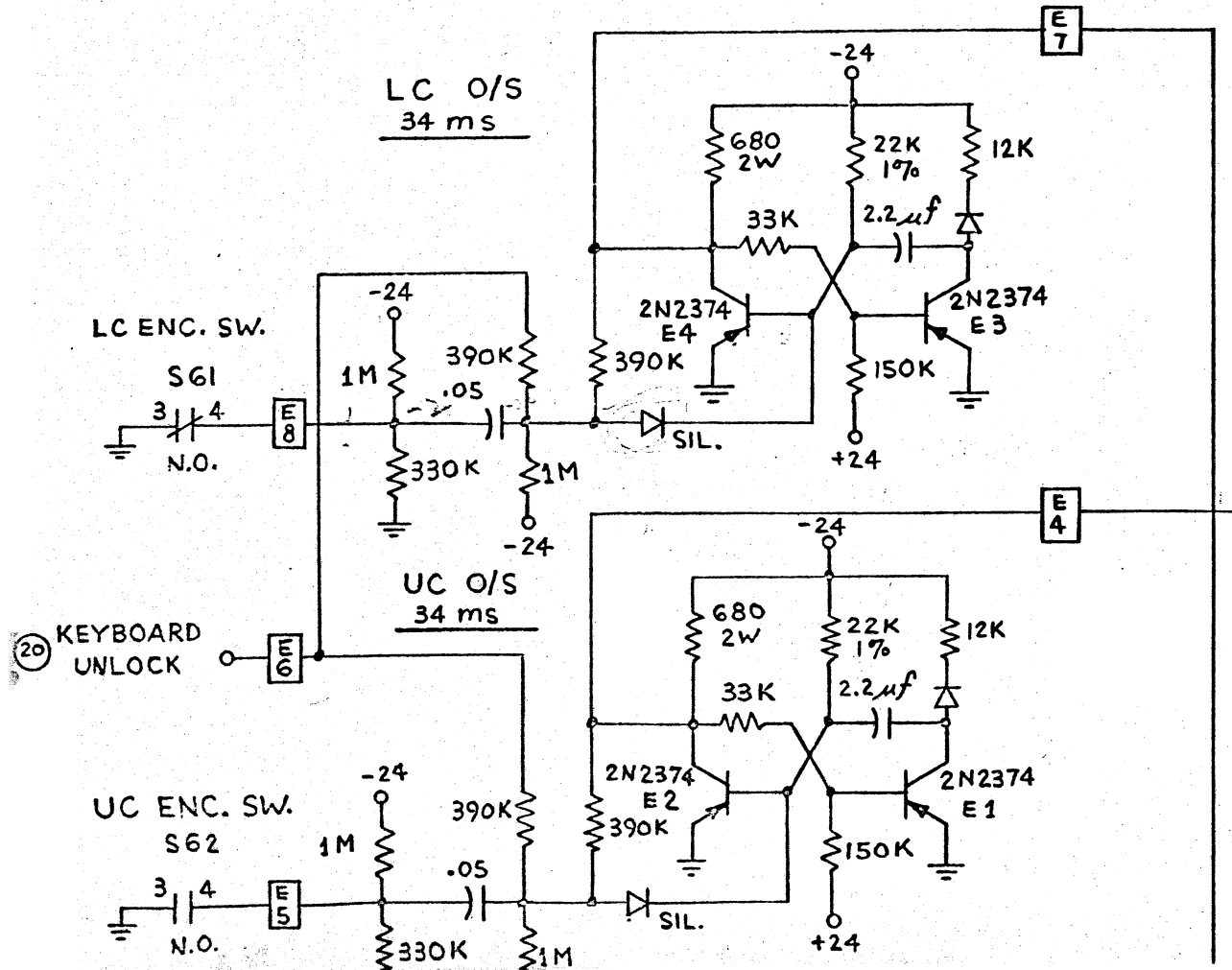


DECODE O/S & RELAY TREE  
DIAGRAM 1



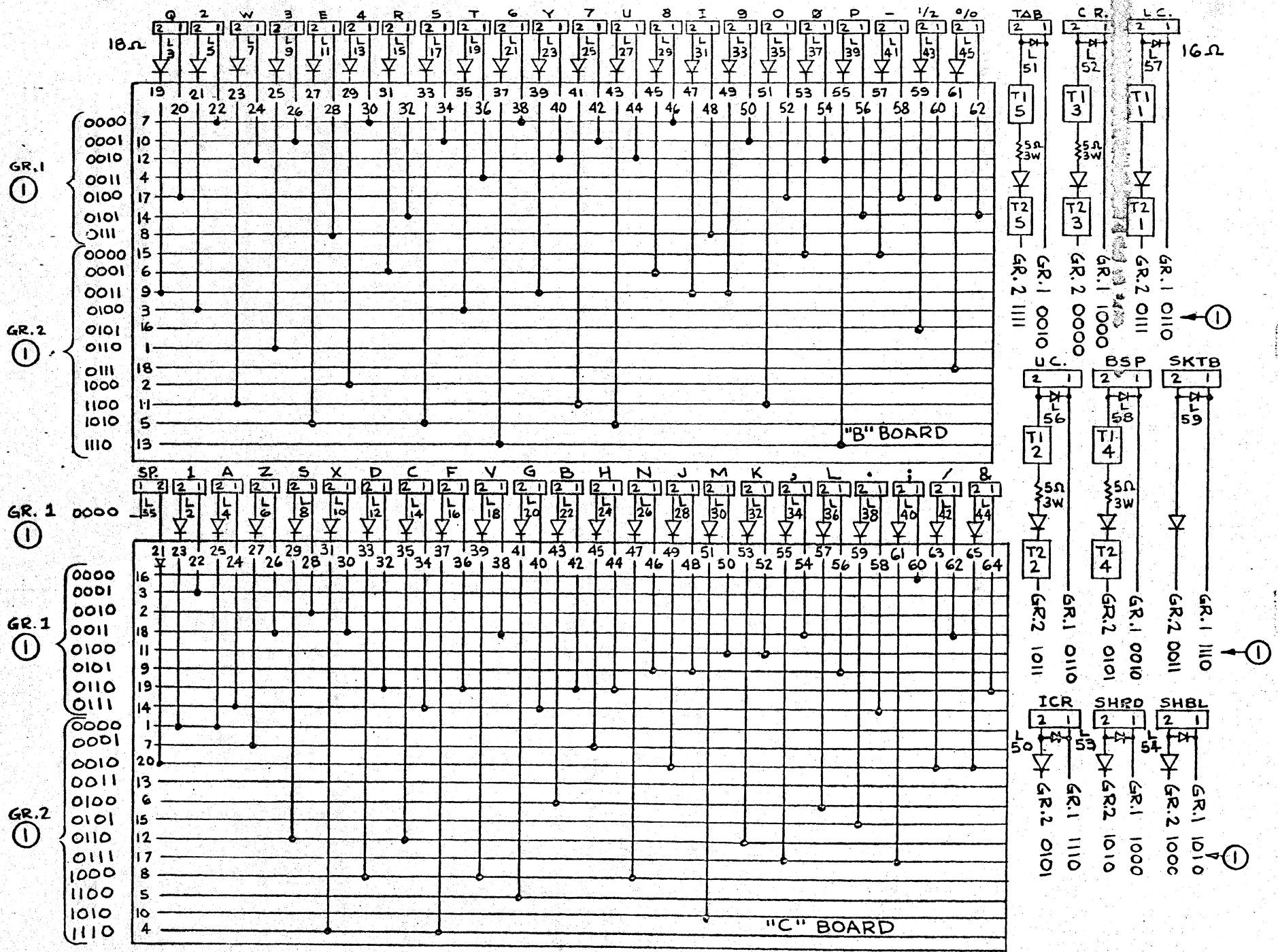


NOTE:  
S61 & S62 SHOWN IN LC POSITION

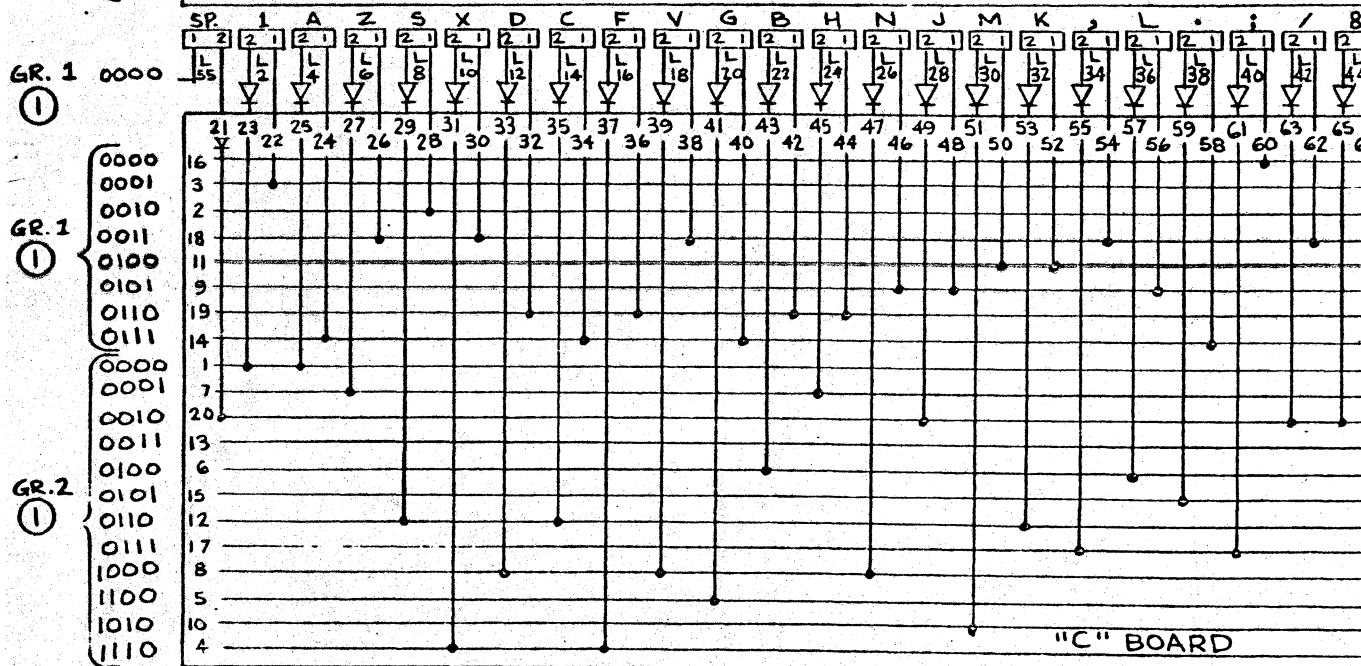
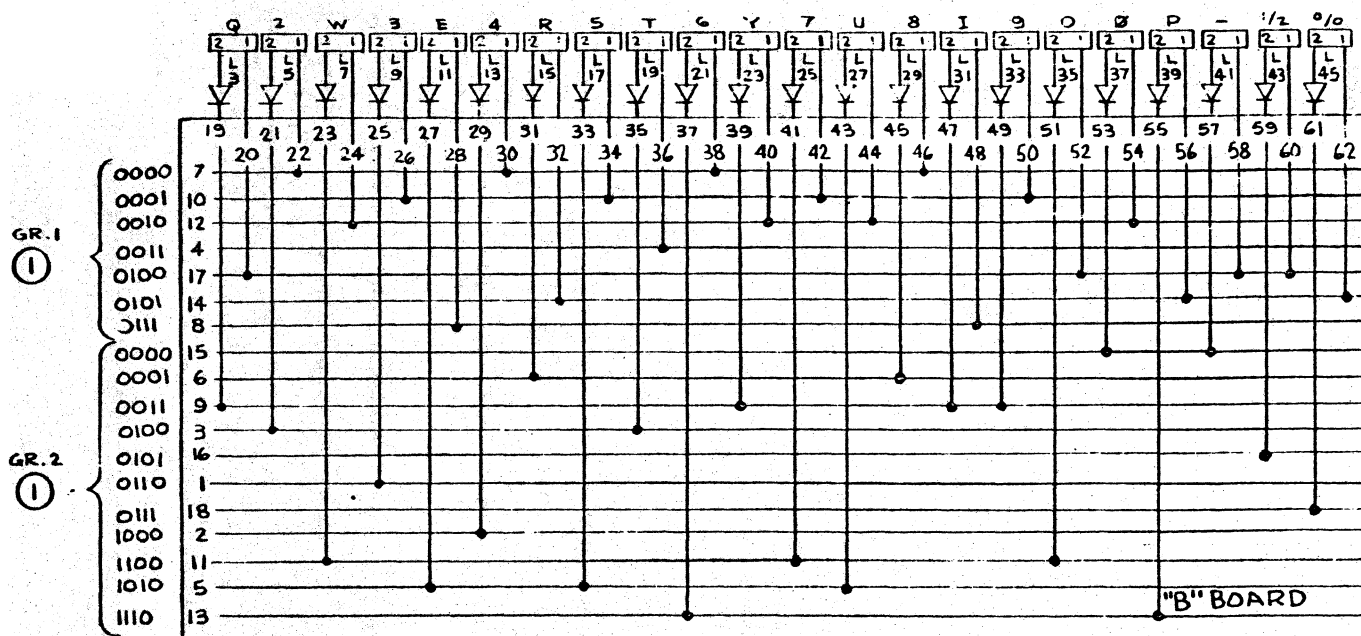




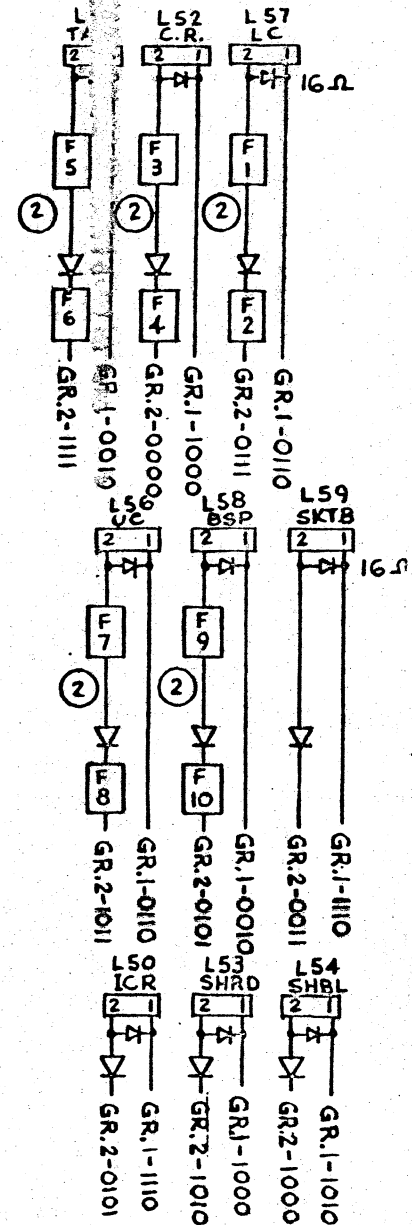




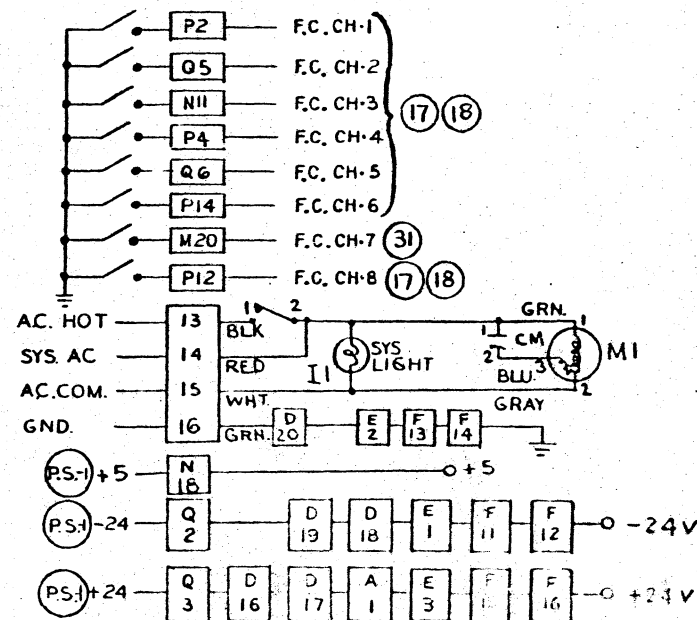
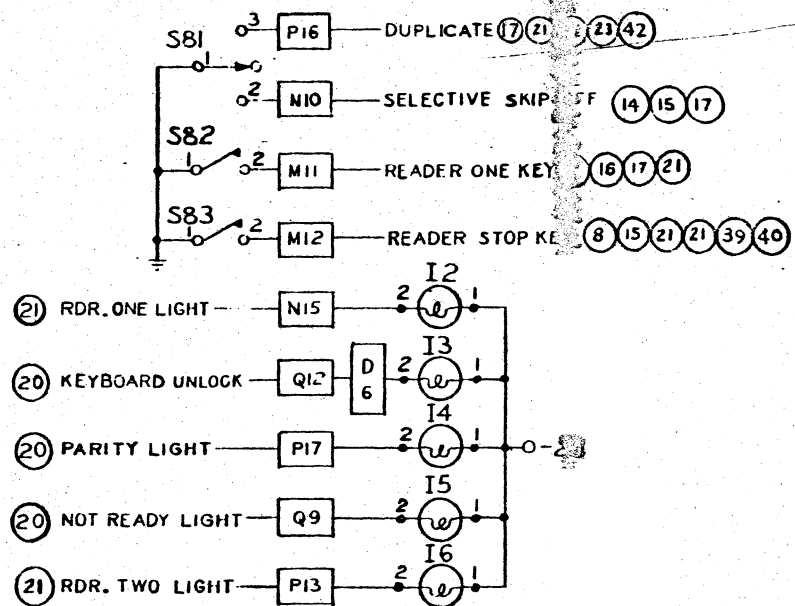
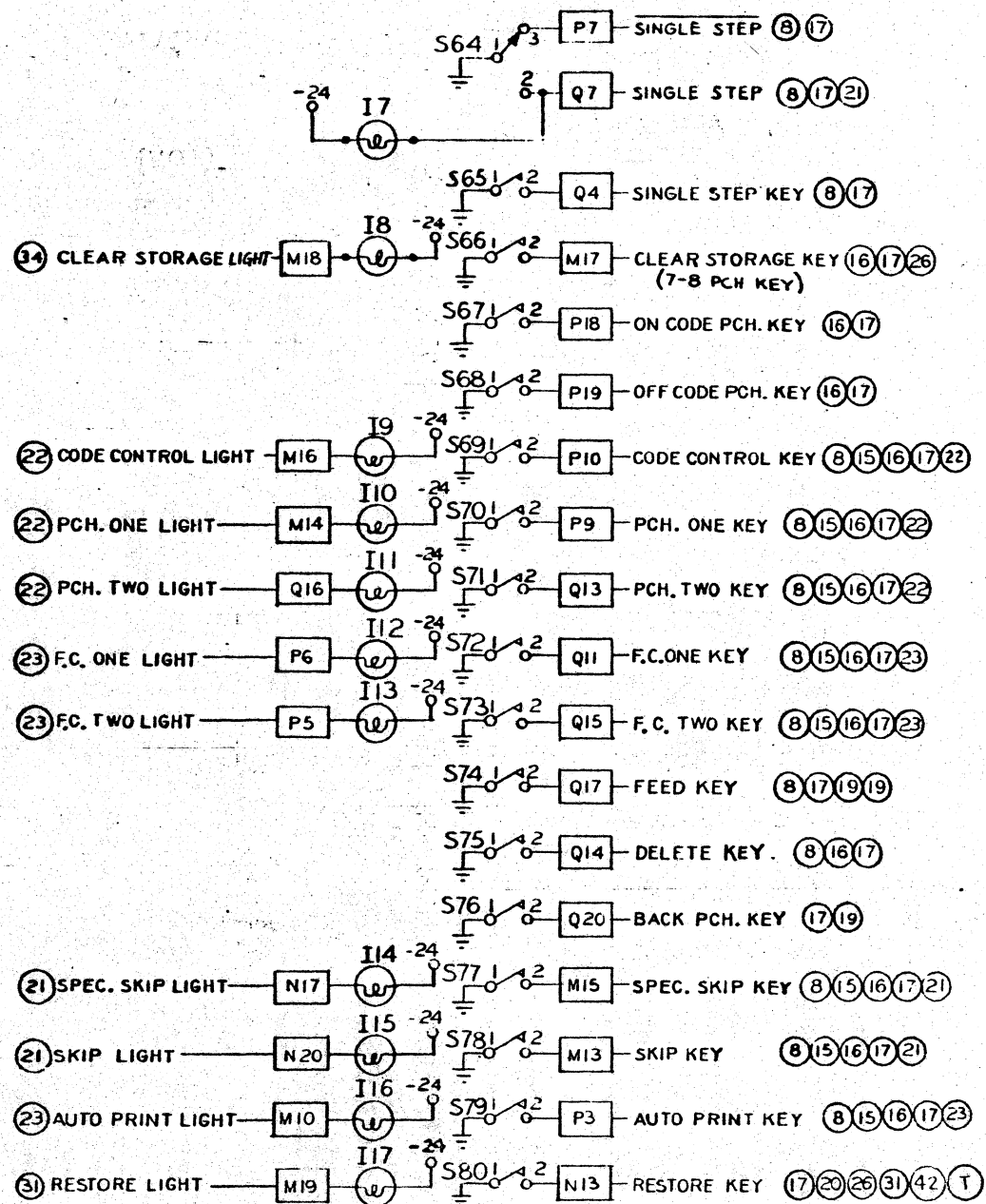
OLD STYLE I/O UNIT  
 CHAR. & FEATURE SOL. & DECODER  
 DIAGRAM 1



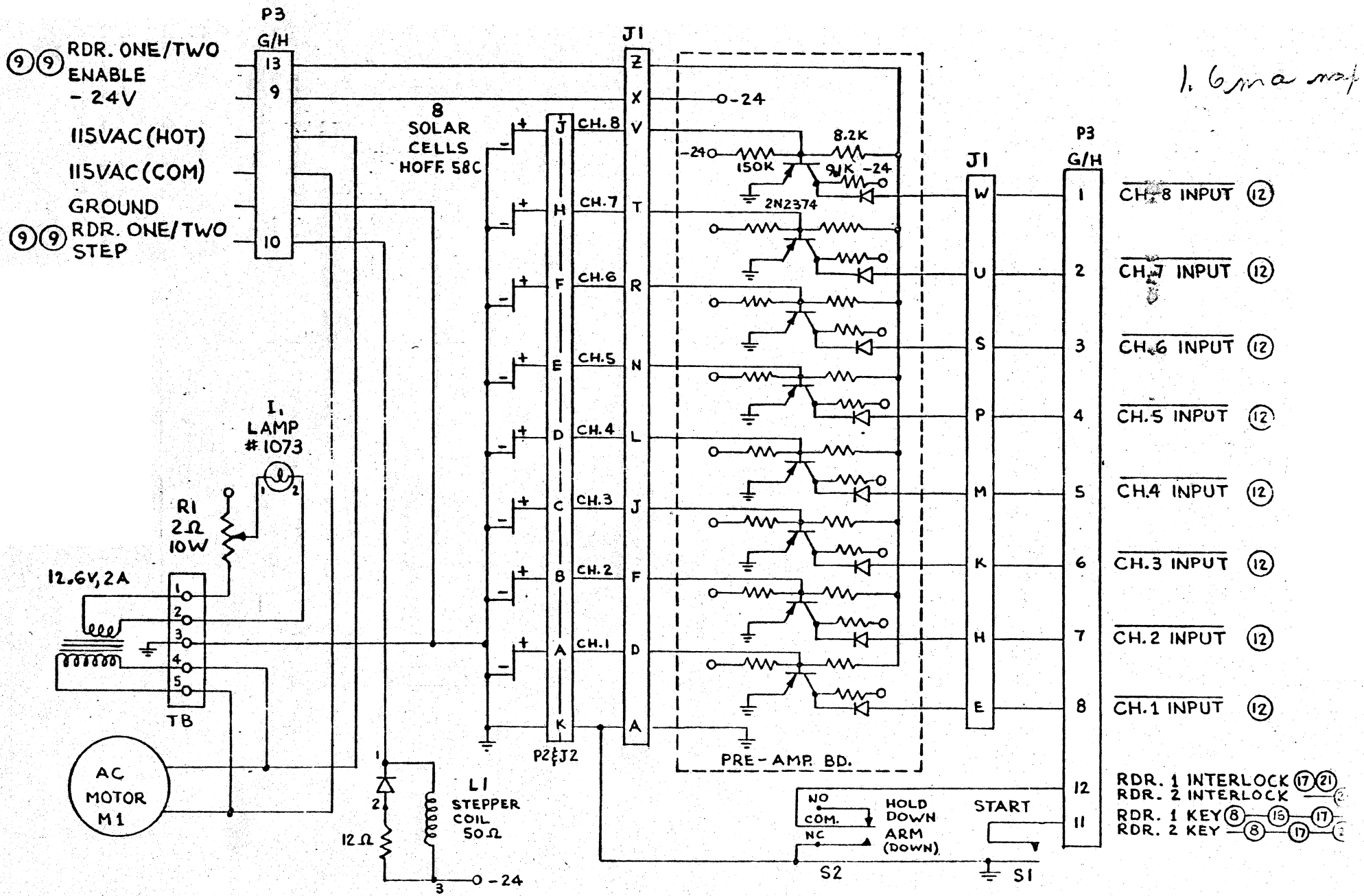
NEW STYLE I/O UNIT  
 DECODER, CHAR. & FEATURE SOLS.  
 DIAGRAM 4



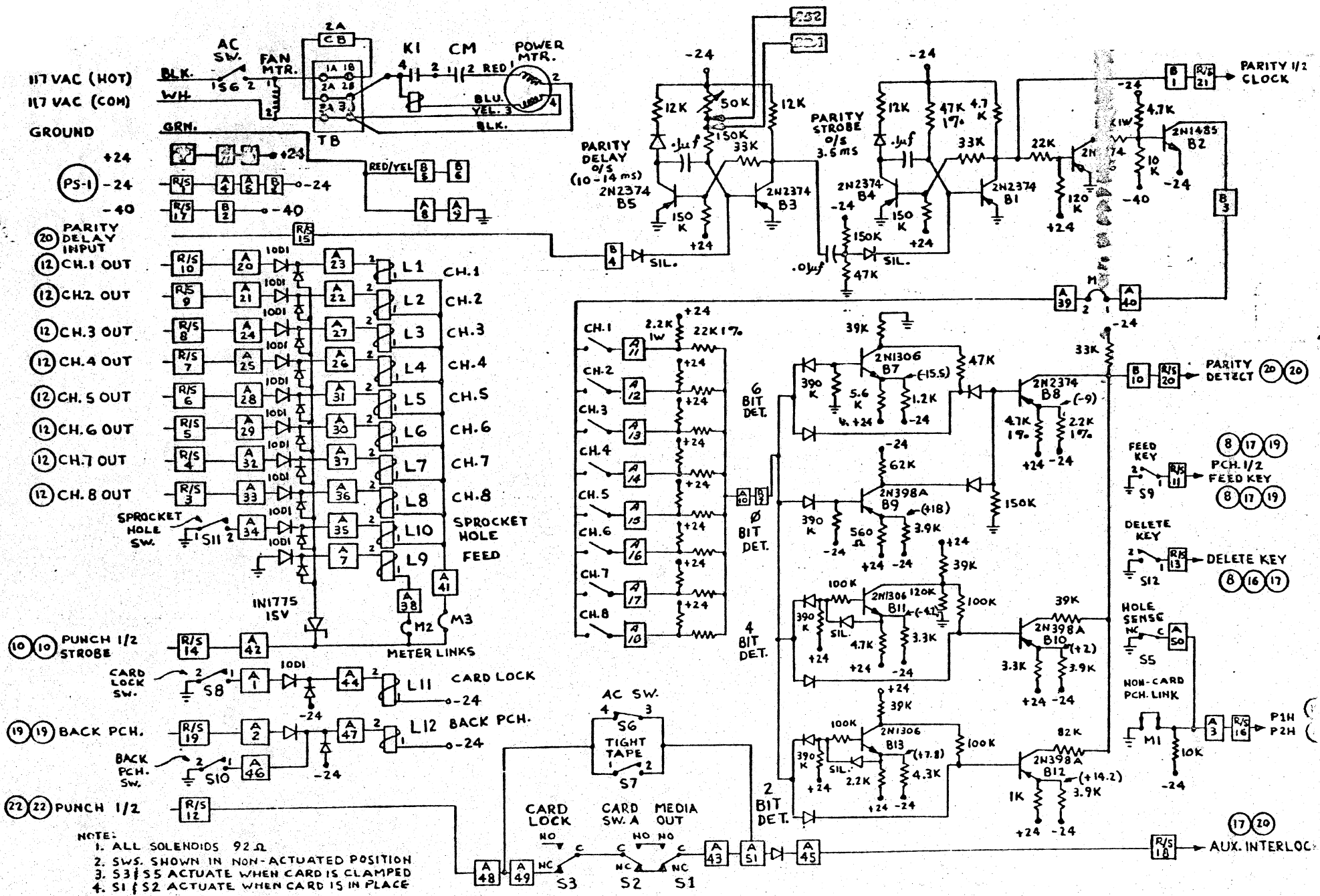




NEW STYLE I/O UNIT  
 MODE PANEL, F.C., & A.C.  
 DIAGRAM 5



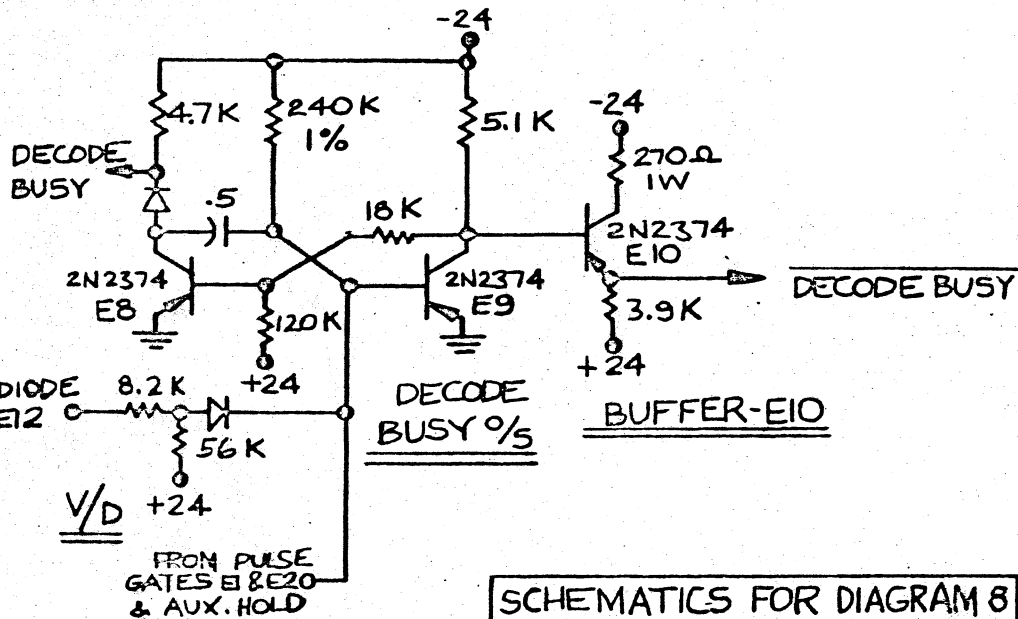
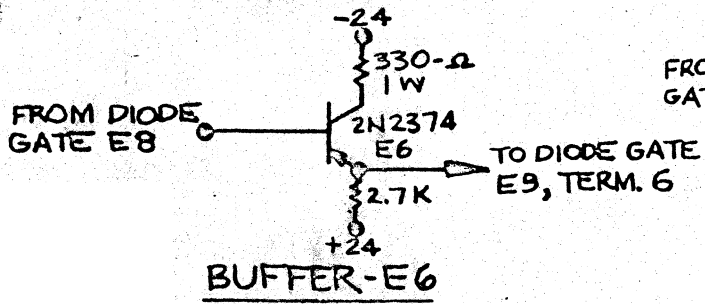
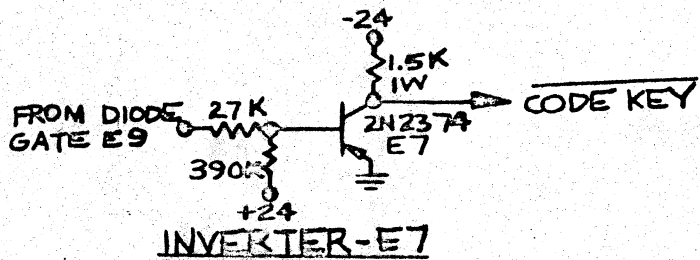
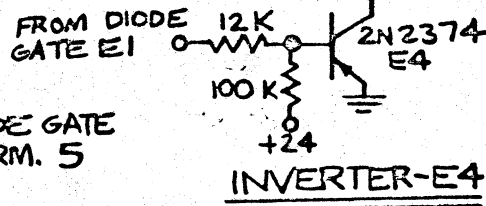
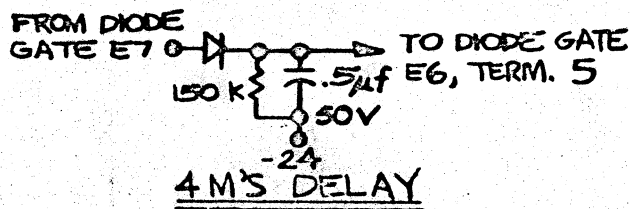
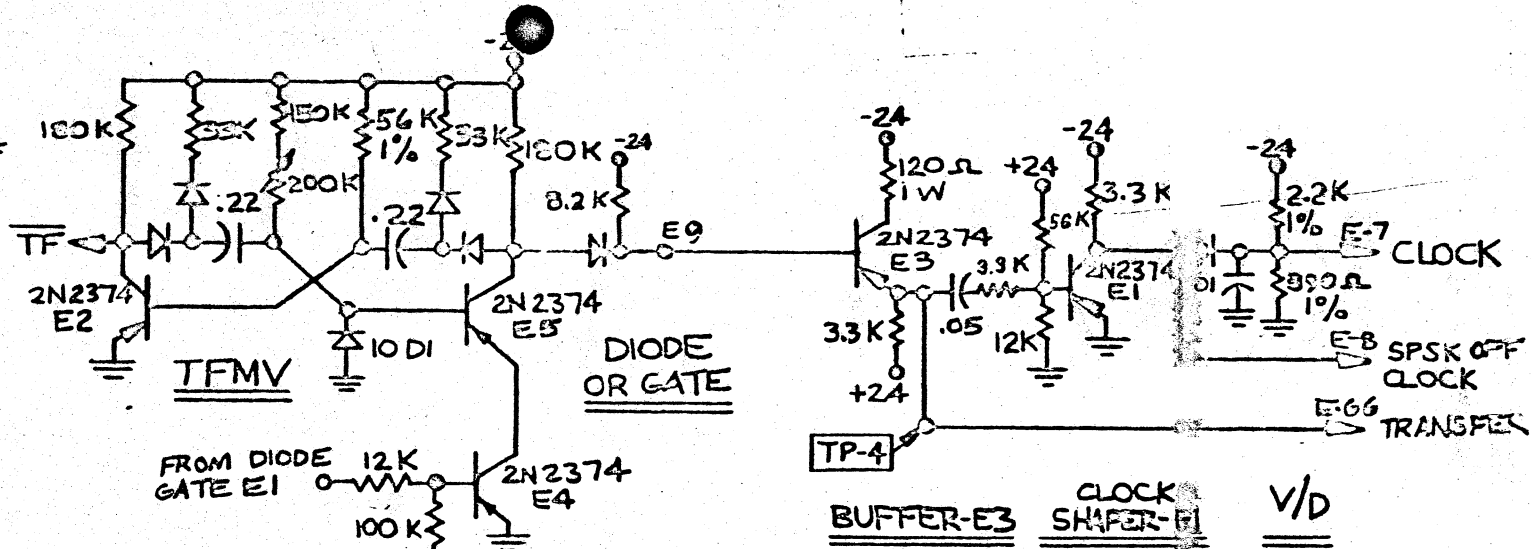
READER  
DIAGRAM 6



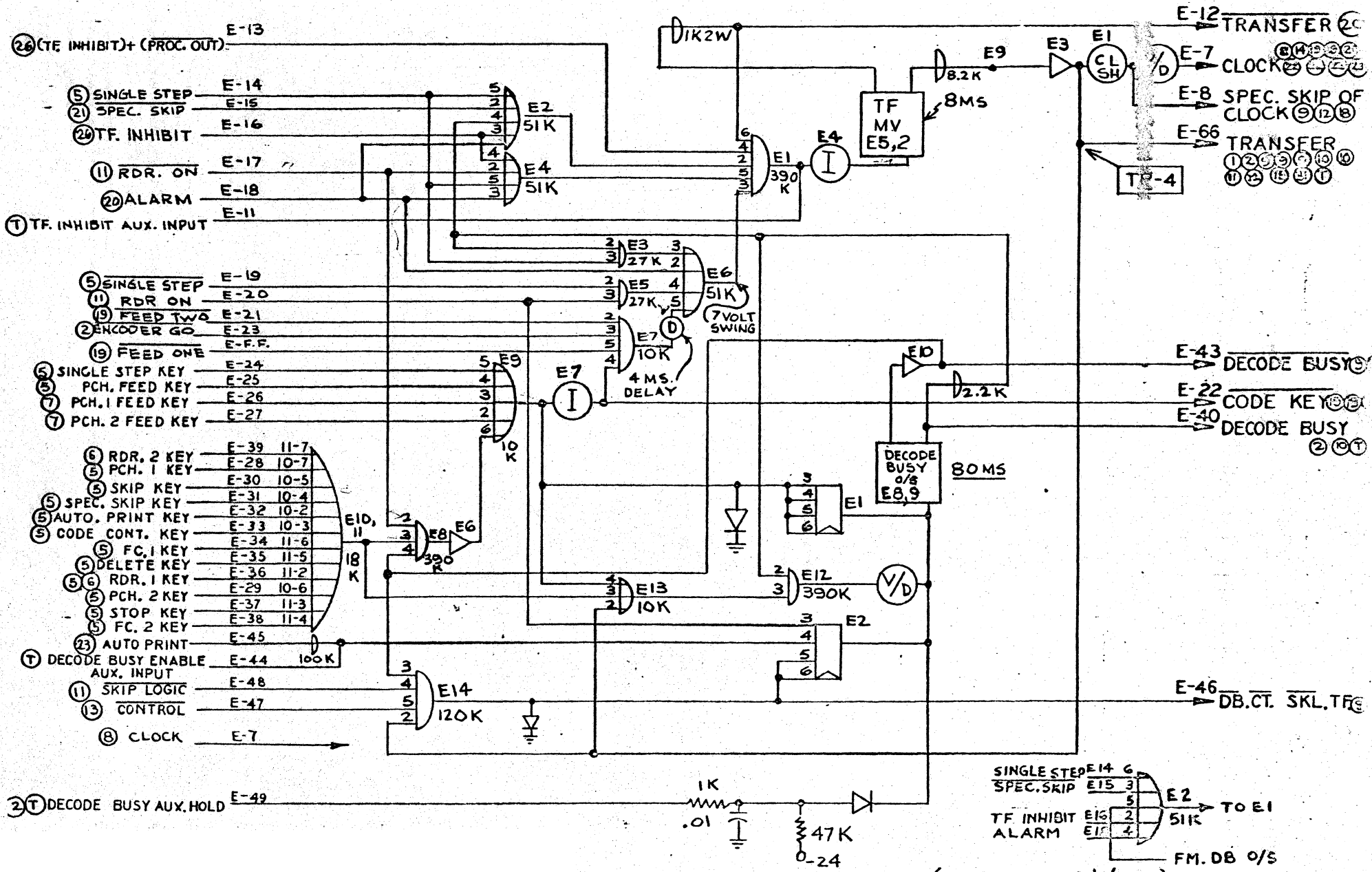
**PUNCH  
DIAGRAM 7**



CM  
 3-1  
 { END 1A2 } FOR CLOCKS  
 { -24 3A4 } A, C, D, E, F  
 { +24 5B6 }  
 { +5 C-9, D-42, E-E2, F-9 }  
 { -40 A-40 & F-42 }

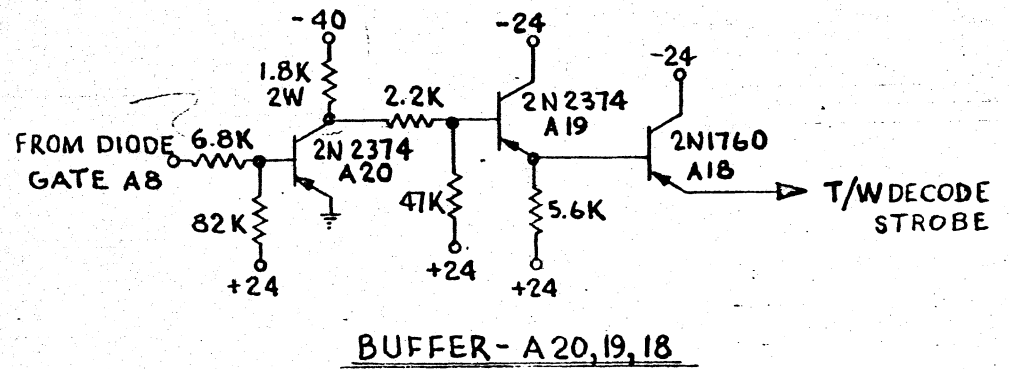
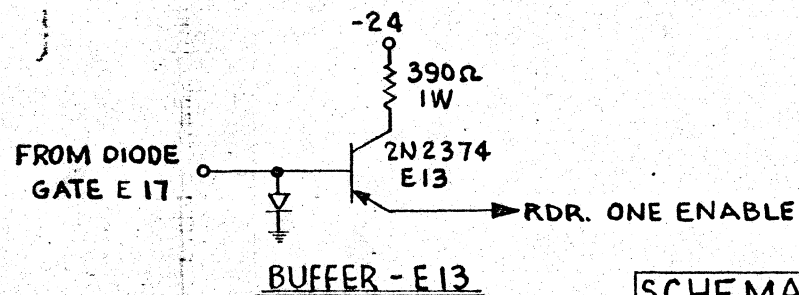
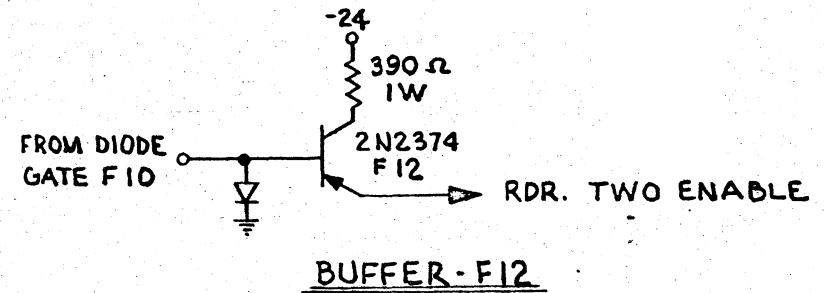
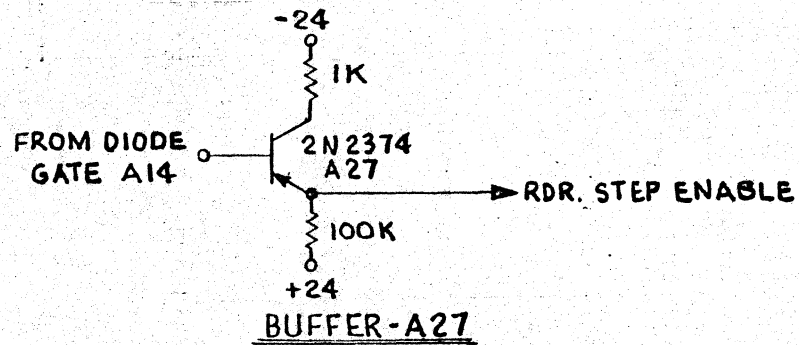
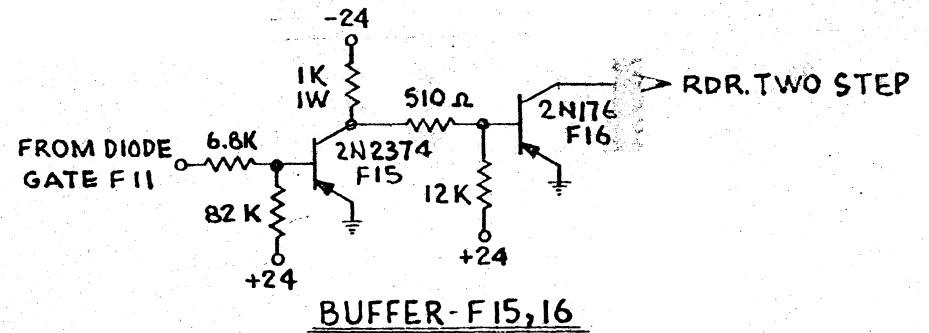
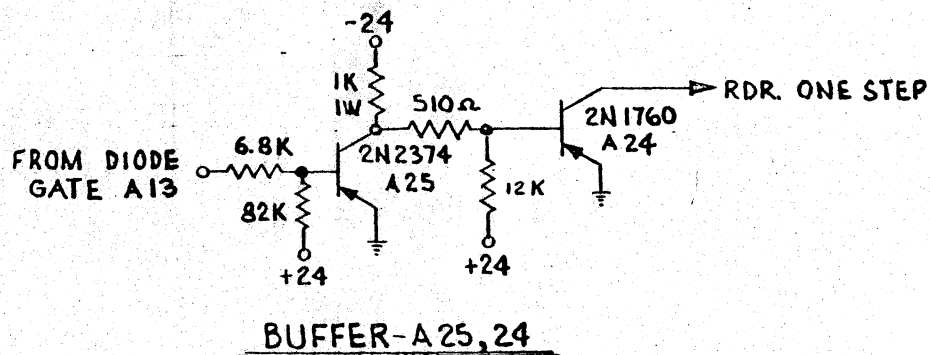




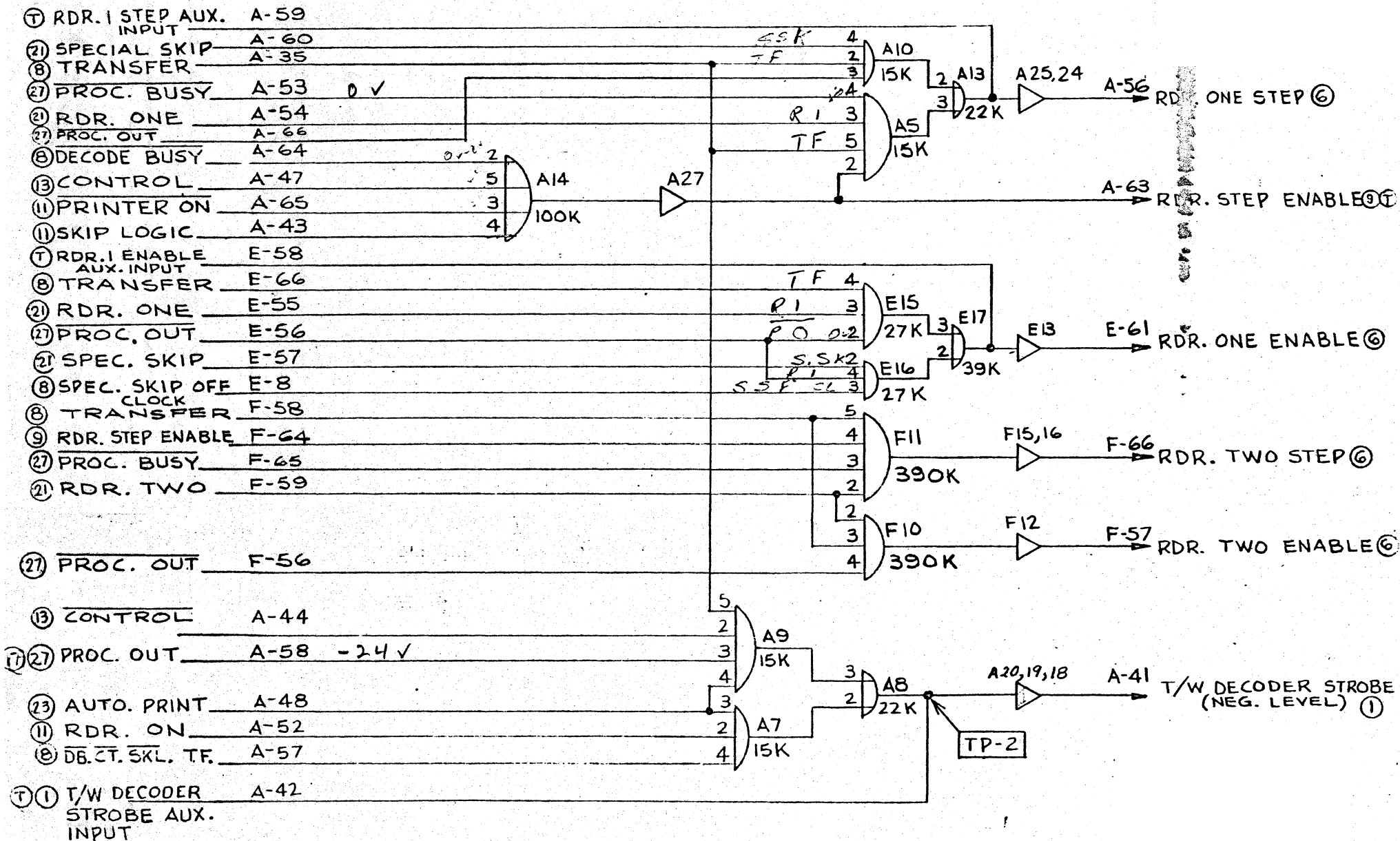


TIMING  
DIAGRAM 8

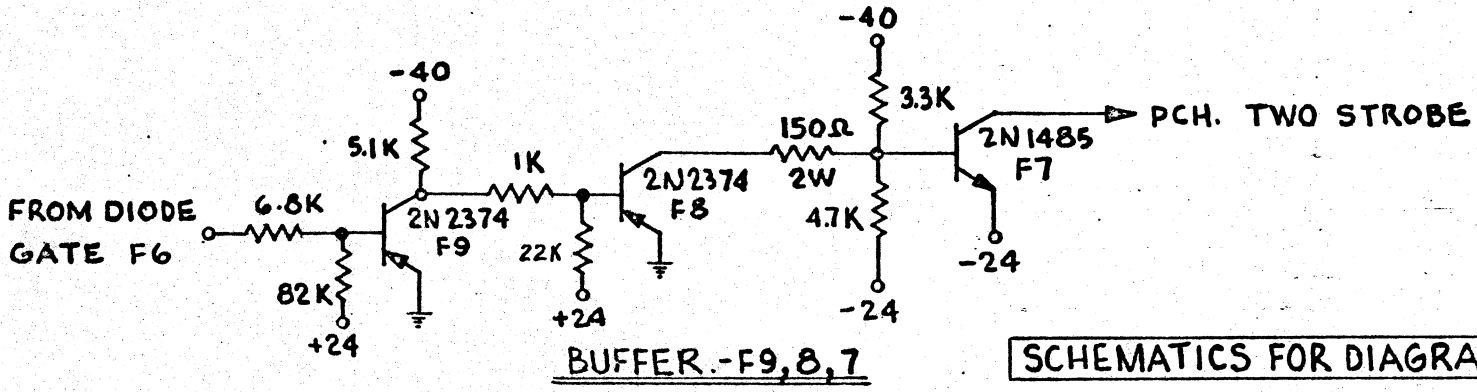
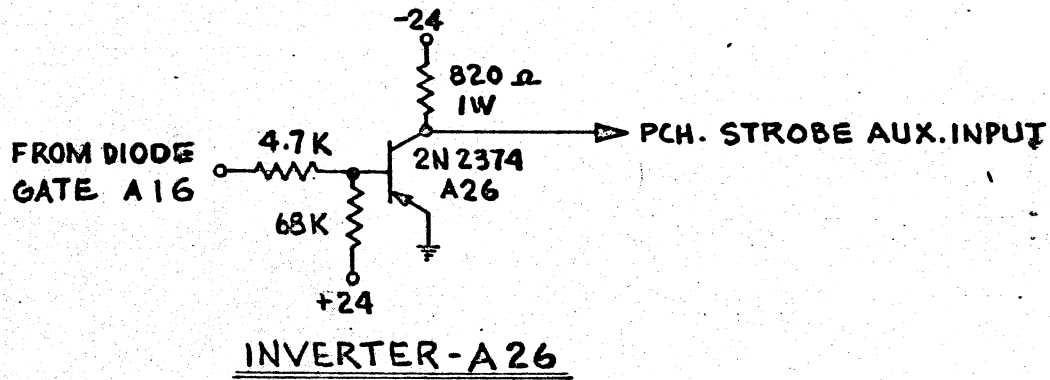
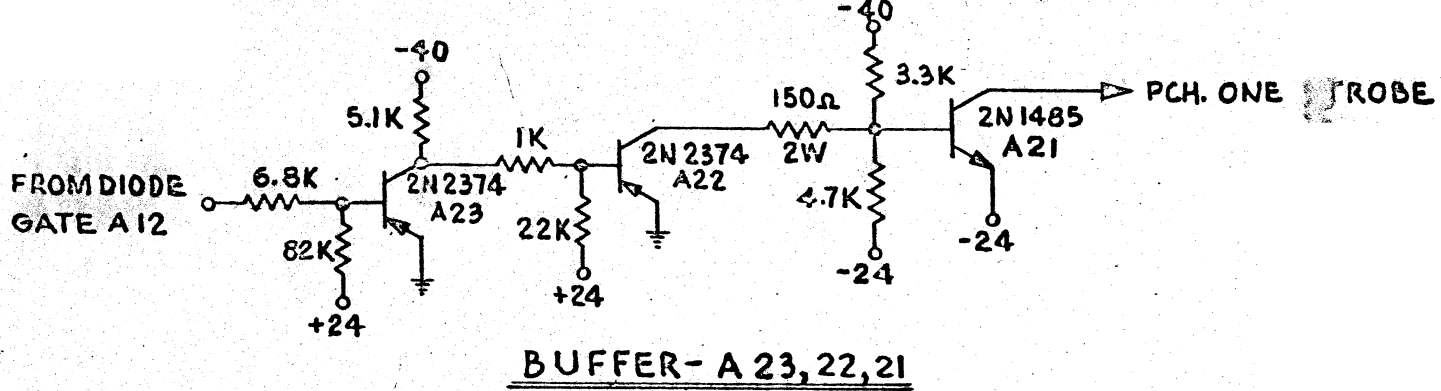
(GATE E-2 FOR 'E' BDS.)  
(ISSUE 'L' & ABOVE)



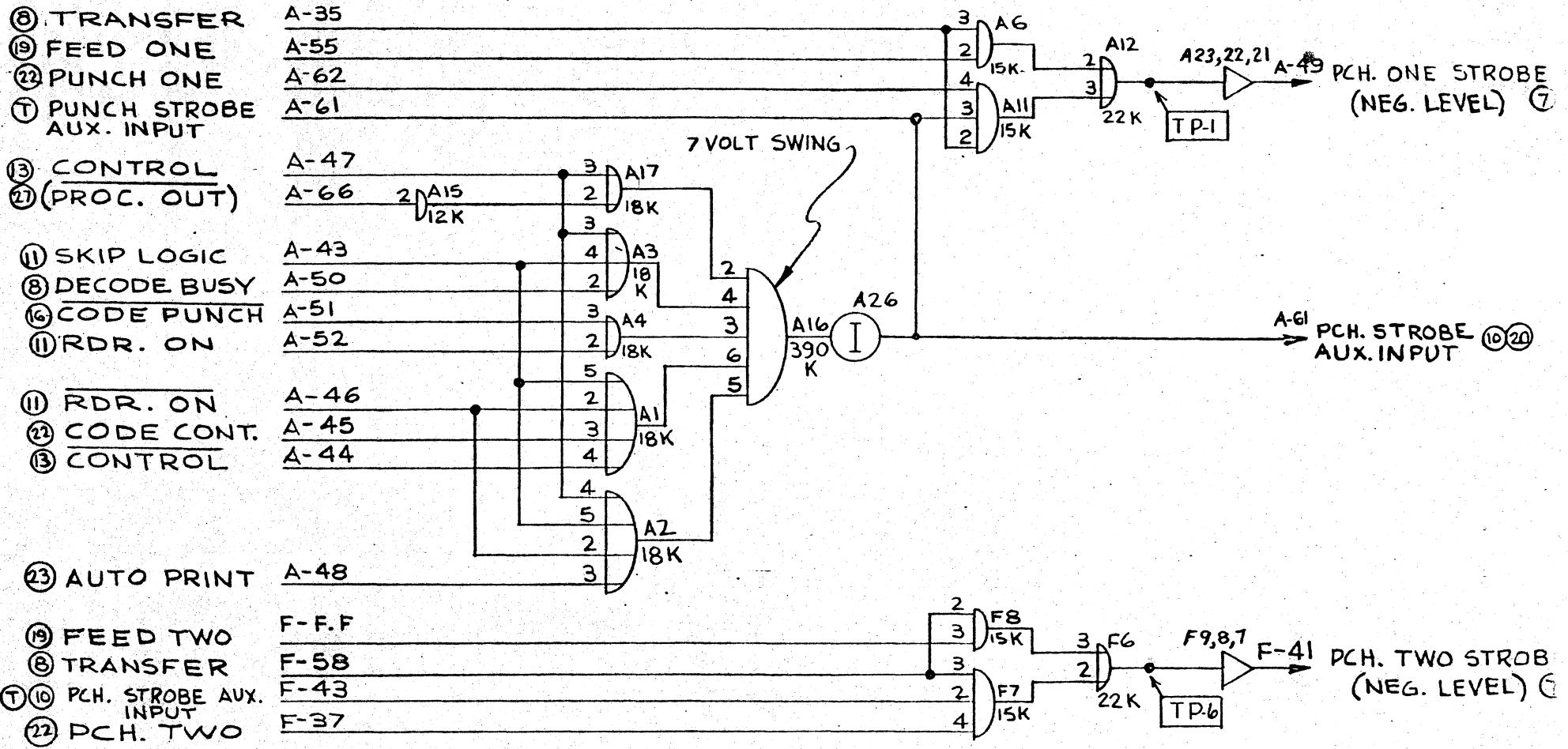
**SCHEMATICS FOR DIAGRAM 9**



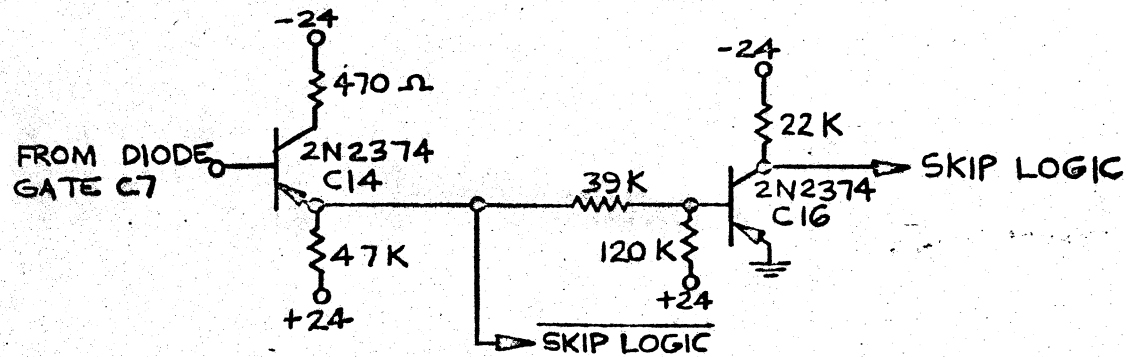
STEP AND T/W STROBE LOGIC  
DIAGRAM 9



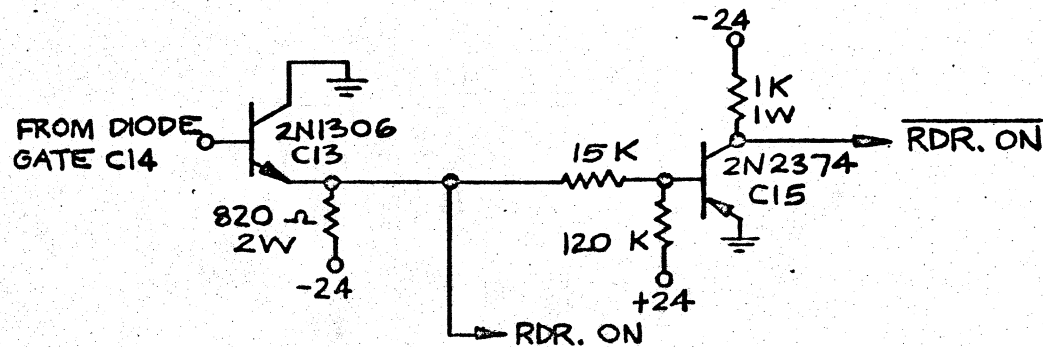
**SCHEMATICS FOR DIAGRAM 10**  
(IX 28)



PUNCH STROBE LOGIC  
DIAGRAM 10

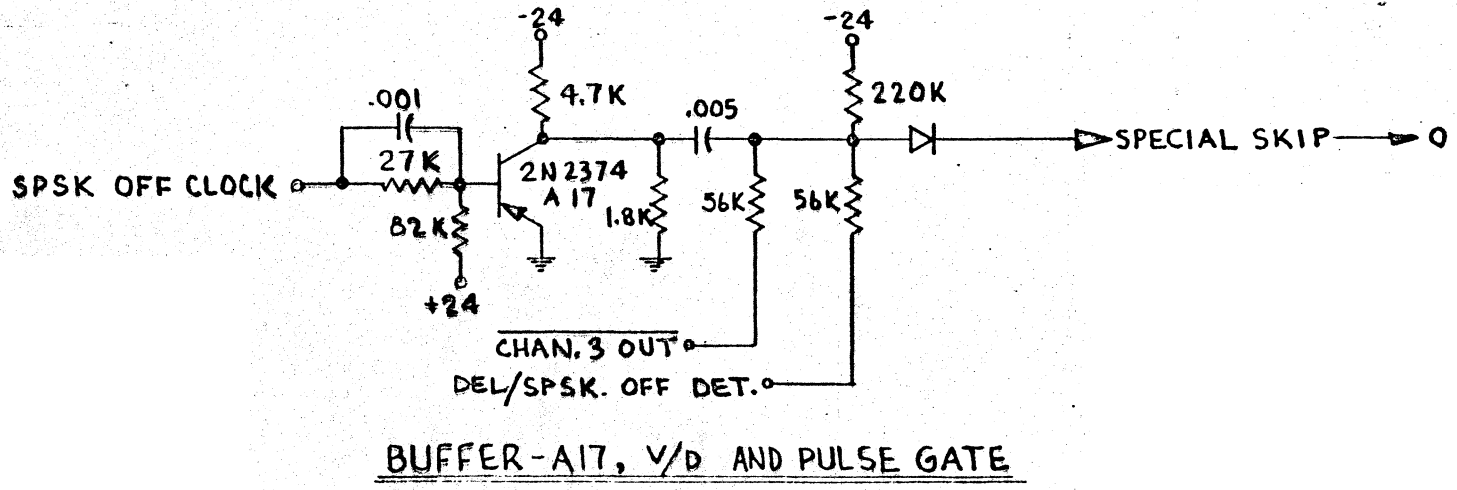
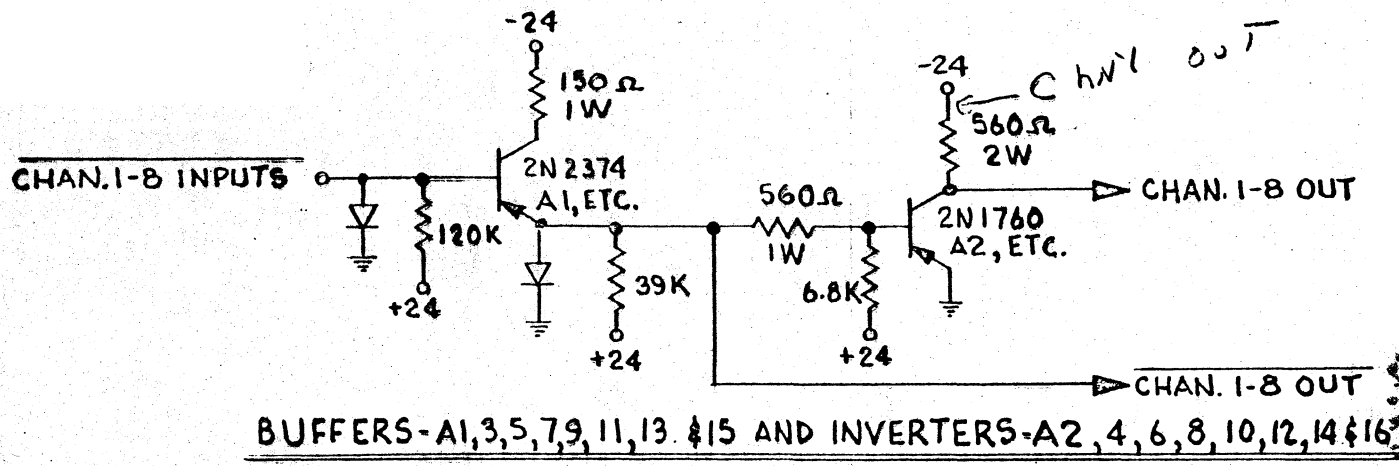


BUFFER-C14 & INVERTER-C16

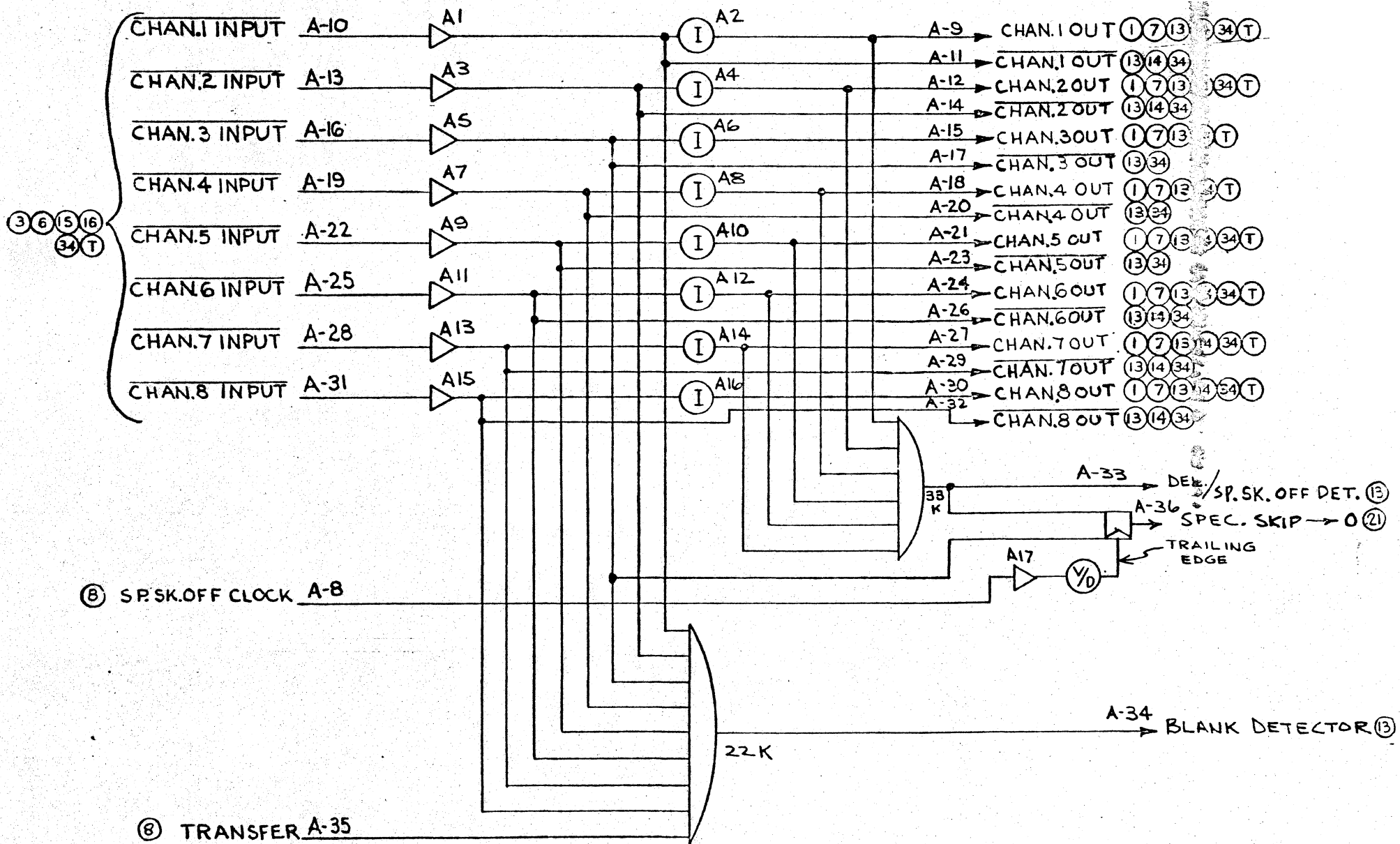


BUFFER-C13 & INVERTER-C15

**SCHEMATICS FOR DIAGRAM 11**

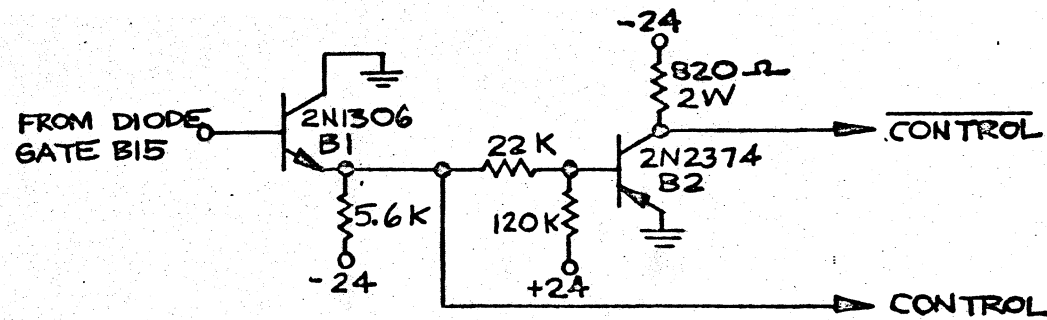


SCHEMATICS FOR DIAGRAM 12



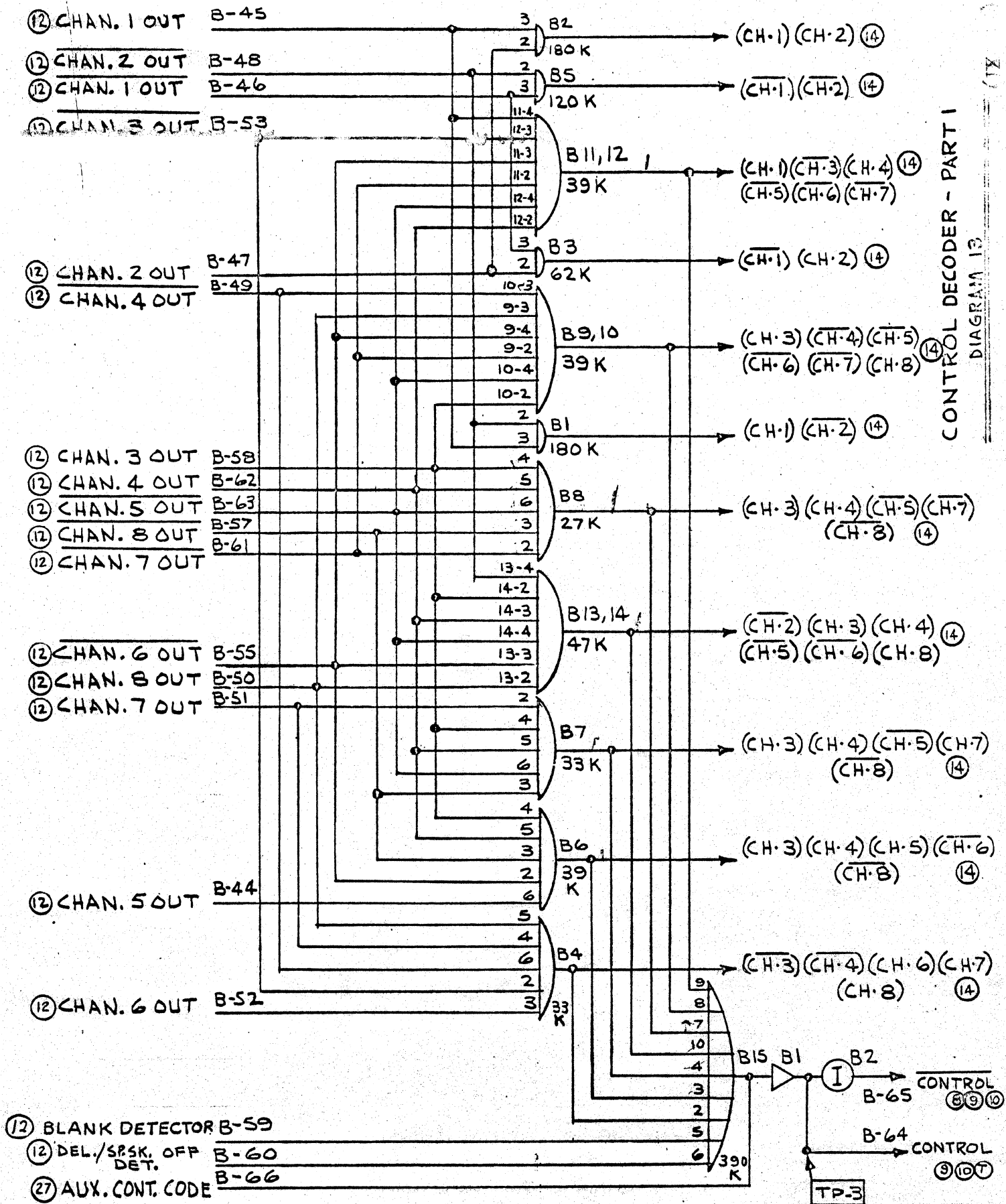
INFORMATION CHANNELS  
DIAGRAM 12



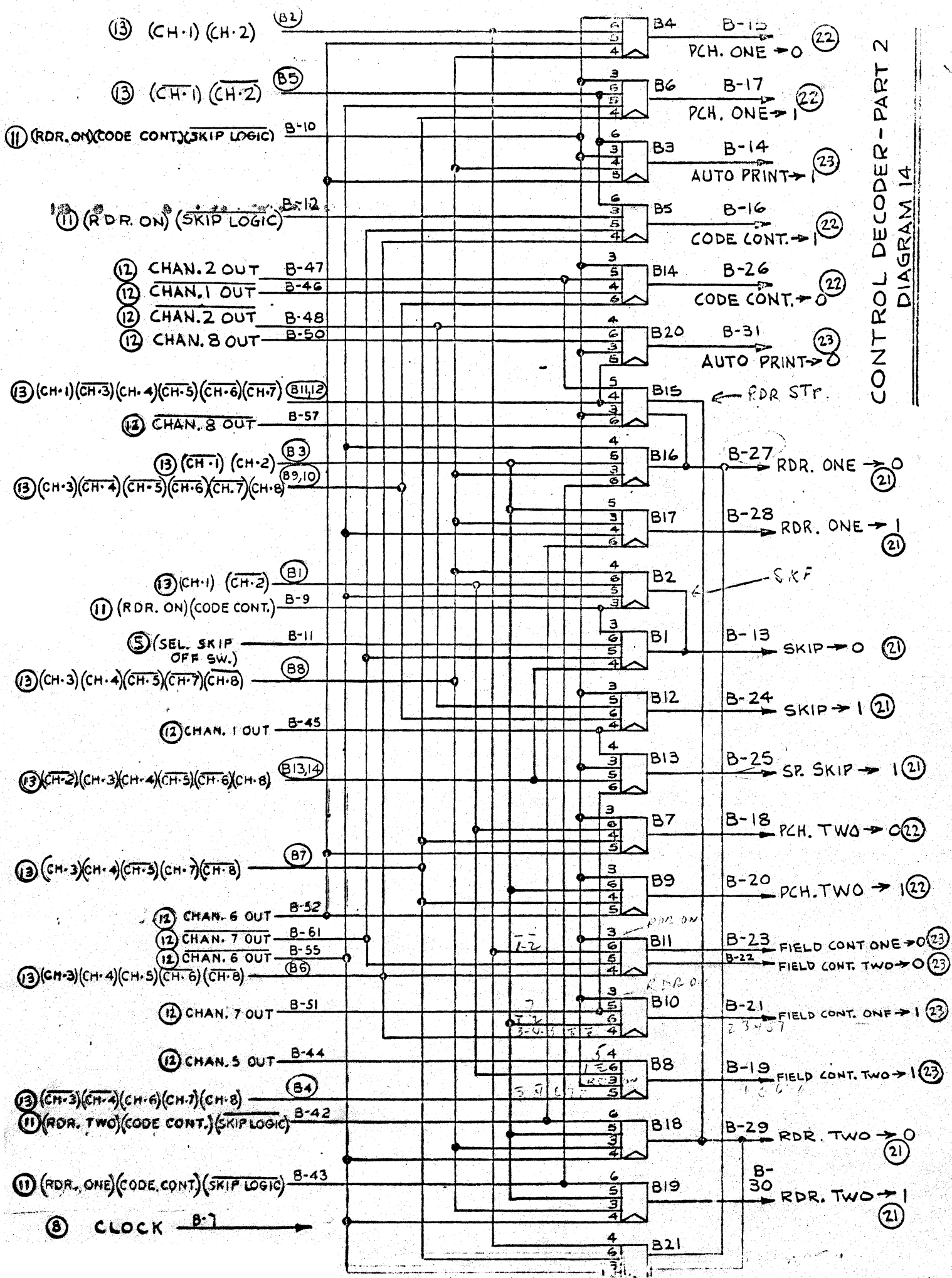


BUFFER-B1 & INVERTER-B2

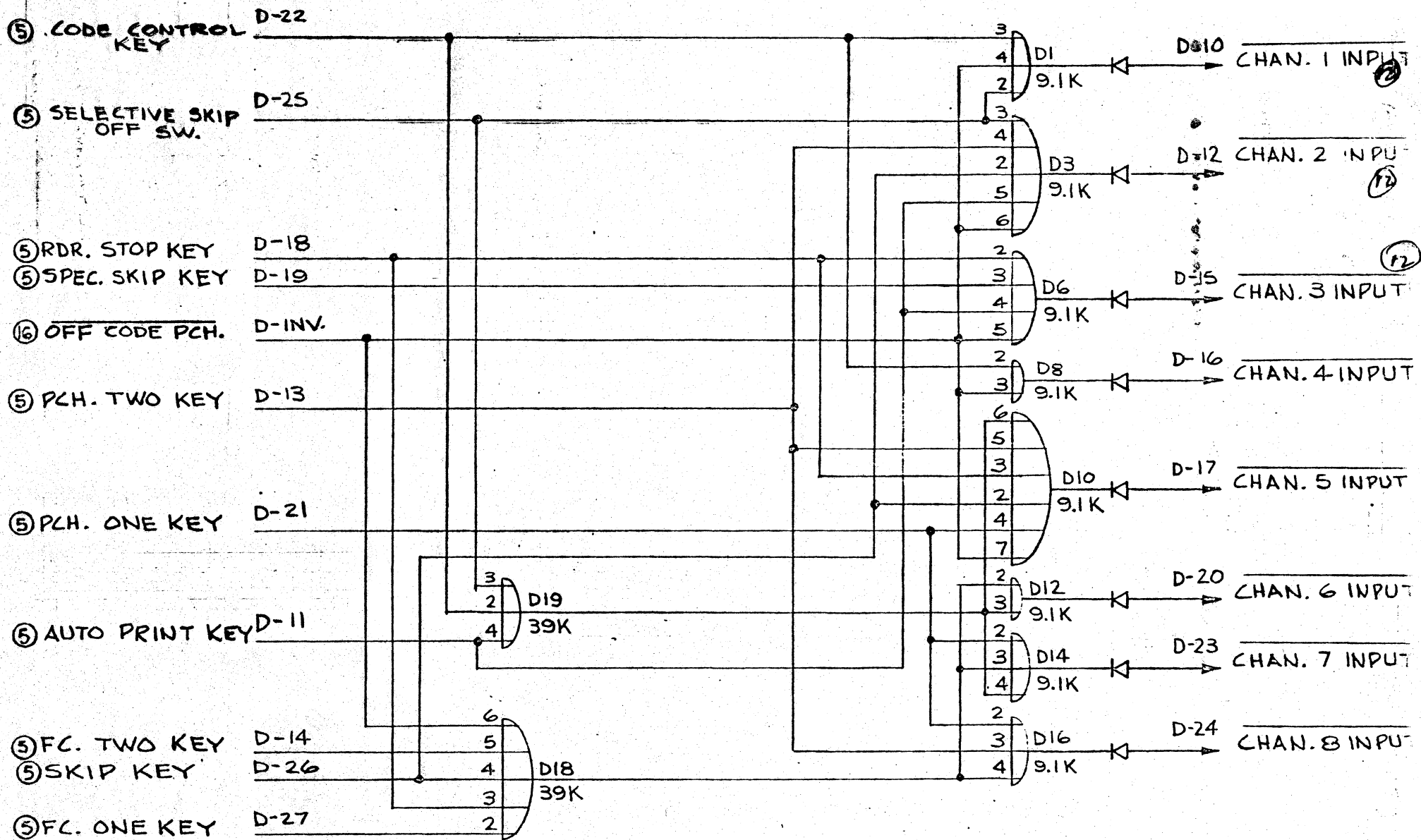
SCHEMATICS FOR DIAGRAM 13



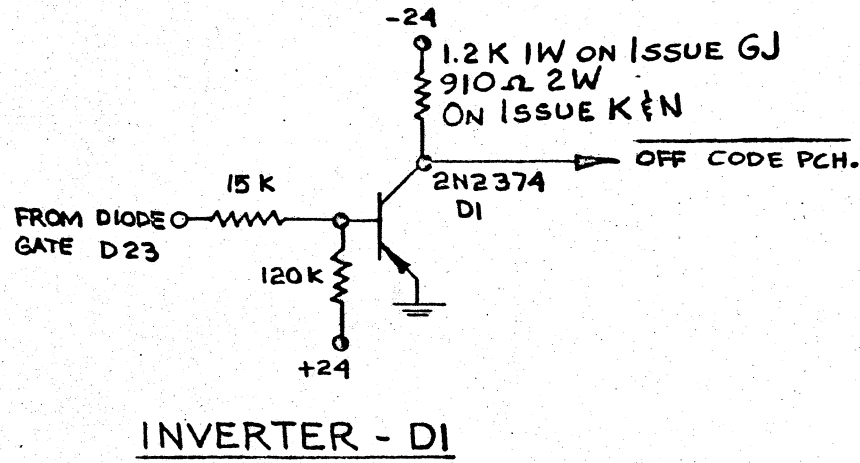
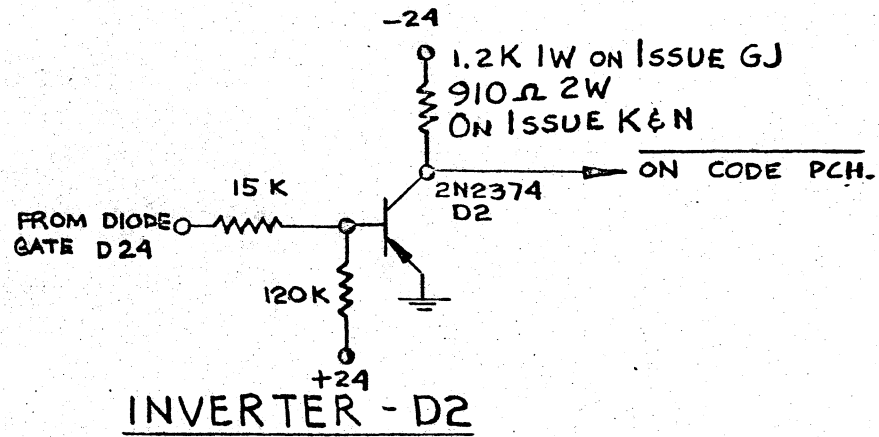
CONTROL DECODER - PART I  
 DIAGRAM 13



CONTROL DECODER - PART 2  
DIAGRAM 14

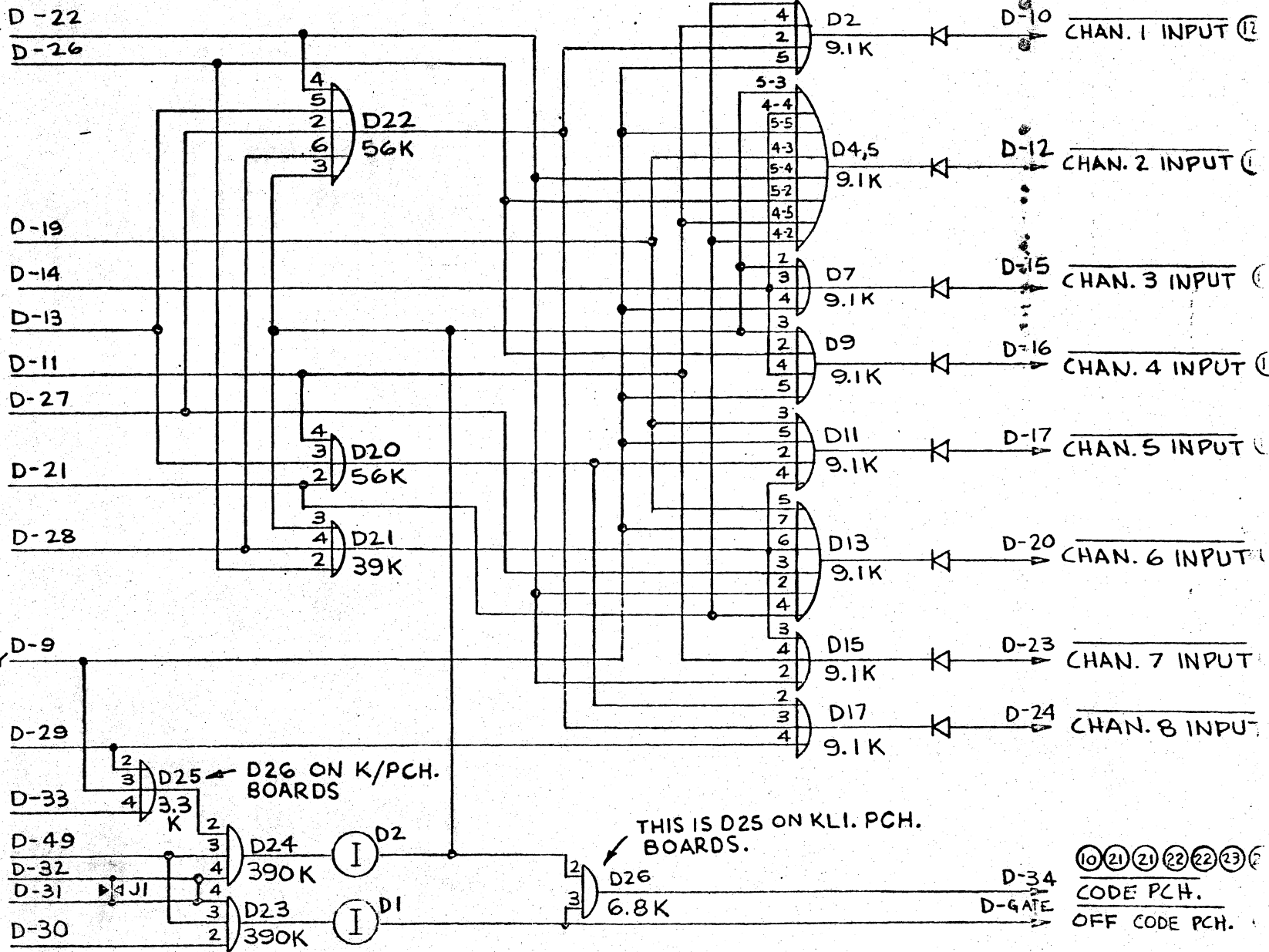


OFF CODE ENCODER  
DIAGRAM 15



SCHEMATICS FOR DIAGRAM 16

⑤ CODE CONT. KEY  
 ⑤ SKIP KEY



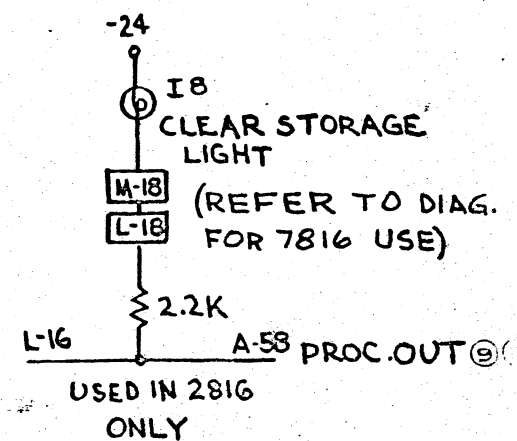
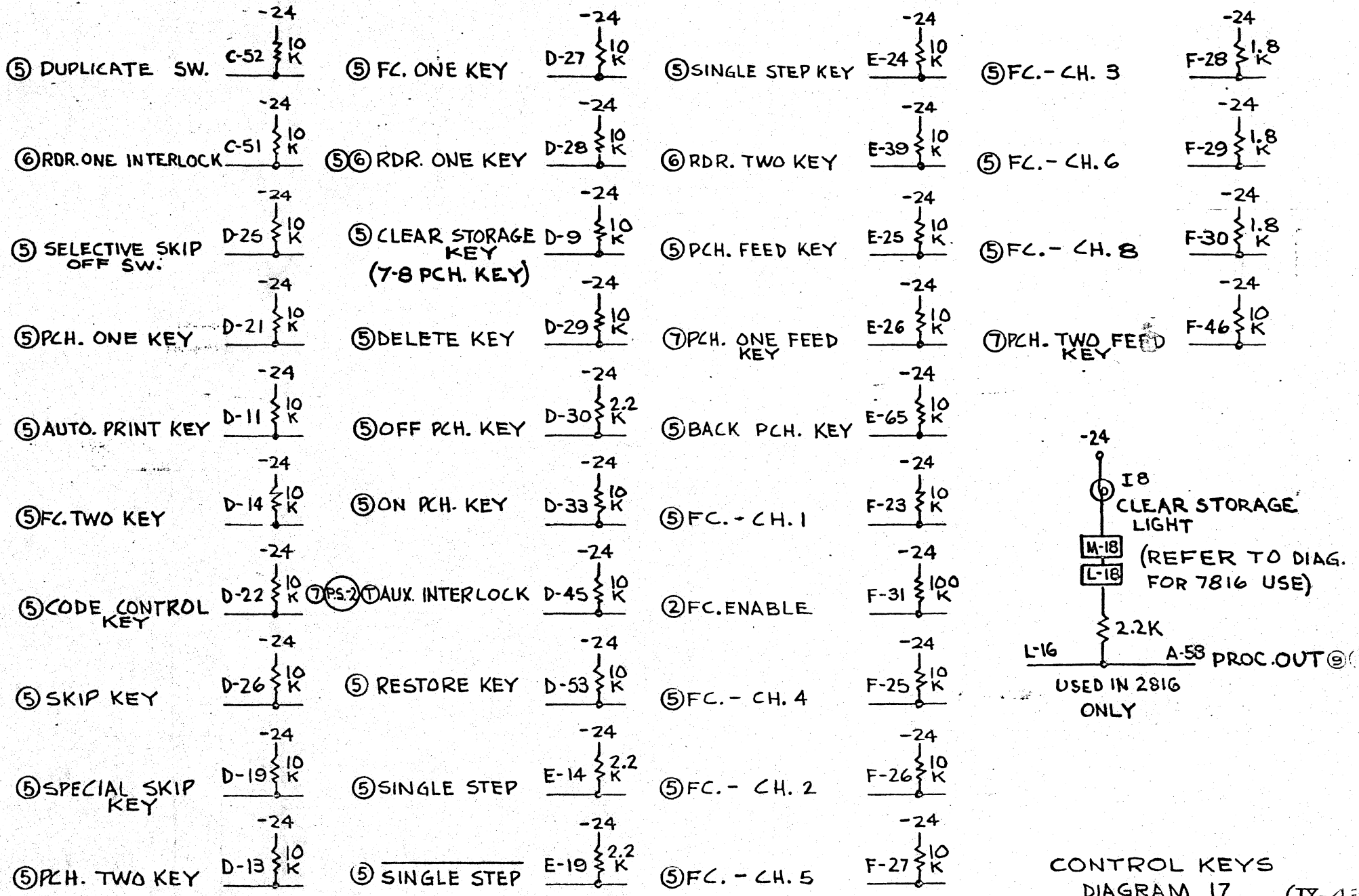
⑤ SPEC. SKIP KEY  
 ⑤ FC. TWO KEY  
 ⑤ PCH. TWO KEY  
 ⑤ AUTO PRINT KEY  
 ⑤ FC. ONE KEY  
 ⑤ PCH. ONE KEY  
 ⑤ RDR. ONE KEY

⑤ CLEAR STORAGE KEY (7-8 PCH. KEY)  
 ⑤ DELETE KEY  
 ⑤ ON PCH. KEY  
 ②⑩ KEYBOARD UNLOCK  
 ⑧ TRANSFER TFA  
 ⑤ OFF CODE PCH.

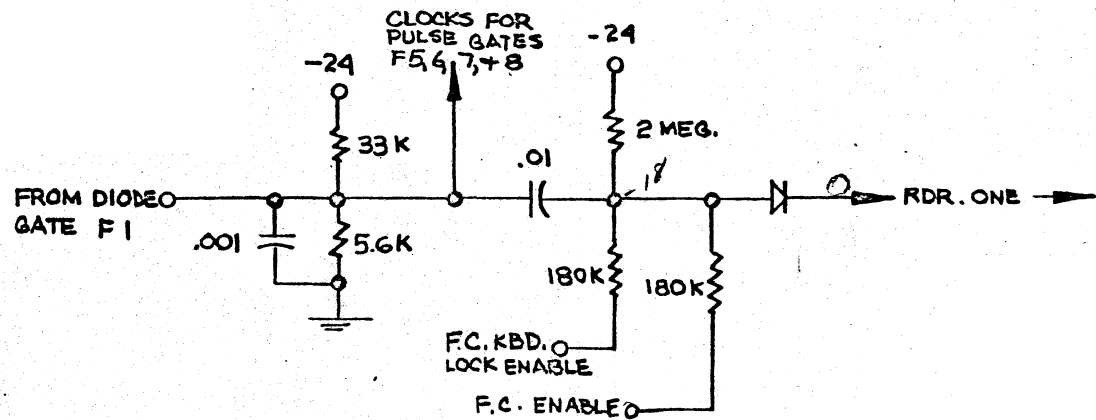
⑩②①②②②③⑤  
 CODE PCH.  
 OFF CODE PCH.

**NOTE:**  
 1. D4 J1 HAS NO MEANING ON "D" BDS. USED WITH MODEL OI CONTROL UNITS.  
 2. LEVEL TFA IS NOT USED WITH MODEL OI CONTROL UNITS.

ON CODE ENCODER  
 DIAGRAM 16



CONTROL KEYS  
 DIAGRAM 17 (IX-4)



V/D AND PULSE GATE

SCHEMATICS FOR DIAGRAM 18



- ⑤ FC-CH.1
- ②② PCH. ONE
- ② FC. ENABLE
- ②③ FC. ONE

⑤ FC.-CH.4

②③ FC. TWO

⑤ FC.-CH.2

②② PCH. TWO

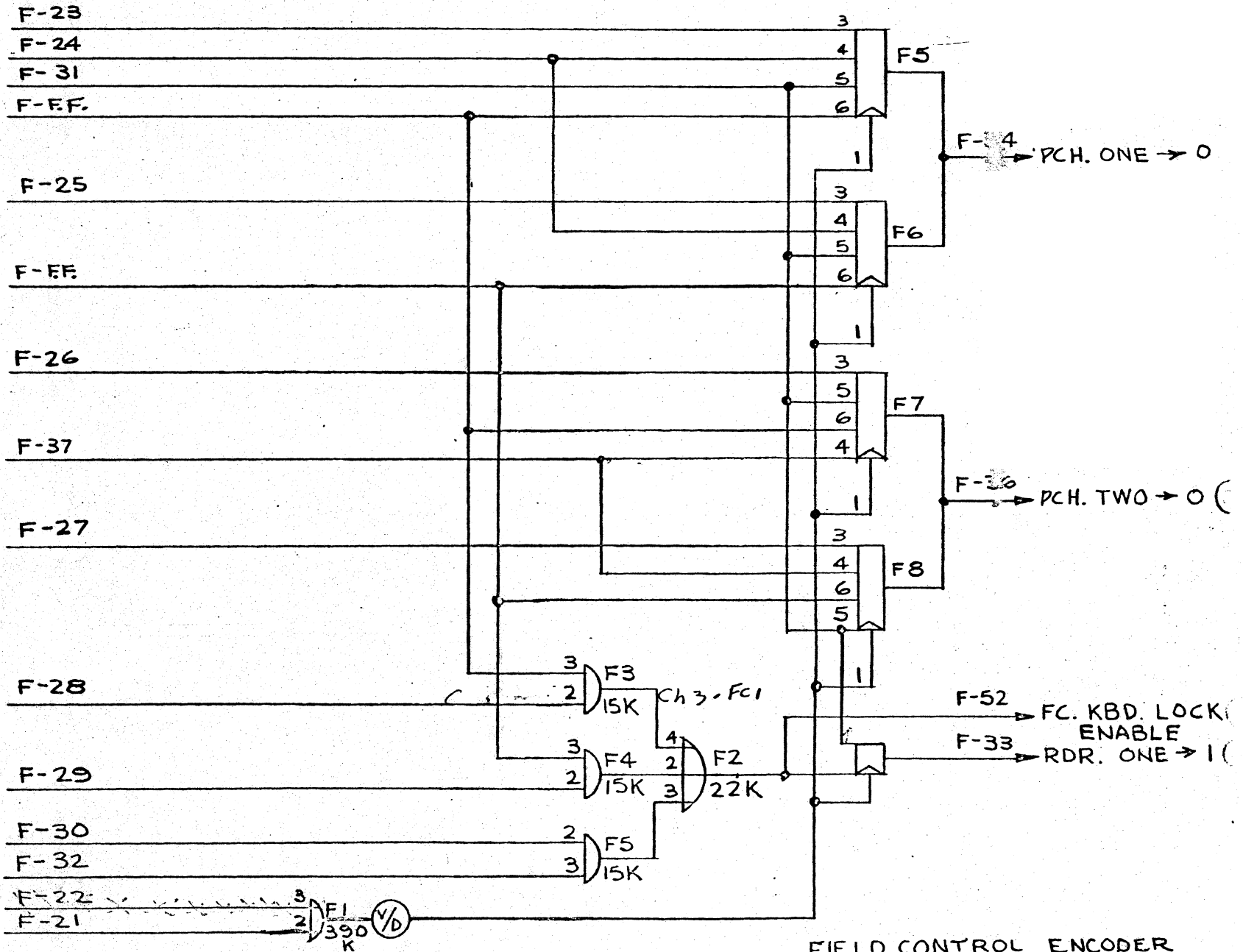
⑤ FC.-CH.5

⑤ FC.-CH.3

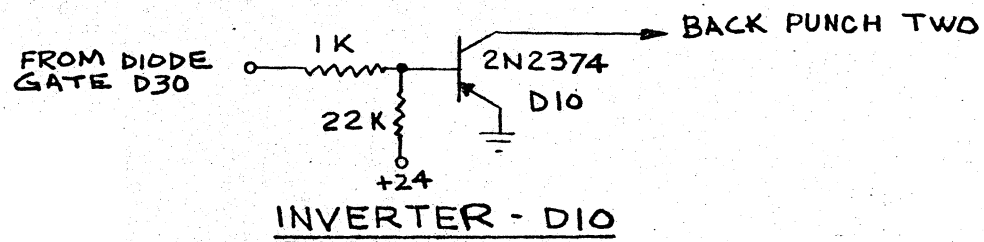
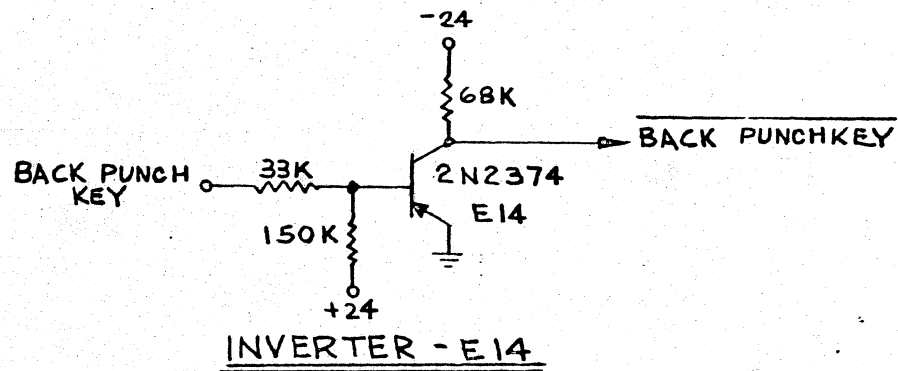
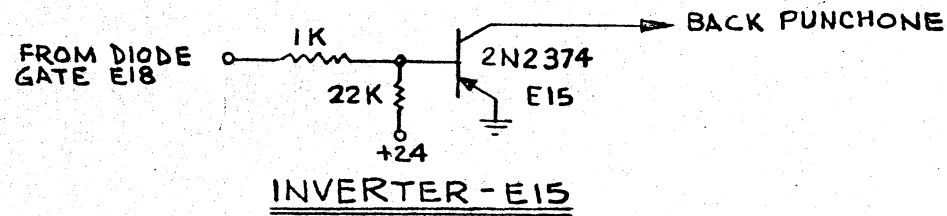
⑤ FC.-CH.6

⑤ FC.-CH.8

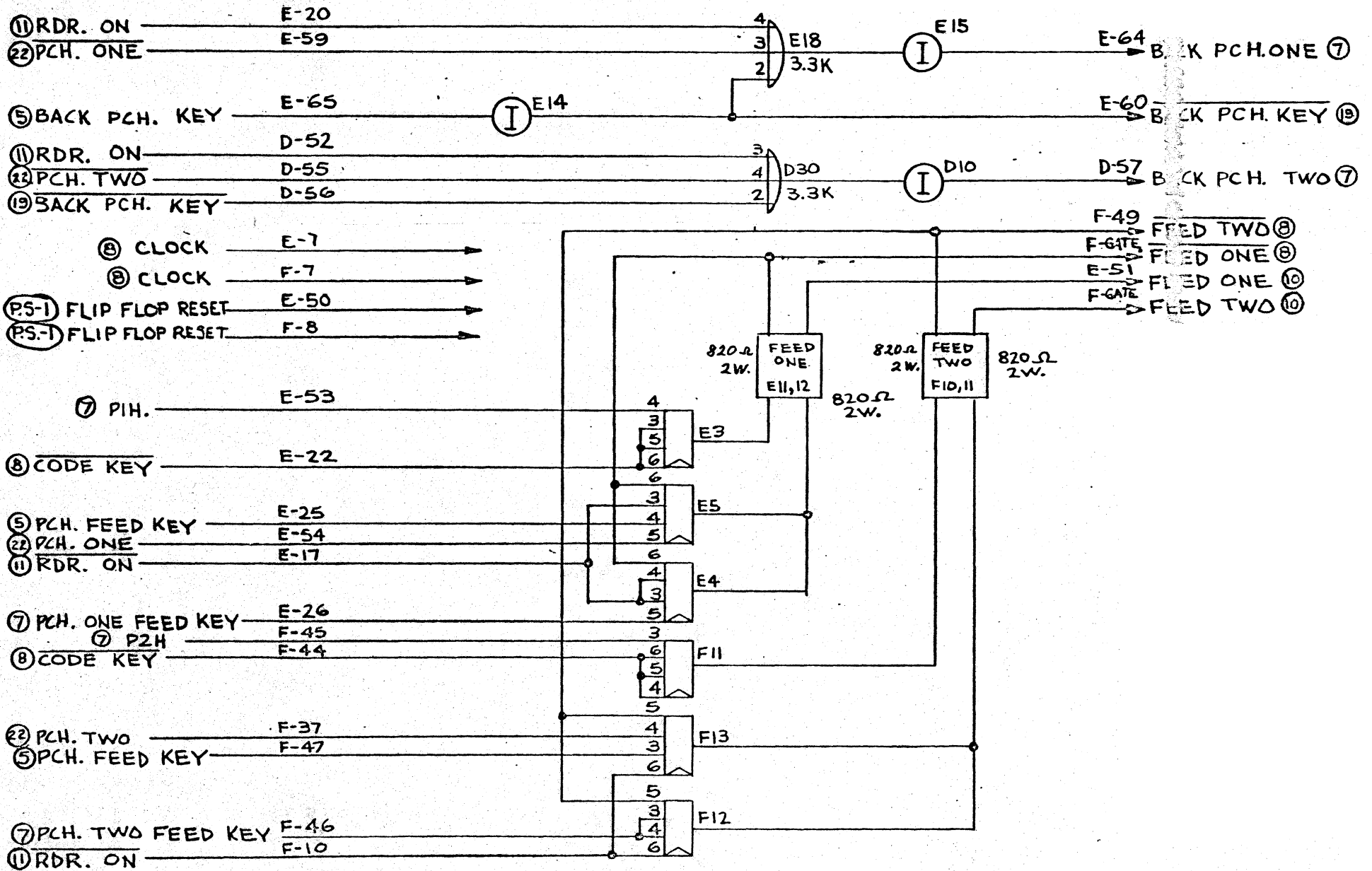
- ②⑦ PA-1
- ⑧ SPEC. SKIP OFF CLOCK
- ② FC. CLOCK



FIELD CONTROL ENCODER  
DIAGRAM 18

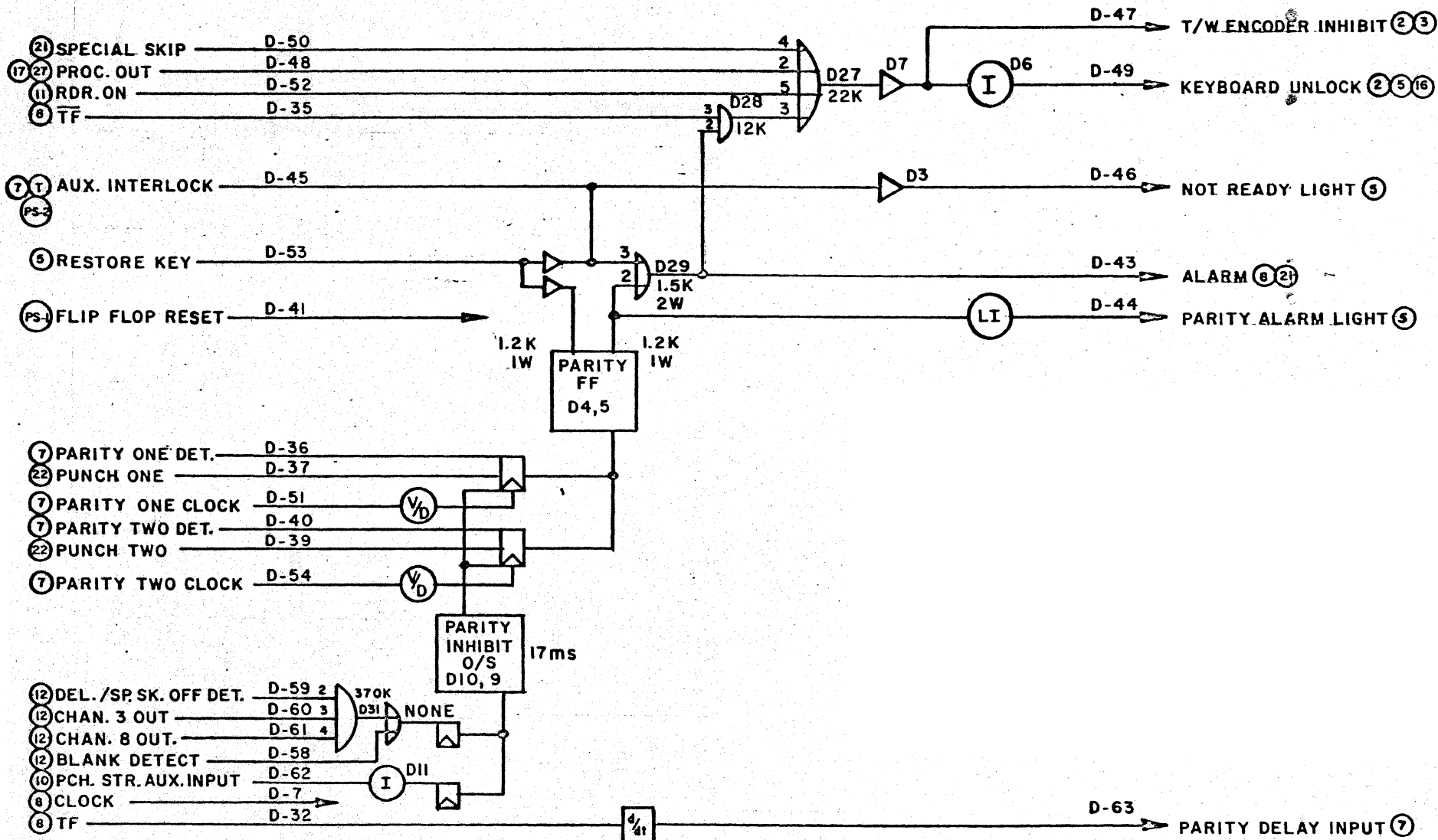


SCHEMATICS FOR DIAGRAM 19



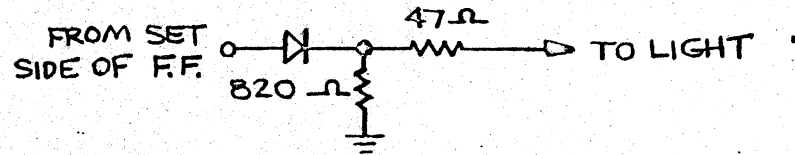
FEED AND BACK LOGIC  
DIAGRAM 19



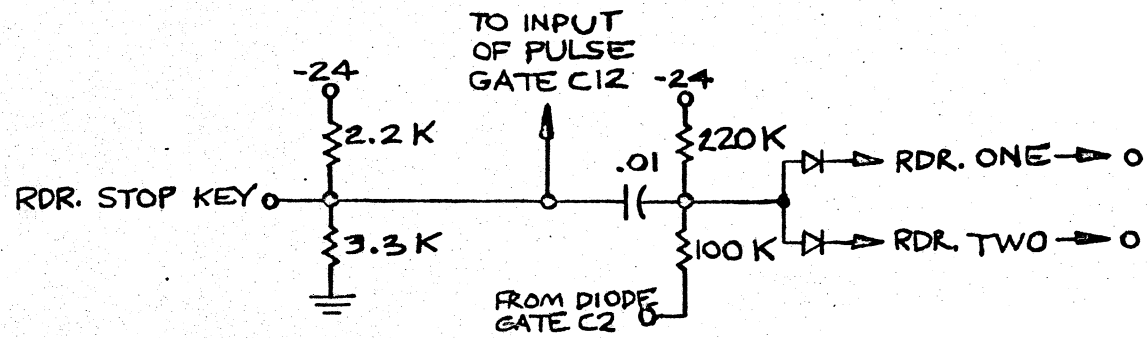


**ALARM & INTERLOCK  
DIAGRAM 20**

(IX-49)  
(REV. 11/12/65)

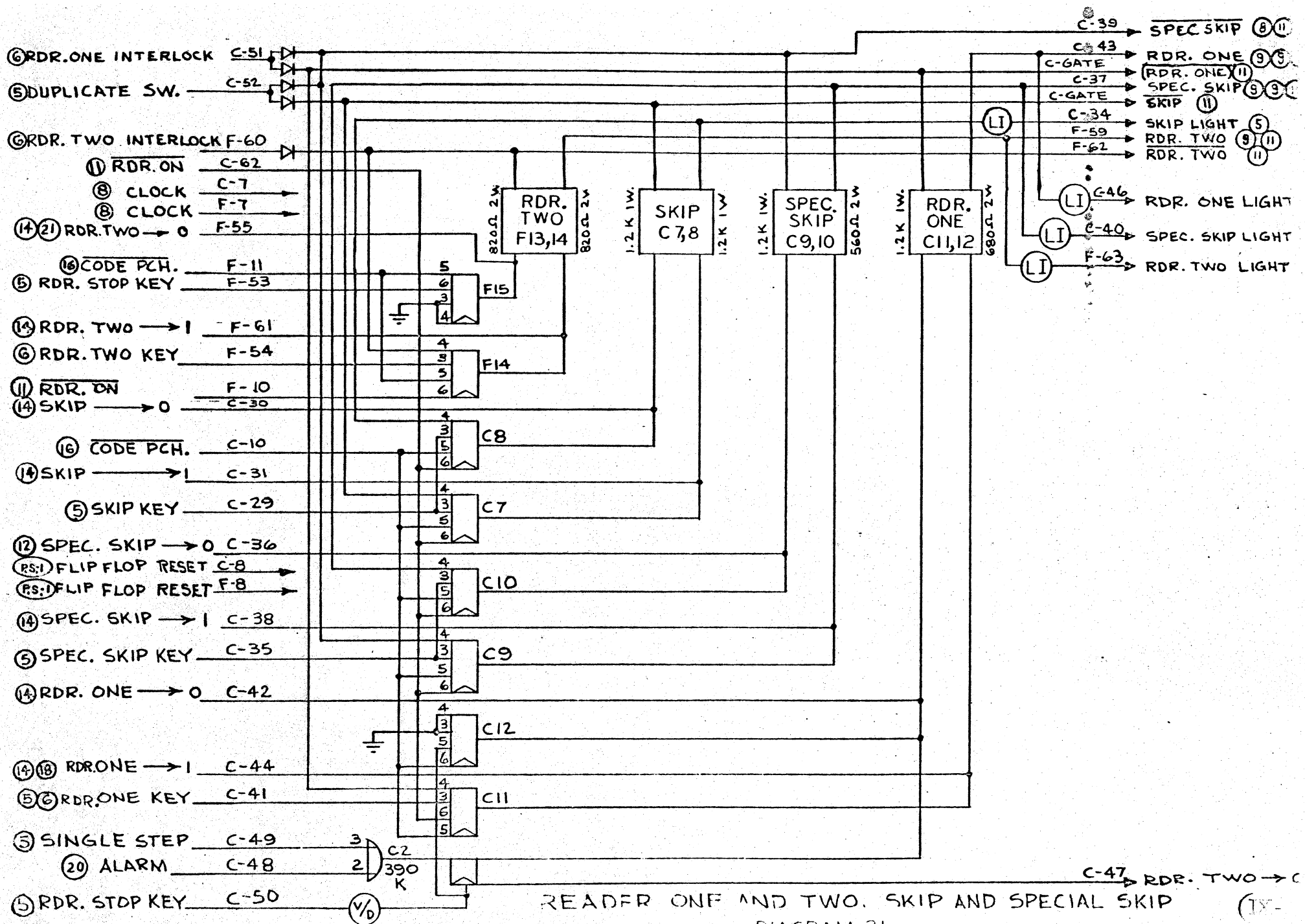


LI FOR SKIP, SPEC. SKIP, RDR. ONE & RDR. TWO

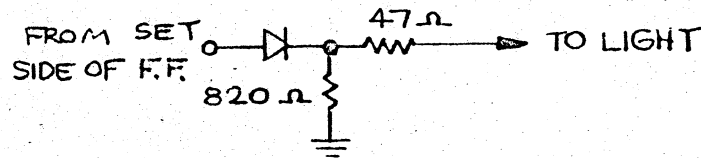


V/D & PULSE GATE

SCHEMATICS FOR DIAGRAM 21

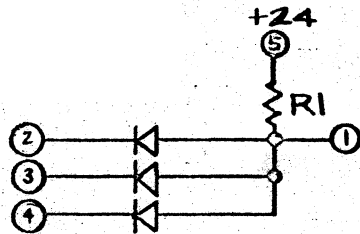


READER ONE AND TWO, SKIP AND SPECIAL SKIP  
 DIAGRAM 21

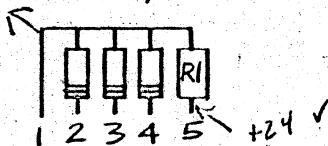


LI FOR PCH. ONE, PUNCH TWO & CC.

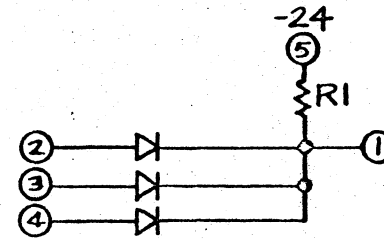
SCHEMATIC FOR DIAGRAM 22



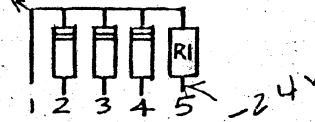
output is always output of gate



AND GATE



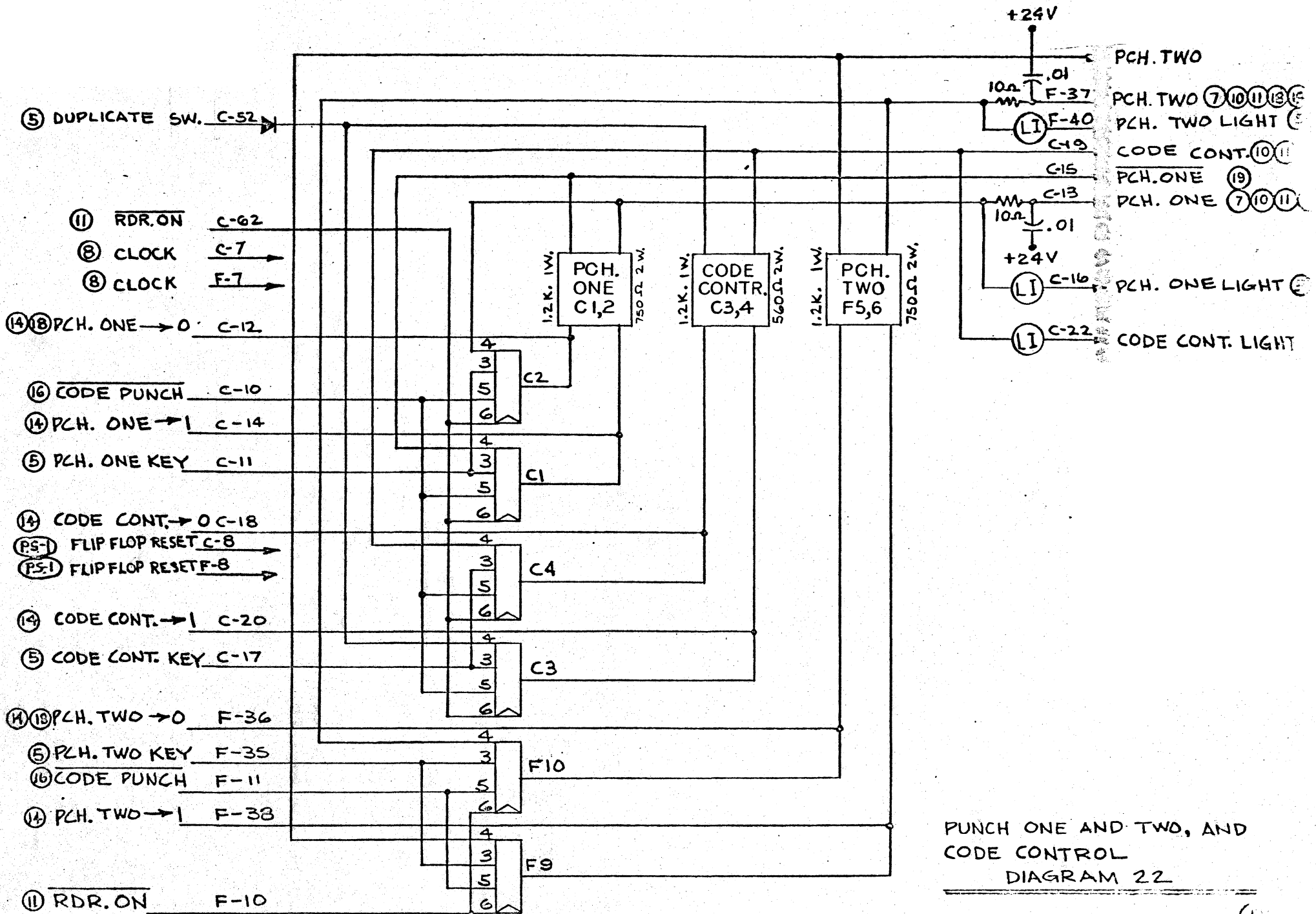
output



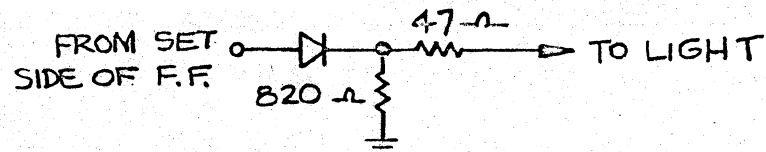
OR GATE

STANDARD DIODE GATES



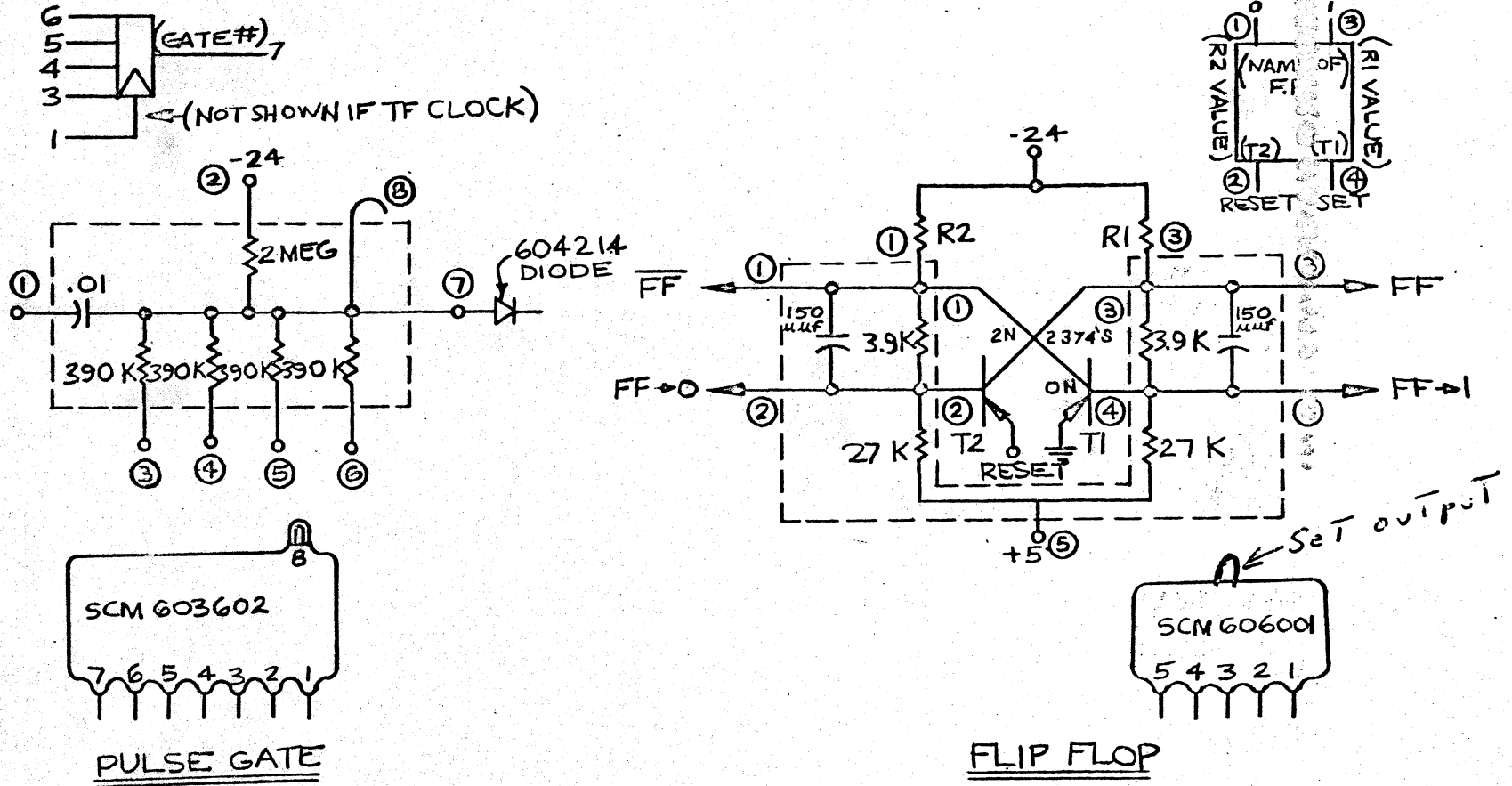


PUNCH ONE AND TWO, AND  
CODE CONTROL  
DIAGRAM 22

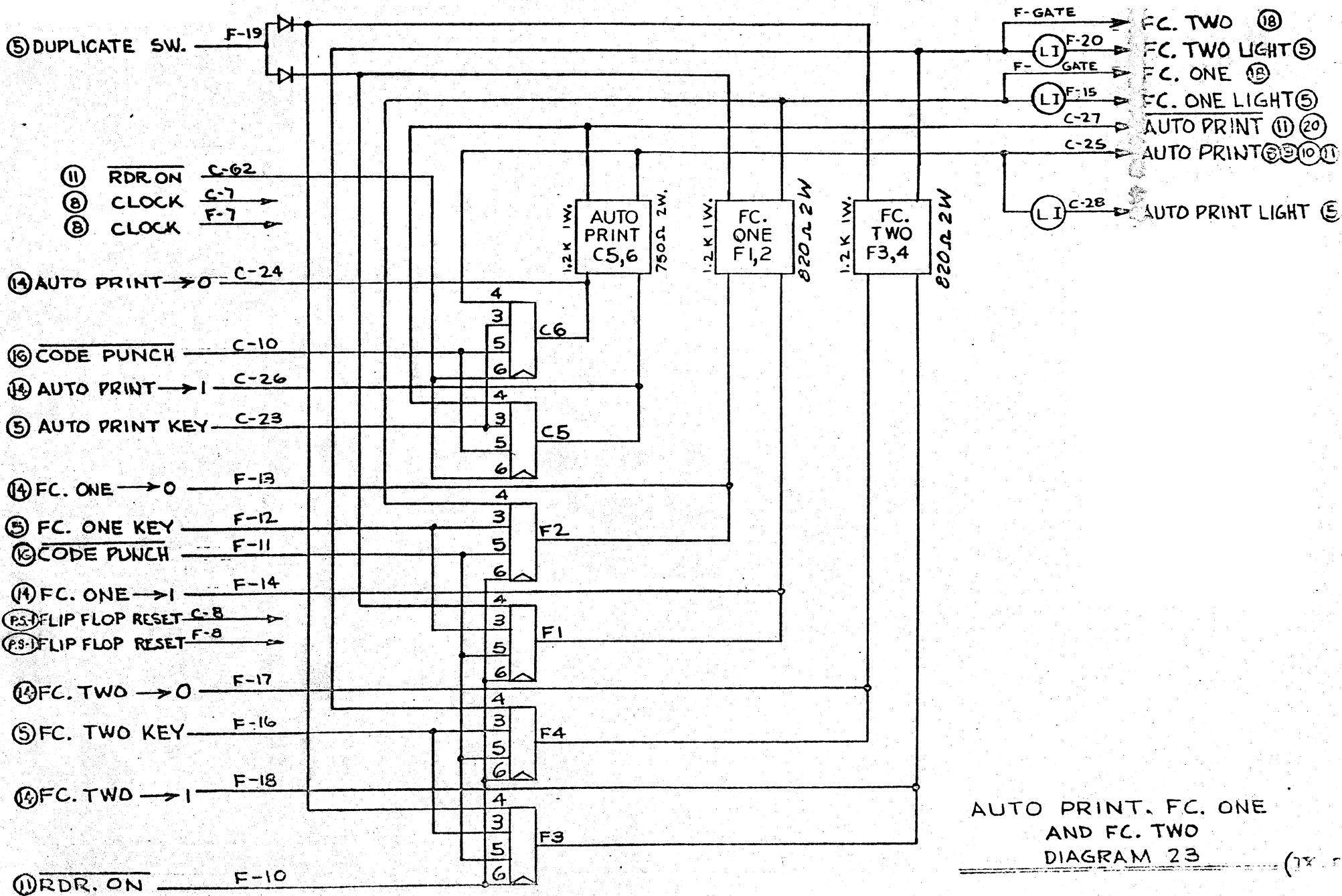


LI FOR FC. ONE, FC. TWO & A.P.

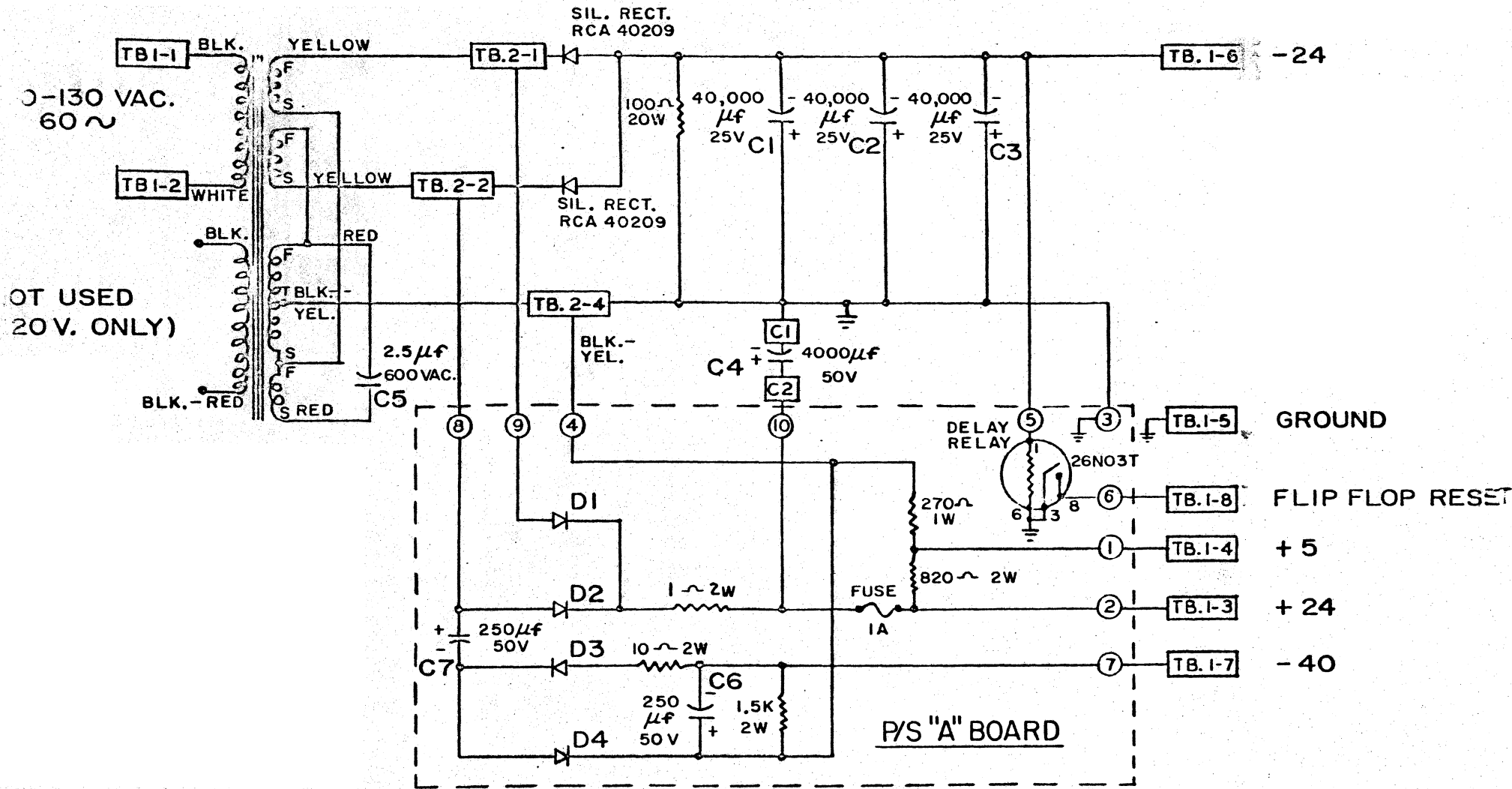
**SCHEMATIC FOR DIAGRAM 23**



**STANDARD PULSE GATE & FLIP FLOP**



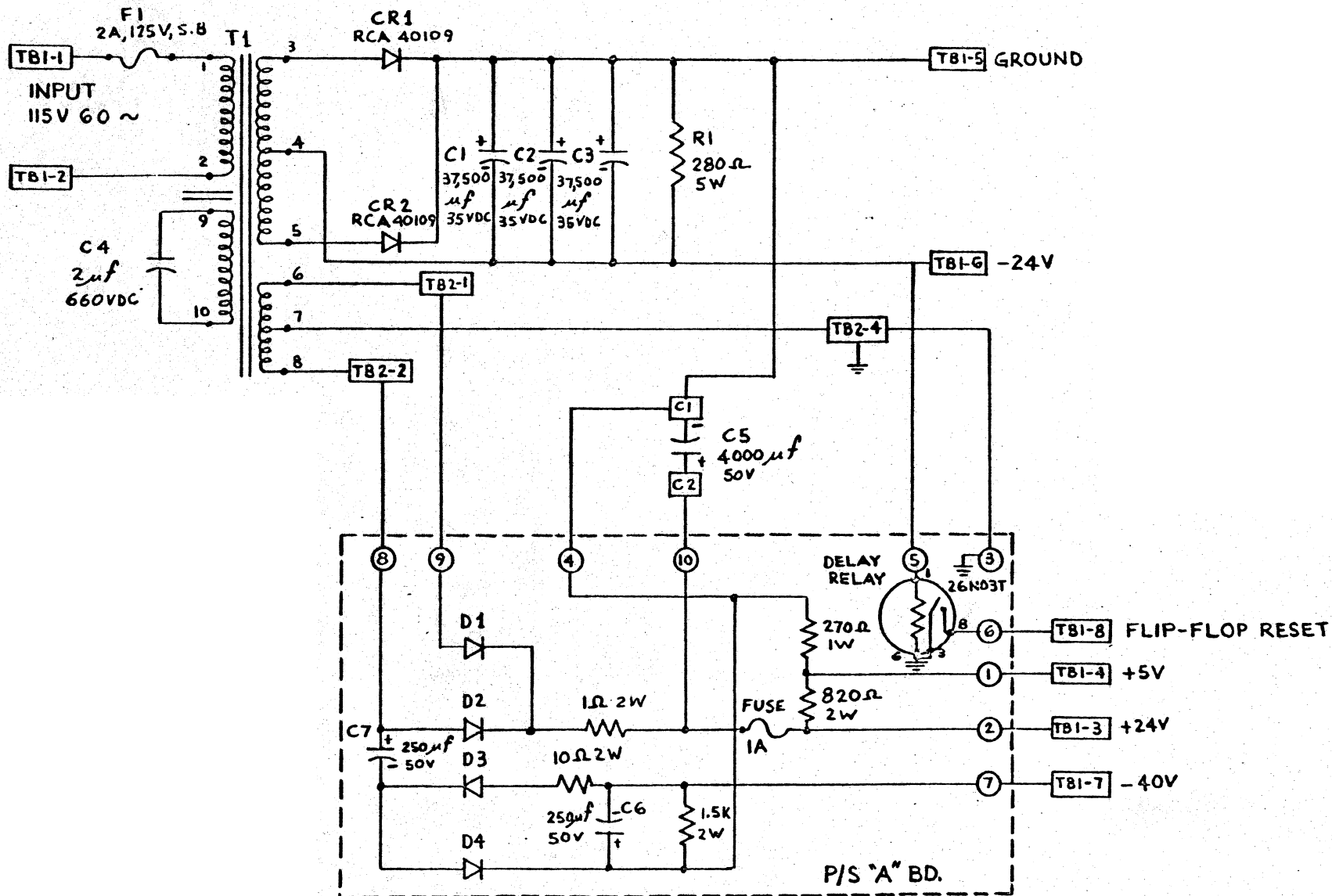
AUTO PRINT, FC. ONE  
 AND FC. TWO  
 DIAGRAM 23 (1X)



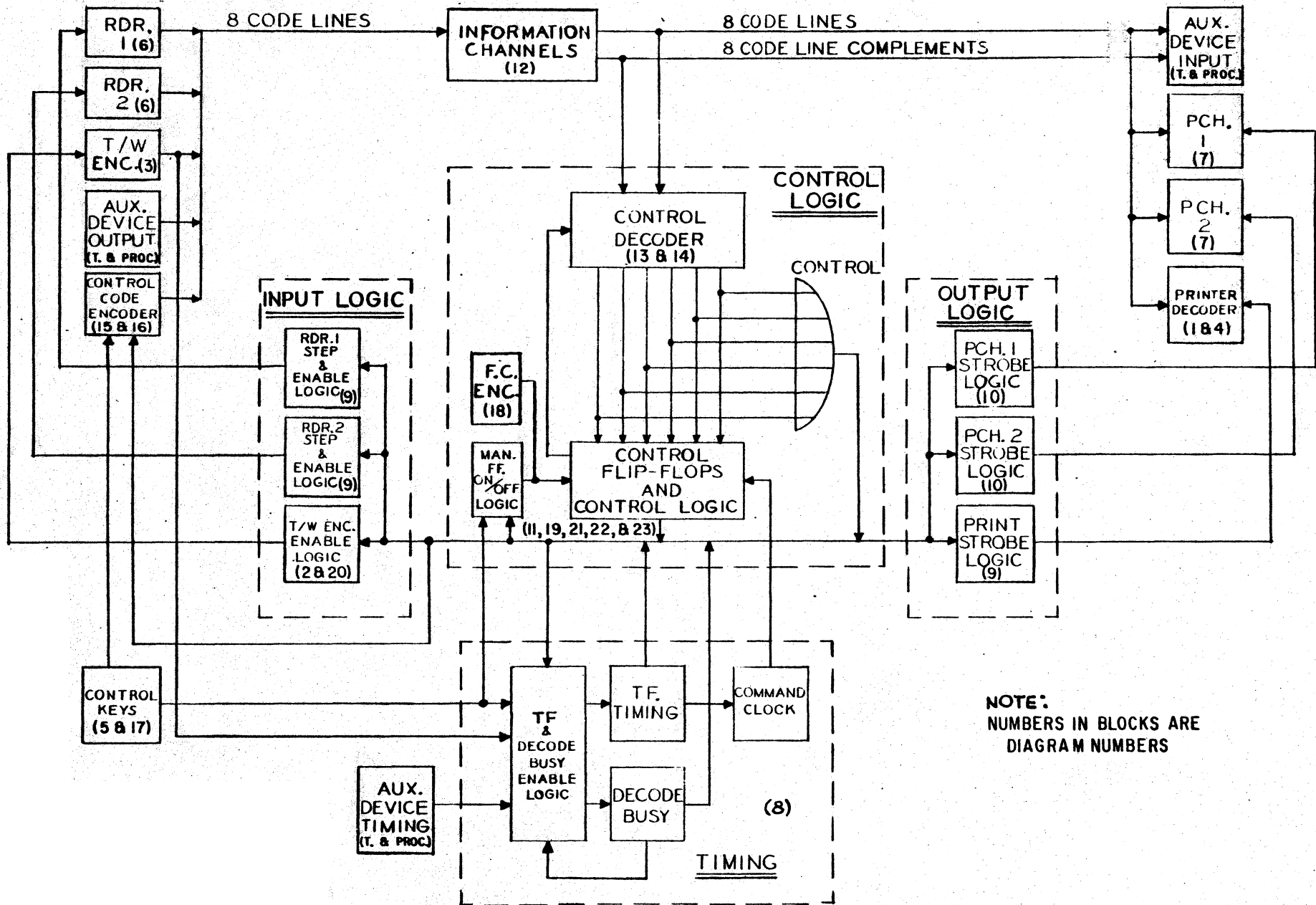
NOTE:  
 C3 IS NOT ON SOME  
 SOLA POWER SUPPLIES

## 2816 SOLA POWER SUPPLY DIAGRAM P.S. -1

(IX-56)  
 (REV. 5-3-65)

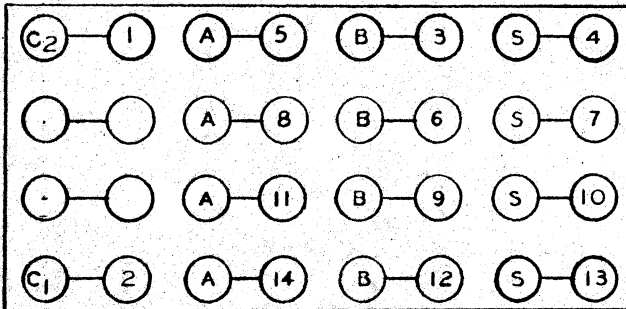
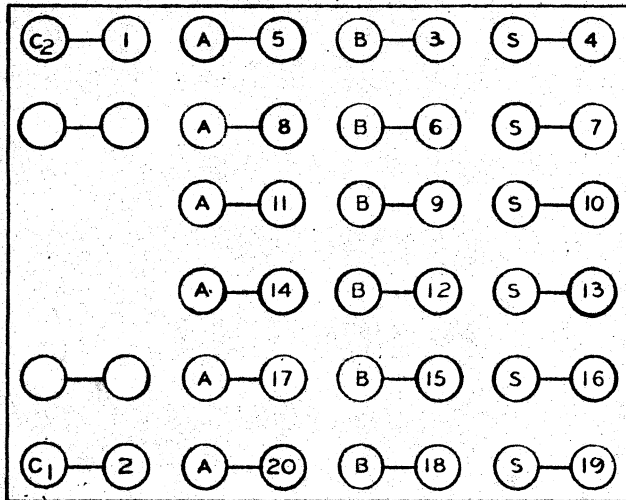
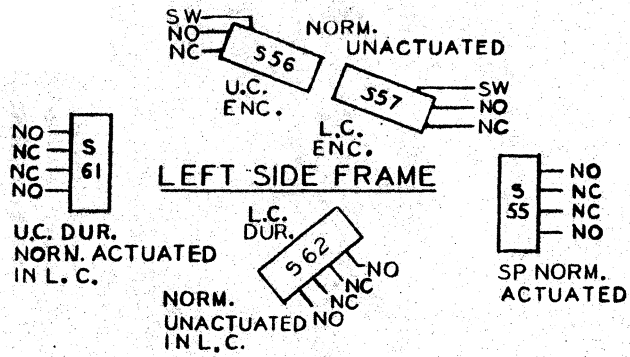


2816 PECO. POWER SUPPLY  
 DIAGRAM P.S. 1A



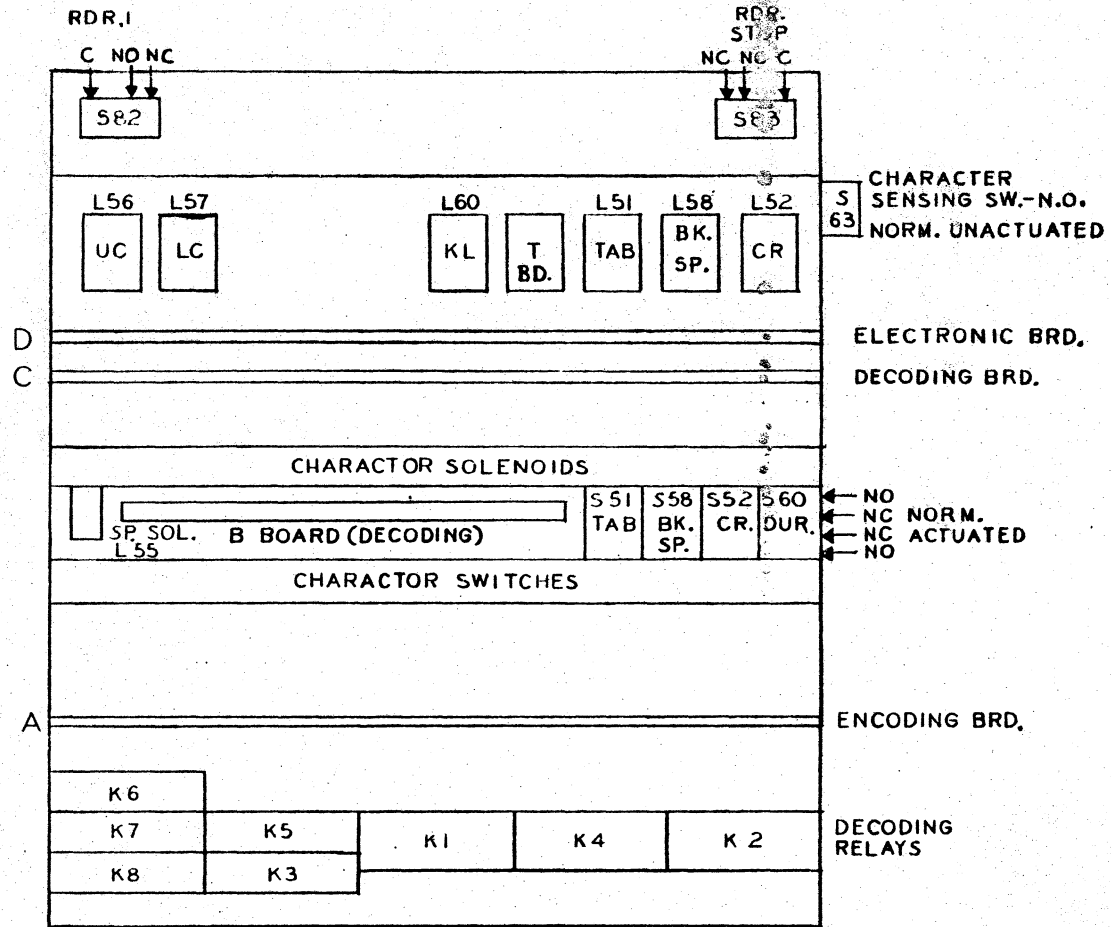
**NOTE:**  
NUMBERS IN BLOCKS ARE  
DIAGRAM NUMBERS

2816 SYSTEM FLOW DIAGRAM



RELAY SOCKETS

A = NORM. OPEN  
 B = NORM. CLOSED  
 S = SWINGER  
 C = COIL

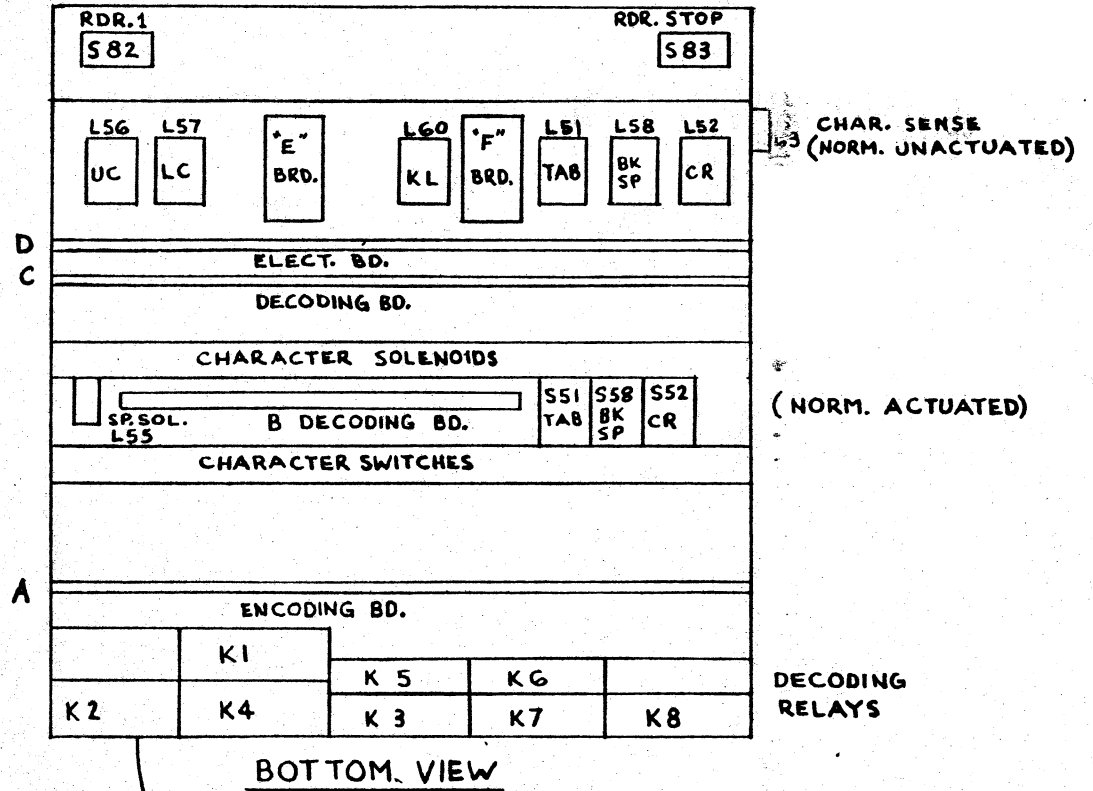
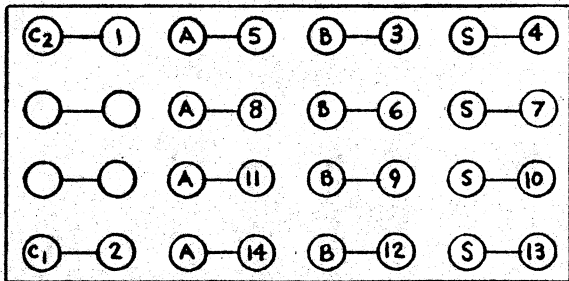
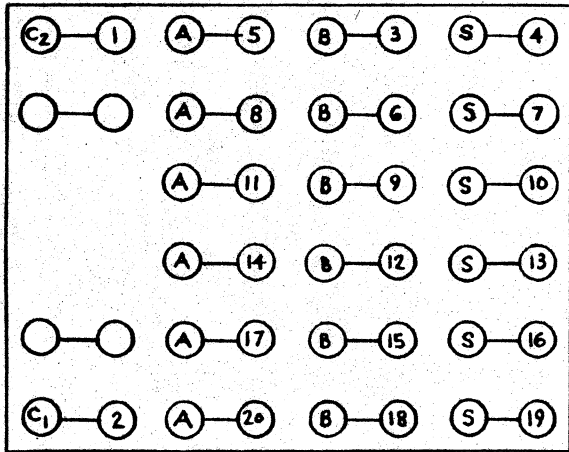
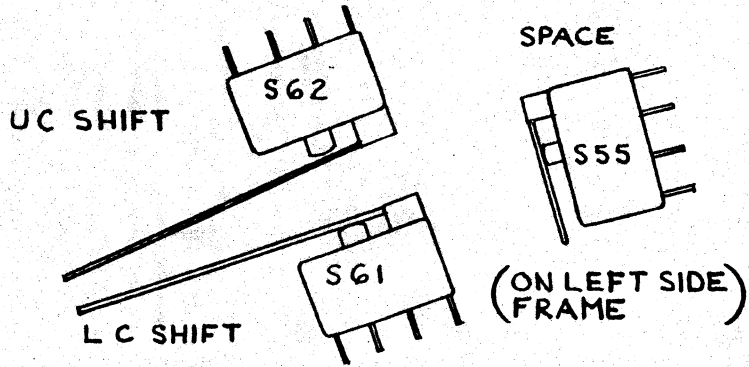


BOTTOM VIEW



OLD STYLE INPUT/OUTPUT UNIT

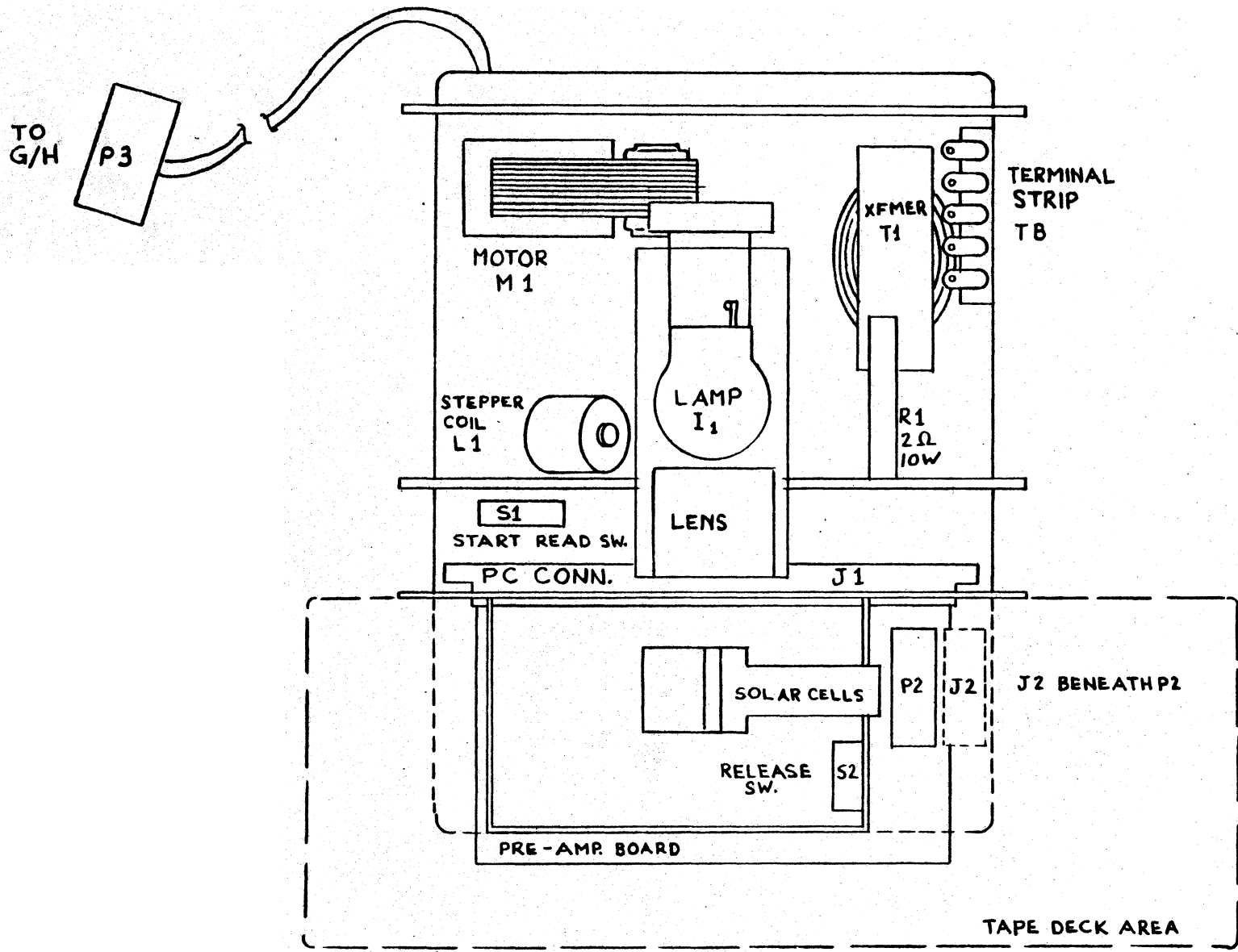
(IX-60)



NEW STYLE INPUT / OUTPUT UNIT

(IX-61)



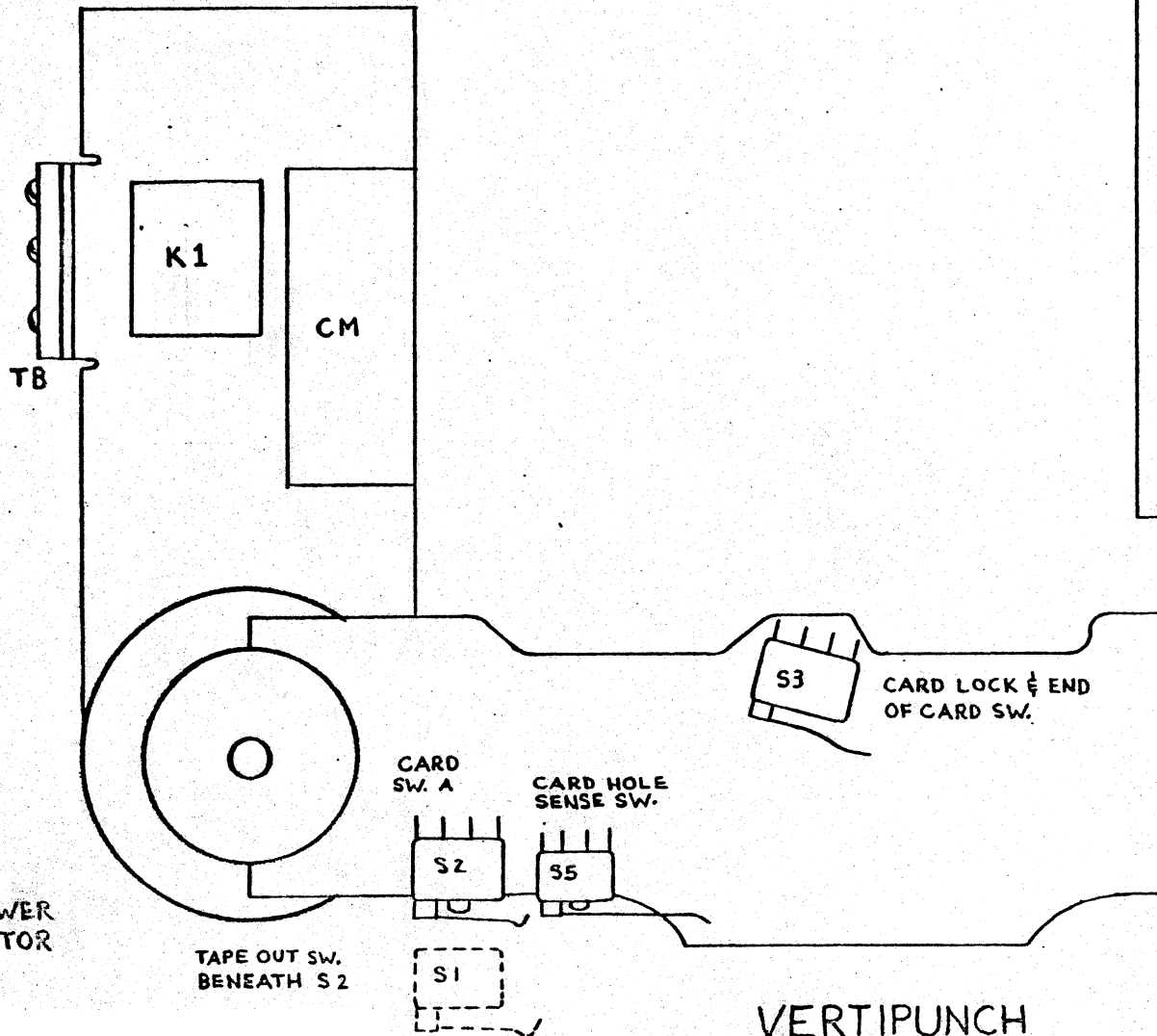


VIEW FROM TOP

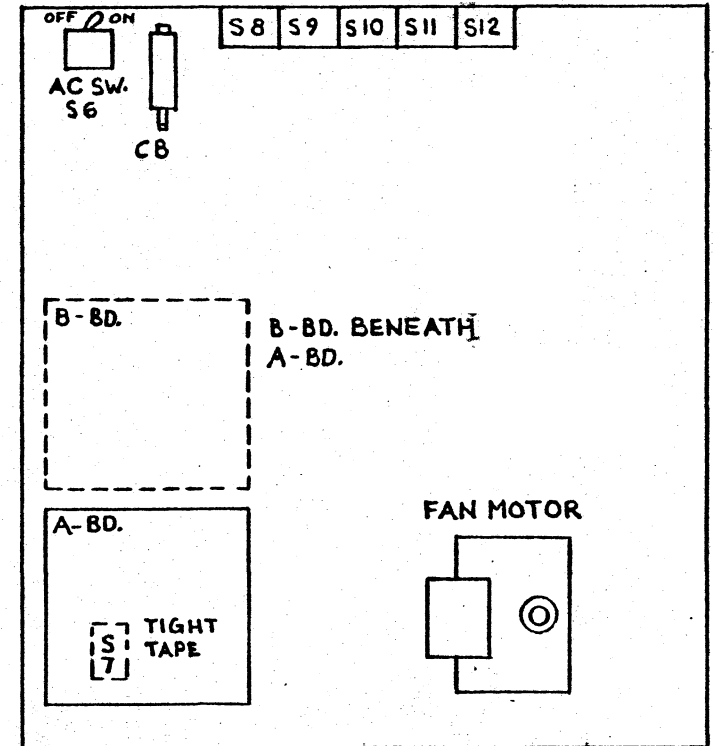
READER UNIT

(IX-62)

VIEW FROM TOP

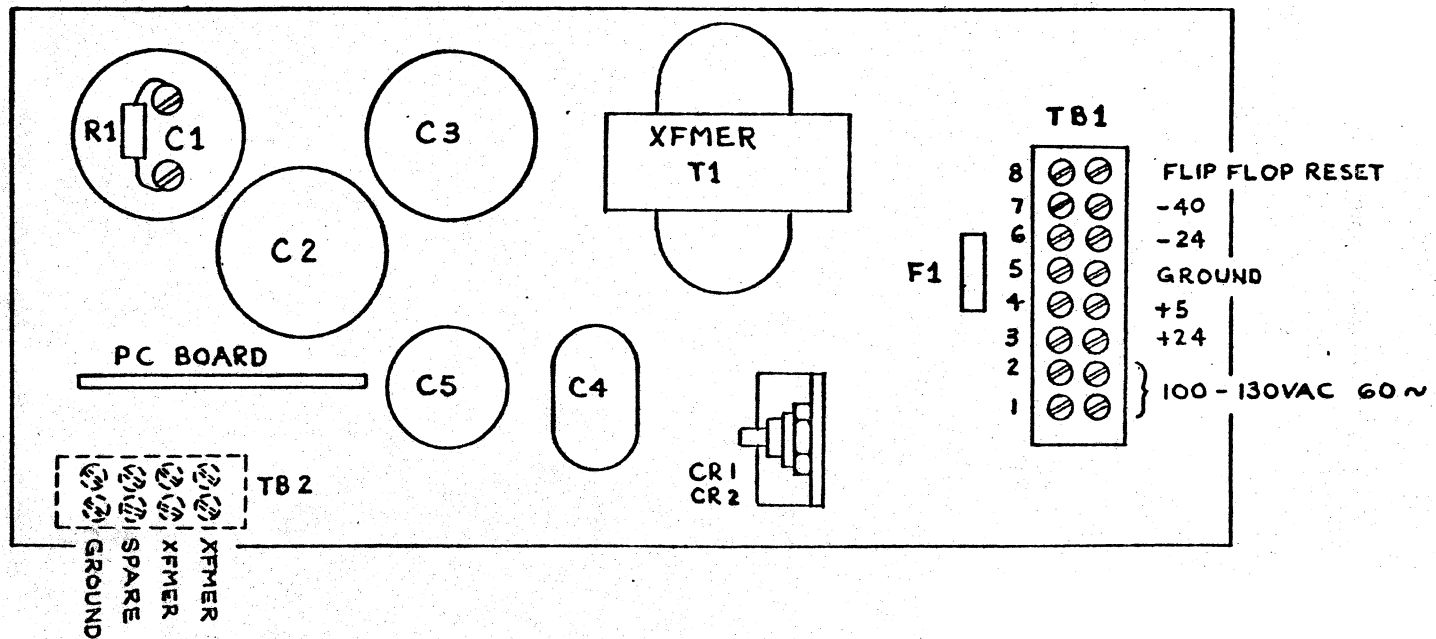


- S8- CARD LOCK
- S9- FEED
- S10- BACK
- S11- SPKT. HOLE
- S12- DELETE

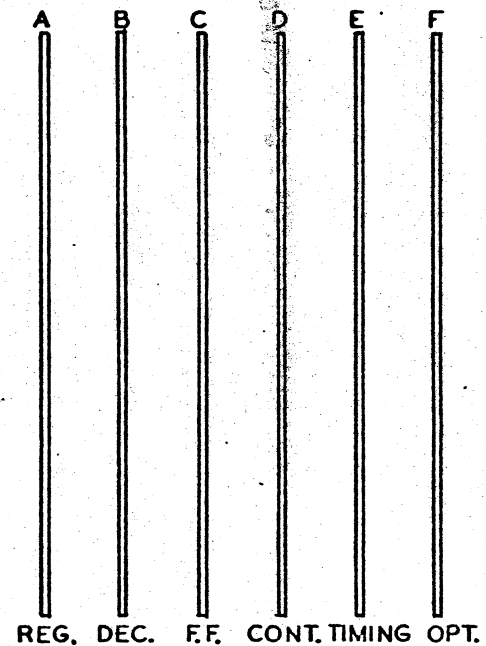
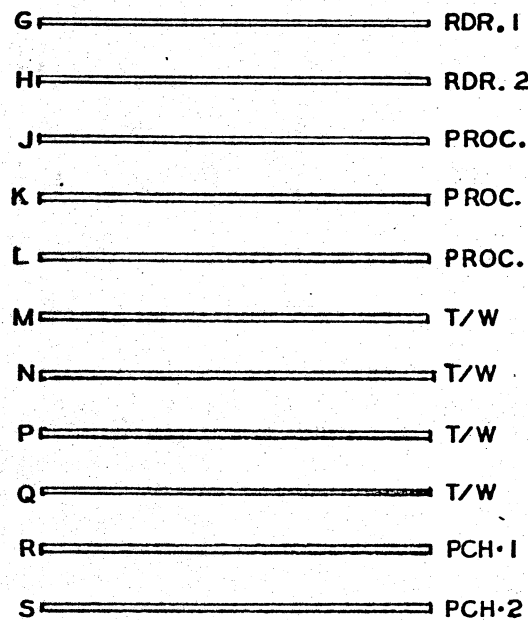
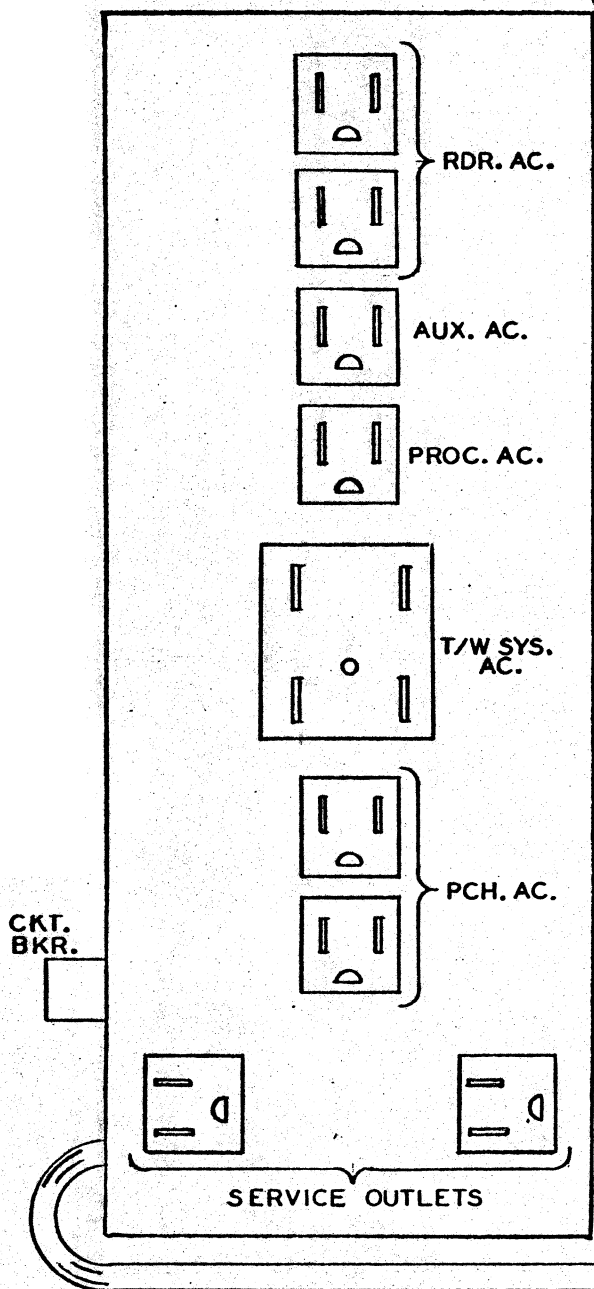


VIEW FROM BOTTOM

VERTIPUNCH

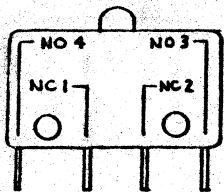


2816 PECO POWER SUPPLY



TO WALL  
OR PROC.

CONTROL UNIT BOARDS

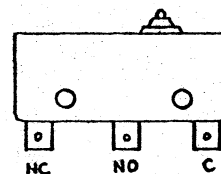


**TYPE:** DPDT, Solder Terms

**USAGE:** I/O Unit - New style Shift and Duration.Tab (S51), C.R. (S52), Space (S55), Bksp. (S58), LC Shift (S61) and UC Shift (S62)

**STATIC**

**CONDITION:** S51, S52, S55, S58 Actuated; S61 or S62 actuated only when segment is resting in LC or UC condition.

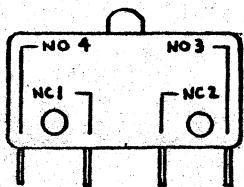


**TYPE:** SPDT, Subminiature

**USAGE:** I/O Unit:  
Rdr. One (S32), Rdr. Stop (S33),  
Single Stop (S64)  
Reader Unit:  
Start Read, Release  
V/P Unit:  
Media Out (S1), Card Sw. (S2),  
Card Lock (S3) & Tight Tape (S7)

**STATIC**

**CONDITION:** S64, S32, S33 Unactuated,  
Start Read & Release Unactuated;  
S1, S2, S3, S7 Unactuated.

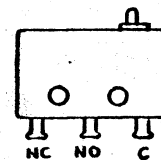


**TYPE:** DPDT, Taper Tab Terms

**USAGE:** I/O Unit - Old style shift and Duration.Tab (S51), C.R. (S52), Space (S55), Bksp. (S58), Tab, C.R., and Bksp. Dur. (S60), LC Dur. (S61) and UC Dur. (S62)

**STATIC**

**CONDITION:** S51, S52, S55, S58, S60 actuated; S61 or S62 actuated only when segment is resting in LC or UC condition.

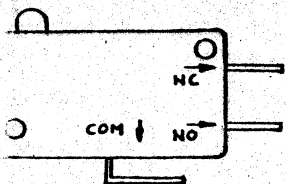


**TYPE:** SPDT, Subminiature

**USAGE:** V/P Unit:  
Hole Sensing (S5)

**STATIC**

**CONDITION:** S5 Unactuated



**TYPE:** SPDT - Quick Conn. Terms

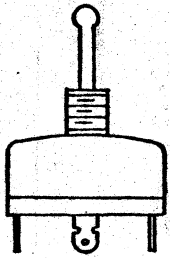
**USAGE:** I/O Unit - Old style shift and Duration. UC Enc. (S56) and LC Enc. (S57).

**STATIC**

**CONDITION:** S56 and S57 unactuated.

2816 SWITCHES

(IX-68)



**TYPE:** Subminiature Toggle,  
3 Position

**USAGE:** I/O Unit;  
Selective Skip Off/Duplicate (S81)

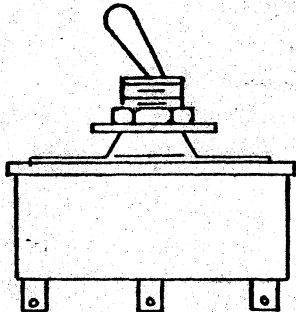
**STATIC  
CONDITION:** (S81) unactuated, center  
position is off.



**TYPE:** N.C. Leaf Sw.

**USAGE:** I/O Unit  
Character Sensing (S6)

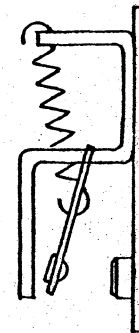
**STATIC  
CONDITION:** (S6) actuated.



**TYPE:** DPDT Toggle

**USAGE:** V/P Unit  
A/C Power (S6)

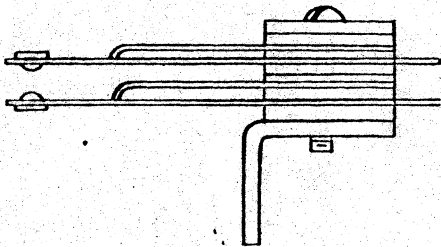
**STATIC  
CONDITION:** (S6) unactuated, one position  
is off; other position on.



**TYPE:** Mode Panel Sw., Single  
Swinger

**USAGE:** I/O Unit  
Mode Sws. (S65 - S80)  
V/P Unit  
Mode Sws. (S3 - S12)

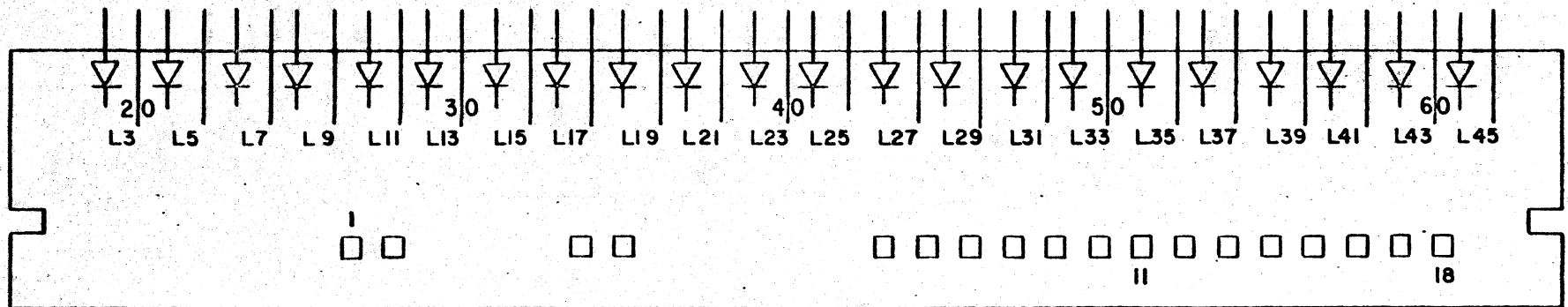
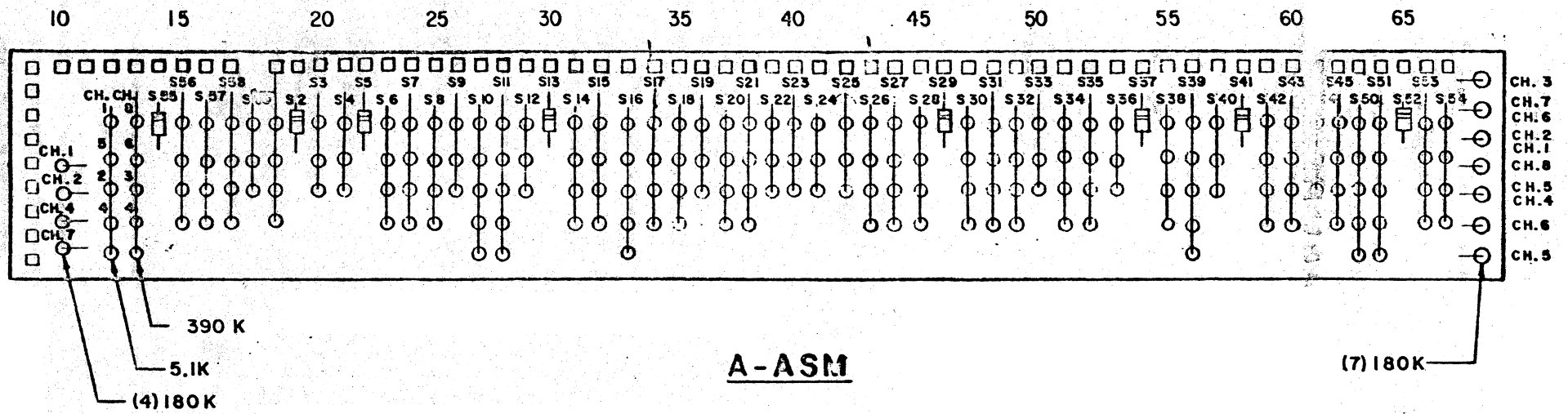
**STATIC  
CONDITION:** (S65 - S80) Unactuated  
(S3 - S12) Unactuated



**TYPE:** 6 Contact Position N.O. Leaf Sw.

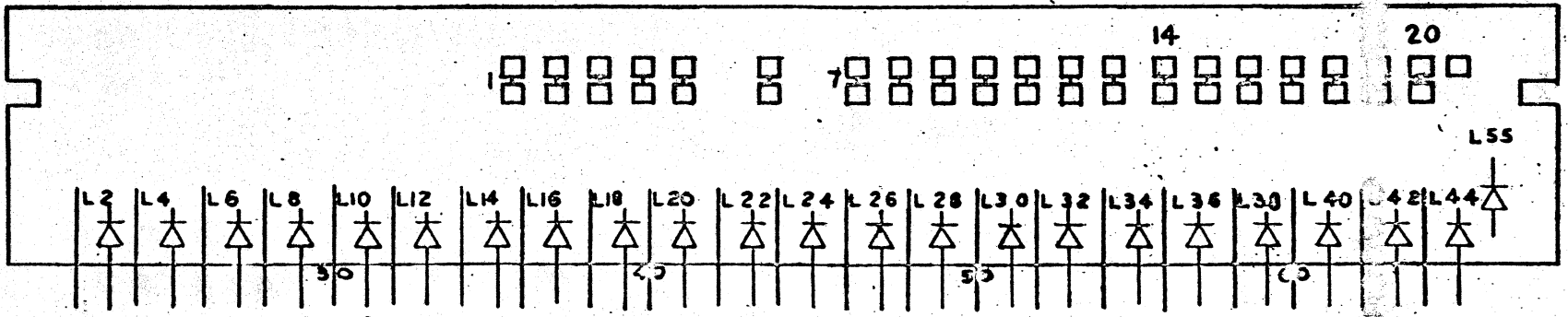
**USAGE:** I/O Unit  
Alpha numeric encoding switches  
(S2 - S45)

**STATIC  
CONDITION:** (S2 - S45) unactuated.

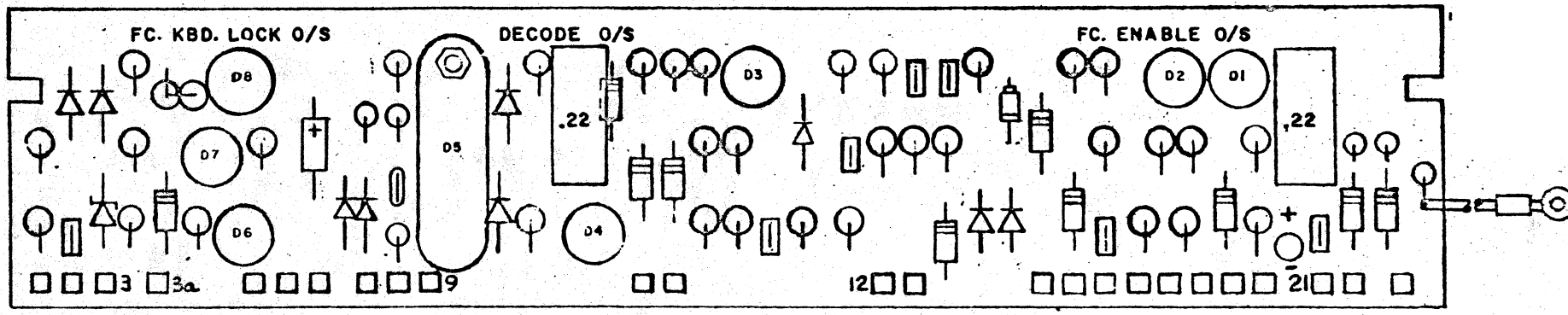


I/O UNIT PC. BOARDS

(IX-70)



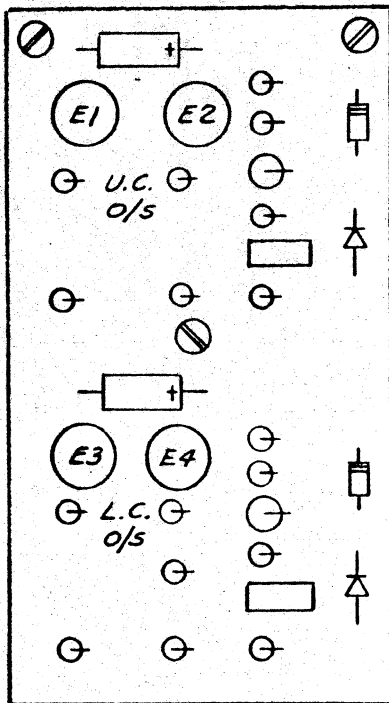
C-ASM



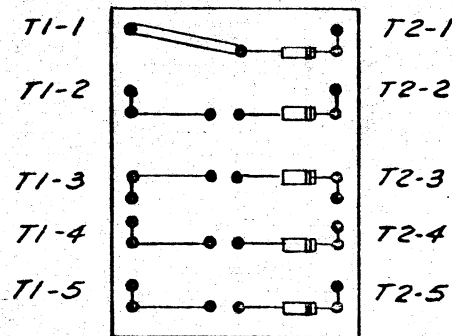
D-ASM

I/O UNIT P.C. BOARDS

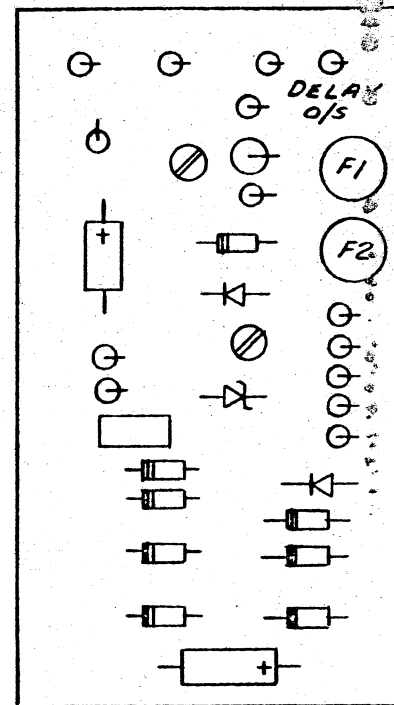




T/W - "E" BOARD



T/W - "T" Bd.



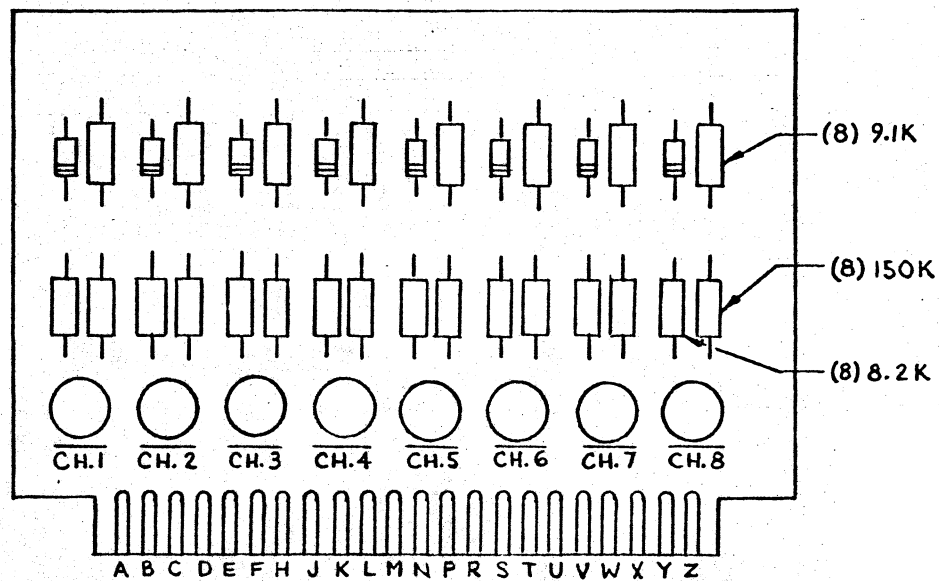
T/W - "F" BOARD

NOTE

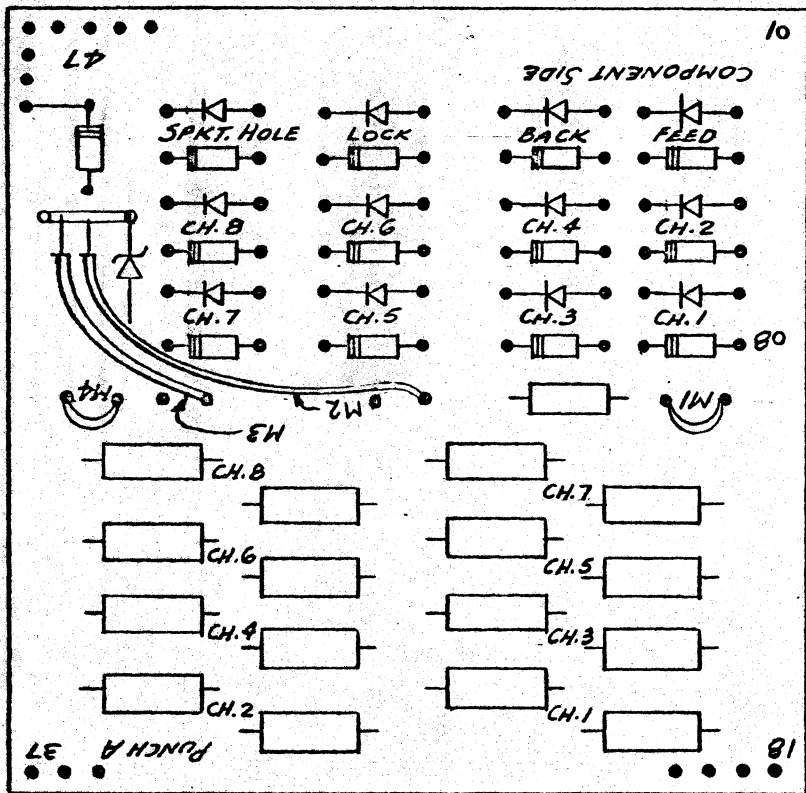
1. "T" Bd. USED ON OLD STYLE I/O UNITS ONLY
2. "E" & "F" BOARDS USED ON NEW STYLE I/O UNITS ONLY.

I/O UNIT P.C. BOARDS

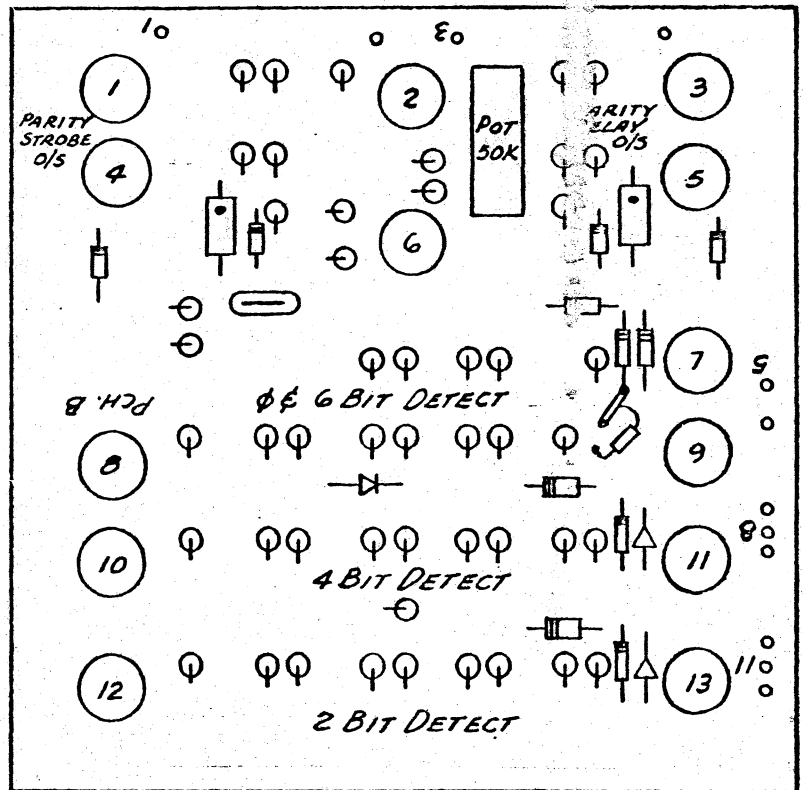
(IX-72)



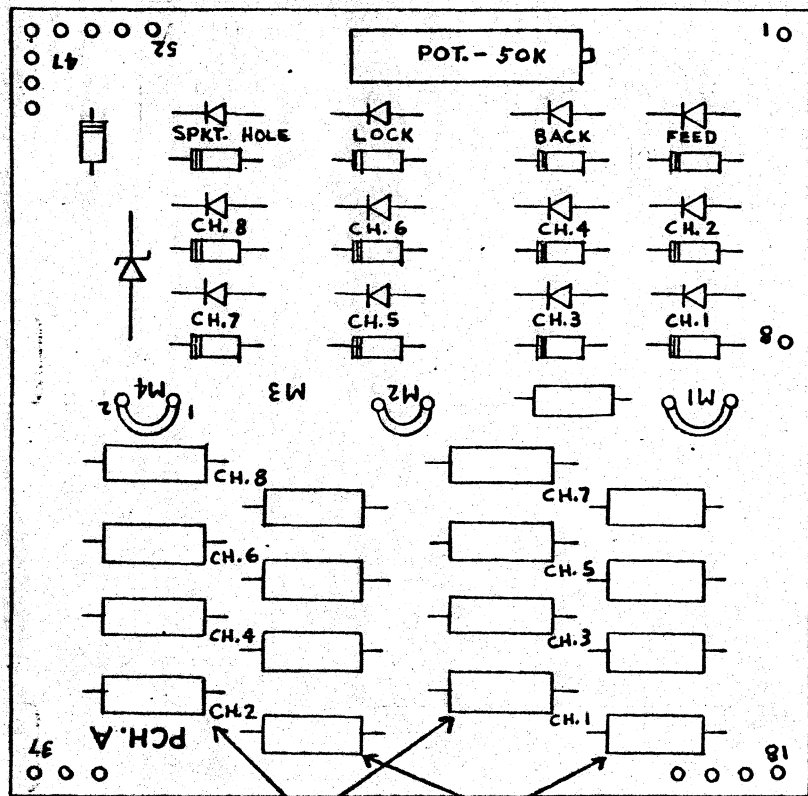
READER PRE-AMP BOARD



PUNCH Bd. A

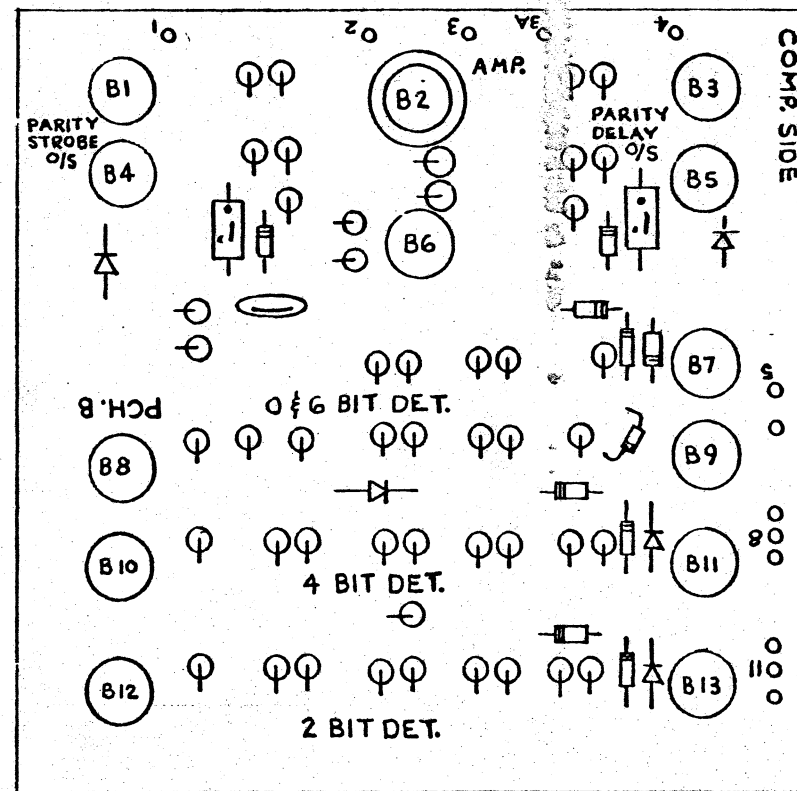


PUNCH Bd. B



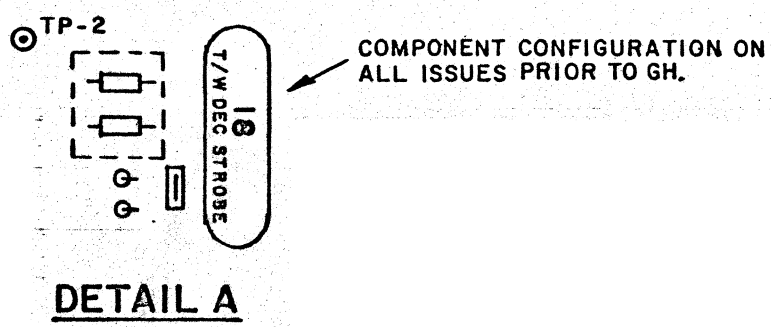
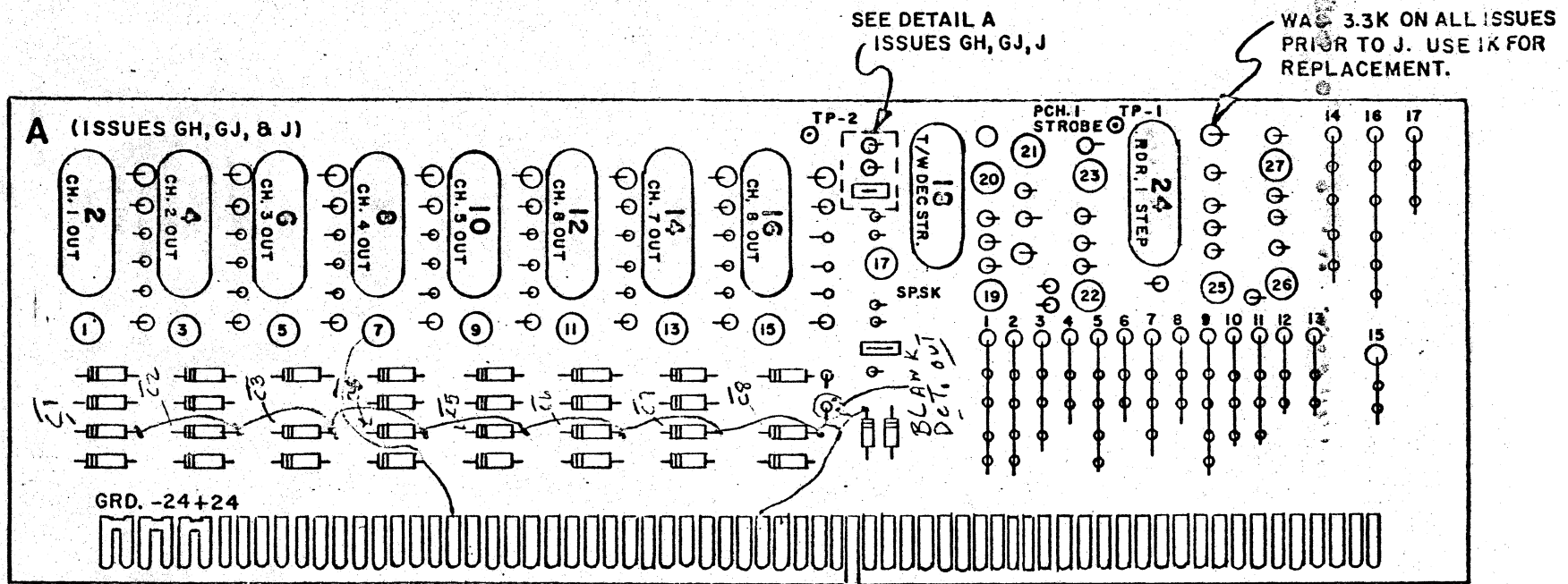
(8) 22.1K (8) 2.2K

A-ASM.



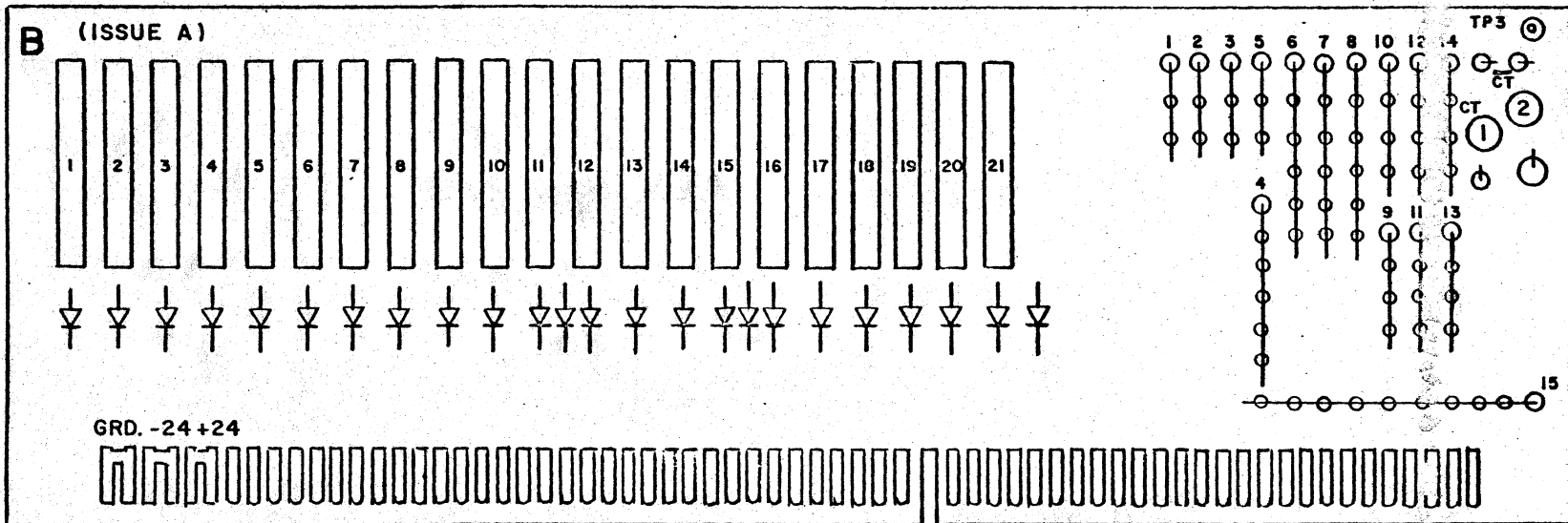
B-ASM.

NEW STYLE VERTIPUNCH P.C. BOARDS



CONTROL UNIT P.C. BOARD "A"

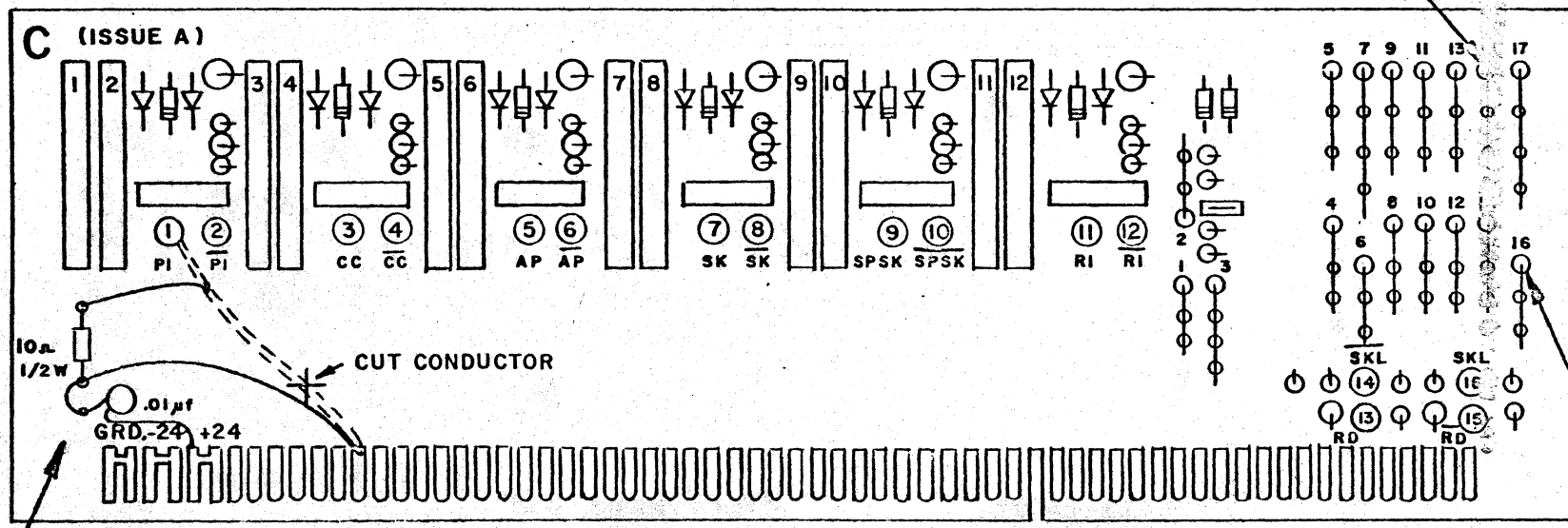
(IX-76)



CONTROL UNIT P.C. BOARD "B"

(IX-77)

WAS 1E ON BOARDS PRIOR TO ISSUE D. USE 6.8K FOR REPLACEMENT.

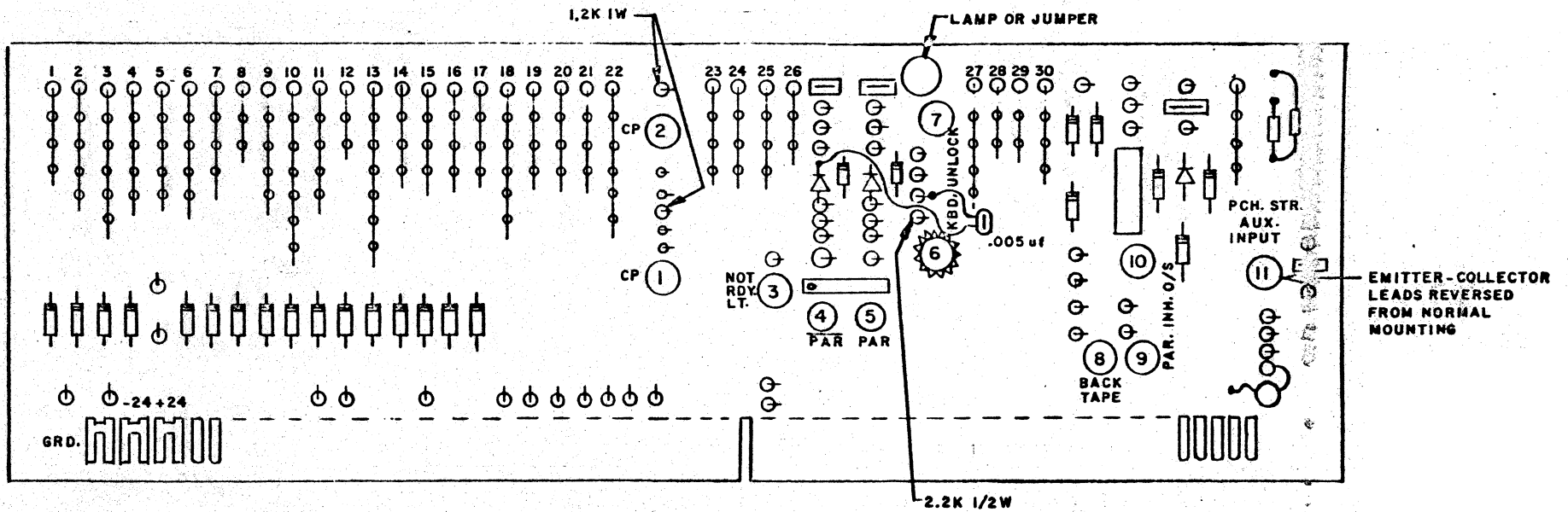


10Ω RES. & .01μf CAPACITOR  
ADDED ON ISSUES B, C & D  
REF. S.B: 28/78-10

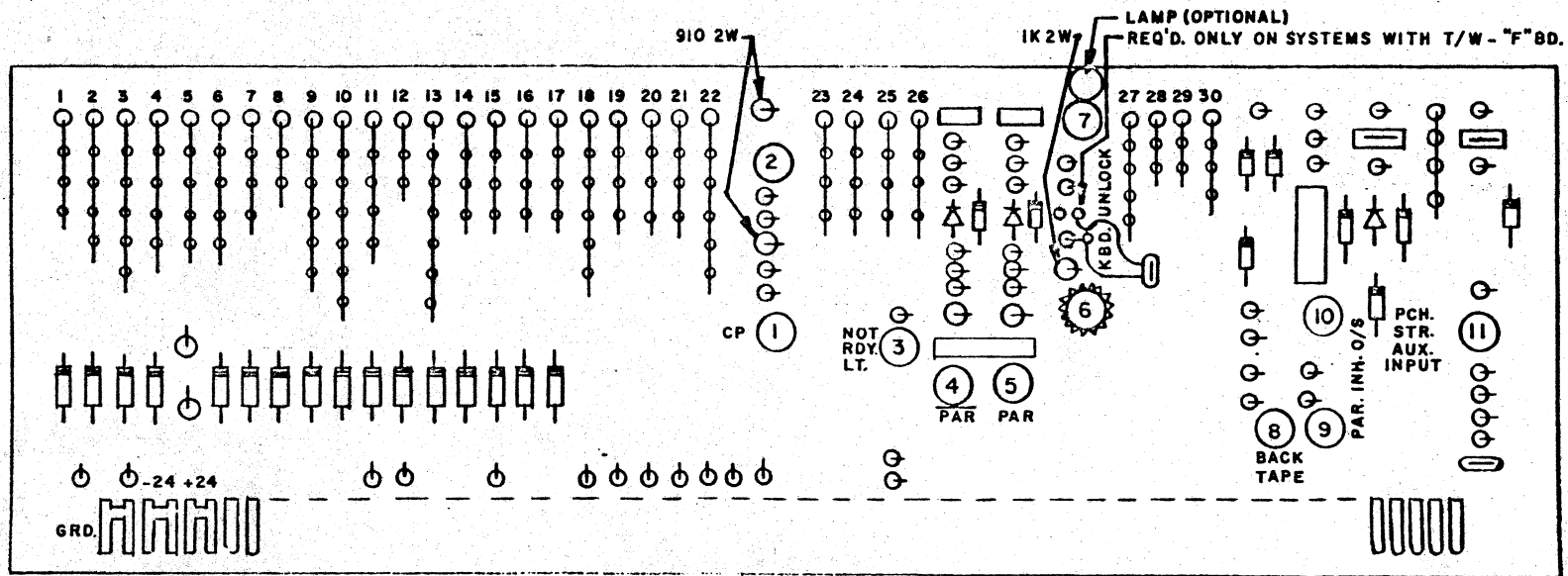
WAS 27K ON BOARDS PRIOR TO ISSUE D. USE 12K FOR REPLACEMENT.

CONTROL UNIT P.C. BOARD "C"

(IX-78)



**ISSUE GJ**

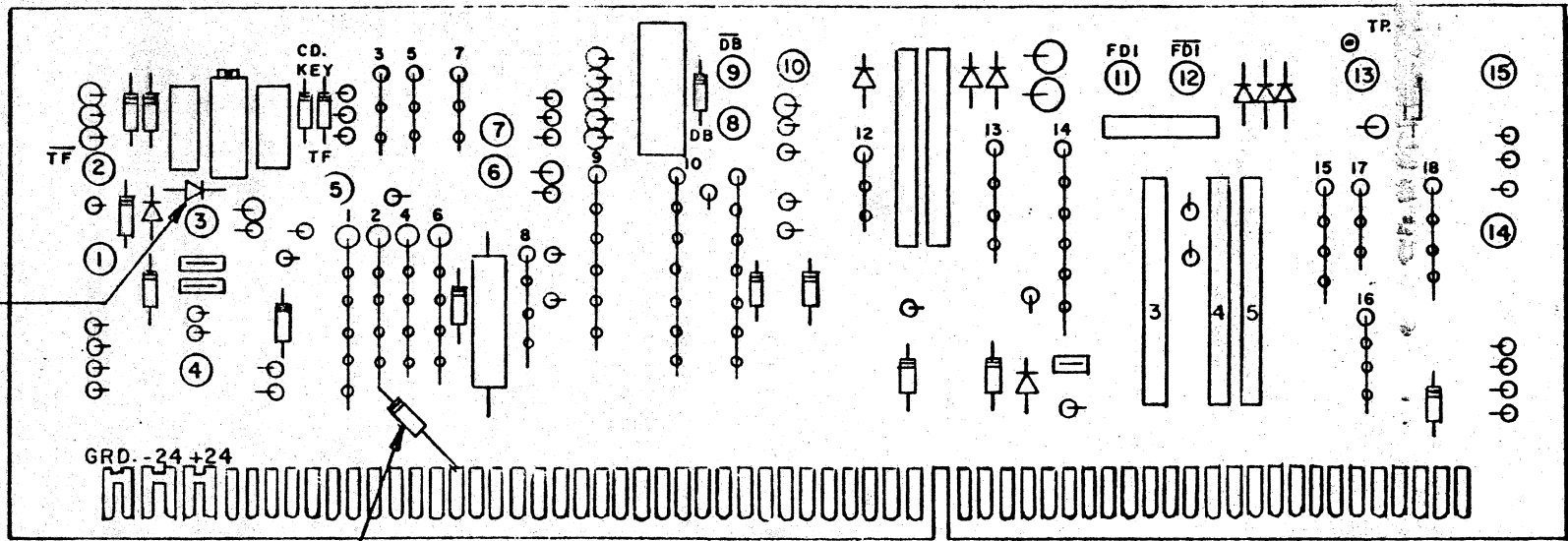


**ISSUE K & N**

**CONTROL UNIT BOARD "D"**



THIS DIODE  
REMOVED AT  
ISSUE N



ADDED AT ISSUE K  
NOT ON ISSUE PRIOR  
TO K. (SEE DETAIL A)

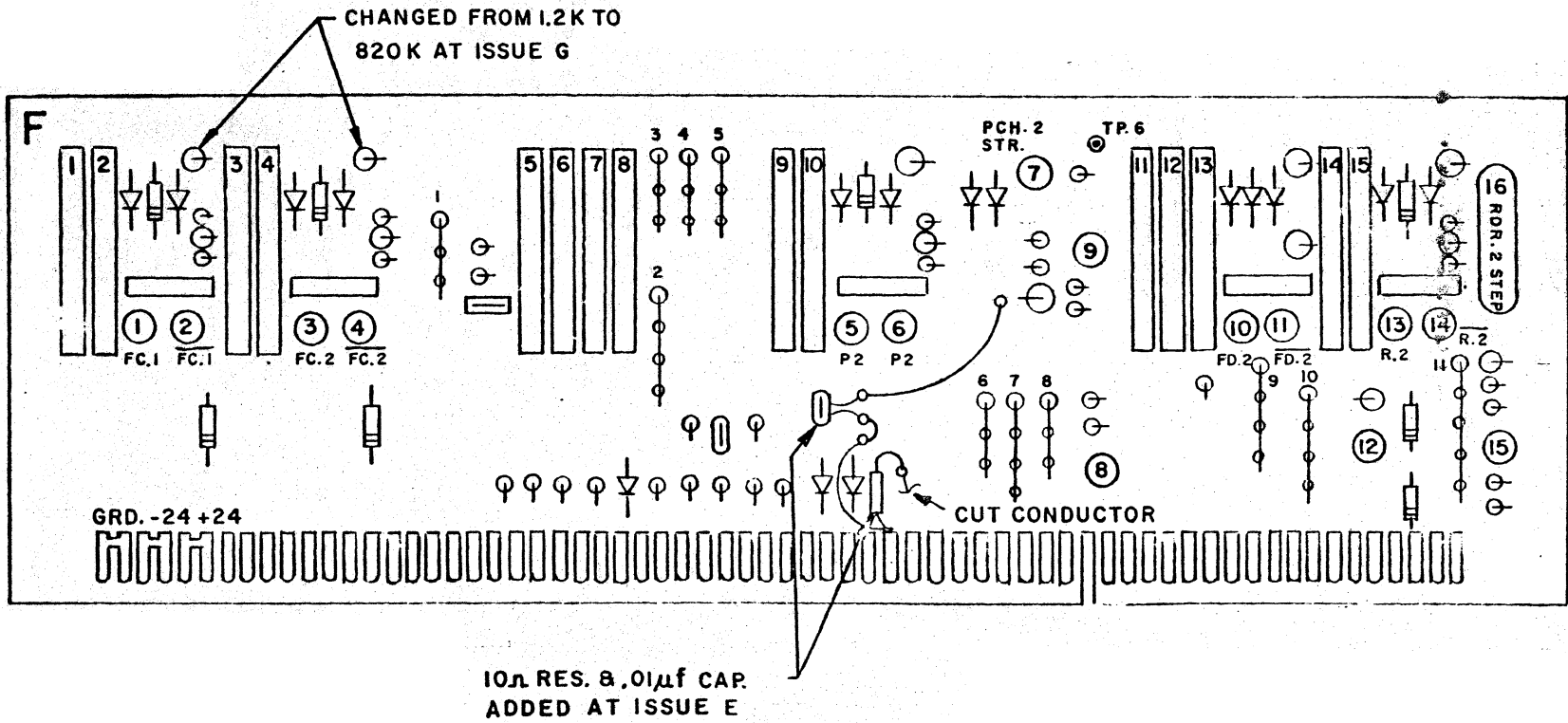


OR GATE E2 CHANGED TO  
5 INPUT GATE AT ISSUE L  
TO INCLUDE DIODE ADDED  
AT ISSUE K

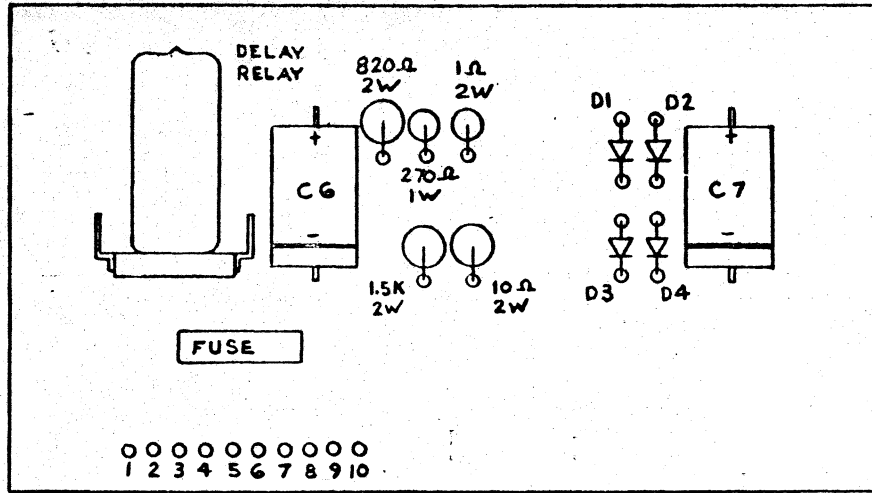
DETAIL A

CONTROL UNIT P.C. BOARD "E"

(IX-80)

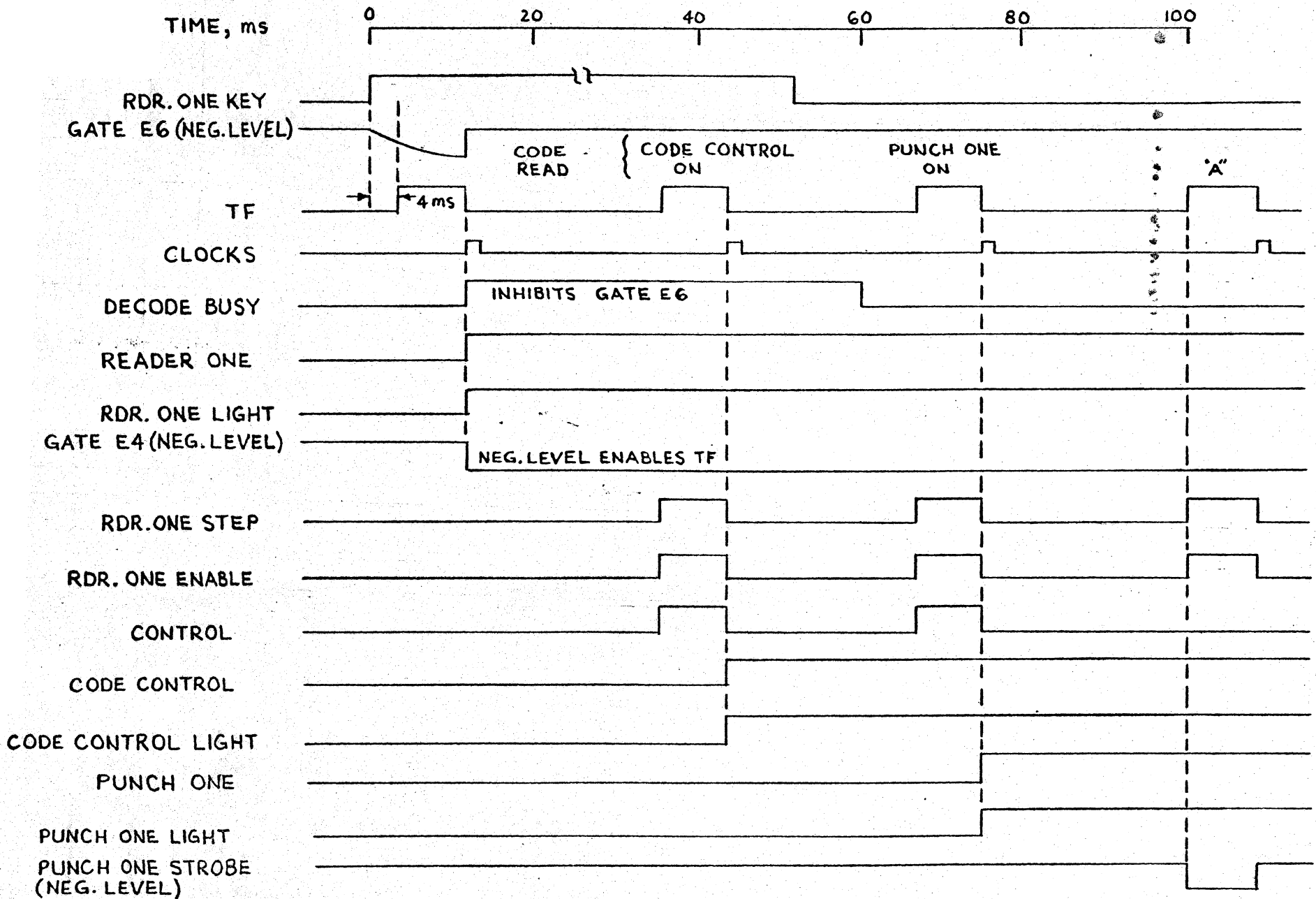


CONTROL UNIT BOARD "F"

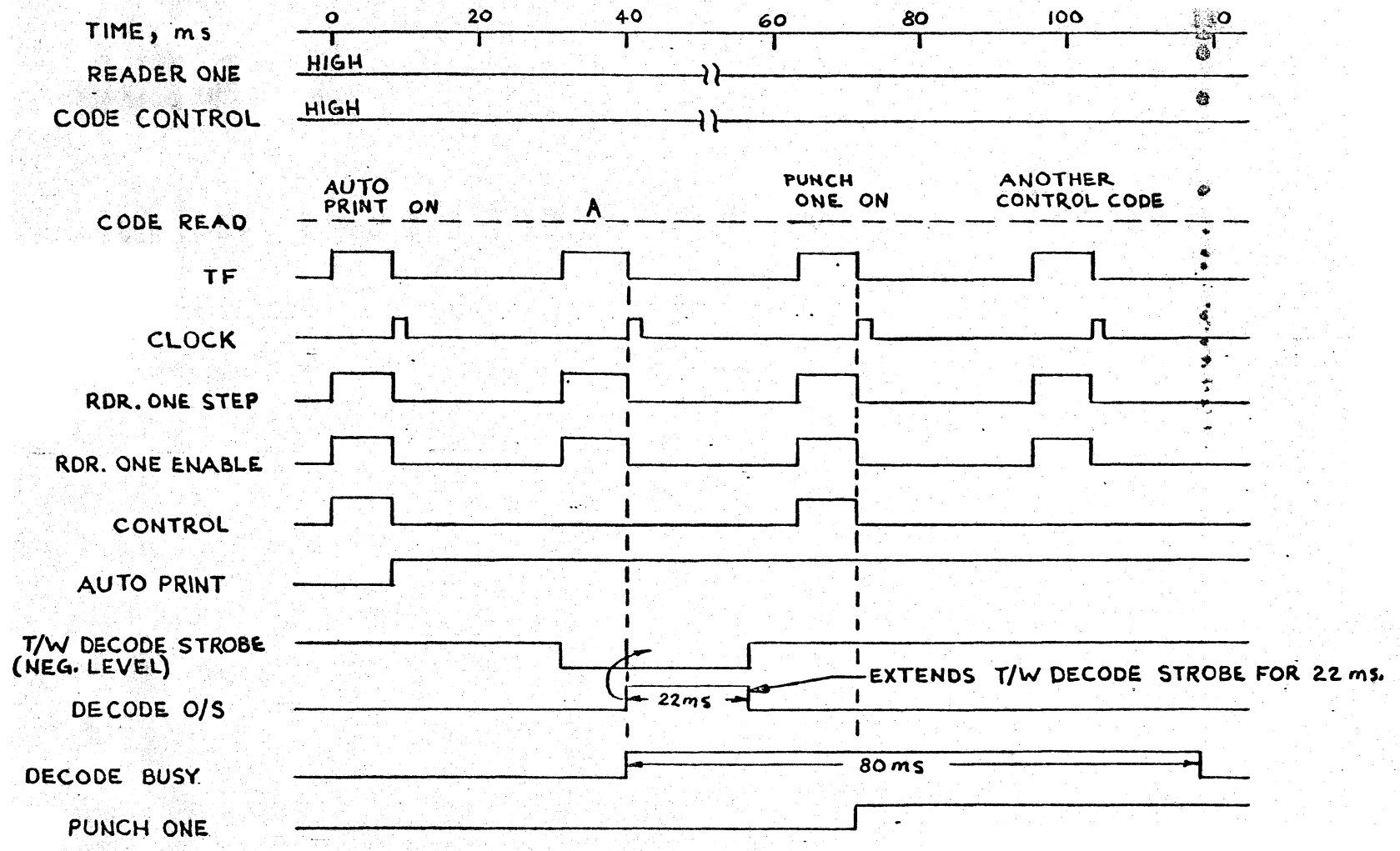


POWER SUPPLY P.C. BOARD

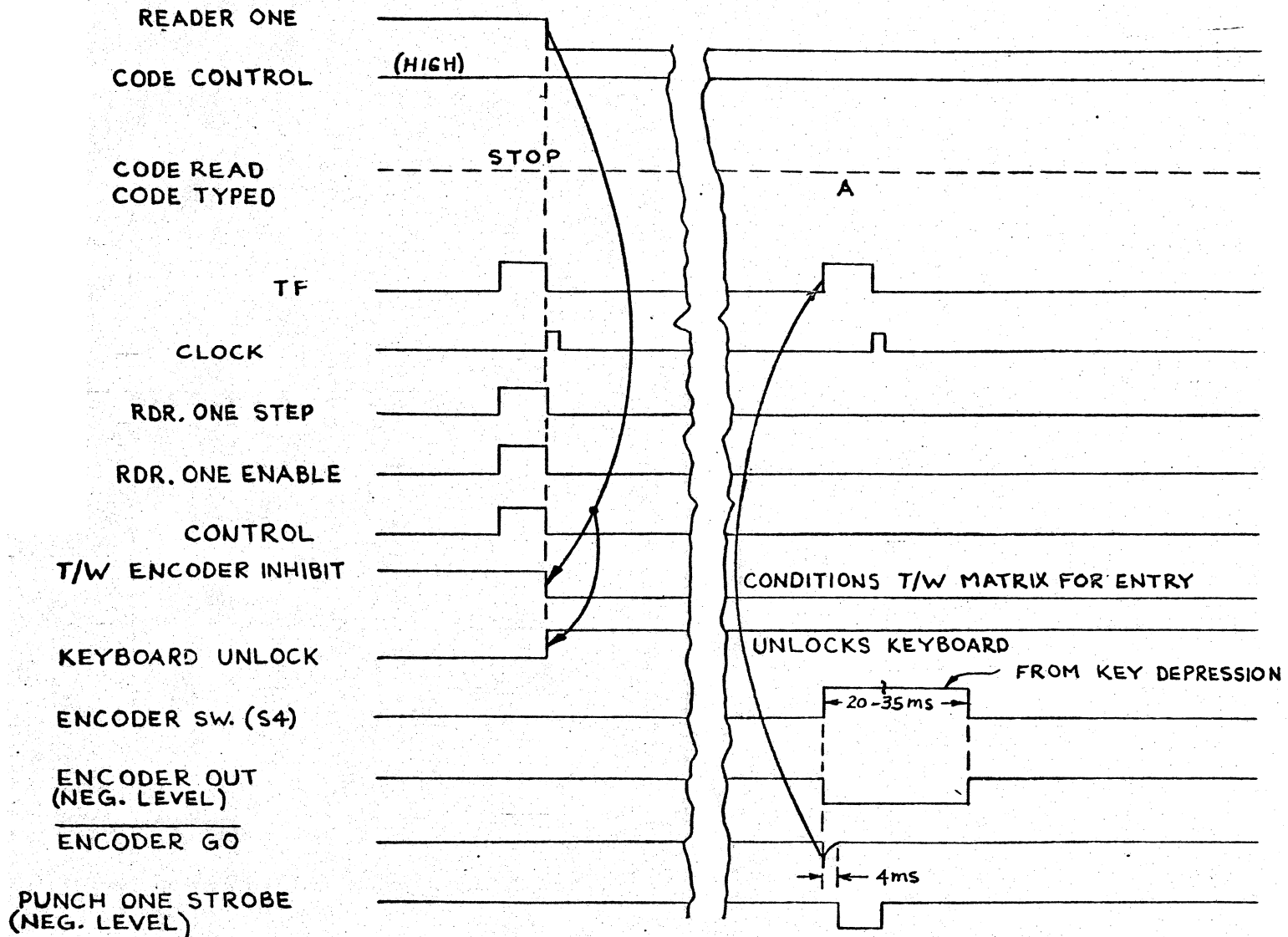
(IX-82)  
(REV. 5-3-65)



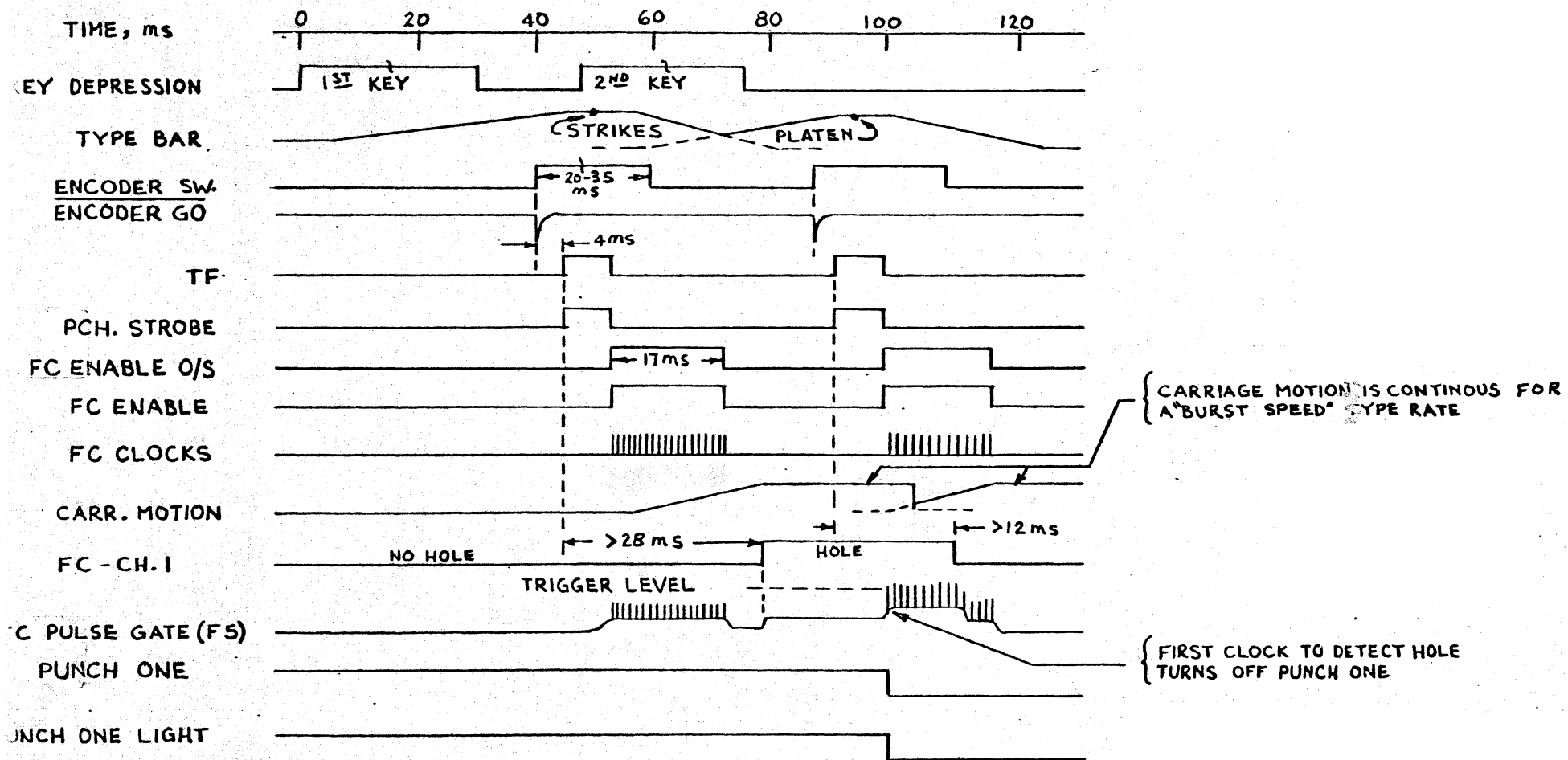
READER ONE TO PUNCH ONE



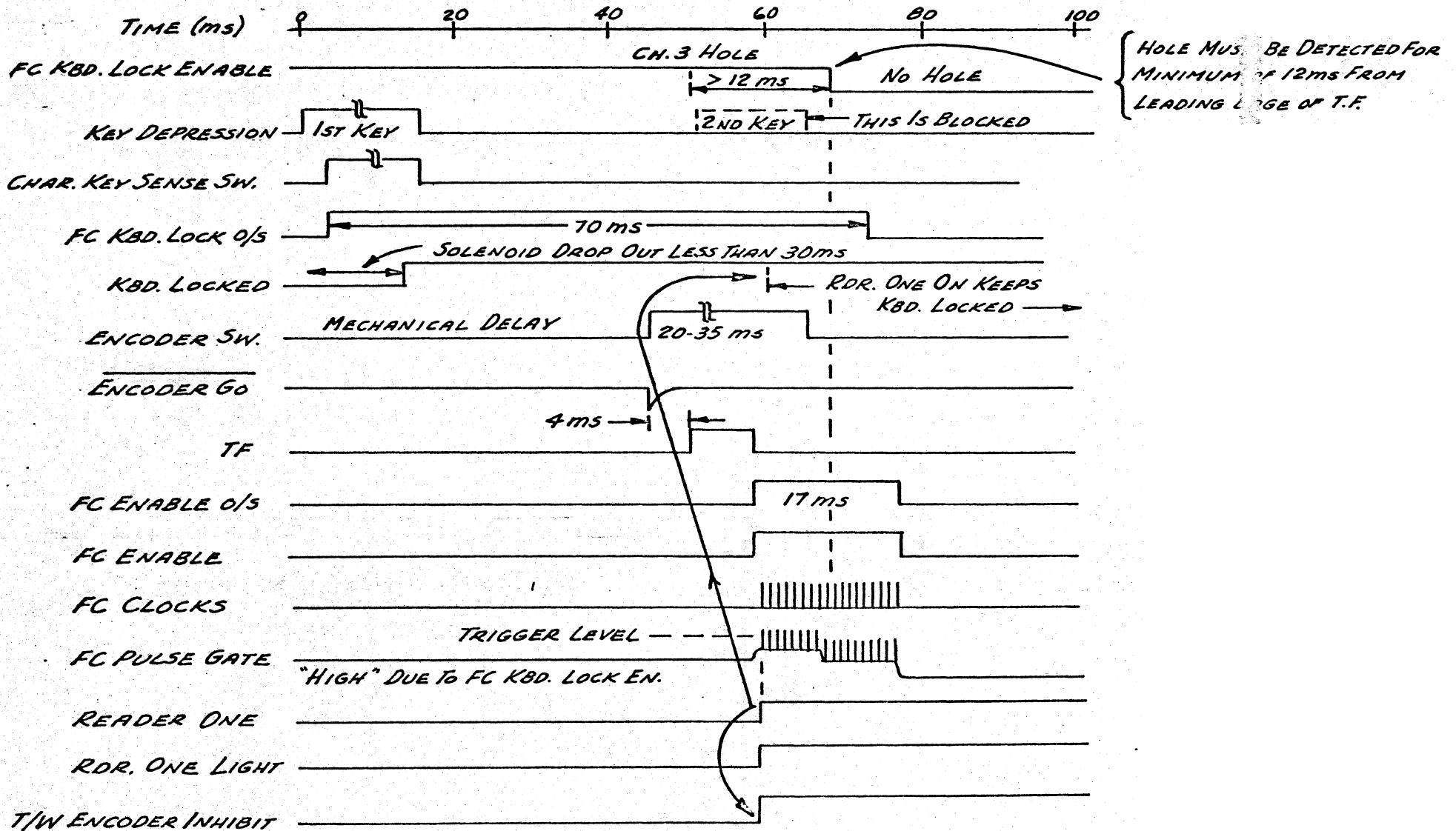
READER ONE TO I/O UNIT



I/O UNIT TO PUNCH ONE

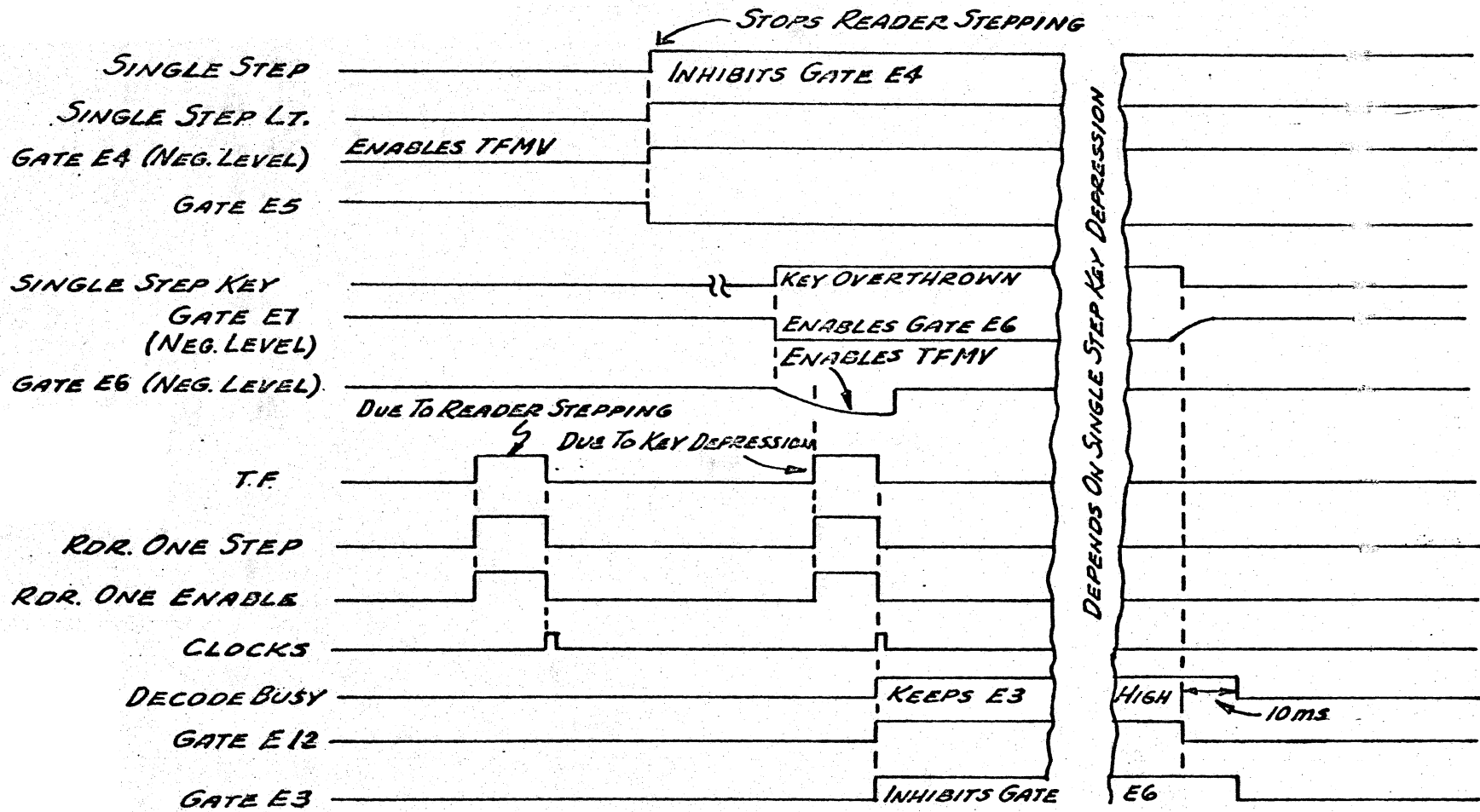


FC CLOCKS

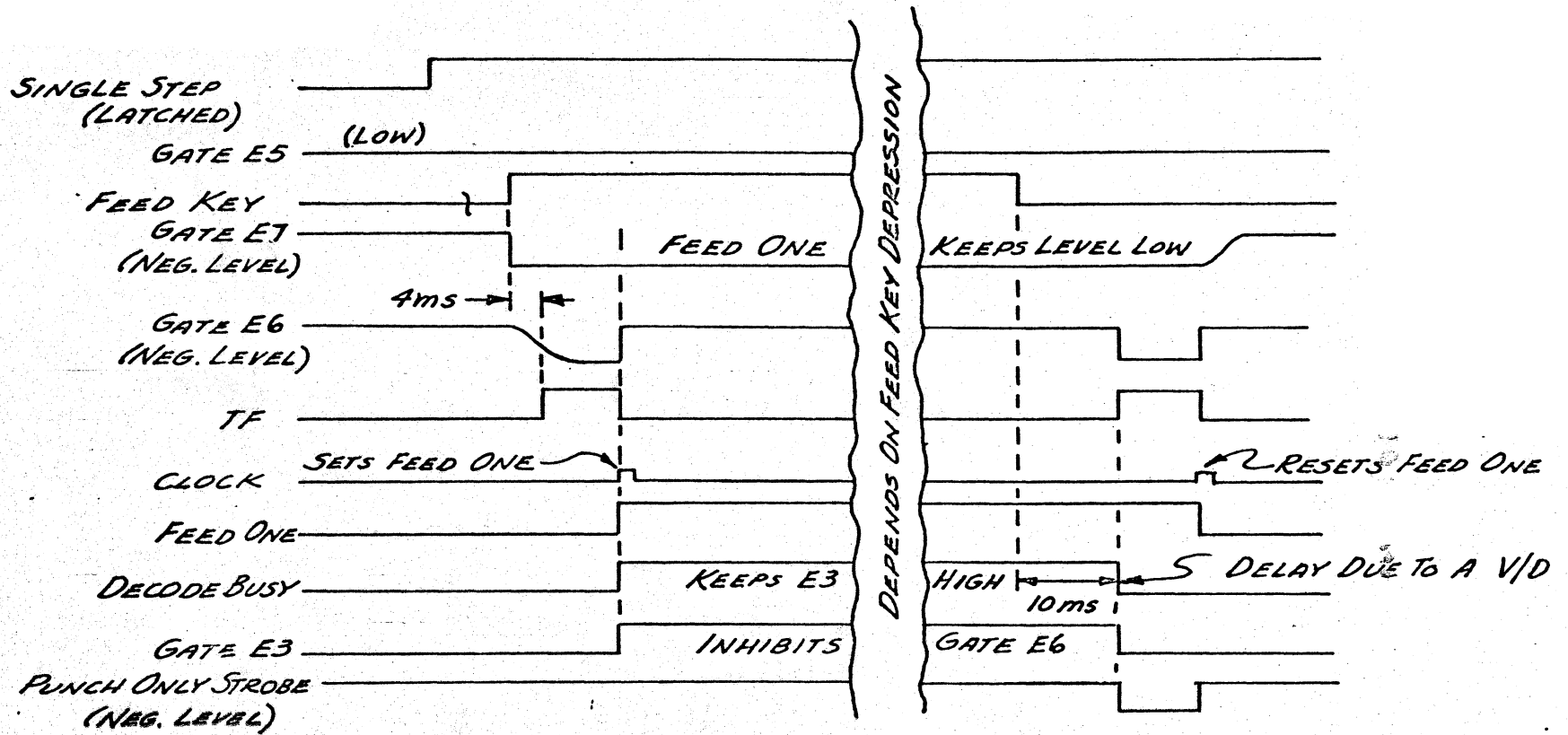


FIELD CONTROL "RDR. ON" KBD. LOCK

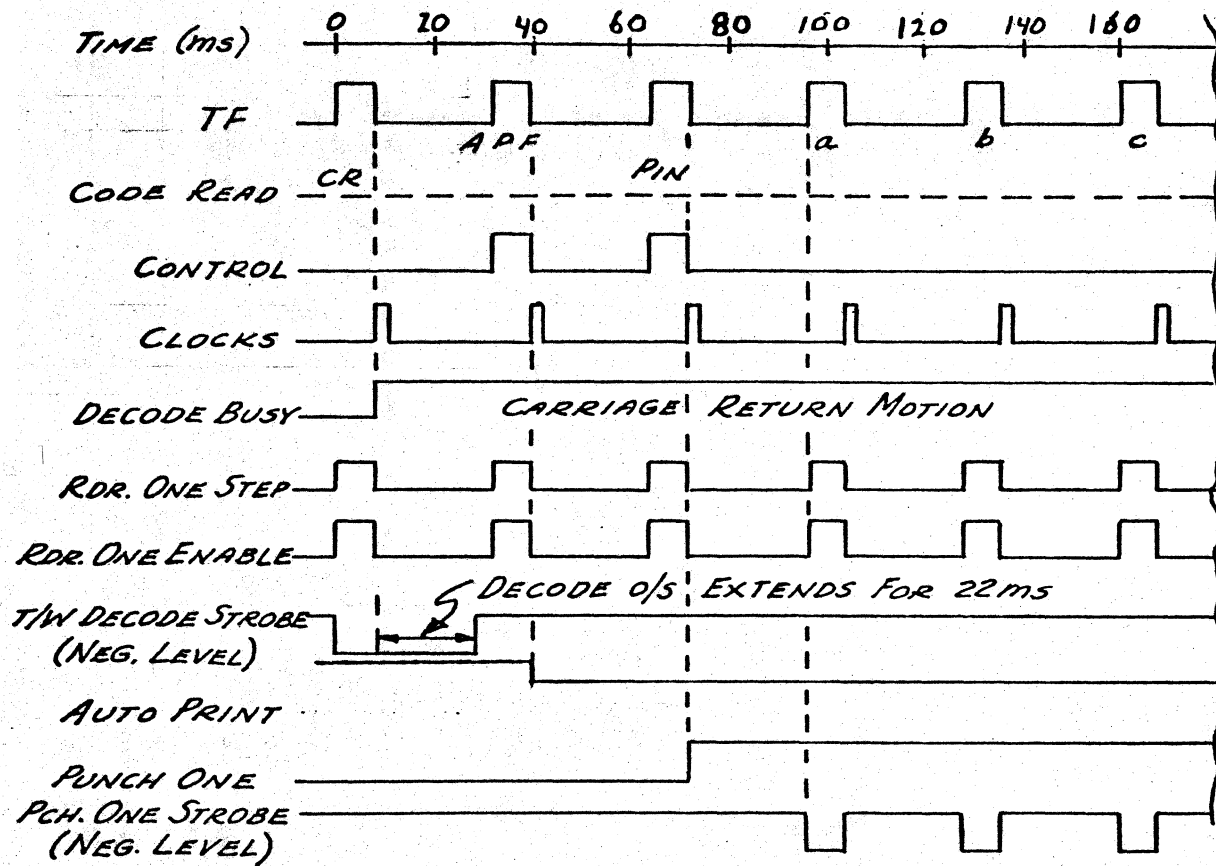




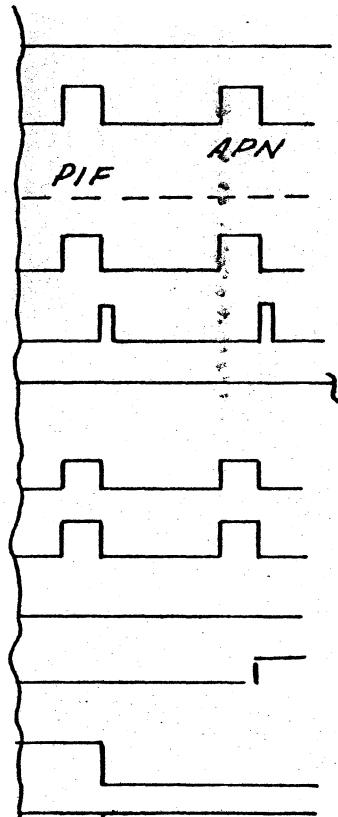
SINGLE STEP



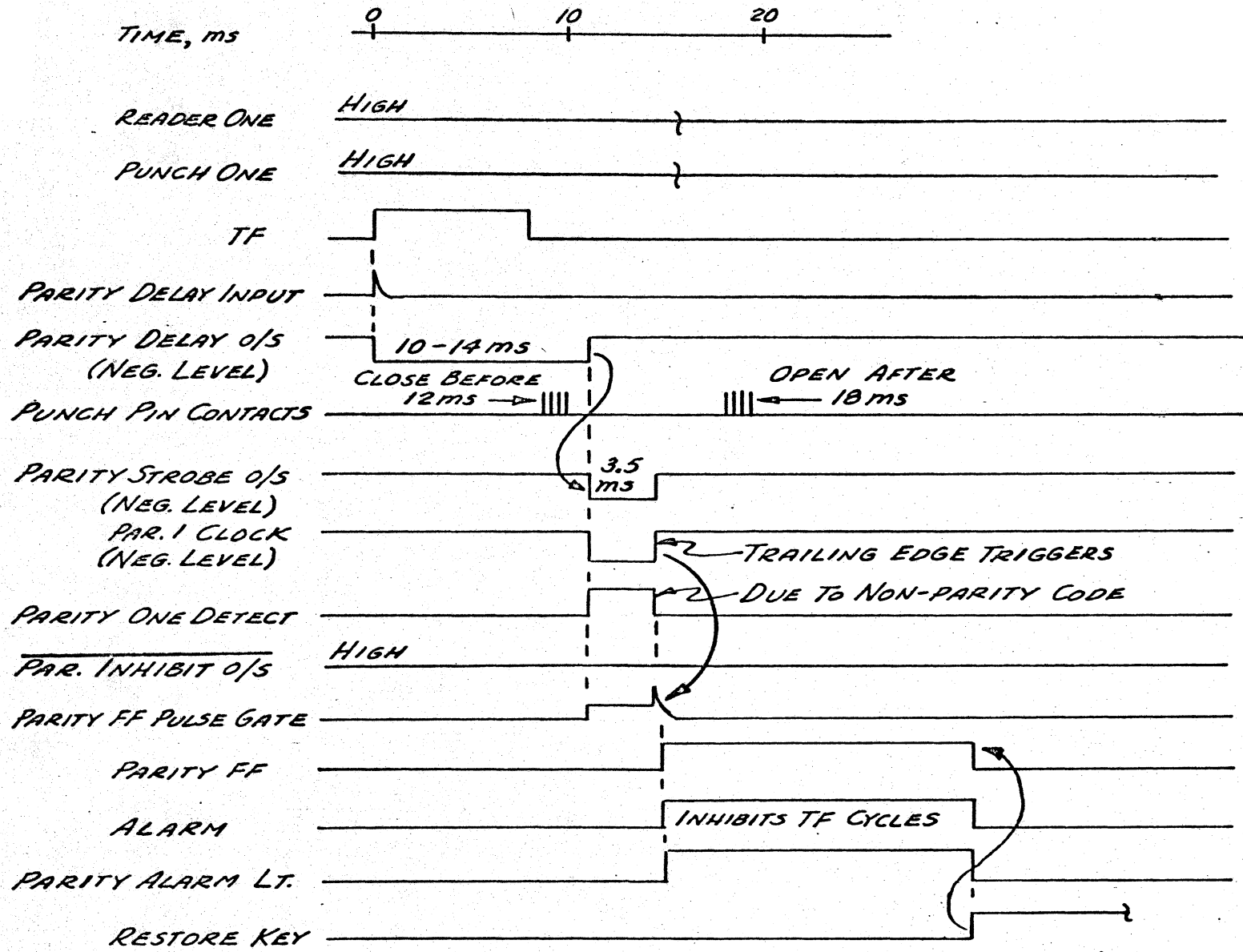
MANUAL FEED IN SINGLE STEP



DEPENDS ON CARRIAGE RETURN TIME



PARAPROCESSING



PARITY ALARM

READER ONE TO PUNCH ONE

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE A:	In this example Reader One is manually turned on. It reads a Code Control On Code, so Control codes read will be reacted to but not punched. A Punch One On code is read to turn on Punch One which punches any following alphanumeric codes. Assume Rdr. One Interlock Arm is down, Auto Print is off, the Processor is not connected, and the System is not in a Skip, Single Step, or Alarm condition.				
1.	Code Punch	$(\overline{\text{Off Pch. Key}}) + (\overline{\text{TF}}) + (\overline{\text{Kbd. Unlock}}) +$ $[(\overline{\text{Clear Storage Key}})(\overline{\text{Delete Key}})(\overline{\text{On Pch. Key}})]$	---	D25	16
2.	Reader On	$(\overline{\text{Rdr. One}})(\overline{\text{Rdr. Two}})$	---	INV C15	11
3.	Rdr. One Key	Manually depress Key.	---	---	5
NOTE B:	The depression of Rdr. One Key sends a "high" level through OR Gate E10, 11 to AND Gate E8. Since both Readers and Decode Busy are off, AND Gate E8 is enabled. This Gate sends a "high" level through Buffer Transistor E6, and OR Gate E9 to Transistor E7 which inverts the level. The "low" level drives AND Gate E7 "low" and is sent through OR Gate E6 to drive AND Gate E1 low. This "low" level is inverted by Transistor E4 to enable the TFMV.				
4.	TF	$(\overline{\text{Alarm}})(\overline{\text{Gate E7}})(\overline{\text{Gate E5}})(\overline{\text{Gate E3}})$	Note B	E6	8
5.	Clock	TF - trailing edge	4	---	8
6.	Decode Busy	$(\overline{\text{Code Key - From Rdr. Key}})(\overline{\text{Clock}})$	3 & 5	---	8
NOTE C:	The Decode Busy level inhibits OR Gate E6 to prevent further TF cycles while a Key is depressed. However, in this case Reader One will turn on and enable OR Gate E4 to provide continuous TF Cycles.				
7.	Reader One → 1	$(\overline{\text{Code Pch.}})(\overline{\text{Rdr. On}})(\overline{\text{Rdr. One}})$ $(\overline{\text{Rdr. One Key}})(\overline{\text{Clock}})$	3 & 5	C11	21

READER ONE TO PUNCH ONE (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
8.	Reader One	Reader One → 1	7	---	21
9.	Rdr. One Light	Reader One	8	---	5
10.	Reader On	Reader One	8	C14	11
11.	T/W Encoder Inh.	Reader On	10	D27	20
12.	Keyboard Unlock	T/W Encoder Inh.	11	INV D6	20
NOTE D: The Input-Output Unit keyboard is locked by turning on Reader One and this prevents manual entry.					
13.	Processor Busy Processor Out TF Inhibit	Processor not connected.	Note A		
14.	TF				
NOTE E: When a Reader is on, it drives OR Gate E4 "low" to cause AND Gate E1 to continuously enable the TFMV.					
15.	Rdr. Step Enable	Printer On	Note A	A14	9
16.	Rdr. One Step	(Rdr. One)(Rdr. Step En.)(Proc. Busy)(TF)	14 & 15	A5	9
NOTE F: Due to the mechanical delay of the Reader Step mechanism, the tape/card does not step until after the code has been read.					
17.	Rdr. One Enable	(Rdr. One)(Proc. Out)(TF)	10 & 14	E15	9
18.	Ch. 1, 2, 3, 4, 5, 6, 7, & 8 Input	(Rdr. One En.)(Code Control On code in tape)	17	---	6
19.	Ch. 1, 2, 3, 4, 5, 6, 7, & 8 Out	Ch. 1, 2, 3, 4, 5, 6, 7, & 8 Input	18	---	12
20.	Ch. (3)(4)(5)(6)(8)	(Ch. 3 Out)(Ch. 4 Out)(Ch. 5 Out)(Ch. 6 Out) (Ch. 8 Out)	19	B6	13

STEP	OUTPUT	LEVEL AND CONDITIONS			
21.	Control	Ch. (3)(4)(5)(6)(8)	20	B15	13
22.	Skip Logic	(Rdr. Two + Skip)(Rdr. One + Skip)			
		(Rdr. One + Spec. Skip)	Note A	C7	11
23.	(Rdr. On)(SKL)	(Reader On)(Skip Logic)	10 & 22	C9	11
24.	Clock	TF - trailing edge	14	---	8
25.	Code Control → 1	[(Rdr. On) (SKL)] [Ch. (1)(2)] (Chan. 7 Out)			
		[Ch. (3)(4)(5)(6)(8)] (Clock)	20 & 24	B5	14
26.	Code Control	Code Control → 1	25	---	22
27.	Code Control Light	Code Control	26	---	5
NOTE G: The System will now react to Control codes to turn on or off the respective functions, but an On Punch cannot reproduce these codes. Only alpha-numeric and feature codes will be punched.					
28.	TF	(Rdr. On)(TF Inhibit)(Sin. Step) (Alarm)	8 & 13	E4	8
29.	Reader Step Enable	Printer On	Note A	A14	9
30.	Rdr. One Step	(Rdr. One)(Rdr. Step En.) (Proc. Busy) (TF)	28 & 29	A5	9
31.	Rdr. One Enable	(Rdr. One)(Proc. Out)(TF)	13 & 28	E15	9
32.	Ch. 1, 2, 5, 6, & 8 Input	(Rdr. One En.)(Punch One On code in tape)	31	---	6
33.	Ch. 1, 2, 3, 4, 5, 6, 7, & 8 Out	Ch. 1, 2, 5, 6, & 8 Input	32	---	12
34.	Ch. (3)(4)(5)(7)(8)	(Ch. 3 Out)(Ch. 4 Out)(Ch. 7 Out)			
		(Ch. 5 Out)(Ch. 8 Out)	33	B7	13
35.	Control	Ch. (3)(4)(5)(7)(8)	34	B15	13
36.	(Rdr. One) (SKL)(CC)	(Rdr. One)(Skip Logic)(Code Control)	23 & 26	C12	11
37.	Clock	TF - trailing edge.	28	---	8

READER ONE TO PUNCH ONE (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
38.	Punch One → 1	[(Rdr. On)(SKL)(CC)] [Ch. (1)(2)] (Chan. 6 Out) [Ch. (3)(4)(5)(7)(8) (Clock)]	34 & 37	B6	14
39.	Punch One	Punch One → 1	38	---	22
40.	Punch One Light	Punch One	39	---	5
41.	TF	(Rdr. On)(TF Inhibit)(Sin. Step)(Alarm)	8 & 13	E4	8
42.	Rdr. Step Enable	(Printer On)	Note A	A14	9
43.	Rdr. One Step	(Rdr. One)(Rdr. Step En.)(Proc. Busy)(TF)	41 & 42	A5	9
44.	Rdr. One Enable	(Rdr. One)(Proc. Out)(TF)	41	E15	9
45.	Ch. 2, 3, 4, 5, & 8 Input	(Rdr. One En.)(Character "A" code in tape)	44	---	6
46.	Ch. 1, 2, 3, 4, 5, 6, 7, & 8 Out	Ch. 2, 3, 4, 5, & 8 Input	45	---	12
47.	Control	Ch. 1, 2, 3, 4, 5, 6, 7, & 8 Out	46	INV B2	13
48.	Pch. Strobe Aux. Input	(Control)(Skip Logic)(Decode Busy)	47	A3	10
NOTE H:	The above conditions in Step 48 send a low level through OR Gate A3 to inhibit AND Gate A16. This "low" level is inverted by Transistor A26 to give the Punch Strobe Aux. Input level.				
49.	Punch One Strobe	(Punch One)(Pch. Strobe Aux. Input)(TF)	41 & 48	A11	10
NOTE I:	The Strobe applies -24 volts to all eight solenoids, but only channels 1, 6, and 7 have been selected by the code and so they will be the only ones energized by the Strobe. The code "A" is punched.				
NOTE J:	If Code Control were not turned on, then all Control codes read would have been punched also.				
NOTE K:	If Auto Print were on, then the code "A" would have been printed also.				
NOTE L:	Additional information about this sequence will be found in the Control Unit Instruction Manual under "System Flow Diagram."				



READER ONE TO INPUT-OUTPUT UNIT (DECODER)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FRC GATE</u>	<u>DIAG.</u>
NOTE A:	In this example assume Reader One and Code Control are on. An Auto Print On code will be read to turn on Auto Print, which conditions the Input-Output Unit to print out characters and perform feature functions. It will be shown that during the printing time a Control code could be read and function. For this sequence assume both Punches are off, the Processor is not connected, and the System is not in a Skip condition.				
NOTE B:	The logic sequences for turning on a Reader and Code Control, so it will respond to Control codes, was previously explained under Reader One to Punch One sequence, Steps 1 through 27.				
1.	TF	(Rdr. On)( $\overline{\text{TF Inhibit}}$ )( $\overline{\text{Sin. Step}}$ )(Alarm)	Note B	E4	8
2.	Rdr. Step Enable	Printer On	Note A	A14	9
3.	Rdr. One Step	(Rdr. One)(Rdr. Step En.)( $\overline{\text{Proc. Busy}}$ )(TF)	1 & 2	A5	9
4.	Rdr. One Enable	(Rdr. One)( $\overline{\text{Proc. Out}}$ )(TF)	1	E15	9
5.	Ch. $\overline{1}$ , $\overline{2}$ , $\overline{5}$ , $\overline{7}$ , & $\overline{8}$ Input	(Rdr. One En.)(Auto Print On code in tape)	4	---	6
6.	Ch. $\overline{1}$ , $\overline{2}$ , 3, 4, $\overline{5}$ , 6, $\overline{7}$ , & $\overline{8}$ Out	Ch. $\overline{1}$ , $\overline{2}$ , $\overline{5}$ , $\overline{7}$ , & $\overline{8}$ Input	5	---	12
7.	Ch. (3)(4)( $\overline{5}$ )( $\overline{7}$ )( $\overline{8}$ )	(Ch. 3 Out)(Ch. 4 Out)( $\overline{\text{Ch. 5 Out}}$ ) (Ch. 7 Out)(Ch. 8 Out)	6	B8	13
8.	Control	Ch. (3)(4)( $\overline{5}$ )( $\overline{7}$ )( $\overline{8}$ )	7	B15	13
9.	(Rdr. On)( $\overline{\text{SKL}}$ )(CC)	(Rdr. On)( $\overline{\text{Skip Logic}}$ )(Code Control)	Note A	C12	11
10.	Clock	TF - trailing edge	1	---	8
11.	Auto Print $\rightarrow$ 1	$[(\text{Rdr. On})(\overline{\text{SKL}})(\text{CC})]$ $[\text{Ch. } (\overline{1})(\overline{2})]$ (Ch. 6 Out) $[\text{Ch. } (3)(4)(\overline{5})(\overline{7})(\overline{8})]$ (Clock)	7 & 10	B9	14
12.	Auto Print	Auto Print $\rightarrow$ 1	11	---	23
13.	Auto Print Light	Auto Print	12	---	5

READER ONE TO INPUT-OUTPUT UNIT (DECODER) Continued

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM C/E</u>	<u>DIAG.</u>
NOTE C:	The Typewriter will now function as an Output Unit to print alphanumeric characters at a 10 character/second rate when the Decoding Relays are strobed. Now the <u>Printer On level</u> no longer controls the Reader Step Enable logic, but the Decode Busy (10 cps) or Control (30 cps) levels do.				
14.	TF	Same levels and conditions as shown in Steps 1 through 4.			
15.	Rdr. Step Enable				
16.	Rdr. One Step				
17.	Rdr. One Enable				
18.	Ch. $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , & $\bar{8}$ Input	(Rdr. One En.)(Character "A" code in tape)	17	---	6
19.	Ch. 1, $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , 6, 7, & $\bar{8}$ Out	Ch. $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , & $\bar{8}$ Input	18	---	12
20.	<u>Control (CT)</u>	Ch. 1, $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , 6, 7, & $\bar{8}$ Out	19	INV B2	13
21.	T/W Decode Strobe	(Rdr. On)(Auto Print) $[(\overline{DB})(\overline{CT})(\overline{SKL})(TF)]$	14 & 20	A7	9
NOTE D:	The T/W Decode Strobe applies -15 volts to all eight Decoding Relays, but the code selects only the Relays for Channels 1, 6, and 7 to print the character "A." At the trailing edge of the Strobe, a 22 ms Decode O/S will be triggered. This One Shot extends the T/W Decode Strobe.				
22.	Decode One Shot	(T/W Decode Strobe)(TF-trailing edge)	14 & 21	---	1
23.	Clock	TF - trailing edge	14	---	8
24.	Decode Busy	(Rdr. On)(Auto Print)(Clock) $[(\overline{DB})(\overline{CT})(\overline{SKL})(TF)]$	20 & 23	E2	8

NOTE E: The Decode Busy O/S (80 ms) provides a divide by 3 TF control so the Decoding Relays will be strobed only every third TF cycle if an alphanumeric code is read in the Reader. The Reader can still step at a 30 character/second rate if:

READER ONE TO INPUT-OUTPUT UNIT (DECODER) Continued

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
	a. Successive Control codes are read. b. Auto Print is turned off. c. Skip function started.				
25.	TF	Same levels and conditions as shown in Steps 1 through 4.			
26.	Rdr. Step Enable				
27.	Rdr. One Step				
28.	Rdr. One Enable				

**NOTE F:** If a Punch One On code is read following the "A" code, then Punch One will be turned on during the Input-Output Unit printing time. The same levels and conditions as shown in Steps 32 through 40 of Reader One to Punch One will occur to turn on Punch One.

**NOTE G:** Additional information about the Reader One to Input-Output Unit sequence will be found in the Control Unit Instruction Manual under "System Flow Diagram" and also in the Input-Output Unit Instruction Manual under "Decoder Network."

INPUT-OUTPUT UNIT (ENCODER) TO PUNCH ONE

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE A: In this example Code Control is on and a Stop code will be read to turn off the On Reader (Rdr. One). Then manual entry is possible in the Input-Output Unit. Assume Punch One is on so the characters typed will not only be printed but also punched.					
1.	TF	Same levels and conditions as shown in Reader One to Input-Output Unit sequence, Steps 1 through 4.	4	---	6
2.	Rdr. Step Enable				
3.	Rdr. One Step				
4.	Rdr. One Enable				
5.	Ch. $\bar{3}$ , $\bar{5}$ , $\bar{6}$ , $\bar{7}$ & $\bar{8}$ Input	(Rdr. One En.)(Stop code in tape)	4	---	6
6.	Ch. 1, 2, $\bar{3}$ , 4, $\bar{5}$ , $\bar{6}$ , $\bar{7}$ , & $\bar{8}$ Out	Ch. $\bar{3}$ , $\bar{5}$ , $\bar{6}$ , $\bar{7}$ , & $\bar{8}$ Input	5	---	12
7.	Ch. (1)( $\bar{3}$ )(4)( $\bar{5}$ )( $\bar{6}$ )( $\bar{7}$ )	Ch. 1, 2, $\bar{3}$ , 4, $\bar{5}$ , $\bar{6}$ , $\bar{7}$ , & $\bar{8}$ Out	6	B11, 12	13
8.	Control	Ch. (1)( $\bar{3}$ )(4)( $\bar{5}$ )( $\bar{6}$ )( $\bar{7}$ )	7	B15	13
9.	(Rdr. On)( $\overline{SKL}$ )(CC)	(Reader On)( $\overline{Skip Logic}$ )(Code Control)	Note A	8	11
10.	Clock	TF - trailing edge	1	---	8
11.	Rdr. One $\rightarrow$ 0	$[(Rdr. On)(\overline{SKL})(CC)] [Ch. (1)(\bar{3})(4)(\bar{5})(\bar{6})(\bar{7})]$ (Ch. 2 Out)(Ch. 8 Out)(Clock)	6 & 10	B15	14
12.	Reader One	Rdr. One $\rightarrow$ 0	11	---	21
13.	Reader One Lt. Off	Reader One	12	---	5
NOTE B: The STOP Code only functions to turn off a Reader since Code Control is on. If Code Control were off, then the STOP Code would have been punched.					
14.	Reader On	(Reader One)(Reader Two)	12	INV C15	11
15.	T/W Encoder Inhibit	(Reader On)(Proc. Out)(Alarm)(Spec. Skip)	14	D27	20
16.	Keyboard Unlock	T/W Encoder Inhibit	15	INV D6	20
17.	Keyboard Unlock Lt.	Keyboard Unlock	16	---	5

INPUT-OUTPUT UNIT (ENCODER) TO PUNCH ONE (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>F I L M G A T E</u>	<u>DIAG.</u>
NOTE C:	The Keyboard is now unlocked to condition the Input-Output Unit for manual entry. The depression of Character Key "A" will set up this code in the Encoder Matrix and allow it to be printed and also sent to the On Punch.				
18.	Ch. $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , & $\bar{8}$ Input	Character Key "A" depression	Note C	---	3
19.	Ch. 1, $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , 6, 7, & $\bar{8}$ Out	Ch. $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , & $\bar{8}$ Input	18	---	12
20.	<u>Control (CT)</u>	Ch. 1, $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , 6, 7, & $\bar{8}$ Out	19	INV B2	13
21.	<u>Encoder Out (Neg.)</u>	Character Key "A" depression	Note C	---	3
22.	<u>Encoder Go</u>	Encoder Out (Neg.)	21	---	2
NOTE D:	The Encoder Go is a negative spike to enable the TFMV for one cycle. This negative spike drives AND Gate E7 "low," and it is sent through OR Gate E6 to drive AND Gate E1 "low." This "low" output from Gate E1 is inverted by Transistor E4 to enable the TFMV.				
23.	TF	<u>(Alarm)(Gate E7)(Gate E5)(Gate E3)</u>	Note D	E6	8
24.	Pch. Strobe Aux. Input	<u>(Control)(Skip Logic)(Decode Busy)</u>	20	A3	10
NOTE E:	The above conditions in Step 24 send a "low" level through OR Gate A3 to inhibit AND Gate A16. This "low" level is inverted by Transistor A26 to give the Pch. Strobe Aux. Input level.				
25.	Punch One Strobe	<u>(Punch One)(Pch. Strobe Aux. Input)(TF)</u>	23 & 24	All	10
NOTE F:	Additional information about this sequence of manual entry will be found in the Control Unit Instruction Manual under "System Flow Diagram" and also in the Input-Output Unit Instruction Manual.				

FC CLOCKS (PUNCH ONE OFF)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FE GA</u>	<u>DIAG.</u>
NOTE A: A FC Clock circuit in the Input-Output Unit furnishes a series of repetition rate pulses. These pulses are for triggering pulse gates to respond to any holes in the Field Control tape, regardless of the speed of manual entry. This example shows two keys depressed at a 20 character/second rate as the carriage is going from a no-hole to a hole condition in the FC tape. A Punch One Off hole is detected to turn off Punch One. Assume Field Control One is on, Punch One is on, both Readers are off, and the Processor is not connected.					
1.	<u>T/W Enc. Inhibit</u>	<u>(Rdr. On)(Spec. Skip)(Proc. Out)(Alarm)</u>	Note A	D27	20
2.	Keyboard Unlock	<u>T/W Enc. Inhibit</u>	1	Inv D6	20
3.	Key depression	Manually depress alpha-numeric key	Note A	---	---
4.	Encoder Switch	Key depression	3	---	3
NOTE B: Due to mechanical movement of Type Bar, there is approximately a 50 ms delay before the Encoder Switch closes. The Switch closure sets up the code in the Encoder Matrix. Then the code is sent from the Matrix through the Information Channels to the Punch input.					
5.	<u>Encoder Out</u>	Encoder Switch	4	---	3
6.	<u>Encoder Go</u>	Encoder Out	5	---	2
7.	TF	<u>(Alarm)(Gate E3)(Gate E5)(Gate E6)</u>	6	E6	8
8.	Pch. One Strobe	<u>(Punch One)(Pch. Strobe Aux. Input)(TF)</u>	7	All	10
9.	FC Enable O/S	<u>(Encoder Out)(TF - trailing edge)</u>	5 & 7	---	2
10.	FC Enable	FC Enable O/S	9	---	2
11.	<u>FC Inhibit</u>	<u>(CH)(BSP)</u>	---	---	2
12.	FC Clocks	<u>(FC Enable O/S)(DB)(FC Inhibit)</u>	9	---	2

NOTE C: The FC Clocks are present but serve no purpose since the carriage is still sitting in a no hole position of the FC tape. The key depression causes the Type Bar to go up and strike the Platen, and then the Carriage motion starts. Now the carriage advances one space and detects a Punch One Off hole in the FC tape.

FC CLOCKS (PUNCH ONE OFF) (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>PULSE GATE</u>	<u>DIAG.</u>
NOTE D:	Assume a second key depression immediately follows the first. Steps 3 through 11 repeat to again give FC Clocks. The carriage motion will be continuous for the two key depression, but the FC Clocks will detect the FC hole. A pulse gate responds to the hole to turn off Punch One, as follows:				
13.	FC - Ch. 1	Punch One "off" hole is sensed.	Note D	---	5
14.	Pch. One → 0	(FC One)(Punch One)(FC Enable) (FC - Ch. 1)(FC Clocks)	Note D	F5	18
15.	<u>Punch One</u>	<u>Pch. One → 0</u>	14	---	22
16.	Pch. One Lt. off	<u>Punch One</u>	15	---	5
NOTE E:	Additional information about this timing and sequence will be found in the Input-Output Unit Instruction Manual under "Field Control," "Field Control Clocks," and "Encoding Timing."				

FIELD CONTROL

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE A: A FC Keyboard Lock circuit in the Input-Output Unit prevents a second key depression when the carriage is sitting in a Reader One "on" hole (Ch. 3 or 6) in the Field Control tape. This circuit locks the keyboard. In this example, assume the T/W Encoder Inhibit level is "low" to allow manual entry, Field Control One is on, and a Ch. 3 hole is detected in the FC tape.					
1.	FC Kbd. Lock En.	(FC One)(FC - Ch. 3)	Note A	F3	18
2.	Key depression	Manually depress alpha-numeric key	Note A	---	---
3.	Character Key Sense	Switch S63 actuated by key depression	2	---	2
4.	FC Kbd. Lock O/S	(FC Kbd. Lock En.)(Char. Key Sense)	1 & 3	---	2
NOTE B: When the 70 ms Kbd. Lock O/S starts conducting, the Keyboard Unlock Solenoid is de-energized to lock the keyboard and to prevent a second key depression. Due to the Type Bar mechanical movement, there is up to an 85 ms delay before its respective switch is closed to generate a TF pulse to turn on Reader One. The Reader then keeps the Keyboard locked.					
5.	Encoder Out	Encoder Switch closure	2	---	3
6.	Encoder Go	Encoder Out	5	---	2
7.	TF	(Alarm)(Gate E3)(Gate E5)(Gate E6)	6	E6	8
8.	FC Enable O/S	(Encoder Out)(TF - trailing edge)	5 & 7	---	2
9.	FC Enable	FC Enable O/S	8	---	2
10.	FC Inhibit	(CR)(BSP)	---	---	2
11.	FC Clocks	(FC Enable O/S)(DB)(FC Inhibit)	8	---	2
NOTE C: The FC Clocks are generated for 17 ms only if Decode Busy is off and the carriage is in a forward motion.					
12.	Rdr. One → 1	(FC Kbd. Lock En.)(FC Enable)(FC Clocks)	9 & 11	---	18
13.	Reader One	Rdr. One → 1	12	---	21
14.	Rdr. One Light	Reader One	13	---	5



FIELD CONTROL "RDR. ON" KBD. LOCK (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL</u> <u>FROM</u> <u>STEP</u>	<u>FR M</u> <u>GA E</u>	<u>DIAG.</u>
15.	Rdr. On	Reader One	13	CL	11
16.	T/W Encoder Inhibit	Reader On	15	D2	20
17.	<u>Keyboard Unlock</u>	T/W Encoder Inhibit	16	IN D6	20

NOTE D: Since Keyboard Unlock is "low" (Keyboard Unlock), the Kbd. Unlock Solenoid will stay de-energized and keep the keyboard locked as long as Reader One is on.

NOTE E: Additional information about this sequence will be found in the Input-Output Unit Instruction Manual under the same title used for this sequence.

SINGLE STEP

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>OR GATE</u>	<u>DIAG.</u>
NOTE A:	In this example, the Processor is not connected and Reader One is on and reading codes when the Single Step Key is depressed. This key depression stops all System operation. Each time this key is depressed to the overthrow position the On Reader steps one code. All System functions are the same as for continuous Reader operation.				
1.	Single Step	Single Step Key latched	Note A	---	5
2.	Single Step Lt.	Single Step	1	---	5
NOTE B:	When Reader One is on and not in Single Step, then the "low" level from OR Gate E4 enables the TF Multivibrator to be free running. But when in Single Step, the level from Gate E4 goes "high" so this Gate no longer enables the TFMV. The Reader stops continuous stepping.				
3.	<u>Gate E5</u>	Single Step (gate output goes "low")	1	E5	8
4.	Single Step Key	Single Step overthrown (gives level "Code Key")	Note A	---	5
NOTE C:	The overthrown Key sends a "high" level through OR Gate E9 which is inverted by Transistor E7. This "low" level drives AND Gate E7 "low." Now the "low" level is delayed 4 ms and then sent through OR Gate E6 to drive AND Gate E1 "low." The "low" level from E1 enables the TFMV for one cycle.				
5.	TF	$(\overline{\text{Alarm}})(\overline{\text{Gate E3}})(\overline{\text{Gate E5}})(\overline{\text{Gate E7}})$	Note C	E6	8
6.	$\left. \begin{array}{l} \overline{\text{Proc. Busy}} \\ \overline{\text{Proc. Out}} \end{array} \right\}$	Processor not connected.	Note A	---	27
7.	Rdr. One Step	$(\text{Rdr. One})(\overline{\text{Proc. Busy}})(\overline{\text{DB}})(\text{TF})$	5 & 6	A5	9
8.	Rdr. One Enable	$(\text{Rdr. One})(\overline{\text{Proc. Out}})(\text{TF})$	5 & 6	E15	9
9.	Clock	TF - trailing edge	5	---	8
10.	Decode Busy	$(\text{level "Code Key"})(\text{Clock})$	4 & 9	---	8

SINGLE STEP (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE D:	The Decode Busy O/S is triggered by the output of a Pulse Gate E1. It is held on by AND Gate E12 for the duration of the key depression. The Decode Busy level enables AND Gate E3 which sends a "high" level through OR Gate E6 to prevent further TF cycles while the Key is depressed.				
11.	<u>Single Step Key</u>	Single Step Key is released	---	---	5
12.	<u>Decode Busy</u>	The One Shot returns to its normal state	---	E12	8
13.	<u>Gate E3</u>	<u>Decode Busy</u>	12	---	8
NOTE E:	One Single Step Cycle has been completed. The System is still in Single Step so the Reader will not start continuous stepping again unless the Single Step Key is unlatched.				
NOTE F:	The code read by the Reader would have punched if a Punch were on; if it were an alpha-numeric code, it would have been printed if Auto Print were on.				

MANUAL FEED IN SINGLE STEP

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE A:	Manual feeding while in Single Step mode is used to advance the media in an ON Punch one position for each Feed Key depression. This method provides control of spacing when "programming" a tape. Both Readers must be off. This Single Step is a two cycle (2 TF's) operation. The Feed Key depression generates the first cycle which does not function for advancing the tape. When the Feed Key is released, the second cycle is generated which strobes the ON Punch to advance the tape one space. In this example, assume a tape is clamped in Punch One which is on.				
1.	Single Step	Single Step Key latched.	Note A	---	5
2.	Single Step Lt.	Single Step	1	---	5
3.	<u>Gate E5</u>	Single Step (gate output goes "low")	1	E5	8
4.	Feed Key	Depress Feed Key on mode panel.	Note A	---	5
NOTE B:	The Feed Key depression sends a "high" level through OR Gate E9, and this level is then inverted by Transistor E7. This "low" level drives AND Gate E7 "low." Now the "low" level is delayed 4 ms and then sent through OR Gate E6 to drive AND Gate E1 low. The "low" level from E1 enables the TFMV for one cycle.				
5.	TF	(Alarm)(Gate E3)(Gate E5)(Gate E7)	Note B	E6	8
6.	Clock	TF - trailing edge	5	---	8
7.	Feed One → 1	(Feed Key)(Pch. One)(Rdr. On)(Feed One) (Clock)	4 & 6	E5	19
8.	Feed One	Feed One → 1	7	---	19
9.	Decode Busy	(Level "Code Key")(Clock)	4 & 6	---	8
NOTE C:	Decode Busy O/S is triggered by the output of a Pulse Gate E1. The One Shot is held on by AND Gate E12 for the duration of the Feed Key depression. The Decode Busy level enables AND Gate E3 which sends a "high" level through OR Gate E6 to prevent further TF cycles while the Key is depressed.				

MANUAL FEED IN SINGLE STEP (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
10.	Code Key (low)	Feed Key is released	Note A	E9	8
11.	<u>Decode Busy</u>	One Shot returns to normal state	10	---	8
12.	<u>Gate E3</u>	<u>Decode Busy</u>	11	E3	8
NOTE D: When Decode Busy O/S returns to its normal state, then the output of AND Gate E3 goes "low." This level drives OR Gate E6 "low" to enable a TF cycle. This cycle will reset Feed One FF (besides strobing Punch). The reset Flip-Flop prevents additional TF cycles by enabling AND Gate E7 to send a "high" level through Gate E6 to Gate E1.					
13.	TF	$(\overline{\text{Alarm}})(\overline{\text{Gate E3}})(\overline{\text{Gate E5}})(\overline{\text{Gate E7}})$	12	E6	8
14.	Pch. One Strobe	(Feed One)(TF)	8 & 13	A6	10
15.	Clock	TF - trailing edge	13	---	8
16.	Feed One $\rightarrow$ 0	$(\overline{\text{Code Key}})(\overline{\text{Punch Index Hole-PIH}})(\overline{\text{Clock}})$	10 & 15	E3	19
NOTE E: The PIH level is always present when tape is in a Punch. This level controls Punch for Card applications.					
17.	<u>Feed One</u>	Feed One $\rightarrow$ 0	16	---	19

SPECIAL SKIP

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE A:	In this example Reader One is on and reads a Switch code. This code turns off Reader One and turns on Reader Two, which reads a Special Skip On code. Now Reader One continuously skips over all codes while looking for a Special Skip Off code. During this skipping, Reader Two continuously reads codes and responds to them. Reader Two codes can be typed and/or punched. Assume Code Control and Punch One are on, Auto Print is off, and the Processor is not connected to the System.				
1.	Reader On	(Rdr. One) + (Rdr. Two)	Note A	C14	11
2.	TF	(Rdr. On)(Sin. Step)(Alarm)(TF Inhibit)	Note A	E4	8
3.	Proc. Busy	Processor not connected	Note A	---	27
	Proc. Out				
	TF Inhibit				
4.	Rdr. Step Enable	Printer On	Note A	A14	9
5.	Rdr. One Step	(Rdr. One)(Rdr. Step En.)(Proc. Busy)(TF)	2 & 4	A5	9
NOTE B:	Due to the mechanical delay of the Reader Step mechanism, the tape/card will not step until after the code has been read.				
6.	Rdr. One Enable	(Rdr. One)(Proc. Out)(TF)	2 & 3	E15	9
7.	Ch. 1, 5, 6, 7 & 8 Input	(Rdr. One En.)(Switch code in Rdr. 1 tape)	6	---	6
8.	Ch. 1, 2, 3, 4, 5, 6, 7, & 8 Out	Ch. 1, 5, 6, 7, & 8 Input	7	---	12
9.	Control	Ch. 3, 4, 5, 7, 8	8	B15	13
10.	Skip Logic	(Rdr. Two + Skip)(Rdr. One + Skip) (Rdr. One + Spec. Skip)	Note A	C7	11

SPECIAL SKIP (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM DATE</u>	<u>DIAG.</u>
11.	(Rdr. One)(CC)( $\overline{\text{SKL}}$ )	(Rdr. One)(Code Control)( $\overline{\text{Skip Logic}}$ )	1 & 10	C12	11
12.	Clock	TF - trailing edge	2	---	8
13.	Rdr. One $\rightarrow$ 0 Rdr. Two $\rightarrow$ 1	$[(\text{Rdr. One})(\text{CC})(\overline{\text{SKL}})]$ (Ch. $\bar{1}$ , 2, 3, 4, $\bar{5}$ , $\bar{6}$ , $\bar{7}$ , $\bar{8}$ Out)(Clock)	8 & 12	B16 B19	14
14.	Rdr. Two	Rdr. Two $\rightarrow$ 1	13	---	21
15.	TF	(Rdr. On)( $\overline{\text{Sing. Step}}$ )( $\overline{\text{Alarm}}$ )( $\overline{\text{TF Inhibit}}$ )	Note A	E4	8
16.	Rdr. Step Enable	$\overline{\text{Printer On}}$	Note A	A13	9
17.	Rdr. Two Step	(Rdr. Two)(Rdr. Step En.)( $\overline{\text{Proc. Busy}}$ )(TF)	14 & 15	F11	9
NOTE C: Rdr. One did not step because this Reader is off, and Special Skip has not yet been turned on. When Spec. Skip is on, then both Readers will step together as Rdr. Two reads codes and Rdr. One is skipping over codes.					
18.	Rdr. Two Enable	(Rdr. Two)( $\overline{\text{Proc. Out}}$ )(TF)	14 & 15	F10	9
19.	Ch. $\bar{2}$ , $\bar{5}$ , $\bar{6}$ Input	(Rdr. Two En.)(Special Skip On code in Rdr. Two tape)	18	---	6
20.	Ch. 1, $\bar{2}$ , 3, 4, $\bar{5}$ , $\bar{6}$ , 7, & 8 Out	Ch. $\bar{2}$ , $\bar{5}$ , $\bar{6}$ Input	19	---	12
21.	Control	Ch. $\bar{2}$ , 3, 4, $\bar{5}$ , $\bar{6}$ , & 8	20	B15	13
22.	(Rdr. On)(CC)( $\overline{\text{SKL}}$ )	(Rdr. Two)(Code Control)( $\overline{\text{Skip Logic}}$ )	1 & 10	C8	11
23.	Clock	TF - trailing edge	15	---	8
24.	Spec. Skip $\rightarrow$ 1	$[(\text{Rdr. On})(\text{CC})(\overline{\text{SKL}})]$ (Ch. 1, $\bar{2}$ , 3, 4, $\bar{5}$ , $\bar{6}$ , 7, & 8 Out)(Clock)	20 & 23	B13	14
25.	Special Skip	Spec. Skip $\rightarrow$ 1	24	---	21
26.	TF	(Rdr. On)( $\overline{\text{Sin. Step}}$ )( $\overline{\text{Alarm}}$ )( $\overline{\text{TF Inhibit}}$ )	Note A	E4	8

SPECIAL SKIP (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
27.	Rdr. Step Enable	Printer On	Note A	A14	9
28.	Rdr. One Step	(Special Skip)(Proc. Out)(TF)	25 & 26	A10	9
	Rdr. Two Step	(Rdr. Two)(Rdr. Step En.)(Proc. Busy)(TF)	26 & 27	F11	9
NOTE D: Assume Reader Two will read the character 5 which will be punched, while Reader One sees the letter A and just skips past it.					
29.	Rdr. Two Enable	(Rdr. Two)(Proc. Out)(TF)	26	F10	9
30.	Ch. 2, 4, 6, 7, & 8 Input	(Rdr. Two En.)(number 5 code in Reader Two tape)	29	---	6
31.	Pch. One Strobe	(Pch. One) [(Rdr. On)(Auto Print)(SKL) (Control)] (TF)	---	A2	10
32.	Spec. Skip Off Clock	TF - trailing edge	26	---	8
33.	Rdr. One Enable	(Spec. Skip)(Proc. Out)(Spec. Skip Off Clock)	25 & 26	E16	9
34.	TF	(Rdr. On)(Sin. Step)(Alarm)(TF Inhibit)	Note A	E4	8
35.	Rdr. Step Enable	Printer On	Note A	A14	9
36.	Rdr. One Step	(Special Skip)(Proc. Out)(TF)	34	A10	9
	Rdr. Two Step	(Rdr. Two)(Rdr. Step En.)(Proc. Busy)(TF)	34	F11	9
NOTE E: Assume Reader Two reads the character 6 which will be punched in Punch One, while Reader One sees the letter B and just skips past it.					
37.	Rdr. Two Enable	(Rdr. Two)(Proc. Out)(TF)	34	F10	9
38.	Ch. 1, 4, 6, 7, & 8 Input	(Rdr. Two En.)(number 6 code in Rdr. Two tape)	37	---	6
39.	Pch. One Strobe	(Pch. One) [(Rdr. On)(Auto Print)(SKL) (Control)] (TF)	34	A2	10
40.	Spec. Skip Off Clock	TF - trailing edge	34	---	8



SPECIAL SKIP

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FR I GA I</u>	<u>DIAG.</u>
41.	Rdr. One Enable	(Spec. Skip)( <u>Proc. Out</u> )(Spec. Skip Off Clock)	40	E1	9
42.	TF	(Rdr. On)( <u>Sin. Step</u> )(Alarm)( <u>TF Inhibit</u> )	Note A	E4	8
43.	Rdr. Step Enable	Printer On	Note A	A1	9
44.	Rdr. One Step	(Special Skip)( <u>Proc. Out</u> )(TF)	42	A10	9
45.	Rdr. Two Step	(Rdr. Two)(Rdr. Step En.)( <u>Proc. Busy</u> )(TF)	42	F1	9
NOTE F: Assume Reader Two reads the character 7 which will be punched, while Reader One sees the Special Skip Off code. Reader One responds to this latter code to stop the skipping. Now just Reader Two will continue to step.					
46.	Rdr. Two Enable	(Rdr. Two)( <u>Proc. Out</u> )(TF)	42	F10	9
47.	Ch. $\bar{4}$ , $\bar{5}$ , $\bar{6}$ , $\bar{7}$ , & $\bar{8}$ Input	(Rdr. Two En.)(Number 7 code in Rdr. Two tape)	46	---	6
48.	Pch. One Strobe	(Pch. One) (Rdr. On)( <u>Auto Print</u> )(SKL)(Control) (TF)	42	A2	10
49.	Spec. Skip Off Clock	TF - trailing edge	42	---	8
50.	Rdr. One Enable	(Spec. Skip)( <u>Proc. Out</u> )(Spec. Skip Off Clock)	49	E16	9
51.	Ch. $\bar{3}$ Input	(Rdr. One En.)(Spec. Skip Off Code in Rdr. One tape)	Note F	---	6
52.	Ch. 1, 2, $\bar{3}$ , 4, 5, 6, 7, & 8 Out	Ch. $\bar{3}$ Input	51	---	12
53.	Control	Del./Spec. Skip Off Det.	52	B15	13
54.	Spec. Skip $\rightarrow$ 0	(Ch. 1, 2, 4, 5, 6, & 7 Out)(Ch. $\bar{3}$ Input)(Spec. Skip Off Clock)	49 & 52	---	12

SPECIAL SKIP (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FR. I GA. :</u>	<u>DIAG.</u>
55.	Special Skip	Spec. Skip → 0	54	--	21

NOTE G: Several System variations of Reader operation are possible before or after the Special Skip Off code. This additional information will be found in the Control Unit Instruction Manual under "Special Skip" of Control Logic Flip-Flops and the Control Decoder.

NOTE H: If Auto Print were on during Special Skip, then Decode Busy operation would control the stepping, printing, and punching of alpha-numeric information at a 10 character/second rate.

PARAPROCESSING

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE A:	Paraprocessing is a programming feature which allows functions such as punching, Processor manipulation, or Control code response to be performed that may require no time in relation to the overall operation of the application. These functions are performed during the time when the carriage motion is such as to prevent printing. In this example, during a Carriage Return motion, a couple of control functions will be performed and several characters punched. Assume Reader One, Code Control, and Auto Print are on, the System is not in a Skip condition, and the Processor is not connected.				
1.	Reader On	Reader One	Note A	C14	11
2.	<u>Processor Busy</u> <u>Processor Out</u> <u>TF Inhibit</u>	Processor not connected.	Note A		
3.	TF	(Rdr. On)( <u>TF Inhibit</u> )( <u>Sin. Step</u> )( <u>Alarm</u> )	Note A	E4	8
4.	Rdr. Step Enable	<u>Decode Busy</u>	---	A14	9
5.	Rdr. One Step	(Rdr. One)(Rdr. Step En.)( <u>Proc. Busy</u> )(TF)	4	A5	9
6.	Rdr. One Enable	(Rdr. One)( <u>Proc. Out</u> )(TF)	2 & 3	E15	9
7.	Ch. $\bar{1}$ , $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , $\bar{6}$ , and $\bar{7}$ Input	(Rdr. One En.)(Carriage Return code in tape.)	Note A	---	6
8.	Ch. $\bar{1}$ , $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , $\bar{6}$ , $\bar{7}$ , and 8 Out	Ch. $\bar{1}$ , $\bar{2}$ , $\bar{3}$ , $\bar{4}$ , $\bar{5}$ , $\bar{6}$ , & $\bar{7}$ Input	7	---	12
9.	T/W Decode Strobe	(Rdr. On)(Auto Print) [(DB)(CT)(SKL)(TF)]	3 & Note A	A7	9

NOTE B: The Carriage Return code (Ch. 8) read in Reader One is sent through the Information Channels to the Decoding Relays in the Input-Output Unit. This code is not a Control code so the T/W Decode Strobe pulse is present to strobe the Decoding Relays. Relay K8 will be energized to set up the code of 1000-0000 in the "Relay Tree" of the Decoding Relays. This code

PARAPROCESSING (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>OM TE</u>	<u>DIAG.</u>
NOTE B: energizes the Carriage Return Solenoid (L52) to initiate a Carriage Return motion. The levels in Step 9 will turn on Decode Busy, which is held on for the duration of the carriage motion. Auto Print will be turned off, which prevents the printing of codes but allows the Reader to continue to step as follows:					
10.	Clock	TF - trailing edge	3	---	8
11.	Decode Busy	(Rdr. On)(Auto Print) $[(\overline{DB})(\overline{CT})(\overline{SKL})(TF)]$ (Clock)	10 & 9	B2	8
12.	TF	(Rdr. On)(TF Inhibit)(Sin. Step)(Alarm)	Note A	B1	8
13.	Rdr. Step Enable	Control	19	A14	9
14.	Rdr. One Step	(Rdr. One)(Rdr. Stop En.)( $\overline{Proc. Busy}$ )(TF)	12 & 13	A5	9
15.	Rdr. One Enable	(Rdr. One)( $\overline{Proc. Out}$ )(TF)	2 & 12	B15	9
16.	Ch. 2, 3, 5, 6, & 7 Input	(Rdr. One En.)(Auto Print Off code in tape)	15	---	6
17.	Ch. 1, 2, 3, 4, 5, 6, 7, & 8 Out	Ch. 2, 3, 5, 6, & 7 Input	16	---	12
18.	Ch. (1)(3)(4)(5)(6)(7)	(Ch. 1 Out)(Ch. 3 Out)(Ch. 4 Out) (Ch. 5 Out)(Ch. 6 Out)(Ch. 7 Out)	17	B11,12	13
19.	Control	Ch. (1)(3)(4)(5)(6)(7)	18	B15	13
20.	(Rdr. On)( $\overline{SKL}$ )(CC)	(Reader On)(Skip Logic)(Code Control)	---	C8	11
21.	Clock	TF - trailing edge	12	---	8
22.	Auto Print $\rightarrow$ 0	$[(Rdr. On)(\overline{SKL})(CC)]$ (Ch. 2 Out)(Ch. 8 Out) $[(Ch. (1)(3)(4)(5)(6)(7))]$ (Clock)	20 & 21	B20	14
23.	Auto Print	Auto Print $\rightarrow$ 0	22	---	23
24.	Printer On	Auto Print	23	---	11

PARAPROCESSING (Continued)

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE C: With Auto Print off, the <u>Printer On</u> level gives the Rdr. Step Enable level which can allow the On Reader to step at a 30 character/second rate.					
NOTE D: Now the sequence of Steps 12 through 21 will repeat to read a Punch One On code and turn on this Punch. The succeeding codes read will punch but will not print since Auto Print is off.					
25.	TF	(Rdr. On)( <u>TF Inhibit</u> )( <u>Sin. Step</u> )( <u>Alarm</u> )	Note A	E4	8
26.	Rdr. Step Enable	<u>Printer On</u>	24	A14	9
27.	Rdr. One Step	(Rdr. One)(Rdr. Step En.)( <u>Proc. Busy</u> )(TF)	26	A5	9
28.	Rdr. One Enable	(Rdr. One)( <u>Proc. Out</u> )(TF)	25	E15	9
29.	Ch. 2, 3, 4, 5, & 8 Input	(Rdr. One En.)(Code "a" in tape)	28	---	6
30.	Ch. 1, 2, 3, 4, 5, 6, 7, and 8 Out	Ch. 2, 3, 4, 5, & 8 Input	29	---	12
31.	Pch. Strobe Aux. Input	(Rdr. On)( <u>Auto Print</u> )( <u>Control</u> ) ( <u>SKL</u> )	23	A2	10
32.	Punch One Strobe	(Punch One)(Pch. Strobe Aux. Input)(TF)	25 & 31	All	10
NOTE E: Now the sequence of Steps 25 through 32 will repeat to read codes "b" and "c" and have them punch. Since a Carriage Return motion can last up to 1 second, many other functions can be performed besides the few steps explained here. Sometimes before the end of the motion, Steps 12 through 21 will repeat to read an Auto Print On code. This turns on Auto Print which allows alpha-numeric codes read after the carriage motion terminates to be printed. Control codes continue to function normally.					
NOTE F: Additional information about Paraprocessing will be found in the Control Unit Instruction Manual under "Reader Step" and also in the 2816 and 7816 Product Detail and Point to Point Programming Manuals.					

PARITY ALARM

<u>STEP</u>	<u>OUTPUT</u>	<u>LEVELS AND CONDITIONS</u>	<u>LEVEL FROM STEP</u>	<u>FROM GATE</u>	<u>DIAG.</u>
NOTE A:	In this example, a Reader is on, and the code read is punched in Punch One as a non-parity code (even number of holes) which initiates an Alarm condition to "lock up" the System and prevent it from functioning.				
1.	TF	(Rdr. On)(Sin. Step)(Alarm)(TF Inhibit)	Note A	E4	8
2.	Parity Delay Input	TF - leading edge	1	---	20
3.	Parity Delay O/S	Parity Delay Input	2	---	7
NOTE B:	The Parity Delay O/S conducts for 10-14 ms from leading edge of TF. During this conduction, the punch pin contacts close as the code is punched. These contacts close in less than 12 ms and don't open until after 18 ms from the leading edge of TF. As the Parity Delay O/S returns to its normal state, it triggers a 3.5 ms Parity Strobe O/S. This One Shot gives a 3.5 ms Parity Clock and Parity Detect pulses. The 10-14 ms timing is manually adjusted so the Parity Strobe is not present until after the punch pin contacts have closed and is removed before they open. This timing prevents arcing across opening and closing contacts.				
4.	Parity 1 Clock	Parity Strobe O/S	Note B	---	7
5.	Parity 1 Detect	Parity Strobe O/S and non-parity code	Notes A & B	---	7
NOTE C:	Punch One On and Parity One Detect are two of the three levels needed to arm a Parity FF pulse gate. The third level is from the Parity Inhibit O/S when it is in the normal condition (OFF). It remains off for all codes that are to be checked for parity.				
6.	Parity FF → 1	(Punch One)(Parity Inhibit O/S)(Parity 1 Detect)(Parity One Clock-trailing edge)	4 & 5	---	20
7.	Alarm	Parity FF → 1	6	D29	20
8.	Parity Alarm Lt.	Parity FF → 1	6	---	5
NOTE D:	The Alarm condition "locks up" the System, to denote an error. The depression of the Restore Key removes the Alarm by resetting the Parity FF.				

LEVELS AND DIAGRAMS

<u>LEVEL</u>	<u>FROM DIAG. #</u>	<u>LEVEL</u>	<u>FROM DIAG. #</u>	<u>LEVEL</u>	<u>FROM DIAG. #</u>
a	33	/c	28	Channel 1 Output	12
$\bar{a}$	33	$\bar{/c}$	28	<u>Channel 1 Output</u>	12
Accumulate Cycle	30	(/c) + (/m)	28	Channel 2 Output	12
Add	31	( $\bar{/c}$ ) ( $\bar{/m}$ )	28	<u>Channel 2 Output</u>	12
Alarm	20	/c + % Code	35	Channel 3 Output	12
Auto Minus Code	35	Carry/Borrow	31	<u>Channel 3 Output</u>	12
Auto Print	23	CR	2	Channel 4 Output	12
<u>Auto Print</u>	23	(Ch. 1) (Ch. 2)	13	<u>Channel 4 Output</u>	12
Auto Print Key	5	(Ch. 1) ( $\bar{\text{Ch. 2}}$ )	13	Channel 5 Output	12
Auto Print Light	23	(Ch. 1) ( $\bar{\text{Ch. 3}}$ ) ( $\bar{\text{Ch. 4}}$ ) ( $\bar{\text{Ch. 5}}$ ) ( $\bar{\text{Ch. 6}}$ ) ( $\bar{\text{Ch. 7}}$ )	13	<u>Channel 5 Output</u>	12
Auto Print $\rightarrow$ 0	14	( $\bar{\text{Ch. 1}}$ ) (Ch. 2)	13	Channel 6 Output	12
Auto Print $\rightarrow$ 1	14	( $\bar{\text{Ch. 1}}$ ) ( $\bar{\text{Ch. 2}}$ )	13	<u>Channel 6 Output</u>	12
Aux. Control Code	27	( $\bar{\text{Ch. 2}}$ ) (Ch. 3) (Ch. 4) ( $\bar{\text{Ch. 5}}$ ) ( $\bar{\text{Ch. 6}}$ ) (Ch. 8)	13	Channel 7 Output	12
Aux. Interlock	7, P.S.-2 & T	(Ch. 3) (Ch. 4) (Ch. 5) ( $\bar{\text{Ch. 6}}$ ) ( $\bar{\text{Ch. 8}}$ )	13	<u>Channel 7 Output</u>	12
		(Ch. 3) (Ch. 4) ( $\bar{\text{Ch. 5}}$ ) (Ch. 7) ( $\bar{\text{Ch. 8}}$ )	13	Channel 8 Output	12
b	33	(Ch. 3) (Ch. 4) ( $\bar{\text{Ch. 5}}$ ) ( $\bar{\text{Ch. 7}}$ ) ( $\bar{\text{Ch. 8}}$ )	13	<u>Channel 8 Output</u>	12
$\bar{b}$	33	(Ch. 3) ( $\bar{\text{Ch. 4}}$ ) ( $\bar{\text{Ch. 5}}$ ) ( $\bar{\text{Ch. 6}}$ ) ( $\bar{\text{Ch. 7}}$ ) (Ch. 8)	13	Channel 1 Output Buff	34
Back Punch Key	5	( $\bar{\text{Ch. 3}}$ ) ( $\bar{\text{Ch. 4}}$ ) (Ch. 6) (Ch. 7) (Ch. 8)	13	<u>Channel 1 Output Buff</u>	34
<u>Back Punch Key</u>	19	Channel 1 Input		Channel 2 Output Buff	34
Back Punch One	19	Channel 2 Input		<u>Channel 2 Output Buff</u>	34
Back Punch Two	19	Channel 3 Input		Channel 3 Output Buff	34
Backspace	2 & 35	Channel 4 Input	3, 6, 15, 16, 34 & T	<u>Channel 3 Output Buff</u>	34
Backspace Correct	29	Channel 5 Input		Channel 4 Output Buff	34
Bit Clock	29	Channel 6 Input		<u>Channel 4 Output Buff</u>	34
Blank Detector	12	Channel 7 Input		Channel 5 Output Buff	34
		Channel 8 Input			

LEVELS AND DIAGRAMS (Continued)

<u>LEVEL</u>	<u>FROM DIAG. #</u>	<u>LEVEL</u>	<u>FROM DIAG. #</u>	<u>LEVEL</u>	<u>FROM DIAG. #</u>
Field Control Ch. 2	5	G. Reg. Tog.	28	J - Reg. Code	35
Field Control Ch. 3	5	Go	31	J - Reg. Tog	28
Field Control Ch. 4	5	<u>Go</u>	31	J' Reg. Function	28
Field Control Ch. 5	5	Go Tog → 0	30	K + Reg. Code	35
Field Control Ch. 6	5	Go Tog → 1	27	K - Reg. Code	35
Field Control Ch. 7	5			K - Reg. Tog	28
Field Control Ch. 8	5	H. Reg. Code	35	K' Reg. Function	28
Field Control Clock	2	H. Reg. Tog.	28	Keyboard Lock Aux. Hold	2 & T
Field Control Enable	2	Half Cent R.O. Cyc.	26	Keyboard Unlock	20
Field Control Inhibit	Int. to 2				
Field Control Keyboard Lock Enable	18	I Reg. Code	35	Last Oper. Output	31
Field Control One	23	I Reg. Tog	28	L/C Code	Internal to 3
Field Control One Key	5	(Icand + Output On) Tog	28		
Field Control One Light	23	<u>(Icand - Output On) Tog</u>	28	/m	28
Field Control One → 0	14	(Icand + Output On) Tog → 0	30	<u>/m</u>	28
Field Control One → 1	14	Icand Reg. Code	35	/m Code	35
Field Control Two	23	Icand Shift Mode	30	Minus	32
Field Control Two Key	5	Ier Reg. Code	35	Minus Code	35
Field Control Two Light	23	Ier Tog	28	Minus Round Off Level	29
Field Control Two → 0	14	<u>Ier Tog</u>	28		
Field Control Two → 1	14	Ier Tog → 0	30	Neg. Sign Det.	25
Flip Flop Reset	P.S. - 1 + 1A	Index Level	29	Neg. Togs I & II → 0	30
		<u>Index Level</u>	29	Neg. II	32
G. Reg. Code	35	J + Reg. Code	35	Neg. III	32
				<u>Neg. III</u>	32



LEVELS AND DIAGRAMS (Continued)

<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>	<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>	<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>
g. III → 0	33	Output End	30	$\overline{PA6}$	29
Deciaml	36	Output Mode	30	(PA6 Code)(Code Sync.)	35
on-Output Character	35	Output Seq.	27	(PA6)("0" in Ier)(Output Mode)	29
ot Ready Light	20	(Output Seq.)(Go)	27	Parity	Internal to 20
		Output Unit On	11	Parity Alarm Light	20
ff Code Pch.	16			Parity Delay	Internal to 7
ff Code Punch Key	5	PA1	27	Parity Delay Input	20
on Code Punch Key	5	$\overline{PA1}$	27	Parity One Clock	7
Order Code Tog.	27	(PA1 Code)(Code Sync)	35	Parity Two Clock	7
Order Code Tog.	27	(PA1) + (PA5)	27	Parity One Detect	7
Order S1	36	PA2	27	Parity Two Detect	7
Order S2	36	(PA2 Code)(Code Sync)	35	<u>Parity Inhibit</u>	Internal to 20
Order 1	36	(PA2) + (Output Seq.)	27	Positive Half Cent .0. Cyc.	26
Order 2	36	(PA2) + (PA4)	27	Pre-Index Clock	29
Order 3	36	(PA2)(PA4) + Output Seq.)	27	(Printer Busy) + (PA6)	26
Order 4	36	(PA3 Code)(Code Sync.)	35	<u>Printer On</u>	11
Order 5	36	$\overline{PA4}$	27	<u>Process</u>	27
Order 6	36	$\overline{PA4}$ Clear	36	<u>Proc. Busy</u>	27
Order 7	36	(PA4 Code)(Code Sync.)	35	Process Code	35
Order 8	36	$\overline{PA5}$	27	(Process)(Go)	27
Order 9	36	$\overline{PA5}$ Clear	36	<u>Proc. Out</u>	17 & 27
Order 10	36	(PA5 Code)(Code Sync.)	35	<u>Proc. Out</u>	27
Output Control	31	PA6	29	<u>Proc. Ready</u>	27

LEVELS AND CONDITIONS (Continued)

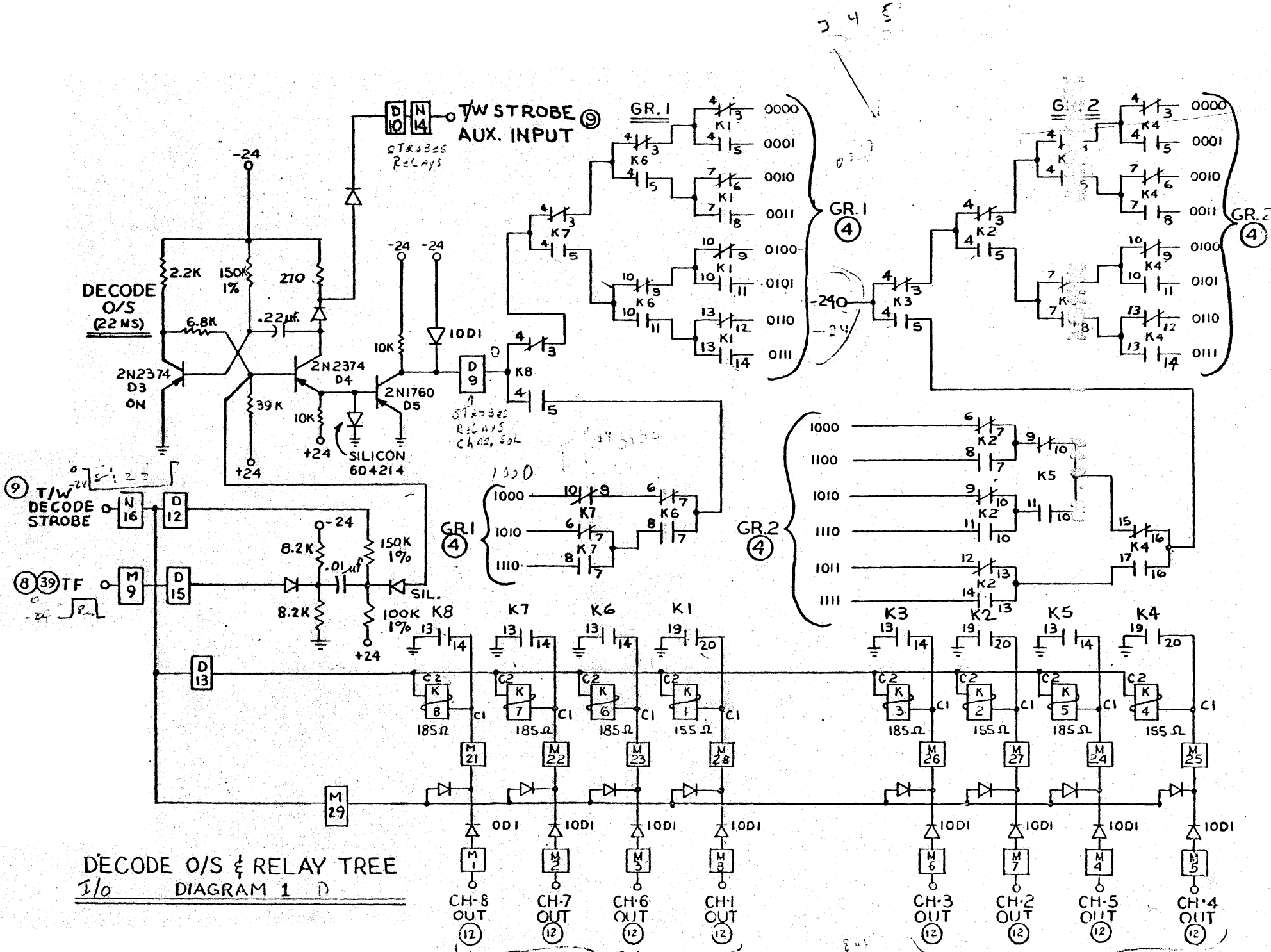
<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>	<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>	<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>
Prod. Reg. Code	35	Qt. Clock	29	Reader One Key	5 & 6
Prod. Tog.	28			Reader One Light	21
Prod. Tog.	28	Read I	30	Reader One Step	9
Prod. Tog. → 0	30	Read II	30	Rdr. One Step Aux. Input	T
Punch One	22	Read III	30	Reader One → 0	14
Punch One	22	Read IV	30	Reader One → 1	14 & 18
Punch One Feed Key	7	Read IV	30	Reader Step Enable	9
Punch One Key	5	Read Head I	P.S.-2	Reader Stop Key	5
Punch One Light	22	Read Head II	P.S.-2	Reader Two	21
Punch One Strobe	10	Read Head III	P.S.-2	Reader Two	21
Punch One → 0	14 & 18	Read Head IV	P.S.-2	(Rdr. Two)(Code Cont.)(Skip Logic)	11
Punch One → 1	14	Reader On	11	Reader Two Enable	9
Punch Strobe Aux. Input	10 & T	Reader On	11	Reader Two Interlock	6
Punch Two	22	(Reader On)(Code Control)	11	Reader Two Key	6
Punch Two	22	(Rdr. On)(Code Cont.)(Skip Logic)	11	Reader Two Light	21
Punch Two Feed Key	7	(Reader On)(Skip Logic)	11	Reader Two Step	9
Punch Two Key	5	Reader One	21	Reader Two → 0	14 & 21
Punch Two Light	22	Reader One	21	Reader Two → 1	14
Punch Two Strobe	10	(Rdr. One)(Code Cont.)(Skip Logic)	11	Reg. Lock Level	24
Punch Two → 0	14 & 18	Reader One Enable	9	Reg. Togs → 0	30
Punch Two → 1	14	Rdr. One Enable Aux. Input	T	Reset F Reg.	36
1H	7	Reader One Interlock	6	Reset G. Reg.	36
2H	7			Reset H Reg.	36

LEVELS AND DIAGRAMS (Continued)

<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>	<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>	<u>LEVEL</u>	<u>FROM</u> <u>DIAG. #</u>
Reset I Reg.	36	Skip Key	5	Tab	2
Reset J Reg.	36	Skip Light	21	Track A	P.S.-2
Reset K Reg.	36	Skip Logic	11	Track B	P.S.-2
Reset Counters to Zero	30	<u>Skip Logic</u>	11	<u>Transfer</u>	8
Reset Hold	27	(SKL) + (R2)(SP SK)	11	<u>Transfer</u>	8
Reset Pick	26	Skip → 0	14	(TF)(CC)(SKL)	11
Restore Key	5	Skip → I	14	TF Inhibit	26
(Restore Key)(Rdr. On)(F.C. #7)	31	Space Output	26	(TF Inhibit) + (Proc. Out)	26
Restore Light	31	Special Skip	21	TF Inhibit Aux. Input	T
Retrieve Output Digit	26	<u>Special Skip</u>	21	Transfer Ier Digit	33
S1 S2 Timing	26	Special Skip Key	5	<u>Type Now</u>	31
Selective Skip Off Sw.	5	Special Skip Light	21	Type Now	31
Set Counters for Multiplication	30	Special Skip Off Clock	8	(Type Now)(Go)	31
Set Go	26	Special Skip → 0	12	Typewriter Decode Strobe	9
Set In/Out Buf.	27	Special Skip → 1	14	Typewriter Encoder Inhibit	20
Set Input Order	27	Subtract	31	Typewriter Strobe Aux. Input	1 & T
Set Modifier	27	Succ. Accum. Mode	30		
Set Reg. Togs	27	Succ. Accum. Tog	29	U/C Code	Internal to 3
Shift In-Out Buffers	33	<u>Succ. Accum. Tog</u>	29		
Single Step	5	Sum/Diff.	31	Write In Buffers	30
<u>Single Step</u>	5	<u>Sum/Diff.</u>	31	Write Tog. Controls	32
Single Step Key	5	Symbol	29	Write I Control	33
<u>Skip</u>	21	<u>Symbol</u>	29	Write I - 0	32

LEVELS AND DIAGRAMS (Continued)

<u>LEVEL</u>	<u>FROM DIAG. #</u>	<u>LEVEL</u>	<u>FROM DIAG. #</u>	<u>LEVEL</u>	<u>FROM DIAG. #</u>
Write I - I	32	4 Code	35	1 <sub>12</sub>	24
Write II Control	33	8 Code	35	2 <sub>12</sub>	24
Write II - 0	32			3 <sub>12</sub>	24
Write II - 1	32	0 Output	25	4 <sub>12</sub>	24
		1 Output	25	5 <sub>12</sub>	24
27	25	2 Output	25	6 <sub>12</sub>	24
27	25	4 Output	25	7 <sub>12</sub>	24
28	25	8 Output	25	8 <sub>12</sub>	24
29	25			9 <sub>12</sub>	24
30	25	0 Sensed	29	10 <sub>12</sub>	24
31	26			10 <sub>12</sub>	24
32	26	1st Qt.	32	11 <sub>12</sub>	24
33	26	2nd Qt.	32	11 <sub>12</sub>	24
34	26	3rd Qt.	32		
351	32	4th qt.	32		
352	32	4th Qt.	32		
"0" In Ier	26	1st & 3rd Qt.	32		
"0" In Ier	26				
("0" In Ier)(Output Mode) (Index Level)	26	0 <sub>3</sub>	24		
"0" In In/Out Buffer	25	1 <sub>3</sub>	24		
("1" In Ier)(Output Mode)	26	2 <sub>3</sub>	24		
Code	35	0 <sub>12</sub>	24		
Code	35	0 <sub>12</sub>	24		



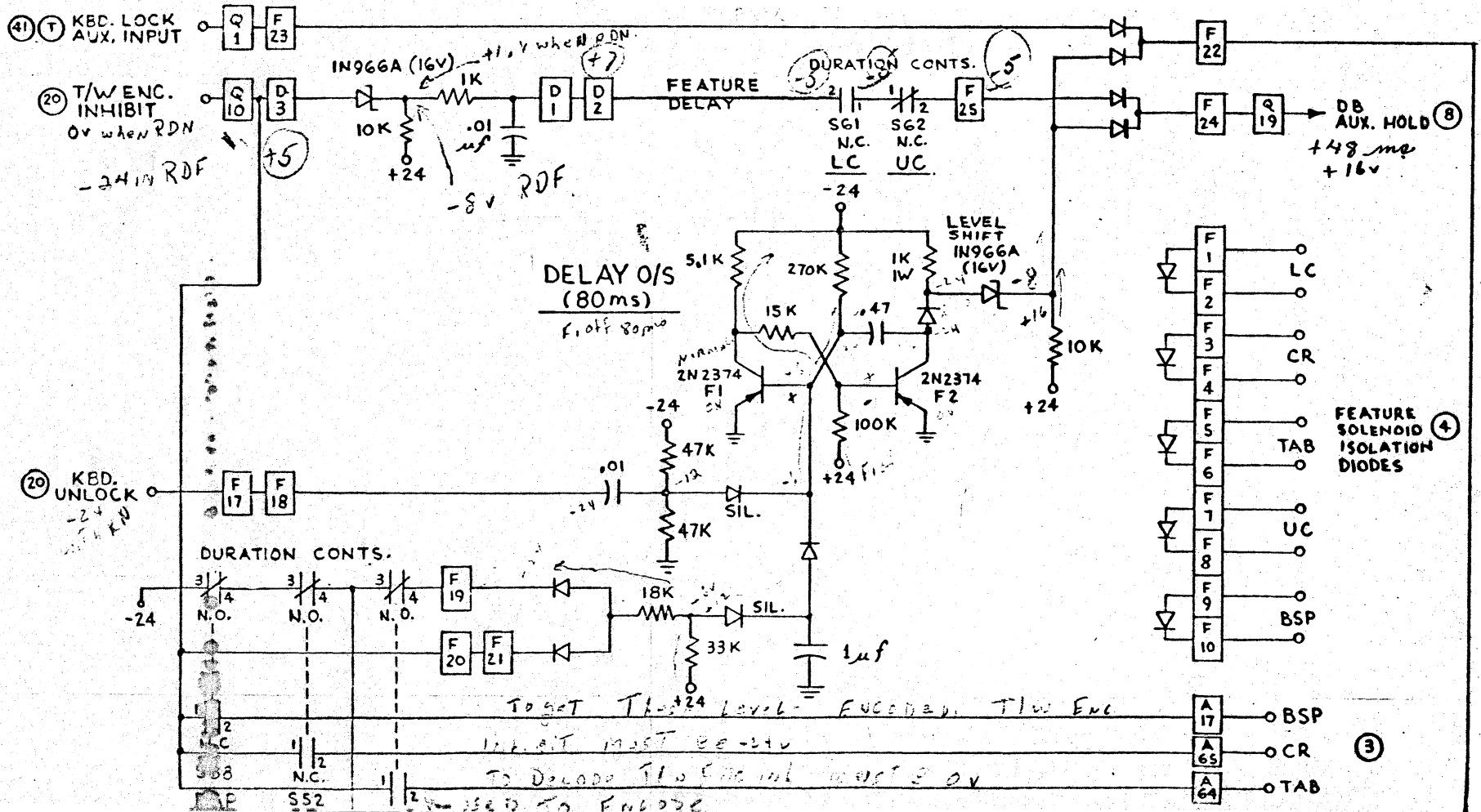
DECODE O/S & RELAY TREE  
I/O DIAGRAM 1

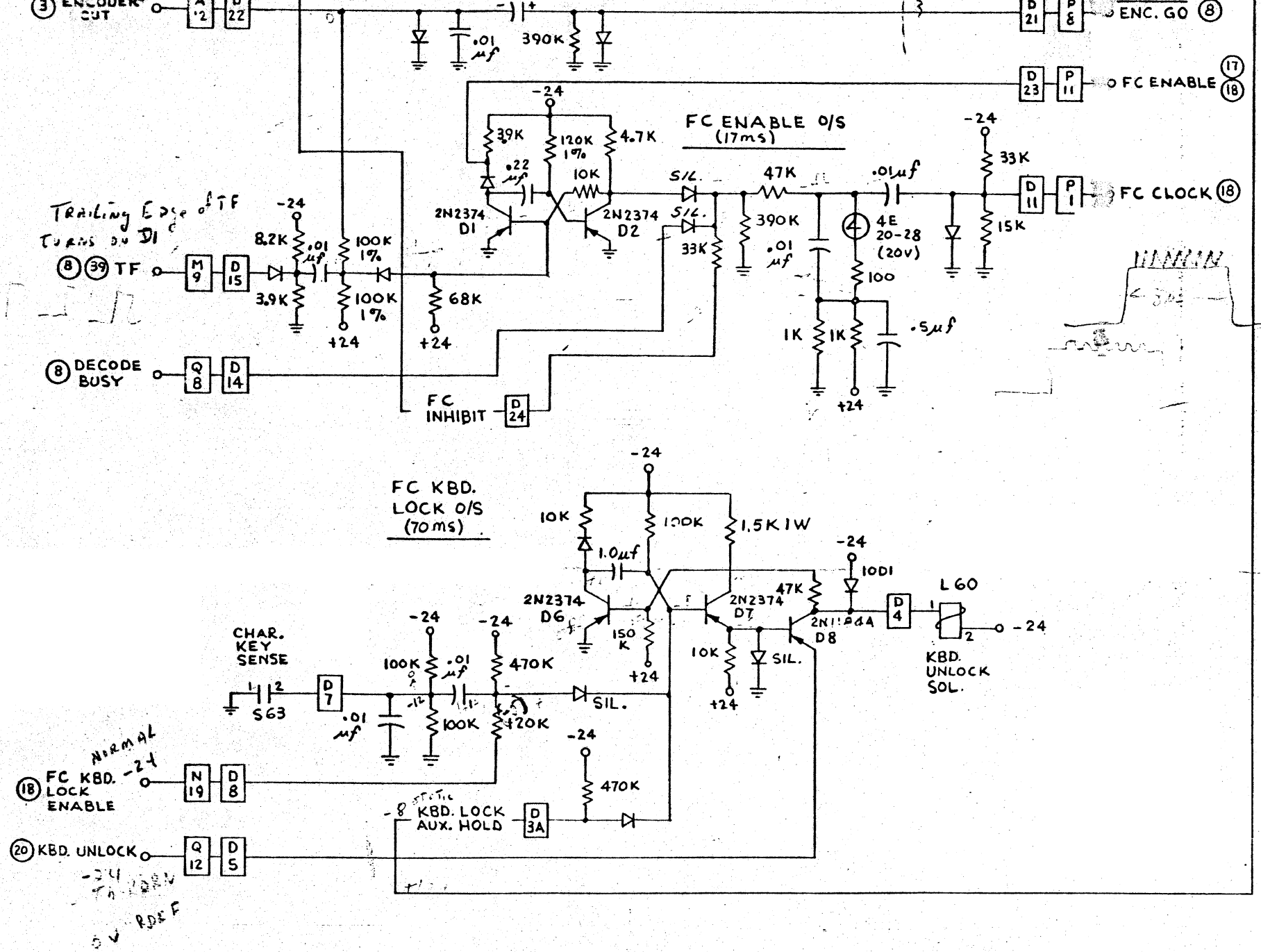
Group 1

(IX-3)

ASKI 00000000  
 121  
 80

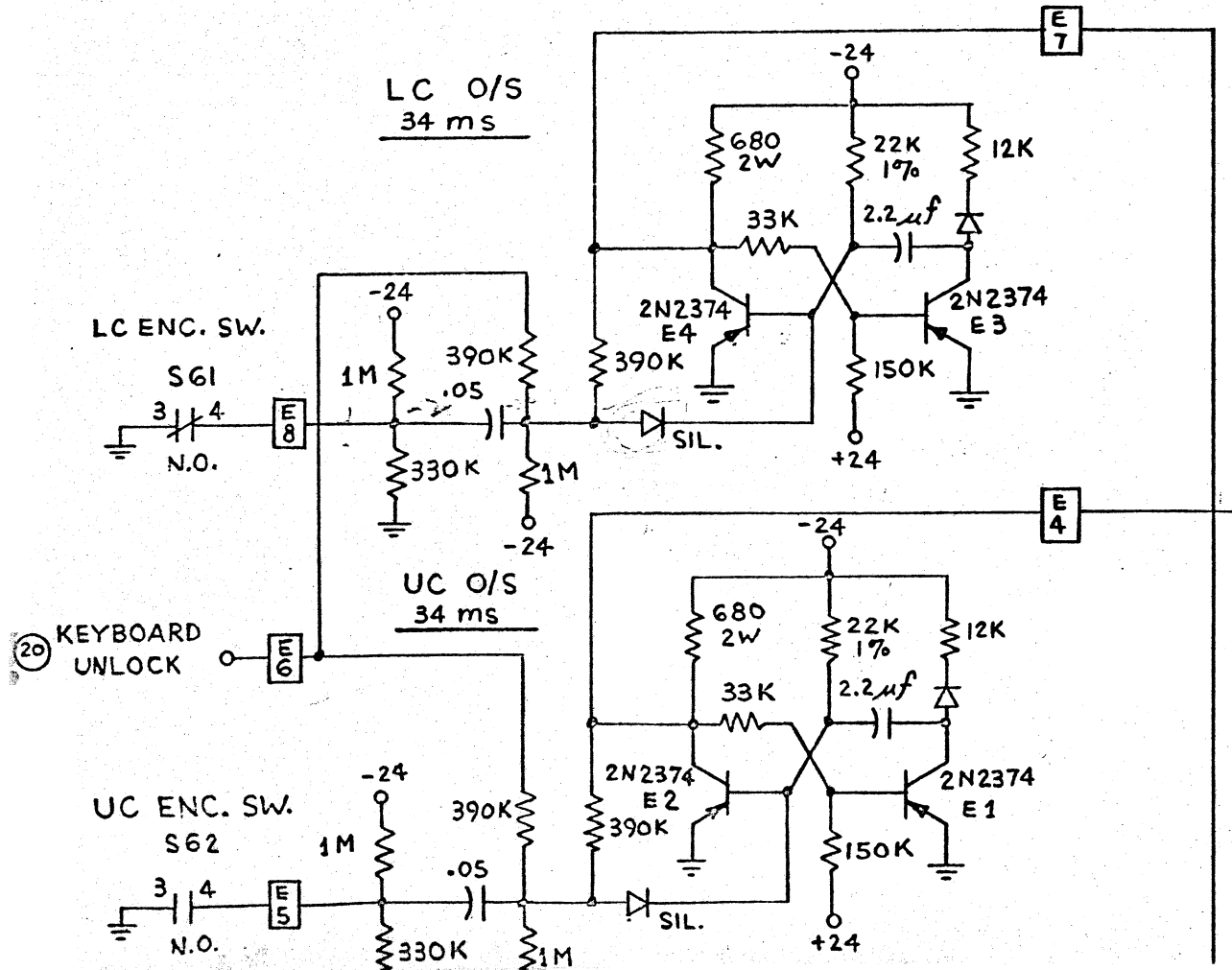
NOTES: 1. S61 & S62 SHOWN IN LC POSITION.  
 2. S51, S52 & S58 SHOWN IN STATIC STATE.



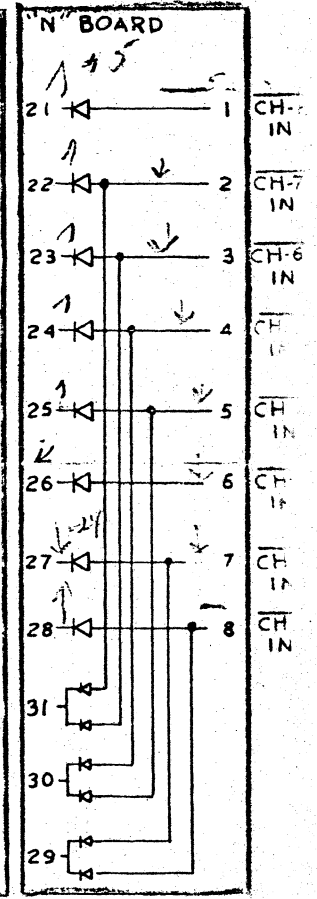
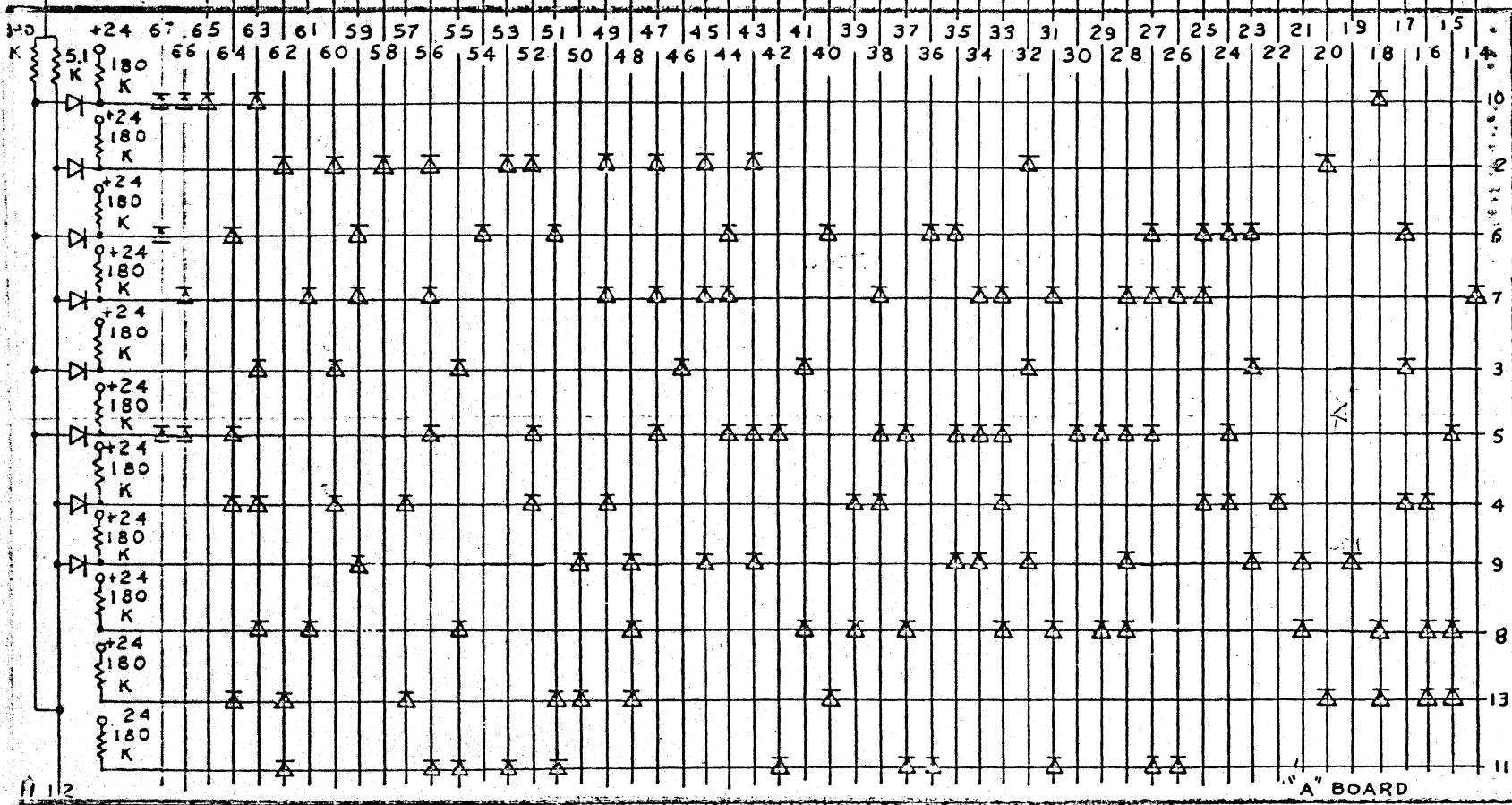
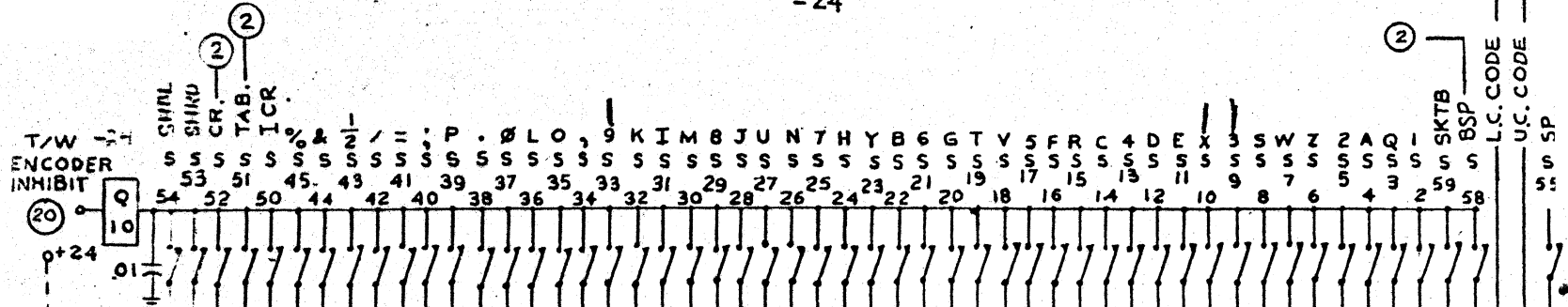


DURATION CKTS., FEATURE DELAY, ENC. GO,  
 FC ENABLE O/S & FC KBD. LOCK O/S  
 Ilo DIAGRAM 2 D.F

NOTE:  
S61 & S62 SHOWN IN LC POSITION

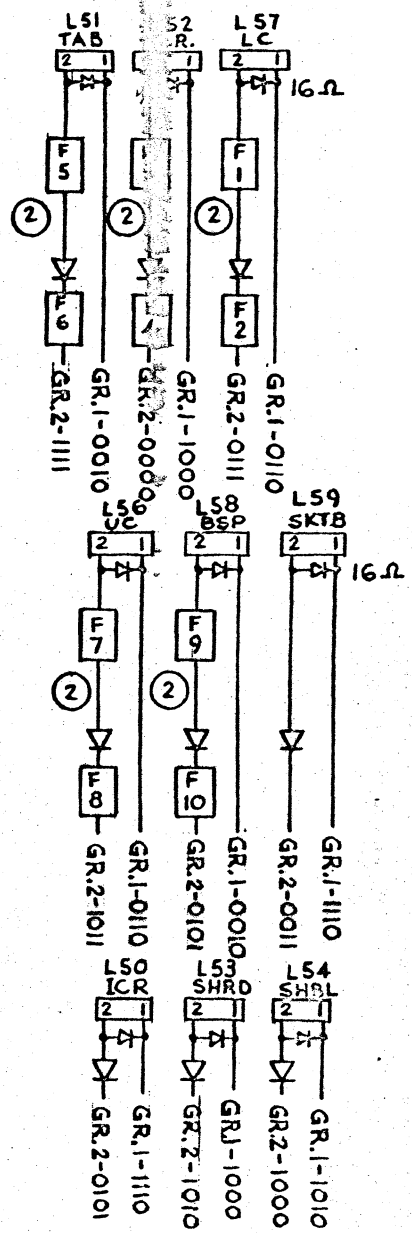
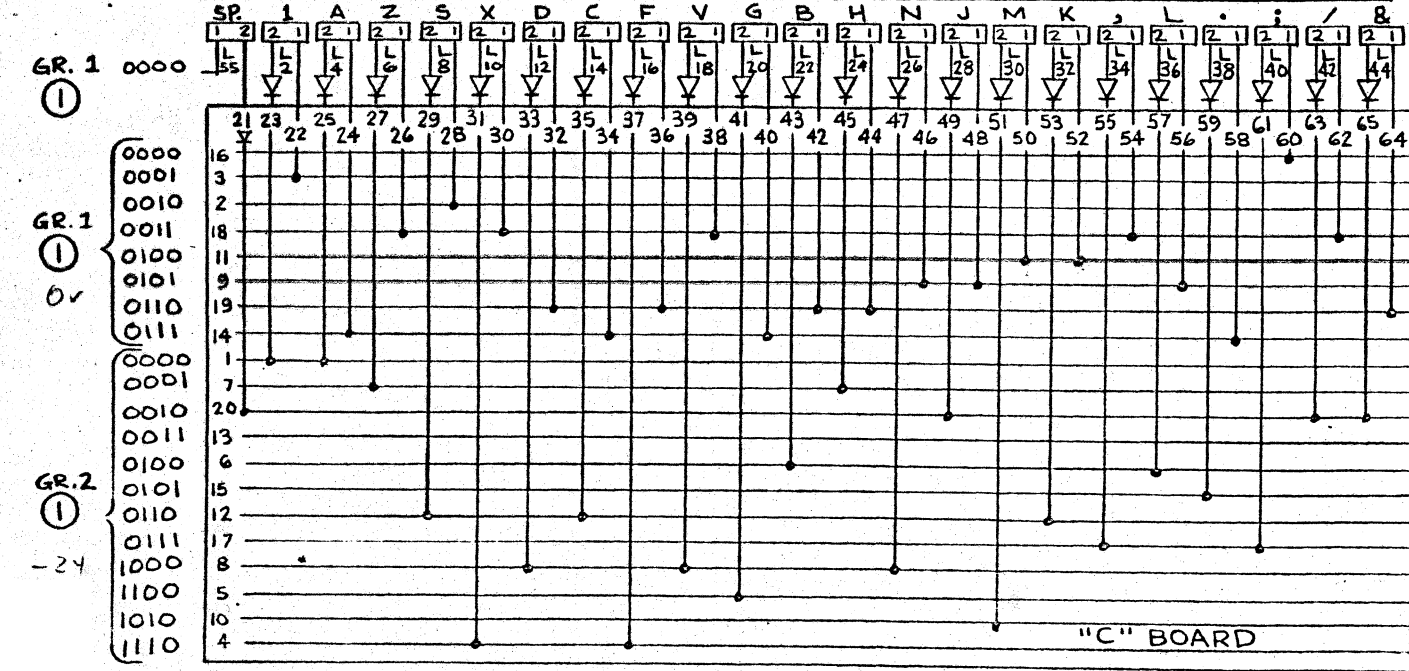
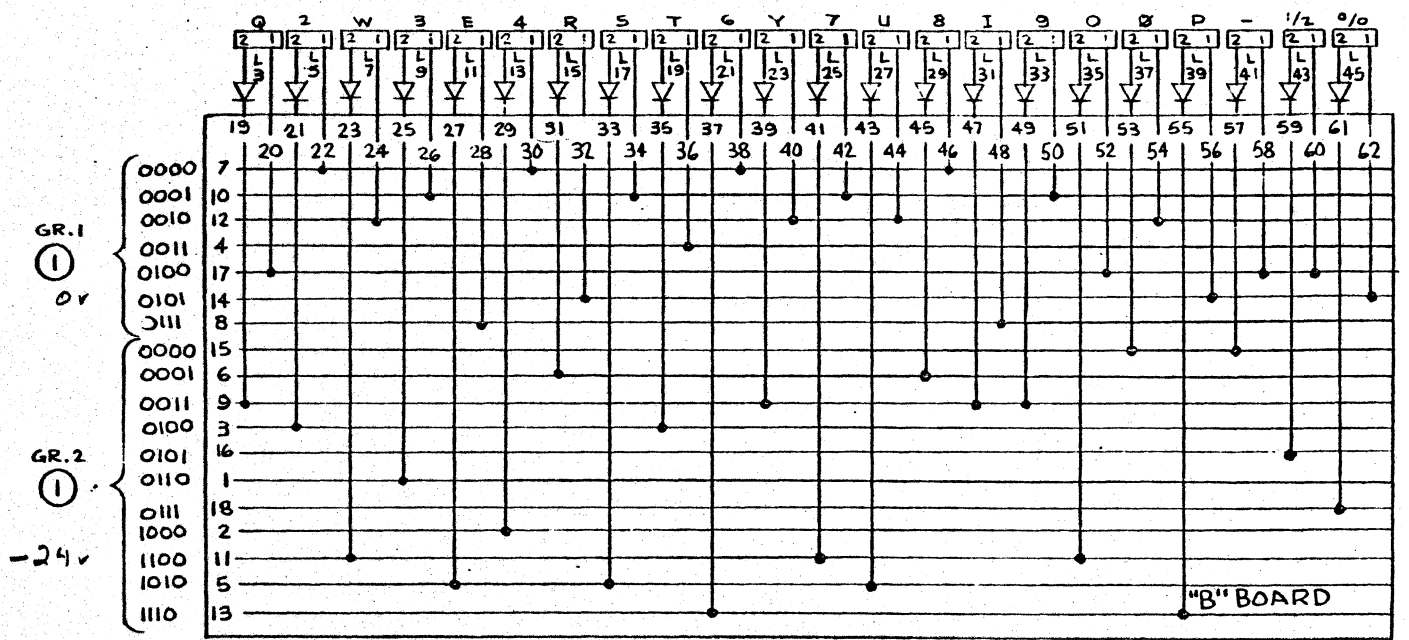




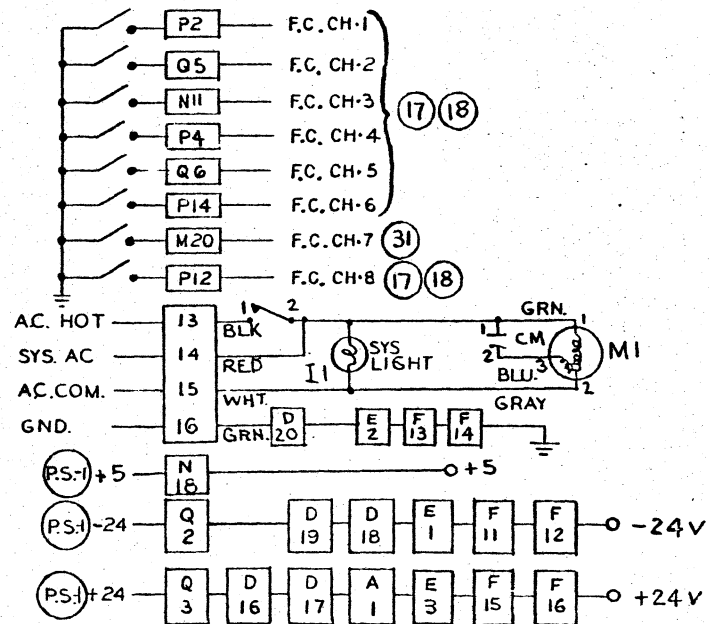
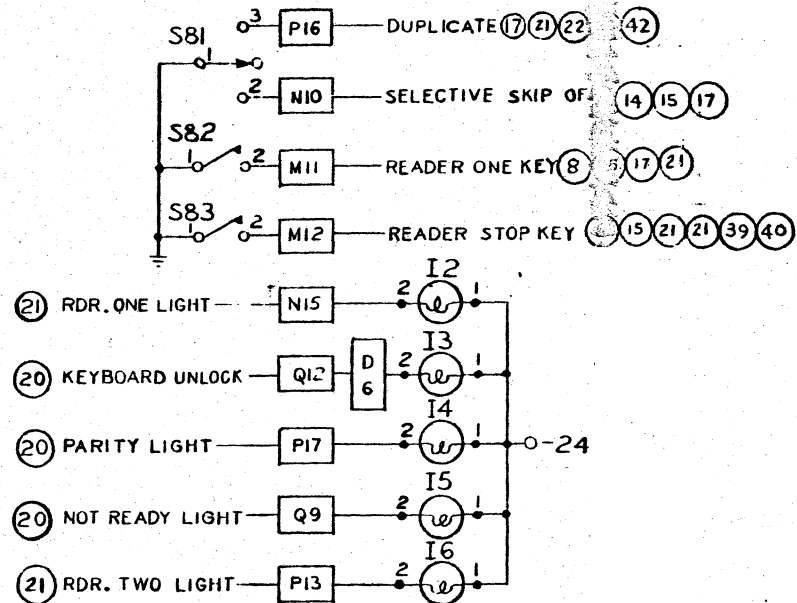
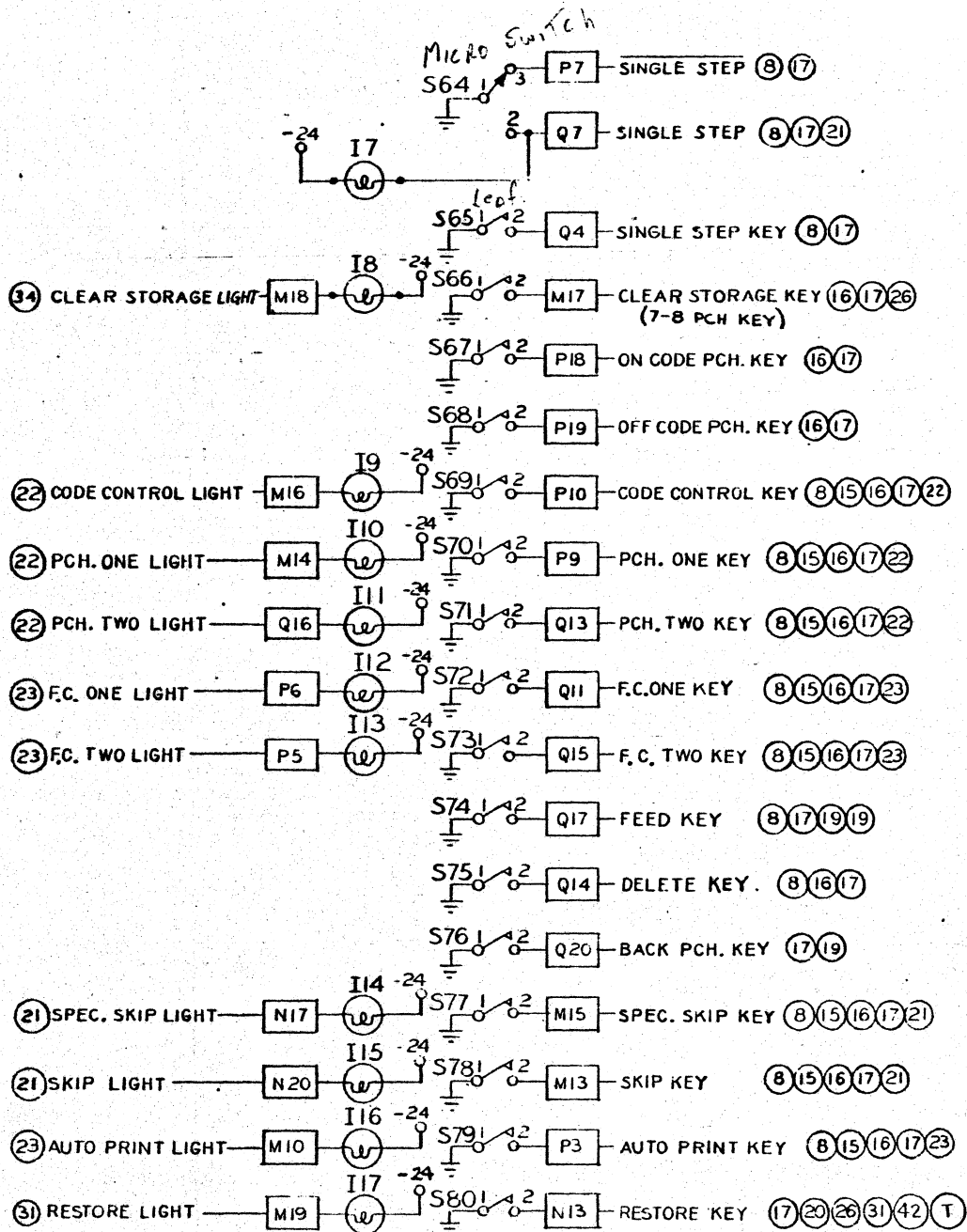


D 22 ENCODER OUT (NEG. LEVEL) TO ENC. GO

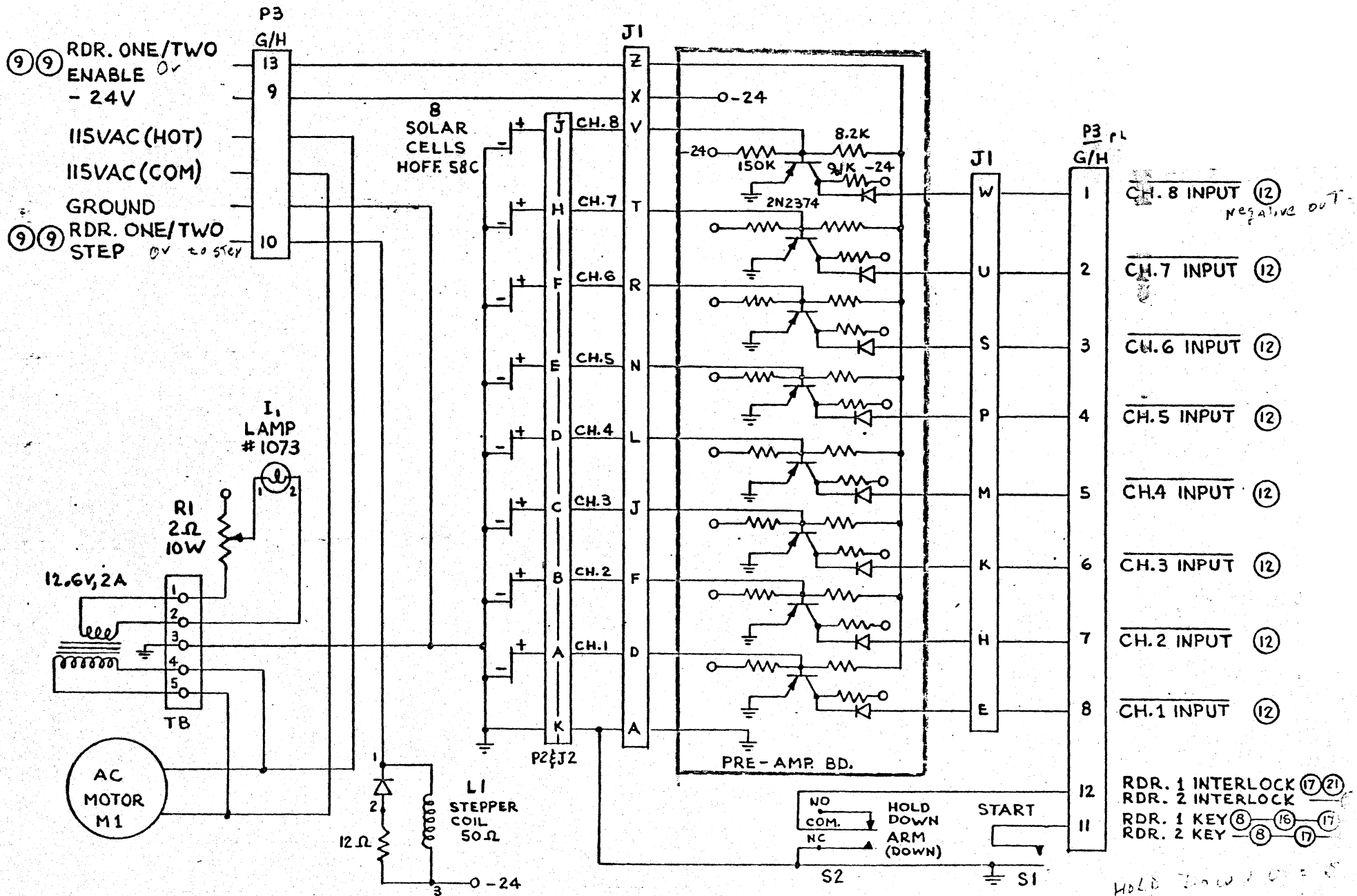
ENCODER, UC/LC ENC. O/S'S CHARACTER & FEATURE SWS. DIAGRAM 30-E



DECODER, CHAR. & FEATURE SOLS.  
I/O DIAGRAM 4 C

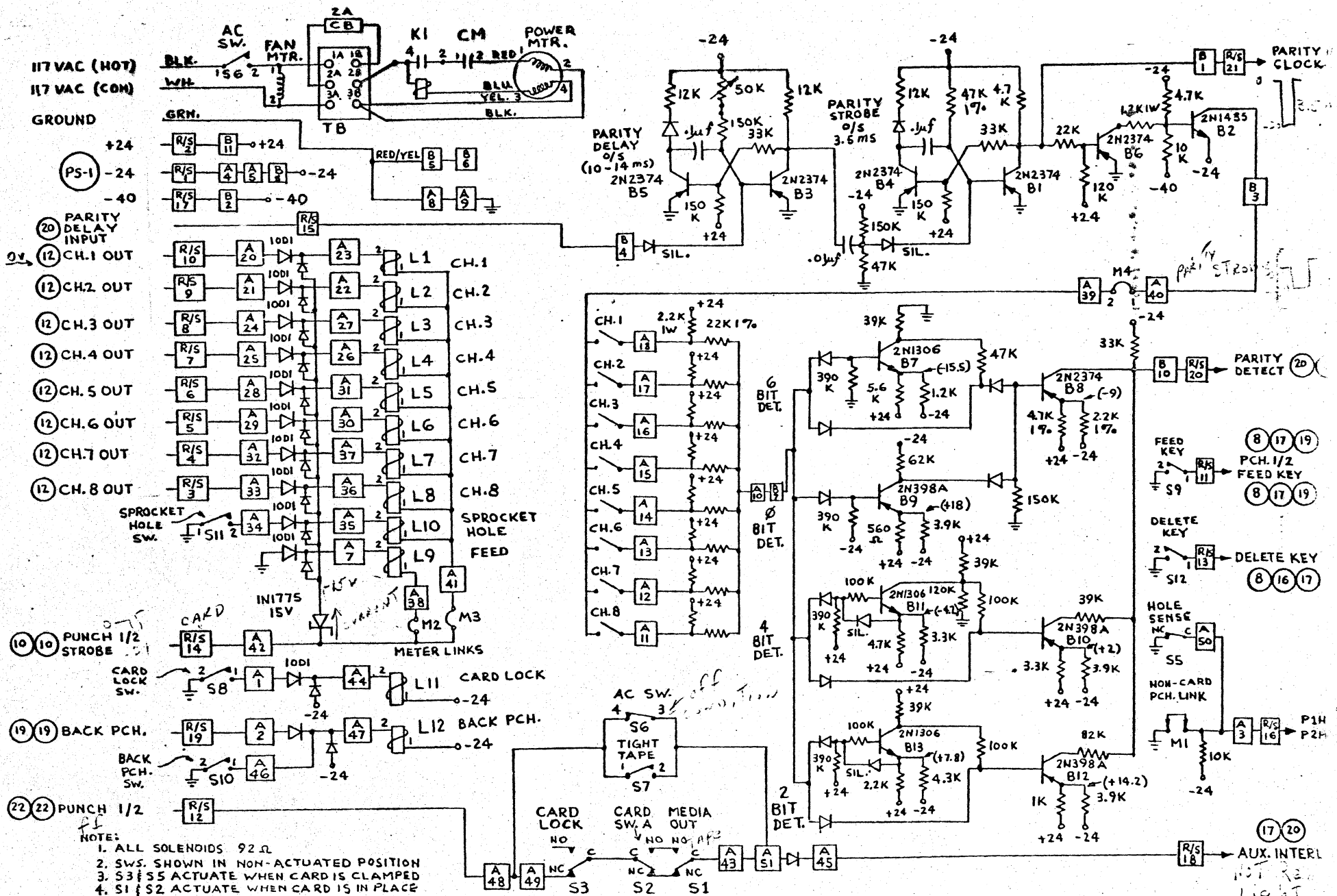


MODE PANEL, F.C., & A.C.  
I/O DIAGRAM 5

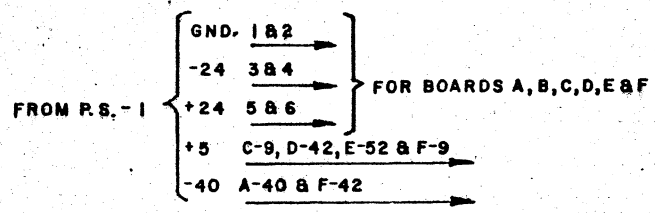
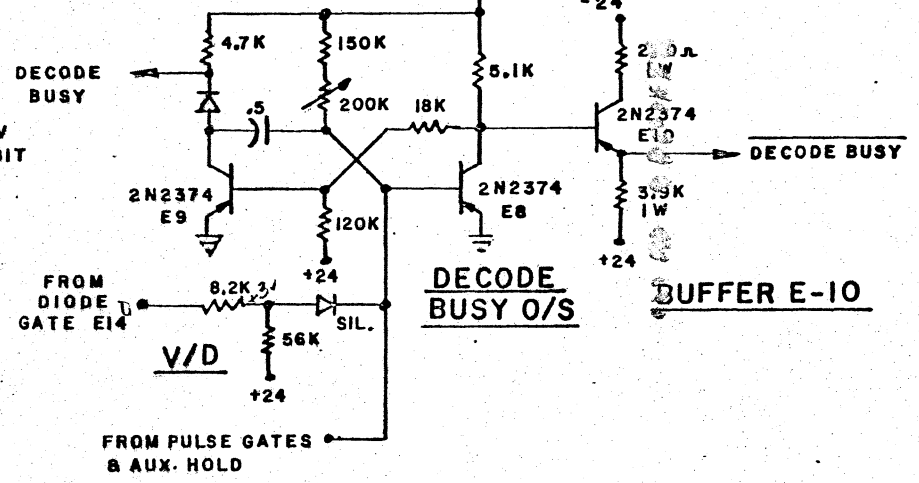
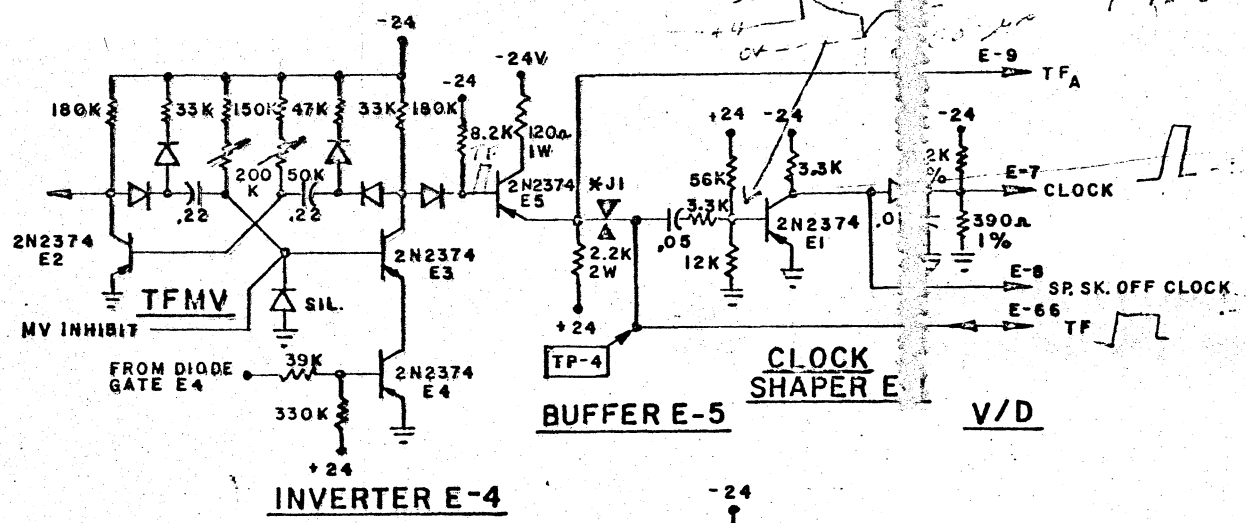
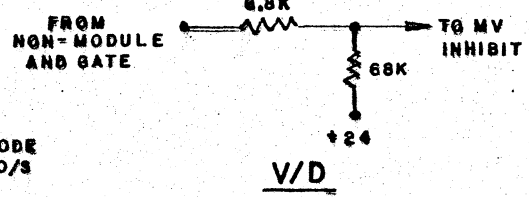
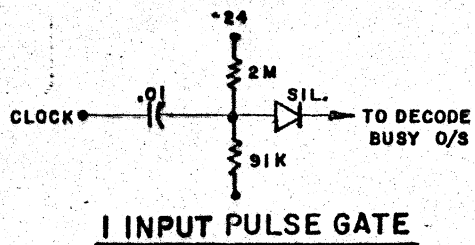
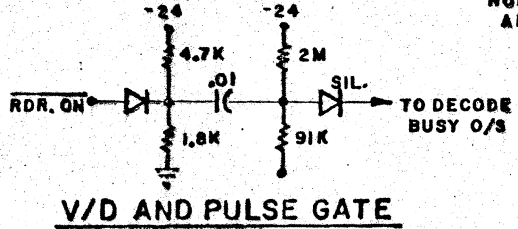
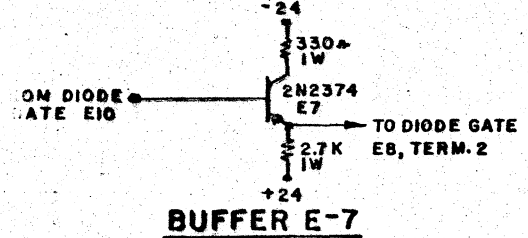
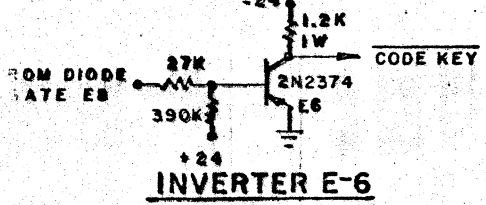
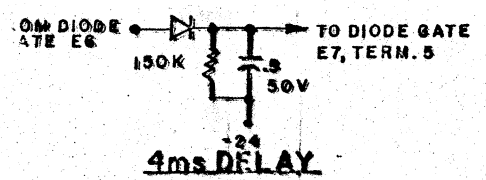


READER  
RDR DIAGRAM 6

HOLD DOWN ARM (DOWN)  
KEY 8 RDR 16 17  
APPLYING TO RDR 16 17  
(IXa-)

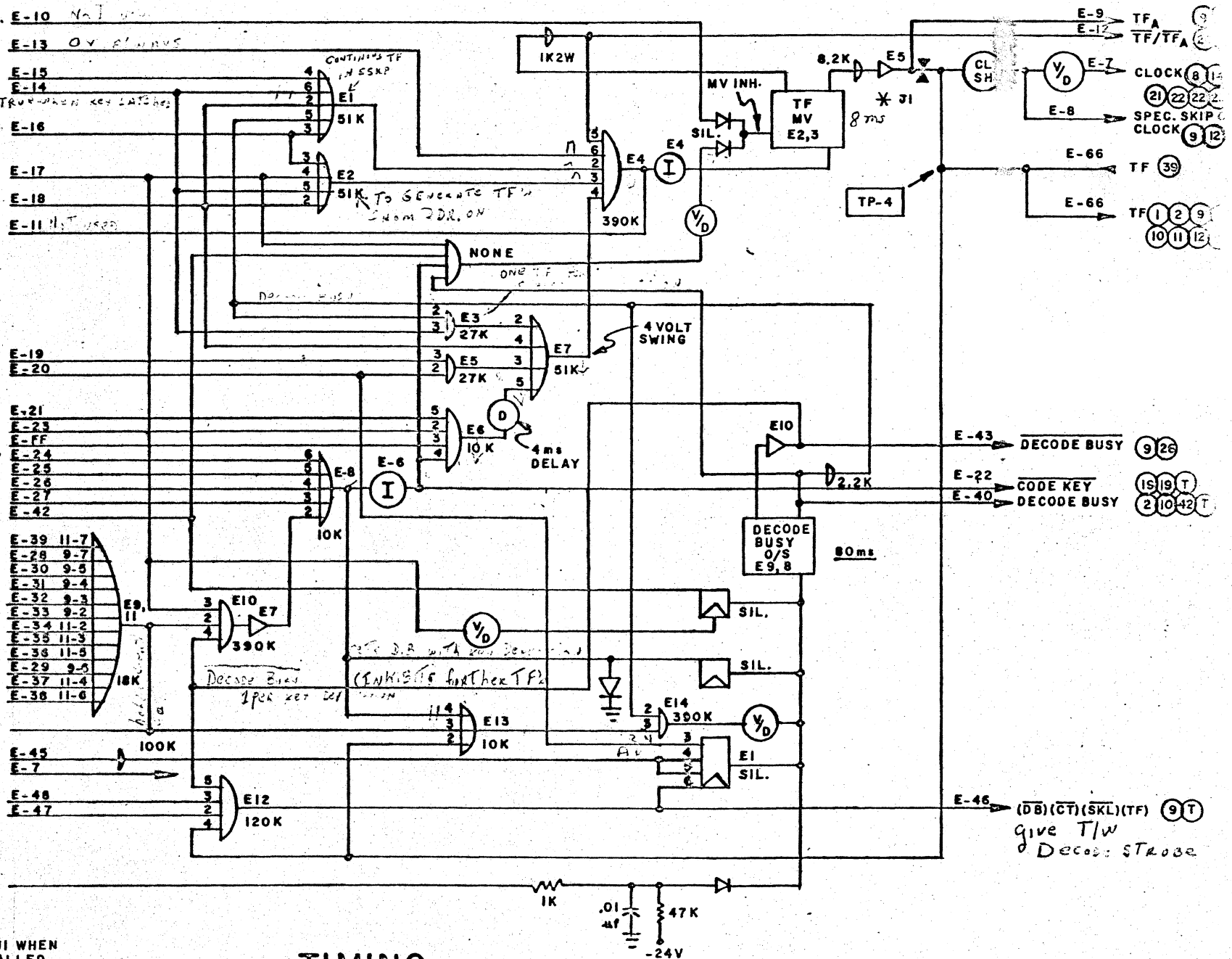


PUNCH  
Pch DIAGRAM 7



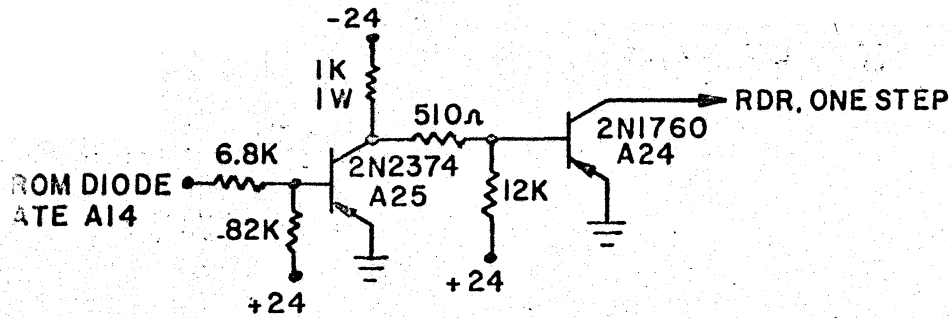
**SCHEMATICS FOR DIAGRAM 8**

- (T) TF DISABLE
- (25) (TF INHIBIT) & (PROC. OUT)
- (21) SPEC. SKIP
- (5) SINGLE STEP
- (26) TF INHIBIT
- (11) RDR. ON
- (20, 42) ALARM
- (41) TF INHIBIT AUX. INPUT
- (5) SINGLE STEP READER ON
- (19) FEED TWO
- (2) ENCODER GO
- (19) FEED ONE
- (5) SINGLE STEP KEY
- (5) PCH. FEED KEY
- (7) PCH. 1 FEED KEY
- (7) PCH. 2 FEED KEY
- (40) VER. ON
- (8) RDR. 2 KEY
- (5) PCH. 1 KEY
- (5) SKIP KEY
- (5) SPEC. SKIP KEY
- (5) AUTO. PRINT KEY
- (5) CODE CONT. KEY
- (5) FC. 1 KEY
- (7, 5) DELETE KEY
- (6, 5) RDR. 1 KEY
- (5) PCH. 2 KEY
- (5) STOP KEY
- (5) FC. 2 KEY
- (T) CODE KEY AUX. INPUT
- (23) AUTOPRINT CLOCK
- (11) SKIP LOGIC CONTROL
- (13)
- (T, 2) DECODE BUSY AUX. HOLD

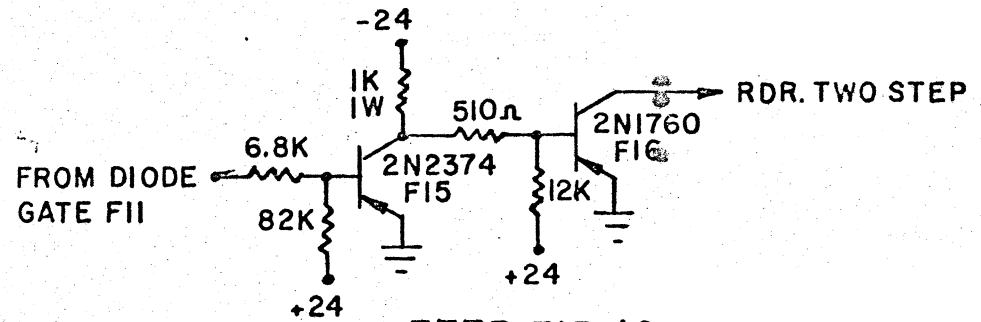


NOTE: CUT ARTWORK AT J1 WHEN VERIFIER IS INSTALLED.

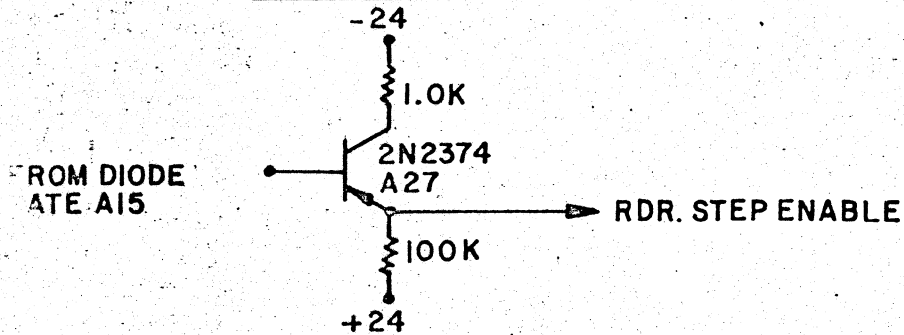
TIMING  
C.D. DIAGRAM 8



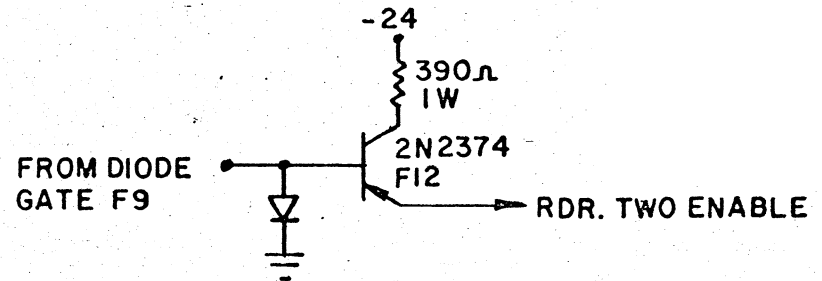
**BUFFER A25,24**



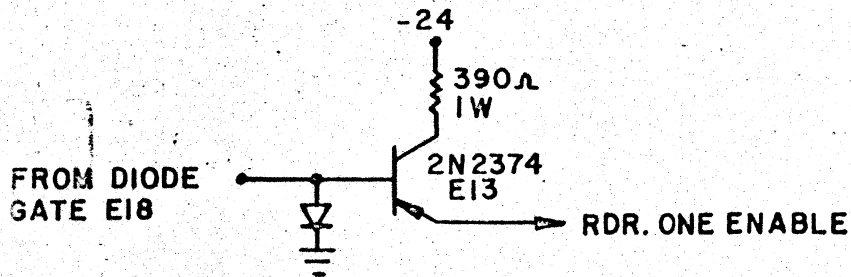
**BUFFER F15,16**



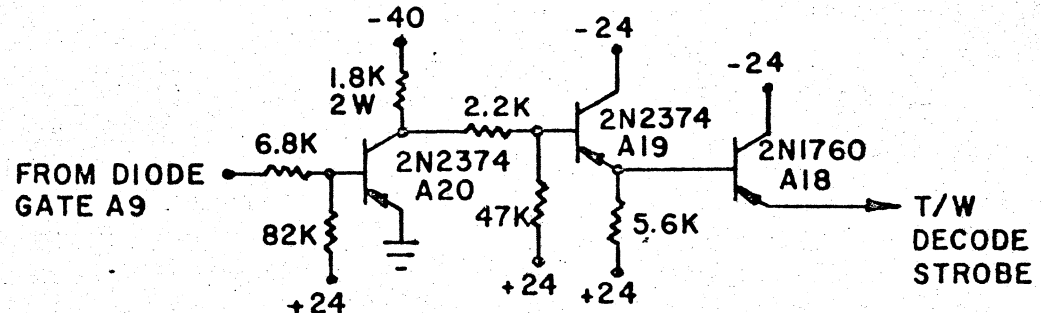
**BUFFER A27**



**BUFFER F12**



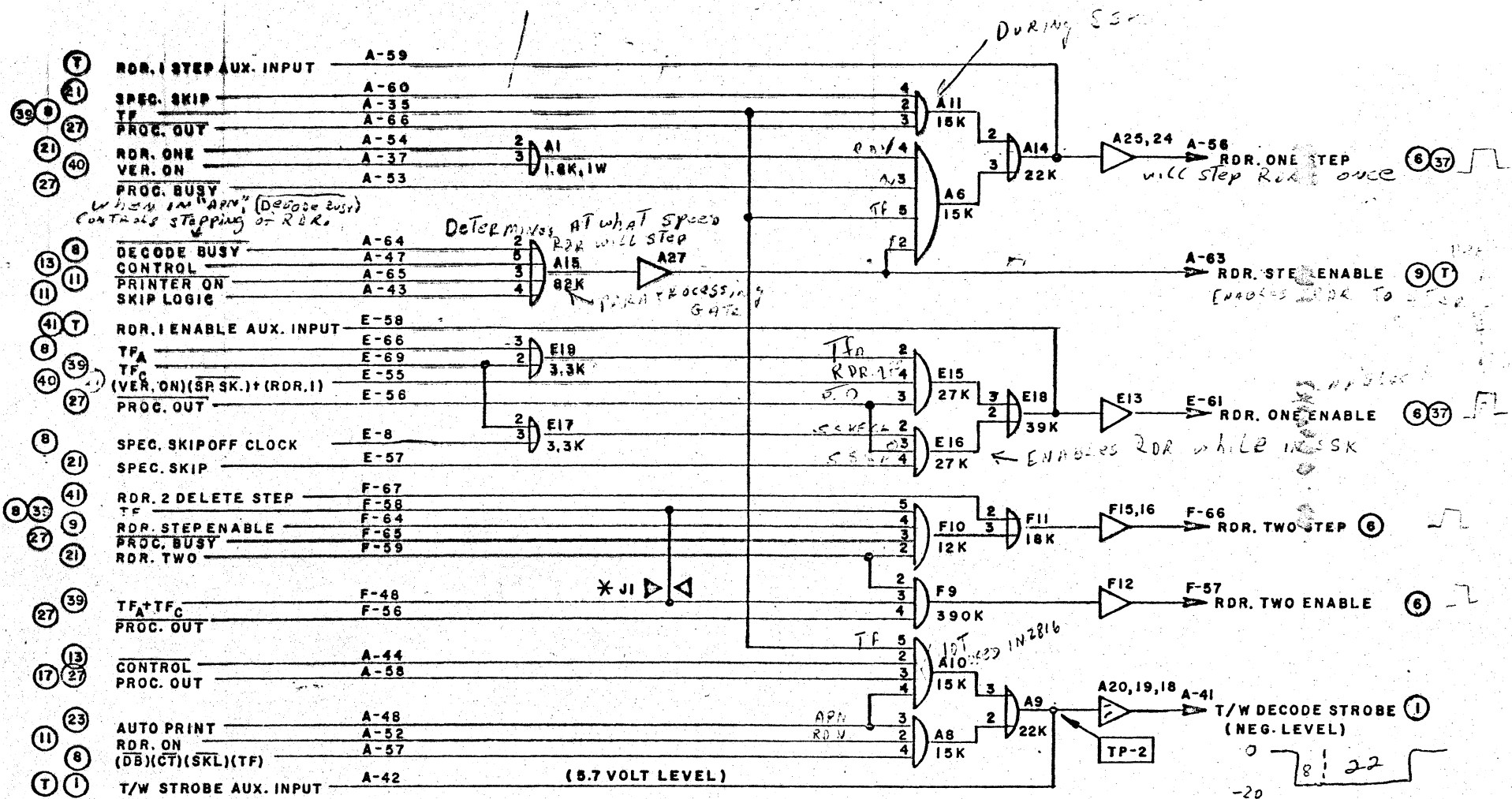
**BUFFER E13**



**BUFFER A20,19,18**

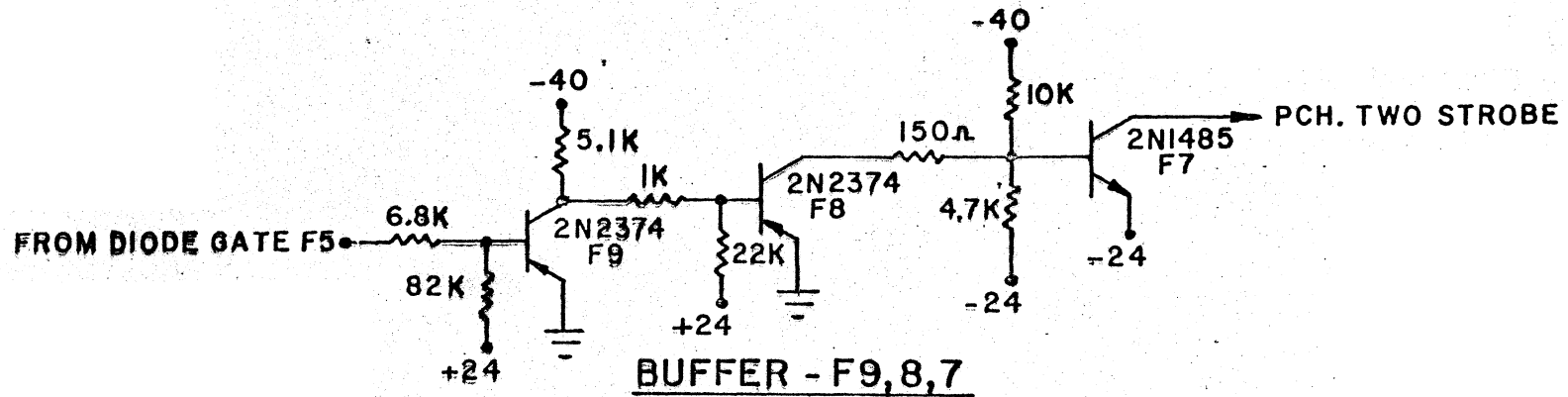
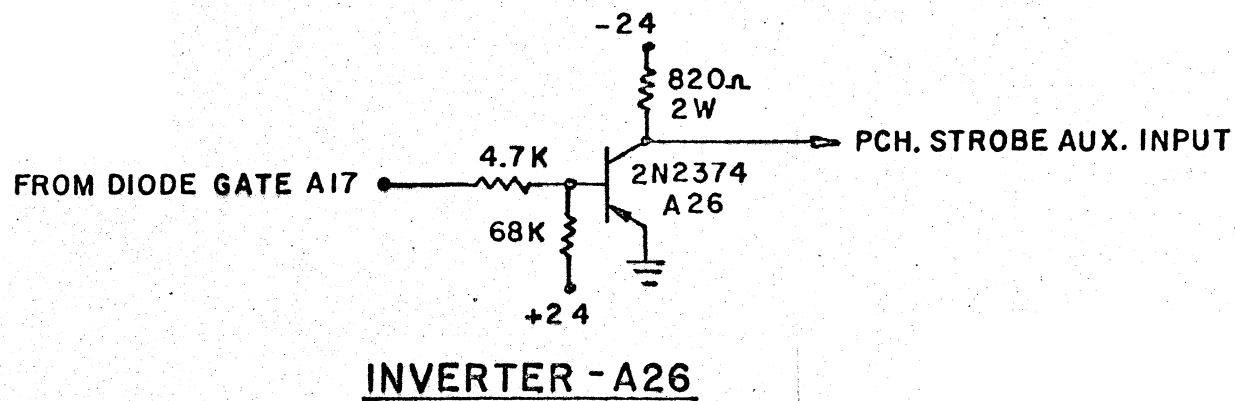
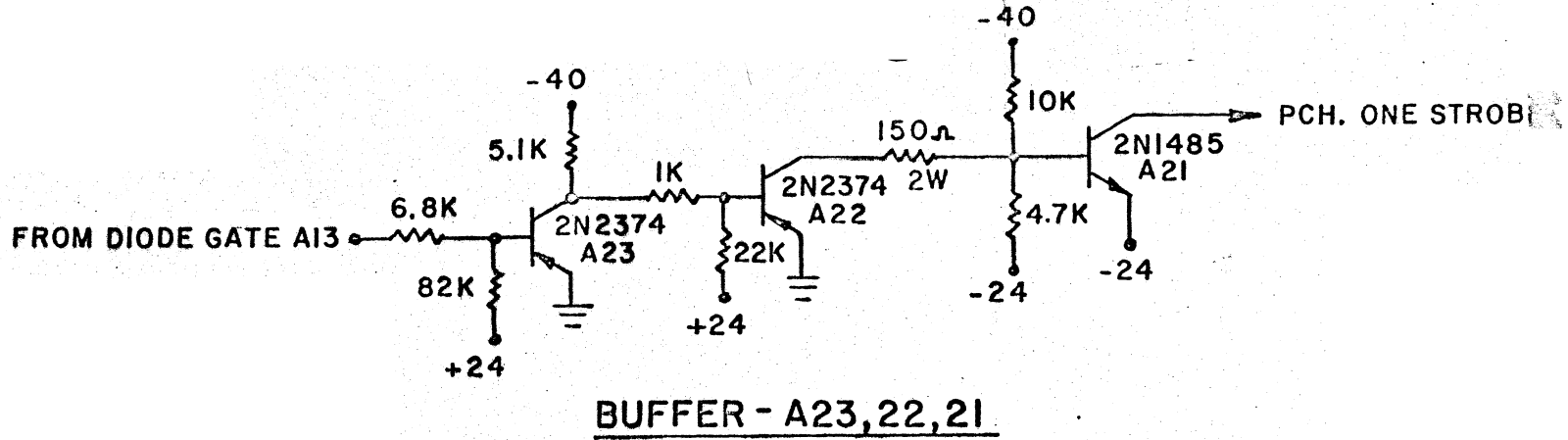
**SCHEMATICS FOR DIAGRAM 9**





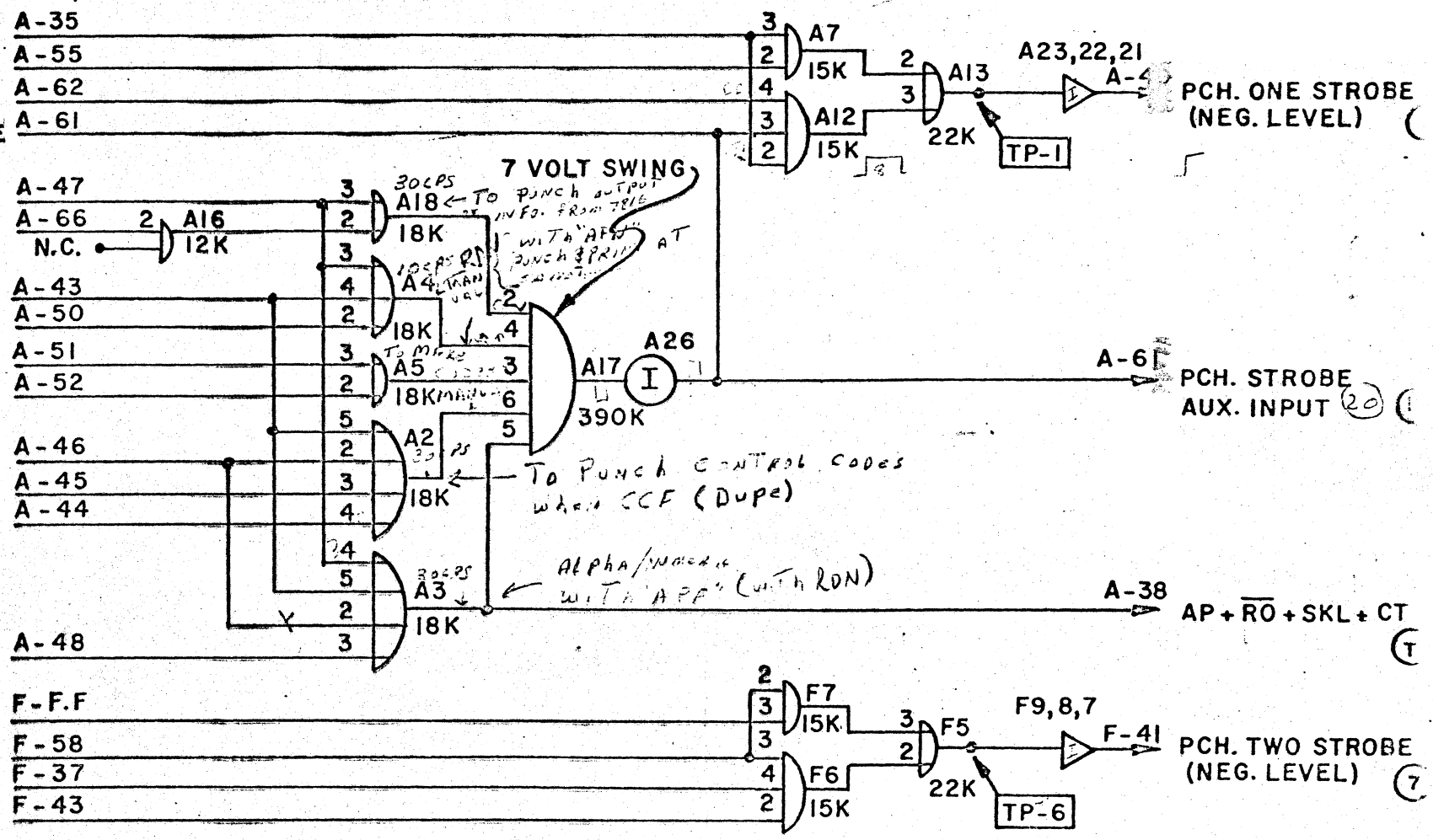
NOTE: \* CUT ARTWORK AT J1 WHEN VERIFIER IS INSTALLED.

STEP, ENABLE, & T/W STROBE LOGIC  
DIAGRAM 9

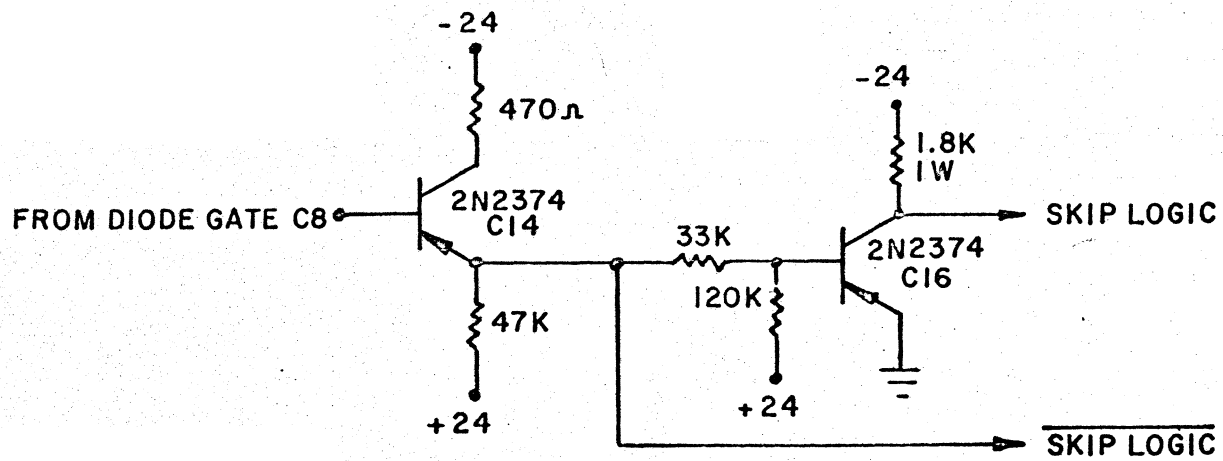


**SCHEMATICS FOR DIAGRAM 10**

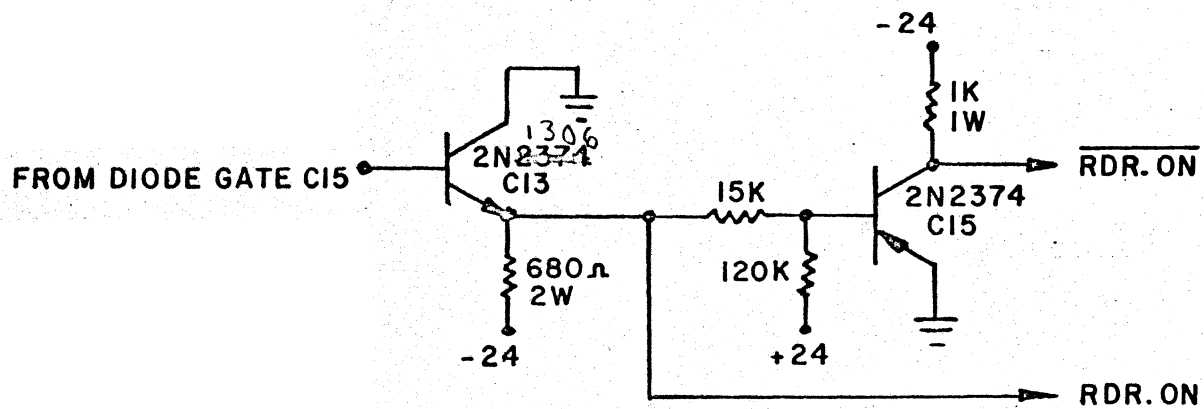
- (8) (39) TF
- (19) FEED ONE ff
- (22) PUNCH ONE
- (42) (T) PUNCH STROBE  
AUX. INPUT
- (13) CONTROL  
(27) (PROC. OUT)
- (11) SKIP LOGIC
- (8) DECODE BUSY
- (16) CODE PUNCH
- (11) RDR. ON
- (11) RDR. ON
- (22) CODE CONT.
- (13) CONTROL
- (23) AUTO PRINT
- (19) FEED TWO
- (8) (39) TF
- (22) PCH. TWO
- (T) (10) PCH. STROBE  
AUX. INPUT



**PUNCH STROBE LOGIC**  
CW. DIAGRAM 10

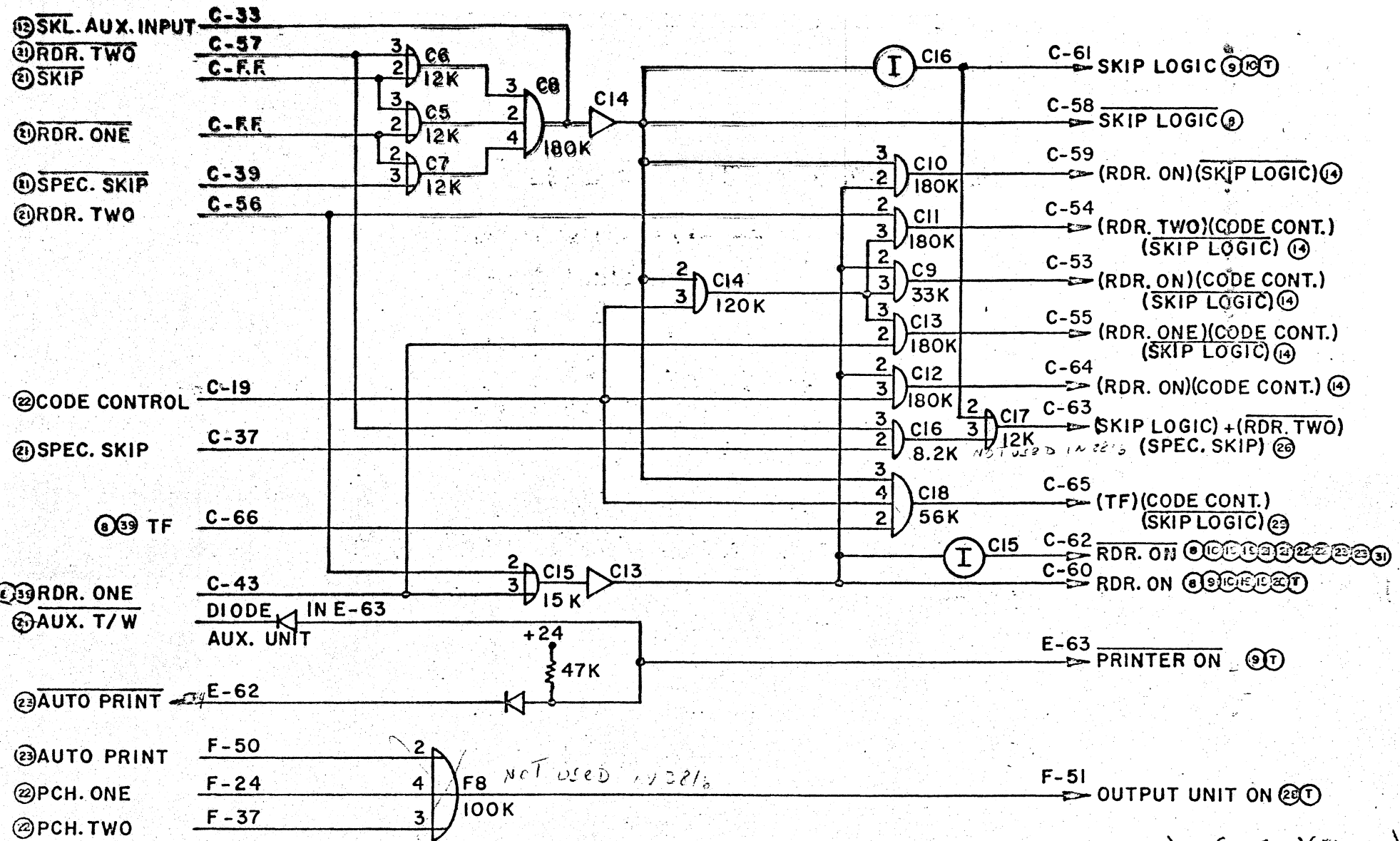


**BUFFER C14 & INVERTER C16**



**BUFFER C13 & INVERTER C15**

**SCHEMATICS FOR DIAGRAM II**



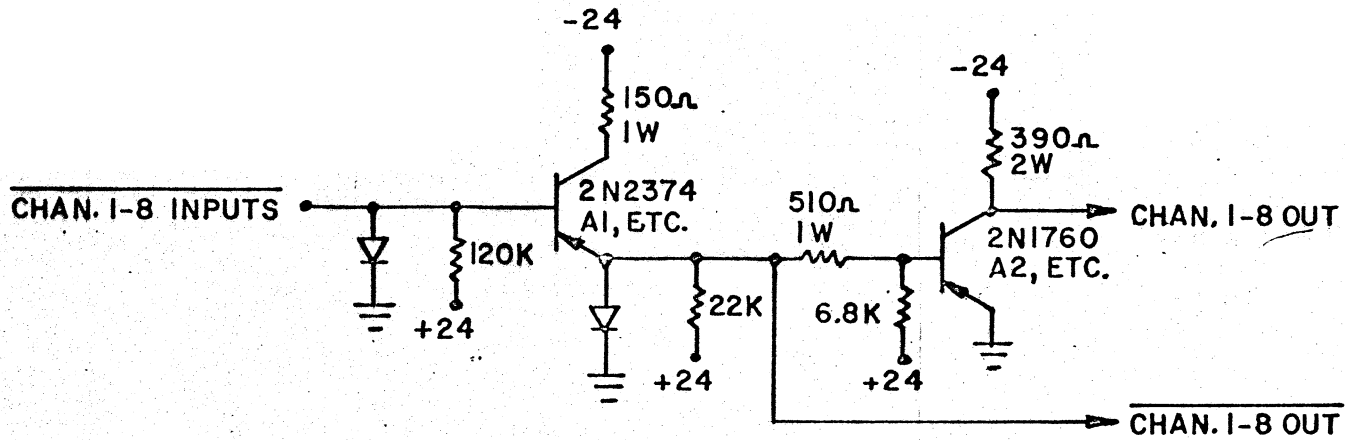
$$\text{SKIP LOGIC} = (\text{RDR. ONE}) + (\text{SKIP}) + (\text{SPEC. SKIP})(\text{RDR. ONE})$$

**CONTROL GATING**  
**C.U. DIAGRAM II**

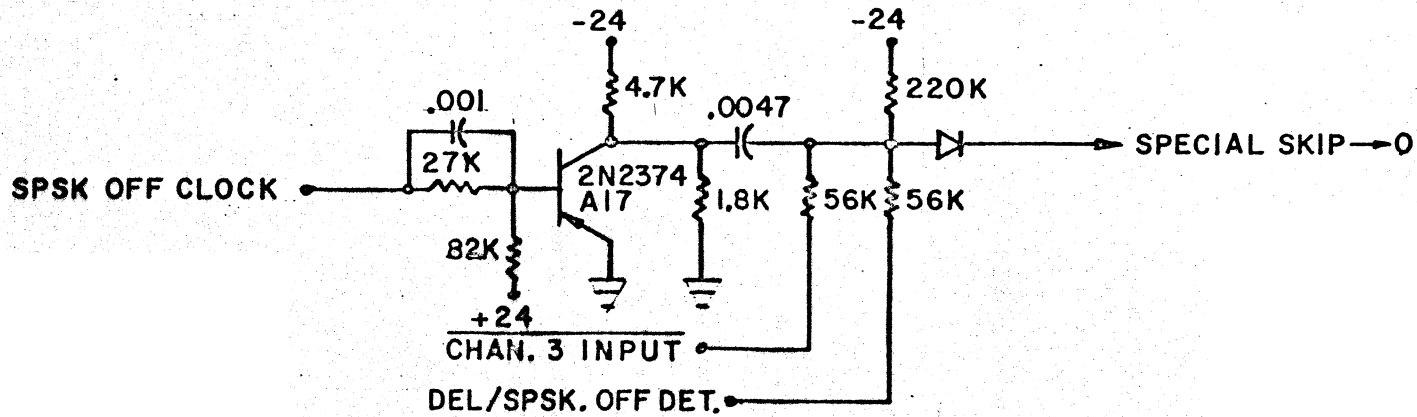
Decode control codes from 202.

(IX a -23)

(REV. 11/12/65)



BUFFERS A1, 3, 5, 7, 9, 11, 13 AND INVERTERS A2, 4, 6, 8, 10, 12, 14 AND 16

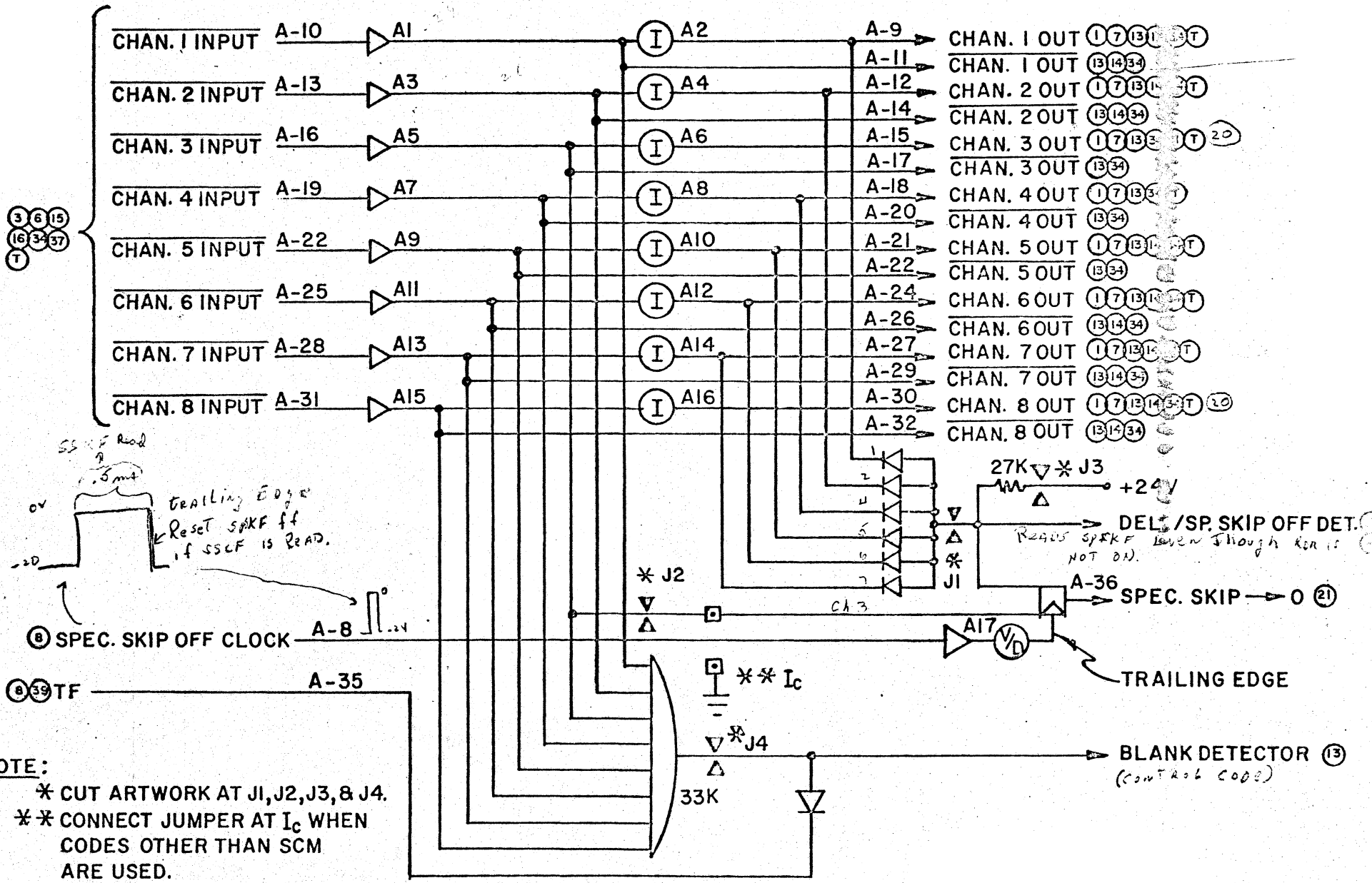


BUFFER A17, V/D, AND PULSE GATE

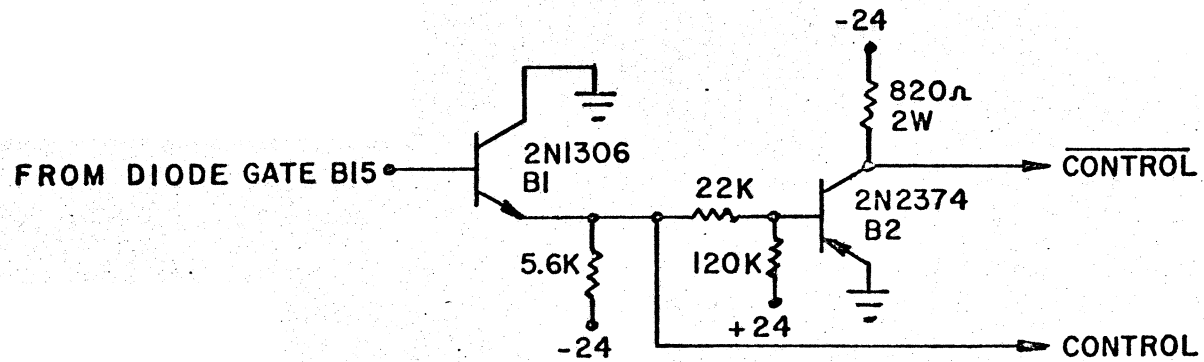
**SCHEMATICS FOR DIAGRAM 12**

(IXa-24)

CODE 2125



INFORMATION CHANNELS  
C.U. DIAGRAM 12



BUFFER-B1 AND INVERTER-B2

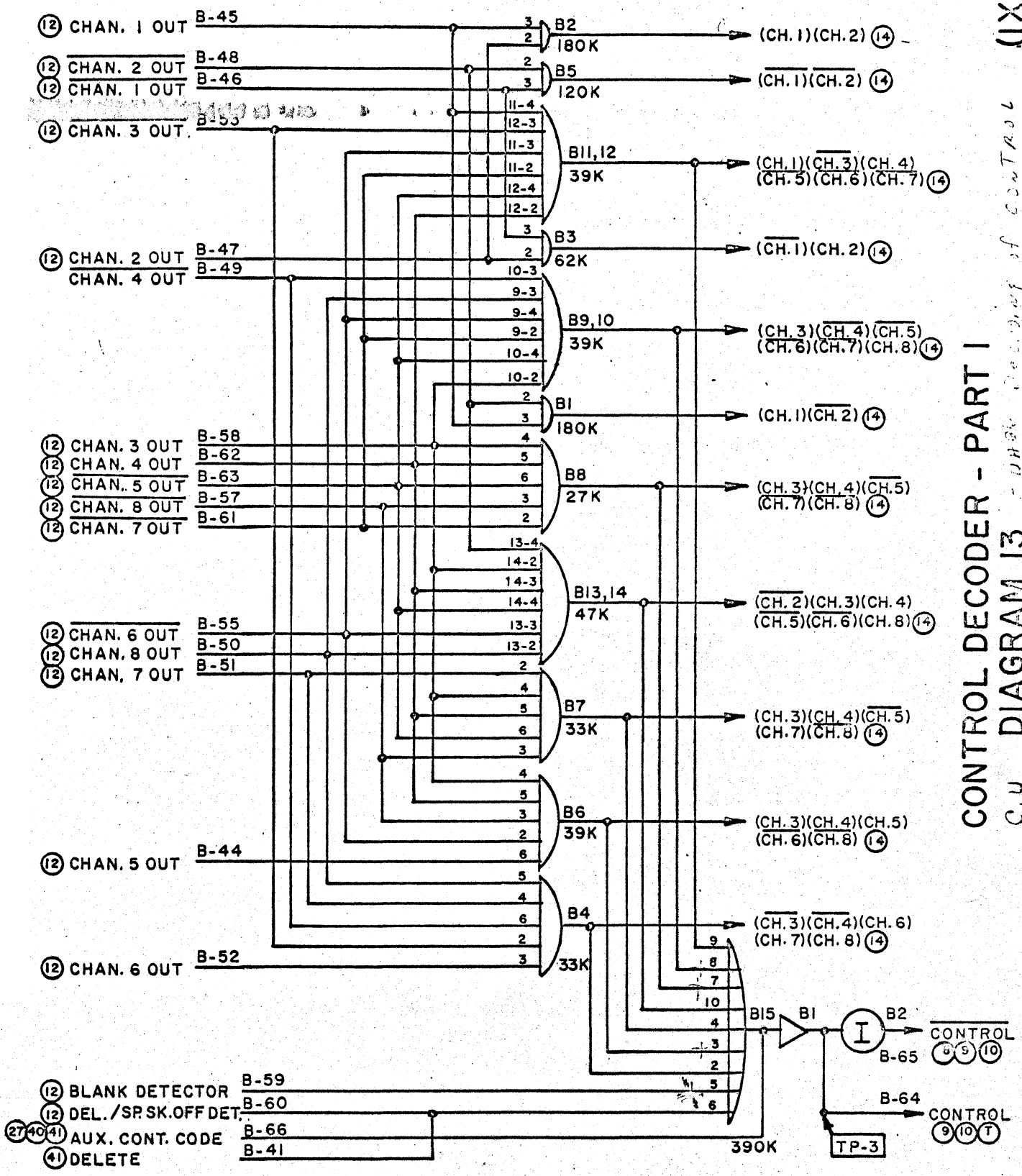
SCHEMATICS FOR DIAGRAM 13

(IXa-26)

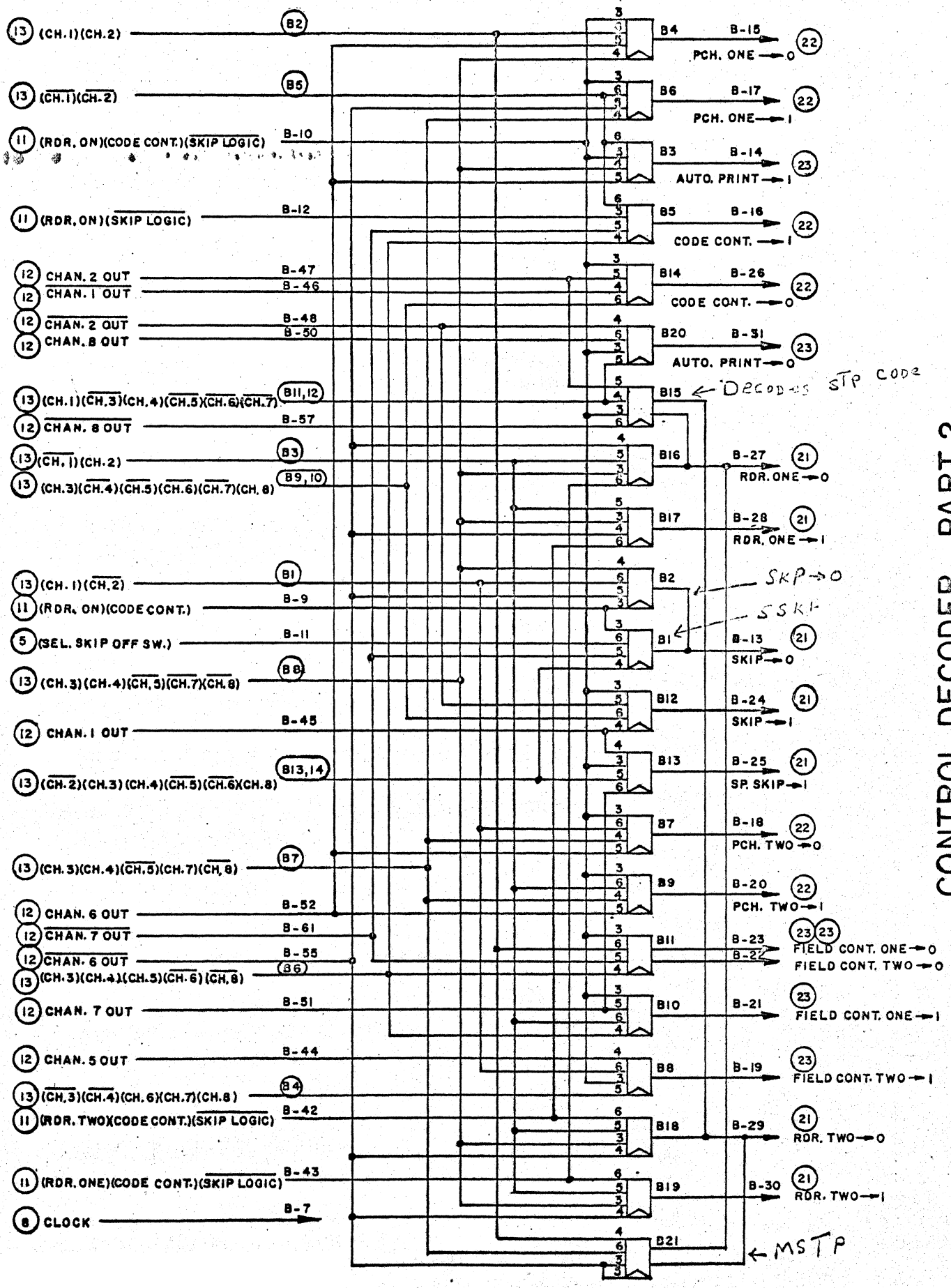


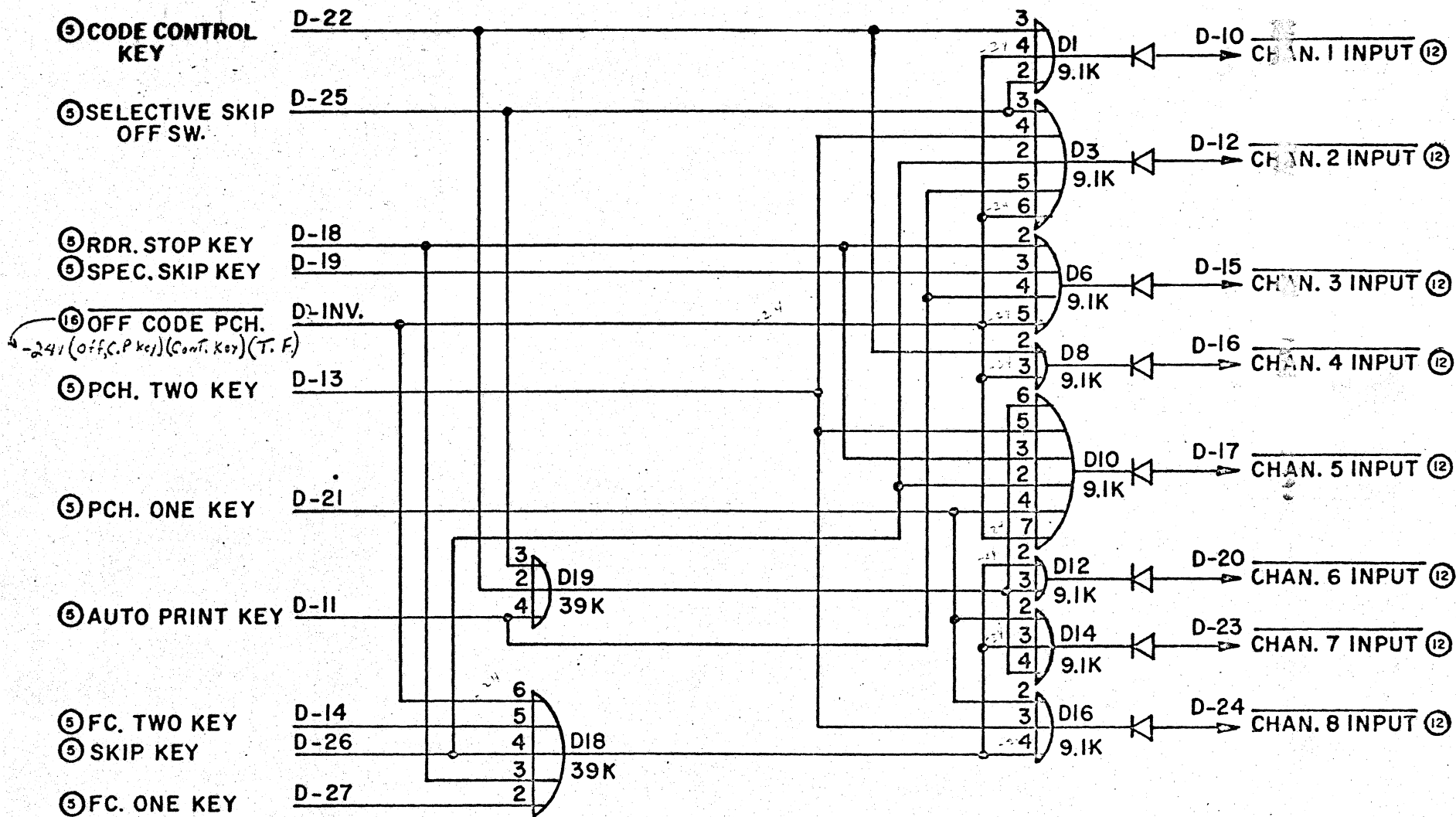
CONTROL DECODER - PART I

C.U. DIAGRAM 13



CONTROL DECODER - PART 2  
DIAGRAM 14



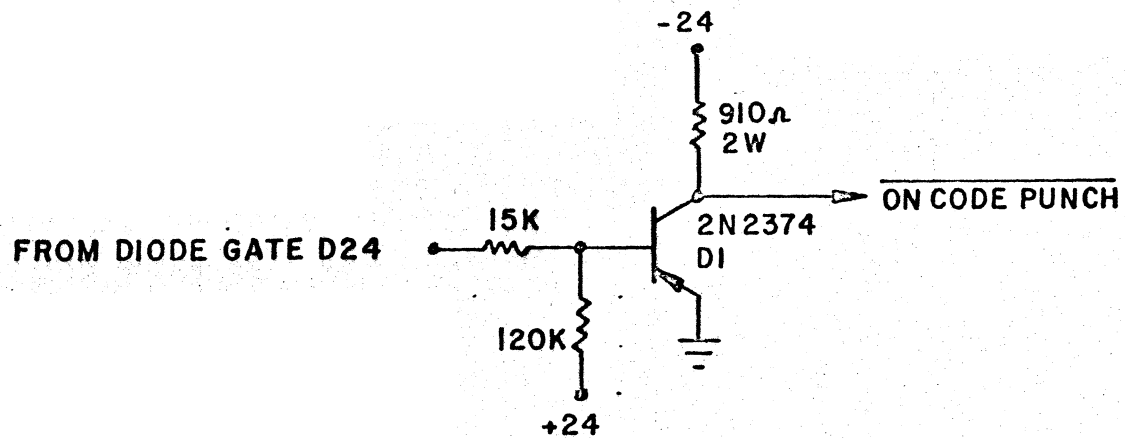


**OFF CODE ENCODER**

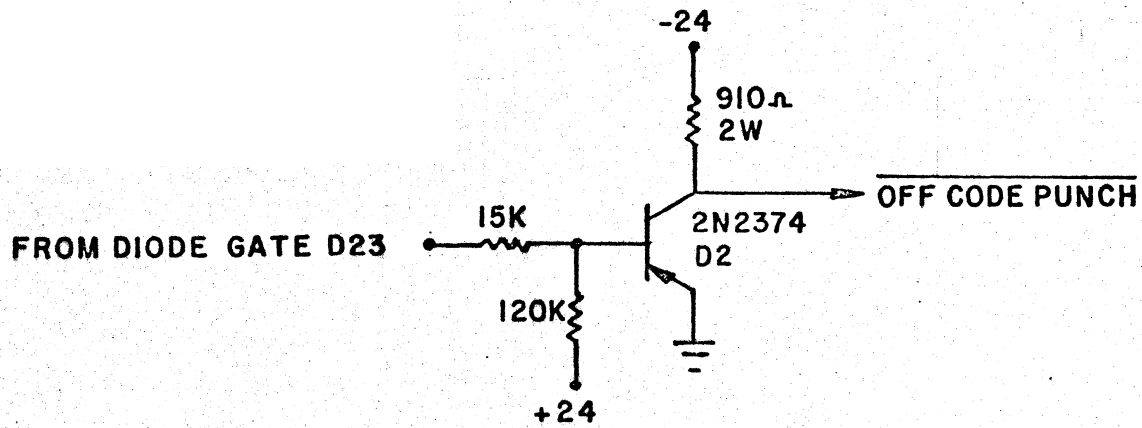
DI DIAGRAM 15

*MANUALLY punching control codes*

(IXa-3)



INVERTER D1

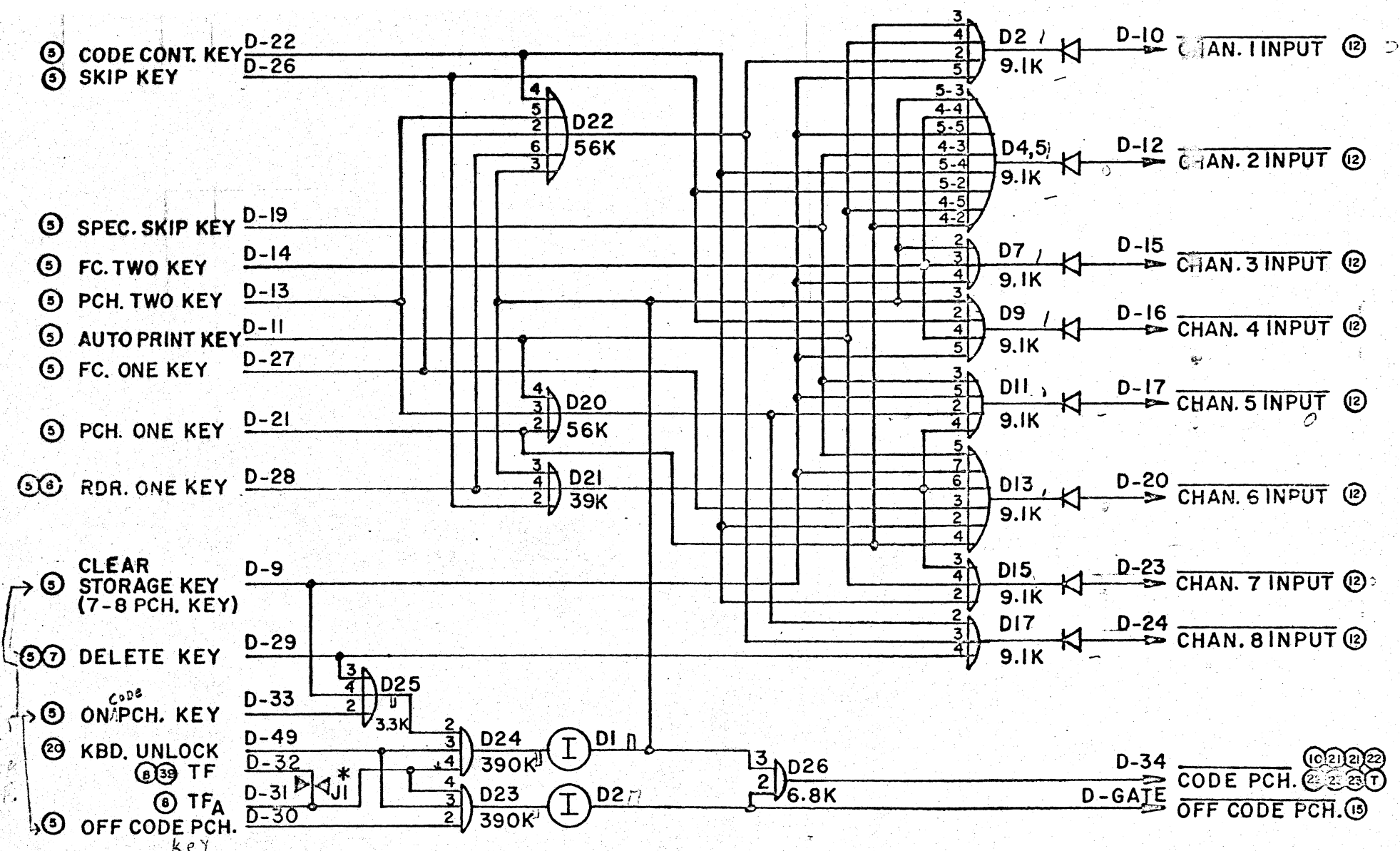


INVERTER D2

SCHEMATICS FOR DIAGRAM 16

(IXa-32)

IN STATIC STATE  
ALL OUTPUTS



⑤ CODE CONT. KEY D-22  
⑤ SKIP KEY D-26

⑤ SPEC. SKIP KEY D-19  
⑤ FC. TWO KEY D-14  
⑤ PCH. TWO KEY D-13  
⑤ AUTO PRINT KEY D-11  
⑤ FC. ONE KEY D-27

⑤ PCH. ONE KEY D-21  
⑤ RDR. ONE KEY D-28

⑤ CLEAR STORAGE KEY (7-8 PCH. KEY) D-9  
⑤ DELETE KEY D-29  
⑤ ON/PCH. KEY D-33  
⑤ KBD. UNLOCK D-49  
⑤ TF D-32  
⑤ TFA D-31  
⑤ OFF CODE PCH. key D-30

D2 1 9.1K D-10 CHAN. 1 INPUT ⑫

D4,5 9.1K D-12 CHAN. 2 INPUT ⑫

D7 9.1K D-15 CHAN. 3 INPUT ⑫

D9 9.1K D-16 CHAN. 4 INPUT ⑫

D11 9.1K D-17 CHAN. 5 INPUT ⑫

D13 9.1K D-20 CHAN. 6 INPUT ⑫

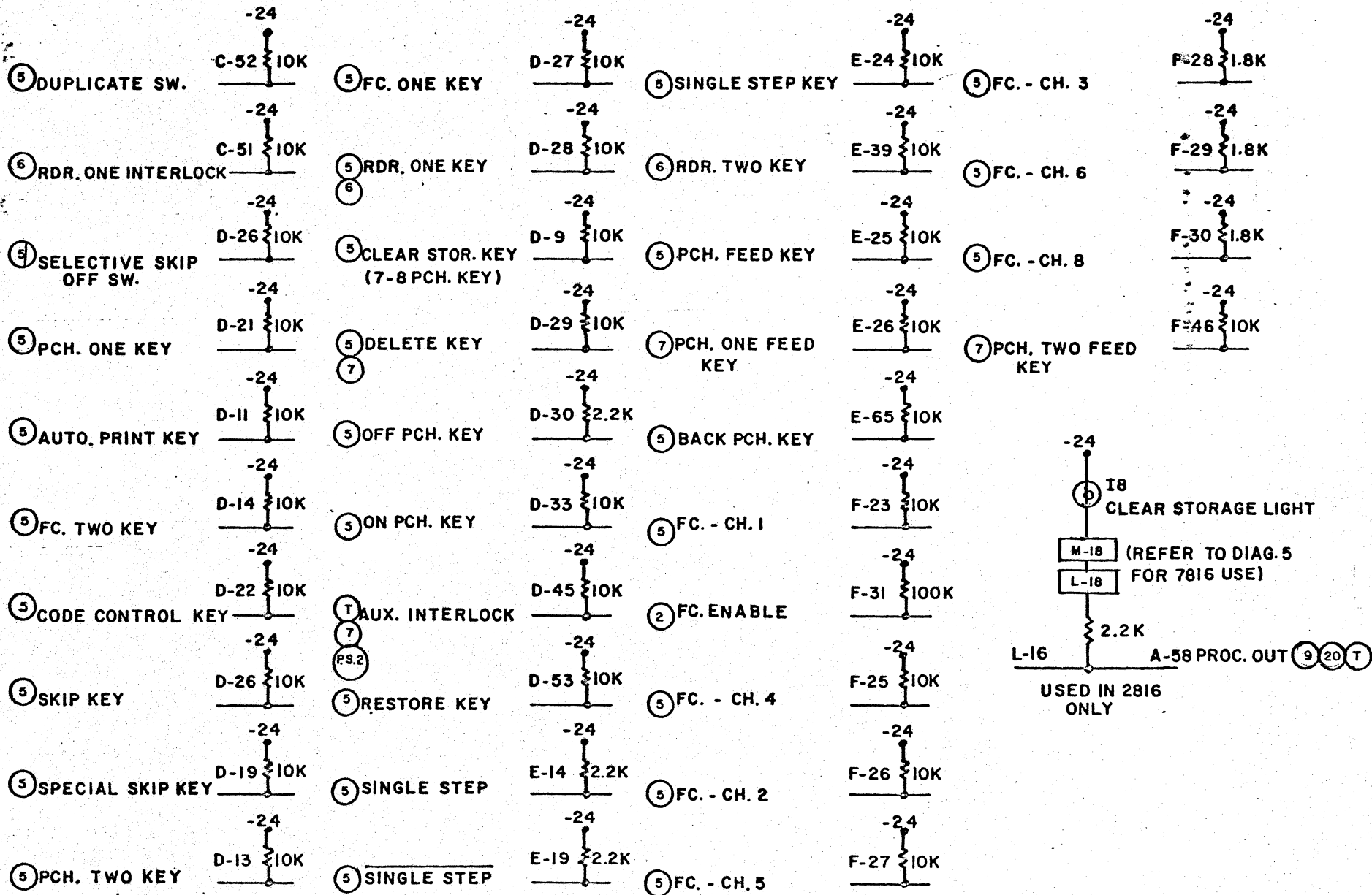
D15 9.1K D-23 CHAN. 7 INPUT ⑫

D17 9.1K D-24 CHAN. 8 INPUT ⑫

D-34 CODE PCH. ⑩ ⑪ ⑫ ⑬ ⑭ ⑮  
D-GATE OFF CODE PCH. ⑮

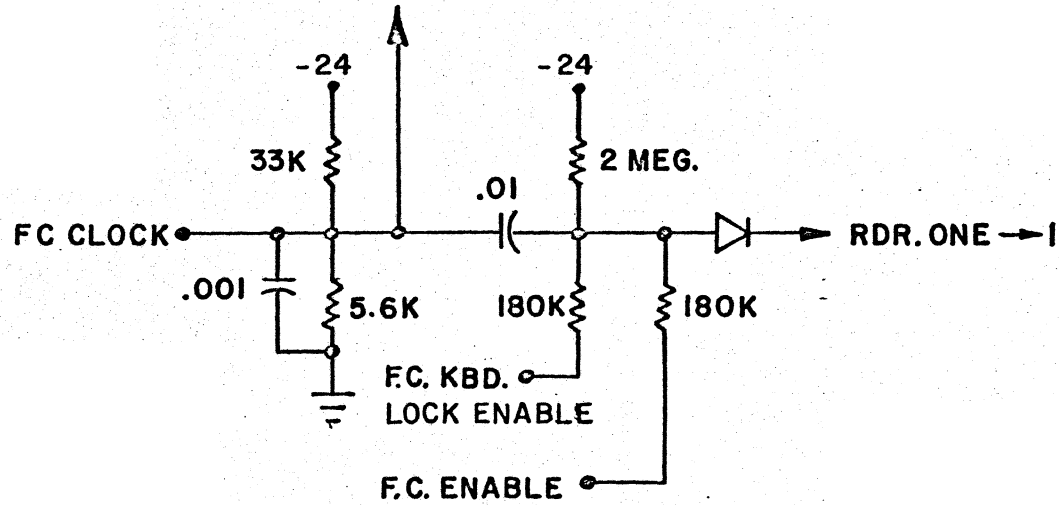
**NOTE**

\* CUT ARTWORK AT J1 WHEN VERIFIER IS INSTALLED.



CONTROL KEYS  
DIAGRAM 17

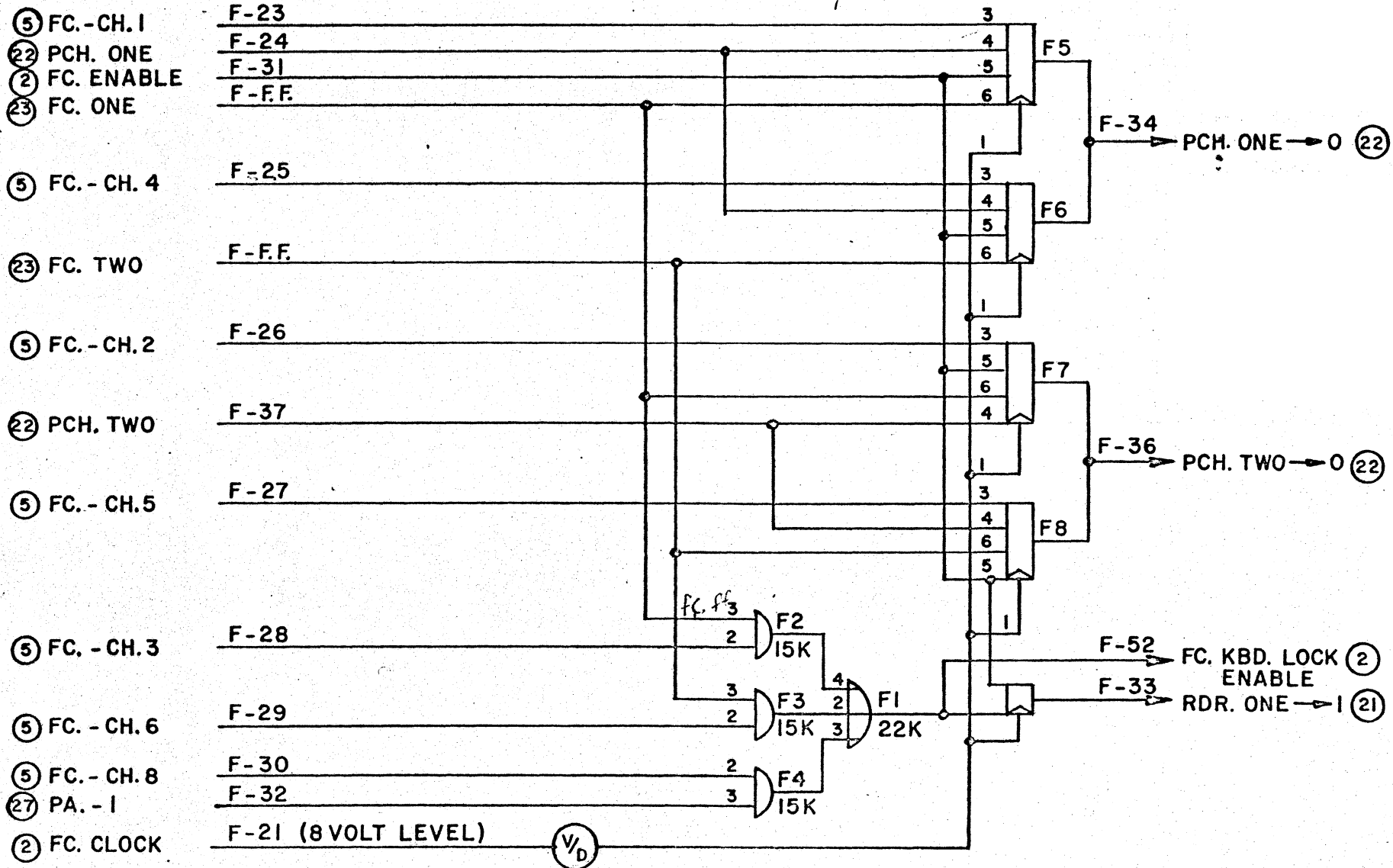
CLOCKS FOR PULSE GATES  
F5, 6, 7, AND 8



V/D & PULSE GATE

SCHEMATICS FOR DIAGRAM 18

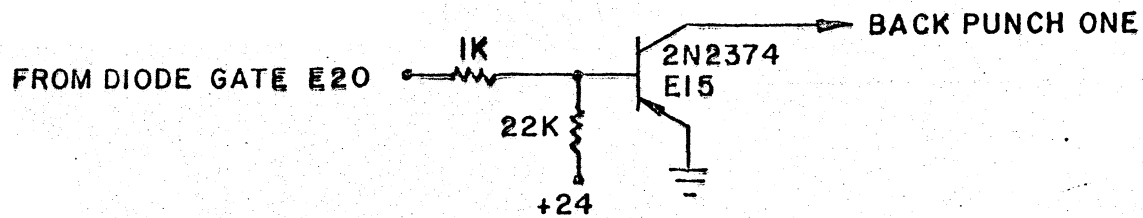
(IXa-36)



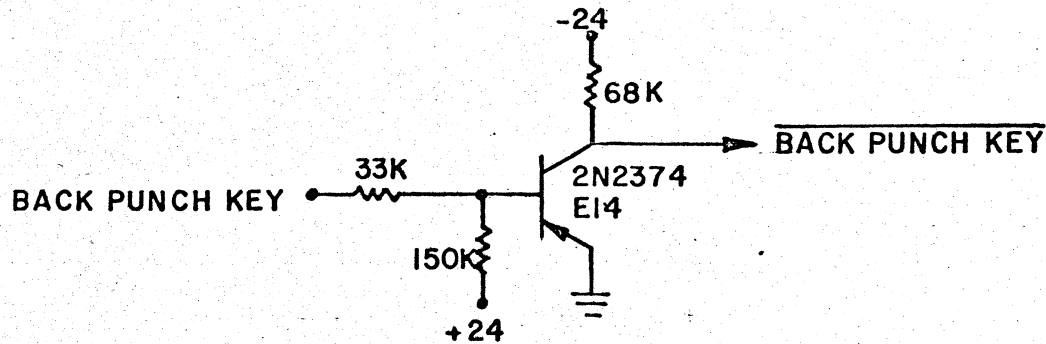
FIELD CONTROL ENCODER  
C.V. DIAGRAM 18

(IXa-37)

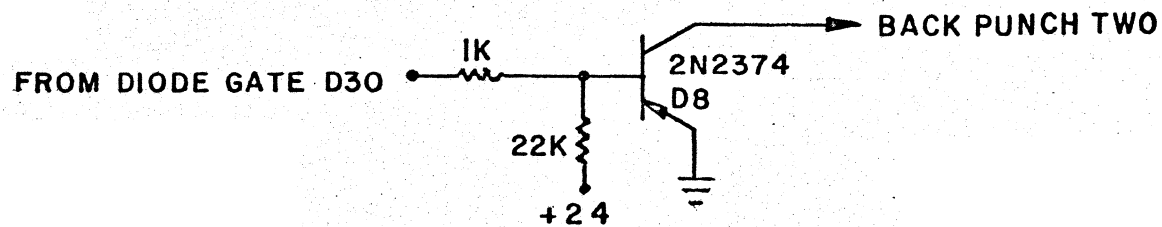




INVERTER - E15



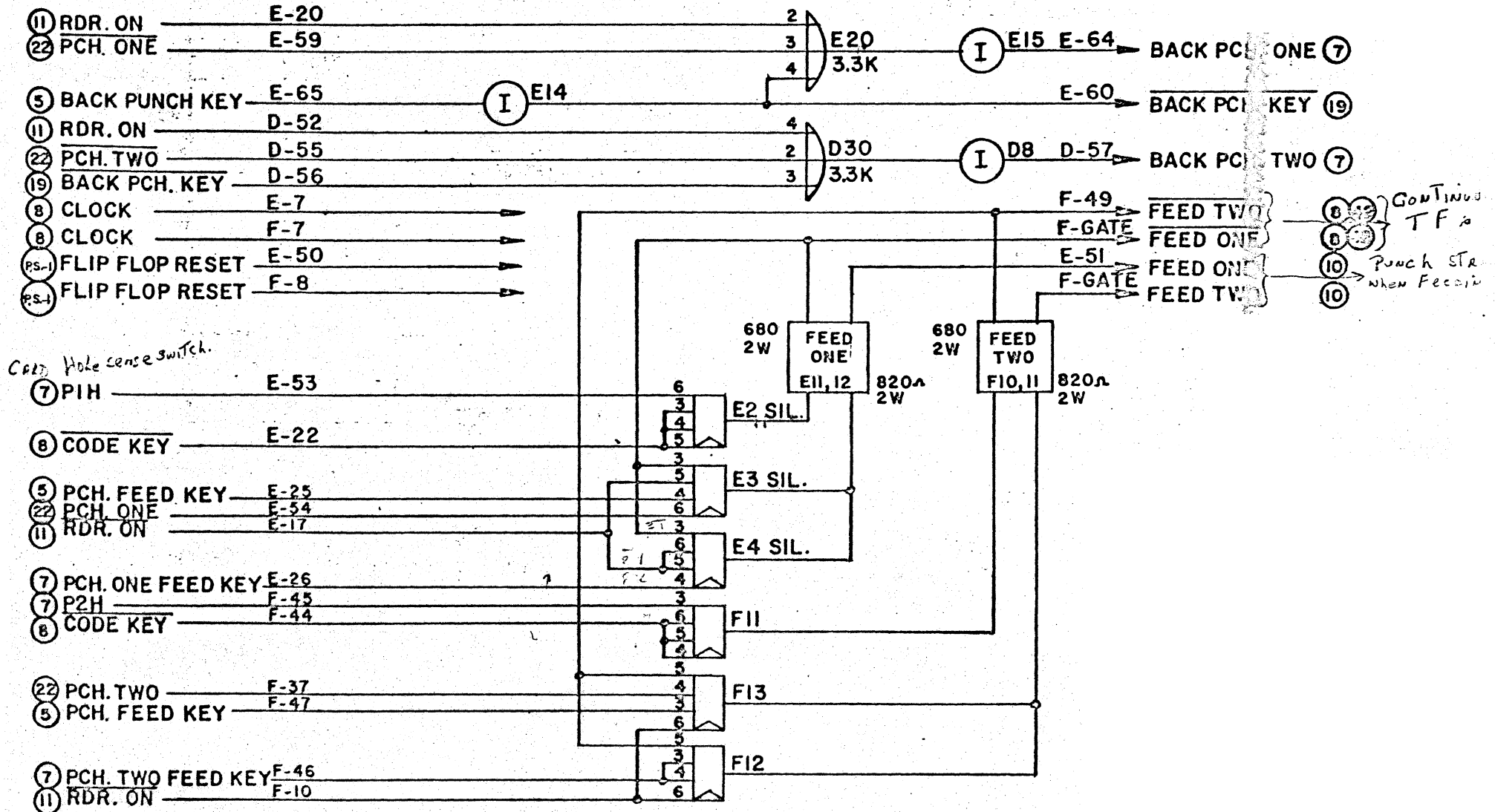
INVERTER - E14



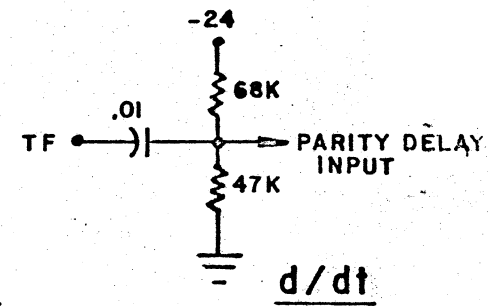
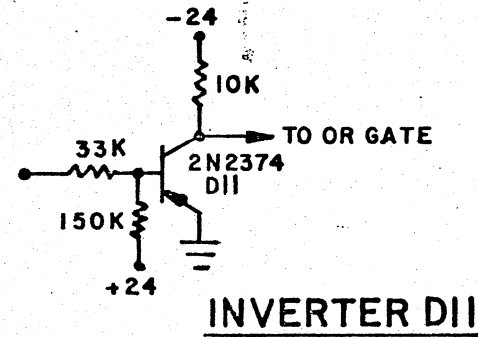
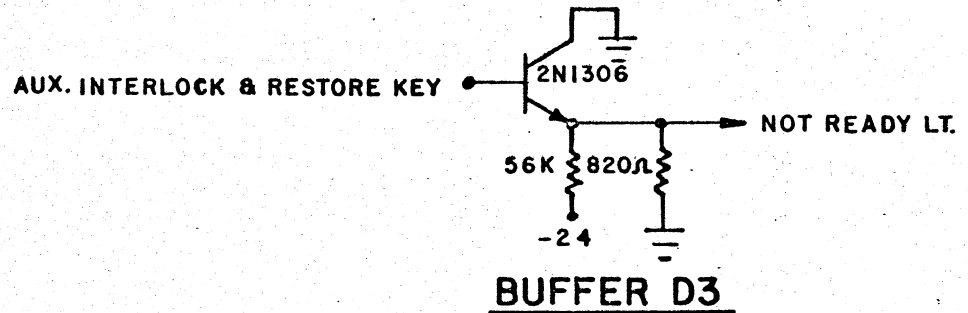
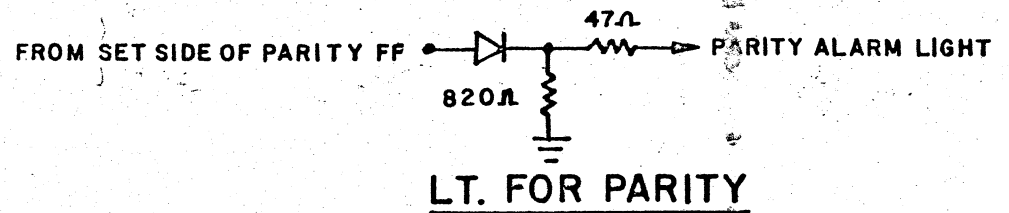
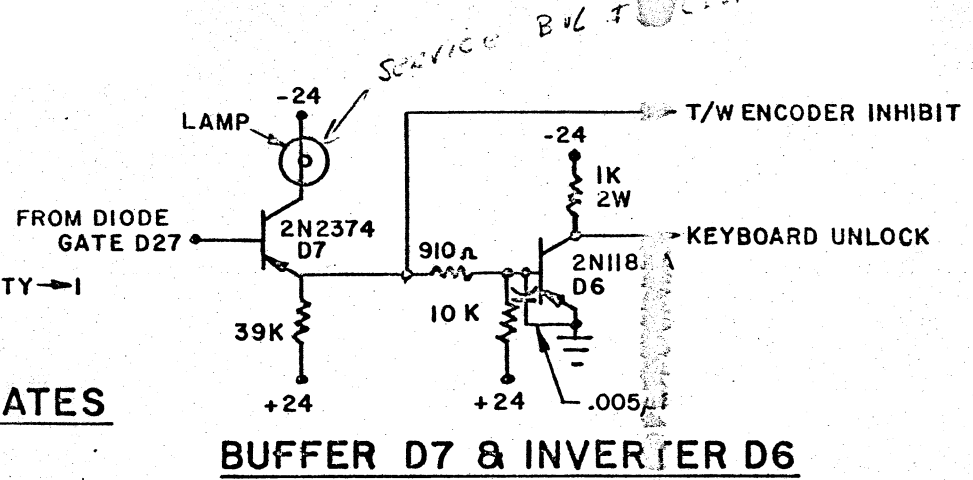
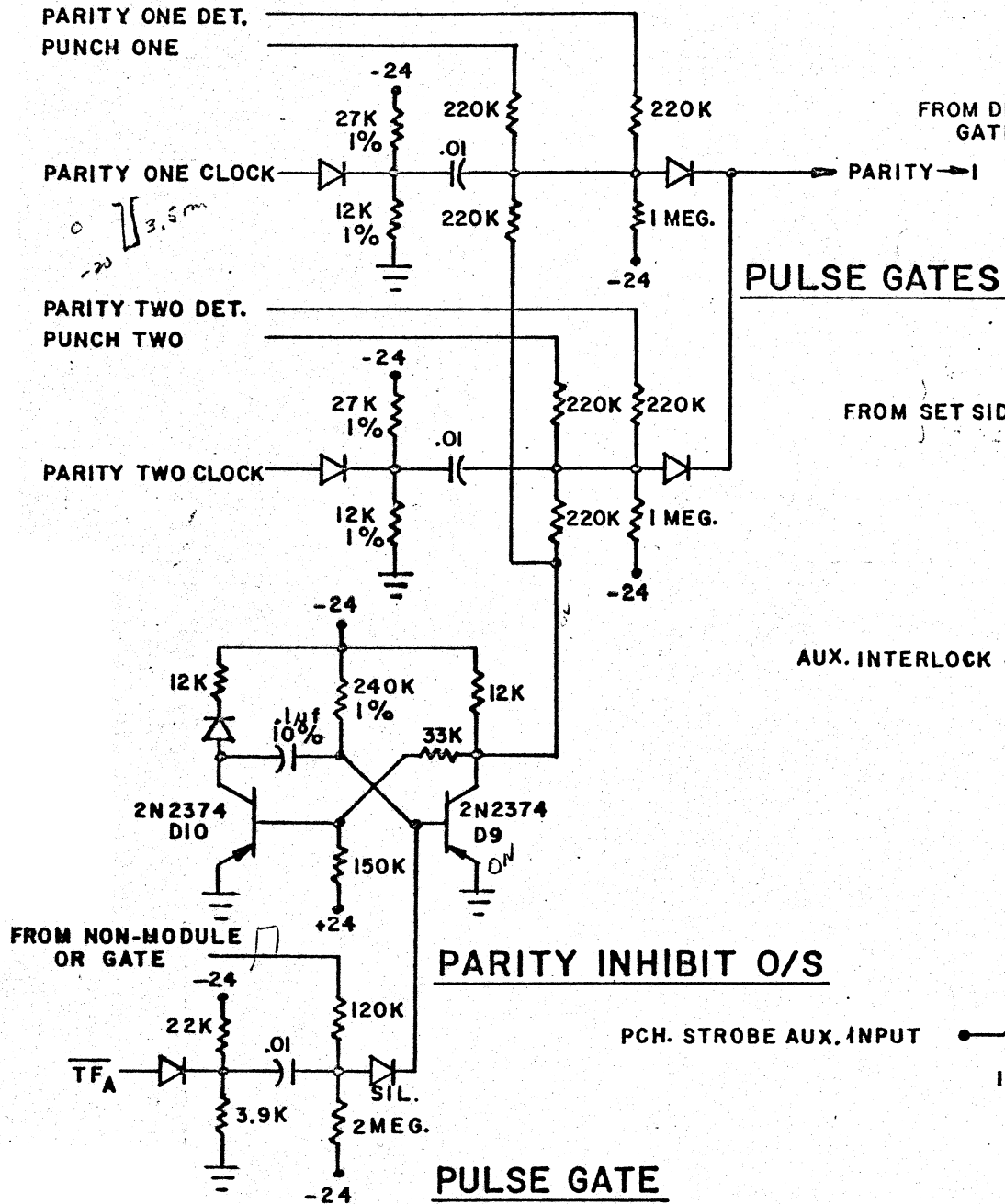
INVERTER - D8

**SCHEMATICS FOR DIAGRAM 19**

(IXa-38)



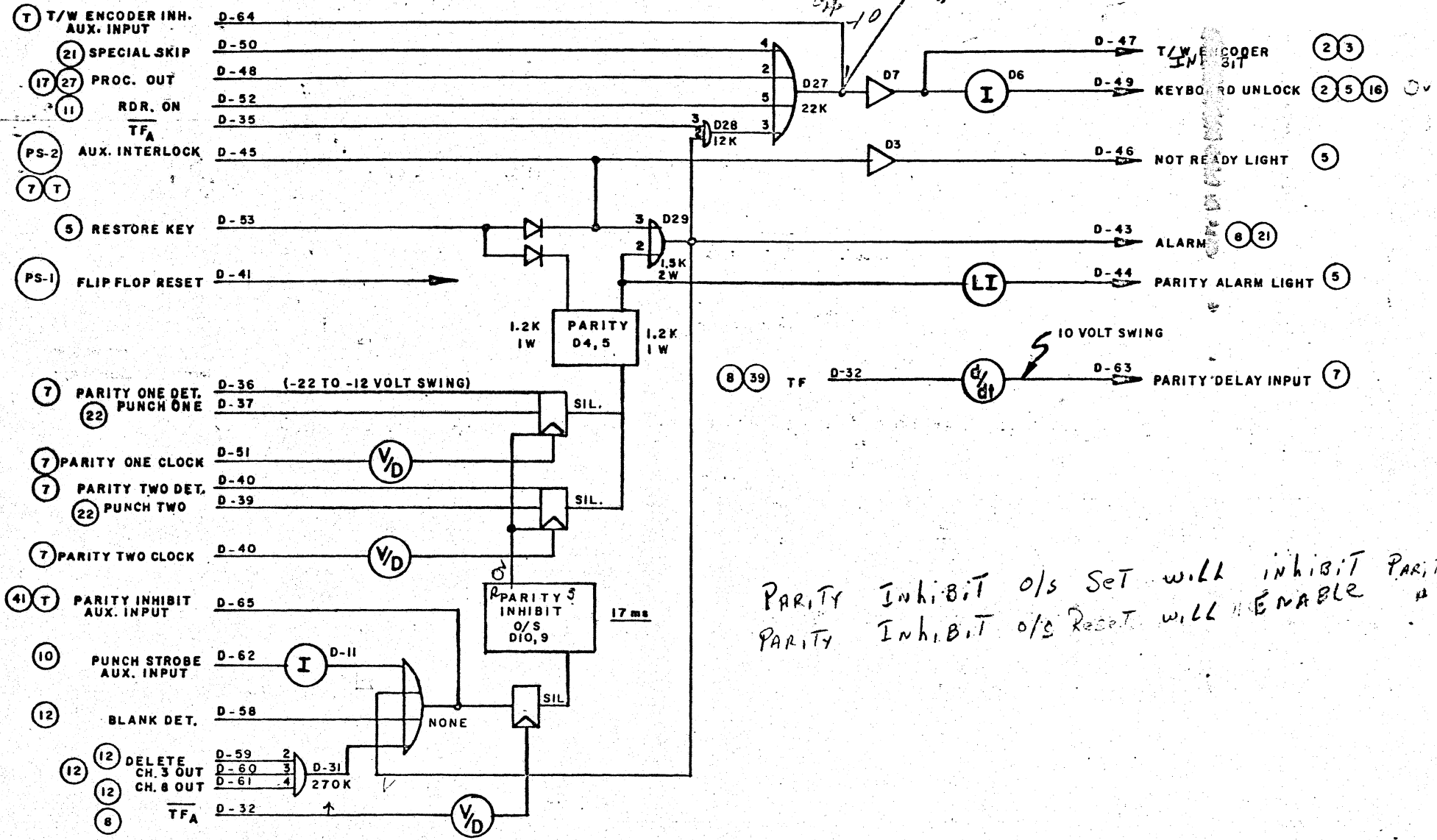
FEED & BACK LOGIC  
CU DIAGRAM 19



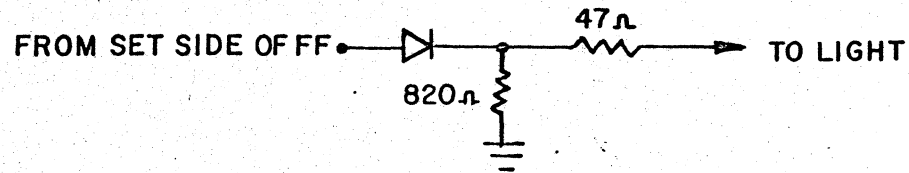
**SCHEMATICS FOR DIAGRAM 20**

(IXa-40)

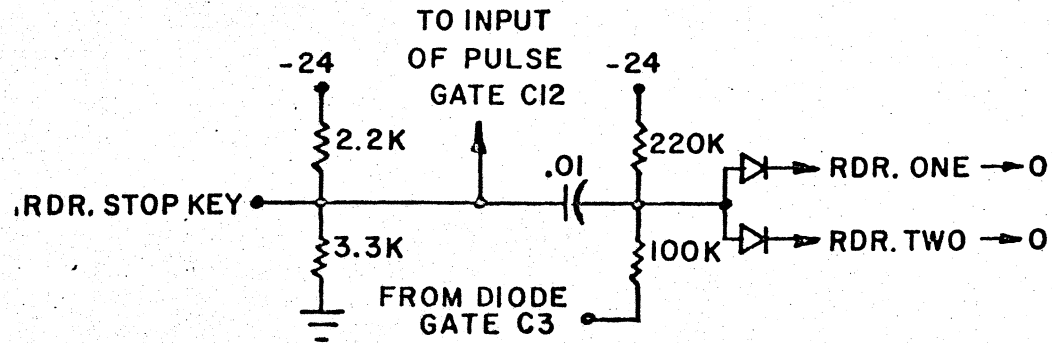
(REV. 2/65)



**ALARM & INTERLOCK  
DIAGRAM 20**



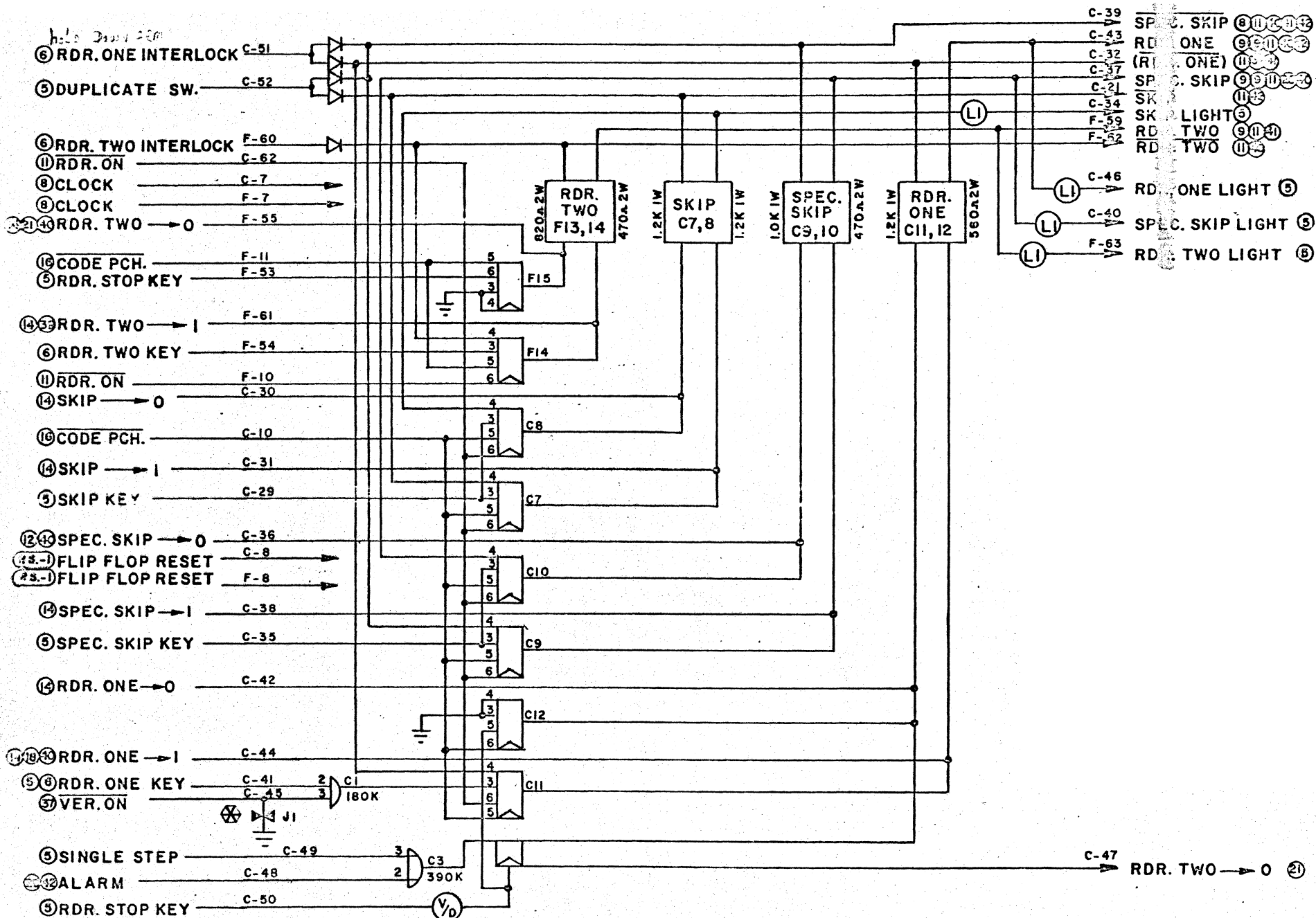
LI FOR SKIP, SPEC. SKIP, RDR. ONE & RDR. TWO



V/D & PULSE GATE

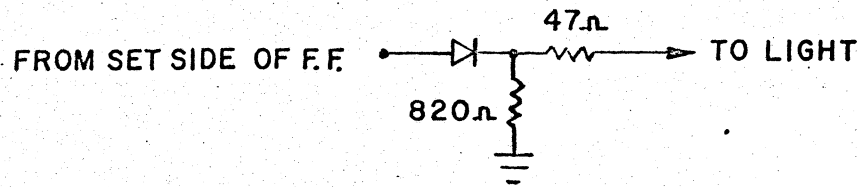
SCHEMATICS FOR DIAGRAM 21

(IXa-42)



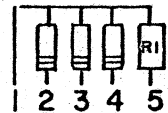
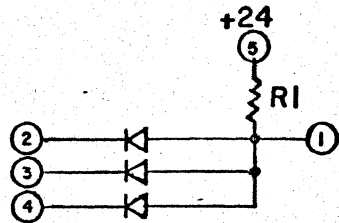
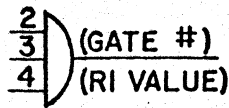
NOTE:  
 ✖ CUT ARTWORK AT J1 WHEN  
 VERIFIER IS INSTALLED.

READER ONE AND TWO, SKIP, AND SPECIAL SKIP  
 DIAGRAM 21

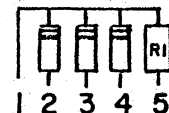
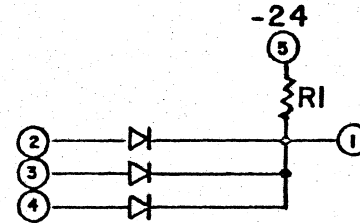
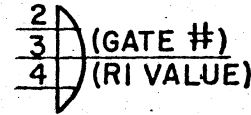


LI FOR PCH. ONE, PCH. TWO AND CC.

**SCHEMATIC FOR DIAGRAM 22**

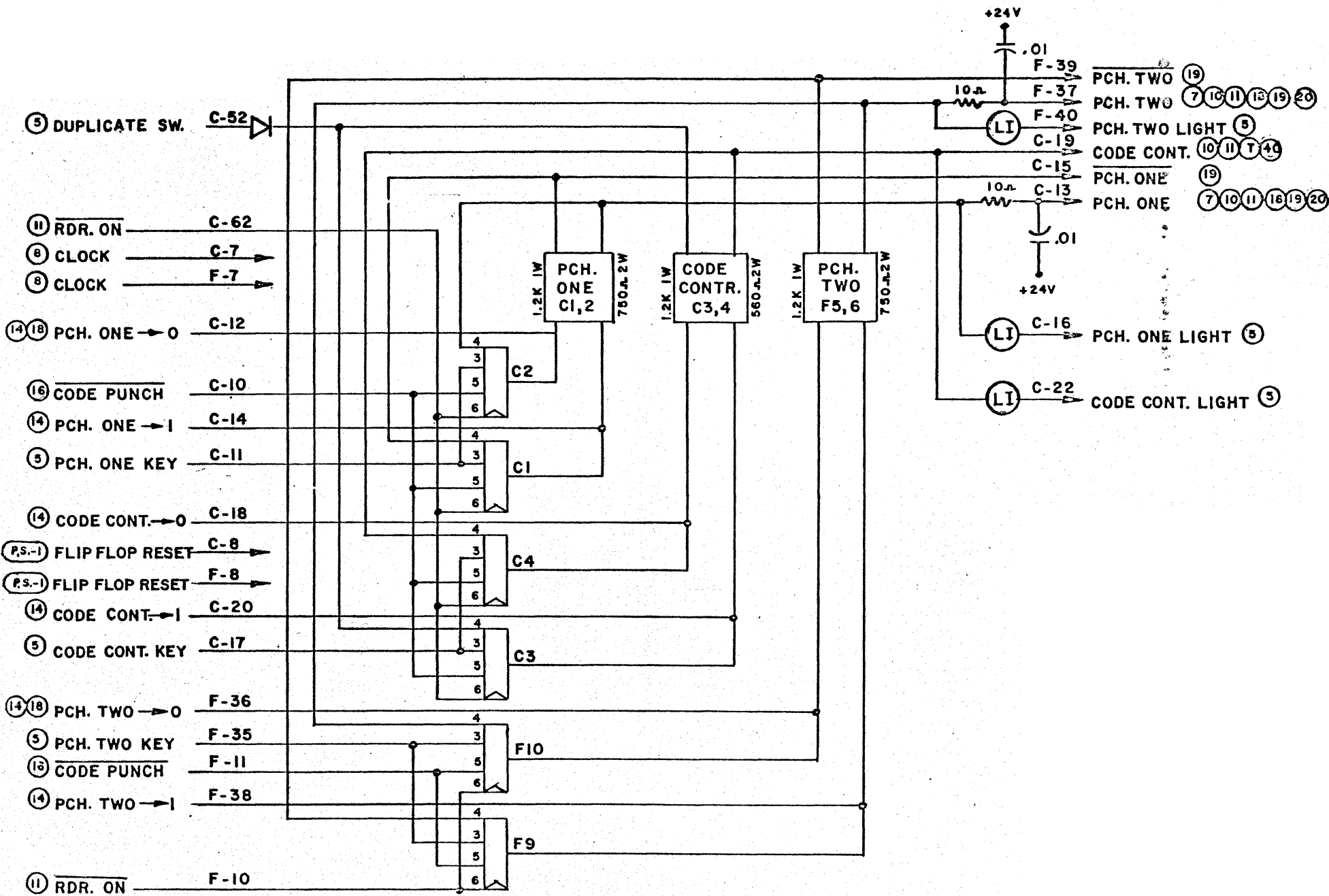


AND GATE



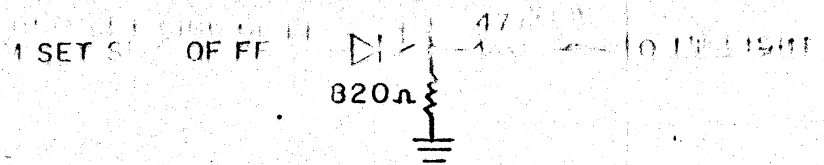
OR GATE

**STANDARD DIODE GATES**



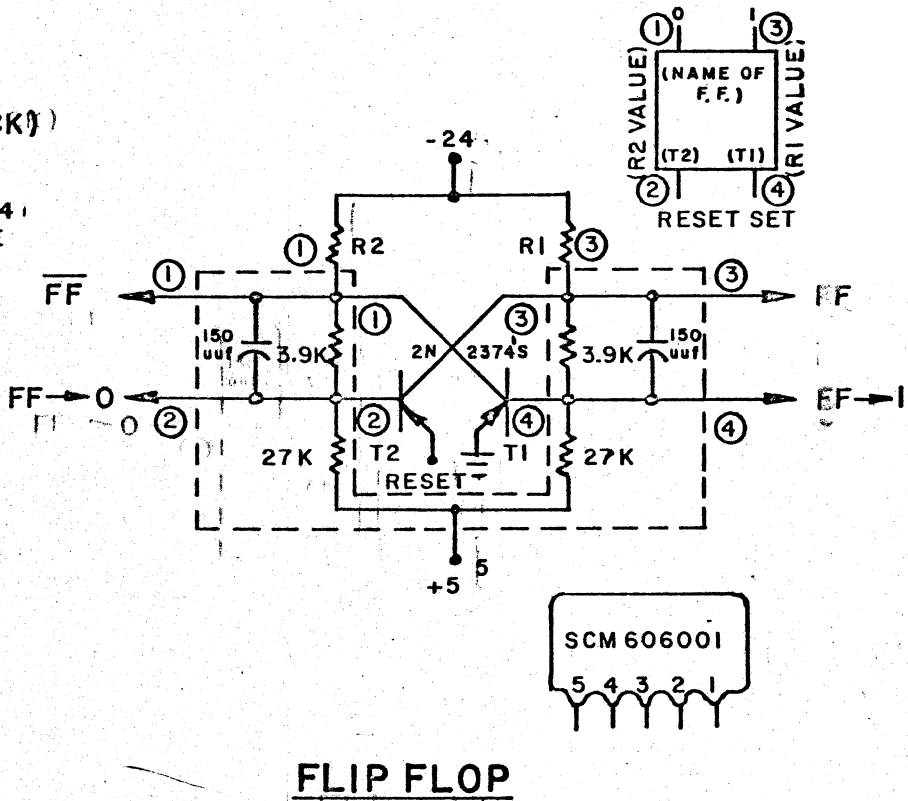
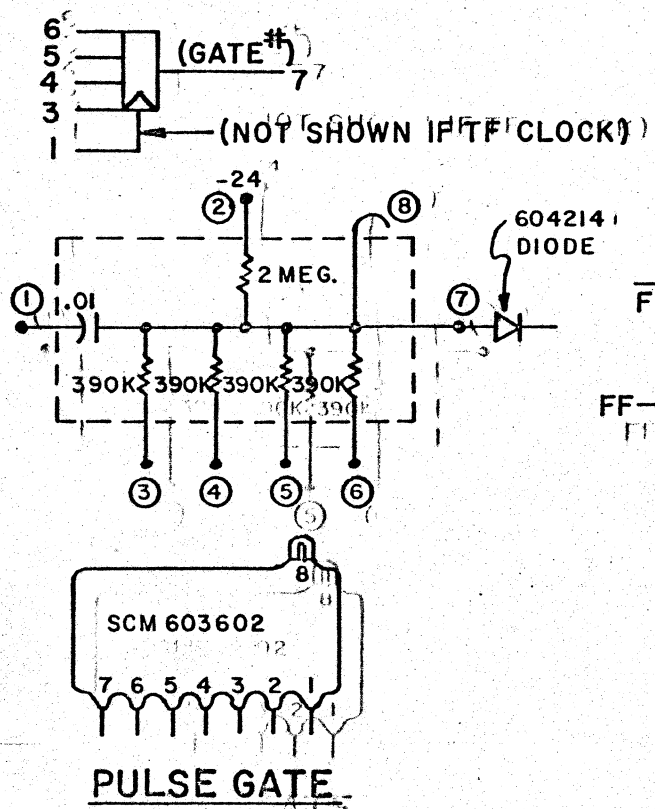
PUNCH ONE AND TWO, AND CODE CONTROL  
 C.U. DIAGRAM 22





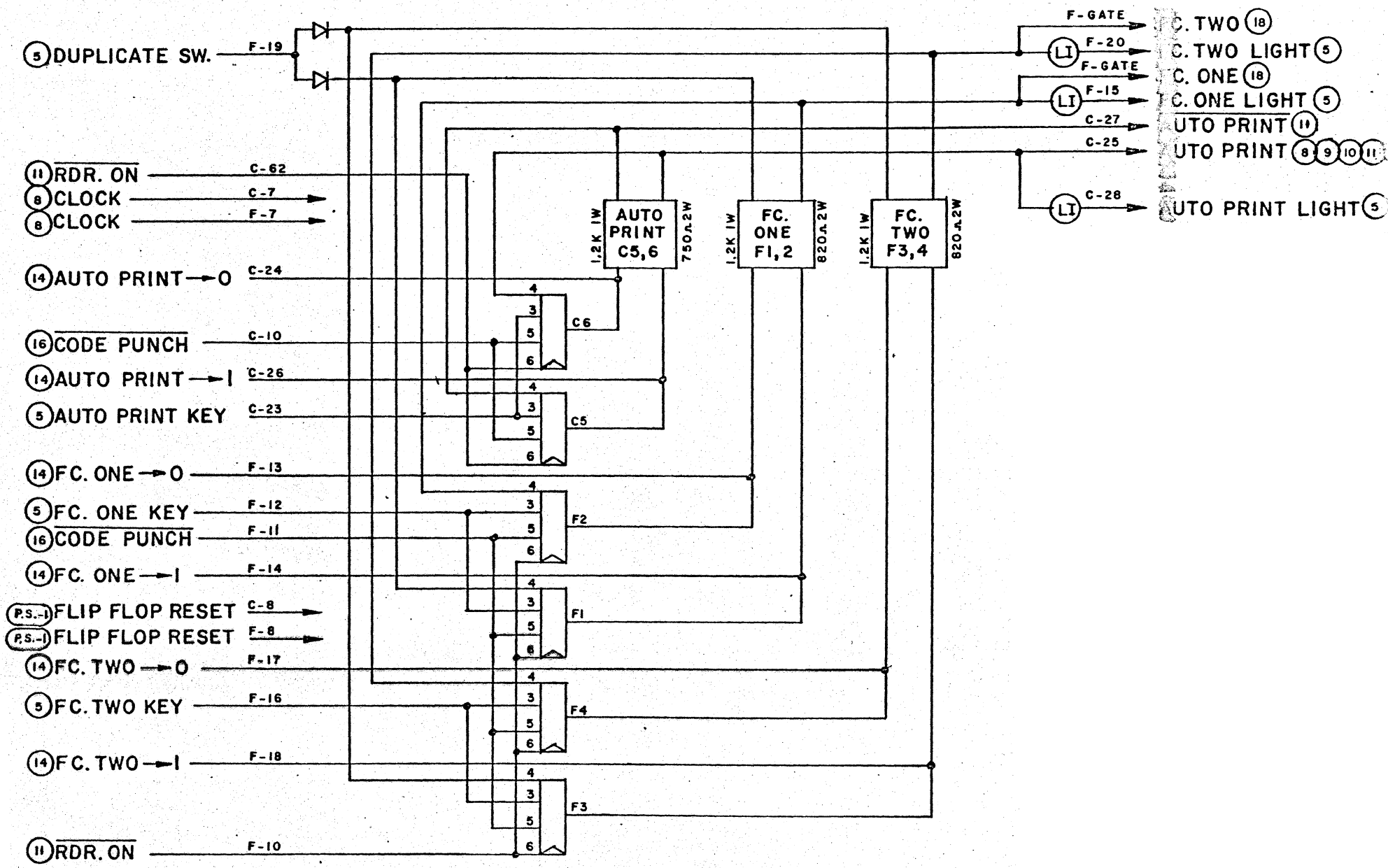
LI FOR FC. ONE, FC. TWO & A.P.

**SCHEMATIC FOR DIAGRAM 23**

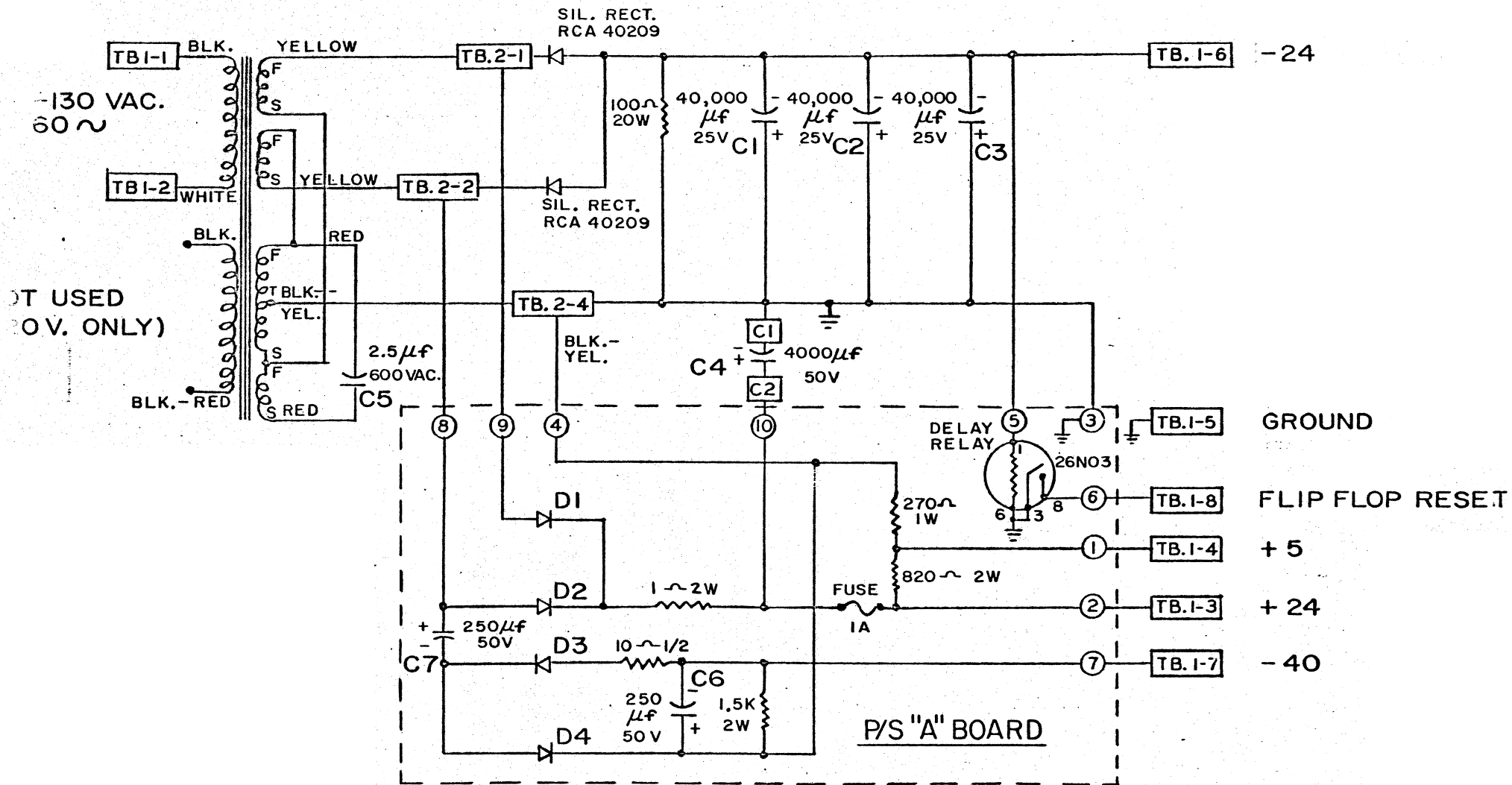


**STANDARD PULSE GATE & FLIP FLOP**

(IXa-46)



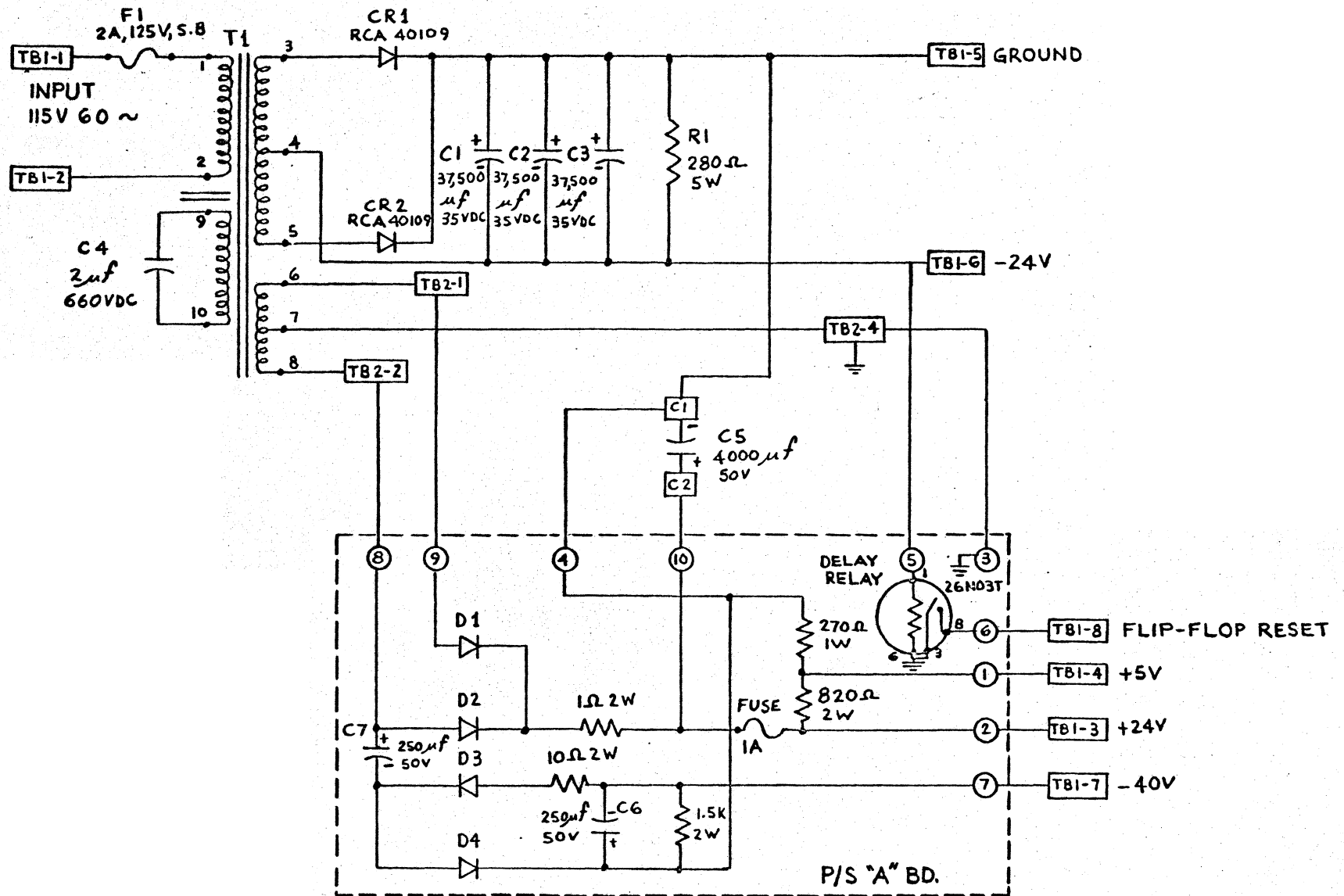
FC. ONE AND TWO, AND AUTO PRINT  
 C. U DIAGRAM 23



## 2816 POWER SUPPLY

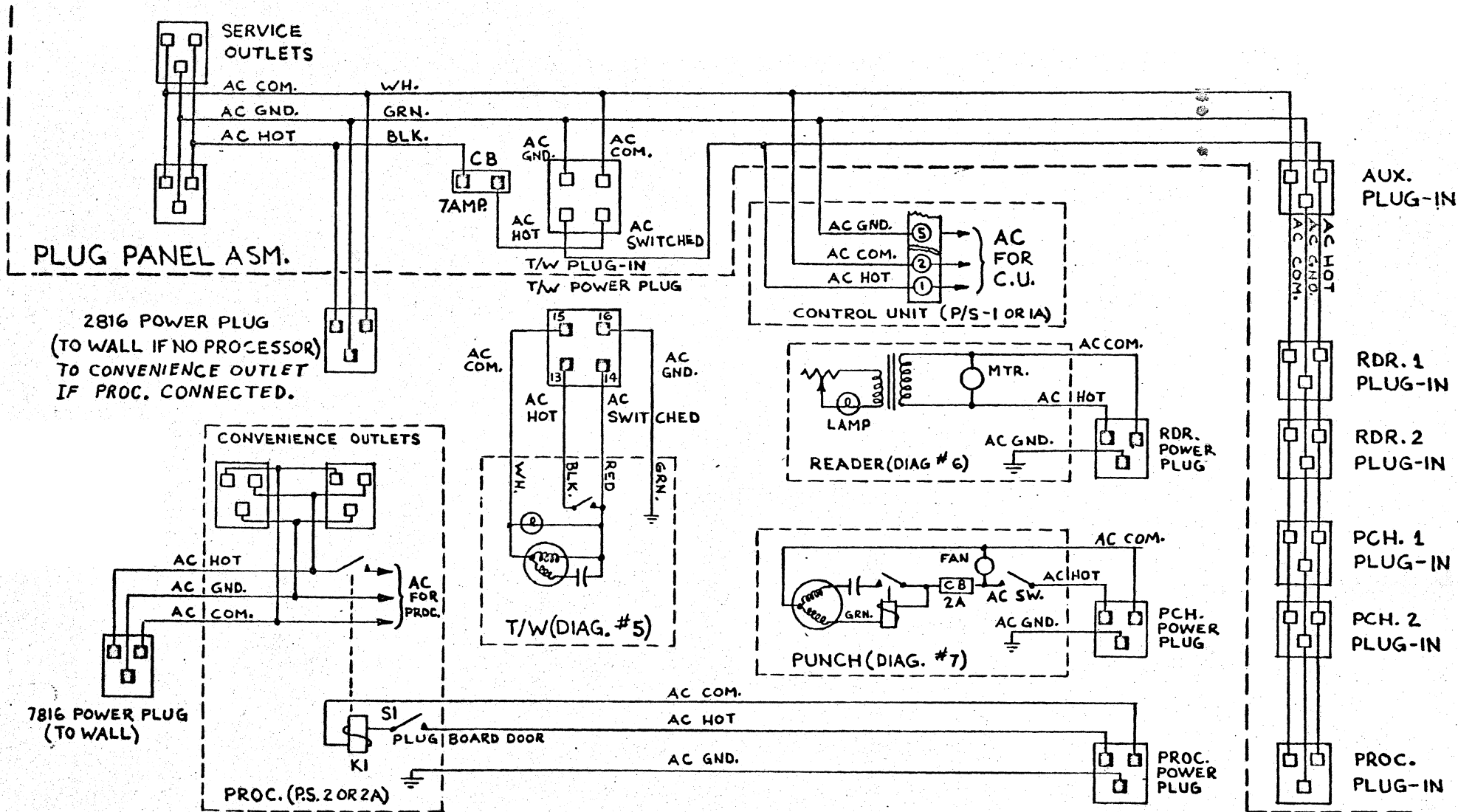
DIAGRAM P.S.-1

(IXa-48)



2816 PECO. POWER SUPPLY  
DIAGRAM P.S. 1A

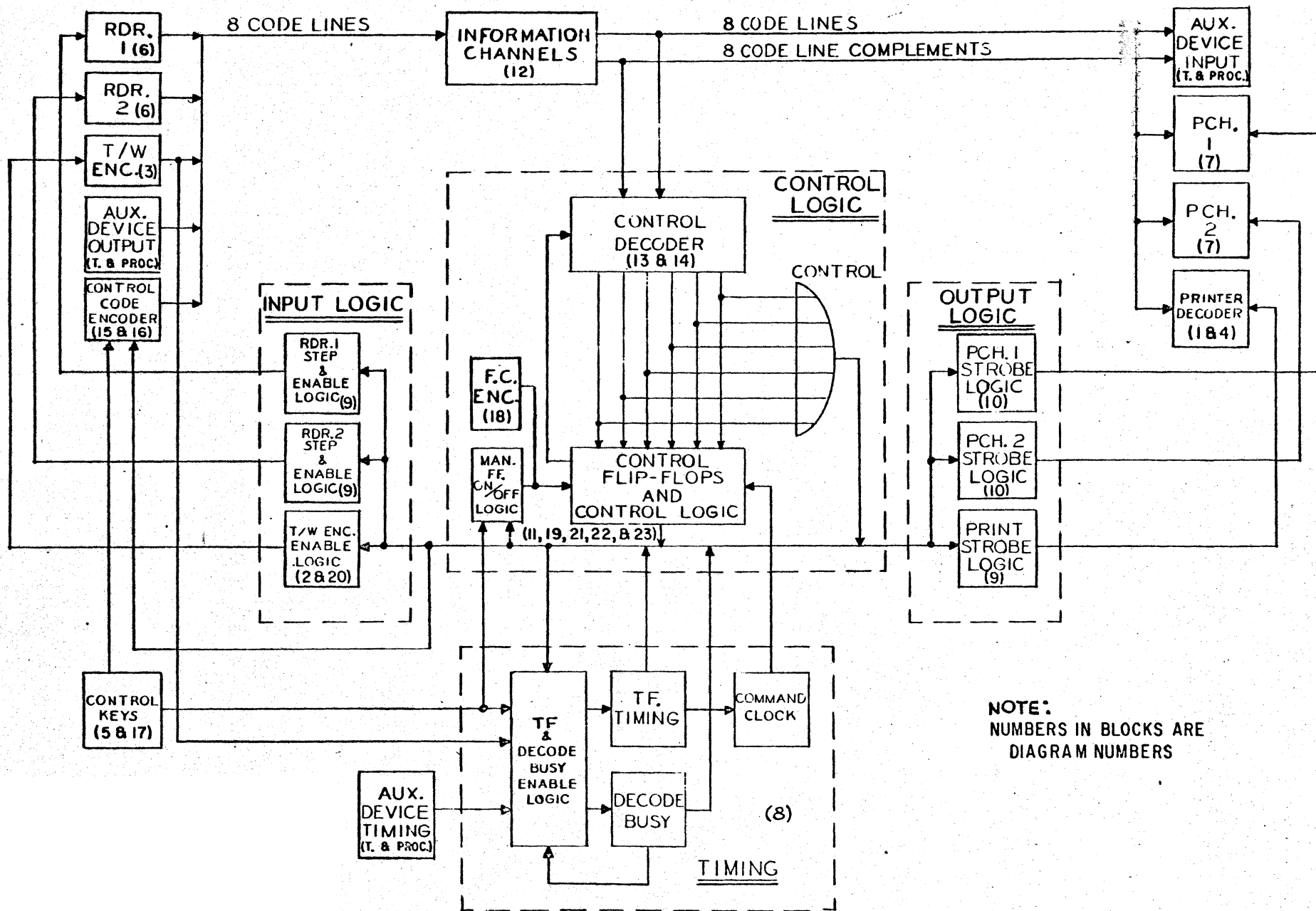
(IXa-40)



- NOTE:
1. ALL PLUGS SHOWN FROM "PLUG-IN" END.
  2. ■ DENOTES PRONGS ON PLUGS
  3. □ DENOTES RECEPTACLES ON PLUG-IN

## 2816/7816 POWER DISTRIBUTION

(IXa-50)



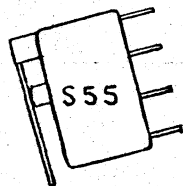
NOTE:  
NUMBERS IN BLOCKS ARE  
DIAGRAM NUMBERS

2816 SYSTEM FLOW DIAGRAM

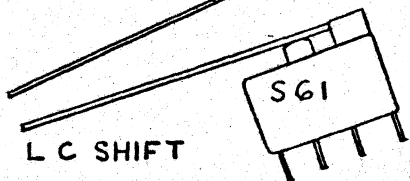
UC SHIFT



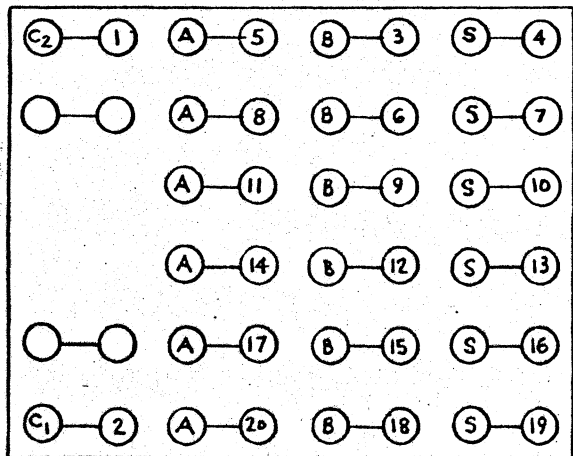
SPACE



LC SHIFT

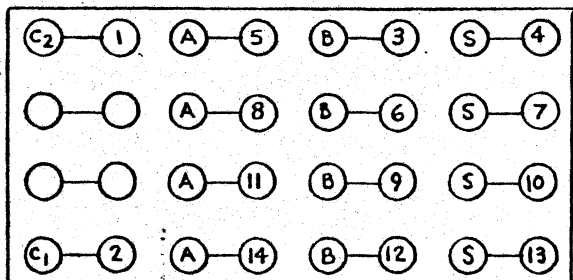


(ON LEFT SIDE FRAME)

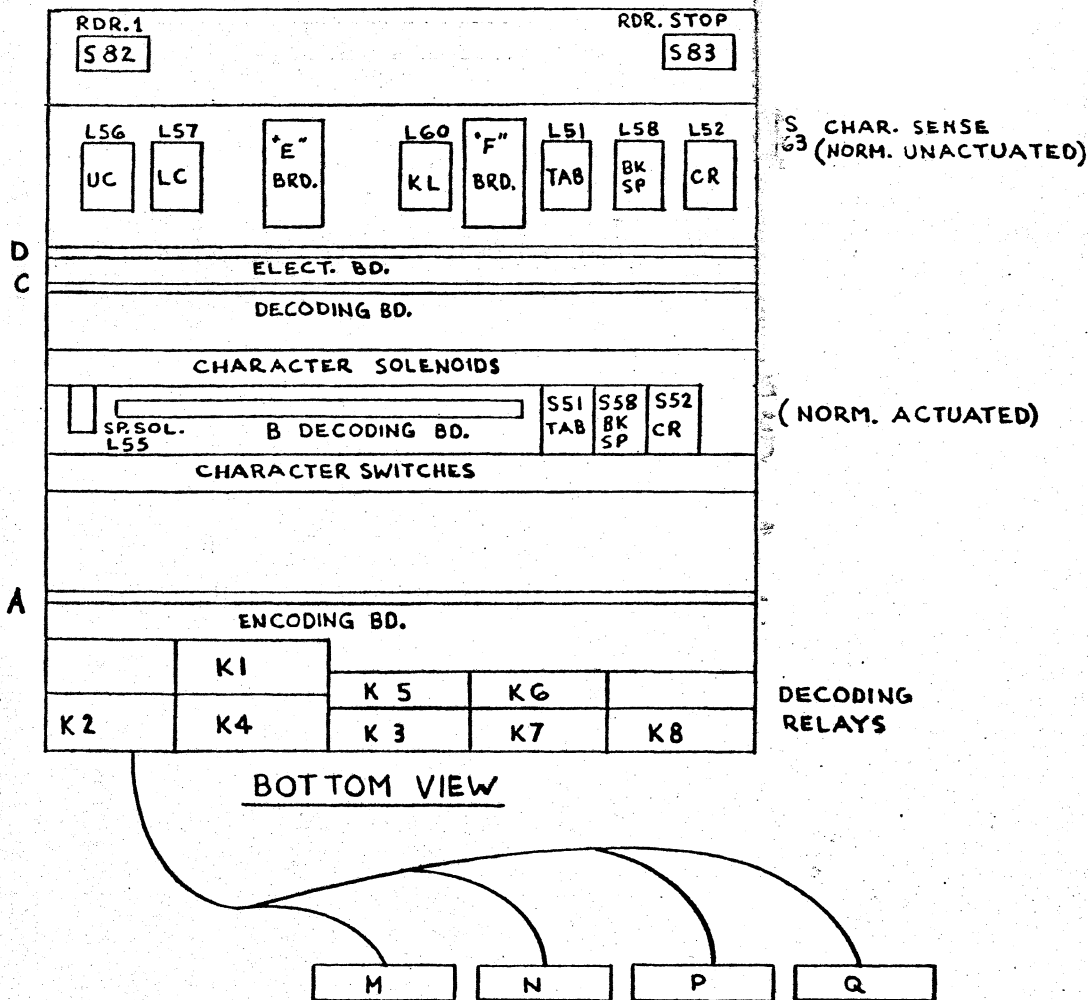


6-POLE RELAY SOC.  
K1, 2 & 4

A- NORM. OPEN  
B- NORM. CLOSED  
S- SWINGER  
C- COIL

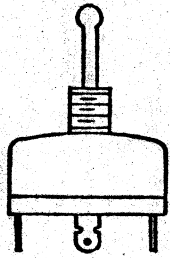


4-POLE RELAY SOC.  
K3, 5, 6, 7 & 8



INPUT/OUTPUT UNIT

(IXa-52)



**TYPE:** Subminiature Toggle,  
3 Position

**USAGE:** I/O Unit;  
Selective Skip Off/Duplicate (S81)

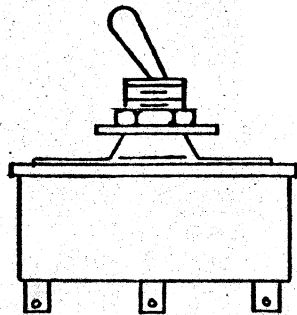
**STATIC  
CONDITION:** (S81) unactuated, center  
position is off.



**TYPE:** N.C. Leaf Sw.

**USAGE:** I/O Unit  
Character Sensing (S63)

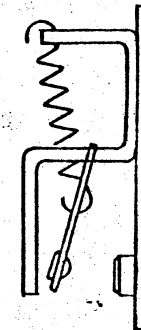
**STATIC  
CONDITION:** (S63) actuated.



**TYPE:** DPDT Toggle

**USAGE:** V/P Unit  
A/C Power (S6)

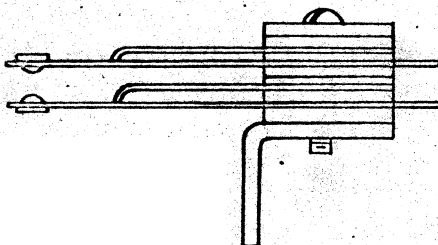
**STATIC  
CONDITION:** (S6) unactuated, one position  
is off; other position on.



**TYPE:** Mode Panel Sw., Single  
Swinger

**USAGE:** I/O Unit  
Mode Sws. (S65 - S80)  
V/P Unit  
Mode Sws. (S8 - S12)

**STATIC  
CONDITION:** (S65 - S80) Unactu  
(S8 - S12) Unactu

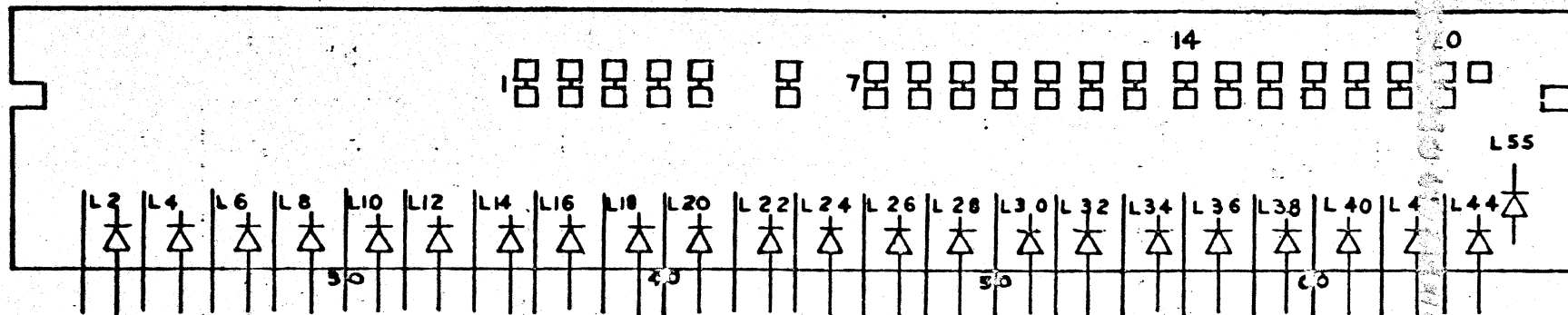


**TYPE:** 6 Contact Position N.O. Leaf Sw.

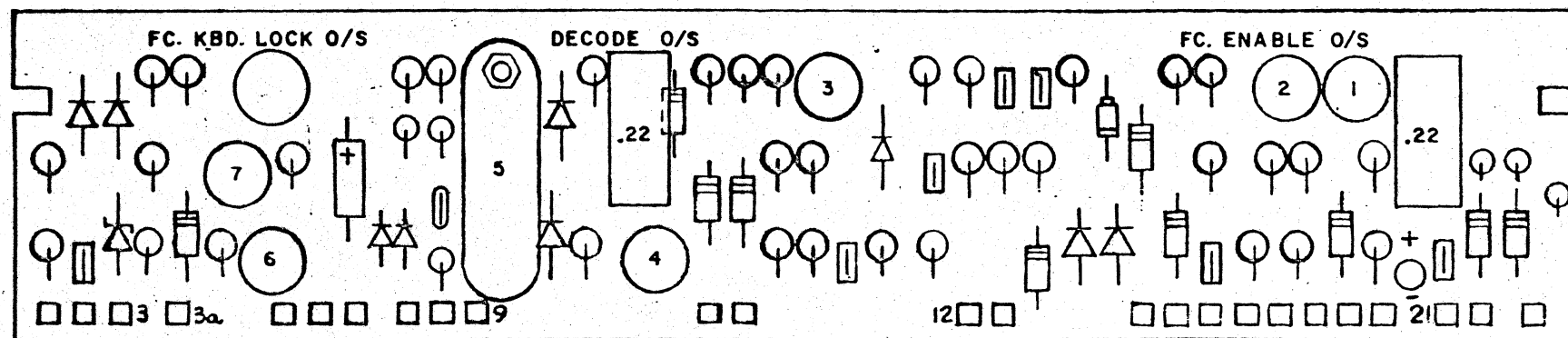
**USAGE:** I/O Unit  
Alpha numeric encoding switches  
(S2 - S45)

**STATIC  
CONDITION:** (S2 - S45) unactuated.



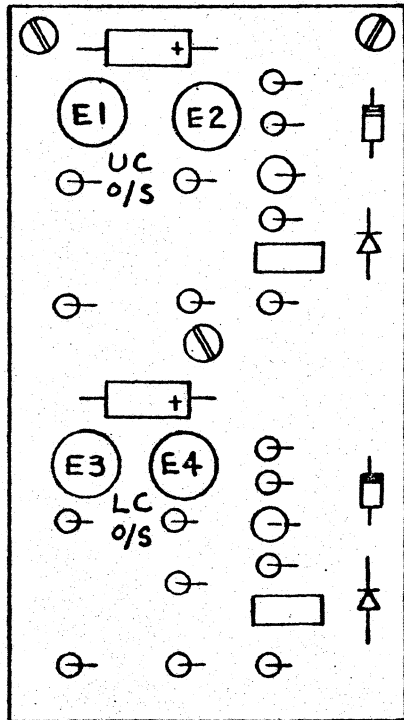


C-ASM

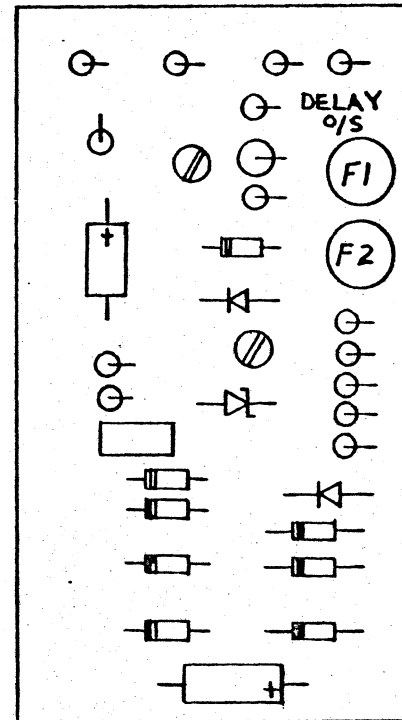


D-ASM

I/O UNIT P.C. BOARDS

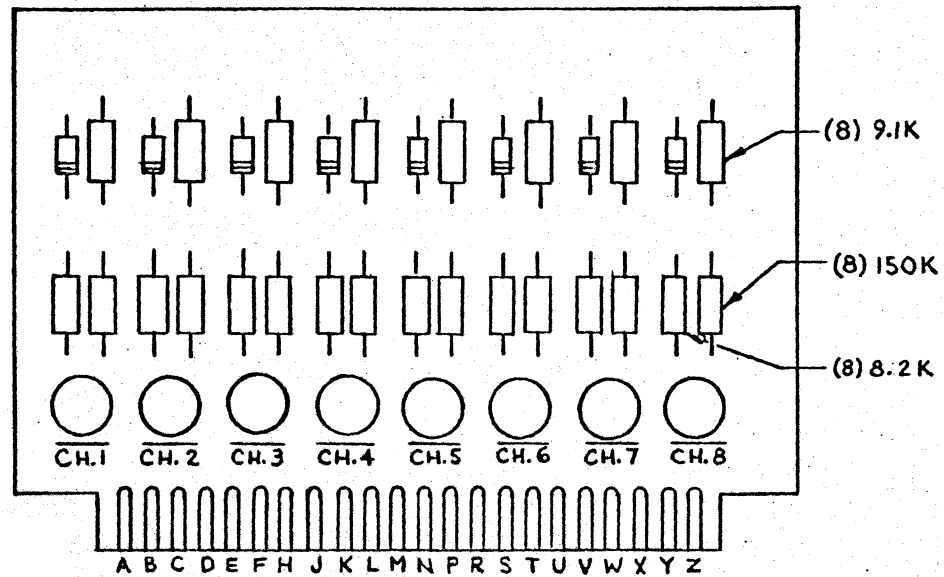


E-ASM.

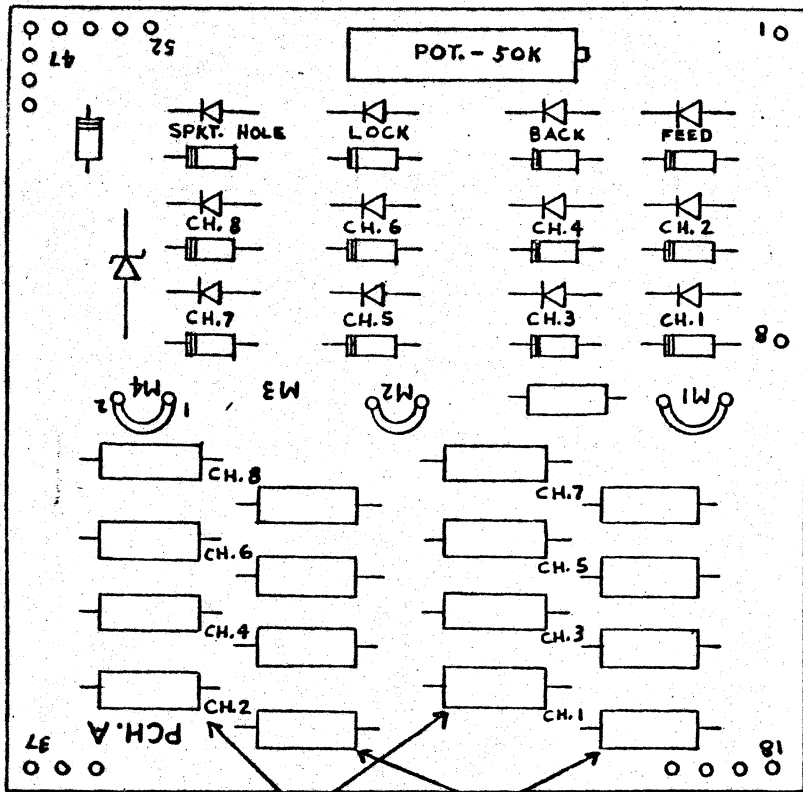


F-ASM.

I/O UNIT P.C. BOARDS

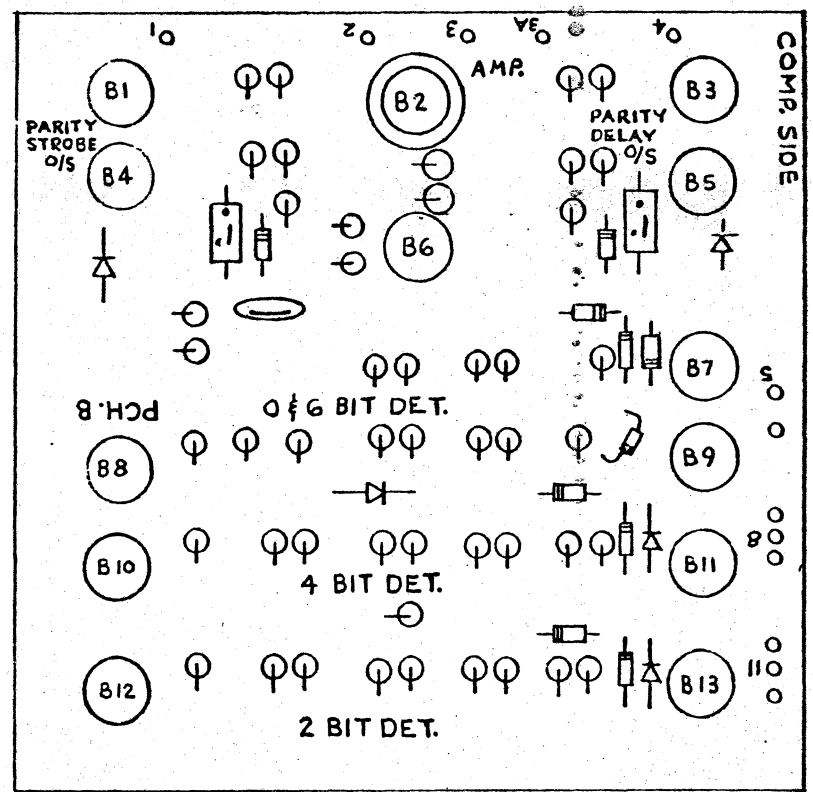


READER PRE-AMP BOARD



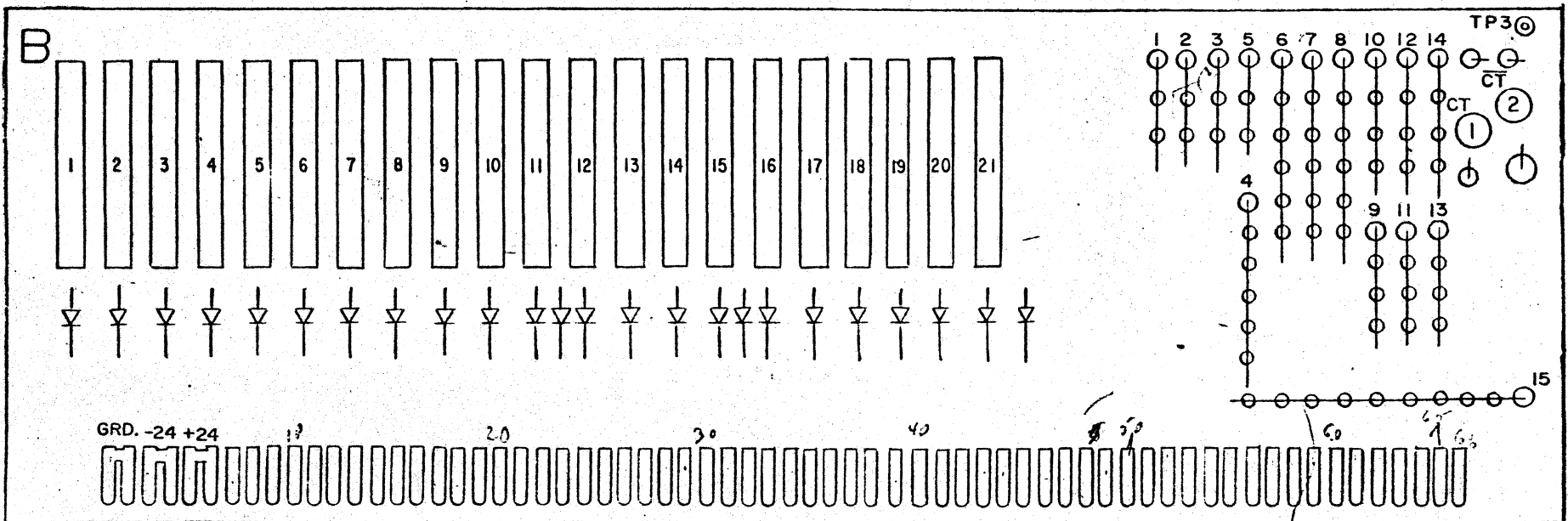
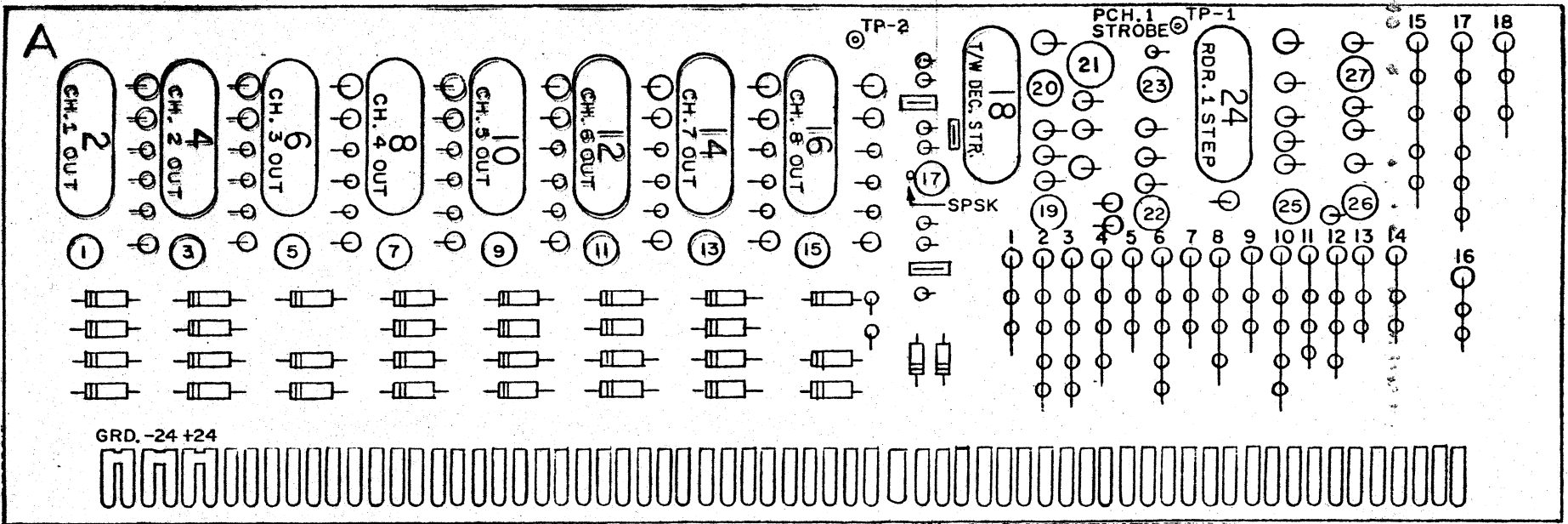
(8) 22.1K (8) 2.2K

A-ASM.



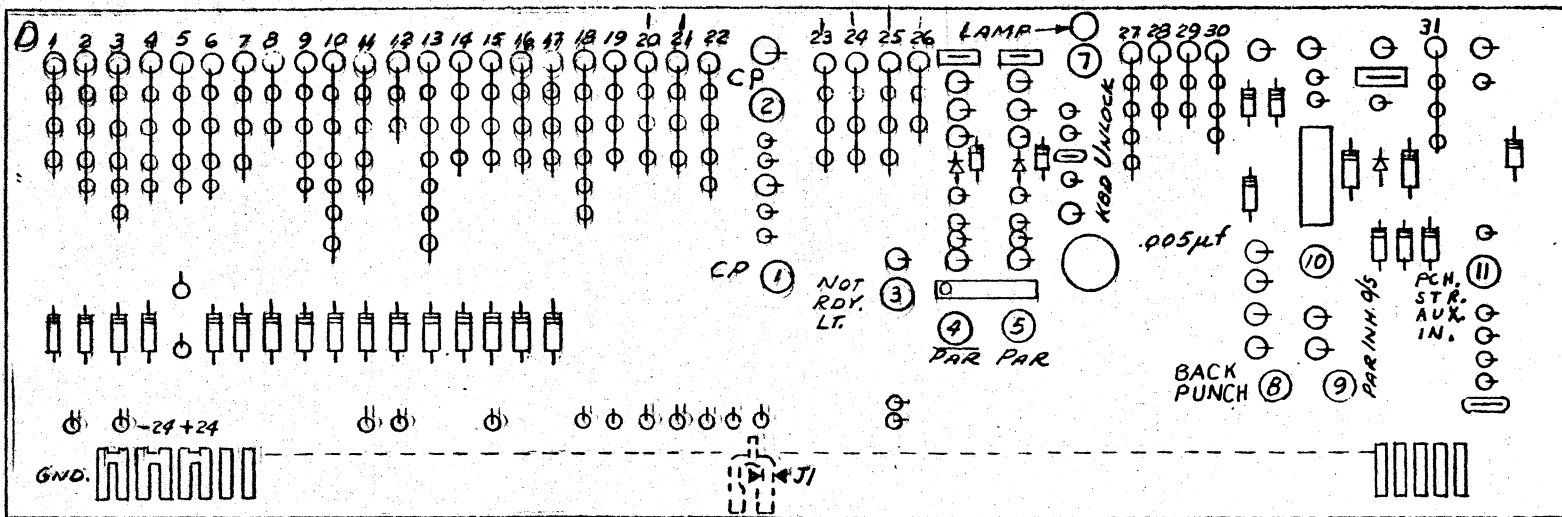
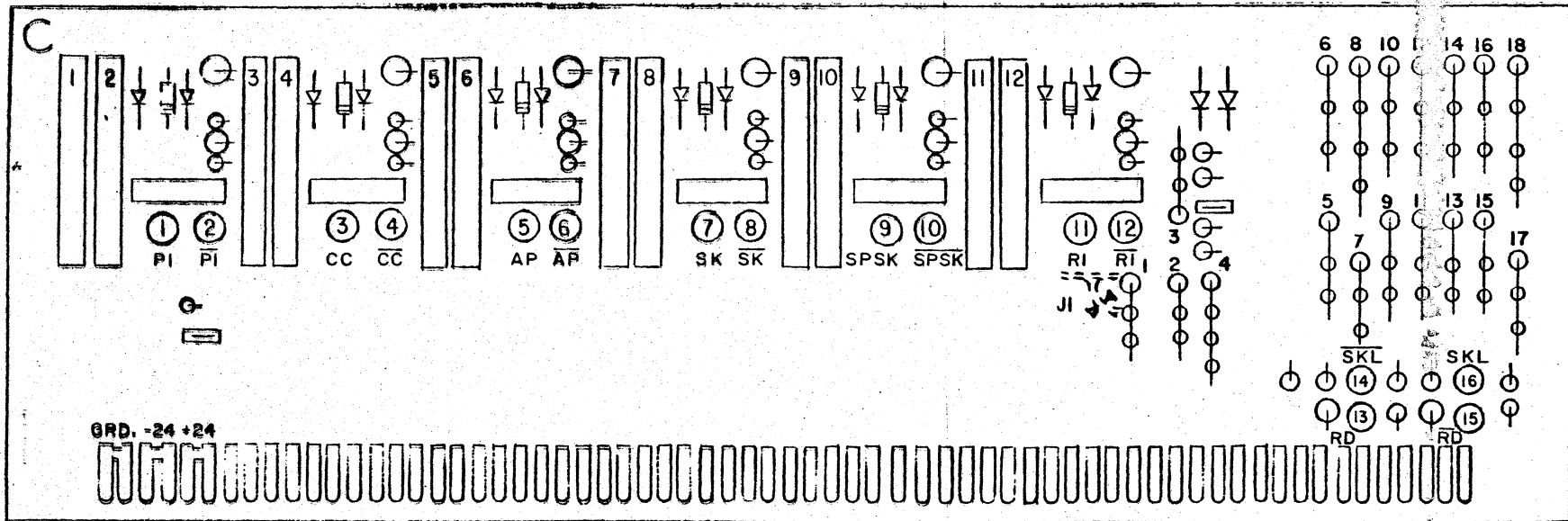
B-ASM.

VERTIPUNCH P.C. BOARDS



CONTROL UNIT P.C. BOARD

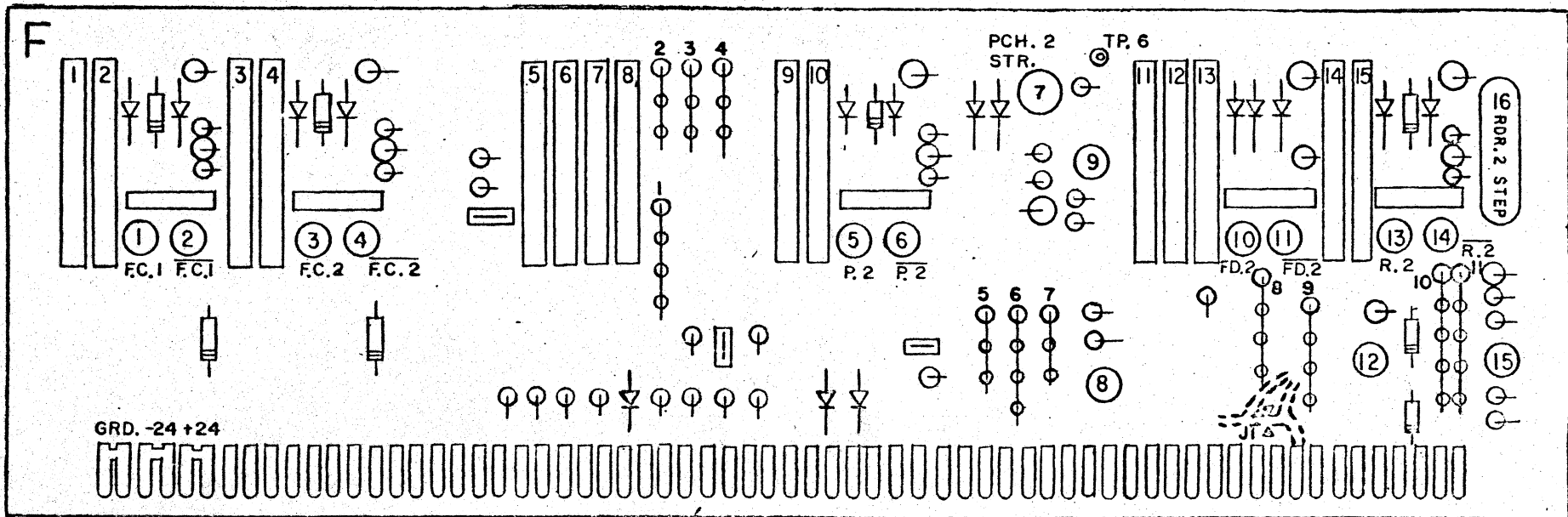
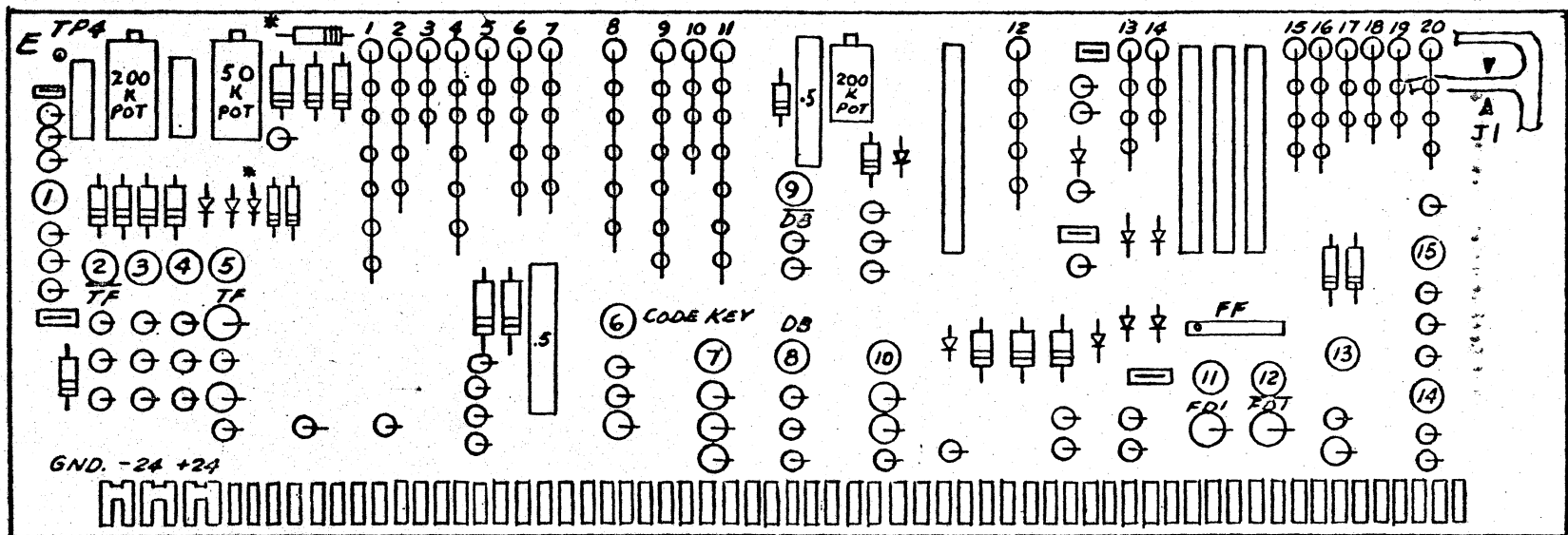
(IXa-65)



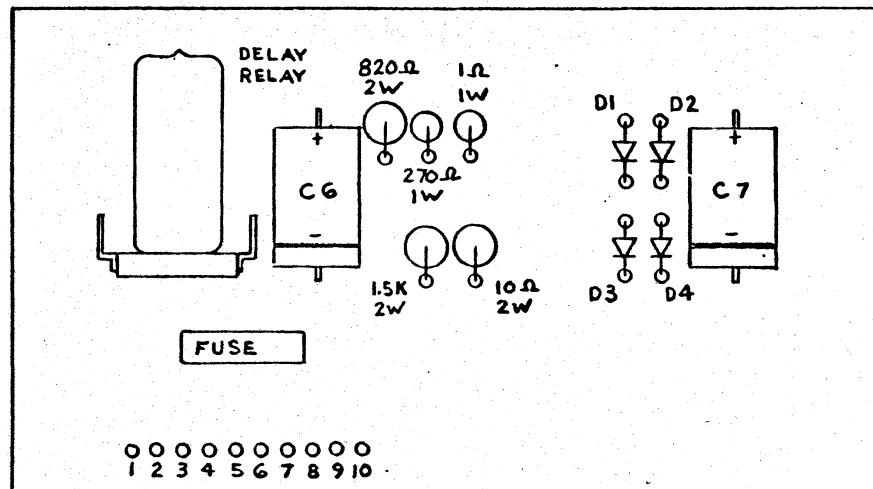
CONTROL UNIT P.C. BOARDS

(IXa-66)  
(REV. 11/12/65)

NOTE: THE TWO \* ON E BOARD DENOTE COMPONENTS ADDED ONLY FOR VERIFIER.



CONTROL UNIT P.C. BOARD



POWER SUPPLY P.C. BOARD

(IXa-68)