

SDS TECHNICAL INFORMATION

SDS 910/920 COMPUTERS
Reference Drawings
Current and History

SDS 900029E

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Reference Drawings
Current and History

SDS 900029E

April 1966

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*Assembly Drawings Include Parts Lists

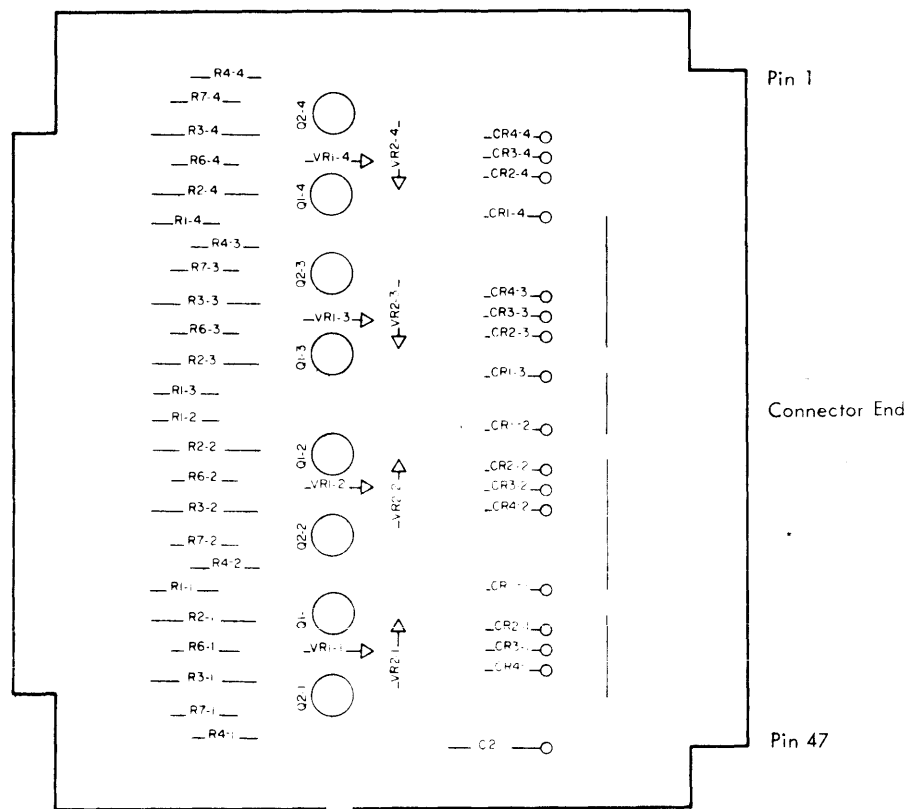
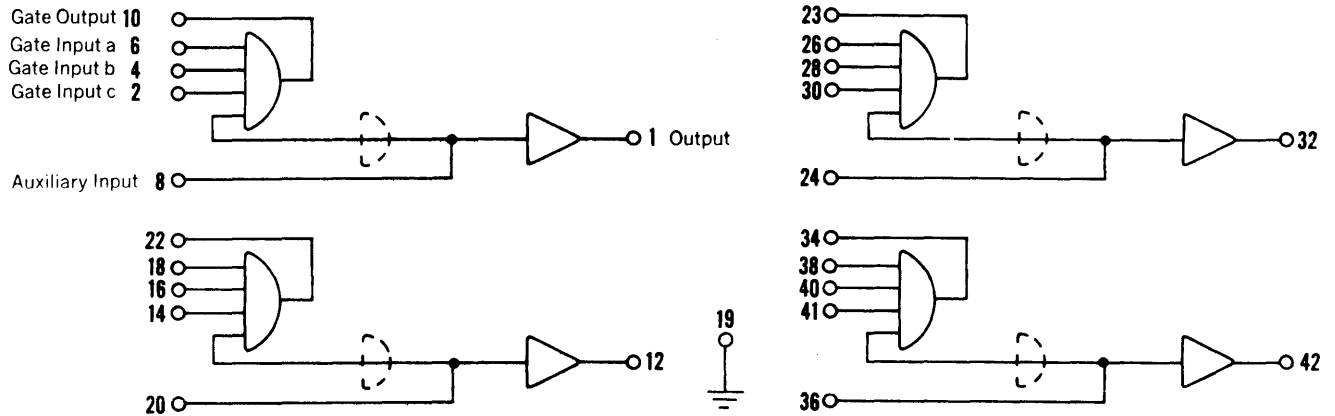
SIGNAL AMPLIFIER

AC10

ASSY NO. 100838

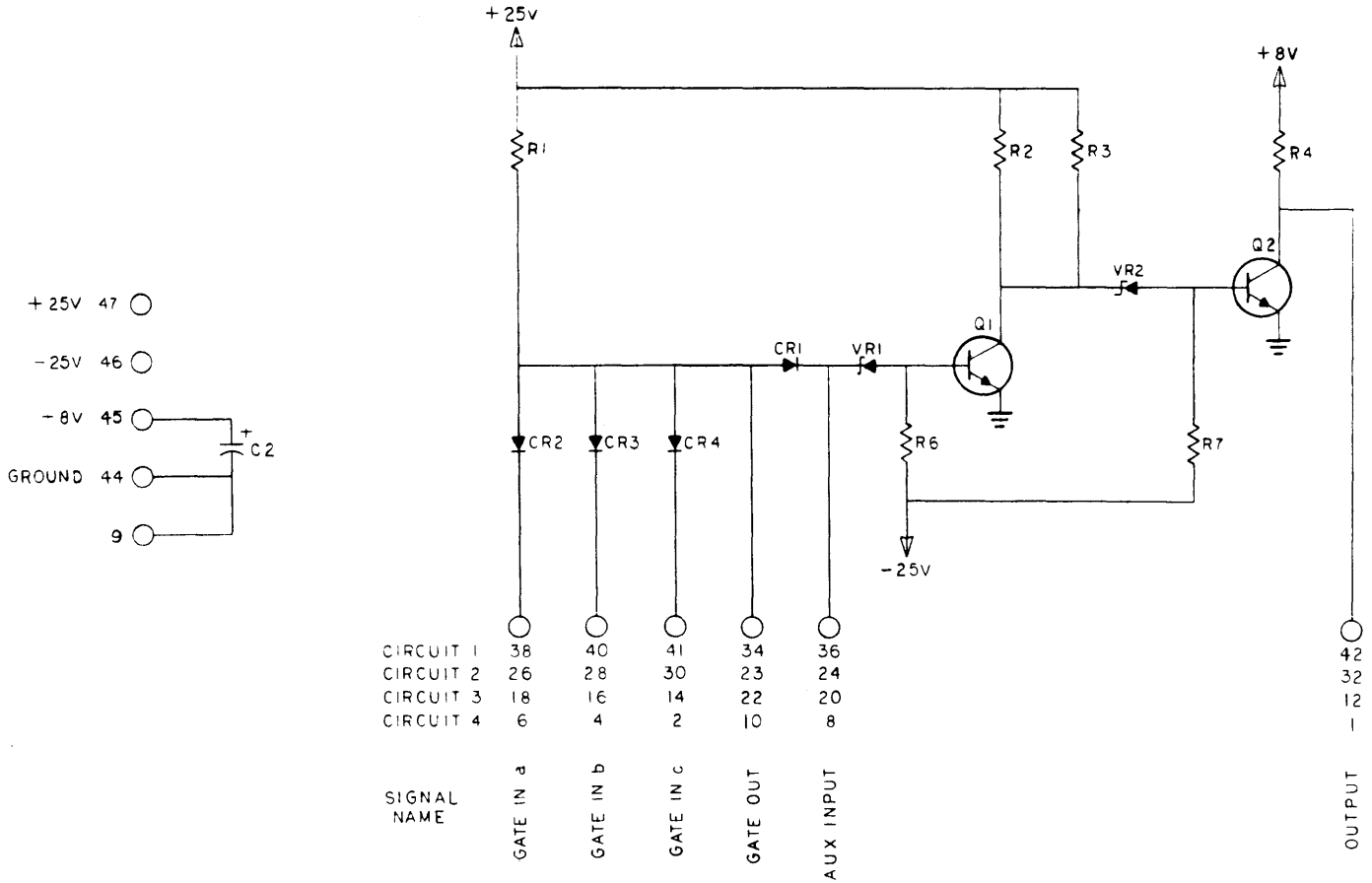
This module contains four independent noninverting signal amplifiers. The input is a standard 3-term AND gate with provision for expansion or addition of more AND/OR gates. It can be used either where a large fan-out is needed or as a line driver.

Output Delay (Typical)	200 nsec
Fan-In	15 terms
Gate Input	1 load
Output	74 loads
+25 Volt Supply	99 ma
+8 Volt Supply	38 ma
-25 Volt Supply	11 ma
Module Dissipation	3.1 watts



MODEL NO. AC10 Schematic

POLARIZING PINS: 8 & 16



MODEL AC10 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N914	4	1, 3, 5, 7
2	Transistor	2N2477 2N2536 2N2848	4	7 1 3
3	Diode	1N746	8	2, 12, 13, 14
4	Diode	1N914A	16	4, 12, 13, 14
5	Capacitor, Tantalum	4.7 μ f \pm 20%, 50v	1	22, 23, 77
6	Resistor	2.2 k ohms \pm 2%	8	36, 38, 73
7	Resistor	820 ohms \pm 2%	4	16, 17
8	Resistor	8.2 k ohms \pm 2%	4	16, 17
9	Resistor	12 k ohms \pm 2%	4	16, 17
10	Resistor	39 k ohms \pm 2%	4	16, 17

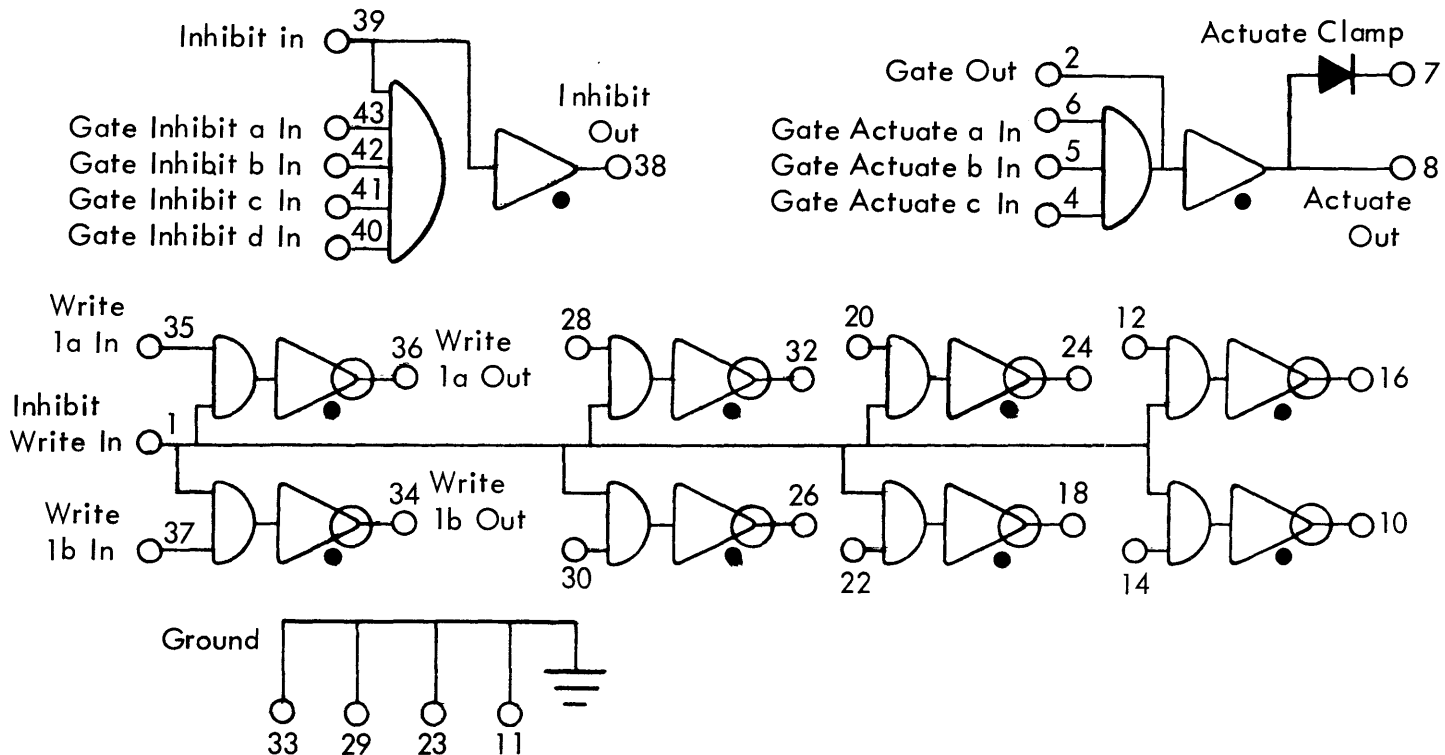
NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Write Driver

Assy. No. 101571

AK52

<u>Input</u>	<u>Loading</u>	<u>Operating Frequency</u>	
Write Inhibit Input	1 load	50 Kc Maximum	
Actuate Input	1 load		
Write Driver Input	7 loads		
<u>Output</u>	<u>Loading</u>	<u>Delay (typical)</u>	<u>Power Drain</u>
Write Inhibit Output	70 loads	30 nsec	+25 Volt Supply 210 ma
Actuate Output	20 loads	80 nsec	+ 8 Volt Supply 48 ma
Write Driver Output	250 ma	100 nsec	-25 Volt Supply 49 ma
			<u>Module Dissipation</u>
			7 watts

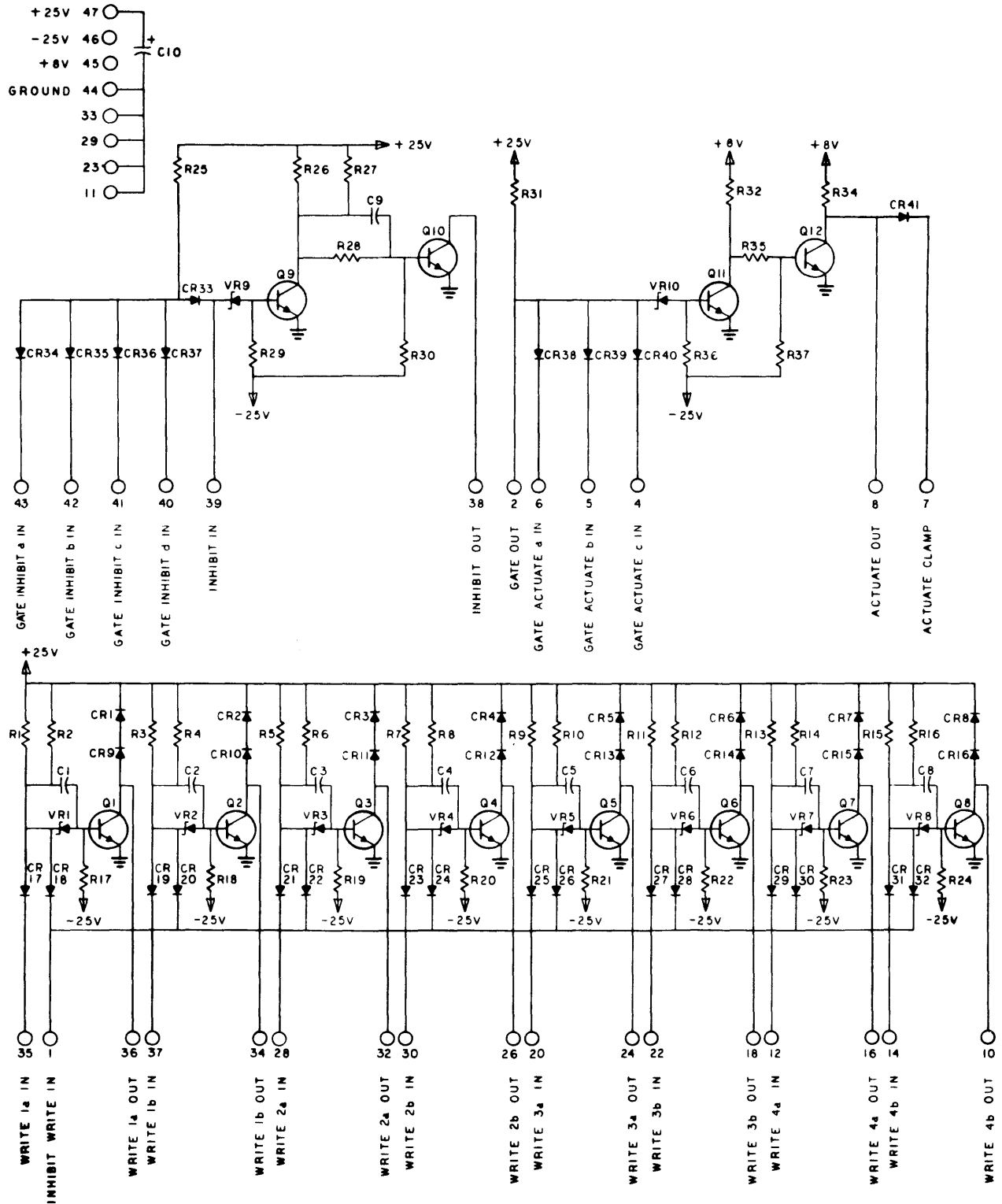


Module AK 52 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor 2N2219 2N2404	Q1 thru Q8	8	1 29
2	Transistor 2N914	Q9,11,12	3	1,3,5,7,10
3	Transistor 2N2538 2N2477 2N2848	Q10	1	1 7 3
4	Diode 1N921	CR1 thru CR16	16	13,15,28
5	Diode 1N907A 1N914A 1N3063 1N3065	CR17 thru CR41	25	4,13 4,12,13,14 4,6 4
6	Diode 1N746	VR1 thru VR10	10	2,3,14,32
7	Capacitor, Mylar, $\pm 5\%$, .010 μ f	C1 thru C8	8	26,27,74
8	Capacitor, Mica, $\pm 5\%$, 100 pf	C9	1	19,20,21
9	Capacitor, Tantalytic, $\pm 5\%$, 4.7 μ f	C10	1	22,23,77
10	Resistor, Metal Film, $\pm 1\%$, 2.2 k ohms	R1 thru R16,R26,R27	18	36,38,73
11	Resistor, $\pm 2\%$, 1/2 watt, 8.2 k ohms	R17 thru R25,R31	10	16,17
12	Resistor, $\pm 2\%$, 1/2 watt, 39 k ohms	R29	1	16,17
13	Resistor, $\pm 2\%$, 1/2 watt, 330 ohms	R28	1	16,17
14	Resistor, $\pm 2\%$, 1/2 watt, 12 k ohms	R30	1	16,17
15	Resistor, $\pm 2\%$, 1/2 watt, 27 k ohms	R36,R37	1	16,17
16	Resistor, $\pm 2\%$, 1/2 watt, 820 ohms	R32,R35	2	16,17
17	Pad, Transistor	Q1 thru Q8, Q10	9	

Module AK52 Schematic

POLARIZING PINS: 10 & 44



Cable Driver

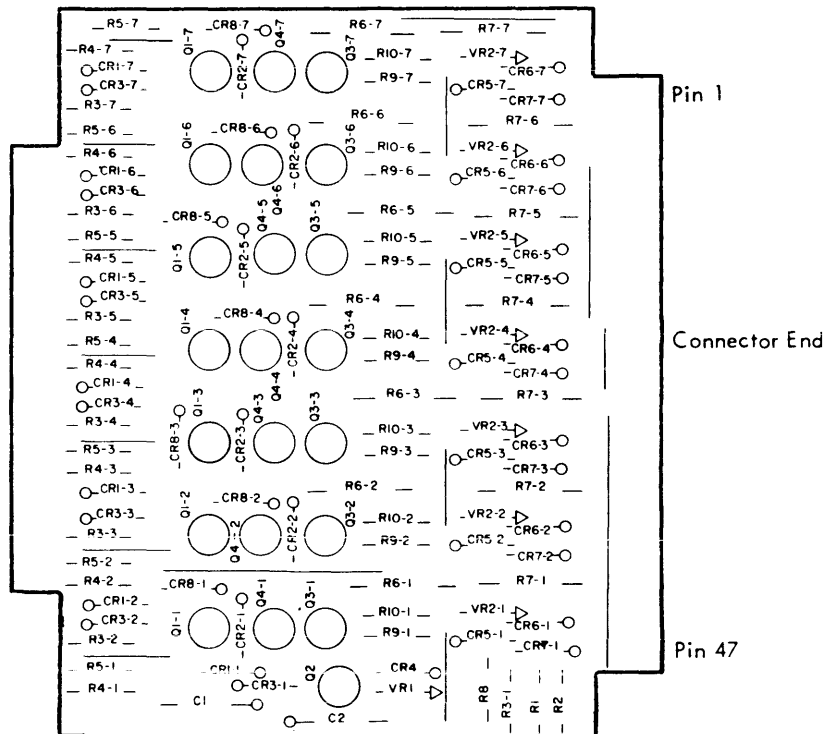
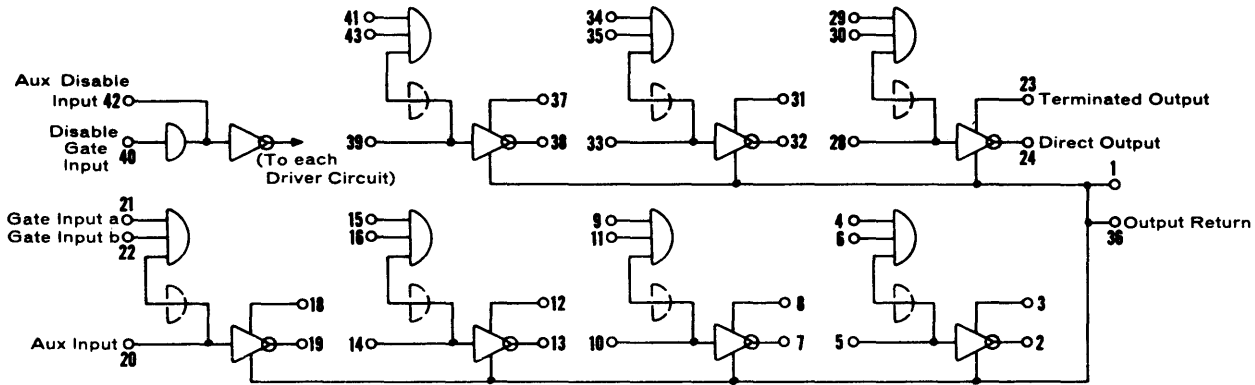
AX14

Assy. No. 102853

Seven identical inverting circuits are contained on this module, each of which is designed to drive a terminated cable. Two outputs at standard logic levels are provided for each circuit. The Direct Output has an impedance of approximately 3 ohms in the false state, and approximately 66 ohms in the true state. If the Direct Output is connected to the Terminated Output, the true state impedance is approximately 33 ohms, while the false state impedance is approximately 3 ohms. The Terminated Output impedance is approximately 33 ohms in either state.

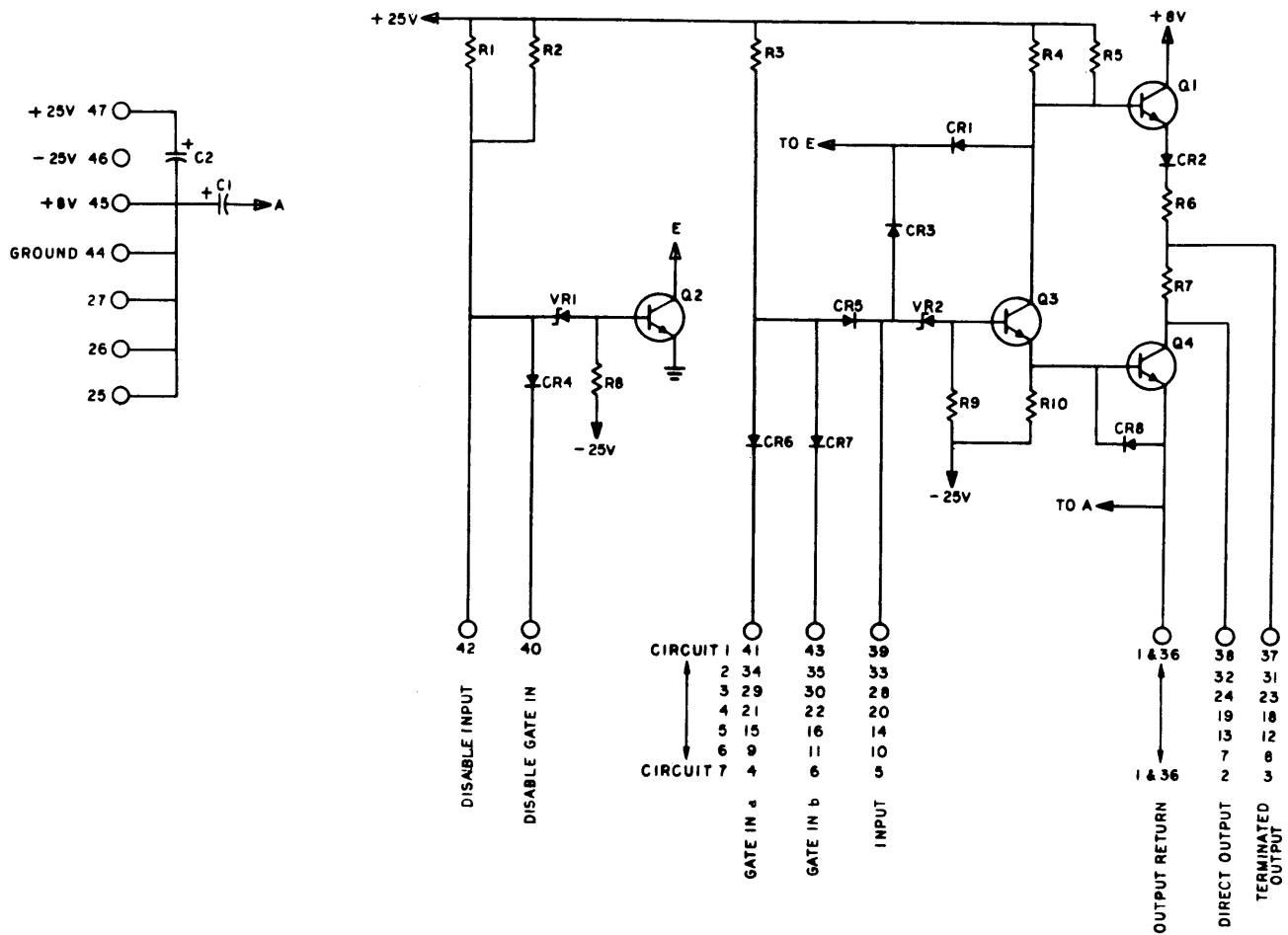
A disable circuit is included which is common to all drivers on the module. When the Disable Input is true, the output impedance of all the drivers is very high and is independent of the state of the gate inputs of the driver circuits.

Maximum Operating Frequency	1 Mc
Gate Input	1 load
Disable Gate Input	4 loads
Output	40 loads
Output Delay (Typical)	70 ns
+25 Volt Supply	120 ma
+ 8 Volt Supply	-31 ma
-25 Volt Supply	14 ma
Module Dissipation	3.8 watts



Model AX14 Schematic

POLARIZING PINS: 20 & 24



Model AX14 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N2538 2N2476 2N2848	Q1,2,4	15	1 7 3
2	Transistor 2N834	Q3	7	1,5,7,95
3	Diode 1N914A	CR1,CR3 through CR8	43	4,12,13,14
4	Diode 1N921	CR2	7	13,15,28
5	Diode 1N746	VR1,2	8	2,12,13,14
6	Capacitor, Tantalum 4.7 μ f \pm 20%,50v	C1,2	2	23,77
7	Resistor 33 ohms \pm 2%	R6,7	14	16,17
8	Resistor 3.9k ohms \pm 2%	R1,2,4,5	16	16,17
9	Resistor 8.2k ohms \pm 2%	R3	7	16,17
10	Resistor 22k ohms \pm 2%	R8,10	8	16,17
11	Resistor 39k ohms \pm 2%	R9	7	16,17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

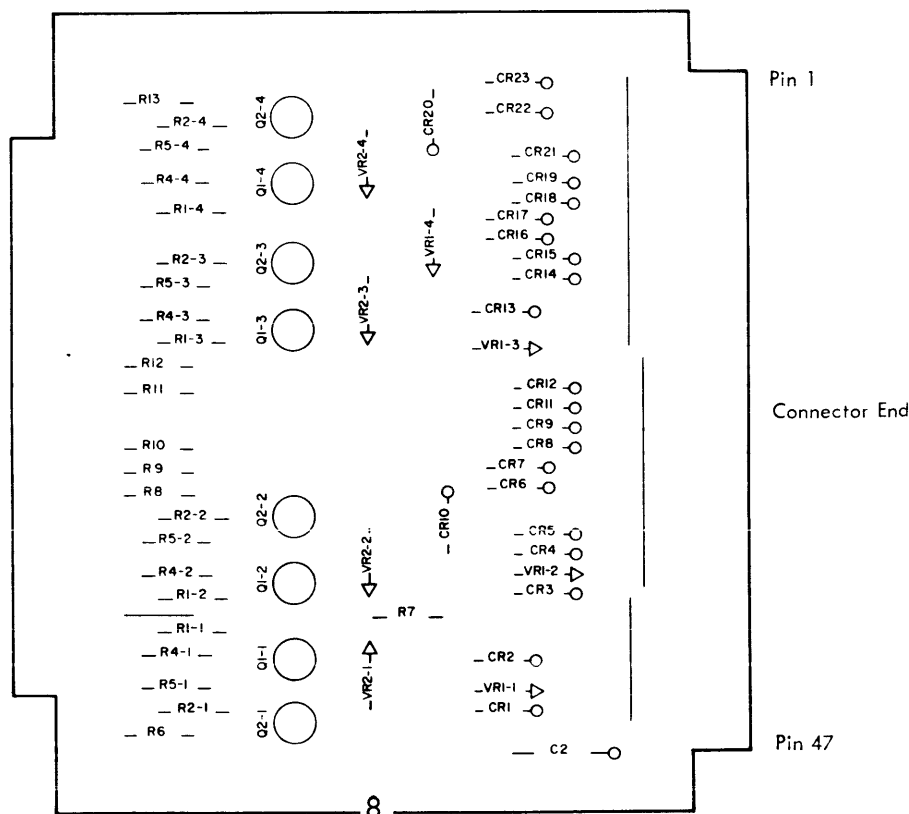
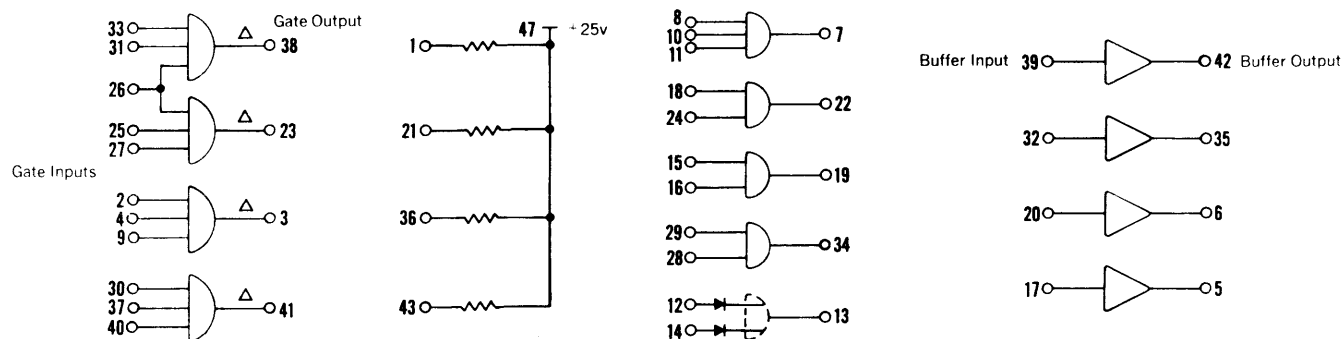
AND:OR BUFFER AMPLIFIER

BC10

ASSY NO. 100166

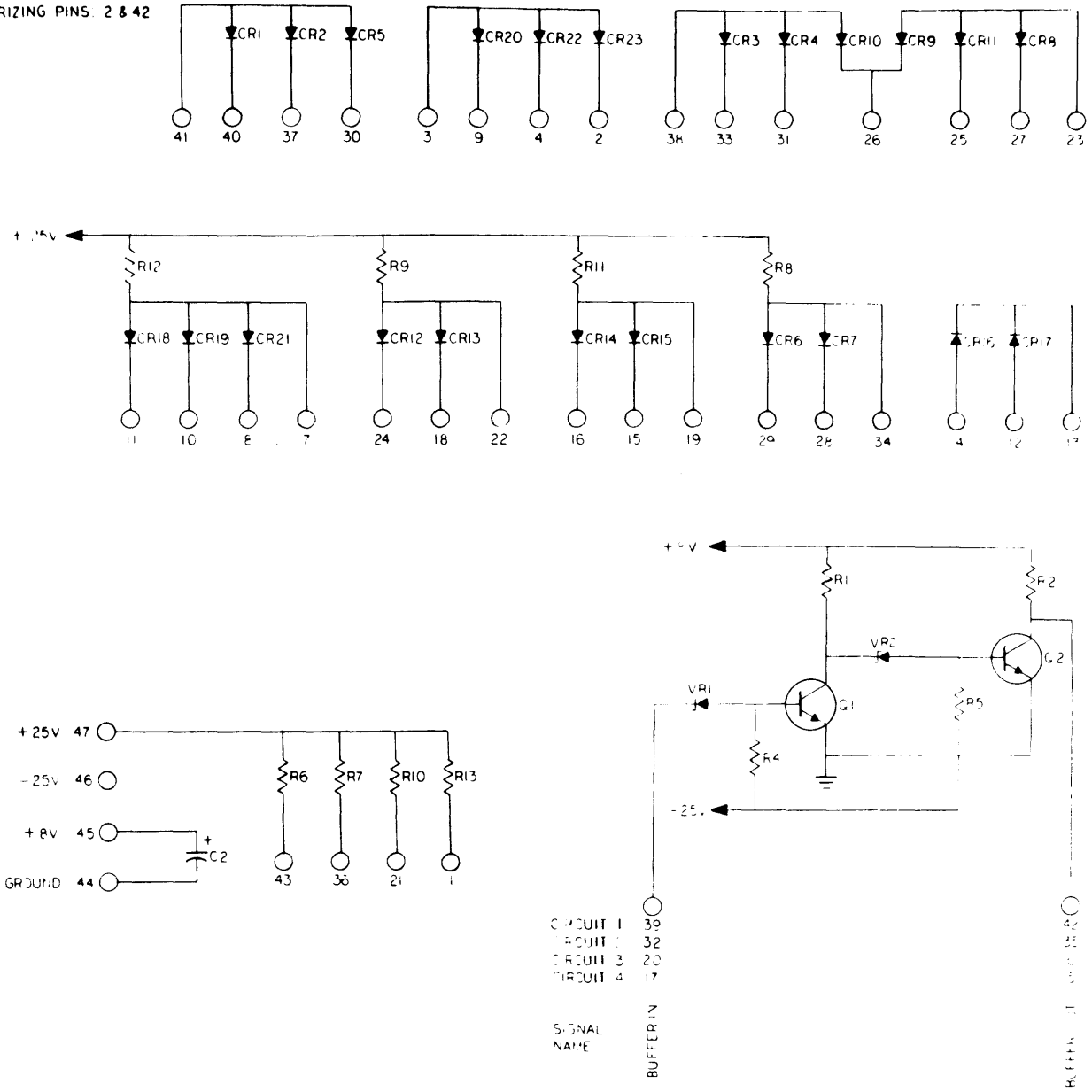
This module contains four complete diode AND gates; four diode Δ AND gates, which can be used for expansion gates or as independent gates by adding one of the gate resistors; one gated input OR gate; plus four buffer amplifiers. AND/OR gates can be constructed by wiring one input pin of an AND gate to one input pin of another to form an OR gate output. The buffer circuits can be used to amplify AND/OR and AND gate outputs when implementing cascaded logic or where a large fan-out is needed.

Amplifier Output Delay (Typical)
 Fan-In 15 terms
 Gate Input 1 load
 Output 22 loads
 +25 Volt Supply 24 ma
 +8 Volt Supply 32 ma
 -25 Volt Supply 7 ma
 Module Dissipation 1.2 watts



MODEL NO. BC10 Schematic

POLARIZING PINS: 2 & 42



MODEL BC10 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N914	Q1, 2	8	1, 3, 5, 7
2	Diode 1N746	VR1, 2	8	2, 12, 13, 14
3	Diode 1N914A	CR 1 through 23	23	4, 12, 13, 14
4	Capacitor, Tantalum 4.7 μ f \pm 20%, 50v	C2	1	22, 23, 77
5	Resistor 820 ohms \pm 2%	R1	4	16, 17
6	Resistor 2.2 k ohms \pm 2%	R2	4	16, 17
7	Resistor 8.2 k ohms \pm 2%	R6 through 13	8	16, 17
8	Resistor 27 k ohms \pm 2%	R4, 5	8	16, 17

NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

AND:OR BUFFER AMPLIFIER

BH10

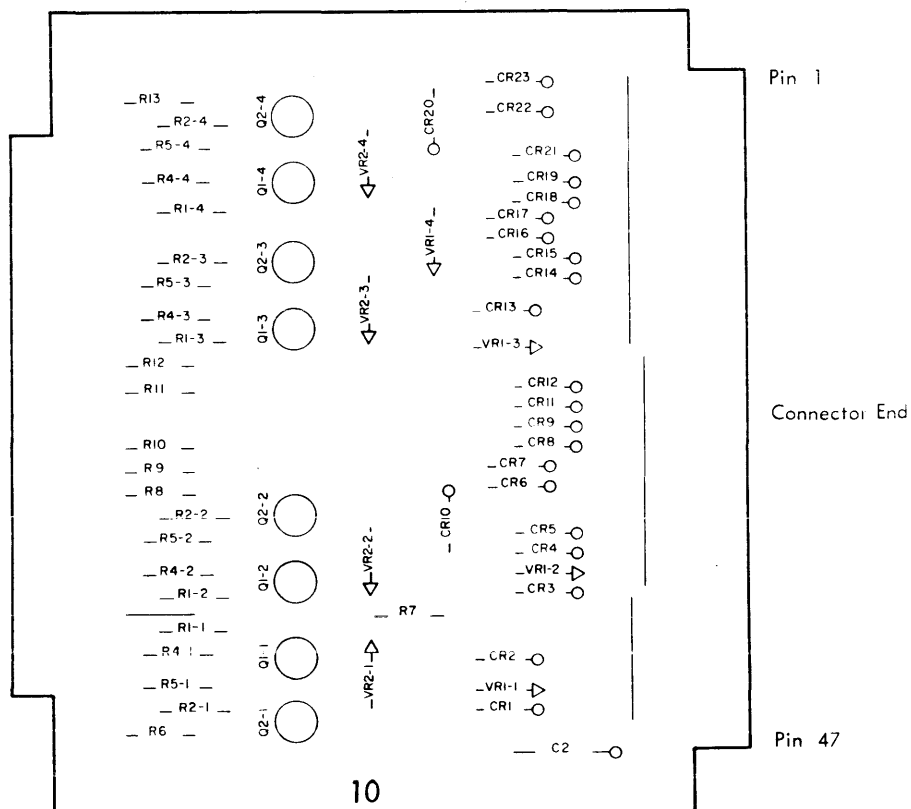
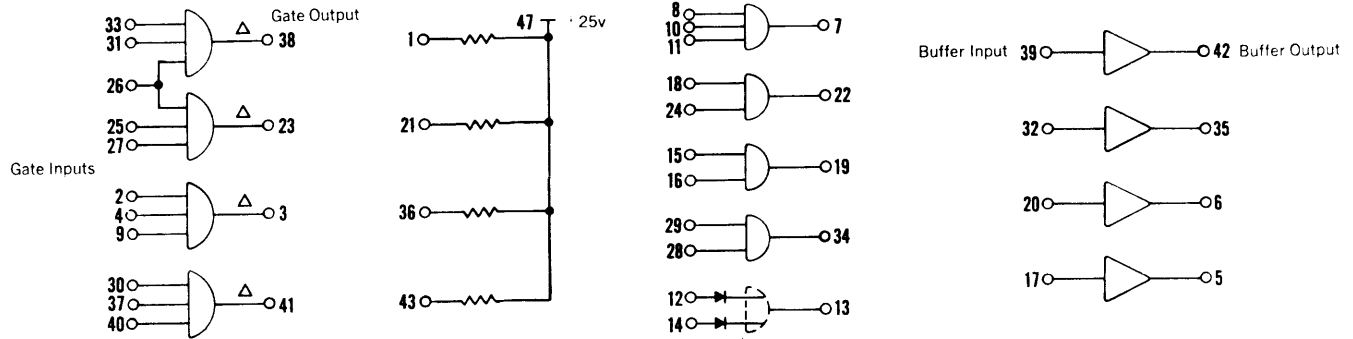
ASSY NO. 100164

Federal Stock No. 6H6605-013-6912

This module contains four complete diode AND gates; four diode Δ AND gates, which can be used for expansion gates or as independent gates by adding one of the gate resistors; one gated input OR gate; plus four buffer amplifiers. AND/OR gates can be constructed by wiring one input pin of an AND gate to one input pin of another to form an OR gate output. The buffer circuits can be used to amplify AND/OR and AND gate outputs when implementing cascaded logic or where a large fan-out is needed.

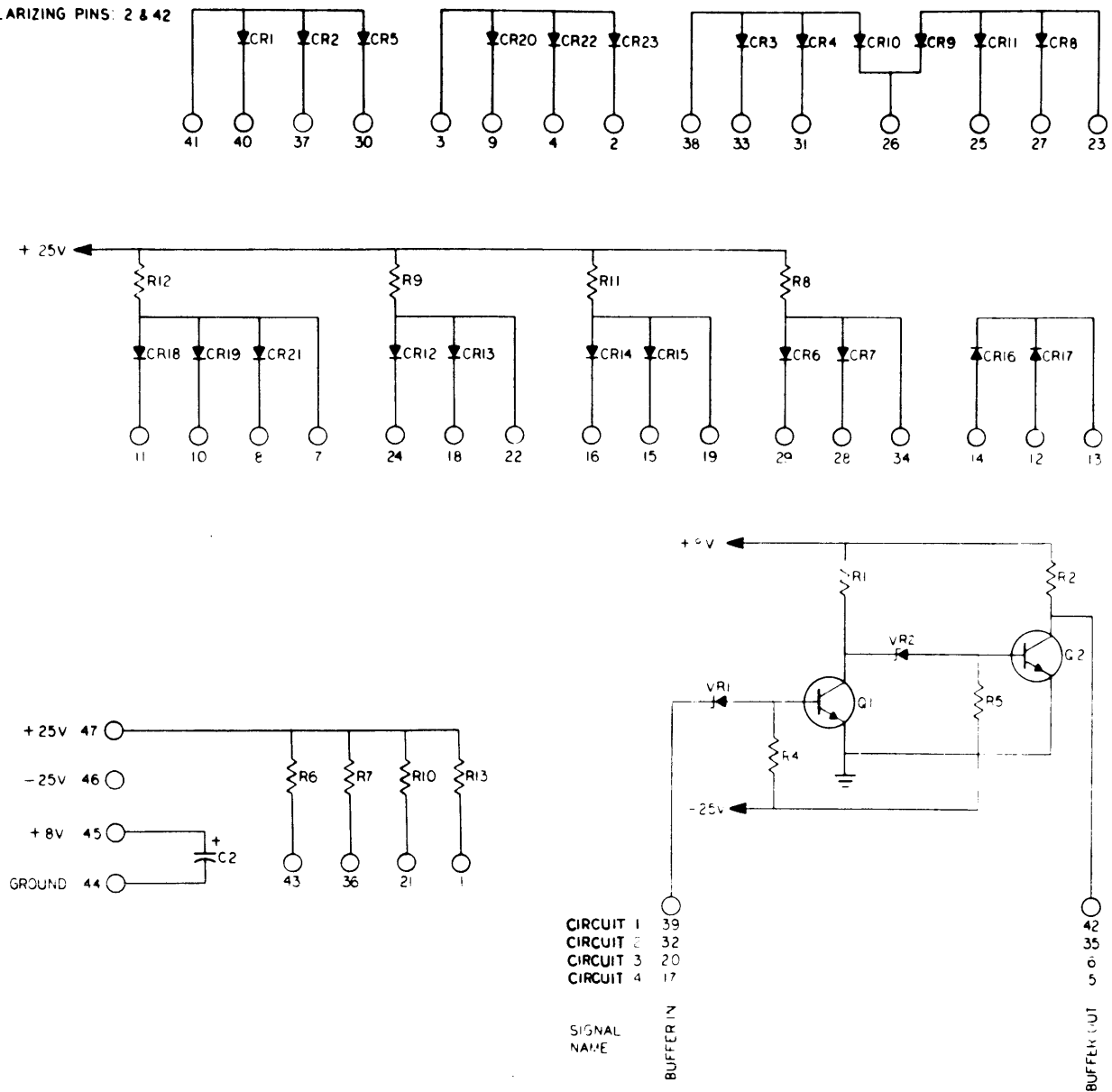
Amplifier Output Delay (Typical)

Fan-In	100 nsec
Gate Input	10 terms
Output	2 loads
+25 Volt Supply	20 loads
+8 Volt Supply	49 ma
-25 Volt Supply	63 ma
Module Dissipation	15 ma
	2.2 watts



MODEL NO. BH10 Schematic

POLARIZING PINS: 2 & 42



MODEL BH10 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N2369 2N2501	Q1, 2	8	3, 11 1
2	Diode 1N746	VR1, 2	8	2, 12, 13, 14
3	Diode 1N914A	CR1 through 23	23	4, 12, 13, 14
4	Capacitor, Tantalum 4.7 μ f \pm 20%, 50v	C2	1	22, 23, 77
5	Resistor 560 ohms \pm 2%	R1	4	16, 17
6	Resistor 820 ohms \pm 2%	R2	4	16, 17
7	Resistor 3.9 k ohms \pm 2%	R6 through 13	8	16, 17
8	Resistor 10 k ohms \pm 2%	R4	4	16, 17
9	Resistor 18 k ohms \pm 2%	R5	4	16, 17

NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

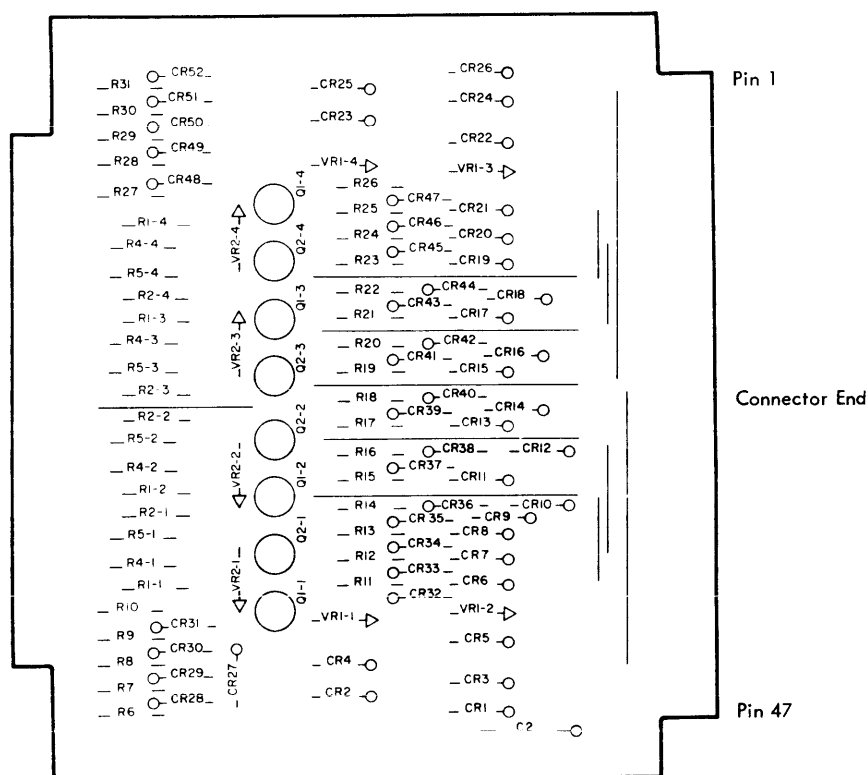
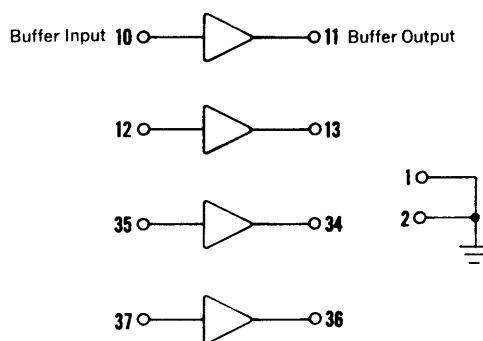
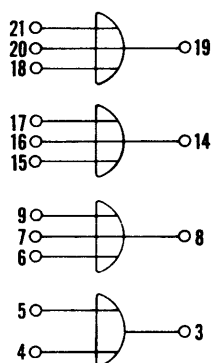
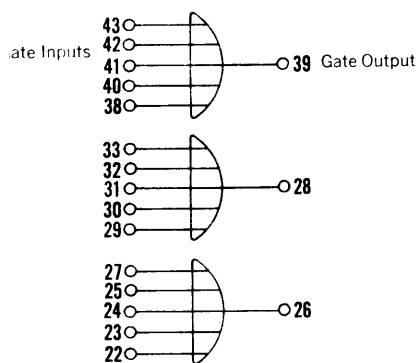
OR GATE BUFFER AMPLIFIER

BH11

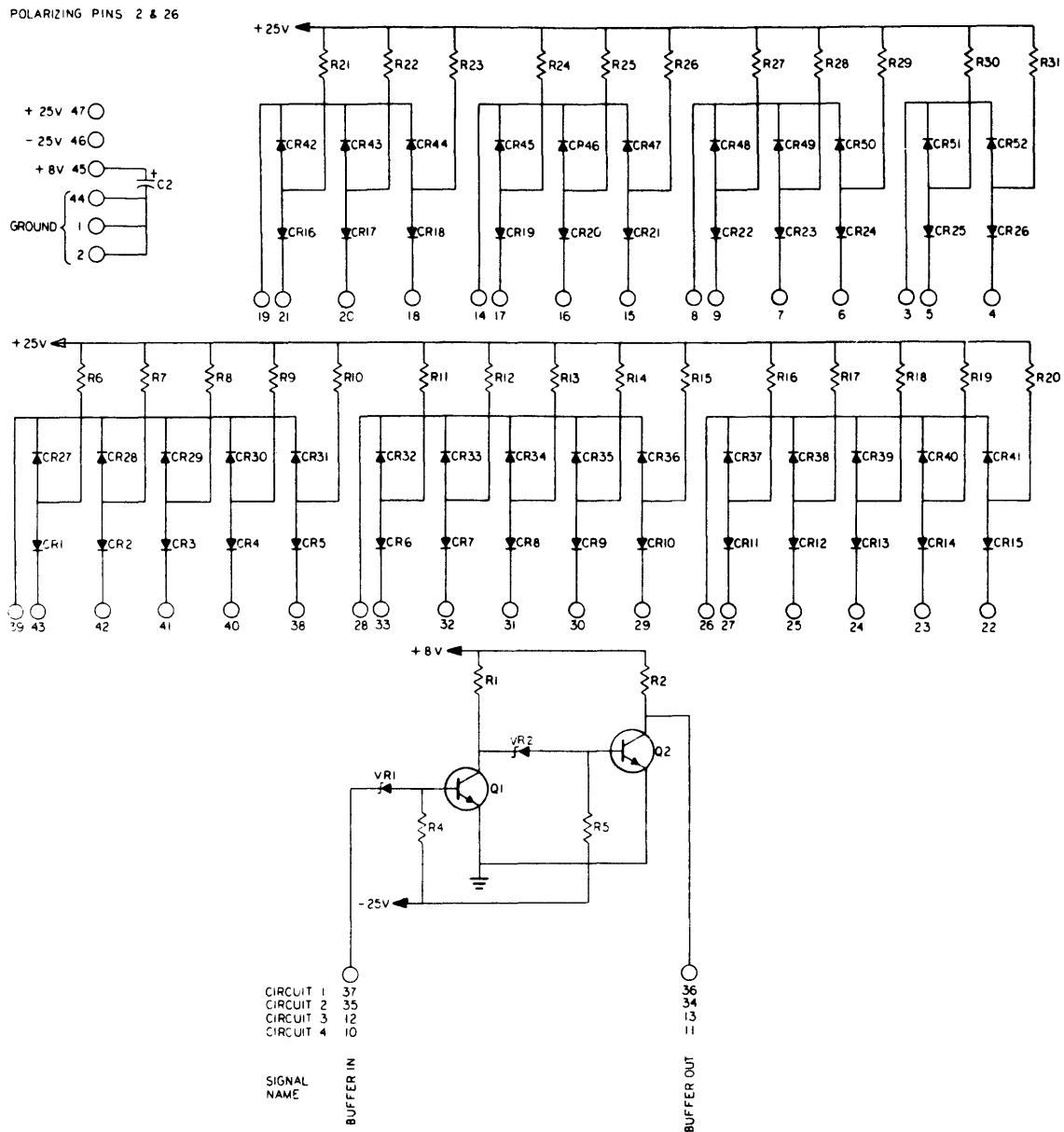
ASSY NO. 100222

This module contains three 5-term OR gates, three 3-term OR gates, one 2-term OR gate, and four buffer amplifiers. Each of the diode gate circuits is a complete OR structure and can be used with the buffer amplifiers to obtain large converging gates for commutating and sampling systems. Two pins are available to ground unused OR gate inputs. Unused buffer circuits can be used to amplify flip-flop outputs or with other diode gate cards.

Amplifier Output Delay (Typical)	100 nsec
Fan-In	10 terms
Gate Input	2 loads
Output	20 loads
+25 Volt Supply	150 ma
+8 Volt Supply	62 ma
-25 Volt Supply	15 ma
Module Dissipation	4.7 watts



Model BH11 Schematic



Model BH11 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N914	Q1, 2	8	1, 3, 5, 7
2	Diode 1N746	VR1, 2	8	2, 12, 13, 14
3	Diode 1N914A	CR1 through 52	52	4, 12, 13, 14
4	Capacitor, Tantalum 4.7 μ f \pm 20%, 50v	C2	1	22, 23, 77
5	Resistor 560 ohms \pm 2%	R1	4	16, 17
6	Resistor 820 ohms \pm 2%	R2	4	16, 17
7	Resistor 3.9 k ohms \pm 2%	R6 through 31	26	16, 17
8	Resistor 10 k ohms \pm 2%	R4	4	16, 17
9	Resistor 18 k ohms \pm 2%	R5	4	16, 17

NOTE: 1. To ensure specified performance, use replacement parts manufactured by suppliers listed in SDS Suppliers Code Index 900036.

2. Unless otherwise indicated, 1/2 watt resistors may be used.

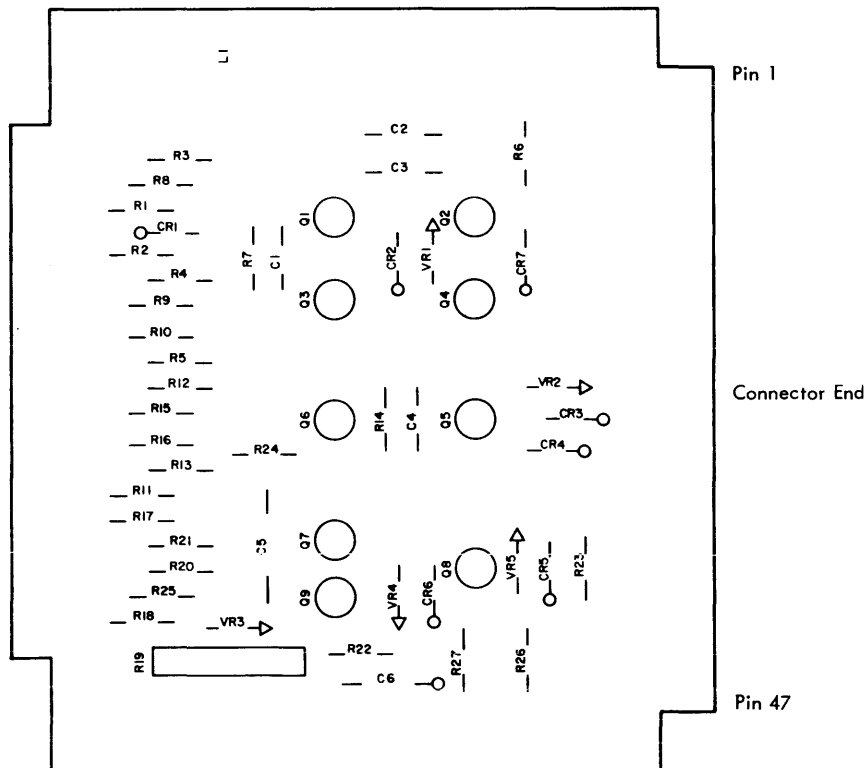
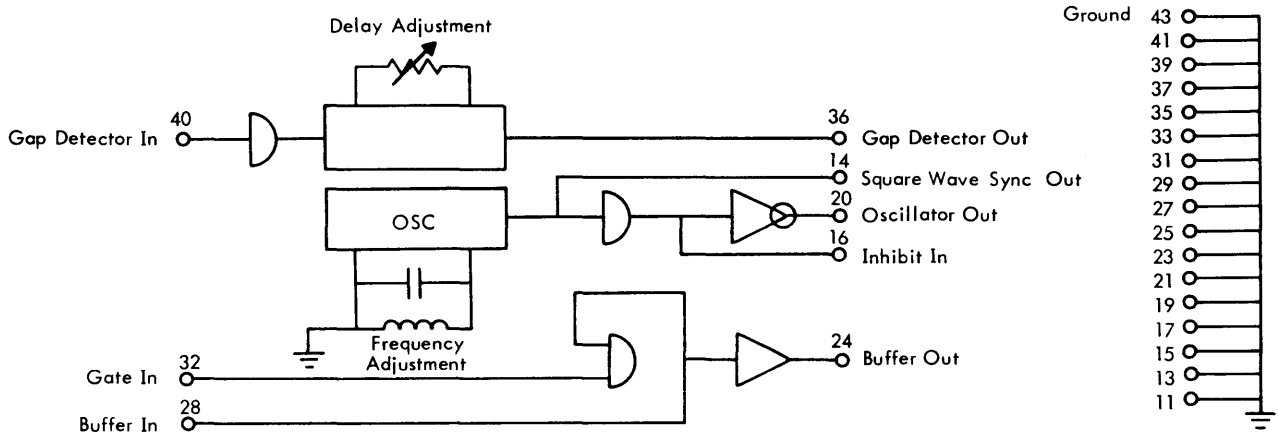
CLOCK GENERATOR

CK52

ASSY NO. 101609

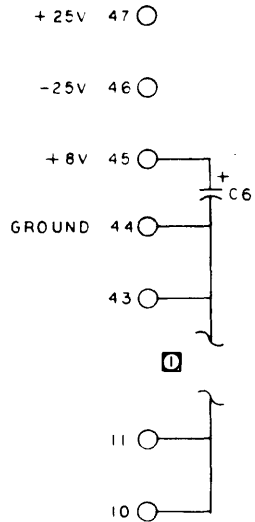
This module contains an LC oscillator which generates a square wave output, a buffer amplifier, and a gap detector. The oscillator is adjustable over the frequency range of 13 to 19 kc. The gap detector is designed to operate with an input which is normally at zero volts with +8-volt, 10-microsecond pulses. The output will be false during a pulse train until a gap of sufficient width occurs. The gap detecting threshold is adjustable from 45 to 240 microseconds.

Operating Frequency	13 to 19 kc
Gap Detector Input	2 loads
Buffer Input	2 loads
Gap Detector Output	10 loads, 400 pf
Oscillator Output	10 loads, 400 pf
Square Wave Sync Output	6 loads, 100 pf
Buffer Output	20 loads, 400 pf
Gap Detector Output Delay	45 to 240 usec
Buffer Output Delay	40 nsec
+25 Volt Supply	27 ma
+8 Volt Supply	32 ma
-25 Volt Supply	21 ma
Module Dissipation	1.4 watts

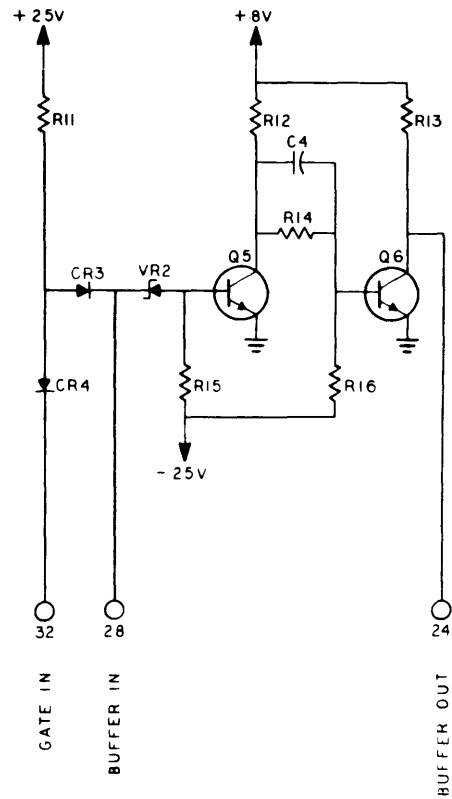
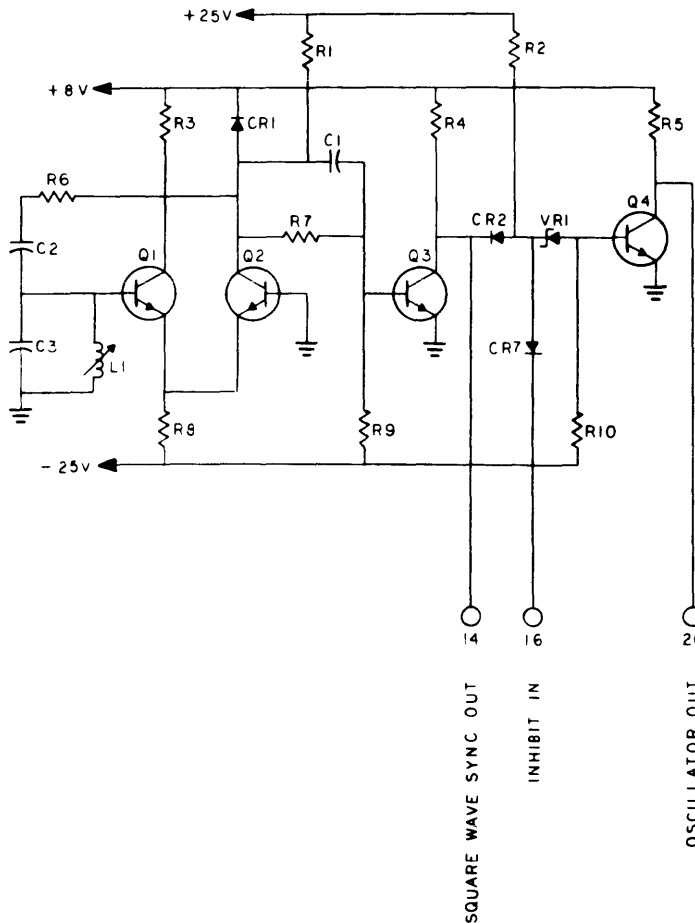
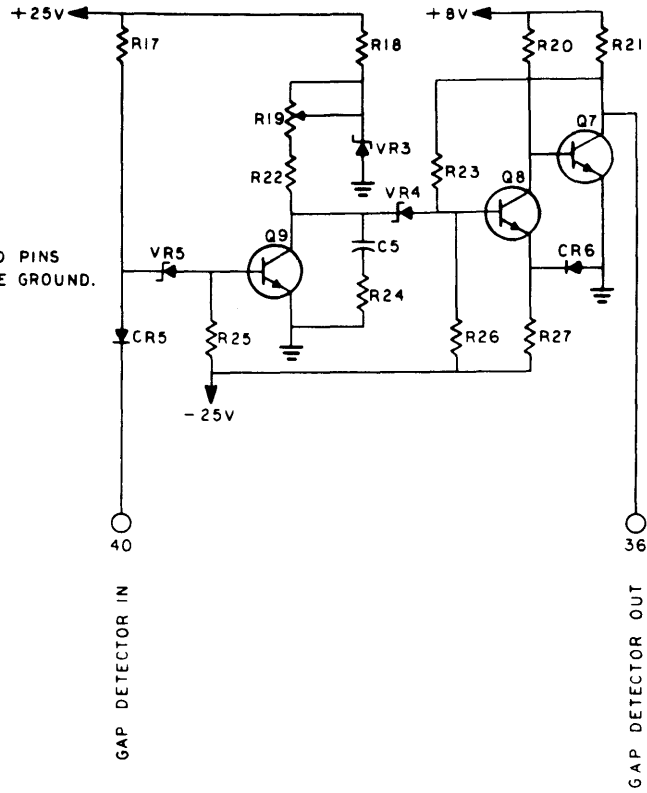


MODEL NO. CK52 Schematic

POLARIZING PINS: 12 & 16



NOTES:
 □ ALL ODD NUMBERED PINS BETWEEN 43 & 11 ARE GROUND.



MODEL CK52 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)	
1	Transistor	2N914	Q1 through 9	9	1, 3, 5, 7
2	Diode	1N914A	CR1 through 7	7	4, 12, 13, 14
3	Diode	1N746	VR1, 2, 5	3	2, 12, 13, 14
4	Diode	1N964A	VR3	1	2, 6, 14, 65
5	Diode	1N752	VR4	1	2, 12, 13, 14
6	Capacitor, Mica	68 pf $\pm 5\%$	C4	1	19, 20, 21
7	Capacitor, Mica	470 pf $\pm 5\%$	C1	1	19, 20, 21
8	Capacitor, Mylar	0.0068 μf $\pm 10\%$	C3	1	26, 27, 74
9	Capacitor, Mylar	0.01 μf $\pm 10\%$	C2	1	26, 27, 74
10	Capacitor, Mylar	0.047 μf $\pm 10\%$	C5	1	26, 27, 74
11	Capacitor, Tantalum	4.7 μf $\pm 20\%$, 50v	C6	1	22, 23, 77
12	Potentiometer	5 k ohms $\pm 10\%$	R19	1	35, 44
13	Resistor	47 ohms $\pm 2\%$	R24	1	16, 17
14	Resistor	390 ohms $\pm 2\%$	R3	1	16, 17
15	Resistor	560 ohms $\pm 2\%$	R12, 14	2	16, 17
16	Resistor	1.2 k ohms $\pm 2\%$	R4	1	16, 17
17	Resistor	1.5 k ohms $\pm 2\%$	R18	1	16, 17
18	Resistor	1.8 k ohms $\pm 2\%$	R22	1	16, 17
19	Resistor	2.2 k ohms $\pm 2\%$	R5, 13, 20, 21	4	16, 17
20	Resistor	3.3 k ohms $\pm 2\%$	R7	1	16, 17
21	Resistor	3.9 k ohms $\pm 2\%$	R8, 11, 17, 27	4	16, 17
22	Resistor	5.6 k ohms $\pm 2\%$	R1	1	16, 17
23	Resistor	8.2 k ohms $\pm 2\%$	R2	1	16, 17
24	Resistor	10 k ohms $\pm 2\%$	R6, 15	2	16, 17
25	Resistor	18 k ohms $\pm 2\%$	R16, 25	2	16, 17
26	Resistor	39 k ohms $\pm 2\%$	R26	1	16, 17
27	Resistor	47 k ohms $\pm 2\%$	R10	1	16, 17
28	Resistor	56 k ohms $\pm 2\%$	R9, 23	2	16, 17
29	Coil, Adjustable R. F.	12-20 mh	L1	1	41

NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Clock Generator #1

Assy. No. 101981

CK53

Output

Clock Outputs 1 through 8

Loading

1 Clock Load
(Input terminal
on CK54)

Operating Frequency

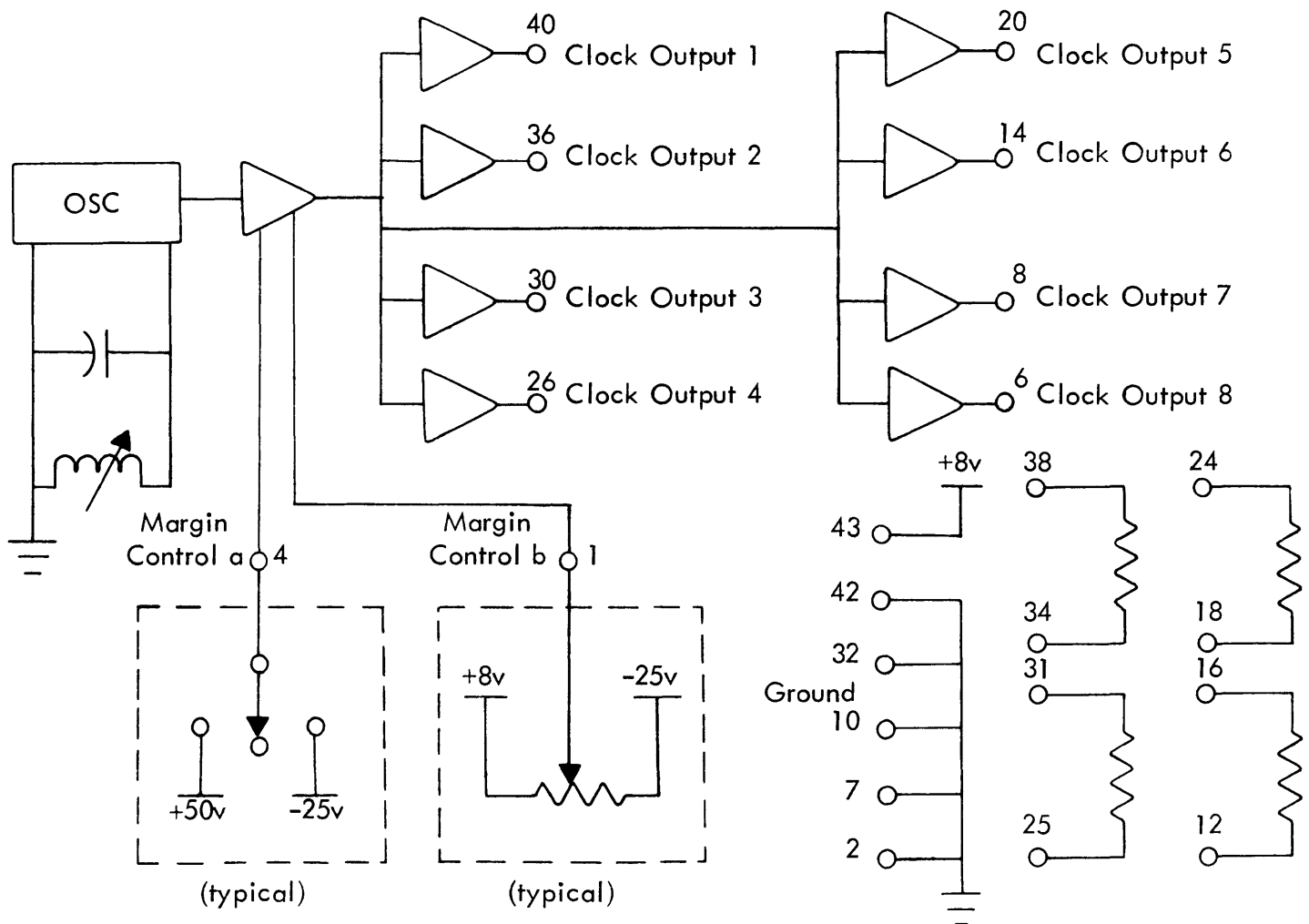
2.9 Mc to 3.6 Mc

Power Drain

+25 Volt Supply 13 ma
+ 8 Volt Supply 310 ma
-25 Volt Supply 11 ma

Module Dissipation

3.3 watts (typical)

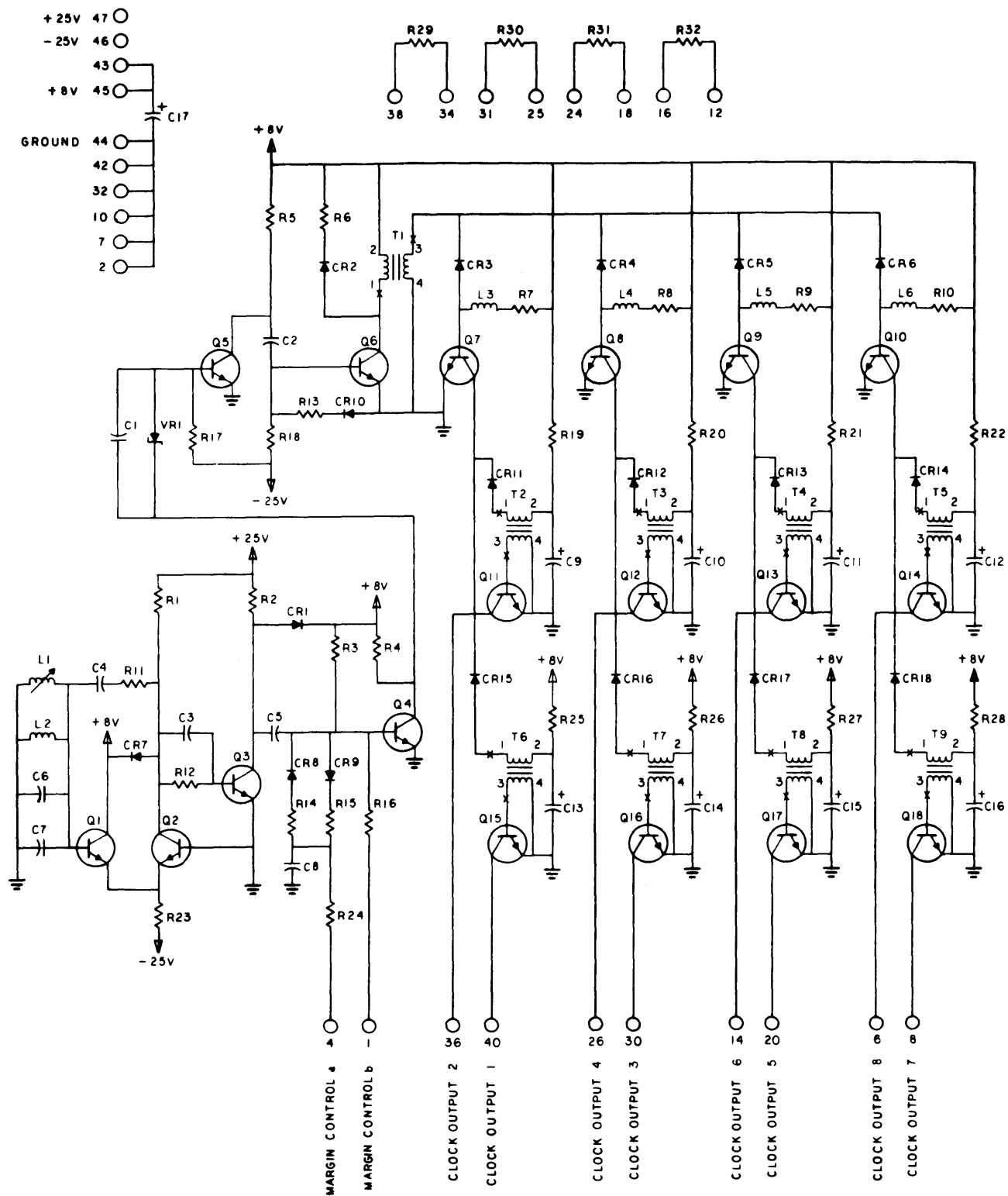


Module CK 53 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N2369	9	3
		2N2501		1
		2N2710		95
2	Transistor	2N2538	9	1
		2N2477		7
		2N2848		3
3	Diode	1N746	1	2, 13, 14, 32
4	Diode	1N907A	6	4, 13
		1N914A		4, 12, 13, 14
		1N3063		4, 6
		1N3065		4
5	Diode	1N3600	12	4
		1N3873		6
6	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C17	1	23, 77
7	Capacitor, Tantalum, $\pm 5\%$, 1.0 μ f	C9 through C16	8	23, 77
8	Capacitor, Mylar, $\pm 5\%$, 0.001 μ f	C2	1	26, 27, 74
9	Capacitor, Mylar, $\pm 5\%$, 0.01 μ f	C8	1	26, 27, 74
10	Capacitor, Mica, $\pm 5\%$, 100pf	C1, C5	2	19, 20, 21
11	Capacitor, Mica, $\pm 5\%$, 120pf	C6	1	19, 20, 21
12	Capacitor, Mica, $\pm 5\%$, 330pf	C7	1	19, 20, 21
13	Capacitor, Mica, $\pm 5\%$, 22pf	C3	1	19, 20, 21
14	Capacitor, Mica, $\pm 5\%$, 470pf	C4	1	19, 20, 21
15	Resistor, $\pm 2\%$, 1/2 watt, 4.7 k ohms	R1	1	16, 17
16	Resistor, $\pm 2\%$, 1/2 watt, 2.7 k ohms	R2, 23	2	16, 17
17	Resistor, $\pm 2\%$, 1/2 watt, 1.5 k ohms	R3, 24	2	16, 17
18	Resistor, $\pm 2\%$, 1/2 watt, 680 ohms	R4, 7, 8, 9, 10	5	16, 17
19	Resistor, $\pm 2\%$, 1/2 watt, 470 ohms	R5	1	16, 17
20	Resistor, $\pm 2\%$, 1/2 watt, 330 ohms	R6, 19, 20, 21, 22	9	16, 17
		25, 26, 27, 28		
21	Resistor, $\pm 2\%$, 1/2 watt, 3.9 k ohms	R11	1	16, 17
22	Resistor, $\pm 2\%$, 1/2 watt, 3.3 k ohms	R12	1	16, 17
23	Resistor, $\pm 2\%$, 1/2 watt, 22 ohms	R13	1	16, 17
24	Resistor, $\pm 2\%$, 1/2 watt, 39 k ohms	R14	1	16, 17
25	Resistor, $\pm 2\%$, 1/2 watt, 22 k ohms	R15	1	16, 17
26	Resistor, $\pm 2\%$, 1/2 watt, 15 k ohms	R16	1	16, 17
27	Resistor, $\pm 2\%$, 1/2 watt, 47 k ohms	R17, 18	2	16, 17
28	Resistor, $\pm 2\%$, 1/2 watt, 10 ohms	R29, 30, 31, 32	4	16, 17
29	Inductor, Molded, 22 μ h $\pm 10\%$	L3, 4, 5, 6	4	42, 90, 91
30	Inductor, Molded, 10 μ h $\pm 10\%$	L2	1	42, 90, 91
31	Coil, RF, Adjustable, 6 μ h to 17 μ h	L1	1	41
32	Transformer, 2:1 2 WEHC	T1 through T9	9	39

Module CK 53 Schematic

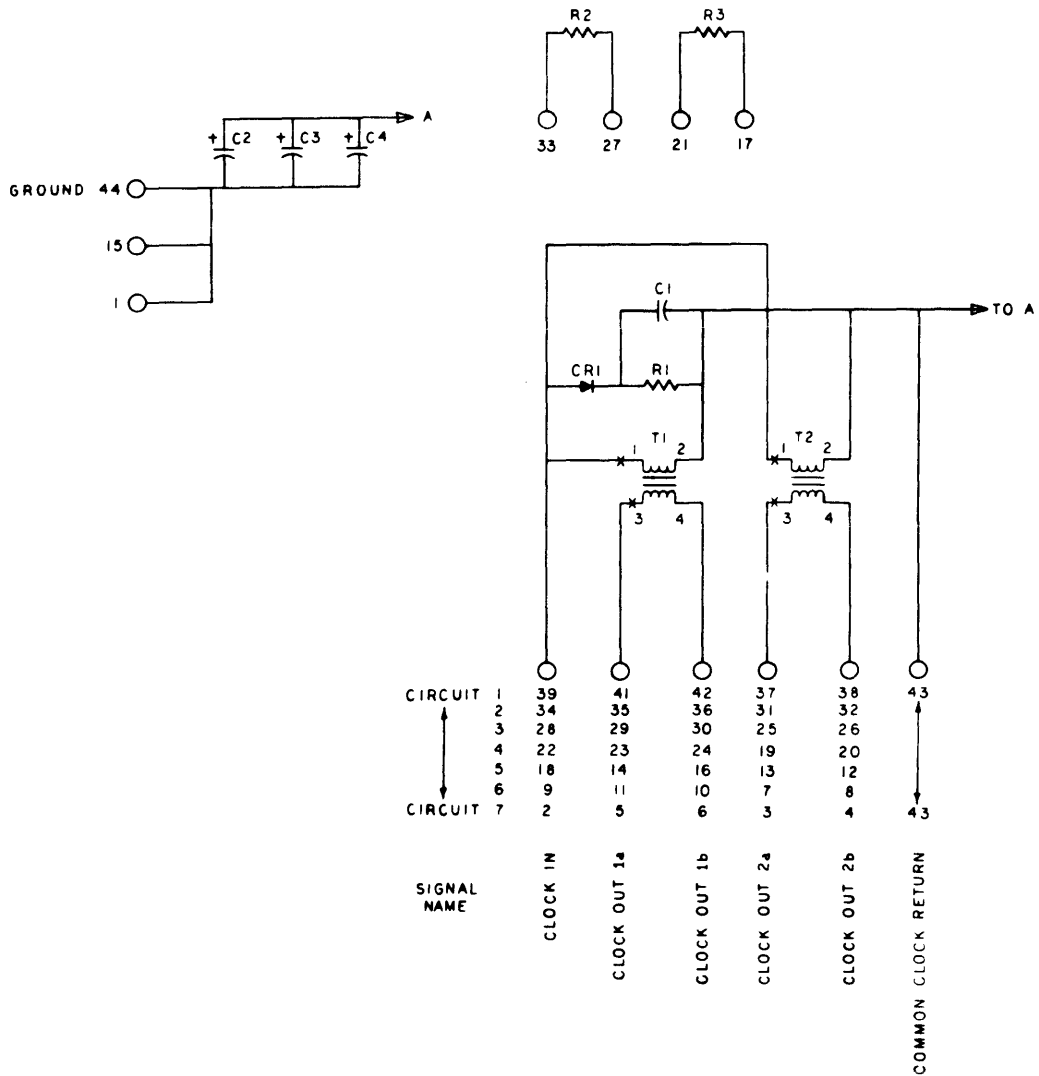
POLARIZING PINS: 16 & 24



Module CK 54 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Diode 1N3600 1N3873	CR1	7	4 6
2	Capacitor, Mylar, $\pm 5\%$, $0.0068\mu\text{f}$	C1	7	26,27,74
3	Capacitor, Tantalum, $\pm 5\%$, $4.7\mu\text{f}$	C2, 3, 4	3	23,77
4	Resistor, $\pm 1\%$, 1000 ohms	R1	7	36,38
5	Resistor, $\pm 2\%$, 1/2 watt, 10 ohms	R2, 3	2	16,17
6	Transformer, 2:1 2 WEHC	T1, T2	14	39

POLARIZING PINS: 16 & 26



Crystal Clock Generator

CX13

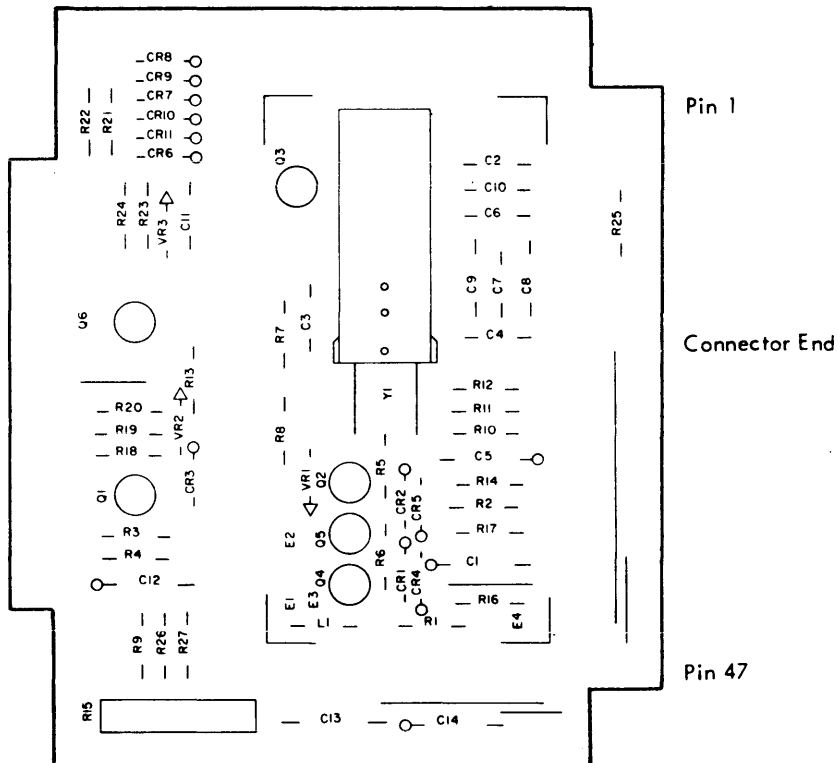
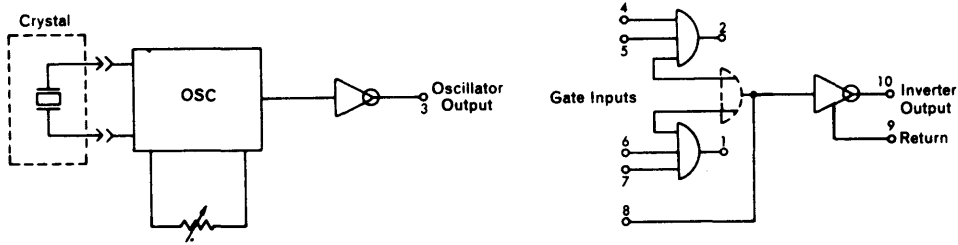
Assy. No. 102171

This module contains a crystal controlled oscillator and an AND/OR Inverter circuit. Frequency is determined by a plug-in quartz crystal. Output from the oscillator is a symmetrical square wave with standard logic levels.

The Inverter Output may be increased to 56 loads by adding an additional gate load resistor to the output pins of the inverter gates. If only one of the two input gates are used, jumpering pins 1 and 2 will provide the extra gate load resistor.

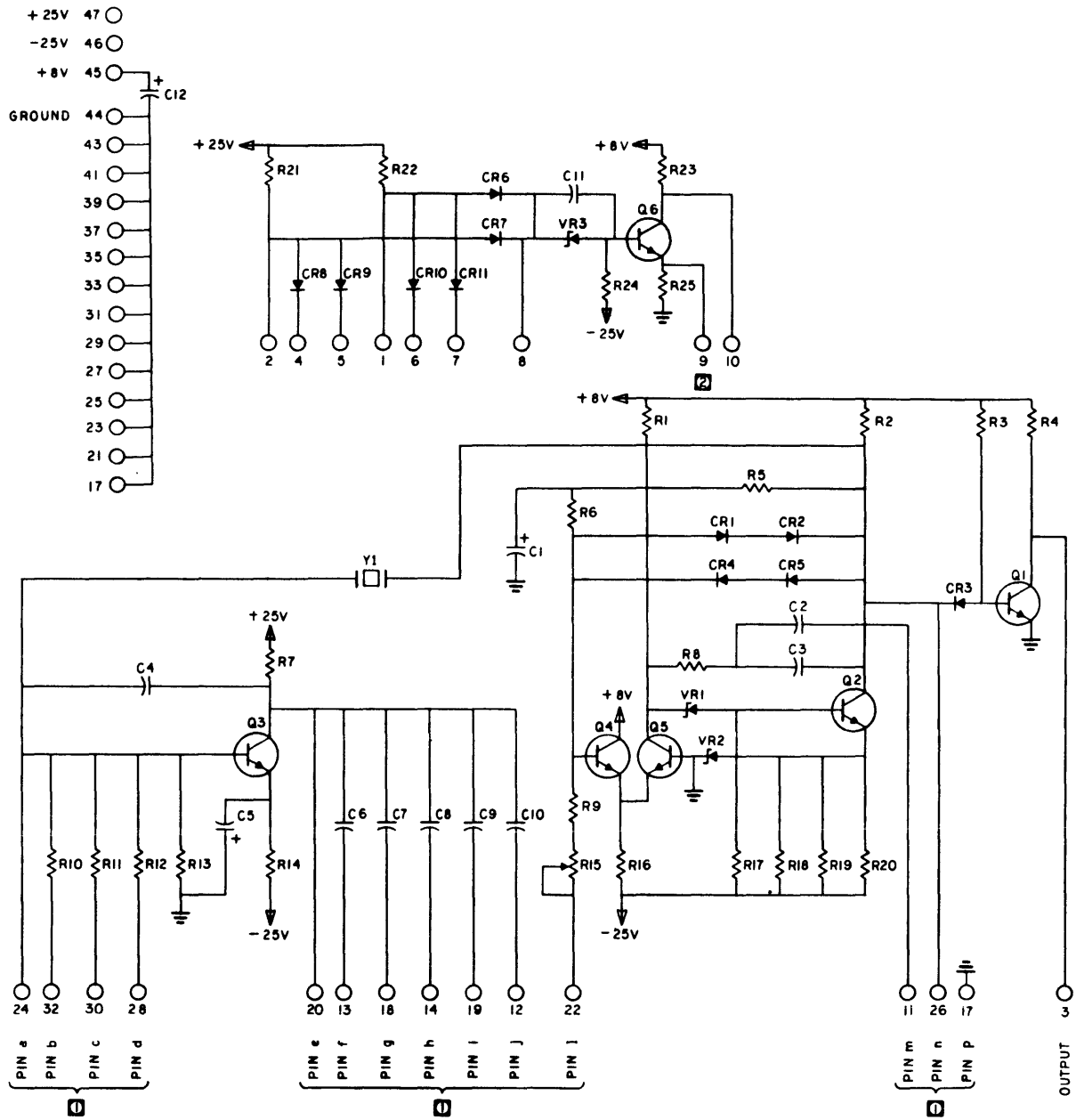
Crystal frequency must be specified.

Operating Frequency Range	30kc to 1.2 Mc
Oscillator Output	6 loads
Accuracy at 60°C,	25 ppm
Gate Inputs	2 loads
Inverter Output	20 loads
+25 Volt Supply	18 ma
+ 8 Volt Supply	26 ma
-25 Volt Supply	32 ma
Module Dissipation	1.8 watts



Model CX13 Schematic

POLARIZING PINS: 16 & 30



NOTES:

1 THE TABLE BELOW LISTS PIN CONNECTIONS TO BE MADE DEPENDING UPON THE FREQUENCY OF THE CRYSTAL USED.

CRYSTAL FREQUENCY RANGE	PIN CONNECTIONS												
	b	c	d	f	g	h	i	j	l	m	n	p	
1 MC TO 300 KC	X					X			X				
300 KC TO 100 KC		X		X				X		X			
100 KC TO 30 KC			X	X				X		X			
											X	X	

2 IF OUTPUT PIN #10 IS USED AS CLOCK FOR FLIP-FLOPS, PIN #9 SHOULD BE GROUNDED NEAR THE FLIP FLOPS; OTHERWISE IT MAY BE GROUNDED LOCALLY.

Model CX13 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N2369 2N2501 2N2710	Q1,2,3,4,5	5	3,11 1 95
2	Transistor 2N2538 2N2476 2N2848	Q6	1	1 7 3
3	Diode 1N914A	CR1 through CR11	11	4,12,13,14
4	Diode 1N746	VR2,3	2	2,12,13,14
5	Diode 1N752	VR1	1	2,12,13,14
6	Capacitor, Mica 47pf ± 5%	C3,4	2	19,20,21
7	Capacitor, Mica 100pf ± 5%	C2	1	19,20,21
8	Capacitor, Mica 150pf ± 5%	C6,7	2	19,20,21
9	Capacitor, Mica 470pf ± 5%	C8	1	19,20,21
10	Capacitor, Mica 510pf ± 5%	C11	1	19,20,21
11	Capacitor, Mylar 1500pf ± 10%	C9	1	74,27,26
12	Capacitor, Mylar 4700pf ± 10%	C10	1	74,27,26
13	Capacitor, Tantalum 4.7μf ± 20%,50v	C12	1	23,77
14	Capacitor, Tantalum 15μf ± 20%,20v	C1,5	2	22,23,76
15	Potentiometer 1.0k ohms ± 10%	R15	1	35,44
16	Resistor 47 ohms ± 2%	R25	1	16,17
17	Resistor 100 ohms ± 2%	R8	1	16,17
18	Resistor 820 ohms ± 2%	R4,23	2	16,17
19	Resistor 1.0k ohms ± 2%	R1,2,5,6,9	5	16,17
20	Resistor 1.5k ohms ± 2%	R10	1	16,17
21	Resistor 2.2k ohms ± 2%	R7	1	16,17
22	Resistor 3.3k ohms ± 2%	R18,19,20	3	16,17
23	Resistor 3.9k ohms ± 2%	R16,21,22,3	4	16,17
24	Resistor 4.7k ohms ± 2%	R11,14	2	16,17
25	Resistor 10k ohms ± 2%	R13	1	16,17
26	Resistor 15k ohms ± 2%	R12	1	16,17
27	Resistor 18k ohms ± 2%	R17	1	16,17
28	Resistor 39k ohms ± 2%	R24	1	16,17
29	Crystal (See Crystal Specification) Y1		1	138

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

CRYSTAL SPECIFICATIONS

1. Crystal shall be housed in Military Holder type HC-6/U, HC-13/U, or HC-13/U with a 2.0 inch cover.
2. Crystal shall be adjusted to have the required frequency in series resonance at 60°C.
3. The crystal cut and mode shall be determined from the following table:

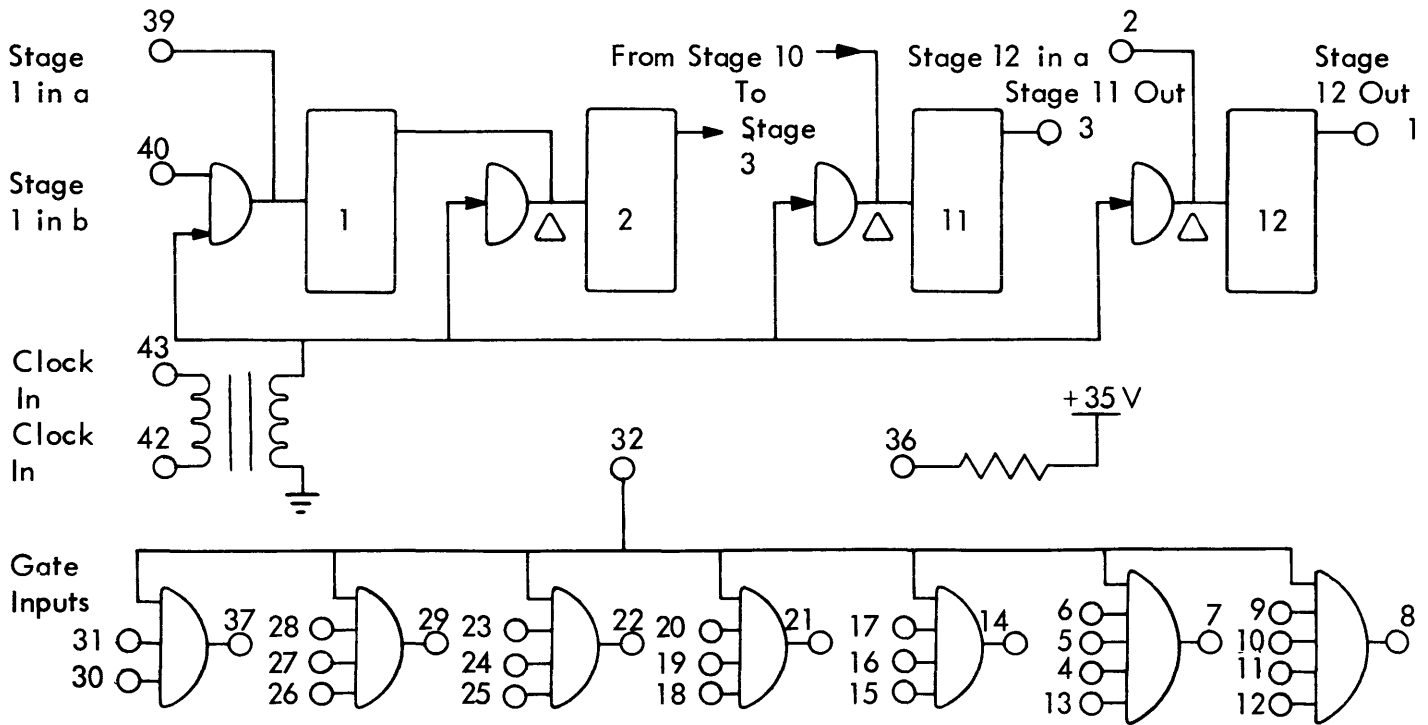
Frequency Range (Kc)	Cut	Mode
30 - 100	N	Flexure
100 - 250	E	Extension
250 - 500	C	Face shear
500 - 2000	A	Thickness shear

Shift Register

Assy. No. 100361

DK51

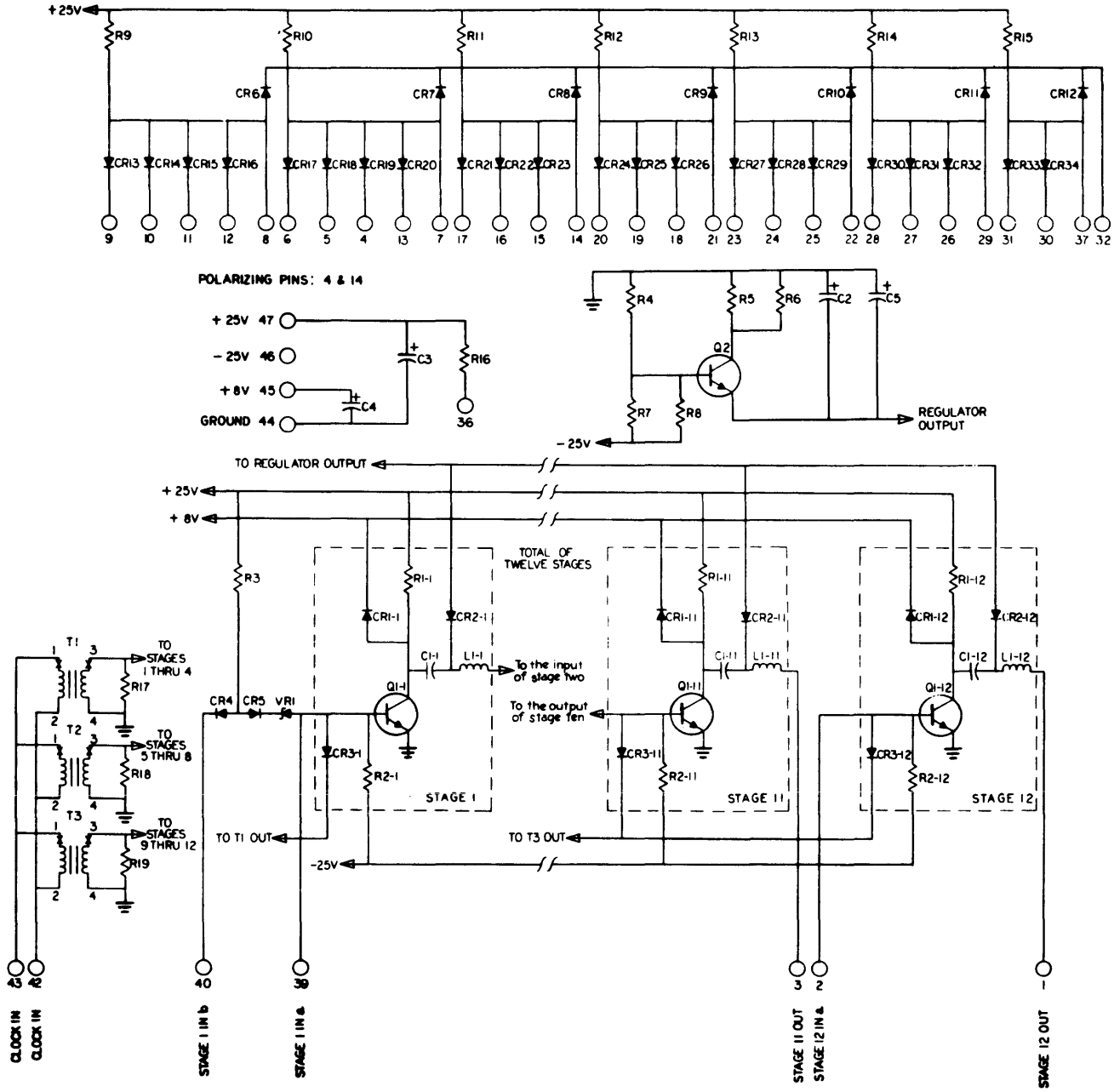
<u>Input</u>	<u>Loading</u>	<u>Operating Frequency</u>
Stage 1 In b	2 loads	2.7 to 3.7 Mc
Stage 1 In a	2 loads	
Stage 12 In a	2 loads	<u>Power Drain</u>
Clock Input	3 clock loads	
Gate Input	2 loads	+ 8 Volt Supply -75 ma
		-25 Volt Supply 22 ma
<u>Output</u>	<u>Loading</u>	<u>Module Dissipation</u>
Stage 11 Out	2 loads, 75 pf	3.1 watts
Stage 12 Out	2 loads, 75 pf	



Module DK51 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N2369	13	3
		2N2501		1
2	Diode	1N746	1	2, 13, 14, 32
3	Diode	1N907A	67	4, 13
		1N914A		4, 12, 13, 14
		1N3063		4, 6
		1N3065		4
4	Capacitor, Silver Mica, $\pm 5\%$, 180 pf	C1	12	19, 20, 21
5	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C2, 3, 4, 5	4	22, 23, 77
6	Inductor, $\pm 5\%$, 100 μ hy	L1	12	42, 90, 91
7	Resistor, $\pm 2\%$, 1/2 watt, 82 ohms	R5, 6	2	16, 17
8	Resistor, $\pm 2\%$, 1/2 watt, 120 ohms	R4	1	16, 17
9	Resistor, $\pm 2\%$, 1/2 watt, 180 ohms	R17, 18, 19	3	16, 17
10	Resistor, $\pm 2\%$, 1/2 watt, 2.7 k ohms	R1, 7, 8	14	16, 17
11	Resistor, $\pm 2\%$, 1/2 watt, 3.9 k ohms	R3, R9 through R16	9	16, 17
12	Resistor, $\pm 2\%$, 1/2 watt, 56 k ohms	R2	12	16, 17
13	Transformer, 2 WHHA	T1, 2, 3	3	39
	4851			69
	01-884			71

Module DK51 Schematic



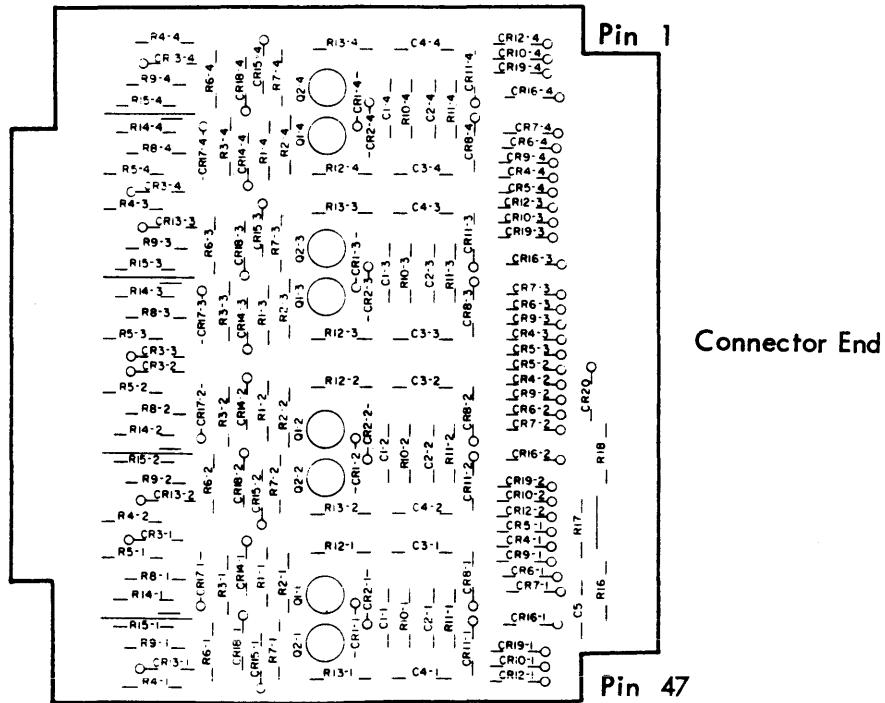
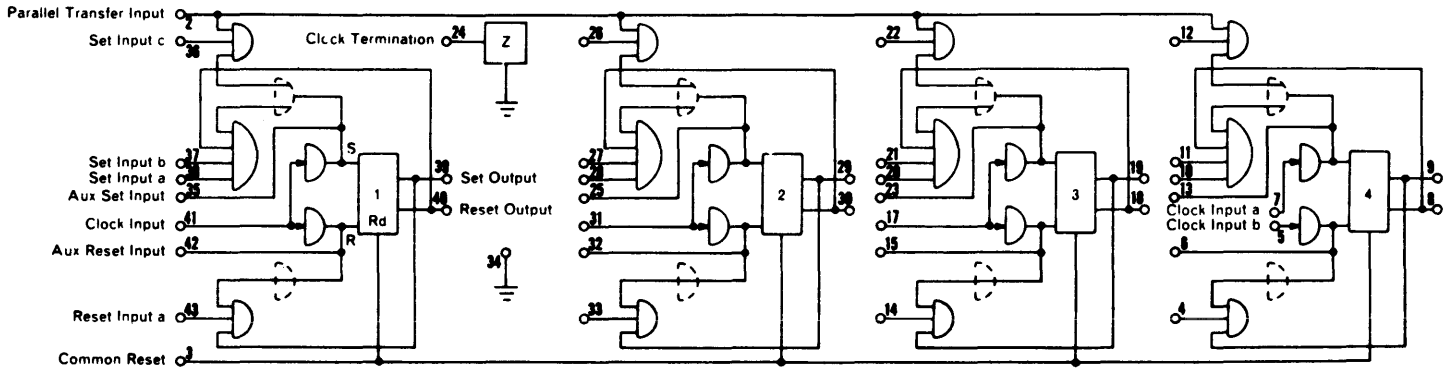
Universal Flip Flop

FC 11

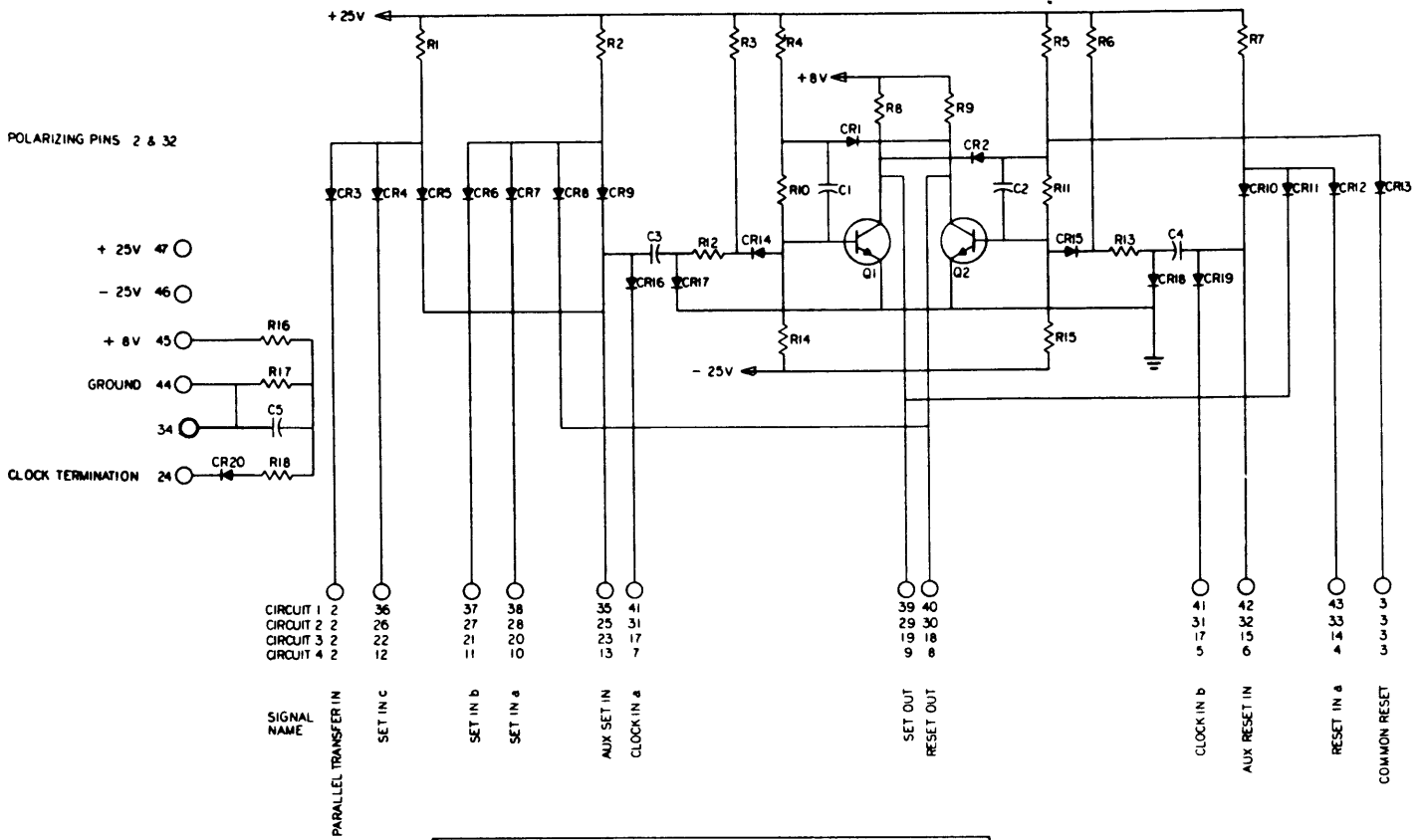
Assy. No. 100141

This module contains four independent flip-flop circuits, a clock termination circuit, and input gating that permits a wide range of applications. For a binary counter, the *Set Output* of each flip-flop is connected to the *Clock Input* of the next, causing it to toggle. A decade counter is similar, but requires a connection from *Reset Output 4* to *Set Input 2a*, and instead of *Set Output 3*, *Set Output 1* drives *Clock Input 4b*. The *Common D.C. Reset Input* is a "low true" input. The *Parallel Transfer Input* allows presetting of the counter, or parallel entry to the shift register, and is connected to ground if not used.

Model Number	FC 11
Maximum Operating Frequency	250 Kc
Fan-in (each aux. input)	15 terms
Gate Input	1 load
Clock Input	3 loads
D.C. Reset Input (Common)	4 loads
Parallel Transfer Input	4 loads
D.C. Set and Reset Input Pulse (min.)	700 nS
Set Output	11 loads
Reset Output	11 loads
Output delay (typical)	150 nS
Output delay (max. capacitive load)	250 nS
+25 volt supply	106 ma
+8 volt supply	40 ma
-25 volt supply	25 ma
Module dissipation (typical)	3.7 watts



MODEL FC11 - Schematic



"REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATIONS WITH THE UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH."

Model FC 11 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor, 2N706B 2N914	Q1,2	8	1 3
2	Diode, 1N3605 FD200 TI73 CD6112	CR 1 through CR 20	77	6 4 12 14
3	Capacitor, Silver Mica, ±5%, 510pf	C 1,2,5	9	19, 20, 21
4	Capacitor, Silver Mica, ±5%, 470pf	C 3,4	8	19, 20, 21
5	Resistor, ±2%, 1/2 watt, 100 ohm	R18	1	16, 17
6	Resistor, ±2%, 1/2 watt, 270 ohm	R12,13	8	16, 17
7	Resistor, ±2%, 1/2 watt, 820 ohm	R8,9,10,11	16	16, 17
8	Resistor, ±2%, 1/2 watt, 2.2k ohm	R17	1	16, 17
9	Resistor, ±2%, 1/2 watt, 3.0k ohm	R4,5	8	16, 17
10	Resistor, ±2%, 1/2 watt, 4.7k ohm	R16	1	16, 17
11	Resistor, ±2%, 1/2 watt, 8.2k ohm	R1,2,7,14,15	20	16, 17
12	Resistor, ±2%, 1/2 watt, 15k ohm	R3,6	8	16, 17

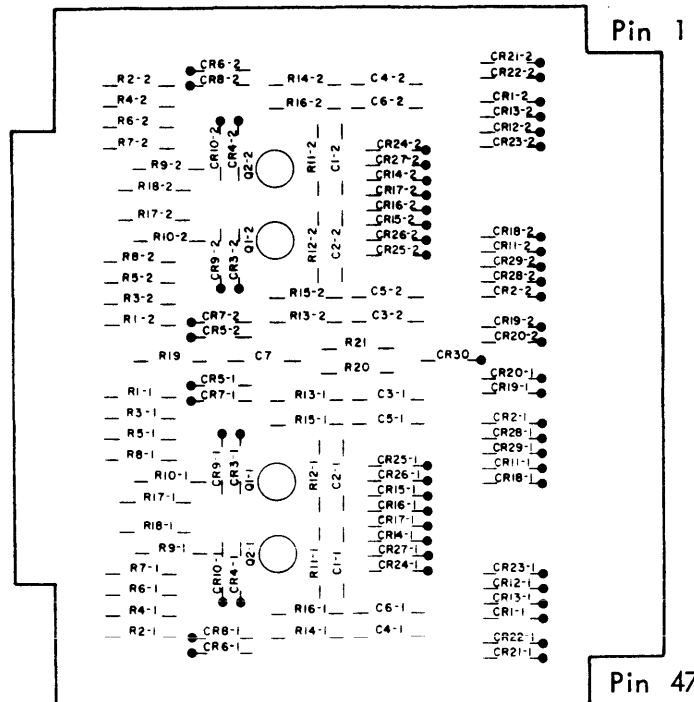
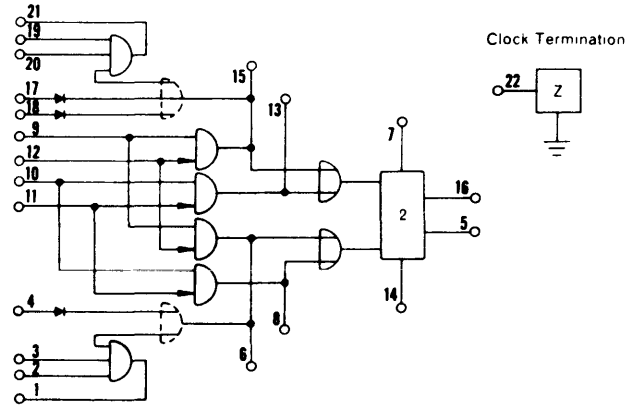
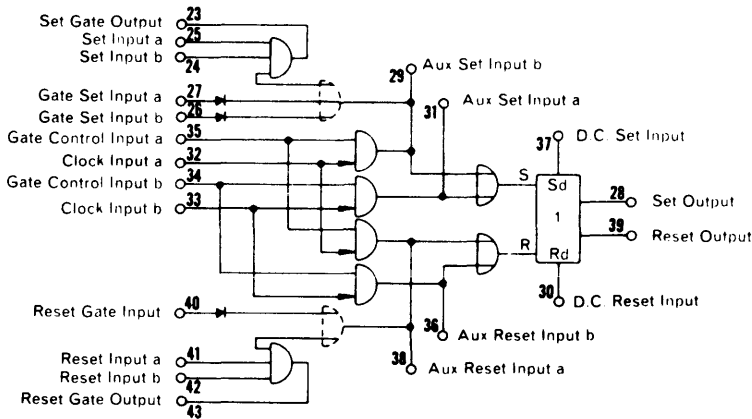
Dual Clock Flip Flop

FC12

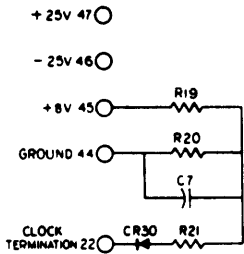
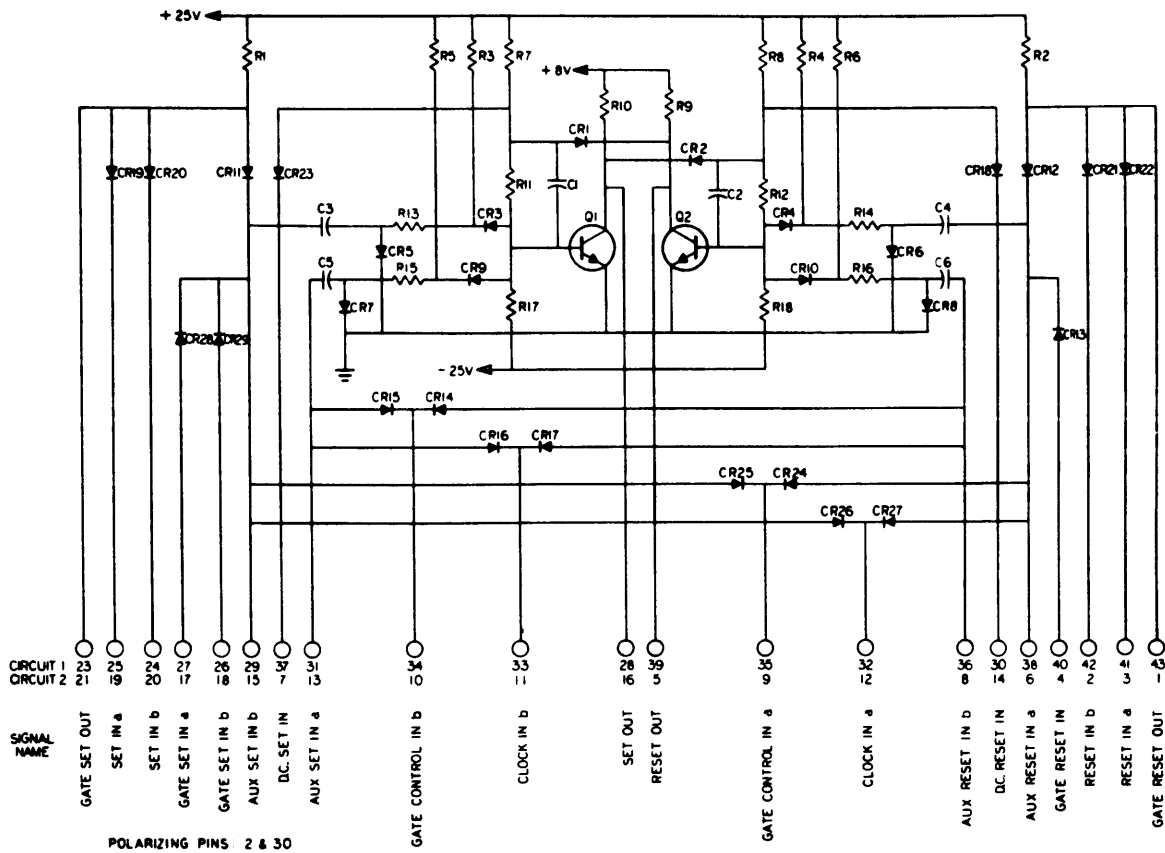
Assy. No. 100170

This module contains two identical flip-flop circuits with input gating and a clock termination circuit. Each flip-flop set and reset input has a pair of input circuits for independent clock inputs, so that this unit is particularly suitable for constructing up-down counters and bi-directional shift registers. Both *D.C. Set Input* and *D.C. Reset Input* terminals are available for "low true" triggering. All input gates can be expanded by use of the Gate Expander modules to the maximum number of terms. *Set Gate Inputs* and *Reset Gate Inputs* are provided to be driven directly by AND gate outputs.

Model Number	FC12
Maximum Operating Frequency	250 Kc
Fan-in (each aux. input)	15 terms
Gate Input	1 load
Gate Control Input	1 load
Clock Input	3 loads
D.C. Set Input	1 load
D.C. Reset Input	1 load
D.C. Set and Reset Input Pulse (min.)	700 nS
Set Output	12 loads
Reset Output	12 loads
Output delay (typical)	150 nS
Output delay (max. capacitive load)	250 nS
+25 volt supply	54 ma
+8 volt supply	20 ma
-25 volt supply	12 ma
Module dissipation (typical)	1.9 watts



MODEL FC12 - Schematic



"REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATIONS WITH THE UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH."

Model FC 12 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor, 2N7068 2N914	Q1,2	4	1 3
2	Diode, 1N3605 FD200 T173 CD6112	CR 1 through CR 30	59	6 4 12 14
3	Capacitor, Silver Mica ±5%, 470pf	C 3,4,5,6	8	19, 20, 21
4	Capacitor, Silver Mica ±5%, 510pf	C 1,2,7	5	19, 20, 21
5	Resistor, ±2%, 1/2 watt, 100 ohm	R21	1	16, 17
6	Resistor, ±2%, 1/2 watt, 270 ohm	R13,14,15,16	8	16, 17
7	Resistor, ±2%, 1/2 watt, 820 ohm	R9,10,11,12	8	16, 17
8	Resistor, ±2%, 1.2 watt, 2.2k ohm	R20	1	16, 17
9	Resistor, ±2%, 1/2 watt, 3.0k ohm	R7,8	4	16, 17
10	Resistor, ±2%, 1.2 watt, 4.7k ohm	R19	1	16, 17
11	Resistor, ±2%, 1/2 watt, 8.2k ohm	R1,2,17,18	8	16, 17
12	Resistor, ±2%, 1.2 watt, 15k ohm	R3,4,5,6	8	16, 17

Counter Flip-Flop

Assy. No. 101004

FC15

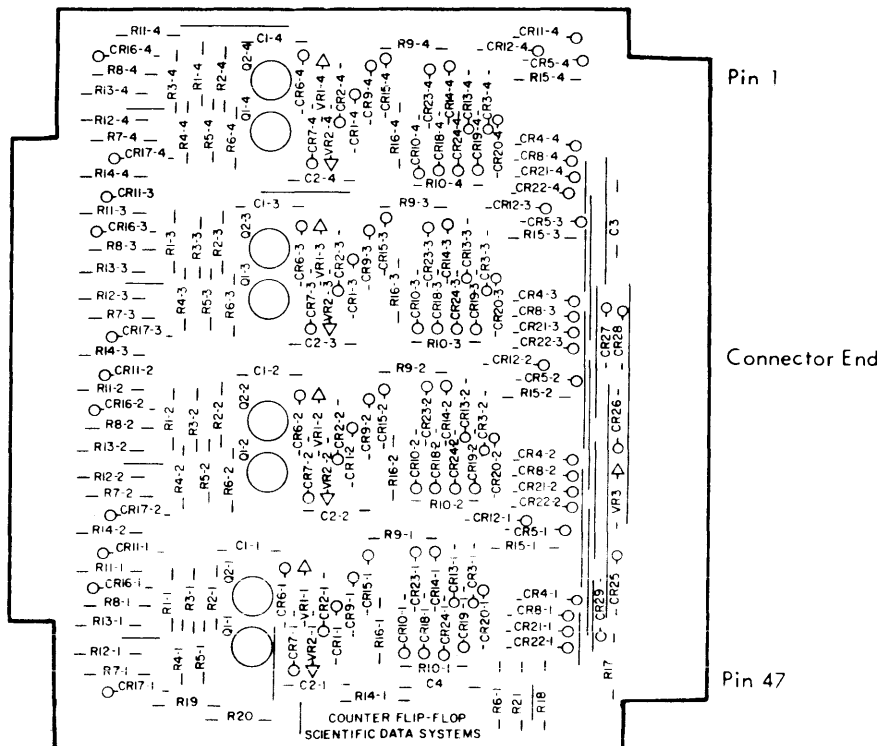
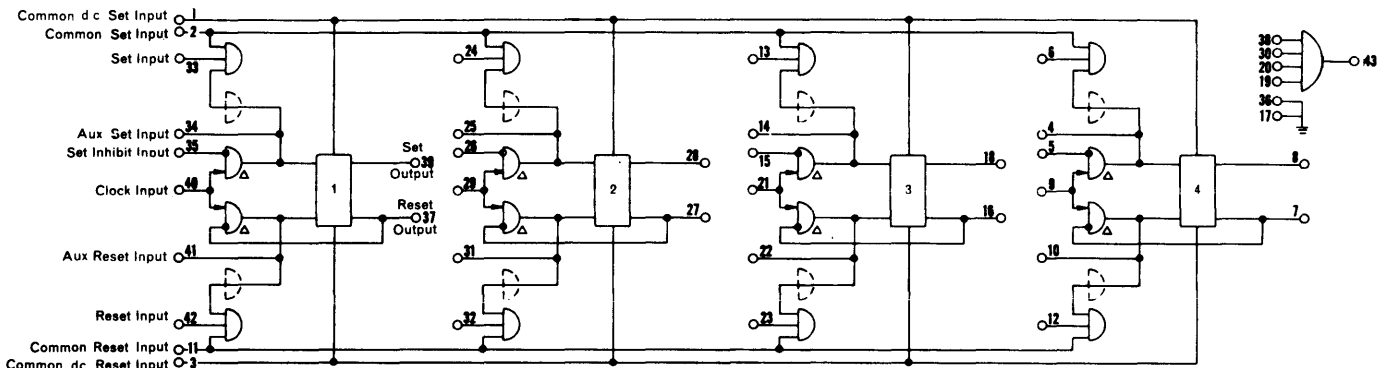
This module contains four flip-flop circuits which are independent except for the Common Set and Reset Input lines. The input gating on the card provides for constructing binary or decimal unlocked counters, and shift registers.

Either clocked or unlocked operation of the flip-flops is satisfactory. Clock termination circuits are prewired on the module, as are the comprehensive noise level control circuits.

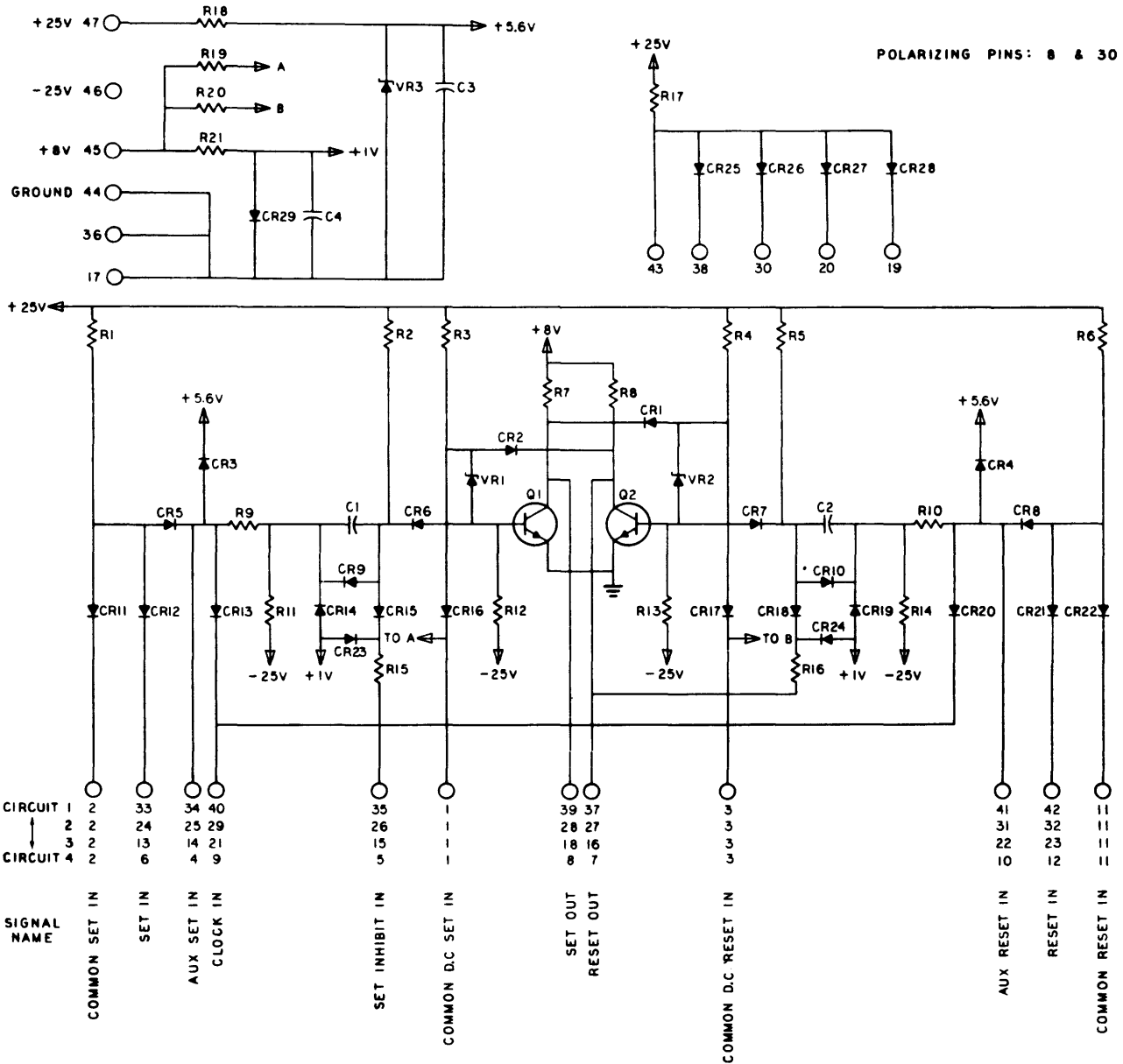
The Counter Flip-flop may be used in a unique "repeater" manner which enables it to follow the true and false changes of a single input logic signal connected to the Set Inhibit Input and the Reset Input. This flip-flop may be used in gated RS, JK, Delay, or Trigger configurations. Other applications include the mechanization of large, unusually efficient clocked counters.

True signals have no effect on the dc inputs which respond only when false (0-volt) signals are applied.

Maximum Operating Frequency	300 kc
Fan-In (Each aux. input)	15 terms
Set, Reset Inputs	1 load
Clock Input	3 loads
Common dc Set, Reset Inputs	4 loads
Common Set, Reset Inputs	4 loads
Set Inhibit Input	2 loads
Set Output	12 loads
Reset Output	10 loads
Output Delay (Typical)	150 ns
+25 Volt Supply	72 ma
+8 Volt Supply	54 ma
-25 Volt Supply	3 ma
Module Dissipation	2.4 watts



Model FC15 Schematic



Model FC15 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N914	Q1, 2	8
2	Diode	1N746	VR1, 2	8
3	Diode	1N914A	CR1 through CR29	101
4	Diode	1N752	VR3	1
5	Capacitor, Mica	510 pf ± 5%	C1, 2	8
6	Capacitor, Mylar	0.01µf ± 10%	C3, 4	2
7	Resistor	270 ohms ± 2%	R9, 10, 15, 16	16
8	Resistor	470 ohms ± 2%	R21	1
9	Resistor	820 ohms ± 2%	R7, 8	8
10	Resistor	4.7 k ohms ± 2%	R18	1
11	Resistor	6.8 k ohms ± 2%	R3, 4	8
12	Resistor	8.2 k ohms ± 2%	R1, 6, 17	9
13	Resistor	15 k ohms ± 2%	R2, 5	8
14	Resistor	47 k ohms ± 2%	R19, 20	2
15	Resistor	100 k ohms ± 2%	R12, 13	8
16	Resistor	470 k ohms ± 2%	R11, 14	8

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Universal Flip-Flop

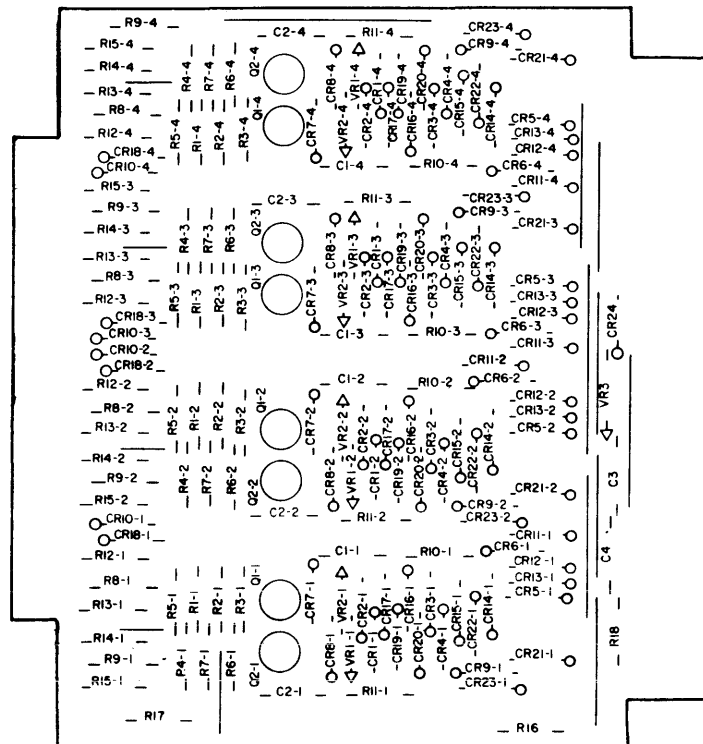
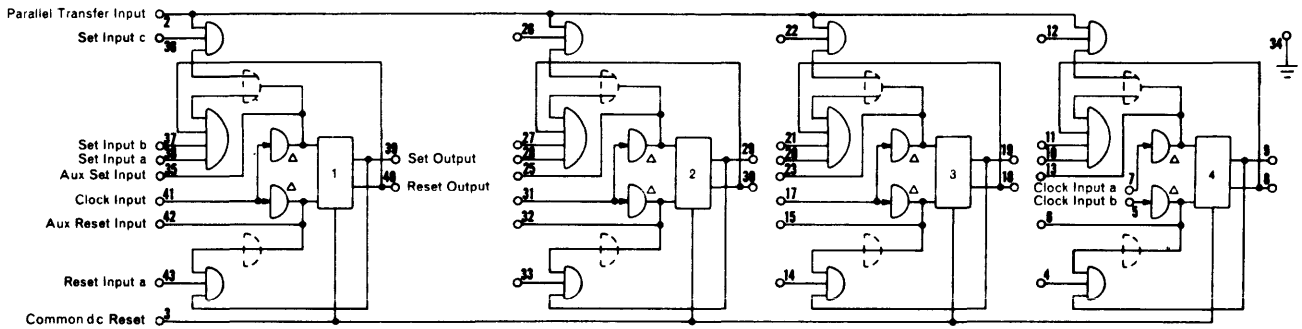
FC17

Assy. No. 101502

This module contains four independent flip-flop circuits with input gating that permits a wide range of applications. For a binary counter, the Set Output of each flip-flop is connected to the Clock Input of the next, causing it to toggle. A decade counter (8, 4, 2, 1) is similar, but requires a connection from Reset Output 4 to Set Input 2a, and instead of Set Output 3, Set Output 1 drives Clock Input 4b. The Parallel Transfer Input allows presetting of the flip-flops, and is connected to ground if not used. Clock termination circuits are prewired on the module, as are the comprehensive noise level control circuits.

True signals have no effect on the dc inputs which respond only when false (0-volt) signals are applied.

Maximum Operating Frequency	300 kc
Fan-In (Each aux. input)	15 terms
Set, Reset Inputs	1 load
Clock Input	3 loads
Common dc Reset Input	4 loads
Parallel Transfer Input	4 loads
Set Output	11 loads
Reset Output	11 loads
Output Delay (Typical)	150 ns
+25 Volt Supply	72 ma
+ 8 Volt Supply	54 ma
-25 Volt Supply	3 ma
Module Dissipation	2.4 watts

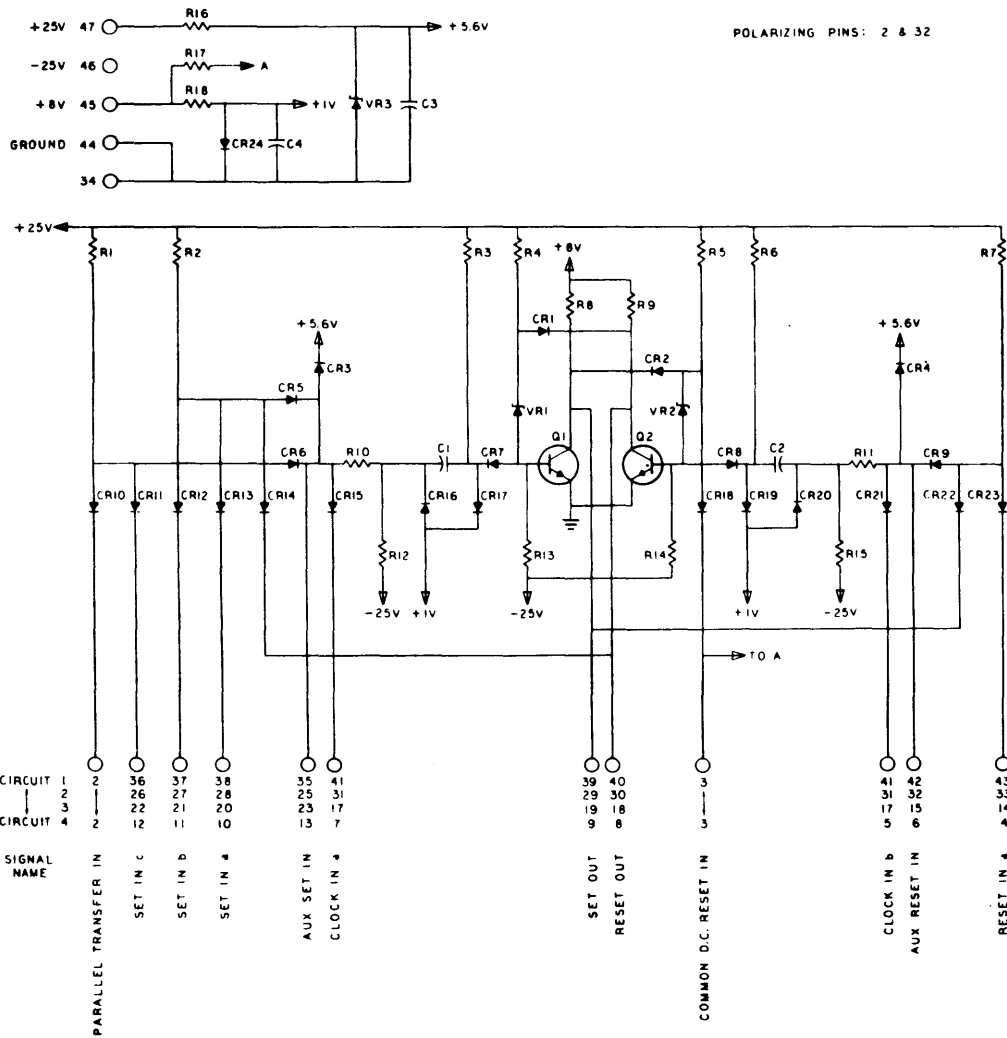


Pin 1

Connector End

Pin 47

Model FC17 Schematic



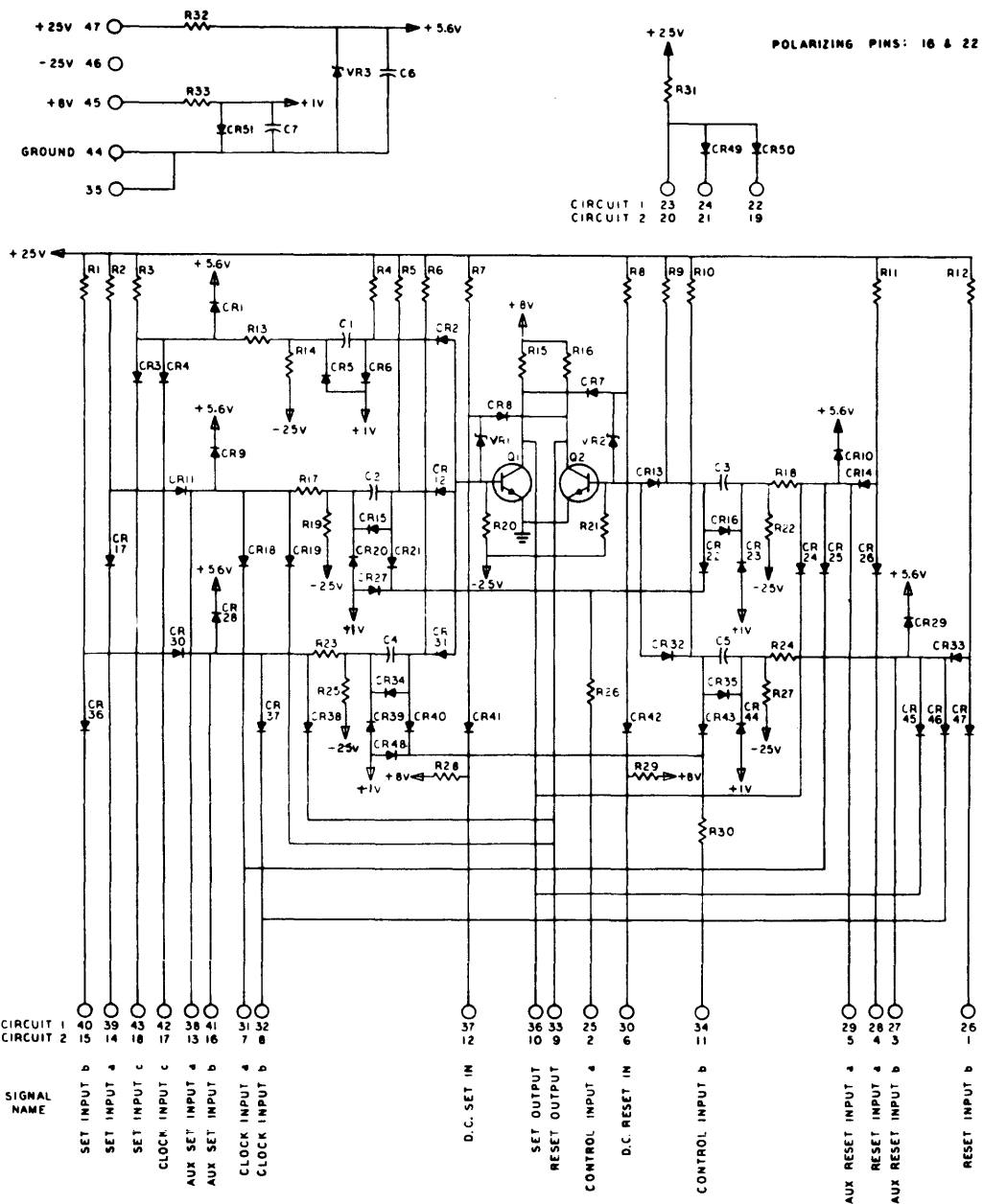
Model FC17 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)	
1	Transistor	2N914	Q1,2	8	1,3,5,7
2	Diode	1N746	VR1,2	8	2,12,13,14
3	Diode	1N914A	CR1 through CR24	93	4,12,13,14
4	Diode	1N3827 1N1765	VR3	1	2 6
5	Capacitor, Mica	510pf ± 5%	C1,2	8	19,20,21
6	Capacitor, Mylar	0.01 µf ± 10%	C3,4	2	74,27,26
7	Resistor	270 ohms ± 2%	R10,11	8	16,17
8	Resistor	470 ohms ± 2%	R18	1	16,17
9	Resistor	820 ohms ± 2%	R8,9	8	16,17
10	Resistor	4.7 k ohms ± 2%	R16	1	16,17
11	Resistor	6.8 k ohms ± 2%	R4,5	8	16,17
12	Resistor	8.2 k ohms ± 2%	R1,2,7	12	16,17
13	Resistor	15 k ohms ± 2%	R3,6	8	16,17
14	Resistor	47 k ohms ± 2%	R17	1	16,17
15	Resistor	100 k ohms ± 2%	R13,14	8	16,17
16	Resistor	470 k ohms ± 2%	R12,15	8	16,17

NOTE

Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Model FC18 Schematic



Model FC18 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N914	Q1,2	4 1,3,5,7
2	Diode	1N746	VR1,2	4 2,12,13,14
3	Diode	1N914A	CR1 through CR51	101 4,12,13,14
4	Diode	1N3827 1N1765	VR3	1 2 6
5	Capacitor, Mica	510 pf ± 5%	C1 through C5	10 19,20,21
6	Capacitor, Mylar	0.01 μf ± 10%	C6,7	2 74,27,26
7	Resistor	270 ohms ± 2%	R13,17,18, 23,24,26,30	14 16,17
8	Resistor	470 ohms ± 2%	R33	1 16,17
9	Resistor	820 ohms ± 2%	R15,16	4 16,17
10	Resistor	4.7k ohms ± 2%	R32	1 16,17
11	Resistor	6.8k ohms ± 2%	R7,8	4 16,17
12	Resistor	8.2k ohms ± 2%	R1,2,3,11,12,31	12 16,17
13	Resistor	15k ohms ± 2%	R4,5,6,9,10	10 16,17
14	Resistor	47k ohms ± 2%	R28,29	4 16,17
15	Resistor	100k ohms ± 2%	R20,21	4 16,17
16	Resistor	470k ohms ± 2%	R14,19,22,25,27	10 16,17

NOTE

Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Counter Flip-Flop

Assy. No. 101026

FH15

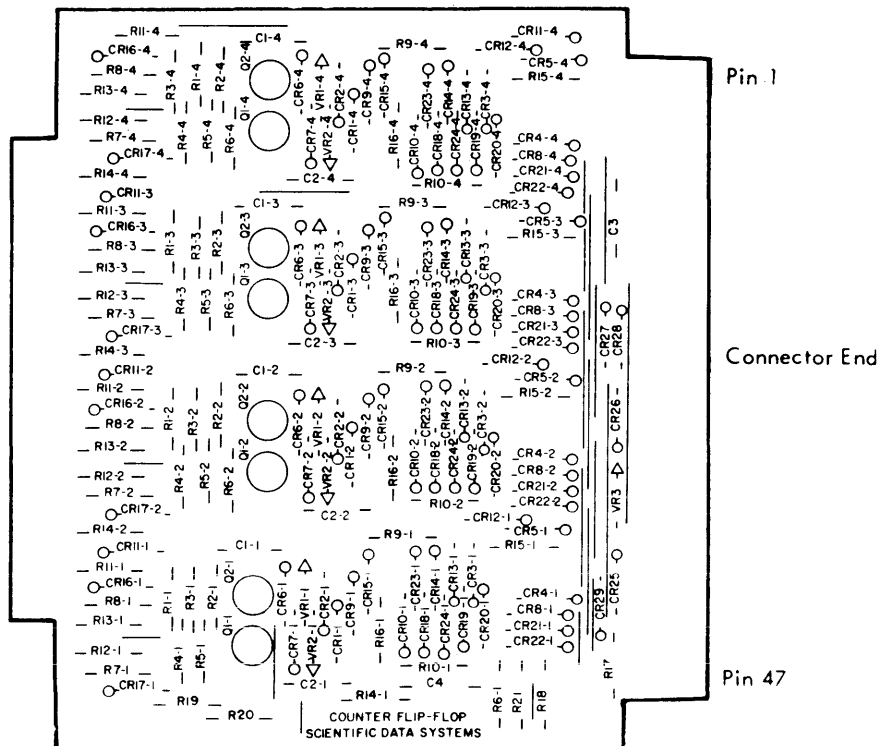
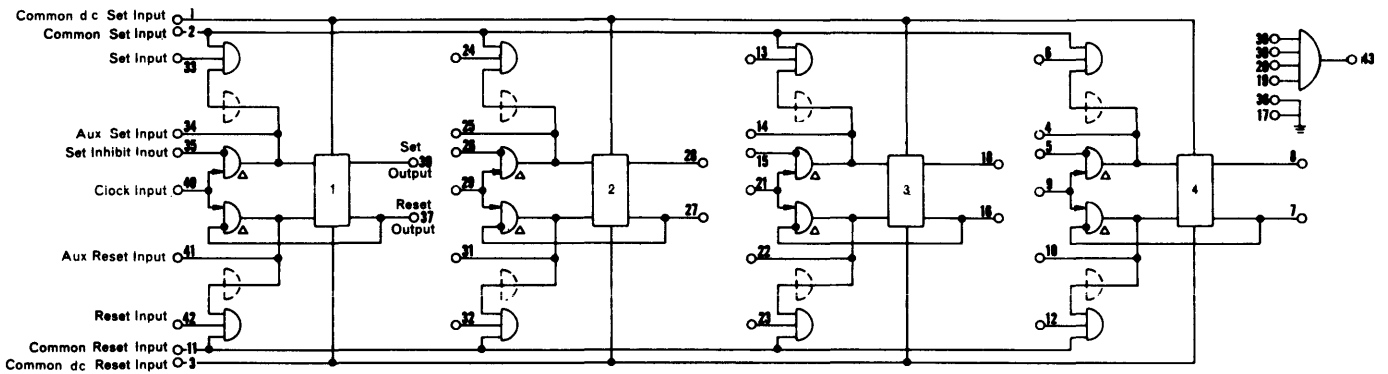
This module contains four flip-flop circuits which are independent except for the Common Set and Reset Input lines. The input gating on the card provides for constructing binary or decimal unclocked counters, and shift registers.

Either clocked or unclocked operation of the flip-flops is satisfactory. Clock termination circuits are prewired on the module, as are the comprehensive noise level control circuits.

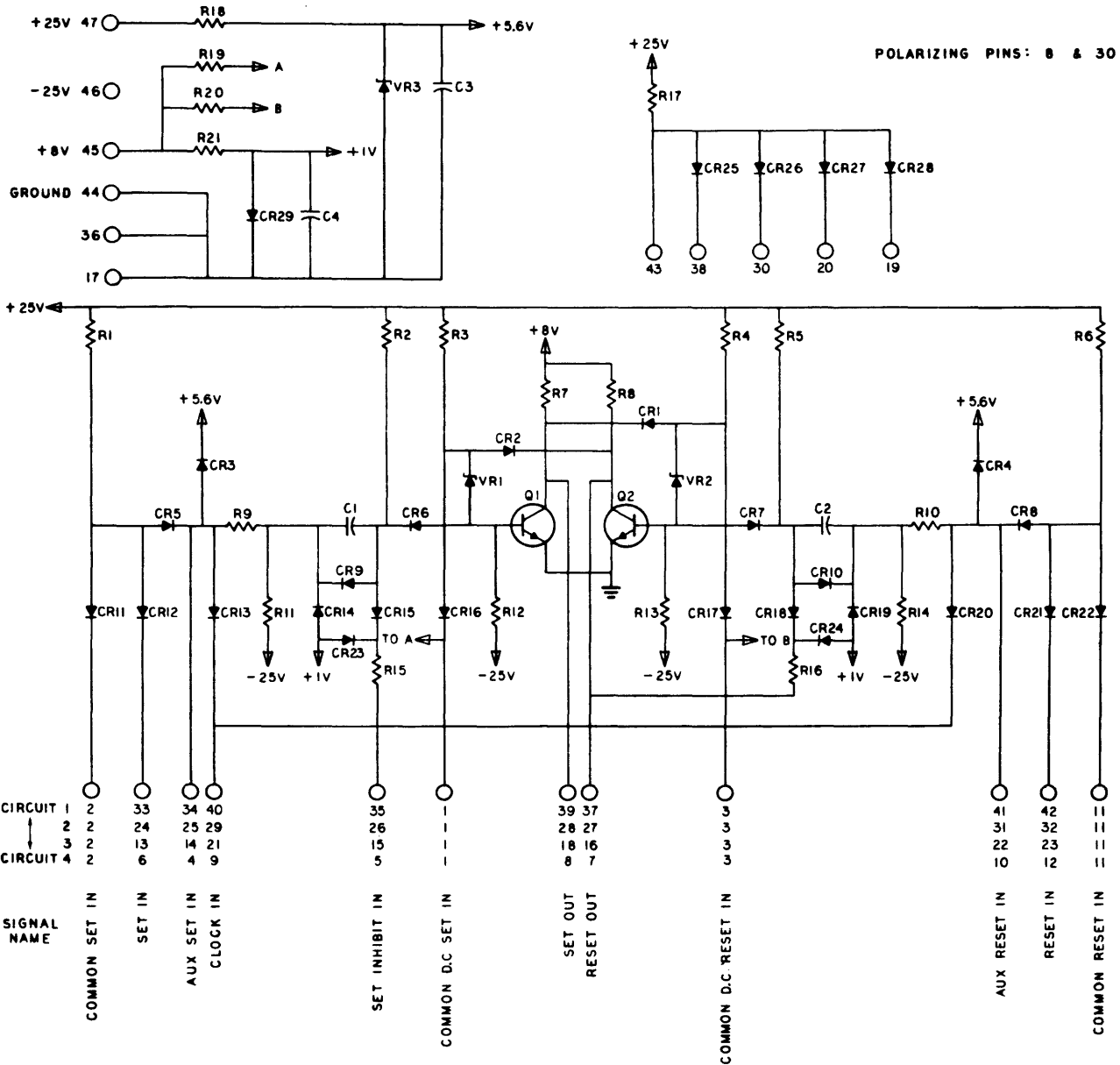
The Counter Flip-flop may be used in a unique "repeater" manner which enables it to follow the true and false changes of a single input logic signal connected to the Set Inhibit Input and the Reset Input. This flip-flop may be used in gated RS, JK, Delay, or Trigger configurations. Other applications include the mechanization of large, unusually efficient clocked counters.

True signals have no effect on the dc inputs which respond only when false (0-volt) signals are applied.

Maximum Operating Frequency	1 Mc
Fan-In (Each aux. input)	10 terms
Set, Reset Inputs	2 loads
Clock Input	4 loads
Common dc Set, Reset Inputs	6 loads
Common Set, Reset Inputs	8 loads
Set Inhibit Input	4 loads
Set Output	12 loads
Reset Output	8 loads
Output Delay (Typical)	100 ns
+25 Volt Supply	93 ma
+8 Volt Supply	54 ma
-25 Volt Supply	3 ma
Module Dissipation	2.9 watts



Model FH15 Schematic



Model FH15 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N834	Q1,2	8	1,5,7,95
2	Diode 1N914A	CR1 through CR29	101	4,12,13,14
3	Diode 1N746	VR1,2	8	2,12,13,14
4	Diode 1N752	VR3	1	2,12,13,14
5	Capacitor, Mica 330pf ± 5%	C1,2	8	19,20,21
6	Capacitor, Mylar 0,01µf ± 10%	C3,4	2	74,27,26
7	Resistor 120 ohms ± 2%	R9,10,15,16	16	16,17
8	Resistor 470 ohms ± 2%	R21,7,8	9	16,17
9	Resistor 3,9 k ohms ± 2%	R1,6,17	9	16,17
10	Resistor 4,7 k ohms ± 2%	R18	1	16,17
11	Resistor 5,6 k ohms ± 2%	R3,4	8	16,17
12	Resistor 10 k ohms ± 2%	R2,5	8	16,17
13	Resistor 47 k ohms ± 2%	R19,20	2	16,17
14	Resistor 100 k ohms ± 2%	R12,13	8	16,17
15	Resistor 470 k ohms ± 2%	R11,14	8	16,17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Printed in U.S.A.

Universal Flip-Flop

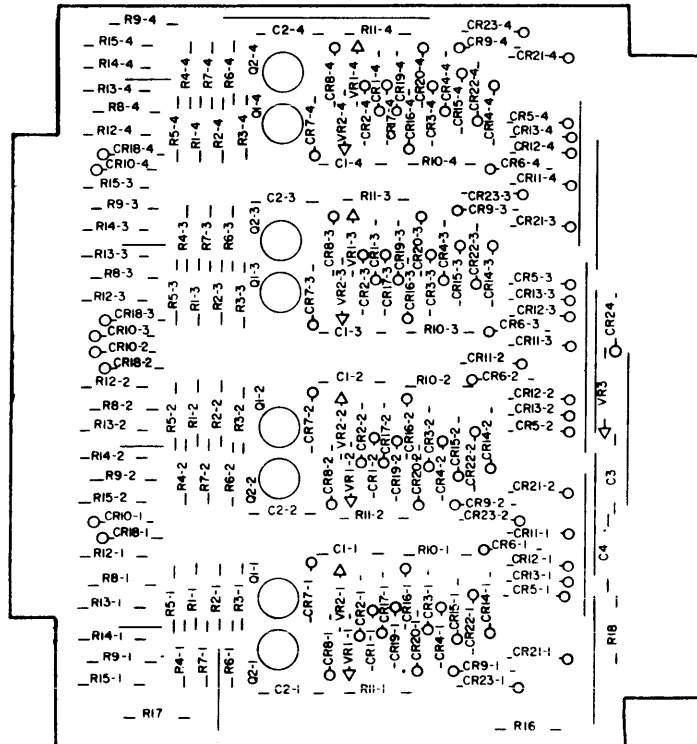
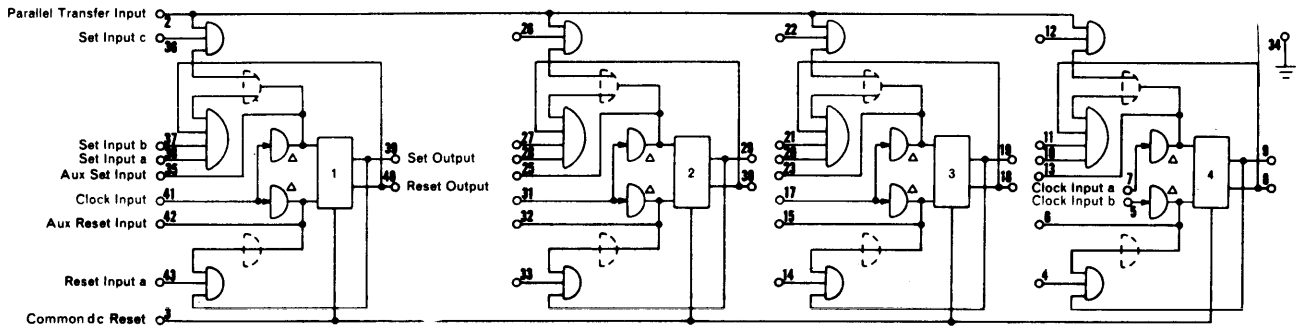
Assy. No. 101534

FH17

This module contains four independent flip-flop circuits with input gating that permits a wide range of applications. For a binary counter, the Set Output of each flip-flop is connected to the Clock Input of the next, causing it to toggle. A decade counter (8, 4, 2, 1) is similar, but requires a connection from Reset Output 4 to Set Input 2a, and instead of Set Output 3, Set Output 1 drives Clock Input 4b. The Parallel Transfer Input allows presetting of the flip-flops, and is connected to ground if not used. Clock termination circuits are prewired on the module, as are the comprehensive noise level control circuits.

True signals have no effect on the dc inputs which respond only when false (0-volt) signals are applied.

Maximum Operating Frequency	1 Mc
Fan-In (Each aux. input)	10 terms
Set, Reset Inputs	2 loads
Clock Input	3 loads
Common dc Reset Input	6 loads
Parallel Transfer Input	8 loads
Set Output	10 loads
Reset Output	10 loads
Output Delay (Typical)	100 ns
+25 Volt Supply	140 ma
+ 8 Volt Supply	54 ma
-25 Volt Supply	3 ma
Module Dissipation	4.1 watts

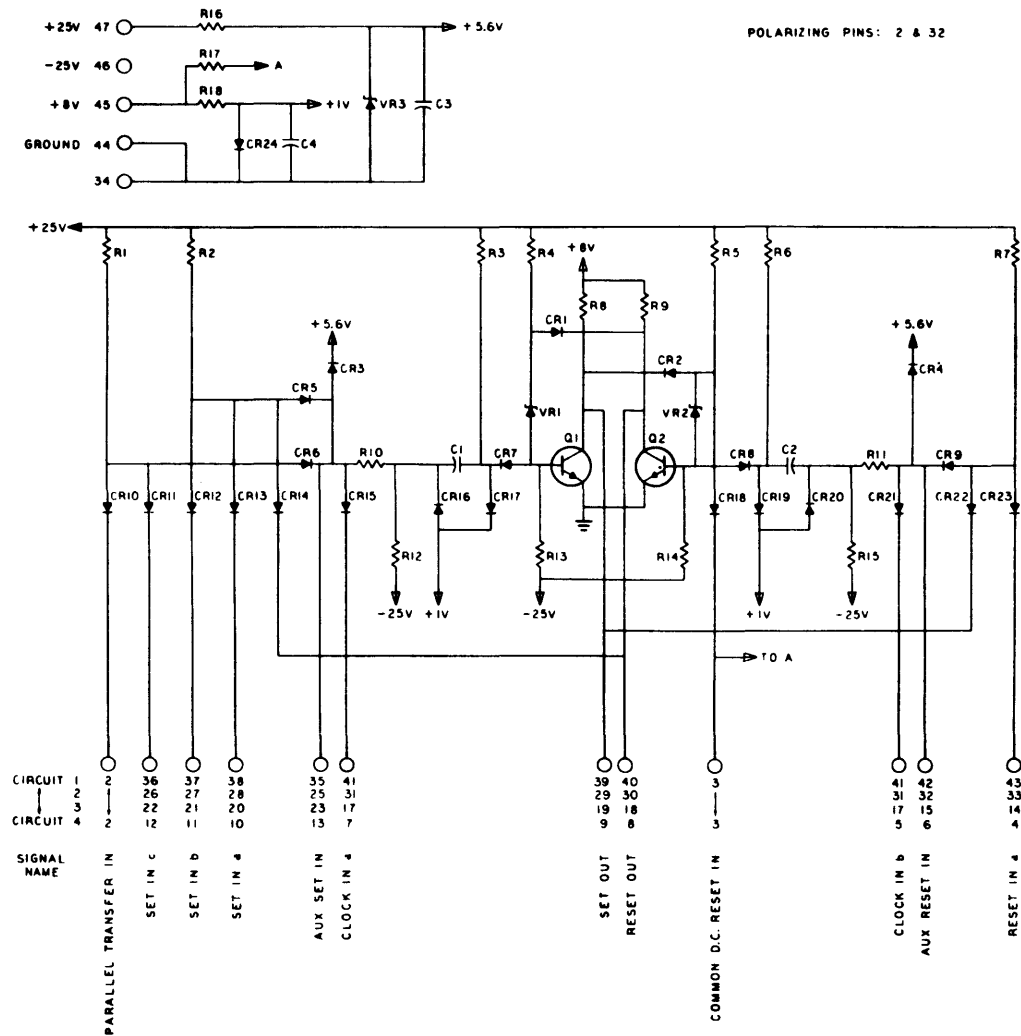


Pin 1

Connector End

Pin 47

Model FH17 Schematic



Model FH17 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N834	Q1,2	8	1,5,7,95
2	Diode 1N914A	CR1 through CR24	93	4,12,13,14
3	Diode 1N746	VR1,2	8	2,12,13,14
4	Diode 1N3827 1N1765	VR3	1	2 6
5	Capacitor, Mica 330pf ± 5%	C1,2	8	19,20,21
6	Capacitor, Mylar 0.01µf ± 10%	C3,4	2	74,27,26
7	Resistor 120 ohms ± 2%	R10,11	8	16,17
8	Resistor 470 ohms ± 2%	R8,9,18	9	16,17
9	Resistor 3.9 k ohms ± 2%	R1,2,7	12	16,17
10	Resistor 4.7 k ohms ± 2%	R16	1	16,17
11	Resistor 47 k ohms ± 2%	R17	1	16,17
12	Resistor 100 k ohms ± 2%	R13,14	8	16,17
13	Resistor 470 k ohms ± 2%	R12,15	8	16,17
14	Resistor 5.6 k ohms ± 2%	R4,5	8	16,17
15	Resistor 10 k ohms ± 2%	R3,6	8	16,17

NOTE

Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Repeater Flip Flop

Assy. No. 100353

FK51

Fan In

Auxiliary Set Input 10 terms

Operating Frequency

2.5 Mc to 4.0 Mc

Input

Set Input A 2 loads

Common Set Input 4 loads

Common Hold Input 8 loads

D. C. Set Input 6 loads

Register Input 2 loads

Common Clock Input 1 clock load

Inverter Input 2 loads

Gate Input 2 loads

Power Drain

+25 Volt Supply 92 ma

+ 8 Volt Supply 43 ma

-25 Volt Supply 20 ma

Module Dissipation

3.2 watts

Output

Set out A or B 12 loads, 200 pf

Auxiliary Set out 12 loads, 600 pf

Reset out A or B 12 loads, 200 pf

Inverter out 12 loads, 200 pf

Delay (typical)

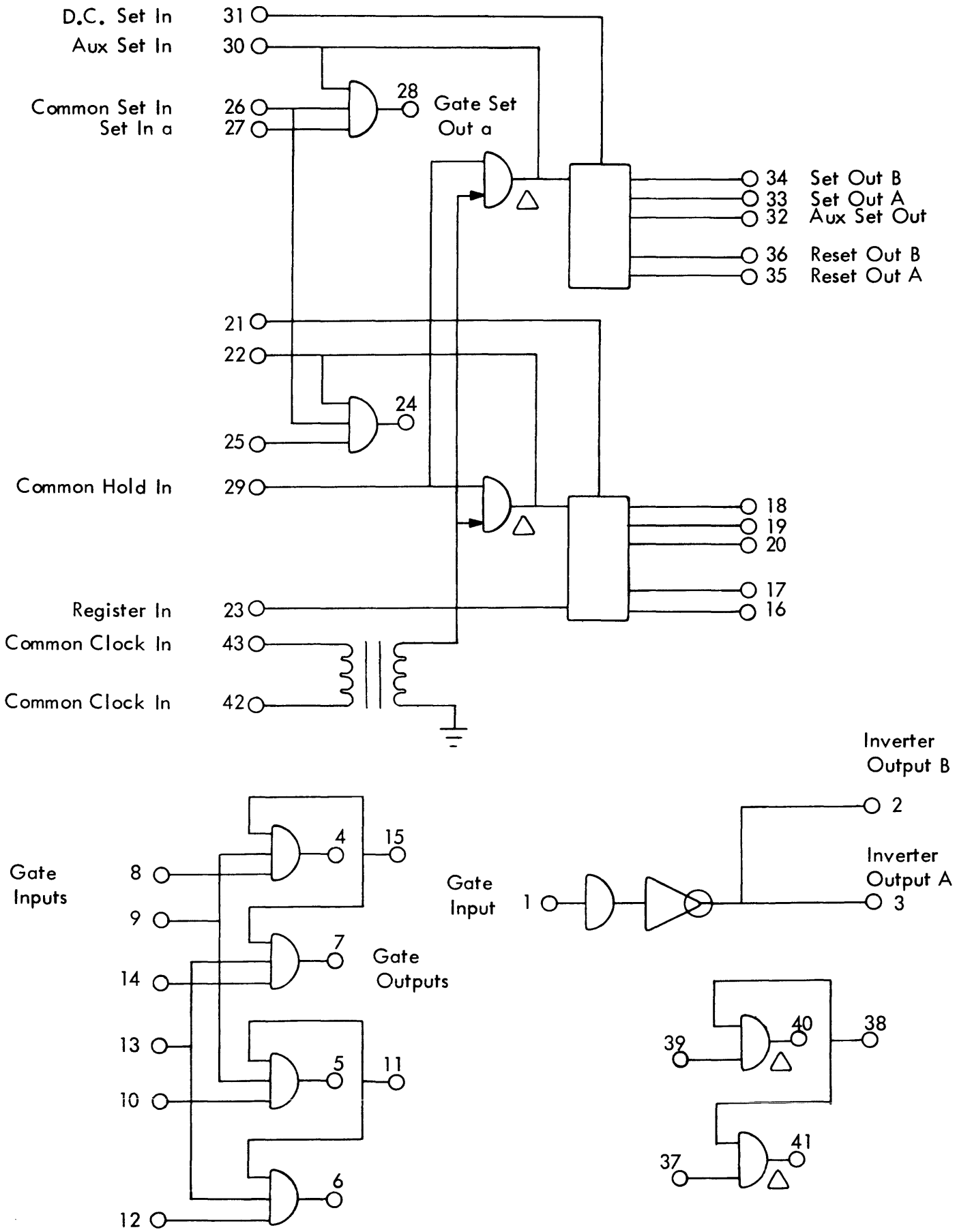
36 nsec

50 nsec

36 nsec

24 nsec

Module FK51 Logic Diagram



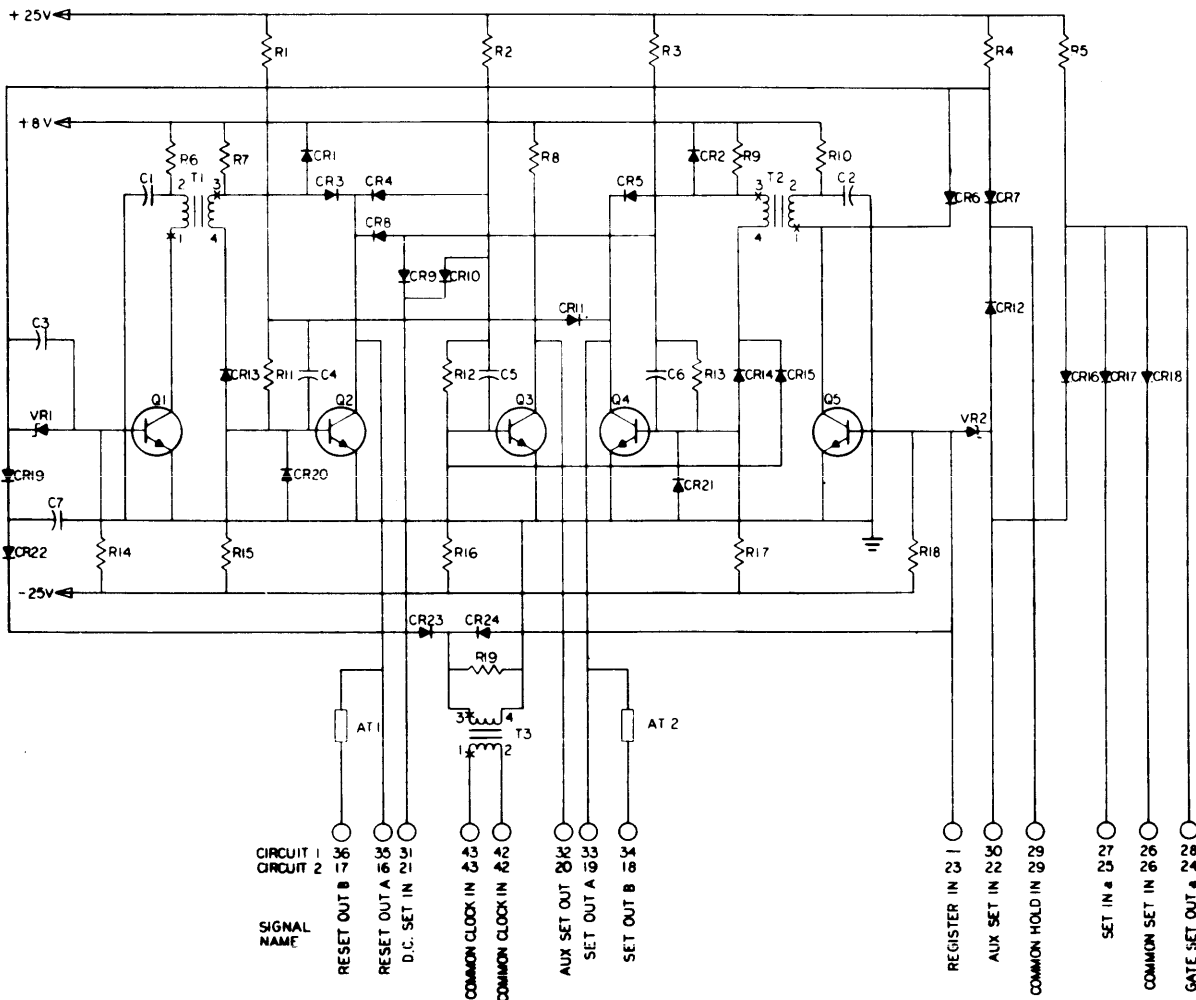
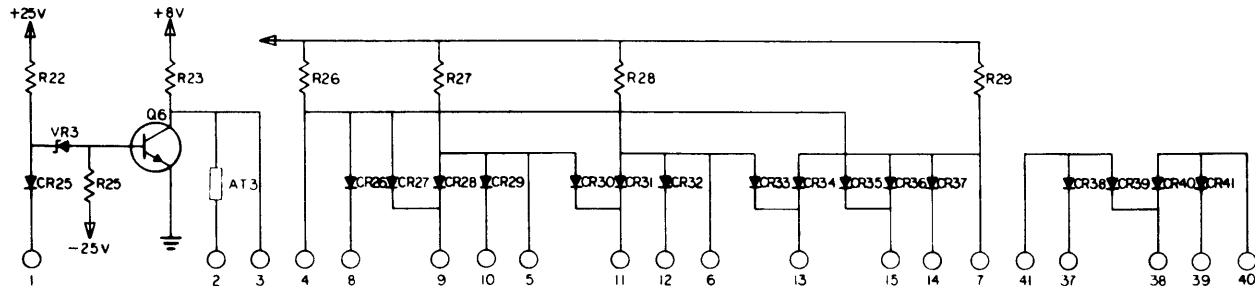
Module FK51 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor, 2N2501 2N2369	Q1 through Q6	11	1 3
2	Diode, Zener, 1N746	VR1 through VR3	5	2,13,14,32
3	Diode, 1N907A 1N914A 1N3063 1N3065	CR1 through CR41	65	4,13 4,12,13,14 4,6 4
4	Capacitor, Silver Mica, $\pm 5\%$, 91 pf	C7-1	1	19,20,21
5	Capacitor, Silver Mica, $\pm 5\%$, 82 pf	C7-2	1	19,20,21
6	Capacitor, Silver Mica, $\pm 5\%$, 100 pf	C4, 5, 6	6	19,20,21
7	Capacitor, Silver Mica, $\pm 5\%$, 470 pf	C1, 2, 3	6	19,20,21
8	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C8	1	22,23,77
9	Resistor, 1/2 watt, $\pm 2\%$, 120 ohms	R6, 10	4	16,17
10	Resistor, 1/2 watt, $\pm 2\%$, 180 ohms	R19	1	16,17
11	Resistor, 1/2 watt, $\pm 2\%$, 820 ohms	R7,8,9,11,12,13,23	13	16,17
12	Resistor, 1/2 watt, $\pm 2\%$, 3.0 k ohms	R1, 2, 3	6	16,17
13	Resistor, 1/2 watt, $\pm 2\%$, 3.9 k ohms	R4,5,22,26,27,28,29	9	16,17
14	Resistor, 1/2 watt, $\pm 2\%$, 8.2 k ohms	R15, 16,17	6	16,17
15	Resistor, 1/2 watt, $\pm 2\%$, 1.8 k ohms	R25	1	16,17
16	Resistor, 1/2 watt, $\pm 2\%$, 56 k ohms	R14, 18	4	16,17
17	Transformer 2WHHA 4851 01-884	T3	1	39 69 71
18	Transformer 1W9HA 4853 01-883	T1, 2	4	39 69 71
19	Assy, Resistive term. 3 ea. 56-590-65/3B	AT1, 2, 3	5	72

Module FK51 Schematic

POLARIZING PINS: 2 & 6

- +25V 47 ○
- 25V 46 ○
- +8V 45 ○
- GROUND 44 ○



Dual Flip Flop

Assy. No. 100348

FK52

Fan In

Auxiliary Set Input 10 terms
Auxiliary Reset Input 10 terms

Input

Set Inputs a, b, c, or d 2 loads
Common Reset Input 4 loads
Common Clock Input 1 clock load
Gate Input 2 loads

Output

	<u>Loading</u>	<u>Delay (typical)</u>
Set Output A or B	12 loads, 200 pf	36 nsec
Auxiliary Set Output	12 loads, 600 pf	50 nsec
Reset Output A or B	24 loads, 200 pf	36 nsec

Operating Frequency

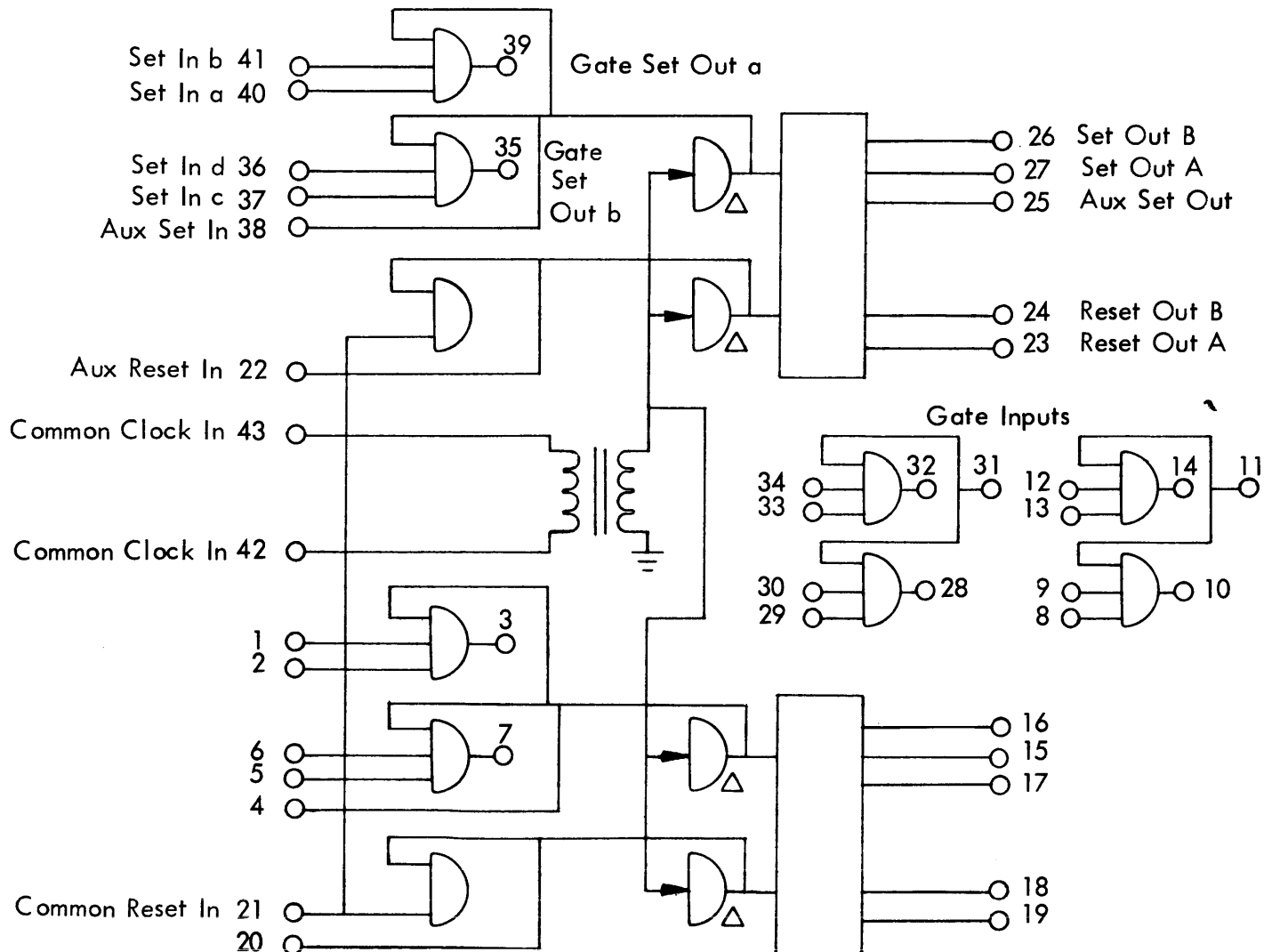
2,5 Mc to 4 Mc

Power Drain

+25 Volt Supply	116 ma
+ 8 Volt Supply	58 ma
-25 Volt Supply	26 ma

Module Dissipation

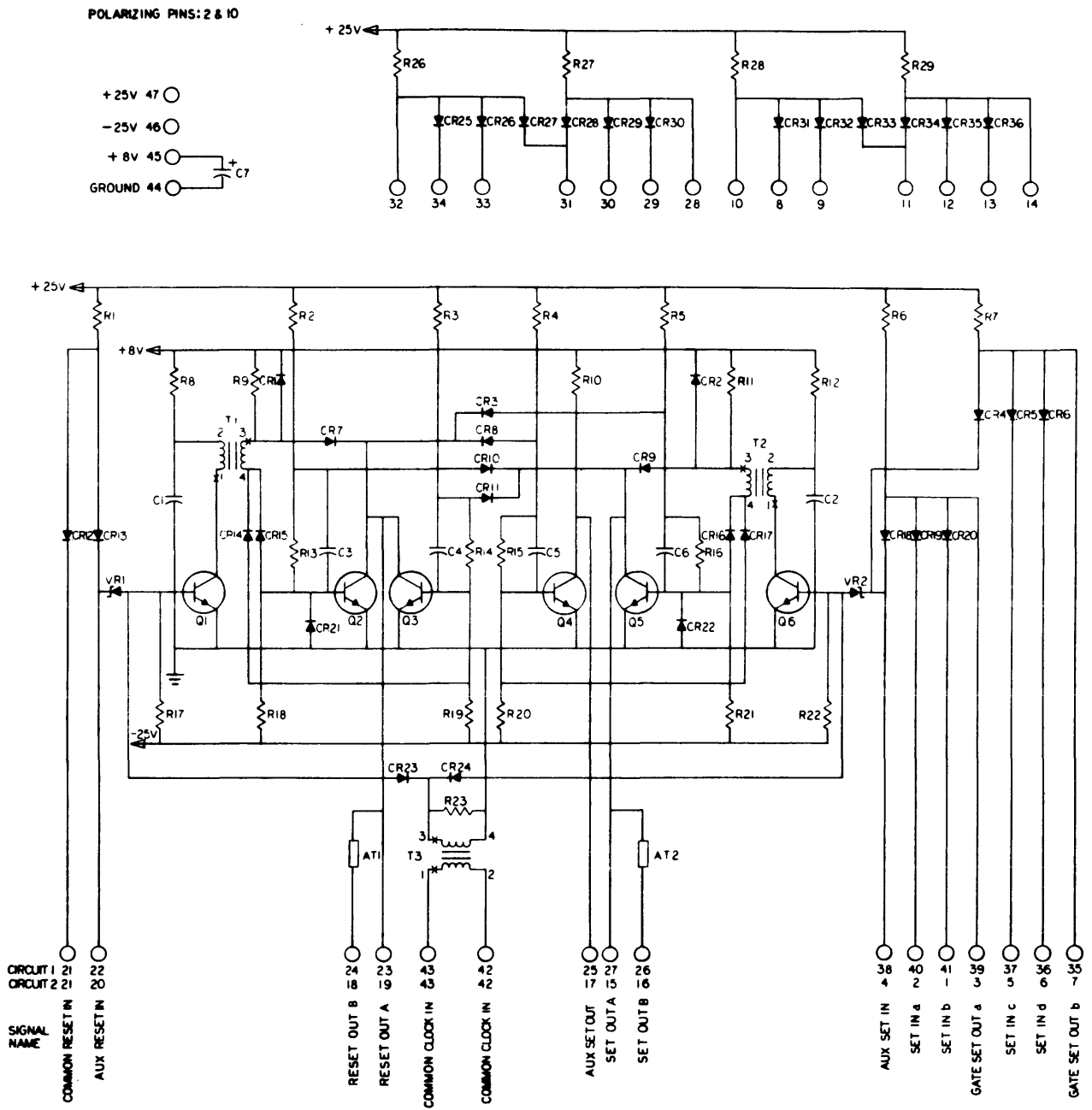
4,0 watts



Module FK52 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor, 2N2369 2N2501	Q1 through Q6	12	3 1
2	Diode, 1N907A 1N914A 1N3063 1N3065	CR1 through CR36	60	4, 13 4, 12, 13, 14 4, 6 4
3	Diode, Zener 1N746	VR1, 2	4	10, 12, 13, 14
4	Capacitor, Silver Mica, $\pm 5\%$, 100 pf	C3 through C6	8	19, 20, 21
5	Capacitor, Silver Mica, $\pm 5\%$, 470 pf	C1, 2	4	19, 20, 21
6	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C7	1	22, 23, 77
7	Resistor, 1/2 watt, $\pm 2\%$, 120 ohms	R8, 12	4	16, 17
8	Resistor, 1/2 watt, $\pm 2\%$, 180 ohms	R23	1	16, 17
9	Resistor, 1/2 watt, $\pm 2\%$, 820 ohms	R9, 10, 11, 13, 14, 15, 16	14	16, 17
10	Resistor, 1/2 watt, $\pm 2\%$, 3.0 k ohms	R2 through R5	8	16, 17
11	Resistor, 1/2 watt, $\pm 2\%$, 3.9 k ohms	R6, 1, 7, 26, 27, 28, 29	10	16, 17
12	Resistor, 1/2 watt, $\pm 2\%$, 8.2 k ohms	R18 through 21	8	16, 17
13	Resistor, 1/2 watt, $\pm 2\%$, 56 k ohms	R17, 22	4	16, 17
14	Transformer 2WHHA 4851 01-884	T3	1	39 69 71
15	Transformer 1W9HA 4853 01-883	T1, 2	4	39 69 71
16	Assy, Resistive Term. 3 ea. 56-590-65/3B	AT1, 2	4	72

Module FK52 Schematic



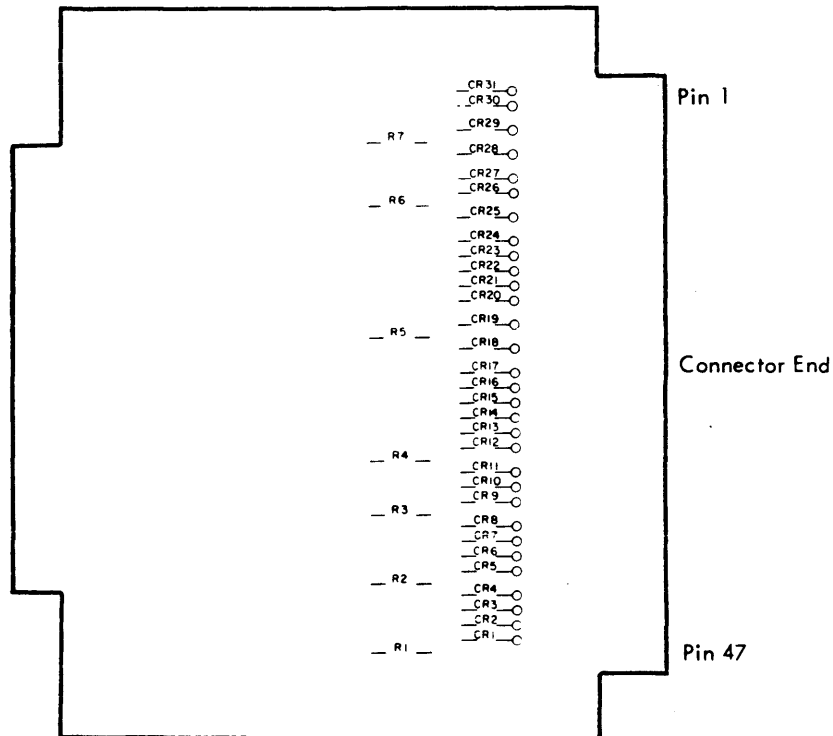
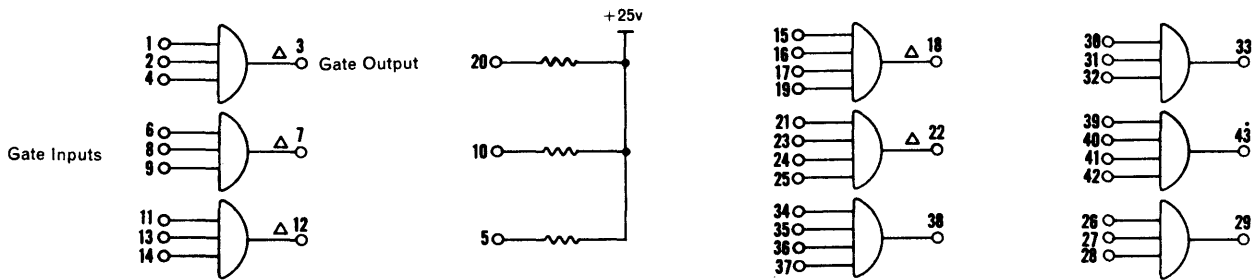
Gate Expander

Assy. No. 100151

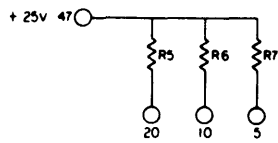
GC10

This module contains four complete multi-term AND gates plus five Δ AND gates, and gate resistors to complete three AND gates. These circuits are intended for use in expanding flip-flop input gates or for use as independent gate structures with inverters, buffers, and similar circuits. AND:OR gates can be implemented by wiring one AND gate input pin to one input pin of another to form the combined OR gate output.

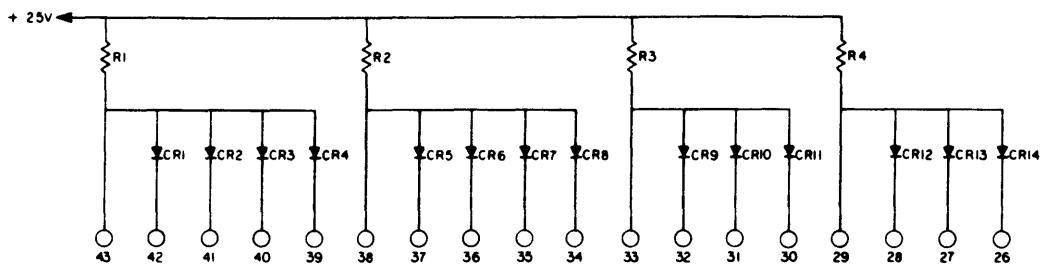
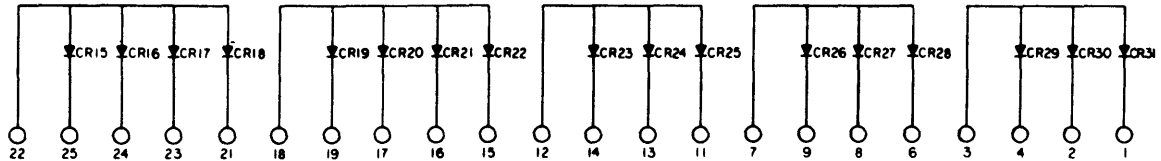
Maximum Operating Frequency	300 kc
Gate Input	1 load
+25 Volt Supply	22 ma
Module Dissipation	0.5 watts



Model GC10 Schematic



POLARIZING PINS: 2 & 40



Model GC10 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Diode 1N914A	CR1 through CR31	31	4, 12, 13, 14
2	Resistor 8.2k ohms $\pm 2\%$	R1 through R7	7	16, 17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

GATE EXPANDER

GH11

ASSY NO. 101769

Federal Stock No. 6H6605-013-6915

This module contains 31, three-element gates pre-wired in a matrix configuration. Often of exceptional economic value in applications involving the selection and distribution of data, these modules are frequently used to select:

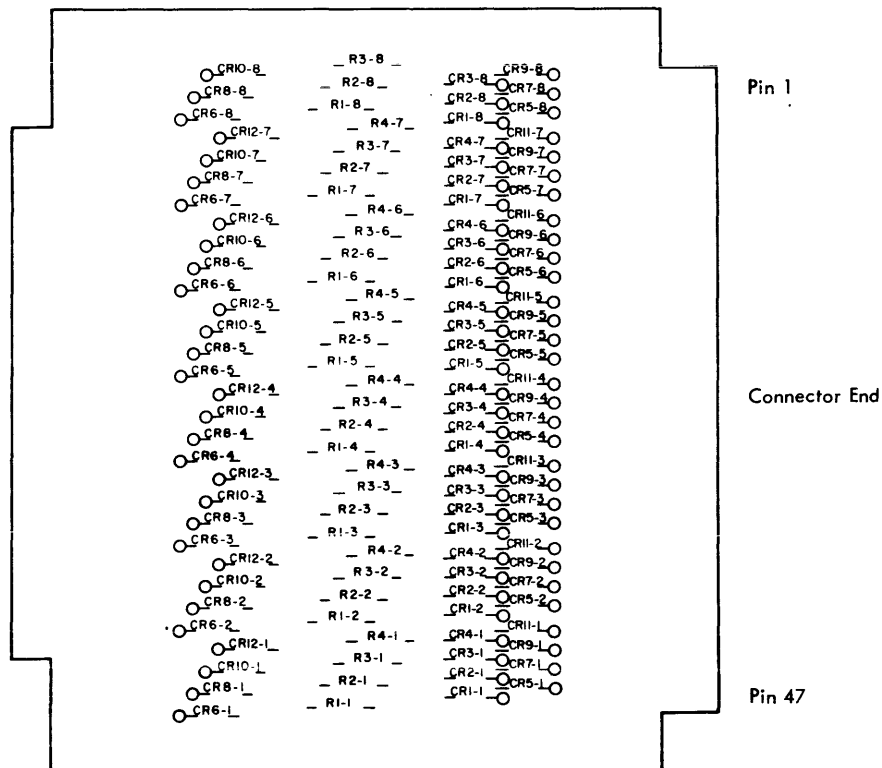
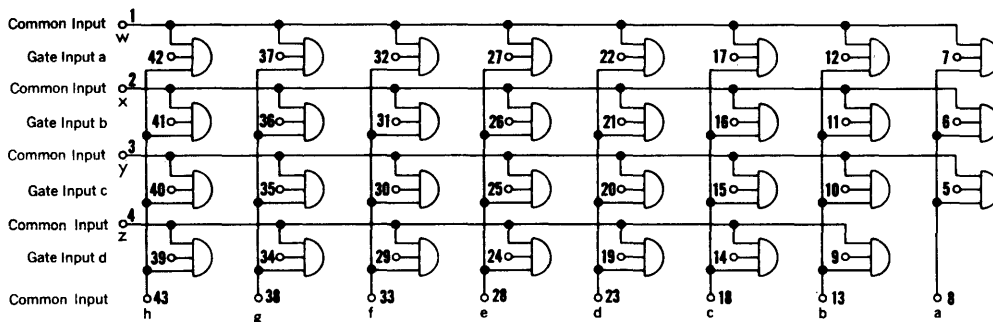
1. Any one of up to 31 possible outputs. By causing one y-axis and one x-axis common input to be true, the third term on the selected gate becomes true.

2. One set of eight outputs from three (or four) possible sets. When a horizontal select line becomes true, any signals connected to the corresponding AND gate inputs will appear on the common vertical lines.

3. One set of four outputs from seven (or eight) possible sets. As (2) above, but use other axis.

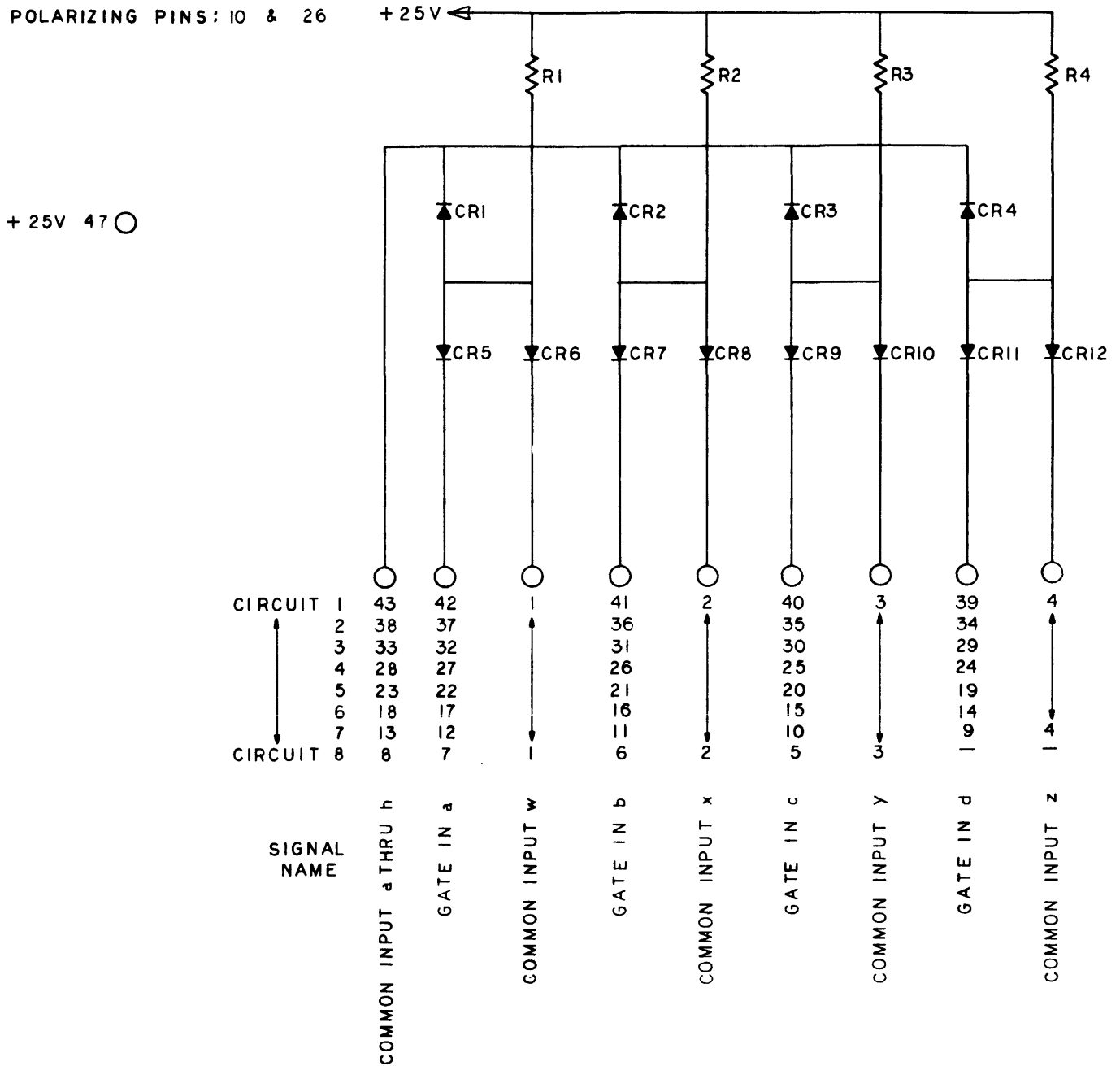
In these modes, the output will be through OR diodes and can drive an inverter, buffer amplifier, flip-flop, or similar input. These two-load gates can also be used with L Series circuits.

Gate Input	2 loads
Common Input (a through h) (Maximum)	8 loads
Common Input (w through z) (Maximum)	16 loads
+25 Volt Supply	190 ma
Module Dissipation	4.8 watts



MODEL GH11 Schematic

POLARIZING PINS: 10 & 26



MODEL GH11 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Diode	1N914A	CR1 thru 12	93 4, 12, 13, 14
2	Resistor	3.9 k ohms ±2%	R1, 2, 3, 4	31 16, 17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Diode Gate No. 1

Assy. No. 100246

GK51

Input

Gate Input

Loading

2 unit loads

Power Drain

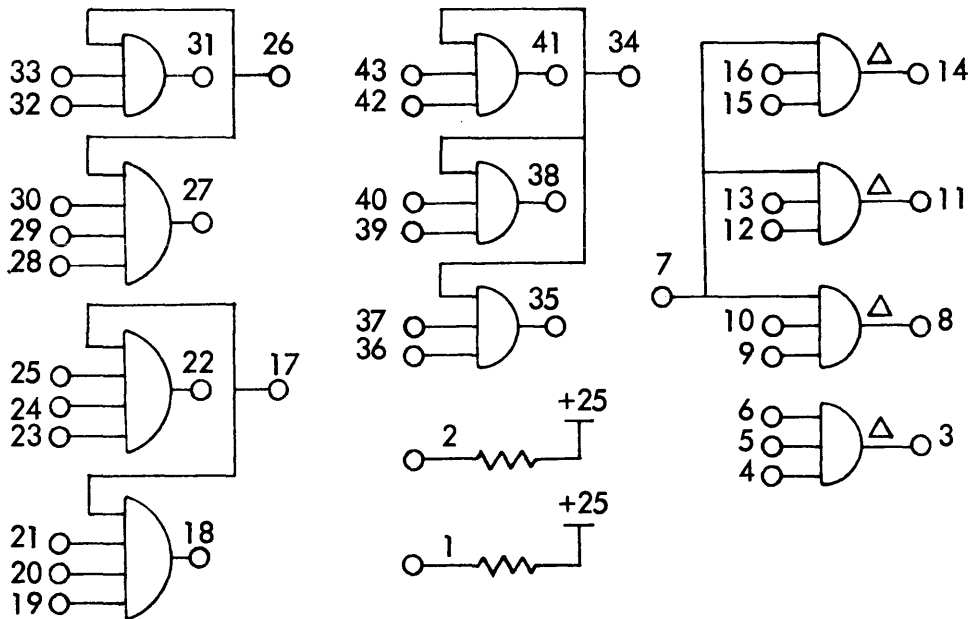
+25 Volt Supply 55 ma

Operating Frequency

to 4 Mc

Module Dissipation

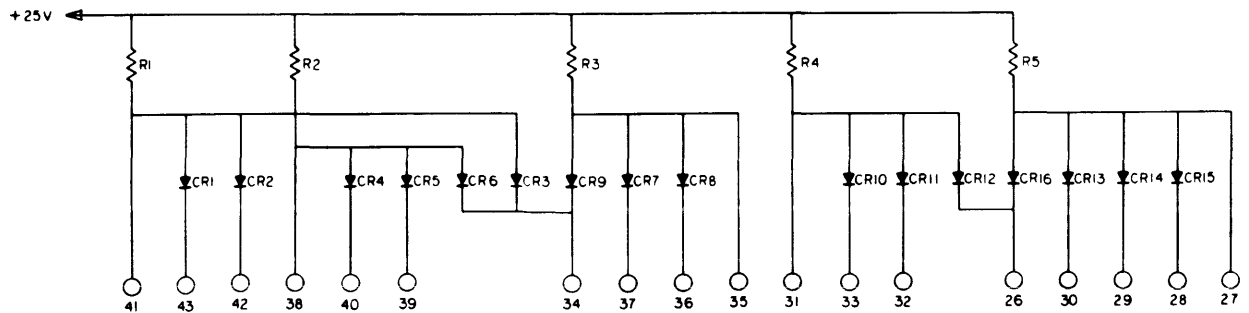
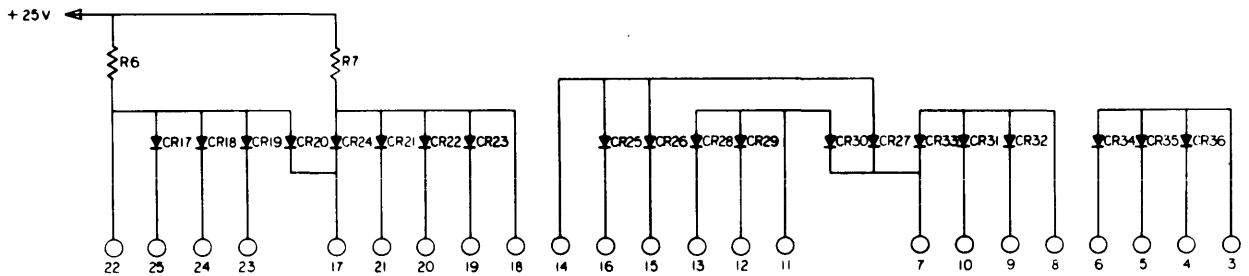
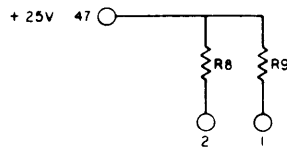
1.4 watts



Module GK 51 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Diode, 1N907A 1N914A 1N3063 1N3065	CR1 thru CR36	36	4, 13 4, 12, 13, 14 4, 6 4
2	Resistor, $\pm 2\%$, 1/2 watt, 3.9 k ohms	R1 thru R9	9	16, 17

POLARIZING PINS: 2 & 22



Diode Gate No. 2

Assy. No. 100267

GK52

Input

Gate Input

Loading

2 unit loads

Power Drain

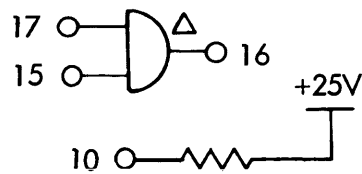
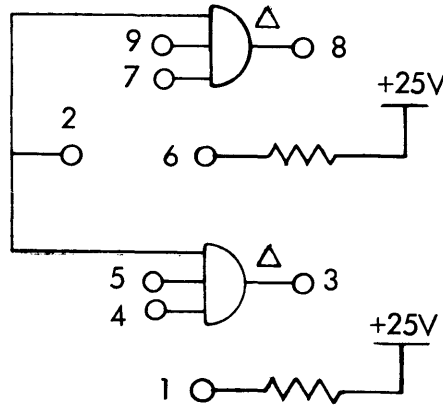
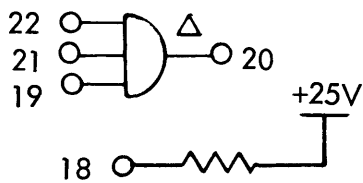
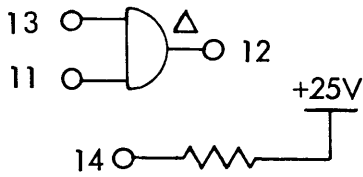
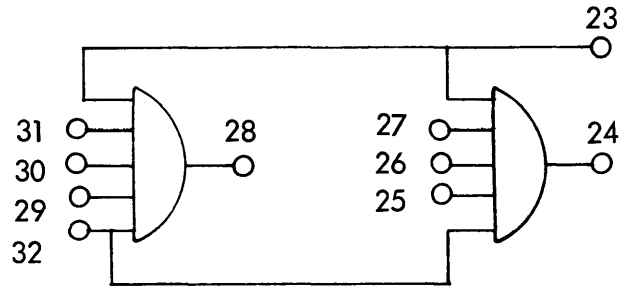
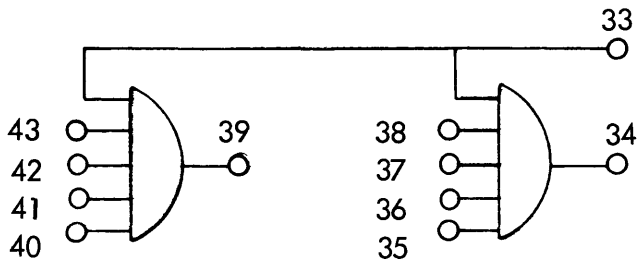
+25 Volt Supply 55 ma

Operating Frequency

to 4 Mc

Module Dissipation

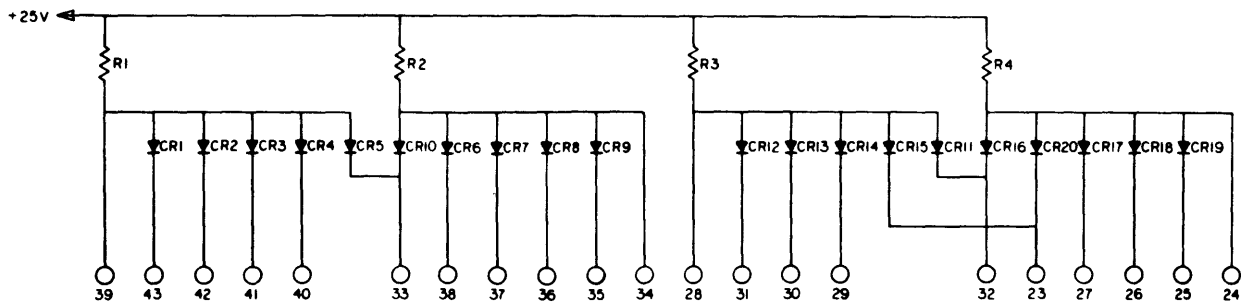
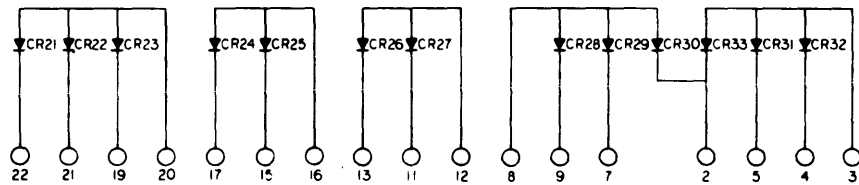
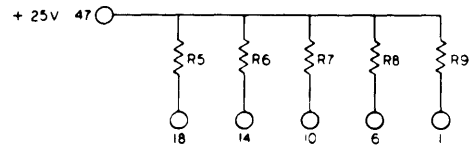
1.4 watts



Module GK 52 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Diode, 1N907A 1N914A 1N3063 1N3065	CR1 thru CR33	33	4, 13 4, 12, 13, 14 4, 6 4
2	Resistor, $\pm 2\%$, 1/2 watt, 3.9 k ohms	R1 thru R9	9	16, 17

POLARIZING PINS: 2 & 20



Discriminator

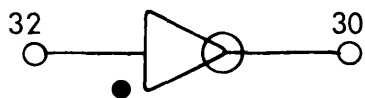
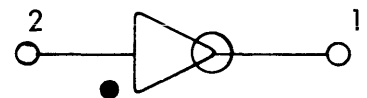
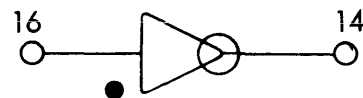
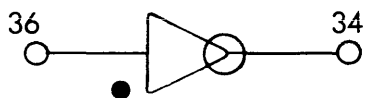
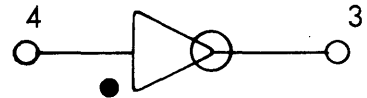
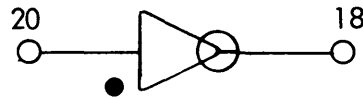
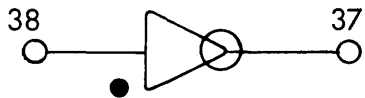
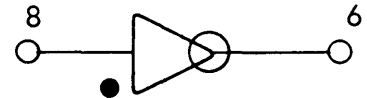
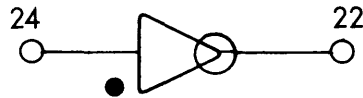
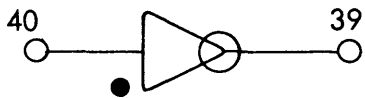
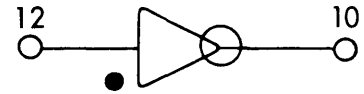
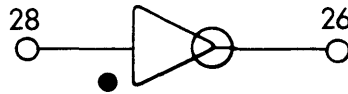
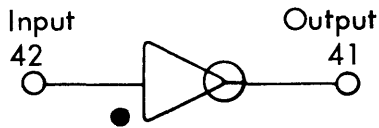
Assy. No. 100303

HK51

<u>Input</u>	<u>Loading</u>	
Input	1 load	
<u>Output</u>	<u>Loading</u>	<u>Delay (typical)</u>
Output	6 loads 200 pf	100 nsec

<u>Operating Frequency</u>
to 250 Kc
<u>Power Drain</u>
+8 Volt Supply 100 ma

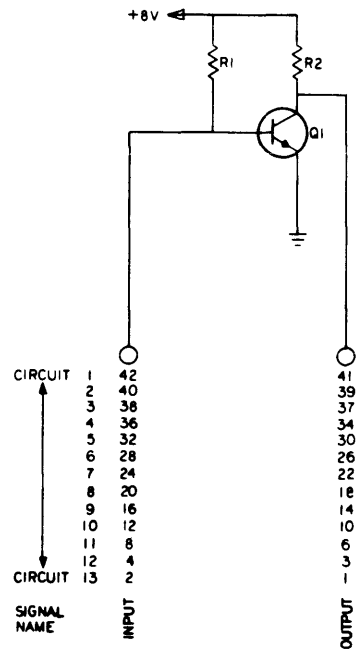
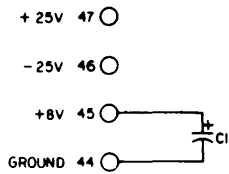
Module Dissipation
1 watt (typical)



Module HK51 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor, 2N914	Q1	13	1,3,5,7,10
2	Capacitor, Tantalum, $\pm 5\%$, 15 μf	C1	1	22, 23, 24
3	Resistor, 1/2 watt, $\pm 2\%$, 2.2k ohms	R2	13	16,17
4	Resistor, 1/2 watt, $\pm 2\%$, 8.2k ohms	R1	13	16,17

POLARIZING PINS: 2 & 18

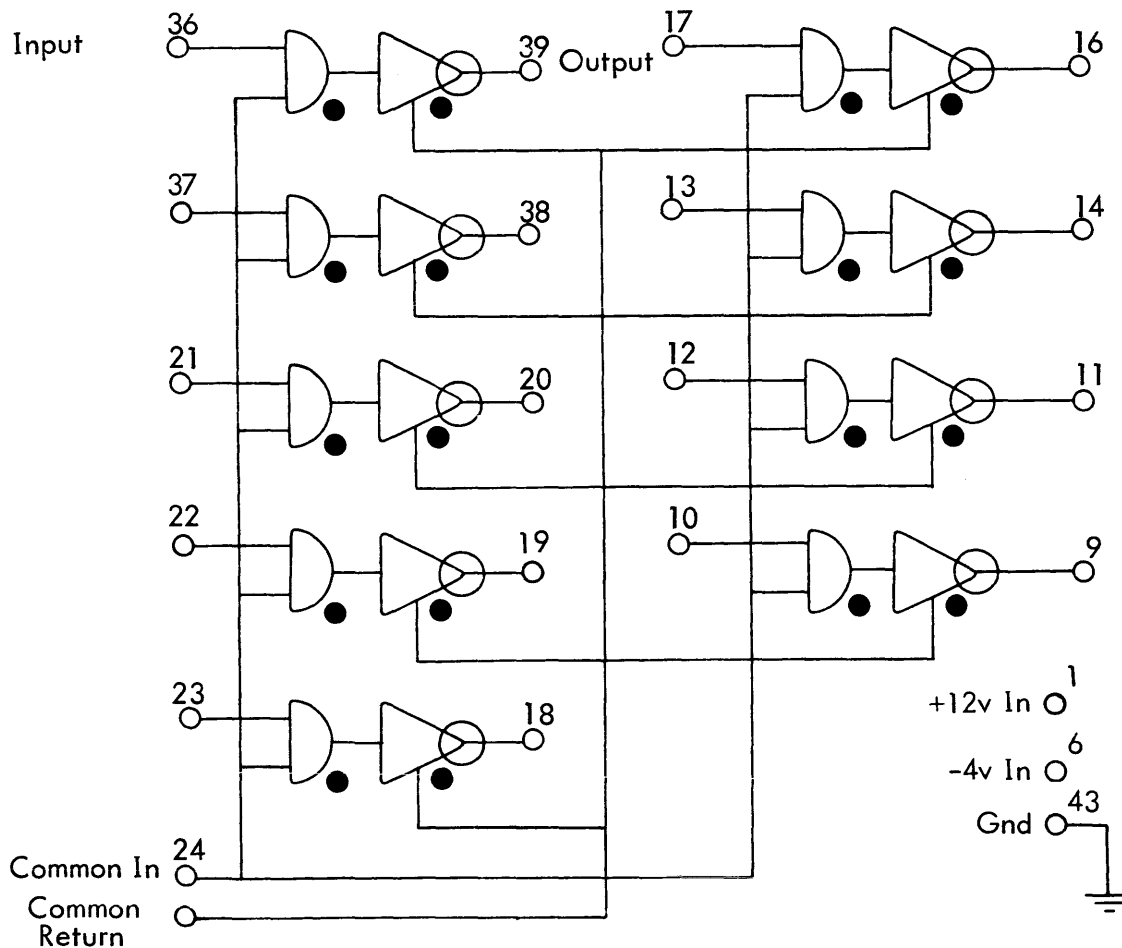


Z Driver

Assy. No. 100367

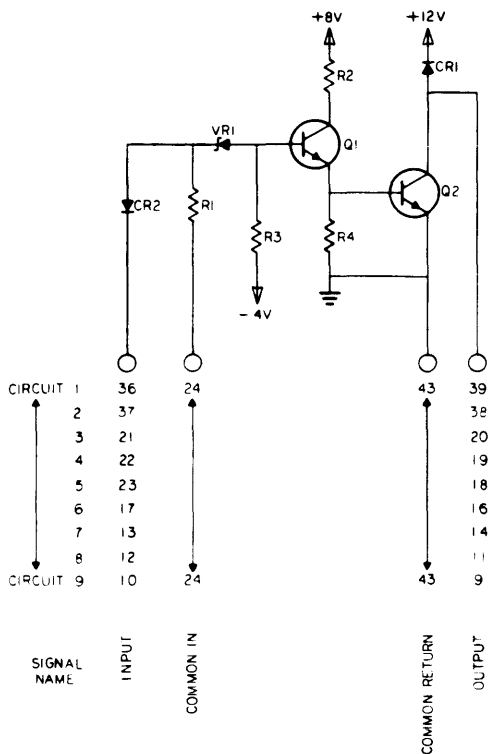
HK52

<u>Input</u>	<u>Loading</u>	<u>Operating Frequency</u>
Input	2 loads	to 175 Kc
Common Input	60 ma at +25 volts	
<u>Output</u>	<u>Loading</u>	<u>Power Drain</u>
Output	80 loads 200 pf	+ 8 Volt Supply 50 ma
		+12 Volt Supply 700 ma (typ)
		- 4 Volt Supply 9 ma
	<u>Delay (typical)</u>	<u>Module Dissipation</u>
	200 nsec	2.5 watts (typical)



Module HK52 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N914	9	1,3,5,7,10
2	Transistor	2N2538 2N2477 2N2848	9	1 7 3
3	Diode, Zener	1N746	9	2,13,14,32
4	Diode	1N907A 1N914A 1N3063 1N3065	18	4,13 4,12,13,14 4,6 4
5	Capacitor, Tantalum, $\pm 5\%$, 47 μf	C2	1	22,23,75
6	Capacitor, Tantalum, $\pm 5\%$, 100 μf	C3	1	22,23,76
7	Capacitor, Tantalum, $\pm 5\%$, 47 μf	C1	1	22,23,76
8	Resistor, 1/2 watt, $\pm 2\%$, 100 ohms	R4	9	16,17
9	Resistor, 1/2 watt, $\pm 2\%$, 150 ohms	R2	9	16,17
10	Resistor, 1/2 watt, $\pm 2\%$, 3.9 k ohms	R1	9	16,17
11	Resistor, 1/2 watt, $\pm 2\%$, 5.6 k ohms	R3	9	16,17



POLARIZING PINS: 2 & 12

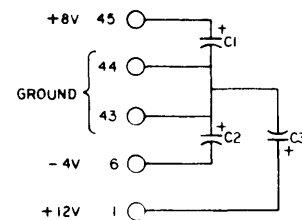


Photo Sense Amplifier

Assy. No. 100772

HK54

Input

Sprocket Amplifier In
Amplifier In
Inverter In

Loading

400 μ a from photocell
120 μ a from photocell
2 loads

Operating Frequency

1 Kc Maximum

Power Drain

+25 Volt Supply 35 ma
+ 8 Volt Supply 50 ma
-25 Volt Supply 50 ma

Output

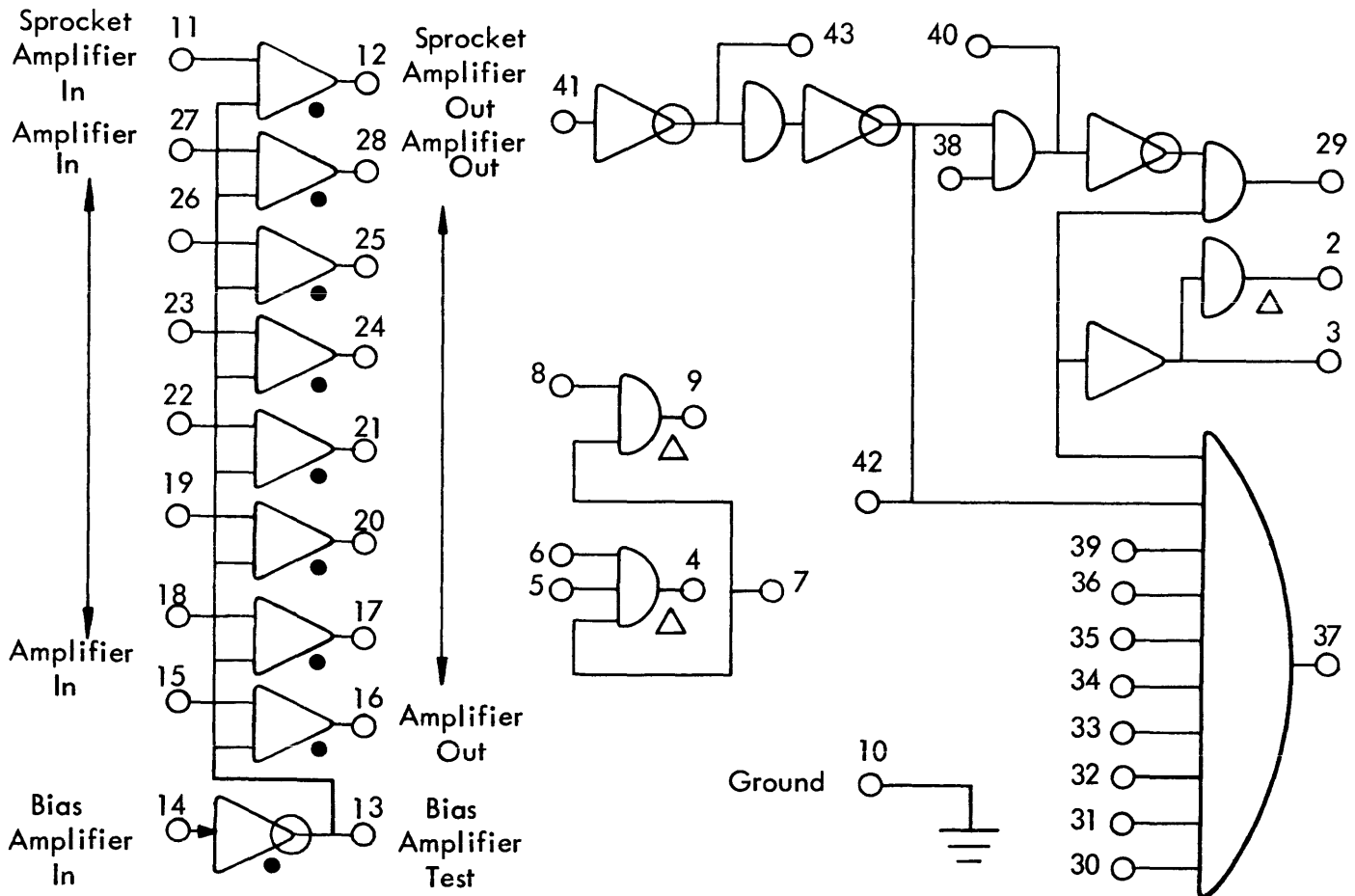
Sprocket Amplifier Out
Amplifier Out
Inverter Output

Loading

4 loads, 200 μ f
4 loads, 200 μ f
12 loads, 200 μ f

Module Dissipation

2.6 watts

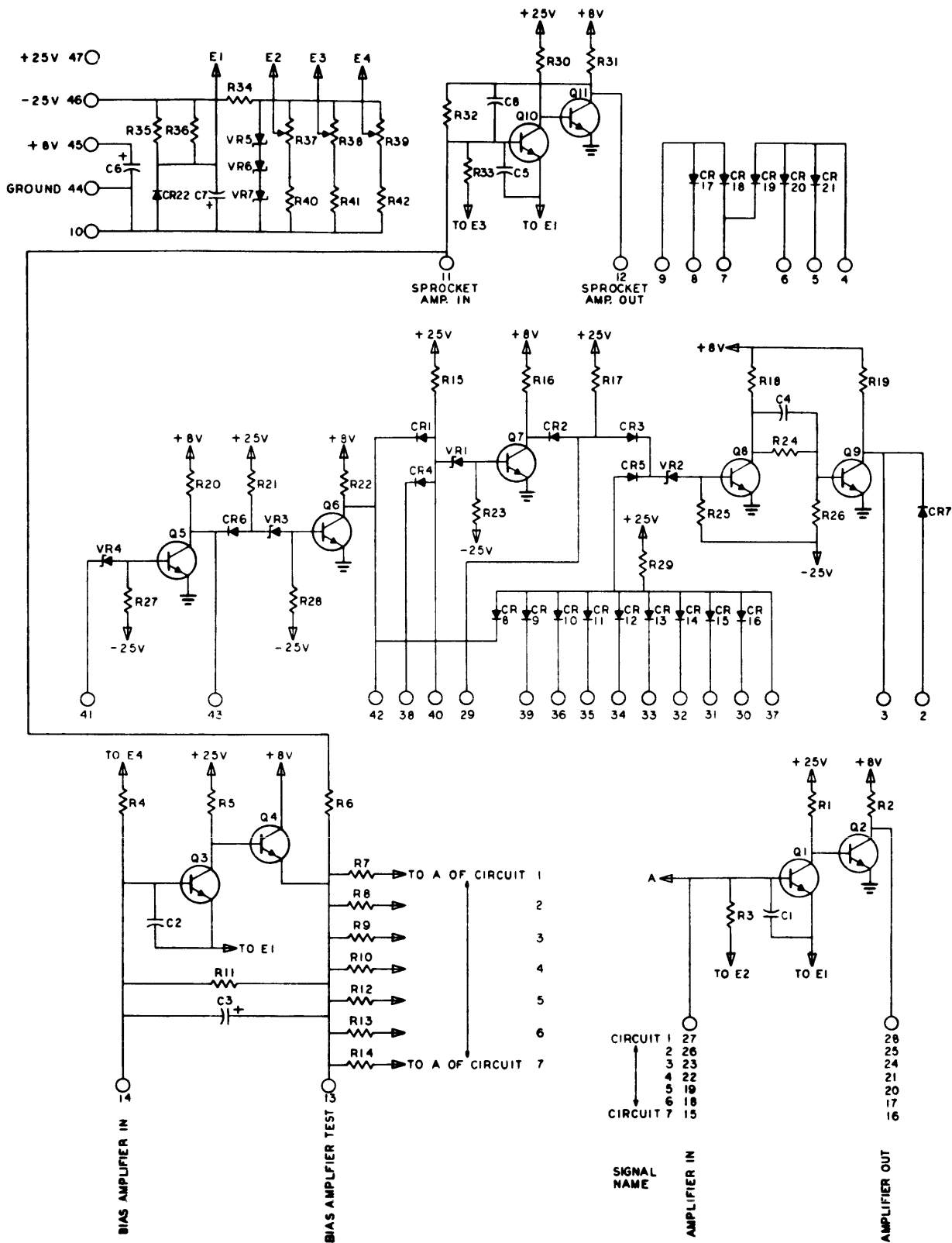


Module HK 54 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N834	Q1 through Q11	23	1,5,7
2	Diode 1N907A 1N914A 1N3063 1N3065	CR1 through CR21	21	4,13 4,12,13,14 4,6 4
3	Diode 1N746	VR1 through VR4	4	2,13,14,32
4	Diode 1N752	VR5, 6, 7	3	2,12,13,14,64
5	Diode 1N921	CR22	1	13,15,28
6	Capacitor, Silver Mica, $\pm 5\%$, 68 pf	C4	1	19,20,21
7	Capacitor, Mylar, $\pm 5\%$, 0.0047 μ f	C1, 2, 5	9	26,27,74
8	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C6, 3	2	22,23,77
9	Capacitor, Tantalum, $\pm 5\%$, 150 μ f	C7	1	22,23,75
10	Potentiometer, 2500 ohms	R37, 38, 39	3	35,44
11	Resistor, $\pm 2\%$, 1/2 watt, 33 k ohms	R1, 11	8	16,17
12	Resistor, $\pm 2\%$, 1/2 watt, 8.2 k ohms	R2, 31	8	16,17
13	Resistor, $\pm 2\%$, 1/2 watt, 39 k ohms	R3, 4	8	16,17
14	Resistor, $\pm 2\%$, 1/2 watt, 12 k ohms	R5, 6	2	16,17
15	Resistor, $\pm 2\%$, 1/2 watt, 18 k ohms	R33	1	16,17
16	Resistor, $\pm 2\%$, 1/2 watt, 27 k ohms	R7, 8, 9, 10, 12, 13, 14	7	16,17
17	Resistor, $\pm 2\%$, 1/2 watt, 15 k ohms	R30	1	16,17
18	Resistor, $\pm 2\%$, 1/2 watt, 3.9 k ohms	R15, 17, 21, 29, 35, 36	6	16,17
19	Resistor, $\pm 2\%$, 1/2 watt, 820 ohms	R16, 19, 20, 22	4	16,17
20	Resistor, $\pm 2\%$, 1/2 watt, 560 ohms	R18, 24	2	16,17
21	Resistor, $\pm 2\%$, 1/2 watt, 18 k ohms	R23, 27, 28, 26	4	16,17
22	Resistor, $\pm 2\%$, 1/2 watt, 10 k ohms	R25	1	16,17
23	Resistor, $\pm 2\%$, 1/2 watt, 470 k ohms	R32	1	16,17
24	Resistor, Metal Film, $\pm 1\%$, 270 ohms, 1/2 watt	R34	1	36,38,73
25	Resistor, $\pm 2\%$, 1/2 watt, 680 ohms	R40, 41	2	16,17
26	Resistor, $\pm 2\%$, 1/2 watt, 100 ohms	R42	1	16,17

Module HK54 Schematic

POLARIZING PINS: 4 & 42

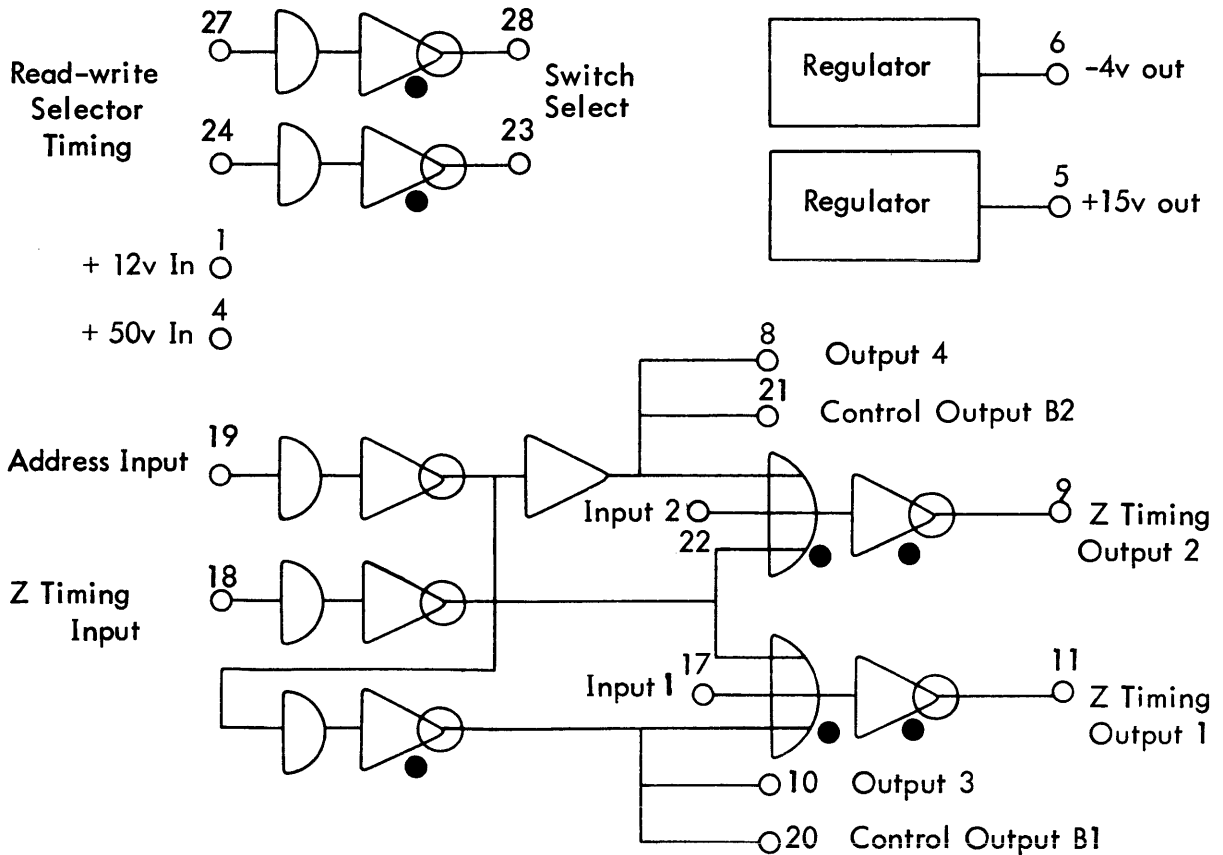


Selector Control

Assy. No. 100998

HK55

<u>Input</u>	<u>Loading</u>	<u>Operating Frequency</u>	
Read-write Select Timing	2 loads	to 175 Kc	
Address Input	2 loads		
Input 1, 2	2 loads		
Z Timing Input	2 loads		
			<u>Power Drain</u>
			+50 Volt Supply 100 ma
			+25 Volt Supply 300 ma
			+12 Volt Supply -60 ma
			+ 8 Volt Supply 30 ma
			+25 Volt Supply 100 ma
			<u>Module Dissipation</u>
			16 watts
<u>Output</u>	<u>Loading</u>	<u>Delay (max)</u>	
Switch Select	30 ma	200 nsec	
Output 4, B2, 3, B1	110 ma	500 nsec	
Z Timing Output 1, 2	180 ma	800 nsec	
+15 v Output	15 ma		
- 4 v Output	50 ma		

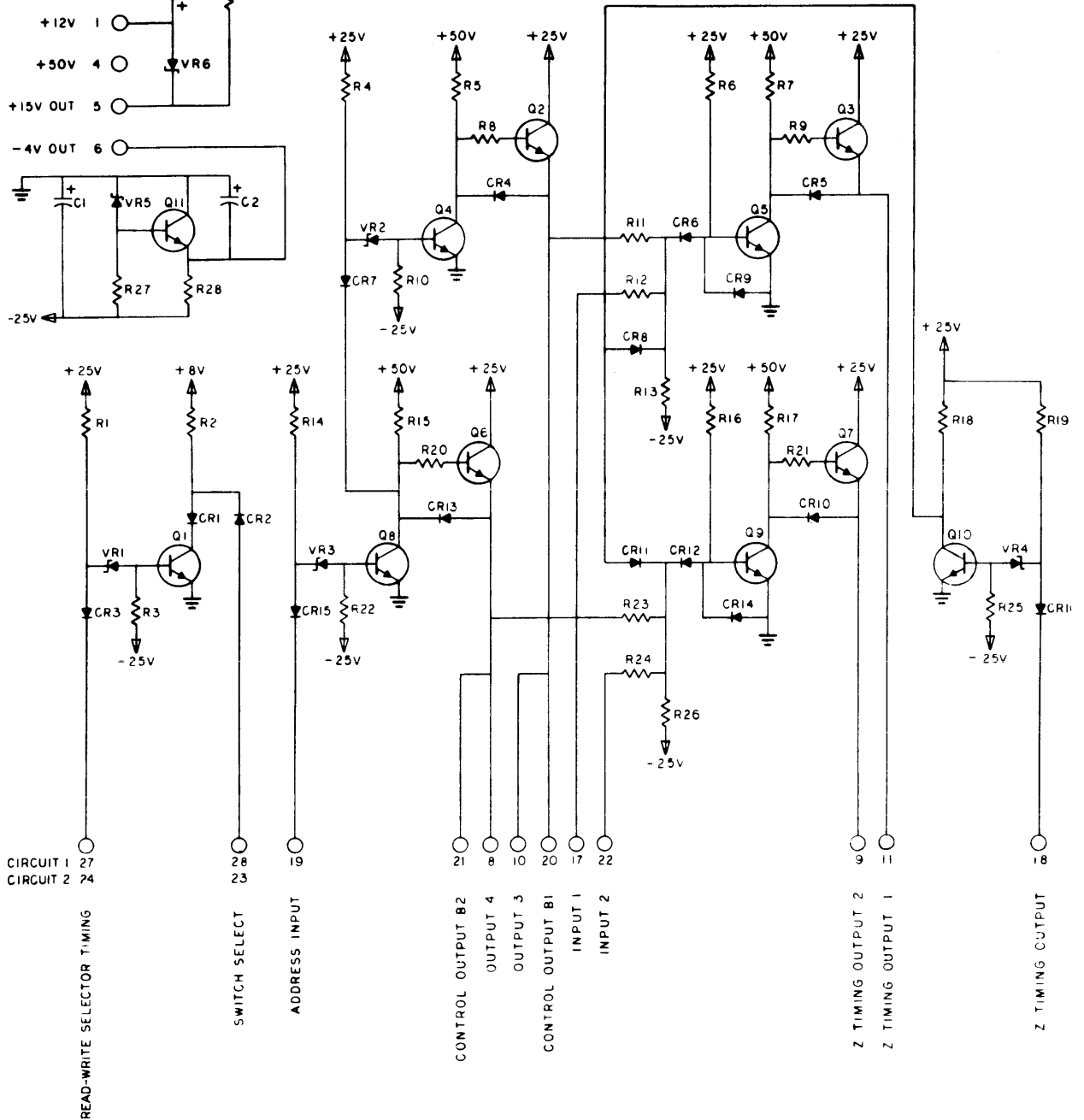
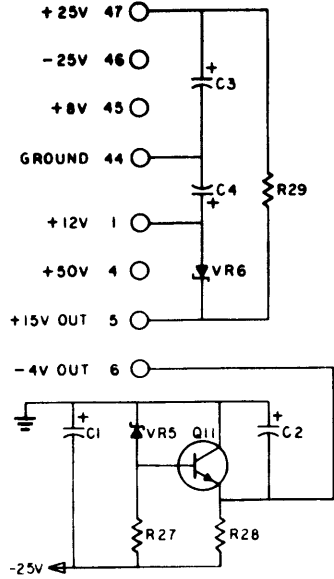


Module HK55 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)	
1	Transistor	2N834	Q1, 10, 11	4	1, 5, 7
2	Transistor	2N2219 2N2404	Q2 through Q9	8	1 29
3	Diode, Voltage Regulator	1N746	VR1 through VR7	7	10, 12, 13, 14
4	Diode	1N921	CR1, 2	4	13, 15, 28, 29
5	Diode	1N907A 1N914A 1N3063 1N3065	CR3 through CR15	15	4, 13 4, 12, 13, 14 4, 6 4
6	Capacitor, Tantalum, 47 μ f, \pm 20%, 6 vdc	C2		1	22, 23, 75
7	Capacitor, Tantalum, 4.7 μ f, \pm 20%, 50 vdc with Mylar insulating sleeving	C1, 3, 4		3	23, 77
8	Resistor, \pm 2%, 1/2 watt, 100 ohms	R8, 9, 20, 21		4	16, 17
9	Resistor, \pm 2%, 1/2 watt, 680 ohms	R2		2	16, 17
10	Resistor, \pm 2%, 1/2 watt, 3.9 k ohms	R18		1	16, 17
11	Resistor, \pm 2%, 1/2 watt, 6.8 k ohms	R19		1	16, 17
12	Resistor, \pm 2%, 1/2 watt, 8.2 k ohms	R13, 26		2	16, 17
13	Resistor, \pm 2%, 1/2 watt, 18 k ohms	R3, 6, 10, 16, 22		6	16, 17
14	Resistor, \pm 2%, 1/2 watt, 2.2 k ohms	R27		1	16, 17
15	Resistor, \pm 2%, 1/2 watt, 22 k ohms	R25		1	16, 17
16	Resistor, \pm 2%, 1/2 watt, 4.7 k ohms	R1, 4, 11, 12, 14, 23, 24		8	16, 17
17	Resistor, \pm 2%, 1/2 watt, 390 ohms	R29		1	16, 17
18	Resistor, \pm 2%, 1 watt, 330 ohms	R28		1	92, 93, 94
19	Resistor, \pm 2%, 1 watt, 2.2 k ohms	R5, 7, 15, 17		4	92, 93, 94

Module HK55 Schematic

POLARIZING PINS 4 & 16



Read Pre-Amplifier

Assy. No. 101632

HK56

Input

Between Input a and Input b 30 mv pk to pk (nominal)
 Input Impedance 10 K ohms
 Read Activate 5 loads

Amplifier Gain

15 to 150 (adjustable)

Output

Between Output a and Output b 3 volts pk to pk into 300 ohms (max)

Operating Frequency

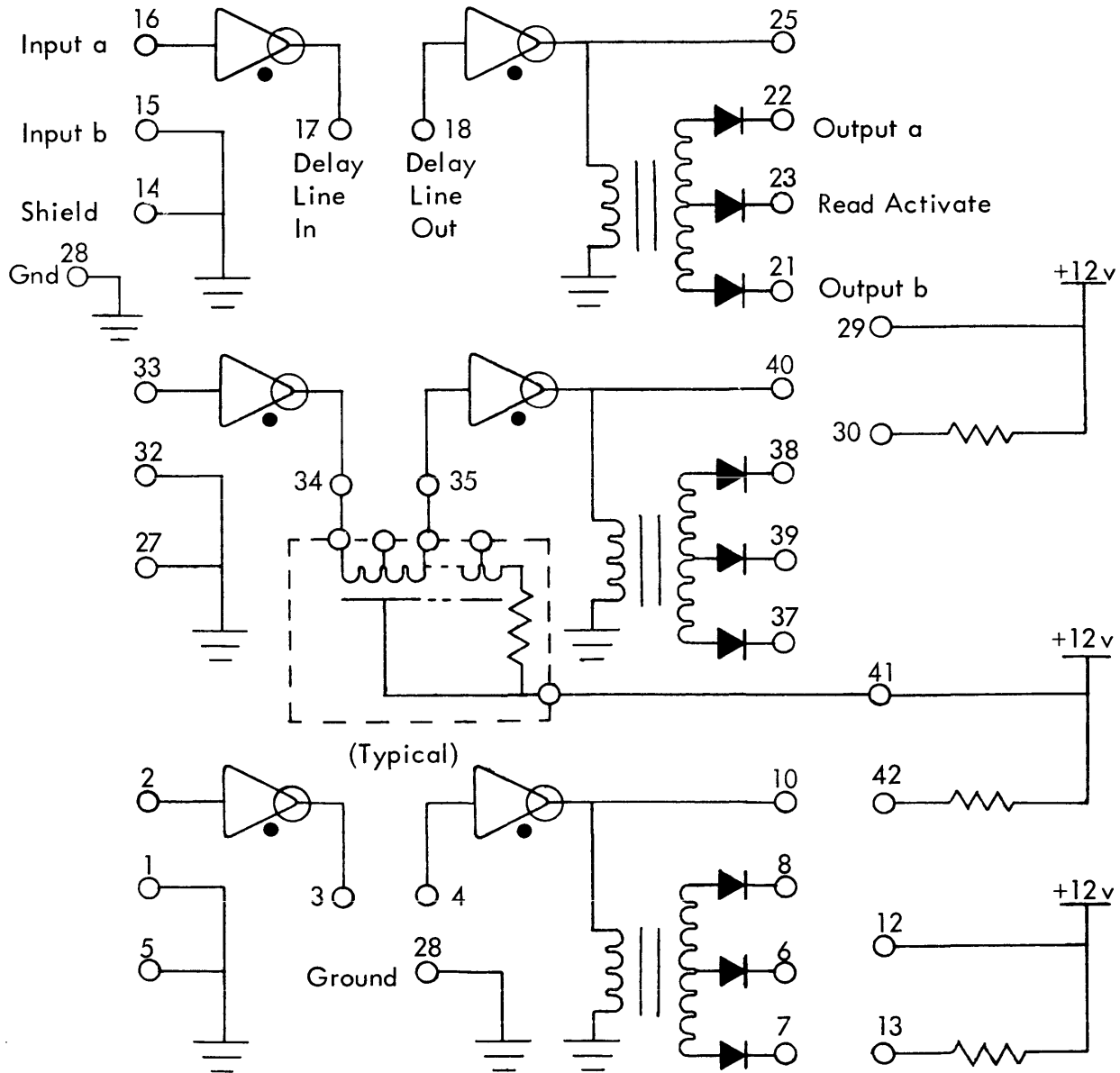
Upper Cut Off 50 Kc
 Lower Cut Off .4 Kc

Power Drain

+25 Volt Supply 90 ma

Power Dissipation

2.3 watts

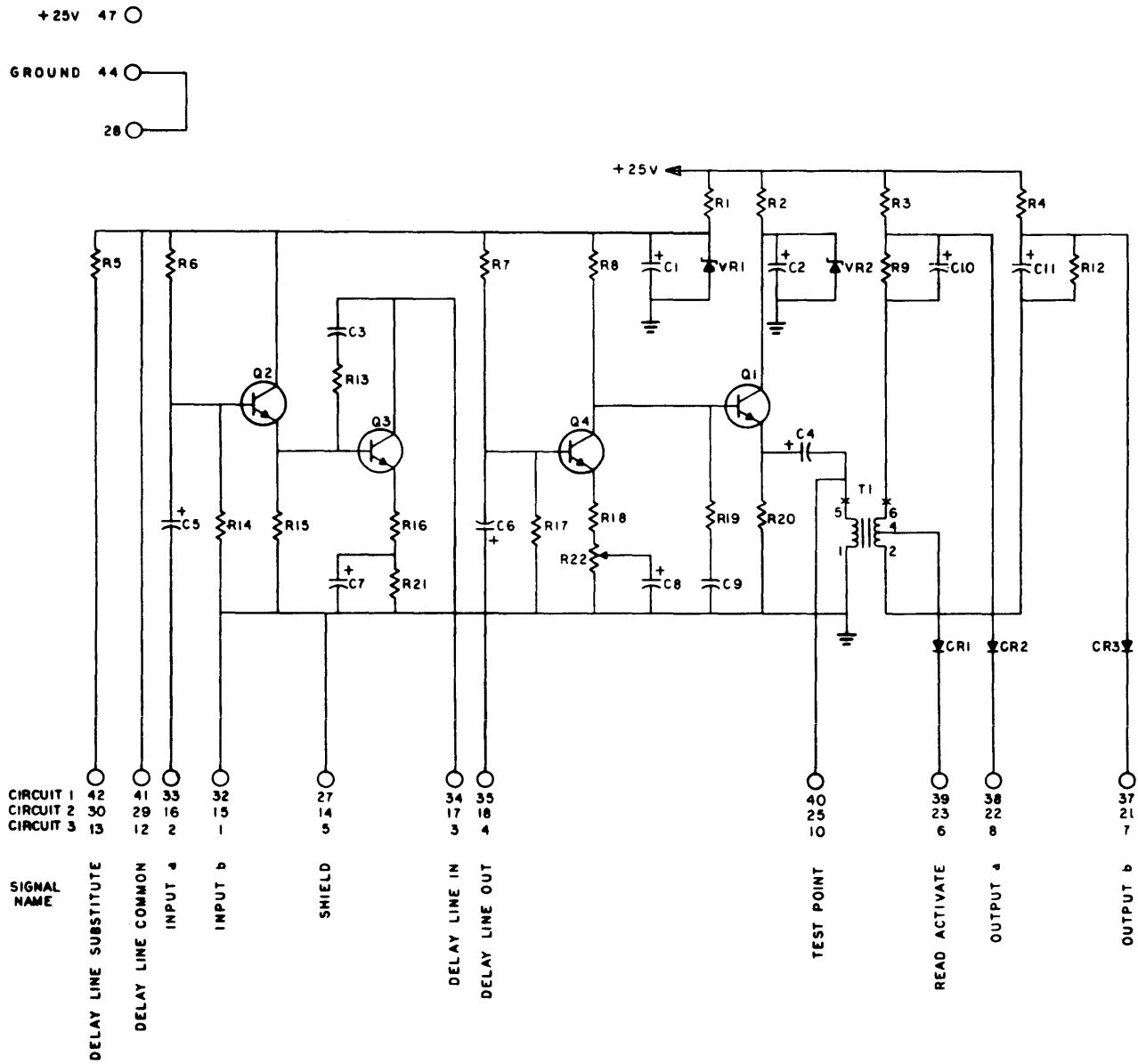


Module HK 56 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N914	Q1 through Q4	12	1,3,5,7,10
2	Diode 1N907A 1N914A 1N3063 1N3065	CR1 through CR3	9	4,13 4,12,13,14 4,6 4
3	Diode 1N964A	VR1, VR2	6	2,6,14,65
4	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C1, 2, 4, 6	12	22,23,76
5	Capacitor, Tantalum, $\pm 5\%$, 0.68 μ f	C5	3	22,23,77
6	Capacitor, Mica, $\pm 5\%$, 100pf	C3	3	19,20,21
7	Resistor, 1/2 watt, $\pm 2\%$, 820 ohms	R1, 2, 20	9	16,17
8	Resistor, 1/2 watt, $\pm 2\%$, 3.3 k ohms	R3, 4	6	16,17
9	Resistor, 1/2 watt, $\pm 2\%$, 1.0 k ohms	R5	3	16,17
10	Resistor, 1/2 watt, $\pm 2\%$, 22 k ohms	R6, 14	6	16,17
11	Resistor, 1/2 watt, $\pm 2\%$, 27 k ohms	R7	3	16,17
12	Resistor, 1/2 watt, $\pm 2\%$, 4.7 k ohms	R15	3	16,17
13	Resistor, 1/2 watt, $\pm 2\%$, 47 ohms	R9,R12,R13,R16,R18	15	16,17
14	Resistor, 1/2 watt, $\pm 2\%$, 68 ohms	R19	3	16,17
15	Resistor, 1/2 watt, $\pm 2\%$, 10 k ohms	R17	3	16,17
16	Resistor, 1/2 watt, $\pm 2\%$, 1.2 k ohms	R21	3	16,17
17	Potentiometer, 1000 ohms	R22	3	35,44
18	Transformer 1ZYGA	T1	3	40
19	Capacitor, Mylar, $\pm 5\%$, 0.0015 μ f	C9	3	20,27,74
20	Resistor, 1/2 watt, $\pm 2\%$, 2.2 k ohms	R8	3	16,17
21	Capacitor, Tantalum, $\pm 5\%$, 47 μ f	C7, C8, C10, C11	12	22,23,75

Module HK56 Schematic

POLARIZING PINS: 12 & 18



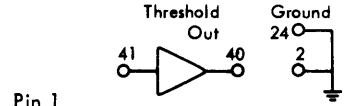
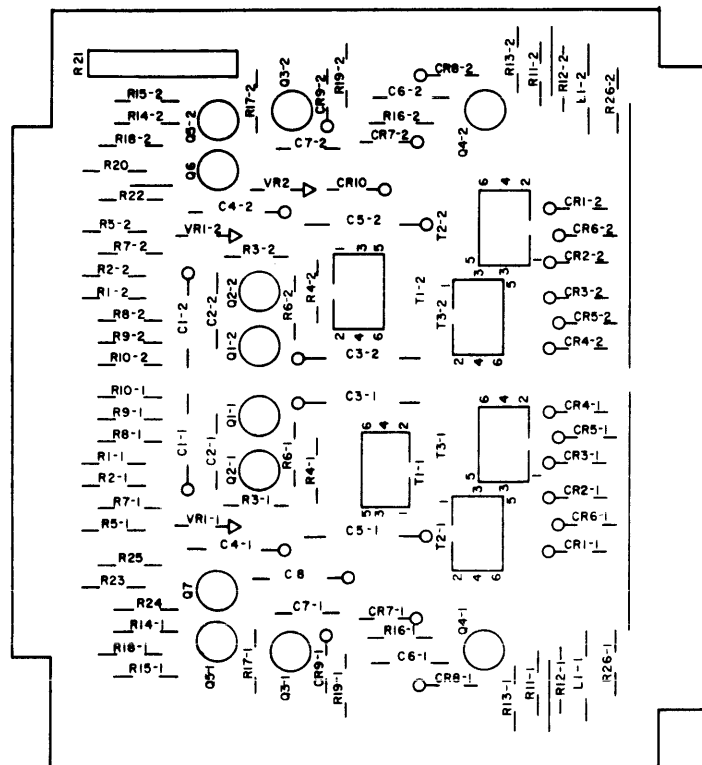
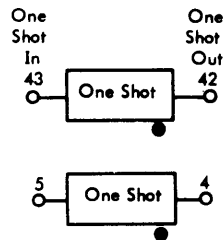
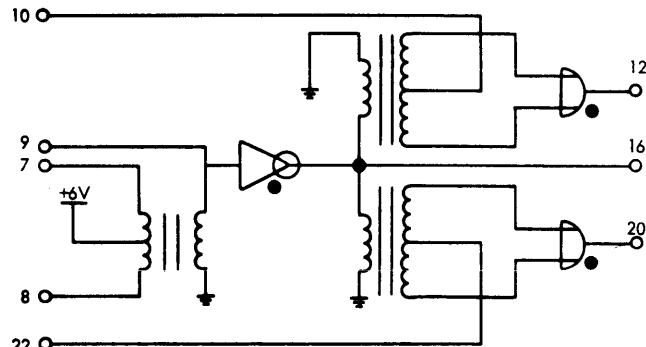
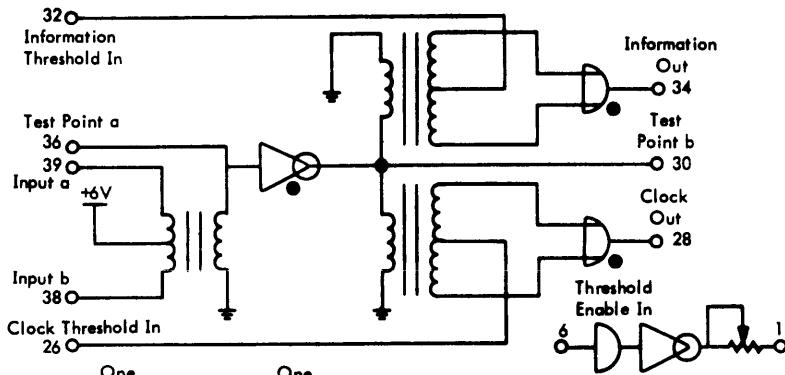
READ AMPLIFIER

HK57

Assy No. 101657

Read Amplifier module HK57, designed primarily for magnetic tape systems, contains two identical amplifiers, two one-shot multivibrators and two threshold sensing circuitries. The amplifiers accept low level differential input from a preamplifier, such as HK63. The input transformer also offers common mode noise rejection. The amplifier has two transformer coupled outputs, one used as clock signal, the other as the amplified information signal. Both output signals should be biased with a threshold voltage coupled to the centertap of the output transformers through the threshold sensing circuitry. Both outputs are buffered with a 2-microsecond one-shot multivibrator.

Operating Frequency	
Upper Cutoff	50 kc
Lower Cutoff	1.8 kc
Nominal Input (between inputs a and b)	2 volts pk to pk
Input Impedance	300 ohms
One Shot Input	1 ma
Threshold Set Input	1 load
Amplifier Gain	7.5 ±10%
Test Point Output	20 volts, pk to pk
Output Impedance (Nominal)	50 ohms
One Shot Output	8 loads, 200 pf pulse width 2 μsec
Threshold Set Output (Adjustable)	0 to +8 volts (sink 6 ma average)
+25 Volt Supply	73 ma
+8 Volt Supply	25 ma
-25 Volt Supply	56 ma
Module Dissipation	3.2 watts

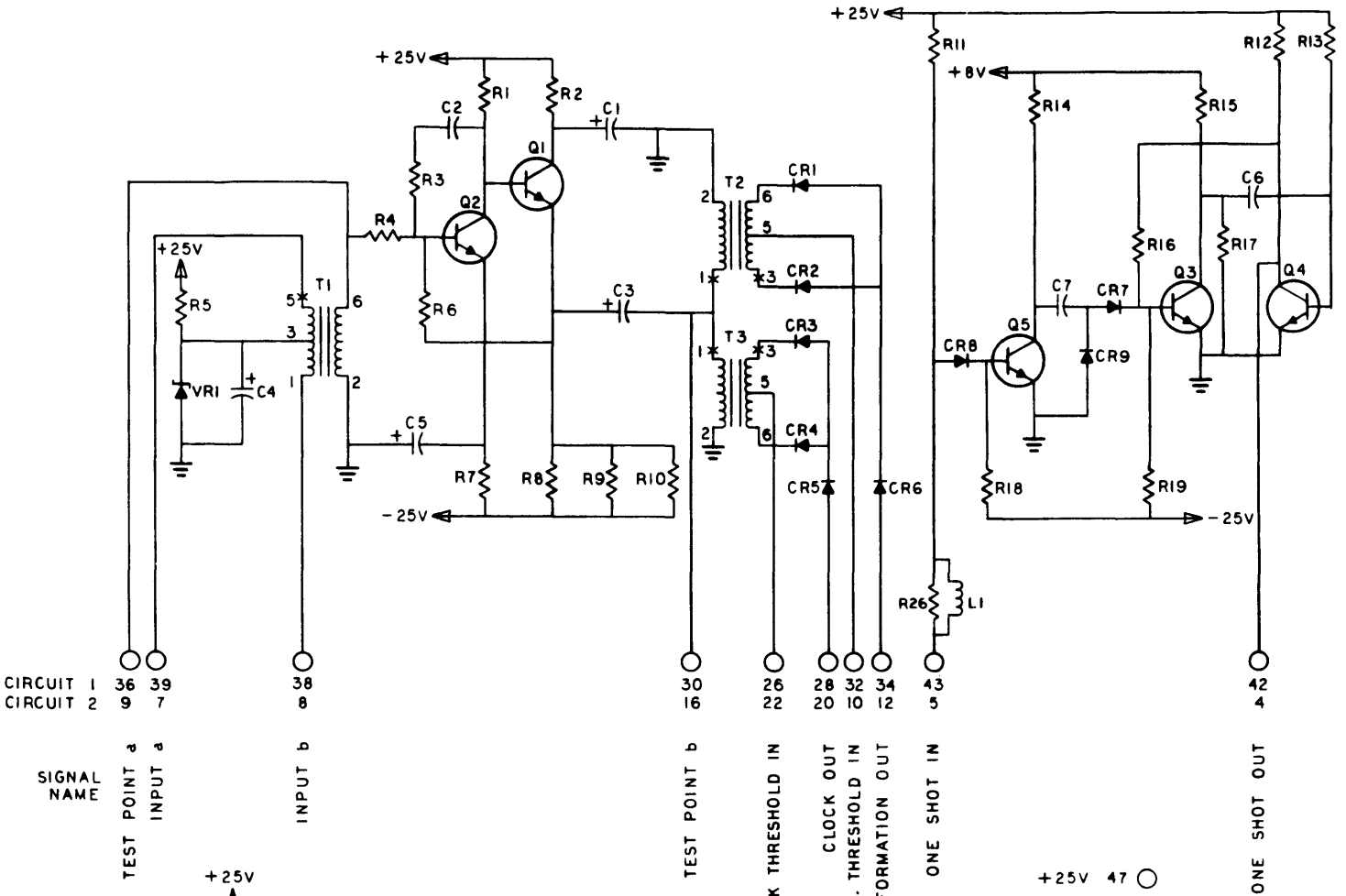


Pin 1

Connector End

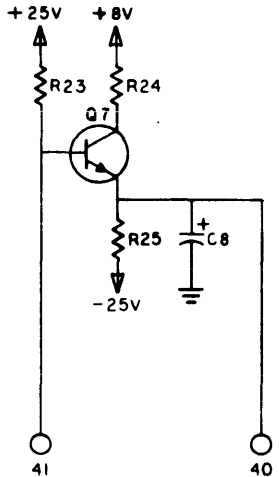
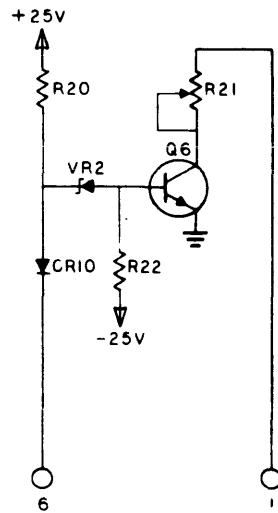
47

Model HK57 Schematic

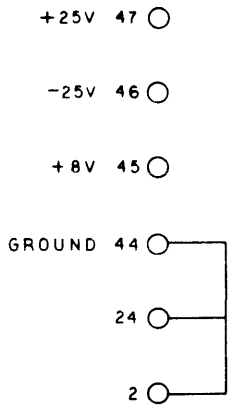


CIRCUIT 1 36 39
 CIRCUIT 2 9 7

SIGNAL NAME
 TEST POINT a
 INPUT a
 INPUT b



TEST POINT b
 TEST POINT b
 CLOCK THRESHOLD IN
 CLOCK OUT
 INFO. THRESHOLD IN
 INFO. THRESHOLD IN
 INFORMATION OUT
 ONE SHOT IN
 ONE SHOT IN
 ONE SHOT OUT



POLARIZING PINS: 12 & 22

Model HK57 Parts List

Item	Description	Designator	Qty	Suppliers Code (See Index)
1	Transistor	2N2219	Q1, Q7	3, 1, 11
2	Transistor	2N914	Q2 thru Q6	1, 3, 5, 7
3	Diode	1N914A, 1N3064	CR1 thru CR10	3,5,10,11,14,225
4	Diode	1N752	VR1	1, 10, 11, 14
5	Diode	1N746	VR2	1, 11, 14
6	Inductor, Molded	470 μ H \pm 5%	L1	41, 70, 90, 91
7	Capacitor, Tantalum	4.7 Mf \pm 20%, 50v	C1, 4, 8	11,22,23,24,192
8	Capacitor, Mylar	2.2 nf \pm 10%, 80v	C2	23,25,191,192,193
9	Capacitor, Tantalum	47 mf \pm 20%, 20v	C3, 5	11,22,23,24,30,192
10	Capacitor, Mylar	1.5 nf \pm 10%, 80v	C6	23,25,191,192,193
11	Capacitor, Mica	220 pf \pm 5%, 300v	C7	19,20,30,188,189
12	Transformer, Pulse	1:1	T1	39
13	Transformer, Pulse	1:1:1	T2, T3	23, 39, 71
14	Resistor	2.2 k ohms \pm 2%	R1, R6, R14	11, 16, 17, 36, 181
15	Resistor	270 ohms \pm 2%	R2, R4	11, 16, 17, 36, 181
16	Resistor	68 ohms \pm 2%	R3, R24	11, 16, 17, 36, 181
17	Resistor	22 k ohms \pm 2%	R5, R11	11, 16, 17, 36, 181
18	Resistor	3.9 k ohms \pm 2%	R7, R23, R26	11, 16, 17, 36, 181
19	Resistor	6.8 k ohms \pm 2%	R8, 9, 10, 12	11, 16, 17, 36, 181
20	Resistor	12 k ohms \pm 2%	R13	11, 16, 17, 36, 181
21	Resistor	820 ohms \pm 2%	R15, R17	11, 16, 17, 36, 181
22	Resistor	3.3 k ohms \pm 2%	R16, R25	11, 16, 17, 36, 181
23	Resistor	100k ohms \pm 2%	R18	11, 16, 17, 36, 181
24	Resistor	47 k ohms \pm 2%	R19	11, 16, 17, 36, 181
25	Resistor	8.2 k ohms \pm 2%	R20	11, 16, 17, 36, 181
26	Resistor	39 k ohms \pm 2%	R22	11, 16, 17, 36, 181
27	Potentiometer, Trimmer	2.5 k ohms \pm 10%, 1W	R21	35, 44

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Sense Amplifier

Assy. No. 102053

HK59

Input

Between Input a
and Input b

Input Impedance

Voltage Gain

Normal Mode

Common Mode

Output

Output

Loading

45 mv (nominal)

275 ohms

400 (nominal)

1.5 (max)

Loading

2 ma

Operating Frequency

Upper Cutoff 500 Kc

Lower Cutoff 10 Kc

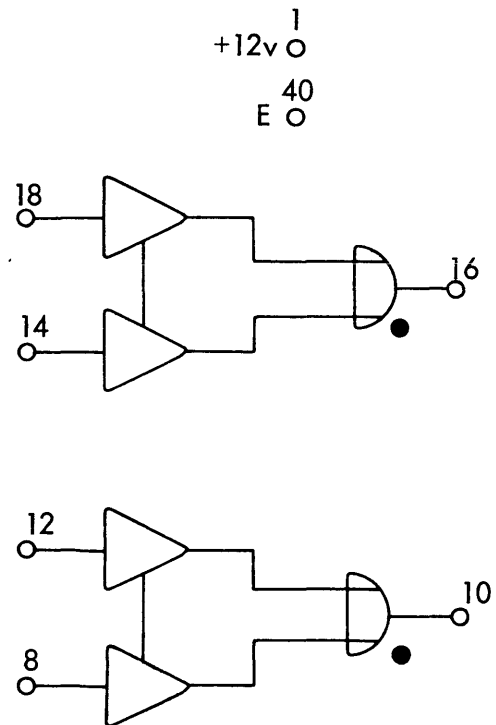
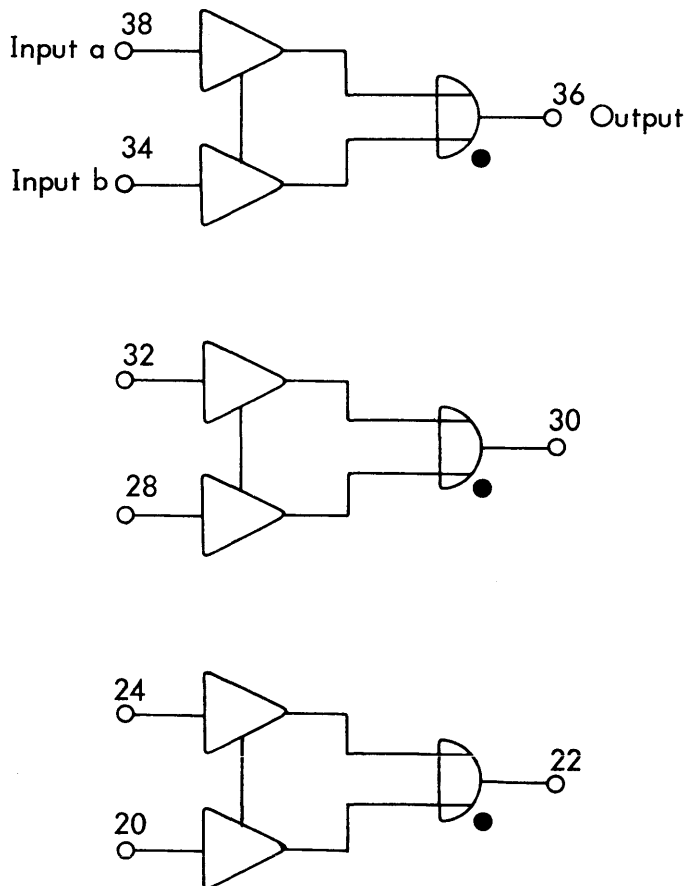
Power Drain

+25 Volt Supply 100 ma

-25 Volt Supply 100 ma

Module Dissipation

5 watts

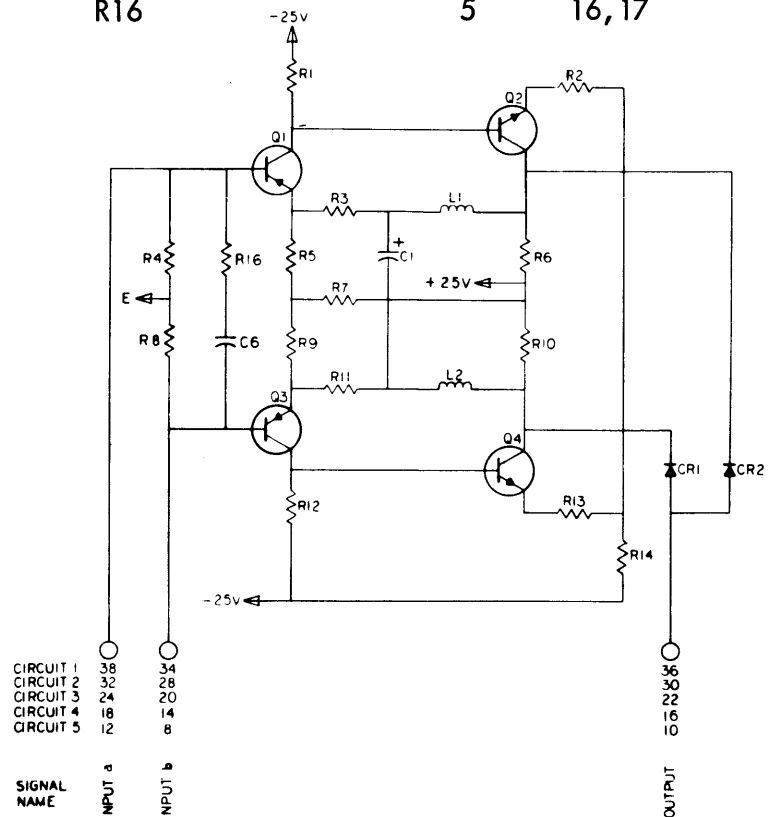
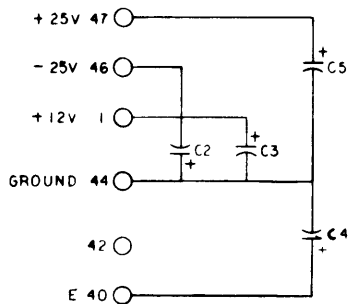


SDS 900174A

Module HK 59 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N2219 2N2404	Q2, 4	10	1 29
2	Transistor 2N1132	Q1, 3	10	3, 10
3	Diode 1N907A 1N914A 1N3063 1N3065	CR1, 2	10	4, 13 4, 12, 13, 14 4, 6 4
4	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C2, 5	2	22, 23, 77
5	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C3, 1, 4	7	22, 23, 76
6	Capacitor, Mylar, $\pm 5\%$, 0.001 μ f	C6	5	26, 27, 74
7	Resistor, $\pm 2\%$, 1/2 watt, 4.7 k ohms	R6, 10	10	16, 17
8	Resistor, $\pm 2\%$, 1/2 watt, 2.4 k ohms	R1, 12	10	16, 17
9	Resistor, $\pm 2\%$, 1/2 watt, 150 ohms	R4, 8, 2, 13	20	16, 17
10	Resistor, $\pm 2\%$, 1/2 watt, 100 ohms	R5, 9, 3, 11	20	16, 17
11	Resistor, $\pm 2\%$, 1/2 watt, 1.1 k ohms	R14	5	16, 17
12	Inductor, 47 mhy $\pm 10\%$	L1, 2	10	109
13	Pad, Transistor	Q1, 3, 2, 4	20	
14	Resistor, $\pm 2\%$, 1/2 watt, 2.2 k ohms	R7	5	16, 17
15	Resistor, $\pm 2\%$, 1/2 watt, 68 ohms	R16	5	16, 17

POLARIZING PINS: 2 & 14



Read Amplifier

Assy. No. 102868

HK60

Input

Between Input a
and Input b
Input Impedance
Detection Threshold Input
Ampl Sense Threshold Input
Threshold Enable Input

Loading

30/60 mv (nominal)
peak to peak
20 K ohms (nominal)
0v to 10v
5v to 10v
1 load

Operating Frequency

Upper Cutoff 60 Kc
Lower Cutoff 6 Kc

Power Drain

+25 Volt Supply 112 ma
-25 Volt Supply 88 ma
+ 8 Volt Supply 1 ma

Amplifier Gain

120 to 500 (adjustable)

Output

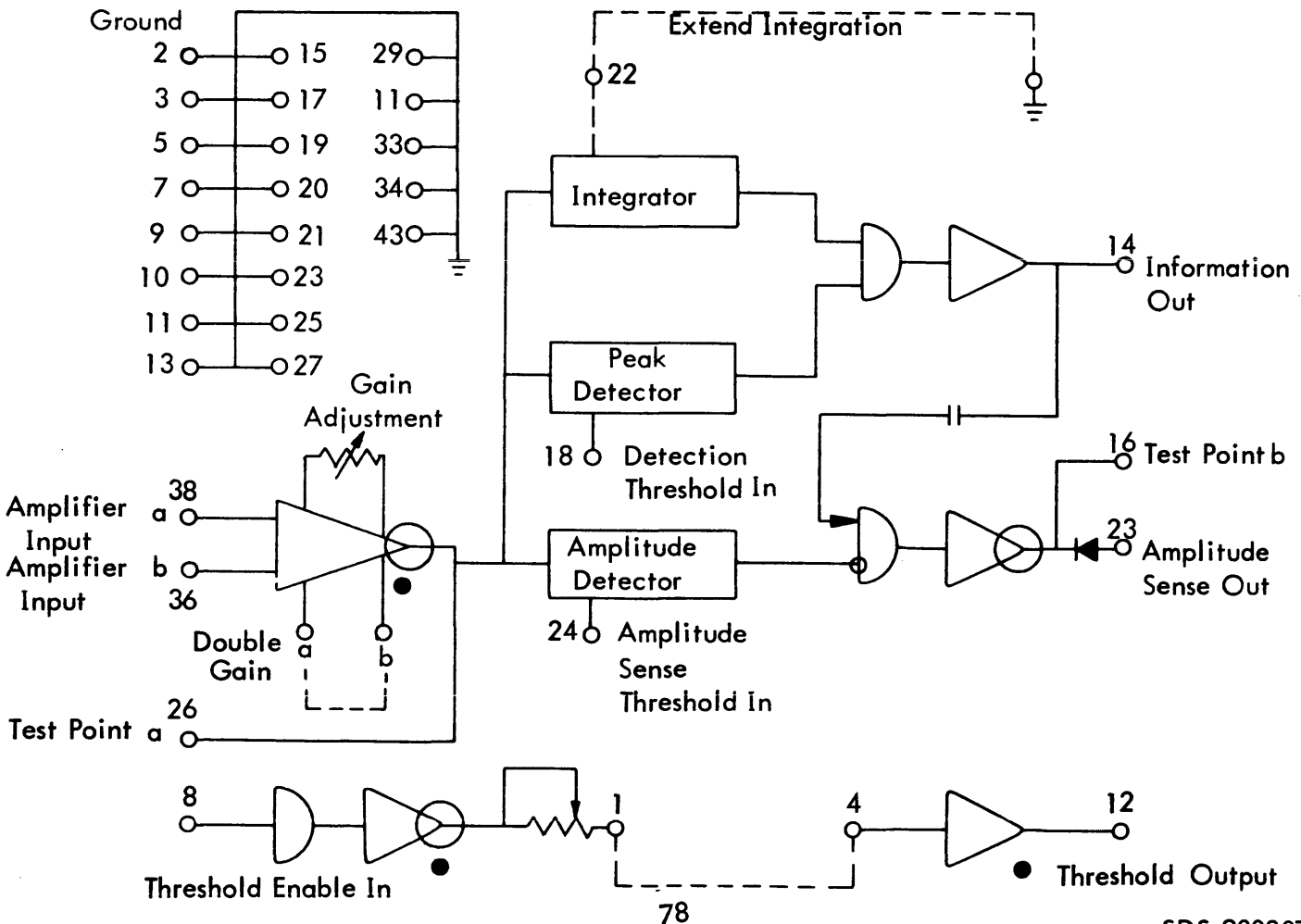
Information Output
Amplitude Sense Output
Threshold Output
Test Point Output

Loading

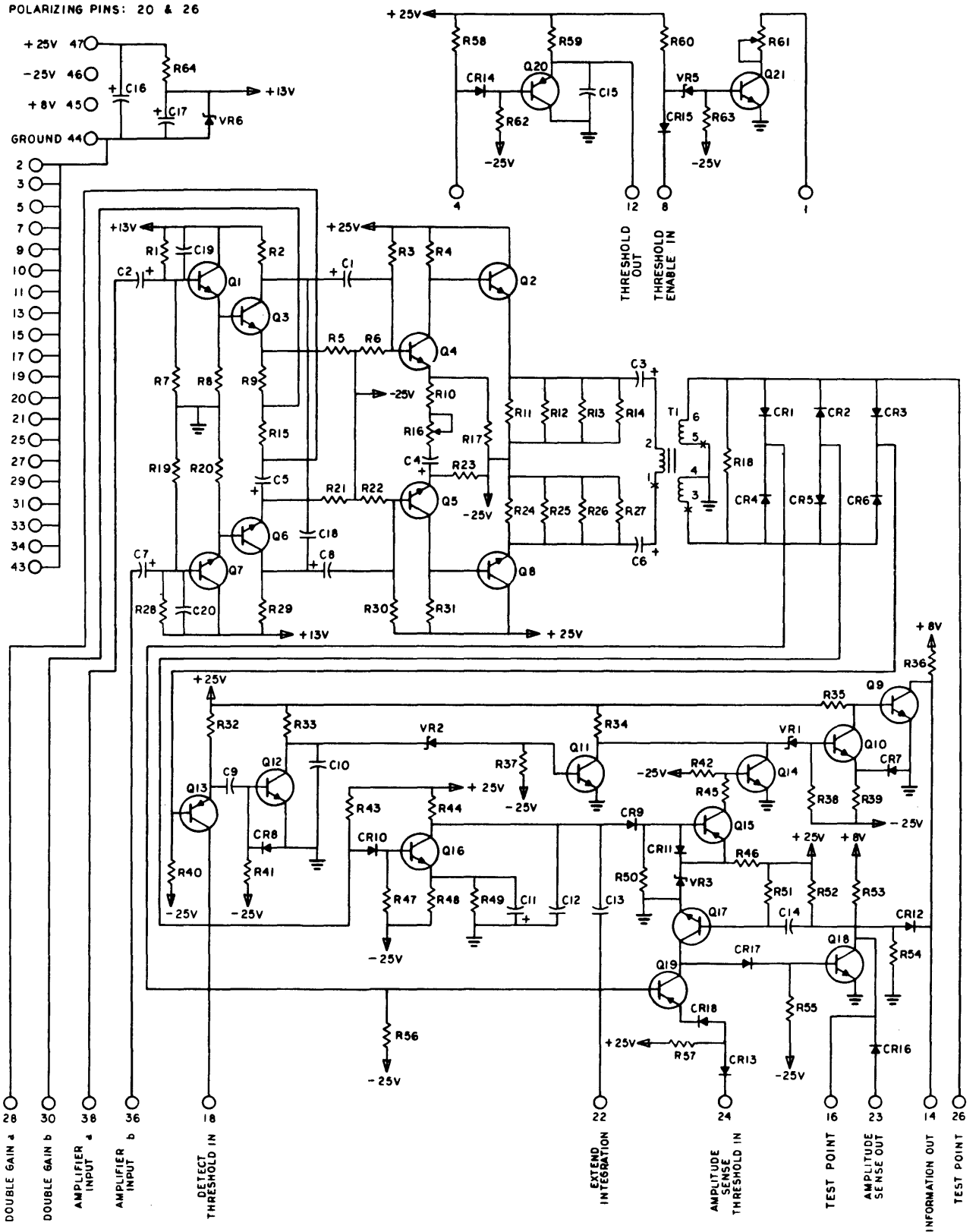
10 loads
5 loads
0 to 10 volts adjustable, sink 40 ma average
20v peak to peak

Module Dissipation

5.2 watts



Model HK60 Schematic



Model HK60 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N930 2N2483	Q1,7	2	3, 11 3
2	Transistor 2N914	Q3 through Q6, Q9 through Q12, Q14, 16, 17, 18, 21	13	1, 3, 5, 7
3	Transistor 2N2219	Q2, 8	2	1, 11, 30
4	Transistor 2N2801 2N2905	Q13, 15, 19, 20	4	1 1
5	Diode 1N914A	CR1 through CR18	18	4, 12, 13, 14
6	Diode 1N746	VR1, 2, 5	3	2, 12, 13, 14
7	Diode 1N752	VR3	1	2, 12, 13, 14
8	Diode 1N964A	VR6	1	2, 6, 14, 65
9	Capacitor, Mica 100pf \pm 5%	C14	1	19, 20, 21
10	Capacitor, Mica 180pf \pm 5%	C10, 12, 13	3	19, 20, 21
11	Capacitor, Mica 270pf \pm 5%	C19, 20	2	19, 20, 21
12	Capacitor, Mylar 1000pf \pm 10%	C15	1	74, 27, 26
13	Capacitor, Mylar 1500pf \pm 10%	C18	1	74, 27, 26
14	Capacitor, Mylar 2200pf \pm 10%	C9	1	74, 27, 26
15	Capacitor, Tantalum 4.7 μ f \pm 20% 50v	C1, 2, 7, 8, 11, 16, 17	7	23, 77
16	Capacitor, Tantalum 47 μ f \pm 20%, 20v	C4, 5	2	22, 23, 76
17	Capacitor, Tantalum 47 μ f \pm 20%, 35v	C3, 6	2	22, 23, 87
18	Potentiometer 500 ohms \pm 10%	R16	1	35, 44
19	Potentiometer 1 k ohms \pm 10%	R61	1	35, 44
20	Resistor 22 ohms \pm 2%	R9, 15	2	16, 17
21	Resistor 82 ohms \pm 2%	R10	1	16, 17
22	Resistor 330 ohms \pm 2%	R49	1	16, 17
23	Resistor 470 ohms \pm 2%	R64	1	16, 17
24	Resistor 1.0 k ohms \pm 2%	R2, 29	2	16, 17

Model HK60 Parts List (Continued)

Item	Description	Designator	Qty.	Supplier Code (See Index)
25	Resistor 2,2 k ohms \pm 2%	R4, 31	2	16, 17
26	Resistor 2,7 k ohms \pm 2%	R45	1	16, 17
27	Resistor 3,9 k ohms \pm 2%	R32, 39, 46	3	16, 17
28	Resistor 4,7 k ohms \pm 2%	R17, 23	2	16, 17
29	Resistor 5,6 k ohms \pm 2%	R5, 21	2	16, 17
30	Resistor 6,8 k ohms \pm 2%	R11 through R14 R24 through R27	8	16, 17
31	Resistor 8,2 k ohms \pm 2%	R34, 36, 59, 60	4	16, 17
32	Resistor 10 k ohms \pm 2%	R54, 57, 62	3	16, 17
33	Resistor 12 k ohms \pm 2%	R8, 20, 35	3	16, 17
34	Resistor 15 k ohms \pm 2%	R53	1	16, 17
35	Resistor 18 k ohms \pm 2%	R33	1	16, 17
36	Resistor 22 k ohms \pm 2%	R3, 6, 22, 30, 38	5	16, 17
37	Resistor 27 k ohms \pm 2%	R18, 48, 58	3	16, 17
38	Resistor 33 k ohms \pm 2%	R44, 52	2	16, 17
39	Resistor 39 k ohms \pm 2%	R40, 50, 51, 63	4	16, 17
40	Resistor 56 k ohms \pm 2%	R37, 42, 55	3	16, 17
41	Resistor 100 k ohms \pm 2%	R7, 19, 43	3	16, 17
42	Resistor 120 k ohms \pm 2%	R1, 28	2	16, 17
43	Resistor 150 k ohms \pm 2%	R56	1	16, 17
44	Resistor 220 k ohms \pm 2%	R47	1	16, 17
45	Resistor 330 k ohms \pm 2%	R41	1	16, 17
46	Transformer 11 WGB	T1	1	40

Photo Sense Amplifier

Assy. No. 102964

HK61

Input

Data Input 0 to + 0.6v total
0.06 to 0.6vac

Sprocket Input 0 to + 0.6v total
0.06 to 0.6vac

Input resistance (normal) 1200 ohms
Input resistance (reduced) 400 ohms

Operating Frequency

200 to 400 cps

Power Drain

+25 Volt Supply 70 ma
+ 8 Volt Supply 18 ma
-25 Volt Supply 51 ma

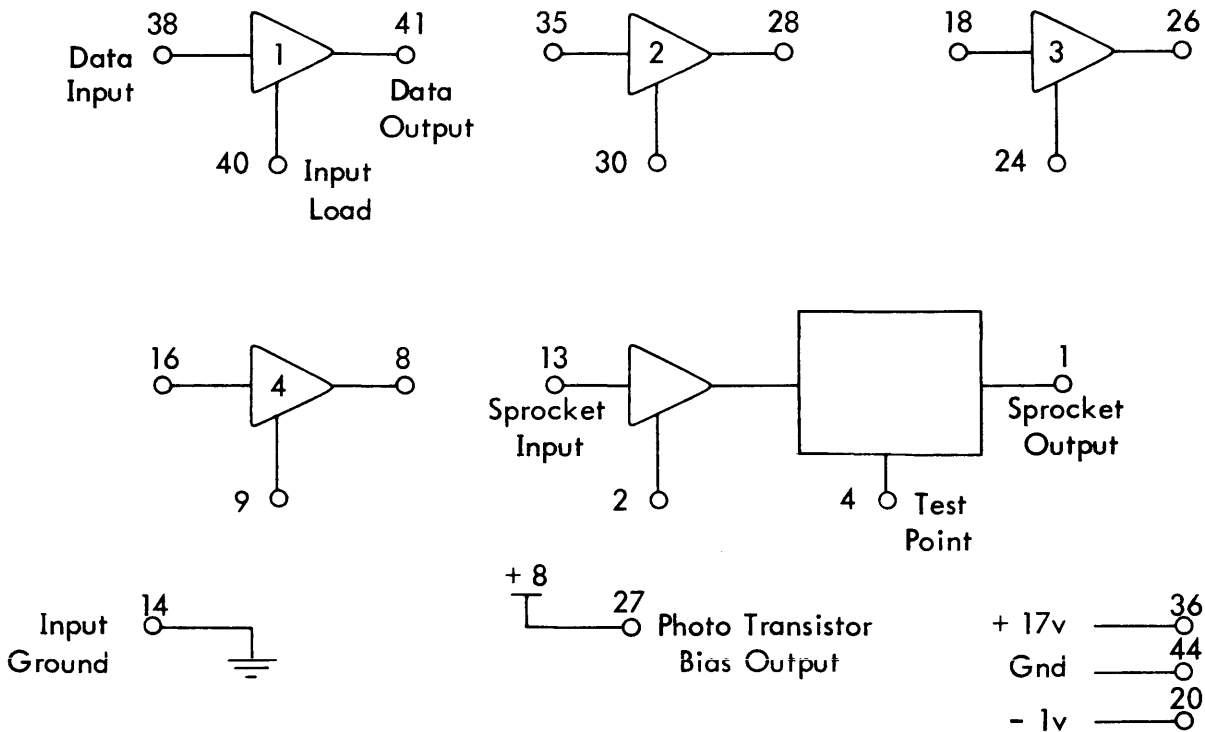
Output

Data Output 4 loads

Sprocket Output 4 loads 700 μ sec 30 μ sec

Module Dissipation

3.2 watts



Module HK61 Parts List

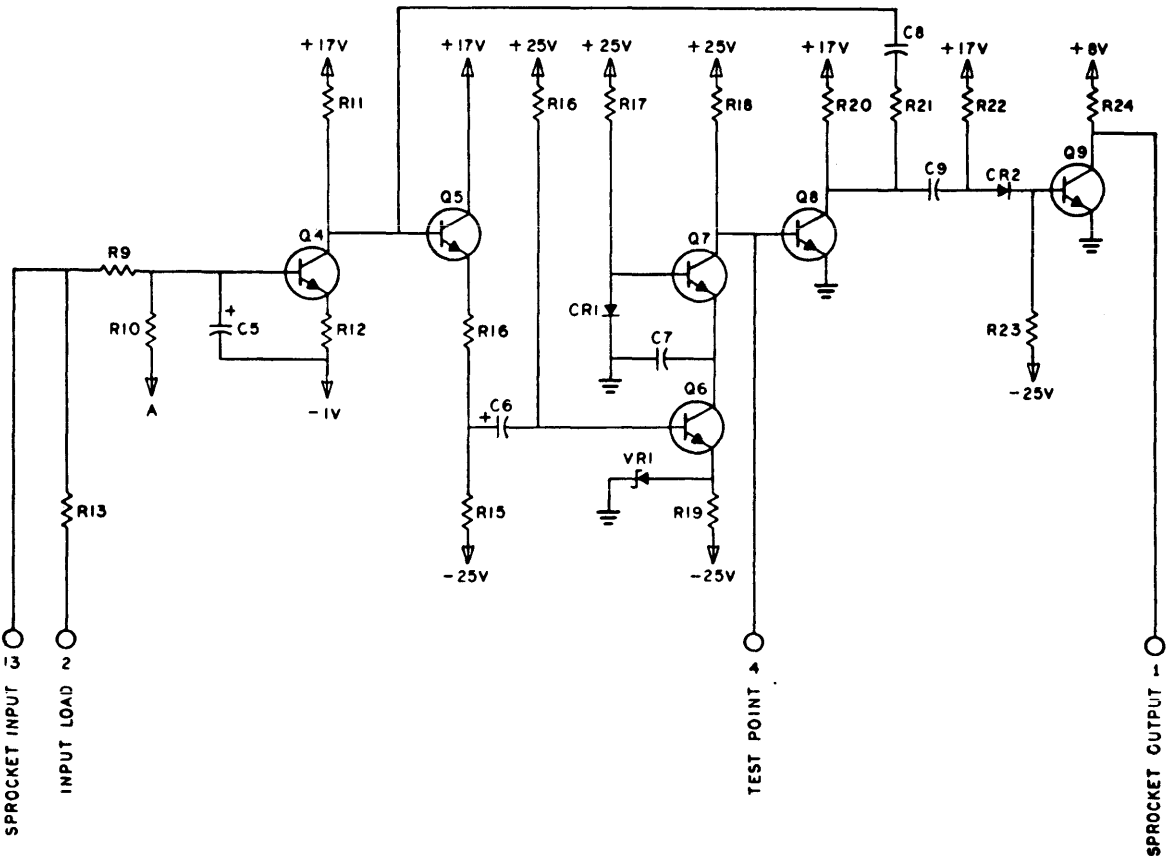
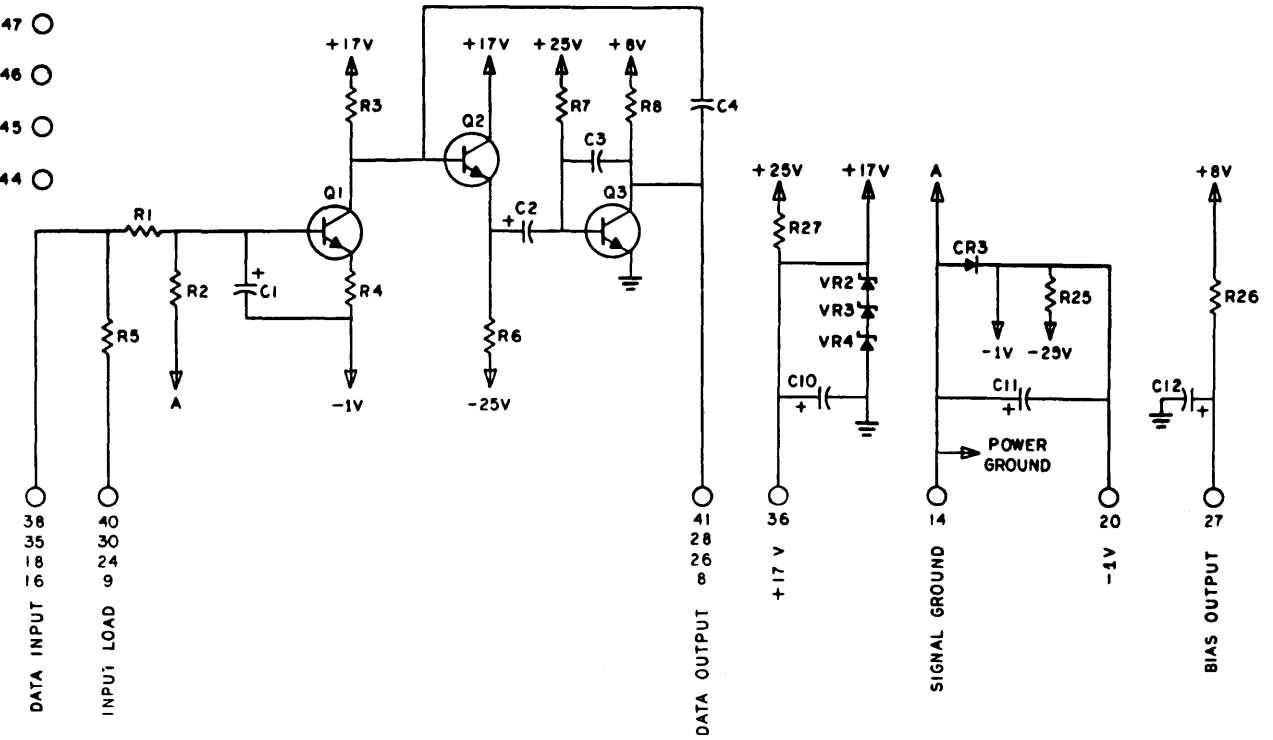
Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N914	19	1,3,5,7,10
2	Transistor	2N1711 2N2219	8	3,62 1
3	Diode, Zener	1N3827	4	2
4	Diode	1N3063 1N3065 1N907A 1N914A	2	4,6 4 4,13 4,12,13,14
5	Diode	1N3600 1N3873	1	4 6
6	Capacitor, Silver Mica, 150pf \pm 5%	C3,4	14	19,20,21
7	Capacitor, Silver Mica, 510pf \pm 5%	C8	1	19,20,21
8	Capacitor, Mylar, 0.003 μ f \pm 10%	C9	1	25,26,27
9	Capacitor, Mylar, 0.22 μ f \pm 10%	C7	1	25,26,27
10	Capacitor, Tantalum, 0.10 μ f \pm 20%, 50v	C1,5	8	23,77
11	Capacitor, Tantalum, 4.7 μ f \pm 20%, 50v	C2,6	8	23
12	Capacitor, Tantalum, 100 μ f \pm 20%, 20v	C10	1	22,23,75
13	Capacitor, Tantalum, 15 μ f \pm 20%, 20v	C12	1	22,23,75
14	Capacitor, Tantalum, 47 μ f \pm 20%, 6v	C11	1	22,23,75
15	Resistor, 1/2 watt, 22 ohms \pm 2%	R14	1	16,17
16	Resistor, 1/2 watt, 47 ohms \pm 2%	R26	1	16,17
17	Resistor, 1 watt, 130 ohms \pm 2%	R27	1	92,93,94
18	Resistor, 1/2 watt, 180 ohms \pm 2%	R1,9	8	16,17
19	Resistor, 1/2 watt, 270 ohms \pm 2%	R4,12	8	16,17
20	Resistor, 1 watt, 750 ohms \pm 2%	R25	1	92,93,94
21	Resistor, 1/2 watt, 1 k ohms \pm 2%	R2,10	8	16,17
22	Resistor, 1/2 watt, 1.2 k ohms \pm 2%	R5,13	5	16,17
23	Resistor, 1/2 watt, 2.2 k ohms \pm 2%	R8,24	8	16,17
24	Resistor, 1/2 watt, 2.7 k ohms \pm 2%	R19	1	16,17
25	Resistor, 1/2 watt, 5.6 k ohms \pm 2%	R3,11,20	9	16,17
26	Resistor, 1/2 watt, 18 k ohms \pm 2%	R6,15,18,21,22	11	16,17
27	Resistor, 1/2 watt, 22 k ohms \pm 2%	R7	4	16,17
28	Resistor, 1/2 watt, 56 k ohms \pm 2%	R16	1	16,17
29	Resistor, 1/2 watt, 150 k ohms \pm 2%	R17,23	2	16,17

Module HK61 - Schematic

POLARIZING PINS: 4 & 32

- + 25V 47 ○
- 25V 46 ○
- + 8V 45 ○
- GROUND 44 ○

CIRCUIT 1	38	40
CIRCUIT 2	35	30
CIRCUIT 3	18	24
CIRCUIT 4	16	9



AND/OR INVERTER

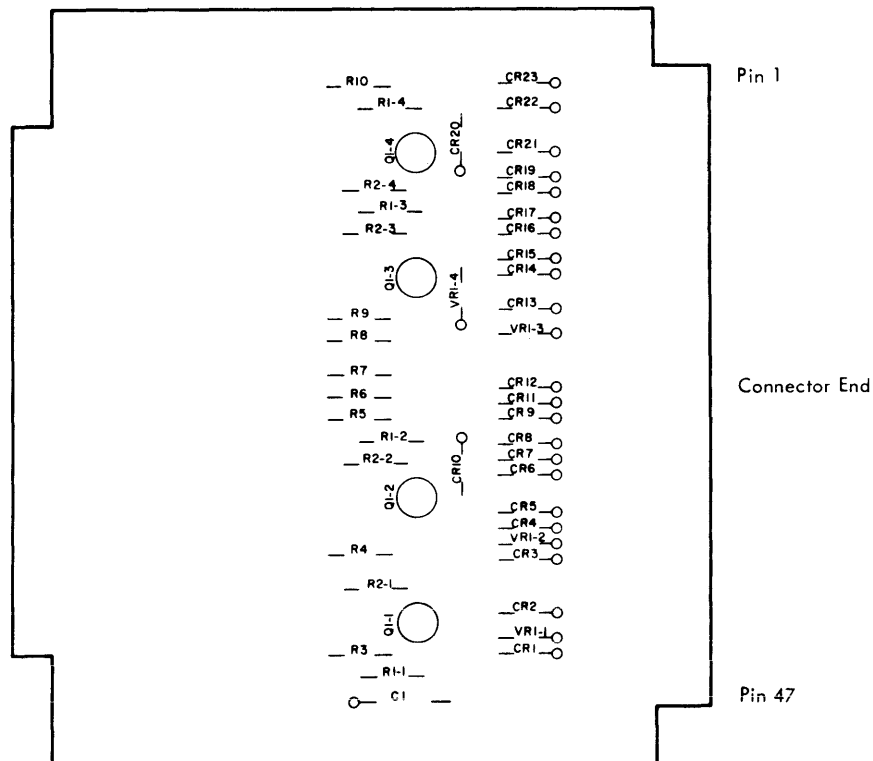
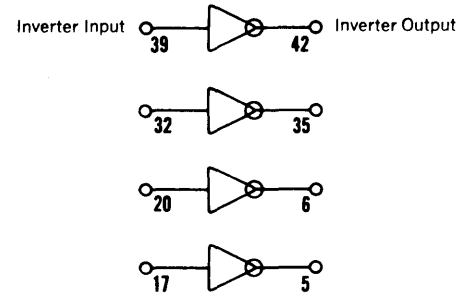
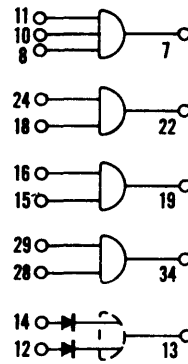
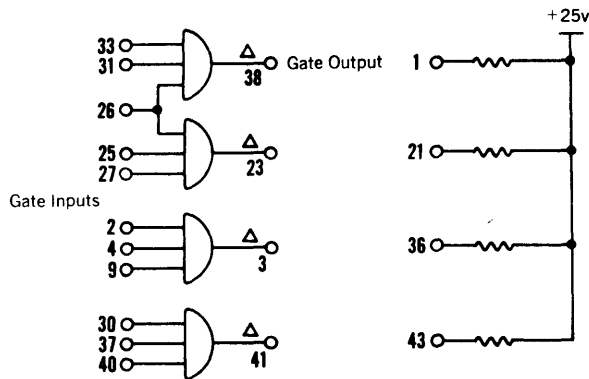
IC10

ASSY. NO. 100168

This module contains four complete diode AND gates; four diode Δ AND gates, which can expand the AND gates or become independent gates by adding one of the gate resistors; one gated input OR gate; and four inverter-amplifiers. AND/OR gates can be constructed by wiring one input of an AND gate to one input of another to form an OR gate output. Inverter circuits can be used either for NAND and NOR constructions or for improving the fan-out of flip-flops. Two inverters can be wired in series to provide noninverting amplification and pulse shaping.

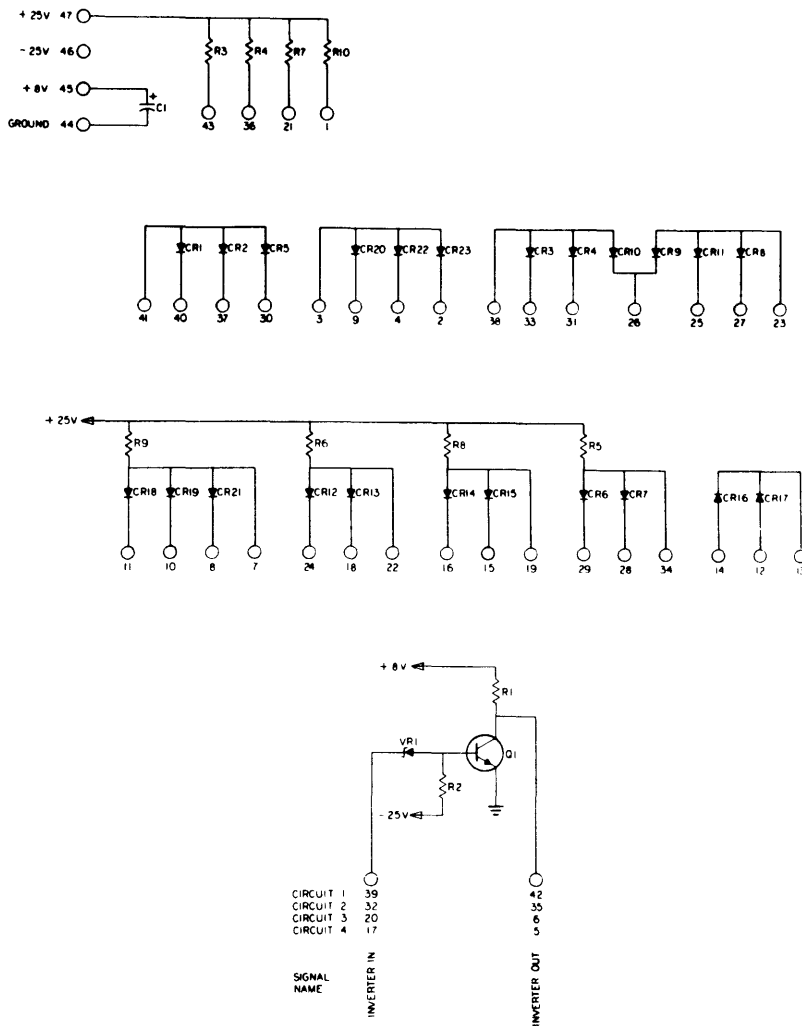
Inverter Output Delay (Typical)
Fan-In
Gate Input
Output
+25 Volt Supply
+8 Volt Supply
-25 Volt Supply
Module Dissipation
Federal Stock No.

110 nsec
15 terms
1 load
7 loads
23 ma
14 ma
3 ma
0.8 watts
-



MODEL IC10 Schematic

POLARIZING PINS 2 & 44



MODEL IC10 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor	2N914	Q1	4, 3, 5, 7
2	Diode	1N914A	CR1 through 23	4, 12, 13, 14
3	Diode	1N746	VR1	2, 12, 13, 14
4	Capacitor, Tantalum	4.7 μ f \pm 20%, 50v	C1	22, 23, 77
5	Resistor	2.2 k ohms \pm 2%	R1	16, 17
6	Resistor	8.2 k ohms \pm 2%	R3 through 10	16, 17
7	Resistor	39 k ohms \pm 2%	R2	16, 17

NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

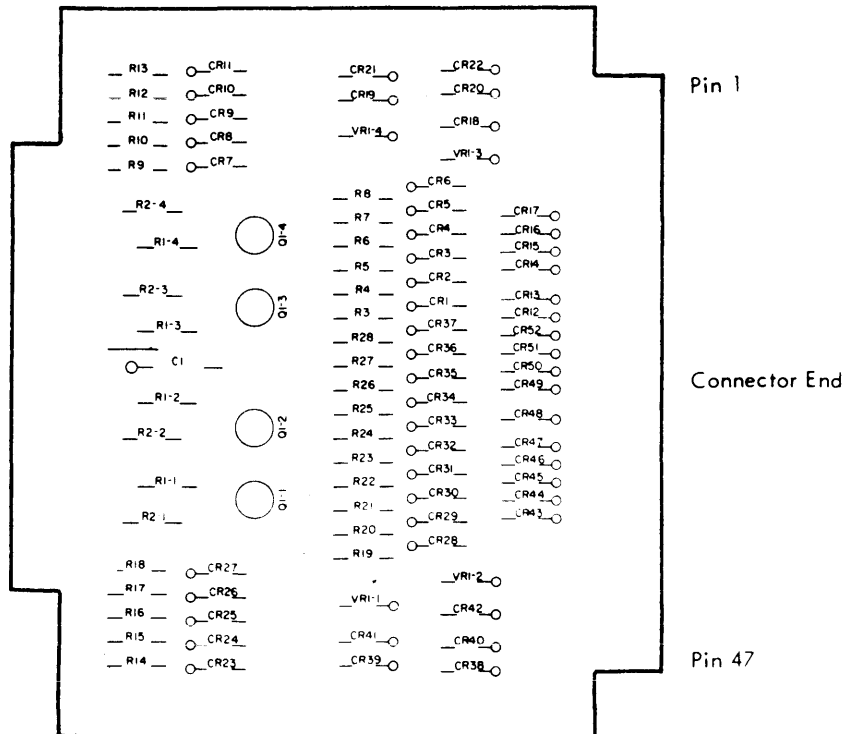
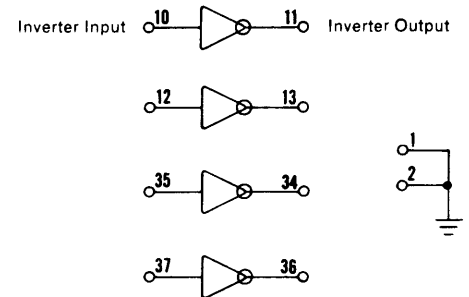
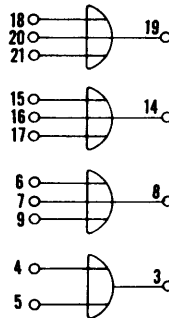
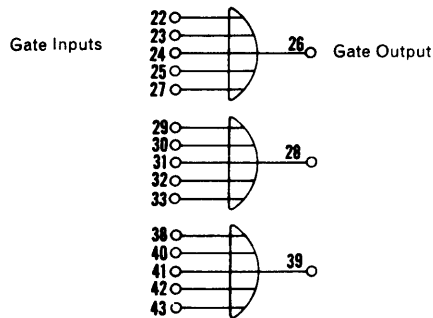
OR Gate/Inverter (NOR)

IC11

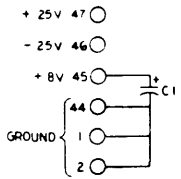
Assy. No. 100320

This module contains three 5-term OR gates, three 3-term OR gates, one 2-term OR gate, and four inverter circuits. Since each of the diode gate circuits is a complete OR structure, it may be freely used with the inverters to implement NOR logic. Two pins are available to ground unused OR gate inputs. Unused inverter circuits may be used in conjunction with Gate Expander or Flip-Flop modules.

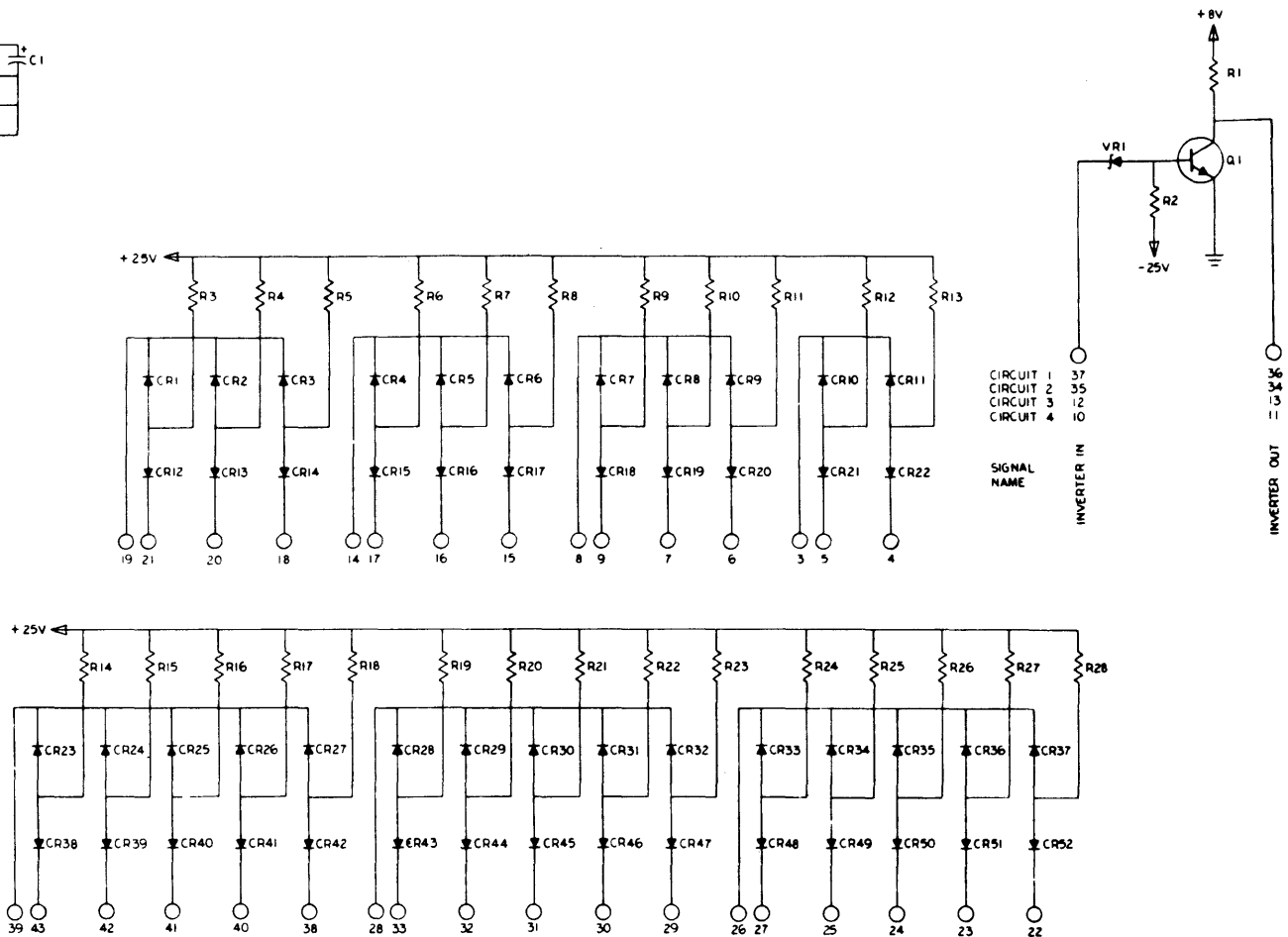
Maximum Operating Frequency	300 kc
Fan-In	15 terms
Gate Input	1 load
Output	7 loads
Output Delay (Typical)	110 ns
+25 Volt Supply	70 ma
+8 Volt Supply	14 ma
-25 Volt Supply	2 ma
Module Dissipation	1.7 watts



Model IC11 Schematic



POLARIZING PINS 2 & 16



Model IC11 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N914	Q1	4	1,3,5,7
2	Diode 1N746	VR1	4	2,12,13,14
3	Diode 1N914A	CR1 through CR52	52	4,12,13,14
4	Capacitor, Tantalum 4.7 μ f \pm 20%, 50v	C1	1	23,77
5	Resistor 2.2k ohms \pm 2%	R1	4	16,17
6	Resistor 8.2k ohms \pm 2%	R3 through R28	26	16,17
7	Resistor 39k ohms \pm 2%	R2	4	16,17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

AND GATE/INVERTER

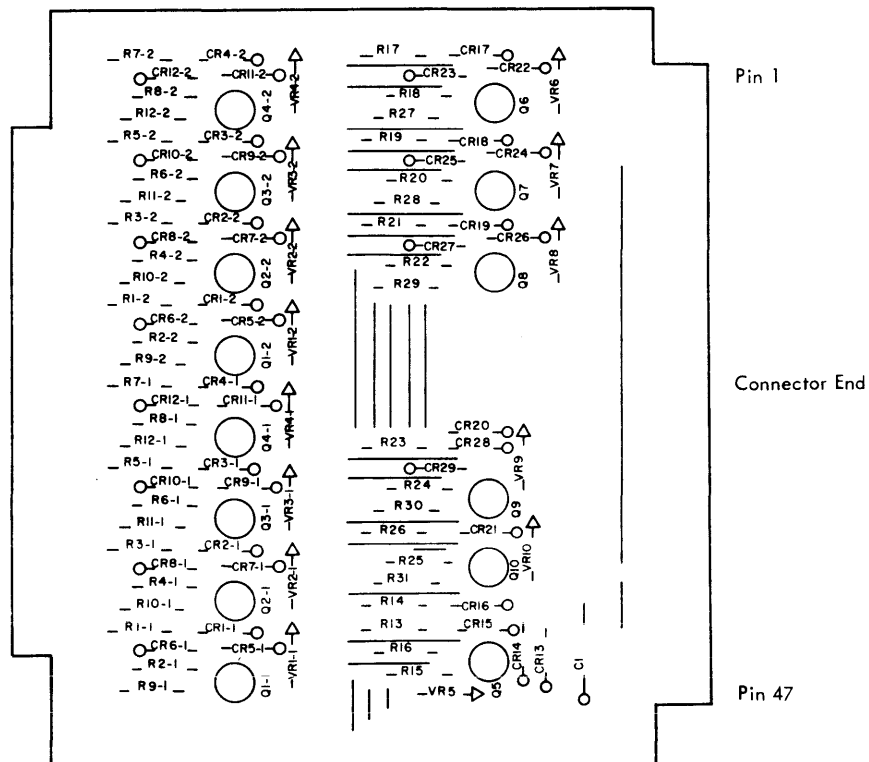
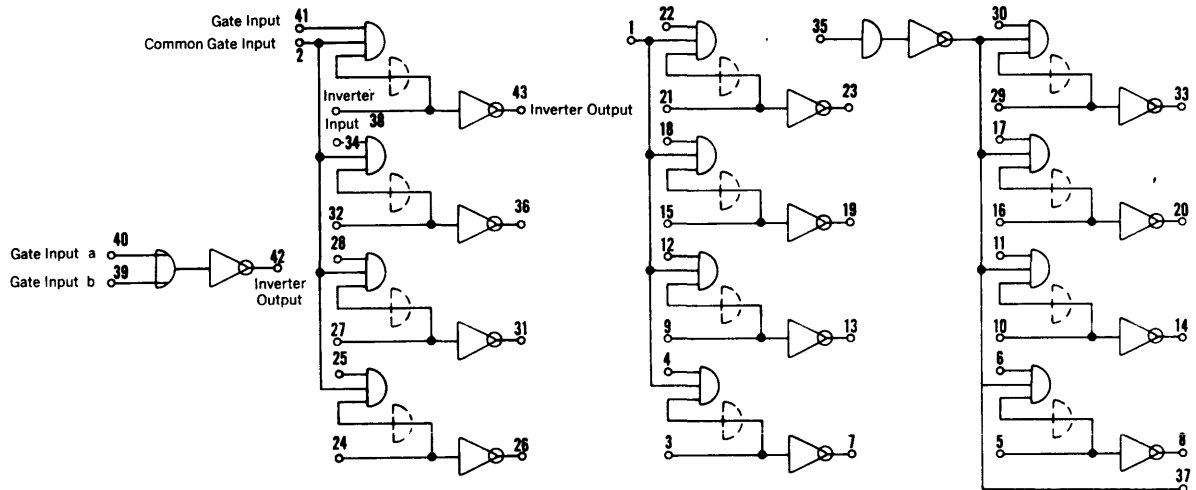
IC12

ASSY. NO. 101540

This module contains 14 inverter circuits with gated inputs. The gating can be expanded by wiring additional terms to the Inverter Input from a suitable Gate Expander module. These inverter circuits have a greater output capability than the other inverter circuits of the series. Inverter circuits can be used for NAND and NOR constructions or for improving the fan-out of flip-flops. The input gating is prewired to facilitate applications requiring decoding or selection operations, particularly when the inverter output is used to control flip-flop "repeater" type inputs. The input gate loads on the IC12 module are larger than normal loads. However, the inverters operate satisfactorily at reduced output capability with standard gate inputs. The IC12 can be used to power small relays or incandescent lamps.

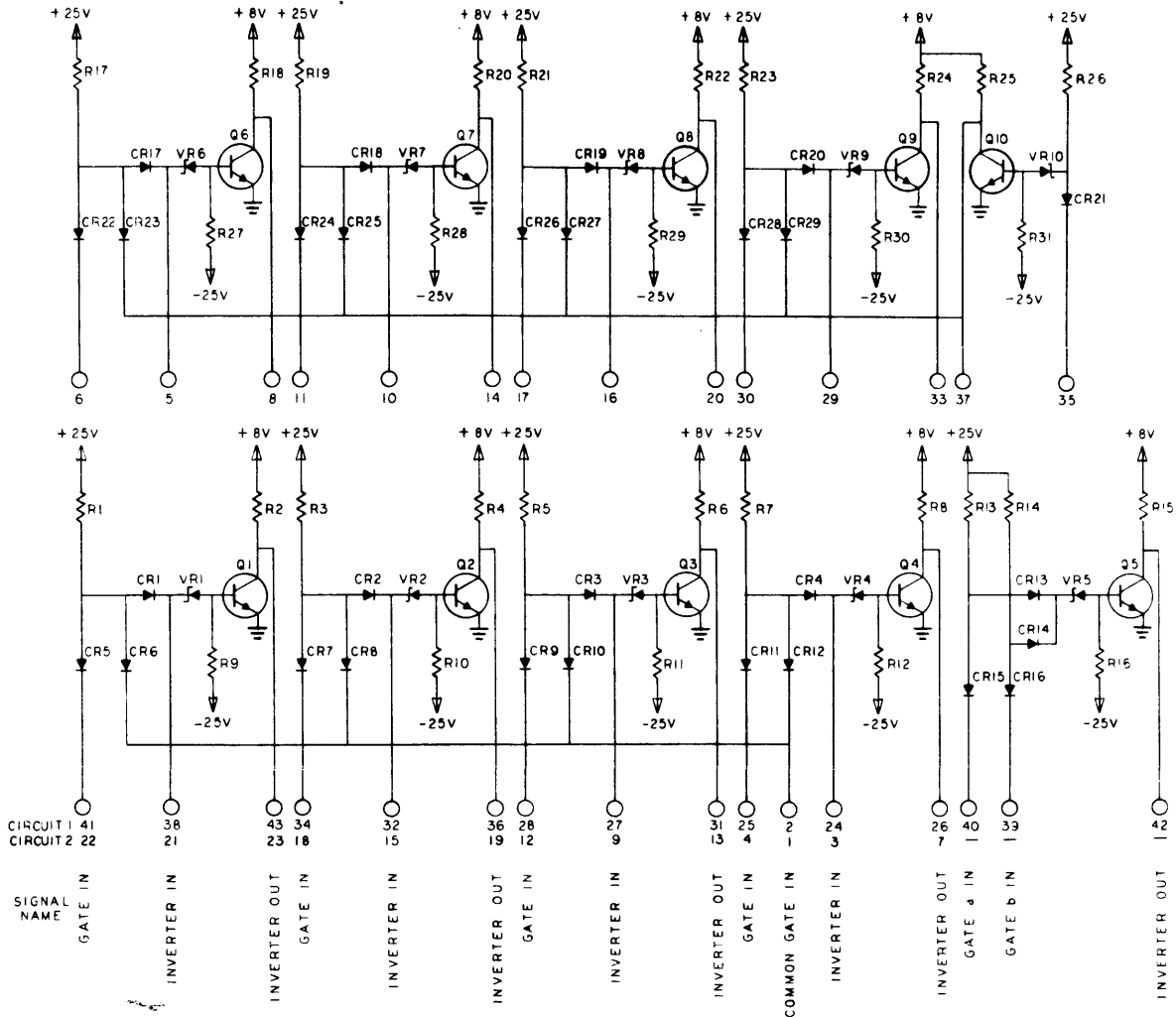
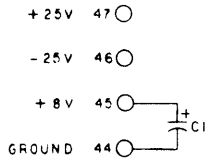
Output Delay (Typical)
Fan-In (inverter input)
Gate Input
Common Gate Input
Output
Output (with external one-load gate input)
+25 Volt Supply
+8 Volt Supply
-25 Volt Supply
Module Dissipation

150 nsec
10 terms
2 loads
8 loads
24 loads
9 loads
96 ma
51 ma
9 ma
3.1 watts



MODEL IC12 Schematic

POLARIZING PINS: 10 & 34



MODEL IC12 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor 2N2538 2N2477 2N2848	Q1 through 10	4	1 7 3
2	Diode 1N914A	CR1 through 29	41	4, 12, 13, 14
3	Diode 1N746	VR1 through 10	14	2, 12, 13, 14
4	Capacitor, Tantalum 4.7 μ f \pm 20%, 50v	C1	1	22, 23, 77
5	Resistor 2.2 k ohms \pm 2%	R2, 4, 6, 8, 15, 18, 20 R22, 24, 25	14	16, 17
6	Resistor 3.9 k ohms \pm 2%	R1, 3, 5, 7, 13, 14, 17 R19, 21, 23, 26	15	16, 17
7	Resistor 39 k ohms \pm 2%	R9, 10, 11, 12, 16, 27	14	16, 17

NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

AND/OR INVERTER

IH10

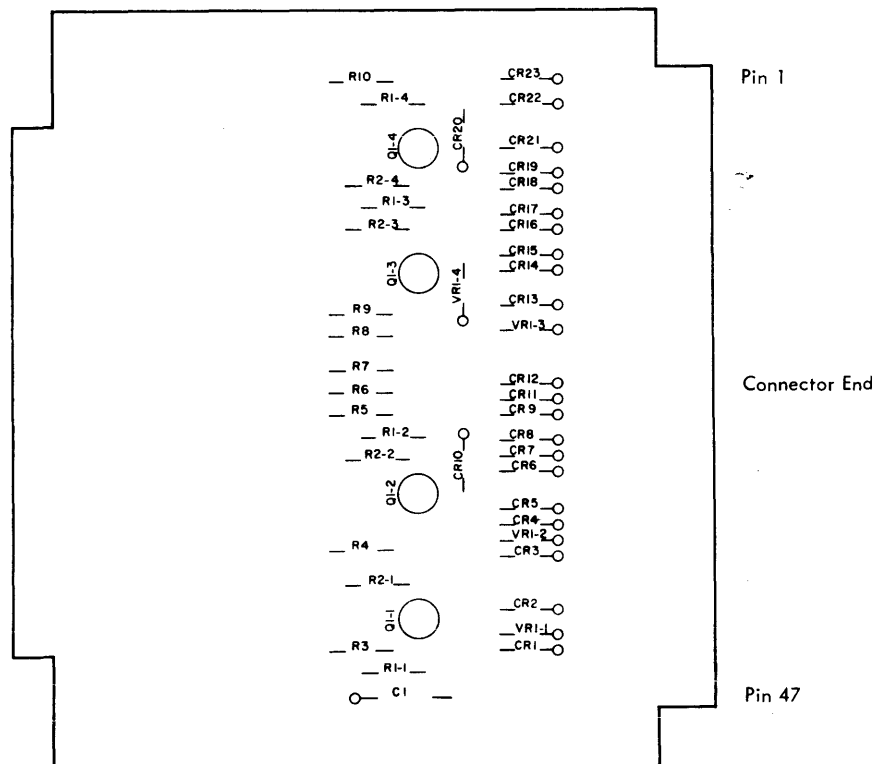
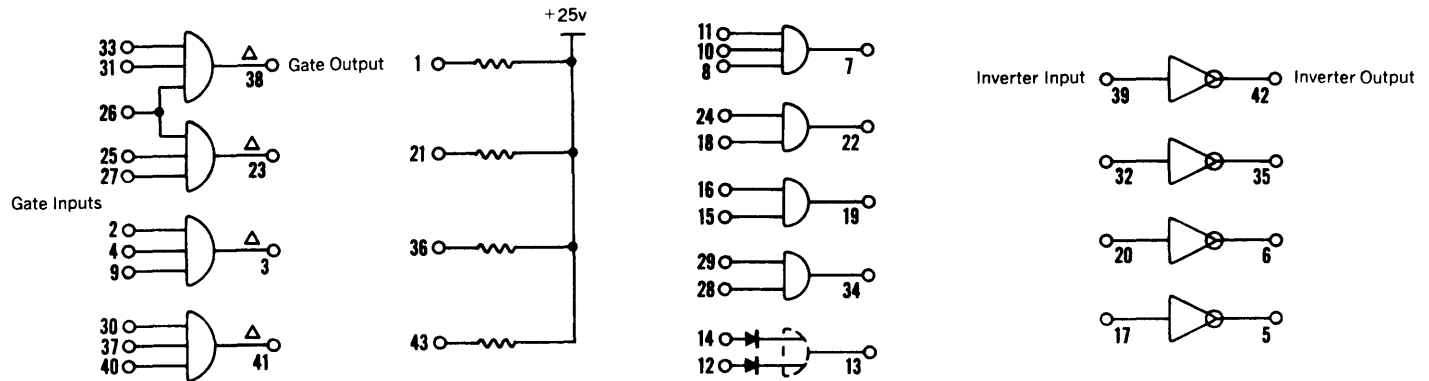
ASSY. NO. 100137

Federal Stock No. 6H6605-013-6916

This module contains four complete diode AND gates; four diode Δ AND gates, which can expand the AND gates or become independent gates by adding one of the gate resistors; one gated input OR gate; and four inverter-amplifiers. AND/OR gates can be constructed by wiring one input of an AND gate to one input of another to form an OR gate output. Inverter circuits can be used either for NAND and NOR constructions or for improving the fan-out of flip-flops. Two inverters can be wired in series to provide noninverting amplification and pulse shaping.

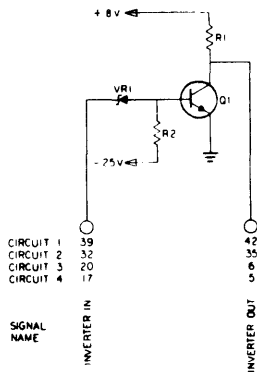
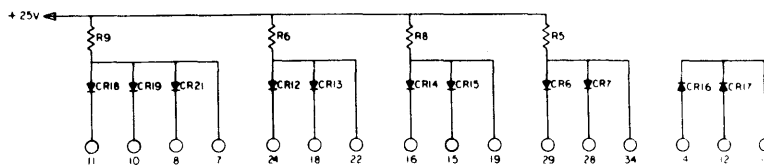
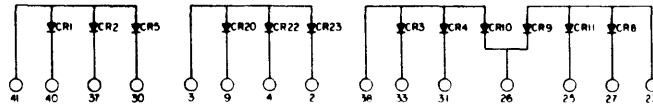
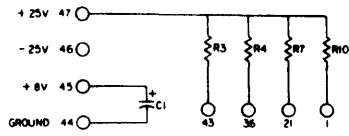
Inverter Output Delay (Typical)

Fan-In	60 nsec
Gate Input	10 terms
Output	2 loads
+25 Volt Supply	12 loads
+8 Volt Supply	49 ma
-25 Volt Supply	37 ma
Module Dissipation	5 ma
	1.6 watts



MODEL IH10 Schematic

POLARIZING PINS 2 & 44



MODEL IH10 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor 2N2369 2N2501	Q1	4	3, 11 1
2	Diode 1N914	CR1 through 23	23	4, 12, 13, 14
3	Diode 1N746	VR1	4	2, 12, 13, 14
4	Capacitor, Tantalum 4.7 μ f \pm 20%, 50v	C1	1	23, 77
5	Resistor 820 ohms \pm 2%	R1	4	16, 17
6	Resistor 3.9 k ohms \pm 2%	R3 through 10	8	16, 17
7	Resistor 18 k ohms \pm 2%	R2	4	16, 17

NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

AND GATE/INVERTER

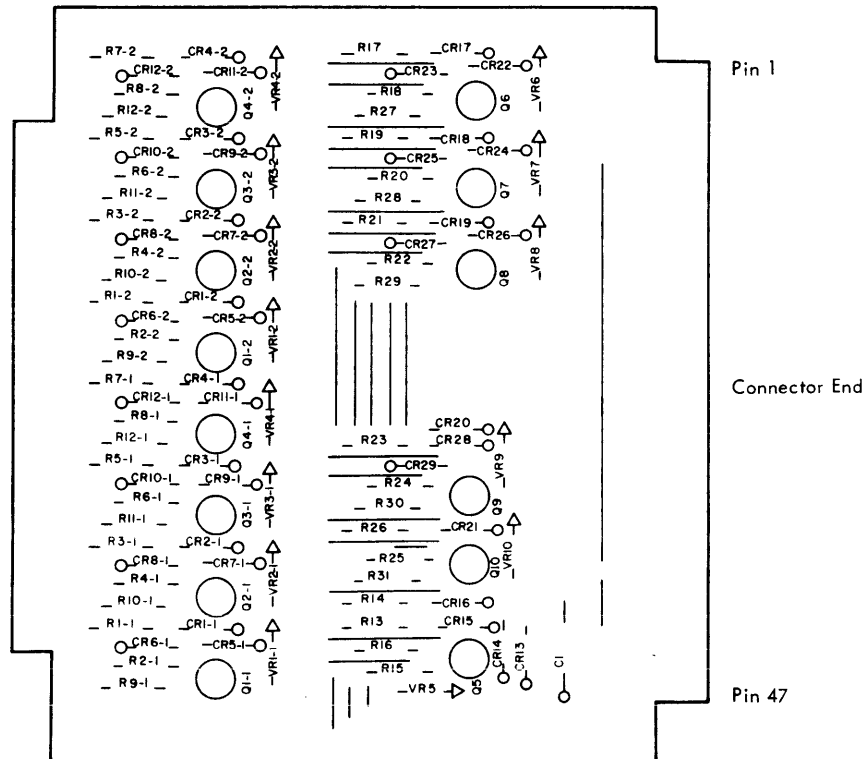
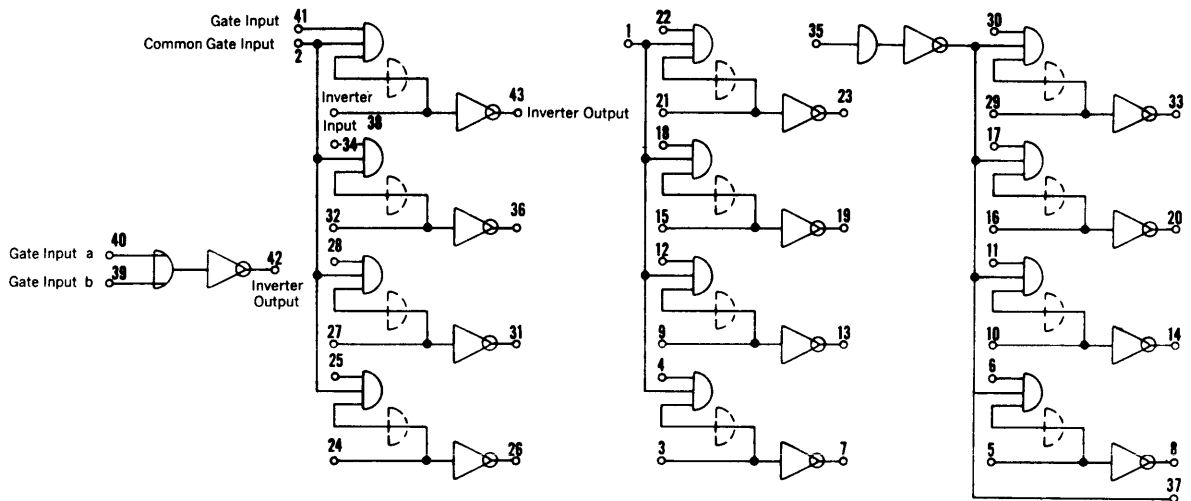
IH12

ASSY. No. 101767

This module contains fourteen inverter circuits, each with a gated input. The gating may be expanded by wiring additional terms to the Inverter Input from a suitable Gate Expander module. These inverter circuits have a greater output capability than the other inverter circuits of the series. Inverter circuits may be used for NAND and NOR constructions or for improving the fan-out of flip-flops. The input gating is prewired to facilitate applications requiring decoding or selection operations, particularly when the inverter output is used to control flip-flop "repeater" type inputs.

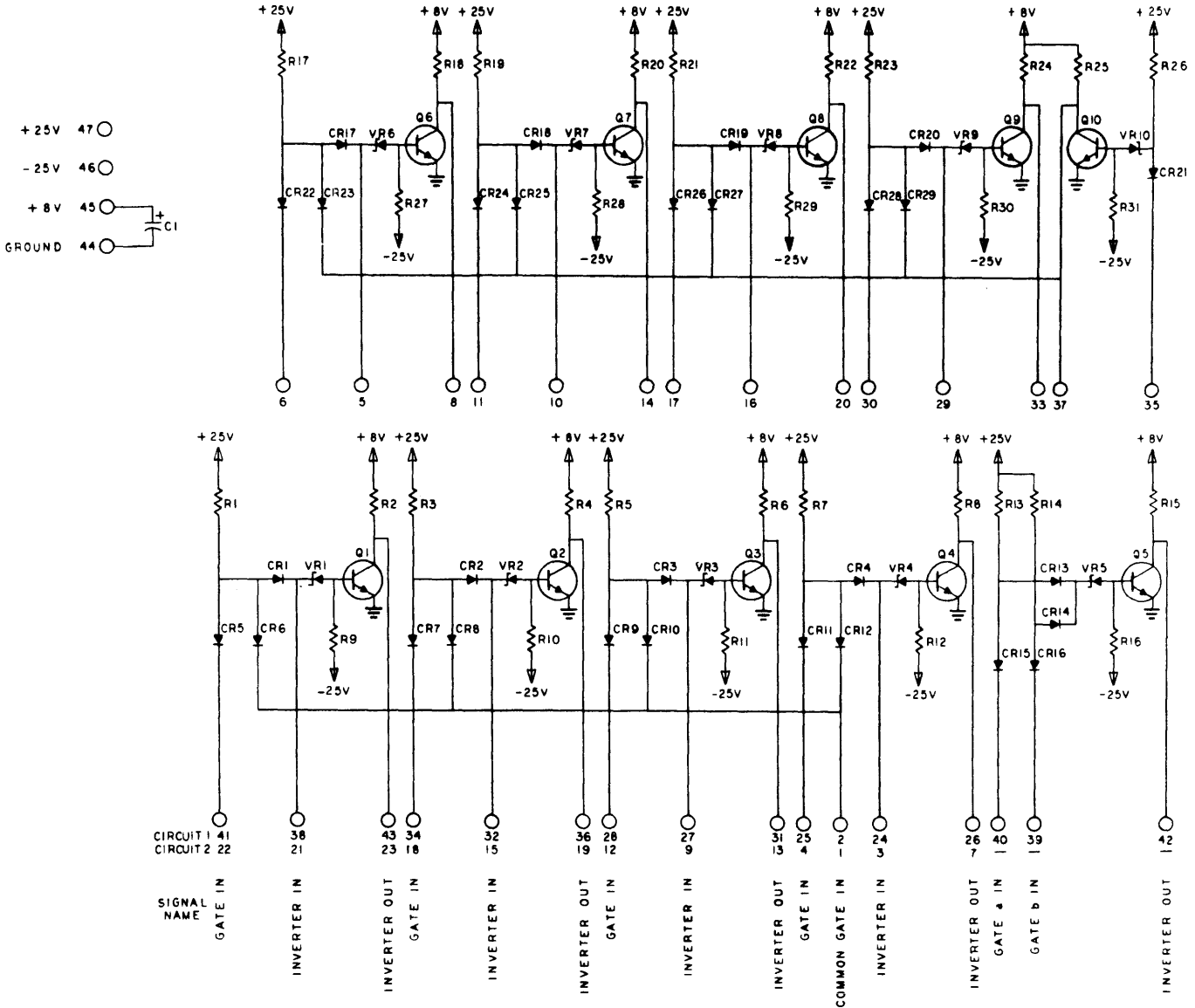
Output Delay (Typical)
Fan-In (Inverter Input)
Gate Input
Common Gate Input
Output
+25 Volt Supply
+8 Volt Supply
-25 Volt Supply
Module Dissipation

100 nsec
10 terms
2 loads
8 loads
15 loads
96 ma
137 ma
20 ma
4.4 watts



MODEL IH12 Schematic

POLARIZING PINS: 10 & 34



MODEL IH12 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor	2N2538 2N2476 2N2848	Q1 through 10	14 7 3
2	Diode	1N914A	CR1 through 29	41 4, 12, 13, 14
3	Diode	1N746	VR1 through 10	14 2, 12, 13, 14
4	Capacitor, Tantalum	4.7 μ f \pm 20%, 50v	C1	1 23, 77
5	Resistor	820 ohms \pm 2%	R2, 4, 6, 8, 15, 18, 20, 22, 24, 25	14 16, 17
6	Resistor	3.9 k ohms \pm 2%	R1, 3, 5, 7, 13, 14, 17, 19, 21, 23, 26	15 16, 17
7	Resistor	18 k ohms \pm 2%	R9, 10, 11, 12, 16, 27, 28, 29, 30, 41	14 16, 17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

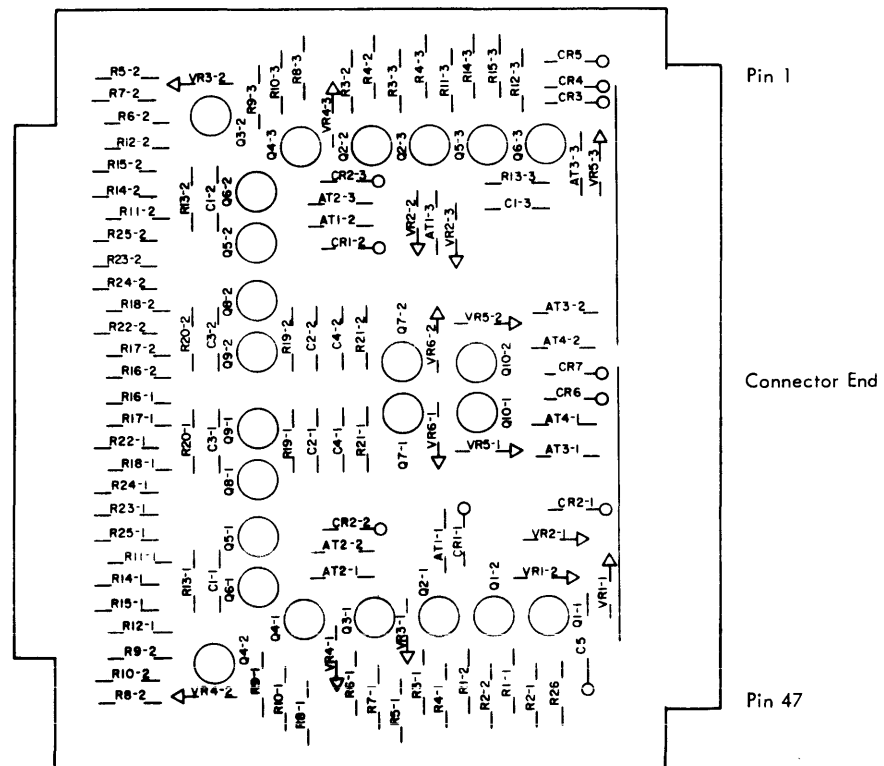
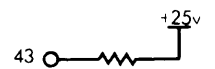
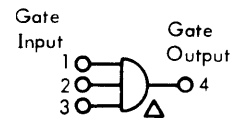
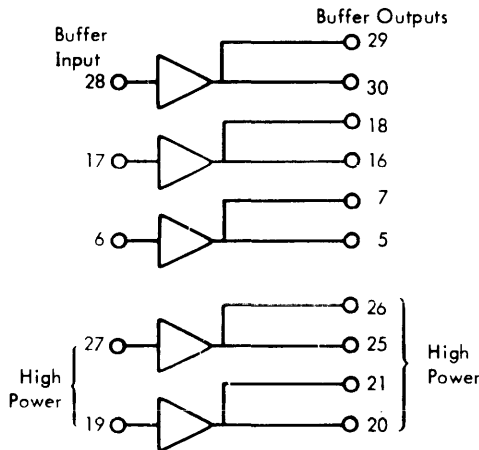
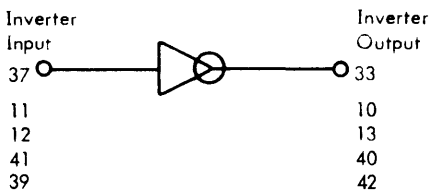
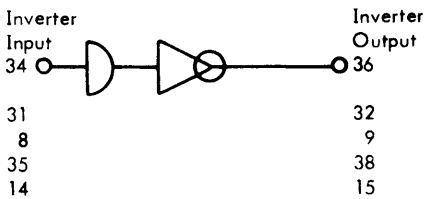
INVERTER AMPLIFIER

IK51

Assy No. 100388

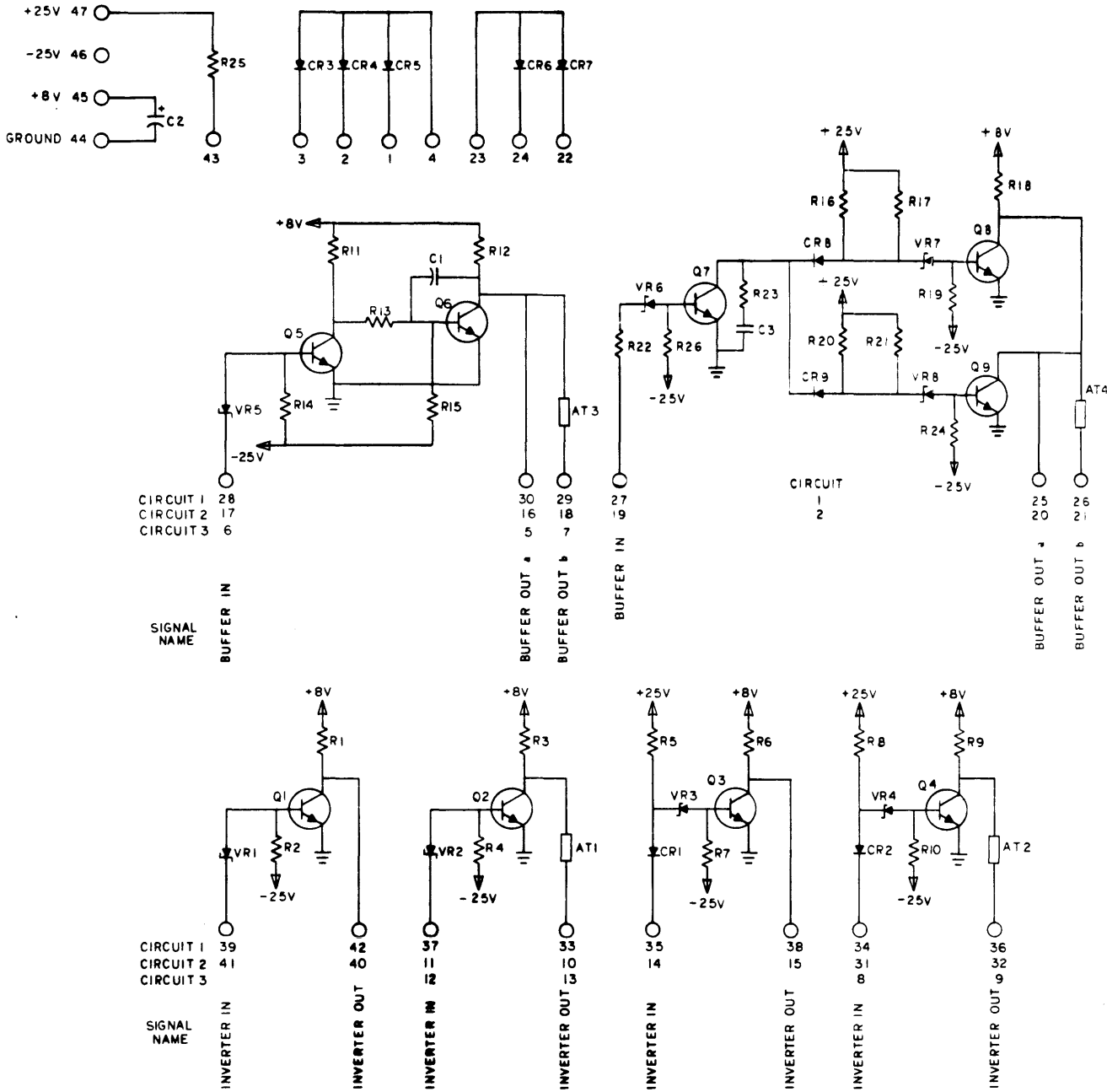
This module contains three standard buffers, two high powered buffers, ten standard inverters, two diode gates, and a spare gate resistor. None of the buffers have diode gates on their inputs. At least one gate and gate resistor must be wired to the input of each buffer. The same is true of Inverters Q1 and Q2 while Inverters Q3 and Q4, each having a single isolation diode and gate resistor, may be driven directly from an active circuit. Inverters Q2 and Q4 each have a resistive termination on their output while inverters Q1 and Q3 have none. The buffers have two output pins each, one with a resistive termination and one without. Output leads with the resistive termination are capable of driving lines up to several feet in length, while the ones without are restricted to driving lines of about two feet in length.

Maximum Operating Frequency	4.0 Mc
Inverter Output Delay (Typical)	20 nsec
Standard Buffer Output Delay (Typical)	45 nsec
High Power Buffer Output (Typical)	64 nsec
Inverter Input	2 loads
Standard or High Power Buffer Input	2 loads
Inverter Input (Fan In)	10 terms
Standard or High Power Buffer Input (Fan In)	10 terms
Inverter Output	12 loads, 200 pf
Standard Buffer Output	20 loads, 200 pf
High Power Buffer Output	60 loads, 400 pf
+25 Volt Supply	115 ma
+8 Volt Supply	175 ma
-25 Volt Supply	34 ma
Module Dissipation	4.3 watts



Model IK51 Schematic

POLARIZING PINS 2 & 8



Model IK51 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)	Item	Description	Designator	Qty	Supplier Code (See Index)		
1	Transistor	2N2369	Q1 thru 8	20	3, 11	8	Resistor	820 ohms ±2%	R1,3,6,9,12	13	16, 17
		2N2501		1	1	9	Resistor	3.9k ohms ±2%	R5, 8, 26	6	16, 17
		2N2710		95		10	Resistor	10k ohms ±2%	R14	3	16, 17
2	Diode	1N746	VR1 thru 6	15	2, 12, 13, 14	11	Resistor	15k ohms ±2%	R22	2	16, 17
3	Diode	1N914A	CR1 thru 10	16	4, 12, 13, 14	12	Resistor	18k ohms ±2%	R2,4,7, 10,15	13	16, 17
4	Capacitor, Silver Mica	68 pf ±5%	C1, 2, 3, 4	9	19, 20, 21	13	Resistor	27k ohms ±2%	R23, 24, 25	6	16, 17
5	Capacitor, Tantalum	4.7 µf ±20%, 50v	C5	1	23, 77	14	Assy, Resistive Term.		AT1 thru 4	11	72
6	Resistor	470 ohms ±2%	R18	2	16, 17						
7	Resistor	560 ohms ±2%	R11, 13, 16, 17, 19, 20, 21	16	16, 17						

NOTE: 1. To ensure specified performance, use replacement parts manufactured by suppliers listed in SDS Suppliers Code Index 900036.
 2. Unless otherwise indicated, 1/2 watt resistors may be used.

Adder

Assy. No. 100679

IK52

<u>Input</u>	<u>Loading</u>	<u>Operating Frequency</u>
Input A, \bar{A} , Modifier DI, E	2 loads each	4.0 Mc Maximum
Input \bar{B} , B1, C1, \bar{C} , Modifier M1	4 loads each	<u>Power Drain</u>
		+25 Volt Supply 165 ma
		+ 8 Volt Supply 70 ma
		-25 Volt Supply 17 ma
<u>Output</u>	<u>Loading</u>	<u>Delay (typical)</u>
Output MIA	8 loads, 200 pf	30 nsec
Output \bar{M} I A	8 loads, 200 pf	30 nsec
Out IDIE	2 loads, 100 pf	30 nsec
		<u>Module Dissipation</u>
		5.1 watts

Module IK 52 Parts List

Item	Description	Designator	Qty.	Supplier Cod (See Index)
1	Transistor 2N2369 2N2501	Q1, 2, 3, 4	12	3 1
2	Diode 1N907A 1N914A 1N3063 1N3065	CR1 thru CR26	78	4, 13 4, 12, 13, 14 4, 6 4
3	Diode 1N746	VR1, 2, 3, 4	12	2, 13, 14, 32
4	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C1	1	22, 23, 77
5	Resistor, 1/2 watt, $\pm 2\%$, 820 ohms	R2, 11, 12, 16	12	16, 17
6	Resistor, 1/2 watt, $\pm 2\%$, 3.9 k ohms	R1, 4, 5, 6, 7, 8, 9, 10, 15	27	16, 17
7	Resistor, 1/2 watt, $\pm 2\%$, 18k ohms	R3, 13, 14, 17	12	16, 17

SDS900176A

AND Gate Inverter Assy. No. 100713

IK53

Fan In

Auxiliary Input 10 terms

Input

Input A 2 loads
Common Input 8 loads

Output

Inverter Output A or B 12 loads, 200 pf 20 nsec

Operating Frequency

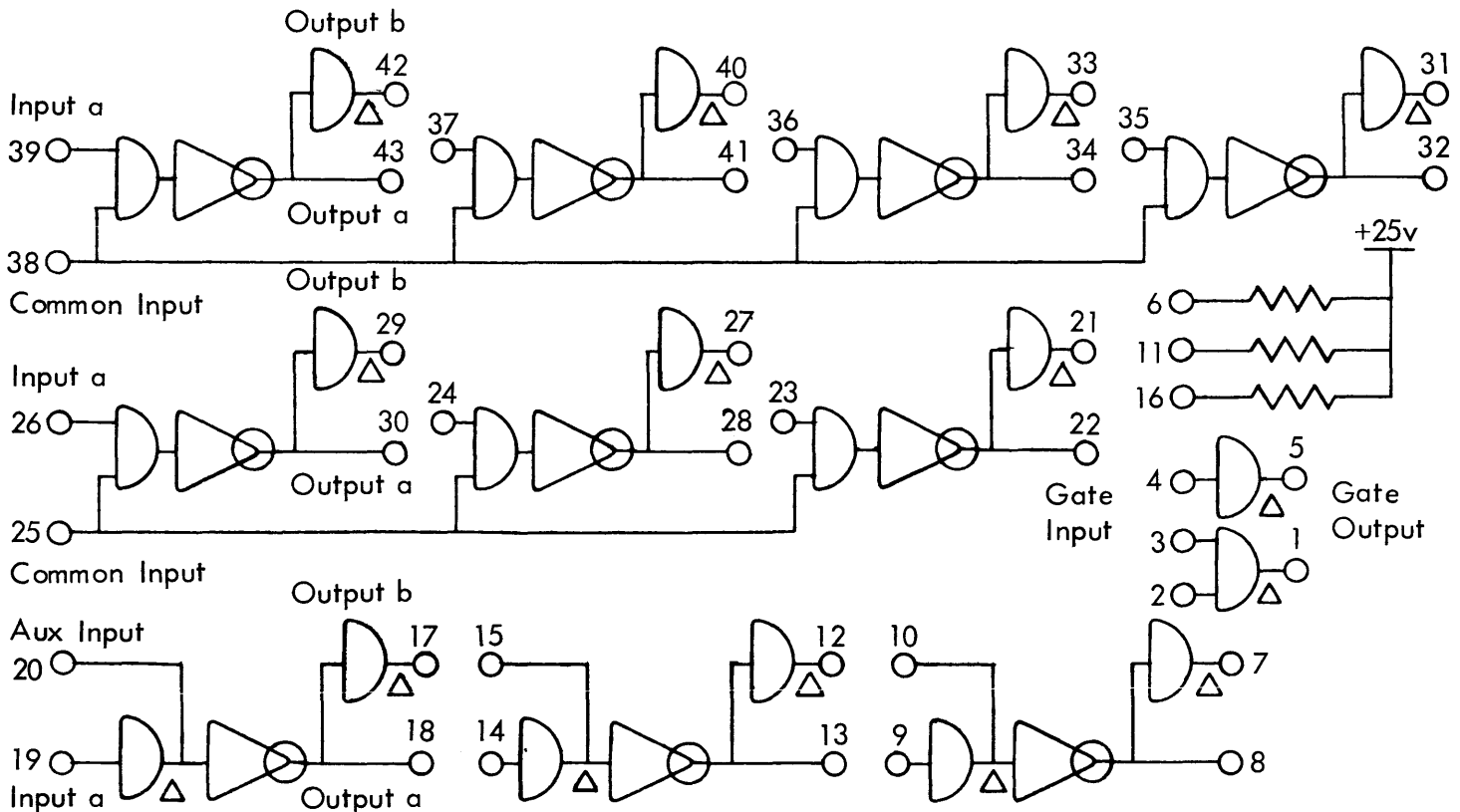
4 Mc, Maximum

Power Drain

+25 Volt Supply 60 ma
+ 8 Volt Supply 60 ma
-25 Volt Supply 14 ma

Module Dissipation

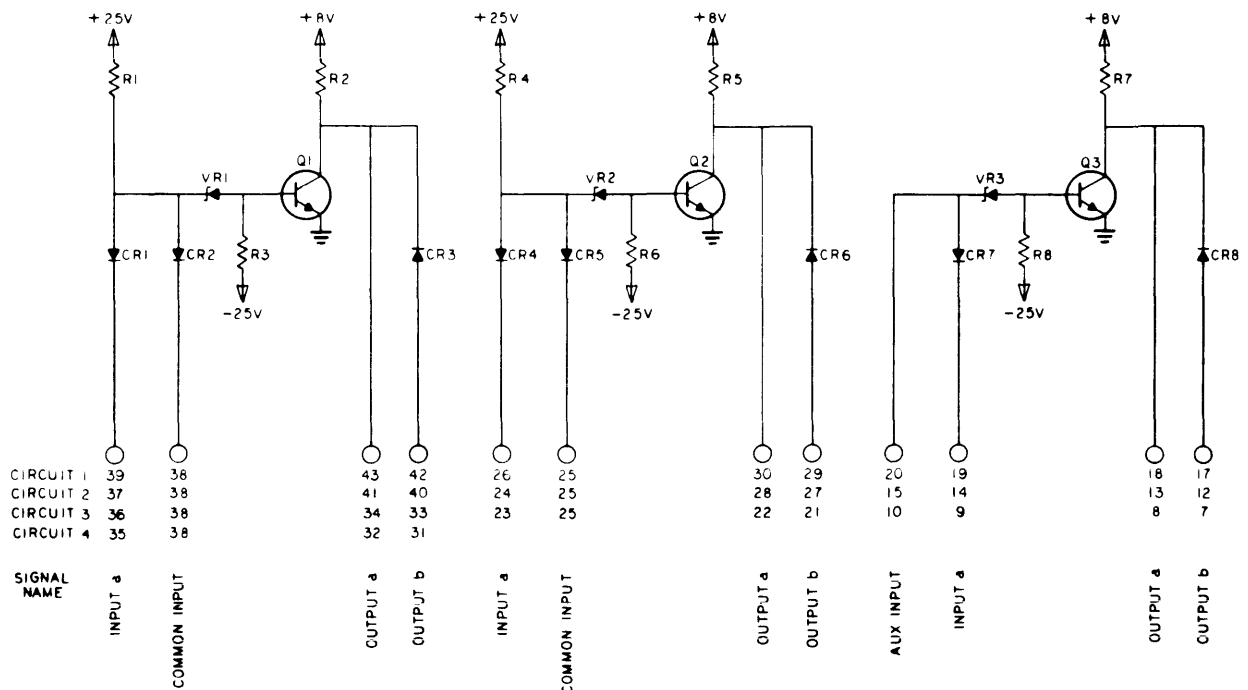
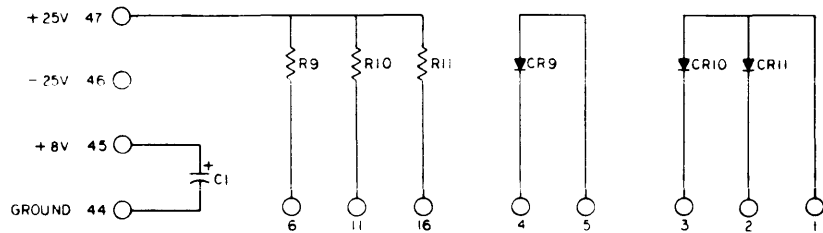
2.3 watts



Module IK 53 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor, 2N2501 2N2369	Q1,2,3	10	1 3
2	Diode, 1N907A 1N914A 1N3063 1N3069	CR1 thru CR11	30	4, 13 4, 12, 13, 14 4, 6 4
3	Diode, Zener 1N746	VR1,2,3	10	2, 12, 14, 32
4	Capacitor, Tantalum, ±5%, 4.7 μf	C1	1	22, 23, 77
5	Resistor, 1/2 watt, ±2%, 820 ohms	R2,5,7	10	16, 17
6	Resistor, 1/2 watt, ±2%, 3.9 k ohms	R1,4,9,10,11	10	16, 17
7	Resistor, 1/2 watt, ±2%, 18 k ohms	R3,6,8	10	16, 17

POLARIZING PINS: 4 & 36



Gated Logic Amplifier

Assy. No. 103175

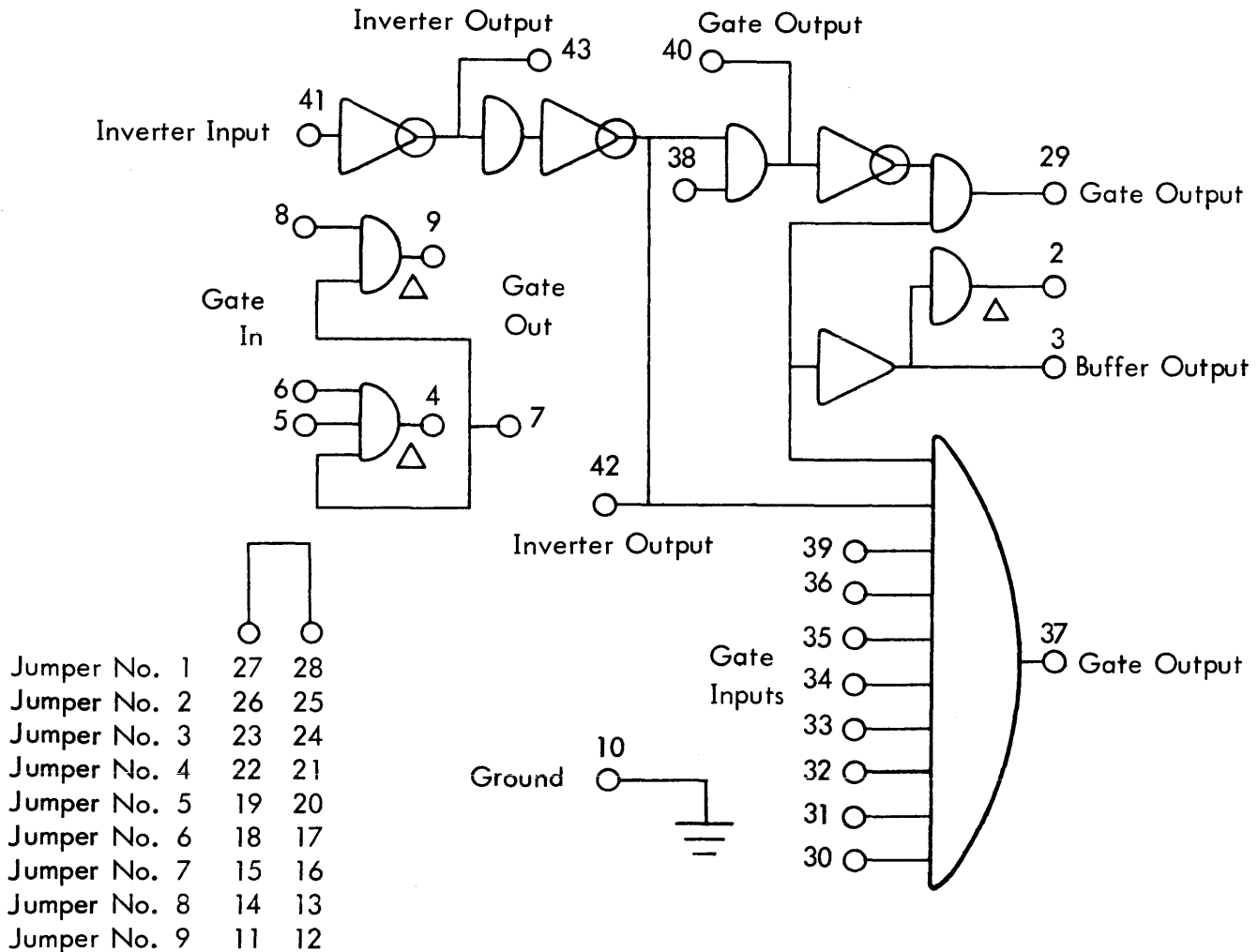
IK54

<u>Input</u>	<u>Loading</u>	<u>Operating Frequency</u>
Gate Input	2 loads	1 Mc, Maximum

<u>Output</u>	<u>Loading</u>	<u>Power Drain</u>
Inverter Output	8 loads, 200 pf	+25 Volt Supply 25 ma
Buffer Output	20 loads, 200 pf	+ 8 Volt Supply 35 ma
		-25 Volt Supply 9 ma

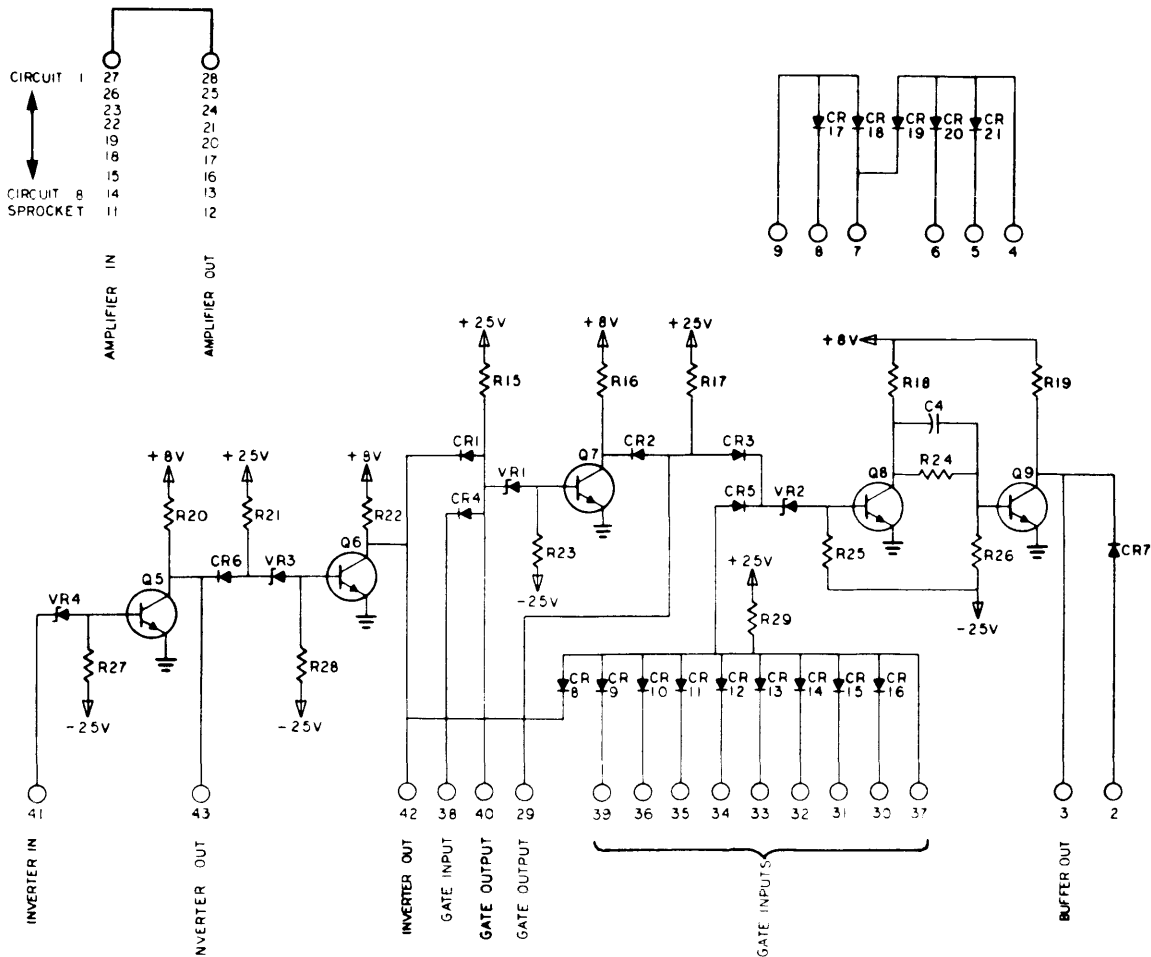
Module Dissipation

1.1 watts



Module IK 54 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N834	Q5 through Q9	5	1,5,7
2	Diode 1N907A 1N914A 1N3063 1N3065	CR1 through CR21	21	4,13 4,12,13,14 4,6 4
3	Diode, Zener 1N746	VR1 through VR4	4	2,13,14,32
4	Capacitor, Silver Mica, ± 5%, 68pf	C4	1	19,20,21
5	Capacitor, Tantalum, ± 5%, 4.7µf	C6	1	22,23,77
6	Resistor, ± 2%, 1/2 watt, 3.9 k ohms	R15,17,21,29	4	16,17
7	Resistor, ± 2%, 1/2 watt, 820 ohms	R16,19,20,22	4	16,17
8	Resistor, ± 2%, 1/2 watt, 560 ohms	R18,24	2	16,17
9	Resistor, ± 2%, 1/2 watt, 18 k ohms	R23,27,28,26	4	16,17
10	Resistor, ± 2%, 1/2 watt, 10 k ohms	R25	1	16,17



One Shot Multivibrator

Assy. No. 101228

OK52

<u>Input</u>	<u>Loading</u>	<u>Duty Cycle</u>
Gate Inputs, a, b, c	2 loads	For normal pulse width 40% max
Auxiliary Input	2 loads	For 20% width reduction 75% max
DC Input	2 loads	
Clock Input	6 loads	

<u>Output</u>	<u>Loading</u>	<u>Power Drain</u>
Output	15 loads 400 pf	+25 Volt Supply 48 ma
		+ 8 Volt Supply 31 ma
		-25 Volt Supply 4 ma

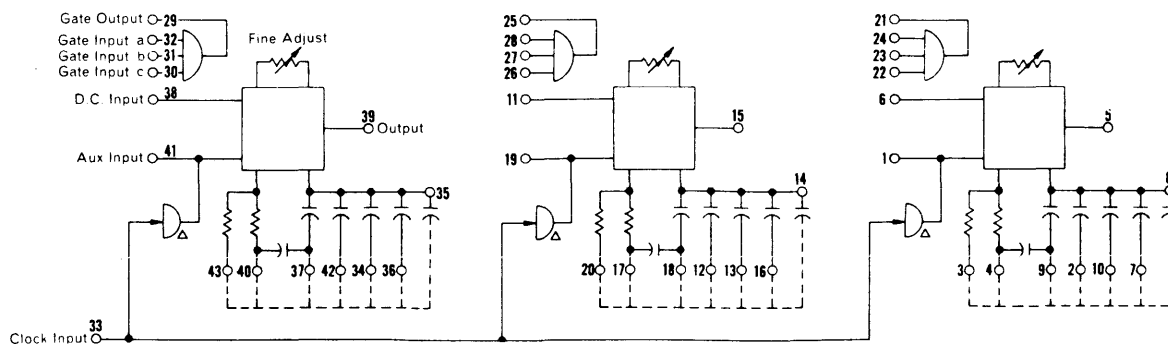
Module Dissipation

1.6 watts (typical)

Pulse Characteristics

Output Pulse Width 2 μ sec to 200 msec
(with external capacitors) 10 sec

Temperature Coefficient
of Pulse Width 0.25% per $^{\circ}$ C (typical)

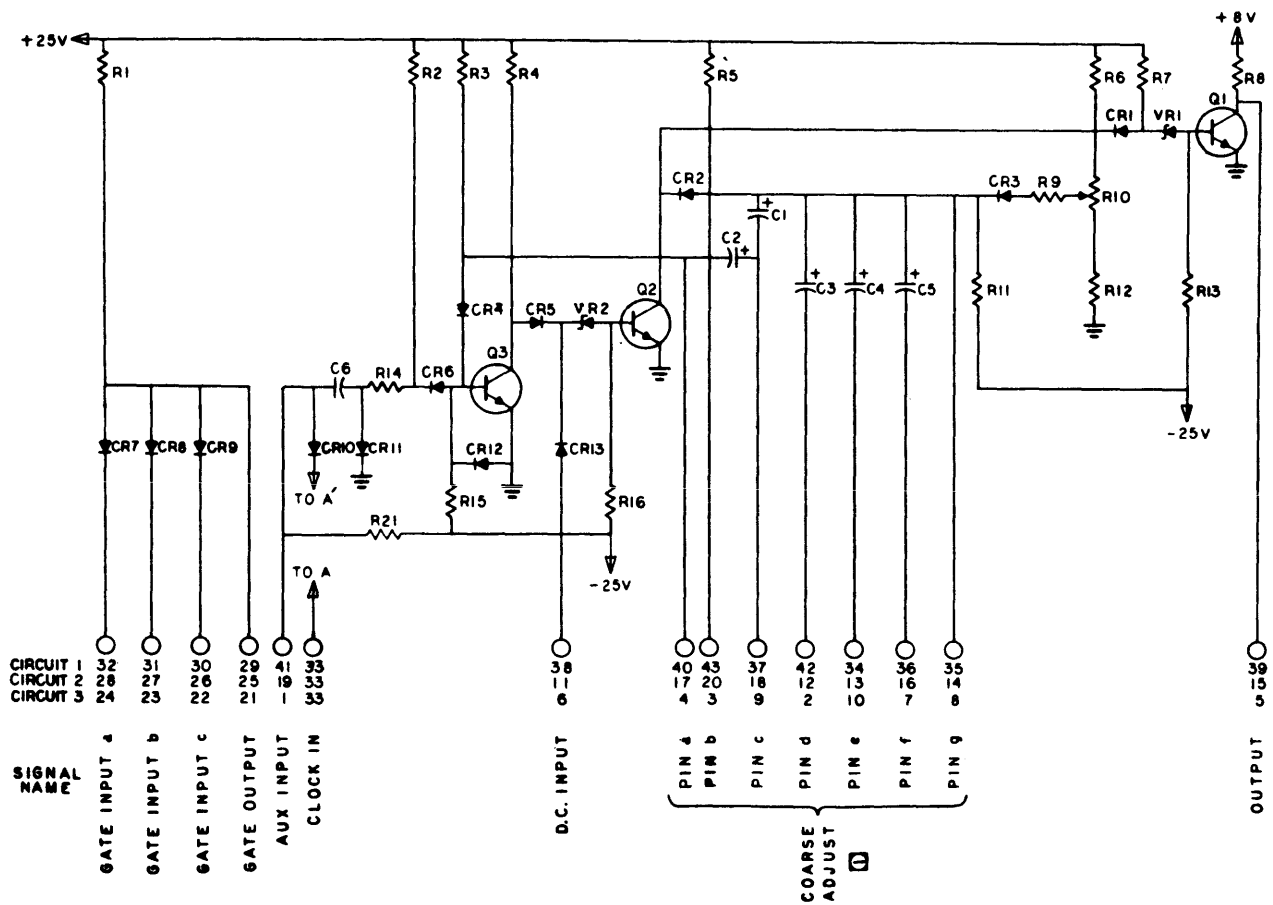
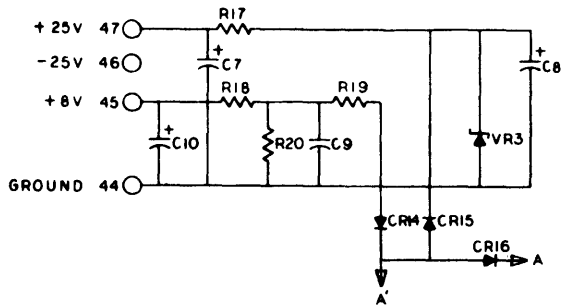


Module OK 52 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N2369 2N2501	Q1, 2	6	3 1
2	Transistor 2N2219 2N1711	Q3	3	1 3,62
3	Diode 1N746	VR1, 2	6	2, 13, 14, 32
4	Diode 1N907A 1N914A 1N3063 1N3065	CR1 through CR16	42	4, 13 4, 12, 13, 14 4, 6 4
5	Diode 1N752	VR3	1	2, 12, 13, 14, 64
6	Capacitor, Silver Mica, $\pm 5\%$, 100pf	C2	3	19, 20, 21
7	Capacitor, Silver Mica, $\pm 5\%$, 510pf	C9, 6	4	19, 20, 21
8	Capacitor, Mylar, $\pm 5\%$, 0.001 μ f	C1	3	25, 26, 27
9	Capacitor, Mylar, $\pm 5\%$, 0.01 μ f	C3	3	25, 26, 27
10	Capacitor, Tantalum, $\pm 5\%$, 0.1 μ f	C4	3	22, 23, 24
11	Capacitor, Tantalum, $\pm 5\%$, 1 μ f	C5	3	22, 23, 24
12	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C7, 10	2	22, 23, 24
13	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C8	1	22, 23, 24
14	Potentiometer $\pm 5\%$, 10 k ohms	R10	3	
15	Resistor, $\pm 2\%$, 1/2 watt, 68 ohms	R19	1	16, 17
16	Resistor, $\pm 2\%$, 1/2 watt, 820 ohms	R8	3	16, 17
17	Resistor, $\pm 2\%$, 1/2 watt, 1.0 k ohms	R9, 20	4	16, 17
18	Resistor, $\pm 2\%$, 1/2 watt, 2.2 k ohms	R6, 12, 18	7	16, 17
19	Resistor, $\pm 2\%$, 1/2 watt, 3.9 k ohms	R7, R1	6	16, 17
20	Resistor, $\pm 2\%$, 1/2 watt, 4.7 k ohms	R17	1	16, 17
21	Resistor, $\pm 2\%$, 1/2 watt, 15 k ohms	R2, 4	6	16, 17
22	Resistor, $\pm 2\%$, 1/2 watt, 47 k ohms	R13, 16	6	16, 17
23	Resistor, $\pm 2\%$, 1/2 watt, 220 k ohms	R5	3	16, 17
24	Resistor, $\pm 2\%$, 1/2 watt, 390 k ohms	R3	3	16, 17
25	Resistor, $\pm 2\%$, 1/2 watt, 2200 k ohms	R11, 15	6	16, 17
26	Resistor, $\pm 2\%$, 1/2 watt, 470 k ohms	R21	3	16, 17
27	Resistor, $\pm 2\%$, 1/2 watt, 270 ohms	R14	3	16, 17

Module OK52 Schematic

POLARIZING PINS: 2 & 46



One Shot Multivibrator

Assy. No. 101202

OX11

The module contains three identical one-shot circuits. Each circuit has a single output which is normally low, and becomes high for a defined period following the application of an input. The period can be adjusted. Both a.c. and d.c. input connections are provided, which must be driven by a standard AND gate (also provided on the module). When using the d.c. input, triggering occurs when the gate is enabled. For the a.c. input, triggering occurs when the gate is disabled (inhibited), following a period of the gate being enabled for at least 0.5 microseconds. The maximum duty cycle is 75 per cent.

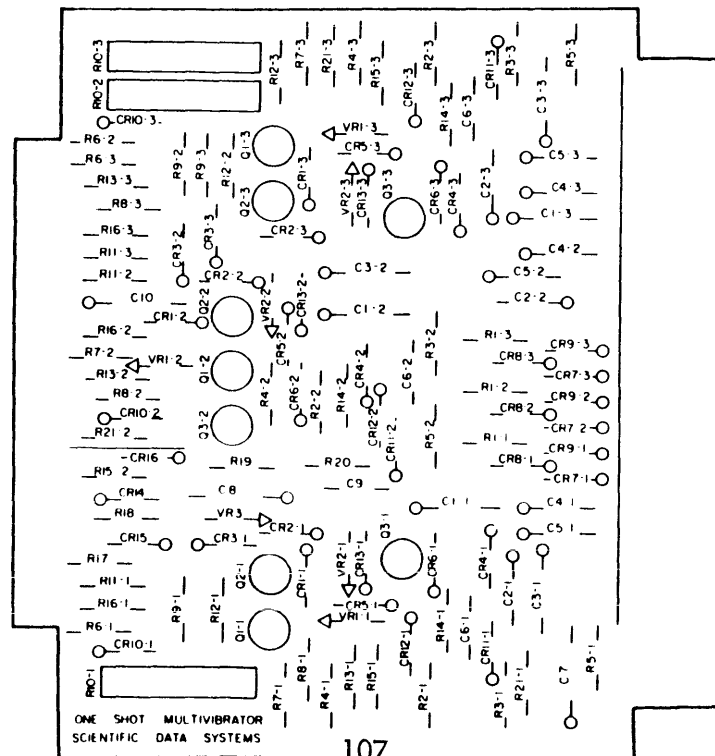
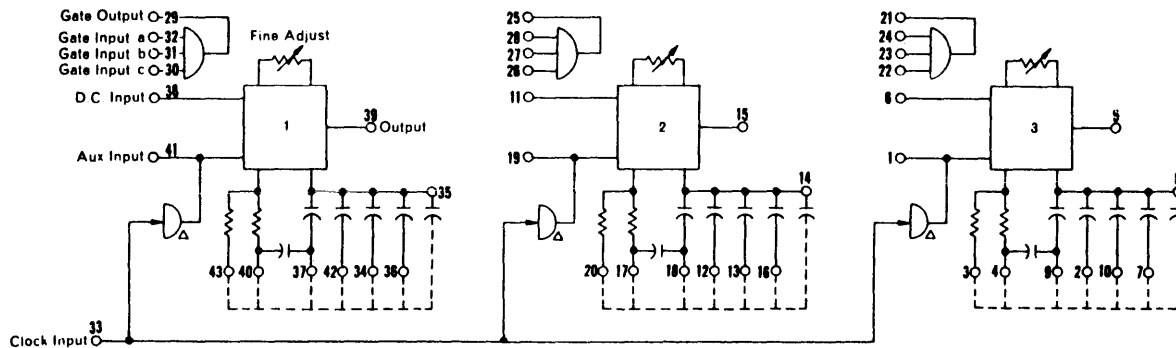
At duty cycles exceeding 40%, the nominal output pulse width is reduced by a small amount from the theoretical value, but duty cycles up to 75% are permissible.

MODEL NUMBER

Gate Input
Output
Output pulse width
(with capacitors on module)
Maximum pulse width
(with 47 μ f 20 v capacitor)
Continuous adjustment
Duty cycle (for normal pulse width)
Duty cycle (with 20% pulse width reduction)
Temperature sensitivity of pulse width:
Below 20 μ s
Above 20 μ s

OX11
2 loads
15 loads
2 μ s to 200 mS
10 seconds
4:1 (typical)
40% (max)
75% (max)
0.2% per $^{\circ}$ C. (typical)
0.3% per $^{\circ}$ C. (typical)
48 ma
31 ma
4 ma
1.6 watts

+25 Volt Supply
+8 Volt Supply
-25 Volt Supply
Module Dissipation (Typical)

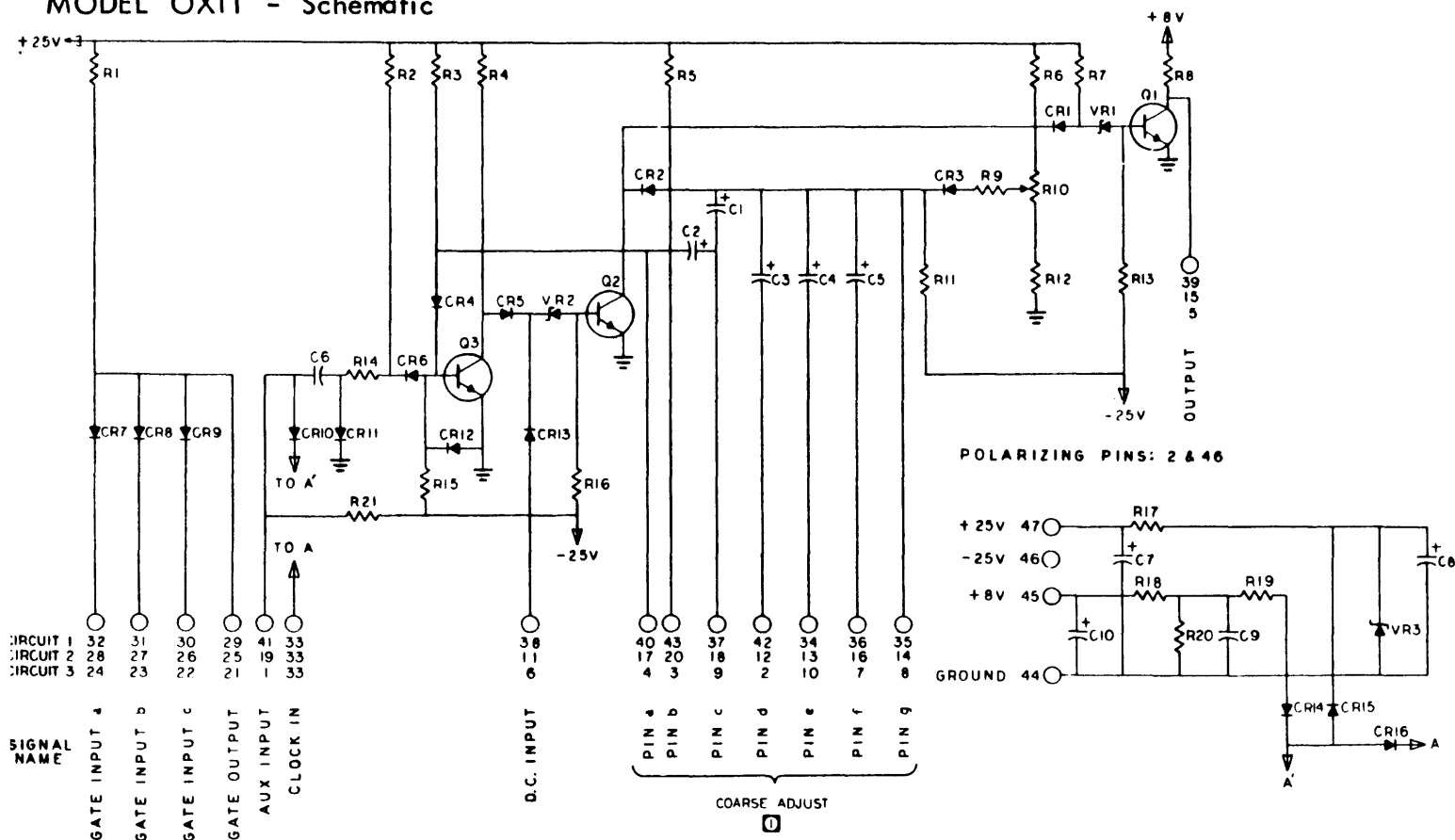


Pin 1

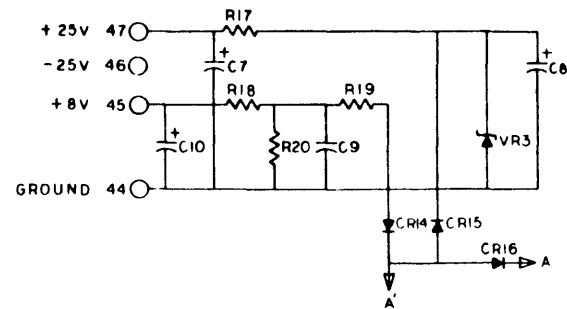
Connector End

Pin 47

MODEL OX11 - Schematic



POLARIZING PINS: 2 & 46



NOTES:

1 THE TABLE BELOW GIVES COARSE ADJUST PIN CONNECTIONS FOR TEN DIFFERENT DELAY RANGES. FINE ADJUST IS ACCOMPLISHED BY VARYING R10.

DELAY RANGE	COARSE ADJUST PIN CONNECTIONS					
	a	b	c	d	e	f
2 μSEC - 6 μSEC	x	x				
6 μSEC - 20 μSEC						
20 μSEC - 60 μSEC	x	x	x			
60 μSEC - 200 μSEC	x		x			
200 μSEC - 600 μSEC	x	x		x		
600 μSEC - 2 MSEC	x			x		
2 MSEC - 6 MSEC	x	x			x	
6 MSEC - 20 MSEC	x				x	
20 MSEC - 60 MSEC	x	x				x
60 MSEC - 200 MSEC	x					x

EXAMPLE:

TO OBTAIN 300 μSEC DELAY, JUMPER COARSE ADJUST PINS a, b AND d, AND VARY R10 FOR FINE ADJUSTMENT

BY ADDING A CAPACITOR, C, EXTERNALLY, FURTHER DELAY RANGES CAN BE OBTAINED AS FOLLOWS:

(a) JUMPER PIN a TO b AND CONNECT CAPACITOR BETWEEN PINS a AND g; THE DELAY RANGE THEN IS $20 \times C$ TO $60 \times C$ MILLISECONDS. (C IS IN MICROFARADS)

(b) CONNECT CAPACITOR BETWEEN PINS a AND g; THE DELAY RANGE IS $60 \times C$ TO $200 \times C$ MILLISECONDS (C IS IN MICROFARADS)

Model OX 11 Parts List

Item	Description	Designator	Qty	Supplier Code (see Index)
1	Transistor, 2N834 2N2369	Q1, 2, 3	9	1, 30 3
2	Diode, Zener, IN746	VR1, 2	6	10, 12, 13, 14
3	Diode, FD200 IN3605 T173 CD6112	CR1 through CR16	42	4 6 12 14
4	Diode, Zener, IN752	VR3	1	2, 12, 14, 30
5	Capacitor, Silver Mica, ±5%, 100 pf	C2, 6	6	19, 20, 21
6	Capacitor, Mylar, ±5%, .001 μf	C1	3	25, 26, 27
7	Capacitor, Mylar, ±5%, .01 μf	C3	3	25, 26, 27
8	Capacitor, Tantalum, ±20%, .1 μf, 50 vdc	C4	3	22, 23, 24
9	Capacitor, Tantalum, ±20%, 1.0 μf, 50 vdc	C5	3	22, 23, 24
10	Capacitor, Tantalum, ±20%, 4.7 μf, 50 vdc	C7, 10	2	22, 23, 24
11	Capacitor, Tantalum, ±20%, 15 μf	C8	1	22, 23, 24
12	Capacitor, Silver Mica, ±5%, 510 pf	C9	1	19, 20, 21
13	Potentiometer, ±5%, 10 k ohms	R10	3	35
14	Resistor, 1/2 watt, ±2%, 68 ohms	R19	1	16, 17
15	Resistor, 1/2 watt, ±2%, 820 ohms	R8	3	16, 17
16	Resistor, 1/2 watt, ±2%, 1.0 k ohms	R9, 20	4	16, 17
17	Resistor, 1/2 watt, ±2%, 2.2 k ohms	R6, 12, 14, 18	10	16, 17
18	Resistor, 1/2 watt, ±2%, 3.9 k ohms	R7	3	16, 17
19	Resistor, 1/2 watt, ±2%, 4.7 k ohms	R17	1	16, 17
20	Resistor, 1/2 watt, ±2%, 8.2 k ohms	R1	3	16, 17
21	Resistor, 1/2 watt, ±2%, 15 k ohms	R4	3	16, 17
22	Resistor, 1/2 watt, ±2%, 47 k ohms	R2, 13, 16	9	16, 17
23	Resistor, 1/2 watt, ±2%, 220 k ohms	R5	3	16, 17
24	Resistor, 1/2 watt, ±2%, 390 k ohms	R3	3	16, 17
25	Resistor, 1/2 watt, ±2%, 2.2 megohms	R11, 15	6	16, 17

ONE-SHOT MULTIVIBRATOR

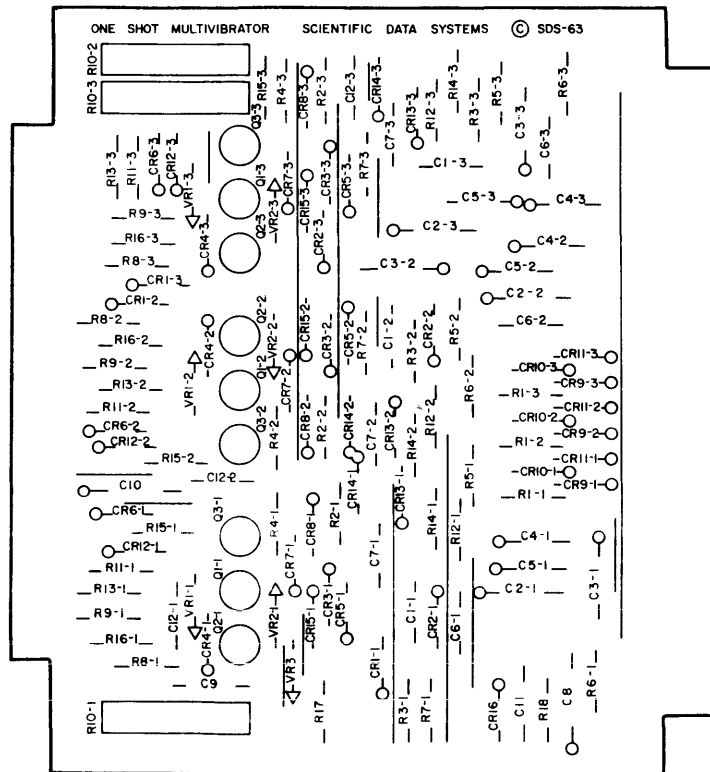
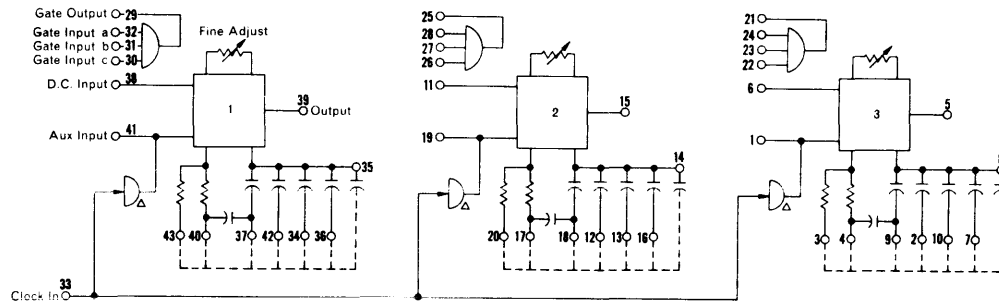
OX13

Assy. No. 103932

This module contains three identical one-shot circuits. Each circuit has a single output which is normally low, and becomes high for a defined period following the application of an input. The period can be adjusted. Both (ac) Clock Input and DC Input connections are provided, which must be driven by a standard AND gate (also provided on the module). When using the DC Input, triggering occurs when the gate is enabled for at least 100 nanoseconds. For the (ac) Clock Input, triggering occurs when the gate is disabled (inhibited), following a period of the gate being enabled for at least 0.5 microseconds.

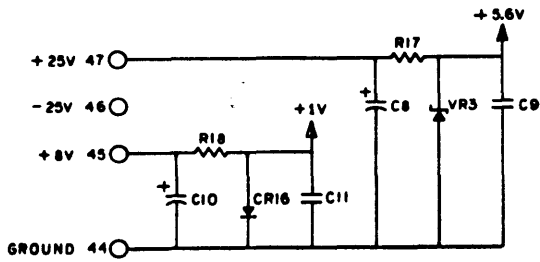
At duty cycles exceeding 40%, the nominal output pulse width is reduced by a small amount from the theoretical value. With 20% pulse width reduction, duty cycles up to 75% are permissible.

Gate Input	2 loads
Output	20 loads
Output pulse width (with capacitors on module)	2µsec to 200 msec
Maximum pulse width (with 47 µf 35 v capacitor)	10 seconds
Continuous adjustment (Typical)	4:1
Temperature sensitivity of pulse width (Typical):	
Below 20 µs	0.2%/°C
Above 20 µs	0.3%/°C
+ 25 Volt Supply	48 ma
+ 8 Volt Supply	31 ma
- 25 Volt Supply	4 ma
Module Dissipation	1.6 watts



Model OX13 Schematic

POLARIZING PINS: 2 & 46



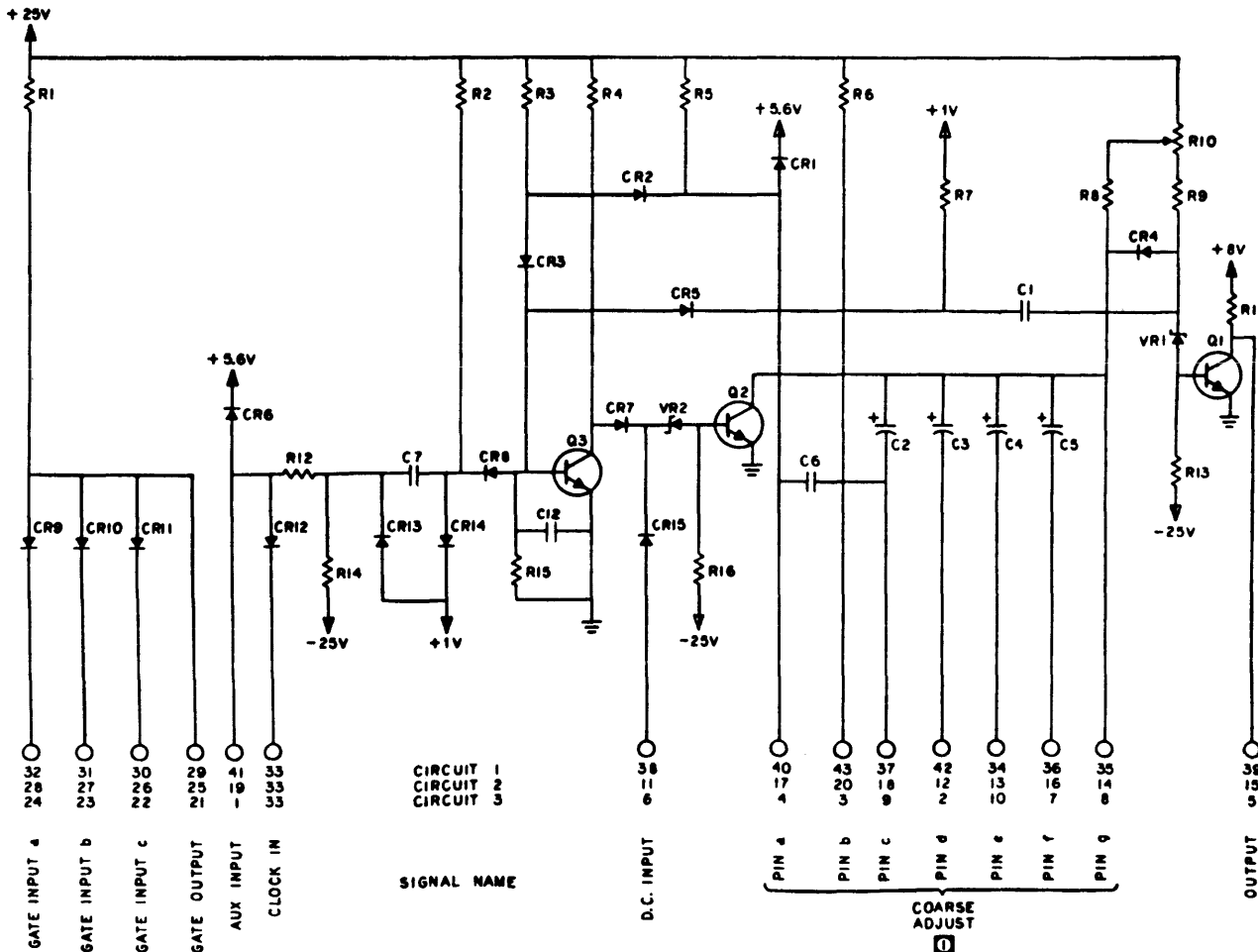
NOTES:

1 THE TABLE BELOW GIVES COARSE ADJUST PIN CONNECTIONS FOR TEN DIFFERENT DELAY RANGES. FINE ADJUST IS ACCOMPLISHED BY VARYING R10.

DELAY RANGE	COARSE ADJUST PIN CONNECTIONS					
	a	b	c	d	e	f
2 μ SEC-6.7 μ SEC	X	X				
6.7 μ SEC-20 μ SEC						
20 μ SEC-67 μ SEC	X	X	X			
67 μ SEC-200 μ SEC	X		X			
200 μ SEC - 670 μ SEC	X	X		X		
670 μ SEC-2 MSEC	X			X		
2 MSEC-6.7 MSEC	X	X			X	
6.7 MSEC-20 MSEC	X				X	
20 MSEC-67 MSEC	X	X				X
67 MSEC-200 MSEC	X					X

EXAMPLE:
TO OBTAIN 300 μ SEC DELAY, JUMPER COARSE ADJUST PINS a, b AND d, AND VARY R10 FOR FINE ADJUSTMENT.

BY ADDING A CAPACITOR C, EXTERNALLY, FURTHER DELAY RANGES CAN BE OBTAINED AS FOLLOWS:
a) JUMPER PIN a TO b AND CONNECT CAPACITOR BETWEEN PINS a AND g; THE DELAY RANGE THEN IS $20 \times C$ TO $67 \times C$ MILLISECONDS. (C IS IN MICROFARADS.)
b) CONNECT CAPACITOR BETWEEN PINS a AND g; THE DELAY RANGE IS $67 \times C$ TO $200 \times C$ MILLISECONDS. (C IS IN MICROFARADS.)



Model OX13 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N2369 2N2501 2N2710	Q1,2	6	3, 11 1 95
2	Transistor 2N930 2N2843	Q3	3	3, 11 3
3	Diode 1N746	VR1,2	6	2, 12, 13, 14
4	Diode 1N914A	CR1 through CR16	46	4, 12, 13, 14
5	Diode 1N752	VR3	1	2, 12, 13, 14
6	Capacitor, Mica 10 pf $\pm 5\%$	C12	3	19, 20, 21
7	Capacitor, Mica 100 pf $\pm 5\%$	C6	3	19, 20, 21
8	Capacitor, Mica 220 pf $\pm 5\%$	C1	3	19, 20, 21
9	Capacitor, Mica 510 pf $\pm 5\%$	C7	3	19, 20, 21
10	Capacitor, Mylar 1000 pf $\pm 10\%$	C2	3	27, 74
11	Capacitor, Mylar 0.01 μf $\pm 10\%$	C3, 9, 11	5	26, 27, 74
12	Capacitor, Tantalum 0.1 μf $\pm 20\%$, 50v	C4	3	23, 77
13	Capacitor, Tantalum 1.0 μf $\pm 20\%$, 50v	C5	3	23, 77
14	Capacitor, Tantalum 4.7 μf $\pm 20\%$, 50v	C8, 10	2	23, 77
15	Potentiometer 2 k ohms $\pm 10\%$	R10	3	35, 44
16	Resistor 270 ohms $\pm 2\%$	R12	3	16, 17
17	Resistor 470 ohms $\pm 2\%$	R9, 18	4	16, 17
18	Resistor 820 ohms $\pm 2\%$	R11	3	16, 17
19	Resistor 1 k ohm $\pm 2\%$	R7	3	16, 17
20	Resistor 3.9 k ohms $\pm 2\%$	R1, 8	6	16, 17
21	Resistor 4.7 k ohms $\pm 2\%$	R17	1	16, 17
22	Resistor 15 k ohms $\pm 2\%$	R2, 4	6	16, 17
23	Resistor 47 k ohms $\pm 2\%$	R13, 16	6	16, 17
24	Resistor 100 k ohms $\pm 2\%$	R15	3	16, 17
25	Resistor 220 k ohms $\pm 2\%$	R6	3	16, 17
26	Resistor 470 k ohms $\pm 2\%$	R3, 14	6	16, 17
27	Resistor 4.7 M ohms $\pm 2\%$	R5	3	16, 17

NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Address Decoder

Assy. No. 100540

QK52

Input

Input 1, $\bar{1}$, 2, $\bar{2}$, 4, $\bar{4}$,

Loading

4 loads

Operating Frequency

To 175 Kc

Operating Temperature Range

10°C to 60°C (standard)

0°C to 70°C (optional)

Power Drain

+25 Volt Supply 108 ma

+ 8 Volt Supply 35 ma

-25 Volt Supply 10 ma

Module Dissipation

3.25 watts

Output

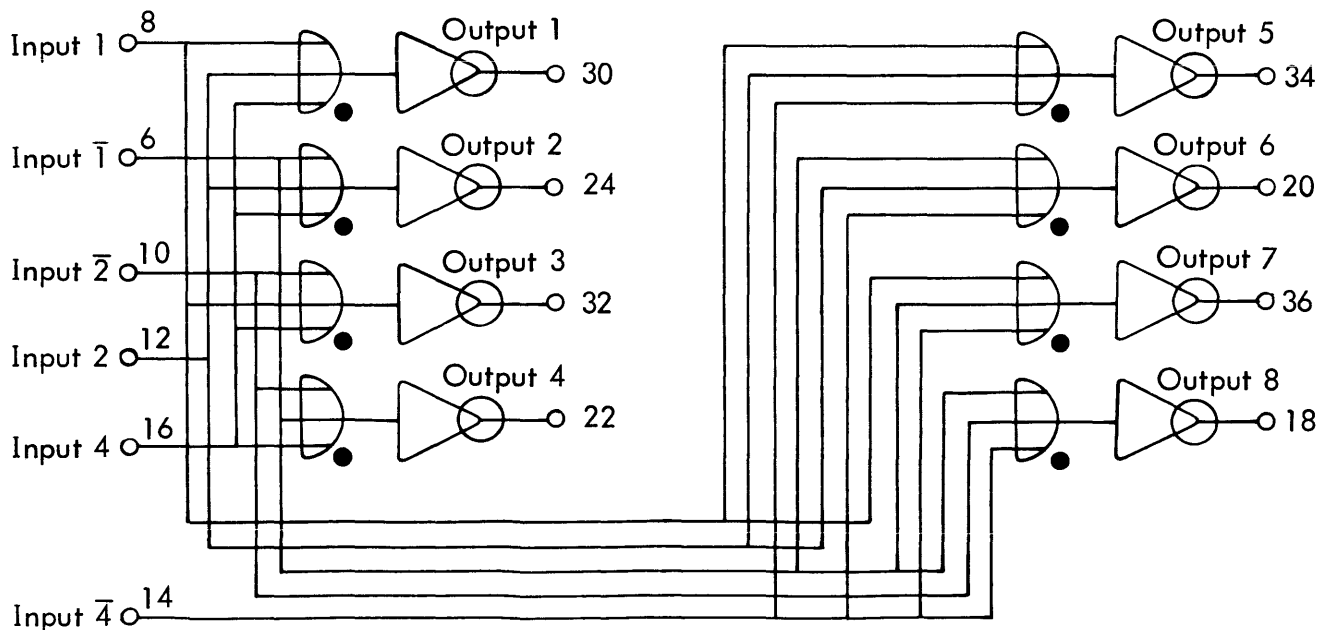
Outputs 1 through 8

Loading

4 loads 200 pf

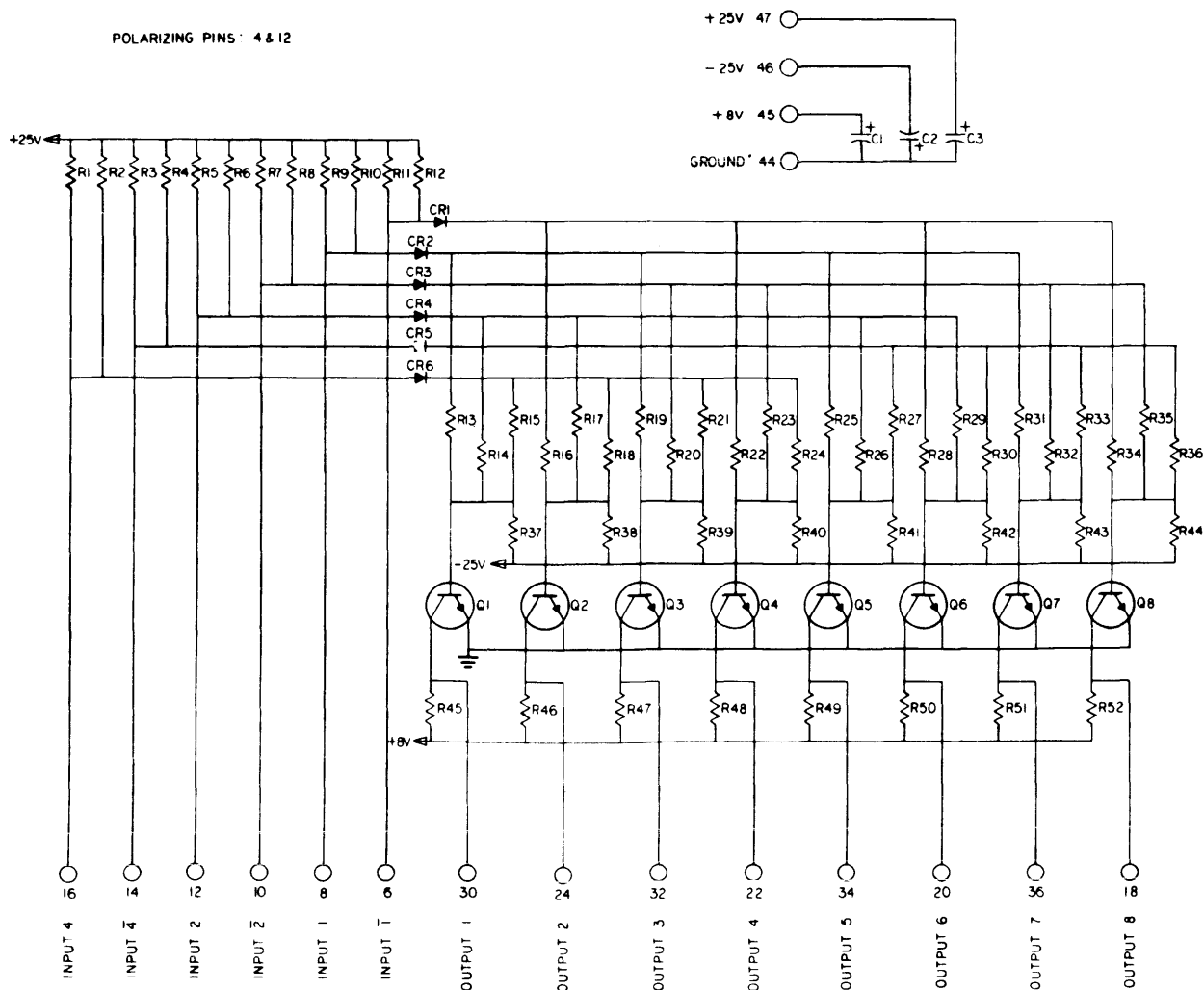
Delay (max)

300 nsec



Module QK52 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor, 2N914	Q1 thru Q8	8	1, 3, 5, 7, 10
2	Diode, 1N907A 1N914A 1N3063 1N3065	CR1, 2, 3, 4, 5, 6	6	4, 13 4, 12, 13, 14 4, 6 4
3	Capacitor, Tantalum, $\pm 5\%$, 15 μf	C1	1	22, 23, 76
4	Capacitor, Tantalum, $\pm 5\%$, 4.7 μf	C2, 3	2	22, 23, 77
5	Resistor, 1/2 watt, $\pm 2\%$, 2.2k ohms	R13 thru R36	24	16, 17
6	Resistor, 1/2 watt, $\pm 2\%$, 2.7k ohms	R1 thru R12	12	16, 17
7	Resistor, 1/2 watt, $\pm 2\%$, 27k ohms	R37 thru R44	8	16, 17
8	Resistor, 1/2 watt, $\pm 2\%$, 1.8k ohms	R45 thru R52	8	16, 17



XY Selector

Assy. No. 101019

QK53

Input

Input C
Common Input A
Common Input B

Loading

2 loads
50 ma at +25v
14 ma

Operating Frequency

to 175 Kc

Output

Sink Input
Switch Output

Loading

80 loads
80 loads

Delay (max)

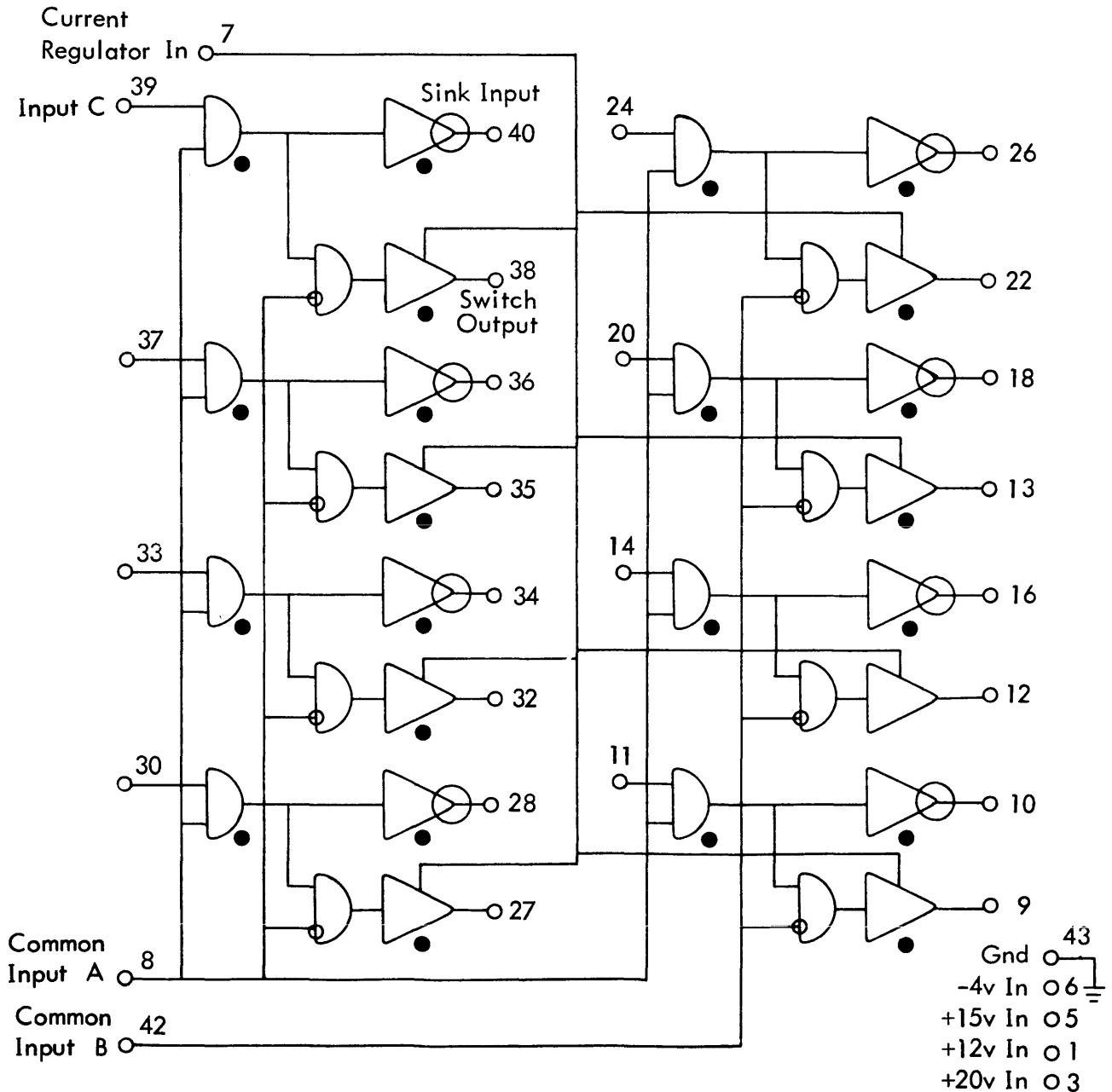
300 nsec
300 nsec

Power Drain

+20 Volt Supply	35 ma
+15 Volt Supply	35 ma
+12 Volt Supply	35 ma
+ 8 Volt Supply	65 ma
- 4 Volt Supply	30 ma

Module Dissipation

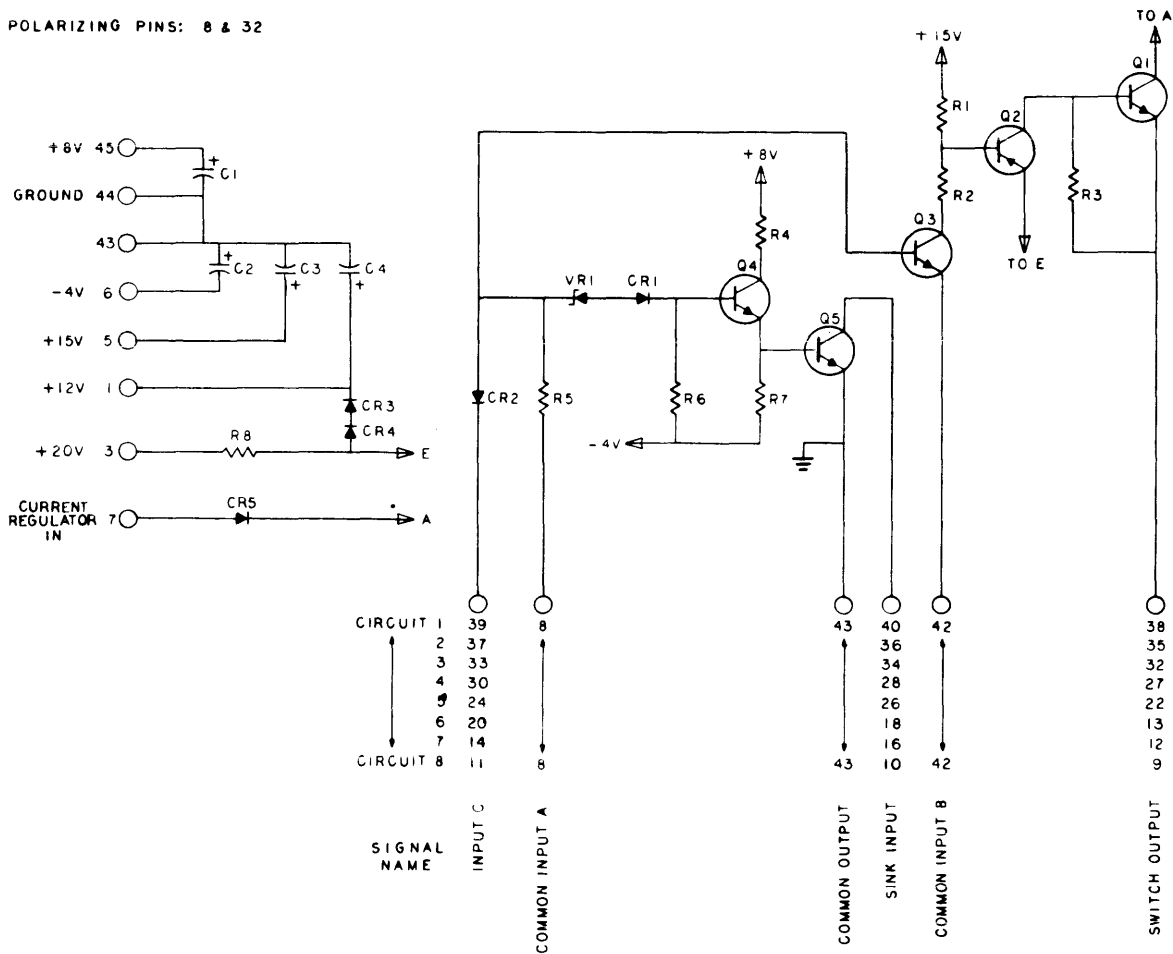
2.8 watts



Module QK 53 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N834	16	1,5,7
2	Transistor	2N2219	16	1
		2N2404		29
3	Transistor	2N1132	8	3,10
4	Diode	1N746	8	2,3,14,32
5	Diode	1N907A	18	4,13
		1N914A		4,12,13,14
		1N3063		4,6
		1N3065		4
6	Resistor, $\pm 2\%$, 1/2 watt, 100 ohms	R3	8	16,17
7	Resistor, $\pm 2\%$, 1/2 watt, 150 ohms	R4	8	16,17
8	Resistor, $\pm 2\%$, 1/2 watt, 330 ohms	R7, 8	9	16,17
9	Resistor, $\pm 2\%$, 1/2 watt, 470 ohms	R1	8	16,17
10	Resistor, $\pm 2\%$, 1/2 watt, 820 ohms	R2	8	16,17
11	Resistor, $\pm 2\%$, 1/2 watt, 2.7 k ohms	R6	8	16,17
12	Resistor, $\pm 2\%$, 1/2 watt, 3.9 k ohms	R5	8	16,17
13	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C1, 3, 4	3	22,23,76
14	Capacitor, Tantalum, $\pm 5\%$, 47 μ f	C2	1	22,23,75
15	Diode	1N921	1	13,15,28

POLARIZING PINS: 8 & 32



RELAY DRIVER

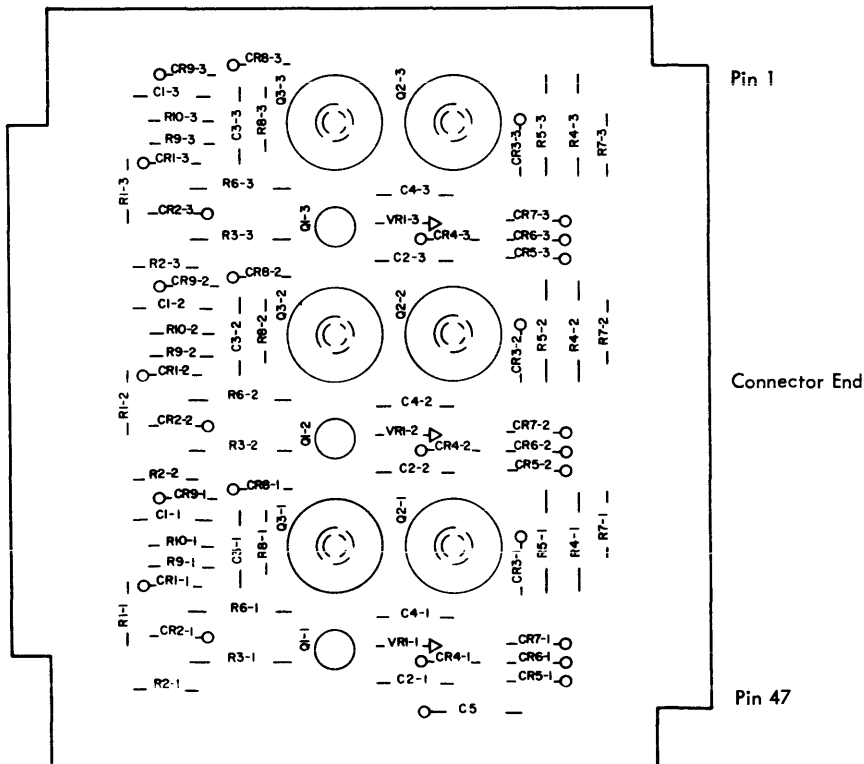
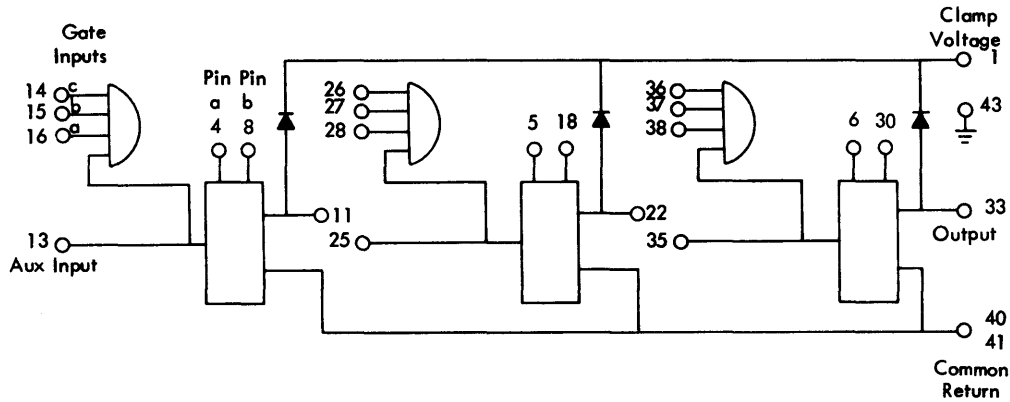
RK51

ASSY. NO. 100779

This module contains three identical Relay Driver circuits. The Relay Driver functions as a switch between the low side of the relay coil and ground. When a constant potential is applied to the relay coil, the driver will allow coil current to flow only when turned "on". Each circuit has a three input AND gate and provision for expanding the input gating. A clamping voltage terminal is provided to limit the voltage excursion across the relay coil and output transistors. A pair of terminals on each circuit are brought out and are jumpered together when the relay coil current exceeds 350 milliamps. The common return pin is normally connected to ground but is brought out separately in order to allow a choice in the return point to improve ground noise reduction.

Maximum Operating Frequency
Input
Output Current
Clamp Voltage
Output (To Relay)
Drop Across Output Transistor
Switching Time (Typical)
+25 Volt Supply
+8 Volt Supply (Nominal)
+8 Volt Supply (Worst Case)
-25 Volt Supply
Module Dissipation

1 kc
2 loads
750 ma (max)
+90 volts(max)
+90 volts(max)
+2 volts (max)
80 μ sec
20 ma
14 ma
800 ma
15 ma
8 watts

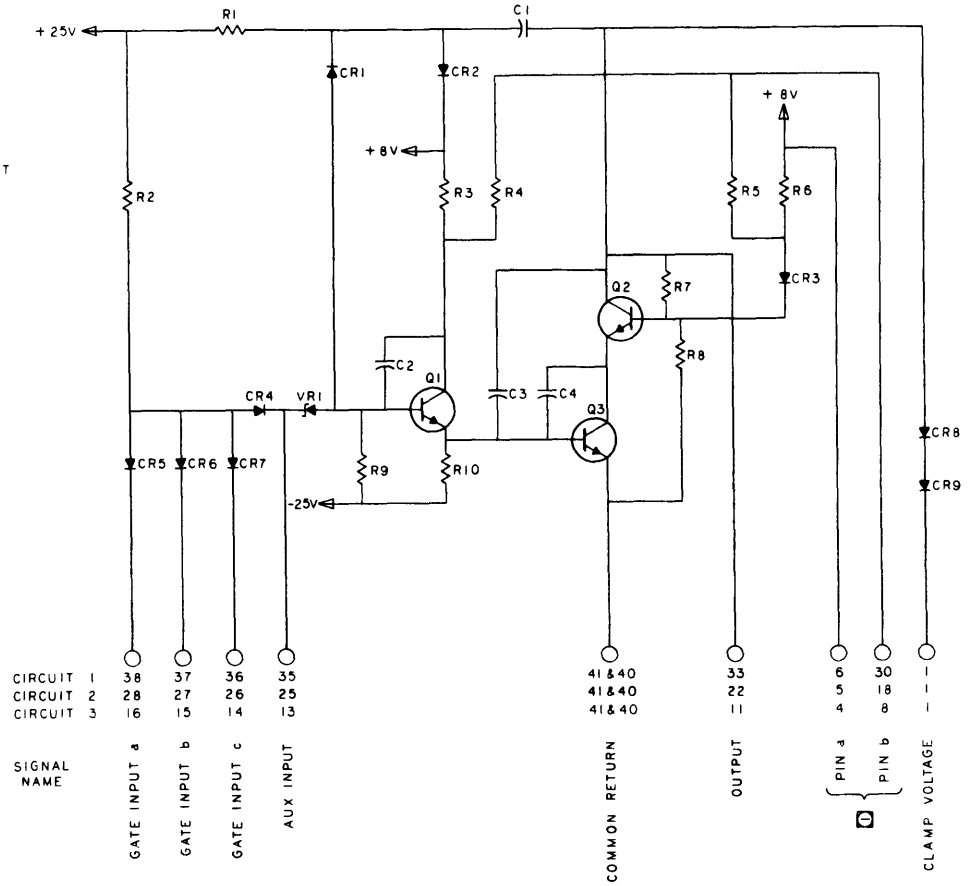
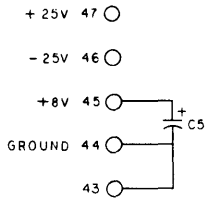


MODEL RK51 Schematic

NOTES:

☐ JUMPER PINS a AND b IF LOAD CURRENT IS GREATER THAN 350 MILLIAMPERES.

POLARIZING PINS: 4 & 44



CIRCUIT 1	38	37	36	35
CIRCUIT 2	28	27	26	25
CIRCUIT 3	16	15	14	13
SIGNAL NAME	GATE INPUT a	GATE INPUT b	GATE INPUT c	AUX INPUT

COMMON RETURN	41 & 40	33	6	30
OUTPUT	41 & 40	22	5	18
	41 & 40	11	4	8
			PIN a	
			PIN b	
			CLAMP VOLTAGE	

MODEL RK51 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N2219	Q1	3	1, 11, 30
2	Transistor 2N1486	Q2, 3	6	7, 8
3	Diode, Zener 1N746	VR1	3	2, 12, 13, 14
4	Diode 1N914A	CR1, 2, 4, 5, 6, 7	18	4, 12, 13, 14
5	Diode 1N921	CR3, 8, 9	9	13, 15, 28
6	Capacitor, Mylar 3300 pf ± 10%	C1, 4	6	26, 27, 74
7	Capacitor, Mylar 4700 pf ± 10%	C2, 3	6	26, 27, 74
8	Capacitor, Tantalum 4.7 μf ± 20%, 50 v	C5	1	23, 77
9	Resistor, Metal Film 68 ohms ± 2%, 1 watt	R5, 6	6	36, 38, 73
10	Resistor, Metal Film 100 ohms ± 2%, 1 watt	R3, 4	6	36, 38, 73
11	Resistor 3.9 k ohms ± 2%	R2	3	16, 17
12	Resistor 4.7 k ohms ± 2%	R10	3	16, 17
13	Resistor 22 k ohms ± 2%	R7, 8	6	16, 17
14	Resistor 47 k ohms ± 2%	R1, 9	6	16, 17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

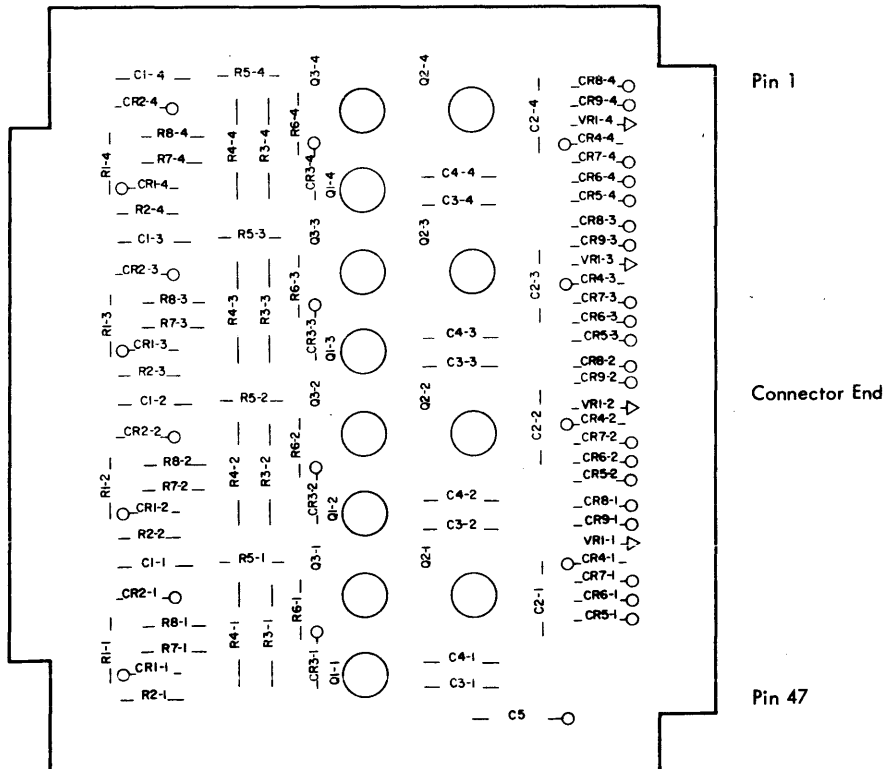
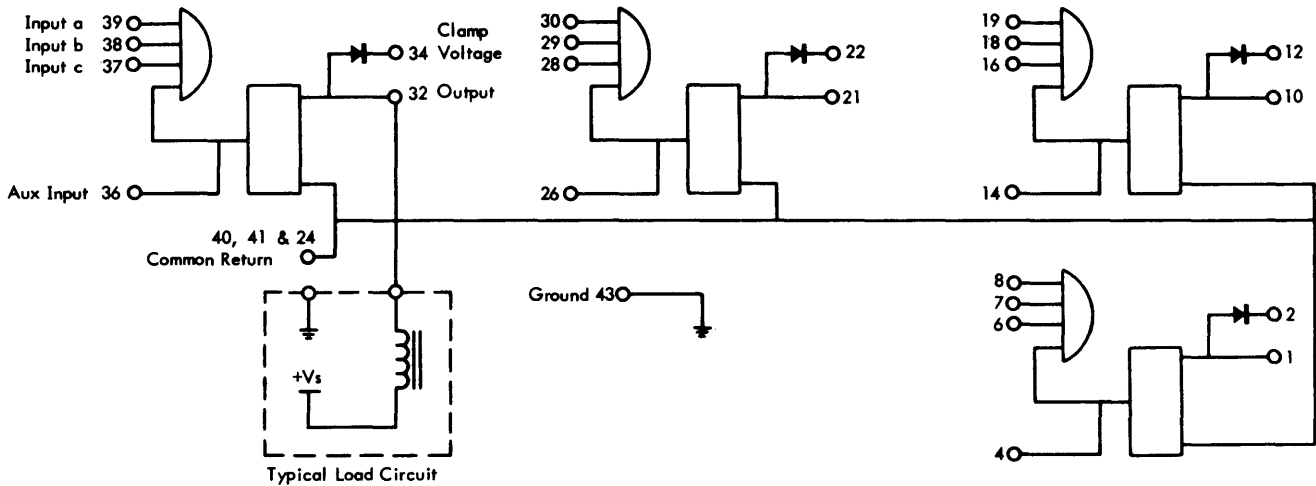
RELAY DRIVER

RK53

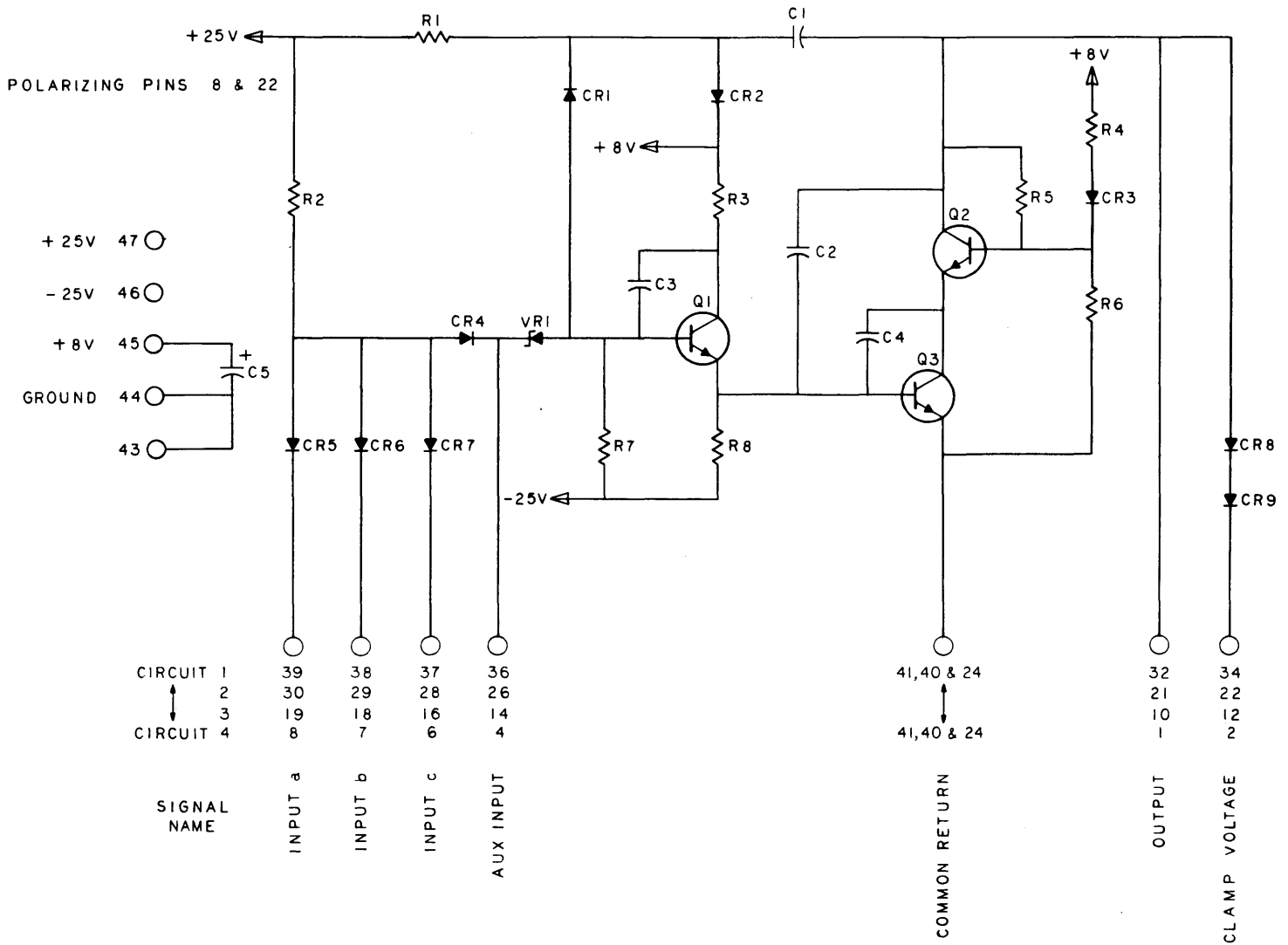
ASSY NO. 100905

This module contains four identical Relay Driver circuits. The Relay Driver functions as a switch between the low side of the relay coil and ground. When a constant potential is applied to the relay coil, the Driver will allow coil current to flow only when turned "on". Each circuit has a three input AND gate and provision for expanding the input gating. A clamping voltage terminal is provided to limit the voltage excursion across the relay coil and output transistors. The common return pin is normally connected to ground but is brought out separately in order to allow a choice in the return point to improve ground noise reduction.

Maximum Operating Frequency	2 kc
Input	2 loads
Output Current	350 ma (maximum)
Clamp Voltage	+60 volts
Relay Voltage	+60 volts
Drop Across Output Transistor	+2 volts (maximum)
Switching Time	60 μsec
+25 Volt Supply	28 ma
+8 Volt Supply (Typical)	0 ma
+8 Volt Supply (Worst Case)	600 ma
-25 Volt Supply	22 ma
Module Dissipation	4.8 watts



MODEL RK53 Schematic



MODEL RK53 Parts List

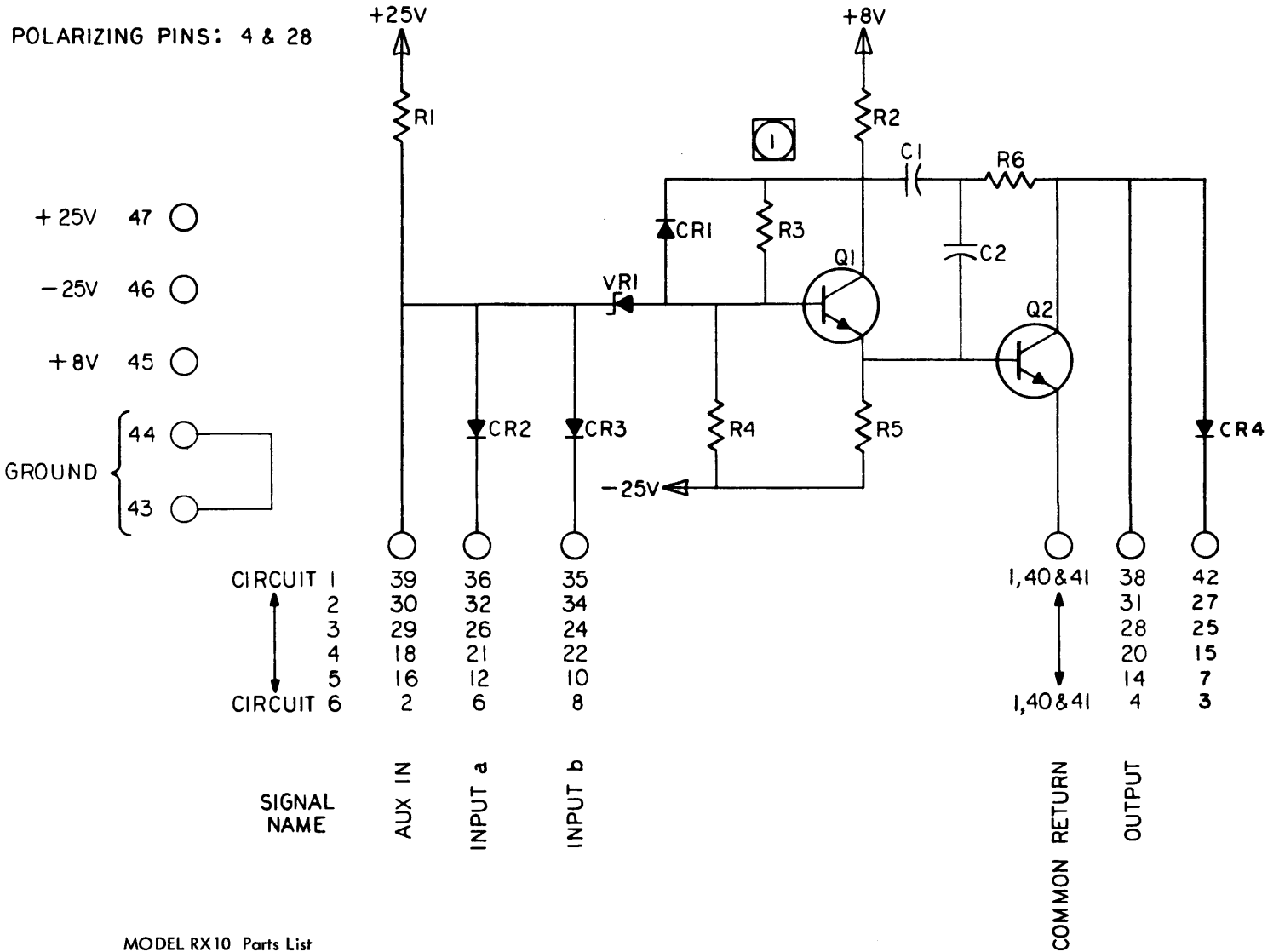
Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N2219	Q1,2,3	12	1,11,30
2	Diode, Zener 1N746	VR1	4	2,12,13,14
3	Diode 1N914A	CR1 through 9	28	4,12,13,14
4	Diode 1N921	CR2,3	8	13,15,28
5	Capacitor, Mylar 3300 pf ±10%	C1,4	8	26,27,74
6	Capacitor, Mylar 4700 pf ±10%	C2,3	8	26,27,74
7	Capacitor, Tantalum 4.7 μf ±20%, 50 v	C5	1	23,77
8	Resistor, Metal Film 68 ohms ±2%, 1 watt	R4	4	36,38,73
9	Resistor, Metal Film 100 ohms ±2%, 1 watt	R3	4	36,38,73
10	Resistor 3.9 k ohms ±2%	R2	4	16,17
11	Resistor 4.7 k ohms ±2%	R8	4	16,17
12	Resistor 22 k ohms ±2%	R5,6	8	16,17
13	Resistor 47 k ohms ±2%	R1,7	8	16,17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

MODEL RX10 Schematic

NOTES: UNLESS OTHERWISE SPECIFIED

1 IN RX10-1, CR1, R3, C1, C2, & R6 ARE OMITTED FROM CKTS 1 & 2.



MODEL RX10 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor	2N914	Q1	6, 1, 3, 5, 7
2	Transistor	2N2219	Q2	6, 1, 11, 30
3	Diode	1N914A	CR1, 2, 3	4, 12, 13, 14
4	Diode	1N3189	CR4	2, 6, 30, 68
5	Diode	1N746	VR1	2, 12, 13, 14
6	Capacitor, Mylar	3300 pf ±10%	C2	26, 27, 74
7	Capacitor, Mylar	4700 pf ±10%	C1	26, 27, 74
8	Resistor	100 ohms ±2%	R2	6, 36, 38, 73
9	Resistor	47 ohms ±2%	R6	6, 16, 17
10	Resistor	3.9 k ohms ±2%	R1	6, 16, 17
11	Resistor	10 k ohms ±2%	R5	6, 16, 17
12	Resistor	47 k ohms ±2%	R3, 4	6, 12, 16, 17

NOTE: Unless otherwise noted, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Voltage Regulator

Assy. No. 100519

SK53

Input

Marginal Test

To +50v; or
-25v for 6%
change in
+12-Volt Output

Power Drain

+18 Volt Supply 2.5 amps
+25 Volt Supply 75 ma

Module Dissipation

18 watts

Output

+12-Volt Output

10v to 14v (adjustable)

Loading

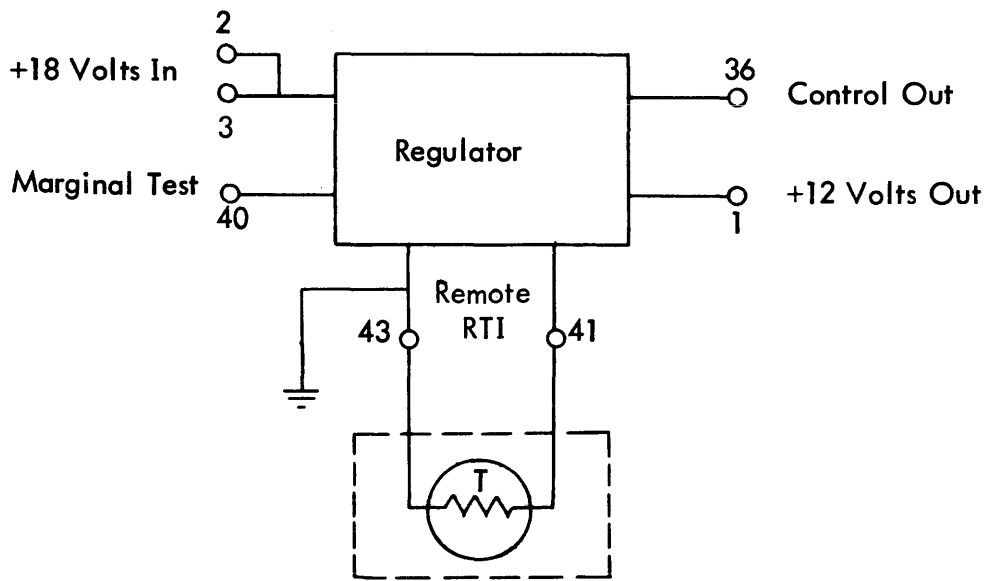
2 amps

Varies by: $E = E_0 \xi^{-0.004T}$
where: $E_0 = \text{Voltage @ } 0^\circ\text{C}$
 $T = \text{Temperature}$

Control Output

10v to 14v (adjustable)

20 ma



(Typical)

Module SK 53 Parts List

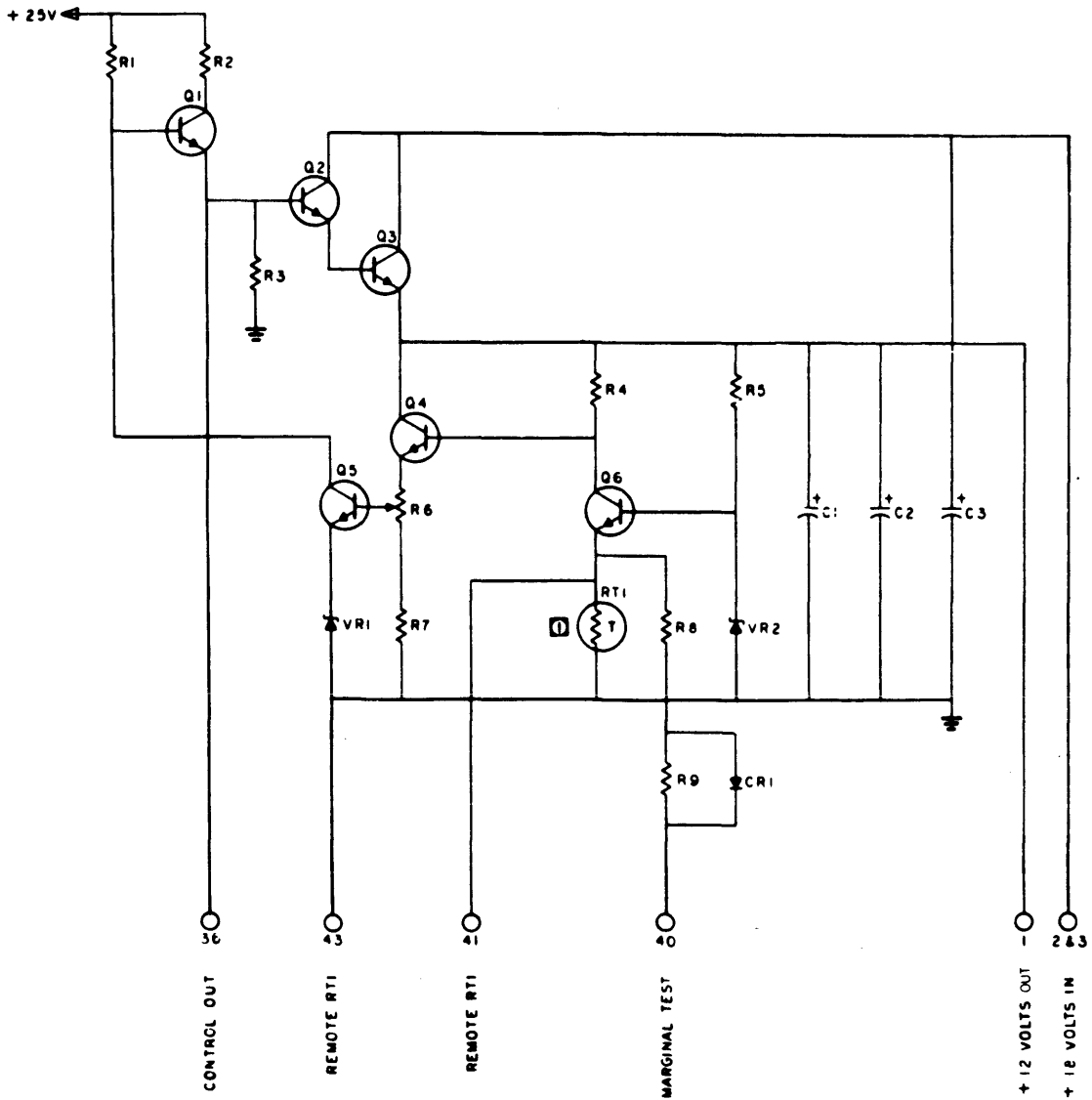
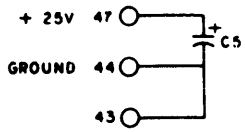
Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor, 2N914	Q4, Q5, Q6	3	1,3,5,7,10
2	Transistor, 2N2219 2N2404	Q1	1	1 29
3	Transistor, 2N1490	Q3	1	7,8
4	Transistor, 2N1486	Q2	1	7,8
5	Diode, 1N746	VR1, VR2	2	2,13,14,32
6	Diode, 1N907A 1N914A 1N3063 1N3065	CR1	1	4,13 4,12,13,14 4,6 4
7	Capacitor, Tantalum, $\pm 5\%$, 100 μ f	C1, C2	2	22,23,76
8	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C3, C5	2	23,77
9	Resistor, 1/2 watt, $\pm 2\%$, 100 ohms	R7	1	16,17
10	Resistor, 1/2 watt, $\pm 2\%$, 1.8 k ohms	R1, R3	2	16,17
11	Resistor, 1/2 watt, $\pm 2\%$, 330 ohms	R4	1	16,17
12	Resistor, 1/2 watt, $\pm 2\%$, 680 ohms	R5	1	16,17
13	Resistor, 1/2 watt, $\pm 2\%$, 82 ohms	R2	1	16,17
14	Resistor, 1/2 watt, $\pm 2\%$, 10 k ohms	R9	1	16,17
15	Resistor, 1/2 watt, $\pm 2\%$, 12 k ohms	R8	1	16,17
16	Potentiometer, 200 ohms	R6	1	35,44

Module SK53 Schematic

POLARIZING PINS: 4 & 8

NOTES:

① THE SENSISTOR RT1 IN MOST CASES IS PHYSICALLY LOCATED NEAR THE CORE MEMORY STACK.



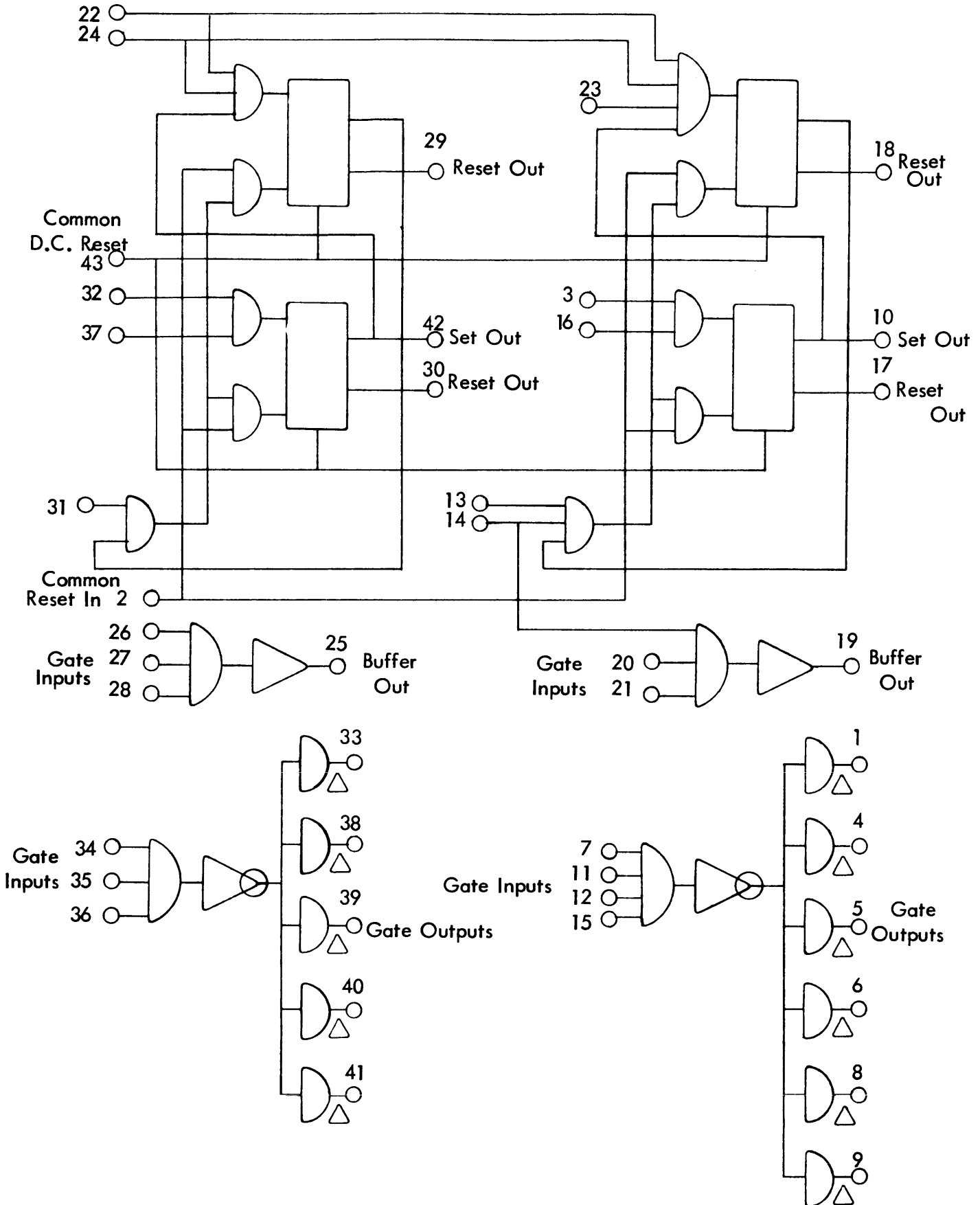
Priority Interrupt

Assy. No. 100751

SK55

<u>Input</u>	<u>Loading</u>	<u>Operating Frequency</u>
Buffer Input	1 load	to 250 Kc
Inverter Input	1 load	
Flip-flop Common Reset Input	4 loads	<u>Power Drain</u>
Flip-flop D.C. Reset Input	15 loads	+25 Volt Supply 110 ma
		+ 8 Volt Supply 20 ma
		-25 Volt Supply 33 ma
<u>Output</u>	<u>Loading</u>	<u>Delay (typical)</u>
Buffer Output	16 loads, 200 pf	90 nsec
Inverter Output	7 loads, 200 pf	45 nsec
Flip-flop Set or Reset Output	12 loads, 50 pf	43 nsec
		<u>Module Dissipation</u>
		3.7 watts

Module SK55 Logic Diagram



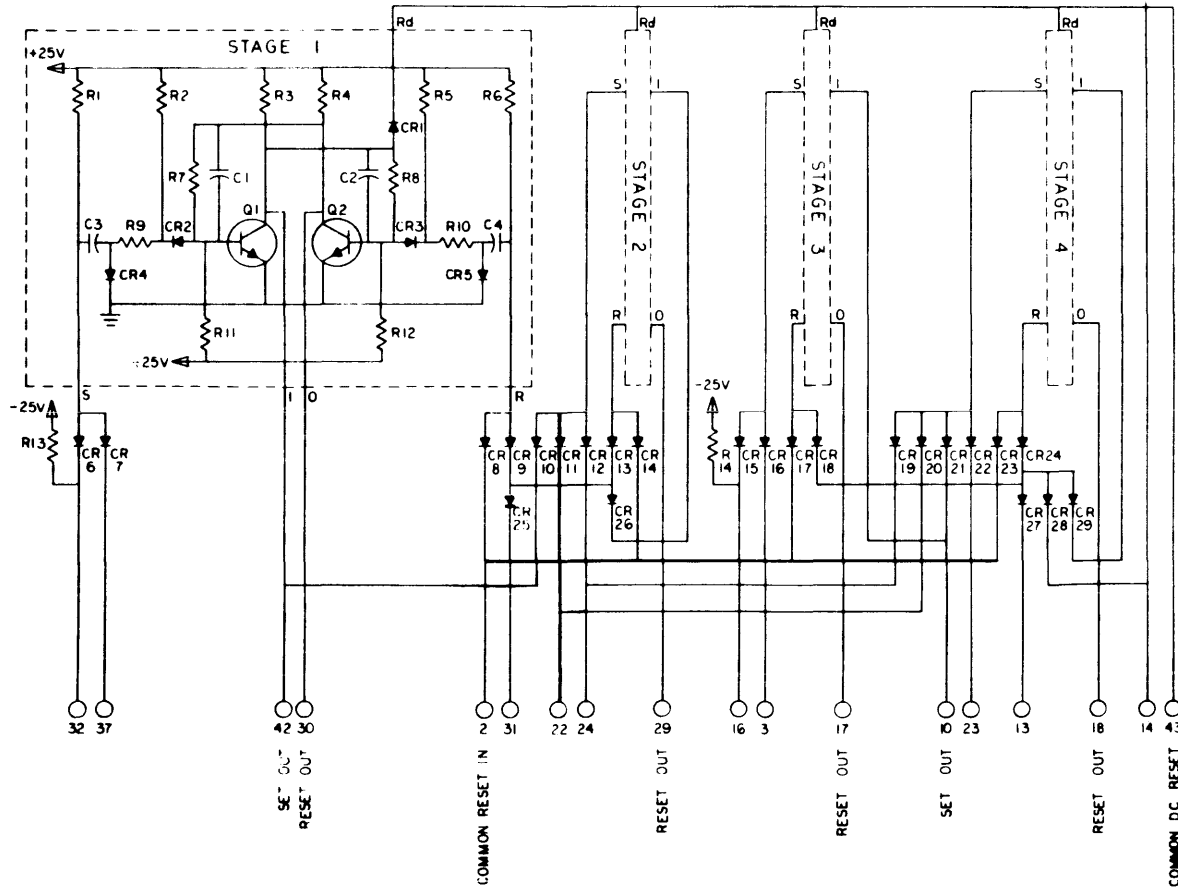
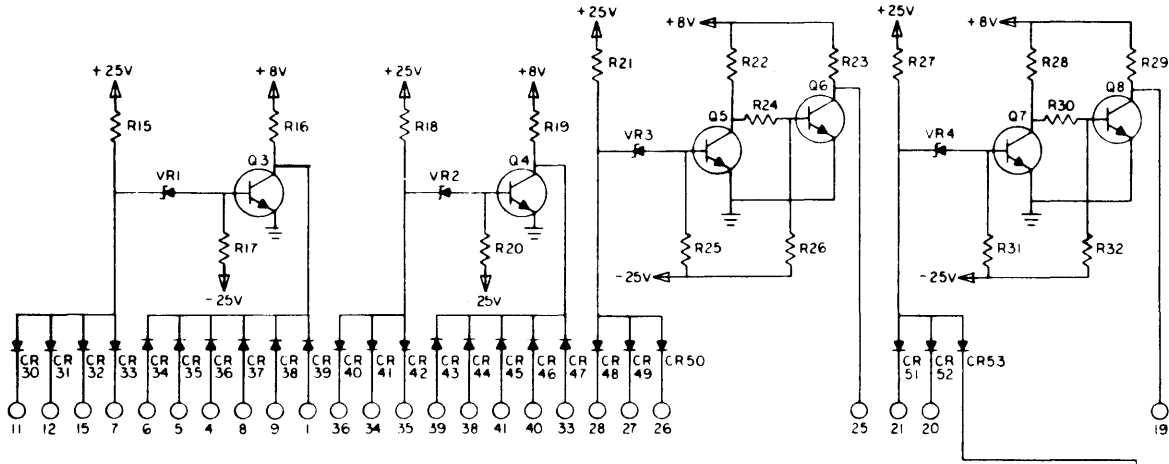
Module SK 55 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N834	Q1 through Q8	14	1,5,7
2	Diode 1N746	VR1 through VR4	4	2,13,14,32
3	Diode 1N907A 1N914A 1N3063 1N3065	CR1 through CR53	68	4,13 4,12,13,14 4,6 4
4	Capacitor, Silver Mica, $\pm 5\%$, 470pf	C3, 4	8	19,20,21
5	Capacitor, Silver Mica, $\pm 5\%$, 510pf	C1, 2	8	19,20,21
6	Capacitor, Tantalum, $\pm 5\%$, 4.7 μ f	C5	1	22,23,77
7	Resistor, $\pm 2\%$, 1/2 watt, 270 ohms	R9, 10	8	16,17
8	Resistor, $\pm 2\%$, 1/2 watt, 820 ohms	R7, 8, 22, 24, 28, 30	12	16,17
9	Resistor, $\pm 2\%$, 1/2 watt, 2.2 k ohms	R16, 19, 23, 29, 3, 4	12	16,17
10	Resistor, $\pm 2\%$, 1/2 watt, 6.8 k ohms	R13, 14	2	16,17
11	Resistor, $\pm 2\%$, 1/2 watt, 8.2 k ohms	R1, 6, 11, 12, 15, 18, 21, 27	20	16,17
12	Resistor, $\pm 2\%$, 1/2 watt, 15 k ohms	R2, 5	8	16,17
13	Resistor, $\pm 2\%$, 1/2 watt, 27 k ohms	R25, 26, 31, 32	4	16,17
14	Resistor, $\pm 2\%$, 1/2 watt, 39 k ohms	R17, 20	2	16,17

Module SK55 Schematic

POLARIZING PINS: 4 & 38

- +25V 47 ○
 - 25V 46 ○
 - +8V 45 ○
 - GROUND 44 ○
- C5



Regulator and Clamp

Assy. No. 100964

SK56

Output

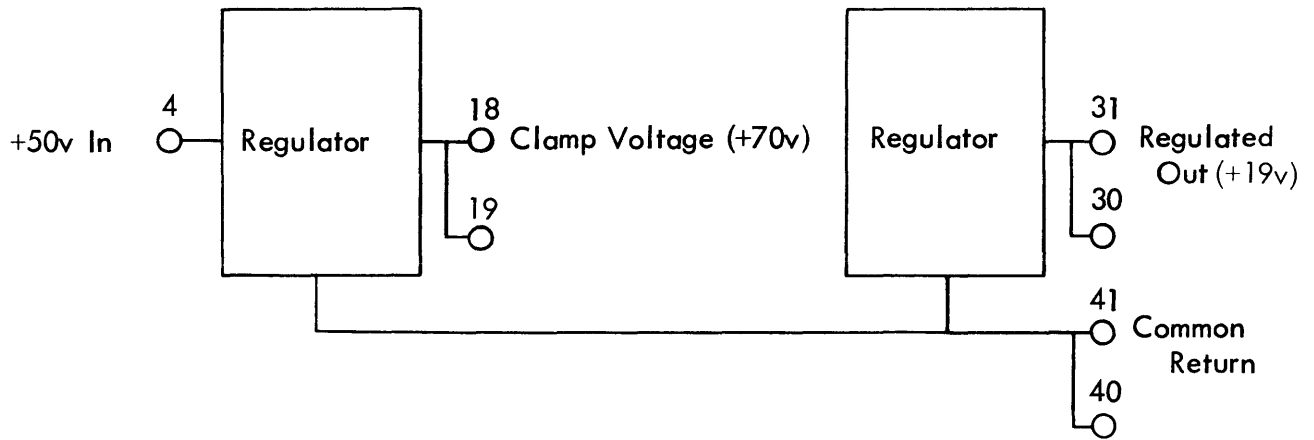
Regulated Output	19 Volts	800 ma
Clamp Voltage	70 Volts	800 ma

Power Drain

+25 Volt Supply	500 ma (typical)
+50 Volt Supply	+30 ma to -200 ma

Power Dissipation

6 watts (typical)

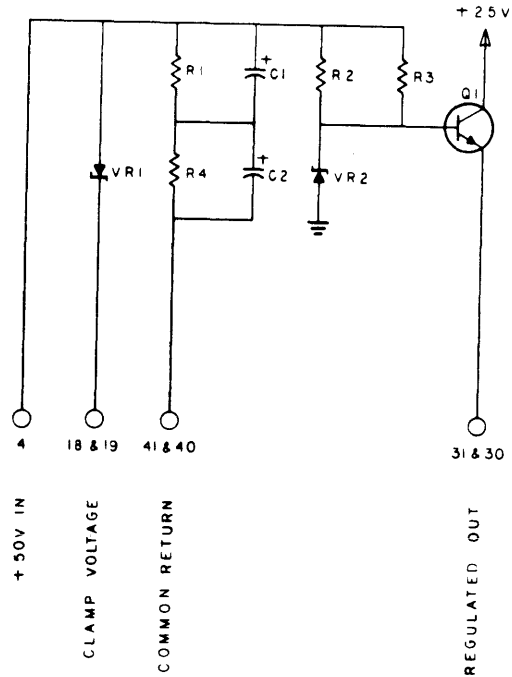


Module SK 56 Parts List

Item	Description	Designator	Qty	Supplier Code (See Index)
1	Transistor, 2N1490	Q1	1	7,8
2	Diode, 50M20ZB	VR1,2	2	2
3	Resistor, 1/2 watt, $\pm 2\%$, 8.2 k ohms	R1,4	2	16,17
4	Resistor, Metal Film, 1 watt, $\pm 1\%$, 2.2 k ohms	R2,3	2	36,38,73
5	Capacitor, Tantalum, $\pm 5\%$, 15 μf	C1,2	2	22,23,77

POLARIZING PINS: 8 & 28

+ 25V 47 ○
GROUND 44 ○



Voltage Regulator

Assy. No. 101594

SK57

Input

Control Input

Loading

20 ma

Power Drain

+25 Volt Supply	40 ma
+18 Volt Supply	2.5 amps
+ 8 Volt Supply	15 ma

Module Dissipation

17 watts

Output

+12 Volt Input

+12 volts (nominal)

Varies $E = E_0 \xi^{-0.004T}$

where: E_0 = voltage at 0°C
 T = temperature, $^{\circ}\text{C}$

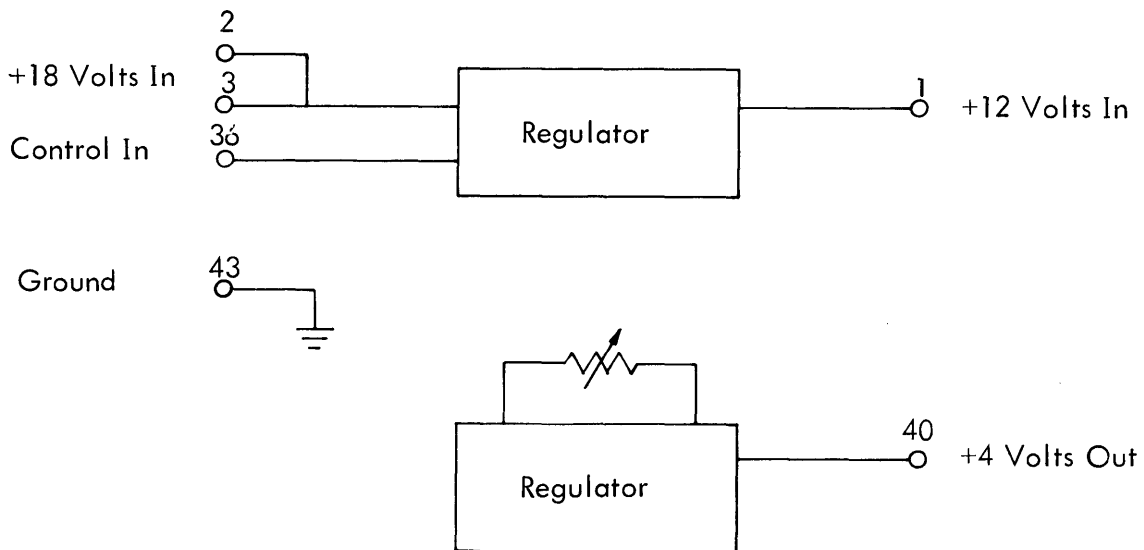
Loading

2 amps

+4 Volt Output

0v to 6v (adjustable)

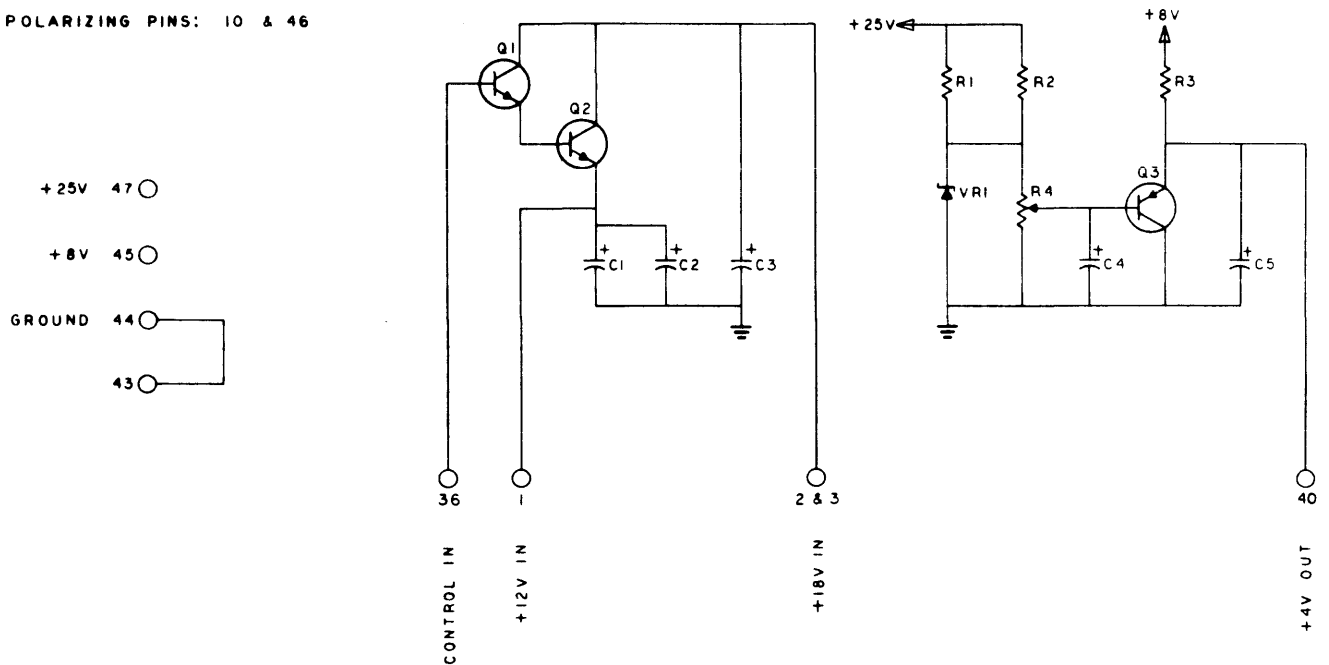
60 ma



Module SK 57 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N1490	Q2	1	7,8
2	Transistor 2N1486	Q1	1	7,8
3	Transistor 2N1132	Q3	1	3,10
4	Diode 1N752	VR1	1	2,12,13,14,64
5	Capacitor, Tantalum, $\pm 5\%$, 100 μ f	C1, 2	2	22,23,76
6	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C4, 5	2	22,23,76
7	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C3	1	23,77
8	Resistor, $\pm 2\%$, 1/2 watt, 560 ohms	R3	1	16,17
9	Resistor, $\pm 2\%$, 1/2 watt, 1.0 k ohms	R1, 2	2	16,17
10	Potentiometer, 200 ohms	R4	1	35,44

POLARIZING PINS: 10 & 46

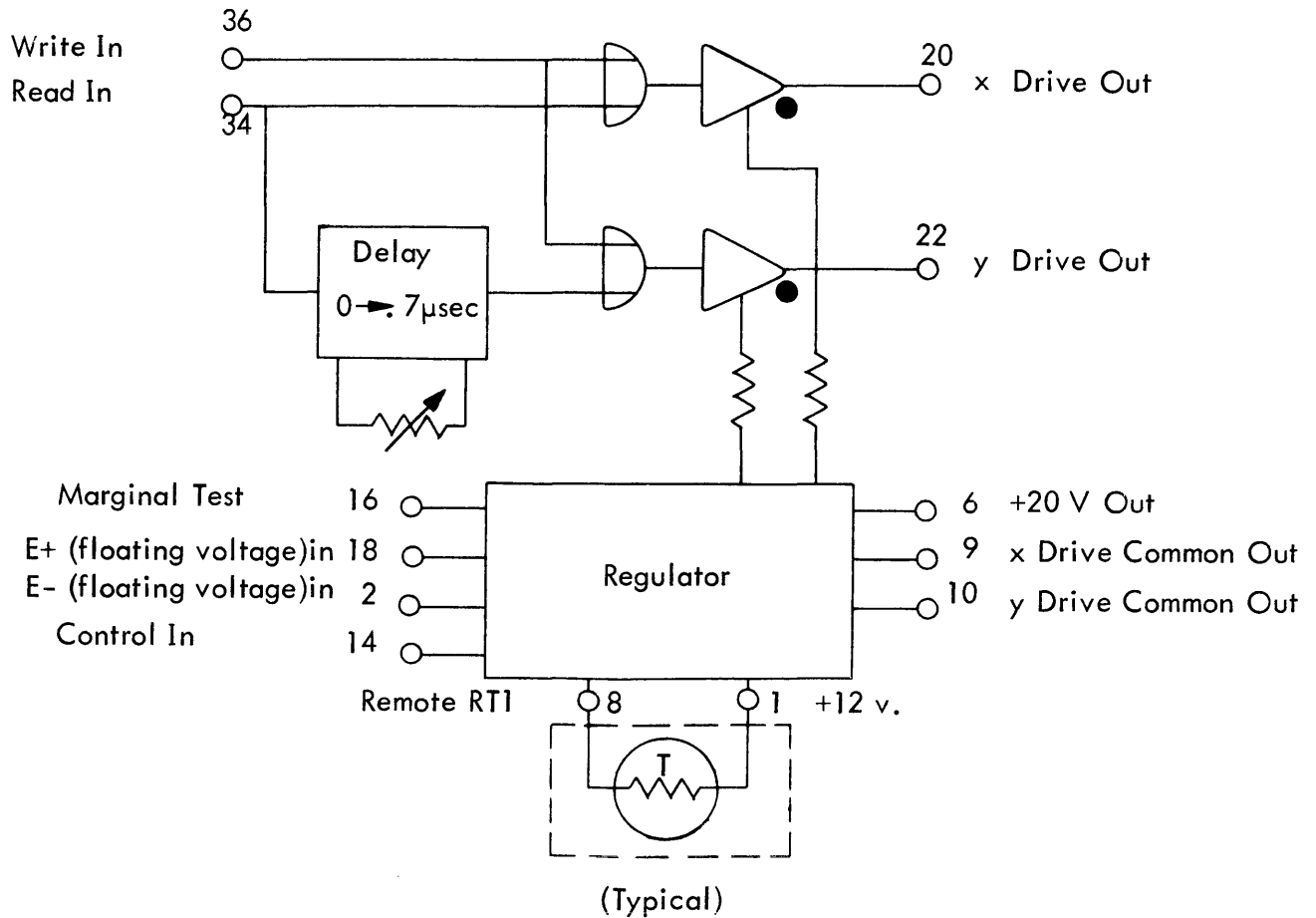


Current Regulator

Assy. No. 102059

SK58

<u>Input</u>	<u>Loading</u>	<u>Power Drain</u>
Read Input	1/2 load	+25 Volt Supply 30 ma
Write Input	3 loads	+12 Volt Supply 750 ma
Control Input	110 ma	+ 8 Volt Supply 10 ma
Marginal Test Input	+50v to -25v for ± 6% change in Ix and Iy	-25 Volt Supply 4 ma
		<u>Module Dissipation</u>
		22 watts
± E Input (floating voltage) 15v at 1 amp		
<u>Output</u>	<u>Loading</u>	*Varies by: $I = I_o \xi^\alpha$
X Drive Output	240 ma *(nominal)	where: $I_o =$ current at 0°C
Y Drive Output	240 ma *(nominal)	$\alpha =$ temp coefficient in $^\circ\text{C}$
+20v. Output	1 amp	(determined by stack in use)



Module SK 58 Parts List

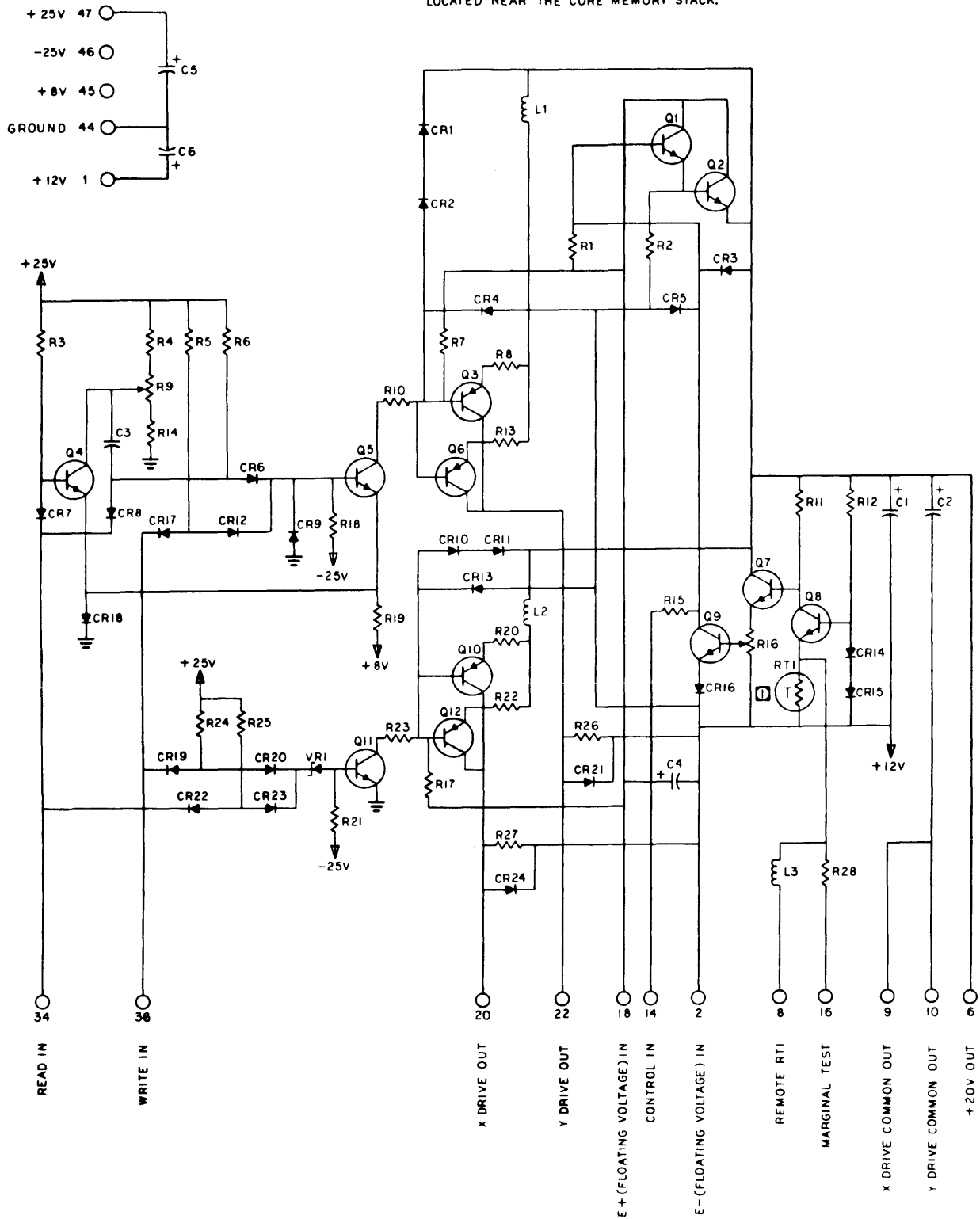
Item	Description	Designator	Qty.	Supplier Code (See Index)	
1	Transistor	2N834	Q4, 5, 7, 8, 9, 11	6	1, 5, 7
2	Transistor	2N2219 2N2404	Q1	1	1 29
3	Transistor	2N1490	Q2	1	7, 8
4	Transistor	2N1132	Q3, 6, 10, 12	4	3, 10
5	Diode	1N746	VR1	1	2, 13, 14, 32
6	Diode	1N907A 1N914A 1N3063 1N3065	CR6, 7, 8, 9, 12, 17 through 24	13	4, 13 4, 12, 13, 14 4, 6 4
7	Diode	1N921	CR1, 2, 3, 4, 5, 10, 11, 13, 14, 15, 16	11	13, 15, 28
8	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C2, 5	2	23, 77	
9	Capacitor, Tantalum, $\pm 5\%$, 100 μ f	C4	1	22, 23, 76	
10	Capacitor, Tantalum, $\pm 5\%$, 15 μ f	C6	1	22, 23, 76	
11	Capacitor, Tantalum, $\pm 5\%$, 47 μ f	C1	1	22, 23, 76	
12	Capacitor, Mica, $\pm 5\%$, 180pf	C3	1	19, 20, 21	
13	Resistor, 1/2 watt, $\pm 2\%$, 100 ohms	R12	1	16, 17	
14	Resistor, 1/2 watt, $\pm 2\%$, 1.2 k ohms	R7, 17	2	16, 17	
15	Resistor, 1/2 watt, $\pm 2\%$, 56 k ohms	R18, 28	2	16, 17	
16	Resistor, 1/2 watt, $\pm 2\%$, 15 k ohms	R3	1	16, 17	
17	Resistor, 1/2 watt, $\pm 2\%$, 180 ohms	R15	1	16, 17	
18	Resistor, 1/2 watt, $\pm 2\%$, 1.8 k ohms	R1, 2	2	16, 17	
19	Resistor, 1/2 watt, $\pm 2\%$, 470 ohms	R14	1	16, 17	
20	Resistor, 1/2 watt, $\pm 2\%$, 3.9 k ohms	R24, 25	2	16, 17	
21	Resistor, 1/2 watt, $\pm 2\%$, 6.8 k ohms	R5, 6	2	16, 17	
22	Resistor, 1/2 watt, $\pm 2\%$, 680 ohms	R26, 27, 11	3	16, 17	
23	Resistor, 1/2 watt, $\pm 2\%$, 330 ohms	R10, 23	2	16, 17	
24	Resistor, 1/2 watt, $\pm 2\%$, 8.2 k ohms	R21	1	16, 17	
25	Resistor, 1/2 watt, $\pm 2\%$, 1.0 k ohms	R19	1	16, 17	
26	Resistor, Metal Film, $\pm 1\%$, 61.9 ohms	R8, 13, 20, 22	4	116, 118	
27	Potentiometer, 200 ohms	R16	1	35, 44	
28	Potentiometer, 10 k ohms	R9	1	35, 44	
29	Inductor, Molded, 10 μ h $\pm 10\%$	L1, 2, 3	3	42, 90, 91	

Module SK58 Schematic

POLARIZING PINS: 16 & 28

NOTES:

1 THE SENSISTOR RT1 IN MOST CASES IS PHYSICALLY LOCATED NEAR THE CORE MEMORY STACK.



Clock and Gap Detector

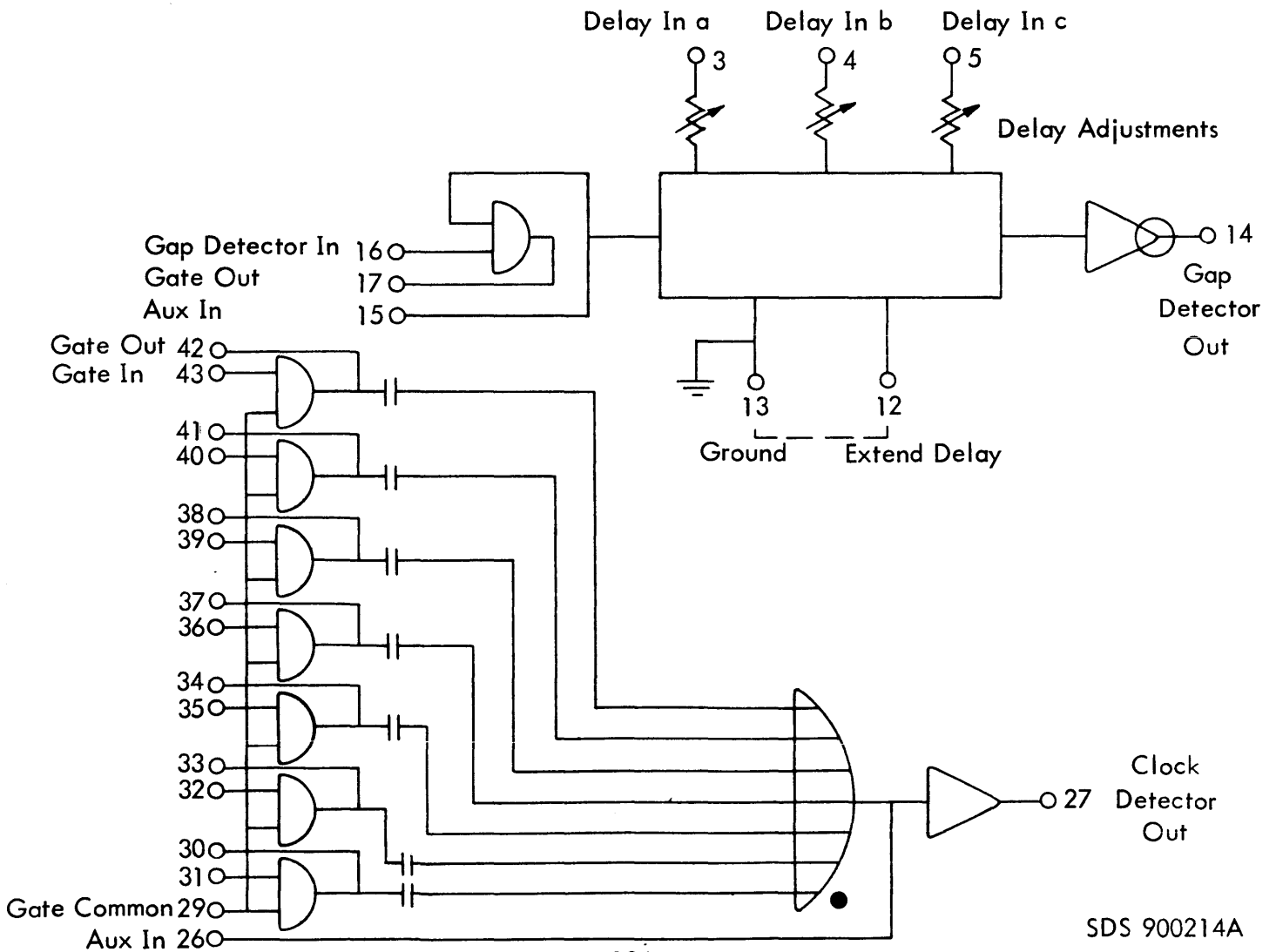
Assy. No. 102667

SK59

<u>Input</u>	<u>Loading</u>	<u>Power Drain</u>
Gap Detector Input	2 loads	+25 Volt Supply 57 ma
Clock Detector Input	2 loads	+ 8 Volt Supply 23 ma
Delay a, b, c	2 loads	-25 Volt Supply 40 ma

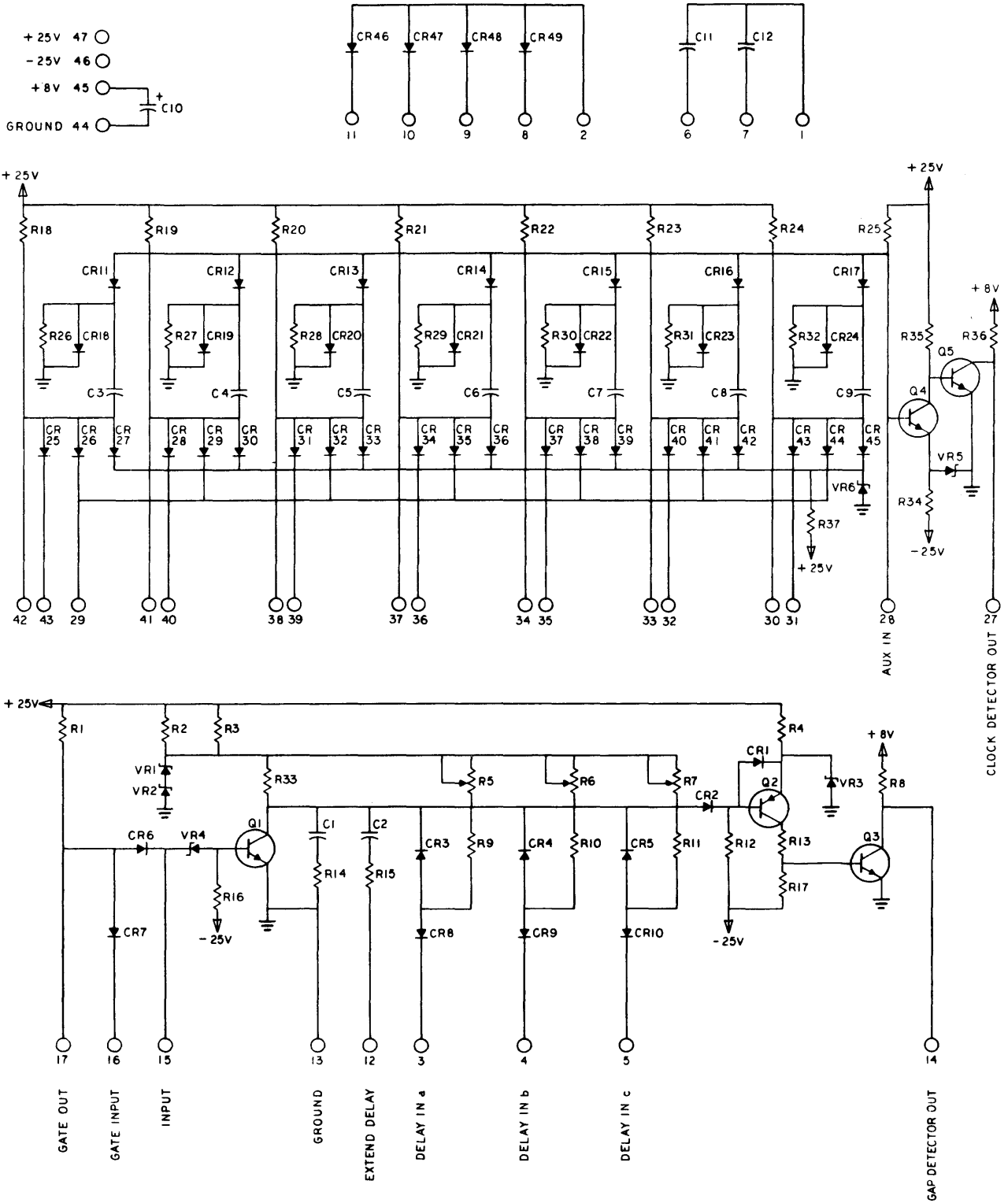
Module Dissipation
2.4 watts (typical)

<u>Output</u>	<u>Loading</u>	<u>Delay</u>
Clock Detector Output	8 loads 400 pf	40 nsec
Gap Detector Output	4 loads 400 pf	7 to 90 μ sec (normal) 14 to 180 μ sec (extended)



Model SK59 Schematic

POLARIZING PINS: 16 & 38



Model SK59 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Transistor 2N834	Q1,3,4,5	4	1,5,7,95
2	Transistor 2N2801 2N2905	Q2	1	1 1
3	Diode 1N914A	CR1 through CR49	49	4,12,13,14
4	Diode 1N752	VR1,3,6	3	2,12,13,14
5	Diode 1N964A	VR2	1	2,6,14,65
6	Diode 1N746	VR4,5	2	2,12,13,14
7	Capacitor, Mylar 0.001 μ f \pm 10%	C3 through C9,C11,C12	9	74,27,26
8	Capacitor, Mylar 0.01 μ f \pm 10%	C1,2	2	74,27,26
9	Capacitor, Tantalum 4.7 μ f \pm 20%, 50v	C10	1	23,77
10	Resistor 47 ohms \pm 2%	R14,15	2	16,17
11	Resistor 680 ohms \pm 2%	R2,3	2	16,17
12	Resistor 2.2 k ohms \pm 2%	R8,13,R26 through R32, R36	10	16,17
13	Resistor 3.3 k ohms \pm 2%	R4	1	16,17
14	Resistor 3.9 k ohms \pm 2%	R1,9,10,11,R18 through R24,R37,R34	13	16,17
15	Resistor 12 k ohms \pm 2%	R35	1	16,17
16	Resistor 18 k ohms \pm 2%	R16	1	16,17
17	Resistor 22 k ohms \pm 2%	R25	1	16,17
18	Potentiometer 40 k ohms \pm 10%	R5,6,7	3	35,44
19	Resistor 56 k ohms \pm 2%	R17	1	16,17
20	Resistor 68 k ohms \pm 2%	R33	1	16,17
21	Resistor 220 k ohms \pm 2%	R12	1	16,17

POTENTIOMETER MODULE

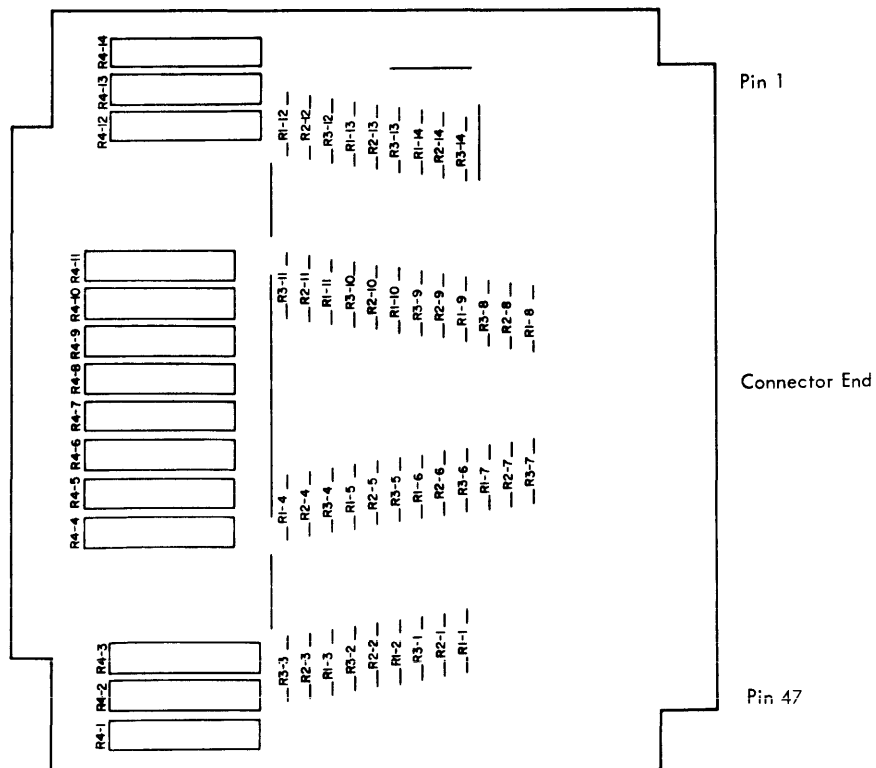
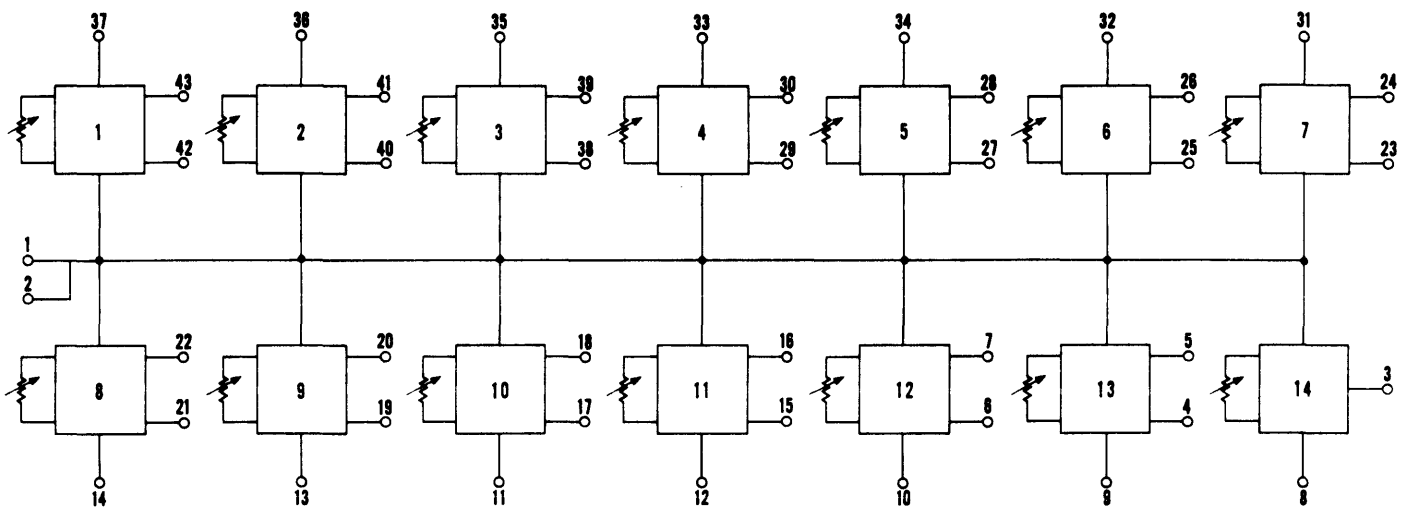
SX36

ASSY NO. 102228

This module contains 14 voltage divider circuits with a common input. Each circuit contains a potentiometer, making the circuit resistance continuously variable within its range of resistance. By connecting various pins together, and applying inputs and outputs to different pins, various voltages and range of voltages may be obtained.

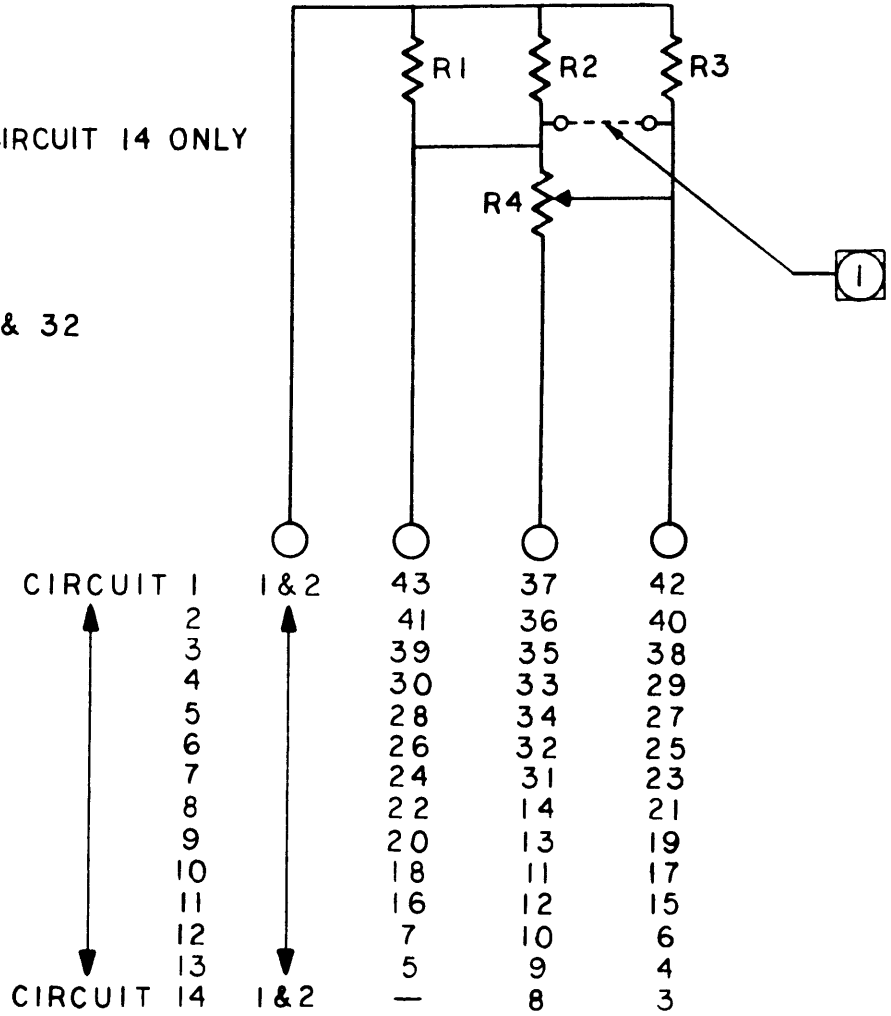
Potentiometer

Number of turns	25
Resolution	1.0%
Dissipation	5/8 watt at 100°C



① JUMPER WIRE LOCATED ON CIRCUIT 14 ONLY

POLARIZING PINS: 16 & 32



MODEL SX36 Parts List

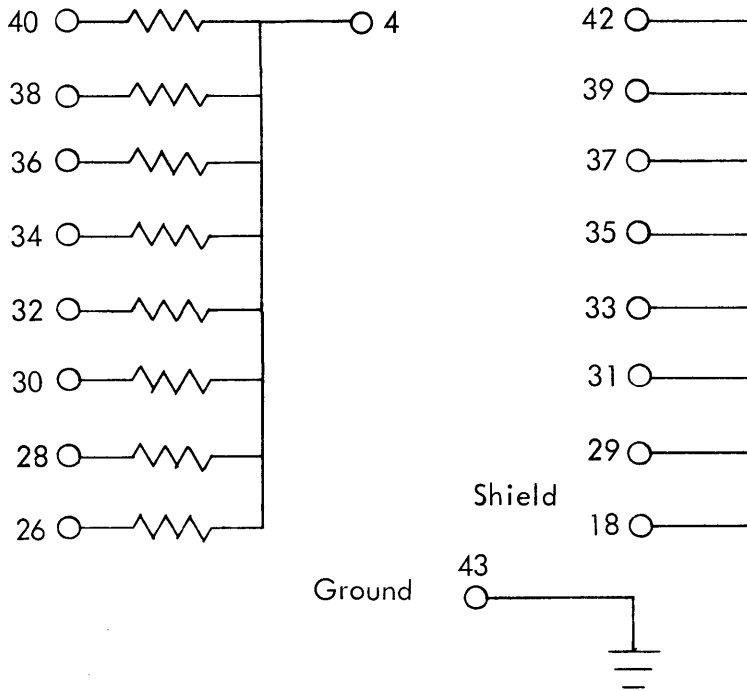
Item	Description	Designator	Qty	Supplier Code (See Index)
1	Potentiometer	R4	14	35, 44
2	Resistor	R1, 2, 3	42	16, 17

NOTE: Unless otherwise indicated, 1/2-watt resistors may be used. To maintain specified performance, use replacement types designated in SDS Suppliers Code Index.

Resistor Module

Assy. No. 101716

ZK51



Power Drain

+25 Volt Supply 800 ma
(typical)

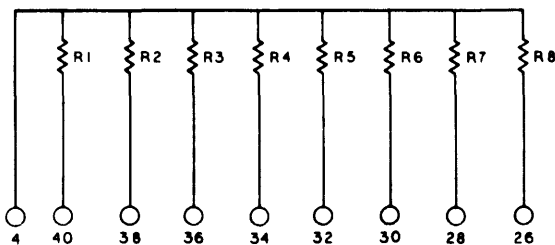
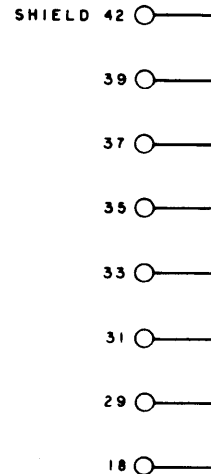
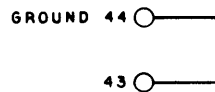
Module Dissipation

20 watts (typical)

Module ZK 51 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Resistor, Wirewound	R1 thru 8	8	99,100

POLARIZING PINS: 12 & 24



Termination Module

Assy. No. 101660

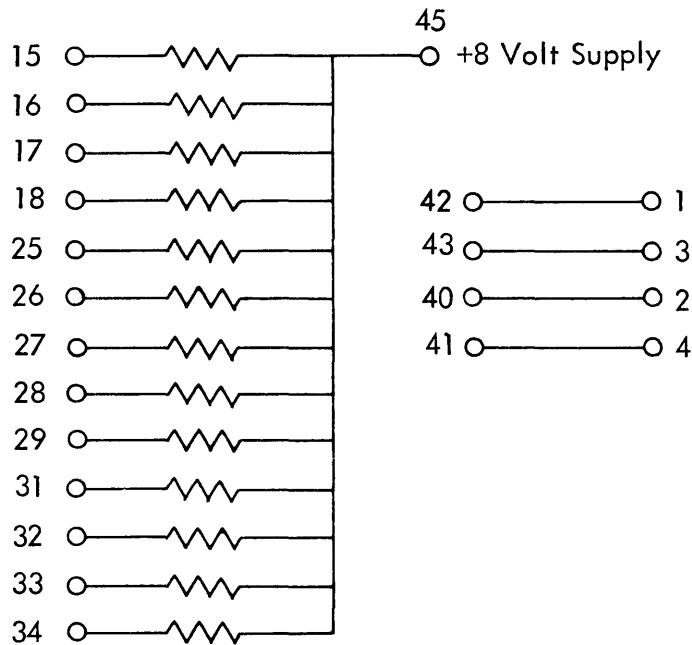
ZK52

Power Drain

+ 8 Volt Supply 13 ma (max)

Module Dissipation

54 milliwatts (typical)

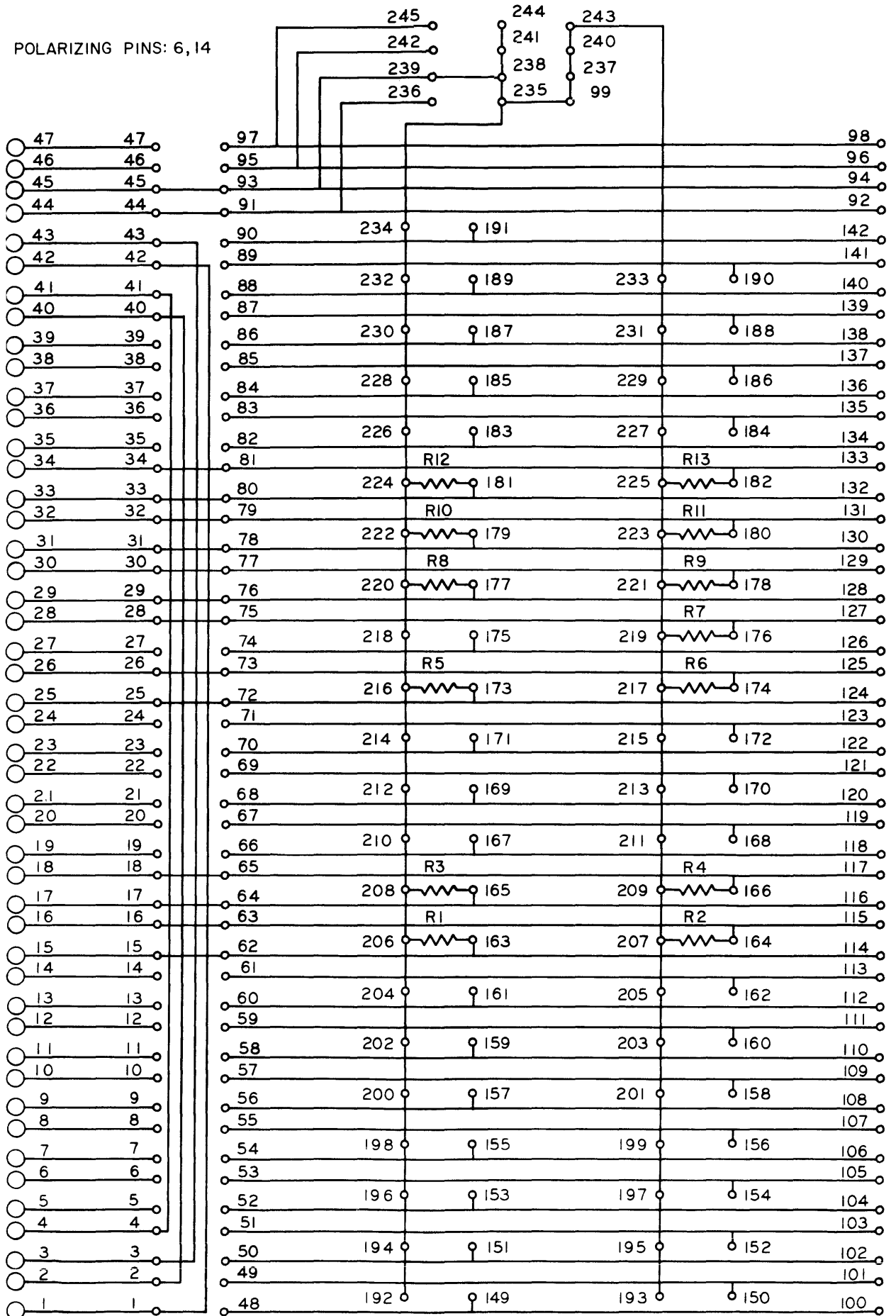


Module ZK52 Parts List

Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Resistor, 1/2 watt, ± 2%, 8.2 k ohms	R1 through R13	13	16, 17

Module ZK52 Schematic

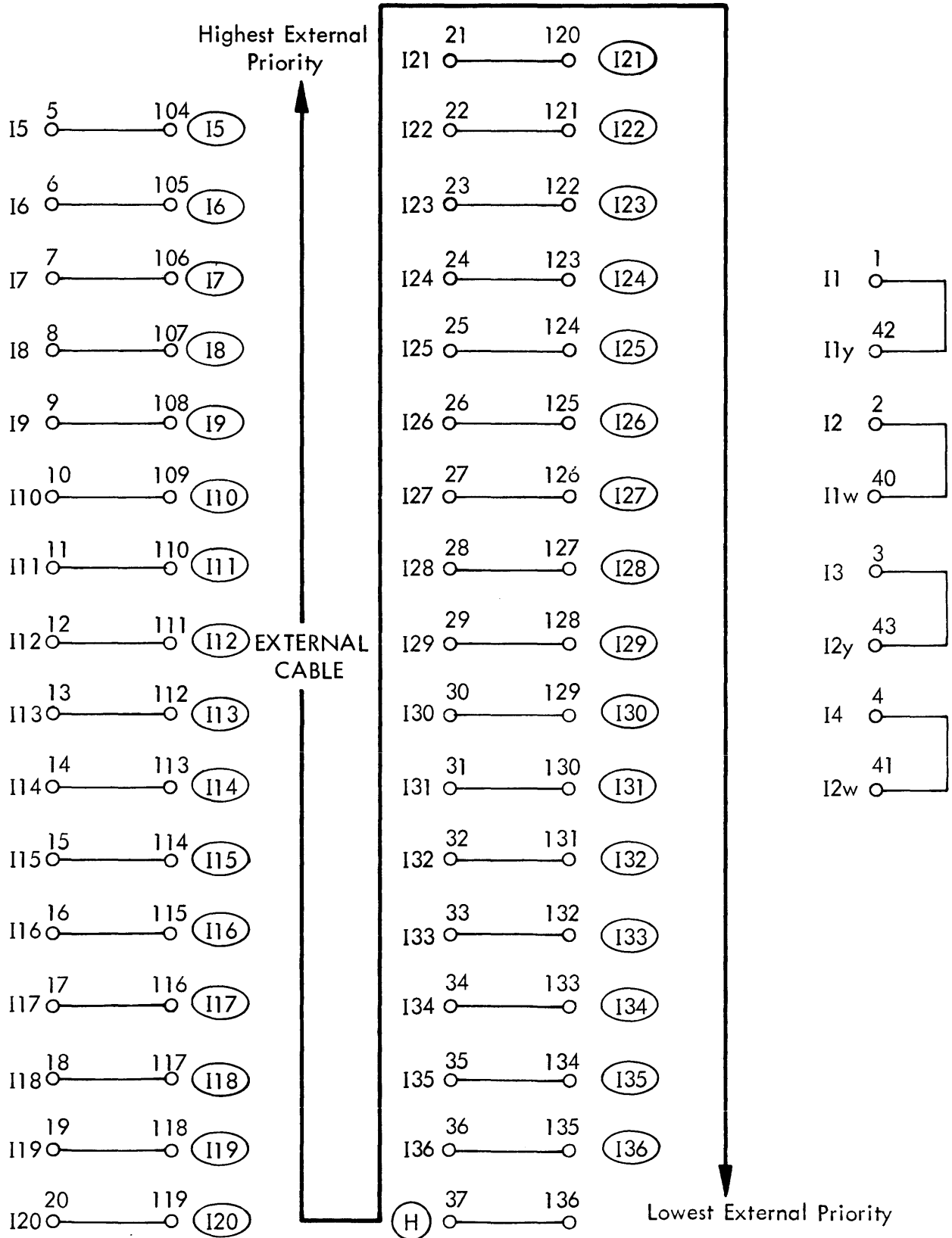
POLARIZING PINS: 6, 14



Termination Module

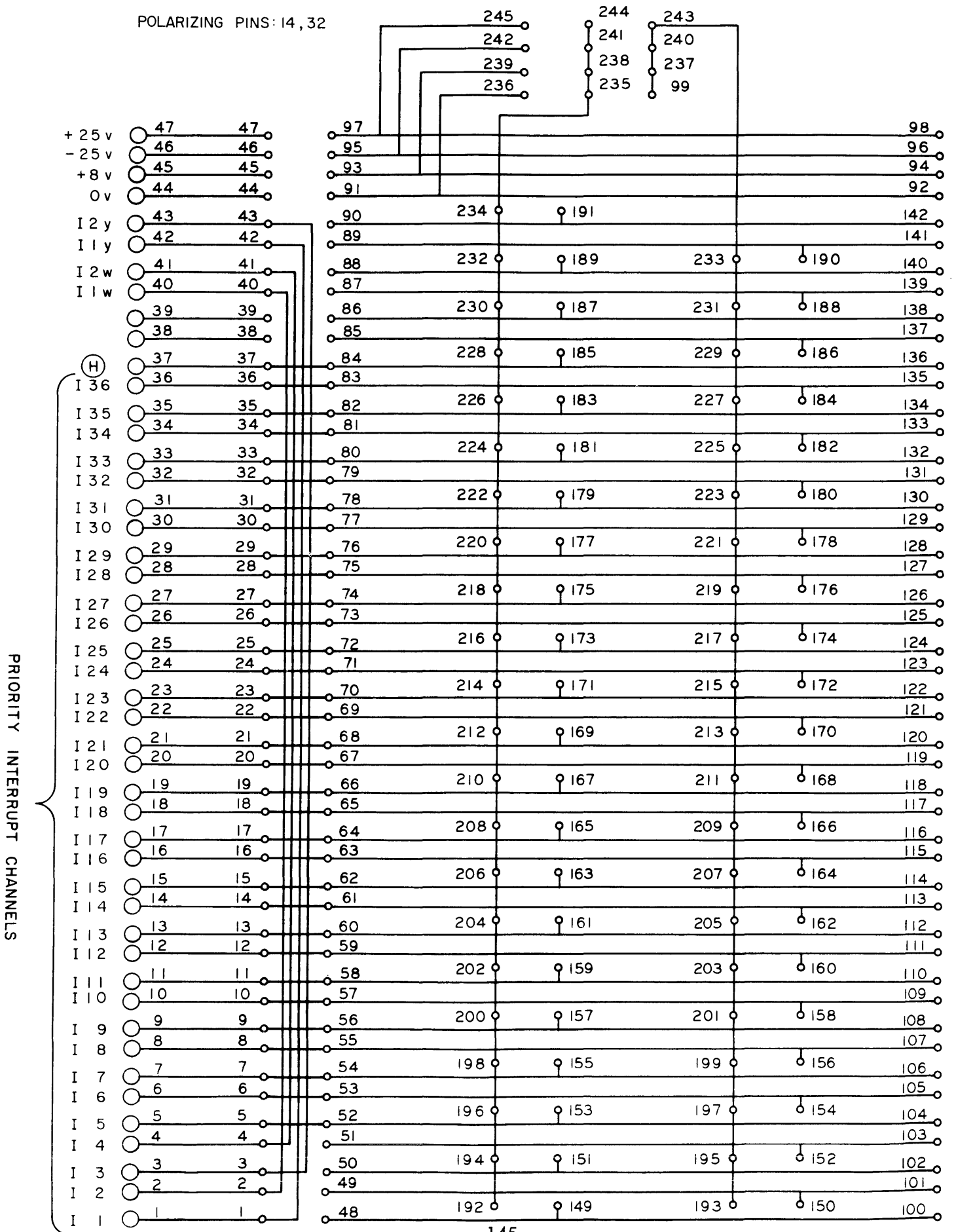
Assy. No. 101798

ZK54



Module ZK54 - Schematic

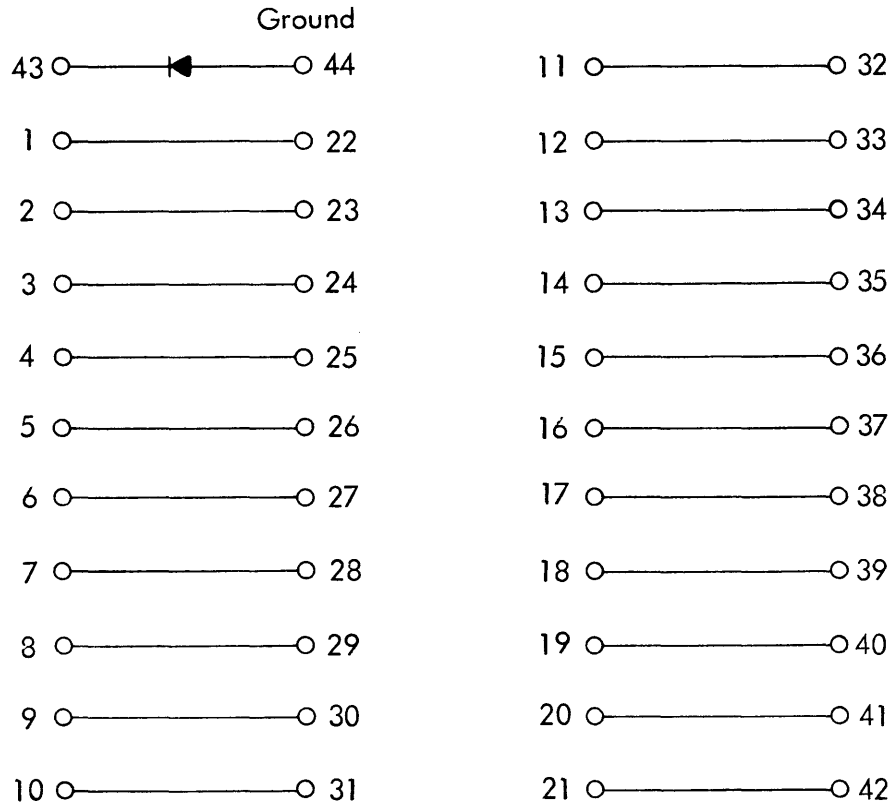
POLARIZING PINS: 14, 32



Termination Module

Assy. No. 101649

ZK 55



Module ZK 55 Parts List

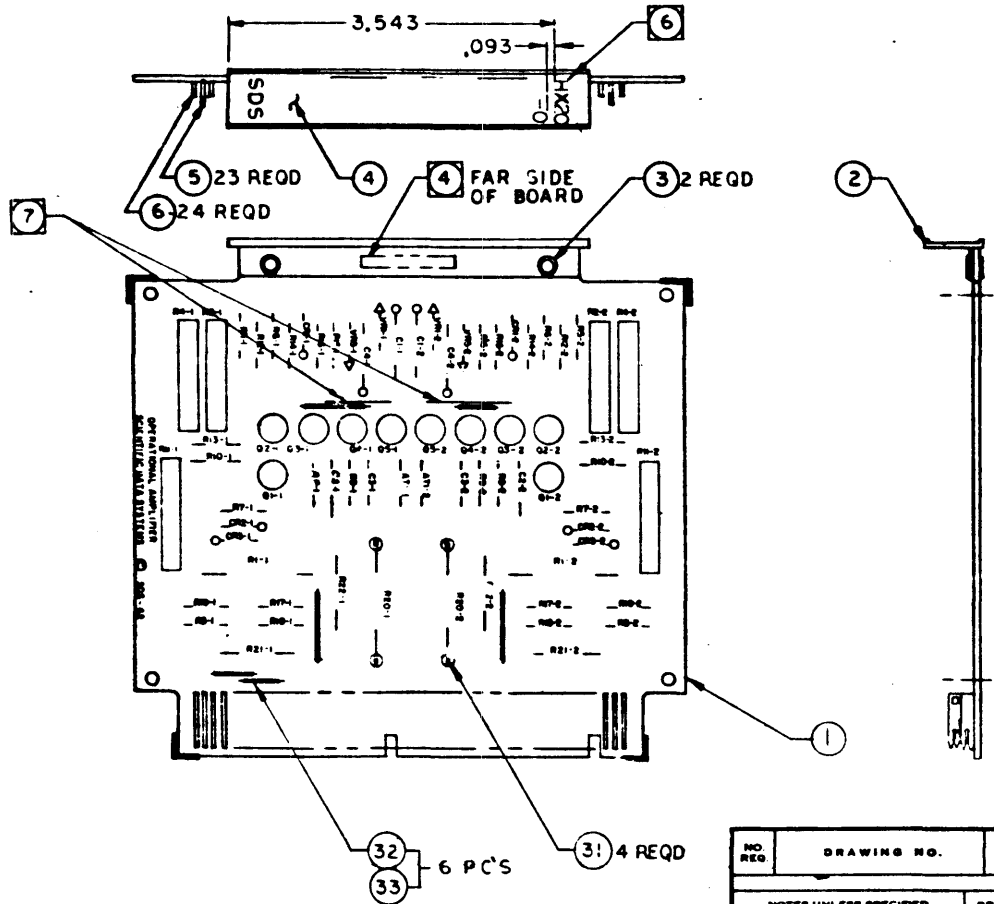
Item	Description	Designator	Qty.	Supplier Code (See Index)
1	Diode	CR1	1	4, 13
	1N907A			4, 12, 13, 14
	1N914A			4, 6
	1N3063			4
	1N3065			

- 5
6 NOMENCLATURE: HOT STAMP 10 POINT NEWS
GOTHIC, COLOR BLACK, CENTERED
APPROX AS SHOWN.
- 7 JUMPER WIRES AT THIS POINT NOT TO
BE INSTALLED.

NOTES: UNLESS OTHERWISE SPECIFIED.

1. SEE MATERIAL LIST NO. 103056 (SH2)
2. ASSEMBLED BOARD TO CONFORM TO SDS
DWG NO. 100106 (SPECIFICATION, PRINTED
WIRING ASSEMBLY).
3. REF DWGS SCHEMATIC NO. 103057
P W BOARD NO. 100639
TEST SPEC. NO.
- 4 IDENTIFY PER SDS DWG NO. 100198.

REV.	DESCRIPTION	DATE
B	REVISED & REDRAWN, SEE REV E.O.	
C	SEE REVISION E.O.	
D	SEE REV E.O.	
E	SEE REV E.O.	



NO. REQ	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN	<div style="text-align: right;"> </div>	
1. TOLERANCES .01 ± .000 ANGULAR .001 ± .010 ± 1/2° 2. BREAK ALL SHARP EDGES .010 APPROX. 3. HATCH SURFACES ✓ 4. ALL DIM. IN INCHES		CHECK	1542 FIFTEENTH STREET SANTA MONICA, CALIFORNIA ASSEMBLY, PRINTED WIRING OPERATIONAL AMPLIFIER	
MODEL NO. HX 20-0		APPR.	SIZE C	DWG. NO. 103056
NEXT ASSY.		SCALE 1/1		DO NOT SCALE DRAWING

103056 E

101

148

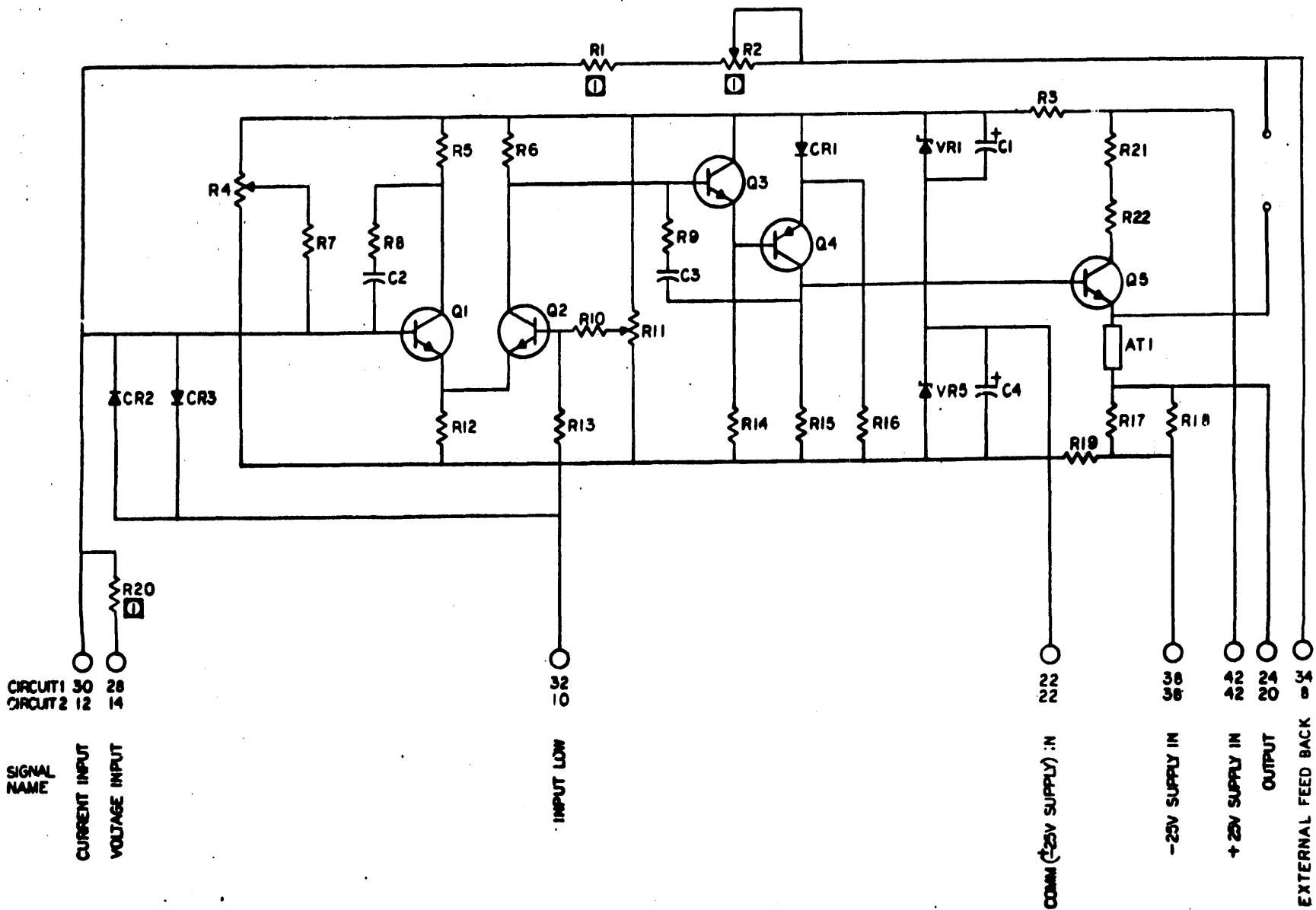
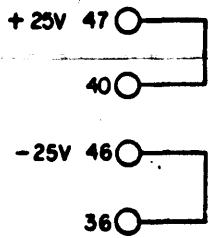
REV	DESCRIPTION	CHK	DATE
A	RELEASED TO MFG		
B	SEE REVISION 6.0.		

DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	REV. NO.
HX20-0	OPERATIONAL AMPLIFIER	SDS	D
MATERIAL LIST		SDS	
DATE	BY	DATE	BY
5/9/63	J. M. ...	5/9/63	J. M. ...
5/9/63	J. M. ...	5/9/63	J. M. ...
5/9/63	J. M. ...	5/9/63	J. M. ...
TITLE		OPERATIONAL AMPLIFIER	
SCALE		NO. OF SHEETS DRAWING SHEET	
SCALE		103057 B	

POLARIZING PINS: 4 & 26

NOTES:

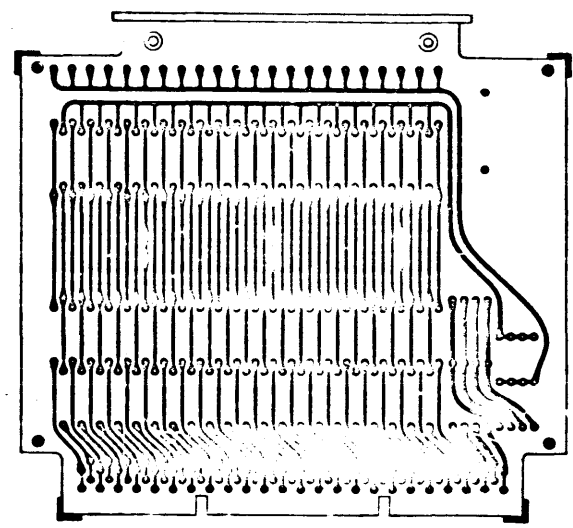
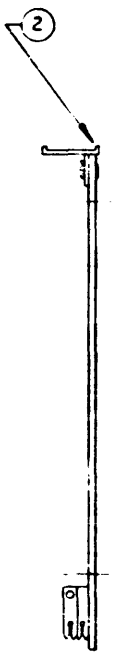
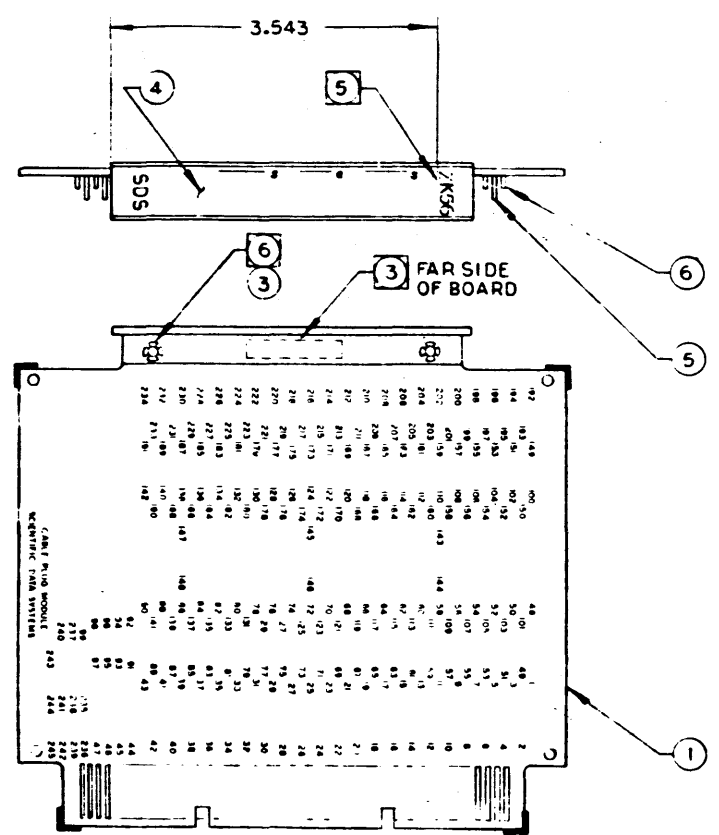
- Ⓛ ON SOME MODELS, ONE OR MORE OF THE RESISTORS R1, R2 AND R20 ARE OMITTED.



6 INSTALL ITEM 3 FROM FAR SIDE OF BOARD.

- NOTES: UNLESS OTHERWISE SPECIFIED
1. SEE MATERIAL LIST NO. 103016 SHEET 2
 2. ASSEMBLED BOARD TO CONFORM TO SDS DWG NO. 100106 (SPECIFICATION, PRINTED WIRING ASSEMBLY).
 3. IDENTIFY PFR SDS DWG NO. 100193.
 4. REF. DWGS: SCHEMATIC NO. 103015
PW BD NO. 101652-034
 5. NOMENCLATURE: 10 POINT ALT GOTHIC -
COLOR: BLACK.
CENTERED APPROX AS SHOWN.

REV	DESCRIPTION	CHK	DATE	APPROVED
A	RELEASED TO YFG			



NO REQ	DRAWING NO	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN	V.M.	4/26/60
1. TOLERANCES FR - 0.005 ANGULAR TSS - 0.10		CHECK	<i>[Signature]</i>	<i>[Signature]</i>
2. BREAK ALL SHARP EDGES R10 APPROX		APPR	<i>[Signature]</i>	<i>[Signature]</i>
3. WASH SURFACES ✓				
4. ALL DIM IN INCHES				
MODEL NO ZK 56		SDS SCIENTIFIC DATA SYSTEMS 152 FIFTEENTH STREET, SANTA MONICA, CALIFORNIA		TITLE ASSEMBLY, PRINTED WIRING, TERMINATION MODULE (20 S)
NEXT ASSY		SIZE D	DWG NO 103016	A
		SCALE 1/1	DO NOT SCALE DRAWING	SHEET 1 OF 2

REV	A	MATERIAL LIST			ML	DWG. NO.	REV	
		SDS		SCIENTIFIC DATA SYSTEMS		103016	A	
ML	103016	TERMINATION MODULE (205)		MOD #	DATE	SHEET 2 OF 2		
		ITEM	DWG. TITLE	DWG. NO.	NO. REQ	REMARKS OR CKT. DESIG.		
		1	Board, Printed Wiring	101652-034	1			
		2	Handle, Circuit Card	100016	1			
		3	Rivet, Drive	100278-003	2			
		4	Strip, Marker	100197	1			
		5	Contact, Conn. Upper	100097	23			
		6	Contact, Conn. Lower	100098	24			
		7	Resistor, 1/2 w	100111-471	14	(4-51) (7-54) (10-57) (13-60)		
						(16-63) (19-66) (22-69) (25-72)		
						(28-75) (31-78) (34-81) (37-84)		
						(40-87) (43-90)		
		8	Capacitor MYLAR	100308-682	14	(2-49) (5-52) (8-55) (11-58)		
						(14-61) (17-64) (20-67) (23-70)		
						(26-73) (29-76) (32-79) (35-82)		
						(38-85) (41-88)		
		9	Capacitor TANTALUM	100311-475	1	+ (1-48)		
		10	Diode, SDS 107	100324	14	(3 - X 50) (6 - X 53)		
						(9 - X 56) (12 - X 59)		
						(15 - X 62) (18 - X 65)		
						(21 - X 68) (24 - X 71)		
						(27 - X 74) (30 - X 77)		
						(33 - X 80) (36 - X 83)		
						(39 - X 86) (42 - X 89)		
		11	Tubing, Teflon	100274-022	6"			
		12	Wire, Solid Bare	100042-024	12"	(149-192) (150-152) (153-155)		
						(156-158) (159-161) (162-164)		
						(165-167) (168-170) (171-173)		
						(174-176) (177-179) (180-182)		
						(183-185) (186-188) (189-191)		
						(44-91) (235-236) (102-104)		
						(103-105) (108-110) (109-111)		
						(114-116) (115-117) (120-122)		
						(121-123) (126-128) (127-129)		
						(132-134) (133-135) (138-140)		
						(139-141)		

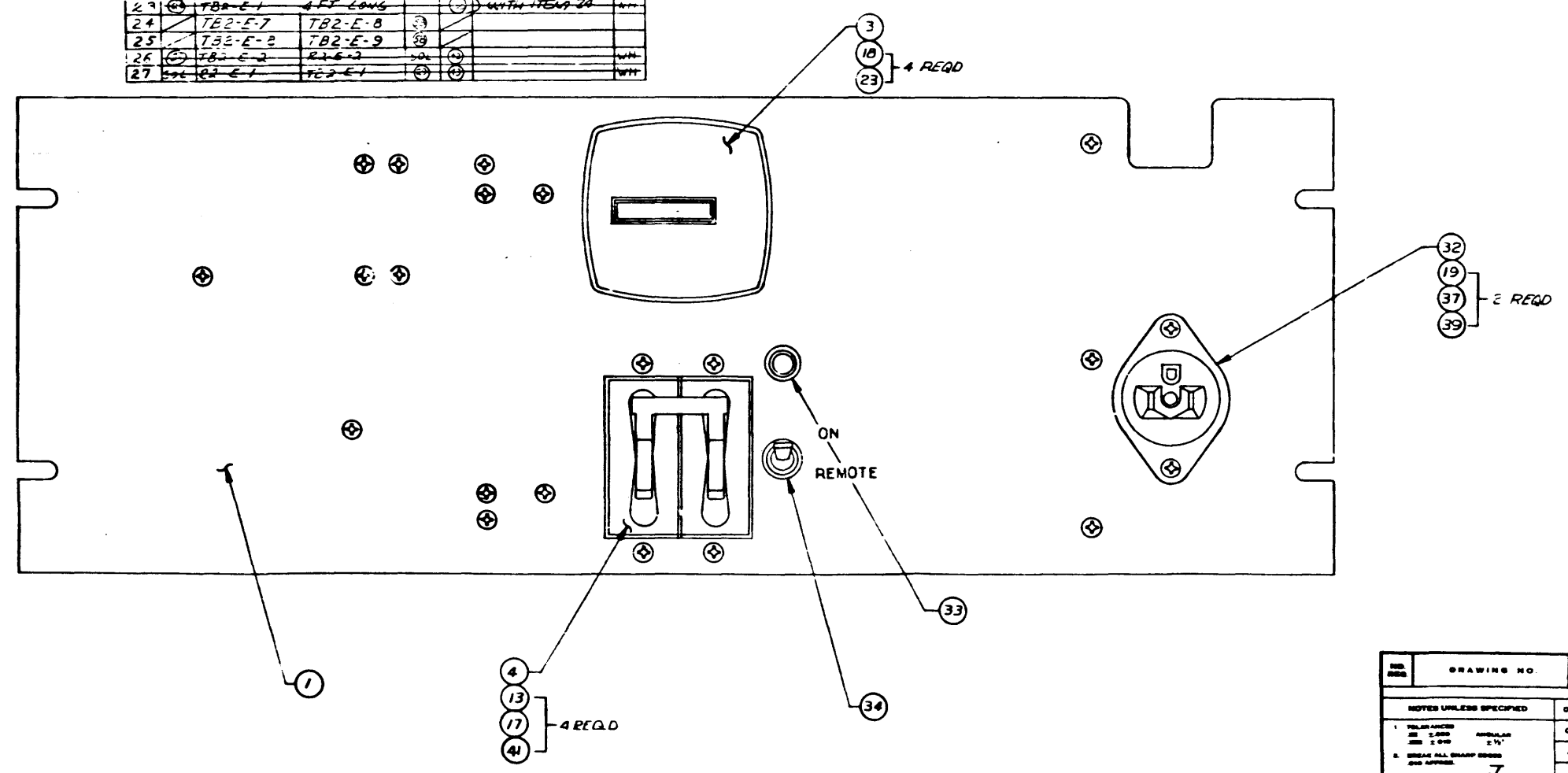
SDS-E-106

153

NOTES: UNLESS OTHERWISE SPECIFIED
 1. SEE MATERIAL LIST 101418 SHTS 3 & 4.
 2. IDENTIFY PART PER SDS 100198.

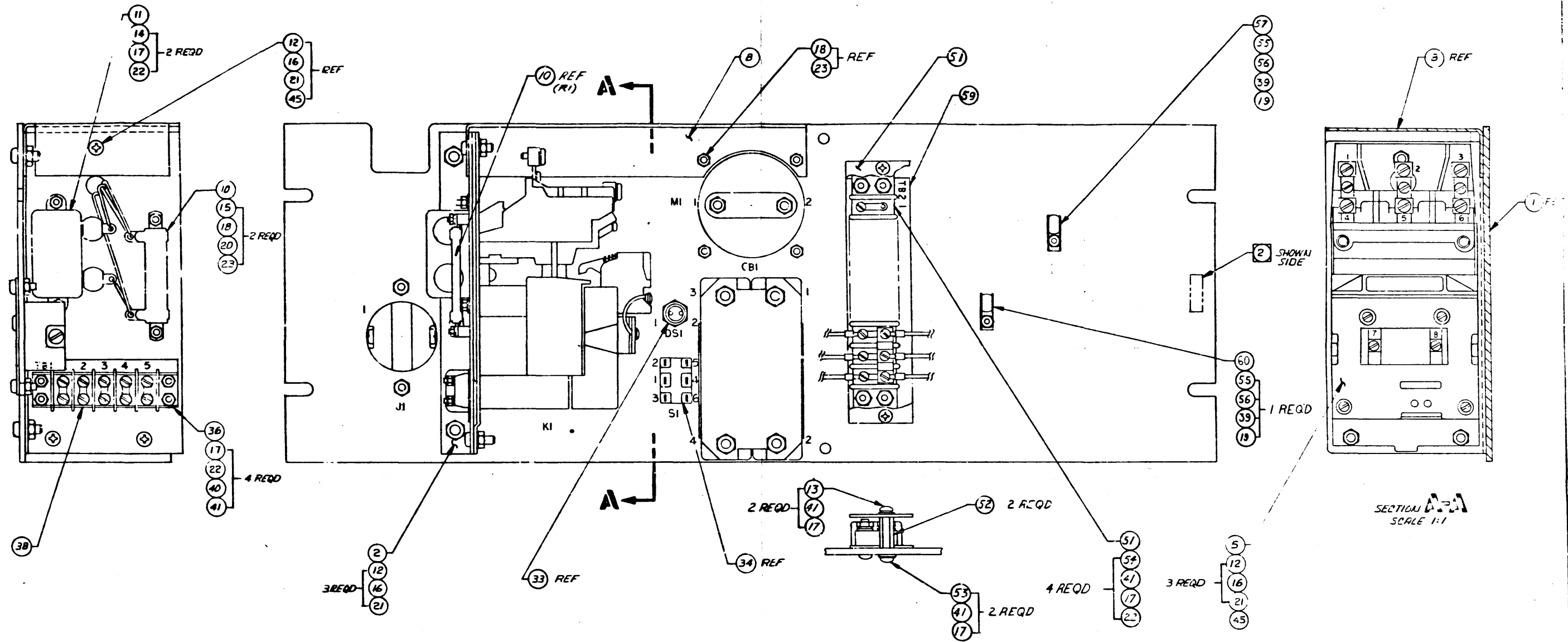
REVISIONS				
REV	DESCRIPTION	CHK	DATE	APPROVED
E	REVISED FROM PELHAM, SEE LOG			
F	SEE REV. E.O.			
G	SEE REV. E.O.			
H	SEE REV E.O.			
J	SEE REV E.O.			
K	SEE REV E.O.			
L	SEE REV E.O.			
M	SEE REV E.O.			
N	SEE REV E.O.			
P	SEE REV. E.O.			

WIRE NO.	TERM	FROM	TO	TERM	WIRE TYPE	NOTES	DRWR
1	(3)	CB1-E-2	K1-E-5	(2)	(3)		SLK
2	(2)	K1-E-8	R1-E-2	(3)	(3)		WH
3	SOL	R1-E-1	C1-E-1	(3)	(3)		WH
4	SOL	C1-E-2	K1-E-7	(2)	(3)		WH
5	(2)	CB1-E-4	K1-E-4	(2)	(2)		WH
6	(3)	K1-E-1	TB2-E-8	(3)	(2)		WH
7	(3)	K1-E-2	M1-E-2	(3)	(2)		BLK
8	(3)	TB2-E-7	6 FT. LONG	(3)	(2)	WRAP TOGETHER WITH ITEM 24	WH
9	(3)	M1-E-2	6 FT. LONG	(3)	(2)		BLK
10	(3)	J1-E-1	TB1-E-1	(3)	(2)		WH
11	(3)	J1-E-2	TB1-E-2	(3)	(2)		WH
12	(3)	TB1-E-1	DS1-E-1	(3)	(2)		WH
13	SOL	DS1-E-1	SI-E-3	(3)	(2)		WH
14	(3)	TB1-E-2	DS1-E-2	(3)	(2)		WH
15	SOL	DS1-E-2	SI-E-6	(3)	(2)		WH
16	SOL	SI-E-4	K1-E-8	(3)	(2)		WH
17	SOL	SI-E-2	K1-E-4	(3)	(2)		WH
18	SOL	SI-E-5	K1-E-5	(3)	(2)		WH
19	SOL	K2-E-7	TB2-E-2	(3)	(2)		WH
20	(3)	M1-E-1	TB2-E-9	(3)	(2)		WH
21	SOL	K2-E-3	M1-E-1	(3)	(2)		WH
22	SOL	K2-E-8	3 FT LONG	(3)	(2)	WRAP TOGETHER WITH ITEM 24	WH
23	(3)	TB2-E-1	4 FT LONG	(3)	(2)	WRAP TOGETHER WITH ITEM 24	WH
24	(3)	TB2-E-7	TB2-E-8	(3)	(2)		WH
25	(3)	TB2-E-2	TB2-E-9	(3)	(2)		WH
26	(3)	TB2-E-3	R1-E-2	(3)	(2)		WH
27	SOL	R2-E-1	TB2-E-1	(3)	(2)		WH



NO.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
NOTES UNLESS SPECIFIED				
1. TOLERANCES UNLESS OTHERWISE SPECIFIED	DRAWN	DATE	MATERIAL LIST	
2. BREAK ALL SHARP EDGES AND APPROX.	CHECK	DATE	SDS SCIENTIFIC DATA SYSTEMS	
3. HATCH SURFACES	APPR.	DATE	1542 FIFTEENTH STREET SANTA MONICA CALIFORNIA	
4. ALL DIM. IN INCHES			TITLE	
			ASSY, POWER DISTRIBUTION PANEL	
MODEL NO. 310/320	REV. D	OWS NO. 101418	P	
ITEMY ASSY 100913			SCALE 1:1 DO NOT SCALE DRAWING SHEET 1 OF 4	
100943				

REVISIONS		101-418	P
REV	DESCRIPTION	CHK	DATE
	SEE SHT ONE		



NO. REQ	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION
MATERIAL LIST			
NOTES UNLESS SPECIFIED		DRAWN: <i>[Signature]</i> CHECK: <i>[Signature]</i> APPR: <i>[Signature]</i>	SDS SCIENTIFIC DATA SYSTEMS 1545 FIFTEENTH STREET, SANTA MONICA, CALIFORNIA
1. TOLERANCES: IN: 0.005 ANGULAR 0.5° DEC: 0.010 2. BREAK ALL SHARP EDGES AND APPROX. 3. HATCH SURFACES ✓ 4. ALL DIM. IN DECIMALS		TITLE ASSY, POWER DISTRIBUTION PANEL	
MODEL NO. 910-920 NEXT ASSY. 100913-100349		SIZE: D DWG NO.: 101-418	P
SCALE		DO NOT SCALE DRAWING	SHEET 2 OF 4

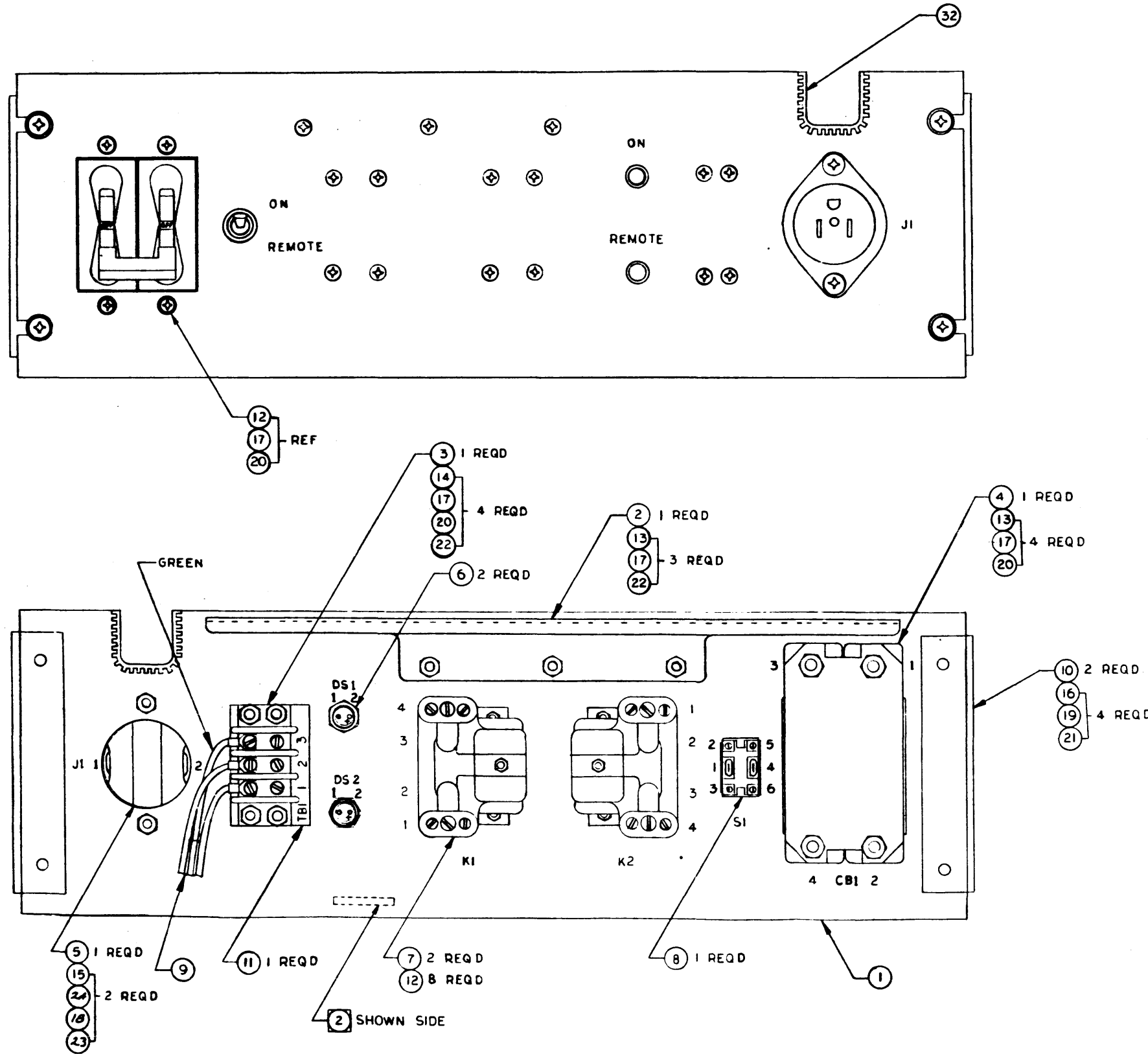
REV	DWG. NO.	MATERIAL LIST	SDS	SCIENTIFIC DATA SYSTEMS	ML	DWG. NO.	REV
P	101418	DWG. TITLE				101418	P
		ASSY, POWER DIST. PANEL		MOD # 910/920	DATE	SHEET 3	OF 4
ITEM	DWG. TITLE	DWG. NO.	NO. REQ.	REMARKS OR CKT. DESIG.			
1	Panel, Power Dist.	101251	1				
2	Angle, Contactor Mtg	101226	1				
3	Meter, Time	101233	1				
4	Circuit, Breaker	101231	1				
5	Contactor, 600V AC	101230	1				
6	Relay 115VAC	101425	2				
7	Relay 50VDC	101426	1				
8	Cover, Contactor & Meter	101588	1				
9	Assy, Cable Plug Module (PI2)	101640	1				
10	Resistor, W. W. 20 watt	101155-100	1	R1			
11	Capacitor, 1000 VDC	100992-003	1	C1			
12	Screw, Pan Hd	100012-508	6				
13	Screw, Pan Hd	100012-306	4				
14	Screw, Flat Hd	100039-306	2				
15	Screw, Flat Hd	100039-208	2				
16	Washer, Lock	100024-500	6				
17	Washer, Lock	100024-300	18				
18	Washer, Lock	100024-200	6				
19	Washer, Lock	100024-400	4				
20	Washer, Flat	100018-200	2				
21	Nut, Hex Machine	100008-500	6				
22	Nut, Hex Machine	100008-300	10				
23	Nut, Hex Machine	100008-200	6				
24	Tubing, Spiral	101625-003	x	as req'd			
25	Wire, Strd, Teflon Insul.	100238-016	6"				
26	Wire, Stranded Insul.	101881-110	8 ft				
27	Wire, Stranded Insul.	101881-010	8 ft				
28	Wire, Strd, Teflon Insul	100238-022	7 ft				
29	Term. Insul. Ring Tongue	100343-003	9				
30	Term. Insul. Ring Tongue	100343-007	5				
31	Term. Insul. Ring Tongue	100989-004	10				
32	Receptacle, 3 Wire Groundng	101430	1				
33	Lamp, Neon	100531	1				
34	Switc h, Toggle, DPDT	100509	1				
35	Terminal, Ring Tongue	100989-002	4				
36	Block, Term. Molded Barrier	100094-005	1				
37	Screw, Pan Hd	100012-406	2				
38	Strip, Marker	107954-051	1				

SDS-E-106

157

NOTES: UNLESS OTHERWISE SPECIFIED.
 1. SEE MATERIAL LIST NO. 101810 SMT. 2.
 2. IDENTIFY PART PER SDS 100198

REVISIONS			
REV.	DESCRIPTION	CHK.	DATE
C	SEE REVISION E.O.		
D	SEE REV. E.O.		
E	SEE REV E.O.		
F	SEE REV E.O.		



WIRE NO	TERM	FROM	TO	TERM	WIRE TYPE	NOTES	COLOR
1	(30)	J1-E-1	TBI-E-1	(29)	(26)		WH
2	(30)	J1-E-2	TBI-E-2	(29)	(26)		WH
3	(29)	TBI-E-1	DS2-E-1	SOL	(26)		WH
4	(29)	TBI-E-1	SI-E-3	SOL	(26)		WH
5	(29)	TBI-E-2	DS2-E-2	SOL	(26)		WH
6	(29)	TBI-E-2	SI-E-6	SOL	(26)		WH
7	SOL	DS1-E-1	K1-E-1	(29)	(26)		WH
8	SOL	DS1-E-2	K2-E-4	(29)	(26)		WH
9	SOL	K1-E-2	K2-E-3	SOL	(26)		WH
10	SOL	K2-E-3	SI-E-1	SOL	(26)		WH
11	SOL	K1-E-3	K2-E-2	SOL	(26)		WH
12	SOL	K2-E-2	SI-E-4	SOL	(26)		WH
13	SOL	SI-E-2	CBI-E-2	(29)	(26)		WH
14	(31)	CBI-E-2	K1-E-4	(31)	(26)		BLK
15	SOL	SI-E-5	CBI-E-4	(29)	(26)		WH
16	(31)	CBI-E-4	K2-E-1	(31)	(27)		WH

NO. REV.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
NOTES UNLESS SPECIFIED		MATERIAL LIST		
1. TOLERANCES XX ± 0.30 ANGULAR XXX ± 0.10 2. BREAK ALL SHARP EDGES AND APPROX. 3. HATCH SURFACES ✓ 4. ALL DIM. IN INCHES		CHECK: [Signature] APPR: [Signature]	SDS SCIENTIFIC DATA SYSTEMS 1542 FIFTEENTH STREET, SANTA MONICA, CALIFORNIA	
MODEL NO. 9110, 9119, 9210		TITLE ASSY, POWER DIST. PANEL 5 1/4		
NEXT ASSY: 100954 100880, 101086		SIZE D	DWG. NO. 101810	F
157		SCALE 1/1	DO NOT SCALE DRAWING	SHEET 1 OF 2

REVISIONS			
REV	DESCRIPTION	CHK	DATE
	SEE SH1 ONE		

REPLACEMENT PARTS LIST

ITEM	DESCRIPTION	DESIGNATION	QTY	SUPPLIER CODE (SEE INDEX)
1	CORD, A.C. 1/2/3 SPT-3 CORD WITH *PA-3 PLUG	P1, P4	2	101
2	CONNECTOR, 5 WIRE FEMALE *3523	P2	1	102
3	CONNECTOR, 3 WIRE MALE *3331	P3	1	102
4	RECEPTACLE, 3 WIRE FEMALE *5256	J1	1	102
5	CONNECTOR, 5 WIRE MALE *3525	J2	1	102
6	WIREMCLD, A.C. *G-20GB306	J4 THRU J9	1	103
7	LAMP, NEON *249-784H-1437	D51, D52	2	104
8	RELAY, SPST *GMS-13A/115 VAC	K1, K2	2	79
9	CIRCUIT BREAKER, DOUBLE POLE *2XAM1516-35-250 VAC 60 CYCLE CURVE 2	CBI	1	105
10	SWITCH, TOGGLE DPDT	S1	1	106

NO. REQ.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN	SDS SCIENTIFIC DATA SYSTEMS 242 FIFTEENTH STREET, SANTA MONICA, CALIF. 90401	
1. TOLERANCES EX. ±.030 ANGULAR SEE 2.010 2.1"		CHECK	TITLE	
BREAK ALL SHARP EDGES BIG APPROX		APPR	SCHEMATIC POWER DISTRIBUTION	
2. HATCH SURFACES ✓				
3. ALL DIM. IN INCHES				
MODEL NO. 9110, 9114, 9119, 9210, 9211, 9219			SIZE	DWG NO.
NEXT ASSY 01-01, 0008, 100086, 100091			D	102334
		SCALE	DO NOT SCALE DRAWING	SHEET 2 OF 2

REVISIONS					102209	B
REV.	DESCRIPTION	CHK	DATE	APPROVED		
A	Released to Mfg					
B	See Rev. E. O.					

NO. REQ.	DRAWING NO	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
				108

NOTES UNLESS SPECIFIED					DRAWN		MATERIAL LIST		SDS SCIENTIFIC DATA SYSTEMS		
1. TOLERANCES .XX ±.030 ANGULAR ± 1/2° .XXX ±.010 2. BREAK ALL SHARP EDGES .010 APPROX. 3. MACH. SURFACES ✓ 4. ALL DIM. IN INCHES					CHECK	<i>J. Hill</i>	<i>11/10/62</i>	1542 FIFTEENTH STREET SANTA MONICA CALIFORNIA			
					APPR.	<i>C. Benson</i>	<i>12/20/62</i>	TITLE			
								INSTALLATION PROCEDURE, PRIORITY INTERRUPT			
MODEL NO.									SIZE	DWG. NO.	
9128									A	102209	B
NEXT ASSY.									SCALE	DO NOT SCALE DRAWING	SHEET 1 of 3
100973											

1. Combinations of \bar{N}_5 , \bar{N}_6 , \bar{N}_7 , \bar{N}_8 , & \bar{N}_9 signal diodes are removed from Cable Plug Mod. P8, depending on how many additional chassis of priority interrupt are used.

No. of Additional Chassis Used	Remove Diodes Attached to following points on P8:
1	163, 164, 166, 177
2	163, 164, 166
3	163, 164, 177
4	163, 164
5	163, 165, 166, 177
6	163, 165, 166
7	163, 165, 177
8	163, 165
9	163, 166, 177
10	163, 166
11	163, 177
12	163
13	164, 165, 166, 177
14	164, 165, 166
15	164, 165, 177
16	164, 165
17	164, 166, 177
18	164, 166
19	164, 177
20	164
21	165, 166, 177
22	165, 166
23	165, 177
24	165
25	166, 177
26	166
27	177
28	none

TITLE	INSTALLATION PROCEDURE PRIORITY INTERRUPT	SCIENTIFIC DATA SYSTEMS
		102209
		B
		SHEET 2 OF 3

2. To convert any standard priority interrupt channel to a single execution channel, a jumper must be added as follows:

CHANNEL	JUMPER
I 5	27 N-E-1 To 30N-E-29
I 6	2 30N-E-18
I 7	4 31N-E-29
I 8	6 31N-E-18
I 9	8 32N-E-29
I 10	9 32N-E-18
I 11	11 33N-E-29
I 12	13 33N-E-18
I 13	14 34N-E-29
I 14	15 34N-E-18
I 15	16 35N-E-29
I 16	17 35N-E-18
I 17	19 36N-E-29
I 18	21 36N-E-18
I 19	23 37N-E-29
I 20	24 37N-E-18
I 21	25 38N-E-29
I 22	26 38N-E-18
I 23	27 39N-E-29
I 24	28 39N-E-18
I 25	30 40N-E-29
I 26	31 40N-E-18
I 27	32 41N-E-29
I 28	34 41N-E-18
I 29	35 42N-E-29
I 30	36 42N-E-18
I 31	37 43N-E-29
I 32	39 43N-E-18
I 33	40 44N-E-29
I 34	41 44N-E-18
I 35	27 N-E-42 45N-E-29
I 36	29 N-E-38 To 45 N-E-18

NOTE: This format varies for each additional chassis. Jumpers are typical.

I 5 thru I 36 - Chassis 1
 I 37 " I 68 - " 2
 " " " " " "
 " " " " " "
 I 869 thru I 900 - Chassis 28

TITLE	INSTALLATION PROCEDURE PRIORITY INTERRUPT	SDS SCIENTIFIC DATA SYSTEMS
		102209 B
		SHEET 3 OF 3

SDS-6-117

REVISIONS				
REV	DESCRIPTION	CHK	DATE	APPROVED
A	Pre-Released			
B	Released to Mfg			

NO. REG.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.

MATERIAL LIST				
NOTES UNLESS SPECIFIED 1. TOLERANCES .XX ±.030 ANGULAR .XXX ±.010 ±1/2° 2. BREAK ALL SHARP EDGES .010 APPROX. 3. MACH. SURFACES ✓ 4. ALL DIM. IN INCHES	DRAWN			SDS SCIENTIFIC DATA SYSTEMS 1542 FIFTEENTH STREET SANTA MONICA CALIFORNIA TITLE CHART, MODULE LOCATION PRIORITY INTERRUPT (9129)
	CHECK			
	APPR.			
MODEL NO.	9129		SIZE	DWG NO.
NEXT ASSY.	101217		A	101191
			SCALE	DO NOT SCALE DRAWING
				SHEET 1 of 2

CONNECTOR LOCATION

	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Type																									
Key Loc.																									

CONNECTOR LOCATION

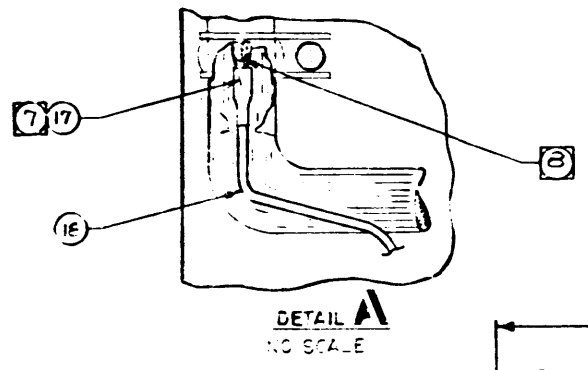
	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
Type	SK 55	SK 55	SK 55	SK 55	SK 55	SK 55	SK 55	SK 55												
Key	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	8	6	2	
Loc.	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	16	14	40	

LET.

CHASSIS	N
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Note Location 1 - 25 on Fixed Chassis
 26 - 45 on Swing out Chassis

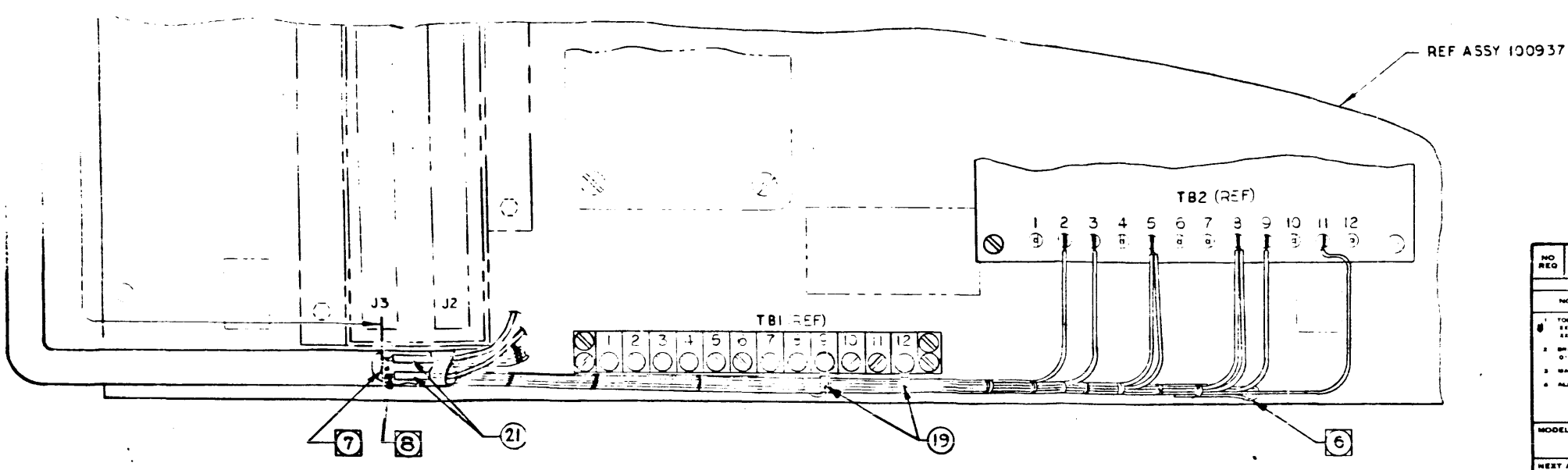
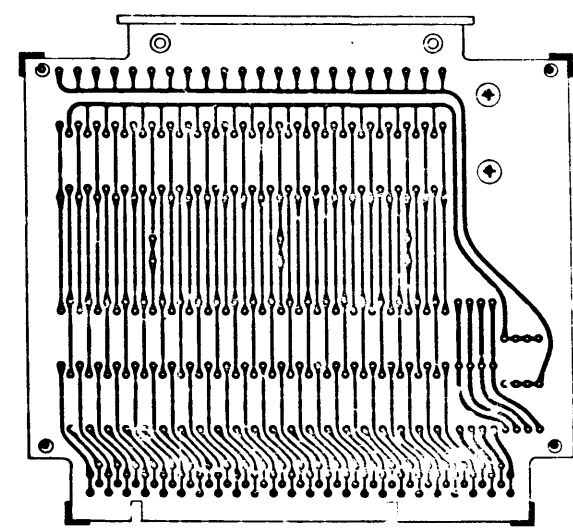
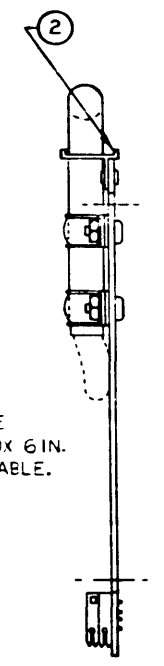
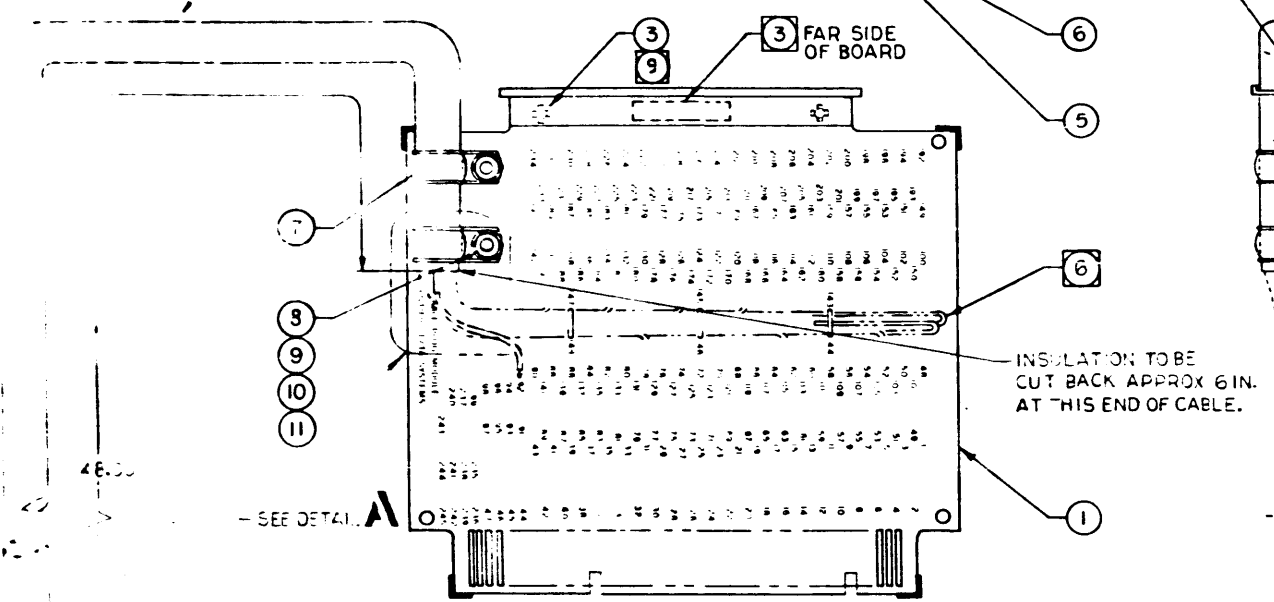
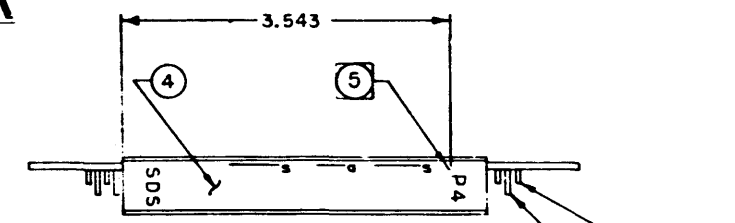
TITLE	CHART, MODULE LOCATION PRIORITY INTERRUPT (9129)	SCIENTIFIC DATA SYSTEM
		101191
		SHEET 2 OF 2



- 7 SLIDE VINYL INSULATION BACK & STRIP ALL SHIELDS TO THIS POINT. AFTER INSTALLING ITEMS 17 & 18 RETURN INSULATION TO ORIGINAL POSITION.
- 8 DRAIN WIRES (2 BARE STRD WIRES) REF WIRES #2 & 3 ON 101153
- 9 INSTALL ITEM 3 FROM FAR SIDE OF BOARD

- NOTES: UNLESS OTHERWISE SPECIFIED.
- 1 SEE MATERIAL LIST NO. 00088 SHEET 2.
 - 2 ASSEMBLED BOARD TO CONFORM TO SDS DWG. NO. 100106 (SPECIFICATION, PRINTED WIRING ASSEMBLY).
 - 3 IDENTIFY PER SDS DWG NO. 10098.
 - 4 REF. DWGS: WIRE LIST NO. 101153. PWB NO. 100280-034.
 - 5 NOMENCLATURE: 10 POINT ALT GOTHIC - COLOR: BLACK. CENTERED APPROX AS SHOWN.
 - 6 SPARES TO BE LACED IN WITH CABLE.

REVISIONS				
REV	DESCRIPTION	CHK	DATE	APPROVED
	SEE REVISION E.O.			
E	SEE REVISION E.O.			
F	SEE REVISION E.O.			



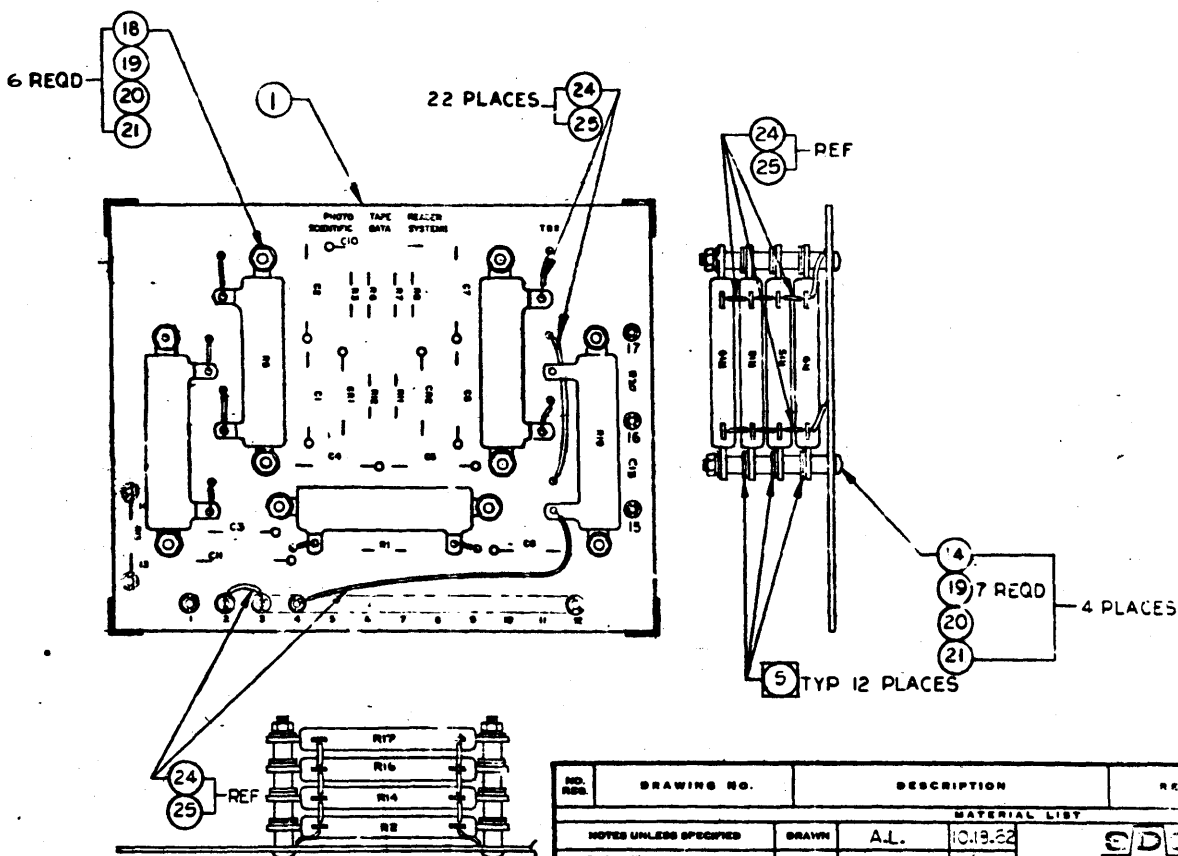
NO REQ	DRAWING NO	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO
MATERIAL LIST				
NOTES UNLESS SPECIFIED				
1	TOLERANCES	ANGULAR		
2	BREAK ALL SHARP EDGES	0.3 APPROX		
3	RATCH SURFACES			
4	ALL DIM IN INCHES			
MODEL NO 9131		SDS SCIENTIFIC DATA SYSTEMS		
NEXT ASSY 100937		TITLE ASSEMBLY, PRINTED WIRING, CABLE		
		SIZE D	DWG NO 100888	F
		SCALE 1/1	DO NOT SCALE DRAWING	SHEET 1 OF 2

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NOTES: UNLESS OTHERWISE SPECIFIED.

1. SEE MATERIAL LIST NO. 101107 SHEET 2.
2. ASSEMBLED BOARD TO CONFORM TO SDS DWG NO. 100106 (SPECIFICATION PRINTED WIRING ASSEMBLY).
3. REF DWGS: P.W. BD NO. 101106, SCHEMATIC NO. J01105 & 103628.
4. INSTALL ITEMS 8, 9 & 13 AFTER DIP SOLDERING.
5. DO NOT USE ITEM 19 (AS SPACER) IF RESISTOR STANDOFF IS MORE THAN .250 LG.

REVISIONS			
REV	DESCRIPTION	CHK	DATE
D	SEE REVISION E.O.		
E	SEE REV. E.O.		
F	SEE REVISION E.O.		
G	SEE REVISION E.O.		
H	SEE REV. E.O.		
J	SEE REV. E.O.		
K	SEE REV. E.O.		



169

101107 K

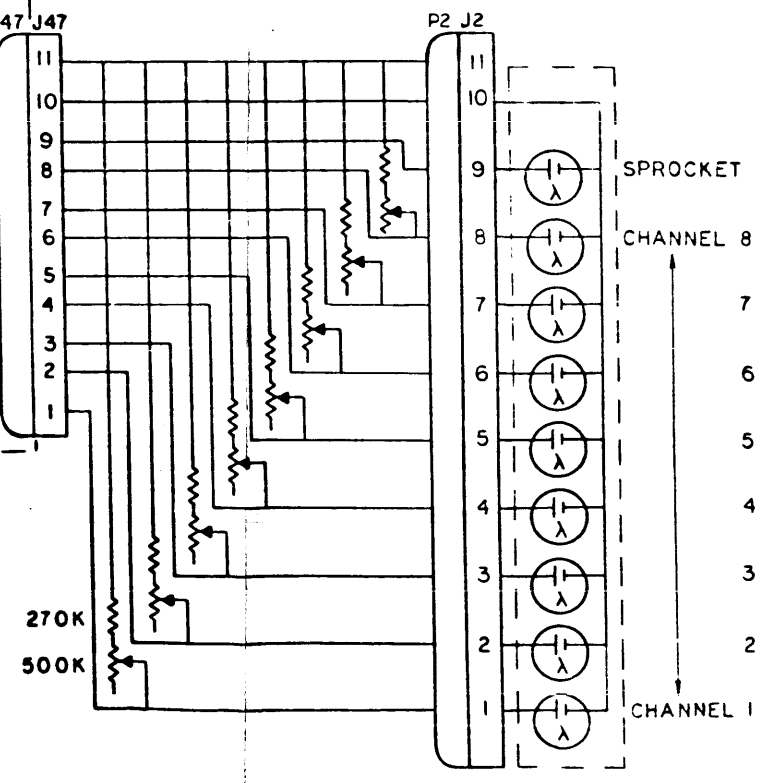
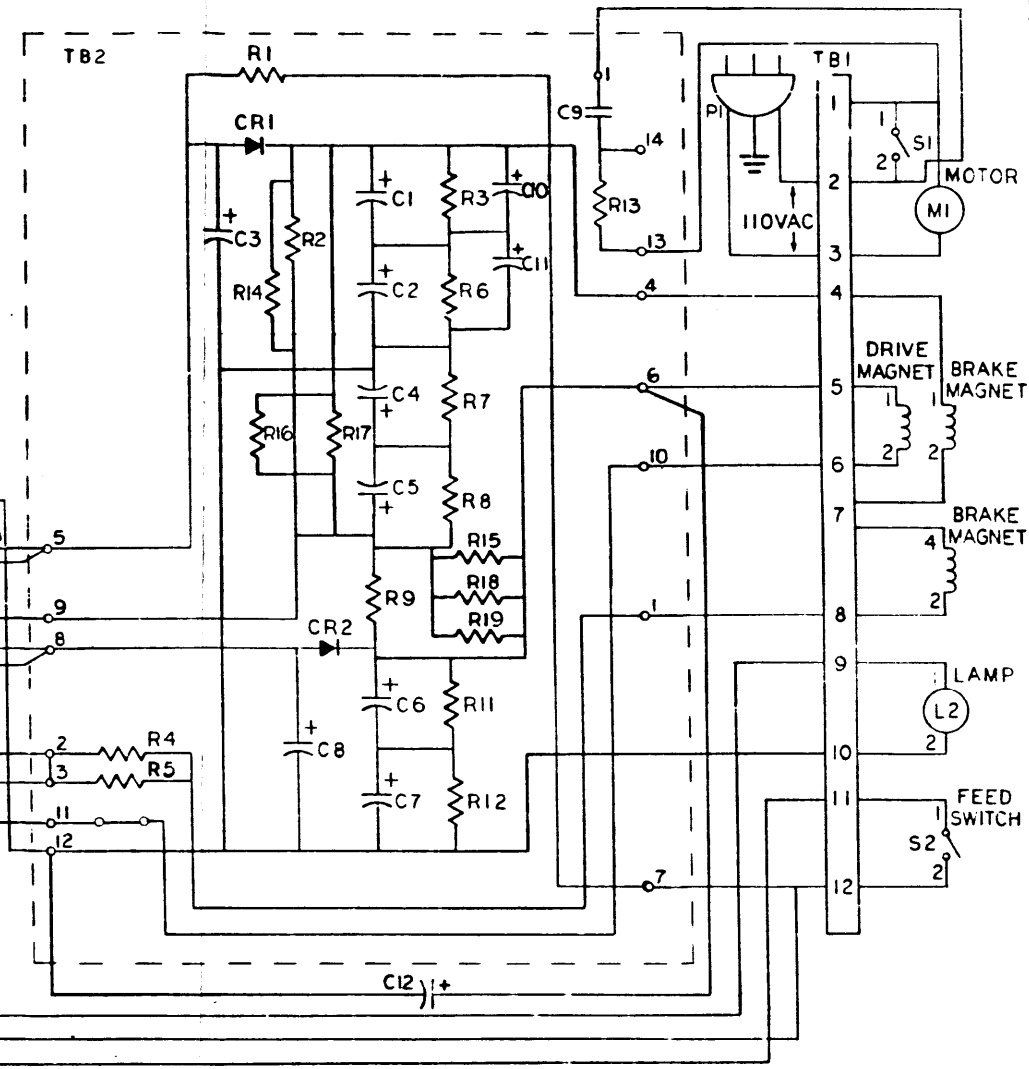
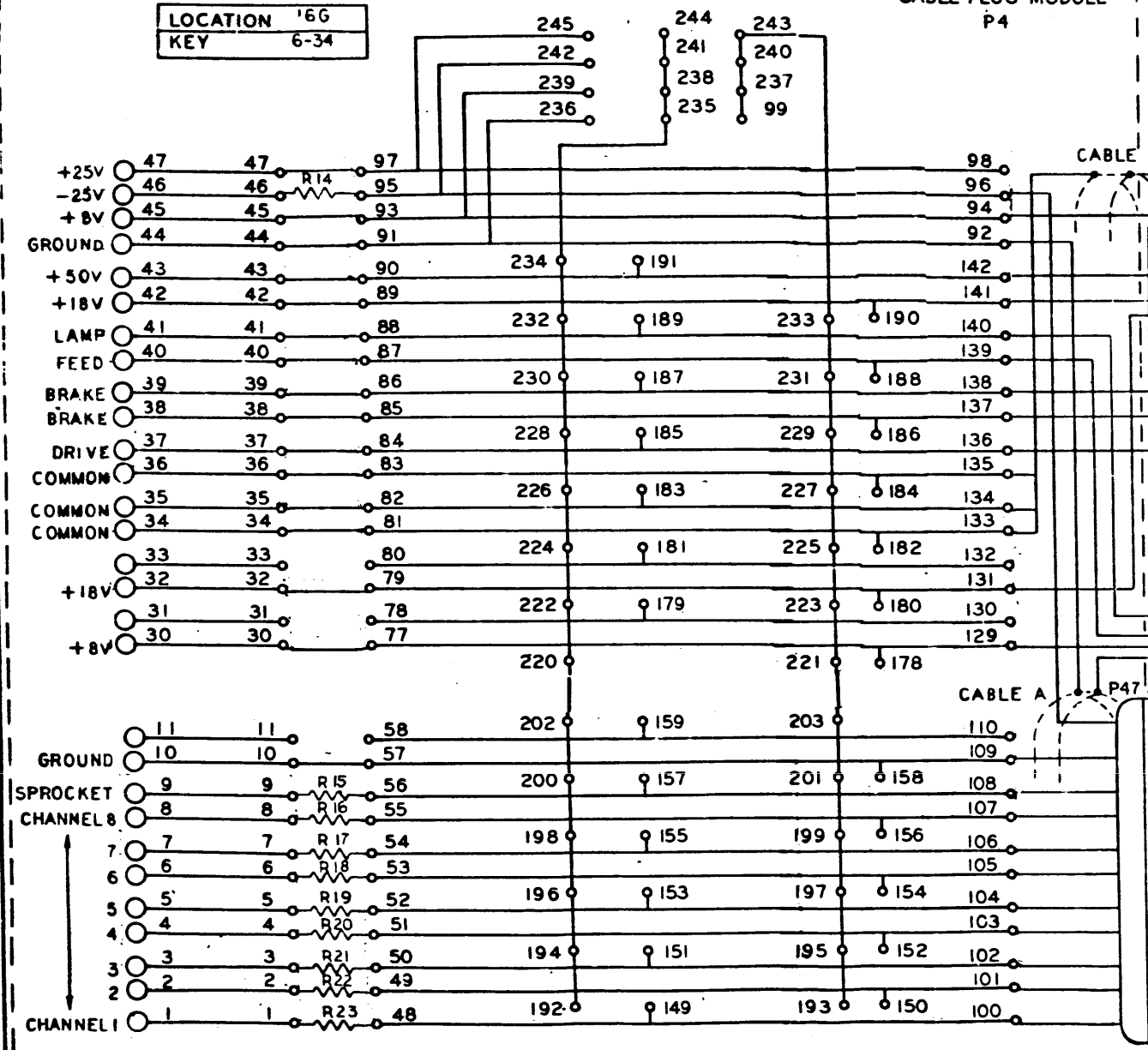
NO. REV.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	CHK.
		MATERIAL LIST		
NOTES UNLESS SPECIFIED				
1. TOLERANCES UNLESS SPECIFIED		DRAWN	A.L.	1019.62
2. DIMENSIONS UNLESS SPECIFIED		CHECK	E.L. Bond	10/23/62
3. CHECK ALL DIMENSIONS AND ANGLES		APPD.	E.L. Bond	10/23/62
4. CHECK DIMENSIONS		TITLE		
5. ALL DIM. IN INCHES		ASSEMBLY, PRINTED WIRING BOARD, TAPE READER		
FORM NO. 9131		REV.	DWG NO.	101107
FORM REV. 106712		SCALE	DO NOT SCALE DRAWING	SHEET 1 OF 2

REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH. (MIL. STD. 16B)

REV	DESCRIPTION	CHK	DATE
A	RELEASED TO M.D.		
B	FILE REVISION		
C	SEE REV. E.O.		
D	SEE REV. E.O.		
E	SEE REV. E.O.		
F	SEE REV. E.O.		
G	SEE REV. E.O.		

LOCATION '66
KEY 6-34

CABLE PLUG MODULE
P4



NO. REQ	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
3	9131	SCHEMATIC TAPE READER		
2	100837			

NOTES UNLESS SPECIFIED		MATERIAL LIST	
1. TOLERANCES AS SHOWN UNLESS OTHERWISE SPECIFIED	2. BREAK ALL SHARP EDGES .010 APPROX.	3. MACH. SURFACES	4. ALL DIM. IN INCHES
1. TOLERANCES AS SHOWN UNLESS OTHERWISE SPECIFIED	2. BREAK ALL SHARP EDGES .010 APPROX.	3. MACH. SURFACES	4. ALL DIM. IN INCHES

MODEL NO.	9131	SIZE	DWG NO.	D	101105
NEXT ASSY.	100837	SCALE	CONTRACT NO.	100837	

REV	DESCRIPTION	CHK	DATE	APPROVED
	SEE SHEET 215			

REPLACEMENT PARTS LIST

ITEM	DESCRIPTION	DESIGNATION	QTY	SUPPLIER CODE (SEE INDEX)
1	RESISTOR, 180Ω ± 2%	(P4) R5 THRU R23	9	16,17
2	22KΩ ± 2%	(TB2) R1 (P4) R14	2	16,17
3	82KΩ ± 2%	(TB2) R3, R5, R7, R8, R11, R12	6	16,17
4	WW 10Ω ± 5%	(TB2) R4, R5	2	99,100
5	10Ω ± 2%	(TB2) R13	1	36,38,73
6	RESISTOR, WW 500Ω ± 5%	(TB2) R2, R14, R16, R17	4	99,100
7	DIODE, SILICON 1N3159	(TB2) CR1, CR2	2	2,30,68
8	CAPACITOR, TANTALUM 15μF ± 20% 50V	(TB2) C4, C5	2	22,23,77
9	CAPACITOR, TANTALUM 4.7μF ± 20% 50V	(TB2) C3, C8	2	22,23,77
10	CAPACITOR, TANTALUM 47μF ± 20% 35V	(TB2) C1, C2, C5, C7, C10, C11	6	22,23,87
11	CAPACITOR, OIL 25μF ± 20% 1000V	(TB2) C9	1	80,81
12	CORD, AC CORD # 6/3 SPT-3 WITH PLUG # P2-3	P1	1	101
13	RESISTOR, W.W. 250Ω ± 5%	(TB2) R9, R15, R18, R19	4	99,100
14	CAPACITOR, ELECTROLYTIC 250μF 150V	C12	1	57,58,59

NO. REQ.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
		MATERIAL LIST		
NOTES UNLESS SPECIFIED		DRAWN	DATE	5/8/63
1. TOLERANCES UNLESS SPECIFIED		CHECK	DATE	5/8/63
2. DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED		APPR.	DATE	5/8/63
3. SURFACES UNLESS SPECIFIED		TITLE		
4. ALL DIMS. IN INCHES		SCHEMATIC TAPE READER		
MODEL NO.	3131	SIZE	DWG NO.	101105
NEXT ASSY	120937	SCALE	DO NOT SCALE DRAWING	SHEET 2

REV	DWG. NO.	MATERIAL LIST	SDS	SCIENTIFIC DATA SYSTEMS	ML	DWG. NO.	REV
K	101107	ASSY. P. W. BD. TAPE READER		(131)		101107	K
				MOD # 910/920			DATE 7-10-2 SHEET 2 OF 2
ITFM	DWG. TITLE	DWG. NO.	NO. REQ.	REMARKS OR CKT. DESIG.			
1	Bd., P. W. Tape Reader	101106	1				
2	Capacitor, Tantalum 50V	100311-156	2	C4, C5,			
3	Capacitor, Tantalum 50V	100311-475	2	C3, C8			
4	Capacitor, Tantalum 35V	100856	6	C1, 2, 6, 7, 10, 11			
5	Diode, Silicon (SDS 113)	101154	2	CR1, CR2			
6	Resistor, 1/2 watt	100111-222	1	R1			
7	Resistor, 1/2 watt	100111-822	6	R3, 6, 7, 8, 11, 12			
8	Resistor, Wirewound 20 W	101155-100	3	R4, R5, R10			
9	Resistor, Wirewound 20 W	101155-501	4	R2, R14, R16, R17			
10	Resistor, Wirewound 20 W	101155-010	1	R10			
11	Resistor, Prec. Metal Film	100580-100	2	R13, R20			
12	Capacitor, Oil Imprg. 1000 VDC	100992-003	1	C9			
13	Resistor, Wirewound 20W	101155-251	4	R9, R15, R18, R19			
14	Screw, Pan Head	100012-224	4				
15	Screw, Pan Hd Recessed	100012-304	2				
16	Washer, Flat	100018-300	2				
17	Washer, Lock Int. Tooth	100024-300	2				
18	Screw, Pan Hd	100012-208	6				
19	Washer, Flat	100018-200	34	(5)			
20	Washer, Lock, Int. Tooth	100024-200	10				
21	Nut, Hex Machine	100008-200	10				
22							
23							
24	Wire, Solid Bare	100042-024	1 ft				
25	Tubing, Teflon	100274-022	1 ft				

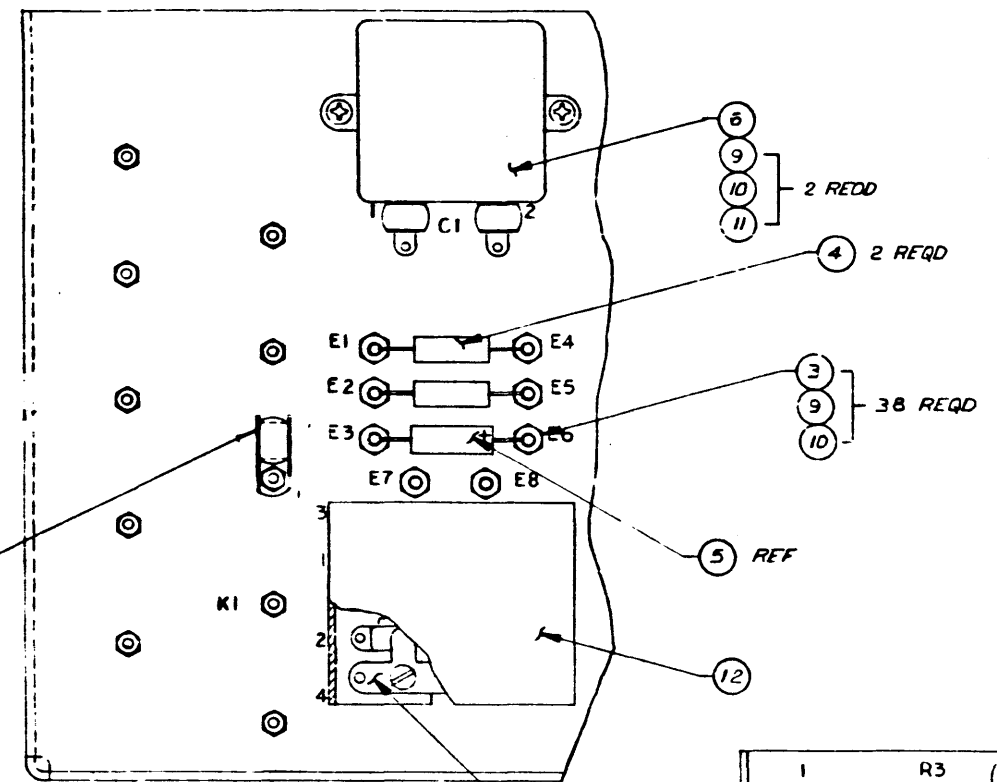
SDS-E-106

REVISIONS				
REV.	DESCRIPTION	CHK	DATE	APPROVED
F	Revised & Redrawn - see Rev. E. O.			
G	See Rev E, O.			

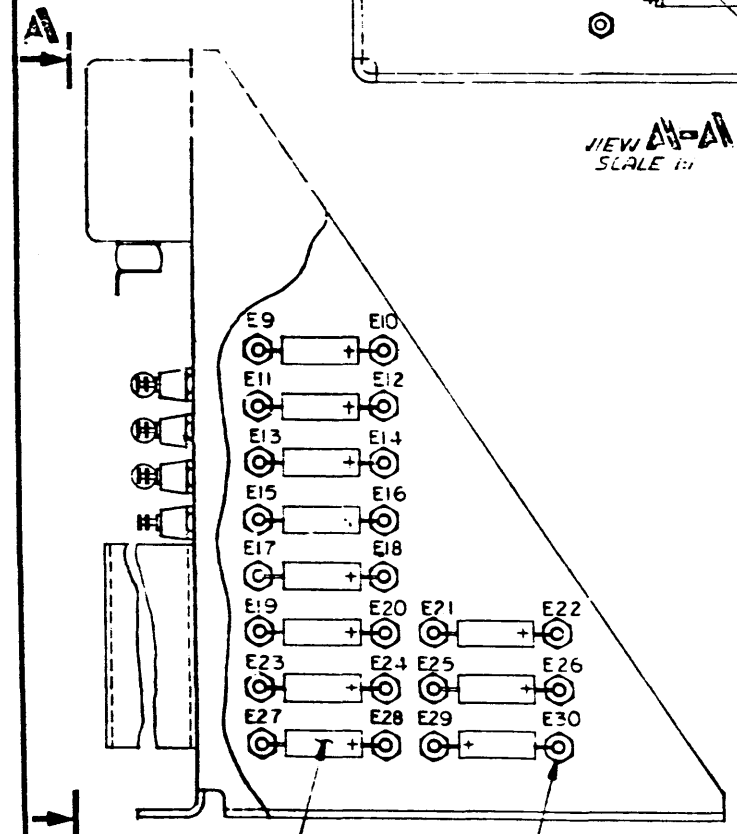
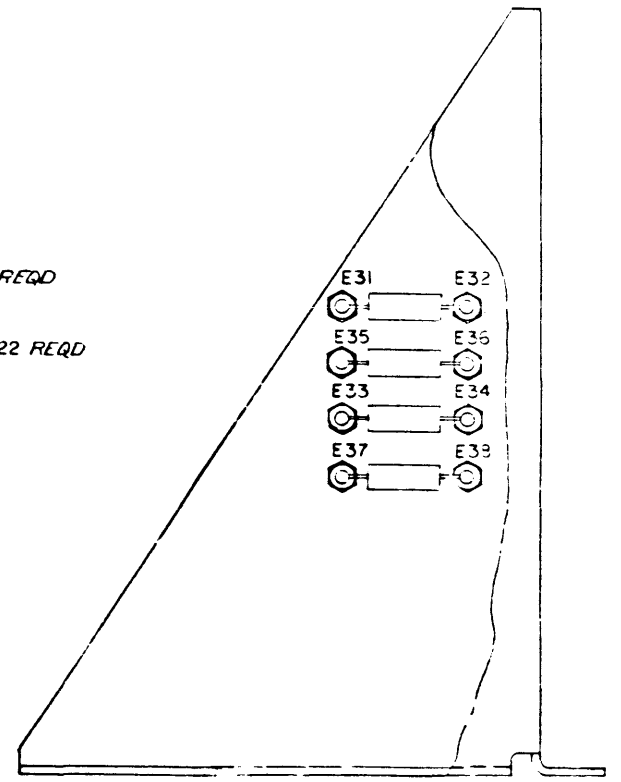
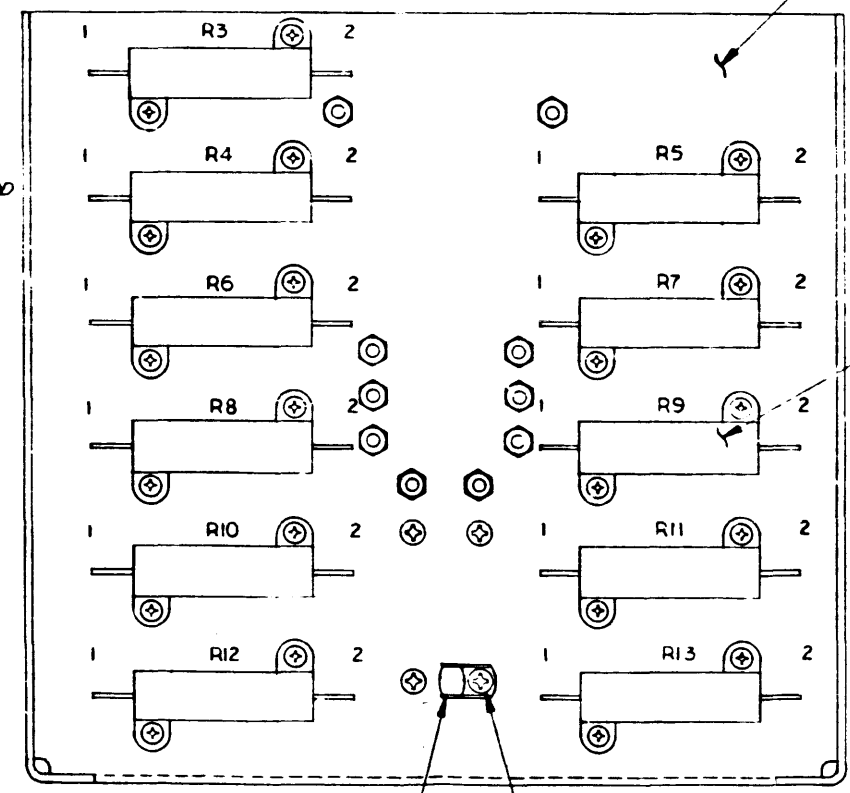
NO. REG.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
				101

MATERIAL LIST				
NOTES UNLESS SPECIFIED 1. TOLERANCES .XX ±.030 ANGULAR ±.010 ±½" 2. BREAK ALL SHARP EDGES .010 APPROX. 3. MACH. SURFACES J 4. ALL DIM. IN INCHES	DRAWN	<i>R. Sanchez</i>	6-8-67	SDS SCIENTIFIC DATA SYSTEMS SANTA MONICA, CALIFORNIA
	CHECK	<i>John W. Smith</i>	6-27-67	
	APPR.	<i>C. A. Wallace</i>	29 June 68	
		TITLE		
		ASSEMBLY, PAPER TAPE PUNCH		
MODEL NO.	9136	SIZE	A	DWG. NO.
NEXT ASSY.				101205
		SCALE	DO NOT SCALE DRAWING	SHEET 1 of 2

REVISIONS			
REV	DESCRIPTION	CHKD	APPROVED
F	SEE REVISION E		
G	SEE REVISION E		
H	SEE REVISION E		
J	SEE REVISION E		



VIEW A-A (PARTIAL)
SCALE 1:1



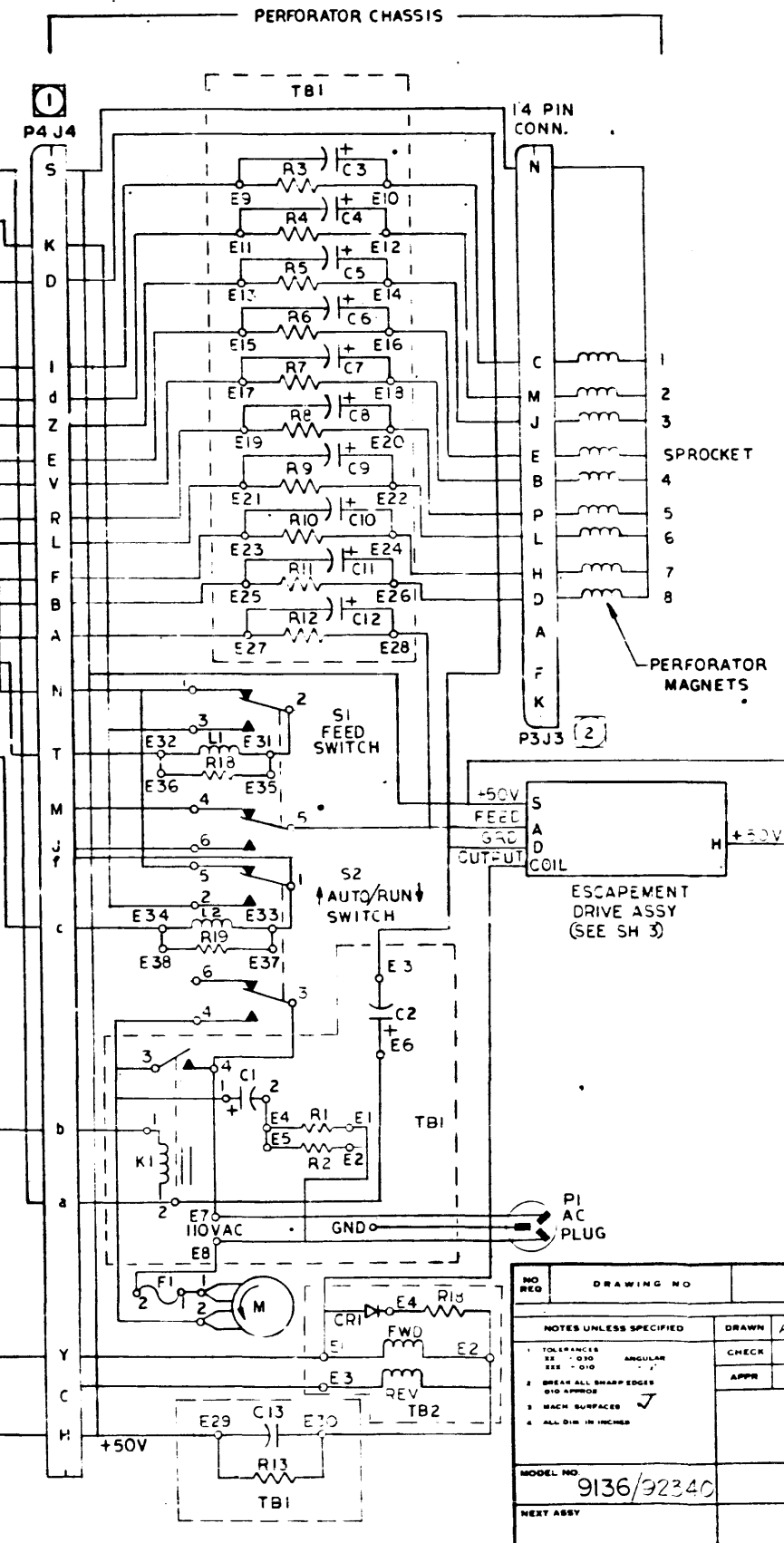
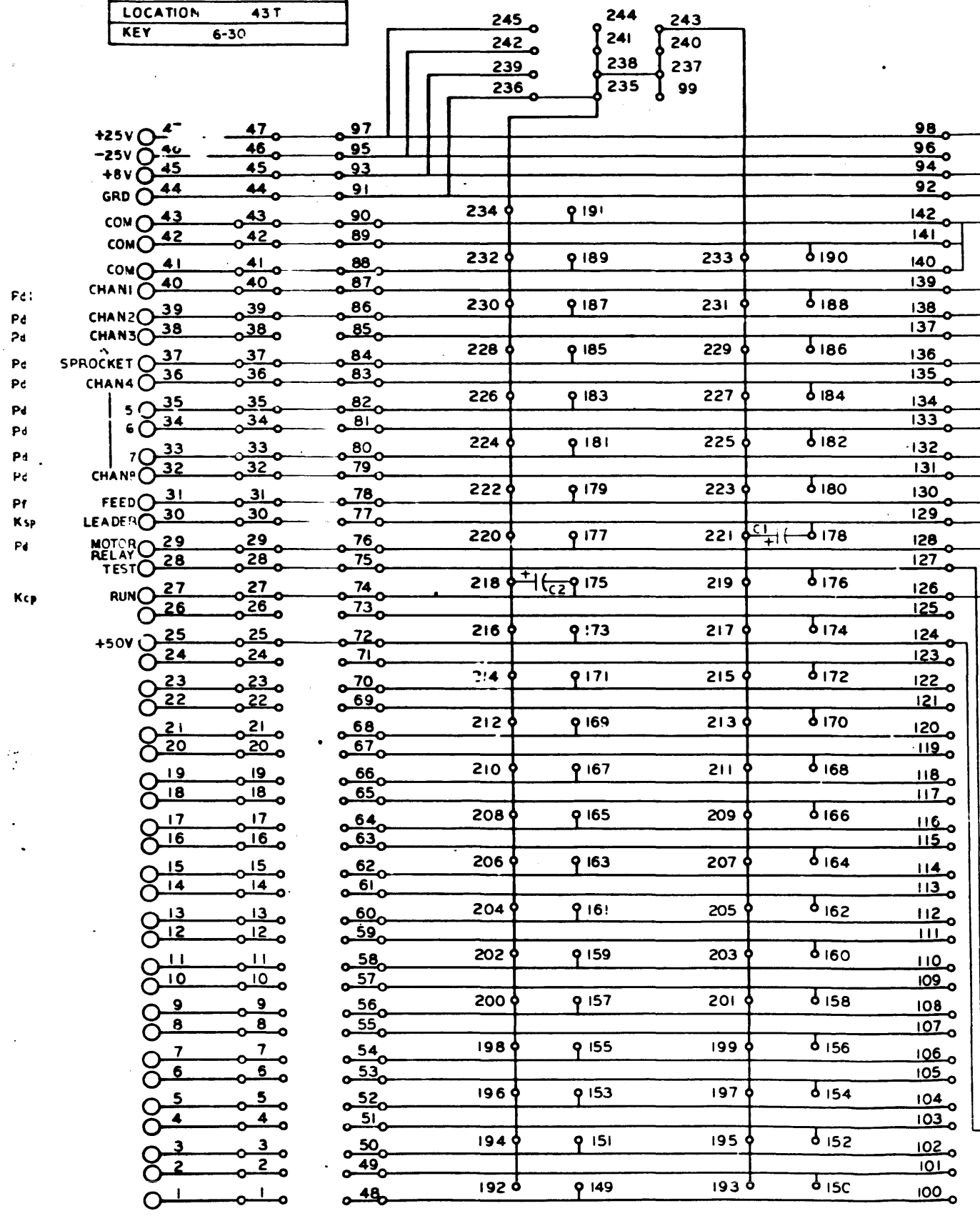
NO. REQD.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN	SDS SCIENTIFIC DATA SYSTEMS	
1. TOLERANCES XX ± 0.00 ANGULAR XXX ± 0.10 ± 1/16		CHECK	1545 FIFTEENTH STREET, SANTA MONICA, CALIFORNIA	
2. BREAK ALL SHARP EDGES AND APPROX.		APPR.	TITLE	
3. HATCH SURFACES ✓			ASSY, COMPONENT MTG ANGLE	
4. ALL DIM. IN INCHES			MODEL NO.	SIZE DWG NO.
			9/136	D 101161 J
			NEXT ASSY. 107395	SCALE 1:1 DO NOT SCALE DRAWING SHEET 1 OF 2

179

DESIGNATION	P5
LOCATION	43T
KEY	6-30

- NOTES:
- ① J46 ON ASSY 107395 & IN VENDORS MANUAL
 - ② P48 ON WIRE LIST 101160

REVISIONS			
REV	DESCRIPTION	CHR	DATE
H	REVISED AND DRAWN. SEE REV P5		
J	RELEASED TO MFG		
K	SEE REV EC		



NO	REG	DRAWING NO	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST					
NOTES UNLESS SPECIFIED					
1. TOLERANCES: .010 ANGULAR .010					
2. BREAK ALL SHARP EDGES .010 APPROX					
3. MACH SURFACES					
4. ALL DIM IN INCHES					
DRAWN		Kosso	2-2-59	SDS SCIENTIFIC DATA SYSTEMS	
CHECK		1432 FIFTEENTH STREET, SANTA MONICA, CALIFORNIA	
APPR				TITLE	
				SCHEMATIC, TAPE PERFORATOR	
MODEL NO		9136/92340		SIZE	D
NEXT ASSY				DWG NO	101163
				SCALE	DO NOT SCALE DRAWING
				SHEET	1 OF 3

REVISIONS				C1163
REV	DESCRIPTION	CHK	DATE	APPROV
	SEE SHEET ONE			

REPLACEMENT PARTS LIST

ITEM	DESCRIPTION	DESIGNATION	QTY	SUPPLIER CODE (SEE INDEX)
1	RESISTOR, 10Ω ± 2%	(TBI) R1, R2 (P5) R19	2	36,38,73
2	RESISTOR, WW, 150Ω ± 1%	(TBI) R3 THRU R13	11	88, 89
3	RESISTOR, 270Ω ± 2%	(TBI) R18, R19	2	36,38,73
4	INDUCTOR, 220 μH ± 5%	(TBI) L1, L2	2	42,90,91
5	CAPACITOR, OIL, 1μf ± 20% 1000V	(TBI) C1	1	80, 81
6	CAPACITOR, TANTALUM 15μf ± 20% 50V	(TBI) C2 THRU C13	12	23,77
7	RELAY, A.C. CNAS-13A/115 VAC	(TBI) K1	1	79
8	FUSE, 3AG, 3AMP, 250V, SERIES AGC SERIES 311(000) & 312(000)	F1	1	49 48
9	CONNECTOR, 34 PIN FEMALE #34-20S	P4	1	98
10	CONNECTOR, 34 PIN MALE #34-20P	J4	1	98
11	CORD, AC CORD #16/3 SPT-3 WITH PLUG #PA-3	P1	1	101
12	RESISTOR, 100Ω ± 2%	R18	1	16,17
13				
14	DIODE, IN3189	CR1	1	2,6,30,68
15	CAPACITOR, MYLAR .001μf ± 10%	(P5) C1, C2	2	26,27,74
16	RESISTOR, 250Ω 5W	R1	1	23
17	RESISTOR 1K	R2, R10	3	16,11,181
18	RESISTOR 10Ω	R3	1	16,1,131
19	RESISTOR 120Ω	R4	1	16,1,131
20	RESISTOR 470Ω	R5	1	16,1,131
21	DIODE CD1559	CR1, CR2, CR3	3	14
22	DIODE SS875 SS 875	CR4, CR5, CR6, CR7	4	⓪
23	INDUCTOR 1.6 HY 318000	L1	1	⓪
24	INDUCTOR 165Ω J30566	L2	1	⓪
25	TRANSFORMER 7 HY 317990	T1	1	⓪
26	CAPACITOR .22 MFD	C1	1	22,23
27	CAPACITOR 4.7 MFD	C2	1	22
28	CAPACITOR 1.8 MFD	C3	1	22
29	CAPACITOR .5 MFD	C4	1	22
30	RESISTOR 680Ω	R6	1	16,1,131
31	RESISTOR 390Ω	R7	1	16,1,131
32	TRANSISTOR SMI947	Q1	1	1
33	TRANSISTOR 2N2102	Q2	1	7
34	SWITCH DRS-1	SW1	1	⓪
35	RESISTOR 1K 1W	R9	1	230 182
36	DIODE, 222A, 22V ± 10%	CR8	1	⓪

⓪ DENOTES TALLY PART NUMBER

NO	REQ	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST					
NOTES UNLESS SPECIFIED		DRAWN	5-28-69	SDS SCIENTIFIC DATA SYSTEMS 152 FIFTEENTH STREET SANTA MONICA CALIFORNIA	
1. TOLERANCES UNLESS SPECIFIED ARE AS SHOWN		CHECK	5/1/69		
2. BREAK ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED		APPR.	5/1/69	TITLE SCHEMATIC, TAPE PERFORATOR	
3. HATCH SURFACES					
4. P.L. DIM. IN DIMENSIONS				MODEL NO. 9:36/92340	
NEXT ASSY.				SIZE D	DWG NO. C1163
				SCALE DO NOT SCALE DRAWING	SHEET 2 OF 3

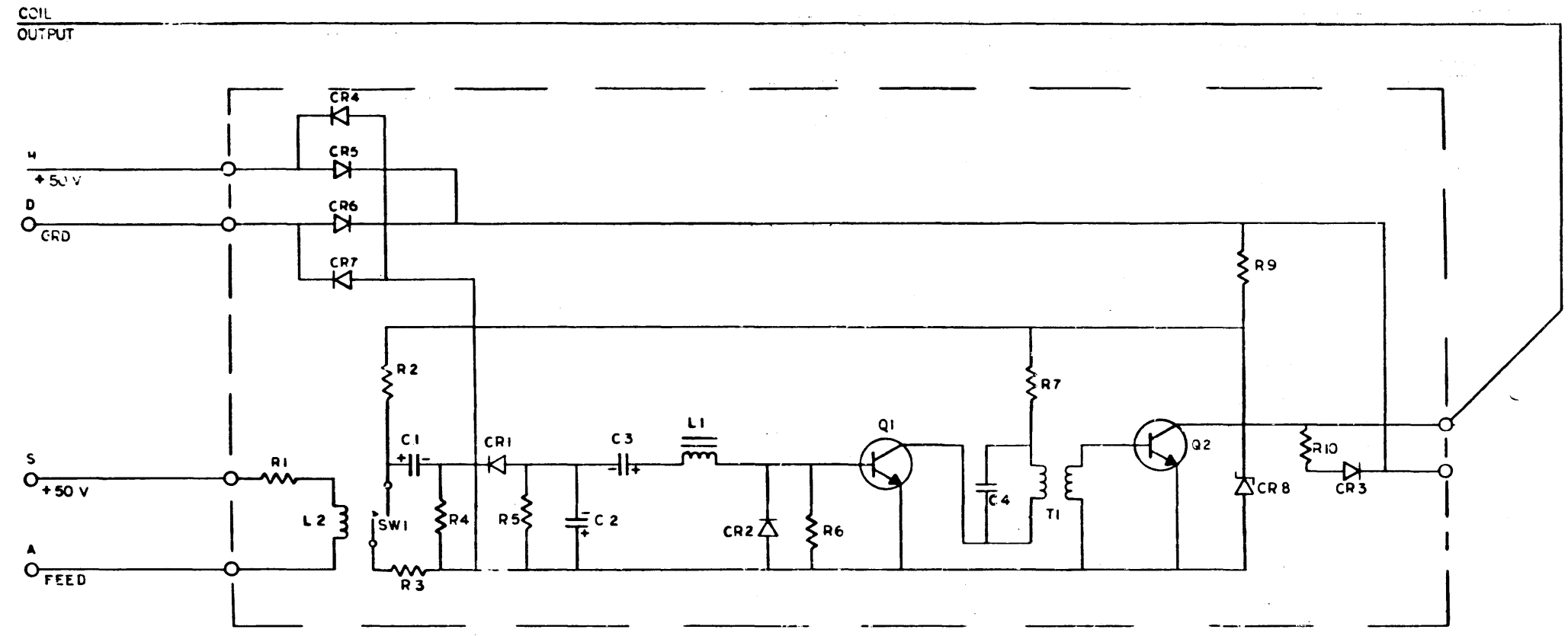
181

3

2

1

REVISIONS				101163	K
REV.	DESCRIPTION	DATE	APPROVED		
	SEE SHEET ONE				



ESCAPEMENT DRIVE ASSEMBLY

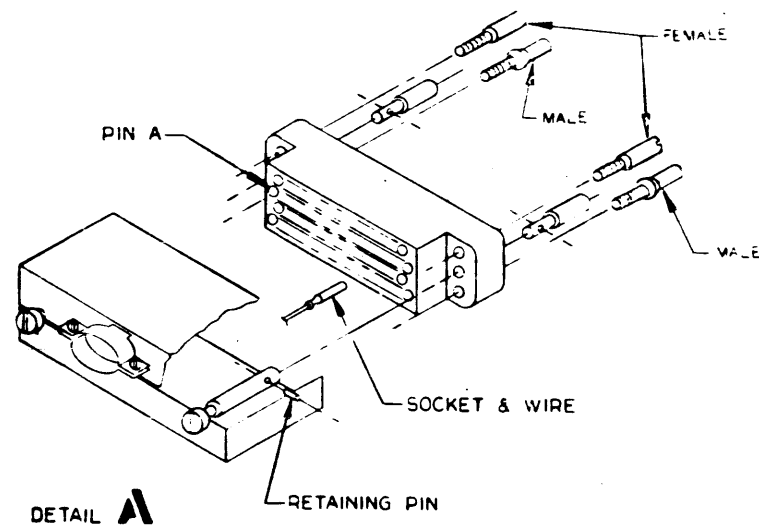
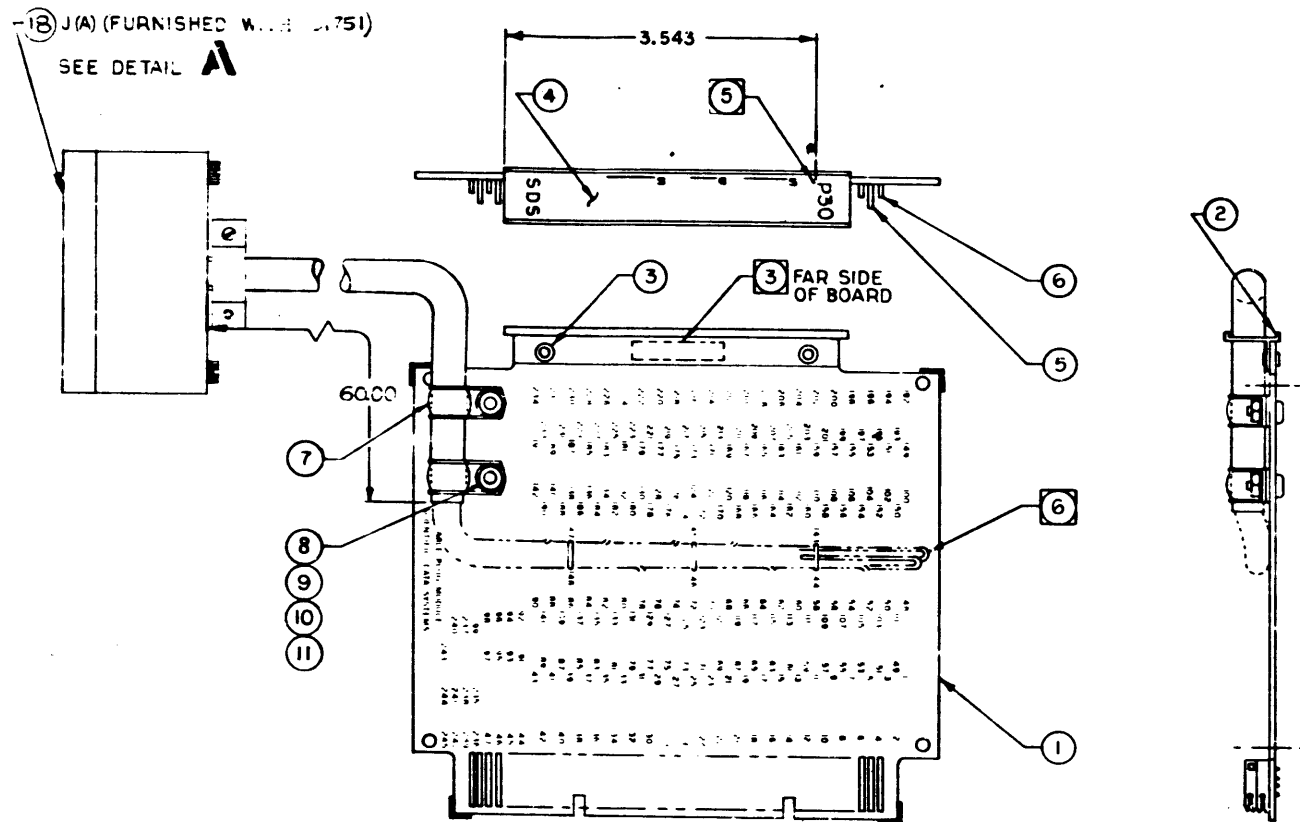
REV. NO.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
NOTES UNLESS SPECIFIED				
1. TOLERANCES		DRAWN	MATERIAL LIST	
UNLESS SPECIFIED		CHECK	SDS	
FRACTIONS 1/16" ANGULAR		APPR.	SCIENTIFIC DATA SYSTEMS	
DECIMALS 0.005 2 1/2"			SANTA MONICA, CALIFORNIA	
2. BREAK ALL SHARP EDGES			TITLE	
3. HIDE SURFACES			SCHEMATIC,	
4. ALL DIM. IN INCHES			TAPE PERFORATOR	
MODEL NO.			REV.	DWG. NO.
9136/92340			D	101163
NEXT ASSY.			SCALE	DO NOT SCALE DRAWING SHEET 3 OF 5

3

2

179

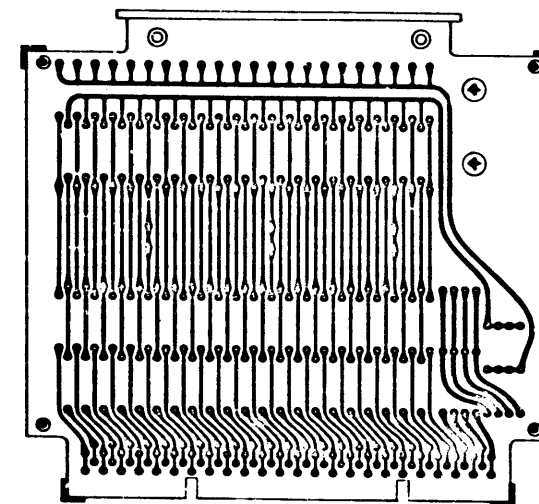
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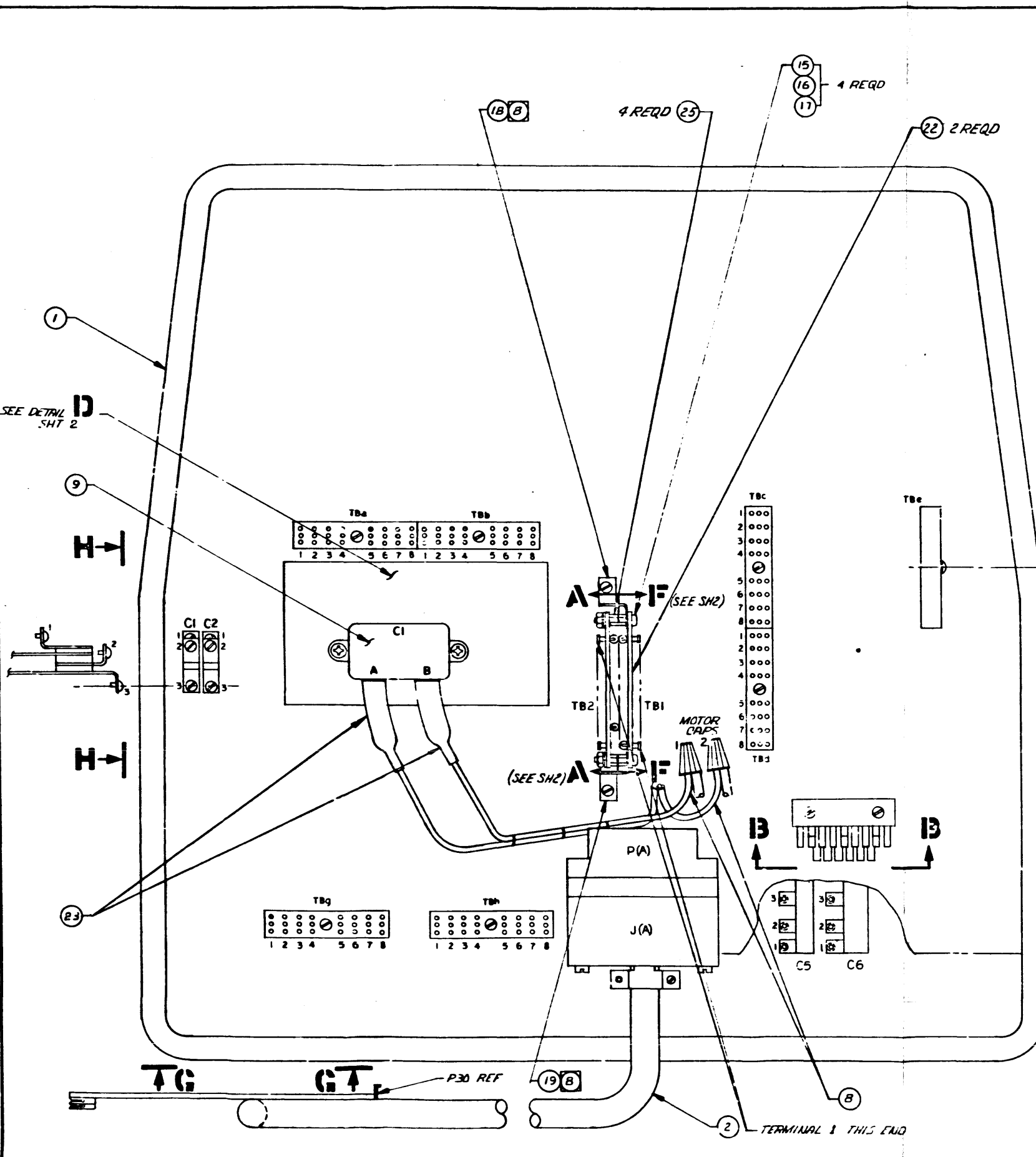
NOTES: UNLESS OTHERWISE SPECIFIED.

- 1 SEE MATERIAL LIST NO. 101876 S-EET 2
- 2 ASSEMBLED BOARD TO CONFORM TO SDS DWG. NO. 100106 (SPECIFICATION, PRINTED WIRING ASSEMBLY).
- 3 IDENTIFY PER SDS DWG NO. 100198.
- 4 REF. DWGS: WIRE LIST NO. 101877
P W BD NO. 01652-033
- 5 NOMENCLATURE: 10 POINT ALT GOTHIC -
COLOR: BLACK.
CENTERED APPROX AS SHOWN.
- 6 SPARES TO BE LACED IN WITH CABLE.

REVISIONS			
REV	DESCRIPTION	CHK	DATE
A	RELEASED TO MFG		
B	SEE REV. E.D.		
C	SEE REV. E.D.		



NO. REQ	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN	SDS SCIENTIFIC DATA SYSTEMS	
1 TOLERANCES FR - .030 HOLE - .010		CHECK	1700	
2 BREAK ALL SHARP EDGES RIP APPROX		APPR	TITLE	
3 HOLE SURFACES			ASSEMBLY, PRINTED WIRING, CABLE PLUG MODULE P30 TYPEWRITER	
4 ALL DIM. IN INCHES			MODEL NO. 3139 3	
			SIZE D DWG NO. 101876	
			NEXT ASSY 101887	
			SCALE 1/1 DO NOT SCALE DRAWING SHEET 1 OF 2	



- NOTES: UNLESS OTHERWISE SPECIFIED
1. SEE MATERIAL LIST NO. 101887 SHT 3
 2. REF CABLE PLUS MODULE WIRE LIST NO. 101977.
 3. MARK TITLE MODEL NO. & SERIAL NO. 12 HIGH AS SHOWN, COLOR BLACK.
 4. REMOVE VENDOR'S NAMEPLATE & INSTALL ITEM 12.
 5. BLACK BAND INDICATES CATHODE END.
 6. REMOVE "INDEX" KEY BY BREAKING ARM AT THIS POINT.
 7. ATTACH WITH SUITABLE CEMENT.
 8. ATTACH WITH EXISTING HARDWARE.
 9. REF WIRE LIST NO. 101899.
 10. LOOSEN SCREW & SLIDE SOLENOID LATCHING PLATE AS FAR AS POSSIBLE IN SHOWN DIRECTION, THEN TIGHTEN SCREW.
 11. REF ADJUSTMENT SPEC 110625.
 12. ITEM 31 (TYPING ELEMENT) NOT SHOWN MAY BE PURCHASED BY THE USER AS A SEPARATE ITEM IF FORTRAN SYMBOLS ARE DESIRED.
 13. FOR SERIALIZATION REF MANUFACTURING PROCEDURE NO. 05-01-02

REVISIONS			
REV	DESCRIPTION	CHK	DATE
A	RELEASE TO M/S		
B	SEE REV E.O.		
C	SEE REVISION E.O.		
D	SEE REVISION E.O.		
E	SEE REVISION E.O.		
F	SEE REV E.O.		
G	SEE REV E.O.		
H	SEE REV E.O.		
J	SEE REV E.O.		
K	SEE REV E.O.		

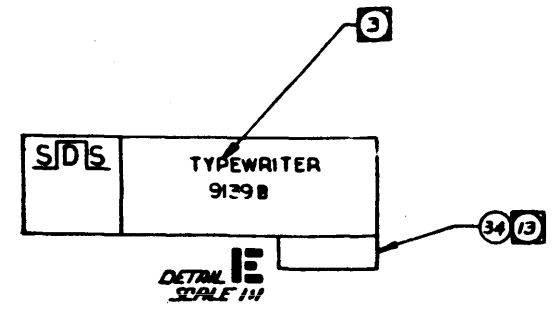
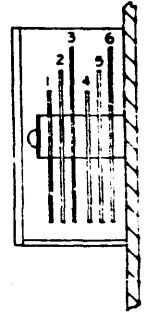
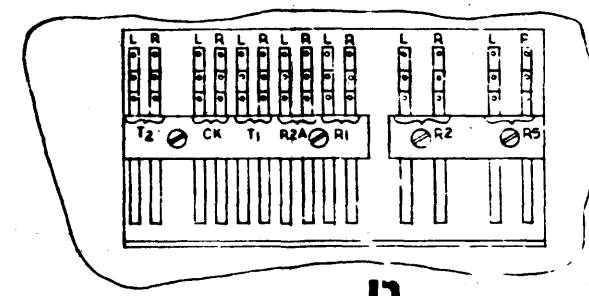
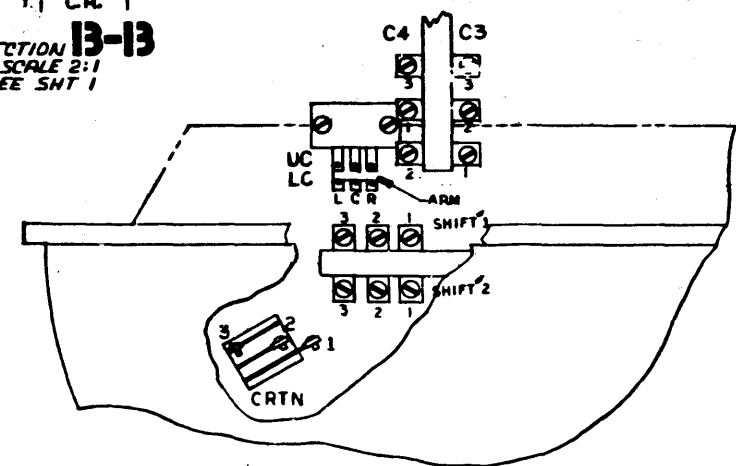
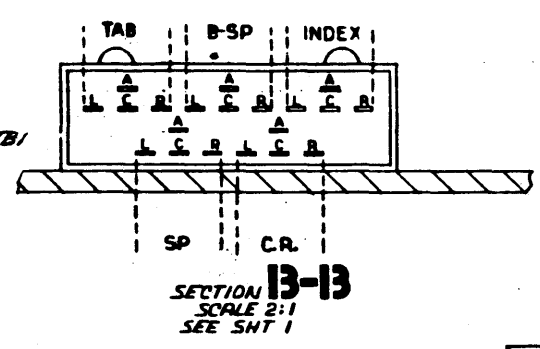
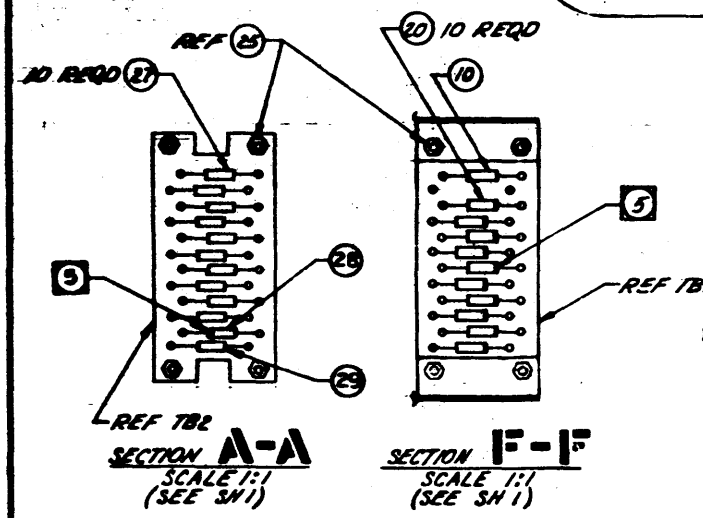
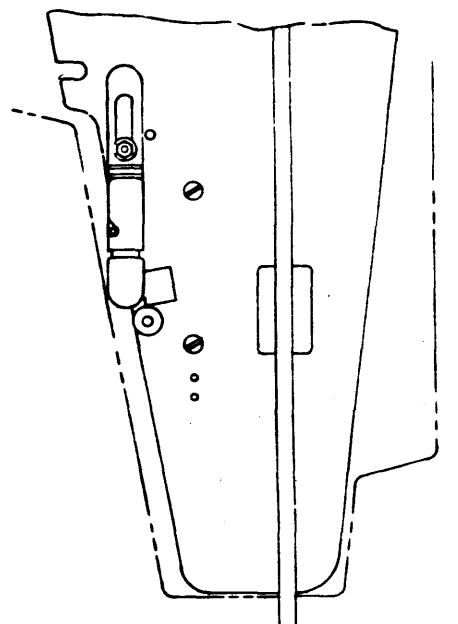
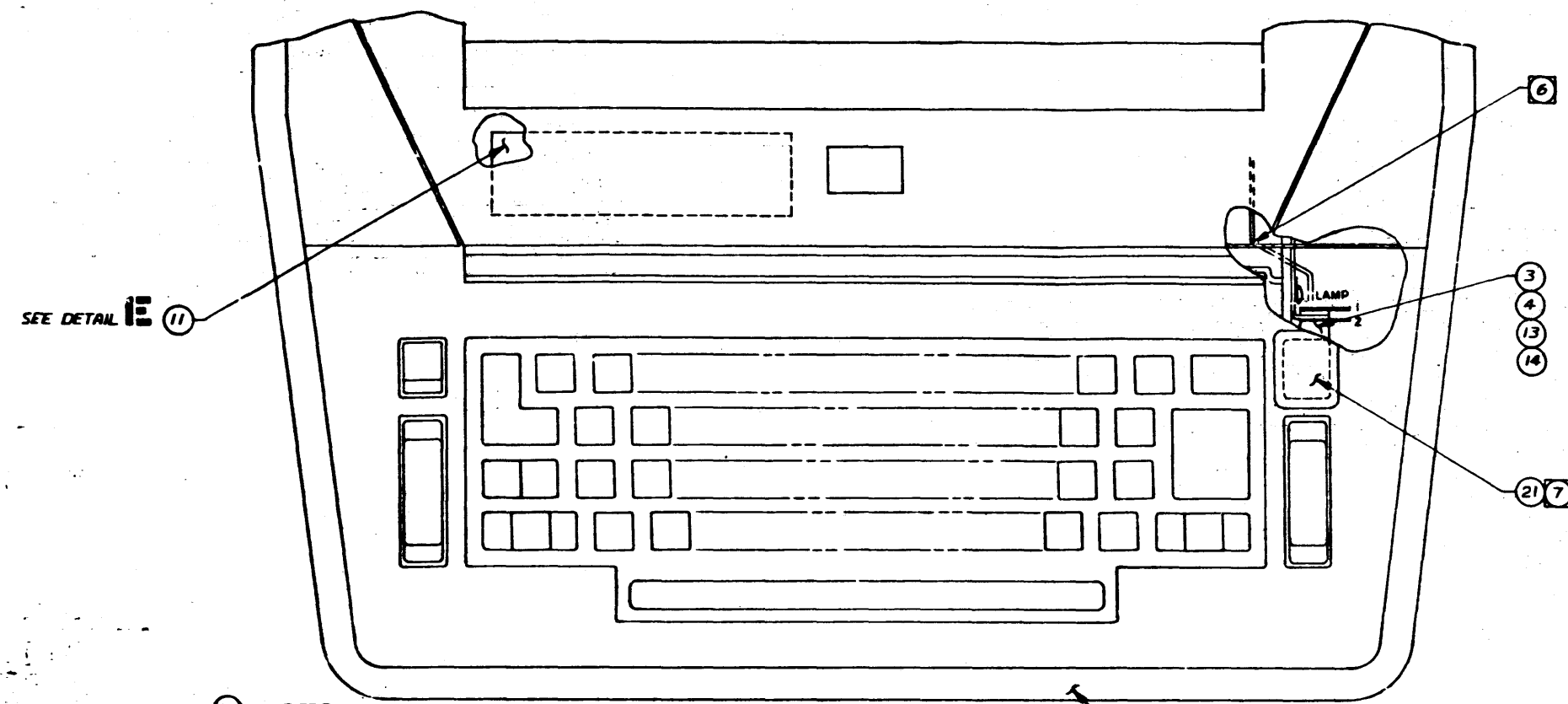
SEE DETAIL SHT 2

NOTE STOP

REV.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED				
1. UNBALANCED				
2. 2.000				
3. 2.000				
4. 2.000				
5. 2.000				
6. 2.000				
7. 2.000				
8. 2.000				
SDS IDENTIFYING DATA SYSTEMS				
1242 FIFTEENTH STREET, SANTA MONICA, CALIFORNIA				
TITLE				
ASSY, TYPEWRITER CHASSIS				
MODEL NO.	9139 B	REV. NO.	D	101887
WEEKS NO.	101891	SCALE	1:1	DO NOT SCALE DRAWING
				1 OF 4

185

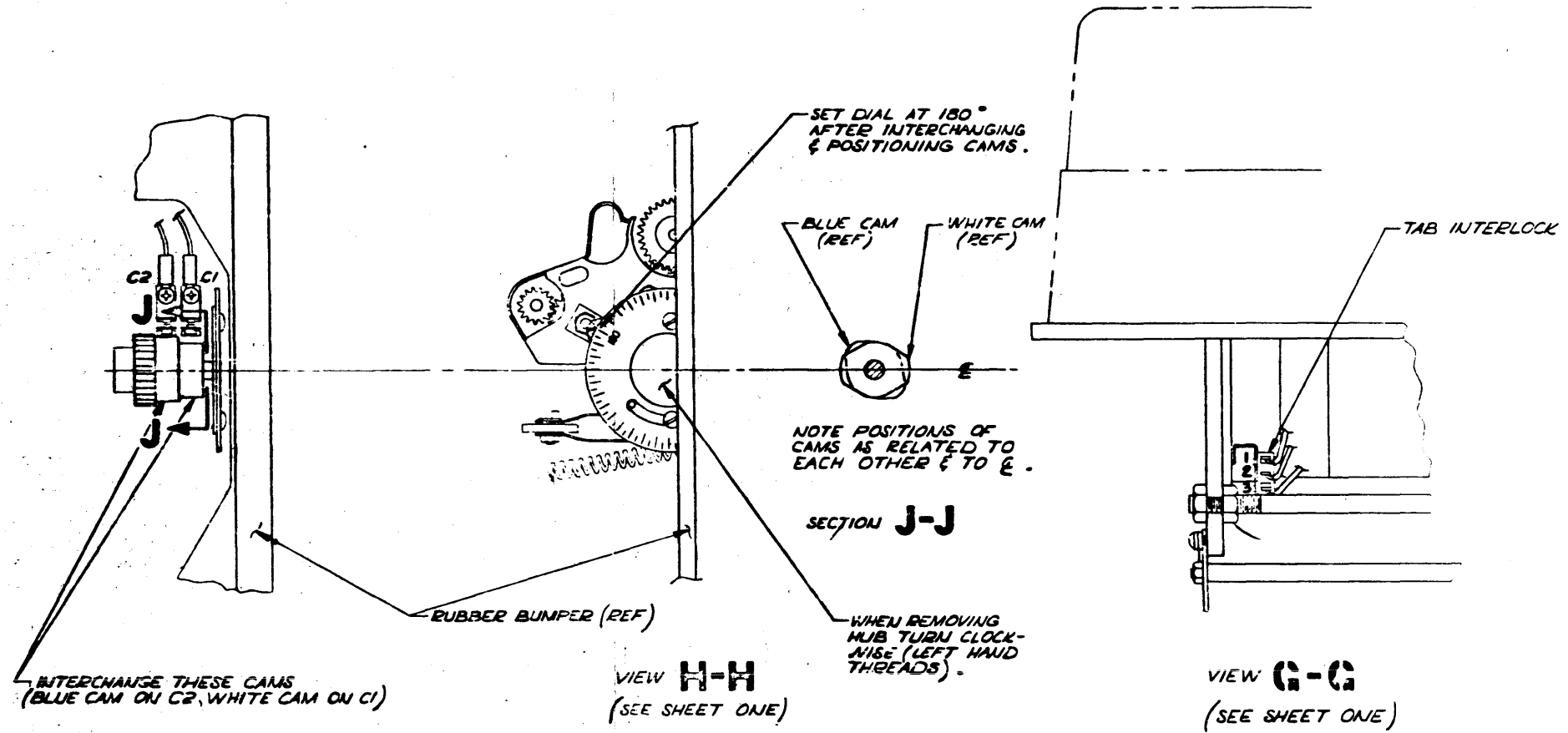
REVISIONS		C1387	
REV	DESCRIPTION	CHK	DATE
	SEE SHT ONE		



REV	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
NOTES UNLESS SPECIFIED		MATERIAL LIST		
1. DIMENSIONS IN 3/16" ANGULAR IN 3/32" 2 1/4"	DRAWN KH	11-24-62	SDS ORIENTING DATA SYSTEMS 1545 FIFTEENTH STREET SANTA MONICA, CALIFORNIA	
2. CHECK ALL CRAMP CORNERS FOR SQUARE	CHECK C.P. ...	12/1/62	TITLE ASSY, TYPEWRITER CHASSIS	
3. DIM. SURFACE	APPR.	PART NO. 9139 B	
4. ALL DIM. IN INCHES			REV. NO. D 101887	
			SCALE DO NOT SCALE DRAWING	
			SHEET NO. 101891	
			SHEET 2 OF 4	

101887 K

REVISIONS		0155
REV.	DESCRIPTION	CHK. DATE APPROVED
	SEE SHEET ONE	



REV.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN <i>[Signature]</i> 9/9/53	SDS SCIENTIFIC DATA SYSTEMS 1245 FIFTEENTH STREET SANTA MONICA, CALIFORNIA	
1. TELEGRAPH 2. 2.000 3. 2.000	CHECK <i>[Signature]</i> 9/16/53	APPR. <i>[Signature]</i> 9/14/53	TITLE ASSY, TYPEWRITER CHASSIS	
4. BREAK ALL SHARP EDGES AND ANGLES			SIZE D	DWG NO. 101887
5. DIMEN. SURFACES J				ITEM NO. K
6. ALL DIM. IN INCHES			SCALE 1:1	DO NOT SCALE DRAWING SHEET 3 OF 4
MODEL NO. 9139 B				
WEEK ASBY. 101891				

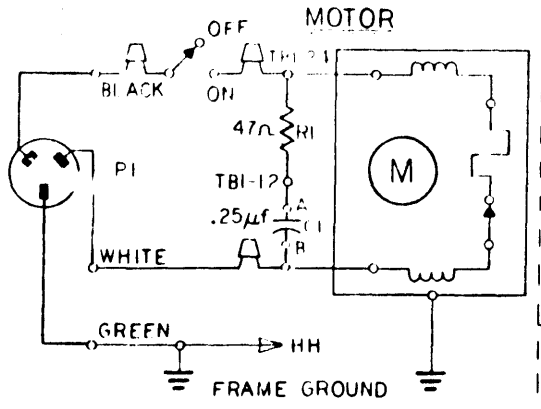
101887 K

REV	K	MATERIAL LIST			ML	DWG. NO.	REV
		SDS		SCIENTIFIC DATA SYSTEMS		101887	K
ML	101887	ASSY. TYPEWRITER CHASSIS		MOD #	DATE	SHEET	OF
				9139B	12-10	4	4
DWG. NO.	101887	ITEM	DWG. TITLE	DWG. NO.	NO. REQ.	REMARKS OR CKT. DESIG.	
		1	Typewriter, Spec. Control	101751	1		
		2	Assy, Cable Plug Module	101876	1	P30	
		3	Lampholder	102045	1		
		4	Lamp, Incandescent	101797	1		
		5	List, Wire Cable Plug Mod.	101877	x	Ref.	
		6	List, Wire, Type. Chassis	101889	x	Ref.	
		7	Adjustment Spec	110625	x	Ref.	
		8	Wire, Strd Teflon Insul.	100238-024	x	As req'd	
		9	Capacitor, Oil Impreg. ^{1000 VDC}	100992-003	1		
		10	Resistor, 1/2 watt	100111-470	1		
		11	Nameplate, Blank	101109	1		
		12	Nameplate	102067	1		
		13	Screw, Pan Head	100012-304	1		
		14	Washer, Lock, Int. Tooth	100024-300	1		
		15	Screw, Pan Hd	100012-210	4		
		16	Washer, Lock, Int. Tooth	100024-200	4		
		17	Nut, Hex Machine	100008-200	4		
		18	Bracket, Term. Bd. Mtg	102047-001	1		
		19	Bracket, Term. Bd. Mtg	102047-002	1		
		20	Diode, SDS 103	100091	10		
		21	Cover, Lamp	101973	1		
		22	Board, Terminal	101599	2		
		23	Tubing, Insul. Shrinkable	100744-112	4"		
		24	Cord, Lacing	101514	x	As req'd	
		25	Standoff, Threaded Hex	100217-003	4		
		26	Washer, Flat	100018-200	8		
		27	Resistor, 1/2 watt	100111-151	10		
		28	Diode, SDS 108	100325	1		
		29	Inductor, Molded	100342-105	1		
		30	Pin, Taper	113003	17		
		31	Character Arrangement Element, Typing Modified	111015	X	Ref	
		32	Spec Test Typewriter	124318	x	Ref	
		33	Spec Acceptance Typewriter	124319	x	Ref	
		34	Nameplate Serialization	114351	1		

REV	DESCRIPTION	CHK	DATE	APPROVED
1	RELEASED		11-1-54	
2	REVISED		11-1-54	
3	REVISED		11-1-54	
4	REVISED		11-1-54	

NO. REV.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
1	NOTES UNLESS SPECIFIED		
2	1. DIMENSIONS		
3	2. TOLERANCES		
4	3. FINISHES		
5	4. MATERIALS		
6	5. WEIGHTS		
7	6. MACH. FINISHES		
8	7. ALL DIM. IN INCHES		

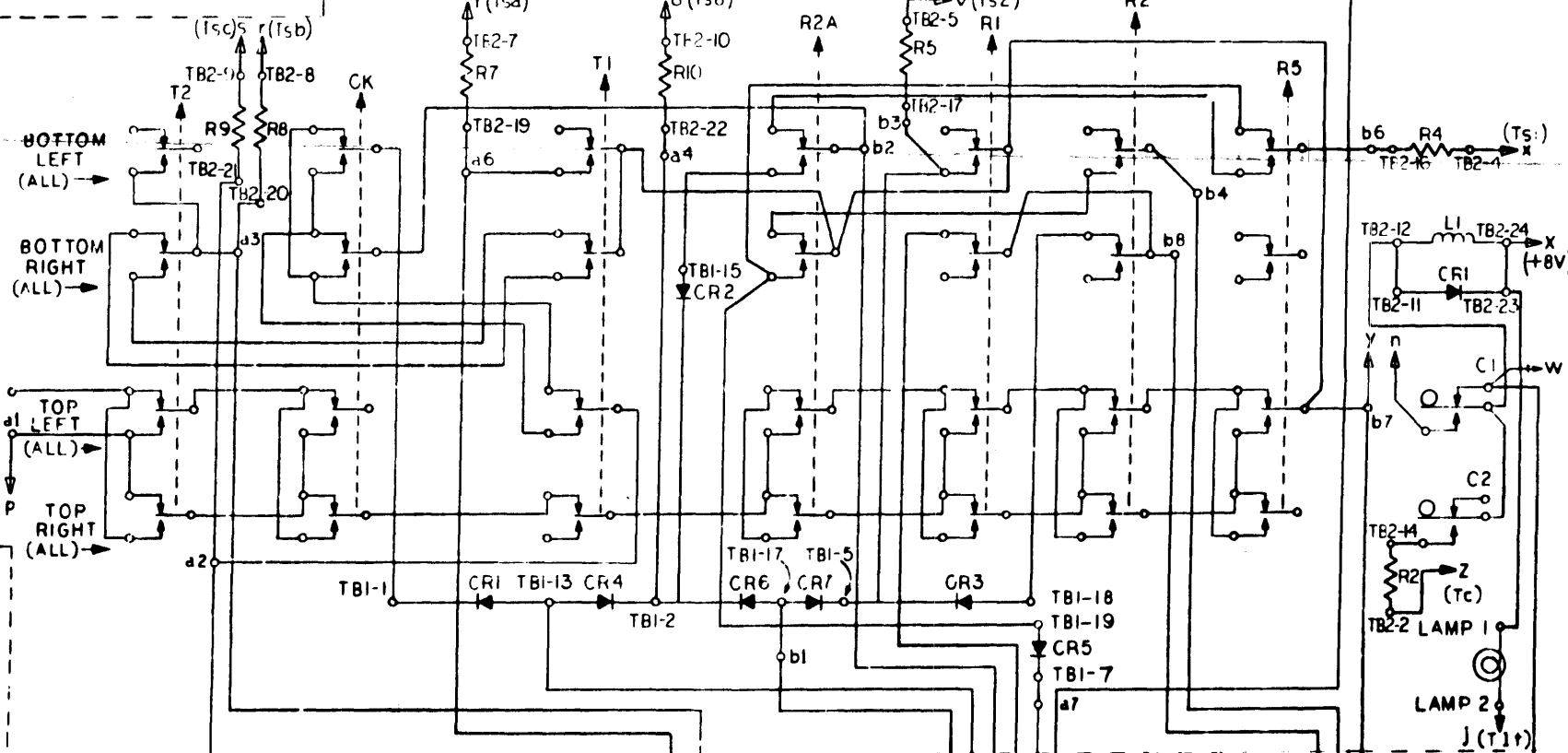
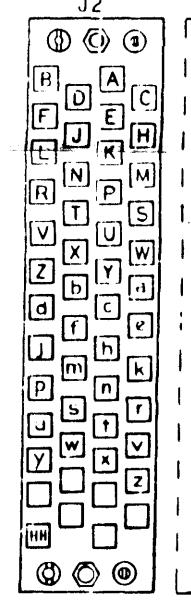
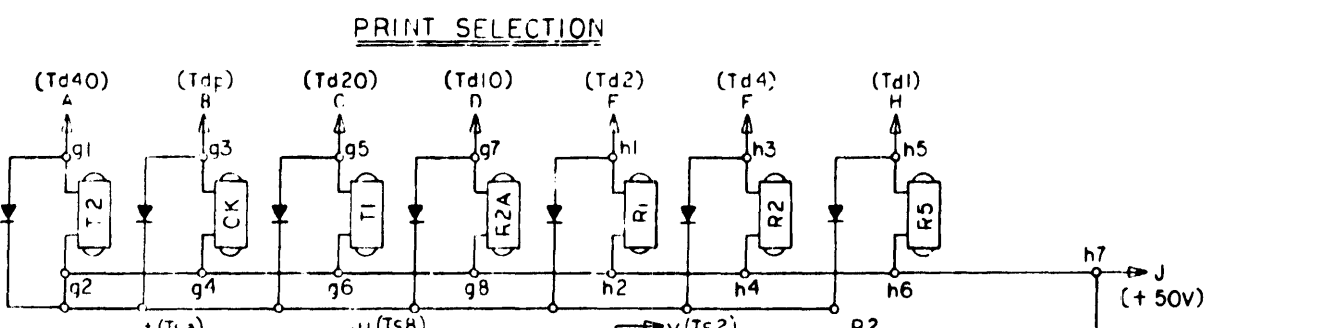
SDS	SCHEMATIC, BCD TYPEWRITER
101888	
D	
101888	
E	



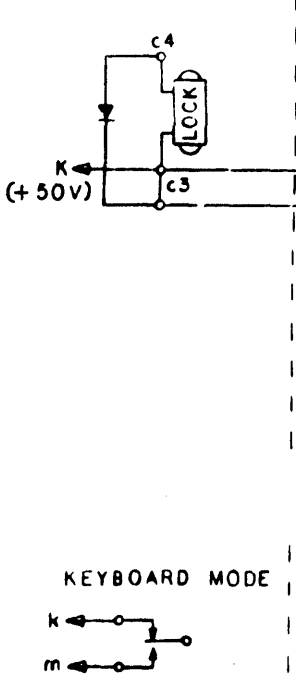
NOTES:
 CONTACT NUMBERING SCHEME:
 N.O.=1
 ARM=2
 N.C.=3
 EXCEPT TOP LEFT AND TOP RIGHT WHICH ARE:
 N.O.=4
 ARM=5
 N.C.=6

TRANSLATION OF PRINT TRANSMITTING CONTACTS FOR BCD CODE.

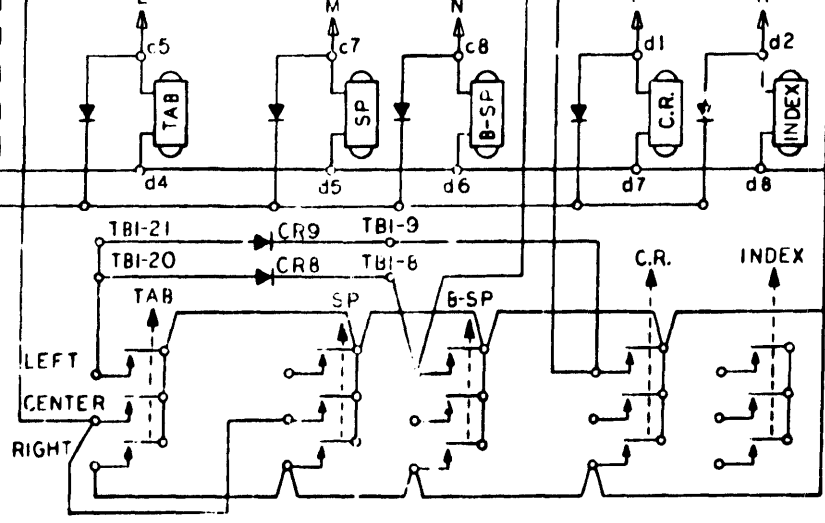
SH + R2A	→	d
(R2A · SH) + (R2 · R2A · SH) + (SH · R1)	→	4
R1 + (SH · R2)	→	2
(R2A · R5) + (R2A · R5 · SH)	→	A
T1	→	B
T1 · T2 + T1 · T2	→	B
(SH · CK + SH · CK) · T1 + (SH · CK + SH · CK) · T1	→	C



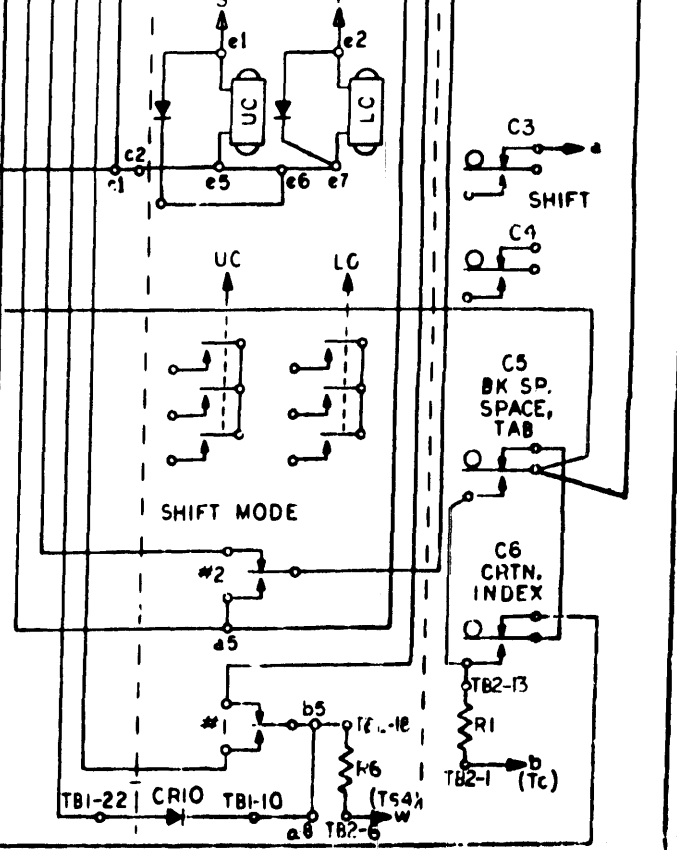
KEYBOARD



OPERATIONAL

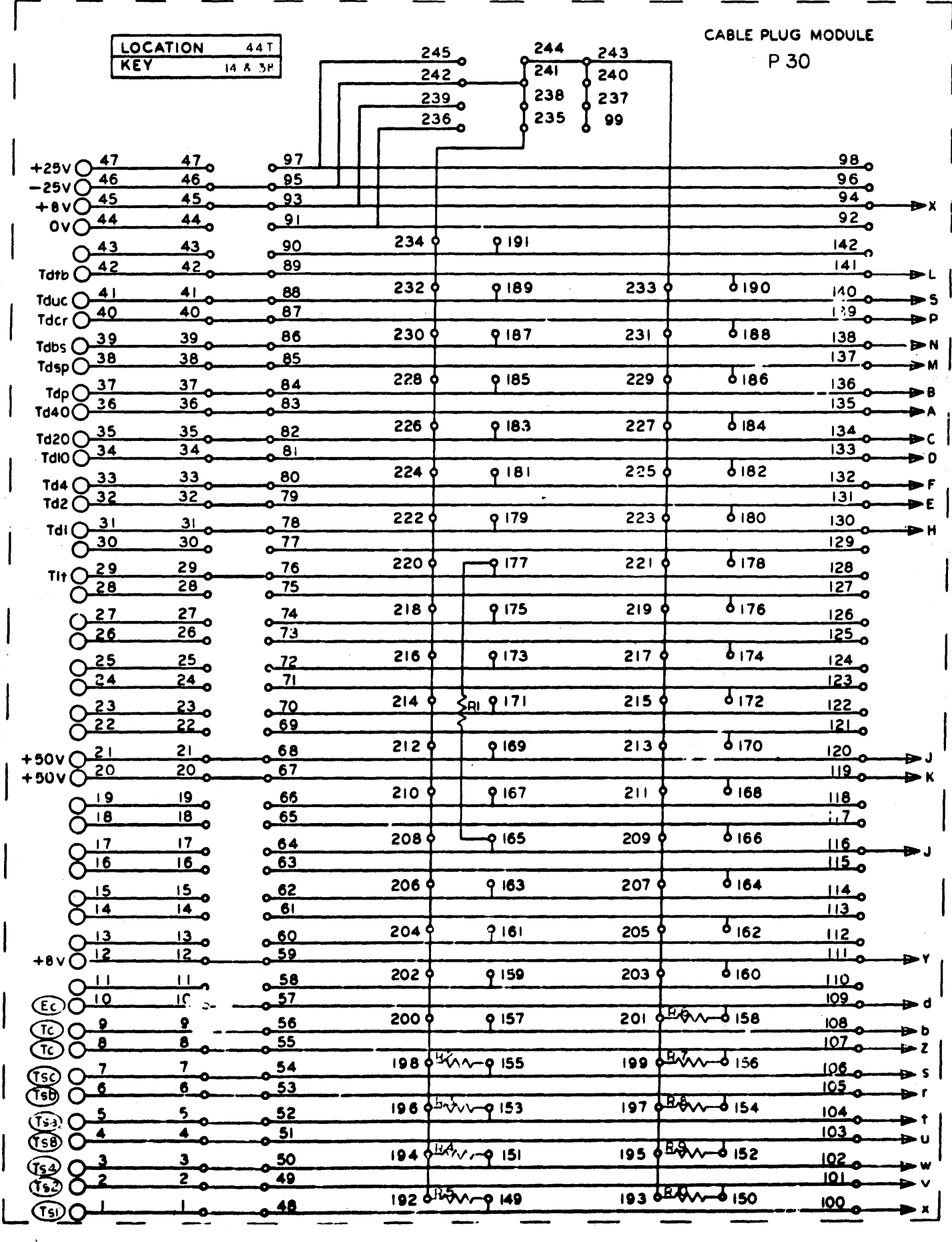


SHIFT



REV	DESCRIPTION	DATE	BY
1	SEE SHT 01C		

REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH. (MIL. STD. 168)



REV	DESCRIPTION	DATE	BY
1	SEE SHT 01C		

BRWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
9139B, 9139C	SCHEMATIC, BCD TYPEWRITER	SDIS	
101887, 103085			

REVISIONS			
REV.	DESCRIPTION	CHK.	DATE
	SEE SH. ONE		

REPLACEMENT PARTS LIST

ITEM	DESCRIPTION	DESIGNATION	QTY	SUPPLIER CODE (SEE INDEX)
1	RESISTOR, 10 Ω ± 2%	(P30) R1	1	36, 38, 73
2	RESISTOR, 1.0 K ± 2%	(P30) R7	1	16, 17
3	RESISTOR, 2.7 K ± 2%	(P30) R2 THRU R6 R8, R9, R10	8	16, 17
4	CORD, A.C. COORDS/6/3 SPT-3 WITH PLUS PRA-3	P1	1	101
5	DIODE, SILICON SWITCHING IN907A IN914A IN3063 IN3065	(TBI) CR1 THRU CR6	10	4, 13 4, 12, 13, 14 4, 6 4
6	RESISTOR, 150 Ω ± 2%	(TB2) R1 THRU R10	10	16, 17
7	RESISTOR, 47 Ω ± 2%	(TBI) R1	1	16, 17
8	CAPACITOR, OIL .25 μF ± 20% 1000 V	C1	1	80, 81
9	CONNECTOR, 50 PIN FEMALE #201358-1 WITH #201328-1 SOCKETS	P2	1	111
10	CONNECTOR, 50 PIN MALE #201358-1 WITH #201328-1 PINS	J2	1	111
11	DIODE, IN964A	(TB2) CR1	1	2, 6, 14, 65
12	INDUCTOR, 1000 μH ± 5%	(TB2) L1	1	42, 90, 91

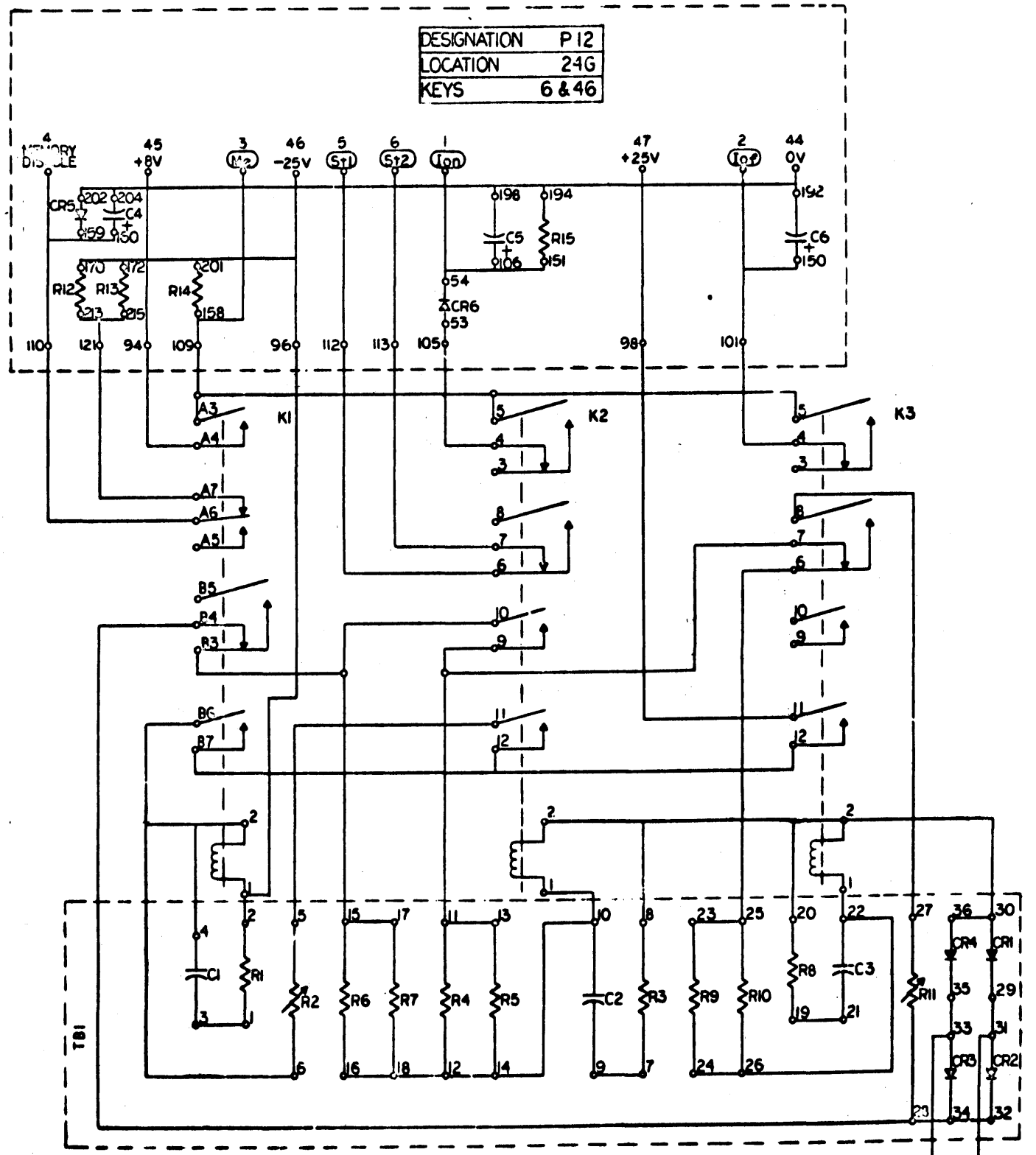
DWG. NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
9139B, 9139 C	SCHMATIC, BCD TYPEWRITER		E
101887, 103085			

NOTES UNLESS SPECIFIED: 1. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES. 2. DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED. 3. DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED. 4. DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED. 5. DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.	DRAWN: <i>[Signature]</i> CHECKED: <i>[Signature]</i> APPR: <i>[Signature]</i>	SDS SCIENTIFIC DATA SYSTEMS 1545 PATTERSON STREET SANTA MONICA, CALIFORNIA
Dwg. No. 9139B, 9139 C Army No. 101887, 103085	Scale: DO NOT SCALE Sheet: 3 OF 3	Title: SCHEMATIC, BCD TYPEWRITER

101888 E

REV	DESCRIPTION	CHK DATE	APPROVED
A	REL TO MFG		

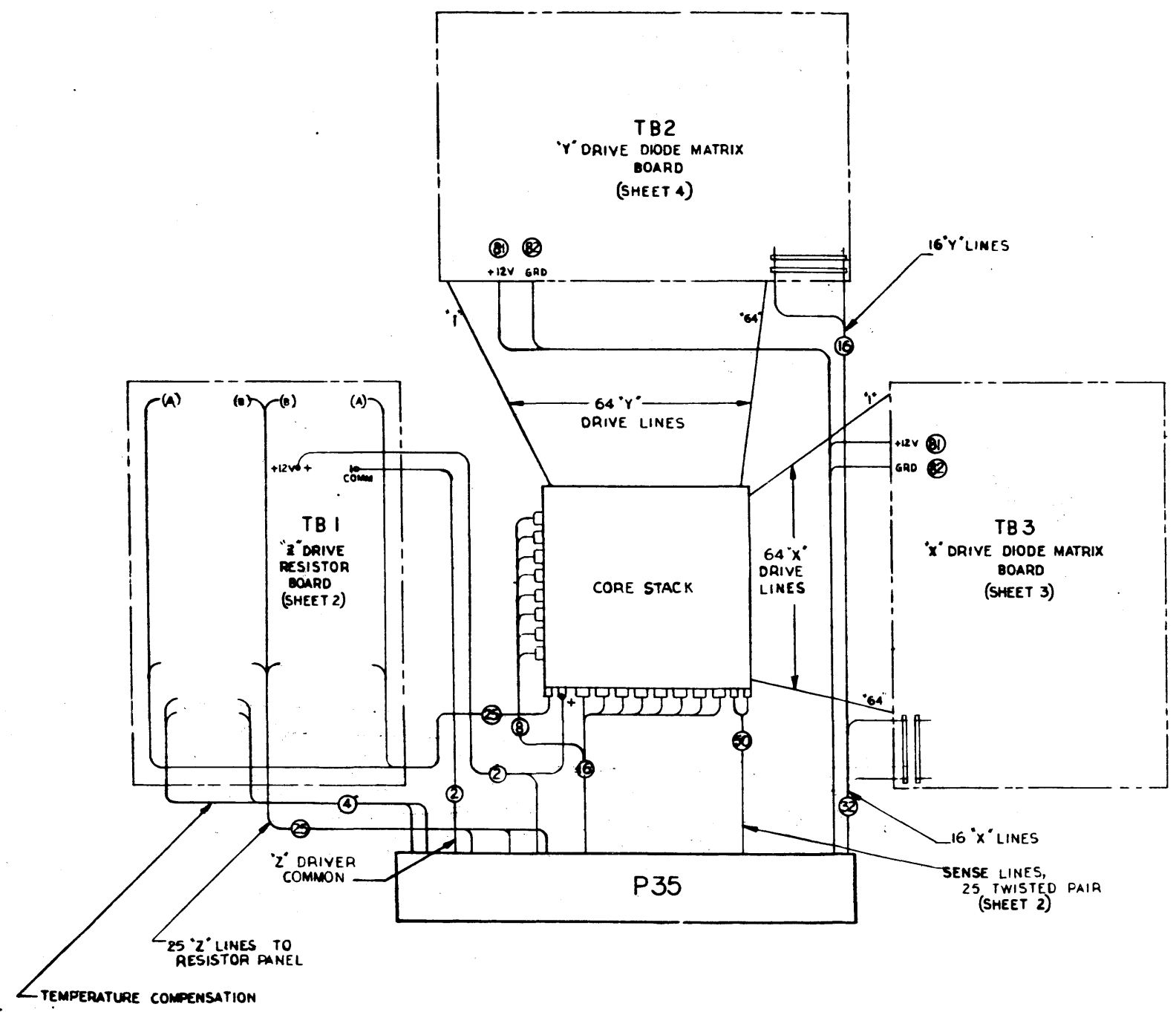
NO. AND REV.	DESCRIPTION	REFERENCE DESIGNATION	FIG. NO.
			113
DRAWING NO. 9201		MATERIAL LIST	
NOTES UNLESS SPECIFIED		DRAWN: [Signature]	
1. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES.		CHECK: [Signature]	
2. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.		APPR: [Signature]	
3. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.		TITLE	
4. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.		SCHEMATIC, AUTO START-UP	
SCALE	DWG. NO. D 102733	1000 FIFTEENTH STREET, SANTA MONICA, CALIFORNIA	
DO NOT SCALE DRAWING	REV. NO. A	SHEET 1 OF 2	



193

REVISION		100588 C	
REV	DESCRIPTION	CHK	APP
1	REVISED & REDRAWN		

REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH. (MIL. STD. 168)

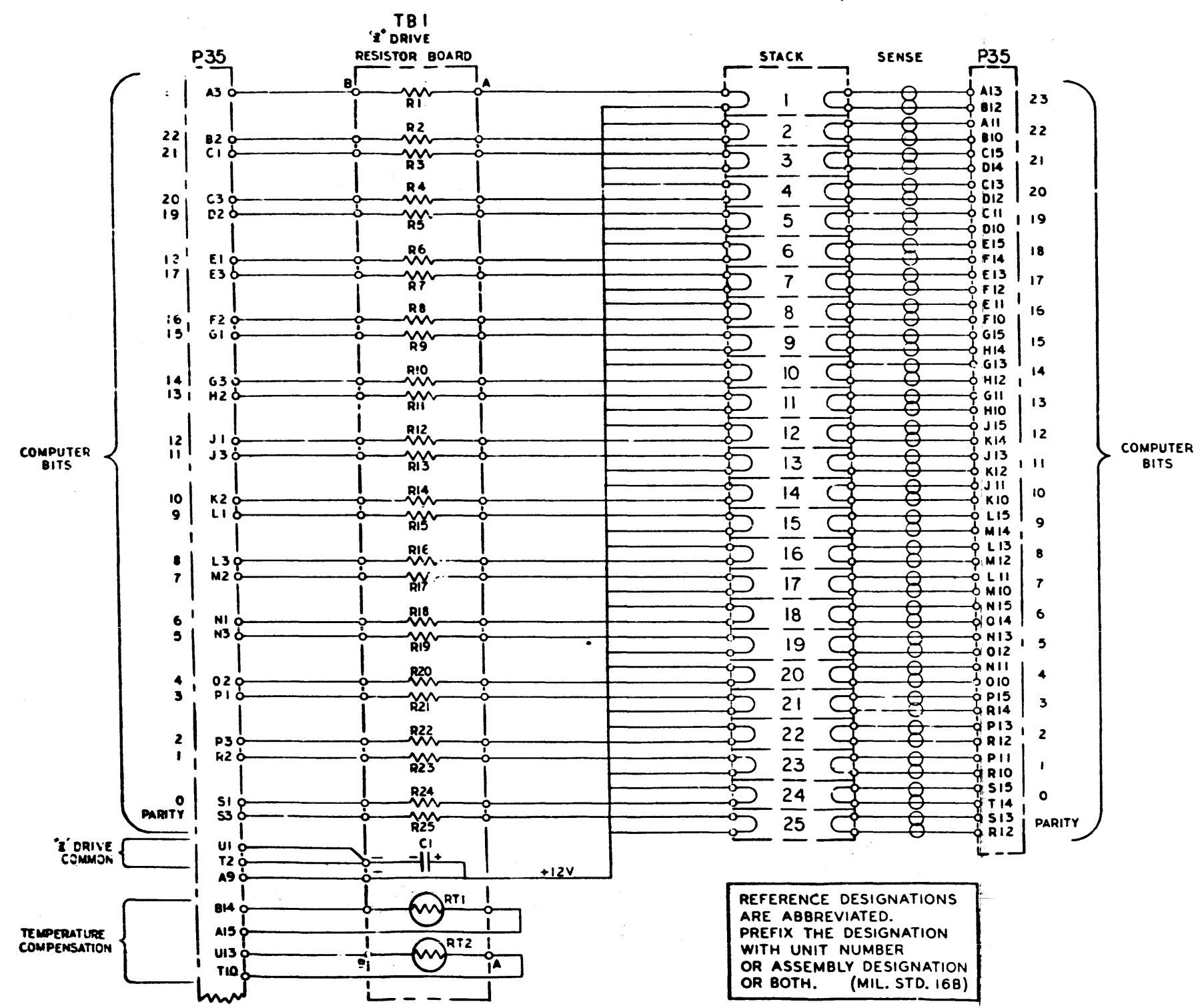


NO	REQ	DRAWING NO	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO
NOTES UNLESS SPECIFIED					
1			TOLERANCES		
			±.030	ANGULAR	
			±.010		
2			BREAK ALL SHARP EDGES		
			0.10 APPROX		
3			HATCH 0.125 SPACES		
4			ALL DIM IN INCHES		
MODEL NO		9104, 9204		TITLE	
NEXT ASSY		191		SCHEMATIC, CORE MEMORY	
SCALE		DO NOT SCALE DRAWING		SHEET 1 OF 5	

110588 C

3

REV	DESCRIPTION	CHK	DATE	APPROV'D
C	SEE SHEET ONE			



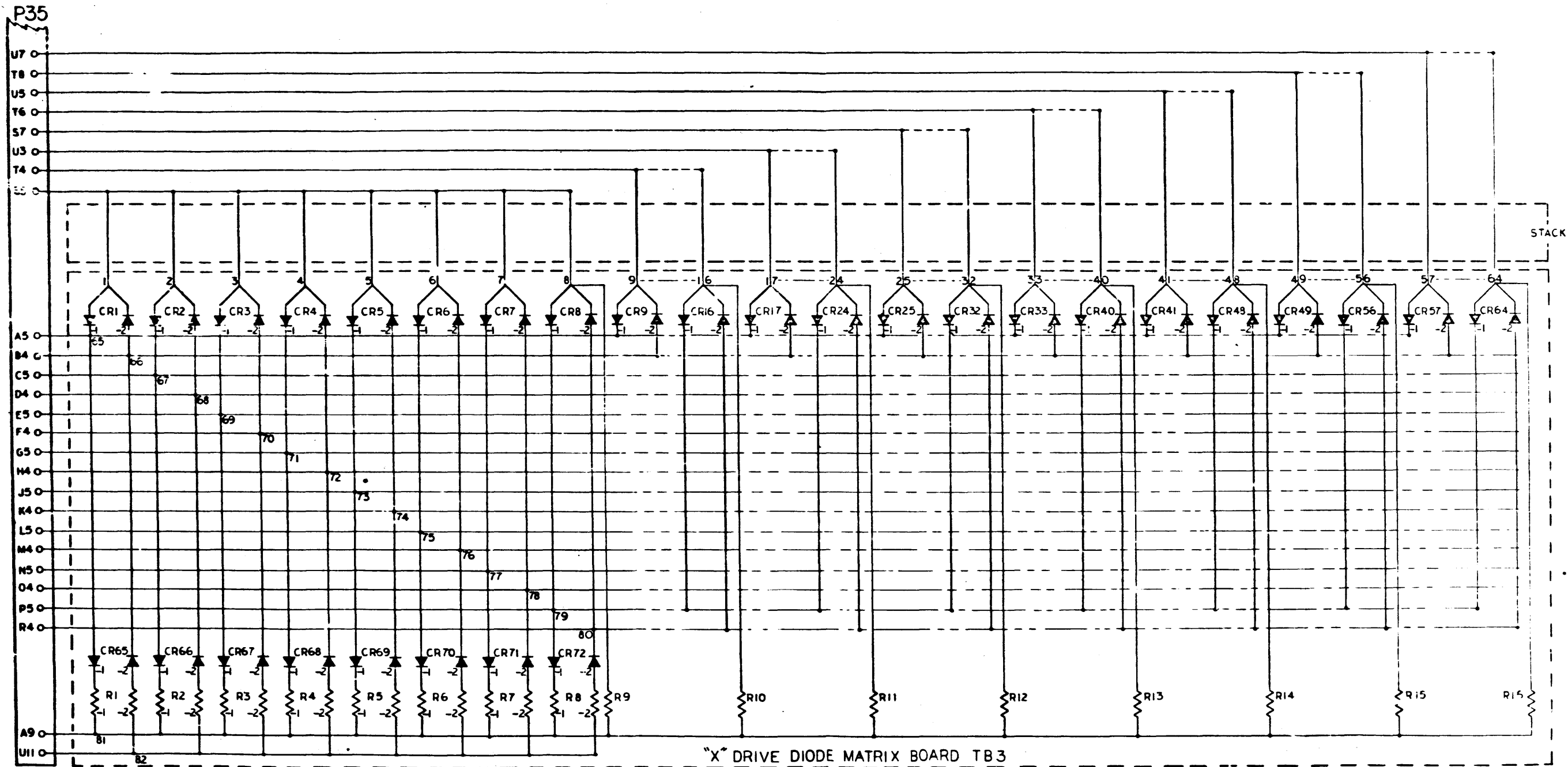
REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH. (MIL. STD. 168)

NO. REV.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN: <i>AK</i> 6-10-63	SDS SCIENTIFIC DATA SYSTEMS 145 FIFTEENTH STREET, SANTA MONICA, CALIFORNIA	
1. TOLERANCES UNLESS SPECIFIED ARE 0.005 ANGULAR 0.1°	CHECK: <i>[Signature]</i> 6/17/63	APPR: <i>[Signature]</i> 6-20-63	TITLE: SCHEMATIC, CORE MEMORY	
2. BREAK ALL SHARP EDGES AND ANGLES				
3. HATCH OUTPANELS				
4. ALL DIM. IN INCHES				
MODEL NO. 9104, 9204	SIZE D	DWG. NO. 100588	C	
NEXT ASSY.	192	SCALE	DO NOT SCALE DRAWING SHEET 2 OF 5	

100588 C

193

REVISIONS		NO.	DATE	BY	APPROVED
REV	DESCRIPTION	CHK	DATE		
C	SEE SHEET ONE				

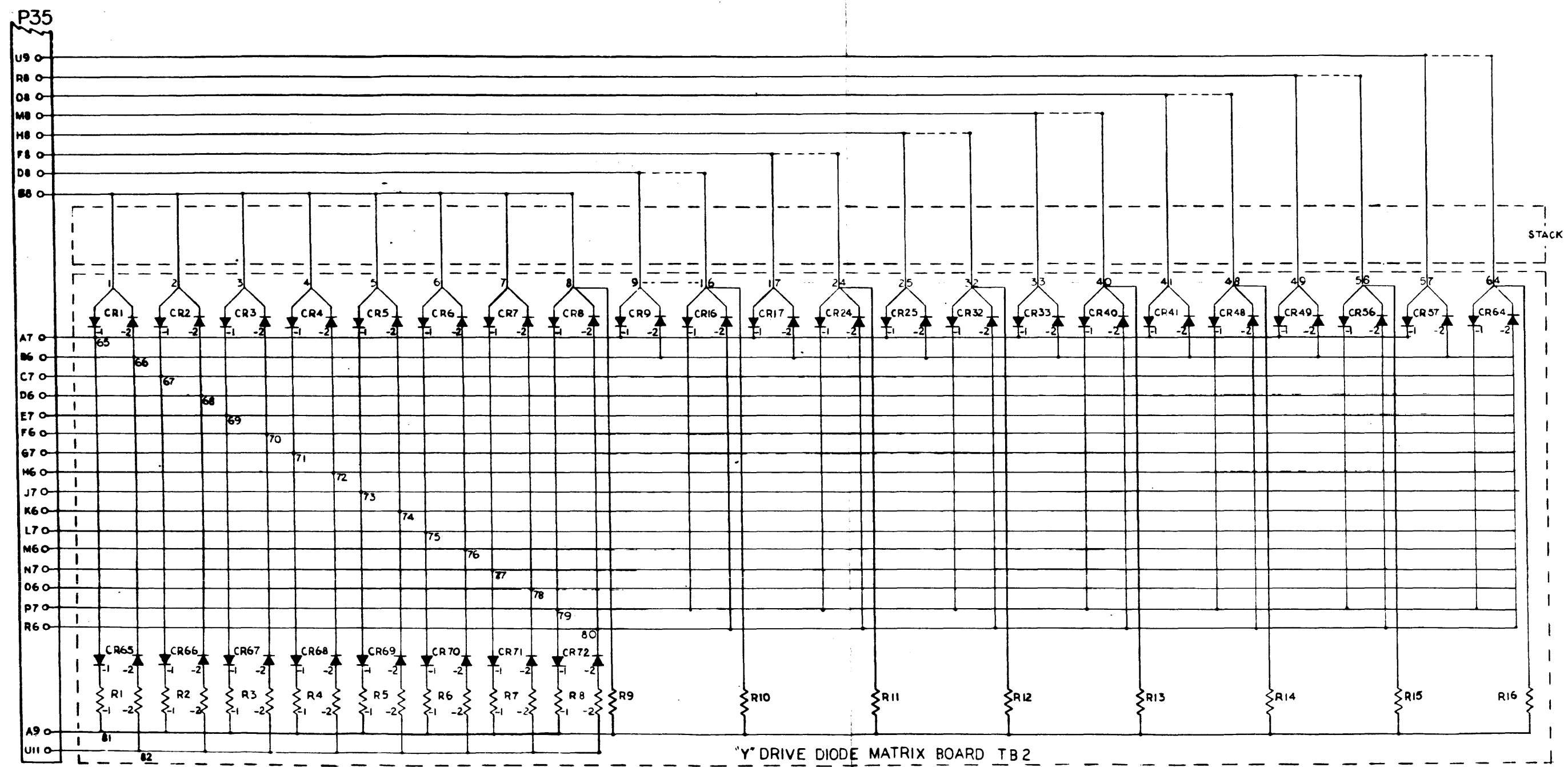


NO. REV.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED				
1. TOLERANCES: DIM ± 0.005 ANGULAR ± 1°				
2. BREAK ALL SHARP EDGES AND SURFACES				
3. HATCH SURFACES				
4. ALL DIM. IN INCHES				
DRAWN: <i>[Signature]</i> 01/02/53		CHECK: <i>[Signature]</i> 01/17/53		
APPR: <i>[Signature]</i> 01/20/53		TITLE		
MODEL NO. 9104, 9204		SDS ORIENTED DATA SYSTEMS 3425 AVENUE 4 STREET SANTA MONICA, CALIFORNIA		
NEXT ASSY.		SIZE: D DWG NO. 100588		C

193

3075

100588|C1



"Y" DRIVE DIODE MATRIX BOARD TB2

NO REQ	DRAWING NO	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO
		NOTES UNLESS SPECIFIED: 1. BREAK ALL SHARP EDGES 2. DIMENSIONS TO CENTER UNLESS OTHERWISE SPECIFIED 3. HATCH SURFACES 4. ALL DIM IN INCHES	SDS SCIENTIFIC DATA SYSTEMS TITLE: SCHEMATIC, CORE MEMORY	
	9104, 9204	DRAWN: [Signature] CHECK: [Signature] APPR: [Signature]	MODEL NO: 9104, 9204 NEXT ASSY: 194	SIZE: D DWS NO: 100588 SHEET 4 OF 5

100588-1A

197

REV	DESCRIPTION	CHEK	DATE	APPROVED
C	SEE SHEET ONE			

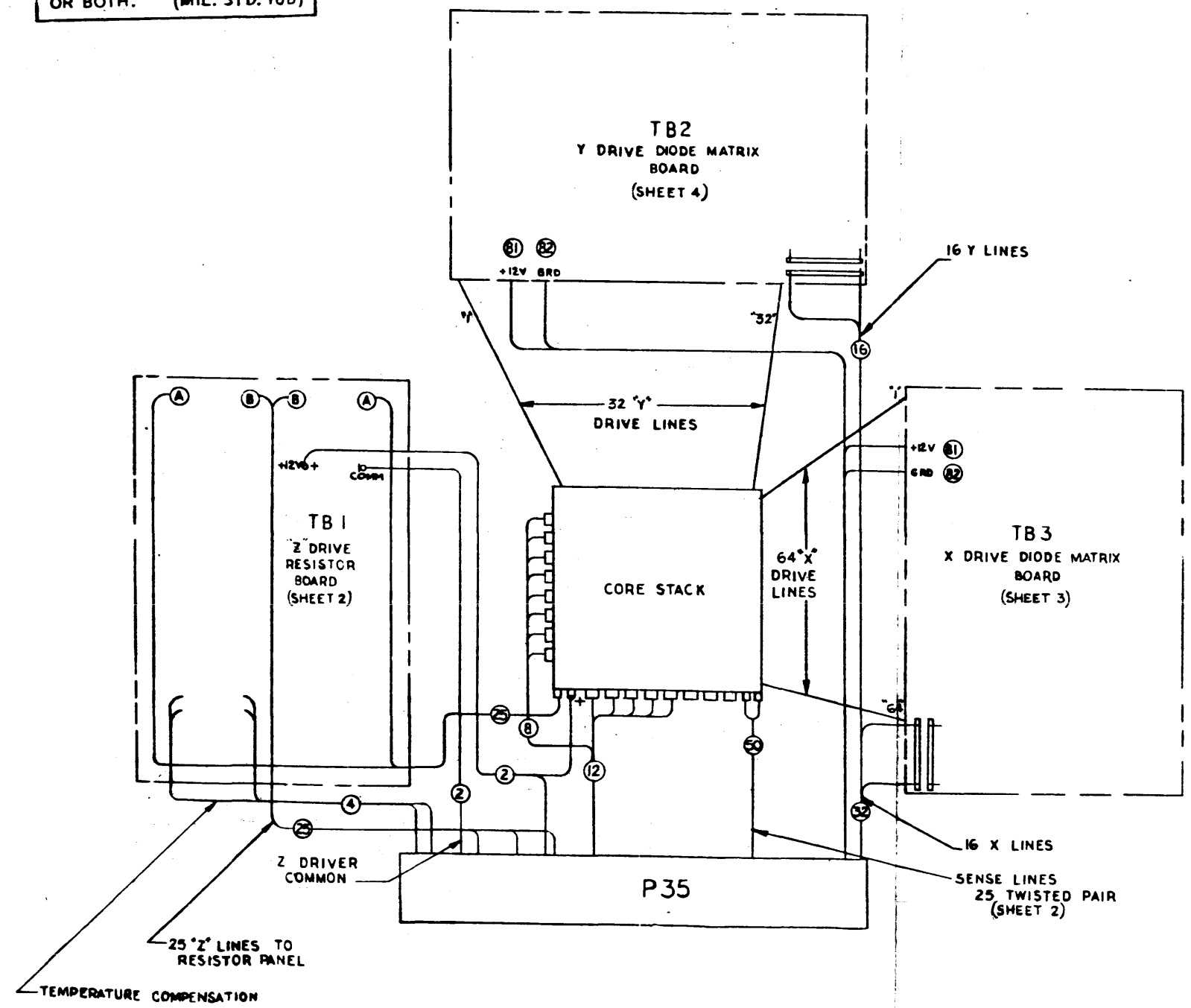
REPLACEMENT PARTS LIST

ITEM	DESCRIPTION	DESIGNATION	QTY	SUPPLIER CODE (SEE INDEX)
1	RESISTOR, 56 Ω \pm 2%	(TB2) R1-1 THRU R8-1 (TB2) R1-2 THRU R8-2 (TB3) R1-1 THRU R8-1 (TB3) R1-2 THRU R8-2	32	16, 17
2	RESISTOR, 2.7K Ω \pm 2%	(TB2) R9 THRU R16 (TB3) R9 THRU R16	16	16, 17
3	DIODE, SILICON SWITCHING 1N921	(TB2) CR1-1 THRU CR72-1 (TB2) CR1-2 THRU CR72-2 (TB3) CR1-1 THRU CR72-1 (TB3) CR1-2 THRU CR72-2	288	13, 15, 28
4	CAPACITOR, TANTALUM 100 μ F \pm 20%, 20V	(TB1) C1	1	22, 23, 76
5	RESISTOR, TEMP SENSITIVE 220 Ω \pm 5%	(TB1) RT1 (TB1) RT2 (9104A ONLY)	1 OR 2	119
6	RESISTOR, TEMP SENSITIVE 180 Ω \pm 5%	(TB1) RT2 (9104B ONLY)	1 OR NONE	119
7	RESISTOR, METAL FILM \pm 1% (VALUE TO BE DETERMINED BY RESISTOR BEING REPLACED)	(TB1) R1 THRU R25	25	116, 118
8	CONNECTOR, 140 PIN FEMALE #F 5718-140-6	P35	1	82

NO. REQ.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN	DATE	SDS SCIENTIFIC DATA SYSTEMS 342 FIFTEENTH STREET SANTA MONICA CALIFORNIA TITLE SCHEMATIC, CORE MEMORY
1. TOLERANCES UNLESS SPECIFIED		CHECK	DATE	
2. BREAK ALL SHARP EDGES		APPR.	DATE	
3. HATCH SURFACES				
4. ALL DIM IN INCHES				
MODEL NO. 9104, 9204		SIZE D		DWG NO. 100588 C
NEXT ASSY.		SCALE		DO NOT SCALE DRAWING SHEET 3 OF 5

100588 C

REFERENCE DESIGNATIONS
 ARE ABBREVIATED.
 PREFIX THE DESIGNATION
 WITH UNIT NUMBER
 OR ASSEMBLY DESIGNATION
 OR BOTH. (MIL. STD. 16B)

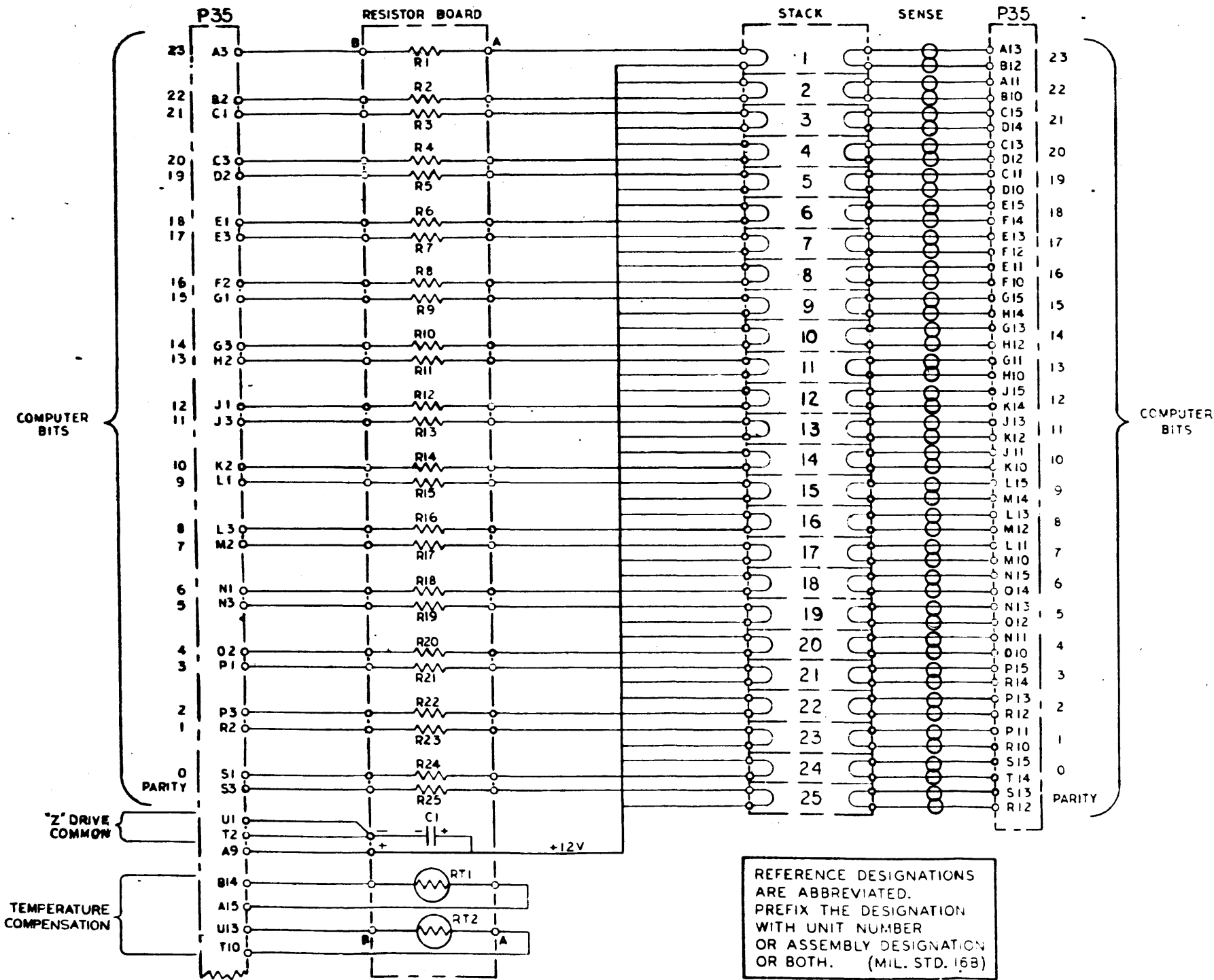


NO. REV.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	REV. NO.
NOTES UNLESS SPECIFIED				
1. TOLERANCES UNLESS SPECIFIED		CHECK	DATE: 10/15/53	
2. DIMENSIONS UNLESS SPECIFIED		APPR.	TITLE	
3. BREAK ALL SHARP CORNERS		SCHEMATIC CORE MEMORY		
4. HIDE SURFACES				
5. ALL DIMENSIONS		MODEL NO. 9.22, 3202		
NEXT ASSY.		SIZE DWG NO. 100797		

100797

199

REV	DESCRIPTION	CHK	DATE	APPROVED
C	REVISED & REDRAWN (SEE REV 2.0)			

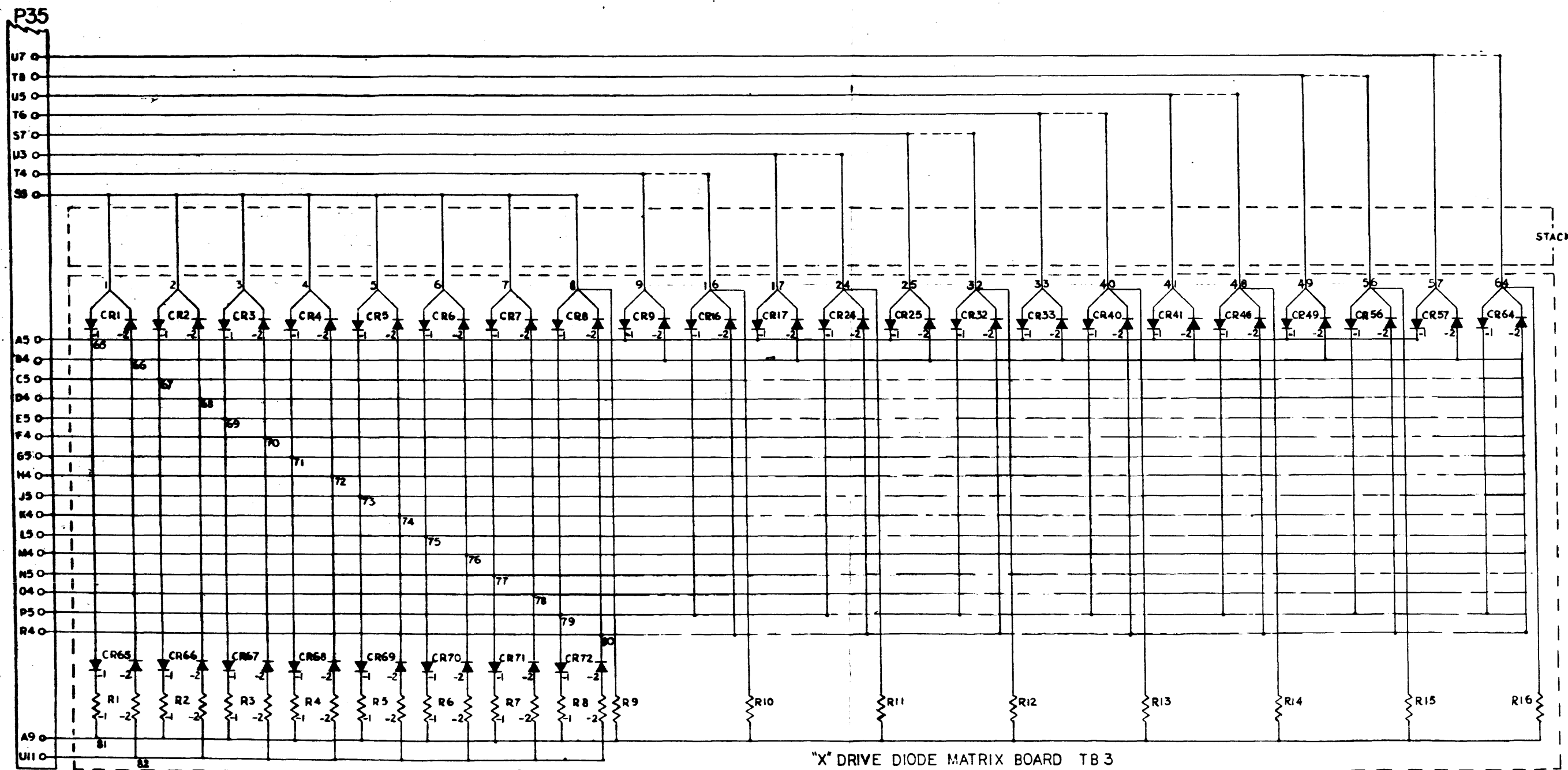


REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH. (MIL. STD. 16B)

NO. REQ.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	ITEM NO.
		NOTES UNLESS SPECIFIED		
		1. TOLERANCES UNLESS OTHERWISE SPECIFIED ARE AS SHOWN		
		2. BREAK ALL SHARP EDGES 0.0 APPROX		
		3. MATCH SURFACES		
		4. ALL DIM IN INCHES		
		CHECKED BY: <i>[Signature]</i>		
		APPROVED BY: <i>[Signature]</i>		
		SDS SCIENTIFIC DATA SYSTEMS		
		SCHEMATIC, CORE MEMORY		
	MODEL NO. 9102,9202	SIZE D	DWG NO. 100797	C
	NEXT ASSY			

100797 C

REV	DESCRIPTION	CHE	DATE	APPROV
C	SEE SHEET ONE			



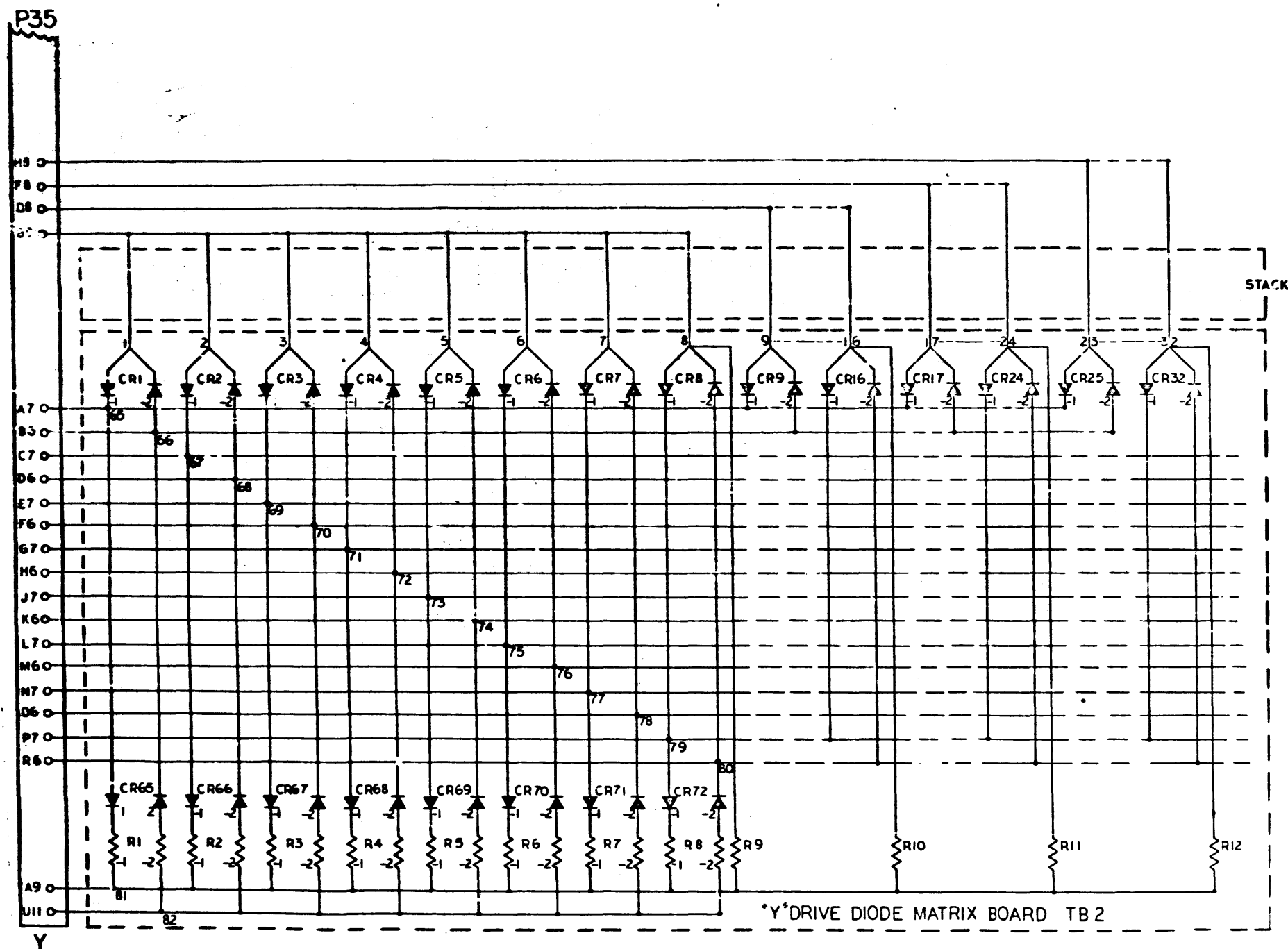
"X" DRIVE DIODE MATRIX BOARD TB 3

NO.	DRAWING NO.	DESCRIPTION	REVISION DESIGNATION
1	9102, 9202	SCHEMATIC, CORE MEMORY	100797 C
MODEL NO. 9102, 9202 NEXT ASSY:		SDS SCIENTIFIC DATA SYSTEMS CHECKED: <i>C. H. ...</i> APPROVED: <i>[Signature]</i> DATE: 7 SHEET 3 OF 5	

100797C1

201

REVISION				
REV	DESCRIPTION	CHK	DATE	APPROVED
C	SEE SHEET ONE			



NO. REQ.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION
MATERIAL LIST			
NOTES UNLESS SPECIFIED		DRAWN <i>[Signature]</i>	SCIENTIFIC DATA SYSTEMS
1. TOLERANCES DIM. ±.000 ANGULAR ±1°		CHECK <i>[Signature]</i>	2855 AVENUE 18 STREET, SANTA MONICA, CALIF. 90405
2. BREAK ALL SHARP EDGES 3.10 APPROX.		APPR	TITLE
3. HATCH SURFACES ✓			SCHMATIC, CORE MEMORY
4. ALL DIM. IN INCHES			
MODEL NO.	9102,9202	SIZE	DWG. NO. 100737
PRINT ASBY.	199		C

1100737/C1

REPLACEMENT PARTS LIST

ITEM	DESCRIPTION	DESIGNATION	QTY	SUPPLIER CODE (SEE INDEX)
1	RESISTOR, 56Ω ± 2%	(TB2) R1-1 THRU R8-1 (TB2) R1-2 THRU R8-2 (TB3) R1-1 THRU R8-1 (TB3) R1-2 THRU R8-2	32	16, 17
2	RESISTOR, 2.7KΩ ± 2%	(TB2) R9 THRU R12 (TB3) R9 THRU R16	12	16, 17
3	DIODE, SILICON SWITCHING 1N921	(TE2) CR1-1 THRU CR32-1 (TE2) CR1-2 THRU CR32-2 (TE2) CR65-1 THRU CR72-1 (TE2) CR65-2 THRU CR72-2 (TB3) CR1-1 THRU CR72-1 (TB3) CR1-2 THRU CR72-2	224	13, 15, 26
4	CAPACITOR, TANTALUM 100 μF ± 20%, 20V	(TB1) C1	1	22, 23, 76
5	RESISTOR, TEMP. SENSITIVE 220Ω ± 5%	(TB1) RT1 (TB1) RT2 (9102A ONLY)	1 OR 2	119
6	RESISTOR, TEMP. SENSITIVE 180Ω ± 3%	(TB1) RT2 (9102B ONLY)	1 OR NONE	119
7	RESISTOR, METAL FILM ± 1% (VALUE TO BE DETERMINED BY RESISTOR BEING REPLACED)	(TB1) R1 THRU R25	25	116, 118
8	CONNECTOR, 140 PIN FEMALE "FB01B-140-6	P35	1	82

NO. REQ.	DRAWING NO.	DESCRIPTION	REFERENCE DESIGNATION	REV. NO.
MATERIAL LIST				
NOTES UNLESS SPECIFIED		DRAWN	EDS SCIENTIFIC DATA SYSTEMS	
1. TOLERANCES XX .030 ANGULAR XX .010		CHECK	100 EASTMAN STREET, SANTA MONICA, CALIF. 90401	
2. BREAK ALL SHARP EDGES DIA. APPROX.		APPR.	TITLE	
3. MACH SURFACES ✓			SCHEMATIC, CORE MEMORY	
4. ALL DIM. IN INCHES				
MODEL NO.	SIZE	DWG. NO.		
9102, 9202	D	100797	C 20	
NEXT ASSY	200	SCALE	DO NOT SCALE DRAWING SHEET 5 OF 5	

100797 | C |

Code No.	Name	Address
1	Motorola Semiconductor	5005 E. McDowell Rd. Phoenix, Arizona
2	Same as 1	
3	Fairchild Semiconductor	545 Whisman Road Mountain View, Calif.
4	Same as 3	
5	General Electric Co. Semiconductor Products Div.	Electronics Park Syracuse 1, N. Y.
6	Same as 5	
7	RCA Semiconductor Div.	Somerville, N. Y.
8	Silicon Transistor Corp.	East Gate Blvd. Garden City, N. Y.
9	Same as 8	
10	Hughes Semiconductor Div.	500 Superior Ave. Newport Beach, Calif.
11	Texas Instruments, Inc.	P.O. Box 5012 Dallas, Texas
12	Same as 11	
13	Pacific Semiconductors, Inc.	1420 Aviation Blvd. Lawndale, Calif.
14	Continental Device Corp.	12515 Chadron Ave. Hawthorn, Calif.
15	Sperry Semiconductor Div.	380 Main Ave. Norwalk, Conn.
16	Corning Glass Works	550 High St. Bradford, Penn.
17	Welwyn International, Inc.	3535 Edgecliff Terr. Cleveland 11, Ohio
18	Same as 11	
19	Arco Electronics, Inc.	Community Drive Great Neck, N. Y.
20	Sangamo Electric Co.	1207 N. 11th. St. Springfield, Ill.
21	Micamold Electric Mfg. Co.	65 Gouverneur St. Newark, N. J.
22	Kemet Company	11901 Madison Ave. Cleveland 1, Ohio
23	Sprague Electric Co.	481 Marshall St. North Adams, Mass.
24	U.S. Semiconductor Products	3540 W. Osborn R. Pheonix, Ariz.
25	General Electric Co. Capacitor Dept.	Hudson Falls, N. Y.
26	Same as 23	
27	Same as 23	
28	Raytheon Semiconductor Co.	350 Ellis St. Mountain View, Calif.
29	National Semiconductor Corp.	P.O. Box 443 Danbury, Conn.
30	General Instrument Corp.	65 Gouverneur St. Newark, N. J.

Code No.	Name	Address
31	Sylvania Electric Products Semiconductor Div.	100 Sylvan Road Woburn, Mass.
32	Western Semiconductors	2200 S. Fairview St. Santa Ana, Calif.
33	Computer Diode Corp.	250 Garibaldi Ave. Lodi, New Jersey
34	Tungsol Electric Inc.	1 Summer Ave. Newark, N. J.
35	Bourns, Inc.	1200 Columbia Ave. Riverside, Calif.
36	International Resistance Co.	401 N. Broad St. Philadelphia, Penn.
37	General Resistance, Inc.	430 Southern Blvd. New York 55, N. Y.
38	Same as 23	
39	Technitrol Engineering Co.	1952 E. Allegheny Ave. Philadelphia, Penn.
40	Same as 39	
41	Delevan Electronics Corp.	77 Olean Road East Aurora, N. Y.
42	Same as 41	
43	Delco Radio Division	700 E. Firmin St. Kokomo, Indiana
44	Atohm Electronics	7648 San Fernando Rd. Sun Valley, Calif.
45	Dale Electronics, Inc.	P.O. Box 609 Columbus, Nebraska
46	Tepro Electric Co.	5 St. Paul Street Rochester 4, N. Y.
47	Sage Electronics Corp.	Country Club Road East Rochester, N. Y.
48	Littelfuse Inc.	1865 Miner St. Des Plaines, Illinois
49	Bussman Mfg. Co.	University at Jefferson St. Louis, Missouri
50	Sola Electric Company	1717 Busse Road Elk Grove Village, Ill.
51	Cinch Jones Division	1026 S. Homan Ave. Chicago, Ill.
52	Same as 51	
53	Ohmite Mfg. Co.	3635 Howard St. Skokie, Illinois
54	Cutler-Hammer, Inc.	321 N. 12th. Street Milwaukee, Wisc.
55	Centralab	900A E. Keefe Ave. Milwaukee, Wisc.
56	Eldema Corporation	1805 Belcroft Ave. El Monte, Calif.
57	Same as 23	
58	Same as 25	
59	Same as 20	
60	Same as 51	

Code No.	Name	Address
61	Same as 54	
62	Amelco, Inc.	341 Moffet Blvd. Mountain View, Calif.
63	Transitron Electronic Corp.	168-182 Albion St. Wakefield, Mass.
64	Same as 10	
65	Same as 30	
66	American Semiconductor Corp.	3940 N. Kilpatrick Chicago, Illinois
67	Hoffman Electronics Corp. Semiconductor Division	Box 471 1001 N. Arden El Monte, Calif.
68	Delta Semiconductors, Inc.	835 Production Place Newport Beach, Calif.
69	Pulse Engineering, Inc.	560 Robert Ave. Santa Clara, Calif.
70	Nytronics, Inc.	550 Springfield Ave. Berkeley Heights, N. J.
71	Alladin Electronics, Inc.	Nashville 10, Tenn.
72	Ferroxcube Corp. of America	E. Bridge Street Saugerties, New York
73	Electra Mfg. Co.	4051 Broadway Kansas City, Mo.
74	Same as 25	
75	Same as 24	
76	Same as 24	
77	Same as 24	
78	Same as 53	
79	Allied Control Co, Inc.	2 East 2nd Ave. New York, 21, N.Y.
80	Same as 23	
81	Same as 20	
82	Elco Corporation	Willow Grove, Penn.
83	Chicago Miniature Lamp Works	4433 Ravenswood Ave. Chicago 40, Illinois
84	General Electric Co. Miniature Lamp Dept.	Nela Park Cleveland 12, Ohio
85	Same as 34	
86	Automatic Electric Sales Corp.	North Lake, Illinois
87	Same as 24	
88	Same as 47	
89	Same as 45	
90	J.W. Miller Co.	5917 S. Main St. Los Angeles 3, Calif.
91	Stanwyck Winding Co.	137 Walsh Ave. Newburgh, N. Y.
92	Same as 36	
93	Same as 73	
94	Same as 23	
95	Philco Corp.	Lansdale Division Lansdale, Penn.
96	Amperex Electronic Corp.	230 Duffy Avenue Hicksville, N. Y.

Code No.	Name	Address
97	Siliconix, Inc.	1140 W. Evelyn Ave. Sunnyvale, Calif.
98	Continental Connector Corp.	34-63 56th Street Woodside 77, N. Y.
99	Same as 23	
100	Same as 53	
101	Royal Electric Corp.	95 Grand Ave. Pawtucket, R. I.
102	Harvey Hubbell, Inc.	Bridgeport, Conn.
103	The Wiremold Co.	Hartford 10, Conn.
104	Dialight Corp.	60 Stewart Ave. Brooklyn 37, N. Y.
105	Heinemann Electric Co.	2636 Brunswick Pike Trenton 2, N. J.
106	Arrow-Hart and Hegeman Electric	103 Hawthorne St. Hartford, Conn.
107	Allen Bradley Co.	136 W. Greenfield Ave. Milwaukee 4, Wisc.
108	General Electric Co. Meter Division	1 River Road Schenectady 5, N.Y.
109	Same as 70	
110	Winchester Electronics, Inc.	Willard Road Norwalk, Conn.
111	AMP, Inc.	Harrisburg, Penn.
112	Grayhill, Inc.	569 Hillgrove Ave. LaGrange, Illinois
113	Controls Co. of America	9555 Soreng Ave. Schiller Park, Illinois
114	Amphenol-Borg Amphenol Connector Division	1830 S. 54th Ave. Schiller Park, Illinois
115	Same as 36	
116	Same as 36	
117	Same as 73	
118	Same as 73	
119	Same as 11	
120	Thermalloy Co.	4417 N. Central Expressway Dallas 5, Texas
121	Astro Dynamics, Inc.	Second Avenue Northwest Industrial Park Burlington, Mass.
122	Tor Mfg. Co.	1533 E. Walnut St. Pasadena, Calif.
123	Wakefield Engineering, Inc.	9 Broadway Wakefield, Mass.
124	Same as 35	
125	Same as 36	
126	Same as 37	
127	Erie Resistor Corp.	644 W. 12th Street Erie, Penn.
128	Same as 55	

Code No.	Name	Address
129	Same as 37	
130	C. P. Clare and Co.	3101 Pratt Blvd. Chicago 45, Illinois
131	The Adams and Westlake Co.	N. Michigan Street Elkhart, Indiana
132	Not Assigned	
133	Not Assigned	
134	Cannon Electric Co.	3208 Humboldt St. Los Angeles 31, Calif.
135	Indiana General Corp.	Crows Mill Road Keasbey, New Jersey
136	Same as 23	
137	Electro-Cube, Inc.	805 Fairview Ave. South Pasadena, Calif.
138	Monitor Products, Inc.	815 Fremont Ave. South Pasadena, Calif.
139	Rotron Mfg. Co.	Woodstock, N. Y.
140	The Digitran Co.	660 S. Arroyo Parkway Pasadena, Calif.
141	Minneapolis-Honeywell Semiconductor Products Div.	2747 4th Ave. South Minneapolis, Minn.
142	Babcock Relays Div.	1645 Babcock Ave. Costa Mesa, Calif.
143	Simco Company	19th and Walnut St. Lansdale, Penn.
144	IMC Magnetics Corp.	570 Main Street Westbury, N. Y.
145	Malco Mfg. Co.	4025 W. Lake St. Chicago 24, Ill.
146	Drake Mfg. Co.	4626 N. Olcott Ave. Chicago 31, Ill.
147	Same as 25	
148	Same as 23	
149	Same as 20	
150	Westinghouse Electric Co.	Semiconductor Dept. Youngwood, Penn.
151	Stancor Electronics, Inc.	3501 W. Addison St. Chicago 18, Ill.
152	Ammon Instruments, Inc.	345 Kelley St. Manchester, N.H.
153	Raytheon Company Industrial Components Div.	465 Center Street Quincy, Mass.
154	Same as 108	
155	Same as 55	
156	Capitol Machine and Switch Co.	36 Balmforth Street Danbury, Conn.
157	Same as 82	
158	Same as 51	
159	Quam-Nichols Co.	Marquette Rd. at Prairie Chicago 37, Illinois

Code No.	Name	Address
160	Magtrol, Inc.	241 Seneca Street Buffalo 4, New York
161	West Coast Electrical Mfg. Co.	233 W. 116th Place Los Angeles 61, Calif.
162	Minneapolis-Honeywell Micro Switch Division	Chicago and Spring Sts. Freeport, Illinois
163	Eldema Corp.	1805 Belcroft Ave. El Monte, Calif.
164	Potter and Brumfield Div. of Amer. Machine and Foundry	1200 E. Broadway Princeton, Indiana
165	Electric Indicator Company	Camp Avenue Stamford, Conn.
166	General Instrument Co. Magne Head Division	3216 W. El Segundo Hawthorne, Calif.
167	Contract Tool Corp.	3820 Hoke Ave. Culver City, Calif.
168	Milton Ross Metals Co.	250 Jacksonville Rd. Hatboro, Penn.
169	Robinson Company	3636-5 W. 139th St. Hawthorne, Calif.
170	ADC Products, Inc.	6411 Cambridge St. Minneapolis 26, Minn.
171	Same as 170	
172	Same as 170	
173	Same as 53	
174	Bendix Corporation Scintilla Division	Sidney, New York
175	Ward Leonard Electric Co.	75 South Street Mount Vernon, N.Y.
176	Clarostat Mfg. Co. Inc.	Washington Street Dover, New Hampshire
177	J. B. T. Instruments, Inc.	133 Hamilton Street New Haven 8, Conn.
178	Herman H. Smith, Inc.	2336 Nostrand Ave. Brooklyn 10, N.Y.
179	International Instruments	88 Marsh Road Orange, Conn.
180	U. S. Engineering Co. Div. of Litton Ind.	13536 Saticoy St. Van Nuys, Calif.
181	Campbell Industries	Dover, New Hampshire
182	California Resistor Corp.	1631 Colorado Ave. Santa Monica, Calif.
183	Kelvin Electric Co.	5907 Noble Ave. Van Nuys, Calif.
184	Angstrom Precision Co.	7341 Greenbush Ave. N. Hollywood, Calif.
185	Mepco Inc.	35 Abbet Ave. Morristown, N. J.
186	Wood Electric Corp.	244 Broad Street Lynn, Mass.
187	Pendar, Inc.	509 Sherman Ave. Coeur D'Alene, Idaho

Code No.	Name	Address
188	Aerovox Corp.	740 Belleville Ave. New Bedford, Mass.
189	Cornell-Dubilier	50 Paris Street Newark 1, N. J.
190	Augat Inc.	33 Perry Ave. Attleboro, Mass.
191	Dearborn Labs	Box 3431 Orlando, Florida
192	TRW Capacitor, Div.	112 W. 1st Street Ogallala, Nebraska
193	Electron Products	1962 Walker Ave. Monrovia, Calif.
194	Mallory & Co. Inc.	3029 E. Washington St. Indianapolis, Ind.
195	Ampex Corp.	401 Broadway Redwood City, Calif.
196	Astron Division	255 Grant Avenue E. Newark, N. J.
197	Elgin Controls Division	2435 N. Naomi St. Burbank, Calif.
198	Superior Switch Co.	1001 W. Broad St. Richmond, Va.
199	Rheem Electronics	5250 W. El Segundo Hawthorne, Calif.
200	Union Carbide Cons. Prod. (Eveready)	270 Park Ave. N. Y., New York
201	Mossman, Inc. Donald P.	Box 265 Brewster, N. Y.
202	Dickson Elect. Corp.	310 S. Wells Fargo Scottsdale, Arizona
203	Master Specialties	15020 Figureoa Gardena, Calif.
204	Alco Elect. Prod. Inc.	3 Wolcott Ave. Lawrence, Mass.
205	Southern Electronics	150 W. Cypress Ave. Burbank, Calif.
206	San Fernando Elec. Mfg. Co.	1509 First Street San Fernando, Calif.
207	Leecraft Mfg. Co. Inc.	21-16 44th Rd. Long Island City, N. Y.
208	Oak Mfg. Co.	Crystal Lake, Illinois
209	National Cash Register Co.	S. Main at K St. Dayton, Ohio
210	Sylvania, Lighting Prod. Division	60 Boston St. Salem, Mass.
211	Westinghouse Lamp Div.	MacArthur Blvd. Bloomfield, N. J.
212	National Radio Inc.	37 Washington St. Melrose, Mass.
213	James Electronics Inc.	4050 N. Rockwell, Chicago, Ill.

Code No.	Name	Address
214	Vemaline Products Co.	Box 1, Franklin Lakes, New Jersey
215	United Shoe Mach. Corp.	Federal at High St. Boston 7, Mass.
216	Atlas Tack Corp.	South Pleasant St. Fairhaven, Mass.
217	Cambridge Thermionic Corp.	445 Concord Ave. Cambridge 38, Mass.
218	Hartwell Corp.	9035 Venice Blvd. Los Angeles 34, Calif.
219	Kulka Electric	633 S. Fulton Ave. Mt. Vernon, N. Y.
220	Atlee Corp.	2 Lowell Ave. Winchester, Mass.
221	Birnbach Radio	145 Hudson St. New York 13, N. Y.
222	Southco Fastener Co.	233 Industrial Hwy. Lester, Penn.
223	Standard Pressed Steel Co. (SPS)	Box 1084, Jenkintown, Penn.
224	Penn Engineering & Mfg. Corp.	Box 311 Doylestown, Penn.
225	National Transistor, Div. ITT	500 Broadway Lawrence, Mass.
226	Lerco Div., Microdot	220 Pasadena Ave. South Pasadena, Calif.
227	Burndy	Norwalk, Connecticut
228	Electro-Mec Inst. Co.	47-51 33rd St. Long Island City, N. Y.
229	Ohio Nut & Bolt	36 First Ave. Berea, Ohio
230	Riedon Div. On Mark Eng.	11728 Vost St. No. Hollywood, Calif.
231	Rubbercraft Corp. of Calif.	1800 W. 220th St. Torrance, Calif.
232	Masterite Industries	835 W. Olive St. Inglewood, Calif.
233	Weckesser Co. Inc.	5701 Northwest Hwy. Chicago 46, Illinois
234	Key Resistor Corp.	321 W. Redondo Beach Blvd. Gardena, Calif.
235	Alpha Wire Corp.	180 Varick St. New York 14, N. Y.
236	Nylon Molding Corp.	141 South Ave. Garwood, New Jersey
237	Dakota Engineering Co.	4315 Sepulveda Culver City, Calif.
238	PCA Electronics	16799 Schoenborn St. Sepulveda, Calif.
239	ILS Div., Merriam	10978 Madison Ave. Cleveland, Ohio

Code No.	Name	Address
240	Philadelphia Insulated Wire Co.	333 New Albany Rd. Moorestown, N. J.
241	Amerock Corp.	4000 Auburn St. Rockford, Illinois
242	Superior Electric Co.	383 Middle St. Bristol, Conn.
243	Reon	155 Sawmill River Rd. Yonkers, N.Y.
244	Hardwick Hindle	Huntington, Indiana
245	Driver, W.B.	1875 MacCarter Hwy. Newark 4, N. J.
246	Driver-Harris	202 Middlesex St. Harrison, N. J.
247	Pacific Electricord	747 W. Redondo Beach Blvd., Gardena, Calif.
248	Standard Wire & Cable	3434 Overland Ave. Los Angeles 34, Calif.
249	Illumitronic Eng.	680 E. Taylor Ave. Sunnyvale, Calif.
250	Belden Mfg. Co.	415 S. Kilpatrick Ave. Chicago 44, Ill.
251	Arnold Eng.	Box G, Marengo, Ill.
252	Carstedt Research	2501 E. 68th St. Long Beach 5, Calif.
253	Maloney Elect. Co.	5390 Bircher Ave. St. Louis, Mo.
254	Gerrard, A. J.	400 E. Touhy Ave. Des Plaines, Ill.
255	Ducommun	4890 S. Alameda Los Angeles, Calif.
256	Stevens Paper Mills Inc.	Box 347 Windsor, Conn.
257	Schweitzer, P. J.	Lee, Massachusetts
258	Cottrell Paper	10 Purchase St. Fall River, Mass.
259	American Pamcor	181 Hillcrest Havertown, Pa.
260	Johns - Manville	220 E. 40th St. New York 16, N. Y.
261	Minnesota Mining & Mfg. Co. (3M)	2501 Hudson Ave. St. Paul, Minn.
262	Permacel Mfg. Co.	U. S. Highway 1 New Brunswick, N. J.
263	Technical Tape Co.	240 North Ave. New Rochelle, N. Y.
264	Anaconda	605 Third Ave. New York, N. Y.
265	Essex Wire	1601 Wall St. Fort Wayne, Indiana
266	Kennecott Wire	Phillipsdale 16, R. I.
267	Phelps - Dodge Copper	4400 New Haven Ave. Fort Wayne, Ind.

Code No.	Name	Address
268	Westinghouse, Specialty Transf. Div.	Greenville, Pa.
269	International Rectifier	233 Kansas St. El Segundo, Calif.
270	Chicago Printed String	2322 Logan Blvd. Chicago 47, Ill.
271	Varflex	514 W. Court St. Rome, N.Y.
272	Natvar Corp.	211 Randolph Ave. Woodbridge, N. J.
273	General Electric Wire & Cable Div.	1285 Boston Ave. Bridgeport, Conn.
274	Standard Record Mfg.	17 N. San Gabriel Blvd. Pasadena, Calif.
275	Sun Chemical Corp. Electro-Tech Prod. Div.	Nutley, N. J.
276	Camlock Fastener Corp.	22 Spring Valley Rd. Paramus, N. J.
277	Thomas & Betts	36 Butler St. Elizabeth, N. J.
278	Unistrut	933 W. Washington Blvd. Chicago, Ill.
279	Victor Wire & Cable	618 Main St. Warwick, R.I.
280	Thermatics Corp.	P. O. Drawer 505 Elm City, N. Carolina
281	Reeves-Hoffman	145 Cherry St. Carlisle, Penn.
282	Bulova Electronics	61-20 Woodside Ave. Woodside 77, N.Y.
283	Palmer Inst. Co.	1017 Mission St. Pasadena, Calif.
284	Filtair, Inc.	706 Forrest St. Charlottesville, Va.
285	Signetics	680 W. Maude Ave. Sunnyvale, Calif.
286	American Super-Temp. Wires, Inc.	W. Canal St. Winooski, Vermont
287	Jan Hardware Mfg. Co.	38-03 Queens Blvd. Long Island City 1, N.Y.
288	International Business Mach. Co.	112 E. Post St. White Plains, N.Y.
289	Hoskins Mfg.	4445 Lawton Ave. Detroit 8, Michigan
290	Zippertubing Corp.	13000 S. Broadway Los Angeles 61, Calif.
291	CPR International	555 N. Alaska, Torrance, Calif.
292	Western Insulated Wire	2425 E. 30th Los Angeles 58, Calif.
293	Minneapolis Honeywell, Meter Div.	Grenier Field Manchester, N.H.

Code No.	Name	Address
294	Ives, H. B.	New Haven, Conn.
295	Plastiglide Mfg. Co.	1757 Stanford St. Santa Monica, Calif.
296	Croven Ltd.	500 Beech St. Box 1420, Whitby, Ontario, Canada
297	Darnell Corp.	12000 S. Woodruff Ave. Downey, Calif.
298	Tracor	Austin, Texas
299	Barden Corp.	200 Park Avenue Danbury, Conn.
300	Kooltronic Fan Co.	Box 504 Princeton, N. J.
301	Waldes-Kohinoor	47-16 Austel Place Long Island City, New York
302	PIC Design Corp.	477 Atlantic Ave. E. Rockaway, N. Y.
303	Shakeproof Division Illinois Tool	St. Charles Road Elgin, Illinois
304	Elastic Stop Nut Co. (ESNA)	2330 Vauxhall Road Union, N. J.
305	National Lock Co.	42 Hermon Street Newark 5, N. J.
306	Groov-Pin Corp.	1125 Hendricks Cswy. Ridgefield, N. J.
307	Harrison Labs. Div.	45 Industrial Road Berkeley Heights, New Jersey
308	Boston Gear Works	14 Hayward Street Quincy 71, Mass.
309	Emerson & Cumming	869 Washington Street Canton, Mass.
310	ARBCO Electronics	7820 Gloria Van Nuys, Calif.
311	Sealectro	139 Hoyt St. Mamaroneck, New York
312	General Sensor, Inc.	Box 231 Athens, Texas

Code No.	Name	Address
313	Thermal-Systems, Inc.	15100 S. Broadway Gardena, Calif.
314	Tinnerman Products, Inc.	Box 6688 Cleveland 1, Ohio
315	Brush Beryllium Co.	17876 St. Clair Ave. Cleveland, Ohio
316	National Beryllia Corp.	1st & Haskell Avenues Haskell, N. J.
317	Frenchtown Porcelain	Frenchtown, N. J.
318	Lenz Electric Mfg. Co.	1751 N. Western Ave. Chicago 47, Ill.
319	Space Products Co.	2235 E. Artesia St. Long Beach, Calif.
320	Sterling Inst. Div.	76 E. 2nd Street Mineola, N. Y.
321	Atlantic India Rubber Co.	571 W. Polk St. Chicago 7, Illinois
322	Waldom Electric	4627 W. 53rd Street Chicago, Illinois
323	Mystik Tape Inc. Div.	1700 Winnetka Ave. Northfield, Ill.
324	Amphenol-Borg, Controls Div.	120 S. Main Janesville, Wisc.
325	General Electric, Transformer Div.	1 River Road Schenectady, N. Y.
326	GC Electronics Div.	400 S. Wyman St. Rockford, Ill.
327	United Carr Fastener Div.	459 Watertown St. Newtonville, Mass.
328	North American Elect. Div. IRC	71 Linden St. West Lynn, Mass.
329	Carol Cable Div., Crescent Wire	249 Roosevelt Ave. Pawtucket, R. I.
330	Plastoid Corp.	42-61 24th Street Long Island City, N. Y.
331	G-V Controls Inc.	101 Okner Parkway Livingston, N. J.
332	Teletype Corp.	5555 Touhy Avenue Skokie, Illinois
333	Parker Seal	10567 Jefferson Blvd. Culver City, Calif.