

Rec'd. 25-11-74

\$5,910.00

6625-0126-08428

~~Lab 23422~~  
~~S/N 74050~~ Disposal



Model 1090-90

**MODEL 1090 DIGITAL OSCILLOSCOPE**

**SCHEMATICS AND WIRING TABULATIONS**

Nicolet Instrument Corporation  
5225 Verona Road  
Madison, Wisconsin

(608) 271-3333

November, 1973

## TABLE OF CONTENTS

I.	CIRCUIT DIAGRAMS (General Description)	1
II.	WIRING TABULATIONS (General Description)	1
III.	BOARD PLACEMENT DIAGRAM	2
IV.	CIRCUIT DIAGRAMS (Individual Listing)	
	Register Board 1A, 1B (Sheet 1 of 2)	3
	Register Board 1A, 1B (Sheet 2 of 2)	4
	Control Board 2A (Sheet 1 of 2)	5
	Control Board 2A (Sheet 2 of 2)	6
	Address Board 3A	7
	Decimal Board 4A	8
	Decimal Decoder 4A	9
	I/O Board 5A	10
	Front Panel Interface 6A (Sheet 1 of 2)	11
	Front Panel Interface 6A (Sheet 2 of 2)	12
	Display Board 7A (Sheet 1 of 2)	13
	Display Board 7A (Sheet 2 of 2)	14
	Memory (Dynamic)	15
	Memory (RAM)	16
	Front Panel	17
	Power Supply	18
	Power Supply (High Voltage Section)	19
	<u>Model 90 Plug-In</u>	
	Signal Amplifier	20
	Analog to Digital Converter	21
	Trigger and Sweep Circuits	22
	<u>Model 92 Plug-In</u>	
	Signal Attenuators & Multiplexer	23
	Analog to Digital Converter	24
	ADC Discriminator Board	25
	ADC Pulser - Control Board	26
	Control Board	27
	Address Registers, Trigger & Sweep Circuits	28
V.	DIGITAL I/O CONNECTOR DIAGRAM	29
VI.	WIRING TABULATIONS (Listing)	30

## MODEL 1090 TABULATIONS AND SCHEMATICS

### I. CIRCUIT DIAGRAMS

Capacitance values shown are in picofarads unless otherwise indicated.

Signals labeled with a minus sign are at essentially ground potential for "yes," and at about +3.5 volts for "no." For example, the signal RM- is at ground during the command RM (reset M). Signals without the minus sign suffix are active high.

### II. WIRING TABULATIONS

The interconnections between panel, circuit boards, and connectors are shown in the wire wrap tabulations which follow. The signal names given for each wire are identifiable by consulting the associated circuit diagrams. In those diagrams, signals whose acronyms are enclosed in a box are signals which enter or leave the circuit boards.

The boards and components are identified by the prefix in the tabulations; for example, 4A-3 refers to circuit board connector 4A, pin 3. The circuit diagrams may be used to determine which circuit board utilizes connector 4A.

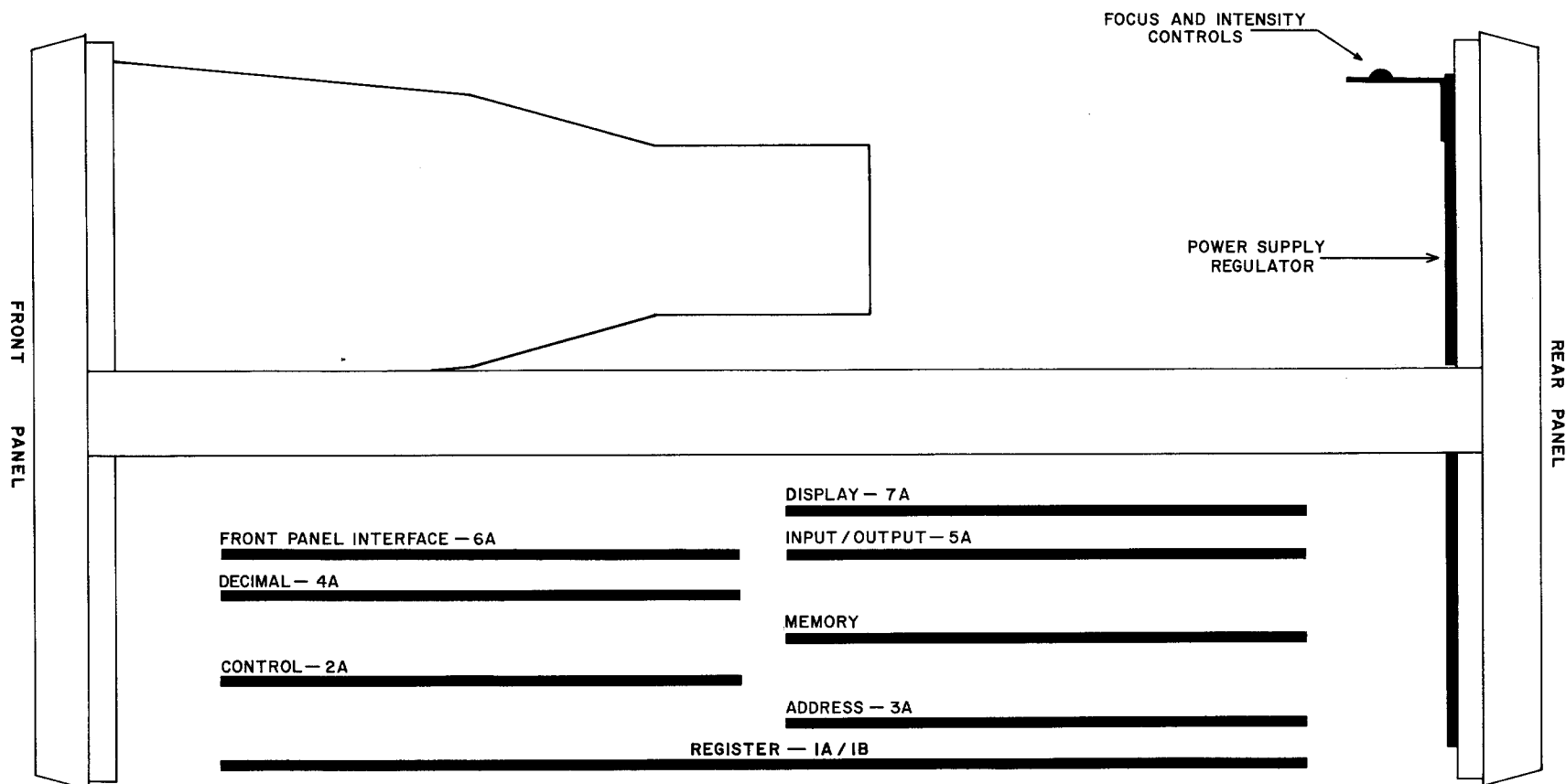
The input plug-in unit is identified by the prefix PL-; the power supply by PS-.

In the tabulations an entry such as:

DSWPE 5B-71 6A-24 7A-34 6B-20

indicates that the signal DSWPE is wire-wrap connected between connectors 5B, 6A, 7A, and 6B at the numbered pins indicated. Each connector pin is numbered with small numerals on the bottom of the connector.

REVISIONS			
SYM.	ZONE	DESCRIPTION	DATE
			APPROVED

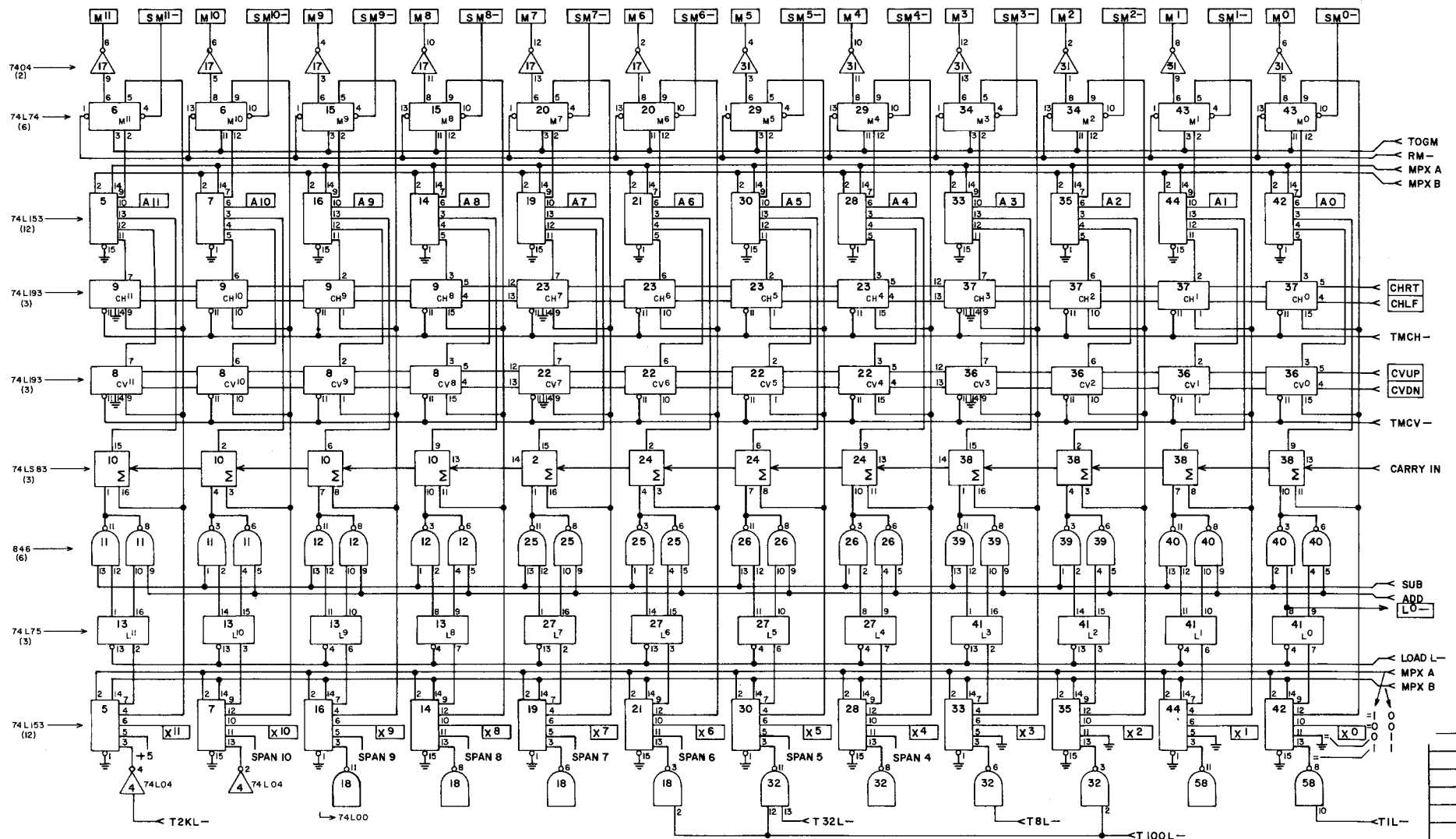


RE  
DIST.  
KEY

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE FRACTIONS DECIMALS ANGLES ± ± ± ✓ INDICATES SURFACE ROUGHNESS PER MIL-STD-10		REMOVE ALL BURRS BREAK ALL SHARP CORNERS		DATE	
MATERIAL		DRAWN		CHECKED	
SPEC.		APPROVED		APPROVED	
FINISH					
SPEC.					
NEXT ASS'Y		USED ON		TITLE	
APPLICATION				BOARD PLACEMENT DIAGRAM	
		CODE IDENT. NO.		SIZE DWG. NO.	
		SCALE		C	
				SHEET 1 of 1	



REVISIONS			
SYM.	ZONE	DESCRIPTION	DATE
			APPROVED



UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
AND TOLERANCES ARE  
FRACTIONS DECIMALS ANGLES  
± ± ±  
√ INDICATES SURFACE  
ROUGHNESS PER MIL-STD-10

MATERIAL

SPEC.

FINISH

SPEC.

REMOVE ALL BURRS  
BREAK ALL SHARP CORNERS

DRAWN DATE

CHECKED

APPROVED

APPROVED

TITLE

1090/1020 REGISTER BOARD 1A/1B

CODE IDENT.

NO.

SIZE

C

DWG. NO.

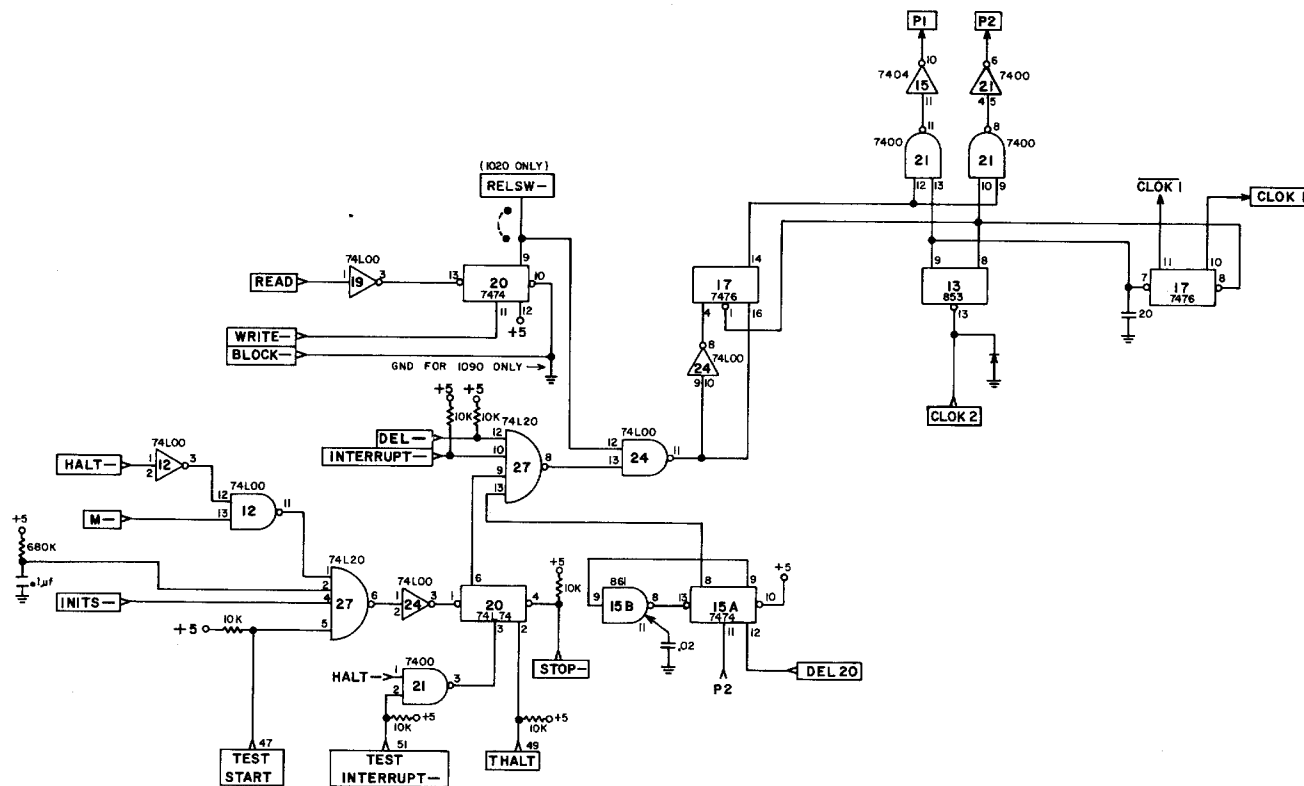
SCALE

SHEET 2 of 2

NEXT ASS'Y USED ON  
APPLICATION

DIST.  
KEY

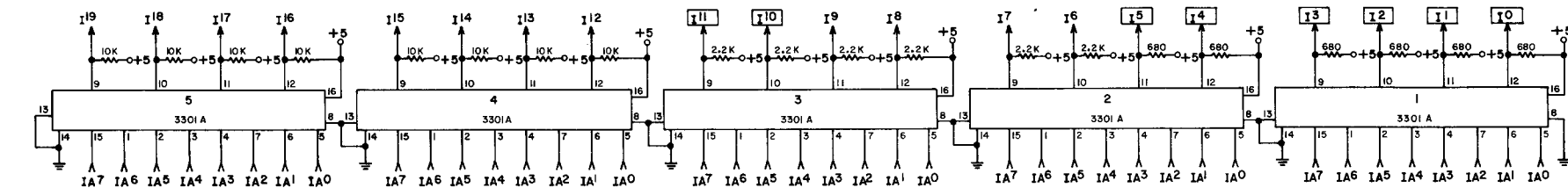
REVISIONS				
SYM.	ZONE	DESCRIPTION	DATE	APPROVED



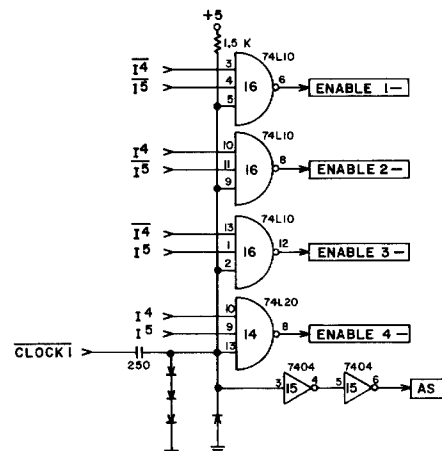
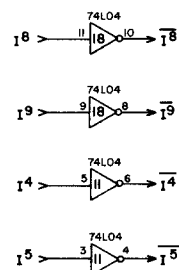
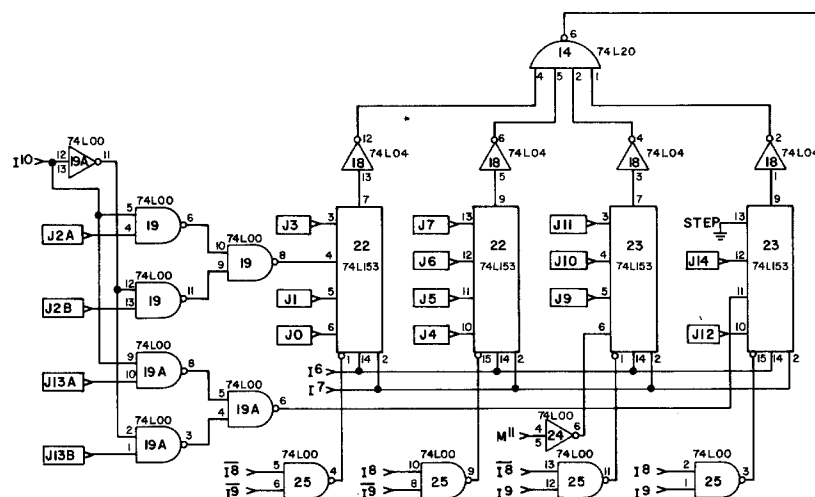
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE FRACTIONS    DECIMALS    ANGLES ±                    ±                    ± ✓ INDICATES SURFACE ROUGHNESS PER MIL-STD-10	REMOVE ALL BURRS BREAK ALL SHARP CORNERS		TITLE  1090/1020 CONTROL BOARD 2A		
	DRAWN	DATE			
	CHECKED		CODE IDENT. NO.		
	APPROVED				
	APPROVED		C		
MATERIAL			SCALE	SHEET 1 of 2	
SPEC.					
FINISH					
SPEC.					

## REVISIONS

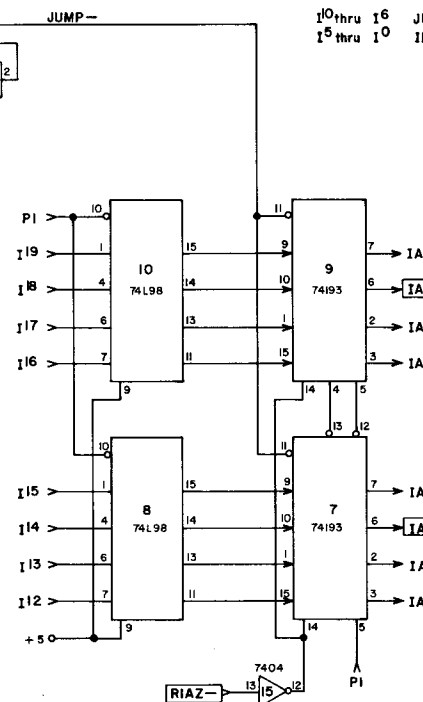
SYM.	ZONE	DESCRIPTION	DATE	APPROVED
------	------	-------------	------	----------



I<sup>10</sup> thru I<sup>12</sup> JUMP DESTINATION  
 I<sup>11</sup> BLANKING  
 I<sup>10</sup> thru I<sup>16</sup> JUMP CONDITION  
 I<sup>5</sup> thru I<sup>10</sup> INSTRUCTION



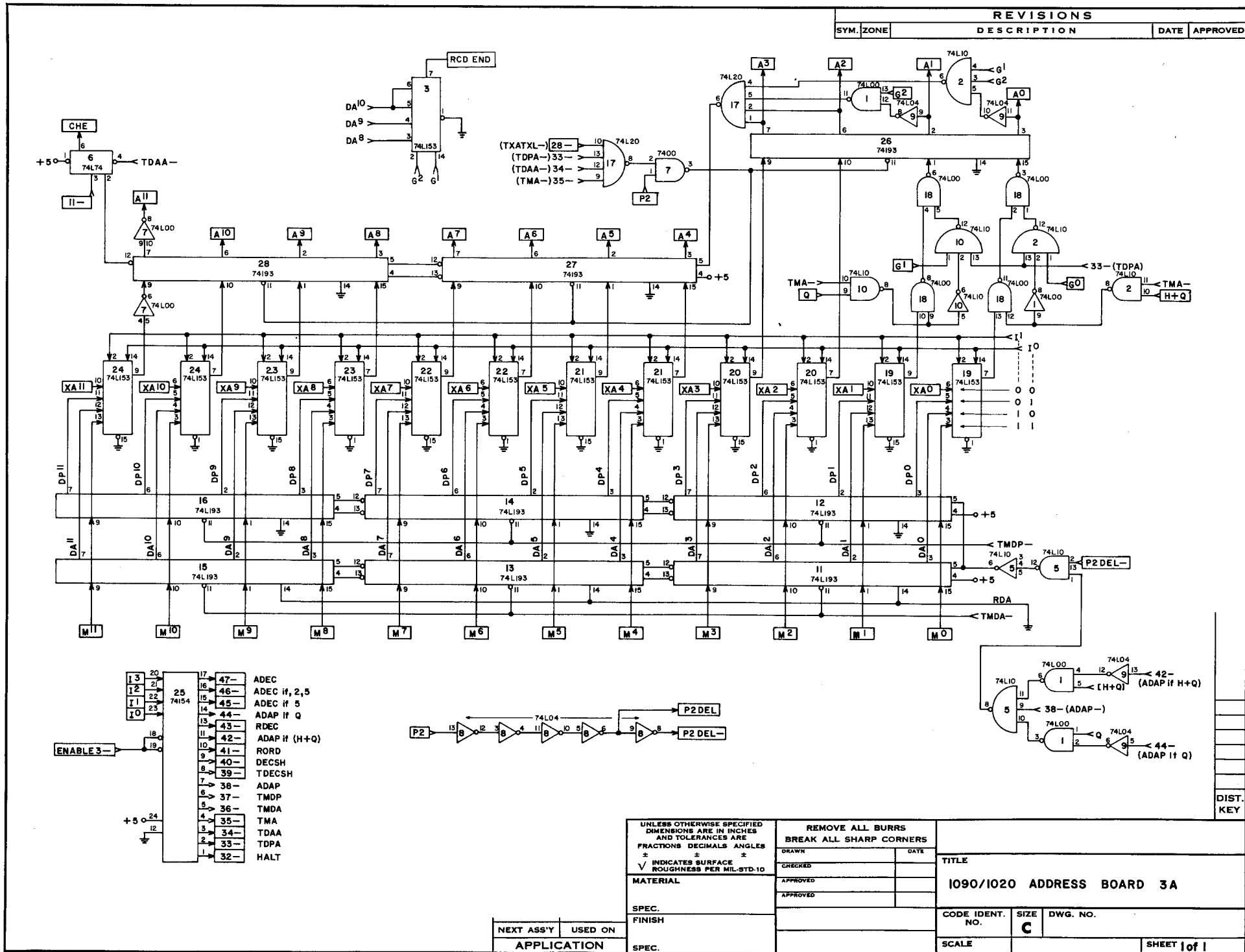
NEXT ASS'Y USED ON  
 APPLICATION



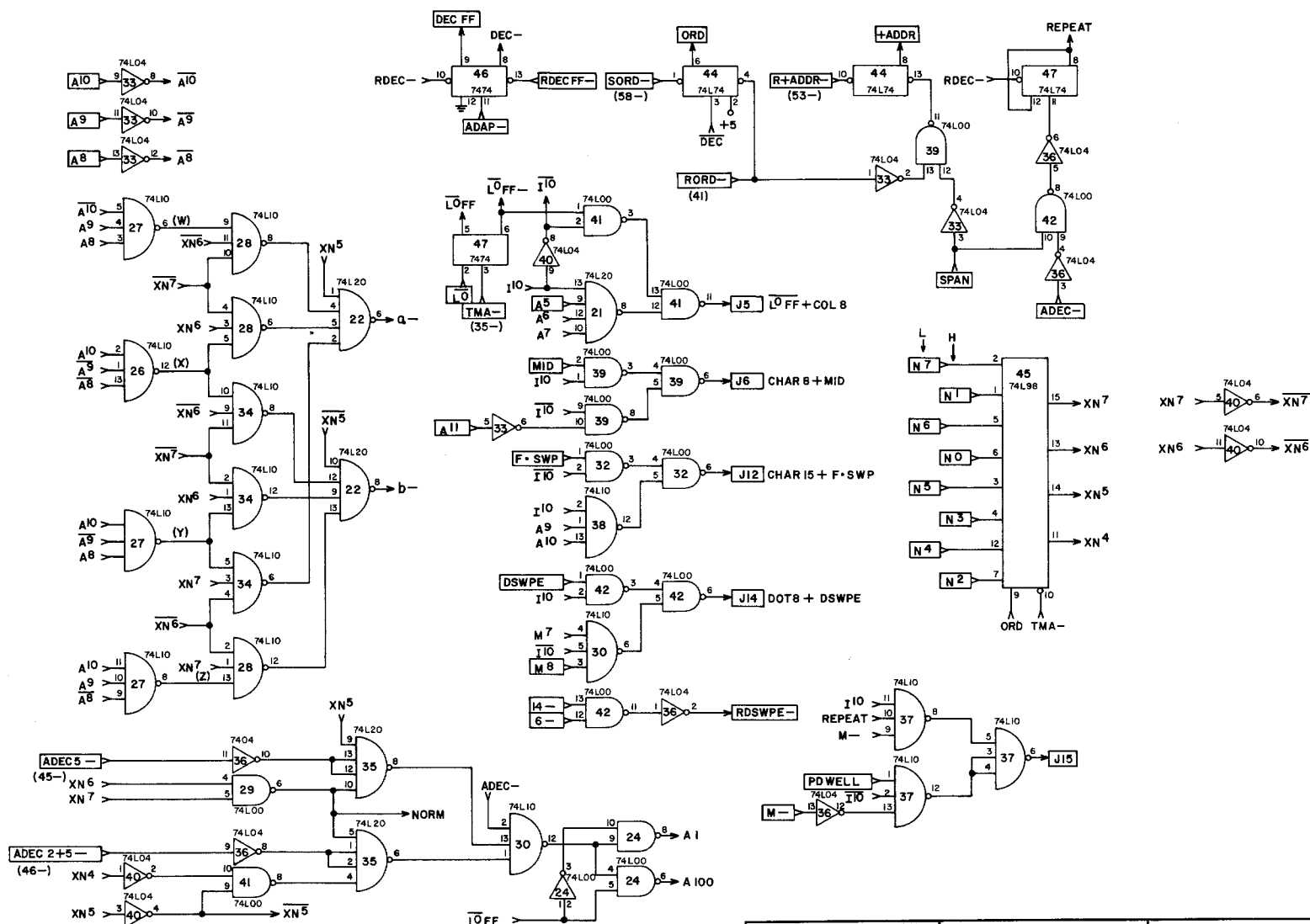
ALL DIODES FD-6666 UNLESS OTHERWISE INDICATED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE FRACTIONS DECIMALS ANGLES ± ± ± ✓ INDICATES SURFACE ROUGHNESS PER MIL-STD-10		REMOVE ALL BURRS BREAK ALL SHARP CORNERS		DATE	
MATERIAL		DRAWN		TITLE	
SPEC. FINISH		CHECKED		I090/I020 CONTROL BOARD 2A	
SPEC.		APPROVED		CODE IDENT. NO.	
		APPROVED		SIZE DWG. NO.	
				SCALE	
				SHEET 2 of 2	

DIST.  
KEY

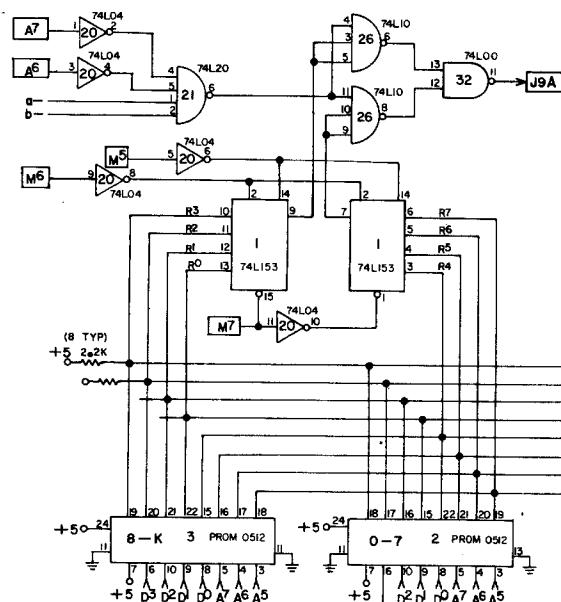


REVISIONS			
SYM.	ZONE	DESCRIPTION	DATE APPROVED

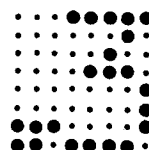


UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE FRACTIONS DECIMALS ANGLES ± ± ± ✓ INDICATES SURFACE ROUGHNESS PER MIL-STD-10		REMOVE ALL BURRS BREAK ALL SHARP CORNERS		TITLE	
MATERIAL		DRAWN		DATE	
SPEC. FINISH		CHECKED		APPROVED	
SPEC.		APPROVED		APPROVED	
NEXT ASSY		USED ON		CODE IDENT. NO.	
APPLICATION		SPEC.		SIZE	
				DWG. NO.	
				SCALE	
				SHEET 1 of 2	

DIST.  
KEY

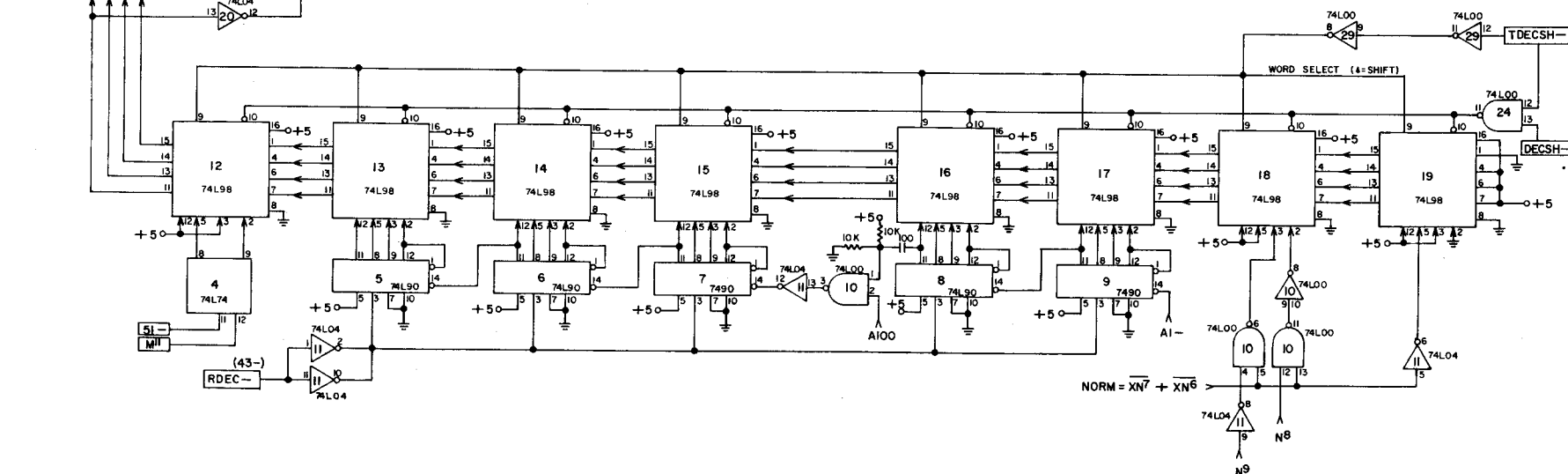


$\overline{A^5} A^5$   
 $\overline{A^6} A^6$   
 $\overline{A^7} A^7$



# BCD CODE

0000	=	0
0001	=	1
0010	=	2
0011	=	3
0100	=	4
0101	=	5
0110	=	6
0111	=	7
1000	=	8
1001	=	9
1010	=	S
1011	=	-
1100	=	J
1101	=	M
1110	=	BLANK
1111	=	K



TITLE

1090 / 1020 DECIMAL DECODER 4A

DRAWN

SIZE

DWG. NO.

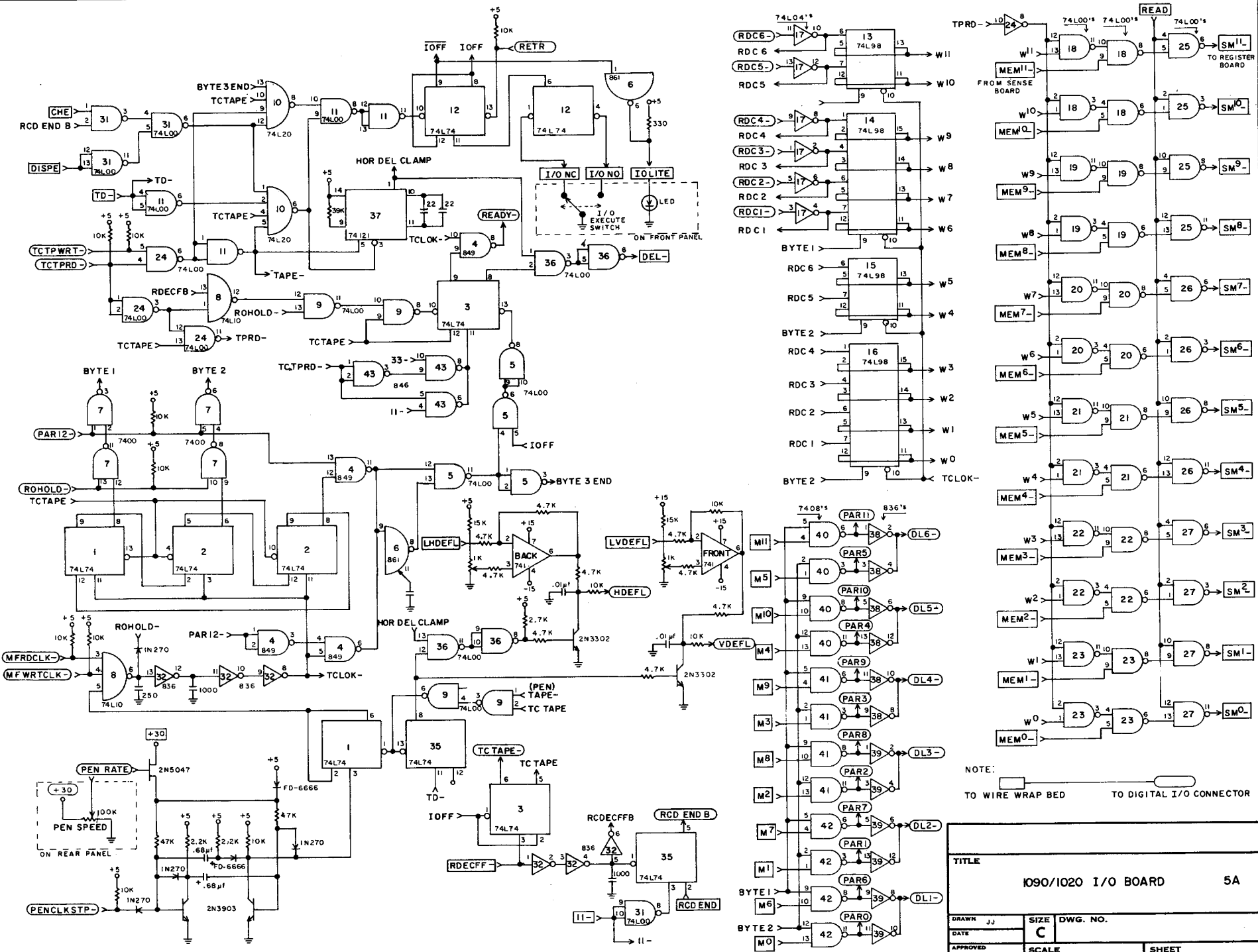
DATE

C

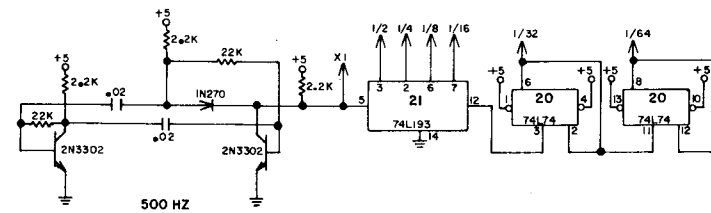
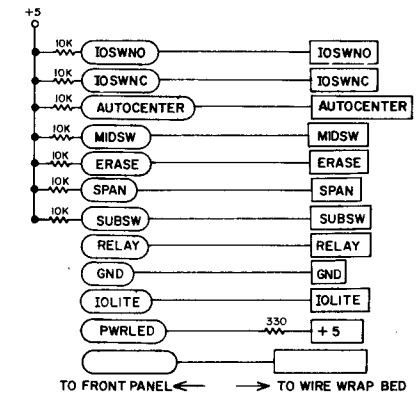
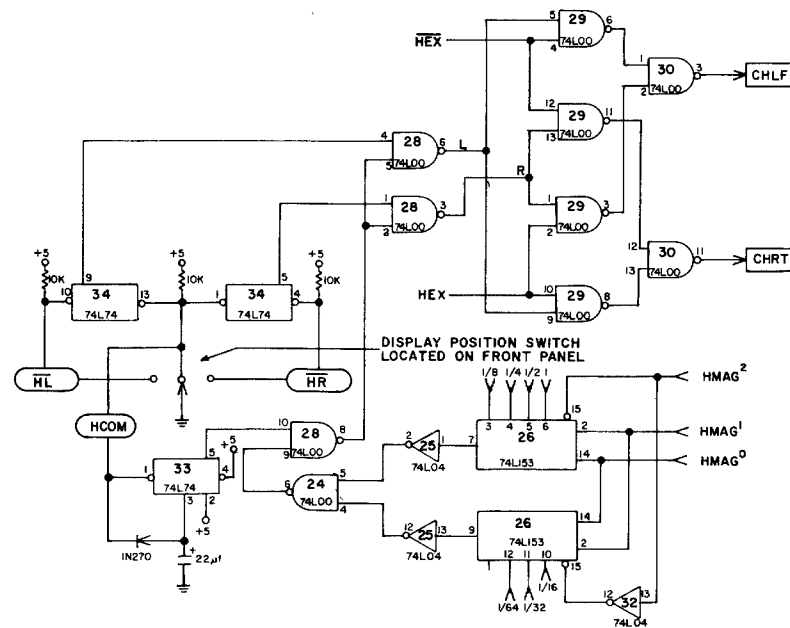
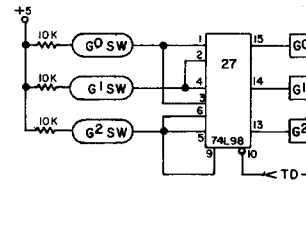
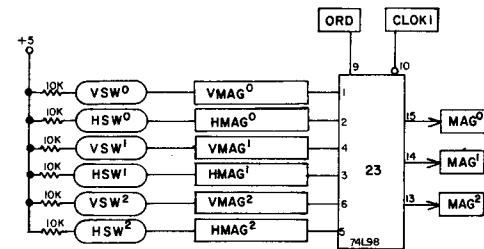
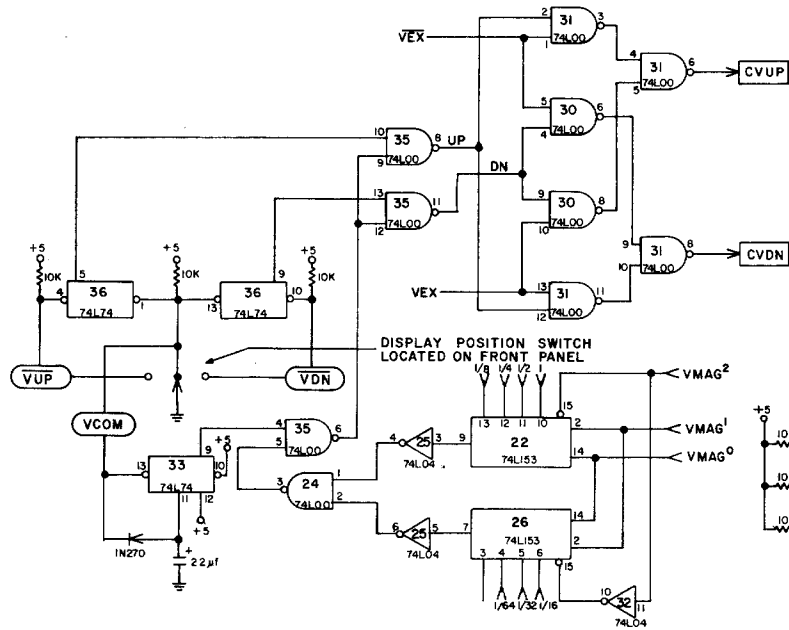
APPROVED

SCALE

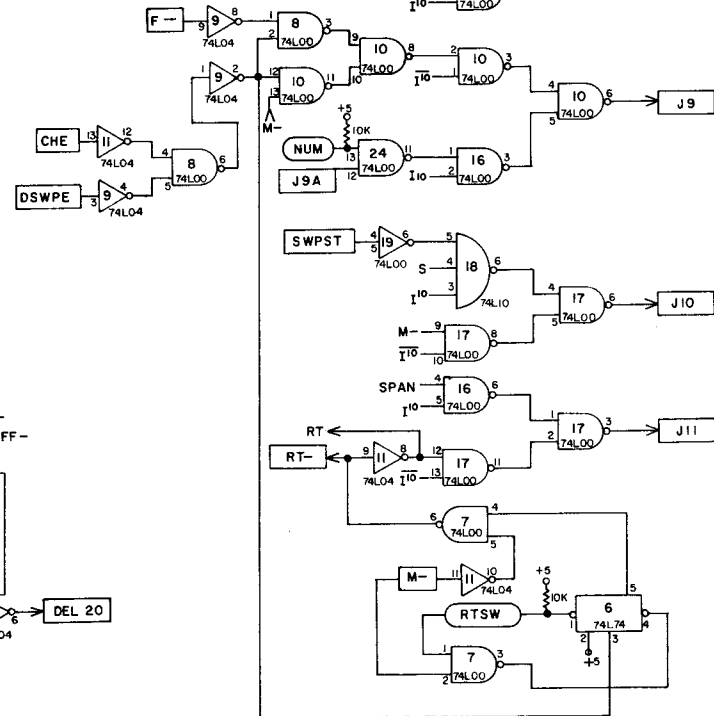
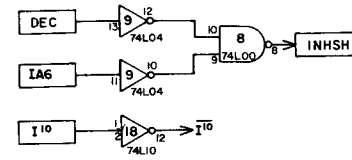
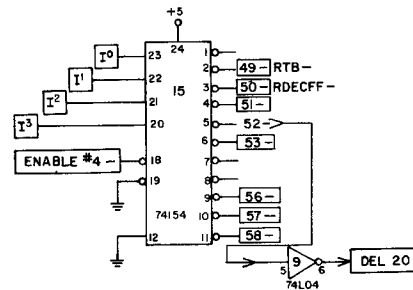
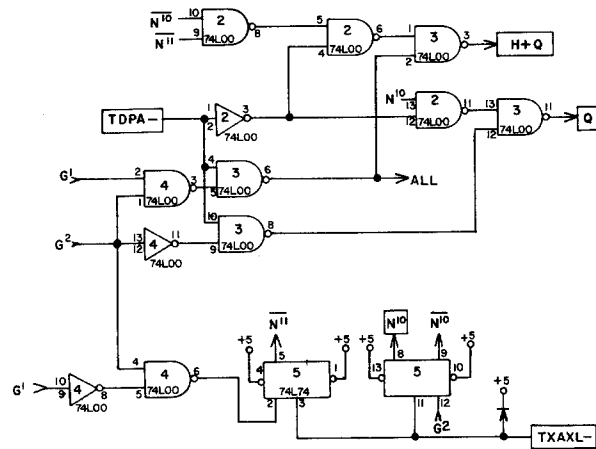
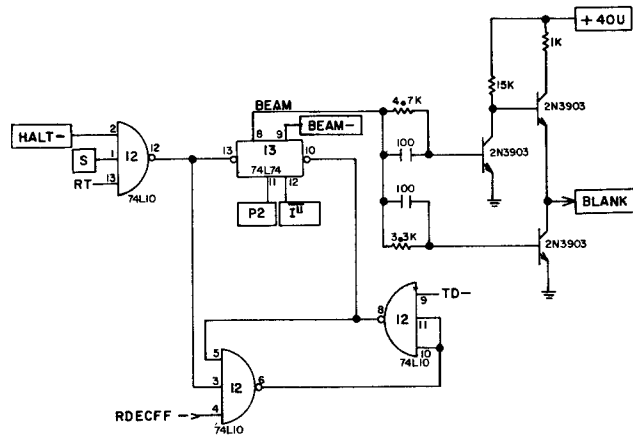
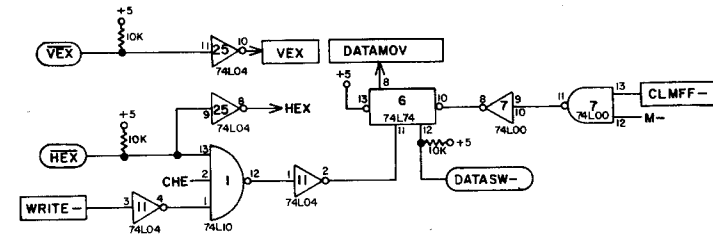
SHEET 2 of 2



REVISIONS			
SYM.	ZONE	DESCRIPTION	DATE APPROVED



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE FRACTIONS DECIMALS ANGLES ± ± ± ✓ INDICATES SURFACE ROUGHNESS PER MIL-STD-10		REMOVE ALL BURRS BREAK ALL SHARP CORNERS		DATE	
MATERIAL		DRAWN		CHECKED	
SPEC.		APPROVED		APPROVED	
FINISH		TITLE		FRONT PANEL INTERFACE 6A 1090/1020	
SPEC.		CODE IDENT. NO.		SIZE DWG. NO.	
APPLICATION		SCALE		C	
NEXT ASS'Y USED ON		SHEET 1 of 2		DIST. KEY	



## REVISIONS

SYM. ZONE	DESCRIPTION	DATE	APPROVED
-----------	-------------	------	----------

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
AND TOLERANCES ARE  
FRACTIONS DECIMALS ANGLES  
± ± ±  
✓ INDICATES SURFACE  
ROUGHNESS PER MIL-STD-10

MATERIAL

SPEC.  
FINISH

SPEC.

REMOVE ALL BURRS  
BREAK ALL SHARP CORNERS

DRAWN	DATE
CHECKED	
APPROVED	
APPROVED	

TITLE  
FRONT PANEL INTERFACE 6A 1090/1020

CODE IDENT. NO. SIZE DWG. NO.

SCALE SHEET 2 of 2

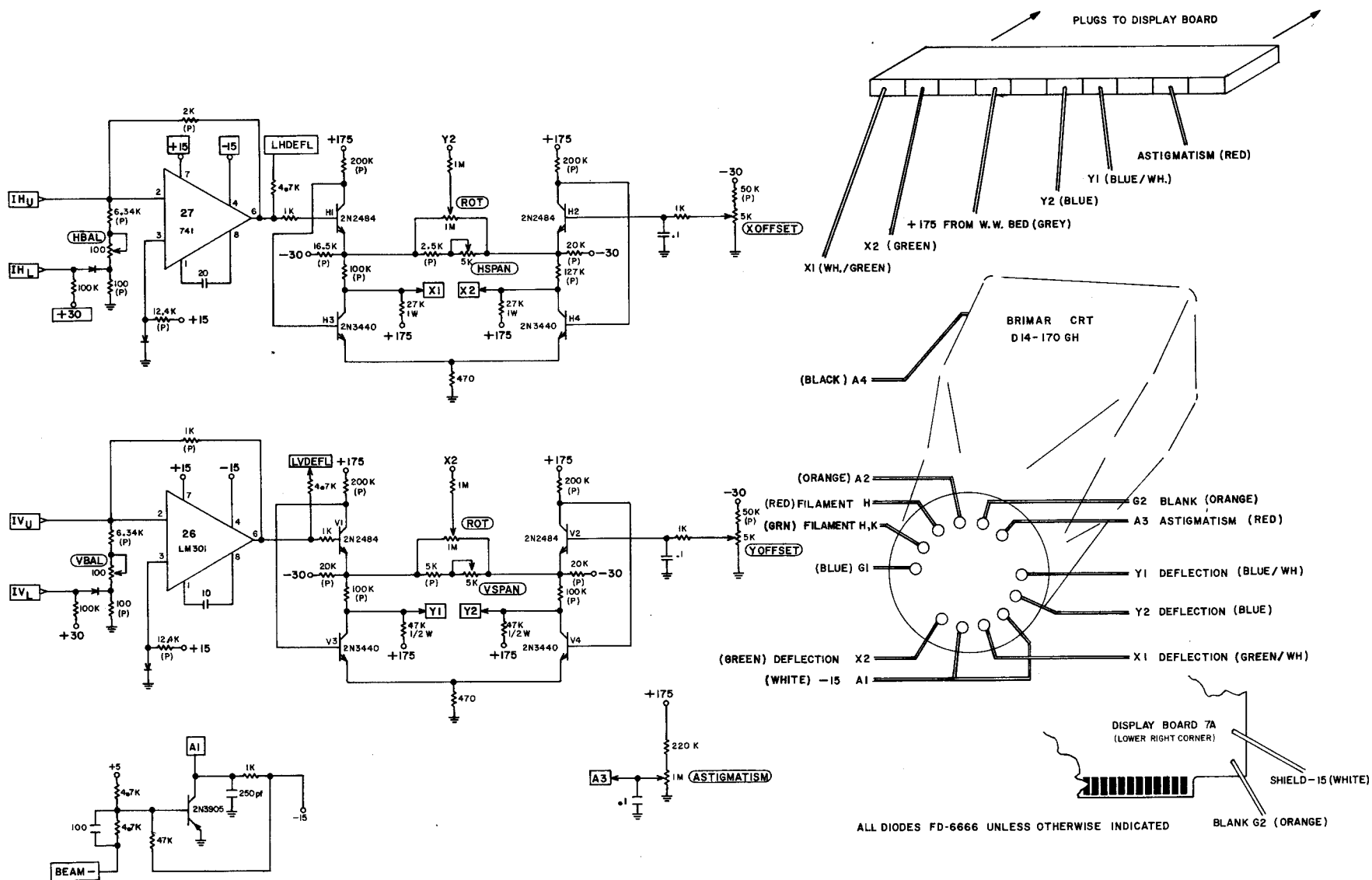
NEXT ASSY USED ON  
APPLICATION



**SHEET 1 of 2**

**DIST.**  
**KEY**

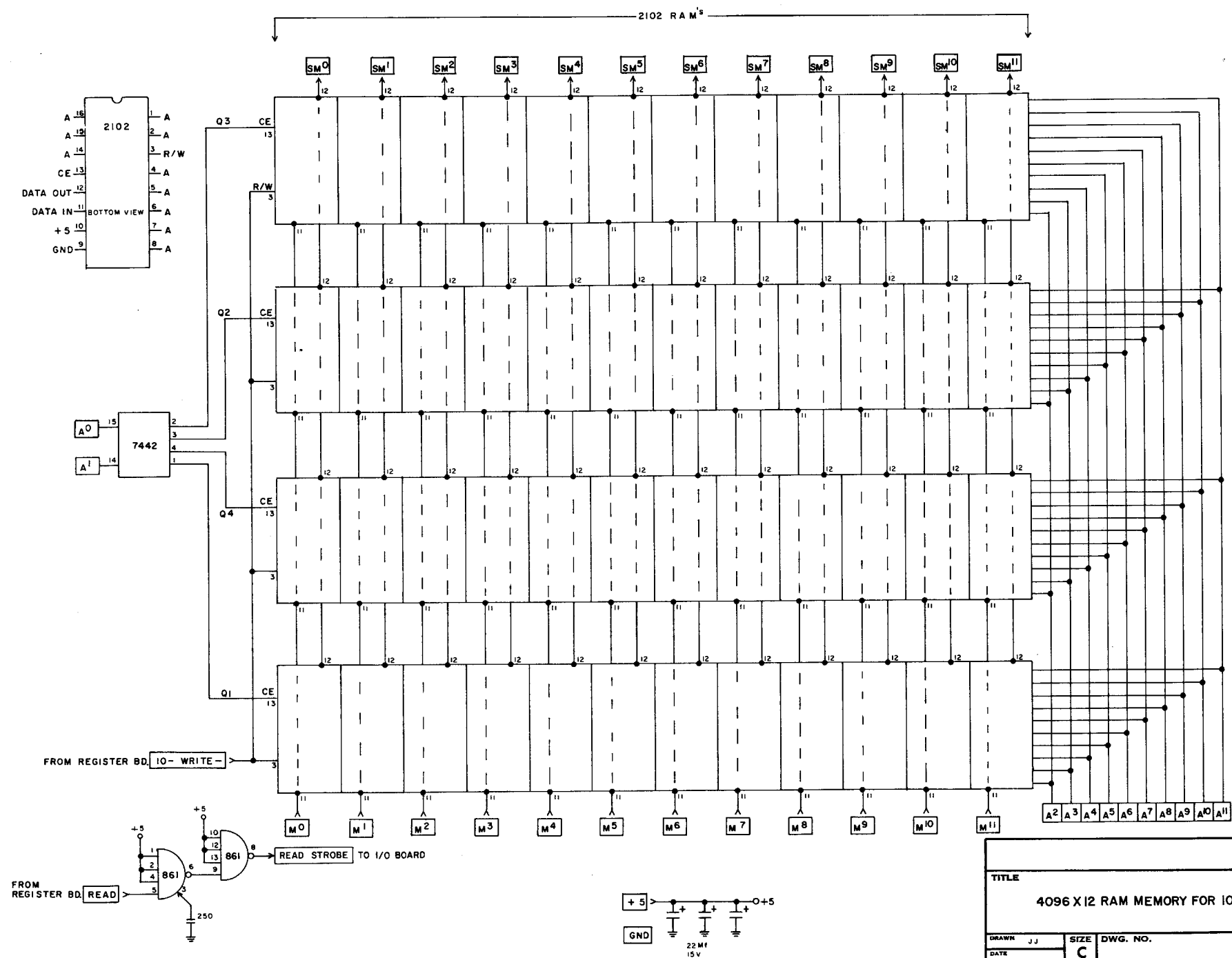
REVISIONS				
SYM.	ZONE	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE FRACTIONS DECIMALS ANGLES ± ± ± ✓ INDICATES SURFACE ROUGHNESS PER MIL-STD-10	REMOVE ALL BURRS BREAK ALL SHARP CORNERS		TITLE	
	DRAWN	DATE	I090/I020 DISPLAY BOARD 7A	
	CHECKED			
	APPROVED			
MATERIAL	APPROVED		CODE IDENT. NO.	SIZE DWG. NO.
SPEC. FINISH			SCALE	C
SPEC.				SHEET 2 of 2

NEXT ASS'Y	USED ON
APPLICATION	





TITLE

4096 X 12 RAM MEMORY FOR I090/I020

DRAWN J J

SIZE

C

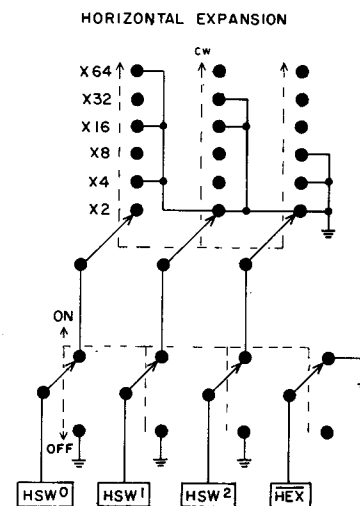
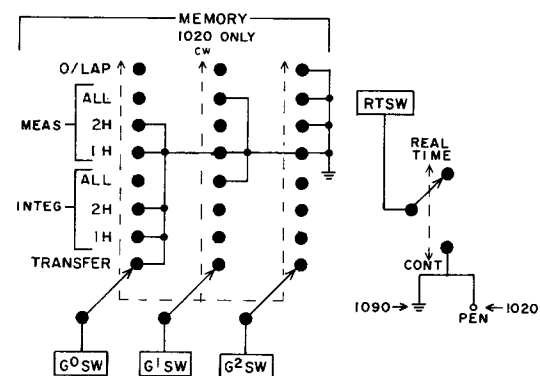
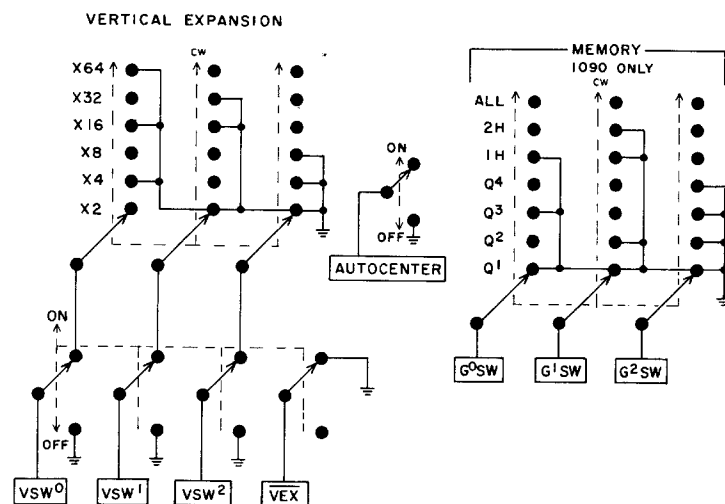
DWG. NO.

DATE

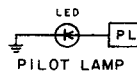
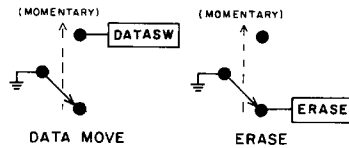
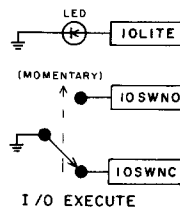
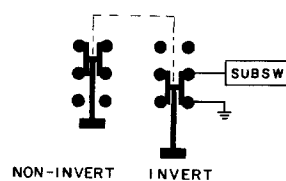
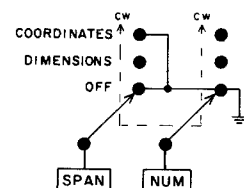
APPROVED

SCALE

SHEET

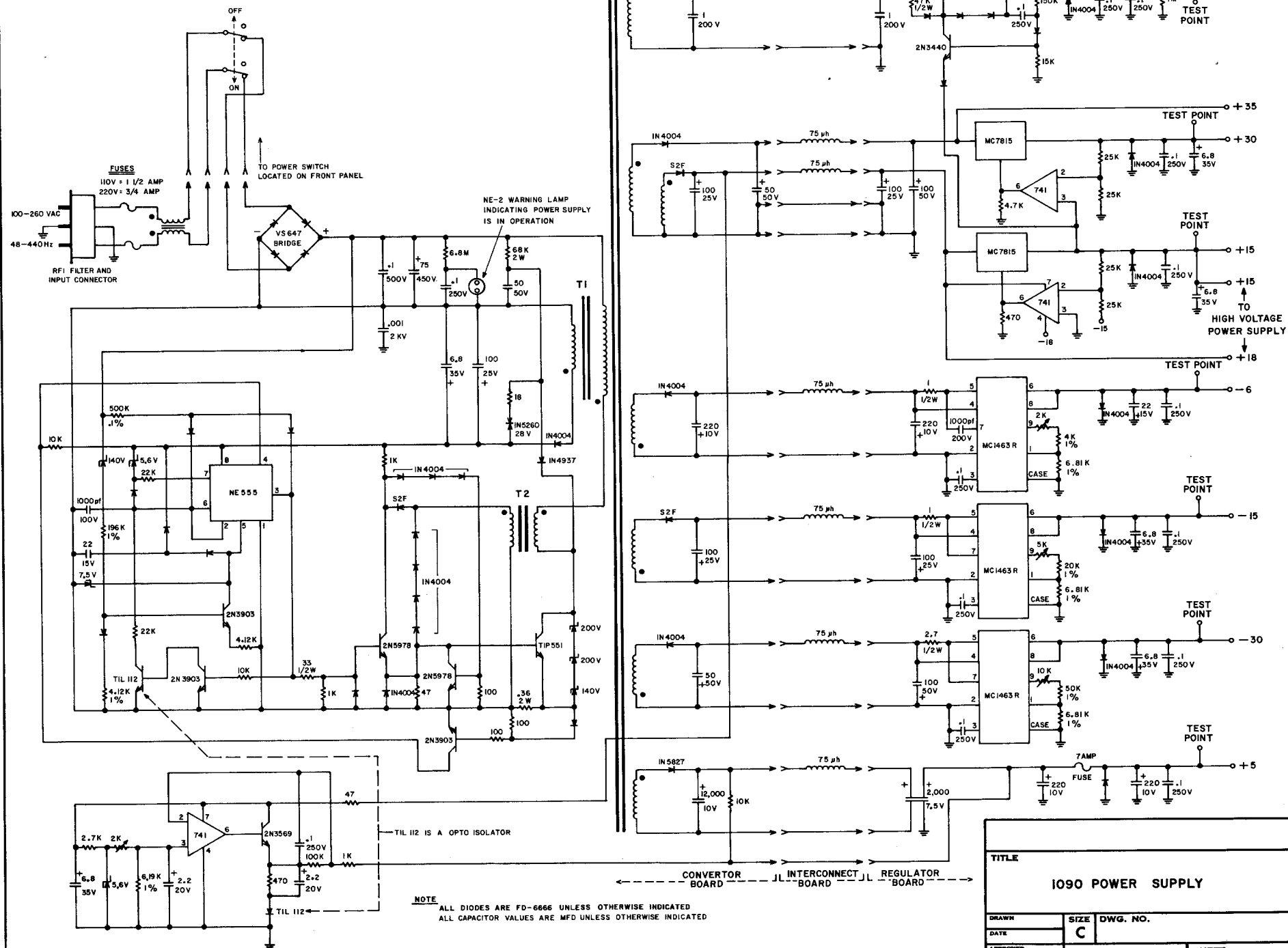


HORIZONTAL AND VERTICAL POSITION SWITCHES  
(SHOWN ON FRONT PANEL INTERFACE 6A)

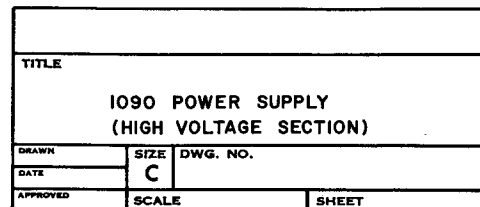


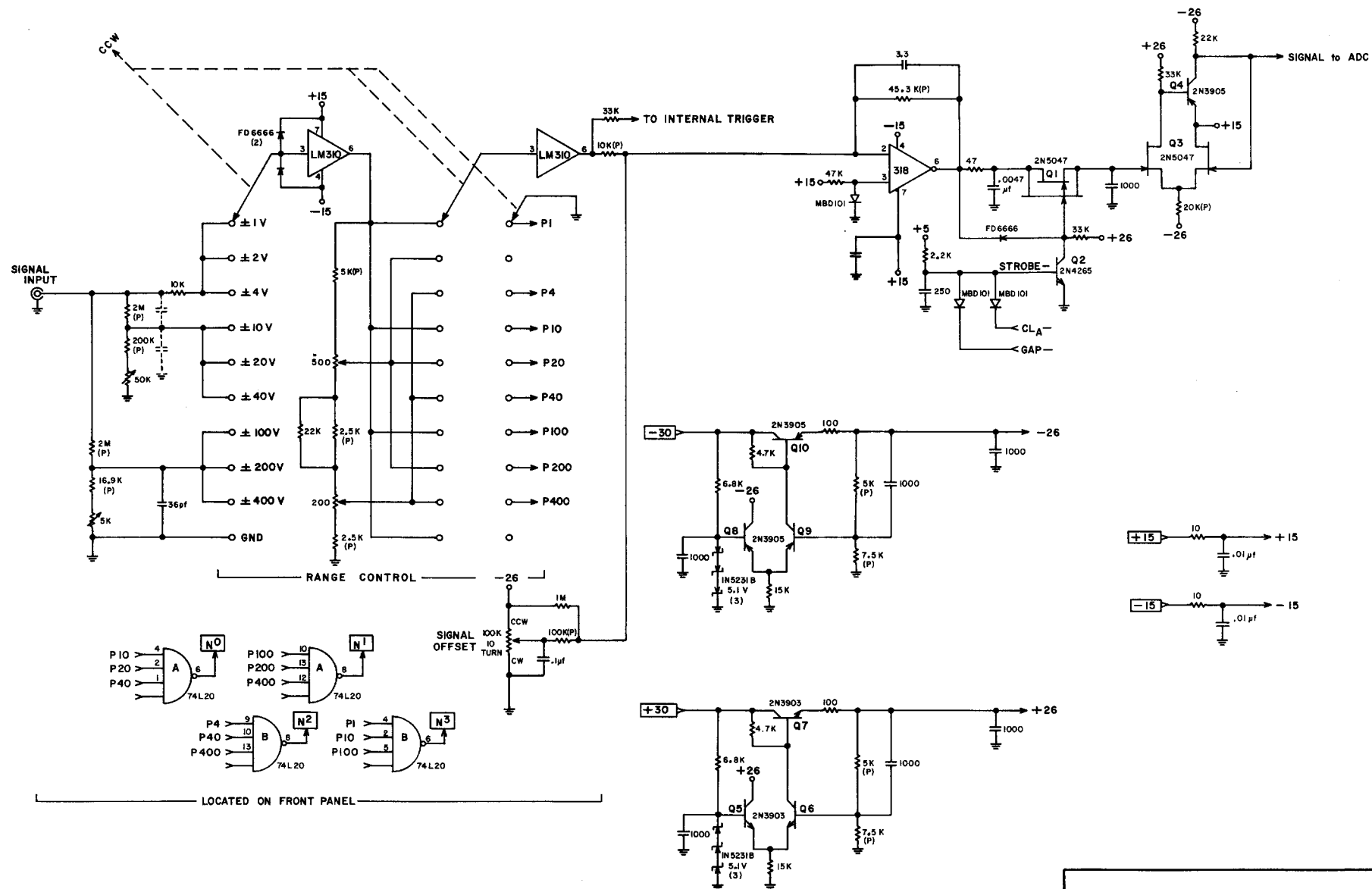
POWER SWITCH  
(SEE POWER SUPPLY)

TITLE		
1090/1020 FRONT PANEL		
DRAWN JJ	SIZE C	DWG. NO.
DATE 10/3/73	APPROVED	SHEET



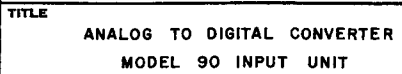
TITLE			
1090 POWER SUPPLY			
DRAWN		SIZE	DWG. NO.
DATE		C	
APPROVED		SHEET	



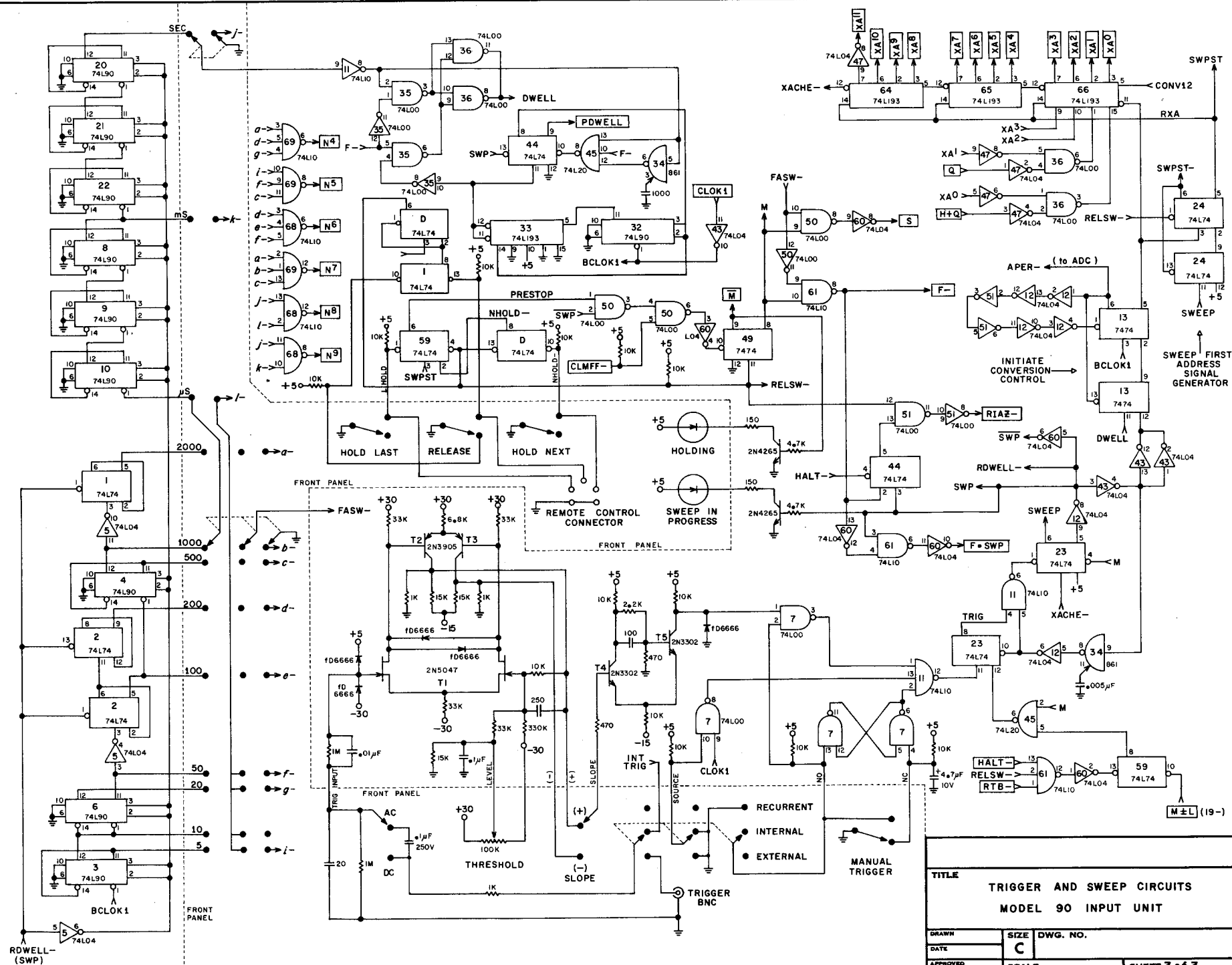


TITLE  
SIGNAL AMPLIFIER  
MODEL 90 INPUT UNIT

DRAWN	SIZE	DWG. NO.
DATE	C	
APPROVED	SCALE	SHEET 1 of 3

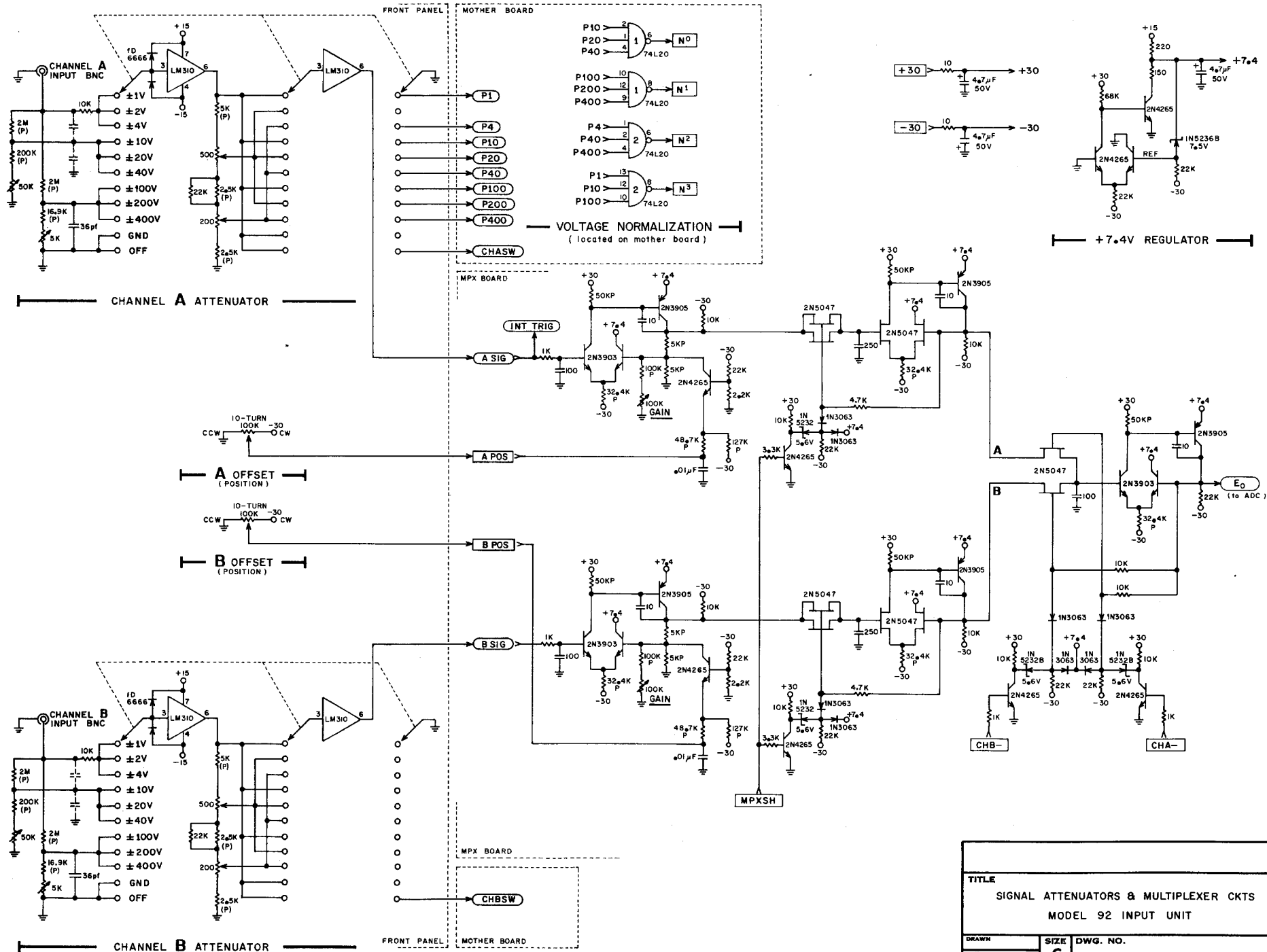


**SHEET 2 of 3**

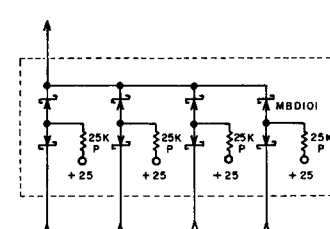
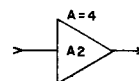
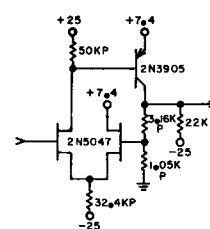
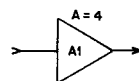
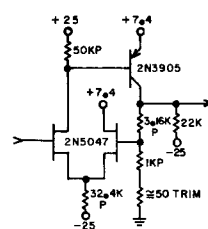
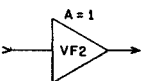
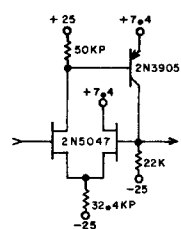
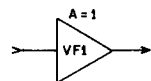
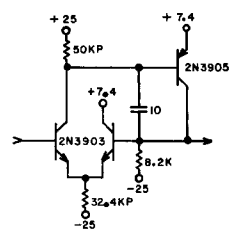
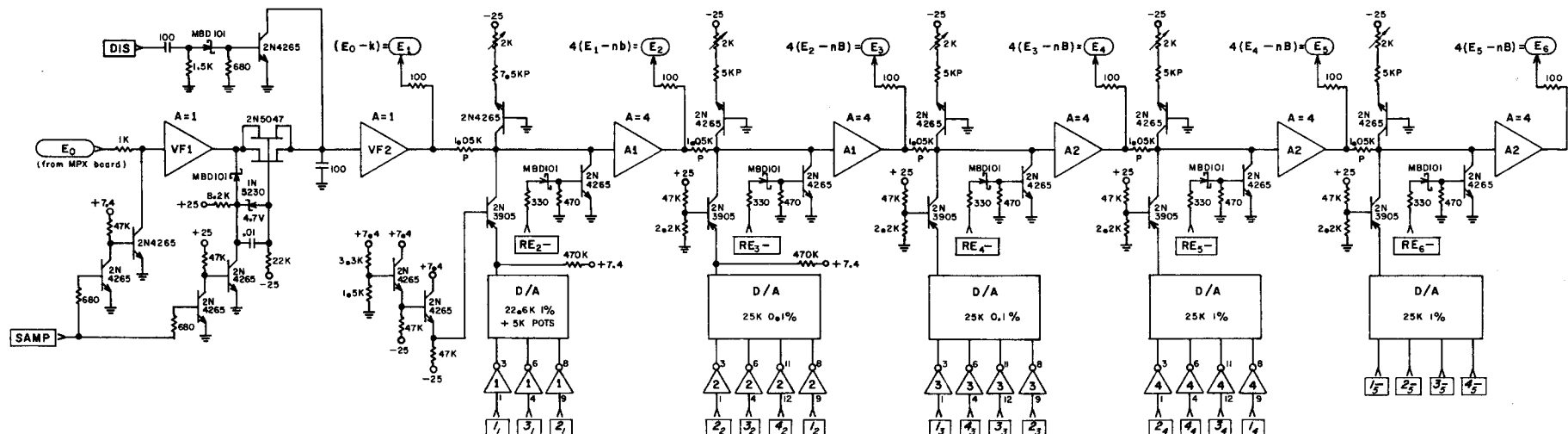


TITLE	TRIGGER AND SWEEP CIRCUITS
	MODEL 90 INPUT UNIT

DRAWN	SIZE	DWG. NO.
DATE	C	
APPROVED	SCALE	SHEET 3 of 3

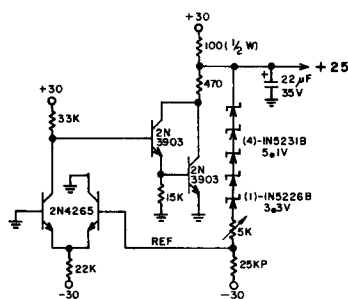


TITLE		
SIGNAL ATTENUATORS & MULTIPLEXER CKTS		
MODEL 92 INPUT UNIT		
DRAWN	SIZE	DWG. NO.
DATE	C	
APPROVED	SCALE	SHEET 1 of 6

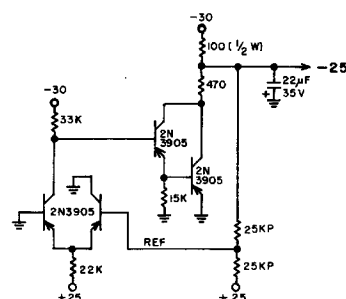


## DIGITAL-TO-ANALOG CONVERTERS

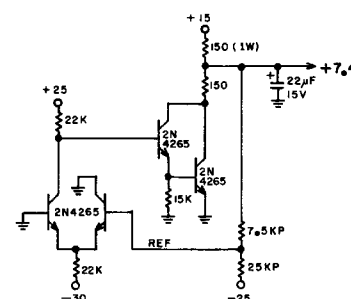
### AMPLIFIER DETAILS



— +25V REGULATOR —



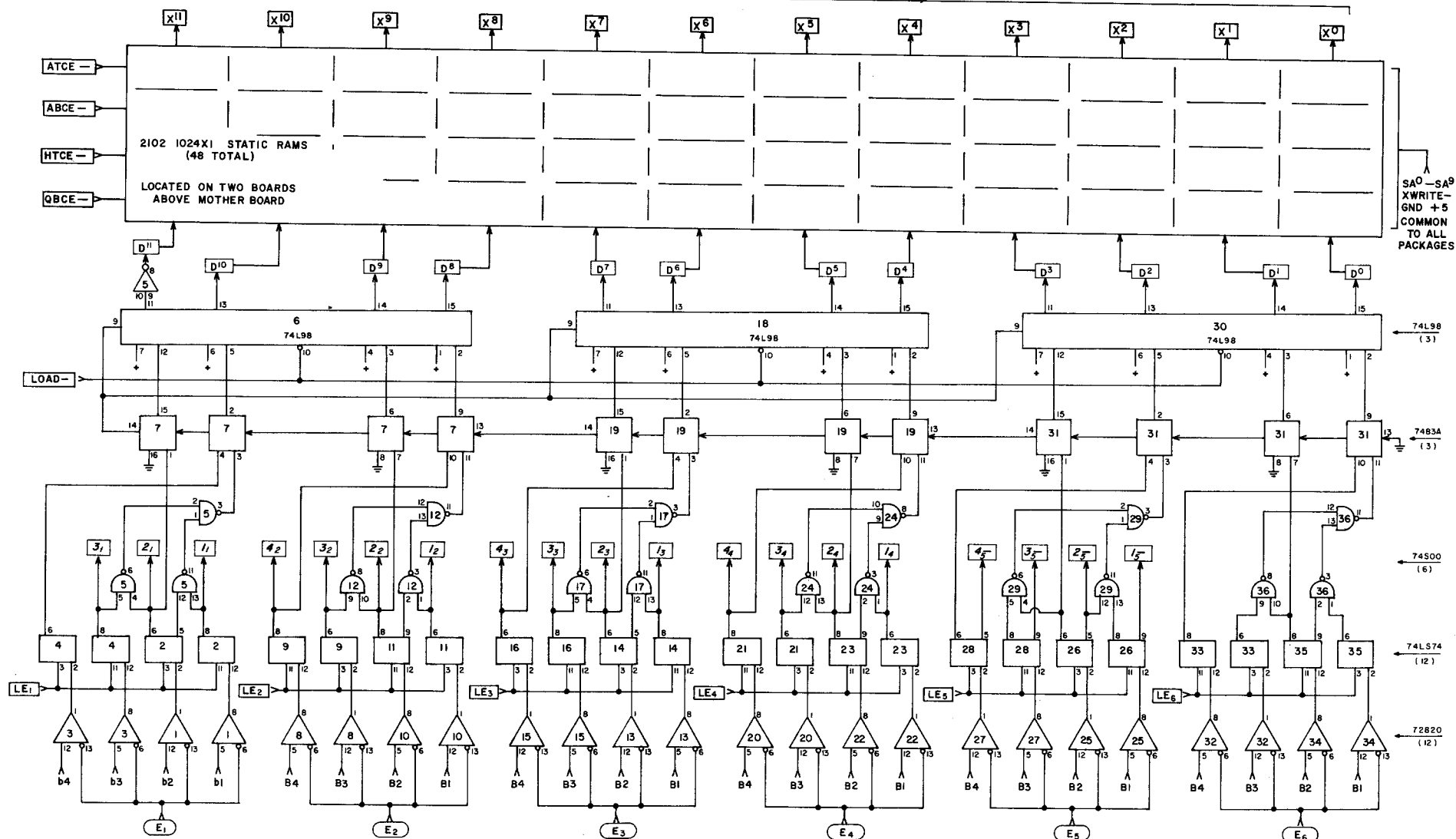
└── -25V REGULATOR ──┘



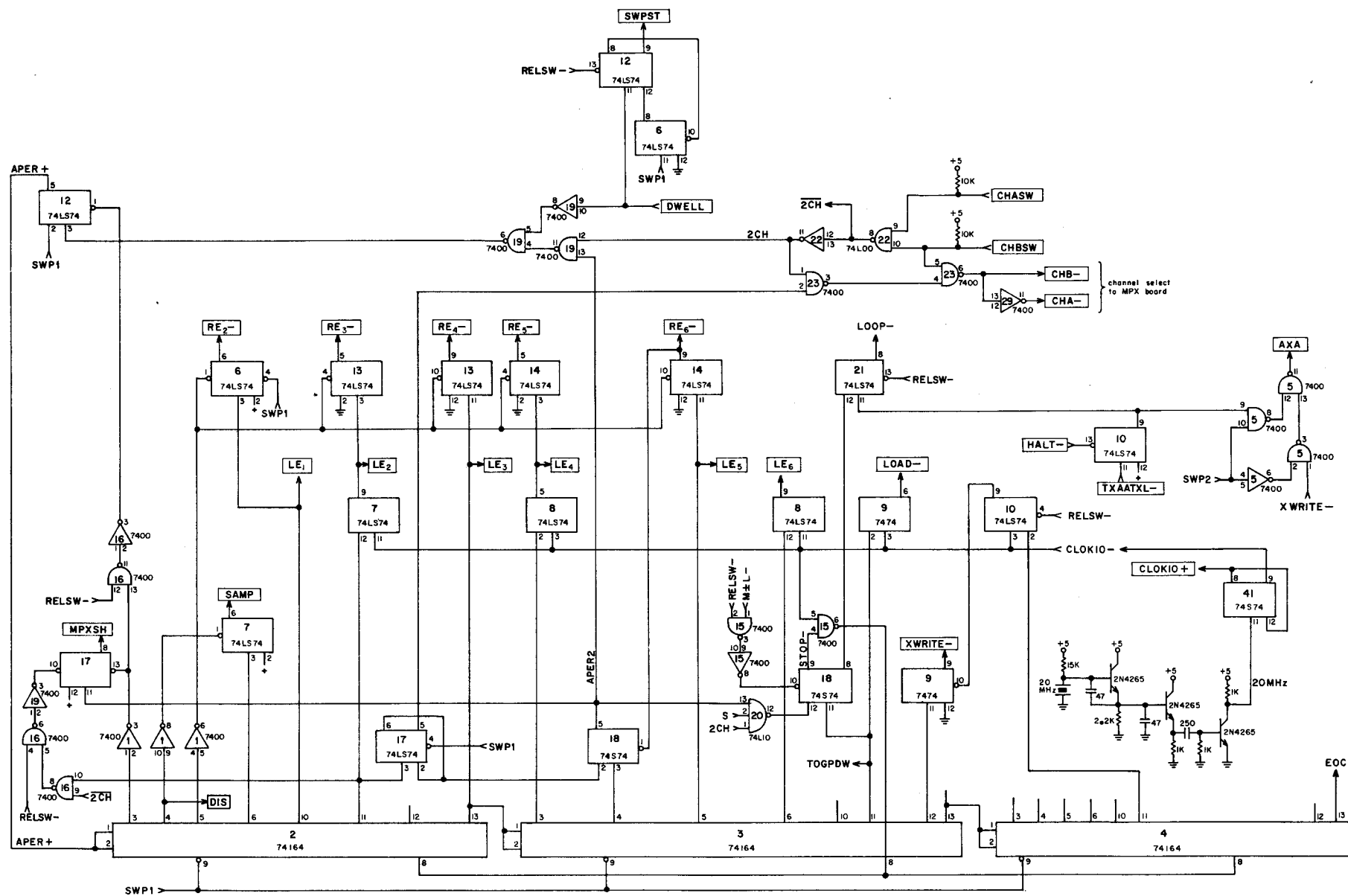
— + 7.4 V REGULATOR —

TITLE			
ADC ANALOG BOARD MODEL 92 INPUT UNIT			
DRAWN	SIZE	DWG. NO.	
DATE	C		
APPROVED	SHEET	2 of 6	

TO 1090 MAINFRAME

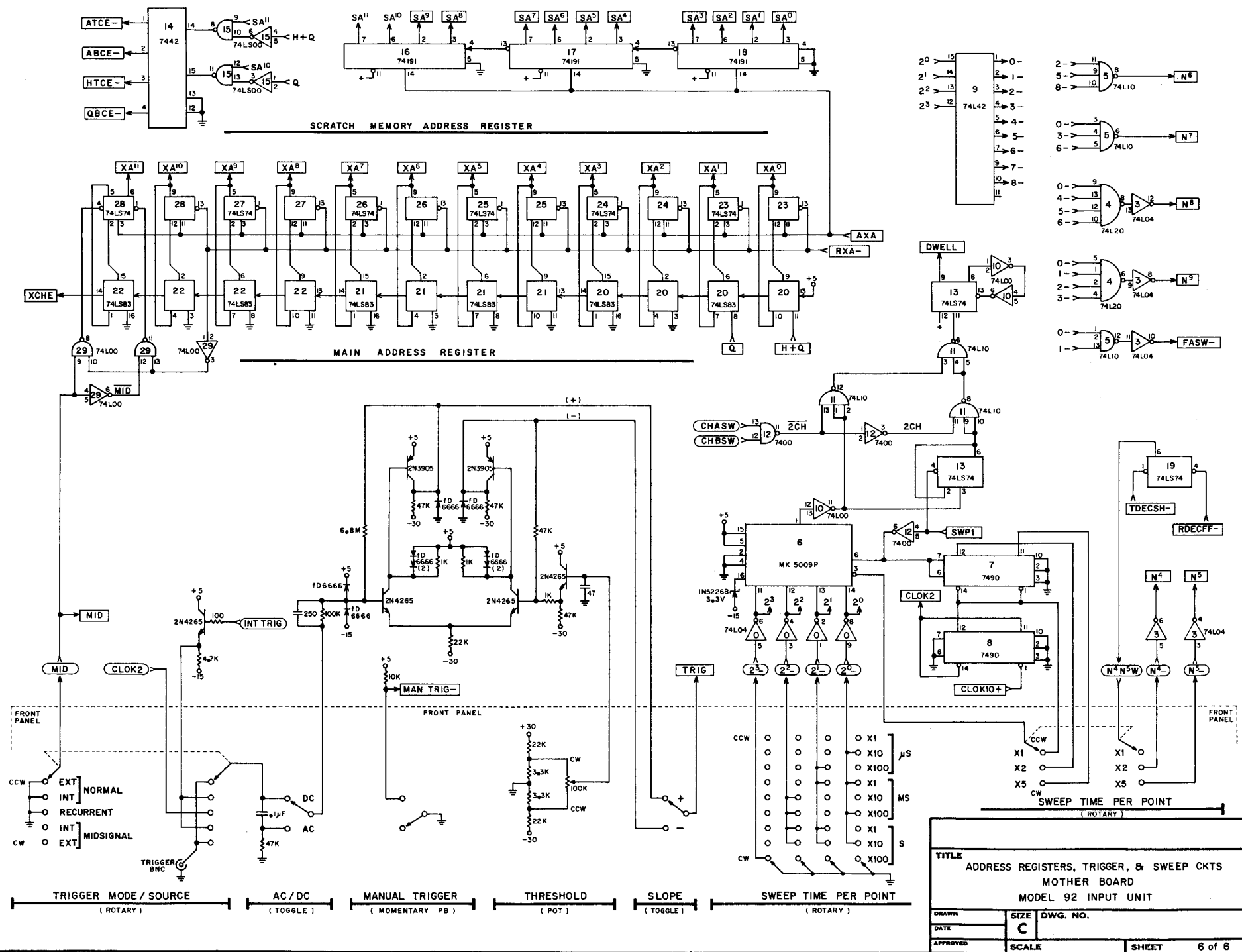


TITLE			
ADC DISCRIMINATOR BOARD			
MODEL 92 INPUT UNIT			
DRAWN	SIZE	DWG. NO.	
DATE	C		
APPROVED	SCALE	SHEET	
		3 of 6	

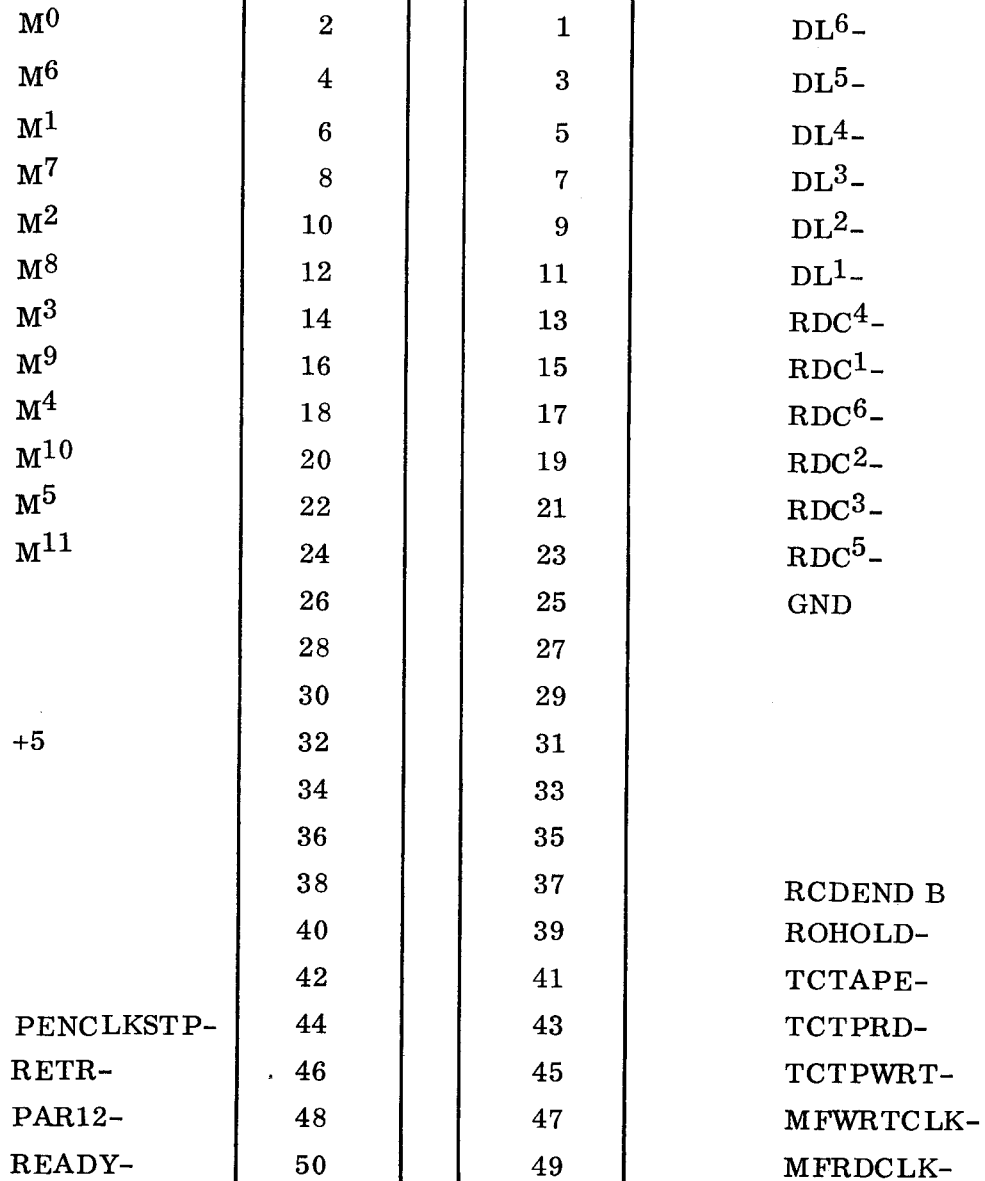


TITLE		
ADC PULSER - CONTROL BOARD MODEL 92 INPUT UNIT		
DRAWN	SIZE	DWG. NO.
DATE	C	
APPROVED	SCALE	SHEET





# DIGITAL I/O CONNECTOR DIAGRAM



## WIRE WRAP

A0	1A-36	2A-31	4A-16		
A1	1A-38	2A-33	4A-14		
A2	1A-42	2A-35	4A-12		
A3	1A-44	2A-37	4A-10		
A4	1A-73	2A-32	4A-8		
A5	1A-75	2A-30	5B-16	4A-34	
A6	1B-4	2A-22	5B-12	4A-32	
A7	1B-6	2A-20	5B-14	4A-30	
A8	1B-36	2A-18	5B-6	4A-28	
A9	1B-38	2A-16	5B-8	4A-26	
A10	1B-58	2A-14	5B-20	4A-24	
A11	1B-60	2A-12	5B-18	4A-44	
47- ADEC-		2A-54	5B-73		
45- (ADEC 5)-		2A-65	5B-78		
46- (ADEC 2+5)-		2A-67	5B-68		
38- ADAP-		2A-63	5B-48		
AUTOCENTER		1A-25	6B-69		
AS	3B-48	4A-2			
BEAM	7A-60	6B-47			
BLANK	7A-75	6B-7			
CHE	2A-8	6A-30	6B-27		
CHLF	1A-23	6B-73			
CHRT	1A-27	6B-75			
CLMFF-	PL-46	6B-78			
CLOCK1	3B-67	PL-34	6B-64		
CVDN	1A-21	6B-77			
CVUP	1A-18	6B-79			
DATAMOV	1A-15	6B-24			
DEC	5B-46	6B-12			
40- DECSH-		2A-55	5B-62		
DEL-	3B-73	6A-10			
52- DEL20		3B-79	6B-11		
DSWPE	5B-71	6A-24	7A-34	6B-20	
ENABLE #1		1A-28	3B-69		
ENABLE #2		1A-5	3B-65		
ENABLE #3		3B-62	2A-58		
ENABLE #4		3B-54	6B-32		
ERASE	1A-19	PL-17	6B-67		
F-	PL-59	6B-18			
F*SWP	5B-13	PL-63			
G0	2A-52	6B-65			
G1	2A-50	6B-49			
G2	2A-42	6B-51			
H+Q	2A-76	PL-5	6B-6		
32- HALT-		3B-75	2A-73	PL-22	6B-72
HMAG0	7A-8	6B-61			
HMAG1	7A-12	6B-59			
HMAG2	7A-10	6B-55			
I0	1A-20	3B-11	2A-66	6B-38	
I1	1A-22	3B-13	2A-64	6B-36	
I2	1A-24	3B-15	2A-62	6B-34	
I3	1A-26	3B-17	2A-60	6B-30	
I10	3B-24	5B-59	6B-48		
I11-	3B-26	6B-26			
I46	3B-8	6B-8			

[illegible]

N0	5B-35	PL-37		
N1	5B-45	PL-35		
N2	5B-33	PL-33		
N3	5B-39	PL-31		
N4	5B-31	PL-29		
N5	5B-47	PL-27		
N6	5B-37	PL-25		
N7	5B-43	PL-23		
N8	5B-77	PL-21		
N9	5B-75	PL-19		
N10	1A-2	6B-13		
ORD	5B-29	6B-62		
OVERFLO-		1B-72	7A-68	
P2	3B-36	2A-6	6B-15	
P2DEL	1A-3	2A-10		
P2DEL-	2A-4	7A-14		
PDWELL	5B-70	PL-26		
Q	2A-38	PL-3	6B-17	
53- R+ADDR-		5B-27	6B-50	
43- RDEC-		2A-61	5B-49	
50- RDECFF-		5B-51	6A-8	PL-1 6B-44
RDSWPE-	5B-72	7A-35		
READ	1A-6	3B-59	4A-6	
READSTROBE		6A-74	1A-35	
RCDEND	2A-56	6A-26		
RELSW-	3B-63	PL-41	4A-18	
RIAZ-	3B-61	PL-42		
RADDOFLO-		1B-70		
41- RORD-		2A-53	5B-23	
49- RTB-		PL-51	6B-40	
S	PL-55	6B-35		
51- SETSIGN-		5B-79	6B-46	
SM0-	1A-34	6A-46		
SM1-	1A-32	6A-48		
SM2-	1A-50	6A-50		
SM3-	1A-46	6A-52		
SM4-	1A-71	6A-54		
SM5-	1A-74	6A-56		
SM6-	6A-58	1B-12		
SM7-	6A-60	1B-8		
SM8-	6A-62	1B-34		
SM9-	6A-70	1B-30		
SM10-	6A-72	1B-66		
SM11-	6A-76	1B-62		
58- SORD-		5B-21	6B-45	
57-	6B-22			
SPAN	5B-22	6B-66		
SUBSW	1A-13	6B-74		
SWPST	PL-48	6B-43		
8- TD-	1A-12	6A-20	7A-52	6B-28
39- TDECSH-		2A-57	5B-64	PL-20
33- TDPA-		2A-71	6B-19	6A-31
35- TMA-		2A-59	5B-67	
14- TMCV IF AUTCENTER-		1A-29	5B-74	
6- TMH-	1A-14	5B-76	7A-16	
5- TMV-	1A-16	7A-50		

TPRD	4A-50	6A-75			
28- TXAXL-		1A-1	2A-75	PL-44	6B-5
UNDERFLO-		7A-66	1B-74		
VMAG0	7A-42	6B-63			
VMAG1	7A-48	6B-57			
VMAG2	7A-46	6B-53			
VEX	1A-17	6B-37			
10- WRITE-		1A-8	3B-64	6B-21	4A-4
X0	1A-31	PL-76			
X1	1A-30	PL-70			
X2	1A-52	PL-72			
X3	1A-48	PL-74			
X4	1A-76	PL-68			
X5	1A-68	PL-66			
X6	1B-14	PL-64			
X7	1B-10	PL-62			
X8	1B-32	PL-60			
X9	1B-28	PL-58			
X10	1B-68	PL-56			
X11	1B-64	PL-54			
XA0	2A-49	PL-7			
XA1	2A-45	PL-9			
XA2	2A-29	PL-13			
XA3	2A-34	PL-11			
XA4	2A-27	PL-6			
XA5	2A-28	PL-8			
XA6	2A-21	PL-4			
XA7	2A-17	PL-15			
XA8	2A-15	PL-14			
XA9	2A-11	PL-12			
XA10	2A-5	PL-16			
XA11	2A-1	PL-18			

# POWER

GND BUS	A39 +A40	1A	2A	3A	4A	5A	6A	7A	PS-11
	B41 +B42	1B	3B	5B	6B	PS-14			
+5 BUS	A77 +A78	1A	2A	3A	6A	7A			
	B3 +B4	3B	5B	6B					
-30 YELLOW	7A-2	PL-65	PS-9						
-15 GREEN	6A-37	7A-1	PL-67	PS-12					
-5 BROWN	PL-32	PS-6							
GND WHITE	PL-40	PL-79	PL-80	PS-8					
+5A BLACK	6A-78	2A-77	PS-7						
+5B BLACK	3B-4	1B-77	PS-13						
+5M BLACK	4A-77	4A-3	PS-10						
+5P RED	PL-77	PS-4							
+15 VIOLET	6A-43	7A-3	4A-60	PS-3					
+30 ORANGE	7A-4	6A-42	PS-1						
+30 ORANGE	PL-73	PS-1							
+40 BLUE	6B-9	PS-2							
+160 GRAY	PIN ON TOP OF DISPLAY BOARD	PS-15							

# FRONT PANEL

1	
2	
3	
4	
5	
6	SUBSW
7	IOLITE
8	IOSWNO
9	IOSWNC
10	DATASW-
11	
12	NUM
13	SPAN
14	ERASE
15	
16	RELAY-
17	POWER ON LED
18	G1
19	G0
20	G2
21	VMAG1
22	VMAG2
23	VMAG0
24	HMAG1
25	HMAG2
26	HMAG0
27	VEX-
28	HEX-
29	GND
30	GND
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	HR-
44	HCOM
45	HL-
46	VJP-
47	VCOM
48	VDN-
49	RTSW
50	AUTOCENTER

# I/O HARNESS

1	DL6-
2	M0
3	DL5-
4	M6
5	DL4-
6	M1
7	DL3-
8	M7
9	DL2-
10	M2
11	DL1-
12	M8
13	RDC4-
14	M3
15	RDC1-
16	M9
17	RDC6-
18	M4
19	RDC2-
20	M10
21	RDC3-
22	M5
23	RDC5-
24	M11
25	GND
26	
27	
28	
29	
30	
31	
32	+5
33	
34	
35	
36	
37	RCDEND B
38	
39	ROHOLD-
40	
41	TCTAPE-
42	
43	TCTPRD-
44	PENCLKSTP-
45	TCTPWRT-
46	RETR-
47	MFWRTCLK-
48	PAR12-
49	MFRDCLK-
50	READY-