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Nancy G. Roman

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PART I

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This Appendix contains detailed wiring charts which show connections from, connector to, connector and chassis to chassis of the complete system.

LOGIC SECTION

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I Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	Inv 1 out	1	INV1-8		
2	Invalid Code Lamp Pin B (Conn INIT Pin 5)	1	(Conn I-5)	Inval Code Lamp	
3	Cycle Lamp Pin B (Conn INIT Pin 6)	1	(Conn I-6)	Cycle Lamp	
5	Common B	1	RR3-F		
7	Ground bus	1	C-V		1 TBD
9	Amplitier to Common C	1	ORZ-18		
11	Inv 4 out	1	INV1-5		
13	NOR 2 out	1	NOR1-3		
15	+5 VDC bus	1	C-17		
17	F1-F	1	F1-F		
B	Overflow Lamp Pin B (Conn INIT Pin 9)	1	(Conn I-7)	Overflow Lamp	
D	NOR 3 out	1	NOR1-2		
F	INV 2 out	1	INV1-6		
J	Conn INIT Pin 1	1	Conn I-1		
L1	NOR 4 out	1	NOR4-2		
N	Inv 5 out	1	INV1-14		
R	Inv 3 out	1	INV1-15		
T	Common D	1	RRG-11		
V	Inv 6 out AP1-11	1	AP1-11		

RR3 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	Ground bus	1	RR4-1	1	RR2-1
3	α=PFT +5 VDC bus	1	SWR1-2		
5	+5 VDC	1	RR4-B	1	RR2-5
6	Common AJ	1	NOR2-24		
7	OR 4 out	1	OR2-3		
9	RR4-F	1	RR4-F		
11	α=V +5 VDC bus	1	SαD-Comm	1	RR2-F
13	Common AL	1	OR5-30		
15	Common AI	2	BD 1-C Conn 10-5		
17	OR 2 in DB1-F	1	DB1-F		
B	OR 20-in	1	OR2-7		
D	Common AK	1	RR4-6		
F	Common B	1	INV1-7	1	I-5
J	δ=8,9 +5 VDC bus	1	(Conn ES-3)	ES1-N	
K	P=6,8,9,10	1	OR4-23		
L	α=T +5 VDC bus	1	RR6-N	1	RR1-3
N	NOR 20 in	1	NOR2-32		
R	Common H	1	RR6-F	1	PT-13
T	δ=3,7 +5 VDC bus	2	(Conn ES-2) OR4-21	ES1-11	rr1-F
V	W=1-4,7-8 +5 VDC bus	1	RR4-11		

PT Logic

Pin	Wire To	No. of wires out	to	in	from
1	Ground bus	1	F 1-V	1	C-V
3	Inv 7 out =	1	INV1-12		
5	NOR 10 out =	1	NOR 1-21		
7	Common F	1	OR 3-5		
9	SWR 1-N	1	SWR 1-N		
11	Common G	1	F 4-T		
13	Common H	1	RR 3-R		
15	Common I	1	RR 7-T		
17	+5 VDC bus	1	F 1-T	1	C-17
B	Inv 8 out =	1	INV 1-26		
D	NOR 14 out	1	NOR 1-20		
F	NOR 15 out	1	NOR 4-20		
J	OR 23 in	1	OR 1-11		
L	Not used	0			
N	NOR 17 out	1	NOR 3-16		
R	RR 2-15	1	RR 2-15		
T	S J - Comm	1	S G - Comm		
V	Common BC	1	INV 1-22		

F1 Logic

Pin	Wire to	No. of wires out	to	in	from
1	Inv 11 out	1	INV1-24		
3	+12 VDC bus	1	F 2-3	1	S-52
5	Common K	1	RR 4-R		
7	OR 9 in = DB1-E	1	DB1-E		
9					
11	Common L	1	D 4-15		
13	Inv 14 out	1	INV 1-32		
15	Common M	1	F 5-D		
17	Inv 13 out	1	INV 1-33		
B	Common N	1	F 5-5		
D	Inv 12 out	1	INV 1-30		
F	I - 17			1	I-17
J					
L					
N	Common O	1	RR 4-13		
R	Inv 15 out	1	INV 2-8	1	A-3
T	+5 VDC bus	1	F 2-T	1	PT-17
V	Ground bus	1	F 2-v	1	PT-1

F2 Logic

Pin	Wire To	No. of wires out	to	in	from
1	Inv 16 out	1	INV 2-5		
3	+12 VDC bus	1	F3-1	1	F 1-3
5	Common P	1	RR 4-V		
7	OR 9 in = DB1-5	1	DB1-5		
9					
11	Common Q	1	S-38		
13	Inv 18 out	1	INV 2-6		
15	Common R	1	F 5-V		
17	Inv 19 out	1	INV 2-14		
B	Common S	1	F 5-17		
D	Inv 17 out	1	INV 2-15		
F	Common T	1	F 5-T		
J					
L					
N	Common U	1	RR 4-N		
R	Inv 20 out	1	INV 2-12		
T	+5 VDC bus	1	F 3-B	1	F 1-T
V	Ground bus	1	F 3-3	1	F 1-V

F3 Logic

Pin	Wire To	No. of Wires Out	To	In	From
1	+12 VDC bus	1	F 4-L	1	F 2-3
3	Ground bus	1	F 4-B	1	F 2-V
5	NOR 11 out	1	NOR 3-2		
7	NOR 19 out	1	NOR 1-34		
9		0		Avail std. OS (output)	
11	Common V	1	INV 2-21		
13	Common W	1	OR 3-12	1	BD 1-6
15	Common X	1	F 4-7		
17	Inv 21 out	1	INV 2-26		
B	+5 VDC bus	1	F 4-1	1	F 2-T
D	OR 8 in	1	OR 5-4		
F	not used	0			
J		0		Avail std. OS (input) (no driver)	
L	NOR 12 out	1	NIR 4-16		
N	OR 13 in	1	OR 1-22		
R	Inv 9 out	1	INV 2-23		
T	Inv 23 out	1	INV 2-24		
V	Inv 22 out	1	INV 2-32		

F4 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	+5 VDC bus	1	F5-3	1	F3-B
3	bad pin use c instead	0			
5	Inv 24 out	1	INV2-33		
7	Common X	1	INV2-31	1	F3-15
9	D22-21	1	D22-21		
11	COBX 1 to ID	1	(BNC FREQ U5)	U CNT #1-S	
13	Common AE	1	F5-13		
15	Inv 27 out	1	D14-11		
17	RR7-R	1	RR7-R		
B	Ground bus	1	F5-1	1	F3-3
C	NOR 22 out	1	NOR3-21		
D	NOR 16 out	1	NOR1-33		
F	NOR 23 out	1	NOR3-20		
J	D22-23	1	D22-23		
L	+12 VDC bus	1	F5-B	1	F3-1
N	D23-32	1	D23-32		
R	Inv 25 out	1	INV2-30		
T	Common G	1	NOR3-34	1	PT-11
V	NOR 21 out	1	NOR2-3		

C Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	NOR 5 out	1	NOR5-2		
3	Common E	1	AP1-5		
5	NOR 7 out	1	NOR3-3		
7	Signal Cable Line 1 (A NEG)	1	BNC-A NEG		
9	Counter Cable Line L (A+)	2	COAX to A+ SWRZ-T		
11	Counter Cable Line 2 (B-)	1	OR1-4		
13	Conn INIT Pin 2 K=1,3,6	1	(Conn I-2)	SKC-C	
15	Conn INIT Pin 3 K=2,4,5,7	1	(Conn I-3)	SKD-C	
17	+5 VDC bus	1	PT-17	1	I-15
B	NOR 8 out	1	NOR1-16		
D	SWR2-1	1	SWR2-1		
F	OR 2 out PB1-3	1	DB1-B		
J	Counter Cable Line 3 (A-)	2	COAX to A- SWRZ-D		
L	Signal Cable Line 2 (A POS)	1	BNC A POS		
N	Counter Cable Line 4 (B+)	1	OR1-6		
R	NOR 9 out	1 NOR1-15			
T	Signal Cable Line 3 (B POS)	1	BNC B POS		
V	Ground bus	1	PT-1	1	I-7

(---) means OLD SYSTEM

F5 Logic

Pin	Wire to	No. of wires out	to	in	from
1	Ground bus	1	RR 1-1	1	F 4-8
3	+5 VDC bus	1	RR 1-5	1	F 4-1
5	Common N	1	INV 1-25	1	F 1-8
7	NOR 18 out	1	NOR 2-2		
9	D 22-24	1	D 22-24		
11	D 22-20	1	D 22-20		
13	Common AE	1	D 14-17	1	F 4-13
15	S = 3,7,+5VDC bus	1	RR 1-F		
17	Common D	1	INV 2-4	1	F 2-B
B	+12 VDC bus	1	RR 7-1	1	F 4-L
D	Common M	1	INV 1-34	1	F 1-15
F	INV 26 out	1	D 14-9		
J	D 22-25	1	D 22-25		
L	D 22-19	1	D 22-19		
N	D 18-32	1	D 18-32		
R	RR 5-15	1	RR 5-15		
T	Common T	1	RR 6-5	1	F 2-F
V	Common R	1	INV 2-13	1	F 2-15

RR1 Logic

Pin	Wire to	No. of wires out	to	in	from
1	Ground bus	1	RR 2-1	1	F 5-1
3	α = T+5 VDC bus	2	SWR 1-4 RR 3-L		
5	+5 VDC bus	1	RR 2-5	1	F 5-3
7	α = V+5VDC bus	2	SWR 1-U RR 2-F		
9	W = 3-8 +5 VDC bus	1	RR 2-17		
11	Common C	3	RR 2-J RR 1-R INV 1-16		
13	Prog B init via or gate 29	1	OR 4-11		
15	S = 1,2,4,5	1	OR 4-22	1	Conn ES-4
17	Common BU	1	SWR 2-17		
B	RR 5-9	1	RR 5-9		
D	RR 5-L	1	RR 5-L		
F	S = 3,7+5 VDC bus	1	RR 3-T	1	F 5-15
J	NOR 4 in	1	NOR 4-4		
L	α = FP+5 VDC bus	1	SαE-comm		
N	SWR 1-D	1	SWR 1-D		
R	Initiate (Common C)			1	RR 1-11
T	W = 1,2 +5 VDC bus	1	RR 5-13		
V	NOR 16 in	1	NOR 1-31		

RR2 Logic

Pin	Wire to	No. of wires out	to	in	from
1	Ground bus	1	RR 3-1	1	RR 1-1
3	Common AF	1	OR 1-24		
5	+5 VDC bus	1	RR 3-5	1	RR 1-5
7	NOR 4 in	1	NOR 4-5		
9	Common AG	1	RR 5-17		
11	δ = 8 +5 VDC bus	1	RR 6-15		
12	δ = 6	1	RR 8-N		
13	α = VTP+5 VDC bus	1	SWR 1-E		
15	PT-R			1	PT-R
17	W = 3-8+5 VDC bus	1	RR s-R	1	RR 1-9
B	Common AH	1	OR 1-25		
D	α = TP+5 VDC bus	1	S F-comm		
F	α = V+5 VDC bus	1	RR 3-11	1	RR 1-7
J	Common C	1	AP 1-1	1	RR 1-R
L	δ = 9 +5 VDC bus	1	RR 6-9		
N	α = F +5 VDC bus	2	SWR 1-17 RR 6-T		
R	NOR 12 in	1	NOR 4-11		
T	Common BV	1	SWR 2-J		
V	OR 7 in	1	OR 3-29		

RR4 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	Ground bus	1	RR 5-1	1	RR 3-1
3	NOR 24 in	1	NOR 2-25		
5	K=1,4,5 +5 VDC bus	1	(Conn I-8)	ALG-14	
7	OR 1 in	1	OR 2-11		
9	Conn Count-1	1	Conn C-1	Conn Count B-n	
11	W=1-4,7-8 +5 VDC bus	2	(Conn P-10)	Prg A-11	
			SWR 2-R	1	RR 3-V
13	Common O	1	INV 1-31	1	F i-N
15	W=5,6 +5 VDC bus	3	DB 1-A		
			SWH-Comm		
			(Conn P-1)		
17	RR 7-J	1	RR 7-j		
B	+5 VDC bus	1	RR 5-B	1	RR 3-5
D	NOR 6 in	1	NOR 2-22		
F	RR 3-9	0		1	RR3-9
J	not used	0			
L	Common AK	1	NOR 2-30	1	RR 3-D
N	Common U	1	INV 2-7	1	F 2-N
R	Common K	1	INV 1-35	1	F 1-5
T	RR 7-D	1	RR 7-D		
V	Common P	1	INV 2-16	1	F 2-5

RR5 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	Ground bus	1	RR 6-V	1	RR 4-1
3	Common AP	1	OR 5-31		
5	Common AO	1	OR 3-22		
7	US=off +5 VDC bus		(Conn ID-11)	QUS Collector	
9	RR 1-B			1	RR 1-B
11	US=on +5 VDC bus	1	(Conn ID-10)	Sus B-Comm	
13	W=1-2 +5 VDC bus	1	SWG-Comm	1	RR 1-T
15	F 5-R			1	F 5-R
17	Common AG	1	NOR 4-22	1	RR 2-9
B	+5 VDC bus	1	RR 6-17	1	RR 4-b
D		1	RR 8-F		
F	Common AM	1	OR 3-14		
J	Common AN	1	NOR 1-13		
L	RR 1-D			1	RR 1-D
N	not used				
R	W=3-8 +5 VDC bus	1	SWD-Comm	1	RR 2-17
T	NOR 17 in	1	NOR 3-13		
V	SWR 1-11	1	SWR 1-11		

RR6 Logic

Pin	Wire To	No. of Wires Out	To	In	From
1	NOR 17 in	1	NOR 3-14		
3	Common AR	1	INV 1-17		
5	Common T	1	OR 2-13	1	F5-T
6	δ=6			1	RR 8-N
7	Common AS	1	OR 3-23		
9	δ=9 +5 VDC bus	1	SWR 2-18	1	RR 2-6
11	Common D	1	AP 1-3	1	I-T
13	Common AT	1	OR 3-24		
15	δ=8 +5 VDC bus	1	SWR 2-V	1	RR 2-11
17	+5 VDC bus	1	RR 7-17	1	RR 5-B
B	NOR 12 in	1	NOR 4-12		
D	NOR 19 in	1	NOR 1-29		
F	Common H			1	RR 3-R
J	Common AU	1	OR 1-12		
L	α=P +5 VDC bus	2	SWR 1-R SαI-Comm	1	RR 8-L
N	α=T +5 VDC bus	1	SαH-Comm	2	RR 8-V RR 3-L
R	OR 12 in	1	OR 2-32		
T	α=F +5 VDC bus	1	SαC-Comm	1	RR 2-N
V	Ground bus	1	RR 7-V	1	RR 5-1

RR7 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	+12 VDC bus	1	+12 VDC pt	1	F5-B
3	NOR 20 in	1	OR 4-13		
5	RC=B +5 VDC bus	1	(Conn ES-8)	ES 1-7	RR 8-13
7	RC=W +5 VDC bus	1	(Conn IS-10)	ES 2-C	RR 8-B
9	OR 2 out	1	OR 2-2		
11	RC=P +5 VDC bus	1	Conn ES-9		
13	K=1,3,5,7 +5 VDC bus	1	Conn I-9		
15	K=2,4,6 +5 VDC bus	1	Conn I-10		
17	+5 VDC bus	1	SWR 1-17	1	RR 6-17
B	OR 14 out	1	OR 1-33		
D	RR 4-T			1 1	Logic Misc A-9 RR 4-T
F	Common BA	2	INV 1-13 (Conn ID-13)	J21-34	
J	RR 4-17			1	RR 4-17
L	RC=PW +5 VDC bus	1		ES 2-11	RR 8-D
N	Common BO	1	SWR 2-11		
R	F4-17			1	F4-17
T	Common I	1	D 14-12	1	PT-15
V	Ground bus	1	SHUT 1-V	1	RR 6-v

RR8 Logic

Pin		Wires	Out To	New Location	Wires	In From
1	Abort	1	NOR 4-6			
3	T init	1	NOR 5-31			
5	(T init)	1	OR 5-24			
7	+5 VDC	1	AP 1-15		2	DB 1-7 NOR 5-8
9	not used					
11	δ=10	1	(Conn P-15)	PROG A-17 ES 2-S		
13	RC=B	1	RR 7-5			
15	FV	1	SWR 1-H			
17	Gnd	1	Osc-7		1	DB 1-17
B	RC=W	1	RR 7-7			
D	RC=PW	1	RR 7-L			
F	(Abort) RR5-D	1	RR 5-D			
J	F init	1	OR 2-31			
L	α=D	1	RR 6-L			
N	δ=6	2	RR 2-6 Conn P-12		1	RR 2-12
R	Initiate	1	AP 1-1			
T	α=FT	1	Spare Wire			
V	α=T	1	RR 6-N			

Logic Card DB1

Pin	Function	in	from	out	to
A	P 9 in W=5,6	1	RR4-15		
B	4 OR 2 out	1	C-F		
C	1 OR ξ in	1	RR3-15	1	OR2-23
D	2 OR η out	1	SWR2-15		
E	3 OR 9 in	1	F1-7		
F	4 OR 2 in (on F1-L)	1	RR3-17		
H					
J				1	NOR5-30
K					
L					
M	P 12 out open C 9 (NOR 9 in)			1	NOR1-14
N					
P					
R					
S					
T					
U					
V					
1	P 10 in F initiate	1	NOR3-24		
2	3 OR 9 out	1	Logic Misc A-16		
3	1 OR ξ out (new)	1	SWR2-7		
4	2 OR η in (on SWR2-15)	1	Conn ID-9	OBSOLETE	
5	3 OR 9-in (on F2-9)	1	F2-7		
6	4 OR 2-in (on F1-9)	1	F3-13		
7	+5 VDC	1	RR8-7	1	Logic Misc A-1
8				1	NOR3-15
9				1	NOR1-25
10		1	Conn ID-7	OBSOLETE	
11		1	Conn ID-8	OBSOLETE	
12			SDN NO		
13					
14			Conn Count-8		
15					
16			SDN NC		
17	GND	1	RR8-17	1	Logic Misc A-A
18					

OBSOLETE

SHUT 1 Logic

Pin		Out	To	In	From
1		1	S SHUTP A-NC		
3	Powerload sig.	1	Conn EXIT-16		
5		1	S SHUTP A-NO		
7		1	Display Dim-2		
9	Close shutter P (red lead)	1	Conn EXIT-19		
11	Not used				
13	Open shutter P (green lead)	1	Conn EXIT-20		
15	Shutter open limit switch	1	Conn EXIT-17		
17	+5 VDC bus	1	SWR 2-F	1	RR 7-17
B		1	S SHUTP B-NC		
D	EMG lamp power	1	S SHUTP EMG lamp (D)		
F		1	Display Sim 3,5		
J		1	Clock (+etc) lamp bank		
L	initial resit at power on	1	Conn E 5-7		
N	+28 VDC bus	1	Osocillator-2		
R		1	Relay Card Shutter 4		
T	Shutter closed limit switch	1	Conn EXIT-18		
V	GND bus	1	SWR 2-13	1	RR 7-V

SWR 1 Logic

Pin	Wire To	Out To	New Location	In From
1		1 OR4-4		
2				1 RR3-3
3		1 NOR5-32		
4	α=T			1 RR1-3
5	α=3 S B-3			1 SαB-3 (RO-3)
6	α=5 S B-5			1 SαB-5 (RO-58)
7	α=4 S B-4			1 SαB-4 (RO-4)
8		1 OR1-29		
9	α=6 SαB-6			1 SαB-6 (RO-59)
10	BCD α=2 Comm RO-61		OR13-31	1
11				1 RR5-V
12		1 OR3-7		
13	COA signal		PROG A-13	(1 Conn P-7)
14	CHB signal		PROG A-14	(1 Conn P-8)
15			OBSOLETE	(1 Conn ID-9)
16			S SCOPE B-NQ	(1 S_{SCOPE} B-7)
17	α=F			1 RR2-N
18	GND	1 GND pt		
A		1 OR4-7		
B		1 NOR5-23		
C	α=1 SαB-1			1 SαB-1 (RO-1)
D				1 RR1-N
E				1 RR2-13
F	BCD α=1 Conn RO-60		OM13-17	(1 Conn RO-60)
H	FV			1 RR8-15
J	α=2 SαB-2			1 SαB-2 (RO-2)
K		1 OR3-25		
L		1 NOR5-22		
M	BCD α=4 Conn RO-62		OM14-17	(1 Conn RO-62)
N				1 PT-9
P	CHA signal		PROG A-14	(1 Conn P-9)
R	α=P			1 RR6-L
S			OBSOLETE	(1 S_{SCOPE} B-8)
T			S SCOPE B-NC	(1 S_{SCOPE} B-9)
U	α=V	(1 Conn P-11)	PROG A-38	1 RR1-7
V	+5 VDC	1 +5 pt		

SWR 2 Logic

Pin	Wire To	Out To	In From
1	C-D		1 C-D
2	PNT control	1 ES2-T	(1 Conn ES-16)
3	OR 26 in	1 OR1-5	
5	CPY control	1 ES2-4	(1 Conn ES-2)
7	Common AI (U sync)	1 DB1-3	
9	OR 25 in	1 OR1-7	
11	Common BO	1 D20-26	1 RR7-N
12	PER control	1 Conn ES-13	OBSOLETE
13	Ground bus	1 AP1-B	1 SWR1-V
15	Common BT (y sncy)	1 DB1-D	
17	Common BU (Δx sync)	1 J21-25	1 RR1-17 (1 Conn ID-3)
18	S=9 control	1 Conn P-14	OBSOLETE
B	LIN control	1 Conn ES-15	OBSOLETE
D	AB signal		1 C-J
F	+5 VDC bus	1 AP1-15	1 SWR1-17
J	Common BV (Δy sync)	1 J21-26	1 RR2-T (1 Conn ID-4)
L	TIM control	1 ES1-13	(1 Conn ES-1)
N	FRM control	1 ES1-8	(1 Conn ES-14)
R	W=1-4,7-8 control	1 +5	1 RR4-11 (S_{WE}-Comm)
T	λ_A A signal		1 C-9
V	S=8 control	1 PROG A-22	1 RR6-15 (1 Conn P-13)

Oscillator

Pin	Wire to	Out	To	In	From
1	Not used				
2	+28 VDC	1	OSC-3	1	SHUT1-N
3	+28 VDC	1	+28 VDC point	1	OSC-2
4	Not used				
5	Not used				
6	Output			1	D 14-4
7	gnd	2	RR 8-17 OSC-8	1	AP 1-B
8	gnd	1	Gnd point	1	OSC-7

Clock Memory

D 25	Out To	New Location	In From
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14	1 (RO-42)	OM1-5	
15	1 (RO-43)	OM2-5	
16	1 (RO-44)	OM3-5	
17	1 (RO-34)	OM4-5	
18	1 D12-23		
19	1 D12-18		
20	1 D12-20		
21	1 D12-13		
22			
23			
24	1 (RO-38)	OM1-35	
25	1 (RO-39)	OM2-35	
26	1 (RO-40)	OM5-8	
27	1 D24-22		1 Gnd point
28	1 (RO-41)	OM5-34	
29	1 D10-23	in (8000)	
30	1 D10-18	in (4000)	
31	1 D24-31		1 +5 VDC point
32	1 D10-20	in (2000)	
33	1 D10-13	in (1000)	
34			
35	1 D24-35		1 AP1-1

BOOK 1

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CONSTRUCTION AND OPERATION SPECIFICATIONS FOR IDCADS

INTRODUCTION

This report, Part II, is the continuation of the IDCADS report begun in Part I. Part I contains a general description and design information for the four instrumentation packages.

Part II contains the operating and calibration procedures, design details, and maintenance information for the control console and the associated electronics.

The report is in three parts; this volume and two appendices. This volume will contain the explanatory text in the first part, as well as calibration and operating instructions. The second part will contain detailed circuit connector information which describes the destination of each wire leaving each pin of each circuit board. The first appendix is the completion of the connector wiring data. Appendix II contains the schematic diagrams of the circuit boards in the system and of the interconnection between boards and consoles.

LOGIC

The logic section controls nearly all timing, sequencing, and information handling. Most of the inputs come from the Experiment Select section as logic levels for a particular type of operation. Other input and output locations are I.D. control and Data and the Exit lines.

There are five major divisions in the Logic section. They are designated as follows: I (initiate) logic, C (count) logic, PT (period-time) logic, F (frame) logic, and the pulse chain source. The pulse chain source consists of a precision oscillator at 10^7 hertz whose output goes through a pulse-forming network and into the various gates to be routed to the selected chain. These are identified as the P, T, F, or clock chain. Output of the P chain goes through a series of dividers whose outputs are respectively 10^4, 10^5, 10^6, and 10^7 PPS. These outputs go into the contacts of a switch in the ID control panel where they may be selected individually to drive the Period (or Y) counter. In the case of the T chain the output goes to a different series of dividers in order to get 2, 200, and 20000 PPS. These three lines go into one deck of the Master Timing (α) switch in order to operate the Timed sequence of operation. The F chain also goes through a series of dividers to get 10^5 PPS, which goes to the F logic. The last chain is the clock chain which furnishes one pulse per second to a seconds counter. This clock consists of a counter which increases by one for every input pulse and displays the count continuously on the front panel readout. The clock counts through 99999 and starts over or can be reset to zero with a front panel switch.

Initiation of the system for a run cycle is under control of I logic. To start the system the Initiate switch is depressed and released. This switch is located on the Data panel. Actuation of the switch sends a D.C. level through PG8. PG8 was opened by the General Reset pulse which resulted from the end of the last cycle or by depressing the Abort switch. Abort is also on the Data panel. The DC level through PG8 goes to clear counters A and B and to open PG1. PG1 has a 1 PPS input from the clock chain constantly, so that the next of these pulses to come along after the gate is open is able to pass and start the cycle. In this way the beginning of each cycle is controlled by the basic timing pulses rather than the random actuation of the Initiate switch. PG 14 is opened by the initiate pulse through PG1 if the α switch, the ρ switch (experiment select), and the ω switch (detector select) are in certain specific positions. If PG14 opens, the same pulse that went through PG1 also goes through PG14 after which it recloses itself through a delay and then goes to a gating system which determines whether it initiates the F, P, or T logic. The selection is made by the ρ and α switch positions. The remainder of the I part of the logic is composed of switching gates which determine which circuits are initiated dpending upon the settings of the ρ, α, and ω switches.

The function of the C logic is to control the two console mounted UP/DOWN counters, called λ_A and λ_B. λ_A is used to count the pulses from the detectors on the mechanical module. There are two inputs possible for λ_A. One is marked +CHA, the other -CHA.

Both go into a gate circuit which has two outputs. The + output is +CHA and goes to the + input of λ_A. The other is the minus output and goes to the minus, or reversing, input of λ_A. The gates are arranged so that either +CHA is allowed to pass or both CHA and CHB are allowed. Provision is also made for connecting both inputs through gates to the corresponding inputs of λ_B. However, the normal input for λ_B is used to count various functions as follows under control of the Count Control (Scc) switch on Experiment Select. When Scc is set to Frame position, λ_B counts up one every time the ΔY counter in ID Control gets a sync pulse. If Scc = LINE, λ_A increases by one for every ΔX sync from ID Control. When Scc = COPY then λ_B counts with λ_A. When Scc is set to PERIOD then λ_B counts one for every Y (period counter) sync pulse. If Scc = PNT (point) then λ_B increases every time a pulse goes to the Integration Time Switch on the Logic panel. Another possible input for λ_B is from +CHB through a gate identical to the input gate for λ_A. This input signal also comes from the detectors on the mechanical module. The remainder of the C logic is mostly gates to allow clearing of the two counters under different conditions. Both counters have an internal memory which can be held or released by a logic level. Each counter also has a circuit to detect the highest counter digit being reached. This is used in conjunction with the DN switch to turn on an overflow light which shows that the count is higher than the digit which the DN switch has selected.

The P (period) and T (timing) logic circuits are grouped together and called the PT logic, since the functions are nearly the same. The Period part of the logic is the simper of the two. PG5 is opened by the P initiate line, which allows the 10^7 PPS from the oscillator to pass to the Y counter (period counter in ID Control) through the frequency select switch. Closing of the PG5 is done by either the general reset or by the Y-counter sync output. The sync pulse either goes to PG5 direct or through PG4 depending upon the setting of $S\alpha$. If $S\alpha$ is set to Time or View then the sync pulse goes through PG4; if set to Period then the path is direct. If the path is direct the sync pulse closes PG13 to end the cycle. General reset closes PG4 after the end of the cycle. PG4 was originally opened by a sync pulse from the Integration Time counters. The Y-counter sync pulse also goes through PG11 if PG11 is open. This gate is opened by the I logic and closed either by general reset or in the same way that PG4 is opened. Output of PG11 goes to form the F Interrupt initiate signal.

To initiate the T logic part, a signal comes from I logic to open PG3. Input to PG3 comes from the T chain, through the gate and out to the count input of the Integration Time counters. These counters may be preset by front panel switches so that a sync pulse comes from the counters when the number of pulses set on the switches have come from PG3. This sync pulse closes PG3 and the Integration counters are reset. The last gate in this subsection is PG10, whose prime purpose is completed after the Integration Time counters finish their count. This is done by opening PG10 using the sync pulse from the counters. Then a frame control signal is allowed to pass through PG10 and end the cycle at the end of the frame.

The F logic is the last and largest subsection of the Logic section. It is concerned mostly with controlling the frame mode. There are two input pulse trains, one is the 10^5 PPS from the F chain, the other is the output sync pulses from the Point Dwell Time (U) counter in ID control. The 10^5 PPS comes into PG6 and goes through to the input of the U counter. This gate is opened by an initiate pulse from the I logic and closed by either the general reset or by the sync pulse from the U-counter. The pulse that opens PG6 also opens PG15, as does general reset. PG15 is closed by the F interrupt initiate and by a sync pulse from ΔX (number of horizontal steps counter) in ID control. Output of PG15 goes to prepare AND 1 to switch states or to go through AND 1 if it is in the proper state. Input to PG15 is the output of a divide-by-five counter whose signal source is the 10^5 PPS from the F chain, but which comes through PG16 in this case. The output of the divide-by-five counter also acts as the input to an additional divide-by-nine counter which gives a delay of 0.9 millisecond in addition to the 50 microsecond delay from the first section. Both delayed pulses go through an "or" gate to do the same job. The delay counters are reset to zero by the U sync pulse. The gate whose output drives the delay counters is PG16. PG16 is opened by the U sync pulse and closed by general reset or by either of the delayed pulses described above.

The gates just described are used to start a cycle and furnish some of the necessary delays. The next two gates and AND 1 are involved with λ_B control and to reset some counters. PG12 output is the input for PG13. Input for PG12 is from AND 1 output, and is closed only by a Temporary Halt signal. PG12 is opened by an F interrupt initiate pulse, by the output from PG4, and by general reset. PG13 is opened by F interrupt initiate, and has two outputs designated "open" and "closed". The "closed" output goes through some gates and a delay to open PG8 which allows the clearing of λ_A and λ_B. The "open" output goes to the C logic as an input to PG7 to reset λ_B, to the C logic to open PG2 for λ_A input, to open PG6, to reopen PG13, and to reset D18, D19 and D20A.

The gates marked AND 1, AND 2, etc. are unusual in that they have two signal inputs which are also the open inputs. When a signal comes into an input the other input line is opened. Then when the second input line gets a signal it is allowed to pass. A third input on either of the signal input lines would also pass but the way these circuits are used this is not allowed to happen. AND 1 gets an input on one of its signal input lines from either the 50 microsecond or 0.9 millisecond delays, whichever is allowed to pass to it. The other signal input line is activated from Prog. A reinitiate, from primary F initiation, or from recording delay circuits in F logic not yet described. Reset of AND 1 is by its own output signal, by general reset, and the output of OR1 - 19.

The remainder of the primary and AND designated gates are involved with recording control. PG-17 allows the 10^5 PPS from the F-chain to pass to the delay counters D18 through D20A. PG17 is opened by the output of OR1 - 19 and closed by G.R. or by the 0.50 second delay output. The delay counters are a series of five decade counters gated to furnish an output after 0.01

seconds, 0.02 seconds, 0.03 seconds, and 0.50 seconds. Each of these outputs go through a one-shot multivibrator. Each one-shot sends a pulse to one input of AND 2, AND 3, AND 4, and AND 5. The other input to these AND gates comes from the U-sync pulse through a group of gates which select which of the AND gates will get this input. Conditions under which the U-sync is allowed to the AND gates are satisfied when the system is set to area or period scan in either period, frame, or timed mode and when recording on any instrument is going on. Under these conditions if the tape recorder is being written on, and if the Detector Select switch is not set to select both ID3 and ID4 then one input to AND 2 will be pulsed once. If this happens before the other AND 2 input is pulsed the delay counters will start a count which will run for 0.01 sec. after which the 0.01 sec. one shot will fire and send its output through AND 2 and out to make one input to AND 1. With the same detectors selected and the printer being used, then the 0.03 second one-shot is activated through AND 4, to do the same timing operation. When the Detector Select switch is set to use both ID3 and ID4 together then AND 3 is used instead of AND 2 and AND 5 is used instead of AND 4 to double the recording time to allow for twice the amount of information.

Miscellaneous circuits make up the rest of the Logic Section. One is the shutter control circuit which opens and closes an opaque shutter over the photmultiplier to protect it from excess light. Control is by a push button with a lighted face. One section of the face is on when the shutter is open and off when closed. Another section is on when an overload condition has tripped the emergency circuit and closed the shutter. The third section is on all the time and identifies the switch. In operation the switch is depressed to change the state of flip-flop. The flip-flop has two outputs called Q and $\bar{Q}$. One output is high when the other is low. When the flip-flop changes state, the output that rises triggers a one-shot which sends a wide pulse through amplifiers to one of the step coils of a bidirectional stepping motor. The pulse causes the motor to move one step, which moves the shutter either to open or closed. The other output of the flip-flop goes to the coil which drives the motor the opposite direction. Identical circuits exist for shutters on each light sensing device mounted on the Mechanical Module, but they are located in the section which primarily has control.

Another circuit using a stepping motor is the aperture controls. This is a precision stepper which makes steps of 1.8^{o} with an accuracy of ±3% nonaccumulative. It is used to position a disk around the perimeter of which 22 precision apertures are mounted at intervals of 14.4 degrees, or 8 steps apart, center to center. There is also a large cutout (clear aperture) whose center is 16 steps from the centers of the apertures on each side. Stepping is done through a control board which is purchased with the motor. In order to initiate a stepping sequence the forward or reverse push button is depreseed. This opens a gate which allows a pulse chain to go to a counter and to an input of the motor control board. The motor takes one step for each pulse to the control board input, so the counter is in step with motor movement. Therefore, when the counter goes to the count of 8 the gate is turned off to stop the pulses. Located in the Experiment Select section is a separate circuit which allows the clear aperture to be stepped to directly from any location. Centering for the clear aperture is done by use of the read-out signal. Read-out signals come from a digital encoder attched to the motor shaft. The output signals from the encoder go through a decoder circuit which drive lights on the front panel to show which aperture is being used. In the case of the clear aperture the read-out signal also stops the motor at the proper place.

The high voltage indicator lamp is merely an indicator to show when high voltage is applied to the photmultiplier tube. The other detector power supplies also have an indicator on the appropriate panel.

Four groups of panel switches control the Logic section, exclusive of the external controlls. The simpler ones are the Oscilloscope display switch and the digital voltmeter display switch. The oscilloscope switch, along with the Y/Z modulation switch, determine the input to the scope. The display switch operates gates to allow the scope input to be from Channel A or B direct or from Core A or B, or from an external source. Y/Z modulation refers to the input terminal of the oscilloscope used. On Z modulation a raster type sweep input is impressed on the X and Y inputs, with signal information on the Z, or intensity, input. In Y modulation the X input is the same but signal input goes into the Y input. In the case of the DVM switch the input is simply routed from the particular source to the DVM. In both cases a light is turned on to show what is being measured.

One of the more complex of the two major control switches is the Detector Select (ω) switch. This switch determines if ID2, ID3, ID4, ID3 with ID4, or the photomultiplier is being used as detector. It also determines whether pulse detection or voltage-to-frequency conversion detection is used. An auxiliary function is to furnish one input to the multiplex control board. Control output from the switch goes mainly to enable logic gates for the various functions. One deck of the rotary switch operates indicator lights mounted on the front panel.

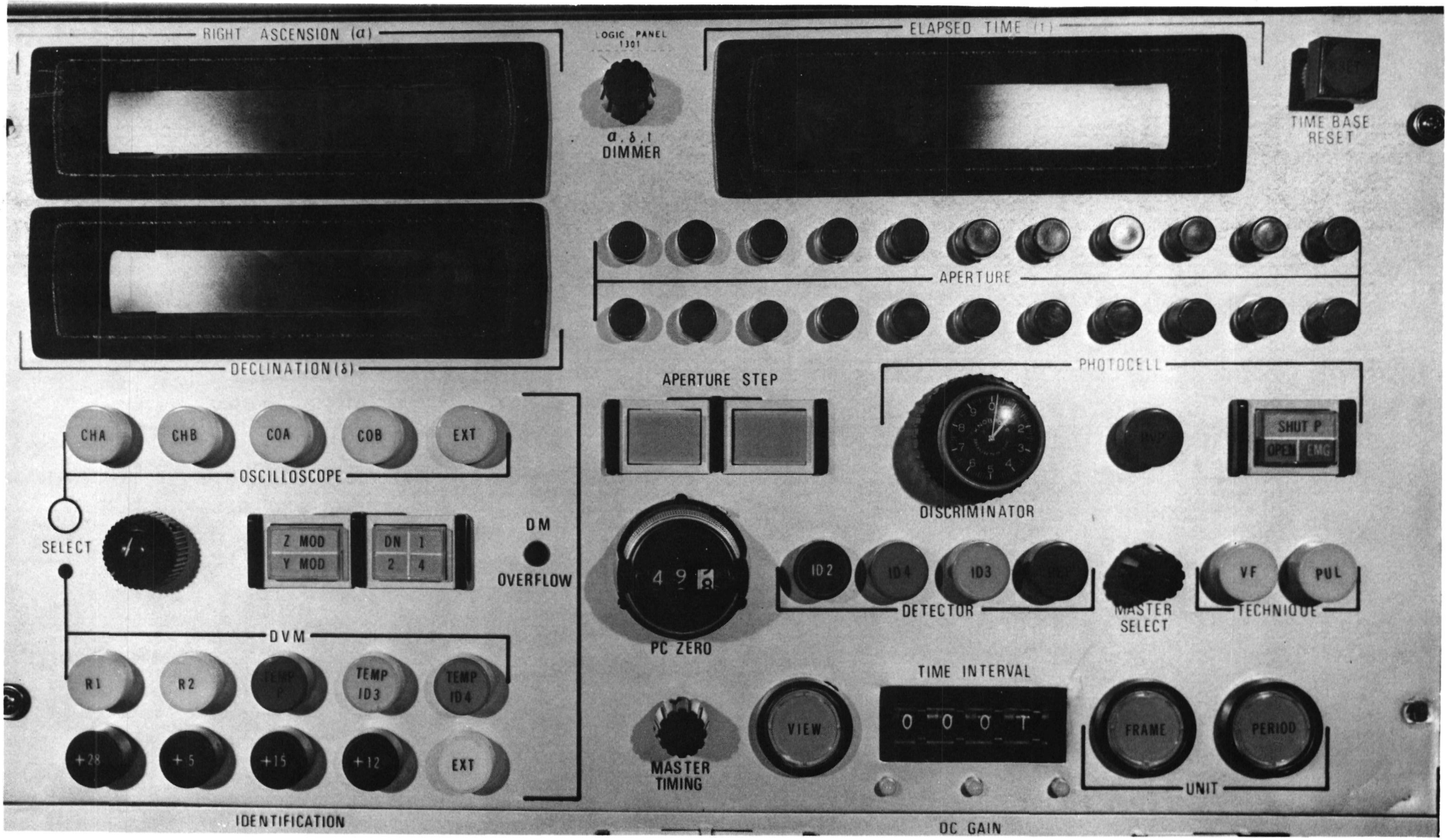
Last of these switches is the Time Scaling Control (α) switch. This switch sets the system to View, Frame, Period, or Timed modes of operation. In View no information is being recorded. This is merely a finding mode in which the image dissector and the oscill-oscope screen are both swept in raster fashion and the detected image impressed on the face of the oscilloscope by intensity increases. In Frame recording may be done. The raster sweep and the signal indication is the same except that only one complete scanning pass is made. Since recording is possible, the scanning is slowed by the AND gates and delay circuits previously described to allow time for recording. Reading may also be done (as from tape or computer) in this mode. Period mode is the same except that the number of frames (or full scans) made is determined by the number possible during the period of time set on the period (or Y) counter in ID control. Allowance is made for the last frame to be completed if the period ends during a frame. Timing is approximately the same as period. The timing switches are the Integration Time Switches (δ) and are three working thumbwheel switches and one dummy switch. Under the δ switches are three small indicators to locate the decimal point, which is set by the α switch. Possible time elapsed is from .001 seconds to 999. seconds. In this operating mode, a number of frames will be covered. The number appears on the time set and on the time necessary for one frame to be completed.

There are two digital displays which are slaved to the readout of right ascension and declination generated at the telescope.

In the new system many changes were made in the layout and contents of the Logic and Data panels. The front panel is now one large panel hinged at one side for access. Added to the front panel are the controls for the Experiment Select and the ID Control assemblies. The circuits for these two assemblies have been added to the Data area of the rack. The panel readouts for Right Ascension and Declination have been removed and replaced by the control and position readout for the mechanical assembly rotation.

Also removed are all elements dealing with Period operation, and all circuits concerned with the digital voltmeter. Double channel inputs have been removed since only one input is now available at any one time.

The Detector Select switch has been changed to select between a photomultiplier and an Image Dissector tube, and the Oscilloscope selects either Channel A direct or the computer output.



LOGIC FRONT PANEL

IMAGE DISSECTOR CONTROL

The ID control panel primarily controls image dissectors 2,3, and 4. These controls consist of a digitally generated ramp for each axis of the ID tube, a center location control for each axis, a step size control, and shutter circuits. Other major front panel controls are the dwell time and period counter controls.

Basis for the ID control timing and an important part of the Logic functions comes from either the Dwell Time or the Period counter. The two are always used separarely. Both counters operate in the same way so the description of the Dwell Time only will be used for both. The Period counter has six decades and the input is either 10^4, 10^5, 10^6, or 10^7PPS selected by a four position rotary switch. Dwell Time has five decades and an input of 10^5 PPS. Timing is done by setting a bank of thumbwheel switches on the front panel. In operation the switches are set to the desired time interval and the counters increase until their output binaries are equal to the switch settings. At this time a one shot multivibrator is triggered which simultaneously resets the counters and sends a pulse out to the Logic panel and to the input of the horizontal sweep circuit.

Horizontal and vertical sweep generating circuits are identical. Three thumbwheel switches for each sweep circuit are preset in the same way as in the Dwell Timing counter, and the counting and reset operation are identical. However, in this case each sweep circuit has a second counter whose count is identical to the preset counter at all times.

BCD output of this second counter is the input to a BCD to decimal decoder, so that the output of the decoder is an analog voltage directly proportional to the counted value of the counters.

Output from the reset one-shot of the horizontal sweep goes to the input of the vertical sweep and to the Logic Panel. In this way after every horizontal line is completed the sweep moves up one step until the vertical counter reaches its preset value, at which time both vertical and horizontal are reset and the sequence can be restarted by the next input pulse from the Point Dwell Time counter.

In order to get the proper voltage and current to drive the sweep coils of the image dissector tube a number of operations must be performed on the output of the BCD-to-decimal converter. Only one sweep channel will be described, since the other is identical. First, it is necessary to set the most negative point of the sawtooth to a precise zero (or ground) point. To do this an operational gain-of-one amplifier with a zeroing pot is used. This pot is a precision ten turn pot with a vernier read-out dial and is mounted on the rear panel in an accessable position. This is necessary so that when the step size is changed the lower left corner of the area scanned will not move. Step size is changed by varying the gain of the next operational amplifier, using a single thumbwheel switch on the front panel. This is called the Points per Inch switch and controls the distance each step of the sampling point covers. In this way the image may be magnified electronically.

The final gian stage is an operational adder and driver stage. In this stage the zero point of the sawtooth sweep signal is set to near -20 volts so that the scanning points start in the lower left corner of the image dissector tube. In actual practice the extrene lower left point is off the cathode since the cathode is round and it is desirable to scan all of the area. A full sweep of the cathode then ends in the upper right corner with the sweep amplifier outputs near +20 volts. Each final gain stage has a precision potentiometer mounted on the rear for adjusting the gain and another for shifting the D.C. output level so that the full sweep begins at the -20 volt point and ends at the +20 volt point. In practice the gain is adjusted by observing a precision grid and correcting the gain so that a precise number of steps is needed to cross the grid. This is the reason the ±20 volt points are not exact.

The ID Centering controls on the front panel change sweep starting location. This is done by adding voltages into the final gain stage. The voltages come from the front panel switches and a resistor chain. Complete range of variation is one inch in steps of one-thousandth of an inch.

The error signal from the guidance section is added into the amplifier and is the final input. The output of each gain stage then goes to one axis sweep coil of the Image Dissector tube.

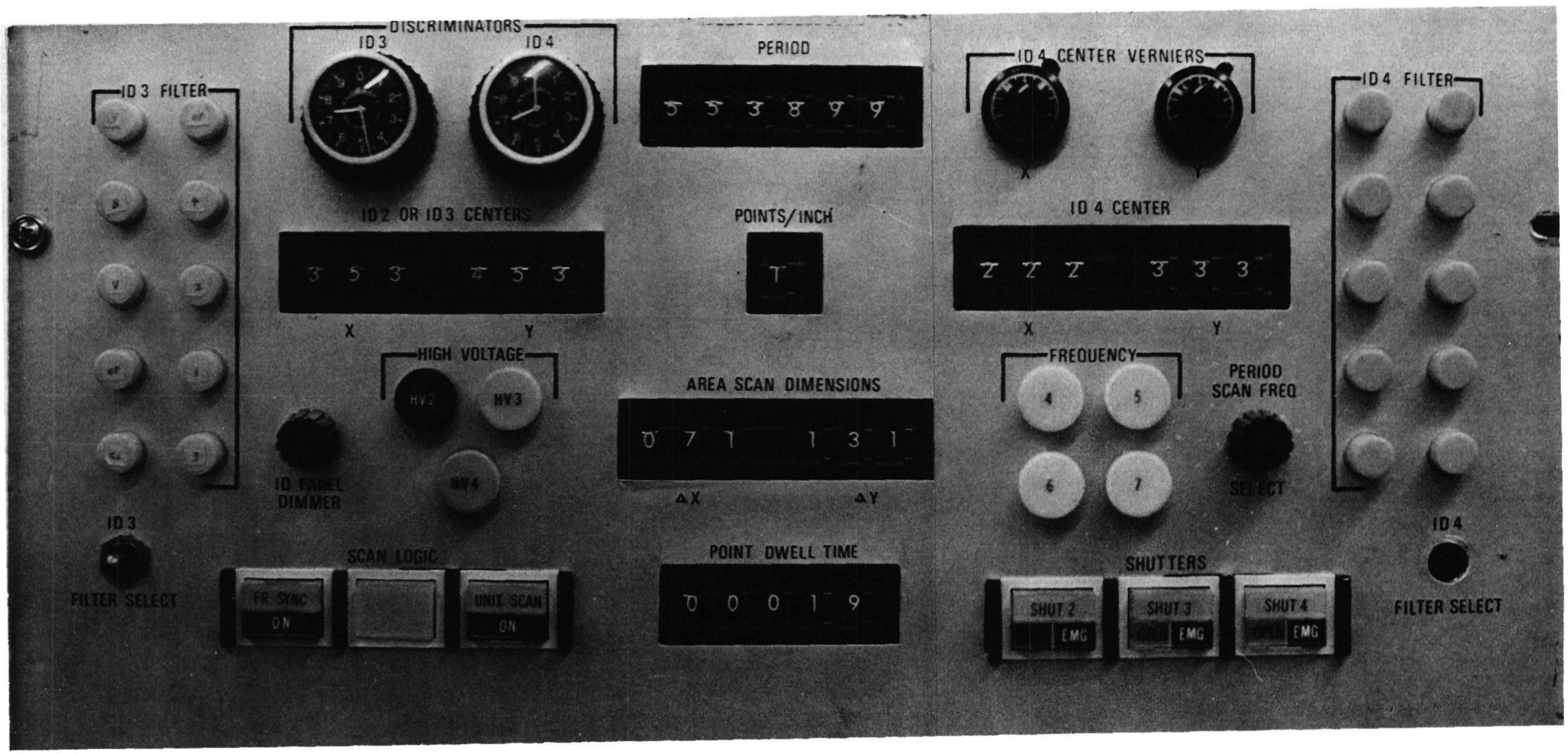
The drive for ID2 and ID3 has one final gain stage. There is a separate final gain stage to drive ID4. They are identical except that an electronic switch disables ID4 when not in use. All front panel switches are used in common except that ID4 had its own centering switch bank. ID2 and ID4 share the same discriminator control, but ID 3 has a separate control. ID4 also has separate final gain and level control potentiometers mounted on the rear of the panel.

At the output of the first amplifier following the BCD-to-decimal decoder a line is taken off to drive the horizontal (or vertical) amplifier in the oscilliscope mounted in the console. Each one of these lines go through two sample-and-hold circuits before going to the oscilloscope.

Other controls and circuits are: the shutter circuits and switches for ID2, ID3, and ID4, filter wheel controls for ID3 and ID4, and the Frame Sync and Unit Scan switches. These last two send levels to the Logic Section.

The new version of the system moves the ID Control panel into the Logic/Data circuit locations and removes some of the functions.

The Period count function is the largest block to be removed. Next is the circuitry to control the second Image Dissector tube, ID4.



ID CONTROL FRONT PANEL

DATA PANEL

This section has control of the recording and reading functions. Its controlling signals come from the Experiment Select section, from the Logic section, and a small amount from the I.D. Control section. Other functions included are photographic controls, filter wheel controls and readout, pulse divider circuit controls for ID3 and ID4, comments and identification switches, and the count algebra control.

By far the largest part is the recording and reading part of the Data section. The reading, or input, part is mainly the IMTM boards (Input Multiplexer - TRANSFER MEMORY), the programmer boards, and the input sources. Input sources are the computer, the tape recorder, and two counters. Counter A is generally the only counter used, and it counts pulses coming from the Image Dissectors or the photmultiplier. Each counter has a memory incorporated so that the reading can be held in the counter for the necessary time regardless of counter input changes. Hold and release of the memory is controlled by the Logic section. No matter which input source is used, the BCD output from this source goes to the inputs of the IMTM boards. These boards are primarily made up of four four-bit multiplixers in parallel and a 4 bit memory. There are seven IMTM boards of which the first six are each one BCD digit and the seventh is the sign. Two control lines from the A Programmer select which inputs are passed through the multiplixers to the memory. The memories are controlled by an input from either the A Programmer for parallel reading or from the

T Programmer for serial reading. This type of memory changes output state to correspond to the input whenever a high level is applied to its control line. When the control line is low then the memory output is constant regardless of input changes. Serial reading is only used during reading from the magnetic tape unit. All other read modes are parallel.

Output of the IMTM boards go to both the display circuits and to the Output Multiplexers. The display circuits consist of a parallel group of multiplexers whose outputs go through "and" gates to the same type of memories as those in the IMTM boards. Twenty-four lines go to the multiplexer inputs but the output selections are groups of eight. Since the coding is in BCD form, with four lines making one decimal digit, then it follows that there are six decimal digits into the multiplexers and groups of two adjacent digits are selected for the output. Seclection is made by a "count-of-five" counter which is incremented by the DN switch on the front panel. From the multiplexers, the two selected digits go through "and" gates which allow their memories to be set to zero under control of the A Programmer. Memory output is the input for a pair of digital-to-analog converters whose output goes through an operational amplifier to the Z-input to the oscilloscope. In this way the oscilloscope gives an intensity modulated display of the signal strength variations from whichever instrument is being read through the IMTM boards.

Since whatever is read into the system will need to be recorded on one of the output recording devices, the IMTM board outputs also go to the Output Multiplexer (OM) boards. The only exception to this is in No Record mode or in View mode, where the objective is to look at the oscilloscope display of the object of interest. All the inputs to the recording devices are connected in parallel to the multiplex outputs, so that all that is necessary to record on a particular device is to select it from the panel switches. In the case of the tape recorder it is necessary to go through the TSR cards, which convert the parallel nature of the multiplexer output to serial, since the tape must be recorded in serial form. Programmer T furnishes the control lines to the TSR cards.

There are many more inputs to the OM boards than just from IMTM. All the switches and controlls and indicators whose status is to be recorded go to other inputs of the OM boards. In order to select which of these inputs is transferred to the output of the multiplexer, a counter output from Programmer B is used.

In general there are two kinds of recording done in the system. One is heading and bookkeeping data under the control of the B Programmer. This is switch position, clock reading, module position, and so forth. The other type of recording is the signal information from the detection devices on the mechanical module or the plate scanner and is primarily controlled by the A Programmer. Both programmers will be described later, along with the C and the T programmers.

Control signals to the read-out devices are primarily from one of the programmers or from Experiment Select. The programmers themselves get their control signals from Experiment Select, from Logic, and from each other. Programmer A is used for all read or write operations. Initiation of this programmer is a pulse from Logic and is repetitive. Time between pulses is controlled either by a fixed delay in the Logic section or by the Point Dwell Time, whichever has the longest delay time. This input pulse takes different paths through Prog. A depending largely on which line from Experiment Select is selected. Some of the many functions that the A Programmer output performs are as follows:

A pulse to the display memory to initiate a transfer memory (IMTM) read into display memory.

A level to counter A and B memories to hold the memory reading.

A pulse to Prog. C to initiate clearing of the counters. Also clears the display memory.

Pulses to control IMTM multiplexer.

Parallel IMTM transfer memory read pulse.

An output pulse to the computer to initiate the Encode function.

The Run command to the computer.

A pulse to initiate recording on one of the output devices, determined by Record Control from Experiment Select.

A pulse to the logic to reinitiate the sequence. If this pulse is stopped for some reason then the logic will reinitiate itself by the sync pulse from Point Dwell Time.

Operation of Prog. A is fairly straight forward for the most part. The initiating pulse goes through delay circuits to "and" gates which are opened by logic levels from panel switches in order to direct the initiating pulse into different paths, depending upon function. The first division has two paths; one to read tape, the other to record on any of the output devices or to read the computer. The next division has three paths; one to read IMTM into the display memory, one to read from the computer, and one to record on anything. Last is the selected lines which determine which of the recording devices will be initiated, or that none will be. Then the pulse goes to the Logic to reinitiate the recording sequence.

Programmer B is almost exclusively concerned with the recording of non-test-data information. As such, it only operates at the beginning of a recording sequence or as a separate sequence to record "bookkeeping" information such as heading, time, comments, etc. Three main sections make up the B Programmer. First is the counter whose output lines operate the multiplexer select lines on the Output Multiplexer boards. Next is the gating and delay circuits which control counting interval of the B Programmer, as well as select the recording instrument and the specific sequence to be recorded. The last section is the counter and decoder which controls the number of lines of information to be recorded and turns off the B cycle. Operation of the B Programmer begins with a single initiate pulse from the Logic Section. This pulse presets the O.M. control counter to a value selected by the ρ-switches on Experiment Select; opens the gate which allows the B Programmer to restart internally; and sends the first record command through the system to the proper recording devices. The pulse continues past the record start and goes back around the loop through some delaying circuits in order to update both internal counters and to continue the cycle. This loop action continues until the cycle control counter increments to its selected value, at which time a reset pulse is generated and the loop opened. At this time the console General Reset circuit is activated and the system waits for the Initiate switch to be depressed for a restart.

Programmer C serves as a sort of interface board between programmers and between programmer and recording device. One of the functions of Prog. C is to send pulses to the tape recorder to prepare it for a read or write operation. Two different groups of signals are possible. One group comes when the tape is loaded on to the transport and are used to move the tape through the heads until a specified length of tape is through. The other signal group is used every time the tape unit restarts a read or write operation. An end-of-file detector circuit is incorporated to allow the tape to be stepped from file to file in sequence. The tape unit is started in fast read mode by a push-button on Experiment Select and stopped at the end-of-file marks on the tape. There is also a circuit to change a front-panel electo-mechanical counter by one count every time an end-of-file is written or read.

Another part of the C Programmer is used to send signals to the computer to reset the address and to start the computer cycle. The rest of the programmer consists of voltage level changes and the 70-counter for the tape control circuits.

The last of the programmers is the T Programmer, which controls the digital tape recorder. Most of the electronics to control the tape unit is part of the unit, but some external starting and presetting pulses are necessary as well as some voltage levels.

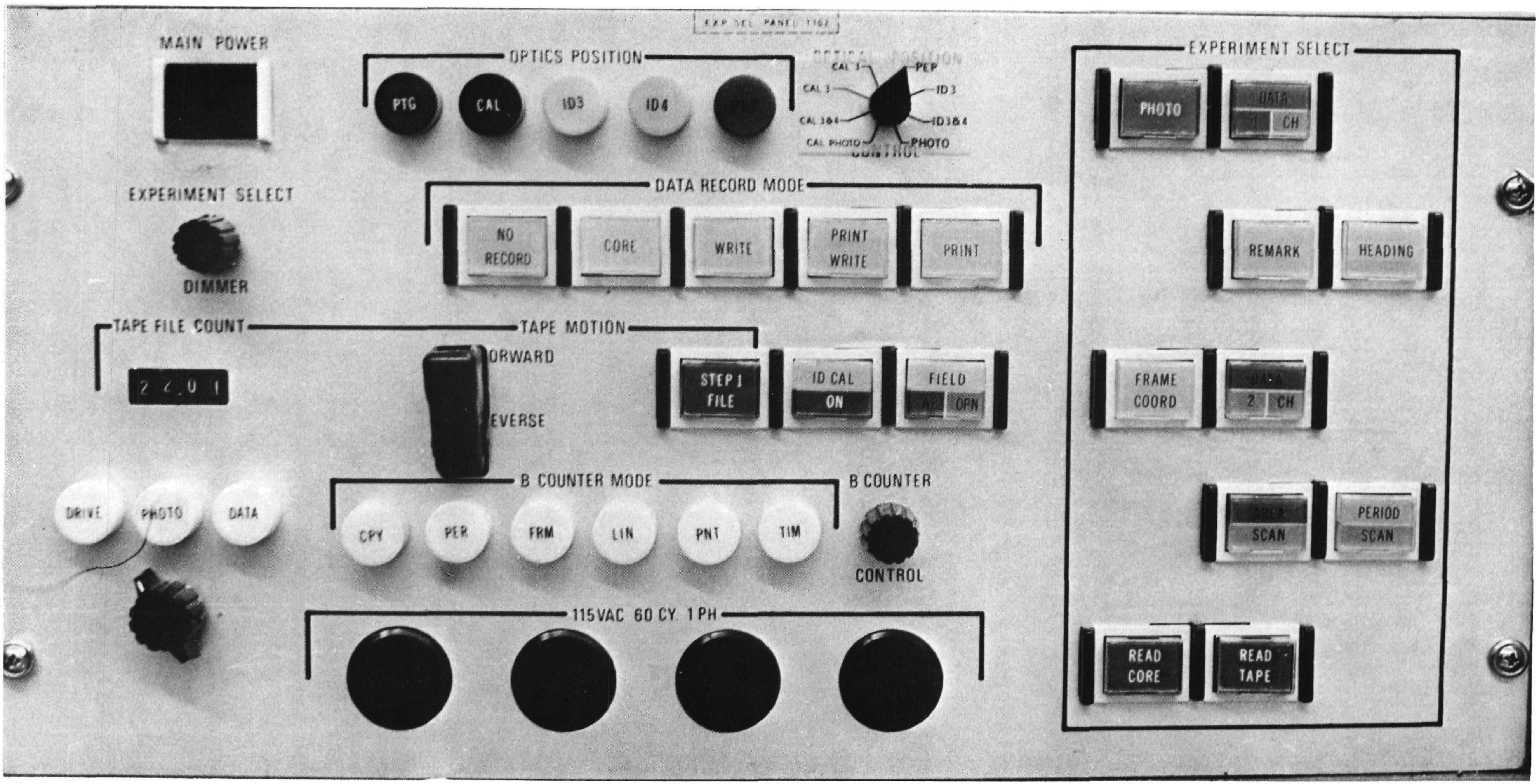
Two counters, one BCD to decimal converter, and a number of steering gates, delays, and flip-flops make up the major part of the programmer. Operation is begun by bringing in an initiate pulse on one of three lines. One line to read under control of programmer A, another line to write under Prog. B control, and the other to write under Prog. A control. The main differrence between the lines is that the 7-or-10 counter is set to count either seven or ten before it will reset. This determines whether seven or ten digits of data are recorded or read back. After setting up the counter, the three input initiate lines combine so that the rest of the initiate sequence is the same regardless of the input line activated. The initiate pulse simultaneously sets a flip-flop and sends a step pulse to the tape recorder. The flip-flop $\bar{Q}$ output goes high so that a gate in line with the tape clock is opened. In this way when the clock pulse returns through some delay circuitry, the clock pulse becomes the next step pulse. The delays allow time for the tape recorder to complete its sequence before another step is sent to it. To stop the clock pulses from restarting the tape indefinitely, the resetting of the 7 or 10 counter also resets the flip-flop, which closes the gate in the clock line. Then the programmer waits for another initiate pulse on the input lines. In order for the A and B Programmers to know that the T Programmer is finished with a group of seven or ten, the $\bar{Q}$ output of the flip-flop is used to finish opening three gates; one reinitiates Prog. A after the tape write, one reinitiates Prog. A after a tape read, and the other reinitiates Prog. B after a tape write involving the B Prog. Output of any of the three gates comes when the last clock pulse comes into (but not through) the now closed gate which normally passes the clock pulse on through to the step pulse circuits. There are two clock pulses coming into Prog. T. One is direct from the tape unit, the other goes through a circuit, located on the Record Gap Detector card, which, when the Read Tape switch on Experiment Select is on, forces the clock pulse to go through an additional delay before coming into Prog. T. The direct clock goes through no delays at all and is the pulse that reinitiates Prog. A or B as described above. It also enables the read line output gates which will be described later. The delayed clock pulse is delayed longer for read than for write and is used to make the tape step pulses and to count up both counters in Prog. T.

In addition to resetting itself and the flip-flop mentioned above, the 7-or-10 counter also selects the order in which the digits are recorded on or read back from the tape recorder. The 1-2-4-8 output lines from the counter go to the control input of the TSR cards and selects which input is sent through the card to the tape recorder. This is the parallel-to-serial conversion mentioned earlier. These counter output lines also go to a BCD-to-octal converter whose output lines each go to an and gate. Therefore only one of the seven output lines is high at a time. Each output line goes to the Input Multiplexer -- Transfer Memory serial read input, so that the serial information read from the tape is stored in successive IMTM cards and so converted from the serial form from the tape back to the parallel form necessary for the rest of the console.

The other counter is called the 70-counter and is used to count the number of digits recorded on the tape. Every time this counter counts from zero through 69 a signal is sent to the tape recorder to initiate an end-of-file sequence. The console is designed so that a record and a file are the same length, therefore an end-of-record command is actually sent before the end-of-file command. Output of the counter also initiates a circuit to ensure that the record (or file) will be filled out with zeros if there is not enough legitimate information.

Also external is a circuit to make sure that the 7-or-10 counter is reset between reading each 7 or 10 decimal digit number. It consists of a relaxation oscillator which is reset by the clock pulses before the oscillator can fire as long as the time between pulses is short. In other words if a clock pulse fails to arrive before a certain time the oscillator sends a reset pulse to the 7-10 counter. This time is set to be more than the time to read one decimal digit but less than the time to pass through an end-of-record gap.

The new system removes some of the old functions to make room for the circuitry from the ID control and the Experiment Select, as well as changing the panel as described at the end of the Logic description. The photographic section has been removed, as well as the circuits for two Image Dissector tubes.



EXPERIMENT SELECT

Experiment Select

The experiment select section contains controls to determine which instrument will record the output, what information will be recorded, the tape recorder controls, the optical positioning controls, and a control to determine the input to the B counter.

To control the readout selection a bank of 5 pushbutton switches are used, arranged so that only one switch will remain closed at a time. These switches send appropriate logic signals to the Logic and to the Data sections.

For the selection of what will be recorded, the actual experiment selection, a group of ten lighted push button switches are connected to operate in the same manner as the readout select bank. These switches are designated with the Greek letter ρ and send outputs to a readout decoder circuit which converts the decimal output to BCD for recording purposes, and to the Logic and Data panels as logic controls. The function and color coding of each switch is as follows. The programmers A, B, C, and T are in Data.

HEADING - White, light level higher when on.

Furnishes a control voltage to the B-programmer to allow readout of Sequence d for the photometry heading.

ONE CHANNEL DATA - Green in upper half and lower left quarter. Yellow in lower right quarter controls B-programmer to record sequence C for single channel data recording.

REMARK - All white. Controls seguence e through B-programmer to record information from special switch banks which are not built into the normal readout.

FRAME COORD - White - controls sequence a through the B-programmer to record time, position of R1 and R2 and theta, and the setting of the ID1 positioning controls.

2 CHANNEL DATA - Upper half is green, lower right quarter yellow, lower left quarter yellow. Gives same result as 1 Ch. Data excpet the B counter reading is recorded.

AREA SCAN - Upper half green, lower half yellow. This is the normal mode of operation. In this mode a raster is scanned and the output of the ID tube sent as pulses into the display circuits and to one of the recording devices. The first three lines of sequence c are recorded under control of the B programmer, then control is shifted to Programmer A.

PERIOD SCAN - Upper half yellow, lower half green. Scans under control of the Period counter in Image Dissector Control panel.

PHOTO - Blue. Controls sequence b for recording photographic data.

READ CORE - Red. Sends the proper logic signal to the Logic and the Data panels to control the readout of the computer. The A-programmer is used.

READ TAPE - Red. Sends the proper logic levels to the Logic and Data panels to control tape readout. The T programmer, the A programmer, and the C programmer are used.

Optical positioning is a rotary switch, designated Mode Select, which has at least seven positions. Its purpose is to operate the circuitry to move two separate slides located on the mechanical module. These slides move various optical elements into the path of the image from the telescope so that the image is directed to the proper sensing device, such as photocell, image dissector, or photographic plate. Five colored lamps are associated with the switch to show when the two slides have arrived at the selected locations.

Additional tape controls are the forward/reverse switch, the step-one-file switch, and the file counter. The forward/reverse switch sends a logic level to the tape recorder to determine direction. The step-one-file switch and its associated circuitry start the tape running in a high speed read mode until an end-of-file marker is read, at which time a signal is sent to stop the tape and to count the file counter up or down one; the direction determined by the forward/reverse switch.

Last of the major controls is the Counter Control switch, which is a six position rotary switch with indicator lamps to show switch position. Logic levels go to the Logic section in order to route the proper signal into the B counter.

In addition to the above is the main power switch for the console, the Calibration Lamp switch which turns a lamp on the mechanical module on or off, and the Full Field Switch which activates a circuit to move the aperture wheel to its full open position.

Modifications in the new system are as follows.

The optical positioning controls are no longer included. Also removed are 2 CHANNEL DATA, PERIOD SCAN, and PHOTO from the experiment selecting switch bank.

GUIDER

The purpose of the guidance panel is to search for and lock to a preselected guide star in the vicinity of an object which is to be analyzed. If these two images are near each other on the telescope mirror then any variation in the apparent position of the two should be identical.

In operation the guide star is centered and locked on the face of the .040 aperture image dissector tube (ID 1). Then any variation in position generates an error signal which is routed to the correct instrument. Error signal output goes to other image dissectors or to one of a pair of vibrators. One pair of vibrators moves the transfer lens for photographic work, the other controls the position of the aperture wheel assemble. An error signal also goes to the telescope drive circuits through an angle correction circuit.

The guidance system consists of the error channel, positioning circuitry, oscilloscope, sweep generator, and signal selection. Readout for the rotary movement of the module mounted on the telescope is on the guidance panel, as are the controls for the rotary movement, and radial motion of the two detector carriers. Figure 2 shows a block diagram of the guidance system. There are five push-button switches which select the destination of the error signals.

The amplifier in Figure 2 consists of two stages. One stage is an integrated circuit voltage follower and is mounted inside ID 1 tube housing. It is an impedance converter and

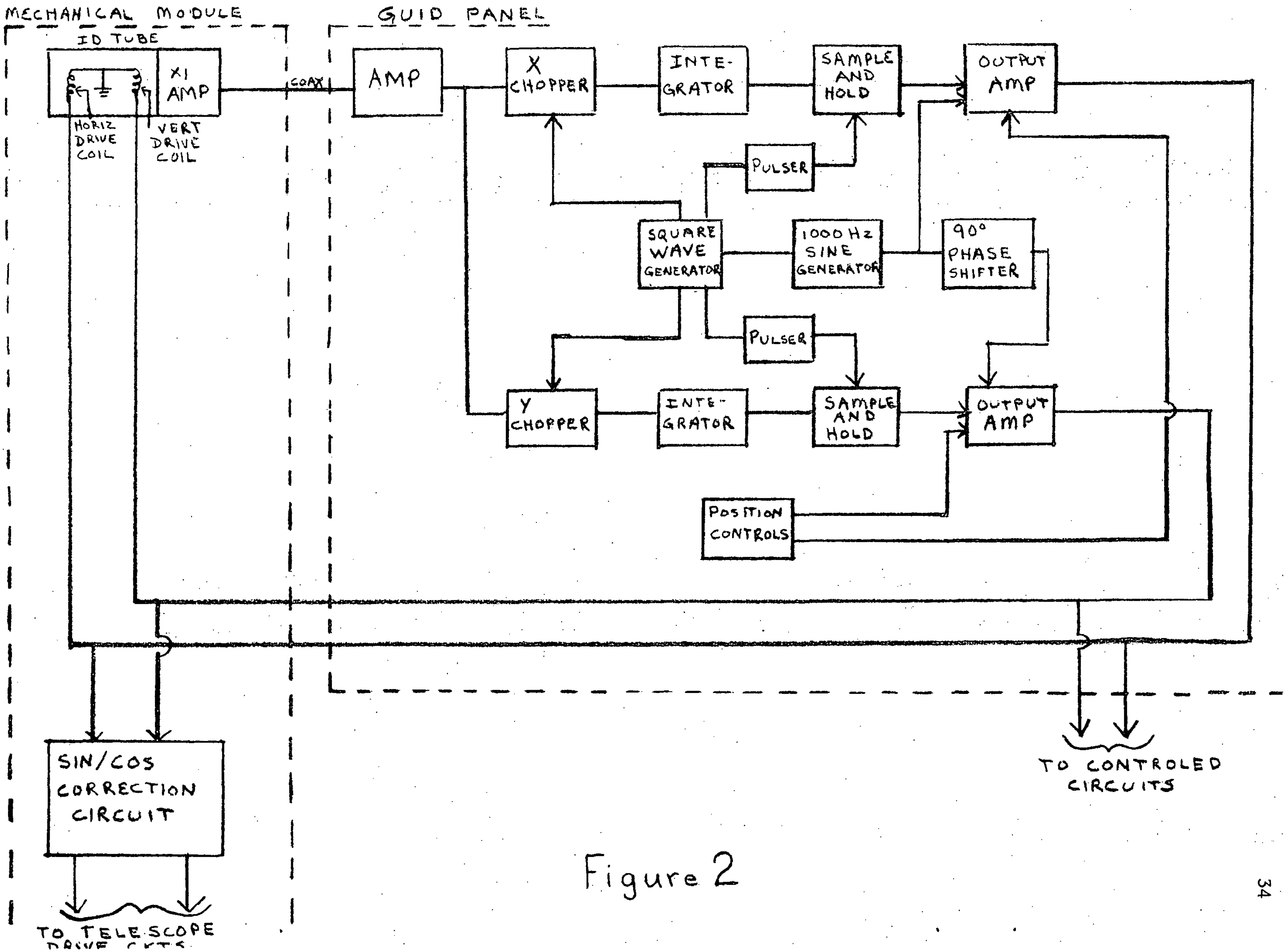

MECHANICAL MODULE
ID TUBE
X1 AMP
HORIZ DRIVE COIL
VERT DRIVE COIL
COAX
GUID PANEL
AMP
X CHOPPER
INTE-GRATOR
SAMPLE AND HOLD
OUTPUT AMP
PULSER
SQUARE WAVE GENERATOR
1000 Hz SINE GENERATOR
90° PHASE SHIFTER
PULSER
Y CHOPPER
INTE-GRATOR
SAMPLE AND HOLD
OUTPUT AMP
POSITION CONTROLS
SIN/COS CORRECTION CIRCUIT
TO TELESCOPE DRIVE CKTS
TO CONTROLED CIRCUITS

Figure 2

line driver, with a one megohm input impedane and approximately 1 ohm output. The second stage is a conventional operational amplifier with a gain of 66-2/3. The circuit is shown in Figure 3.

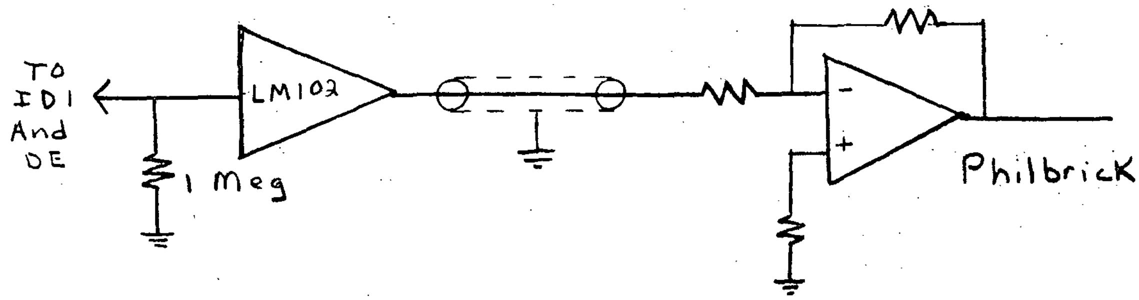


FIGURE 3

The error generator (see Figure 4) is made up of a chopper, an integrator and a sample-and-hold circuit to act as a filter. There is a separate identical error generator for each axis. The chopper takes the signal from the amplifier to two lines, one to an operational amplifier switch which alternately passes the signal and connects it to ground. The other line goes through an inverter before going through the same type switch. The timing signals to the switches control lines are arranged so that when one switch is passing the signal through, the other switch is passing the signal to ground. The output of the switches are connected to the input of an analog adder to recombine the two signals.

The output of the adder goes to an integrator whose function is to compare the area of the positive going part of the rectangular wave with the negative going. As long as the two areas are equal no error signal is generated.

In order to test for area equalization, the sample and hold circuit samples the output of the integrator for a short time at the end of one complete period of the rectangular wave. If the areas are equal the triangular output of the integrator will remain at zero level. The sample and hold circuit will also remove the triangular component from the error output. Output to the guided components is from the sample and hold circuit.

The output circuit is a gain of 10 adder-amplifier. All the necessary positioning controls, automatic locking and the view circuits, and the sweep circuits come in to the input. The output circuit only drives the positioning coils on ID 1.

The timing circuitry is composed of a free-running square wave generator at approximately 4000 hz, a series of divide-by-two flip-flops, a band pass filter, and an integrator. The soutput of the generator is divide by 4, by 8, and by 16. Output from the divide-by-four goes to operate the X channel chopper; slso the Y channel sample-and-hold through a one-shot multivibrator with an output pulse duration near 5μ sec. The inverse of the divide-by-four operate the remaining channel. See Figure 5 for the pulse timing chart.

The sweep generator takes the output from the divide-by-four through a notch filter set to 1000 hz. and sends the resultant sine wave to the X output amplifier and to an integrator. The integrator shifts the phase of the sine wave 90^{o} and sends it to the Y output amplifier. The magnitude of both the X and the Y sine wave are set equal so the resulting sweep is a circle set to make an approximately .040 inch diameter sweep on ID 1.

Positioning is done by thumbwheel switches on the front panel. These switches select a voltage from a precision resistor chain which has a double regulated voltage impressed on it. This selected voltage goes to one input of a differential amplifier whose output drives an integrator. The other input of the differential amplifier is from the attenuated output of the integrator. Therefore an abrupt change in the switch position will cause a slow change on the output of the integrator, which is routed to an input on the output amplifier. There are two positioning controls; one for normal positioning, one for switching in a precise offset. The offset is accomplished by a separate switch bank with its precision resistor chain. Switch output is added into the differential amplifier and is switched in or out of the circuit as needed.

Autolock is accomplished by amplifying the sweep generator sine waves and then modulating with a triangular wave. In this way the position being viewed on the image dissector cathode is moved out from center in a tight spiral, then is spiraled back to center until an image of sufficient brightness is crossed. The signal from the image dissector then automatically causes the error amplifier to lock, and disconnects the modulated sweep.

The oscilloscope control connects the proper singals to the oscilloscope to enable the operator to monitor the desired outputs or inputs. The selection is made by a rotary switch on the front panel. Possible choices are:

Pos. 1. TELESCOPE ERROR - These are the error signals sent to the telescope. They have been corrected for rotation of the mechanical module by a sin/cos potentiometer.

2. ERROR - In this position the error signals directly out of the error generator are shown.

3. SIGNAL - Shows the signal out of the input amplifier.

4. AUTO LOCK - Gives a view of the spiral sweep until lock on.

5. VIEW - Shows the spiral sweep and a negative pulse superimposed on the spiral whenever a light source is located.

6 thru 10 SPARE POSITIONS

The error signals are chopped and displayed alternately with a zero reference between each view of an error signal. See Figure 6. Either error may be above or below the zero reference.

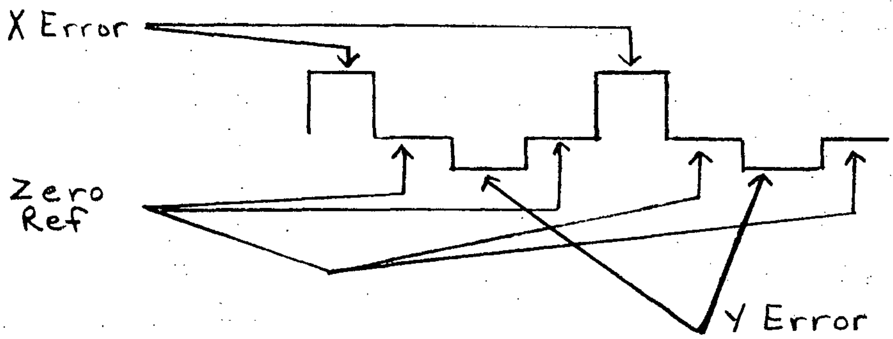


FIGURE 6

Operation of the error generator is as follows. The circle sweep makes one full cycle in 1 millisecond. Therefore each channel is tested for position once each millisecond as shown in Figure 7.

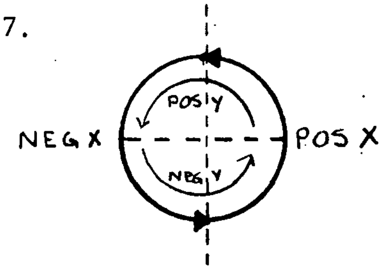


FIGURE 7

Output from the input amplifier during POS. X drives the X channel integrator in a positive ramp direction. During NEG. X the integrator output is a negative giong ramp. If the two integrator inputs are equal in magnitude, zero error is generated in channel X. An error in channel Y is generated the same way except POS. Y is compared to NEG. Y.

In order for this system to operate, the output of the input amplifier must be essentially a positive D.C. level.

$$\frac{V\ out}{I\ in} = R_{in}\ (\text{INPUT AMP GAIN})\ (\text{INTEGRATOR GAIN})\ (\text{OUTPUT AMP GAIN})$$

$$= 10^6\ \left(\frac{R_2}{R_1}\right)\ \left(\frac{t}{R_{21}C}\right)\ \left(\frac{R_{28}}{R_{27}}\right)\ \left(\frac{R_{32}}{R_{31}}\right)$$

$$= 10^6\ (66.7)\ \frac{(0.1)}{(.05)}\ (6.5)\ (10)$$

$$= \frac{(430\text{x}10^6)}{133\text{x}10^6}$$

change integrations capacitor to .005 uf

R_{28} = 130K

R_{27} = 20K

t - .0005 sec for one half of a sweep cycle

Physical displacement of the part of the cathode observed is as follows.

Displacement current = 40 ma/inch.

Each sweep coil has a 330 ohm resistor in series with it. The D.C. resistance of each coil is about 150 ohms. Therefore 19.2 volts/in is the displacement voltage. Assuming that the guide star appears as 0.020 inch diameter on the cathode, and the tube aperture is 0.04 inch diameter, then the object will be bisected by the aperture under locked on condition. In other words, the tube cathode will have one half the available light reaching it. The sinusoidal sweep keeps the aperture effectively rotating around the object with the edge of the aperture resting on the center of the object. Any motion of the object on the cathode will cause an unbalance in the amount of light seen by the cathode and an error voltage will be generated.

Assume that the guide star is 15th magnitude. From Figure 8 the ID tube current is found to be 0.7×10^{-9} amp for one power supply voltage. Since under balanced conditions we are looking at only one-half the image, then the output current would be one half of the 0.7×10^{-9} amp, or 0.35×10^{-9} amp, Under these conditions current density is

$$\frac{0.35 \times 10^{-9}}{\pi\ (.01)^2/2} = .22 \times 10^{-5} \text{ amp/in}^2$$

Then for a movement of 1% of the image diameter the current change would be $(.01)\ (.02)\ (.02)\ (.22\text{x}10^{-5}) = 8.8\text{x}10^{-12}$ amp.

To move the image 1% of the image diameter, or $2\text{x}10^{-4}$ inches, $(19^{\text{v}}/\text{in})\ (2\text{x}10^{-4}\text{ in}) = 3.8\text{x}10^{-3}$ volts change on the output amplifier are needed.

Therefore the necessary transconductance of the circuit is

$$\frac{3.8\text{x}10^{-3}}{8.8\text{x}10^{-12}}\ \text{volts}/_{\text{amp}} = .43\text{x}10^{9}\ \text{v}/_{\text{a}}$$

Gain calculations are based on a constant value of high voltage to the image dissector tube. Current from the tube depends upon both the intensity of light and the high voltage impressed on it, since gain is a function of voltage. In order to go automatically to image sources with widely varying light intensities a special circuit senses the input amplitude and controls the high voltage power supply to vary the tube gain.

MODIFIED VERSION

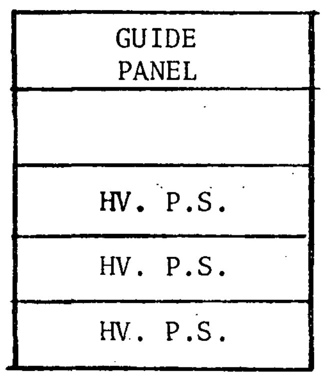


FIGURE 9

The new version of the system separates the guidance system cabinet from the main console and removes the Experiment Select panel from this part of the cabinet.

Changes in the guidance panel itself consist of removing the positioning controls and the theta readout, and of modifying the output cables to make the rack independent of the main console. See Figure 9.

GUIDE OPERATING INSTRUCTIONS

I. Install ID 1 in its bracket either on a telescope or on a test fixture with a point light source. The image from the telescope or the light source should be focused near the center of the cathode.

II. Initial Turn-On

A. Depress MAIN POWER pushbutton. The internal lamp should come on.

B. Turn DIMMER control clockwise until the lights in the switches and indicators are visible.

C. Turn on oscilloscope by lifting the top of the rack and moving the center slide switch (near the rear on the right side) forward. Alternately the oscilloscope may be pulled forward from the panel far enough to reach the switch.

D. The ID tube shutter should be closed at this time. To insure this, depress and release the SHUTTER switch until the OPN light has turned on and then back off. This will ensure that the shutter and the OPN light are working together.

E. Check the ON section of all the switches marked GUIDE at the top. If any of the ON sections are illuminated depress the switch to turn the light off.

F. If the OFF section of the OFFSET switch is not illuminated depress the switch to turn on the lamp.

G. The SET section of the DRIFT switch should be illuminated. Depress the switch if necessary to light that section.

H. The OFF section of the SWEEP switch should be illuminated. Depress the switch if necessary to light that section.

I. Turn on the ID 1 high voltage power supply.

1. Set the high voltage to 1800 volts as read on the meter of the ID 1 high voltage supply panel.

J. Depress the SHUTTER switch so that the OPN lamp turns on.

K. Oscilloscope preliminary setup

1. Input coupling - DC
2. Power - on
3. Int/Ext - int
4. Level/Slope trigger knob - ccw until click
5. Intensity - as desired
6. Volts/div - cal.
7. Horiz. mag - cal.
8. ↕ pos - to center trace vertically
9. ⟷ pos - to center trace horizontally
10. Volts/div - as needed
11. Sec/div - as needed

III. Manually Find the Image and Lock to it

A. At right front of the oscilloscope set VOLTS/DIV switch to 1.

B. Turn SCOPE SELECT switch to Pos. 8.

1. Adjust VERT POS control on the scope until the horizontal trace is on the center line of the face.

C. Turn SCOPE SELECT switch to SIGNAL pos.

D. Find image

1. Step X Center Coordinator switch through the 100's digit while watching the scope trace. If at any point the scope trace either moves slightly positive or begins to show positive spikes, leave the X switch there and go to Paragraph III D 2.

If the oscilloscope shows no indication go to Para. III D 3.

2. Step the Y Center Coordinate switches while watching the oscilloscope until the spikes or the DC level is maximum. Then alternately step X and Y switches until the trace is maximum. Then go to Para. III D 4.

3. If the oscilloscope showed no movement of the trace in Para. III D 1, then it will be necessary to proceed as follows.

a. Set the Y Center Coordinate switch to a convenient value such as 000.

b. Step through the X Center Coordinate 100's decade while observing the scope trace for a positive deflection.

c. If no deflection is observed in step b above, move the Y switch by 100 and repeat step b.

d. Repeat steps b and c above until a movement of the trace is found and then maximize the trace as described in Para. III D 2.

E. Lock

1. Depress SWEEP pushbutton. ON lamp will light.

a. The scope trace should drop in amplitude, but not to zero. Usually about half way.

b. If trace goes to zero, lock was not achieved. In this case depress SWEEP twice to turn the sweep off and back on to try for a lock again.

IV. SEARCH mode

A. Set the scope horiz. amp to EXT.

B. Turn the SCOPE SELECT switch to VIEW.

C. Set the X and Y Center Coord. switches to 500.

D. OFF light of SWEEP switch should be turned on. Depress the switch if necessary to turn the light on.

1. A pattern should appear on the oscilloscope which spirals from the center out and then back to the center.

2. A target image will cause a spike to appear on the spiral whenever the target is crossed.

3. The target can be centered by moving the X and Y coordinate switches until the spike occurs at the center of the spiral.

4. To lock manually, turn the SCOPE SELECT switch to SIGNAL and depress SWEEP.

V. Automatic Lock

A. Turn SCOPE SELECT switch to AUTO LOCK.

B. Depress SWEEP switch. The spiral sweep should start and continue until an image of sufficient magnitude is intersected. The guider should lock to it and stop the spiral.

VI. Additional Oscilloscope Information

A. Error signals may be viewed as follows:

1. Turn the horiz. amp return

2. Turn the SCOPE SELECT switch to ERROR.

a. The X error and the Y error signal are both shown on the same base line, separated by a zero line as shown in Figure 1.

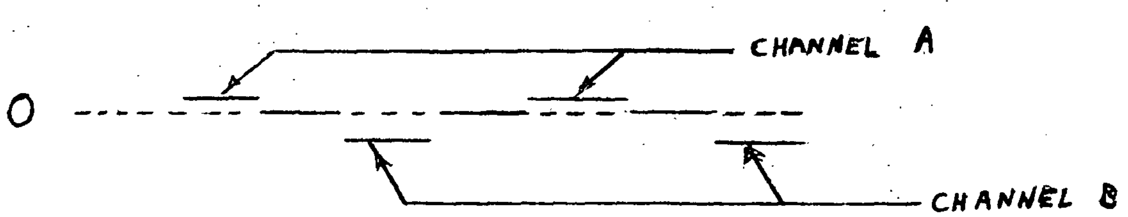


Figure 1

b. The error for X or Y channel can be identified by changing the X or Y CENTER COORDINATE switch and watching to see which segment moves.

c. The distance the segments are from the center is an indication of the distance the image is from the coordinates set by the switches.

d. Polarity around zero indicated the direction the image is from the center coordinates.

B. Telescope error is the error signals going to the telescope guide inputs.

1. Turn the SCOPE SELECT switch to TEL ERROR.

a. The oscilloscope trace will have the same pattern as in Fig. 1 and gives the same type of information.

VII. Error Signal Destination

A. Any or all of 5 destinations may be selected, although only one would normally be used at any one time.

1. Selected by depressing one of the pushbutton switches marked GUIDE. This will light the ON lamp showing that the circuit is completed.

VIII. Focus Current

A. Turn SCOPE SELECT to Pos. E.

B. Measure the signal amplitude on the oscilloscope.

1. Amplitude should be between 200 and 210 mv.

IX. Shut Down

A. Depress SHUTTER switch to turn OPN lamp off.

B. Depress SWEEP switch to turn ON lamp off.

C. Turn off oscilloscope power switch.

D. Turn off High Voltage supply switch.

E. Depress MAIN POWER switch to turn off AC to console.

GUIDANCE PANEL CALIBRATION

I. Materials

A. Guidance schematics

B. Oscilloscope with DC to 500,000 Hz bandwidth

C. Light Source

1. Must be small spot (near .20 inch diam.) focused near the center of the ID tube cathode.

2. Must be able to move either the source or the tube with respect to each other. The movement must be measurable.

3. Must be able to vary the intensity.

D. Digital voltmeter or other type of accurate voltage meter.

II. Initial Adjustments

A. +10 volt and -10 volt supply

1. Connect the meter in ID above between the -10 trim T.P. and ground on MISC #4 board.

a. Adjust the -10 v trimpot, which is located on the MISC #5 board, for exactly -10 volts.

2. Connect the meter between the +10 v T.P. and ground on MISC #4.

a. Adjust the +10 v trimpot (on MISC #5) for exactly +10 v.

3. Remove the meter probes.

B. Circle Generator Drive Voltage

1. Connect the oscilloscope between the X SWEEP TP on MISC #4 and ground.

a. The image should be a sine wave of 0.8 volts peak-to-peak.

1) To correct adjust the WAVEFORM TRIM pot for the maximum amplitude and the most symmetrical sine wave.

2) Adjust the oscilloscope probe to the Y SWEEP TP.

a) Adjust the Y SWEEP TRIM pot for the 0.8 volts peak-to-peak.

3) Remove the scope probe.

C. ERROR GENERATOR adjustment

1. Set the Guide Center Coordinate switches to 499, for both X and Y.

2. Set the GUIDE CENTER OFFSET switches to zero, for both X and Y.

3. Set the VERNIER OFFSET CONTROL pots to 500, for both X and Y.

4. Set SWEEP pushbutton switch to OFF.

5. Set OFFSET pushbutton switch to OFF.

6. Set the DRIFT pushbutton switch to OFF.

7. Remove the coaxial cable at the rear of the guidance frame and connect the center contact on the chassis mounted plug to ground.

8. Connect the oscilloscope probe to pin 6 of A1 amplifier.

a. Adjust the ZERO ADJ. pot in the top of A1 for zero on the oscilloscope. Use the most sensitive scale of the scope input.

9. Connect the oscilloscope probe between TP1 of ERROR GEN #2 (X) card and ground.

a. Set the oscilloscope amplifier gain attenuator to a sensitive scale and find a zero reference line.

b. The waveform on the scope should be a rectangular wave of no more than 100 mv. amplitude centered around zero.

1) If not, adjust R7 and R20 until the waveform is of proper size and location.

10. Move the probe from TP1 to PIN 6 of the top Philbrick amplifier (Operational Amp. #1) on to PIN 11 of ERR GEN #1 (FILTER) card.

  a. Adjust X ERR CENTER pot on the rear panel to zero indication on the oscilloscope. Small variations around zero reference are normal, as are small narrow spikes.

11. Move the scope probe to the four pins (#3, 4, 5, 6) of the integrated circuit marked X on the ERR GEN #1 (FILTER) card.

  a. Set the vertical amp. VOLTS/DIV on the scope to 5 v/cm.

  b. Set the zero reference on the scope to the center of the screen.

  c. Adjust the X COORD CENTER pot located at the rear of the panel until the waveform is centered on the zero reference line.

  d. Set the X CENTERING thumbwheel switches to 000.

    1) The scope trace should go to -10 v.

    2) If not, adjust the X CENTER COORD GAIN pot on rear panel.

  e. Set the X CENTERING thumbwheel switches to 999.

    1) The scope trace should go to +10 volts.

    2) If not, repeat steps c. through e. 1) above until the three conditions are met.

  f. Set the X CENTERING thumbwheel switches to 499.

  g. Set the X OFFSET thumbwheel switches to +999.

    1) Depress the OFFSET pushbutton to turn on the ON lamp.

    2) The scope trace should drift to +10 v.

    3) If not, adjust the X OFFSET GAIN put at the rear panel.

h. Set the X OFFSET switches to -999.

1) The scope trace should drift to -10 v.

2) If not, recheck the +10 v and -10 volts as described in Para. IIA.

3) Depress the OFFSET pushbutton again.

12. Move the scope probe to TP1 of ERR GEN #4.

a. Set the VOLTS/DIV switch on the oscilloscope to a sensitive range.

b. If necessary adjust R20 and R29 for a rectangular wave of 100 mv. or less centered around the zero reference line.

13. Move the scope probe to PIN 6 of Operational Amplifier #2 or to PIN 8 of ERR GEN #1 (FILTER).

a. Adjust the Y ERROR CENTER pot on the rear panel until the trace on the scope is centered on the zero reference line.

14. Move the probe to the four pins (3, 4, 5, 6) of the integrated circuit marked Y on ERR GEN #1 (FILTER).

a. Adjust the Y COORD CENTER thumbwheel switches to 499.

b. Set the VOLTS/DIV switch on the scope for 5 volts/division.

1) The trace on the scope should be a small sine wave whose center line is at zero volts.

2) Adjust the Y CENTER COORD GAIN pot on the rear panel if necessary.

c. Set the Y COORD CENTER thumbwheel switches to 999.

1) The small sine wave should now be centered at +10 v.

d. Set the Y COORD CENTER thumbwheel switches to 000.

1) The small sine wave should now be centered at -10 v.

2) If not, repeat Para. 14 a thru 14 d.

e. Set the Y COORD CENTER thumbwheel switches to 499.

f. Set the Y OFFSET pushbutton to light the ON lamp.

1) Depress the OFFSET pushbutton to light the ON lamp.

2) The center line of the small sine wave should drift to +10 v.

3) Adjust the Y OFFSET GAIN pot on the rear panel if necessary.

g. Set the Y OFFSET thumbwheel switches ot 000.

1) Depress OFFSET pushbutton to turn the OFF light on.

15. Zero Adjust for Op Amp #1 and #2

a. Set the oscilloscope VOLTS/DIV to 50 mv/div.

b. Set the trace at the centerline on the CRT.

c. Connect the oscilloscope probe to Op Amp #1, pin 6.

1) If the amplifier is properly zeroed, the trace will show short horizontal line segments all at nearly the same voltage.

2) If not zeroed, the line segments will be tilted.

3) Adjust the screwdriver pot through the hole in the top of the amplifier cover.

d. For Op Amp #2 connect the probe to Op Amp #2, pin 6.

1) The picture should be the same as in 15 c.

2) Adjust the pot in Op Amp #2.

16. High Voltage Power Supply Control Adjust

a. Verify that ID1 shutter is closed.

b. Turn on ID1 H.V. power supply.

1) The ID1 voltage meter on the front of the power supply panel should read ~2400 volts.

2) If not, adjust R119 on ERR GEN.

c. Turn on the light source and make sure it is focused near the cathode center.

d. Remove the ground from the input of A1.

e. Reconnect the coax cable to A1 input.

f. Turn on the small oscilloscope mounted in the front panel.

g. Turn SCOPE INPUT SELECT switch on front panel to VIEW.

h. Adjust the trace to the center of the screen with the oscilloscope centering control.

i. Depress the SHUTTER switch to open the shutter.

j. The scope trace should becone a fuzzy line at +1 to +2 volts and the power supply voltage should drop to about -1800 volts.

1) If the trace does not change, center the light source either by moving the mount or manipulating the X and Y CENTER COORD thumbwheel switches until the trace is at maximim volts.

2) Manipulating the switches is done as follows:

a) If the light is near enough to the center coordinate so that the image is in the edge of the aperture for part of each sweep then the scope trace will be a line with humps in it.

b) In this case, move X and Y CENTER COORD switches as necessary to make the trace as high and as straight as possible.

c) If there is no significant change in the scope trace when the shutter is opened, then move X and Y CENTER COORD switches in a pattern to search the cathode until a signal is found. Steps of 100 are permissible.

3) When an image is found and brought to maximum amplitude check the power supply meter. The reading should be near -1800 volts.

a) If not, adjust R118.

17. Focus Current Adjustment

a. With the image centered on the cathode as in 16 j 2) b) above, move the X CENTER COORD switch in small steps down until the scope trace changes slightly.

b. Step the X switch up until the same movement of the scope trace is observed.

c. Adjust the focus control pot until the number of incrememts between the upper and lower switch settings is minimum.

d. Set the SCOPE SELECT switch on the front panel to position 6.

1) Optimum adjustment of the focus current should cause a reading of between 200 mv. and 210 mv. on the scope trace. This is equivalent to 200 ma to 210 ma of current.

III. Final Centering and Offset Adjustments

A. Turn the SCOPE SELECT switch to VIEW.

B. Set the image in the aperture on the cathode as described in Para. II c 16 h thru j.

C. With the image centered proceed as follows:

1. Move the light .015 inches with respect to the cathode in the X direction.

2. Step the X CENTER COORD switches until the image is centered again, as indicated by the trace on the oscilloscope.

a. The number of steps needed should be 15 (one step of the 10's digit and 5 of the units digit).

b. If a correction is needed adjust the X CENTER COORD GAIN pot on rear panel and then lock the dial.

3. With the image centered again, proceed as follows to adjust OFFSET:

a. Depress the OFFSET button to light the ON lamp.

b. Move the light 0.15 inches.

c. Change the X OFFSET thumbwheel switches to recenter the target.

1) Should take 15 steps as before.

2) Adjust the X OFFSET gain pot on the rear panel, if necessary.

d. Depress OFFSET pushbutton to turn ON lamp off.

4. With the target centered as before, move the target .015 inches in the other (Y) axis.

a. Step the Y COORD CENTER switches to bring the target back to center.

b. Should take 15 steps as before.

c. Adjust Y CENTER COORD GAIN pot on rear panel if necessary.

d. Move the target .015 inches away fron center.

e. Depress OFFSET pushbutton to turn On lamp on.

f. Step the Y OFFSET switches to recenter the target.

g. Should take 15 steps as before.

h. Adjust Y OFFSET GAIN pot on rear panel if necessary.

i. Close shutter.

j. Turn off light voltage power supply.

IV. To Adjust SEARCH Pattern

A. Scope trace should show a continuously expanding and contracting spiral starting at zero volts and expanding out to a maximum of 10 volts diameter.

1. To adjust center of spiral to zero, adjust VAR SWEEP ADJ pot on MISC #5 board.

V. To Adjust FILTER Output Zero

A. Connect external scope probe to ERR GEN #1 pin 15.

B. Set VOLTS/DIV to a sensitive scale.

1. Adjust FILTER ADJ (X) pot on MISC #5 for zero level of the scope trace.

C. Move probe to ERR GEN #1 pin 3.

1. Adjust FILTER ADJ (Y) pot on MISC #5 for zero level on oscilloscope.

D. Calibration is complete. Disconnect equipment.

CONSOLE INSTRUCTIONS

I. Calibration

Instruments

A. Oscilloscope such as HP 180 A

B. Light Source focused on the cathode of the ID tube. Must be small diameter.

C. Precise grid placed between light source and ID tube cathode. Must be capable of being moved a precise distance and be returned. The plate scanner with the grid plate meet the requirements for B and C.

Calibration of X and Y Drive Amplfiers

A. Initial preparation

1. Open right hand console door.
2. Pull out the bottom chassis until the potentiometers are available.
3. Locate X amplifier driver card pin 7.
4. Connect oscilloscope probe to pin 7 and adjust scope controls as follows.
    a. VOLTS/DIV to five
    b. SWEEP MODE to AUTO
    c. TIME/DIV to .2 msec.
    d. Input amplifier select to DC.
    e. Sync select to INT.
5. Set ID CENTER X and Y switches each to 000.
6. Set AREA SCAN DIMENSIONS ΔX and ΔY each to 001.
7. Set POINTS/INCH switch to one.

8. Set POINT DWELL TIME to 50 or 100.

B. Adjustments

1. OFFSET

a. Adjust the X offset pot until the oscilloscope trace is at the -10 volt line. Pot is on card.

2. AMPLIFIER GAIN

a. Set ΔX switches to 999.

b. Observe oscilloscope indication. Should be a sawtooth composed of many small steps with a voltage excursion of approximately +10 volts to -10 volts.

1) To adjust the X amplifier gain pot until B 2 b is satisfied. If the center of the sweep is no longer at zero go on to B 2 c. to adjust BALANCE. Pot is on the card.

c. If oscilloscope trace is not symmetrical above and below zero volts, adjust X Balance pot (on top of chassis).

3. CENTERING CONTROL GAIN

a. Set ΔX switches to 001. Trace should be at -10 v.

b. Set ΔX switches to 999.

1) Scope trace should go to +10 volts. Adjust centering gain pot if necessary. Pot is on the card.

4. Final gain adjustment for DRIVER AMPLIFIER

a. Center the calibration grid over the image dissector tube cathode in the plate scanner. The grid is a square piece of glass coated with an opaque substance. The grid is made by etching away lines which are 0.1 mm wide and spaced a distance of 1.0 mm from center to center. There are 25 rows and 25 columns of the squares.

b. Turn on plate scanner light.

c. Turn high voltage supply to ID tube on.

d. Set ΔX switch to 40.

e. Set STEPS/INCH switch to 1.

f. Set ΔY switch to a convenient value such as 5 or 10.

g. Depress INITIATE.

h. Open shutter slide on plate scanner.

i. Observe the pattern traced out on the oscilloscope exactly 10 squares should be included in the horizontal direction.

1) If necessary to manipulate the grid location for for best measurement X Center and Y Center may be moved.

2) Adjust X driver amplifier gain pot if necessary to get exactly 10 squares.

j. X CENTER gain

1) Get a clear trace on the oscilloscope of the grid pattern in the WRITE mode of the scope.

2) At the end of the trace change X center switch by 200 either direction.

3) Watch the new grid pattern trace being reproduced over the first trace. The new trace should be displaced exactly 5 squares. Adjust CENTER GAIN to correct if necessary.

5. GUIDANCE GAIN CONTROL

a. Connect guidance section to the main console with its cables.

b. Obtain a target and lock to as is described in GUIDE operation section. Be sure that the Guide Center switches have the cathode sensitive area centered directly on the target image so that no guidance error signal is developed.

c. The console oscillosocope should still display the grid pattern set up in paragraph 4 if the console is running.

d. Depress GUIDE ID3 to light ON lamp. This connects the error signal to the driver amplifiers.

e. On the Guide panel, increase the most significant digit of the X CENTER switch by one digit. This is best done after a grid has been traced on the oscilloscope and at the end of the raster. The grid now should be displaced horizontally.

f. On the console, move the most significant digit of the X CENTER switches on digit in the opposite direction. This should move the grid back to its former position. If not, adjust the Guide gain pot on the card until satisfactory.

6. To adjust the Y Channel

   a. Connect the oscilloscope probe to pin 7 of the Y driver amplifier.

   b. Return to A4 and repeat the procedure except that everywhere X or ΔX is specified, replace with Y or ΔY.

7. Turn off high voltage supply and close shutters.

8. Remove probes and close console doors.

II. CONSOLE OPERATION

1-Directions for connecting GUIDE rack and RECORD rack to console (see Figure 1).

A. GUIDE rack

1. Connect cable A (fig. 1) to the rear lower right panel. There are two connectors PG1 and PG2. These are connected to SG1 and SG2 respectively.

2. Connect the high voltage supply marked ID 1 to the image dissector H.V. input using the high voltage coaxial cable.

3. Connect the coaxial signal cable from GUIDE to ID 1.

4. Connect a Fluke high voltage supply to the other image dissector or to the photocell, whichever is in use.

5. Connect the AC cord from the GUIDE rack to a convenient AC outlet, either on the wall or in the rear of the main console.

B. RECORD rack

1. Connect cable B (see fig. 1) to the PRINT connector inside the rear of the console.

2. Connect cable C (see fig. 1) to the TAPE connector beside the PRINT connector.

3. Plug the AC connector into the plug strip on the rear of the console.

2-Connecting Plate Scanner to console.

A. Connect cable D (see fig. 1) to the connector marked J20 at the rear lower panel of the console.

B. Connect the AC power cord to any convenient outlet.

C. Mechanical module should be disconnected.

3-Connecting the mechanical module to the console.

A. Connect cable E to the designated connectors on the lower rear panel of the console.

4-Description of Initial use switches

A. DN switch

1. Operates a counter whose output enables the proper multiplier inputs. The pushbutton switch face is separated into four quadrants which are marked DN, 2, 3, 4 respectively.

2. Selects which pair of counter digits from Counter A are selected. The BCD output from the selected pair go through a digital-to-analog converter and then to the signal input of the oscilloscope.

a. The numbers on the switch light to identify the most significant digit of the pair selected, numbered from right to left on the counter digits.

B. DIMMER controls

1. Control illumination of panel lights as specified on the panel.

C. CLOCK RESET

1. Sets the clock counters to zero while depressed. The clock resumes counting from zero when released.

D. APERTURE switches

1. Control a wheel with 22 precision apertures and one large open area.

2. Two side by side pushbutton switches control the rotation. Depressing the switch marked "-" once causes the wheel to move to the next adjacent smaller aperture. The switch marked "+" causes a step the other way. There is a panel light which turns on to mark each location.

3. The Open area is reached by depressing the FIELD pushbutton. The aperture wheel will free run until the opening is reached and stop automatically. One section of the FIELD switch will light.

E. FILTER switches

1. Each filter switch controls a wheel in which ten filters are mounted.

2. To select a filter, momentarily move the toggle switch up or down and release. The wheel will move to the next adjacent filter forward or backward, depending on the direction the switch was moved. A lamp will illuminate identifying the filter selected.

F. THETA MOTION controls

1. Used to move the ring mounting the module through one complete rotation. An electrical stop keeps the rotation from continuing long enough to twist the cables.

2. The controls consist of three parts:

a. On-off switch

b. Direction control with three positions: FORWARD-BRAKE-REVERSE

c. Speed control

3. A digital readout in degrees marked POSITION ANGLE gives a continuous check of module position.

G. COUNTER CONTROL switch

1. Controls the input to the B counter. Consists of a rotary switch and a group of indicator lights.

2. The inputs are as follows - as designated by the indicator lamps:

a. TIM - counts the number of pulses going into the TIME INTERVAL counters. Stops when the count reaches the figure set on the TIME INTERVAL switches.

b. PNT - counts the number of steps the scan makes on each line. The counter clears on the end of each line except the last. Operates turning the scan mode of the EXPERIMENT SELECT switch.

c. LIN - counts the number of lines within an area scan frame. The total number of lines is retained in the counter on the last frame.

d. FRM - counts the number of frames completed in a multi-frame area scan.

e. CPY - copys the count in the A counter except that if the count in the A counter is accumulating, the count in the B counter clears between individual elements and may drive a display.

f. PER - counts the number of frames in a multi-period period scan. (OBSOLETE)

H. Z/Y MOD switch

1. Controls the input to the oscilloscope as follows.

a. On Z MOD position

1) Y-axis input (vertical) is from the vertical scanning circuitry which also controls the scan of the image dissector tube.

2) The Z-input (brightness of the scope trace) is from the information signal, so that a change in signal intensity changes the brightness of the scope trace.

b. On Y-MOD position

1) Y-axis input is from the information signal. There is no input to the Z-input.

c. X input (horizontal) to the scope is from the horizontal drive circuits of the image dissector controls.

I. SHUTTER CONTROL switch

1. Opens and closes the shutter by momentarily depressing the switch.

2. On initial turn on the shutter should be checked to be sure it is closed. To do this, momentarily depress the switch a few times to turn the OPN light on and then off one time.

3. The switch has a section marked EMG. This section lights if the tube puts out a current which is too high. The shutter closes at the same time.

J. UNIT SCAN switch

1. Pushbutton switch used to restrict the scan to a single point when the bottom half is lighted.

K. IDENTITY switches

1. A group of thumbwheel switches which are used to enter object identification or coded data into the console.

L. PRESCALE switches

1. A group of pushbutton switches which divide the number of pulses from the detector circuits by 1, 10, 100, or 1000 depending on which switch is activated. The switches are arranged so that only one will stay activated at any time.

M. COUNT ALGEBRA switch

1. A rotary switch and seven indicator lights which control algebraic operations on successive photometric record as follows, identified by the markings on the lingts.

a. $-\frac{T}{2}$ The count time set on the TIME INTERVAL switch is divided by two and the count direction is down. The counter clears at the beginning of each cycle.

b. $+\frac{T}{2}$ Same as Paragraph a. above except the counter increases.

c. +T The counter counts up for the full time set on the TIME INTERVAL switches.

d. +TA Same as Paragraph c. above except the counter is not cleared at the start of a cycle.

e. $-\frac{T}{2}$ A Same as Paragraph a. above except the counter does not clear at the start of the cycle.

f. $+\frac{T}{2}$ A Same as Paragraph b. above except the counter does not clear at the start of the cycle.

g. -TA Same as Paragraph d. above except the count direction is down.

N. GAIN CONTROL switches

1. Thumbwheel switches controlling the gain of the DC amplifiers. COARSE gain switches change the gain by 1000. FINE gain switches control in smaller steps.

O. COMMENTS switches

1. Thumbwheel switches which allow coded comments to be recorded directly.

P. NATURE OF DATA switches

1. A thumbwheel switch which allows entry of a data code on the record. The code indicates the nature of the data recorded.

Q. REJECT switch

1. A pushbutton switch which when activated writes a code on the recording instrument which the computer program will use to reject the previous data record. The switch automatically resets at the end of each cycle so it must be specifically activated for each cycle.

5-Console Operation

A. Initial switch set up

1. Depress console main power switch so that its cover is illuminated.

2. Set the console switches as follows:

a. Z/Y MOD to Z MOD

b. OSCILLOSCOPE to CHA

c. DETECTOR SELECT to ID

d. MODE SELECT to PULSE

e. UNIT SCAN to OFF

f. APERTURE to OPEN

g. MASTER TIMING set to illuminate VIEW lamp

h. EXPERIMENT SELECT depress AREA SCAN

i. PRESCALE depress /1

j. COUNT ALGEBRA set to illuminate +T lamp

k. FILTER SELECT switch operated until CLEAR lamp is lighted

l. ID CENTER (X and Y) both set to 000

m. POINTS/INCH switch set to 1

n. AREA SCAN DIMENSION (ΔX and ΔY) set to 100

o. POINT DWELL TIME to 1000

p. FOCUS CURRENT METER - should read near 205 ma

q. HIGH VOLTAGE POWER SUPPLY (in guid panel) Set POWER switch to ON

r. HIGH VOLTAGE P.S. switches set for -1800 v. After STDBY RESET lamp turns on turn H.V. switch to the right. High voltage is now applied to the image dissector.

B. Mechanical adjustments

1. Physically position the optic system so that the light source

shines near the center of the tube cathode

C. Oscilloscope set-up procedure

1. Turn on oscilloscope

2. CONTROL POSITIONS

a. HORIZONTAL

1) Position - as necessary

2) MAGNIFIER - X10

3) AC/DC - DC

4) DISPLAY - EXT CAL

b. INPUT AMPLIFIERS

1) DISPLAY - A

2) Y SCALE - .1

3) X SCALE - .1

4) AC/GND/DC - both to DC

5) POLARITY - +UP

3. RECORDING ON SCOPE

a. NORM pushbutton pushed in

b. Intensity is controlled by a knobpot on the console marked.

1) Should be set so that the scope trace is very dim.

c. PERSISTENCE - set to best position by experimentation. Probably near the extreme clockwise position.

d. Depress WRITE

1) A permenant trace should begin to form on the face of the scope. If too bright depress ERASE and turn intensity down. If the trace fades too fast turn PERSISTENCE clockwise. Any time the trace begins to bloom, or to blur from too many retraces, depress ERASE momentarily.

e. To store an image for a long period with no blurring, depress STORE after the desired picture has formed on the screen.

D. Acquiring a picture on the oscilloscope

1. Plate scanner

a. Set MODE SELECT for PULSE or VF as desired.

b. Connect coax cable between plate scanner PULSE or VF output to correspond to the mode selected and the console input.

c. Turn the lamp power supply on the plate scanner to ON and be sure that the intensity control is set near the center of its range.

d. Open the mechanical slide on the plate scanner.

e. Depress INITIATE switch.

1) A raster pattern should appear on the oscilloscope.

a) The raster starts at the lower left on the scope

b) To change the raster sweep speed change the POINT DWELL TIME.

c) To change the raster size change ΔX and/or ΔY.

d) As the raster is traced out a brighter spot will appear if the light source is shining on an area of the cathode which is being covered by the scan. It should be under the conditions as specified.

(NOTE: if no spot appears the light may be too dim or the Step Dwell Time too short.)

e) On V.F. mode the DISCRIMINATOR may need to be adjusted.

2) When a spot is found move it to the lower left of the scope screen.

a) Increase the X and Y (ID Center) switches by small amounts.

b) As the image moves down and to the left the ΔX and ΔY switches may be decreased to speed the completion of each raster.

c) After the spot is moved, the image may be magnified by increasing the Steps/Inch switch. The size of the raster may need to be increased to cover the increased image size.

2. Acquiring an image from the Mechanical Module

(NOTE: The following description is valid if the image dissector has an image centered on its cathode. The image may be from an actual star with the mechanical module mounted on a telescope or from an artificial light source.)

a. Set MODE SELECT for PULSE or VF as desired.

b. Connect coax signal cable between ID tube VF or PULSE output and the console signal input.

c. Move the filter wheel to the desired filter position.

d. Move the aperture wheel to the desired aperture position.

e. Depress the SHUTTER switch to turn on OPN light.

f. Depress INITIATE switch

1) Continue as described in Paragraphs 5-D.1.e. to locate the image and adjust the controls for the desired results.

E. Data Control Operation

1. Integrating into the computer

a. Depress CHA

b. Determine the number of frames desired.

c. Estimate the amount of time necessary to be set on the TIME INTERVAL switches.

1) TIME IN SECONDS $\leq$ (SETTING OF ΔX)$\cdot$(SETTING OF ΔY) - $\left(\frac{\text{SETTING OF POINTS/INCH}}{100000}\right)\cdot$(# FRAMES)

2) If the time ends in the middle of a frame, the frame is completed.

d. Set the TIME INTERVAL SWITCHES to the value calculated above. From 0 to 999 seconds in .001 sec. steps.

e. Set MASTER TIMING to illuminate FRAME if only one frame is desired.

f. Set the MASTER TIMING to illuminate one of the small white lights under the TIME INTERVAL switches. This fixes the decimal point location for a number of frames.

g. Depress CORE.

h. Computer set-up

1) Turn on main power switch on the inside of the computer front door panel.

2) Clear the computer memory as follows:

a) Depress CLEAR SWITCH REG. with a finger.

b) Depress switch register position 1 and 5 with a finger.

c) Depress LOAD REGISTER

d) Depress RUN

3) Depress CLEAR SWITCH REGISTER

4) Depress 0, 2, 3, 4 of the SWITCH REGISTER.

5) Depress LOAD REGISTER.

The computer is now prepared.

i. Turn on printer.

j. Depress INITIATE.

1) Whatever the ID tube (or photomultiplier) is looking at will be integrated in the computer and the result left in the memory. The next step is usually to record the memory on magnetic tape.

2. Reading out the computer memory

a. Select the unit to be used to record the data.

1) Depress either WRITE or PRINT for the tape recorder or the printer.

b. Set MASTER TIMING for FRAME.

c. Set up the recording unit as described elsewhere.

d. Depress READ CORE.

e. Check the SWITCH REGISTER on the computer to be sure the numbers illuminated have not changed.

f. Depress INITIATE.

3. PRINT operation

a. Printer preparation

1) Turn on power switch

2) Set line spacing as desired.

3) Check for sufficient paper in the printer.

b. To print

1) Set MASTER TIMING to FRAME or TIME INTERVAL. FRAME is normal since only one frame is usually desired.

2) STEP DWELL TIME switch may be increased to slow the printer down if desired.

3) Select the source of the information desired.

a) For printing signal data preparation is complete with AREA SCAN depressed.

b) For other information depress one of the following as desired: HEADING, DATA, REMARK, FRAME COORD., READ CORE, or READ TAPE.

c) If printing from another instrument prepare the instrument as described elsewhere.

4) Depress INITIATE.

4. Magnetic Tape Operation

a. Initial preparation

1) Depress WRITE switch or TAPE READ, as needed.

2) Be sure FORWARD/REVERSE switch is set to FORWARD.

3) Note reading of file counter.

4) Load tape into the machine. (See Fig.) If WRITE is depressed be sure read has write ring installed.

a) If tape already loaded, skip to 4. d.

b) Install the full reel on the bottom holder, positioned so the tape comes off the top when turning clockwise. Push reel all the way back and turn knob clockwise to lock.

c) Lock an empty reel of the same size on the top holder.

d) Press the pushbutton marked PWR ON.

e) Press and hold the LOWER button and pull about three feet of tape off lower reel. Attach the end to the upper reel.

f) Press the UPPER button and turn the upper reel two or more turns clockwise.

g) Press the LOWER button and remove the bottom reel.

h) Thread the tape into the recorder as shown in Fig. and by the arrows on the front of the recorder.

b. Press READY pushbutton.

c. Press LOAD pushbutton.

1) The tape will move to the BOT reflective marker and stop. The stop operation initiates a sequence of signals from the console which move the tape a short distance. This distance is determined by the WRITE or the READ TAPE operation.

d. Direct recordings on tape from signal.

1) Depress WRITE.

2) Set MASTER TIMING to FRAME.

3) AREA SCAN should be depressed.

4) Tape operation can be slowed by increasing STEP DWELL TIME.

5) Depress INITIATE.

e. Recording from computer onto tape.

1) Depress WRITE.

2) Depress READ CORE.

3) Set MASTER TIMING to FRAME.

4) Prepare computer as previously described.

5) Depress INITIATE.

f. Reading from tape to printer.

1) Depress PRINT.

2) Depress READ TAPE.

3) Find the file to be read out.

a) Set the FORWARD/REVERSE switch for the desired direction.

b) While watching the file counter depress STEP ONE FILE switch as many times as necessary to reach the correct file.

c) Set the FORWARD/REVERSE switch to FORWARD.

4) Prepare the printer.

5) Depress INITIATE.

g. Reading from tape into the computer.

1) Depress READ TAPE.

2) Depress CORE.

3) Find the correct file.

4) Prepare the computer as before.

5) Depress INITIATE.

F. Console shutdown procedure

1. Close all shutters.

2. Turn High Voltage Power Supply standby switch to standby position.

3. Depress POWER pushbutton switch.

MECHANICAL MODULE ELECTRICAL AND ELECTRONIC SUBSYSTEMS

The strictly electrical parts of the mechanical module are concerned with moving submodules and components, and with the readouts to show their location. Rotating motion of the entire unit is done by driving a ring gear with a reversible motor controlled by a variable speed controller. Angular position is detected by a digital encoder mounted on the base plate and coupled to the ring gear. Output of the encoder is sent to the console where it is decoded electronically and displayed on the front panel in degrees. Two sub-modules Mod 1 and Mod 2 are mounted on the ring gear on linear bearings and are moved radially by long screws driven by the same type of motors as drives the ring gear. Control for all three motors is from the front panel of the console. All three motor systems are equiped with limit switches so that the modules cannot be driven too far and damaged. Readout for the two linearly driven modules is from multiple turn precision potentiometers coupled to each "driving" screw. These pots are tied between a precision regulated voltage and ground, and the wipers tied to a selecting circuit in the console so that either can be selected to be read on a digital voltmeter. A precision trimpot is inserted between the voltage and each pot so that the readout scale can be controlled. They are set to one volt per inch of movement. The remainder of the electrical components consist of the stepping motors which drive shutters and filter wheels described elsewhere, and the cooling unit for the photmultiplier. The cooling unit is a thermoelectric device which is driven by an external power supply and controlled by an automatic temperature controller. In addition, two small motors each drive a slide with optical components mounted on them, controlled from the console. Schematic diagram number 01110 define and identify all the components and show their interconnections.

The components described as electronic are the pulse amplifiers, the polar-to-rectangular coordinate converter circuits, and the signal processing circuit box. The pulse amplifiers are copies of amplifiers developed at Lick Observatory and combine the amplifier and discriminator in the same housing. Amplifier input comes direct from the detector anode and is designed to respond to a pulse amplitude of 70 microvolts or greater. Output after passing through the discriminator is a negative going pulse of 6 monosecond duration with a nominal amplitude of 1.5 volts. This output then goes to a circuit which widens the pulse, then inverts and amplifies it to a suitable level to drive TTL logic. A tunnel divide flip-flop is used to widen the pulses and normal pulse amplifiers do the rest.

The signal processing has two channels for each detector input. One channel is the pulse input, the other is to convert from a voltage level to a pulse train whose repetition rate depends on the voltage amplitude. The voltage level input is through a gain-of-one amplifier whose input impedance is either a 10^8 ohm or a 10^5 ohm resistor, selected from the console. These are followed by a voltage follower whose input impedance is much greater than 10^8 ohms so can be ignored. Output from this amplifier goes into a voltage-to-frequency converter card with an input range of 0 to 10 volts and an output frequency range of 0 to 10^6 PPS. This output goes to one input of a card called discriminator which is a gate card used to determine whether the pulse mode or V-F mode is passed through to the scaler. It follows of course that the pulse in from the detector is another input. Selection is under control of the gate card which has inputs from the ω-switch denoting switch position, and also has inputs from the gain switches. In the case of the ω inputs, these are combined and sent to the discriminator card to select which input passes through. The gain input goes through a driver, then out to the DC amplifier to switch the 10^5 ohm input resistor into the circuit. Output from the discriminator goes to a scaler circuit card, which is a series of three divide-by-ten circuits, with gating so that the output from any of the three can be sent to the output. In this way the input pulse train can be divided by 10, 100, or 1000 as desired. Control is from actuating the Prescaler push button switches on Data panel. Output from the scaler goes through a line driver then to the coaxical cable and to the console input. Also mounted on the mechanical module is a group of relays and their control card which are used to multiplex the signals going to and from the console. In this way only enough lines to operate the mode being used used are needed and the interconnecting cable is smaller. The multiplex control card is a series of gates controlled by the ω switch and by a multiplex switch mounted on Experiment Select. The gates operate drivers which pull in the proper relay for the switch configuration set up.

Only one relay will be closed at any time. An identical set of relays with their control card are mounted in the console.

The polar-to-rectangular coordinate converter is necessary because the guidance detector mount is capable of rotation with respect to the telescope, while telescope motion is in rectangular coordinates. An error signal is generated by the detector (ID1), also in rectangular coordinates. Therefore, in order to send the proper error signal to the telescope drive circuits the rotational component must be added to the error signal before sending this error signal to the telescope. To make this correction a dual sin/cos potentiometer is mounted on the stationary part of the module mount. Its rotor is connected to the rotating gear so the error correction equations are as follows.

(declination) $E'x = Ex \cos \theta - Ey \sin \theta$

(right ascension) $E'y = Ex \sin \theta + Ey \cos \theta$

See X-Y Resolver schematic for details.

To solve the above equations electronically operational adders and subtractors are used in conjunction with the sin/cos put. The output is then sent to the drive circuits of the telescope through a relay whose control is on the Guidance panel. This relay allows the guidance signal to be sent to the telescope drive controls only when desired.

One circuit which combines electrical and electronic components is the cooling system for the photomultiplier. In this system a thermoelectric cooler is used. A separate power supply furnishes operating power for the cooler. The electronic part is a temerature controller to keep the temerature constant. The hot side of the

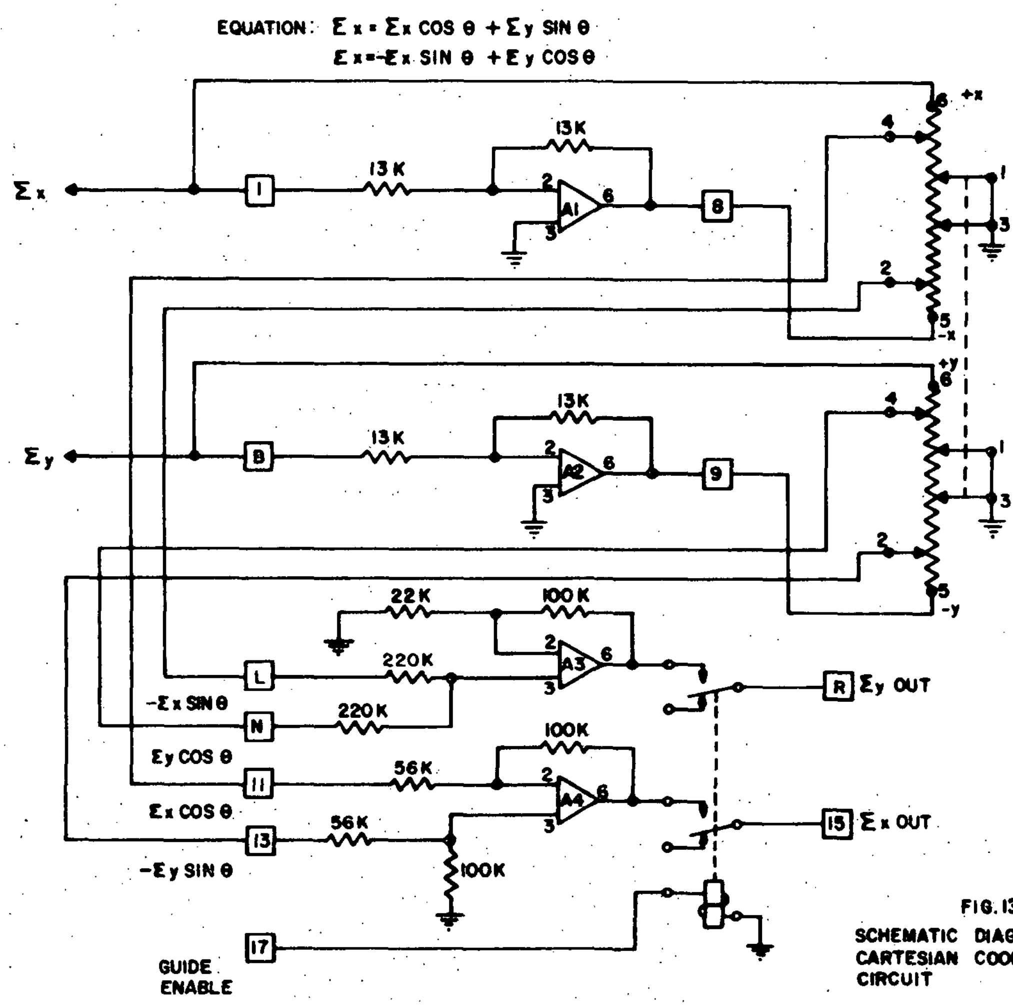
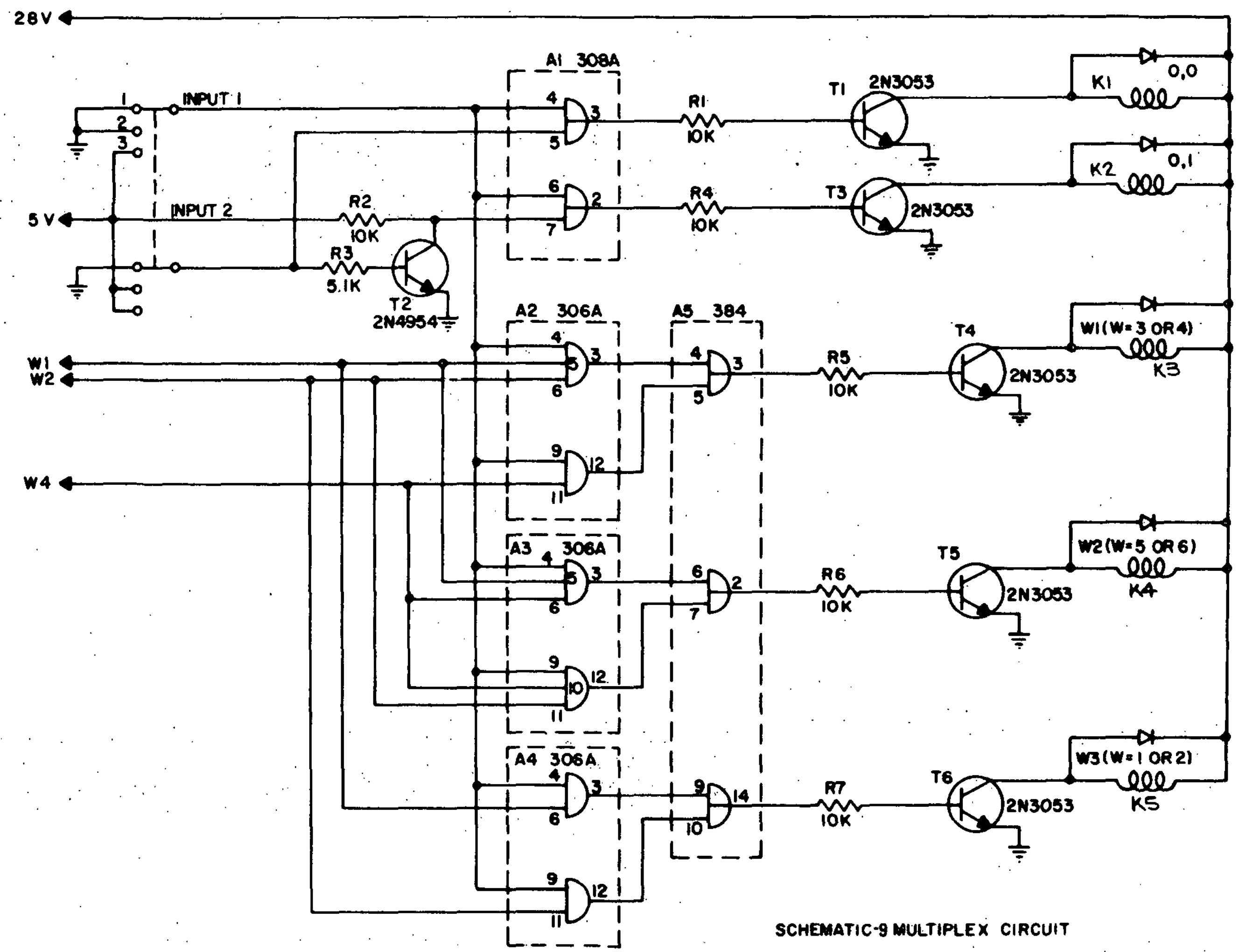


FIG. 13

SCHEMATIC DIAGRAM OF POLAR-TO-CARTESIAN COORDINATE TRANSFORMATION CIRCUIT

Thermoelectric cooler uses chilled water to carry off excess heat. Chilled water comes from a commercial water cooler unit.

All schematic diagrams for the units described are in the accompanying manuals.



SCHEMATIC-9 MULTIPLEX CIRCUIT

SPACE ASTRONOMY
OF THE
STEWARD OBSERVATORY

THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA

FINAL TECHNICAL REPORT

OF

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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IMAGE DISSECTOR CONTROL AND DATA SYSTEM ELECTRONICS

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SECTION II

APPENDIX I

This Appendix contains detailed wiring charts which show connections from, connector to, connector and chassis to chassis of the complete system.

LOGIC SECTION

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I Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	Inv 1 out	1	INV1-8		
2	Invalid Code Lamp Pin B (Conn INIT Pin 5)	1	(Conn I-5)	Inval ~~Code~~ Lamp	
3	Cycle Lamp Pin B (Conn INIT Pin 6)	1	(Conn I-6)	Cycle Lamp	
5	Common B	1	RR3-F		
7	Ground bus	1	C-V		1 TBD
9	Amplitier to Common C	1	ORZ-18		
11	Inv 4 out	1	INV1-5		
13	NOR 2 out	1	NOR1-3		
15	+5 VDC bus	1	C-17		
17	F1-F	1	F1-F		
B	Overflow Lamp Pin B (Conn INIT Pin 9)	1	(Conn I-7)	Overflow Lamp	
D	NOR 3 out	1	NOR1-2		
F	INV 2 out	1	INV1-6		
J	Conn INIT Pin 1	1	Conn I-1		
L1	NOR 4 out	1	NOR4-2		
N	Inv 5 out	1	INV1-14		
R	Inv 3 out	1	INV1-15		
T	Common D	1	RRG-11		
V	Inv 6 out AP1-11	1	AP1-11		

RR3 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	Ground bus	1	RR4-1	1	RR2-1
3	α=PFT +5 VDC bus	1	SWR1-2		
5	+5 VDC	1	RR4-B	1	RR2-5
6	Common AJ	1	NOR2-24		
7	OR 4 out	1	OR2-3		
9	RR4-F	1	RR4-F		
11	α=V +5 VDC bus	1	SαD-Comm	1	RR2-F
13	Common AL	1	OR5-30		
15	Common AI	2	BD 1-C Conn 10-5		
17	OR 2 in DB1-F	1	DB1-F		
B	OR 20-in	1	OR2-7		
D	Common AK	1	RR4-6		
F	Common B	1	INV1-7	1	I-5
J	δ=8,9 +5 VDC bus	1	(Conn ES-3)	ES1-N	
K	P=6,8,9,10	1	OR4-23		
L	α=T +5 VDC bus	1	RR6-N	1	RR1-3
N	NOR 20 in	1	NOR2-32		
R	Common H	1	RR6-F	1	PT-13
T	δ=3,7 +5 VDC bus	2	(Conn ES-2) OR4-21	ES1-11	rr1-F
V	W=1-4,7-8 +5 VDC bus	1	RR4-11		

PT Logic

Pin	Wire To	No. of wires out	to	in	from
1	Ground bus	1	F 1-V	1	C-V
3	Inv 7 out =	1	INV1-12		
5	NOR 10 out =	1	NOR 1-21		
7	Common F	1	OR 3-5		
9	SWR 1-N	1	SWR 1-N		
11	Common G	1	F 4-T		
13	Common H	1	RR 3-R		
15	Common I	1	RR 7-T		
17	+5 VDC bus	1	F 1-T	1	C-17
B	Inv 8 out =	1	INV 1-26		
D	NOR 14 out	1	NOR 1-20		
F	NOR 15 out	1	NOR 4-20		
J	OR 23 in	1	OR 1-11		
L	Not used	0			
N	NOR 17 out	1	NOR 3-16		
R	RR 2-15	1	RR 2-15		
T	S J - Comm	1	S G - Comm		
V	Common BC	1	INV 1-22		

F1 Logic

Pin	Wire to	No. of wires out	to	in	from
1	Inv 11 out	1	INV1-24		
3	+12 VDC bus	1	F 2-3	1	S-52
5	Common K	1	RR 4-R		
7	OR 9 in = DB1-E	1	DB1-E		
9					
11	Common L	1	D 4-15		
13	Inv 14 out	1	INV 1-32		
15	Common M	1	F 5-D		
17	Inv 13 out	1	INV 1-33		
B	Common N	1	F 5-5		
D	Inv 12 out	1	INV 1-30		
F	I - 17			1	I-17
J					
L					
N	Common O	1	RR 4-13		
R	Inv 15 out	1	INV 2-8	1	A-3
T	+5 VDC bus	1	F 2-T	1	PT-17
V	Ground bus	1	F 2-v	1	PT-1

F2 Logic

Pin	Wire To	No. of wires out	to	in	from
1	Inv 16 out	1	INV 2-5		
3	+12 VDC bus	1	F3-1	1	F 1-3
5	Common P	1	RR 4-V		
7	OR 9 in = DB1-5	1	DB1-5		
9					
11	Common Q	1	S-38		
13	Inv 18 out	1	INV 2-6		
15	Common R	1	F 5-V		
17	Inv 19 out	1	INV 2-14		
B	Common S	1	F 5-17		
D	Inv 17 out	1	INV 2-15		
F	Common T	1	F 5-T		
J					
L					
N	Common U	1	RR 4-N		
R	Inv 20 out	1	INV 2-12		
T	+5 VDC bus	1	F 3-B	1	F 1-T
V	Ground bus	1	F 3-3	1	F 1-V

F3 Logic

Pin	Wire To	No. of Wires Out	To	In	From
1	+12 VDC bus	1	F 4-L	1	F 2-3
3	Ground bus	1	F 4-B	1	F 2-V
5	NOR 11 out	1	NOR 3-2		
7	NOR 19 out	1	NOR 1-34		
9		0		Avail std. OS (output)	
11	Common V	1	INV 2-21		
13	Common W	1	OR 3-12	1	BD 1-6
15	Common X	1	F 4-7		
17	Inv 21 out	1	INV 2-26		
B	+5 VDC bus	1	F 4-1	1	F 2-T
D	OR 8 in	1	OR 5-4		
F	not used	0			
J		0		Avail std. OS (input) (no driver)	
L	NOR 12 out	1	NIR 4-16		
N	OR 13 in	1	OR 1-22		
R	Inv 9 out	1	INV 2-23		
T	Inv 23 out	1	INV 2-24		
V	Inv 22 out	1	INV 2-32		

F4 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	+5 VDC bus	1	F5-3	1	F3-B
3	bad pin use c instead	0			
5	Inv 24 out	1	INV2-33		
7	Common X	1	INV2-31	1	F3-15
9	D22-21	1	D22-21		
11	COBX 1 to ID	1	(BNC FREQ U5)	U CNT #1-S	
13	Common AE	1	F5-13		
15	Inv 27 out	1	D14-11		
17	RR7-R	1	RR7-R		
B	Ground bus	1	F5-1	1	F3-3
C	NOR 22 out	1	NOR3-21		
D	NOR 16 out	1	NOR1-33		
F	NOR 23 out	1	NOR3-20		
J	D22-23	1	D22-23		
L	+12 VDC bus	1	F5-B	1	F3-1
N	D23-32	1	D23-32		
R	Inv 25 out	1	INV2-30		
T	Common G	1	NOR3-34	1	PT-11
V	NOR 21 out	1	NOR2-3		

C Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	NOR 5 out	1	NOR5-2		
3	Common E	1	AP1-5		
5	NOR 7 out	1	NOR3-3		
7	Signal Cable Line 1 (A NEG)	1	BNC-A NEG		
9	Counter Cable Line L (A+)	2	COAX to A+ SWRZ-T		
11	Counter Cable Line 2 (B-)	1	OR1-4		
13	Conn INIT Pin 2 K=1,3,6	1	(Conn I-2)	SKC-C	
15	Conn INIT Pin 3 K=2,4,5,7	1	(Conn I-3)	SKD-C	
17	+5 VDC bus	1	PT-17	1	I-15
B	NOR 8 out	1	NOR1-16		
D	SWR2-1	1	SWR2-1		
F	OR 2 out PB1-3	1	DB1-B		
J	Counter Cable Line 3 (A-)	2	COAX to A- SWRZ-D		
L	Signal Cable Line 2 (A POS)	1	BNC A POS		
N	Counter Cable Line 4 (B+)	1	OR1-6		
R	NOR 9 out	1 NOR1-15			
T	Signal Cable Line 3 (B POS)	1	BNC B POS		
V	Ground bus	1	PT-1	1	I-7

(---) means OLD SYSTEM

F5 Logic

Pin	Wire to	No. of wires out	to	in	from
1	Ground bus	1	RR 1-1	1	F 4-8
3	+5 VDC bus	1	RR 1-5	1	F 4-1
5	Common N	1	INV 1-25	1	F 1-8
7	NOR 18 out	1	NOR 2-2		
9	D 22-24	1	D 22-24		
11	D 22-20	1	D 22-20		
13	Common AE	1	D 14-17	1	F 4-13
15	S = 3,7,+5VDC bus	1	RR 1-F		
17	Common D	1	INV 2-4	1	F 2-B
B	+12 VDC bus	1	RR 7-1	1	F 4-L
D	Common M	1	INV 1-34	1	F 1-15
F	INV 26 out	1	D 14-9		
J	D 22-25	1	D 22-25		
L	D 22-19	1	D 22-19		
N	D 18-32	1	D 18-32		
R	RR 5-15	1	RR 5-15		
T	Common T	1	RR 6-5	1	F 2-F
V	Common R	1	INV 2-13	1	F 2-15

RR1 Logic

Pin	Wire to	No. of wires out	to	in	from
1	Ground bus	1	RR 2-1	1	F 5-1
3	α = T+5 VDC bus	2	SWR 1-4 RR 3-L		
5	+5 VDC bus	1	RR 2-5	1	F 5-3
7	α = V+5VDC bus	2	SWR 1-U RR 2-F		
9	W = 3-8 +5 VDC bus	1	RR 2-17		
11	Common C	3	RR 2-J RR 1-R INV 1-16		
13	Prog B init via or gate 29	1	OR 4-11		
15	S = 1,2,4,5	1	OR 4-22	1	Conn ES-4
17	Common BU	1	SWR 2-17		
B	RR 5-9	1	RR 5-9		
D	RR 5-L	1	RR 5-L		
F	S = 3,7+5 VDC bus	1	RR 3-T	1	F 5-15
J	NOR 4 in	1	NOR 4-4		
L	α = FP+5 VDC bus	1	SαE-comm		
N	SWR 1-D	1	SWR 1-D		
R	Initiate (Common C)			1	RR 1-11
T	W = 1,2 +5 VDC bus	1	RR 5-13		
V	NOR 16 in	1	NOR 1-31		

RR2 Logic

Pin	Wire to	No. of wires out	to	in	from
1	Ground bus	1	RR 3-1	1	RR 1-1
3	Common AF	1	OR 1-24		
5	+5 VDC bus	1	RR 3-5	1	RR 1-5
7	NOR 4 in	1	NOR 4-5		
9	Common AG	1	RR 5-17		
11	δ = 8 +5 VDC bus	1	RR 6-15		
12	δ = 6	1	RR 8-N		
13	α = VTP+5 VDC bus	1	SWR 1-E		
15	PT-R			1	PT-R
17	W = 3-8+5 VDC bus	1	RR s-R	1	RR 1-9
B	Common AH	1	OR 1-25		
D	α = TP+5 VDC bus	1	S F-comm		
F	α = V+5 VDC bus	1	RR 3-11	1	RR 1-7
J	Common C	1	AP 1-1	1	RR 1-R
L	δ = 9 +5 VDC bus	1	RR 6-9		
N	α = F +5 VDC bus	2	SWR 1-17 RR 6-T		
R	NOR 12 in	1	NOR 4-11		
T	Common BV	1	SWR 2-J		
V	OR 7 in	1	OR 3-29		

RR4 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	Ground bus	1	RR 5-1	1	RR 3-1
3	NOR 24 in	1	NOR 2-25		
5	K=1,4,5 +5 VDC bus	1	(Conn I-8)	ALG-14	
7	OR 1 in	1	OR 2-11		
9	Conn Count-1	1	Conn C-1	Conn Count B-n	
11	W=1-4,7-8 +5 VDC bus	2	(Conn P-10)	Prg A-11	
			SWR 2-R	1	RR 3-V
13	Common O	1	INV 1-31	1	F i-N
15	W=5,6 +5 VDC bus	3	DB 1-A		
			SWH-Comm		
			(Conn P-1)		
17	RR 7-J	1	RR 7-j		
B	+5 VDC bus	1	RR 5-B	1	RR 3-5
D	NOR 6 in	1	NOR 2-22		
F	RR 3-9	0		1	RR3-9
J	not used	0			
L	Common AK	1	NOR 2-30	1	RR 3-D
N	Common U	1	INV 2-7	1	F 2-N
R	Common K	1	INV 1-35	1	F 1-5
T	RR 7-D	1	RR 7-D		
V	Common P	1	INV 2-16	1	F 2-5

RR5 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	Ground bus	1	RR 6-V	1	RR 4-1
3	Common AP	1	OR 5-31		
5	Common AO	1	OR 3-22		
7	US=off +5 VDC bus		(Conn ID-11)	QUS Collector	
9	RR 1-B			1	RR 1-B
11	US=on +5 VDC bus	1	(Conn ID-10)	Sus B-Comm	
13	W=1-2 +5 VDC bus	1	SWG-Comm	1	RR 1-T
15	F 5-R			1	F 5-R
17	Common AG	1	NOR 4-22	1	RR 2-9
B	+5 VDC bus	1	RR 6-17	1	RR 4-b
D		1	RR 8-F		
F	Common AM	1	OR 3-14		
J	Common AN	1	NOR 1-13		
L	RR 1-D			1	RR 1-D
N	not used				
R	W=3-8 +5 VDC bus	1	SWD-Comm	1	RR 2-17
T	NOR 17 in	1	NOR 3-13		
V	SWR 1-11	1	SWR 1-11		

RR6 Logic

Pin	Wire To	No. of Wires Out	To	In	From
1	NOR 17 in	1	NOR 3-14		
3	Common AR	1	INV 1-17		
5	Common T	1	OR 2-13	1	F5-T
6	δ=6			1	RR 8-N
7	Common AS	1	OR 3-23		
9	δ=9 +5 VDC bus	1	SWR 2-18	1	RR 2-6
11	Common D	1	AP 1-3	1	I-T
13	Common AT	1	OR 3-24		
15	δ=8 +5 VDC bus	1	SWR 2-V	1	RR 2-11
17	+5 VDC bus	1	RR 7-17	1	RR 5-B
B	NOR 12 in	1	NOR 4-12		
D	NOR 19 in	1	NOR 1-29		
F	Common H			1	RR 3-R
J	Common AU	1	OR 1-12		
L	α=P +5 VDC bus	2	SWR 1-R SαI-Comm	1	RR 8-L
N	α=T +5 VDC bus	1	SαH-Comm	2	RR 8-V RR 3-L
R	OR 12 in	1	OR 2-32		
T	α=F +5 VDC bus	1	SαC-Comm	1	RR 2-N
V	Ground bus	1	RR 7-V	1	RR 5-1

RR7 Logic

Pin	Wire To	No. of Wires Out	To	New Location	From
1	+12 VDC bus	1	+12 VDC pt	1	F5-B
3	NOR 20 in	1	OR 4-13		
5	RC=B +5 VDC bus	1	(Conn ES-8)	ES 1-7	RR 8-13
7	RC=W +5 VDC bus	1	(Conn IS-10)	ES 2-C	RR 8-B
9	OR 2 out	1	OR 2-2		
11	RC=P +5 VDC bus	1	Conn ES-9		
13	K=1,3,5,7 +5 VDC bus	1	Conn I-9		
15	K=2,4,6 +5 VDC bus	1	Conn I-10		
17	+5 VDC bus	1	SWR 1-17	1	RR 6-17
B	OR 14 out	1	OR 1-33		
D	RR 4-T			1 1	Logic Misc A- RR 4-T
F	Common BA	2	INV 1-13 (Conn ID-13)	J21-34	
J	RR 4-17			1	RR 4-17
L	RC=PW +5 VDC bus	1		ES 2-11	RR 8-D
N	Common BO	1	SWR 2-11		
R	F4-17			1	F4-17
T	Common I	1	D 14-12	1	PT-15
V	Ground bus	1	SHUT 1-V	1	RR 6-v

RR8 Logic

Pin		Wires	Out To	New Location	Wires	In From
1	Abort	1	NOR 4-6			
3	T init	1	NOR 5-31			
5	(T init)	1	OR 5-24			
7	+5 VDC	1	AP 1-15		2	DB 1-7 NOR 5-8
9	not used					
11	δ=10	1	(Conn P-15)	PROG A-17 ES 2-S		
13	RC=B	1	RR 7-5			
15	FV	1	SWR 1-H			
17	Gnd	1	Osc-7		1	DB 1-17
B	RC=W	1	RR 7-7			
D	RC=PW	1	RR 7-L			
F	(Abort) RR5-D	1	RR 5-D			
J	F init	1	OR 2-31			
L	α=D	1	RR 6-L			
N	δ=6	2	RR 2-6 Conn P-12		1	RR 2-12
R	Initiate	1	AP 1-1			
T	α=FT	1	Spare Wire			
V	α=T	1	RR 6-N			

Logic Card DB1

Pin	Function	in	from	out	to
A	P 9 in W=5,6	1	RR4-15		
B	4 OR 2 out	1	C-F		
C	1 OR ξ in	1	RR3-15	1	OR2-23
D	2 OR η out	1	SWR2-15		
E	3 OR 9 in	1	F1-7		
F	4 OR 2 in (on F1-L)	1	RR3-17		
H					
J				1	NOR5-30
K					
L					
M	P 12 out open C 9 (NOR 9 in)			1	NOR1-14
N					
P					
R					
S					
T					
U					
V					
1	P 10 in F initiate	1	NOR3-24		
2	3 OR 9 out	1	Logic Misc A-16		
3	1 OR ξ out (new)	1	SWR2-7		
4	2 OR η in (on SWR2-15)	1	Conn ID-9	OBSOLETE	
5	3 OR 9-in (on F2-9)	1	F2-7		
6	4 OR 2-in (on F1-9)	1	F3-13		
7	+5 VDC	1	RR8-7	1	Logic Misc A-1
8				1	NOR3-15
9				1	NOR1-25
10		1	Conn ID-7	OBSOLETE	
11		1	Conn ID-8	OBSOLETE	
12			SDN NO		
13					
14			Conn Count-8		
15					
16			SDN NC		
17	GND	1	RR8-17	1	Logic Misc A-A
18					

OBSOLETE

SHUT 1 Logic

Pin		Out	To	In	From
1		1	S SHUTP A-NC		
3	Powerload sig.	1	Conn EXIT-16		
5		1	S SHUTP A-NO		
7		1	Display Dim-2		
9	Close shutter P (red lead)	1	Conn EXIT-19		
11	Not used				
13	Open shutter P (green lead)	1	Conn EXIT-20		
15	Shutter open limit switch	1	Conn EXIT-17		
17	+5 VDC bus	1	SWR 2-F	1	RR 7-17
B		1	S SHUTP B-NC		
D	EMG lamp power	1	S SHUTP EMG lamp (D)		
F		1	Display Sim 3,5		
J		1	Clock (+etc) lamp bank		
L	initial resit at power on	1	Conn E 5-7		
N	+28 VDC bus	1	Osocillator-2		
R		1	Relay Card Shutter 4		
T	Shutter closed limit switch	1	Conn EXIT-18		
V	GND bus	1	SWR 2-13	1	RR 7-V

SWR 1 Logic

Pin	Wire To	Out To	New Location	In From
1		1 OR4-4		
2				1 RR3-3
3		1 NOR5-32		
4	α=T			1 RR1-3
5	α=3 S B-3			1 SαB-3 (RO-3)
6	α=5 S B-5			1 SαB-5 (RO-58)
7	α=4 S B-4			1 SαB-4 (RO-4)
8		1 OR1-29		
9	α=6 SαB-6			1 SαB-6 (RO-59)
10	BCD α=2 Comm RO-61		OR13-31	1
11				1 RR5-V
12		1 OR3-7		
13	COA signal		PROG A-13	(1 Conn P-7)
14	CHB signal		PROG A-14	(1 Conn P-8)
15			OBSOLETE	(1 Conn ID-9)
16			S SCOPE B-NQ	(1 S_{SCOPE} B-7)
17	α=F			1 RR2-N
18	GND	1 GND pt		
A		1 OR4-7		
B		1 NOR5-23		
C	α=1 SαB-1			1 SαB-1 (RO-1)
D				1 RR1-N
E				1 RR2-13
F	BCD α=1 Conn RO-60		OM13-17	(1 Conn RO-60)
H	FV			1 RR8-15
J	α=2 SαB-2			1 SαB-2 (RO-2)
K		1 OR3-25		
L		1 NOR5-22		
M	BCD α=4 Conn RO-62		OM14-17	(1 Conn RO-62)
N				1 PT-9
P	CHA signal		PROG A-14	(1 Conn P-9)
R	α=P			1 RR6-L
S			OBSOLETE	(1 S_{SCOPE} B-8)
T			S SCOPE B-NC	(1 S_{SCOPE} B-9)
U	α=V	(1 Conn P-11)	PROG A-38	1 RR1-7
V	+5 VDC	1 +5 pt		

SWR 2 Logic

Pin	Wire To	Out To	In From
1	C-D		1 C-D
2	PNT control	1 ES2-T	(1 Conn ES-16)
3	OR 26 in	1 OR1-5	
5	CPY control	1 ES2-4	(1 Conn ES-2)
7	Common AI (U sync)	1 DB1-3	
9	OR 25 in	1 OR1-7	
11	Common BO	1 D20-26	1 RR7-N
12	PER control	1 Conn ES-13	OBSOLETE
13	Ground bus	1 AP1-B	1 SWR1-V
15	Common BT (y sncy)	1 DB1-D	
17	Common BU (Δx sync)	1 J21-25	1 RR1-17 (1 Conn ID-3)
18	S=9 control	1 Conn P-14	OBSOLETE
B	LIN control	1 Conn ES-15	OBSOLETE
D	AB signal		1 C-J
F	+5 VDC bus	1 AP1-15	1 SWR1-17
J	Common BV (Δy sync)	1 J21-26	1 RR2-T (1 Conn ID-4)
L	TIM control	1 ES1-13	(1 Conn ES-1)
N	FRM control	1 ES1-8	(1 Conn ES-14)
R	W=1-4,7-8 control	1 +5	1 RR4-11 (S_{WE}-Comm)
T	λ_A A signal		1 C-9
V	S=8 control	1 PROG A-22	1 RR6-15 (1 Conn P-13)

Oscillator

Pin	Wire to	Out	To	In	From
1	Not used				
2	+28 VDC	1	OSC-3	1	SHUT1-N
3	+28 VDC	1	+28 VDC point	1	OSC-2
4	Not used				
5	Not used				
6	Output			1	D 14-4
7	gnd	2	RR 8-17 OSC-8	1	AP 1-B
8	gnd	1	Gnd point	1	OSC-7

Clock Memory

D 25	Out To	New Location	In From
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14	1 (RO-42)	OM1-5	
15	1 (RO-43)	OM2-5	
16	1 (RO-44)	OM3-5	
17	1 (RO-34)	OM4-5	
18	1 D12-23		
19	1 D12-18		
20	1 D12-20		
21	1 D12-13		
22			
23			
24	1 (RO-38)	OM1-35	
25	1 (RO-39)	OM2-35	
26	1 (RO-40)	OM5-8	
27	1 D24-22		1 Gnd point
28	1 (RO-41)	OM5-34	
29	1 D10-23	in (8000)	
30	1 D10-18	in (4000)	
31	1 D24-31		1 +5 VDC point
32	1 D10-20	in (2000)	
33	1 D10-13	in (1000)	
34			
35	1 D24-35		1 AP1-1

Clock Memory

D 24	Out To	New Location	In From
1			
2	1	OM6-9	
3			
4	1 (RO-35)	OM6-35	
5	1 (RO-36)	OM7-9	
6	1 D23-3		1 D24-27
7	1 (R)-37)	OM7-35	
8	1 D8-23		
9	1 D8-18		
10	1 D8-20		
11	1 D8-13		
12			
13			
14	1 (RO-30)		
15	1 (RO-31)		
16	1 (RO-32)		
17	1 (RO-33)		
18	1 D6-23		
19	1 D6-18		
20	1 D6-20		
21	1 D6-13		
22			
23			
24	1	OM16-9	
25	1 (RO-27)	OM10-34	
26	1 (RO-28)	OM11-9	
27	1 D24-6		1 D25-27
28	1 (RO-29)	OM11-34	
29	1 D4-23		
30	1 D4-18		
31	1 D23-2		1 D25-31
32	1 D4-20		
33	1 D4-13		
34			
35			1 D25-35

Coil Delay

D 23		out	to	in	from
1					
2	+5VDC	1	D 22-22	1	D 24-31
3	gnd	1	D 22-3	1	D 24-6
4		1	D 22-33		
5					
6				1	D 23-26
7					
8		1	D 22-32		
9					
10		1	D 22-12		
11					
12					
13					
14					
15					
16		1	D 22-11		
17					
18		1	D22-10		
19					
20					
21		1	D 22-34		
22					
23					
24					
25		1	D 22-9		
26		1	D 23-6		
27		1	D22-4	1	D23-34
28					
29					
30					
31		1	D 22-35		
32				1	F 4-N
33					
34		1	D 23-27		
35					

Delay Preset Eeco Reset

D 22		out	to	in	from	
1		1	D 20-34			Reset 1 out
2		1	OR 5-16			Reset 1 in OR 10 out
3	gnd	1	D 21-B	1	D 23-3	
4				1	D 23-27	Reset 2 out
5		1	OR 2-34			OR 24 out Reset 2 in
6						
7		1	D 21-34			Reset 3 out
8		1	OR 2-15			Reset 3 in OR 11 in
9				1	D 23-25	
10				1	D 23-18	
11				1	D 23-16	
12				1	D 23-10	
13		1	D 20-4			
14		1	D 20-21			
15		1	D 20-31			
16		1	D 20-8			
17		1	D 20-7			
18		1	D 20-5			
19				1	F 5-L	
20				1	F 5-11	
21				1	F 4-9	
22	+5VDC	1	D 21-2	1	D 23-2	
23				1	F 4-J	
24				1	F 5-9	
25				1	F 5-J	
26		1	D 19-13			
27		1	D 19-22			
28		1	D 19-11			
29		1	D 19-16			
30		1	D 19-18			
31		1	D 19-25			
32				1	D 23-8	
33				1	D 32-4	
34				1	D 23-21	
35				1	D 23-31	

S Count

D 21		out	to	in	from
1					
2	+5VDC	1	D 20-2	1	D 22-22
3	gnd	1	D 20-3	1	D 22-3
4		1	S-7		
5		1	S-6		
6		1	S-8	1	D 21-26
7					
8					
9					
10		1	S-4		
11					
12					
13		1	S-2		
14		1	S-3		
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25		1	S-1		
26		1	D 21-6		
27		1	D 20-27	1	D 21-34
28					
29					
30					
31		1	S-5		
32		1	D 20-10		
33					
34		1	D 21-27	1	D 22-7
35					

½ Record Delay ½ S Count

D 20		out	to	in	from
1					
2	+5VDC	1	S 19-2	1	D 21-2
3	gnd	1	D 19-3	1	D 21-3
4				1	D 22-13
5				1	D 22-18
6					
7				1	D 22-17
8				1	D 22-16
9					
10		1	S-12	1	D 21-32
11					
12					
13		1	S-10		
14		1	S-11		
15					
16					
17					
18					
19					
20					
21				1	D 22-14
22					
23					
24					
25		1	S-9		
26				1	SWR 2-11
27				1	D 21-27
28					
29					
30					
31				1	D 22-15
32		1	D 19-10		
33					
34		1	D 19-34	1	D 22-1
35					

Record Delay

D 19		out	to	in	from	
1						
2	+5VDC	1	D 18-2	1	D 20-2	
3	gnd	1	D 18-3	1	D 20-3	
4						
5						
6				1	D 19-26	
7						
8						
9						
10				1	D 20-32	
11				1	D 22-28	Logic Misc A-V
12						
13				1	D 22-26	Logic Misc A-N
14				1	Logic Misc A-F	
15						
16				1	D 22-29	
17						
18				1	D 22-30	
19						
20						
21						
22				1	D 22-27	Logic Misc A-U
23						
24						
25				1	D 22-31	
26		1	D 19-6			
27		1	D 18-34	1	D 19-34	
28						
29						
30						
31						
32		1	D 18-10			
33						
34		1	D 19-27	1	D 20-34	

Record Delay

D 18		Out To	In From
1			
2	+5 VDC	1 D17-2	1 D19-2
3	Gnd	1 D17-3	1 D19-3
4			
5			
6			1 D18-26
7			
8			
9			
10			1 D19-32
11			
12 through 25 NOT USED			
26		1 D18-6	
27			1 D18-34
28			
29			
30			
31			
32			1 F5-N
33			
34		1 D18-27	1 D19-27
35			

½ T Chain

D 17			
1			
2	+5 VDC	1 D16-2	1 D18-2
3	Gnd	1 D16-3	1 D18-3
4			
5			
6		1 SλG-4(T1)	
7			
8 through 31 NOT USED			
32		1 D16-10	
33			
34		1 D16-34	
35			

T Chain

D 16		Out To	In From
1			
2	+5 VDC	1 D15-2	1 D17-2
3	Gnd	1 D15-3	1 D17-3
4			
5			
6		1 SλG-3 (T01)	1 D16-26
7			
8			
9			
10			1 D17-32
11			
12 through 25 NOT USED			
26		1 D16-6	
27		1 D15-34	1 D16-34
28			
29			
30			
31			
32		1 D15-10	
33			
34		1 D16-27	1 D17-34
35			

T Chain

D 15			
1			
2	+5 VDC	1 D14-30	1 D16-2
3	Gnd	1 D14-1	1 D16-3
4			
5			
6		1 SλG-2 (T0001)	1 D15-26
7			
8			
9			
10			1 D16-32
11			
12 through 25 NOT USED			
26		1 D15-6	
27		1 D14-22	1 D15-34
28			
29			
30			
31			
32		1 D14-18	
33			
34		1 D15-27	1 D16-27
35			

Timing Module

D 14	out	to	in	from
1 gnd	1	D 13-3	1	D 15-3
2				
3				
4	1	Oscillator-6		
5*				
6**				
7	1	SCLRS-NO		
8	1	D 3-34		
9		I26?	1	F 5-F (output-input is pin 10)
10	1	INV 2-22	1	D 14-14 Common BD
11			1	F 4-15
12			1	RR 7-T
13	1	D 1-32		
14	1	D 14-10		
15				
16				
17			1	F 5-13
18			1	D 15-32
19	1	INV 1-32		Inv 10-out
20				
21				
22			1	D 15-27
23				
24	1	COAX 2 to BNC Freq 7	OBSOLETE	
25	1	COAX 2 to BNC Freq 6	OBSOLETE	
26				
27				
28	1	COAX 4 to BNC Freq 5	OBSOLETE	
19				
30 +5VDC	1	D 13-2	1	D 15-2
31	1	COAX 5 to VNC Freq 4	OBOSLETE	
32	1	OR 5-20	1	D 14-34 Comm BH
33	1	OR 3-2		OR 3-out
34	1	D 14-32		
35				

*Avail 10^6 pp5 (x-chain)
**Reset on X chain

Clock Lamp Drive

D 13		out	to	in	from
1					
2	+5VDC	1	D 12-2	1	D 14-30
3	gnd	1	D 12-3	1	D 14-1
4		1	D 12-32		
5				1	Display 00000
6		1	D 12-34		
7				1	Display 10000
8					
9					
10				1	Display 20000
11		1	D 12-17		
12		1	D 12-25		
13					
14				1	Display 30000
15					
16					
17					
18				1	Display 40000
19		1	D 12-29		
20		1	D 12-28		
21				1	Display 50000
22				1	Display 60000
23					
24		1	D 12-5		
25					
26		1	D 12-7		
27				1	Display 70000
28					
29					
30				1	Display 80000
31					
32		1	D 12-11		
33		1	D 12-9		
34				1	Display 90000
35					

Clock Counter

D 12		out	to	in	from
1					
2	+5VDC	1	D 11-2	1	D 13-2
3	gnd	1	D 11-3	1	D 13-3
4					
5				1	D 13-24
6					
7				1	D 13-26
8					
9				1	D 13-33
10					
11				1	D 13-32
12		1	D 10-12	1	D 14-8
13				1	D 25-21
14					
15		1	D 10-23	1	
16					
17				1	D 13-11
18				1	D 25-19
19					
20				1	D 25-20
21					
22					
23				1	D 25-18
24					
25				1	D 13-12
26					
27					
28				1	D 13-20
29				1	D 13-19
30					
31					
32				1	D 13-4
33					
34				1	D 13-6
35					

Clock Lamp Drive

D11		out	to	in	from
1					
2	+5VDC	1	D 10-2	1	D 12-2
3	gnd	1	D 10-3	1	D 12-3
4		1	D 10-32		
5				1	Display 000
6		1	D 10-34		
7				1	Display 1000
8					
9					
10				1	Display 2000
11		1	D 10-17		
12		1	D 10-25		
13					
14				1	Display 3000
15					
16					
17					
18				1	Display 4000
19		1	D 10-29		
20		1	D 10-28		
21				1	Display 5000
22				1	Display 6000
23					
24		1	D 10-5		
25					
26		1	D 10-7		
27				1	Display 7000
28					
29					
30				1	Display 8000
31					
32		1	D 10-11		
33		1	D 10-9		
34				1	Display 9000
35					

D 10		Out	To	In	From
1					
2	+5VDC	1	D 9-2	1	D 11-2
3	gnd	1	D 9-3	1	D 11-3
4					
5				1	D 11-24
6					
7				1	D 11-26
8					
9				1	D 11-33
10					
11				1	D 11-32
12		1	D 8-12	1	D 12-12
13				1	D 25-33
14					
15		1	D 8-23	1	
16					
17				1	D 11-11
18				1	D 25-30
19					
20				1	D 25-32
21					
22					
23				1	D 12-15 & D 25-29
24					
25				1	D 11-12
26					
27					
28				1	D 11-20
29				1	D 11-19
30					
31					
32				1	D 11-4
33					
34				1	D 11-6
35					

Clock Lamp Drive

D 9		out	to	in	from
1					
2	+5VDC	1	D 8-3	1	D 10-2
3	gnd	1	D 8-3	1	D 10-3
4		1	D 8-32		
5				1	Display 000
6		1	D 8-34		
7				1	Display 100
8					
9					
10				1	Display 200
11		1	D 8-17		
12		1	D 8-25		
13					
14				1	Display 300
15					
16					
17					
18				1	Display 300
19		1	D 8-29		
20		1	D 8-28		
21				1	Display 500
22				1	Display 600
23					
24		1	D 8-5		
25					
26		1	D 8-7		
27				1	Display 700
28					
29					
30				1	Display 800
31					
32		1	D 8-11		
33		1	D 8-9		
34				1	Display 900
35					

Clock Counter

D 8		out	to	in	from
1					
2	+5VDC	1	D 7-2	1	D 9-2
3	gnd	1	D 7-3	1	D 9-3
4					
5				1	D 9-24
6					
7				1	D 9-26
8					
9				1	D 9-33
10					
11				1	D 9-32
12		1	D 6-12	1	D 10-12
13				1	D 24-11
14					
15		1	D 6-23	1	
16					
17				1	D 9-11
18				1	D 24-9
19					
20				1	D 24-10
21					
22					
23				1	D 10-15 & D 24-8
24					
25				1	D 9-12
26					
27					
28				1	D 9-20
29				1	D 9-19
30					
31					
32				1	D 9-4
33					
34				1	D 9-6
35					

Clock Lamp Drive

D 7		out	to	in	from
1					
2	+5VDC	1	D 6-2	1	D 8-2
3	gnd	1	D 6-2	1	D 8-3
4		1	D 6-32		
5				1	Display 00
6		1	D 6-34		
7				1	Display 10
8					
9					
10				1	Display 20
11		1	D 6-17		
12		1	D 6-25		
13					
14				1	Display 30
15					
16					
17					
18				1	Display 40
19		1	D 6-29		
20		1	D 6-28		
21				1	Display 50
22				1	Display 60
23					
24		1	D 6-5		
25					
26		1	D 6-7		
27				1	Display 70
28					
29					
30				1	Display 80
31					
32		1	D 6-11		
33		1	D 6-9		
34				1	Display 90
35					

Clock Counter

D 6		out	to	in	from
1					
2	+5VDC	1	D 5-2	1	D 7-2
3	gnd	1	D 5-3	1	D 7-3
4					
5				1	D 7-24
6					
7				1	D 7-26
8					
9				1	D 7-33
10					
11				1	D 7-32
12		1	D 4-12	1	D 8-12
13				1	D 24-21
14					
15		1	D 4-23	1	
16					
17				1	D 7-11
18				1	D 24-19
19					
20				1	D 24-20
21					
22					
23				1	D 8-15 & D 24-18
24					
25				1	D 7-12
26					
27					
28				1	D 7-20
29				1	D 7-19
30					
31					
32				1	D 7-4
33					
34				1	D 7-6
35					

Clock Lamp Drive

D5		out	to	in	from	
1						
2	+5VDC	1	D4-2	1	D6-2	
3	gnd	1	D4-3	1	D6-3	
4		1	D4-32			0
5				1	Display 0	
6		1	D4-34			1
7				1	Display 1	
8						
9						
10				1	Display 2	
11		1	D4-17			
12		1	D4-25			
13						
14				1	Display 3	
15						
16						
17						
18				1	Display 4	
19		1	D4-29			4
20		1	D4-28			5
21				1	Display 5	
22				1	Display 6	
23						
24		1	D4-5			6
25						
26		1	D4-7			7
27				1	Display 7	
28						
29						
30				1	Display 8	
31						
32		1	D4-11			8
33		1	D4-9			9
34				1	Display 9	
35						

D4		out	to	in	from
1					
2	+5VDC	1	D3-2	1	D5-2
3	gnd	1	D3-3	1	D5-3
4					
5				1	D5-24
6					
7				1	D5-26
8					
9				1	D5-33
10					
11				1	D5-32
12		1	D3-34	1	D6-12
13				1	D24-33
14					
15		1	D3-10	1	F1-11
16					
17				1	D5-11
18				1	D24-30
19					
20				1	D24-32
21					
22					
23				1	D6-15&24-19
24					
25				1	D5-12
26					
27					
28				1	D5-20
29				1	D5-19
30					
31					
32				1	D5-4
33					
34				1	D5-6
35					

Clock Chain

D3		Out To	In From	New Location
1				
2	+5 VDC	1 D2-2	1 D4-2	
3	Gnd	1 D2-3	1 D4-3	
4				
5				
6			1 D3-26	
7				
8				
9				
10			1 D4-15	
11				
12 through 25 NOT USED				
26		1 D3-6	1 AP1-13	
27		1 D2-34	1 D3-34	
28				
29				
30				
31				
32		1 D2-10		
33				
34		1 D3-27	1 D4-12	
35				

Clock Chain

D2				
1				
2	+5 VDC	1 D1-2	1 D3-2	
3	Gnd	1 D1-3	1 D3-3	
4				
5				
6			1 D2-26	
7				
8				
9				
10			1 D3-32	to ES1-4
11				
12 through 25 NOT USED				
26		1 D2-6		
27		1 D1-34	1 D2-34	
28				
29				
30				
31				
32		1 D1-10		
33				
34		1 D2-27	1 D3-27	
35				

Clock-Chain

D1		out	to	in	from
1					
2	+5VDC	1	S-37	1	D2-2
3	gnd	1	S-39	1	D2-3
4					
5					
6				1	D1-26
7					
8					
9					
10				1	D2-32
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26		1	D1-6		
27				1	D1-34
28					
29					
30					
31					
32				1	D14-13
33					
34		1	D1-27	1	D2-27

δ Sync (S) logic

pin	out	to	in	from
1			1	D21-25
2			1	D21-13
3			1	D21-14
4			1	D21-10
5			1	D21-31
6			1	D21-5
7			1	D21-4
8			1	D31-6
9			1	D20-25
10			1	D20-13
11			1	D20-14
12			1	D20-10
13			1	$S\delta_{100}$-1
14			1	$S\delta_{100}$-2
15			1	$S\delta_{100}$-4
16			1	$S\delta_{100}$-8
17			1	$S\delta_{10}$-1
18			1	$S\delta_{10}$-2
19			1	$S\delta_{10}$-4
20			1	$S\delta_{10}$-8
21			1	$S\delta_{1}$-1
22			1	$S\delta_{1}$-2
23			1	$S\delta_{1}$-4
24			1	$S\delta_{1}$-8
25			1	$S\delta_{100}$-$\overline{1}$
26			1	$S\delta_{100}$-$\overline{2}$
27			1	$S\delta_{100}$-$\overline{4}$
28			1	$S\delta_{100}$-$\overline{8}$
29			1	$S\delta_{10}$ $\overline{1}$
30			1	$S\delta_{10}$-$\overline{2}$
31			1	$S\delta_{10}$-$\overline{4}$
32			1	$S\delta_{10}$-$\overline{8}$
33			1	$S\delta_{1}$-$\overline{1}$
34			1	$S\delta_{1}$-$\overline{2}$
35			1	$S\delta_{1}$-$\overline{4}$
36			1	$S\delta_{1}$-$\overline{8}$
37	+5VDC		1	D1-2
38			2	Sδ-Comm+F2-11
39	ground		1	D1-3

δ Sync (S) logic cont.

Pin		Out	To	In	From
40		1	OM15-19		
41		1	OM15-34		
42		1	OM16-19		
43		1	OM16-34		
44		1	OM17-19		
45		1	OM17-34		
46		1	OM18-19		
47		1	OM18-34		
48		1	OM19-20		
49		1	OM19-35		
50		1	OM20-20		
51		1	OM20-35		
52	+12VDC	1	F1-3		

INV 1

pin		notes	comm	out		in	from
1							
2	+5VDC			1	INV2-2		
3		1-in	A	1	OR2-16		
4		4-in	AZ	1	OR1-23		
5		4-out				1	I-11
6		2-out				1	I-F
7		2-in	B			1	RR3-F
8		1-out				1	I-1
9							
10							
11	Int Gnd						
12		7-out				1	PT-3
13		5-in	BA	1	OR2-14	1	RR7-F
14		5-out				1	I-N
15		3-out				1	I-R
16		3-in	C	1	OR2-19	1	RR1-11
17		7-in	AR	1	NOR1-22	1	RR6-3
18							
19							
20	Int +5						
21		8-in	BB	1	OR1-20		
22		10-in	BC	1	NOR4-34	1	PT-V
23		10-out				1	D14-19
24		110out				1	F1-1
25		11-in	N			1	F5-5
26		8-out				1	PT-B
27							
28							
29	gnd			1	INV2-29		
3-		12-out				1	F1-D
31		14-in	O			1	RR4-13
32		14-out				1	F1-13
33		13-out				1	F1-17
34		13-in	M			1	F5-D
35		12-in	K			1	RR4-4
36							

INV 2

Pin	Notes	Comm	Out	To	In	from	
1							
2 +5VCD			1	OR1-8	1	INV1-2	
3	15-in	BE	1	INV2-17			
4	16-in	S	1	OR5-11	1	F5-17	
5	16-out				1	F2-1	
6	18-out				1	F2-13	
7	18-in	U			1	RR4-N	
8	15-out				1	F1-R	
9							
10							
11 Int Gnd							
12	20-out				1	F2-R	
13	19-in	R			1	F5-V	Reset in
14	19-out				1	F2-17	Reset out
15	17-out				1	F2-D	
16	17-in	P			1	RR4-V	
17	20-in	BE	1	INV2-25	1	INV2-3	
18							
19							
20 Int +5							
21	21-in	V	1	NOR2-34	1	F3-11	
22	9-in	BD	1	OR2-20	1	D14-10	
23	9-out				1	F3-R	
24	23-out				1	F3-T	
25	23-in	BE	1	OR5-2	1	INV2-17	
26	21-out				1	F3-17	
27							
28							
29 Gnd			1	OR1-35	1	INV1-29	
30	25-out				1	F4-R	
31	22-in	X	1	NOR2-4	1	F4-7	
23	22-out				1	F3-V	
33	24-out				1	F4-5	
34	24-in	BF	1	OR1-15			
35	25-in	BG	1	OR2-21			
36							

OR2

Pin	Notes	Comm	Out	To	New Location	In	From
1							
2	20-out					1	RR7-9
3	4-out					1	RR3-7
4	4-in	J	1	OR2-22		1	OR1-19
5	4-in				ProgA-2	1	(Conn P-5)
6	20-in					1	AP1-9
7	20-in					1	RR3-B
8 +5VDC			1	OR3-8		1	OR1-8
9							
10							
11	1-in					1	RR4-7
12	1-in				Conn Count (A)-N		(Conn C-2)
13	11-in	T	1	NOR3-31		1	RR6-5
14	11-in	BA	1	OR2-29		1	INV1-13
15	11-out					1	D22-8
16	1-out	A	1	OR3-4		1	INV1-3
17 Int Gnd							
18						1	I-9
19						1	INV1-16
20	5-out	BD	1	OR5-13		1	INV2-22
21	6-out	BG	1	OR2-30		1	INV2-35
22	6-in		1	OR2-24		1	OR2-4
23	6-in	AI				1	DB1-C
24	5-in		1	OR3-31		1	OR2-22
25	5-in	BF	1	NOR3-5		1	OR1-15
26 Int +5							
27							
28							
29	24-in	BA	1	OR3-6		1	OR2-14
30	24-in	BG	1	NOR3-30		1	OR2-21
31	12-in Finit					1	RR8-J
32	12-in					1	RR6-R
33	12-sp out		1	OR3-11			
34	24-out					1	D22-5
35 Gnd			1	OR3-35		1	OR1-35
36							

OR 1

Pin	Notes	Conn	Out To	New Location	In From
1					
2	25-out		(1) λ_B+-in	Coax C-4	
3	26-out		(1) λ_B-in	Coax C-2	
4	26-in				(1) C-11
5	26-in				(1) SWR2-3
6	25-in				(1) C-N
7	25-in				(1) SWR2-9
8	+5 VDC		1 OR2-8		1 INV1-2
9					
10					
11	22-in				1 PT-J
12	22-in	AU	1 OR5-24		1 RR6-J
13	12 SP		1 OR3-16		
14	12 SP		1 OR3-20		
15	12-out	BF	1 OR2-25		1 INV2-34
16	12-SP		1 OR1-18		
17	(Int Gnd)				
18					1 OR1-16
19	23-out	J	1 OR2-4		1 AP1-7
20	16-out	BB	1 NOR1-25		1 INV1-21
21	13-out		1 OR1-31		
22	13-in				1 F3-N
23	13-in	AZ			2{ S_{AB}A-C / INV1-4
24	16-in	AF	1 OR3-13		1 RR2-3
25	16-in	AH	1 OR1-30		1 RR2-B
26	(Int +5)				
27					
28					
29	17-in		1 OR5-32		1 SWR1-8
30	17-in	AH	1 OR5-29		1 OR1-25
31	14-in				1 OR1-21
32	14-in				1 Prog B-26
33	14-out				1 RR7-B
34	17-out				1 AP1-L
35	Gnd		1 OR2-35		1 INV2-29
36					

OR 3

Pin		Notes	Comm	Out	To	New Location	In	From
1								
2		3-out					1	D14-33
3								
4		3-in	A	1	NOR3-25		1	OR2-16
5		3-in	F	1	NOR3-7		1	PT-7
6		3-in	BA	1	OR5-6		1	OR2-29
7		3-in	BQ	1	NOR5-25		1	SWR1-12
8	+5VDC			1	OR4-8		1	OR2-8
9								
10								
11		12-in(sp)					1	OR2-33
12		12-in(sp)	W			J21-33	2	F3-13 (Conn ID-2)
13		12-in(sp)	AF	1	OR5-22		1	OR1-24
14		12-in(sp)	AM	1	NOR4-23		1	RR5-F
15								
16		12sp					1	OR1-13
17	Int Gnd							
18								
19								
20		12sp					1	OR1-14
21								
22		12-in	AO	1	NOR4-24		1	RR5-5
23		12-in	AS	1	OR5-23		1	RR6-7
24		12-in	AT	1	NOR4-31		1	RR6-13
25		12-in					1	SWR1-K
26	Int +5							
27								
28								
29		7-in					1	RR2-V
30	Int Gnd	7-in						
31		7-in	J	1	OR5-5		1	OR2-24
32	Int Gnd	gnd bus						
33								
34		7-out	C initiate	1	(Conn COUNT-6)	Prog C-11		
35	Gnd			1	OR4-17		1	OR2-35
36								

OR 4

Pin	Notes	Comm	Out	To	New Location	In	From
1							
2	out-27					1	M1-33
3	out-28					1	M1-34
4	in-28					1	SWR1-1
5	in-28		1	OR4-6		1	M1-35
6	in-27		1	OR4-30		1	OR4-5
7	in-27					2	SWR1-A Sz/yB-comm
8	+5VDC		1	OR5-8		1	OR3-8
9							
10							
11	in-29					1	RR1-13
12	in-29		1	OR5-23			
13	in-30					1	RR7-3
14	in-30				Prog A-27	1	(Conn I-13)
15	out-30		1	NOR2-33			
16	out-29				Prog B-2	1	(Conn P-2)
17	gnd		1	OR5-35		1	OR3-35
18							
19							
20	Int +5						
21	α-in					1	RR3-T
22	α-in					1	RR1-15
23	α-out					1	RR3-K
24	β-in						
25	β-in						
26	β-out						
27							
28							
29	Int Gnd						
30						1	OR4-6
31							
32			OBSOLETE				S scope B-EXT
33					Prog A-12	1	(Conn P-6)
34							
35			OBSOLETE				S scope B-CoB
36							

OR 5

Pin		Notes	Comm	Out	To	In	From
1							
2		8-out	BE			1	INV2-25
3							
4		8-in				1	F3-D
5		8-in	J	1	NOR1-32	1	OR3-31
6		8-in	BA	1	OR5-12	1	OR3-6
7	Int Gnd	gnd bus					
8	+5VDC			1	NOR1-8	1	OR4-8
9							
10							
11		10-in	S	1	NOR2-6	1	INV2-4
12		10-in	BA	1	NOR1-5	1	OR5-6
13		10-in	BD	1	NOR3-12	1	OR2-20
14	Int Gnd	gnd bus					
15							
16		10-out				1	D22-2
17	Int Gnd						
18							
19							
20		15-out	BH			1	D14-32
21							
22		15-in	AF			1	OR3-13
23		15-in	AS			1	OR3-23
24		15-in	AU			2	OR1-12
							RR8-5
25	Int Gnd	gnd bus					
26	Int Gnd						
27							
28							
29		19-in	AH			1	OR1-30
30		19-in	AL	1	NOR1-30	1	RR3-13
31		19-in	AP	1	NOR5-5	1	RR5-3
32		19-in	BW			1	OR1-29
33							
34		19-out				1	OR4-12
35	Gnd			1	NOR1-35	1	OR4-17
36							

NOR1

Pin		Notes	Comm	Out	To	In	From
1							
2		3-out				1	I-D
3		2-out				1	I-13
4		2-in				1	AP1-D
5		2-in	BA	1	NOR1-7	1	OR5-12
6		3-in				1	AP1-J
7		3-in	BA	1	NOR1-12	1	NOR1-5
8	+5VDC			1	NOR2-8	1	OR5-8
9							
10							
11		8-in				1	AP1-F
12		8-in	BA	1	NOR1-23	1	NOR1-7
13		9-in	AN	1	NOR3-4	1	RR5-J
14		9-in	F init. +W=5,6			1	DB1-M
15		9-out				1	C-R
16		8-out				1	C-B
17	Int Gnd						
18							
19							
20		14-out				1	PT-D
21		10-out	1			1	PT-5
22		10-in	AR			1	INV1-14
23		10-in	BA	1	NOR1-24	1	NOR1-12
24		14-in	BA	1	NOR2-5	1	NOR1-23
25		14-in	BB			2	DB1-9 OR1-20
26	Int +5						
27							
28							
29		19-in				1	RR6-D
30		19-in	AL			1	OR5-30
31		16-in				1	RR1-V
32		16-in	J			1	OR5-5
33		16-out				1	F4-D
34		19-out				1	F3-7
35	Gnd			1	NOR2-35	1	OR5-35
36							

NOR 2

Pin		Notes	Comm	Out	To	In	From
1							
2		18-out				1	F5-7
3		21-out				1	F4-V
4		21-in	X	1	NOR3-22	1	INV2-31
4		21-in	BA	1	NOR2-7	1	NOR1-24
6		18-in	S			1	OR5-11
7		18-in	BA	1	NOR3-11	1	NOR2-5
8	+5VDC			1	NOR3-8	1	NOR1-8
9							
10							
11		X-in					
12		X-in					
13		Y-in					
14		Y-in					
15		Y-out					
16		X-out					
17	Int Gnd						
18							
19							
20		24-out			Conn Count	(A)1-I	(Conn C-4)
21		6-out			Conn Count	(B)1-I	(Conn C-5)
33		6-in				1	RR4-D
23		6-in	E			1	AP1-5
24		6-in	AJ	1	NOR2-29	1	RR3-6
25		24-in				1	RR4-3
26	Int +5						
27							
28							
29		24-in	AJ			1	NOR2-24
30		24-in	AK			1	RR4-L
31		20-in				1	Logic Misc A-8
32		20-in				1	RR3-N
33		20-in				1	OR4-15
34		20-out	V			1	INV2-21
35	Gnd			1	NOR3-35	1	NOR1-35
36							

NOR 3

Pin		Notes	Comm	Out	To	In	From
1							
2		11-out				1	F3-5
3		7-out				1	C-5
4		7-in	AN	1	NOR4-30	1	NOR1-13
5		7-in	BF	2	DB1-1		
					NOR3-24	1	OR2-25
6		7-in	BI	1	NOR5-32		
7		11-in	F	1	NOR4-13	1	OR3-5
8	+5VDC			1	NOR4-8	1	NOR2-8
9							
10							
11		11-in	BA	1	NOR3-23	1	NOR2-7
12		11-in	BD			1	OR5-13
13		17-in				1	RR5-T
14		17-in				1	RR6-1
15		17-in				1	DB1-8
16		17-out				1	PT-N
17	Int Gnd						
18							
19							
20		23-out				1	F4-F
21		22-out				1	F4-C
22		22-in	X			1	NOR2-4
23		22-in	BA	1	NOR3-29	1	NOR3-11
24		22-in	BF			1	NOR3-5
25		23-in	A	1	NOR3-32	1	OR3-4
26	Int +5						
27							
28							
29		23-in	BA	1	NOR3-33	1	NOR3-23
30		23-in	BG	1	NOR5-7	1	OR2-30
31		13-in	T			1	OR2-13
32		13-in	A	1	NOR5-4	1	NOR3-25
33		13-in	BA	1	NOR5-6	1	NOR3-29
34		13-out	G			1	F4-T
35	Gnd			1	NOR4-35	1	NOR2-35
36							

NOR 4

Pin		Notes	Comm	Out	To	In	From
1							
2		4-out				1	I-6
3							
4		4-in				1	RR1-J
5		4-in				1	RR2-7
5		4-in				1	RR8-1
7		4sp		1	NOR5-21		
8	+5VDC			1	NOR5-8	1	NOR3-8
9							
10							
11		12-in				1	RR2-R
12		12-in				1	RR6-B
13		12-in	F			1	NOR3-7
14		12sp		1	NOR5-20		
15							
16		12-out				1	F3-L
17	Int Gnd						
18							
19							
20		15-out	1			1	PT-F
21							
22		15-in	AG			1	RR5-17
23		15-in	AM	1	NOR4-29	1	OR3-14
24		15-in	AO			1	OR3-22
25		15sp		1	NOR5-34		
26	Int +5						
27							
28							
29		25-in	AM			1	NOR4-23
30		25-in	AN			1	NOR3-4
31		25-in	AT			1	OR3-24
32		25-sp		1	NOR5-33		
33							
34		25-out	BC			1	INV1-22
35	Gnd			1	NOR5-35	1	NOR3-35
36							

NOR 5

Pin		Notes	Comm	Out	To	Location	In	From	
1									
2		5-out					1	C-1	
3									
4		5-in	A				1	NOR3-32	
5		5-in	AP				1	OR5-31	
6		5-in	BA	1	NOR5-24		1	NOR3-33	
7		5-in	BG				1	NOR3-30	
8	+5VDC			1	RR8-7		1	NOR4-8	
9									
10									
11		in							
12		in							
13		in							
14		in							
15									
16		out							
17	Int Gnd								
18									
19									
20		12sp					1	NOR4-14	
21		4sp					1	NOR4-7	
22		4-in					1	SWR1-L	
23		4-in					1	SWR1-B	
24		12-in	BA	1	NOR5-29		1	NOR5-6	
25		12-in	BQ				1	OR3-7	
26	Int +5								
27									
28									
29		15-in	BA			Prog A-39	1	NOR5-24	(Conn P-3)
30		15-in					1	DB1-J	
31		25-in	AU				1	RR8-3	
32		25-in	BI				2	SWR1-3	
								NOR3-6	
33		25sp					1	NOR4-32	
34		15-sp					1	NOR4-25	
35	Gnd			1	Gnd pt		1	NOR4-35	

OBSOLETE

DD Logic

Pin	Wire To	Out To	In From
1		1 Conn RO-11	
2		1 Conn RO-10	
3		1 Conn RO-9	
4		1 Conn RO-12	
5		1 SDVM C-4	
6		1 SDVM C-3	
7		1 SDVM C-5	
8		1 SDVM C-1	
9		1 SDVM C-7	
10		1 SDVM C-6	
11		1 SDVM C-2	
12		1 Conn RO-8 } changed to DD J-75	
13		1 Conn RO-6	Conn EXIT-22
14		1 Conn RO-7	Conn EXIT-23
15		1 Conn RO-5	Conn EXIT-21
16		1 Swf-5	
17		1 Swf-1	
18		1 Swf-4	
19		1 Swf-7	
20		1 Swf-6	
21		1 Swf-2	
22		1 Swf-3	
23			
24		1 Swf-8	
25		1 SDVM C-8 } OBSOLETE	
26		1 SDVM C-9	
27			
28			
29		1 +5 VDC bus	
30		1 Gnd bus	

M1 Logic

Pin		Out	To
1	gnd Clamps	1	gnd point
2	not used		
3		1	Z/y lamps gnd
4		1	scope lamps gnd
5		1	DVM lamps gnd OBSOLETE
6	AP2 lamp gnd	1	AP2-TBD
7		1	SHUTP lamps gnd
8		1	AP^+ & AP^- lamps gnd
9		1	S_δ lamps gnd
10		1	PEP,KD2-4 lamps gnd OBSOLETE
11		1	PUL,VF lamps gnd OBSOLETE
12		1	V,F,P lamps gnd
13		1	HVP lamp gnd
14		1	T lamps gnd
15		1	on lamps gnd
16	+12VDC	1	+12VDC point
17	tied to Pin 1 gnd		
18		1	BNC from ID ΔX signal OBSOLETE
19		1	BNC from DM signal OBSOLETE
20		1	DM3-11
21		1	BNC form ID ΔY signal OBSOLETE
22		1	DM3-13
23		1	BNC to Scope X
24		1	BNC to Scope Y
25		1	BNC to Scope Z
26		1	DM3-6 (Conn RO-47)
27		1	DN-1 lamp
29	+12VDC	1	-12VDC point
29		1	DN-3 lamp
30	gnd	1	gnd point
31		1	DN-2 lamp
32		1	MISC1-35 (Conn I-11)
33		1	OR4-2
34		1	OR4-3
35		1	OR4-5

Logic (Misc A)

Pin		Out	To	In	From	New Location
1	+5VDC			1	DB1-7	
2						
3	Reset	1	F1-R			
4	Busy Reset	1	(Logic Conn Misc-A(Red))			GD-17 (Tie Point) to Conn Tape-G
5						
6						
7						
8	Nor 20(in)	1	NOR2-31			
9		1	RR7-D			
10						
11						
12	EOR	1	(Logic Conn Misc-A(Blk))			ProgT-28
13						
14						
15						
16		1	DB1-2			
17						
18						
A	Gnd			1	DB1-17	
B						
C						
D						
E						
F		1	D19-14			
H						
J						
K						
L						
M						
N		1	D19-13			
P						
R						
S						
T						
U		1	D19-22			
V		1	D19-11			

AP1 Logic

Pin	Wire to	No. of wires out	to	in	from	New Location
1	Common C	1	D25-35	2	RR8-R RR2-J	
3	Common D	0		1	RR6-11	
5	Common E	1	NOR2-23	1	C-3	
7	Common J	2	OR1-19			J21-35
9	OR20-in	1	OR2-6 (Conn ID-1)			
11	I-V	0		1	I-V	
13	Common BP	1	D3-26			
15	+5VDC bus	1	+5VDC point	2	RR8-7 SWR2-F	
17	Conn EX-2	1	Conn EX-2			
B	Ground bus	1	Oscillator-7	1	SWR2-13	
D	NOR2-in	1	NOR1-4			
F	NOR8-in	1	NOR1-11			
J	NOR3-in	1	NOR1-6			
L	OR17-out	1	OR1-34			
N	SAP+A-NO	1	SAP+A-NO			
R	SAP-A-NO	1	SAP-A-NO			
T	-12VDC bus	1	-12VDC point			
V	Conn EX-1	1	Conn EX-1			

AP 2-Board

Pin	Function	In	From	Out	To	New Location
1	22			1	AP4-10	
2	17			1	AP4-5	
3	18			1	AP4-9	
4	A Ap Encoder line #2	1	Conn. Exit-4			
5	B Sp Encoder line #9	1	Conn. Exit-11			
6	23 OPN Encode line	1	(Conn ES-5)			ES1-7
7	5			1	AP3-3	
8	11			1	AP3-H	
9	9			1	AP4-16	
10	U AP Encoder line #6	1	Conn. Exit=8			
11	LO			1	AP3-15	
12	14			1	AP3-D	
13	16			1	AP3-8	
14	3			1	AP3-4	
15	2			1	AP3-L	
16	Z AP Encoder line #5	1	Conn. Exit-7			
17	M4			1	AP3-16	
18	+5VDC	1	SWR1-V	1	AP3-A	
A	21			1	AP4-M	
B	20			1	AP4-7	
C	19			1	AP4=J	
D	A AP Encoder line #1	1	Conn. Exit-3			
E	K5			1	AP3-4	
F	K6			1	AP3-5	
H	8			1	AP4-17	
J	10			1	AP3-J	
K	C AP Encode line #8	1	Conn. Exit-10			
L	t AP Encode line #7	1	Conn. Exit-9			
M	L2			1	AP3-18	
N	L4			1	AP3-T	
P	15			1	AP3-C	
R	1			1	AP3-B	
S	Y AP Encoder line #3	1	Conn. Exit-5			
T	V AP Encoder line #4	1	Conn. Exit-6			
U	M7			1	AP3-17	
V	Gnd	1	SWR1-18	1	AP3-1	

AP 3-Board

Pin	Function	In	From	Out	To
1	Gnd	1	AP 2-V	1	AP 4-V
2	15 Lamp #15			1	AP Lamp-15
3	5	1	AP 2-7	1	AP 4-D
4	3	1	AP 2-14		
5	1			1	AP 4-11
6	1		Lamp #1	1	AP Lamp-1
7	11 Lamp #1			1	AP Lamp-11
8	16	1	AP 2-13	1	AP 4-C
9	2			1	AP 4-B
10	13 Lamp #13			1	AP Lamp-13
11	4			1	AP 4-2
12	12 Lamp #12			1	AP Lamp-12
13					
14					
15	LO	1	AP 2-11		
16	M4	1	AP 2-17		
17	M4	1	AP 2-U		
18	L2	1	AP 2-M		
A	+5VDC	1	AP 2-18	1	AP 4-18
B	1	1	AP 2-R		
C	15	1	AP 2-P		
D	14	1	AP 2-12		
E	3 Lamp #3			1	AP Lamp-3
F	14 Lamp #14			1	AP Lamp-14
H	11	1	AP 2-8		
J	10	1	AP 2-J		
K	10 Lamp #10			1	AP Lamp-10
L	2	1	AP 2-15	1	AP 4-L
M	10			1	AP 4-5
N					
P	7 Lamp #7			1	AP Lamp-7
R	6 Lamp #6			1	AP Lamp-6
S	K6	1	AP 2-F		
T	L4	1	AP 2-N		
U	K5	1	AP 2-E		
V	4 Lamp #4			1	AP Lamp-4

AP 4-Board

Pin	Function	In	From	Out	To	New Location
1	2 (BCD2)	1	(Conn RO-2)			OM 17-23
2	4	1	AP 3-11			
3	16 Lamp #16			1	AP Lamp-16	
4	5 Lamp #5			1	AP Lamp-5	
5	10	1	AP 3-M			
6	20 Lamp #20			1	AP Lamp-20	
7	20	1	AP 2-B			
8	20 (BCD20)	1	(Conn RO-59)			OM 15-23
9	18	1	AP 2-3			
10	22	1	AP 2-1			
11	1	1	AP 3-5			
12	1 (BCD1)	1	(Conn RO-1)			OM 17-12
13						
14	8 (BCD8)	1	(Conn RO-4)			OM 18-23
15	17 Lamp #17			1	AP Lamp-17	
16	9	1	AP 2-9			
17	8	1	AP 2-H			
18	+5VDC	1	AP 3-A			
A	4 (BCD4)	1	(Conn RO-3)			OM 18-12
B	2	1	AP 3-9			
C	16	1	AP 3-8			
D	5	1	AP 3-3			
E	2 Lamp #2			1	AP Lamp-2	
F	10 (BCD10)	1	(Conn RO-58)			OM 15-12
H	19 Lamp #19			1	AP Lamp-19	
J	19	1	AP 2-C			
K	18 Lamp *18			1	AP Lamp-18	
L	2	1	AP 3-L			
M	21	1	AP 2-A			
N						
P	22 Lamp #22			1	AP Lamp-22	
R	21 Lamp #21			1	AP Lamp-21	
S	17	1	AP 2-2			
T	9 Lamp #9			1	AP Lamp-9	
U	8 Lamp #8			1	AP Lamp-8	
V	Gnd	1	AP 3-1			

Relay Card Logic OBSOLETE

Pin	Out	To	IN	From
HV Relay				
100Ω	1	Conn EXIT-12		
4	1	Conn EXIT-13		
6	1	HVP lamp		
7	1	Conn I-12		
Shutter Relay				
1	1	28 VDC point		
4			1	SHUT 1-R
6	1	SHUT P-ON lamp		

Panel Switches (W, Scope) OBSOLETE

Switch	Deck	Pins		Common Pt.	Out To	In From
SScope	B	7	CHA		1 SWR 1-16	
		8	CHB		1 SWR 1-S	
		9	COA		1 SWR 1-T	
		10	COB		1 OR 4-35	
		11,12	EXT		1 OR 4-32	
		Comm		Gnd	1 Panel Gnd	

Clock Display

Counter out	Driver in	Driver out	Display in
D4 9	D5- 4	D5- 5	9
11	6	7	8
7	11	10	7
5	12	14	6
28	19	18	5
29	20	21	4
25	24	22	3
17	26	27	2
34	32	30	1
32	33	34	0
D6- 9	D7- 4	D7- 5	90
11	6	7	80
7	11	10	70
5	12	14	60
28	19	18	50
29	20	21	40
25	24	22	30
17	26	27	20
34	32	30	10
32	33	34	00
D8- 9	D9- 4	D9- 5	900
11	6	7	800
7	11	10	700
5	12	14	600
28	19	18	500
29	20	21	400
25	24	22	300
17	26	27	200
34	32	30	100
32	33	34	000
D10- 9	D11- 4	D11- 5	9000
11	6	7	8000
7	11	10	7000
5	12	14	6000
28	19	18	5000
29	20	21	4000
25	24	22	3000
17	26	27	2000
34	32	30	1000
32	33	34	0000
D12- 9	D13- 4	D13- 5	90000
11	6	7	80000
7	11	10	70000
5	12	14	60000
28	19	18	50000
29	20	21	40000
25	24	22	30000
17	26	27	20000
34	32	30	10000
32	33	34	00000

Clock Memory and Readout

Counter out	Memory in		Memory out	RO Conn	(Value)
D4-13	D24-33		D24-24	26	1
D4-20	D24-32		D24-25	27	2
D4-18	D24-30		D24-26	28	4
D4-23	D 6-15	D24-29	D24-28	29	8
D6-13	D24-21		D24-14	30	10
D6-20	D24-20		D24-15	31	20
D6-18	D24-19		D24-16	32	40
D6-23	D 8-15	D24-18	D24-17	33	80
D8-13	D24-11		D24- 2	34	100
D8-20	D24-10		D24- 4	35	200
D8-18	D24- 9		D24- 5	36	400
D8-23	D10-15	D24- 8	D24- 7	37	800
D10-13	D25-33		D25-24	38	1000
D10-20	D25-32		D25-25	39	2000
D10-18	D25-30		D25-26	40	4000
D10-23	D12-15	D25-29	D25-28	41	8000
D12-13	D25-21		D25-14	42	10000
D12-20	D25-20		D25-15	43	20000
D12-18	D25-19		D25-16	44	40000
D12-23	D25-18		D25-17	45	80000

Panel Switches (α, CLRS, AP+, AP-) T*=T(1) + T(01) + T(0001)

Switch	Deck	Pins	Common pt.	out	to	in	from
Sα	A	1 V		1	VIEW lamps $\overline{ABCD}$		
		2 T(0001)		1	T(0001) lamp		
		3 T(01)		1	T(01) lamp		
		4 T(1)		1	T(1) lamp		
		5 F		1	FRAME lamps $\overline{ABCD}$		
		6 P		1	PERIOD lamps $\overline{ABCD}$	OBSOLETE	
		Comm	I-12	1	I-12 point		
Sα	B	1 V		1	SWR1-C		
		2 T(0001)		1	SWR1-J		
		3 T(01)		1	SWR1-5		
		4 T(1)		1	SWR1-7		
		5 F		1	SWR1-6		
		6 P		1	SWR1-9 OBSOLETE		
		Comm	Gnd	1	Panel Gnd	1	SαC-1,2,3,4,6
Sα	C	$\overline{1,2,3,4,6}$	Gnd	1	SαB-Comm	1	SαD-2,3,4,5,6
		5 F	+5	2	SαD-1	1	SWH-5,6
					$S_{z/y}$B-NC		
		Comm				1	RRG-T
Sα	D	1 V	+5	1	SαE-5,6	1	SαC-5
		$\overline{2,3,4,5,6}$	Gnd	1	SαC-1,2,3,4,6	1	SαE-1,2,3,4,
		Comm				1	RR3-11
Sα	E	$\overline{1,2,3,4}$	Gnd	1	SαD-2,3,4,5,6	1	SαF-1,5
		5,6 FP	+5	1	SαF-2,3,4,6	1	SαD-1
		Comm				1	RR1-L
Sα	F	$\overline{1,5}$	Gnd	1	SαE-1,2,3,4	1	SαG-1,5,6
		2,3,4,6 TP	+5	1	SαH-2,3,4	1	SαE-5,6
		Comm				1	RR2-D
Sα	G	$\overline{1,5,6}$	Gnd	1	SαF-1,5	1	SαH-1,5,6
		2 T(0001)				1	D15-6
		3 T(01)				1	D16-6
		4 T(1)				1	D17-6
		Comm				1	PT-T
Sα	H	$\overline{1,5,6}$	Gnd	1	SαG-1,5,6	1	SαI-1,2,3,4,5
		$\overline{2,3,4}$ T*	+5	1	SαI-6	1	SαF-2,3,4,6
		Comm				1	RR6-N
Sα	I	$\overline{1,2,3,4,5}$	Gnd	1	SαH-1,5,6		
		6 P	+5			1	SαH-2,3,4
		Comm				1	RR6-L
S_{CLRS}		1				1	D14-7
		3	Gnd	1	Panel Gnd		

δ Switch and Sync Detect (S)

			K CR A		
D21-32	D20-10	S-12	25	S-24	S δ_1-8
	D20-14	S-11	26	S-23	S δ_1-4
	D20-13	S-10	27	S-22	S δ_1-2
	D20-25	S-9	28	S-21	S δ_1-1
D21-26	D21-6	S-8	29	S-20	S δ_{10}-8
	D21-4	S-7	30	S-19	S δ_{10}-4
	D21-5	S-6	31	S-18	S δ_{10}-2
	D21-31	S-5	32	S-17	S δ_{10}-1
	D21-10	S-4	33	S-16	S δ_{100}-8
	D21-14	S-3	34	S-15	S δ_{100}-4
	D21-13	S-2	35	S-14	S δ_{100}-2
	D21-25	S-1	36	S-13	S δ_{100}-1

S_δ-out	S logic-in	K Z A	S logic-out		(Conn RO)
$S\delta_1$-$\overline{8}$	S-36	12	S-51	OM20-35	(13)
$S\delta_1$-$\overline{4}$	S-35	13	S-50	OM20-20	(14)
$S\delta_1$-$\overline{2}$	S-34	14	S-49	OM19-35	(15)
$S\delta_1$-$\overline{1}$	S-33	15	S-48	OM19-20	(16)
$S\delta_{10}$-$\overline{8}$	S-32	16	S-47	OM18-34	(17)
$S\delta_{10}$-$\overline{4}$	S-31	17	S-46	OM18-19	(18)
$S\delta_{10}$-$\overline{2}$	S-30	18	S-45	OM17-34	(19)
$S\delta_{10}$-$\overline{1}$	S-29	17	S-44	OM17-19	(20)
$S\delta_{100}$-$\overline{8}$	S-28	20	S-43	OM16-34	(21)
$S\delta_{100}$-$\overline{4}$	S-27	21	S-42	OM16-19	(22)
$S\delta_{100}$-$\overline{2}$	S-26	22	S-41	OM15-34	(23)
$S\delta_{100}$-$\overline{1}$	S-25	23	S-40	OM15-19	(24)

S Comm S-38

S-37 To +5VDC
S-39 To Gnd
S-32 To +12VDC

Panel Switches (W, Scope)   OBSOLETE

Switch	Deck	Pins	Common pt.	out	to	in	from
SW	A	$\overline{1,3,5,7}$		1	PUL lamp		
		$\overline{2,4,6,8}$		1	VF lamp		
		Comm	I-12	1	SWB-Comm		
SW	B	$\overline{1,2}$		1	PEP lamp		
		$\overline{3,4,5,6}$		1	1D3 lamp		
		$\overline{7,8}$		1	1D2 lamp		
		Comm	I-12	1	SWC-Comm	1	SWA-Comm
SW	C	$\overline{5,6}$		1	1D4 lamp		
		Comm	I-12	1	I-12 point	1	SWB-Comm
SW	D	$\overline{1,2}$	Gnd	1	SWE-5,6		
		$\overline{3,4,5,6,7,8}$	+5			1	SWE-1-4,7-8
		Comm				1	RR5-R
SW	E	$\overline{1,2,3,4,7,8}$	+5	1	SWD-3-8	1	SWG-1,2
		$\overline{5,6}$	Gnd	1	SWF-Comm	1	SWD-1,2
		Comm				1	SWR2-R
SW	F	1				1	DD-17
		2				1	DD-21
		3				1	DD-22
		4				1	DD-18
		5				1	DD-16
		6				1	DD-20
		7				1	DD-19
		8				1	DD-24
		Comm	Gnd	1	Panel Gnd	2	SWE-5,6 SWG-3-8
SW	G	$\overline{1,2}$	+5	1	SWE-1-4,7-8	1	SWG-5,6
		$\overline{3,4,5,6,7,8}$	Gnd	1	SWF-Comm	1	SWH-1-4,7-8
		Comm				1	RR5-13
SW	H	$\overline{1,2,3,4,7,8}$	Gnd	1	SWG-3-8		
		$\overline{5,6}$	+5	2	$S\alpha C$-5 SWG-1,2		
		Comm				1	RR4-15
S_{Scope}	A	1 CHA		1	CHA lamp		
		2 CHB		1	CHB lamp		
		3 COA		1	COA lamp		
		4 COB		1	COB lamp		
		$\overline{5,6}$ EXT		1	EXT lamp		
		Comm	I-11			2	DN lamp-B S_{DVM} A-Comm

Panel Switches (DVM, Z/Y SHUTP, DN)

Switch	Deck	Pins	Common Pt.	Out	To	In	From
S_{DVM}	A	1 R1		1	R1 lamp OBSOLETE		
		2 R2		1	R2 lamp OBSOLETE		
		3 TEMP P		1	TEMP P lamp OBSOLETE		
		4 TEMP 3		1	TEMP 3 lamp OBSOLETE		
		5 TEMP 4		1	TEMP 4 lamp OBSOLETE		
		6 +28		1	+28 lamp OBSOLETE		
		7 +5		1	+5 lamp OBSOLETE		
		8 +15		1	+15 lamp OBSOLETE		
		9 +12		1	+12 lamp OBSOLETE		
		10,11,12 EXT		1	EXT lamp OBSOLETE		
		Comm	I-11	2	Conn I-11 OBSOLETE		
					S_{scope}A-Comm OBSOLETE		
						+	
S_{DVM}	B	1		1	Conn INIT-15 OBSOLETE		
		2		1	Conn INIT-16 OBSOLETE		
		3		1	Conn 1D-14 OBSOLETE		
		4		1	Conn 1D-15 OBSOLETE		
		5		1	Conn 1D-16 OBSOLETE		
		6	+28	2	+28 VDC point OBSOLETE		
					Disp dim-4 OBSOLETE		
		7	+5	2	+5 VDC point OBSOLETE		
					$S_{z/y}$B-NC (Y) OBSOLETE		
		8	+15	1	+15 VDC point OBSOLETE		
		9	+12	1	+12 VDC point OBSOLETE		
		Comm		1	Conn COUNT-3 OBSOLETE		
S_{DVM}	C	1				1	DD-8
		2				1	DD-11
		3				1	DD-6
		4				1	DD-5
		5				1	DD-7
		6				1	DD-10
		7				1	DD-9
		8				1	DD-25
		9				1	DD-25
		Comm	Gnd	1	Panel Gnd OBSOLETE		
Sz/y	A	NO Z		1	Z MOD lamps ($\overline{AB}$)		
		NC Y		1	Y MOD lamps ($\overline{CD}$)		
		Comm	I-11			1	DN lamp-B
Sz/y	B	NO Z	Gnd	1	Panel Gnd		
		NC Y	+5	1	SαC-5	1	
							B-7
		Comm		1	OR4-7		

Panel Potentiometers

Pot		Out	To	In	From
P Zero	1	1	TBD		
	2	1	Conn EXIT-14		
	3	1	TBD		
P Discvion	1			1	TBD
	2			1	Conn EXIT-15
	3			1	TBD
Display Dim	1	1	Panel Gnd		
	2			1	SHUT 1-7
	$\overline{3,5}$			1	SHUT 1-F
	4 +28	2	S_{shutp} B-Comm		

Panel Switches (α, CLRS, AP+, AP-)

Switch	Deck	Pins	Common Pt.	Out To	In From
S_{AP+}	A	Comm			1 AP 1-N
		NO	Conn ES-6	1 S_{AP-}	
		NC	+5		
S_{AP-}	A	Comm			1 AP 1-R
		NO	Conn ES-6	1 Conn ES-6	1 S_{AP+} A-Comm
		NC	+5		

Panel Switches (DVM, Z/Y, SHUTP, DN)

Switch	Deck	Pins	Common Pt.	Out To	In From
S_{SHUPT}	A	NO			1 SHUT 1-5
		NC			1 DISP DIM-4
		Comm	Gnd	1 Panel Gnd	
S_{SHUPT}	B	NC			1 SHUT 1-B
		Comm	+28		1 DISP DIM-4
S_{DN}	A	NO		1 Conn RO-51	
		Comm	Gnd	1 Panel Gnd	

Panel Lamps

Switch	Lamp	In	From	In	From
AP	1	1	AP 3-6	1	I-12 Point
	2	1	AP 4-E		
	3	1	AP 3-E		
	4	1	AP 3-V		
	5	1	AP 4-4		
	6	1	AP 3-R		
	7	1	AP 3-P		
	8	1	AP 4-U		
	9	1	AP 4-T		
	10	1	AP 3-K		
	11	1	AP 3-7		
	12	1	AP 3-12		
	13	1	AP 3-10		
	14	1	AP 3-F		
	15	1	AP 3-2		
	16	1	AP 4-3		
	17	1	AP 4-15		
	18	1	AP 4-K		
	19	1	AP 4-H		
	20	1	AP 4-6		
	21	1	AP 4-R		
	22	1	AP 4-P		
CLRS	Set Gnd	1	Panel Gnd	1	SHUT 1-J
	Clock bank	50 (see clock sheets)			
	RA bank	50	TBD		
	DEC bank	42	TBD		

Logic Panel Common Points

Conn I-12	Relay Cd HV-7	
	Juction Pt.	$S\alpha$A-Comm SWA-Comm SWB-Comm SWC-Comm $S\delta$ lamps (A) S_{ap+} lamps ($\overline{ABCD}$) S_{ap-} lamps ($\overline{ABCD}$) S_{shutp} lamps ($\overline{AB}$) AP lamps Comm
Conn I-11	M 1-32	
		S_{scope} A-Comm DN lamp-B $S_{z/y}$ A-comm
SHUT1-J	Junction pt.	S_{clars}-4 (lamp) Clock lamp comm DEC lamp comm RA lamp comm
+28 VDC		Disp dim-4 S_{shutp} B-Comm
+15 VDC		
+12 VDC		
+5 VDC		$S_{z/y}$ B-NC $S\alpha$ C-5, D-1, E-5,6, F-2,3,4,6, H-2,3,4, I-6 SW D-3-8, E-1-4,7-8, G-1,2, H-5,6
Gnd point	Junction pt.	Spare S_{DN} A-Comm S_{shutp} A-Comm S_{CLRS}-1 S S_{CLRS}-2 (lamp) Disp Dim-1 DM ovflo lamp (A) $S\alpha$B-Comm $S_{z/y}$ B-ND

S_{ap+} A-Comm S_{ap-} A-Comm Conn E5-6

Connectors OBSOLETE

Conn	pin		out	to	in	from
ID	1	Interrupt Inst. to ID			1	AP1-7
	2	F recycle Inst. to SH	1	OR3-12		
	3	ΔX sync			1	SWR2-17
	4	ΔY sync			1	SWR2-J
	5	U sync	1	ConnP-16	1	RR3-15
	6					
	7	" " -OFF=+5VDC sig	1	DB1-10		
	8	" " -ON=+5VDC sig	1	DB1-11		
	9	Y sync	1	SWR1-15	1	DB1-4
	10	S_{us}-ON +5VDC			1	RR5-11
	11	" -OFF "			1	FF5-7
	12	Sample level 2 command from prog	1	Conn INIT-14		
	13	General reset to ID			1	RR7-F
	14	TEMP 1 signal to S_{DVM} (PC)			1	S_{DVM}B-3
	15	TEMP 2 signal to S_{DVM} (ID3)			1	S_{DVM}B-4
	16	TEMP 3 signal to S_{DVM} (ID4)			1	S_{DVM}B-5

BNC Conn	in	from
FREQ U5	1	F4-11
FREQ 7	1	D14-24
FREQ 6	1	D14-25
FREQ 5	1	D14-28
FREQ 4	1	D14-31
SCOPE (ID) X	1	M1-18
SCOPE (ID) Y	1	M1-21
SCOPE DM	1	M1-19
SCOPE X	1	M1-23
SCOPE Y	1	M1-24
SCOPE Z	1	M1-25
SIGNAL A POS	1	C-L
SIGNAL A NEG	1	C-7
SIGNAL B POS	1	C-T

Connectors OBSOLETE

Conn	Pin		out	to	in	from
Count	1	λ_B overflow from C-2			1	RR4-9
	2	λ_A " " "	1	OR2-12		
	3	DVM input line			1	S_{DVM} B-Comm
	4	clear λ_A	1	NOR2-20		
	5	clear λ_B	1	NOR2-21		
	6	Prog C initiate			1	OR3-34
	7					
	8	DN Counter Signal			1	DB1-14
Exp Sel	1	CC=TIM			1	SWR2-L
	2	δ=3,7			1	RR3-T
	3	δ=8,9			1	RR3-J
	4	δ=1,2,4,5			1	RR1-15
	5	OPN encode line	1	AP2-6		
	6	AP Stop gnd line			1	S_{ant}-A-Comm
	7	Init power-on reset			1	SHUT1-L
	8	RC=B			1	RR7-5
	9	RC=P			1	RR7-11
	10	RC=W			1	RR7-7
	11	RC=PW			1	RR7-6
	12	CC=CPY			1	SWR2-5
	13	CC=PER			1	SWR2-12
	14	CC=FRM			1	SWR2-N
	15	CC=LIN			1	SWR2-8
	16	CC=PNT			1	SWR2-2
Program	1	W=5,6			1	RR4-15
	2	B prog init	1	OR4-16		
	3	General Reset to prog	1	NOR5-29		
	4	OR14-in initiate GR	1	OR1-32		
	5	OR4-in	1	OR2-5		
	6	S_{sco} B-COB	1	OR4-33		
	7	" COA	1	SWR1-13		
	8	" CHB	1	SWR1-14		
	9	" CHA	1	SWR1-p		
	10	W=1-4,7-8	1	RR4-11		
	11	α=V	1	SWR1-U		
	12	δ=6	1	RR8-N		
	13	δ=8			1	SWR2-V
	14	δ=9			1	SWR2-18
	15	δ=10	k	RR8-11		
	16	A prog init	1	Conn ID-5		

Connectors

Conn	Pin		Out	To	In	From
Initiate	1	Initiate SW OBSOLETE			1	I-J
	2	K=1,3,6 OBSOLETE			1	C-13
	3	K=2,4,5,7 OBSOLETE			1	C=15
	4	Abort Sw OBSOLETE	1	OR1-23		
	5	Inv. code lamp OBSOLETE			1	I-2
	6	cycle lamp OBSOLETE			1	I-3
	7	overflow lamp OBSOLETE			1	I-B
	8	K=1,4,5 OBSOLETE			1	RR4-5
	9	K=1,3,5,7 OBSOLETE			1	RR7-13
	10	K=2,4,6 OBSOLETE			1	RR7-15
	11	display dimmer OBSOLETE			2	S_{DVM} A-Comm M1-32
	12	PEP dimmer OBSOLETE	1	Panel lamps	1	Relay Cd HV-7
	13	"AND 1" veinitiate	1	OR4-14 OBSOLETE		
	14	Samp level 2 in ID OBSOLETE			1	Conn ID-12
	15	R1 signal to DVM from OBSOLETE DATA			1	S_{DVM} B-1
	16	R2 Signal to data section and DVM OBSOLETE	1	Conn EXIT-24		
Exit	1	Step AP+			1	AP1-V
	2	Step AP-			1	AP1-17
	3	Ap encoder Line #1	1	AP2-D		
	4	Ap encoder Line #2	1	AP2-4		
	5	Ap encoder Line #3	1	AP2-5		
	6	Ap encoder Line #4	1	AP2-T		
	7	Ap encoder Line #5	1	AP2-16		
	8	Ap encoder Line #6	1	AP2-10		
	9	Ap encoder Line #7	1	AP2-L		
	10	Ap encoder Line #8	1	AP2-K		
	11	Ap encoder Line #9	1	AP2-5		
	12				1	Relay Cd HV-no
	13				1	Relay Cd HV-4
	14				1	PEP-Zero
	15		1	PEP discvim-2		
	16	overload			1	SHUT1-3
	17	open lim SW			1	SHUT1-15
	18	closed shutter			1	SHUT1-T
	19	close shutter			1	SHUT1-9
	20	open shutter			1	SHUT1-13
	21	W=1 BCD control to tel	1	DD-15		
	22	W=2 BCD control to tel	1	DD-13		
	23	W=4 BCD control to tel	1	DD-14		
	24	R2 signal from telescope			1	Conn INIT-16

Connectors OBSOLETE

Conn	Pin		Out	To	In	From
READOUT	1	AP=1 BCD	1	AP4-12		
	2	AP=2 BCD	1	AP4-1		
	3	AP=4 BCD	1	AP4-A		
	4	AP=8 BCD	1	AP4-14		
	5	W=1 BCD			1	DD-15
	6	W=2 BCD			1	DD-13
	7	W=4 BCD			1	DD-14
	8	W=8 BCD			1	DD-12
	9	DVM=1 BCD			1	DD-3
	10	DVM=2 BCD			1	DD-2
	11	DVM=4 BCD			1	DD-1
	12	DVM=8 BCD			1	DD-4
	13	$\delta=\overline{8}$			1	Kδ-1B
	14	$\delta=\overline{4}$			1	Kδ-2B
	15	$\delta=\overline{2}$			1	Kδ-3B
	16	$\delta=\overline{1}$			1	Kδ-4B
	17	$\delta=\overline{80}$			1	Kδ-5B
	18	$\delta=\overline{40}$			1	Kδ-6B
	19	$\delta=\overline{20}$			1	Kδ-7B
	20	$\delta=\overline{10}$			1	Kδ-8B
	21	$\delta=\overline{800}$			1	Kδ-9B
	22	$\delta=\overline{400}$			1	Kδ-10B
	23	$\delta=\overline{200}$			1	Kδ-11B
	24	$\delta=\overline{100}$			1	Kδ-12B
	25		1	spare		
	26	Clock 1			1	KL-1B
	27	Clock 2			1	KL-2B
	28	Clock 4			1	KL-3B
	29	Clock 8			1	KL-4B
	30	Clock 10			1	KL-5B
	31	Clock 20			1	KL-6B
	32	Clock 40			1	KL-7B
	33	Clock 80			1	KL-8B
	34	Clock 100			1	KL-9B
	35	Clock 200			1	KL-10B
	36	Clock 400			1	KL-11B
	37	Clock 800			1	KL-12B
	38	Clock 1000			1	KL-1D
	39	Clock 2000			1	KL-2D
	40	Clock 4000			1	KL-3D
	41	Clock 8000			1	KL-4D
	42	Clock 10000			1	KL-5D
	43	Clock 20000			1	KL-6D
	44	Clock 40000			1	KL-7D
	45	Clock 80000			1	KL-8D
	46		1	spare		
	47				1	M1-26
	48				1	M1-22
	49				1	M1-20
	50		1	DM overflow lamp		

Common

A	Inv 1-in (Inv 1-3)	counter overflow line
	NOR 23 in (NOR 3-25)	
	OR 3 in (OR 3-4)	
	NOR 13 in (NOR 3-32)	
	NOR 5 in (NOR 5-4)	
	OR 1 out (OR 2-16)	
B	I-5	PG 8 output +5
	Inv 2 in (Inv 1-7)	
	RR 3-F	
C	I-9	PG 1 output +5
	Inv 3 in (Inv 1-16)	
	Delay 1 in = AP 1-1	
	RR 1-11	
	RR 1-R	
	RR 2-J (Logic conn misc A-C (white))	
	D 24-1	
	D 25-1	
D	I-T	PG 14 output +5
	Delay 2 in = AP 1-3	
	RR 6-11	
E	C-3	PG 7 output +5
	Delay 3 in = AP 1-5	
	NOR 6 in (NOR 2-23)	
F	PT-7	PG 4 output +5
	NOR 11 in (NOR 3-7)	
	NOR 12 in (NOR 4-13)	
	OR 3 in (OR 3-5)	
G	PT-11	δ sync +5
	F4-T	Gen reset +5
	NOR 13 out (NOR 3-34)	
H	PT-13	PG 10 output
	RR 3-R	
	RR 6-F	
I	PT-15 coax	PG 3 output
	FF7-T coax	
	D14-12 coax	
J	OR 23 out (OR 1-19) (source)	PG 11 output +5 (interrupt init)
	OR 4 in (LR 2-4) (counter clearing)	
	OR 5 in (OR 2-24) (tie to lower F init)	
	OR 6 in (OR 2-22) (tie to U sync line)	
	NOR 16 in (NOR 1-32) (close PG 15)	
	OR 7 in (OR 3-31) (core memory address reset)	
	AP 1-7 (to RC for AND initiation)	
	OR 8 in (OR 5-5) (reset AND 1-5)	

conn ID pin 1 (U, ΔX, ΔY, clearing & ?)

Common

K	F 1-5 RR 4-R Inv 12 in (Inv 1-35)	
L	F 1-11 D 3-10 D 4-15	
M	F 1-15 F 5-D Inv 13 in (Inv 1-34)	
N	F 1-B F 5-5 Inv 11 in (Inv 1-25)	
O	F 1-N RR 4-13 Inv 14 in (Inv 1-31)	
P	F 2-5 RR 4-V Inv 17 in (Inv 2-16)	
Q	F 2-11 Sδ(1)-C Sδ(10)-C Sδ(100)-C S-38	
R	F 2-15 F 5-V Inv 19 in (Inv 2-13)	
S	F 2-B Inv 16 in (Inv 2-4) F 5-17 OR 10 in (OR 5-11) NOR 18 in (NOR 2-6)	
T	F 2-F F 5-T NOR 13 in (NOR 3-31) OR 11 in (OR 2-13) RR 6-5	δ Sync
U	F 2-N RR 4-N Inv 18 in (Inv 2-7)	
V	F 3-11 NOR 20 out (NOR 2-34) Inv 21 in (Inv 2-21)	
W	F 3-13 OR 2 in (F 1-9) Conn ID pin 2 OR 12 in (OR 3-12)	PG 13 output (reinitiate)

Common

X	F 3-15	
	Inv 22 in (Inv 2-31)	
	F 4-7	
	NOR 21 in (NOR 2-4)	
	NOR 22 in (NOR 3-22)	
Y	F 4-9	^{s}.0009 Sync detect
	CR 1 A on D-22 (pin 21)	
	CR 2 A on D-22 (pin 21)	
	CR 3 A on D-22 (pin 21)	
	CR 4 A on D-22 (pin 21)	
	R 1 (A)on D-22 (pin 21)	
Z	F 4-J	^{s}.00005 Sync detect
	CR 5 A on D-22 (pin 23)	
	CR 6 A on D-22 (pin 23)	
	CR 7 A on D-22 (pin 23)	
	CR 8 A on D-22 (pin 23)	
	R 2 (A)on D-22 (pin 23)	
AA	F 5-9	^{s}.02 Sync detect
	CR 9 A on D-22 (pin 24)	
	CR 10 A on D-22 (pin 24)	
	CR 11 A on D-22 (pin 24)	
	CR 12 A on D-22 (pin 24)	
	R 3 (A) on D-22 (pin 24)	
AB	F 5-J	^{s}.01 Sync detect
	CR 13 A on D-22 (pin 25)	
	CR 14 A on D-22 (pin 25)	
	CR 15 A on D-22 (pin 25)	
	CR 16 A on D-22 (pin 25)	
	R 4 (A) on D-22 (pin 25)	
AC	F 5-11	^{s}.30 Sync detect
	CR 17 A on D-22 (pin 20)	
	CR 18 A on D-22 (pin 20)	
	CR 19 A on D-22 (pin 20)	
	CR 20 A on D-22 (pin 20)	
	R 5 (A) on D-22 (pin 20)	
AD	F 5-L	^{s}.50 Sync detect
	CR 21 A on D-22 (pin 19)	
	CR 22 A on D-22 (pin 19)	
	CR 23 A on D-22 (pin 19)	
	CR 24 A on D-22 (pin 19)	
	R 6 (A) on D-22 (pin 19)	
AE	F 4-12 coax	10^5 pps F chain output
	F 5-13 coax	
	S 14-17 coax	
AF	RR 2-3	
	OR 12 in (OR 3-13)	
	OR 15 in (OR 5-22)	
	OR 16 in (OR 1-24)	

Common

AG	RR 2-9			
	RR 5-17			
	NOR 15 in (NOR 4-22)			
AN	RR 5-J			
	NOR 25 in (NOR 4-30)			
	NOR 7 in (NOR 3-4)			
	NOR 9 in (NOR 1-13)			
AO	RR 5-5			
	OR 12 in (OR 3-22)			
	NOR 15 in (NOR 4-24)			
AP	RR 5-3			
	OR 19 in (OR 5-31)			
	NOR 5 in (NOR 5-5)			
AQ	nonexistant			
AR	RR 6-3			
	Inv 7 in (Inv 1-17)			
	NOR 10 in (NOR 1-22)			
AS	RR 6-7			
	OR 15 in (OR 5-23)			
	OR 12 in (OR 3-23)			
AT	RR 6-13			
	OR 12 in (OR 3-24)			
	NOR 25 in (NOR 4-31)			
AU	RR 6-J			
	OR 15 in (OR 5-24)			
	NOR 25 in (NOR 5-31)			
	OR 23 in (OR 1-12)			
AV	nonexistant			
AW	nonexistant			
AX	nonexistant			
AY	nonexistant			
AZ	Inv 4 in (Inv 1-4)			
	OR 13 in (OR 1-23)			
	Conn INIT pin 4			
BA		(Conn ID-13)	Reset U, ΔX, ΔY, Y enters	
	Inv 5 in	(Inv 1-13)	Open PG 8, cycle lamp off	Gen reset
	OR 11 in	(OR 2-14)	Reset δ enter	
	OR 24 in	(OR2-29)	Reset coil delay	
	OR 3 in	(OR 3-6)	Close PG 5	
	OR 7 in	(OR 4-12)	Reset core memory	
	OR 8 in	(OR 5-6)	Reset 5 AND	
	OR 10 in	(OR 5-12)	Reset Rec delay	
	NOR 2 in	(NOR 1-5)	Close PG 14	
	NOR 3 in	(NOR 1-7)	Close PG 1	
	NOR 8 in	(NOR 1-12)	Close PG 7	

Common

(BA continued)	NOR 10 in	(NOR 1-23)	Close PG 11
	NOR 14 in	(NOR 1-24)	Close PG 4
	NOR 21 in	(NOR 2-5)	Close PG 16
	NOR 18 in	(NOR 2-7)	Close PG 17
	NOR 11 in	(NOR 3-11)	Open GP 12
	NOR 22 in	(NOR 3-23)	Open PG 15
	NOR 23 in	(NOR 3-29)	Close PG 6
	NOR 13 in	(NOR 3-33)	Close PG 3, Reset B in Cntr
	NOR 5 in	(NOR 5-6)	Close PG 2, PG 9
	NOR 12 in	(NOR 5-24)	Close PG 13
	NOR 15 in	(NOR 5-29)	Close PG 10
		Conn P-3 -?-	Reset in programmers (2 input points)
	RR 7-F	(RR 7-F)	Source (drives 3 7 14) Inv or NOR?

BB	Inv 8 in (Inv 1-21) NOR 14 in (NOR 1-25) OR 16 out (OR 1-20) Conn ID pin 6	
BC	Inv 10 in (Inv 1-22) PT-V NOR 25 out (NOR 4-34)	T initiate
BD	Inv 9 in (Inv 2-22) NOR 11 in (NOR 3-12) OR 5 out (OR 2-20) D 14-10 OR 10 in (OR 5-13) D 14-14	
BE	Inv 15 in (Inv 2-3) Inv 20 in (Inv 2-17) Inv 23 in (Inv 2-25) OR 8 out (OR 5-2)	
BF	Inv 24 in (Inv 2-34) NOR 22 in (NOR 3-24) OR 12 out (OR 1-15) NOR 7 in (NOR 3-5) NOR 9 in (NOR 1-14) OR 5 in (OR 2-25)	F initiate
BG	Inv 25 in (Inv 2-35) NOR 23 in (NOR 3-30) OR 24 in (OR 2-30) OR 6 out (OR 2-21) NOR 5 in (NOR 5-7)	
BH	OR 15 out (OR 5-20) D 14-32 D 14-34	

Common

BI	SαH-T NOR 25 in (NOR 5-32) NOR 7 in (NOR 3-6)
BJ	SαJ-T (0001) D 15-6 D 15-26
BK	SαJ-T (01) D 16-6 D 16-26
BL	D 14-22 D 15-34 D 15-27 D 16-34 D 16-27 D 17-34
BM	D 14-8 D 1-34 D 1-27 D 2-34 D 2-27 D 3-34 D 3-27
BN	D 22-7 D 20-27 D 21-34 D 21-27
BO	RR 4-N D 20-26 SWR 2-11
BP	AP 1-13 D 3-26 D 3-6
BQ	SαI-P OR 3 in (OR 3-7) NOR 12 in (NOR 5-25)
BR	D 22-4 D 23-34 D 23-27
BS	D 20-34 D 19-27 D 19-34 D 18-27 D 18-34 D 22-1
BT	Conn ID-9 SWR 2-15 SαI-Comm

Common

BU	Conn ID-3 SWR 2-17 RR 1-17
BV	nonexistant
BW	SWR 1-8 OR 1-29 OR 5-32

+12 VDC	F 1-3 F 2-3 F 3-1 F 4-L F 5-B RR 7-1 S-S2 + 12 point

OBSOLETE

Coax Connections

		gnd at
D23-26	D23-6	D23-6
D21-32	D20-10	D20-10
D21-26	D21-6	D21-6
D20-32	D19-10	D19-10
D19-26	D19-6	D19-6
D19-32	D18-10	D18-10
D18-26	D18-6	D18-6
D17-6	SαG-4	D17-6
D16-26	D16-6 SαG-3	D16-6
D17-32	D16-10	D16-10
D16-32	D15-10	D15-10
D15-26	D15-6 SαG-2	D15-6
D15-32	D14-18	D15-32
D14-13	D1-32	D14-13
D14-24	BNC FREQ 7	BNC
D14-25	BNC FREQ 6	BNC
D14-28	BNC FREQ 5	BNC
D14-31	BNC FREQ 4	BNC
M1-18	BNC SCOPE ID X	BNC
M1-19	BNC SCOPE DM	BNC
M1-21	BNC SCOPE ID Y	BNC
M1-23	BNC SCOPE X	BNC
M1-24	BNC SCOPE Y	BNC
M1-25	BNC SCOPE Z	BNC
OR1-2	λ_B-A *	
OR1-3	λ_B-B *	
I-17	F1-F	F1-F
C-7	BNC SIGNAL A NEG	BNC
C-9	SWR 2-T	
	λ_A-A *	λ_A-A Conn
C-11	OR1-4	OR1-4
C-J	SWR 2-D	
	λ_A-B *	λ_A-B Conn
C-L	BNC SIGNAL A POS	BNC
C-N	OR1-6	OR1-6
C-T	BNC SIGNAL B POS	BNC
PT-15	RR7-T D14-12	PT-15 RR7-T
PT-T	SαG-Comm	PT-T
F1-11	D4-15	F1-11
F4-11	BNC FREQ U5	BNC
F4-13	F5-13 D14-17	F5-13
F4-15	D14-11	D14-11
F4-17	RR7-R	F4-17
F4-N	D23-32	D23-32
F5-N	D18-32	D18-32
RR7-N	SWR2-11 D20-26	RR7-N SWR3-11
SWR2-3	OR1-5	SWR2-3
SWR2-9	OR1-7	SWR2-3
AP1-13	D3-26	AP1-13
Osc-6	D14-4	Osc-6

Common Wire Runs

A	INV 1-3	OR 2-16	OR 3-4	NOR 3-25	NOR 3-32	NOR 5-4		
B	I-5	RR 3-F	INV 1-7					
C	OR 2-19	INV 1-16	RR 1-11	RR 2-J	AP 1-1	RR 8-R D 25-35	D 24-35	Conn P-10
D	I-T	RR 6-11	AP 1-3					
E	C-3	AP 1-5	NOR 2-23					
F	PT-7	OR 3-5	NOR 3-7	NOR 4-13				
G	PT-11	F 4-T	NOR 3-34					
H	PT-13	RR 3-R	RR 6-F					
I	PT-15	RR 7-T	D 14-12					
J	AP 1-7	OR 1-19	OR 2-4	OR 2-22	OR 2-24	OR 4-13	OR 5-5	NOR 1-32
	Conn 10-1 -?-							
K	F 1-5	RR 4-R	INV 1-35					
L	F 1-11	D 4-15	D 3-10					
M	F 1-15	F 5-D	INV 1-34					
N	F 1-B	F 5-5	INV 1-25					
O	F 1-N	RR 4-13	INV 1-31					
P	F 2-5	RR 4-V	INV 2-16					
Q	F 2-11	S-38	Sδ(1,10,100 C)					
R	F 2-15	F 5-V	INV 2-13					
S	F 2-B	F 5-17	INV 2-4	OR 5-11	NOR 2-6			
T	F 2-F	F 5-T	RR 6-5	OR 2-13	NOR 3-31			
U	F 2-N	RR 4-N	INV 2-7					
V	F 3-11	INV 2-21	NOR 2-34					
W	F 1-9	F 3-13	OR 3-12	Conn ID-2				
X	F 3-15	F 4-7	INV 2-31	NOR 2-4	NOR 3-22			
Y	AD nonexistant, built into D22 board							

Common Wire Runs

AE	F 4-13	F 5-13	D 14-17						
AF	RR 2-3	OR 1-24	OR 3-13	OR 5-22					
AG	RR 2-9	RR 5-17	NOR 4-22						
AH	RR 2-B	OR 1-25	OR 1-30	OR 5-29					
AI	ConnID-5 Conn 1-B	RR 3-15	SWR 2-7	OR 2-23					
AJ	RR 3-6	NOR 2-24	NOR 2-29						
AK	RR 3-D	RR 4-L	NOR 2-30						
AL	RR 3-13	OR 5-30	NOR 1-30						
AM	RR 5-F	OR 3-14	NOR 4-23	NOR 4-29					
AN	RR 5-J	NOR 1-13	NOR 3-4	NOR 4-30					
AO	RR 5-5	OR 3-22	NOR 4-24						
AP	RR 5-3	OR 5-31	NOR 5-5						
AQ	nonexistant								
AR	RR 6-3	INV 1-17	NOR 1-22						
AS	RR 6-7	OR 3-23	OR 5-23						
AT	RR 6-13	OR 3-24	NOR 4-31						
AU	RR 6-J	OR 1-12	OR 5-24	NOR 5-31					
AV	nonexistant								
AW	nonexistant								
AX	nonexistant								
AY	nonexistant								
AZ	INV 1-4	OR 1-23	Conn I-4						
BA	ConnID-13	RR 7-F	INV 1-13	OR 2-14	OR 2-29	OR 3-6	OR 4-12	OR 5-6	OR 5-12
	NOR 1-5	NOR 1-7	NOR 1-12	NOR 1-23	NOR 1-24	NOR 2-5	NOR 2-7	NOR 3-11	
	NOR 3-23	NOR 3-29	NOR 3-33	NOR 5-6	NOR 5-24	NOR 5-29	Conn P-3	Conn I-13	
BB	INV 1-21	OR 1-20	NOR 1-25	Conn ID-6					
BC	PT-V	INV 1-22	NOR 4-34						
BD	D 14-14	D 14-10	INV 2-22	OR 2-20	OR 5-13	NOR 3-12			

BE	INV 2-3	INV 2-17	INV 2-17	INV 2-25	OR 5-2		
BF	INV 2-34	OR 1-15	OR 2-25	NOR 1-14	NOR 3-5	NOR 3-24	
BG	INV 2-35	OR 2-21	OR 2-30	NOR 3-30	NOR 5-7		
BH	D 14-34	D 14-32	OR 5-20				
BI	NOR 3-6	NOR 5-32	SαH-T				
BJ	D 15-26	D 15-6	SαJ-T (0001)				
BK	D 16-26	D 16-6	SαJ-T (01)				
BL	D 17-34	D 16-34	D 16-27	D 15-34	D 15-27	D 14-22	
BM	D 14-8	D 3-34	D 3-27	D 2-34	D 2-27	D 1-34	D 1-27
BN	D 22-7	D 21-34	D 21-27	D 20-27			
BO	RR 7-N	SWR 2-11	D 20-26				
BP	AP 1-13	D 3-26	D 3-6				
BQ	SαI-P	OR 3-7	NOR 5-25				
BR	D 23-34	D 23-37	D 22-4				
BS	D 22-1	D 20-34	D 19-34	D 19-27	D 18-34	D 18-27	
BT	SαI-comm	SWR 2-15	Conn ID-9				
BU	RR 1-17	SWR 2-17	Conn ID-3				
BV	RR 2-T	SWR 2-J	Conn ID-4				
BW	SWR 1-8	OR 1-29	OR 5-32				

		S-39	
Ground	I-7	D1-3	VIEW lamp-B T (1) lamp-B
	C-V	D2-3	T (01) lamp-B T (0001) lamp-B
	PT-1	D3-3	FRAME lamp-B PERIOD lamp-B
	F1-V	D4-3	
			PUL lamp-B
	F2-V	D5-3	VF lamp-B PEP lamp-B
	F3-3	D6-3	ID 3 lamp-B ID 4 lamp-B
	F4-B	D7-3	ID 2 lamp-B
	F5-1	D8-3	
	RR1-1	D9-3	
	RR2-1	D10-3	
	RR3-1	D11-3	
	RR4-1	D12-3	
	RR5-1	D13-3	
	RR6-V	D14-1	
	RR7-V	D15-3	
	SWR1-1 SWR2-13	D16-3	
	AP1-B gnd pt	D17-3	
	Oscill-7,8 gnd pt	D18-3	
		D19-3	
		D20-3	
		D21-3	
		D22-3	
		D23-3	
		D24-6 D24-27 D25-27 gnd pt	

		S-37	
+5VDC	I-15	D1-2	SαB-comm
	C-17	D2-2	SαC-comm
	PT-17	D3-2	SαD-comm
	F1-T	D4-2	SαE-comm
	F2-T	D5-2	SαF-comm
	F3-B	D6-2	SWD-comm
	F4-1	D7-2	SWE-comm
	F5-3	D8-2	
	RR1-5	D9-2	
	RR2-5	D10-2	
	RR3-5	D11-2	
	RR4-B	D12-2	
	RR5-B	D13-2	
	RR6-17	D14-30	
	RR7-17	D15-2	
	SWR1-17 SWR2-F	D16-2	
	AP1-15 +5 point	D17-2	
		D18-2	
		D19-2	
		D20-2	
		D21-2	
		D22-22	
		D23-2	
		D24-31	
		D25-31 +5 point	

Control Commons

W	1,2	RR1-T	RR5-13	SWG-comm		
	3-8	RR1-9	RR2-17	RR5-R	SWD-comm	OBSOLETE
	1-4,7-8	RR3-V	RR4-11	SWR2-R	SWE-comm	
	5,6	Conn P-1	RR4-15	SWH-comm		
α	T	SWR1-19	RR1-3	RR3-L	RR6-N	SαH-comm
	V	SWR1-20	RR1-7	RR2-F	FF3-11	SαD-comm
	FP	RR1-L	SαE-FP			
	VTP	RR2-13	SαC-VTP			
	TP	RR2-D	SαF-TP			
	F	SWR1-21	RR2-N	RR6-T	RR8-15	
					SαC-comm	
	PFT	FF3-3	SαD-PFT			
	P	SWR1-22	RR6-L	SαI-comm		
δ	3,7	F5-15	RR1-F	RR3-T	Conn ES-2	
	8	RR2-11	RR6-15	SWR2-V	Conn ES-6	
	9	RR2-L	FF6-9	SWR2-18	Conn ES-7	
	8,9	RR3-J	Conn ES-3			
	6,10	RR1-15	Conn ES-4			
K	1,4,5	RR4-5	Conn I-9			
	1,3,5,7	RR7-13	Conn I-9			
	2,4,6	RR7-15	Conn I-10			
	1,3,6	C-13	Conn I-2			
	2,4,5,7	C-15	Conn I-3			
US	off	RR5-7	Conn ID-11			
	on	RR5-11	Conn ID-10			
RC	B	RR7-5	Conn ES-8			
	P	RR7-11	Conn ES-9			
	W	RR7-7	Conn ES-10			
	PW	RR7-L	Conn ES-11			
CC	CPY	SWR2-5	Conn ES-12			
	PER	SWR2-12	Conn ES-13			
	FRM	SWR2-N	Conn ES-14			
	LIN	SWR2-B	Conn ES-15			
	PNT	SWR2-2	Conn ES-16			
	TIM	SWR2-L	Conn ES-1			

Panel Lamps

Switch	Lamp	In	Out	From	In	Out	From
DVM	R1 Common1	1		M1-5	1		SDVM A-R1
	R2 " "				1		" R2
	DEG (1) Comm 1				1		" DEG (1)
OBSOLETE	DEG (2) "				1		" DEG (2)
	DEG (3) "				1		" DEG (3)
	TP1 Comm 1				1		" TP1
	TP2 "				1		" TP2
	TP3 "				1		" TP3
	TP4 "				1		" TP4
	EXT "				1		" EXT
SCOPE	CHA Comm 1	1		M1-4	1		SSCOPE A-CHA
	CHB "				1		" CHB
OBSOLETE	COA "				1		" COA
	COB "				1		" COB
	EXT "				1		" EXT
α	T (1) Comm 1	1	M	M1-14	1		SαA-T(1)
	T (01) "				1		" T(01)
	T (0001) Comm1						" T(0001)
	VIEW Comm 1	1		M1-12	1		" V
	FRAME "				1		" F
	PERIOD "				1		" P
W	PEP	1		M1-10	1		SWB-1,2
	ID2				1		" -7,8
OBSOLETE	ID3				1		" -3,4,5,6
	ID4				1		SWC-5,6
	PVL	1		M1-11	1		SWA-1,3,5,7
	VF				1		SWA-2,4,6,8
Z/Y	Z MOD ($\overline{AB}$)	1		M1-3	1		Sz/y A-Z
	Y MOD ($\overline{CD}$)				1		" -Y
DN	DN (B)	1		M1-2		1	Sz/y A-comm
					1		Sscope A-comm
	1 (A)				1		M1-27
	2 (C)				1		M1-31
	3 (D)				1		M1-29
-	DN overflow	GND	1	Panel Gnd	1		Conn RO-50
SHUT P	SHUT P($\overline{AB}$)	1		M1-7		1	I-12 comm
	ON (C)				1		Relay Card SHUTTER-6
	EMG (D)				1		SHUT 1-D
AP+	APERT +($\overline{ABCD}$)	1		M1-8		I-12	I-12 comm
		1					
AP-	APERT -($\overline{ABCD}$)	1		M1-8		I-12	I-12 comm

Panel Lamps Continued

Switch	Lamp	in	out	from	in	out	from
δ	$\delta(4)$	1		M1-9		1	I-12 comm
-	HVP	1		M1-13	1		Relay Card HV-6

Inverters

		pin assignments		input	output			operates		
	Board	in	out	from	to	FF	OS	AND	OR	NOR
1	INV 1	INV 1-3	INV 1-8	Comm A	I-1	1				
2	INV 1	INV 1-7	INV 1-6	Comm B	I-F	1				
3	INV 1	INV 1-16	INV 1-15	Comm C	I-R	2				
4	INV 1	INV 1-4	INV 1-5	Comm AZ	I-11	2				
5	INV 1	INV 1-13	INV 1-14	Comm BA	I-N	2				
6	Built into AP1 board, drop from list									
7	INV 1	INV 1-17	INV 1-12	Comm AR	PT-3	1				
8	INV 1	INV 1-21	INV 1-26	Comm BB	PT-B	1				
9	INV 2	INV 2-22	INV 2-23	Comm BD	F3-R	1				
10	INV 1	INV 1-22	INV 1-23	Comm BC	D14-19		1			
11	INV 1	INV 1-25	INV 1-24	Comm N	F1-1	1				
12	INV 1	INV 1-35	INV 1-30	Comm K	F1-D	1				
13	INV 1	INV 1-34	INV 1-33	Comm M	F1-17	1				
14	INV 1	INV 1-31	INV 1-32	Comm O	F1-13	1				
15	INV 2	INV 2-3	INV 2-8	Comm BE	F1-R	4				
16	INV 2	INV 2-4	INV 2-5	Comm S	F2-1	1				
17	INV 2	INV 2-16	INV 2-15	Comm P	F2-D	1				
18	INV 2	INV 2-7	INV 2-6	Comm U	F2-13	1				
19	INV 2	INV 2-13	INV 2-14	Comm R	F2-17	1				
20	INV 2	INV 2-17	INV 2-12	Comm BE	F2-R	4				
21	INV 2	INV 2-21	INV 2-26	Comm V	F3-17			1		
22	INV 2	INV 2-31	INV 2-32	Comm X	F3-V	1				
23	INV 2	INV 2-25	INV 2-24	Comm BE	F3-T	2				
24	INV 2	INV 2-34	INV 2-33	Comm BF	F4-5	1				
25	INV 2	INV 2-35	INV 2-30	Comm BG	F4-R	1				
26	D14	D14-10	D14-9	Comm BD	F5-F	1				
27	D14	D14-12	D14-11	Comm I	F4-15	1				

OR gates

	Board	pin assignments in	pin assignments out	input from	output to	FF	OS	INV	AND	OR	NOR
1	OR2	OR 2-11	OR 2-16	RR4-7	Comm A			1		1	3
		OR 2-12		Conn C-2							
2	F1	F1-L	F1-J	RR3-17	C-F				1		
		F1-9		Comm W							
3	OR 3	OR 3-4	OR 3-2	Comm A	D14-33	1					
		OR 3-5		Comm F							
		OR 3-6		Comm BA							
		OR 3-7		Comm BQ							
4	OR 2	OR 2-4	OR 2-3	Comm J	RR 3-7				2*		
		OR 2-5		TBD[1]							
5	OR 2	OR 2-24	OR 2-20	Comm J	Comm BD		1	2		1	1
		OR 2-25		Comm BF							
6	OR 2	OR 2-22	OR 2-21	Comm J	Comm BG			1		1	2
		OR 2-23		Comm AI							
7	OR 3	OR 3-29	OR 3-34	RR2-V	TBD[2]						
		OR 3-30		Comm BA							
		OR 3-31		Comm J							
8	OR 5	OR 5-4	OR 5-2	F3-D	Comm BG			3			
		OR 5-5		Comm J							
		OR 5-6		Comm BA							
9	BD1	DB1-E	DB1-2	F1-7	NOR 20-in						1
		DB1-5		F2-7							

(1) Program λ clear
* Mutually exclusive (only 1 "on" at any time)
(2) Core address reset

OR gates

	Board	pin assignments in	pin assignments out	input from	output to	FF	Q/OS	INV	AND	OR	NOR
10	OR 5	OR 5-11	OR 5-16	Comm S	D22-2		1				
		OR 5-12		Comm BA							
		OR 5-13		Comm BD							
11	OR 2	OR 2-13	OR 2-15	Comm T	D22-8		1				
		OR 2-14		Comm BA							
12	OR 3/1	OR 3-11	OR 1-15	RR 6-R	Comm BF			1		1	3
		OR 3-12		Comm W							
		OR 3-13		Comm AF							
		OR 3-14		Comm AM							
		(OR 3-16	OR 1-13)								
		(OR 3-20	OR 1-19)								
		OR 3-22		Comm AO							
		OR 3-23		Comm AS							
		OR 3-24		Comm AT							
		OR 3-25		SαG-V							
13	OR 1	OR 1-22	OR 1-21	F3-N	OR 14-in						
		OR 1-23		Comm AZ							
14	OR 1	OR 1-31	OR 1-33	OR 13-out	RR 7-B		1				
		OR 1-32		Conn P-4							
15	OR 5	OR 5-22	OR 5-20	Comm AF	Comm BH	1	1				
		OR 5-23		Comm AS							
		OR 5-24		Comm AU							
16	OR 1	OR 1-24	OR 1-20	Comm AF	Comm BB			1			2*
		OR 1-25		Comm AH							

* 1 via Sps and z connectors to ID section

OR gates

	Board	pin assignments in	out	input from	output to	FF	Q/OS	INV	AND	OR	NOR
17	OR1	OR1-29	OR1-34	SαG-FT	AP1-L		1				
		OR1-30		Comm AH							
18											
19	OR5	OR5-30	OR5-34	Comm AL	OR4-12				5*		
		OR5-29		Comm AH							
		OR5-31		Comm AP							
		OR5-32									
20	OR2	OR2-6	OR2-2	AP1-9	RR7-9				4*		
		OR2-7		RR3-B							
21											
22	Non existant, replaced by NOR/INV conversion										
23	OR1 (include driver)	OR1-11 (OR1-16--OR1-18)	OR1-19	PT-J	J Comm	5	4(4)			5	1
		OR1-12		Comm AV							
24	OR2	OR2-29	OR2-34	Comm BA	D22-5		1				
		OR2-30		Comm BG							
25	OR1	OR1-6	OR1-2	C-N	λ_BA-in		Janus Counter A input				
		OR1-7		SWR2-9							
26	OR1	OR1-4	OR1-3	C-11	λ_BB-in		Janus counter B input				
		OR1-5		SWR2-3							
27	OR4	OR4-6	OR4-2	OR4-5 Sscope B-INT M1-33							
		OR4-7		$S_{z/y}$ B-Y							
28	OR4	OR4-4	OR4-3	$S_{z/y}$ B-Z	M1-34						
		OR4-5		OR4-6 M1-35							

* Mutually exclusive (only one "on" at any time)

(4) Delay elrcuit and 3 EECO reset drivers (in ID area)

NOR gates

	Board	pin assignments in	out	input from	output to	FF	Q/OS	INV	AND	OR	NOR
1	Nonexistant										
2	NOR 1	NOR1-4	NOR1-3	AP1-D	I-13						
		NOR1-5		Comm BA							
3	NOR 1	NOR1-6	NOR1-2	AP1-J	I-D						
		NOR1-7		Comm BA							
4	NOR4/5	NOR4-4	NOR4-2	RR1-J	I-L						
		NOR4-5		RR2-7							
		NOR4-6		RR5-D							
		NOR5-22 (NOR5-21--NOR4-7)		SαG-P							
		NOR 5-23		SαHVFP							
5	NOR 5	NOR5-4	NOR5-2	Comm A	C-1						
		NOR5-5		Comm AP							
	N	NOR5-6		Comm BA							
		NOR5-7		Comm BG							
6	NOR 2	NOR2-22	NOR2-21	RR4-D	Conn C-5						
		NOR2-23		Comm E							
		NOR2-24		Comm AJ							
7	NOR 3	NOR3-4	NOR3-3	Comm AN	C-5						
		NOR3-5		Comm BF							
		NOR3-6		Comm BI							
8	NOR 1	NOR1-11	NOR1-16	AP1-F	C-B						
		NOR1-12		Comm BA							
9	NOR 1	NOR1-13	NOR1-15	Comm AN	C-R						
		NOR1-14		Comm BF							

NOR gates

	Board	pin assignments in	out	input from	output to	FF	Q/OS	INV	AND	OR	NOR
10	NOR 1	NOR1-22	NOR1-21	Comm AR	PT-5						
		NOR1-23		Comm BA							
11	NOR 3	NOR3-7	NOR3-2	Comm F	F3-5						
		NOR3-11		Comm BA							
		NOR3-12		Comm BD							
12	NOR4/5	NOR4-11	NOR4-16	RR2-R	F3-L						
		NOR4-12		RR6-B							
		NOR4-1		Comm F							
		NOR5-24 (NOR5-20--NOR4-14)		Comm BA							
		NOR5-25		Comm BQ							
13	NOR 3	NOR3-31	NOR3-34	Comm T	Comm G						
		NOR3-32		Comm A							
		NOR3-33		Comm BA							
14	NOR 1	NOR1-24	NOR1-20	Comm BA	PT-D						
		NOR1-25		Comm BB							
15	NOR4/5	NOR4-22	NOR4-20	Comm AB	PT-F						
		NOR4-23		Comm AM							
		NOR4-24		Comm AO							
		NOR5-29 (NOR5-23--NOR4-25)		Comm BA							
		NOR5-30		Conn ID-7							
16	NOR 1	NOR1-31	NOR1-33	RR1-V	F4-D						
		NOR1-32		Comm J							

NOR gates

	Board	pin assignments in	out	input from	output to	FF	Q/OS	INV	AND	OR	NOR
17	NOR 3	NOR3-13	NOR3-16	RR5-T	PT-N						
		NOR3-14		RR6-1							
		NOR3-15		Comm ID-8							
18	NOR 2	NOR2-6	NOR2-2	Comm S	F5-7						
		NOR2-7		Comm BA							
19	NOR 1	NOR1-29	NOR1-34	RR6-D	F3-7						
2		NOR1-30		Comm AL							
20	NOR 2	NOR2-31	NOR2-34	DB1-2	Comm V						
		NOR2-32		RR3-N							
		NOR2-33		OR4-15							
21	NOR 2	NOR2-4	NOR2-3	Comm X	F4-V						
		NOR2-5		Comm BA							
22	NOR 3	NOR3-22	NOR3-21	Comm X	F4-C						
		NOR3-23		Comm BA							
		NOR3-24		Comm BF							
23	NOR 3	NOR3-25	NOR3-20	Comm A	F4-F						
		NOR3-29		Comm BA							
		NOR3-30		Comm BG							
24	NOR 2	NOR2-25	NOR2-20	RR4-3	Conn C-4						
		NOR2-29		Comm AJ							
		NOR2-30		Comm AK							

NOR gates

	Board	pin assignments in	out	input from	output to	FF	Q/OS	INV	AND	OR	NOR
25	NOR4/5	NOR4-29	NOR4-34	Comm AM	Comm BC						
		NOR4-30		Comm AN							
		NOR4-31		Comm AT							
		NOR5-31		Comm AU							
		(NOR5-33	NOR4-32)								
		NOR5-32		Comm BI							

DATA AND ID CONTROL PANEL

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Filter Drive #2

Pin	Function	In From	Out To
1	Motor Drive (Red)		ID/EXIT Conn-17
2	Motor Drive (Green)		ID/EXIT Conn-18
3			
4			
5	Forward Drive	Filter #2 SW	
6	Reverse Drive	Filter #2 SW	
7			
8			
9			
10			
11			
12	+12 V		
13			
14			
15			
16			
17			
18	Gnd		

J21 Board
(Interface)

Pin	Function	In From	Out To	
1	Gnd			
2				
3	Per. SYNC	NO LONGER USED	1 J2-9	
4				
5	+5 V			
6	S.H. X2, Y2 Control		1 J45-6	
7	Level 2 Sample Command		Prog A-16	(J2-12)
8	S.H. X1, Y1 Control		1 J45-19	
9				
10	ΔY-Pre-Set		1 SS3-C	
11	Y-Pre-Set		1 SY6-C	
12	+12 V			
13				
14	Y-Reset (EECO PART)		1 J50-27	
15	ΔY-Counter Reset		1 J56-27	
16	ΔX-Counter Reset		1 J56-34	
17	U-Counter Reset		1 J54-34	
18				
19	ΔX-Counter	1 J45-19		
20				
21				
22	U-SYNC		RR3-15	(J2-5)
23	ΔY-Counter		1 J55-26	
24				
25	ΔX-SYNC	1 J69-34	1 SWR2-17	(J2-3)
26	ΔY-SYNC	1 J64-27	1 SWR2-J	(J2-4)
27	Y-Reset (SYL Card #2)		1 J71-22	
28	Y-Reset (SYL Card #1)		1 J70-22	
29	U-Preset		1 SU5-C	
30	ΔX-Preset		1 ST3-C	
31				
32				
33	F-Logic +5V Pulse		DR3-12	(J2-2)
34	Logic I.D. (Gen Reset)		RR7-F	(J2-13)
35	Logic I.D. (Inter Reset)		AP1-7	(J2-1)

(---) means used only in OLD SYSTEM

J27 Board
(ID2, ID3 Shutter Ckt.)

Pin	Function	In From	Out To
1	Gnd		
2			
3			
4			
5	+5 VDC		
6			
7			
8			
9			
10	Shut. Motor I.D. 2 (Grn-Opn)		1 J4-8
11	S Shut. P A-NC (Gnd on Common) I.D.3	1 S Shut A-NC	
12	Shut. Motor I.D.3 (Grn-Opn)		1 J4-15
13	Shut. Motor I.D.2 (Red-Clo.)		1 J4-7
14	Shut. Motor I.D.3 (Red-Clo)		1 J4-14
15	+12 VDC		
16	S Shut. P A-NO I.D.3	1 S, Shut A-NO	
17	Emg. Lamp I.D.3 (Term D)	1 S Shut Lamp D	
18	Over-Load I.D.3		1 J4-26
19	S Shut P B-NC (+28 VDC on Common) I.D.3	1 S Shut B-NC	
20	Limit Sw. I.D.3 (Clo)		1 J4-11
21	Limit Sw. I.D.3 (Opn)		1 J4-12
22			
23	Light I.D.3 (Opn-Term C)	1 S Shut Lamp C	
24	Turn-On-Reset		
25	Limit Sw. I.D.2 (Clo)		1 J4-4
26	Limit Sw. I.D.2 (Opn)		1 J4-5
27	Dimmer (Out)		
28	+28 VDC		
29			
30	S Shut P A-NO I.D.2	1 S Shut A-NO	
31	S Shut P A-NC (Gnd on Common) I.D.2	1 S Shut A-NC	
32	Light I.D.2 (Opn-Term C)	1 S Shut Lamp C	
33	S Shut P B-NC (+28 VDC on Common) I.D.2	1 S Shut B-NC	
34	Over-Load I.D.2		1 J4-24
35	Emg. Lamp I.D.2 (Term D)	1 S Shut Lamp D	

J45 Board
(Sample/Hold)

Pin	Function	In From	Out To
1	Gnd		
2			
3			
4	CW. Coil		EXIT-7
5	CCW. Coil		EXIT-9
6	Level 2 Sample (X^2, Y^2)	1 J21-6	
7			
8	(X) Input		Horiz Z-Atten Pin V
9	Scope (Y) Input		To Rear Panel BNC "Y"
10	(Y) Input		Vert Z Atten Pin V
11			
12	+12 VDC		
13			
14			
15	+15 VDC		
16	-15 VDC		
17			
18			
19	Level 1 Sample (X^1, Y^1)		1 J21-19
20			
21			
22			
23			
24			
25	Scope (X) Input, Thru. Amp.		
26			
27	Scope (X) Input		To Rear Panel BNC "X"
28	+28 VDC		
29			
30			
31	ON #1 (CW.)		1 SM1A-1
32	ON #2 (CCW.)		1 SM1A-2
33			
34			
35			

J46 Board
(Resistor Card)

Pin	Function	In From	Out To
1	10 K		1 SQ3C2-1
2	20 K		1 SQ3C2-2
3	30 K		1 SQ3C2-3
4	40 K		1 SQ3C2-4
5	50 K		1 SQ3C2-5
6	60 K		1 SQ3C2-6
7	70 K		1 SQ3C2-7
8	80 K		1 SQ3C2-8
9			
10			
11			
12			
13			
14			
15	+15 VDC		
16			
17			
18			
19	1 K		1 SQ3B2-1
20	2 K		1 SQ3B2-2
21	3 K		1 SQ3B2-3
22	4 K		1 SQ3B2-4
23	5 K		1 SQ3B2-5
24	6 K		1 SQ3B2-6
25	7 K		1 SQ3B2-7
26	8 K		1 SQ3B2-8
27	800Ω		1 SQ3A2-8
28	700Ω		1 SQ3A2-7
29	600Ω		1 SQ3A2-6
30	500Ω		1 SQ3A2-5
31	400Ω		1 SQ3A2-4
32	300Ω		1 SQ3A2-3
33	200Ω		1 SQ3A2-2
34	100Ω		1 SQ3A2-1
35	Gnd		

J47 Board
(Resistor Card)

Pin	Function	In From	Out To
1	10 K		1 SR3F2-1
2	20 K		1 SR3F2-2
3	30 K		1 SR3F2-3
4	40 K		1 SR3F2-4
5	50 K		1 SR3F2-5
6	60 K		1 SR3F2-6
7	70 K		1 SR3F2-7
8	80 K		1 SR3F2-8
9			
10			
11			
12			
13			
14			
15	+15 VDC		
16			
17			
18			
19	1 K		1 SR3E2-1
20	2 K		1 SR3E2-2
21	3 K		1 SR3E2-3
22	4 K		1 SR3E2-4
23	5 K		1 SR3E2-5
24	6 K		1 SR3E2-6
25	7 K		1 SR3E2-7
26	8 K		1 SR3E2-8
27	800Ω		1 SR3D2-8
28	700Ω		1 SR3D2-7
29	600Ω		1 SR3D2-6
30	500Ω		1 SR3D2-5
31	400Ω		1 SR3D2-4
32	300Ω		1 SR3D2-3
33	200Ω		1 SR3D2-2
34	100Ω		1 SR3D2-1
35	Gnd		

J48 Board
(Resistor Card)

Pin	Function	In From	Out To
1	10 K		1 SV3C2-1
2	20 K		1 SV3C2-2
3	30 K		1 SV3C2-3
4	40 K		1 SV3C2-4
5	50 K		1 SV3C2-5
6	60 K		1 SV3C2-6
7	70 K		1 SV3C2-7
8	80 K		1 SV3C2-8
9			
10			
11			
12			
13			
14			
15	+15 VDC		1 SQ3A,B,C-9
16			
17			
18			
19	1 K		1 SV3B2-1
20	2 K		1 SV3B2-2
21	3 K		1 SV3B2-3
22	4 K		1 SV3B2-4
23	5 K		1 SV3B2-5
24	6 K		1 SV3B2-6
25	7 K		1 SV3B2-7
26	8 K		1 SV3B2-8
27	800Ω		1 SV3A2-8
28	700Ω		1 SV3A2-7
29	600Ω		1 SV3A2-6
30	500Ω		1 SV3A2-5
31	400Ω		1 SV3A2-4
32	300Ω		1 SV3A2-3
33	200Ω		1 SV3A2-2
34	100Ω		1 SV3A2-1
35	Gnd		

J49 Board
(Resistor Card)

Pin	Function	In From	Out To
1	10 K		1 SW3F2-1
2	20 K		1 SW3F2-2
3	30 K		1 SW3F2-3
4	40 K		1 SW3F2-4
5	50 K		1 SW3F2-5
6	60 K		1 SW3F2-6
7	70 K		1 SW3F2-7
8	80 K		1 SW3F2-8
9			
10			
11			
12			
13			
14			
15	+15 VDC		1 SW3D,E,F-9
16			
17			
18			
19	1 K		1 SW3E2-1
20	2 K		1 SW3E2-2
21	3 K		1 SW3E2-3
22	4 K		1 SW3E2-4
23	5 K		1 SW3E2-5
24	6 K		1 SW3E2-6
25	7 K		1 SW3E2-7
26	8 K		1 SW3E2-8
27	800Ω		1 SW3D2-8
28	700Ω		1 SW3D2-7
29	600Ω		1 SW3D2-6
30	500Ω		1 SW3D2-5
31	400Ω		1 SW3D2-4
32	300Ω		1 SW3D2-3
33	200Ω		1 SW3D2-2
34	100Ω		1 SW3D2-1
35	Gnd		

U Count #1

Pin	Function	To
1	Gnd	
2	Reset	J21-17
3	100's SW	Su 100's SW "1"
4	100's SW	Su 100's SW "8"
5	100's SW	Su 100's SW "2"
6	100's SW	Su 100's SW "4"
7	10,000's SW	Su 10,000's SW "4"
8	10,000's SW	Su 10,000's SW "2"
9	10's SW	Su 10's SW "1"
10	10's SW	Su 10's SW "8"
11	10's SW	Su 10's SW "2"
12	10's SW	Su 10's SW "4"
13	10,000's SW	Su 10,000's SW "8"
14	10,000's SW	Su 10,000's SW "1"
15	1's SW	Su 1's SW "8"
16	1's SW	Su 1's SW "1"
17	1's SW	Su 1's SW "2"
18	1's SW	Su 1's SW "4"
D	Count Out	U Count #2-S
N	10,000's Count In	U Count #2-14
R	U Reset In	J21-17
S	Count Input	10^5 PPS Osc.
V	+5 VDC	

U Count #2

1	Gnd	
6	1000's SW	Su 1000's SW "2"
8	EOF Gap Command	
9	Spare Input for Commands	
10	Read Core Command In	
11	G.R. In	
12	Su Switches Common	J21-29
14	Su 1000's SW "8"	U Count #1-N
16	Reset In	U Count #1-R
17	1000's SW	Su 1000's "1"
18	1000's SW	Su 1000's "4"
S	Count In	U Count #1-D
U	Su "8" Comm	Su "8"
V	+5 VDC	

J70 Board
(Preset Decade Divider)

Pin	Function	In From	Out To
1		1 J38-35 (Coax)	
2 through 5 NOT USED			
6			1 J71-26
7			
8		1 J38-31 (Coax)	
9			
10			
11			
12		1 J38-23	
13 through 19 NOT USED			
20		1 J38-27	
21 through 28 NOT USED			
29	Freq. Select (Coax)		1 Se1A-C
30 through 35 NOT USED			

J71 Board
(Preset Decade Divider)

Pin	Function	In From	Out To
1		1 J38-14	
2 through 7 NOT USED			
8		1 J38-19	
9			
10			
11			
12		1 J38-5	
13 through 19 NOT USED			
20		1 J38-10	
21 through 25 NOT USED			
26		1 J70-6	
27 through 35 NOT USED			

J72 Board
(And-Gate)

Pin	Function	In From	Out To
1	Q=400	1 OM3-10 (J100-31)	
2	Q=200	1 OM2-10 (J100-30)	
3	Q=100	1 OM1-10 (J100-29)	
4	Q=800	1 OM4-10 (J100-32)	
5			1 SQ3A1-4
6			1 SQ3A1-3
7			1 SQ3A1-5
8			1 SQ3A1-1
9			1 SQ3A1-7
10			1 SQ3A1-6
11			1 SQ3A1-2
12	Q=80	1 OM5-26 (J100-28)	
13	Q=20	1 OM2-25 (J100-26)	
14	Q=40	1 OM5-10 (J100-27)	
15	Q=10	1 OM1-25 (J100-25)	
16			1 SQ3B1-5
17			1 SQ3B1-1
18			1 SQ3B1-4
19			1 SQ3B1-7
20			1 SQ3B1-6
21			1 SQ3B1-2
22			1 SQ3B1-3
23			1 SQ3B1-9
24			1 SQ3B1-8
25			1 SQ3A1-8
26			1 SQ3A1-9
27			
28			
29	+5 VDC		
30	Gnd		

J73 Board
(And-Gate)

Pin	Function	In From	Out To
1	Q=4	1 OM7-12 (J100-23)	
2	Q=2	1 OM6-24 (J100-22)	
3	Q=1	1 OM6-12 (J100-21)	
4	Q=8	1 OM7-24 (J100-24)	
5			1 SV3C1-4
6			1 SV3C1-3
7			1 SV3C1-5
8			1 SV3C1-1
9			1 SV3C1-7
10			1 SV3C1-6
11			1 SV3C1-2
12	R=8	1 OM12-28(J100-36)	
13	R=2	1 OM4-26 (J100-34)	
14	R=4	1 OM12-9 (J100-35)	
15	R=1	1 OM3-26 (J100-33)	
16			1 SW3D1-5
17			1 SW3D1-1
18			1 SW3D1-4
19			1 SW3D1-7
20			1 SW3D1-6
21			1 SW3D1-2
22			1 SW3D1-3
23			1 SW3D1-9
24			1 SW3D1-8
25			1 SV3C1-8
26			1 SV3C1-9
27			
28			
29	+5 VDC		
30	Gnd		

J74 Board
(And-Gate)

Pin	Function	In From		Out To
1	R=40	1 OM11-12	(J100-39)	
2	R=20	1 OM10-24	(J100-38)	
3	R=10	1 OM10-12	(J100-37)	
4	R=80	1 OM11-24	(J100-40)	
5				1 SR3E1-4
6				1 SR3E1-3
7				1 SR3E1-5
8				1 SR3E1-1
9				1 SR3E1-7
10				1 SR3E1-6
11				1 SR3E1-2
12	R=800	1 OM9-24	(J100-44)	
13	R=200	1 OM8-24	(J100-42)	
14	R=400	1 OM9-12	(J100-43)	
15	R=100	1 OM8-12	(J100-41)	
16				1 SR3F1-5
17				1 SR3F1-1
18				1 SR3F1-4
19				1 SR3F1-7
20				1 SR3F1-6
21				1 SR3F1-2
22				1 SR3F1-3
23				1 SR3F1-9
24				1 SR3F1-8
25				1 SR3E1-8
26				1 SR3E1-9
27				
28				
29	+5 VDC			
30	Gnd			

J76 Board
(And-Gate)

UNUSED IN NEW SYSTEM

Pin	Function	In From	Out To
1	V=400	1 J06-35	
2	V=200	1 J06-34	
3	V=100	1 J06-33	
4	V=800	1 J06-36	
5			1 SQ3C1-4
6			1 SQ3C1-3
7			1 SQ3C1-5
8			1 SQ3C1-1
9			1 SQ3C1-7
10			1 SQ3C1-6
11			1 SQ3C1-2
12	W=8	1 J06-40	
13	W=2	1 J06-38	
14	W=4	1 J06-39	
15	W=1	1 J06-37	
16			1 SR3D1-5
17			1 SR3D1-1
18			1 SR3D1-4
19			1 SR3D1-7
20			1 SR3D1-6
21			1 SR3D1-2
22			1 SR3D1-3
23			1 SR3D1-9
24			1 SR3D1-8
25			1 SQ3C1-8
26			1 SQ3C1-9
27			
28			
29	+5 VDC		
30	Gnd		

Switches I.D. Panel
(Thumb Sw.)

Switch	Deck	Pin		In From	Out To
SR3F	2	1		1 J47-1	
		2		1 J47-2	
		3		1 J47-3	
		4		1 J47-4	
		5		1 J47-5	
		6		1 J47-6	
		7		1 J47-7	
		8		1 J47-8	
		9	+15 VDC	1 SR3E2-9	
		0	Gnd		
SV3A (I.D.#4 Center)	2	1		1 J48-34	NO LONGER USED
		2		1 J48-33	
		3		1 J48-32	
		4		1 J48-31	
		5		1 J48-30	
		6		1 J48-29	
		7		1 J48-28	
		8		1 J48-27	
		9	+15 VDC		
		0	Gnd		
SV3B	2	1		1 J48-19	NO LONGER USED
		2		1 J48-20	
		3		1 J48-21	
		4		1 J48-22	
		5		1 J48-23	
		6		1 J48-24	
		7		1 J48-25	
		8		1 J48-26	
		9	+15 VDC		
		0	Gnd		
SV3C	2	1		1 J48-1	NO LONGER USED
		2		1 J48-2	
		3		1 J48-3	
		4		1 J48-4	
		5		1 J48-5	
		6		1 J48-6	
		7		1 J48-7	
		8		1 J48-8	
		9	+15 VDC		
		0	Gnd		

Switches I.D. Panel
(Thumb Sw.)

Switch	Deck	Pin		In From	Out To
SQ3A	2	1		1 J46-34	
(I.D.#2,I.D.#3		2		1 J46-33	
Centers)		3		1 J46-32	
		4		1 J46-31	
		5		1 J46-30	
		6		1 J46-29	
		7		1 J46-28	
		8		1 J46-27	
		9	+15 VDC	1 J48-15	1 SQ3B2-9
		0	Gnd	1 J48-35	1 SQ3B2-0
SQ3B	2	1		1 J46-19	
		2		1 J46-20	
		3		1 J46-21	
		4		1 J46-22	
		5		1 J46-23	
		6		1 J46-24	
		7		1 J46-25	
		8		1 J46-26	
		9	+15 VDC	1 SQ3A2-9	1 SQ3C2-9
		0	Gnd	1 SQ3A2-0	1 SQ3C2-0
SQ3C	2	1		1 J46-1	
		2		1 J46-2	
		3		1 J46-3	
		4		1 J46-4	
		5		1 J46-5	
		6		1 J46-6	
		7		1 J46-7	
		8		1 J46-8	
		9	+15 VDC	1 SQ3B2-9	
		0	Gnd	1 SQ3B2-0	
SR3D	2	1		1 J47-34	
(I.D.#2, I.D.#3		2		1 J47-33	
Centers)		3		1 J47-32	
		4		1 J47-31	
		5		1 J47-30	
		6		1 J47-29	
		7		1 J47-28	
		8		1 J47-27	
		9	+15 VDC	1 J49-15	1 SR3E2-9
		0	Gnd		
SR3E		1		1 J47-19	
		2		1 J47-20	
		3		1 J47-21	
		4		1 J47-22	
		5		1 J47-23	
		6		1 J47-24	
		7		1 J47-25	
		8		1 J47-26	
		9	+15 VDC	1 SR3D2-9	1 SR3F2-9
		0	Gnd		

Switches I.D. Panel
(Thumb Sw.)

NO LONGER USED

Switch	Deck	Pin		In From	Out To
SW3D (I.D.#4 Center)	2	1		1 J49-34	
		2		1 J49-33	
		3		1 J49-32	
		4		1 J49-31	
		5		1 J49-30	
		6		1 J49-29	
		7		1 J49-28	
		8		1 J49-27	
		9	+15 VDC		
		0	Gnd		
SW3E	2	1		1 J49-19	
		2		1 J49-20	
		3		1 J49-21	
		4		1 J49-22	
		5		1 J49-23	
		6		1 J49-24	
		7		1 J49-25	
		8		1 J49-26	
		9	+15 VDC		
		0	Gnd		
SW3F	2	1		1 J49-1	
		2		1 J49-2	
		3		1 J49-3	
		4		1 J49-4	
		5		1 J49-5	
		6		1 J49-6	
		7		1 J49-7	
		8		1 J49-8	
		9	+15 VDC		
		0	Gnd		

Switches I.D. Panel
(Thumb SW)

Switch	Pin	Function	In From	Out To
SU5E	1	1	1 J41-13	
(Step Dwell	2	2	1 J41-4	
Time)	4	4	1 J41-18	
	8	8	1 J41-9	
	1	$\overline{1}$	1 J41-16	
	2	$\overline{2}$	1 J41-12	
	4	$\overline{4}$	1 J41-7	
	8	$\overline{8}$	1 J41-3	
	C			
SU5D	1	10	1 J40-26	
	2	20	1 J40-34	
	4	40	1 J40-22	
	8	80	1 J40-30	
	1	$\overline{10}$	1 J40-21	
	2	$\overline{20}$	1 J40-25	
	4	$\overline{40}$	1 J40-29	
	8	$\overline{80}$	1 J40-33	
	C			
SU5C	1	100	1 J40-9	
	2	200	1 J40-13	
	4	400	1 J40-4	
	8	800	1 J40-18	
	1	$\overline{100}$	1 J40-16	
	2	$\overline{200}$	1 J40-12	
	4	$\overline{400}$	1 J40-7	
	8	$\overline{800}$	1 J40-3	
	C			
SU5B	1	1000	1 J39-26	
	2	2000	1 J39-34	
	4	4000	1 J39-22	
	8	8000	1 J39-30	
	1	$\overline{1000}$	1 J39-21	
	2	$\overline{2000}$	1 J39-25	
	4	$\overline{4000}$	1 J39-29	
	8	$\overline{8000}$	1 J39-33	
	C			
SU5A	1	10000	1 J39-9	
	2	20000	1 J39-13	
	4	40000	1 J39-4	
	8	80000	1 J39-18	
	1	$\overline{10000}$	1 J39-16	
	2	$\overline{20000}$	1 J39-12	
	4	$\overline{40000}$	1 J39-7	
	8	$\overline{80000}$	1 J39-3	
	C			

Switches in I.D. Panel

Switches	Deck			In From	Out To
Frame Sync	A	C			1 K12 Coil-G 1 J2-7
		NO	+5 VDC		
		NC	Gnd		
	B	C			1 J2-8
		NO	+5 VDC		
		NC	Gnd		
		Lamp A,B			1 K12B-C
		Lamp C,D			1 K12B-NO
Unit Scan	A	C			1 J2-11
(PI)		NO	+5 VDC		
		NC	Gnd		
OBSOLETE	B	C			1 J2-10 1 K13 Coil-G
		NO	+5 VDC		
		NC	Gnd		
		Lamp A,B			1 K13B-NO
		Lamp C,D			1 K13B-C
Shutter	A	C			
(#1)		NO			1 J27-30
		NC			1 J27-31
	B	C			
		NO			
		NC			1 J27-33
		Lamp A,B			
		Lamp C			1 J27-32
		Lamp D			1 J27-35
Shutter	A	C			
(#2)		NO			1 J27-16
		NC			1 J27-11
	B	C			
		NO			
		NC			1 J27-19
		Lamp A,B			
		Lamp C			1 J27-23
		Lamp D			1 J27-17

Switch in I.D. Panel

Switches	Deck			In From	Out To
Shutter	A	C			
(#4)		NO			1 J20-30
OBSOLETE		NC			1 J20-31
	B	C			
		NO			
		NC			1 J20-33
		Lamp A,B			
		Lamp C			1 J20-32
		Lamp D			1 J20-35
Filter Sel #1					
Spring Toggle					
(M1)		C	Gnd		
		NO	+ Red		1 J4-34
		NC	- Grn		1 J4-35
Filter Sel #2					
Spring Toggle					
(N1)		C	Gnd		
		NO	+ Red		1 J4-37
		NC	- Grn		1 J4-38
Discriminator					
(I.D.)		1	Gnd		
		2			1 J4-40
		3	+15 VDC		
Discriminator					
(I.D.#4)	1	Gnd			
OBSOLETE	2				1 J4-42
	3	+15 VDC			

Switches I.D. Panel
(Thumb Sw.)

Switch	Deck	Pin	In From	Out To
SZA (Step Size)	2	1	1 Z DECODE-16	(J35-2)
		2	1 Z DECODE-15	(J35-3)
		3	1 Z DECODE-14	(J35-4)
		4	1 Z DECODE-17	(J35-7)
		5	1 Z DECODE-13	(J35-8)
		6	1 Z DECODE-11	(J35-9)
		7	1 Z DECODE-10	(J35-10)
		8	1 Z DECODE-9	(J35-11)
		9	1 Z DECODE-6	(J35-14)
		0	1 Z DECODE-5	(J35-17)
		Common	+5 VDC	
SZB	1	1	1 J35-18	UNUSED
		2	1 J35-19	UNUSED
		3	1 J35-20	UNUSED
		4	1 J35-21	UNUSED
		5	1 J35-22	UNUSED
		6	1 J35-23	UNUSED
		7	1 J35-24	UNUSED
		8	1 J35-25	UNUSED
		9	1 J35-26	UNUSED
		0	1 J35-27	UNUSED

Switches I.D. Panel
(Thumb Sw.)

Switch	Pin	Function	In From	Out To
SS3A (Area Scan Dim)	1	1	1 J42-18	
	2	2	1 J42-4	
	4	4	1 J42-13	
	8	8	1 J42-9	
	1	$\overline{1}$	1 J43-3	
	2	$\overline{2}$	1 J43-12	
	4	$\overline{4}$	1 J43-7	
	8	$\overline{8}$	1 J43-16	
	C	+5 VDC	(thru 1.2 K)	
SS3B	1	10	1 J42-30	
	2	20	1 J42-22	
	4	40	1 J42-34	
	8	80	1 J42-26	
	1	$\overline{10}$	1 J42-21	
	2	$\overline{20}$	1 J42-25	
	4	$\overline{40}$	1 J42-29	
	8	$\overline{80}$	1 J42-32	
	C	+5 VDC	(thru 1.2 K)	
SS3C	1	100	1 J43-13	
	2	200	1 J43-4	
	4	400	1 J43-18	
	8	800	1 J43-9	
	1	$\overline{100}$	1 J42-3	
	2	$\overline{200}$	1 J42-7	
	4	$\overline{400}$	1 J42-12	
	8	$\overline{800}$	1 J42-16	
	C	+5 VDC	(thru 1.2 K)	
ST3D (Area Scan Dim)	1	1	1 J43-26	
	2	2	1 J43-34	
	4	4	1 J43-22	
	8	8	1 J43-30	
	1	$\overline{1}$	1 J44-21	
	2	$\overline{2}$	1 J44-25	
	4	$\overline{4}$	1 J44-33	
	8	$\overline{8}$	1 J44-29	
	C	+5 VDC	(thru 1.2 K)	

Switches I.D. Panel
(Thumb Sw.)

Switch	Pin	Function	In From	Out To
ST3E (Area Scan Dim)	1	10	1 J44-13	
	2	20	1 J44-4	
	4	40	1 J44-18	
	8	80	1 J44-9	
	1	$\overline{10}$	1 J44-3	
	2	$\overline{20}$	1 J44-16	
	4	$\overline{40}$	1 J44-7	
	8	$\overline{80}$	1 J44-12	
	C	+5 VDC		
ST3F	1	100	1 J44-30	
	2	200	1 J44-22	
	4	400	1 J44-34	
	8	800	1 J44-26	
	1	$\overline{100}$	1 J43-21	
	2	$\overline{200}$	1 J43-25	
	4	$\overline{400}$	1 J43-33	
	8	$\overline{800}$	1 J43-29	
	C	+5 VDC		
SY6A (Period)	1	1	1 J38-26	
	2	2	1 J38-30	
	4	4	1 J38-34	
	8	8	1 J38-22	
	1	$\overline{1}$	1 J38-25	
	2	$\overline{2}$	1 J38-33	
	4	$\overline{4}$	1 J38-21	
	8	$\overline{8}$	1 J38-29	
	C	+5 VDC		
SY6B	1	10	1 J38-9	NO LONGER USED
	2	20	1 J38-13	
	4	40	1 J38-13	
	8	80	1 J38-4	
	1	10	1 J38-3	
	2	20	1 J38-7	
	4	40	1 J38-16	
	8	80	1 J38-12	
	C	+5 VDC		

Switches I.D. Panel

Switch	Deck	Pin		In From	Out To
E1	A	1			
Rotary		2			
OBSOLETE		3			
		4			
		C			
	B	5			1 Freq. Lamp #7
		6			1 Freq. Lamp #6
		7			1 Freq. Lamp #5
		8			1 Freq. Lamp #4
		C	Gnd		
Dimmer		1,5		1 J34-27	
		2		1 J34-28	
		3	Gnd		
		4	+28 VDC		

Z Decode Card

Pin	Function	To
4	Gnd	
5	0 Input	Sz "0" Term.
6	9 Input	Sz "9" Term.
9	8 Input	Sz "8" Term.
10	7 Input	Sz "7" Term.
11	6 Input	Sz "6" Term.
12	EN1 Out	Z Amp X and Y-17
13	5 Input	Sz "5" Term.
14	3 Input	Sz "3" Term.
15	2 Input	Sz "2" Term.
16	1 Input	Sz "1" Term.
17	4 Input	Sz "4" Term.
18	D_{13} Out, 1 out	Z Readout-2
E	9 Out	Z Readout-14
F	D_{01} Out	Z Amp X and Y-15
H	4 Out	Z Readout-3
J	8 Out	Z Readout-11
K	D_{11} Out	Z Amp X and Y-16
L	D_{02} Out	Z Amp X and Y-8
M	D_{12} Out	Z Amp X and Y-9
N	EN_2 Out	Z Amp X and Y-10
P	7 Out	Z Readout-10
R	6 Out	Z Readout-9
S	5 Out	Z Readout-8
T	3 Out	Z Readout-2
U	2 Out, D_{03}	{ Z Readout-3 Z Amp X and Y-2
V	EN3	

I.D. Panel Lamps

Switch		In From	Out To
Filter Bank #1	Lamp #1d		1 J22-34
	Lamp #2d		1 J22-27
	Lamp #3d		1 J22-19
	Lamp #4d		1 J22-13
	Lamp #5d		1 J22-5
	Lamp #6d		1 J23-34
	Lamp #7d		1 J23-27
	Lamp #8d		1 J23-19
	Lamp #9d		1 J23-13
	Lamp #10d		1 J23-5
	Lamps Common		
Filter Bank #2	Lamp #1E		1 J24-34
	Lamp #2E		1 J24-27
	Lamp #3E		1 J24-19
	Lamp #4E		1 J24-13
	Lamp #5E		1 J24-5
	Lamp #6E		1 J25-34
	Lamp #7E		1 J25-27
	Lamp #8E		1 J25-19
	Lamp #9E		1 J25-13
	Lamp #10E		1 J25-5
	Lamps Common		
High Voltage	H.V. Lamp		
	Lamp Common (Gnd)	(chained together)	
Frequency Select			
(ε1)	Freq. Lamp #4	1 S ε_1 B-8	
OBSOLETE	Freq. Lamp #5	1 S ε_1 B-7	
	Freq. Lamp #6	1 S ε_1 B-6	
	Freq. Lamp #7	1 S ε_1 B-5	
	Lamp Common		1 Dimmer

Switch I.D. Panel
(Trimpot)

Switch	Pin		In From	Out To
ΔX Zero Wiper	1	Gnd		
(#1)	2		1 J34-22	
	3	+15 VDC		
ΔY Zero Wiper	1	Gnd		
(#2)	2		1 J34-11	
	3	+15 VDC		
ΔX Gain I.D.#2, I.D. #3				
(#3)	1	Gnd		
	2		1 J58-30	
	3			
ΔY Gain I.D. #2, I.D. #3				
(#4)	1	Gnd		
	2			
	3		1 J33-5	
ΔX Center I.D. #2, I.D. #3				
(#5)	1	Gnd		
	2		1 J58-8	
	3	+15 VDC		
ΔY Center I.D. #2, I.D. #3				
(#6)	1	Gnd		
	2		1 J33-28	
	3	+15 VDC		
ΔX Gain I.D. #4	1	Gnd		
(#7)	2			
	3		1 J58-10	
ΔY Gain I.D. #4	1	Gnd		
(#8)	2			
	3	.	1 J33-6	
ΔX Center I.D. #4				
(#9)	1	Gnd		
	2		1 J58-22	
	3	+15 VDC		
ΔY Center I.D. #4				
(#10)	1	Gnd		
	2		1 J33-22	
	3	+15 VDC		

Z Amp Card for X

Pin	Function	To
2	D_{03} In	Z Decode-U
4	+15 VDC	
6	Hi Gain Out	X Driver Amp-4
8	D_{02} In	Z Decode-L
9	D_{12} In	Z Decode-M
10	EN_2 In	Z Decode-N
11	Med. Gain Out	X Driver Amp-3
15	D_{01} In	Z Decode-F
16	D_{11} In	Z Decode-K
17	EN_1 In	Z Decode-12
18	Low Gain Out	X Driver Amp-2
J	-15 VDC	
V	To S-H Input	S-H Board-8

Z Amp Card for Y

Pin	Function	To
2	D_{03} In	Z Decode-U
4	+15 VDC	
6	Hi Gain Out	Y Driver Amp-4
8	D_{02} In	Z Decode-L
9	D_{12} In	Z Decode-M
10	EN_2 In	Z Deocde-N
11	Med. Gain Out	X Driver Amp-3
15	D_{01} In	Z Decode-F
16	D_{11} In	Z Decode-K
17	EN_1 In	Z Decode-12
18	Low Gain Out	Y Driver Amp-2
J	-15 VDC	
V	To S-H Input	S-H Board-10

Filter Readout Decode #1

Pin	Function	Out To
1 through 7 NOT USED		
8	DD Board "2" Input	J77-11
9		
10	#2 Light Control	J204-39
11	DD Board "3" Input	J77-6
12	#3 Light Control	J204-38
13	DD Board "4" Input	J77-5
14	#4 Light Control	J204-37
15	DD Board "5" Input	J77-7
16	"5" Light Control	J204-31
17	DD Board "6" Input	J77-10
18	#6 Light Control	J204-32
19	DD Board "7" Input	J77-9
20	#7 Light Control	J204-33
21	+12 VDC Input	
22	DD Board "9" Input	J77-26
23	#9 Light Control	J204-35
24	DD Board "8" input	J77-25
25	#8 Light Control	J204-34
26	+5 VDC Input	
27		
28	#10 Light Control	J204-26
29	Control Line from Readout Pot	EXIT Conn-4
30	+15 VDC Input	
31	-15 VDC Input	
32	#1 Light Control	J204-40
33	+28 VDC Input	
34	DD Board "1" Input	J77-8
35	Gnd	

Filter Readout Decode #2
Board A

1		Board B-1
2		Board B-2
3		Board B-3
4		Board B-4
5		Board B-5
6		Board B-6
7		Board B-7
8		Board B-8
9		Board B-9
10		Board B-10
11	+15 VDC In	
12	-15 VDC In	
13 through 15 NOT USED		
16	Control Line From Readout Pot	Exit Conn-5
17	+28 VDC In	
18	-28 VDC In	
A, B, C, D, E, F, H, J, K, L, M, N NOT USED		
P	Gnd	
R, S, T, U, V NOT USED		

Filter Readout Decode #2
Board B

Pin	Function	Out To
1		Board A-1
2		Board A-2
3		Board A-3
4		Board A-4
5		Board A-5
6		Board A-6
7		Board A-7
8		Board A-8
9		Board A-9
10		Board A-10
11	+5 VDC In	
12	+12 VDC In	
13	#7 Light Control	J204-30
14	Gnd	
15	#8 Light Control	J204-29
16		
17		
18		
A	#10 Light Control	J204-28
B		
C	#9 Light Control	J204-27
D	DD Board "9" Input	J77-23
E	DD Board "8" Input	J77-24
F	DD Board "7" Input	J77-19
H	#6 Light Control	J204-21
J	DD Board "5" Input	J77-16
K	#5 Light Control	J204-22
L	DD Board "6" Input	J77-20
M	#4 Light Control	J204-23
N	DD Board "3" Input	J77-22
P	#3 Light Control	J204-24
R	DD Board "4" Input	J77-18
S	#1 Light Control	J204-25
T	DD Board "1" Input	J77-17
U	#2 Light Control	J204-19
V	DD Board "2" Input	J77-21

OM 1 {C1B1
C2B1

Pin		Function	In From	Out To	
41		control $\overline{8}$	1 PROG C-27	1 OM2-41	
40		control 4	1 PROG C-6	1 OM2-40	
39		control 2	1 PROG C-22	1 OM2-39	
38		control 1	1 PROG C-10	1 OM2-38	
37		+5 VDC		1 OM2-37	
36		λA11	1 IMTM6-25		
35		L21		1 Logic Card D25-24	(Conn Logic-38(RO))
34		γ11		1 DD2-E	
33		P11		ID S_{US}B-C and Q_{US} Base	(Conn ID(100)-84)
32		ρ=4	1 OM3-25	1 PROG B-18	
31		W11		1 Logic Card DD-15	(Conn Log-5(RO))
30		D21		1 Conn Guide (6G)-5	
29		A11		1 ES Card ES3-17	(Conn ES-1)
28		Y21	NO LONGER USED		(Conn ID(60)-17)
27		V21	NO LONGER USED		(Conn ID(60)-29)
26		S21		1 ID Card ΔX Readout Decode-R	(Conn ID(100)-53)
25		Q21		1 ID Card J72-15	(Conn ID(100)-75)
24		J11	NO LONGER USED		(Conn LOG-9(RO))
23		ρ=5	1 OM2-23	1 PROG B-22	
22		τ11		1 Misc 2-4	
21		ρ=2	1 OM2-21	1 PROG B-14	
20		B21		Logic Card	(Conn LOG-65(RO))
19		not used (int gnd)			
18		λSA11	1 IMTM7-25		
17		β11		1 DD2-17	
16		ρ11		ES Card ES2-C	(Conn ES-10)
15		D11		1 Conn Guide (60)-2	
14		Y11	NO LONGER USED		(Conn ID(60)-21)
13		V11	NO LONGER USED		(Conn ID(60)-33)
12		S11		ID Card ΔX Readout Decode-V	(Conn ID(100)-57)
11	B out	C2B1 out		1 TSR12-C	
10		Q11		1 ID Card J72-3	(Conn ID(100)-29)
9		not used (int gnd)			
8		B11		Logic Card	IConn LOG-63(RO))
7	BP out	C2B1 to P		1 Conn Print (50)-3	
6	A out	C1B1 out		1 TSR12-B	
5		L11		Logic Card (KL-5B) D25-14	(Conn LOG-42(RO))
4	AP out	C1B1 to P		1 Conn Print (50)-3	
3	print logic	+12 VDC	1 DM3-3	1 OM2-3	
2		Gnd	1 T.S.	1 OM2-2	
1		control $\overline{8}$	1 PROG C-15	1 OM2-1	

OM1 see layout sheet

OM2 {C1B2, C2B2}

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM1-41	1 OM3-41	
40	control 4	1 OM1-40	1 OM3-40	
39	control 2	1 OM1-39	1 OM3-39	
38	control 1	1 OM1-38	1 OM3-38	
37	+5 VDC	1 OM1-37	1 OM3-37	
36	λA12	1 IMTM6-20		
35	L22		Logic Card D25-25	(Conn LOG-39(RO))
34	γ12		1 DD2-D	
33	not used			
32	not used			
31	W12		Logic Card DD-13	(Conn LOG-6(RO))
30	D22			(Conn Guide (60)-6)
29	A12		ES Card ES3-19	(Conn ES-2)
28	Y22	NO LONGER USED		(Conn ID(60)-18)
27	V22	NO LONGER USED		(Conn ID(60)-30)
26	S22		ID Switch Decode Card-P	(Conn ID(100)-54)
25	Q22		ID Card J72-13	(Conn ID(100)-86)
24	J12	NO LONGER USED		(Conn LOG-10(RO))
23	ρ=5	1 OM3-23	1 OM1-23	
22	τ12		1 Misc 2-16	
21	ρ=2	1 OM5-25	1 OM1-21	
20	B22		Logic Card	(Conn LOG-66(RO))
19	not used			
18	not used			
17	B12		1 DD2-T	
16	ρ12		ES Card ES2-11	(Conn ES-11)
15	D12		1 Conn Guide (60)-10	
14	Y12	NO LONGER USED		(Conn ID(60)-22)
13	V12	NO LONGER USED		(Conn ID(60)-34)
12	S12		ID Card $S_{\Delta Y}$ Readout Decode-U	(Conn ID(100)-58)
11	C2B2 out		1 TSR12-U	
10	Q12		ID Card J72-2	(Conn ID(100)-30)
9	not used (int gnd)			
8	B12		Logic Card	(Conn LOG-64(RO))
7	C2B2 to P		1 Conn Print (50)-4	
6	C1B2 out		1 TSR12-17	
5	L12		Logic Card D25-15	(Conn LOG-43(RO))
4	C1B2 to P		1 Conn Print (50)-2	
3	+12 VDC	1 OM1-3	1 OM3-3	
2	Gnd	1 OM1-2	1 OM3-2	
1	control 8	1 OM1-1	1 OM3-1	

OM2 = OM1
<u>less</u> 9,10 lines and associated AND chip
24 line to GND internally instead
and shift OR-13 output to OR14 output

OM3 $\left\{\begin{matrix} C1B4 \\ C6B1 \end{matrix}\right.$

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM2-41	1 OM4-41	
40	control 4	1 OM2-40	1 OM4-40	
39	control 2	1 OM2-39	1 OM4-39	
38	control 1	1 OM2-38	1 OM4-38	
37	+5 VDC	1 OM2-37	1 OM4-37	
36	λB21	1 IMTM5-24		
35	λA51	1 IMTM2-25		
34	CC11		ES Card ES1-L	(Conn ES-4)
33	K11	1 A6G-J		
32	S_A11	1 Misc 2-1	1 Conn EXIT-21	
31	E_31		1 Conn Guide (60)-13	
30	K11		1 Conn Theta (24)-1	
29	Y61	NO LONGER USED		(Conn ID(60)-1)
28	W31	NO LONGER USED		(Conn ID(60)-37)
27	T31		ID $S_{\Delta Y}$ Readout Decode-V	(Conn ID(100)-61)
26	R31		ID Card J73-15	(Conn ID(100)-33)
25	ρ=4	1 OM4-25	1 OM1-32	
24	U11		ID Card S_U Readout Decode #1-D	(Conn ID(100)-17)
23	ρ=5	1 OM4-23	1 OM2-23	
22	(From TM decoder) $I_{SD}11$	1 IMTM2-34		
21	C_S11		Logic Card	(Conn LOG-81(RO))
20	σ41	1 Sσ-1		
19	TMC6B1		1 DM2-N	
18	not used			
17	B14		1 DD2-N	
16	ρ14		ES Card ES2-4	(Conn ES-12)
15	D14		1 Conn Guide (60)-11	
14	Y14	NO LONGER USED		(Conn ID(60)-23)
13	V14	NO LONGER USED		(Conn ID(60)-35)
12	S14		ID Card ΔX Readout Decode-T	(Conn ID(100)-59)
11	C6B1 out	1 Conn CORE-q	1 TSR12-B	
10	Q14		ID Card J72-1	(Conn ID(100)-31)
9	not used (int gnd)			
8	not used			
7	C6B1 to P		1 Conn Printer (50)-11	
6	C1B4 out		1 TSR48-B	
5	L14		Logic Card D25-16	(Conn LOG-44(RO))
4	C1B4 to P		1 Conn Printer (50)-26	
3	+12 VDC	1 OM2-3	1 OM4-3	
2	Gnd	1 OM2-2	1 OM4-2	
1	control 8	1 OM2-1	1 OM4-1	

OM3(A side) = OM1(A side)
<u>less</u> 24 line to gnd internally instead
34 line to gnd internally instead
shift OR-13 output to OR-14
OM3(B side) see layout sheet

OM4 $\{^{C1B8}_{C6B2}$

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM3-41	1 OM5-41	
40	control 4	1 OM3-40	1 OM5-40	
39	control 2	1 OM3-39	1 OM5-39	
38	control 1	1 OM3-38	1 OM5-38	
37	+5 VDC	1 OM3-37	1 OM5-37	
36	λB22	1 IMTM5-21		
35	λA52	1 IMTM2-20		
34	CC12		ES Card ES1-M	(Conn ES-5)
33	K12	1 ALG-1		
32	ρA12	1 Misc 2-2	1 Conn EXIT-23	
31	E32		1 Conn IXIT Guide (60)-14	
30	K12		1 Conn Theta (24)-2	
29	Y62	NO LONGER USED		(Conn ID(60)-2)
28	W32		ID Card J76-13	(Conn ID(60)-38)
27	T32		ID Card $S_{\Delta Y}$ Readout Decode-U	(Conn ID(100)-68)
26	R32		ID Card J73-13	(Conn ID(100)-34)
25	ρ=4	1 OM12-27	1 OM3-25	
24	U12		ID Card S_U Readout Decode#1-E	(Conn ID(100)-18)
23	ρ=5	1 OM5-22	1 OM3-23	
22	(From TM decoder) $I_{SD}12$	1 IMTM2-1		
21	not used			
20	σ42	1 Sσ-2		
19	TMC6B2	1 DM1-2		
18	not used			
17	β18		1 DD2-7	
16	ρ18		ES Card ES2-12	(Conn ES-13)
15	D18		1 Conn Guide (60)-12	
14	Y18	NO LONGER USED		(Conn ID(60)-24)
13	V18	NO LONGER USED		(Conn ID(60)-36)
12	S18		ID Card $S_{\Delta X}$ Readout Decode-S	(Conn ID(100)-60)
11	C6B2 out	1 Conn CORE-r	1 TSR12-S	
10	Q18		ID Card J72-4	(Conn ID(100)-32)
9	not used (int gnd)			
8	not used			
7	C6B2 to P		1 Conn Printer (50)-12	
6	C1B8 out		1 TSR48-17	
5	L18		Logic Card D25-17	(Conn LOG-45(RO))
4	C1B8 to P		1 Conn Printer (50)-27	
3	+12 VDC	1 OM3-3	1 OM5-3	
2	Gnd	1 OM3-2	1 OM5-2	
1	control 8	1 OM3-1	1 OM5-1	

OM4 = OM3
<u>less</u> 21 line to gnd internally instead

OM5 { C2B4
C2B8

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM4-41	1 OM6-41	
40	control 4	1 OM4-40	1 OM6-40	
39	control 2	1 OM4-39	1 OM6-39	
38	control 1	1 OM4-38	1 OM6-38	
37	+5 VDC	1 OM4-37	1 OM6-37	
36	λA18	1 IMTM6-10		
35	γ18		1 DD2-2	
34	L28		Logic Card D25-28	(Conn LOG-41(RO))
33	J14	NO LONGER USED		(Conn LOG-11(RO))
32	τ14			
31	ω18		Logic Card DD-12	(Conn LOG-8(RO))
30	D28		1 Conn Guide (60)-8	
29	Y28	NO LONGER USED		(Conn ID(60)-20)
28	V28	NO LONGER USED		(Conn ID(60)-32)
27	S28		ID Card $S_{\Delta X}$ Readout Card-C	(Conn ID(100)-56)
26	Q28		ID Card J72-3	(Conn ID(100)-28
25	ρ=2		1 OM2-21	
24	τ18		1 DD2-M	
23	J18	NO LONGER USED		(Conn LOG-12(RO))
22	ρ=5	1 OM12-24	1 OM4-23	
21	B28		1 Conn LOG-68(RO))	
20	not used (int gnd)			
19	λA14	1 IMTM6-17		
18	γ14		1 DD2-11	
17	ω14		Logic Card DD-14	(Conn LOG-7(RO))
16	D14		1 Conn Guide (60)-7	
15	A14		ES Card ES3-15	(Conn ES-3)
14	Y24	NO LONGER USED		(Conn ID(60)-19)
13	V24	NO LONGER USED		(Conn ID(60)-31)
12	S24		ID Card $S_{\Delta X}$ Readout Decode-B	(Conn ID(100)-55)
11	C2B8 out		1 TSR48-U	
10	Q24		ID Card J72-14	(Conn ID(100)-27)
9	B24		Logic Card	(Conn LOG-67(RO))
8	L24		Logic Card D25-26	(Conn LOG-40(RO))
7	C2B8 to P		1 Conn Printer (50)-29	
6	C2B4 out		1 TSR48-C	
5	not used (int gnd)			
4	C2B4 to P		1 Conn Printer (50)-28	
3	+12 VDC	1 OM4-3	1 OM6-3	
2	Gnd	1 OM4-2	1 OM6-2	
1	control 8	1 OM4-1	1 OM6-1	

OM6 {C3B1 / C3B2

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM5-41	1 OM7-41	
40	control 4	1 OM5-40	1 OM7-40	
39	control 2	1 OM5-39	1 OM7-39	
38	control 1	1 OM5-38	1 OM7-38	
37	+5 VDC	1 OM5-37	1 OM7-37	
36	λA22	1 IMTM5-20		
35	L32		Logic Card D24-4	(Conn LOG-35(RO))
34	M12		Logic Card	(Conn ID(100)-24)
33	not used			
32	not used			
31	not used			
30	D32		1 Conn Guide (60)-2	
29	not used			
28	not used			
27	Y32	NO LONGER USED		(Conn ID(60)-14)
26	V32	NO LONGER USED		(Conn ID(60)-26)
25	S32		ID Card $S_{\Delta\chi}$ Readout Decode-E	(Conn ID(100)-50)
24	Q32		ID Card J73-2	(Conn ID(100)-22)
23	not used			
22	B32		Logic Card	(Conn LOG-70(RO))
21	σ12	1 $S\sigma$-2000		
20	not used (int gnd)			
19	λA21	1 IMTM5-25		
18	M11		Logic Card	(Conn ID(100)-73)
17	H11		1 Conn Guide (60)-51	
16	D31		1 Conn Guide (50)-1	
15	Y31	NO LONGER USED		(Conn ID(60)-13)
14	V31	NO LONGER USED		(Conn ID(60)-25)
13	S31		ID Card $S_{\Delta\chi}$ Readout Decode-D	(Conn ID(100)-49)
12	Q31		ID Card J73-3	(Conn ID(100)-21)
11	C3B2 out		1 TSR12-P	
10	B31		Logic Card	(Conn LOG-69(RO))
9	L31		Logic Card D24-2	(Conn LOG-34(RO))
8	σ11	1 $S\sigma$-1000		
7	C3B2 to P		1 Conn Print (50)-6	
6	C3B1 out		1 TSR12-6	
5	not used (int gnd)			
4	C3B1 to P		1 Conn Print (50)-5	
3	+12 VDC	1 OM5-3	1 OM7-3	
2	Gnd	1 OM5-2	1 OM7-2	
1	control 8	1 OM5-1	1 OM7-1	

OM7 {C3B4 C3B8

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM6-41	1 OM8-41	
40	control 4	1 OM6-40	1 OM8-40	
39	control 2	1 OM6-39	1 OM8-39	
38	control 1	1 OM6-38	1 OM8-38	
37	+5 VDC	1 OM6-37	1 OM8-37	
36	λA28	1 IMTM5-10		
35	L38		Logic Card D24-7	(Conn LOG-37(RO))
34	M18		Logic Card	(Conn ID(100)-52)
33	not used			
32	not used			
31	not used			
30	D38		1 Conn Guide (60)-4	
29	not used			
28	not used			
27	Y38	NO LONGER USED		(Conn ID(60)-16)
26	V38	NO LONGER USED		(Conn ID(60)-28)
25	S38		ID Card $S_{\Delta X}$ Readout Decode-N	(Conn ID(100)-52)
24	Q38		ID Card J73-4	(Conn ID(100)-24)
23	not used			
22	not used			
21	σ18	1 Sσ-8000		
20	(int gnd)			
19	λA24	1 IMTM5-17		
18	M14		Logic Card	(Conn ID(100)-75)
17	not used			
16	D34		1 Conn Guide (60)-3	
15	Y34	NO LONGER USED		(Conn ID(60)-15)
14	V34	NO LONGER USED		(Conn ID(60)-27)
13	S34		ID Card $S_{\Delta X}$ Readout Decode-M	(Conn ID(100)-51)
12	Q34		ID Card J73-1	(Conn ID(100)-23)
11	C3B8 out		1 TSR48-P	
10	B34		Logic Card	(Conn LOG-71(RO))
9	L34		Logic Card D24-5	(Conn LOG-36(RO))
8	σ14	1 Sσ-4000		
7	C3B8 to P		1 Conn Printer (50)-31	
6	C3B4 out		1 TSR48-6	
5	(int gnd)			
4	C3B4 to P		1 Conn Printer (50)-30	
3	+12 VDC	1 OM6-3	1 OM8-3	
2	Gnd	1 OM6-2	1 OM8-2	
1	control 8	1 OM6-1	1 OM8-1	

OM 8 {C4B1
C4B2

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM7-41	1 OM9-41	
40	control 4	1 OM7-40	1 OM9-40	
39	control 2	1 OM7-39	1 OM9-39	
38	control 1	1 OM7-38	1 OM9-38	
37	+5 VDC	1 OM7-37	1 OM9-37	
36	λA32	1 IMTM4-20		
35	L42		ID Card D24-15	(1 Conn LOG-31(RO))
34	N12	NO LONGER USED		(1 Conn ID(100)-78)
33	not used			
32	not used			
31	not used			
30	E12		1 Conn Guide (60)-22	
29	not used			
28	not used			
27	Y42	NO LONGER USED		(1 Conn ID(60)-10)
26	W42	NO LONGER USED		(1 Conn ID(60)-46)
25	T12		Logic Card	(1 Conn ID(100)-70)
24	R12		ID Card J74-13	(1 Conn ID(100)-42)
23	B42		Logic Card	(1 Conn LOG-74(RO))
22	σ22	1 Sσ-200		
21	not used (int gnd)			
20	λSB11	1 IMTM7-24		
19	λA31	1 IMTM4-25		
18	N11	NO LONGER USED		(1 Conn ID(100)-77)
17	ηA11	1 Conn EXIT-2	1 SηA $\overline{1248}$	
16	E11		1 Conn Guide (60)-21	
15	Y41	NO LONGER USED		(1 Conn ID(60)-9)
14	W11	NO LONGER USED		(1 Conn ID(60)-45)
13	T11		ID Card SΔY Readout Decode-D	(1 Conn ID(100)-69)
12	R11		ID Card J74-15	(1 Conn ID(100)-41)
11	C4B2 out		1 TSR12-14	
10	B41		Logic Card	(1 Conn LOG-73(RO))
9	L41		ID Card D24-14	(1 Conn LOG-30(RO))
8	σ21	1 Sσ-100		
7	C4B2 to P		1 Conn Print (50)-8	
6	C4B1 out	1 IMTM3-5	1 TSR12-7	
5	TMC7B1 (sign)	1 IMTM7-28		
4	C4B1 to P		1 Conn Print (50)-7	
3	+12 VDC	1 OM7-3	1 OM9-3	
2	Gnd	1 OM7-2	1 OM9-2	
1	control 8	1 OM7-1	1 OM9-1	

OM9 {C4B4
C4B8

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM8-41	1 OM10-41	
40	control 4	1 OM8-40	1 OM10-40	
39	control 2	1 OM8-39	1 OM10-39	
38	control 1	1 OM8-38	1 OM10-38	
37	+5 VDC	1 OM8-37	1 OM10-37	
36	λA38	1 IMTM4-10		
35	L48		Logic Card D24-17	(Conn LOG-33(RO))
34	N18	NO LONGER USED		(Conn ID(100)-80)
33	not used			
32	not used			
31	not used			
30	E18		1 Conn Guide (60)-24	
29	not used			
28	not used			
27	Y48	NO LONGER USED		(Conn ID(60)-12)
26	W18	NO LONGER USED		(Conn ID(60)-48)
25	T18		ID Card $S_{\Delta Y}$ Readout Decode-N	(Conn ID(100)-72)
24	R18		ID Card J74-12	(Conn ID(100)-44)
23	B48		Logic Card	(Conn LOG-76(RO))
22	σ28	1 Sσ-800		
21	not used (int gnd)			
20	not used			
19	λA34	1 IMTM4-17		
18	N14	NO LONGER USED		(Conn ID(100)-70)
17	not used			
16	E14		1 Conn Guide (60)-23	
15	Y44	NO LONGER USED		(Conn ID(60)-11)
14	W14	NO LONGER USED		(Conn ID(60)-47)
13	T14		ID Card $S_{\Delta Y}$ Readout Decode-M	(Conn ID(100)-71)
12	R14		ID Card J74-14	(Conn ID(100)-43
11	C4B8 out		1 TSR48-14	
10	B44		Logic Card	(Conn LOG-75(RO))
9	L44		Logic Card D24-16	(Conn LOG-32(RO))
8	σ24	1 Sσ-400		
7	C4B8 to P		1 Conn Printer (50)-33	
6	C4B4 out		1 TSR48-7	
5	not used (int gnd)			
4	C4B4 to P		1 Conn Printer (50)-32	
3	+12 VDC	1 OM8-3	1 OM10-3	
2	Gnd	1 OM8-2	1 OM10-2	
1	control 8	1 OM8-1	1 OM10-1	

OM10 {C5B1 C5B2

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM9-41	1 OM11-41	
40	control 4	1 OM9-40	1 OM11-40	
39	control 2	1 OM9-39	1 OM11-39	
38	control 1	1 OM9-38	1 OM11-38	
37	+5 VDC	1 OM9-37	1 OM11-37	
36	λB12	1 IMTM6-21		
35	λA42	1 IMTM3-20		
34	L52		Logic Card D24-25	(Conn LOG-27(RO))
33	not used			
32	not used			
31	θA12	1 SθA-2		
30	E22		1 Conn Guide (60)-18	
29	not used			
28	not used			
27	Y52	NO LONGER USED		(Conn ID(60)-6)
26	W22	NO LONGER USED		(Conn ID(60)-42)
25	T22		ID Card $S_{\Delta X}$ Readout Decode-P	(Conn ID(100)-66)
24	R22		ID Card J74-2	(Conn ID(100)-38)
23	B52		Logic Card	(Conn LOG-78(RO))
22	σ32	1 Sσ-20		
21	TMC5B2	1 DM1-4		
20	λB11	1 IMTM6-24		
19	λA41	1 IMTM3-25		
18	FS11	NO LONGER USED		(Conn ID(100)-83)
17	θA11	1 SθA-1		
16	E21		1 Conn Guide (60)-17	
15	Y51	NO LONGER USED		(Conn ID(60)-5)
14	W21	NO LONGER USED		(Conn ID(60)-41)
13	T21		ID Card $S_{\Delta Y}$ Readout Decode-R	(Conn ID(100)-65)
12	R21		ID Card J74-3	(Conn ID(100)-37)
11	C5B2 out		1 TSR12-S	
10	B51		Logic Card	(Conn LOG-77(RO))
9	L51		Logic Card D24-24	(Conn LOG-26(RO))
8	σ31	1 Sσ-10		
7	C5B2 to P		1 Conn Printer (50)-10	
6	C5B1 out		1 TSR12-H	
5	TMC5B1	1 OM1-3		
4	C5B1 to P		1 Conn Printer (50)-9	
3	+12 VDC	1 OM9-3	1 OM11-3	
2	Gnd	1 OM9-2	1 OM11-2	
1	control 8	1 OM9-1	1 OM11-1	

OM11 {C5B4 / C5B8

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM10-41	1 OM12-41	
40	control 4	1 OM10-40	1 OM12-40	
39	control 2	1 OM10-39	1 OM12-39	
38	control 1	1 OM10-38	1 OM12-38	
37	+5 VDC	1 OM10-37	1 OM12-37	
36	λB18	1 IMTM6-11		
35	λA48	1 IMTM3-10		
34	L58		Logic Card D24-28	(Conn LOG-29(RO))
33	not used			
32	not used			
31	θA18	1 SθA-8		
30	E28		1 Conn Guide (60)-20	
29	not used			
28	not used			
27	Y58	NO LONGER USED		(Conn ID(60)-8)
26	W28	NO LONGER USED		(Conn ID(60)-44
25	T28		ID Card $S_{\Delta Y}$ Readout Decode-C	(Conn ID(100)-68)
24	R28		ID Card J74-4	(Conn ID(100)-40)
23	B58		Logic Card	(Conn LOG-80(RO))
22	σ38	1 Sσ-80		
21	TMC5B8	1 DM1-14		
20	λB14	1 IMTM6-16		
19	λA44	1 IMTM3-17		
18	not used			
17	θA14	1 SθA-4		
16	E24			(Conn Guide (60)-19)
15	Y54	NO LONGER USED		(Conn ID(60)-7)
14	W24	NO LONGER USED		(Conn ID(60)-43)
13	T24		ID Card $S_{\Delta Y}$ Readout Decode-B	(Conn ID(100)-67)
12	R24		ID Card J74-1	(Conn ID(100)-39)
11	C5B8 out		1 TSR48-S	
10	B54		Logic Card	(Conn LOG-79(RO))
9	L54		Logic Card D24-26	(Conn LOG-28(RO))
8	σ34	1 Sσ-40		
7	C5B8 to P		1 Conn Printer (50)-35	
6	C5B4 out		1 TSR48-H	
5	TMC5B4	1 DM1-L		
4	C5B4 to P		1 Conn Printer (50)-34	
3	+12 VDC	1 OM10-3	1 OM12-3	
2	Gnd	1 OM10-2	1 OM12-2	
1	control 8	1 OM10-1	1 OM12-1	

OM12 {C6B4, C6B8}

Pin		Function	In From	Out To	
41		control $\overline{8}$	1 OM11-41	1 OM13-41	
40		control 4	1 OM11-40	1 OM13-40	
39		control 2	1 OM11-39	1 OM13-39	
38		control 1	1 OM11-38	1 OM13-38	
37		+5 VDC	1 OM11-37	1 OM13-37	
36		λB28	1 IMTM5-11		
35		λA58	1 IMTM2-10		
34	B5	not used			
33	B4	U18		ID Card S_U Readout Decode #1-N	(Conn ID(100)-20)
32		E38		1 Conn Guide (60)-16	
31		Y68	NO LONGER USED		(Conn ID(60)-4)
30		W38	NO LONGER USED		(Conn ID(60)-40)
29		T38		ID Card $S_{\Delta Y}$ Readout Decode-S	(Conn ID(100)-64)
28		R38		ID Card J73-12	(Conn ID(100)-36)
27		ρ=4	1 OM13-26	1 OM4-25	
26	A4	U14		ID Card S_U Readout Deocde #1-M	(Conn ID(100)-19)
25	A5	ISD14	1 IMTM2-35		
24		ρ=5	1 OM13-28	1 OM5-22	
23		σ48	1 Sσ-8		
22		TMC6B4	1 DM1-P		
21		λB24	1 IMTM5-16		
20		λA54	1 IMTM2-17		
19		CC14		1 Conn ES-6	
18		K14	1 ALG-A		
17		not used			
16		not used			
15		not used			
14		E34		1 Conn Guide (60)-15	
13		Y64	NO LONGER USED		(Conn ID(60)-3)
12		W34	NO LONGER USED		(Conn ID(60)-39)
11		C6B8 out		1 TSR48-16	
10		T34		ID Card $S_{\Delta Y}$ Readout Decode Card-T	(Conn ID (100)-63)
9		R34		ID Card J73-14	(Conn ID(100)-35)
8		σ44	1 Sσ-4		
7		C6B8 to P		1 Conn Printer (50)-37	
6		C6B4 out	1 Conn CORE-s	1 TSR48-B	
5		TMC6B4	1 OM1-9		
4		C6B4 to P		1 Conn Printer (50)-36	
3		+12 VDC	1 OM11-3	1 OM13-3	
2		Gnd	1 OM11-2	1 OM13-2	
1		control 8	1 OM11-1	1 OM13-1	

OM13 $\left\{\begin{matrix}\text{C7B1}\\ \text{C7B2}\end{matrix}\right.$

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM12-41	1 OM14-41	
40	control 4	1 OM12-40	1 OM14-40	
39	control 2	1 OM12-39	1 OM14-39	
38	control 1	1 OM12-38	1 OM14-38	
37	+5 VDC	1 OM12-37	1 OM14-37	
36	λB32	1 IMTM4-21		
35	λA62	1 IMTM1-20		
34	μ12	1 Sμ-2		
33	I12	NO LONGER USED		(Conn DVM(24)-2)
32	U22		ID Card S_U Readout Decode #1-P	(Conn ID(100)-14)
31	α12		Logic Card SWR1-10	(Conn LOG-61(RO))
30	K22		1 Conn Theta (24)-2	
29	I11	NO LONGER USED		(Conn DVM(24)-1)
28	ρ=5	1 OM14-28	1 OM12-24	
27	U21		ID Card S_U Readout Decode #1-R	(Conn ID(100)-13)
26	ρ=4	1 OM14-26	1 OM12-27	
25	Z12		ID Card J75-2	(Conn ID(100)-46)
24	ε12	NO LONGER USED		(Conn ID(100)-82)
23	C12		Logic Card	(Conn LOG-83(RO))
22	π12	1 Sπ-2000		
21	TMC7B2	1 DM1-C		
20	λB31	1 IMTM4-24		
19	λA61	1 IMTM1-25		
18	μ11	1 Sμ-1		
17	α11		Logic Card SWR1-F	(Conn LOG-60(RO))
16	ηB11	1 Conn EXIT-3	1 S B$\overline{1248}$	
15	K21		1 Conn Theta (24)-3	
14	ε11	OBSOLETE		(CONN ID(100)-81)
13	GS11		1 Conn Guide (60)-38	
12	FS11		1 Conn Guide (60)-25	
11	C7B2 out	1 Conn CORE-m	1 TSR12-T	
10	Z11		ID Card J75-3	
9	C11		Logic Card	(Conn LOG-82(RO))
8	π11	1 Sπ-1000		
7	C7B2 to P		1 Conn Printer (50)-14	
6	C7B1 out	1 Conn CORE-k	1 TSR12-9	
5	TMC7B1		1 DM2-6	
4	C7B1 to P		1 Conn Printer (50)-13	
3	-12 VDC	1 T.S.	1 OM14-3	
2	Gnd	1 OM12-2	1 OM14-2	
1	control 8	1 OM12-1	1 OM14-1	

OM14 {C7B4, C7B8

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM13-41	1 OM15-41	
40	control 4	1 OM13-40	1 OM15-40	
39	control 2	1 OM13-39	1 OM15-39	
38	control 1	1 OM13-38	1 OM15-38	
37	+5 VDC	1 OM13-37	1 OM15-37	
36	λB38	1 IMTM4-11		
35	λA68	1 IMTM1-10		
34	μ18	1 Sμ-8		
33	I18	NO LONGER USED		(Conn DVM(24)-4)
32	U28		ID Card S_U Readout Decode #1-C	(Conn ID(100)-1
31	not used			
30	K28		1 Conn Theta (24)-6	
29	I14	NO LONGER USED		(Conn DVM-3)
28	ρ=5	1 OM15-28	1 OM13-28	
27	U24		ID Card S_U Readout Decode #1-B	(Conn ID(100)-1
26	ρ=4	1 OM15-26	1 OM13-26	
25	Z18		ID Card J75-4	(Conn ID(100)-48)
24	not used			
23	C18		1 Conn LOG-85 (RO)	
22	π18	1 Sπ-8000		
21	TMC7B8	1 DM1-13		
20	λB34	1 IMTM4-16		
19	λA64	1 IMTM1-17		
18	μ14	1 Sμ-4		
17	α14		Logic Card SWR1-M	(Conn LOG-62(RO))
16	not used			
15	K24		1 Conn Theta (24)-5	
14	not used			
13	not used			
12	not used			
11	C7B8 out	1 Conn CORE-p	1 TSR48-T	
10	Z14		ID Card J75-1	(Conn ID(100)-47)
9	C14		Logic Card	(Conn LOG-84(RO))
8	π14	1 Sπ-4000		
7	C7B8 to P		1 Conn Printer (50)-39	
6	C7B4 out	1 Conn CORE-n	1 TSR48-9	
5	TMC7B4	1 DM1-K		
4	C7B4 to P		1 Conn Printer (50)-38	
3	-12 VDC	1 OM13-3	1 OM15-3	
2	Gnc	1 OM13-2	1 OM15-2	
1	control 8	1 OM13-1	1 OM15-1	

OM15 {C8B1 C8B2

Pin	Function	In From	Out To
41	control $\overline{8}$	1 OM14-41	1 OM16-41
40	control 4	1 OM14-40	1 OM16-40
39	control 2	1 OM14-39	1 OM16-39
38	control 1	1 OM14-38	1 OM16-38
37	+5 VDC	1 OM14-37	1 OM16-37
36	λB42	1 IMTM3-21	
35	ξ12	1 Sξ-20	
34	δ12		Logic Diode Card δ Sync-41 (Conn LOG-23(RO))
33	I22	NO LONGER USED	(Conn DVM(24)-6)
32	U32		ID Card S_U Readout Decode #1-U (Conn ID(100)-10)
31	θB12	1 SθB-2	
30	K32		1 Conn Theta (24)-8
29	I21	NO LONGER USED	(Conn DVM(24)-5)
28	ρ=5	1 OM16-28	1 OM14-28
27	U31		ID Card S_U Readout Decode #1-V (Conn ID(100)-9
26	ρ=4	1 OM16-26	1 OM14-26
25	G12		1 Conn Guide (60)-48
24	F12		1 Conn Guide (60)-35
23	X12		Logic Card AP4-8 (Conn LOG-59(RO))
22	C22		Logic Card (Conn LOG-87(RO))
21	π22	1 Sπ-200	
20	λB41	1 IMTM3-24	
19	δ11		Logic Diode Card δ Sync-40 (Conn LOG-24(RO))
18	TMC8B2	1 DM1-E	
17	θB11	1 SθB-1	
16	K31		1 Conn Theta (24)-7
15	ξ11	1 Sξ-10	
14	G11		1 Conn Guide (60)-47
13	F11		1 Conn Guide (60)-34
12	X11		Logic Card AP4-F (Conn LOG-58(RO))
11	C8B2 out	1 Conn CORE-h	1 TSR12-15
10	not used		
9	TMC8B1		1 DM2-M
8	C21		Logic Card (Conn LOG-86(RO))
7	C8B2 to P		1 Conn Printer (50)-16
6	C8B1 out	1 Conn CORE-2	1 TSR12-J
5	π21	1 Sπ-100	
4	C8B1 to P		1 Conn Printer (50)-15
3	+12 VDC	1 OM14-3	1 OM16-3
2	Gnd	1 OM14-2	1 OM16-2
1	control 8	1 OM14-1	1 OM16-1

OM16 {C8B4, C8B8}

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM15-41	1 OM17-41	
40	control 4	1 OM15-40	1 OM17-40	
39	control 2	1 OM15-39	1 OM17-39	
38	control 1	1 OM15-38	1 OM17-38	
37	+5 VDC	1 OM15-37	1 OM17-37	
36	λB48	1 IMTM3-11		
35	ξ18	1 Sξ-80		
34	δ18		Logic Diode Card δ Sync-43	(Conn LOG-81(RO
33	I28	NO LONGER USED		(Conn DVM(24)-8)
32	U38		ID Card S_U Readout Decode #1-S	(Conn ID(100)-1
31	θB18	1 SθB-8		
30	K38		1 Conn Theta (24)-10	
29	I24	NO LONGER USED		(Conn DVM(24)-7)
28	ρ=5	1 OM17-28	1 OM15-28	
27	U34		ID Card S_U Readout Decode #1-T	(Conn ID(100)-1
26	ρ=4	1 OM17-26	1 OM15-26	
25	G18		1 Conn Guide (60)-50	
24	F18		1 Conn Guide (60)-37	
23	not used			
22	C28		Logic Card	(Conn LOG-89(RO))
21	π28	1 Sπ-800		
20	λB44	1 IMTM3-16		
19	δ14		Logic Diode Card δ Sync-42	(Conn LOG-22(RO
18	TMC8B8	1 DM1-R		
17	θB14	1 SθB-4		
16	K34		1 Conn Theta (24)-9	
15	ξ14	1 Sξ-40		
14	G14		1 Conn Guide (60)-49	
13	F14		1 Conn Guide (60)-36	
12	not used			
11	C8B8 out	1 Conn CORE-j	1 TSR48-15	
10	not used			
9	TMC8B4	1 DM1-10		
8	C24		Logic Card	(Conn LOG-88(RO))
7	C8B8 to P		1 Conn Printer (50)-41	
6	C8B4 out	1 Conn CORE-i	1 TSR48-J	
5	π24	1 Sπ-400		
4	C8B4 to P		1 Conn Printer (50)-40	
3	-12 VDC	1 OM15-3	1 OM17-3	
2	Gnd	1 OM15-2	1 OM17-2	
1	control 8	1 OM15-1	1 OM17-1	

OM17 {C9B1
C9B2

Pin	Function	In From	Out To
41	control $\overline{8}$	1 OM16-41	1 OM18-41
40	control 4	1 OM16-40	1 OM18-40
39	control 2	1 OM16-39	1 OM18-39
38	control 1	1 OM16-38	1 OM18-38
37	+5 VDC	1 OM16-37	1 OM18-37
36	λB52	1 IMTM2-21	
35	ξ22	1 Sξ-2	
34	δ22		Logic Diode Card δ Sync-45 (Conn LOG-19(RO))
33	I32	NO LONGER USED	(Conn DVM(24)-10)
32	U42		ID Card S_U Readout Decode #2-M (Conn ID(100)-6)
31	ρB12	1 Misc 2-3	1 Conn EXIT-24
30	K42		1 Conn Theta (24)-12
29	I31	NO LONGER USED	(Conn DVM(24)-9)
28	ρ=5	1 OM18-28	1 OM16-28
27	U41		ID Card S_U Readout Decode #2-N (Conn ID(100)-5)
26	ρ=4	1 OM18-26	1 OM16-26
25	G22		1 Conn Guide (60)-44
24	F22		1 Conn Guide (60)-31
23	X22		Logic Card AP4-1 (Conn LOG-2(RO))
22	C32		Logic Card (Conn LOG-91(RO))
21	π32	1 Sπ-20	
20	λB51	1 IMTM2-24	
19	δ21		Logic Diode Card δ Sync-44 (Conn LOG-20(RO))
18	TMC9B2	1 DM1-6	
17	ρB11	1 Misc 2-C	
16	K41		1 Conn EXIT-23
15	ξ21	1 Sξ-1	
14	G21		1 Conn Guide (60)43
13	F21		1 Conn Guide (60)-30
12	X21		Logic Card AP4-12 (Conn LOG-1(RO))
11	C9B2 out	1 Conn CORE-d	1 TSR12-R
10	not used		
9	TMC9B1		1 DM2-12
8	C31		Logic Card (Conn LOG-90(RO))
7	C9B2 to P		1 Conn Printer (50)-18
6	C9B1 out	1 Conn CORE-c	1 TSR12-F
5	π31	1 Sπ-10	
4	C9B1 to P		1 Conn Printer (50)-17
3	-12 VDC	1 OM16-3	1 OM18-3
2	Gnd	1 OM16-2	1 OM18-2
1	control 8	1 OM16-1	1 OM18-1

OM18 {C9B4 C9B8

Pin	Function	In From	Out To
41	control $\overline{8}$	1 OM17-41	1 OM19-41
40	control 4	1 OM17-40	1 OM19-40
39	control 2	1 OM17-39	1 OM19-39
38	control 1	1 OM17-38	1 OM19-38
37	+5 VDC	1 OM17-37	1 OM19-37
36	λB58	1 IMTM2-11	
35	ξ28	1 S^{ξ}-8	
34	δ28		Logic Card δ Sync-47(Conn LOG-17(RO))
33	I38	NO LONGER USED	(Conn DVM(24)-12)
32	U48		ID Card S_U Readout Decode #2-V (Conn ID(100)-8)
31	not used		
30	K48		1 Conn Theta (24)-14
29	I34	NO LONGER USED	(Conn DVM(24)-11)
28	ρ=5	1 OM19-28	1 OM17-28
27	U44		Logic Card S_U Readout Decode #2=S(Conn ID(100)-7
26	ρ=4	1 OM19-26	1 OM17-26
25	G28		1 Conn Guide (60)-46
24	F28		1 Conn Guide (60)-33
23	X28		Logic Card AP4-14 (Conn LOG-4(RO))
22	not used		
21	π38	1 Sπ-80	
20	λB54	1 IMTM2-16	
19	δ24		Logic Diode Card δ Sync-46 (Conn LOG-18(RO))
18	TMC9B8	1 DM1-S	
17	not used		Spare
16	K44		1 Conn Theta (24)-13
15	ξ24	1 Sξ-4	
14	G24		1 Conn Guide (60)-45
13	F24		1 Conn Guide (60)-32
12	X24		Logic Card AP4-A (Conn LOG-3(RO))
11	C9B8 out	1 Conn CORE-f	1 TSR48-R
10	not used		
9	TMC9B4	1 DM1-11	
8	C34		Logic Card (Conn LOG-92(RO))
7	C9B8 to P		1 Conn Printer (50)-43
6	C9B4 out	1 Conn CORE-e	1 TSR48-F
5	π34	1 Sπ-40	
4	C9B4 to P		1 Conn Printer (50)-42
3	-12 VDC	1 OM17-3	1 OM19-3
2	Gnd	1 OM17-2	1 OM19-2
1	control 8	1 OM17-1	1 OM19-1

OM19 {C10B1
C10B2

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM18-41	1 OM20-41	
40	control 4	1 OM18-40	1 OM20-40	
39	control 2	1 OM18-39	1 OM20-39	
38	control 1	1 OM18-38	1 OM20-38	
37	+5 VDC	1 OM18-37	1 OM20-37	
36	λB62	1 IMTM1-21		
35	δ32		Logic Diode Card δ Sync-49	(Conn LOG-15(RO))
34	not used			
33	I42	NO LONGER USED		(Conn DVM(24)-14
32	U52		ID Card S_U Readout Decode #2-T	(Conn ID(100)-2)
31	not used			
30	K52		1 Conn Theta (24)-16	
29	I41	NO LONGER USED		(Conn DVM(24)-13
28	ρ=5	1 OM20-28	1 OM18-28	
27	U51		ID Card S_U Readout Decode #2-U	(Conn ID(100)-1)
26	ρ=4	1 OM20-26	1 OM18-26	
25	G32		1 Conn Guide (60)-40	
24	F32		1 Conn Guide (60)-27	
23	C42		Logic Card	(Conn LOG-94(RO))
22	π42	1 Sπ-2		
21	λB61	1 IMTM1-24		
20	δ31		Logic Diode Card δ Sync-48	(Conn LOG-16(RO))
19	not used			
18	TMC10B2	1 DM1-J		
17	not used			
16	O11		ES Card ES3-14	(Conn ES-T)
15	K51		1 Conn Theta (24)-15	
14	ν11	1 Misc 2-F		
13	G31		1 Conn Guide (60)-39	
12	F31		1 Conn Guide (60)-26	
11	C10B2 out	1 Conn CORE-z	1 TSR12-13	
10	not used			
9	TMC10B1	1 DM2-P		
8	C41		Logic Card	(Conn LOG-93(RO))
7	C10B2 to P		1 Conn Printer (50)-20	
6	C10B1 out	1 Conn CORE-y	1 TSR12-E	
5	π41	1 Sπ-1		
4	C10B1 to P		1 Conn Printer (50)-19	
3	-12 VDC	1 OM18-3	1 OM20-3	
2	Gnd	1 OM18-2	1 OM20-2	
1	control 8	1 OM18-1	1 OM20-1	

OM20 $\left\{\begin{array}{l}\text{C10B4}\\ \text{C10B8}\end{array}\right.$

Pin	Function	In From	Out To	
41	control $\overline{8}$	1 OM19-41		
40	control 4	1 OM19-40		
39	control 2	1 OM19-39		
38	control 1	1 OM19-38		
37	+5 VDC	1 OM19-37	1 ALG-7	
36	λB68	1 IMTM1-11		
35	δ38		Logic Diode δ Sync-51	(Conn LOG-13(RO))
34	not used			
33	I48	NO LONGER USED		(Conn DVM(24)-16
32	U58		ID Card S_U Readout Decode #2-P	(Conn ID(100)-4)
31	not used			
30	K58		1 Conn Theta (24)-18	
29	I44	NO LONGER USED		(Conn DVM(24)-15)
28	ρ=5		1 OM19-28	
27	U54		ID Card S_U Readout Decode #2-R	(Conn ID(100)-3)
26	ρ=4		1 OM19-26	
25	G38		1 Conn Guide (60)-42	
24	F38		1 Conn Guide (60)-29	
23	C48		Logic Card	(Conn LOG-46(RO))
22	π48	1 Sπ-8		
21	λB64	1 IMTM1-16		
20	δ34		Logic Diode Card δ Sync-50	(Conn LOG-14(RO))
19	not used			
18	TMC10B8	1 DM1-15		
17	not used			
16	not used			
15	K54		1 Conn Theta (24)-17	
14	not used			
13	G34		1 Conn Guide (60)-41	
12	F34		1 Conn Guide (60)-28	
11	C10B8 out	1 Conn CORE-b	1 TSR48-13	
10	not used			
9	TMC10B4	1 DM1-M		
8	C44		Logic Card	(Conn LOG-95(RO))
7	C10B8 to P		1 Conn Printer (50)-45	
6	C10 B4 out	1 Conn CORE-a	1 TSR48-E	
5	π44	1 Sπ-4		
4	C10B4 to P		1 Conn Printer (50)-44	
3	-12 VDC	1 OM19-3	1 TSR48-V 1 IMTM3-3	
2	Gnd	1 OM19-2		
1	control 8	1 OM19-1		

Data/ID Exit Connector

Connector	Pin	Function	(Panel Conn) In From	(Cable Conn) Out To
EXIT	1	ID Vert Dr.		Patch P.-33
	2	ID Horiz Dr.		Patch P.-34
	3	ID Shutter L.S. "Close"		Patch P.-35
	6	ID Shutter L.S. "Open"		Patch P.-36
	7	ID Shutter Motor (Red)		Patch P.-38
	8	ID Shutter Motor (Green)		Patch P.-39
	9	PM Shutter L.S. "Close"		Patch P.-42
	10	PM Shutter L.S. "Open"		Patch P.-43
	11	PM Shutter Motor (Red)		Patch P.-45
	12	PM Shutter Motor (Green)		Patch P.-46
	13	ID Overload Sense		Patch P.-50
	14	PM Overload Sense		Patch P.-52
	4	ID Filter Encoder	#1 R/O Decode-29	Patch P.-54
	5	PM Filter Encoder	#2 R/O Decode-A16	Patch P.-56
	15	ID Filter Motor (Red)		Patch P.-58
	16	ID Filter Motor (Green)		Patch P.-59
	17	PM Filter Motor (Red)	Filter Drive #2-1	Patch P.-61
	18	PM Filter Motor (Green)	Filter Drive #2-2	Patch P.-62
	19	ID Discriminator		Patch P.-64
	20	PM Discriminator		Patch P.-66
	21	ID Focus Com		Patch P.-71
	22	ηA=1 Gain Sw Sig	ηA Sw	Patch P.- 2
	23	ID Focus (+)		Patch P.-73
	24			
	25			
BNC	DM		DM3-N	

Connector
Printer Section

	Pin		In From	Out To
PRINT	1	C1B1 to P	1 OM1-4	
	2	C1B2 to P	1 OM2-4	
	3	C2B1 to P	1 OM1-7	
	4	C2B2 to P	1 OM2-7	
	5	C3B1 to P	1 OM6-4	
	6	C3B2 to P	1 OM6-7	
	7	C4B1 to P	1 OM8-4	
	8	C4B2 to P	1 OM8-7	
	9	C5B1 to P	1 OM10-4	
	10	C5B2 to P	1 OM10-7	
	11	C6B1 to P	1 OM3-7	
	12	C6B2 to P	1 OM4-7	
	13	C7B1 to P	1 OM13-4	
	14	C7B2 to P	1 OM13-7	
	15	C8B1 to P	1 OM15-4	
	16	C8B2 to P	1 OM15-7	
	17	C9B1 to P	1 OM17-4	
	18	C9B2 to P	1 OM17-7	
	19	C10B1 to P	1 OM19-4	
	20	C10B2 to P	1 OM19-7	
	21			
	22			
	23	+Print Command	1 Misc 3-7	
	24			
	25			
	26	C1B4 to P	1 OM3-4	
	27	C1B8 to P	1 OM4-4	
	28	C2B4 to P	1 OM5-4	
	29	C2B8 to P	1 OM5-7	
	30	C3B4 to P	1 OM7-4	
	31	C3B8 to P	1 OM7-7	
	32	C4B4 to P	1 OM9-4	
	33	C4B8 to P	1 OM9-7	
	34	C5B4 to P	1 OM11-4	
	35	C5B8 to P	1 OM11-7	
	36	C6B4 to P	1 OM12-4	
	37	C6B8 to P	1 OM12-7	
	38	C7B4 to P	1 OM14-4	
	39	C7B8 to P	1 OM14-7	
	40	C8B4 to P	1 OM16-4	
	41	C8B8 to P	1 OM16-7	
	42	C9B4 to P	1 OM18-4	
	43	C9B8 to P	1 OM18-7	
	44	C10B4 to P	1 OM20-4	
	45	C10B8 to P	1 OM20-7	
	46			
	47			
	48			
	49			
	50	Gnd	1 T.S.	

Connector (55-pin to Computer)
Computer Section

	Pin		In From	Out To
CORE	A	Comp. 1		1 IMTM1-23
	B	Comp. 2		1 IMTM1-22
	C	Comp. 4		1 IMTM1-15
	D	Comp. 8		1 IMTM1-12
	E	Core-10		1 IMTM2-23
	F	Core-20		1 IMTM2-22
	G	Core-40		1 IMTM2-15
	H	Core-80		1 IMTM2-12
	J	Core-100		1 IMTM3-23
	K	Core-200		1 IMTM3-22
	L	Core-400		1 IMTM3-15
	M	Core-800		1 IMTM3-12
	N	Core-1000		1 IMTM4-23
	P	Core-2000		1 IMTM4-22
	R	Core-4000		1 IMTM4-15
	S	core-8000		1 IMTM4-12
	T	Core-10000		1 IMTM5-23
	U	Gnd } BIN→BCD	1 T.S	
	V	+5 VDC	1 T.S	
	W	To Level Conv. core sign out		1 IMTM7-4
	X	To Level Conv encode signal out		1 IMTM7-5
			(Input)	
	Y	C10B1 out	1	1 OM19-36
	Z	C10B2 out	2	1 OM19-31
	a	C10B4 out	4	1 OM20-36
	b	C10B8 out	8	1 OM20-31
	c	C9B1 out	10	1 OM17-36
	d	C9B2 out	20	1 OM17-31
	e	C9B4 out	40	1 OM18-36
	f	C9B8 out	80	1 OM18-31
	g	C8B1 out	100	1 OM15-36
	h	C8B2 out	200	1 OM15-31
	i	C8B4 out	400	1 OM16-36
	j	C8B8 out	800	1 OM16-31
	k	C7B1 out	1000	1 OM13-36
	m	C7B2 out	2000	1 OM13-31
	n	C7B4 out	4000	1 OM14-36
	p	C7B8 out	8000	1 OM14-31
	q	C6B1 out	10000	1 OM3-31
	r	C6B2 out	20000	1 OM4-31
	s	C6B4 out	40000	1 OM12-36
	t	-12 VDC	1 T.S	
	u	32768 +5v signal out		
	v	65546 +5v signal out		
	w	From level conv Core sign in	1 IMTM3-2	
	x	From level conv Flag Command to Duplex (Rd)	1 IMTM3-1	
	y	not used		
	z	not used		

Connector
Computer Section (cont'd)

Pin		In From	Out To
AA	2114 Run Command	1 Misc 3-K	}(Tie Points)
BB	Load Address Command	1 Misc 3-10	
CC	Gnd }for BCD → BIN	1 T.S	
DD	+5		

Connector
Theta Section

THETA	1	100's	1	1 OM3-30
	2		2	1 OM4-30
	3	10's	1	1 OM13-15
	4		2	1 OM13-30
	5		4	1 OM14-15
	6		8	1 OM14-30
	7	1's	1	1 OM15-16
	8		2	1 OM15-30
	9		4	1 OM16-16
	10		8	1 OM16-30
	11	0.1's	1	1 OM17-16
	12		2	1 OM17-30
	13		4	1 OM18-16
	14		8	1 OM18-30
	15	0.01's	1	1 OM19-15
	16		2	1 OM19-30
	17		4	1 OM20-15
	18		8	1 OM20-30
	19			
	20			
	21			
	22			
	23			
	24			

ΔX DAC Card

Pin	Function	To
1	Gnd	
2	Reset In	J21-16
3	ΔX Sw (Units)	ΔX 1's Sw "1"
5	ΔX Sw (Units)	ΔX 1's Sw "2"
8	DAC Output to Z in	Z Amp Card
9	ΔX Sw 10's	ΔX 10's Sw "1"
11	ΔX Sw 10's	ΔX 10's Sw "2"
13	ΔX Sw 100's	ΔX 100's Sw "1"
15	ΔX Sw 100's	ΔX 100's Sw "2"
16	Sw. Common	SΔX Sw. Commons
17	-15 VDC	
18	+15 VDC	
A	Count Input	J21-19
D	ΔX Sw 1's	SΔX 1's Sw "8"
F	ΔX Sw 1's	SΔX 1's Sw "4"
L	ΔX Sw 10's	SΔX 10's Sw "8"
N	ΔX Sw 10's	SΔX 10's Sw "4"
R	ΔX Sw 100's	SΔX 100's Sw "8"
T	ΔX Sw 100's	SΔX 100's Sw "4"
U	Preset Out	J21-30
V	+5 VDC	

ΔY DAC Card

1	Gnd	
2	Reset In	J21-15
3	ΔY Sw 1's	ΔY 1's Sw "1"
5	ΔY Sw 1's	ΔY 1's Sw "2"
8	DAC Out to Z Amp In	Z Amp Card
9	ΔY Sw 10's	ΔY 10's Sw "1"
11	ΔY Sw 10's	ΔY 10's Sw "2"
13	ΔY Sw 100's	ΔY 100's Sw "1"
15	ΔY Sw 100's	ΔY 100's Sw "2"
16	Sw. Common	SΔY Sw. Commons
17	-15 VDC	
18	+15 VDC	
A	Count Input	J21-23
D	ΔY Sw "1"	SΔY "1" Sw "8"
F	ΔY Sw "1"	SΔY "1" Sw "4"
L	ΔY Sw 10's	SΔY 10's Sw "8"
N	ΔY Sw 10's	SΔY 10's Sw "4"
R	ΔY Sw 100's	SΔY 100's "8"
T	ΔY Sw 100's	SΔY 100's "4"
U	Preset Out	J21-30
V	+5 VDC	

Data Connectors Guide

Connector	Pin	Function		In From	Out To
GUIDE	1	D=1		1 OM6-16	
	2	2		1 OM6-30	
	3	4		1 OM7-16	
	4	8		1 OM7-30	
	5	10		1 OM1-30	
	6	20		1 OM2-30	
	7	40		1 OM5-16	
	8	80		1 OM5-30	
	9	100		1 OM1-15	
	10	200		1 OM2-15	
	11	400		1 OM3-15	
	12	800		1 OM4-15	
	13	E=1		1 OM3-31	
	14	2		1 OM4-31	
	15	4		1 OM12-14	
	16	8		1 OM12-32	
	17	10		1 OM10-16	
	18	20		1 OM10-30	
	19	40		1 OM11-16	
	20	80		1 OM11-30	
	21	100		1 OM8-16	
	22	200		1 OM8-30	
	23	400		1 OM9-16	
	24	800		1 OM9-30	
	25	FS 1	(1=-)	1 OM13-12	
	26	F=1		1 OM19-12	
	27	2		1 OM19-24	
	28	4		1 OM20-12	
	29	8		1 OM20-24	
	30	10		1 OM17-13	
	31	20		1 OM17-24	
	32	40		1 OM18-13	
	33	80		1 OM18-24	
	34	100		1 OM15-13	
	35	200		1 OM15-24	
	36	400		1 OM16-13	
	37	800		1 OM16-24	
	38	GS=1	(1=-)	1 OM13-13	
	39	G=1		1 OM19-13	
	40	2		1 OM19-25	
	41	4		1 OM20-13	
	42	8		1 OM20-25	
	43	10		1 OM17-14	
	44	20		1 OM17-25	
	45	40		1 OM18-14	
	46	80		1 OM18-25	
	47	100		1 OM15-14	
	48	200		1 OM15-25	
	49	400		1 OM16-14	
	50	800		1 OM16-25	
	51	H=1	(1=offset)	1 OM6-17	
	52	not used			
	53	not used			
	54	not used			
	55	not used			
	56 - 60 not used				

Data Connectors (COUNT A)

Count (A) Connector Pin			In From	Out To
A		1		1 IMTM1-25
B		2		1 IMTM1-20
C		10		1 IMTM2-25
D		20		1 IMTM2-20
E		100		1 IMTM3-25
F		200		1 IMTM3-20
G		1000		1 IMTM4-25
H		2000		1 IMTM4-20
J		10000		1 IMTM5-25
K		20000		1 IMTM5-20
L		100000		1 IMTM6-25
M		200000		1 IMTM6-20
N		overflow	1 Conn LOGIC (C)-2	
h		+ (Sign Bit)		1 IMTM7-25
P		-5 supply		1 DM7-5
R		+5 supply		
S		4		1 IMTM1-17
T		8		1 IMTM1-10
U		40		1 IMTM2-17
V		80		1 IMTM2-10
W		400		1 IMTM3-17
X		800		1 IMTM3-10
Y		4000		1 IMTM4-17
Z		8000		1 IMTM4-10
a		40000		1 IMTM5-17
b		80000		1 IMTM5-10
c		400000		1 IMTM6-17
d		800000		1 IMTM6-10
g		spare		
e		store		1 PROG A-28
i		clear	1 Conn LOGIC (C)-4	Count A DATA-45
f	Gnd	Gnd		1 Gnd pt

Data Connectors (COUNT B)

Count (B) Connector Pin		In From	Out To
A	1		1 IMTM1-24
B	2		1 IMTM1-21
C	10		1 IMTM2-24
D	20		1 IMTM2-21
E	100		1 IMTM3-24
F	200		1 IMTM3-21
G	1000		1 IMTM4-24
H	2000		1 IMTM4-21
J	10000		1 IMTM5-24
K	20000		1 IMTM5-21
L	100000		1 IMTM6-24
M	200000		1 IMTM6-21
N	overflow	1 Conn LOGIC (C)-1	
h	+		1 IMTM7-24
P	-5 supply		
R	+5 supply		
S	4		1 IMTM1-16
T	8		1 IMTM1-11
U	40		1 IMTM2-16
V	80		1 IMTM2-11
W	400		1 IMTM3-16
X	800		1 IMTM3-11
Y	4000		1 IMTM4-16
Z	8000		1 IMTM4-11
a	40000		1 IMTM5-16
b	80000		1 IMTM5-11
c	400000		1 IMTM6-16
d	800000		1 IMTM6-11
g	spare		
e	store		1 PROG A-1
i	clear	1 Conn LOGIC (C)-5	
f	Gnd		1 Gnd pt

PI-1207 DIGITAL RECORDER--Input/Output Connections

TABLE 2.1

CONNECTOR J1 PIN ASSIGNMENTS

Data Connector	Pin	Function
A	A	Write Input, Track 1
B	B	Write Input, Track 2
C	C	Write Input, Track 4
D	D	Write Input, Track 8
-	E	Write Input, Track A
-	F	Write Input, Track B
-	H	Write Input, Track C
c	J	Step Input
*E	K	Ground
*E	L	Ground
-	M	Slew Input = "1"
F	N	High-Speed Input = "1"
G	P	Forware/Reverse Input "0" = Fwd
H	R	Read/Write Input "0" = Read
*E	S	Ground
*E	T	Ground
J	U	End-of-Record Input
K	V	End-of-File Input
-	W	Ready Input
-	X	Load Input
-	Y	Rewind Input = "1"
L	Z	Stop Input
-	a	Capstan Stop Input = "1"
M	b	Beginning-of-Tape Input
N	c	System Reset Input = "1"
E	d	Ground
-	e	+12 VDC
-	f	-12 VDC
-	h	+5 VDC
*E	j	Ground
b	k	Busy Reset Pulse Output = "1"
a	m	Busy Level Output = "1"
P	n	Beginning-of-Tape Indication Output
R	p	End-of-Tape Indication Output "1" = Error
-	r	Write Head Drivers Enabled Output
-	s	Load Indication Output
S	t	Vertical Parity Error Output "1" = Error
-	u	Ready Indication Output = "1"
-	v	Rewind Indication Output
T	w	Longitudinal Parity Gate Output "1" = Error
-	x	Stop Indication Output
*E	y	Ground
U	z	Read Clock Output
V	AA	Read Output, Track 1
W	BB	Read Output, Track 2
X	CC	Read Output, Track 4
Y	DD	Read Output, Track 8
Z	EE	Read Output, Track A
-	FF	Read Output, Track B
-	HH	Read Output, Track C

Jumper

NOTE: All Ground connections should be used.
Logic "1" = -12 volts
Logic "0" = 0 volts
Mating Connector is Winchester MRA-50P-JTDH
*All Gnds go to Pin E

Data Connector
(Tape)

Connector	Pin	Function	In From	Out To
Tape (26Pin)	A	BCD "1"-Write Input		1 TSR12-18
	B	BCD "2"-Write Input		1 TSR12-2
	C	BCD "4"-Write Input		1 TSR48-18
	D	BCD "8"-Write Input		1 TSR48-2
	E	Gnd		1 Prog T-1
	F	High-Speed Input = "1"		1 Prog C-41
	G	Forward/Reverse Input "0"=Fwd	1 Conn ES-24	
	H	Read/Write Input "0"=Read	1 Prog C-17	
	J	End-of-Record Input		1 Prog T-3
	K	End-of-File Input		1 Prog C-37
Tied Together	L	Stop Input		
	M	Beginning-of-Tape Input		1 Prog C-39
	N	System Reset Input="1"		1 Prog C-40
	P	Beginning-of-Tape Indication Output		1 Prog C-38
	R	End-of-Tape Indication Output="1"		
	S	Vertical Parity Error Output "1"=Error	TBD	
	T	Longitudinal Parity Gate Output "1"=Error		TBD
	U	Read Clock Output		1 Prog T-40
	V	BCD "1"-Read Output	1 IMTM1-4	
	W	BCD "2"-Read Output	1 IMTM1-5	
	X	BCD "4"-Read Output	1 IMTM1-32	
	Y	BCD "8"-Read Output	1 IMTM1-33	
	Z	BCD "A"-Read Output	TBD	
	a	Busy Level	TBD	
	b	Busy Reset Pulse	GD-18 (Tie Pt) (Red) Conn M-A	
	c	Step Input		1 Prog T-13

Data Boards
IMTM 1

Pin		In From	Out To
1	Tape out BCD 1 aft Lev. Conv.	1 Prog C-29	1 MISC 2-15
2	Tape out BCD 2 aft Lev. Conv.	1 Prog C-28	1 MISC 2-R
3			
4	Tape out BCD 1 to Lev. Conv.		1 Conn Tape-V
5	Tape out BCD 2 to Lev. Conv.		1 Conn Tape-W
6	+5 VDC	1 Prog A-21	1 IMTM2-6
7	Parallel Rd.	1 Prog A-4	1 IMTM2-7
8	Serial Rd.		1 Prog T-5
9	Tape 8	1 MISC 2-9	1 IMTM2-9
10	MA 8	1 Conn C(A)-T	1 OM14-35
11	MB 8	1 Conn C(B)-T	1 OM20-36
12	Comp 8	1 Conn Core-D	
13	B-Control	1 Prog A-9	1 IMTM2-13
14	A-Control	1 Prog A-7	1 IMTM2-14
15	Comp 4	1 Conn Core-C	
16	MB 4	1 Conn C(B)-S	1 OM20-21
17	MA 4	1 Conn C(A)-S	1 OM14-19
18	Tape 4	1 Misc 2-N	1 IMTM2-18
19	Tape 2	1 Misc 2-J	1 IMTM2-19
20	MA 2	1 Conn C(A)-B	1 OM13-35
21	MB 2	1 Conn C(B)-B	1 OM19-36
22	Comp 2	1 Conn Core-B	
23	Comp 1	1 Conn Core-A	
24	MB 1	1 Conn C(B)-A	1 OM19-21
25	MA 1	1 Conn C(A)-A	1 OM13-19
26	Tape 1	1 Misc 2-K	1 IMTM2-26
27	BCD 8 out		1 DM1-15
28	BCD 1 out		1 DM2-P
29	BCD 2 out		1 DM1-J
30	BCD 4 out		1 DM1-M
31	Gnd	1 Prog A-20	1 IMTM2-31
32	Tape out BCD 4 Lev Conv		1 Conn Tape-X
33	Tape out BCD 8 Lev Conv		1 Conn Tape-Y
34	Tape out BCD 8 aft Lev Conv	1 Prog C-35	1 Misc 2-13
35	Tape out BCD 4 aft Lev Conv	1 Prog C-34	1 Misc 2-14

Data Boards
IMTM 2

Pin			In From	Out To
1		$I_{SD}12$ coded DVM sign & decimal		1 OM4-22
2				
3				
4		XX.XX	OBSOLETE (Conn DVM-19)	
5		.XXXX	OBSOLETE (Conn DVM-17)	
6	+5 VDC		1 IMTM1-6	1 IMTM3-6
7		Parallel Rd	1 IMTM1-7	1 IMTM3-7
8		Serial Rd		1 Prog T-8
9		Tape 80	1 IMTM1-9	1 IMTM3-9
10		MA 80	1 Conn C(A)-V	1 OM12-35
11		MB 80	1 Conn C(B)-V	1 OM18-36
12		Core 80	1 Conn Core-H	
13		B control	1 IMTM1-13	1 IMTM3-13
14		A control	1 IMTM1-14	1 IMTM3-14
15		Core 40	1 Conn Core-G	
16		MB 40	1 Conn C(B)-U	1 OM18-20
17		MA 40	1 Conn C(A)-U	1 OM12-20
18		Tape 40	1 IMTM1-18	1 IMTM3-18
19		Tape 20	1 IMTM1-19	1 IMTM3-19
20		MA 20	1 Conn C(A)-D	1 OM4-35
21		MB 20	1 Conn C(B)-D	1 OM17-36
22		Core 20	1 Conn Core-F	
23		Core 10	1 Conn Core-E	
24		MB 10	1 Conn C(B)-C	1 OM17-20
25		MA 10	1 Conn C(A)-C	1 OM3-35
26		Tape 10	1 IMTM1-26	1 IMTM3-26
27		BCD 80 out		1 DM1-S
28		BCD 10 out		1 DM1-F
29		BCD 20 out		1 DM1-6
30		BCD 40 out		1 DM1-11
31	Gnd		1 IMTM1-31	1 IMTM3-31
32		X.XXX	OBSOLETE (Conn DVM-18)	
33		DVM sign	OBSOLETE (Conn DVM-23)	
34		I_{SD11} coded DVM sign & dec		1 OM3-22
35		$\pm_{SD14}$ coded DVM sign & dec		1 OM12-25

Data Boards
IMTM 3

Pin			In From	Out To
1		Flag to Comp (out level conv)		1 Conn Core-X
2		Sign to Comp (out level conv)		1 Conn Core-W
3		-12 VDC	1 OM20-3	
4		Flag to Comp (in level conv)		1 Prog A-30
5		Sign to Comp (in level conv)		1 OM8-6
6	+5 VDC		1 IMTM2-6	1 IMTM4-6
7		Parallel Rd	1 IMTM2-7	1 IMTM4-7
8		Serial Rd		1 Prog T-26
9		Tape 800	1 IMTM2-9	1 IMTM4-9
10		MA 800	1 Conn C(A)-X	1 OM11-35
11		MB 800	1 Conn C(B)-X	1 OM16-36
12		Core 800	1 Conn Core-M	
13		B control	1 IMTM2-13	1 IMTM4-13
14		A control	1 IMTM2-14	1 IMTM4-14
15		Core 400	1 Conn Core-6	
16		MB 400	1 Conn C(B)-W	1 OM16-20
17		MA 400	1 Conn C(A)-W	1 OM11-19
18		Tape 400	1 IMTM2-18	1 IMTM4-18
19		Tape 200	1 IMTM2-19	1 IMTM4-19
20		MA 200	1 Conn C(A)-F	1 OM10-35
21		MB 200	1 Conn C(B)-F	1 OM15-36
22		Core 200	1 Conn Core-K	
23		Core 100	1 Conn Core-J	
24		MB 100	1 Conn C(B)-E	1 OM15-20
25		MA 100	1 Conn C(A)-E	1 OM10-19
26		Tape 100	1 IMTM2-26	1 IMTM4-26
27		BCD 800 out		1 DM1-R
28		BCD 100 out		1 DM1-S
29		BCD 200 out		1 DM1-E
30		BCD 400 out		1 DM1-10
31	Gnd		1 IMTM2-31	1 IMTM4-31
21				
33				
34				
35				

Data Boards
IMTM 4

Pin			In From	Out To
1			1 Prog A-33	
2			1 Prog B-16	
3		+12 VDC	1 OM12-3	
4				
5				
6	+5 VDC		1 IMTM3-6	1 IMTM5-6
7		Paralell Rd	1 IMTM3-7	1 IMTM5-7
8		Serial Rd		1 Prog T-6
9		Tape 8000	1 IMTM3-9	1 IMTM5-9
10		MA 8000	1 Conn C(A)-Z	1 OM9-36
11		MB 8000	1 Conn C(B)-Z	1 OM14-36
12		Core 8000	1 Conn Core-S	
13		B control	1 IMTM3-13	1 IMTM5-13
14		A control	1 IMTM3-14	1 IMTM5-14
15		Core 4000	1 Conn Core-R	
16		MB 4000	1 Conn C(B)-Y	1 OM14-20
17		MA 4000	1 Conn C(A)-Y	1 OM9-19
18		Tape 4000	1 IMTM3-18	1 IMTM5-18
19		Tape 2000	1 IMTM3-19	1 IMTM5-19
20		MA 2000	1 Conn C(A)-H	1 OM8-36
21		MB 2000	1 Conn C(B)-H	1 OM13-36
22		Core 2000	1 Conn Core-P	
23		Core 1000	1 Conn Core-N	
24		MB 1000	1 Conn C(B)-G	1 OM13-20
25		MA 1000	1 Conn C(A)-G	1 OM8-19
26		Tape 1000	1 IMTM3-26	1 IMTM5-26
27		BCD 8000 out		1 DM1-13
28		BCD 1000 out		1 DM1-D
29		BCD 2000 out		1 DM1-C
30		BCD 4000 out		1 DM1-K
31	Gnd		1 IMTM3-31	1 IMTM5-31
32				
33				
34				1 Misc 3-15
35				

Data Boards
IMTM 5

Pin			In From	Out To
1	OR Gate		1 Prog A-26	
2			1 Prog C-2	
3		2114 Run command		Tie Pt → 1 Misc 3-k
4				
5				
6	+5 VDC		1 IMTM4-6	1 IMTM6-6
7		Parallel Rd	1 IMTM4-7	1 IMTM6-7
8		Serial Rd		1 Prog T-11
9		Tape 80000	1 IMTM4-9	1 IMTM6-9
10		MA 80000	1 Conn C(A)-b	1 OM7-36
11		MB 80000	1 Conn C(B)-b	1 OM12-36
12		Gnd (int)		
13		B control	1 IMTM4-13	1 IMTM6-13
14		A control	1 IMTM4-14	1 IMTM6-14
15		Gnd (int)		
16		MB 40000	1 Conn C(B)-a	1 OM12-21
17		MA 40000	1 Conn C(A)-a	1 OM7-19
18		Tape 40000	1 IMTM4-18	1 IMTM6-18
19		Tape 20000	1 IMTM4-19	1 IMTM6-19
20		MA 20000	1 Conn C(A)-K	1 OM6-36
21		MB 20000	1 Conn C(B)-K	1 OM4-36
22		→ Gnd (int)		
23		Core 10000	1 Conn Core-T	
24		MB 10000	1 Conn C(B)-J	1 OM3-36
25		MA 10000	1 Conn C(A)-J	1 OM6-19
26		Tape 10000	1 IMTM4-26	1 IMTM6-26
27		BCD 80000 out		1 DM1-P
28		BCD 10000 out		1 DM1-B
29		BCD 20000 out		1 DM1-2
30		BCD 40000 out		1 DM1-9
31	Gnd		1 IMTM4-31	1 IMTM6-31
32				
33				
34				
35				

Data Boards
IMTM 6

Pin			In From	Out To
1				
2				
3				
4				
5				
6	+5 VDC		1 IMTM5-6	1 IMTM7-6
7		Parallel Rd	1 IMTM5-7	1 IMTM7-7
8		Serial Rd		1 Prog T-10
9		Tape 800000	1 IMTM5-9	1 IMTM7-9
10		MA 800000	1 Conn C(A)-d	1 OM5-36
11		MB 800000	1 Conn C(B)-d	1 OM11-36
12		Gnd (int)		
13		B control	1 IMTM5-13	1 IMTM7-13
14		A control	1 IMTM5-14	1 IMTM7-14
15		Gnd (int)		
16		MB 400000	1 Conn C(B)-c	1 OM11-20
17		MA 400000	1 Conn C(A)-c	1 OM5-19
18		Tape 400000	1 IMTM5-18	1 IMTM7-18
19		Tape 200000	1 IMTM5-19	1 IMTM7-19
20		MA 200000	1 Conn C(A)-M	1 OM2-36
21		MB 200000	1 Conn C(B)-M	1 OM10-36
22		Gnd (int)		
23		Gnd (int)		
24		MB 100000	1 Conn C(B)-L	1 OM10-20
25		MA 100000	1 Conn C(A)-L	1 OM1-36
26		Tape 100000	1 IMTM5-26	1 IMTM7-26
27		BCD 800000 out		1 DM1-14
28		BCD 100000 out		1 DM1-3
29		BCD 200000 out		1 DM1-4
30		BCD 400000 out		1 DM1-L
31	Gnd		1 IMTM5-31	1 IMTM7-31
32				
33				
34				
35				

Data Boards
IMTM 7

Pin		In From	Out To
1	from level conv core sign at +5V level		1 IMTM7-23
2	from level conv encode signal at +5V level		1 Prog A-19
3	tied to Pin 6 on Board (+5V)		
4	to level conv core sign out (at -12V)		1 Conn Core-W
5	to level conv encode signal out (at -12V)		1 Conn Core-X
6	+5 VDC	1 IMTM6-6	1 DM7-4
7	Parallel Td	1 IMTM6-7	
8	Serial Rd		1 Prog T-9
9	Tape 8 (Sign)	1 IMTM6-9	
10			
11	Int. Short to Gnd		
12			
13	B control	1 IMTM6-13	
14	A control	1 IMTM6-14	
15			
16	Int. Short to Gnd		
17			
18	Tape 4 (Sign)	1 IMTM6-18	
19	Tape 2 (Sign)	1 IMTM6-19	
20			
21	Int. Short to Gnd		
22			
23	Core Sign	1 IMTM7-1	
24	MB Sign	1 Conn C(B)-h	1 OM8-20
25	MA Sign	1 Conn C(A)-h	1 OM1-18
26	Tape 1 (Sign)	1 IMTM6-26	
27			
28	Sign ($\substack{1=-\\0=+}$)		1 OM8-5
29			
30			
31	Gnd	1 IMTM6-31	1 OM6-3
32			
33			
34			
35			

Data Boards

DM 7 (EECO9001)

Pin		In From	Out To
1			
2			
3			
4	+5 VDC	1 IMTM7-6	1 DM5-4
5	-5 VDC	1 Conn COUNT(A)-P	1 DM5-5
6,7,8 NOT USED			
9			1 DM6-4
10 through 16 NOT USED			
17			1 DM6-5
18			
19			
20	Gnd+	1 Gnd T.S.	
21,22,23,24 NOT USED			
25			1 DM6-30
26,27 NOT USED			
28			1 DM5-12
29,30,31,32 NOT USED			
33			1 DM6-35
34			
35			

DM 6 (EECO IDA0255)

1			
2			
3	Gnd	1 IMTM7-31	1 DM4-3
4		1 DM7-9	
5		1 DM7-17	
6			1 DM2-A
7			
8			
9			
10	-12 VDC	1 -12VDC T.S.	1 DM4-10
11 through 17 NOT USED			
18			1 DM2-1
19			
20 through 26 NOT USED			
27			1 DM2-2
28,29 NOT USED			
30		1 DM7-25	
31			
32	+12 VDC	1 Prog A-32	1 DM4-32
33			
34			1 DM2-B
35			

Data Boards
DM 5 (EECO IDA9001)

Pin		In From	Out To
1			
2			
3			
4	+5 VDC	1 DM7-4	1 DM3-D
5	-5 VDC	1 DM7-5	
6			1 DM3-9
7			
8			
9			1 DM4-4
10			
11			
12		1 DM7-28	
13 through 16 NOT USED			
17			1 DM4-5
18 through 24 NOT USED			
25			1 DM4-30
26 through 32 NOT USED			
33			1 DM4-35
34			
35			

DM 4 (EECO IDA0255)

Pin		In From	Out To
1			
2			
3	Gnd	1 DM6-3	1 DM3-B
4		1 DM5-9	
5		1 DM5-17	
6			1 DM2-8
7			
8			
9			
10	-12 VDC	1 DM6-10	1 DM3-5
11 through 17 NOT USED			
18			1 DM2-9
19 through 26 NOT USED			
27			1 DM2-10
28			
29			
30		1 DM5-25	
31			
32	+12 VDC	1 DM6-32	1 DM3-3
33			
34			
35		1 DM5-33	

Data Boards
DM 3

Pin			In From	Out To
1	+28 VDC		1 +28 VDC T.S.	
3	+12 VDC		1 DM4-32	1 OM1-3 G.D.-1
5	-12 VDC		1 DM4-10	
7				
9		DM analog in	1 DM5-6	
11		DN 1 lamp line	1 M1-20	
13		DN 4 lamp line	1 M1-22	
15		control "2"		1 DM2-14
17		DN switch common	Common	
B	Gnd		1 DM4-3	1 DM1-1
D	+5 VDC		1 DM5-4	1 DM2-V
F		DM overflow in		1 DM2-U
J		DM overflow out	1 DM overflow lamp	
L		DN 2 lamp line	1 M1-26	
N		DM output	Analog SW-25	
R		control "4"		1 DM2-R
T		control "1"		1 DM2-12
V		init reset	1 ES2-P, SWR2-5	

Data Boards
DM 2

Pin			In From	Out To
1		(2)	1 DM6-18	
2		(4)	1 DM6-27	
3		DM 4		1 DM1-8
4		DM 2		1 DM1-A
5				
6				
7				
8		(10)	1 DM4-6	
9		(20)	1 DM4-18	
10		(40)	1 DM4-27	
11		(80)	1 DM4-34	
12		TM 10	1 OM17-9	1 DM1-F
13		control 1	1 DM3-T	1 DM1-T
14		control 2	1 DM3-15	1 DM1-U
15		DM 20		1 DM1-H
16		clear DM	1 Prog A-25	
17		DM 40		1 DM1-12
18	Gnd		1 ALG-18	
A		(1)	1 DM6-6	
B		(8)	1 DM6-34	
C		DM 8		1 DM1-N
D				
E				
F				
H				
J				
K				
L		TM 1000	1 OM13-5	1 DM1-D
M		TM 100	1 OM15-9	1 DM1-5
N		TM 10000	1 OM3-19	1 DM1-B
P		TM 1	1 IMTM1-28	1 OM19-9
R		control 4	1 DM3-R	1 DM1-17
S		DM 10		1 DM1-7
T		DM rd TM	1 Prog A-10	
U		DM 80	1 DM3-F	1 DM1-16
V	+5 VDC		1 DM3-D	1 DM1-18

Data Boards
DM 1

Pin		In From	Out To
1	Gnd	1 DM3-B	1 ALG-18
2	20000	1 IMTM5-29	1 OM4-19
3	100000	1 IMTM6-28	1 OM10-5
4	200000	1 IMTM6-29	1 OM10-21
5	100	2{ IMTM3-28 DM2-M	
6	20	1 IMTM2-29	1 OM17-18
7	(10)	1 DM2-S	
8	(4)	1 DM2-3	
9	40000	1 IMTM5-30	1 OM12-5
10	400	1 IMTM3-30	1 OM16-9
11	40	1 IMTM2-30	1 OM18-9
12	(40)	1 DM2-17	
13	8000	1 IMTM4-27	1 OM14-21
14	800000	1 IMTM6-27	1 OM11-21
15	8	1 IMTM1-27	1 OM20-18
16	(80)	1 DM2-U	
17	control 4	1 DM2-R	
18	+5 VDC	1 DM2-V	1 ALG-7
A	(2)	1 DM2-4	
B	10000	2{ IMTM5-28 DM2-N	
C	2000	1 IMTM4-29	1 OM13-21
D	1000	2{ IMTM4-28 DM2-L	
E	200	1 IMTM3-29	1 OM15-18
F	10	2{ IMTM2-28 DM2-12	
H	(20)	1 DM2-15	
J	2	1 IMTM1-29	1 OM19-18
K	4000	1 IMTM4-30	1 OM14-5
L	400000	1 IMTM6-30	1 OM11-5
M	4	1 IMTM1-30	1 OM20-9
N	(8)	1 DM2-C	
P	80000	1 IMTM5-27	1 OM12-22
R	800	1 IMTM3-27	1 OM16-18
S	80	1 IMTM2-27	1 OM18-18
T	control 1	1 DM2-13	
U	control 2	1 DM2-14	
V	not used		

Data Boards
ALG

Pin			In From	Out To
1		K=2,3,6,7		1 OM4-33
2				
3				
4		K=5		1 S_KB-5
5				
6				
7	+5 VDC		1 OM20-37 1 DM1-18	
8		K=3		1 S_KB-3
9				
10				
11				
12				
13				
14		K=1,4,5	1 RR4-5 (Conn LOGIC(I)-8)	
15				
16				
17				
18	Gnd		1 DM1-1	1 DM2-18
A		K=4,5,6,7		1 DM2-18
B		K=7		1 S_KB-7
C		K=6		1 S_KB-6
D				
E		K=4		1 S_KB-4
F				
H		K=2,4,6	1 RR7-15 (Conn LOGIC(I)-10)	
J		K=1,3,5,7	1 RR7-13 (Conn LOGIC	1 OM3-33
K		K=2	(I)-9)	1 S_KB-2
L				
M		K=1		1 S_KB-1
N				
P				
R				
S				
T				
U				
V				

Data Boards
Program A

Pin			In From		Out To
1	MB Hold		1 Conn COUNT(B)-e		
2	C Logic prog		1 OR2-5	(Conn LOGIC(P)-5)	
3	CC=cpy		1 ES1-H	(Conn ES-31)	
4	Parallel rd				1 IMTM1-7
5	ρ=7		1 Gnd	(Conn ES-20)	1 Prog B-27
6	ρ=3		1 ES2-T	(Conn ES-16)	1 Prog B-23
7	Advance				1 IMTM1-14
8	Init Tape rd				1 Prog T-15
9	B driver				1 IMTM1-13
10	DM rd TM				1 DM2-T
11	ω=1-4, 7-8		1 +5V	(Conn LOGIC(P)-10)	
12	COB		1 OR4-33	(Conn LOGIC(P)-6)	
13	COA		1 SWR1-13	(Conn LOGIC(P)-7)	
14	CHA		1 Conn Logic (P)-9 1 SWR1-P		
15	CHB		1 Gnd	(Conn LOGIC(P)-8)	
16	Sample X_2, Y_2		1 Interface-7	(Conn LOGIC(I)-14)	
17	ρ=10		1 ES2-S	(Conn ES-23)	1 Prog C-32
18	Tape rd reinit				1 Prog T-34
19	2114 Encode				1 IMTM7-2
20	Gnd	Gnd	1 Gnd T.S.		1 IMTM1-31
21	+5 VDC	+5 VDC	1 +5 VDC T.S.		1 IMTM1-6
22	ρ=8		1 ES2-17	(Conn ES-21)	1 Prog B-25
23	ρ=9		1 Conn ES-22		1 Prog B-24
24	ρ=6		1 Conn ES-19		1 Prog C-13
25	Initiate		1 Interface-22	(Conn LOGIC(P)-16)	1 DM2-16
26	2114 run				1 IMTM5-1
27	"AND" 1 reinitiate		1 OR4-14	(Conn LOGIC(I)-13)	1 Prog C-7
28	MA hold		1 Conn COUNT (A)-e		
29	ω=5,6		1 Conn Logic (P)-1		
30	Duplex rd		1 IMTM3-4		
31	Tape Write (Reinitiate A)				1 Misc 3-B
32	-12 VDC	+12 VDC	1 +12 VDC T.S.		1 DM6-32
33	Print TM				1 IMTM4-1
34	RC=C		1 S_{RCB}C-COM	(Conn ES-26)	1 Prog C-12
35	RC=P		1 S_{RCP}C-COM	(Conn ES-29)	1 Prog B-29
36	RC=P/W		1 Gnd	(Conn ES-28)	1 Prog B-30
37	RC=NR		1 Gnd	(Conn ES-30)	1 TBD
38	α=V		1 SWR1-U	(Conn LOGIC(P)-11)	1 TBD
39	GR		1 UOR5-29	(Conn LOGIC(P)-3)	1 Prog B-34
40	RC=W		1 S_{RCW}C-COM	(Conn ES-27)	1 Prog B-33
41	Init Tape Write TM		1 Prog T-35		

Data Boards
Program C

Pin		In From	Out To
1	Step Pulse to Gap Det		G.D.-80
2	2114 run from "c"		1 IMTM5-2
3	Step Sig in	1 Prog T-13	
4	Tape Step	1 Conn Tape c	
5	2114 load address signal	1 Misc 3-10 (Tie Pt)	
6	OM "4" driver out		1 OM1-40
7	Reinit from Prog A	1 Prog A-27	
8	G.R.	1 Prog B-34	1 Prog T-25 1 Misc 2-7
9	OM "4" driver in	1 Prog B-7	
10	"1" driver out		1 OM1-38
11	InitProg C	1 OR3-34 (Conn LOGIC(C)-6)	
12	RC=C	1 Prog A-34	1 Prog B-39
13	ρ=6	1 Prog A-24	
14	OM "1" driver in	1 Prog B-6	
15	OM "B" driver out		1 OM1-1
16	70-Counter in	1 Prog T-13	
17	Write (-12 V)		1 Conn Tape-H
18	-12 VDC		1 Prog T-2
19	OM "8" driver in	1 Prog B-5	
20	Gnd	1 Prog A-20	1 Prog T-1
21	+5 VDC	1 Prog A-21	1 Prog T-41
22	OM "2" driver out		1 OM1-39
23	69-Sync out		1 Prog T-4
24	68-Sync out	1 Misc 3-V	1 GD-16
25	Initiate	1 D25-1 (Conn M-C(White))	1 Prog T-32
26	OM "2" driver in	1 Prog B-4	
27	OM "$\bar{8}$" driber out		1 OM1-41
28	End-of-File Detector "2"		1 IMTM1-2
29	End-of-File Detector "1"		1 IMTM1-1
30	Write or P/W	1 Prog B-11	1 Prog T-19
31	OM "$\bar{8}$" driver in	1 Prog B-3	
32	ρ=10 "Read" command	1 Prog A-17	1 Misc 2-5 1 Prog T-24
33	EOF sig	1 Prog T-7	
34	End-of-File Detector "4"		1 IMTM1-34
35	End-of-File Detector "8"		1 IMTM1-35
36	Record Count CKT		1 ES1-C (Conn ES-25)
37	To Tape "EOF"	1 Conn Tape-K	
38	Tape BOT Indicator	1 Conn Tape-P	
39	Tape BOT Input	1 Conn Tape-M	
40	Tape System Reset	1 Conn Tape-N	
41	Tape Hi Speed Input	1 Conn Tape-F	1 Conn ES-9

Note: Includes B-Prog drivers, T-Prog, 69-Counter & C-Programmer itself

Data Boards
Program T

Pin		In From	Out To
1	Gnd	1 Conn Tape-E 1 Prog C-20	
2	-12 VDC	1 Prog C-18	1 TSR12-V
3	Tape EOR	1 Conn Tape-J	
4	69-Sync (70 Counter)	1 Prog C-23	
5	Read Lines/TM Digits (1)	1 IMTM1-8	
6	Read Lines/TM Digits (4)	1 IMTM4-8	
7	EOF Sig		1 Prog C-33
8	Read Lines/TM Digits (2)	1 IMTM2-8	
9	Read Lines/TM Digits (7)	1 IMTM7-8	
10	Read Lines/TM Digits (6)	1 IMTM6-8	
11	Read Lines/TM Digits (5)	1 IMTM5-8	
12	70-Counter (In)		1 Prog C-16
13	Tape Step		1 Prog C-3
14	Tape Write Driver		1 TSR12-K
15	Init. Prog A Signal (Read)	1 Prog A-8	
16	Init Reset	1 Prog B-19	
17	Control Line (4)/TW Shift Multip.		1 TSR12-3
18	Control Line (8)/TW Shift Multip.		1 TSR12-D
19	RC=PW or W	1 Prog C-30	
20	DO NOT USE		
21	DO NOT USE		
22	Control Line(1)/TW Shift Multip.		1 TSR12-5
23	Control Line(2)/TW Shift Multip.		1 TSR12-4
24	ρ=10	1 Prog C-32	1 Prog T-39
25	General Reset	1 Prog C-8	
26	Read Lines/TM Digists (3)	1 IMTM3-8	
27	To Gap Det.	1 G.D.-8	
28	EOR (+5V) to logic		1 Misc A-12(Conn M-B(B1
29	RC=C	1 Prog B-12	(GAP DET-16)
30	Direct Clock	1 G.D.-2	
31	Reinit. Prog "A" after TW	1 Misc 3-T (PROG A-3)	
32	Initiate	1 Prog C-25	
33	RC=W	1 Prog B-32	
34	Reinit. Prog "A" after TR	1 Prog A-18	
35	Init Prog "A" Signal TW		1 Prog A-41
36	Init Prog "B" Signal TW		1 Prog B-28
37	RC=P/W	1 Prog B-30	
38	Reinit. Prog "B" after TW	1 Prog B-17	
39	ρ=10	1 Prog T-24	1 G.D.-5
40	Tape Clock	1 G.D.-8	
41	+5 VDC	1 Prog C-21	

Data Boards
TSR 12

Pin		In From	Out To
1	+5 VDC	1 Misc 2-H	1 TSR48-1
2	Write Tape "2"	1 Conn Tape-B	
3	C (4)	1 Prog T-17	1 TSR48-3
4	B (2)	1 Prog T-23	
5	A (1)	1 Prog T-22	
6	C3 B1	1 OM6-6	
7	C4 B1	1 OM8-6	
8	C6 B1	1 OM3-11	
9	C7 B1	1 OM13-6	
10			
11			
12			
13	C10 B2	1 OM19-11	
14	C4 B2	1 OM8-11	
15	C8 B2	1 OM15-11	
16	C6 B2	1 OM4-11	
17	C1 B2	1 OM2-6	
18	Write Tape "1"	1 Conn Tape-A	
A	Gnd	1 Misc 2-A	1 TSR48-A
B	C1 B1	1 OM1-6	
C	C2 B1	1 OM1-11	
D	ST (B)	1 Prog T-18	1 TSR48-D
E	C10 B1	1 OM19-6	
F	C9 B1	1 OM17-6	
H	C5 B1	1 OM10-6	
J	C8 B1	1 OM15-6	
K	Write Gate from TW Controller	1 Prog T-14	1 TSR 48-K
L			
M			
N			
P	C3 B2	1 OM6-11	
R	C9 B2	1 OM17-11	
S	C5 B2	1 OM10-11	
T	C7 B2	1 OM13-11	
U	C2 B2	1 OM2-11	
V	-12 VDC	1 Prog T-2	
		1 TSR 48-V	

Data Boards
TSR 48

Pin		In From	Out To
1	+5	1 TSR12-1	1 G.D.-A
2	Write Tape "8"	1 Conn Tape-D	
3	C (4)	1 TSR12-3	
4	B (2)	1 TSR12-4	
5	A (1)	1 TSR12-5	
6	C3 B4	1 OM7-6	
7	C4 B4	1 OM9-6	
8	C6 B4	1 OM12-6	
9	C7 B4	1 OM14-6	
10			
11			
12			
13			
14	C10 B8	1 OM20-11	
15	C4 B8	1 OM9-11	
16	C6 B8	1 OM16-11	
17	C1 B8	1 OM4-6	
18	Write Tape "4"	1 Conn Tape-C	
A	Gnd	1 TSR12-A	1 G.D.-B
B	C1 B4	1 OM3-6	
C	C2 B4	1 OM5-6	
D	St (8)	1 TSR12--D	
E	C10 B4	1 OM20-6	
F	C9 B4	1 OM18-6	
H	C5 B4	1 OM11-6	
J	C8 B4	1 OM16-6	
K	Write Gare from TW Controllwe	1 TSR12-K	
L			
M			
N			
P	C3 B8	1 OM7-11	
R	C9 B8	1 OM18-11	
S	C5 B8	1 OM11-11	
T	C7 B8	1 OM14-11	
U	C2 B8	1 OM5-11	
V	-12 VDC	1 OM20-3	1 TSR12-V

Misc 1

Board	Pin	Function	Out To	In From
Misc 1	1	Gnd	1 Filt #1-35	
	2	+28	1 K1 Coil +	
	3	PEP filter lamp line	1 filter a, b lamps common	
	4	ξ,μ lamps line	1 ξ,μ lamps common	
	5	κ lamps line	1 SκA-common	1 DD2-9
	6	ζ lamp line	1 $\zeta_A\zeta_B$ lamps common	
	7			
	8	η,θ lamp line	1 $\eta_{AB}\theta_{AB}$ lamps common	
	9			
	10	PEP dimmer power input	1 PEP dimmer-1,5	
	11	PEP dimmer control	1 PEP dimmer-2	
	12	logic PEP lamps dimmer output	1 Misc 1-12 (Conn LOGIC(I)-12)	
	13			
	14			
	15			
	16			
	17	Clock lamp int	1 S cl. B-C	
	18	Init lamp int	1 Init lamps common	
	19	Abort lamp int	1 Abort lamps common	
	20	Reject lamp int	1 ν lamps $\bar{A}\bar{B}$	
	21			
	22			
	23			
	24	Red/Blue lamps PTG	OBSOLETE	
	25	Ident dimmer control	1 Ident dimmer-2	
	26	Col, Clk, Shut line	OBSOLETE	
	27	PTG filts Lamp line	OBSOLETE	
	28	PTG dimmer power input	OBSOLETE	
	29	Ident dimmer power input	1 Ident dimmer 1,5	
	30	PTG dimmer control	OBSOLETE	
	31	Ident lamps line	1 Ident lamps common	
	32	Display dimmer regulator	1 Disp dimmer-1,5	
	33			
	34	Display dimmer power input	1 Disp dimmer-2	
	35	Display dimmer output	1 M1-32 (Conn LOGIC(I)-11)	

Misc 2

Board	Pin	Function	Out To	In From
Misc 2	1	ζA 1 BCD	1 OM3-32	
	2	ζA 2 BCD	1 OM4-32	
	3	ζB 2 BCD	1 OM17-31	
	4	$\zeta A=2$		1 SζA/100 B-C
	5	$\zeta B=1$		1 SζB/10 B-C
	6	$\zeta B=2$		1 SζB/100 B-C
	7	General Reset	1 DD2-K	1 Prog C-8
	8	SνA-C	1 SνA-C	
	9	Tape out BCD "8" to Lev. Conv.	1 IMTM1-9	
	10	$\tau=4$ BCD		1 OM5-32
	11	Filt #5 Lamp 5c		OBSOLETE
	12	Filt #5 Lamp 4c		OBSOLETE
	13	BCD 8-out		1 IMTM1-34
	14	BCD 4-out		1 IMTM1-35
	15	BCD 1-out		1 IMTM1-1
	16	$\tau=2$ BCD		1 OM2-22
	17	Filt #5 Lamp 3c		OBSOLETE
	18	Filt #5 Lamp 1c		OBSOLETE
	A	Gnd	1 TSR12-A 1 DD2-A	1 T.S.
	B	$\zeta A=3$		1 A/1000 B-C
	C	ζB 1 BCD	1 OM17-17	
	D	$\zeta B=3$		1 S B/1000 B-C
	E	$\zeta A=1$		1 S A/10 B-C
	F	$\nu=1$ BCD	1 OM19-14	
	H	+5	1 TSR12-1 1 DD2-1	1 T.S.
	J	Tape out BCD "2" to Lev Conv.	1 IMTM1-19	
	K	Tape out BCD "1" to Lev. Conv.	1 IMTM1-26	
	L	Filt #6 Lamp 7c		OBSOLETE
	M	Filt #6 Lamp 6c		OBSOLETE
	N	Tape out BCD "4" to Lev. Conv.	1 IMTM1-18	
	P	ν Lamps $\bar{C}\bar{D}$	1 S Lamps $\bar{C}\bar{D}$	
	R	BCD 2-out		1 IMTM1-2
	S	$\zeta=10$		1 Prog C-32
	T	Filt #5 Lamp 2c		OBSOLETE
	U	$\tau=1$ BCD		1 OM1-22
	V	Filt #6 Lamp 9c		1 Filt 6-13

Misc 3

Board	Pin	Function	Out To	In From
Misc 3	1			
	3			
	5			
	7	print command out from driver	1 Conn PRINT-23	
	9			
	11			
	13			
	15	print command in from driver		1 IMTM4-34
	17			
	B			
	D			
	F			
	J			
	L			
	N	Gnd		OBSOLETE
	R			
	T			
	V			
	(K)	tie pt 2114 Run	1 Conn CORE-AA	1 IMTM5-3
	(10)	tie pt 2114 Load Address	2{Conn CORE-BB Prog C-5	

Data Panel Switches

Switch	Deck	Pin		Out To	In From
INIT	A	C			1 Conn Logic (I)-1
		NO	+5 VDC		
(momentary)		NC	Gnd		
	B	C			
		NO			
		NC			
ABORT	A	C			1 Conn Logic (I)-4
		NO	+5 VDC		
(momentary)		NC	Gnd		
	B	C			
		NO			
		NC			
Algebra	A	1		1 -T/2 lamp	
(K)		2		1 +TA lamp	
		3		1 -T/2 A lamp	
		4		1 +T lamp	
		5		1 +T/2 lamp	
		6		1 -TA lamp	
		7		1 +T/2 A lamp	
		C	PEP dimmer ckt		1 Misc 1-5
	B	1			1 ALG-M
		2			1 ALG-K
		3			1 ALG-8
		4			1 ALG-E
		5			1 ALG-4
		6			1 ALG-C
		7			1 ALG-B
		C	Gnd		
	C	136	+5 VDC		
		2457	Gnd		
		C			1 Conn Logic (I)-2
	D	136	Gnd		
		2457	+5 VDC		
		C			1 Conn Logic (I)-3

Switches in Data Panel

Switch	Deck	Pin		Out To	In From
Sigma (σ)		1		1 OM3-20	
(IDENT)		2		1 OM4-20	
σ is the switch		4		1 OM12-8	
on the left looking		8		1 OM12-23	
at the front of		10		1 OM10-8	
panel		20		1 OM10-22	
		40		1 OM11-8	
		80		1 OM11-22	
		100		1 OM8-8	
		200		1 OM8-22	
		400		1 OM9-8	
		800		1 OM9-22	
		1000		1 OM6-8	
		2000		1 OM6-21	
		4000		1 OM7-8	
		8000		1 OM7-21	
		C	+5		
		lamp a }			1 Misc 1-31
		lamp b			
Pi (π)		1		1 OM19-5	
(IDENT)		2		1 OM19-22	
		4		1 OM20-5	
		8		1 OM20-22	
		10		1 OM17-5	
		20		1 OM17-21	
		40		1 OM18-5	
		80		1 OM18-21	
		100		1 OM15-5	
		200		1 OM15-21	
		400		1 OM16-5	
		800		1 OM16-21	
		1000		1 OM13-8	
		2000		1 OM13-22	
		4000		1 OM14-8	
		8000		1 OM14-22	
		C	+5		
		lamp a }			1 Misc 1-31
		lamp b			
Xi (ξ)		1		1 OM17-5	
(COMMENTS SW.)		2		1 OM17-35	
		4		1 OM18-15	
		8		1 OM18-35	
		10		1 OM15-15	
		20		1 OM15-35	
		40		1 OM16-15	
		80		1 OM16-35	
		C	+5		
		lamp a }			1 Misc 1-4
		lamp b			

Switches in Data Panel

Switch	Deck	Pin		Out To	In From
θ_A		1		1 OM10-17	
(FINE GAIN CONT.)		2		1 OM10-31	
		4		1 OM11-17	
		8		1 OM11-31	
		C	+5		
		lamp a }			1 Misc 1-8
		lamp b }			
θ_B		1		1 OM15-17	
(FINE GAIN CONT.)		2	OBSOLETE	1 OM15-31	
		4		1 OM16-17	
		8		1 OM16-31	
		C	+5		
		lamp a }			1 Misc 1-8
		lamp b }			
μ		1		1 OM13-18	
(NATURE OF DATA)		2		1 OM13-34	
		4		1 OM14-18	
		8		1 OM14-34	
		C	+5		
		lamp a }			1 Misc 1-4
		lamp b }			
ηA		1 }		1 Conn Exit-2	1 OM8-17
(COARSE GAIN CONT)		2 }	chained		
		4 }			
		8 }			
		C	+5		
		lamp a }			1 Misc 1-8
		lamp b }			
ηB		1 }		1 Conn Exit-3	1 OM13-16
(COARSE GAIN CONT)		2 }	chained		
		4 }			
		8 }		OBSOLETE	
		C	+5		
		lamp a }			1 Misc 1-8
		lamp b }			

Data Panel Switches

Filter Switch (Spring Toggle)

Switch	Pin		Out To	In From
S Filt #1	C	Gnd	TBD	
(a)	NO	+ (Red)	1 Conn Exit-8	
	NC	- (Grn)	1 Conn Exit-10	
S Filt #2	C	Gnd	TBD	
(b)	NO	+ (Red)	1 Conn Exit-12	
	NC	- (Grn)	1 Conn Exit-14	
S Filt #3	C	Gnd	TBD	
(PTG)	NO	+ (Red)	1 Conn Exit-7	OBSOLETE
	NC	- (Grn)	1 Conn Exit-9	
S Reject A	C			1 Misc 2-8
(Sν)	NO	Gnd		
	NC	+5		
	$\bar{A}\bar{B}$ Lamps			1 Misc 1-20
	$\bar{C}\bar{D}$ Lamps			1 Misc 2-P
	Common Side +28			
S Shut A	C			
(PTG)	NO		1 Conn Exit-17	OBSOLETE
	NC		1 Conn Exit-18	
		Gnd		
B	C			
	NO			
	NC			OBSOLETE
	$\bar{A}\bar{B}$	Lamps	1 Cal Lamps $\bar{A}\bar{B}$	1 Misc 1-26
	$\bar{C}$	Lamp	1 Conn Exit-19	
	$\bar{D}$	Lamp	1 Conn Exit-20	
S Cal A	C		1 S Clo. A-C	1 Misc 1-24
(PTG)	NO		1 Cal Lamps $\bar{C}\bar{D}$	
	NC			
		Gnd		
B	C		1 Ptg. Dimmer-2	
	NO	OBSOLETE	1 Conn Exit-15	
	NC			
	$\bar{A}\bar{B}$	Lamps	1 Clock Lamps $\bar{A}\bar{B}$	1 Shut Lamps $\bar{A}\bar{B}$
	$\bar{C}\bar{D}$	Lamp		1 S Cal A-NO
S Clock A	C		1 Frame Lamps $\bar{A}\bar{B}\bar{C}\bar{D}$	1 S Cal A-C
(PTG)	NO	OBSOLETE	1 Conn Exit-16	
	NC			
	$\bar{A}\bar{B}$ Lamps			1 Cal Lamps $\bar{A}\bar{B}$
	$\bar{C}\bar{D}$ Lamps			1 S Clo A-NO

Data Panel Switch

(Dimmer CKT)

Switch	Pin		Out To	In From
Disp. Dim.	3	Gnd		
	2			1 Misc 1-34
	1,5			1 Misc 1-32
	4	+28		
Pep. Dim.	3	Gnd		
	2			1 Misc 1-11
	1,5			1 Misc 1-10
	4	+28		
PTG. Dim.	3	Gnd		
	2	OBSOLETE		1 Misc 1-30
	1,5			1 Misc 1-28
	4	+28		
Ident. Dim.	3	Gnd		
	2			1 Misc 1-25
	1,5			1 Misc 1-29
	4	+28		
Calib. Dim.	3	Gnd		
	2	OBSOLETE		1 S Cal B-C
	1,5			
	4	+28		

Data Panel Lamps

Switch	Pins	Out To	In From
Filter Bank "C"			
(PTG)	Lamp #1C	1 Filt 5-34	
	Lamp #2C	1 Filt 5-27	
	Lamp #3C	1 Filt 5-19	
	Lamp #4C	1 Filt 5-13	
	Lamp #5C	1 Filt 5-5	OBSOLETE
	Lamp #6C	1 Filt 6-34	
	Lamp #7C	1 Filt 6-27	
	Lamp #8C	1 Filt 6-19	
	Lamp #9C	1 Filt 6-13	
	Lamp #10C	1 Filt 6-5	
	"C" Lamps Common		1 Misc 1-27
Filter Bank "A"			
(P.C.)	Lamp #1A	1 Filt 1-32	
	Lamp #2A	1 Filt 1-10	
	Lamp #3A	1 Filt 1-12	
	Lamp #4A	1 Filt 1-14	
	Lamp #5A	1 Filt 1-16	
	Lamp #6A	1 Filt 1-18	
	Lamp #7A	1 Filt 1-20	
	Lamp #8A	1 Filt 1-25	
	Lamp #9A	1 Filt 1-23	
	Lamp #10A	1 Filt 1-28	
	A & B Lamps Common		1 Misc 1-3
Filter Bank "B"			
(P.C.)	Lamp #1B	1 Filt 2-S	
	Lamp #2B	1 Filt 2-U	
	Lamp #3B	1 Filt 2-P	
	Lamp #4B	1 Filt 2-M	
	Lamp #5B	1 Filt 2-K	
	Lamp #6B	1 Filt 2-H	
	Lamp #7B	1 Filt 2-13	
	Lamp #8B	1 Filt 2-15	
	Lamp #9B	1 Filt 2-C	
	Lamp #10B	1 Filt 2-A	
	A & B Lamps Common		1 Misc 1-3

Data Panel Lamps

Switch	Pins		Out To	In From
INIT	$\bar{A}\bar{B}\bar{C}\bar{D}$	+28 VDC		
	common gnd (Temp)	gnd		
ABORT	$\bar{A}\bar{B}\bar{C}\bar{D}$	+28 VDC		
	common gnd (Temp)	gnd		
Algebra	-T/2			1 S_KA-1
	+TA			1 S_KA-2
	-T/2 A			1 S_KA-3
	+T			1 S_KA-4
	+T/2			1 S_KA-5
	-TA			1 S_KA-6
	+T/2 A			1 S_KA-7
	common side (Temp)	gnd	1 Temp Gnd T.S.	
Code Lamps				
	CYCLE			1 Conn Logic (I)-6
	INVALID CODE			1 Conn Logic (I)-5
	OVERFLOW			1 Conn Logic (I)-7
	common side	+28 VDC		
PTG Lamps	Frame		1 Conn Exit-13	OBSOLETE
	Common side	gnd		

Data Panel Switches

Switch	Deck	Pin		Out To	In From
ζA	A	C	*Lamp chain	1 S ζA/10 A-C	1 S ζA Lamps $\bar{A}\bar{B}$ 1 Misc 1-6
(/1)					
		NO		1 S ζA/1 lamp $\bar{C}\bar{D}$	
		NC			
	B	C			
		NO			
		NC			
	C	C	+28		
		NO		1 S ζA/1 coil +	
		NC		1 S ζA/10 C-C	
	D	C		1 S ζA/10 D-NC	
		NO			1 S ζA/1 coil G
		NC			
		coil +			
(/10)	A	C		1 S ζA/100 A-C	1 S ζA/1 A-C
		NO		1 S ζA/10 lamp $\bar{C}\bar{D}$	
		NC			
	B	C		1 Misc 2-E	
		NO	+5		
		NC	Gnd	1 S ζA/100 B-NC	
	C	C			1 S ζA/1 C-NC
		NO		1 S ζA/10 coil +	
		NC		1 S ζA/100 C-C	
	D	C		1 S ζA/100 D-NC	
		NO			1 S ζA/10 coil G
		NC			1 S ζA/1 D-C
		coil +			
(/100)	A	C		1 S ζA/1000 A-C	1 S ζA/10 A-C
		NO		1 S ζA/100 lamp $\bar{C}\bar{D}$	
		NC			
	B	C		1 Misc 2-4	
		NO	+5		
		NC	Gnd	1 S ζA/1000 B-NC	1 S ζA/10-BU
	C	C			1 S ζA/10 C-NC
		NO		1 S ζA/100 coil +	
		NC		1 S ζA/1000 C-C	
	D	C		1 S ζA/1000 D-NC	
		NO			1 S ζA/100 coil G
		NC			1 S ζA/10 D-C
		coil +			
(/1000)	A	C			1 S ζA/100 A-C
		NO		1 S ζA/1000 lamp $\bar{C}\bar{D}$	
		NC			
	B	C		1 Misc 2-B	
		NO	+5		
		NC	Gnd		1 S ζA/100 B-NC
	C	C			1 S ζA/100 C-NC
		NO		1 S ζA/1000 coil +	
		NC			
	D	C	Gnd		1 S ζA/100 B-NC
		NO			1 S ζA/1000 coil G
		NC			1 S ζA/100 D-C
		coil +			

* Chain Lamps $\bar{A}\bar{B}$ on ζ Lamps /1, /10, /100 & /1000

Data Panel Misc

		Function	Out To	In From
Display Dimmer	Pin 1	Gnd		
	2			1 Misc 1-34
	3,5			1 Misc 1-32
	4	+28		
PEP Dimmer	Pin 1	Gnd		
	2			1 Misc 1-11
	3,5			1 Misc 1-10
	4	+28		

Terminal Strip in Data Section

Pin	1	Gnds
	2	Gnds
	3	Gnds
	4	Gnds
	5	Gnds
	6	Open
	7	Open
	8	+5
	9	+5
	10	Open
	11	+28
	12	+28
	13	+28
	14	+28
	15	Open
	16	+12
	17	Open
	18	Open
	19	-12
	20	Open
	21	Open

Power Runs

A) +5 VDC Pin 7 ALG Board to Pin 5 on OM 20

B) -12 VDC Pin 3 IMTM 3 to Pin 39 on OM 20

C) +12 VDC Pin 3 IMTM 4 to Pin 39 on OM 12

D) Gnd Pin 18 DM-2 to Pin 40 on OM 20

Focus Current Control and Readout

From	Function	To
Pin 1	Gnd	Gnd Bus
2		
3 through 22 NOT USED		
23	+15 VDC	+15 Bus
24		
25		
26		
27	Current Control	Current Control Pot-2
28		
29		
30		
31	-15 VDC	-15V Bus
32		
33		
34	Focus Meter Control	-Term on Focus Meter
35	Focus Current	Exit -

Data Panel Switches

OBSOLETE

Switch	Pin		Out To	In From
S Frame A (PTG)	C	+28		
	NO		1 Conn Exit 11	
	NC			
	Gnd			
B	C			
	NO			
	NC			
	$\bar{A}\bar{B}\bar{C}\bar{D}$ Lamps			1 S Clo A-C

Relay Card DATA

OBSOLETE

Relay	Deck	Pin		Function	In From	Out To
K1	A	C			1 BNC-DVM	
		NO				1 K2 A-C
		NC				1 Conn Logic (C)-3
	Coil	+	IN4001	28 V	1 Misc 1-2	1 K2 Coil +
		G		Driver	1 Prog B-36	
K2	A	C			1 K1 A-NO	
		NO				1 Conn Logic (I)-16
		NC			1 Conn Exit-1	
	Coil	+	IN4001	28 V	1 K1 Coil +	
		G		Driver	1 Prog B-31	

Data Panel Switches

OBSOLETE

Switch	Deck	Pin		Out To	In From
B (/1)	A	C	*Lamp chain	1 S ζB/10 A-C	1 S ζB lamp $\bar{A}\bar{B}$ 1 Misc 1-6
		NO		1 S ζB/1 lamp $\bar{C}\bar{D}$	
		NC			
	B	C			
		NO			
		NC			
	C	C	+28		
		NO		1 S ζB/1 coil +	
		NC		1 S ζB/10 C-C	
	D	C		1 S ζB/10 D-NC	
		NO			1 S ζB/1 coil G
		coil +			
(/10)	A	C		1 S ζB/100 A-C	1 S ζB/1 A-C
		NO		1 S ζB/10 lamp $\bar{C}\bar{D}$	
		NC			
	B	C		1 Misc 2-5	
		NO		1 S ζB/100 B-NO	
		NC	Gnd	1 S ζB/100 B-NC	
	C	C			1 S ζB/1 C-NC
		NO		1 S ζB/10 coil +	
		NC		1 S ζB/100 C-C	
	D	C		1 S ζB/100 D-NC	
		NO			1 S ζB/10 coil G
		NC			1 S ζB/1 D-C
		coil +			
(/100)	A	C		1 S ζB/1000 A-C	1 S ζB/10 A-C
		NO		1 S ζB/100 lamp $\bar{C}\bar{D}$	
		NC			
	B	C		1 Misc 2-6	
		NO	+5	1 S ζB/1000 B-NO	1 S ζB/10 B-NO
		NC	Gnd	1 S ζB/1000 B-NC	1 S ζB/10 B-NC
	C	C			1 S ζB/10 C-NC
		NO		1 S ζB/100 coil +	
		NC		1 S ζB/1000 C-C	
	D	C		1 S ζB/1000 D-NC	
		NO			1 S ζB/100 coil G
		NC			1 S ζB/10 D-C
		coil +			
(/1000)	A	C			1 S ζB/100 A-C
		NO		1 S ζB/1000 lamp $\bar{C}\bar{D}$	
		NC			
	B	C		1 Misc 2-D	
		NO	+5		1 S ζB/100 B-NO
		NC	Gnd	1 S ζB/1000 D-C	1 S ζB/100 B-NC
	C	C			1 S ζB/100 C-NC
		NO		1 S ζB/1000 coil +	
		NC			
	D	C	Gnd		1 S ζB/1000 B-NC
		NO			1 S ζB/1000 coil G
		NC			1 S ζB/100 D-C
		coil +			

* Chain lamps $\bar{A}\bar{B}$ on ζ lamps /1, /10, /100 & /1000

Data Boards
Filt 1

OBSOLETE

Pin	Function	In From	Out To
1			
2			
3			
4			1 Filt #2-31
5	Lamp 5a	1 Lamp 5a	1 DD2-15
6			
7			
8			
9			
10			
11			
12			
13	Lamp 4a	1 Lamp 4a	1 DD2-16
14			
15			
16			
17			
18			
19	Lamp 3a	1 Lamp 3a	1 DD2-18
20	-12	T.S.	1 Filt 2-20
21	+12	T.S.	1 Filt 2-21
22			
23			
24			
25			
26			
27	Lamp 2a	1 Lamp 2a	1 DD2-U
28			
29			
30			
31			
32	Filt a (pc) encode	1 Conn EXIT-4	1 Filt 2-32
33			
34	Lamp 1a	1 Lamp 1a	1 DD2-V
35	Gnd	1 Misc 1-1	1 Filt 2-35

Data Boards
Filt 2

OBSOLETE

Pin	Function	In From	Out To
1			
2			
3			
4			
5	Lamp 10a	1 Lamp 10a	
6			
7			
8			
9			
10			
11			
12			
13	Lamp 9a	1 Lamp 9a	
14			
15			
16			
17			
18			
19	Lamp 8a	1 Lamp 8a	1 DD2-J
20	-12	1 Filt 1-20	1 Filt 3-20
21	+12	1 Filt 1-21	1 Filt 3-21
22			
23			
24			
25			
26			
27	Lamp 7a	1 Lamp 7a	1 DD2-13
28			
29			
30			
31		1 Filt #1-4	
32	Filt a (pc) encode	1 Filt 1-32	
33			
34	Lamp 6a	1 Lamp 6a	1 DD2-14
35	Gnd	1 Filt 1-35	1 Filt 3-35

Data Boards
Filt 3

OBSOLETE

Pin	Function	In From	Out To
1			
2			
3			
4			1 Filt #4-31
5	Lamp 5b	1 Lamp 5b	1 DD2-P
6			
7			
8			
9			
10			
11			
12			
13	Lamp 4b	1 Lamp 4b	1 DD2-12
14			
15			
16			
17			
18			
19	Lamp 3b	1 Lamp 3b	1 DD2-6
20	-12	1 Filt 2-20	1 Filt 4-20
21	+12	1 Filt 2-21	1 Filt 4-21
22			
23			
24			
25			
26			
27	Lamp 2b	1 Lamp 2b	1 DD2-5
28			
29			
30			
31			
32	Filt b (pc) encode	1 Conn EXIT-6	1 Filt 4-32
33			
34	Lamp 1b	1 Lamp 1b	1 DD2-U
35	Gnd	1 Filt 2-35	1 Filt 4-35

Data Boards
Filt 4

Pin	Function	OBSOLETE In From	Out To
1			
2			
3			
4			
5	Lamp 10b	1 Lamp 10b	
6			
7			
8			
9			
10			
11			
12			
13	Lamp 9b	1 Lamp 9b	1 DD2-B
14			
15			
16			
17			
18			
19	Lamp 8b	1 Lamp 8b	1 DD2-F
20	-12	1 Filt 3-20	1 Filt 5-20
21	+12	1 Filt 3-21	1 Filt 5-21
22			
23			
24			
25			
26			
27	Lamp 7b	1 Lamp 7b	1 DD2-S
28			
29			
30			
31		1 Filt #3-4	
32	Filt b (pc) encode	1 Filt 3-32	
33			
34	Lamp 6b	1 Lamp 6b	1 DD2-R
35	Gnd	1 Filt 3-35	1 Filt 5-35

Data Boards
Filt 5

OBSOLETE

Pin	Function	In From	Out To
1			
2			
3			
4			1 Filt #6-31
5	Lamp 5c	1 Lamp 5c	1 Misc 2-11
6			
7			
8			
9			
10			
11			
12			
13	Lamp 4c	1 Lamp 4c	1 Misc 2-12
14			
15			
16			
17			
18			
19	Lamp 3c	1 Lamp 3c	1 Misc 2-17
20	-12	1 Filt 4-20	1 Filt 6-20
21	+12	1 Filt 4-21	1 Filt 6-21
22			
23			
24			
25			
26			
27	Lamp 2c	1 Lamp 2c	1 Misc 2-T
28			
29			
30			
31			
32	Filt c (PTG) Encode	1 Conn Exit-5	1 Filt 6-32
33			
34	Lamp 1c	1 Lamp 1c	1 Misc 2-18
35	Gnd	1 Filt 4-35	1 Filt 6-35

Data Boards
Filt 6

OBSOLETE

Pin	Function	In From	Out To
1			
2			
3			
4			
5	Lamp 10c	1 Lamp 10c	
6			
7			
8			
9			
10			
11			
12			
13	Lamp 9c	1 Lamp 9c	1 DD2-L 1 Misc 2-V
14			
15			
16			
17			
18			
19	Lamp 8c	1 Lamp 8c	1 DD2-10
20	-12	1 Filt 5-20	
21	+12	1 Filt 5-21	
22			
23			
24			
25			
26			
27	Lamp 7c	1 Lamp 7c	1 Misc 2-L
28			
29			
30			
31		1 Filt #5-4	
32	Filt c (PTG) Encode	1 Filt 5-32	
33			
34	Lamp 6c	1 Lamp 6c	1 Misc 2-M
35	Gnd	1 Filt 5-35	1 Misc 3-N

DD 2

OBSOLETE

Pin	Function	In From	Out To
1	+5	1 Misc 2-H	
2	BCD $\gamma 8$	1 OM5-35	
3	Spare		
4	Spare		
5	Filt #3 Lamp 2b	1 Filt 3-27	
6	Filt #3 Lamp 3b	1 Filt 3-19	
7	BCD $\beta 8$	1 OM4-17	
8	Filt #2 Lamp 9a	1 Filt 2-13	
9	ν FF		1 Misc 1-5
10	Filt #6 Lamp 10c	1 Filt 6-19	
11	BCD $\gamma 4$	1 OM5-18	
12	Filt #3 Lamp 4b	1 Filt 3-13	
13	Filt #2 Lamp 7a	1 Filt 2-27	
14	Filt #2 Lamp 6a	1 Filt 2-34	
15	Filt #1 Lamp 5a	1 Filt 1-5	
16	Filt #1 Lamp 4a	1 Filt 1-13	
17	BCD $\beta 1$	1 OM1-17	
18	Filt #1 Lamp 3a	1 Filt 1-19	
A	Gnd	1 Misc 2-A	
B	Filt #4 Lamp 9b	1 Filt 4-13	
C	Spare		
D	BCD $\gamma 2$	1 OM2-34	
E	BCD $\gamma 1$	1 OM1-34	
F	Filt #4 Lamp 8b	1 Filt 4-19	
H	Filt #3 Lamp 1b	1 Filt 3-34	
J	Filt #2 Lamp 8a	1 Filt 2-19	
K	Gen. Reset	1 Misc 2-7	
L	Filt #6 Lamp 9c	1 Filt 6-13	
M	BCD $\tau 8$	1 OM5-24	
N	BCD $\beta 4$	1 OM3-17	
P	Filt #3 Lamp 5b	1 Filt 3-5	
R	Filt #4 Lamp 6b	1 Filt 4-34	
S	Filt #4 Lamp 7b	1 Filt 4-27	
T	BCD $\beta 2$	1 OM2-17	
U	Filt #1 Lamp 2a	1 Filt 1-27	
V	Filt #1 Lamp 1a	1 Filt 1-34	

Data Connectors (ES)

OBSOLETE

Connector	Pin		In From	Out To
ES	1	A=1 } BCD	1 OM1-29	
	2	2	1 OM2-29	
	3	4	1 OM5-15	
	4	CC=1 } BCD	1 OM3-34	
	5	2	1 OM4-34	
	6	4	1 OM12-19	
	7	O=1 BCD	1 OM19-16	
	8	Loose Wire		
	9	Tape Hi Speed	1 Prog C-41	
	10	ρ=1	1 OM1-16	
	11	2	1 OM2-16	
	12	4	1 OM3-16	
	13	8	1 OM4-16	
	14	ρ=1	1 Prog B-15	
	15	ρ=2	1 Prog B-14	
	16	ρ=3		1 Prog A-6
	17	ρ=4	1 Prog B-18	
	18	ρ=5	1 Prog B-22	
	19	ρ=6	1 Conn LOGIC (P)-12	1 Prog A-24
	20	ρ=7		1 Prog A-5
	21	ρ=8	1 Conn LOGIC (P)-13	1 Prog A-22
	22	ρ=9	1 Conn LOGIC (P)-14	1 Prog A-23
	23	ρ=10(0)	1 Conn LOGIC (P)-15	1 Prog A-17
	24	Tape direction control		1 Conn Tape-G
	25	EOF Sig (+5v)	1 Prog C-36	
	26	RC=C		1 Prog A-34
	27	RC=W		1 Prog A-40
	28	RC=P/W		1 Prog A-36
	29	RC=P		1 Prog A-35
	30	RC=NR		1 Prog A-37
	31	CC=CP→		1 Prog A-3
	32	init power on reset		1 DM3-V

Connector
DVM Section

OBSOLETE

Connector	Pin		In From	Out To
DVM	1	MSD-1000	1 OM13-29	
	2	2000	1 OM13-33	
	3	4000	1 OM14-29	
	4	8000	1 OM14-33	
	5	SSD-100	1 OM15-29	
	6	200	1 OM15-33	
	7	400	1 OM16-29	
	8	800	1 OM16-33	
	9	TSD-10	1 OM17-29	
	10	20	1 OM17-33	
	11	40	1 OM18-29	
	12	80	1 OM18-33	
	13	LSD-1	1 OM19-29	
	14	2	1 OM19-33	
	15	4	1 OM20-29	
	16	8	1 OM20-33	
	17	.XXX	1 IMTM2-5	
	18	X.XX	1 IMTM2-32	
	19	XX.XX	1 IMTM2-4	
	20	XXX.X	not used	
	21	Common Gnd		1 T.S
	22	Ready for printout signal	not used	
	23	+ Sign	1 IMTM2-33	
	24	Spare		

Data Connectors Logic (RO) part 1

OBSOLETE

Connector	Pin		In From	Out To
Logic (RO)	1	X=1	1 OM17-12	
	2	X=2	1 OM17-23	
	3	X=4	1 OM18-12	
	4	X=8	1 OM18-23	
	5	W=1	1 OM1-31	
	6	W=2	1 OM2-31	
	7	W=4	1 OM5-17	
	8	W=8	1 OM5-31	
	9	J=1	1 OM1-24	
	0	J=2	1 OM2-24	
	11	J=4	1 OM5-33	
	12	J=8	1 OM5-23	
	13	δ=8	1 OM20-35	
	14	δ=4	1 OM20-20	
	15	δ=2	1 OM19-35	
	16	δ=1	1 OM19-20	
	17	δ=80	1 OM18-34	
	18	δ=40	1 OM18-19	
	19	δ=20	1 OM17-34	
	20	δ=10	1 OM17-19	
	21	δ=800	1 OM16-34	
	22	δ=400	1 OM16-19	
	23	δ=200	1 OM15-34	
	24	δ=100	1 OM15-19	
	25	Spare	Spare	
	26	L=1	1 OM10-9	
	27	L=2	1 OM10-34	
	28	L=4	1 OM11-9	
	29	L=8	1 OM11-34	
	30	L=10	1 OM8-9	
	31	L=20	1 OM8-35	
	32	L=40	1 OM9-9	
	33	L=80	1 OM9-35	
	34	L=100	1 OM6-9	
	35	L=200	1 OM6-35	
	36	L=400	1 OM7-9	
	37	L=800	1 OM7-35	
	38	L=1000	1 OM1-35	
	39	L=2000	1 OM2-35	
	40	L=4000	1 OM5-8	
	41	L=8000	1 OM5-34	
	42	L=10000	1 OM1-5	
	43	L=20000	1 OM2-5	
	44	L=40000	1 OM3-5	
	45	L=80000	1 OM4-5	
	46	Spare	Spare	
	47	control line to DN Lamp 2		1 DM3-6
	48	control line to DN Lamp 4		1 DM3-13
	49	control line to DN Lamp 1		1 DM3-11
	50	shift to Logic (C)-7	not used	
	51	shift to Logic (C)-8	not used	
	52		not used	
	53		not used	
	54		not used	
	55		not used	

Data Connectors LOGIC (RO) part 2

OBSOLETE

Connector	Pin		In From	Out To
LOGIC (RO)	56		not used	
	57		not used	
	58	X=10	1 OM15-12	
	59	X=20	1 OM15-23	
	60	α=1	1 OM13-17	
	61	α=2	1 OM13-31	
	62	α=4	1 OM14-17	
	63	B=10000	1 OM1-8	
	64	B=20000	1 OM2-8	
	65	B=1000	1 OM1-20	
	66	B=2000	1 OM2-20	
	67	B=4000	1 OM5-9	
	68	B=8000	1 OM5-21	
	69	B=100	1 OM6-10	
	70	B=200	1 OM6-22	
	71	B=400	1 OM7-10	
	72	not used	not used	
	73	B=10	1 OM8-10	
	74	B=20	1 OM8-23	
	75	B=40	1 OM9-10	
	76	B=80	1 OM9-23	
	77	B=1	1 OM10-10	
	78	B=2	1 OM10-23	
	79	B=4	1 OM11-10	
	80	B=8	1 OM11-23	
	81	C=10000	1 OM3-21	
	82	C=1000	1 OM13-9	
	83	C=2000	1 OM13-23	
	84	C=4000	1 OM14-9	
	85	C=8000	1 OM14-23	
	86	C=100	1 OM15-8	
	87	C=200	1 OM15-22	
	88	C=400	1 OM16-8	
	89	C=800	1 OM16-22	
	90	C=10	1 OM17-8	
	91	C=20	1 OM17-22	
	92	C=40	1 OM18-8	
	93	C=1	1 OM19-8	
	94	C=2	1 OM19-23	
	95	C=4	1 OM20-8	
	96	C=8	1 OM20-23	
	97		not used	
	98		not used	
	99		not used	
	100		not used	

OBSOLETE

Connector	Pin		In From	Out To
ID (RO100)	1	U=1	1 OM19-27	
	2	U=2	1 OM19-32	
	3	U=4	1 OM20-27	
	4	U=8	1 OM20-32	
	5	U=10	1 OM17-27	
	6	U=20	1 OM17-32	
	7	U=40	1 OM18-27	
	8	U=80	1 OM18-32	
	9	U=100	1 OM15-27	
	10	U=200	1 OM15-32	
	11	U=400	1 OM16-27	
	12	U=800	1 OM16-32	
	13	U=1000	1 OM13-27	
	14	U=2000	1 OM13-32	
	15	U=4000	1 OM14-27	
	16	U=8000	1 OM14-32	
	17	U=10000	1 OM3-24	
	18	U=20000	1 OM4-24	
	19	U=40000	1 OM12-26	
	20	U=80000	1 OM12-33	
	21	Q=1	1 OM6-12	
	22	Q=2	1 OM6-24	
	23	Q=4	1 OM7-12	
	24	Q=8	1 OM7-24	
	25	Q=10	1 OM1-25	
	26	Q=20	1 OM2-25	
	27	Q=40	1 OM5-10	
	28	Q=80	1 OM5-26	
	29	Q=100	1 OM1-10	
	30	Q=200	1 OM2-10	
	31	Q=400	1 OM3-10	
	32	Q=800	1 OM4-10	
	33	R=1	1 OM3-26	
	34	R=2	1 OM4-26	
	35	R=4	1 OM12-9	
	36	R=8	1 OM12-28	
	37	R=10	1 OM10-12	
	38	R=20	1 OM10-24	
	39	R=40	1 OM11-12	
	40	R=80	1 OM11-24	
	41	R=100	1 OM8-12	
	42	R=200	1 OM8-24	
	43	R=400	1 OM9-12	
	44	R=800	1 OM9-24	
	45	Z=1	1 OM13-10	
	46	Z=2	1 OM13-25	
	47	Z=4	1 OM14-10	
	48	Z=8	1 OM14-25	
	49	S=1	1 OM6-13	
	50	S=2	1 OM6-25	
	51	S=4	1 OM7-13	
	52	S=8	1 OM7-25	
	53	S=10	1 OM1-26	
	54	S=20	1 OM2-26	
	55	S=40	1 OM5-12	

OBSOLETE

Connector	Pin		In From	Out To
ID (RO100)	56	S=80	1 OM5-27	
	57	S=100	1 OM1-12	
	58	S=200	1 OM2-12	
	59	S=400	± OM3-12	
	60	S=800	1 OM4-12	
	61	T=1	1 OM3-27	
	62	T=2	1 OM4-27	
	63	T=4	1 OM12-10	
	64	T=8	1 OM12-29	
	65	T=10	1 OM10-13	
	66	T=20	1 OM10-25	
	67	T=40	1 OM11-13	
	68	T=80	1 OM11-25	
	69	T=100	1 OM8-13	
	70	T=200	1 OM8-25	
	71	T=400	1 OM9-13	
	72	T=800	1 OM9-25	
	73	M=1	1 OM6-18	1 J1(100)-73
	74	M=2	1 OM6-34	1 J1(100)-74
	75	M=4	1 OM7-18	1 J1(100)-75
	76	M=8	1 OM7-34	1 J1(100)-76
	77	N=1	1 OM8-18	1 J1(100)-77
	78	N=2	1 OM8-34	1 J1(100)-78
	79	N=4	1 OM9-18	1 J1(100)-79
	80	N=8	1 OM9-34	1 J1(100)-80
	81	ε=1	1 OM13-14	
	82	ε=2	1 OM13-24	
	83	FS=1	1 OM10-18	
	84	P=1	1 OM1-33	
	85			
	86			
	87			
	88			
	89			
	90			
	91			
	92			
	93			
	94			
	95			
	96			
	97			
	98			
	99			
	100			

OBSOLETE

Connector	Pin		In From	Out To
ID (RO60)	1	Y=1	1 OM3-29	
	2	Y=2	1 OM4-29	
	3	Y=4	1 OM12-13	
	4	Y=8	1 OM12-31	
	5	Y=10	1 OM10-15	
	6	Y=20	1 OM10-27	
	7	Y=40	1 OM11-15	
	8	Y=80	1 OM11-27	
	9	Y=100	1 OM8-15	
	10	Y=200	1 OM8-27	
	11	Y=400	1 OM9-15	
	12	Y=800	1 OM9-27	
	13	Y=1000	1 OM6-15	
	14	Y=2000	1 OM6-27	
	15	Y=4000	1 OM7-15	
	16	Y=8000	1 OM7-27	
	17	Y=10000	1 OM1-28	
	18	Y=20000	1 OM2-28	
	19	Y=40000	1 OM5-14	
	20	Y=80000	1 OM5-29	
	21	Y=100000	1 OM1-14	
	22	Y=200000	1 OM2-14	
	23	Y=400000	1 OM3-14	
	24	Y=800000	1 OM4-14	
	25	V=1	1 OM6-14	
	26	V=2	1 OM6-26	
	27	V=4	1 OM7-14	
	28	V=8	1 OM7-26	
	29	V=10	1 OM1-27	
	30	V=20	1 OM2-27	
	31	V=40	1 OM5-13	
	32	V=80	1 OM5-28	
	33	V=100	1 OM1-13	
	34	V=200	1 OM2-13	
	35	V=400	1 OM3-13	
	36	V=800	1 OM4-13	
	37	W=1	1 OM3-28	
	38	W=2	1 OM4-28	
	39	W=4	1 OM12-12	
	40	W=8	1 OM12-30	
	41	W=10	1 OM10-14	
	42	W=20	1 OM10-26	
	43	W=40	1 OM11-14	
	44	W=80	1 OM11-26	
	45	W=100	1 OM8-14	
	46	W=200	1 OM8-26	
	47	W=400	1 OM9-14	
	48	W=800	1 OM9-26	
	49			
	50			
	51			
	52			
	53			
	54 to 60 not used			

Data Connectors (Logic (I), Logic (C), Logic (P))

OBSOLETE

Connector	Pin		In From	Out To
Logic (I)	1	Init		1 S_IA-C
	2	K=1,3,6		1 S_KC-C
	3	K=2,4,5,7		1 S_KD-C
	4	About		1 S_{AB}A-C
	5	invalid code		1 INVALID CODE lamp
	6	cycle		1 CYCLE lamp
	7	Overflow		1 OVERFLOW lamp
	8	K=1,4,5		1 ALG-14
	9	K=1,3,5,7		1 ALG-J
	10	K=2,4,6		1 ALG-H
	11	Display dimmer	1 MISC 1-35	
	12	PEP dimmer	1 MISC 1-12	
	13	"AND 1" Reinit		1 PROG A-27
	14	Sample command level 2		1 PROG A-16
	15	R1 signal to logic		1 Conn EXIT-1
	16	R2 signal from logic	1 K2A-NO	
Logic (C)	1	Overflow B		1 Conn COUNT(B)-N
	2	Overflow A		1 Conn COUNT(A)-N
	3	DVM input	1 K1A-NC	
	4	Clear A		1 Conn COUNT(A)-i
	5	Clear B		1 Conn COUNT(B)-i
	6	core address reset init		1 PROG C-11
	7	DM overflow lamp dimmer		1 DM3-J
	8	shift DN level		1 DM3-17
Lgoic (P)	1	W=5,6		1 PROG A-29
	2	init B		1 PROG B-12
	3	GR		1 PROG A-39
	4	prog GR		1 PROG B-26
	5	prog clr		1 PROG A-2
	6	COB		1 PROG A-12
	7	COA		1 PROG A-13
	8	CHB		1 PROG A-15
	9	CHA		1 PROG A-14
	10	W=1-4,7-8		1 PROG A-11
	11	α=V		1 PROG A-38
	12	ρ=6		1 Conn ES-19
	13	ρ=8		1 Conn ES-21
	14	ρ=9		1 Conn ES-22
	15	ρ=10		1 Conn ES-23
	16	init A		1 PROG A-25
Logic (M)	A (Red)	Tape Busy Reset	GD-17 (Tie Pt)	Conn Tape-b
	B (Blk)	EOR (+5V)	Prog T-28	
	C (White)	Initiate	Prog T-32	Prog C-25

Switches I.D. Panel

NO LONGER USED

Switch	Pin	Function	In From	Out To
SY6C	1	100	1 J37-9	
(Period)	2	200	1 J37-18	
	4	400	1 J37-13	
	8	800	1 J37-4	
	1	$\overline{100}$	1 J37-2	
	2	$\overline{200}$	1 J37-7	
	4	$\overline{400}$	1 J3716	
	8	$\overline{800}$	1 J37-12	
	C	+5 VDC		
SY6D	1	1000	1 J37-26	
	2	2000	1 J37-30	
	4	4000	1 J37-34	
	8	8000	1 J37-22	
	1	$\overline{1000}$	1 J37-25	
	2	$\overline{2000}$	1 J37-33	
	4	$\overline{4000}$	1 J37-21	
	8	$\overline{8000}$	1 J37-29	
	C	+5 VDC		
SY6E	1	10000	1 J36-26	
	2	20000	1 J36-30	
	4	40000	1 J36-34	
	8	80000	1 J36-22	
	1	$\overline{10000}$	1 J36-25	
	2	$\overline{20000}$	1 J36-33	
	4	$\overline{40000}$	1 J36-21	
	8	$\overline{80000}$	1 J36-29	
	C	+5 VDC		
SY6F	1	100000	1 J36-9	
	2	200000	1 J36-18	
	4	400000	1 J36-13	
	8	800000	1 J36-4	
	1	$\overline{100000}$	1 J36-3	
	2	$\overline{200000}$	1 J36-7	
	4	$\overline{400000}$	1 J36-16	
	8	$\overline{800000}$	1 J36-12	
	C	+5 VDC		

Connectors

OBSOLETE

Conn	Pin		Out To	In From
Misc A	A	Busy Reset (Red)		1 Logic Misc A-4
	B	EOR (Black)		1 Logic Misc A-12
	C	Gen Init (White)		1 D25-1
	D			
	E			
	F			
	H			
	J			
	K			
	L			
	M			
	N			
	P			
	R			
	S			

Preset Decode Divider
J 71

	From	To
1		
2	+5v	
3	Gnd	
4		
5		
6		
7		
8		
9		
10	(J36-21)	
11	J36-29	
12		
13	(J36-25)	
14	(J36-23)	
15		
16	J36-33	
19		
20		
21		
22	J36-35	
23		
24		
25	(J36-27)	
26	70-6	
27		
28		
29		
30		
31		
32		
33		
34		
35		

Preset Decode Divider
J70

	From	To
1		
2	+5v	
3	Gnd	
4	(J36-5)	
5	(J36-7)	
6	(J36-3)	71-26
7	J36-14	
8	J36-12	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21	J36-16	
22		
23		
24		
25		
26		
27		
28		
29		
30		
31	(J36-10)	
32		
33	J36-19	
34		
35		

J51 Board
(EECO-LOG-2210)

Pin	Function	In From	Out To
1			
2	+5 VDC		
3	Gnd		
4	Output	1 J36-14	
5	Output	1 J36-19	
6	Output	1 J36-5	1 J51-26
7			
8			
9			
10	Output	1 J36-23	
11			
12			
13	Output	1 J36-35	
14	Output	1 J36-31	
15			
16			
17			
18			
19			
20			
21			
22			
23			
24	Input	1 J36-27	
25			
26	Count Input	1 J51-6	
27	Reset Input	1 J51-34	
28			
29			
30			
31	Output	1 J36-10	
32	Count Input	1 J50-10	
33			
34	Reset Input	1 J50-27	1 J51-27
35			

J50 Board
(EECO-LOG-2210)

Pin	Function	In From	Out To
1			
2	+5 VDC		
3	Gnd		
4	Ouput	1 J37-5	
5	Output	1 J37-19	
6	Output	1 J37-14	1 J50-26
7			
8			
9			
10	Output	1 J37-23	1 J51-32
11			
12			
13	Output	1 J37-31	
14	Output	1 J37-35	
15			
16			
17			
18			
19			
20			
21			
22			
23			
24	Input	1 J37-27	
25			
26	Count Input	1 J50-6	
27	Reset Input	1 J21-14	1 J51-34
28			
29			
30			
31	Output	1 J37-10	
32	Count Input		1 J71-12
33			
34	Reset Input		1 J50-27
35			

J36 Board
(Diode)

Pin	Function	In From	Out To
1	+12 VDC		
2	Y=1		1 SY6F-$\overline{1}$
3			1 J06-1
4			1 SY6F-8
5			1 J51-6
6	Y=2		1 J06-2
7			1 SY6F-$\overline{2}$
8			
9			1 SY6F-1
10			1 J51-31
11	Y=8		1 J06-4
12			1 SY6F-$\overline{8}$
13			1 SY6-4
14			1 J51-4
15	Y=4		1 J06-3
16			1 SY6F-$\overline{4}$
17			
18			1 SY6F-2
19			1 J51-5
20	Y=40		1 J06-7
21			1 SY6E-$\overline{4}$
22			1 SY6E-8
23			1 J51-10
24	Y=10		1 J06-5
25			1 SY6E-$\overline{1}$
26			1 SY6E-1
27			1 J51-24
28	Y=80		1 J06-8
29			1 SY6E-$\overline{8}$
30			1 SY6E-2
31			1 J51-14
32	Y=20		1 J06-6
33			1 SY6E-$\overline{2}$
34			1 SY6E-4
35			1 J51-13

J37 Board
(Diode)

Pin	Function	In From	Out To
1	+12 VDC		
2	Y=1000		1 J06-13
3			1 SY6C-$\overline{1}$
4			1 SY6C-8
5			1 J50-4
6	Y=2000		1 J06-14
7			1 SY6C-$\overline{2}$
8			
9			1 SY6C-1
10			1 J50-31
11	Y=8000		1 J06-16
12			1 SY6C-$\overline{8}$
13			1 SY6C-4
14			1 J50-6
15	Y=4000		1 J06-15
16			1 SY6C-$\overline{4}$
17			
18			1 SY6C-2
19			1 J50-5
20	Y=400		1 J06-11
21			1 SY6D-$\overline{4}$
22			1 SY6D-8
23			1 J50-10
24	Y=100		1 J06-9
25			1 SY6D-$\overline{1}$
26			1 SY6D-1
27			1 J50-24
28	Y=800		1 J06-12
29			1 SY6D-$\overline{8}$
30			1 SY6D-2
31			1 J50-13
32	Y=200		1 J06-10
33			1 SY6D-$\overline{2}$
34			1 SY6D-4
35			1 J50-14

ID Connector

Connector	Pin	Function	In From	Out To
J100	1	U=10000	1 J39-15	
(RO)	2	U=20000	1 J39-11	
	3	U=40000	1 J39-6	
	4	U=80000	1 J39-2	
	5	U=1000	1 J39-20	
	6	U=2000	1 J39-24	
	7	U=4000	1 J39-28	
	8	U=8000	1 J39-32	
	9	U=100	1 J40-15	
	10	U=200	1 J40-11	
	11	U=400	1 J40-6	
	12	U=800	1 J40-2	
	13	U=10	1 J40-20	
	14	U=20	1 J40-24	
	15	U=40	1 J40-28	
	16	U=80	1 J40-32	
	17	U=1	1 J41-15	
	18	U=2	1 J41-11	
	19	U=4	1 J41-6	
	20	U=8	1 J41-2	
	21	Q=1		1 J73-3
	22	Q=2		1 J73-2
	23	Q=4		1 J73-1
	24	Q=8		1 J73-4
	25	Q=10		1 J72-15
	26	Q=20		1 J72-13
	27	Q=40		1 J72-14
	28	Q=80		1 J72-12
	29	Q=100		1 J72-3
	30	Q=200		1 J72-2
	31	Q=400		1 J72-1
	32	Q=800		1 J72-4
	33	R=1		1 J73-15
	34	R=2		1 J73-13
	35	R=4		1 J73-14
	36	R=8		1 J73-12
	37	R=10		1 J74-3
	38	R=20		1 J74-2
	39	R=40		1 J74-1
	40	R=80		1 J74-4
	41	R=100		1 J74-15
	42	R=200		1 J74-13
	43	R=400		1 J74-14
	44	R=800		1 J74-12
	45	Z=1	To be Wired In	
	46	Z=2		
	47	Z=4		
	48	Z=8		

ID Connector

Connector	Pin	Function	In From	Out To
J100	49	S=1	1 J42-2	
(RO)	50	S=2	1 J42-6	
	51	S=4	1 J42-11	
	52	S=8	1 J42-15	
	53	S=10	1 J42-20	
	54	S=20	1 J42-24	
	55	S=40	1 J42-28	
	56	S=80	1 J42-33	
	57	S=100	1 J43-2	
	58	S=200	1 J43-11	
	59	S=400	1 J42-6	
	60	S=800	1 J43-15	
	61	T=1	1 J43-20	
	62	T=2	1 J43-24	
	63	T=4	1 J43-28	
	64	T=8	1 J43-32	
	65	T=10	1 J44-2	
	66	T=20	1 J44-15	
	67	T=40	1 J44-6	
	68	T=80	1 J44-11	
	69	T=100	1 J44-20	
	70	T=200	1 J44-24	
	71	T=400	1 J44-28	
	72	T=800	1 J44-32	
	73	M=1	1 ID(100)-73	1 J26-21
	74	M=2	1 ID(100)-74	1 J26-22
	75	M=4	1 ID(100)-75	1 J26-24
	76	M=8	1 ID(100)-76	1 J26-28
	77	N=1	1 ID(100)-77	1 J26-31
	78	N=2	1 ID(100)-78	1 J26-32
	79	N=4	1 ID(100)-79	1 J26-34
	80	N=8	1 ID(100)-80	1 J26-35
	81	E=1		
	82	E=2		
	83	FS=1		1 K12A-C
	84	P=1		1 K13A-C
	85			
	86			
	87			
	88			
	89			
	90			
	91			
	92			
	93			
	94			
	95			
	96			
	97			
	98			
	99			
	100			

RO		Broad
Q=4	(J100-23)	1 J76-1
Q=2	(J100-22)	1 J76-2
Q=1	(J100-21)	1 J76-3
Q=8	(J100-24)	1 J76-4
R=8	J100-36	1 J76-12
R=2	J100-34	1 J76-13
R=4	J100-35	1 J76-14
R=1	J100-33	1 J76-15
V=400	J06-35	1 J73-1
V=200	J06-34	1 J73-2
V=100	J06-33	1 J73-3
V=800	J06-36	1 J73-4
W=8	J06-40	1 J73-12
W=2	J06-38	1 J73-13
W=4	J06-39	1 J73-14
W=1	J06-37	1 J73-15

J73	1	V=400	1 J06-27
	2	V=200	1 J06-26
	3	V=100	1 J06-25
	4	V=800	1 J06-28
J75	1	V=4	1 J06-35
	2	V=2	1 J06-34
	3	V=1	1 J06-33
	4	V=8	1 J06-36
J73	12	W=8	1 J06-48
	13	W=2	1 J06-46
	14	W=4	1 J06-47
	15	W=1	1 J06-45
J77	12	W=800	1 J06=40
	13	W=200	1 J06-38
	14	W=400	1 J06-39
	15	W=100	1 J06-37
J76	12	R=8	1 J100-44
	13	R=2	1 J100-42
	14	R=4	1 J100-43
	15	R=1	1 J100-41
J74	12	R=800	1 J100-36
	13	R=200	1 J100-34
	14	R=400	1 J100-35
	15	R=100	1 J100 33

ID Connector

Connector	Pin	Function		In From	Out To
J06	1	Y=1		1 J36-2	
(RO-60)	2	Y=2		1 J36-6	
	3	Y=4		1 J36-15	
	4	Y=8		1 J36-11	
	5	Y=10		1 J36-24	
	6	Y=20		1 J36-32	
	7	Y=40		1 J36-20	
	8	Y=80		1 J36-28	
	9	Y=100		1 J37-24	
	10	Y=200	OK	1 J37-32	
	11	Y=400		1 J37-20	
	12	Y=800		1 J37-28	
	13	Y=1000		1 J37-2	
	14	Y=2000	OK	1 J37-6	
	15	Y=4000		1 J37-15	
	16	Y=8000		1 J37-11	
	17	Y=10000		1 J38-2	
	18	Y=20000		1 J38-6	
	19	Y=40000		1 J38-15	
	20	Y=80000		1 J38-11	
	21	Y=100000		1 J38-24	
	22	Y=200000		1 J38-32	
	23	Y=400000		1 J38-20	
	24	Y=800000		1 J38-28	
	25	V=1			1 J75-3
	26	V=2			1 J75-2
	27	V=4			1 J75-1
	28	V=8			1 J75-4
	29	V=10			1 J75-15
	30	V=20			1 J75-13
	31	V=40			1 J75-14
	32	V=80			1 J75-12
	33	V=100			1 J76-3
	34	V=200			1 J76-2
	35	V=400			1 J76-1
	36	V=800			1 J76-4
	37	W=1			1 J76-15
	38	W=2			1 J76-13
	39	W=4			1 J76-14
	40	W=8			1 J76-12
	41	W=10			1 J77-3
	42	W=20			1 J77-2
	43	W=40			1 J77-1
	44	W=80			1 J77-4
	45	W=100			1 J77-15
	46	W=200			1 J77-13
	47	W=400			1 J77-14
	48	W=800			1 J77-12
	49				
	50				
	51				
	52				
	53				
	54				
	55 to 60 not used				

GUIDE SECTION

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OBSOLETE

Guidance Connector

Connector	Pin	Function	In From	Out To
Drive (55-Pin)	AA	$\Delta\delta$		
	BB	$\Delta\alpha$		
	CC	Mod 1 L.S. (out)	1 Conn Exit-R	
	DD	Base Ring L.S. (C.C.W. Common)	1 Conn Exit-C	
	EE	Mod 2 L.S. (out)	1 Conn Exit-4	
	FF	Base Ring L.S. (C.C.W. NC)	1 Conn Exit-B	
	GG			
	HH			

Power Connector

	Pin	Function
	1	Gnd
	2	+15 VDC
	3	-15 VDC
	4	ID1 H.V. Adj.
	5	+5 VDC
	6	+12 VDC
	7	-12 VDC
	8	+28 VDC

Guidance Panel

Switch	Pin		In From	Out To
Theta Dimmer	1,5			
	2			
	3	Gnd		
	4	+28 VDC		
Display Dimmer	1,5			
	2			
	3	(Gnd)		
	4	+28 VDC		1 S Shut B-C
Vernier Offset Control ΔX	1	-15 VDC	1 T.S.	1 Vernier Y-1
	2		Err Gen 3-2	
	3	+15 VDC		1 Vernier Y-3
Vernier Offset Control ΔY	1	-15 VDC	1 Vernier x-1	
	2		1 Err Gen 5-2	
	3	+15 VDC	1 Vernier x-3	

TERMINAL STRIP

4	+	----- Goes to +10
3	-	----- Goes to -10
B	c	----- Goes to Pin 9 Locations on Sw.
2	+	----- +5 Also
1	-	----- Gnd Also
4	c	----- Goes out to R.O.

Guidance Connector

Connector	Pin	Function	In	From	Out	To
Exit	A	+15			1	Conn Drive-$\overline{C}$
	B	Vert Defl. (y)			1	Conn Drive-FF
	C	Horiz Defl. (x)			1	Conn Drive-DD
	D	-15			1	Conn Drive-z
	E	ID 1 Shutter L.S. (close)	1	Shut-11		
	F	ID 1 Shutter L.S. Metor (green)	1	Shut-5		
	G	Focus Comm				
	H	Focus				
	J				1	Conn Drive-$\overline{P}$
	K	Gnd				
	L	Gnd				
	M	Gnd				
	N	Shutter L.S. (open)	1	Shut-6		
	P				1	Conn Drive-q
	R				1	Conn Drive-CC
	S	Shutter Motor (red)	1	Shut-10		
	T				1	Conn Drive-i
	U				1	Conn Drive-EE
	V				1	Conn Drive-j
	W	Vert. Deflection (y)			1	Err Gen 1-2
	X	Horiz Deflection (x)			1	Err Gen 1-18
		Shutter L.S. Comm & Gnd				
	Y	Telescope Guide Relay Command			1	Stel B-C
	Z	$\Delta\delta$ Telescope Guide Sig (x)				K5A N.O.
	a	EX (out)		ErrGen1-15		
	b	$\Delta\alpha$ Telescope Guide Sig (y)				K5C N.O.
	c	EY (out)		ErrGen1-3		
RO(60-Pin)	49	G=400	1	BCD 6-14		
	50	G=800	1	BCD 6-12		
	51					
	52					
	53 to 60 not used					
Power	1	Gnd			1	OSC-T
	2	+15 VDC				
	3	-15 VDC				
	4					
	5	+5 VDC				
	6	+12 VDC				
	7	-12 VDC				
	8	+28 VDC				

Guidance Connector

Connector	Pin	Function	In	From	Out	To
RO (60-Pin)	1	D=1	1	BCD 1-3		
	2	D=2	1	BCD 1-2		
	3	D=4	1	BCD 1-1		
	4	D=8	1	BCD 1-4		
	5	D=10	1	BCD 1-15		
	6	D=20	1	BCD 1-13		
	7	D=40	1	BCD 1-14		
	8	D=80	1	BCD 1-12		
	9	D=100	1	BCD 2-3		
	10	D=200	1	BCD 2-2		
	11	D=400	1	BCD 2-1		
	12	D=800	1	BCD 2-4		
	13	E=1	1	BCD 2-15		
	14	E=2	1	BCD 2-13		
	15	E=4	1	BCD 2-14		
	16	E=8	1	BCD 2-12		
	17	E=10	1	BCD 3-3		
	18	E=20	1	BCD 3-2		
	19	E=40	1	BCD 3-1		
	20	E=80	1	BCD 3-4		
	21	E=100	1	BCD 3-15		
	22	E=200	1	BCD 3-13		
	23	E=400	1	BCD 3-14		
	24	E=800	1	BCD 3-12		
	25					
	26	F=1	1	BCD 4-3		
	27	F=2	1	BCD 4-2		
	28	F=4	1	BCD 4-1		
	29	F=8	1	BCD 4-4		
	30	F=10	1	BCD 4-15		
	31	F=20	1	BCD 4-13		
	32	F=40	1	BCD 4-14		
	33	F=80	1	BCD 4-12		
	34	F=100	1	BCD 5-3		
	35	F=200	1	BCD 5-2		
	36	F=400	1	BCD 5-1		
	37	F=800	1	BCD 5-4		
	38					
	39	G=1	1	BCD 5-15		
	40	G=2	1	BCD 5-13		
	41	G=4	1	BCD 5-14		
	42	G=8	1	BCD 5-12		
	43	G=10	1	BCD 6-3		
	44	G=20	1	BCD 6-2		
	45	G=40	1	BCD 6-1		
	46	G=80	1	BCD 6-4		
	47	G=100	1	BCD 6-15		
	48	G=200	1	BCD 6-13		

Guidance Boards (DD)
BCD 1

Pin	Function	In	From	Out	To
1	D=4			1	Conn RO-3
2	D=2			1	Conn RO-2
3	D=1			1	Conn RO-1
4	D=8			1	Conn RO-4
5	Input 4	1	SD_A-4		
6	Input 3	1	SD_A-3		
7	Input 5	1	SD_A-5		
8	Input 1	1	SD_A-1		
9	Input 7	1	SD_A-7		
10	Input 6	1	SD_A-6		
11	Input 2	1	SD_A-2		
12	D=80			1	Conn RO-8
13	D=20			1	Conn RO-6
14	D=40			1	Conn RO-7
15	D=10			1	Conn RO-5
16	Input 5	1	SD_B-5		
17	Input 1	1	SD_B-1		
18	Input 4	1	SD_B-4		
19	Input 7	1	SD_B-7		
20	Input 6	1	SD_B-6		
21	Input 2	1	SD_B-2		
22	Input 3	1	SD_B-3		
23	Input 9	1	SD_B-9		
24	Input 8	1	SD_B-8		
25	Input 8	1	SD_A-8		
26	Input 9	1	SD_A-9		
27					
28					
29	+5VDC Back row pins				
30	Gnd " " "				

Guidance Boards (DD)
BCD 2

Pin	Function	In	From	Out	To
1	D=400			1	Conn RO-11
2	D=200			1	Conn RO-10
3	D=100			1	Conn RO-9
4	D=800			1	Conn RO-12
5	Input 4	1	SD_C-4		
6	Input 3	1	SD_C-3		
7	Input 5	1	SD_C-5		
8	Input 1	1	SD_C-1		
9	Input 7	1	SD_C-7		
10	Input 6	1	SD_C-6		
11	Input 2	1	SD_C-2		
12	E=8			1	Conn RO-16
13	E=2			1	Conn RO-14
14	E=4			1	Conn RO-15
15	E=1			1	Conn RO-13
16	Input 5	1	SE_A-5		
17	Input 1	1	SE_A-1		
18	Input 4	1	SE_A-4		
19	Input 7	1	SE_A-7		
20	Input 6	1	SE_A-6		
21	Input 2	1	SE_A-2		
22	Input 3	1	SE_A-3		
23	Input 9	1	SE_A-9		
24	Input 8	1	SE_A-8		
25	Input 8	1	SD_C-8		
26	Input 9	1	SD_C-9		
27					
28					
29	+5 VDC Back row pins				
30	Gnd " " "				

Guidance Boards (DD)
BCD 3

Pin	Function	In	Form	Out	To
1	E=40			1	Conn RO-19
2	E=20			1	Conn RO-18
3	E=10			1	Conn RO-17
4	E=80			1	Conn RO-20
5	Input 4	1	SE_B-4		
6	Input 3	1	SE_B-3		
7	Input 5	1	SE_B-5		
8	Input 1	1	SE_B-1		
9	Input 7	1	SE_B-7		
10	Input 6	1	SE_B-6		
11	Input 2	1	SE_B-2		
12	E=800			1	Conn RO-24
13	E=200			1	Conn RO-22
14	E=400			1	Conn RO-23
15	E=100			1	Conn RO-21
16	Input 5	1	SE_C-5		
17	Input 1	1	SE_C-1		
18	Input 4	1	SE_C-4		
19	Input 7	1	SE_C-7		
20	Input 6	1	SE_C-6		
21	Input 2	1	SE_C-2		
22	Input 3	1	SE_C-3		
23	Input 9	1	SE_C-9		
24	Input 8	1	SE_C-8		
25	Input 8	1	SE_B-8		
26	Input 9	1	SE_B-9		
27					
28					
29	+5 VDC Back row pins				
30	Gnd " " "				

Guidance Boards (DD)
BCD 4

Pin	Function	In	From	Out	To
1	F=4			1	Conn RO-28
2	F=2			1	Conn RO-27
3	F=1			1	Conn RO-26
4	F=8			1	Conn RO-29
5	Input 4	1	SF_A-4		
6	Input 3	1	SF_A-3		
7	Input 5	1	SF_A-5		
8	Input 1	1	SF_A-1		
9	Input 7	1	SF_A-7		
10	Input 6	1	SF_A-6		
11	Input 2	1	SF_A-2		
12	F=80			1	Conn RO-33
13	F=20			1	Conn RO-31
14	F=40			1	Conn RO-32
15	F=10			1	Conn RO-30
16	Input 5	1	SF_B-5		
17	Input 1	1	SF_B-1		
18	Input 4	1	SF_B-4		
19	Input 7	1	SF_B-7		
20	Input 6	1	SF_B-6		
21	Input 2	1	SF_B-2		
22	Input 3	1	SF_B-3		
23	Input 9	1	SF_B-9		
24	Input 8	1	SF_B-8		
25	Input 8	1	SF_A-8		
26	Input 9	1	SF_A-9		
27					
28					
29	+5 VDC Back row pins				
30	Gnd " " "				

Guidance Boards (DD)
BCD 5

Pin	Function	In	From	Out	To
1	F=400			1	Conn RO-36
2	F=200			1	Conn RO-35
3	F=100			1	Conn RO-34
4	F=800			1	Conn RO-37
5	Input 4	1	SF_C-4		
6	Input 3	1	SF_C-3		
7	Input 5	1	SF_C-5		
8	Input 1	1	SF_C-1		
9	Input 7	1	SF_C-7		
10	Input 6	1	SF_C-6		
11	Input 2	1	SF_C-2		
12	G=8			1	Conn RO-42
13	G=2			1	Conn RO-40
14	G=4			1	Conn RO-41
15	G=1			1	Conn RO-39
16	Input 5	1	SG_A-5		
17	Input 1	1	SG_A-1		
18	Input 4	1	SG_A-4		
19	Input 7	1	SG_A-7		
20	Input 6	1	SG_A-6		
21	Input 2	1	SG_A-1		
22	Input 3	1	SG_A-3		
23	Input 9	1	SG_A-9		
24	Input 8	1	SG_A-8		
25	Input 8	1	SF_C-8		
26	Input 9	1	SF_C-9		
27					
28					
29	+5 VDC Back row pins				
30	Gnd " " "				

Guidance Boards (DD)
BCD 6

Pin	Function	In	From	Out	To
1	G=40			1	Conn RO-45
2	G=20			1	Conn RO-44
3	G=10			1	Conn RO-43
4	G=80			1	Conn RO-46
5	Input 4	1	SG_B-4		
6	Input 3	1	SG_B-3		
7	Input 5	1	SG_B-5		
8	Input 1	1	SG_B-1		
9	Input 7	1	SG_B-7		
10	Input 6	1	SG_B-6		
11	Input 2	1	SG_B-2		
12	G=800			1	Conn RO-50
13	G=200			1	Conn RO-48
14	G=400			1	Conn RO-49
15	G=100			1	Conn RO-47
16	Input 5	1	SG_C-5		
17	Input 1	1	SG_C-1		
18	Input 4	1	SG_C-4		
19	Input 7	1	SG_C-7		
20	Input 6	1	SG_C-6		
21	Input 2	1	SG_C-2		
22	Input 3	1	SG_C-3		
23	Input 9	1	SG_C-9		
24	Input 8	1	SG_C-8		
25	Input 8	1	SG_B-8		
26	Input 9	1	SG_B-9		
27					
28					
29	+5 VDC Back row pins				
30	Gnd " " "				

Error Generator 1
Board (Filter)

Pin	Function	In	From	Out	To
1	"Y" Sweep Coil Driver (fdbk.)	1	Err Gen 5-18		
2	"Y" Sweep Coil Driver	1	Conn Exit-W		
3	"Y" Error Output				
4					
5	Lo-Pass Filter Adj (Y)			1	Misc 5-16
6	"Y" Sweep Coil Input	1	Err Gen 5-U		
7	+15 VDC	1	Misc 5-R		
8	"Y" Error Input	1	Err Gen 5-17		
9					
10					
11	"X" Error Input	1	Err Gen 3-17		
12					
13	"X" Sweep Coil Input	1	Err Gen 3-U		
14					
15	"X" Error Output				
16	Lo-Pass Filter Adj (X)			1	Misc 5-T
17	"X" Sweep Coil Driver (fdbk.)	1	Err Gen 3-18		
18	"X" Sweep Coil Driver	1	Conn Exit-X		
A	Gnd	1	Misc 5-V		
B					
C					
D					
E					
F					
H					
J					
K					
L					
M					
N					
P					
R					
S					
T					
U					
V	-15 VDC	1	Err Gen 2-U	1	Misc 5-S

Error Generator 2
Board (X)

Pin	Function	In	From	Out	To
1	Sample/Hold			1	Err Gen 3-P
2	Sample/Hold Relay			1	Err Gen 3-1
3					
4					
5	Error Gen Driver (X)			1	Err Gen 6-6
6					
7	Intergrader Lock Cir.			1	Err Gen 4-7
8	"X" Error Centering Adj	1		1	X Err Center Adj-2
9	X Signal Output			1	Err Gen 6-10 Err Gen 4-9
10					
11					
12					
13					
14					
15					
16	1KC Square Wave	1	EECO 1-13		
17					
18					
A	-12 VDC	1	Err Gen 4-A		
B	+15 VDC	1	Err Gen 3-B	1	Err Gen 4-B
C	Zero Set Adj			1	Misc 5-P
D					
E	ID 1 Err Gen Signal Input (coax)	1	Conn Coax		
F	Zero Set Adj			1	Misc S-N
H					
J					
K					
L					
M					
N					
P					
R					
S					
T					
U	-15 VDC	1	Err Gen 4-U	1	Err Gen 1-V
V	Gnd	1	Err Gen 3-A	1	Err Gen 4-V

Error Generator #3
Board (X)

Pin	Function	In From	Out To
1	Sample/Hold Relay	1 Err Gen 2-2	
2	ΔX Control		1 ΔX Adj-2
3			
4			
5			
6			
7			
8			
9			
10			
11			
12	"X" Sweep Input		1 Err Gen 5-4
13			
14			
15			
16	"X" Sweep (Coax)	1 Err Gen 5-7*	
17	Error Output		1 Err Gen 1-11
18	"X" Sweep Coil Driver (feedback)		1 Err Gen 1-17
A	Gnd	1 Err Gen #5-A	1 Err Gen #2-V
B	+15 VDC	1 Err Gen 5-B	1 Err Gen 2-B
C			
D			
E			
F			
H			
J			
K			
L			
M			
N			
P	Sample/Hold	1 Err Gen 2-1	
R			
S			
T			
U	"X" Sweep Coil Input		1 K2B-C 1 Err Gen 1-13
V	-15 VDC	1 Coc 1-V	1 Err Gen 5-V

Error Generator #4
Board (Y)

Pin	Function	In From	Out To
1	Sample/Hold		1 Err Gen 5-P
2	Sample/Hold Relay		1 Err Gen 5-1
3			
4			
5	Error Gen Driver (Y)		1 Err Gen 6-5
6	Sweep Control		1 Err Gen 5-13
			1 S Sweep 5-C
7	Integrator Lock Cir	1 Err Gen 2-7	
8	"Y" Error Centering Adj		1 Y Err Center Adj
9	Y Signal Output	1 Err Gen 2-9	
10			
11			
12			
13			
14			
15			
16	"Inverse" Error Driver	1 EECO 1-14	
17			
18			
A	-12 VDC	1 Misc 4-V	1 Err Gen #2-A
B	+15 VDC	1 Err Gen 2-B	1 Misc 5-R
C			
D			
E			
F			
H			
J			
K			
L			
M			
N			
P			
S			
T			
U	-15 VDC	1 Err Gen 5-V	1 Err Gen 2-U
V	Gnd	1 Err Gen #2-V	

Error Generator #5
Board (Y)

Pin	Function	In From	Out To
1	Sample/Hold Relay	1 Err Gen 4-2	
2	ΔY Control		1 ΔY Adj-2
3	62.5 cps Input		1 Div Board-24
4	"X" Sweep Input (Coax)	1 Err Gen 3-12*	
5			
6			
7	"X" Sweep (Coax)	1 COC 1-5*	1 Err Gen 3-16
8			
9			
10			
11			
12			
13	Signal Indicator		Err Gen #4-6 1 Lock Det-14
14	Variable Sweep Adj		1 Misc 5-U
15			
16	"Y" Sweep (Coax)	1 COC 2-5*	
17	Error Output (Coax)		1 Err Gen 1-8
18	"Y" Sweep Coil Driver (feedback)		1 Err Gen 1-1
A			
B			
C			
D			
E			
F			
H			
J			
K			
L			
M			
N			
P	Sample/Hold	1 Err Gen 4-1	
R			
S			
T			
U	"Y" Sweep Coil Unput		1 K 2 C-C 1 Err Gen 1-6
V	-15 VDC	1 Err Gen 3-V	1 Err Gen 4-U

Error Generator #6
Board

Pin	Function	In From	Out To
1			
2			
3	Sample Timing Pulse (Y)	1 EECO 1-13	
4			
5	Sample Pulse (Y)	1 Err Gen 4-5	
6	Sample Pulse (X)	1 Err Gen 2-5	
7	4.V. #1 Control	1 Conn Power-4	
8			
9	H.V. Gain Control (3)		1 Misc 5-K
10	X Signal Input	1 Err Gen 2-9	
11	H.V. Gain Control (2)		1 Misc 5-L
12			
13			
14			
15	H.V. Limit Control (2)		1 Misc 5-M
16			
17	Sample Timing Pulse (X)	1 EECO 1-14	
18			
A			
B			
C	Gnd		
D			
E			
F			
H			
J	+12 VDC		
K			
L			
M	-12 VDC		
N			
P			
R			
S			
T			
U			
V	+5 VDC		

Osilloscope Board

Pin	Function	In	From	Out	To
1	Signal Input			1	K1A-NO
2					
3					
4					
5	View/Auto Lock (Y)			1	K1B-NO
6					
7					
8					
9					
10					
11					
12					
13	"X" Telescope Error			1	K4A-C
14					
15	Input Driver (250 cps)			1	EECO 1-26
16					
17					
18					
A					
B	+12 VDC	1	Conn Power-6	1	
C	Signal Input			1	K3A-NO
D	Error/Telescope Error Input			1	K4B-NO
E					
F	"Y" Telescope Error			1	K4C-C
H					
J	Error/Telescope Error Input			1	K5B-C
K					
L	"X" Input of Scope			1	Scope "X" Input
M					
N	"Y" Input of Scope			1	Scope "Y" Input
P					
R	View/Auto Lock (X)			1	K2C-NO
S					
T	Gnd	1	Conn Power-1	1	
U					
V	-12 VDC	1	Conn Power-7	1	Lok Det-V

Shutter Ckt.
Board

Pin	Function	In	From	Out	To
1	+28 VDC	1	VU/GD-1	1	Coc 1-B
2	+28 VDC				
3					
4					
5	Shut. Opn. Line (Green) Motor			1	Conn Exit-F
6	Command Opn. L.S.			1	Conn Exit-N
7	Output-Shut. SW.			1	Shut.SW. B-NC
8					
9					
10	Shut. Clo. Line (Red) Motor			1	Conn Exit-S
11	Command Clo. L.S.			1	Conn Exit-E
12	Shut. Dimmer Line			1	Misc 6-34
13	Shut. Opn. Light			1	Shut. Lamp $\overline{D}$
14					
15	Output-Shut. SW.			1	Shut. SW. A-NO
16	Overload				
17	Shut. Emg. Light			1	Shut. Lamp $\overline{C}$
18	Output-Shut. SW.			1	Shut. SW. A-NC
A	+12 VDC	1	VU/GD-V	1	Lok Det-U
B	Gnd	1	VU/GD-A	1	Lok Det-B
C					
D					
E					
F					
H					
J					
K					
L					
M					
N					
P					
R					
S					
T					
U					
V	(Gnd)				

Lock Detector Board

Pin	Function	In	From	Out	To
1					
2	Telescope Guide Relay Control			1	S Tel B-NO
3					
4					
5					
6					
7					
8	Auto Lock Control			1	K2D-NO
9					
10					
11	Gnd (Shield)				
12					
13	Lock Lamp Control			1	Lock Lamp
14	Output	K1-6 K2-6		Err Gen 5-13	
15					
16	Signal Indicator	AMP 1 out			
17					
18					
A	+15 VDC	1	Conn Power-5	1	Misc 4-B
B	Gnd	1	Shut-B	1	Misc 4-T
C	Gnd				
D					
E					
F					
H	+5 VDC	1	Conn Power-5	1	Coc 1-A
J					
K					
L					
M					
N					
P					
R					
S					
T					
U	+12 VDC	1	Shut-A	1	Misc 4-A
V	-12 VDC	1	OSC-V	1	Misc 5-V

Misc 4 Board

Pin	Function	In	From	Out	To
1	"X" Sweep			1	Coc 1-5
2	+10V Output			1	SF4 H-4
3	Voltage Adj (3)			1	Misc 5-F
4	Voltage Adj (2)			1	Misc 5-J
5	Voltage Adj (1)			1	Misc 5-H
6					
7					
8	"Y" Sweep			1	Coc 2-5
9					
10					
11					
12					
13					
14					
15	Voltage Adj (3)			1	Misc 5-D
16	-10V Output			1	SF4 H-3
17					
18	Square Wave Input 1000 cps			1	EECO 1-13
A	+12 VDC	1	Loc Det-U		
B	+15 VDC	1	Loc Det-A	1	Coc 1-E
C					
D					
E					
F					
H					
J					
K					
K					
M					
N					
P					
R					
S					
T	Gnd	1	Lok Det-B	1	Coc 1-C
U	-15 VDC	1	Conn Power-3	1	Coc 2-V
V	-12 VDC	1	Lok Det-V	1	Err Gen 4-A

Misc 5 Board
(Trim-Pot Adj)

Pin	Function	In	From	Out	To
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16	Filter Adj "Y" (2)	1	Err Gen 1-5		
17					
18					
A					
B					
C					
D	Volt Reg Adj-(3)	1	Misc 4-15		
E					
F	Volt Reg Adj+(3)	1	Misc 4-3		
H	Volt Reg Adj+(1)	1	Misc 4-5		
J	Volt Reg Adj+(2)	1	Misc 4-4		
K	H.V. Gain Adj (3)	1	Err Gen 6-9		
L	H.V. Gain Adj (2)	1	Err Gen 6-11		
M	H.V. Gain Adj (2)	1	Err Gen 6-15		
N	Err Gen Zero Adj (3)	1	Err Gen 2-F		
P	Err Gen Zero Adj (1)	1	Err Gen 2-C		
R	+15 VDC	1	Err Gen 4-B	1	Err Gen 1-7
S	-15 VDC	1	Err Gen 1-V		
T	Filter Adj "X" (2)	1	Err Gen 1-16		
U	Var. Sweep Adj (2)	1	Err Gen 5-14		
V	Gnd	1	Err Gen 4-V	1	Err Gen 1-A

Misc 6 Board
(Dimmer Resistors)

Pin	Function	In	From	Out	To
1					
2	Offset Lamps C,D			1	S Offset A-C
3					
4	Drift Lamps C,D			1	S Drift A-C
5					
6	ID4 Lamps C,D			1	S ID4 A-C
7					
8	ID3 Lamps C.D			1	S ID3 A-C
9					
10	PTG Lamps C,D			1	S PTG A-C
11					
12	Pep Lamps C,D			1	S Pep A-C
13					
14	Telescope Lamps C,D			1	S Tel A-C
15					
16	Sweep Lamps C,D			1	S Sweep A-C
17					
18					
19					
20					
21					
22	Common Side			1	Q34-Emitter
23					
24					
25					
26	Mirror C,D	1	KL1 A-NO		
27					
28	Cooling Lamps			1	S Cool-?
29					
30	White Lamps $\overline{AB}$*			1	Lamps $\overline{AB}$
31					
32	Spare				
33					
34	Shutter Lamp (open)			1	Shut-12
35					

* All white lamps on switches to be tied together.

Centering & Offset Control 1
Board (X)

Pin	Function	In	From	Out	To
1					
2					
3					
4					
5	"X" Coord Adj	1	Misc 4-1	1	Err Gen 5-7
6	"X" Center Coord. Control			1	S Drift B-C
7	Center Coord. Gain "Input"			1	Coord. Gain Adj-1
8	X=100			1	SD3 F-C
9	X=1			1	SD3 D-C
10					
11	X Coord. Gain			1	Coc 2-18
12					
13	"X" Centering "Input"			1	X Center Adj-2
14	Offset Gain "Input"			1	Offset Gain Adj-3
15	X=10			1	SF4 F-C
16	X=1			1	SF4 E-C
17					
18					
A	+5 VDC	1	Lok Det-H	1	Coc 2-A
B	+28 VDC	1	Shut-1	1	Coc 2-B
C	Gnd	1	Misc 4-T	1	Coc 2-C
D					
E	+15 VDC	1	Misc 4-B	1	Coc 2-E
F					
H					
J	X=10			1	SD3 E-C
K					
L	(Gnd)				
M					
N					
P	Center Coord. Gain "Output"	1	Coord Gain Adj-3		
R					
S	X=100			1	SF4 Co-C
T	Offset Gain "Output	1	Offset Gain Adj-1		
U	"X" Offset Control			1	S Offset B-C
V	-15 VDC	1	Coc 2-V	1	Err Gen 3-V

Centering & Offset Control 2
Board (Y)

Pin	Function	In	From	Out	To
1	"Go" Lamp Control			1	Drift Lamp-D
2	"Go" Position			1	S Drift A-NO
3					
4					
5	"Y" Coord. Adj.	1	Misc 4-8	1	Err Gen 5-16
6	"Y" Center Coord. Control	1	S Drift B-C		
7	Center Coord. Gain "Input"			1	Coord Gain Adj-1
8	Y=100			1	SE3 F-C
9	Y=1			1	SE3 D-C
10					
11					
12					
13	"Y" Centering "Input"			1	Y Center Adj-2
14	Offset Gain "Input"	1	Offset Gain Adj-3		
15	Y=10			1	SG4 F-C
16	Y=1			1	SG4 E-C
17					
18	X Coord Gain	1	Coc 1-11		
A	+5 VDC	1	Coc 1-A		
B	+28 VDC	1	Coc 1-B		
C	Gnd	1	Coc 1-C	1	Err Gen 5-A
D					
E	+15 VDC	1	Coc 1-E	1	Err Gen 5-B
F					
H					
J	Y=10			1	SE3 E-C
K					
L	(Gnd)				
M					
N					
P	Center Coord Gain "Output"	1	Coord Gain Adj-3		
R	Offset Lamp Control "Red"				
S	Y=100			1	SG4 G-C
T	Offset Gain "Output"			1	Offset Gain Adj-1
U	"Y" Offset Control	1	S Offset B-C		
V	-15 VDC	1	Misc 4-U	1	Coc 1-V

Analog Gate #1
Board

Pin	Function	In From	Out To
1	Summing Point Input	1 Op. Amp 1-4	
2	-15 VDC	1 T.S.	1 Analog Gate 2-2 1 Analog Gate 1-12
3	+15 VDC	1 T.S.	1 Analog Gate 2-3
4			
5	Gnd	1 T.S.	1 Analog Gate 1-8
6	Logic Input		1 Err Gen 6-6
7	Summing Point Output		1 Op. Amp 1-3
8	Cond	1 Analog Gate 1-5	
9			
10			
11			
12	-15 VDC	1 Analog Gate 1-2	
13			
14			
15			

Analog Gate #2
Board

Pin	Function	In From	Out To
1	Summing Point Input	1 Op. Amp 2-4	
2	-15 VDC	1 Analog Gate 1-2	1 Op. Amp 1-10 1 Analog Gate 2-12
3	+15 VDC	1 Analog Gate 1-3	1 Op. Amp 1-8
4			
5	Gnd	1 T.S.	1 Analog Gate 2-8
6	Logic Input		1 Err Gen 6-5
7	Summing Point Output		1 Op. Amp 2-3
8	Gnd	1 Analog Gate 2-5	1 Op. Amp 1-2
9			
10			
11			
12	-15 VDC	1 Analog Gate 2-2	
13			
14			
15			

Operational Amplifier #1

Pin	Function	In From	Out To
1			
2	Gnd	1 Analog Gate 2-8	1 Op. Amp 1-9
3	- Input	1 Analog Gate 1-7	
4	Output		1 Analog Gate 1-1
5			
6	Output		1 Err Gen 3-1
7			
8	+15 VDC	1 Analog Gate 2-3	1 Op. Amp 2-8
9	Gnd	1 Op. Amp 1-2	1 Op. Amp 2-2
10	-15 VDC	1 Analog Gate 2-2	1 Op. Amp 2-10

Operational Amplifier #2

Pin	Function	In From	Out To
1			
2	Gnd	1 Op. Amp 1-2	1 Op. Amp 2-9
3	- Input	1 Analog Gate 2-7	
4	Output		1 Analog Gate 2-1
5			
6	Output		1 Err Gen 5-1
7			
8	+15 VDC	1 Op. Amp 1-8	
9	Gnd	1 Op. Amp 1-2	
10	-15 VDC	1 Op. Amp 1-10	

EECO Board #1
(2252)

Pin	Function	In From	Out To
1			
2	+5	1 BCD 1-30	1 EECO 2-3
3	Gnd	1 BCD 1-29	1 EECO 2-2
4	Output (2 KC)		1 EECO 1-9
5			
6	Output		1 EECO 1-11
7			
8			
9	Input (2 KC)	1 EECO 1-4	1 EECO 1-18
10	Input (4 KC)	1 EECO 2-5	
11	Input	1 EECO 1-6	
12			
13	Output (1000 cps)	1 Misc 4-18	
		1 EECO 1-16	1 Err Gen 6-3
14	Output	1 EECO 1-20	1 Err Gen 4-16
			1 Err Gen 6-17
15			
16	Input (1000 cps)	1 EECO 1-31	1 EECO 1-13
17			
18	Input (2 KC)	1 EECO 1-9	
19			
20	Input		1 EECO 1-14
21			
22			
23			
24			
25	Input (500 cps)		1 EECO 1-33
26	Output (250 cps)	1 OSC -15	Div. Board-4
27			
28			
29			
30			
31	Input (1000 cps)		1 EECO 1-16
32			
33	Output (500 cps)	1 EECO 1-25	
34			
35			

EECO Board #2
(0225)

Pin	Function	In From	Out To
1			
2	+5 VDC	1 EECO 1-3	
3	Gnd	1 EECO 1-2	
4			
5	Output (4 KC)		1 EECO 1-10
6			
7			
8			
9			
10			
11			
12	(+) .008		1 EECO 2-22
13	1 KC Square Wave		1 Err Gen 2-16
14	(-) .008		1 EECO 2-24
15			
16			
17			
18			
19			
20			
21			
22	(-) .008	1 EECO 2-12	
23			
24	(+) .008	1 EECO 2-14	
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			

Frequency Divider and Focus Current Adjust

Pin	Function	In From	Out To
1			
2	+5 VDC		
3	Gnd		
4	250 PPS Input	EECO #1-26	
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17	Current Readout Sel.	Scope Sel SW Pin 6	
18	Readout to Scope		Scope Input
19			
20	+28 VDC		
21			
22			
23			
24	62.5 PPS Out	Err Gen #5 Pin 3	
25			
26			
27	Focus Coil Common	Exit Conn Pin G	
28			
29			
30	Focus Control Adj	Focus Control Center Tap	
31			
32			
33			
34	Focus Coil		Exit Conn Pin H
35			

Resistor Board #1
(X Center Coord.)

Pin		In From	Out To
1	R44 (10K)		1 SDF-1
2	R43 (10K)		1 SDF-2
3	R42 (10K)		1 SDF-3
4	R41 (10K)		1 SDF-4
5	R40 (10K)		1 SDF-5
6	R39 (10K)		1 SDF-6
7	R38 (10K)		1 SDF-7
8	R37 (10K)		1 SDF-8
9			
10			
11			
12			
13			
14			
15	R16 (100Ω)		1 SDD-9
16			
17			
18			
19	R34 (1K)		1 SDE-1
20	R33 (1K)		1 SDE-2
21	R32 (1K)		1 SDE-3
22	R31 (1K)		1 SDE-4
23	R30 (1K)		1 SDE-5
24	R29 (1K)		1 SDE-6
25	R28 (1K)		1 SDE-7
26	R27 (1K)		1 SDE-8
27	R16 (100Ω)		1 SDD-8
28	R17 (100Ω)		1 SDD-7
29	R18 (100Ω)		1 SDD-6
30	R19 (100Ω)		1 SDD-5
31	R20 (100Ω)		1 SDD-4
32	R21 (100Ω)		1 SDD-3
33	R22 (100Ω)		1 SDD-2
34	R23 (100Ω)		1 SDD-1
35	R24 (100Ω)		1 SDD-0

Resistor Board #2
(Y Center Coord.)

Pin		In From	Out To
1	R44 (10K)		1 SEF-1
2	R43 (10K)		1 SEF-2
3	R42 (10K)		1 SEF-3
4	R41 (10K)		1 SEF-4
5	R40 (10K)		1 SEF-5
6	R39 (10K)		1 SEF-6
7	R38 (10K)		1 SEF-7
8	R37 (10K)		1 SEF-8
9			
10			
11			
12			
13			
14			
15	R16 (100Ω)		1 SED-9
16			
17			
18			
19	R34 (1K)		1 SEE-1
20	R33 (1K)		1 SEE-2
21	R32 (1K)		1 SEE-3
22	R31 (1K)		1 SEE-4
23	R30 (1K)		1 SEE-5
24	R29 (1K)		1 SEE-6
25	R28 (1K)		1 SEE-7
26	R27 (1K)		1 SEE-8
27	R16 (100Ω)		1 SED-8
28	R17 (100Ω)		1 SED-7
29	R18 (100Ω)		1 SED-6
30	R19 (100Ω)		1 SED-5
31	R20 (100Ω)		1 SED-4
32	R21 (100Ω)		1 SED-3
33	R22 (100Ω)		1 SED-2
34	R23 (100Ω)		1 SED-1
35	R24 (100Ω)		1 SED-0

Resistor Board #3
(X Center Offset)

Pin		In From	Out To
1	R84 (10K)		1 SFG-1
2	R83 (10K)		1 SFG-2
3	R82 (10K)		1 SFG-3
4	R81 (10K)		1 SFG-4
5	R80 (10K)		1 SFG-5
6	R79 (10K)		1 SFG-6
7	R78 (10K)		1 SFG-7
8	R77 (10K)		1 SFG-8
9			
10			
11			
12			
13			
14			
15	R59 (100Ω)		1 SFE-9
16			
17			
18			
19	R75 (1K)		1 SFF-1
20	R74 (1K)		1 SFF-2
21	R73 (1K)		1 SFF-3
22	R72 (1K)		1 SFF-4
23	R71 (1K)		1 SFF-5
24	R70 (1K)		1 SFF-6
25	R69 (1K)		1 SFF-7
26	R68 (1K)		1 SFF-8
27	R59 (100Ω)		1 SFE-8
28	R60 (100Ω)		1 SFE-7
29	R61 (100Ω)		1 SFE-6
30	R62 (100Ω)		1 SFE-5
31	R63 (100Ω)		1 SFE-4
32	R64 (100Ω)		1 SFE-3
33	R65 (100Ω)		1 SFE-2
34	R66 (100Ω)		1 SFE-1
35	R67 (100Ω)		1 SFE-0

Resistor Board #4
(Y Center Offset)

Pin		In From	Out To
1	R154 (10K)		1 SGG-1
2	R153 (10K)		1 SGG-2
3	R152 (10K)		1 SGG-3
4	R151 (10K)		1 SGG-4
5	R150 (10K)		1 SGG-5
6	R149 (10K)		1 SGG-6
7	R148 (10K)		1 SGG-7
8	R147 (10K)		1 SGG-8
9			
10			
11			
12			
13			
14			
15	R129 (100Ω)		1 SGE-9
16			
17			
18			
19	R145 (1K)		1 SGF-1
20	R144 (1K)		1 SGF-2
21	R143 (1K)		1 SGF-3
22	R142 (1K)		1 SGF-4
23	R141 (1K)		1 SGF-5
24	R140 (1K)		1 SGF-6
25	R139 (1K)		1 SGF-7
26	R138 (1K)		1 SGF-8
27	R129 (100Ω)		1 SGE-8
28	R130 (100Ω)		1 SGE-7
29	R131 (100Ω)		1 SGE-6
30	R132 (100Ω)		1 SGE-5
31	R133 (100Ω)		1 SGE-4
32	R134 (100Ω)		1 SGE-3
33	R135 (100Ω)		1 SGE-2
34	R136 (100Ω)		1 SGE-1
35	R137 (100Ω)		1 SGE-0

Switches In Guidance Panel

Switches	Deck	Pin		In From	Out To
D3	A	0			
(X)		1			1 BCD 1-8
		2			1 BCD 1-11
		3			1 BCD 1-6
		4			1 BCD 1-5
		5			1 BCD 1-7
		6			1 BCD 1-10
		7			1 BCD 1-9
		8			1 BCD 1-15
		9			1 BCD 1-26
		c	Gnd		1 SD3 B-c
D3	D	0	Gnd	1 Resistor B 1-35	
(X)		1		1 RB 1-34	
		2		1 RB 1-33	
		3		1 RB 1-32	
		4		1 RB 1-31	
		5		1 RB 1-30	
		6		1 RB 1-29	
		7		1 RB 1-28	
		8		1 RB 1-27	
		9		1 SD3 E-9	1 SE3 F-9
		c		1 Coc 1-9	
		Lamp a	Gnd		
		b			
D3	B	0			
(X)		1			1 BCD 1-17
		2			1 BCD 1-21
		3			1 BCD 1-22
		4			1 BCD 1-18
		5			1 BCD 1-16
		6			1 BCD 1-20
		7			1 BCD 1-19
		8			1 BCD 1-24
		9			1 BCD 1-23
		c	Gnd	1 SD3 A-C	1 SD3 C-C
D3	E	0	Gnd	1 SD3 D-0	1 SD3 F-0
(X)		1		1 RB 1-19	
		2		1 RB 1-20	
		3		1 RB 1-21	
		4		1 RB 1-22	
		5		1 RB 1-23	
		6		1 RB 1-24	
		7		1 RB 1-25	
		8		1 RB 1-26	
		9		1 SD3 F-9	1 SD3 D-9
		c		1 Coc 1-J	
		Lamp a	Gnd		
		b			

Switches in Guidance Panel

Switch	Deck	Pin		In From	Out To
D3	C	0			
(X)		1			1 BCD 2-8
		2			1 BCD 2-11
		3			1 BCD 2-6
		4			1 BCD 2-5
		5			1 BCD 2-7
		6			1 BCD 2-10
		7			1 BCD 2-9
		8			1 BCD 2-25
		9			1 BCD 2-26
		c	Gnd	1 Chain Lamp b	
				1 SD3 B-C	1 SE3 A-C
D3	F	0	Gnd	1 SD3 E-0	1 SE3 D-0
(X)		1		1 RB 1-1	
		2		1 RB 1-2	
		3		1 RB 1-3	
		4		1 RB 1-4	
		5		1 RB 1-5	
		6		1 RB 1-6	
		7		1 RB 1-7	
		8		1 RB 1-8	
		9		1 SF4 H-4	1 SD3 E-9
		c		1 COC 1-B	

Lamp a Gnd
b

1. Chain All Lamp A Sides to Gnd
2. Chain All Lamp B Sides Together (White Lights)

Switches in Guidance Panel

Switch	Deck	Pin		In From	Out To
E3	A	0			
(Y)		1			1 BCD 2-17
		2			1 BCD 2-21
		3			1 BCD 2-22
		4			1 BCD 2-18
		5			1 BCD 2-16
		6			1 BCD 2-20
		7			1 BCD 2-19
		8			1 BCD 2-24
		9			1 BCD 2-23
		c	Gnd	1 SD3 C-c	1 SE3 B-c
E3	D	0	Gnd	1 Resistor B 2-35	
(Y)				1 SD3 F-0	1 SE3 E-0
		1		1 RB 2-34	
		2		1 RB 2-33	
		3		1 RB 2-32	
		4		1 RB 2-31	
		5		1 RB 2-30	
		6		1 RB 2-29	
		7		1 RB 2-28	
		8		1 RB 2-27	
		9		1 SE3 E-9	
		c		1 COC 2-9	
		Lamp a	Gnd		
		b			
E3	B	0			
(Y)		1			1 BCD 3-9
		2			1 BCD 3-11
		3			1 BCD 3-6
		4			1 BCD 3-5
		5			1 BCD 3-7
		6			1 BCD 3-10
		7			1 BCD 3-9
		8			1 BCD 3-25
		9			1 BCD 3-26
		c	Gnd	1 SE3 A-C	1 SE3 C-C
E3	E	0	Gnd	1 SE3 D-0	1 SE3 F-0
(Y)		1		1 RB 2-19	
		2		1 RB 2-20	
		3		1 RB 2-21	
		4		1 RB 2-22	
		5		1 RB 2-23	
		6		1 RB 2-24	
		7		1 RB 2-25	
		8		1 RB 2-26	
		9		1 SE3 F-9	1 SE3 D-9
		c		1 COC 2-J	
		Lamp a	Gnd		
		b			

Switches in Guidance Panel

Switch	Deck	Pin		In From	Out To
E3	C	0			
(Y)		1			1 BCD 3-17
		2			1 BCD 3-21
		3			1 BCD 3-22
		4			1 BCD 3-18
		5			1 BCD 3-16
		6			1 BCD 3-20
		7			1 BCD 3-19
		8			1 BCD 3-24
		9			1 BCD 3-23
		c	Gnd	1 SE3 F-0	
				1 SE3 B-C	
E3	F	0	Gnd	1 SE3 E-0	1 SE3 C-C
		1		1 RB 2-1	
		2		1 RB 2-2	
		3		1 RB 2-3	
		4		1 RB 2-4	
		5		1 RB 2-5	
		6		1 RB 2-6	
		7		1 RB 2-7	
		8		1 RB 2-8	
		9		1 SD3 D-9	1 SE3 E-9
		c		1 COC 2-8	
		Lamp a	Gnd		
		b			

1. Chain A-1 Lamp A Sides to Gnd
2. Chain All Lamp B Sides Together (White Lights)

Switches in Guidance Panel

Switch	Deck	Pin		In From	Out To
F4 (X)	A	0			
		1			1 BCD 4-8
		2			1 BCD 4-11
		3			1 BCD 4-6
		4			1 BCD 4-5
		5			1 BCD 4-7
		6			1 BCD 4-10
		7			1 BCD 4-9
		8			1 BCD 4-25
		9			1 BCD 4-26
		c	Gnd		1 SF4 B-C
F4 (X)	E	0	Gnd	1 Resistor B 3-35	1 SF4 F-0
		1		1 RB 3-34	
		2		1 RB 3-33	
		3		1 RB 3-32	
		4		1 RB 3-31	
		5		1 RB 3-30	
		6		1 RB 3-29	
		7		1 RB 3-28	
		8		1 RB 3-27	
		9			
		c		1 COC 1-16	
		Lamp	a Gnd		
			b		
F4 (X)	B	0			
		1			1 BCD 4-17
		2			1 BCD 4-21
		3			1 BCD 4-22
		4			1 BCD 4-18
		5			1 BCD 4-16
		6			1 BCD 4-20
		7			1 BCD 4-19
		8			1 BCD 4-24
		9			1 BCD 4-23
		c	Gnd	1 SF4 A-C	1 SF4 C-C
F4 (X)	F	0	Gnd	1 SF4 E-0	1 SF4 G-0
		1		1 RB 3-19	
		2		1 RB 3-20	
		3		1 RB 3-21	
		4		1 RB 3-22	
		5		1 RB 3-23	
		6		1 RB 3-24	
		7		1 RB 3-25	
		8		1 RB 3-26	
		9			
		c		1 COC 1-15	
		Lamp	a Gnd		
			b		

Switches in Guidance Panel

Switch	Deck	Pin		In From	Out To
F4 (X)	C	0			
		1			1 BCD 5-8
		2			1 BCD 5-11
		3			1 BCD 5-6
		4			1 BCD 5-5
		5			1 BCD 5-7
		6			1 BCD 5-10
		7			1 BCD 5-9
		8			1 BCD 5-25
		9			1 BCD 5-26
		c	Gnd	1 SF4 G-0	
				1 SF4 B-C	
F4 (X)	G	0	Gnd	1 SF4 F-0	1 SF4 C-C
		1		1 RB 3-1	
		2		1 RB 3-2	
		3		1 RB 3-3	
		4		1 RB 3-4	
		5		1 RB 3-5	
		6		1 RB 3-6	
		7		1 RB 3-7	
		8		1 RB 3-8	
		9		1 SF4 H-B	
		c		1 COC 1-5	
		Lamp	a Gnd		
			b		
F4 (Sign)	D	2	+5 VDC		
		1	Gnd		
		4		(R.O.)	
F4 (Sign)	H	4	+10v	1 Misc 4-2	1 SD3 F-9
					1 SG4 H-4
		3	-10v	1 Misc 4-16	1 SG4 H-3
		B			1 SF4 G-9
		Lamp	a Gnd		
			b		

1. Chain All Lamp A Sides to Gnd
2. Chain All Lamp B Sides Together (White Lights)

Switches in Guidance Panel

Switch	Deck	Pin		In From	Out To
G4	A	0			
(Y)		1			1 BCD 5-17
		2			1 BCD 5-21
		3			1 BCD 5-22
		4			1 BCD 5-18
		5			1 BCD 5-16
		6			1 BCD 5-20
		7			1 BCD 5-19
		8			1 BCD 5-24
		9			1 BCD 5-23
		c	Gnd		
G4	E	0	Gnd	1 Resistor B 4-35	
(Y)		1		1 RB 4-34	
		2		1 RB 4-33	
		3		1 RB 4-32	
		4		1 RB 4-31	
		5		1 RB 4-30	
		6		1 RB 4-29	
		7		1 RB 4-28	
		8		1 RB 4-27	
		9			
		c		1 COC 2-16	
		Lamp a	Gnd		
		b			
G4	B	0			
(Y)		1			1 BCD 6-8
		2			1 BCD 6-11
		3			1 BCD 6-6
		4			1 BCD 6-5
		5			1 BCD 6-7
		6			1 BCD 6-10
		7			1 BCD 6-9
		8			1 BCD 6-25
		9			1 BCD 6-26
		c	Gnd		
G4	F	0	Gnd		
(Y)		1		1 RB 4-19	
		2		1 RB 4-20	
		3		1 RB 4-21	
		4		1 RB 4-22	
		5		1 RB 4-23	
		6		1 RB 4-24	
		7		1 RB 4-25	
		8		1 RB 4-26	
		9			
		c		1 COC 2-15	
		Lamp a	Gnd		
		b			

Switches in Guidance Panel

Switch	Deck	Pin		In From	Out To
G4 (Y)	C	0			
		1			1 BCD 6-17
		2			1 BCD 6-21
		3			1 BCD 6-22
		4			1 BCD 6-18
		5			1 BCD 6-16
		6			1 BCD 6-20
		7			1 BCD 6-19
		8			1 BCD 6-24
		9			1 BCD 6-23
		c	Gnd		
G4 (Y)	G	0	Gnd		
		1		1 RB 4-1	
		2		1 RB 4-2	
		3		1 RB 4-3	
		4		1 RB 4-4	
		5		1 RB 4-5	
		6		1 RB 4-6	
		7		1 RB 4-7	
		8		1 RB 4-8	
		9		1 SG4 H-B	
		c		1 COC 2-5	
		Lamp	a Gnd		
			b		
G4 (Sign)	D	2	+5 VDC		
		1	Gnd		
		4		(R.O.)	
G4 (Sign)	H	4	+10v	1 SF4 H-4	
		3	-10v	1 SF4 H-3	
		B			1 SG4 G-9
		Lamp	a Gnd		
			b		

1. Chain All Lamp A Sides to Gnd
2. Chain All Lamp B Sides Together (White Lights)

Guidance Panel

Switch	Deck	Pin	In From	Out To
Drift	A	c	1 Misc 6-4	
		NO	1 COC 2-2	
		NC	1 Drift Lamp-c	
	B	c	1 COC 1-6	1 COC 2-6
		NO Gnd		1 SOF set B-NO
		NC +28 VDC	1 SOF set B-NC	
		$\overline{AB}$ Lamps		1 Ofset Lamps $\overline{AB}$
		D Lamp (Go)	1 COC 2-1	
		C Lamp (Set)		1 S Drift A-NC
Offset	A	c	1 Misc 6-2	
		NO	1 Ofset Lamp c	
		NC	1 Ofset Lamp D	
	B	c	1 COC 1-U	1 COC 2-U
		NO Gnd	1 S Drift B-NO	1 S Mirror A-C
		NC +28 VDC		1 S Drift B-NC
		$\overline{AB}$ Lamps	1 Drift $\overline{AB}$	1 Mirror Lamps $\overline{AB}$
		C Lamp		1 S ofset A-NO
		D Lamp		1 S ofset A-NC
Mirror	A	c Gnd	1 S ofset B-NO	1 S shut A-C
		NO	1 VU/GD-6	
(OBSOLETE)		NC	1 VU/GD-5	
	B	c		
		NO		
		NC		
		$\overline{AB}$ Lamps	1 Ofset Lamps $\overline{AB}$	1 Sweep Lamps $\overline{AB}$
		$\overline{C}$ Lamp		1 K_{L2} A-C
		$\overline{D}$ Lamp		1 K_{L1} A-C
Sweep	A	c	1 Misc 6-16	
		NO	1 Sweep Lamp c	
		NC	1 Sweep Lamp D	
	B	c	1 Err Gen 4-6	1 K1D-C
		NC +5 VDC		
		$\overline{AB}$ Lamps	1 Mirror Lamps $\overline{AB}$	1 Shut Lamps $\overline{AB}$
		C Lamp		1 S Sweep A-NO
		D Lamp		1 S Sweep A-NC
Shutter	A	c Gnd	1 S Mirror A-C	
		NO	1 Shut-15	
		NC	1 Shut-18	
	B	c +28 VDC	1 Guide Dimmer-4	1 S Pep B-C
		NO		
		NC	1 Shut-7	
		$\overline{AB}$ Lamps	1 Sweep Lamps $\overline{AB}$	1 ID4 Lamps $\overline{AB}$
		$\overline{C}$ Lamp	1 Shut-17	
		$\overline{D}$ Lamp	1 Shut-13	

Guidance Panel

Switch	Deck	Pin	In From	Out To
Telescope	A	c	1 Misc 6-14	
		NO	1 Tel Lamp c	
		NC	1 Tel Lamp D	
	B	c	1 Conn. Exit-Y	
		NO	1 Lok Det-2	
		$\overline{AB}$ Lamps	1 Pep Lamps $\overline{AB}$	
		C Lamp		1 S Tel A-NO
		D Lamp		1 S Tel A-NC
Pep	A	c	1 Misc 6-12	
		NO	1 Pep Lamp c	
(OBSOLETE)		NC	1 Pep Lamp D	
	B	c +28 VDC	1 S Shut B-C	1 S Ptg B-C
		NO	1 Conn. Drive-W	1 S Ptg B-NO
		NC		
		$\overline{AB}$ Lamps	1 Ptg Lamps $\overline{AB}$	1 Tel Lamps $\overline{AB}$
		C Lamp		1 S Pep A-NO
		D Lamp		1 S Pep A-NC
Ptg	A	c	1 Misc 6-10	
		NO	1 Ptg Lamp c	
		NC	1 Ptg Lamp D	
(OBSOLETE)	B	c +28 VDC	1 S Pep B-C	1 SID3 B-C
		NO	1 S Pep B-NO	1 Conn. Drive-X
		NC		
		$\overline{AB}$ Lamps	1 ID3 Lamps $\overline{AB}$	1 Pep Lamps $\overline{AB}$
		C Lamp		1 S Ptg A-NO
		D Lamp		1 S Ptg A-NC
ID3	A	c	1 Misc 6-8	
		NO	1 ID3 Lamp c	
		NC	1 ID3 Lamp D	
	B	c +28 VDC	1 S Ptg B-C	1 S ID4 B-C
		NO		1 Conn. Drive-t
		NC		
		$\overline{AB}$ Lamps	1 ID4 Lamps $\overline{AB}$	1 Ptg Lamps $\overline{AB}$
		C Lamp		1 S ID3 A-NO
		D Lamp		1 S ID3 A-NC
ID4	A	c	1 Misc 6-6	
		NO	1 ID4 Lamp c	
(OBSOLETE)		NC	1 ID4 Lamp D	
	B	c +28 VDC	1 S ID3 B-C	
		NO		1 Conn. Drive-s
		NC		
		$\overline{AB}$ Lamps	1 Shut Lamp $\overline{AB}$	1 ID3 Lamps $\overline{AB}$
		C Lamp		1 S ID4 A-NO
		D Lamp		1 S ID4 A-NC

Guidance Relay Panel

Relay	Deck	Pin		Function	In From	Out To
KL1	A	c	9		1 Mirror Lamp $\overline{D}$	
(Guide Lamp)		NO	10		1 KL2 A-NO	1 Misc 6-26
		NC	8			
(OBSOLETE)	B	c	6			
		NO	7			
		NC	5			
	Coil	+	1	+28 VDC		
		IN4001				
		G	4		1 VU/GD-12	
KL2	A	c	9		1 Mirror Lamp $\overline{c}$	
(View Lamp)		NO	10			1 KL1 A-NO
		NC	8			
(OBSOLETE)	B	c	6			
		NO	7			
		NC	5			
	Coil	+	1	+28 VDC		
		IN4001				
		G	4		1 VU/GD-18	
KSS	A	c	6		1 Conn. Exit-L	
(Start/Stop)		NO	7	"Start"		1 KRF A-NO
		NC	5	"Stop"		
(OBSOLETE)	B	c	9		1 Conn. Exit-K	
		NO	10	"Start"	1 KRF B-NO	
		NC	8	"Stop"		
	Coil	+	1	(Stop)	1 VU/GD-L	
		G	4	(Start)	1 VU/GD-11	
KRF	A	c	6	+28 VDC		
(Rev/Fwd)		NO	7	"Forward"	1 KSS A-NO	1 KRF B-NC
		NC	5	"Reverse"		1 KRF B-NO
(OBSOLETE)	B	c	9	Gnd		
		NO	10	"Forward"	1 KRF A-NC	1 KSS B-NO
		NC	8	"Reverse"	1 KRF A-NO	
	Coil	+	1	(Forward)	1 VU/GD-2	
		G	4	(Reverse)	1 VU/GD-c	

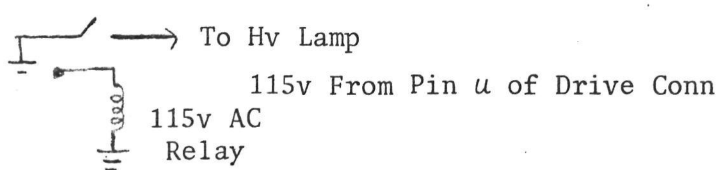
Guidance Relay Panel

Relay	Deck	Pin		Function	In From	Out To
K1 (View)	A	c	6			1 K2
		NO	7		1 OSC-1	1 K2A-NO
		NC	5			
	B	c	9		1 K2B-c	
		NO	10		1 OSC-5	1 K2B-NO
		NC	8			
	C	c	12			1 K2C-c
		NO	13		1 K2C-NO	
		NC	11			
	D	c	15		1 S Sweep B-NO	
		NO	16			
		NC	14			
	Coil	+	1	+28 VDC		
		IN4001				
		G	4	(Gnd)		
K2 (Auto Lock)	A	c	6		1 K1A-c	Lock Det-14
		NO	7		1 K1A-NO	
		NC	5			
	B	c	9		1 Err Gen 3-U	1 K1B-c
		NO	10		1 K1B-NO	
		NC	8			
	C	c	12		1 Err Gen 5-U 1 K1C-c	
		NO	13		1 OSC-R	1 K1C-NO
		NC	11			
	D	c	15			
		NO	16		1 Lock Det-8	
		NC	14			
	Coil	+	1	+28 VDC		
		IN4001				
		G	4	(Gnd)		
K3 (Signal)	A	c	6		A1-out	
		NO	7		1 OSC-c	
		NC	5			
	B	c	9			
		NO	10			
		NC	8			
	C	c	12			
		NO	13			
		NC	11			
	D	c	15			
		NO	16			
		NC	14			
	Coil	+	1	+28 VDC		
		IN4001				
		G	4	(Gnd)		

Guidance Relay Panel

Relay	Deck	Pin		Function	In From	Out To
K4	A	c	6		1 OSC-13	1 K5A-c
(Error)		NO	7		Err Gen #1-15	Conn Guid Exit a
		NC	5			
	B	c	9		1 K5B-c	
		NO	10		1 OSC-D	1 K5B-NO
		NC	8			
	C	c	12		1 OSC-F	1 K5C-c
		NO	13		Err Gen #1-3	Conn Guid Exit c
		NC	11			
	D	c	15			
		NO	16			
		NC	14			
	Coil	+	1	+28 VDC		
		IN4001				
		G	4	(Gnd)		
K5	A	c	6		1 K4A-c	
(Tel Error)		NO	7			Conn Guid - Z
		NC	5			
	B	c	9		1 OSC-J	1 K4B-c
		NO	10		1 K4B-NO	
		NC	8			
	C	c	12		1 K4C-c	
		NO	13			Conn Guid - b
		NC	11			
	D	c	15			
		NO	16			
		NC	14			
	Coil	+	1	+28 VDC		
		IN4001				
		G	4	(Gnd)		

K_HV



Guidance Panel
(Rear)

Potentiometers	Pin		In From	Out To
"Y" Offset Gain	1		1 COC 2-T	1 Y Offset Gain Adj-2
	2		1 Y Offset Gain Adj-1	
	3		1 COC 2-14	
"Y" Centering	1	Gnd		
	2		1 COC 2-13	
	3	-15 VDC		
"Y" Center Coord Gain				
	1		1 COC 2-7	1 Y Center Coord Gain Adj-2
	2		1 Y Center Coord Gain Adj-1	
	3		1 COC 2-P	
"X" Centering	1	Gnd		
	2		1 COC 1-13	
	3	-15 VDC		
"X" Offset Gain	1		1 COC 1-T	1 X Offset Gain Adj-2
	2		1 X Offset Gain Adj-1	
	3		1 COC 1-14	
"X" Center Coord Gain				
	1		1 COC 1-7	1 X Center Goord Gain Adj-2
	2		1 X Center Coord Gain Adj-1	
	3		1 COC 1-P	
"X" Error Centering				
	1	Gnd		
	2		1 Err Gen 2-8	
	3	-15 VDC		
"Y" Error Centering				
	1	Gnd		
	2		1 Err Gen 4-8	
	3	-15 VDC		

View/Guide Mirror
Board

OBSOLETE

Pin	Function	In	From	Out	To
1	+28 VDC	1	Conn Power-8	1	Shut-1
2	"Forward" Input			1	KRF-1
3					
4					
5	View/Guide "NC"			1	S Mirror A-NC
6	View/Guide "NO"			1	S Mirror A-NO
7	Right Limit Switch ID 2			1	Conn Exit-M
8					
9					
10					
11	"Start" Command			1	KSS-4
12	"Guide" Lamp			1	KL1-4
13					
14					
15					
16					
17					
18	"View" Lamp			1	KL2-4
A	Gnd	1	OSD-T	1	Shut-B
B					
C	"Reverse" Input			1	KRF-4
D					
E					
F	Left Limit Switch ID 1			1	Conn Exit-G
H					
J					
K					
L	"Stop" Command			1	KSS-1
M	Center Limit Switch "Open"			1	Conn Exit-H
N					
P					
R					
S					
T					
U					
V	+12 VDC	1	OSC-B	1	Shut-A

Guidance Connector OBSOLETE

Connector	Pin	Function	In	From	Out	To
Drive (55-Pin)	A	Theta Drive SW 2 (common)	1	S2 Theta-C		
	B	Theta Drive SW 2 (common)	1	S2 Theta-C		
	C	Theta Drive SW 1 (lo/hi)	1	S1 Theta A-4 S1 Theta A-2		
	D	Theta Drive Speed Control (pos A)	1	θSC-A		
	E	Theta Drive Speed Control (pos B)	1	θSC-B		
	F	Theta Indicator Light (neutral side)	1	θ Lamp-N		
	G	Theta Drive SW 2 (rev/Fwd)	1	S2 Theta A-3 S2 Theta B-1		
	H	Theta Drive SW 1 (lo)	1	S1 Theta B-3		
	J	Theta Drive SW 2 (off)	1	S1 Theta B-2		
	K	Theta Drive SW 2 (rev)	1	S2 Theta B-3		
	L	Theta Drive SW 2 (Fwd)	1	S2 Theta A-1		
	M	R1 Drive SW 2 (common)	1	S2 R1-C		
	N	R1 Drive SW 2 (common)	1	S2 R1-C		
	P	R1 Dirve SW 1 (lo/hi)	1	S1 R1 A-4 S1 R1 A-2		
	R	R1 Drive Speed Control (pos A)	1	R1 SC-A		
	S	R1 Drive Speed Control (pos B)	1	R1 SC-B		
	T	R1 Indicator Light (neutral side)	1	R1 Lamp-N		
	U	R1 Drive SW 2 (rev/Fwd)	1	S2 R1 A-3 S2 R1 B-1		
	V	R1 Drive SW 2 (lo)	1	S1 R1 B-3		
	W	R1 Drive SW 2 (off)	1	S2 R1 B-2		
	X	R1 Drive SW 2 (rev)	1	S2 R1 B-3		
	Y	R1 Drive SW 2 (Fwd)	1	S2 R1 A-1		
	Z	Base Ring L. S. (C.W. Common)	1	Conn Exit-D		
	a	R2 Drive SW 2 (common)	1	S2 R2-C		
	b	R2 Drive SW 2 (common)	1	S2 R2-C		
	c	Base Ring L.S. (C.W. NC)	1	Conn. Exit-A		
	d	R2 Drive SW 1 (lo/hi)	1	S1 R2 A-4 S1 R2 A-2		
	e	R2 Drive Speed Control (pos A)	1	R2 SC-A		
	f	F2 Drive Speed Control (pos B)	1	R2 SC-B		
	g	R2 Indicator Light (neutral side)	1	R2 Lamp-N		
	h	R2 Drive SW 2 (rev/Fwd)	1	S2 R2 A-3 S2 R2 B-1		
	i	Mod 2 L.S. (between)	1	Conn. Exit-T		
	j	Mod 2 L.S. (in)	1	Conn. Exit-V		
	k	R2 Drive SW 1 (lo)	1	S1 R2 B-2		
	m	R2 Drive SW 2 (off)	1	S1 R2 B-2		
	n	R2 Drive SW 2 (rev)	1	S2 R2 B-3		
	p	Mod 1 L.S. (between)	1	Conn. Exit-J		
	q	Mod 1 L.S. (in)	1	Conn. Exit-P		
	r	R2 Drive SW 2 (Fwd)	1	S2 R2 A-1		
	s	ID 4 Relay Coil	1	S1 D4 B-NO		
	t	ID 3 Relay Coil	1	S1 D3 B-NO		
	u	High Voltage Power Supply Control	1	ERR Gen 6-7		
	v	High Voltage Lamp Control	1	H.V. Relay Coil		
	w	Pep Relay Coil			1	SPep B-NO
	x	Pep/Ptg Relay Coil	1	SPep/Ptg B-NO		
	y	Gnd				

EXPERIMENT SELECT SECTION

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ES Panel Lamps

Lamp	Letter		Out To	In From
ID CAL (OBSOLETE)	$\overline{AB}$	*ES3-11 chain	1 S_{IDCAL} A-C	1 FIELD lamps $\overline{AB}$
	$\overline{CD}$			1 S_{IDCAL} A-NO
	gnd			1 ES3-8
STEP ONE FILE (SOF)	$\overline{ABCD}$	*ES3-11 chain	1 Scc A-C	1 S_{IDCAL} A-C
	gnd			1 ES3-7
FIELD	$\overline{AB}$	*ES3-11 chain	1 IDCAL lamps $\overline{AB}$	1 S_{FLD} A-C
(Full Ap)	AP D			1 S_{FLD} A-NC (AP)
	OPN C			1 K(FLD) A-NO
	gnd			1 ES3-5
MAIN POWER	$\overline{ABCD}$		1 ES3-5	
	gnd	Gnd		
CC	TIM			1 Scc A-1
	PNT			1 Scc A-2
	LIN			1 Scc A-3
	PER			1 Scc A-5
	CPY			1 Scc A-6
	common side			1 ES3-6
OPTICS SELECT (A)	PEP			1 K19 coil +
	ID4			1 K21 coil +
	ID3			1 K20 D-NO
(OBSOLETE)	CAL			1 K18 coil +
	PTG			1 K20 coil +
	common side			1 ES3-4
RC	CORE $\overline{ABCD}$			1 S_{ACC} B-NO
	WRITE $\overline{ABCD}$			1 S_{RCW} B-NO
	PRINT $\overline{ABCD}$			1 S_{RCP} B-NO
	common gnds $\overline{NR, C, W, PW, P}$			1 ES3-2
ES	FRAME $\overline{ABCD}$			1 ES4-7
	1 CH DATA $\overline{ABCD}$			1 ES4-27
	HEADING $\overline{ABCD}$			1 WS4-28
	REMARK $\overline{ABCD}$			1 ES4-29
	READ CORE $\overline{ABCD}$			1 ES4-30
	AREA SCAN $\overline{ABCD}$			1 ES4-32
	READ TAPE $\overline{ABCD}$			1 ES4-34
	common gnds $\overline{F, P, 1CD, H, R, 2CD, AS, PS, RT}$			

ES Panel Switches
(CC, TAPE DIRECTION, OPTICS SELECT)

Switch	Deck	Pin		Out To	In From
CC	A	c	*ES3-11 chain		1 SOF lamps $\overline{ABCD}$
		1		1 TIM lamp	
		2		1 PNT lamp	
		3		1 LIN lamp	
		4		1 FRM lamp	
		5		1 CPY lamp	
		6			
	B	c	Gnd		
		1			1 ES1-14
		2			1 ES1-17
		3			1 ES1-15
		4			1 ES1-16
		5			1 ES1-K
		6			
TAPE DIRECTION (TDC)	A	c			1 Conn RO-24
		NO (Rev)	-12 VDC		
		NC (Fwd)	Gnd		
	B	c			1 ES3-22
		NC	(Black)		1 File Counter Motor (Blk)
		NO	(White)		1 File Counter Motor (W)
OPTICS SELECT (A)	A	15678			1 K17 A-C
		$\overline{2}34$			1 K17 B-C
	B	$\overline{1}$			1 K18 D-C
		$\overline{2}34$			1 K18 C-C
		$\overline{6}78$			1 K20 D-NO
(OBSOLETE)	C	$12\overline{3}4$			1 K18 B-C
		$\overline{5}678$			1 K18 A-C
	D	1			1 K19 B-C
		$\overline{2}345678$			1 K19 A-C
	E	$\overline{1}23678$			1 K20 A-C
		45			1 K20 B-C
	F	$\overline{1}2$			1 K21 F-C
		$\overline{3}$			1 K21 E-C
		$\overline{4}5$			1 K27 α-C
		$\overline{6}$			1 K21 D-C
		$\overline{7}8$			1 K21 C-C
	G	$1\overline{2}4578$			1 K21 B-C
		$3\overline{6}$			1 K21 A-C
	Comm	ABCD$\overline{E}$FG	+28 VDC		
	H	1			1 ES3-31
		2			1 ES3-30
		3			1 ES3-26
		4			1 ES3-25
		5			1 ES3-33
		6			1 ES3-32
		78			1 ES3-27
		c	+28 VDC		

ES Panel Switches (RC)
(4 pole momentary with latching relay)

Switch	Deck	Pin		Out To	In From
NO RECORD	A	c	+28 VDC		
(RCNR)		NO		1 S_{RCNR} coil +	
		NC		1 S_{RCC} A-C	
	B	c	+28 VDC		
(OBSOLETE)		NO		1 NO REC lamps $\overline{ABCD}$	1 ES4-1
		NC			1 ES4-12
	C	c			1 Conn RO-30
		NO	+5 VDC		
		NC	Gnd		
	D	c		1 S_{RCC} D-NC	
		NO		1 S_{RCNR} coil G	
		NC			
	coil	+			1 S_{RCNR} A-NO
		gnd			1 S_{RCNR} D-NO
CORE	A	c			1 S_{RCNR} A-NC
(RCC)		NO		1 S_{RCC} coil +	
		NC		1 S_{RCW} A-C	
	B	c	+28 VDC		
		NO		1 CORE lamps $\overline{ABCD}$	1 ES4-2
		NC			1 ES4-11
	C	c			
		NO	+5 VDC		
		NC	Gnd		
	D	c		1 S_{RCW} D-NC	
		NO		1 S_{RCC} coil G	
		NC			1 S_{RCNR} D-C
	coil	+			1 S_{RCC} A-NO
		gnd			1 S_{RCC} D-NO
WRITE	A	c			1 S_{RCC} A-NC
(RCW)		NO		1 S_{RCW} coil +	
		NC		1 S_{RCPW} A-C	
	B	c	+28 VDC		
		NO		1 WRITE lamps $\overline{ABCD}$	1 ES4-3
		NC			1 ES4-10
	C	c			1 Conn RO-27
		NO	+5 VDC		
		NC	Gnd		
	D	c		1 S_{RCPW} D-NC	
		NO		1 S_{RCW} coil G	
		NC			1 S_{RCC} D-C
	coil	+			1 S_{RCW} A-NO
		gnd			1 S_{RCW} D-NO

ES Panel Switches
(RC continued, ES)
(ES 4 pole momentary with latching relay)

Switch	Deck	Pin		Out To	In From
PRINT/WRITE					
(RCPW)	A	c			1 S_{RCW} A-NC
		NO		1 S_{RCPW} coil +	
		NC		1 S_{RCP} A-C	
	B	c	+28 VDC		
		NO		1 PR/WR lamps $\overline{ABCD}$	1 ES4-4
		NC			1 ES4-9
(OBSOLETE)	C	c			1 Conn RO-28
		NO	+5 VDC		
		NC	Gnd		
	D	c		1 S_{RCP} D-NC	
		NO		1 S_{RCPW} coil G	
		NC			1 S_{RCW} D-C
	coil	+			1 S_{RCPW} D-NO
		Gnd			1 S_{RCPW} D-NO
PRINT	A	c			1 S_{RCPW} A-NC
(RCP)		NO		1 S_{RCP} coil +	
		NC			
	B	c	+28 VDC		
		NO		1 PRINT lamps $\overline{ABCD}$	1 ES4-5
		NC			1 ES4-8
	C	c			1 Conn RO-29
		NO	+5 VDC		
		NC	Gnd		
	D	c	Gnd		
		NO		1 S_{RCP} coil G	
		NC			1 S_{RCPW} D-C
	coil	+			1 S_{RCP} A-NO
		Gnd			1 S_{RCP} D-NO
FRAME	A	c			1 $S_{\rho R}$ A-NC
(ρF)		NO		1 $S_{\rho F}$ coil +	1 ES4-15
		NC		1 $S_{\rho 2CD}$ A-C	
(OBSOLETE)	B	c			1 ES2-D
		NO	+5 VDC		
		NC	Gnd		
	C	c	Gnd		
		NO			1 ES2-A
		NC			
	D	c		1 $S_{\rho 2CD}$ D-NC	
		NO		1 $S_{\rho F}$ coil G	
		NC			1 $S_{\rho R}$ D-C
	coil	+			1 $S_{\rho F}$ A-NO
		Gnd			1 $S_{\rho F}$ D-NO

ES Panel Switches (ES continued)

Switch	Deck	Pin		Out To	In From
PHOTO	A	c	+28 VDC		
(ρP)		NO		1 $S_{\rho P}$ coil +	1 ES4-14
		NC		1 $S_{\rho 1CD}$ A-C	
	B	c			1 ES2-F
(OBSOLETE)		NO	+5 VDC		
		NC	Gnd		
	C	c	Gnd		
		NO			1 ES2-9
		NC			
	D	c		1 $S_{\rho 1CD}$ D-NC	
		NO		1 $S_{\rho P}$ coil G	
		NC			
	coil	+			1 $S_{\rho P}$ A-NO
		Gnd			1 $S_{\rho P}$ D-NO
1 CH DATA	A	c			1 $S_{\rho P}$ A-NC
(ρ1CD)		NO		1 $S_{\rho 1CD}$ coil +	1 ES4-19
		NC		1 $S_{\rho H}$ A-C	
	B	c			1 ES2-T
		NO	+5 VDC		
		NC	Gnd		
	C	c	Gnd		
		NO			1 ES2-10
		NC			
	D	c		1 $S_{\rho H}$ D-NC	
		NO		1 $S_{\rho 1CD}$ coil G	
		NC			1 $S_{\rho P}$ D-C
	coil	+			1 $S_{\rho 1CD}$ A-NO
		Gnd			1 $S_{\rho 1CD}$ D-NO
HEADING	A	c			1 $S_{\rho 1CD}$ A-NC
(ρH)		NO		1 $S_{\rho H}$ coil +	1 ES4-20
		NC		1 $S_{\rho R}$ A-C	
	B	c			1 ES2-5
		NO	+5 VDC		
		NC	Gnd		
	C	c	Gnd		
		NO			1 ES2-3
		NC			
	D	c		1 $S_{\rho R}$ D-NC	
		NO		1 $S_{\rho H}$ coil G	
		NC			1 $S_{\rho 1CD}$ D-C
	coil	+			1 $S_{\rho H}$ A-NO
		Gnd			1 $S_{\rho H}$ D-NO

ES Panel Switches
(ES continued)

Switch	Deck	Pin		Out To	In From
REMARK	A	c			1 $S_{\rho H}$ A-NC
(ρR)		NO		1 $S_{\rho R}$ coil +	1 ES4-21
		NC		1 $S_{\rho F}$ A-C	
	B	c			1 ES2-E
		NO	+5 VDC		
		NC	Gnd		
	C	c	Gnd		
		NO			1 ES2-2
		NC			
	D	c		1 $S_{\rho F}$ D-NC	
		NO		1 $S_{\rho R}$ coil G	
		NC			1 $S_{\rho H}$ D-C
	coil	+			1 $S_{\rho R}$ A-NO
		Gnd			1 $S_{\rho R}$ D-NO
READ CORE	A	c			1 $S_{\rho AS}$ A-NC
(ρRC)		NO		1 $S_{\rho RC}$ coil +	1 ES4-22
		NC		1 $S_{\rho RT}$ A-C	
	B	c			1 ES2-15
		NO	+5 VDC		
		NC	Gnd		
	C	c	Gnd		
		NO			1 ES2-K
		NC			
	D	c		1 $S_{\rho RT}$ D-NC	
		NO		1 $S_{\rho RC}$ coil G	
		NC			1 $S_{\rho AS}$ D-C
	coil	+			1 $S_{\rho RC}$ A-NO
		Gnd			1 $S_{\rho RC}$ D-NO
2 CH DATA	A	c			1 $S_{\rho F}$ A-NC
(OBSOLETE)		NO		1 $S_{\rho 2CD}$ coil +	1 ES4-23
		NC		1 $S_{\rho PS}$ A-C	
	B	c			1 ES2-16
		NO	+5 VDC		
		NC	Gnd		
	C	c	Gnd		
		NO			1 ES2-B
		NC			
	D	c		1 $S_{\rho PS}$ D-NC	
		NO		1 $S_{\rho 2CD}$ coil G	
		NC			1 $S_{\rho F}$ D-C
	coil	+			1 $S_{\rho 2CD}$ A-NO
		Gnd			1 $S_{\rho 2CD}$ D-NO

ES Panel Switches
(ES continued)

Switch	Deck	Pin			Out To	In From
AREA SCAN	A	c				1 $S_{\rho PS}$ A-NC
(ρAS)		NO			1 $S_{\rho AS}$ coil +	1 ES4-24
		NC			1 $S_{\rho RC}$ A-C	
	B	c				1 ES2-17
		NO	+5 VDC			
		NC	Gnd			
	C	c	Gnd			
		NO				1 ES2-M
		NC				
	D	c			1 $S_{\rho RC}$ D-NC	
		NO			1 $S_{\rho AS}$ coil G	
		NC				1 $S_{\rho PS}$ D-C
	coil	+				1 $S_{\rho AS}$ A-NO
		Gnd				1 $S_{\rho AS}$ D-NO
PERIOD SCAN						
(ρPS)	A	c				1 $S_{\rho 2CD}$ A-NC
		NO			1 $S_{\rho PS}$ coil +	1 ES4-25
		NC			1 $S_{\rho AS}$ A-C	
(OBSOLETE)	B	c				1 ES2-U
		NO	+5 VDC			
		NC	Gnd			
	C	c	Gnd			
		NO				1 ES2-L
		NC				
	D	c			1 $S_{\rho AS}$ D-NC	
		NO			1 $S_{\rho PS}$ coil G	
		NC				1 $S_{\rho 2CD}$ D-C
	coil	+				1 $S_{\rho PS}$ A-NO
		Gnd				1 $S_{\rho PS}$ D-NO
READ TAPE	A	c				1 $S_{\rho RC}$ A-NC
(ρRT)		NO			1 $S_{\rho RT}$ coil +	1 ES4-26
		NC				
	B	c				1 ES2-S
		NO	+5 VDC			
		NC	Gnd			
	C	c		NOT		
		NO		USED		
		NC	Gnd			
	D	c	Gnd			
		NO			1 $S_{\rho RT}$ coil G	
		NC				1 $S_{\rho RC}$ D-C
	coil	+				1 $S_{\rho RT}$ A-NO
		Gnd				1 $S_{\rho RT}$ D-NO

ES Panel Switches
IDCAL, SOF, FIELD, MAIN POWER)

Switch	Deck	Pin	Function	Out To	In From
ID CAL	A	c	*ES3-11 chain	1 SOF lamps $\overline{ABCD}$	1 ID CAL lamps $\overline{AB}$
		NO		1 ID CAL ON lamps $\overline{CD}$	
(OBSOLETE)		NC			
	B	c	+28 VDC		
		NO			1 ES3-23
		NC			

*ES3-11 chain as follows
ES3-11 S Fld A-C FIELD lamps $\overline{AB}$ IDCAL lamps $\overline{AB}$ S_{IDCAL} lamps $\overline{ABCD}$ scc A-C

Switch	Deck	Pin	Function	Out To	In From
STEP ONE FILE					
(SOF)	A	c			
		NO			1 Conn RO-25
		NC			
	B	c			
		NO			
		NC			
	C	c	Gnd		
		NO			1 ES1-3
		NC			
	D	c			
		NO			
		NC			
FIELD	A	c	*ES3-11 chain	1 FIELD lamps $\overline{AB}$	1 ES3-11
(Full AP)		NO (OPN)			
		NC (AP)		1 AP lamp (D)	
	B	c	Gnd		
		NO (OPN)			1 ES1-6
		NC (AP)		(CONN Logic-9)	1 RR7-11
MAIN POWER	A	c	+28		
		NO		1 ES3-21	
		NC			
	B	c		+1 MP relay coil	
		NO	115 VAC (A side)	1 115 VAC TS (A)	
		NC			

+May be in EXIT area, location TBD, 115 VAC B side on opposite end of coil

ES 1

Pin	Function	In From	Out To	
1	Gnd	1 Gnd T.S.	1 ES2-18	
2	-12 VDC	1 -12 VDC T.S.		
3	S_{SOF}C-NO		1 S_{SOF}C-NO	
4	100 PPS clock		1 BNC 100 PPS	
5	RC=W	1 S_{RCW}C-COM	1 SWR2-2	(Logic Conn-16)
6	S_{FLD} B-OPN		1 S_{FLD} B-OPN	
7	OPN decode line		1 RR7-5	(Conn Logic-8)
8	RC=P/N		1 SWR2-N	(Logic Conn-14)
9	SccB-5		1 SccB-5	
10	drive AP to OPN		1 Conn EXIT-12	
11	CC=PNT (2)		1 SWR3-T	(Conn Logic-2)
12	CC=FRM (4)		1 RR1-15	(Conn Logic-4)
13	CC=TIM (1)		1 SWR2-L	(Conn Logic-1)
14	SccB-1		1 SccB-1	
15	SccB-3		1 SccB-3	
16	SccB-4		1 SccB-4	
17	SccB-2		1 SccB-2	
18	$S_{\delta RT}$C-Comm	(NOT USED)	1 $S_{\delta RT}$C-Comm	
A	+5 VDC	1 +5 VDC T.S.	1 ES2-V	
B	K_{FLD}coil G	1 K(FLD) coil G		
C	EOF detect (+5 v Sig)	1 ES3-13	1 PROG C-36	(Conn RO-25)
D	CC=4 BCD RO		1 OM12-19	(Conn RO-6)
E	CC=PGR (S)		OBSOLETE	(Conn Logic-5)
F				
H	CC=CPY (G)		2 { S_{AP+}A-Comm PROG A-3	(Conn Logic-6) (Conn RO-31)
J				
K	SccB-G		1 SccB-G	
L	CC=1 BCD RO		1 OM3-34	(Conn RO-4)
M	CC=2 BCD RO		1 OM4-34	(Conn RO-5)
N	CC=LIN (3)		1 OM5-15	(Conn Logic-3)
P				
R	Power Init +5 Pulse	1 ES2-N		
S				
T				
U				
V	Tape Hi Speed	(1 RO-9)	1 PROG C-41	(Conn RO-9)

ES 2

Pin	Function	In From	Out To	
1	Power Relay ON Signal	1 ES3-20		
2	$\delta=5$ for RO decode		1 $S_{\delta R}$C-NO	
3	$\delta=4$ for RO decode		1 $S_{\delta H}$C-NO	
4	$\delta=4$ BCD RO		1 OM3-16	(Conn RO-12)
5	$\delta=4$ signal		2 PROG B-18 $S_{\delta H}$B-Comm	(Conn AO-17)
6	$\delta=1,2,4,5$ signal		1 SHUT 1-6	(Conn Logic-7)
7	NOT USED			
8	NOT USED			
9	$\delta=2$ for RO decode		OBSOLETE	(S_{SP}C-NO)
10	$\delta=3$ for RO decode		1 $S_{\delta ICD}$C-NO	
11	$\delta=2$ BCD RO		1 OM2-16	(Conn RO-11)
12	$\delta=8$ BCD RO		1 OM4-16	(Conn RO-13)
13	$\delta=8,9$ signal		1 RR7-7	(Conn Logic-10)
14	$\delta=3,7$ signal		1 RR7-11	(Conn Logic-11)
15	$\delta=6$ signal		2{PROG A-24 $S_{\delta RC}$B-Comm	(Conn RO-19)
16	$\delta=7$ signal		OBSOLETE	(S_{S2CD}B-Comm)
17	$\delta=8$ signal		2{PROG A-22 $S_{\delta AS}$B-Comm	(Conn RO-20) (Conn RO-21)
18	Gnd	1 ES1-1	1 ES3-1	
A	$\delta=1$ for RO decode		OBSOLETE	($S_{\delta F}$ C-NO)
B	$\delta=7$ for RO decode		OBSOLETE	($S_{\delta 2CD}$ C-NO)
C	$\delta=1$ BCD RO		1 OM1-16	(Conn RO-10)
D	$\delta=1$ signal		OBSOLETE	{($S_{\delta F}$B-Comm) (Conn RO-14)
E	$\delta=5$ signal		2{PROG B-22 $S_{\delta R}$B-Comm	(Conn RO-18)
F	$\delta=2$ signal		OBSOLETE	{($S_{\delta P}$ B-Comm) (Conn RO-15)
H	NOT USED			
J	NOT USED			
K	$\delta=6$ for RO decode		1 $S_{\delta RC}$C-NO	
L	$\delta=9$ for RO decode		OBSOLETE	($S_{\delta PS}$ C-NO)
M	$\delta=8$ for RO decode		1 $S_{\delta AS}$C-NO	
N	Power init +5 pulse		1 ES1-R	
P	Power init gnd pulse		1 SWR2-5	(Conn Logic-12)
R	$\delta=6,10$ signal		NOT USED	
S	$\delta=10$ signal		2{$S_{\delta RT}$B-Comm PROG A-17	(Conn RO-23)
T	$\delta=3$ signal		2{$S_{\delta BCD}$B-Comm PROG A-6	(Conn RO-16)
U	$\delta=9$ signal		OBSOLETE	{($S_{\delta PS}$ B-Comm) (Conn RO-22)
V	+5 VDC	1 ES1-A		

ES 3

Pin		Function	In From	Out To
1		Gnd	1 ES2-18	
2		RC lamps comm		1 RC lamps common gnds
3		δ lamps comm		1 δ lamps common gnds
4		A lamps comm		OBSOLETE (A lamps common side)
5		A lamps comm		1 FIELD lamps common gnd
6		CC lamps comm		1 SOF lamps common gnd
7		SOF lamp gnd		1 SOF lamps common gnd
8		ID CAL lamp gnd		OBSOLETE (ID CAL lamps common gnd)
9	*	decode A node Avail Space		NOT USED
10		Dimmer 3,5		1 Dimmer 3,5
11		Dimmer power control	1 K_{FLD} A-comm	1 *S_{FLD} A-comm
12	*	Diode K athode Avail Space		NOT USED
13		E.O.F. Sig		1 ES1-C
14		ID CAL=ON for RO		OBSOLETE (Conn RO-7)
15		A=4 BCD RO		OBSOLETE (Conn RO-3)
16		USED		
17		A=1 BCD RO		OBSOLETE (Conn RO-1)
18		USED		
19		A=2 BCD RO		OBSOLETE (Conn RO-2)
20		power-on signsl		1 ES2-1
21		S_{MP}A-NO (+28v)		1 S_{MP}A-NO
22		S.O.F. Counter		1 STD B-C
23		ID CAL power on		OBSOLETE { ($S_{ID\ CAL}$B-NO) (Conn EXIT-11)
24		USED		
25		S_AH-4	OBSOLETE-	1 S_AH-4
26		S_AH-3	OBSOLETE-	1 S_AH-3
27		S_AH-78	OBSOLETE-	1 S_AH-8
28		K28 A-comm	1 K28 A-comm	-OBSOLETE
29		K28 B-comm	1 K28 B-comm	-OBSOLETE
30		S_AH-2	OBSOLETE-	1 S_AH-2
31		S_AH-1	OBSOLETE-	1 S_AH-1
32		S_AH-6	OBSOLETE-	1 S_AH-6
33		S_AH-5	OBSOLETE-	1 S_AH-5
34		Dimmer-2		1 Dimmer-2
35		lamp power after reset drop		1 MP lamps $\overline{ABCD}$

*(chain together)

S_{FLD}A-comm, FIELD lamps AB
S_{IDCAL}A-comm, IDCAL lamps AB
SOF lamps in common ABCD
SccA-comm

ES 4

Pin	Function	In From	Out To
1	S_{RCNR}B-no		(S_{RCNR} B-NO)
2	S_{RCP}B-NO		1 S_{RCP}B-NO
3	S_{RCPW}B-NO		(S_{RCPW}B-NO)
4	S_{RCW}B-NO		1 S_{RCW}B-NO
5	S_{RCC}B-NO		1 S_{RCC}B-NO
6	PHOTO lamps + comm		(PHOTO lamps ABCD)
7	FRM lamps + comm		(FRAME lamps ABCD)
8	S_{RCC}B-NC		1 S_{RCC}B-NC
9	S_{RCW}B-NC		1 S_{RCW}B-NC
10	S_{RCPW}B-NC		(S_{RCPW}B-NO)
11	S_{RCNR}B-NC		1 S_{RCP}B-NC
12	S_{RCNR}B-NC		(S_{RCNR}B-NC)
13	diode out		NOT USED
14	$S_{\delta P}$A-NO		($S_{\delta P}$A-NO)
15	$S_{\delta F}$A-NO		($S_{\delta P}$A-NO)
16			
17			
18			
19	$S_{\delta ICD}$A-NO		1 $S_{\delta ICD}$A-NO
20	$S_{\delta H}$A-NO		1 $S_{\delta H}$A-NO
21	$S_{\delta R}$A-NO		1 $S_{\delta R}$A-NO
22	$S_{\delta RC}$A-NO		1 $S_{\delta RC}$A-NO
23	$S_{\delta 2CD}$A-NO		($S_{\delta 2CD}$A-NO)
24	$S_{\delta AS}$A-NO		1 $S_{\delta AS}$A-NO
25	$S_{\delta PS}$A-NO		($S_{\delta PS}$A-NO)
26	$S_{\delta RT}$A-NO		1 $S_{\delta RT}$A-NO
27	1CD lamps + comm		1 1CH DATA lamps ABCD
28	Head lamps + comm		1 HEADING lamps ABCD
29	Rem lamps + comm		1 REMARK lamps ABCD
30	R.C. lamps + comm		1 RD CORE lamps ABCD
31	2CD lamps + comm		(2CH DATA lamps ABCD)
32	A.S. lamps + comm		1 AREA SCN lamps ABCD
33	P.S. lamps + comm		(PER SCN lamps ABCD)
34	READ TAPE lamps + comm		1 RD TAPE lamps ABCD
35	+28 VDC	1 +28 VDC T.S.	

ES Panel Miscellany

			Out To	In From
ES Dimmer	Pin 1	Gnd		
	2			1 ES3-34
	3,5			1 ES3-10
	4	+28 VDC		
File Count (motor)		Black	1 S TD B-NO	
		White	1 S TD B-NC	
		Red -- Green	1 +28 VDC	

115 VAC outlets (OBSOLETE) wire 4 sockets in parallel
A side to 115 VAC terminal 115 VAC TS (A)
B side to 115 VAC terminal 115 VAC TS (B)
Gnd side to 115 VAC gnd terminal 115 VAC TS (G)

Main Power Relay

Deck	Pin	
A	c	To 28 VDC power supply
	NO	To 115 VAC side A 115 VAC TS (A)
	NC	
B	c	To +5, ±12, ±15 VDC power supplies & Tape area plug strip
	NO	
	NC	
C	c	To Computer section plug strip
	NO	
	C NC	
D	c	To Remaining plug strips
	NO	
	NC	
coil	+	From S_{MP} B-C
	G	To gnd side of 115 VAC line 115 VAC TS (B)

ES Connectors (1)

Connector	Pin		In From	Out To	Function
EXIT	1		1 RC K20 D-C		
	2		1 RC K18 coil +		
	3		1 RC K19 coil +		
	4		1 RC K20 coil +		
	5		1 RC K21 coil +		
	6		1 RC K28 coil +		--OBSOLETE
	7		1 RC K23 B-C		
	8		1 RC K23 α-C		
	9		1 RC K25 B-C		
	10		1 RC K25 α-C		
	11		1 ES 3-23		
	12				
	13				
	14				
	15				
	16				
LOGIC	1		1 ES1-13		
	2		1 ES1-11		
	3		1 ES1-N		
	4		1 ES 1-12		
	5		1 ES1-E		--OBSOLETE
	6		1 ES1-H		
	7		1 ES2-6		
	8		1 ES1-7		
	9			1 S_{FLD}B-AP	
	10		1 ES2-13		
	11		1 ES2-14		
	12		1 ES2-P	1 Conn RO-32	
	13			1 Conn RO-29	
	14			1 Conn RO-28	
	15			1 Conn RO-26	
	16			1 Conn RO-27	
BNC 100 PPS	1	(coax)	1 ES1-4	OBSOLETE	

ES Connectors (2)

OBSOLETE

Connector	Pin		In From	Out To	Function
RO	1		1 ES3-17		
	2		1 ES3-19		
	3		1 ES3-15		
	4		1 ES1-L		
	5		1 ES1-M		
	6		1 ES1-D		
	7		1 ES3-14		
	8	Spare			
	9	Tape Hi Speed	1 ES1-V		
	10		1 ES2-C		
	11		1 ES2-11		
	12		1 ES2-4		
	13		1 ES2-12		
	14		1 ES2-D		
	15		1 ES2-F		
	16		1 ES2-T		
	17		1 ES2-5		
	18		1 ES2-E		
	19		1 ES2-15		
	20		1 ES2-16		
	21		1 ES2-17		
	22		1 ES2-U		
	23		1 ES2-S		
	24	Tape Direction		1 S_{TDC}-Comm	
	25	EOF Sig (+5 VDC)	1 ES1-C		
	26		1 Conn LOGIC-15	1 S_{RCB}C-Comm	
	27	Tape Write	1 Conn LOGIC-16	1 S_{RCW}C-Comm	
	28		1 Conn LOGIC-14	1 S_{RCPW}C-Comm	
	29		1 Conn LOGIC-13	1 S_{RCP}C-Comm	
	30			1 S_{RCNR}C-Comm	
	31		1 ES1-H		
	32		1 Conn LOGIC-12		

ES Relay Card (1)

OBSOLETE

Relay	Deck	Pin		Function	In From	Out To
K 17	A	C	6			1 S_AA-1
		NO	7			1 K18 B-NO
		NC	5			
	B	C	9			1 S_AA-2
		NO	10			1 K18 A-NO
		NC	8			
	C	C	12	+28 VDC		1 K19 C-C
		NO	13		1 K18 D-NO	1 K23 Y coil +
		NC	11			
	D	C	15			
		NO	16			
		NC	14			
	coil	+		IN4001		1 K20 D-C
		G				2{K18 coil G K23 X coil G
K 18	A	C				1 S_AC-8
		NO			1 K17 B-NO	1 K19 B-NO
		NC				
	B	C				1 S_AC-1
		NO			1 K17 A-NO	1 K19 A-NO
		NC				
	C	C				1 S_AB-2
		NO			1 K19 C-NO	1 K23 X coil +
		NC				
	D	C				1 S_AB-1
		NO				1 K17 C-NO
		NC				
	coil	+		IN4001		2{Conn EXIT-2 A=CAL lamp
		G			1 K17 coil G	1 K19 coil G
K 19	A	C				1 S_AD-1
		NO			1 K18 A-NO	1 K24 X coil +
		NC				
	B	C				1 S_AD-1
		NO			1 K18 A-NO	1 K24 Y coil +
		NC				
	C	C		+28 VDC	1 K17 C-C	1 K20 C-C
		NO				1 K18 C-NO
		NC				
	D	C				
		NO				
		NC				
	coil	+		IN4001		2{Conn EXIT-3 A=PEP lamp
		G			1 K18 coil G	1 K20 coil G

ES Relay Card (2)

OBSOLETE

Relay	Deck	Pin		Function	In From	Out To
K 20	A	C				1 S_AE-3
		NO			1 K28 A-NO	1 K26 X coil +
		NC				
	B	C				1 S_AE-4
		NO				2{K26 Y coil + K21 A-NO
		NC				
	C	C		+28 VDC	1 K19 C-C	1 K28 C-C
		NO			1 K21 F-NO	1 K25 Y coil +
		NC				
	D	C			1 K17 coil +	1 Conn EXIT-1
		NO				2{S_AB-8 A=ID3 lamp
		NC				
	coil	+		IN4001		2{Conn EXIT 4 A=PTG lamp
		G			1 K19 coil G	1 K21 coil G
K 21	A	C	6			1 S_AG-3
		NO	7		1 K20 B-NO	1 K28 B-NO
		NC	5			
	B	C	9			1 S_AG-2
		NO	10		1 K26 X coil +	
		NC	8			
	C	C	12		1 K27 α X	1 S_AF-8
		NO	13		1 K28 C-NO	1 K25 X coil +
		NC	11			
	D	C	15			1 S_AF-6
		NO	16			1 K27 Y coil +
		NC	14			
	E	C	18			1 S_AF-3
		NO	19			1 K27 X coil +
		NC	17			
	F	C	21		1 K27 B Y	1 S_AF-1
		NO	22			1 K20 C-NO
		NC	20			
	coil	+		IN4001		2{Conn EXIT-5 A=ID4 lamp
		G			1 K20 coil G	1 K28 coil G

ES Relay Card (3)

OBSOLETE

Relay	Deck	Pin	Function	In From	Out To
K 23	α	C			1 Conn EXIT-8
		X			1 K23 B-Y
		Y			1 K23 B-X
	B	C			1 Conn EXIT-7
		X		1 K23 α-Y	1 K24 α-C
		Y		1 K23 α-X	1 K24 B-C
	X coil	+	IN4001	1 K18 C-NO	
		G		1 K17 coil G	1 K23 Y coil G
	Y coil	+	IN4001	1 K17 C-NO	
		G		1 K23 X coil G	1 K24 X coil G
K 24	α	C		1 K23 B-X	
		X		1 K24 X coil G	
		Y			
	B	C		1 K23 B-Y	
		X	+28 VDC	1 K28 C-C	1 K26 B-X
		Y			
	X coil	+	IN4001	1 K19 A-NO	
		G		1 K23 Y coil G	2{K24 αX K24 Y coil G
	Y coil	+	IN4001	1 K19 B-NO	
		G		1 K24 X coil G	1 K25 X coil G
K 25	α	C			1 Conn EXIT-10
		X			1 K25 B-Y
		Y			1 K25 B-X
	B	C			1 Conn EXIT-9
		X		1 K25 α-Y	1 K26 α-C
		Y		1 K25 α-X	1 K26 B-C
	X coil	+	IN4001	1 K21 C-NO	
		G		1 K24 Y coil G	1 K25 Y coil G
	Y coil	+	IN4001	1 K20 C-NO	
		G		1 K25 X coil G	1 K26 X coil G
K 26	α	C		1 K25 B-X	
		X		1 K26 X coil G	
		Y			
	B	C		1 K25 B-Y	
		X	+28 VDC	1 K24 B-X	
		Y			
	X coil	+	IN4001	1 K20 A-NO	1 K21 B-NO
		G		1 K25 Y coil G	2{K26 αX K26 Y coil G
	Y coil	+	IN4001	1 K20 B-NO	
		G		1 K26 X coil G	1 K27 X coil G
K 27	α	C		1 K27 B-C	1 S_A F-4
		X			1 K21 C-C
		Y			
	B	C			1 K27 α-C
		X			
		Y			1 K21 F-C

ES Relay Card (4)

OBSOLETE

Relay	Deck	Pin	Function	In From	Out To
K 28	A	C			1 ES3-28
		NO			1 K20 A-NO
		NC			
	B	C			1 ES3-29
		NO		1 K21 A-NO	
		NC			
	C	C	+28 VDC	1 K20 C-C	2{K(FLD) coil + K24 BX
		NO			1 K21 C-NO
		NC			
	D	C			
		NO			
		NC			
	coil	+	IN4001		1 Conn EXIT-6
		G		1 K21 coil G	1 GND T.S.
K (FLD)	A	C			1 ES3-11
		NO			1 FIELD OPN lamp
		NC			
	B	C			
		NO			
		NC			
	C	C			
		NO			
		NC			
	D	C			
		NO			
		NC			
	coil	+	IN4001 +28 VDC	1 K28 C-C	1 28 VDC pt
		G			1 ES1-B

SIGNAL SECTION

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MOD I
VF 2

Pin	Function	In From	Out To
1			
2			
3			
4			
5	DC Input	DC 2/3-7	
6			
7 through 23 NOT USED			
24	Gnd		
25			
26 through 32 NOT USED			
33	+15 VDC	DC 2/3-15	
34			
35	-15 VDC	DC 2/3-17	Gate-13
36	Pulse Out		Disc 2/3-L

MOD I
VF 3

Pin	Function	In From	Out To
1			
2			
3			
4			
5	DC Input	DC 2/3-13	
6			
7 through 23 NOT USED			
24	Gnd		
25			
26 through 32 NOT USED			
33	+15 VDC		VF 2-33
34			
35	-15 VDC		VF 2-35
36	Pulse Out		Disc 2/3-9

MOD I
Gate

Pin	Function	To
1		
2	ω=4,6 Out	Disc 2/3-8
3	ω=3,5 Out	Disc 2/3-H
4	ω=2 In	Multiplex-4
5		
6		
7	$\bar{\eta}_A$ Out	DC 2/3-R
8	η_A In	TB8-29
9		
10		
11	$\bar{\eta}_B$ Out	
12	η_B In	TB8-6
13	-15 VDC	
14	ω=1 Out	
15		
16	ω=2 Out	
17	ω=8 Relay Driver	TB8-39
18	ω=2 Relay Driver	
A	ω=4,6 Out	TB8-22
B		
C	ω=7 Out	Disc 2/3-12
D	Gnd	Gnd Bus
E	Gnd	Disc 2/3-18, DC 2/3-1
F	+5 VDC	
H		
J		
K		
L		
M	ω=4 In	Multiplex-6
N		
P		
R		
S	ω=1 In	Multiplex-10
T	ω=8 Out	Disc 2/3-11
U		
V		

MOD I
Scale A+
(Prescaler)

Pin	Function	To
1	+5 VDC	
2	Gnd	
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14	τ_A BCD "1"	TB8-23
15		
16		
17	+15 VDC	VF 2-33, VF 3-33
18		Disc 2/3-10
A		
B		
C	Count Output	BNC-CHA+ (Coax)
D		
E		
F		
H		
J		
K		
L		
M		
N		
P		
R	τ_A BCD "2"	TB8-24
S		
T		
U		
V		Disc 2/3-K

MOD I
DC 2/3

Pin	Function	
1	Gnd	
2		
3		
4		
5		
6		
7	DC Out (ID2)	VF 2-5
8		
9	Zero Adj (ID3)	TB8-32
10		
11	Zero Adj (ID2)	TB8-30
12		
13	DC Out (ID3)	VF 3-5
14		
15	+15 VDC	
16		
17	-15 VDC	
18		
A		
B		
C		
D		
E		
F	DC Input (ID2)	Coax to Tube Out
H		
J	+28 VDC	
K		
L		
M		
N	DC Input (ID3)	Coax to Tube Out
P		
R	Relay Gain Control	Gate-7
S		
T		
U		
V		

MOD I
Discriminator 2/3

Pin	Function	To
1		
2	ID3 Pulse Input	Coax to Pulse Amp
3		
4		
5		
6		
7		
8	ω=4,6 In	Gate-2
9	ID3 VF In	VF 3-36
10	ID2 VF/Pulse Out	Scale A+-18
11	ω=8 In	Gate-T
12	ω=7 In	Gate-C
13		
14		
15		
16		
17	ID2 Pulse Input	Coax to Pulse Amp Out
A		Multiplex-14
B		
C		
D		
E		
F		
H		Gate-3
J		
K	ID3 VF/Pulse Out	Scale A+-V
L	ID2 VF In	VF 2-36
M		
N		
P		
R		
S		
T		
U		
V		

Signal Box Connector
(MIII)

	Pin	Function	In From	Out To
VF	1			
	2			
	3			
	4			
	5		1 DC 2/3-13	
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			
	21			
	22			
	23			
	24	Gnd		
	25			
	26			
	27			
	28			
	29			
	30			
	31			
	32			
	33	+15 VDC	1 DC 2/3-15	
	34			
	35	-15 VDC	1 DC 2/3-17	1 Gate-13
	36			1 Discrim-9

Signal Box Connector
(MIII)

Pin		Function	In From	Out To
DC 2/3	1	Gnd	1 P1-a	
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9	Discriminator ID#3		
	10			
	11	Discriminator ID#3	1 P1-R	
	12			
	13			1 VF-5
	14			
	15	+15 VDC	1 P1-U	1 VF-33
	16			
	17	-15 VDC	1 P1-V	1 VF-35
	18			
	a			
	b			
	c			
	d			
	e			
	f			
	h			
	j	+28 VDC	1 P1-T	
	k			
	l			
	m			
	n	DC Input		1 Pulse Amp
	p			
	r			1 Gate-7
	s			
	t			
	u			
	v			

Signal Box Connector
(MIII)

Pin	Function	In From	Out To
Discrim 2/3			
1			
2	Pulse In (ID#3)	1 Pulse Amp	
3			
4			
5			
6			
7			
8	ω=4,6		1 Gate-2
9		1 VF-36	
10			
11			
12			
13			
14			
15			
16			
17			
18	Gnd		
a	+5 VDC	1 P1-n	1 Gate-F
b			
c			
d			
e			
f			
h			
j			
k			1 Scale A+-V
l			
m			
n	ω=3,5		1 Gate-3
p			
r			
s			
t			
u			
v			

Signal Box Connector
(MIII)

	Pin	Function	In From	Out To
Gate	1			
	2	ω=4,6	1 Discrim 2/3-8	
	3	ω=3,5	1 Discrim 2/3-N	
	4	ω=2	1 P1-X	
	5	ω=1	1 P1-W	
	6			
	7		1 DC 2/3-R	
	8	ηA	1 P1-A	
	9			
	10			
	11			
	12			
	13	-15 VDC	1 VF-35	
	14			
	15			
	16			
	17			
	18			
	a	ω=4,6		1 Pulse Amp (Relay)
	b			
	c			
	d			
	e	Gnd		
	f	+5 VDC	1 Discrim 2/3-A	1 Scale A+-1
	h			
	j			
	k			
	l			
	m	ω=4	1 P1-2	
	n			
	p			
	r			
	s			
	t			
	u			
	v			

Signal Box Connector
(MIII)

Pin	Function	In From	Out To
Scale A+			
1	+5 VDC	1 Gate-f	
2	Gnd		
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14	A BCD#1	1 P1-B	
15			
16			
17			
18			
a			
b			
c	Count Output from Scaler		(Coax) 1 BNC-CHA +
d			
e			
f			
h			
j			
k			
l			
m			
n			
p			
r	A BCD#2	1 P1-C	
s			
t			
u			
v		1 Discrim 2/3-K	

SPACE ASTRONOMY

OF THE

STEWARD OBSERVATORY

THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA

FINAL TECHNICAL REPORT

OF

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

GRANT NGR 03-002-032

IMAGE DISSECTOR CONTROL AND DATA SYSTEM ELECTRONICS

PART III

December 15, 1975

A-75-10 ABC

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LOGIC SECTION

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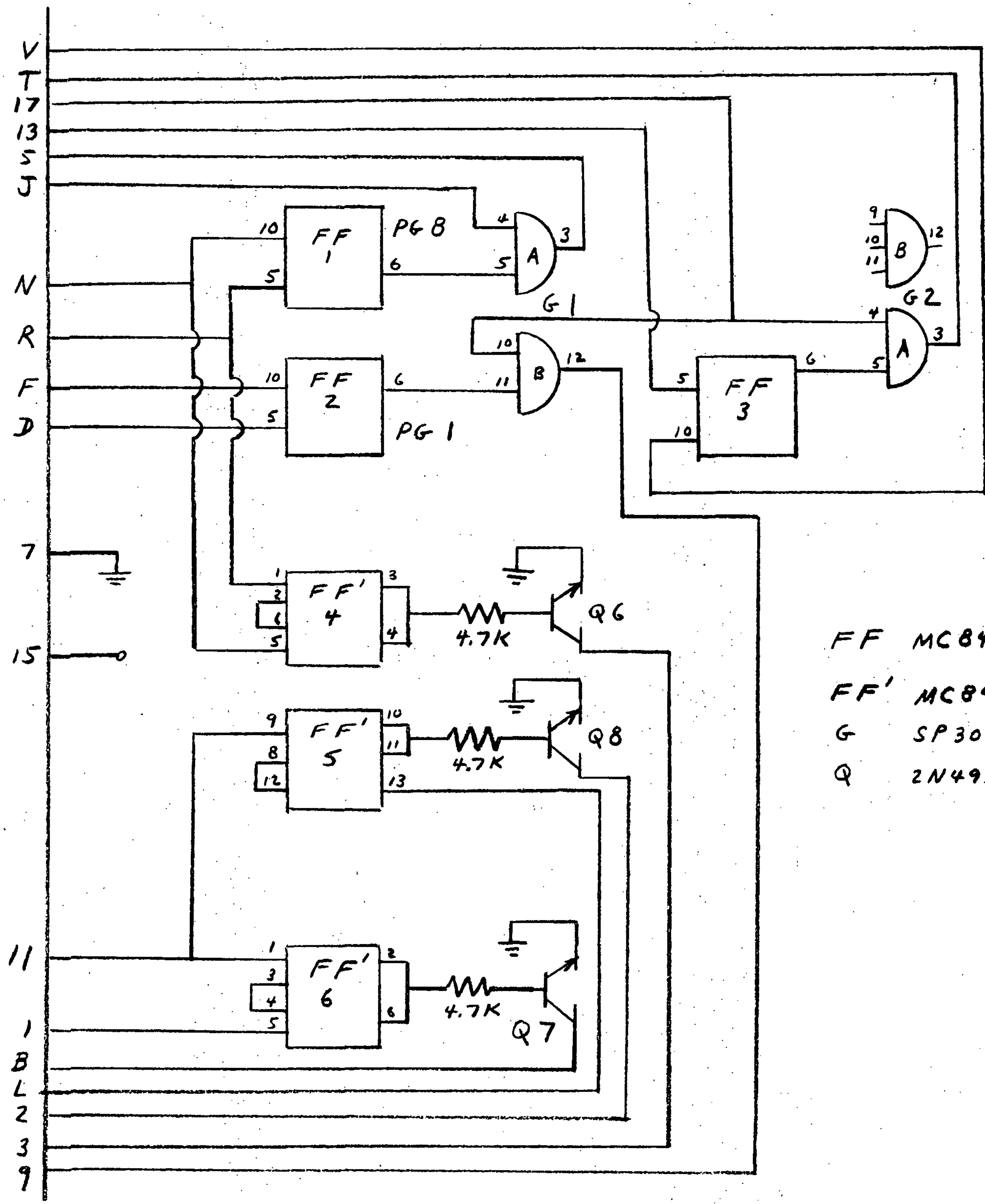
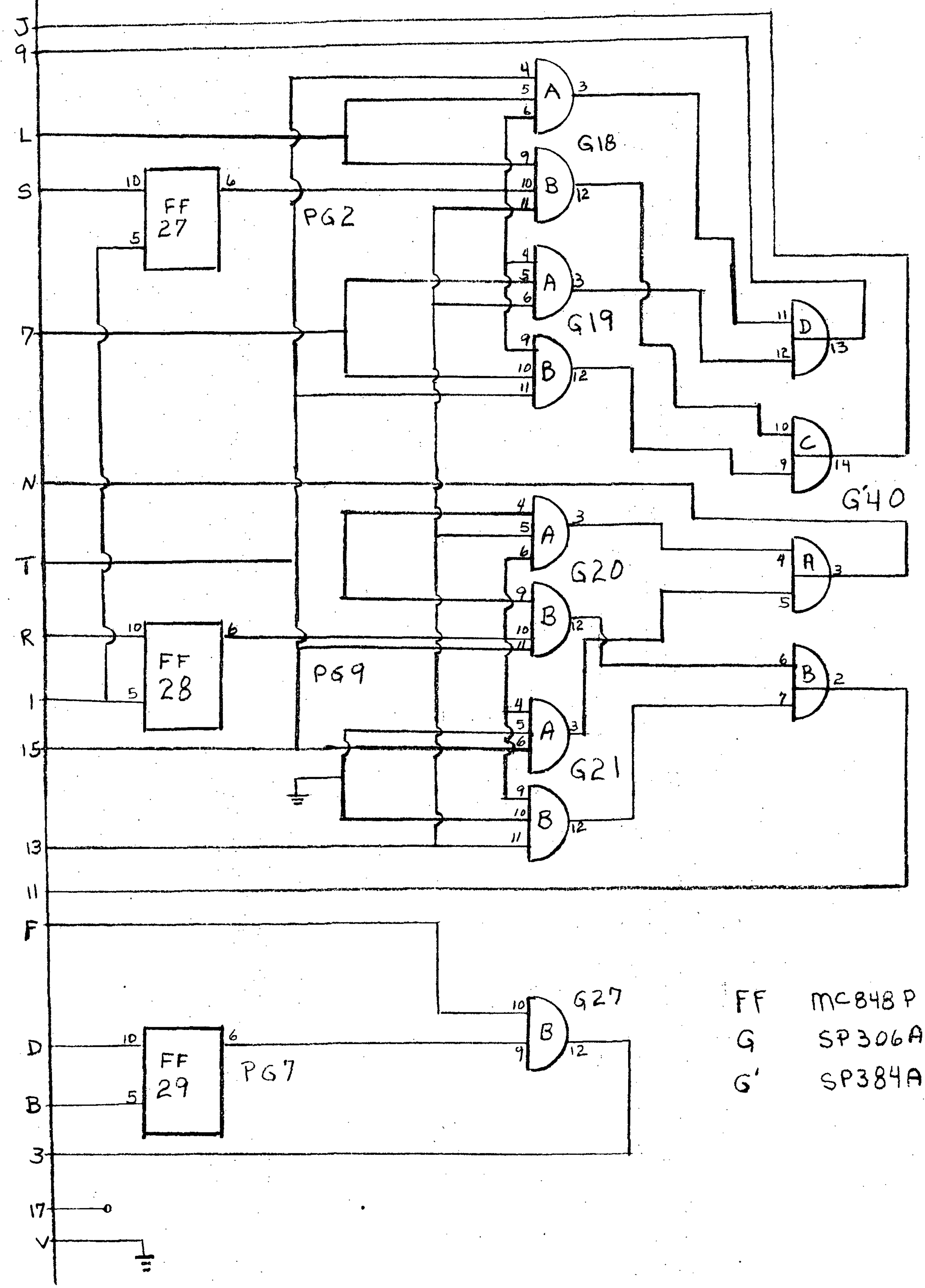
I Logic



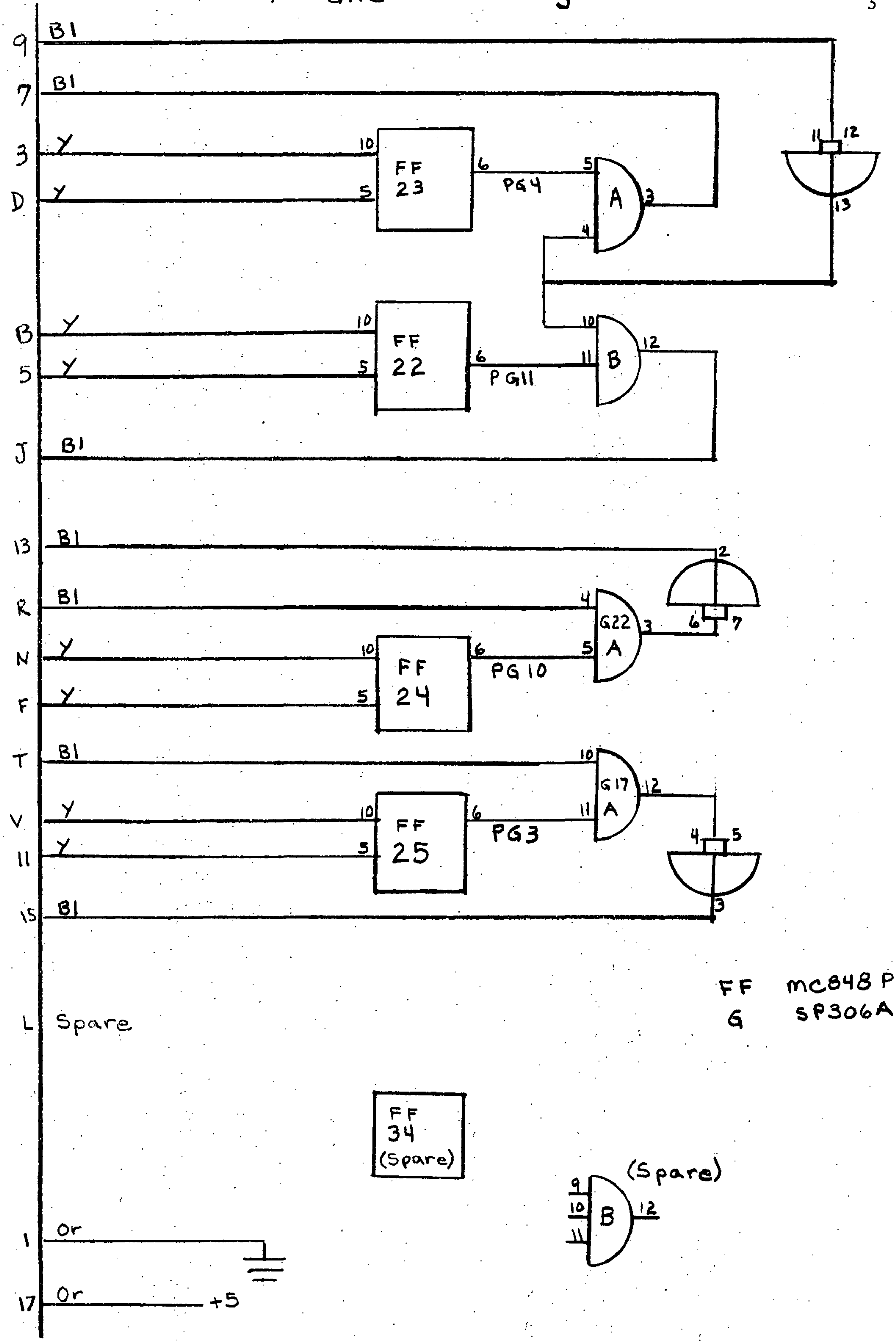
FF	MC848P
FF'	MC846P
G	SP306A
Q	2N4954

C Logic

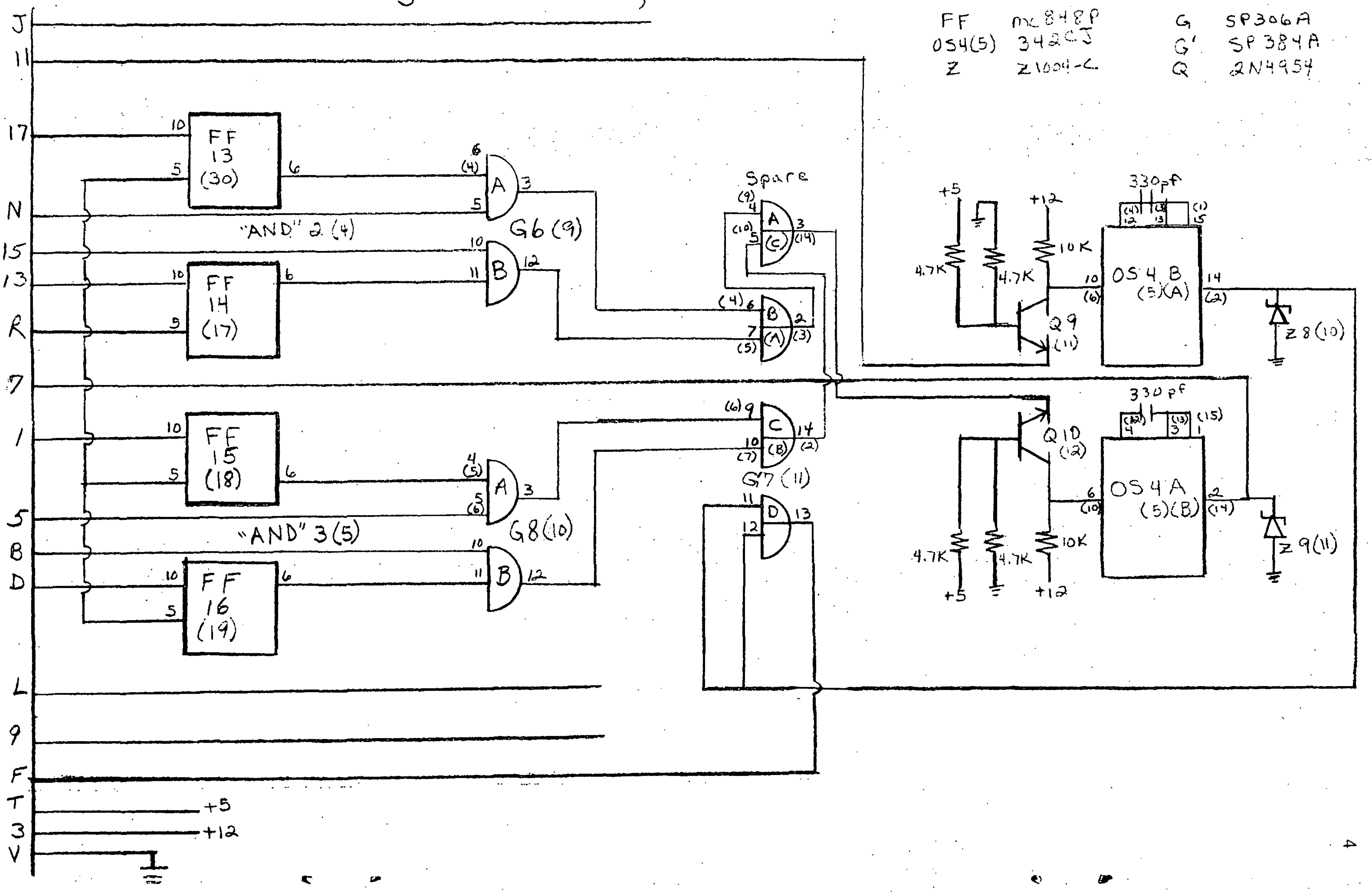


FF MC848P
G SP306A
G' SP384A

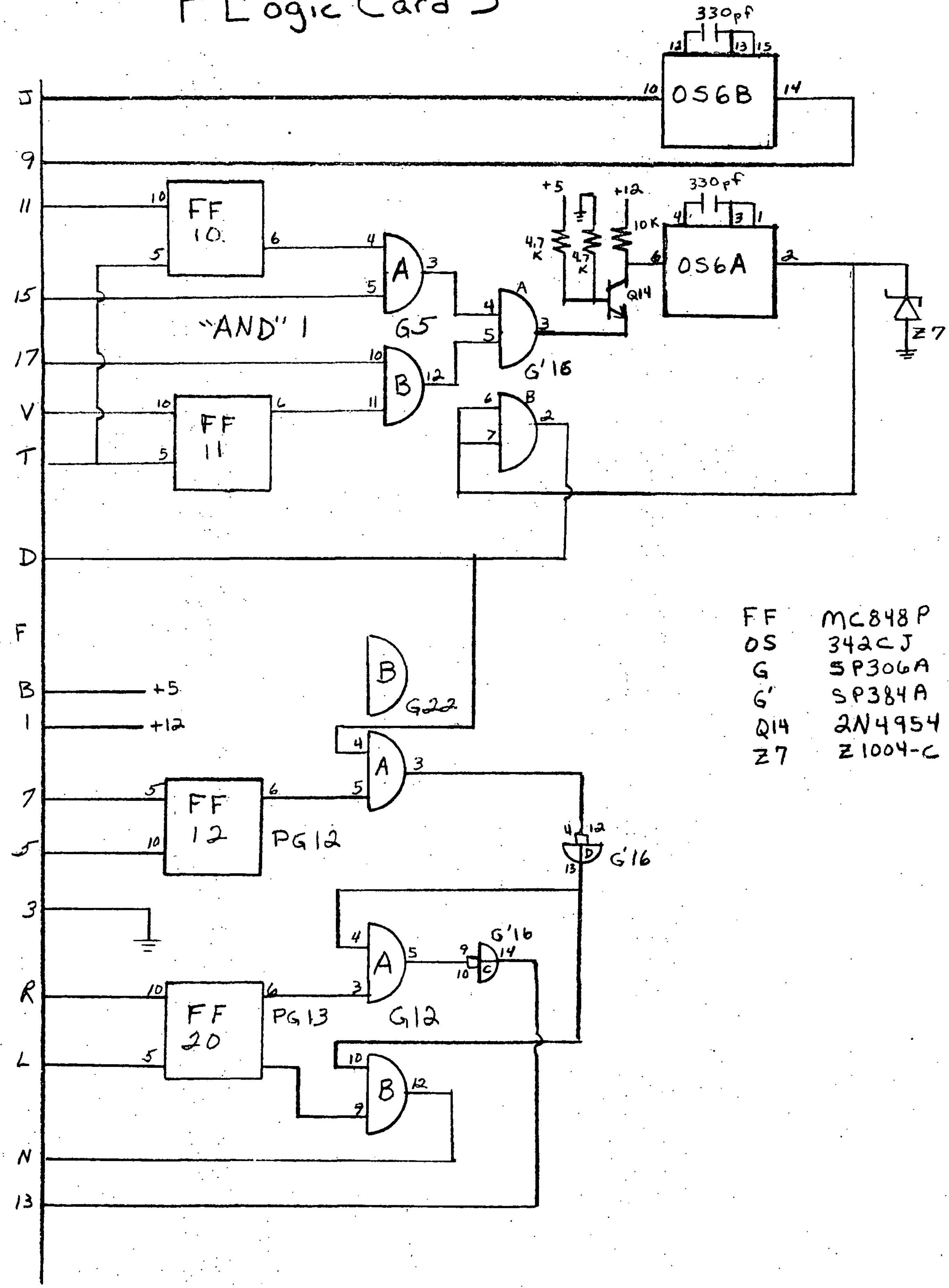
P and T Logic


9 B1
7 B1
3 Y
D Y
B Y
5 Y
J B1
13 B1
R B1
N Y
F Y
T B1
V Y
11 Y
15 B1
L Spare
1 Or
17 Or
+5
FF 23
FF 22
FF 24
FF 25
FF 34 (Spare)
PG4
PG11
PG10
PG3
A
B
G22 A
G17 A
B
(Spare)
FF mc848P
G SP306A

F Logic Card 1, 2

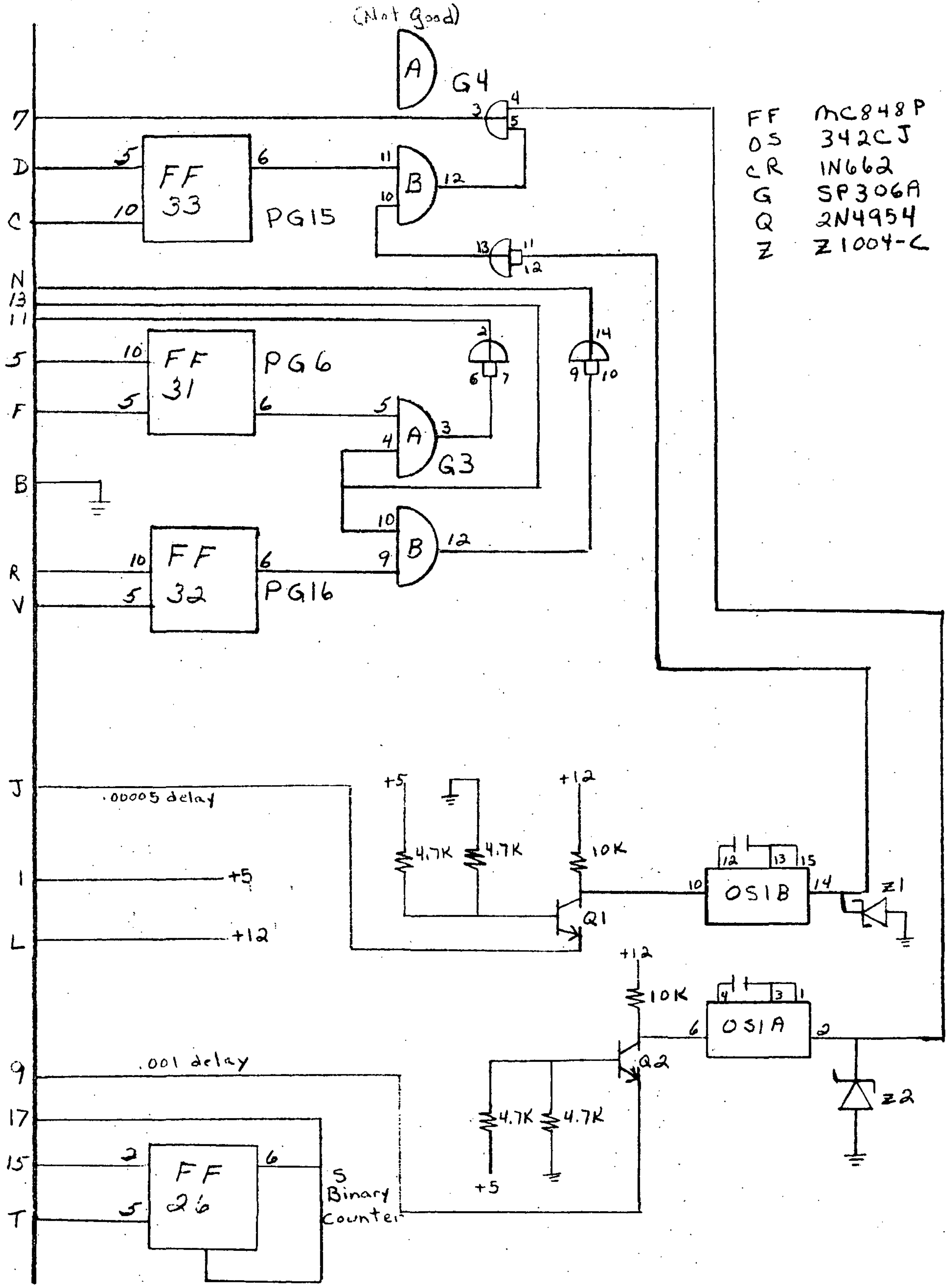


F Logic Card 3



FF	MC848P
OS	342CJ
G	SP306A
G'	SP384A
Q14	2N4954
Z7	Z1004-C

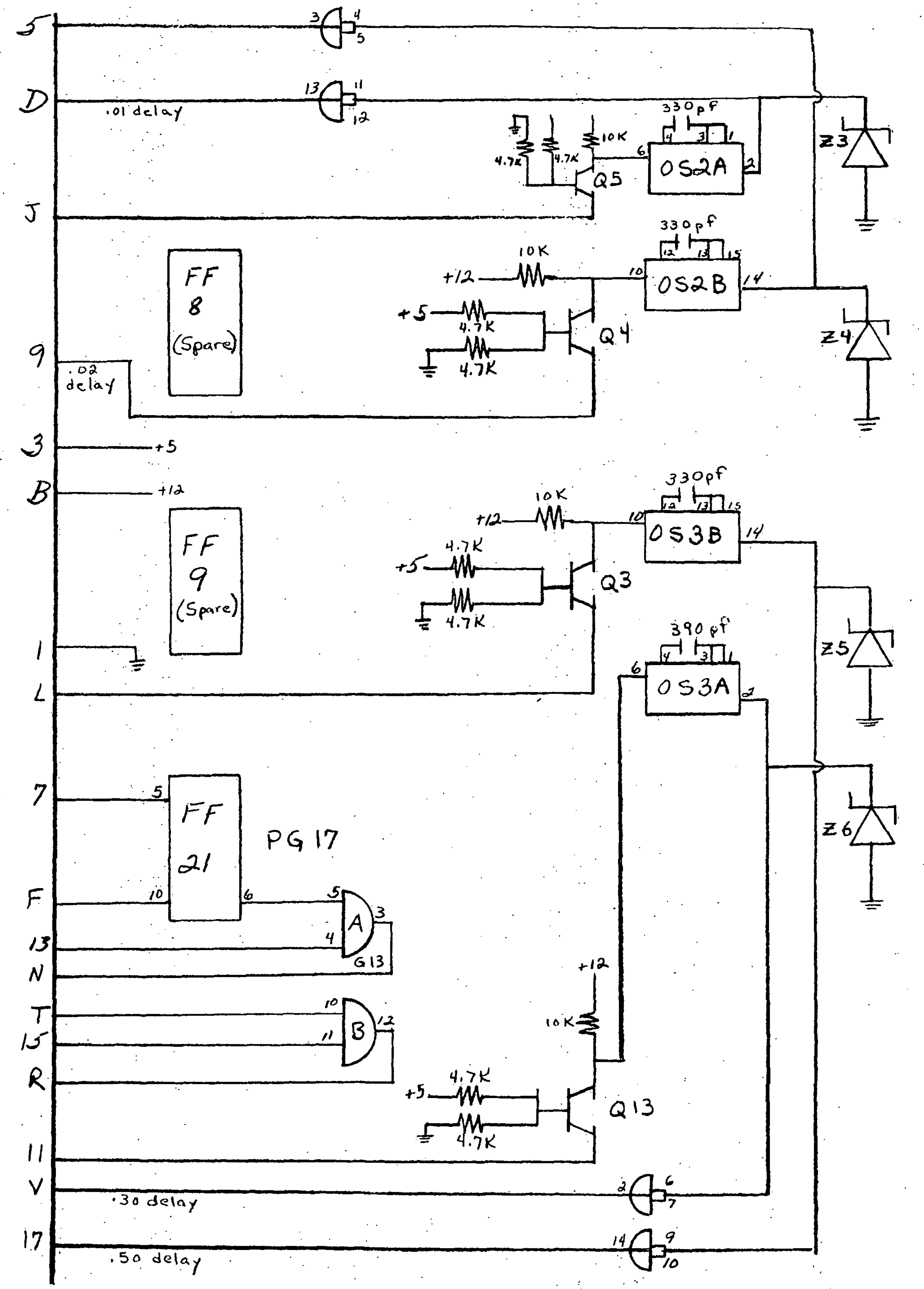
F Logic Card 4



FF	MC848P
OS	342CJ
CR	1N662
G	SP306A
Q	2N4954
Z	Z1004-C

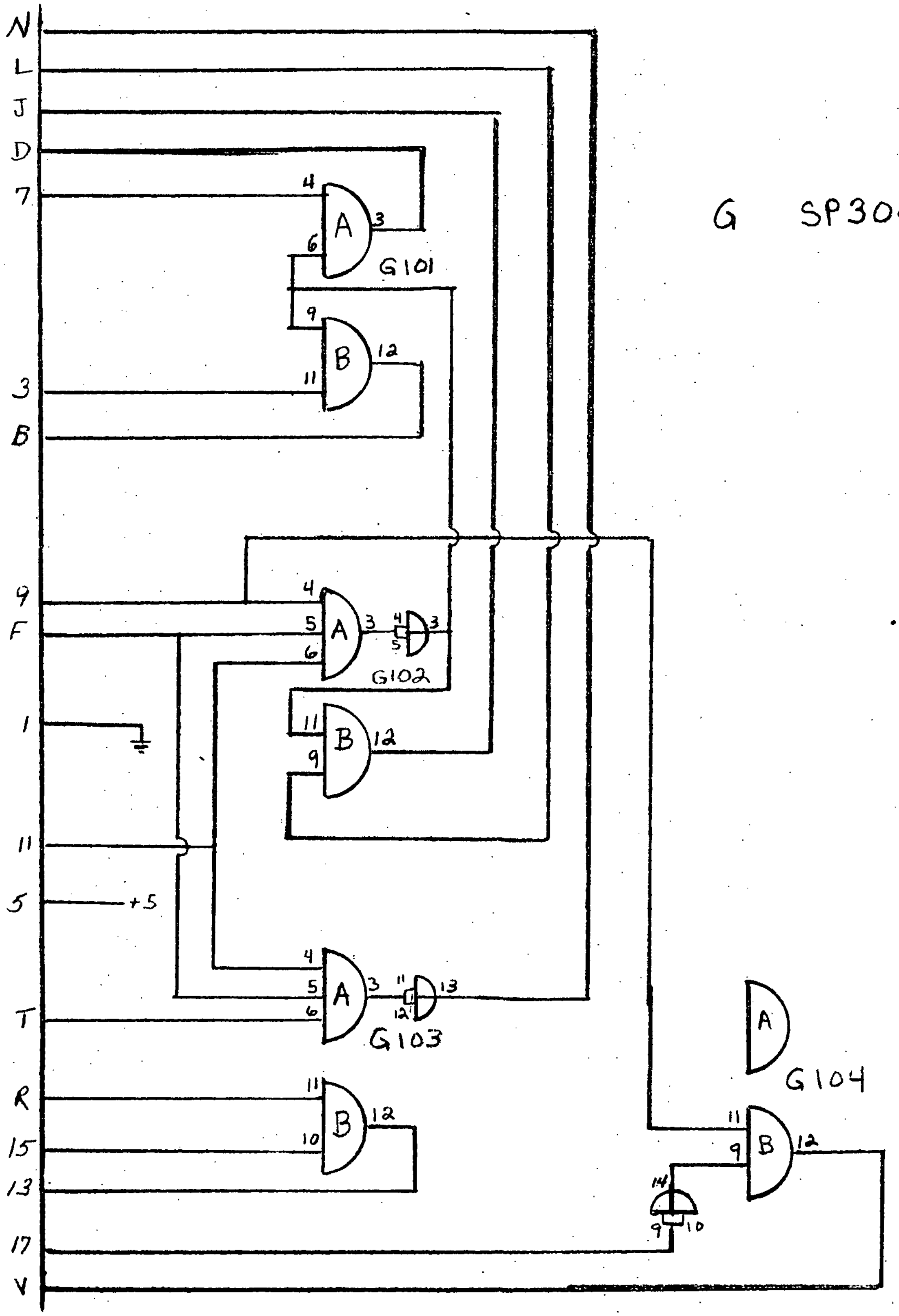
F Logic Card 5

FF MC848P Q 2N4954
OS 342CJ Z Z1004-C
G SP306A

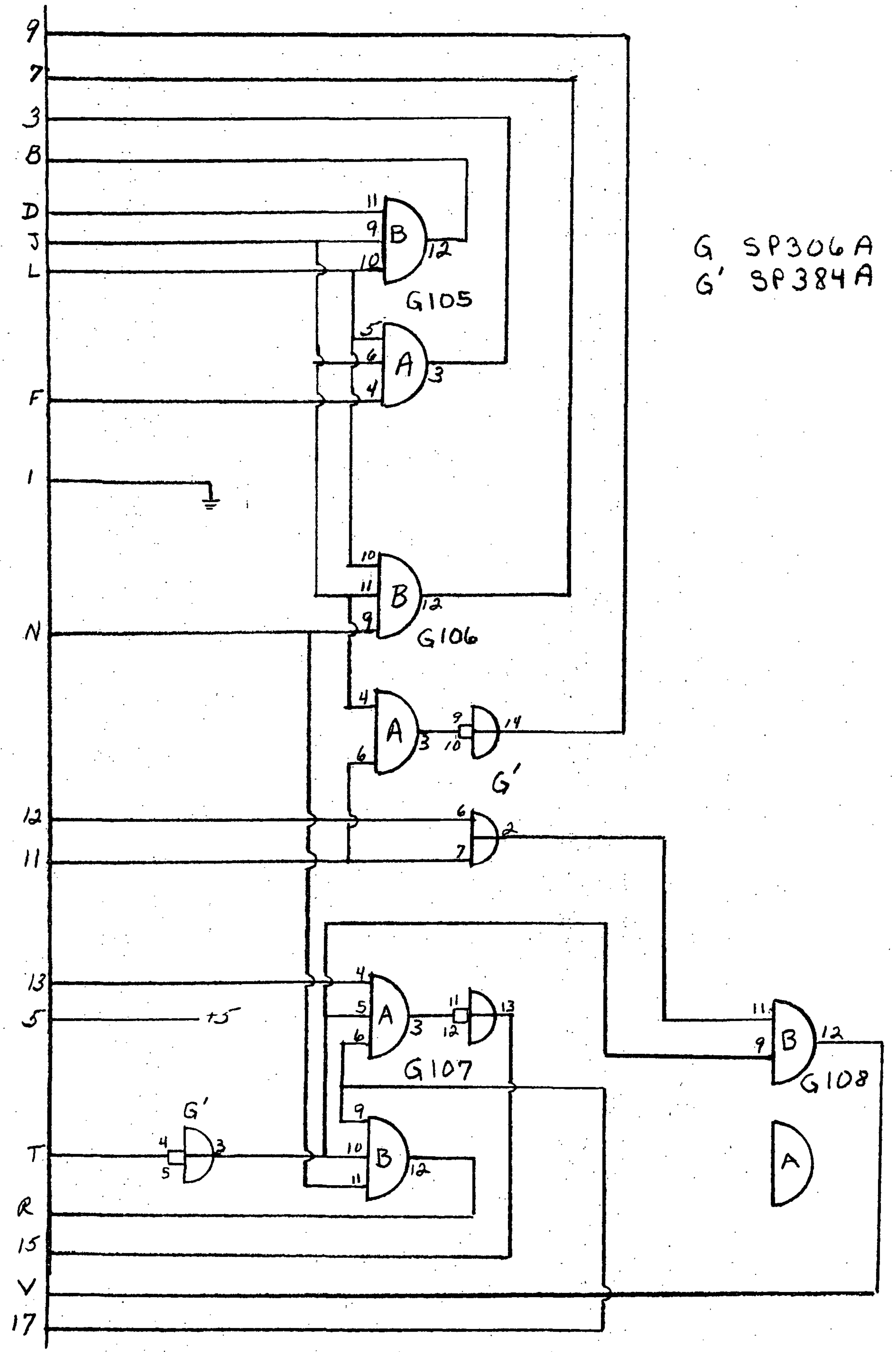


RR1 Logic

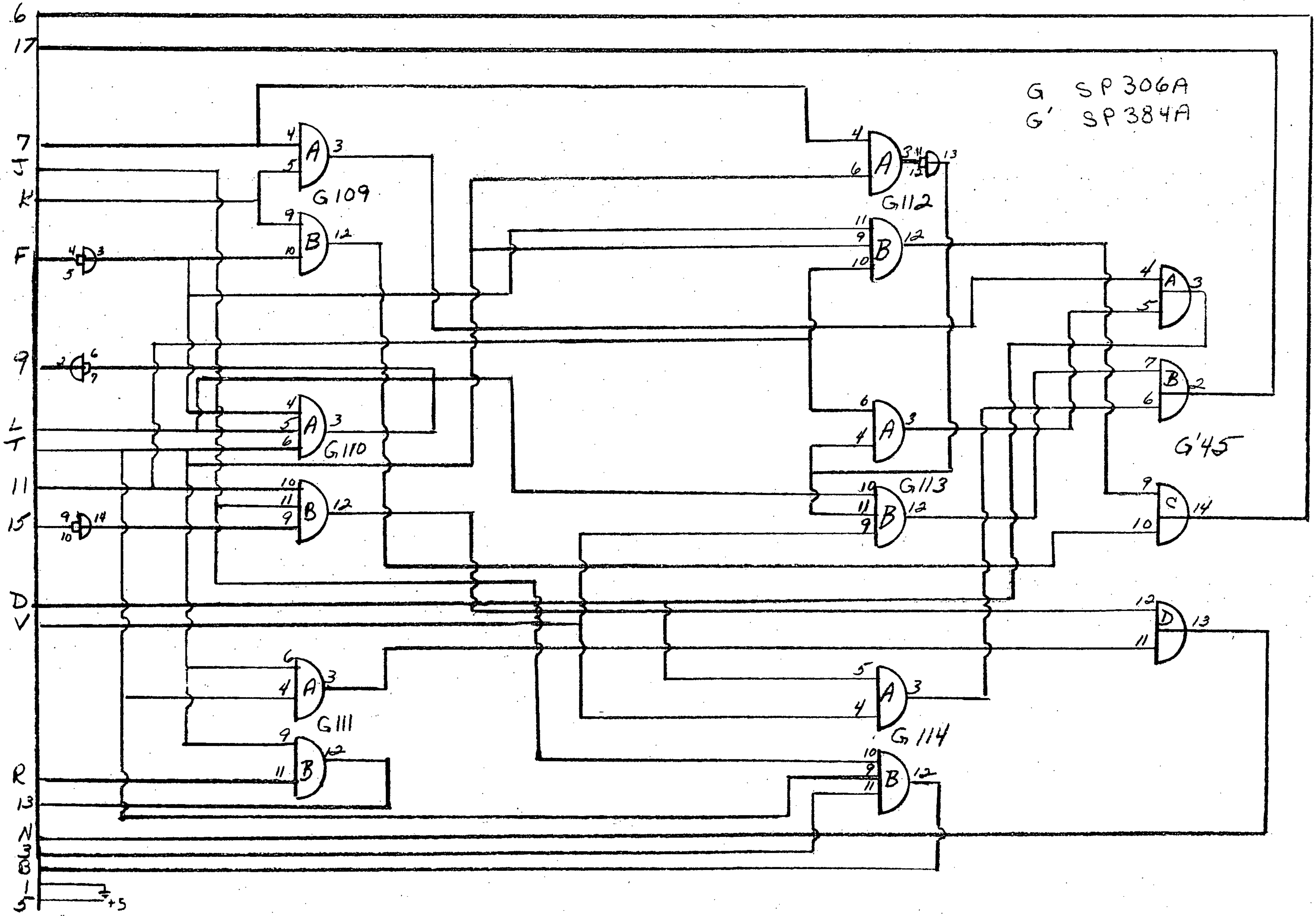
G SP306A



RR 2 Logic

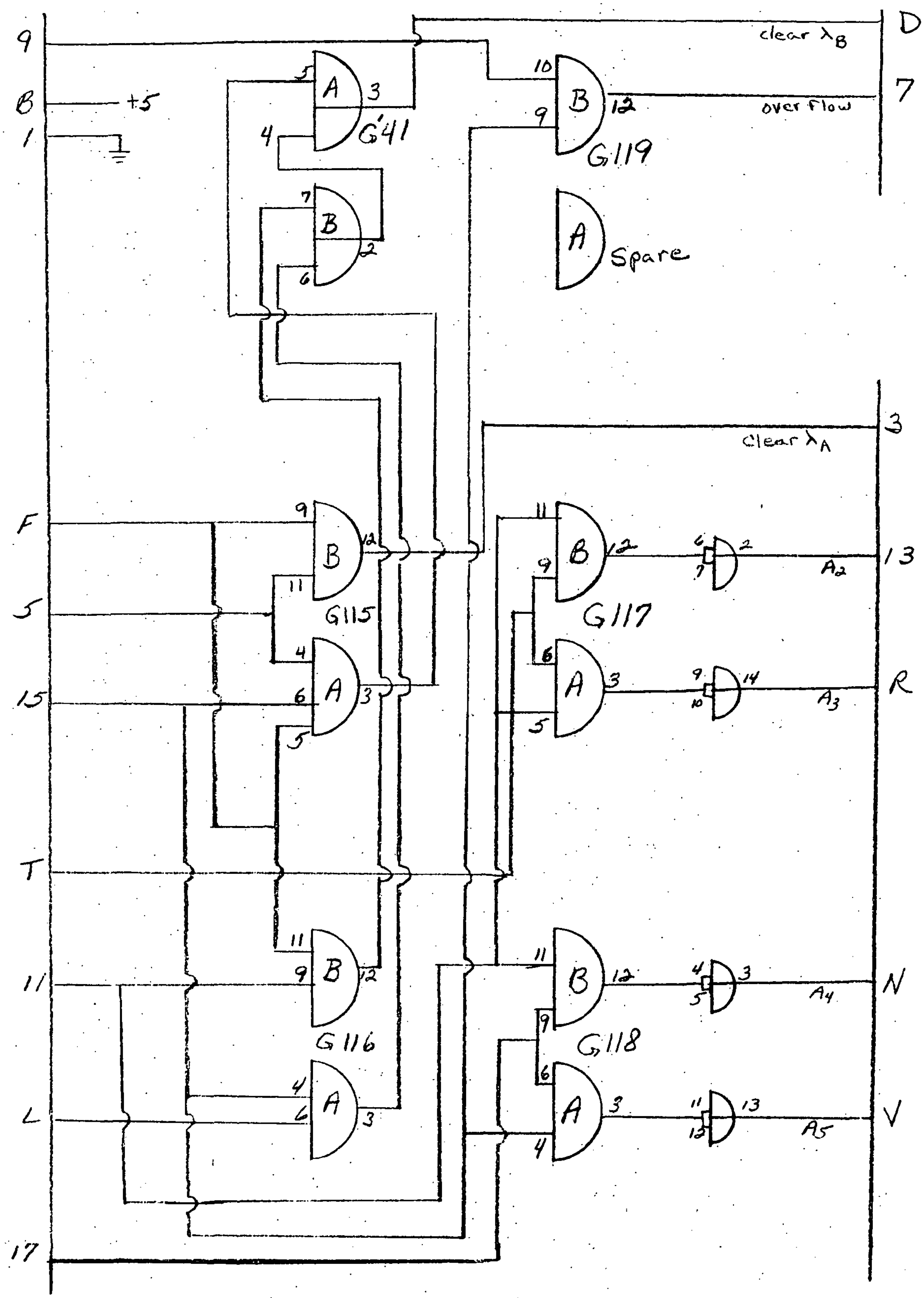

9
7
3
B
D
J
L
F
1
N
12
11
13
5
T
R
15
V
17
B
G105
A
B
G106
A
G'
G107
A
B
G'
B
G108
A
+5
G SP306A
G' SP384A

RR 3 Logic


G SP306A
G' SP384A
G109
G110
G111
G112
G113
G114
G'45
6
17
7
J
K
F
9
L
T
11
15
D
V
R
13
N
3
B
1
5
+5

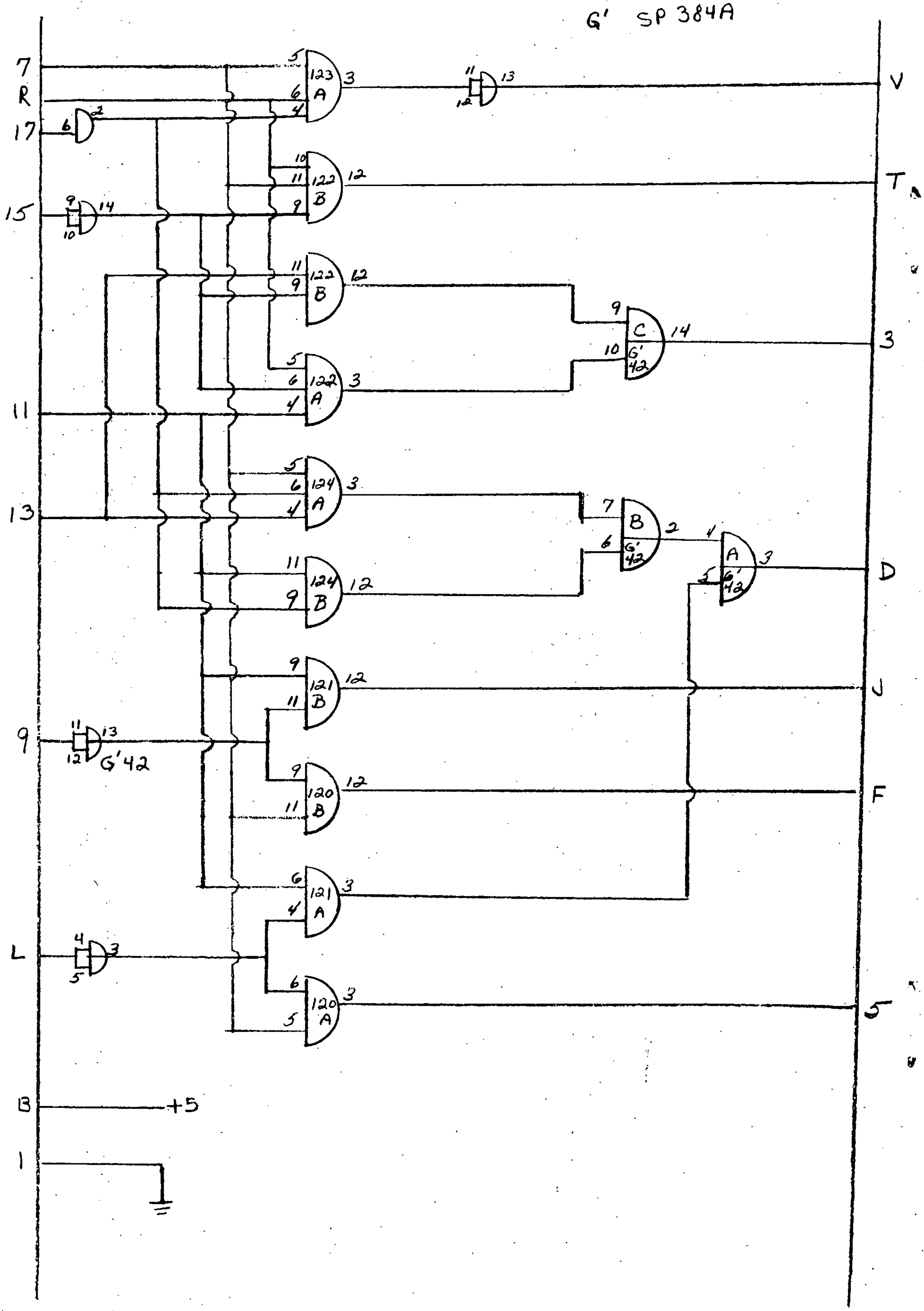
RR 4 Logic

G' SP384A
G SP304A

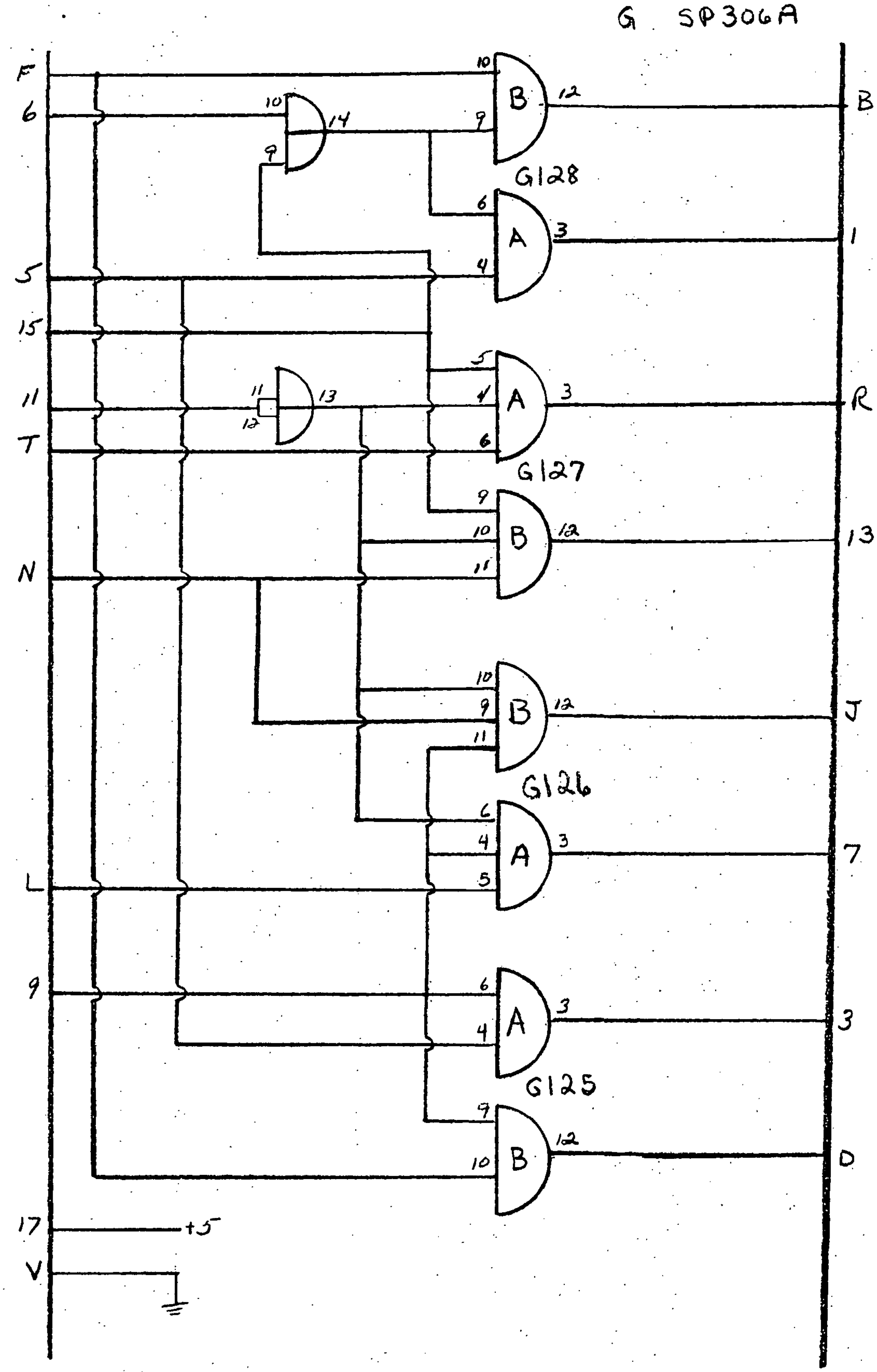


RR 5 Logic

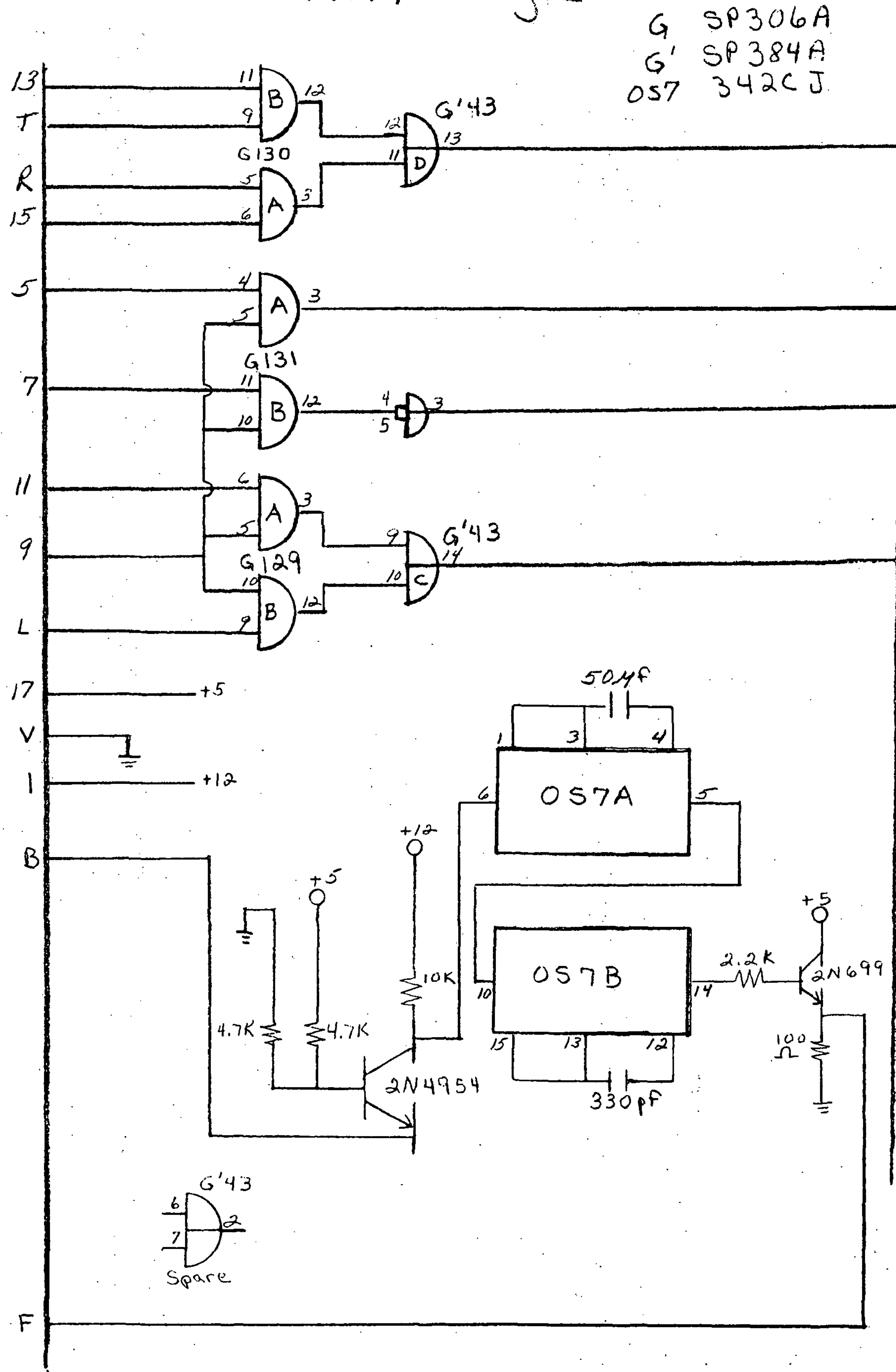
G SP306A
G' SP384A



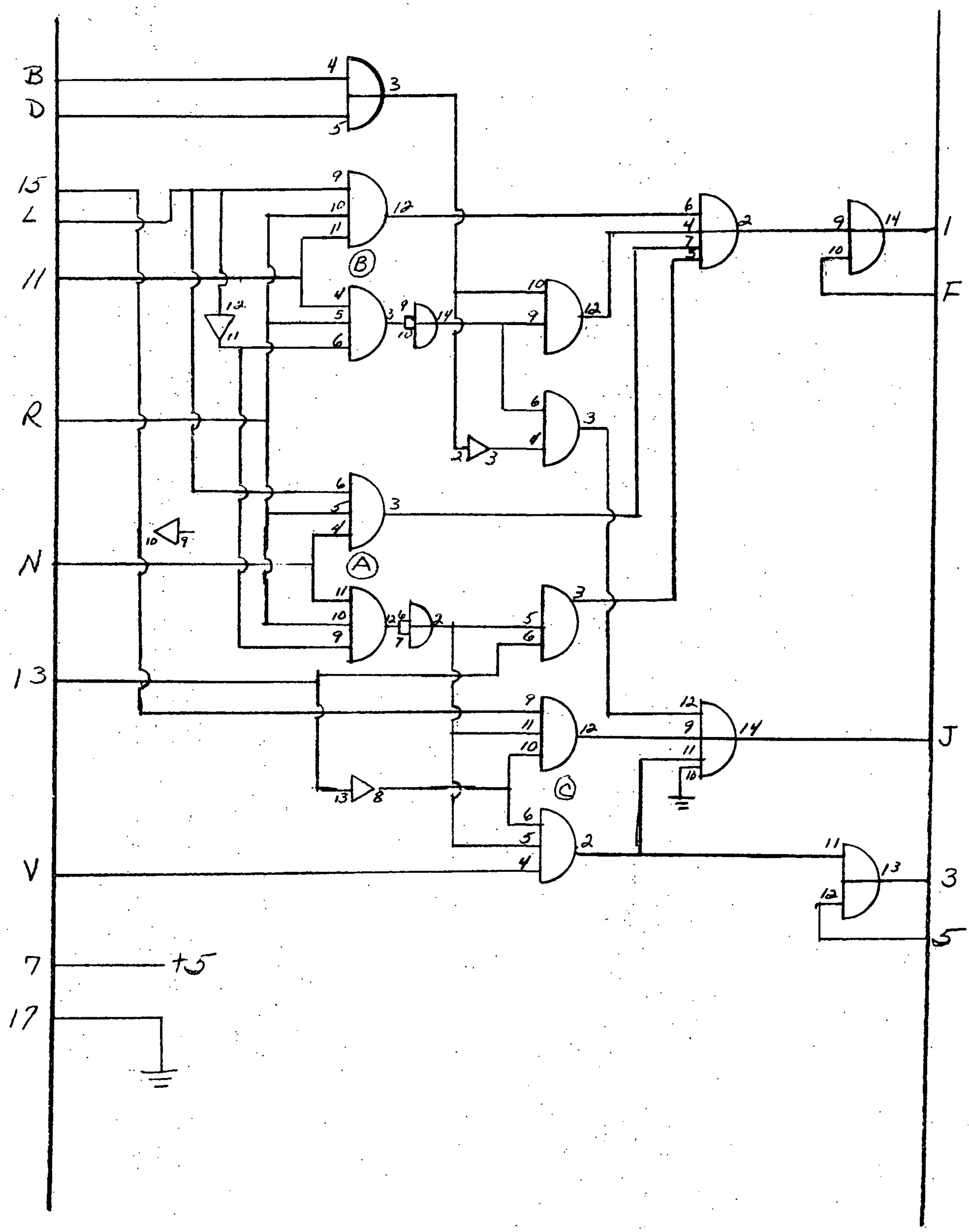
RR 6 Logic



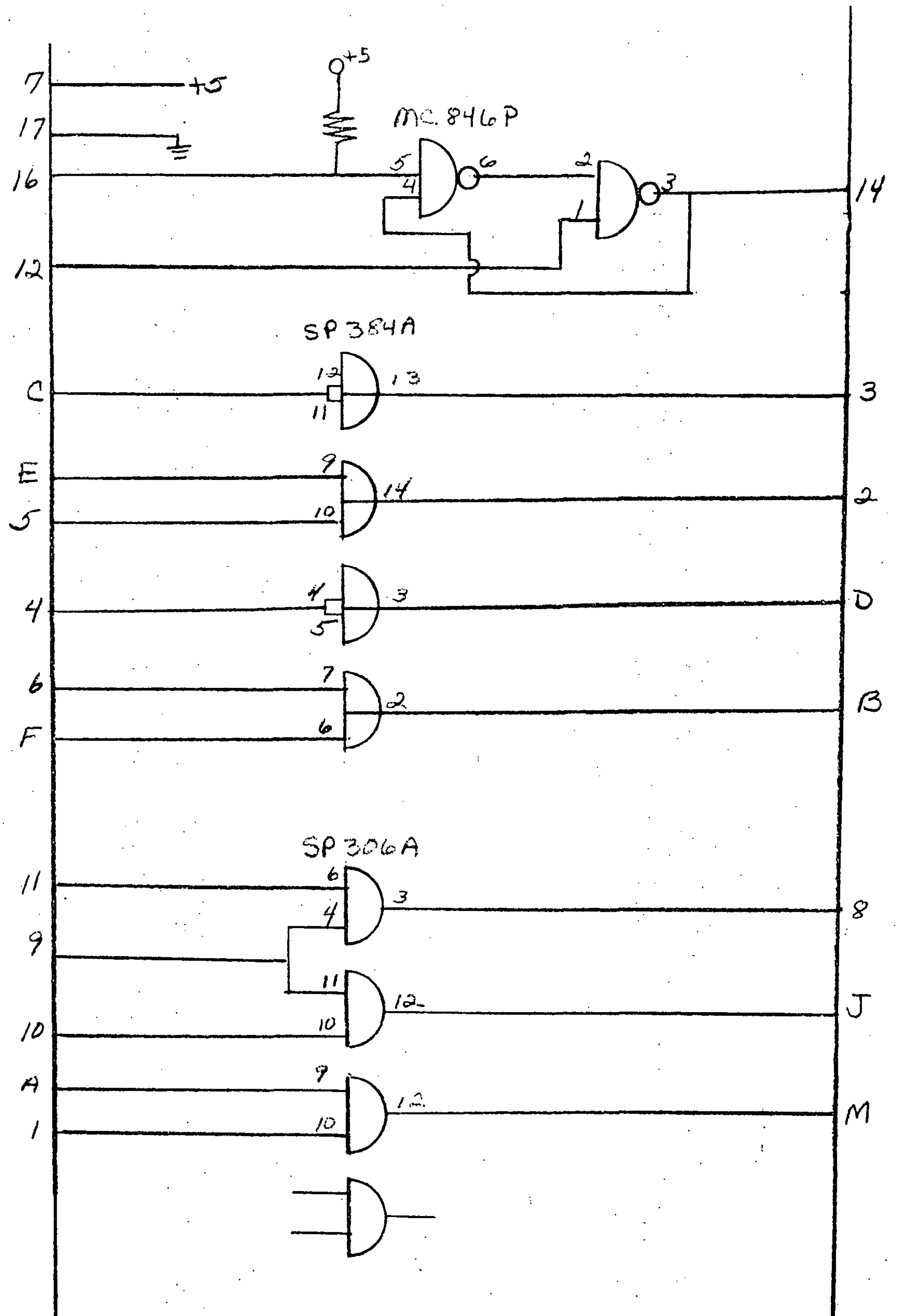
RR7 Logic


G SP306A
G' SP384A
OS7 342CJ
G130
G'43
G131
G129
OS7A
OS7B
50μf
330pf
2N4954
2N699
10K
4.7K
2.2K
100 Ω
+5
+12
Spare
13
T
R
15
5
7
11
9
L
17
V
I
B
F
N
3
D
J

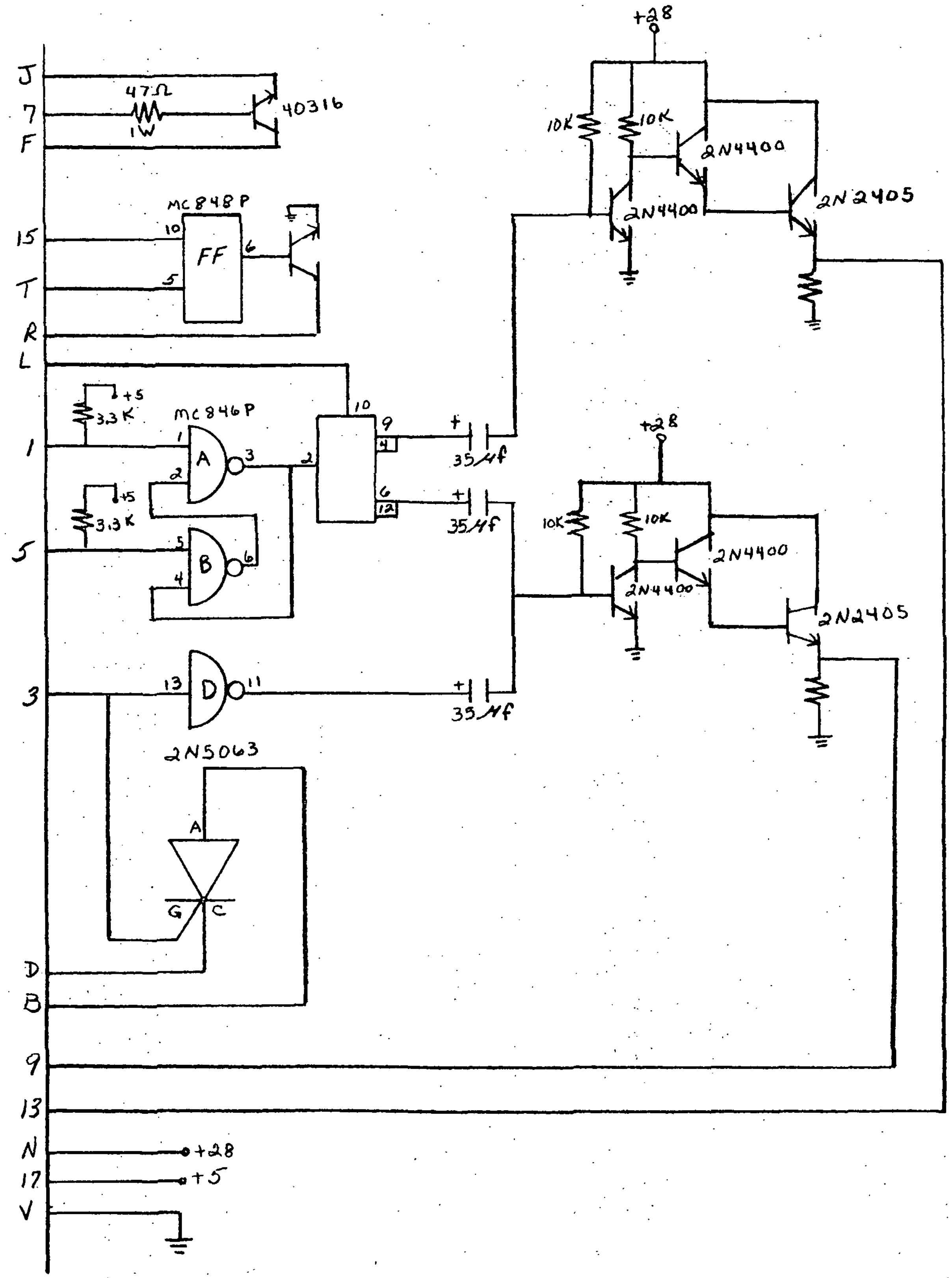
RR8 (Logic)



Logic DB1 Board

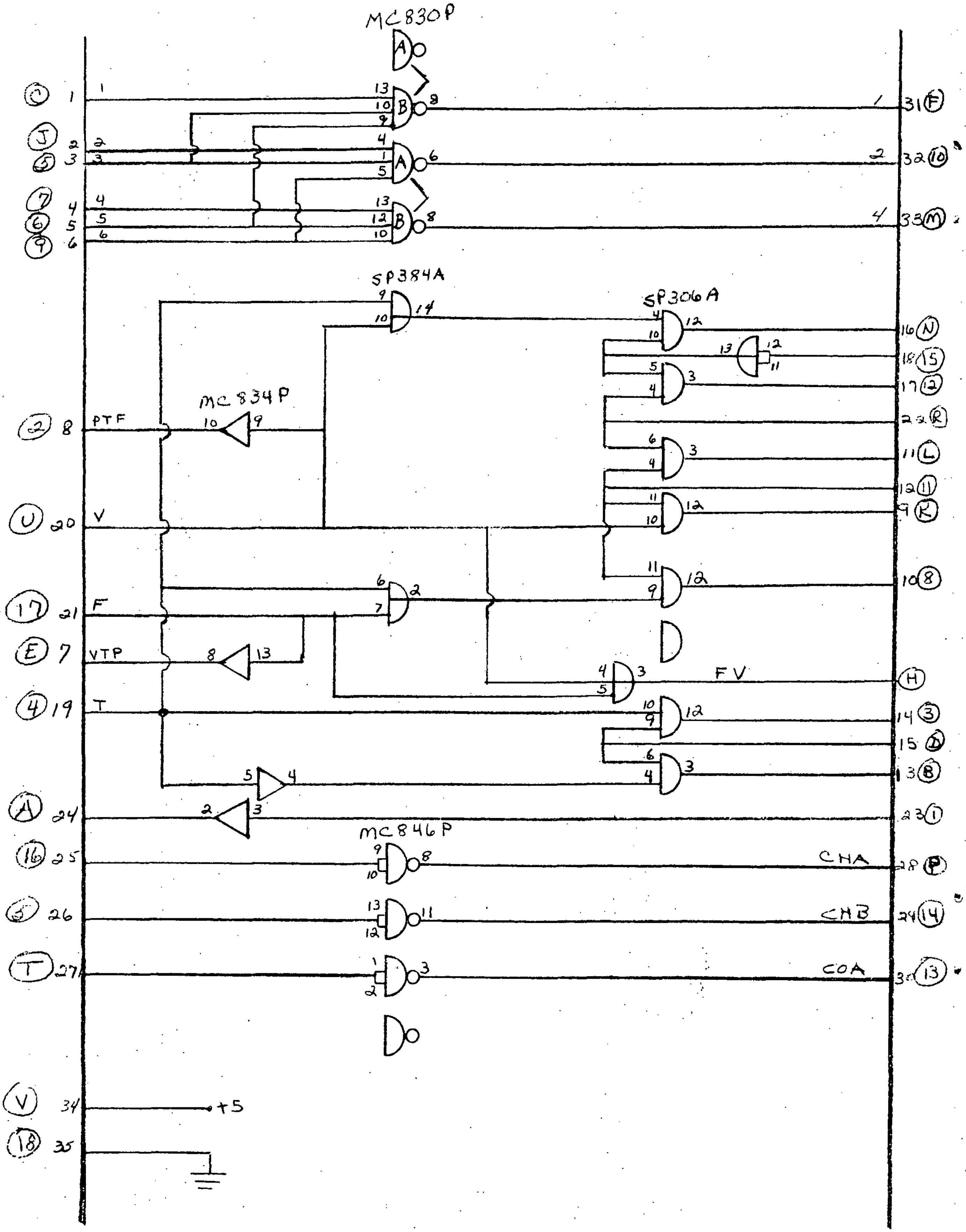


Shut 1 (Logic)



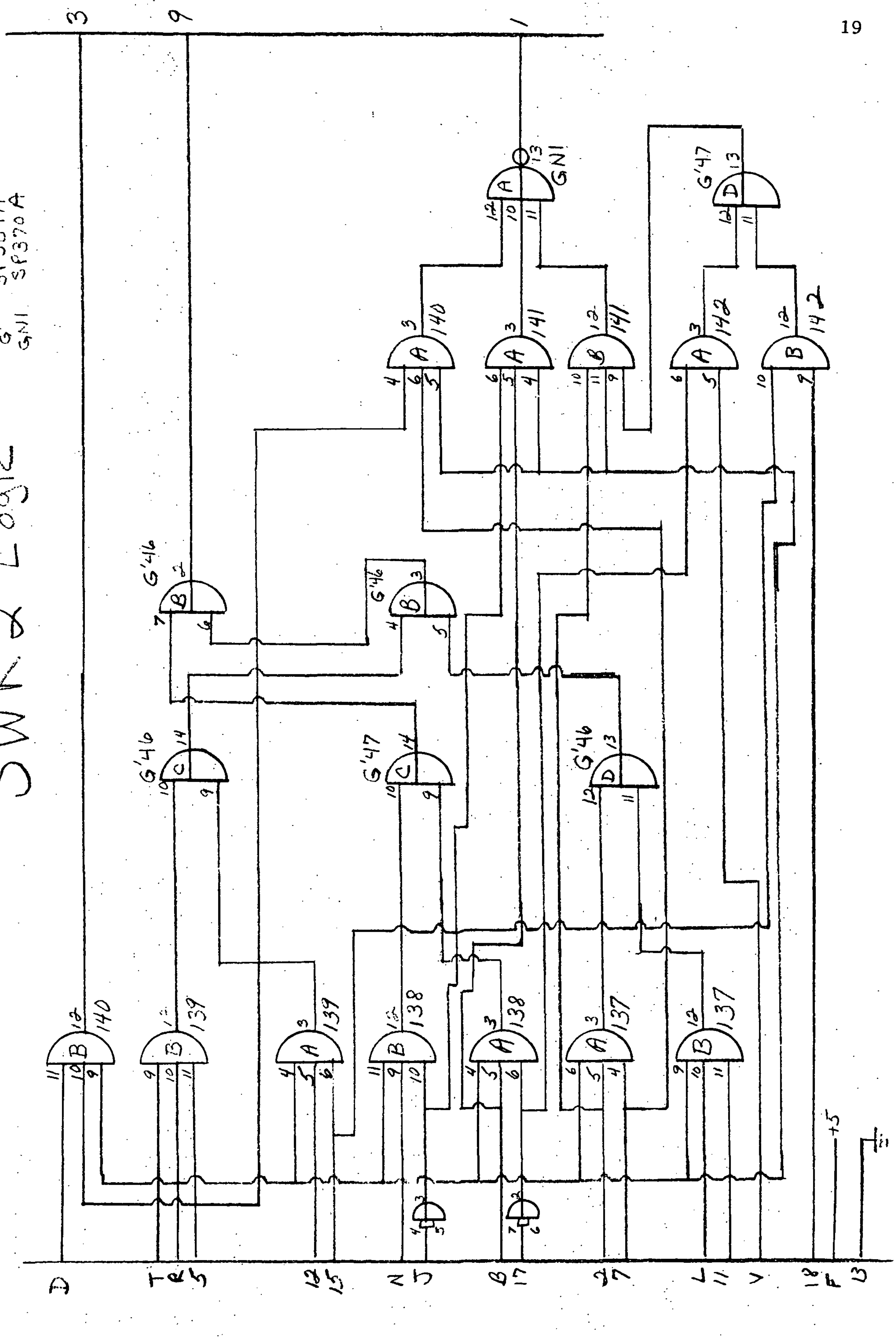
J
7
F
47Ω
1W
40316
MC848P
15
T
R
L
FF
10
5
6
+5
3.3K
MC846P
1
5
3
A
B
D
13
11
2
4
9
12
35μf
+28
10K
2N4400
2N2405
2N5063
G
C
D
B
9
13
N
17
V
+28
+5

SWR1 (Logic)



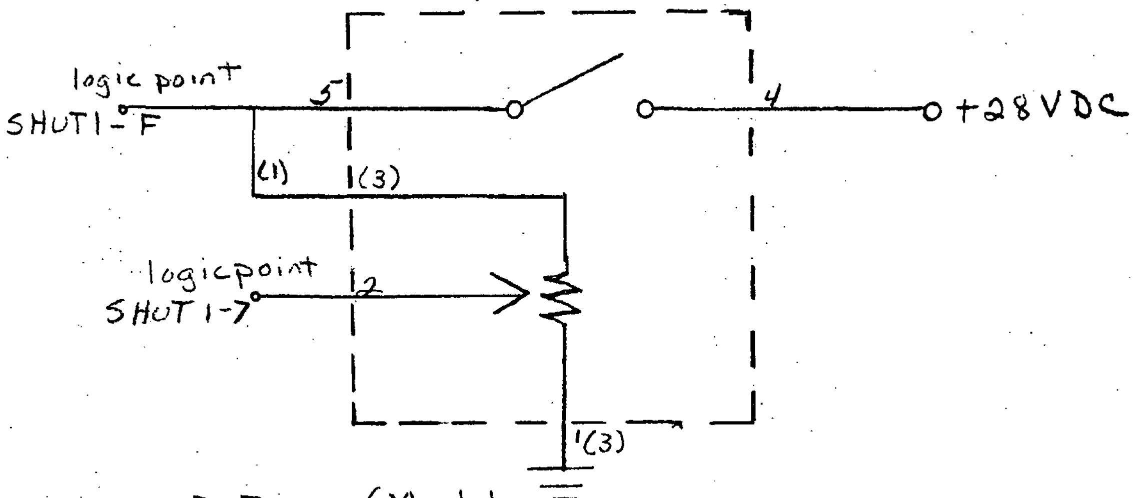
MC830P
SP384A
SP306A
MC834P
MC846P
PTF
V
F
VTP
T
FV
CHA
CHB
COA
+5

SWR 2 Logic

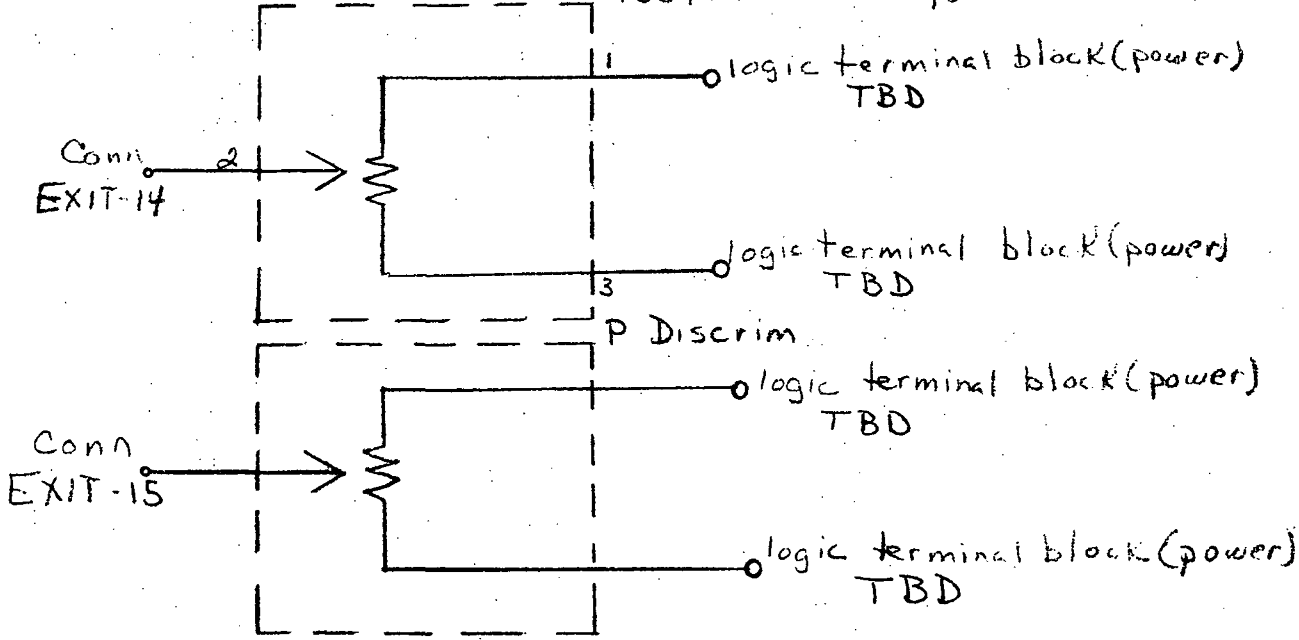


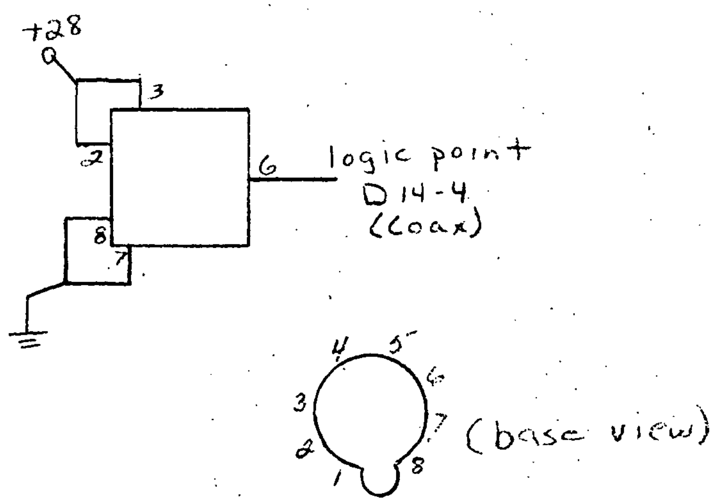
Logic Panel Pots; Oscillator

Display Lamp Dimmer

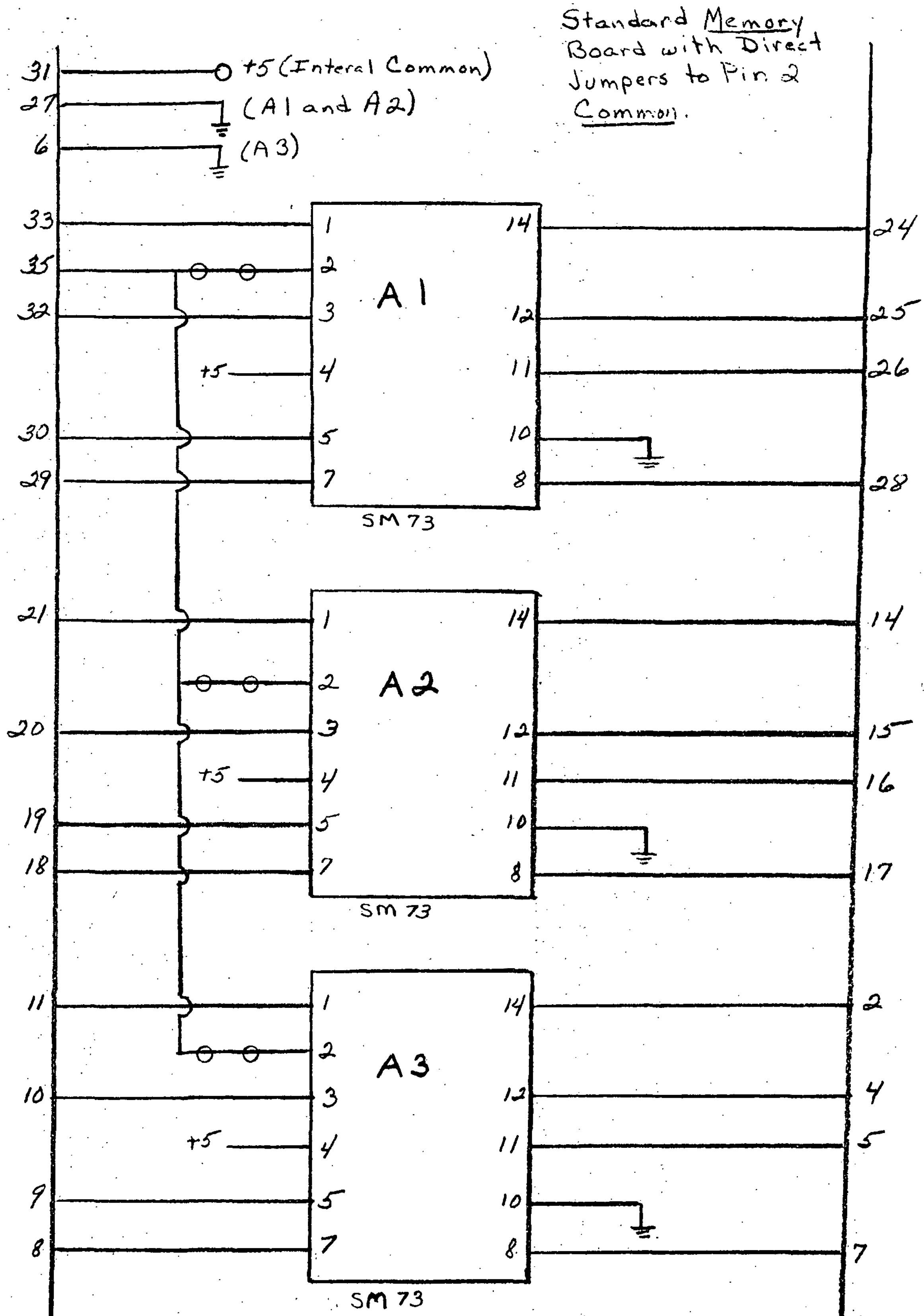


P Zero (Model 1309 Microdial top)



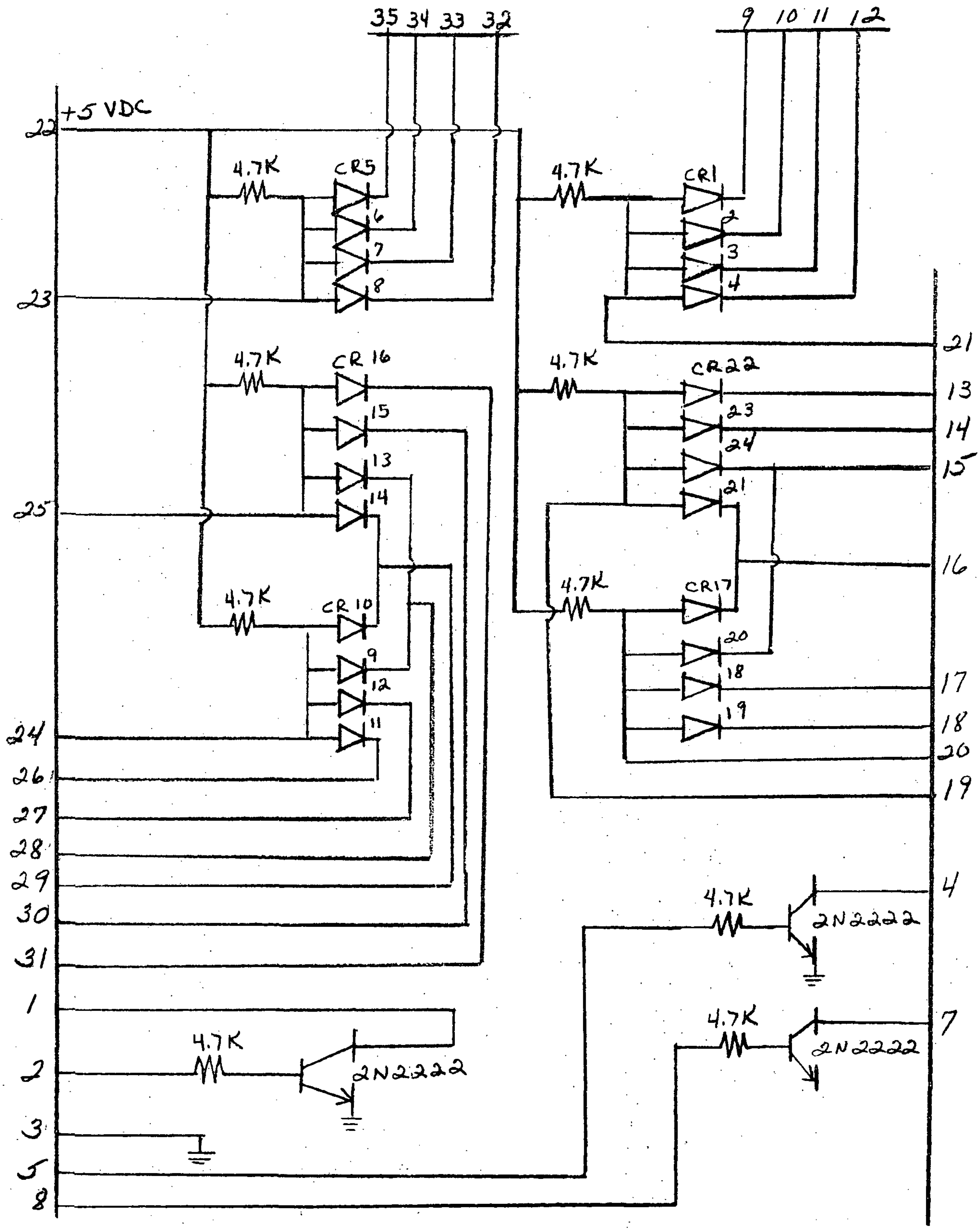


Memory Cards D25, D24 Logic

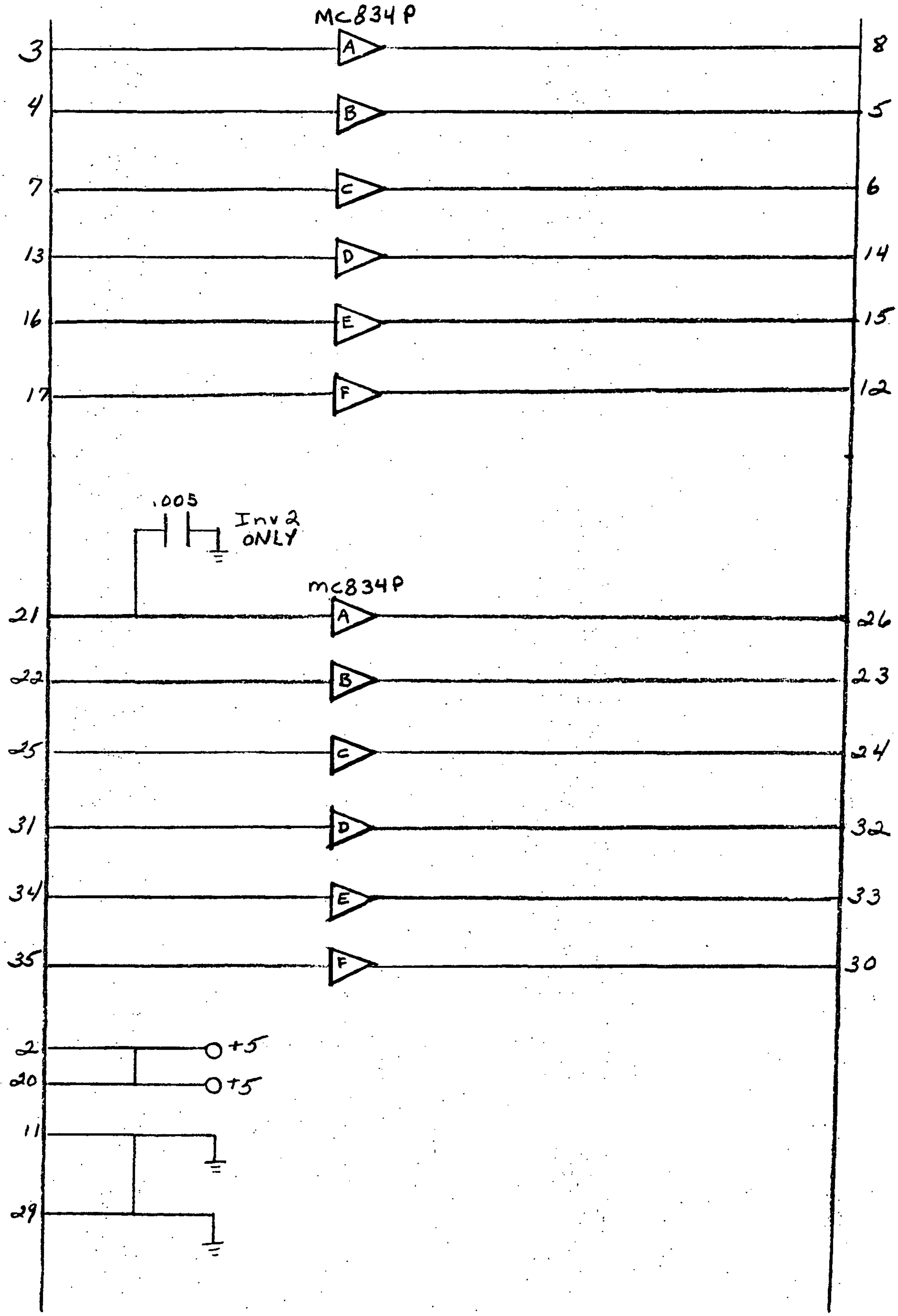


D24 uses all units
D25 omits the A3 unit

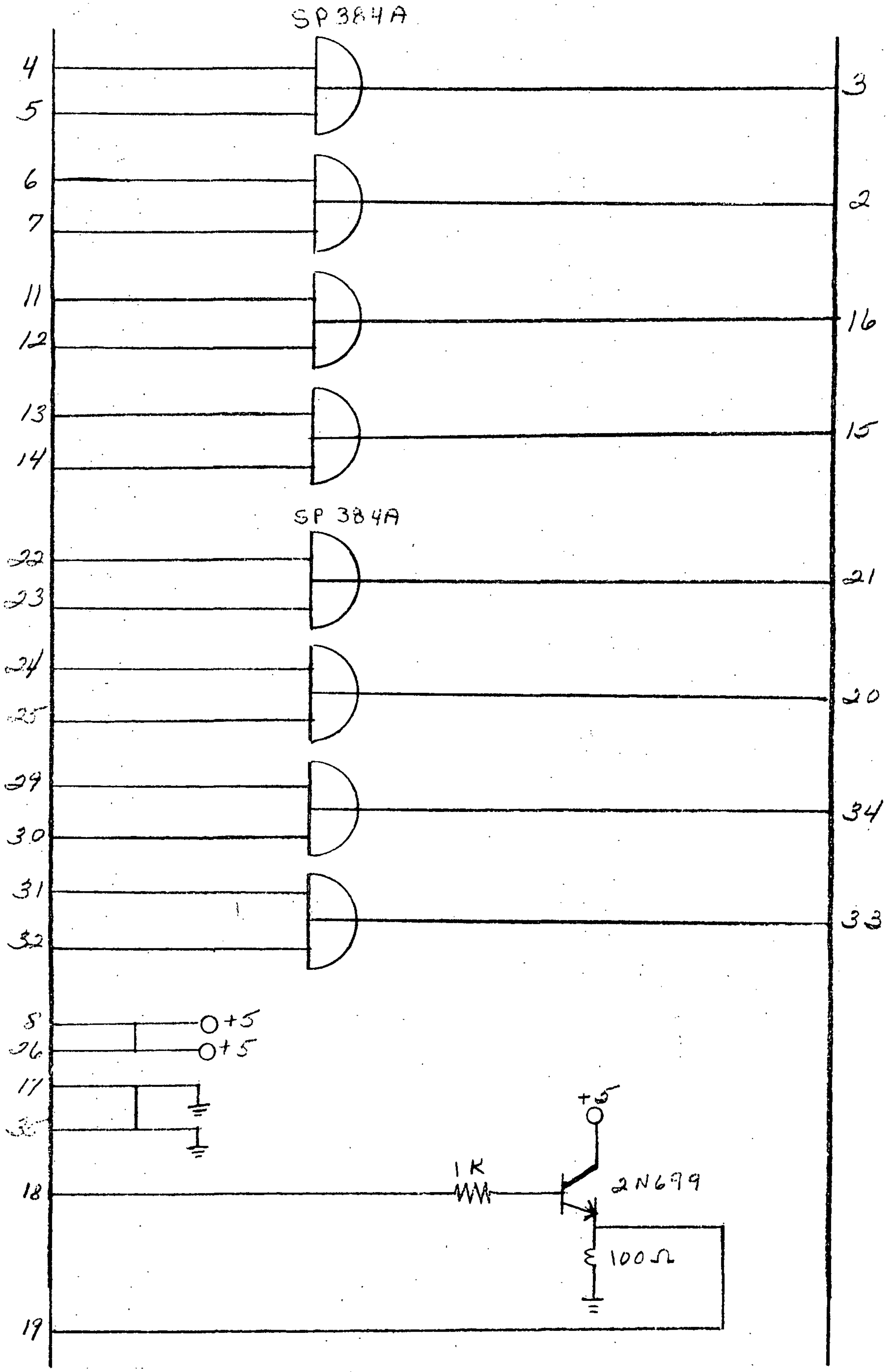
D 22 Logic


35 34 33 32
9 10 11 12
+5 VDC
22
23
25
24
26
27
28
29
30
31
1
2
3
5
8
4.7K
CR5
6
7
8
CR1
2
3
4
21
CR16
15
13
14
CR22
23
24
21
13
14
15
16
CR10
9
12
11
CR17
20
18
19
17
18
20
19
4
7
2N2222

Cards INV 1, INV 2 Logic
GP Board

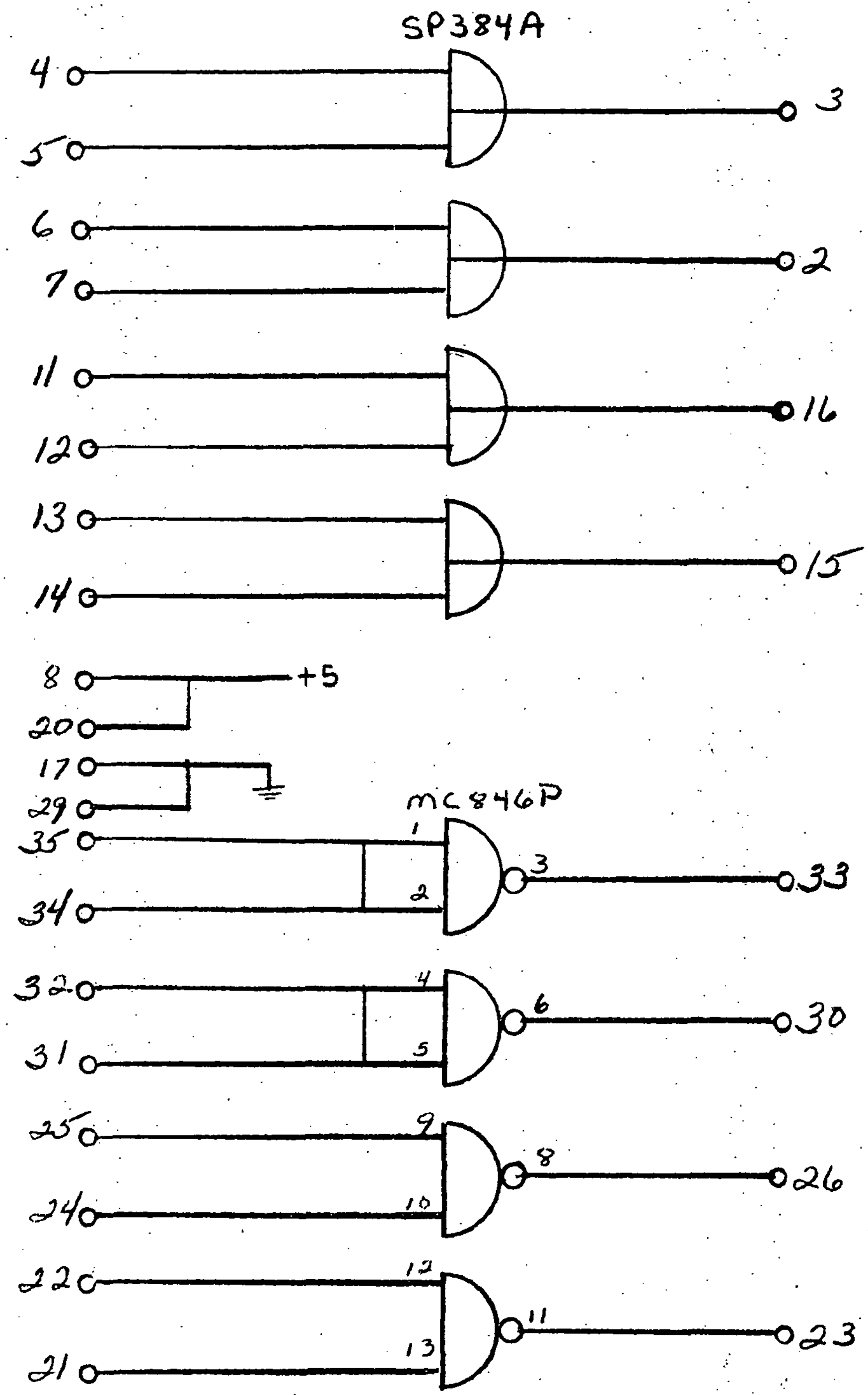


Cards OR1, OR2 on GP Cards
Logic

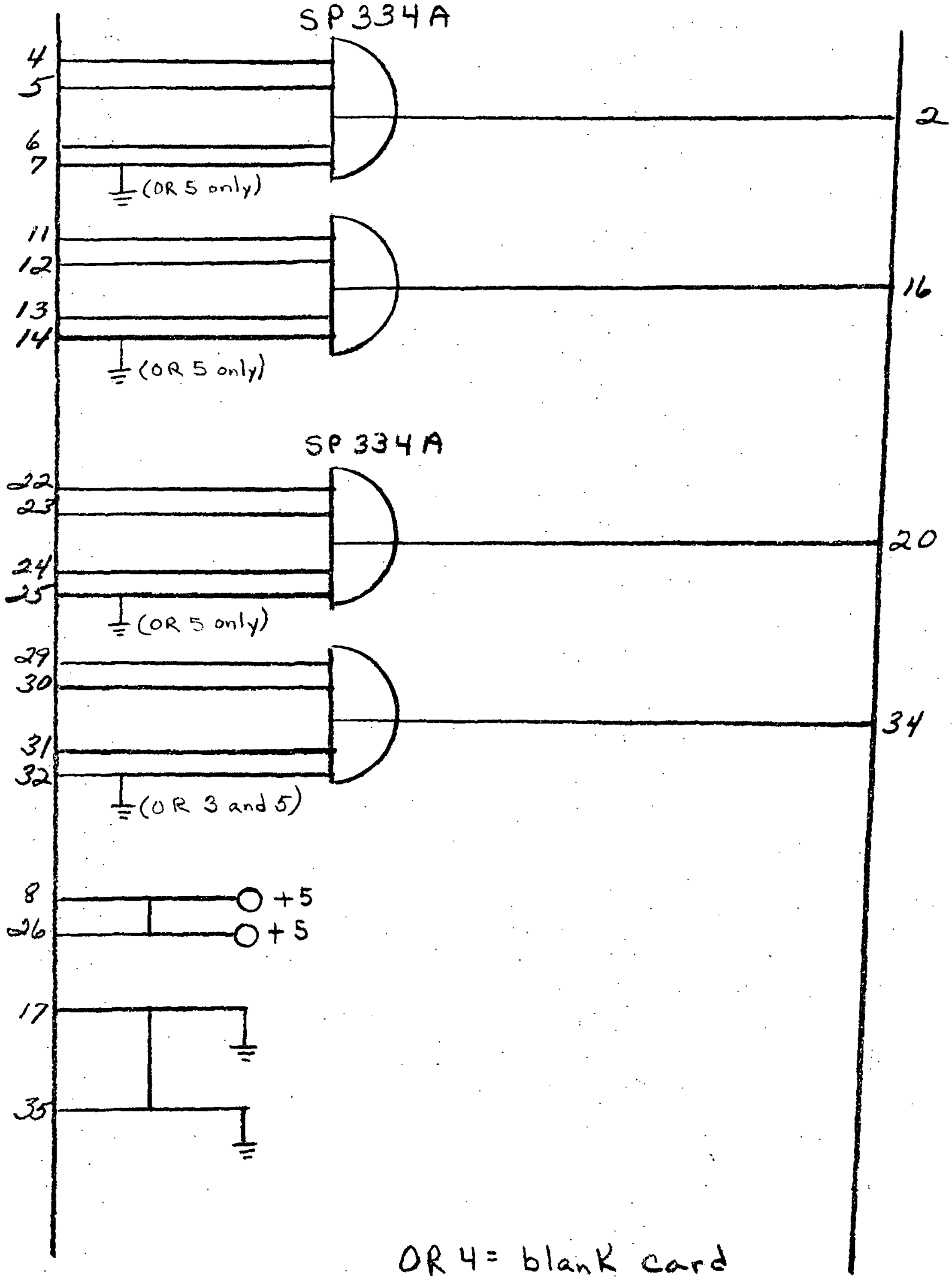


OR 4 Logic

general purpose board

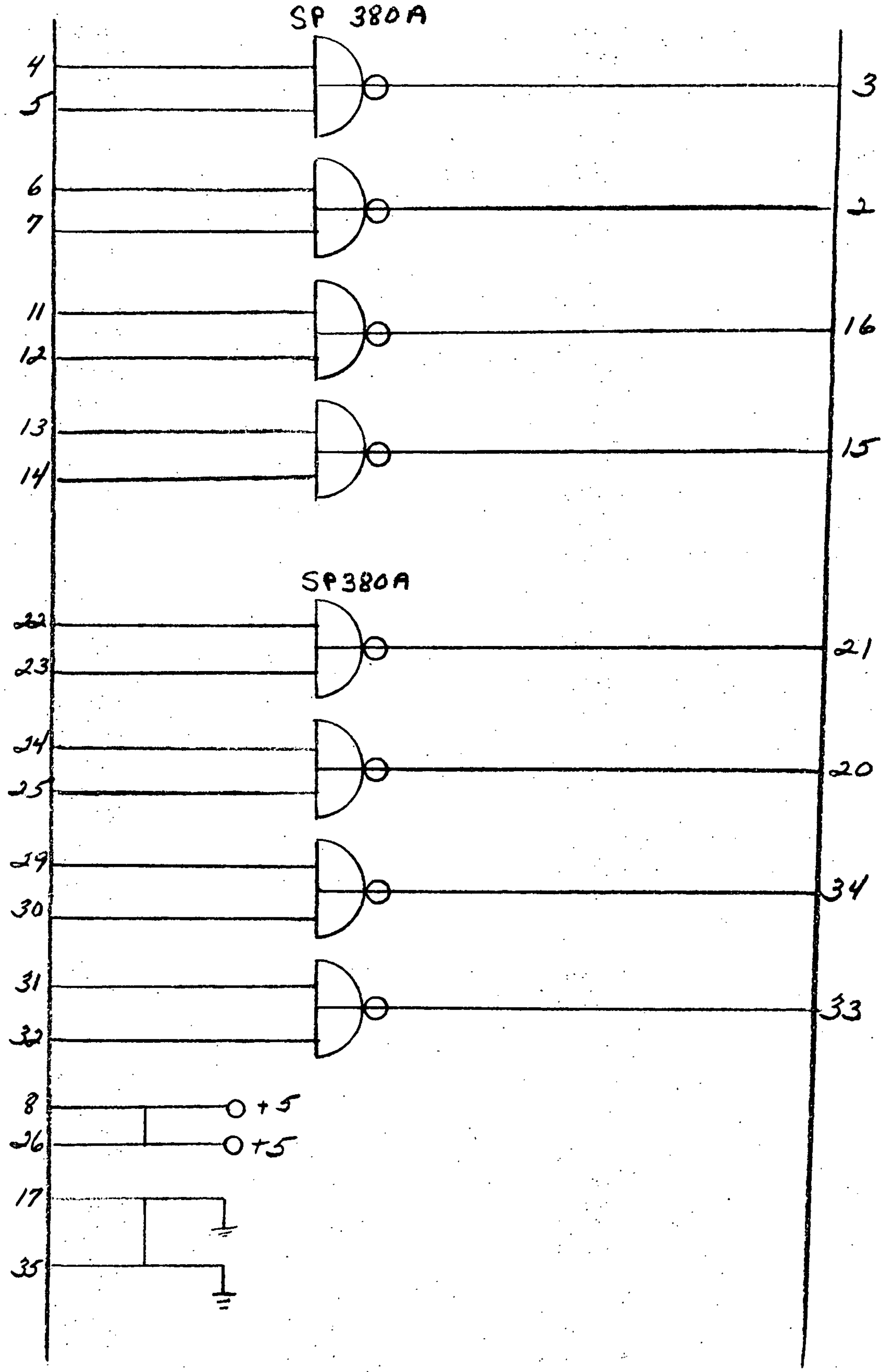


Cards OR 3 on GP Cards OR 5 Logic

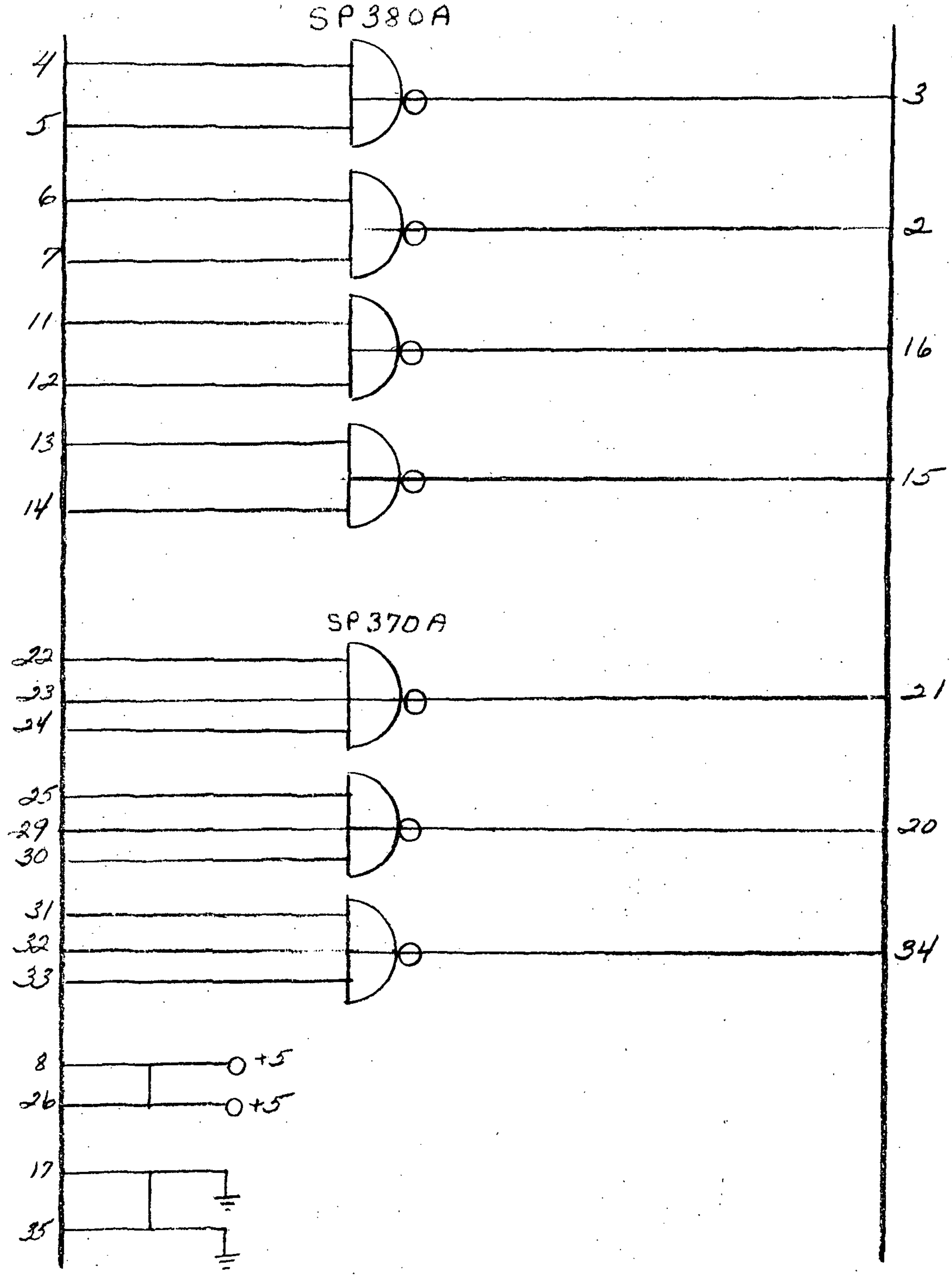


OR 4 = blank card
+5 VDC on pin 1
gnd on pin 36

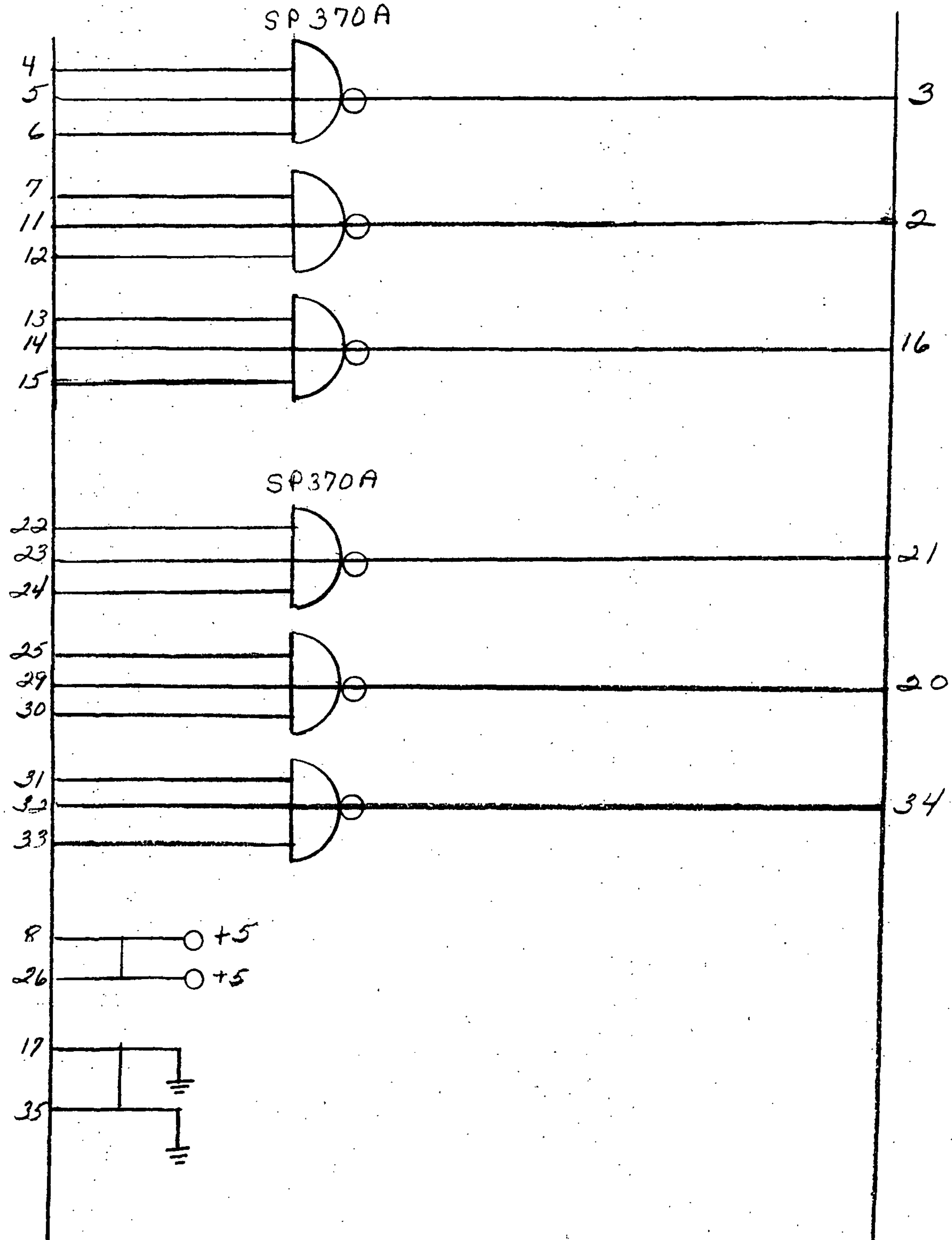
Card NOR 1 Logic on GP Board



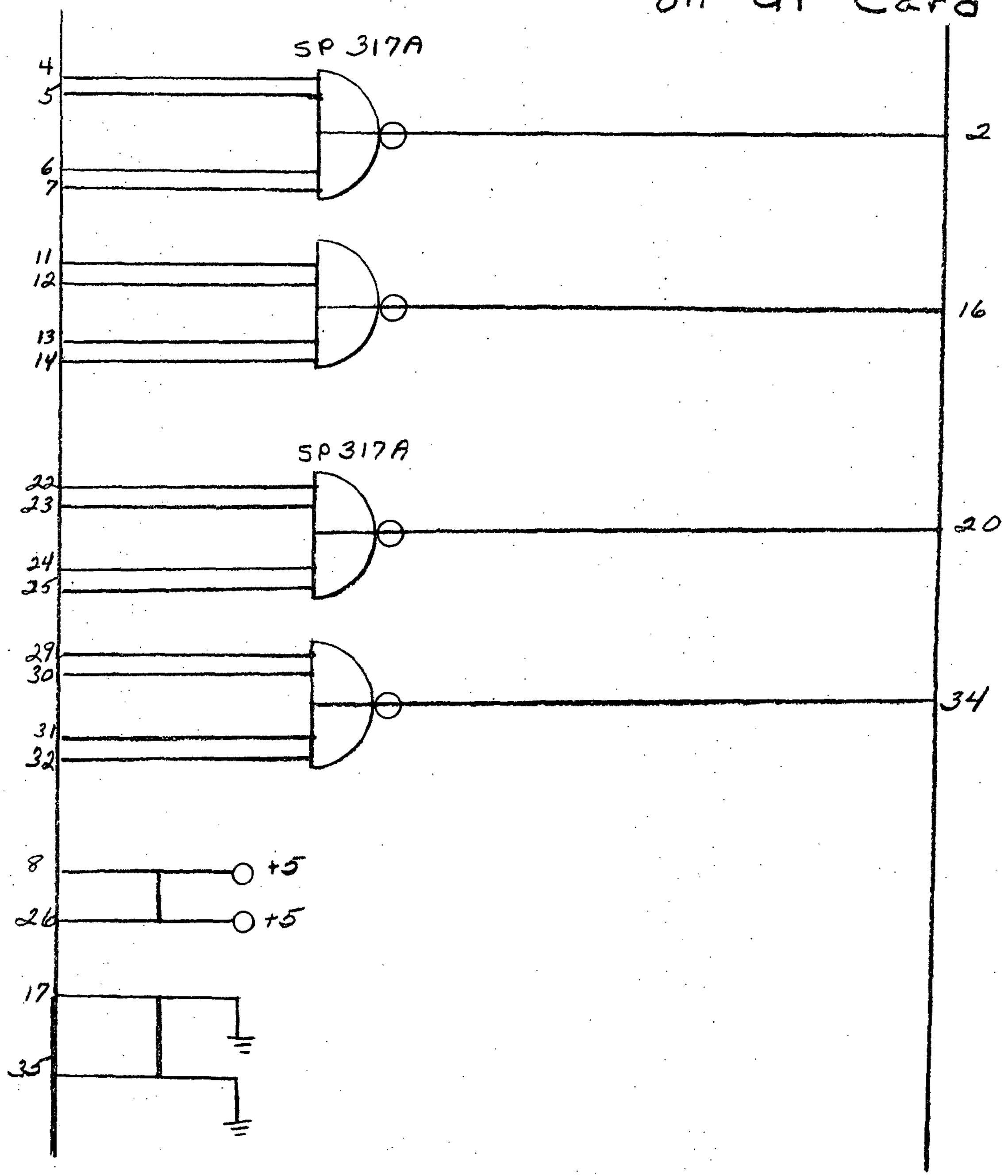
NOR 2 Logic on GP Board



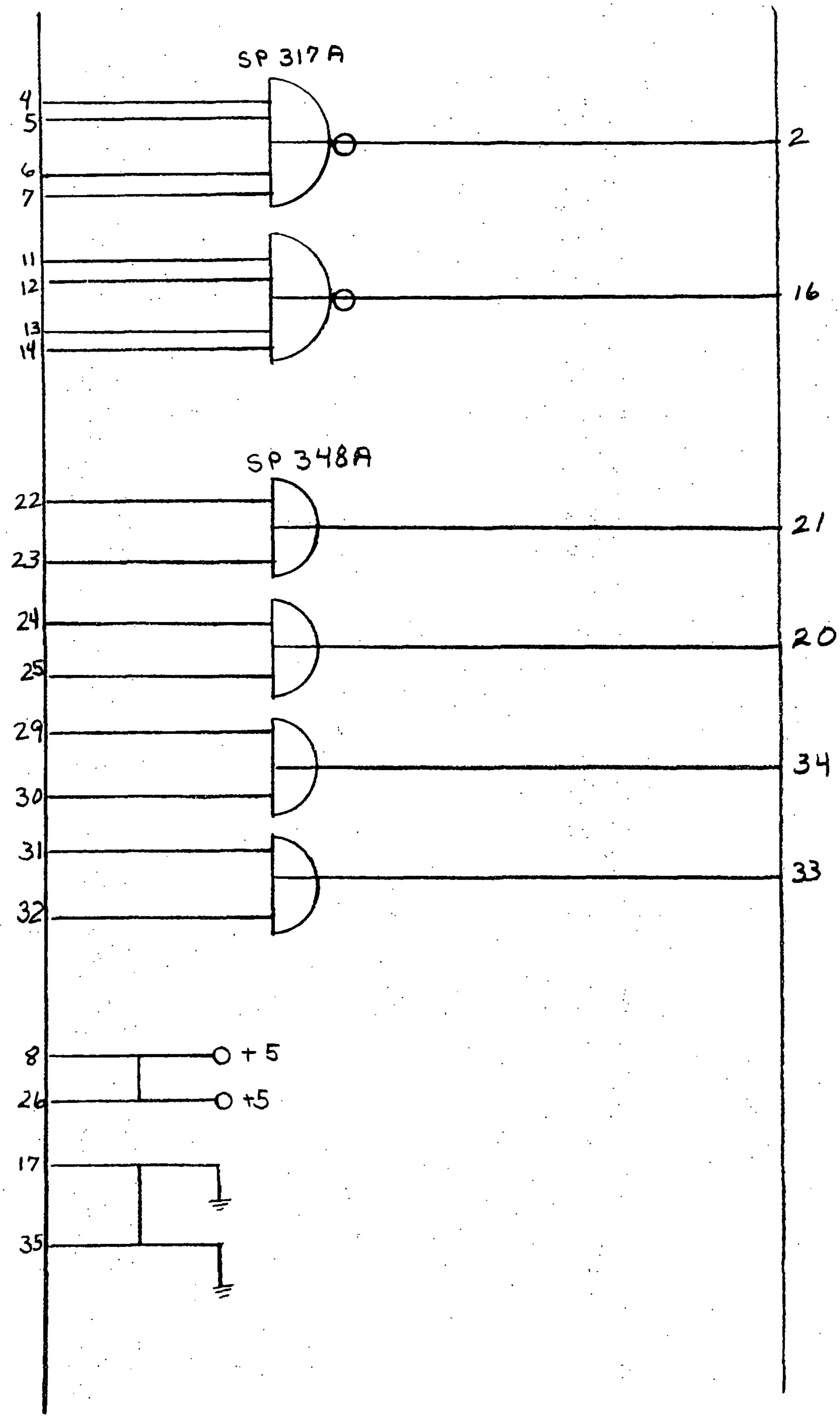
Card NOR 3 Logic on GP Board



Card NOR 4 Logic on GP Card

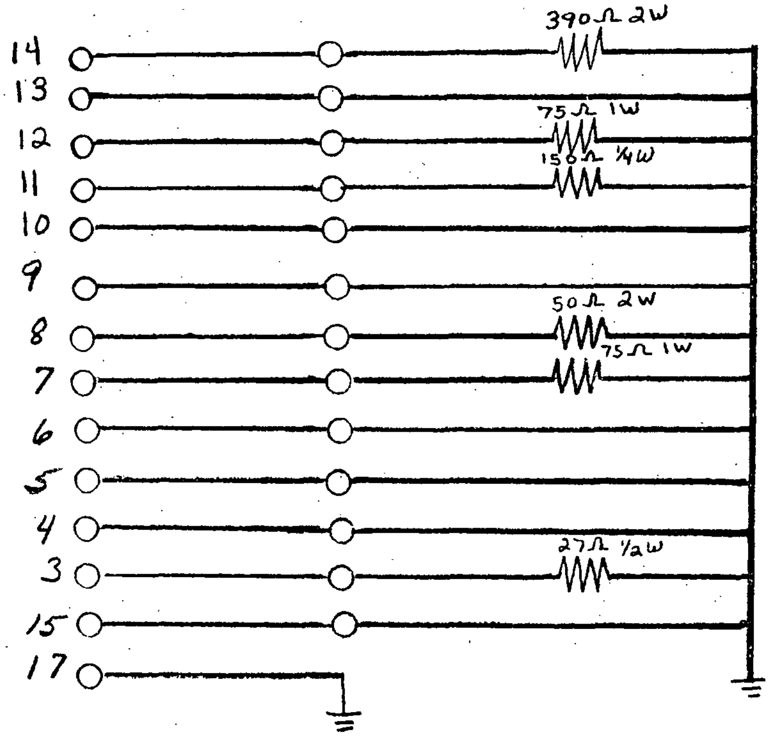


NOR 5 Logic on GP Board

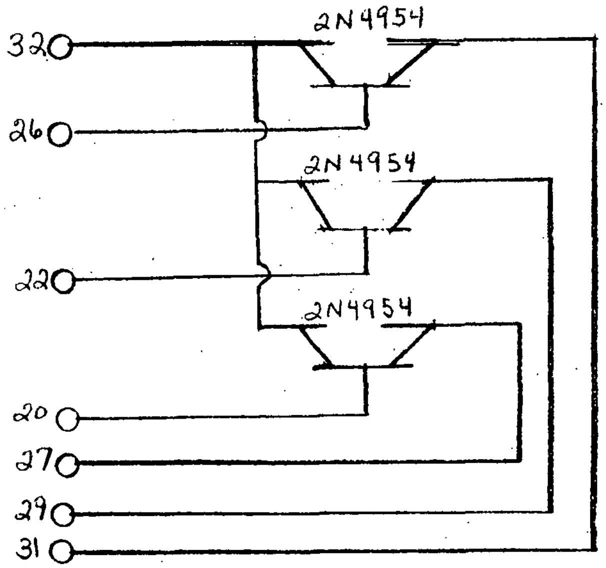


Card M1

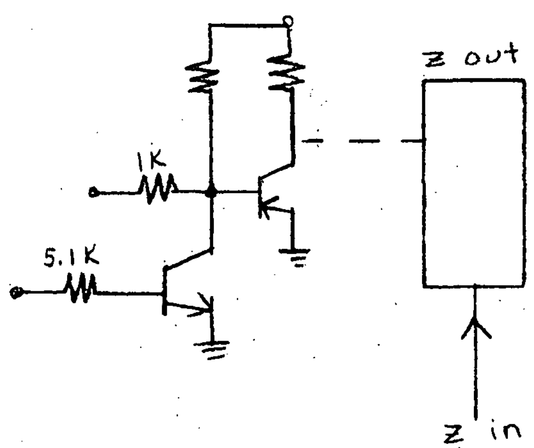
Lamp Intensity Control



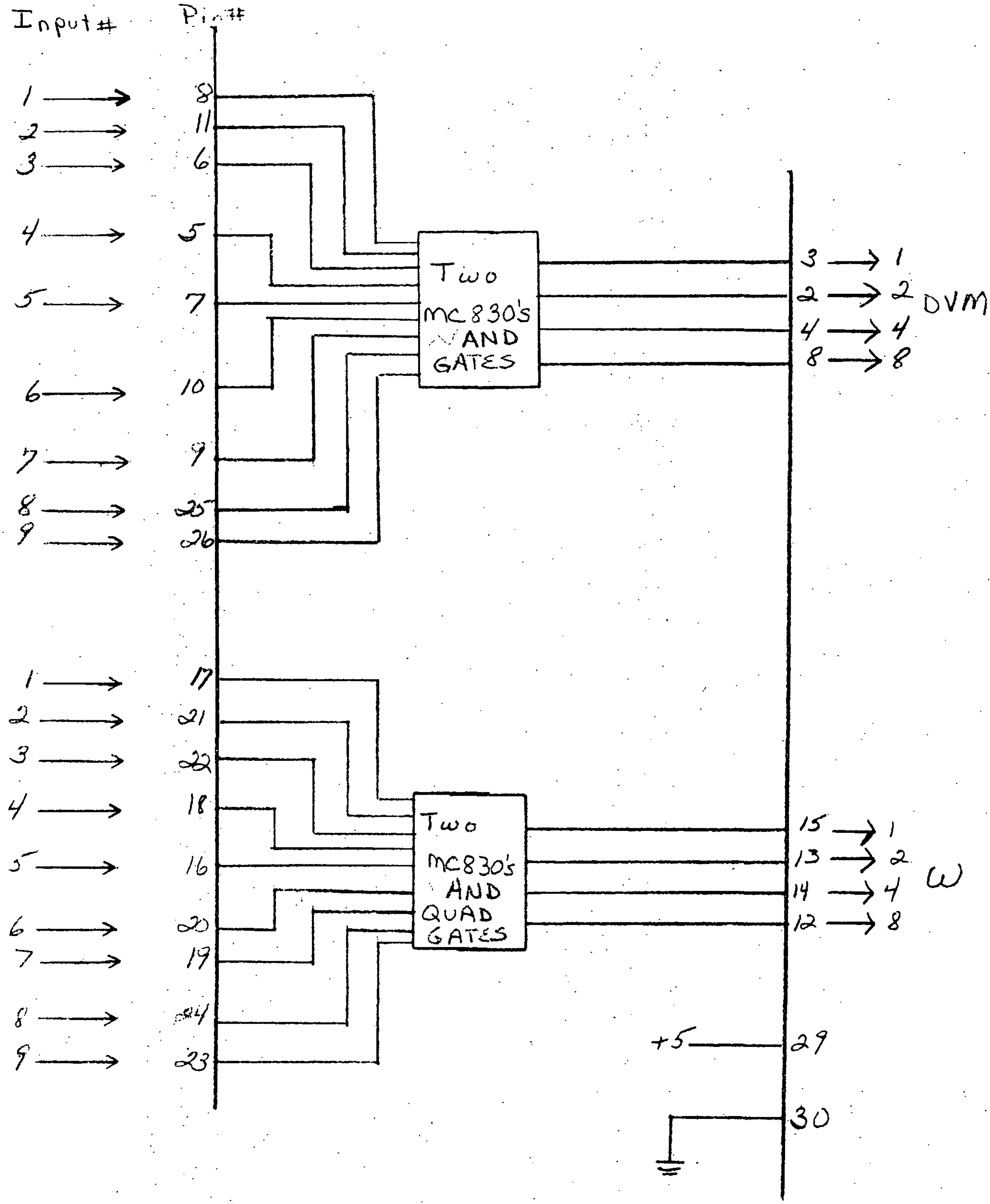
DN Lamp Drivers



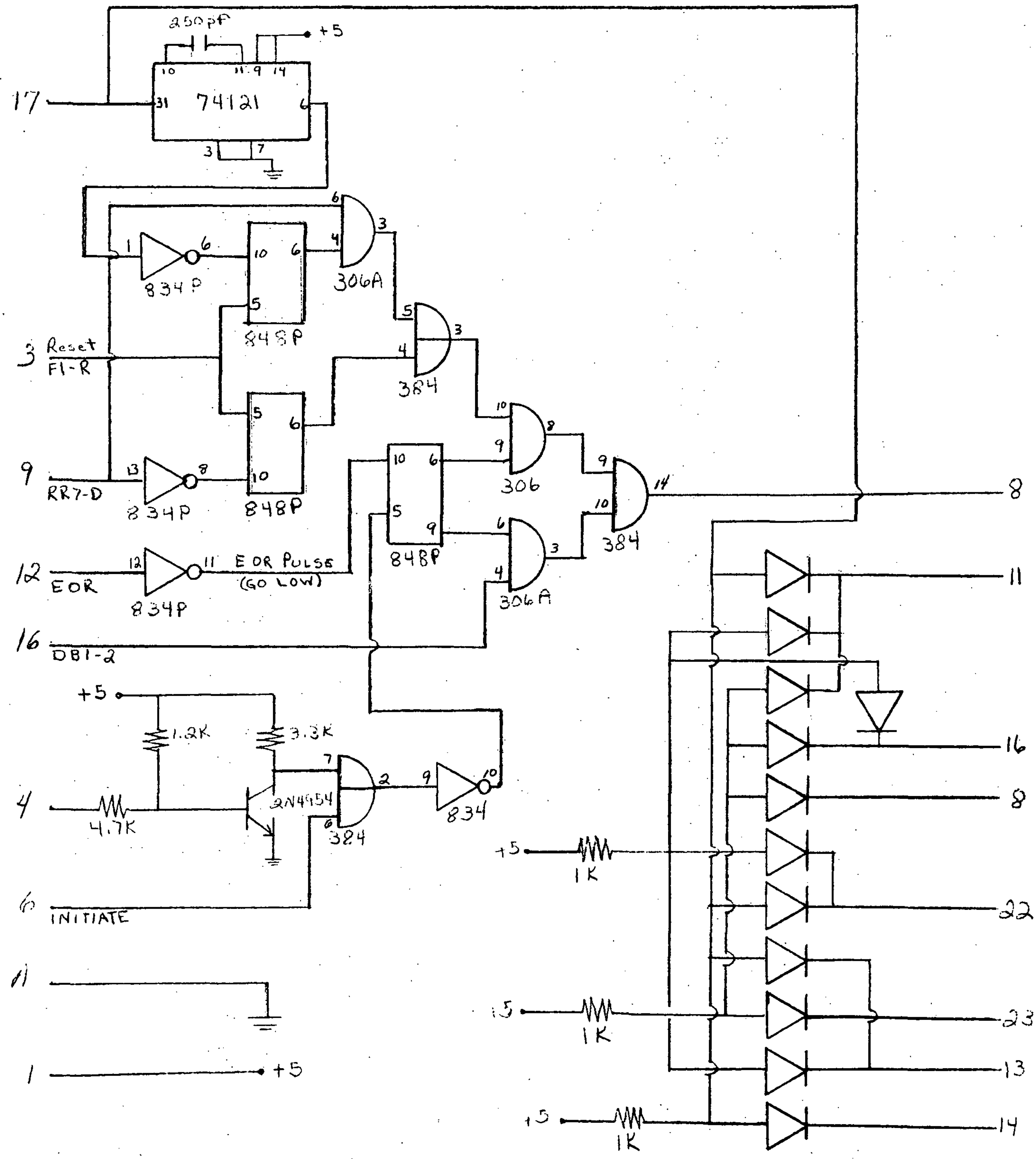
Z Control

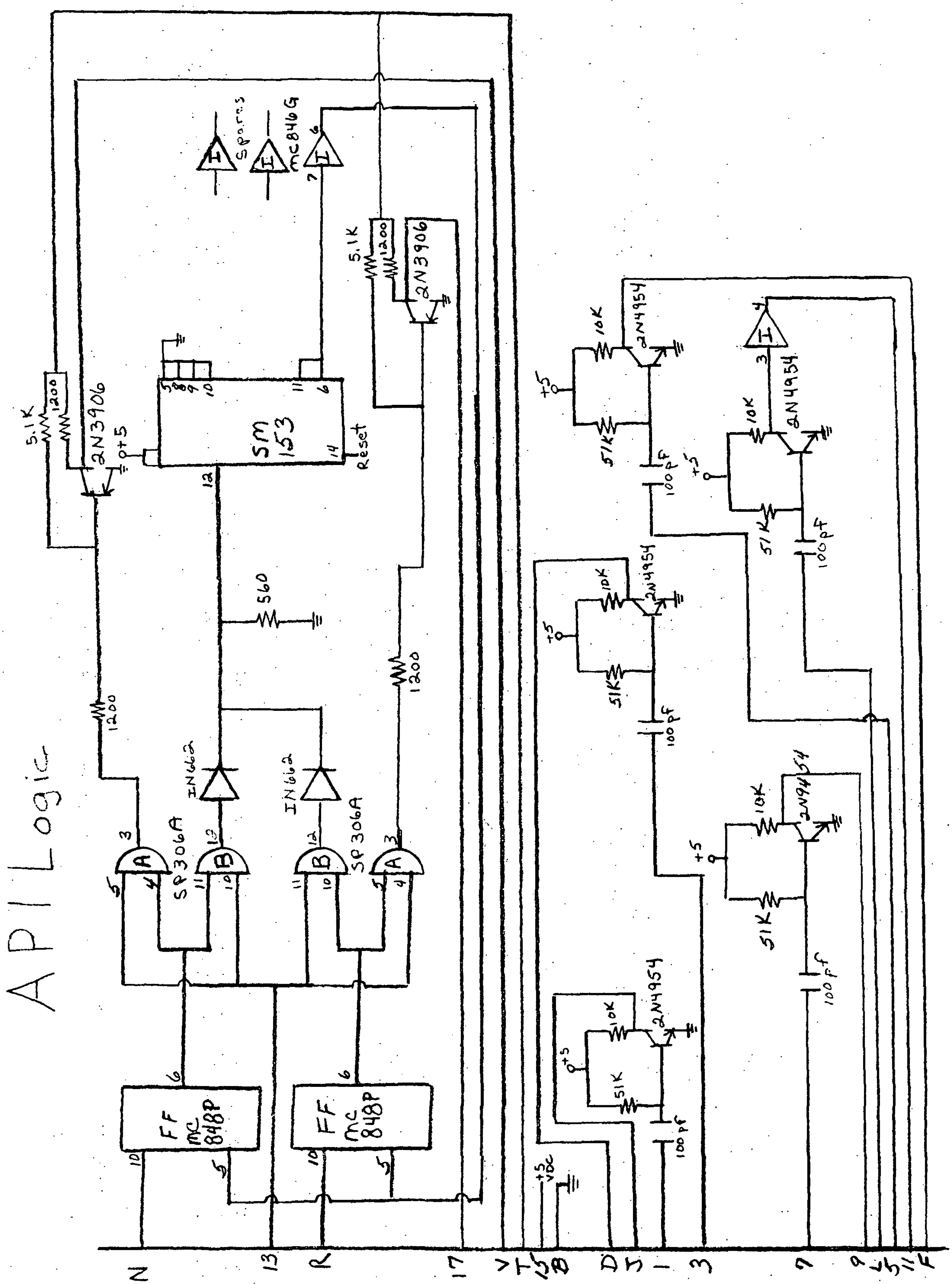


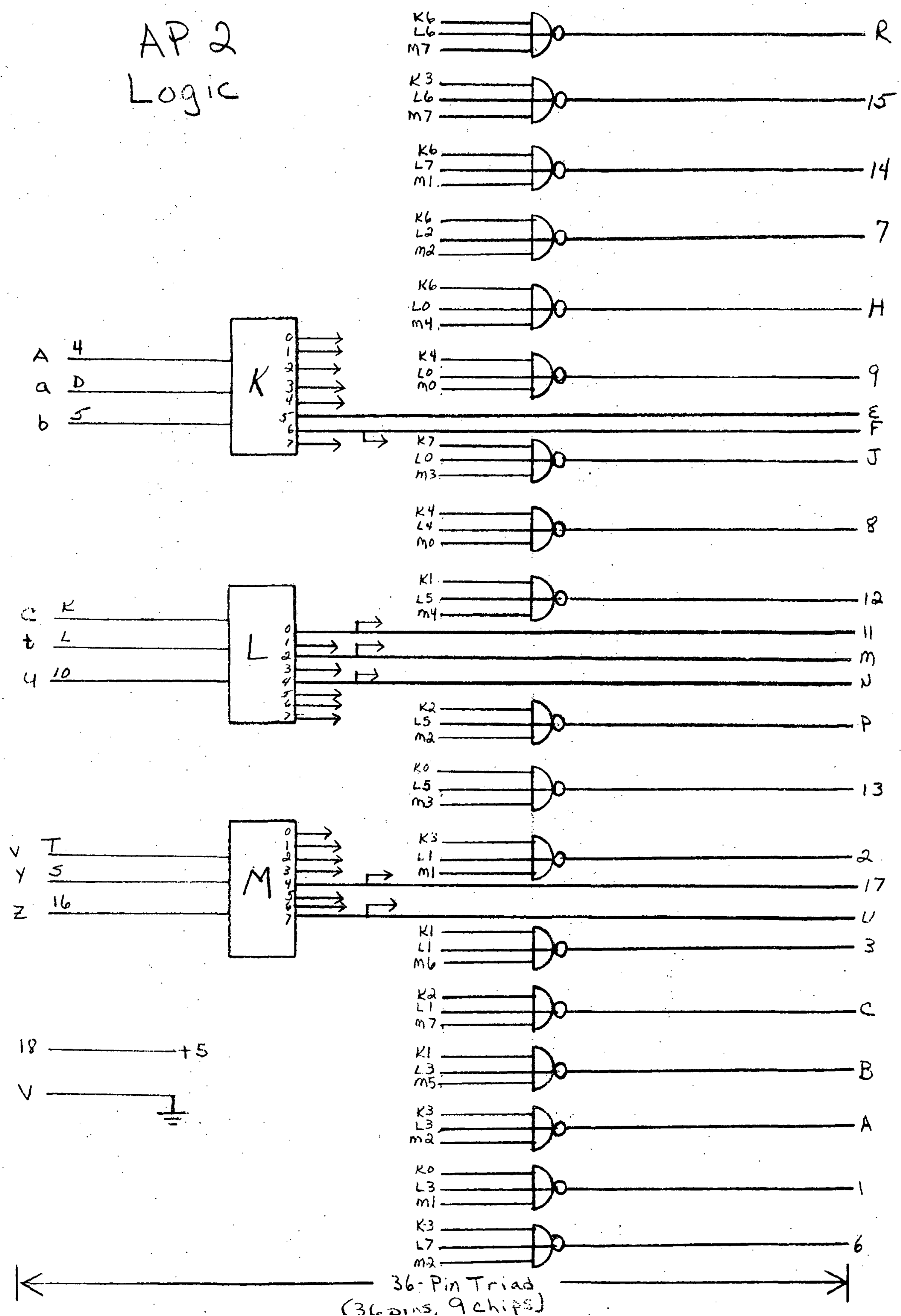
DD Logic


Input#
Pin#
1
2
3
4
5
6
7
8
9
8
11
6
5
7
10
9
25
26
Two
MC830's
AND
GATES
3
2
4
8
1
2
4
8
DVM
1
2
3
4
5
6
7
8
9
17
21
22
18
16
20
19
24
23
Two
MC830's
AND
QUAD
GATES
15
13
14
12
1
2
4
8
W
+5
29
30

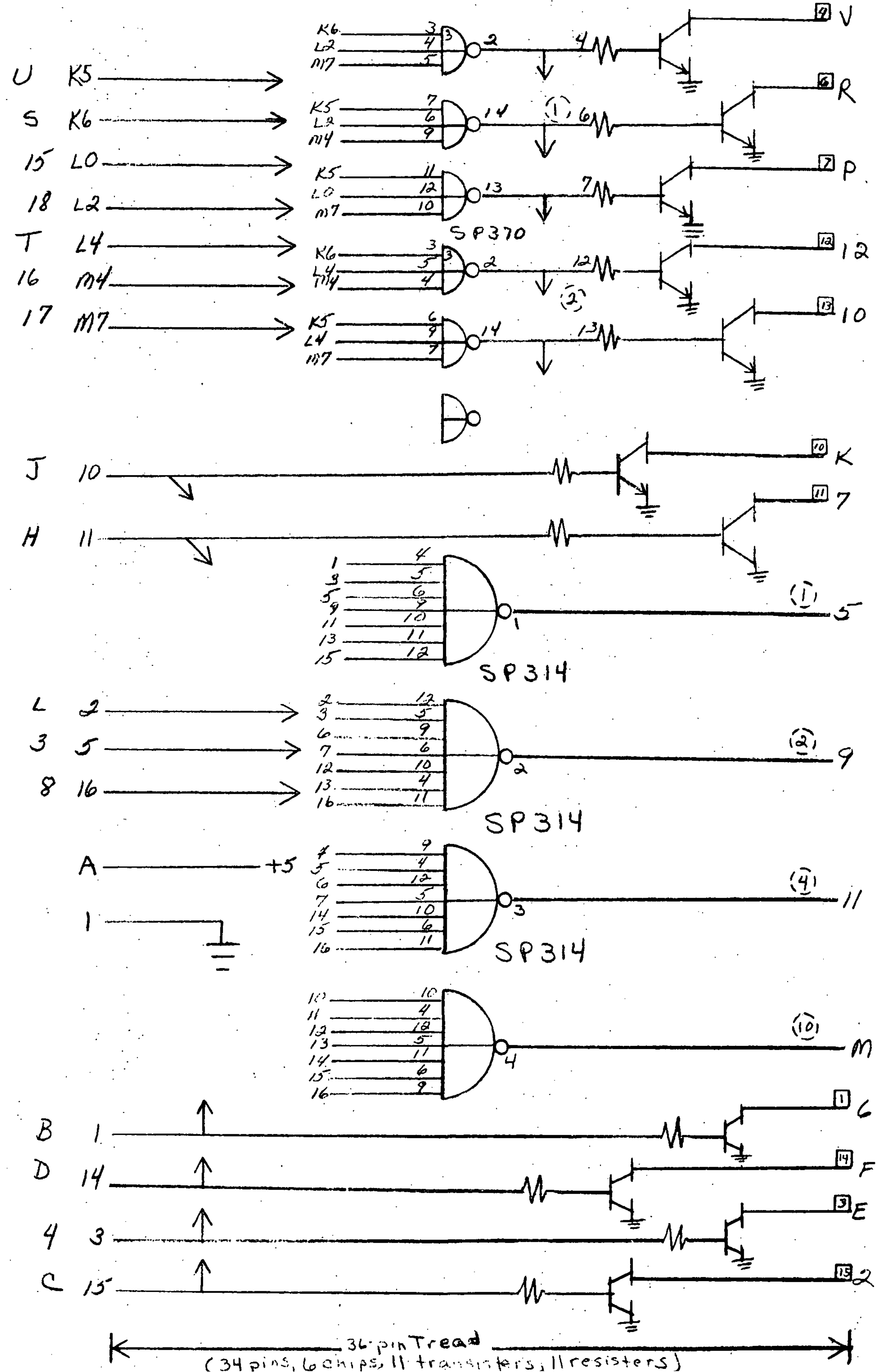
Misca (DB-2)
(Logic)



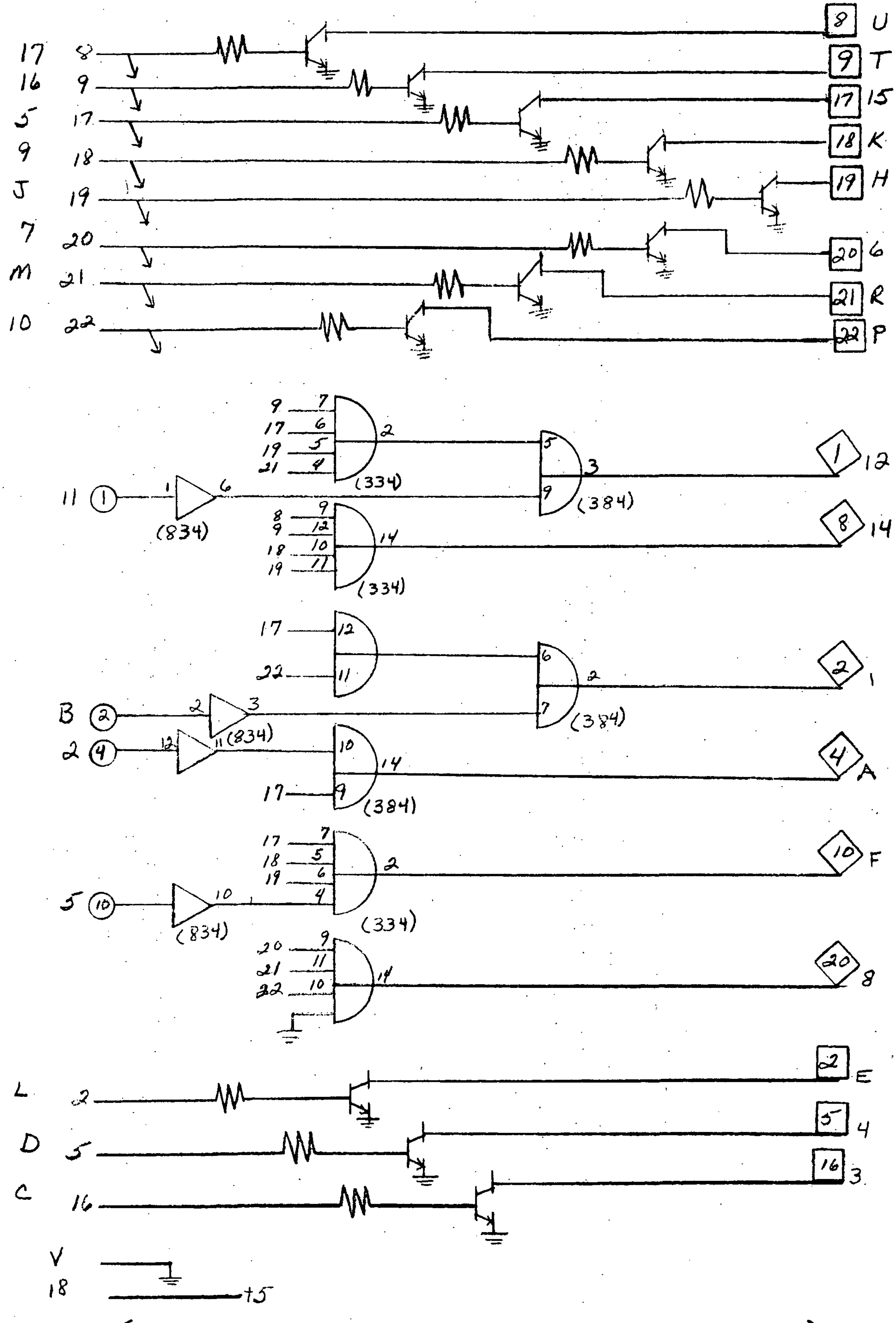

API Logic
SM 153
Reset
FF mc 848P
FF mc 848P
SP306A
SP306A
IN662
IN662
2N3906
2N3906
2N4954
mc846G
Spares
5.1K
1200
560
10K
51K
100pf
+5
+5 VDC


AP 2
Logic
A 4
a D
b 5
K
c K
t L
u 10
L
v T
Y 5
Z 16
M
18 +5
V
K6 L6 M7 R
K3 L6 M7 15
K6 L7 M1 14
K6 L2 M2 7
K6 L0 M4 H
K4 L0 M0 9
E
F
K7 L0 M3 J
K4 L4 M0 8
K1 L5 M4 12
11
M
N
K2 L5 M2 P
K0 L5 M3 13
K3 L1 M1 2
17
U
K1 L1 M6 3
K2 L1 M7 C
K1 L3 M5 B
K3 L3 M2 A
K0 L3 M1 1
K3 L7 M2 6
36-Pin Triad
(36 pins, 9 chips)

AP 3 Logic

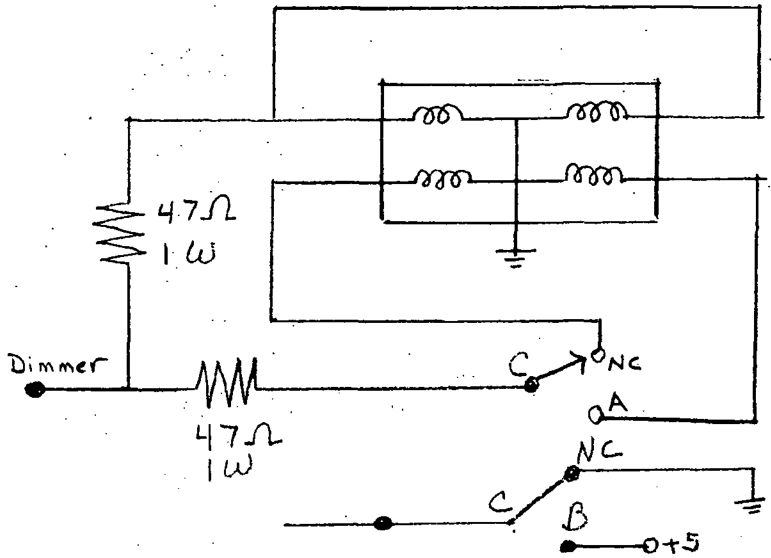

U K5
S K6
15 L0
18 L2
T L4
16 M4
17 M7
K6 L2 M7
K5 L2 M4
K5 L0 M7
K6 L4 M4
K5 L4 M7
SP370
V
R
P
12
10
J 10
H 11
K
7
SP314
5
L 2
3 5
8 16
SP314
9
A
+5
1
SP314
11
M
B 1
D 14
4 3
C 15
6
F
E
2
36-pin Tread
(34 pins, 6 chips, 11 transisters, 11 resisters)

AP4 Logic

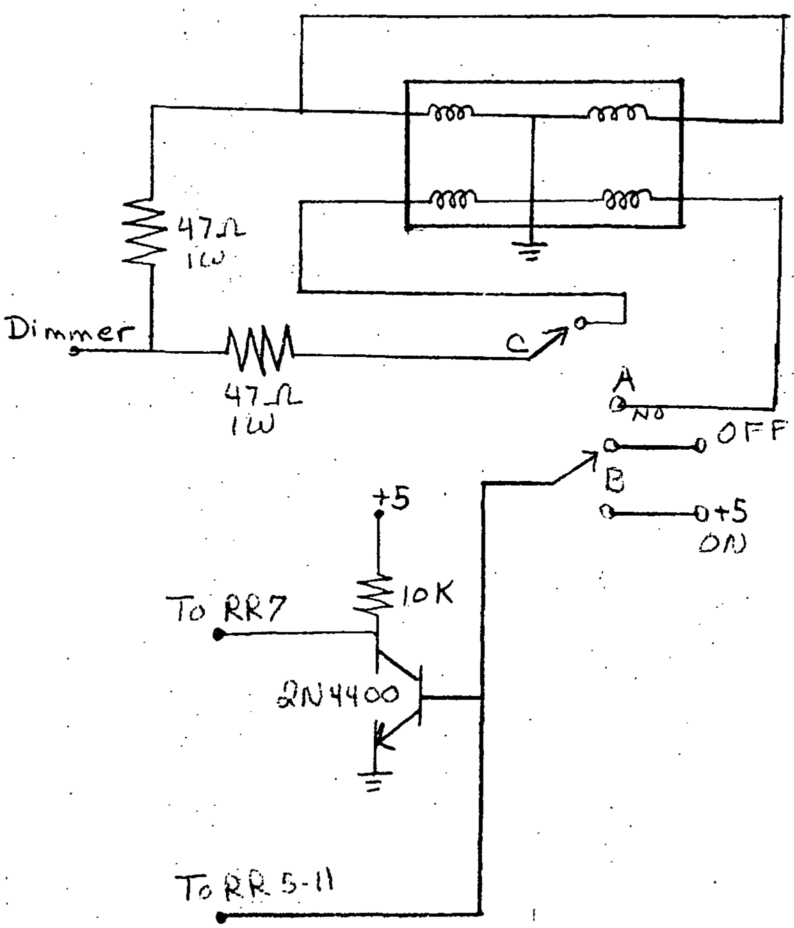


36 pin Tread
(35 pins, 4 chips, 11 Transisters, 11 Resistors)

New Panel Switches with Lamps (Logic)

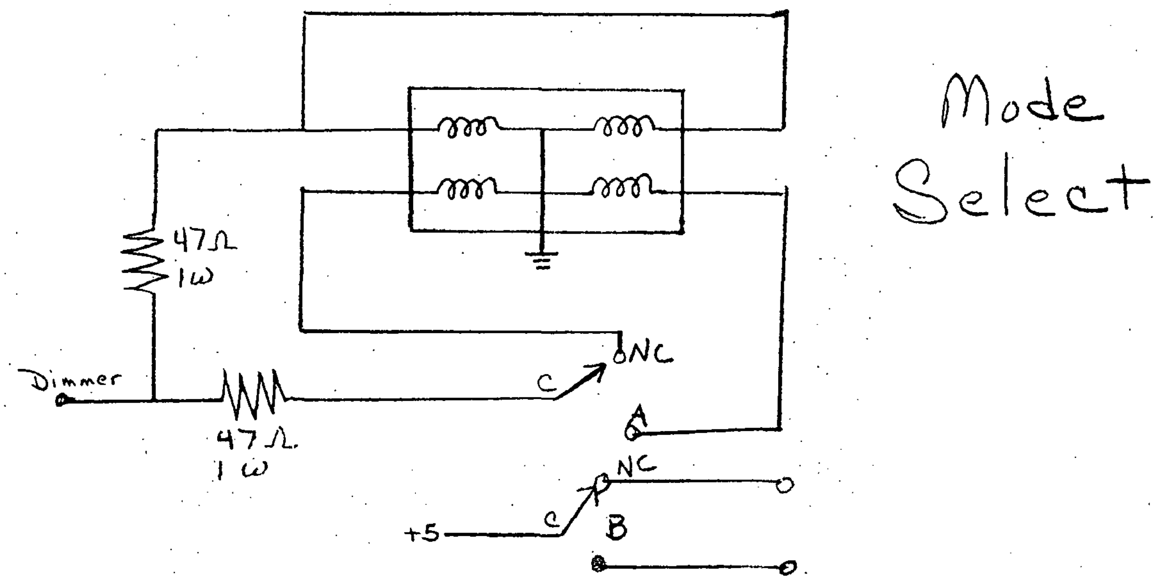


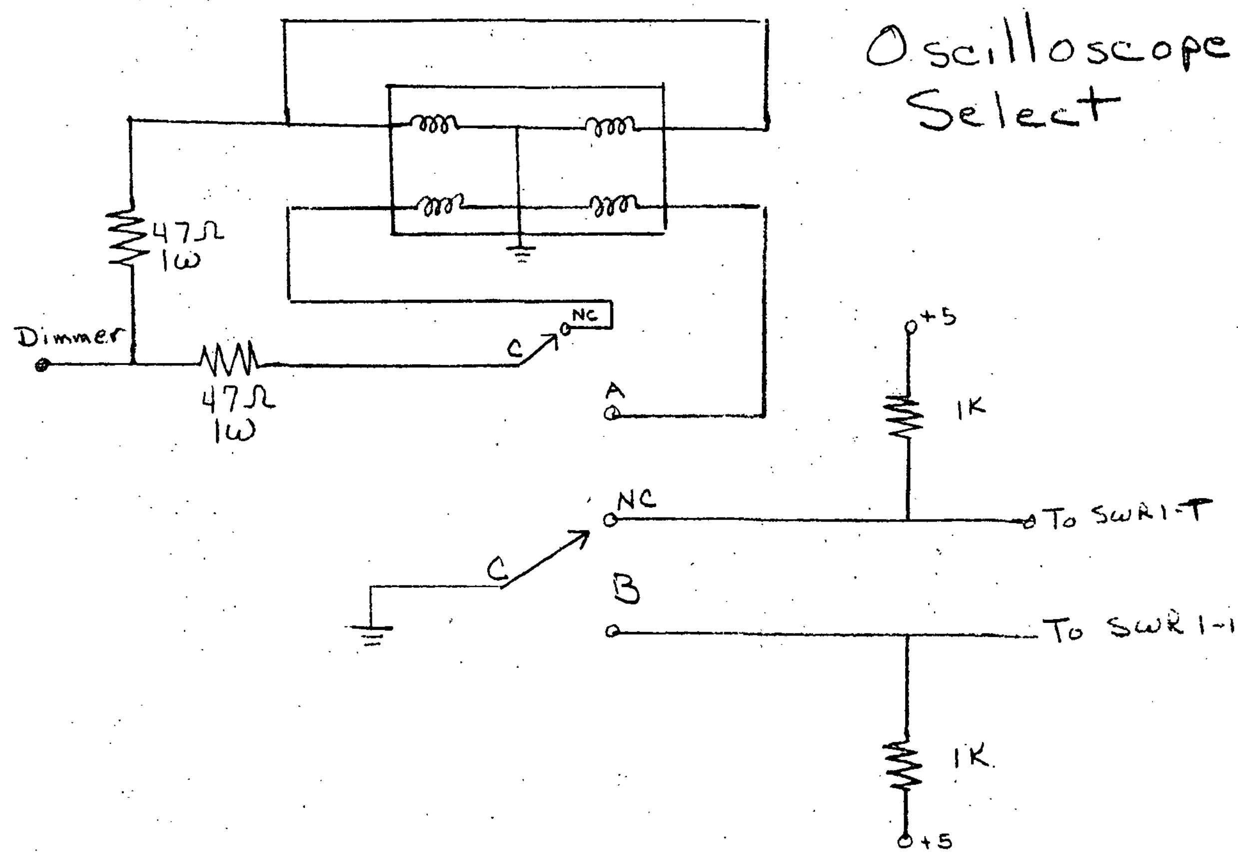
Detector Sel.



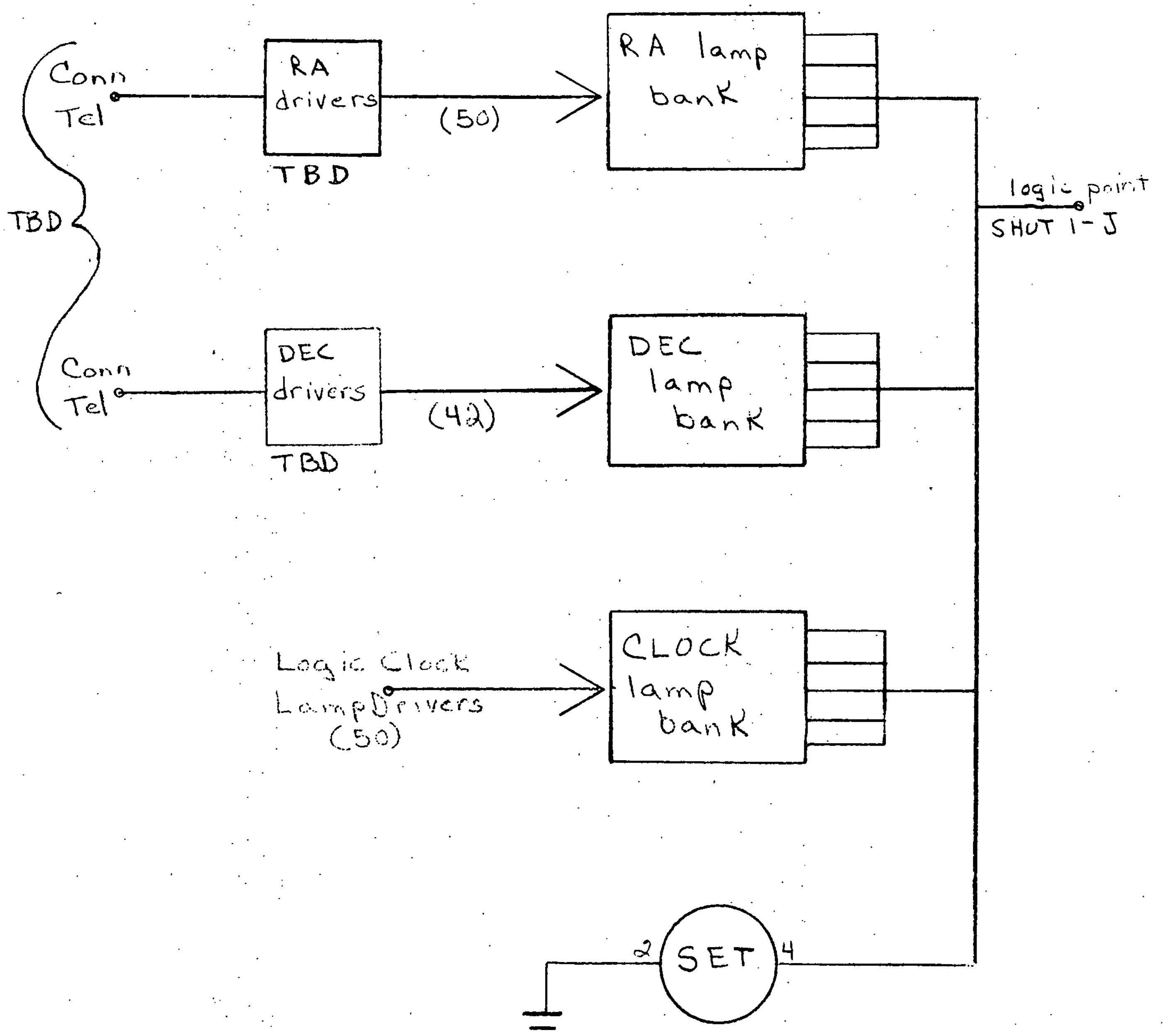
Unit Scan

New Panel Switches with Lamps (Logic)

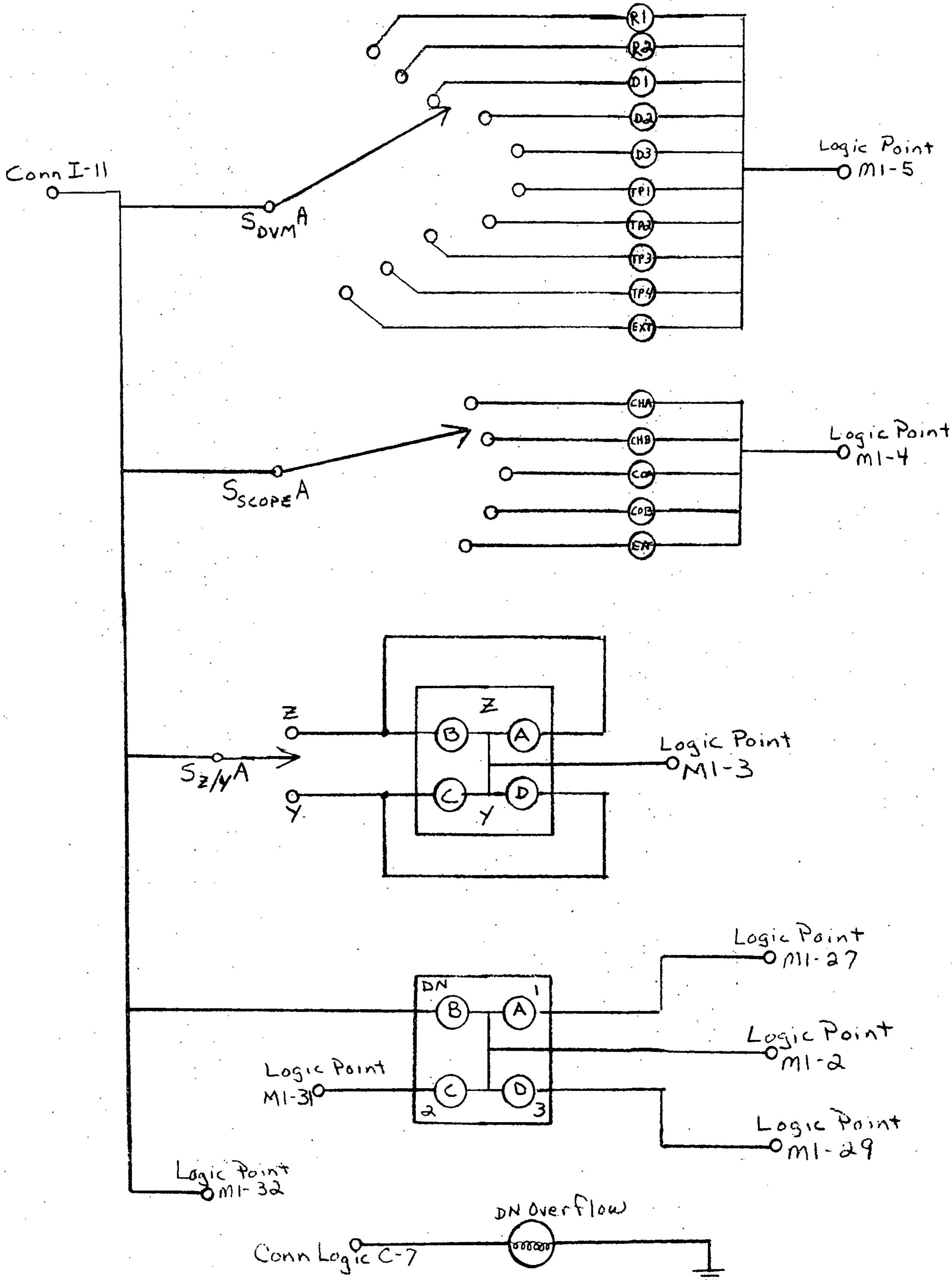




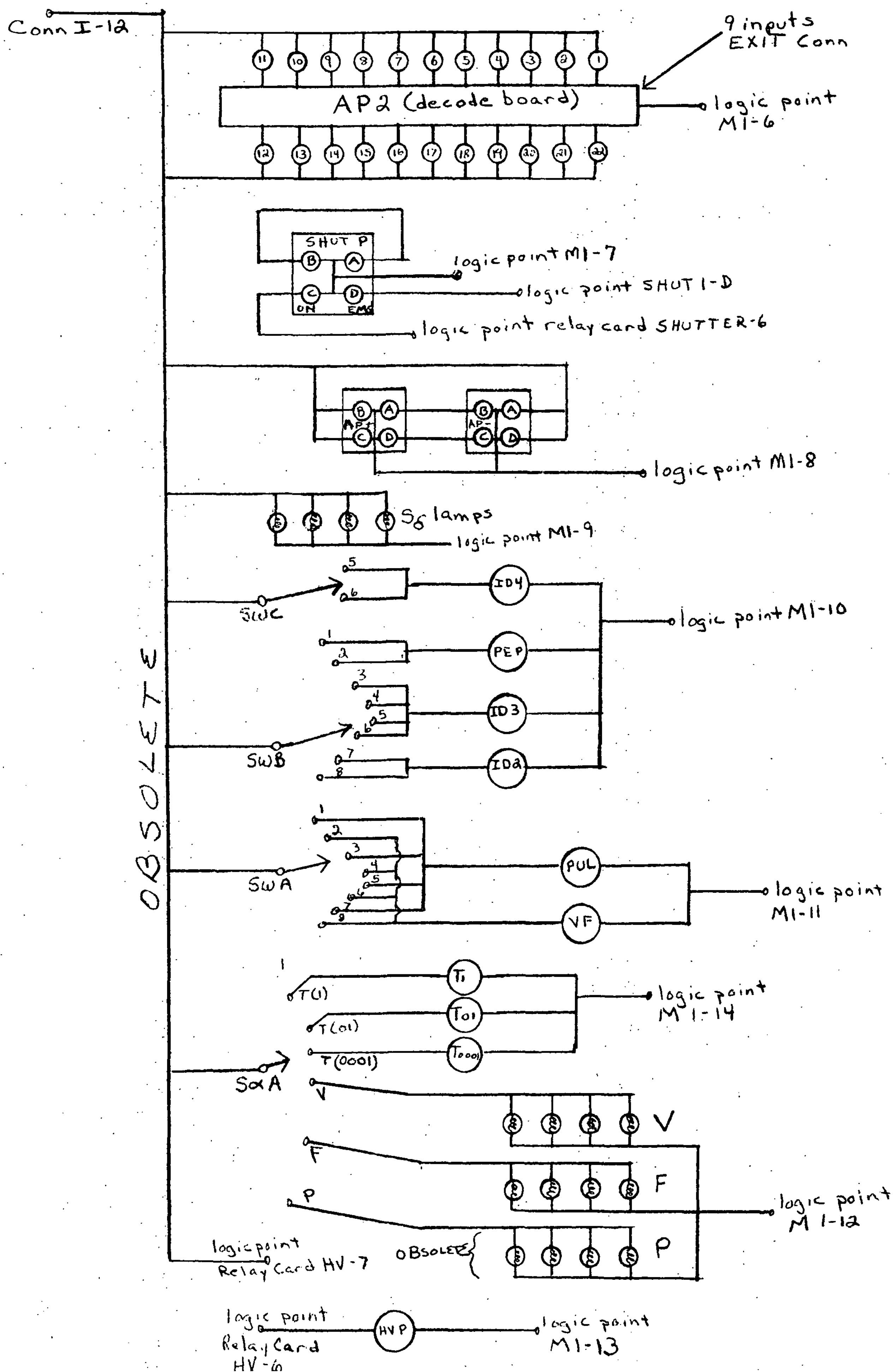
Logic Panel Lamps



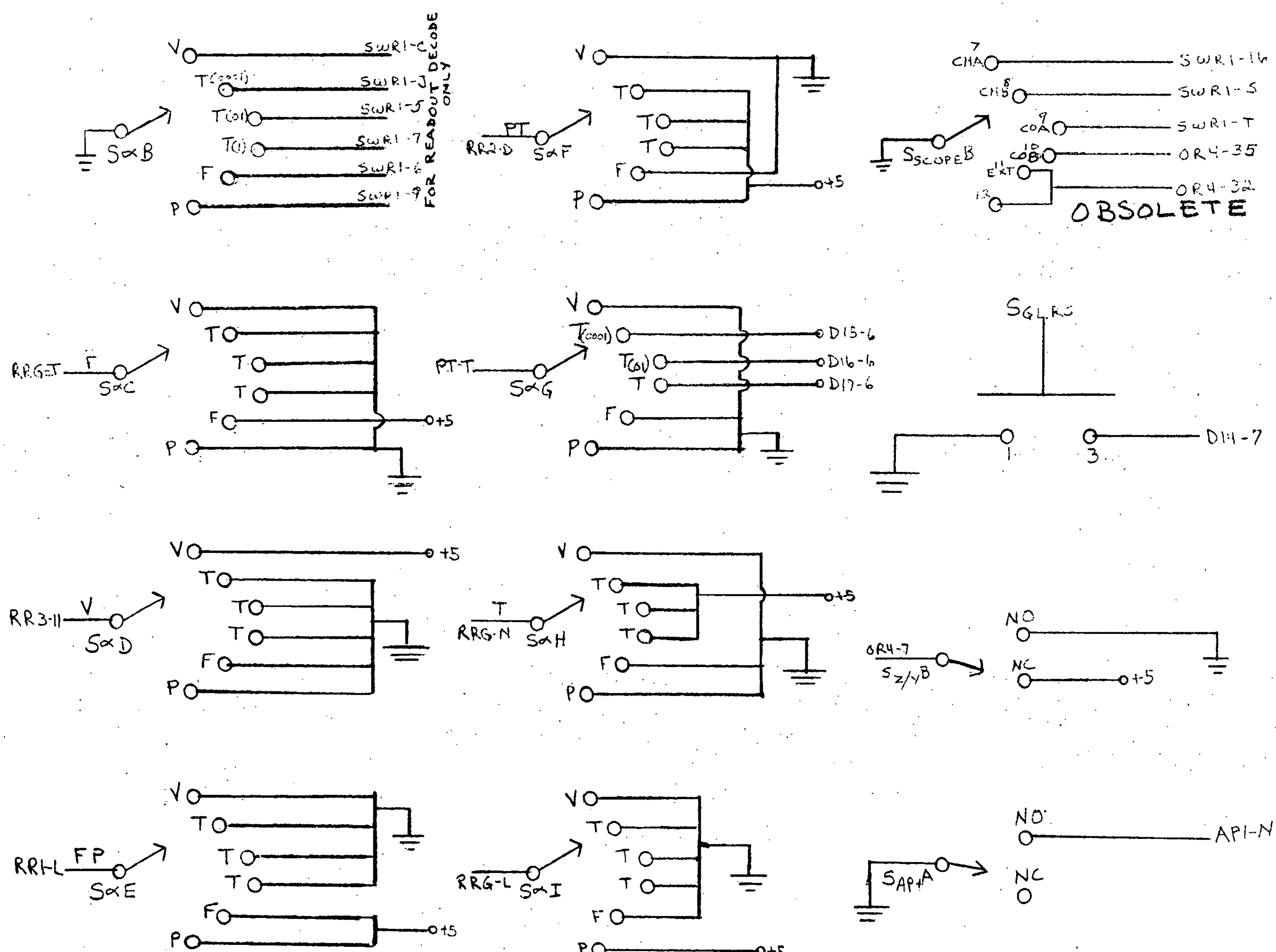
Logic Panel Lamps



Logic Panel Lamps



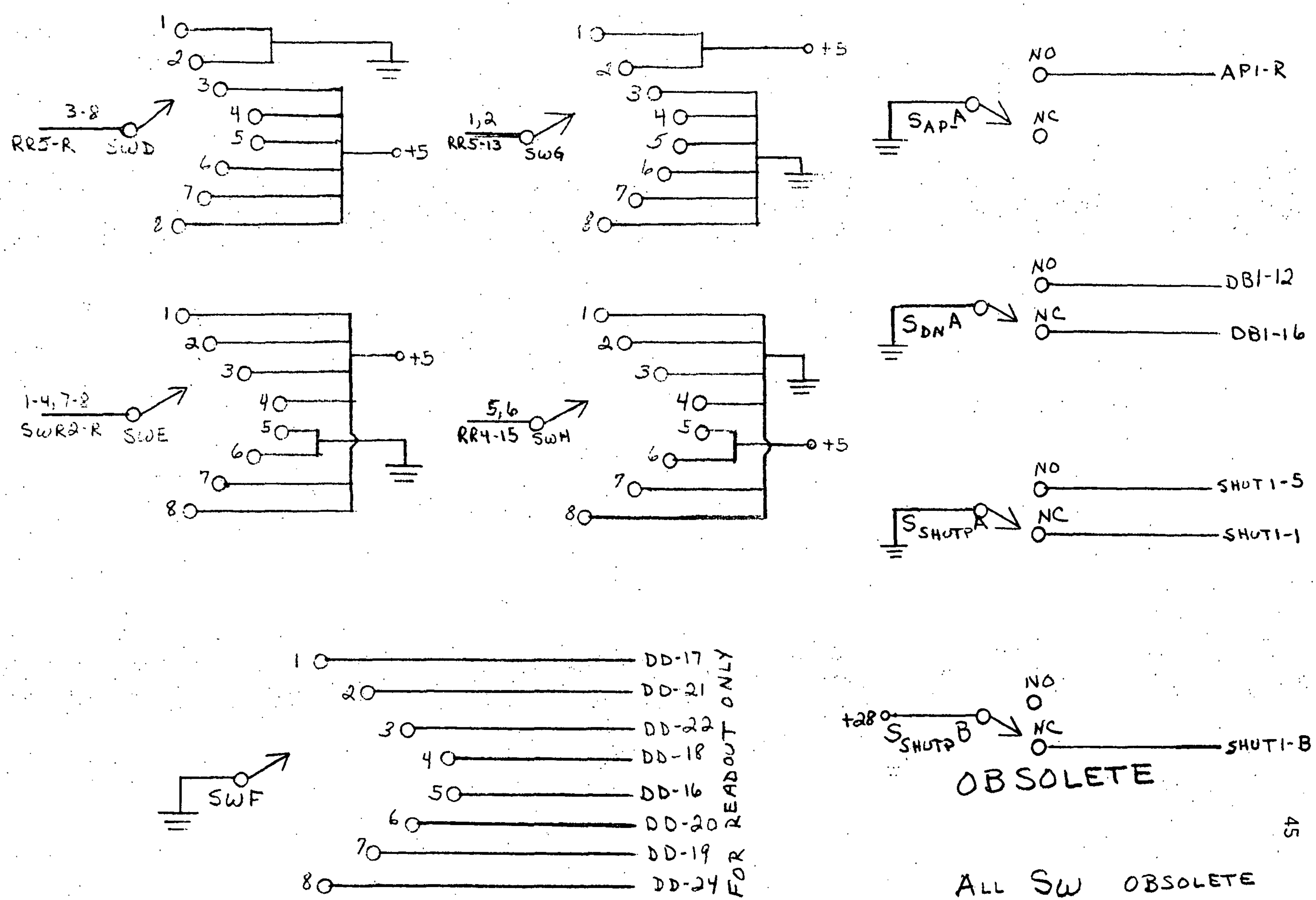
Logic Panel Switches (not directly associated with lamps)



ALL SW OBSOLETE

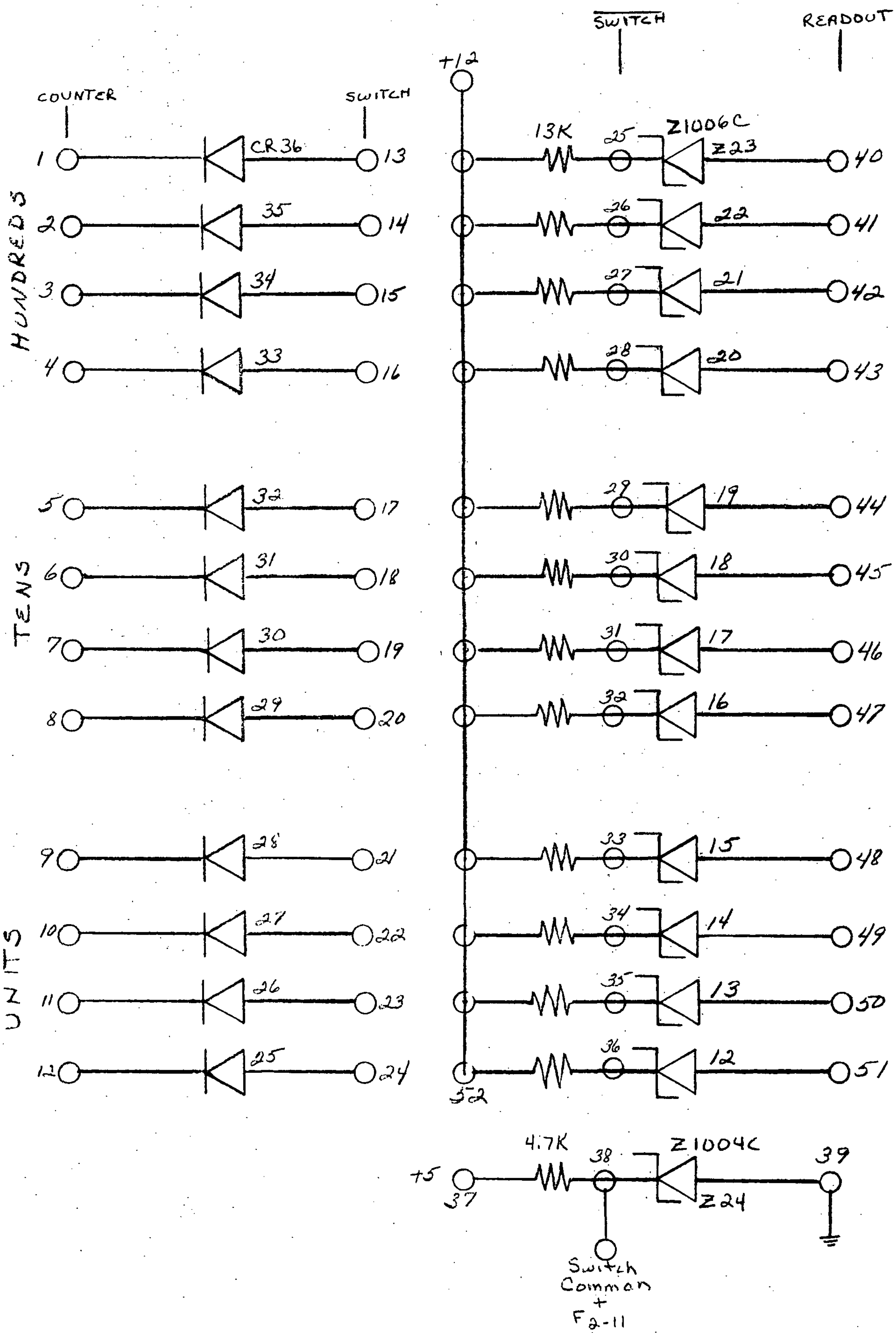
ALL "P" OBSOLETE

Logic Panel Switches (not directly associated with lamps)

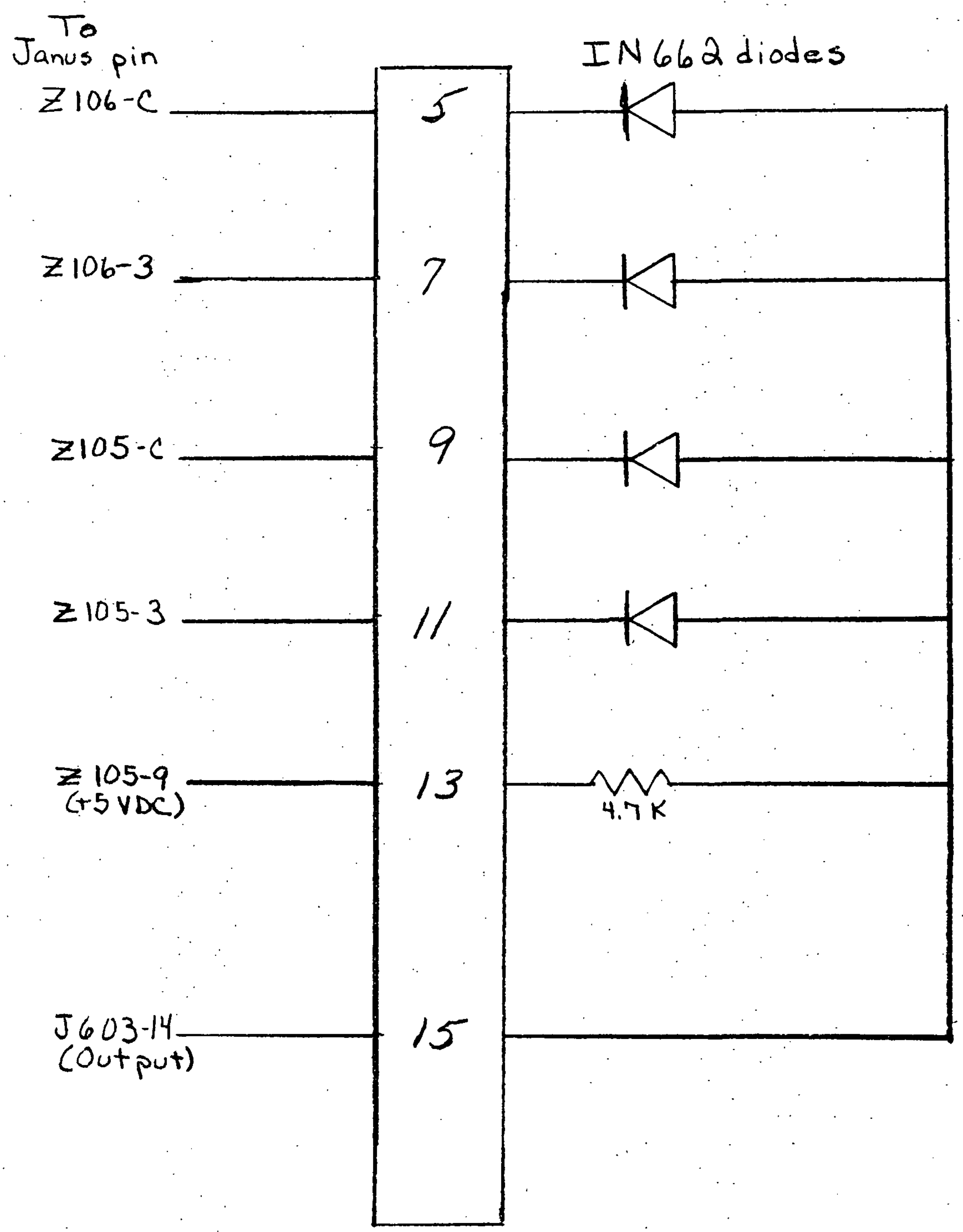


ALL SW OBSOLETE
ALL "P" OBSOLETE

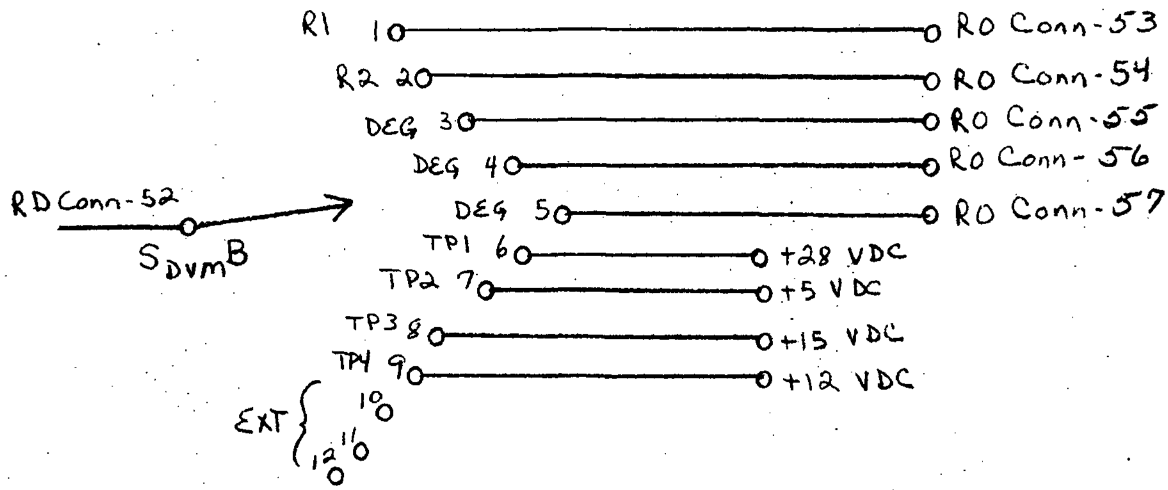
δ Sync Logic (S)

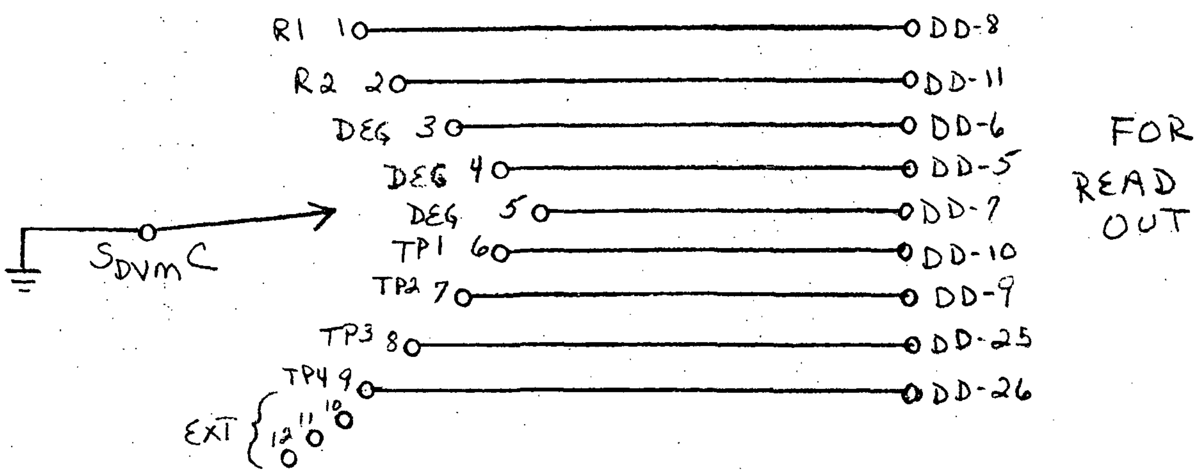


Counter Overflow
(Logic)

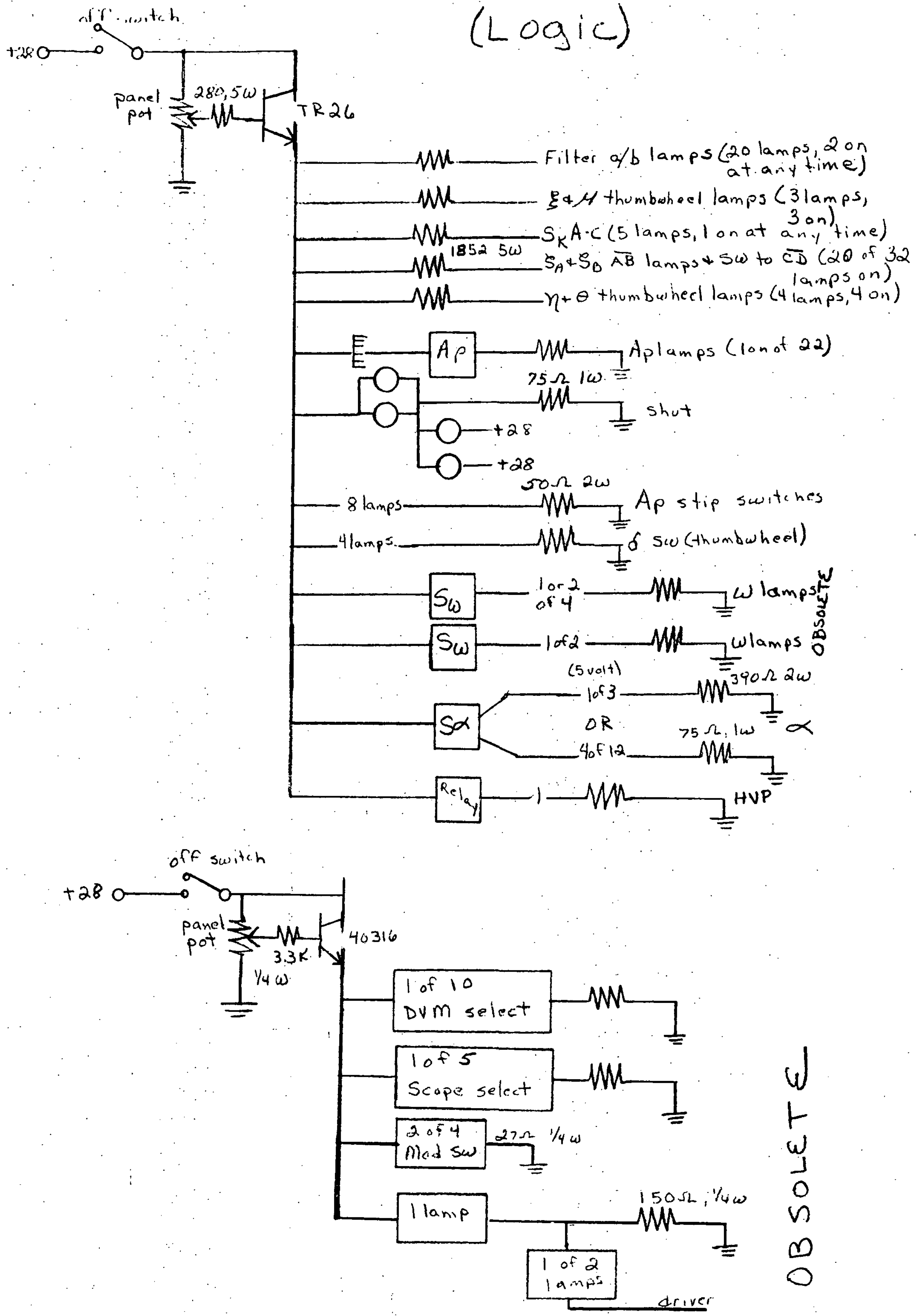


SDVM decks B & C OBSOLETE

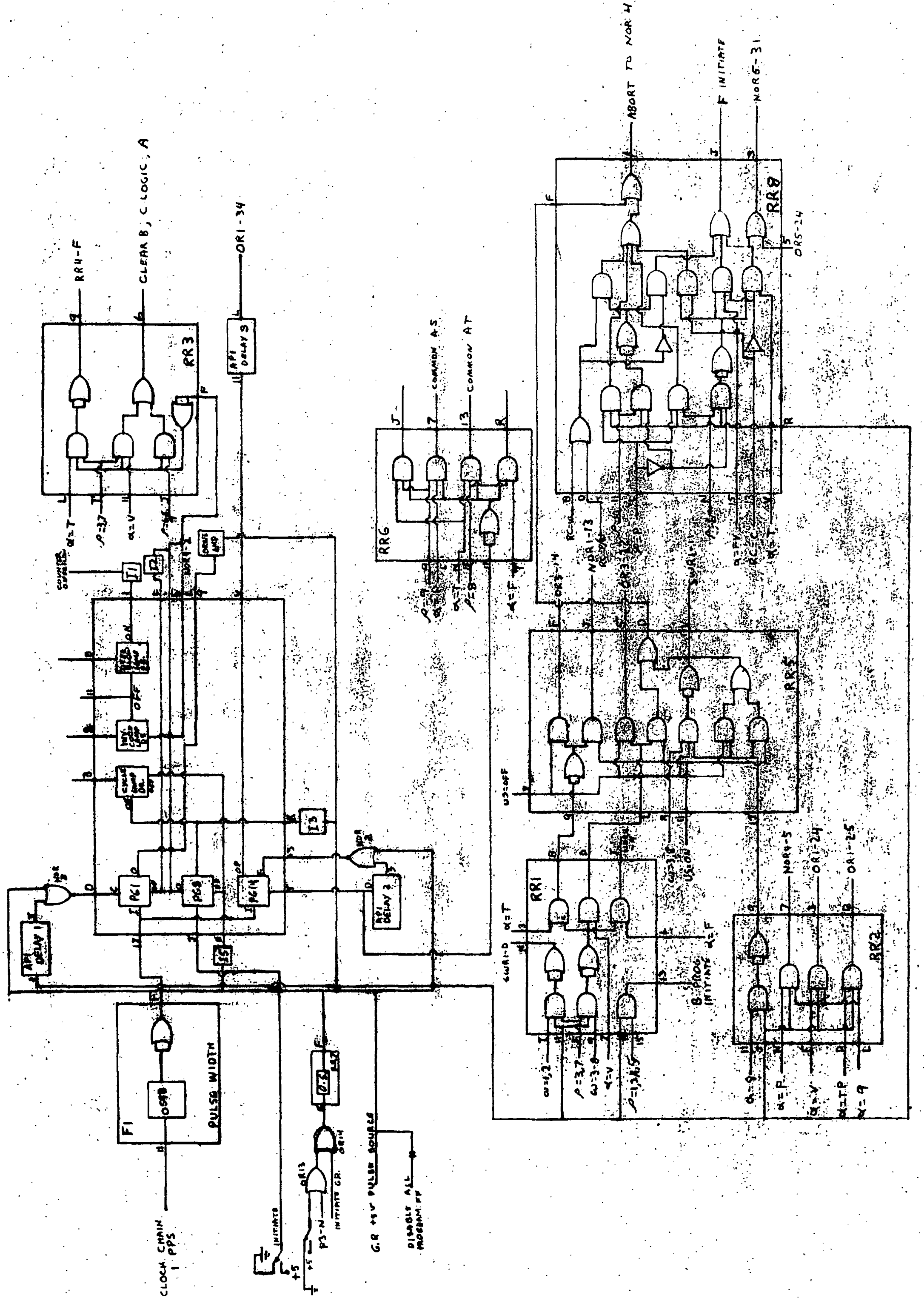


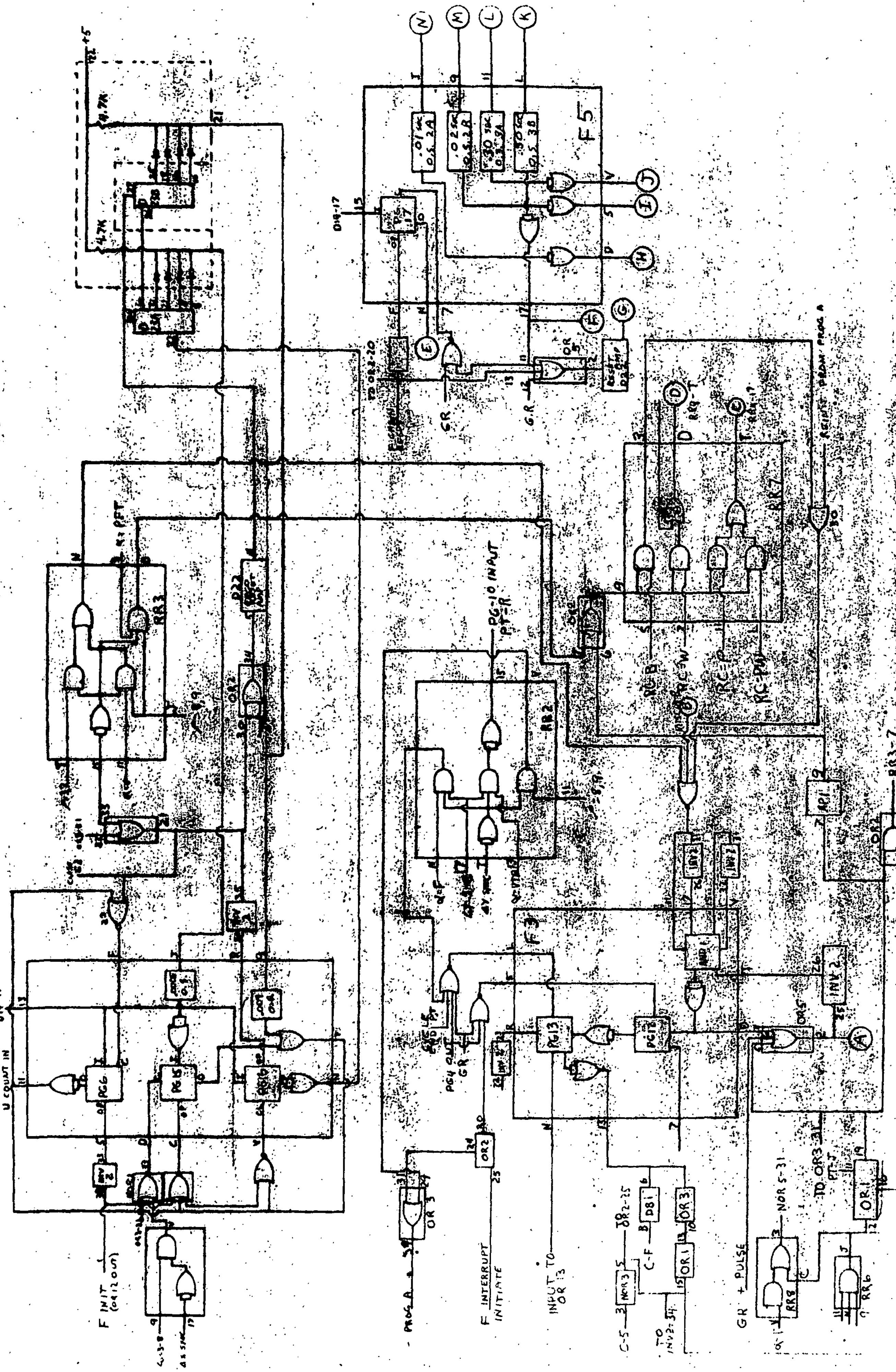


PEP dimmer (Logic)

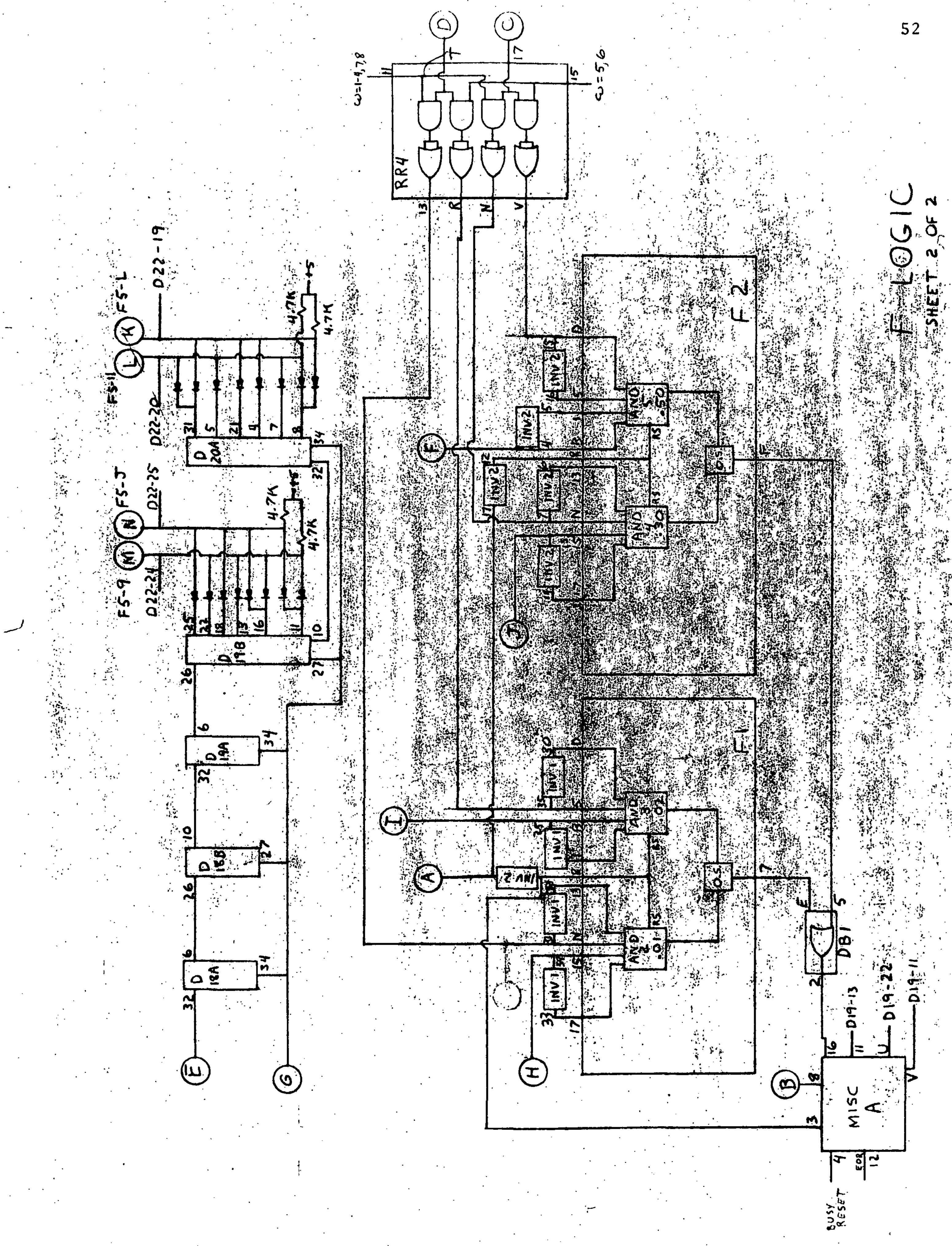


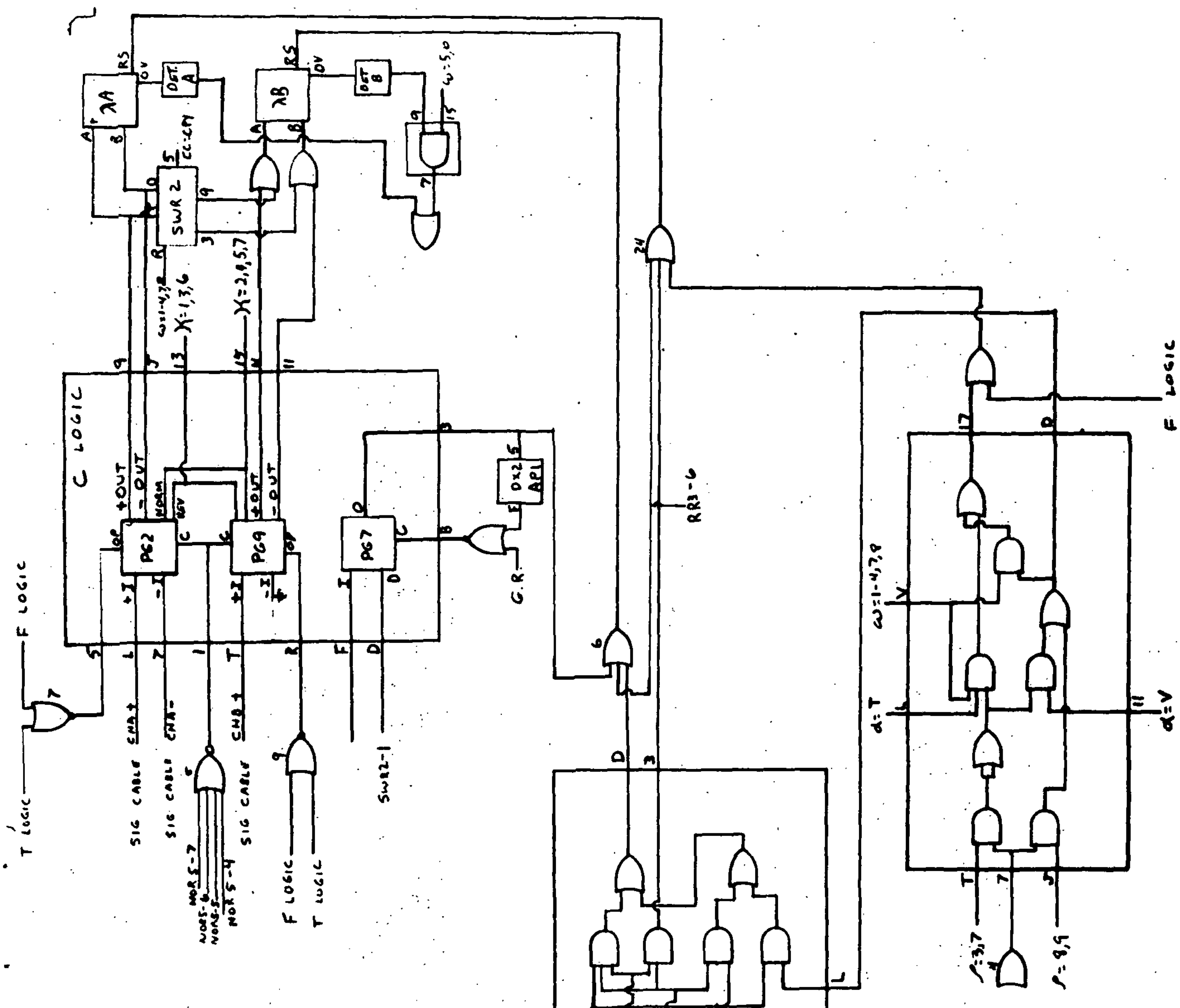
INITIATE LOGIC



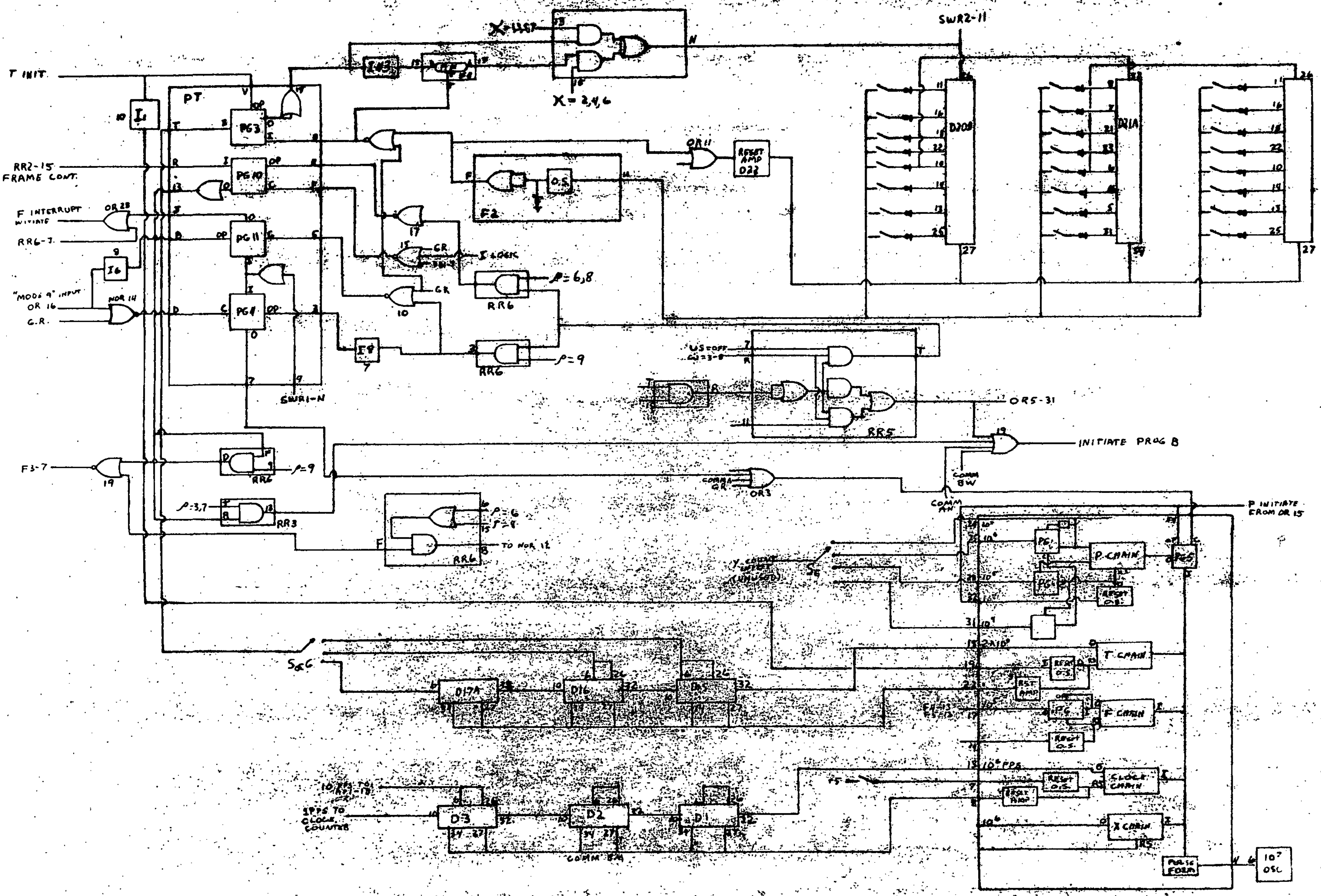


F LOGIC
SHEET 1 OF 2


F LOGIC
SHEET 2 OF 2
RR4
F2
F1
MISC A
DB1
D 18A
D 18B
D 19A
D 19B
D 20A
D22-19
D22-20
D22-24
D22-25
D19-13
D19-22
D19-11
F5-L
F5-J
F5-9
F5-11
4.7K
BUSY RESET
EOR
INV 1
INV 2
AND
O.S.


C LOGIC
PG2
PG9
PG7
SWR 2
λA
λB
DX2 AP1
F LOGIC
T LOGIC
G.R.
RR3-6
SWR2-1

C LOGIC


T INIT
RR2-15
FRAME CONT.
F INTERRUPT
RR6-7
"MODE 4" INPUT
OR 16
G.R.
F3-7
PT
PG3
PG10
PG11
PG4
SWR1-N
SWR2-11
X = 2,4,6
F2
O.S.
OR 11
RESET AMP D22
D20B
D21A
RR6
RR5
RR3
OR5-31
INITIATE PROG B
COMM BW
COMM AN
OR3
TO NOR 12
P INITIATE FROM OR 15
P CHAIN
T CHAIN
F CHAIN
CLOCK CHAIN
X CHAIN
PULSE FORM
10^7 OSC
S&C
D17A
D16
D15
D3
D2
D1
COMM BM

PT LOGIC

DATA ID CONTROL

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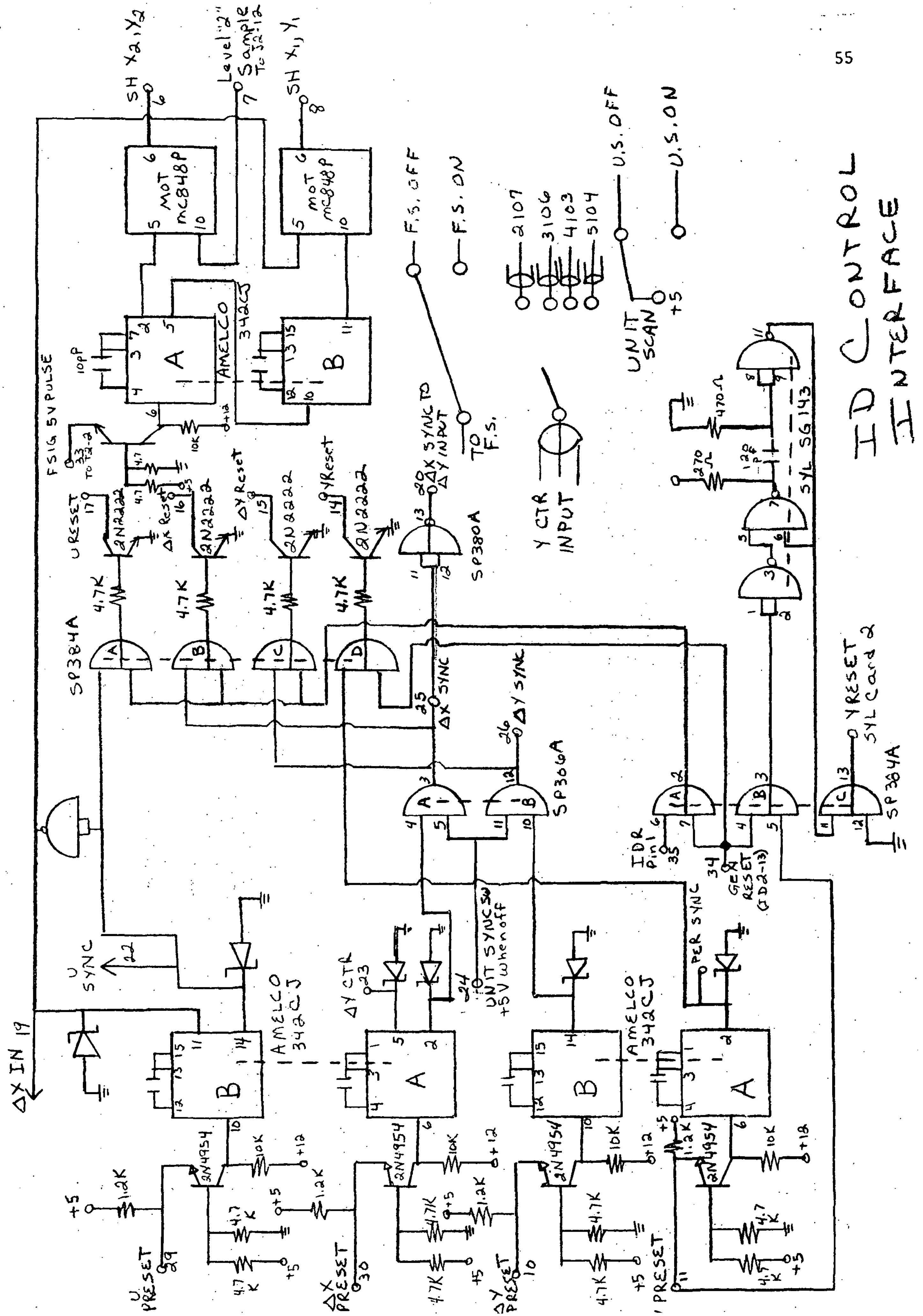
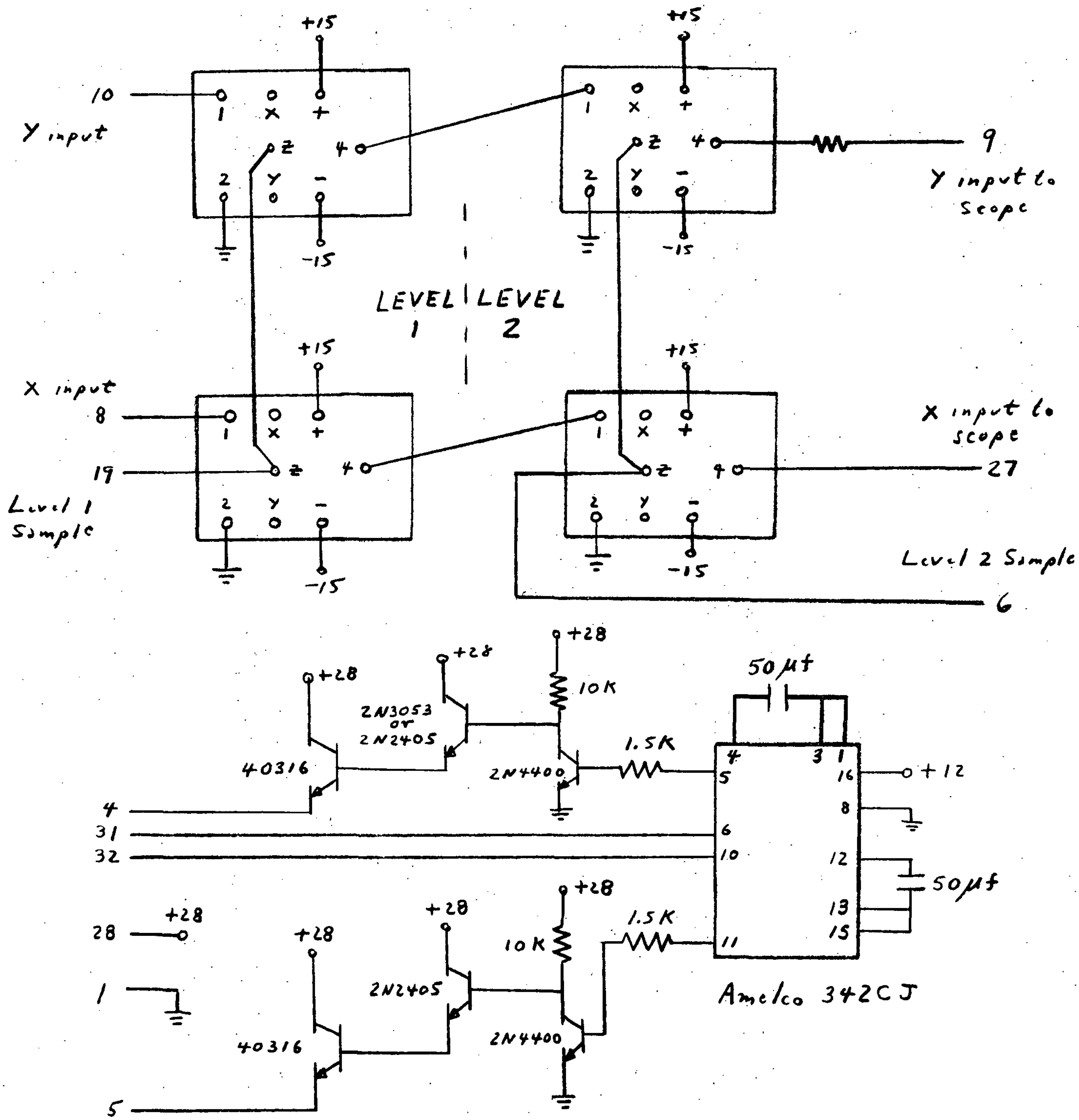
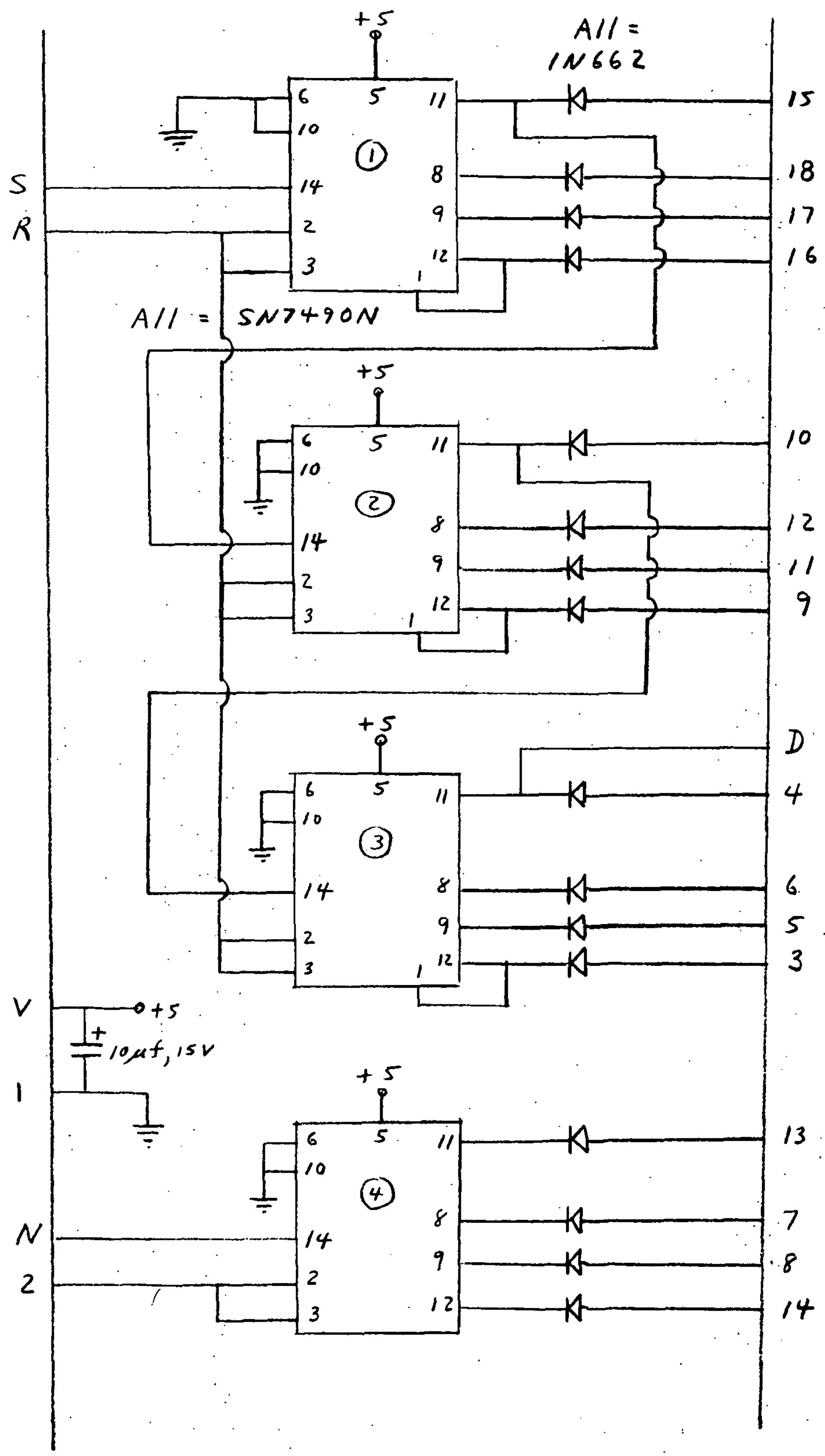

ID CONTROL INTERFACE
SH X2, Y2
Level "2" Sample To J2-12
SH X1, Y1
MOT MC848P
AMELCO 342CJ
F.S. OFF
F.S. ON
TO F.S.
2107
3106
4103
5104
U.S. OFF
U.S. ON
UNIT SCAN
+5
Y CTR INPUT
FSIG 5V PULSE
10pF
10K
+12
2N2222
U RESET
ΔX Reset
ΔY Reset
Y Reset
4.7K
SP384A
SP380A
ΔX SYNC TO ΔY INPUT
ΔX SYNC
ΔY SYNC
SP306A
IDR Pin 1
GEN RESET (ID2-13)
Y RESET SYL Card 2
470Ω
270Ω
120 pF
SYL SG143
U SYNC
ΔX IN 19
ΔY CTR
UNIT SYNC SW +5V when off
PER SYNC
2N4954
1.2K
U PRESET
ΔX PRESET
ΔY PRESET
Y PRESET

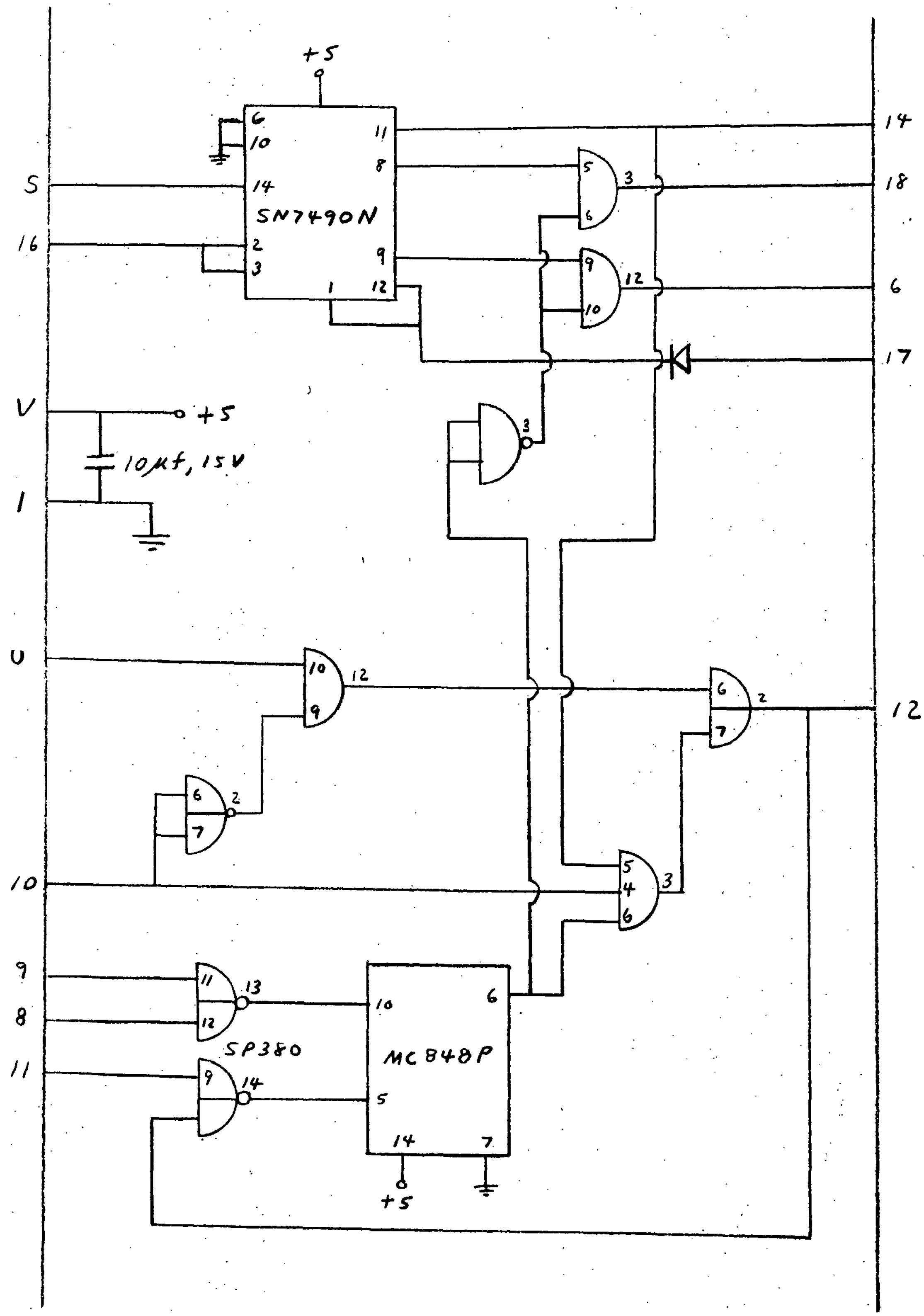
ID Control
Sample/Hold Card J45
(Rear View)



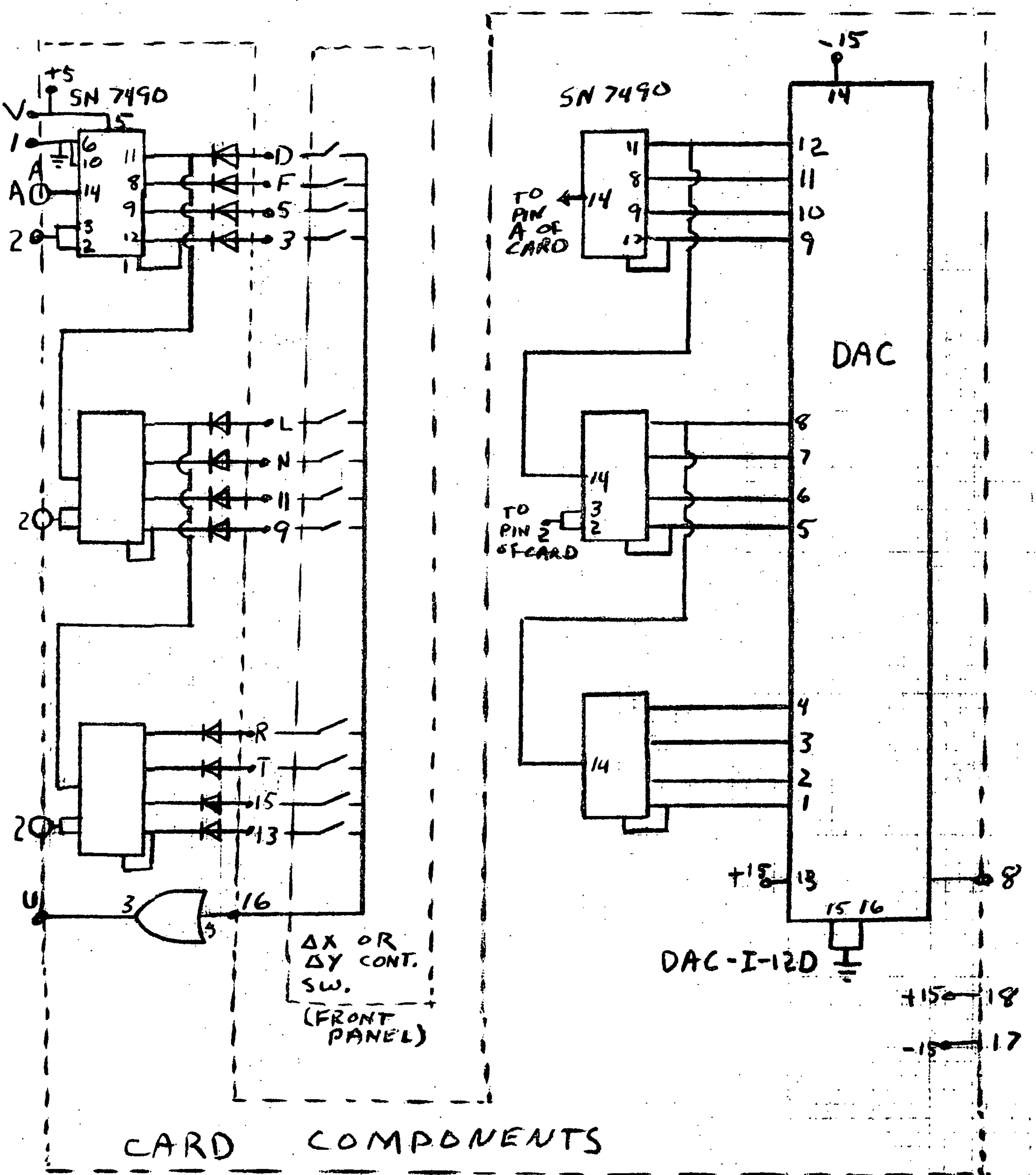
U Count #1
ID Control



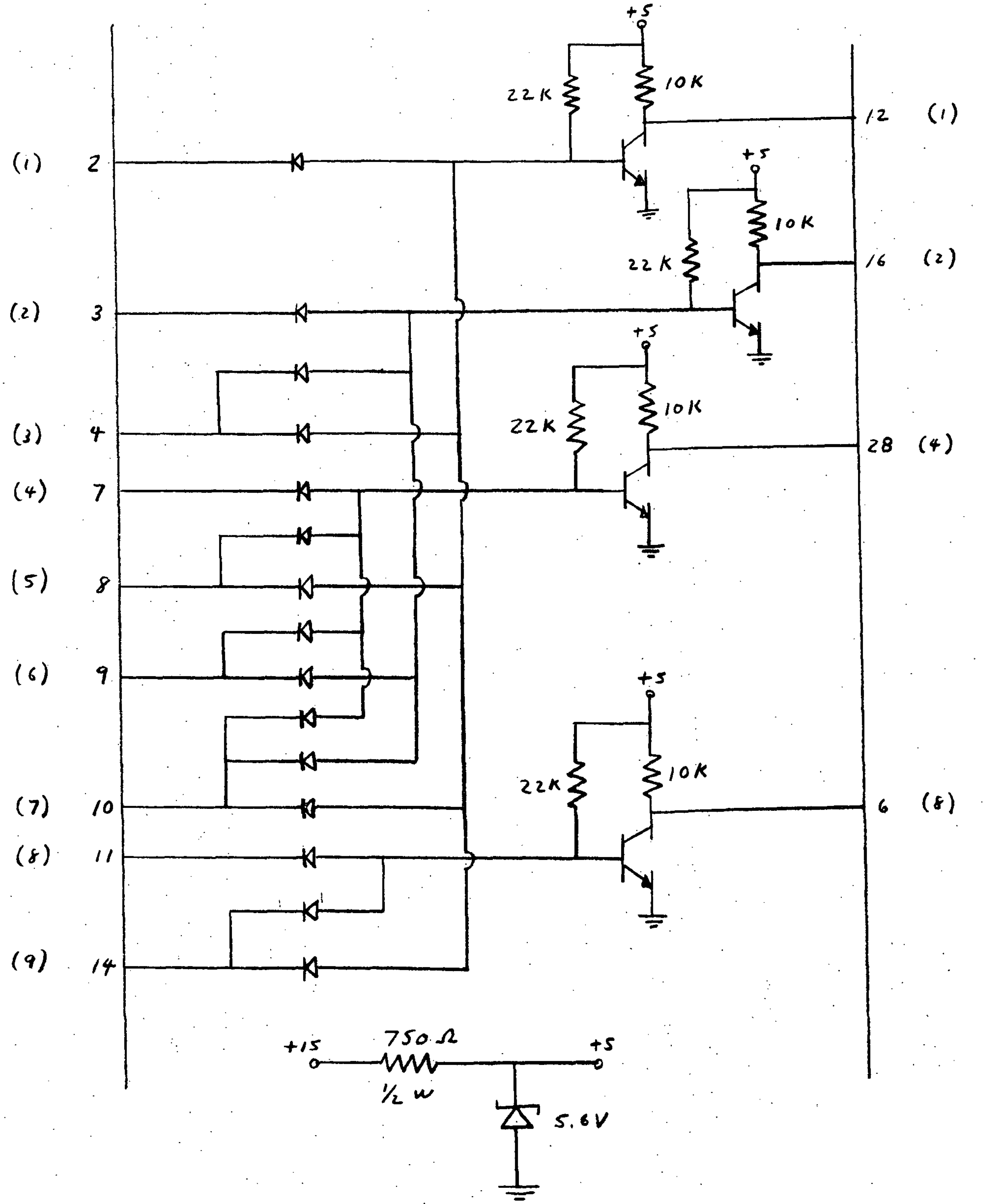
U Count #2
I D Control

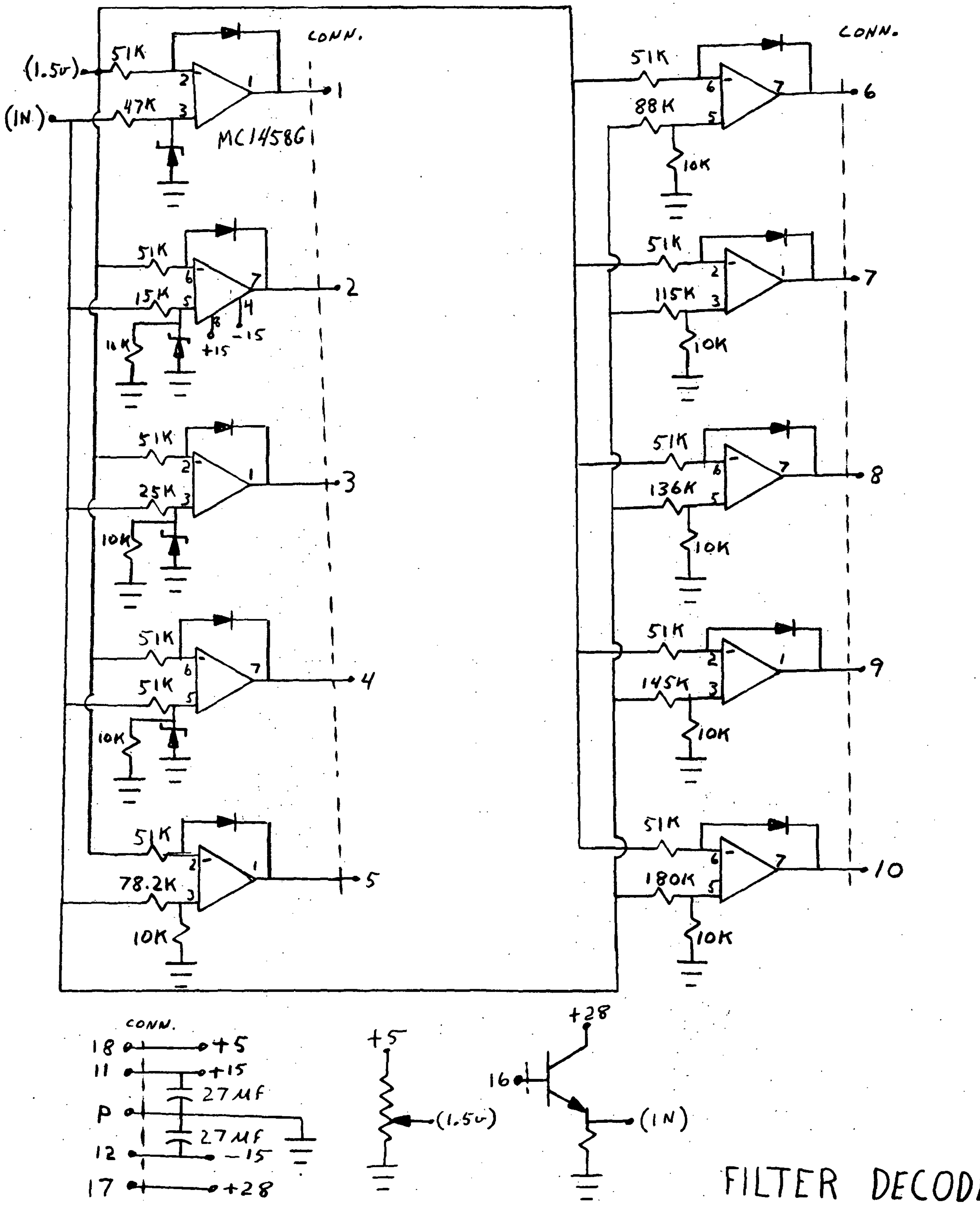


DAC CARDS, ΔX OR ΔY



Z Readout
ID Control

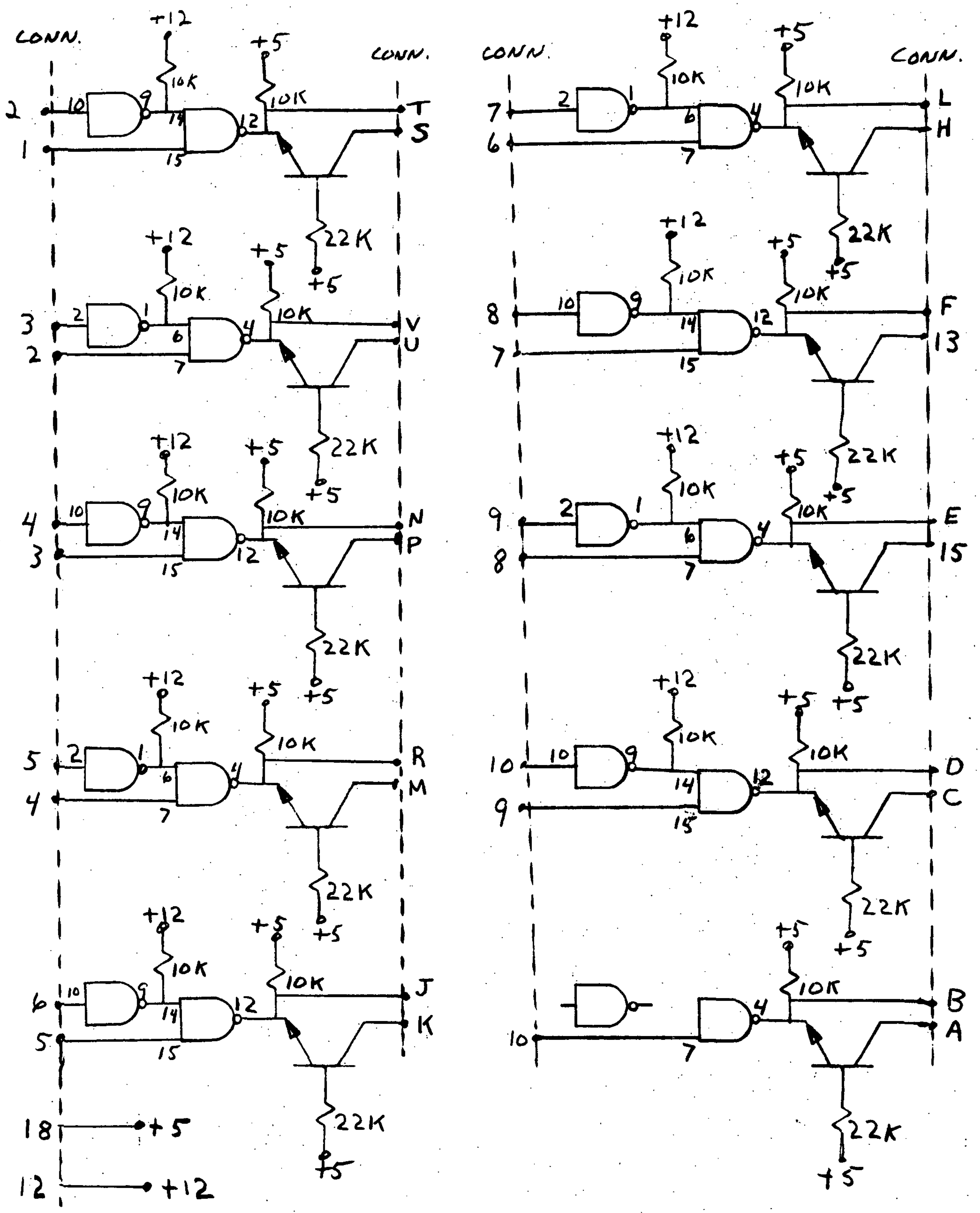




FILTER DECODE
CARD 2A

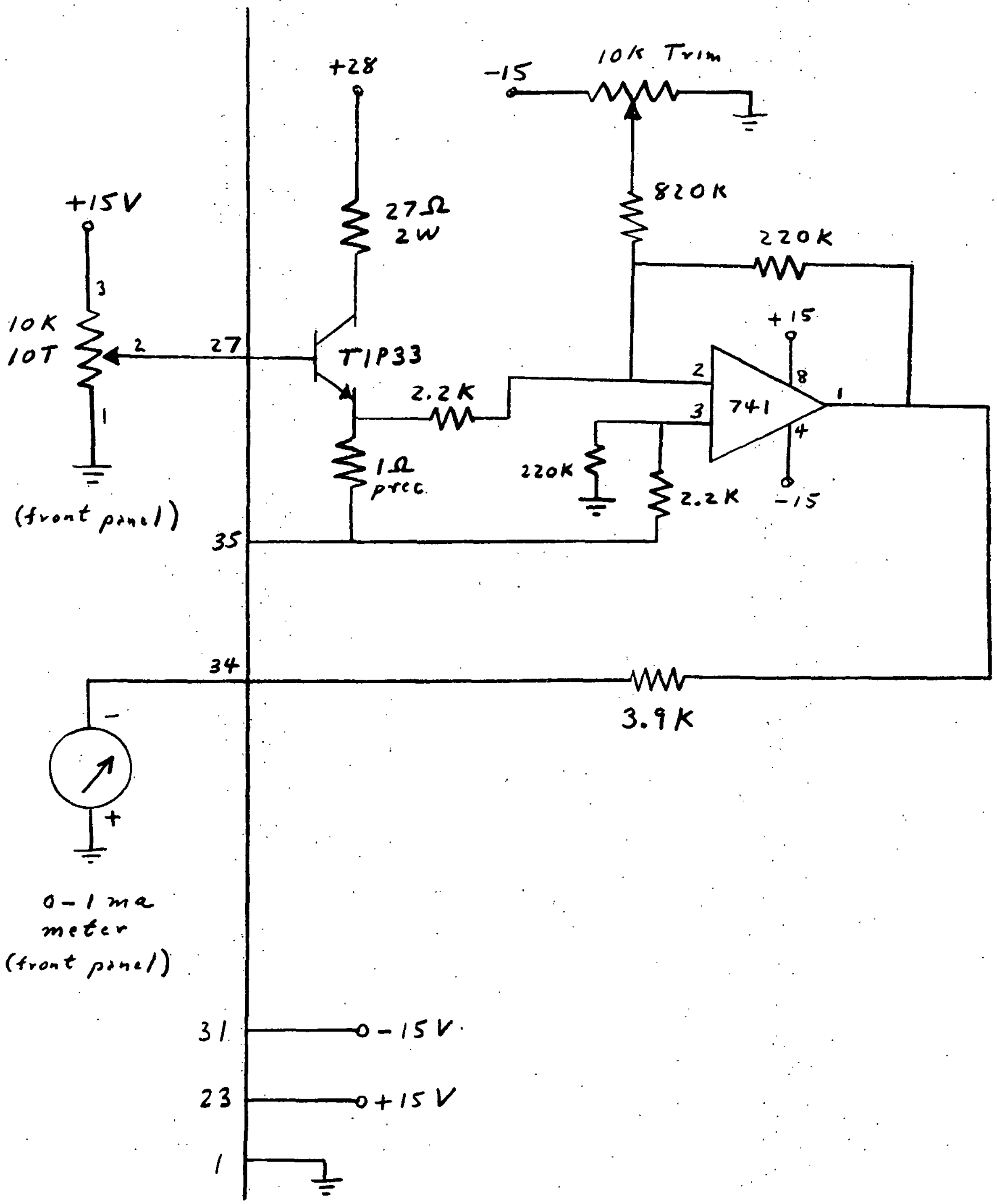
ZENER DIODES 2N5232
FEEDBACK DIODES 2N4001

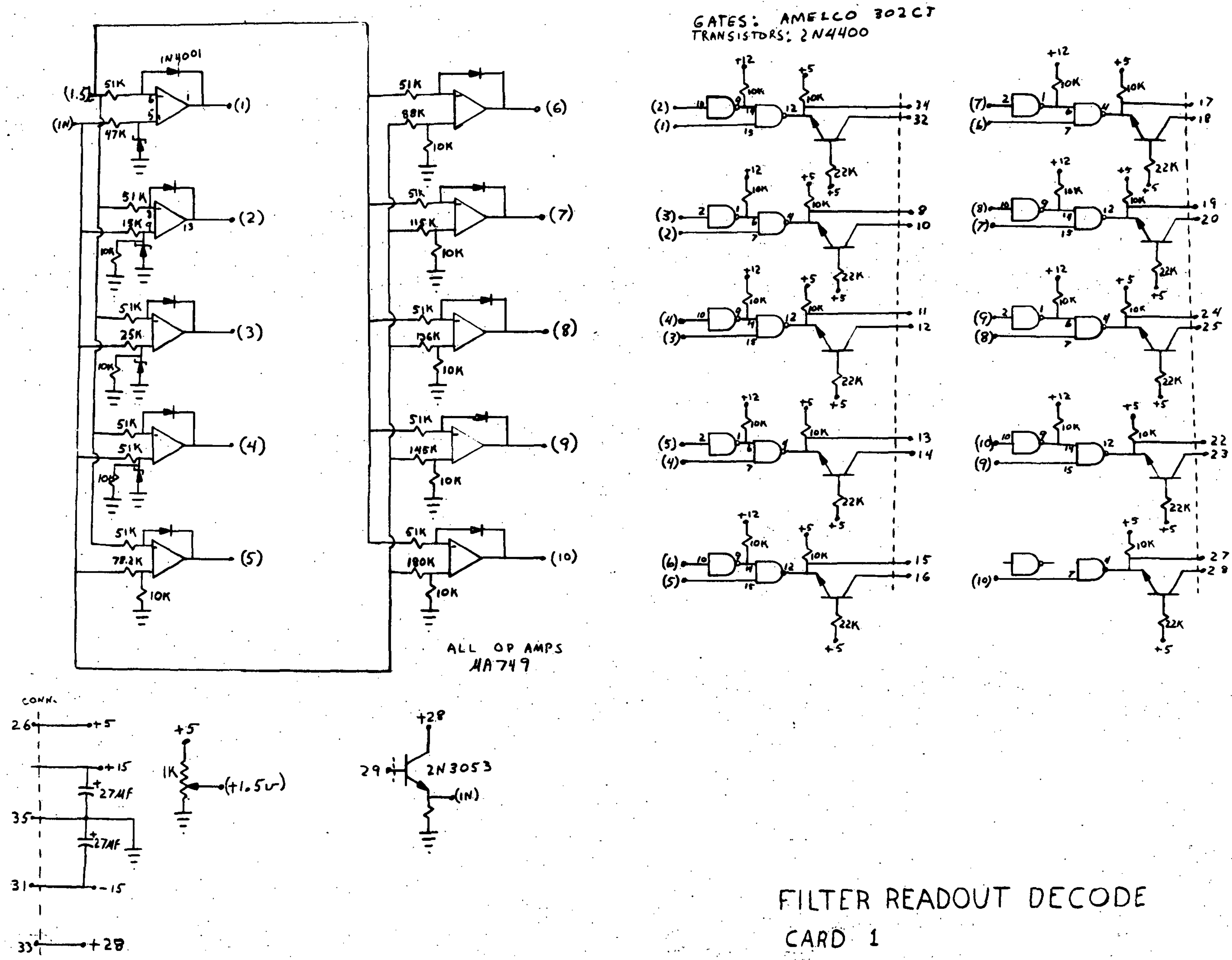
GATES: AMELCO 302CJ
TRANSISTORS: 2N4400



FILTER DECODE
CARD 2B

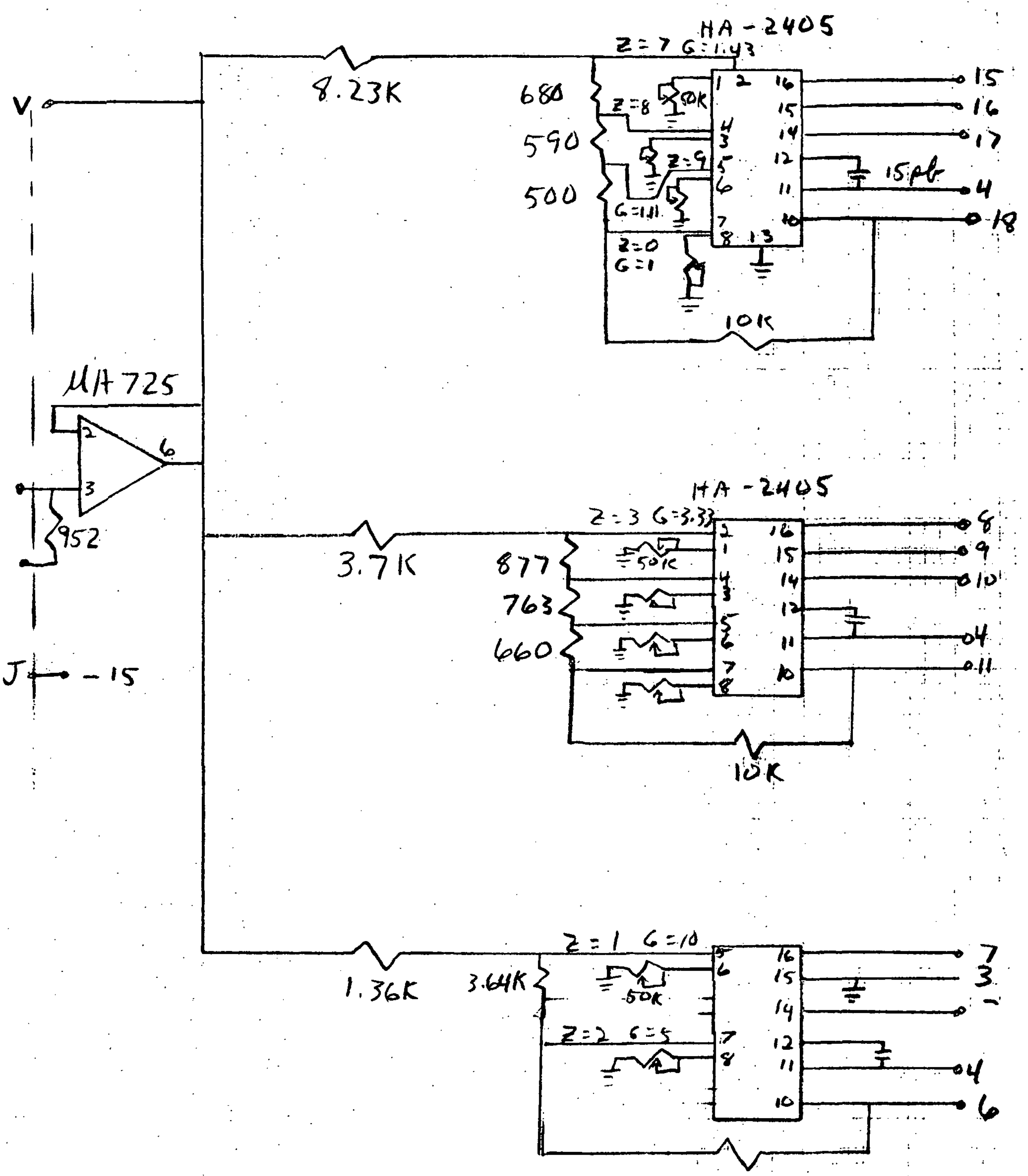
Focus Current Control and Readout ID Control



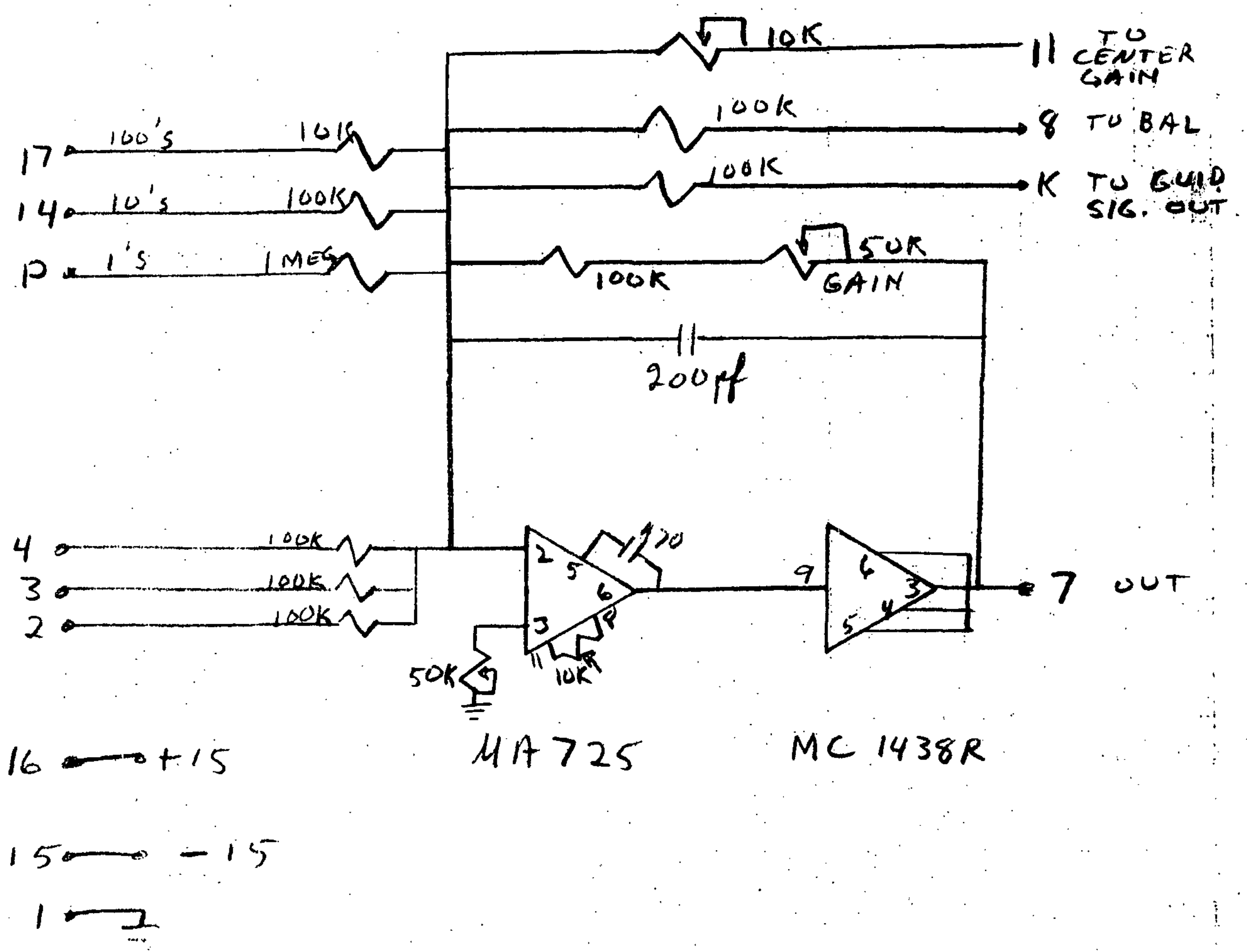


FILTER READOUT DECODE
CARD 1

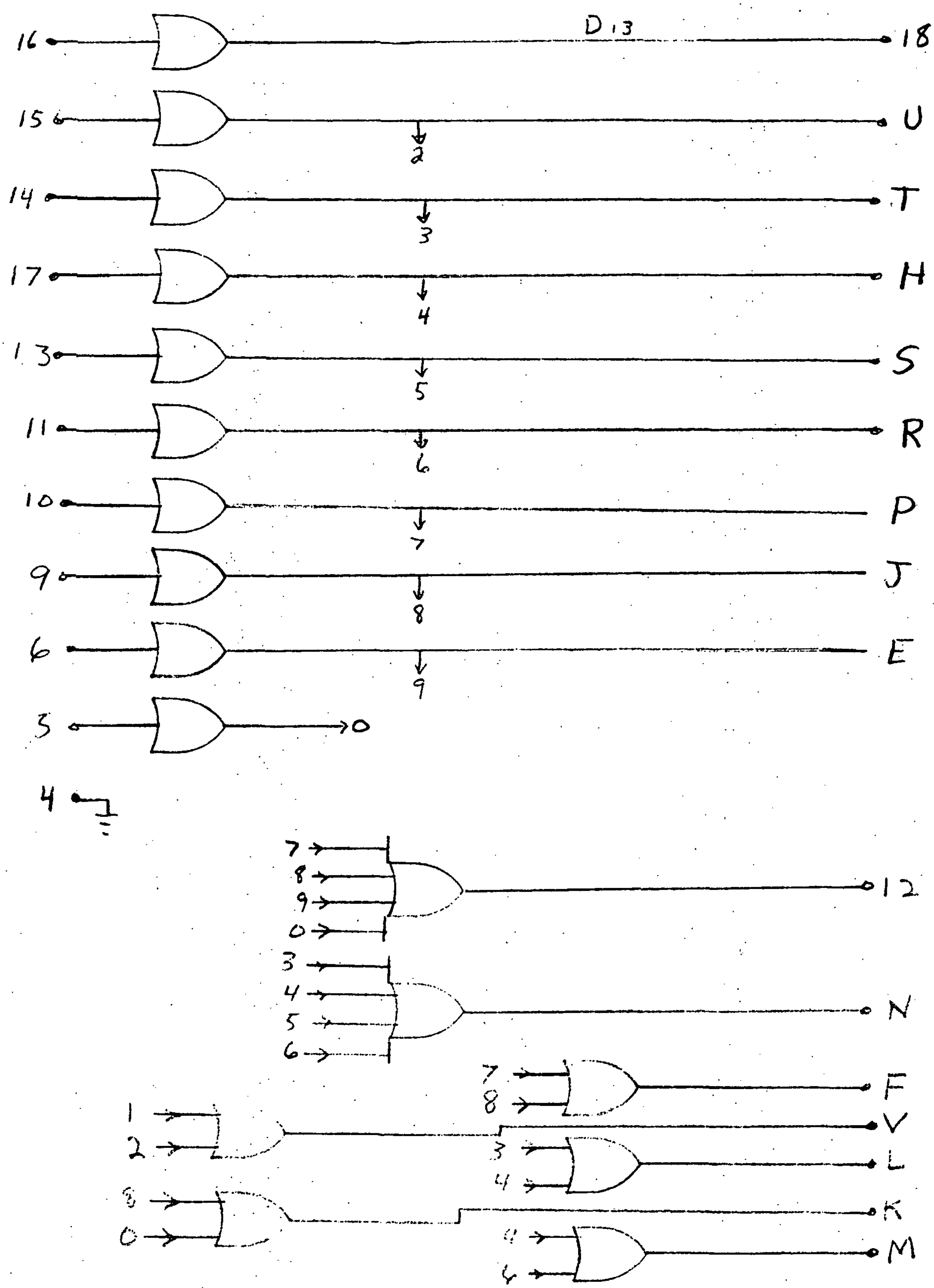
Z AMPLIFIER CARDS



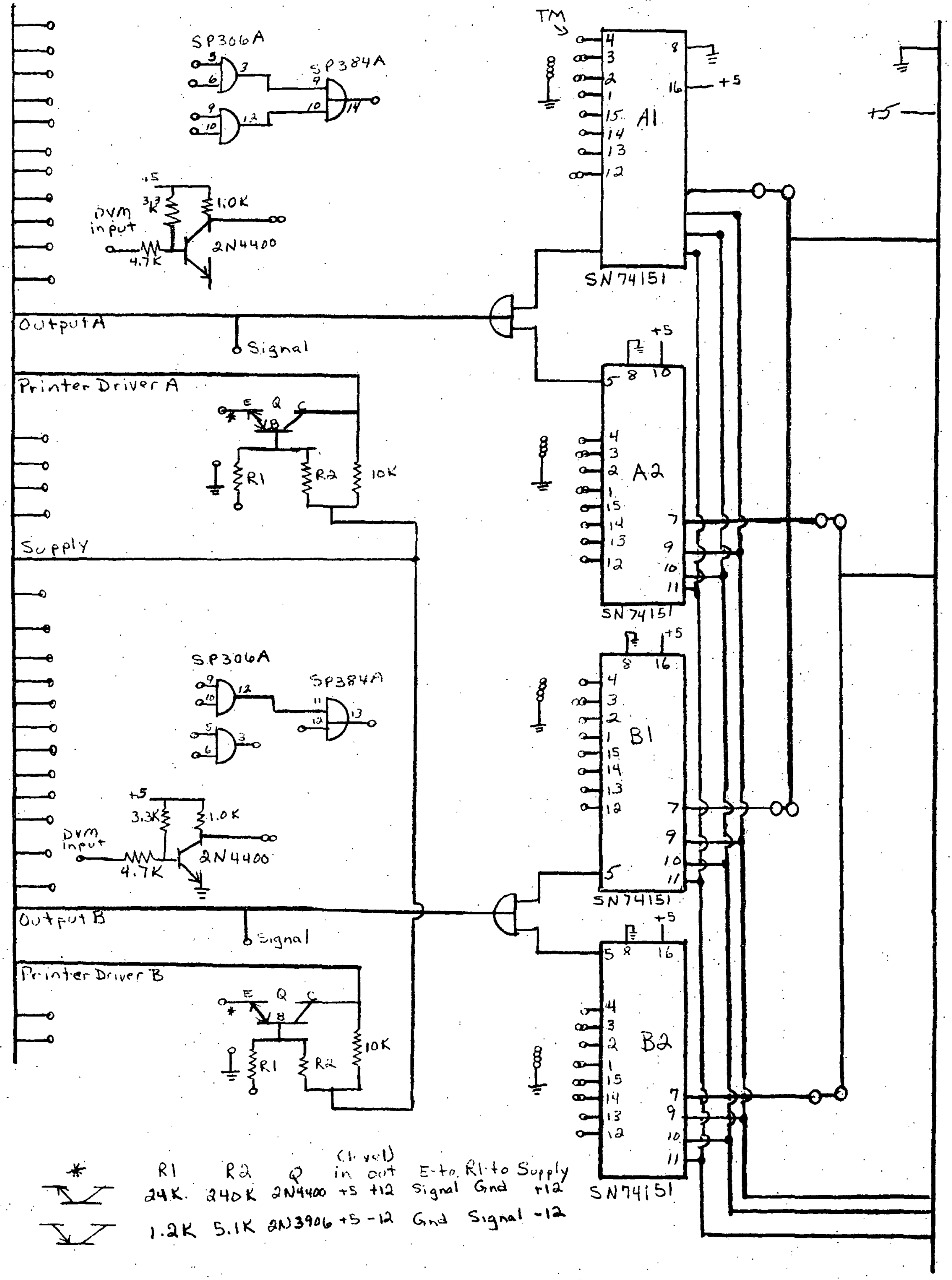
DRIVER AMP, X OR Y



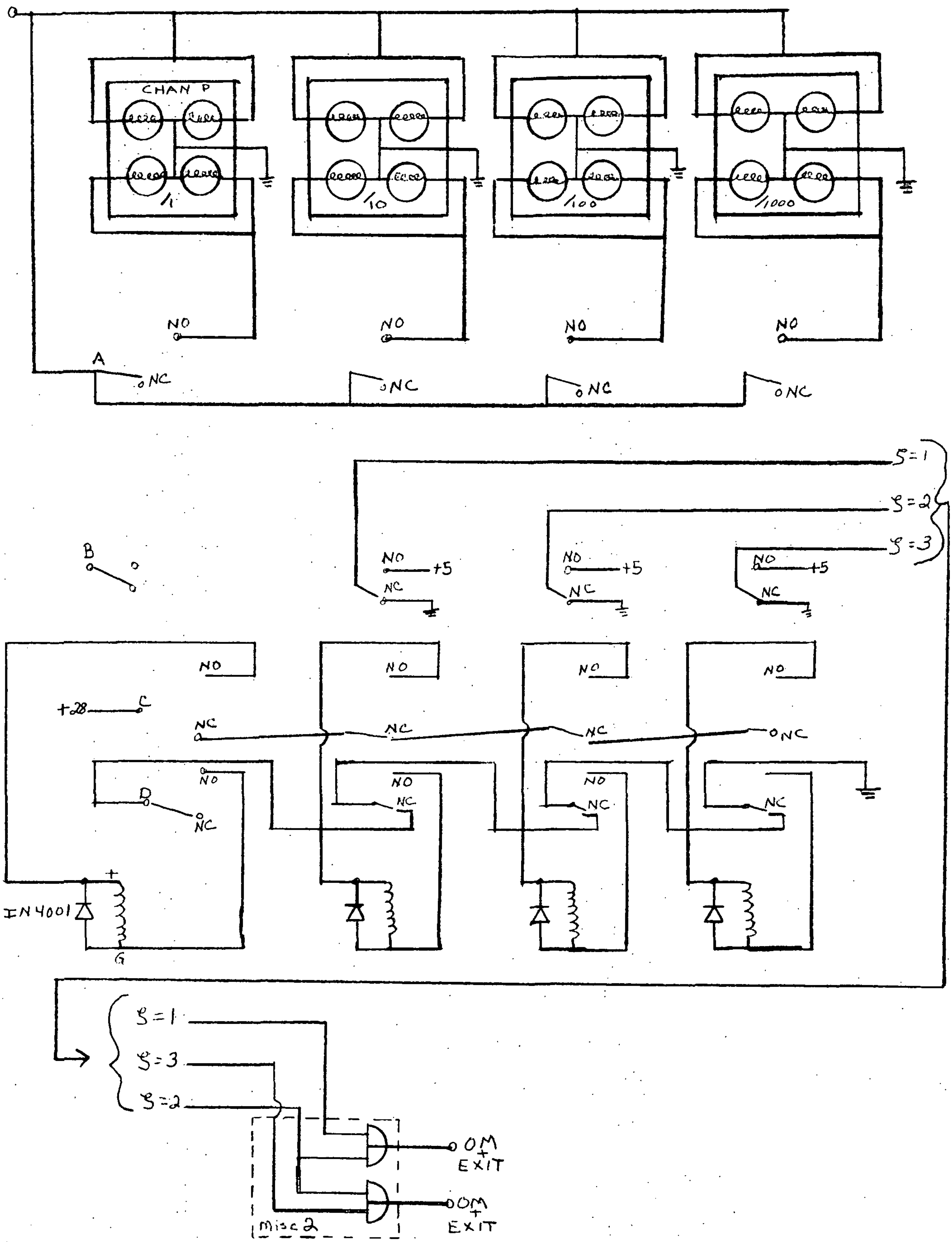
Z DECODE CARD



Data Output Multiplexer



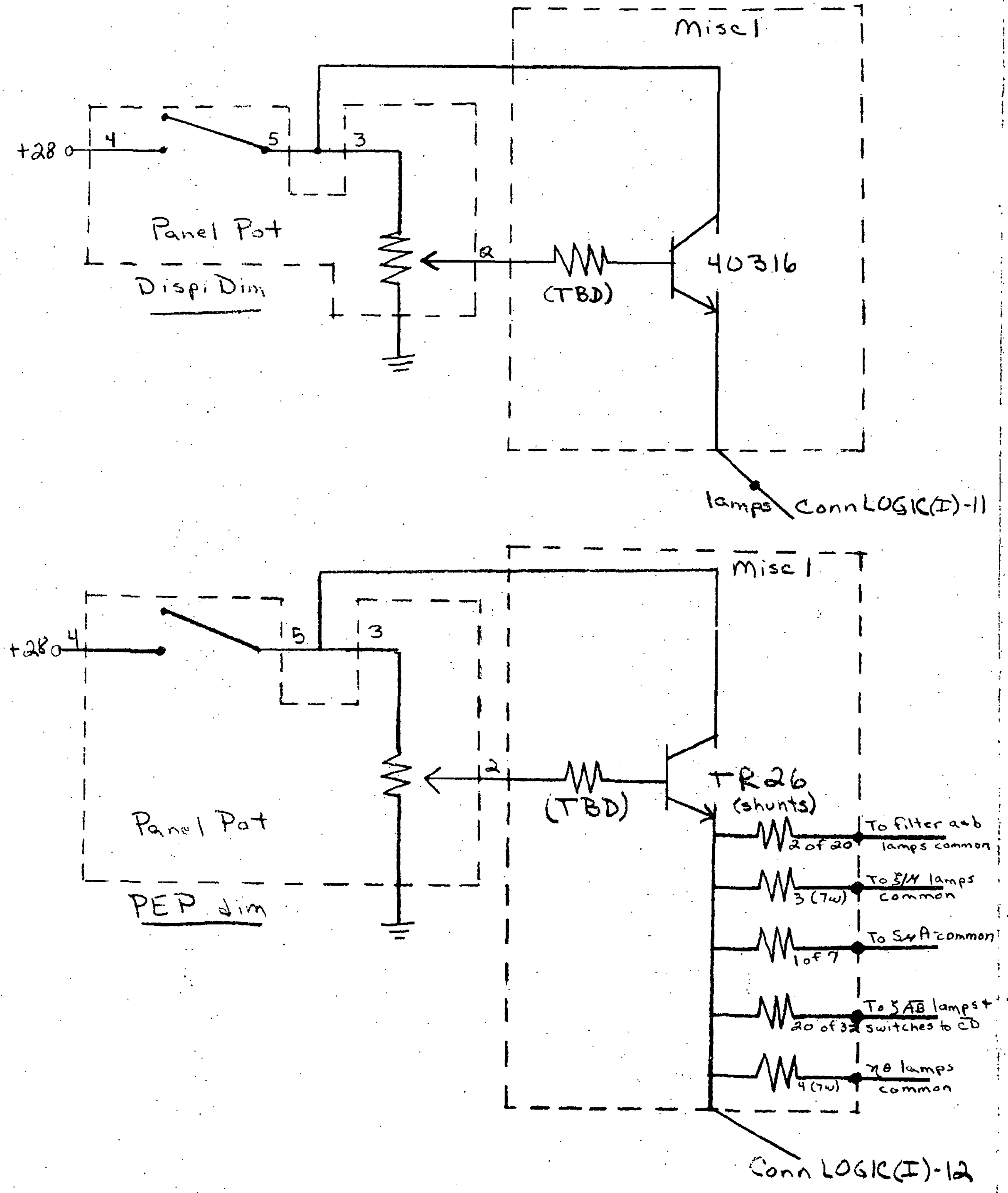
ς switch system (Identical for A+B)
DATA (B NO LONGER USED)



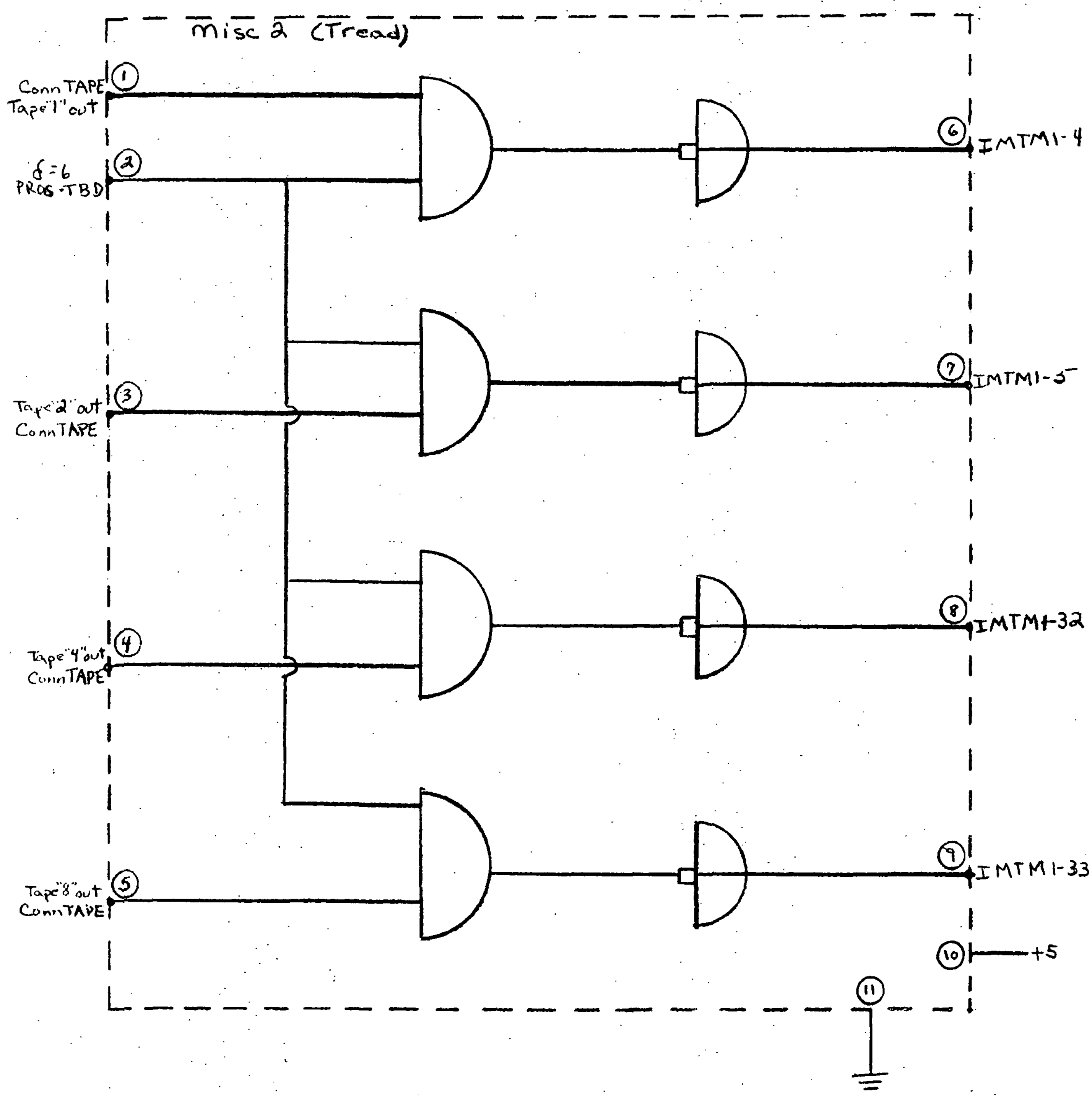
Note #1 Invalid Code + Cycle lamps interchanged

Dimmer CKt (Board Misc 1)

DATA

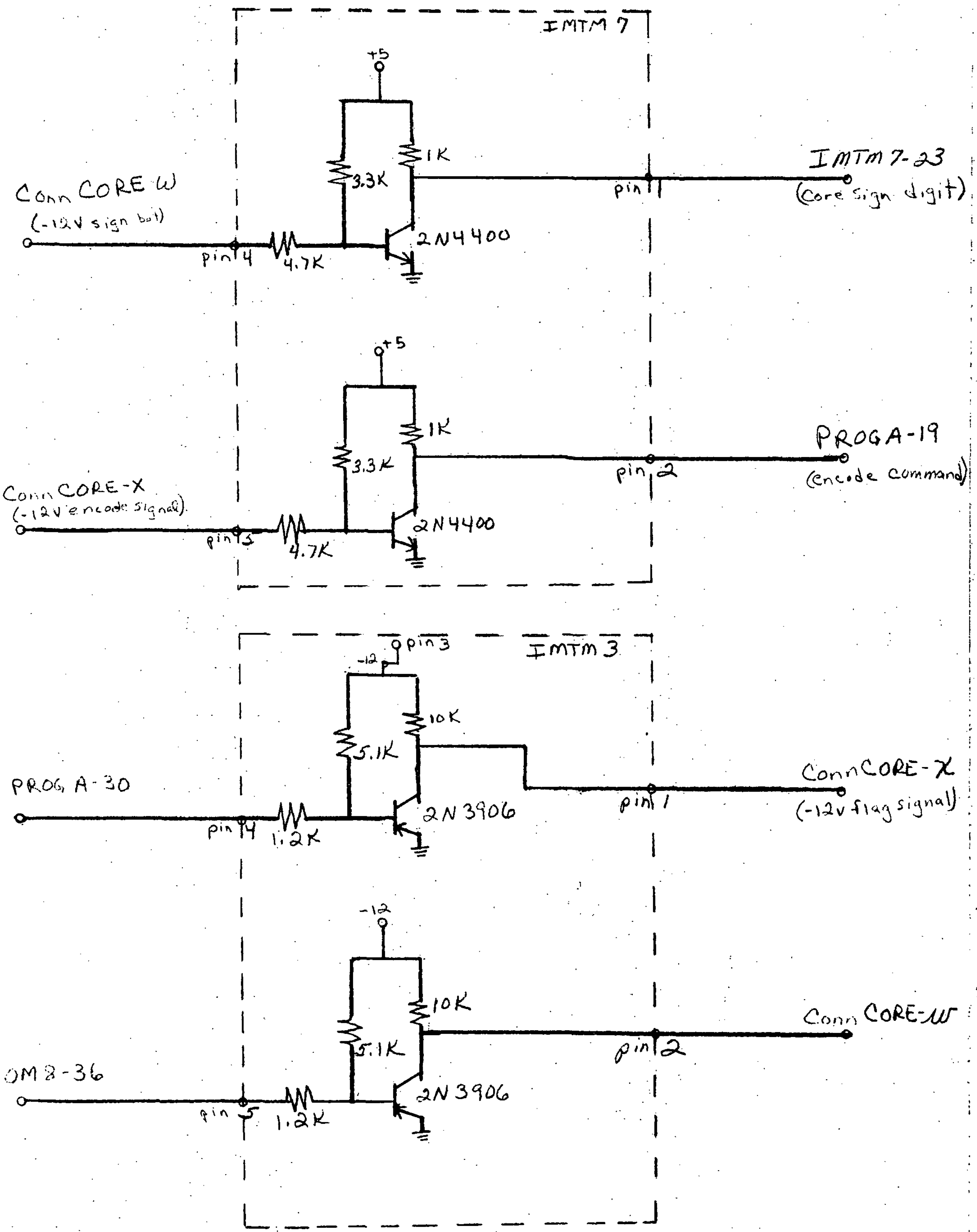


Tape Read Gate
DATA



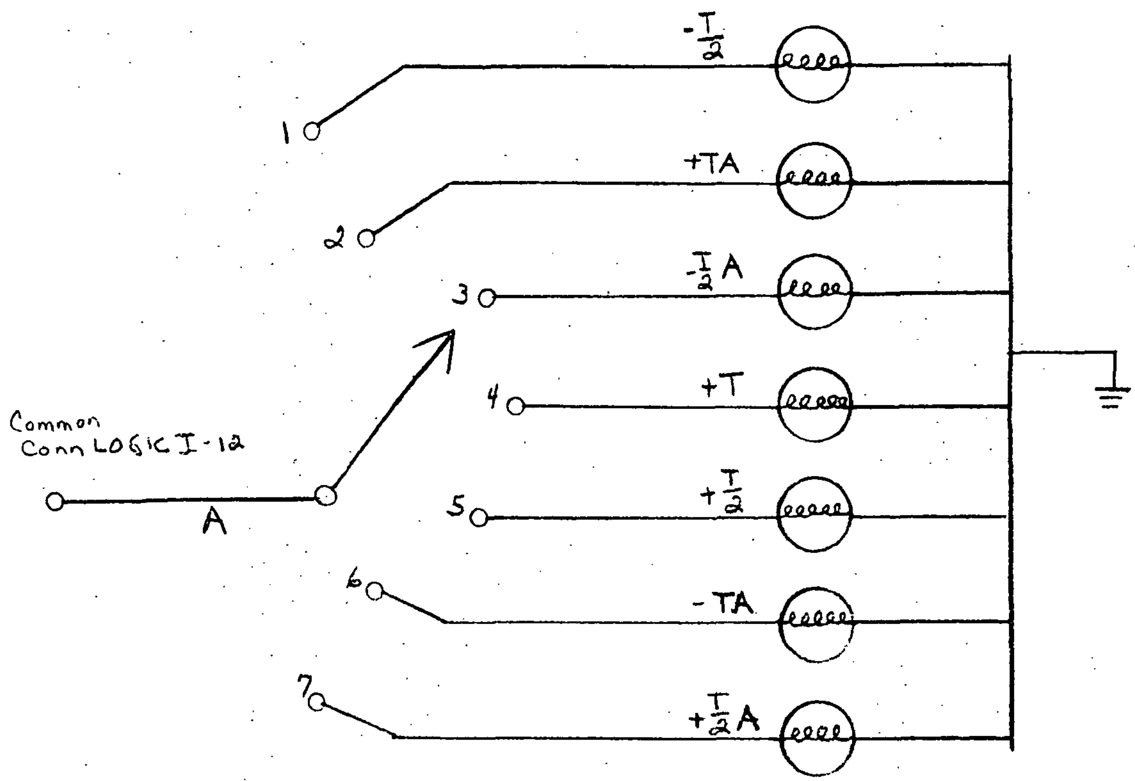
Level Conversion of Computer Signals not on BCD/BIN bds

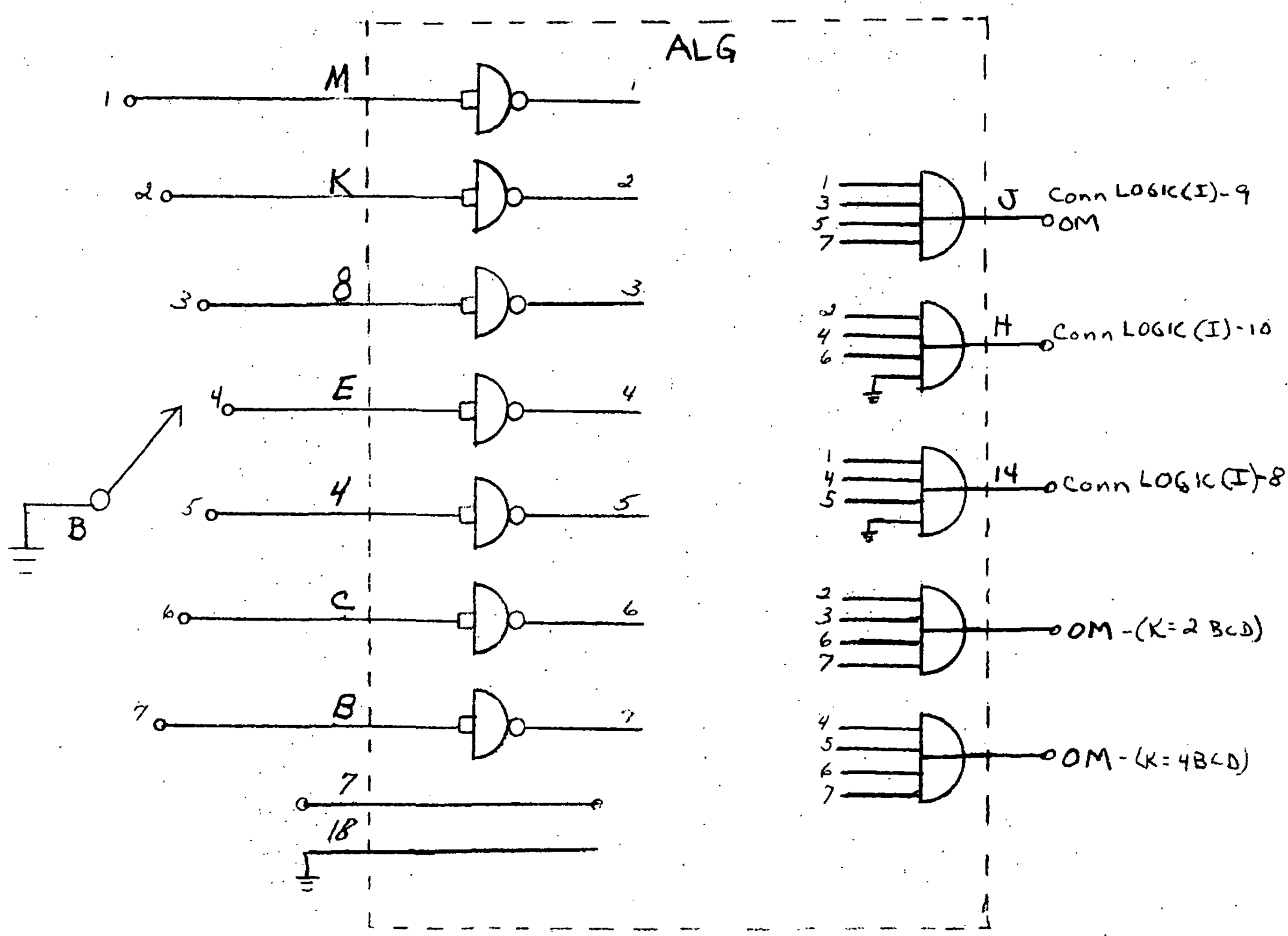
DATA



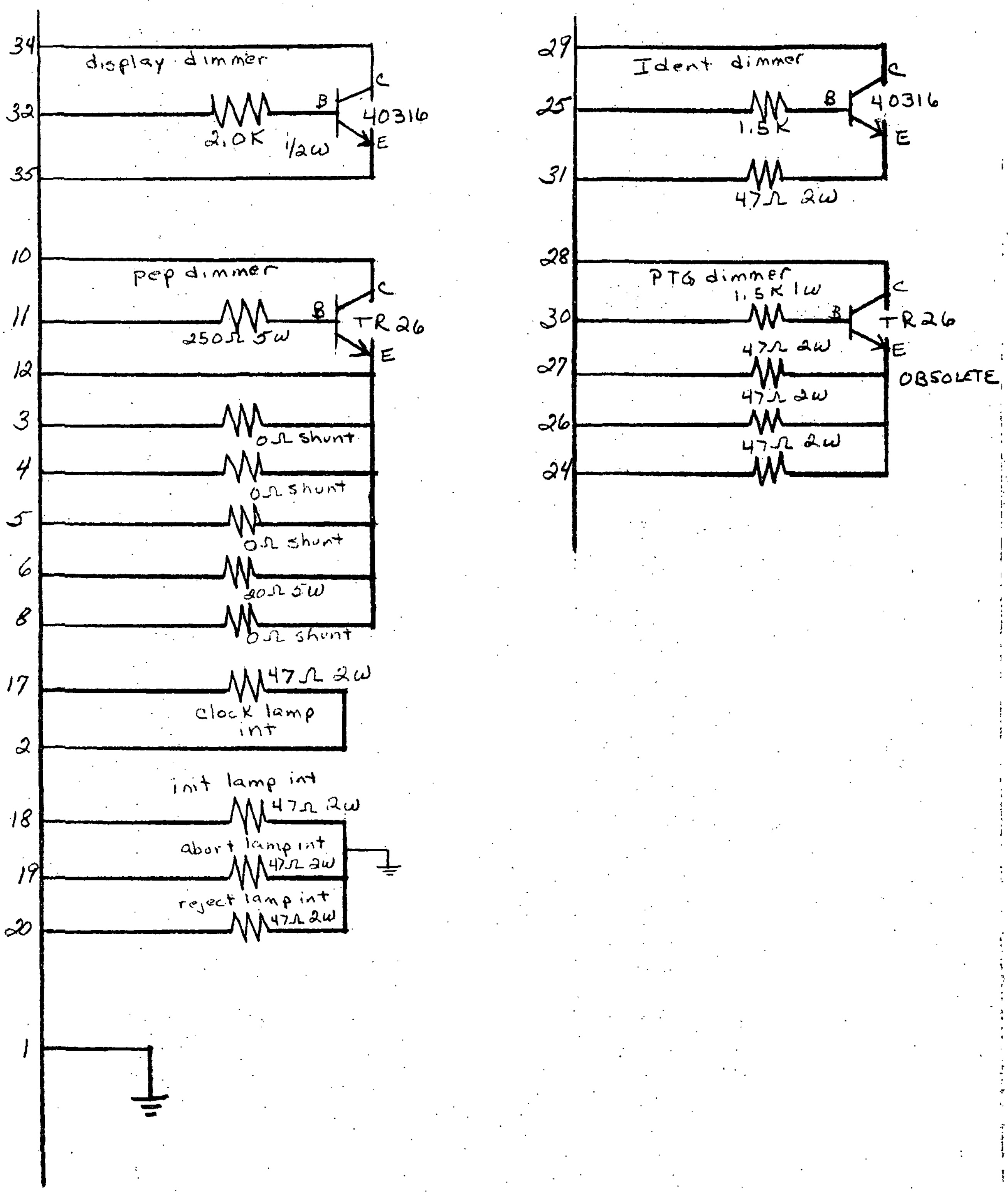
Data Panel Switches

ALGEBRA (K)

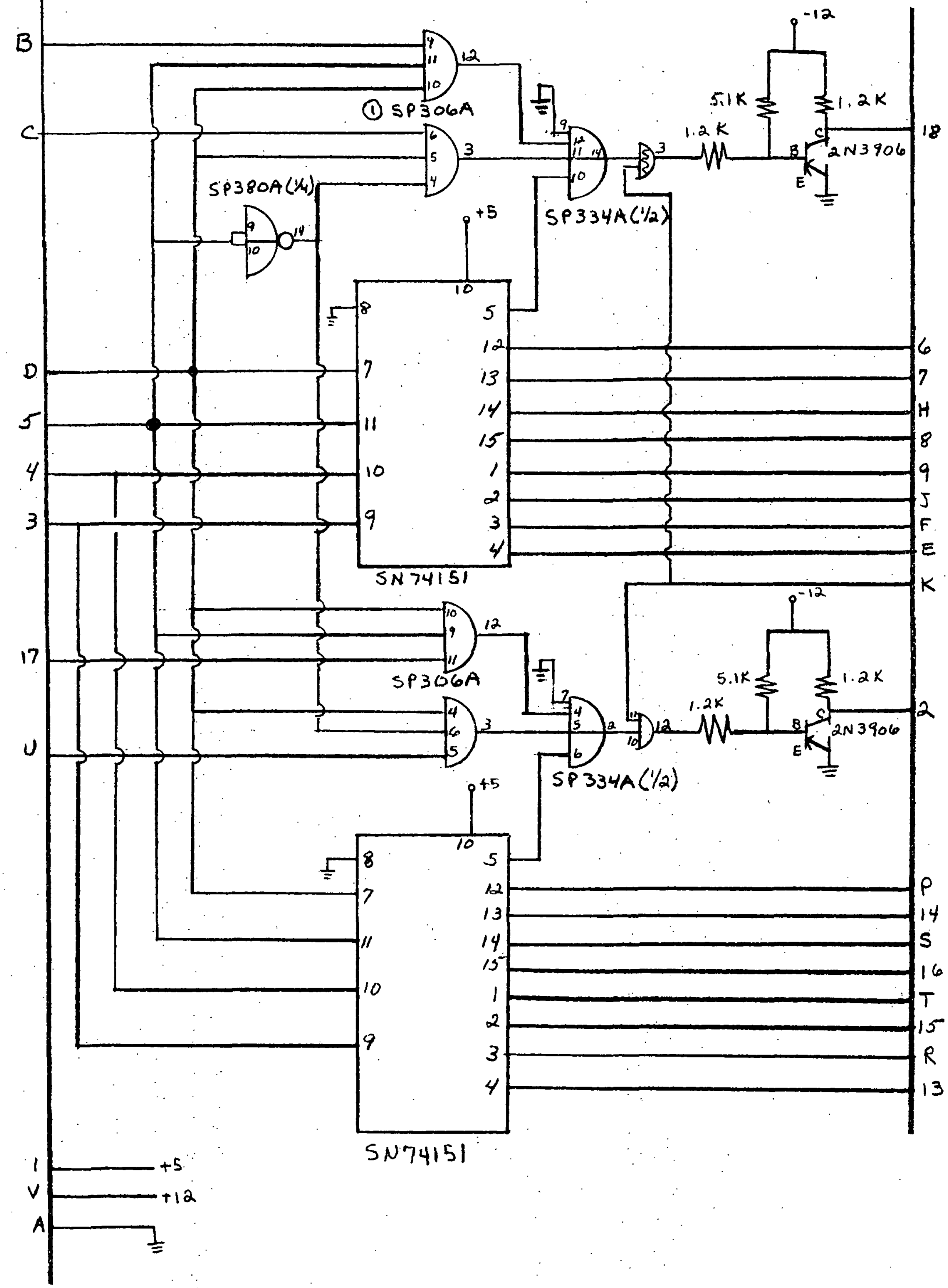




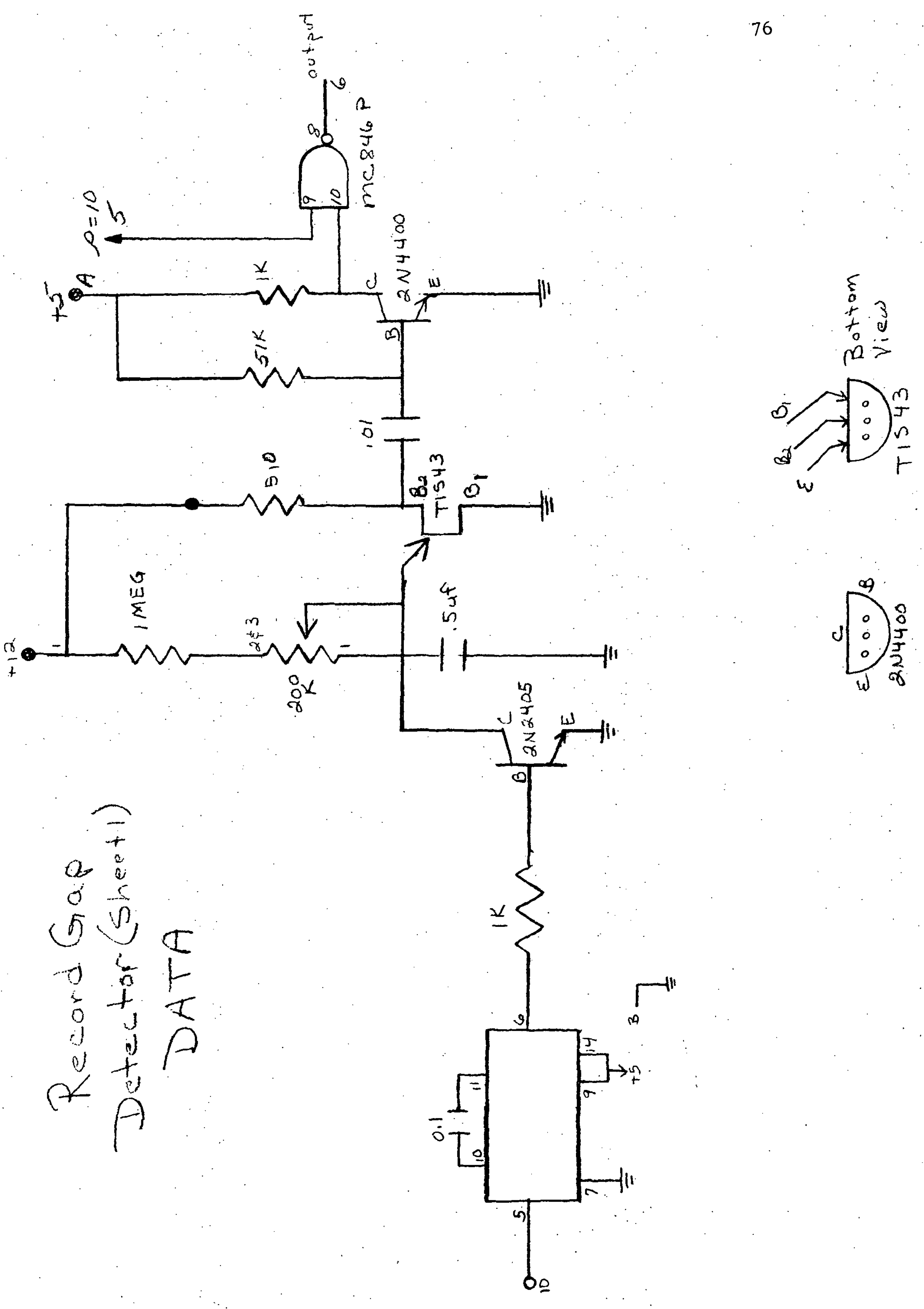
Misc I Board Data



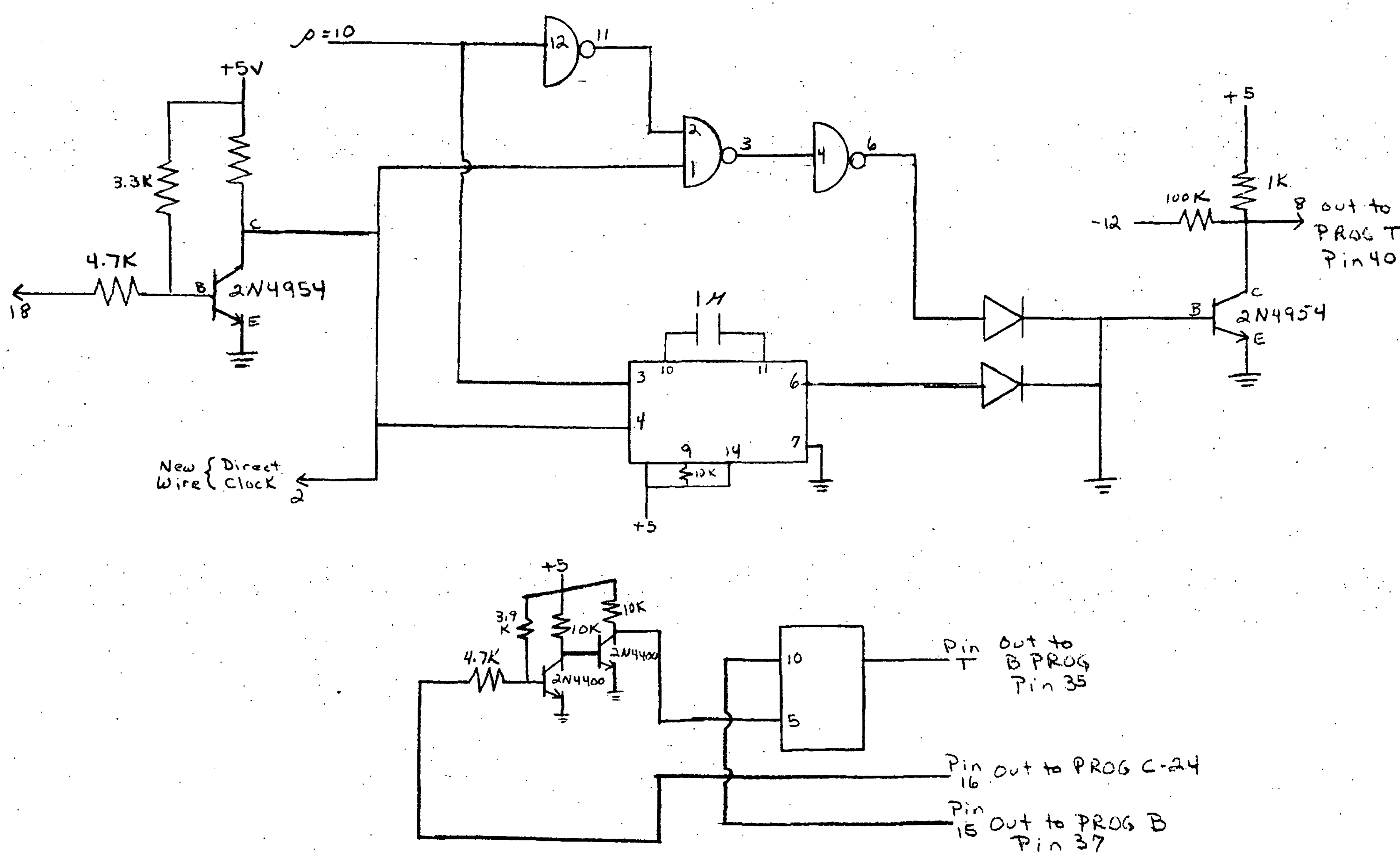
Write Tape Multiplexer/Driver
TSR12/TSR48
DATA



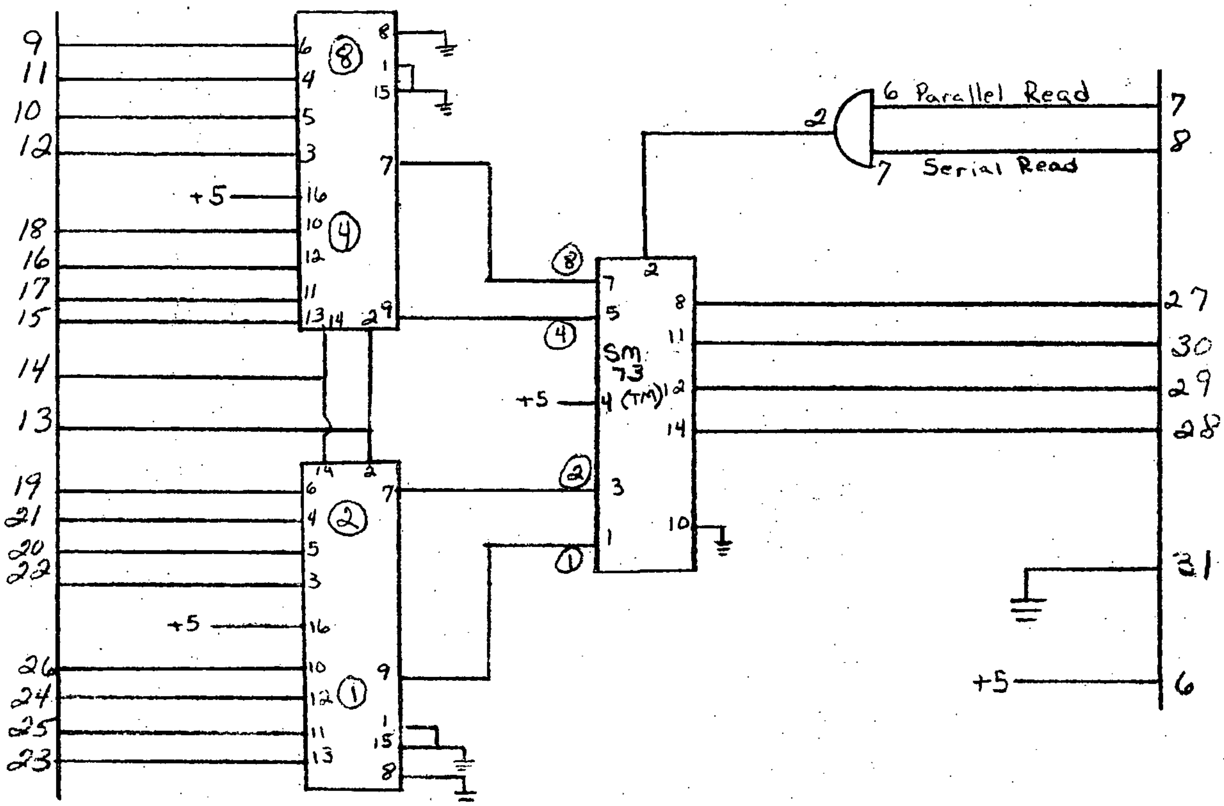
Record Gap Detector (Sheet 1)
DATA

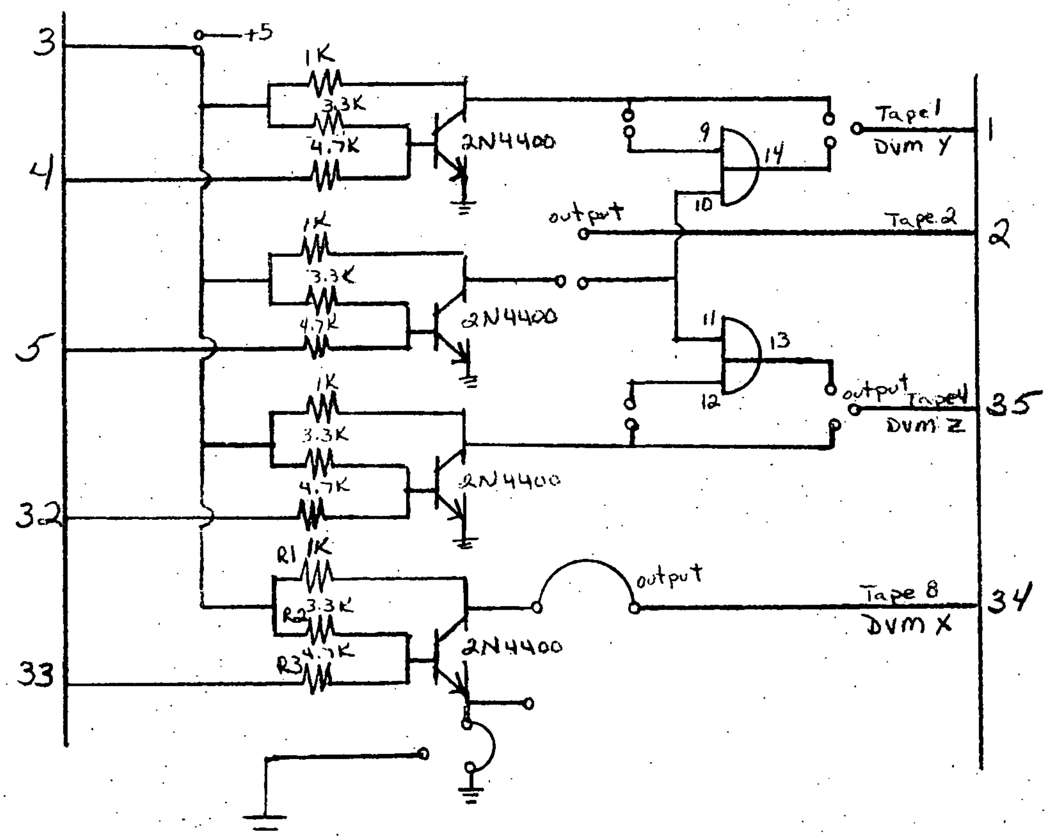


Record Gap Detector (Sheet 2)
DATA



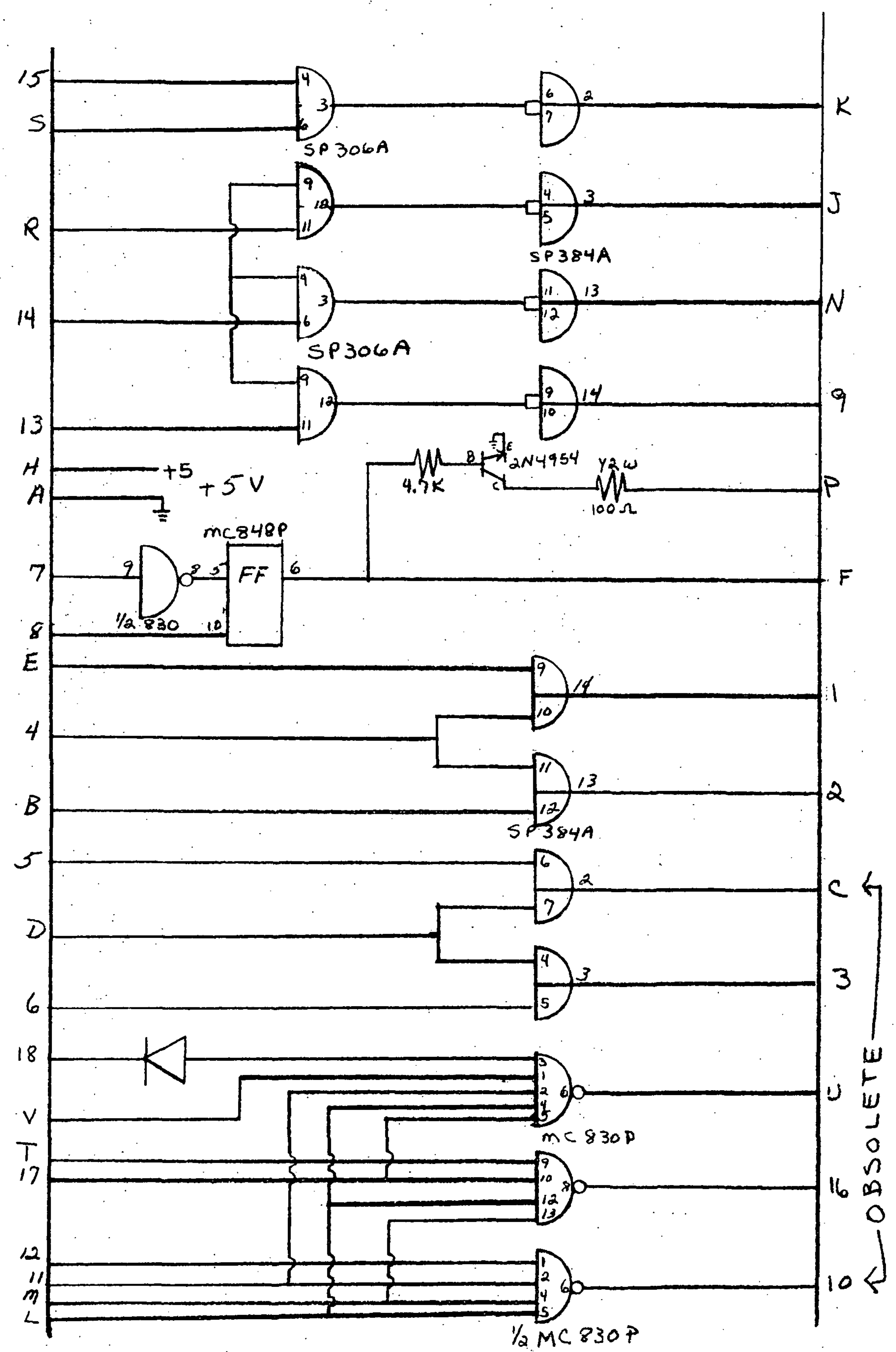
Data Input Multiplexer and Transfer Memory



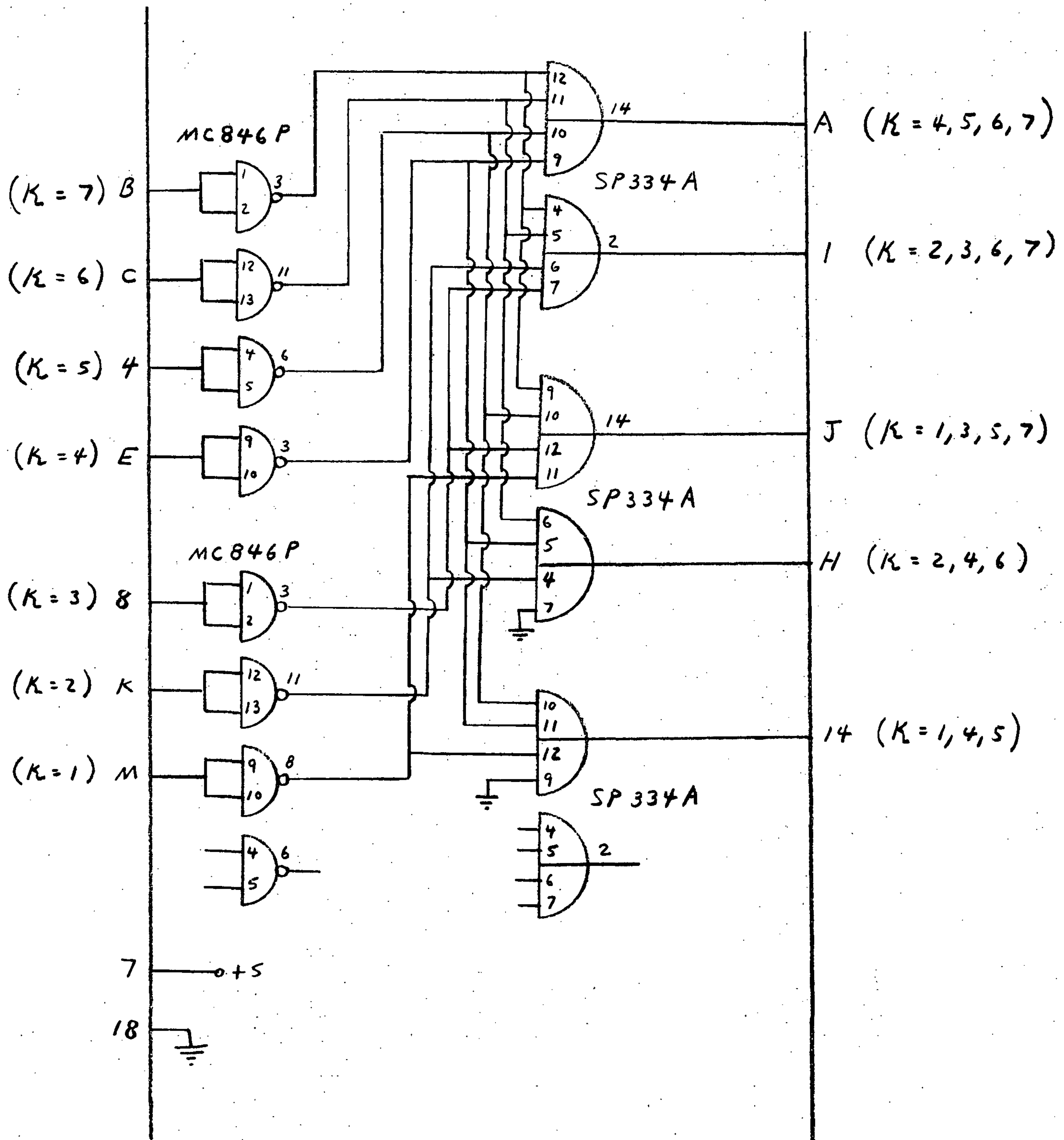


Misc 2 Board Data

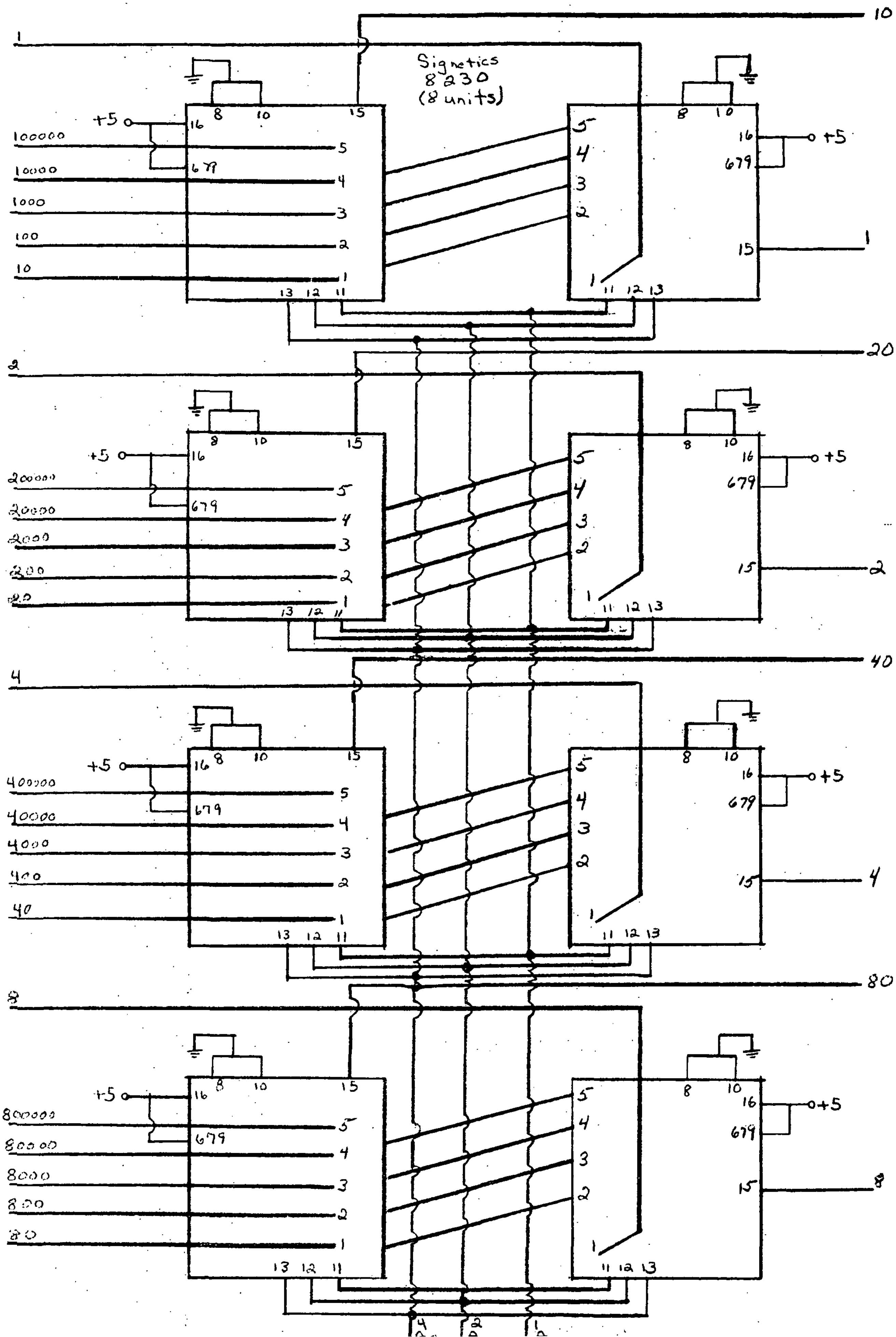
(Tread, 36-pin)

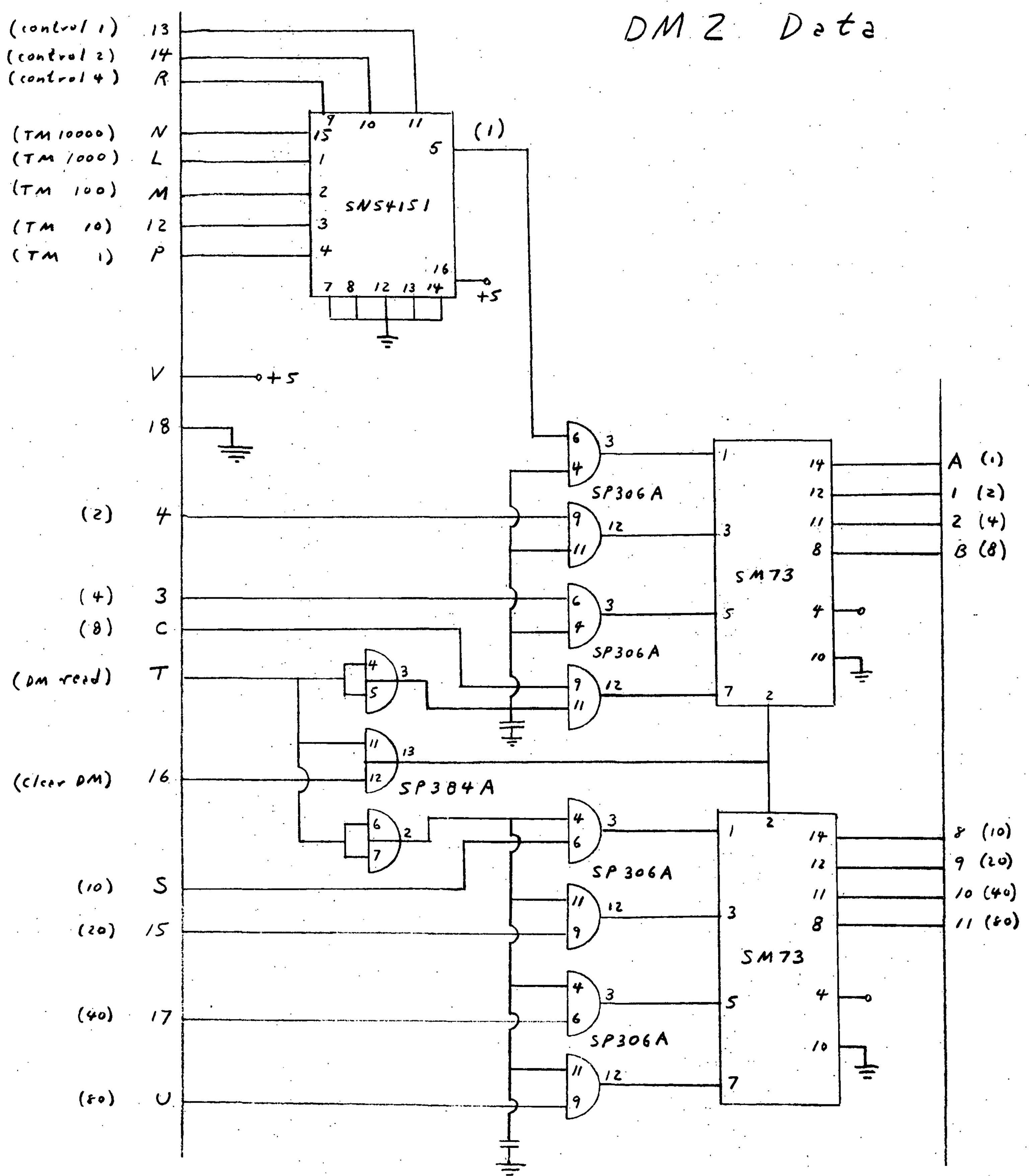


ALG Card
Data

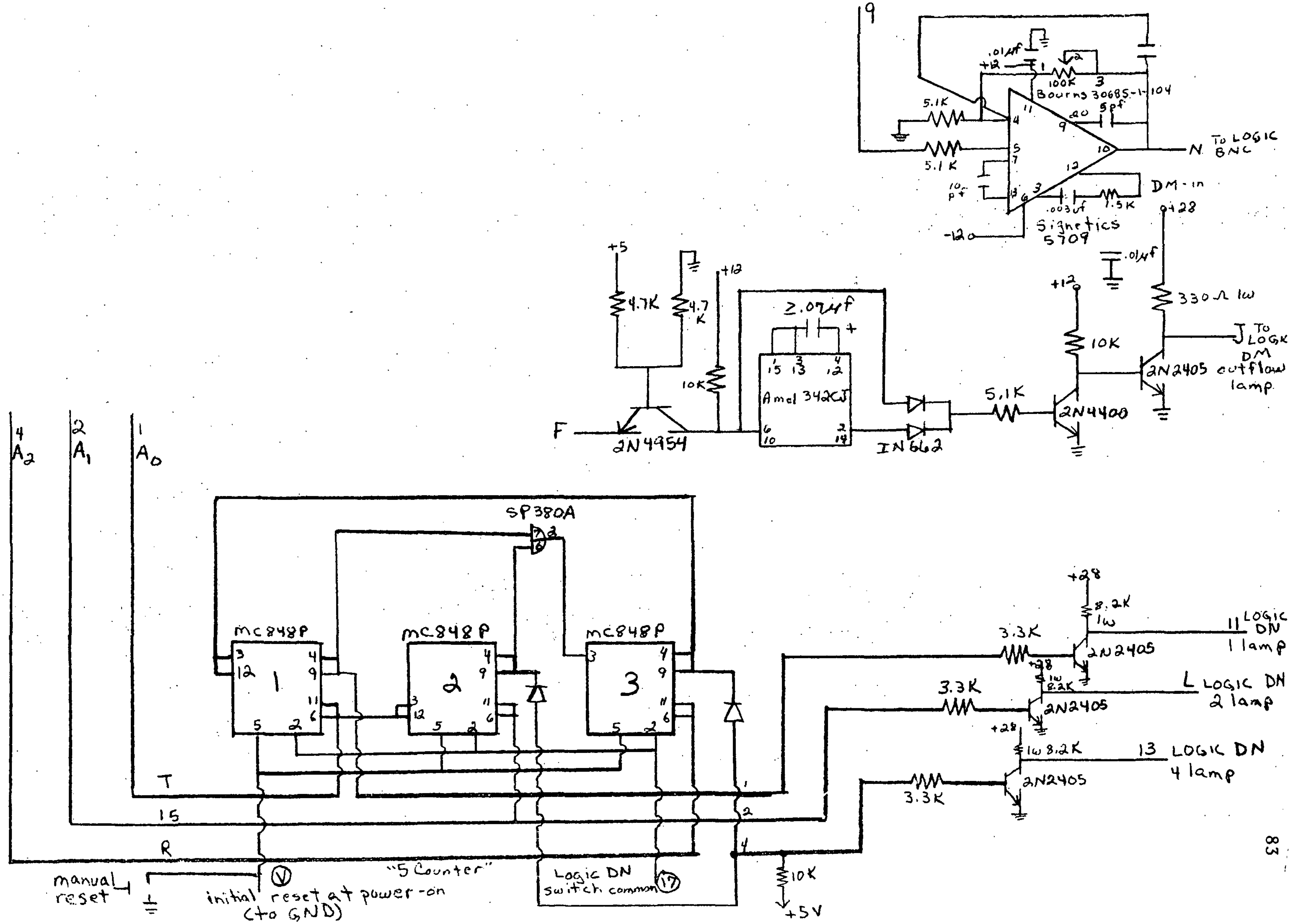


DM1 Board


Signetics 8230 (8 units)
1
2
4
8
10
20
40
80
+5
100000
10000
1000
100
10
200000
20000
2000
200
20
400000
40000
4000
400
40
800000
80000
8000
800
80
16
679
15

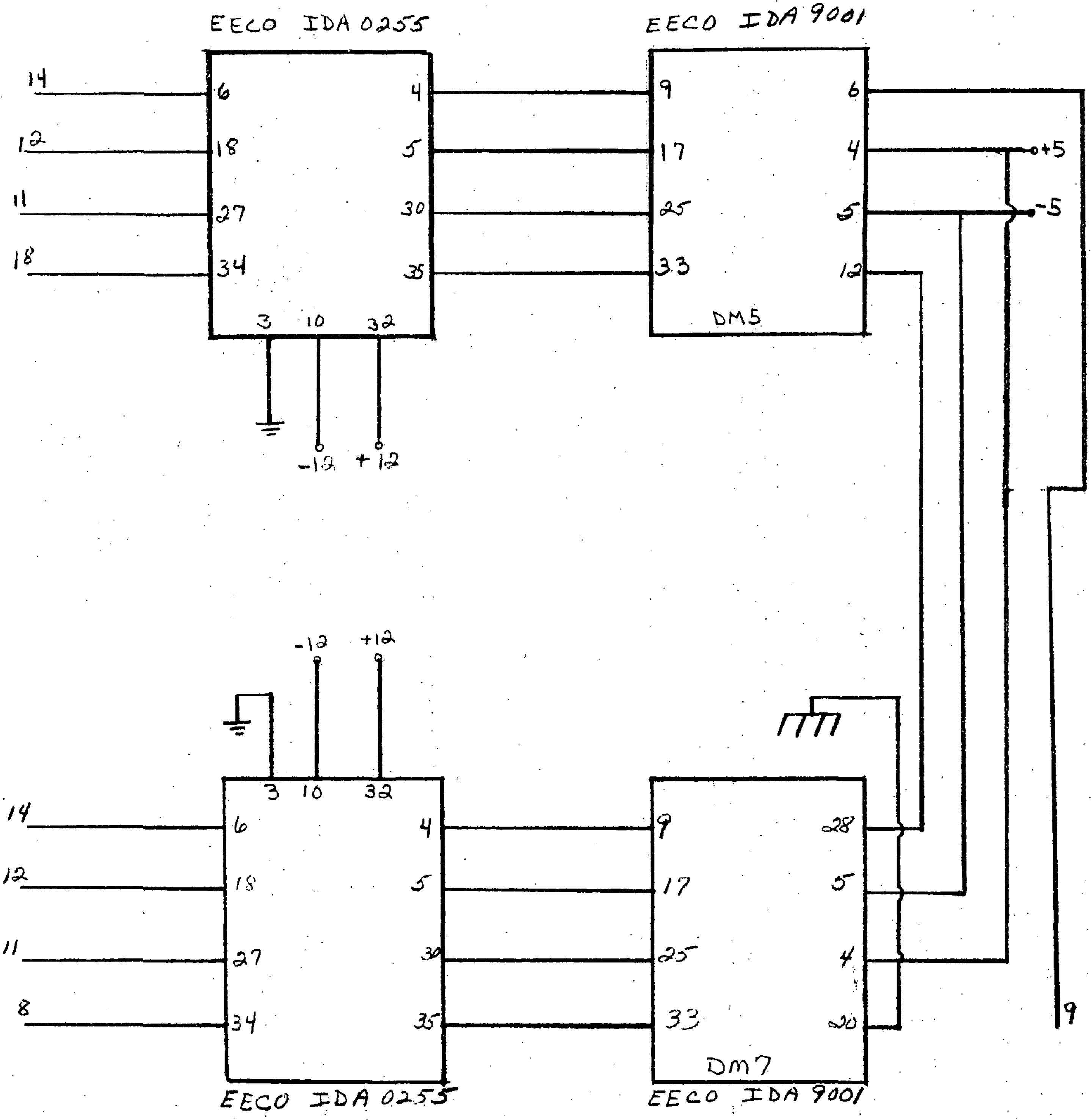

DM 2 Data
(control 1) 13
(control 2) 14
(control 4) R
(TM 10000) N
(TM 1000) L
(TM 100) M
(TM 10) 12
(TM 1) P
SN54151
(1)
+5
V +5
18
(2) 4
(4) 3
(8) C
(DM read) T
(clear DM) 16
(10) S
(20) 15
(40) 17
(80) U
SP306A
SP306A
SP384A
SP306A
SP306A
SM73
SM73
A (1)
1 (2)
2 (4)
B (8)
8 (10)
9 (20)
10 (40)
11 (80)

DM3 Board



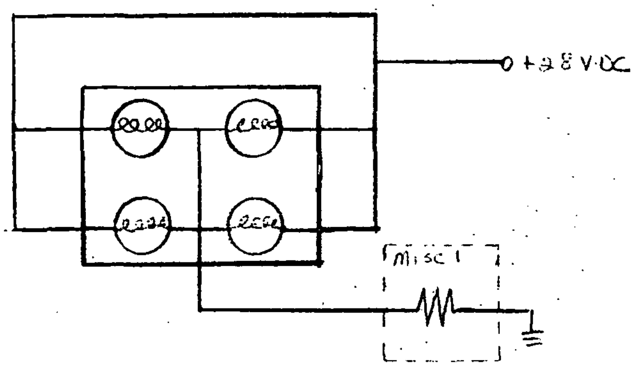
9
.01µf
+12
100K
3
Bourns 3068S-1-104
5.1K
5.1K
20
5pf
10
N
To LOGIC BNC
12
DM-in
10 pf
.003µf
1.5K
Signetics 5709
-12
+28
.01µf
330Ω 1w
J
To LOGIC DM outflow lamp
+5
4.7K
4.7 K
+12
10K
2.0µf
+
Amel 342CJ
F
2N4954
+12
10K
2N2405
5.1K
2N4400
IN662
4
A2
2
A1
1
A0
SP380A
MC848P
1
MC848P
2
MC848P
3
T
15
R
+28
8.2K 1w
3.3K
2N2405
11 LOGIC DN 1 lamp
3.3K
+28
1w 8.2K
2N2405
L LOGIC DN 2 lamp
+28
1w 8.2K
13 LOGIC DN 4 lamp
3.3K
2N2405
10K
+5V
manual reset
"5 Counter"
V
initial reset at power-on (to GND)
Logic DN switch common
17

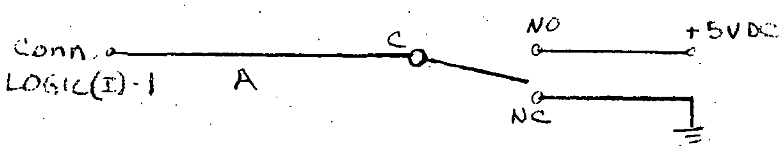
Data System
DAC DM Circuits



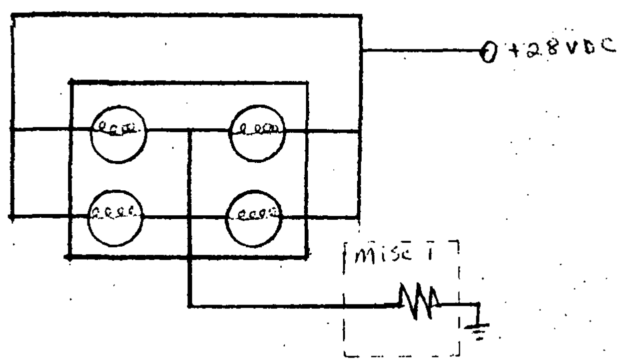
Data Panel Switches

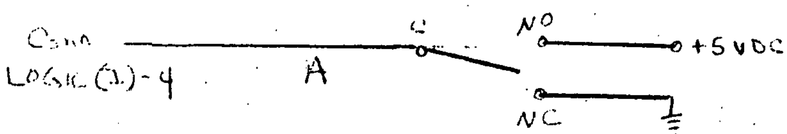
initiate
S_I



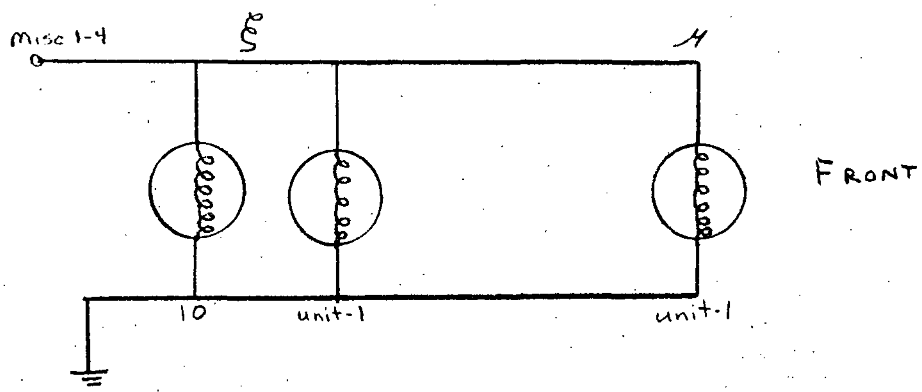


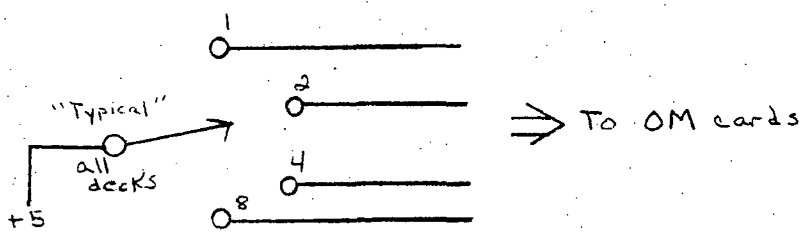
Abort
S_{AB}



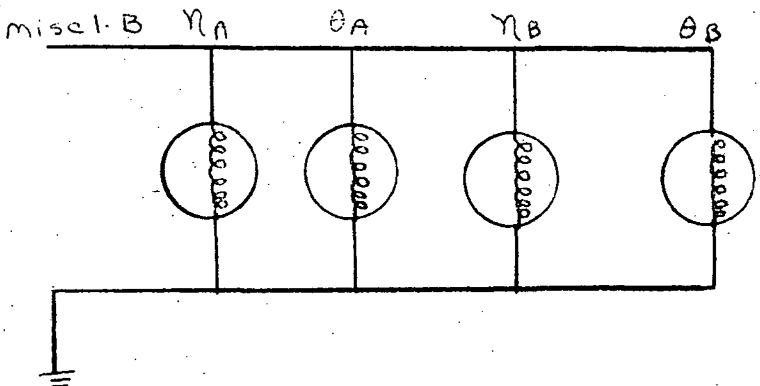


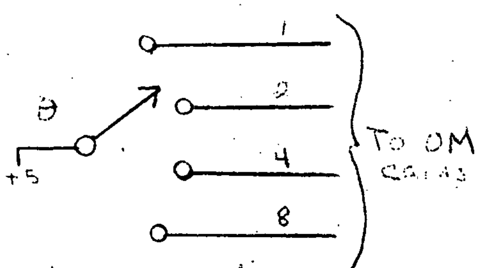
ξ/μ Switches & lamps DATA



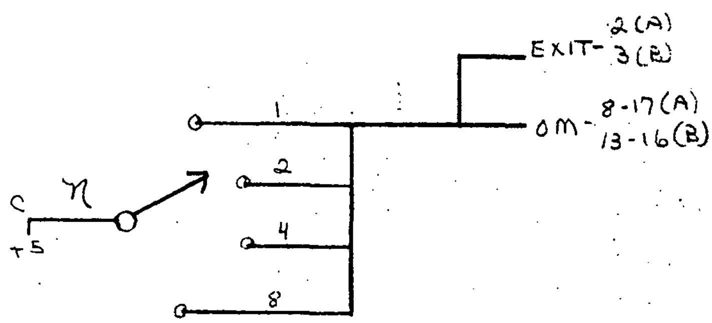


θ, η Switches & lamps



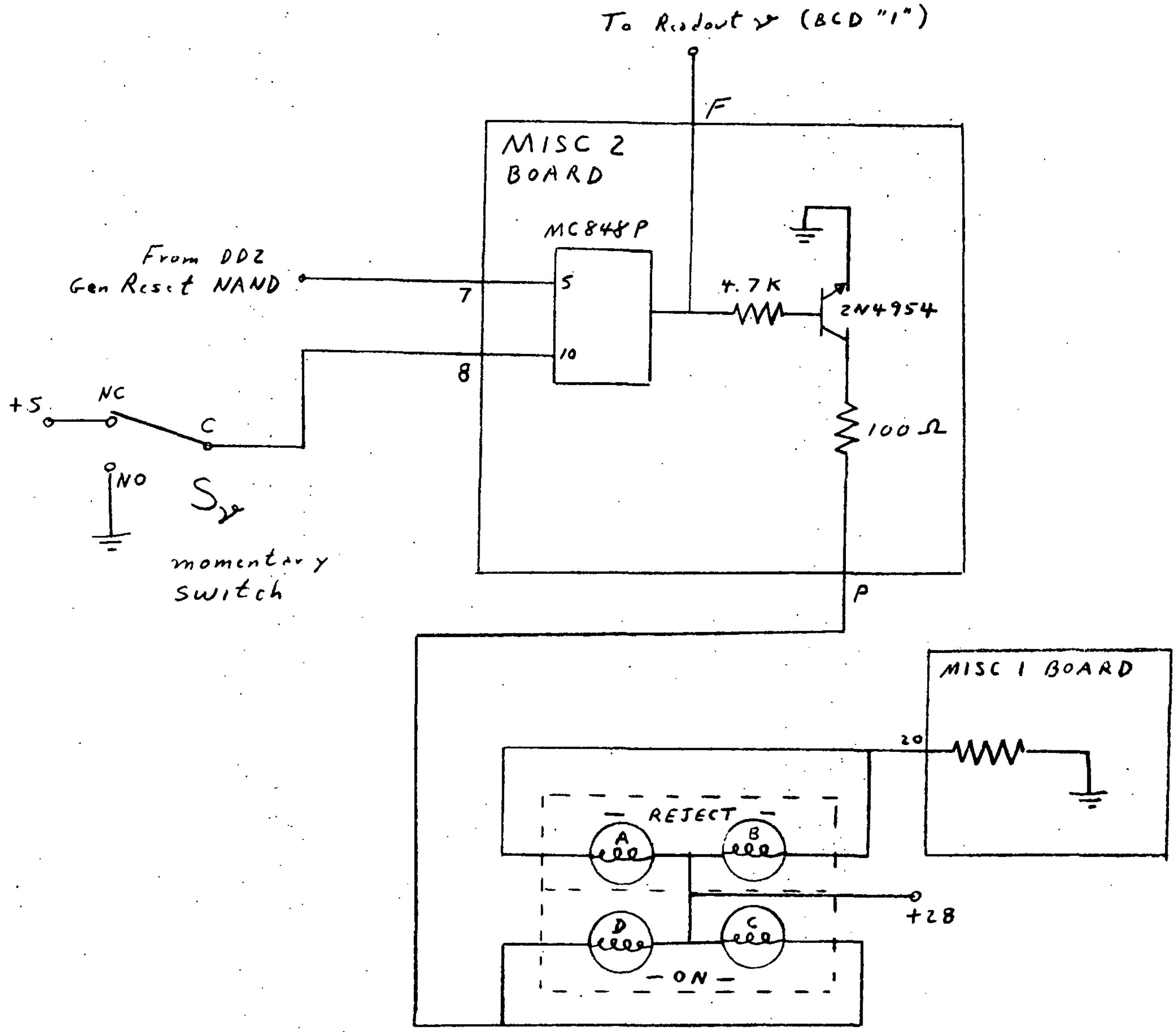


identical A/B

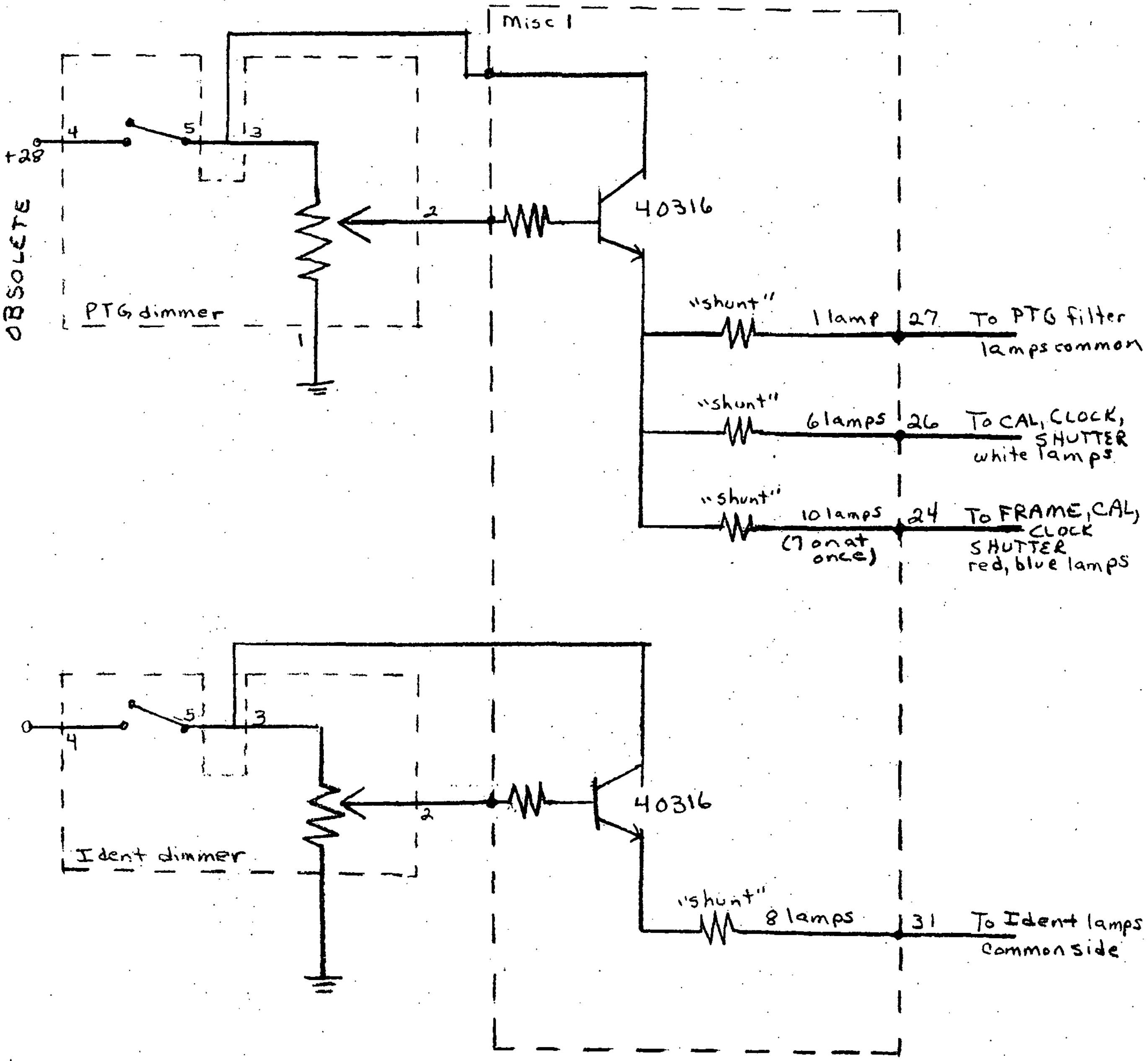


identical A/B

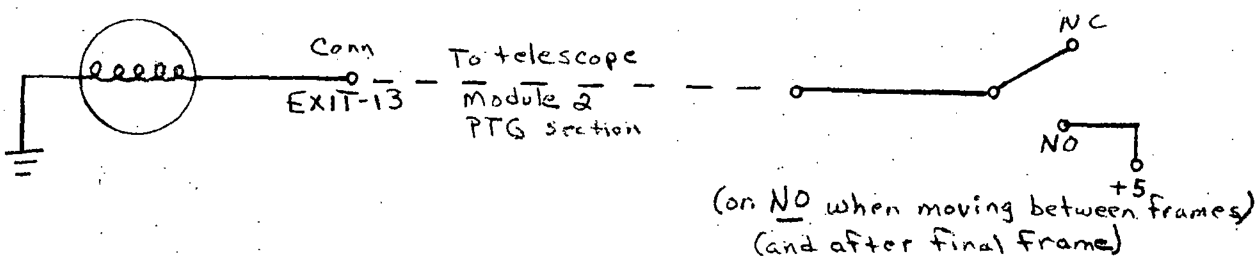
Reject Circuit Data



Dimmer Circuits PTG, Ident DATA

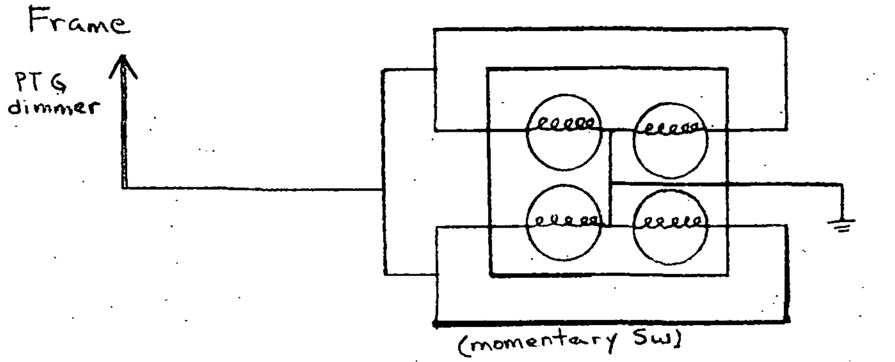


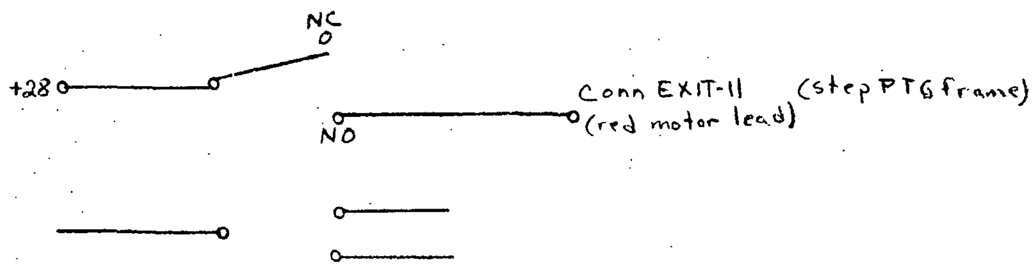
PTG "frame" lamp
OBSOLETE



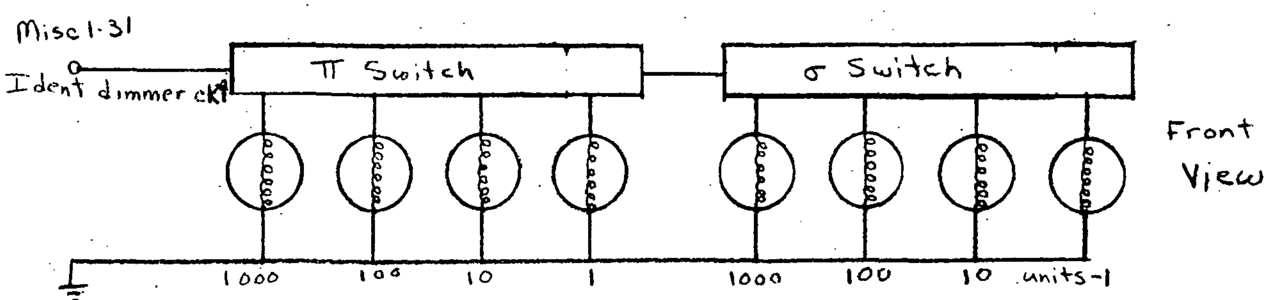
PTG Controls DATA

OBSOLETE

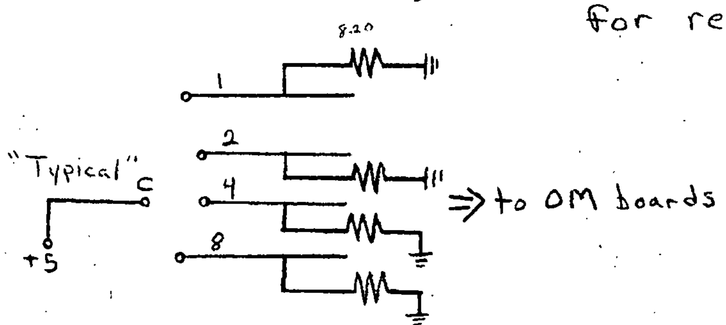




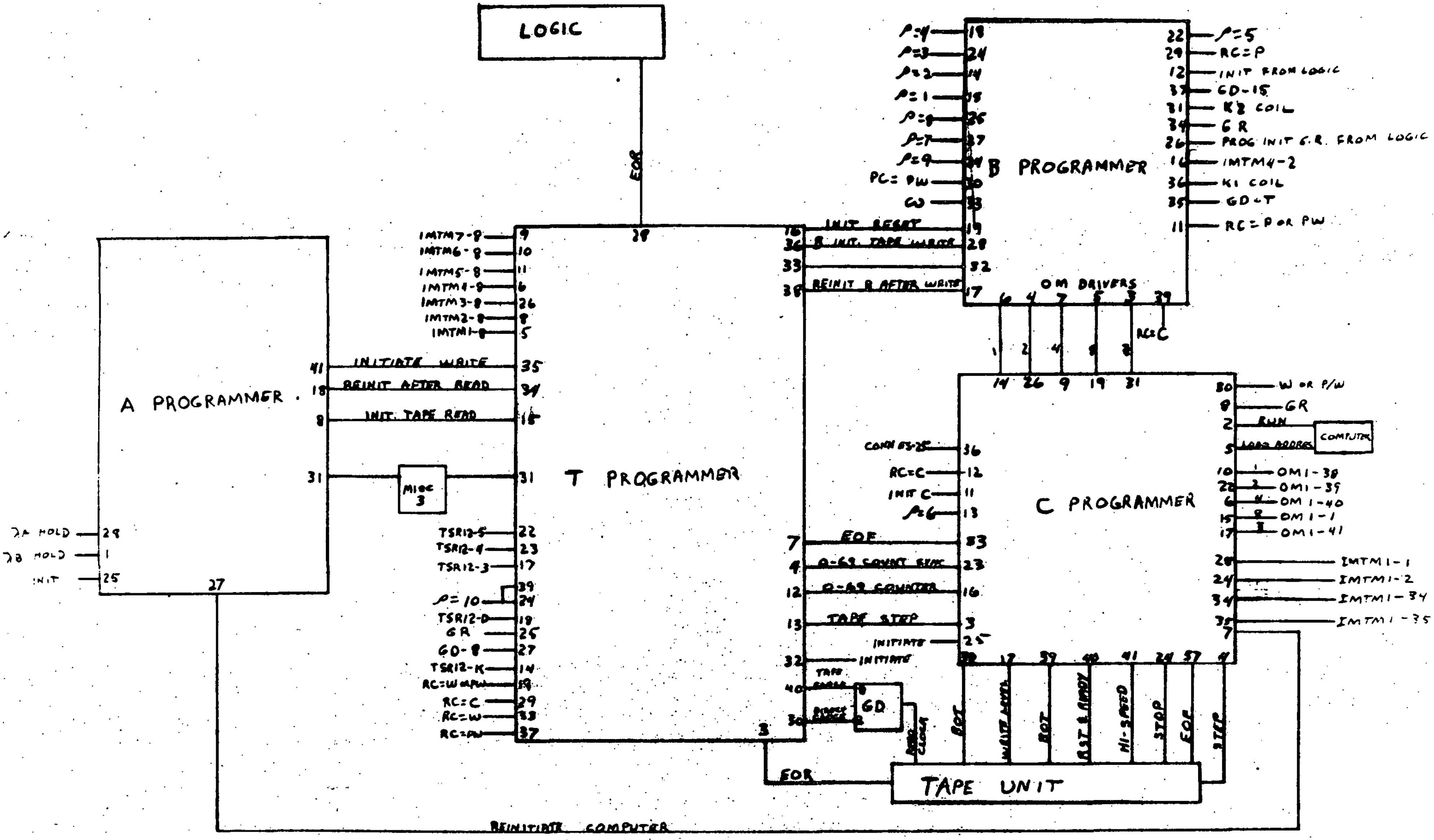
Identity lamps/switches



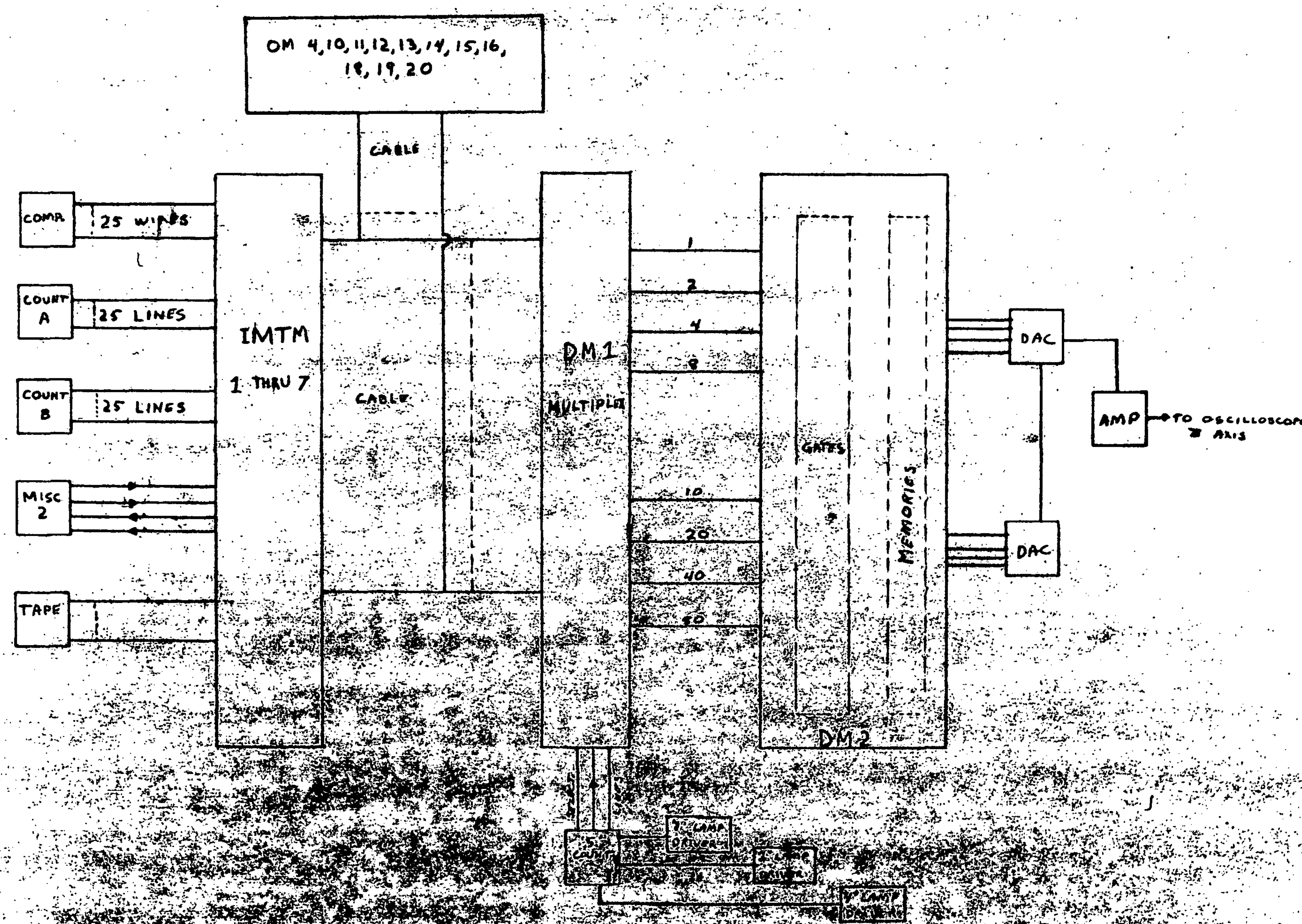
Switch lines themselves go directly to OM boards for readout



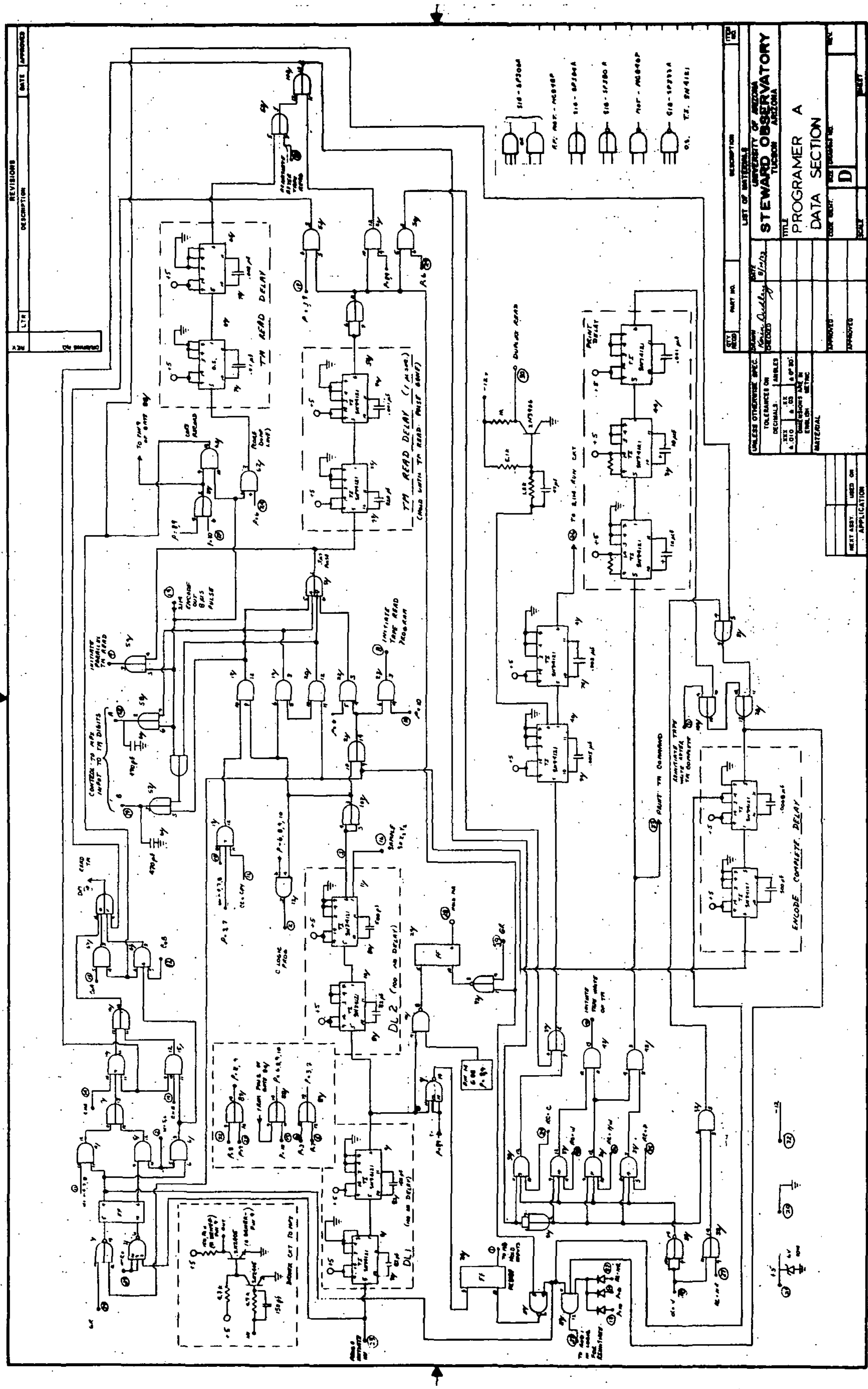
Note: add 510Ω from each switch output to GND

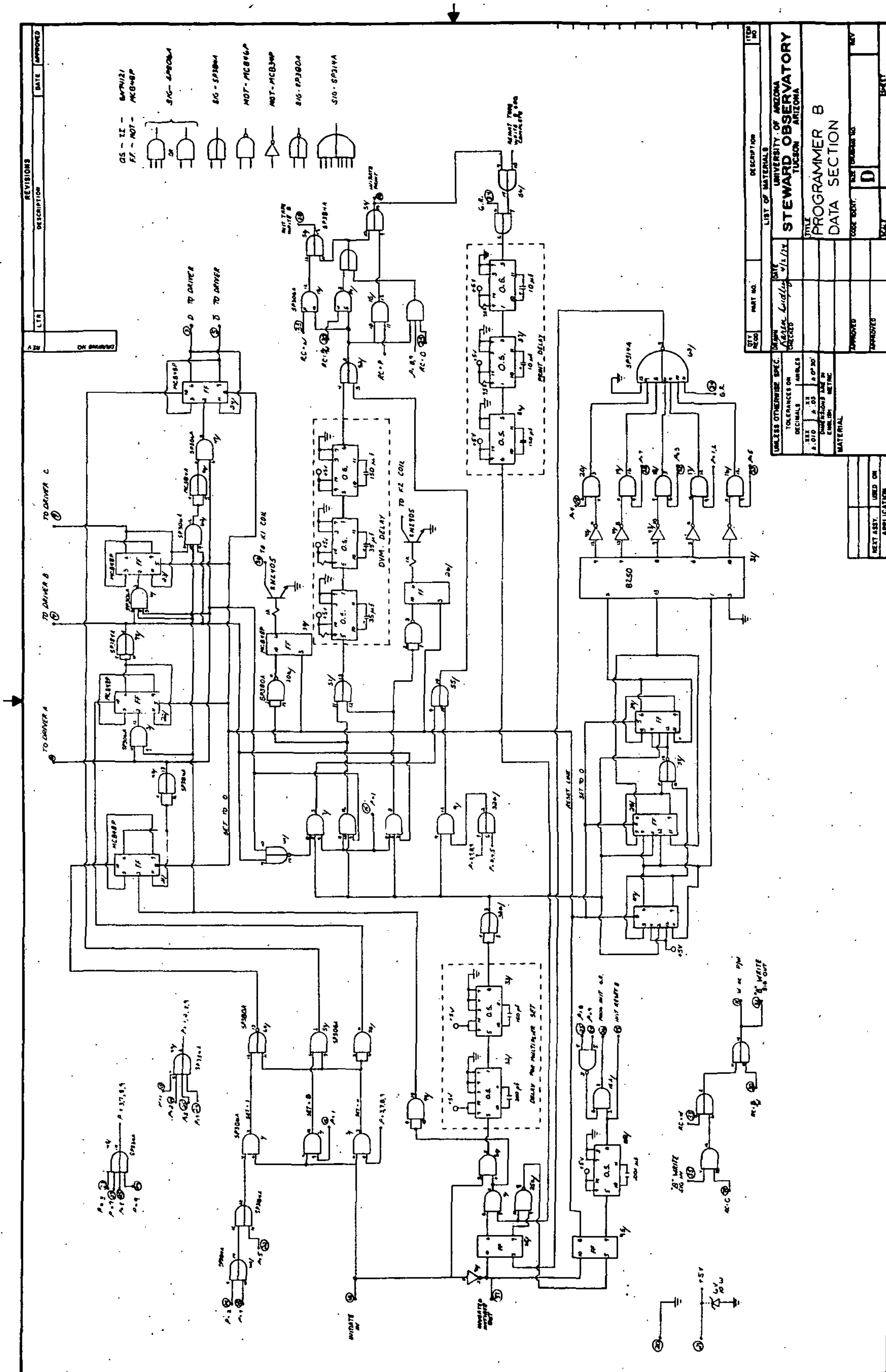


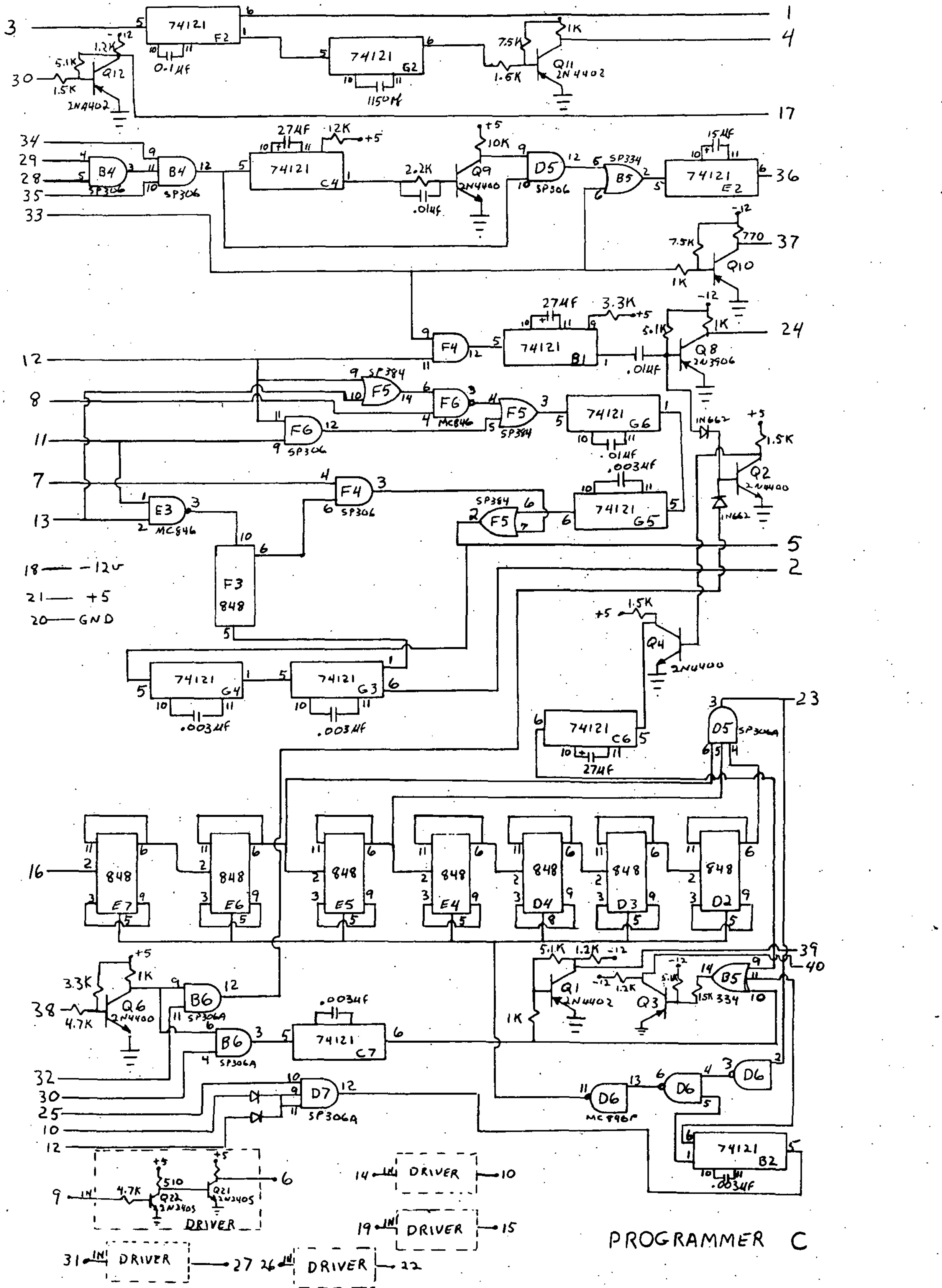
READ/WRITE SEQUENCE



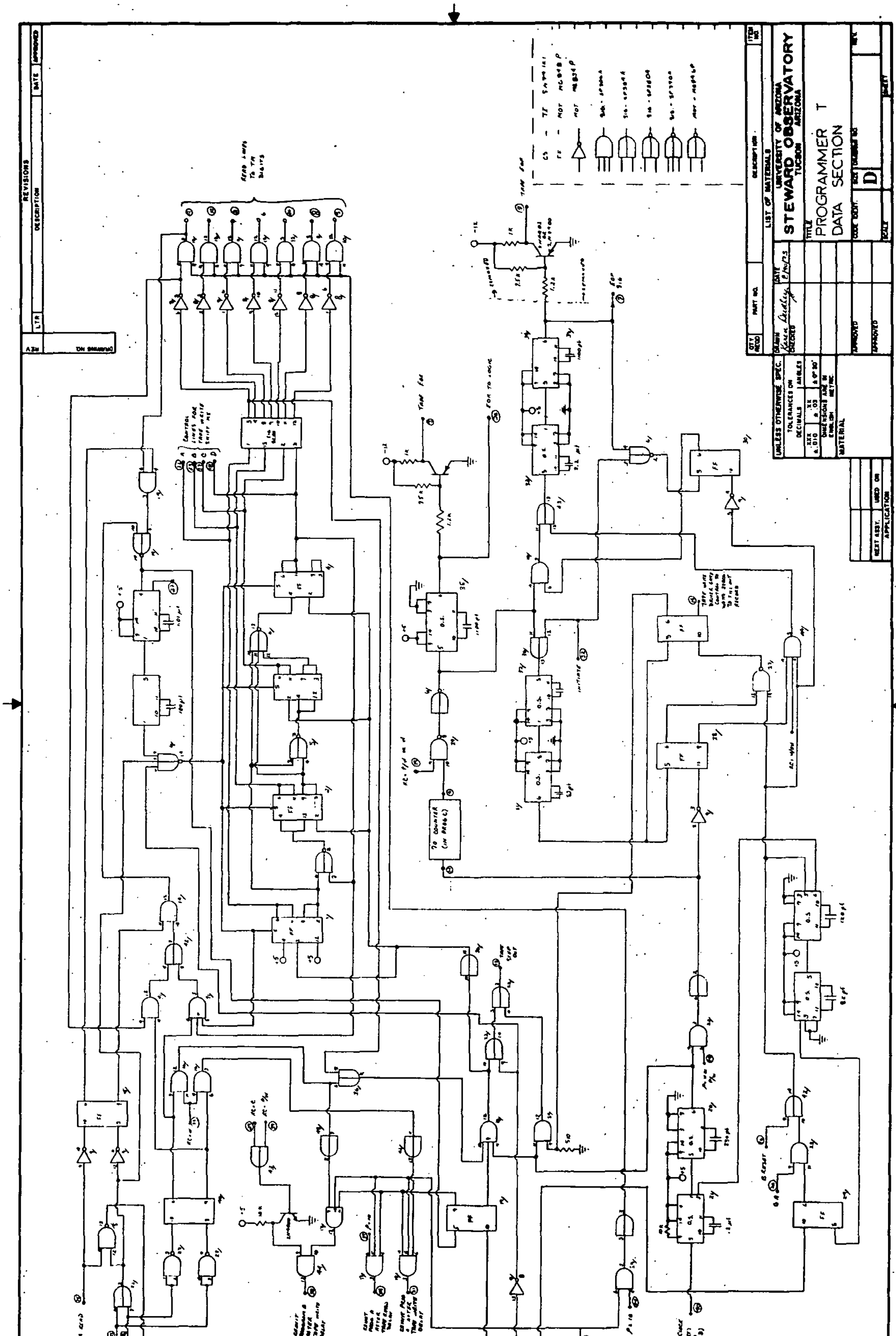
DATA RECORD SIGNAL FLOW


UNIVERSITY OF ARIZONA
STEWARD OBSERVATORY
TUCSON ARIZONA
PROGRAMER A
DATA SECTION
TM READ DELAY
ENCODE COMPLETE DELAY


UNIVERSITY OF ARIZONA
STEWARD OBSERVATORY
TUCSON ARIZONA
PROGRAMMER B
DATA SECTION
D



PROGRAMMER C


UNIVERSITY OF ARIZONA
STEWARD OBSERVATORY
TUCSON ARIZONA
PROGRAMMER T
DATA SECTION

GUIDE SECTION

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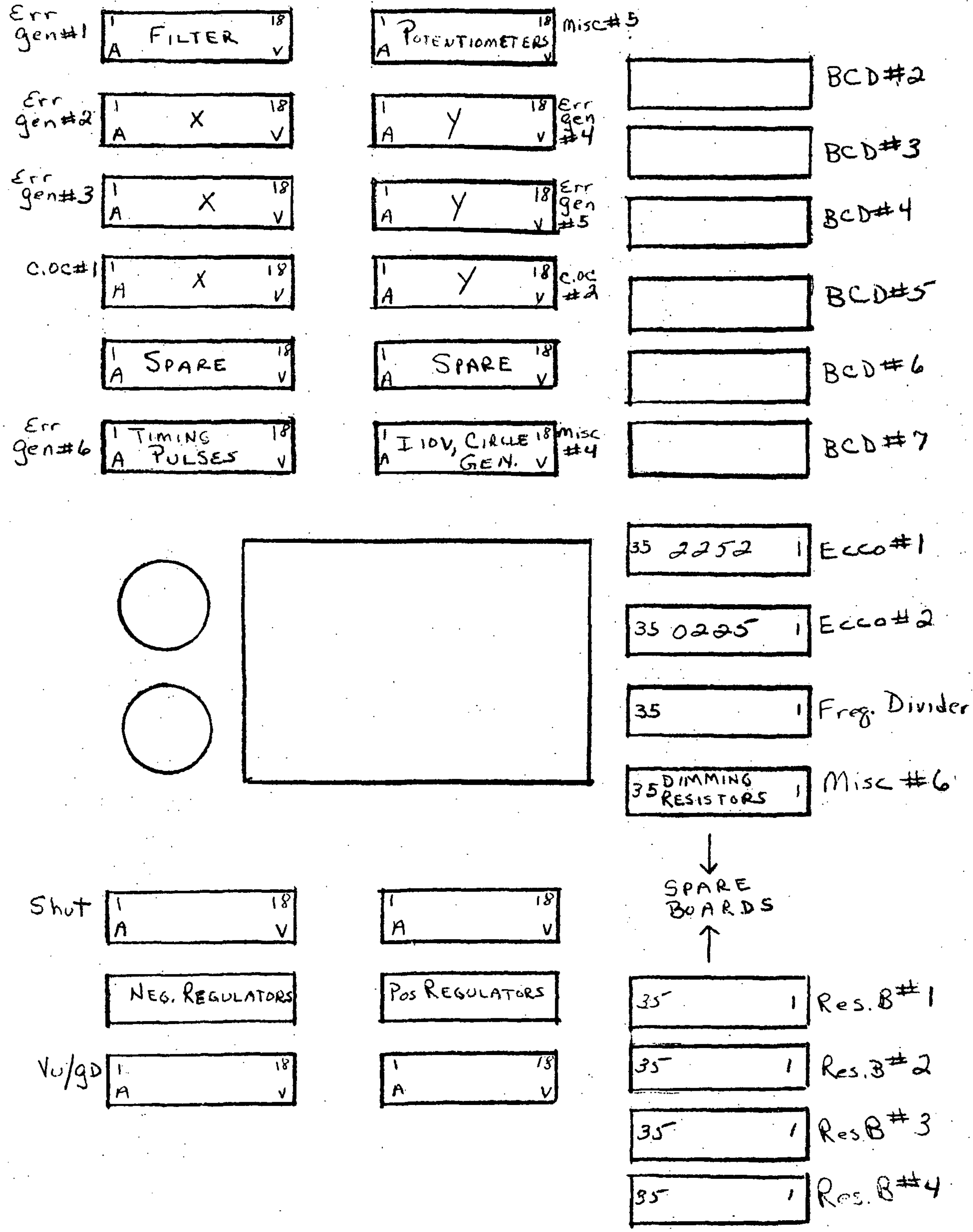
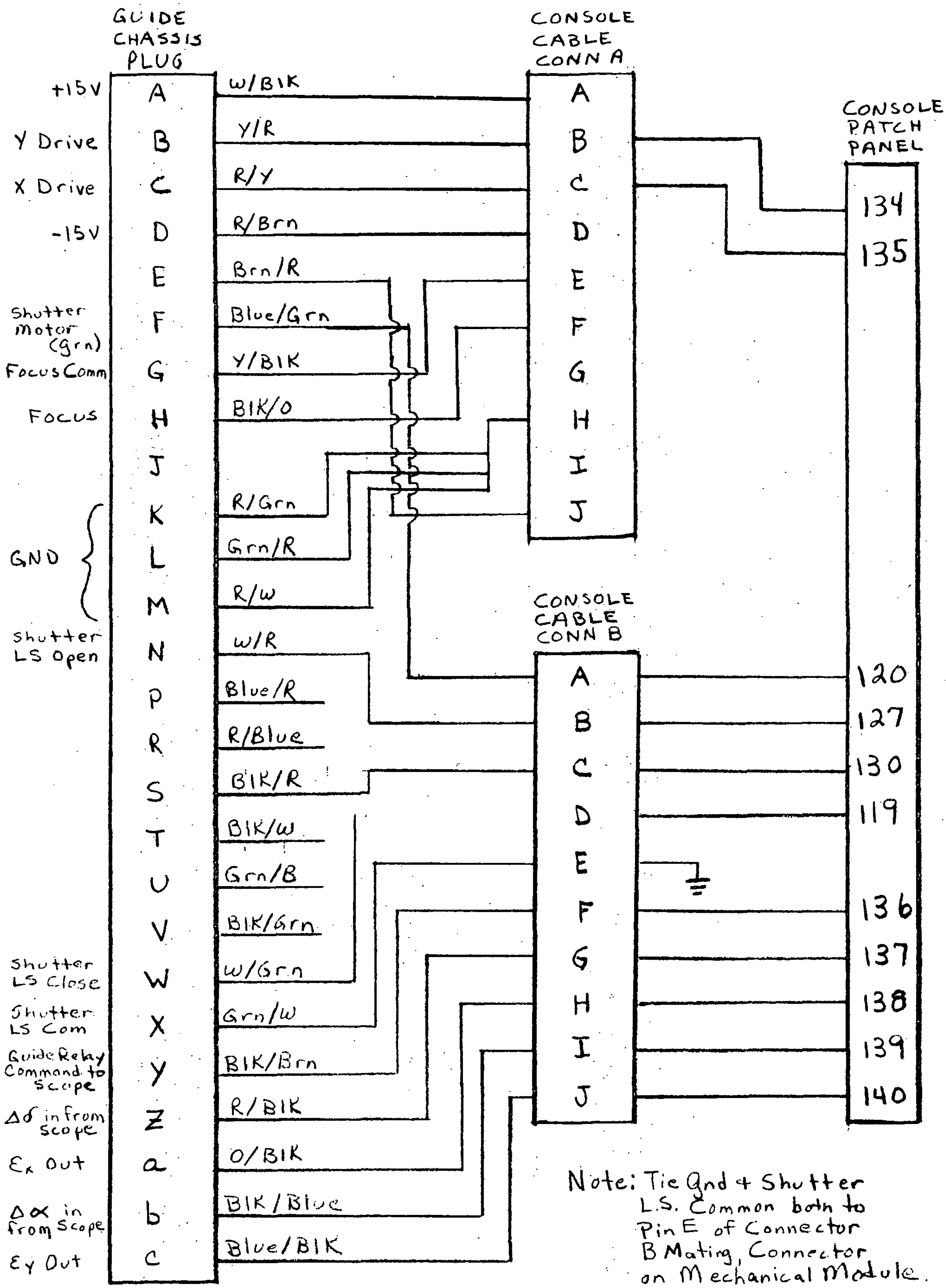
GUIDE CARD LOCATOR

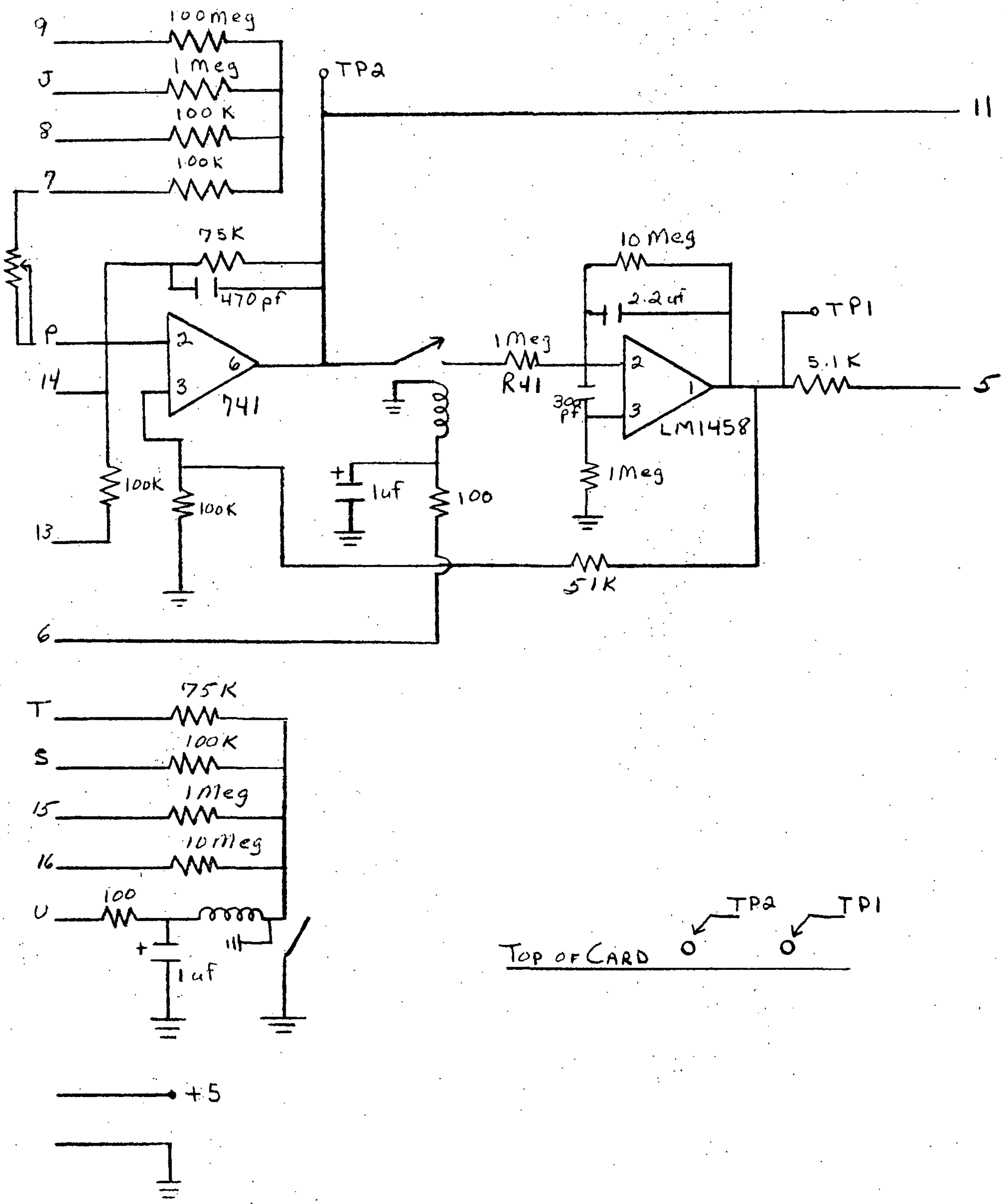


Exit Cable

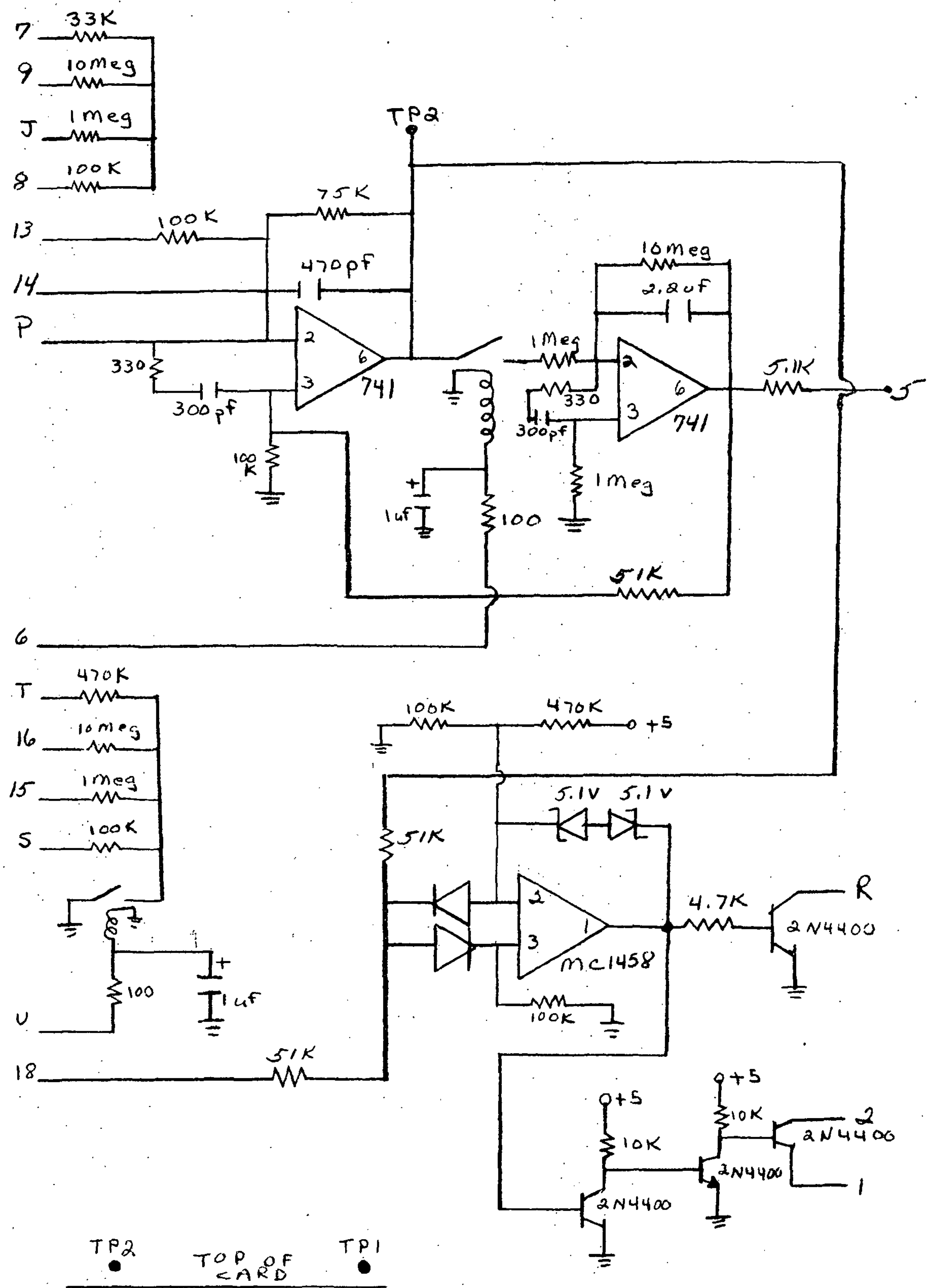


Note: Tie Gnd + Shutter L.S. Common both to Pin E of Connector B Mating Connector on Mechanical Module.

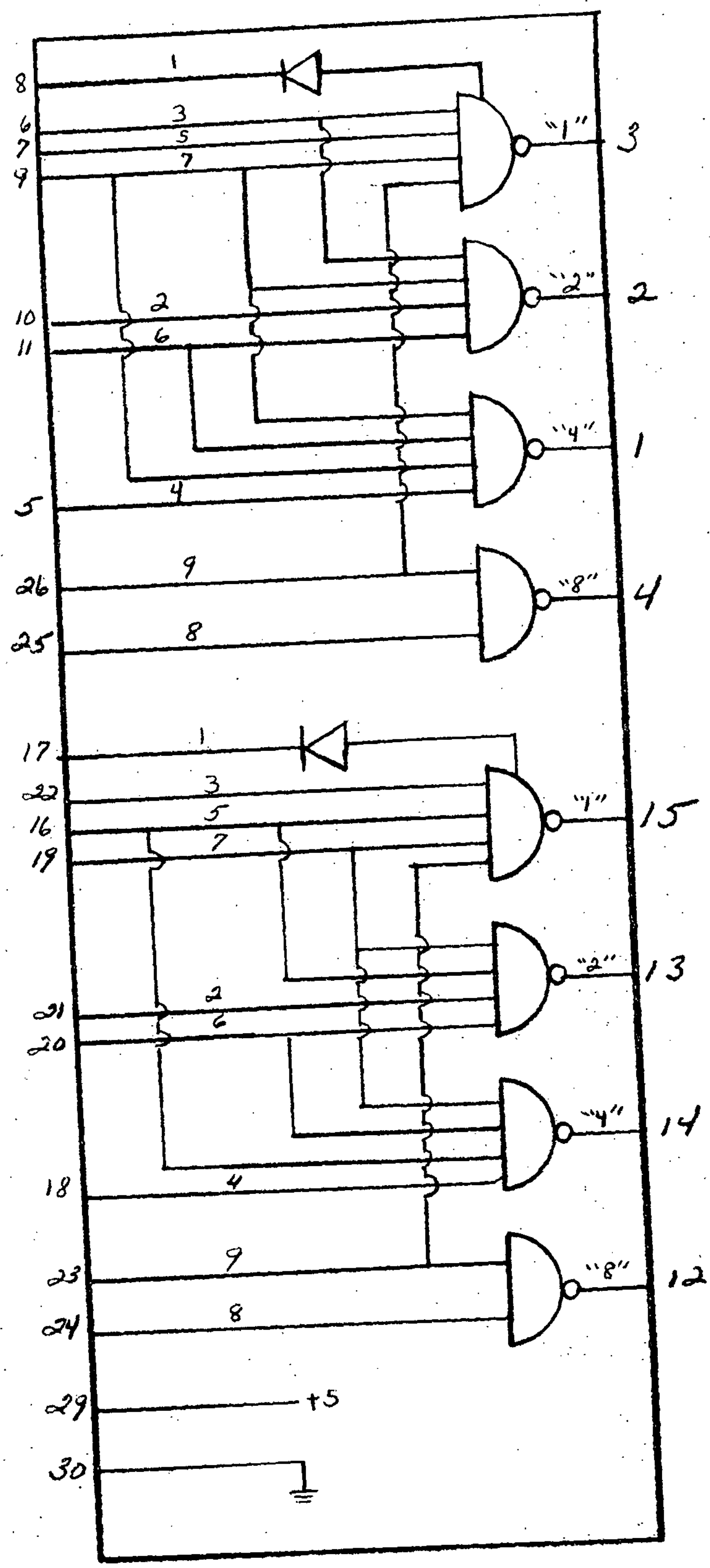
Centering & Offset Control #1



Centering & Offset Control #2

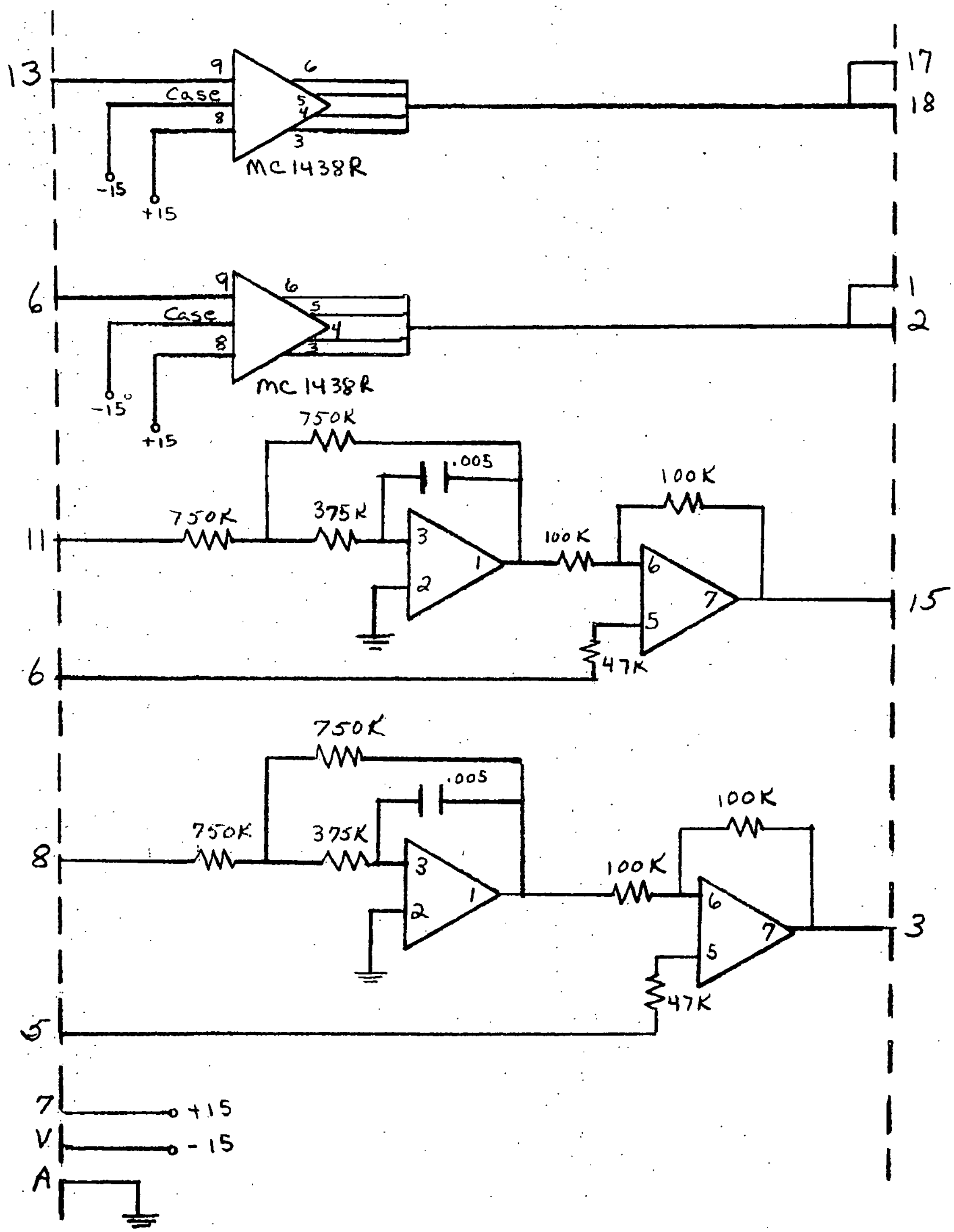


BCD Card (Decade to Digital Converter)

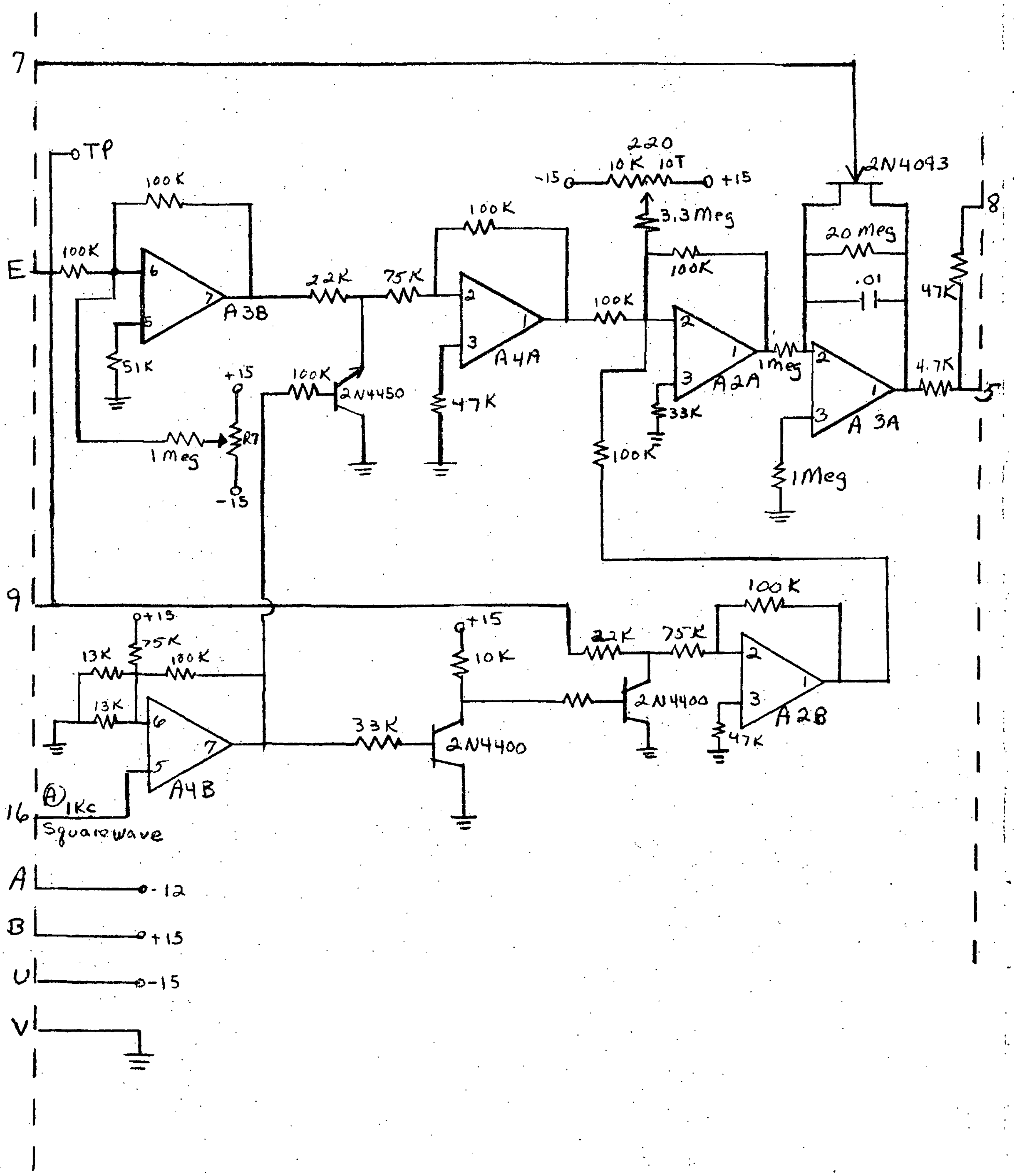


Error Generator Board #1

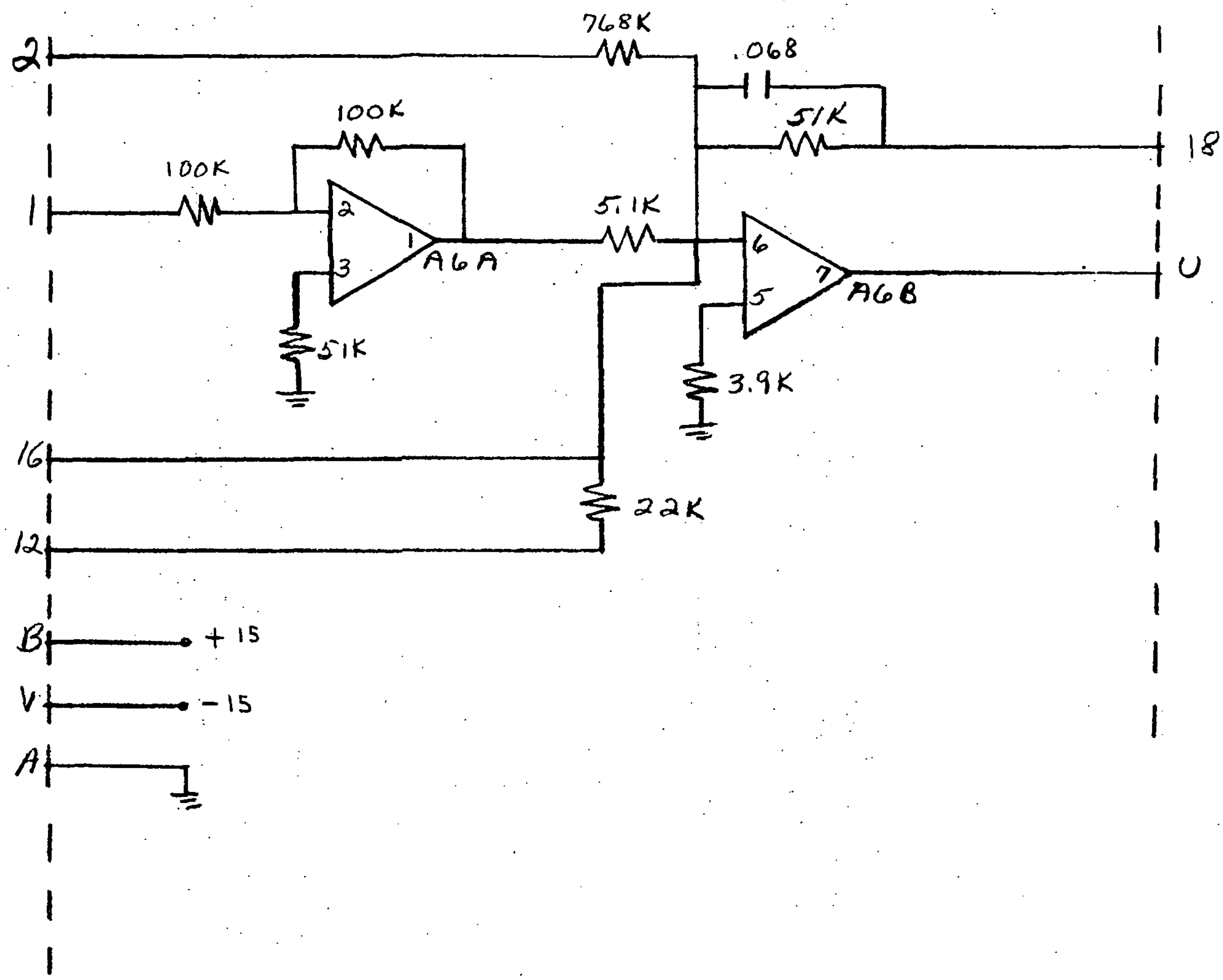
(Filter)



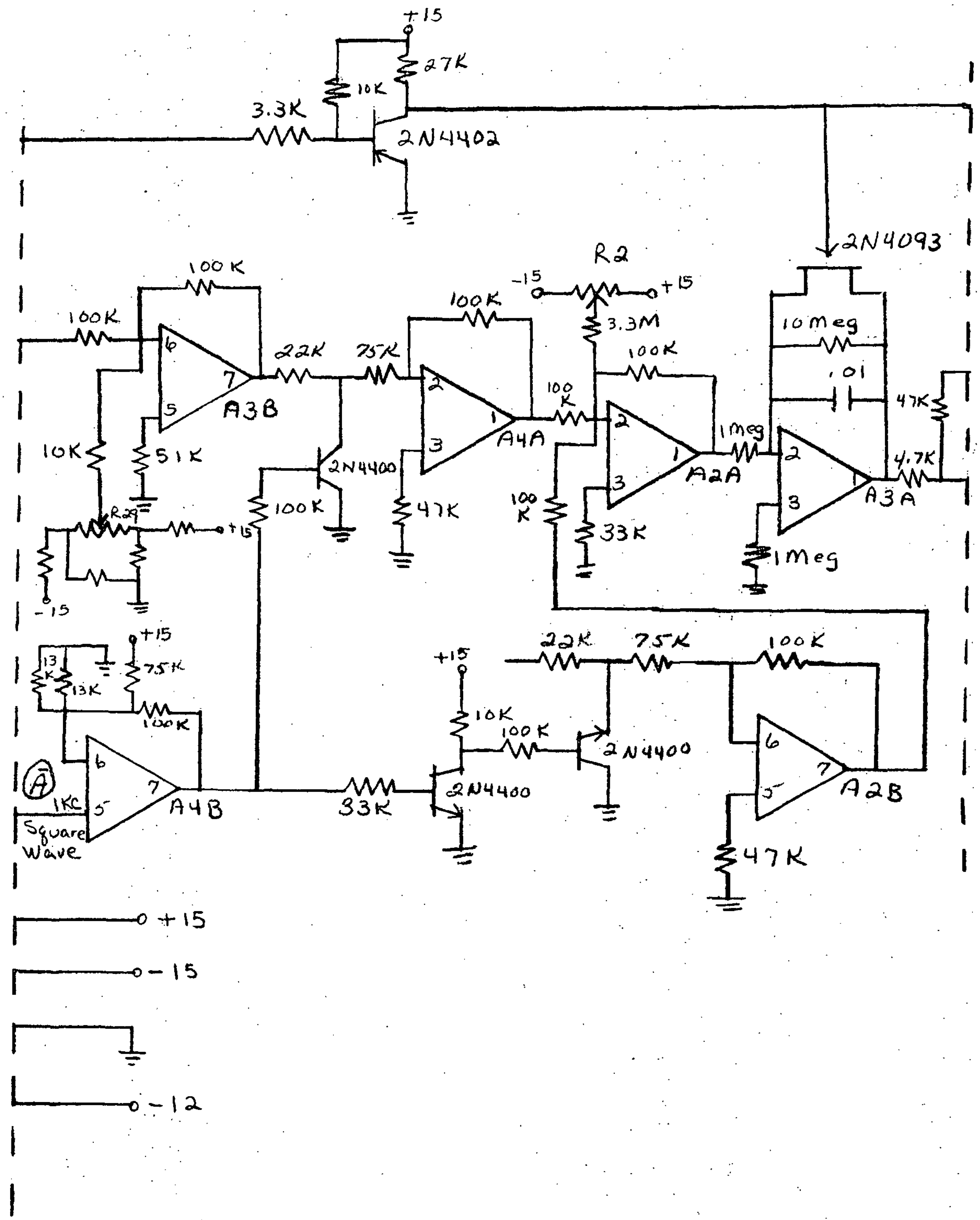
Error Generator Board # 2 (X)



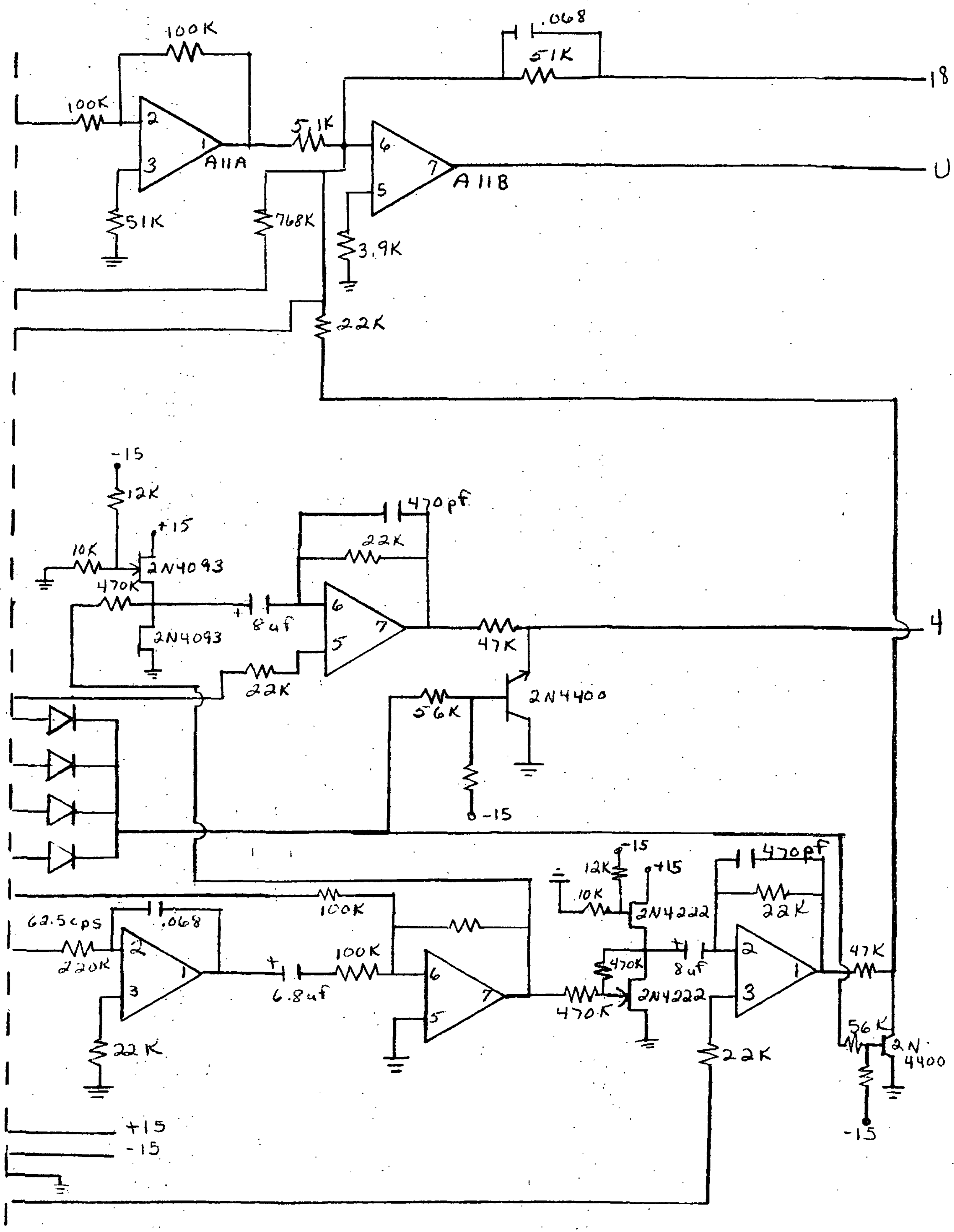
Error Generator #3 Board (X)



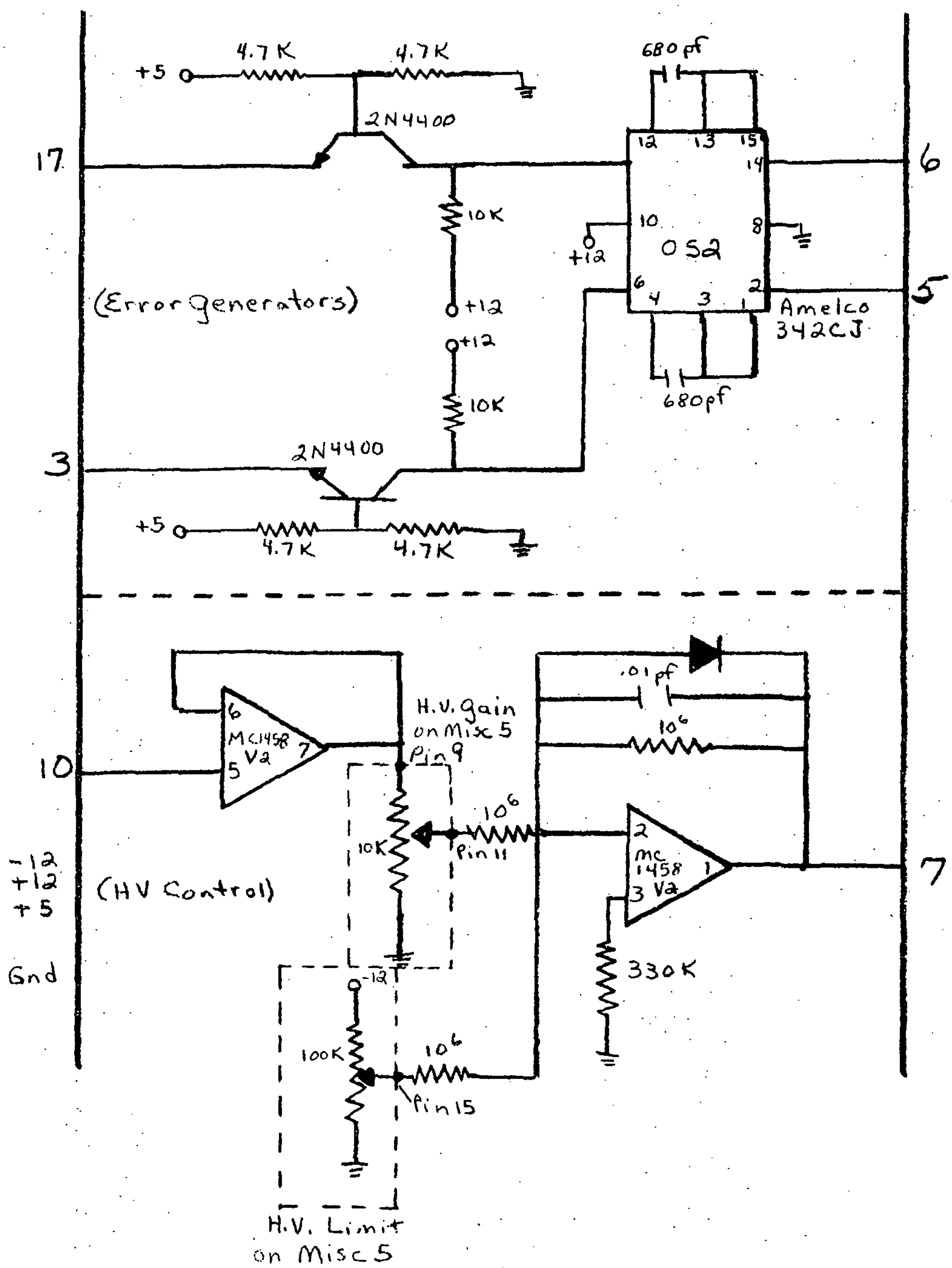
Error Generator #4 Board (Y)



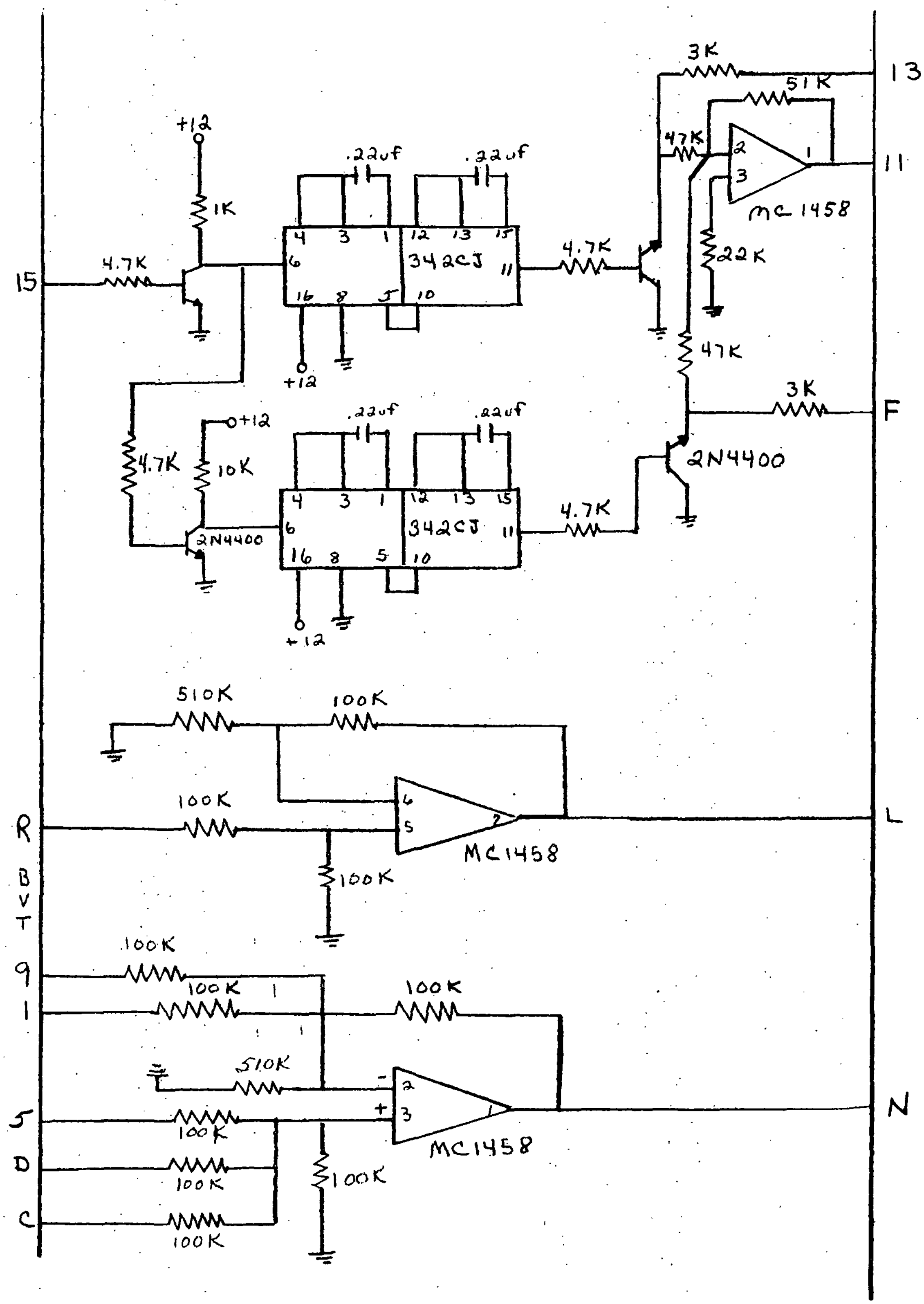
Error Generator #5 Board (Y)



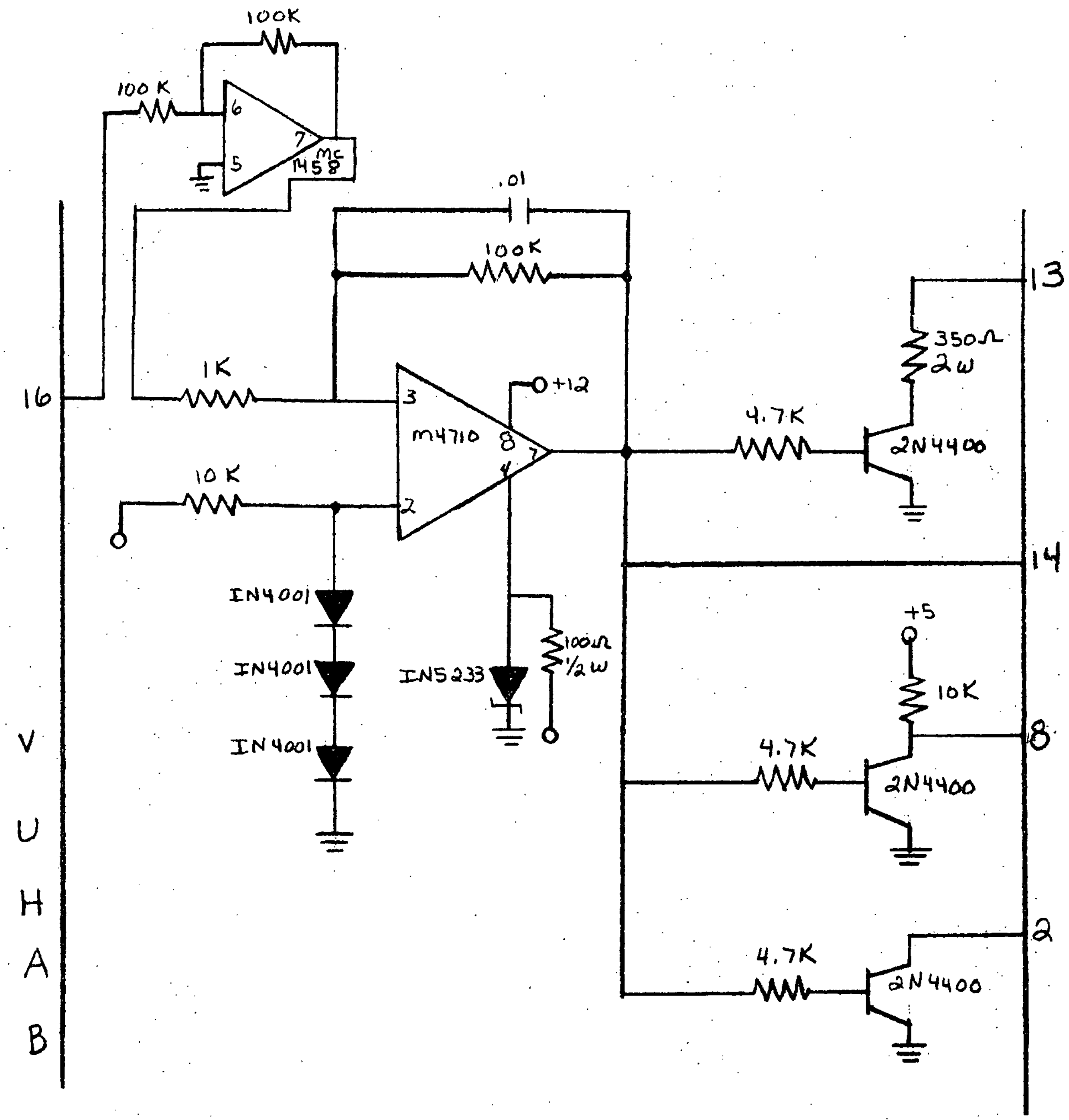
Error Generator #6/ HV Control Board (Triad)



Osilloscope Ckt Board

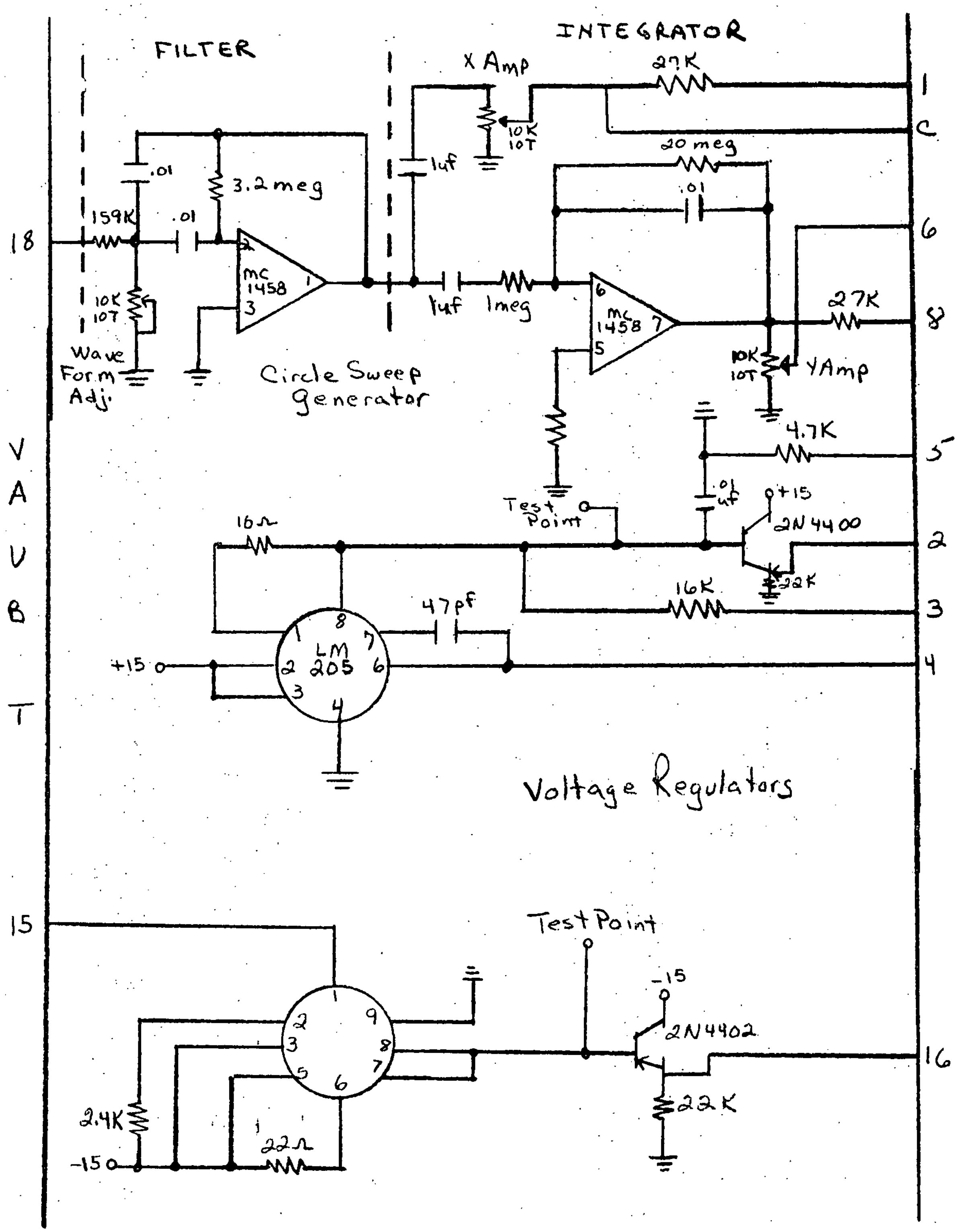


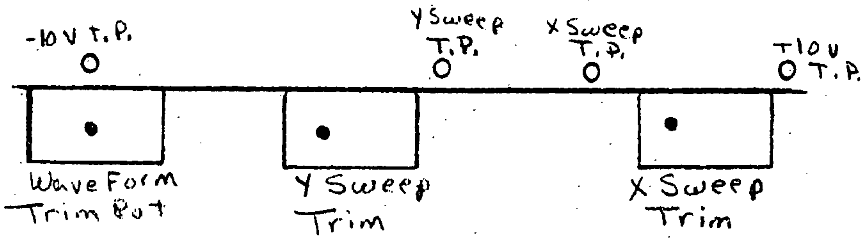
Lock Detector Board



+15 V Not Used

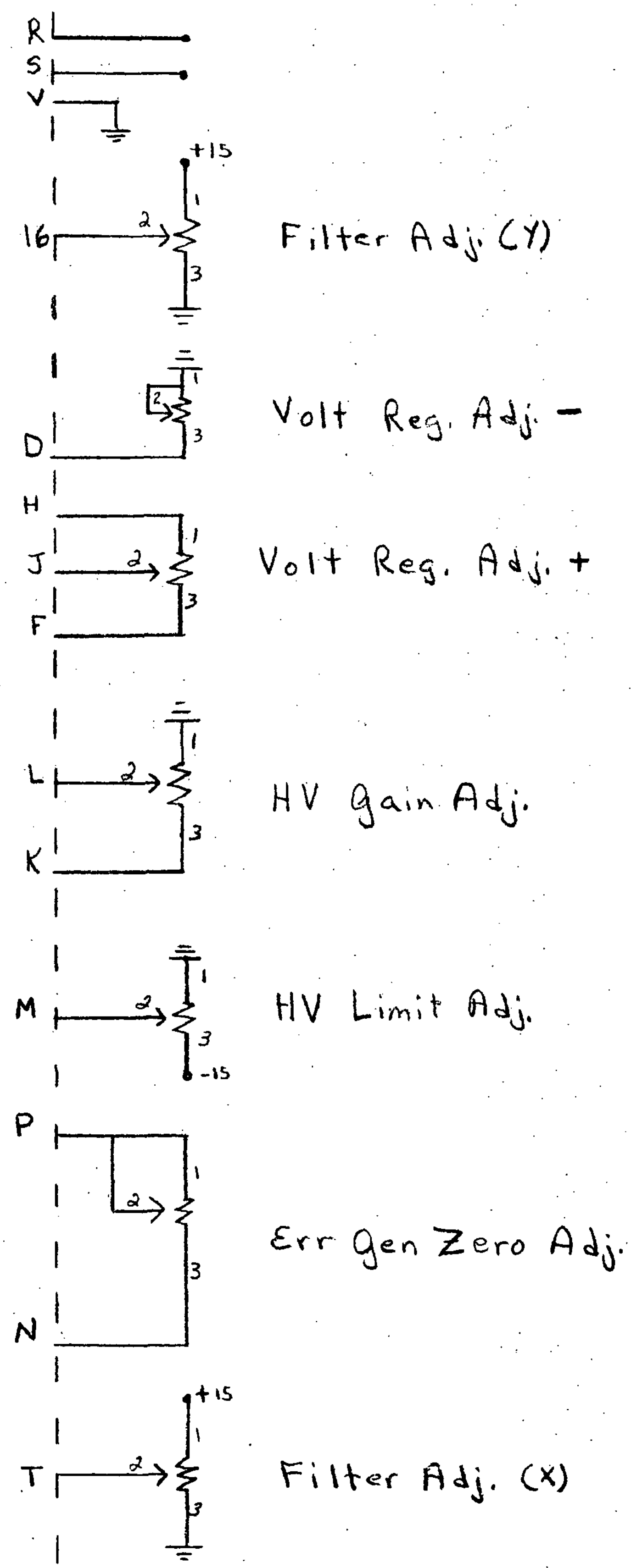
Misc #4 Board



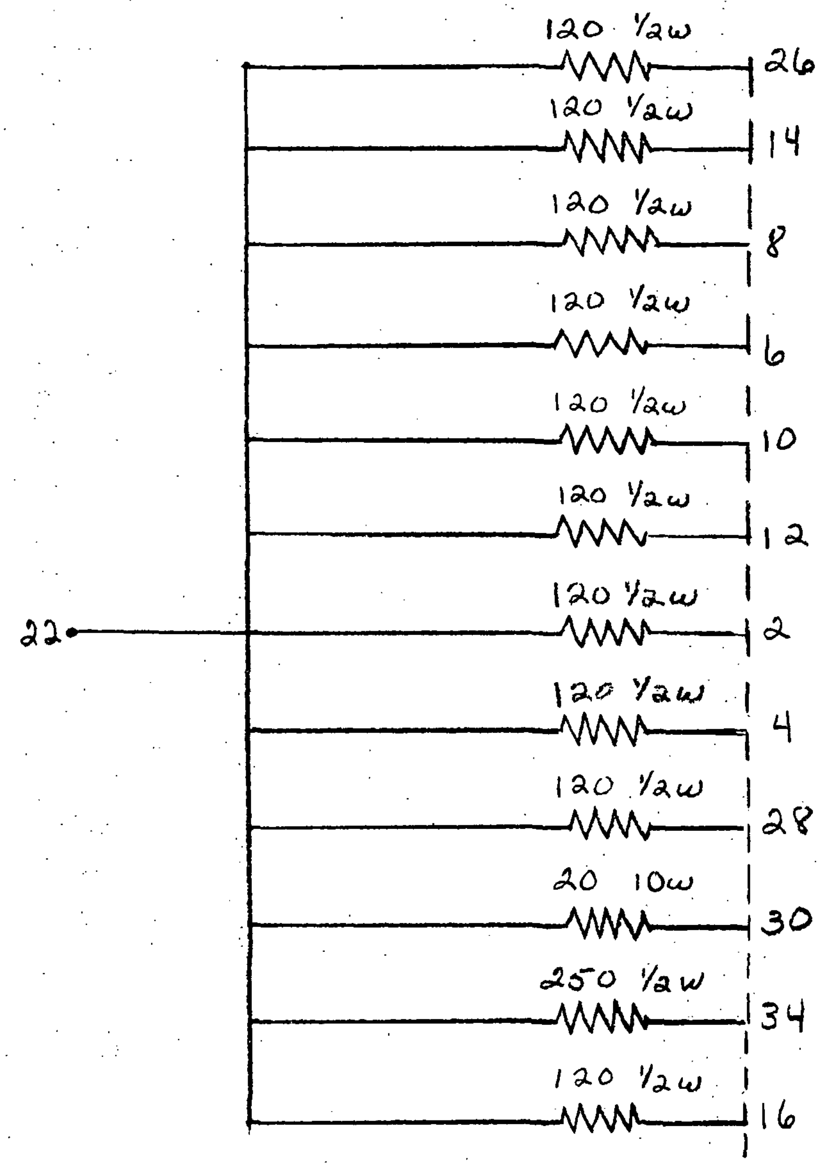


View of Board from Rear of Chassis

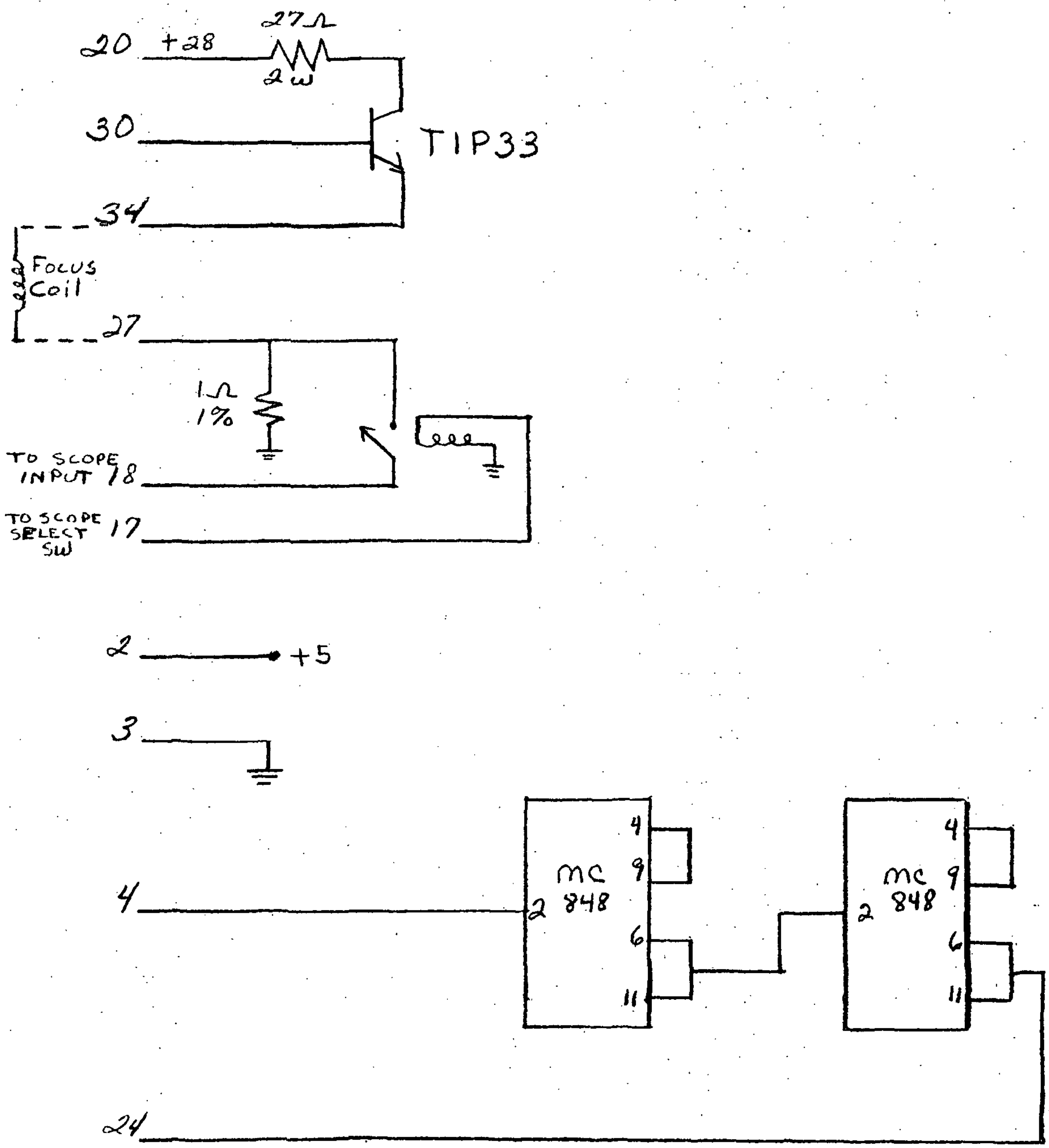
Misc #5 Board


R
S
V
+15
16
2
1
3
Filter Adj. (Y)
D
2
1
3
Volt Reg. Adj. −
H
J
F
2
1
3
Volt Reg. Adj. +
L
K
2
1
3
HV gain Adj.
M
2
1
3
−15
HV Limit Adj.
P
N
2
1
3
Err Gen Zero Adj.
+15
T
2
1
3
Filter Adj. (X)

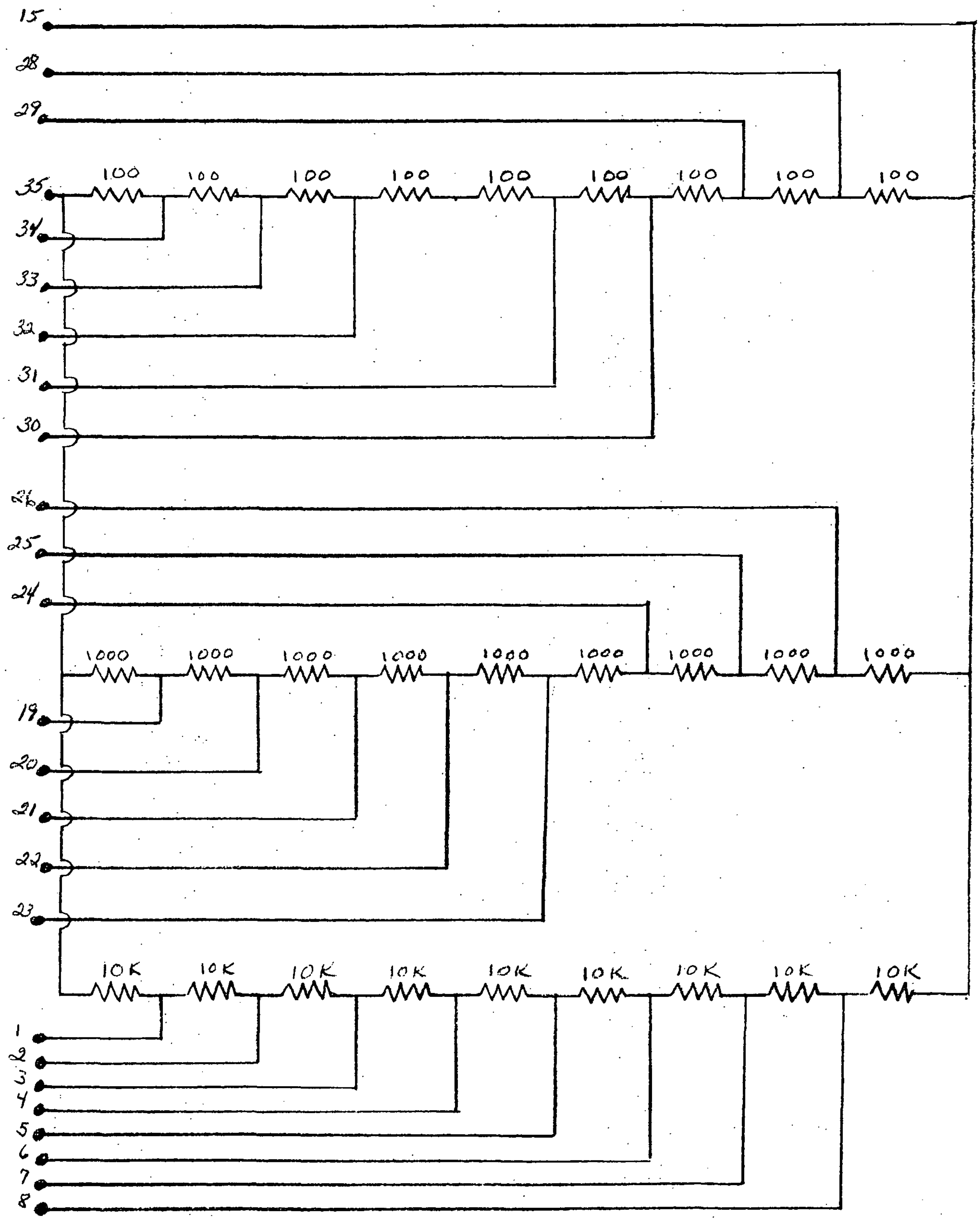
Misc#6


120 1/2w
26
120 1/2w
14
120 1/2w
8
120 1/2w
6
120 1/2w
10
120 1/2w
12
120 1/2w
22
2
120 1/2w
4
120 1/2w
28
20 10w
30
250 1/2w
34
120 1/2w
16

Frequency Divider & Focus Control

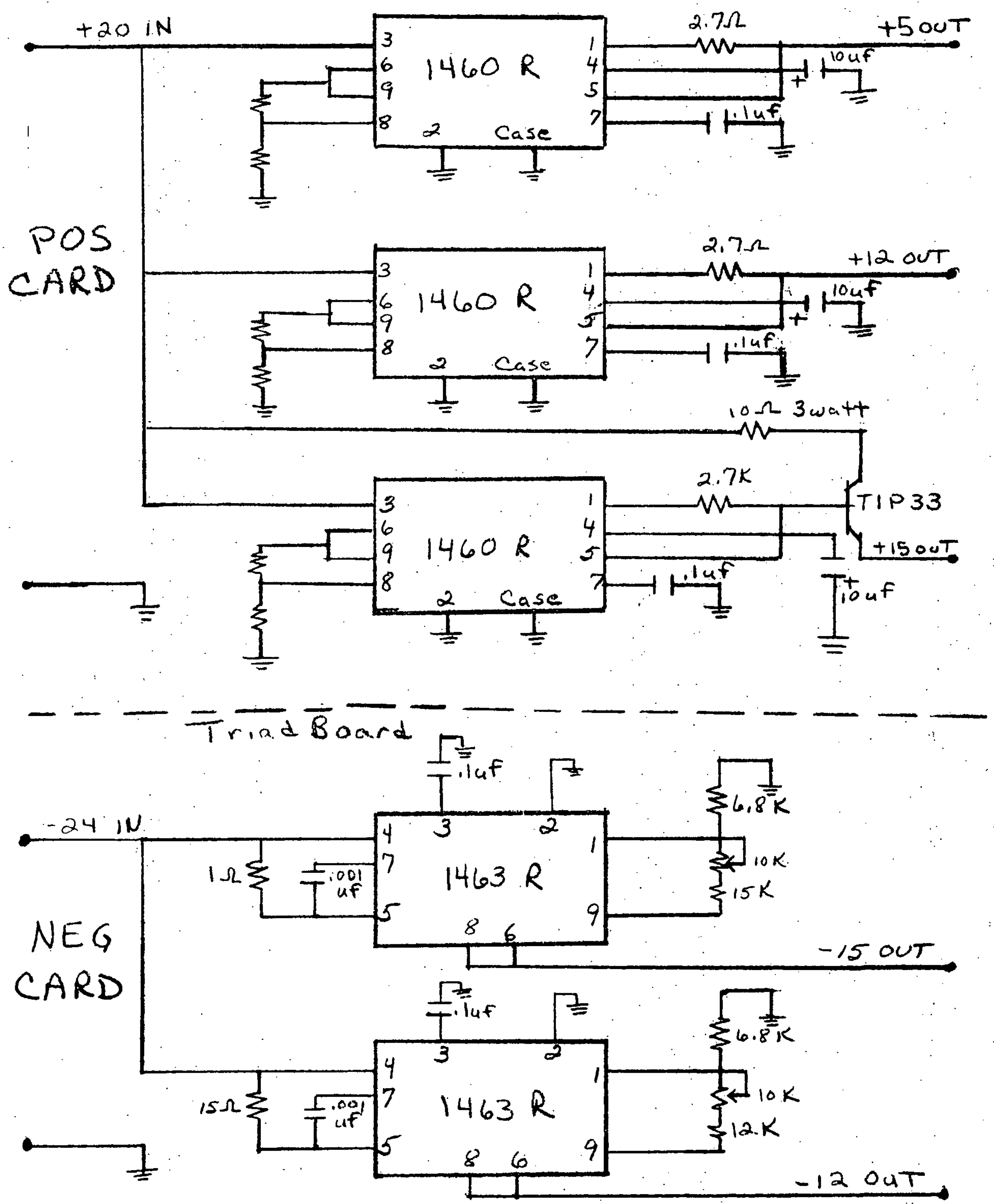


Resistor Card

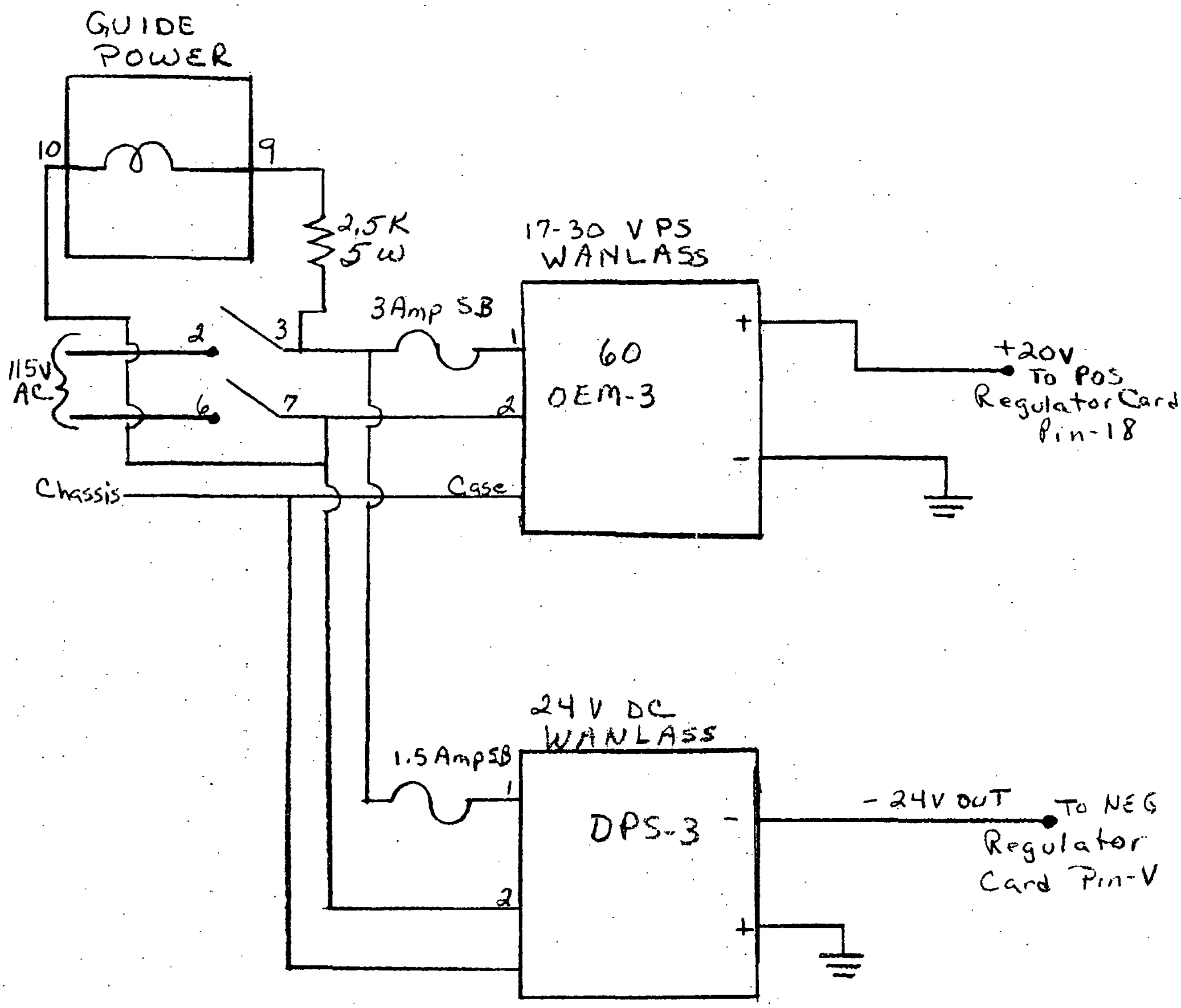


Voltage Regulator Cards

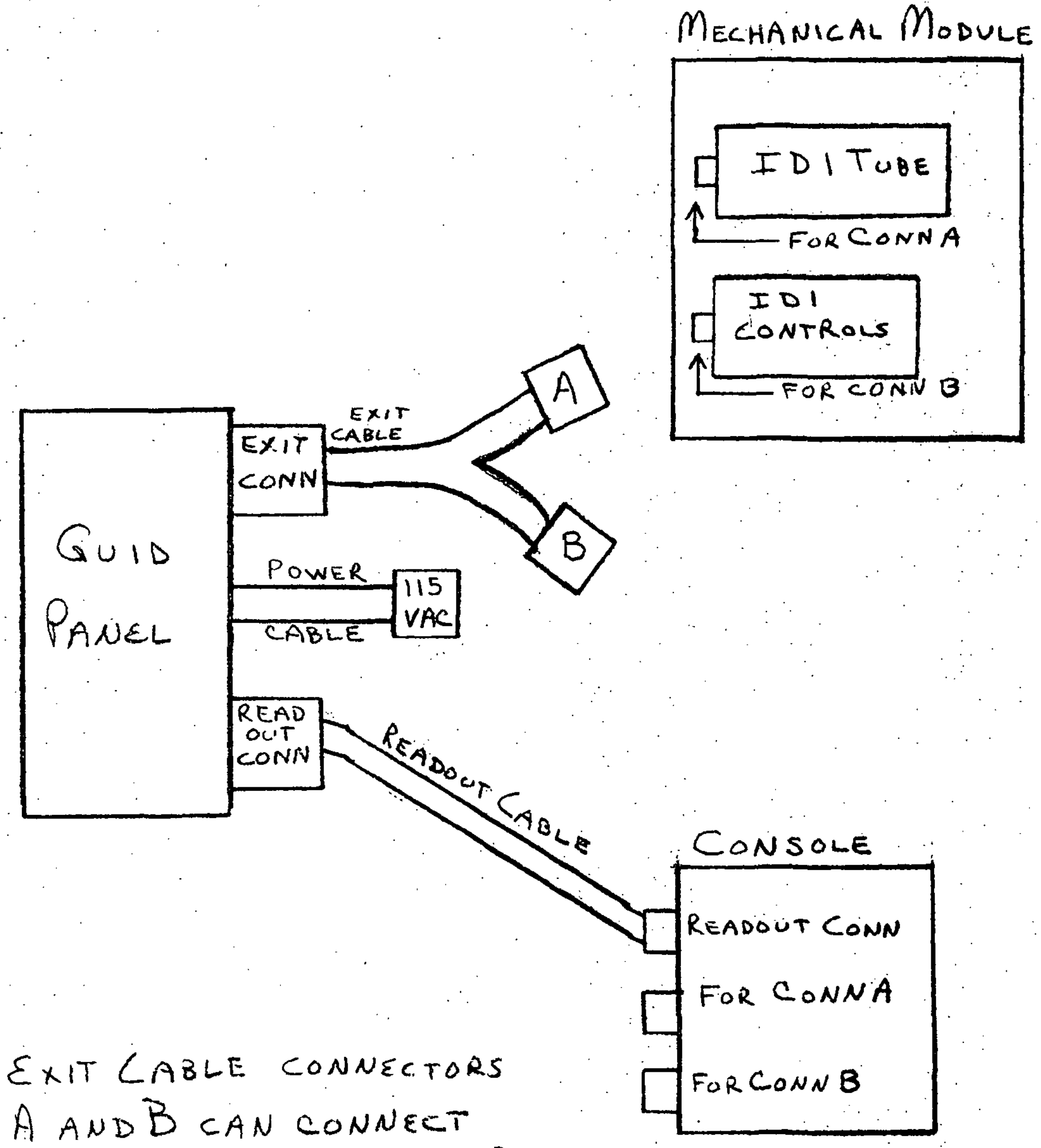
Triad Board



Power Supply



CABLE INTERCONNECTION DIAGRAM



EXIT CABLE CONNECTORS A AND B CAN CONNECT EITHER TO THE CONSOLE OR TO THE MECHANICAL MODULE AS SHOWN.

Guide Center Coordinate Switches

D (1) A	E (10) B	F (100) C		D (1) A	E (10) B	F (100) C

$\underbrace{Y}_{E3}$ $\underbrace{X}_{D3}$

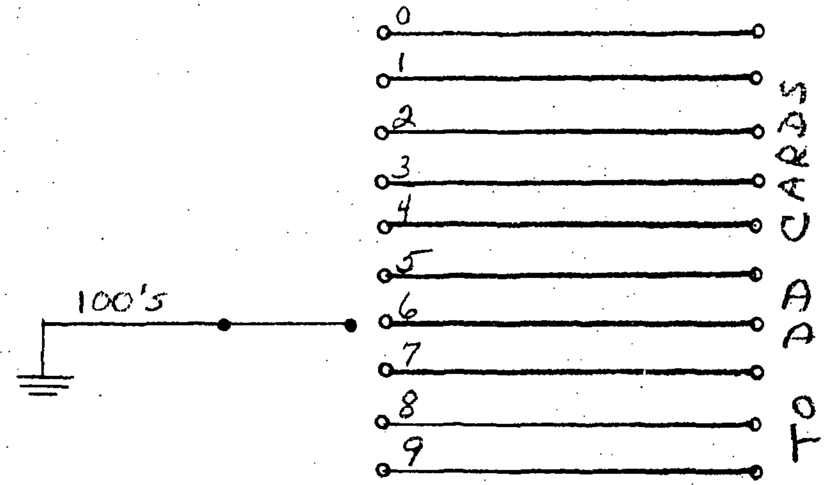
Guide Center Offset Switches

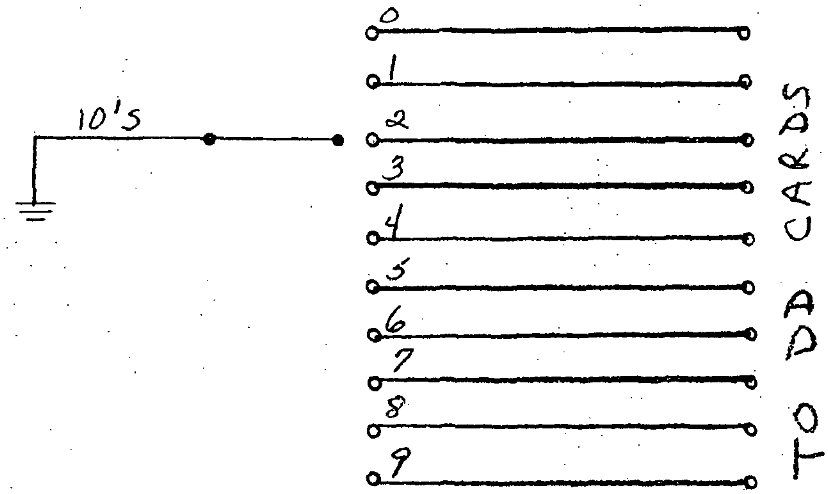
E (1) A	F (10) B	G (100) C	H Sign D		E (1) A	F (10) B	G (100) C	H Sign D

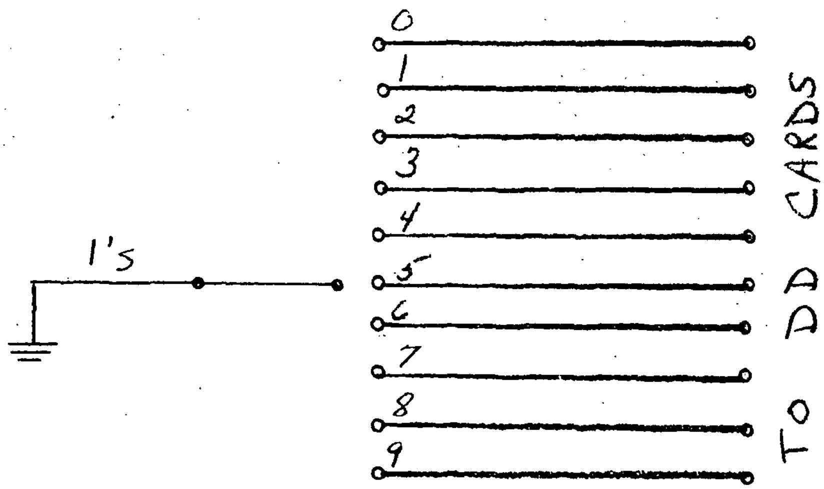
$\underbrace{Y}_{G4}$ $\underbrace{X}_{F4}$

Note 8: View is from the Rear Panel, Looking Forward

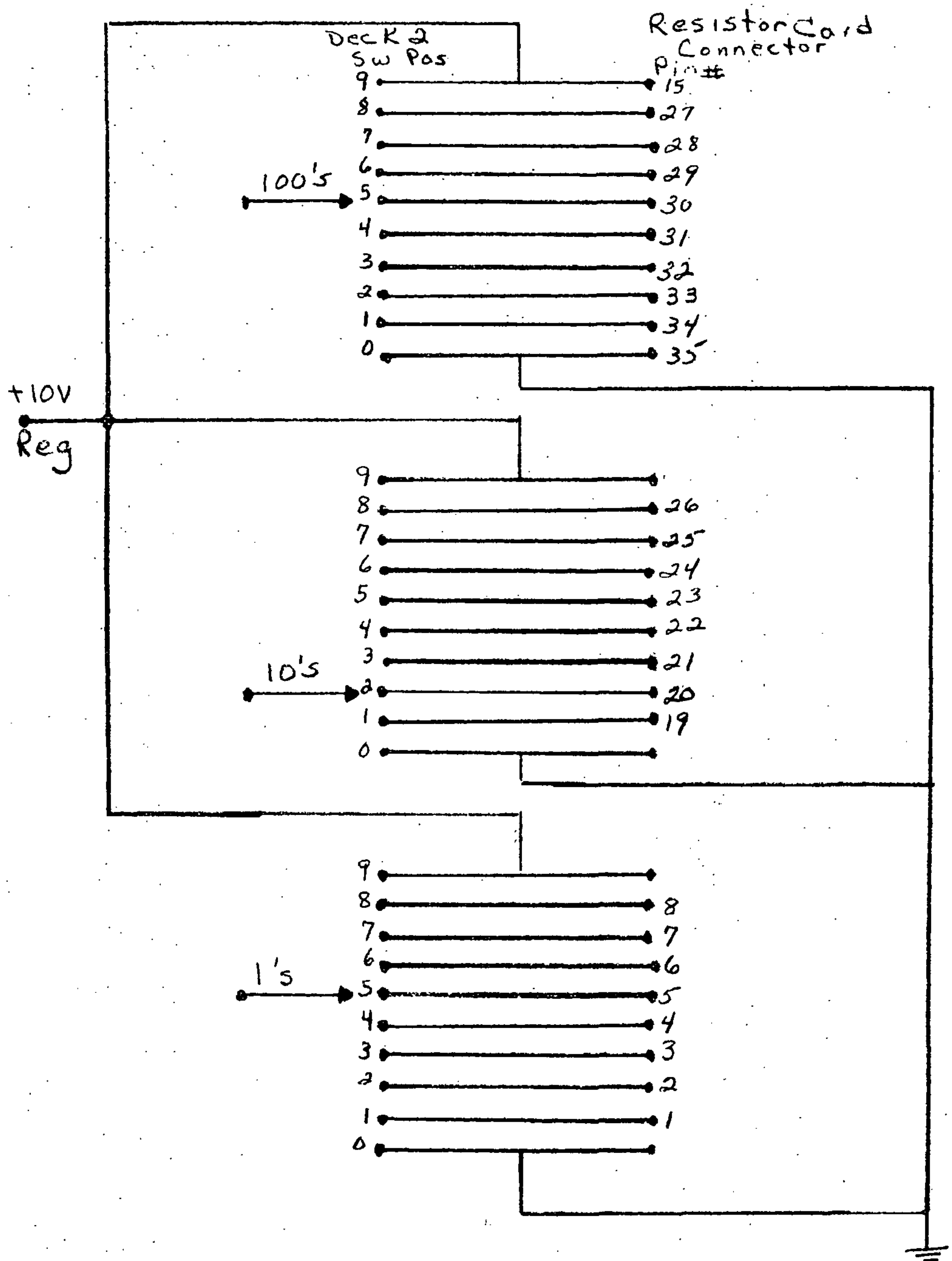
Thumbwheel Switch Wiring
(Deck 1)



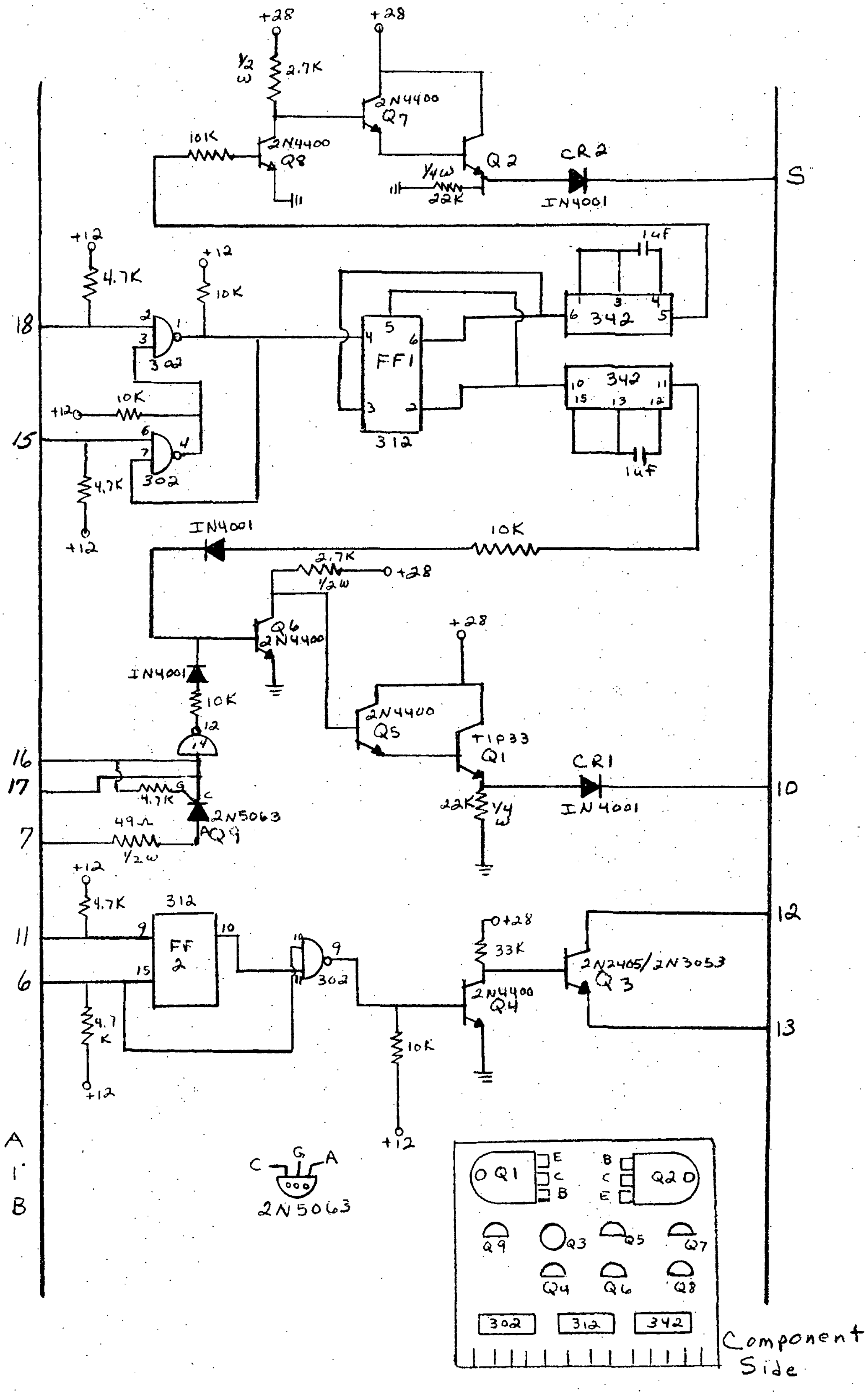




Thumbwheel Switch Wiring (Deck 2)

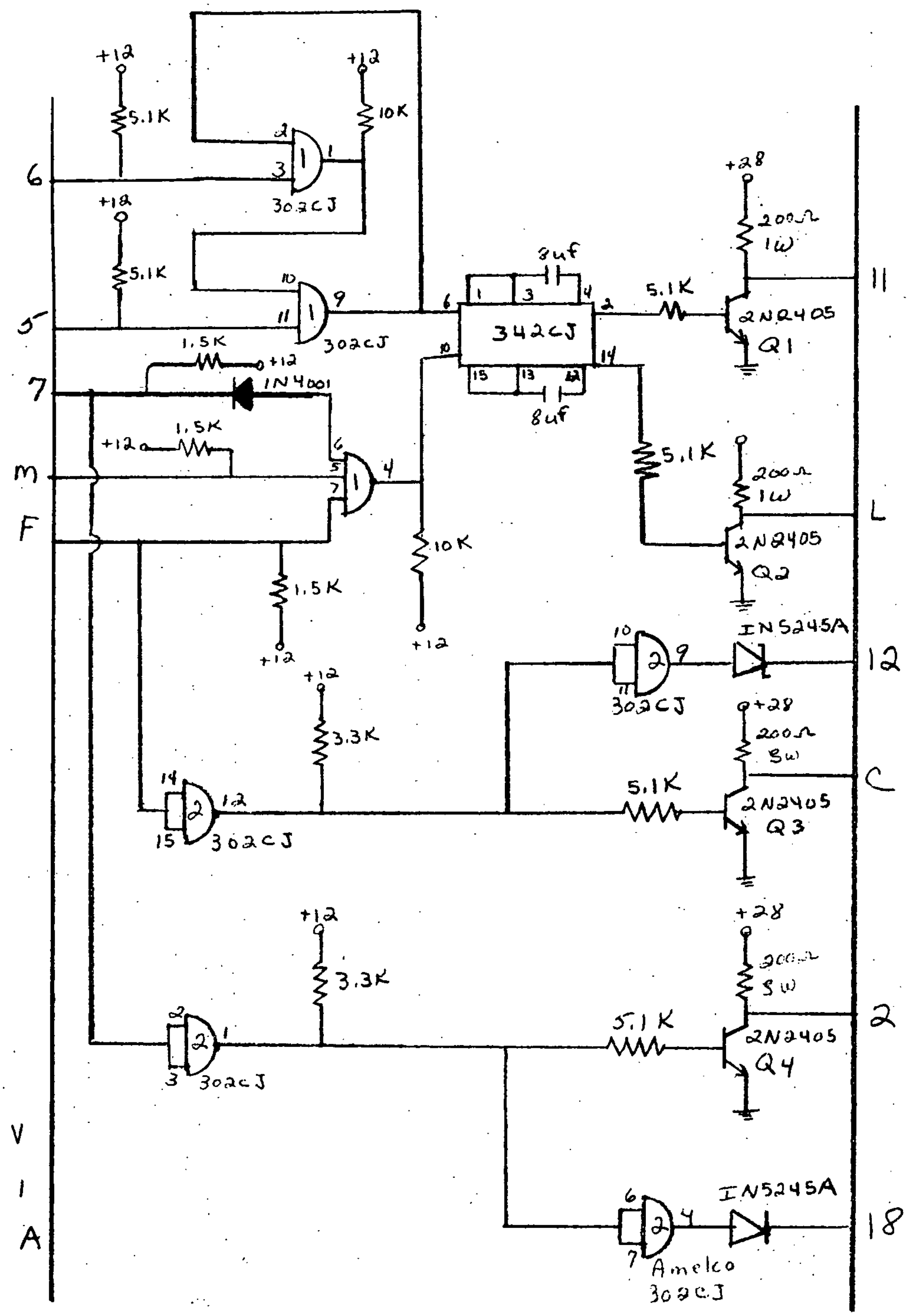


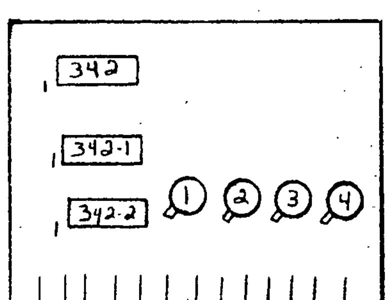
Shutter Ckt Board (vector)



View/Guide Mirror Board

(OBSOLETE)

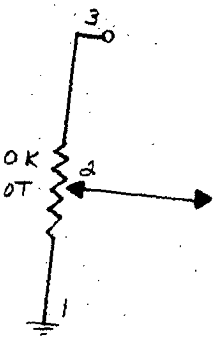




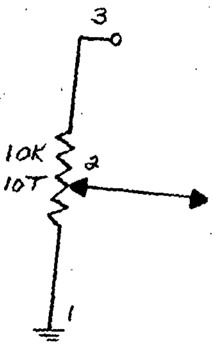
Component Side Up

Guidance Panel (Rear)

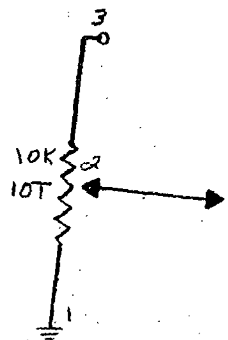
X Error Centering



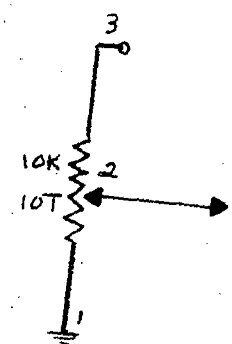
Y Error Centering



H.V. Gain Control



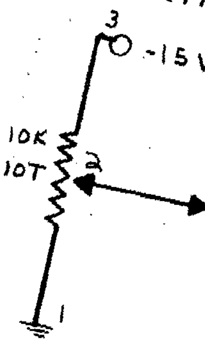
H.V. Limit Control



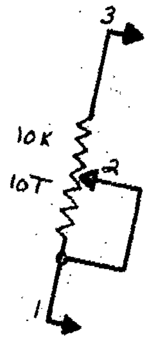
Guidance Panel (Rear)

Y Offset gain

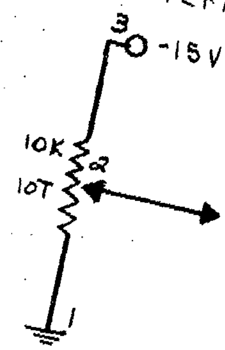
Y Centering Offset



Y Center Coord. gain

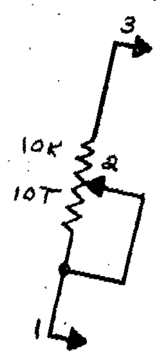


X Centering Offset



X Offset Gain

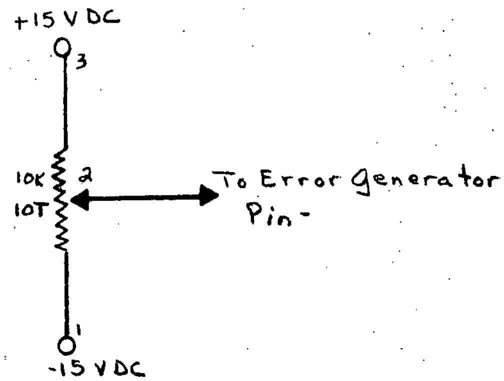
X Center Coord. gain



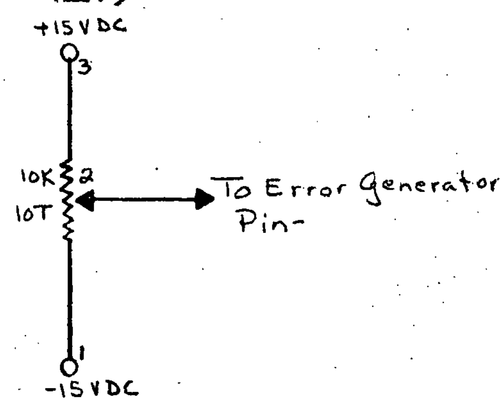
Guidance Panel (Front)

Switch

Vernier Offset Control (ΔX)

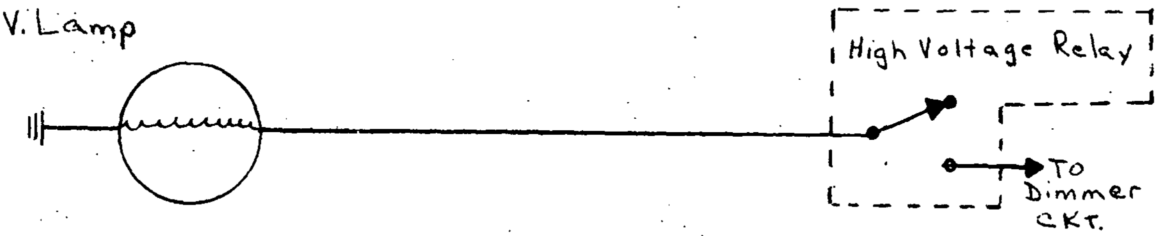


Vernier Offset Control (ΔY)



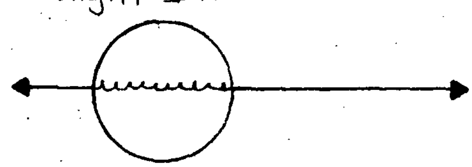
Panel Lamps

H.V. Lamp

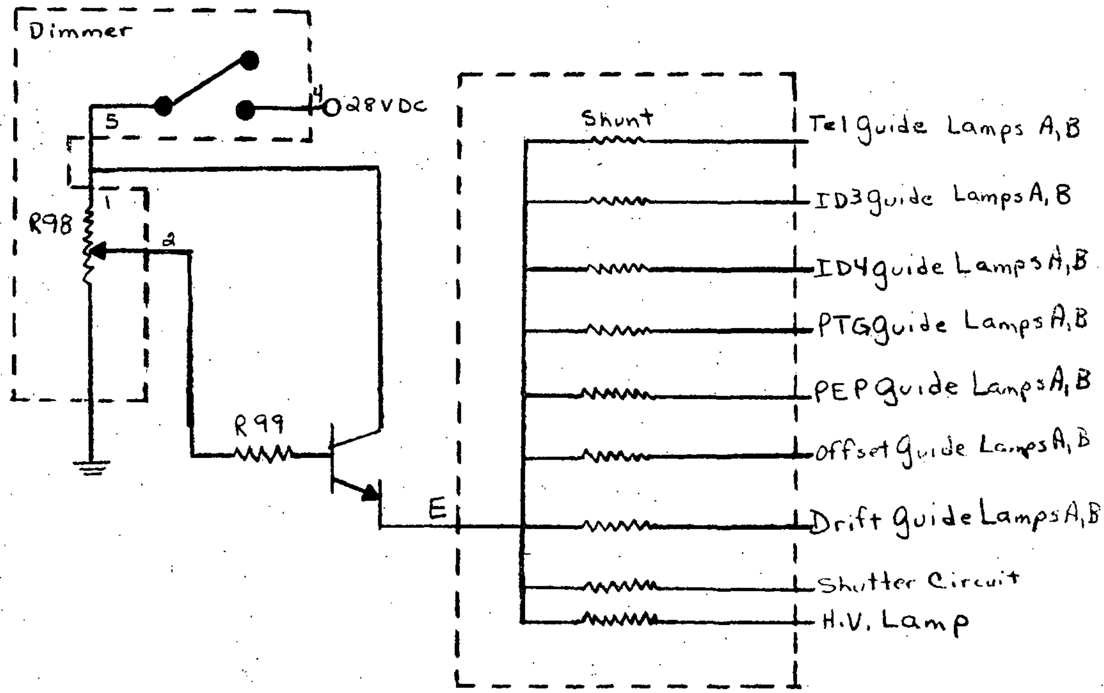


Lock Detector Lamp

Offset Light Indicator

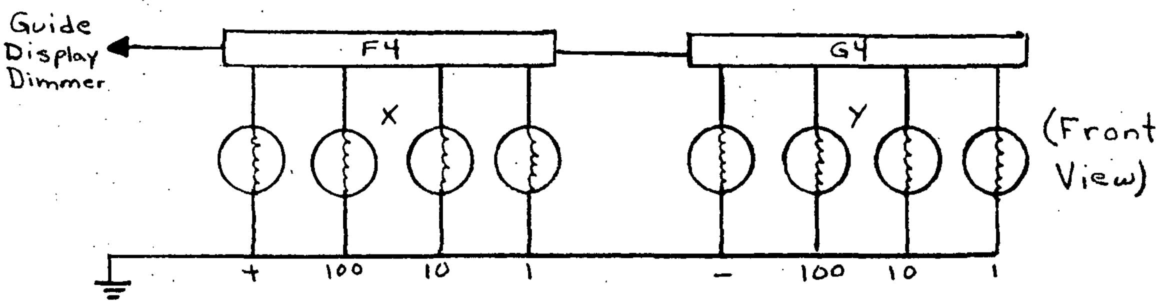


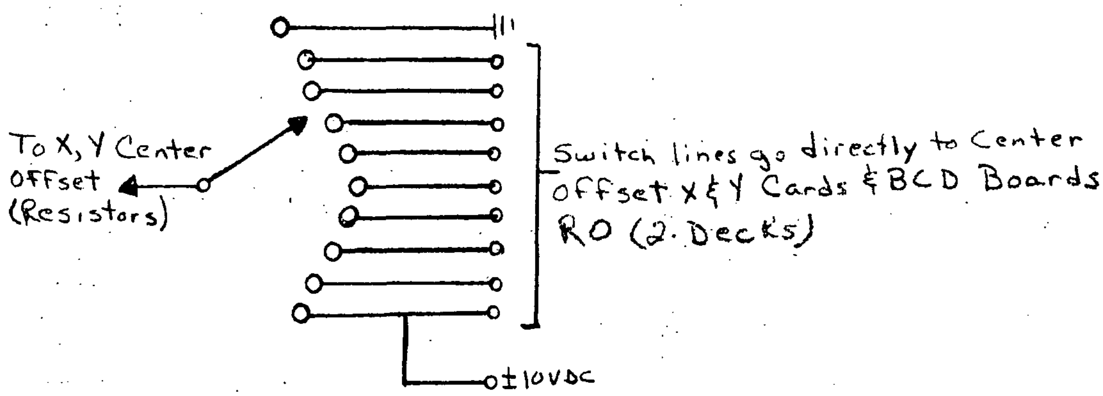
Dimmer Circuit



Note: Transistor on heat sink,
Pot and Switch on Front Panel

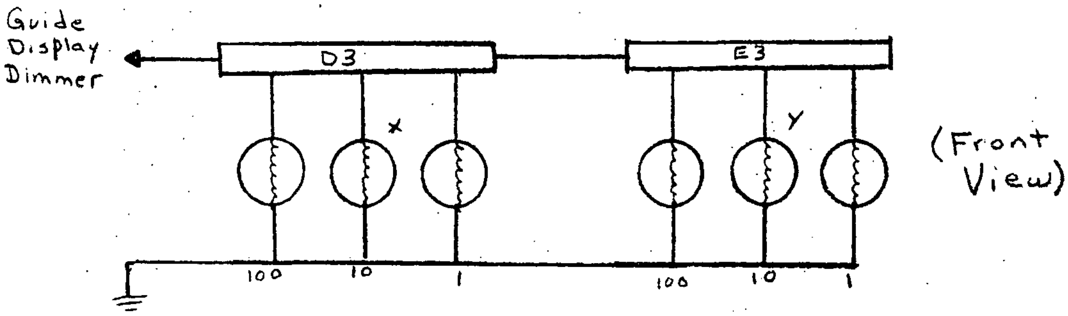
Center Offsets Sw.

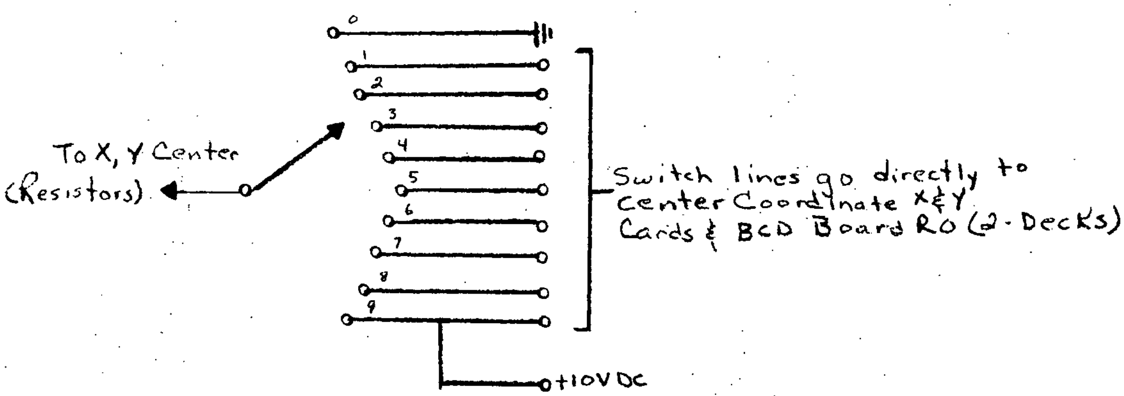




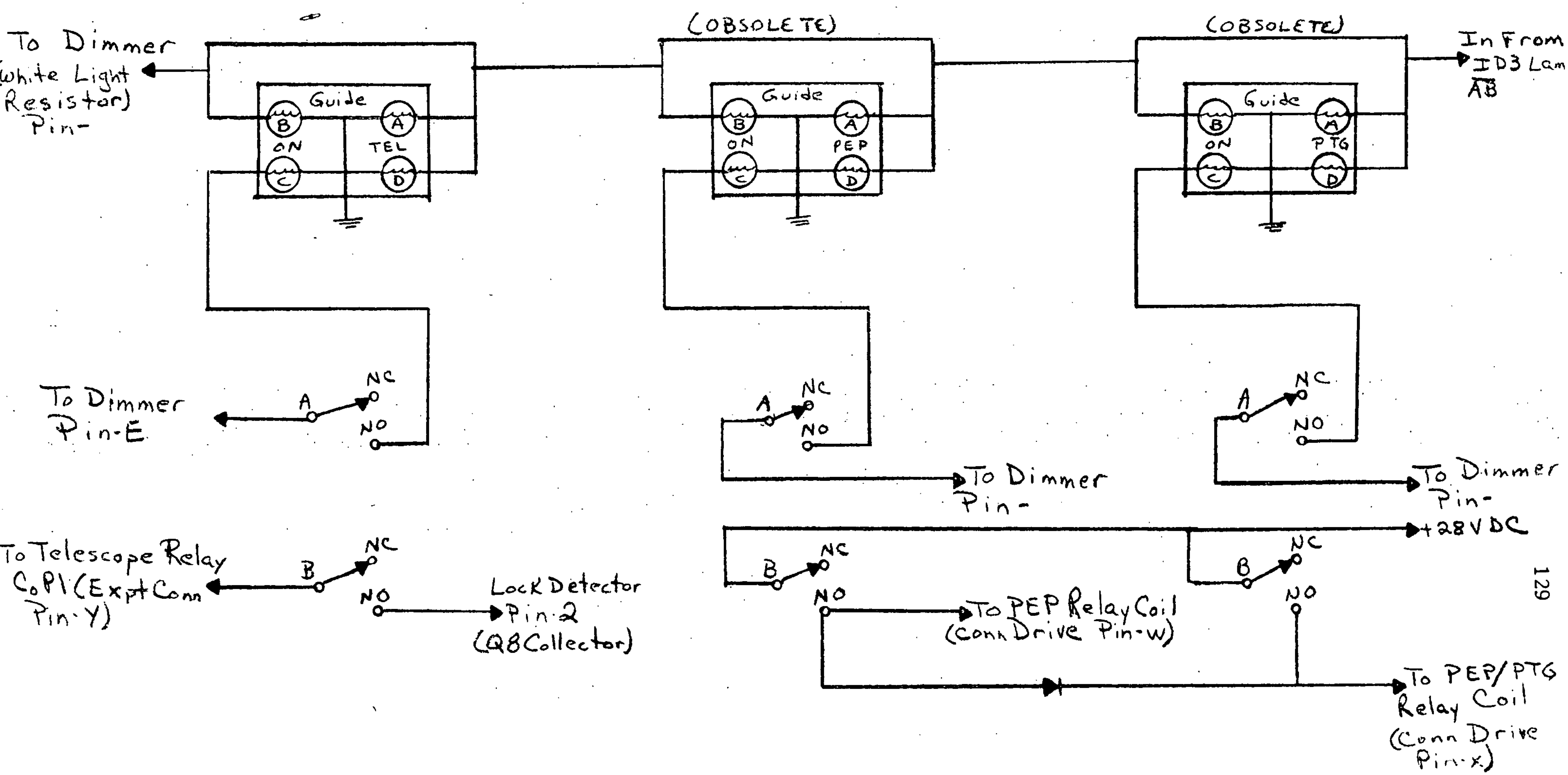
Note: A- Sign receives −10v from Voltage Regulators
B- Sign receives +10v from Voltage Regulators

Center Coordinate Sw

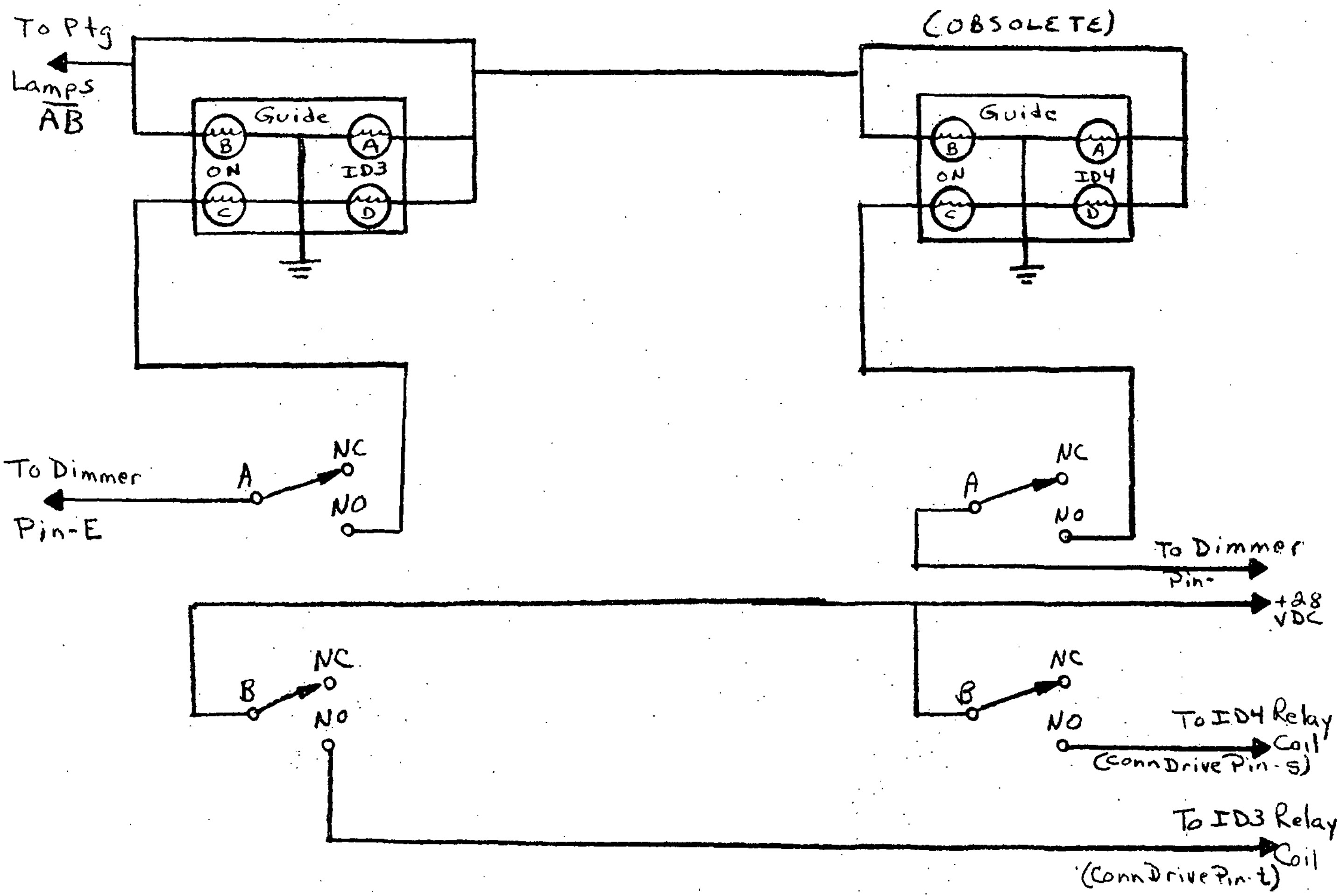




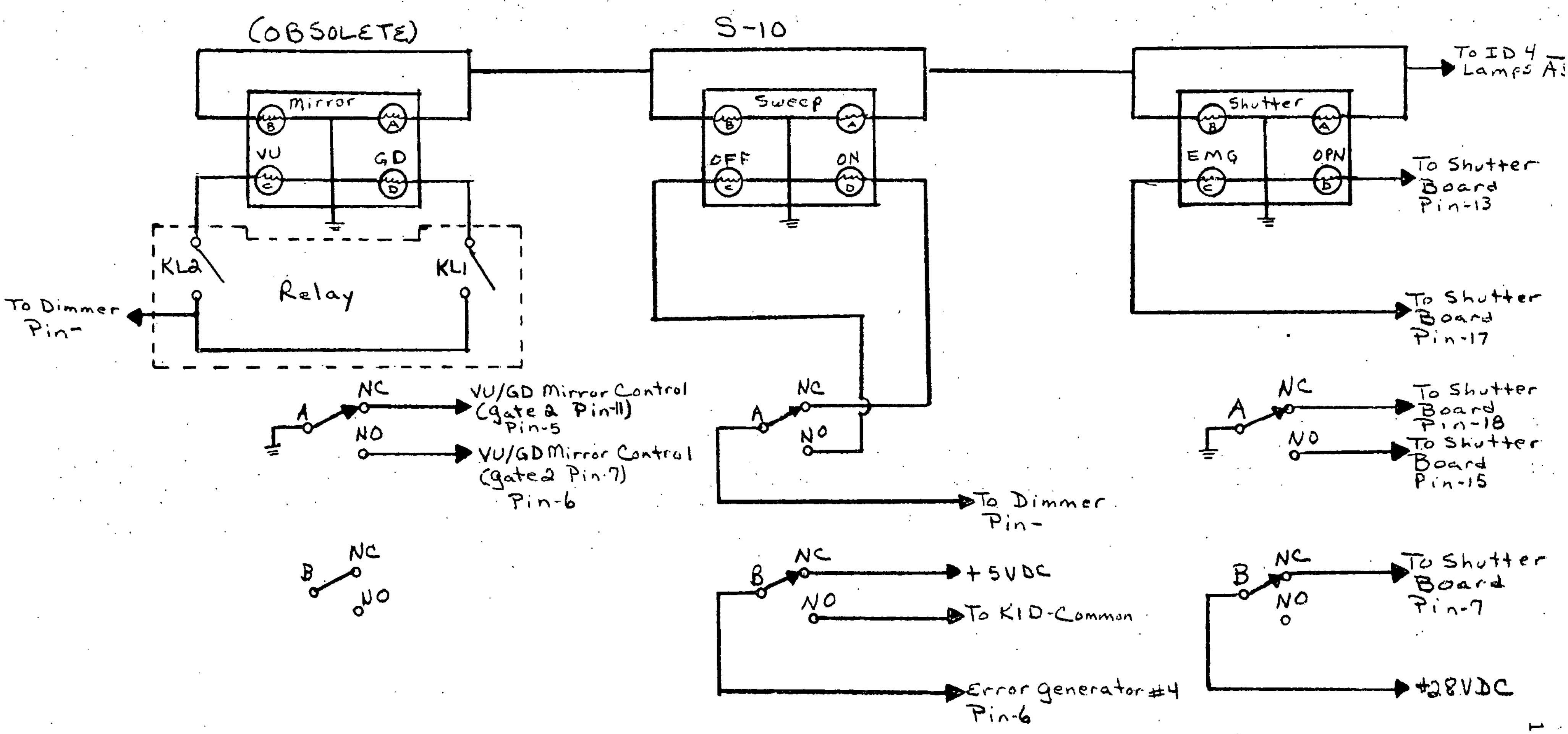
Guide Signal Switches



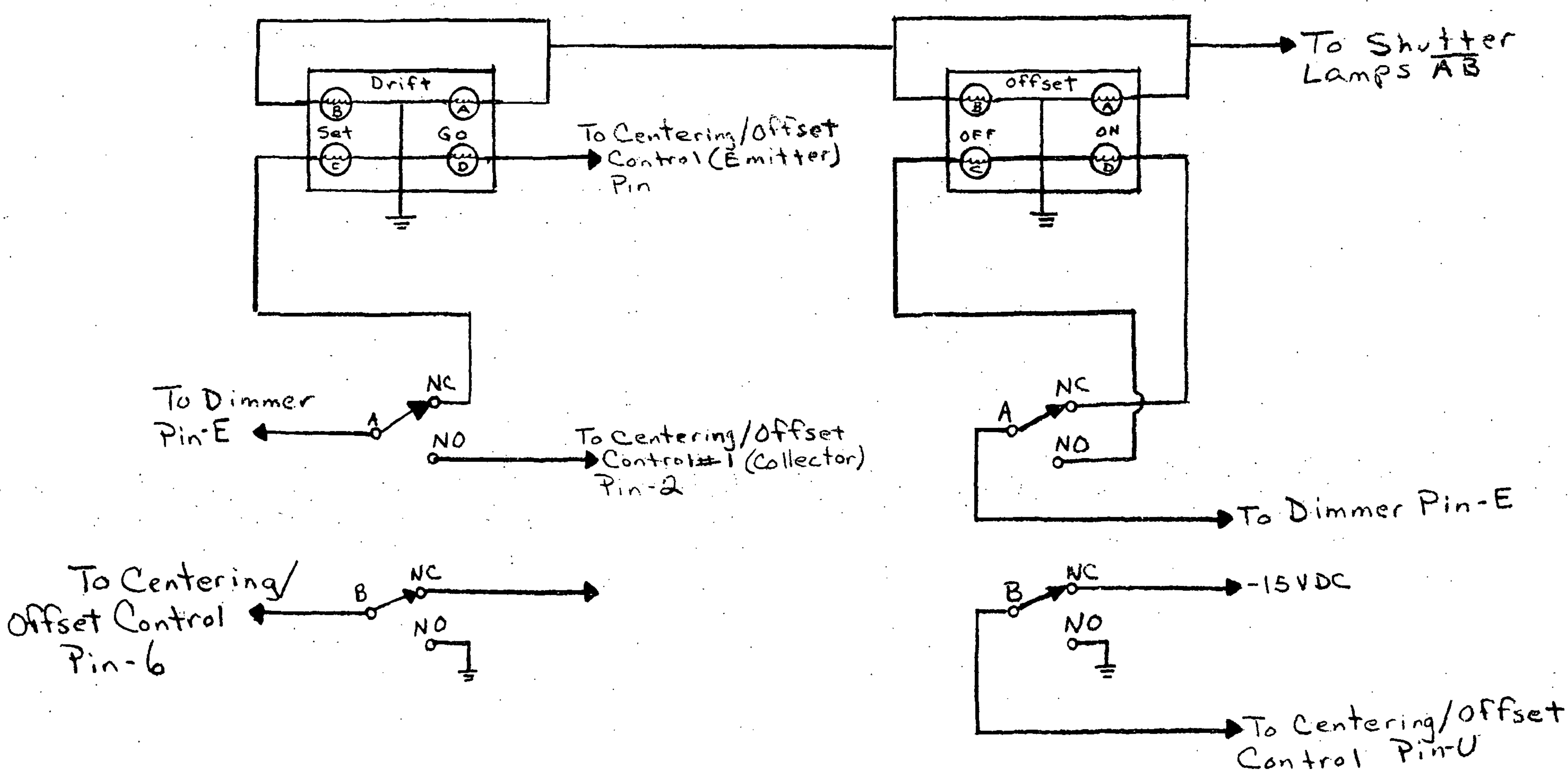
Guide Signal Switches

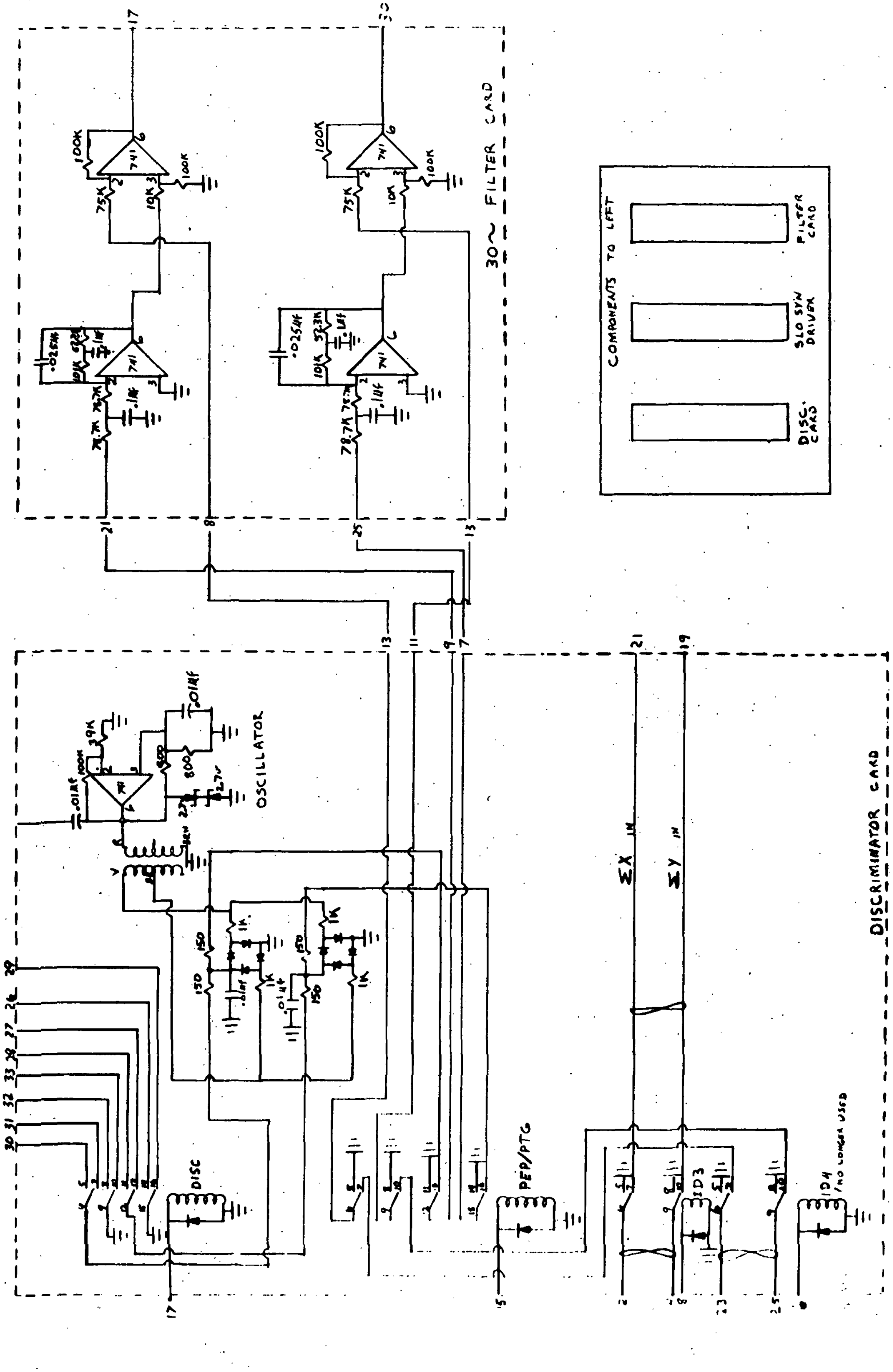


Guide Scan Switches



Drift/Offset Switches (guide)





DRIVER MODULE

EXPERIMENT SELECT

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Panel Switches (ρ)	135
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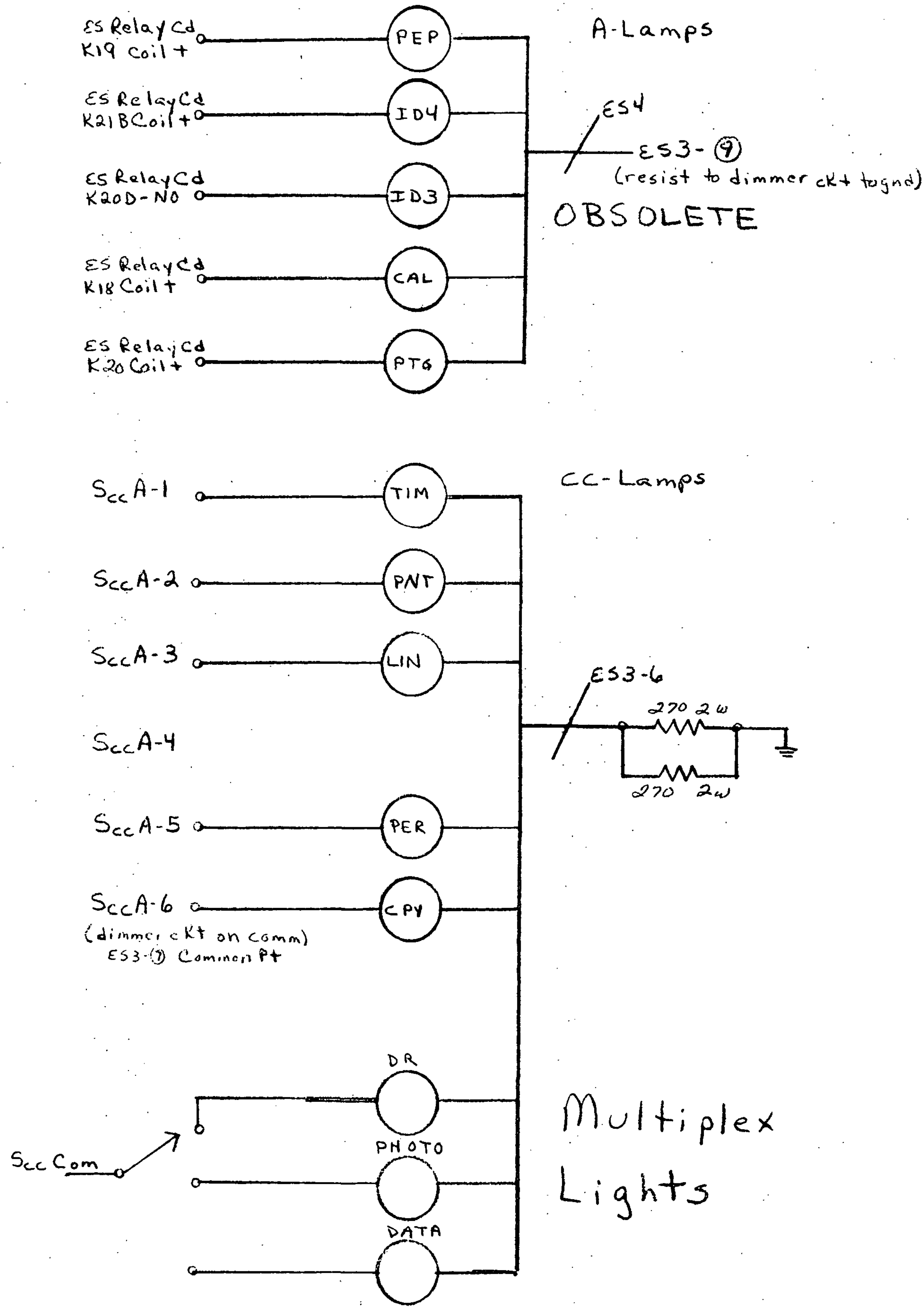
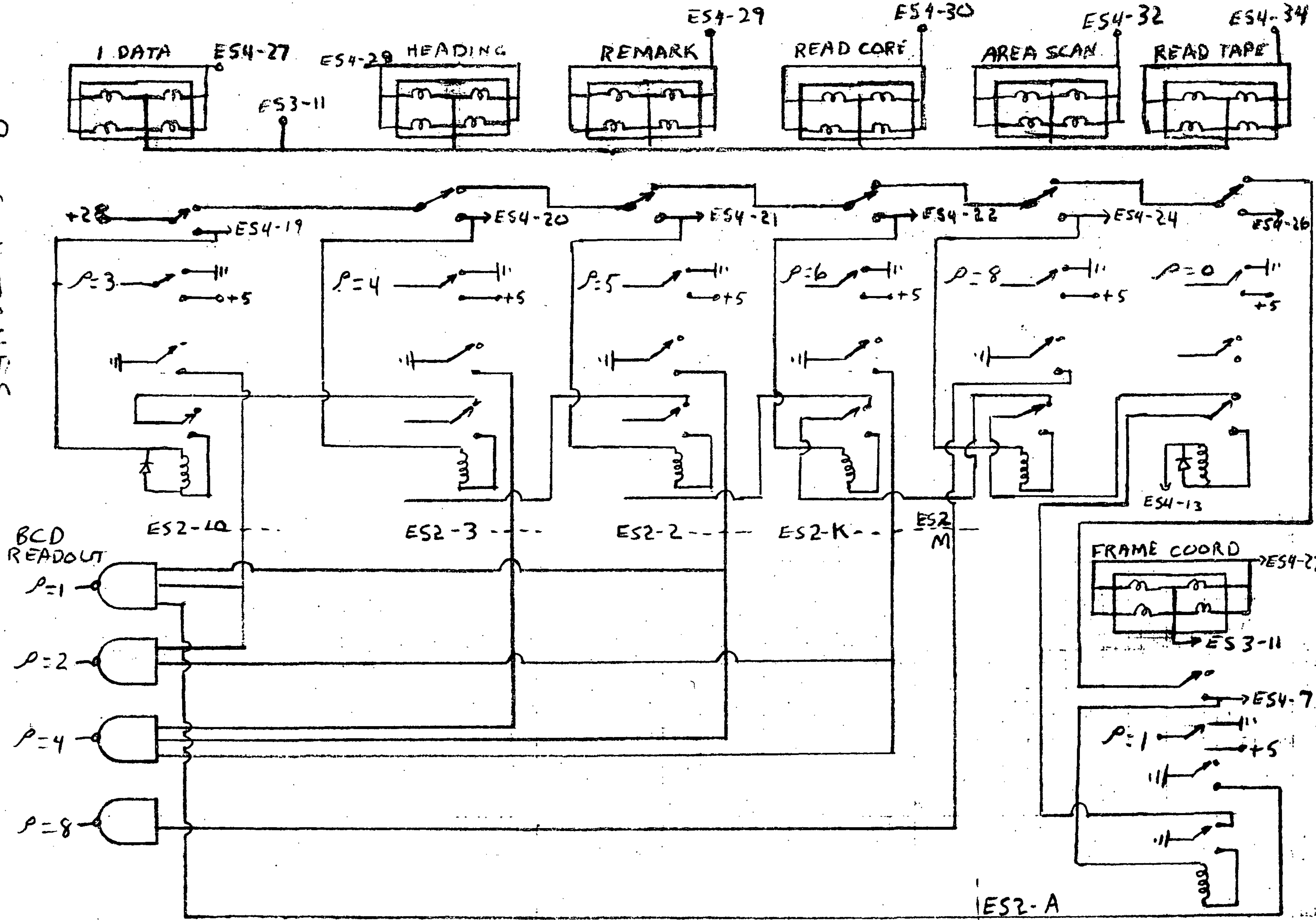
ES 1 Card	137
ES 2 Card	138
ES 3 Card	139
ES 4 Card	140
ES Dimmer	141

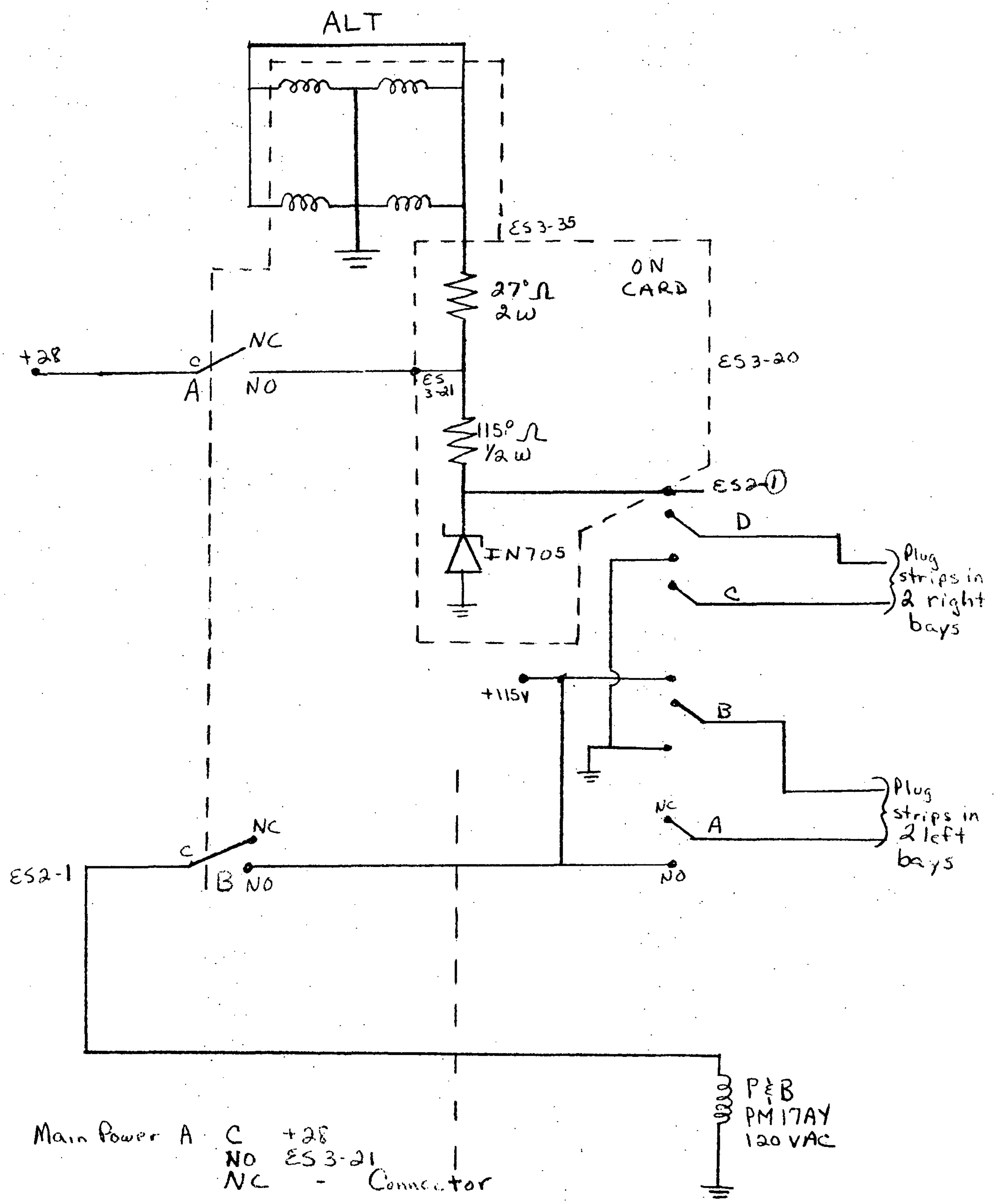
Panel Lamps (ES)




I DATA
ES4-27
ES4-28
HEADING
ES4-29
REMARK
ES4-30
READ CORE
ES4-32
AREA SCAN
ES4-34
READ TAPE
ES3-11
+28
ES4-19
ES4-20
ES4-21
ES4-22
ES4-24
ES4-26
ρ=3
ρ=4
ρ=5
ρ=6
ρ=8
ρ=0
+5
ES4-13
ES2-10
ES2-3
ES2-2
ES2-K
ES2 M
BCD READOUT
ρ=1
ρ=2
ρ=4
ρ=8
FRAME COORD
ES3-11
ES4-7
ρ=1
ES2-A

ρ SWITCHES

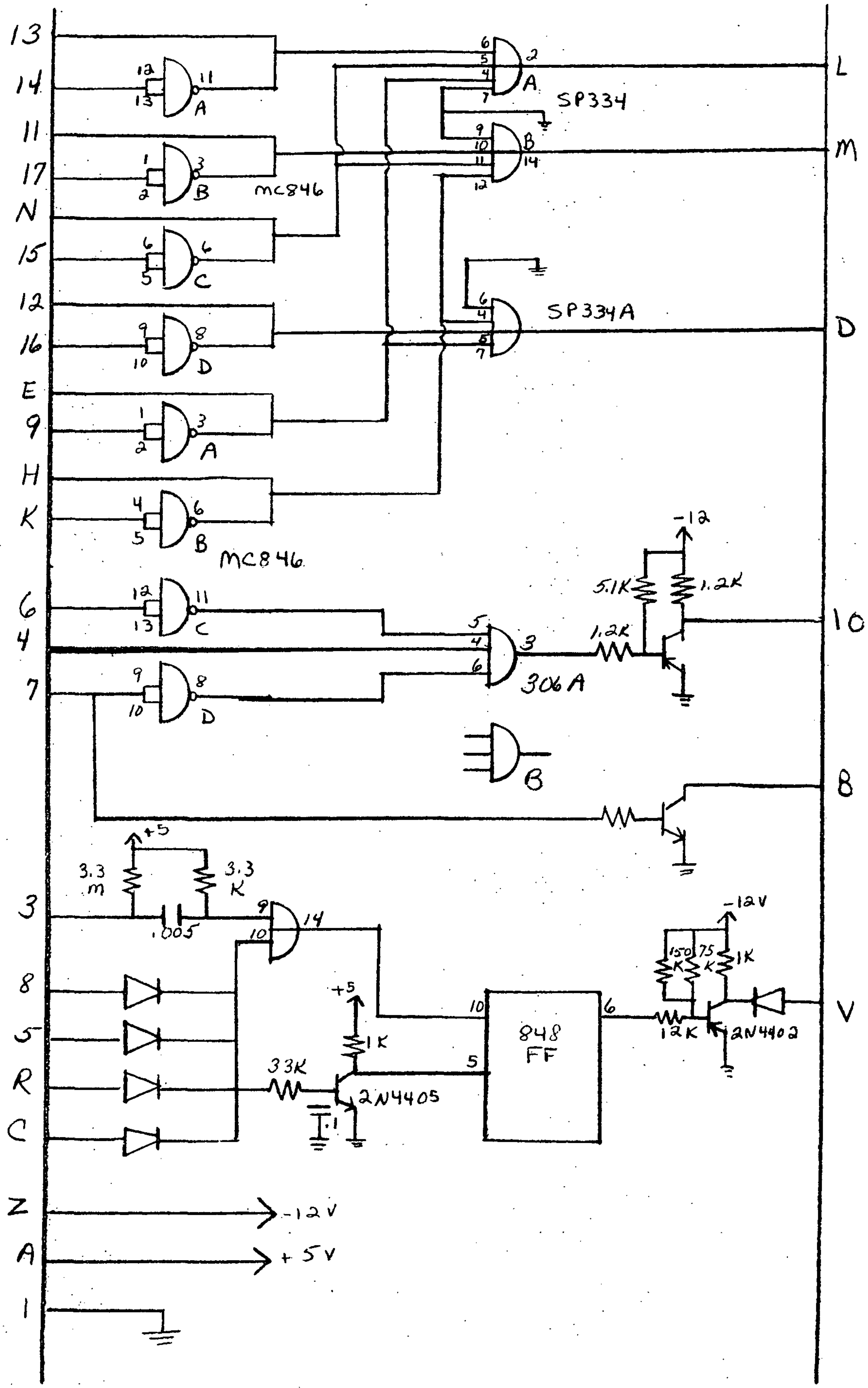
Main Power Sw



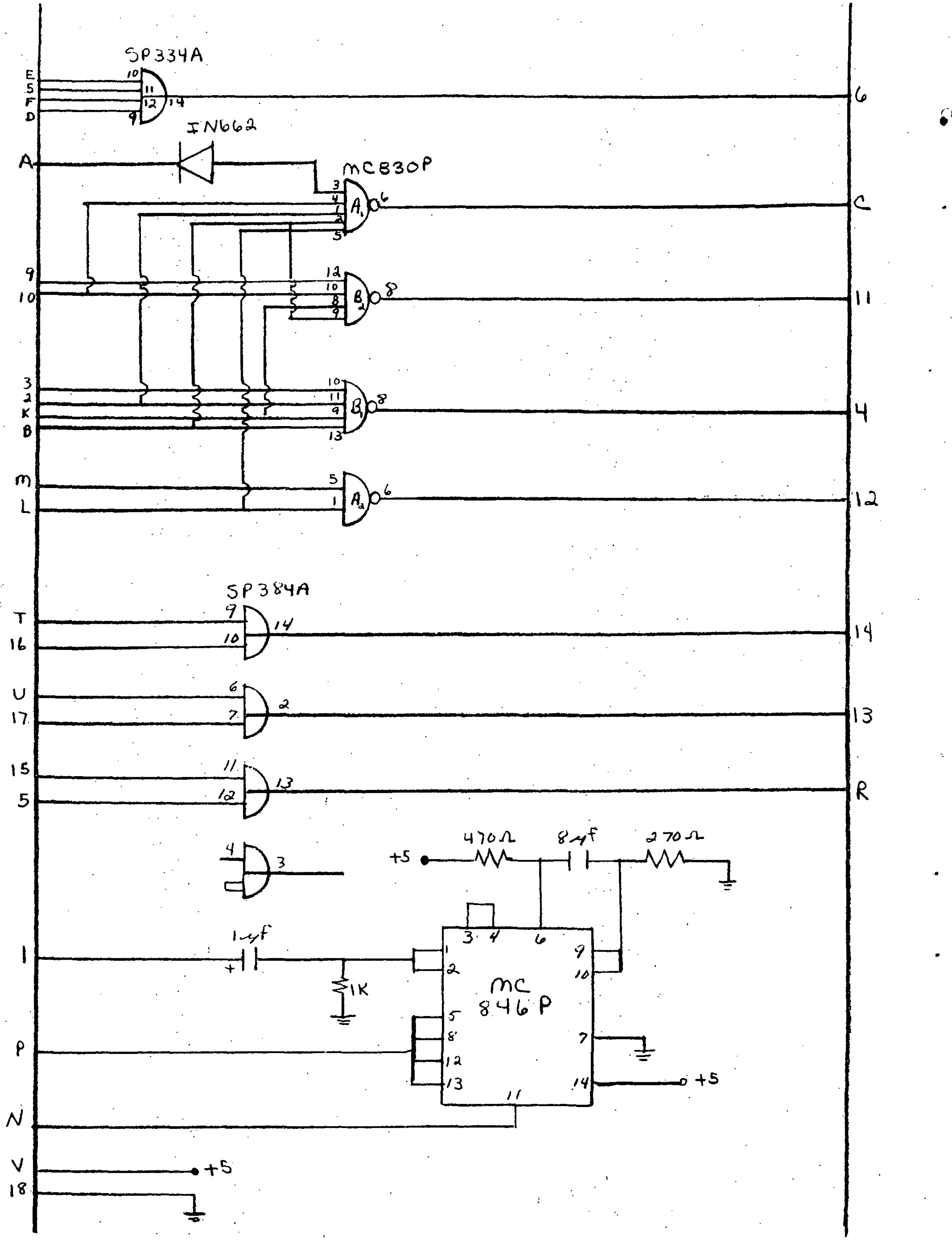
Main Power A C +28
NO ES3-21
NC - Connector

B C MP Relay Coil
NO 115v AC and 115v Relay
A&C NO Contacts

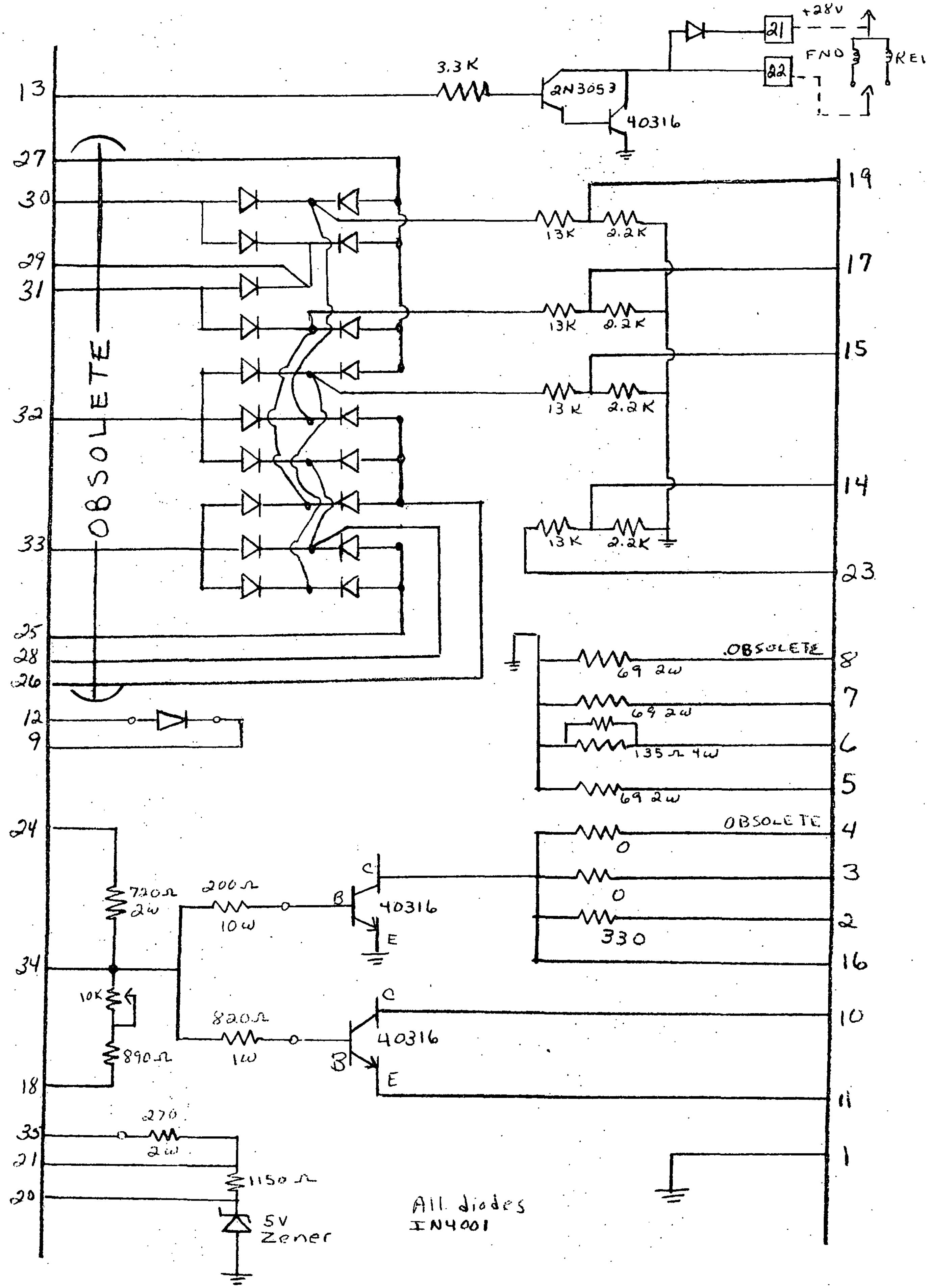
ESI Card (Triad)



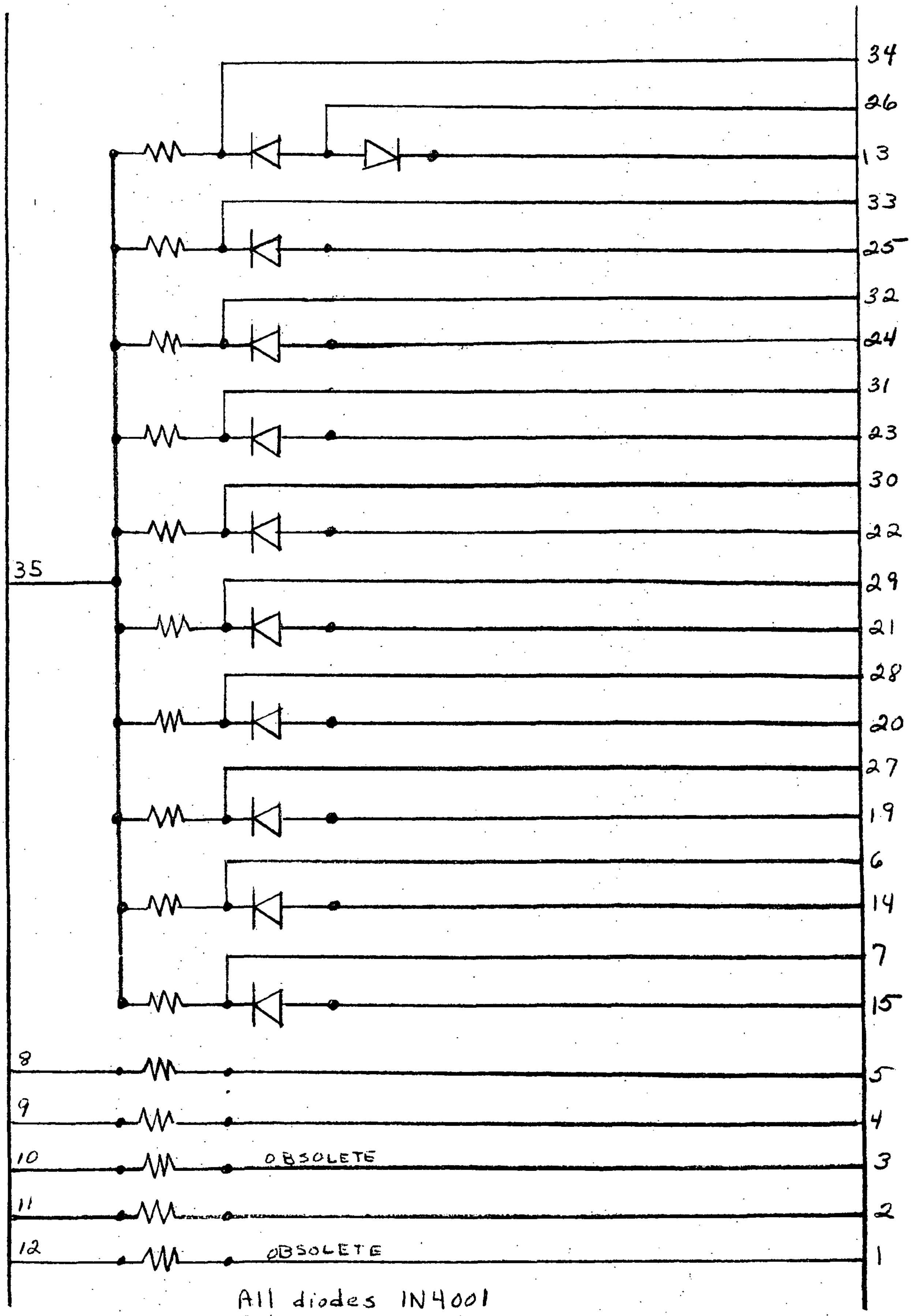
ES2 Card (Triad)



ES3 Card (Vector Board)

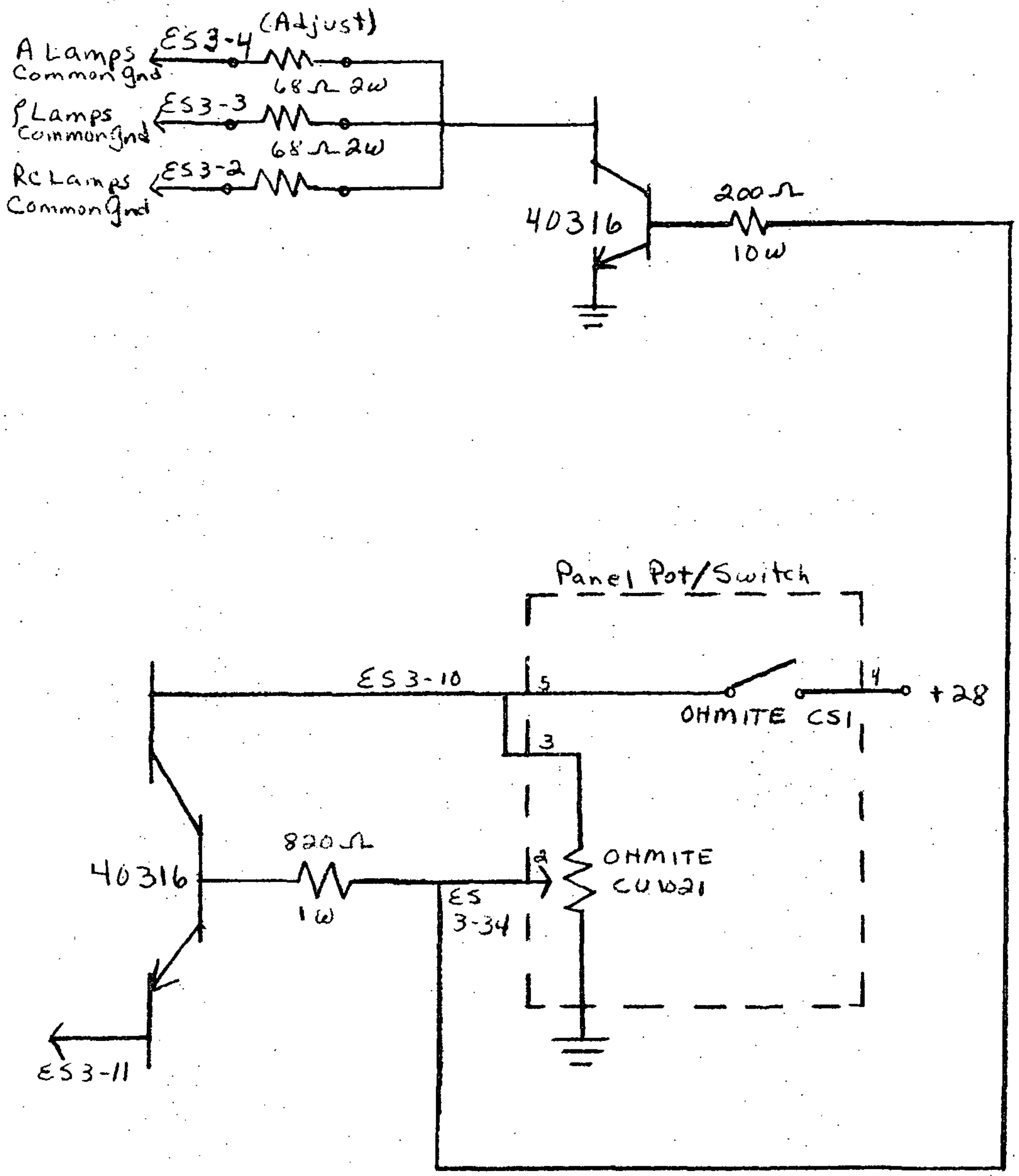


ES4 Card



All diodes IN4001
All resistors 82 Ω 2W

ES Dimmer Circuit



SIGNAL SECTION

SCHEMATIC INDEX

	Page
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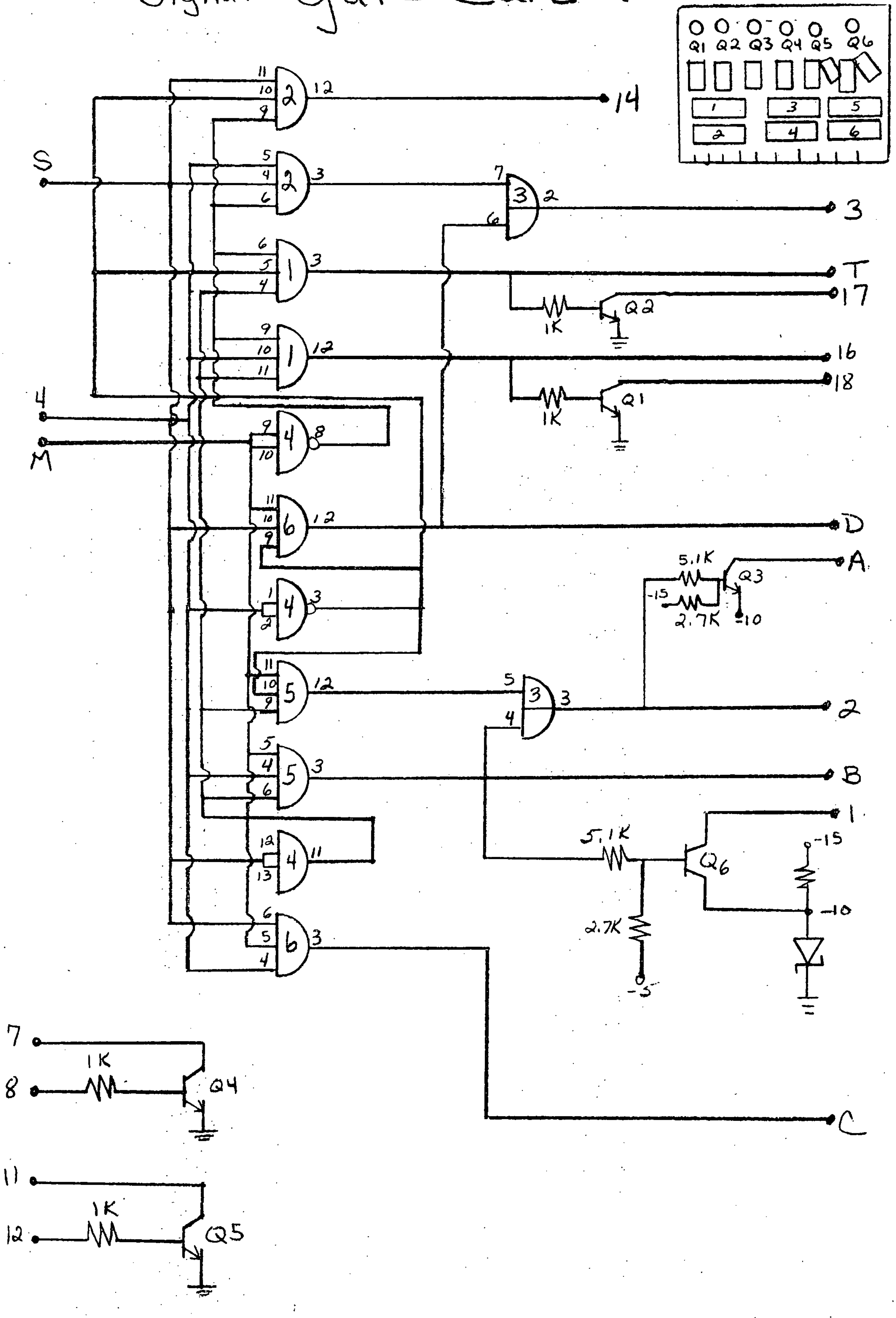
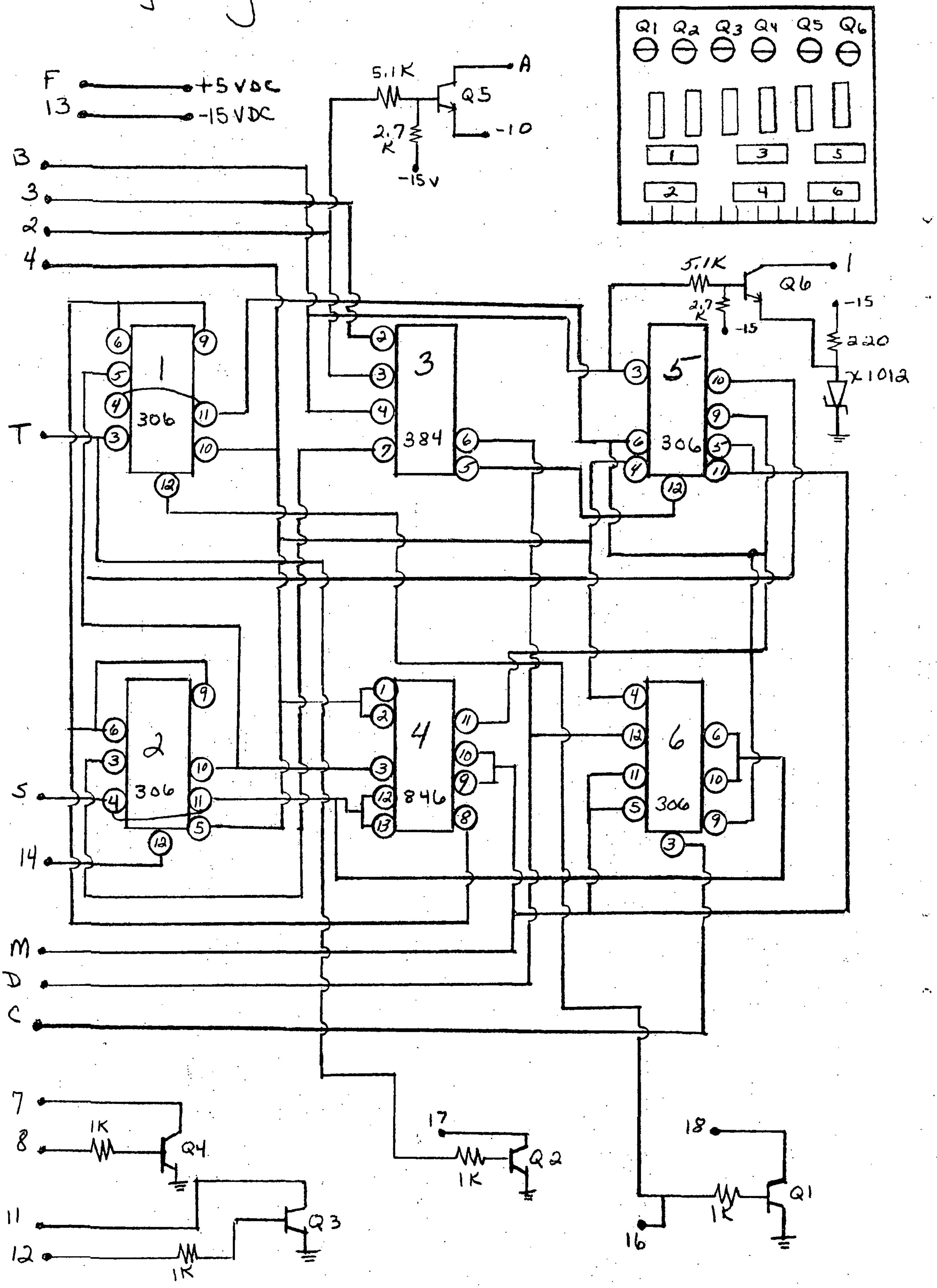
Gate Card	143
Scale A+ Card	144
DC 2/3 Amp	145
Signal Box Connection (M III)	146
Prescaler	147
Discriminator	148
Logic Circuit Flow	149
Logic Circuit Flow	150

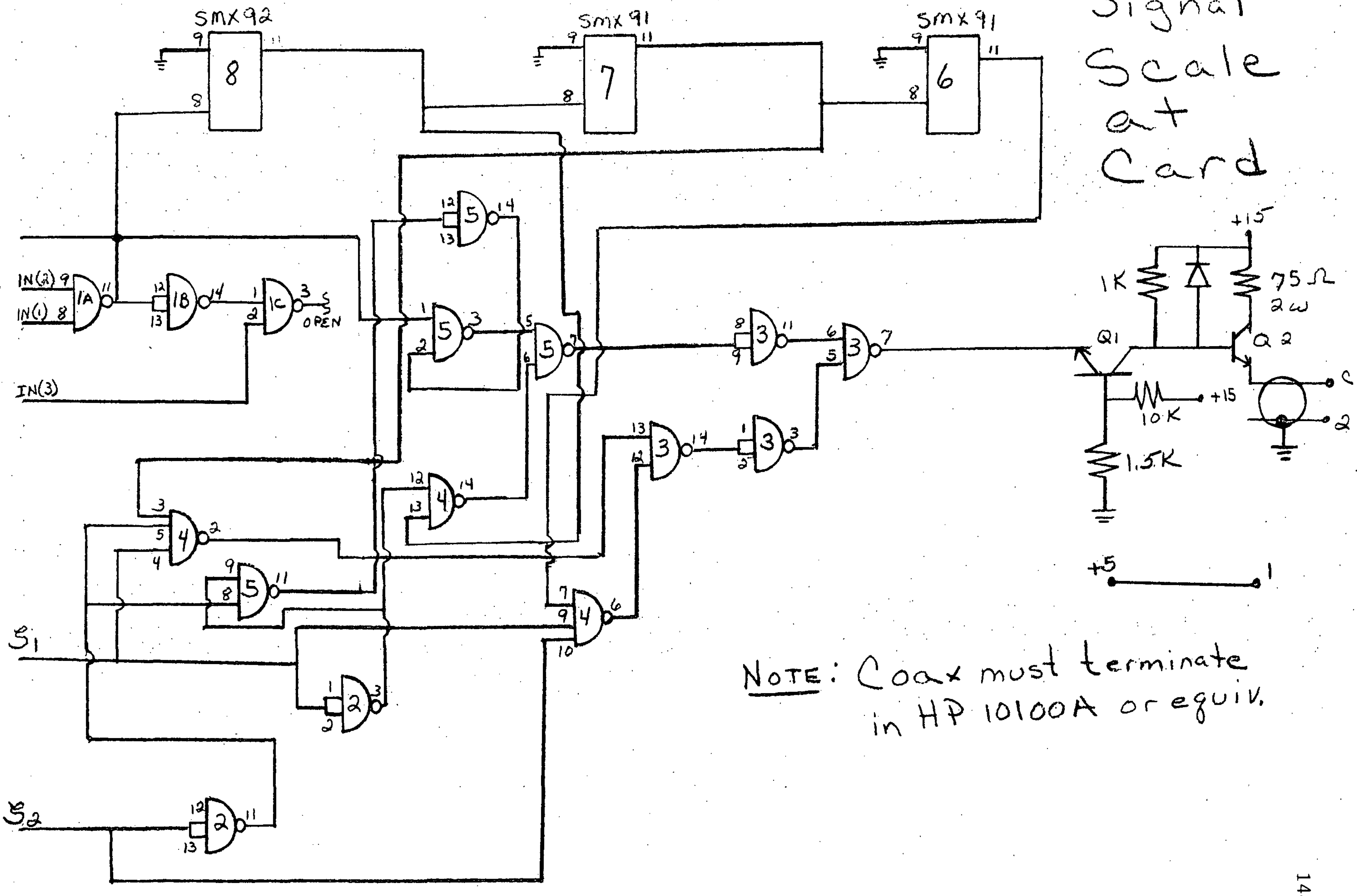
Signal Gate Card (MULTIPLEX)



Signal Gate Card

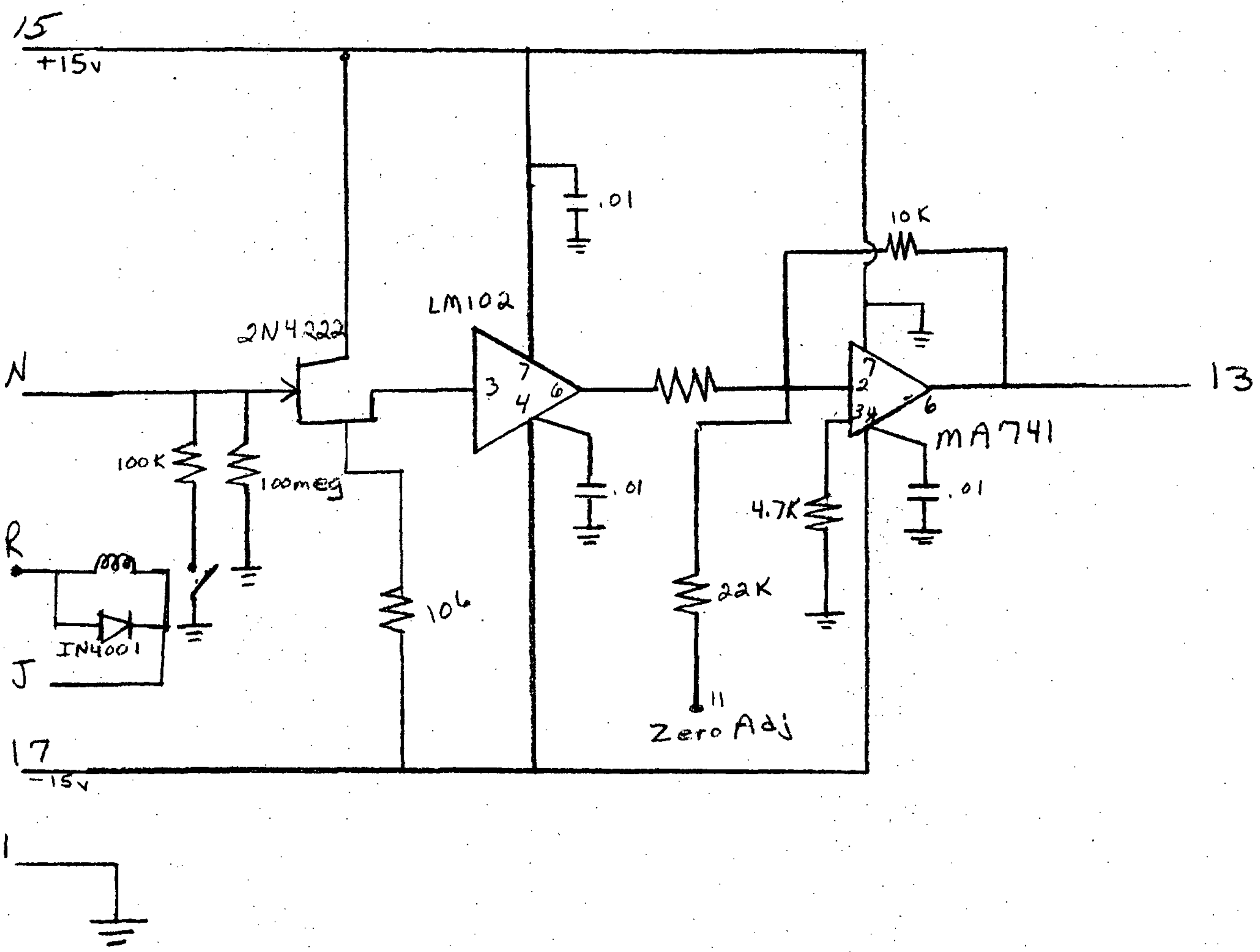


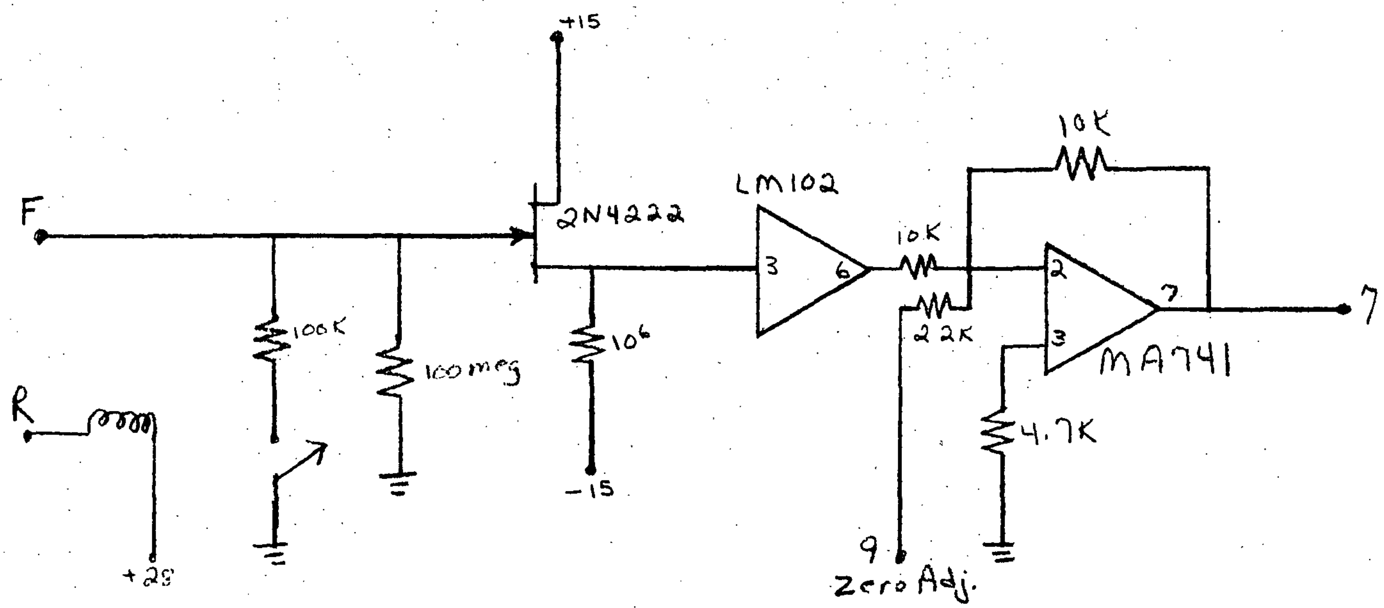
Signal Scale at Card

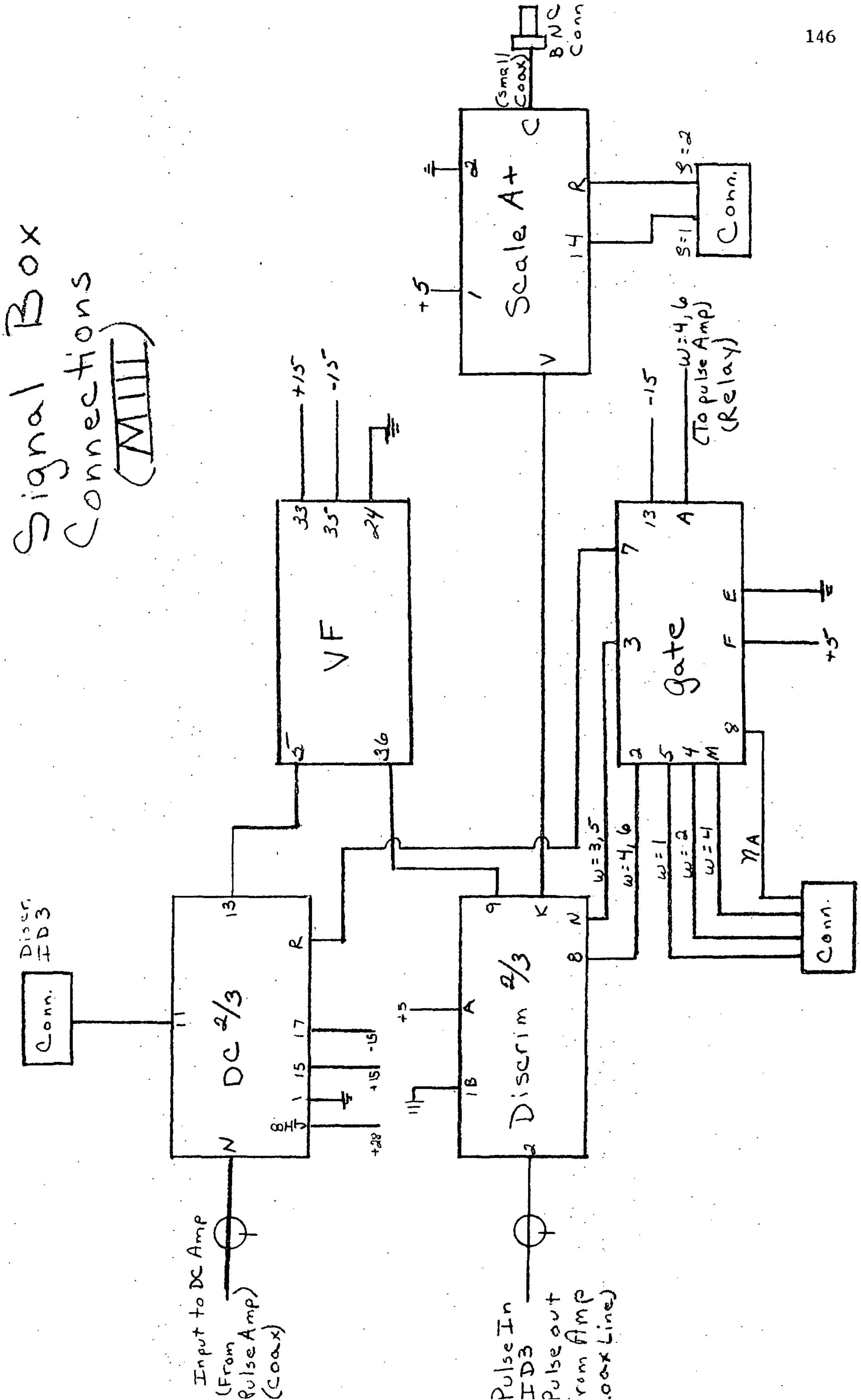


NOTE: Coax must terminate in HP 10100A or equiv.

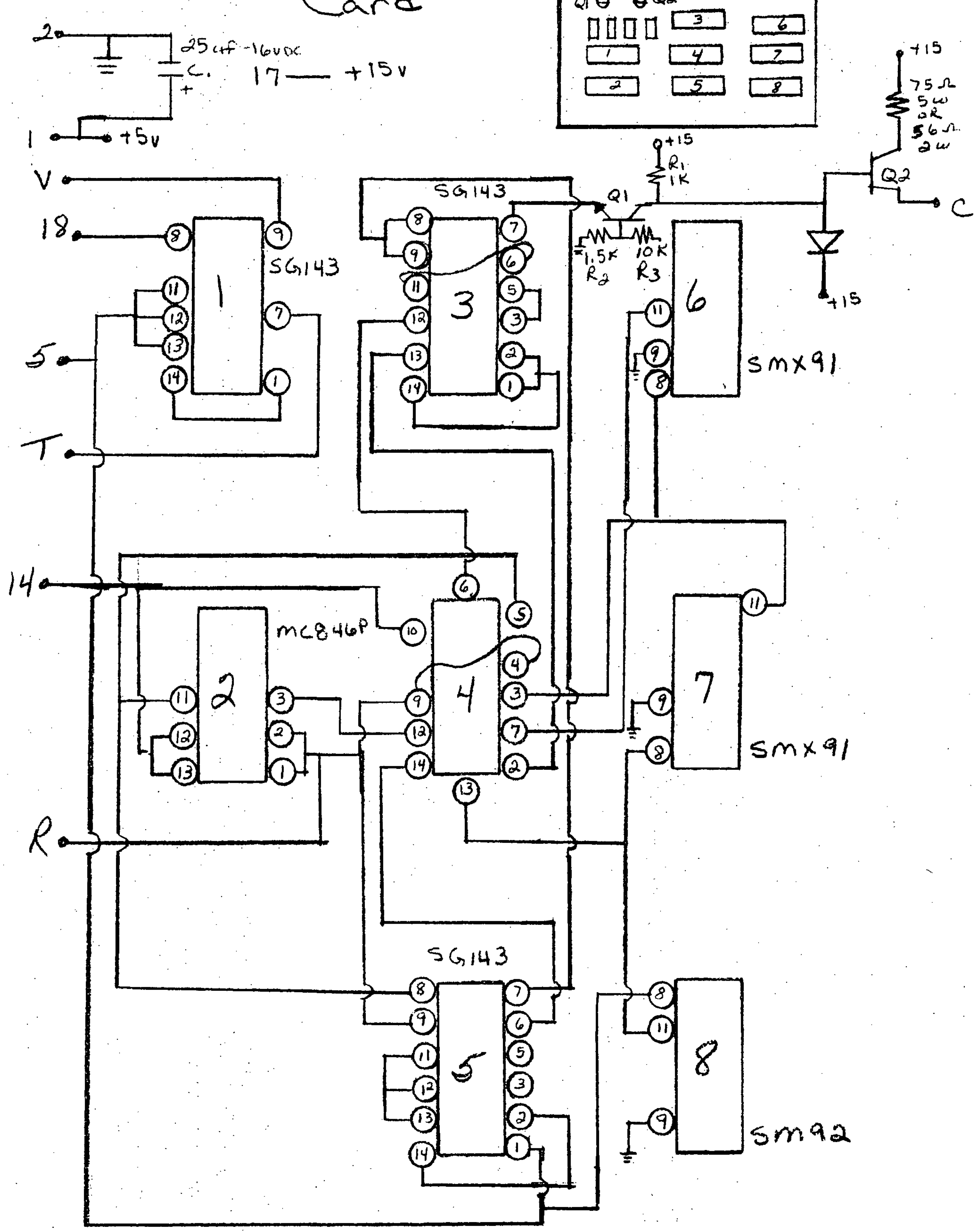
Signal S191 D.C. Amplifier Card

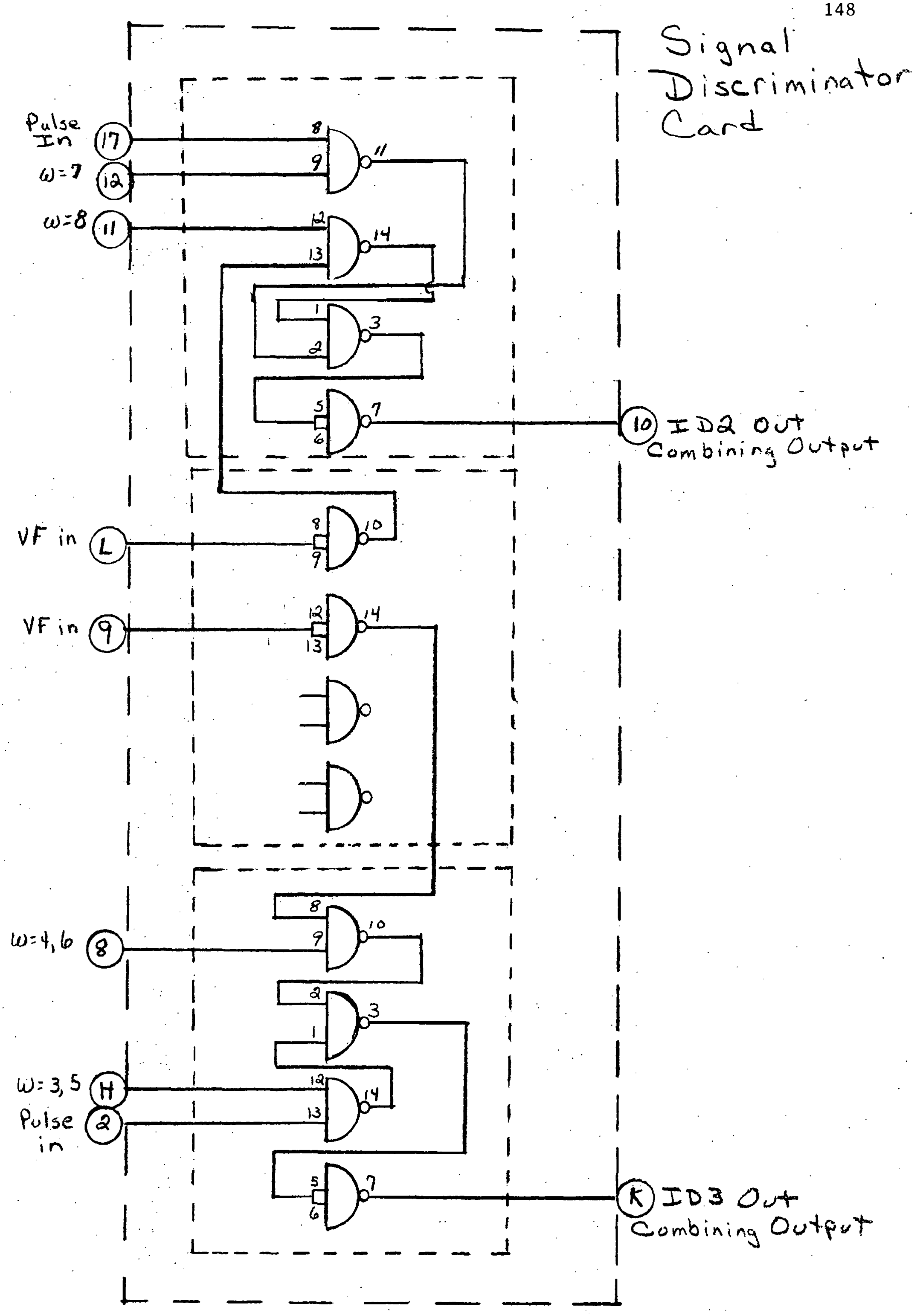


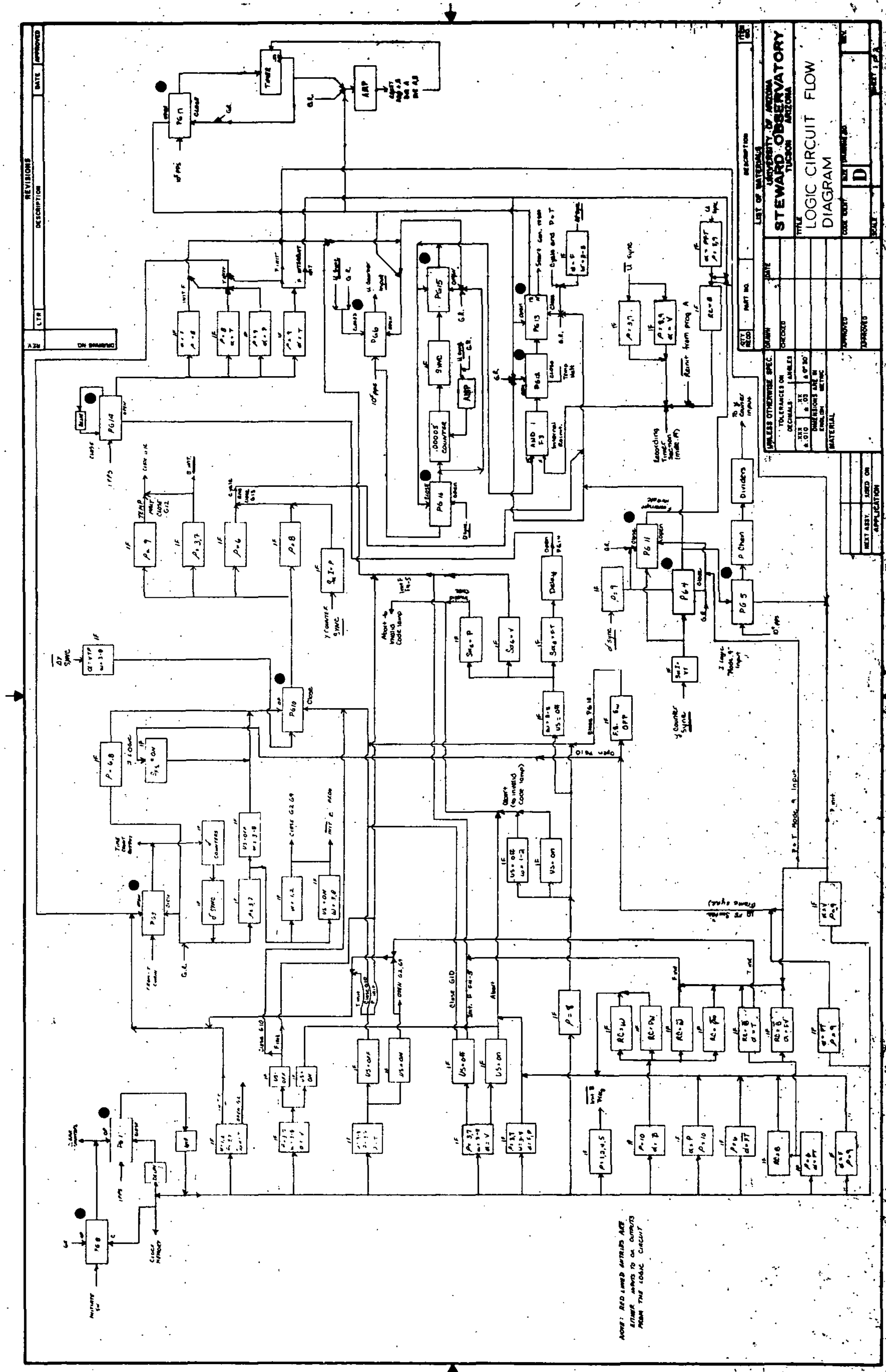


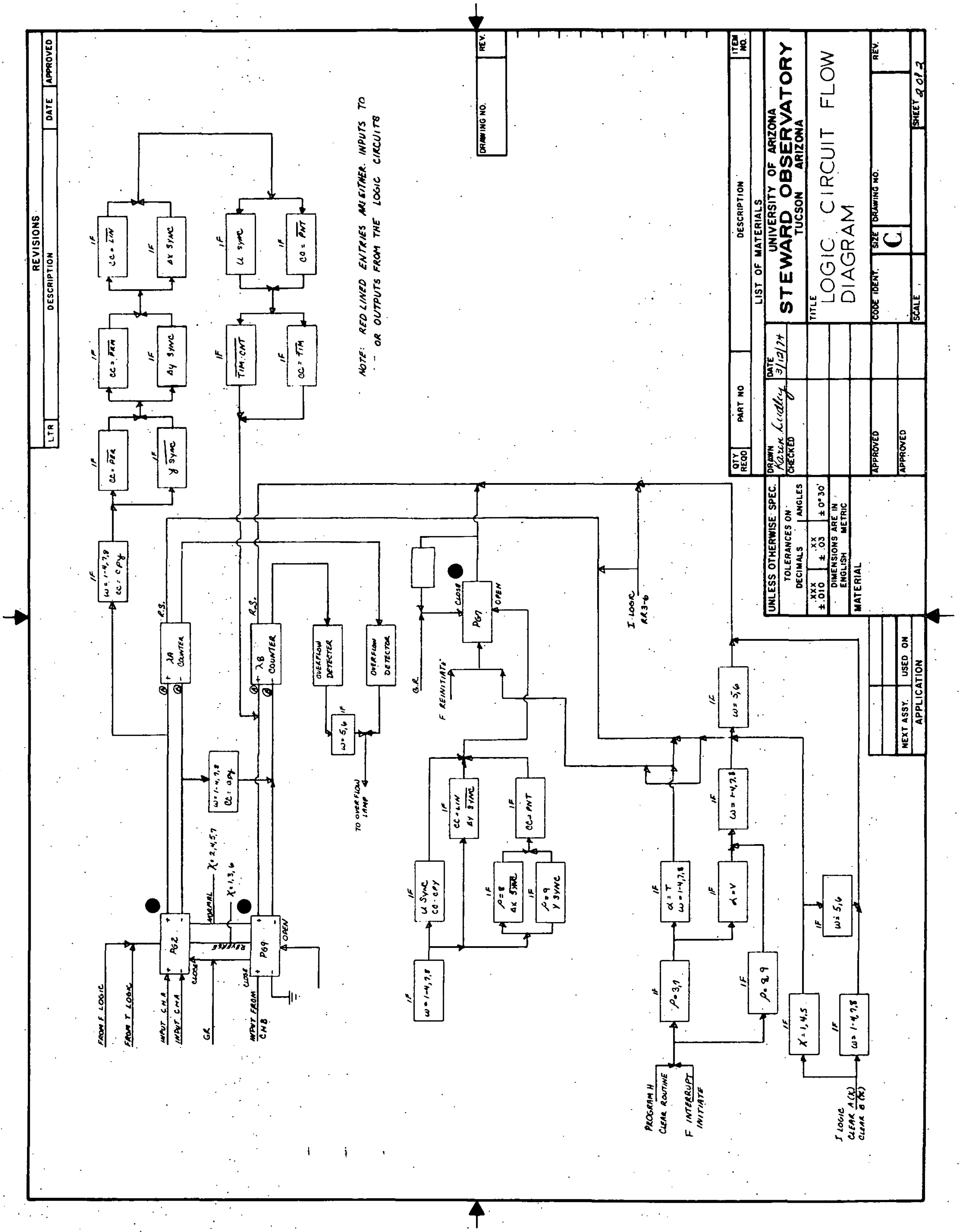

Signal Box Connections
(MIII)
Scale A+
VF
Gate
DC 2/3
Discrim 2/3
Conn.
BNC Conn.
(Small Coax)
Discr. ID3
w:4,6 (To pulse Amp) (Relay)
w=3,5
w:4,6
w=1
w=2
w=4
nA
Input to DC Amp
Pulse In

Signal Prescaler Card




Signal Discriminator Card
Pulse In
17
ω=7
12
ω=8
11
VF in
L
VF in
9
ω=4,6
8
ω=3,5
H
Pulse in
2
10
ID2 Out
Combining Output
K
ID3 Out
Combining Output


UNIVERSITY OF ARIZONA
STEWARD OBSERVATORY
TUCSON ARIZONA
LOGIC CIRCUIT FLOW DIAGRAM


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
REV.
DRAWING NO.
NOTE: RED LINED ENTRIES ARE EITHER INPUTS TO OR OUTPUTS FROM THE LOGIC CIRCUITS
OVERFLOW DETECTOR
OVERFLOW DETECTOR
TO OVERFLOW LAMP
FROM F LOGIC
FROM T LOGIC
INPUT CHA
INPUT CHA
INPUT FROM CHB
F REINITIATE
PROGRAM H CLEAR ROUTINE
F INTERRUPT INITIATE
I LOGIC CLEAR A(K) CLEAR B(K)
LIST OF MATERIALS
QTY REQD
PART NO
DESCRIPTION
ITEM NO.
UNIVERSITY OF ARIZONA
STEWARD OBSERVATORY
TUCSON ARIZONA
TITLE
LOGIC CIRCUIT FLOW DIAGRAM
DRAWN Karen Ludley
DATE 3/12/74
CHECKED
APPROVED
APPROVED
CODE IDENT.
SIZE C
DRAWING NO.
SCALE
SHEET 2 of 2
UNLESS OTHERWISE SPEC.
TOLERANCES ON:
DECIMALS
ANGLES
.XX ±.03
.XXX ±.010
±0°30'
DIMENSIONS ARE IN ENGLISH METRIC
MATERIAL
NEXT ASSY.
USED ON
APPLICATION