
Parts Lists and Diagrams—Section 6

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6.1 GENERAL.

This section contains the parts lists, circuit-board layout drawings and schematic diagrams for the instrument. (Section 4 contains functional block diagrams. Section 5 contains photographs of the instrument, identifying various parts.) The heavy lines on schematic diagrams denote the major signal flow.

Reference designation usage is described below.

6.2 REFERENCE DESIGNATIONS.

Each electrical component part on an assembly is identified on equipment and drawings by means of a reference designator comprised of numbers and letters. Component types on an assembly are numbered sequentially, the numbers being preceded by a letter designation that identifies the component (R for resistor, C for capacitor, etc.). Some of the less obvious designators are: DS, lamp; Q, transistor;

U, integrated circuit; WT, wire tie point; X, J, P, or SO, connector; Y, crystal resonator; Z, network.

Each assembly (typically a circuit board) has its own sequence of designators which can be identified by using prefixes, such as A- for the main frame and V- for power supply. Examples: B-R8 designates B board, resistor 8; D-WT2 = D board, wire-tie point 2; CR6 on the V schematic is a shortened form of designator V-CR6 = V board, diode 6. The instrument may contain A-R1, B-R1, C-R1, and D-R1.

6.3 DIAGRAMS.

Generally, each schematic diagram is located on a right-hand fold-out page for convenience. The associated layout drawing and parts list are located on the same page, the facing page, or otherwise nearby.

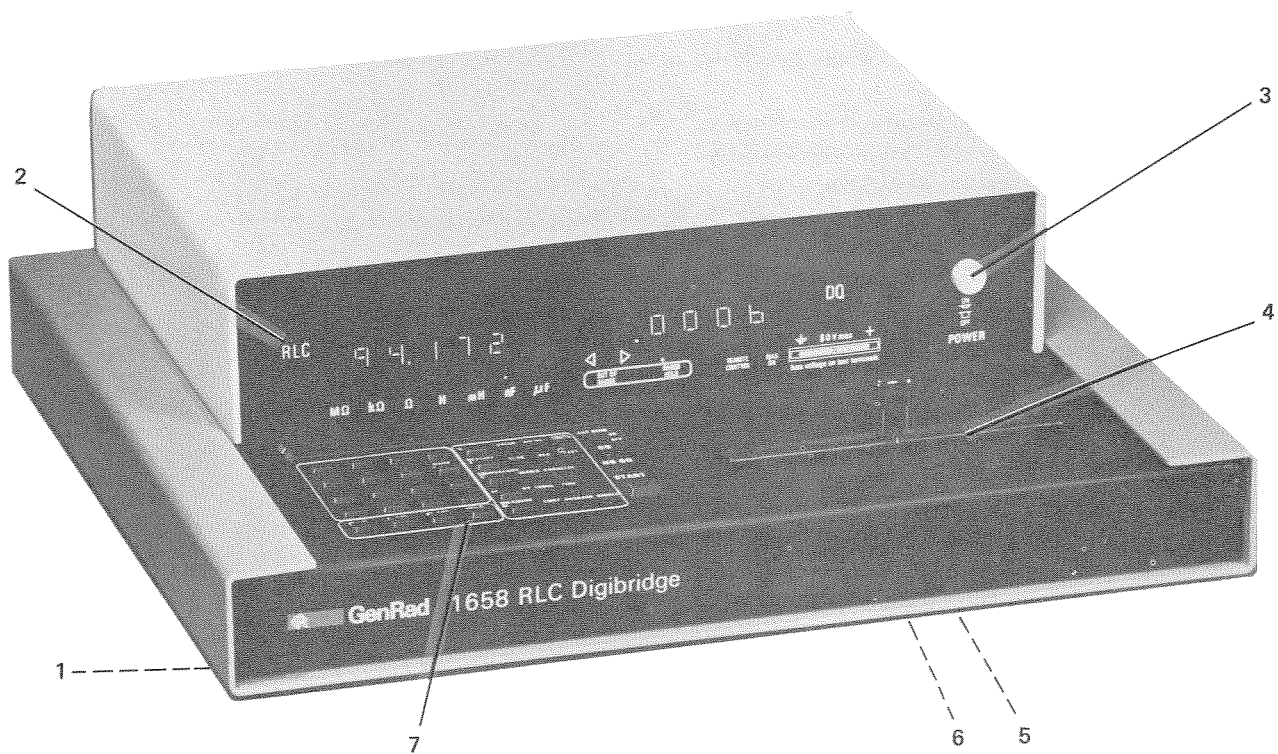


Figure 6-1. Front view, showing replaceable mechanical parts.

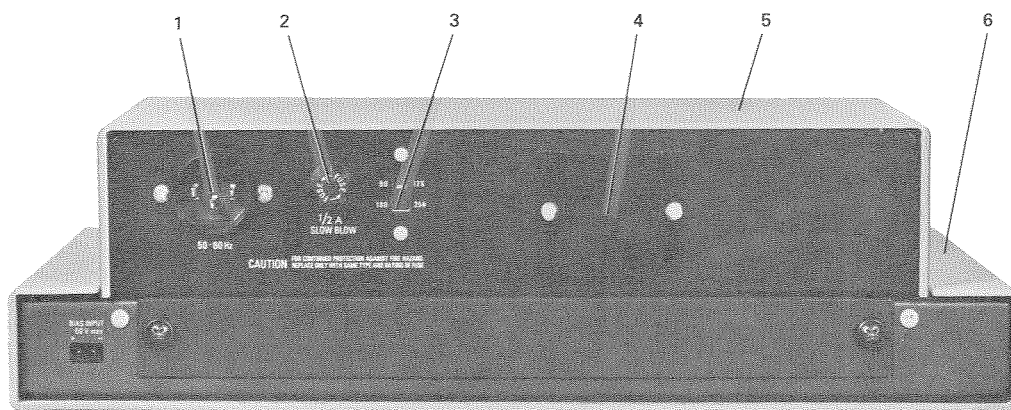


Figure 6-2. Rear view, showing replaceable mechanical parts. Notice that item 1 is slightly different from the picture (more rectangular than round).

MECHANICAL PARTS LIST

FRONT

Figure 6-1	Quantity	Description	GenRad Part No.	FMC	Mfgr Part No.
1	4	Foot	5260-2051	24655	5260-2051
2	1	Display panel (plastic)	1658-7032	24655	1658-7032
3	1	Actuator (push rod)	1657-2810	24655	1657-2810
4	1	Guide block assembly	1657-2200	24655	1657-2200
5	1	Card pan	1658-8200	24655	1658-8200
6	1	Instruction card	1658-0110	24655	1658-0110
7	1	Keyboard plate (120 Hz)	1658-8045	24655	1658-8045
	or	Keyboard plate (100 Hz)	1658-8046	24655	1658-8046

REAR

Figure 6-2	Quantity	Description	GenRad Part No.	FMC	Mfgr Part No.
1	1	Power connector J101	4240-0250	82389	EAC-302
2	1	Fuse extractor post F1	5650-0100	75915	342-004
3	1	Slide switch S2	7910-0832	82389	11A-1266
4	1	Cover (safety)	1657-8120	24655	1657-8120
5	1	Top cover	1657-8060	24655	1657-8060
6	1	Bottom shell	1657-8000	24655	1657-8000

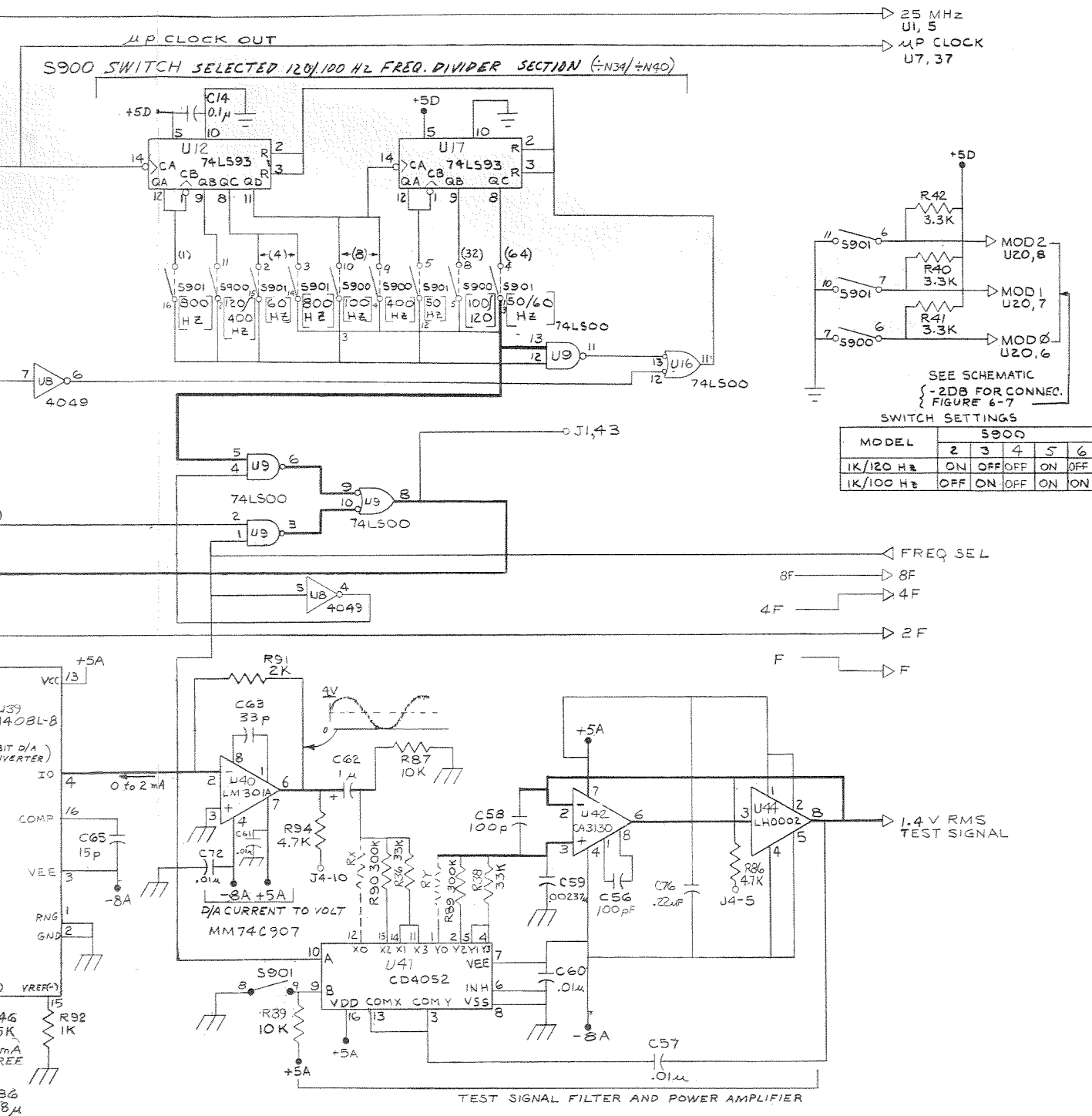


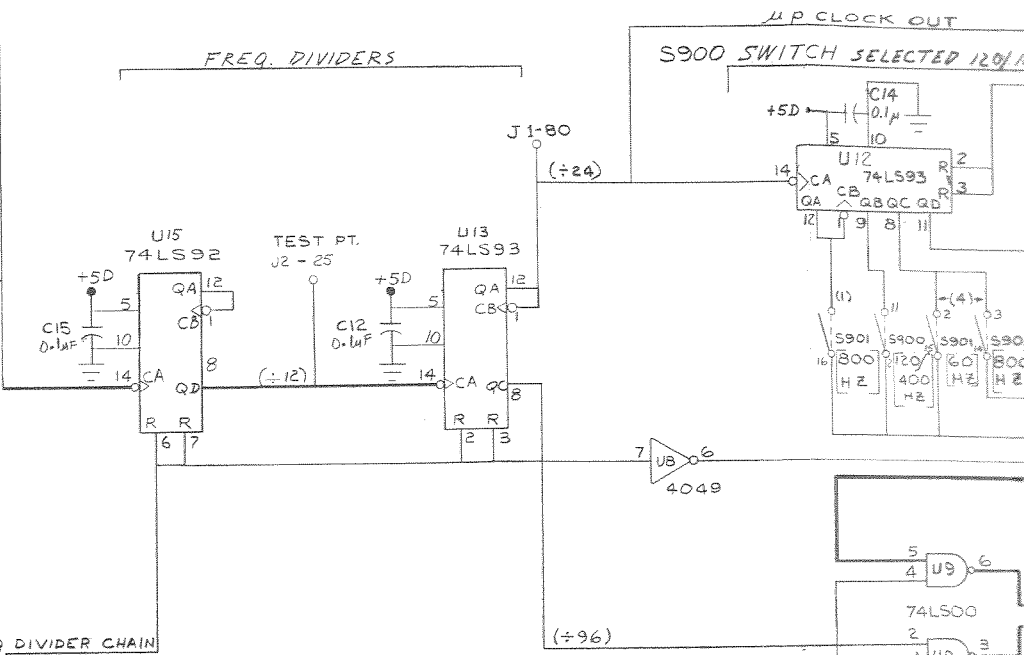
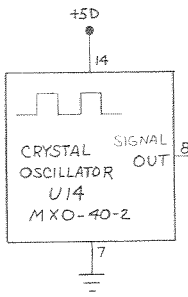
Figure 6-3. Main (MB) board, -4700, clock and test signal sources.

RESISTANCE IS IN OHMS, $\times 10^3$ K, $\times 10^6$ M
 CAPACITANCE IS IN FARADS, $\times 10^{-6}$ μ , $\times 10^{-9}$ n
 VOLTAGES EXPLAINED IN INSTRUCTION BOOK SERVICE NOTES
 PANEL CONTROL PANEL CONTROL
 RESPONSE CONTROL RESPONSE TIME TEST POINT
 COMPLETE REFERENCE DESIGNATION INCLUDES SUBASSEMBLY
 LETTER, C-M, S-W, ETC.

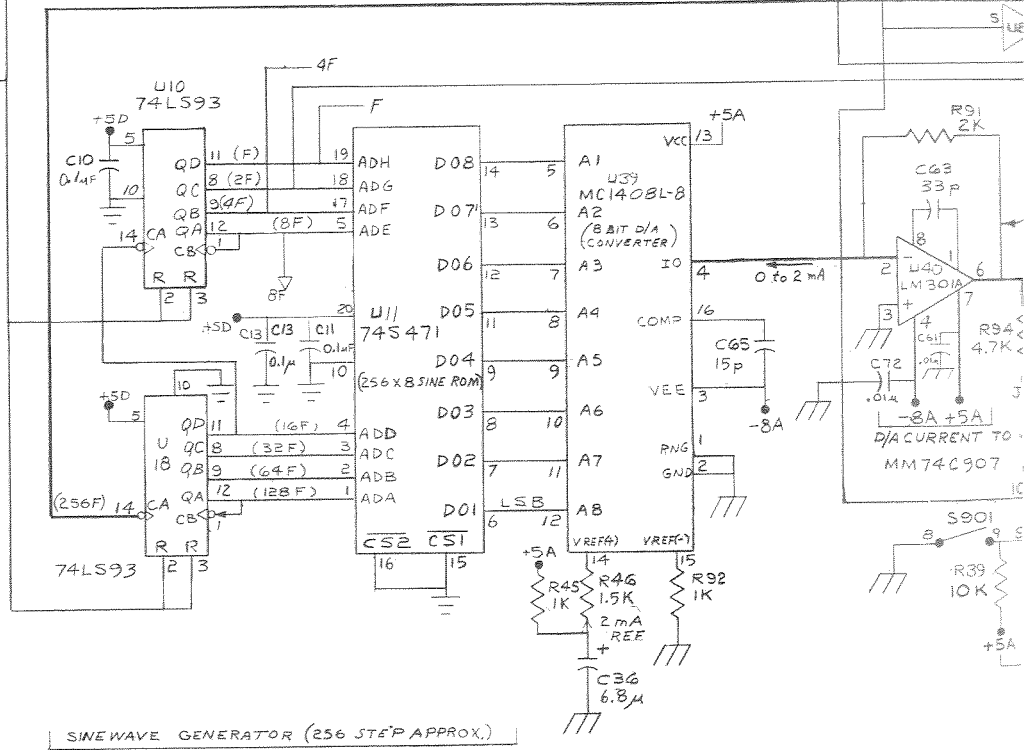
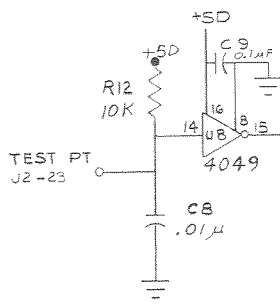
CONNECTIONS
 OUTPUT LEAVES SUBASSEMBLY
 INPUT FROM DIFFERENT SUBASSEMBLY
 OUTPUT REMAINS ON SUBASSEMBLY
 INPUT FROM SAME SUBASSEMBLY

H.F. FOR DUAL SLOPE CIRCUIT

CRYSTAL OSCILLATOR
 25.06752 MHz (120 Hz VERSION)
 24.576 MHz (100 Hz VERSION)



RESET FOR FREQ DIVIDER CHAIN



SPECIAL RESISTOR VALUES FOR RX, AND RY

FREQ OPTION	RX, RY
50Hz/60Hz	560K
400Hz	32K
800Hz	39K

NOTE: S901, RX, RY NOT ASSEMBLED FOR STANDARD MODELS. ONLY USED FOR SPECIALS.

SINEWAVE GENERATOR (256 STEPS APPROX.)

NOTE: *Orientation:* Viewed from parts side. *Part number:* Refer to caption.
Symbolism: Outlined area = part; gray ckt pattern (if any) = parts side, black
= other side. *Pins:* Square pad in ckt pattern = collector, I-C pin 1, cathode
(of diode), or + end (of capacitor).

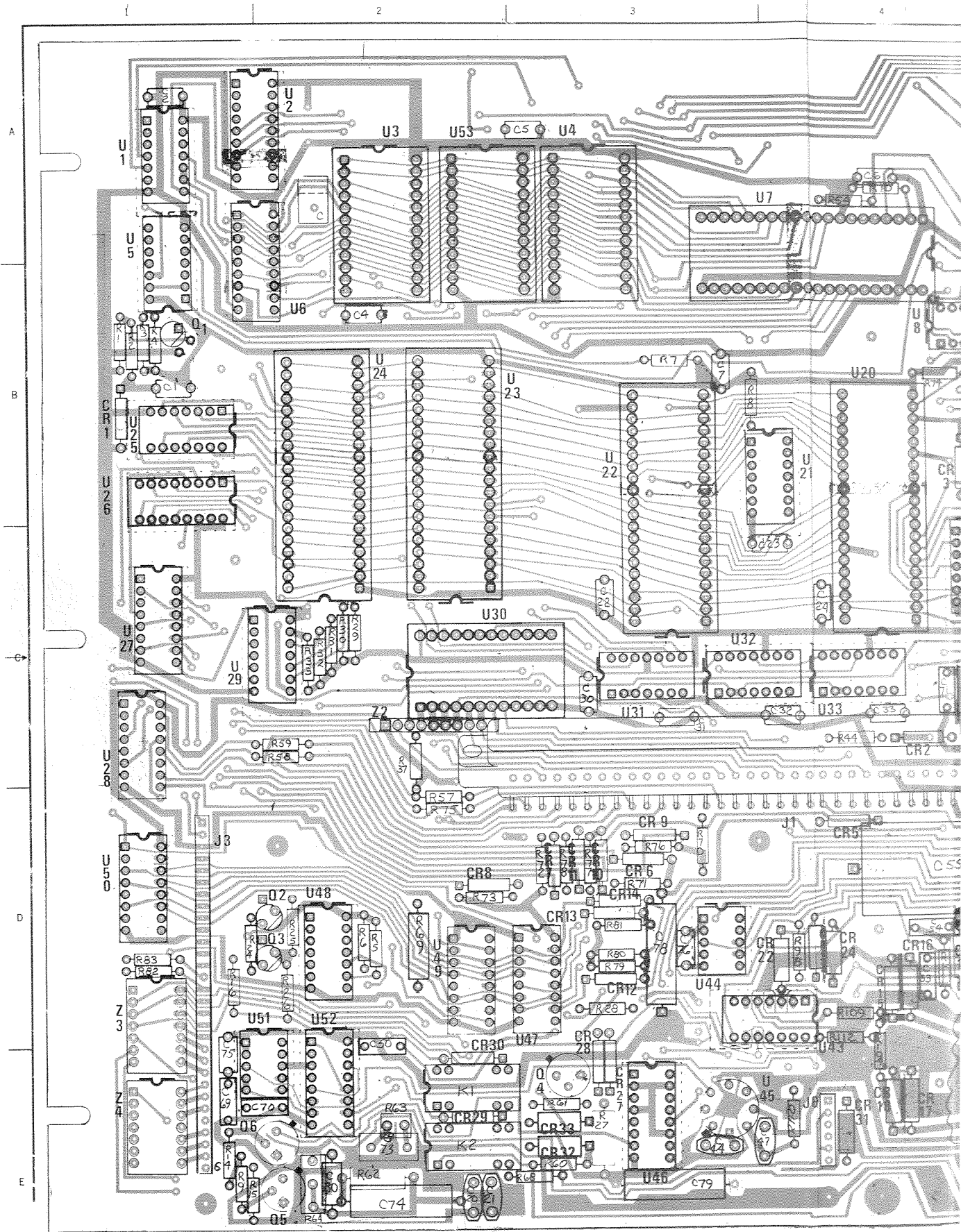
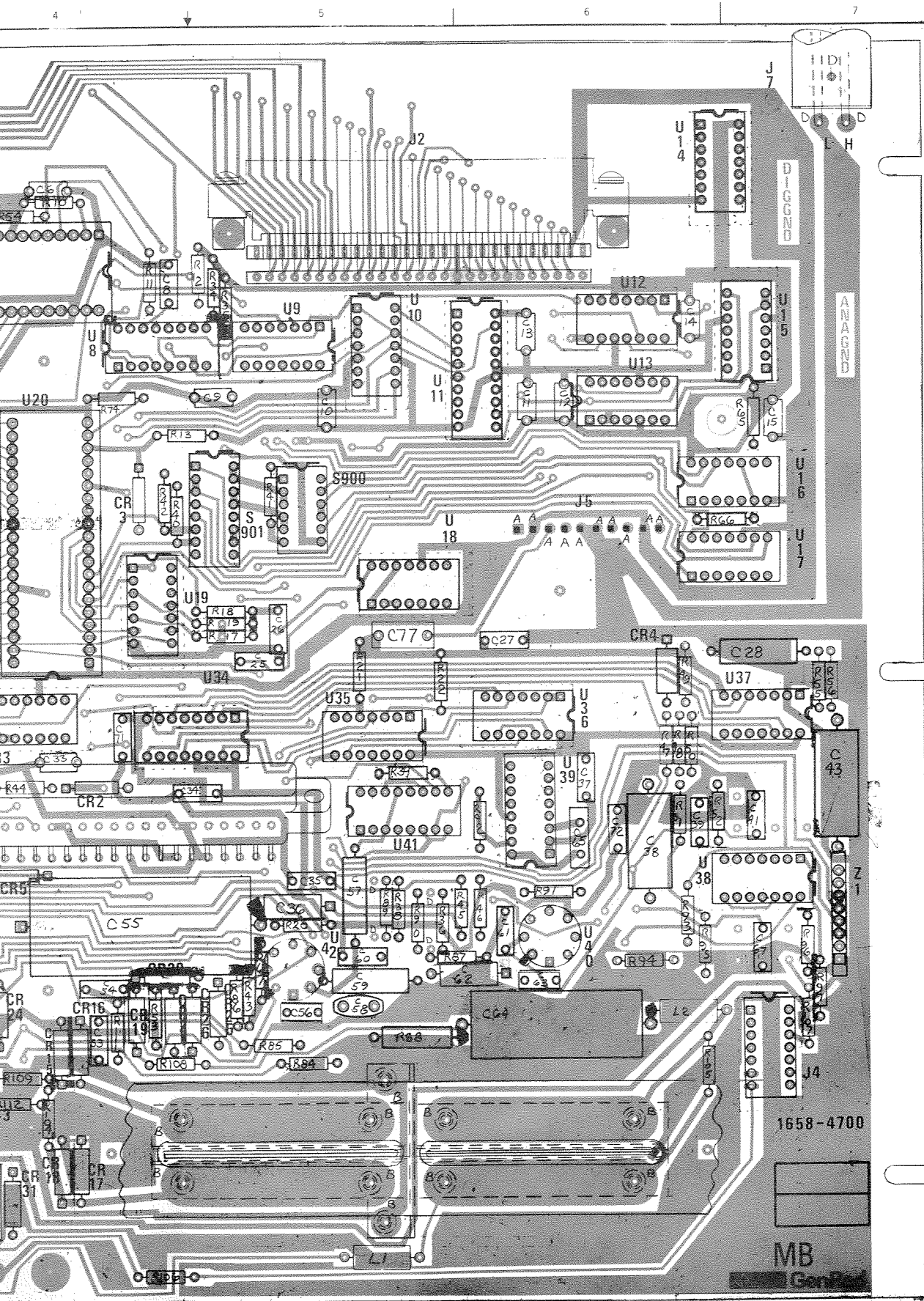


Figure 6-4. Main (M8) board, 1658-4700, 1



board, 1658-4700, layout. (Refer to Table 5-11.)

6-6 PARTS & DIAGRAMS

NOTE: 1. SOME OF THE CONNECTIONS TO U20 ARE OMITTED FROM THIS DIAGRAM AND ARE SHOWN ON 1658-4700-2DB

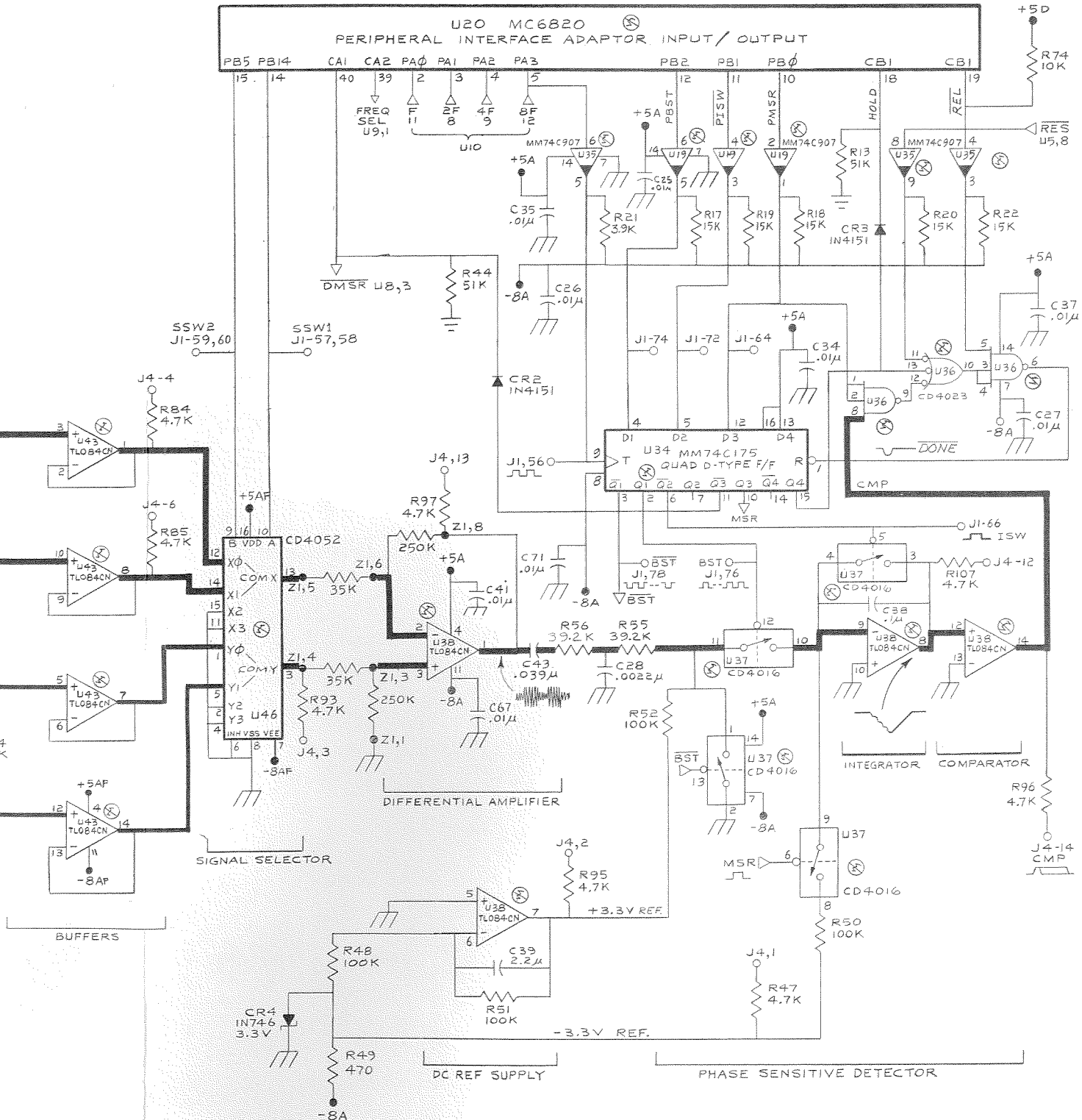
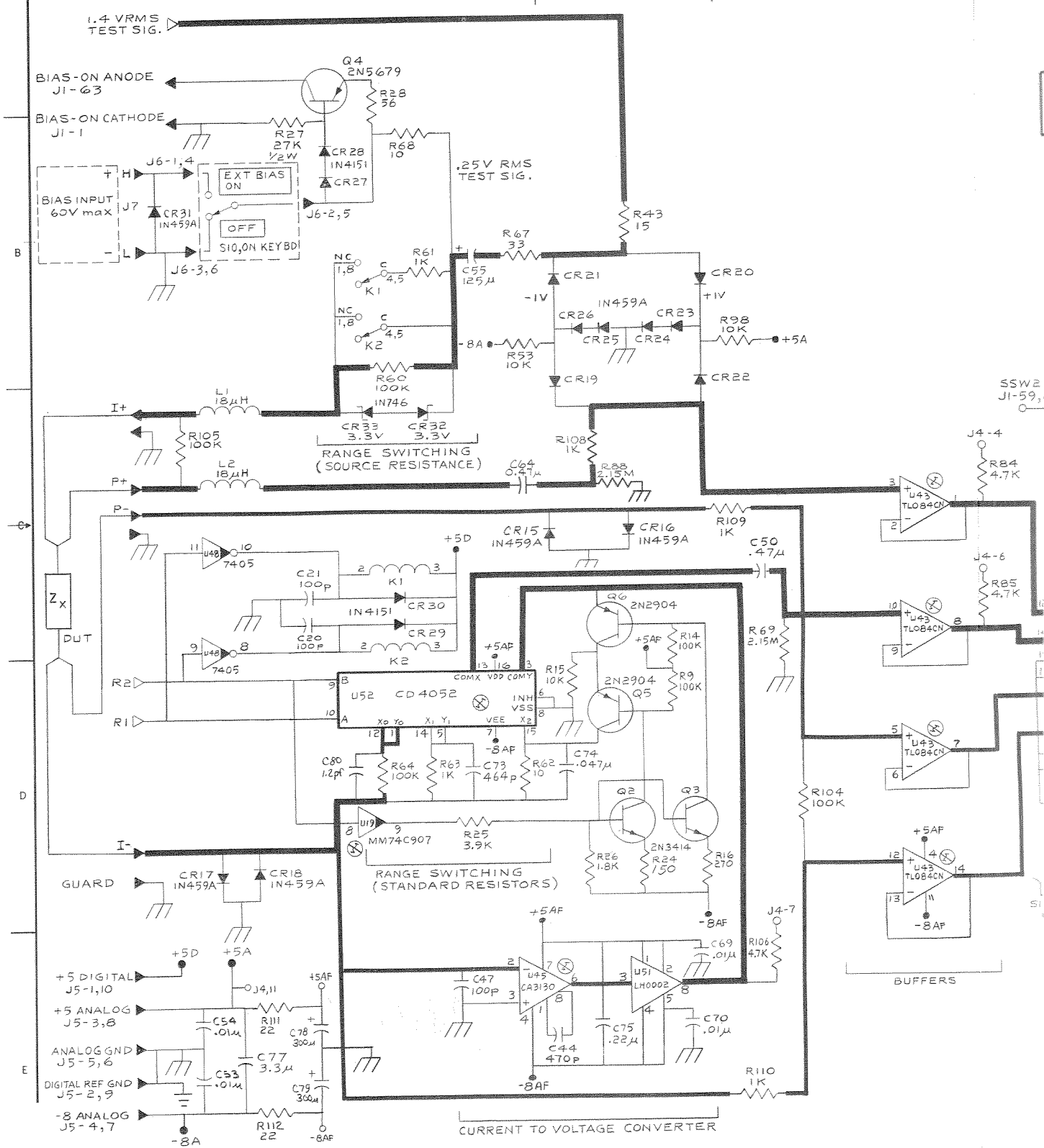


Figure 6-5. Main (MB) board, -4700, analog front end and detector.

A.

TRANSIENT PROTECTION CLAMPS



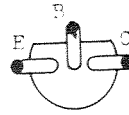
SSW2
J1-59,

J4-4
R84
4.7K

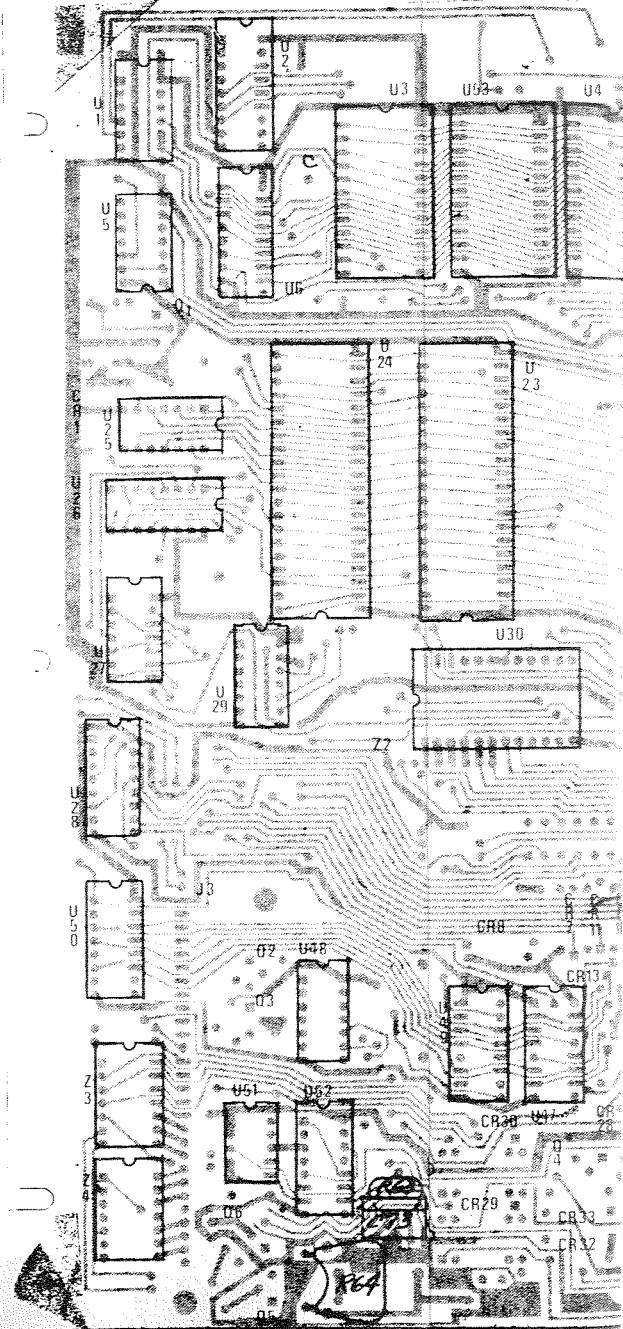
J4-6
R85
4.7K

BUFFERS

CURRENT TO VOLTAGE CONVERTER



Q1...3
BOTTOM VIEW



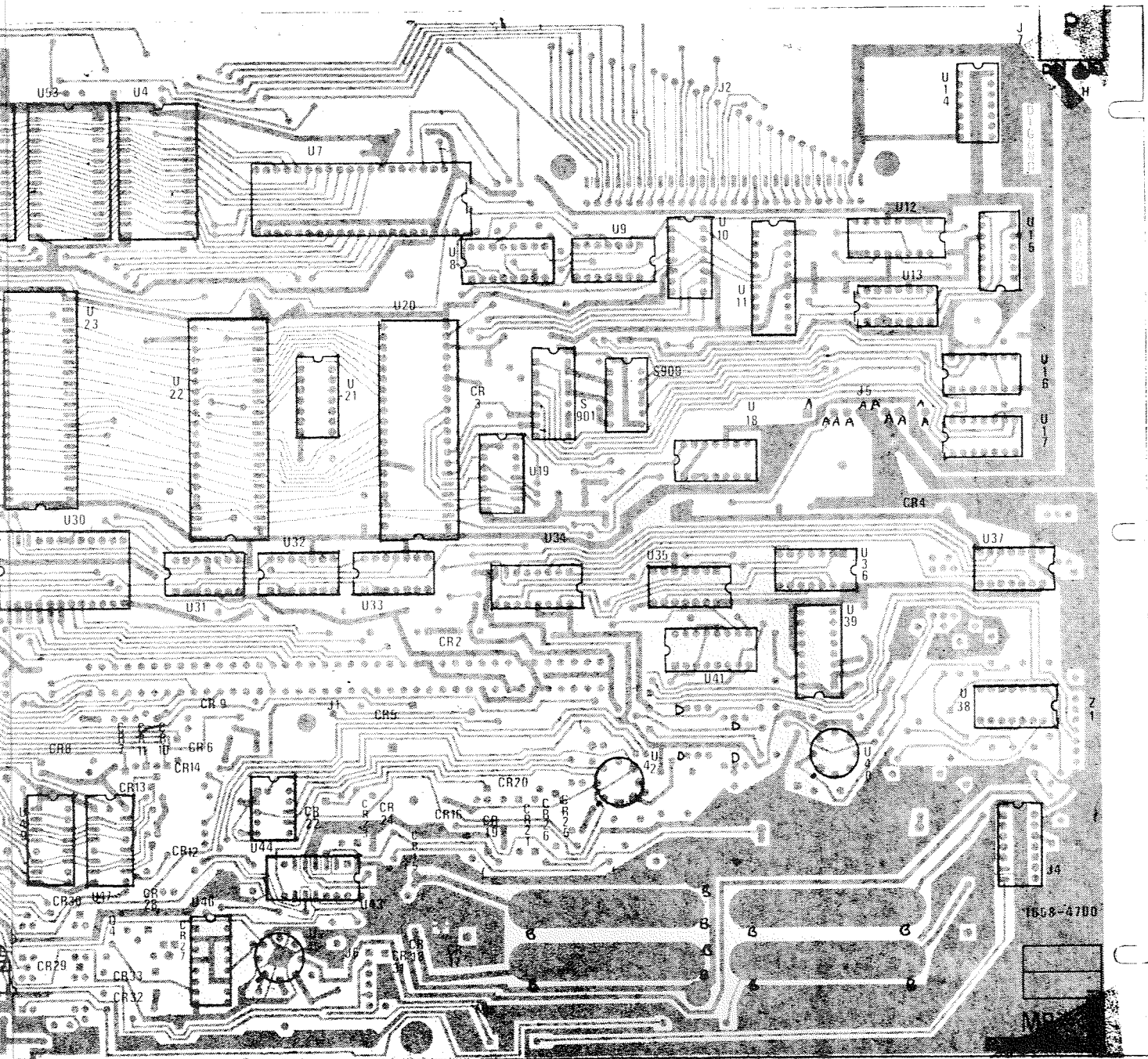


Figure 6-6. Main (MB) board, 1658-4700, integrated-circuit locator.

RESISTANCE IS IN OHMS, R¹⁰, R¹⁰⁰, R^{1K}, R^{10K}, R^{100K}, R^{1M}
 CAPACITANCE IS IN FARADS, μ¹⁰, μ¹⁰⁰, μ^{1K}, μ^{10K}, μ^{100K}, μ^{1M}
 VOLTAGES EXPLAINED IN INSTRUCTION BOOK SERVICE NOTES
 PANEL CONTROL REAR CONTROL
 SCREWDRIVER CONTROL WITH THE TP-TEST POINT
 COMPLETE REFERENCE DESIGNATION INCLUDES SUBASSEMBLY LETTER, C, R, B, E, ETC.

CONNECTIONS
 → OUTPUT LEAVES SUBASSEMBLY
 ← INPUT FROM DIFFERENT SUBASSEMBLY
 ⇄ OUTPUT REMAINS ON SUBASSEMBLY
 ⇄ INPUT FROM SAME SUBASSEMBLY

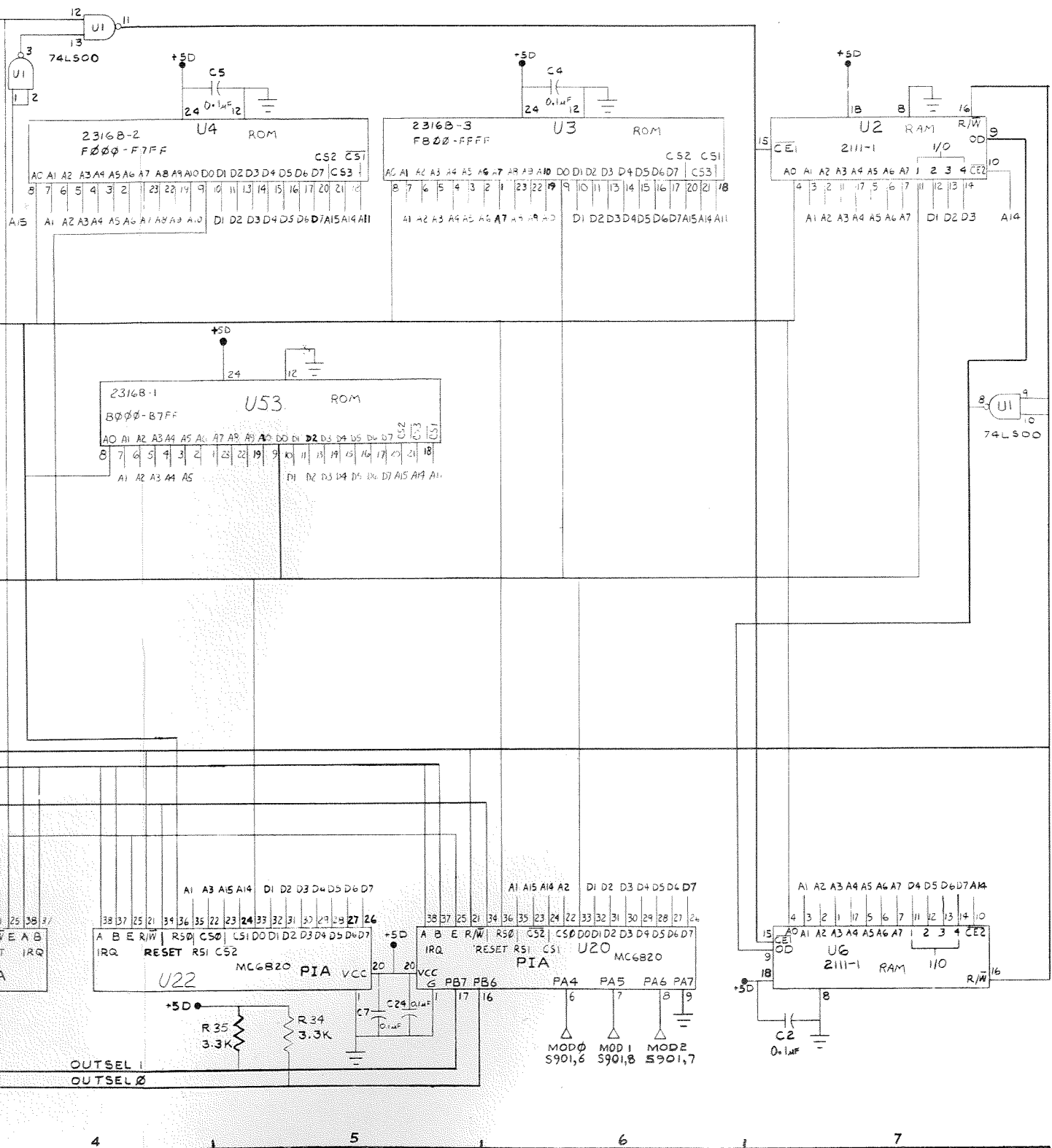
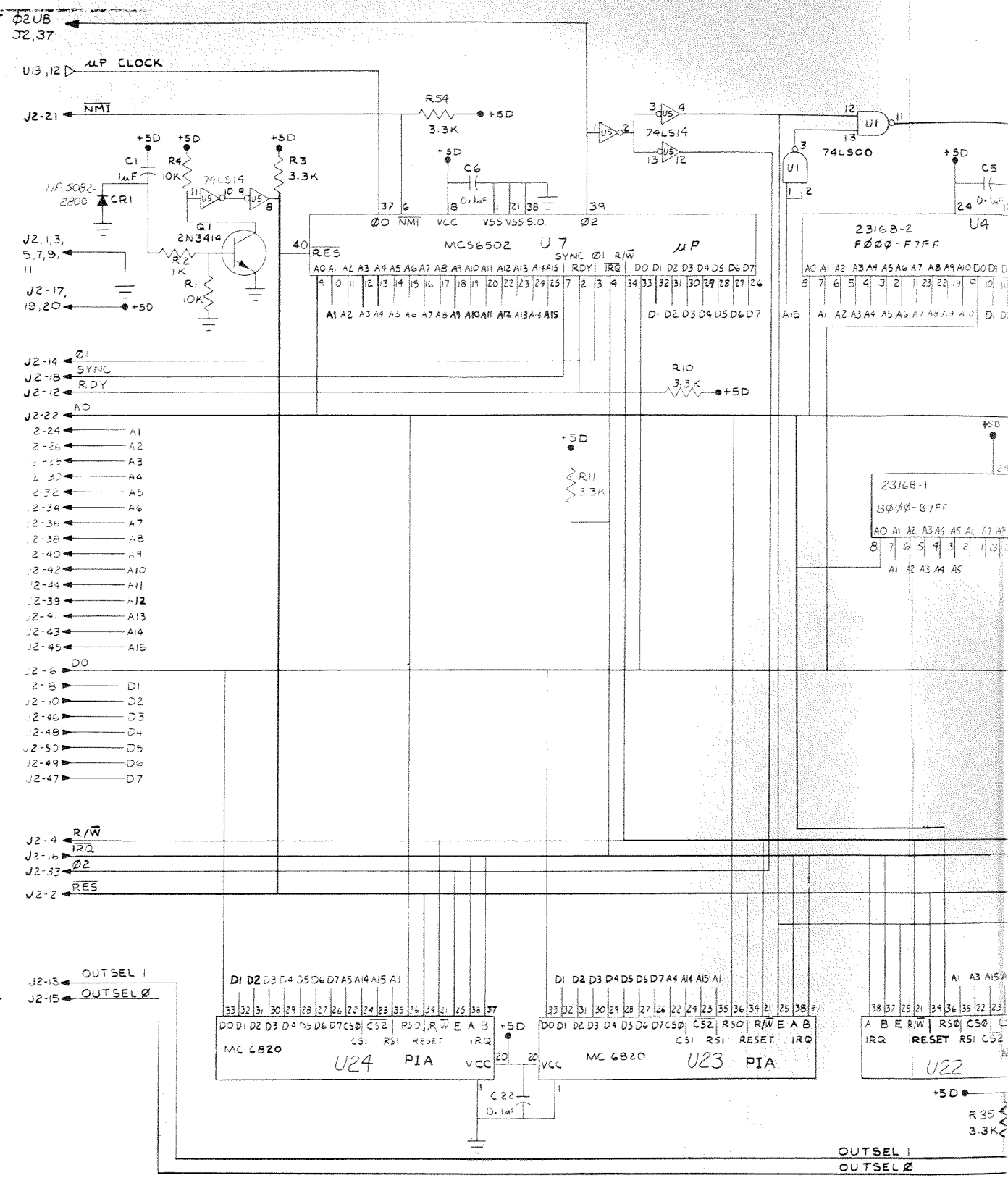


Figure 6-7. Main (MB) board, -4700, digital processor, memories, interfaces.

TO OUTPUT OPTION CONNECTOR



1 2 3 4

ELECTRICAL PARTS LIST

ANALOG AND CONTROL PC BOARD MB P/N 1658-4700

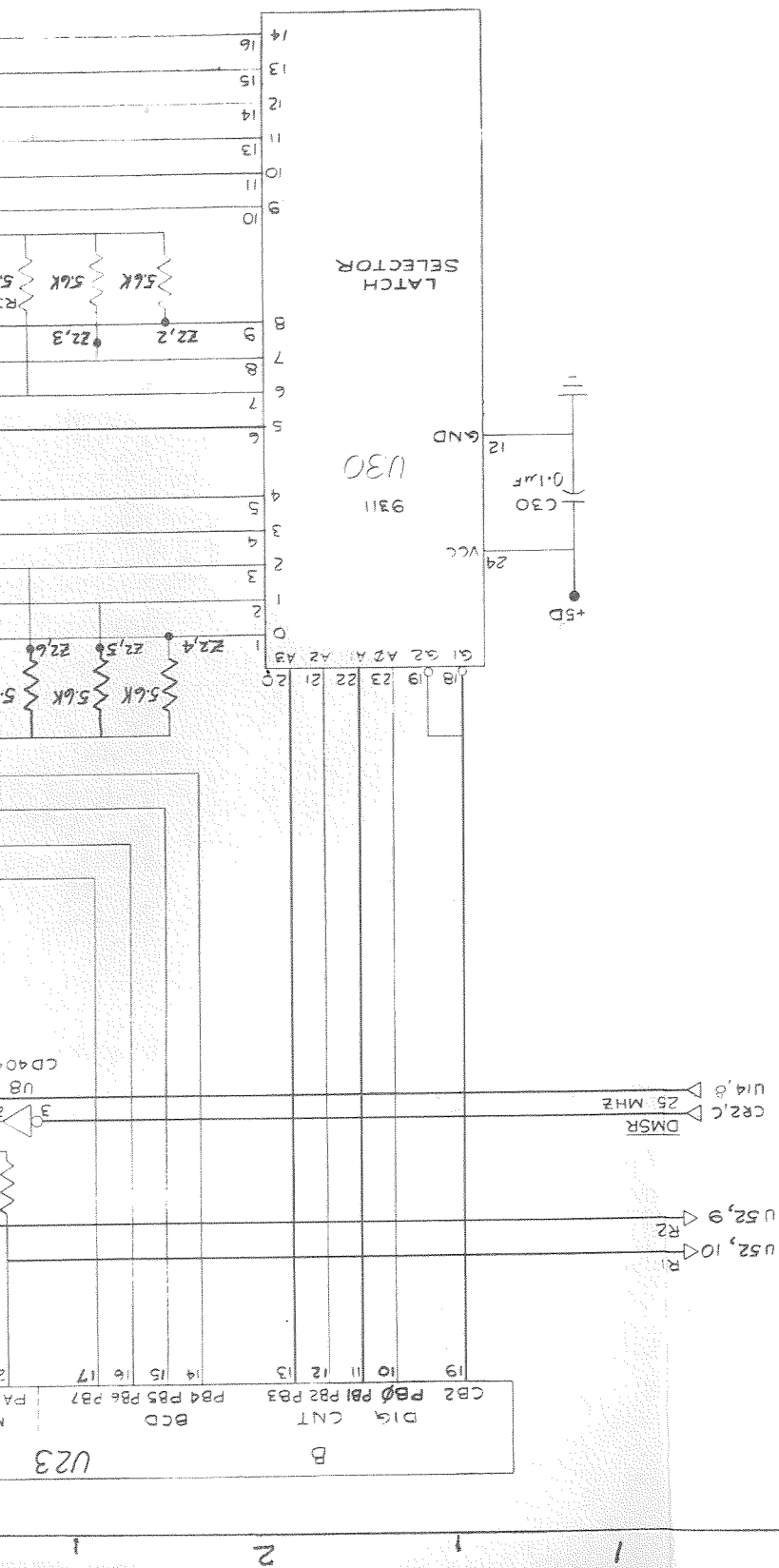
REFDES		DESCRIPTION	PART NO.	FMC	MFR	PART NUMBER
C 1	CAP CER MONO	2.2UF 20PCT 50VGP	4400-2080	72982	8141-M050-651-225M	
C 2	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 4	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 5	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 6	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 7	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 8	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 9	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 10	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 11	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 12	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 13	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 14	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 15	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 20	CAP CER DISC	100PF 5PCT 500V	4404-1105	72982	0831082Z5000101J	
C 21	CAP CER DISC	100PF 5PCT 500V	4404-1105	72982	0831082Z5000101J	
C 22	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 23	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 24	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 25	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 26	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 27	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 28	CAP MYLAR	.0022UF 10 PCT 200V	4860-7329	56289	410P .0022 UF 10PCT	
C 30	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 31	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 32	CAP CER MONO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 33	CAP CER MCNO	0.1UF 20PCT 50VGP	4400-2050	72982	8131-M050-651-104M	
C 34	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 35	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 36	CAP TANT	6.8 UF 20PCT 6V	4450-4800	56289	150D685X0006A2	
C 37	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 38	CAP POLYPROPYL	0.1UF 10PCT 200V	4863-3000	84411	X363UW 0.1UF 10PCT	
C 39	CAP CER MCNO	2.2UF 20PCT 50VGP	4400-2080	72982	8141-M050-651-225M	
C 41	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 43	CAP MYLAR	.039UF 10PCT 200V	4860-8009	56289	410P .039 UF 10PCT	
C 44	CAP CER DISC	470PF 5PCT 500V	4404-1475	72982	0831082Z5000471J	
C 47	CAP CER DISC	100PF 5PCT 500V	4404-1105	72982	0831082Z5000101J	
C 50	CAP CER MCNO	.0047UF 10PCT 50V	4400-6358	72982	8141-50-X7R-474K	
C 53	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 54	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 55	CAP ALUM	125UF 100V	4450-6156	56289	430125G100GJ6	
C 56	CAP CER DISC	100PF 5PCT 500V	4404-1105	72982	0831082Z5000101J	
C 57	CAP MYLAR	.01UF 2 PCT 100V	4860-7650	56289	410P .01 UF 2PCT	
C 58	CAP CER DISC	100PF 5PCT 500V	4404-1105	72982	0831082Z5000101J	
C 59	CAP MYLAR	.00237UF 2 PCT 100V	4860-7336	56289	410P .00237 UF 2PCT	
C 60	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 61	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 62	CAP TANT	1.0 UF 20PCT 35V	4450-4300	56289	150D105X00035A2	
C 63	CAP CER DISC	33PF 5PCT 500V	4404-0335	72982	0831082Z5000330J	
C 64	CAP MYLAR	.47UF 10 PCT 100V	4860-8248	56289	410P 0.47 UF 10PCT	
C 65	CAP CER DISC	15PF 5PCT 500V	4404-0155	72982	0831082Z5000150J	
C 67	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 69	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 70	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 71	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 72	CAP CER DISC	.01UF 80/20PCT 100V	4401-3100	72982	0805540Z5U00103Z	
C 73	CAP MICA	464PF 1PCT 500V	4710-0535	81349	CM05FD464FN	
C 74	CAP MYLAR	.047UF 2PCT 100V	4860-8201	56289	410P .047UF 2PCT	
C 75	CAP CER MONO	0.22UF 20PCT 50VGP	4400-2052	72982	8131-M050-651-224M	
C 76	CAP CER MCNO	0.22UF 20PCT 50VGP	4400-2052	72982	8131-M050-651-224M	
C 77	CAP CER MONO	3.3UF 20PCT 50VGP	4400-2082	72982	8151-M050-651-335M	
C 78	CAP TANT	300 UF 20PCT 10V WET	4450-5724	33173	69F933	
C 79	CAP TANT	300 UF 20PCT 10V WET	4450-5724	33173	69F933	
C 80	CAP CER TUB	1.2PF 5PCT 500V	4400-0120	95121	QC 1.2PF 5PCT 500V	

ELECTRICAL PARTS LIST (cont)

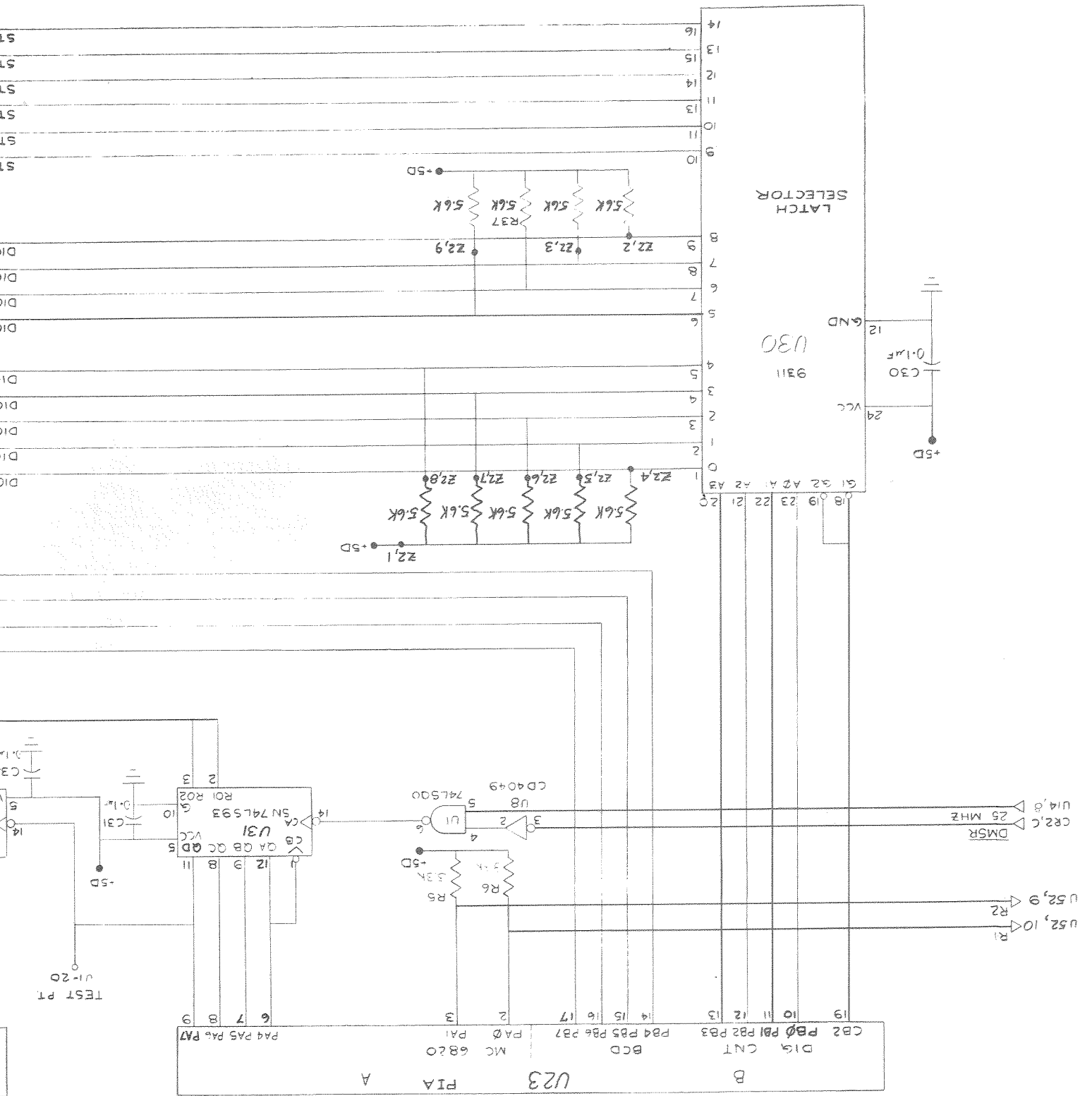
		ANALOG AND CONTROL PC BOARD MB		P/N 1658-4700		
REFDES		DESCRIPTION	PART NO.	FMC	MFR	PART NUMBER
CR	1	DIODE HP5082-2800 IR 200NA SI	6082-1034	28480		HP-5082-2800
CR	2	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	3	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	4	ZENER 1N746 3.3V 10PCT .4W	6083-1005	14433		1N746
CR	5	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	6	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	7	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	8	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	9	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	10	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	11	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	12	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	13	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	14	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	15	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	16	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	17	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	18	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	19	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	20	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	21	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	22	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	23	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	24	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	25	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	26	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	27	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	28	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	29	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	30	DIODE 1N4151 75PIV IR.1UA SI	6082-1001	14433		1N3604
CR	31	DIODE 1N459A 175PIV IR.025UA SI	6082-1011	14433		1N459A
CR	32	ZENER 1N746 3.3V 10PCT .4W	6083-1005	14433		1N746
CR	33	ZENER 1N746 3.3V 10PCT .4W	6083-1005	14433		1N746
J	1	CONNECTOR PC 40 POS DR	1657-0400	24655		1657-0400
J	2	CONNECTOR PC 25 POS DR	4230-5008	24655		4230-5008
J	3	HEADER FEMALE 30 CONT	4230-8048	30146		929850-30
J	6	HEADER FEMALE 6 CONT	4230-8044	30146		929850-6
J	7	BIAS TERMINAL	1658-6002	24655		1658-6002
JA	2	HEADER FEMALE 27 CONT	4230-8045	30146		929850-27
JB	2	HEADER FEMALE 27 CONT	4230-8045	30146		929850-27
K	1	RELAY REED DRY 5V FORM 1A	6090-2080	14908		1192-1A-5
K	2	RELAY REED DRY 5V FORM 1A	6090-2080	14908		1192-1A-5
L	1	CHOKE MOLDED 18.0 UH 10PCT	4300-2500	99800		1537-42
L	2	CHOKE MOLDED 18.0 UH 10PCT	4300-2500	99800		1537-42
Q	1	TRANSISTOR 2N3414	8210-1290	56289		2N3414
Q	2	TRANSISTOR 2N3414	8210-1290	56289		2N3414
Q	3	TRANSISTOR 2N3414	8210-1290	56289		2N3414
Q	4	TRANSISTOR 2N5679	8210-1223	04713		2N5679
Q	5	TRANSISTOR 2N2904	8210-1074	04713		2N2904
Q	6	TRANSISTOR 2N2904	8210-1074	04713		2N2904
R	1	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R	2	RES COMP 1.0 K 5PCT 1/4W	6099-2105	81349		RCR07G102J
R	3	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R	4	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R	5	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R	6	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R	7	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R	8	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R	9	RES COMP 100 K 5PCT 1/4W	6099-4105	81349		RCR07G104J
R	10	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R	11	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R	12	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R	13	RES COMP 51 K OHM 5PCT 1/4W	6099-3515	81349		RCR07G513J
R	14	RES COMP 100 K 5PCT 1/4W	6099-4105	81349		RCR07G104J
R	15	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J

ELECTRICAL PARTS LIST (cont)

REFDES	DESCRIPTION	PART NO.	FMC	MFGR	PART NUMBER
R 16	RES COMP 270 OHM 5PCT 1/4W	6099-1275	81349		RCR07G271J
R 17	RES COMP 15 K 5PCT 1/4W	6099-3155	81349		RCR07G153J
R 18	RES COMP 15 K 5PCT 1/4W	6099-3155	81349		RCR07G153J
R 19	RES COMP 15 K 5PCT 1/4W	6099-3155	81349		RCR07G153J
R 20	RES COMP 15 K 5PCT 1/4W	6099-3155	81349		RCR07G153J
R 21	RES COMP 3.9 K 5PCT 1/4W	6099-2395	81349		RCR07G392J
R 22	RES COMP 15 K 5PCT 1/4W	6099-3155	81349		RCR07G153J
R 24	RES COMP 150 OHM 5PCT 1/4W	6099-1155	81349		RCR07G151J
R 25	RES COMP 3.9 K 5PCT 1/4W	6099-2395	81349		RCR07G392J
R 26	RES COMP 1.8 K 5PCT 1/4W	6099-2185	81349		RCR07G182J
R 27	RES COMP 27 K 5PCT 1/2W	6100-3275	81349		RCR20G273J
R 28	RES COMP 56 OHM 5PCT 1/4W	6099-0565	81349		RCR07G560J
R 29	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 30	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 31	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 32	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 33	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 34	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 35	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 36	RES COMP 33 K 5PCT 1/4W	6099-3335	81349		RCR07G333J
R 37	RES COMP 5.6 K 5PCT 1/4W	6099-2565	81349		RCR07G562J
R 38	RES COMP 33 K 5PCT 1/4W	6099-3335	81349		RCR07G333J
R 39	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 40	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 41	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 42	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 43	RES COMP 15 OHM 5PCT 1/4W	6099-0155	81349		RCR07G150J
R 44	RES COMP 51 K OHM 5PCT 1/4W	6099-3515	81349		RCR07G513J
R 45	RES COMP 1.0 K 5PCT 1/4W	6099-2105	81349		RCR07G102J
R 46	RES COMP 1.5 K 5PCT 1/4W	6099-2155	81349		RCR07G152J
R 47	RES COMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 48	RES FLM 100K 1 PCT 1/8W	6250-3100	81349		RN55D1003F
R 49	RES COMP 470 OHM 5PCT 1/4W	6099-1475	81349		RCR07G471J
R 50	RES COMP 100 K 5PCT 1/4W	6099-4105	81349		RCR07G104J
R 51	RES FLM 100K 1 PCT 1/8W	6250-3100	81349		RN55D1003F
R 52	RES COMP 100 K 5PCT 1/4W	6099-4105	81349		RCR07G104J
R 53	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 54	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 55	RES FLM 39.2K 1 PCT 1/8W	6250-2392	81349		RN55D3922F
R 56	RES FLM 39.2K 1 PCT 1/8W	6250-2392	81349		RN55D3922F
R 57	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 58	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 59	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 60	RES COMP 100 K 5PCT 1/4W	6099-4105	81349		RCR07G104J
R 61	RES COMP 1.0 K 5PCT 1/4W	6099-2105	81349		RCR07G102J
R 62	RES PWR WW 10 OHM .02PCT 10PPM	6620-1036	24655		6620-1036
R 63	RES FLM 1K .02PCT 10PPM	6619-5070	24655		6619-5070
R 64	RES FLM 100K .02PCT 10PPM	6619-6000	24655		6619-6000
R 65	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 66	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 67	RES COMP 33 OHM 5PCT 1/4W	6099-0335	81349		RCR07G330J
R 68	RES COMP 10 OHM 5PCT 1/4W	6099-0105	81349		RCR07G100J
R 69	RES FLM 2.15M 1 PCT 1/4W	6350-4215	81349		RN60D2154F
R 70	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 71	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 72	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 73	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 74	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 75	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 76	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 77	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 78	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 79	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 80	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 81	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 82	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 83	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 84	RES COMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 85	RES COMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 86	RES COMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 87	RES COMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 88	RES FLM 2.15M 1 PCT 1/4W	6350-4215	81349		RN60D2154F
R 89	RES COMP 300 K OHM 5PCT 1/4W	6099-4305	81349		RCR07G304J

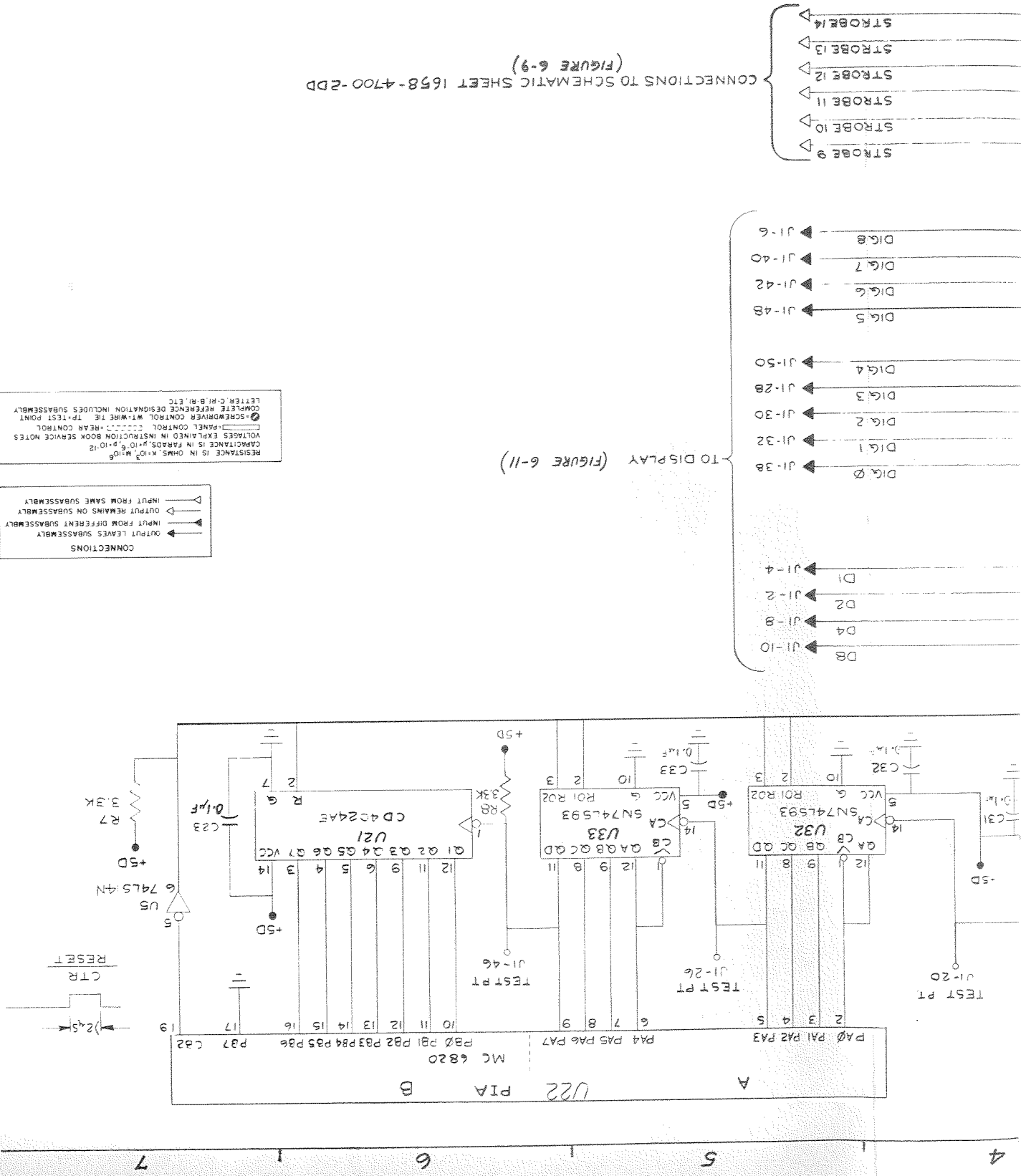


M
 D
 C
 B



1 2 3 4

Figure 6-8, Main (MB) board, -4700, measurement counter, display driver.



CONNECTIONS TO SCHEMATIC SHEET 1658-4700-2DD (FIGURE 6-9)

TO DISPLAY (FIGURE 6-11)

RESISTANCE IS IN OHMS, K=10³, M=10⁶. CAPACITANCE IS IN FARADS, µ=10⁻⁶, n=10⁻⁹. VOLTAGES EXPLAINED IN INSTRUCTION BOOK SERVICE NOTES. PANEL CONTROL CONNECTIONS REAR CONTROL. SCREENING CONTROL WIRE TO TEST POINT. COMPLETE REFERENCE DESIGNATION INCLUDES SUBASSEMBLY LETTER, C-R-I-B-R-I, ETC.

CONNECTIONS
 ← OUTPUT LEAVES SUBASSEMBLY
 → INPUT FROM DIFFERENT SUBASSEMBLY
 ⇌ OUTPUT REMAINS ON SUBASSEMBLY
 ⇌ INPUT FROM SAME SUBASSEMBLY

ELECTRICAL PARTS LIST (cont)

ANALOG ANC CONTROL PC BOARD MB P/N 1658-4700

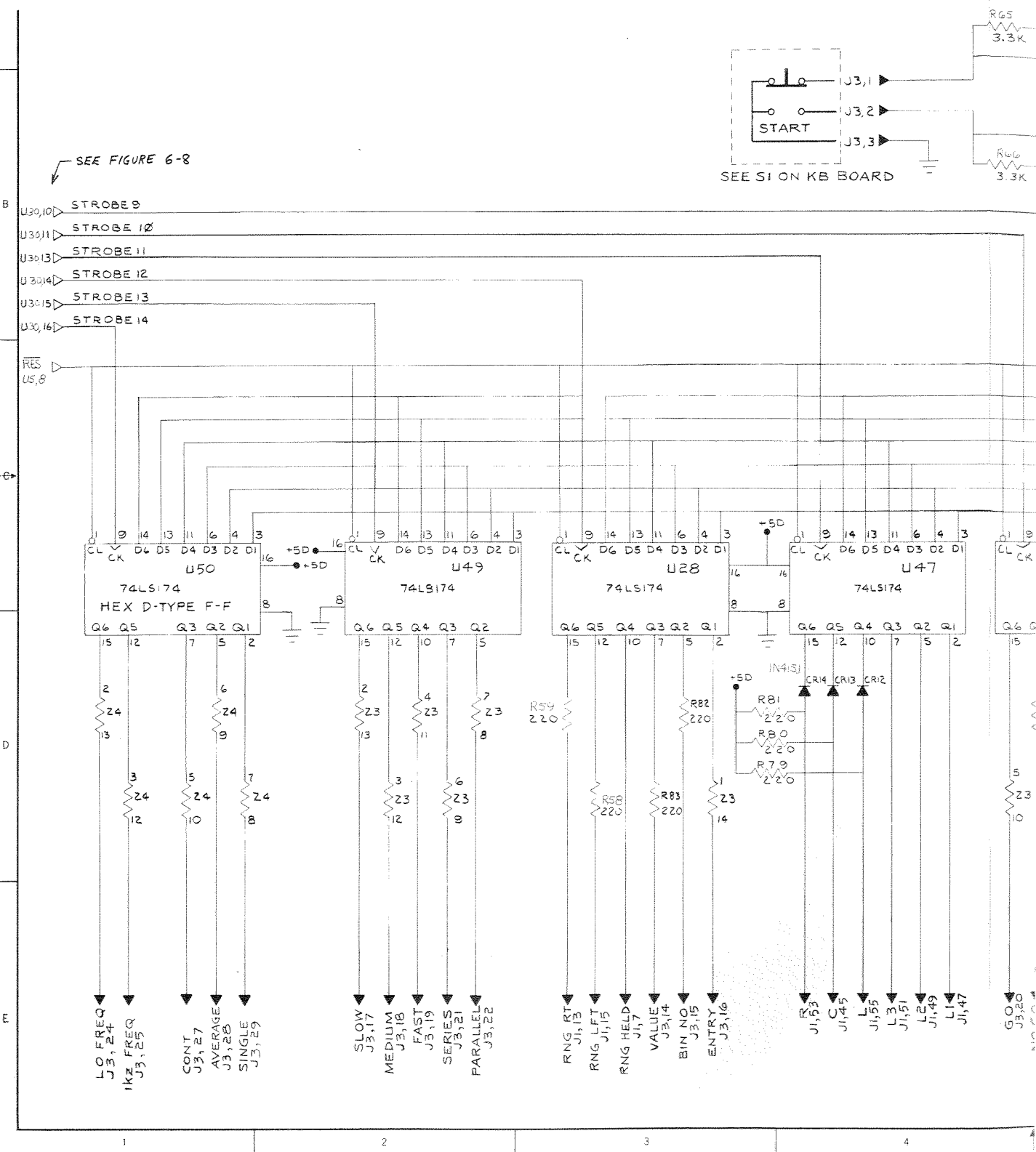
REFDES	DESCRIPTION	PART NO.	FMC	MFGR	PART NUMBER
R 90	RES CCMP 300 K OHM 5PCT 1/4W	6099-4305	81349		RCR07G304J
R 91	RES COMP 2.0 K OHM 5PCT 1/4W	6099-2205	81349		RCR07G202J
R 92	RES CCMP 1.0 K 5PCT 1/4W	6099-2105	81349		RCR07G102J
R 93	RES COMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 94	RES CCMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 95	RES COMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 96	RES CCMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 97	RES CCMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 98	RES CCMP 10 K 5PCT 1/4W	6099-3105	81349		RCR07G103J
R 104	RES COMP 100 K 5PCT 1/4W	6099-4105	81349		RCR07G104J
R 105	RES CCMP 100 K 5PCT 1/4W	6099-4105	81349		RCR07G104J
R 106	RES CCMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 107	RES CCMP 4.7 K 5PCT 1/4W	6099-2475	81349		RCR07G472J
R 108	RES CCMP 1.0 K 5PCT 1/4W	6099-2105	81349		RCR07G102J
R 109	RES COMP 1.0 K 5PCT 1/4W	6099-2105	81349		RCR07G102J
R 110	RES CCMP 1.0 K 5PCT 1/4W	6099-2105	81349		RCR07G102J
R 111	RES CCMP 22 OHM 5PCT 1/4W	6099-0225	81349		RCR07G220J
R 112	RES CCMP 22 OHM 5PCT 1/4W	6099-0225	81349		RCR07G220J
S 900	SWITCH TCGGLE 6STA SPST PC	7910-2030	31514		1006-692
U 1	IC DIGITAL SN74LS00N	5431-8600	01295		SN74LS00N
J 2	ICD (STATIC PROTECT REQ)	5627-1001	34649		P2111A-4
U 3	ICD (STATIC PROTECT REQ)	5627-0005	24655		5627-0005
U 4	ICD (STATIC PROTECT REQ)	5627-0004	24655		5627-0004
U 5	ICD SN74LS14N HX SCHMT-TR INVERT	5431-8614	01295		SN74LS14N
U 6	ICD (STATIC PROTECT REQ)	5627-1001	34649		P2111A-4
U 7	ICD (STATIC PROTECT REQ)	5431-2402	24655		5431-2402
U 8	ICD (STATIC PROTECT REQ)	5431-7021	86684		CD4049AE
U 9	IC DIGITAL SN74LS00N	5431-8600	01295		SN74LS00N
U 10	ICD SN74LS93N 4BIT BIN COUNTER	5431-8693	01295		SN74LS93N
U 11	ICD (STATIC PROTECT REQ)	5627-0002	24655		5627-0002
U 12	ICD SN74LS93N 4BIT BIN COUNTER	5431-8693	01295		SN74LS93N
U 13	ICD SN74LS93N 4BIT BIN COUNTER	5431-8693	01295		SN74LS93N
U 15	IC DIGITAL SN74LS92	5431-8692	01295		SN74LS92
U 16	IC DIGITAL SN74LS00N	5431-8600	01295		SN74LS00N
U 17	ICD SN74LS93N 4BIT BIN COUNTER	5431-8693	01295		SN74LS93N
U 18	ICD SN74LS93N 4BIT BIN COUNTER	5431-8693	01295		SN74LS93N
U 19	ICD (STATIC PROTECT REQ)	5431-7042	12040		MM74C907
U 20	ICD (STATIC PROTECT REQ)	5431-2450	04713		MC6820A
U 21	ICD (STATIC PROTECT REQ)	5431-7008	04713		MC14024BCP
U 22	ICD (STATIC PROTECT REQ)	5431-2450	04713		MC6820A
U 23	ICD (STATIC PROTECT REQ)	5431-2450	04713		MC6820A
U 24	ICD (STATIC PROTECT REQ)	5431-2450	04713		MC6820A
U 25	IC DIGITAL SN74LS04N	5431-8604	01295		SN74LS04N
U 26	IC DIGITAL SN74LS174N	5431-8774	01295		SN74LS174N
U 27	IC DIGITAL SN74LS174N	5431-8774	01295		SN74LS174N
U 28	IC DIGITAL SN74LS174N	5431-8774	01295		SN74LS174N
U 29	ICD SN74LS20N D 4IN POS NAND GA	5431-8620	01295		SN74LS20N
U 30	ICD 9311 24D MS1 10F16 DECODER	5431-9617	18324		9311/74154
U 31	ICD SN74LS93N 4BIT BIN COUNTER	5431-8693	01295		SN74LS93N
U 32	ICD SN74LS93N 4BIT BIN COUNTER	5431-8693	01295		SN74LS93N
U 33	ICD SN74LS93N 4BIT BIN COUNTER	5431-8693	01295		SN74LS93N
U 34	ICD (STATIC PROTECT REQ)	5431-7041	12040		MM74C175
U 35	ICD (STATIC PROTECT REQ)	5431-7042	12040		MM74C907
U 36	ICD (STATIC PROTECT REQ)	5431-7009	86684		CD4023AE
U 37	ICD (STATIC PROTECT REQ)	5431-7003	86684		CD4016AE
U 38	ICL (STATIC PROTECT REQ)	5432-7001	01295		TL084CN
U 39	D/A CONV 8 BIT MONOLITHIC	5429-5043	50721		DAC IC8BC
U 40	IC LINEAR LM301A	5432-1004	12040		LM301AH
U 41	ICD (STATIC PROTECT REQ)	5431-7032	86684		CD4052AE
U 42	ICL (STATIC PROTECT REQ)	5432-7000	86684		CA3130T
U 43	ICL (STATIC PROTECT REQ)	5432-7001	01295		TL084CN
U 44	IC LINEAR LH0002CN	5432-1062	12040		LH0002CN
U 45	ICL (STATIC PROTECT REQ)	5432-7000	86684		CA3130T
U 46	ICD (STATIC PROTECT REQ)	5431-7032	86684		CD4052AE
U 47	IC DIGITAL SN74LS174N	5431-8774	01295		SN74LS174N
U 48	ICD SN7405N 14D HX INV COL 5V	5431-8105	01295		SN7405N
U 49	IC DIGITAL SN74LS174N	5431-8774	01295		SN74LS174N
U 50	IC DIGITAL SN74LS174N	5431-8774	01295		SN74LS174N
U 51	IC LINEAR LH0002CN	5432-1062	12040		LH0002CN
U 52	ICD (STATIC PROTECT REQ)	5431-7032	86684		CD4052AE
U 53	ICD (STATIC PROTECT REQ)	5627-0003	24655		5627-0003

ELECTRICAL PARTS LIST (cont)

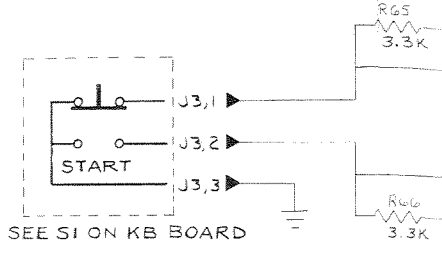
ANALOG AND CONTROL BOARD MB P/N 1658-4700

REF DES	DESCRIPTION	PART NO.	FMC	MFG PT. NO.
Z 1	THIN FILM RESISTOR NETWORK	1658-0800*	24655	1658-0800
Z 2	RESISTOR NETWORK 5.6K 5PCT	6741-0104	24655	6741-0104
Z 3	RESISTOR NETWORK	1657-0810*	24655	1657-0810
Z 4	RESISTOR NETWORK	1657-0810	24655	1657-0810

* NOTE: AN OPEN CIRCUIT IN A RESISTOR NETWORK CAN BE REPAIRED BY SHUNTING AN EXTERNAL RESISTOR ACROSS THE APPROPRIATE TERMINALS.
1658-0800 pins 1-2, 2-3, 6-7, or 7-8: $125\text{ k}\Omega \pm 0.2\%$
1658-0800 pins 3-4 or 5-6: $35\text{ k}\Omega \pm 0.2\%$
1657-0810 (each section): $220\ \Omega \pm 5\%$.
6741-0104 has a common point (pin 1); each resistor is $5.6\text{ k}\Omega \pm 5\%$.

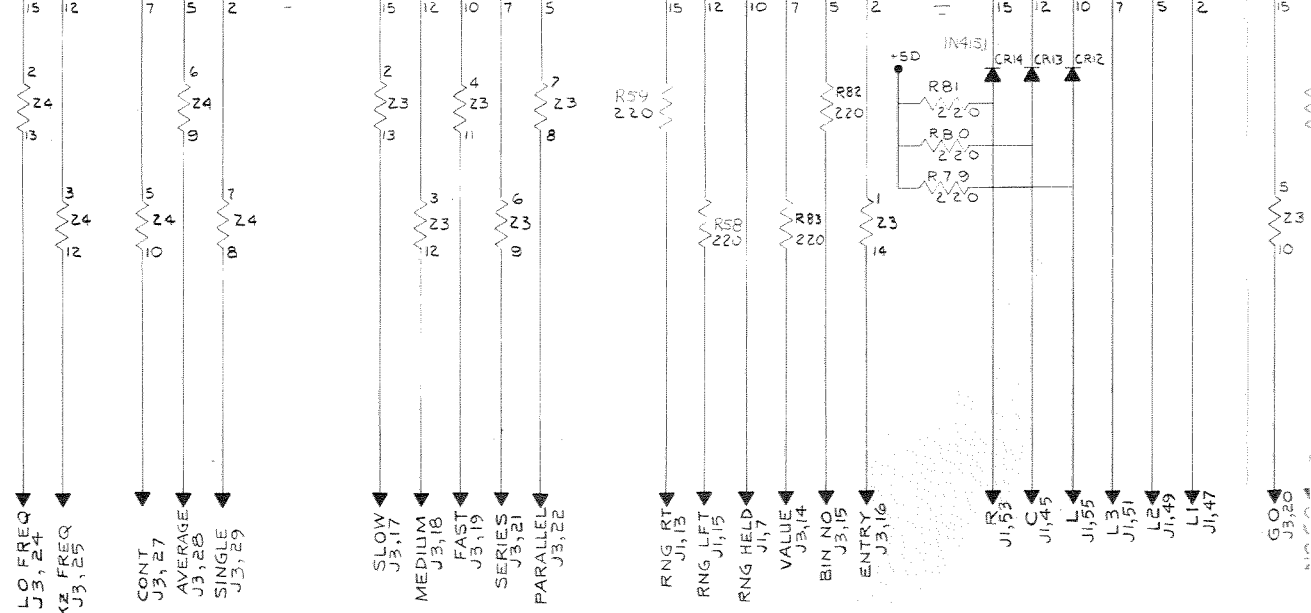
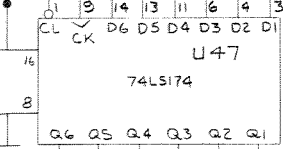
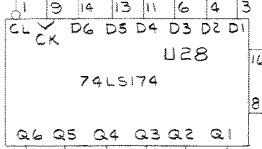
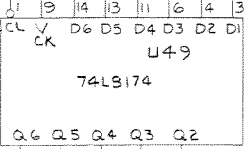
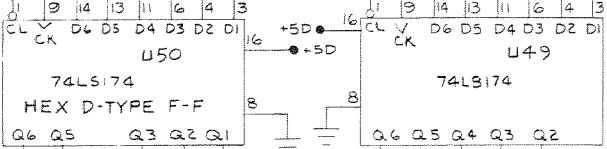


SEE FIGURE 6-8



SEE SI ON KB BOARD

B
U30,10 STROBE 9
U30,11 STROBE 10
U30,13 STROBE 11
U30,14 STROBE 12
U30,15 STROBE 13
U30,16 STROBE 14
RES U5,8
D
F



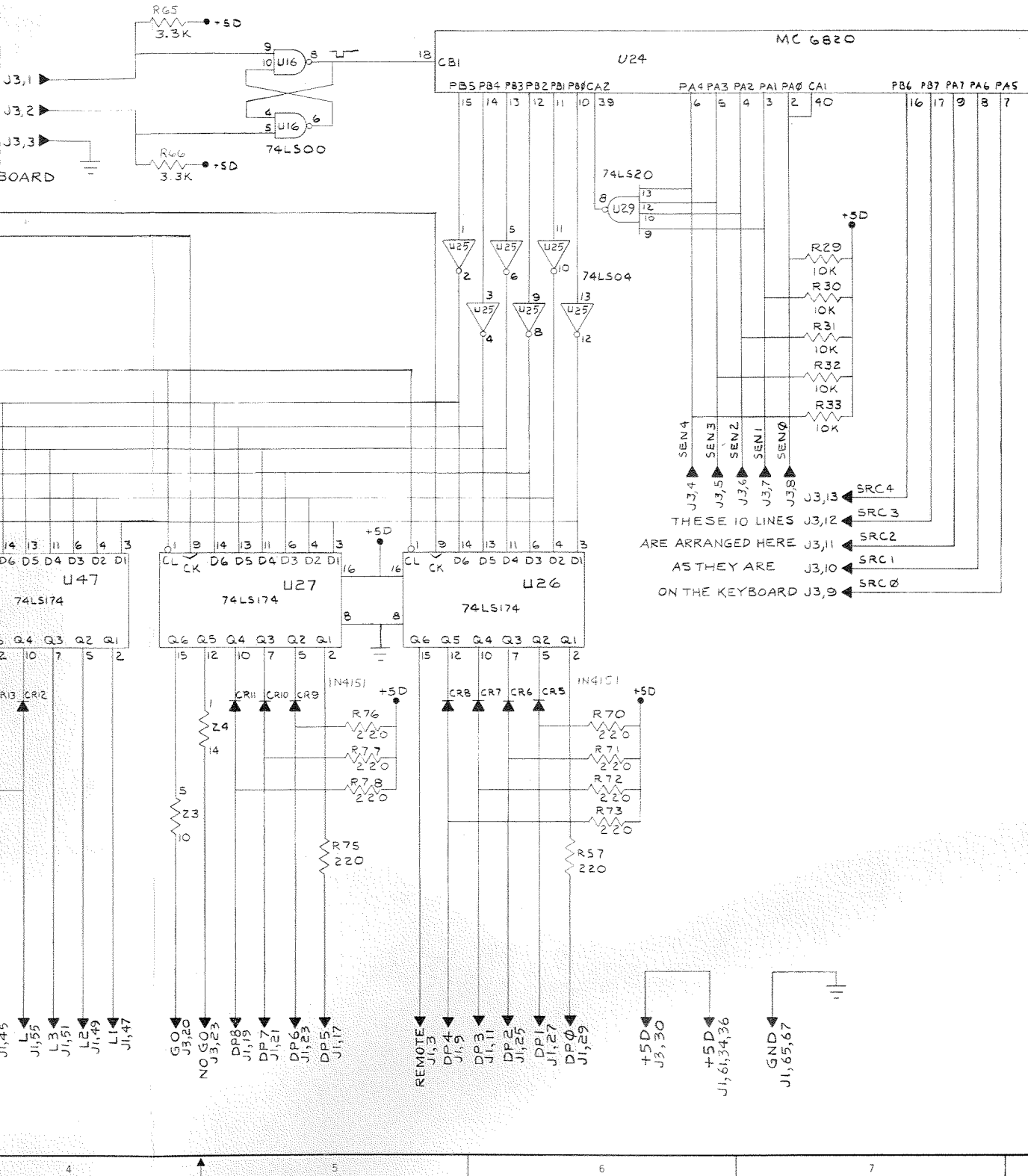


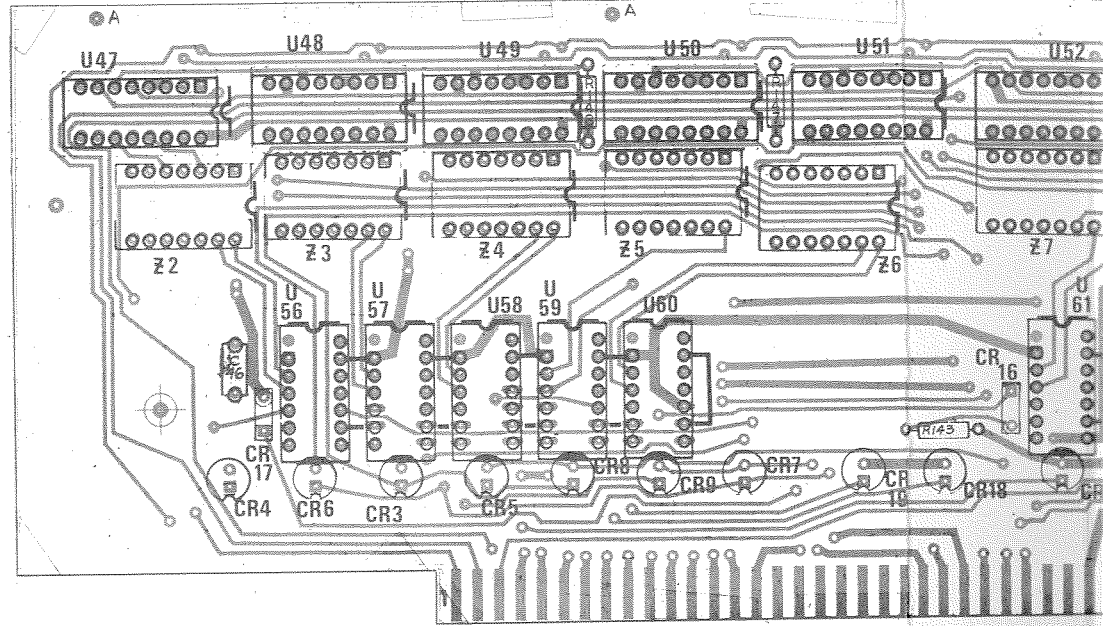
Figure 6-9. Main (MB) board, -4700, keyboard and display-LED interfaces.

ELECTRICAL PARTS LIST

DISPLAY BOARD ASM DB P/N 1658-4715

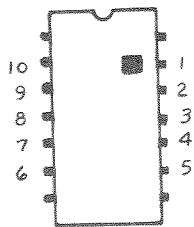
REFDES	DESCRIPTION	PART NO.	FMC	MFGR	PART NUMBER
C 46	CAP CER MCNO 0.1UF 20PCT 50VGP	4400-2050	72982		8131-M050-651-104M
CR 3	LED RED MV5023	6084-1104	71744	CM4-23	
CR 4	LED RED MV5023	6084-1104	71744	CM4-23	
CR 5	LED RED MV5023	6084-1104	71744	CM4-23	
CR 6	LED RED MV5023	6084-1104	71744	CM4-23	
CR 7	LED RED MV5023	6084-1104	71744	CM4-23	
CR 8	LED RED MV5023	6084-1104	71744	CM4-23	
CR 9	LED RED MV5023	6084-1104	71744	CM4-23	
CR 10	LED RED MV5023	6084-1104	71744	CM4-23	
CR 11	LED RED MV5023	6084-1104	71744	CM4-23	
CR 12	LED RED MV5023	6084-1104	71744	CM4-23	
CR 13	LED RED MV5023	6084-1104	71744	CM4-23	
CR 16	LED RED	6084-1110	72619	555-3007	
CR 17	LED RED	6084-1110	72619	555-3007	
CR 18	LED RED MV5023	6084-1104	71744	CM4-23	
CR 19	LED RED MV5023	6084-1104	71744	CM4-23	
R 142	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 143	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 144	RES COMP 220 OHM 5PCT 1/4W	6099-1225	81349		RCR07G221J
R 145	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 146	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 147	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
R 148	RES COMP 3.3 K 5PCT 1/4W	6099-2335	81349		RCR07G332J
U 47	ICD (STATIC PROTECT REQ)	5431-7037	04713	MC14511CP	
U 48	ICD (STATIC PROTECT REQ)	5431-7037	04713	MC14511CP	
U 49	ICD (STATIC PROTECT REQ)	5431-7037	04713	MC14511CP	
U 50	ICD (STATIC PROTECT REQ)	5431-7037	04713	MC14511CP	
U 51	ICD (STATIC PROTECT REQ)	5431-7037	04713	MC14511CP	
U 52	ICD (STATIC PROTECT REQ)	5431-7037	04713	MC14511CP	
U 53	ICD (STATIC PROTECT REQ)	5431-7037	04713	MC14511CP	
U 56	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
U 57	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
U 58	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
U 59	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
U 60	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
U 61	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
U 62	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
U 63	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
U 64	INDICATOR DIGITAL .300 CHARACTER	5437-1400	28480		5082-7613
Z 2	RESISTOR NETWORK	1657-0810	24655*		1657-0810
Z 3	RESISTOR NETWORK	1657-0810	24655		1657-0810
Z 4	RESISTOR NETWORK	1657-0810	24655		1657-0810
Z 5	RESISTOR NETWORK	1657-0810	24655		1657-0810
Z 6	RESISTOR NETWORK	1657-0810	24655		1657-0810
Z 7	RESISTOR NETWORK	1657-0810	24655		1657-0810
Z 8	RESISTOR NETWORK	1657-0810	24655		1657-0810
Z 9	RESISTOR NETWORK	1657-0810	24655		1657-0810
Z 10	RESISTOR NETWORK	1657-0810	24655		1657-0810

* NOTE: AN OPEN CIRCUIT IN A RESISTOR NETWORK CAN BE REPAIRED BY SHUNTING AN EXTERNAL RESISTOR ACROSS THE APPROPRIATE TERMINALS.
1657-0810 (each section): 220 Ω \pm 5%.



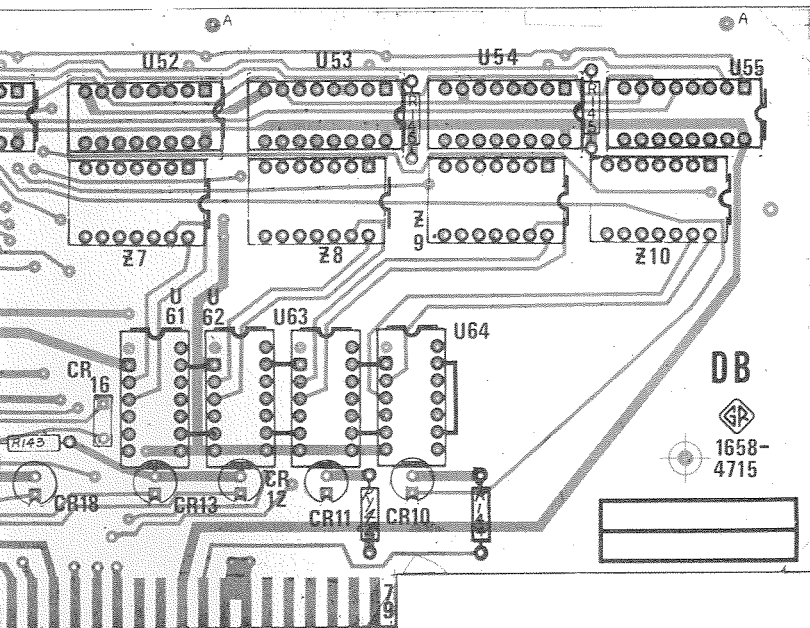
Front	PIN	SIG
	1	L7
	2	L8
	3	L9
	4	L10
	5	L11
	6	DP4
	7	DP3, 11
	8	RNGT, 13
	9	RNGLFT, 15
	10	BP5, 17
	11	DP8, 19
	12	DP7, 21
	13	DP6, 23
	14	DP2, 25
	15	DP1, 27
	16	DP0, 29
	17	L4
	18	L1
	19	L2
	20	L3
	21	L6
	22	L5
	23	45D, 51

Rear	SIG	PIN
2	B	
4	A	
6	DIG8	
8	C	
10	D	
28	DIG3	
30	DIG2	
32	DIG1	
34	+5D	
36	+5D	
38	DIG0	
40	DIG7	
42	DIG6	
48	DIG5	
50	DIG4	



Bottom view of
U56...64

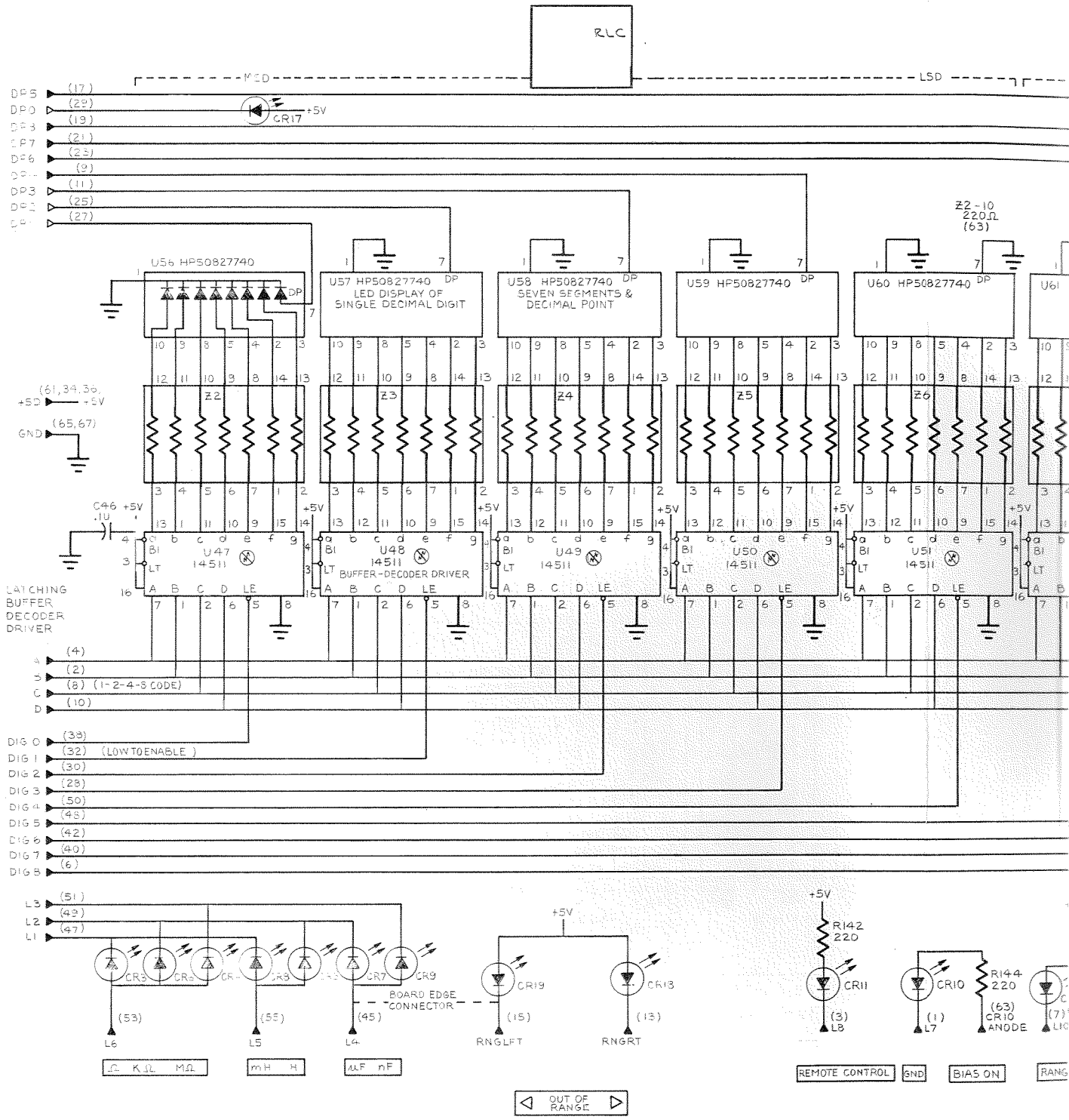
Figure 6-10. Display

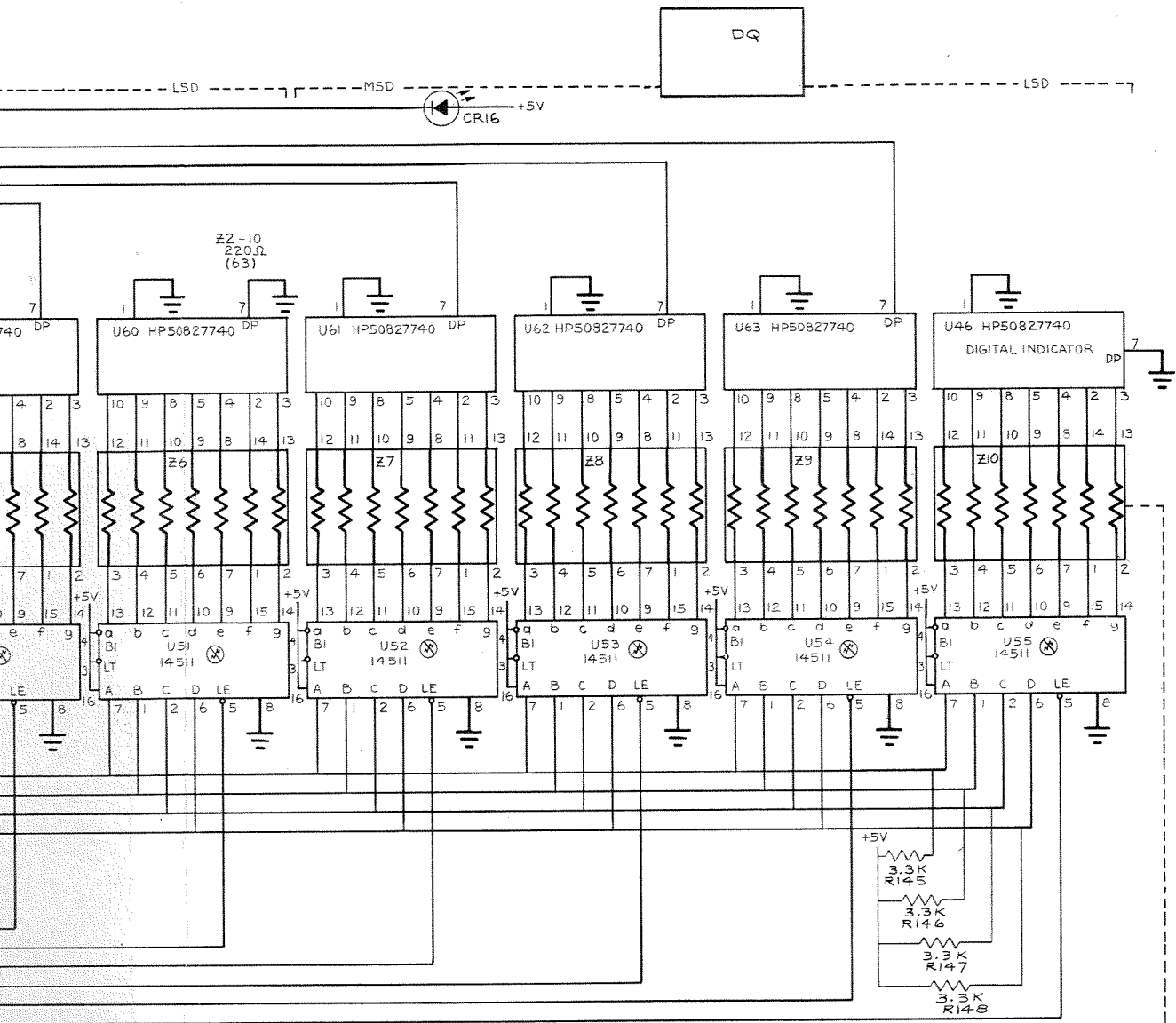


- L4 - 45
- L1 - 47
- L2 - 49
- L3 - 51
- L6 - 53
- L5 - 55
- +5D, 61
- CR10 ANODE, 63
- GND, 65
- GND, 67
- 75
- 77
- 79
- 46 - DIG5
- 48 - DIG5
- 50 - DIG4
- 78
- 80

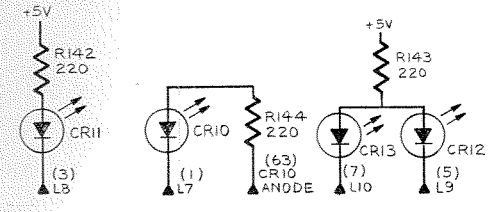
NOTE: Orientation: Viewed from parts side. Part number: Refer to caption.
 Symbolism: Outlined area = part; gray ckt pattern = parts side, black (if any) = other side. Pins: Square pad in ckt pattern = collector, I-C pin 1, cathode (of diode), or + end (of capacitor).

Figure 6-10. Display (DB) board, 1658-4715, layout.





EACH RESISTOR IN Z2 THROUGH Z10 IS 220Ω ±5%



REMOTE CONTROL GND BIAS ON RANGE HELD

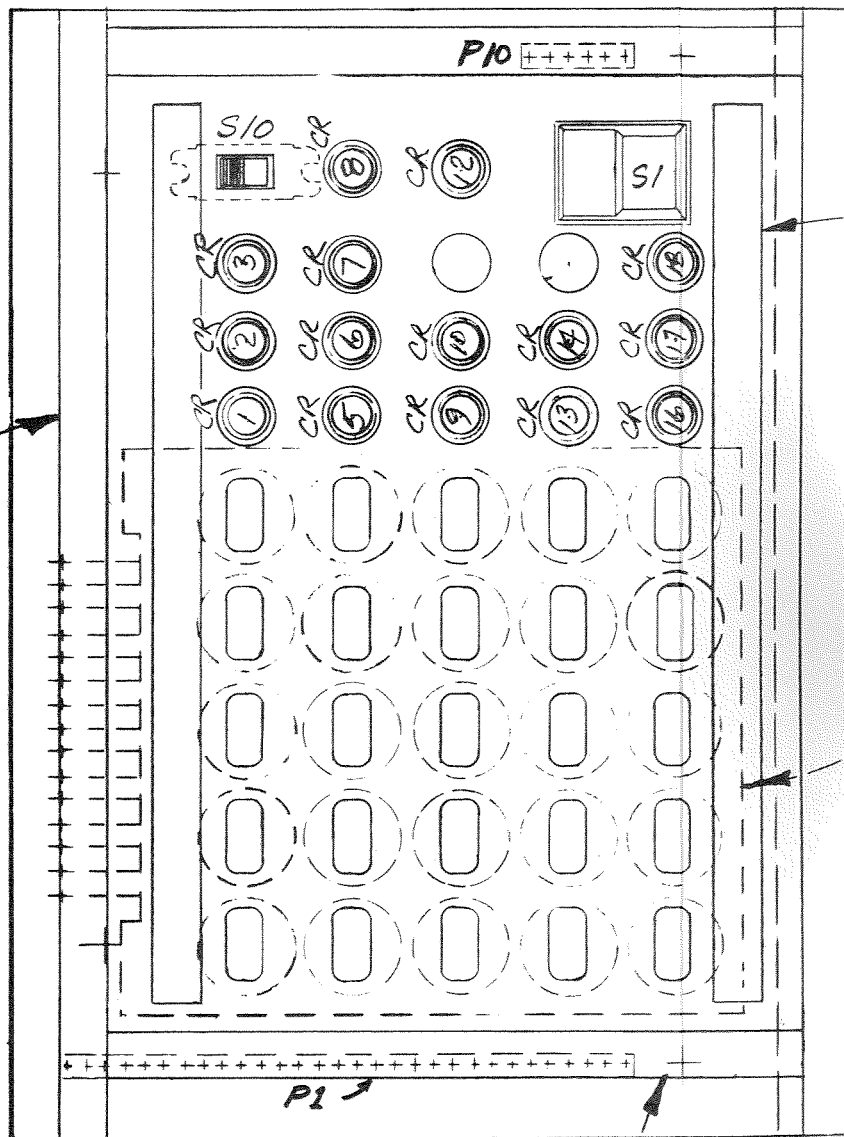
Figure 6-11. Display (DB) board, 1658-4715, diagram.

ELECTRICAL PARTS LIST

KEYBOARD ASM PC BOARD KB P/N 1658-4710

REFDES	DESCRIPTION	PART NO.	FMC	MFGR	PART NUMBER
CR 1	LED RED MV5023	6084-1104	71744	CM4-23	
CR 2	LED RED MV5023	6084-1104	71744	CM4-23	
CR 3	LED RED MV5023	6084-1104	71744	CM4-23	
CR 5	LED RED MV5023	6084-1104	71744	CM4-23	
CR 6	LED RED MV5023	6084-1104	71744	CM4-23	
CR 7	LED RED MV5023	6084-1104	71744	CM4-23	
CR 8	LED GREEN	6084-1055	28480	5082-4950	
CR 9	LED RED MV5023	6084-1104	71744	CM4-23	
CR 10	LED RED MV5023	6084-1104	71744	CM4-23	
CR 12	LED RED MV5023	6084-1104	71744	CM4-23	
CR 13	LED RED MV5023	6084-1104	71744	CM4-23	
CR 14	LED RED MV5023	6084-1104	71744	CM4-23	
CR 16	LED RED MV5023	6084-1104	71744	CM4-23	
CR 17	LED RED MV5023	6084-1104	71744	CM4-23	
CR 18	LED RED MV5023	6084-1104	71744	CM4-23	
P 1	CONN 30 PIN .025 SQ POST	4230-8095	30146	929647-02-30	
P 10	CONN 6 PIN .025SQ POST	4230-8096	30146	929647-02-06	
S 1	SWITCH PUSH MOMENT DPST	7870-1571	31918	TYPE SR BLACK	
S 10	SWITCH SLIDE 2POS DPDT STEADY	7910-0470	10389	23-021-118	
ZS 2	SWITCH PUSHBUTTON MULT KEYBOARD	7880-3200	24655	7880-3200	

5167-4107(2)



5167-4106(2)

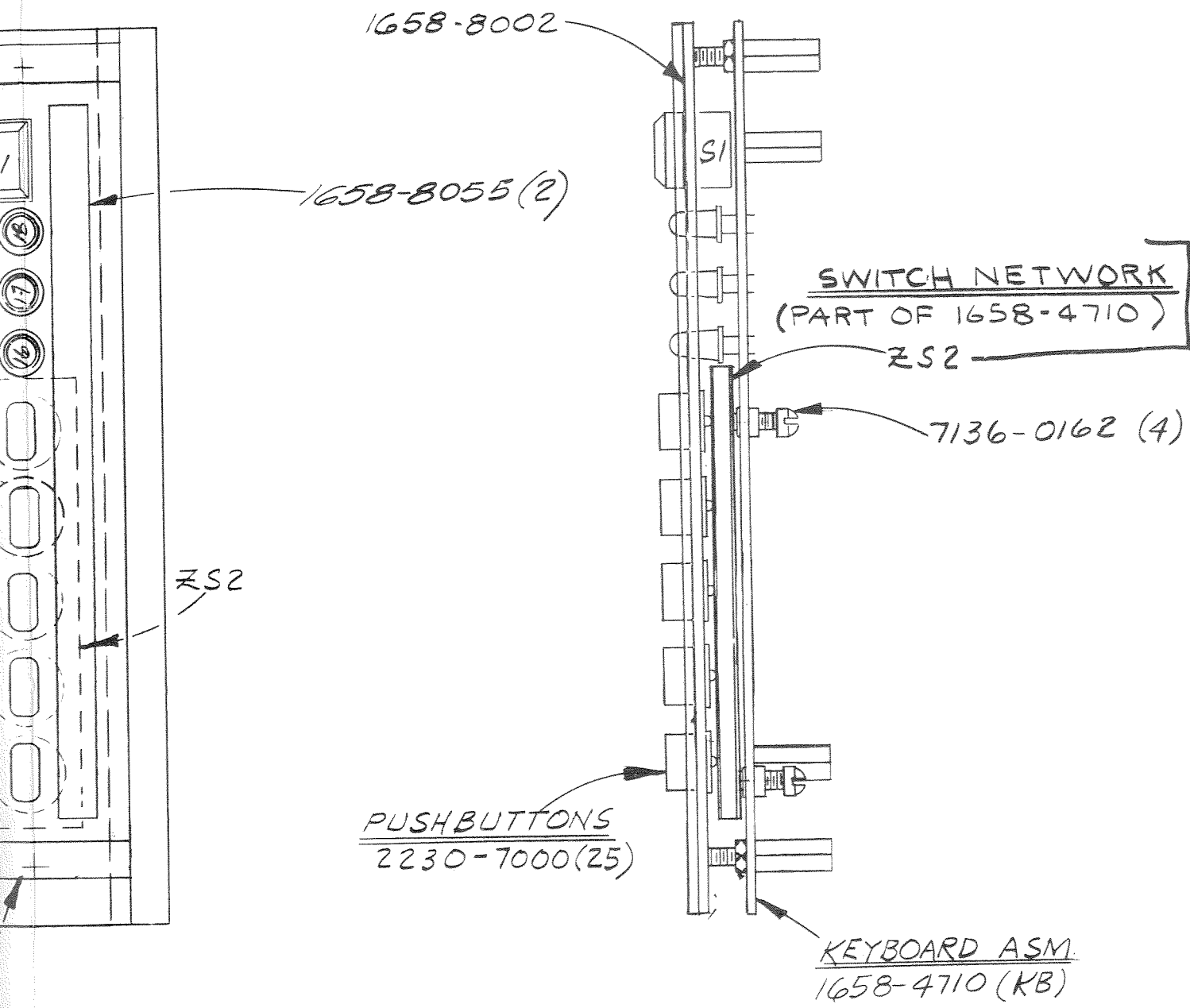


Figure 6-12. Keyboard module assembly, 1658-4200.