CUSTOMER ENGINEERING

WORD PROCESSING NEWSLETTER NO. 30/30A

CONFORM/EXECUTE	
INFORMATION ONLY	X

SYSTEMS 10/20/30

February 26, 1979

928 PIO/LPO CONFIGURATION

(This Newsletter is a combination of WPNL 30 and 30A, it also contains all the latest print E-REVs available at time of publication).

This newsletter contains the PIO/LPO configurations and system descriptions for use with Systems 10A/20/30. Necessary installation illustrations are provided in the text and are supported by the engineering drawings in Appendix "C".

The information contained herein is as follows:

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928 PHOTOCOMPOSITION INPUT OPTION (PIO) AND LINE PRINTER OPTION (LPO)

1. GENERAL INFORMATION

The Photocomposition Input Option (PIO) and Line Printer Option (LPO) are now available for delivery to all Wang customers using Word Processing Systems 10A, 20, and 30.

NOTE:

If the PIO is to be used with system 10A, a minor modification to the system is needed (change Master CPU output channels from two to three).

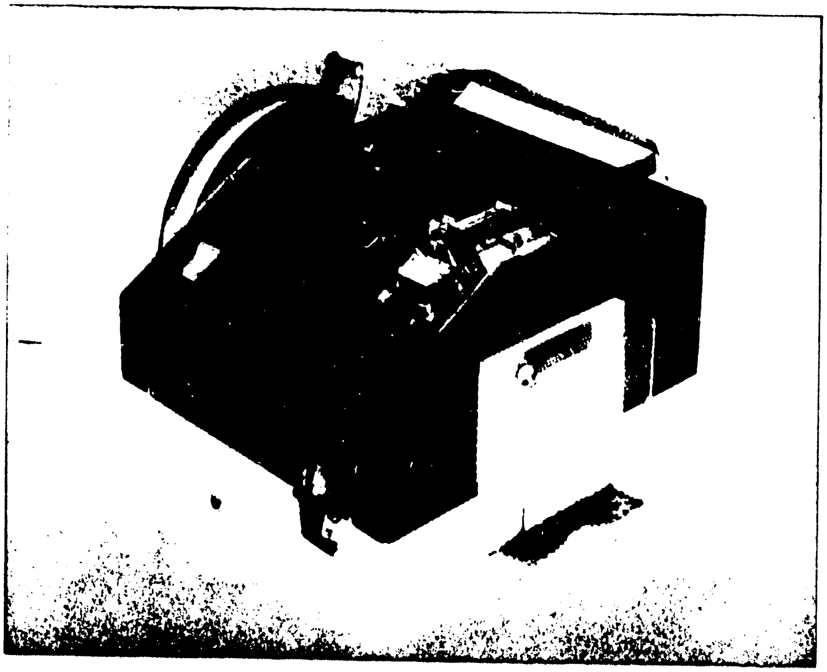
Each option will be discussed separately, however, there are similarities which will be highlighted throughout.

2. PHOTOCOMPOSITION INPUT OPTION (PIO) (5508)

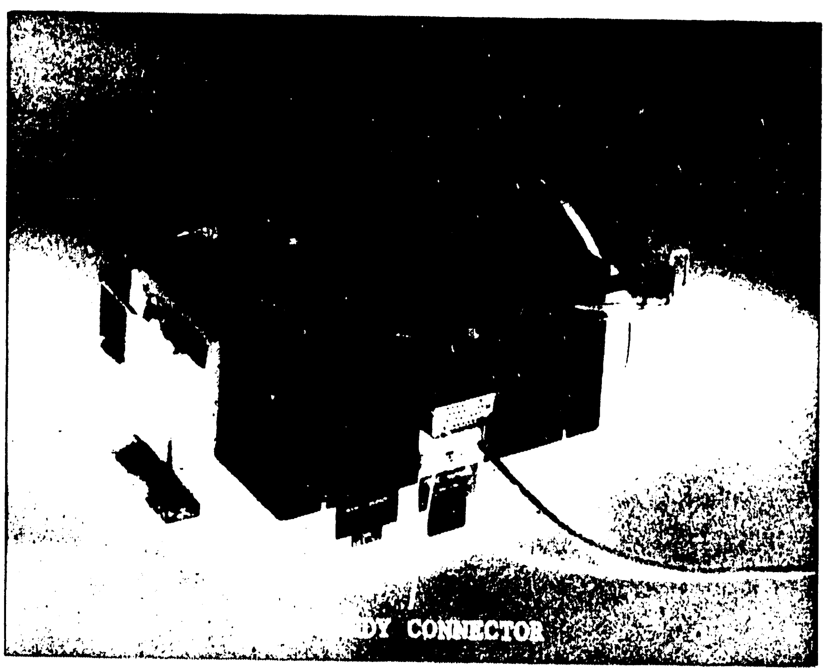
The PIO option (5508) consists of a self-contained paper tape punch and an electronic translator (PIO Interface) - See Figures 1 and 2. These two units produce TTS (TeleTypeSetting Code) punched paper tape for use with any photocomposer accommodating six-level punched paper tape. When the PIO is connected (using a coaxial cable) to a 928 system Master CPU channel output, the electronic translator (Interface) will enable the tape punching operation (See Figure 3).

2.1 PIO DESCRIPTION AND CODES

Any document that is to be punched onto a phototypesetting tape (Punch Output) is stored on a 928 disk in the form of work station CRT display character codes. The function of the WPS software is to translate the CRT codes to a format suitable for input to the PIO. The present implementation translates the CRT display character codes to 6-level (Tape Channels 0 through 5) TTS codes. The PIO is capable of punching tape at the following rates:



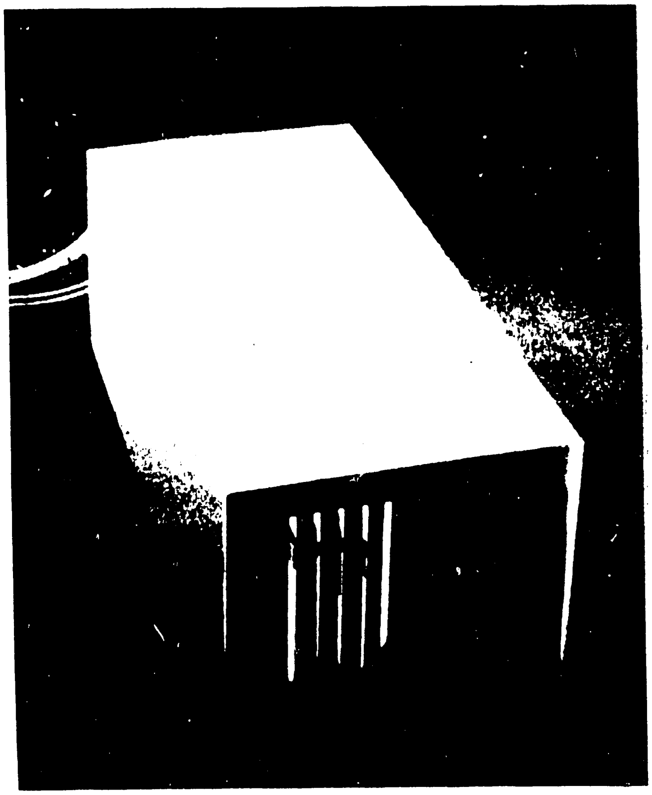
FRONT VIEW



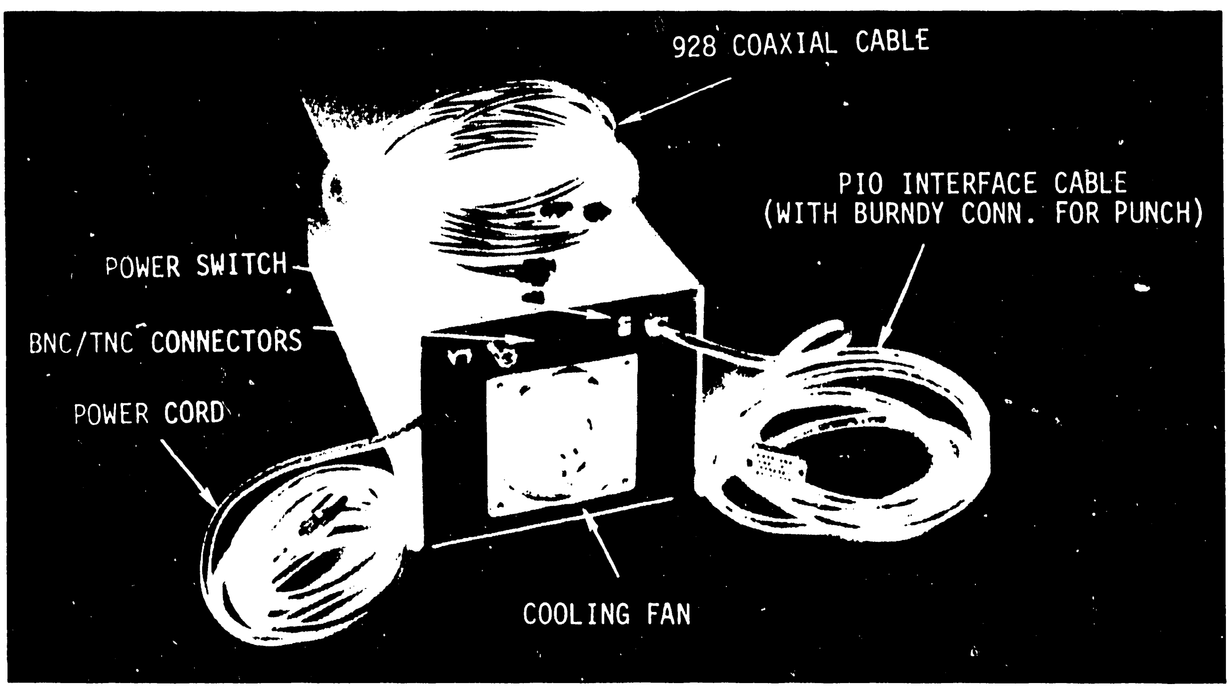
REAR VIEW

MODEL 528 PAPER TAPE PUNCH

FIGURE 1



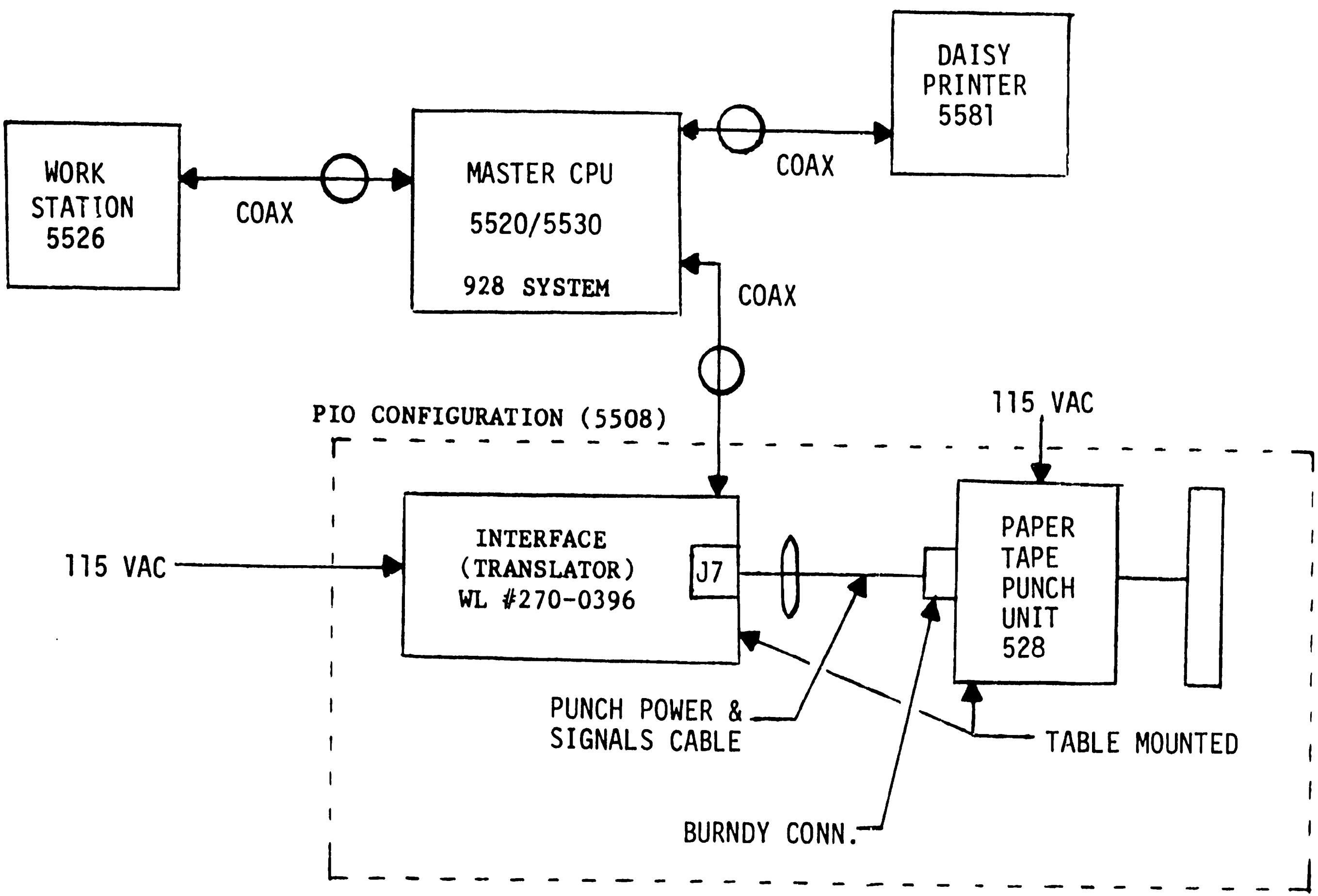
FRONT VIEW



REAR VIEW

PIO INTERFACE (TRANSLATOR)

FIGURE 2



TYPICAL 928 SYSTEM
WITH PIO OPTION

FIGURE 3

a) 50 Characters per second at 60 Hz.

b) 44 Characters per second at 50 Hz.

a. TTS Codes

Table 1 contains a list of the 64 possible TTS codes along with the keystrokes necessary to produce them. Though most of the TTS codes have a direct Wang equivalent keystroke, some do not. In order to produce these unmatched codes, it is necessary to use a two keystroke sequence. The first keystroke in the sequence is MERGE, the second keystroke in the sequence designates the desired TTS code. Table 2 is a list of illegal characters in any keystroke sequence.

b. Shift and Unshift

In order to relieve the operator of the time consuming task of inserting shift and unshift codes, the software automatically takes care of all case changes. For example, the sequence "a Wang" will preclude the following TTS sequence; a, space, shift, W, unshift, a, n, g.

c. Illegal Characters

In the process of punching a document, it is possible to encounter characters that do not have an equivalent TTS code. Whenever this happens, the software will punch the visual message "ILLEGAL CHARACTER IN PAGE XXX JUST BEFORE YYYYYYYYYY" where XXX is the page number where the illegal character is located, and YYYYYYYYYY are the ten characters immediately following the illegal character. This should help the operator locate and correct the error. After the message is punched, the job is terminated.

d. Special Keyboard Characters

The keyboard characters given below are subject to special treatment.

1) NOTES (!!)

If the operator elected to punch the document with notes; all characters following the notes code and before the return code, are punched in visual characters. Only the letters A through Z and the numbers 0 through 9 can be punched visually. If a character other than a letter or a number is found, it will be ignored (a space will be punched). If the operator did not choose the notes option, the message will be ignored.

2) RETURN (◀)

This character will produce a TTS space bar code. If the operator wishes to have a TTS return punched, the sequence that should be used is MERGE and RETURN.

3) TAB (▶)

This character is ignored.

4) DECIMAL TAB (.—)

This character is ignored.

5) INDENT (→)

This character is ignored.

6) SPACE (•)

This character will produce a TTS space bar code.

7) STOP (■)

This character is ignored.

8) CENTER (◆)

This character will produce a TTS quad center code.

9) FORMAT (⊥)

All characters comprising the format are ignored.

10) MERGE (↕)

Used as the first command of a two keystroke sequence.

11) SUPERSCRIPT (↑)

This character is ignored.

12) SUBSCRIPT (↓)

This character is ignored.

TABLE 1. WANG TO TTS TRANSLATION SCHEME

VISUAL TAPE CODE CHANNELS								UPPER CASE		LOWER CASE	
0	1	2	3	4	5	6	7	TTS	WANG	TTS	WANG
	o	o						A	A	a	a
	o			o	o			B	B	b	b
		o	o	o				C	C	c	c
	o			o				D	D	d	d
	o							E	E	e	e
	o		o	o				F	F	f	f
		o		o	o			G	G	g	g
			o		o			H	H	h	h
		o	o					I	I	i	i
	o	o		o				J	J	j	j
	o	o	o	o				K	K	k	k
		o			o			L	L	l	l
			o	o	o			M	M	m	m
			o	o				N	N	n	n
				o	o			O	O	o	o
		o	o		o			P	P	p	p
	o	o	o		o			Q	Q	q	q
		o		o				R	R	r	r
	o		o					S	S	s	s
					o			T	T	t	t
	o	o	o					U	U	u	u
		o	o	o	o			V	V	v	v
	o	o			o			W	W	w	w
	o		o	o	o			X	X	x	x
	o		o		o			Y	Y	y	y
	o				o			Z	Z	z	z
o		o	o		o			?	?	0	0
o	o		o	o	o			1/8	MERGE 1	1	1
o	o	o			o			1/4	MERGE 2	2	2
o	o							3/8	MERGE 3	3	3
o		o		o				1/2	MERGE 4	4	4
o					o			5/8	MERGE 5	5	5

TABLE 1. WANG TO TTS TRANSLATION SCHEME (Continued)

VISUAL TAPE CODE CHANNELS								UPPER CASE		LOWER CASE	
0	1	2	3	4	5	6	7	TTS	WANG	TTS	WANG
o	o		o		o			3/4	MERGE 6	6	6
o	o	o	o					7/8	MERGE 7	7	7
o		o	o					Em Dash	MERGE D	8	8
o				o	o			&	&	9	9
				o				Return	MERGE Return	Return	MERGE Return
			o					Space Bar	MERGE Space	Space Bar	MERGE Space
		o						Elevate	MERGE E	Elevate	MERGE e
o								Thin Space	MERGE T	Thin Space	MERGE t
o				o				Open Quote	"	Close Quote	'
o			o					Add Thin	MERGE A	Add Thin	MERGE a
o		o						Paper Feed	MERGE P	Paper Feed	MERGE p
o			o		o			Em Leader	MERGE L	Em Leader	MERGE l
o		o			o			Vert Rule	MERGE V	Vert Rule	MERGE v
o	o				o			(	(	)	)
o			o	o				,	MERGE ,	,	,
o	o			o				+	+	-	-
o	o		o					Em Space	MERGE M	Em Space	MERGE m
o	o	o						!	!	$	$
o			o	o	o			.	MERGE .	.	.
	o	o		o	o			Shift	MERGE S	Shift	MERGE s
o		o		o	o			:	:	;	;
o	o			o	o			Upper Rail	MERGE Z	Upper Rail	MERGE z
o		o	o	o				En Space	MERGE N	En Space	MERGE n
o	o		o	o				Quad Left	MERGE Q	Quad Left	MERGE q
o	o	o		o				Stop(Bell)	MERGE B	Stop(Bell)	MERGE b
	o	o	o	o	o			Unshift	MERGE U	Unshift	MERGE u
o		o	o	o	o			Quad Center	MERGE C	Quad Center	MERGE c
o	o	o		o	o			Lower Rail	MERGE X	Lower Rail	MERGE x
o	o	o	o		o			En Leader	MERGE Y	En Leader	MERGE y
o	o	o	o	o				Quad Right	MERGE R	Quad Right	MERGE r
o	o	o	o	o	o			Rub Out	MERGE O	Rub Out	MERGE o
								No Punch	MERGE F	No Punch	MERGE f

TABLE 2 ILLEGAL CHARACTERS

¨	ë	#	¶
´	ï	%	°
`	ö	*	§
^	ü	/	£
â	à	<	é
ê	è	=	ß
î	ù	>	ç
ô	Ä	@	[
û	Ö	\	]
ä	Ü	[illegible]	

NOTE:

Any two key stroke sequence, where the second character is not listed in Table 1, is illegal.

2.2 ROYTRON MODEL 528 (ADVANCED FEED) HIGH SPEED PAPER PUNCH WL #725-0046

The desk top punch is a self-contained device that uses a Roytron Model 500 punch and contains the necessary accessories for tape handling.

The desk top unit can fit on most any type of furniture. The front of the unit slants forward with space provided for the punch section and cutouts for the power ON/OFF switch, a TAKE-UP switch and the SELECT switch. The drawer stores the tape roll. A tape winder reel is mounted to the left side of the unit. If a tight tape condition should occur, a tape tension/out-of-tape switch at the right front allows tape to be monitored so that punch operation can be stopped before tape tears. The cover encloses the entire unit except for the top section of the punch, the bottom drawer, the tape tension switch, the tape winder, and a connector and fuse at the rear of the unit. The cover can be removed by loosening the two screws at the front and the two at the rear of the unit.

During normal operation, tape unspools from within the drawer, passes through and over the tape tension/out-of-tape switch and into the punch. When it emerges from the punch, it slips over a guide bar supported by the cover and winds around the idler arm of the rewinder, back over the idler roller of the guide bar and onto the tape reel.

a. Model 528 Tape Punch Specifications

Tape Width:	7/8" to 1" (2.22 to 2.54 cm)
Tape Roll Diameter:	8 1/2" (21.59 cm) maximum
Tape Thickness:	.008" (.02 cm) including splice
Tape Composition*:	Oiled Paper
	Dry Paper
	Mylar/paper

*Oiled paper is recommended because it affords maximum punch life. Dry or mylar paper may be used but should not exceed 10% of total punch operating time. Metal foil tape should not be used.

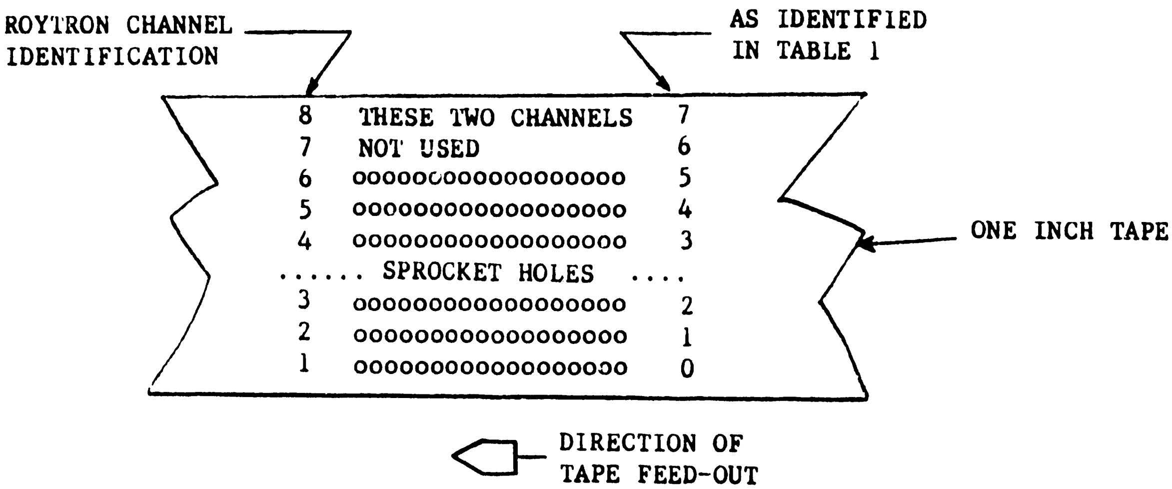
Punch Speed	50 characters/second @ 60 Hz
	44 characters/second @ 50 Hz
Weight:	23.5 lbs. (10.6 kg)
Electrical Requirements:	115 or 220 VAC $\pm$ 10%
	50 or 60 Hz $\pm$ 1 Hz
Operating Environment:	59 F to 95 F (15 C to 35 C)
	20% to 90% relative humidity

b. Adjustable Tape Guide

The guide is mounted to the upper die plate. It consists of a metal plate that guides the right-hand edge of the tape. The operator positions the guide to correspond to the width of tape being processed, then locks the guide in place with the screw. The guide is located at the front of the punch and is used only to correctly guide tape into the punch.

The only tape widths recommended are 7/8" and 1". Six channel tapes can be punched on either.

Data channels and tape motion are illustrated below:



c. Punch Modification

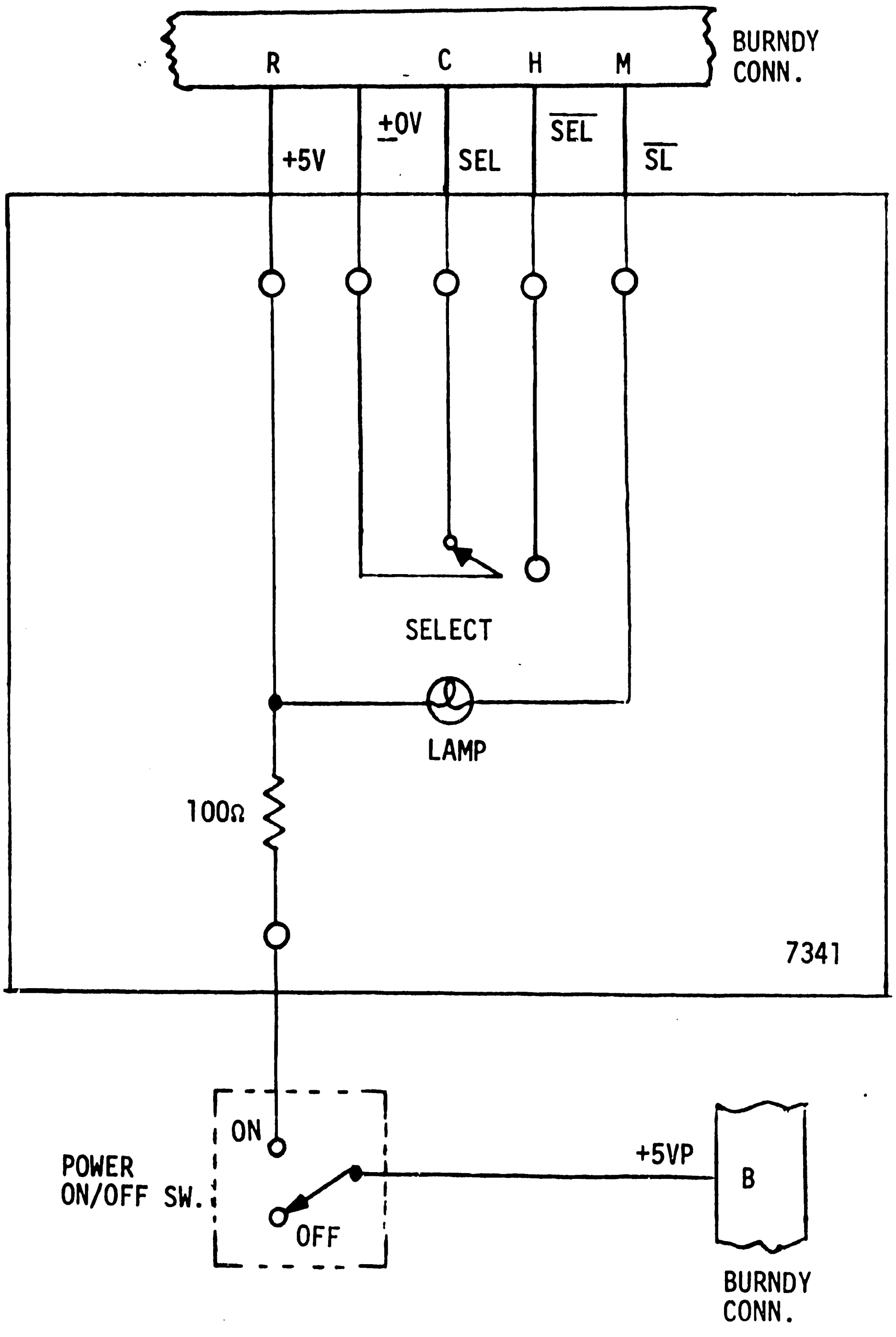
The Tape Punch Model 528 is Wang modified (see Appendix A) to allow SELECT/DESELECT of the punch operation. The operating voltages for the punch are furnished by the 7344 regulator PCB from the interface (translator) via cable to the 34-pin Burndy connector on the rear of the punch. The punch unit is equipped with a 115 VAC power cord which powers the punch drive motor. When ordering parts for the Model 528 Paper Tape Punch, specify that you want parts for an advanced feed (OFFSET) unit.

d. Select Circuit

The SELECT circuit for the punch is designed around a small PC board 7341 which is mounted internally in the punch unit. The SELECT switch/lamp, Figure 4, is mounted on top of the PC board and extends through the sloping front cover of the punch unit.

e. Select Signal

The SELECT signal, when the switch is depressed, causes the SELECT lamp to light and the punch operation to commence. Depress



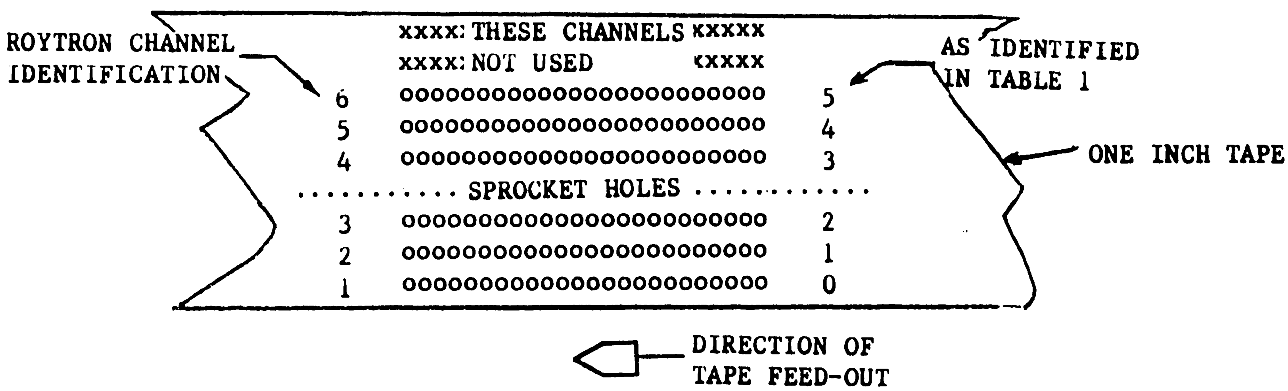
PIO SELECT SWITCH ASSY.
BOARD 7341

FIGURE 4

again and it DESELECTS. The +5VP is furnished by the 7344 punch regulator board located in the interface. The +5VP $\pm$5% operating voltage for the punch is adjusted on the 7344 regulator board for approximately +5.1VP to allow for the drop in the cable. See voltage checkout section for adjustment of +5.1VP used in the punch. The +24V furnished by the 7344 regulator board is used to operate the punch solenoids. This adjustable regulated +24V $\pm$ 10% voltage can be checked at the test point listed in voltage checkouts. Figure 5 illustrates the internal punch wiring on the Burndy connector.

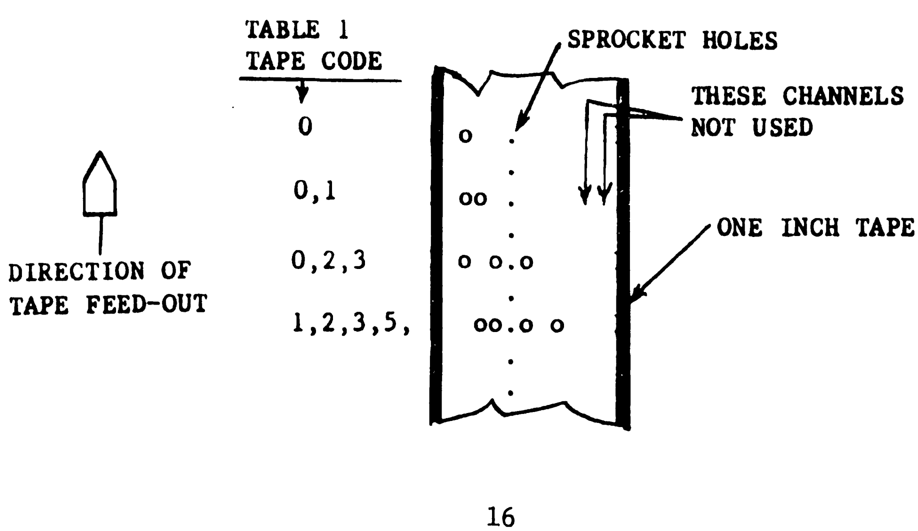
f. Reading Punched Paper Tape

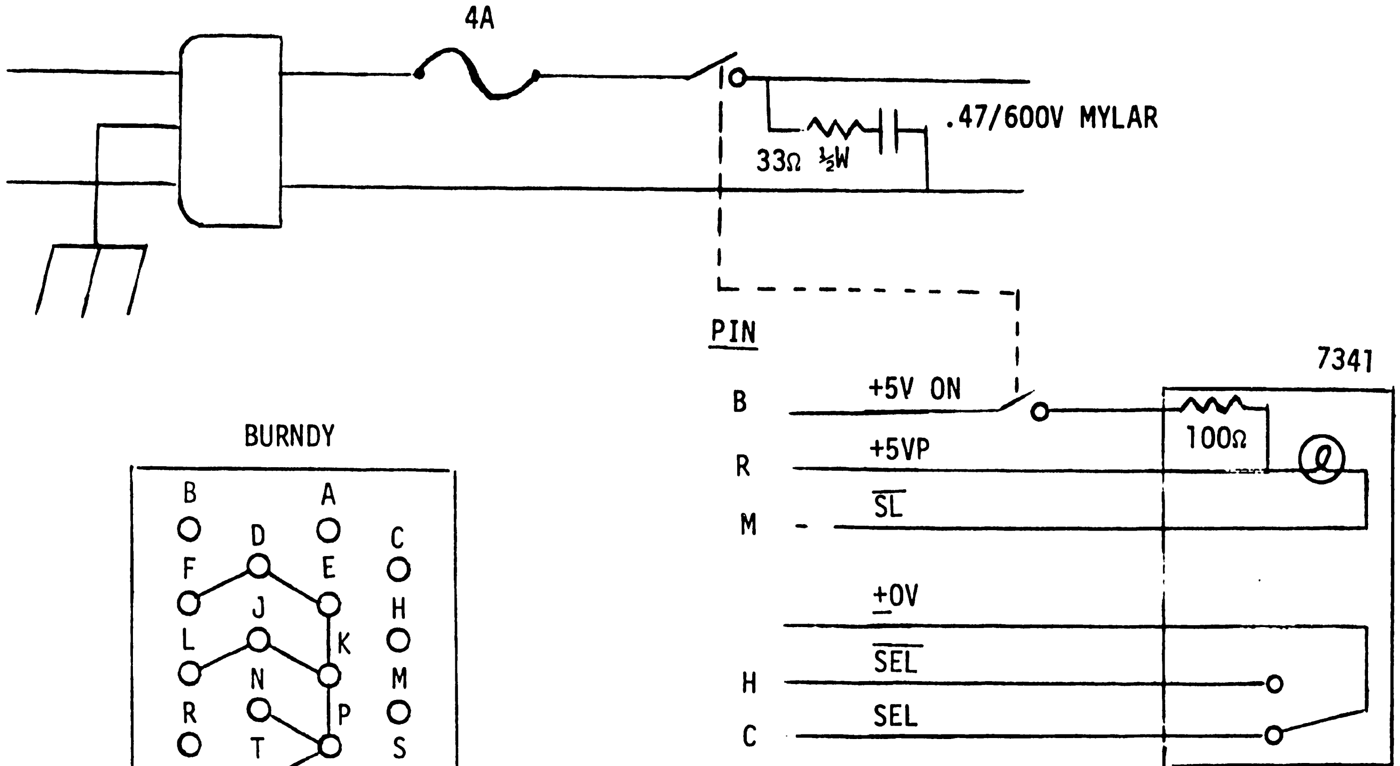
There are numerous ways of identifying the channels on punched paper tape; the channels are referenced to the Model 500 punch mechanism data channel identification.

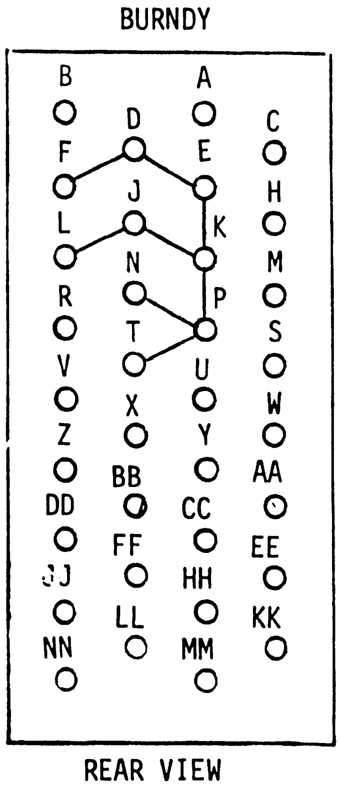


g. Numerical Sequencing

The following is a portion of paper tape with the method of identifying punched holes with numbers.







PINS D, E, F, J, K, L, N, P, T MUST BE JUMPED TOGETHER ALL = ±0V

928
INTERNAL PUNCH
WIRING

FIGURE 5

h. Sample Test Tape

A PIO Test Tape, such as the one shown in Figure 6, can be constructed by the operator. Tape segments A, B, and C indicate the tape's identification by visual means. Tape segment D assures that all six punches are operating properly. Tape segment E assures that staggered punch operation is functioning. Tape segment F checks all possible TTS code elements.

Refer to Table 1 for recognition of keyed TTS codes.

NOTE:

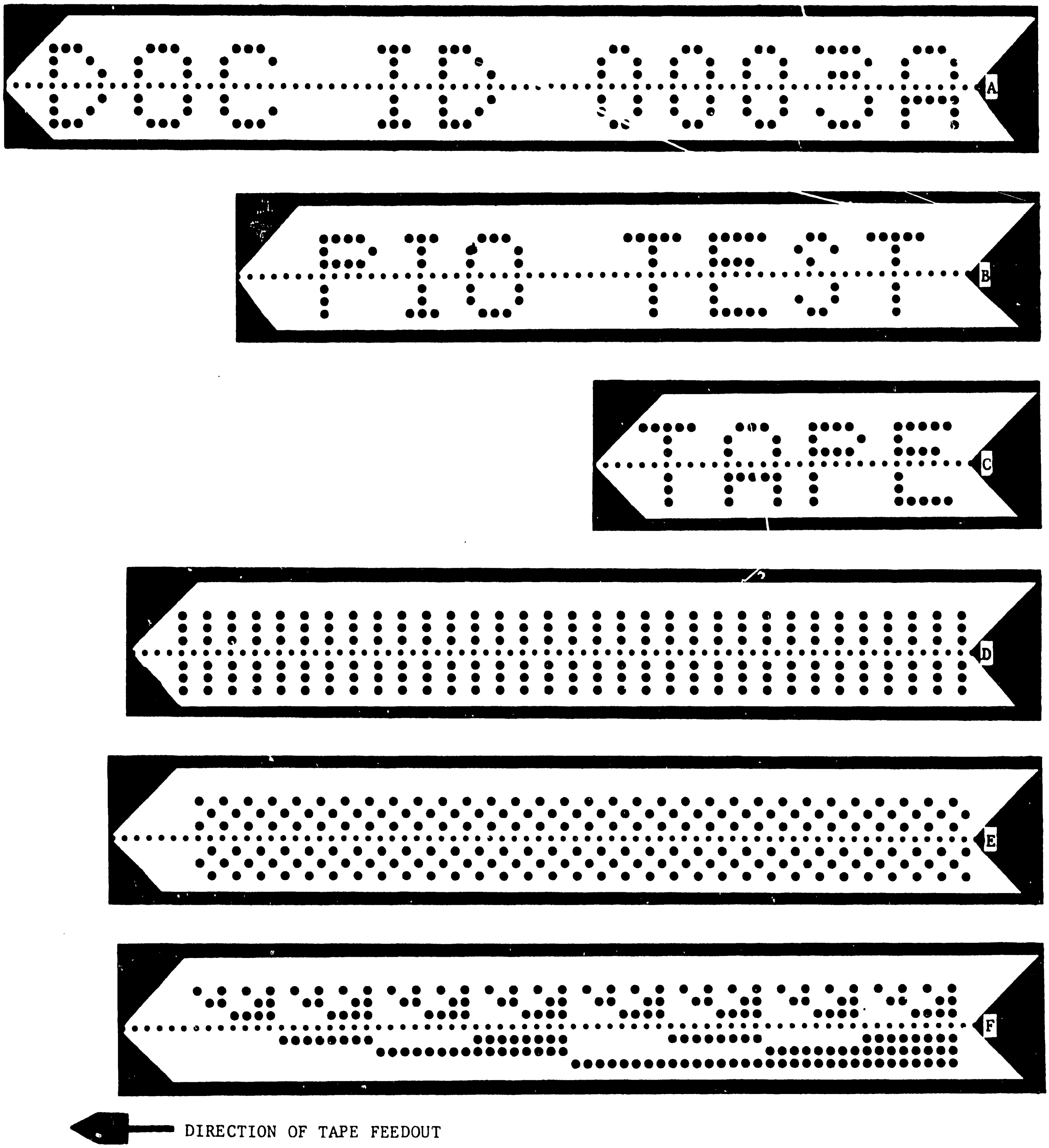
Table 1 TTS code channels are numbered 0 through 5 in lieu of the 1 through 6 designation on the tape illustrations. In either case, the number of available channels is six.

i. Tape Direction (Feedout)

Unless a visual aid of some type (refer to A, B, and C of Figure 6) is used at the beginning of the tape sequence, it is difficult to ascertain the direction of the tape feedout. The tape would have to be examined for an intelligent character sequence. This is especially true when using the 7/8 inch type tape because the area about the sprocket holes is symmetrical. However, using the one inch type tape and knowing that channels 7 and 8 are not used, the direction of tape feed out is descernible.

NOTE:

Notice the difference (advance) between the time that the sprocket hole was punched and the time that the data channel was punched. This indication provides the user with the information necessary to determine the direction of the tape feedout. This in conjunction with the knowledge that the upper two channels are not used, makes it possible to determine top of tape from bottom.



SAMPLE PIO TEST TAPE

FIGURE 6

2.3 PIO INSTALLATION PROCEDURE

a. Physical Characteristics

The overall dimensions for the Model 528 Punch are approximately 14 7/16" wide, 9 3/4" high and 15 5/8" deep. The Interface dimensions are approximately 9" wide, 7 2/5" high and 18 3/4" deep. There are no special stands built for installing the PIO. The two units will be suitably mounted on a table top adjacent to each other because of the restricted length (3' approximately) of the interconnecting cable. The PIO can be remotely located from the Master CPU. The dual coaxial cable length furnished with the PIO is 25' (#220-0148).

b. General Location

The PIO should be located in the proximity of a work station for operator convenience when punching a tape. The punch unit would then be easily accessible for loading and unloading tape. The ventilation fan intake and exhaust louvers for the Interface must not be obstructed by any objects which could reduce normal air flow.

c. Energizing

The initial steps for power-up of the PIO are to plug in power cords for both the Interface and Punch Unit and turn power ON for both units (Interface Power Switch is located on rear panel). The Power ON switch for the Punch is located on the sloping front panel.

2.4 PIO CONTROLS AND INDICATORS

Control switches and indicators used for the operation of the PIO are listed as follows:

a. Interface

ON/OFF Power Switch - The rocker switch located on the upper right rear panel furnishes power to the electronics in the Interface and also power (+5VP and +24V) to the punch. The power cord for the Interface plugs into any convenience AC receptacle. The Interface will operate on 115/220.

b. Paper Tape Punch

1) Power ON/OFF switch

This switch supplies 115/220 VAC $\pm$ 10% 50 or 60 Hz power for the punch input shaft drive motor. The motor operates continuously as long as power is ON. The punch is equipped with a power cord which plugs into any convenience outlet. (The punching of characters depends on data supplied to the punch.)

When the Interface is powered ON, the punch receives +5VP and +24V regulated voltages from the 7344 P.S. regulator in the Interface. An acknowledge signal +5V ON from the punch is sent to the 928 as signal $\overline{\text{PWR EXT}}$ indicating punch power is on.

2) Idle/take-up/feed

A three-position rocker switch located to the right of the punch ON/OFF switch. In IDLE, the take-up reel motor is in idle and the reel does not move. In TAKE-UP, the take-up reel motor is activated. In FEED, the take-up reel motor is activated and paper tape is fed through the punch mechanism. A tape leader is punched as long as the spring-loaded switch is held in the FEED position.

3) Tape tension/out-of-tape indicator

The desk top punch incorporates a tape tension switch which also serves as an out-of-tape indicator. This switch will stop the punch from punching if tape runs out or if it hangs up at the input to the punch. The tape tension switch is manually reset.

4) Select switch

When this punch switch is depressed, the SELECT lamp lights initiating the punch tape operation.

NOTE:

There are no fault indicators for the PIO operation.

2.5 LOADING PAPER TAPE

a. General Information

The PIO paper tape punch (See Figure 7) includes a tape dispenser drawer (A) that conveniently stores a supply tape with a diameter of up to 8 1/2 inches (1000 feet). An automatic tape tension switch (D) stops the units if an out-of-tape or excessive tension condition occurs.

b. Tape Loading Procedure

To load the paper tape, complete the following steps:

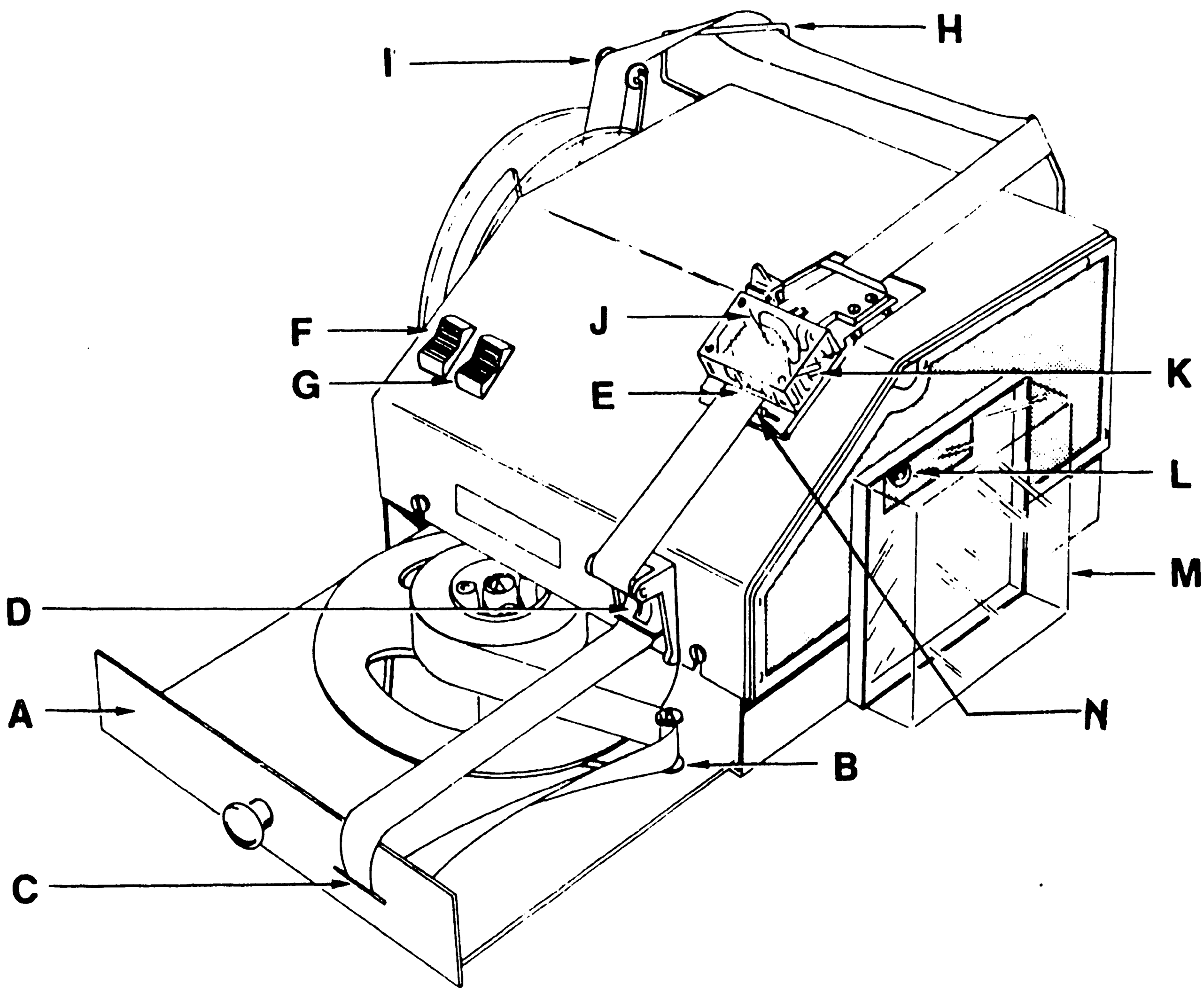
1) Reel loading
Place a supply reel of tape positioned so the roll turns counter-clockwise when unwinding in the tape drawer (A) and extend the tape over the tape tension roller (B).

2) Out of drawer
Place the tape through the drawer slot (C) beneath the roller and close the drawer.

3) To tape guide
Thread the tape through the tape tension switch (D) and outside of the roller, and into the punch die assembly (E). Open the plastic cover to thread the tape past the punch head. Adjust the tape guide (N) for proper operation.

4) Energize
Place the ON/OFF switch (F) in the ON position. Depress the FEED switch (G) and apply slight pressure on the tape in a forward direction to carry the tape into the feeding mechanism and out of the tape deflector.

A. Tape Dispenser Drawer
B. Tape Tension Roller
C. Tape Drawer Slot
D. Automatic Tape Tension Switch
E. Punch Die Assembly
F. ON/OFF Switch
G. Feed Switch
H. Tape Guide
I. Tape Roller
J. Chad Diverter
K. Chad Tube (Start)
L. Chad Tube (Finish)
M. Chad Container
N. Adjustable Tape Guide



PIO PAPER TAPE PUNCH
FIGURE 7

5) Leader length

Use a leader of about 30 inches and thread the tape around guide (H) and roller (I) as shown, and into the take up reel. The unit now is ready for operation.

2.6 CHAD DIVERTER, TUBE, AND CONTAINER

a. Description

Chad (paper tape byproduct from the punch pins) collects in the chad diverter (J) and passes through the chad tube (K to L) into the chad container (M). The chad container holds chad from approximately 1000 feet of punched tape.

b. Chad Disposal

To empty the chad container, grasp it by the top and bottom edge, lift up, and out. It is connected to the side of the punch by a simple screw mount. To replace the container, reverse the process, making sure the chad tube is positioned inside the rear opening.

c. Replacing Chad Tube

If the chad tube becomes dislodged, it is easily replaced. Insert the tube in the opening on the side of the punch at location (L) and push upward through the fastener until it is properly seated.

2.7 PIO INTERFACE (TRANSLATOR)

The PIO translator contains the required 8080 microprocessor and 8K of memory for the translation and formatting of 928 display codes suitable for input to a phototypesetter.

a. Punch Power

Power (+5VP and +24V) and data for the 528 punch is supplied from the Interface through a cable with a BURNDY connector that mates with the punch. (See PIO Interconnection cable chart for point to point wiring Figure 8.) The regulated voltages furnished to the punch originate from the paper tape punch 7344 regulator board (+24V and +5VP). These voltages require an additional rectifier and 2600 ufd capacitor installed in the Interface (see Figure 9). (Refer to Appendix "A" for modifications to PIO Interface.)

b. Interface Units

The Interface power supply also furnishes power to the PC boards that make up the translator for the PIO (Processor). A separate regulator board 7249 furnishes the operating voltages for the PC boards installed in the interface as listed below:

a) 7247 - 8K Printer (Punch) Memory Board (used for PIO only).
b) 7249 - Power Supply Regulator for Interface PCBs.
c) 7343 - Printer Motherboard.
d) 7344 - Power Supply Regulator for Paper Tape Punch. (+24V to punch solenoids) & (+5VP for SELECT and Electronics).
e) 7346 - I/O PC Board for 928 Matrix, Daisy Printer and PIO.
f) 7348 - CPU PC Board for 928 Matrix, Daisy Printer and PIO.
g) Set Punch SELECT switch to Binary 6. (See chart on PCB Dwg. #7348).
h) Wire Punch jumper per chart A, B. (See jumper chart on Dwg. #7346).
i) Punch cable (fingerboard I/O Burndy Punch Connector) part #220-0164.

2.8 VOLTAGE CHECKOUT FOR PIO INTERFACE

Remove top cover on Interface. Convenient test points for checking Interface voltages are located on the 7247 PC board.

The 7249 power supply regulator PC board furnishes the operating voltages for the electronics installed in the Interface. The test points are located at the top (comp. side) of 7247 PCB. Refer to Figures 10 and 11 for test point location and adjustable limits.

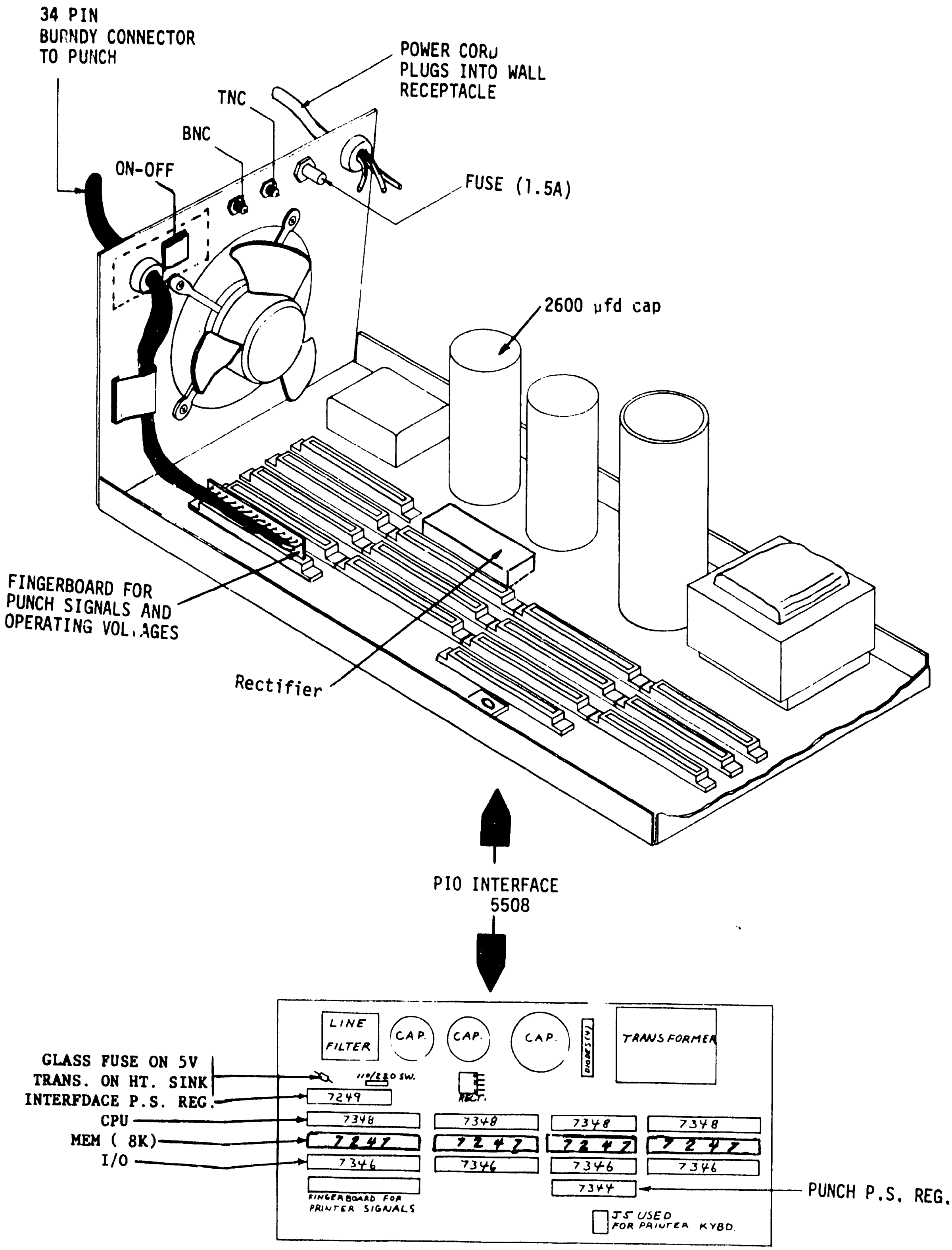
PAPER TAPE PUNCH (PIO) TO INTERFACE BOX (928) CONNECTIONS

PIO CABLE PART #220-0164

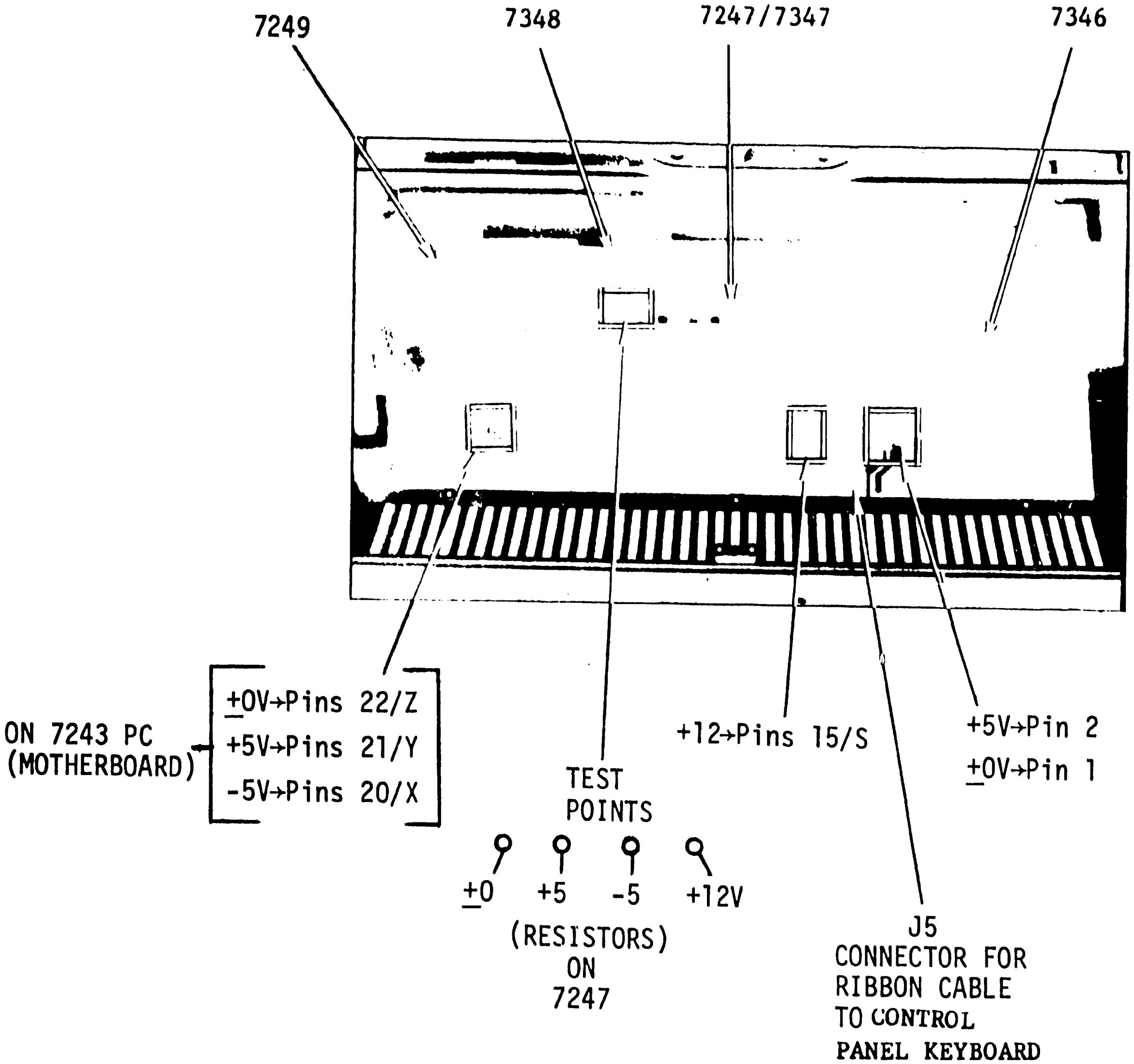
SIGNAL NAME		PIO INTERFACE CABLE Dwg. #D6482-158			DAISY PRINTER MOTHERBOARD		
Paper Tape Punch (528)	Interface Box (5508)	Burndy Conn.	Wire Color	Fingerboard 6703	SP4 (Spare) J7	I/O	
Start Process	Data Strobe ($\overline{\text{DSTB}}$)	Y P	Red Grn	P 13	P 13	V(4) $\pm$0V	
In Process	Busy	Z L	Red Brn	V 18	V 18	M(4) $\pm$0V	
DT1	$\overline{\text{DA1A}}$	BB J	Red Gry	A 1	A 1	J(1) $\pm$0V	
DT2	$\overline{\text{DA2A}}$	CC T	Red Orn	B 2	B 2	H(1) $\pm$0V	
DT3	$\overline{\text{DA3A}}$	DD F	Red Blu	C 3	C 3	3(1) $\pm$0V	
DT4	$\overline{\text{DA4A}}$	EE K	Orn Wht	D 4	D 4	D(1) $\pm$0V	
DT5	$\overline{\text{DA5A}}$	FF N	Orn Yel	E 5	E 5	E(1) $\pm$0V	
DT6	$\overline{\text{DA6A}}$	HH N	Orn Blk	F 6	F 6	Y(1) $\pm$0V	
DT7	$\overline{\text{DA7A}}$	JJ D	Grn Yel	H 7	H 7	X(1) $\pm$0V	THESE TWO CHANNELS ARE NOT USED
DT8	$\overline{\text{DA8A}}$	KK E	Grn Wht	J 8	J 8	W1 $\pm$0V	
$\overline{\text{SL}}$	$\overline{\text{SL}}$	M P	Grn Blk	W 19	W 19	F(2) $\pm$0V	
$\overline{\text{SEL}}$	$\overline{\text{SEL}}$	H K	Blu Yel	T 16	T 16	7(2) $\pm$0V	
SEL	SEL	C E	Blu Blk	S 15	S 15	H(2) $\pm$0V	
+5V ON	+5V ON	B F	Blu Wht	U 17	U 17	N4 $\pm$0V	
+24V	+24V	U	Brn Wht	Z 22	Z 22	SP(2)	L_2-10_2 (7344)
+24VRT	+24VRT	S	Brn Blu	Y 21	Y 21	SP(2)	P_2-13_2 (7344)
		AA D	Brn Wht	R 14	R 14	N(2) $\pm$0V	
+5VP	+5VP	R	Gry Blk	X 20	X 20	+5VP	

NOTE: I/O PIO Interface cable (with Burndy connector) #220-0164 is very similar to printer I/O #220-0165 (Dwg. not available). Use chart for pin to pin checks.

INTERCONNECTION CABLE CHART
FIGURE 8

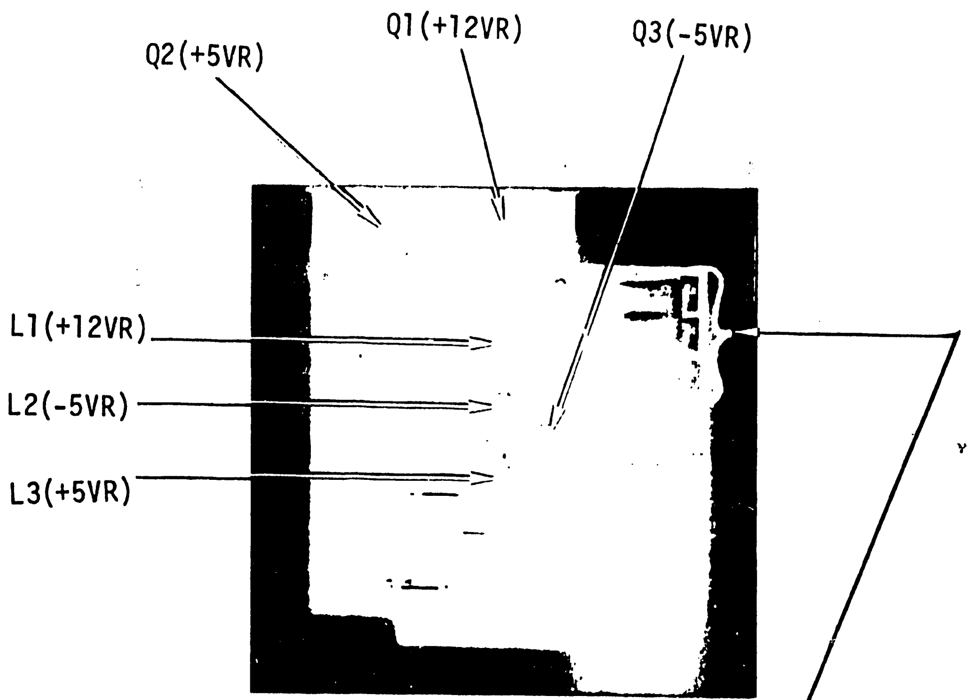


PIO INTERFACE (WITH ADDITIONAL RECTIFIER AND CAPACITOR)
FIGURE 9



WANG PRINTER BOARDS
FIGURE 10

LOCATION	ADJ	VOLTAGE	LIMITS OF TOLERANCE	RIPPLE	BOARDS	CONN	PIN
7249 PC		$\pm$0V			ALL Bds.	4	22,Z
7249 PC	R8	+5VR	+4.90 to +5.10	20mp-p	" "	4	21,Y
7249 PC	R4	-5VR	-4.90 to -5.10		" "	4	20,X
7249 PC	R13	+12VR	+11.80 to +12.20		" "	2	S,15
7249 PC		-15V					
7249 PC		+15V					



7249 PC

Etched markings for the +5VR and +12VR adjustment pots are incorrect on the 7249 pc:

IS:	SHOULD BE:
+ 5	+12 (R13)
- 5	- 5 (R4)
+12	+ 5 (R8)

POTENTIOMETER LOCATION AND ADJUSTABLE LIMITS
FIGURE 11

2.9 VOLTAGE CHECKOUT FOR MODEL 528 PUNCH

Remove Punch Cover and Check test points on upper left corner punch driver board as follows:

TEST POINTS (See Figure 12)

E1 = +24V $\pm$ 10%

E2 = +5.1VP $\pm$ 5%

E3 = $\pm$0V

2.10 OPERATING PROCEDURE (PIO)

a. Create Document

1) Interconnections

Insure that the interconnecting cable and coaxial cable are connected properly. The coaxial cable must be connected to one of the output channels located on the rear panel of the Master CPU.

2) Energize CPU

Turn power "ON" for the 928 Master CPU and the Work Station that is to be used for creating a document (characters to be punched on tape).

3) Energize interface

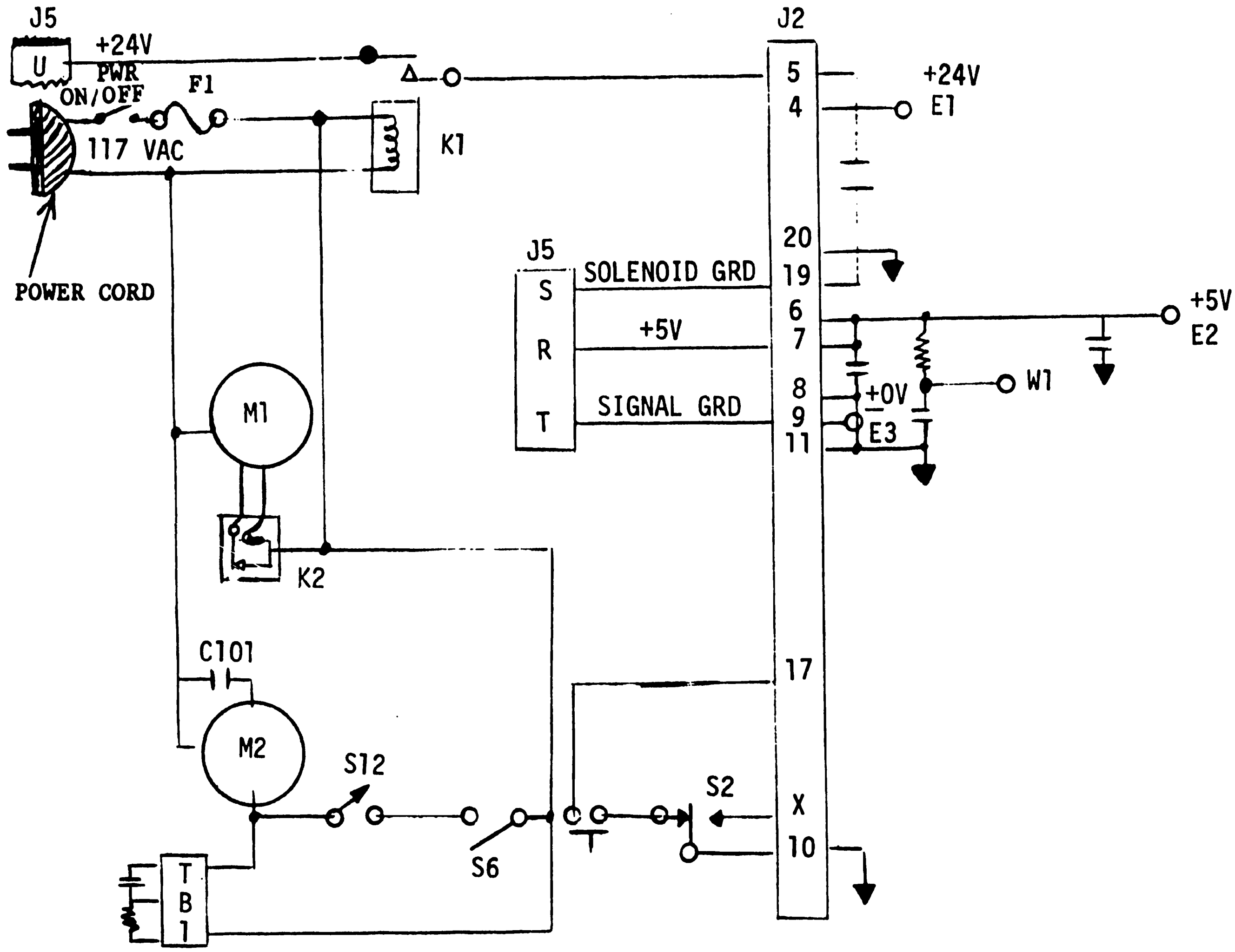
Turn the Interface (5508) power switch "ON".

4) Tape loading

Insure Punch tape is loaded properly and attached to take-up reel. (Refer to tape loading procedure below (2.8).) Check setting of tape tension switch.

5) Energize punch

Turn on Punch Unit with the front panel rocker switch.



PUNCH TEST POINTS
FIGURE 12

6) Software loading

The PIO is resident on the system disk.

7) Menu selection

Select "CREATE A DOCUMENT" from the start-up Menu. Type in the document using the code keys as shown in Table 1.

8) Print sequence

Once the document is completed and edited, return to the start-up menu and select "Printer Playout".

When printer playout menu appears on CRT screen, fill in document ID, name of document and other pertinent data. Select PHOTO-COMP at the bottom of menu using cursor and space bar and EXECUTE.

9) Selection

Push SELECT button on Punch. The punch operation will commence and proceed to its conclusion. DESELECT operation.

2.11 MAINTENANCE

At the time of this writing, adjustment repair instructions have not been published for the Series 500 punch in any Wang documentation. Enclosed as Appendix B are Sections 3 and 4 of the Technical Reference Manual on the Series 500 Tape Punch. These sections include adjustments and lubrication requirements that will be checked and performed at required intervals.

2.12 DISASSEMBLY

To disassemble the unit for punch removal and maintenance, perform the following steps:

a) Turn the punch off.
b) Remove any paper tape from the punch mechanism.
c) Remove chad box and chad tube.
d) Loosen the four screws holding the cover and remove cover.

WARNING:

With the cover removed, the punch motor is exposed. The fan has sharp blades and rotates at a high rate when the punch unit is turned on. Use extreme caution when servicing the unit to avoid personal injury or damage to clothing.

2.13 PUNCH REMOVAL

Pull power cord and remove cover (4 screws). Disconnect the two punch cables (J6 and J7) from the white and black Amp connectors (P6 and P7) mounted on the chassis. Remove the punch mechanism from the unit by removing the four nuts securing the punch to the unit.

When returning a punch mechanism to the Home Office, send only the punch. Retain the chad tube and punch mounting hardware. When requesting a punch on loan, please specify type needed: i.e., advanced sprocket punch.

2.14 TROUBLESHOOTING HINTS

a. Situation 1

1) Symptom: Punch does not feed tape on punch sprocket holes.
2) Corrective Action:
   a) Push rocker switch on front panel to FEED.
   b) Assure that tape tension switch is closed.
   c) Remove cover and check for +24V at test point E1.

b. Situation 2

1) Symptom: Punch feeds tape and punches sprocket holes but does not punch data.
2) Corrective Action:
   a) Assure that the interface cable is connected properly. The Burndy connector must be completely seated with the screws tightened.

b) Remove Interface cover and check for proper connection of the fingerboard.

c) Remove punch cover and check for 5VP at test point E2.

d) Check the coax cable to the PIO (loose, reversed, damaged).

e) Check that all PCBs are in their respective connectors and properly seated.

f) Check for the proper operating voltages on the 7247 PCB (refer to test points) and if necessary, adjust the voltages using the potentiometers on the 7249 PCB.

g) Where necessary, substitute for suspected faulty PCBs.

3. LINE PRINTER OPTION (LPO) (5521/5531)

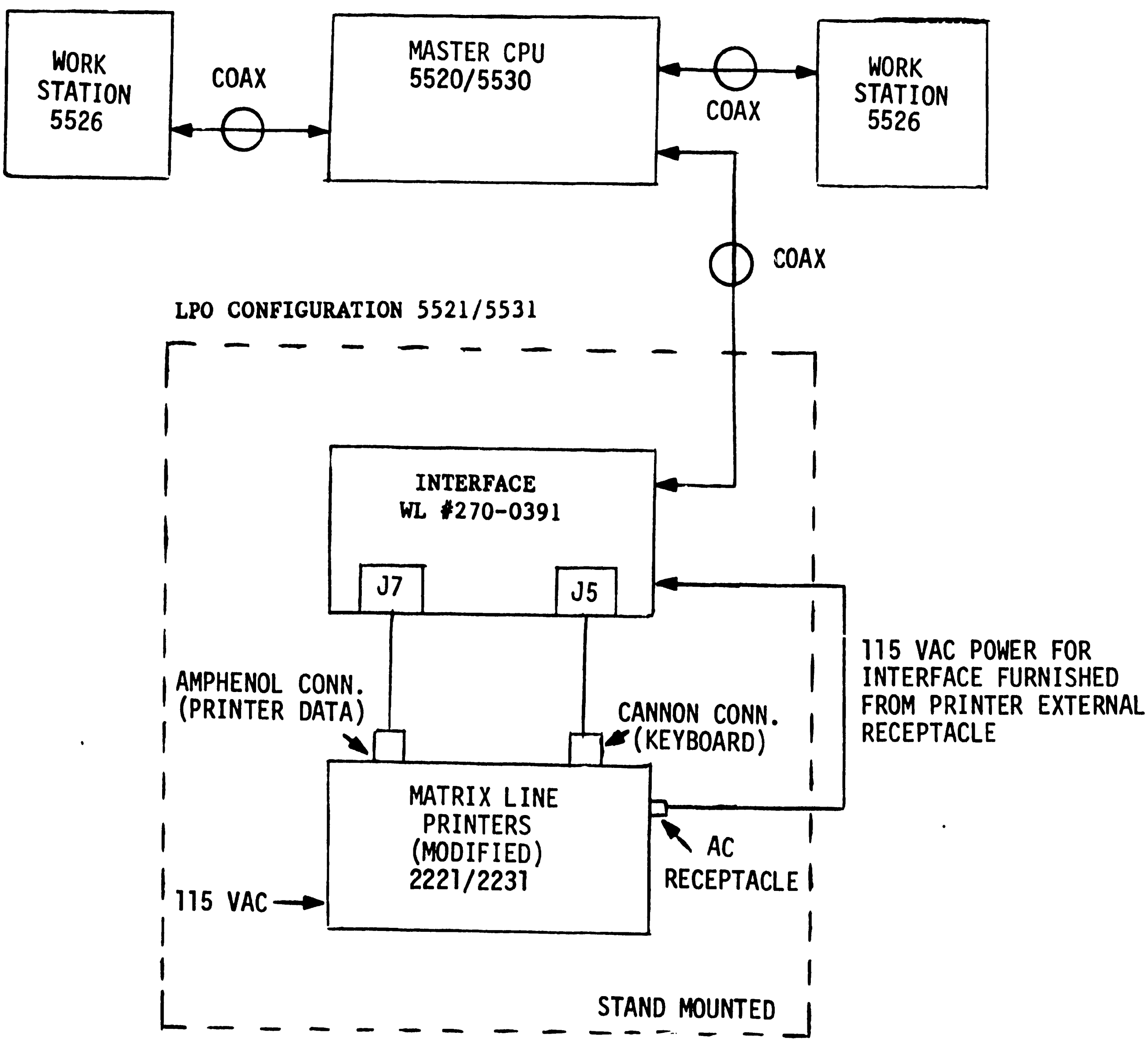
The Line Printer Option results in a choice of one of two matrix line printers, Models 5521 and 5531, and a printer interface (270-0391). The interface with either line printer is an option which supplements the daisy printer, offering a faster and greater printing capacity. (See Figure 13).

This option is furnished with a slightly modified 2221W or 2231W printer mounted on a printer stand with Interface (Part #270-0391) also mounted on the same stand as shown in Figures 14A and B. The Interface and printers have been adapted to the 928 WP Systems 20 and 30.

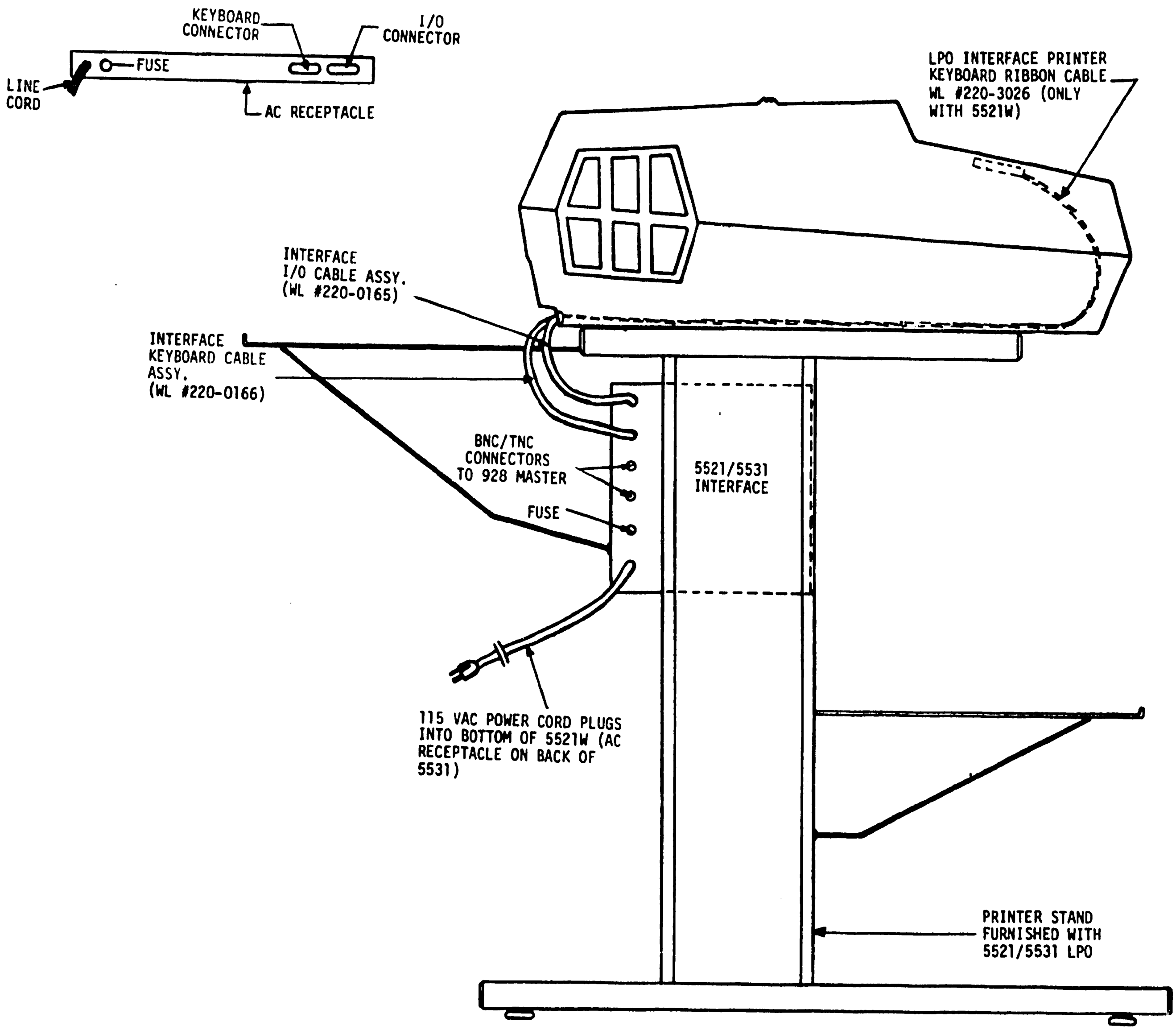
The operating specifications for the 5521/5531 printers can be found in the original maintenance manuals for Models 72 (2221W) and 61 (2231W). The manual identification numbers are 03-0027-0 and 03-0029-0 respectively.

3.1 928 PRINTER INTERFACE ASSEMBLY (WL #270-0391)

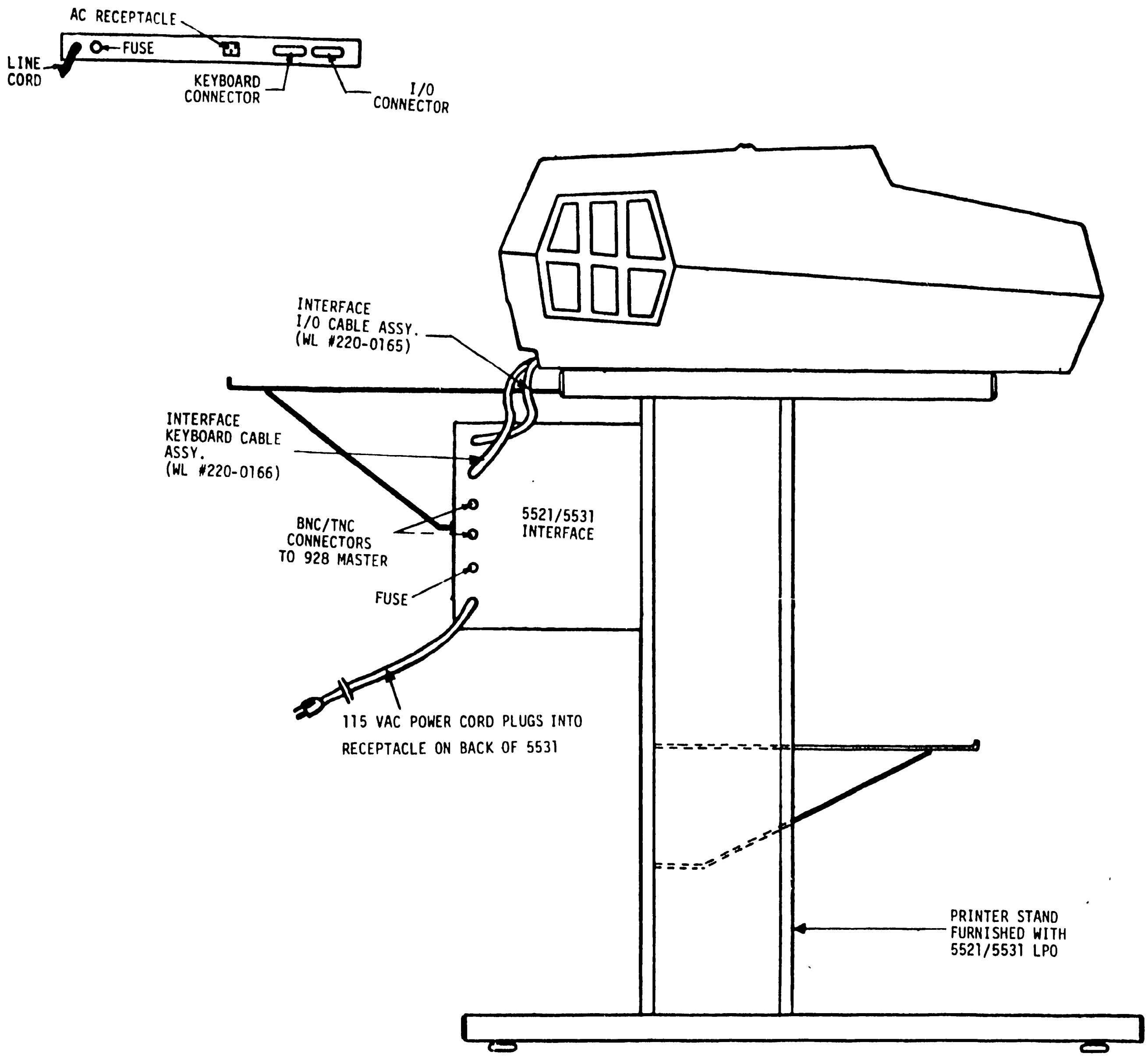
Electrically and mechanically, the LPO Interface assembly differs slightly from the PIO Interface. The interface (See Figure 15) is assembled to adapt to both printer options (5521/5531). The difference between the LPO and PIO Interface options are detailed in Appendix A.



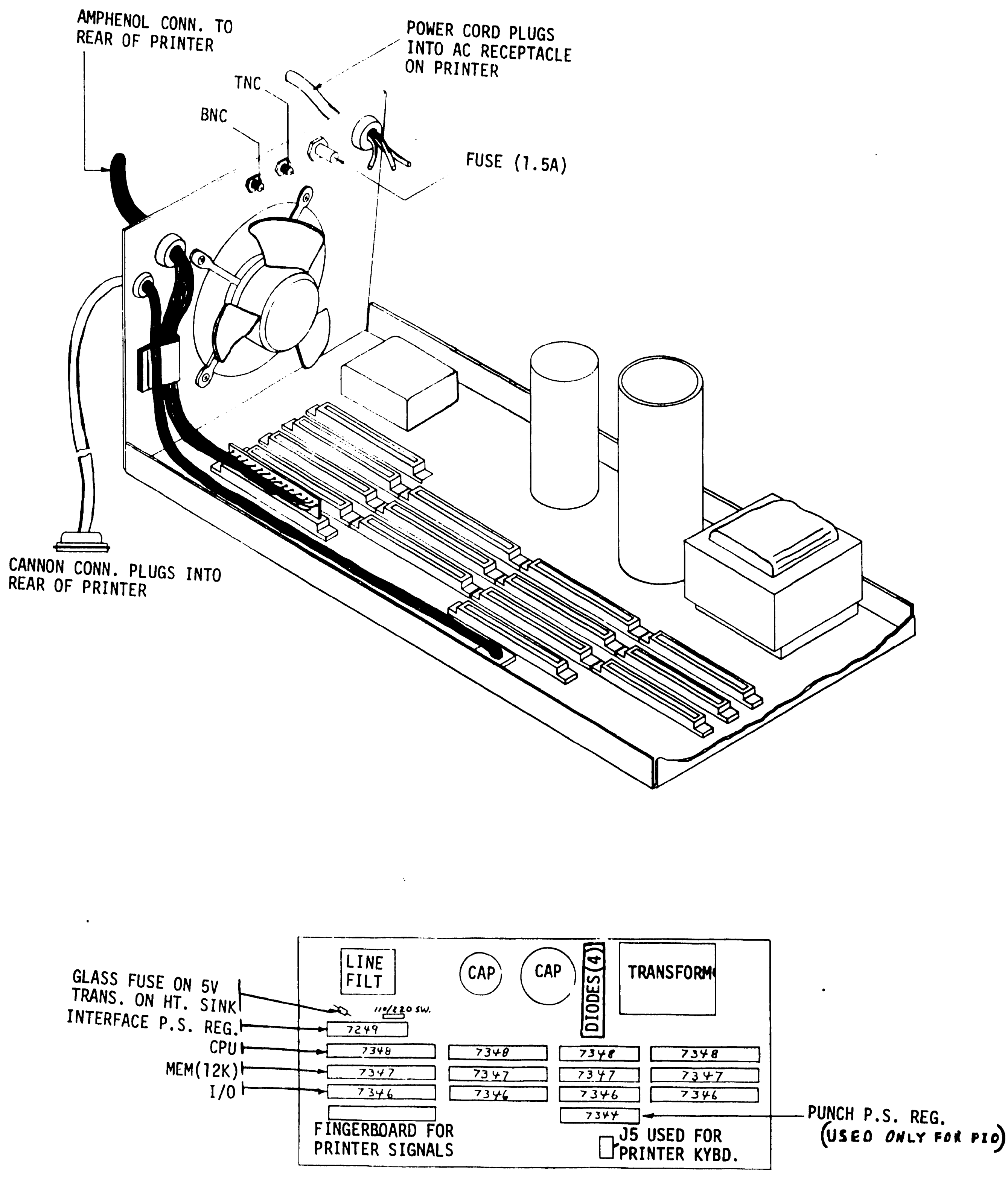
TYPICAL 928 SYSTEM WITH LPO CONFIGURATION
FIGURE 13



5521W LINE PRINTER OPTION (LPO)
FIGURE 14A



5531W LINE PRINTER OPTION (LPO)
FIGURE 14 B



LPO PRINTER INTERFACE-5521-5531

FIGURE 15

3.2 LPO INSTALLATION PROCEDURE

The LPO option, when shipped, will consist of a printer (5521W/5531W), Interface and a printer table stand. It will be assembled as shown in Figures 14A, 14B, and 16. The Interface (electronics) is mounted between the side supports of the stand. The Interface cables are then connected to the rear panel of the printer. The Interface line cord plugs into an AC receptacle on the printer as indicated. The main power switch for the LPO is on the rear panel of the Model 5531 and on printer keyboard of the Model 5521. Once assembled, the LPO should be conveniently located to a power outlet, and the operator's work station(s). The ventilation fan intake and exhaust screen should not be obstructed by any objects which would reduce normal air flow. Connect coaxial cable to the interface and to a 928 master CPU output channel.

3.3 LPO CONTROLS AND INDICATORS

a. Model 5521

The controls and indicators are as follows for Model 5521:

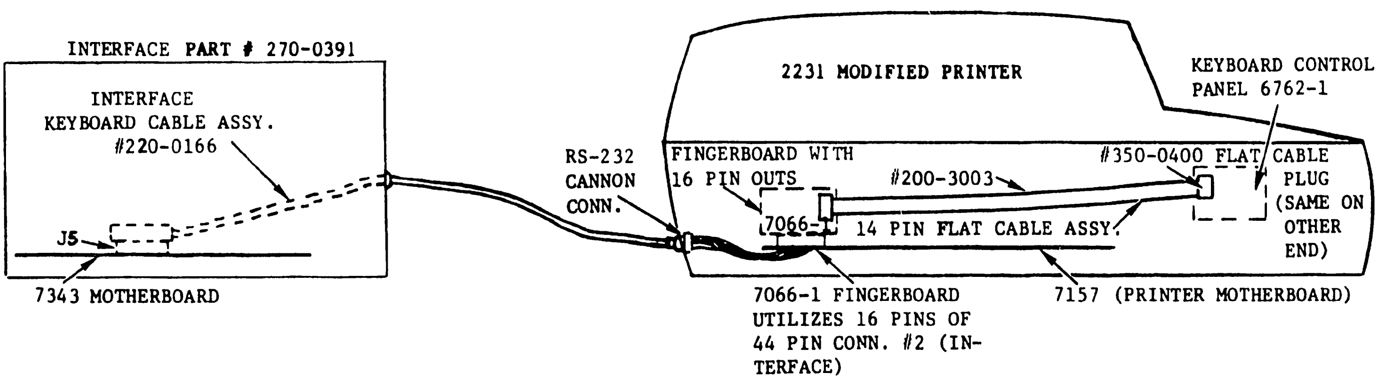
1) Master power switch
The Master power ON-OFF switch is located on the control panel of the Model 5521 printer. This automatically furnishes power to the interface which is plugged into the printer AC receptacle on the bottom rear of the modified chassis.

2) Power on lamp
Indicator on control panel keyboard 7038 (see Dwg. #B7038).

3) Select switch
Enables printing operation. Select switch illuminates when selected.

4) Top of page
Causes paper feed to Top of Form (new page).

5) Other indicators
Malfunction Lamp and Change Paper Lamp.



INTERNAL CONTROL PANEL KEYBOARD

(WIRING HARNESS)

FOR MODEL 2231 PRINTER

FIGURE 16

b. Model 5531

The controls and indicators for the Model 5531 are as follows:

1) Master power switch
The Master ON-OFF power switch is located on the rear of the printer. Power is furnished to the Interface from an AC receptacle on the rear panel of the printer. (See Dwg. #6762 for indicators and switches for modified keyboard 6762-1).
2) Power-on lamp
Illuminates when power is ON.
3) Select switch
Enables printing operation (switch illuminates when selected).
4) Top of forms
Paper feed to next top of form.
5) Paper Out
Paper needed to print.

3.4 VOLTAGE CHECKOUT FOR INTERFACE 5521W/5531W

The check of the Interface voltages will be done exactly as explained in the PIO on TPS located at the top of PCB 7347.

3.5 VOLTAGE CHECKOUT FOR PRINTER MODEL 5521W

Refer to Table 5-1, page 5-3, in Model 72 Matrix Printer (2221W) Maintenance Manual. (Refer to manual #03-0027-0.)

3.6 VOLTAGE CHECKOUT FOR PRINTER MODEL 5531W

Refer to Table 5-1, page 5-3, in Model 61 Matrix Printer (2231W) Maintenance Manual. (Refer to manual #03-0029-0.)

3.7 LPO OPERATING PROCEDURE

The operating procedure for the LPO is the same as for the PIO with one exception. When the printer playout menu appears on the screen, select the line printer using the cursor and spacebar and EXECUTE. Depress SELECT switch on printer keyboard.

3.8 TROUBLESHOOTING HINTS FOR 5521 PRINTER

IMPORTANT:

The 5521 modified printer is always in the "SELECT" state. The SELECT switch on the printer keyboard is routed externally to the 5521 Interface for initiating the printing operation.

a. Situation 1

1. Symptom: Printer does not print when SELECT switch is pushed and illuminated.
2. Corrective Action:
   a) Check "Cover Open" switch on printer.
   b) Check carriage for freedom of motion.
   c) Check all connectors on motherboard and interface cables. Insure that printer Interface I/O cable and keyboard cable assemblies are seated properly on rear panel of printer. Check all Molex connectors and insure all printer PCBs are seated and installed properly. Check operating voltages.
   d) Check Interface cable connectors internally. Check J5 for keyboard controls and J7 for fingerboard 6703 seated properly.

b. Situation 2

1. Symptom: Carriage movement without printing.
2. Corrective Action:
   a) Check 7076 PCB for proper seating and connection.
   b) Replace 7076 PCB if problem persists.

c. Situation 3

1. Symptom: No carriage motion no print.
2. Corrective Action:
   a) Replace PCBs in the following order:
   - 7076-2
   - 6727
   - 6577
   b) Check Interface.
   - Check operating voltages.
   - Check seating of PCBs.
   - Replace PCBs in interface.
   c) Check Coaxial cable (928) for continuity.

3.9 TROUBLESHOOTING HINTS FOR 5531 PRINTER

IMPORTANT:

The 5531 modified printer is always in the "SELECT" state. The keyboard "SELECT" switch is routed externally to the print operation.

a. Situation 1

1. Symptom: Printer does not print when "SELECT switch is pushed and illuminated.
2. Corrective Action:
   a) Check "Cover Open" switch.
   b) Check Servo Motor Fuse if Alarm light is lit.
   c) Check carriage for freedom of motion.
   d) Check all connectors on motherboard and interface cables.
      -Make sure printer interface I/O cable and keyboard cable assemblies are seated and installed properly.
      -Check all Molex connectors and insure all printer PCBs are installed and seated properly.
      -Check printer operating voltages.
   e) Check Interface cable connections internally and externally.

f) Check J5 for keyboard controls and J7 for proper seating of fingerboard 6703.

g) Check I.B. operating voltages.

h) Check coaxial cable for continuity.

APPENDIX A SYSTEM MODIFICATIONS AND OPTIONS

APPENDIX A

SYSTEM MODIFICATIONS AND OPTIONS

1. PHOTOCOMPOSITION INPUT OPTION (5508)

Consists of:

- Modified Model 528 Paper Tape Punch.
- PIO Interface.

A. MODIFIED PAPER TAPE PUNCH

a. PCB 7341

Select switch assembly PCB designed for punch-installed internally.

b. Modified Punch

With power cord and hole cut in cover for SELECT switch plate assembly.

B. PIO INTERFACE

a. PCB 7343

Motherboard.

b. PCB 7346

I/O board for Daisy Printer, Line (Matrix) Printer and Punch (appropriate jumpers are to be installed for PIO operation).

c. PCB 7247

Memory (8K) (not to be used in LPO).

d. PCB 7348

CPU for Daisy Printer, Line Printer and punch (set Select switches to Binary 6).

e. PCB 7249

Power Supply Regulator.

f. PCB 7344

Paper Tape Punch Regulator added to power supply for +24V to operate punch solenoids and +5VP for punch electronics.

g. Punch Cable Assembly (Part #220-0164)

This cable interfaces the punch and Interface (Burndy connector to fingerboard) (Drawing not available). Dwg. #D6482-158 (Burndy Connector to Punch-Fingerboard 6703 plugs into J7 of 7343).

h. Interface

Has selectable AC input switch for 110/220. (See P.S. Interconnection Dwg. #D6850-999).

2. LINE PRINTER OPTION (5521)

Consists of:

- Modified 2221W Line (Matrix) Printer.
- Line Printer Option Interface (Part #270-0391)

A. MODIFIED 2221W PRINTER

a. PCB 6727 (R2) E-REV 1 (ECN 6289)

This ECN includes the installation of PROMs (378-0520, 378-2048 and 378-2049) for 928 ASCII codes. ECN 6289 updates PCB 6727 to E-REV 1 and replaces PCB 7028 in printer.

b. PCB 6577 (R12) (E-REV 7)

Has jumpers installed between B-C and E-F (Option 2).

c. PCB 7076-2 (R0) E-REV 0 (ECN 6371)

ECN 6371 replaces 7076 character set. Starts at 10H instead of 20H (two extra diodes have been added).

d. PCB 6579

ECN 6434 modifies motherboard PCB 6579 and chassis for line filter and AC receptacle (AC receptacle mounted under rear panel).

e. Cable Assembly

A 4'-928 Printer interface keyboard cable assembly (Part #220-3026) has been installed in the 2221W printer (see Dwg. #C6482-153). This flat 14 conductor ribbon cable mates with the printer keyboard control panel 7038 on one end. The opposite end is wired into a 25 pos. female

(Cannon) connector mounted on the rear panel. This connector normally used for TC (RS-232) is adjacent to the Amphenol connector. See Figure 13.

f. Fan

Modified Printer fan assembly and rerouted printer solenoid cable.

g. Control Panel

A new keyboard control panel (7038). (See Dwg. #B7038).

B. LINE PRINTER OPTION INTERFACE

a. PCB 7343

Motherboard.

b. PCB 7346

I/O board for Daisy Printer, Line Printer and Punch (appropriate jumpers are to be installed for printer operation).

c. PCB 7347

Memory (12K) can be substituted in PIO if spare 7247 not available.

d. PCB 7348

CPU for Daisy Printer, Line Printer and Punch (set select switches to Binary 3).

e. PCB 7249

Power Supply Regulator.

f. 928 Interface Keyboard Cable Assembly (Part #220-0166). See Dwg. #C6482-152.

This cable plugs into J5 of 7343, routed through the rear panel of the (IB) to the RS-232 Cannon connector on the 2221W Printer.

g. 928 Interface I/O Cable Assembly (Part #220-0165). Dwg. #C6482-151.

This cable plugs into J7 of the 7343 motherboard and is routed through the rear panel of the interface to the Amphenol connector on rear panel of printer.

3. LINE PRINTER OPTION (5531)

Consists of:

- Modified 2231W Line (Matrix) Printer.
- Line Printer Option Interface (Part #270-0391).

A. MODIFIED 2231W-1 PRINTER

a. PCB 7160D (R2) E-REV 2

ECN 6291 was installed to make the board universal for several applications. (A jumper chart is included for LPO and a PROM chart for 928 ASCII on the revised drawing.) ECNs 6726 and 6750 were artwork changes and improvements to prevent indicator lamp burnouts. 7160 replaces 6760 or 7060.

b. PCB 6756

P.S. Regulator and Power Terminator Board (no change).

c. PCB 6761 (R8) E-REV 6 (ECN 6707)

ECN 6707 provides a jumper arrangement to be installed for no Line Feed (LF) after Carriage Return (CR). Jumper chart on revised drawing (Option 2) specifies jumpers B-C and E-F.

d. PCB 7157

ECN 6438 modifies 7157 motherboard for line filter, AC receptacle and Cannon (TC) connector for keyboard.

e. PCB 7066

ECN 6319 changes wiring on fingerboard 7066 to make it 928 compatible. (See Dwg. #B7066 for standard terms and 928 terms).

f. Modified Keyboard Control Panel

(See Dwg. #C6762 for 6762-1 layout.)

B. LINE PRINTER OPTION INTERFACE

(Same as LPO Interface for 2221W Printer.)

4. SWITCH SETTINGS AND JUMPER CHART FOR PIO, LPO AND DAISY

Two of the standard PC boards used in the interface require internal switch settings and jumper changes for operating each of the options. See chart below:

A. PCB 7348 SWITCH SETTINGS (See Dwg. 7348)

SW 1 Part #325-1501

B. PCB 7346 JUMPERS (See Dwg. 7346 for jumper chart)

JUMPERS	INSTALLED	REMOVED
H,I	Line Printer, Punch	Daisy Printer
D,E	Line Printer, Punch	Daisy Printer
A,C	Line Printer, Daisy	Punch
A,B	Punch	Line Printer, Daisy
G,F	Daisy Printer	Line Printer, Punch

APPENDIX B
TECHNICAL REFERENCE FOR SERIES 500 TAPE PUNCH

SECTION 3

BASIC PUNCH MECHANISM

Punch operation and mechanical details are described in the order in which adjustments should be made if such adjustments become necessary because of punch disassembly for repair or parts replacement. This sequence may, in some instances, vary from the sequence recommended by the punch manufacturer.

1.	Input Shaft Torque Measurement	para. 3.1
2.	Timing	para. 3.2
3.	Punch Position at Rest	para. 3.4.1
4.	Pawl Limit	para. 3.4.2
5.	Punch Drive	para. 3.4.3
6.	Punch Stripper Rod	para. 3.4.4
7.	Punch Solenoid Gap Setting	para. 3.4.6
8.	Index Solenoid Armature/Interposer	para. 3.5.1
9.	Sprocket	para. 3.5.2
10.	Cover	para. 3.7.1
11.	Timing Pulse Generator - Gap & Alignment	para. 3.8.1
~~12.~~	~~Parity Pulse Generator~~	~~para. 3.9~~
13.	Tape Tear Plate	para. 3.7
~~14.~~	~~Parity Switch Block~~	~~para. 3.10~~

Table 3.1 Recommended Sequence of Punch Adjustments

3.1 INPUT SHAFT TORQUE MEASUREMENT

Torque required to turn the input shaft must be measured before the punch is operated or before adjustments are made because excessive friction within the mechanism can affect such adjustments and cause them to be faulty. A high torque reading may be caused by binding of the input shaft and any of its components. Torque should also be measured after making adjustments to verify that they were made correctly. The maximum starting torque should not exceed 4 inch-ounces.

3.2 TIMING

The timing disc has a scale which is graduated in degrees, where one mark represents two degrees of shaft displacement. As shown in the timing chart of Figure 3.1 and timing diagram of Figure 3.2, a punch should reach and be level with the upper surface of the lower die plate at 231 degrees upstroke and 23 degrees downstroke. Punch travel from this point, which is the same as that of the top surface of the platen, into the upper die plate and back should encompass 152 degrees of input shaft rotation. Therefore, after 76 degrees, a punch should be at its maximum height, and the timing dial should indicate 307 degrees. The following equation shows a correct timing disc setting:

$$\frac{(360 - 231) + 23}{2} + 231 = 307 \pm 6 \text{ degrees}$$

All dial indications are referenced to the center pole piece of the pulse generator coil.

A quick check of the timing disc setting can be made as follows:

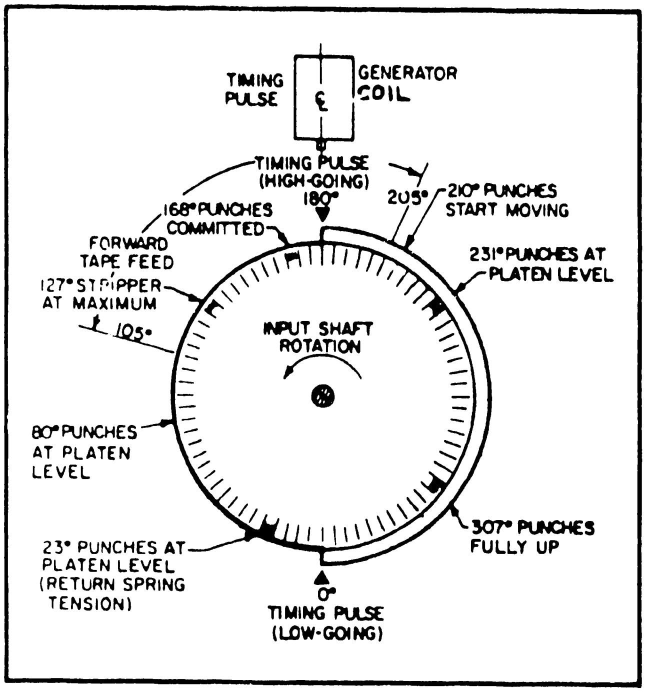


Figure 3.1 Timing Chart, Punch

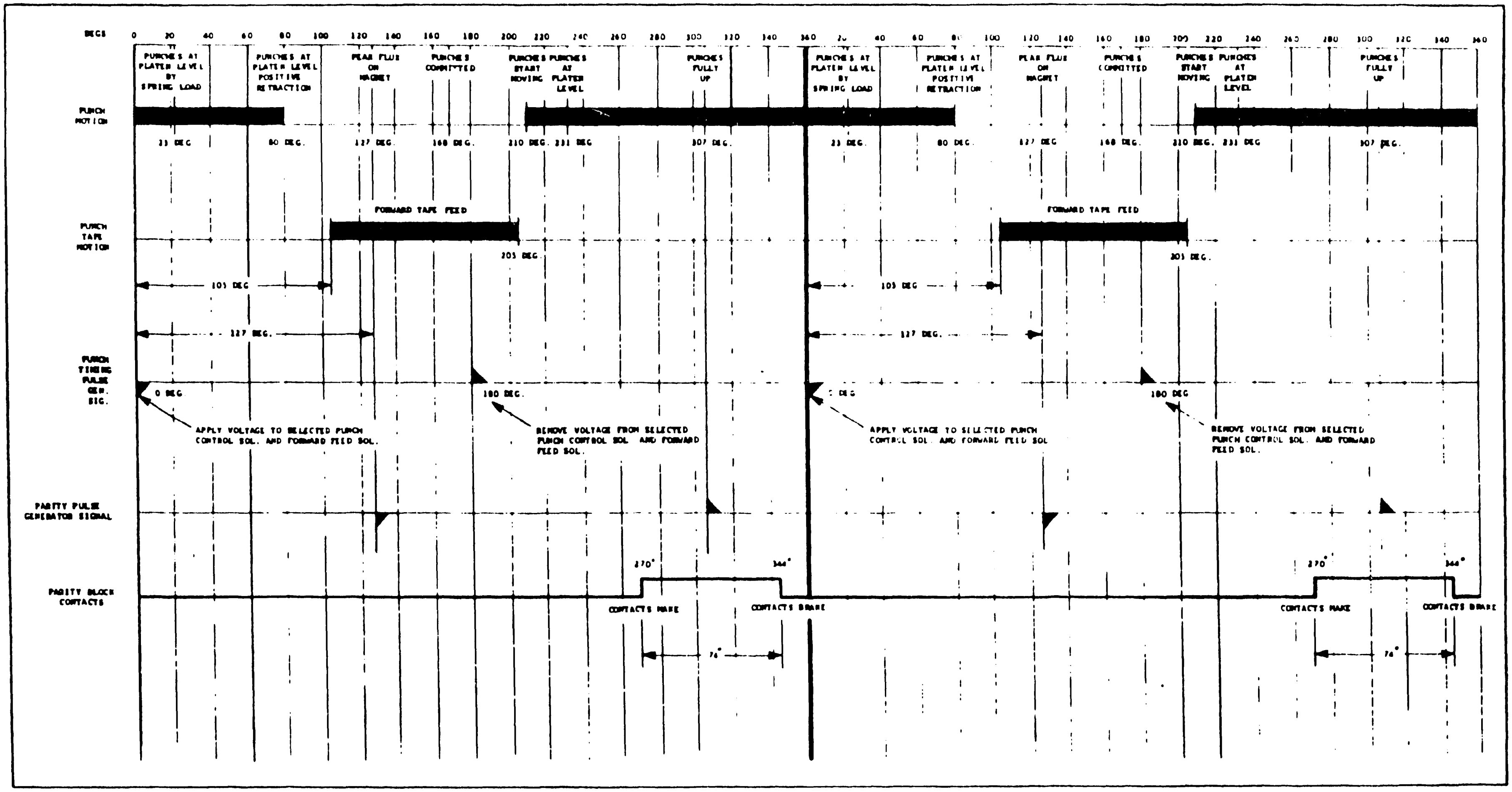
1. Manually latch one of the punches. Turn the input shaft counterclockwise until the rising punch pin emerges from the lower die plate. The timing dial should read approximately 231 degrees at that point.

2. Continue to turn the input shaft counterclockwise. The timing dial should be at approximately 23 degrees when the punch pin returns to the surface of the die plate.

3. The following two examples illustrate the method to determine the existing angular position of the timing disc if it is assumed that the disc has been mounted incorrectly onto the input shaft.

Example 1 First reading: 210 degrees; Second reading: 2 degrees.

$$\frac{(360 - 210) + 2}{2} + 210 = 286 \text{ degrees}$$



B3

Figure 3.2 Mechanical Timing Diagram, Punch

286 degrees therefore is the position at which punches are fully up.

Example 2	First reading:	200 degrees;
	Second reading:	352 degrees.

$$\frac{352 - 200}{2} + 200 = 276 \text{ degrees}$$

276 degrees is then the present angular position at which the punches are fully up.

4. Use the result of example 2 to set the dial so that position 276 degrees lines up with the center of the coil pole piece. Hold the shaft firmly in place and loosen the nut at the timing disc side, see Figure 3.3, and the timing disc setscrew. This setscrew is located in the hub of the disc.

CAUTION: The inner race of the ball bearing must be clamped to the input shaft before either timing disc or counterweight setscrews are tightened. If any adjustment is made, the nut at the end of the shaft is loosened. Then the setscrew is loosened. On reassembly, FIRST tighten the nut, then tighten the setscrew.

5. Keep the input shaft firmly fixed and turn the timing disc so that position 307 degrees faces the coil pole piece. First tighten the nut to clamp the inner race of the ball bearing to the input shaft; then tighten the setscrew in the timing disc hub.

6. Repeat step 1 through 3. Points of actual measurement should coincide with those in Figures 3.1 and 3.2 if the adjustment was made correctly.

3.2.1 COUNTERWEIGHT

The counterweight and timing disc are identical both in shape and material composition.

Alignment of the counterweight relative to the input shaft is extremely important.

The weight and timing disc are factory-adjusted; therefore, they should not require any attention unless the input shaft assembly has been taken apart, disc or counterweight has been moved inadvertently, or punch timing has been adjusted.

1. If the position of the timing disc is changed, that of the counterweight must be changed also. The stepped sections of disc and counterweight should be in close alignment. Place a straight-edge across the punch side frames to align the stepped sections. Keep the straight-edge at right angles to the punch side frames.

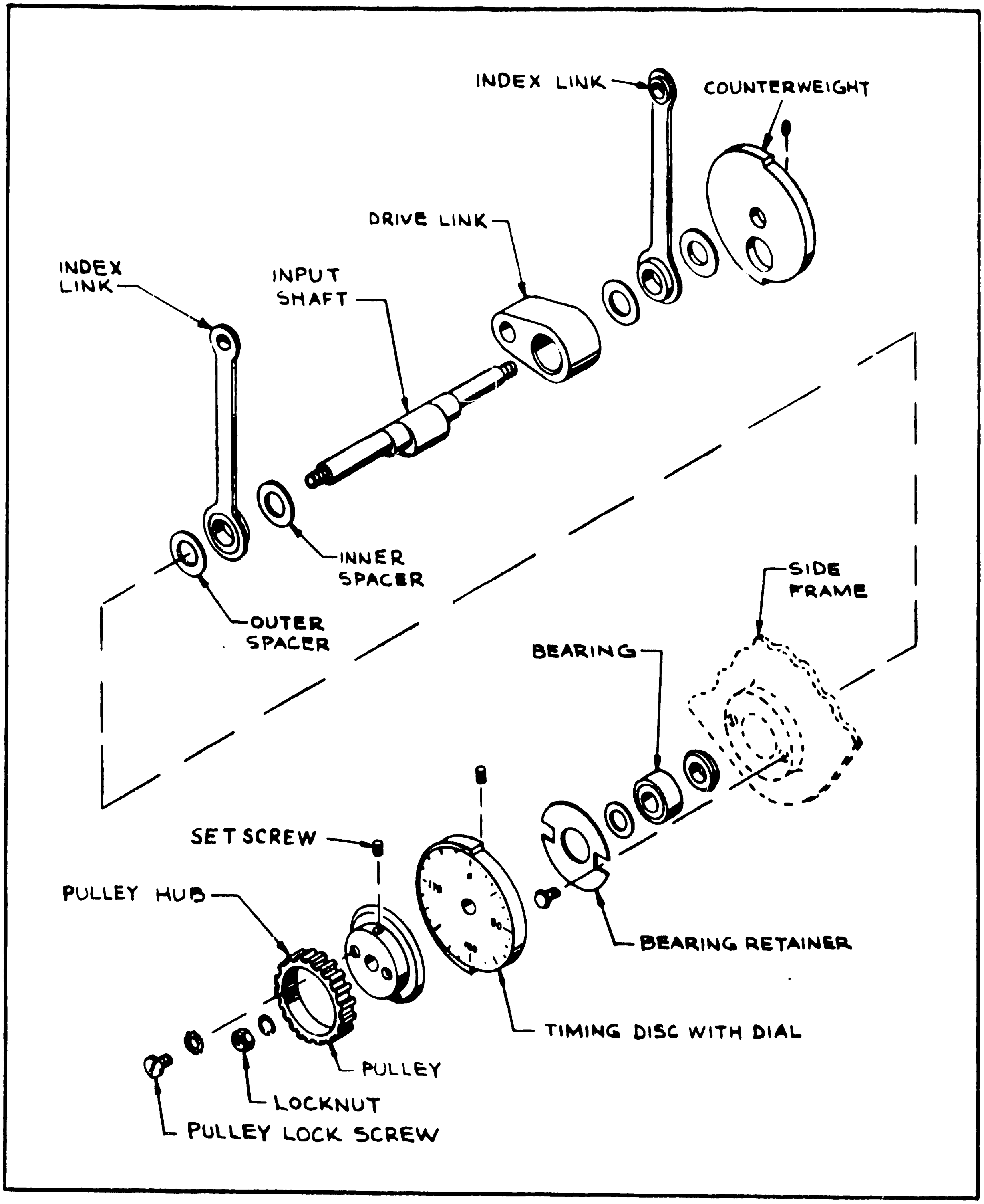


Figure 3.3 Input Shaft and Components

CAUTION: During any adjustment, observe that FIRST the nut at the end of the input shaft must be tightened to lock the inner race of the ball bearing BEFORE the setscrew in the counterweight is tightened.

3.3 PUNCH PIN MOTION

The input shaft rotates continuously while the punch is in operation. The shaft and pulley which is attached to one end of the shaft is driven with a gear belt from a separately-mounted motor. The shaft is eccentric, therefore imparting a reciprocating motion to the drive link and the index link assemblies shown in Figure 3.3. These items continue to move back and forth, raising and lowering the feed mechanism, Figure 3.10, and causing the pawl yoke, Figure 3.6, to swing back and forth about its eccentric shaft.

The movement is repeated during each revolution of the drive shaft without causing the punches to rise and perforate the tape unless punch solenoids have been energized. Current flow through these solenoids sets up magnetic fields to attract the armatures, thereby causing punch pins to rise.

Each punch solenoid armature is connected through the armature link with the corresponding punch pawl as shown in Figure 3.4. Pawls swivel about the common pawl pivot, which is fastened to the upper ends of the pawl yoke side plates. The pawl yoke has a reciprocating motion by being driven through the drive link from the eccentric input shaft. Therefore, the yoke moves back and forth, once toward the solenoids and then away from them for each complete cycle of input shaft rotation.

When a punch solenoid is energized at zero degrees of input shaft rotation, the yoke still moves toward the solenoids and the energized solenoid attracts and holds its armature. As the yoke then reverses its motion, the armature link pulls the top portion of the pawl toward the solenoid and causes the pawl to swing upward. This swiveling of the pawl raises its stepped end to where the end can engage the lower portion of the punch driver arm. During this upward movement of the pawl, the overcentering spring reverses the direction of applied force as soon as the pawl is past the center of its travel. This commits the associated punch at 168 degrees of shaft rotation.

The yoke continues to move away from the solenoids. At 180 degrees, the solenoid is deenergized since punch driver arm and pawl are firmly locked. Further yoke motion away from the solenoids can thus pull the armature

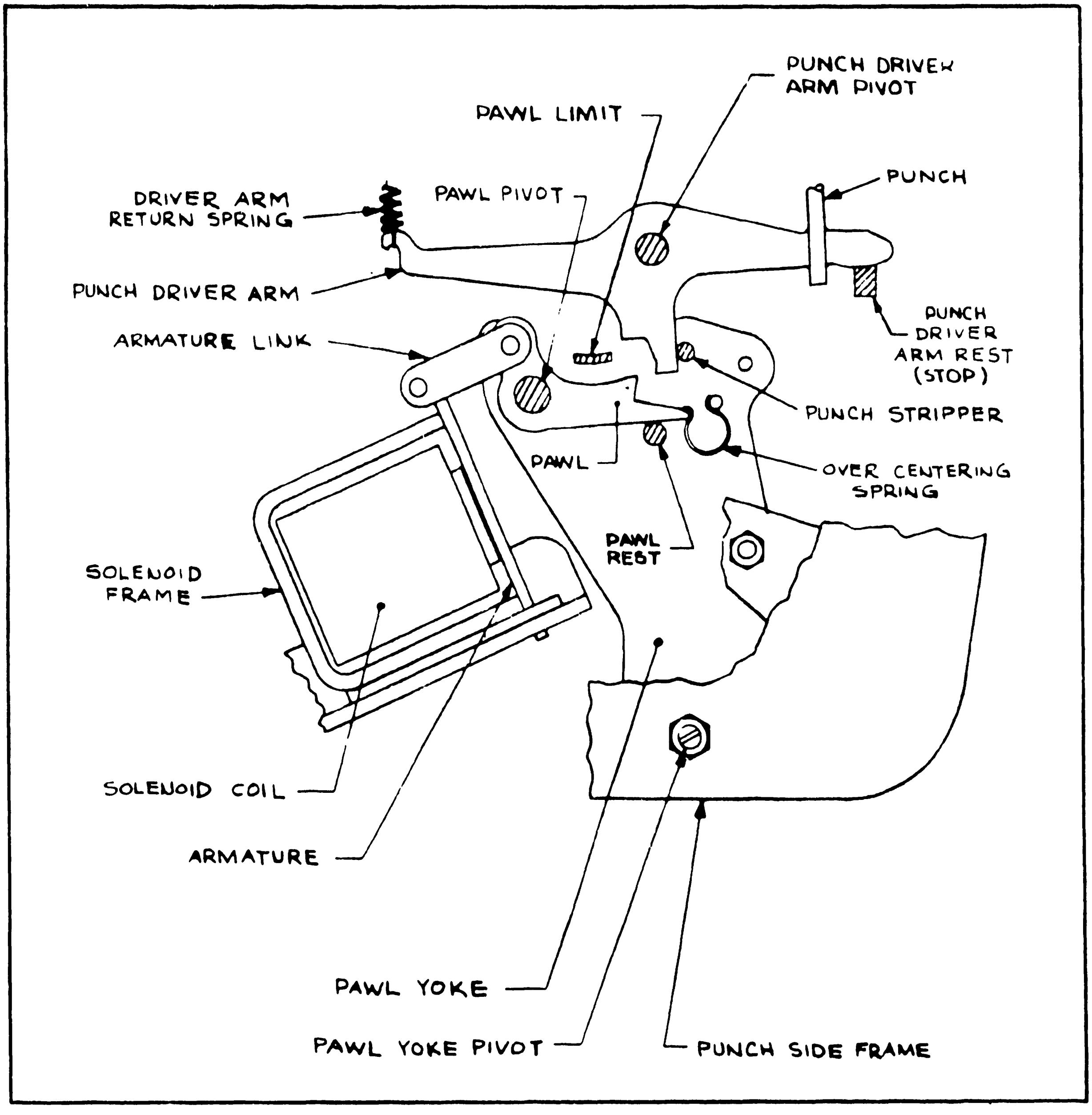


Figure 3.4 Punch Mechanism Schematic

away from the solenoid core. At the same time, the stepped end of the pawl pushes the punch driver arm toward the rear of the punch (in a direction away from the solenoids). Punch driver arms are mounted so that they can swivel about the driver arm pivot, and the motion imparted by the pawl raises the end of the arm to which a punch is attached. The punch consequently is driven through the tape.

When the yoke is farthest away from the solenoids, the two pawl yoke return springs, shown in Figure 3.5, pull the yoke fully to the end of the stroke. The springs reduce chatter of the yoke at high-speed operation, with one spring each attached to either yoke side plate. At this point, in the cycle, the eccentric input shaft has reached its maximum excursion away from the solenoids and reverses direction to move the yoke back towards the solenoids. The pawl, therefore, begins to move away from the punch driver arm, and the arm return spring begins to raise the end of the driver arm opposite to that of the punch. If the spring should fail to do this, the punch stripper would return the driver arm to its normal position at the driver arm stop as the yoke moves closer to the solenoids and the stripper contacts the bottom of the driver arm.

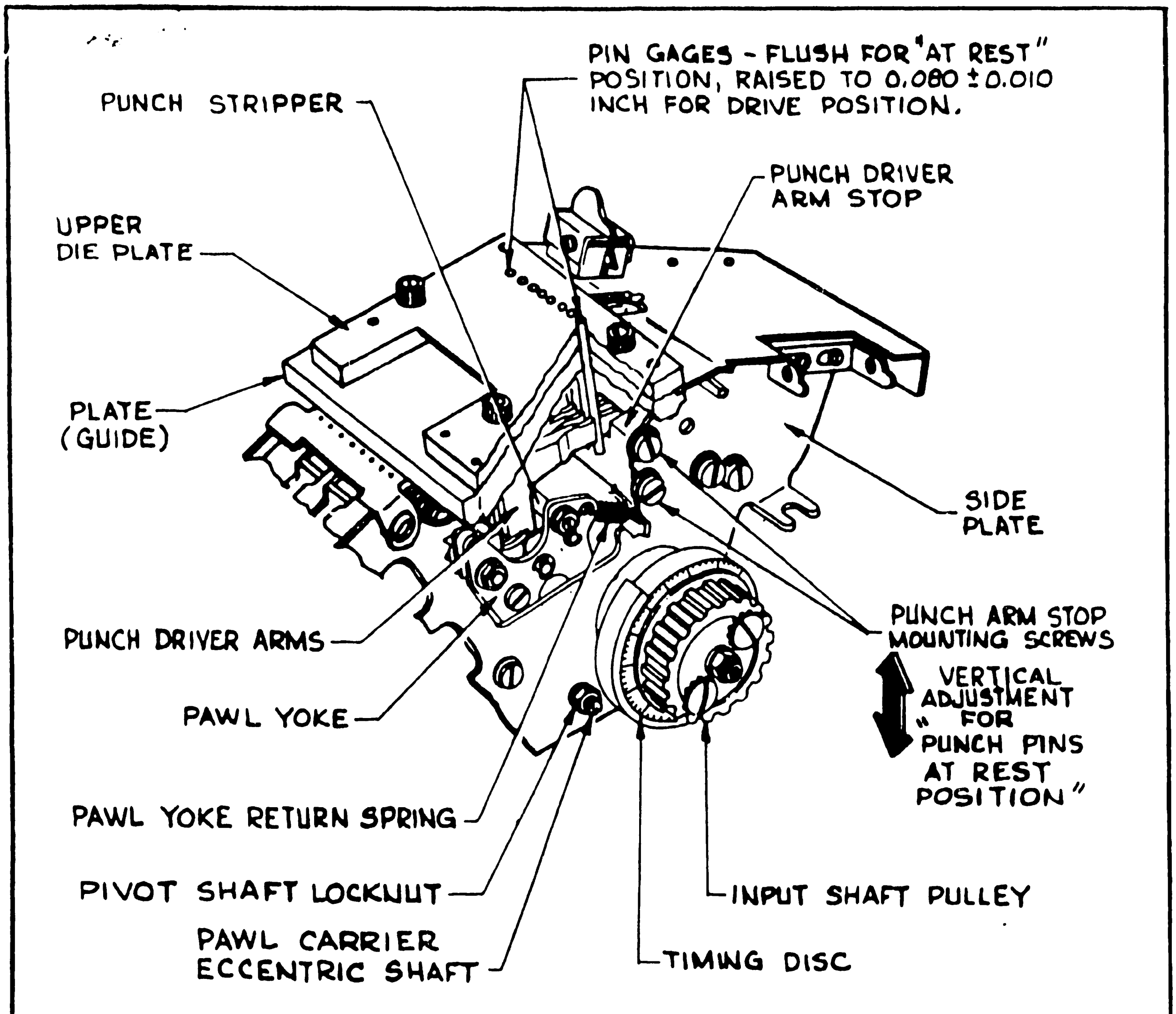


Figure 3.5 Punch Mechanism

When the punch driver arm contacts the punch driver arm stop, the pawl moves away from the bottom projection of the driver arm and transfers its motion through the armature link to the armature until the armature comes to rest against the solenoid frame. As soon as that happens, the armature link pivots the pawl so that the stepped end of the pawl moves downward. During this movement, the overcentering spring reverses the direction of applied force, and the pawl is pressed against the pawl rest.

This completes one cycle. If the solenoid is energized during the next cycle, the previously described process repeats. If the same hole is not to be punched during the next cycle, the solenoid is not energized, thus the armature is not held in place but, instead, moves back and forth with the motion of the yoke, pulled by the pawl and armature link. The pawl remains on the pawl rest, held there by the overcentering spring.

3.4 PUNCH MECHANISM ADJUSTMENTS AND PARTS REPLACEMENT

3.4.1 ADJUSTMENT - PUNCH POSITION AT REST

The punch position at rest adjustment correctly adjusts the height of the punches with respect to the guide and upper die plates. It is essential that spacing on both ends of the row of punches be equal and that the overall height be maintained in order to let punches descend below the platen level (same height as guide plate) before tape moves.

1. Remove the Lucite cover and remove all chad from the die plate. Carefully push any chad in die plate holes down with a thin instrument, bent-up paper clip, etc., until the chad can be discharged through the slot.

2. If necessary, latch the #1 and #8 solenoids manually, then slowly turn the input shaft by hand until punches discharge any remaining chad from the guide plate. Unlatch punches to return them to the rest position.

3. Insert one punch pin gage (kit tool #1B9-1031) each of 0.203 inch length into punch holes #1 and #8.

4. Punch pin gages must be flush with the surface of the upper die plate when punch pins are at rest. If both sides are too high or too low, loosen mounting screws on both punch side plates. To reach those on the side on which the ball detent is mounted, first remove the detent as outlined in paragraph 3.6. Screw holes are slotted in the side plates to permit moving the punch driver arm stop UP or DOWN.

5. Raise or lower the punch driver arm stop, see Figure 3.5, until gage pins are flush with the surface of the upper die plate. Then tighten the four mounting screws. Check the punch drive adjustment; see paragraph 3.4.3.

3.4.2 ADJUSTMENT - PAWL LIMIT

The pawl limit must be adjusted so that the top surfaces of pawls bear evenly against the lower surface of the pawl limit when pawls are raised.

1. Turn the input shaft to approximately 40 degrees. Manually press pawls at point A; see insert of Figure 3.6. This forces pawls to rise.

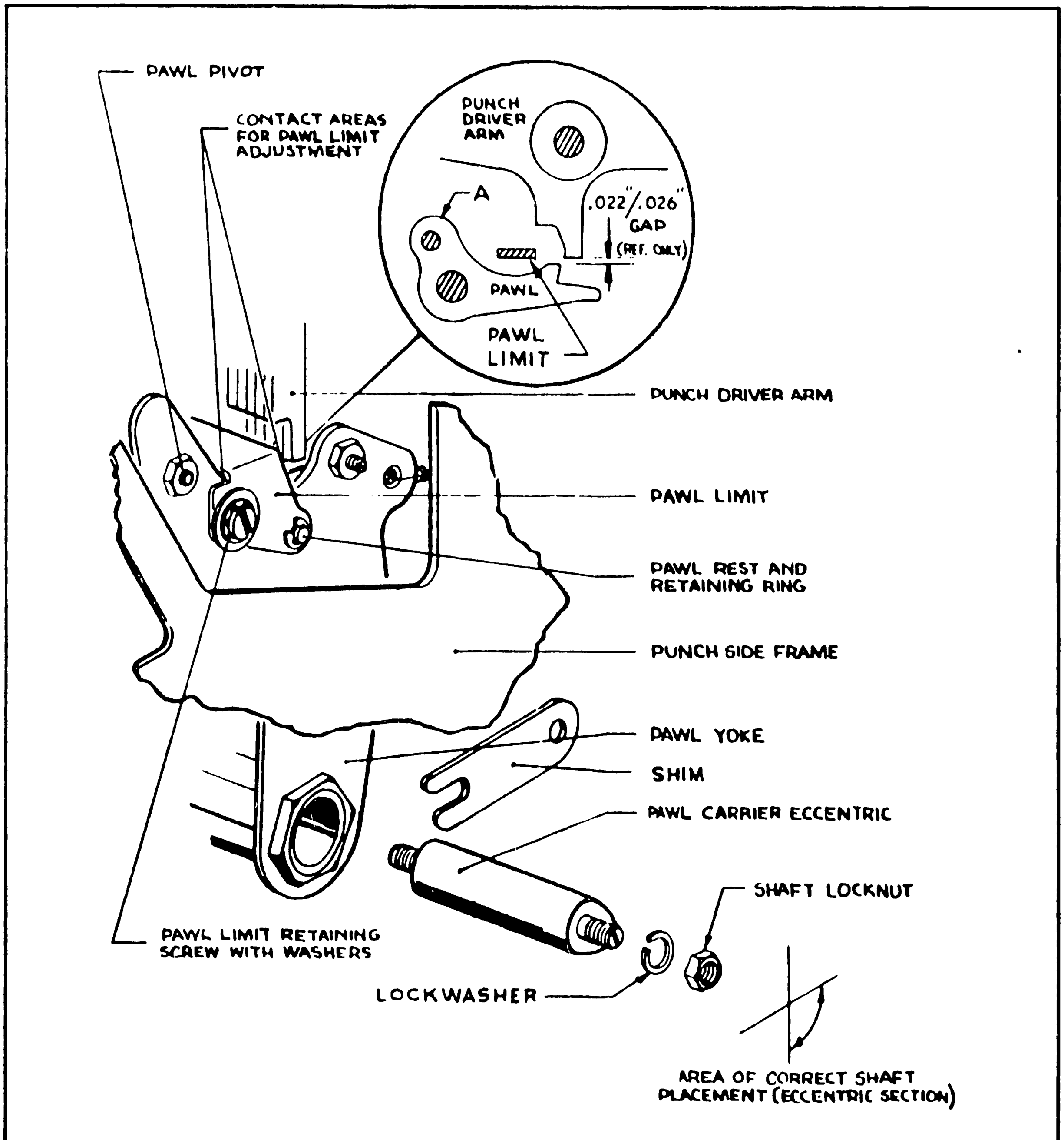


Figure 3.6 Pawl Adjustment and Pawl Limit

2. Check the contact area between pawls and pawl limit on both sides of the limit. No gap should exist. If any gap is visible, loosen the pawl limit retaining screw on each pawl yoke side and adjust the limit so that it evenly contacts the top of all pawls.

3. Tighten the two pawl limit retaining screws. Unlatch all solenoid armatures.

3.4.3 ADJUSTMENT - PUNCH DRIVE

The adjustable eccentric shaft shown in Figure 3.6 is the pawl yoke pivot point. The punch drive adjustment must position this pivot point in such a way that a raised pawl moves the corresponding punch driver arm sufficiently far to lift the punch pin through the punch guide plate and into the upper die plate.

1. Perform the punch position at rest adjustment if necessary; see paragraph 3.4.1. Manually latch the #1 and #8 punch solenoids. Set the input shaft to 307 degrees. At this setting, the pawl yoke should be farthest away from the solenoids. If it is not, check timing as outlined in paragraph 3.2.

2. Insert punch pin gages in the #1 and #8 punch die holes. If the pawl yoke pivot point is correctly set, both pins must extend above the surface of the upper die plate by 0.080±0.010 inch; see Figure 3.5.

3. If this dimension is not correct, loosen locknuts on the threaded ends of the eccentric shaft. Turn the shaft slowly to raise or lower the pawl yoke. Maintain the setting of the input shaft at 307 degrees. After correct pawl yoke pivot point adjustment, tighten the locknuts on both ends of the eccentric shaft. Remove the punch pin gages.

3.4.4 ADJUSTMENT - PUNCH STRIPPER ROD

The punch stripper rod adjustment is made to bring the rod within the required distance of the driver arms. The stripper rod has a flat surface milled along one side with which it contacts the punch driver arms. If an adjustment is required, the stripper rod is turned slightly to obtain the required clearance.

1. Check correct adjustments per paragraphs 3.2, 3.4.1 and 3.4.3. Set the timing dial to 127 degrees. This brings the stripper rod closest to the driver arms; see Figure 3.5. Nominal spacing between rod and driver arms should be 0.005 inch; however, accurate measurement may be difficult because of inaccessibility. Set-up by visual means with back-lighting is recommended. As a check, press the outer punch driver arms down by applying pressure at a point close to the driver arm return spring; see Figure 3.4. The driver arm should just barely move.

2. Turn the input shaft to 103 degrees. Depress the end of the #1 punch driver arm. Arm motion will have considerably increased over that noticed in step 1. The depressed arm must not be able to raise its punch high enough to make the tip show above the guide plate surface.

3. If the visual check of step 2 shows that the punch pin is not retracted sufficiently, loosen the locknut at each end of the stripper rod; see Figure 3.5. Hold the input shaft at 103 degrees. Slowly turn the rod toward the driver arms, then depress the #1 driver arm and check pin retraction. The punch pin must be below the platen surface.

NOTE: The end of the stripper rod at the side of the timing disc is slotted so that a small screwdriver may be inserted to turn the shaft as outlined.

4. After correct adjustment, tighten the nut on each end of the stripper rod. Recheck all settings and make sure that clearance exists between the rod and the punch driver arms at 127 degrees of shaft displacement. This is the point at which the pawl yoke is closest to the solenoids. Thus, some clearance should exist between the punch driver arms and the stripper rod. If no clearance is noted, the previous adjustment was made incorrectly, and the possibility exists that pawl yoke motion may be restricted when the stripper rod contacts the driver arms.

   Such condition could result in improper punch operation and damage due to shock. Consequently, readjust the stripper rod as outlined in step 3.

3.4.5 REPLACEMENT - PUNCH PINS

The following steps list procedures to be followed if a punch pin has to be replaced.

1. Remove the chad tube. Remove the ball detent mounting screws, see Figure 3.10, and remove the detent. Be careful that balls do not fall out. They are retained only by the adhesiveness of the grease within the housing.

2. Remove the two die assembly mounting screws with flat and lockwashers from each punch side plate; see Figure 3.7. Hold the punch mechanism tilted sideways to prevent losing the #8 punch pin which is not held in place because it has no adjacent arm and which, therefore, could fall out of the die as soon as the assembly is moved. Carefully pull the die assembly in the direction toward the solenoids to clear the platen and then raise the assembly to clear punch pins #1 through #7. These punch pins remain attached to their arms.

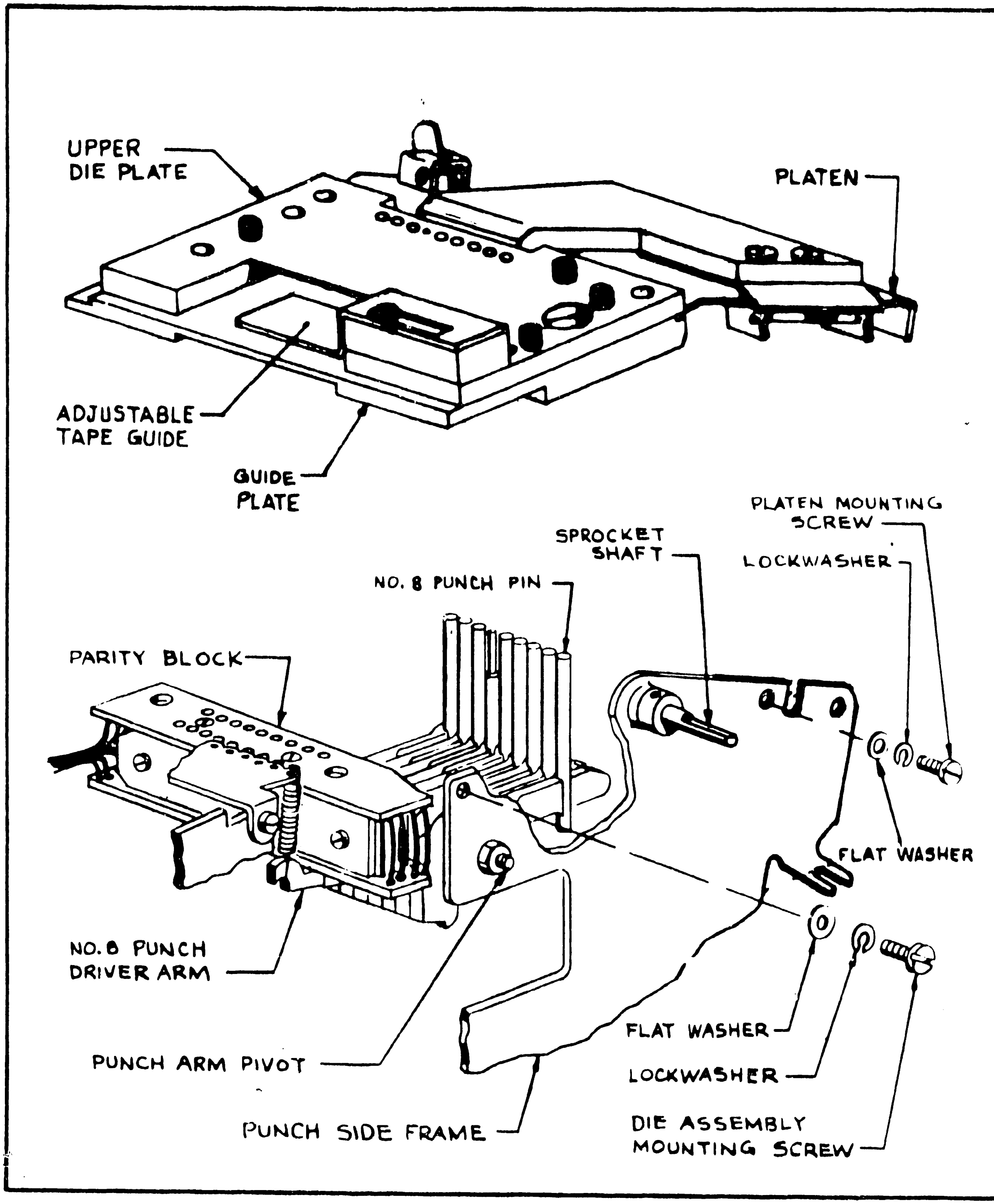


Figure 3.7 Punch and Die Assembly

3. Set the input shaft to 300 degrees. To replace a worn or defective punch pin, raise the punch driver arm and pull the punch pin off

the front of the arm. Fit the replacement punch pin onto the arm and slide it on to where it seats on the slightly wider portion of the arm. Relative alignment should be the same as that of the other punch pins.

4. Place punch pin #8 into the punch die assembly in such a way that the slot in the punch pin lines up correctly with the driver arm. Flat side of slot towards the arm. Very carefully position all other punch pins in the die holes. A pair of tweezers or other thin instrument may have to be used to align each punch pin and its hole. Carefully lower the die assembly and push punch pin #8 down from the top of the punch until the slot engages the #8 punch driver arm.

5. Press the punch die assembly down into the punch side frames. Pull the assembly toward the platen until the end of the platen engages the slot in the die assembly. Insert die assembly mounting screws but do not tighten them.

6. Check punch pin movement by raising driver arms by hand. If binding is noticed, move the die assembly within the limits of the frame mounting holes until all punch pin movement appears to be even and without friction. Carefully tighten mounting screws on both sides, one at a time. Continue to check punch pin movement while fastening screws to prevent binding the punch pins.

7. Check the punch position at rest adjustment, paragraph 3.4.1, and the punch drive adjustment, paragraph 3.4.3. Make corrections as needed.

3.4.6 ADJUSTMENT - PUNCH SOLENOID GAP SETTING

Setting and tolerances for gaps A and B between armature and frame are shown in Figure 3.8. Make measurements only with a non-magnetic feeler

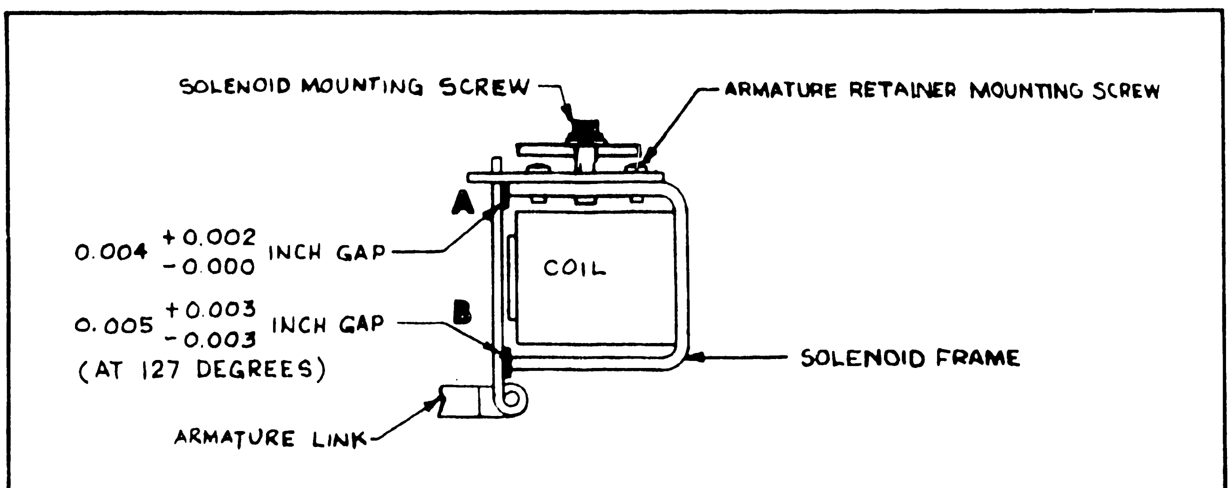


Figure 3.8 Punch Solenoid Armature Gaps

gage. To adjust gap B, remove the solenoid from the punch and loosen the armature retainer mounting screws. Slide the retainer forward or backward to set the gap correctly, then tighten the screws. Gap A is accessible without removing the solenoid and loosening the solenoid mounting screws.

3.4.7 REPLACEMENT - PUNCH SOLENOID COIL

Replace open-circuited or otherwise defective punch solenoid by removing the upper or lower bracket; see Figure 3.9. Solenoids at the rear may be removed without disassembling either bracket, and inside solenoids can possibly be removed by loosening the bracket mounting screws, by removing the two screws at the outer end, and by tiling the upper or lower bracket away from the punch to gain enough clearance to pull the defective solenoid out of the punch.

NOTE: The two forward mounting screws of the upper bracket also retain the spring anchor bracket. Observe the spacer thickness between one tab of the anchor bracket and the punch side frame. Note the number and thickness of spacers under the mounting tab on the other end of the terminal strip. Make sure that spacers are replaced correctly during reassembly.

1. During disassembly of the upper bracket, carefully slide the spring anchor bracket toward the punch assembly. Remove the mounting screw from the solenoid which is to be replaced. The solenoid now will lie loosely within the punch assembly.

2. Remove armature retainer mounting screws from the defective solenoid. Withdraw the frame with coil.

3. Disconnect coil leads from terminal strip and connector. Replace the coil and frame. If wires are to be spliced without opening the cable assembly, make sure that the connection is twisted, properly soldered, insulated and sleeved. Install the replacement coil and frame, then reassemble all parts in reverse order to that outlined previously.

4. After complete reassembly, adjust armature gaps A and B of the replaced solenoid and of all other solenoids which were loosened as specified in paragraph 3.4.6. Then tighten all solenoid mounting screws securely.

3.5 FEED MECHANISM

Tape is fed forward from one punch position to the next over a nominal distance of 0.100 inch when the sprocket takes one step. The sprocket has 24 teeth but only approximately four teeth drive the tape at any

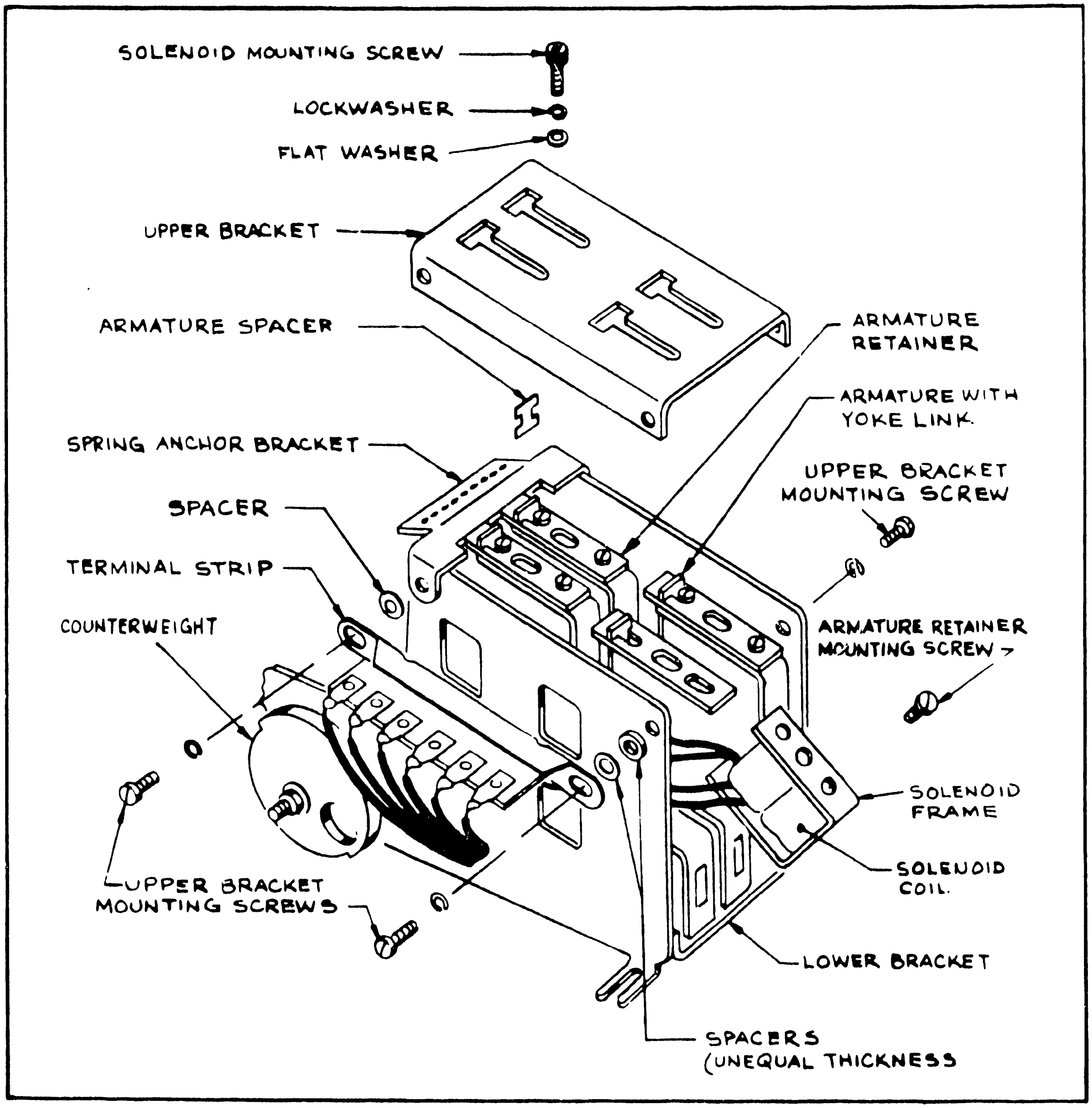


Figure 3.9 Punch Solenoid Parts

one time. The sprocket, Figure 3.10, is mounted on the sprocket shaft, which is held in place on one side by the ball detent gear and, on the other side, by a collar. The shaft also supports the spur gear and the optional positioning knob.

Ratchet and sprocket shaft spur gears mesh, and the ratchet gear drives the sprocket gear when the ratchet shaft is locked and the two index links fall. The index links are supported by the input drive shaft and

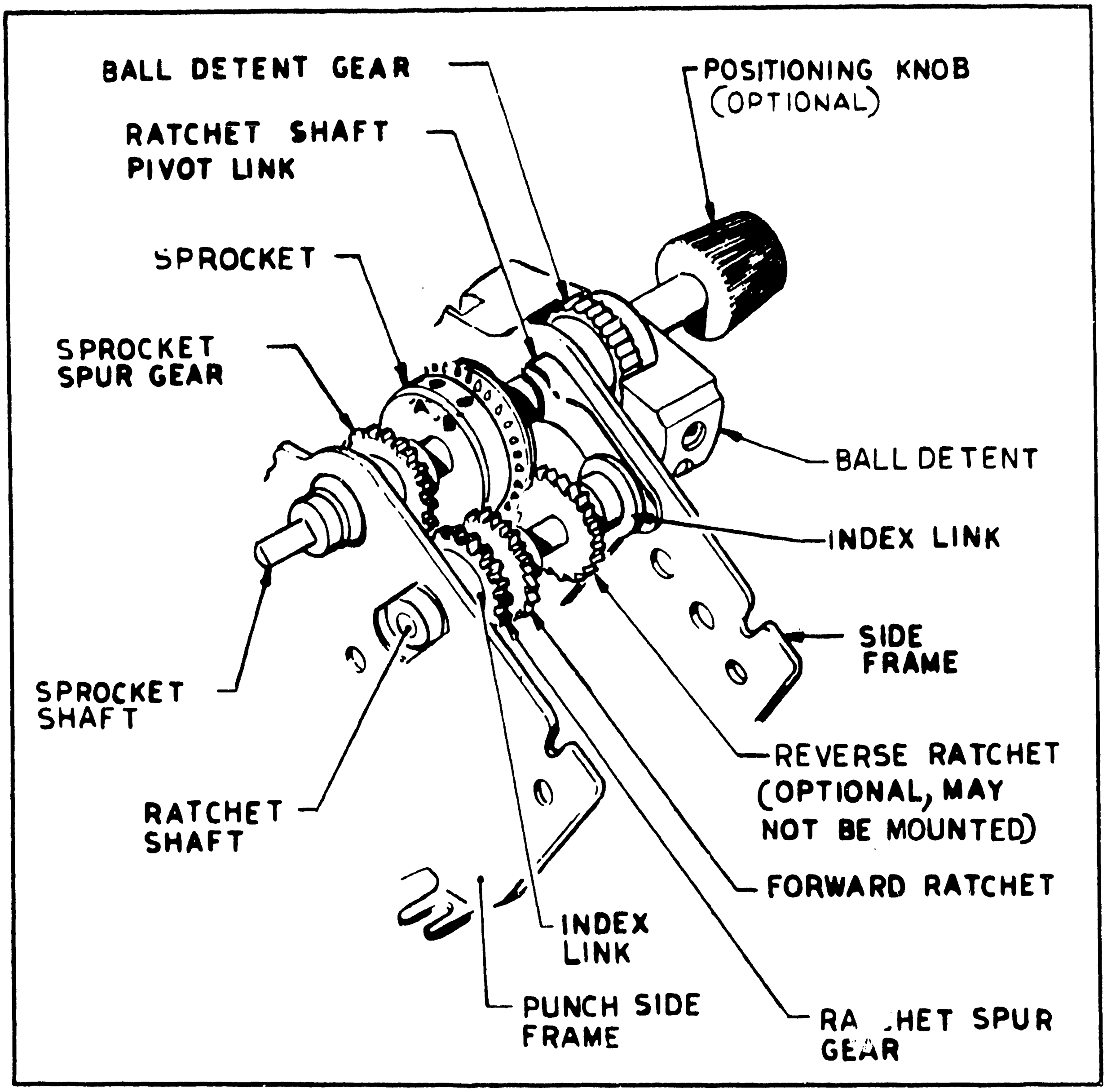


Figure 3.10 Feed Mechanism

actuated by the eccentric section of the shaft. Their motion, therefore, is nearly straight up-and-down.

Index links reach their point of maximum upward excursion at approximately 23 degrees of input shaft rotation. Punches are then at the surface level of the guide plate - which is the same as the top surface of the platen - so that no obstruction exists to tape motion.

Further input shaft rotation causes the index links and ratchet shaft assembly to move down. If the forward feed solenoid is energized at Z1 time (zero degrees), the lower portion of the solenoid armature is pulled against the solenoid core and the interposer portion above the armature pivot point, see Figure 3.11, moves toward the ratchet gear.

The slight rotary motion of the ratchet shaft brings the ratchet gear tooth that lies immediately above the interposer into contact with it. At 105 (+10, -0) degrees, the interposer locks the ratchet gear. As the links continue to move down, the interposer causes the ratchet gear and its shaft to turn; thereby causing the ratchet spur gear to turn one tooth position in the opposite direction. The sprocket moves the tape one hole position until the ball detent locks the sprocket shaft again. In other words, with each revolution of the input shaft, the sprocket shaft moves one sprocket tooth position forward when the feed solenoid is energized.

At 180 degrees of input shaft rotation, the feed solenoid coil is de-energized and the armature return spring pulls the interposer away from the ratchet gear. This prevents drag during the next upward movement of the index links and allows the ratchet spur gear to walk slightly about the stationary sprocket gear.

Tape is directed by the tape guide plate until it reaches the punch station. Leader tape then is picked up by the sprocket and, subsequently, index holes are punched as tape is fed through the punch.

The sprocket is positioned by detenting the sprocket shaft with the ball detent. This detent locks the sprocket shaft in one of 24 positions unless the shaft is driven automatically or manually with the positioning knob.

3.5.1 ADJUSTMENT - INDEX SOLENOID ARMATURE/INTERPOSER

Before the solenoid armature is adjusted, the ball detent must be in place and mounting screws must be tight. Setscrews in all gears and ratchets must be tight. The sprocket shaft must not have any side play.

To check or adjust the gap between the armature and the solenoid frame, remove the solenoid from the punch because it is mounted in an area that makes measuring impossible.

1. Turn power OFF and remove the two solenoid mounting screws from the punch side frame. Withdraw the solenoid from the punch.

2. Check the gaps by electrically energizing the solenoid, or by pressing the armature against the solenoid. Do <u>not</u> apply any excessive force. Gap width should be 0.005±0.001 inch as shown in Figure 3.11. If an adjustment is required, loosen the top and/or bottom armature or plate in such a manner that the specified gap is obtained. Measure the gap only with a non-magnetic feeler gage. Tighten all screws securely.

NOTE: Make sure that the gap at the bottom of the solenoid is measured between the solenoid frame and the armature and not between the inner edge of the plate and the armature. Moving the plate farther to the rear of the solenoid decreases the gap, moving it forward increases the gap.

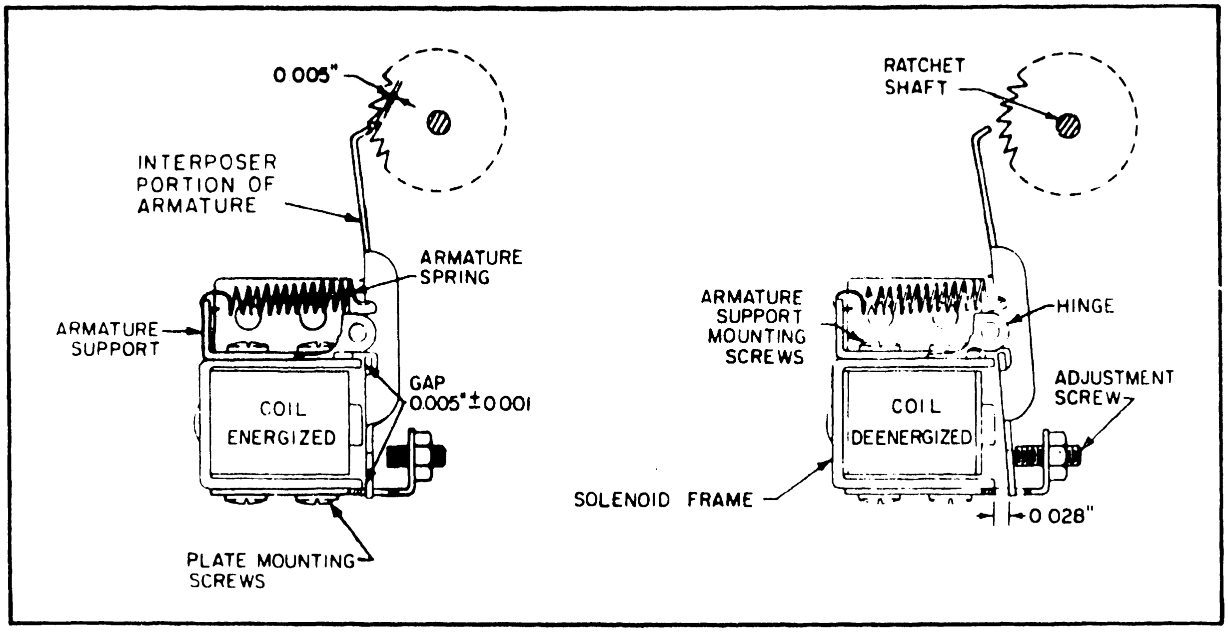


Figure 3.11 Forward Feed Solenoid

3. Loosen the locknut on the adjustment screw. Deenergize the solenoid or release it to the normal rest position. Adjust the adjustment screw so that the gap between armatures and solenoid frame is 0.028 inch. Tighten the locknut.

4. Reinstall the solenoid in the punch. Tighten the mounting screws just enough to prevent solenoid movement. Make sure that timing has been adjusted as outlined in paragraph 3.2. If timing is not correct, adjust it before continuing with the following procedures.

5. Loosen the solenoid mounting screws and pull the solenoid toward the rear of the punch (away from the ratchet shaft) until the rear mounting screw rests on the edge of the enlarged rear mounting hole. Then swing the solenoid toward the ratchet until the interposer portion of the armature leaves a gap between its tip and the outer edge of the adjoining ratchet gear tooth of 0.005 inch. The gap is shown in Figure 3.11.

6. Carefully tighten the two mounting screws while maintaining the solenoid position. Recheck the gap with an offset feeler gage of 0.005 inch thickness. Correct the adjustment, if necessary, as outlined in steps 4 and 5. Then tighten mounting screws securely.

7. Rotate the timing dial to 105 degrees and manually move the interposer toward the ratchet. The interposer must contact the ratchet without play between the top of the interposer and the ratchet tooth. If an adjustment is necessary, loosen the setscrews and reposition the ratchet. Check this adjustment for all ratchet teeth by manually latching the solenoid and by turning the input shaft. Also check after each feed step that the sprocket shaft is in its fully detented position.

3.5.2 ADJUSTMENT - SPROCKET

Sprocket rotation must move tape parallel to the guide edge on the upper die plate. The distance from this edge to the centerline of the sprocket teeth must be 0.394±0.002 inch, or from the guide edge to the outside of the sprocket teeth, 0.371±0.002 inch. This spacing is called zoning.

NOTE: Before measurement is made, all setscrews in sprocket shaft components must be tightened.

1. Measure zoning. If an adjustment is required, loosen screws A and B, see Figure 3.10, and move the sprocket toward or away from the guide edge to obtain a correct spacing of 0.371±0.002 inch to the outside of the sprocket teeth.

2. Checking zoning with a tape gage, or as accurately as possible by punching code holes (delete code) over a section of tape. Fold the tape back on itself and line up two delete codes so that their holes accurately overlap as shown in Figure 3.12. If zoning is

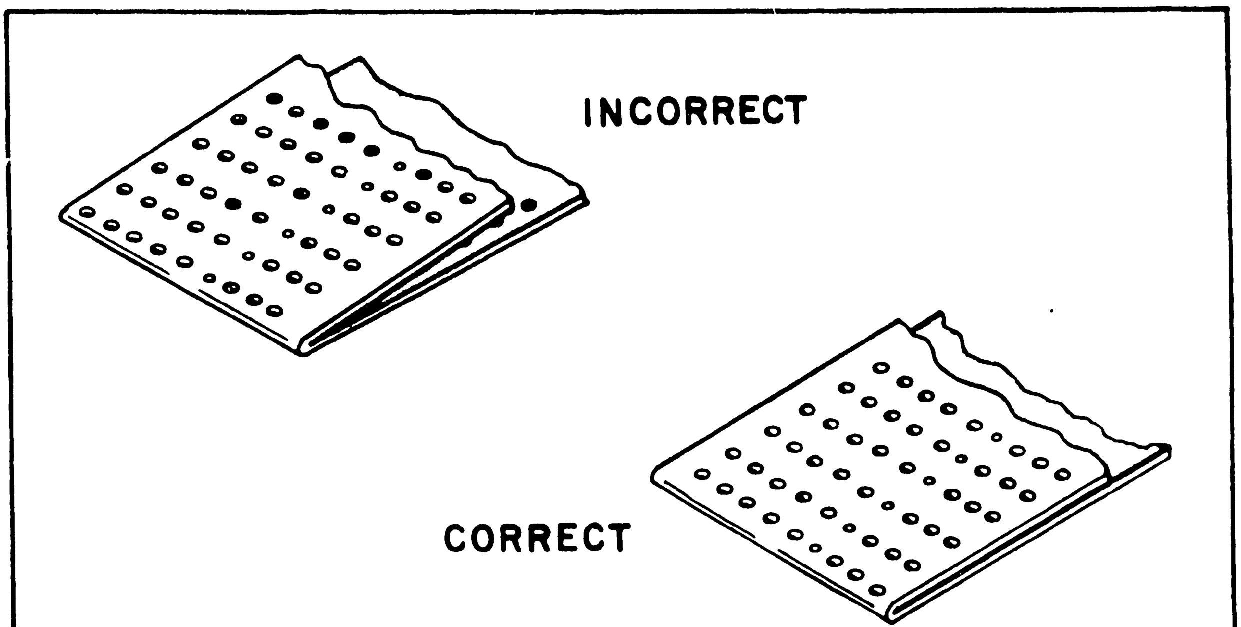


Figure 3.12 Zoning Check

off, code holes are not punched perpendicularly to the edge of the tape and, consequently, when holes line up, the upper and lower edges of the folded tape do not. If any adjustment is required, correct the positioning of the sprocket.

3.6 BALL DETENT

The ball detent arrests the rotation of the sprocket shaft. It also holds the shaft fixed during upward movement of the index links. The detent is shown in Figure 3.10. It consists of an injection-molded plastic part into which six stainless steel balls have been inserted, with individual springs and setscrews. Setscrews are adjusted to provide enough spring tension so that contact between balls and detent gear keeps the shaft normally in a fixed position, except when operation calls for rotation of the sprocket shaft.

The ball detent can be removed from the punch by removing the two detent housing mounting screws, and by loosening the detent gear setscrew, so that both gear and detent housing can be removed from the shaft as a unit. The detent housing may also be removed while leaving the gear on the shaft.

CAUTION: Be very careful not to lose any of the ball and springs which are under tension.

3.7 COVER AND TAPE TEAR PLATE

The spring-loaded cover holds down the tape on its way through the punch. The cover is transparent; it therefore allows the operator to read the perforated code after the tape stops moving. A spring-loaded latch keeps the cover closed and in the DOWN position. To release the cover, the operator must manually retract the latch.

Tape is removed after punching by advancing the tape out of the punch so that none of the data characters are torn off. The operator then pulls the tape up against the tear plate. The plate is positioned so that its serrations cut through the center of index and character code hole(s). The leading edge of the tape should be straight and at right angles to the sides of the tape.

If adjustment is required, loosen the two mounting screws on the platen surface and align the plate so that serrations in the upper section of the tear plate fit over a line through the center of an index hole, as shown in the enlargement of Figure 3.13. After correct adjustment, tighten the two mounting screws.

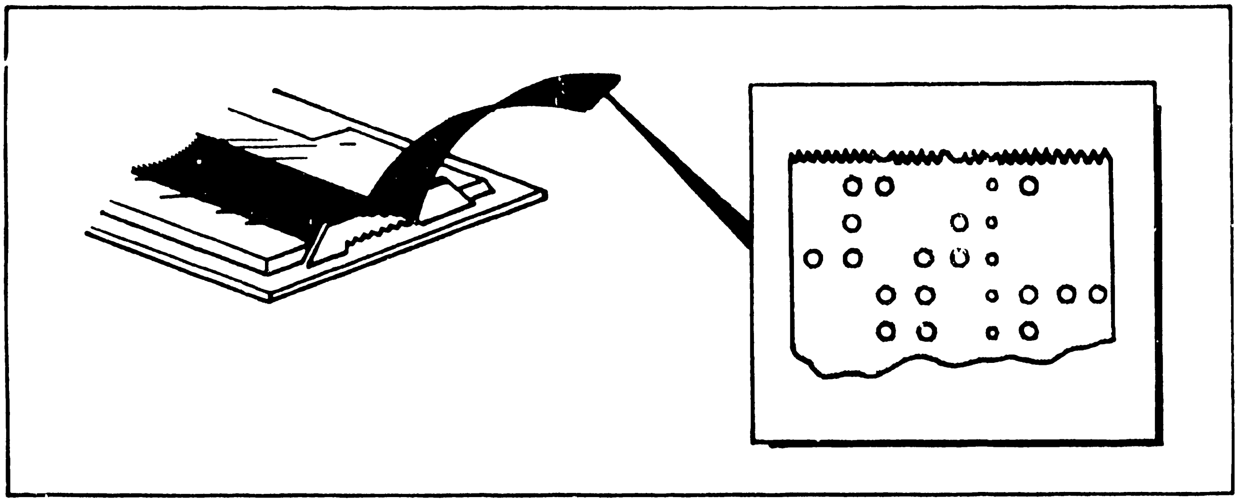


Figure 3.13 Tape Tear Plate

3.7.1 ADJUSTMENT - COVER

Make sure that the pivot shaft is properly secured with E-type retaining rings and that the spring is under stress so that it will tend to unwind, thereby opening the cover.

1. The cover latch must be adjusted so that the cover is spaced 0.015 (+0.000, -0.002) inch away from the sprocket. Use a feeler gage between sprocket and the lower surface of the cover. Press the cover down and loosen the two mounting screws in the latch retainer. The through-holes in the retainer are slotted so that the latch can be moved up or down as required. Adjust the latch so that the lower surface of the latch touches the upper surface of the cover. Tighten the two retainer mounting screws.

IMPORTANT: The previously specified clearance between cover and sprocket must be equal on both sides of the sprocket. Since the cover is curved at the upper end, the same clearance must be maintained at that point.

2. If the adjustment of step 1 shows that clearance is uneven, loosen the bracket mounting screws and move the bracket with cover up, down and/or sideways until 0.015 (+0.000, -0.002) inch can be measured between all points on the sprocket and the lower surface of the cover. Then tighten the bracket mounting screws. Recheck the latch adjustment of step 1.

3. Check that the slot on the underside of the cover is centered above the sprocket teeth. If it is not, loosen the cover mounting screws and move the cover sideways until teeth are perfectly centered in the slot. This adjustment is made with the cover closed. If the

adjustment is made correctly, the clearance between the underside of the cover and any point on the platen should not be less than 0.013 inch nor more than 0.015 inch.

3.8 TIMING PULSE GENERATOR

When the timing disc at one end of the input shaft interrupts the magnetic flux produced by current flow through the solenoid, it generates a timing pulse. The pulse coil is mounted adjacent to the timing disc and its load coil is mounted to the same punch side frame; see Figure 3.14.

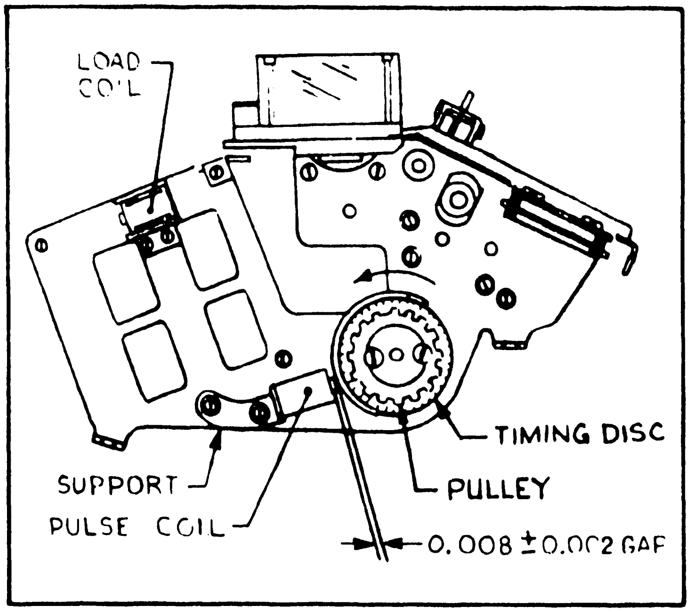


Figure 3.14 Timing Pulse Generator

Current flow through the load coil maintains the pulse generator at a nominal voltage level. Induction establishes a magnetic field whose flux lines pass through the timing disc, the input shaft and the punch frame to form a complete loop. Any interruption of the flux path changes the intensity of the magnetic field and produces a transient voltage level shift in the form of a positive or negative-going spike.

The edge of the timing disc comes closer to the pulse coil at an input shaft setting of 180 to 360 degrees than it does between zero and 180 degrees. At zero, the gap increases and the resultant collapse of the magnetic field induces a voltage in the pulse generator which tends to maintain the direction of current flow; thus, a negative-going spike results. When the timing disc reaches 180 degrees, the disc surface suddenly increases, the gap between the disc and pulse generator decreases, and the magnetic field builds up rapidly, thereby producing a positive-going spike.

3.8.1 ADJUSTMENT - GAP AND ALIGNMENT

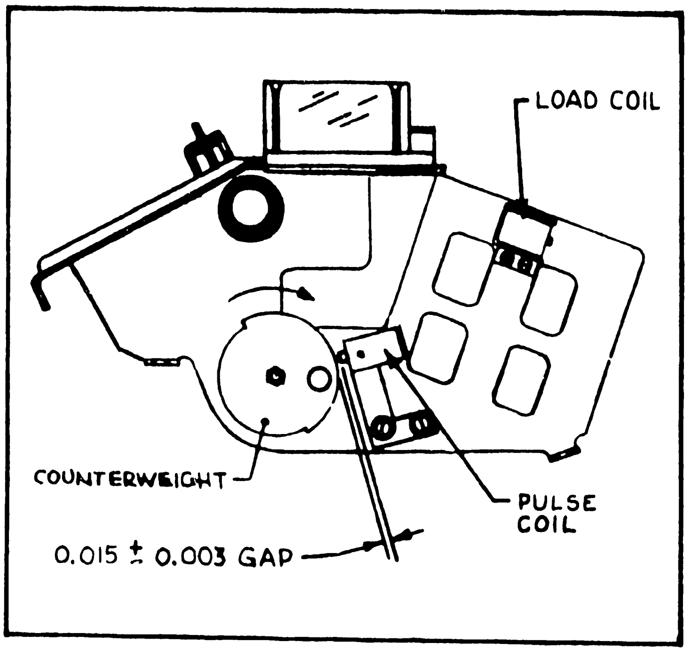
1. The gap between the timing disc and pulse coil shall be 0.008±0.002 inch; see Figure 3.14. The gap shall be measured with a feeler gage while the punch is not in operation. Measurements shall be made between pulse coil pole piece and several spots along the edge of the disc at input shaft settings between 180 degrees and 360 degrees.

2. If the gap is not correct, loosen the mounting screws for the pulse coil support and adjust the coil to obtain the correct gap. Then tighten the mounting screws.

CAUTION: Holes in the coil support plate shown in Figure 3.14 are slotted so that the support may move toward or away from the timing disc with only a minimum amount of side play. This is required because the center of the solenoid core is the reference point for timing disc markings.

Any adjustment of the pulse coil, therefore, should be made as carefully as possible. Attempt to leave the coil in its relative position to the timing disc, while moving it straight back or forth to correctly set the gap.

If the pulse coil is removed for replacement or for other reasons, its position should be accurately inscribed on the punch side plate before removal. It should be adjusted at installation to split the possible total 4 degrees of side motion obtainable because of excess clearance in mounting holes. The series-connected load coil, mounted near the upper edge of the punch side frame, requires no adjustment.



IMPORTANT: The counterweight must be mounted in precisely the same relative attitude to the input shaft as the timing disc; refer to paragraph 3.2.1.

2. If the gap is not correct, loosen the coil bracket retaining screws. Move the coil toward the timing disc or away from it. A gap change of 0.003 inch will produce a voltage change of approximately one volt; thus, if the gap is 0.009 inch and the pulse is four volts, decrease the gap to 0.006 inch to obtain a pulse of five volts. Then tighten the bracket retaining screws. f

IGNORE 3.10 & 3.11

The optional parity switch block consists of 15 switches of the double-throw type which are contained within the block. The block is a molded assembly mounted to the underside of the punch die plate as shown in Figure 3.7. A cutaway view through the block is shown in Figure 3.16.

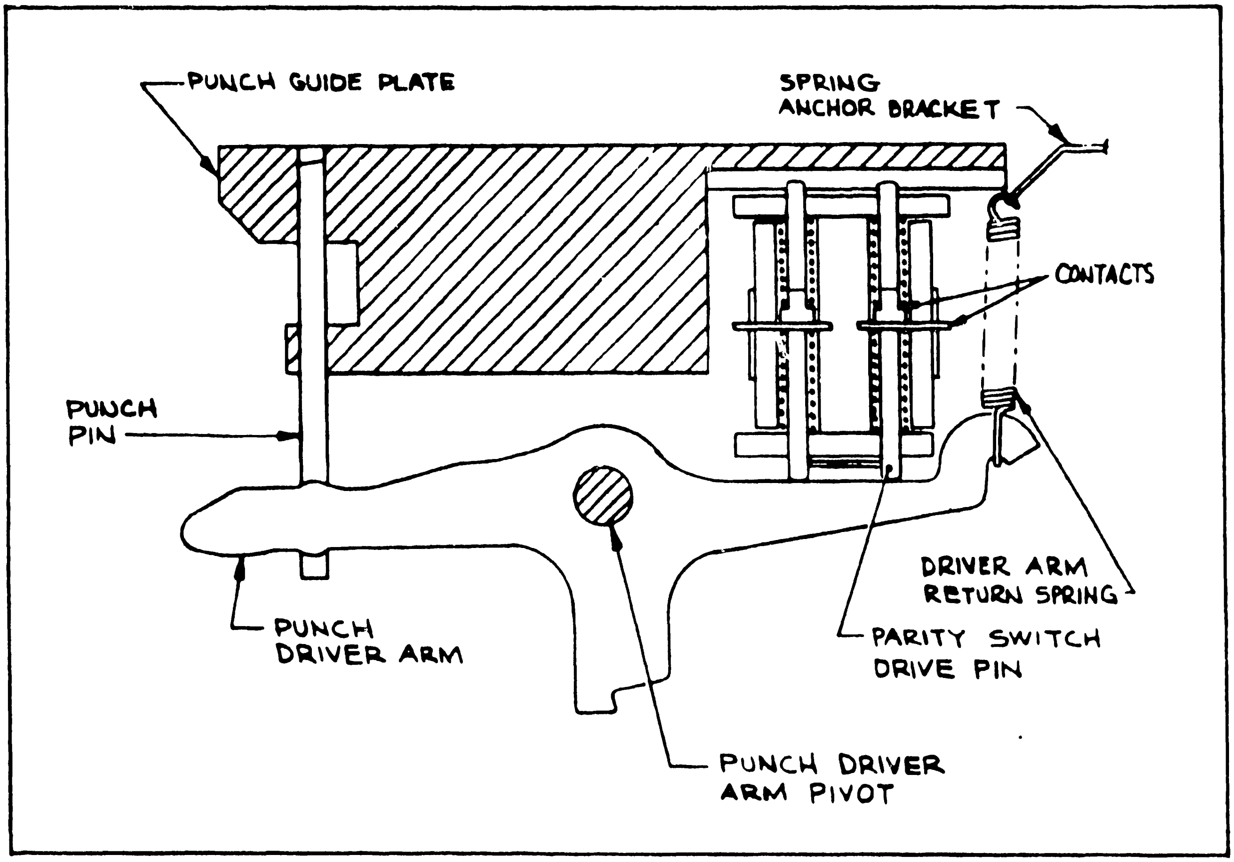


Figure 3.16 Cutaway through Punch

Switches are arranged in two rows so that two switch drive pins rest on the rear top edge of a punch driver arm, except for the arm of punch #1, which has only one pin. Movement of any driver arm results in simultaneous displacement of both parity switch drive pins, with consequent switch transfer. Refer to Section 7, page 7-11, for electronic description and interconnections.

Switches are connected in a series-parallel set-up. The parity block is supplied as a unit assembly which is factory-installed. Adjustment, if necessary, is listed in the following steps.

1. Disconnect the punch from circuits by removing punch connectors. Check the spacing between the underside of the parity block and the rear extensions of driver arms on both sides of the punch. The nominal distance should be 0.062 inch.

2. Use an ohmmeter and set it to the Rx1 range. Connect one ohmmeter lead to pin #10 of connector JP5 (ODD) and the other lead to pin #12 of the same connector (IN). Manually latch the #1 punch solenoid. Turn the input shaft slowly by hand until the meter reading goes from infinity to full scale. The timing disc setting should be less than 307 degrees. Continue to turn the input shaft until the 307 degree mark on the timing disc lines up with the center of the pulse solenoid.

NOTE: Punches are fully up at 307 degrees. Parity switch drive pins should move between 0.010 and 0.020 inch and contact transfer within the parity block should occur before 307 degrees. The mid-point of parity switch contact transfer should be around 307 degrees, and some clearance should exist at that point between the bottom of the parity switch drive pins and the top of the punch driver arms.

3. Check to determine that such clearance exists and then repeat step 2 but this time check continuity by latching solenoid #8. If no continuity can be obtained at all - and assuming that the parity block is not otherwise defective - it indicates that the block is too close to the punch driver arms so that parity switches are held OPEN constantly. The reverse is true if continuity is present continuously.

4. If no clearance exists between the bottom of the drive pins and the top of the driver arms, loosen the parity block mounting screws and remove shims from between the block and the punch frame to raise the parity block and move it farther away from the punch driver arms. Repeat steps 2 and 3 to make sure that the adjustment was made correctly. Note that the row of parity switch drive pins farther away from the driver arm return springs will show less clearance than pins closer to the return springs.

3.11 OUT-OF-TAPE SWITCH

The optional out-of-tape switch is mounted at the rear of the punch. When the microswitch mounting screws with washers are loosened, enough play exists between mounting holes and through holes in the switch to move the switch to a position at which contact transfer occurs. The normally-closed contact and the common contact are used for test (the two outside microswitch terminals).

ROUTINE INSPECTION, CLEANING AND LUBRICATION

The punch must be periodically inspected and cleaned. If necessary, and in accordance with manufacturer's recommendations, the punch must be lubricated at specified intervals. If the punch has to be disassembled to accomplish this, follow procedures outlined previously.

CLEANING

Turn all power OFF and disconnect all plugs. Remove all dirt, paper, dust, lint and old lubricant. Use a lint-free cloth to remove excessive and/or dried lubricants from any and all parts during disassembly. It may be necessary to use a cleaning solvent to insure that all parts are properly cleaned. It is recommended that a non-toxic, non-flammable cleaning fluid be used.

IMPORTANT: Do not immerse the unit in cleaning solvents or ultrasonic cleaners.

LUBRICATION

After cleaning, lubricate the punch. Do not apply lubricants excessively. If specified lubricants are not available, use only acceptable substitutes of a quality and grade equal to, or better than, that of the original lubricants.

Lubrication points of parts are identified in the following figures by callouts. The numeral identifies the lubricant listed in Table 3.2. The area to be lubricated is called out for such item in a tabulation that accompanies each figure. Some parts are labeled to facilitate correlation of representative views shown in the figures contained in this section.

Item Number	Type Lubricant
1	Custom Lube 700
2	Gulflex "A" Grease
3	Custom Lube 700 Mixed With Gulflex "A" Grease

Table 3.2 Lubricants

Reference Figure 3.17

A. Lubricate upper bearing surfaces in both index links.

B. Lubricate both sides of each washer and spacer shown.

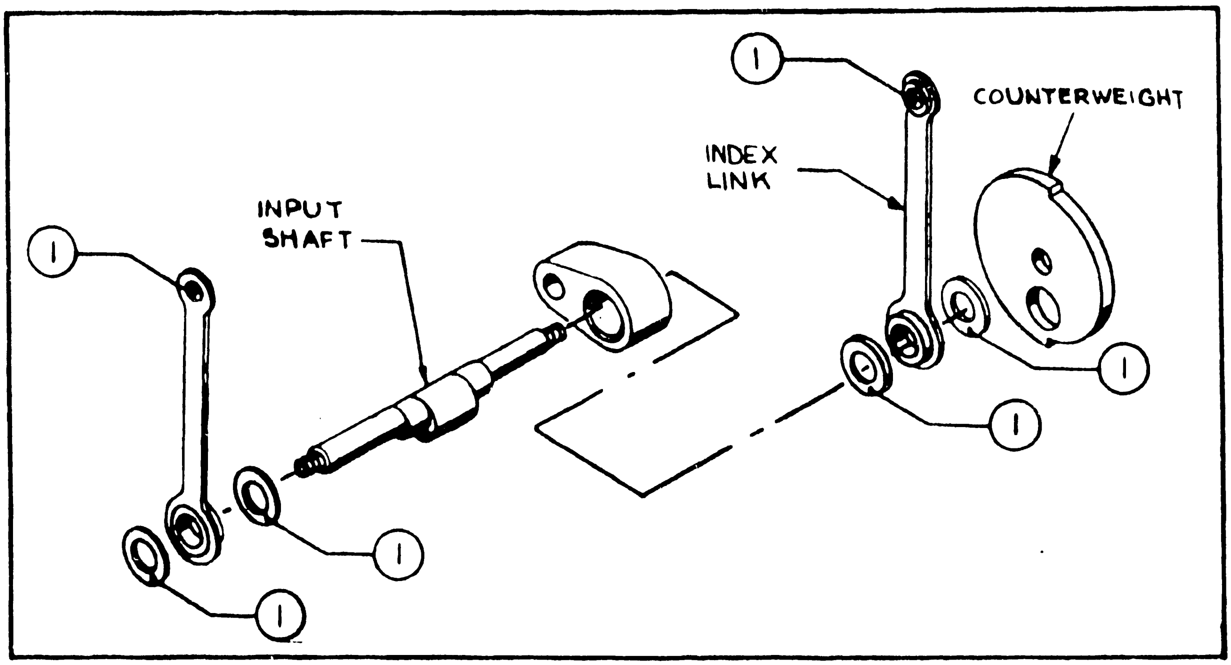


Figure 3.17 Lubrication Points: Shaft & Index Link

Reference Figure 3.18

A. Lubricate the inside bearing surfaces for the sprocket shafts in both punch side frames.

B. Lubricate both holes in each ratchet shaft pivot link.

Reference Figure 3.18 (continued)

C. Grease tooth surfaces of both the ratchet and sprocket shaft spur gears.

D. Grease tooth surfaces of the forward ratchet.

E. Grease tooth surfaces of the detent gear WITH THE BALL DETENT IN PLACE. Latch the forward feed solenoid by hand or electrically energize it to rotate the sprocket shaft. Pack the entire inside area of the detent.

CAUTION: Do NOT remove the ball detent from the shaft.

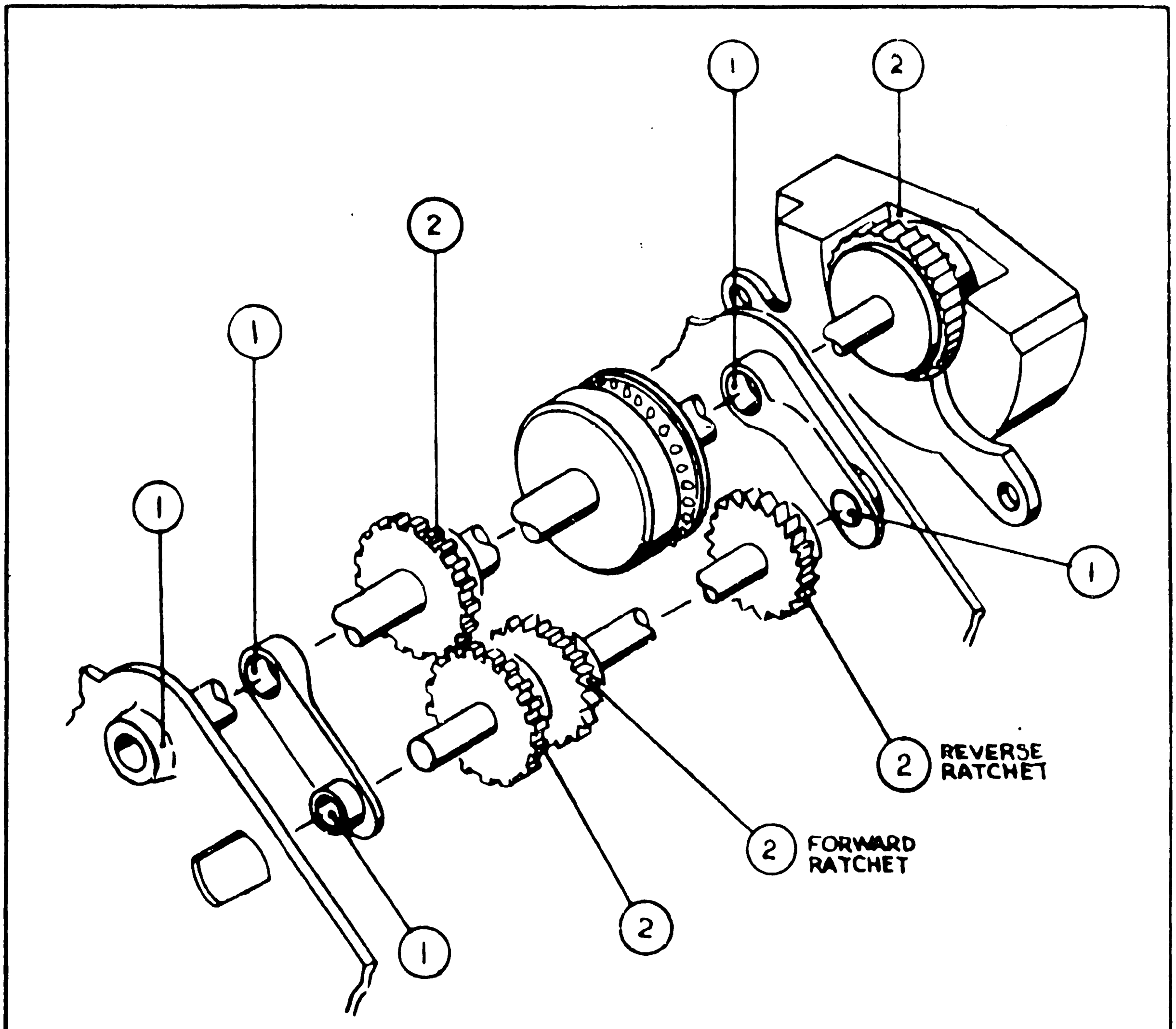


Figure 3.18 Lubrication Points: Ratchets, Gears & Pawl

Reference Figure 3.19

A. Lubricate the surface of the pawl carrier eccentric shaft.

B. Lubricate the pivot hole of each one of the nine pawls.

C. Lubricate the tip of each pawl.

D. Grease the contact points of each one of the nine punch driver arms.

E. Grease the pawl contact notch on each one of the punch driver arms.

F. Grease the ends of the pawl yoke return springs and their attachment holes in the pawl yoke and spring anchor bracket.

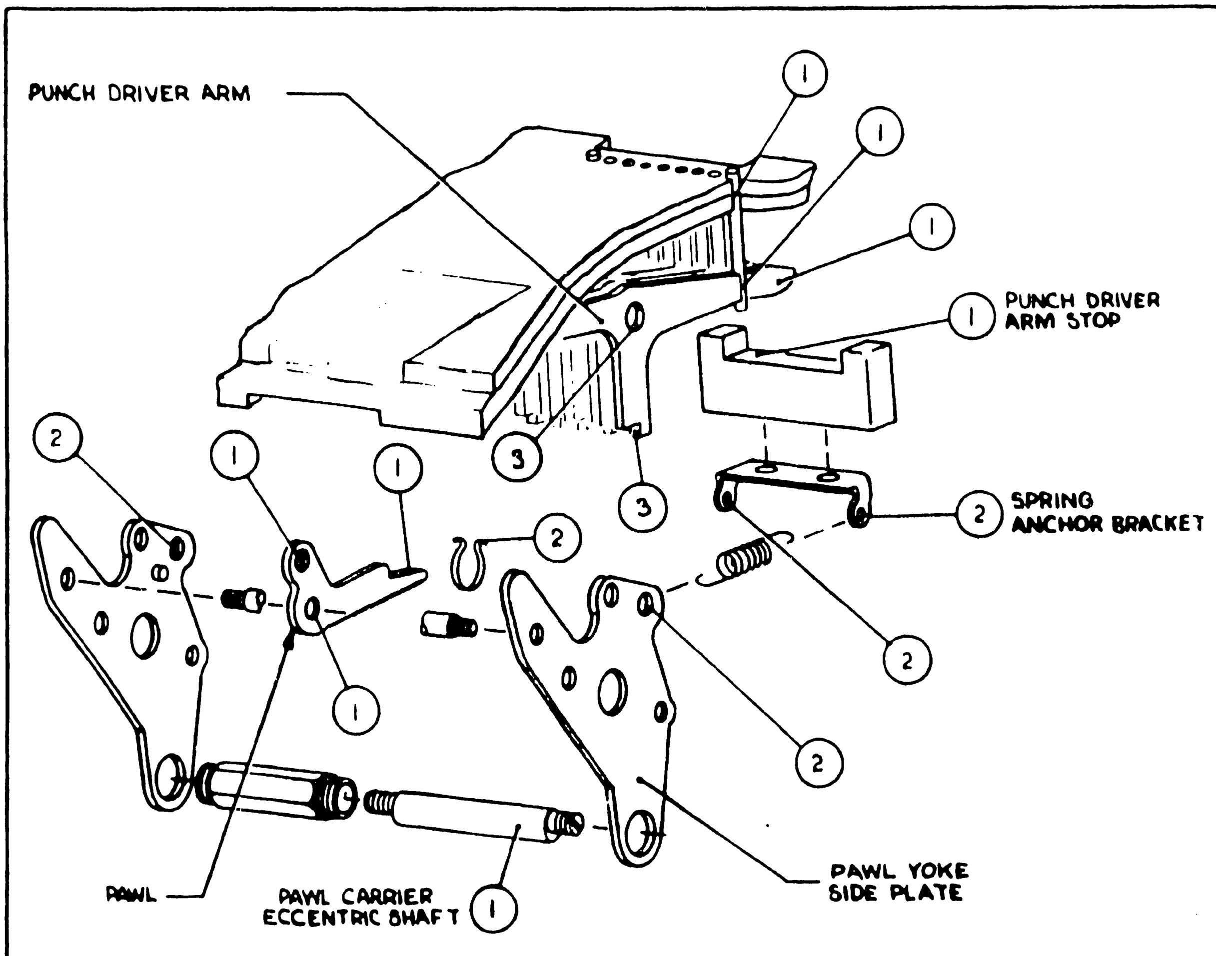


Figure 3.19 Lubrication Points: Pawl & Punch Assembly

Reference Figure 3.19 (continued)

G. Lubricate the upper surface of the punch driver arm stop that contacts the tip of each punch driver arm.

H. Lubricate the contact surface at the end of each one of the punch driver arms.

I. Lubricate the top and bottom of each slot for the index punch and all eight code hole punches.

J. Lubricate the punch guide holes for all nine punches in the lower die plate.

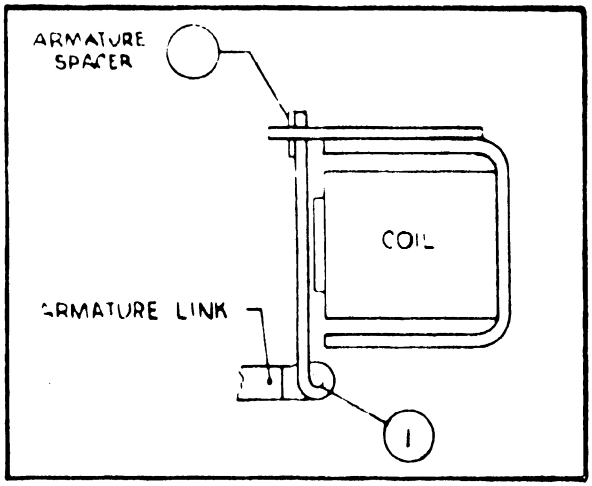


Figure 3.20 Lubrication Points: Solenoid Armatures

Reference Figure 3.20

A. Lubricate both sides of each armature spacer. This must be done on all nine punch solenoid armatures.

B. Lubricate the armature points and link pivot points on all nine solenoids.

CAUTION: Do not get lubricant on armature surfaces, solenoid cores or solenoid frames.

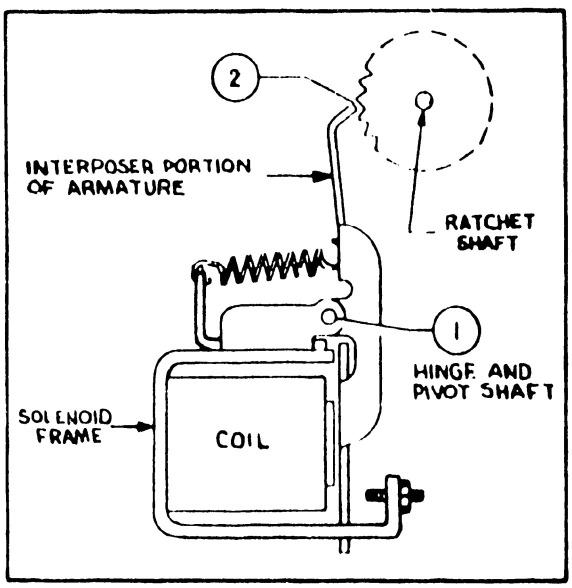


Figure 3.21 Lubrication Points: Feed Solenoid & Ratchet

Reference Figure 3.21

A. Lubricate the inside surfaces of armature pivot holes.

CAUTION: Do not get lubricant on armature surfaces, solenoid cores or solenoid frames.

B. Grease the interposer armature tip.

DRIVE-BELT TENSION

Tension of the drive belt is correct when it can be depressed 1/4 inch with light finger pressure midway between motor and punch drive pulleys.

To adjust, loosen the four motor-mounting screws and nuts, move the motor in the required direction and tighten the nuts.

LUBRICATION

Turn all power OFF, remove the cover, disconnect all plugs and remove the Model 500 punch from the unit. Refer to paragraph 3.12, for cleaning and lubricating the basic punch.

Lubrication points of components of the desk top punch, other than the basic punch, are shown in the following figures. Numerals identify the lubricants listed in Table 3.2,

Reference Figure 4.6

A. Lubricate the rewinder spindle at the points it enters and leaves the rewinder motor gearbox.

B. Lubricate the ends of the ON-OFF switch pivot shaft.

C. Lubricate the tension arm pivot points.

Reference Figure 4.7

A. Lubricate the two pivot holes in the actuating lever.

B. Grease the four contact areas on the overcentering spring.

C. Grease the upper and lower contact surfaces in the two slots on the tension release plate side frames.

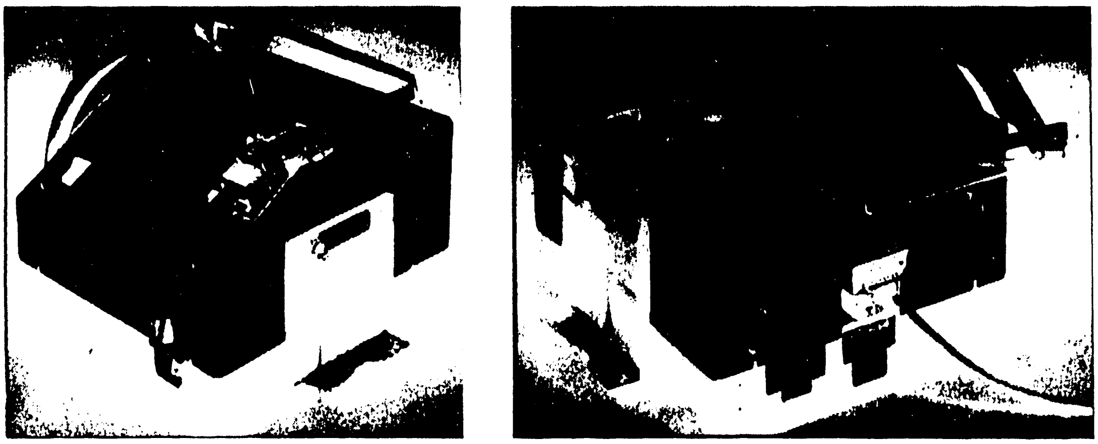
D. Grease the two pivot holes in the tension release plate.

SECTION 4

DESK TOP PUNCH

4.1 GENERAL DESCRIPTION

The desk top punch, Figure 4.1, is a self-contained device that uses a Model 500 punch and contains the necessary accessories for tape handling. It can be supplied with or without electronic logic.



FRONT REAR

Figure 4.1 Desk Top Punch

The desk top unit can fit on furniture, an associated device or the processor. The front of the unit slants forward with space provided for the punch section and a cutout for the tape feed/tape rewind switch.

The drawer has storage space for a tape roll. A tape rewinder is mounted to the left side of the unit. A tape tension and out-of-tape switch at the right front allows tape to be monitored so that punch operation can be stopped before tape tears if a tight tape condition should occur. The cover encloses the entire unit except for the top section of the punch, the bottom drawer, the tape tension switch, the tape rewinder and a connector and fuse at the rear of the unit. The cover can be removed by loosening the two screws at the front and the two at the rear of the unit.

During normal operation, tape unspools from within the drawer, passes through the tape tension and out-of-tape switch and into the punch. When it emerges from the punch, it slips over a guide bar supported by the cover and winds around the idler arm of the rewinder, back over the idler roller of the guide bar and onto the tape reel.

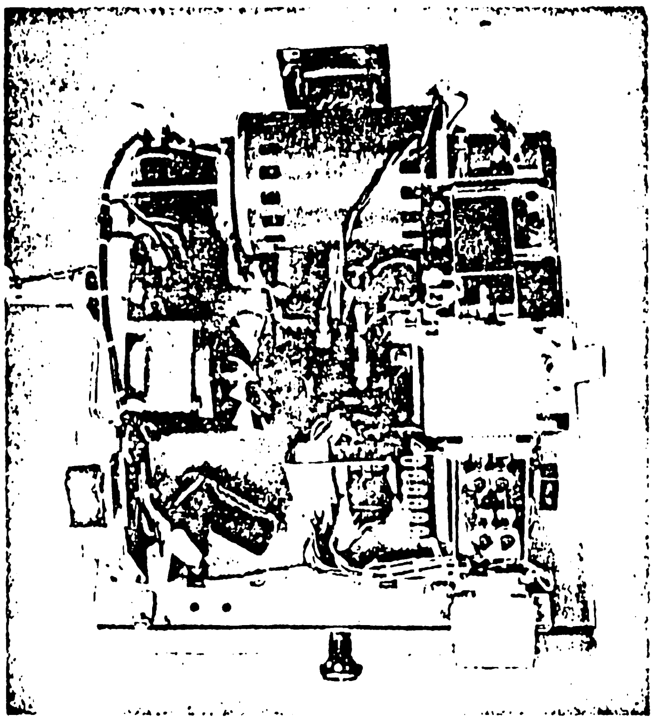


Figure 4.2 Top View of Cabinet with Cover Removed and Connectors Disengaged

The interior of the desk top unit, Figure 4.2, contains the essential parts for operation of the punch drive motor, rewinder drive and rewinder tension stop switch. Parts consist primarily of capacitors, resistors, a microswitch and the required switch actuating linkages. The punch itself is mounted on vibration isolators, two of which are supported by a bracket at the rear. The punch can be removed by loosening the four nuts above its four slotted feet. For ease in removal, nuts and lockwashers should be taken off.

Two connectors, attached to the punch cable, plug into receptacles at the center of the desk top unit. In units without electronics, the receptacles connect directly with that at the rear of the cabinet. This provides a direct path to the punch for interfacing with customer equipment, except that the tape tension switch can be used to stop punch operation if tape begins to hang up at the supply reel drawer. Supply voltages to power the punch drive motor and that of the tape rewinder also enter through the receptacle at the rear of the cabinet.

Models with electronic logic circuits contain these circuits on a board at the center of the interior cabinet. The board is mounted on two brackets, which support the board above some of the other components on the top of the cabinet. The discrete component or integrated circuit board is then interfaced with the punch and the connector at the rear of the desk top unit. Signals received from the central processor are thereby transmitted to the circuit logic and from there to the punch.

Parts of the desk top unit with the punch in place but without the electronic circuit board are shown in Figure 4.2.

4.2 OPERATION - PUNCH

The motor that drives the punch input shaft rotates continuously when power is applied from an external source such as the central processor. The punch can be set up to operate at speeds of up to 50 characters per second. The operation of the punch as a basic unit is described previously in this manual and reference to basic operation should be made in the applicable section.

4.3 OPERATION - TAPE TENSION AND OUT-OF-TAPE SWITCH

The tape tension and out-of-tape switch is mounted to the front of the desk top unit in order to allow tape to be controlled while it is being fed into the punch. If tape hangs up in the tape supply drawer, binds for some other reason before it enters the punch or if tape runs out, the switch will close. The switch must be adjusted so that tape depresses the actuating lever to produce microswitch contact transfer. An out-of-tape condition must release tension on the contact plunger so that contacts transfer. The switch must be adjusted to let the tension release plate drop out when a given value of tape tension is exceeded.

Adjust the switch as follows:

1. Tape tension must not exceed 4 to 6 ounces before the tension release plate drops out. To check this adjustment, insert a piece of tape into the switch as shown in Figure 4.3. Pull the tension release plate forward, insert tape sideways from the left and press the release plate back. Let the tape protrude from the switch at the top and bottom. Doublefold the lower end and pierce a hole through it. Insert a spring gage with a range of 0 to 10 ounces in the hole and hold it while pulling the upper end of the tape in its normal direction of travel. Measure the force required to cause the tape tension plate to drop out.

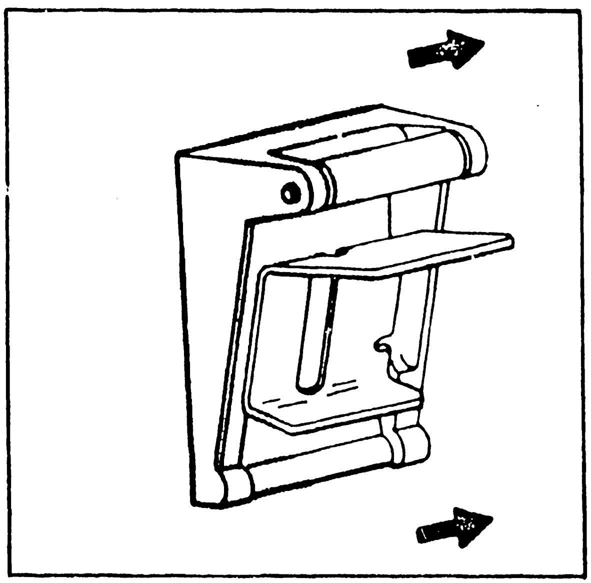


Figure 4.3 Tape Tension Switch

2. If the scale reads above or below the nominal 4 to 6 ounces, make adjustments by changing the setting of the tension adjustment screw; see Figure 4.4. Turning the screw clockwise lowers the upper pressure roller and increases the force required to drop out the tension release plate. Turning the screw counterclockwise reduces the amount of force required to make the plate drop out.

3. To check switch operation, shut off all power. Connect ohmmeter leads to the common and the normally-open terminals of the micro-switch. Remove all tape from the switch. Set the meter to the Rxl range. The meter should indicate full scale.

NOTE: The switch actuating lever is spring-loaded to keep the micro-switch contact plunger depressed when tape is NOT present. This keeps the normally-open contact closed when tape is absent or when the switch opens because of excessive tape tension.

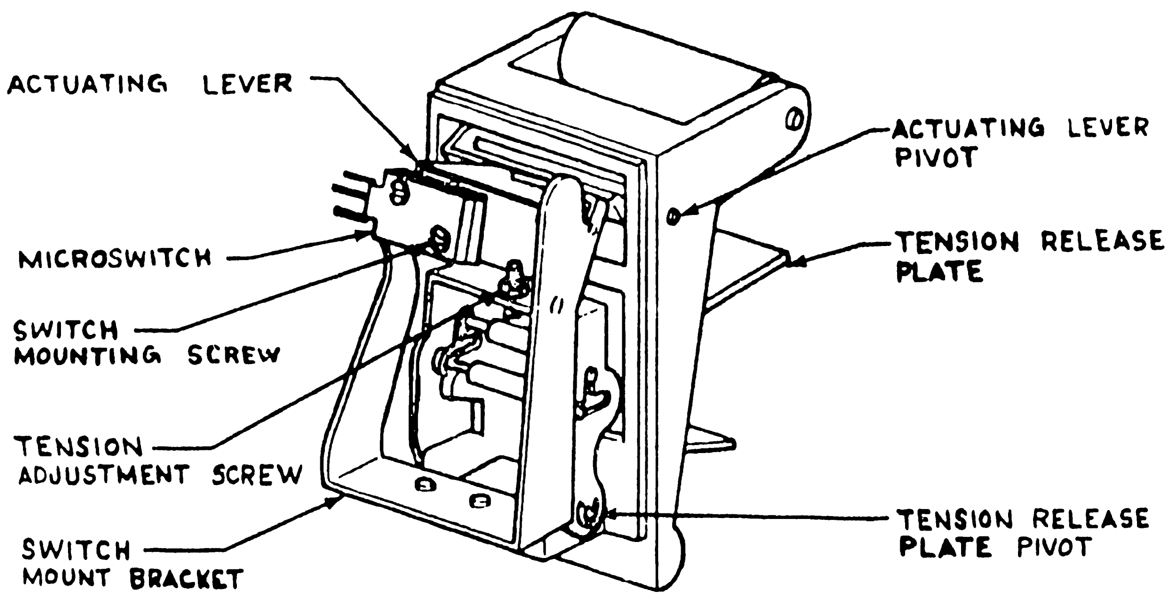


Figure 4.4 Tape Tension Switch Adjustment

4. Insert a piece of tape into the switch and close the tension release plate. The normally-open contact must then open as shown by an infinity reading on the ohmmeter.

5. If the meter readings for steps 3 or 4 do not correspond to those listed, loosen the microswitch mounting screws and carefully adjust the switch until a repeat of the two steps indicates that the switch is set correctly. Then tighten the microswitch mounting screws.

6. Apply power, insert tape, and operate the punch. Check that tape moves freely through the switch without binding. If it binds, check switch installation, tape insertion and the switch adjustment. Make necessary corrections.

NOTE: During normal operation the tension release plate may be pulled forward to halt punch operation.

4.4 ON-OFF-FEED SWITCH

Tape rewinding is controlled with a switch on the left-hand side of the forward cover section. The switch has three positions: ON, OFF and FORWARD FEED. This third position is spring-loaded. Turning the switch from OFF to ON starts the rotation of the rewinder motor and that of the tape reel, provided that tape is slack and ready for spooling.

The switch must be held down in the third position to override the normal spring loading. As long as the switch is held down it will cause the punch to advance tape while, simultaneously, punching sprocket holes into - as yet - unperforated tape. Releasing the switch from this position causes punch operation to stop but it keeps the rewinder motor energized for tape take-up.

CAUTION: The feed switch should be used only to prepare tape leaders or trailers. If the switch is depressed while the punch is operating under processor control, valuable data information may be lost by overriding the processor signal.

4.5 OPERATION - TAPE REWINDER

Rewinding under normal operating conditions begins as soon as enough tape has been fed out of the punch to let the tension arm on the rewind mechanism reach a slack-tape position. This state is obtained when the tension arm, which is spring loaded, moves toward the front of the desk top unit. The rewind operation continues as long as tape is being fed out of the tape supply drawer, through the punch and toward the rewinder.

Under a tight-tape condition or when the punch stops, tape tension begins to increase and the tension arm moves from the front of the unit toward the rear. As it reaches the approximate mid-point of its travel, that is, when it is approximately perpendicular to the base of the desk top unit, it causes microswitch tension contacts to transfer, thereby shutting the rewind drive motor off. The tension arm remains in this position until the punch starts to release more tape or until the operator turns the control switch to OFF.

4.6 ADJUSTMENT - TAPE REWINDER

1. Lift the tension arm to its perpendicular position; Figure 4.5. If the microswitch is transferred before this position is reached or does not transfer when this position is reached, loosen the cam setscrew. With the arm in the perpendicular position, adjust the cam so the microswitch transfers and tighten the setscrew.

2. Using a spring scale, determine that tension on the idler roller at the point the microswitch is transferred is one to two ounces. If it is not, loosen the spring stud and hold the tension arm at the switch transfer position with the spring scale. Turn the return-spring collar until the required tension is read and tighten the stud.

3. Torque on the spindle must be nine to twelve inch-ounces. To adjust this torque, loosen the setscrew on the torque collar, move the collar, as necessary, until the required torque is provided, and tighten the setscrew.

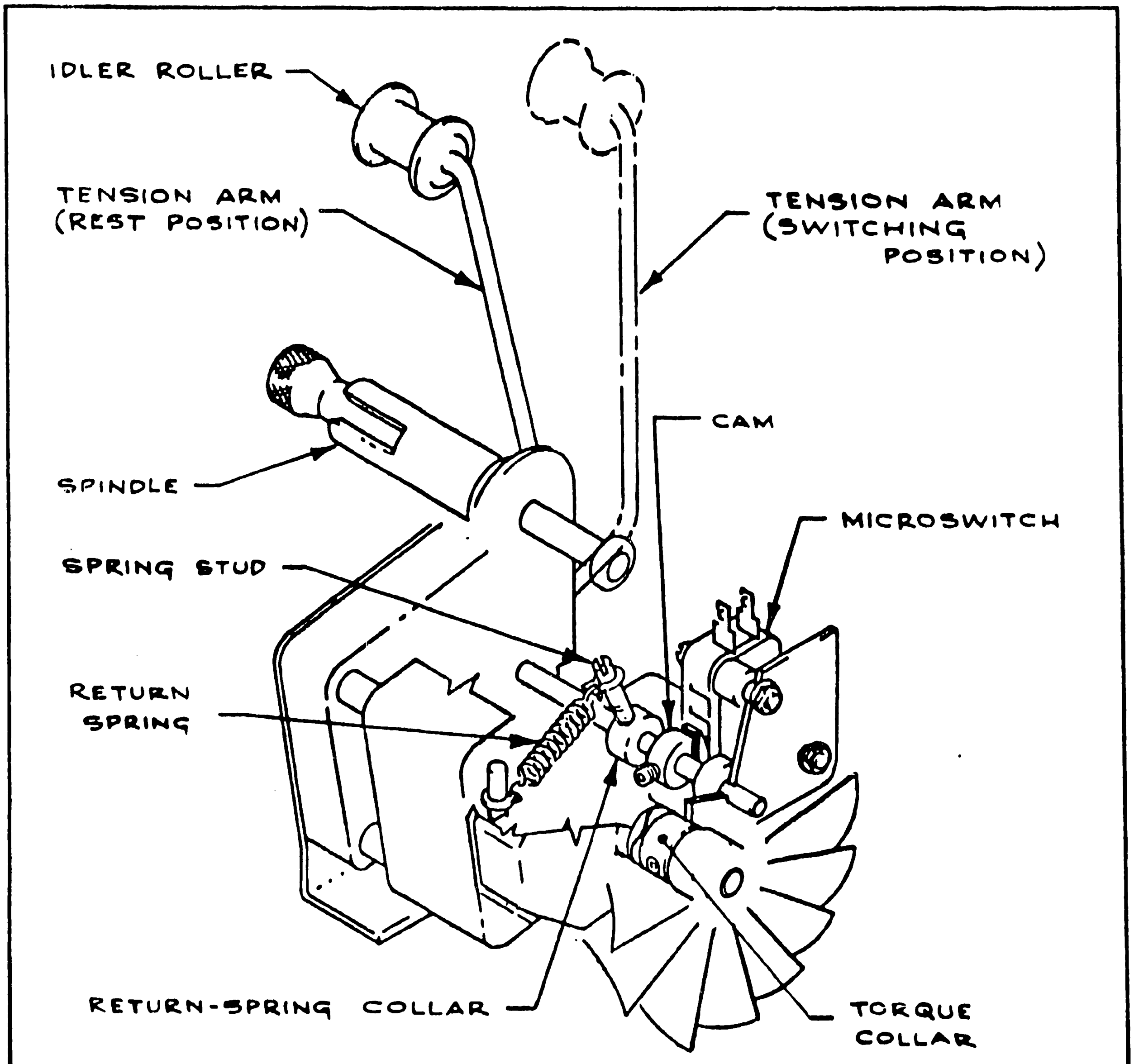


Figure 4.5 Tape Rewinder

4.7 DRIVE-BELT TENSION

Tension of the drive belt is correct when it can be depressed 1/4 inch with light finger pressure midway between motor and punch drive pulleys.

To adjust, loosen the four motor-mounting screws and nuts, move the motor in the required direction and tighten the nuts.

4.8 LUBRICATION

Turn all power OFF, remove the cover, disconnect all plugs and remove the Model 500 punch from the unit. Refer to paragraph 3.12, page 3-28, for cleaning and lubricating the basic punch.

Lubrication points of components of the desk top punch, other than the basic punch, are shown in the following figures. Numerals identify the lubricants listed in Table 3.2, page 3-29.

Reference Figure 4.6

A. Lubricate the rewinder spindle at the points it enters and leaves the rewinder motor gear-box.

B. Lubricate the ends of the ON-OFF switch pivot shaft.

C. Lubricate the tension arm pivot points.

Reference Figure 4.7

A. Lubricate the two pivot holes in the actuating lever.

B. Grease the four contact areas on the overcentering spring.

C. Grease the upper and lower contact surfaces in the two slots on the tension release plate side frames.

D. Grease the two pivot holes in the tension release plate.

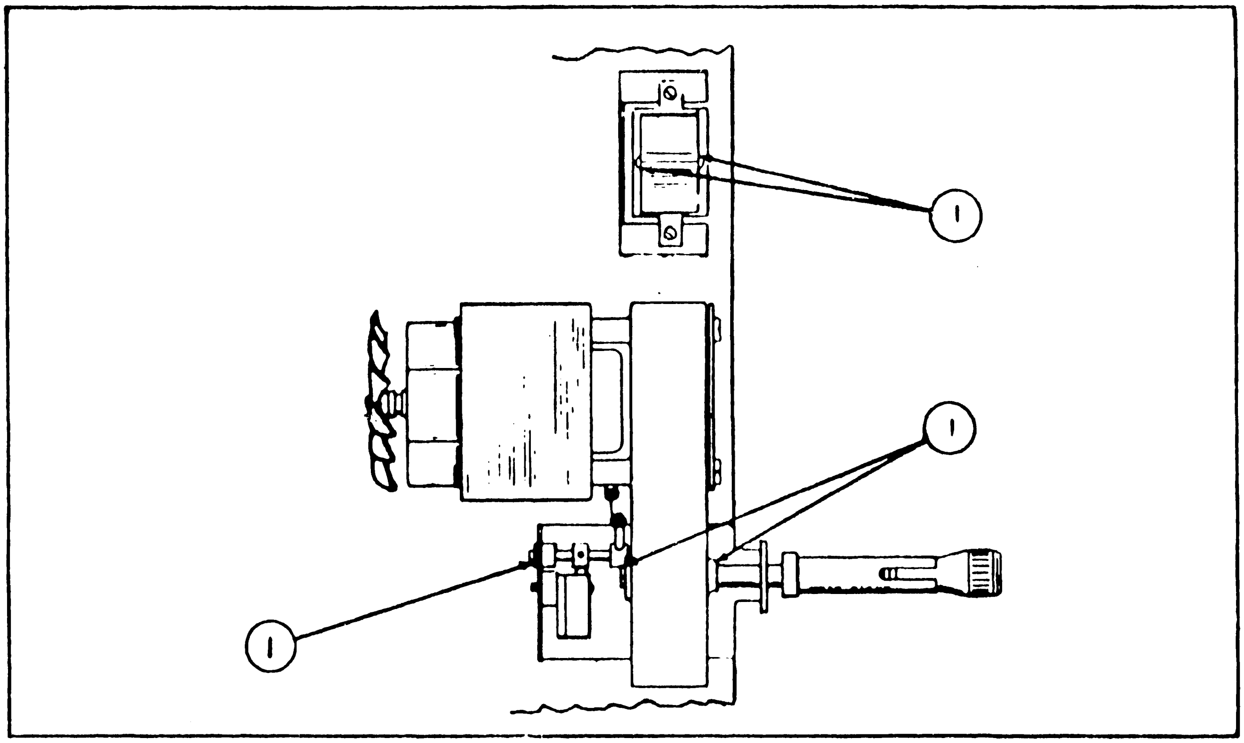


Figure 4.6 Lubrication Points: Tape Rewinder

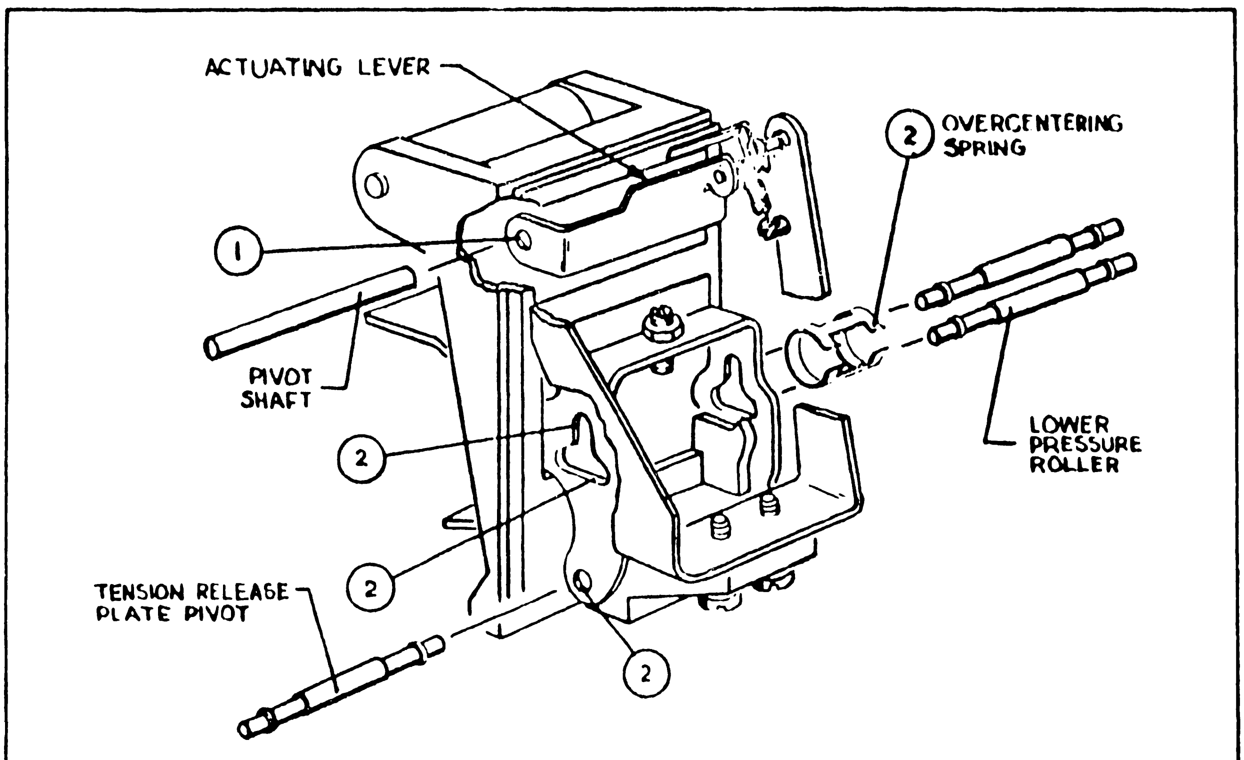


Figure 4.7 Lubrication Points: Tape Tension Switch

APPENDIX C

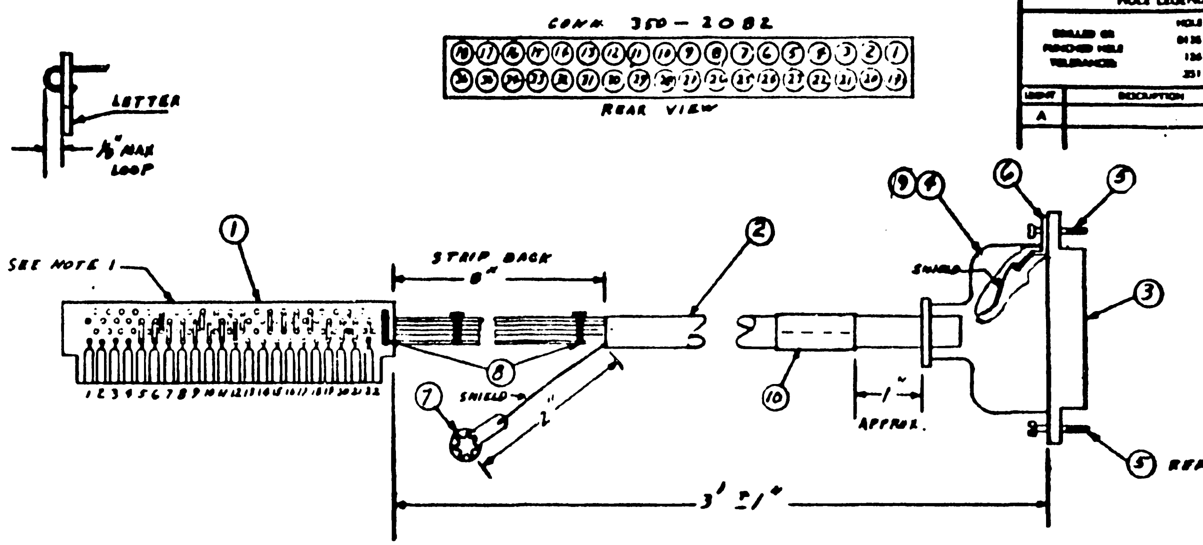
SUPPORTING DRAWINGS

APPENDIX C

SUPPORTING DRAWINGS

DRAWING #	SIZE	TITLE
6482-151	C	928 INTERFACE BOX I/O CABLE ASSY.
6482-152	C	928 INTERFACE BOX KYBD. CABLE ASSY.
6482-153	B	928 INTERFACE PRINTER KYBD. CABLE (21W)
6577	E	LOGIBLOC 6577 FORMAT AND PRINTING CONTROL
6727	E	INTEL MEMORY AND REGULATOR WITH UNDERSCORE (21W)
6756	D	LOGIBLOC POWER TRANSISTOR BOARD
6761	E	TIMING AND FORMAT CONTROL (31W)
6762(-1)	C	CONTROL PANEL KEYBOARD (31W)
6850-999	D	POWER SUPPLY INTERCONNECTION
7038	B	MATRIX PRINTER KEYBOARD (21W)
7066	B	FINGERBOARD 7066 (LOADING SKETCH) (31W)
7076-2	E	I/O CONTROL DATA STORAGE AND UNDERSCORE (21W)
7160	E	I/O DATA STORAGE AND PROM CHARACTER GENERATOR (31W)
7247	E	LOGIBLOC PRINTER MEMORY (8K)
7249	C	POWER SUPPLY REGULATOR
7341	B	SELECT SWITCH ASSY. BOARD (PIO)
7343	E	PRINTER MOTHERBOARD
7344	D	PAPER TAPE PUNCH REGULATOR (PIO)
7346	E	DATA LINK CONTROL - DAISY PRTR., LINE PRTR., AND PUNCH
7347	E	PRINTER MEMORY (12K)
7348	E	CPU FOR DAISY PRTR., MATRIX PRTR., AND PUNCH

DO NOT SCALE



SIGNAL NAME MDL 61,62	SIGNAL NAME MDL 72	SIGNAL NAME MDL 928	CONN PIN NO.	TWISTED PR. COLORS	FINGER PIN NO.
$\overline{DTSB}$	$\overline{DTSB}$	DATA STROBE	1	RED	P
			19	GRN	13
DT_1	DT_1	DA1A	2	RED	A
			20	ORN	1
DT_2	DT_2	DA2A	3	RED	B
			21	GRY	2
DT_3	DT_3	DA3A	4	RED	C
			22	ORN	3
DT_4	DT_4	DA4A	5	RED	D
			23	BLU	4
DT_5	DT_5	DA5A	6	ORN	E
			24	WHT	5
DT_6	DT_6	DA6A	7	ORN	F
			25	YEL	6
DT_7	DT_7	DA7A	8	ORN	H
			26	BLK	7
DT_8	DT_8	DA8A	9	GRN	J
			27	YEL	8
$\overline{ACKLG}$	$\overline{ACKLG}$	$\overline{ACKLG}$	10	GRN	K
			28	WHT	9
BUSY	BUSY	BUSY	11	GRY	V
			29	BLK	18
PO	PO	PE	12	BLU	L
			30	YEL	10
BL RESET	SLCT IP		13	BLU	
			31	BLK	M
$\overline{FAULT}$	$\overline{FAULT}$		14	BLU	12
			32	WHT	N
$\overline{CLR}$	OSCXT		15	BRN	—
			33	[illegible]	
—	—	—	16	BLK	—
—	—	—	34	[illegible]	
CHGND +0V	CHGND +0V	CHGND +0V	17	[illegible]	SHLD
			35	[illegible]	18
+5V	+5V.	+5V.IN	18	GRY	U
			36	BLK	17

FEB 15 1979

WANG PART NO	ITEM	QTY	NAME	MATERIAL	DESCRIPTION
606-0165	10	1	HEATSHRINK MARKER		1/2" DIA
350-4233G	9	1	STRAIN RELIEF COVER		GROOVE HALF
605-1004	8	3	TYRAP		
654-1006	7	1	GROUND LUG		#6
450-0361	6	1	GROUND STRAP		B6815-28
350-4234	5	2	SCREW CAPTIVE		
350-4233-T	4	1	STRAIN RELIEF COVER		TONGUE HALF
350-2082	3	1	CONNECTOR 36POS(MALE)		AMP.
420-0058	2	4FT	CABLE 36 CONDUCTOR T.P. SHIELDED		
510-6703	1	1	PC BOARD 6703		

WANG LABORATORIES, INC. TEWKSBURY MASS. U.S.A.

BY	DATE	APPROVED BY	DATE
DWN	[illegible]	E ENGR	
CHK		M ENGR	
E C CONTROL		MFG ENGR	

MODEL NO 928

TITLE 928 INTERFACE BOX I/O CABLE ASSY

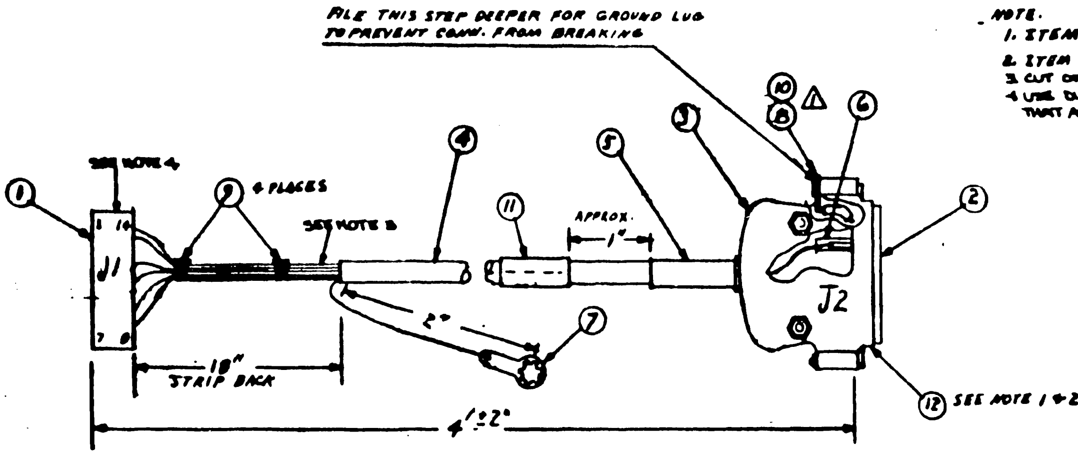
WANG PART NUMBER	SIZE	DRAWING NUMBER	REV
220-0165	C	6482-151	4

SCALE — SHT 1 OF 1

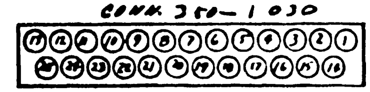
151-6482 C

PILE THIS STEP DEEPER FOR GROUND LUG TO PREVENT CONN. FROM BREAKING

NOTE.
1. ITEM 12 IS NOT SHOWN
2. ITEM 12 APPLIED AFTER INSPECTION
3. CUT OFF WIRES NOT USED
4. USE DUMMY PINS IN HOLES THAT ARE NOT USED



CONN. 350-1030

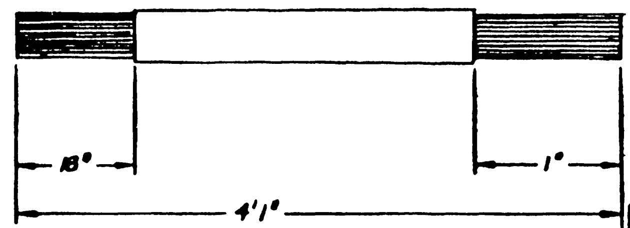


REAR VIEW

SIGNAL	J1	WIRE NO.	J2
+5VR	14	14	14
—	—	—	15
ØV	13	13	16
SEL	2	2	17
+5VR	12	12	18
$\overline{SEL}$	3	3	19
—	—	—	20
S1	11	11	21
TOF	4	4	22
ØV	6	6	23
P2	8	8	24
S2	7	7	25

STRIP 5/32"

STRIP 5/32"



FEB 15 1979

WANG PART NO	ITEM	QTY	NAME	MATERIAL	DESCRIPTION
685-0099	12	1	BUBBLE BAG		5¼" x 4"
606-0166	11	1	HEATSHRINK MARKER		3/8" DIA
605-0123	10		SHRINK TUBING TYPE RNF		3/16" ID BLK: ½" LG
660-0202X		A/R	SOLDER		SN 63-37
605-1006	9	4	TYRAP		
458-0361	8	1	GROUND STRAP		C6815-28
654-1006	7	1	GROUND LUG #6		
605-0002	6	10	SLEEVE		#16 TUBING 1/4" LONG
350-4103	5	1	BUSHING MS 3420-6		
420-0068	4	A/R	CABLE 15 CONDUCTOR SHIELDED		
350-4215	3	1	CONNECTOR SHELL		
350-1030	2	1	CONNECTOR 25 POS		
376-9013	1	1	CONNECTOR 14 PIN AUGAT		

REVISION		
0	ORG. RELEASE	
1	REV. PER ECN #7240 T.R.P. 7/27/77	
2	REV. PER ECN #7502 T.R.P. 9/26/77	
3	REV PER ECN #8546 TRP 12-13-77	G.D. 7/14/78
4	REV PER ECN #8840 6-19-78	G.D.
5	REV PER ECN #9129 8-8-78	G.D.
6	REV PER ECN #9254 8-9-78	SD
7	REV PER ECN #9825 APP. D	

WANG LABORATORIES, INC. TEWKSBURY MASS. U.S.A.

	BY	DATE	APPROVED BY	DATE
DWN		2-16-7	E ENGR	
CHK			M ENGR	
E C CONTROL			MFG ENGR	6/19/7

MATERIAL

FINISH

MODEL NO 928

SEE ENGRG SPECIFICATIONS No.

TOL. EX. AS NOTED

SCALE | SHT 1 OF 1

TITLE 928 INTERFACE BOX KBD CABLE ASS'Y

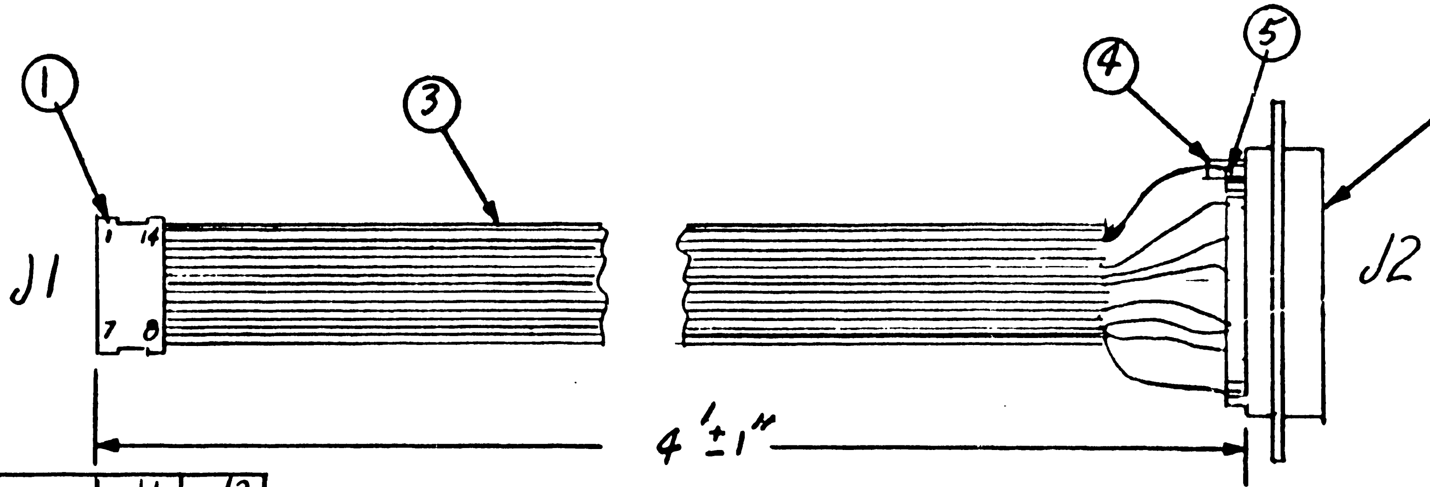
WANG PART NUMBER	SIZE	DRAWING NUMBER	REV
220-0166	C	6482-152	7

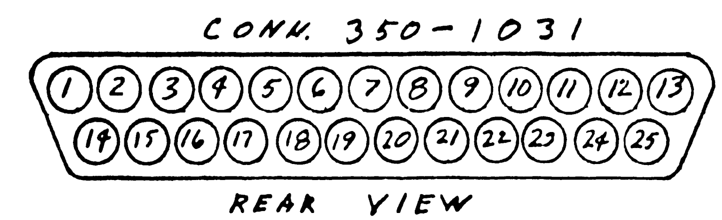
C 6482-152

6 5 4 DO NOT SCALE 3 2 1

HOLE LEGEND			
	HOLE	DIA.	TOL.
DRILLED OR PUNCHED HOLE TOLERANCES:	.0135 to .125		+.003 −.001
	.126 to .250		+.004 −.001
	.251 to .500		+.005 −.001

IDENT.	DESCRIPTION	QTY.
A		





6482-153

SIGNAL	J1	J2
+5V	14	14
		15
±0V	13	16
SEL	2	17
+5V	12	18
$\overline{SEL}$	3	19
		20
$\overline{SL}$	11	21
TOF	4	22
±0V	6	23
$\overline{PL}$	8	24
$\overline{FL}$	7	25

FEB 15 1978

WANG PART NO.	ITEM	QTY.	NAME	MATERIAL	DESCRIPTION
660-0203	5	A/R	SOLDER		SN 63-37
605-0002	4	10	SLEEVE		#15 TUBING 1/2" LONG
420-0042	3	4.00	14 CONDUCTOR FLAT CABLE		
350-1031	2	1	CONNECTOR 25 POS FEMALE		
350-0400	1	1	CONNECTOR 14 PIN FLAT CABLE		

NO	REVISION	DATE	BY
0	ORG PER DWR #E310		

Qty. Per Unit	FIRST USED ON	ASSY USED ON

WANG LABORATORIES, INC. TEWKSBURY, MASS. U. S. A.

	BY	DATE	APPROVED BY	DATE
DWN	[illegible]	2/16/77	E ENGR	
CHK			M ENGR	
E. C. CONTROL			MFG ENGR [illegible]	6/19/77

MATERIAL

MODEL NO. 928

SEE ENGRG SPECIFICATIONS No.

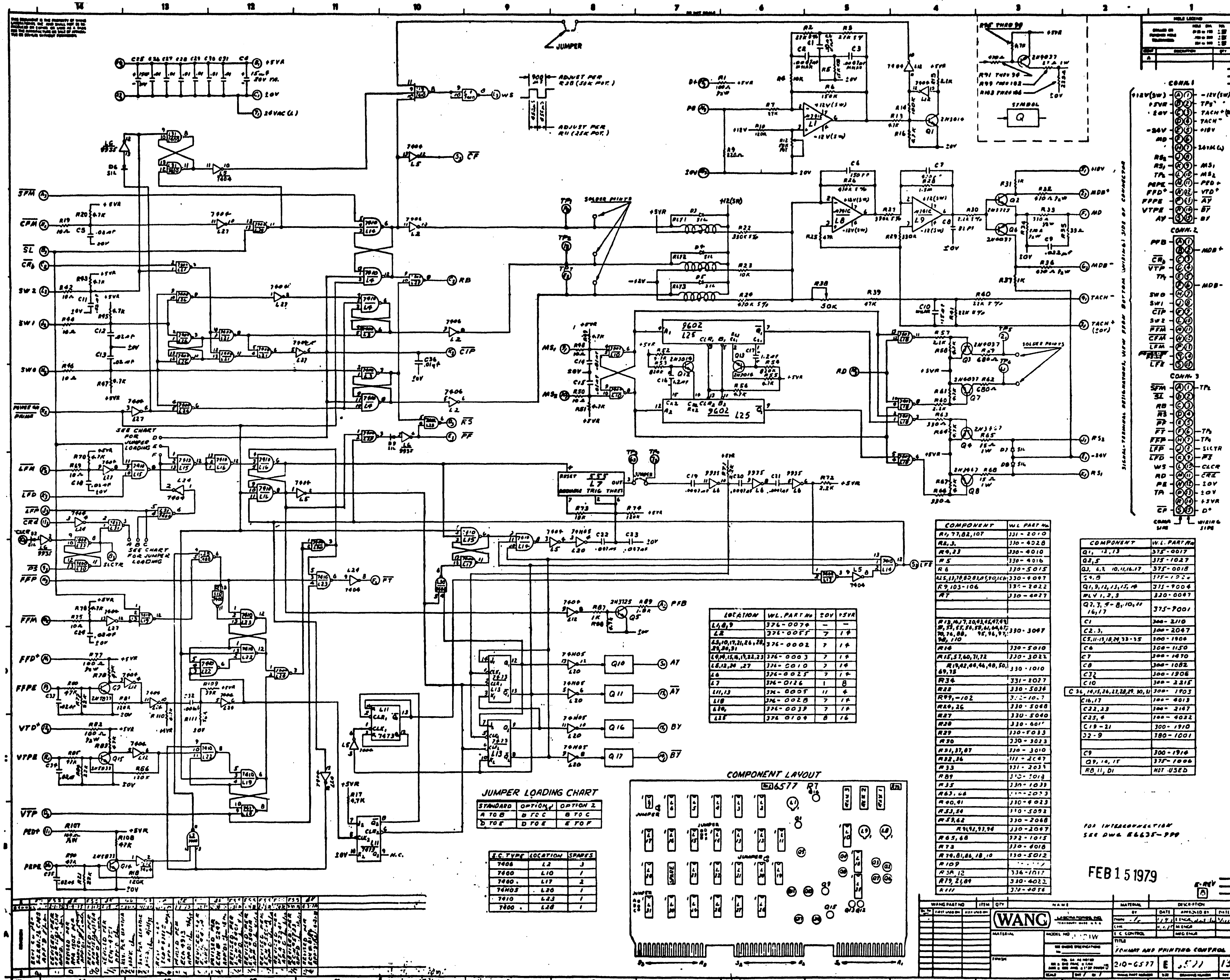
FINISH

TOL. EX. AS NOTED .XX ± .010 FRAC. ± 1/64 .XXX ± .005 ANG. ± 1°30' FINISH 125

SCALE NTS | SHT 1 OF 1

TITLE 928 INTERFACE PRINTER KBD CABLE (21W)

WANG PART NUMBER	SIZE	DRAWING NUMBER	REV.
220-3026	B	6482-153	0



COMPONENT	W.L. PART No.
R1, 77, 82, 107	331-2010
R2, 3.	330-4028
R4, 23	330-4010
R5	330-4016
R6	330-5015
R25,33,78,80,83,85,90,104	330-4047
R9, 103-106	330-2022
R7	330-4027
R13,16,17,20,43,45,47,49, 51,52,55,56,58,61,64,67, 70,76,88. 95,96,97, 98,110	330-3047
R14	330-5010
R15,57,60,71,72	330-3022
R19,42,44,46,48,50, 69,75	330-1010
R34	331-2027
R22	330-5036
R99, -102	[illegible]
R24, 26	330-5068
R27	330-5040
R28	330-601[illegible]
R29	330-5033
R30	330-3023
R31, 37, 87	330-3010
R32, 36	331-2047
R33	331-2039
R89	[illegible]
R35	330-1033
R63, 66	[illegible]
R40, 41	330-4023
R53, 54	330-5092
R59, 62	330-2068
R91,92,93,94	330-2047
R65, 68	332-1015
R73	330-4018
R79, 81, 86, 18, 10	330-5012
R109	[illegible]
R38, 12	336-1017
R19, 21, 84	330-4022
R111	330-4056

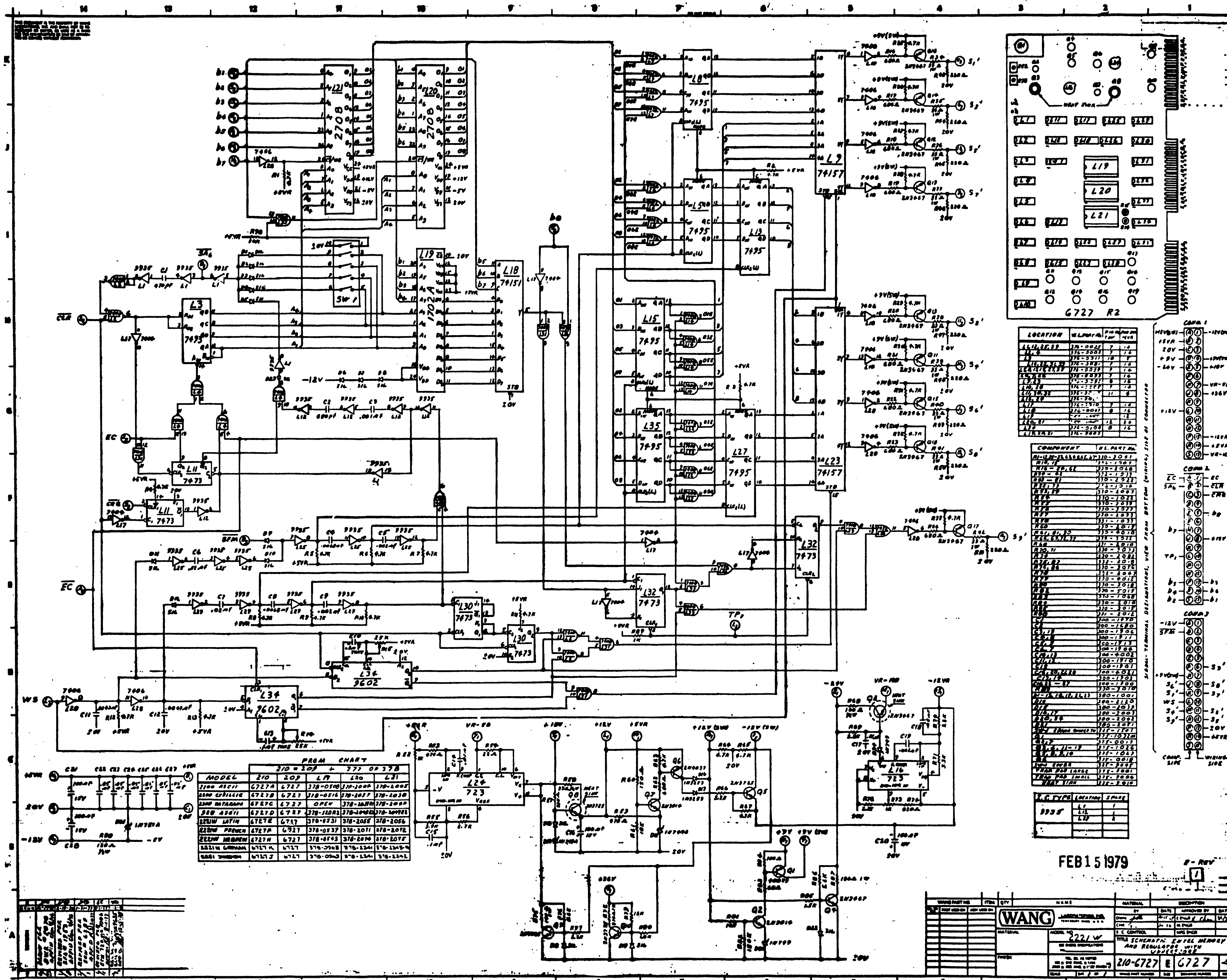
COMPONENT	W.L. PART No.
Q1, 12, 13	375-0017
Q2, 5	375-1027
Q3, 6, 7, 10, 11, 16, 17	375-0018
Q4, 8	[illegible]
Q1, 9, 12, 13, 15, 14	375-9004
RLY 1, 2, 3	320-0047
Q2, 3, 4-8, 10, 11 16, 17	375-9001
C1	300-2110
C2, 3,	300-2047
C5, 11-13, 18, 24, 33-35	300-1906
C6	300-1150
C7	300-1470
C8	300-1082
C32	300-1906
C10	300-2215
C36, 14, 15, 26, 27, 28, 29, 30, 31	300-1903
C16, 17	300-4013
C22, 23	300-2147
C25, 4	300-4022
C19-21	300-1910
D2-9	380-1001
C9	300-1914
Q9, 14, 15	375-1006
R8, 11, D1	NOT USED

LOCATION	W.L. PART No.	20V	+5VR
L1, 8, 9	376-0074	—	—
L2	376-0055	7	14
L3,10,17,21,26,28, 29,30,31	376-0002	7	14
L4,14,15,16,19,22,23	376-0003	7	14
L5,12,24,27	376-0010	7	14
L6	376-0025	7	14
L7	376-0126	1	8
L11, 13	376-0005	11	4
L18	376-0028	7	14
L20	376-0039	7	14
L25	376-0104	8	16

JUMPER LOADING CHART

STANDARD	OPTION 1	OPTION 2
A TO B	B TO C	B TO C
D TO E	D TO E	E TO F

I.C. TYPE	LOCATION	SPARES
7406	L2	3
7400	L10	1
7400	L17	2
74H05	L20	1
7410	L23	1
7400	L28	1

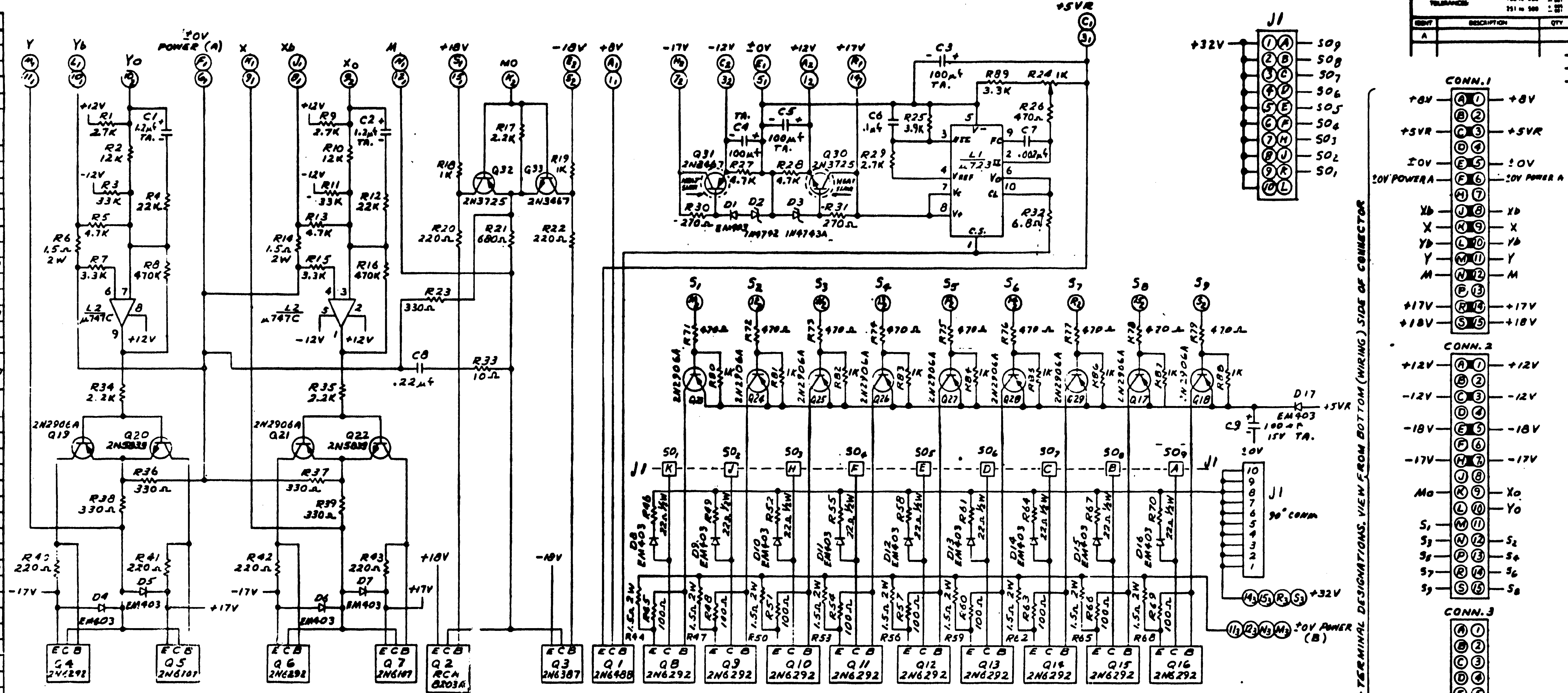


PROM CHART

MODEL	210	209	L19	L20	L21
	210 = 209 + 777 OR 378				
2200 ASCII	6727A	6727	378-0508	378-2004	378-2005
2200 CYRILLIC	6727B	6727	378-0516	378-2037	378-2038
2200 KATAKANA	6727C	6727	OPEN	[illegible]	378-2060
928 ASCII	6727D	6727	378-320R2	[illegible]	[illegible]
222W LATIN	6727E	6727	378-0531	378-2055	378-2056
222W FRENCH	6727F	6727	378-0537	378-2071	378-2072
222W HEBREW	6727H	6727	378-0543	378-2074	378-2075
2221W GERMAN	6727K	6727	[illegible]	378-2241	[illegible]
2221 SWEDEN	6727J	6727	[illegible]	378-2241	378-2242

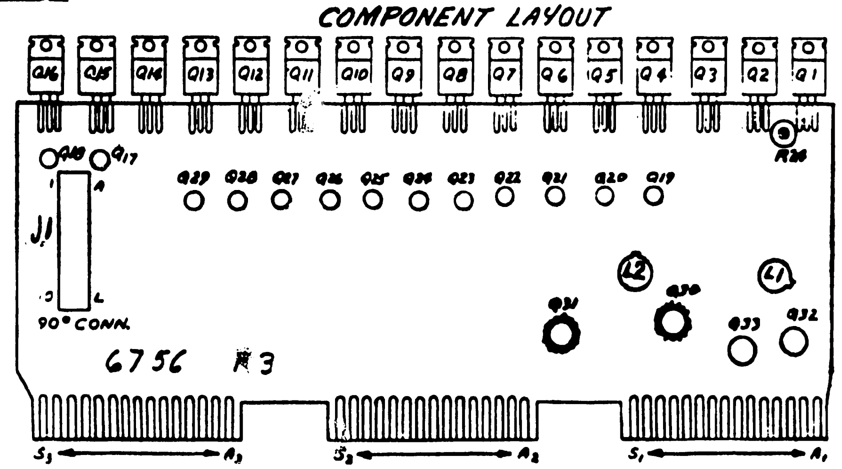
FEB 15 1979

COMPONENT	W.L. NO.
R1,8,29	330-3027
R,2,10	330-4012
R3,11	330-4033
R4,12	330-4022
R5,13,22,28	330-3047
R6,14,44,47 50,53,56,59 62,65,68	330-0026
R7,15,89	330-3033
R8,16	330-5047
R18,19,80-88	330-3010
R20,22,40-43	330-2022
R21	330-2068
R23,36,37,38,39	330-2033
R24	330-1014
R25	330-3039
R26,71-79	330-2047
R17,34,35	330-3022
R30,31	330-2027
R32	330-0068
R33	330-1010
R45,48,51,54 57,60,63,66, 69	330-2010
R46,49,52,55, 58,61,64,67,70	331-1022
C1,2	300-4013
C3,4,5,9	300-9021
C6	300-1901
C7	300-1913
C8	300-1926
D1,4-17	380-4000
D2,	380-2121
D3	380-2113
Q1	375-1054
Q2	375-1053
Q3	375-1052
Q4,6	375-1051
Q5,7	375-1050
Q8-16	375-1051
Q17,18,19,21 23-29	375-1017
Q20,22	375-1006
Q30,32	375-1027
Q31,33	375-1026
H.SINK	375-9010
TRANSIPAD LARGE	375-9001
TRANSIPAD SMALL	375-9004
J1	350-0037



I.C. LOCATION	W.L. NO.	TERM. FOR ±OV	TERM. FOR VCC +5VR
L1	376-0066	5	
L2	376-0187		

COMPONENT LAYOUT

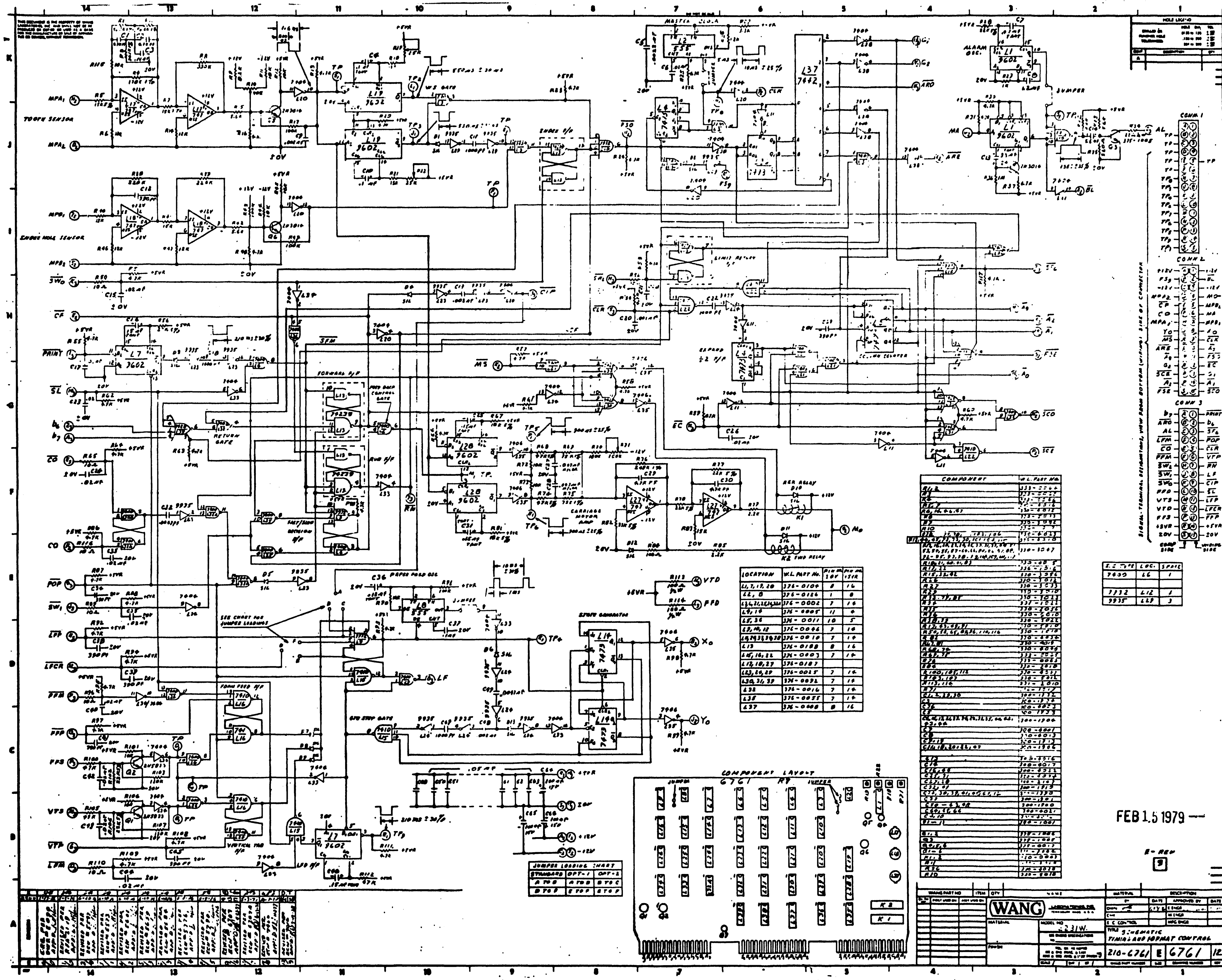


FEB 15 1979

E-REV 4

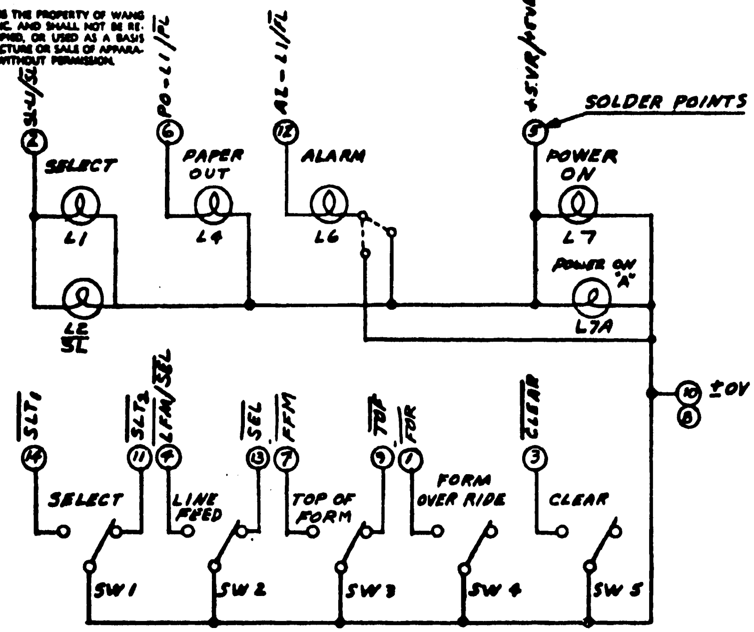
REVISION	ORIGINATED PER DWR 8029 APP'D	REVISED PER R1A 1876 APP'D	REVISED PER REAR 2092 APP'D	REVISED PER	REVISED PER	REVISED PER	REVISED PER	REVISED PER	REVISED PER ECN
	0	1	2						

WANG PART NO	ITEM	QTY	NAME	MATERIAL / DESCRIPTION
WANG LABORATORIES, INC. TEWKSBURY MASS. U.S.A.				
MODEL NO	L2 MATRIX PRINTER			
TITLE	SCHEMATIC LOGIBLOC POWER TRANSISTOR BOARD			
DWN	F.S.S.	7-17-75		
CHK	G.D.			
WANG PART NUMBER	210-6756	SIZE D	DRAWING NUMBER 6756	REV 9
SCALE		SHT 1 OF 1		



FEB 15 1979
E-REV
9
WANG
MODEL NO 2231W.
TITLE SCHEMATIC TIMING AND FORMAT CONTROL
210-6761
E
6761
12
COMPONENT LAYOUT
6761

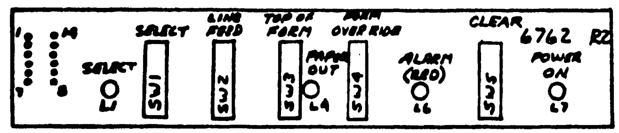
DO NOT SCALE

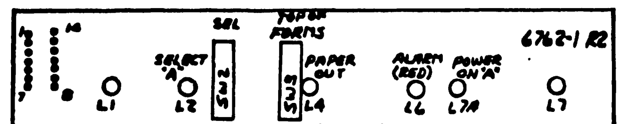


LOADING CHART		
.2231-W	928-2231W	W.L. PT NO.
SW1		325-2305
SW2,3,4,5	SW 2,3.	325-2300
L1,4,6,7	L2,4,6,7A	370-0015
L1,4,6,7	L1,2,4,6,7,7A	370-1020
L1,4,6,7	L1,2,4,6,7,7A	652-3002
IC. PAD	IC PAD	376-9008

HOLE LEGEND		
DRILLED OR PUNCHED HOLE TOLERANCES	HOLE DIA.	TOL.
	.0135 to .125	
	.126 to .250	
	.251 to .500	

IDENT.	DESCRIPTION	QTY.
A		





FEB 15 1979

E-REV 0

REVISION					
0	ORG. PER. DWR. E096 APP: D	1-14-76			
1	CHG. PER. RFA 8017 APP: D	1-1-76	R.A.		
2	REVISED PER. E.C.N. 5504 & RFA 2149 APP: D	6-17-76			
3	REVISED PER. ECN # 5823 APP: D	3-19-76			
4	REVISED PER ECN # 6870 APP: D 3-4-77	2-17-77	EBR		

WANG PART NO	ITEM	QTY	NAME	MATERIAL	DESCRIPTION

WANG LABORATORIES, INC. TEWKSBURY MASS. U.S.A.

	BY	DATE	APPROVED BY	DATE
DWN		1-14-76	E ENGR	
CHK		1-17-76	M ENGR	
E C CONTROL			MFG ENGR	

MATERIAL

MODEL NO 2231

SEE ENGRG SPECIFICATIONS No.

FINISH

TOL. EX AS NOTED XX ± .010 FRAC. ± 1/64 XXX ± .005 ANG. ± 1°30' FINISH

SCALE | SHT 4 OF 5

TITLE SCHEMATIC. CONTROL PANEL KEYBOARD

WANG PART NUMBER	SIZE	DRAWING NUMBER	REV
SEE ABOVE	C	6762	4.

C 6762

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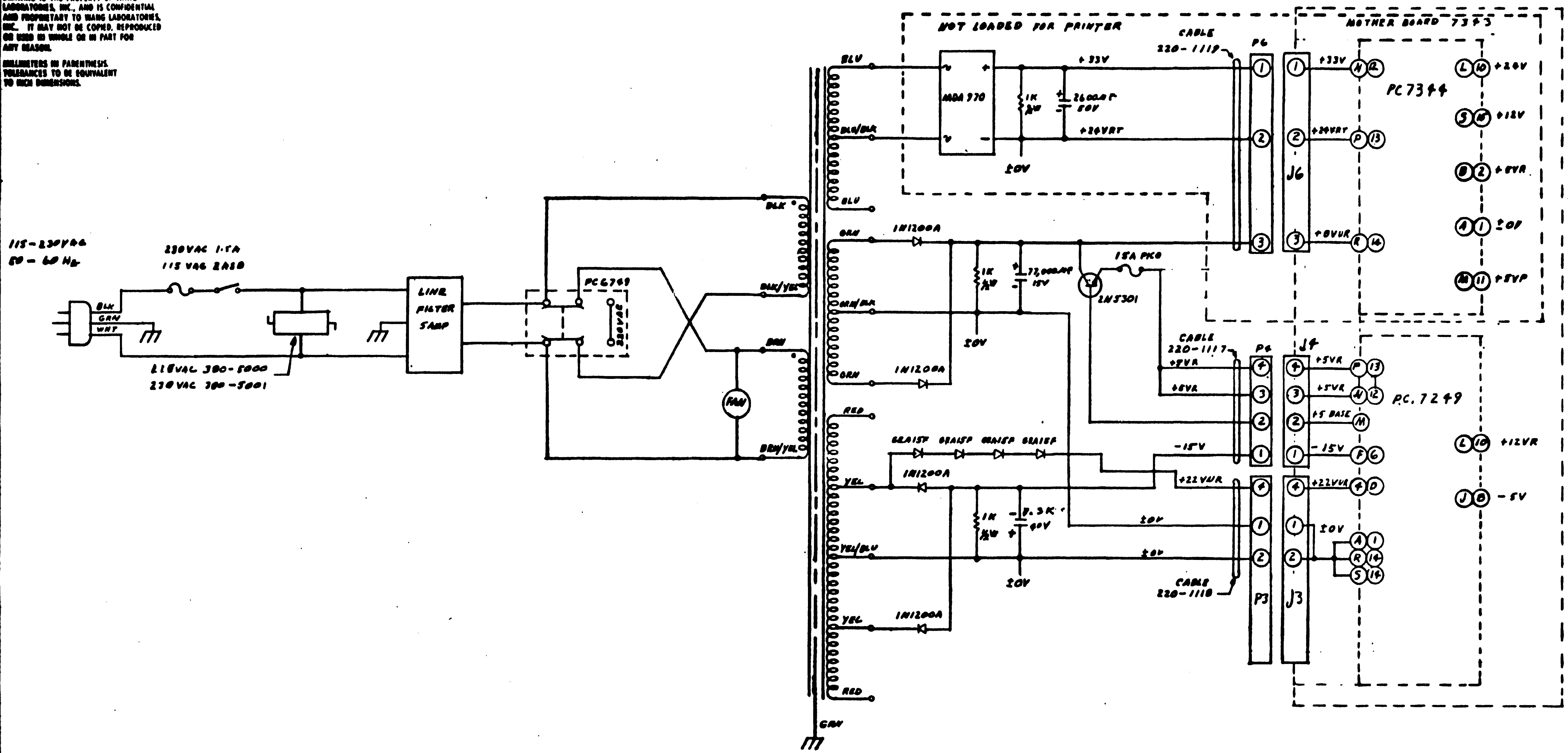
MILLIMETERS IN PARENTHESIS. TOLERANCES TO BE EQUIVALENT TO INCH DIMENSIONS.



E-REV
0

FEB 15 1979

QTY	ITEM	WANG PART NO	DRAWING NO	DESCRIPTION
NEXT ASSY				

WANG LABORATORIES, INC. TEWKSBURY MASS. U.S.A.

MODEL NO 928 PTPO

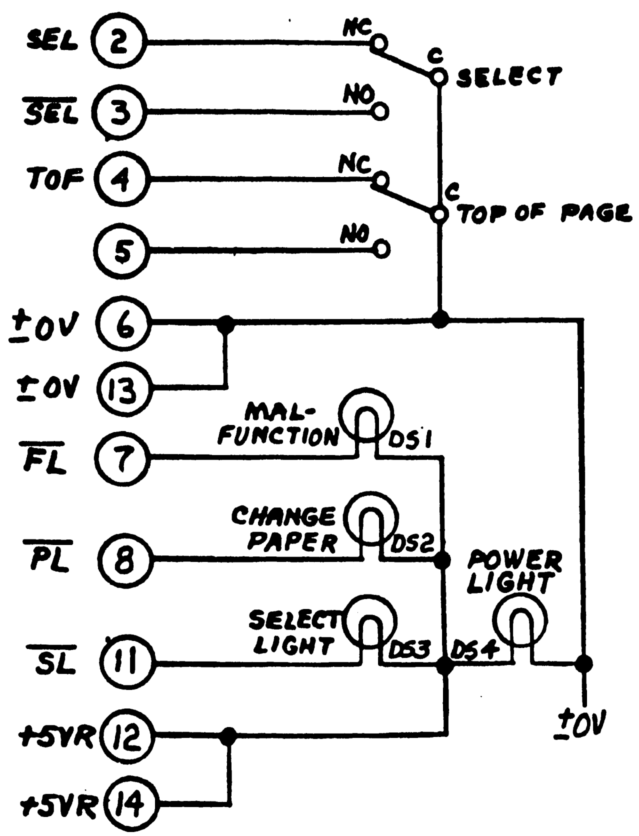
TITLE SCHEMATIC P.S. INTERCONNECTION

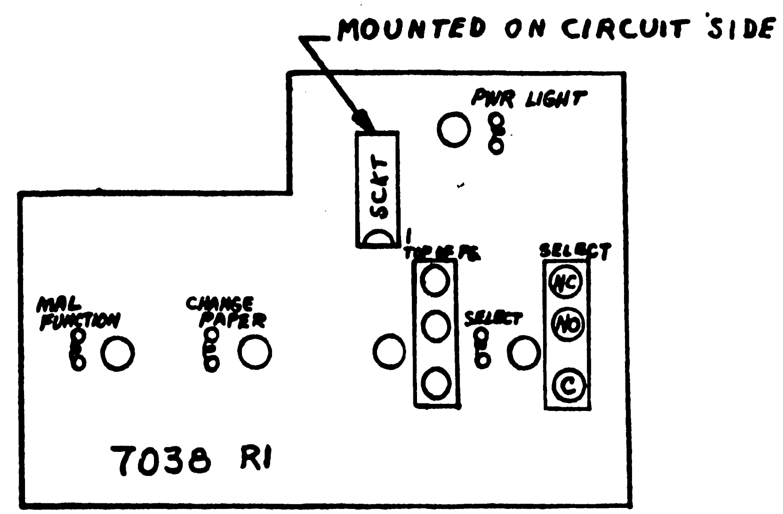
D 6850-999 0

DO NOT SCALE

HOLE LEGEND			
DRILLED OR PUNCHED HOLE TOLERANCES:	HOLE DIA.		TOL.
	.0135 to .125		+.003 −.001
	.126 to .250		+.004 −.001
	.251 to .500		+.005 −.001

IDENT.	DESCRIPTION	QTY.
A		





COMPONENT LAYOUT

COMPONENT	W.L. PART NO.
DS1 - DS4	370-0015
DS1-4 HOLDER	370-1020
NYLON NUT	652-3002
SW1,2	325-2305
I.C. PAD	376-9008
SOCKET	376-9012

FEB 15 1979

E-REV
0

NO.	REVISION	DATE	BY
0	ORIGINATED PER DWR # E215 APP'D: [illegible] 3-4-77	11-8-76	EK
1	REVISED PER ECN # 6335 APP'D [illegible] 3-4-77	3-1-77	EBA
2	REVISED PER ECN # 6561 APP'D [illegible] 3-21-77	3-9-77	EBA

WANG PART NO.	ITEM	QTY.	NAME	MATERIAL	DESCRIPTION

Qty. Per Unit	FIRST USED ON	ASSY USED ON

WANG LABORATORIES, INC. TEWKSBURY, MASS. U.S.A.

MATERIAL

MODEL NO. 5521

SEE ENGRG SPECIFICATIONS No.

FINISH

TOL. EX. AS NOTED .XX ± .010 FRAC. ± 1/64 .XXX ± .005 ANG. ± 1°30' FINISH 125

SCALE 1X | SHT. 4 OF 5

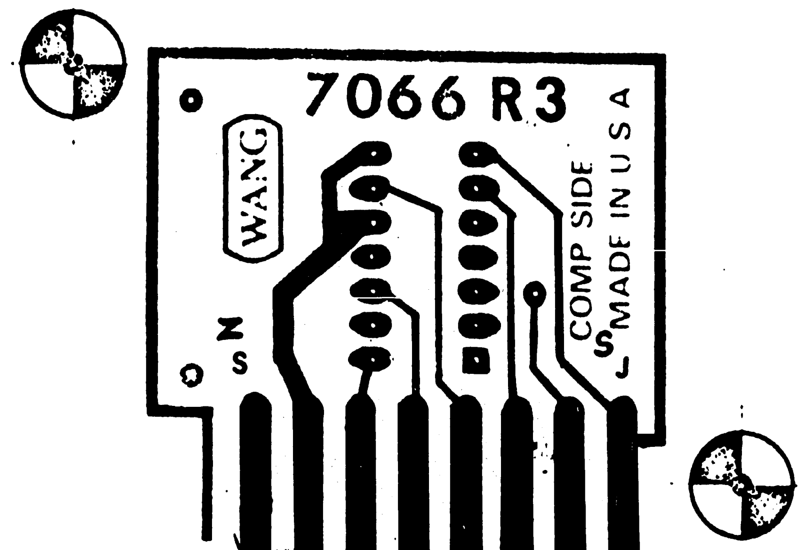
BY		DATE	APPROVED BY	DATE
DWN	EK	11-8-76	E ENGR F. LEE	3/21/77
CHK	[illegible]	11-13-76	M ENGR	
E. C. CONTROL			MFG ENGR	

TITLE
MATRIX PRINTER KEYBOARD

WANG PART NUMBER	SIZE	DRAWING NUMBER	REV.
210-7038	B	7038	2

B 7038

NO.	REVISION	DATE	BY
R2/3	ECN 6319		



S	R	P	N	M	L	K	J
	+OV	$\overline{SLT_1}$	AL-L1		PO-L1		$\overline{FFM}$
15	14	13	12	11	10	9	8
	$\overline{SLT_2}$		+5V	$\overline{FOR}$	SL-L1	$\overline{CLEAR}$	$\overline{LFM}$

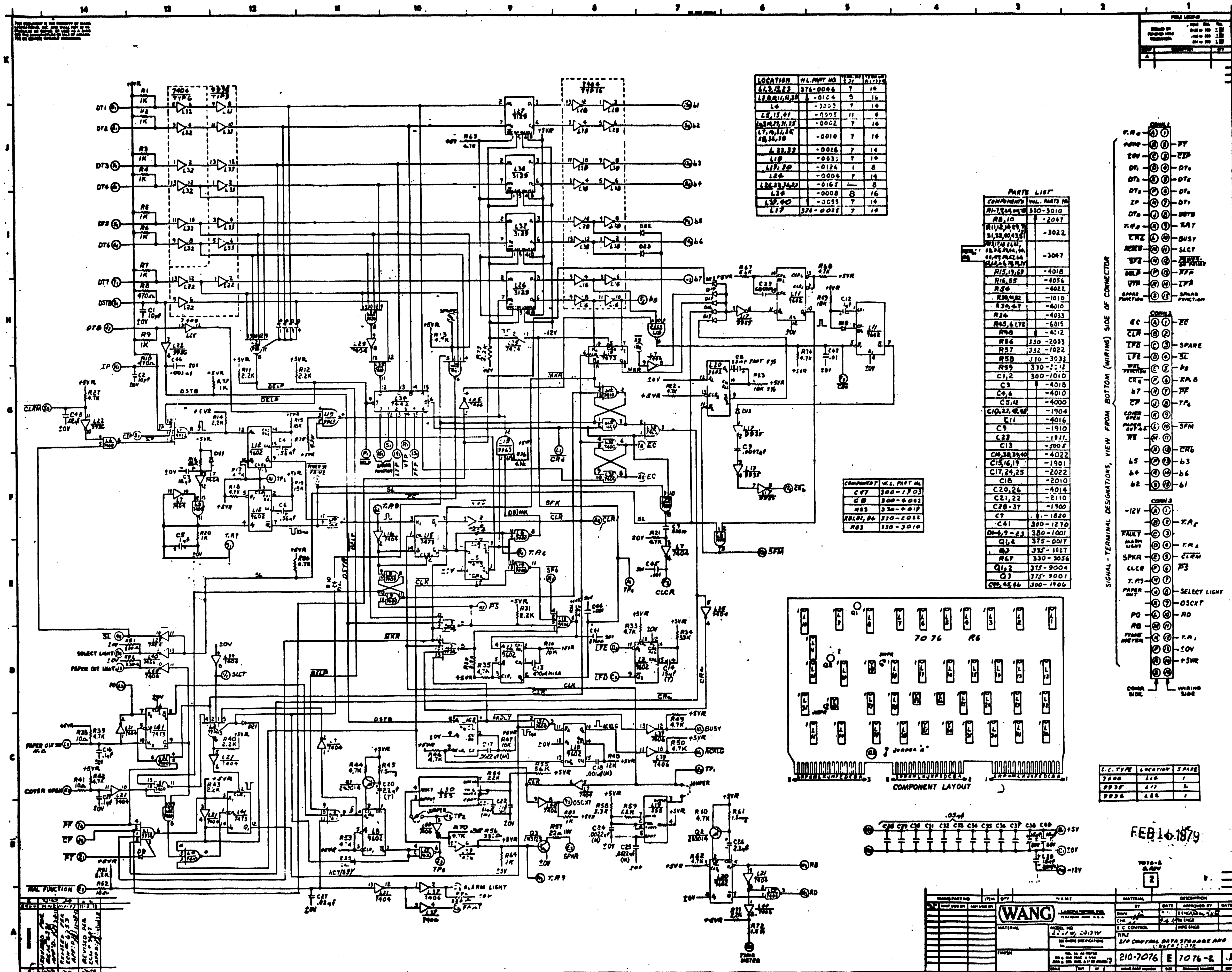
STANDARD TERMS

928 TERMS

Z	Y	X	W	V	U	T	S
	+OVE		$\overline{FL}$	$\overline{TOF}$	$\overline{PL}$	$\overline{SEL}$	
22	21	20	19	18	17	16	15
		SEL	+5VE		$\overline{SL}$		

COPY

WANG LABORATORIES, INC. TEWKSBURY MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
		DWN G	6-5-76	E ENGR	
		CHK WBJ	7-15-76	M ENGR	
MATERIAL	MODEL NO. 62-61	E C CONTROL		MFG ENGR	
	SEE ENGRG SPECIFICATIONS No. ES1001	TITLE LOADING SKETCH FINGER BOARD			
FINISH	TOL. EX. AS NOTED XX ± .010 FRAC. ± 1/64 .XXX ± .005 ANG ± 1°30' FINISH 125	210-7066-R2	B	7066	2
	SCALE 2:1 SHT 4 OF 4	WANG PART NUMBER	SIZE	DRAWING NUMBER	REV.



LOCATION	W.L. PART NO.		
L1,3,13,23	376-0046	7	14
L2,8,9,11,12,20	-0164	5	16
L4	-3333	7	14
L5,15,41	-0005	11	4
L6,14,29,31,35	-0002	7	14
L7,16,21,26,28,32,38	-0010	7	14
L22,33	-0026	7	14
L18	-0031	7	14
L19,30	-0126	1	8
L24	-0004	7	14
L26,27,36,37	-0165	—	8
L34	-0008	8	16
L39,40	-0055	7	14
L17	376-0085	7	14

PARTS LIST

COMPONENTS	W.L. PARTS NO.
R1-7,24,44,73	330-3010
R8,10	-2047
R11,12,14,29,30,31,32,40,43,51	-3022
R13,17,18,26,28,32,36,37,42,44,60,63,50,62,64,B4,46,70,71	-3047
R15,19,69	-4018
R16,55	-4056
R54	-4022
R38,41,52	-1010
R30,47	-4010
R34	-4033
R45,61,72	-6015
R48	-4012
R56	330-2033
R57	332-1022
R58	330-3033
R59	330-[illegible]
C1,2	300-1010
C3	-4018
C4,6	-4010
C5,12	-4000
C10,27,42,43	-1904
C11	-4016
C9	-1910
C23	-1911
C13	-5005
C14,38,39,40	-4022
C15,16,19	-1901
C17,24,25	-2022
C18	-2010
C20,26	-4014
C21,22	-2110
C28-37	-1900
C7	-1820
C41	300-1270
D1-4,9-23	380-1001
Q1,2	375-0017
Q3	375-1027
R67	330-3056
Q1,2	375-9004
Q3	375-9001
C44,45,46	300-1906

COMPONENT	W.L. PART NO.
C47	300-1903
C8	300-4003
R83	330-4019
R81,82,84	330-2022
R83	330-3010

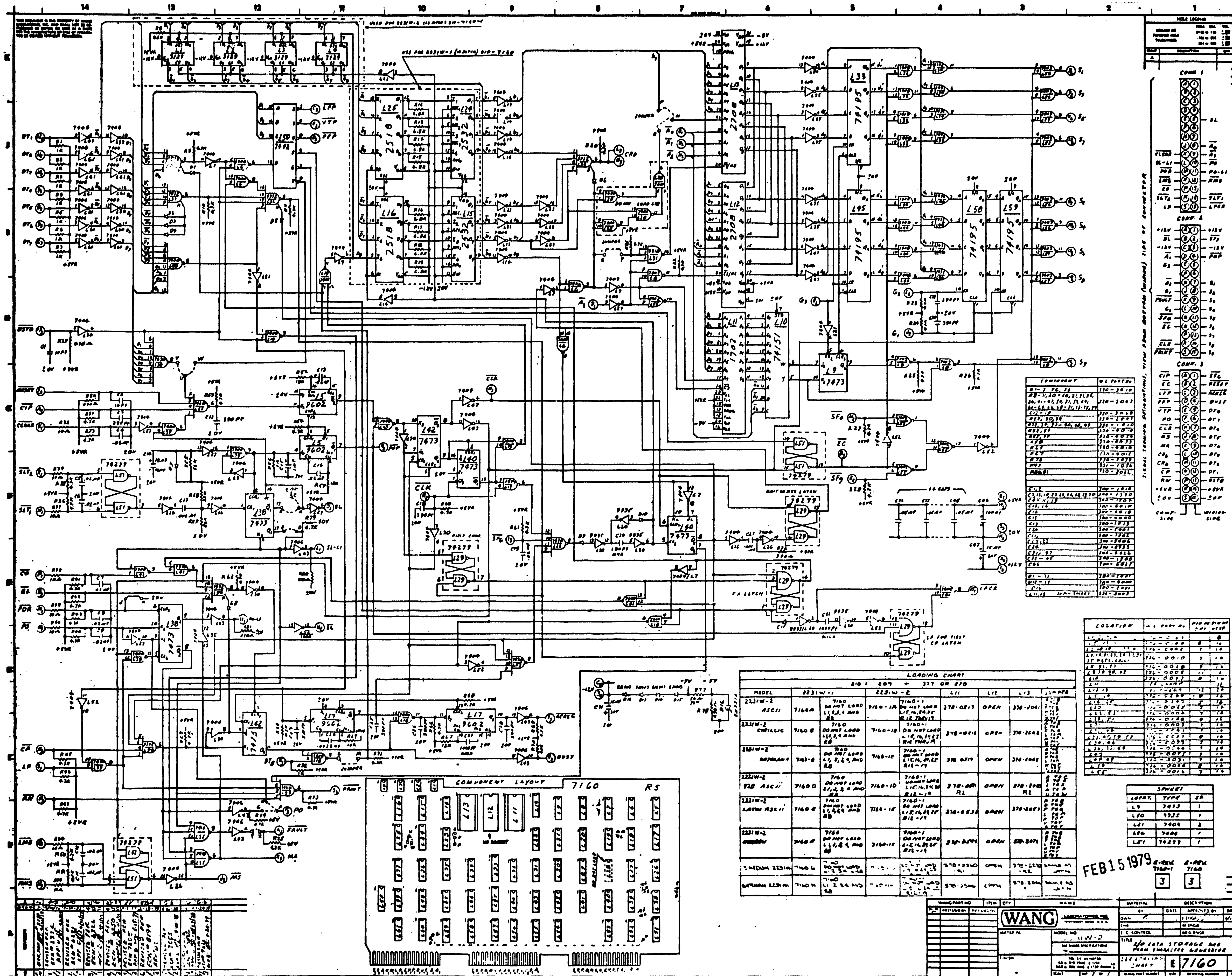
I.C. TYPE	LOCATION	SPARE
7400	L18	1
9935	L17	2
9936	L22	1

WANG LABORATORIES, INC.

MODEL NO: 2261W, 2263W

TITLE: I/O CONTROL DATA STORAGE AND LINE FEED/STOP

210-7076 | E | 7076-2 | 2



LOADING CHART							
210's 209 + 377 OR 378							
MODEL	2231W-1		2231W-2		L11	L12	L13	JUMPER
2231W-2 ASCII	7160A	7160 DO NOT LOAD L1,2,3,4 AND R8	7160-1A	7160-1 DO NOT LOAD L15,16,24,25 R12 THRU 19	378-0517	OPEN	378-2041	[illegible]
2231W-2 CYRILLIC	7160B	7160 DO NOT LOAD L1,2,3,4 AND R8	7160-1B	7160-1 DO NOT LOAD L15,16,24,25 R12 THRU 19	378-0518	OPEN	378-2042	[illegible]
2231W-2 [illegible]	7160-C	7160 DO NOT LOAD L1,2,3,4 AND R8	7160-1C	7160-1 DO NOT LOAD L15,16,24,25 R12-19	378-0519	OPEN	378-2043	[illegible]
2231W-2 928 ASCII	7160D	7160 DO NOT LOAD L1,2,3,4 AND R8	7160-1D	7160-1 DO NOT LOAD L15,16,24,25 R12-19	378-[illegible] R2	OPEN	378-20[illegible] R2	A TO C B TO E J TO K M TO P U TO W
2231W-2 LATIN ASCII	7160E	7160 DO NOT LOAD L1,2,3,4 AND R8	7160-1E	7160-1 DO NOT LOAD L15,16,24,25 R12-19	378-0538	OPEN	378-2061	[illegible]
2231W-2 [illegible]	7160F	7160 DO NOT LOAD L1,2,3,4 AND R8	7160-1F	7160-1 DO NOT LOAD L15,16,24,25 R12-19	378-[illegible]	OPEN	[illegible]-2076	[illegible]
SWEDISH 2231W-2	7160G	7160 DO NOT LOAD L1,2,3,4 AND R8	[illegible]	[illegible]	378-[illegible] R1	OPEN	378-2229 R2	SAME AS [illegible]
GERMAN 2231W-2	7160H	7160 L1,2,3,4 AND R8	[illegible]	[illegible]	378-[illegible]	OPEN	378-2244	SAME AS [illegible]

FEB 15 1979

E-REV 7160-1 [3] E-REV 7160 [3]

WANG PART NO	ITEM	QTY	NAME	MATERIAL	DESCRIPTION

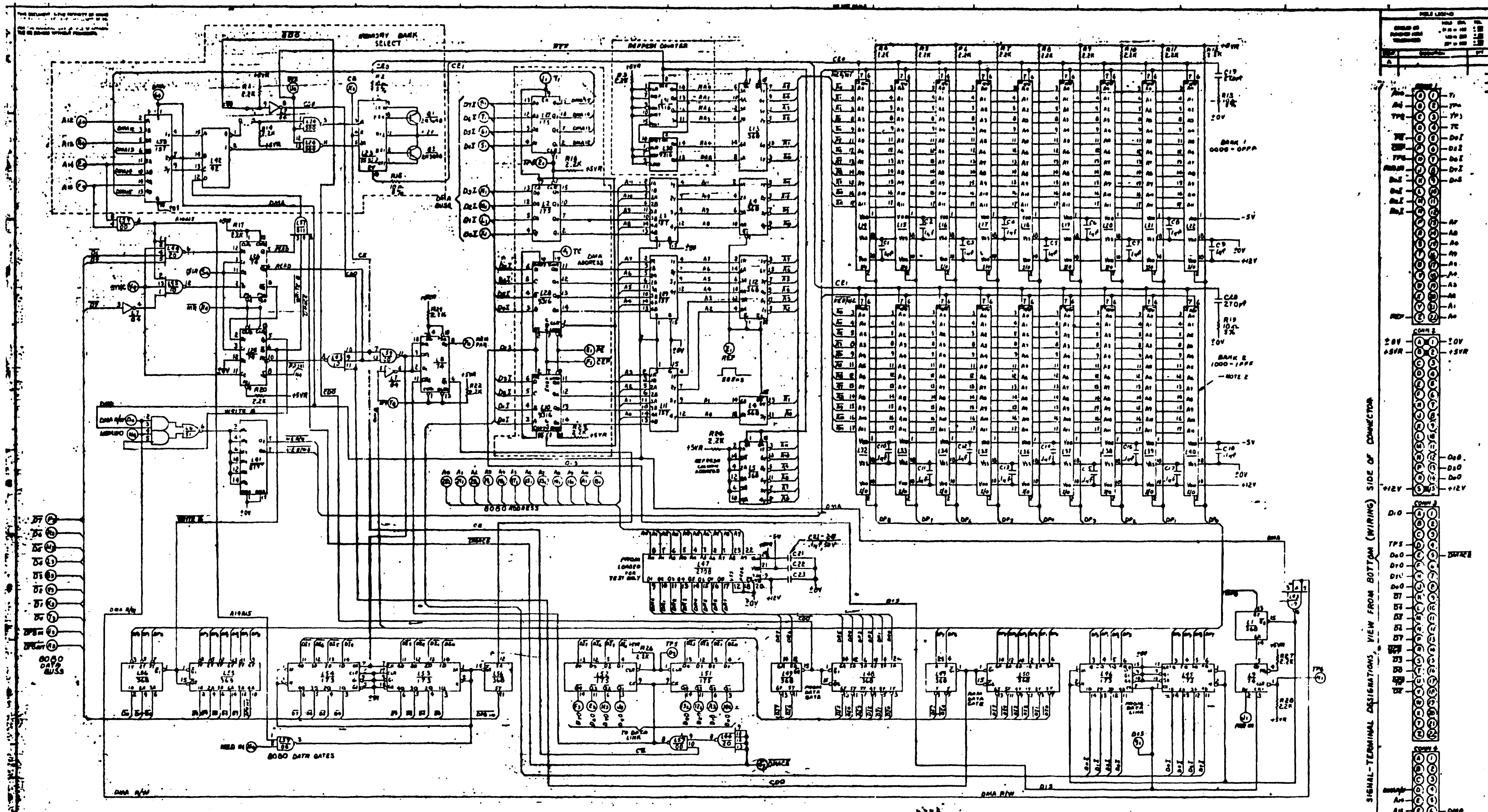
WANG LABORATORIES, INC.

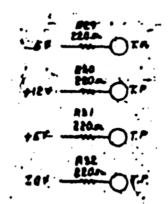
MODEL NO ...1W-2

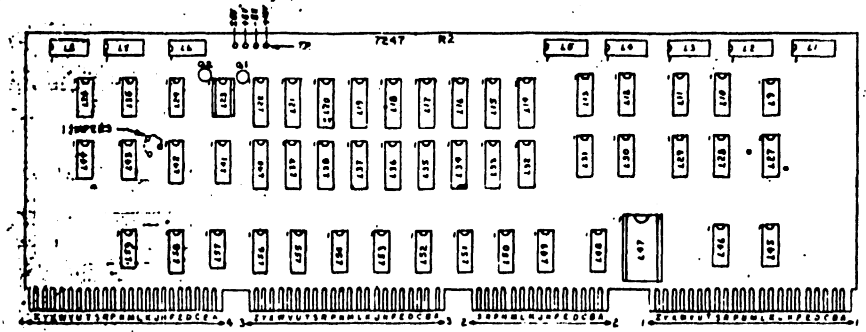
TITLE: I/O DATA STORAGE AND PROM CHARACTER GENERATOR

SCHEMATIC

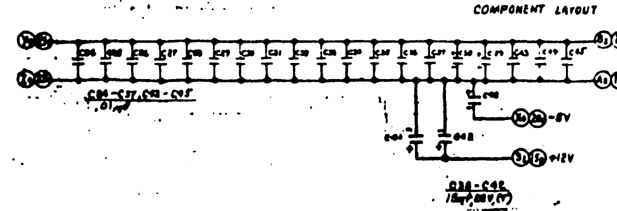
E 7160 9







COMPONENT LAYOUT



COMPONENT	W.L PART NO.
R1,3-12,14,16,17,20-24,26-28	330-3022
R2,13,15,19	330-1011
C1-9	300-1931
C10-18,21-23	300-1930
C19,20	300-1270
C24-37,43-45	300-1903
C38-42	300-4022
Q1,2	375-1050
R29-32	330-2022

LOCATION	W.L. PART NO	TERM NO ±0V	TERM NO. Vcc +5VR
L1,4,5,12,13,48,49,50,55,56	376-0179	8	16
L2,27,51,52	376-0119	8	16
L3,11,29,58	376-0082	8	16
L6	376-0012	7	14
L7	376-0010	7	14
L8,9,25,26	376-0006	7	14
L10,28,30,31	376-0094	8	16
L14-22,32-40	377-0314	18	
L23	376-0178	7	14
L24	376-0228	7	14
L41	376-0176	8	16
L42	376-0008	8	16
L43	376-0003	7	14
L44	376-0004	7	14
L45,46,53,54	376-0183	8	16
L47	[illegible]	[illegible]	[illegible]
L57	376-0237	7	14
L59	376-0002	7	14
L14-22,32-40	376-9014		
L23	376-9001		
L47	376-9003		

LOCATION	TYPE	SPARES
L1	74368	4
L6	7451	1
L7	7404	3
L9	7474	1
L24	74S00	2
L57	74S11	2

LOADING CHART

LOCATION	[illegible]	7247A
L47	NOT LOADED	378-2185

2. ALL MEMORY CHIPS ARE 4060.
1. ALL IC CHIPS ARE 7400 SERIES UNLESS OTHERWISE SPECIFIED.
NOTES

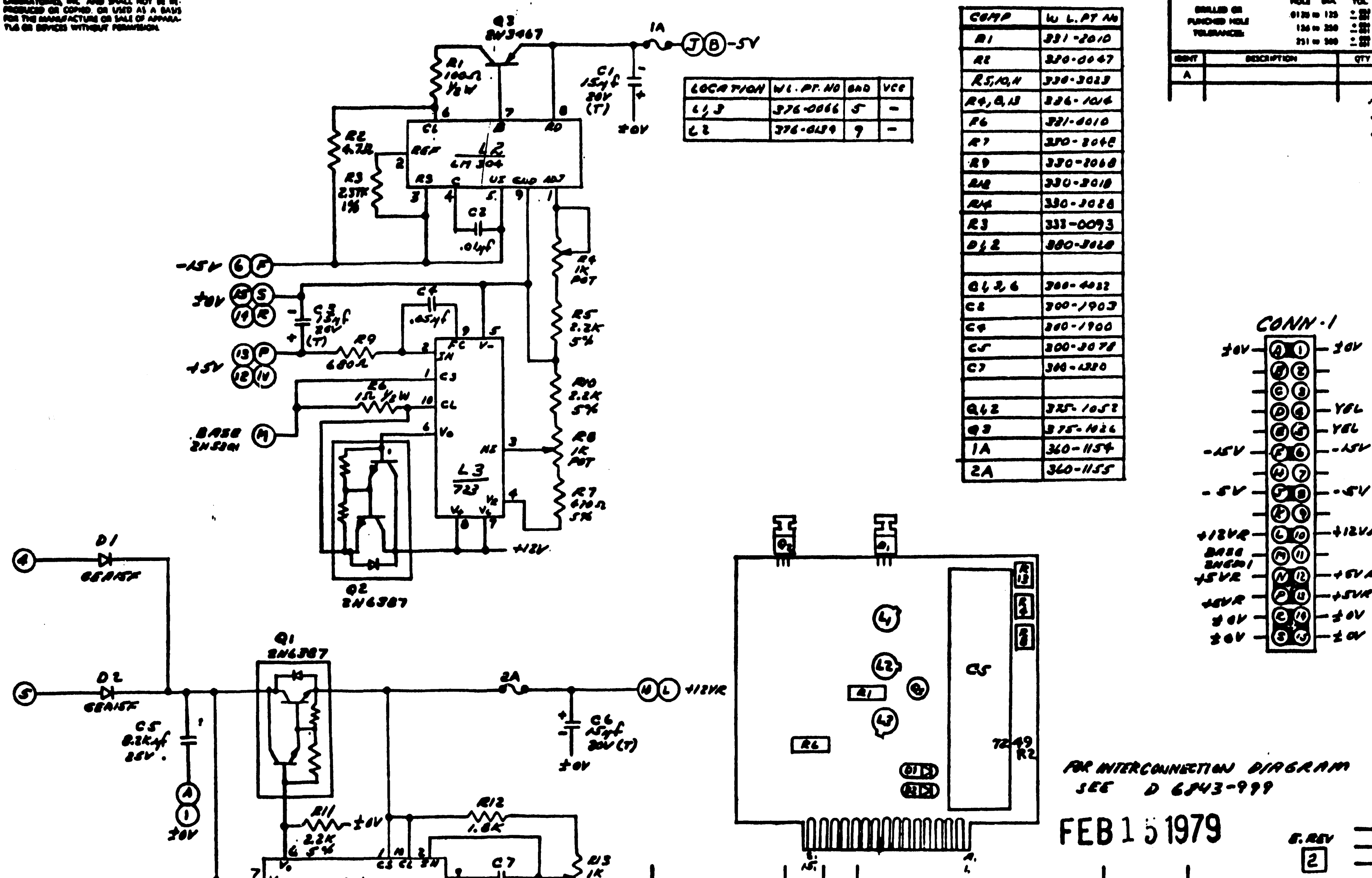
FEB 15 1979

WANG LABORATORIES, INC.

PRINTER MEMORY

210-7247 E 7247

DO NOT SCALE



LOCATION	WL. PT. NO	GND	VCC
L1, 3	376-0066	5	–
L2	376-0139	9	–

COMP	W L. PT No
R1	331-2010
R2	330-0047
R5,10,11	330-3023
R4, 8, 13	336-1016
R6	331-6010
R7	330-3048
R9	330-2068
R12	330-3018
R14	330-3028
R3	333-0093
D1 & 2	380-3028
Q1, 2, 6	300-4032
C2	300-1903
C4	300-1900
C5	300-3078
C7	300-1330
Q1 & 2	375-1052
Q3	375-1026
1A	360-1154
2A	360-1155

HOLE LEGEND			
DRILLED OR PUNCHED HOLE TOLERANCES:	HOLE DIA.	TOL.	
IDENT	DESCRIPTION	QTY	
A			

FOR INTERCONNECTION DIAGRAM SEE D 6843-999

FEB 15 1979

E. REV 2

REVISION			
0/1	DESIGN PER 2N6387 SPECS. ECN# ... APP'D ...	12-2-76	
1/1	REVISED PER ECN # 6784 APP'D: ...	4-4-77	
2/2	REVISED PER ECN # 7528 APP'D: ...	10-11-77	

WANG PART NO	ITEM	QTY	NAME	MATERIAL	DESCRIPTION

WANG LABORATORIES, INC. TEWKSBURY MASS. U.S.A.

BY		DATE	APPROVED BY	DATE
DWN	SSJ	12-2-76	E ENGR	1/3/77
CHK	G.D.	1-3-76	M ENGR	
E C CONTROL			MFG ENGR	

MATERIAL

FINISH

MODEL NO 5581

SEE ENGRG SPECIFICATIONS No.

TOL. EX. AS NOTED XX ± .010 FRAC. ± 1/64 XXX ± .005 ANG ± 1°30' FINISH 125

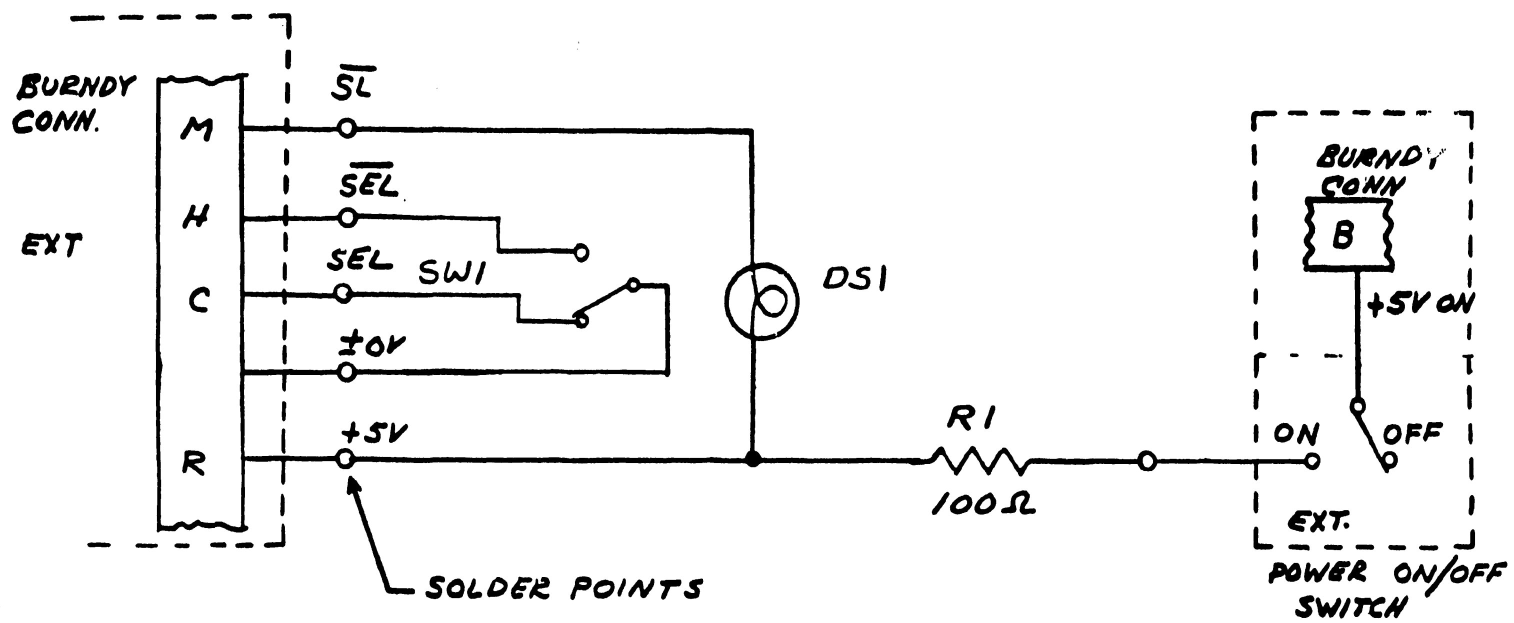
SCALE 1/1 SHT 4 OF 5

TITLE P.S. REGULATOR BD

WANG PART NUMBER	SIZE	DRAWING NUMBER	REV
210-7249	C	7249	2

7249 C

DO NOT SCALE



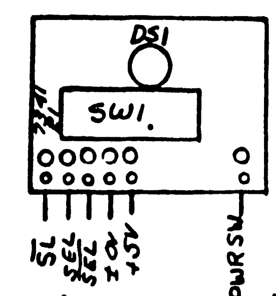
COMPONENT	W.L. PT. NO.
R1	330-2010
SW1	325-2305
DS1	370-0015
DS1	370-1020
DS1	652-3002

HOLE LEGEND

DRILLED OR PUNCHED HOLE TOLERANCES:

HOLE DIA.	TOL.
.0135 to .125	+.003 −.001
.126 to .250	+.004 −.001
.251 to .500	+.005 −.001

IDENT.	DESCRIPTION	QTY.
A		



FEB 15 1979

E REV 0

NO.	DATE	BY	REVISION
0	2-17-77	EBA	ORIGINATED PER DWR# E292 APP'D: [illegible] 4-5-77
1	3-30-77	EBA	REVISED PER ECN# 6656 APP'D [illegible] 4-5-77

WANG PART NO.	ITEM	QTY.	NAME	MATERIAL	DESCRIPTION

WANG LABORATORIES, INC. TEWKSBURY, MASS. U.S.A.

BY		DATE	APPROVED BY	DATE
DWN	EBA	2-17-77	E ENGR [illegible]	4-5-77
CHK	G.D.	2-17-77	M ENGR	
E. C. CONTROL			MFG ENGR	

MATERIAL

MODEL NO. 928 PIO

SEE ENGRG SPECIFICATIONS No.

FINISH

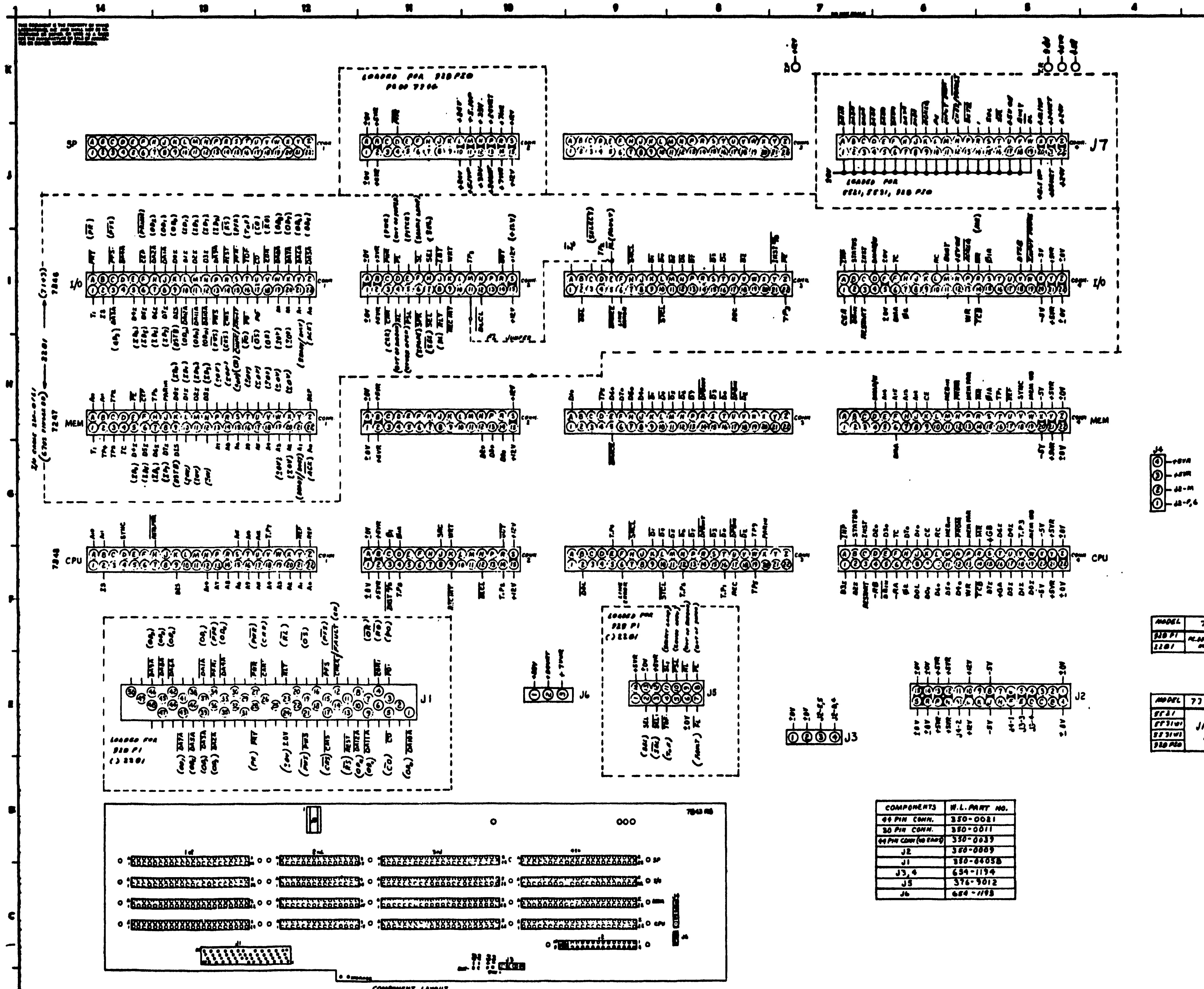
TOL. EX. AS NOTED .XX ± .010 FRAC. ± 1/64 .XXX ± .005 ANG. ± 1°30' FINISH 125

SCALE [illegible] SHT 4 OF 5

TITLE SELECT SWITCH ASSM. BD

WANG PART NUMBER	SIZE	DRAWING NUMBER	REV.
210-7341	B	7341	1

B 7341



MODEL	7343
920 P1	P.C.B 7390 & J6 NOT LOADED
2281	

MODEL	7343 - 1
5521	J1 NOT LOADED
5531W1	
5531W1	
920 PRO	

COMPONENTS	W.L. PART NO.
44 PIN CONN.	350-0021
30 PIN CONN.	350-0011
44 PIN CONN (NO EARS)	350-0039
J2	350-0009
J1	350-04058
J3, 4	654-1194
J5	376-9012
J6	654-1193

FEB 15 1979

WANG LABORATORIES, INC.

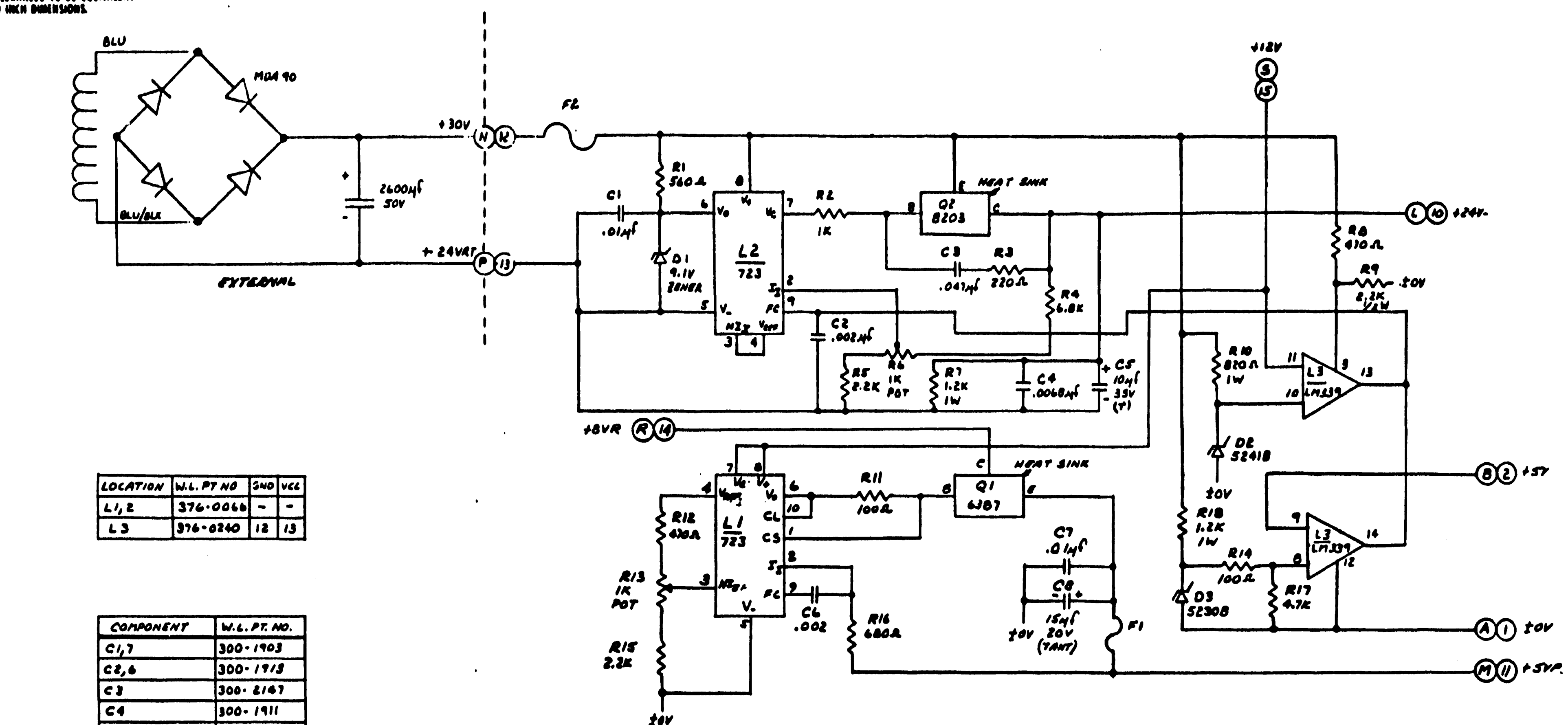
TITLE: PRINTER MOTHERBOARD

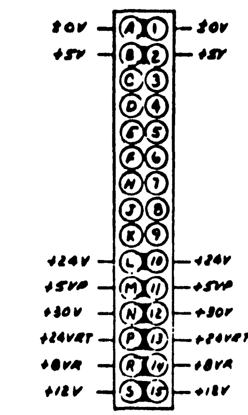
210-7343 | E | 7343 | 2

MILLIMETERS IN PARENTHESIS. TOLERANCES TO BE EQUIVALENT TO INCH DIMENSIONS.

DO NOT SCALE

HOLE LEGEND & TOLERANCES

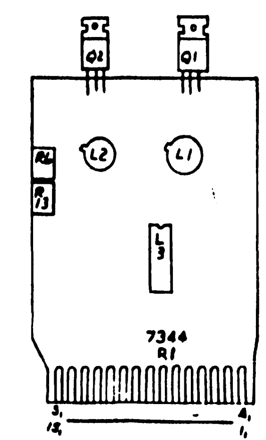




LOCATION	W.L. PT NO	GND	VCC
L1, 2	376-0066	-	-
L3	376-0240	12	13

COMPONENT	W.L. PT. NO.
C1, 7	300-1903
C2, 6	300-1913
C3	300-2147
C4	300-1911
C5	300-4032
C8	300-4022
D1	380-2091-5
D2	380-2111
D3	380-2048
Q1	375-1052
Q2	375-1053
R1,	330-2056
R2,	330-3010
R3	330-2022
R4	330-3068
R5, 15	330-3022
R6, 13	336-1014
R7, 18	332-3012
R8, 12	330-2047
R9	331-3022
R10	332-2082

COMPONENT	W.L. PT NO.
R11, 14	330-2010
R16	330-2068
R17	330-3047
F1, F2	



FEB 15 1979

E. REV 0

REVISION: ORIGINATED PER DWR ... APP'D ...; REVISED PER ... APP'D ...

WANG LABORATORIES, INC.

QTY	ITEM	WANG PART NO	DRAWING NO	DESCRIPTION

NEXT ASSY

MATERIAL

FINISH

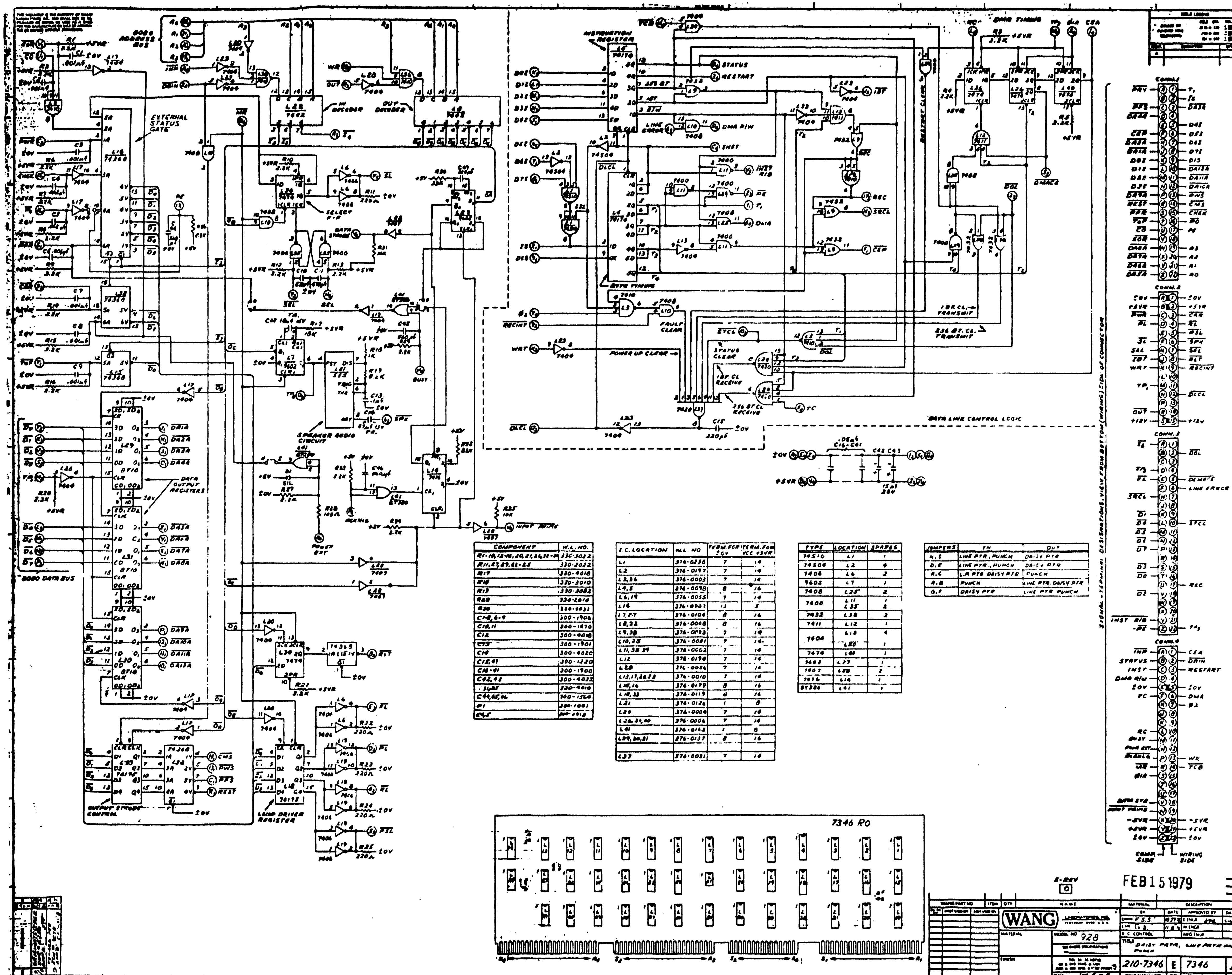
MODEL NO [illegible]28 PIO

SEE ENGRG SPECIFICATIONS No.

BY	DATE	APPROVED BY	DATE
DWN	2-16-77	E ENGR	4-5-77
CHK G.D	2-11-77	M ENGR	
		MFG ENGR	

TITLE: PAPER TAPE PUNCH REG

WANG PART NUMBER	SIZE	DRAWING NUMBER	REV
210-7344	D	7344	1



COMPONENT	W.L. NO.
R1-10, 12-16, 20, 21, 26, 38-39	330-3022
R11, 27, 29, 22-25	330-2022
R17	330-4018
R18	330-3010
R19	330-3082
R20	330-2010
R30	330-4031
C1-3, 6-9	300-1906
C10, 11	300-1470
C12	300-4018
C13	300-1901
C14	300-4020
C15, 47	300-1220
C16-41	300-1900
C42, 43	300-4022
34, 35	330-4010
C44, 45, 46	300-1560
D1	300-1001
C45	300-1918

I.C. LOCATION	W.L. NO	TERM. FOR ±0V	TERM. FOR VCC +5VR
L1	376-0238	7	14
L2	376-0197	7	14
L3, 36	376-0003	7	14
L4, 5	376-0098	8	16
L6, 19	376-0055	7	14
L14	376-0037	13	5
17, 27	376-0104	8	16
L8, 22	376-0008	8	16
L9, 38	376-0093	7	14
L10, 25	376-0081	7	14
L11, 35 39	376-0062	7	14
L12	376-0194	7	14
L28	376-0056	7	14
L13, 17, 20 23	376-0010	7	14
L15, 16	376-0179	8	16
L18, 33	376-0119	8	16
L21	376-0126	1	8
L24	376-0004	7	14
L26, 34, 40	376-0006	7	14
L41	376-0143	1	8
L29, 30, 31	376-0137	8	16
L37	376-0031	7	14

TYPE	LOCATION	SPARES
74S10	L1	1
74S04	L2	4
7406	L6	2
9602	L7	1
7408	L25	2
7400	L11 L35	1 2
7432	L38	2
7411	L12	1
7404	L13 L20	4 1
7474	L40	1
9602	L27	1
7407	L28	2
7476	L14	1
8T380	L41	1

JUMPERS	IN	OUT
H, I	LINE PTR., PUNCH	DAISY PTR
D, E	LINE PTR., PUNCH	DAISY PTR
A, C	L.R PTR DAISY PTR	PUNCH
A, B	PUNCH	LINE PTR. DAISY PTR
G, F	DAISY PTR	LINE PTR PUNCH

E-REV 0

FEB 15 1979

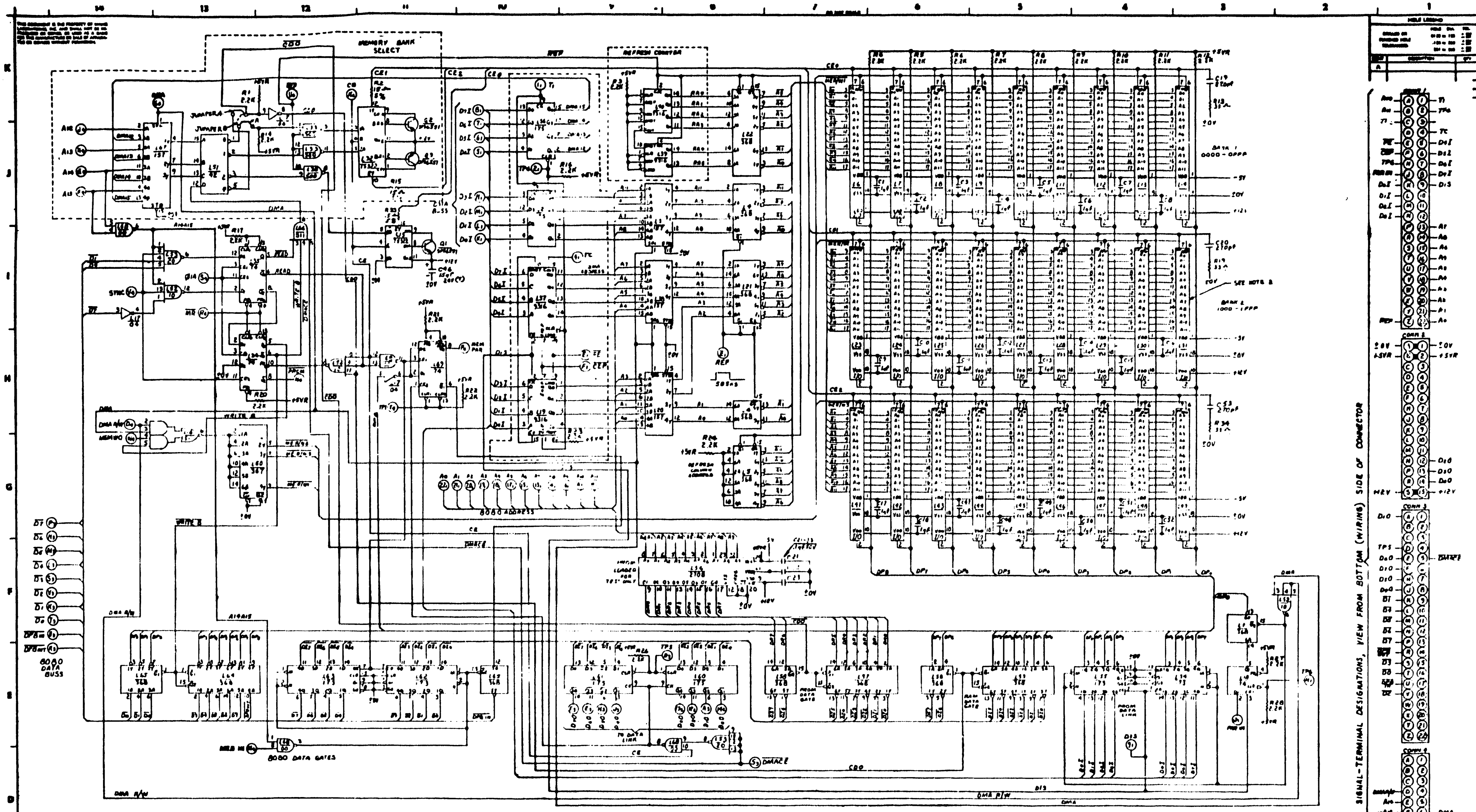
WANG

MODEL NO 928

BY	DATE	APPROVED BY	DATE
DWN F.S.S.	10-77		
CHK G.D.	11-7		
E.C. CONTROL			

TITLE DAISY PRTR, LINE PRTR AND PUNCH

210-7346 | E | 7346 | 1



COMPONENT	W L PART NO
R1,3-12,14,16, 17,20-29, 36-38	330-3022
R2,15,33	330-1016
C1,5,57,18,12,15, 16,17,21-23,47, 49,51	300-1930
C19,20,53	300-1270
C24-37,43,44	300-1900
C38-42,46	300-4022
Q1,2,3	375-1050
R29-32	330-2022
C2,4,6,8,9,11, 13,14,18,40, 50,52	300-1931
R13,19,34	330-1033

LOCATION	W L PART NO	TERM NO ZOV	TERM NO Vcc+5VR
L1,4,5,21,22, 57,58,59,64, 65	376-0179	8	16
L2,36,60,61	376-0119	8	16
L3,20,38,67	376-0082	8	16
L16	376-0012	7	14
L17	376-0010	7	14
L18,34,35,69	376-0006	7	14
L19,37,39,40	376-0094	8	16
L6-14,23-31,41-49	SEE CHART	18	
L15,32	SEE CHART	7	14
L33	376-0228	7	14
L50	376-0176	8	16
L51	376-0008	8	16
L52	376-0003	7	14
L53	376-0004	7	14
L54,55,62,63	376-0183	8	16
L56	SEE CHART	12	24
L66	376-0237	7	14
L68	376-0002	7	14
L6-14,23-31,41-49	SEE CHART	SOCKET	
L16,32		SOCKET	
L56		SOCKET	

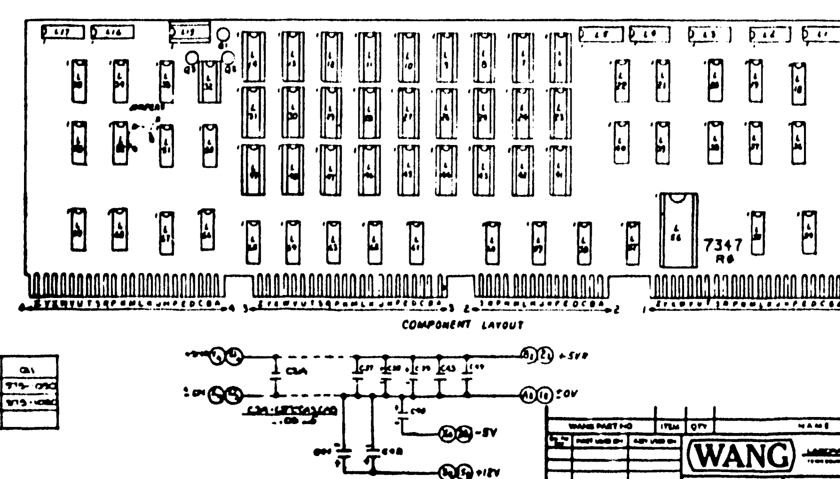
LOCATION	TYPE	SPARES
L1	74368	4
L16	7451	1
L17	7404	3
L18	7474	1
L33	74S00	1
L66	74S11	2

JUMPERS "A" (QTY. 2) PROM AT LOCATION 4000
JUMPER "B" (QTY. 1) PROM AT LOCATION 0

2. ALL MEMORY CHIPS ARE 4096.
1. ALL IC CHIPS ARE 7400 SERIES UNLESS OTHERWISE SPECIFIED.
NOTES

VARIATION CHART

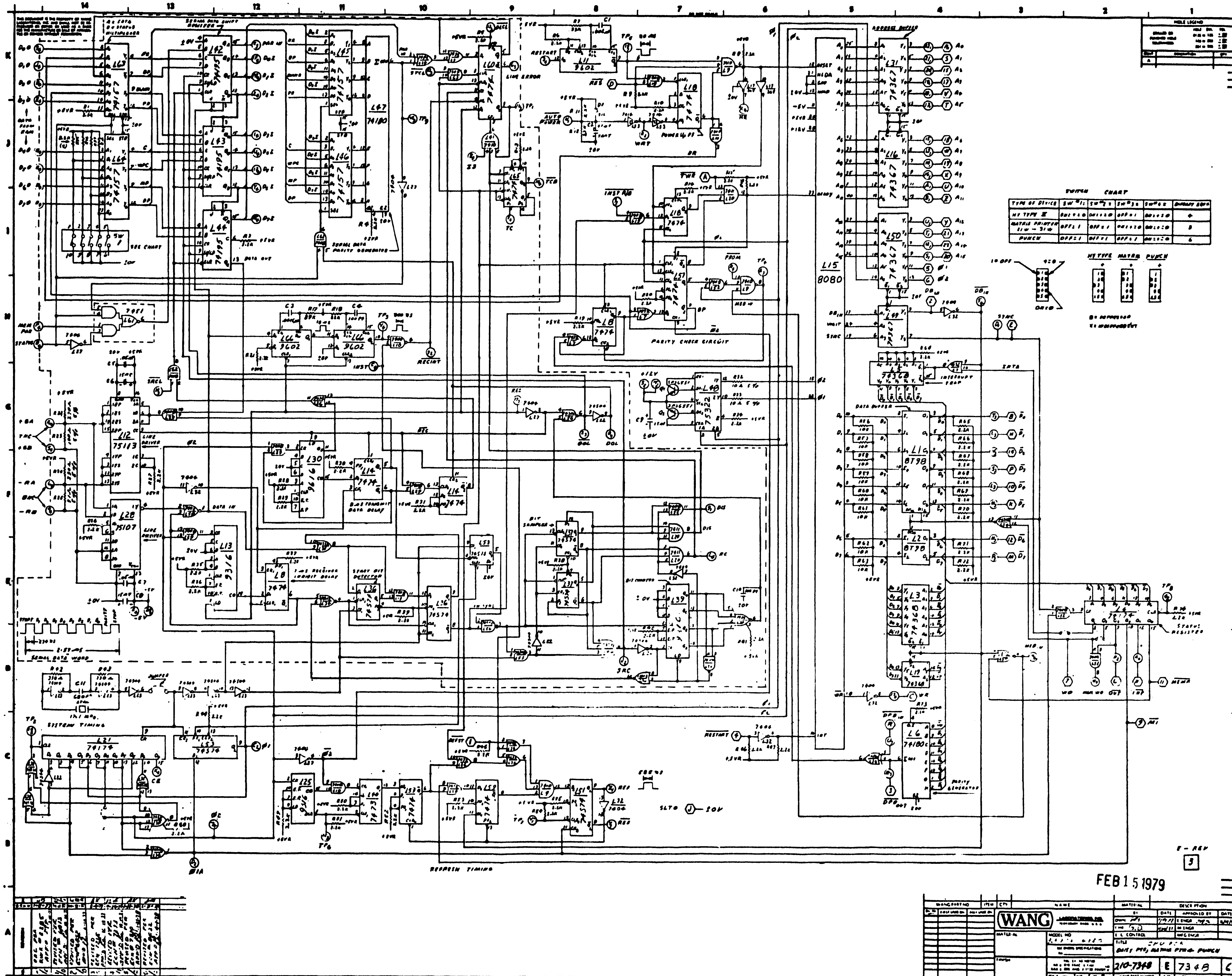
MODEL	209	210	L6-14	L23-31	L41-49	L56	C19	R13	R30	Q1
[illegible] 8K	7347	7347-A	377-0314	377-0314	377-0314		300-1270	330-1033	330-1016	375-1050
[illegible] 12K	7347	7347-B	377-0314	377-0314	377-0314	378-1[illegible]	300-1270	330-1033	330-1016	375-1050
[illegible] 8K	7347-B	7347-BA			377-0314	377-0314				



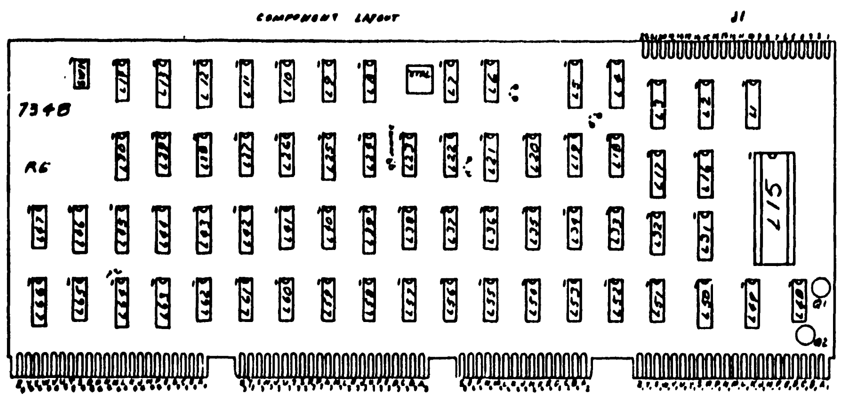
FEB 15 1979

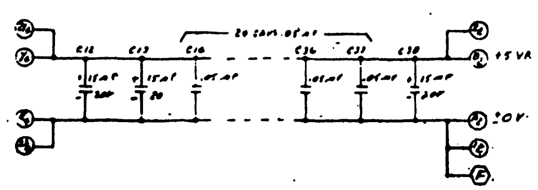
WANG LABORATORIES, INC.

DWN	J.
MODEL NO	1.4 P1
TITLE	PRINTER MEMORY
WANG PART NUMBER	210-7347
SIZE	E
DRAWING NUMBER	7347
REV	5


L15
8080
ADDRESS BUFFER
DATA BUFFER
PARITY CHECK CIRCUIT
SYSTEM TIMING
REFRESH TIMING
SERIAL DATA WORD
STATUS REGISTER
SWITCH CHART
E - REV
3
FEB 15 1979
WANG
TITLE CPU PCB
DAISY PTR, MATRIX PTR & PUNCH
210-7348
E
7348
C

COMPONENT LAYOUT

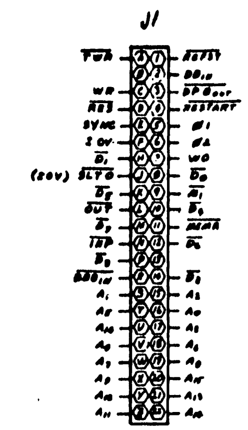


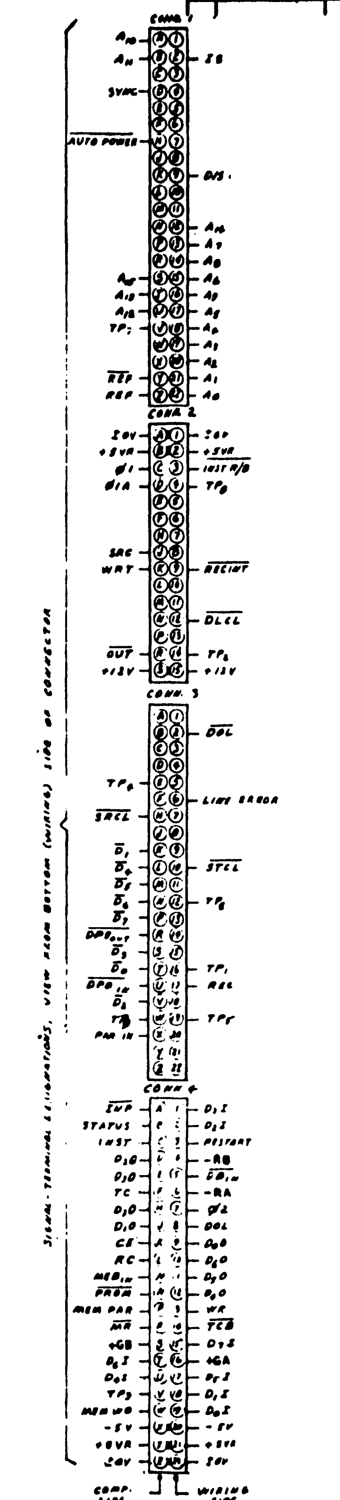


I.C. LOCATION	W.L. PART No	PIN NO 0V	PIN NO +5VA
L1, 2	376-0185	8	16
L3, 5, 17	376-0177	8	16
L4, 21	376-0078	8	16
L6, 47	376-0050	7	14
L7, 26	376-0073	7	14
[illegible]	376-0006	7	14
L9, 41	376-0003	7	14
L10	376-0002	7	14
L11, 66	376-0104	8	16
L12	376-0256	8	16
L13, 25, 30, 39	376-0094	8	16
L15	377-0269	2	20
L16, 31, 49, 50	376-0176	8	16
L19, 29, 58, 62	376-0001	7	14
L20	376-0194	7	14
L22, 23	376-0197	7	14
L24	376-0036	7	14
L35	376-0109	7	14
L27, 32	376-0010	7	14
L28	376-0144	7	14
L33	376-0137	7	14
L34	376-0199	7	14
L36, 37, 54, 57	376-0202	7	14
L38	376-0092	7	14
L40	376-0005	11	4
L42, 43, 44	376-0097	8	16
L45, 46, 63, 64	376-0002	8	16
L48	376-0170	7	14
L59	376-0237	7	14
L55	376-0200	7	14
L56	376-0220	7	14
L58	376-0016	7	14
L61	376-0012	7	14

COMPONENT	WL PART No
R1-6, 8-11, 13-16, 19, 20, 21, 26-36, 39-41, 44-55, 69-77	330-3002
R7	330-4033
R17	330-4019
R18	330-4022
R22	330-2010
R23	330-2011
R24	330-2040
R25	330-1092
R32, 33	330-1011
R42, 43	330-3033
R56-63	330-4010
R12	330-3038
C1	300-1913
C2	300-4010
C3	300-1907
C4, 10	300-1100
C5, 7, 10-17	300-1900
C6, 8, 9, 14, 13, 38	300-4028
C11	300-1600
SW 1	325-1501
D1	380-1001
Q1, 2	375-1050
XTAL 17.1 MHz	321-0018
L15 40 PIN SOCKET	376-3011

IC TYPE	LOCATION	SPARE
7400	L13	2
74S00	L36	1
7402	L50	
7404	L27	2
74S04	L22	2
7408	L62	1
74S08	L53	3
7410	L41	2
74S11	L59	2
7414	L39	4
7451	L61	1
7473	L40	1
7486	L24	2
74367	L49	2
74S74	L51	1
8T98	L2	2
9602	L11	1





FEB 15 1979

WANG	LABORATORIES, INC.	
MODEL NO.		
TITLE	CPU FOR DAISY PTR, MATRIX PTR & PUNCH	
210-7348	E	7348
REV	6	
SHEET	2 OF 2	

END