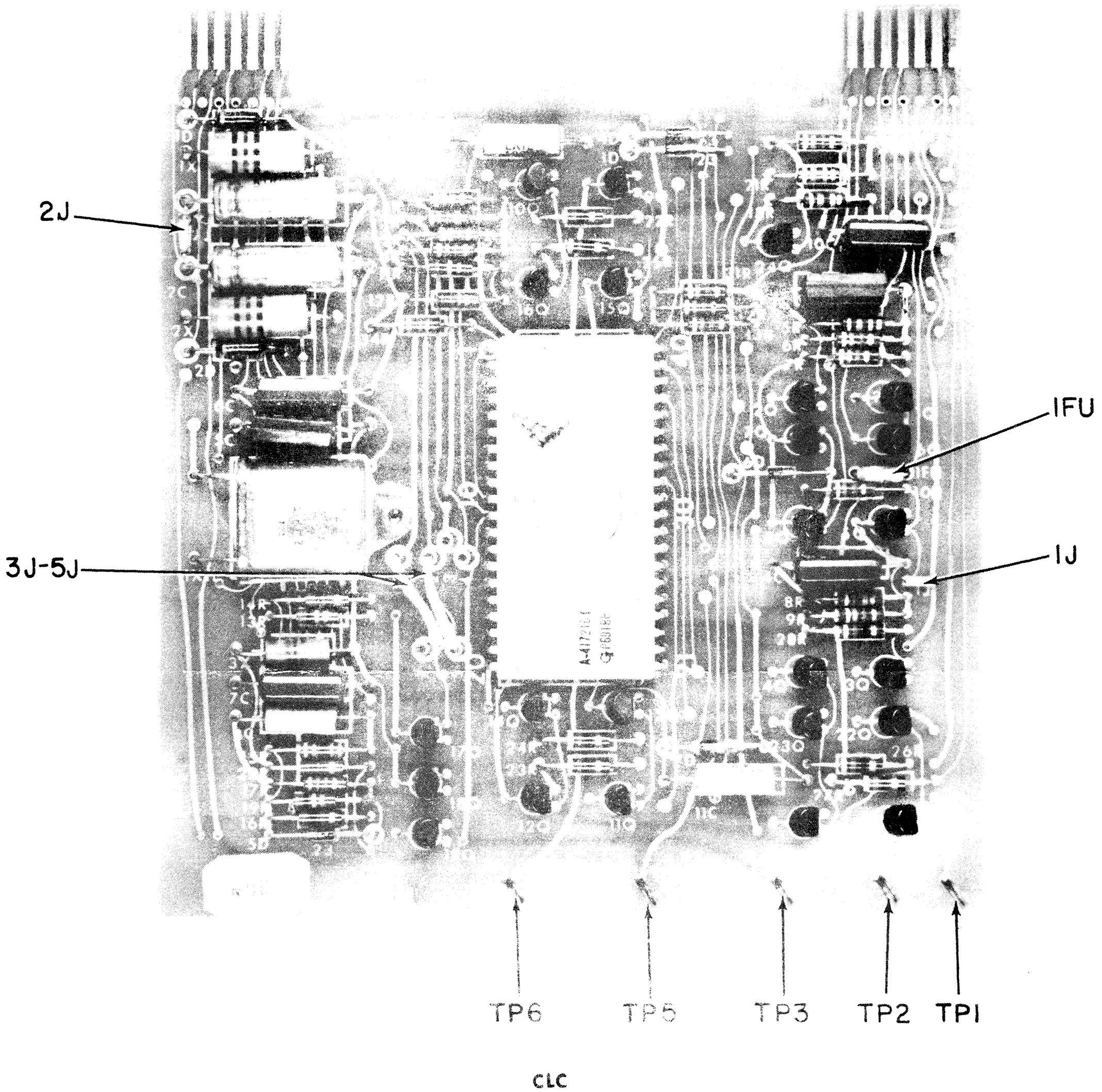
TP3 = Transmit Clock (X Clock)

12 μs pulse every;
1.7 msec at 30 cps
3.4 msec at 15 cps
4.6 msec at 10 cps

Sync: -

TP5 = Receive Clock (R Clock)

Strike a Key
19 pulses, 12 μs wide every;
1.7 msec at 30 cps
3.4 msec at 15 cps
4.6 msec at 10 cps



CLC

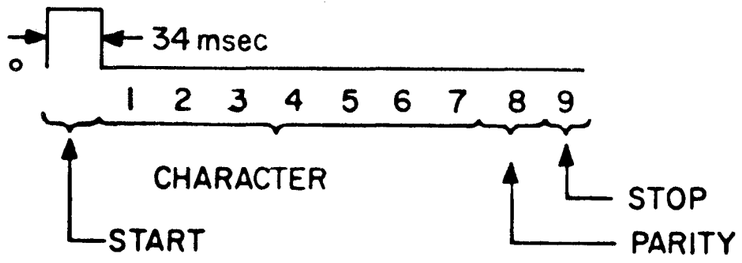
DATASET BOARD (DAT/1)
44B412155-G01

FUSES None

STRAPS 1J = Installed = Motor will stop when "Control D" (EOT) is recognized.
Removed = Motor will not stop.
2J = Factory Jumper - DO NOT REMOVE.

TEST POINTS

TP2 = Receive Data (RCVD)



Trace Shown is "Delete" Code

Sync: -

TP4 = Paper, Speed, Voltage Inhibit ($\overline{PSVI}$)

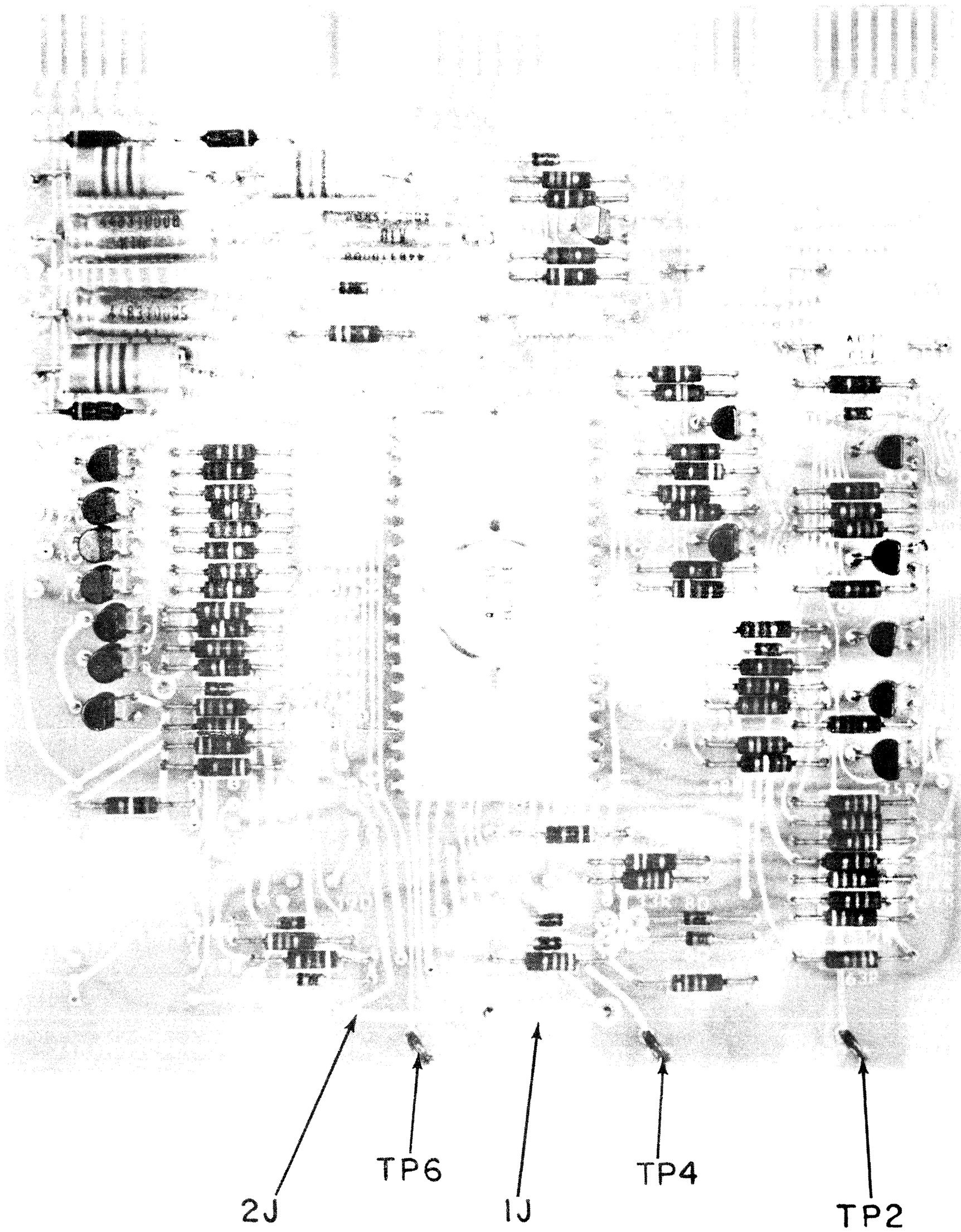
Low paper, low tape or shield up shifts this point to 0 volts. Low speed or low line voltage causes a 12μs pulse.

Sync: +

TP6 = 67 msec Clock ($\overline{67\ ms}$)

12μs pulse every 67 msec

Sync: +



DAT/1

DATASET BOARD (DAT/2)

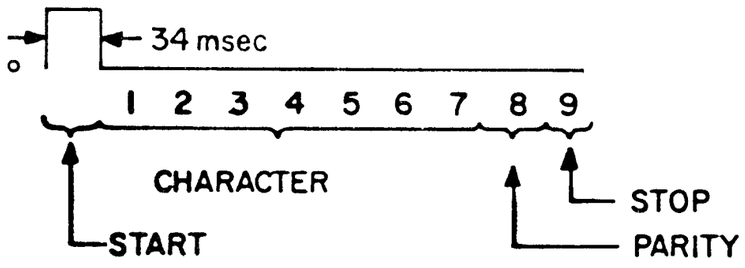
44B412155-G02
(With Auto Motor On/Off)

FUSES — None

STRAPS — 1J = Installed, motor will stop when "Control D" (EOT) is recognized. With strap removed, motor will not stop.
2J = Removed, auto motor On/Off from "Ready".

TEST POINTS

TP2 = Receive Data (RCVD)



Trace shown is "Delete" Code

Sync: -

TP4 = Paper, Speed, Voltage Inhibit ($\overline{\text{PSVI}}$)

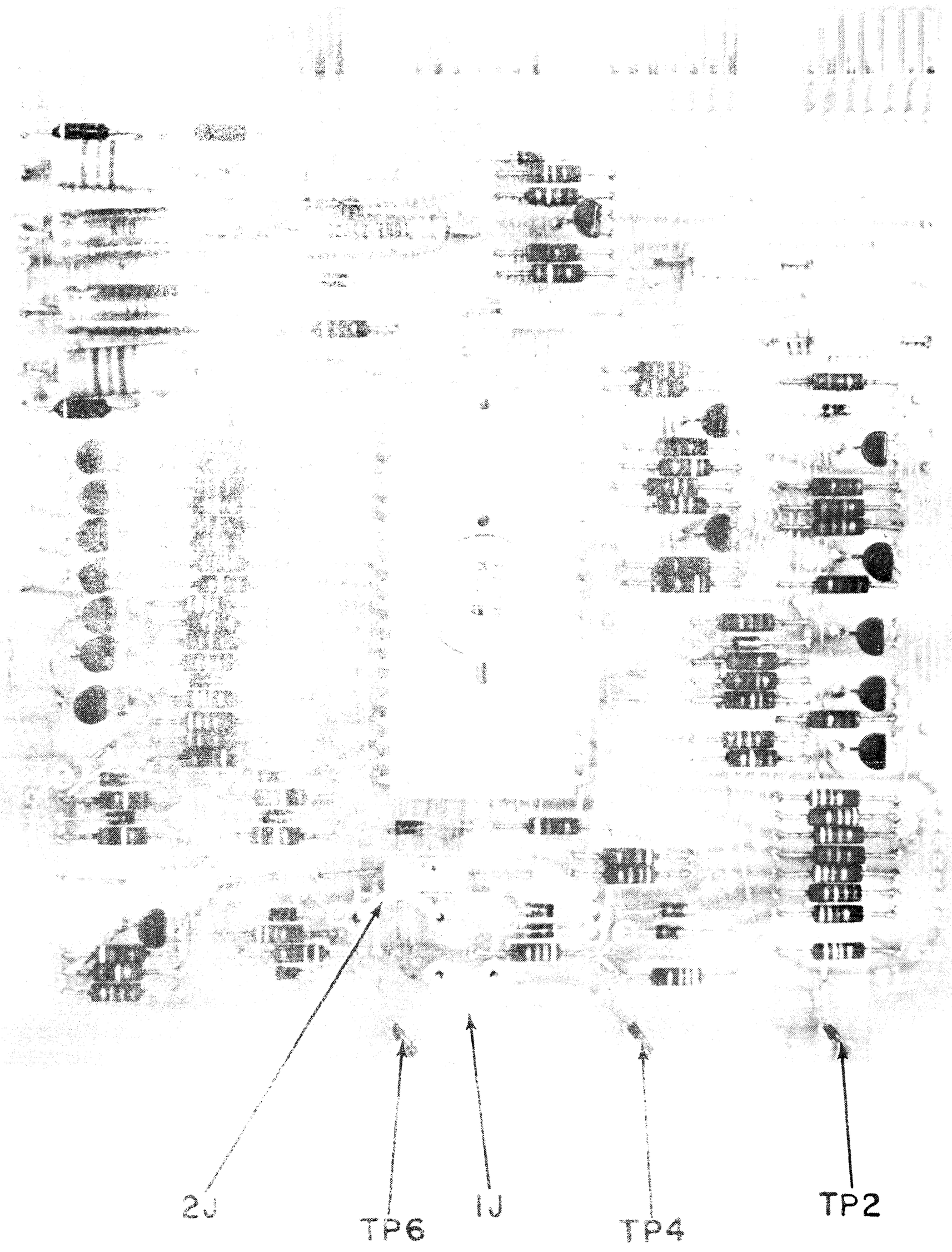
Low paper, low tape or shield up shifts this point to 0 volts. Low speed or low line voltage causes a 12μs pulse.

Sync: +

TP6 = 67 msec Clock ($\overline{\text{67 ms}}$)

12μs pulse every 67 msec

Sync: +



DAT/2

DATASET BOARD (DATB)

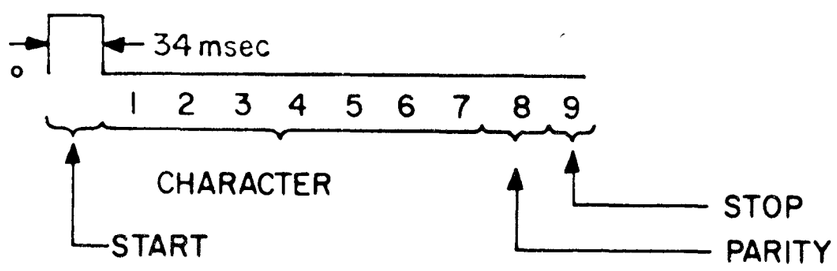
44B412428-G01
(B Model)

FUSES None

STRAPS
1J Installed = Low Paper Alarm will: light alarm lamp, beep, transmit "Break" turn Reader and Motor off. Remove = Light alarm lamp only.
2J Installed = Loss of CA puts transmit data at mark hold.
3J Installed - 4J Removed = Line control from CA.
4J Installed, 3J Removed = Status monitor from CA. (TermiNet Printer in standby or alarm will turn off CA).
5J Installed = Auto motor On/Off with CB On/Off.
5J with 4J = CA controlled by CB when in standby.
6J Installed = motor will stop when "Control D" (EOT) is recognized.
Removed = Motor will not stop

TEST POINTS

TP2 = Receive Data (RCVD)



Trace shown is "Delete" Code

Sync: -

TP4 = Paper, Speed, Voltage Inhibit ($\overline{PSVI}$)

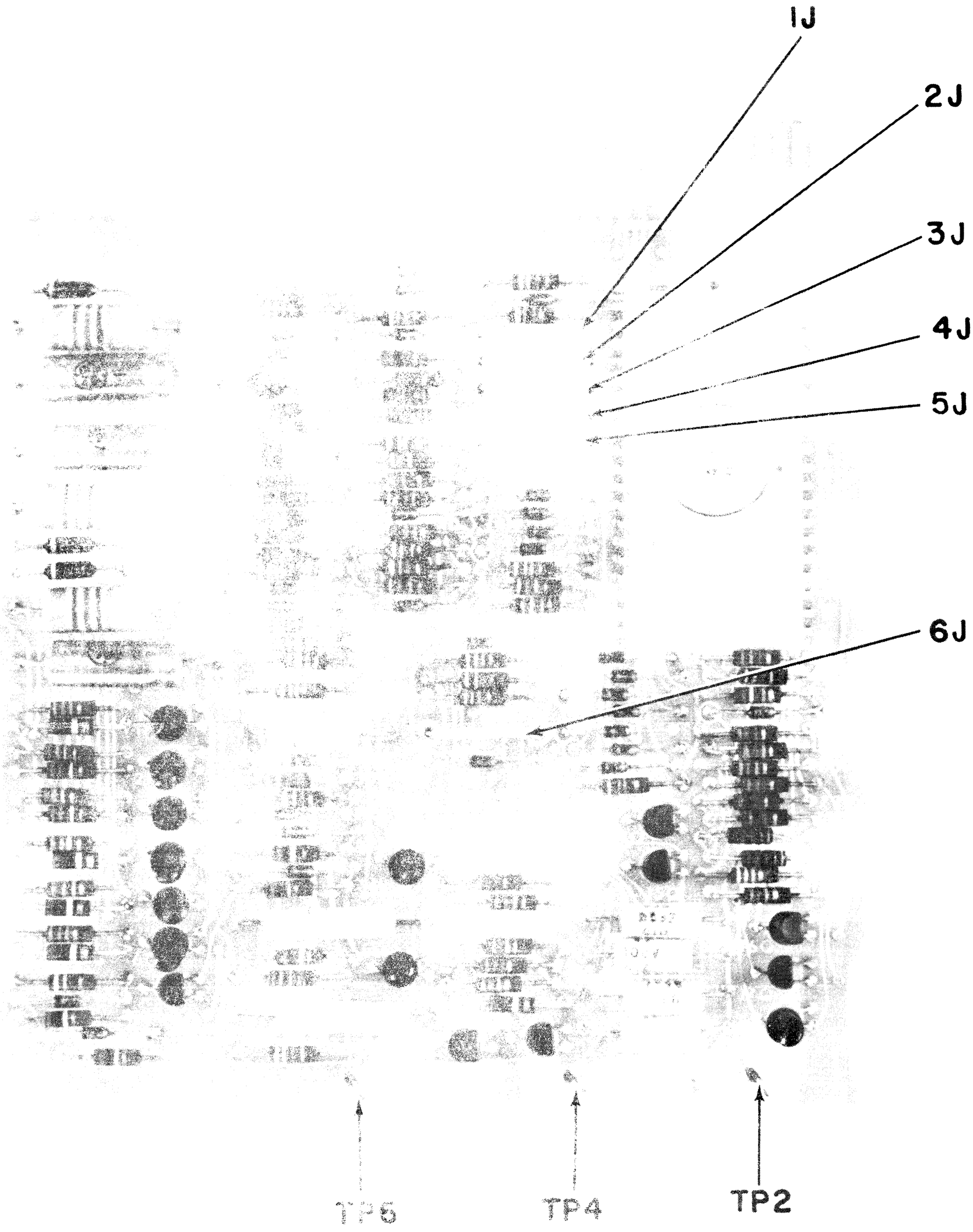
Low paper, low tape or shield up shifts this point to 0 volts. Low speed or low line voltage causes a 12μs pulse.

Sync: +

TP6 = 67 msec Clock ($\overline{67\ ms}$)

12μs pulse every 67 msec

Sync: +


1J
2J
3J
4J
5J
6J
TP5
TP4
TP2

SERIAL DECODER BOARD (DEC/1)

44B412160-G01

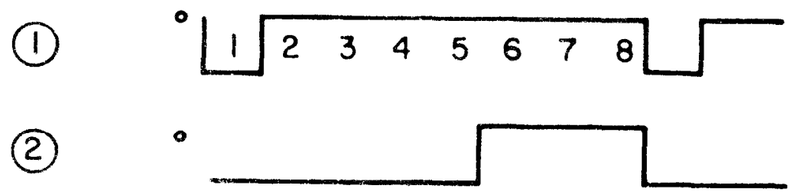
(Short Print Line)

FUSES None

STRAPS None

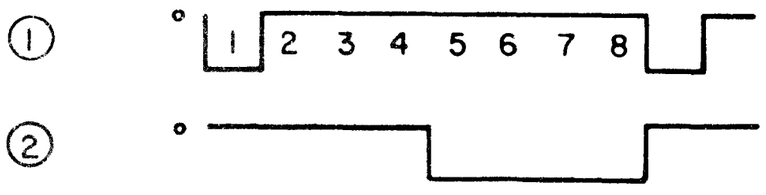
TEST POINTS

TP1 = $\bar{O}$ (Probe 2)*
TP2 CLC BOARD (Probe 1)



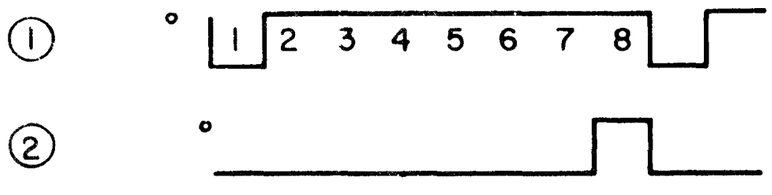
Sync: + from probe 1

TP2 = $\bar{Z}$ (Probe 2)*
TP2 CLC BOARD (Probe 1)



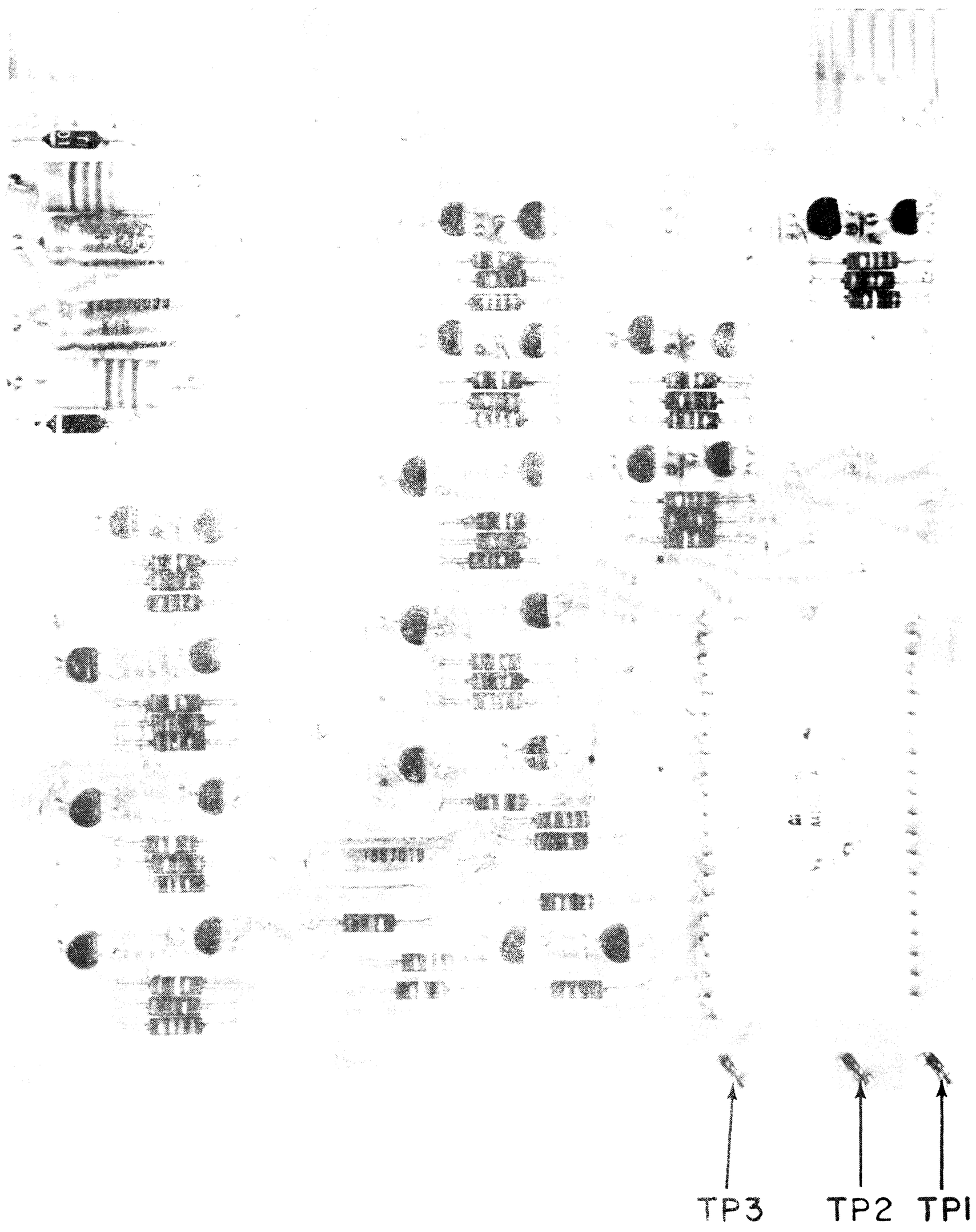
Sync: + from probe 1

TP3 = $\bar{1}$ (Probe 2)*
TP2 CLC BOARD (Probe 1)



Sync: + from probe 1

*Note: Adjust Sweep on probe 2 to show the above traces while printing.



DEC/1

SERIAL DECODER BOARD (DEC/2)

44B412160-G02

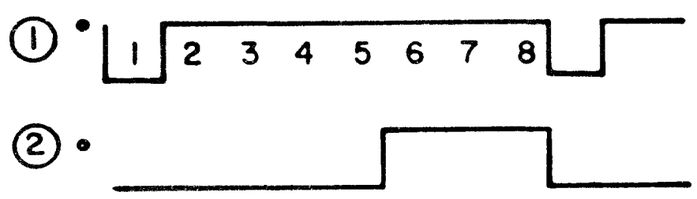
(Long Print Line)

FUSES None

STRAPS None

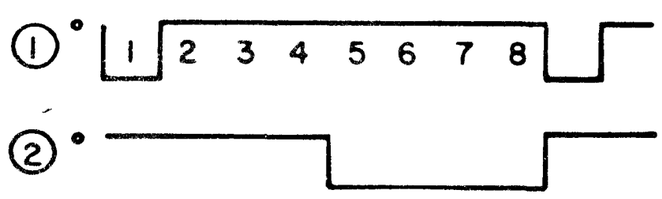
TEST POINTS

TP1 = $\overline{O}$ (Probe 2)*
TP2 = CLC BOARD (Probe 1)



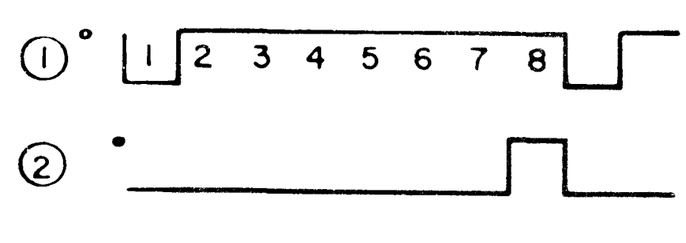
Sync: + from probe 1

TP2 $\overline{Z}$ (Probe 2)*
TP2 CLC BOARD (Probe 1)



Sync: + from probe 1

TP3 = $\overline{1}$ (Probe 2)*
TP2 CLC BOARD (Probe 1)



Sync: + from probe 1

*Note: Adjust Sweep on probe 2 to show the above traces while printing.

DEC / 2

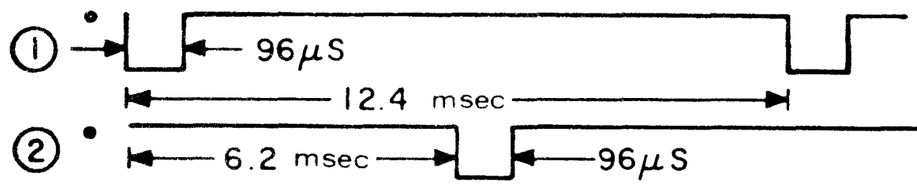
HORIZONTAL TABULATION BOARD (HTB)
44B412157-G01

FUSES None

STRAPS None

TEST POINTS

TP1 = Serial Write B (SWB) (Probe 2)*
TP5 = Serial Write A (SWA) (Probe 1)
Set One Tab



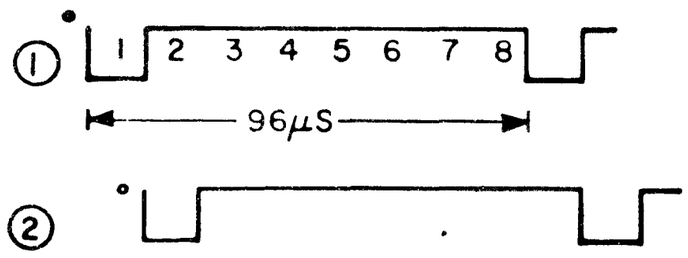
Further tabs will increase the number of Pulses
Sync: -from probe 1

TP4 = Tab Column Advance (TCA) motor on, set Tab in column 1 plus any other column. Strike "CR", see that PPI goes to 1. Strike "HT" Series of 12 μs pulses every 96 μs.

Number of Pulses = Second tab position minus one.

Sync: –

TP6 = Tab Column Store (TCS) (Probe 2)
TP2 CLC BOARD (Probe 1)
Clear Tab Memory, space to PPI "3"



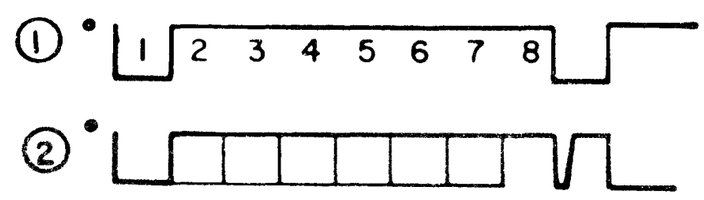
Sync: - from probe 1

TP7 Tab (TQ)
Strike a Key

Chain of 12 μs pulses every 12.4 msec

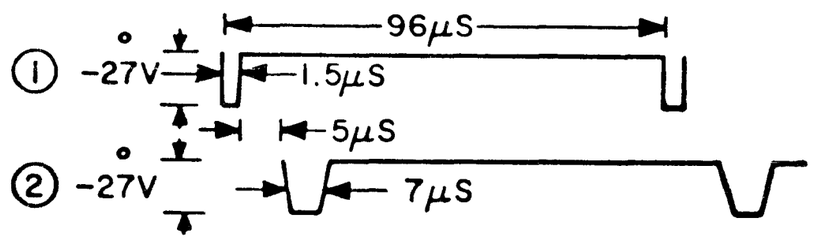
Sync: -

TP8 Tab Count (TC) (Probe 2)*
TP2 CLC BOARD (Probe 1)



Sync: - from probe 1

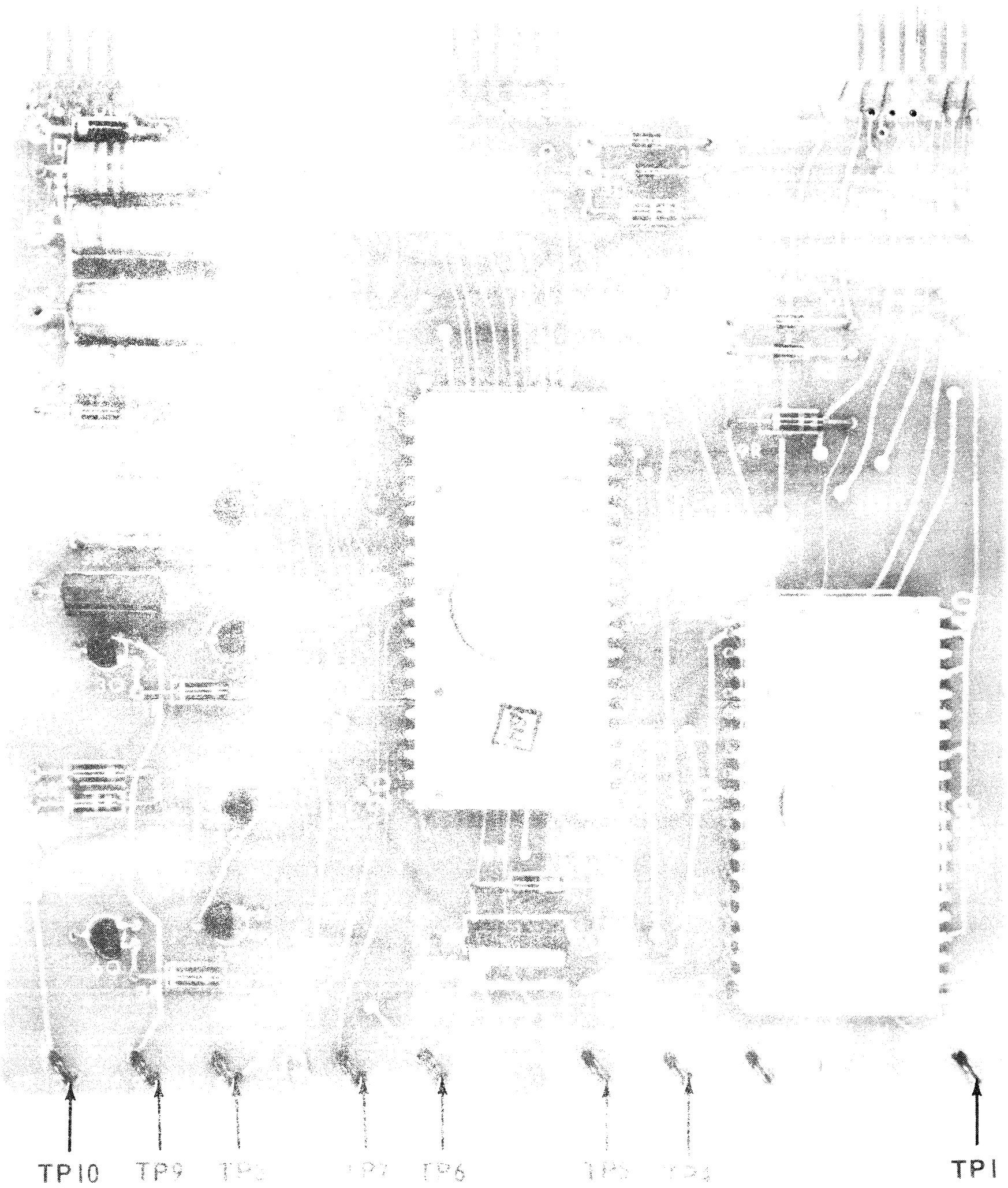
TP9 = T64.Ø1 (Probe 1)
TP10 = T128.Ø2 (Probe 2)*



Positive overshoots must not exceed 0.5V for 0.1 μs

Sync: -

*Note: Adjust sweep on probe 2 as needed



H13

KEYBOARD INTERFACE BOARD (KIF)

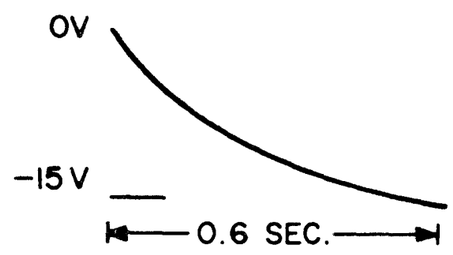
44B412169-G03

FUSES None

STRAPS All straps factory installed - DO NOT REMOVE

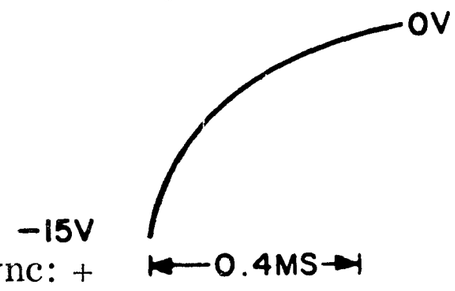
TEST POINTS

TP5 = Time constant #1 (TC1)
Strike a key and hold down



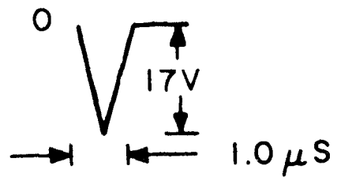
Sync: –

TP6 = Strobe filter capacitor ($\overline{SFC}$)
Strike a key and hold down



Sync: +

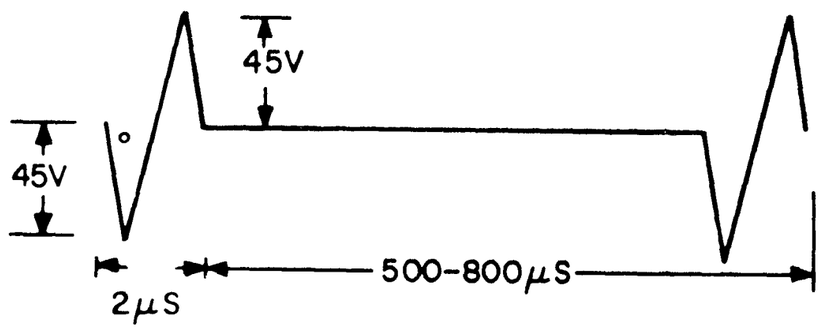
TP7 = Sense Line #6 True (SL6T)
Strike a character containing the 6th bit



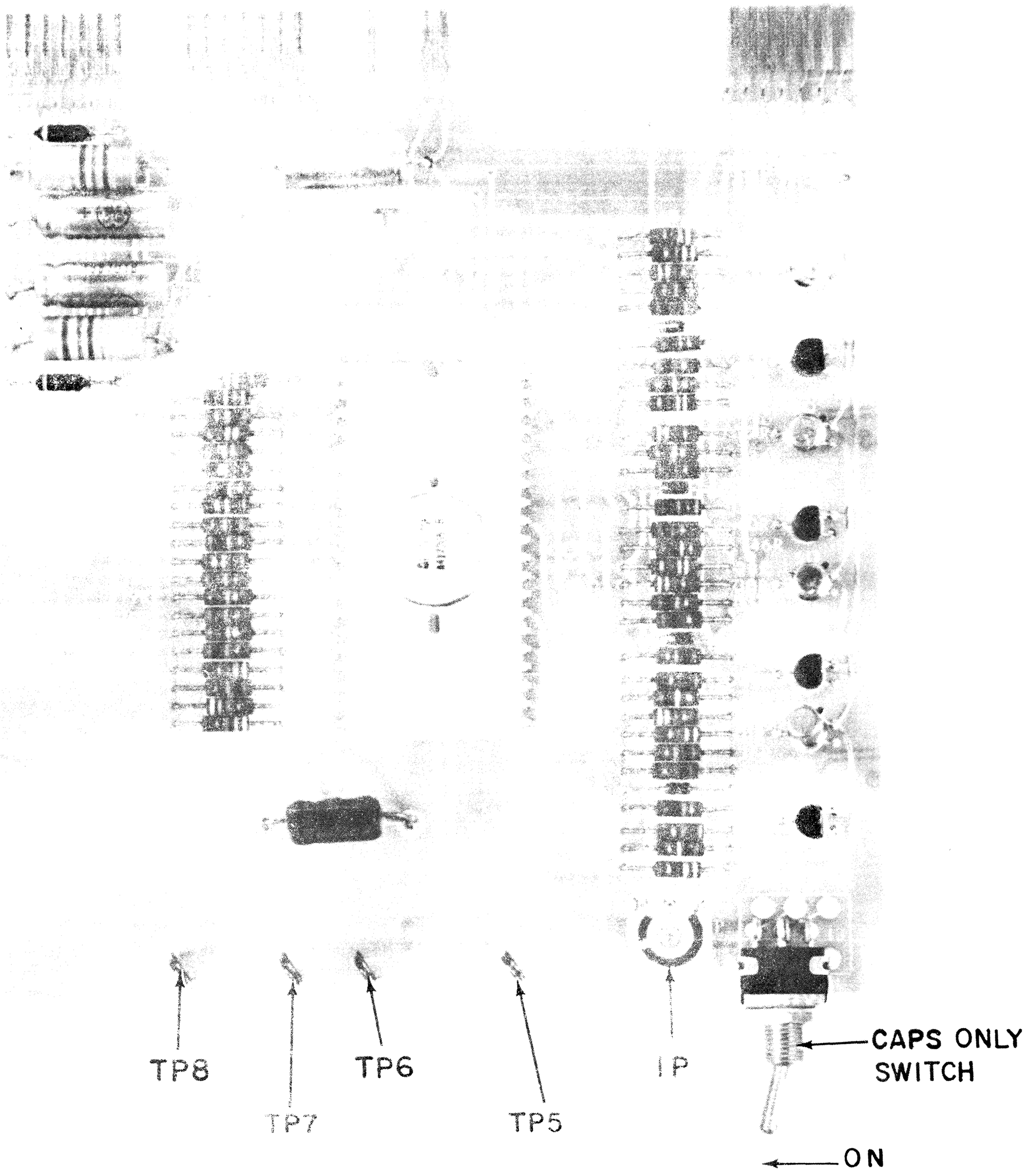
When a character without the 6th bit is struck, amplitude should be less than 4V

Sync: -

TP8 = Sense Line Leading Pulse (SLLP)



Sync: -



KIF

LAMP REGULATOR BOARD (LMP)

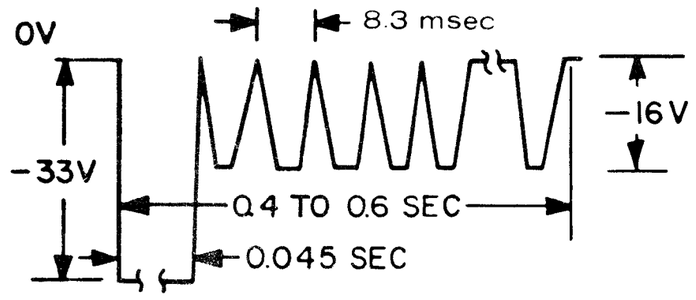
44B412165-G01

FUSES 1FU = 3/8A Pico, + 20V

STRAPS None

TEST POINTS

TP1 = Ribbon Lift (-RIBV)
Strike a printable Key

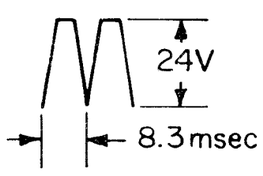


Sync: -

TP2 = +2.3V Regulated (Photocell Lamp Voltage)

TP3 = +20V* (Filtered-Unregulated)

TP4 = +15.6V Regulated (14.8V to 16.5V)



Sync: +

+16V* after filtering

TP6 = +3.0V Hammer Overload Protection (PRT1)

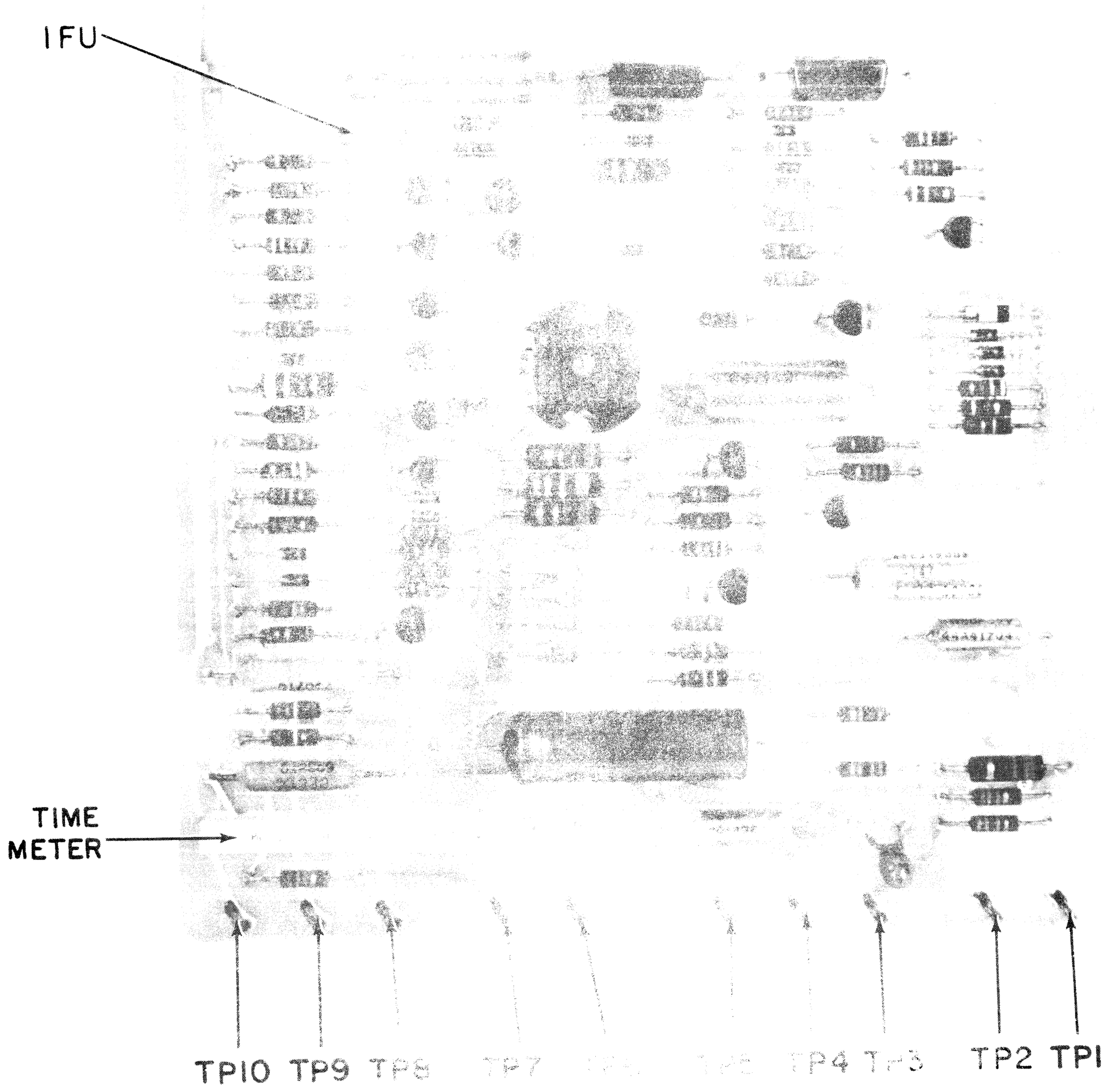
TP7 = -33V* (Filtered - Unregulated)

TP8 = -27.6V Regulated (-27V to -29V)

TP9 = -15.6V (-15.2V to -16.5V)

TP10 = Ground (OV)

*NOTE: Voltages vary with Line Voltage.


IFU
TIME METER
TP10
TP9
TP8
TP7
TP4
TP3
TP2
TP1

MEMORY BOARD (MEM)
44B412[illegible]-G01

FUSES None

STRAPS J1 Installed = Long Print Line (118)
Removed = Short Print Line (75)

TEST POINTS

TP1 = Clock Pulse (CLK)

12 nsec pulse every 8.3 usec

Sync: -

TP2 = Character Strobe Modified ($\overline{CSM}$)

1.7 usec pulse when key is struck

Sync: +

TP3 = Print Space Inhibit ($\overline{PSI}$)

1.1 usec pulse when non printable key is struck

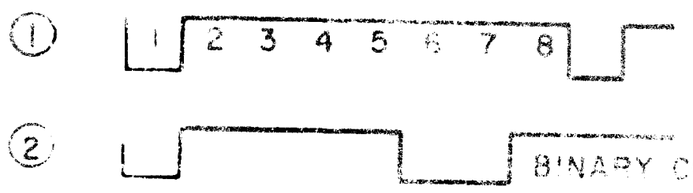
Sync: +

TP4 = Hold Ribbon Up (HOLD)

0.4 to 0.6 sec pulse every printable character

Sync: -

TP5 = Serial Character Count (64A) (Probe 2)*
TP2 CLC BOARD (Probe 1)



Repeat "A" Shown

Sync: - from probe 1

TP6 = Bit 1 of Column Count (XD)

Strike CR, -10 to -15V
Alternates between 0V and above voltage as PPI advances

Sync: [illegible]

TP7 = [illegible] up figure (PICK)

40 to 50 nsec pulse every printable character

Sync: -

TP8 = Write Pulse A Section (WPA)

[illegible] Pulse when key is struck

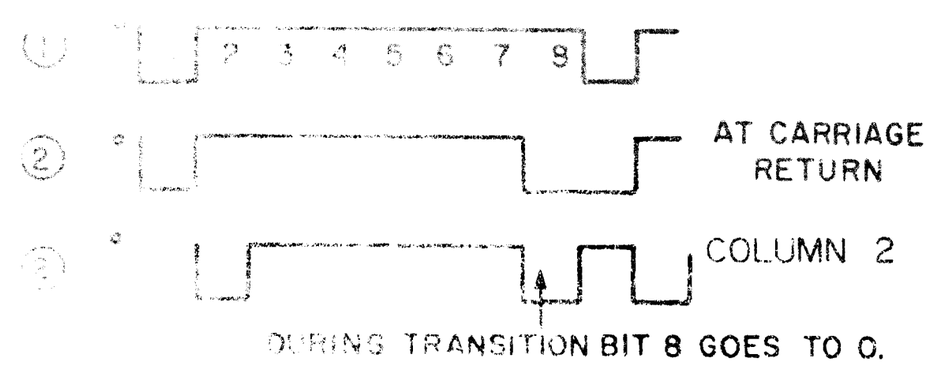
Sync: -

TP9 = Line Feed Go (LFG)

Single LF struck, 8.3 msec pulse
Double LF Struck, 25 msec pulse

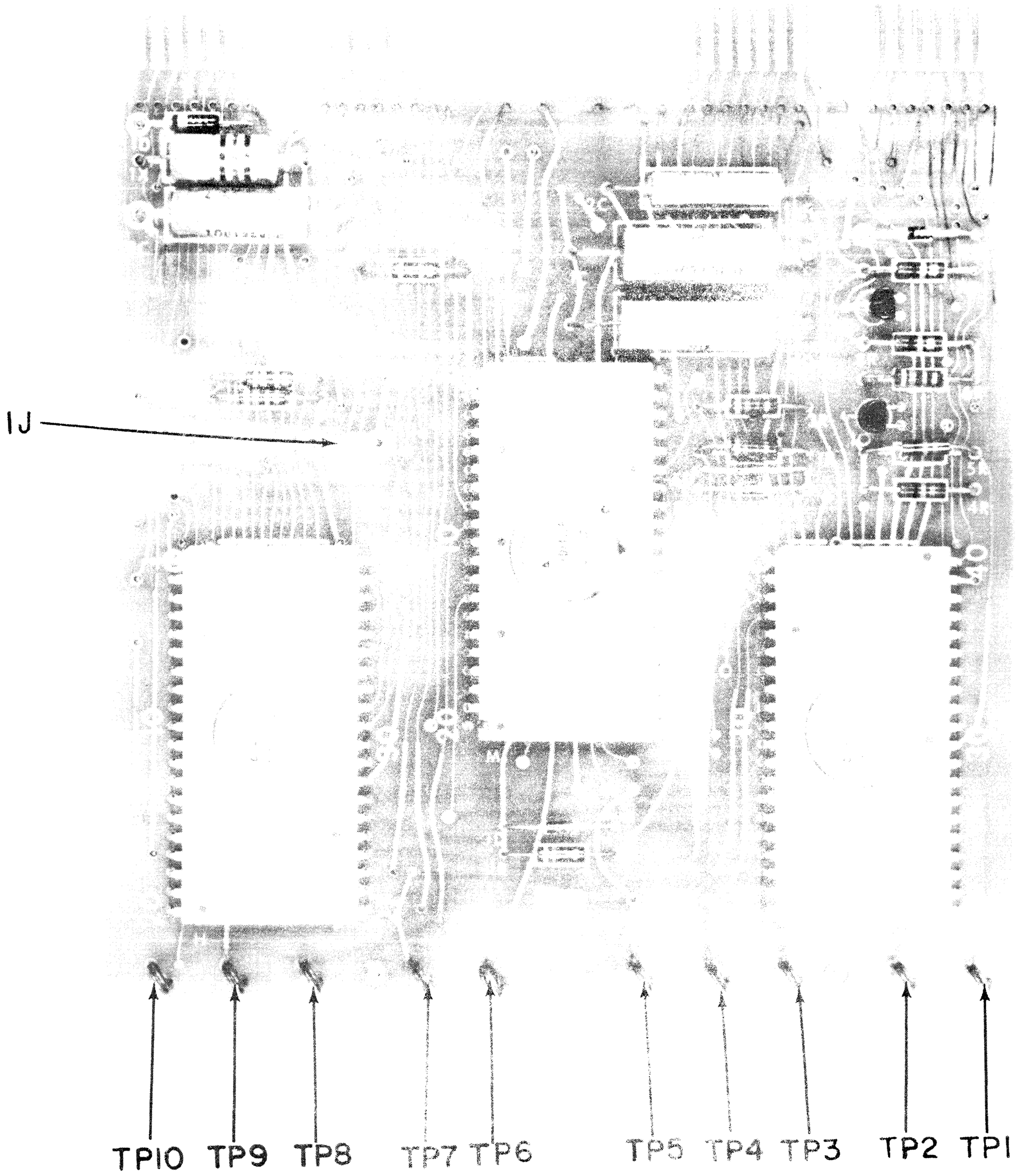
Sync: +

TP10 = Serial Column Count (64B) (Probe 2)*
TP2 [illegible] (Probe 1)



Sync: - from probe 1

*Note: Adjust Sweep on probe 2 as needed.


IJ
TP10
TP9
TP8
TP7
TP6
TP5
TP4
TP3
TP2
TP1
MEM

MODEM BOARD (MOD)

44A417330-001

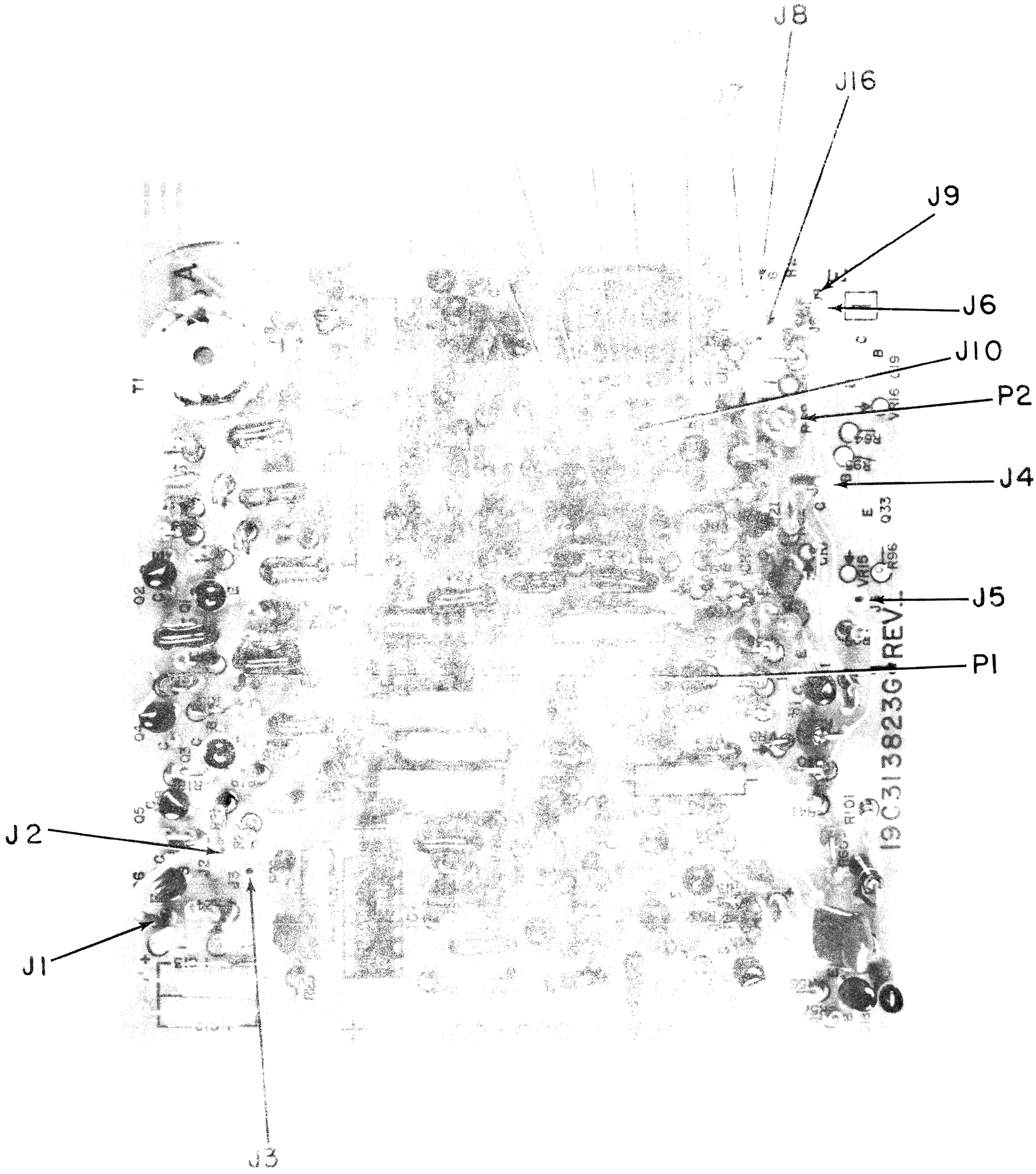
FUSES	None				
STRAPS	Transmitter Level (DBM)	0	J10 (B) TO	J11	
		-3	J10 (B) TO	J12	
		-6	J10 (B) TO	J13	
		-9	J10 (B) TO	J14	Factory Setting
		-12	J10 (B) TO	J15	
	Receive Sensitivity (DBM)	-40	J1 (A) TO	J3	Factory Setting
		-50	J1 (A) TO	J2	
	Request To Send - On		J7 (D) TO	J8	
	- Controlled by Terminet		J7 (D) TO	J9	
	- Controlled by Rec. Line		J7 (D) TO	J16	Factory Setting
	Normal - Transmit Data Connected to Terminet		J4 (C) TO	J6	Factory Setting
	Test - Receive Data Connected To Transmit Data		J4 (C) TO	J5	

POT P1 = Factory Adjustment - DO NOT CHANGE

P2 Factory Adjustment - DO NOT CHANGE

TEST POINTS None

Note: During installation of the Modem board and the associated Data Access Arrangement, check with the Telephone Company to insure the Transmit Level and Receive Sensitivity are adequate.


J8
J16
J9
J6
J10
P2
J4
J5
P1
J2
J1
J3
IC3138236 REV.

PARITY ERROR BOARD (PAR)

44B412260-G01

(Old Model*)
(This board is no longer in production)

FUSES None

STRAPS 1J Installed, 2J Removed = Checks "Even" parity.
2J Installed, 1J Removed = Check "Odd" parity.
3J Installed, Stops error detection during "Transparency" mode of operation.
4J Installed = Causes the following when error is detected:
(1) Momentary alarm sounds.
(2) BREAK signal is transmitted.
(3) Motor turns off.
(4) Reader turns off.

SWITCH S1 = On/Off switch for Parity Error Detection

TEST POINTS

TP3 = Interrupt Lamp Node (INTLND) - Occurs simultaneously with $\overline{CSM}$ upon error detection.

One Pulse per error
1.7 msec at 30 cps
3.4 msec at 15 cps
4.6 msec at 10 cps

Sync: -

TP4 = Inhibit Print (INHPRT)

With Transparency switch on,
-10 to -15V
With Transparency switch off,
OV

Sync: None

CAUTION

Insure the Board in question matches the picture shown. The Strapping Options on these PAR boards are Different.

*It can be used in B Model machines with the Removal of 4J but it will not print.

FOR 230 VOLT MODELS

PARITY ERROR BOARD (PAR)
44B412260-G01
(New Model)

FUSES None

STRAPS 1J Installed, 2J Removed= Checks "Odd" parity.
2J Installed, 1J Removed = Checks "Even" parity.
3J Installed = Causes the following when error is detected:
(1) Momentary alarm sounds
(2) BREAK signal is transmitted.
(3) Motor turns off.
(4) Reader turns off.
4J Installed = Stops error detection during "Transparency" mode of operation.

SWITCH S1 On/Off switch for Parity Error Detection

TEST POINTS

TP3 = Interrupt Lamp Node (INTLND). Occurs simultaneously with $\overline{CSM}$ upon error detection.

One pulse per error
1.7 msec at 30 cps
3.4 msec at 15 cps
4.6 msec at 10 cps

Sync: -

TP4 = Inhibit Print (INHPRT)

With Transparency switch on,
-10 to -15V
With Transparency switch Off, OV

Sync: None

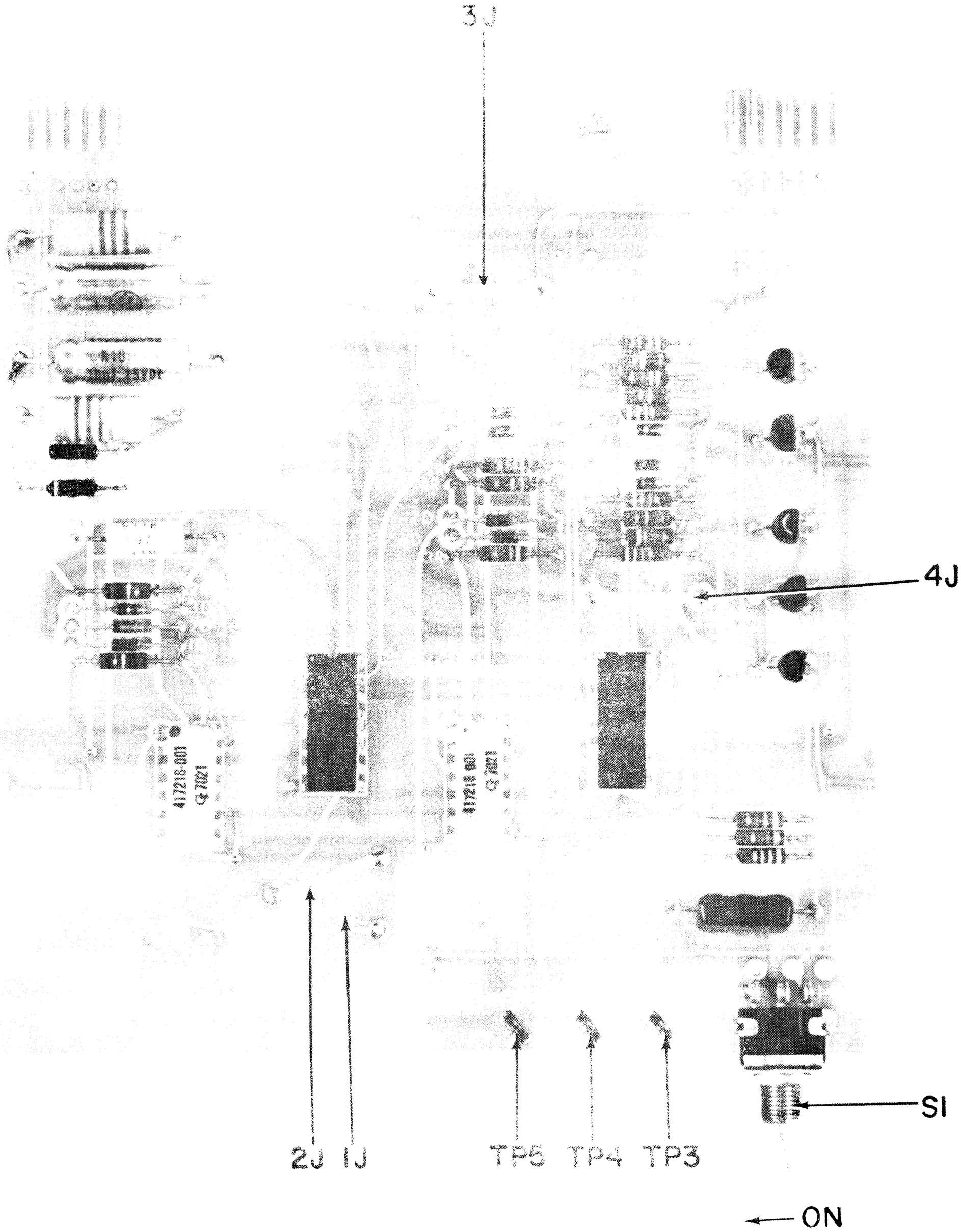
TP5 = Word 127 (W127)

96μ sec pulse every error detection. Begins at end of WPA, stops at end of next $\overline{T64}$ clock pulse.

Sync: -

CAUTION

Insure the Board in question matches the picture shown. The Strapping Options on these PAR boards are different.



PAR NEWER MODEL

PHOTOCELL AMPLIFIER BOARD (PCA)

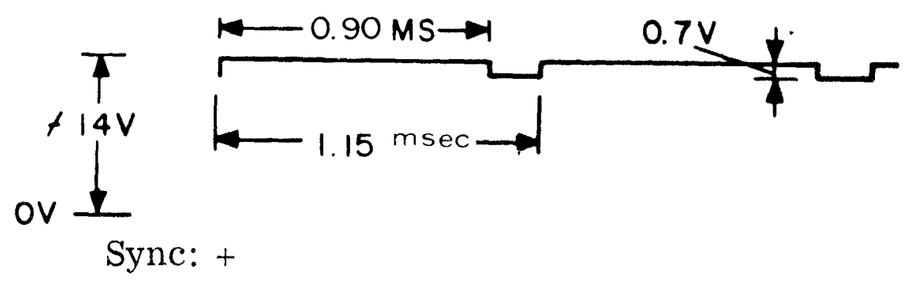
44B412166-G01

FUSES None

STRAPS All straps Factory Jumpers - DO NOT REMOVE OR REPLACE

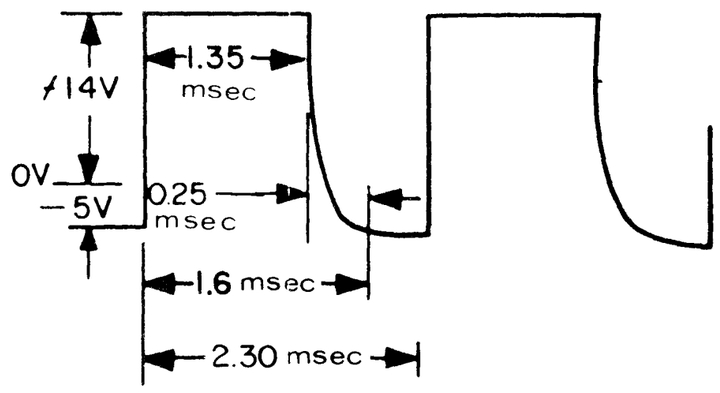
TEST POINTS

TP1 = Hammer Bus Sync Signal (SYNC)



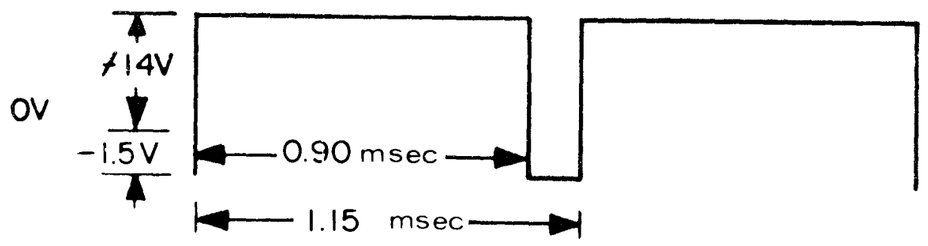
Sync: +

TP2 = Odd Photocell Input (ODD IN)



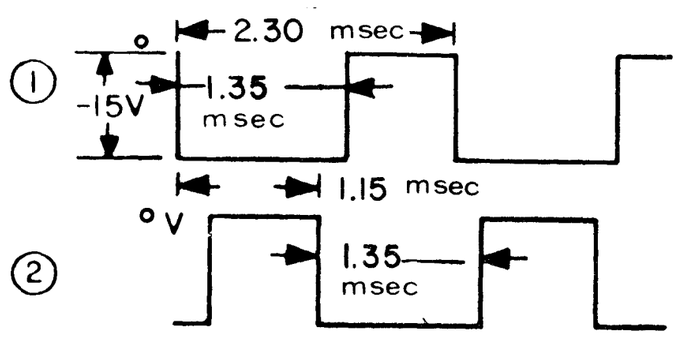
Sync: +

TP3 = Odd Even Drive Time (OE)



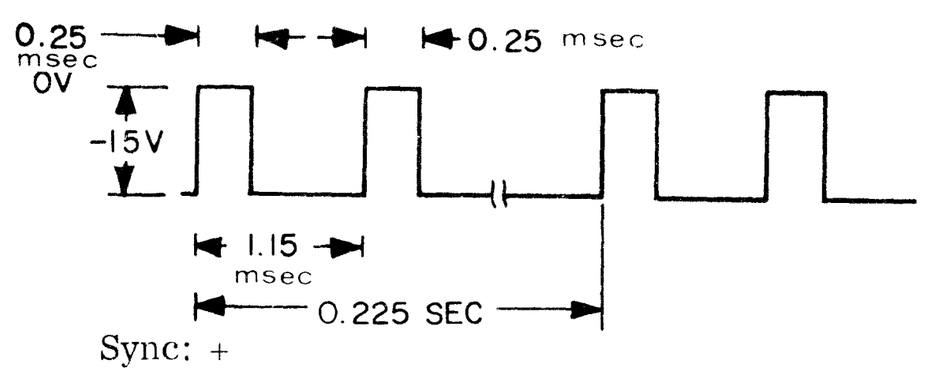
Sync: +

TP4 - Even Finger (EF) (Probe 1)
TP6 - Odd Finger (OF) (Probe 2)



Sync: - from probe 1

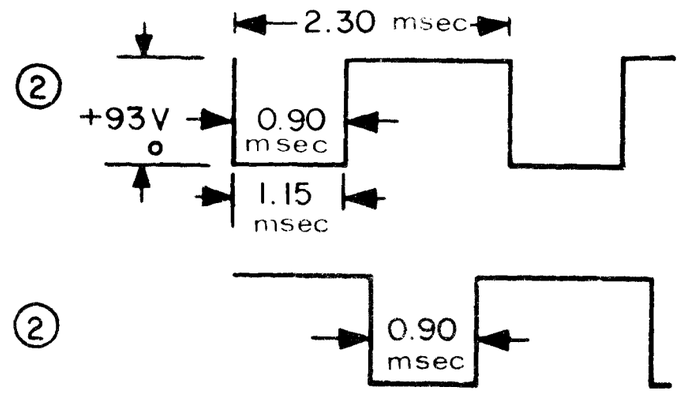
TP5 = (FONT SIGNAL)



Sync: +

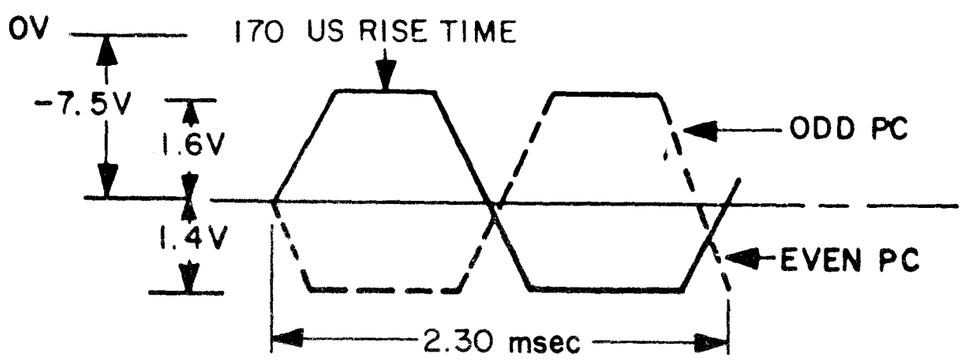
TP7 = (EVEN DRIVE) (Probe 1)
TP10 = (ODD DRIVE) (Probe 2)

REMOVE POWER BEFORE CONNECTING SCOPE



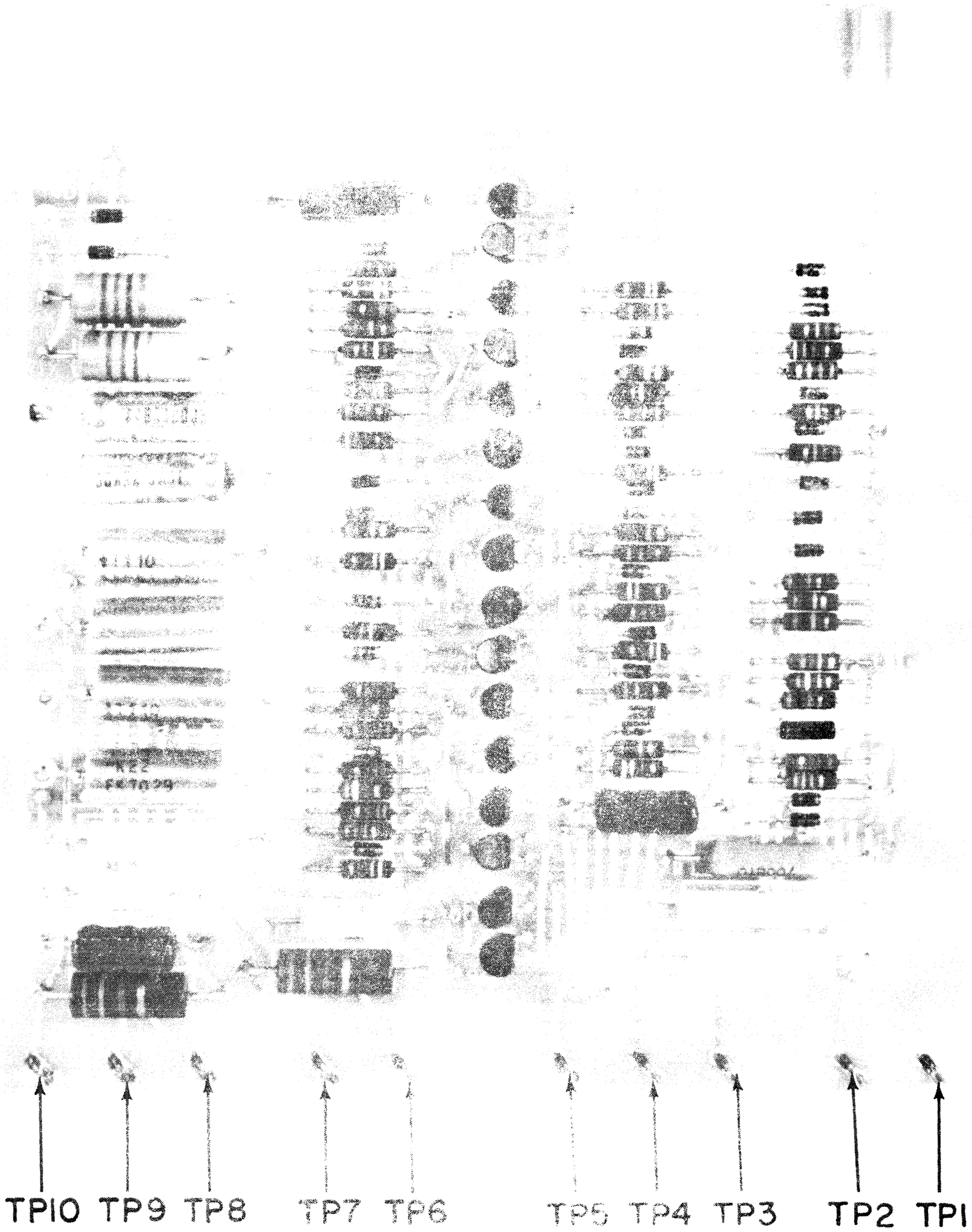
Sync: - from probe 1

TP8 = Even Photocell (EVEN PC) (Probe 2)
TP9 = Odd Photocell (ODD PC) (Probe 1)



Sync: + from probe 1

All waveforms subject to pulse position jitter



PCA

LOW VOLTAGE POWER SUPPLY BOARD (POW)

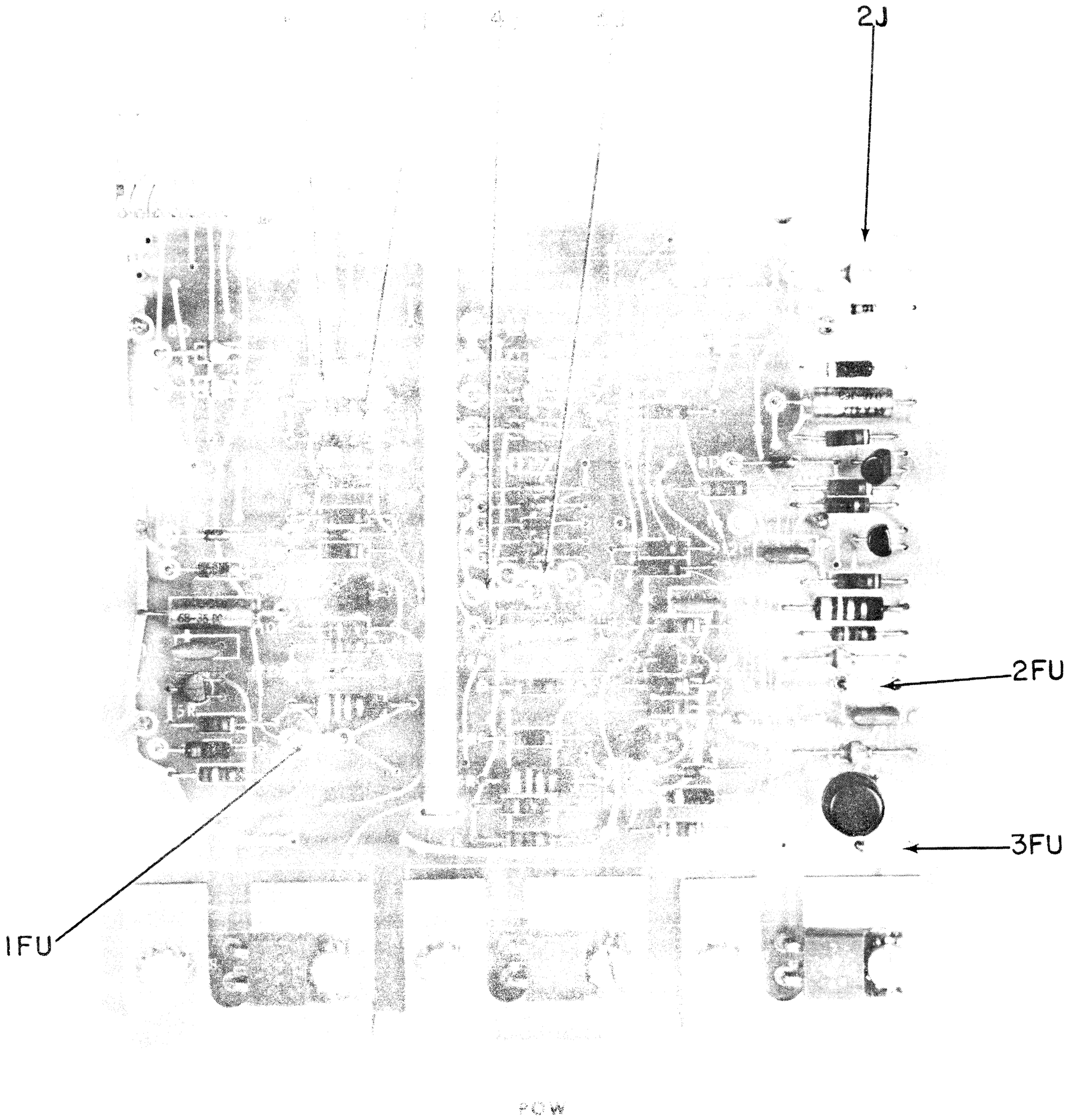
44B412170-G01, G02, & G03

FUSES (Group 1) 1FU = 3/4A Pico, + 15V Supply
2FU = 3/4A Pico, -15V Supply
3FU = 3/4A Pico, -27V Supply

(Group 2,&3) 1FU = 1 1/2A Pico, +15V Supply
2FU = 1 1/2A Pico, -15V Supply
3FU = 1 1/2A Pico, -27V Supply

STRAPS All Straps Factory Jumpers - DO NOT REMOVE

TEST POINTS None


2J
2FU
3FU
1FU
POW

PRINT POSITION INDICATOR BOARD (PPI)

44B412162-G01

FUSES None

STRAPS None

TEST POINTS

TP1 = Count Down (CDN)

One 12 μsec pulse every "Backspace" character

Sync: -

TP2 = Command to Count (COUNT)

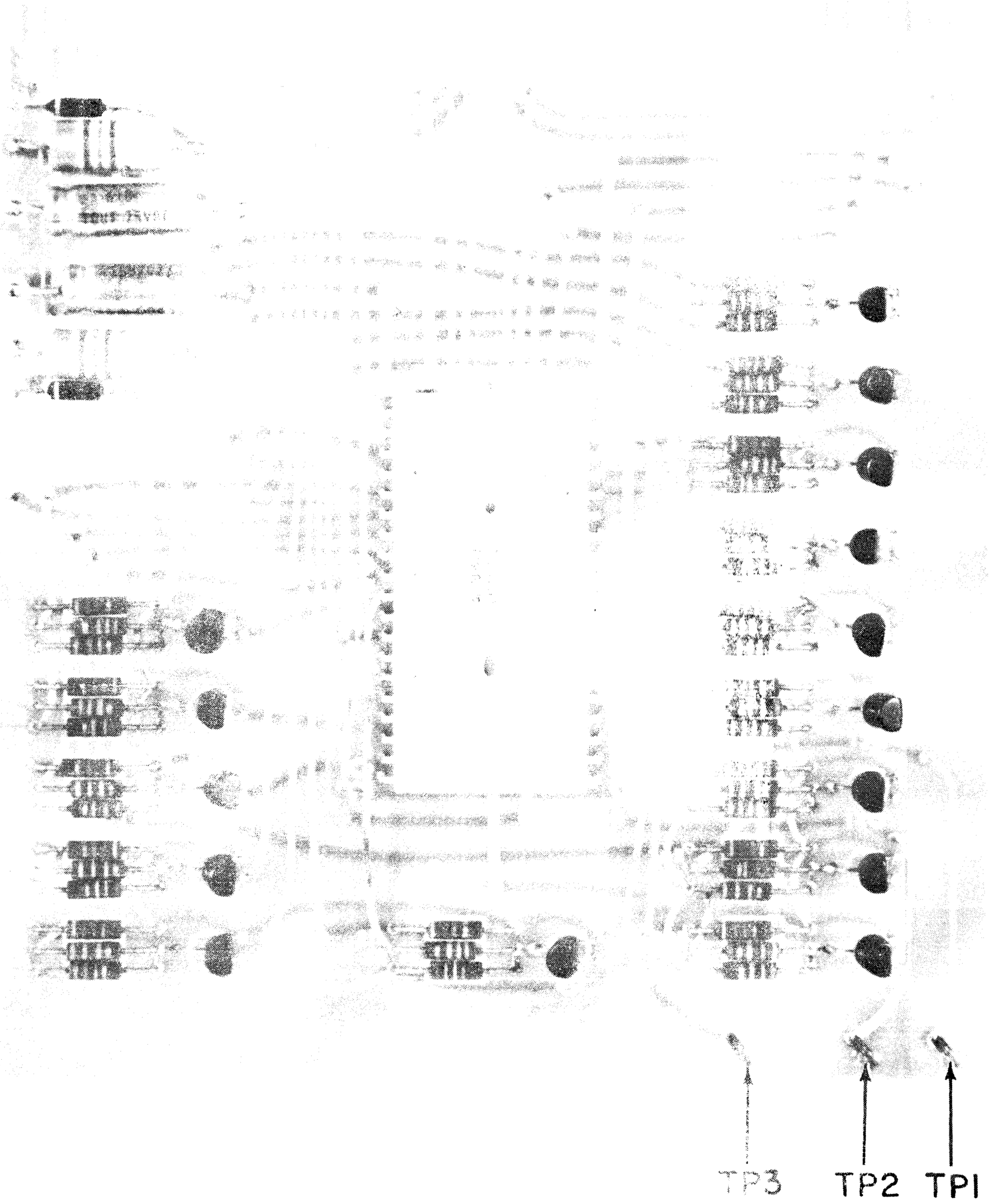
One 12 μ sec pulse every "Space" or printable character

Sync: -

TP3 = Reset Counter to 1 ($\overline{\text{1 SET}}$)

One 1.7 msec pulse every "Carriage Return"

Sync: +



PPI

PROTECTION BOARD (PRO)

44B412164-G01

FUSES None

STRAPS None

POTS P1 = Belt Speed Cutoff Adjustment - DO NOT CHANGE
P2 = Line Voltage Cutoff Adjustment - DO NOT CHANGE

TEST POINTS

TP1 = Hammer Bus Protection (PRT 3)

+9V with motor stopped and during fault condition. Goes to OV approx. 280 msec after the motor starts.

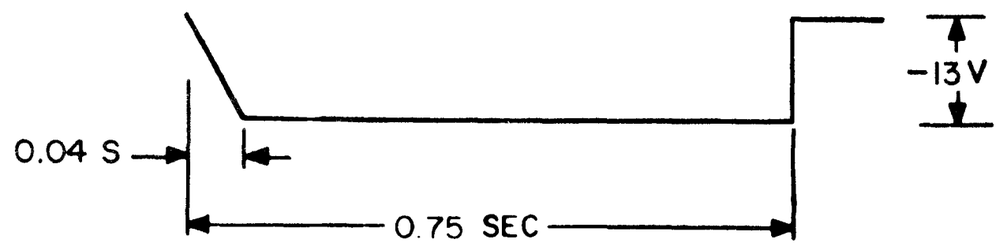
Sync: None

TP2 = Delayed 13V (SLO13)

+15V Approx. 750 msec after power is applied (OV during low voltage condition stops motor).

Sync: +

TP8 = Low Voltage signal (LV) when power is applied (also during low voltage condition).



Sync:

TP9 = Speed/Voltage Fault Signal (S/V)

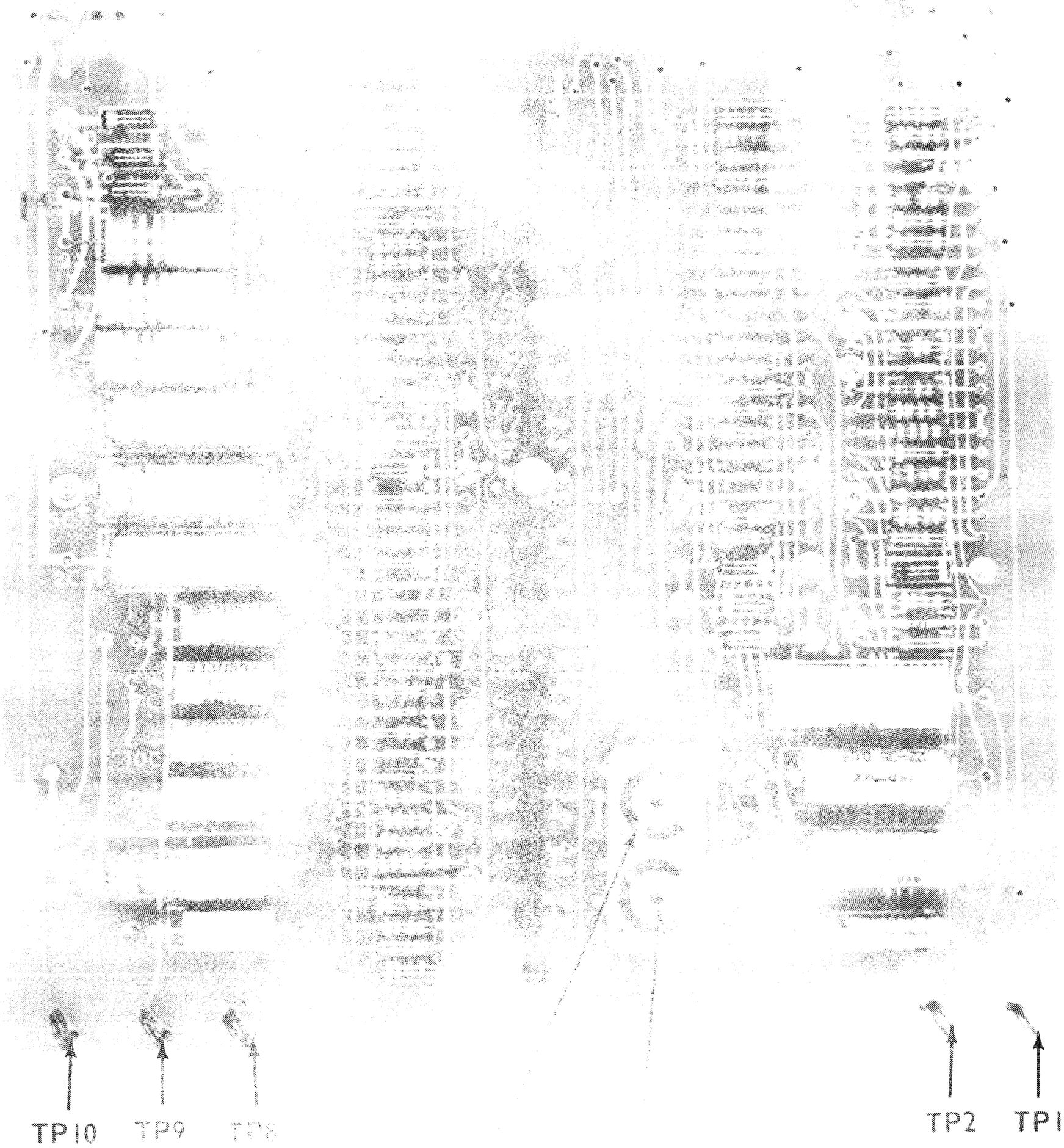
-15V with motor stopped. Goes to OV approx. 280 msec after motor starts. -15V during fault condition

Sync: None

TP10 = Hammer Coil Protection (PRT2)

+1.5V to +7V
Approx. -15V during fault condition.

Sync: None


TP10
TP9
TP8
TP2
TP1

PARALLEL TO SERIAL CONVERTER (PSC/1)

44B412154-G01

FUSES None

STRAPS
1J Installed = Two stop bits at 10 cps
2J Installed = Two stop bits at 15 cps
3J Installed = Two stop bits at 30 cps

NOTE: If more than one jumper is used, all jumpers must be replaced with signaling diodes.

Cathode will be toward the common side of the jumpers.

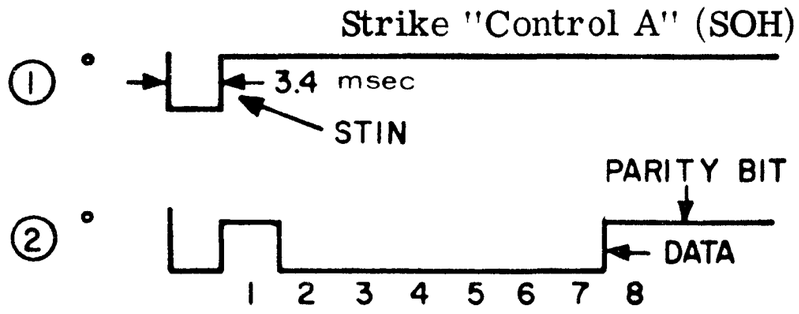
TEST POINTS

TP1 = Generated Data ($\overline{GENDAT}$) (Probe 2)
TP4 = Strobe in (STIN) (Probe 1)

NOTE

Even though $\overline{GENDAT}$ is a "barred" signal, it will rest at OV between characters.

Strike "Control A" (SOH)



Any character can now be struck. Bit levels will follow the numbers in Waveform Two Above.

Sync: - from probe 1

TP2 = Input strobe without Parity ($\overline{ISWOP}$)

One 12 μ sec pulse every 33 msec during Answerback transmission at 30 cps.

Sync: +

TP3 = Input strobe with Parity ($\overline{ISWIP}$)
Start a tape through the Reader

One 12 μ sec pulse every 33 msec. Pattern changes for "CR", "LF", "BS" and "ESC O".

Sync: +

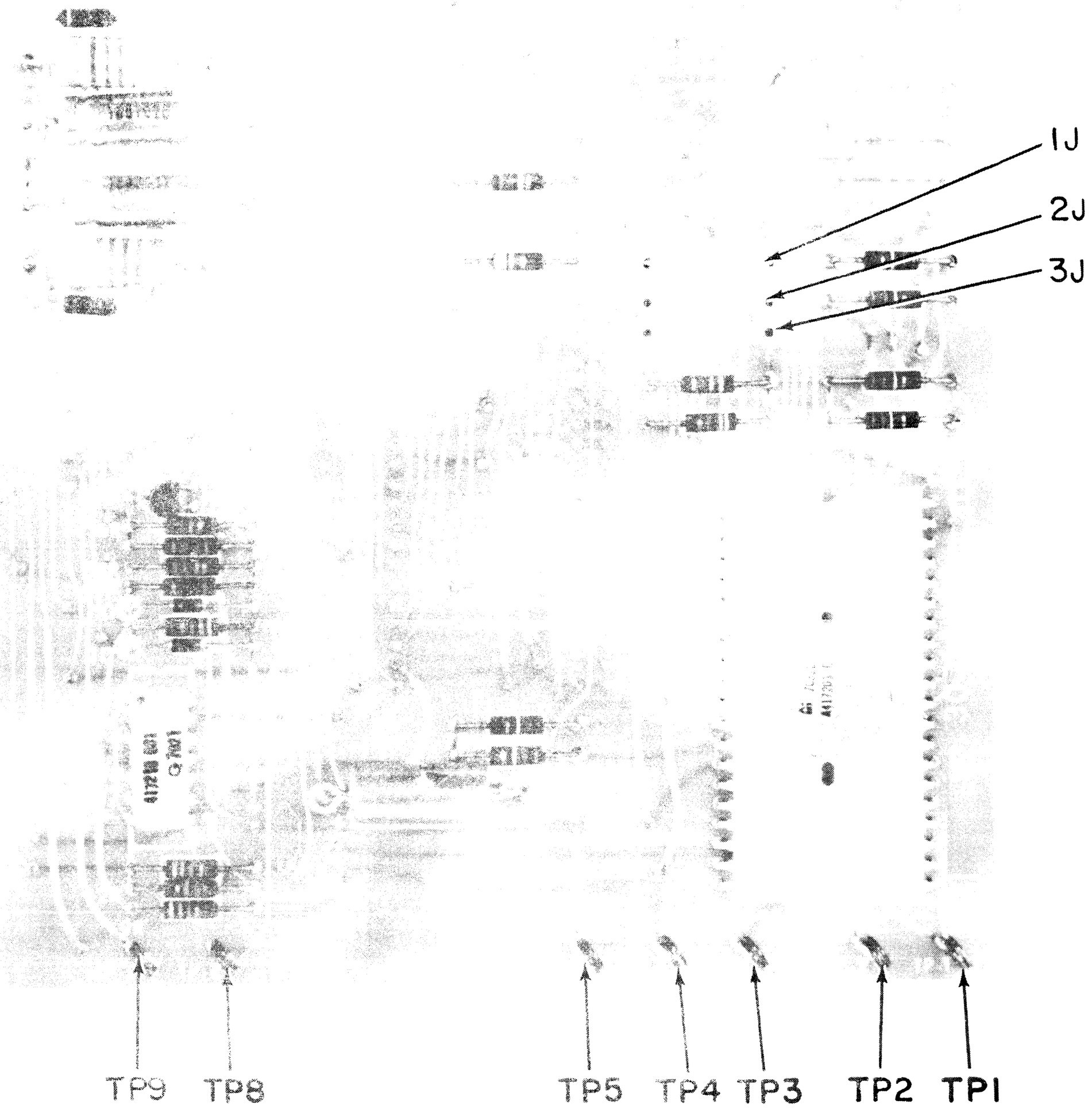
TP4 = Strobe In (STIN)

One 3.4 msec pulse every time a key is struck

Sync: -

TP8 = Keyboard strobe ($\overline{KS}$)
Strike a Key

Sync: +



PSC/1

PARALLEL TO SERIAL CONVERTER (PSC/2)

44B412154-G02
With Line Turn Around

FUSES None

STRAPS 1J Installed = Two stop bits at 10 cps
2J Installed = Two stop bits at 15 cps
3J Installed = Two stop bits at 30 cps

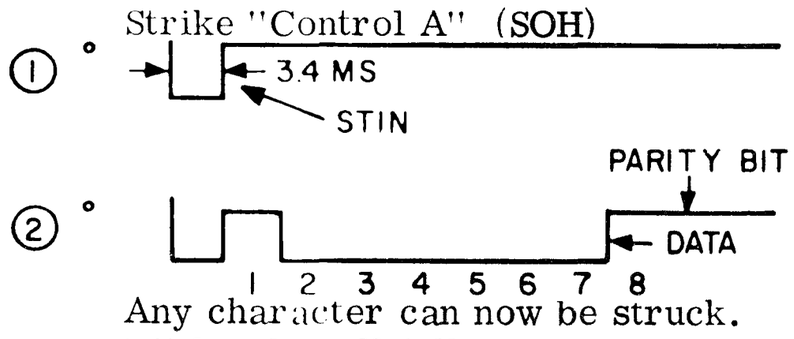
NOTE: If more than One Jumper is used, All jumpers must be replaced with signaling diodes.

Cathode will be toward the common side of the jumpers.

TEST POINTS

TP1 = Generated Data ($\overline{GENDAT}$) (Probe 2)
TP4 = Strobe In (STIN) (Probe 1)

Strike "Control A" (SOH)



Any character can now be struck. Bit levels will follow the numbers in Waveform Two above

Sync: - from probe 1

TP2 = Input strobe without Parity ($\overline{ISWOP}$)

One 12 μ sec pulse every 33 msec during Answerback

Sync: +

TP3 Input strobe with Parity ($\overline{ISWIP}$)
Start a tape through the Reader

One 12 μ sec pulse every 33 msec. Pattern changes for "CR", "LF", "BS" and "ESC O".

Sync: +

TP4 = Strobe In ($\overline{STIN}$)

One 3.4 msec pulse every time key is struck

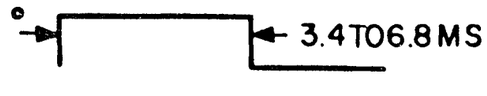
Sync: -

TP5 = Transmit Turn Control (XTC)

One 1.7 msec pulse when "ACK" code is received.

Sync: -

TP8 = Keyboard Strobe ($\overline{KS}$)
Strike a Key

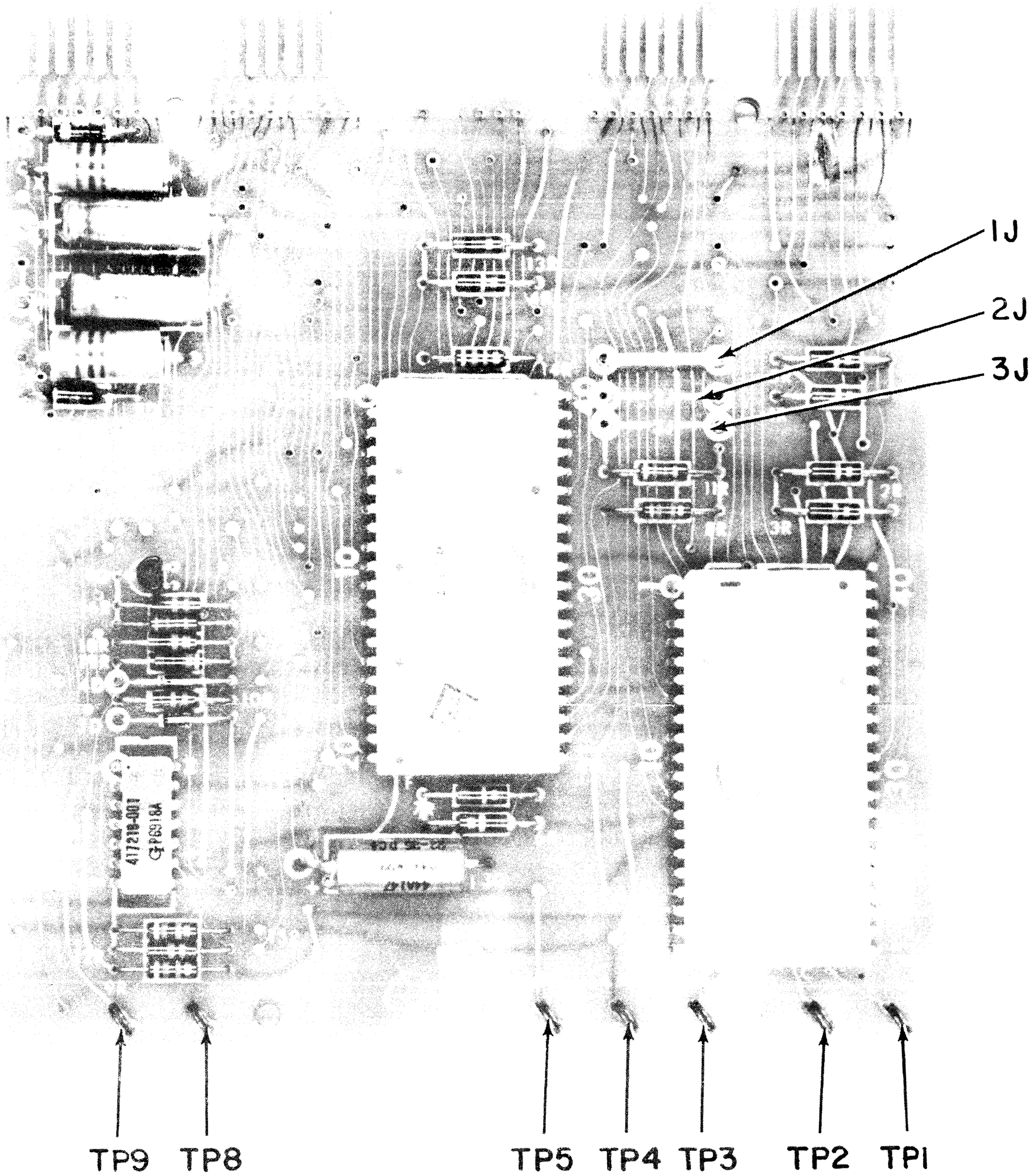


Sync: +

TP9 = Printer Turn to Receive (PTTR)

One 1.7 msec pulse when "ACK" is transmitted at 30 cps.

Sync: -



PSC/2

READER AND PUNCH BOARD (R&P)

44B412163-G01

FUSES None

STRAPS
1J Installed = Reader will not turn off when RDR off is received.
Removed = Reader will turn off when RDR OFF is received.
1-2 Installed = Inhibits Reader generated delays at LO
3-4 Installed = Inhibits Reader generated delays at MED
5-6 Installed = Inhibits Reader generated delays at HI

TEST POINTS

NOTE: TP1 through 6 is with Reader On. TP8 is with Punch On.

TP1 = Read Tape and Advance ($\overline{STEP}$)

One 3.4 msec pulse for each character read.

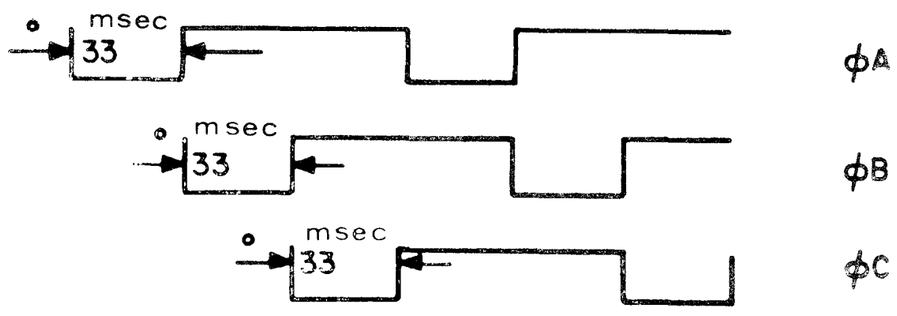
Sync: +

TP2 = Reader Go (GO)

One 12 μ sec pulse for each character read.

Sync: -

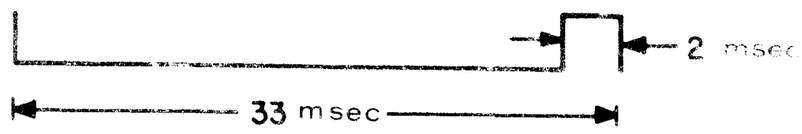
TP5 = Phase A (ØA)
TP4 = Phase B (ØB)
TP3 = Phase C (ØC)



"CR", "LF", "BS" and "ESC" codes will lengthen the pulses

Sync: -

TP6 = Sprocket (SPKT)



Sync: -

TP7 = 536 msec Clock ($\overline{536MS}$)

One 12 μ sec pulse every 536 msec

Sync: +

TP8 = Advance Tape (ADV)

One 12.4 msec pulse for every punched character.

Sync: -

TP9 = Tape Out Flip Flop ($\overline{PTOF}$)

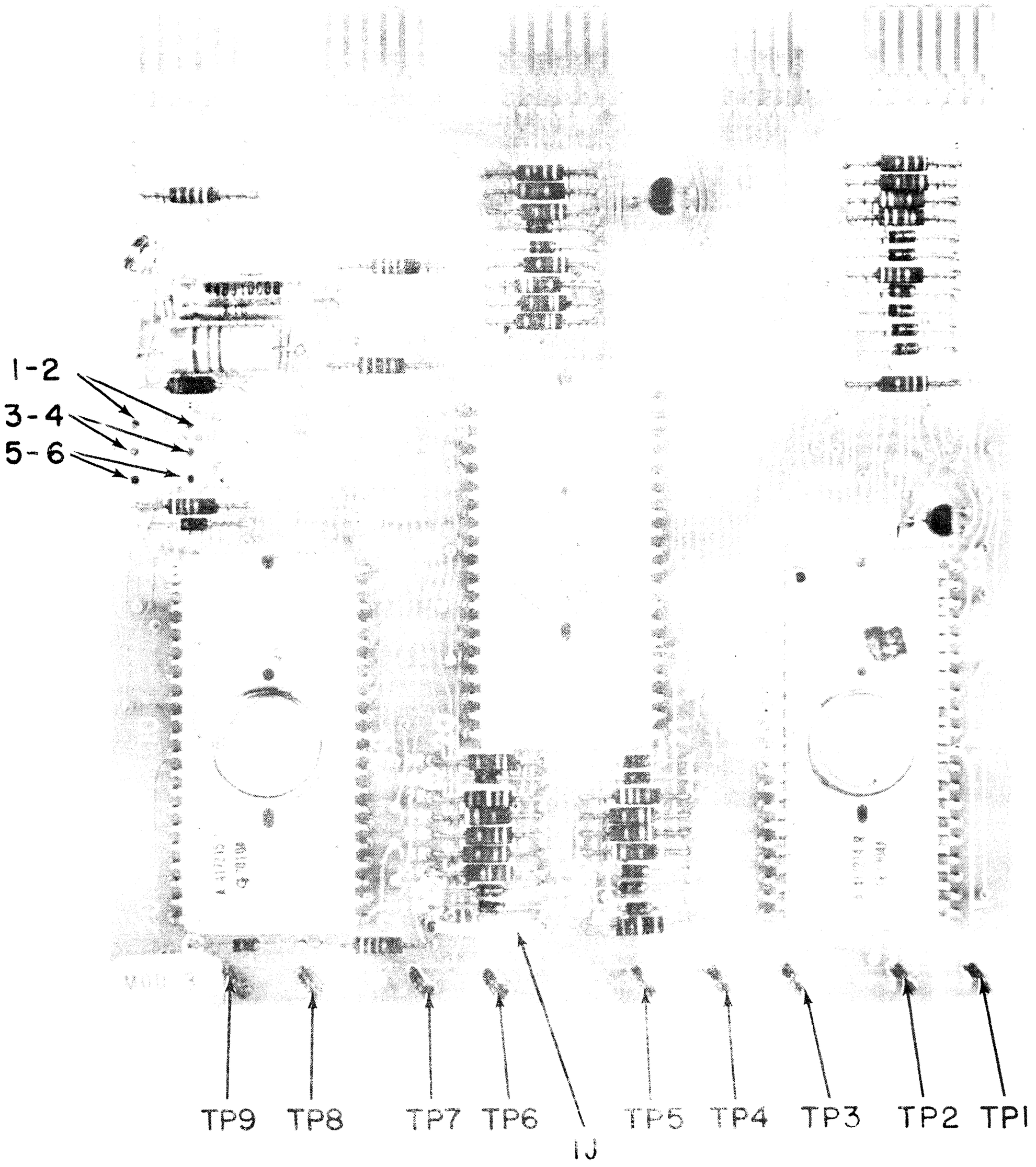
With Punch On

-15V, when Punch has Tape
OV, when Punch runs out of Tape

With Punch Off

-15V

Sync: None



R & P

SERIAL TO PARALLEL CONVERTER BOARD (SPC)

44B412156-G01

FUSES None

STRAPS
1J Installed, 2J Removed = Inhibits Echo-Plex operation
1J Removed, 2J Installed = Allows Echo-Plex operation and local printing.
3J Installed = Allows control of Motor On and Motor Off function with received codes only.
= Allows full duplex operation and inhibits local printing when an Escape semi-colon is recognized.
Allows local printing and full duplex operation to be discontinued when an Excape colon is received.
3J Removed Allows control of Motor On and Motor Off function with recognized Escape codes.

TEST POINTS

TP1 = Detect Break (DET BK)

One 12 μ sec pulse when interrupt is received

Sync: -

TP2 = Decoded Output 0 ($\overline{SZ}$)

1.7 msec pulse when Space Bar is struck

Sync: +

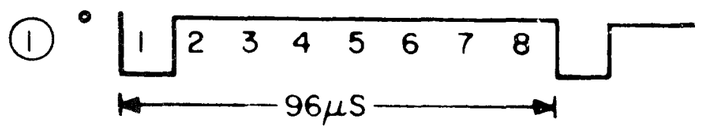
TP3 Incoming Data (DATA)

ASCII Code

Sync: +

TP4 = Belt Count (BC) (Probe 2)*

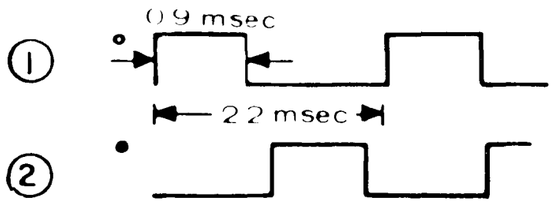
TP2 = CLC BOARD (Probe 1)



Sync: - from probe 1

TP5 Compare Odd (CO) (Probe 1)

TP6 Compare Even ($\overline{CE}$) (Probe 2)



Sync: + from probe 1

TP7 = Font Reset (FR)

12 μs pulse every 220 msec

Sync: -

TP8 = Decoder Output ($\overline{SO}$)

1.7 msec pulse when "CTL SOH" is struck

Sync: +

TP9 = Decoder Output ($\overline{S32}$)

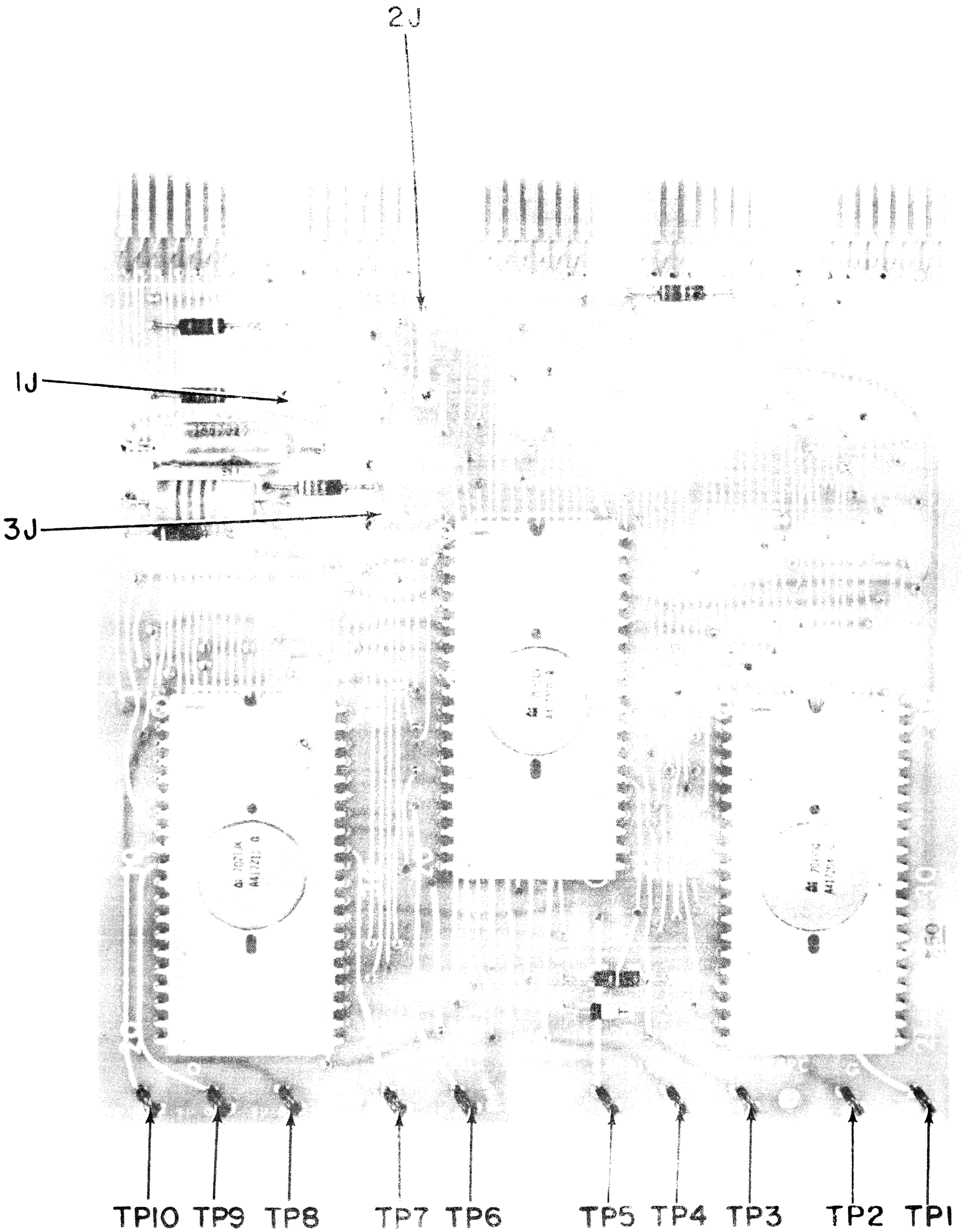
1.7 msec pulse when "Space" is struck

Sync: +

TP10 = Erase Store Flip Flop (EIA)

96 μs pulse when any character is received. Printable characters erased after they are typed. Control characters erased immediately upon being written into memory.

*Note: Adjust sweep on probe 2 as needed



SPC

TIMING AND ALARM BOARD (T & A)

44B412161-G01

FUSES — 1 FU = 1/8A Pico, Phase Two Clock (Ø2)

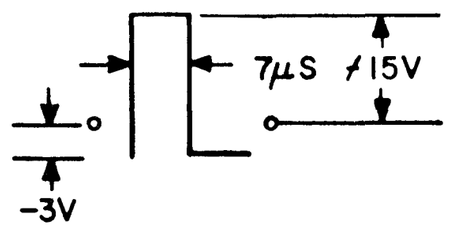
STRAPS — All straps Factory Jumpers - DO NOT REMOVE

POT — 1P = Volume Control for Alarm Beep Tone
2P = Volume Control for Keyboard Beep Tone

TEST POINTS

TP1 = Fire Even Hammers (FEH)

Every time even hammer is actuated



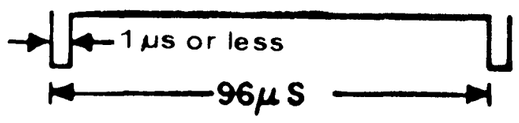
Sync: +

TP2 = Fire Odd Hammer (FOH)

Same waveform as TP1
when odd hammer is actuated

Sync: +

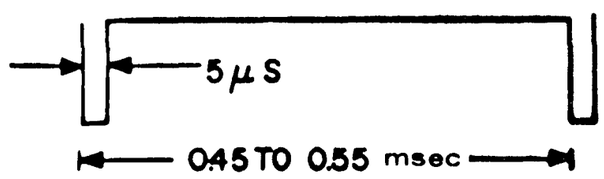
TP3 = Fire Either Hammer ($\overline{\text{FIRE}}$)



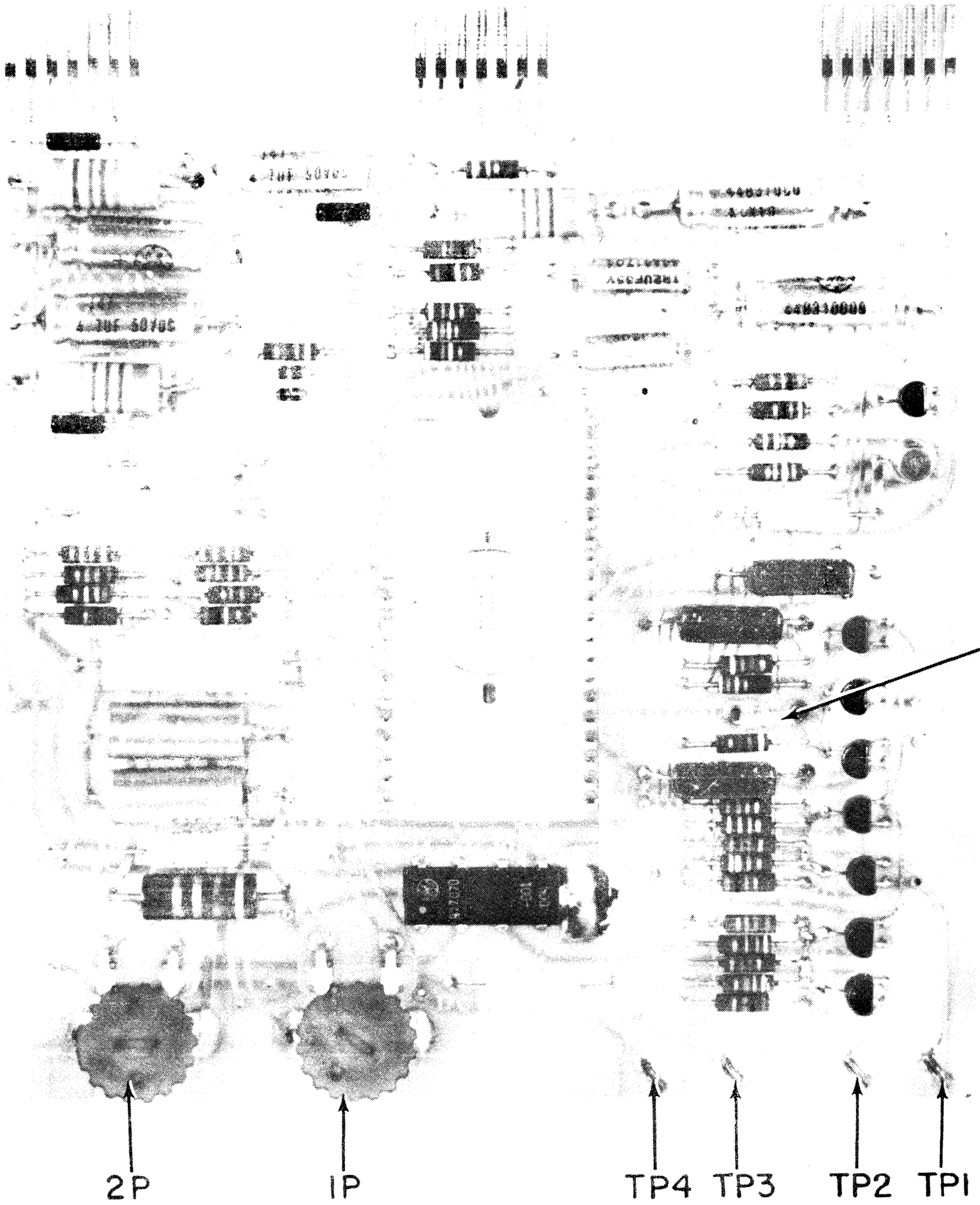
One of above pulses will widen to
12 μs with each print

Sync: -

TP4 = Oscillator 2 kHz (2Kc)



Sync: -



T & A

VERTICAL TAB AND FORM FEED BOARD (VT & FF)

44B412372-G01

FUSES 1FU = 3/8A Pico +20V

STRAPS None

TEST POINTS

NOTE: Unless otherwise specified, all waveshapes are with a "Coded" VT & FF Disc installed.

TP1 = End Delay Eliminator ($\overline{EDE}$) (Probe 1)
TP7 = VT & FF Stored (Probe 2)

Sync: +

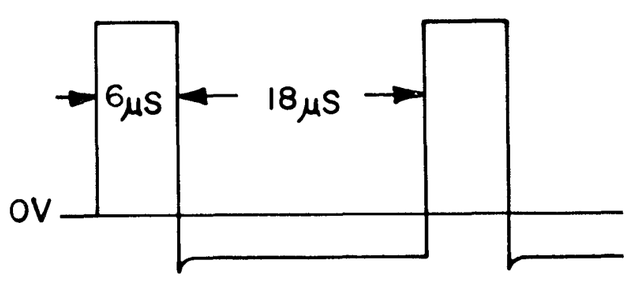
Signal goes from logic 1 (-) to logic 0 (+) with each VT or FF.

Signal length depends on length of VT or FF coding

Sync: +

TP2 = Lamp Voltage Oscillator (LO)

+20



-3

Sync: +

TP3 = VT Decoded Output (VT)

One pulse everytime VT is recognized.

Sync: -

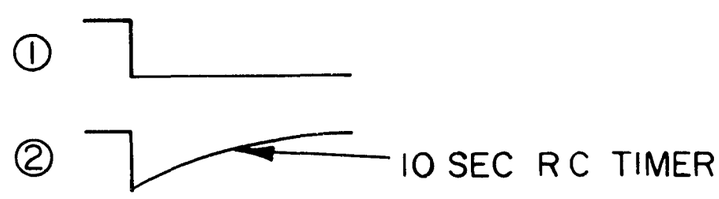
TP4 = VT + FF Start

One pulse at the completion of every VT or FF

Sync: -

TP5 = Fault Timer Input (FTI) (Probe 2)
TP7 = VT & FF Stored (See TP7) (Probe 1)

Use "Uncoded" VT & FF Disc.



Sync: -

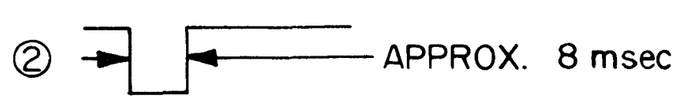
TP6 = FF Decoded Output (FF)

One Pulse every time FF is recognized

Sync: -

TP7 = VT & FF Stored (VT & FF) (Probe 2)
TP8 = VT Photocell (VTP) (Probe 1)

VTP = One pulse for every VT Hole in coding disc.



Signal length depends on length of VT or FF Coding.

Sync: - from probe 2

TP9 = FF Photocell (FFP)

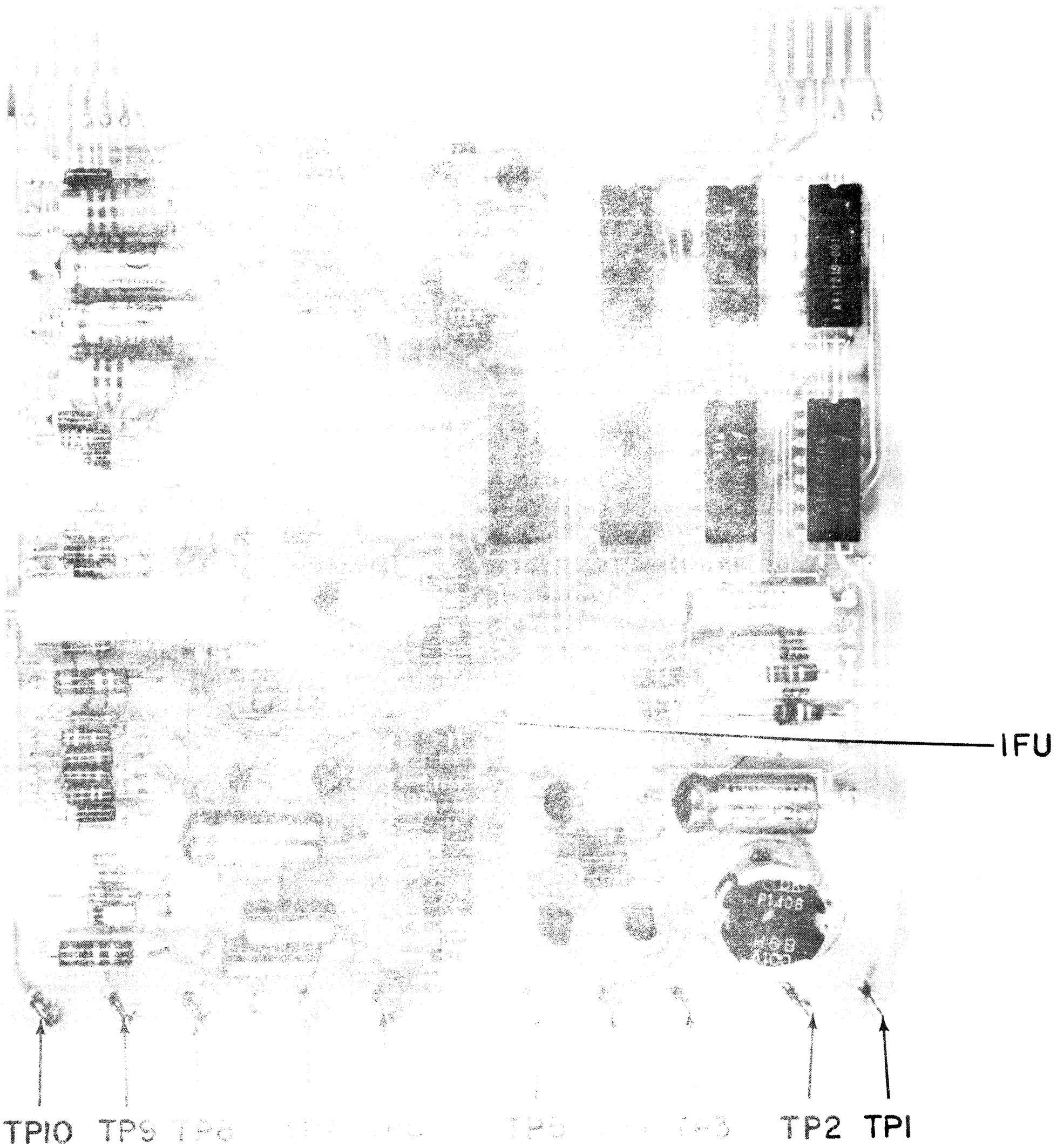
One pulse for every hole in FF row of coding disc

Sync: -

TP10 = Regulated Lamp Supply (LAMP)

+2.1V ± 10%

Sync: None


IFU
TP10
TP9
TP2
TP1

HAMMER DECODER BOARD (HD)

44C414064

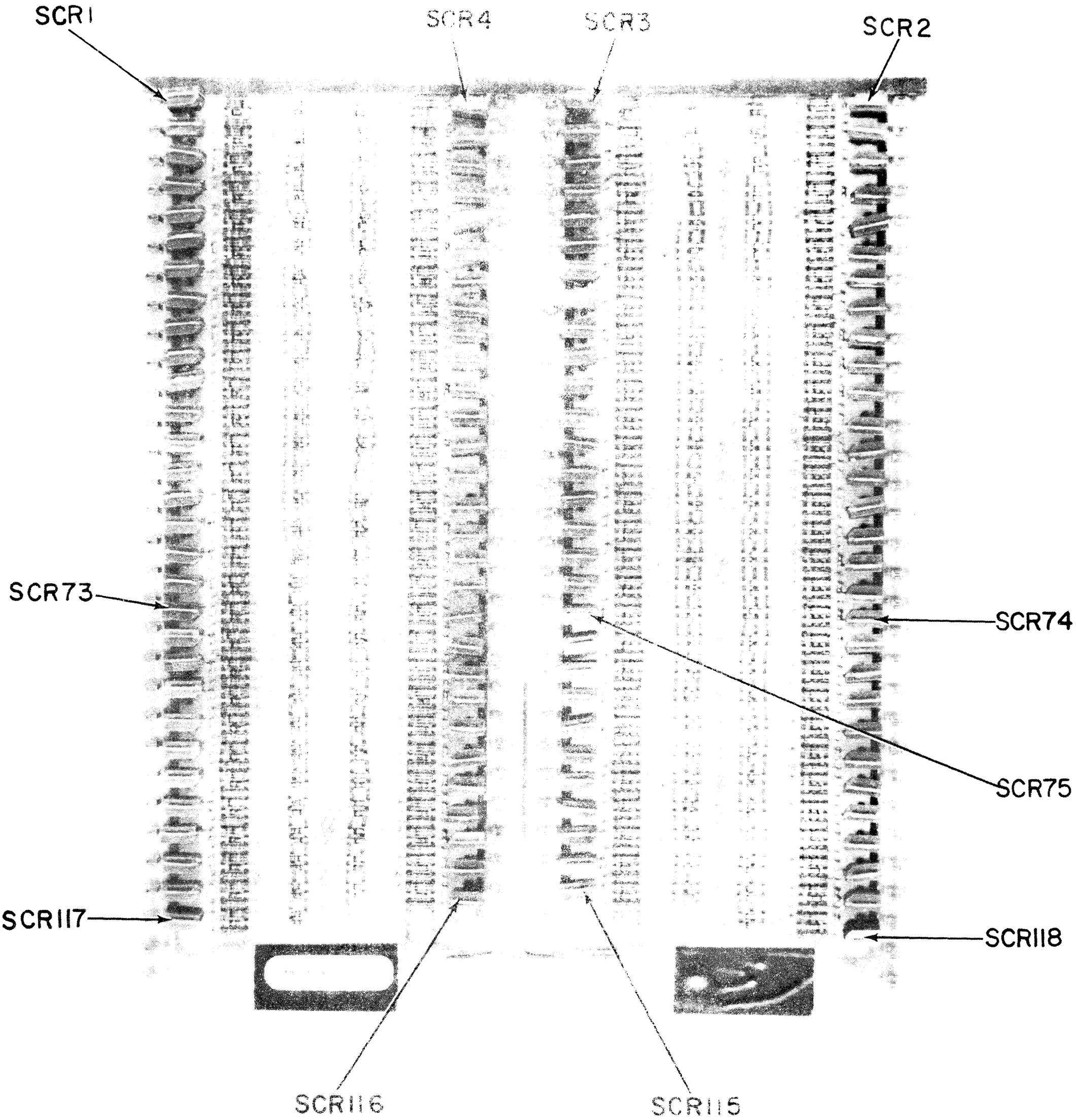
FUSES None

STRAPS None

TEST POINTS None

Board will only have as many SCR's as necessary

50 Print Position = 44C414064-G06 (CGE)
75 Print Position = 44C414064-G01
80 Print Position = 44C414064-G02
118 Print Position = 44C414064-G03
120 Print Position = 44C414064-G04


SCR1
SCR4
SCR3
SCR2
SCR73
SCR74
SCR75
SCR117
SCR118
SCR116
SCR115

HD

HAMMER DRIVER ACCESSORY BOARD (HDA)

44C414063-G01

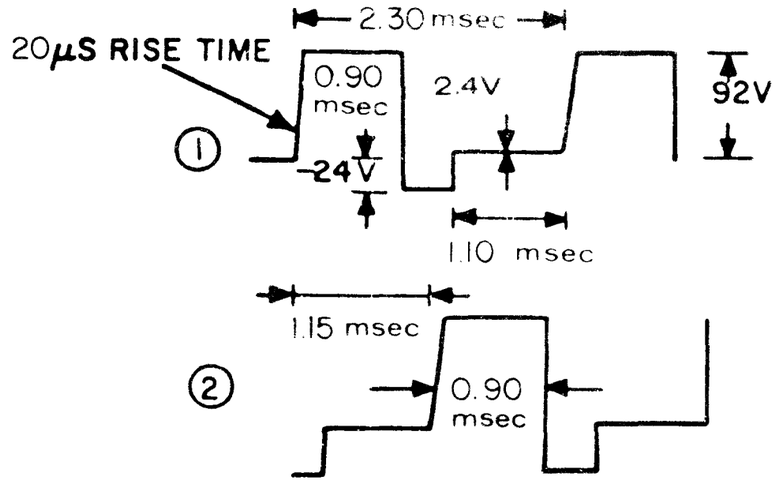
FUSES

1FU = 3A Pico, Odd Hammer Bank #1 (Hammers #1, 5, 9 ... 117)
2FU = 3A Pico, Even Hammer Bank #2 (Hammers #2, 6, 10 .. 118)
3FU = 3A Pico, Odd Hammer Bank #3 (Hammers #3, 7, 11 .. 115)
4FU = 3A Pico, Even Hammer Bank #4 (Hammers # 4, 8, 12 .. 116)

STRAPS All Straps Factory Installed - DO NOT REMOVE

TEST POINTS

TP1 = Odd Hammer Drive (OHD) (Probe 1)
TP6 = Even Hammer Drive (EHD) (Probe 2)*



Sync: + from probe 1

TP2 = +95V

+95V Minimum
+102V Maximum

Sync: None

TP3 = +155V

+155V Belt Stopped
+147V Belt Moving
(Varies with Line Voltage)

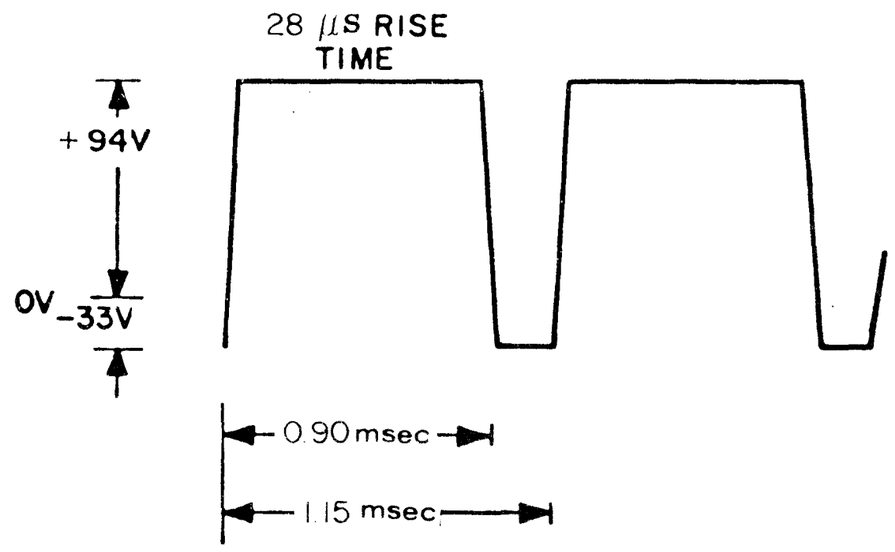
Sync: None

TP4 = Zener Ref.

+96V Minimum
+103V Maximum

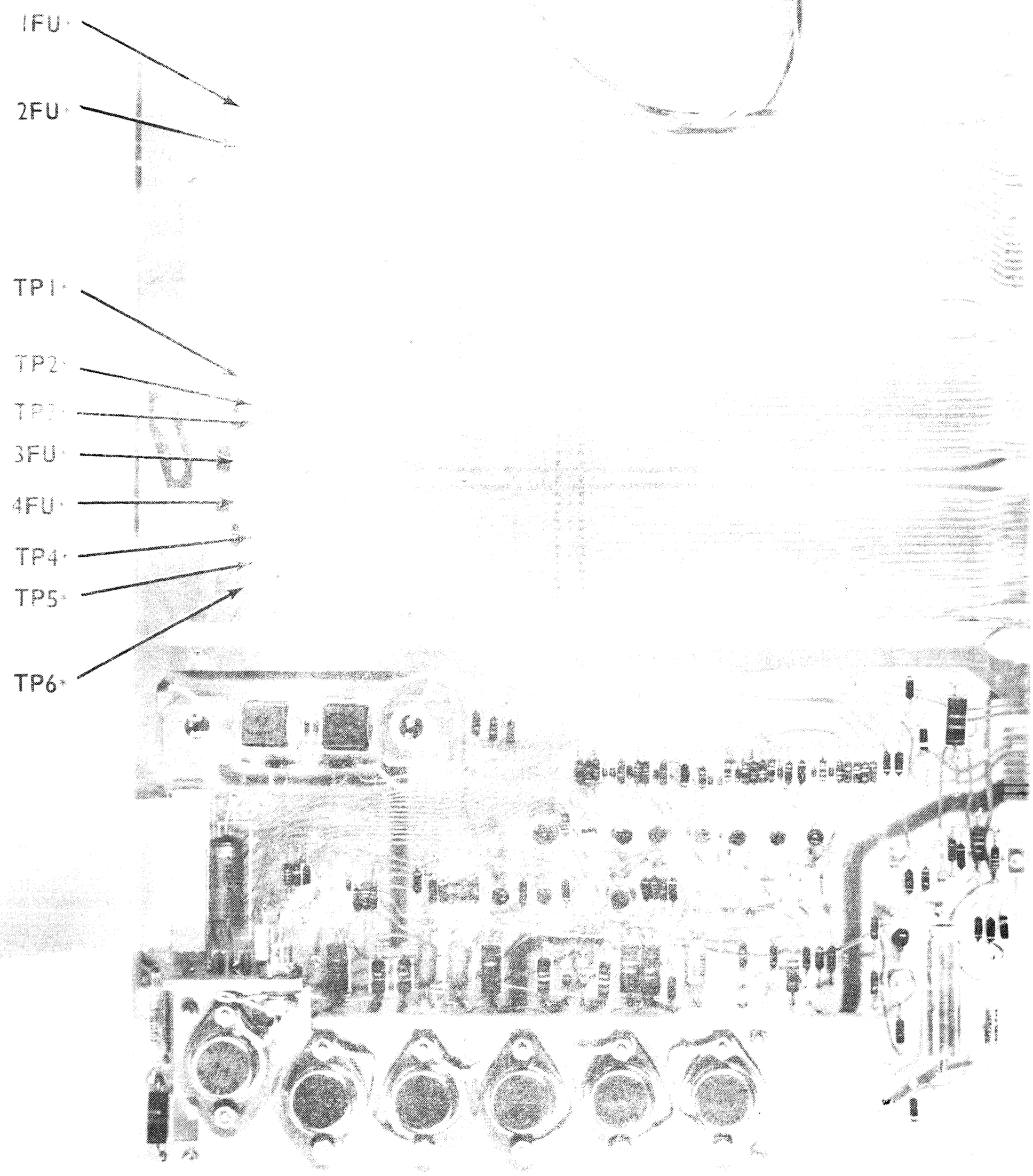
Sync: None

TP5 = Odd Even Drive (OED)



Sync: +

*Note: Adjust sweep on probe 2 as needed.



*On other side of board.
Reached by removing plastic cover under the paper roll.

PHOTOCELL BOARD (PC)

44D415501-G01

FUSES None

STRAPS None

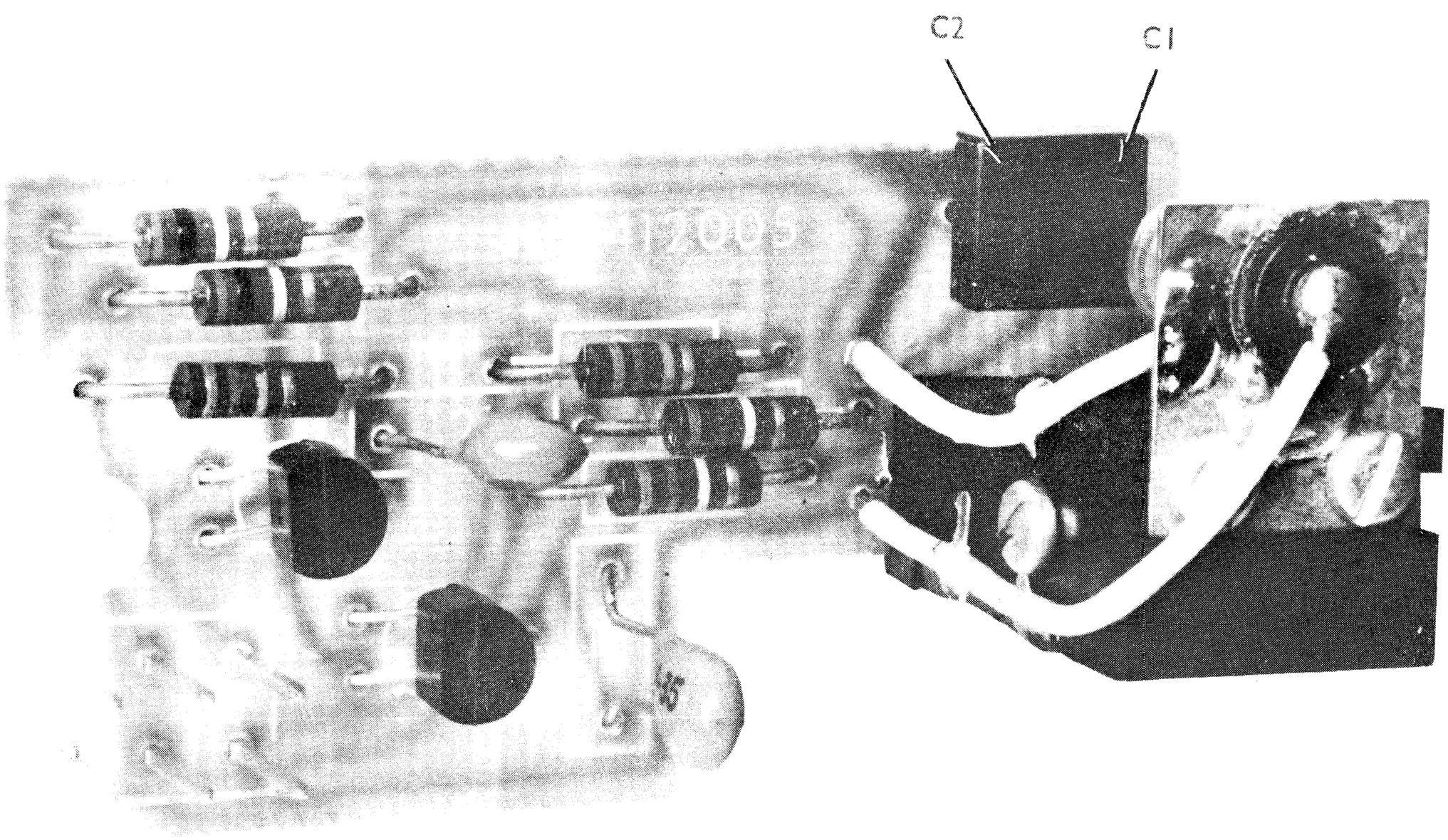
TEST POINTS None

C1 = Odd Photocell
C2 = Even Photocell

Note

When installing Photocell board, insure that yellow dot on PC cable and PC board are facing each other.

If Lamp burns out, replace PC board. Do not try to replace the lamp.



PC

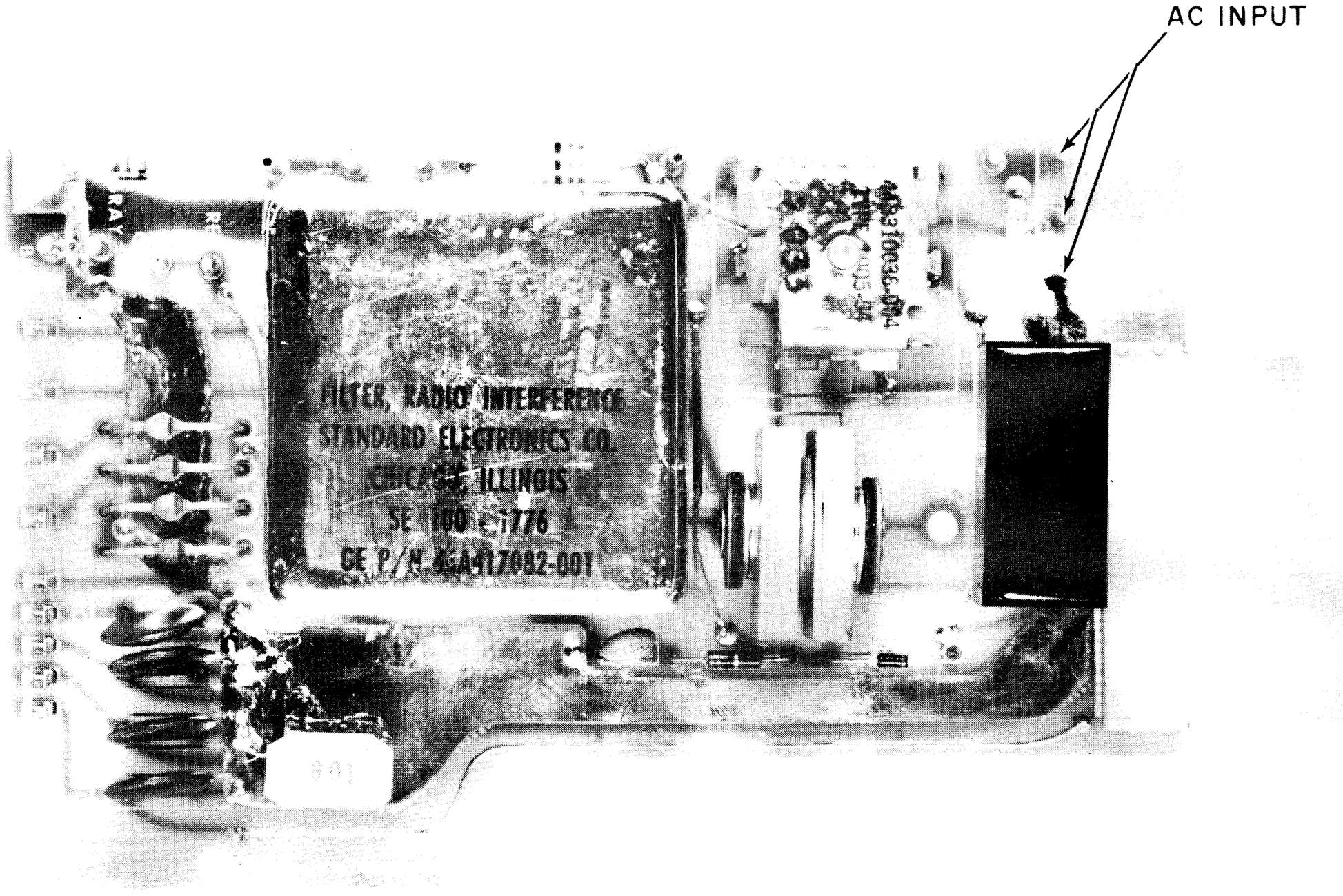
TRANSFORMER POWER SUPPLY BOARD (TXP)

44B412168-G01

FUSES None

STRAPS None

TEST POINTS None



TXP

CHAPTER 5
MAINTENANCE

SECTION 1
ROUTINE MAINTENANCE

GENERAL

Routine maintenance consists mainly of visual inspection, cleaning, and lubrication. If a problem is discovered and the cause is not obvious, refer to the Troubleshooting chapter. If the cause of the problem has been determined, refer to Parts Removal and Adjustment section of this chapter to install a new component or to make an adjustment.

It is suggested that the instructions in this section be performed every six months or 1000 hours whichever occurs first. It may be necessary for the serviceman to modify Routine Maintenance instructions to suit extreme variations of use and environment of the Printer.

VISUAL INSPECTION

Raise the cover and check the Printer as follows:

1. Check for accumulation of dust, dirt, or other foreign matter. If an accumulation of dust is under the pulleys or line feed clutch, this is an indication of excessive wear of a pulley, clutch, or a drive belt.

2. Check for loose or missing parts.

3. Check for bent or broken print fingers.

4. Check for frayed or folded ribbon.

5. Check operation of the tension limiter to see that it moves freely.

6. While holding the fan blade stationary, move the print belt back and forth and check for excessive play in the system. Too much play indicates a loose pulley or drive belt.

7. Disconnect left drive belt. Rotate print belt and check for freedom of movement. Reconnect left drive belt.

8. Check the ribbon reversing mechanisms:

   a. Make certain that the E ring ("A" model mechanisms only) is not cutting into the drum at the center of the ribbon spool.

   b. Check the Teflon* washer between the large gear and mounting plate for doubling or tearing.

*Registered trademark of DuPont Co.
**Registered trademark of Crysler Corp./Amplex Div.

ADJUSTMENT CHECKS

If adjustment is needed, refer to Section 2 of this chapter for procedure.

DRIVE BELT TENSION - The right drive belt should deflect .100 to .175 inches with 4 oz. applied load. The left drive belt should deflect .075 to .125 with 4 oz. applied load. Apply load near center of the longest span of each belt.

JACKSHAFT END PLAY - Move jackshaft horizontally by grasping right drive pulley. There should be .002 to .007 inches movement between the pulley and jack shaft bearing.

PHOTOCELL TIMING - (See figure 5-1) Start the Printer and print a line of random characters. Stop the Printer and rotate the print belt until there is a print finger directly in front of the hammer for column 1. Move even column hammers through the spaces between print fingers. The printed character should be directly under the hammer face. If part of the character is to the left or right of the hammer face, adjust photocell timing.

OPERATION CHECKS

Perform the checkout procedure in Chapter 2.

CLEANING AND LUBRICATION

CLEANING - The platen, pressure rollers (under paper pan), and ribbon guide arms should be cleaned with alcohol to remove ink accumulations.

CAUTION

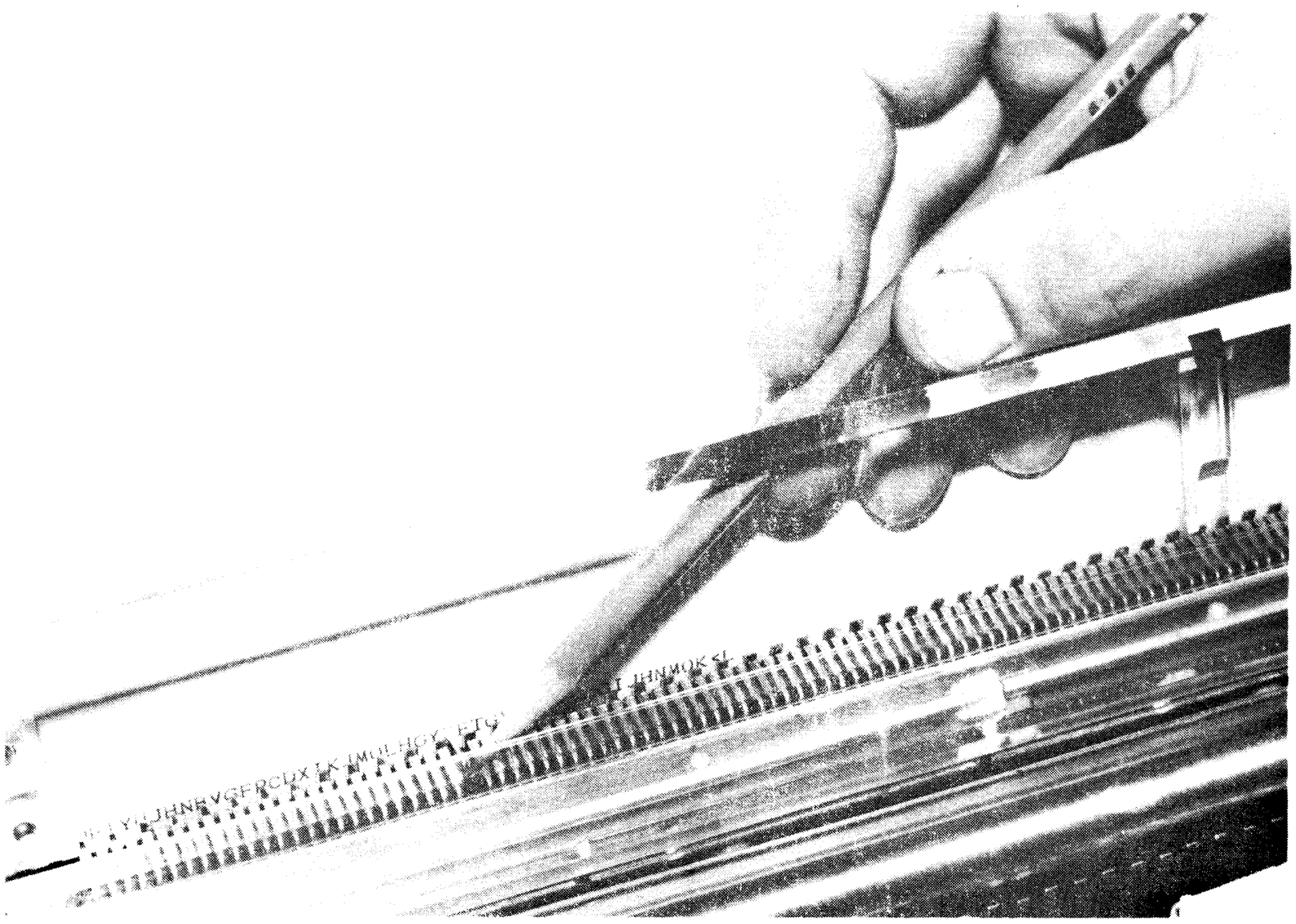
Do not apply alcohol or any other cleaning agent to an OILITE** bearing.

Accumulations of dirt inside the printer can be removed with a cloth dampened in alcohol or blown out with compressed air (if available).

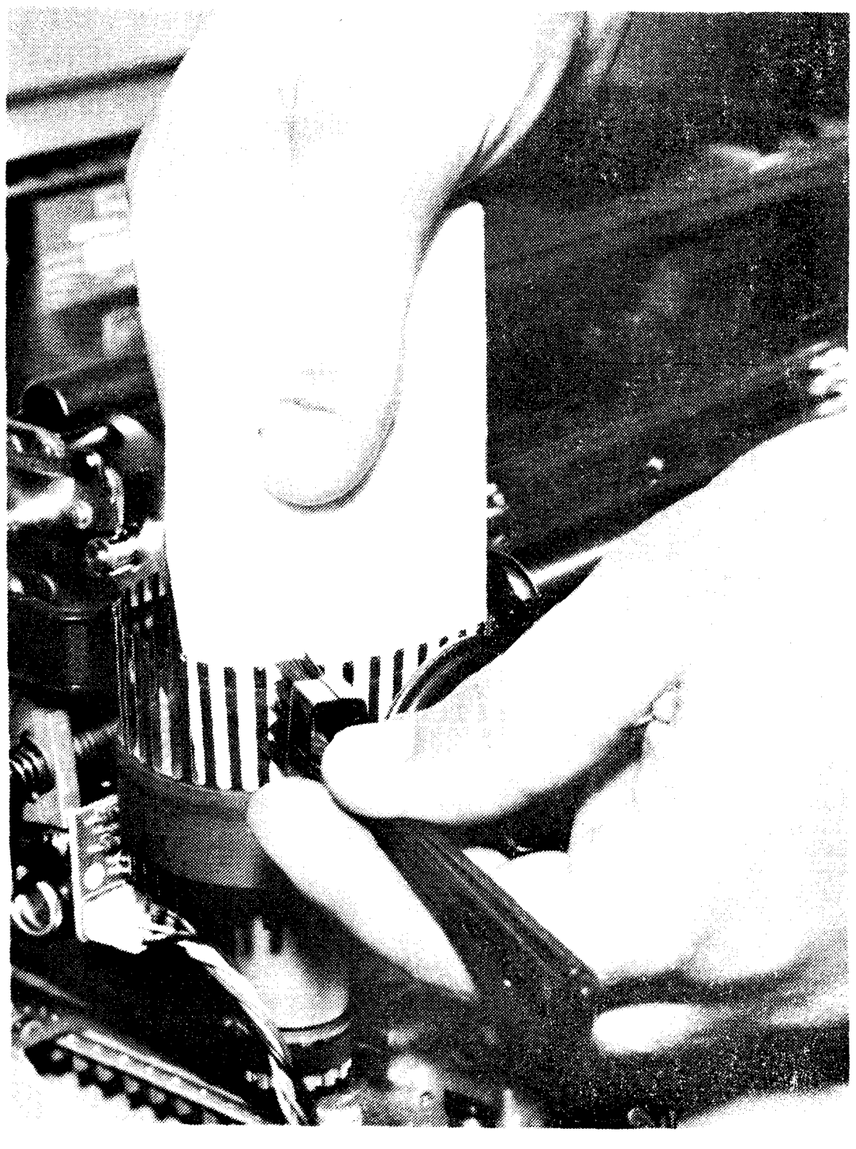
Type fingers can be cleaned by using a type cleaning brush backed by a sponge or soft cloth (see figure 5-2).

LUBRICATION

1. When cleaning parts before lubrication, do not use alcohol or any other cleaning agent on OILITE bearings.



Photocell Timing Check
Figure 5-1



Cleaning Type Fingers
Figure 5-2

2. Use a good grade of non-detergent, inhibited, number 10 SAE oil. Do not use household variety, sewing machine, or general purpose oils unless it is certain that the specifications of the recommended oil is met.

3. After lubrication of a given area, work oil into friction points as well as possible and thoroughly wipe away all excess oil.

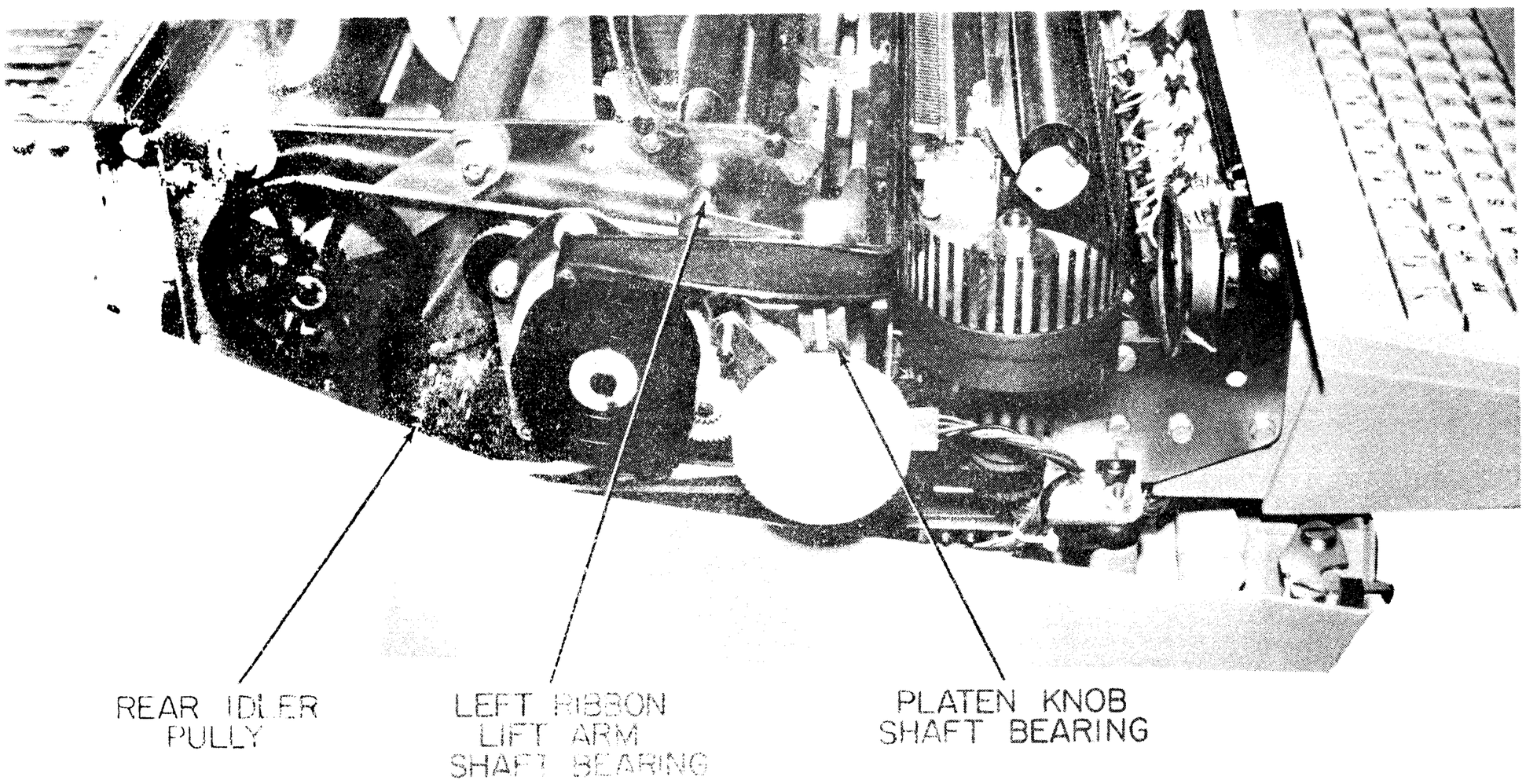
LUBRICATION TABLE

The following table points out the parts to lubricate and the methods in which the parts are to be lubricated. Read table thoroughly before starting.

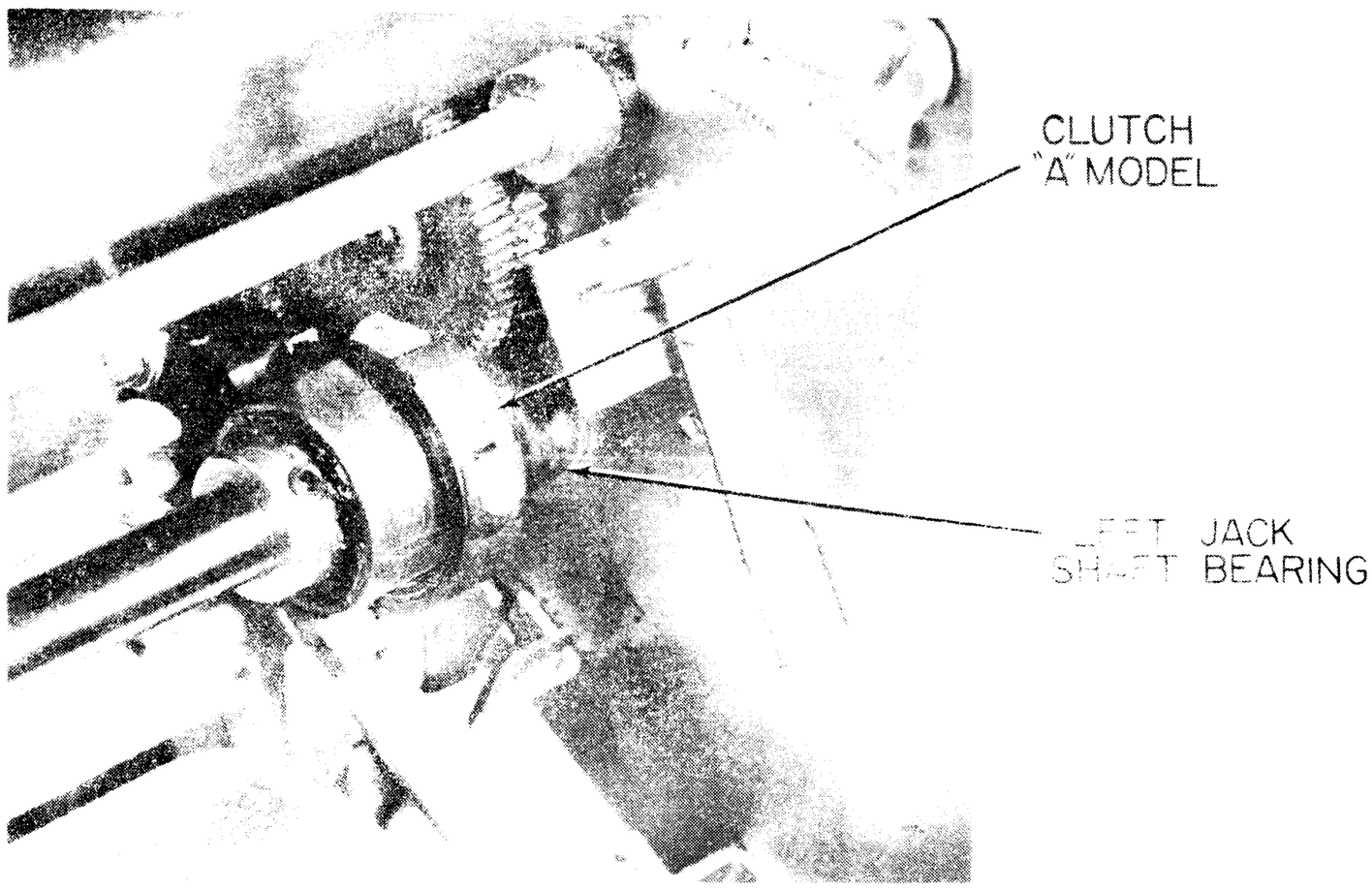
LUBRICATION TABLE

LUBRICATION POINT	METHOD
Rear Idler Pulley (See fig. 5-3)	-Remove belt and pulley. -Wipe bearing clean with clean cloth. -Wipe bearing shaft clean and apply two drops of oil. -Reinstall pulley.
Left Jack Shaft Bearing (See fig. 5-4).	-With "A" model clutch, apply two drops of oil between line feed clutch and side frame. -With "B" model clutch, apply two drops between pulley and side frame.
Right Jack Shaft Bearing (See fig. 5-5).	-Apply two drops of oil on shaft adjacent to end of bearing on inside of machine.
Line Feed Clutch, "A" Model Part No. 44C414046-G01 (See fig. 5-4).	-Apply two drops of oil in spring tang oil hole.
Line Feed Clutch, "B" Model Part No. 44B417108-001	-Requires no lubrication.
Platen Drive Gears (See fig. 5-5).	-Remove any dried grease and dirt from gears and oil holes.
Line Feed Idler Gear	-Apply two drops of oil in oil hole - If there is no hole, apply oil on shaft at each end of gear.
Platen Drive Gear	-Apply one drop of oil on shaft at each end of gear.
Fractional Line Space Gear	-Press platen knob in and apply two drops of oil to shaft in fractional line space gear.
General	-Apply thin film of oil to teeth of each gear (pipe cleaner or small brush can be used). Start Printer and make consecutive line feeds to work in oil.
Platen Bearings	-Remove platen. -Remove "C" ring and bearing from one end of platen. -Wipe platen shaft and bearing clean. -Apply two drops of oil to shaft and reinstall bearing and "C" ring on shaft. -Repeat process for other end of platen and reinstall platen.
Friction Rollers (See fig. 5-5) (under paper pan)	-Apply one drop of oil at bearing surface on end of each roller. Thoroughly wipe off excess and take care not to get oil on rubber part of roller.
Platen Knob Shaft Bearing (See fig. 5-3)	-Remove dried grease and dirt from oil hole and apply one drop of oil in hole. -Push in platen knob and rotate several times to work in oil. Repeat process with another drop of oil. -If there is no oil hole, apply one drop of oil on shaft at end of bearing closest to the platen knob. -Push in platen knob and rotate several times to work in oil. Repeat process with another drop of oil.

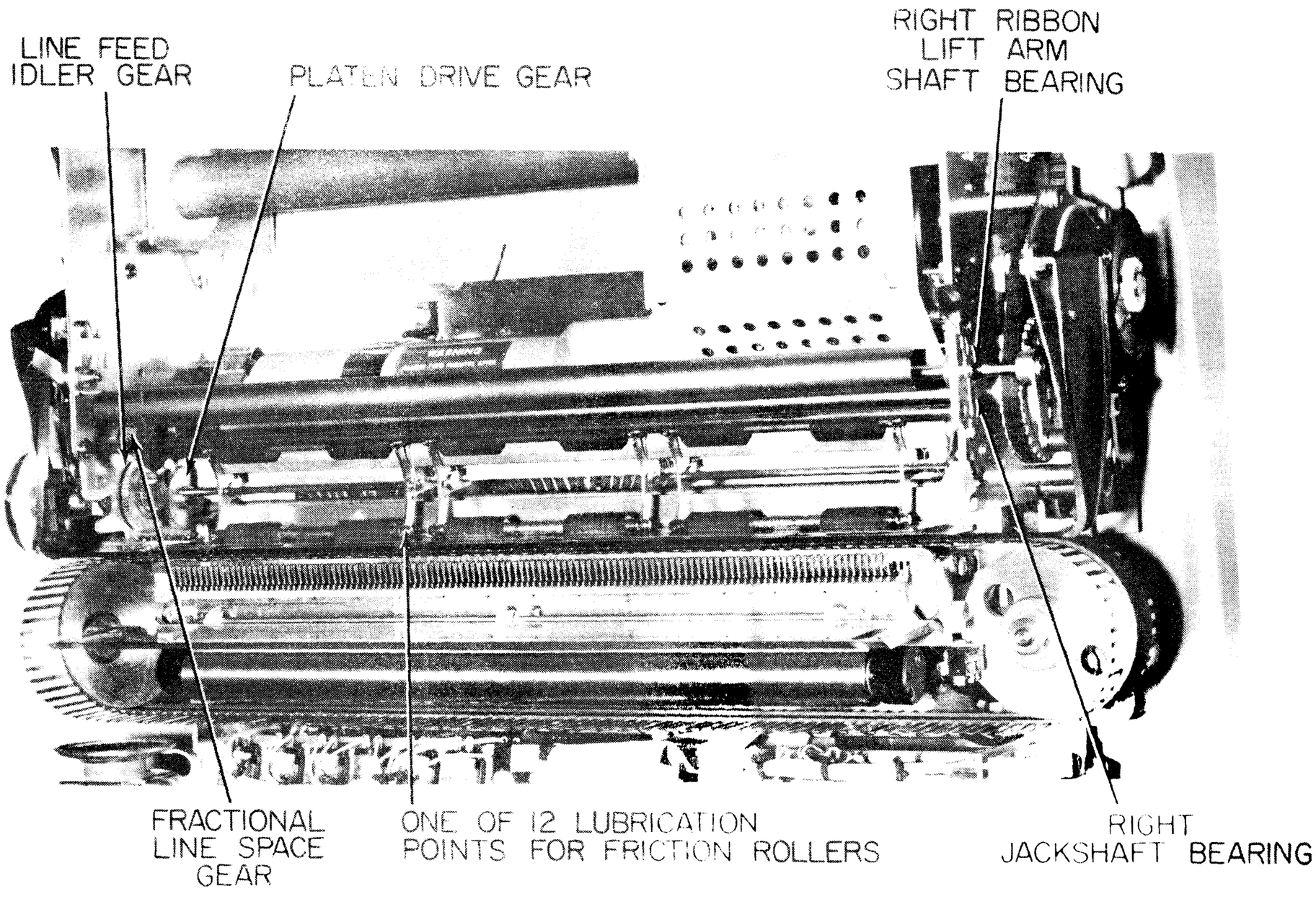
LUBRICATION POINT	METHOD
Ribbon Reversing Mechanisms, "A" models (part numbers 44D415506-G01 and 44D415507-G01) and "B" models (part numbers 44D415570-G01 and 44D415571-G01)	NOTE For ease of identification, the spindle on the "A" model mechanism is held by a "C" ring. The spindle on the "B" model mechanism is held by a flat head on the spindle shaft.
"A" and "B" models	-Remove ribbon reversing mechanisms. -Wipe entire mechanism clean. -Apply one drop of oil to each shaft of the 3 drive gears. -Manually rotate gears to work in oil. -Thoroughly wipe off all excess oil.
"A" model only	-Apply small amount of silicone grease to side of ratchet gear that rubs side plate.
Ribbon Lift Arm Shaft Bearing (See figs. 5-3 and 5-5)	-Apply one drop of oil at each bearing.



Lubrication Points
Figure 5-3



Lubrication Points
Figure 5-4



Lubrication Points
Figure 5-5

SECTION 2
PARTS REPLACEMENT AND ADJUSTMENTS

WARNING

DISCONNECT ALL POWER FROM THE PRINTER BEFORE REMOVING OR REPLACING ANY PARTS.

CONTROL PANEL

1. Remove the two plugs connected to the control panel.

2. Remove the two screws located on each side of the control panel (see figure 5-6).

3. Lift the panel straight up for removal.

4. Replace in reverse order.

KEYBOARD AND SENSE-LINE DRIVER BOARD

1 Remove the plug on the right side of the control panel.

2. Remove the KIF plug from the mother board at the left rear of the Printer.

3. Remove the two screws from each side of the keyboard (see figure 5-6).

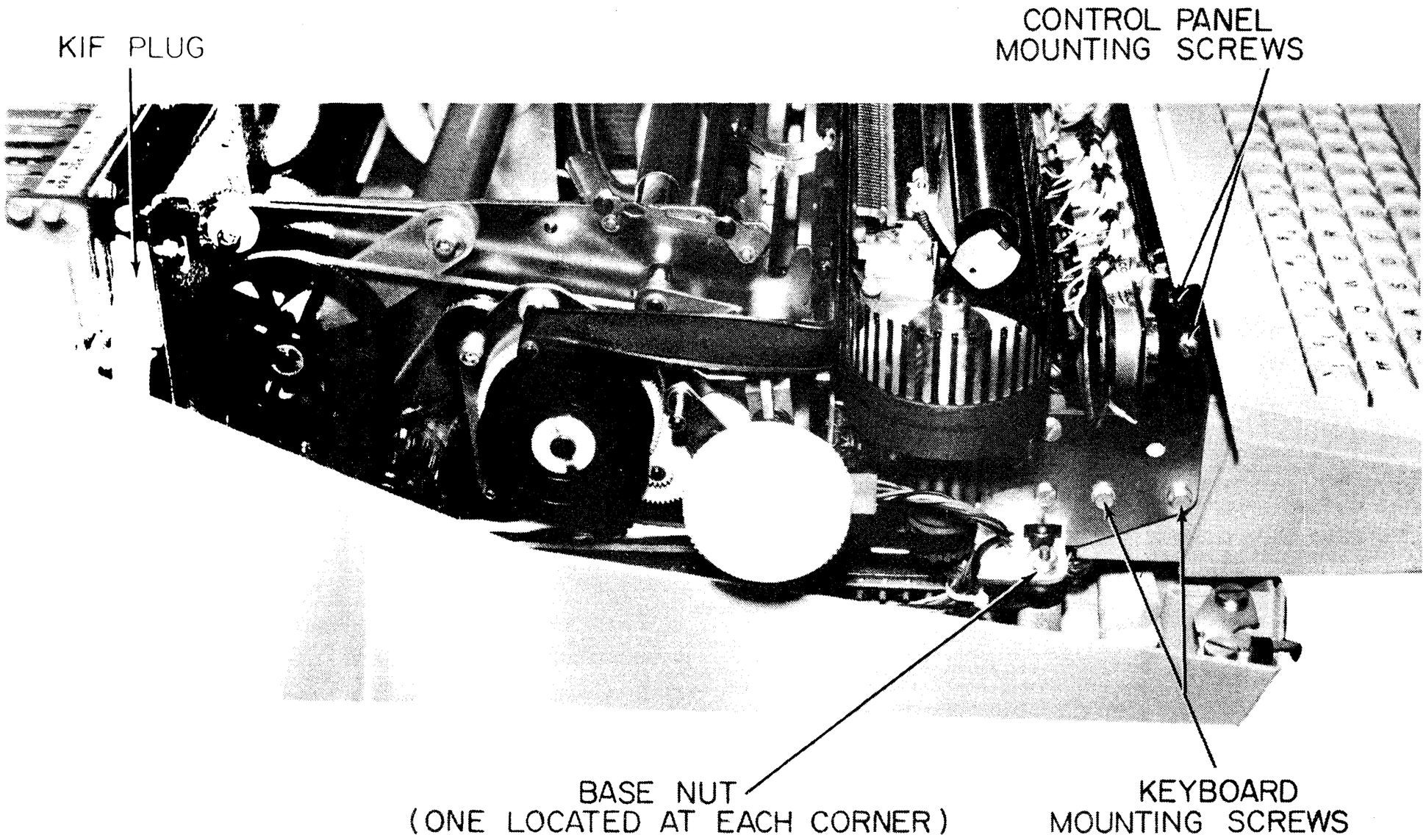
4. Pull the keyboard forward enough to see the white wire in the lower right corner.

5. Unplug the white wire (100V DC lead) from the hammer driver board at the underside of the Hammer Driver board. The keyboard should now be free.

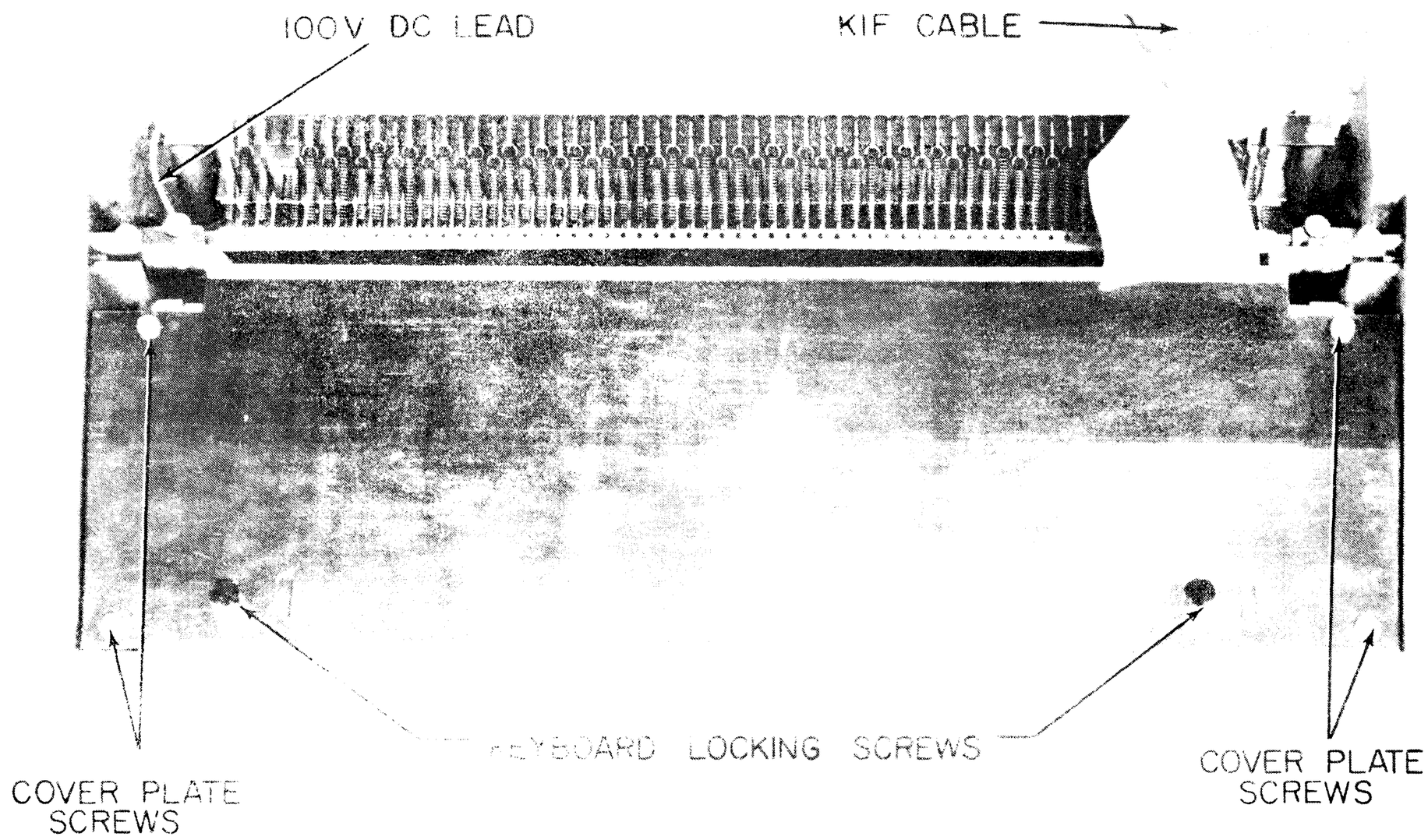
6. Turn the keyboard over and remove the four screws and the bottom cover plate (see figure 5-7).

7. Remove the four screws holding the Sense Line Driver board (see figure 5-8).

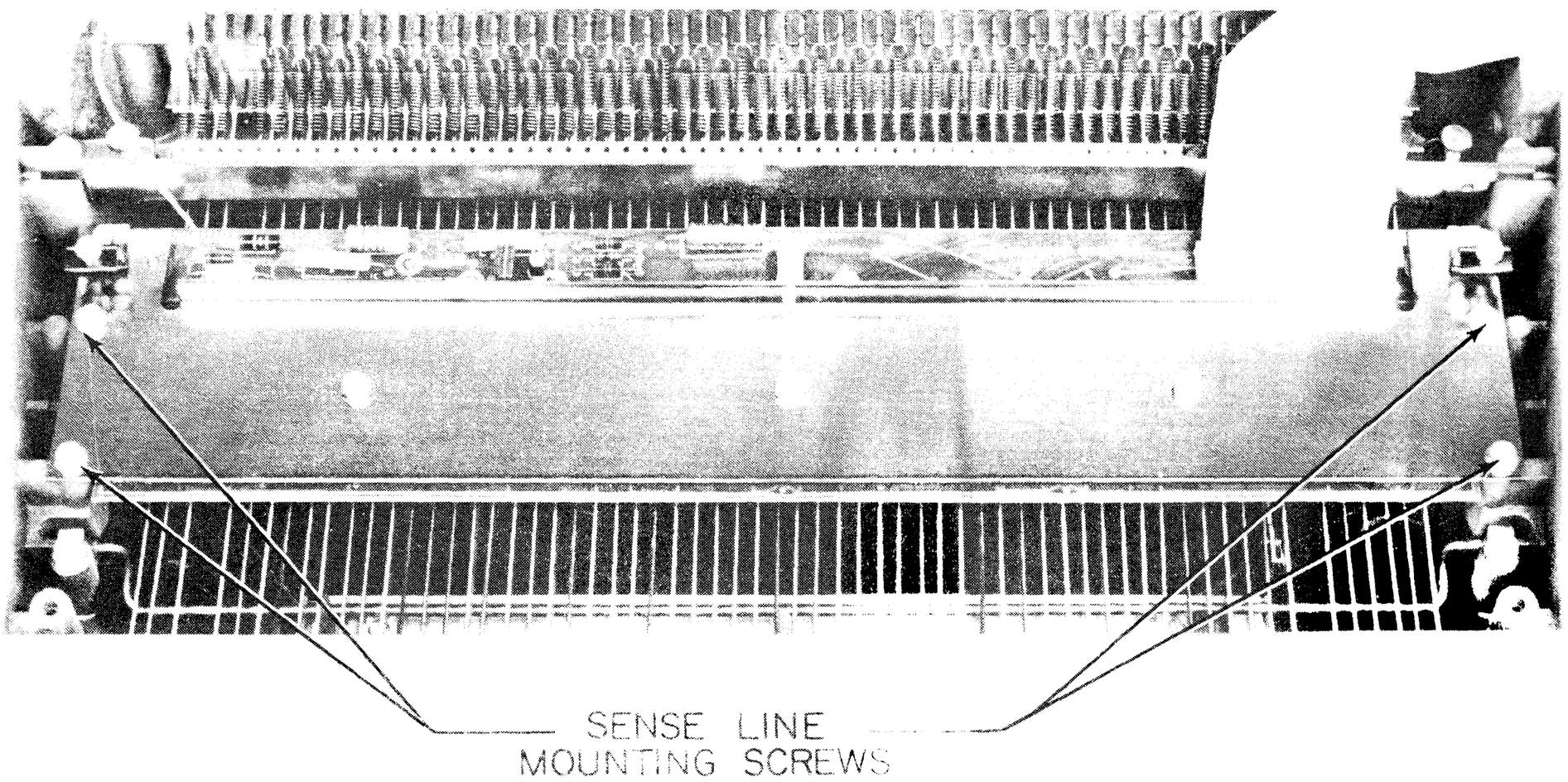
8. Lift the sense line driver assembly out of the keyboard.



Hardware Locations
Figure 5-6



Keyboard Hardware
Figure 5-7



Sense Line Driver Board Mounting
Figure 5-8

9. The upper ferrite cores, which are still in the keyboard, can now be checked for dirt and missing or broken parts (see figure 5-9). The upper core is held on the keybar by a spring clip. To replace, grasp one end of the core and pull firmly off of the keyboard. There are (5) five keys that have mylar spacers. They are ESC, CTL, RPT, and the two (2) shift keys.

10. Replace the keyboard by reversing steps 1 through 8.

MAIN FRAME

1. Disconnect all outgoing cables.

2. Remove the two screws holding bustle cover and remove bustle cover.

3. Remove the top cover by:

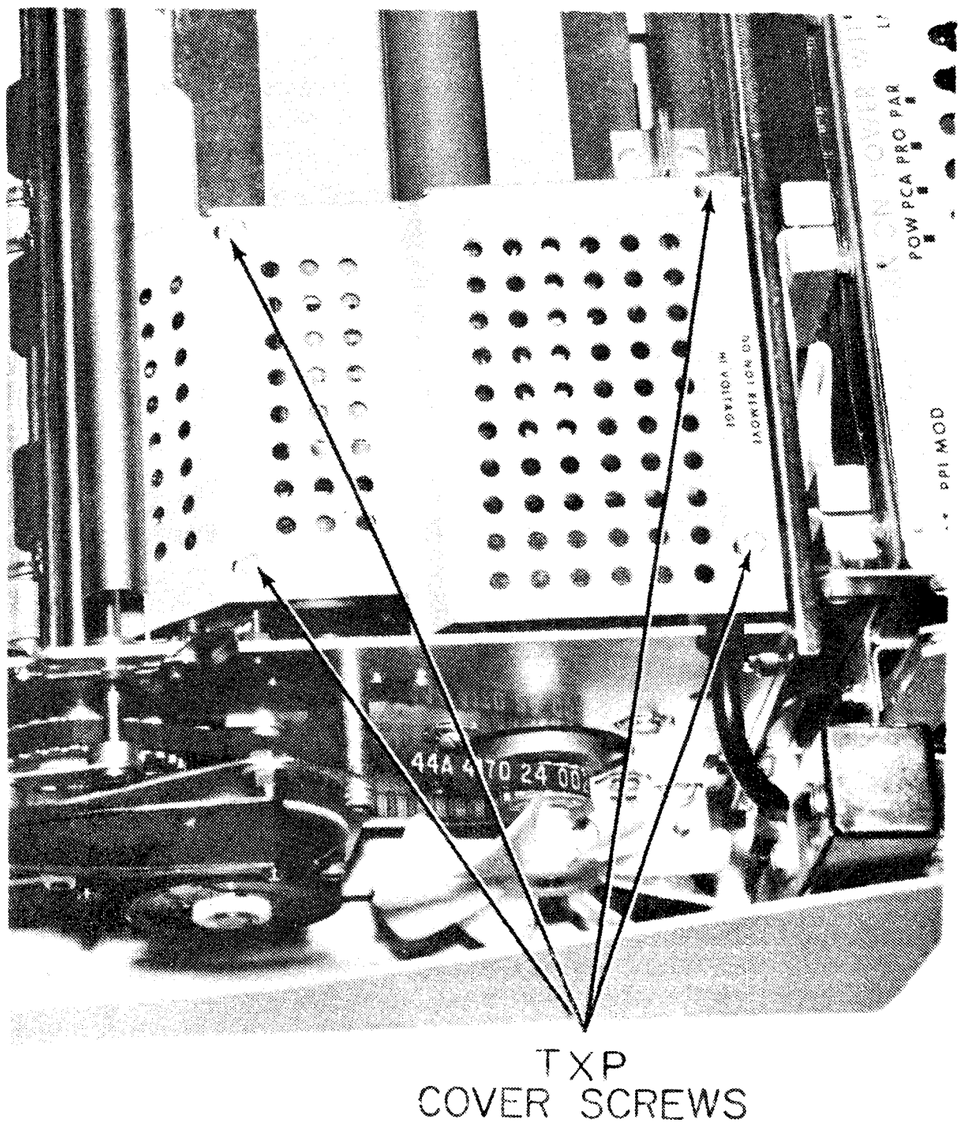
   a. Remove the shoulder screw on each hinge.

   b. Lift top cover back and up from bottom cover.

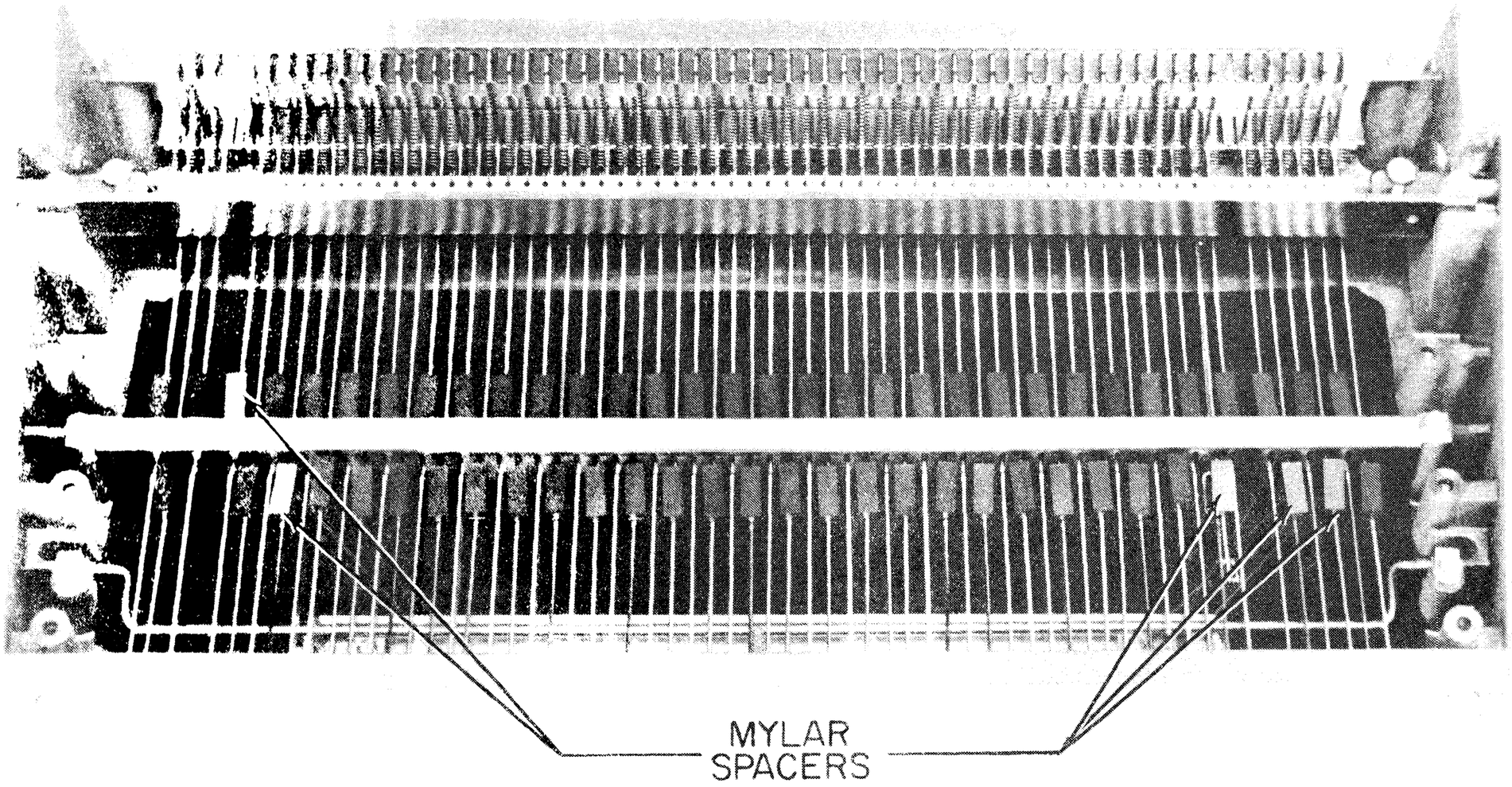
4. Remove the four screws on the TXP cover and then remove the cover (see figure 5-10).

5. Unplug the TXP power cord.

6. Remove the four anchor screws located on the bottom of the Printer. These should have been removed during installation.



TXP Cover Mounting
Figure 5-10



Upper Ferrite Cores In Keyboard
Figure 5-9

7. Remove the base nuts on the shock absorbers located at the four corners of the main frame base plate (see figure 5-6).

8. Gently lift the main frame up and forward.

9. Set the Printer on a flat surface on the four feet provided.

10. Replace the frame in the cover by reversing steps 2 through 8.

BUSTLE FRAME

1. Remove main frame from bustle.

2. Remove the three screws on the top of the bustle where the bustle connects to the main frame.

3. Unplug the six connectors on the mother board.

4. Remove the two screws on the bottom of the bustle where the bustle connects to the main frame.

BUSTLE PRINTED CIRCUIT BOARDS (PCB)

1. Disconnect power

2. Remove bustle cover.

3. Remove the screw on bustle board clamp and remove clamp.

4 Pull PCB straight out of bustle.

NOTE

When replacing printed circuit boards, the component side should face the left side of the bustle as viewed from front of the Printer.

TXP BOARD

1. Remove the four screws and lift off the protecting cover over the TXP board (see figure 5-10).

2. Unplug the power cord and nine (9) separate plug-on wires on top of the TXP board (see figure 5-11).

3. Remove the three mounting screws at the corners of the TXP board.

4. Disconnect TXP cable at the mother board.

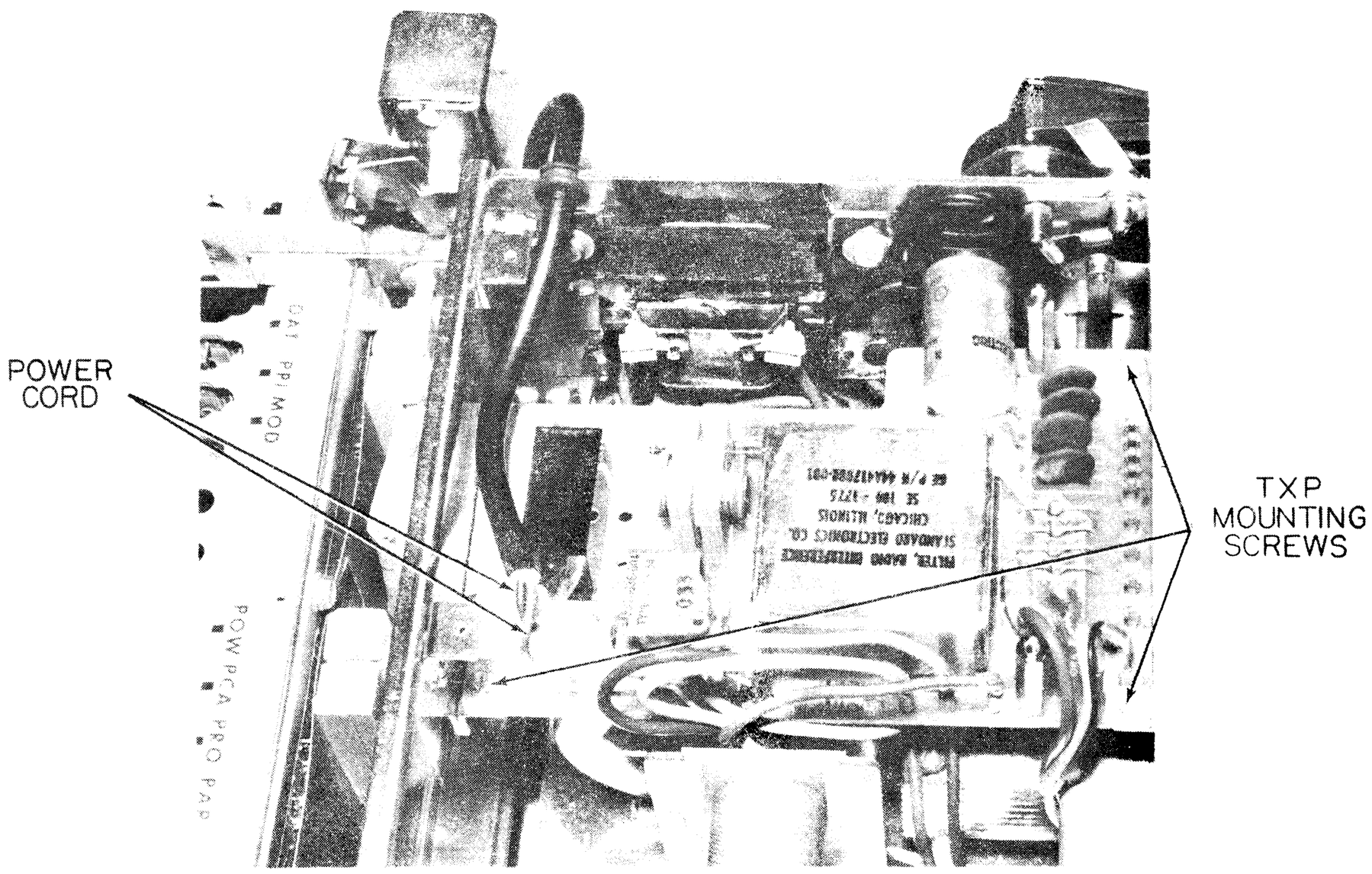
5. Unplug the TXP board from the transformer and lift out of Printer.

6. To reassemble reverse steps 1 through 5.

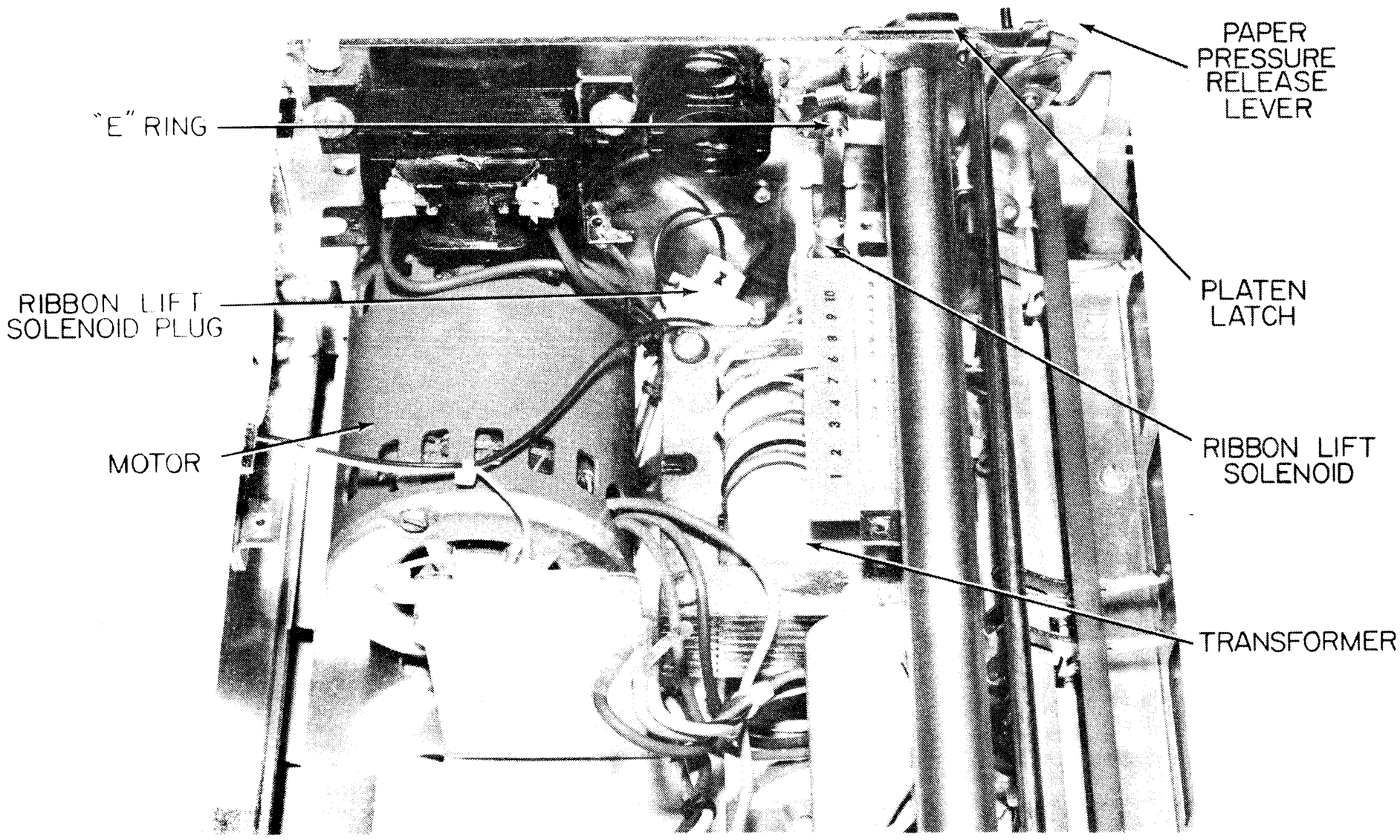
RIBBON LIFT SOLENOID

1. Remove the right ribbon mechanism.

2. Remove the drive belt.



TXP Board Mounting
Figure 5-11



Printer Components, Right Side
Figure 5-12

Right Side View of Printer
Figure 5-13

3. Remove the large jackshaft pulley.

4. Remove the "E" ring on the solenoid arm (see figure 5-12).

5. Remove the four screws holding the solenoid plate to the side frame (see figure 5-13).

6. The solenoid is now free and can be removed by turning slightly and pulling out of the side frame.

7. Disconnect the solenoid by unplugging it from the Printer.

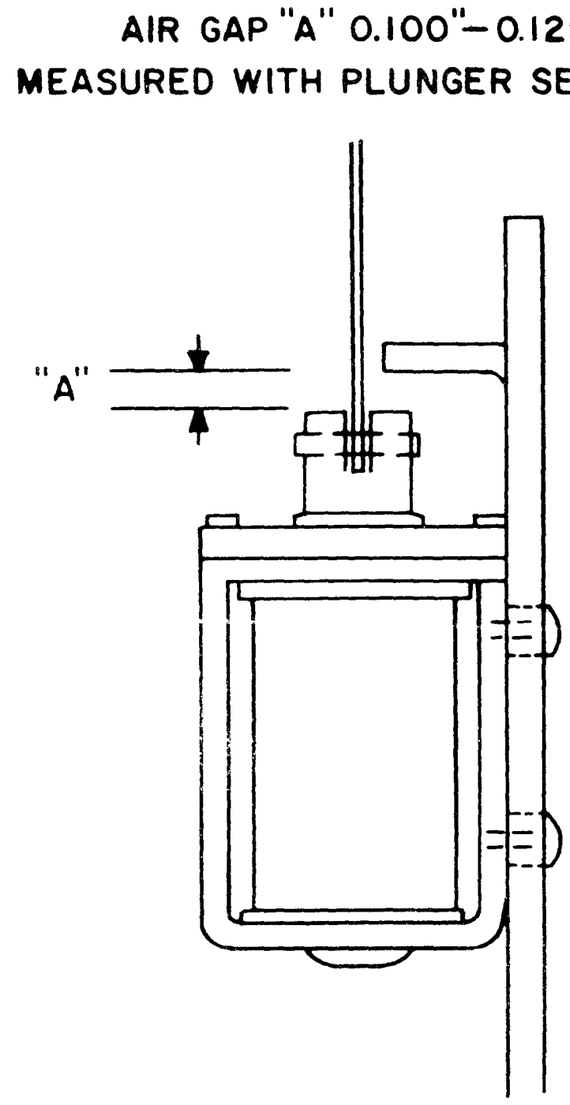
8. Replace the solenoid by reversing steps 1 through 7.

RIBBON LIFT SOLENOID ADJUSTMENT

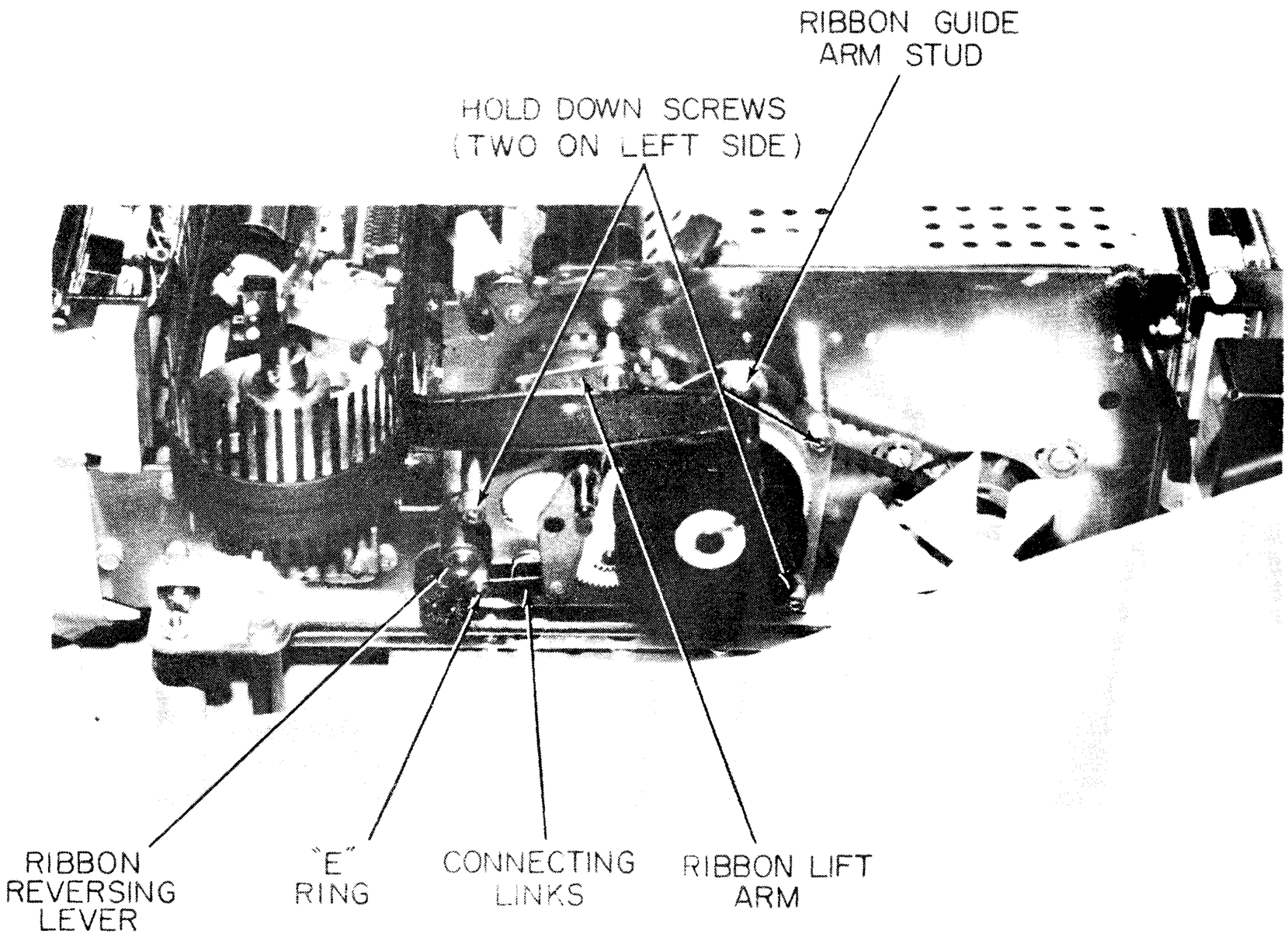
To adjust the plunger throw, seat the plunger in the coil body. Place the feeler gage between the top of the plunger and the bent metal tab directly above the plunger (see figure 5-14). The gap should be 0.100 inch to 0.125 inch.

RIBBON ADJUSTMENT

1. The ribbon should be adjusted so as to be halfway between the fingers and the platen. Loosen the ribbon guide arm stud and move the guide arm forward or backward as needed (see figure 5-15).



Ribbon Lift Solenoid
Figure 5-14



Ribbon Reversing Mechanism Hardware
Figure 5-15

2. The ribbon height should be adjusted so the top edge of the ribbon is .032" to .064" above the tops of the print fingers. Loosen the ribbon lifting arms(one on each side of Printer) and raise or lower as needed. Ribbon lift solenoid should be manually put in the energized position when this adjustment is made.

RIBBON REVERSING MECHANISMS

(See figure 5-15)

1. Remove the ribbon and spool.

2. Remove the "E" ring and lift the connecting link off of the ribbon reversing lever.

3. Remove the two Allen Head screws holding the mechanism in place. (Right side has three screws).

4. This mechanism should now be free. Gently move back and away from the frame.

5. When replacing the ribbon reversing mechanism, insert the pinion into the slots in the jackshaft pulley.

Make certain that the ribbon reversing lever attached to the right side of the ribbon reversing shaft is pointing down.

RIBBON REVERSING SHAFT

(And Reversing Shaft Adjustment)

REMOVAL

1. Remove the "E" rings and lift the connecting links off the ribbon reversing levers (see figure 5-15).

2. Loosen set screws in ribbon reversing levers.

3. Remove reversing shaft by sliding out of frame.

INSTALLATION

1. Insert bearing in frame and replace shaft.

2. Add ribbon reversing lever to both ends of shaft and tighten set screw only on the left side.

3. Attach the links and "E" rings to the reversing levers.

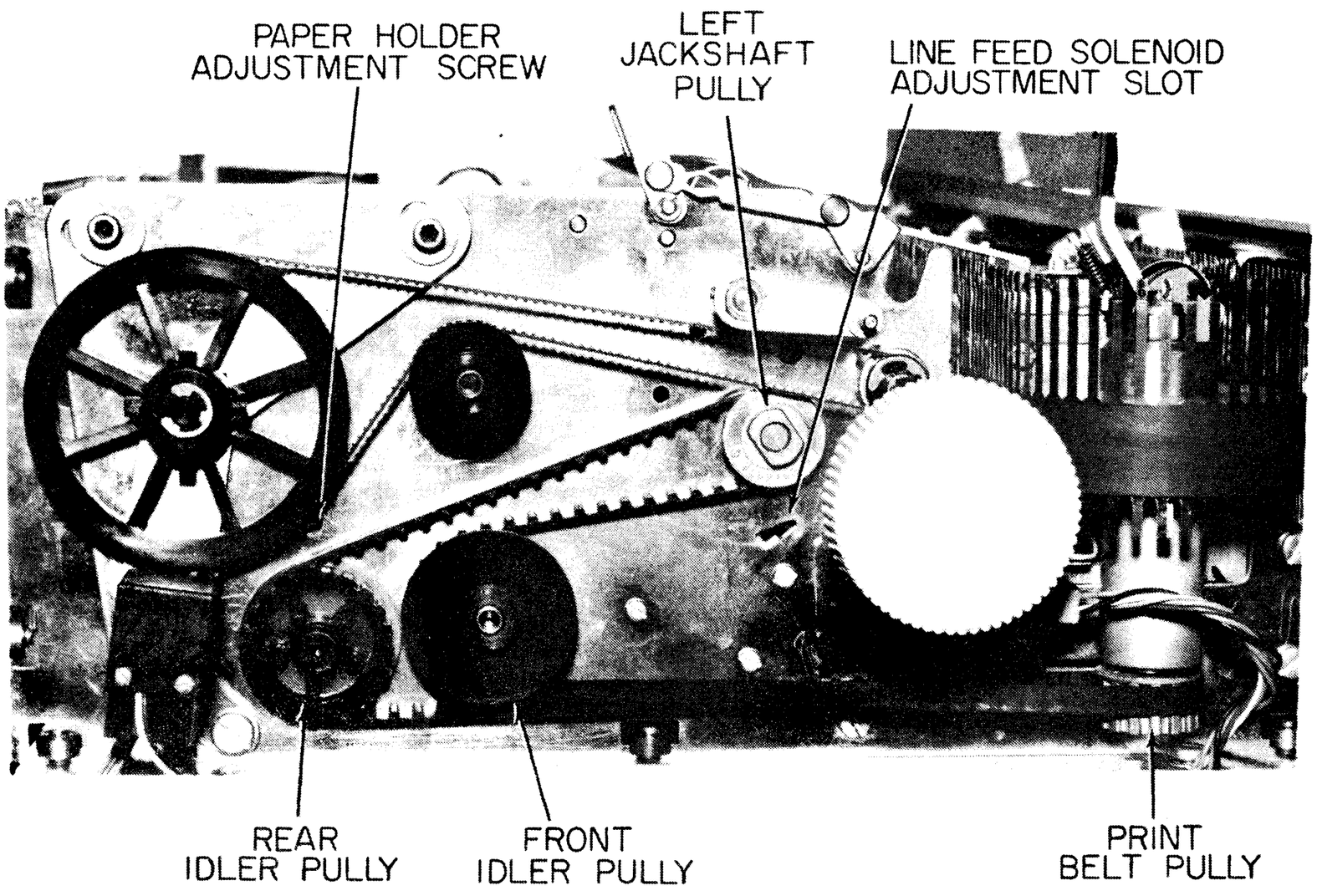
4. On the left side, point the ribbon reversing lever up and connect link and "E" ring. Move the link forward to disengage the reversing mechanism.

5. On the right side, point the ribbon reversing lever down and connect link and "E" ring. Move the link rearward to engage the reversing mechanism.

6. Rotate print belt approximately one-half rotation to insure the gears are engaged.

7. Allow .007" to .020" end play in the reversing shaft and tighten set screw in right ribbon reversing lever.

8. Operate reversing mechanism several times to insure proper operation.



Left Drive Belt and Pulleys
Figure 5-16

DRIVE BELTS

(And Drive Belt Adjustments)

LEFT DRIVE BELT

1. Remove ribbon.

2. Remove left ribbon reversing mechanism.

3. Push down on drive belt next to the print belt pulley and rotate print belt. The belt will ride off of the pulley.

4. To reinstall mount drive belt as shown in figure 5-16.

5. Adjust Drive Belt Tension by moving Rear Idler Pulley. The Belt should deflect 0.1" to .125" with 4 oz. of pressure applied between the left jackshaft pulley and the rear idler pulley.

RIGHT DRIVE BELT

1. Remove ribbon and the right ribbon reversing mechanism.

2. Remove the belt by sliding it off jackshaft pulley.

When replacing the drive belt, adjust the motor position so that the drive belt deflects 1" ±.025 with 4 oz. pressure applied midway between the motor pulley and jackshaft pulley.

JACKSHAFT AND LINE FEED CLUTCH

(And Adjustments)

REMOVAL

1. Remove the ribbon.

2. Remove the right ribbon reversing mechanism.

3. Remove the right drive belt.

4. Run the left drive belt off of the lower pulley under the print belt.

5. Loosen set screw on left jackshaft pulley.

6. Loosen the set screw holding the clutch to the jackshaft.

NOTE

The pulley on the right side of the jackshaft does not have to be removed.

7. Slide the jackshaft to the right, out of the frame and clutch.

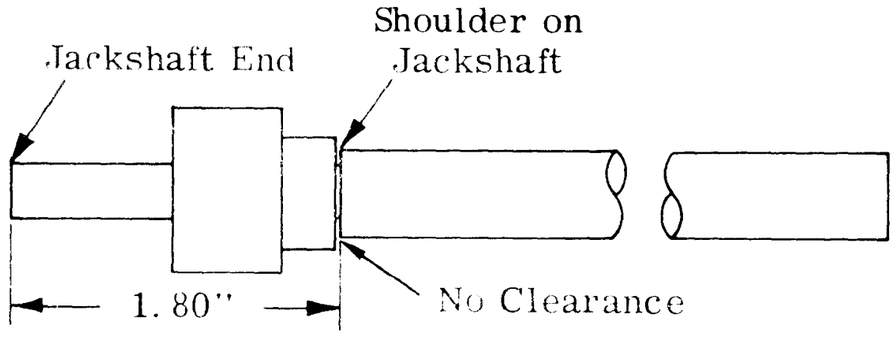
INSTALLATION

1. Install the jackshaft in frame from right to left.

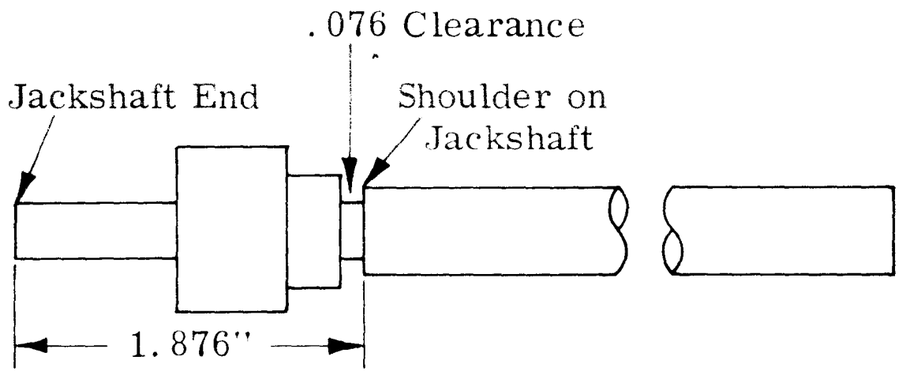
2. Insert the clutch in position and slide the jackshaft through the clutch and left side frame. Make certain the clutch is pressed against the shoulder on the jackshaft before tightening the set screw in the clutch.

NOTE

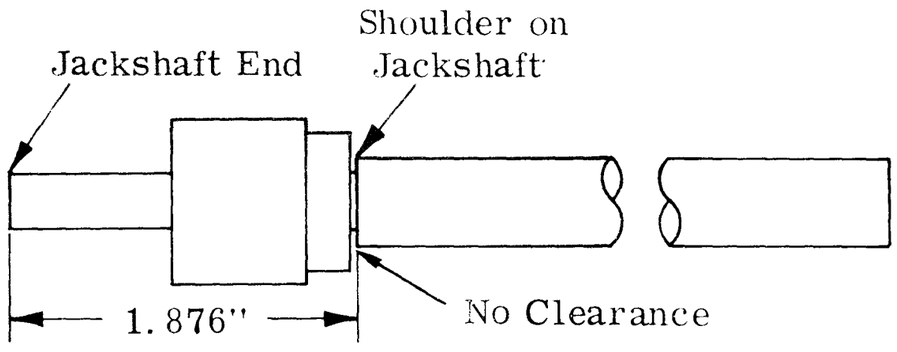
There are allowable variations of clutch and jackshaft combinations. Figure 5-17 shows these variations. Note that the "A" model jackshaft and "B" model clutch are incompatible. Also when the "B" model clutch is used, the new left jackshaft bearing (part number 44B410515-001) must be used.



"A" MODEL LINE FEED CLUTCH AND JACKSHAFT



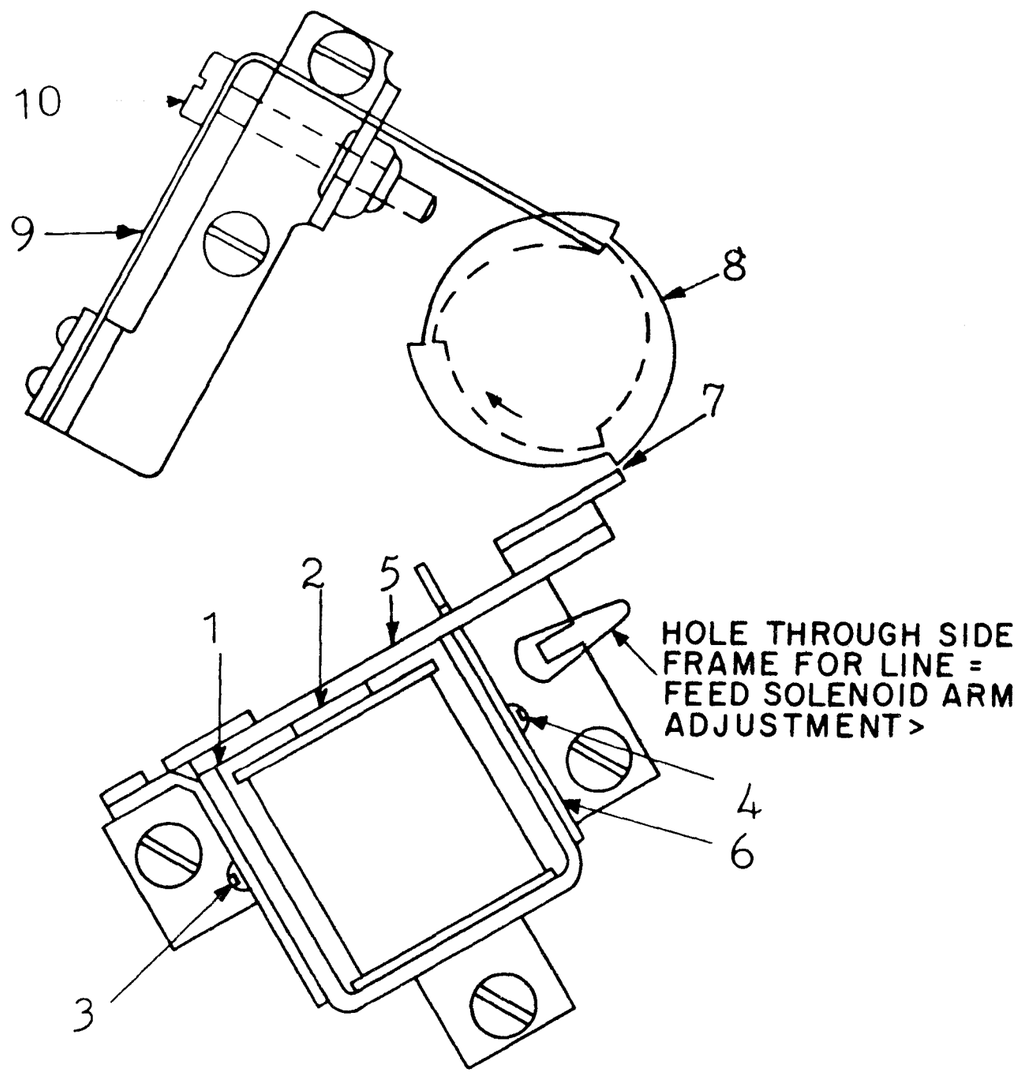
"A" MODEL LINE FEED CLUTCH AND "B" MODEL JACKSHAFT



"B" MODEL LINE FEED CLUTCH AND JACKSHAFT

"A" Model Line Feed Clutch - Part No. 44C414046-G01
"B" Model Line Feed Clutch - Part No. 44B417108-001
"A" Model Jackshaft - Part No. 44B412058-001
"B" Model Jackshaft - Part No. 44B412469-001

Line Feed Clutch and Jackshaft Combinations
Figure 5-17

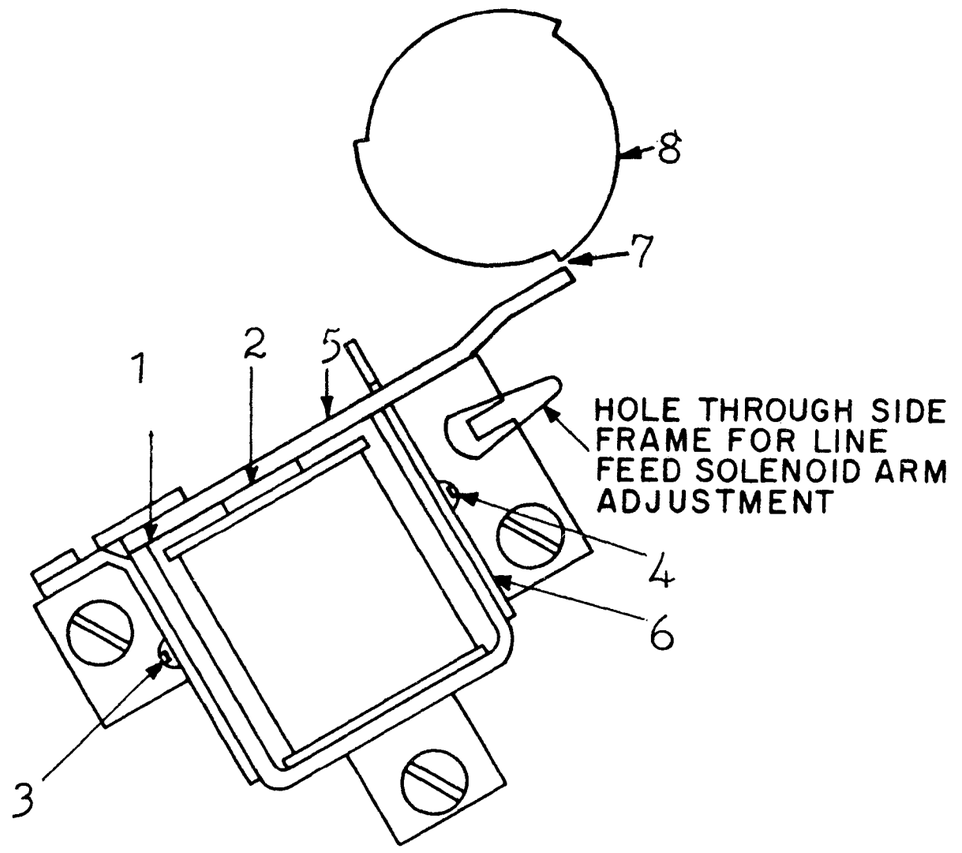


1. **Air Gap - 0.004 - 0.006"**
2. Air Gap - 0.008 - 0.010"
3. Two Screws
4. Two Screws
5. Solenoid Arm
6. Stop Bracket
7. 0.005" to 0.010" clearance.
8. Line feed Clutch
9. Anti-Backlash Spring
10. Anti-Backlash Adjustment Screw

Line Feed Solenoid Adjustment and Anti-backlash Spring Adjustment ("A" model)
Figure 5-18

NOTE

"A" model line feed solenoid part no. 44A410166-G01 is incompatible with "B" model line feed solenoid part no. 44A410166-G02.



1. Air Gap - 0.004 - 0.006"
2. Air Gap - 0.008 - 0.010"
3. Two Screws
4. Two Screws
5. Solenoid Arm
6. Stop Bracket
7. Clearance, 0.005" to 0.010"
8. Line Feed Clutch

Line Feed Solenoid Adjustment ("B" model).
Figure 5-19

LINE FEED SOLENOID

1. Remove the ribbon and left ribbon mechanism.

2. Remove the three screws holding the solenoid (located outside left side frame).

3. Disconnect the coil by unplugging it from the main system. The relay should now be free.

4. After solenoid is replaced, adjust as follows (see figure 5-18, "A" model or figure 5-19, "B" model): Push the solenoid arm down against the stop bracket (energized position). The solenoid arm should clear the lobes on the line feed clutch by 0.005 to 0.010 inch. If adjustment is needed, loosen the three hold-down screws. Insert a screwdriver into the line feed solenoid adjustment slot (in the side frame) and rotate until adjustment is correct. Tighten hold-down screws.

LINE FEED SOLENOID ADJUSTMENT

"A" MODEL

1. Check the air gap (see figure 5-18).

2. Loosen screws (3 and 4 on figure 5-18). Insert a 0.009-inch feeler gage at point 2 of figure 5-18 and press solenoid arm against feeler gage. Adjust the stop bracket until it rests against the solenoid arm. Tighten screws (4 of figure 5-18).

3. While pressing the solenoid arm, insert a 0.005-inch feeler gage at point 1 of figure 5-18 and tighten screws (3 of figure 5-18).

"B" MODEL

Adjustment of "B" Model solenoid and clutch is the same as the "A" model (refer to figure 5-19).

LINE FEED BACKLASH ADJUSTMENT

("A" Model Line Feed Clutch)

1 Press and then release the line feed solenoid arm (see figure 5-18).

2. Rotate the print belt counter-clockwise until the spring is halfway between the lobes on the cam (approximately one inch of print belt rotation).

3. Turn anti-backlash adjustment screw clockwise several turns

4. Rotate the print belt until the line-feed cam stops rotating.

5. Turn adjustment screw counter-clockwise slowly until a click is heard. This will be when the spring drops over the cam lobe.

6. Again press and then release the line-feed solenoid arm.

7. Rotate the print belt in the normal direction. Listen for the click of the spring as it drops over the cam lobe. If no click occurs, repeat step 5. Repeat step 7 three times to check all lobes on the cam.

8. Turn adjustment screw clockwise 1/2 turn.

9. Start 300 Printer and observe line feeds. If clutch oscillates, turn adjustment screw 1/4 turn and perform step 10.

10. After several line-feeds, rotate outer diameter of clutch toward normal direction. If a click is heard (as in step 5) back screw G out 1/4 turn.

11. Repeat steps 9 and 10 until there is little or no oscillation in the clutch and the backlash spring drops over the cam during each line feed.

Line Feed Backlash Spring is built into the "B" model line feed clutch and the above adjustments are not necessary. Backlash spring on "B" model clutch should be slid over collar which holds left jackshaft bearing.

PAPER PRESSURE ADJUSTMENT

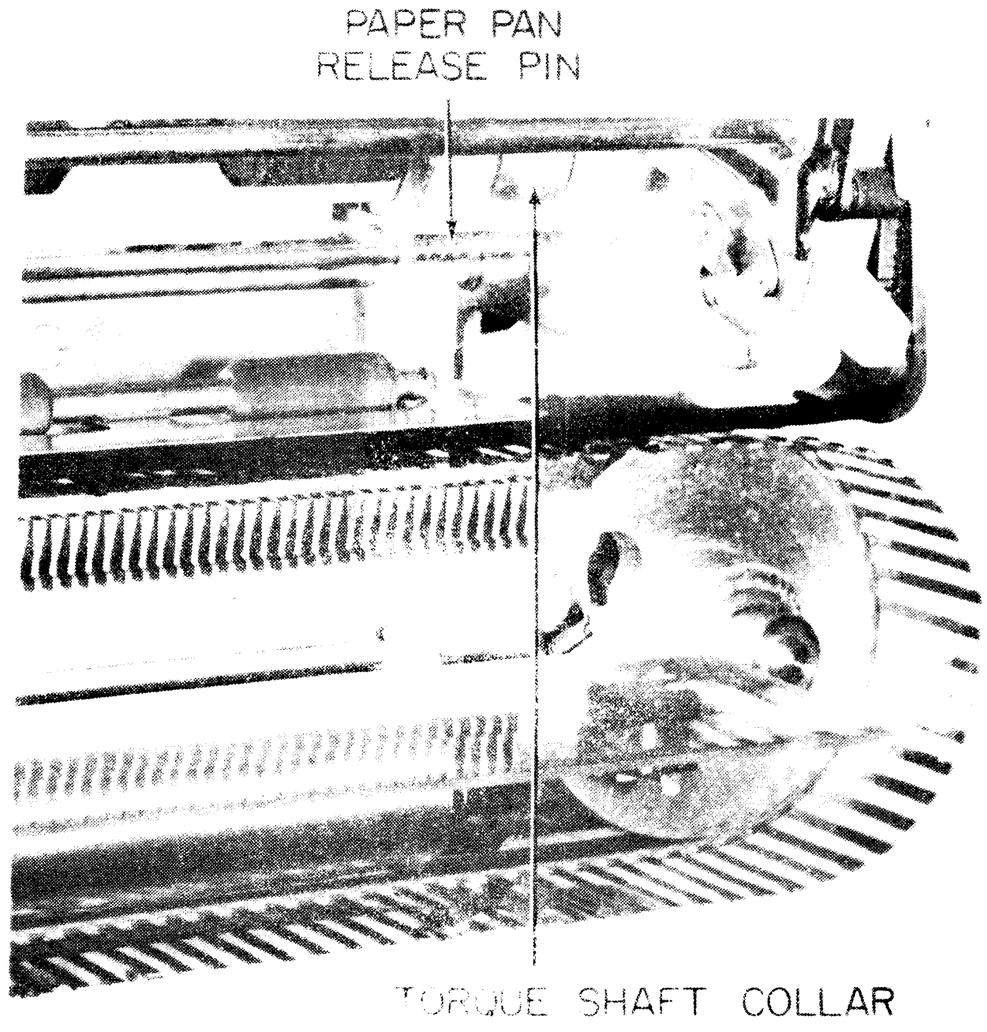
If the paper slips under the platen with the paper pressure release lever engaged in the rearward position (see figure 5-12), perform the following steps:

1. Clean platen with alcohol.

2. Remove the right ribbon drive mechanism.

3. Remove the drive belt and jackshaft pulley.

4. Loosen the set screw in the collar on the torque shaft (see figure 5-20).



Torque Shaft Adjustment
Figure 5-20

5. Holding the paper release lever in the engaged position, place a screwdriver in the end of the torque shaft (see figure 5-13) and turn counter-clockwise until pressure is felt. Do not push with screwdriver with a force that will move torque shaft laterally.

6. Lock the set screw.

7. Install paper and perform pull test (paper should not slip under platen with 15 lbs. pull on the paper).

PAPER SKEW ADJUSTMENT

If the paper does not follow correct alignment, check the left paper holder for alignment. There should be 2.62" from the inside rear frame to the back edge of the paper holder. The paper holder is held in place by two screws to the bottom frame. If the problem still exists, refer to the troubleshooting table under "Paper Handling" (Chapter 4, Section 1).

PAPER HOLDER ADJUSTMENT

To check the paper tension, insert a roll or paper in the terminal. While pressing the feed button, the dancer bar should not bottom out. If the dancer bar bottoms out, adjust the horizontal screw on the left side frame (see figure 5-16) If problem still exists refer to the troubleshooting table under "Paper Handling".

MOTOR

(See Figure 5-12)

1. Remove the bustle, top cover and paper roll.

2. Remove the Printer from its case.

3. Follow the TXP removal instructions; however, the POW cable does not have to be removed.

4. Lay the TXP board back over the bustle frame.

5. Remove the fan blade and the four screws (see figure 5-13) holding the motor to the frame.

6. Remove the capacitor cover directly in front of the paper roll.

7. Disconnect the two motor leads to the motor starting capacitor.

8. Remove the small transformer directly above the motor.

9. Remove the drive belt from the motor pulley.

10. By lifting the back of the motor and twisting slightly, the motor may be removed from the frame.

CAUTION

When installing the motor, the two blue wires will go to the same capacitor terminal located nearest the power transformer. Position the blue wires and the red wire on the other capacitor terminal toward the front of the Printer. Make certain that the capacitor wires do not touch the jackshaft.

HAMMER DECODER (HD) BOARD

1. Remove the Printer from its case. Remove the paper roll.

2. Remove the Printer board hold-down support from the back of the bustle and remove any board that has a switch protruding from it.

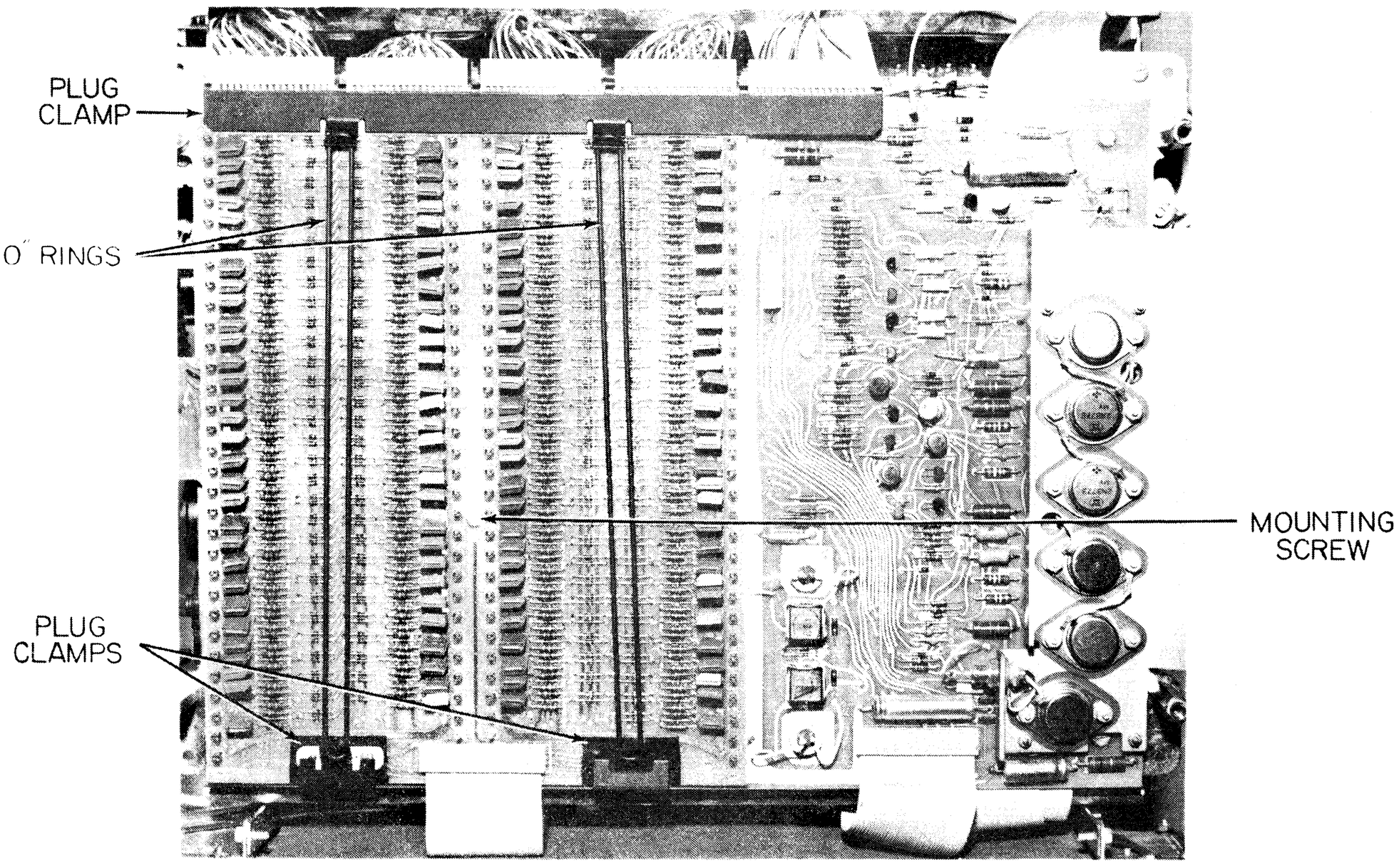
3. Remove the three top screws supporting the top of the bustle frame.

4. Disconnect plugs DEC and PCA from the mother board.

5. Re-install the screws holding the bustle frame.

6. Set the Printer in a vertical position on bustle frame.

7. Remove the "O" rings holding the plug clamps, and remove these clamps (see figure 5-21).



HD Board
Figure 5-21

8. Disconnect the five(5) plugs near the keyboard, the plug on the left side of the HDA going to the photo-cell amplifier, and the power plug to the fluorescent lamp.

9. Remove screw in center of Hammer Decoder board.

10. Remove the hammer decoder (HD) board by gently pulling it away from the hammer driver accessory board.

11. Replace by reversing the above steps.

HAMMER DECODER ACCESSORY BOARD

1. Remove HD Board.

2. Remove the six (6) screws (see figure 5-22) holding the hammer driver accessory (HDA) board. The board should now be free for removal. The wires may be removed with the HD board.

POWER TRANSFORMER

(See Figure 5-12)

1. Remove the Printer from its case.

2. Follow the TXP board removal instructions.

3. Lay the TXP board back in the bustle frame.

4. Remove the cover and the hold-down brackets from the two capacitors directly in front of the paper roll.

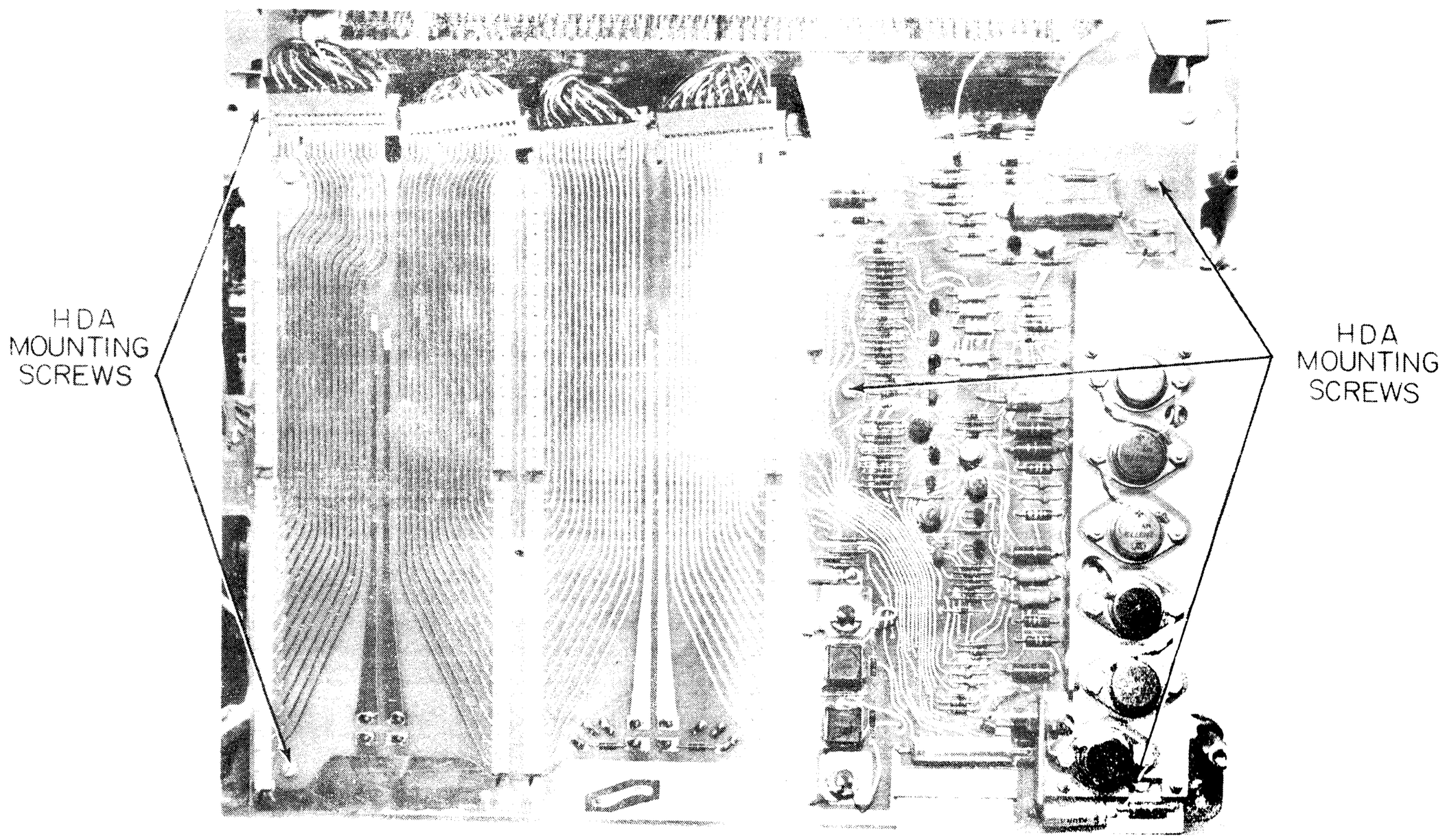
5. Remove the motor wires going to the small starting capacitor, and remove the motor starting capacitor.

6. Remove the hammer decoder (HD) and hammer driver accessory (HDA) boards.

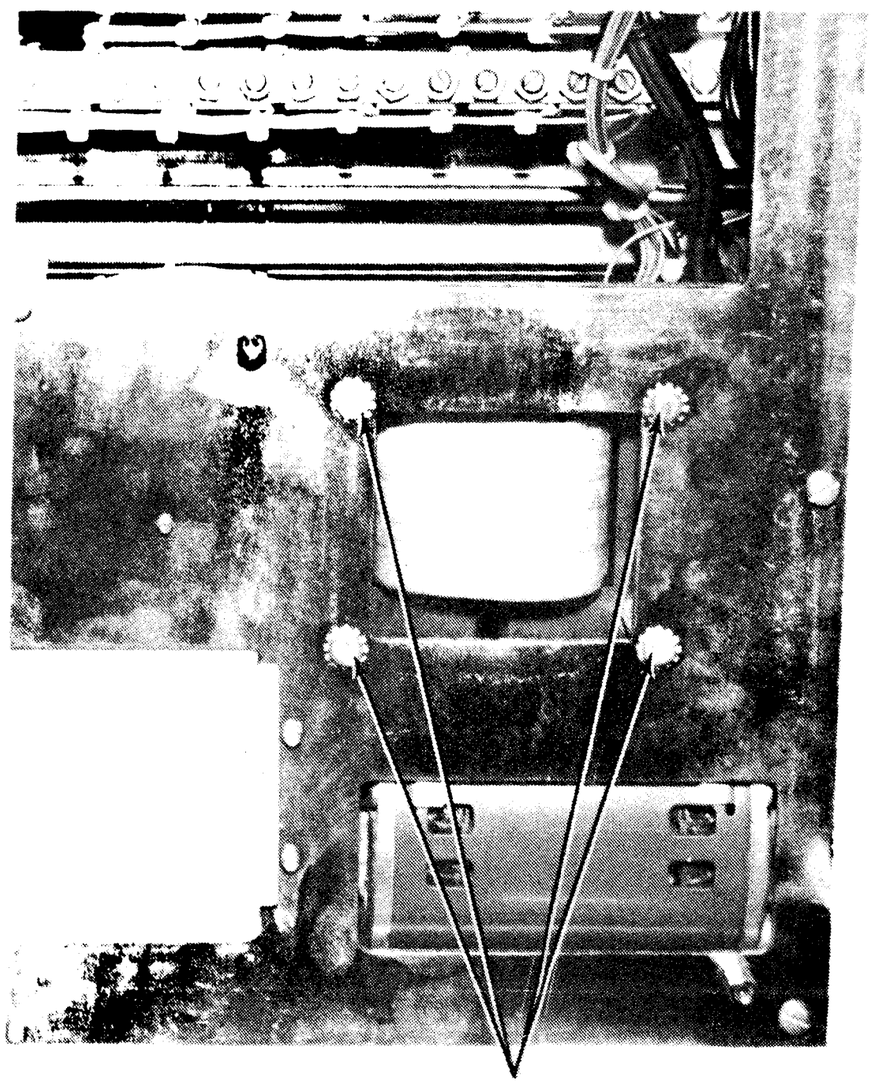
7. Remove the four screws from the bottom of the frame which holds the transformer (see figure 5-23). Hold the transformer while removing the screws.

8. Move the transformer toward the left side of the frame and remove the transformer from the Printer.

9. To reassemble, reverse steps 1 through 8.



HDA Board
Figure 5-22



Power Transformer Mounting Screws
Figure 5-23

PLATEN, PAPER PAN AND PRESSURE ROLLERS

PLATEN

1. Release the platen latches (see figure 5-12) at each side of the frame.

2. Lift the platen straight up and out of the Printer. When installing the platen, insure that the platen gear is to the left side. Seat the platen firmly in the slots provided in the side frames and lock the platen latches.

PAPER PAN- The paper pan is held by a pin under each end of the pan. The pin on the right side is spring loaded (see figure 5-20). Push this pin in toward the left with a small screwdriver and lift the right side up. Move the pan to the left and lift out of the machine. To install the paper pan, engage the right side over the spring loaded pin and move the pan to the left. Drop the left side over the pin and move the pan to the right.

PRESSURE ROLLERS- Lift platen rollers straight up and out of the yoke arms. When installing the pressure rollers, insure that the three large rollers are toward the back of the machine and the three small rollers are toward the belt guide.

HAMMER BANK

1. Remove the main frame from the case.

2. Remove the control panel.

3. Remove the keyboard.

4. Remove the platen and paper pan.

5. Remove the "O" ring clamping bands from under the Printer (see figure 3-21).

6. Disconnect the connector cable plugs from the hammer driver accessory board (HDA), the photocell board plug and the fluorescent lamp plug.

7. Remove the left drive belt by pushing down on the belt at the lower front pulley and rotating the print belt.

8. Remove the three screws (see figure 5-13) on each side of the frame holding the hammer bank assembly. Notice that the rear screw on the left side holds the spring for the photocell preamplifier.

9. Grasp the pulley shaft and the lower portion of the casting and lift the assembly up and forward (see figure 5-24).

10. Reverse steps 1 through 7 to install a new hammer bank assembly. Make certain of the following.

a. The alignment bar protrusion attached to each casting should seat firmly into the mating part attached to each side frame (see figure 5-25).

NOTE

Hammer bank alignment bar is factory adjusted. Do Not Move.

b. Re-install left drive belt as shown in figure 5-16.

REAR BELT GUIDE

Remove the rear or top belt guide as follows:

1. Raise the paper shield.

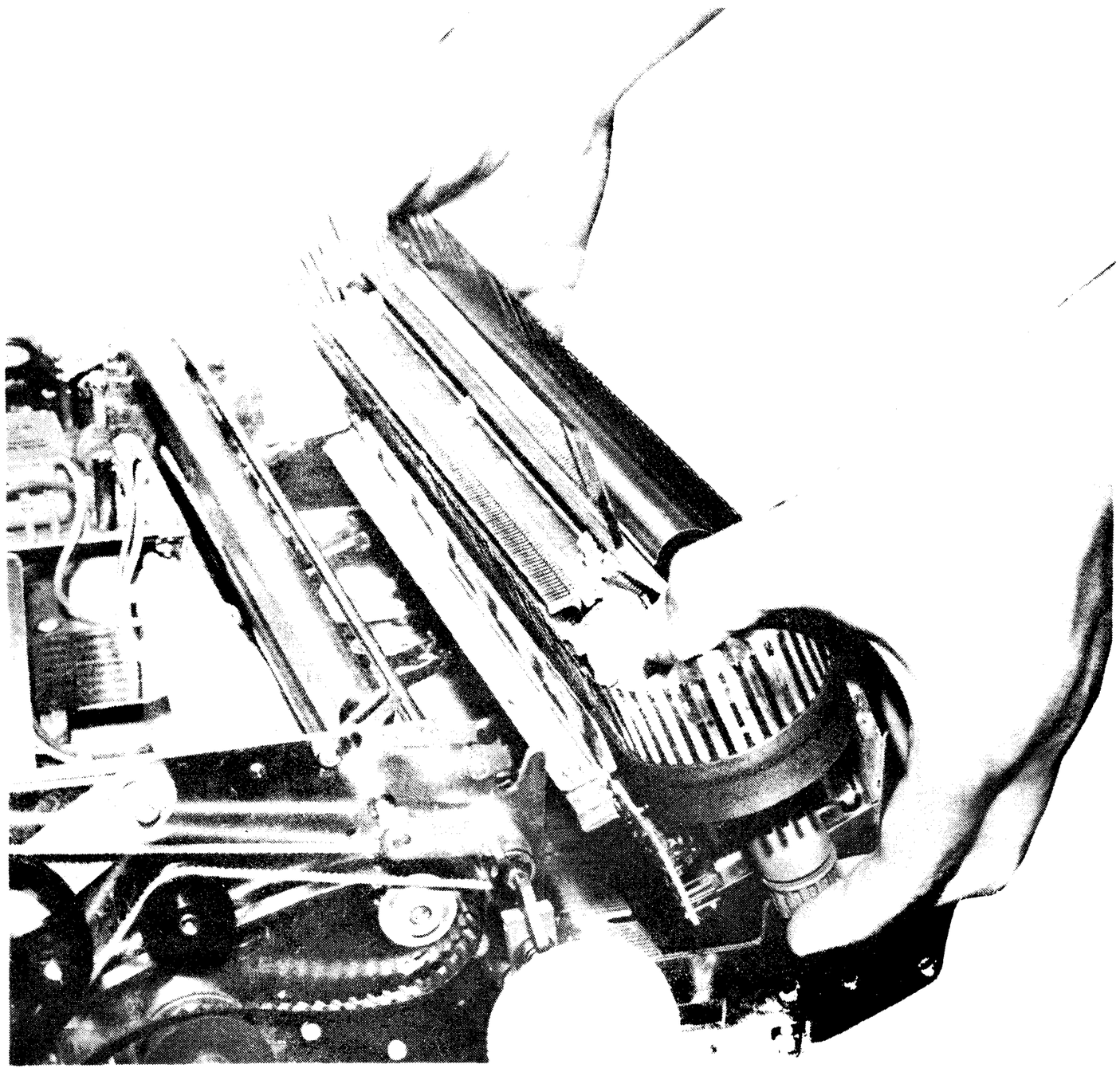
2. Remove the platen.

3. Remove the paper pan.

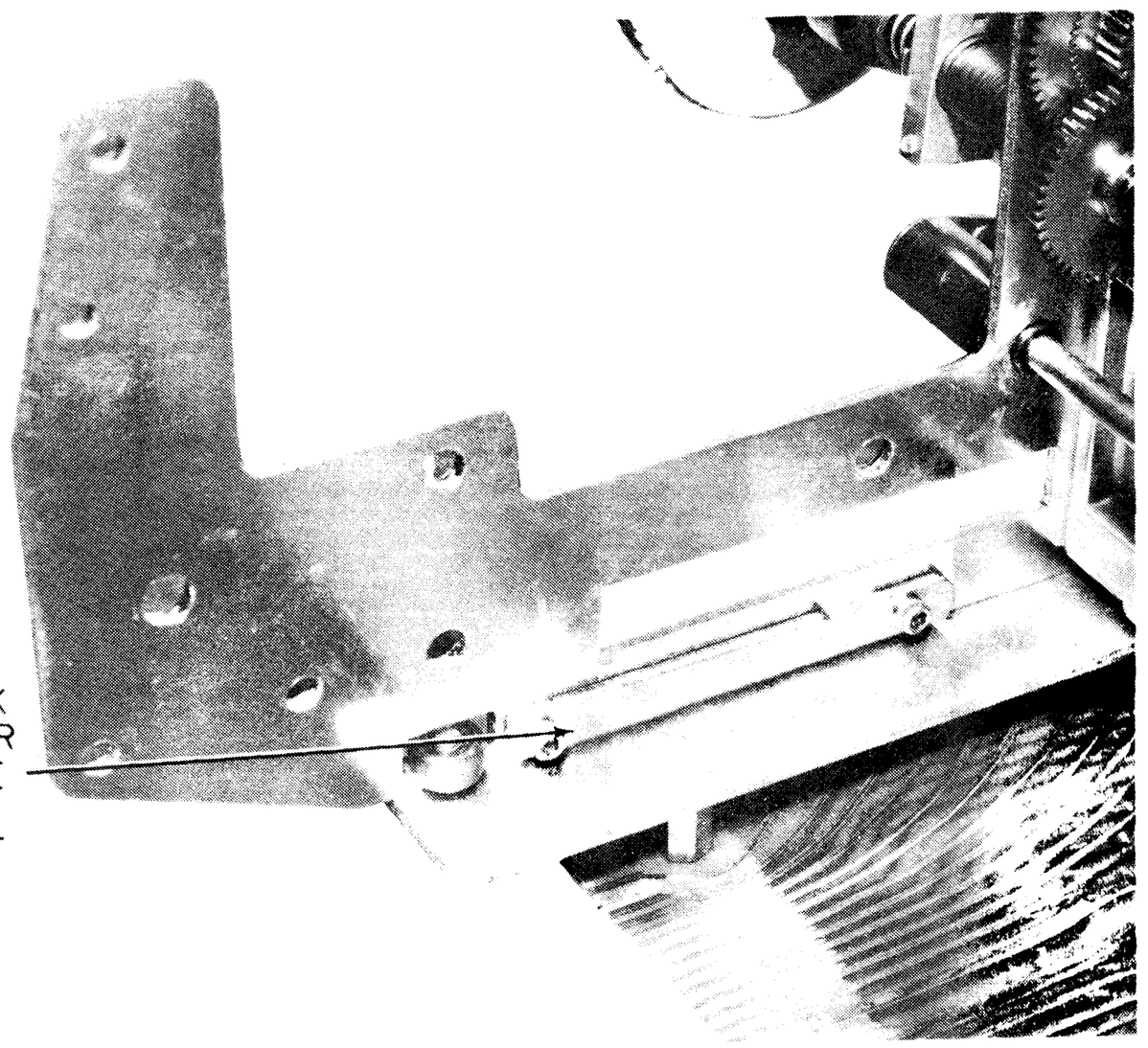
4. Remove the two screws holding the rear guide to the front guide. These screws are located one on each side of the center screw (see figure 5-26).

NOTE

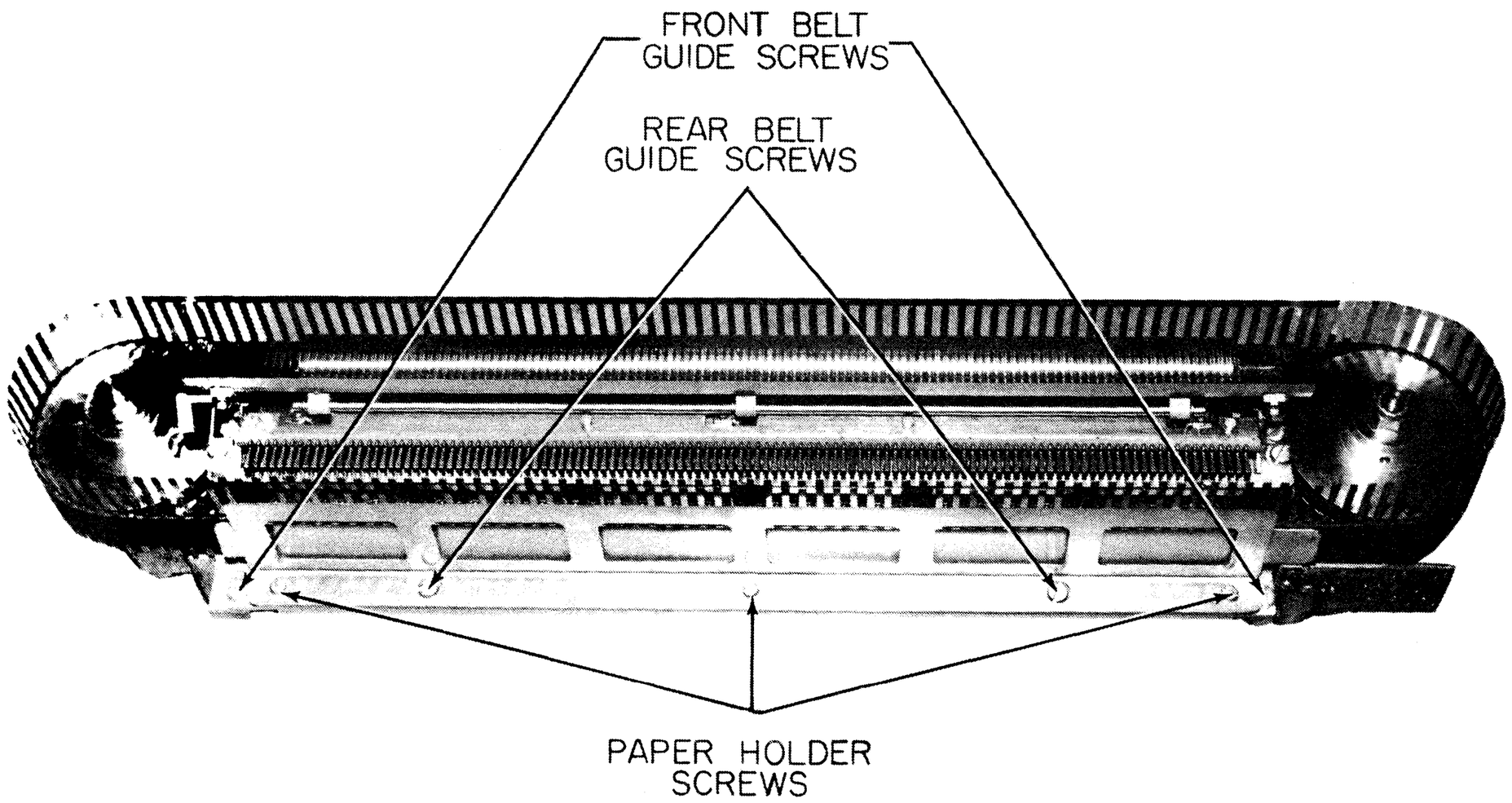
These screws do not have to be removed when adjusting the belt guide.



Hammer Bank Removal
Figure 5-24



Hammer Bank Alignment Bar
Figure 5-25



Belt Guides and Paper Holder Screws
Figure 5-26

PRINT BELT

(And Rear Belt Guide Adjustment)

1. Remove the ribbon.

2. Remove the platen.

3. Remove the paper pan.

4. Remove the three small pressure rollers toward the front of the Printer.

5. Loosen the two (2) screws holding the rear belt guide (see figure 5-26). Move the guide away from the belt.

6. Push in on the right pulley and remove the print belt. A 10-32 x 1.25" screw in the right casting may be used to hold the pulley in.

7. When replacing the belt, ensure that the lower portion of the fingers are in the belt guide and are not touching the photocell shield.

8. Reverse steps 1 through 6 to install the print belt.

9. Allow .003" - .008" clearance between the print belt and the rear belt guide. Insert feeler gage between belt and guide and move gage along the complete length of the guide while rotating belt (see figure 5-27).

FRONT BELT GUIDE

(And Front Belt Guide Adjustment)

The front or lower belt guide is secured to the hammer bank castings by screws located at each end of the belt guide. During normal print belt clearance checks, do not loosen these screws.

REMOVAL

1. Remove the ribbon.

2. Remove the platen and paper pan.

3. Remove the three small pressure rollers.

4. Loosen the two screws holding the rear belt guide and move the guide away from the belt.

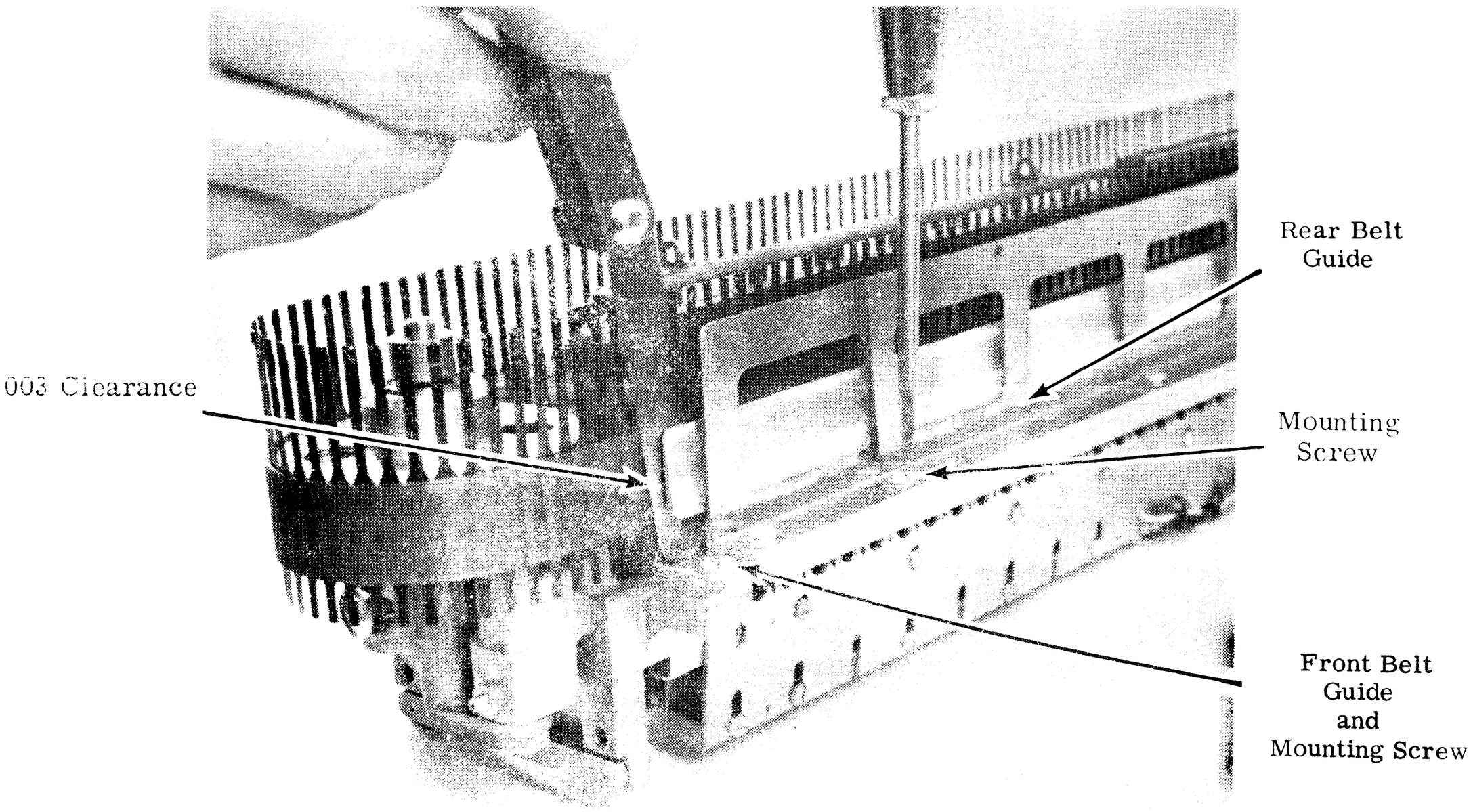
5. Remove the print belt.

6. Remove the rear belt guide by lifting up and tilting back 90°.

7. Remove the two screws holding the front belt guide.

8. Lift the guide up and tilt back 90°.

9. Carefully move the guide by the clevis arms and hammers and remove from Printer.



Rear Belt Guide Adjustment
Figure 5-27

INSTALLATION

1. Tilt guide back 90° and insert lower edge between yoke arms and clevis.

2. With the belt guide, move the yoke arms back and lower the guide into the Printer while tilting the guide forward.

3. Position the guide on the castings and insert the two screws (do not tighten).

4. The casting holding the right pulley is spring loaded. Move this casting toward the side frame until the pulley is at its most forward position. A 10-32 x 1.25" screw in the right casting may be used to hold the pulley in this position.

5. Insert a straight edge along the belt guide where the print belt makes contact (see figure 5-28)

REBOUND BAR ADJUSTMENT

1. Raise the paper shield.

2. Loosen two screws (one at each end of rebound bar).

3. Slide rebound bar forward until the edge of the steel plate is .072" to .079" from the face of the hammers.

4. Tighten screws firmly. DO NOT OVER-TIGHTEN

PHOTOCELL ADJUSTMENT

ADJUSTMENT CHECK
(See figure 5-29)

1. Start the Printer and print out a few random characters on the paper.

2. Stop the Printer and rotate the belt counter-clockwise until a print finger is in front of Hammer #1.

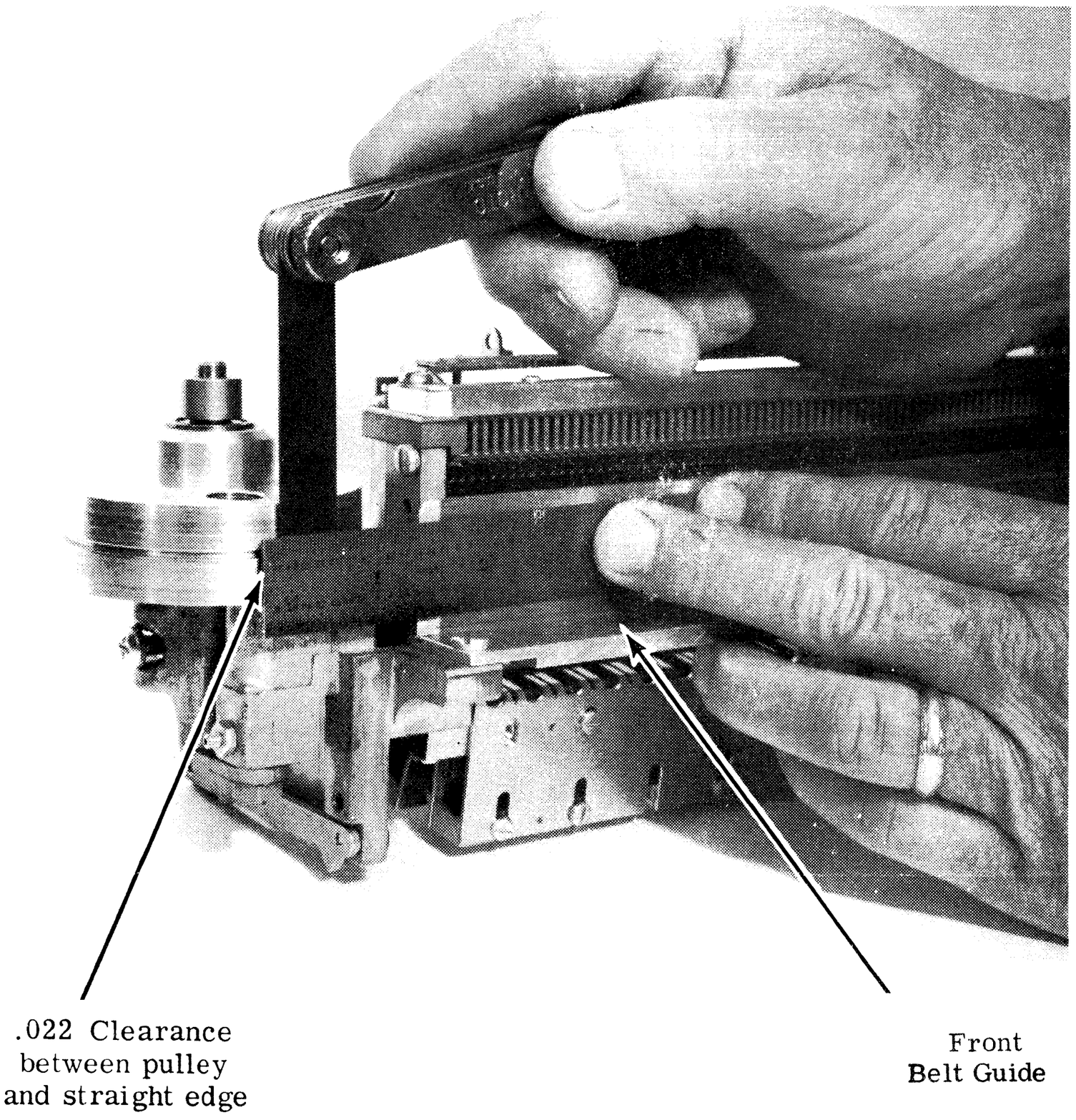
3. Move an even numbered hammer toward the paper. The printed character should be directly under the hammer face.

4. If the character is to the left or right of the hammer, adjust the photocell.

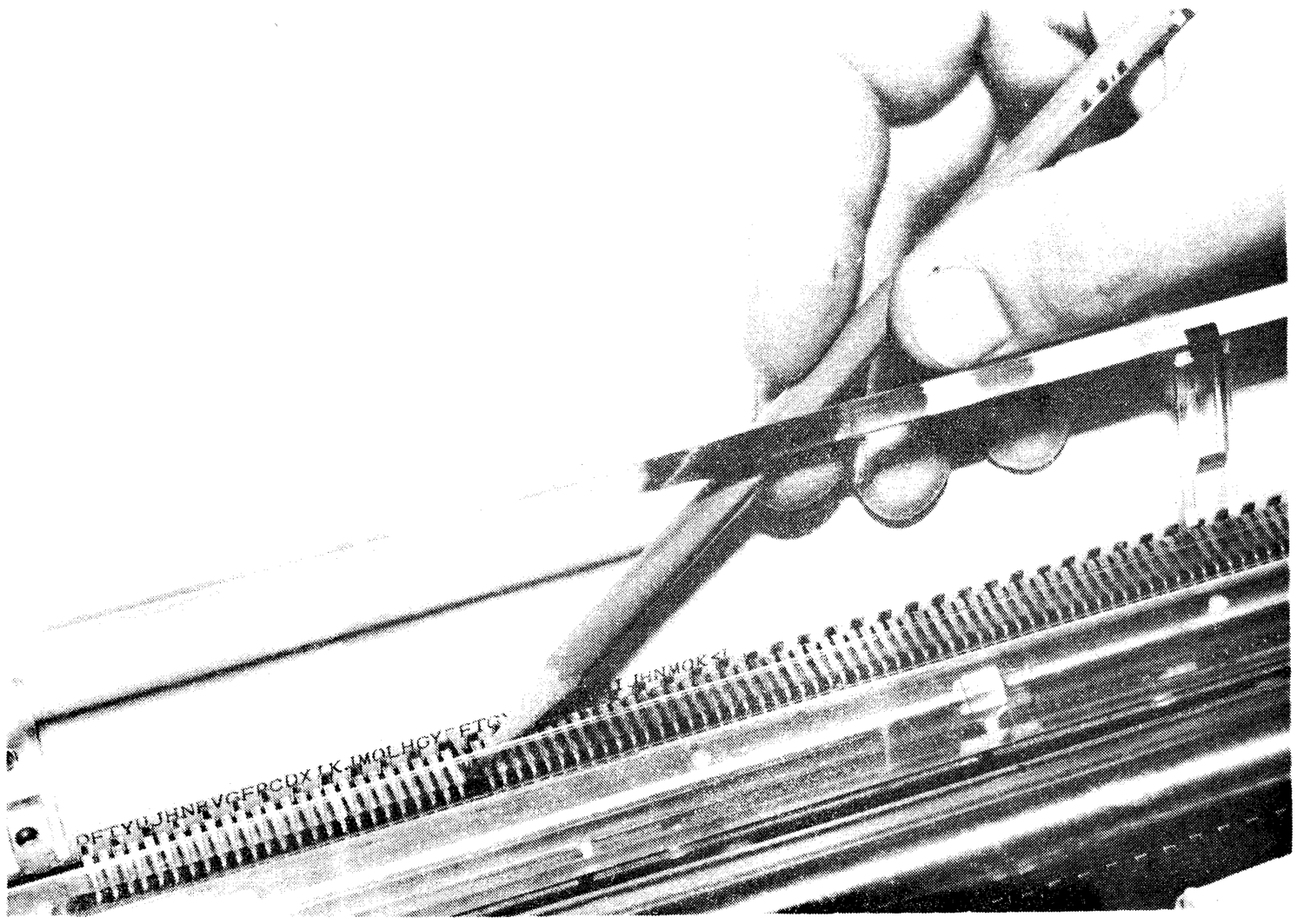
ADJUSTMENT
(See figure 5-30)

1. Loosen the vertical mounting screw in front of the photocell lamp.

2. If print is to the right of the hammer, rotate the horizontal screw under the photocell lamp clockwise; if the print is to the left of the hammer, rotate the screw counter-clockwise.



Front Belt Guide Adjustment
Figure 5-28



Photocell Adjustment Check
Figure 5-29

Photocell Adjustment
Figure 5-30

PRINT FINGER

1. Move the print belt to the right until the damaged fingers is just moving off the drive pulley toward the front of the Printer.

NOTE

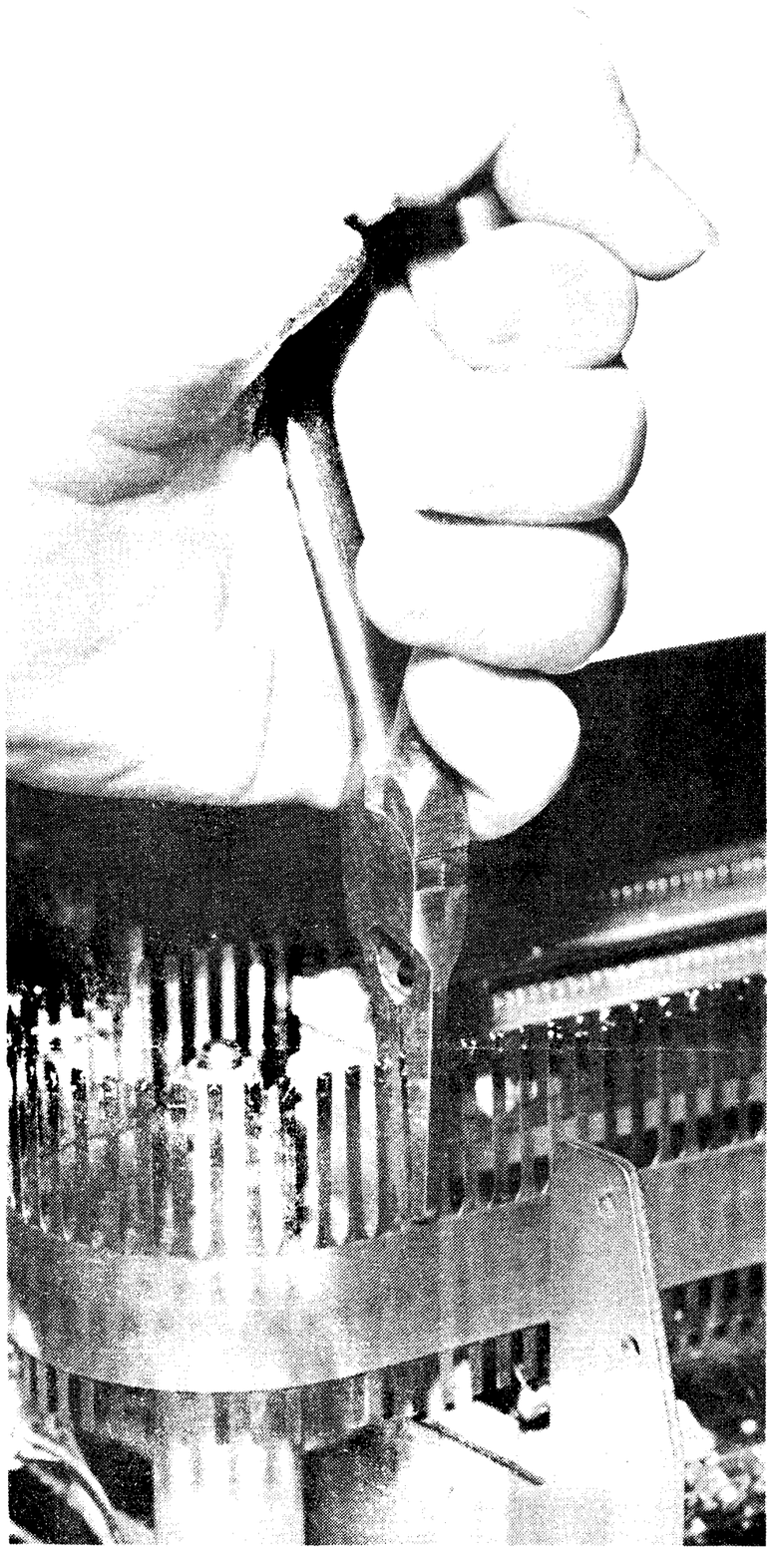
The two fingers with wide bottoms (Font Fingers) cannot be removed.

2. Grasp the finger firmly (close to belt) with the finger removal pliers and pull straight up and out of the belt (see figure 5-31).

3. Grasp a new finger as far down as possible and insert it in the slot. Push the new finger in approximately a quarter of an inch at a time. Be careful not to bend the finger as it will break.

4. Push the finger down until the wide flange is firmly seated against the belt.

5. Check the alignment on the top of the finger in relation to the other fingers in the belt. If slightly out of line, it may be bent slightly to conform with the other fingers.



Print Finger Removal
Figure 5-31

HAMMER THROW ADJUSTMENT

If the hammer throw is suspected of being out of adjustment, it can be checked by pushing down on the clevis plunger and checking the throw of the hammer.

1. Lift cover and remove power from Printer.

2. Tilt the front of the print belt out of the way and with a small screwdriver or suitable tool, push down on the appropriate clevis plunger until it bottoms.

3. The hammer should extend forward .077".

If the hammer is out of adjustment, proceed as follows:

1. Remove the Printer from its case.

2. Remove the HD and HDA boards.

3. Determine the correct adjustment screw.

4. Loosen the lock nut.

5. While holding the nut position, rotate the adjustment screw and recheck hammer throw.

6. When the hammer throw is correct, hold the screw position and seat the lock nut. (The screw movement is very small as there is a 4 to 1 increase between the hammer throw and the screw movement).

CLEVIS AND PLUNGER

REMOVAL

1. Raise cover and remove the platen.

2. Remove the paper pan and front pressure rollers.

3. Loosen rear belt guide and remove the print belt.

4. Remove both front and rear belt guides.

5. Remove the rebound bar assembly.

6. Select the clevis to be removed and move the attached hammer forward until the clevis disconnects (see figure 5-32).

7. Twist the clevis 45° to 90° (in either direction) and pull the clevis and plunger assembly out of the hammer bank (see figure 5-33). Remove clevis assembly toward rear of Printer.

CAUTION

Be careful not to damage the adjacent clevis assemblies when removing the damaged clevis and plunger.

INSTALLATION

1. Insert the plunger into the appropriate coil position from the rear side of the hammer bank.

2. Rotate the clevis until the pin drops through the metal tab on the hammer bank.

3. Rotate clevis assembly 45° to 90°.

4. Push the appropriate hammer forward and hook the clevis onto the hammer.

5. Install and adjust front belt guide.

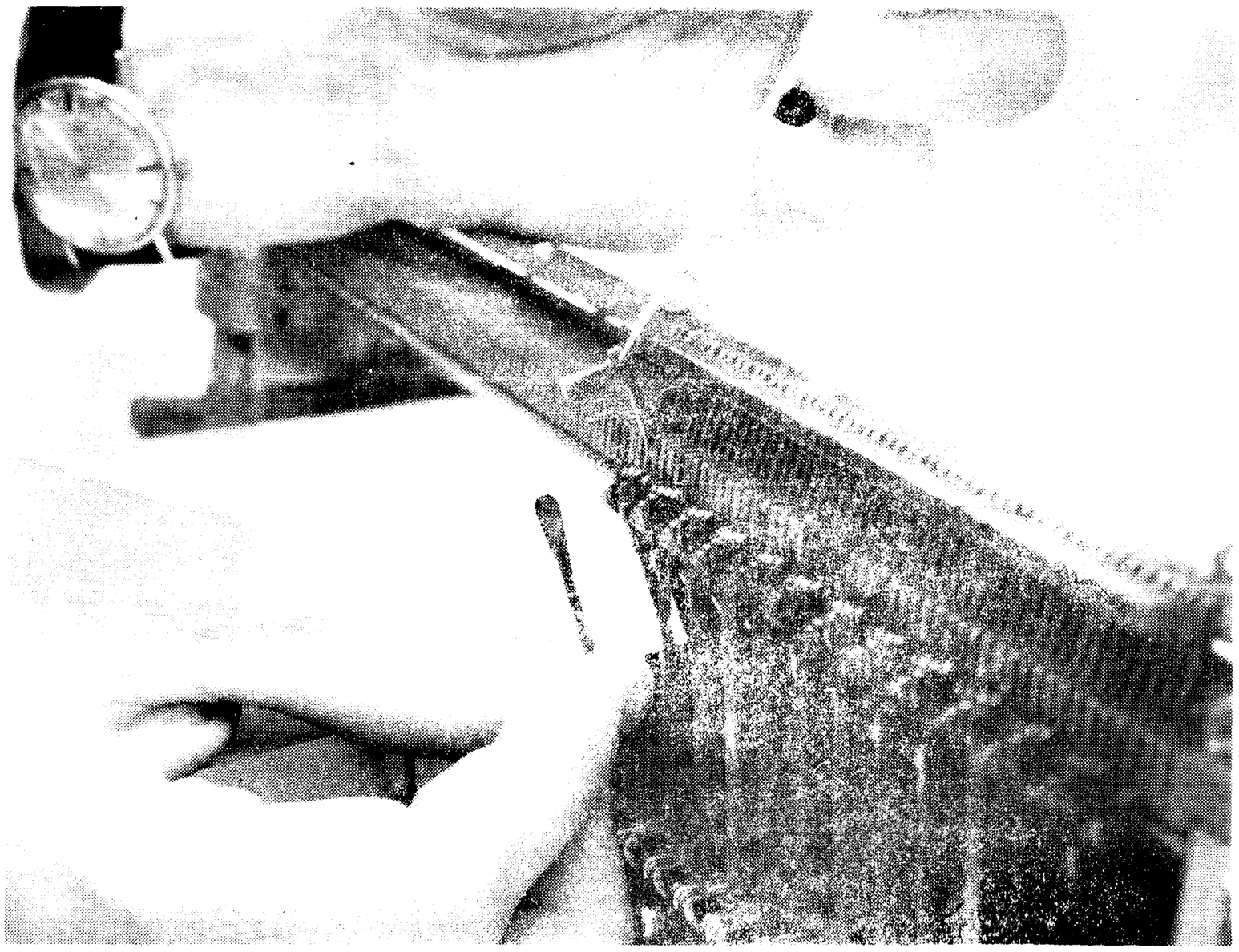
6. Install print belt.

7. Install and adjust rear belt guide.

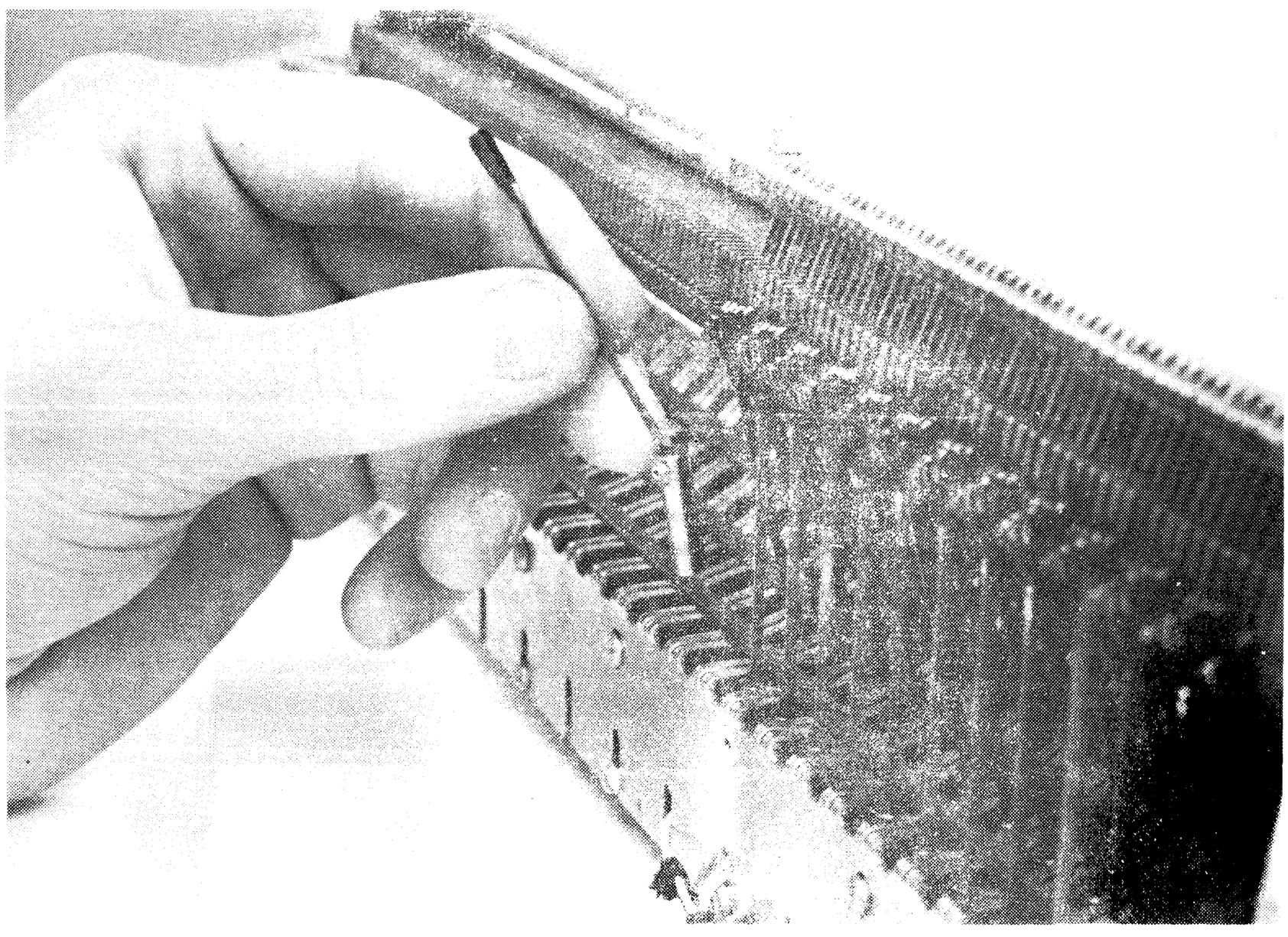
8. Install and adjust rebound bar.

9. Install rollers, paper pan and platen.

10. Check hammer throw adjustment.



Clevis [illegible]
Figure [illegible]



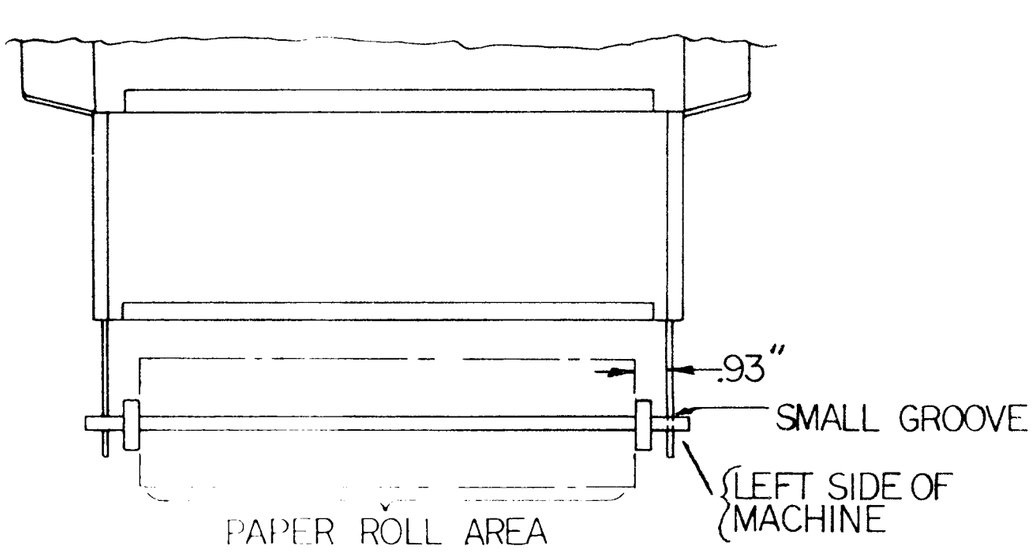
Clevis and Plunger Removal
Figure 5-23

OPTIONS

The following is adjustment instructions or information for those Printer options that may require occassional adjustments.

EXTERNAL PAPER HANDLING SYSTEM

Wide Roll Paper Handler (See Figure 5-34) - The clearance between the collar on the left side of the Printer and the inside of the bracket should be 0.93 inches.



Wide Roll Paper Handler
Figure 5-34

Mounting Brackets and Bumpers (See Figure 5-35)

1. The cross bars should be approximately 1.06" above top of the bustle cover. If necessary, adjust mounting brackets.

2. The bumpers should be set so that the front edge of paper rack clears the platen by 1/16".

VERTICAL TAB AND FORM FEED VTFF

1. Punch a programmable disk with two consecutive VT and FF holes (see figure 5-36) and install disk on disk wheel.

2. Line-feed Printer until the lamp filament is between the two consective FF and VT holes. The range between holes being "A" of figure 5-36.

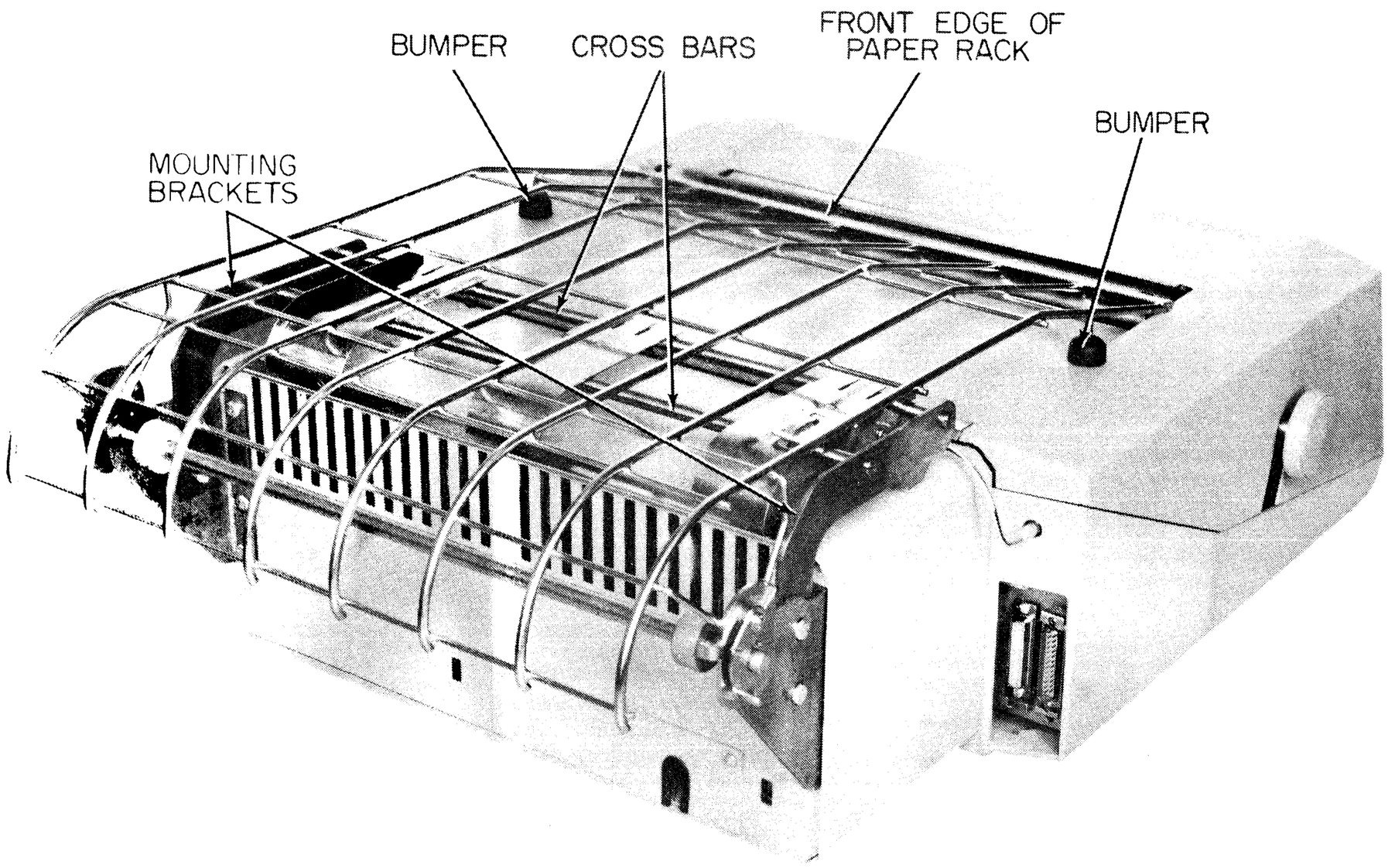
3. Connect negative lead of voltmeter to test point 8 on the VTFF printed circuit board; and connect positive lead to frame of printer.

4. Scribe or pencil a mark at the end of the radial arm (see figure 5-37).

5. Loosen radial arm screw.

6. Position ruler as shown in figure 5-37.

7. Move the radial arm in one direction until the voltmeter reads -20V dc. Note the ruler reading as indicated by the mark on the radial arm.



External Paper Handling System
Figure 5-35

8. Move the radial arm in the opposite direction until the voltmeter reads 0V and drops to -20V dc and again note the ruler reading. These readings establish the range of "A" as shown in figures 5-36 and 5-37. If "A" cannot be established go to step 10.

9. Position radial arm above mid-point of "A" by 1/32" ± 1/64 (see figure 5-37) and tighten radial arm screw. End of procedure.

10. If the range of "A" cannot be established, the larger gear must be slipped a tooth as follows:

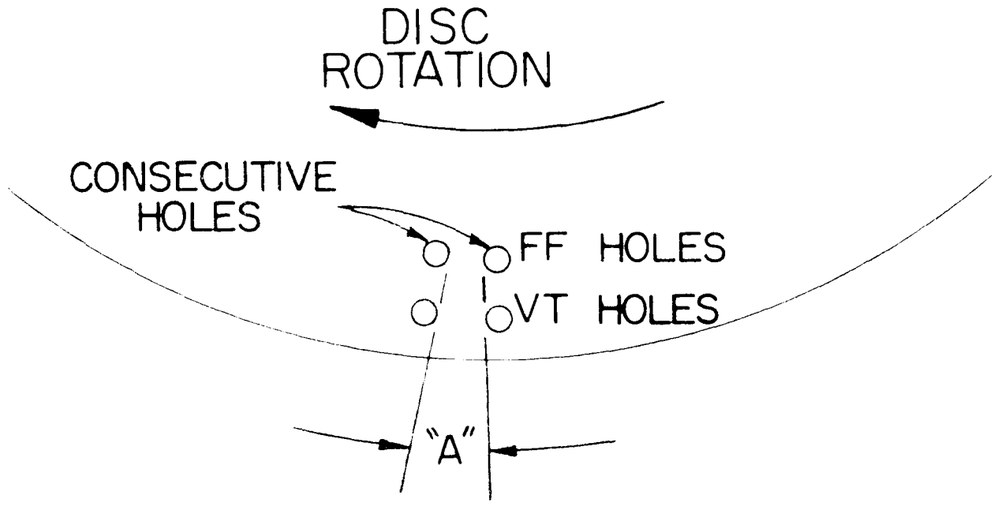
a. If the voltage at test point does not drop to -20 V dc when approaching U (upper end of "A") slip gear in the clockwise direction.

b. If voltage does not drop to -20V dc when approaching the L (lower) end of "A", slip gear counter-clockwise.

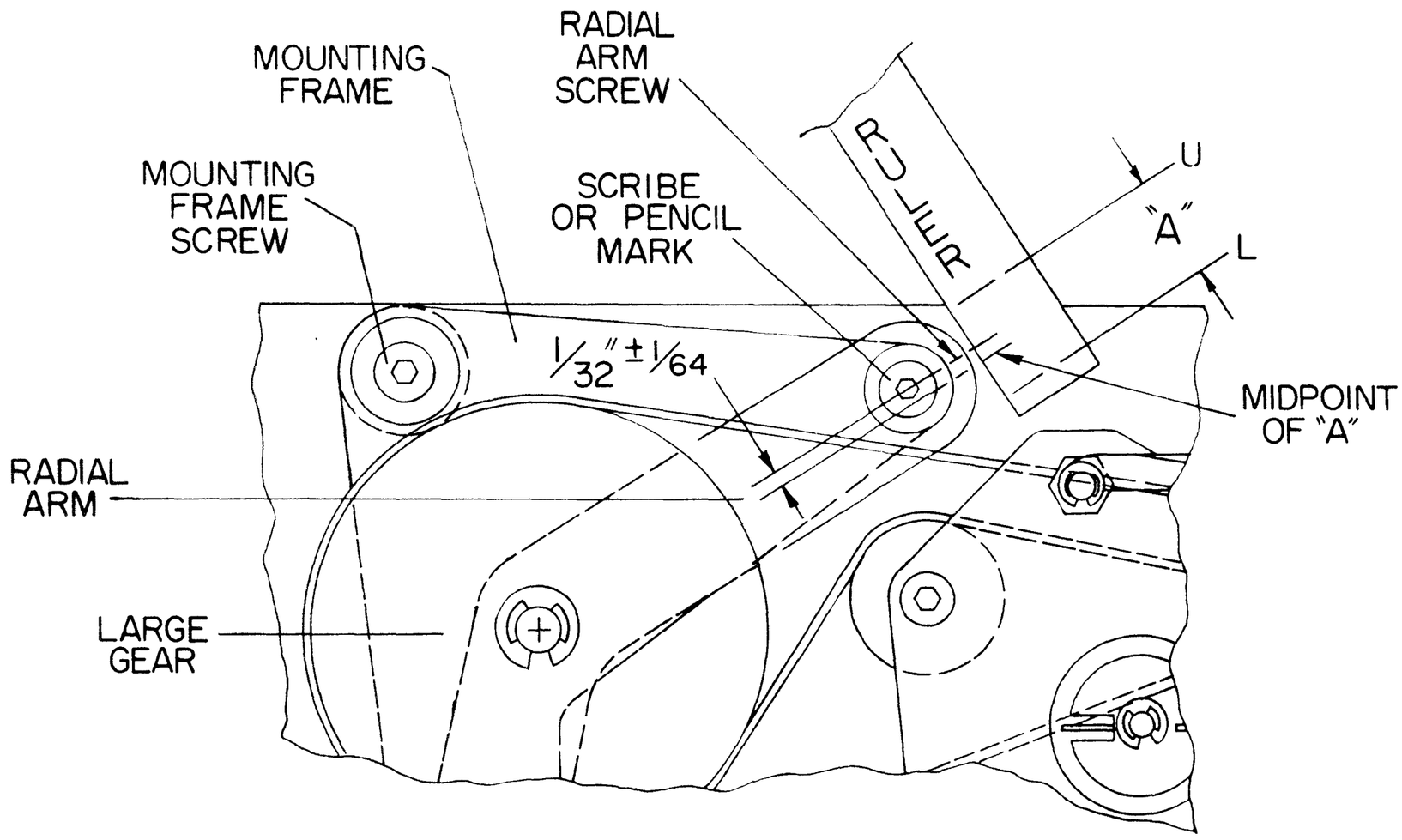
c. To slip belt, mark position of mounting frame and loosen mounting frame screw. Move mounting frame in a clockwise direction to provide enough slack in belt to slip gear. Return mounting frame to original marked position and tighten screw.

d. Check belt tension by applying two (2) ounces of pressure at midpoint of the longest span (top) of the belt. Belt should deflect .100" ± .031. To adjust belt tension, loosen mounting frame screw and move mounting frame.

e. Repeat steps 5 through 8 and perform step 9 if "A" is established.



VTFF Adjustment, Range "A" On Disk
Figure 5-36



VTFF Adjustment Mechanics
Figure 5-37

GENERAL ELECTRIC COMPANY

DATA COMMUNICATION PRODUCTS DEPARTMENT

WAYNESBORO, VIRGINIA 22980

GENERAL ELECTRIC

4-72 (500)

PRINTED IN U.S.A.

GEH-2185A
ADDENDUM 1A

TermiNet* 300 DATA COMMUNICATION PRINTER

ADDENDUM 1 TO GEH-2185A

TermiNet 300 PRINTER

SERVICE MANUAL

*Registered Trademark of the General Electric Co., USA

GENERAL ELECTRIC

DECEMBER, 1971

The information contained herein does not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

FORWARD

This addendum was written to inform the serviceman of the major differences between the "C" Printer and earlier production Printers. However, some of the following information applies to all printers and will be identified as such.

This addendum does not reflect all the changes or improvements built in the "C" Printer. Only that information needed by the serviceman has been supplied. Part numbers for the "C" Printer will be shown in TermiNet 300 Parts Manual GEK-14999B.

The following information is organized in the same sequence as the Service Manual. Chapter, Section, Paragraph, and in some cases the Page Number is given. Under the heading, the added or changed information or instruction is given.

CHAPTER 1
GENERAL

HIGHLIGHTS OF MAJOR CHANGES AND IMPROVEMENTS IN THE "C" PRINTER

KEYBOARD

1. The SLD (Sense Line Driver) PCB and the SLI (Keyboard Interface) PCB have been combined into the new SLC PCB in the keyboard. This eliminates the KIF bustle PCB and the protective CAPS ONLY switch.

2. The AUTO LF and ALT MODE (Alternate Mode CAPS ONLY) switches are now on the keyboard.

3. The ESC (Escape) key on the Optional Keyset has been and should not be pressed simultaneously with another key to cause an Escape-Character sequence. To cause an escape function, the ESC key is pressed and released; then the appropriate character is pressed and released.

CONTROL PANEL

1. The incandescent display lamps of the Print Position Indicator have been replaced by a light emitting diode (LED) display with red characters.

2. The LINE FEED toggle switch has been relabeled LINE SPACE. This was done to avoid confusion on the Receive Only Printer which has a LINE FEED push-button.

3. The AUTO LF Switch has been moved from the control panel to the keyboard.

4. The control panel is removed and installed differently as explained in Chapter 5.

CASTING AND FRAME

1. By changing the mounting arrangement, the main frame is more easily removed from the casting (See Chapter 5).

2. A [illegible] has been added to the right jackshaft support to faster adjustment of the platen pressure (See Chapter 5).

3. On the "C" and later model "B" Printers, the [illegible] roll holder has been redesigned (See [illegible] Section 5).

4. The motor mounting adjustment has been redesigned. (See Chapter 5).

5. The line fuse which was located on the rear of the Printer next to the power switch has been relocated to the IXPC PCB (See Chapter 5).

BUSTLE

1. The bustle and mother board are of a new design.

TermiNet 300 Printer, "C" Model
Figure 1-1A

2. The PCB's in the bustle are now keyed so as to avoid inserting a PCB in the wrong slot or upside down.

PRINTED CIRCUIT BOARDS

1. HDC PCB - This new PCB is a combination of the HD and HDA. The HDC PCB is retrofittable into "A" and "B" Printers.

2. The TXPC PCB has been redesigned. The line fuse is mounted on the new TXPC PCB. The new TXPC PCB is not retrofittable into "A" and "B" Printers.

3. The SLD PCB and the KIF bustle PCB have been combined into the new SLC PCB in the keyboard.

4. The ON-OFF switch has been removed from the rear of the revised PARC PCB. The PARC PCB must be removed to disable parity error detection. The revised PARC PCB is retrofittable into "A" and "B" Printers.

MODEL NUMBER

Figure 1-2A shows how a model number of a "C" Printer is coded.

TERMINET 300 MODEL NUMBERS

3 S 3 0 0 0 A A 0 0 0 C 1

32-01 LINE LENGTH	
	50 COLUMNS
	75 COLUMNS
	80 COLUMNS
	132 COLUMNS

PLATEN	
A	13" FRICTION FEED
B	12.344" PIN FEED
C	9" PIN FEED
D	8.5" PIN FEED
E	8" PIN FEED
F	5.5" PIN FEED

MACHINE TYPE	KSR—KEYBOARD SEND-RECEIVE	RO—RECEIVE ONLY	SR—SEND-RECEIVE	60 HZ, 120 V	FOREIGN POWER	EXT. PAPER HANDLER
A	X			X		
B	X			X		X
C	X				X	
D	X				X	X
E		X		X		
F		X		X		X
G		X			X	
H		X			X	X
J			X	X		
K			X	X		X
L			X		X	
M			X		X	X

OPTION GROUPS

THIS NUMBER WILL BE CHANGED SEQUENTIALLY AS DIFFERENT COMBINATIONS OF OPTIONS ARE MADE. DCP ENGINEERING WILL MAINTAIN A MODEL NUMBER ASSIGNMENT BOOK WHERE THE OPTIONS ARE DESCRIBED FOR EACH NUMBER. THESE OPTIONS ARE: BAUD RATE, HORIZONTAL TAB, LINE CONTROL, ANSWERBACK, VERTICAL TAB AND FORM FEED, ERROR DETECTION, TRANSPARENCY, SELECT, AUTO ON/OFF, PARALLEL INTERFACE, INTERNAL MODEM, REVERSE CHANNEL MODULE, TIMER, TYPE STYLE, WIDE ROLL KIT, NUMERIC CLUSTER, AND OTHERS AS THEY ARE IDENTIFIED.

BLOCK CHANGES

SIGNIFICANT BLOCK VARIATIONS

Model Number Code Chart
Figure 1-2A

CHAPTER 2
PACKING AND INSTALLATION

UNLOCKING THE KEYBOARD

Same as the "B" Printer. However, in the locked condition the shift key is also locked.

KIF AND PAR PRINTED CIRCUIT BOARDS

Because the KIF PCB circuits are now on the SLC PCB in the keyboard, the KIF PCB has been eliminated; therefore, it is not necessary to install the KIF PCB when installing the "C" Printer. Also, the PARC PCB does not have a switch on it any longer and is not packed separately. If the Printer has the Parity Detection option, the PARC PCB will be installed in the bustle.

CHECKOUT PROCEDURE

The checkout procedure operates the same as the"A" and "B" Printers except for the following.

- The LINE FEED switch is called the LINE SPACE switch on the "C" Printer.

- The ESC (Escape) key does not operate in the same manner as in the "A" or "B" Printer. In the case of this Checkout Procedure, press and release the ESC key; then press the HT SET or HT CLR key.

CHAPTER 3
PRINCIPLES OF OPERATION

SECTION 1
GENERAL OPERATING INSTRUCTIONS AND INFORMATION

SWITCHES AND INDICATORS

The following switches are different on the "C" Printer.

NAME	TYPE	FUNCTION
AUTO L.F. (Automatic Line Feed)	Slide Switch	Switch is located on right side of keyboard. Operation is same as "A" and "B" Printer.
ALL CAPS	Slide Switch	Switch is located on left side of keyboard. Operation is same as CAPS switch on KIF PCB ("A" and "B" Printers).
PARITY ERROR		There is no PARITY ERROR switch on the "C" Printer. The parity error option is made operational by inserting the PARC PCB in the bustle.
COVER INTER-LOCK	Switch	When in "On Line" condition, the motor stops and the Printer goes to the "Standby" condition. When in "Local" condition, the motor stops and the Printer stays in the "Local" condition. **CAUTION** Power is still on when the cover is lifted.

KEYBOARD

ESCAPE (ESC) KEY

The ESC key in the "C" Printer is used in a different manner than the "A" and "B" Printer. To perform an escape function with the "C" Printer, press and release the ESC key, then press the appropriate key for the desired escape function. For example, to set a horizontal tab, press and release the ESC key; then press the HT SET key. Do not simultaneously press the ESC and HT SET keys.

NOTE
When the ESC key is pressed, the next key pressed does not cause a character to print.

SECTION 2
OPTIONS

AUTOMATIC ANSWERBACK, ANSC
(44B417405-G02)

This option PCB is used with a DigiNet* TDM-110, or TDM-111, Bell 103A, or similar data set with automatic answer capability. The ANSC PCB will look for the ring indicator from the data set and then look for CB (Clear to Send). After the arrival of CB, the ANSC PCB will automatically send the coded answerback message. In the case of a false call, the ANS PCB will disconnect the line if CB does not arrive within 8 to 16 seconds after ring indication.

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SECTION 3
MECHANICAL OPERATION

KEYBOARD

Mechanically the keyboard in the "C" Printer is nearly identical with the keyboard in the "A" and "B" Printers. Electronically there are differences.

The new SLC PCB combines the sense lines, sense line amplifier, and the circuits that were on the KIF PCB. This eliminates the KIF PCB in the bustle. A detailed description of the "C" model keyboard will appear in a future revision of GEH-2185.

PAPER HANDLING

The "C" Printer and late production "B" Printer have an improved paper holder that consists of an aluminum tube, two brackets, and adjusting stud. The aluminum tube has a spring that grips the inside of the paper roll. A clutch inside one end of the tube provides the correct constant drag on the paper for correct paper feed. This clutch should not be adjusted in the field as the adjustment requires a factory fixture.

SECTION 4
FUNCTIONAL DESCRIPTION OF PRINTED CIRCUIT BOARDS

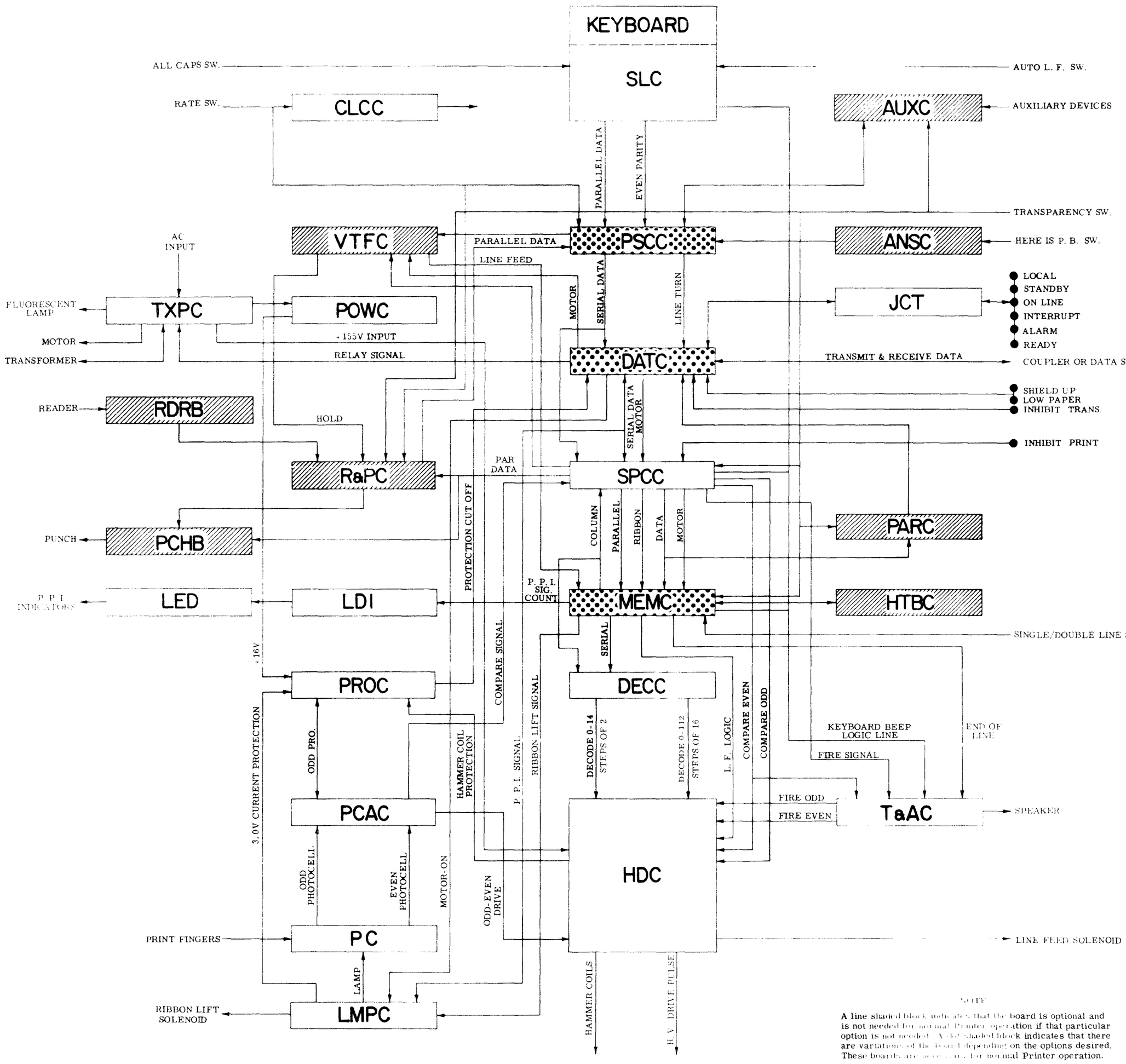
Functionally the "C" Printer is essentially the same as the "B" Printer. The major differences being that the KIF bustle PCB and SLD PCB have been combined into the new SLC PCB in the keyboard, which eliminates the KIF PCB; and the HD and HDA PCB's have been combined in the new HDC PCB. Figure 3-1A is a functional block diagram of the "C" Model TermiNet 300 Printer.

NOTE

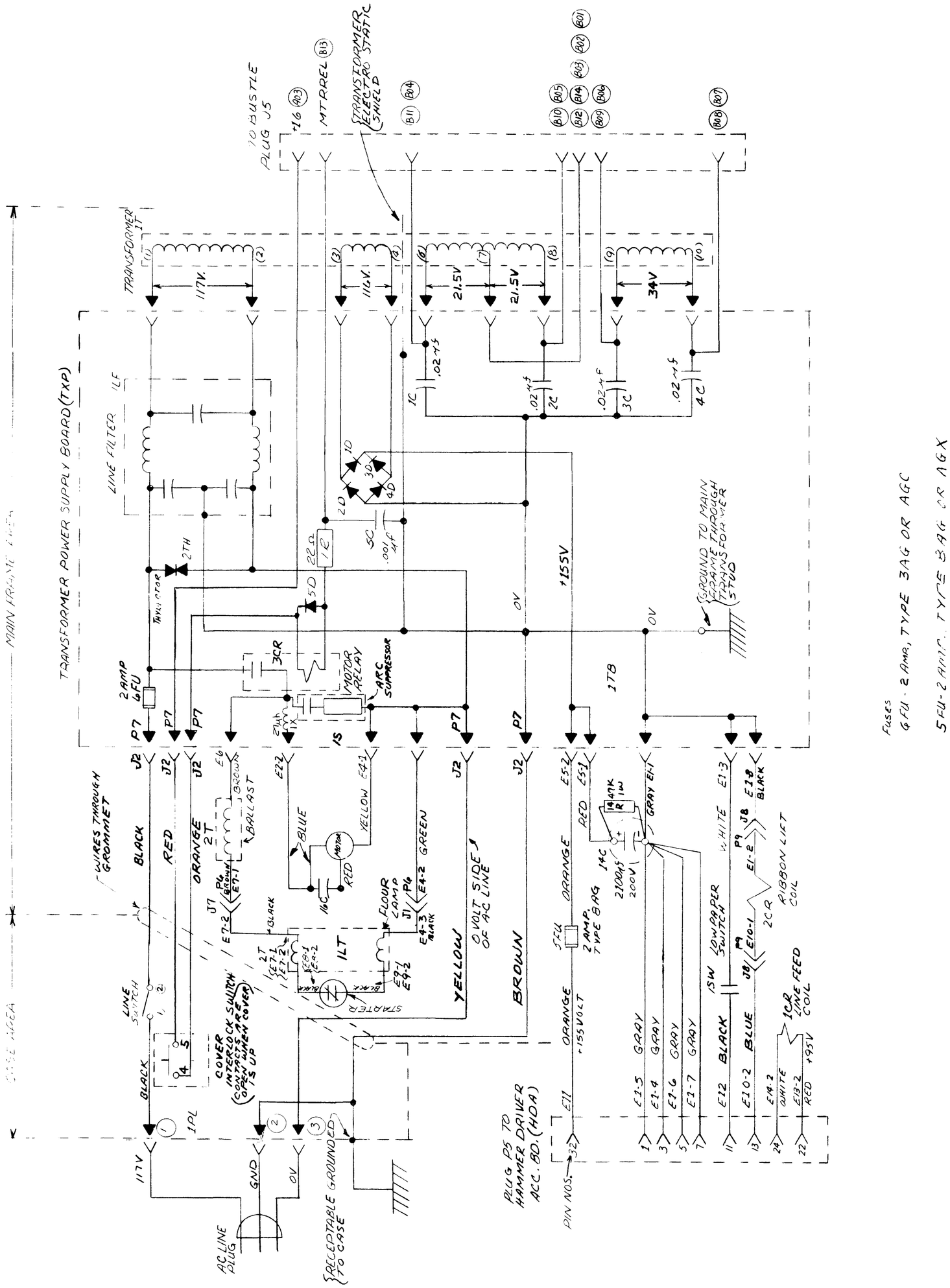
There are late production "B" Printers and retrofitted "A" and "B" Printers that are equipped with the new HDC PCB.

POWER CIRCUITS

The power circuits are essentially the same as the "B" Printer. The most significant changes are in the interlock circuit and the TXPC PCB. Figure 3-2A is the elementary diagram for the "C" Printer power circuits.



Functional Block Diagram of "C" Model TermiNet 300 Printer
Figure 3-1A



"C" Printer Power Circuits
Figure 3-2A

CHAPTER 4
TROUBLESHOOTING

SECTION 1
TROUBLESHOOTING GUIDE

The Troubleshooting Guide can be used for the "C" Printer except for the following exceptions:

1. Reference to the KIF PCB. The KIF PCB circuits are on the SLC PCB in the keyboard of the "C" Printer.

2. Reference to the SLD PCB. The SLD PCB circuits are on the SLC PCB in the keyboard of the "C" Printer.

3. Reference to the HDA or HD PCB's should be recognized as a reference to the HDC PCB. However, reference to fuses on the HDA board should be recognized as problems related only to the HDA PCB.

SECTION 2
FUNCTIONAL TROUBLESHOOTING

Functionally the "C" Printer is essentially the same as the "B" Printer. The major differences being that the circuits in the KIF bustle PCB have been built into the new SLC PCB in the "C" Printer keyboard, which eliminates the KIF PCB, and the HD and HDA PCB's have been combined in the new HDC PCB. Figure 3-1A in this addendum is a functional block diagram of the "C" model TermiNet 300 Printer.

NOTE

There are late production "B" Printer's and retrofitted "A" and "B" Printers that are equipped with the new HDC PCB.

SECTION 3
PRINTED CIRCUIT BOARDS

PRINTED CIRCUIT BOARD TABLE

PCB NAME	SYMBOL	PART NUMBER	MODELS A	MODELS B	MODELS C	COMMENTS
ANSWERBACK	ANS/1	44B412153-G01	X	X		
ANSWERBACK	ANSC/1	44B417405-G01			X	
ANSWERBACK	ANSC/2	44B417405-G02			X	Automatic
AUXILIARY	AUX/1	44B412261-G01		X		
CLOCK BOARD	CLC/1	44B412159-G01	X	X		
CLOCK BOARD	CLC/2	44B412159-G02	X	X		
CLOCK BOARD	CLCC/3	44B412159-G03	X	X	X	
CLOCK BOARD	CLCC/4	44B412159-G04	X	X	X	
DATASET (/1)	DAT/1	44B412155-G01	X	X		
DATASET (/2)	DAT/2	44B412155-G02	X	X		
DATASET (B)	DATB	44B412428-G01	X	X		
DATASET (C)	DATC/1	44B412416-G01	X	X	X	
DATASET INTERFACE	DATI/1	44B417422-G01	X	X	X	
SERIAL DECODER	DEC/1	44B412160-G01	X	X		75 (Short) Print Line
SERIAL DECODER	DEC/2	44B412160-G02	X	X		118 (Long) Print Line
SERIAL DECODER	DECC/3	44B412160-G03	X	X	X	
SERIAL DECODER	DECC/4	44B412160-G04	X	X	X	
HORIZONTAL TABULATION	HTB/1	44B412157-G01	X	X		
HORIZONTAL TABULATION	HTBC/2	44B412157-G02	X	X	X	
KEYBOARD INTERFACE	KIF/3	44B412169-G03	X	X		
LAMP REGULATOR	LMP/1	44B412165-G01	X	X		
LAMP REGULATOR	LMPC/3	44B412165-G03	X	X	X	
MEMORY	MEM/1	44B412158-G01	X	X		
MEMORY	MEM/2	44B412158-G02	X	X		
MEMORY	MEMC/3	44B412158-G03	X	X	X	
MEMORY	MEMC/5	44B412158-G05			X	
MODEM BOARD	MOD/1	44A417330-001		X		
MODEM BOARD	MOD/3	44A417330-003		X	X	
PARITY ERROR (Old Model no longer in production)	PAR	44B412260-G01	X			
PARITY ERROR	PAR/1	44B412260-G01	X	X		
PARITY ERROR	PARC/1	44B417415-G01		X	X	
PHOTOCELL AMPLIFIER	PCA/1	44B412166-G01	X	X		
PHOTOCELL AMPLIFIER	PCAC/2	44B412166-G02	X	X	X	
LOW VOLTAGE POWER SUPPLY	POW/1	44B412170-G01	X	X		
LOW VOLTAGE POWER SUPPLY	POW/2	44B412170-G02	X	X		Special
LOW VOLTAGE POWER SUPPLY	POW/3	44B412170-G03	X	X		
LOW VOLTAGE POWER SUPPLY	POWC/4	44B412170-G04	X	X	X	
PRINT POSITION INDICATOR	PPI/1	44B412162-G01	X	X		
LDI	LDI	44B412405-G01			X	
PROTECTION BOARD	PRO/1	44B412164-G01	X	X		
PROTECTION BOARD	PROC/2	44B412164-G02	X	X	X	
PARALLEL TO SERIAL CONV.	PSC/1	44B412154-G01	X	X		
PARALLEL TO SERIAL CONV.	PSC/2	44B412154-G02	X	X		
PARALLEL TO SERIAL CONV.	PSCC/1	44B417409-G01			X	
PARALLEL TO SERIAL CONV.	PSCC/2	44B417409-G01			X	
READER AND PUNCH	R&P/1	44B412163-G01	X	X		
READER AND PUNCH	R&P/2	44B417408-G02		X		
READER AND PUNCH	R&PC/5	44B412163-G05		X	X	Replaces G01
CASSETTE ACCESSORY CONTROL	TRP	44B417402-G01	X	X	X	
SERIAL TO PARALLEL CONV.	SPC/1	44B412156-G01	X	X		
SERIAL TO PARALLEL CONV.	SPCC/2	44B412156-G02	X	X	X	

(Continued)

PCB NAME	SYMBOL	PART NUMBER	MODELS A	MODELS B	MODELS C	COMMENTS
TIMING AND ALARM	T&A/1	44B412161-G01	X	X		
TIMING AND ALARM	T&AC/2	44B412161-G02	X	X	X	
VERTICAL TAB AND FORM FEED	VT&FF/1	44B412372-G01		X		
VERTICAL TAB AND FORM FEED	VT&FF/2	44B412372-G02		X		
VERTICAL TAB AND FORM FEED	VT&FC/3	44B412372-G03		X	X	
202/1 INTERFACE	202/1	44B417435-G01			X	
SENSE LINE AMPLIFIER	SLA/1	44B412022-G01	X	X		
SENSE LINE CONVERTER	SLC/1	44B412470-G01			X	
TRANSFORMER POWER SUPPLY	TXP/1	44B412168-G01	X	X		
TRANSFORMER POWER SUPPLY	TXP/2	44B412168-G02	X	X		
TRANSFORMER POWER SUPPLY	TXP/3	44B412168-G03	X	X		
TRANSFORMER POWER SUPPLY	TXPC/1	44B417406-G01			X	
PHOTOCELL	PC	44B412005-G01	X	X	X	
HAMMER DECODER	HD/1	44C414064-G01	X	X		75 Print
HAMMER DECODER	HD/2	44C414064-G02	X	X		80 Print
HAMMER DECODER	HD/3	44C414064-G03	X	X		118 Print
HAMMER DECODER	HD/4	44C414064-G04	X	X		120 Print
HAMMER DECODER	HD/6	44C414064-G06	X	X		CGE Special
HAMMER DECODER ACCESSORY	HDA/1	44C414063-G01	X	X		
HAMMER DECODER COMBINATION	HDC/1	44C414166-G01	X	X		50 Print Line
" " "	HDC/2	44C414166-G02	X	X		75 Print Line
" " "	HDC/3	44C414166-G03	X	X		80 Print Line
" " "	HDC/4	44C414166-G04	X	X		118 Print Line
" " "	HDC/5	44C414166-G05			X	50 Print Line
" " "	HDC/6	44C414166-G06			X	75 Print Line
" " "	HDC/7	44C414166-G07			X	80 Print Line
" " "	HDC/8	44C414166-G08			X	118 Print Line
" " "	HDC/9	44C414166-G09			X	50 Print Line -RO only
" " "	HDC/10	44C414166-G10			X	75 Print Line-RO only
" " "	HDC/11	44C414166-G11			X	80 Print Line-RO only
" " "	HDC/12	44C414166-G12			X	118 Print Line-RO only
MOTHER BOARD	MB	44B412167-G01	X			
MOTHER BOARD	MB	44B412167-G02	X			RO Only
MOTHER BOARD	MB	44B412298-G02		X		
MOTHER BOARD	MB	44B412298-G04		X		RO Only
MOTHER BOARD (With Bustle Assembly)	MBC	44D415575-G01			X	
MOTHER BOARD "	MBC	44D415575-G02			X	RO Only

STRAPPING OPTIONS AND FUSES: "C" PRINTED CIRCUIT BOARDS

ANSC/1

Fuses - None

Straps

1J and 2J - Never installed for G01

3J - Stops message at position strapped. Installed at last position coded. All diodes past the jumper should be removed. Test point soldered in from $\overline{LSI}$ to last column of message used.

4J - Factory jumper - Do Not Remove. Connects ENQRD signal to circuit so that message fires off when ENQ code received.

ANSC/2

Fuses - None

Straps

1J - Enables Automatic Answerback

2J - Enables Automatic Disconnect

3J - Stops message at position strapped. Installed at last position coded. All diodes past the jumper should be removed. Test point soldered in from $\overline{LSI}$ to last column of message used.

4J - Never installed for G02

CLCC/3 and CLCC/4

Fuses

1FU - 1/8A Pico, Phase One (Ø1) Clock Signal

Straps

1J - Factory jumper - Do Not Remove

2J - Factory jumper - Do Not Remove

3J and 5J - Connect appropriate cups listed below. Standard strapping is Cup 1 to Cup 6 and Cup 2 to Cup 5.

BAUD RATE SPEED - CUP NUMBER			ACTUAL BAUD RATE AVAILABLE - CUP NUMBER	
LOW	7	-	150	1
MEDIUM	6	-	300	2
HIGH	5	-	600	3
		-	1200	4

DATC/1

Fuses - None

Straps

1J - Enables CA for status monitor. CA will be off when either an alarm condition exists or the Printer is in "Standby".

2J - Enables CA for line control.

3J - Enables forced "Mark Hold" condition on transmitted data with loss of CA during line control. Loss of CB or CD will always do this. When in Suppress Transmit mode, transmitted data will always be forced to "Mark Hold".

4J - Enables control of CA by CB when in "Standby" mode and 1J is in. CB on-state will turn off CA. 4J also enables automatic motor On-Off with CB On-Off. Without 4J, CB will have no effect on CA.

5J - Enables low paper condition to:

1. Light the Alarm lamp.
2. Sound the momentary alarm tone.
3. Transmit a "Break" signal.
4. Turn the motor off.
5. Turn the reader off.

Without 5J, low paper condition will light the alarm lamp only.

6J - Enables motor to be turned off upon receipt of EOT.

HDC GROUPS 1 THRU 12

Fuses - None

Straps

1J, 2J - Factory Jumpers - Do Not Remove

LMPC/3

Same as LMP/1 (See Service Manual)

MEMC/3 AND MEMC/5

1J - In for 118 column print line; Out for 75 columns.

2J - Enables automatic carriage return at the end of print line.

3J - Factory jumper soldered in MEMC/3 for standard ribbon lift operation. Do Not Remove.

4J - Factory jumper soldered in only for MEMC/5 for two color ribbon lift operation. Do Not Remove.

MOD/3 (44A417330-003)

Same as MOD/1 (See Service Manual)

202/1 INTERFACE

Fuses - None

Straps

1J - Enables the reverse channel to transmit a "Break" to reflect an alarm condition or when the INTERRUPT pushbutton is pressed. Used with 3J out for Line Control.

2J - Enables recognition of signal CB (Clear to Send) only after receipt of the reverse channel tone. Thus, data cannot be transmitted and the READY lamp will not be on until the other end of the line is ready to receive data.

3J - Enables the reverse channel to transmit a steady state OFF/ON to reflect the status of the terminal. Used with 1J out for status monitor so that the reverse channel transmitter is turned on only when the printer is ON LINE with no alarm condition.

PARC/1

Same as "New Model" PAR/1 (See Service Manual)

POWC/4

Same as POW/2 and POW/3 (See Service Manual).

PSCC/1 AND PSCC/2

Fuses

Straps

1J - Enables 2 stop bits per character at MED speed

2J - Enables 2 stop bits per character at HIGH speed

3J - Enables 2 stop bits per character at LOW speed

If more than one jumper is to be used at the same time, then replace the jumpers with 44B232028-001 diodes.

4J - Factory installed jumper for PSCC/2 used with Turn Around Option so that ACK or NAK is transmitted after the Answerback message. Do Not Remove.

5J - Never installed for present options.

R&PC/5

Same as R&P/1 (See Service Manual).

SPCC/2

Same as SPC/1 (See Service Manual).

T&AC/2

Same as T&A/1 (See Service Manual)

VTFC/3

Same as VTFF/1 (See Service Manual).

CHAPTER 5
MAINTENANCE

SECTION 1
PARTS REPLACEMENT AND ADJUSTMENTS

ADJUSTMENTS

NOTE

The following changed or added adjustments apply to all Printers except where noted.

RIBBON LIFT SOLENOID ADJUSTMENT
(Page 5-11)

For "C" Model Printers with red/black ribbon option, the gap should be 0.128 to 0.137 inches.

RIBBON ADJUSTMENT (HEIGHT)
(Page 5-12)

Adjust the ribbon height so that the top edge of the ribbon is 0.031" ± 0.031" above the tops of the print fingers with the solenoid in the energized position.

For "C" Printers with red/black ribbon option, adjust the ribbon height so that the top edge of the ribbon is 0.039 ±0.010" above the top of the print fingers with solenoid in the de-energized position.

NOTE

While adjusting the height of red/black option, make certain that the ribbon is resting at the highest position in the ribbon guides

RIBBON REVERSING SHAFT

(Page 5-12)

Adjust for 0.010 to 0.015 end play in the reversing shaft.

DRIVE BELTS
(Page 5-13)

The belt deflection while adjusting both left and right drive belts should be 0.1 to 0.175 inches. To adjust the right drive belt on the "C" Printer, loosen the top Allen Head screw and rotate the motor about the lower screw axis. Tighten the Allen Head screw when proper belt tension has been achieved.

JACK AND LINE FEED CLUTCH

(Page 5-13)

Add steps 3 and 4:

3. While installing the left jackshaft pulley, allow 0.003 to 0.007 end play.

4. Adjust clearance between right jackshaft pulley and the jackshaft bearing to 0.012 to 0.015 inches.

PAPER PRESSURE ADJUSTMENT
(Page 5-15)

The right jackshaft pulley in the "C" Printer has holes in it so that the torque shaft can be reached with a slender screwdriver. Therefore, it is not necessary to remove the jackshaft pulley to adjust the torque shaft.

NOTE

It is possible that the right jackshaft pulley in "A" and "B" Printers may have been replaced with the newer type right jackshaft pulley.

HAMMER BANK

(Page 5-18)

After installing the Hammer Bank, check distance between platen and hammer faces. Distance should be 0.180 to 0.190 inches. If distance is out of tolerance, loosen the screws holding the hammer bank and make sure hammer bank alignment bar is firmly seated in the mating parts on the frame. Check distance again.

PARTS REPLACEMENT

LINE FUSE

1. Raise the top cover of Printer.

2. Remove the four (4) screws on the TXPC PCB cover and remove cover.

3. Two (2) Amp. line fuse is on the TXPC PCB.

CONTROL PANEL, "C" PRINTER

1. Remove Printer from the casting.

2. Remove HDC PCB.

3. Disconnect two control panel cable plugs from the mother board.

4. Remove two screws located on each side of the control panel.

5. Remove control panel from frame.

6. Replace control panel by reversing procedure.

KEYBOARD AND SLC PCB, "C" PRINTERS

Procedure is similar to removing the keyboard and Sense-Line Driver PCB as instructed on page 5-6 of the Service Manual.

MAIN FRAME "C" PRINTER

1. Disconnect all cables from Printer.

2. Remove the 4 screws on the TXP cover and remove cover.

3. Unplug the TXPC power cord.

4. Set Printer on edge of table so that the two screws holding the rear shock absorber to the casting can be accessed. Remove these two screws.

5. Remove the front two base nuts holding the frame to the front shock absorbers.

6. Gently lift the main frame up and forward.

7. Set the Printer on a firm flat surface.

8. Replace main frame by reversing procedure.

MOTOR, "C" PRINTER

Same as for "A" and "B" Printers except that:

1. The top cover and bustle cover do not have to be removed to remove the main frame.

2. There are only two screws holding the motor to the frame; a special screw at the bottom that allows the motor to rotate about the screw axis, and an allen head screw and washer at the top that locks the motor in place.

HAMMER DECODER COMBINATION (HDC) PCB "A" "B" AND "C" PRINTERS

1. Remove Printer main frame from casting.

2. Remove two screws securing the hammer bank connector clamp to brackets.

3. Disconnect 100V lead to keyboard.

4. Disconnect cables to photocell PCB and mother board.

5. Disconnect hammer bank connectors from HDC PCB.

6. Remove six (6) screws securing HDC board to main frame.

7. Replace HDC by reversing procedure.

Data Communication Products Department•General Electric Company
Waynesboro, Virginia 22980

4 72 (500)

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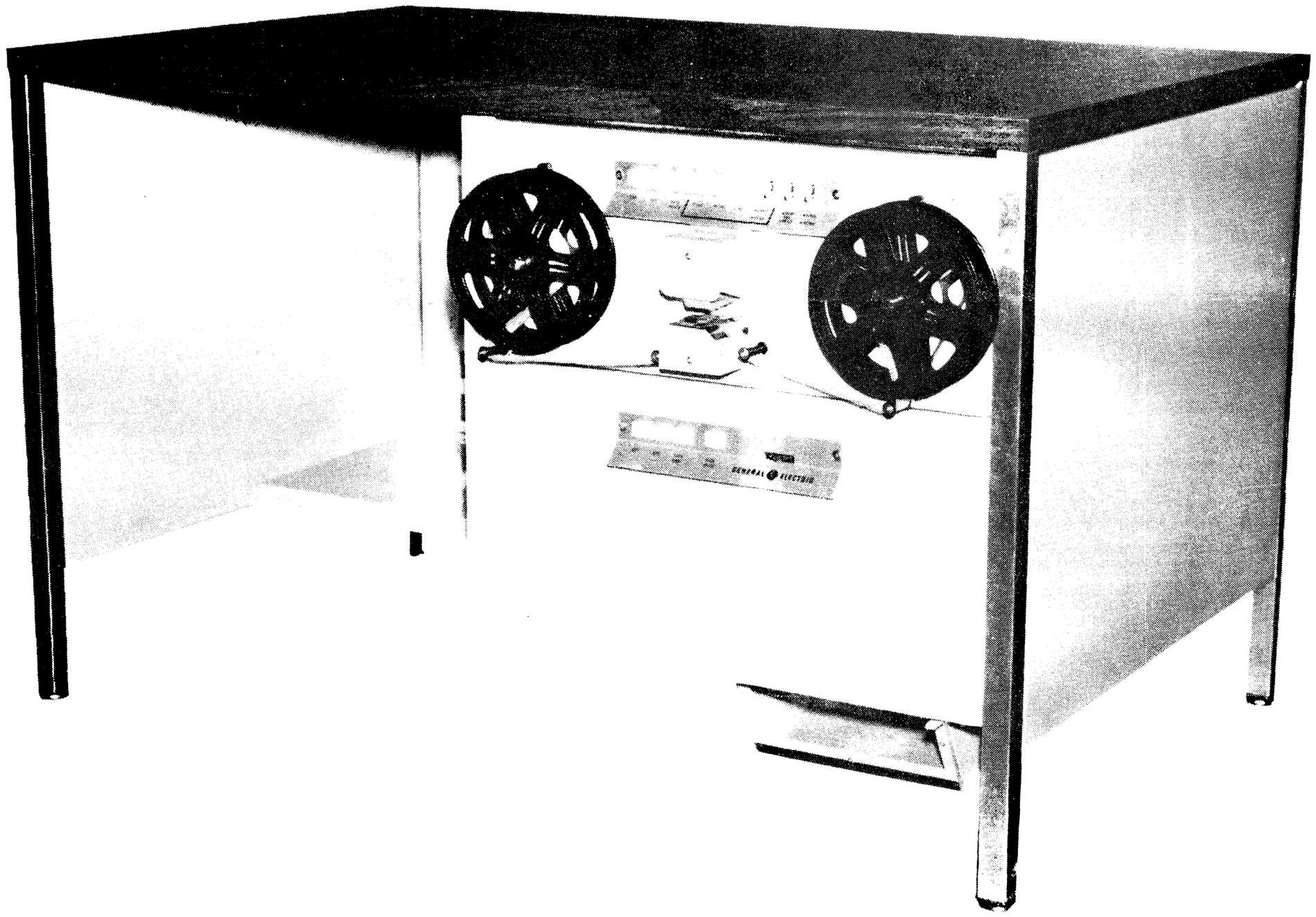
GENERAL ELECTRIC

GEK-14776

TermiNet*300 DATA COMMUNICATION PRINTER

Service Manual



MODEL B PUNCH AND READER

GENERAL ELECTRIC

*Trademark of General Electric Co., USA

TABLE OF CONTENTS

The information contained herein does not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

INDEX

INDEX (CONTINUED)

SECTION I
GENERAL DESCRIPTION AND INSTALLATION

GENERAL DESCRIPTION

The Punch and Reader for the ASR (Automatic Send and Receive) Model B equipment are used in conjunction with the TermiNet 300 Data Communication Printer.* They are located in a TermiNet 300 Desk which is 42" x 26" x 36" and weighs approximately 225 pounds. This desk has one 10-inch drawer containing a Punch and one 8-inch drawer containing a Reader.

A five-position receptacle box is located in the lower back compartment of the desk. A 15-amp grounded line-cord brings power to the lower two positions, and a 6-amp, 125-volt double-pole switch located in the knee-well brings power to the top three positions. The lower two receptacles are energized whenever they are connected to the AC supply.

Separate Punch and Reader control cables (25 conductor #26 shielded) plug into the Printer. Also, power cables from the Punch and Reader are plugged into the desk power-supply. (When a tape reeler is supplied, it has an integral power supply fed by a line cord to one of the top three positions of the receptacle box.)

Pushbutton and switch controls for the Punch and Reader are incorporated in the pulls of their respective drawers.

TAPE PUNCH**

The Tape Punch is mounted in the lower, 10-inch desk drawer, which has an integral chad box that is removable from the front.

The Punch controls are:

OFF

ON

TAPE FEED

BACKSPACE

Also, a Tape Tear-off is provided to conveniently tear the tape and leave a start-finish identification on the tape.

TAPE

Number of code channels: 8
Maximum speed: 30 characters/second

Hole size and alignment: In accordance with ANSI Standard X3-18

Ambient operating temperature range: 0 - 55°C

Life:

(a) On 0045 commercial grades of paper tape: 100 million operations

(b) On mylar tape: 20 million operations

TAPE READER**

The Tape Reader is mounted in the upper, 8-inch desk drawer. It is equipped with a photoelectric Read Head to sense the presence or absence of holes in a tape.

The Reader controls are:

OFF

RUN

BACKSPACE

OMIT OR READ Character, Word, Line

SKIP OR READ Deletes

LOCK /NORM

The Reader is bi-directional. The tape is moved by a 3-phase stepping motor commanded from the TermiNet 300 Printer through a circuit board (R&P). Data is sensed photoelectrically by cells located in the read head. The light source for the photocells is located above the Read Head and is activated when any one of the three motor phases is on. The light-source lamp driver and the photocell amplifiers are on the circuit board (RDR) located in the drawer.

The Tape Reader is quiet and fast in operation. It has a reading speed of 10, 15, and 30 characters per second when used with the Printer and Punch. Its maximum reading speed is 120 characters per second when it is used to transmit data.

OPTIONS

The following options are available:

*Also referred to as "Terminal".
**The Power Supply for the TermiNet 300 Punch and Reader is a self-contained unit mounted in the lower back compartment of the desk. (The Printer has its own Power Supply.)

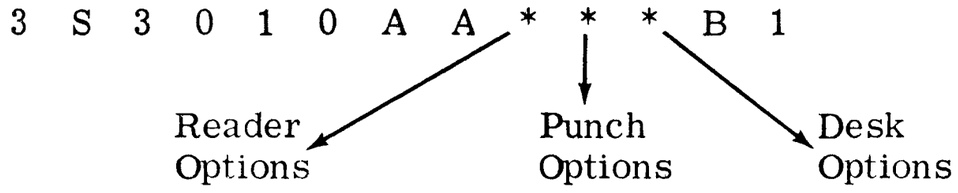
1. A roll-out tray in the kneewell of the desk to hold fanfold paper stacks for the Printer.

2. A Reader with reelers.

3. An adjustable shelf directly in back of the desk to catch fanfold paper.

4. An upper snap-in panel.

The overall number for the TermiNet 300 Desk includes three variable numbers which designate the particular equipment contained in the desk. In the following example, the three variables are designated by asterisks:



For example, in the number 3S3010AA213B1, the variable numbers are "213". The "2" indicates a Reader with reeler. The "1" indicates a Punch. The "3" indicates a right-hand pedestal desk with rear adjustable shelf and sliding shelf; if, in addition, an upper snap-in panel had been provided, this number would have been "4".

The various possibilities for the three variable numbers are as follows:

Reader

0 No Reader

1 Reader

2 Reader and Reeler

Punch

0 No Punch
1 Punch

Desk

1 Desk
2 Desk with rear adjustable shelf
3 Desk, rear adjustable shelf, and sliding shelf
4 Desk, rear adjustable shelf, sliding shelf, and upper snap-in panel
5 Desk with sliding shelf
6 Desk, sliding shelf, and upper snap-in panel
7 Desk and upper snap-in panel
8 Desk, rear adjustable shelf, and upper snap-in panel

INSTALLATION

Before installing the Reader Drawer, Punch Drawer, and Desk, be sure to check all packing material to see that no parts are discarded. The following parts are supplied with each desk:

Qty.	Items	Parts No.
2	Reelers (Optional)	44A417362-001
1	R&P Board	44B412163-G01
1	Reel (For paper tape)	44A417301-001
1	Chad Box	44C414127
1	Lower Snap-in Panel	44A417312-10*2
	Miscellaneous Hardware	

Install the Punch Drawer, Reader Drawer, and R&P Board in accordance with the following instructions:

PUNCH DRAWER

1. Install the Punch Drawer on the slides in the lower right portion of the desk.

2. Leaving the drawer open, route the clamp cables as shown in drawing 44D415568.

3. Install the chad box on the slides under the Punch Drawer.

4. Route the tape in accordance with the decal in the bottom of the Punch Drawer.

5. Plug the Punch cables into the proper socket on the terminal.

READER DRAWER

1. Install the Reader Drawer on the slides in the upper right portion of the desk.

2. Leaving the drawer open, route the clamp cables as shown in drawing 44D415568.

3. Plug the Reader Cable into the proper socket (labeled "Reader") on the TermiNet 300 Data Communication Printer. This socket is on the rear left side of the Printer as viewed from the front. (See Service Manual GEH-2185.)

R&P BOARD

Install the R&P (44B412163-G01) Board in the slot labeled "R&P" in the Terminal bustle.

POWER CORDS

1. Plug the power cord for the terminal into one of the top three outlets of the junction box located in the lower right rear of the desk. (These top three outlets are controlled by the kneewell desk switch.)

2. Plug the power cord for the desk supply into another one of the top three outlets.

3. Plug the power cord for the reelers into the remaining top outlet.

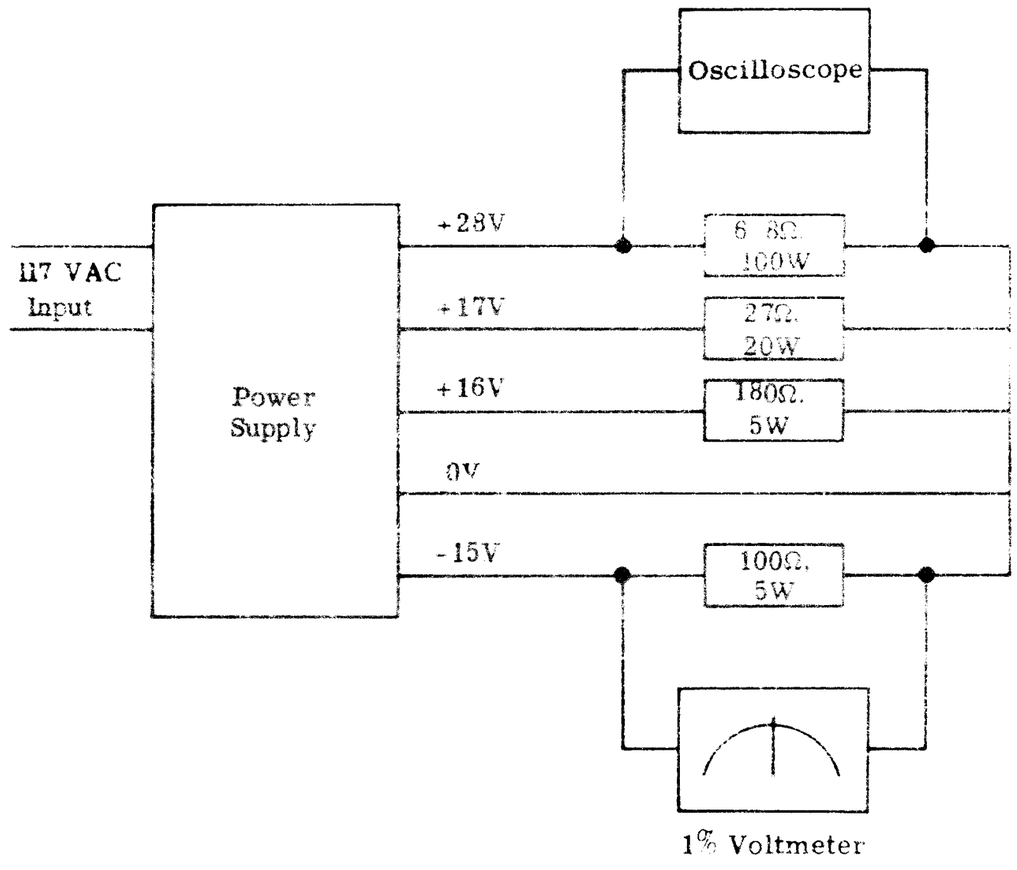
4. Plug the line cord for the desk into the 117V AC grounded outlet. After completing the above instructions, check to see that the drawers open and close freely. (They are locked mechanically and may be released by lifting the lower button located in the desk kneewell.)

POWER SUPPLY **

The Power Supply for the TermiNet 300 Punch and Reader is a self-contained unit mounted in the lower back compartment of the desk.

CHECKING OUT THE POWER SUPPLY

Measure the 28V DC (±2%) output voltage for potential and ripple content at low and high input, with and without the indicated load resistor, to make sure that the tolerance is met. If necessary, adjust potentiometer 1P (located on the printed-circuit board of the power supply) so that the +28V DC is within tolerance.



The input voltage is 117 volts AC ±10%, 60 Hz. The output voltage connectors provide:

+28V DC ±2%
2% peak-to-peak ripple
+17V DC ±10%
+16V DC ±10%
-15V DC ±10%
0 volts

OPERATION CHECKS

1. Apply power by operating the switch located in the desk kneewell.

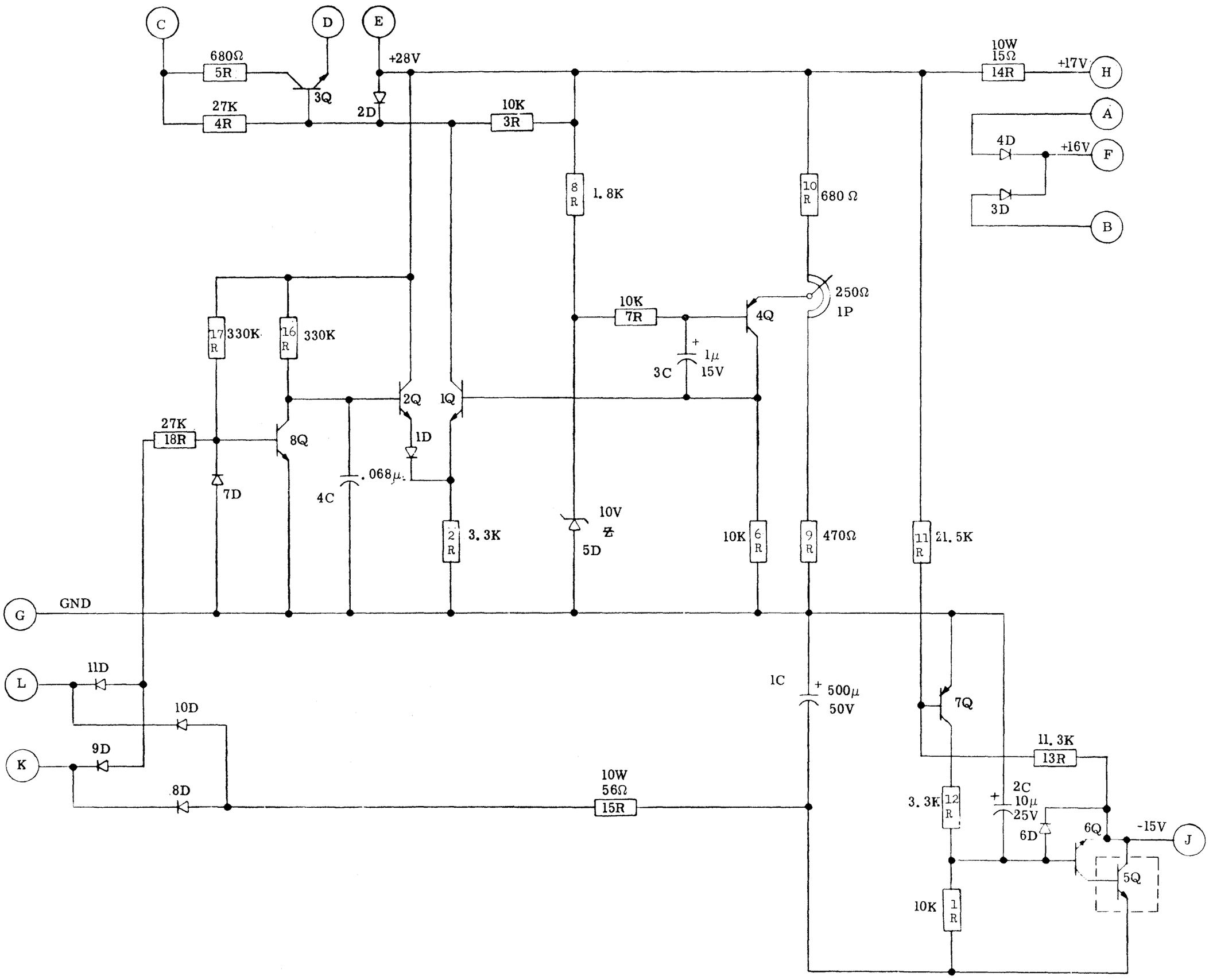
2. Depress the ON pushbutton located on the Punch drawer.

3. Depress the Tape Feed pushbutton. The tape, which will be punched with sprocket holes only, should feed through the slot in the front of the drawer.

4. Depress the Backspace pushbutton on the drawer. The tape should back up one space each time the pushbutton is depressed.

5. Put the terminal in the Local mode and punch tape. Read the tape to see if it has punched correctly. (Tear off the tape so that it may be used in checking the Reader.)

*The "0" may be replaced by another number, depending on the color of the Panel.
**The Desk Power-Supply and connection diagrams are shown on pages 4 and 5.



DESK POWER-SUPPLY (PC BOARD)

WIRE IDENT.	WIRE COLOR	START	FINISH
A01	Gray	TB1-J	J1-C
A02	Black	TB1-H	J1-D
A03	Blue	1C-2	TB1-G
A04	White	TB1-F	J2-B
A05	Red	1C-1	TB1-E
A06	Red	1C-1	J1-A
A07	Blue	1C-2	J1-E
A08	Blue	1C-2	J2-E
A09	Red	1C-1	J2-A
A10	White	1D	TB1-K
A11	White	2D	TB1-L
A12	Black	3D-1	TB1-D
A13	Red	3D-2	TB1-E
A14	Gray	TB1-J	J2-C
A15	Black	FU-1	TH1-1
A16	Orange	1SO	TB1-C
A17	White	TH1-2	3SO

CA1
(LINE CORD)

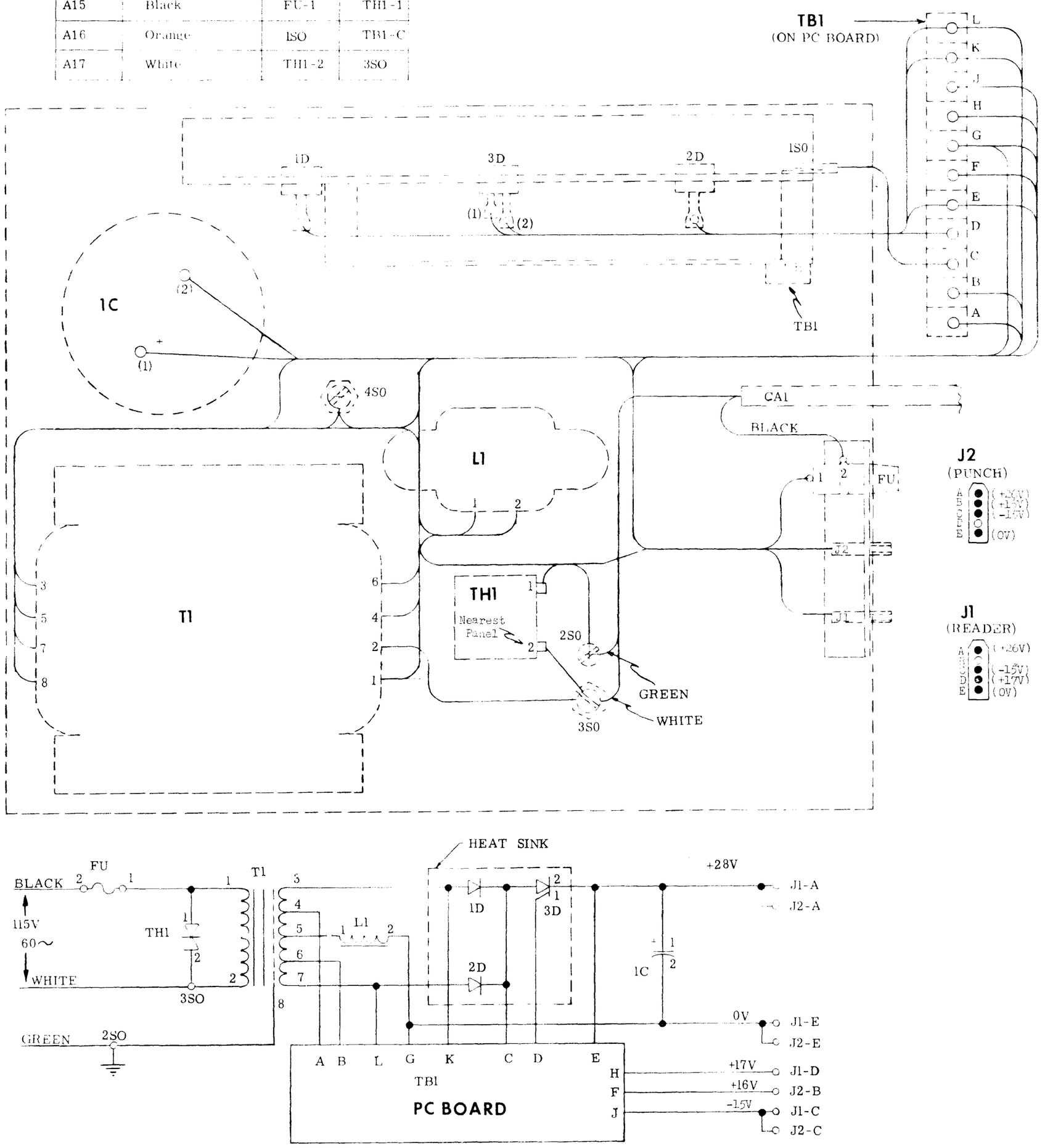
LEAD	CONNECT TO
Green	2SO
White	3SO
Black	FU-2

L1
(CHOKE)

LEAD	CONNECT TO
1	4SO
2	TB1-C

T1
(TRANSFORMER)

LEAD	CONNECT TO
1	FU-1
2	3SO
3	TB1-K
4	TB1-A
5	4SO
6	TB1-B
7	TB1-L
8	2SO



CONNECTION DIAGRAM FOR DESK POWER-SUPPLY

SECTION II
TAPE PUNCH*

Section II, which will be devoted to the Punch only, will cover operation, preventive maintenance, adjustments, and troubleshooting.

OPERATION

TAPE LOADING

1. Place a roll of tape one-inch wide on the supply spool.

2. Feed the tape around the guide rolls and through the angle arm, as shown in the decal in the bottom of the drawer.

3. Move the guide arm forward. Place the tape under the tape hold-down clamp, leaving enough excess tape to fit through the opening in the front of the drawer. Press the tape Hold-down clamp with enough force to indent the tape. While pressing the tape Hold-down clamp, press the Tape Feed pushbutton until the sprocket engages with the sprocket holes in the tape.

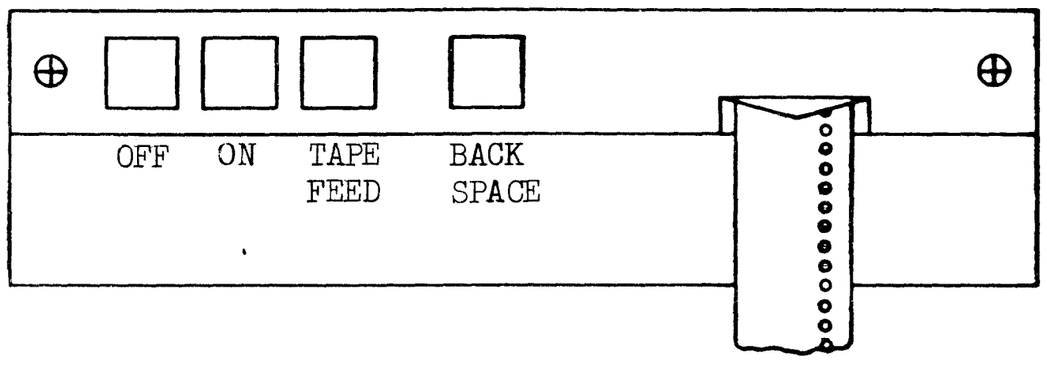
SOLENOIDS

During the punching operation, the sprocket and data solenoids, the bail solenoids, and the transport solenoids are energized sequentially.

PULSE	PARTS ENERGIZED	PURPOSE
1st	Sprocket and Data Solenoids	To perforate the tape
2nd	Bail Solenoids	To restore the punch pins to their normal positions
3rd	Transport Solenoids	To advance the tape

OPERATOR'S DEVICES

Four pushbuttons located in the upper front of the lower drawer are used for operating the Punch:



UPPER FRONT OF PUNCH DRAWER

PUSHBUTTON	FUNCTION
Off	Turns off the Punch.
On	Actuates tape punch logic. Causes the pushbutton light to turn on. (Information may be punched from the Terminal keyboard or from received information.)
Tape Feed	Punches nothing but nulls in the tape. (Tape punched in this manner is used as "leader".)
Backspace	Backspaces the tape one character at a time. NOTE: The backspace key on the keyboard will not backspace the tape.

*TermiNet 300 Users are supplied with a Programmer's Manual (GEK-15002), an Operator's Manual (GEH-2184), and a Service Manual (GEH-2185) for the TermiNet 300 Printer. It is advisable to refer to these manuals for interrelated subjects.

PREVENTIVE MAINTENANCE

The Tape Punch should be inspected, cleaned, and lubricated every six months or after ten million operations, whichever occurs first.

INSPECTION

After removing the Punch from the case, inspect it thoroughly.

1. Make sure that all of the plates for all mounting hardware for the solenoids, the End-of-Tape switch, and the connector, are tight.

2. Check all wiring for proper connections.

3. Check the sprocket for positive action, and for even movement (one notch at a time) with no excessive side play or binding.

4. Make sure that the hold-down clamp operates the End-of-Tape switch.

5. Make sure that the transport mechanism springs are hooked.

6. Check the general cleanliness.

7. Check the lubrication requirements.

8. Check the data solenoid adjustment (pin penetration).

9. Check the transport mechanism adjustment.

CLEANING

To remove any dirt and dust accumulation:

1. Use a clean cloth dampened with cleaning solvent to remove surface dirt.

2. Remove screw #1 (see the foldout on page 17), and remove the chad cover without removing the Punch from the drawer.

Clean the chad cover with warm water and soap. Remove chad particles.

3. Push a clean cloth through the chad trough to remove any oil, moisture, or dust accumulation.

4. Spray the interior of the plastic chad cover with anti-static spray (Audiotex* No. 30-007 or equivalent).

5. Remove the Punch from the drawer.

6. Remove the Punch cover.

7. Remove the two screws (3).

8. Lift the die straight up from the base.

9. Clean the die, using compressed air (60 psi maximum).

10. Also use compressed air (60 psi maximum) to remove dust, chad, and other foreign particles from any inaccessible area.

LUBRICATION

Lubrication is perhaps the most important part of the preventive maintenance program. Lubricate the following parts of the Tape Punch, using the lubricant indicated:

LUBRICATION POINT	LUBRICANT
Solenoid Linkages	Invac** Lubricant 18 *** (or equivalent)
Data hammer shafts	Light lubricating oil. Apply two drops on each hammer shaft.
Transport assembly, spring hooks, ratchet, and pawl	Light grease (Invac Lubricant No. 17****)

NOTE: Solenoid Armatures (Teflon sleeves) do not require lubrication.

*Trademark of G-C Electronics, Rockford, Illinois
**Invac Corporation, Division of Digitronics, 26 Fox Road, Waltham, Massachusetts 02154
***Equivalent to Bemol Suspension #140, 83 Saybolt/sec, 21OF, obtainable from the Bemol Corporation, Box 11, Newton, Massachusetts 02164
****Equivalent to Shell #23

ADJUSTMENTS

Product Service does not recommend that the Invac Punch be dismantled and adjusted internally. IF ANY OF THE SOLENOIDS OR DRIVE MECHANISMS ARE IN NEED OF ADJUSTMENT OR REPAIR, REPLACE THE COMPLETE INVAC PUNCH ASSEMBLY. (To return the Punch, refer to Service Advice #7a).

THE ADJUSTMENTS OUTLINED BELOW SHOULD BE PERFORMED BY EXPERIENCED SERVICE AGENTS ONLY. THEY ARE INCLUDED HERE SOLELY FOR CUSTOMER INFORMATION.

TRANSPORT SOLENOID MECHANISM

1. Manually energize the two transport solenoids. The rubber washer on the solenoids should make positive contact against the solenoid face.

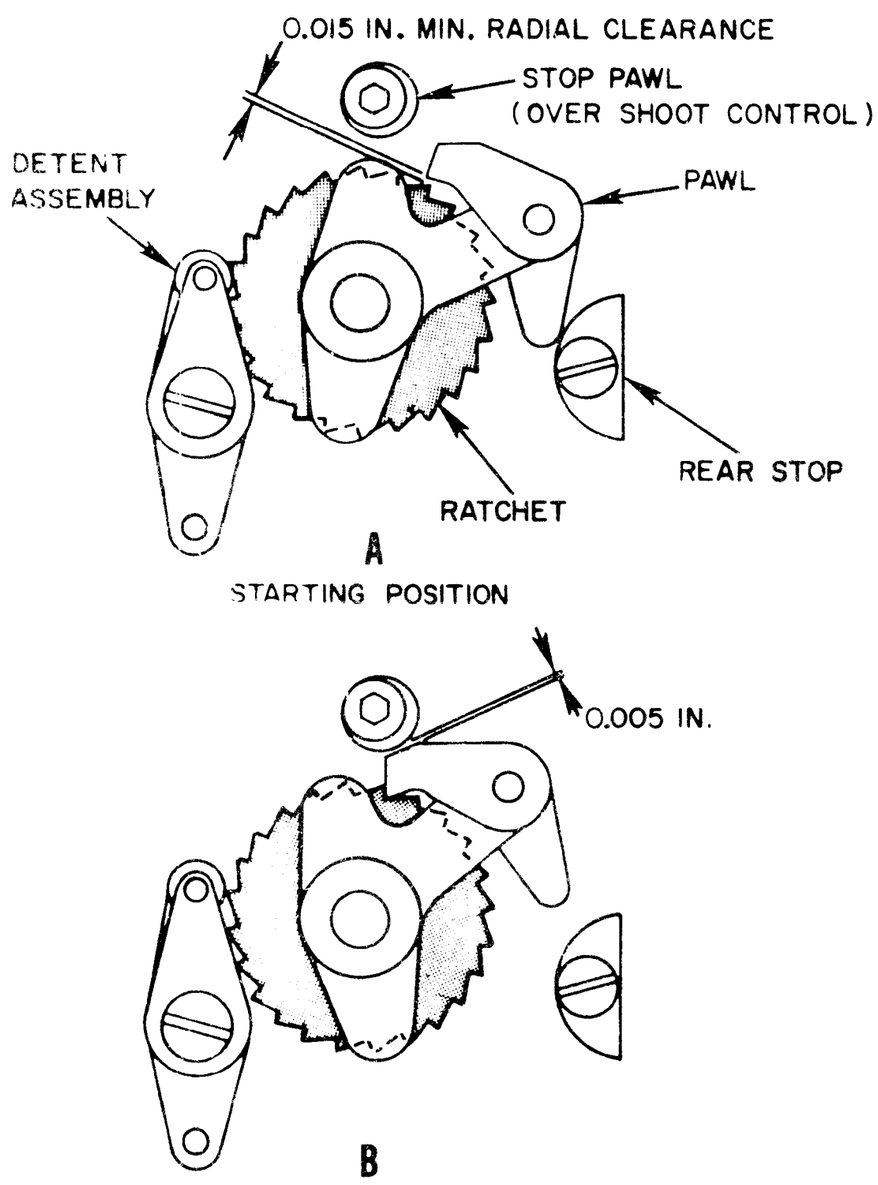
2. With the solenoids in the energized position ("bottomed"), adjust the pawl for a clearance of $\frac{0.010}{0.020}$ inch between the pawl and the back of the ratchet tooth.

3. Holding the solenoids in the energized position ("bottomed"), adjust the pawl stop for a clearance of 0.005 inch between the pawl stop and the pawl.

4. Release the solenoids and allow the pawl to fall over the next tooth on the ratchet. Adjust the rear stop so that it contacts the bottom of the pawl to control radial clearance. With the solenoid completely released, the radial clearance (between the pawl and the ratchet tooth) should be 0.015 inch minimum.

5. With the solenoid completely open, rotate the ratchet knob. The pawl should not contact the ratchet teeth.

6. Manually energize the solenoids and check them for smooth operation. They should both return to the home position at the same time.



Pitch

The stepping of the transport mechanism is preset at the factory to ±0.009 inch within spans of 0.9 to 6 inches.

Edge guiding is preset to 0.392 ±0.003 inch from the feed hole.

The pitch adjustment conforms to EIA Standard RS-227:

1. With an open-end hex wrench, move the eccentric nut of the detent assembly a few degrees in either direction.

2. Run off a length of tape, gaging it to determine which direction is necessary for moving the eccentric nut to center the pitch.

3. When the eccentric nut is properly centered, tighten the detent assembly screw while holding the eccentric nut in place with the wrench.

BAIL SOLENOID ASSEMBLY

The bail solenoid assembly should be adjusted to allow full restoration of the punch pins without imposing a strain on the nylon links. It has two adjusting screws for the vertical positioning of the bail solenoids, and two for adjusting the assembly.

1. Manually energize the data solenoids while keeping the bail solenoids energized. There should be minimum data-solenoid travel before a forcing action is felt from the bail solenoids.

2. Make resistance measurements at the Winchester Connector in the rear of the Punch, referring to the diagram (on the facing page) for pin locations. Make sure that the DC resistance of the bail solenoids is 11.5 ohms nominal.

DATA SOLENOID ASSEMBLY*

The Data Solenoid** should be adjusted for the proper punch-pin penetration and the proper resistance.

Punch-Pin Penetration

To adjust a solenoid for the proper punch-pin penetration:

1. Loosen (do not remove) the two mounting screws* (37).

2. Adjust the threaded insert (38) counterclockwise for increased travel or clockwise for decreased travel of the punch pin.

3. Tighten the two mounting screws.

4. Electrically energize the data solenoid, applying -25V DC. With the hammer assembly (64) and restoring bail (78) against the nylon stop (49), the maximum allowable free play of the restoring bail should not exceed 0.005 inch. No strain should be imposed on the nylon links (41) in this position.

5. Repeat the procedure for the insert adjustment until the maximum free play of 0.005 inch is attained for the restoring bail.

This adjustment procedure will ensure a punch-pin penetration of 0.035 ±0.005 inch into the die.

Resistance

To check the resistance of solenoids:

Make resistance measurements at the Winchester Connector in the rear of the Punch. Refer to the Punch wiring diagram (page 10) for pin-locations. Make sure that the DC resistance of each data solenoid and the sprocket solenoid is 23 ohms nominal.

TAPE HOLD-DOWN CLAMPS*

1. Put the forward tape hold-down clamp in the normal position (or remove the tape from the Punch). Continuity should be observed between pins b and T of the connector (page 10).

2. To adjust the rear hold-down clamp (61) which holds the tape against the die:

   a. Loosen the clamp screw.

   b. Push the tape in toward the body of the Punch until the tape rests against the guide edge of the die.

   c. With the tape in position, adjust the hold-down clamp (61) until it is just touching the tape. Tighten the clamp screw.

SPACING OF PUNCHED HOLES*

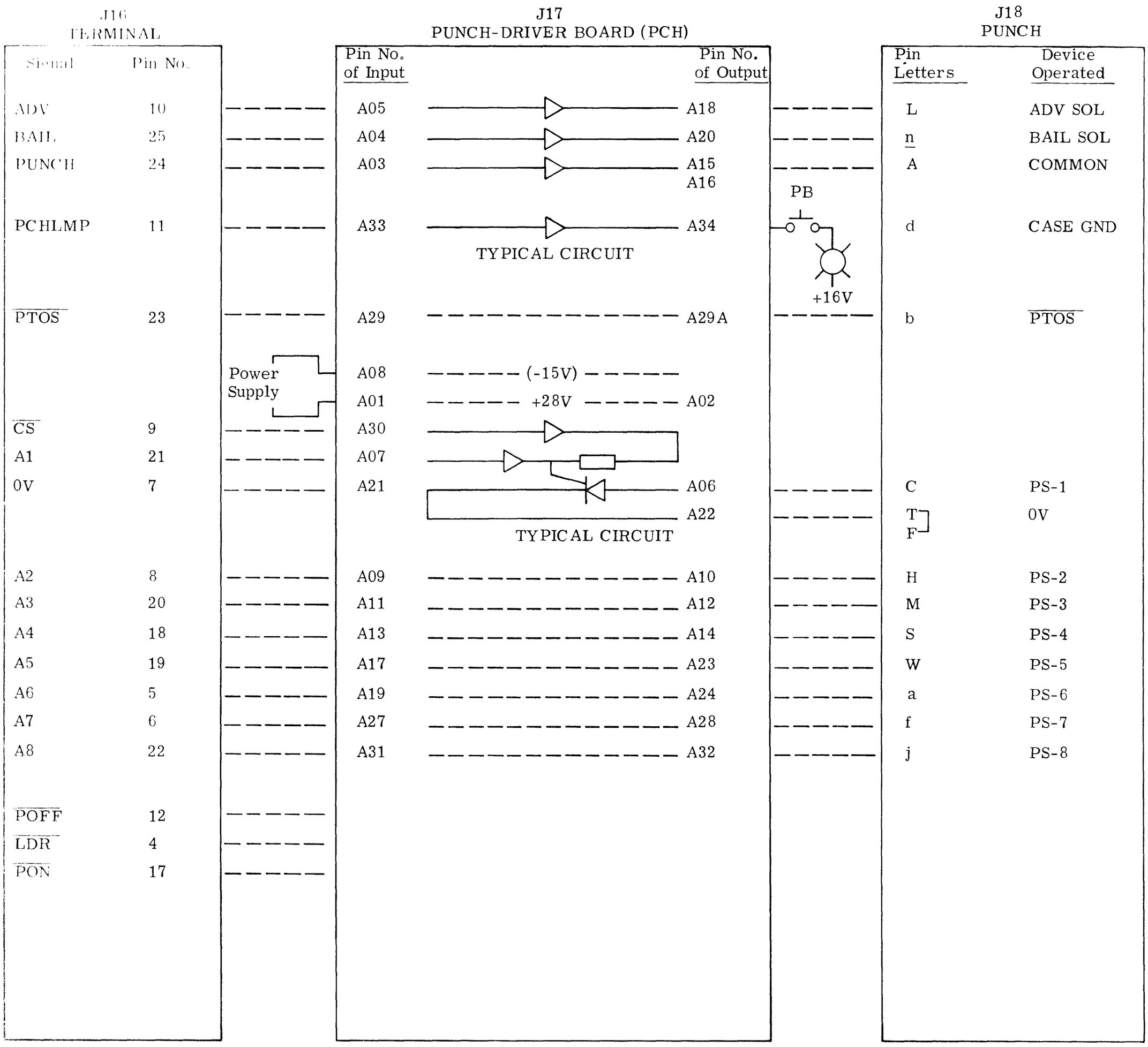
To ensure that the punched holes are evenly spaced from the edge of each side of the tape:

1. Loosen screw (13).

2. Move the tape in toward the body of the Punch until the tape rests against the guide edge of the die.

3. With the tape in position, move the screw (13) against the tape and tighten the screw.

*Refer to the foldout, page 17.
**Each Data Solenoid is fastened to the side plate by the combination of a dual mounting screw and a threaded insert.

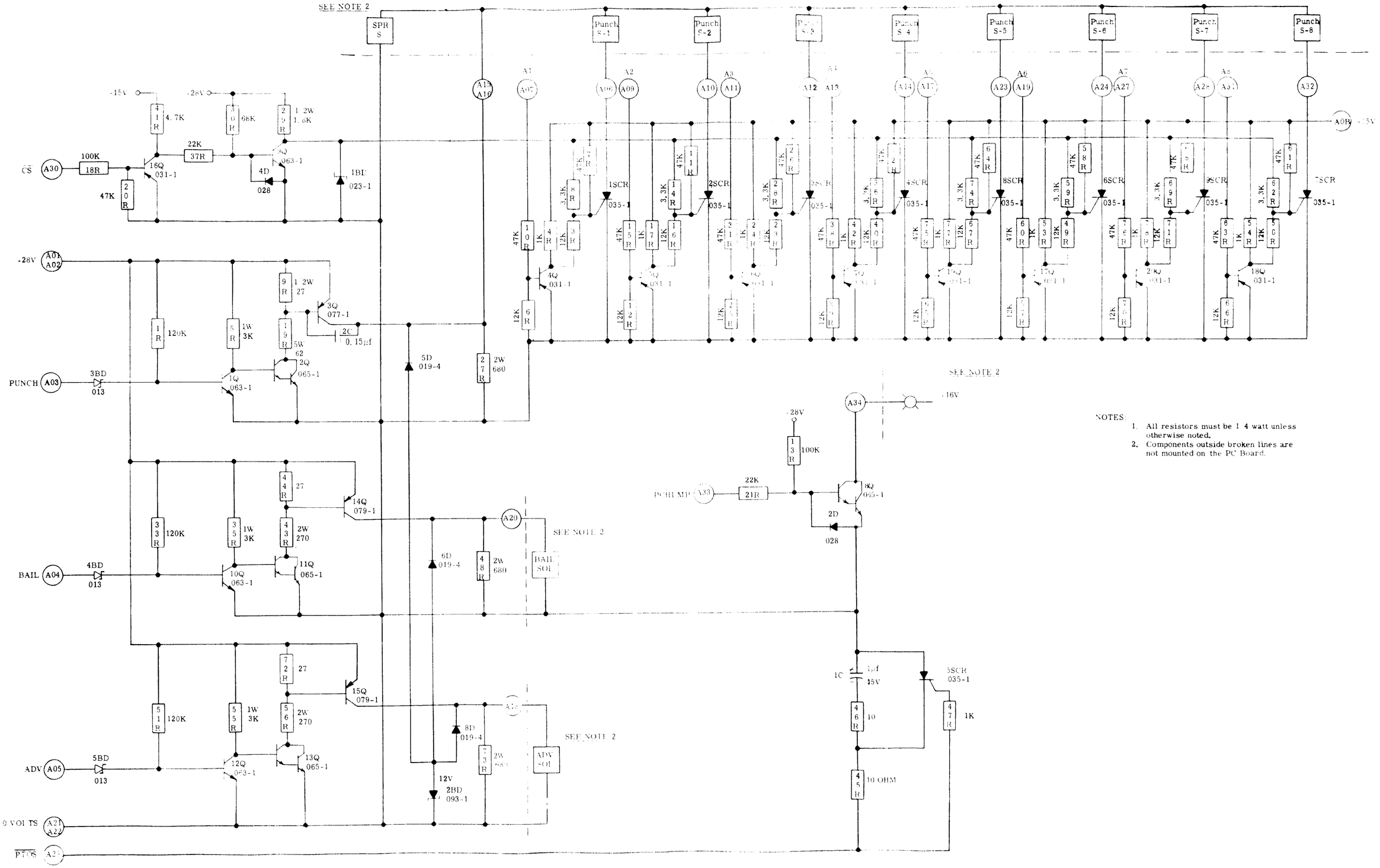


PUNCH CONNECTOR-PLUG ON REAR OF TERMINAL

PUNCH PRINTED-CIRCUIT BOARD IN PUNCH DESK DRAWER

WINCHESTER CONNECTION PLUG ON INVAC PUNCH IN PUNCH DRAWER

INTERCONNECTIONS BETWEEN TERMINAL, PUNCH BOARD, AND PUNCH
(See Foldout, Page 11)



NOTES:

1. All resistors must be 1 4 watt unless otherwise noted.
2. Components outside broken lines are not mounted on the PC Board.

PUNCH-DRIVER BOARD (PCHB)

TROUBLESHOOTING

If a tape-punch malfunction develops, the trouble can usually be localized to one of the following areas:

1. Solenoids
2. Restoring bail
3. Transport mechanism
4. PCH Board
5. R & P Board (in TermiNet)
6. TermiNet

Refer to the chart below for possible defects and their causes.

DEFECT	CAUSE
Improper coding	A defective data solenoid or driver
Erratic coding or tape tearing	Defective bail solenoids or sequencer, or excessive chad accumulation in the chad chute
Tape not advancing	Defective transport solenoids, sprocket solenoid, or sequencer

TESTING THE PUNCH CIRCUIT BOARD

Before testing the Punch Circuit Board (44B412381-G01):

1. Load the Punch with tape and plug the PCH board to be tested into the Punch drawer.

2. Set the Terminal Character Rate switch to 30 char/sec.

3. Turn on the desk main power switch. The Terminal Standby light will turn on.

4. Push the ON switch to ON, to OFF, and again to ON. The Punch light will turn on, off, and on, accordingly.

TEST EQUIPMENT REQUIRED

1. TermiNet 300 Desk Assembly
2. Oscilloscope (Tektronix 561A or its equivalent)

TESTS

There are two types of tests which should be made:

1. Delete and Tape Feed
2. Correct Punching

Deletes and Tape Feed

To test the deletes and tape feeds, proceed as follows:

1. Send a series of deletes from the keyboard.

2. Check to make sure that nine holes are punched in each row of the tape.

3. Push and hold the Tape Feed switch. The tape should be punched with sprocket holes only.

4. Release the Tape Feed switch. The tape stops.

Correct Punching

To test whether or not the punching is correct:

1. Exercise an odd number of the first seven punch solenoids by operating the keyboard or the Reader. For example: depress keys 1, 2, 4, and 7. Not only will the corresponding solenoids become energized, but the eighth solenoid will also become energized automatically for parity detection.

2. Depress a character (A, B, D, or G) that contains an even number of bits.

   Note that the eighth solenoid will not punch.

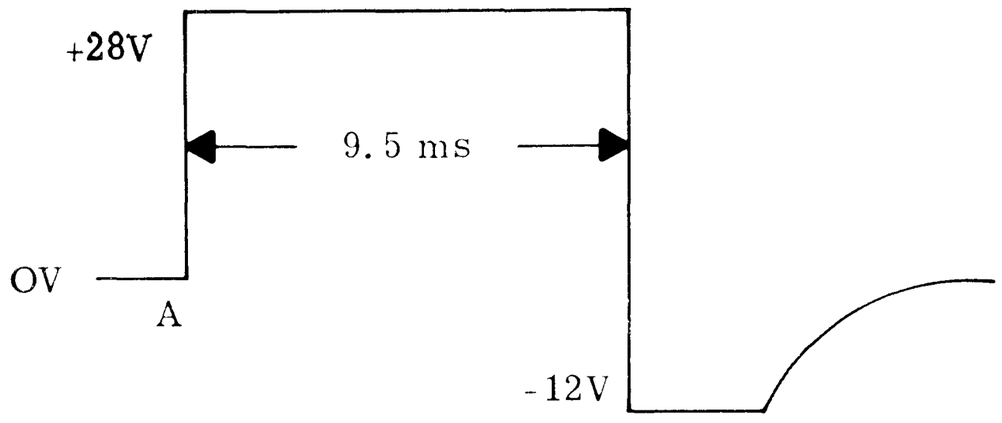
3. Send several Answerback signals from the Terminal to the Punch.

4. Play back Answerback tape from the Reader to the Terminal, and check to see that the correct message is typed.

PUNCH OUTPUT WAVEFORM

1. Connect probe 1 of the oscilloscope to connector points A15-A16 on the Punch Board and switch the oscilloscope to a positive internal sync.

2. While the Punch is being operated, note the waveform. It should be, approximately, as follows:



3. Increase the scope sweep and observe the leading edge -- point A of the waveform. Its rate of change must not exceed 8 volts per microsecond.

TAPE OUT

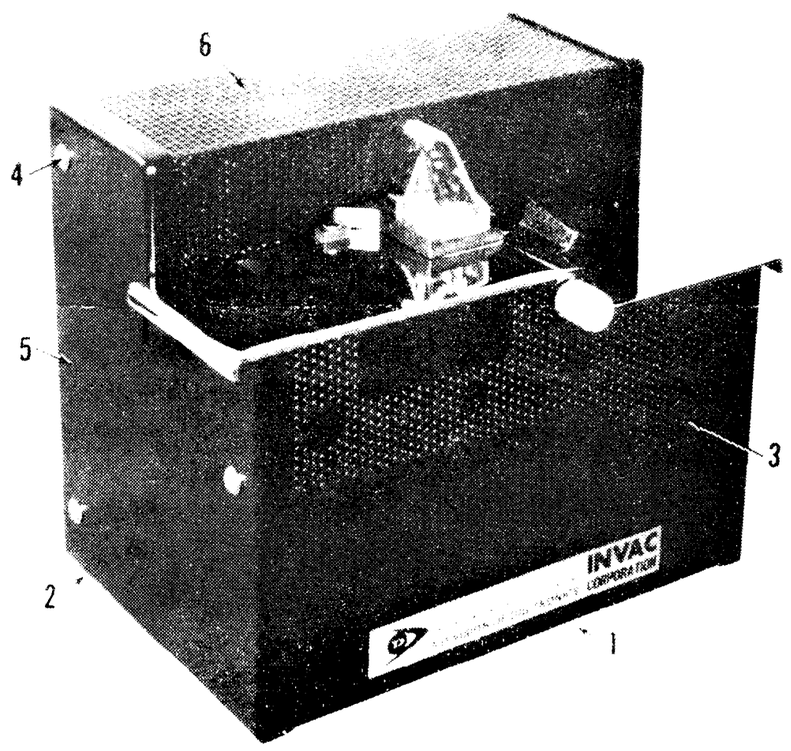
To test the Tape Out function:

1. Let the tape run out of the Punch while the Terminal is in Local. Note that the Terminal will go to Standby, the Punch lamp will turn off, and the Alarm lamp will turn on and remain on. To remove the alarm condition and operate the TermiNet without tape, raise the Tape Hold down clamp.

REMOVAL OF PARTS

The steps for removing the various parts of the Punch are outlined below. Where replacement is obvious or when it is done by reversing the procedure for removing the part, no instruction is given. Replacement parts are listed in Section IV of this Manual.

PUNCH PART	HOW TO REMOVE
Base Plate	1. Remove the four nuts (1) from the base. 2. Separate the Base Plate from the Punch.
Front Grilled Cover	1. Unscrew the four mounting feet from the base (2). 2. Slide the Front Grilled Cover (3) from the Punch.
Rear Grilled Cover	1. Remove the three screws (4) from each protective side plate (5). 2. Remove the protective side plates. 3. Carefully remove the Rear Grilled Cover (6) from the Punch.



NOTE: FOR ALL REMAINING PARTS DESIGNATED BY NUMBER IN THE LIST BELOW, REFER TO THE FOLDOUT, PAGE 17.

Chad Cover	1. Remove the screw (1). 2. Carefully lift the Chad Cover (2) from the Punch.
Die	NOTE: (Remove the die only when necessary for access to other parts.) 1. Remove the two screws (3). 2. Lift the Die from the Punch.
Paper Guide	1. Remove the two screws (5) and the associated hardware (6 or 7) 2. Lift the paper guide (8) from the Punch.

(Continued on page 14)

(Continued from page 13)

PUNCH PART	HOW TO REMOVE
Table	1. Remove the two screws (9) and the associated hardware (10 and 11). 2. If necessary, remove one screw and separate the paper guide edge (13) from the Table. 3. Lift the Table (12) from the Punch.
Front Plate	1. Loosen the set screw and remove the knob (14). 2. Unhook the spring (20) from the plate (21). 3. Remove the two screws (18) and the associated hardware (19) from the plates (35 and 36). Remove the two screws (15) and the associated hardware (16 and 17) from the plate (21). 4. Remove the Front Plate (21). 5. To prevent any further disassembly, replace the screws (15) and the associated hardware (16 and 17).
Bail Solenoids (Note: Scribe or otherwise mark the position of the solenoid bracket with respect to the mounting plate. When replacing the bracket, position it on the scribe mark.)	1. Remove the two screws (22) or (25) and the associated hardware (23 and 24, or 26 and 27.) 2. Remove the solenoid and the spring.
Guide	1. Remove the two screws (43) and the associated hardware (44 and 45) from the mounting plate (94). 2. Carefully remove the Guide (46) with the punch pins (47) from the Punch. 3. If necessary, remove the two screws (48) and separate the bail stop (49) from the Guide (46). 4. Extract the punch pins from the Guide, and remove the Guide.
Paper Hold-Down Assembly	1. Remove the retaining rings (50 and 51). 2. Remove the tension-arm link (52). 3. Remove the retaining ring (53). 4. Remove the two screws (54) and the associated hardware (55) from the plate (36). 5. Remove the paper hold-down clamps (56). Remove the shaft support (57) from the shaft (85). 6. Remove the retaining ring (58). 7. Remove the tension arm (59) with the paper-tension spring (60) from the shaft (82). 8. If necessary, remove one screw, and separate the paper guide (61) from the tension arm (59).
Chad Chute	1. Remove the two screws and the associated hardware from the rear of the plate (94). 2. Slide the chute (88) from the plate.

(Continued on page 15)

(Continued from page 14)

PUNCH PART	HOW TO REMOVE
End-of-Tape Switch	1. Remove the two screws (89) and the associated hardware (90 and 91). 2. Remove the wiring and the switch (92) from the plate (35). 3. If necessary, remove the activator (93) from the switch.

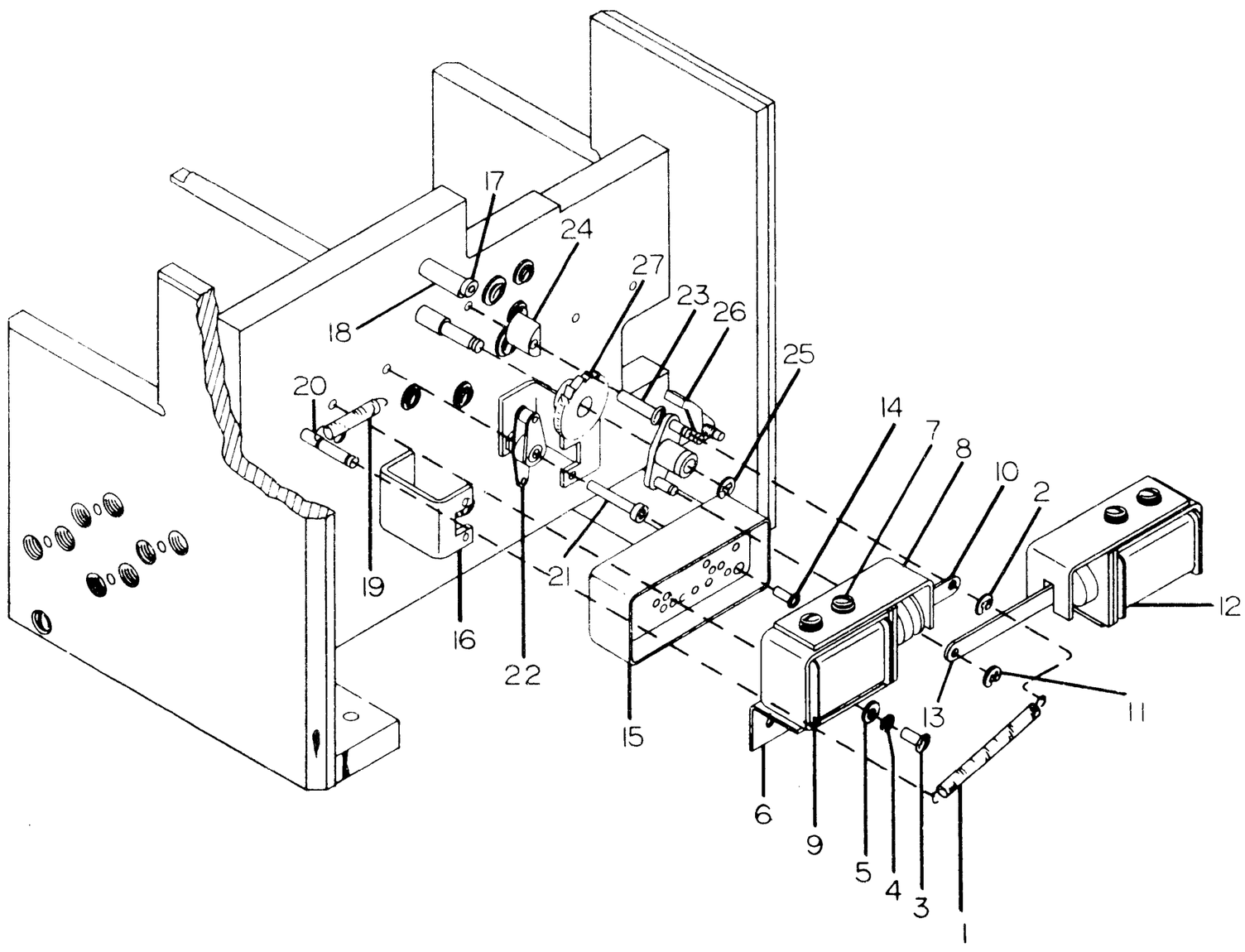
NOTE: THE REMOVAL AND DISASSEMBLY PROCEDURES OUTLINED IN THE FOLLOWING CHART ARE PROVIDED FOR CUSTOMER INFORMATION ONLY. THE GENERAL ELECTRIC COMPANY STRONGLY RECOMMENDS THAT YOU CONTACT YOUR LOCAL SERVICE AGENT IF IT IS NECESSARY TO REPAIR THESE ITEMS.

PUNCH PART	HOW TO REMOVE
Data solenoids*	1. Remove retaining ring (31) and all of the other data-solenoid retaining rings for the left solenoid mounting-plate (35). 2. Remove the two screws (32) and the associated hardware (33 and 34). 3. Remove the left solenoid mounting-plate (35). 4. Remove the right solenoid mounting-plate in the same manner. 5. Remove the two screws (37). 6. Remove the solenoid (39). 7. Extract the roll pin (40) and separate the link (41) and the buffer stop (42) from the solenoid. If necessary, remove the transport stop. 8. Remove all of the solenoids in the same manner.
Hammers	1. Remove the two screws (15) and the associated hardware (16 and 17). 2. Remove the collars (62 and 63). 3. Remove the hammers (64 and 65). 4. Remove the collars and the hammers in the sequence shown.
Restoring Bail and Solenoid Plunger*	1. Remove the two retaining rings (77). Separate the bail (78) from the links (79). 2. Extract the roll pin to separate the link (79), the solenoid stop, and the solenoid plunger (81).
Sprocket*	1. Loosen the set screw on the collar and remove the collar (56). 2. Loosen the set screw on the sprocket and extract the pin from the sprocket (87). Slide the sprocket (87) from the shaft.

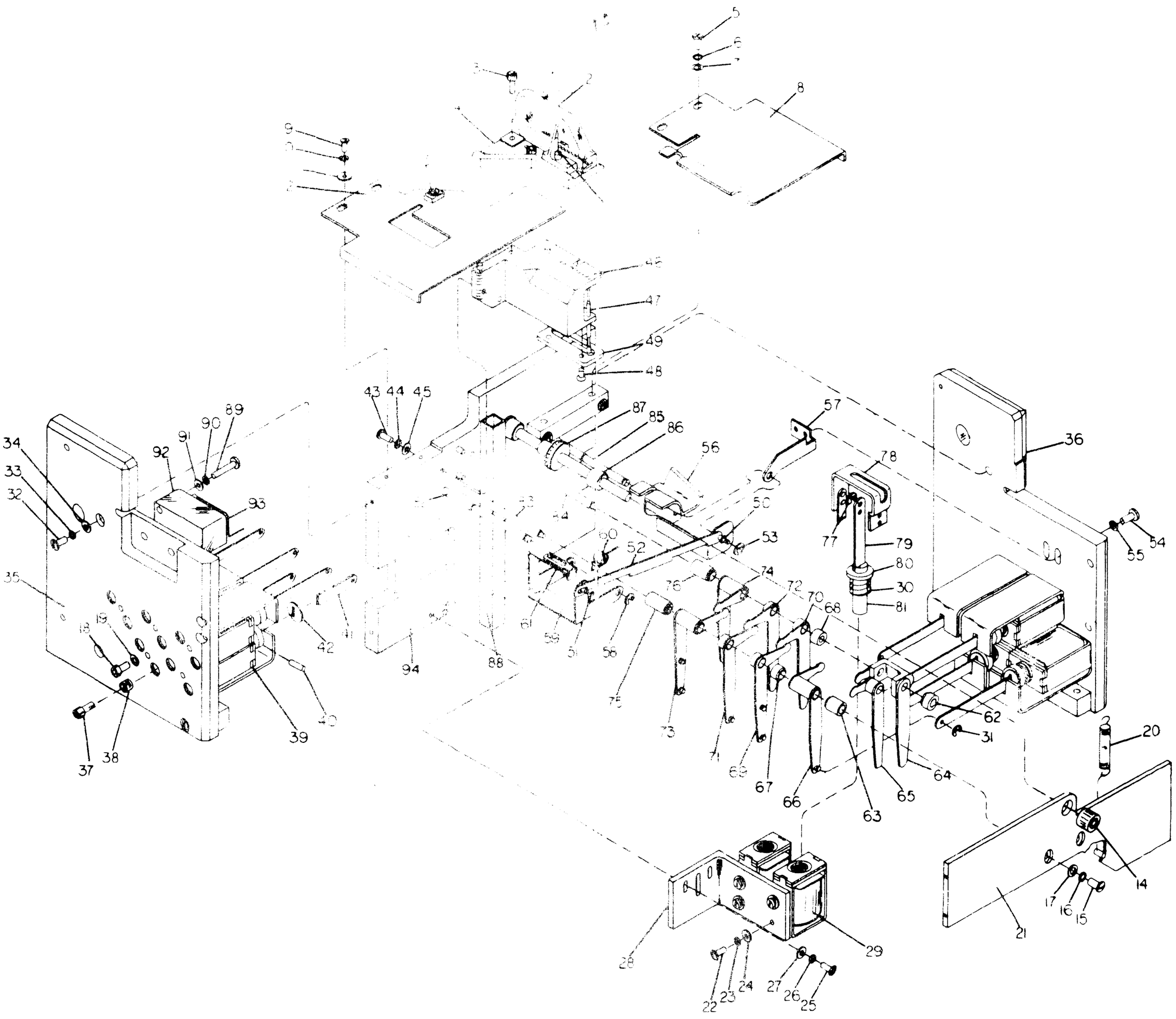
*Refer to the foldout, page 17.

(Continued from page 15)

PUNCH PART	HOW TO REMOVE
Transport Solenoids (See the diagram below.)	1. Unhook the spring (1). 2. Remove the retaining ring (3) from the left solenoid. 3. Remove the two screws (3) and the associated hardware (4 and 5) from the bracket (6). Remove the solenoid with the bracket from the rear plate. 4. Remove the two screws and the associated hardware. Separate the solenoid (9) from the bracket (6). 5. If necessary, remove the two screws (7) and the associated hardware. Separate the transport stop (8) from the solenoid. 6. Remove the right solenoid in the same manner.
Transport Mechanism (See the diagram below.)	1. Remove the screw (17) and the stop (18). 2. Unhook the spring (19). 3. Remove the screw (21) and the detent assembly (22). 4. Remove the screw (23) and the rear stop (24). 5. Remove the retaining ring (25). Slide the pawl assembly (26) from the shaft. 6. Extract the pin, loosen the set screws, and slide the ratchet (27) from the sprocket shaft.



Tape Punch and Transport Mechanism (Exploded View)



TAPE PUNCH (EXPLODED VIEW)

SECTION III
TAPE READER*

In this section, Tape-Reader Operation, Preventive Maintenance, Adjustments, and Troubleshooting will be discussed.

OPERATION

Loading the Tape Reader and operating it through the use of the various devices (located on the top front of the upper drawer), are relatively simple procedures.

TAPE LOADING

1. Lift the upper tape guide.

2. Place the tape into the lower guide, making sure that the sprocket holes in the tape are properly engaged with the teeth of the sprocket drive wheel. The sprocket channel is the one which contains the smallest holes.

3. Lower the upper tape guide. The Reader is now ready for operation.

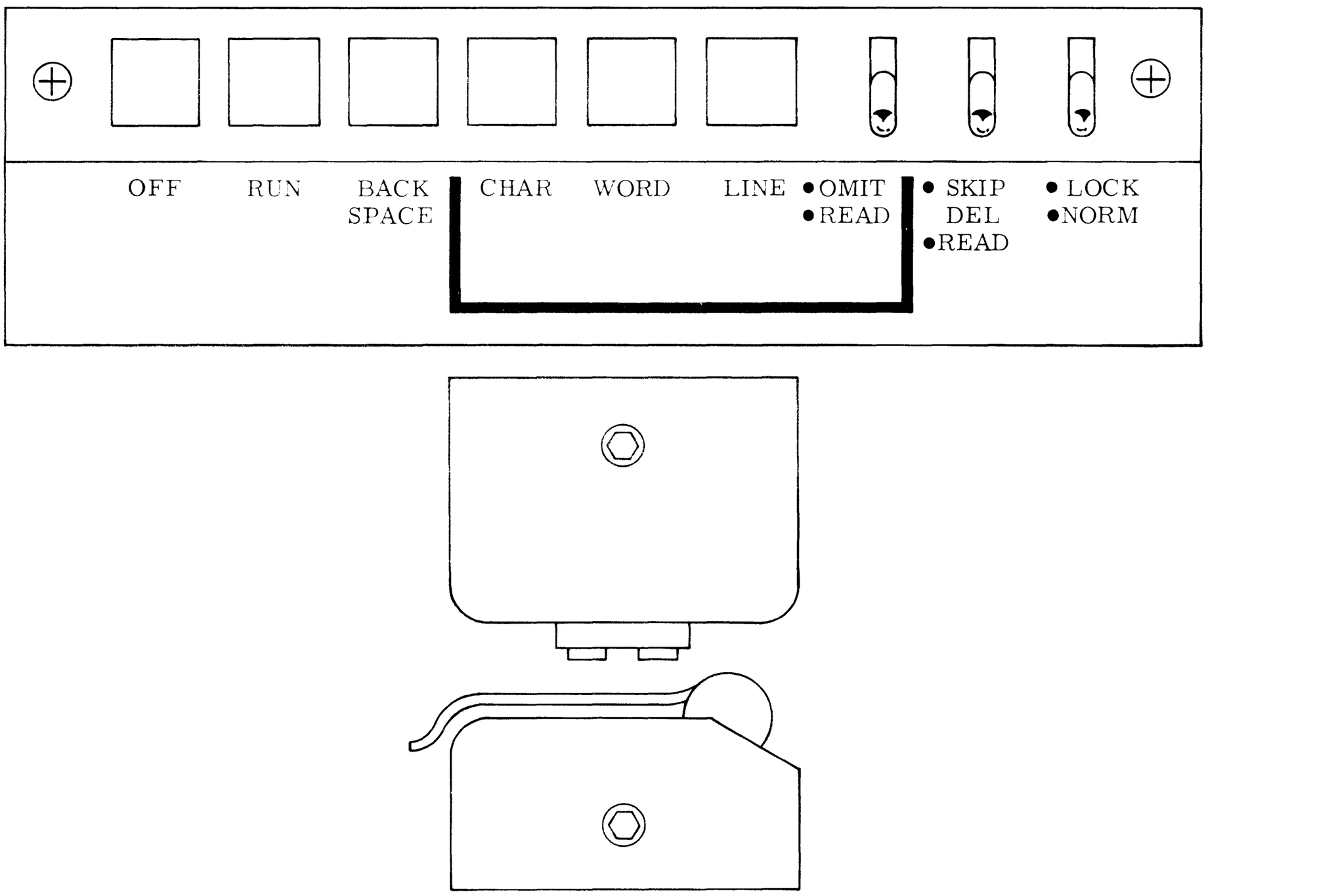
The Reader will handle, without difficulty, tapes which have been spliced by almost any technique. Experience has shown that the butt splice is the most desirable. Use an Opague Splice when making the butt splice.

The direction of travel of tape which is being read is from left to right, as viewed from the front of the Reader Drawer.

Be sure to check all functions of the Reader Drawer with the TermiNet 300 Printer in the Local mode.

OPERATOR'S DEVICES

The Reader is operated by means of six pushbuttons and three switches:



*TermiNet 300 Users are supplied with a Programmer's Manual (GEK-15002), an Operator's Manual (GEH-2184), and a Service Manual (GEH-2185) for the TermiNet 300 Printer. It is advisable to refer to these manuals for interrelated subjects.

PUSHBUTTON	FUNCTION	ASSOCIATED INFORMATION
Run	Applies power to the motor. Causes the tape to move through the Reader Head so that the Reader can read tape information into the TermiNet 300 Printer.	There is a delay of less than one second after the Run pushbutton is depressed before the tape starts to move, in order to allow the Reader lamp to come up to full brilliance. Momentary pauses controlled by the TermiNet 300 Printer will occur in the Reader when any of the following characters is read: CR LF ESC BS If the Terminal is in the Local mode, the tape will start to move. If the Terminal is in the On Line condition but not actually connected on line, the tape will not move.
Off	Stops the Tape Reader and turns off the Reader lamp when the Reader is in any of its operating modes.	
Backspace	Positions the tape one character in reverse; i.e., from right to left.	This action does not cause data to be read into the TermiNet 300 Printer. The Reader lamp turns on if it is not already on, and it remains on after the backspacing has been accomplished.
Character	Advances the tape forward one character.	The Reader lamp turns on if it is not already on, and it remains on after the one-character advance has been accomplished.
Word	Advances the tape forward one word.	The tape stops on the character after the first CR (Carriage Return), HT (Horizontal Tab) or SP (Space) has been recognized by the Reader. The Reader lamp turns on if it is not already on, and it remains on after the one-word advance has been accomplished.
Line	Advances the tape forward one line.	The tape stops on the character after the first CR has been recognized by the Reader. The Reader lamp turns on if it is not already on, and it remains on after the line advance is accomplished.

SWITCH	FUNCTION	ASSOCIATED INFORMATION
Omit Read	Controls the Character, Word, and Line pushbuttons. In the OMIT position, advances the tape at a rate of 125 characters per second. In the READ position, advances the tape at the set rate (10, 15, or 30 CPS) which is read into the TermiNet 300 Printer.	The data is not accepted by the TermiNet 300 Printer. After the operator types in the correct word, character, or line and places the switch in the READ position, the Reader will resume its normal operation.
Skip/Read Deletes	In the SKIP position, causes the deletes to be skipped in order to save reading time. In the READ position, permits reading to be resumed.	If there is a series of deletes, they are advanced at a rate of 125 characters per second. The Tape Punch may be used to verify that the TermiNet 300 Printer did not accept any deletes.
Lock/Norm	In the LOCK position, overrides any attempt to start the Tape Reader. In the NORM position, permits all the functions to operate as described above.	In the LOCK position, the Lock/Norm switch is in parallel with the Off push-button.
Tape Out (Optional)	Detects when the Reader is out of tape, and stops the Reader. Generates a momentary alarm in the Terminal.	The Tape Out switch is mounted in the Read Head. It is electrically parallel with the Off pushbutton.

TAPE-REELER OPTION

The Tape-Reeler option, which is installed on the Tape Reader drawer, consists of a left-hand (44B417103-001) and a right-hand (44B417103-002) tape reeler.

A simple electrical start-stop servo system is used for tape control. Supply and take-up reels are driven directly by separate shaded-pole induction motors which use dynamic braking to control stopping.

Associated with each Reeler is a spring-loaded dancer arm which moves from the outside to the inside through four zones (zone 1 through zone 4). When moved by hand, the dancer arms should respond in accordance with the table shown at the right.

Direction control is by relay K1 located on the right-hand reeler. This relay is controlled by switches which are actuated by the dancer arms.

Be sure to leave enough slack in the threaded tape so that the dancer arms will remain in their proper rest positions. Any inward movement of the dancer arms will start the associated reeler, which could tear the tape during threading.

To take up the slack after the tape has been loaded:

1. Depress the Character pushbutton to apply power to the motor, thereby locking the rotor. As a result, the tape is locked in place.

2. Manually turn the take-up reel in a clockwise direction until the slack is taken up.

FORWARD SEQUENCE

LEFT-HAND REEL		RIGHT-HAND REEL	
Dancer-Arm Zone	Motor Response	Motor Response	Dancer-Arm Zone
1	Stop	Stop	1
2	CW	Stop	2
3	Stop	CW	3
4	Stop	Stop	4
REVERSE SEQUENCE			
1	Stop	Stop	1
2	Stop	CCW	2
3	CCW	Stop	3
4	Stop	Stop	4

PREVENTIVE MAINTENANCE

The Tape Reader motor, which is the only movable part in the Reader, has permanently lubricated precision bearings; therefore, no further lubrication is recommended.

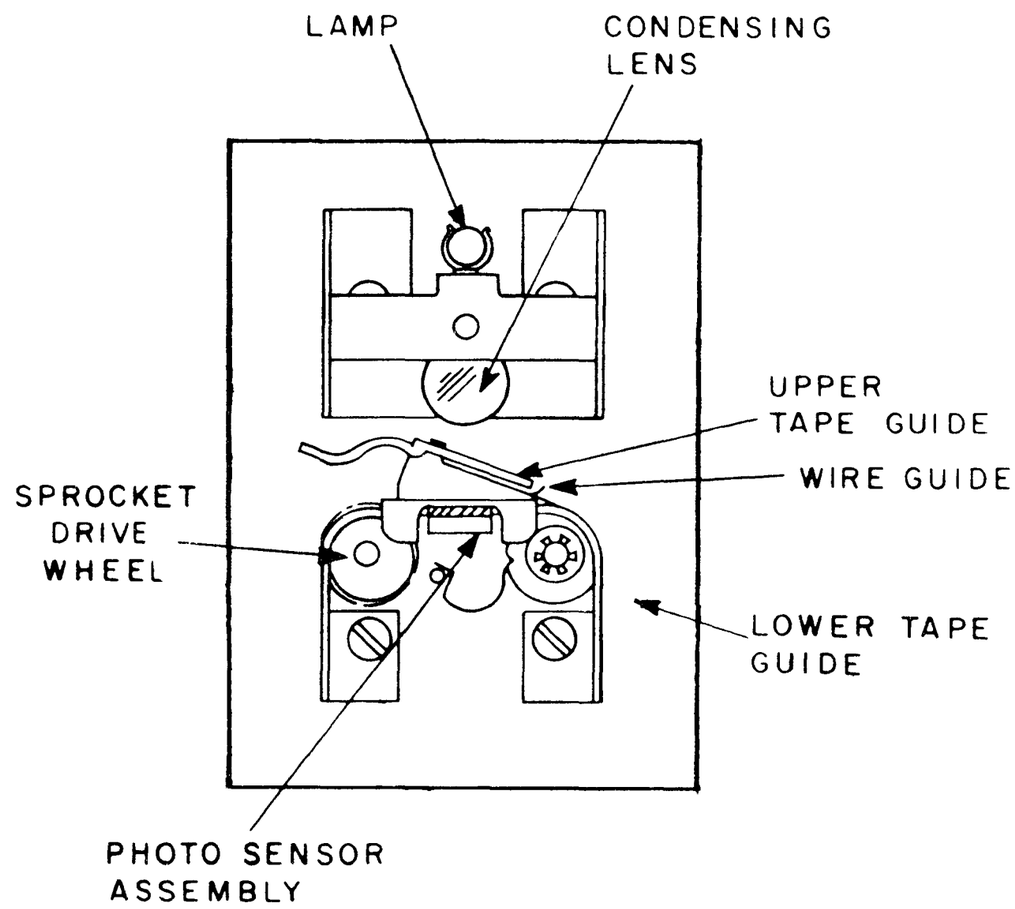
OPTICAL SYSTEM

Some paper tapes produce an appreciable amount of paper dust which tends to build up on the window of the photosensor assembly, thus reducing the light input. Therefore, care must be taken to keep the photosensor clean.

1. Using clear water and a soft cloth or Q-tip*, clean the photosensor case.

2. Using clear water and a soft cloth, remove any dust which may have accumulated on the upper and lower guides.

3. Clean the lens and lamp with a dry, lint-free cloth.



TAPE-READER COMPONENTS

*Trademark of Chesebrough Pond's Company, Inc.

ADJUSTMENTS

The positioning of the Reader Head in relation to the light source and tape is set at the factory. It should, therefore, not be readjusted.

ALIGNMENT

To adjust the position and width of the line:

1. Remove the lamp housing-cover.

2. Make sure that the photocell cover-glass and lens assembly are clean.

3. Rotate the lamp in its socket until the filament is located in its lower center position.

4. Loosen the mounting screws on the lamp housing assembly.

5. Feed tape punched with deletes into the Reader.

6. To locate the tape properly with respect to the photocell, apply power to the motor by depressing the Backspace or the Character pushbutton. (This causes the light to remain on.)

7. Observe the light beam to see if it comes across the center of the tape holes and if it is in focus (straight line with sharp edges).

8. If the tape is out of alignment with the holes, alternately adjust the vertical and horizontal positions of the lamp housing assembly to obtain a light line of minimum width centered over the sprocket holes in the tape. If this does not result in satisfactory location of the light line:

a. Adjust the lens assembly as required to achieve sharp focus.

b. Replace the lamp and rotate the replacement in the socket until the filament is located in its lower center position.

9. Tighten the mounting screws on the lamp housing assembly.

If there is a problem which remains unsolved after following the above procedure, return the Reader Head in accordance with instructions as outlined in Service Advices Nos. 7a and 8 issued by the Communication and Control Devices Department.

READER-BOARD OUTPUT

To check the output of the Reader Board:

1. Connect an oscilloscope to each of the output channels (see foldout, page 23).

2. Insert tape which is completely punched with deletes, into the Reader.

3. Depress the Run, Character, or any other pushbutton which will move the tape, and observe the outputs of the Reader Board.

4. As each hole passes over the photocell, the output should swing from 0 to -15. If it does not, the Reader Board is faulty and should be replaced.

FIELD ADJUSTMENT OF THE READER BOARD

1. Place tape which is known to be good, into the Tape Reader.

2. Rotate the sensitivity potentiometer in full counterclockwise position.

3. With the terminal on, depress the Run pushbutton and observe the printout.

4. Rotate the potentiometer slowly in the clockwise direction until the printout is correct, and observe the position of the potentiometer.

5. Continue to rotate the potentiometer until the printout is incorrect. Note the position of the potentiometer.

6. Place the potentiometer halfway between the positions noted in steps 4 and 5. This is the correct potentiometer setting.

SHOP-LEVEL ADJUSTMENT OF THE READER BOARD

1. Insert a fully punched loop of translucent (40%) tape and step the Reader at 125 characters per second.

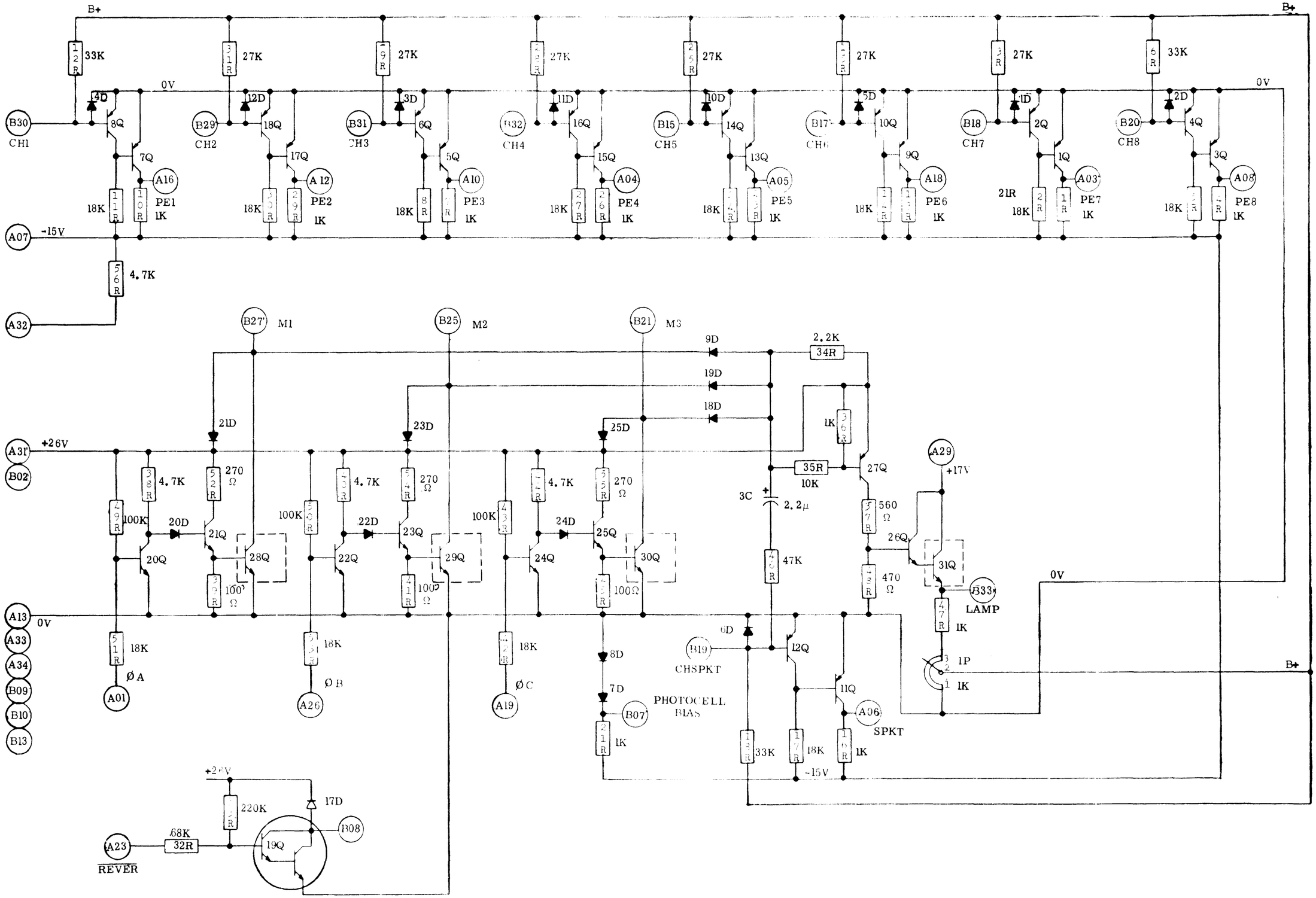
2. With an oscilloscope, monitor the signal at the base of transistors Q1, Q3, Q5, Q9, Q11, Q13, Q15, and Q17, and adjust the potentiometer until the No Hole portion of the signal is at least one millisecond wide. Note the voltage present at B+, the center tap of the potentiometer. (See foldout, page 23.)

3. Using opaque tape, monitor the same points as in 2 and adjust the potentiometer (in the other direction) until one of the channels just begins to break up in the hole portion or signal. Note the voltage present at B+.

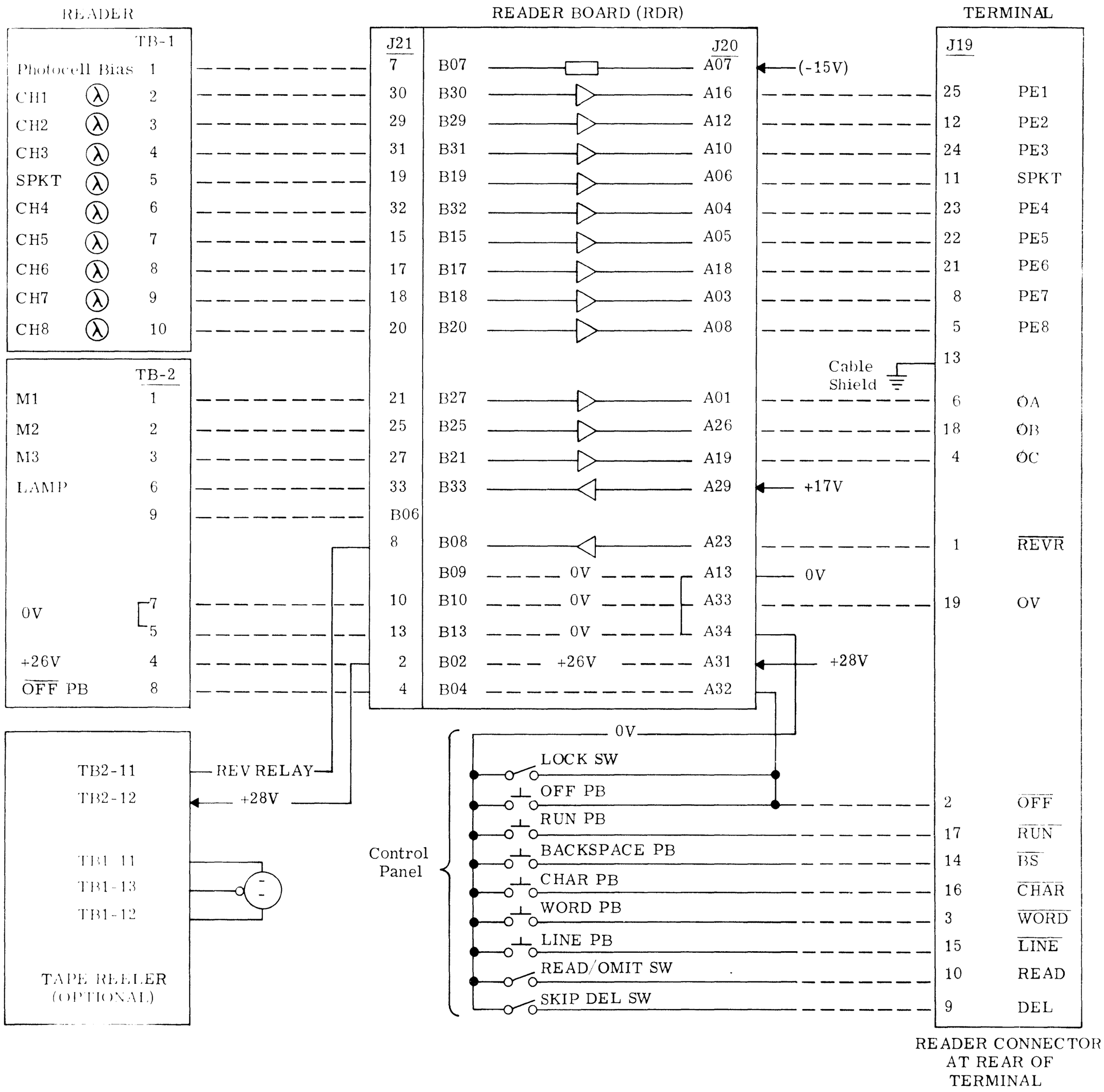
There should be a difference of more than 1/2 volt between the voltages taken in steps 2 and 3.

4. Insert the translucent tape again and readjust the potentiometer as in step 2.

5. Check the channels with the opaque tape for a good, clean signal (good return for the hole condition of the tape).



READER CONTROL BOARD



INTERCONNECTIONS BETWEEN READERS, READER BOARD, AND TERMINAL

TROUBLESHOOTING

Should a malfunction occur, refer to the table below for possible causes.

MALFUNCTION	POSSIBLE CAUSES
Tape does not move	Blown fuse Signal Connector not connected to Tape Reader Step pulse not of sufficient amplitude or duration Tape not properly engaged with Sprocket Drive Wheel Sprocket Drive Wheel loose on motor shaft Driver board not fully seated in connector Driver-board failure Power-supply failure Spring missing from upper tape guide
No Outputs	Blown fuse Burned-out lamp Dirty Read Head Power-supply failure Board failure
Intermittent Outputs	Dirty Read Head Drive board not fully seated in connector Noise in step line Weak lamp

10-3-30 Chad Cover.

SECTION IV
PARTS LIST AND PHOTOGRAPHS

This section provides an illustrated parts list for the Model B Punch and Reader.

When you have occasion to order parts, specify:

1. The complete nameplate data
2. Quantity
3. Part Number
4. Description of each part ordered
5. Number of this publication (GEK-14776)

Parts may be ordered from:

Data Communications
Communication and Control Devices Department
General Electric Company
Waynesboro, Virginia 22980

The listing on the last page of this publication will assist you in finding the nearest service location.

READER DRAWER

(Refer To Figures 1, 2, 3, and 4)

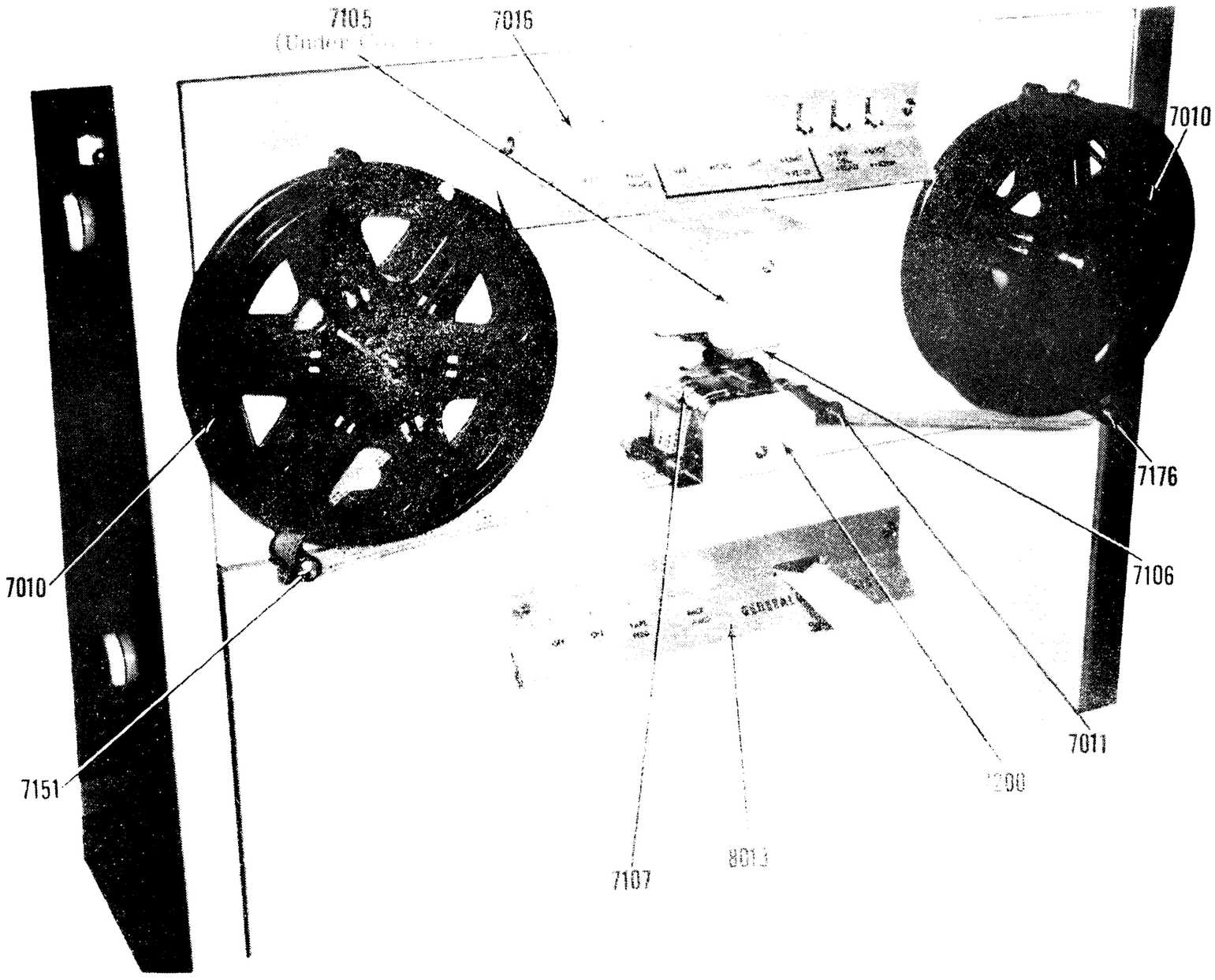
INDEX NO.	PART NUMBER	DESCRIPTION
7008	44C414098-G01	Reader Assembly Kit with Reelers
7009	44A417357-0*9	Drawer
7010	44A417362-001	Tape Reel
7011	44A417364-001	Tape Guide
7012	44C414139-G01	Wire Harness
7013	44A410491-G01	Power Cord (Not shown. Used on reeler drawer only)
7014	44C414121-G01	Reader Assembly Kit
7015	44A417357-0*4	Drawer
7016	44C414124-001	Drawer Pull
7017	44A417308-002	Reel Shaft
7018	44A410352-G01	Feed Reel Shaft
7019	44B412359-001	Guard
7020	44A332155-001	Spring (Not Shown)
7021	44C414120-G01	Wire Harness
7022	44B412396-G01	Wire Harness
7023	44B412360-G01	PC Board (RDRB)
7024	44B412384-G01	Switch Assembly
7105	73A510308P1	Lamp, Reader
7106	73C570214G2	Lens Assembly, Reader
7107	73A510336P1	Drive Sprocket, Reader
7150	44B417103-001	Tape Reeler, Left
7151	73B540044P3	Dancer Arm, Left
7152	73A510114P7	Fuse, 4A
7175	44B417103-002	Tape Reeler, Right
7176	73B540044P4	Dancer Arm, Right
7200	44A417094-002	Tape Reader

NOTE:

1. Reader Assembly Kits (Index Numbers 7008 and 7014) include readers and all necessary items to install the readers in the drawer. The drawer is not included in the kit.

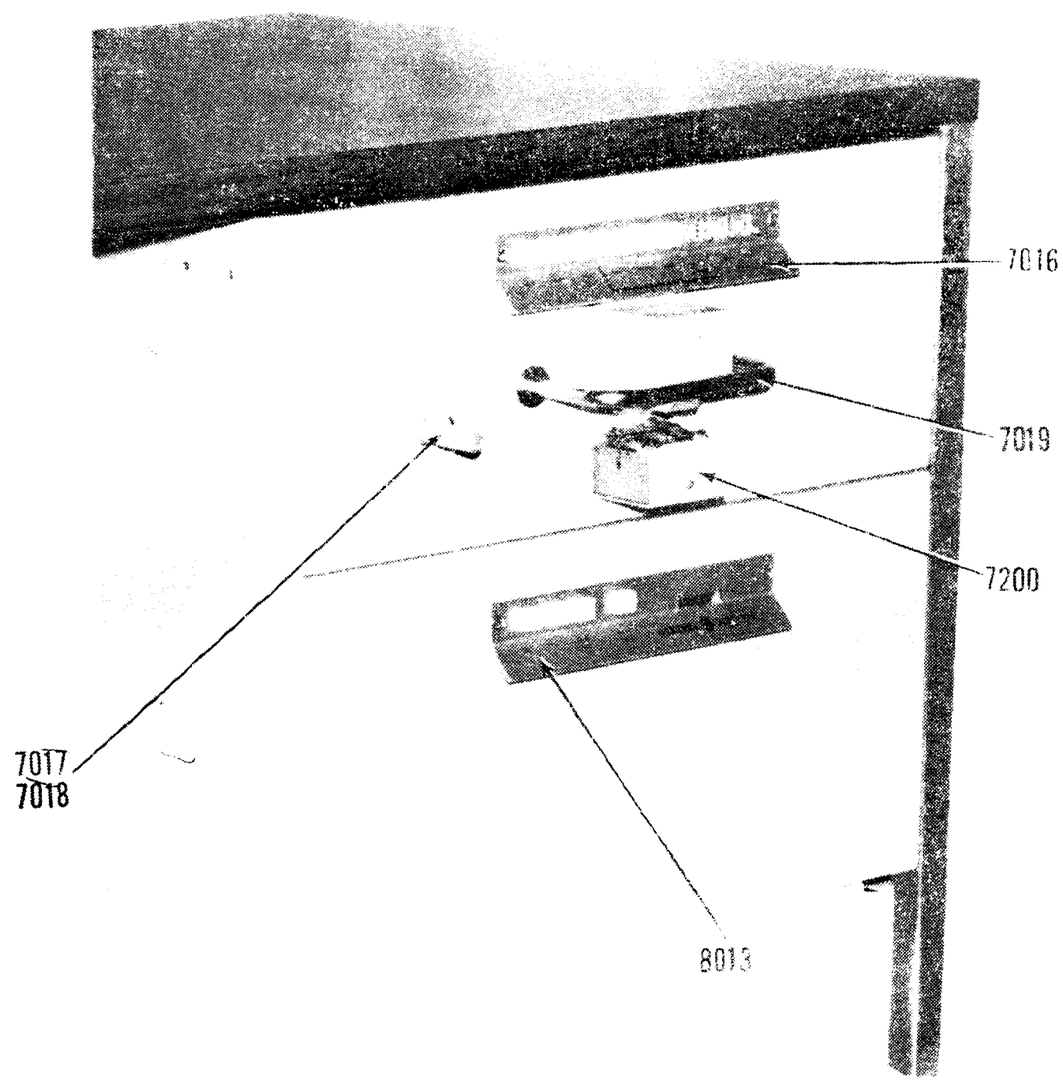
2. The wire harness (Index No. 7022) includes the Switch Assembly (Index No. 7024).

3. The asterisks in the Part Numbers opposite Index Nos. 7009 and 7015 indicate that the next-to-the-last digit will change, depending on the color of the drawer.



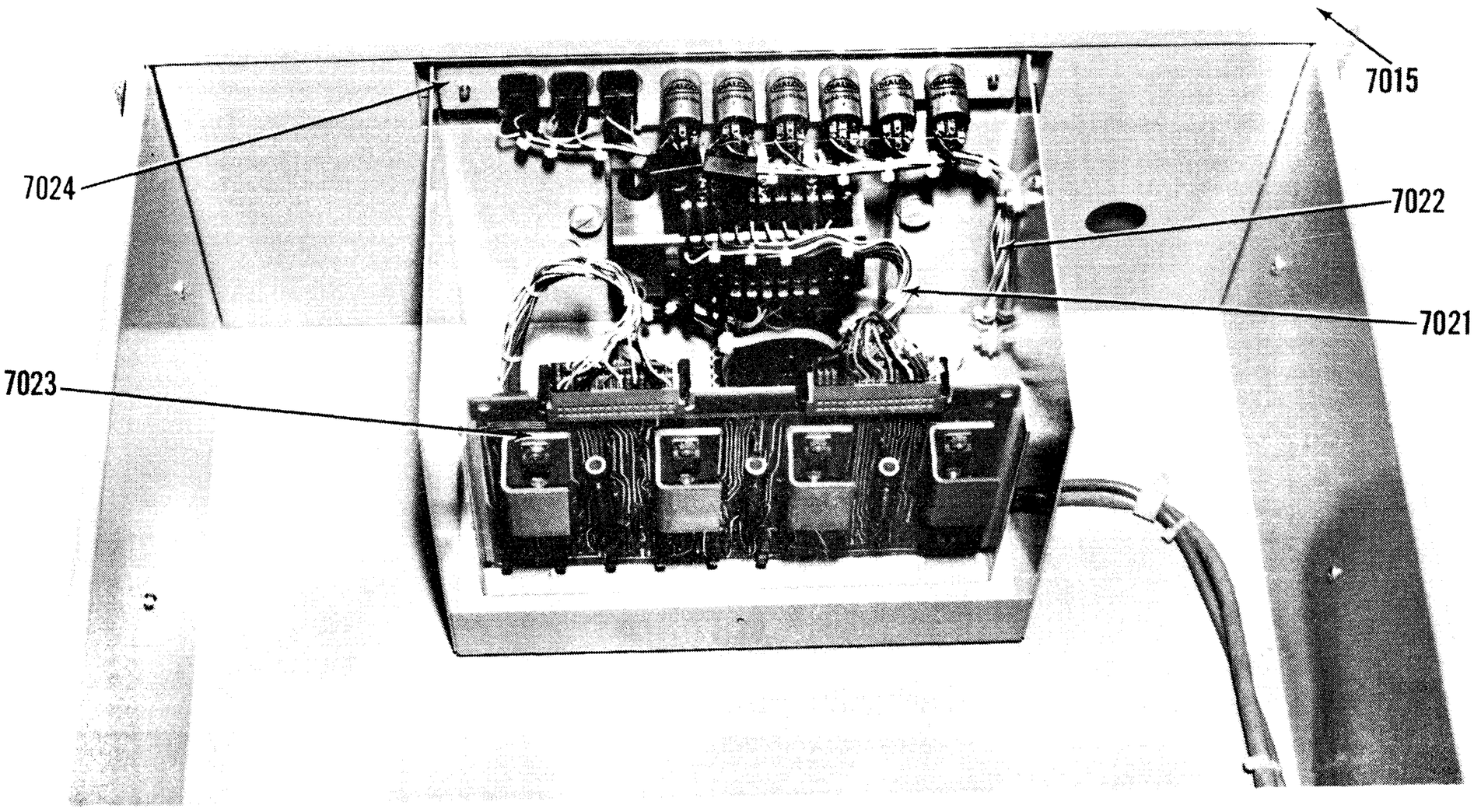
READER AND PUNCH DRAWERS WITH REELER OPTION

Figure 1



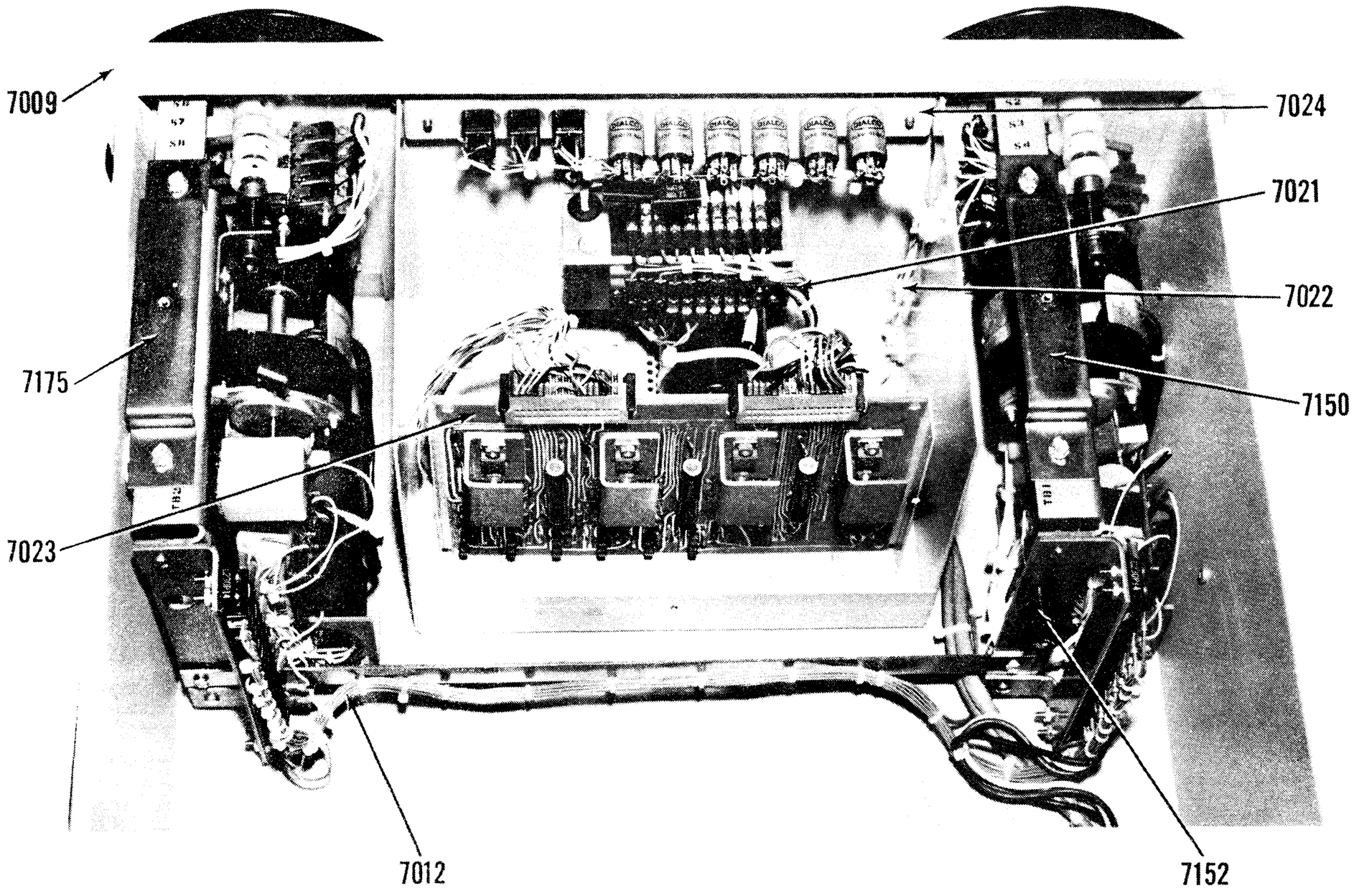
READER AND PUNCH DRAWERS

Figure 2



READER DRAWER

Figure 3



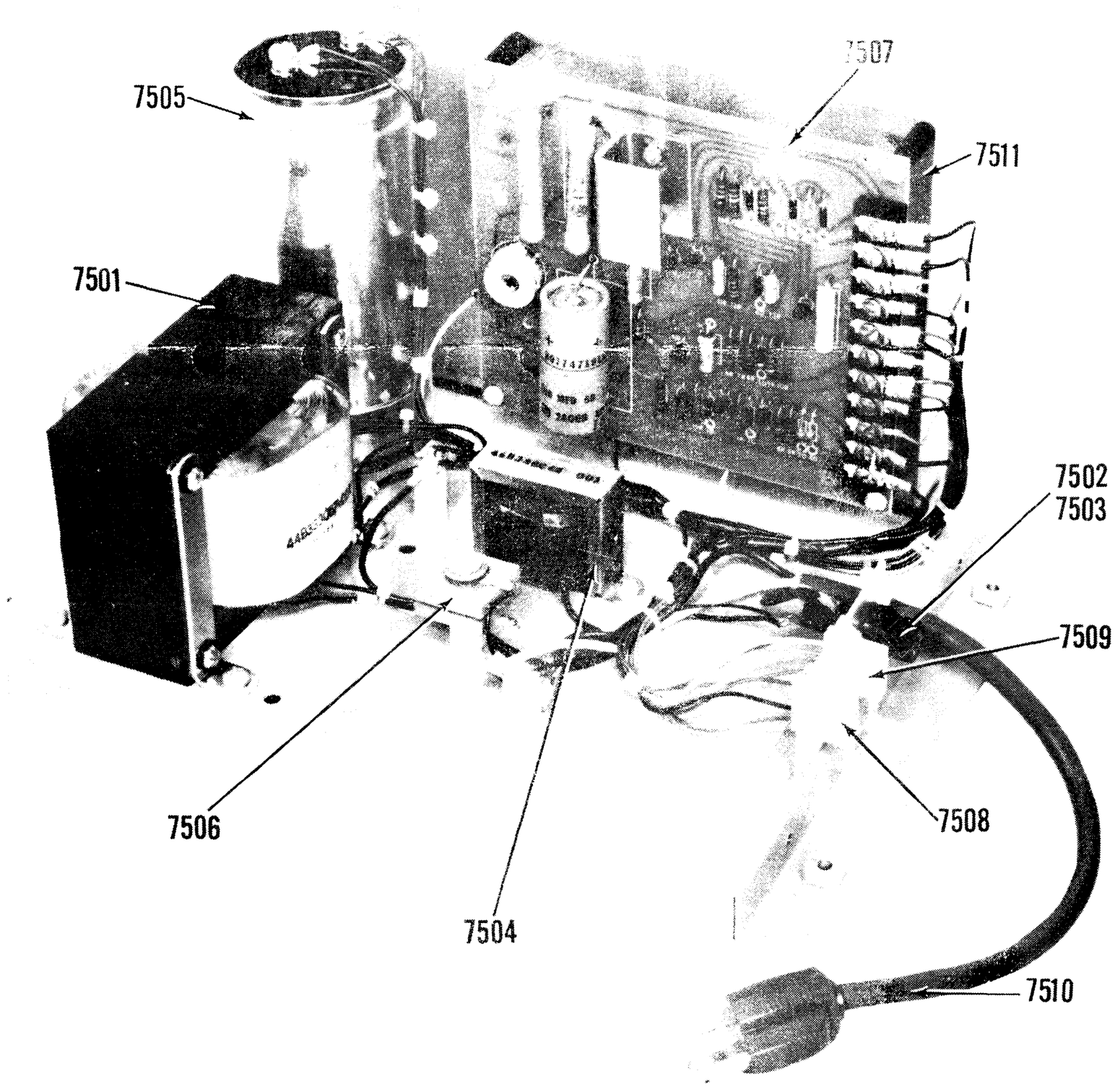
READER DRAWER WITH REELER OPTION

Figure 4

POWER-SUPPLY ASSEMBLY

(Refer To Figure 5)

INDEX NO.	PART NUMBER	DESCRIPTION
7500	44B412388-G01	Power-Supply Assembly
7501	44B333057-001	Transformer
7502	K9774741P14	Fuse
7503	44A417355-001	Fuse Holder
7504	44B333042-001	Choke
7505	44A390238N26	Capacitor
7506	44A417338-001	Thyrector
7507	44B412343-G01	PC Board (DPS)
7508	44A410438-G02	Connector (RDR)
7509	44A410438-G04	Connector (PCH)
7510	44B412380-G01	Cable and Plug
7511	44B412356-G01	Heat Sink (Includes 1D, 2D, and 3D)



POWER-SUPPLY ASSEMBLY

Figure 5

PUNCH DRAWER

(Refer To Figure 6)

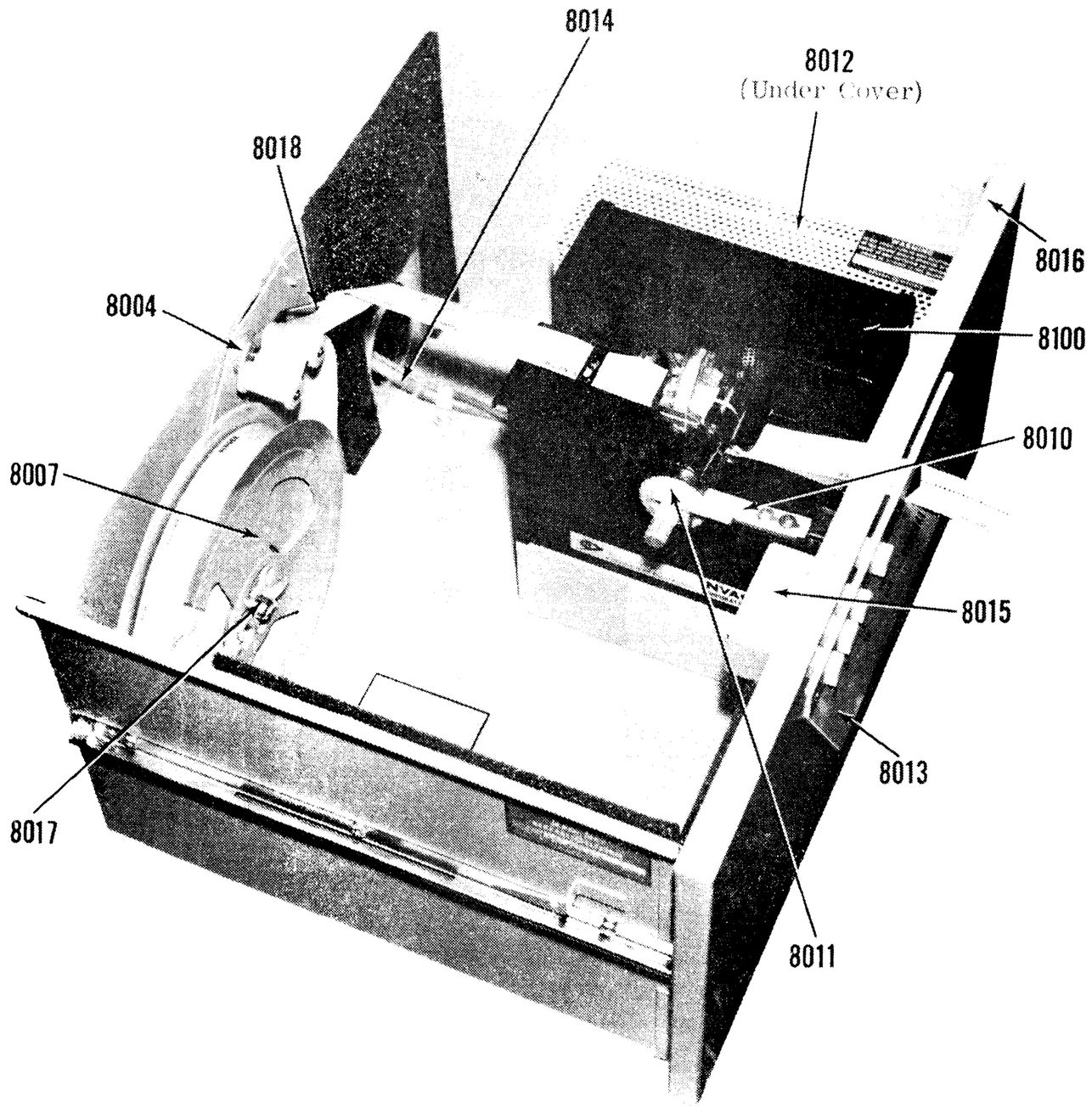
INDEX NO.	PART NUMBER	DESCRIPTION
8004	44A417308-003	Tension-Arm Assembly
8007	44A417301-001	Tape Reel
8009	44C414122-G01	Punch Assembly Kit
8010	44A410444-001	Pawl
8011	44B412358-G01	Rachet Assembly
8012	44B412381-G01	PC Board (PCHB)
8013	44C414123-001	Drawer Pull
8014	44B412395-G01	Wire Harness
8015	44B412385-G01	Switch Assembly
8016	44A417357-0*5	Drawer
8017	44A417308-002	Adapter
8018	44A410287-001	Guide
8100	44A417302-001	Tape Perforator (Punch)

NOTE:

1. The Punch-Assembly Kit (Index No. 8009) includes the Tape Punch and all items necessary to assemble the Tape Punch in the drawer. The drawer is not included in the kit.

2. Wire Harness (Index No. 8014) includes the Switch Assembly (Index No. 8015).

3. The asterisk in the Part Number opposite Index No. 8016 indicates that the next-to-the-last digit will change, depending on the color of the drawer.



PUNCH DRAWER

Figure 6

TeleCommunications

CANADIAN GENERAL ELECTRIC COMPANY LIMITED

Communications, Systems & Services Department

The following is a list of prices and parts for the tape perforator, as requested.

Part Number	Description	Price
10-462-5	Trans Sol-Ass Lt	$ 57.48
10-462-6	Trans Sol-Ass Rt.	$ 55.58
10-3-88	Spring	$ 1.33
43-068	Pawl Ass.	$108.22
TTRFA1206	Retaining Spring	$ .48
10-447	Detent Arm	$ 38.00
10-3-87	Detent Spring	$ 1.90
10-463-3	Bail Sol Ass.	$147.78
CCA8369-3	Data Solenoid	$ 42.43
TTRFM1206	Retaining Ring	$ .48
10-426	Chad Cover	$ 4.20
TH-S10802	Screw	$ .48
TH-WC0407	Washer	$ .48
10-3-224	Cover Lt.	$ 4.18
10-3-225	Cover Rt.	$ 11.21
10-3-233	Cover Ft.	$ 11.59
10-3-234	Cover R.R.	$ 13.87
BAA7929-1	Linkage (Data Solenoids)	$ .86
TTACC0403	Pins Roll	$ .48

Regards,

Wayne Young

Wayne Young
Renewal Parts