

Williams[®]

Drawing Set

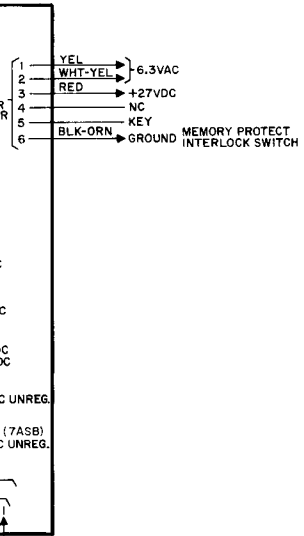
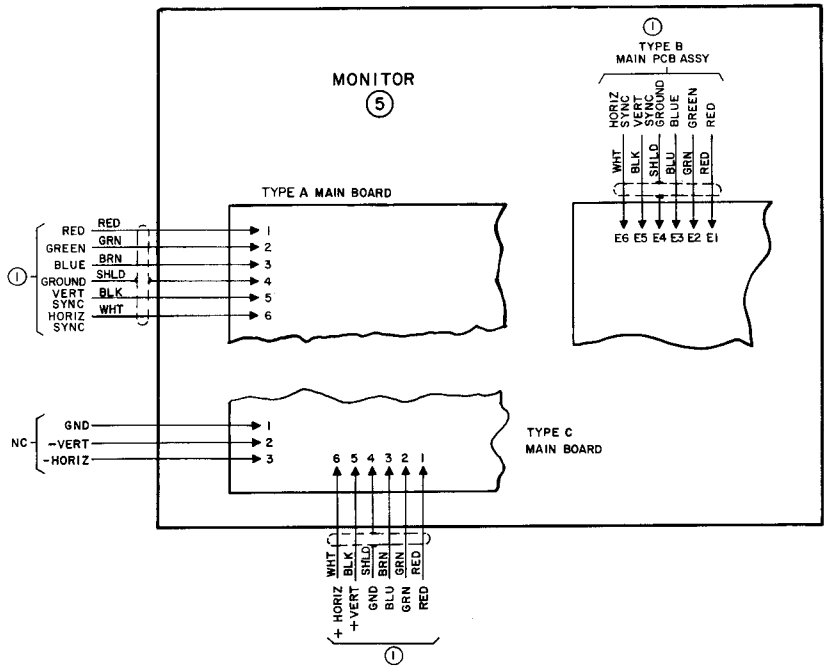
BUBBLES





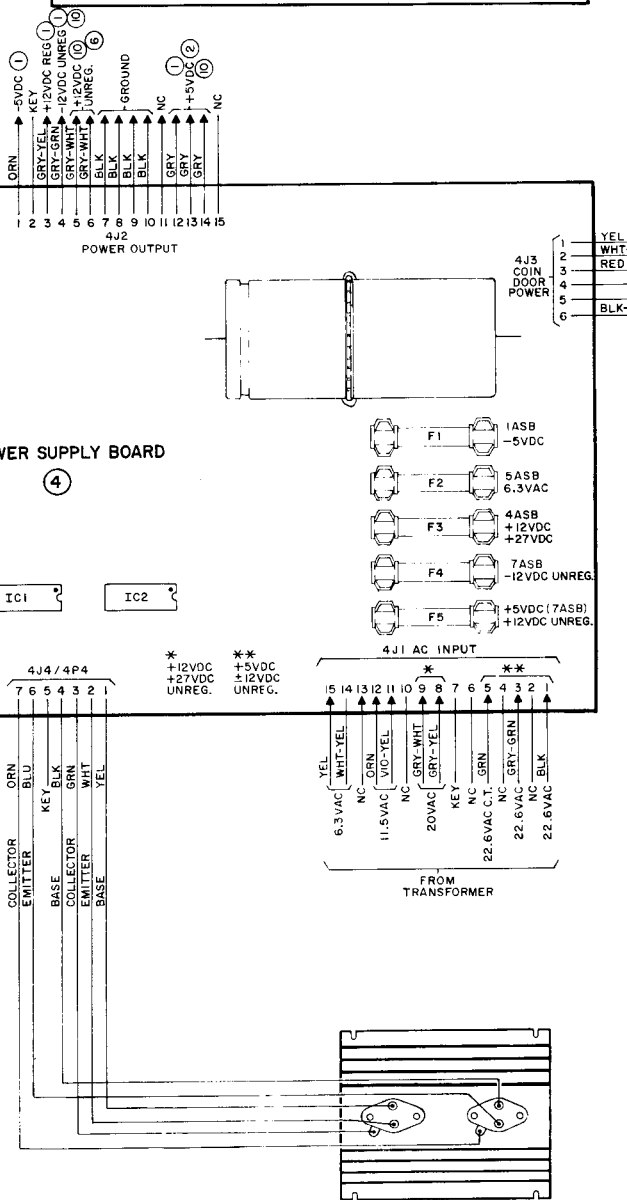
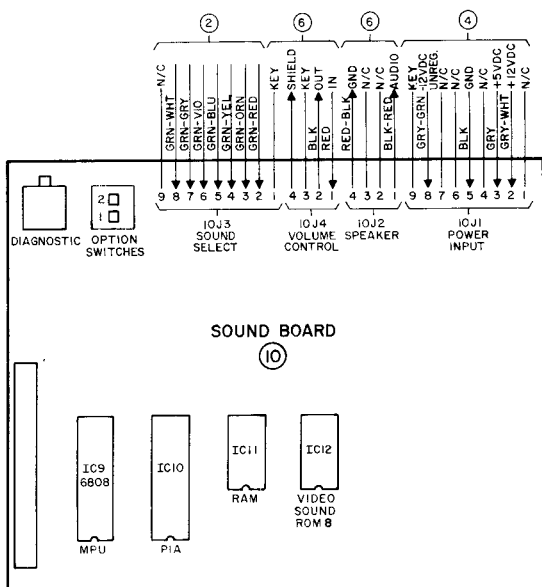
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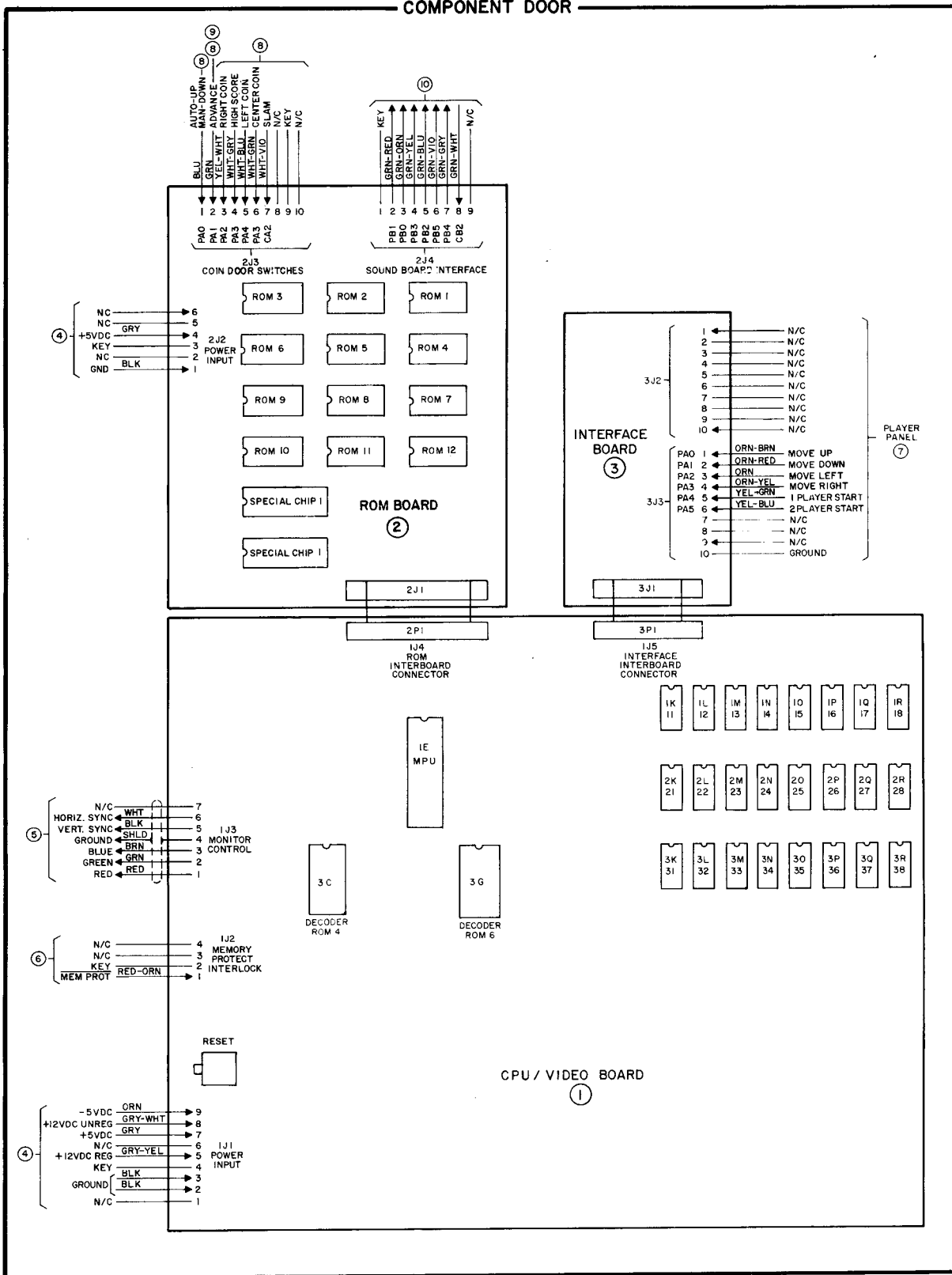
- ① CPU/ VIDEO BOARD
- ② ROM BOARD
- ③ INTERFACE BOARD
- ④ POWER SUPPLY
- ⑤ MONITOR
- ⑥ CABINET
- ⑦ PLAYER PANEL
- ⑧ COIN DOOR
- ⑨ CASH BOX
- ⑩ SOUND BOARD
- ⑪ NOT ASSIGNED
- ⑫ JOYSTICK BOARD

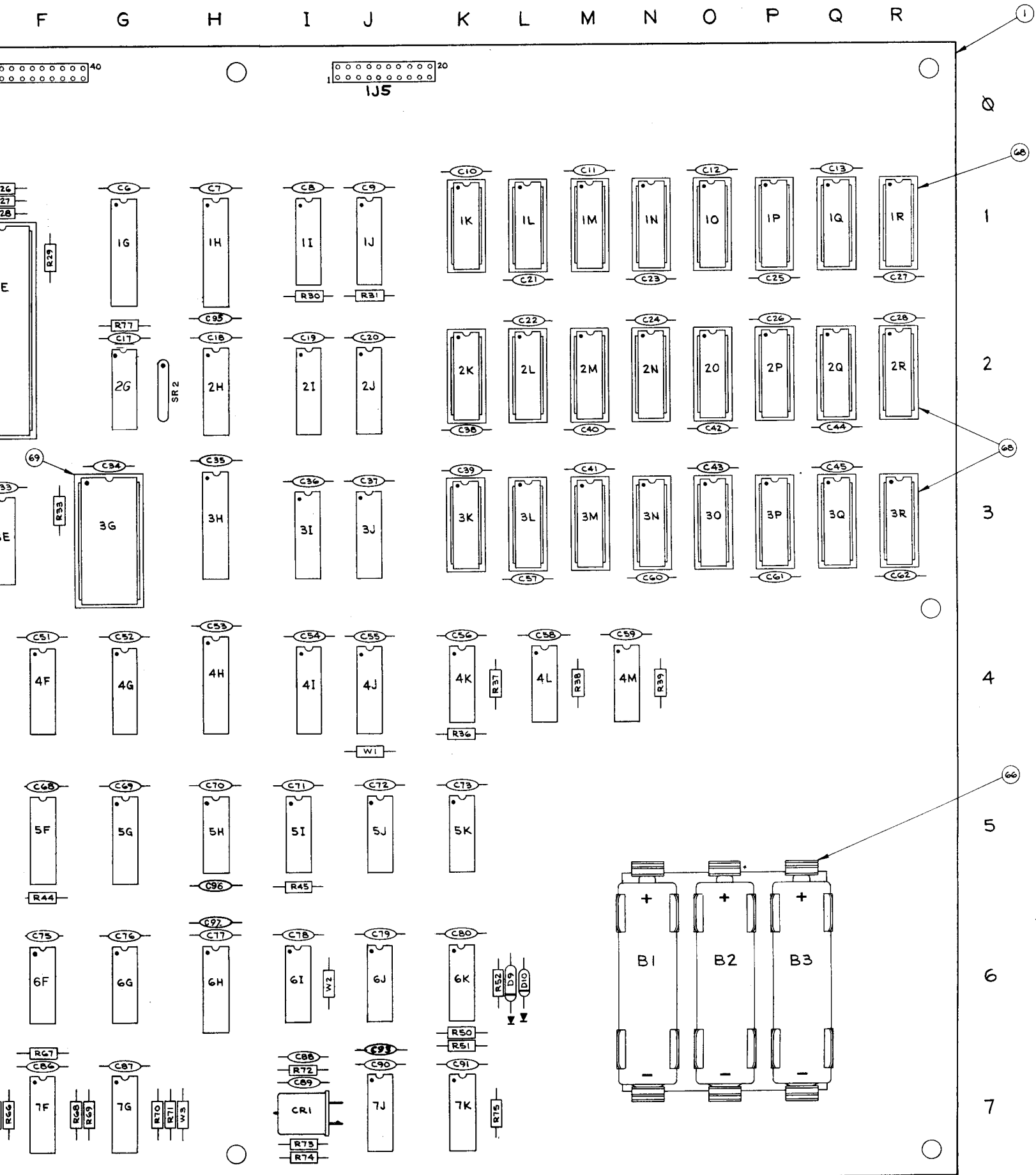
BOARD WIRING



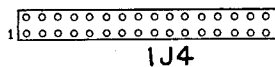
SIDE PANEL

COMPONENT DOOR

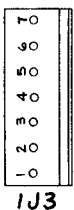
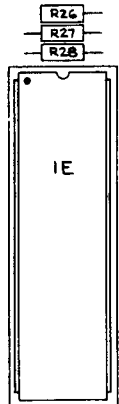
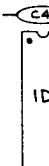
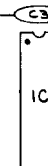
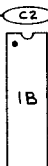
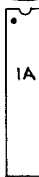
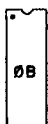
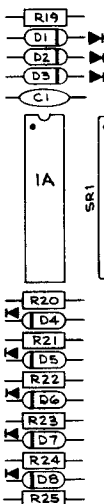
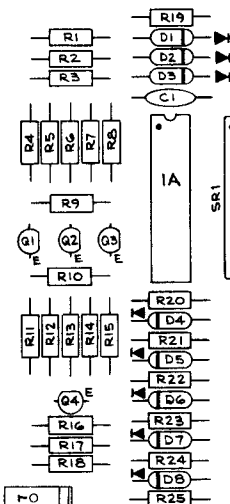




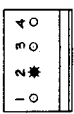
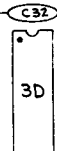
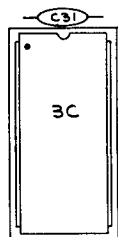
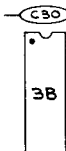
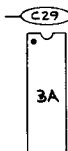
A B C D E F



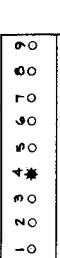
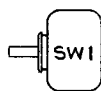
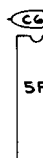
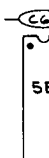
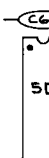
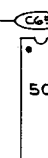
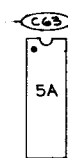
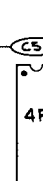
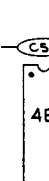
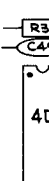
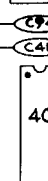
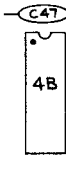
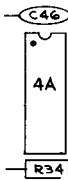
1J4



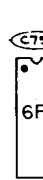
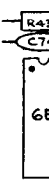
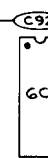
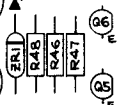
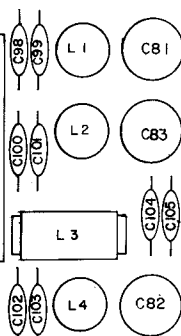
1J3



1J2



1J1



ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D. NO.
(K) 47	5010-09035-00	R64	RESISTOR, C.F. 47K OHM 5% 1/4 W.	1
(L) 48	5551-09822-00	L3	COIL, 9.74H, 3A	1
49	5010-09001-00	R2, R21, R24	RESISTOR, C.F. 330 OHM 5% 1/4 W.	3
50	5010-09039-00	R56	RESISTOR, C.F. 10 OHM 5% 1/4 W.	1
(A) 51	5043-09491-00	C89, C93	CAPACITOR, AXIAL 22 PFD. 1K V. ±10%	2
52	5043-09492-00	C88	CAPACITOR, AXIAL 100 PFD. 50 V. ±10%	1
53	5040-09545-00	C84	CAPACITOR, AXIAL 22 MFD. 10 V. ±20%	1
(G) (A) 54	5043-09065-00	C94 THRU C97	CAPACITOR, AXIAL 470 PFD. 50 V. XTR ±20%	4
(E) 55	5043-08996-00	SEE NOTE #3	CAPACITOR, AXIAL 1 MFD. 50 V. ±20%	85
56	5040-09421-00	C81, C82, C83	CAPACITOR, RADIAL 100 MFD. 25 V. +50 -10%	3
57	5075-09059-00	ZR2	1N5990A 3.9 V. ZENER DIODE	1
58	5075-09018-00	ZR1	1N5996A 6.8 V. ZENER DIODE	1
59	5070-08919-00	D1, D2, D3, D4, D5, D6, D7, D8	1N4148 DIODE, SILICON	8
60	5070-09266-00	D9	1N5817 DIODE, SILICON	1
(E) 61	5160-08938-00	Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q13	2N4401, TO-92 TRANSISTOR, NPN	8
62	5190-09016-00	Q1, Q2, Q3, Q4, Q12	2N4403, TO-92 TRANSISTOR, PNP	5
63	5520-09495-00	CRI	12 MHZ CRYSTAL	1
(L) 64	5093-09345-00	C98-C105	CAPACITOR, AXIAL 100 PFD 50V ±20%	8
65	5880-09022-00	B1, B2, B3	BATTERY ALKALINE 1.5 V. (AA)	3
66	5881-09021-00	---	BATTERY HOLDER *171	1
67	5700-09628-00	---	14-PIN IC SOCKET	0
(J) (H) 68	5700-09006-00	---	16-PIN IC SOCKET	24
69	5700-09004-00	---	24-PIN IC SOCKET	2
70	5700-08985-00	---	40-PIN IC SOCKET	1
71	5791-09437-00	IJ5	20 PIN RIBBON CABLE HEADER	1
72	5791-09349-00	IJ4	40 PIN RIBBON CABLE HEADER	1
73	5791-09028-00	IJ2	4 PIN HEADER 09-65-1041	1
74	5791-09497-00	IJ3	7 PIN HEADER 09-65-1071	1
75	5791-09027-00	IJ1	9 PIN HEADER 09-65-1091	1
76	5019-09669-00	SR1	RESISTOR, 1K OHM 10 PIN SIP	1
77	5010-09534-00	W1, W2, W3	RESISTOR, C.F. 0 OHM 1/4 WATT	3
(C) 78	5340-09689-00	0B, 1C	5114 1K X 4 CMOS STATIC RAM	1
5340-09667-00	6514 1K X 4 CMOS STATIC RAM		0	
(C) 79	5281-09483-00	1B, 2B	74LS189 16 X 4 RAM	0
5280-09625-00	7489 16 X 4 RAM		0	
5282-09716-00	74S189 16 X 4 RAM		0	
5281-09715-00	74LS289 16 X 4 RAM		2	
5282-09717-00	74S289 16 X 4 RAM		0	
80	5641-09371-00	SW1	PUSH BUTTON SW. SPST	0
5641-09312-00	PUSH BUTTON SW. DPDT MOM.		1	
82				
(J) (D) 83	5019-09786-00	SR2	SIP 4.7K 5R 6 PIN 5% 125 W/R @ 70°C	1
(L) (E) (D) 84	5281-09856-00	1H, 3H, 4H	OCTAL LATCH 74LS373	3
(E) (D) 85				

NOTES:

1. 4116: 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 3K, 3L, 3M, 3N, 3O, 3P, 3Q, 3R

2. 4.7K 4 RESISTOR:

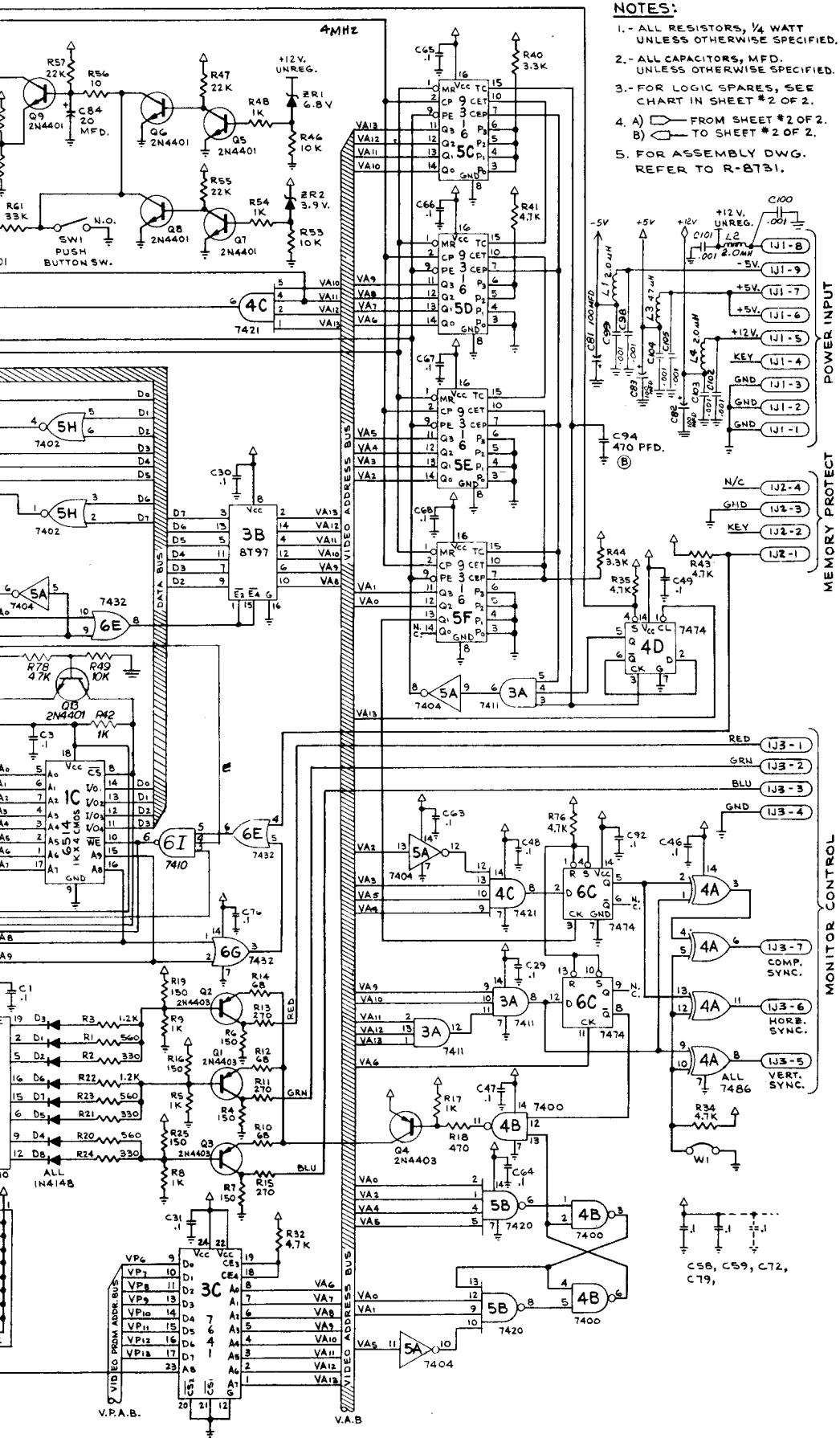
R26, R27, R28, R29, R32, R33, R35, R36, R37, R38, R39, R41, R43, R45, R50, R51, R52, R66, R67, R68, R69, R70, R71, R75, R84, R76, R77, R78

3. 1 MFD. CAPACITORS:

C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C86, C87, C90, C91, C92

4. FOR SCHEMATIC REFER TO 16-BB09

BILL OF MATERIAL				
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D. NO.
1	5770-09656-00		BARE P.C. BOARD	1
2	5280-09073-00	4B	7400 QUAD 2-INPUT NAND	1
3	5280-08948-00	5H	7402 QUAD 2-INPUT NOR	1
4	5281-09215-00	7J	74LS04 HEX. INVERTER	1
5	5280-09013-00	5A, 5K	7404 HEX. INVERTER	2
6	5280-08973-00	6F	7408 QUAD AND	1
7	5280-09011-00	4L, 4M, 6I	7410 TRIPLE 3-INPUT NAND	3
8	5280-09475-00	3A, 6J	7411 TRIPLE 3-INPUT AND	2
9	5280-09530-00	5B	7420 DUAL 4-INPUT NAND	1
10	5280-09476-00	4C	7421 DUAL 4-INPUT AND	1
11	5280-09477-00	6E, 6G	7432 QUAD 2-INPUT OR	2
12	5280-09478-00	4D, 4K, 6K, 6C, 7F, 7G	7474 DUAL-D TYPE FLIP-FLOP	6
13	5280-09479-00	4A, 5J	7486 QUAD 2-INPUT EX-OR	2
14	5281-09480-00	7K	74LS107 DUAL J-K FLIP-FLOP	1
15	5281-09532-00	5G	74LS133 13-INPUT NAND	1
16	5281-09246-00	4G, 6H	74LS139 DUAL 2 to 4 LINE DECODER	2
17	5280-09481-00	3D, 3E, 4E, 4F	74153 DUAL 4 to 1 DATA INVERT	4
18	5280-09668-00	1I, 1J, 2I, 2J, 3I, 3J, 4I, 4J	74166 8-BIT SHIFT REGISTER	8
19				
20	5281-09308-00	1G	74LS245 OCTAL BUS TRANSCEIVER	1
21	5281-09485-00	2C, 2H	74LS257 QUAD DATA MUX	2
22	5370-08989-00	1D, 2D, 2G, 3B	8T97 HEX. TS BUFFER	0
	5281-09385-00		74LS367 HEX BUS DRIVER	4
23	5281-09486-00	1A,	74LS374 OCTAL D-TYPE FLIP-FLOP	1
24	A-5342-09821	3C	UNIVERSAL VERT. DECODER ROM 4	1
25	A-5342-09694	3G	UNIVERSAL HORIZ. DECODER ROM 4	1
26	5551-09848-00	L1, L2, L4	COIL, 2.04H, .5A	3
27	5281-09533-00	5I	74LS393 DUAL 4-BIT BIN. COUNTER	1
28	5340-09488-00	SEE NOTE #1	4116 (450 ns ACCESS) 16K X 1 DYNAMIC RAM	24
29	5070-06258-00	D10	1N4001 DIODE	1
30	5280-09489-00	5C, 5D, 5E, 5F	9316 4-BIT BIN. COUNTER	4
31	5400-09490-00	1E	6809E MICROPROCESSOR	1
32	5010-09548-00	R10, R12, R14	RESISTOR, C.F. 68 OHM 2% 1/4 W.	3
33	5010-09036-00	R65	RESISTOR, C.F. 100 OHM 5% 1/4 W.	1
34	5010-09187-00	R4, R6, R7, R16, R19, R25	RESISTOR, C.F. 150 OHM 5% 1/4 W.	6
35	5010-09508-00	R11, R13, R15	RESISTOR, C.F. 270 OHM 2% 1/4 W.	3
36	5010-09416-00	R18	RESISTOR, C.F. 470 OHM 5% 1/4 W.	1
37	5010-08992-00	R1, R20, R23	RESISTOR, C.F. 560 OHM 5% 1/4 W.	3
38	5010-09356-00	R42, R59, R77, R48, R54, R74	RESISTOR, C.F. 1K OHM 5% 1/4 W.	8
39	5010-09314-00	R3, R22	RESISTOR, C.F. 1.2K OHM 5% 1/4 W.	2
40	5010-08998-00	R59, R72, R73	RESISTOR, C.F. 2.2K OHM 5% 1/4 W.	3
41	5010-08997-00	R60, R63	RESISTOR, C.F. 2.7K OHM 5% 1/4 W.	2
42	5010-08983-00	R30, R31, R40, R44, R58	RESISTOR, C.F. 3.3K OHM 5% 1/4 W.	5
43	5010-08991-00	SEE NOTE #2	RESISTOR, C.F. 4.7K OHM 5% 1/4 W.	
44	5010-09034-00	R49, R46, R53	RESISTOR, C.F. 10K OHM 5% 1/4 W.	3
45	5010-08774-00	R47, R55, R57, R62	RESISTOR, C.F. 22K OHM 5% 1/4 W.	4
46	5010-09113-00	R61	RESISTOR, C.F. 33K OHM 5% 1/4 W.	1



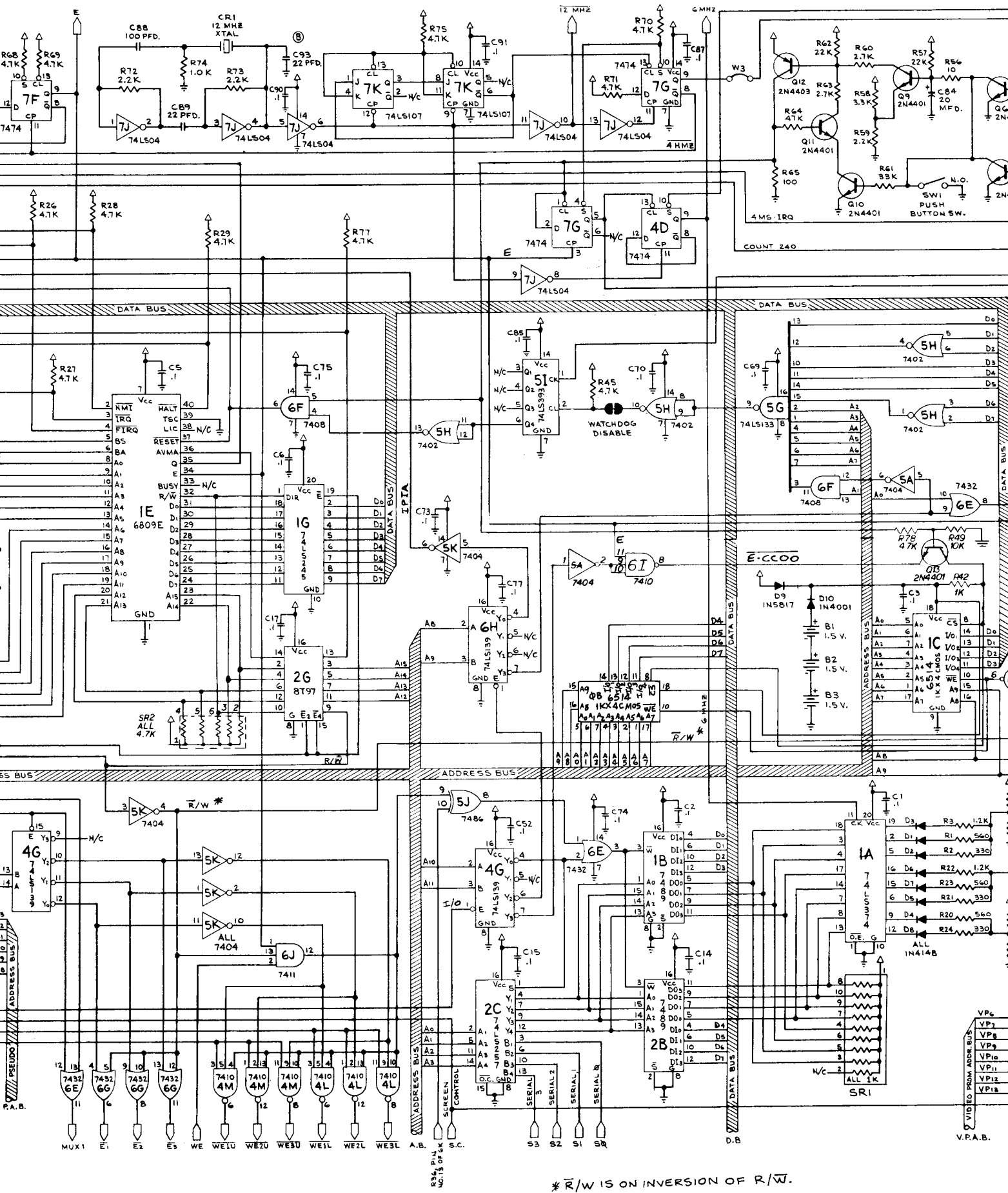
- NOTES:**
- 1.- ALL RESISTORS, 1/4 WATT UNLESS OTHERWISE SPECIFIED.
 - 2.- ALL CAPACITORS, MFD. UNLESS OTHERWISE SPECIFIED.
 - 3.- FOR LOGIC SPARES, SEE CHART IN SHEET #2 OF 2.
 4. A) FROM SHEET #2 OF 2.
B) TO SHEET #2 OF 2.
 5. FOR ASSEMBLY DWG. REFER TO R-8731.

POWER INPUT

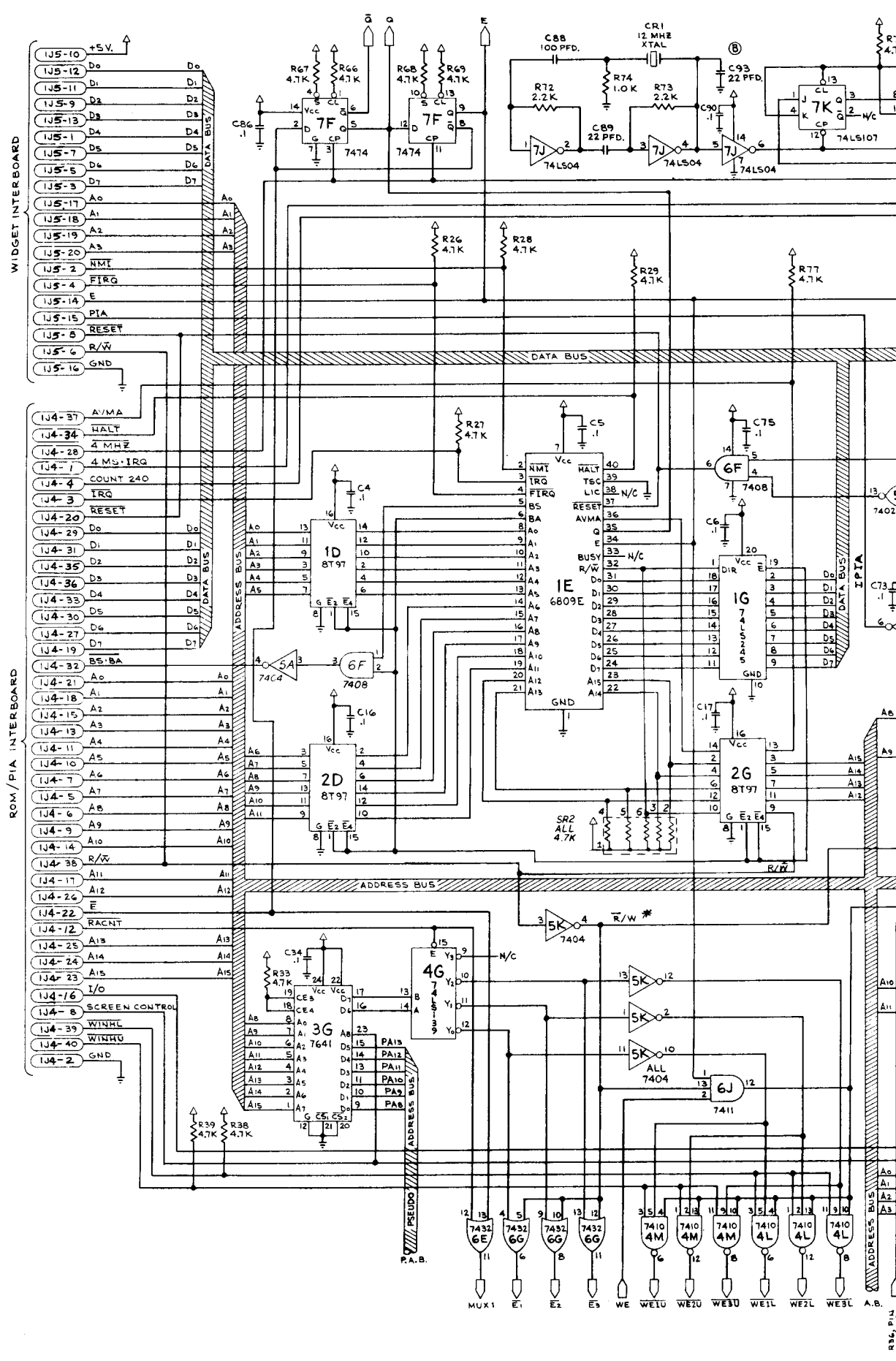
MEMORY PROTECT

MONITOR CONTROL

R-9663 CPU Board Logic Diagram (Sheet 1 of 2)



* R/W IS ON INVERSION OF R/W.



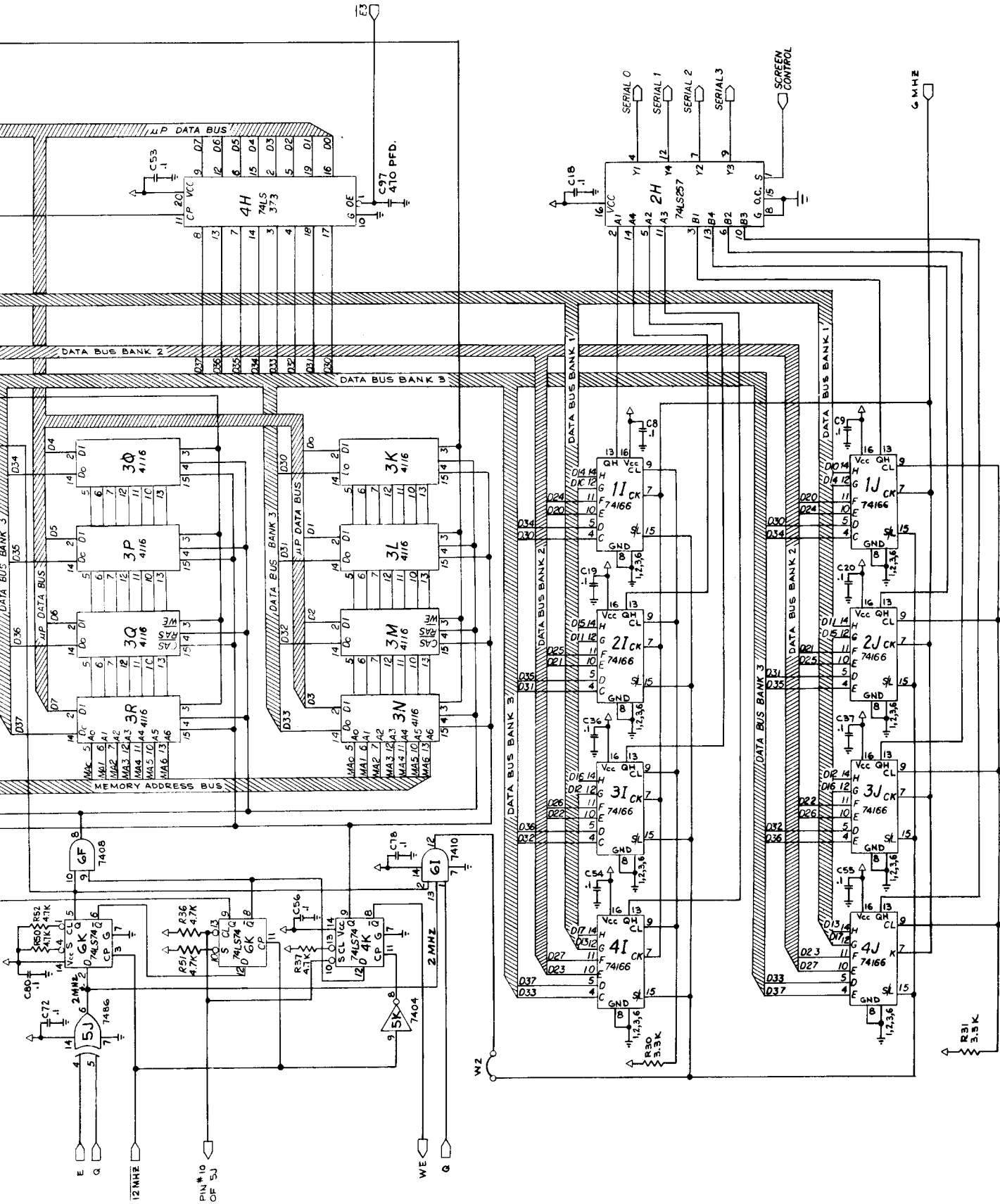
WIDGET INTERBOARD

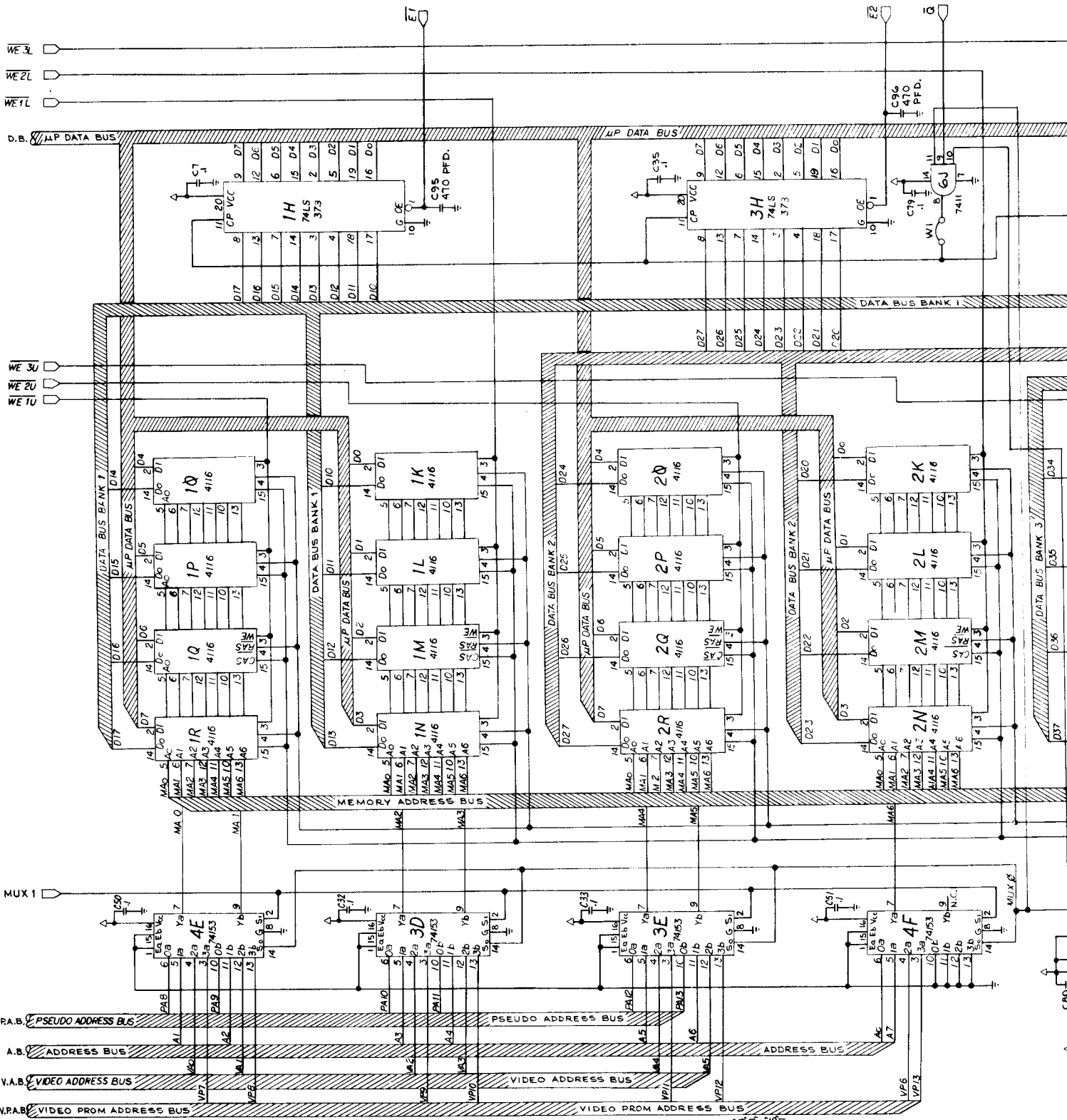
ROM/PIA INTERBOARD

- IJ5-10 +5V.
- IJ5-12 D₀
- IJ5-11 D₁
- IJ5-9 D₂
- IJ5-13 D₃
- IJ5-1 D₄
- IJ5-7 D₅
- IJ5-5 D₆
- IJ5-3 D₇
- IJ5-17 A₀
- IJ5-18 A₁
- IJ5-19 A₂
- IJ5-20 A₃
- IJ5-2 NMT
- IJ5-4 FIRG
- IJ5-14 E
- IJ5-15 PIA
- IJ5-8 RESET
- IJ5-6 R/W
- IJ5-16 GND

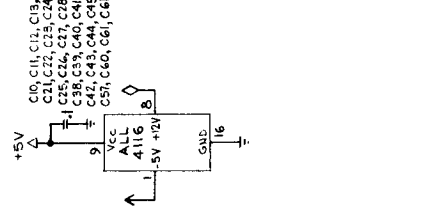
- IJ4-37 A/MA
- IJ4-34 HALT
- IJ4-28 4 MHz
- IJ4-1 4 ms IRQ
- IJ4-4 COUNT 240
- IJ4-3 IRG
- IJ4-3 RESET
- IJ4-29 D₀
- IJ4-31 D₁
- IJ4-31 D₂
- IJ4-36 D₃
- IJ4-33 D₄
- IJ4-30 D₅
- IJ4-27 D₆
- IJ4-19 D₇
- IJ4-32 BS, BA
- IJ4-21 A₀
- IJ4-18 A₁
- IJ4-15 A₂
- IJ4-13 A₃
- IJ4-11 A₄
- IJ4-10 A₅
- IJ4-7 A₆
- IJ4-5 A₇
- IJ4-6 A₈
- IJ4-9 A₉
- IJ4-14 A₁₀
- IJ4-38 R/W
- IJ4-17 A₁₁
- IJ4-26 A₁₂
- IJ4-22 E
- IJ4-72 RACNT
- IJ4-25 A₁₃
- IJ4-24 A₁₄
- IJ4-23 A₁₅
- IJ4-16 I/O
- IJ4-8 SCREEN CONTROL
- IJ4-39 WINHL
- IJ4-40 WINHU
- IJ4-2 GND

- MUX 1
- E₁
- E₂
- E₃
- WE₁
- WE₂
- WE₃
- WE_{1L}
- WE_{2L}
- WE_{3L}
- A.B.



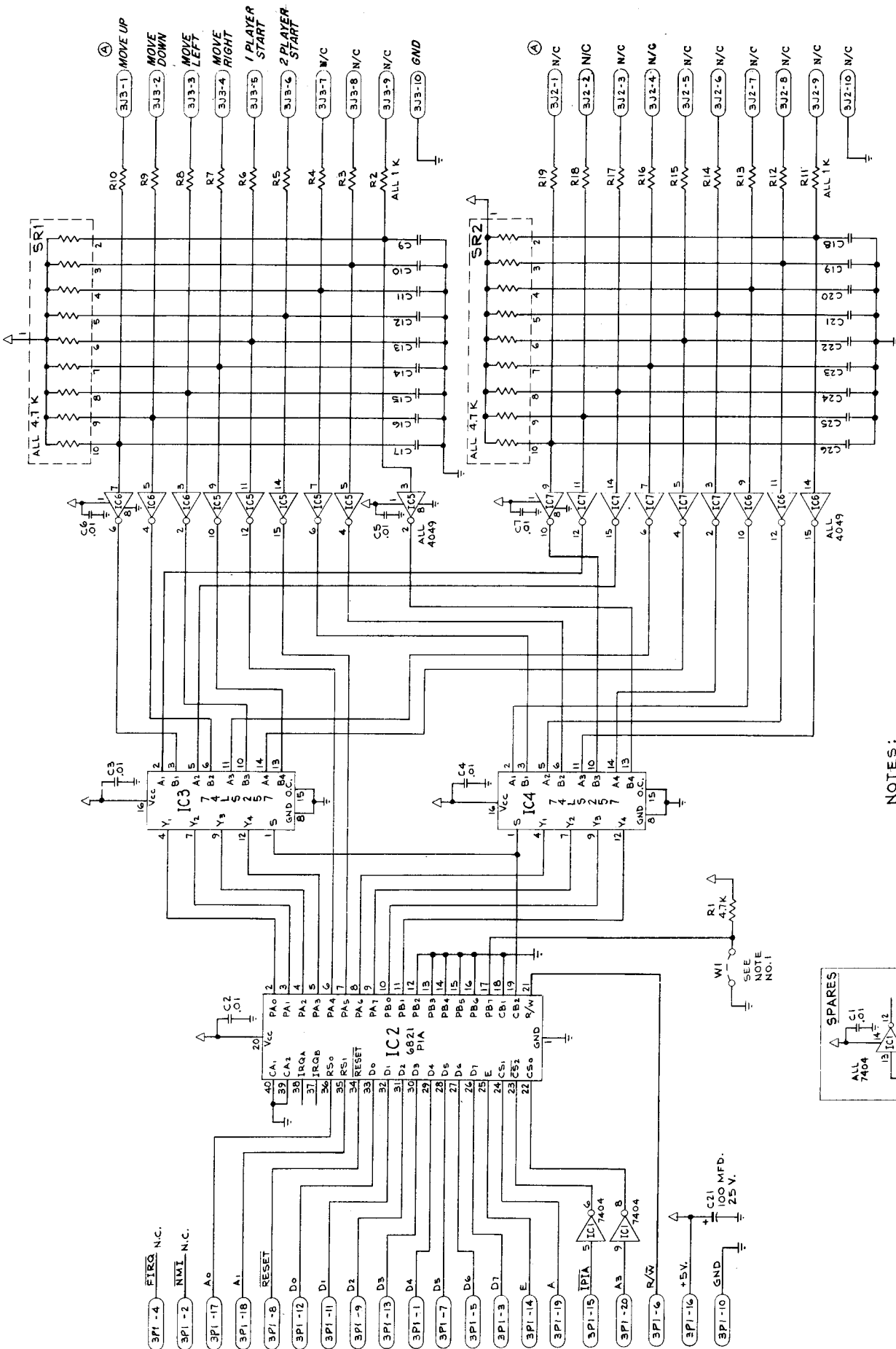


SPARE	
LOC.	QTY.
4B	7400 1
4K	74LS74 1
5I	74LS993 1
5J	7486 2
6D	4011 2
6H	74LS199 1
6I	7410 2

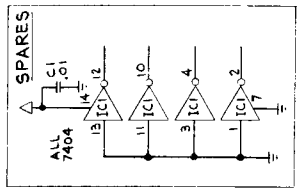


(D)

(E)



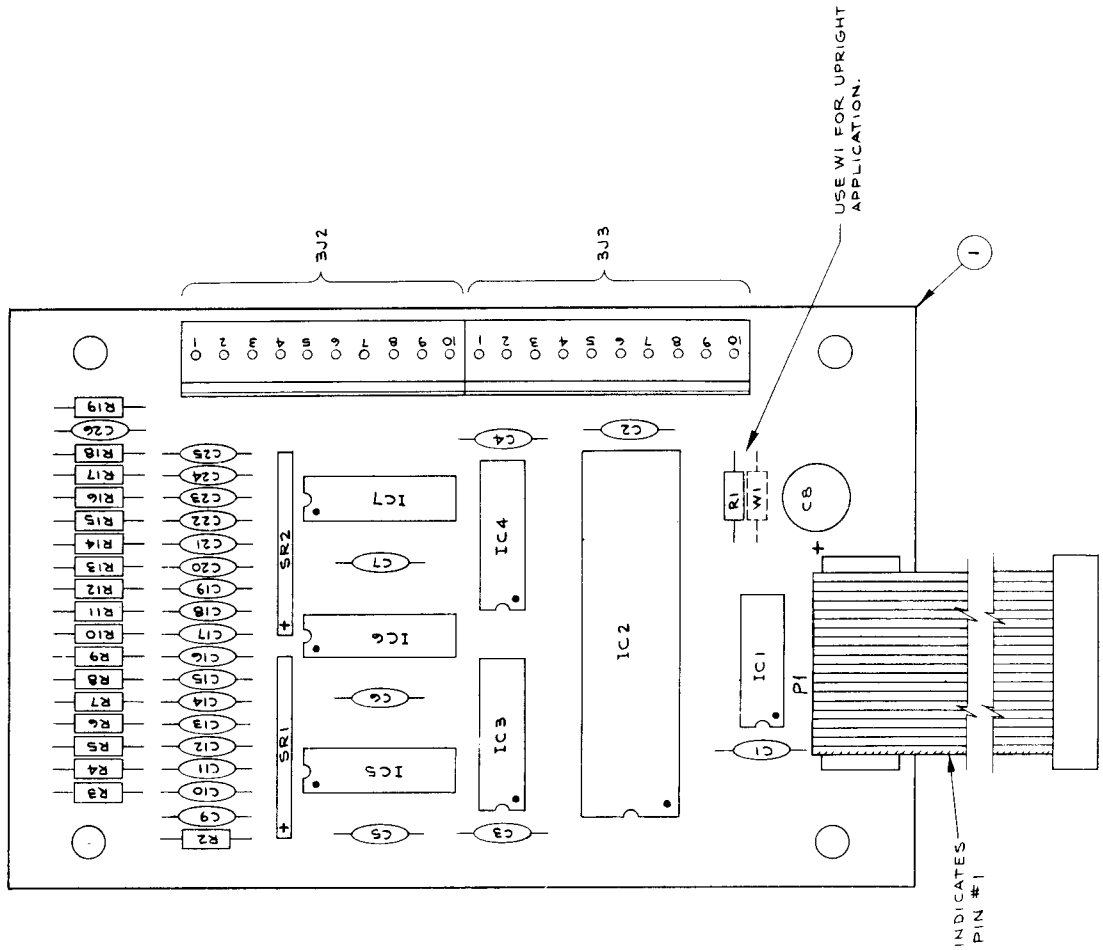
NOTES:
 1. USE W1 FOR UPRIGHT APPLICATION.
 2. FOR ASSEMBLY DWG REFER TO C-8783



C-8783 Interface Board Assembly and Logic Diagram

BILL OF MATERIAL

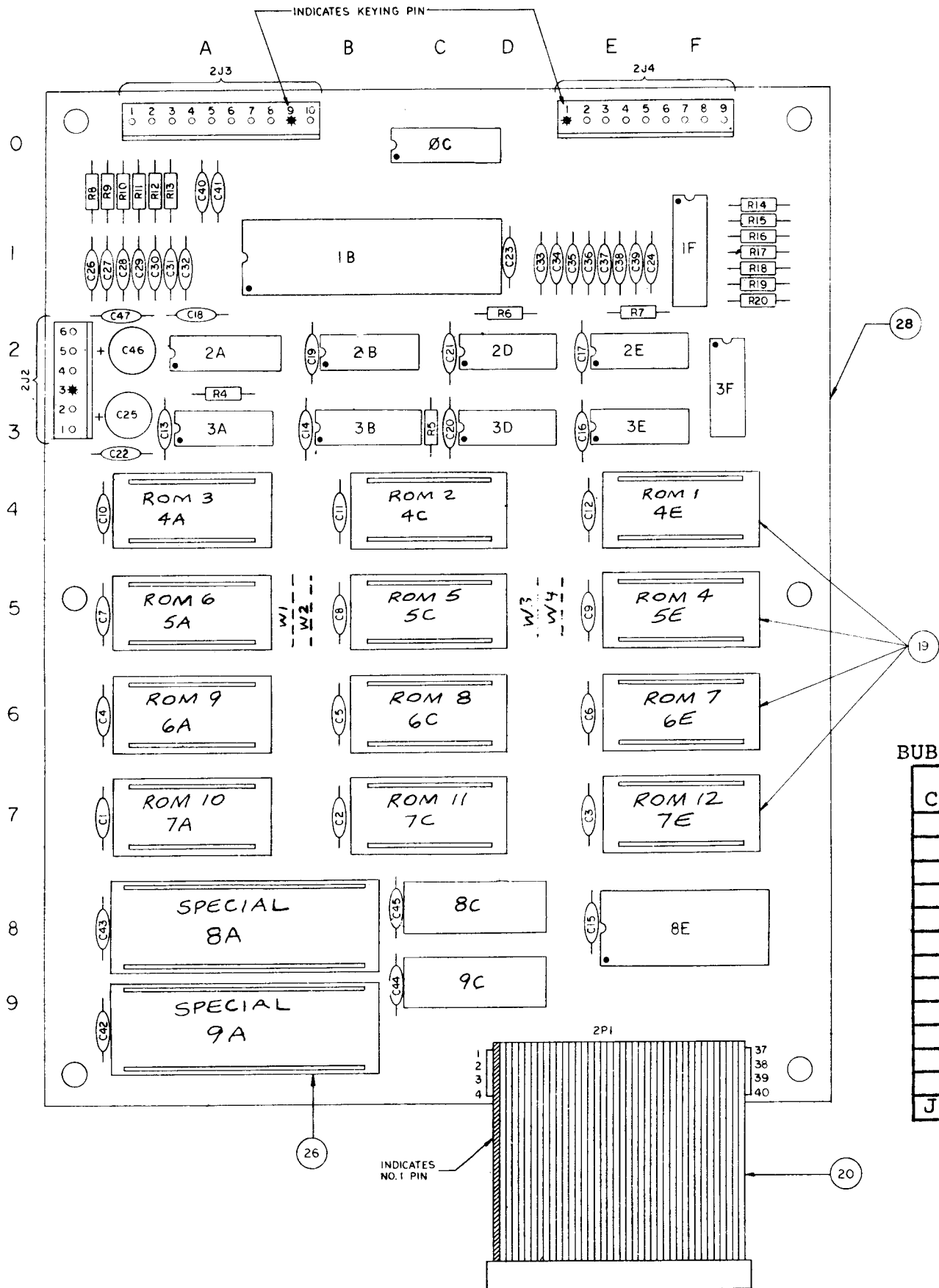
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	NO. REQD.
1	5772-09680-00		BARE P.C. BOARD	1
2	5430-08972-00	IC2	6821 PIA	1
3	5310-08975-00	IC5, IC6, IC7	4049 CMOS HEX INVERTOR	3
4	5280-09013-00	IC1	7404 HEX INVERTER	1
5	5281-09485-00	IC3, IC4	74LS257 QUAD DATA MULTIPLEXER	2
6	5019-09362-00	SR1, SR2	4.7K OHM 9 RES. 10 PIN SIP	2
7	5010-09388-00	R2 THRU R19	RESISTOR, C.F. 1K OHM 5% 1/4 WATT	18
8	5010-08991-00	R1	RESISTOR, C.F. 4.7K OHM 5% 1/4 WATT	1
9	5010-09554-00	W1	RESISTOR, C.F. 0 OHM 1/4 WATT	1
10	5043-09065-00	C9 THRU C26	CAPACITOR, CERAMIC DISC 470 PFD. 50 V. XTR ±20%	18
11	5040-09421-00	C8	CAPACITOR, ELECT. RADIAL 100 MFD. 25VOLT, +50-10%	1
12	5043-08980-00	C1 THRU C7	CAPACITOR, CERAMIC DISC, .01 MFD. 50 V. +80-20%	7
13	5795-09540-00	P1	20 PIN RIBBON CABLE ASSY.	1
14	5791-09444-00	3J2, 3J3	10 PIN HEADER 09-65-1101	2



TABLES

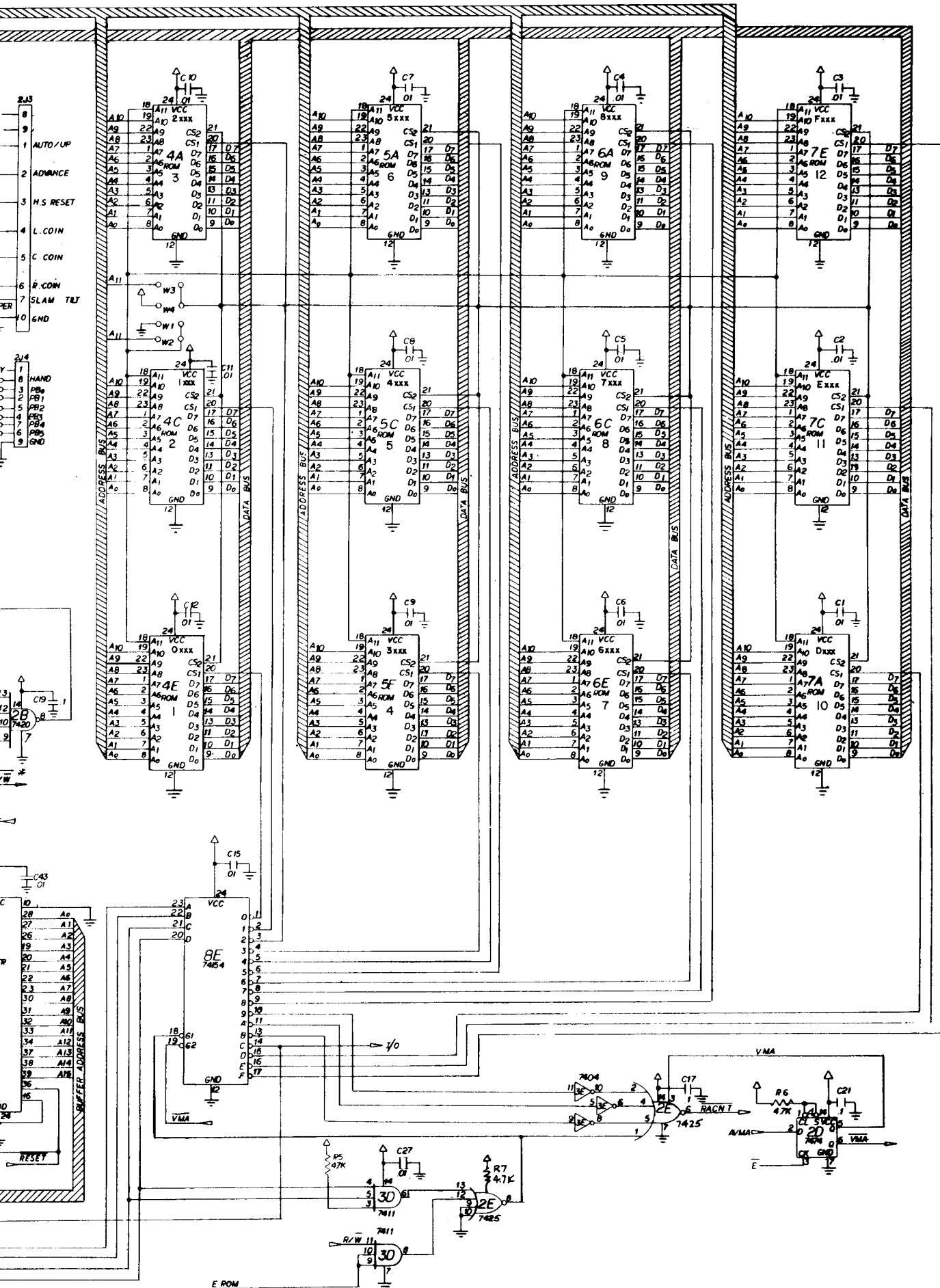
SHIP CODE	ROM #	PART #	COLOR
4E	ROM 1B	A-5343-10111-B	brown
4C	ROM 2B	A-5343-10112-B	brown
4A	ROM 3B	A-5343-10113-B	brown
5E	ROM 4B	A-5343-10114-B	brown
5C	ROM 5B	A-5343-10115-B	brown
5A	ROM 6B	A-5343-10116-B	brown
6E	ROM 7B	A-5343-10117-B	brown
6C	ROM 8B	A-5343-10118-B	brown
6A	ROM 9B	A-5343-10119-B	brown
7A	ROM 10B	A-5343-10120-B	brown
7C	ROM 11B	A-5343-10121-B	brown
7E	ROM 12B	A-5343-10122-B	brown
UMPER			W1, W3

BILL OF MATERIALS				
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D NO.
1	5771-09840-00		BARE PC. BOARD	1
2	5280-09407-00	1F	7447BCD TO 7SEG LED DISPLAY	1
3	5280-09478-00	2D, 3A	7474 DUAL-D TYPE FLIP-FLOP	2
4	5281-09246-00	3B	74LS139 DUAL 2 TO 4 LINE DECODER	1
5	5280-09530-00	2B	7420 DUAL 4-INPUT NAND	1
6	5280-09475-00	3D	7411 TRIPLE 3 INPUT AND	1
7	5280-09013-00	3E	7404 HEX INVERTERS	1
8	5280-09551-00	2E	DUAL 4 INPUT 7425 NOR GATE WITH STROBE	1
9	5280-09010-00	8E	74154 4 TO 16 LINE DEC. / DEMULT.	1
10	5430-08972-00	1B	MC 6821 PIA	1
11	5019-09239-00	QC	4.7K 15 RES 16 PIN DIP PACK	1
12	5010-09187-00	R14 THRU R20	RESISTOR C.F. 150 OHM 5% 1/4 W	7
13	5010-08991-00	R4 THRU R7	RESISTOR C.F. 4.7K OHM 5% 1/4 W	4
14	5671-09411-00	3F	MAN 72A 7SEG LED DISPLAY	1
15	5043-08980-00	C1-C21, C23, C24, C42-45	CAP. CERAMIC .01 MFD 50V +80-20%	27
16	5040-09421-00	C25, C46	CAP ELEC 100 MFD. 25V RAD +50%-10%	2
17	5043-08996-00	C22, C47	CAP CERAMIC .1 MFD. 50V ±20%	2
18	5043-09065-00	C26 THRU C41	CAP CERAMIC 470 PFD. 50V AXIAL +/-20%	16
19	5700-09004-00		24-PIN IC. SOCKET	12
20	5795-09611-00	2P1	40 PIN RIBBON CABLE ASS'Y 5"	1
21	5791-09038-00	2J2	HEADER, 6 PIN, 09-65-1061	1
22	5791-09444-00	2J3	10 PIN MALE CONN 09-65-1101	1
23	5791-09027-00	2J4	9 PIN CONN 09-65-1091	1
24	5310-08975	2A	4049 INVERTING HEX BUF.	1
25	5010-09358-00	R8 THRU R13	RESISTOR C.F. 1K OHM 5% 1/4 W	6
26	5700-08985-00		40-PIN IC. SOCKET	2
28	D-9192		ROM/PIA BD. SUB-ASSEMBLY	1
29	SEE CHART	4A THRU 7E SEE CHART	GAME ROM ASSEMBLY	AS REQ'D
30	5010-09534-00	W1 THRU W4 SEE CHART	RESISTOR C.F. 0 OHM 1/4 WATT	AS REQ'D
31	5410-09866-00	8A, 9A	FULL CUSTOM I.C.	2
32	5281-09308-00	8C	I.C., 74LS245 OCTAL BUS / LINE DR / LINE RCVR	1

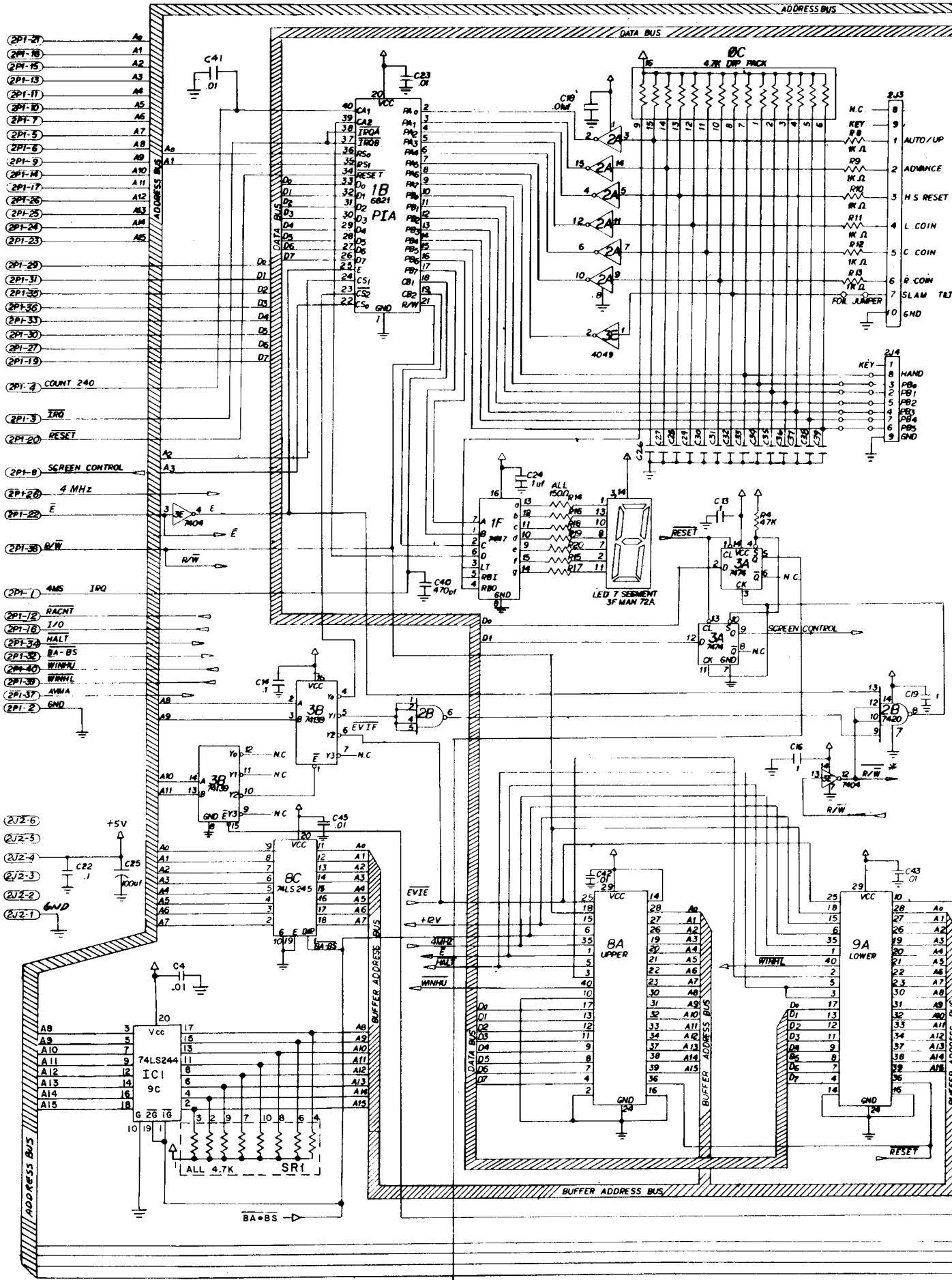


BUBBLES

CHIP CODE
4E
4C
4A
5E
5C
5A
6E
6C
6A
7A
7C
7E
JUMPER



D-9144 ROM Board Logic Diagram



- 2P1-21 A₀
- 2P1-18 A₁
- 2P1-15 A₂
- 2P1-13 A₃
- 2P1-11 A₄
- 2P1-10 A₅
- 2P1-7 A₆
- 2P1-5 A₇
- 2P1-6 A₈
- 2P1-9 A₉
- 2P1-14 A₁₀
- 2P1-17 A₁₁
- 2P1-26 A₁₂
- 2P1-25 A₁₃
- 2P1-24 A₁₄
- 2P1-23 A₁₅
- 2P1-29 D₀
- 2P1-31 D₁
- 2P1-35 D₂
- 2P1-33 D₃
- 2P1-32 D₄
- 2P1-30 D₅
- 2P1-27 D₆
- 2P1-19 D₇
- 2P1-4 COUNT 240
- 2P1-3 IRQ
- 2P1-20 RESET
- 2P1-8 SCREEN CONTROL
- 2P1-28 4 MHz
- 2P1-22 E
- 2P1-38 R/W
- 2P1-1 4MS IRQ
- 2P1-12 RACNT
- 2P1-16 I/O
- 2P1-34 MALT
- 2P1-36 BA-B5
- 2P1-40 WINPU
- 2P1-39 WINML
- 2P1-37 WINMA
- 2P1-2 GND

- 2J2-6 +5V
- 2J2-5 C22 .1
- 2J2-3 C25 100uF
- 2J2-2 GND
- 2J2-1 GND

- A₈
- A₉
- A₁₀
- A₁₁
- A₁₂
- A₁₃
- A₁₄
- A₁₅
- 3 V_{CC}
- 5
- 7
- 9
- 12
- 14
- 16
- 18
- 17
- 15
- 13
- 11
- 8
- 6
- 4
- 2
- 1
- 19
- 20
- 26
- 27
- 28
- 29
- 30
- 31
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- 36
- 37
- 38
- 39
- 40

BA=B5

ADDRESS BUS

DATA BUS

0C 2.2K DIP PACK

16

9 15 14 13 12 11 10 8 7 6 5 4 3 2 1

N.C. 2J3

KEY P8 9

1 ALTO/UP

2 ADVANCE

3 H S RESET

4 L COIN

5 C COIN

6 R COIN

7 SLAM TR

8 FOR JUMPER

9 GND

KEY 2J4

1 HAND

2 PB0

3 PB1

4 PB2

5 PB3

6 PB4

7 PB5

8 GND

9

13

12

11

10

9

8

7

6

5

4

3

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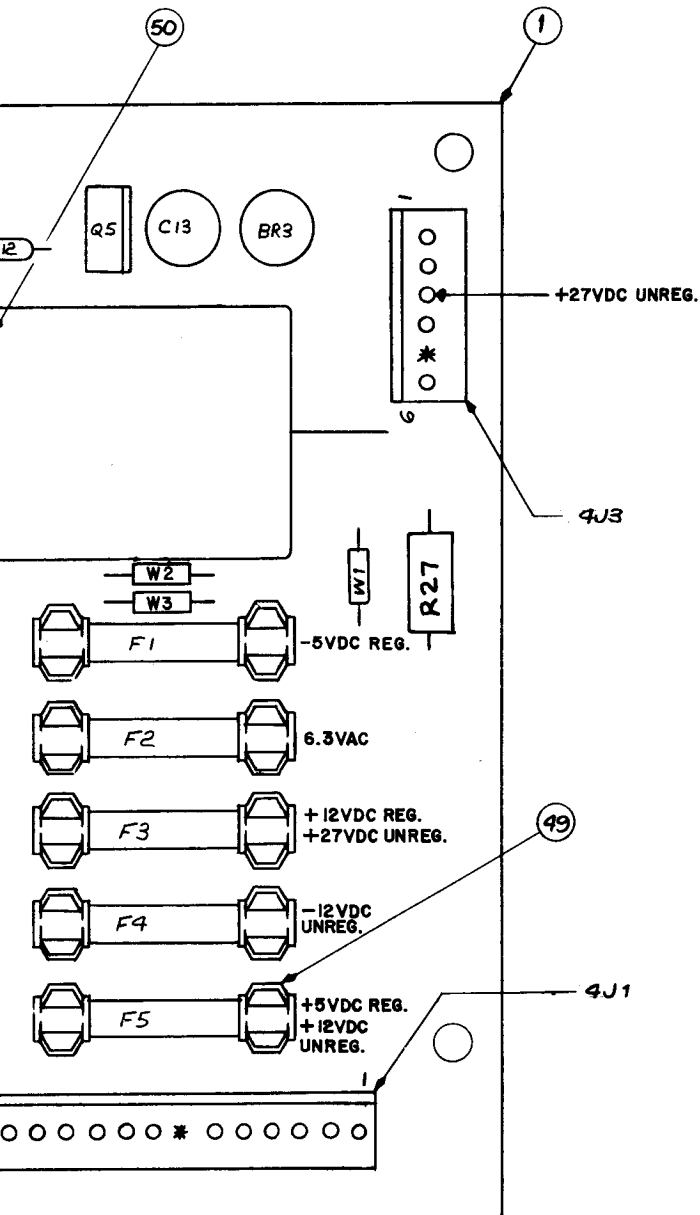
4

3

2

1

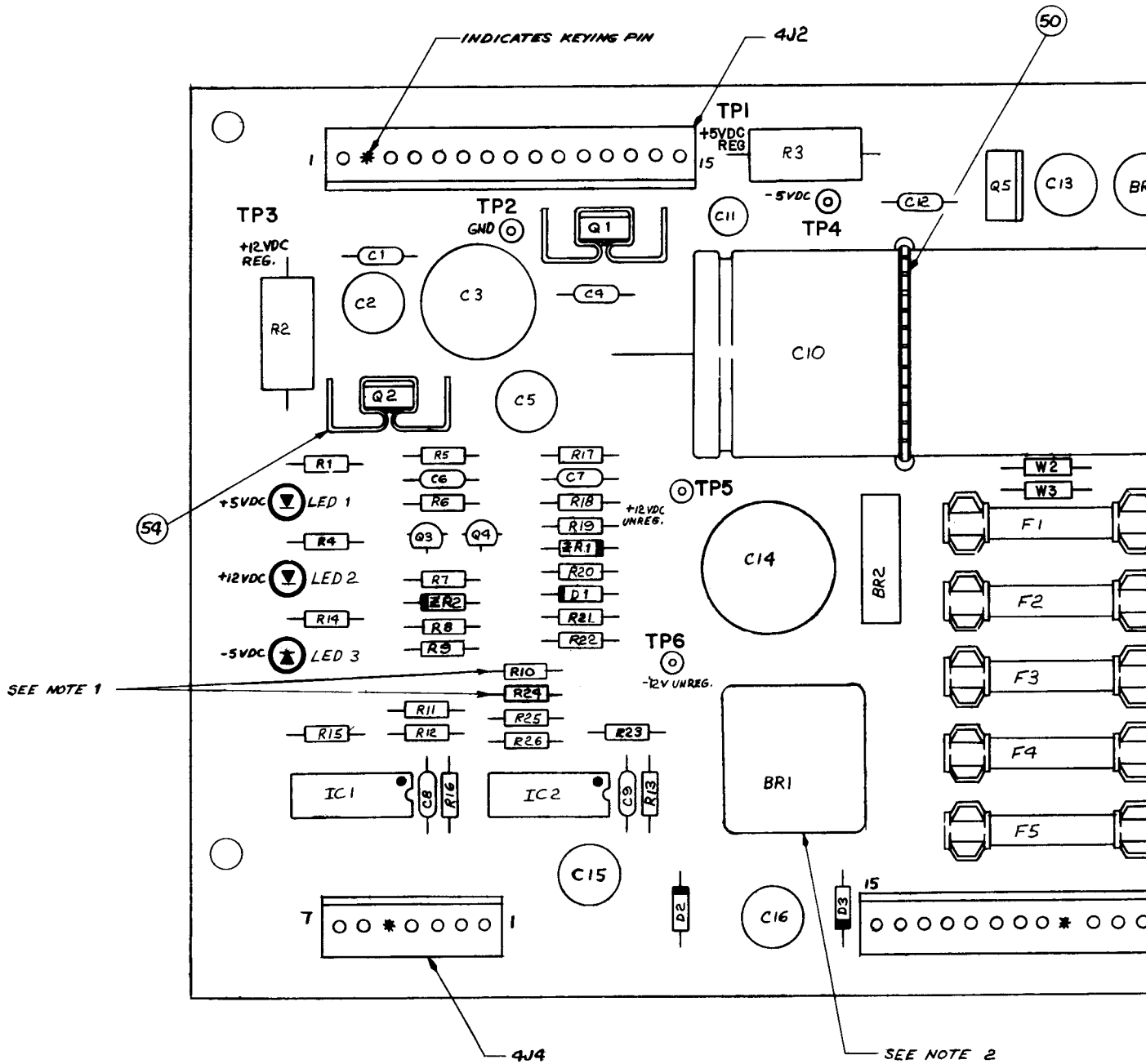
BILL OF MATERIAL



ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D NO.
1	5773-09679-00		BARE P.C. BOARD	1
2	5010-09085-00	R23	RESISTOR, 1.5K 5%, 1/4W	1
3	5010-08541-00	R13, R15	RESISTOR, 2.7K 2%, 1/4W	2
4	5010-09508-00	R21	RESISTOR, 870Ω 2%, 1/4W	1
5	5010-09428-00	R20	RESISTOR, 1.5K 2%, 1/4W	1
6	5010-09509-00	R16	RESISTOR, 1.1K 2%, 1/4W	1
7	5010-08510-00	R7	RESISTOR, 12K 2%, 1/4W	1
8	5010-09314-00	R4	RESISTOR, 1.2K 5%, 1/4W	1
9	5010-09416-00	R1, R14	RESISTOR, 470Ω 5%, 1/4W	2
10	5013-09542-00	R11	RESISTOR, 7.3K 1%, 1/4W	1
11	5013-09427-00	R12	RESISTOR, 9.99K 1%, 1/4W	1
12	5013-09426-00	R25	RESISTOR, 2.15K 1%, 1/4W	1
13	5012-09429-00	R3	RESISTOR, 12Ω 5%, 5W	1
14	5012-09512-00	R2	RESISTOR, 27Ω 5%, 5W	1
15	5012-09037-00	R27	RESISTOR, 0.4Ω 5%, 3W	1
16	5012-09665-00	R26	RESISTOR, 3.11K 1%, 1/4W	1
17	5010-09434-00	R6, R18	RESISTOR, C.F. 22Ω ± 5% 1/4W	2
18	5010-09036-00	R5, R9, R17 & R22	RESISTOR, C.F. 100Ω ± 5% 1/4W	4
19	5010-09039-00	R8, R19	RESISTOR, C.F. 10Ω ± 5% 1/4W	2
20	5010-09534-00	W1	RESISTOR, 0Ω	1
21	5043-08996-00	C6, C7	CAPACITOR, 0.1μF CERAMIC +80% -20% 50V	2
22	5040-09421-00	C2, C16	CAPACITOR, 100MFD, 25V RADIAL +50% -10%	2
23	5040-09422-00	C15	CAPACITOR, 47 MFD, 50V RADIAL +50% -10%	1
24	5040-09420-00	C3	CAPACITOR, 1000MFD, 25V RADIAL +75% -10%	1
25	5040-09419-00	C10	CAPACITOR, 18,000MFD 20V AXIAL +75% -10%	1
26	5040-09423-00	C5	CAPACITOR, 330 MFD 10V RADIAL +50% -10%	1
27	5040-09504-00	C14	CAPACITOR, 4700MFD 35V RADIAL +50% -10%	1
28	5043-09446-00	C1, C4 & C12	CAPACITOR, 1MFD 50V AXIAL ±5% -20 +80%	3
29	5043-08065-00	C9	CAPACITOR, 470PFD 50V AXIAL XTR ± 10%	1
30	5043-09492-00	C8	CAPACITOR, 100PFD 50V AXIAL 52L ± 5%	1
31	5040-09506-00	C13	CAPACITOR, 220MFD 16V RADIAL +50% -10%	1
32	5040-09493-00	C11	CAPACITOR, 22MFD 10V RADIAL +50% -10%	1
33	5070-06258-00	D1, D2 & D3	DIODE, 1N4001	3
34	5075-09406-00	ZR1	ZENER, 1N5234 ± 5% (6.2V)	1
35	5075-09662-00	ZR2	ZENER, 1N5244 ± 5% (14V)	1
36	5130-09430-00	Q3, Q4	TRANSISTOR, MPS A55	2
37	5130-09661-00	Q1, Q2	SCR 8 AMP, 100V	2
38	5250-09515-00	Q5	VOLTAGE REGULATOR, 7905	1
39	5460-09424-00	IC1, IC2	VOLTAGE REGULATOR, 723	2
40	5100-09890-00	BR1	BRIDGE RECTIFIER, 35 AMP, 200V	1
41	5100-09513-00	BR2	BRIDGE RECTIFIER, 4.0A, 50V	1
42	5100-09514-00	BR3	BRIDGE RECTIFIER, 1.0A, 50V	1
43	5671-09048-00	LED1, LED2, LED3	LED, RED	3
44	5824-09298-00	TP1 - TP6	TERMINAL #1502-1 (TEST POINT)	4

45	5731-09432-00	F4 & F5	FUSE, TA.S.B.	2
46	5731-06314-00	F3	FUSE, 9A, S.B., 250V	1
47	5731-06569-00	F1	FUSE, 1A, S.B., 250V	1
48	5731-09651-00	F2	FUSE, 5A, S.B., 250V	1
49	5732-09178-00		FUSEHOLDER,	10
50	03-1520		TIE WRAP	1
51	5791-09074-00	4J1 & 4J2	HEADER, 15 PIN 09-65-1051	2
52	5791-09030-00	4J3	HEADER, 6 PIN 09-65-1061	1
53	5791-09497-00	4J4	HEADER, 7 PIN 09-65-1071	1
54	5705-09663-00		HEAT SINK	2
	5705-09668-00		HEAT SINK	0

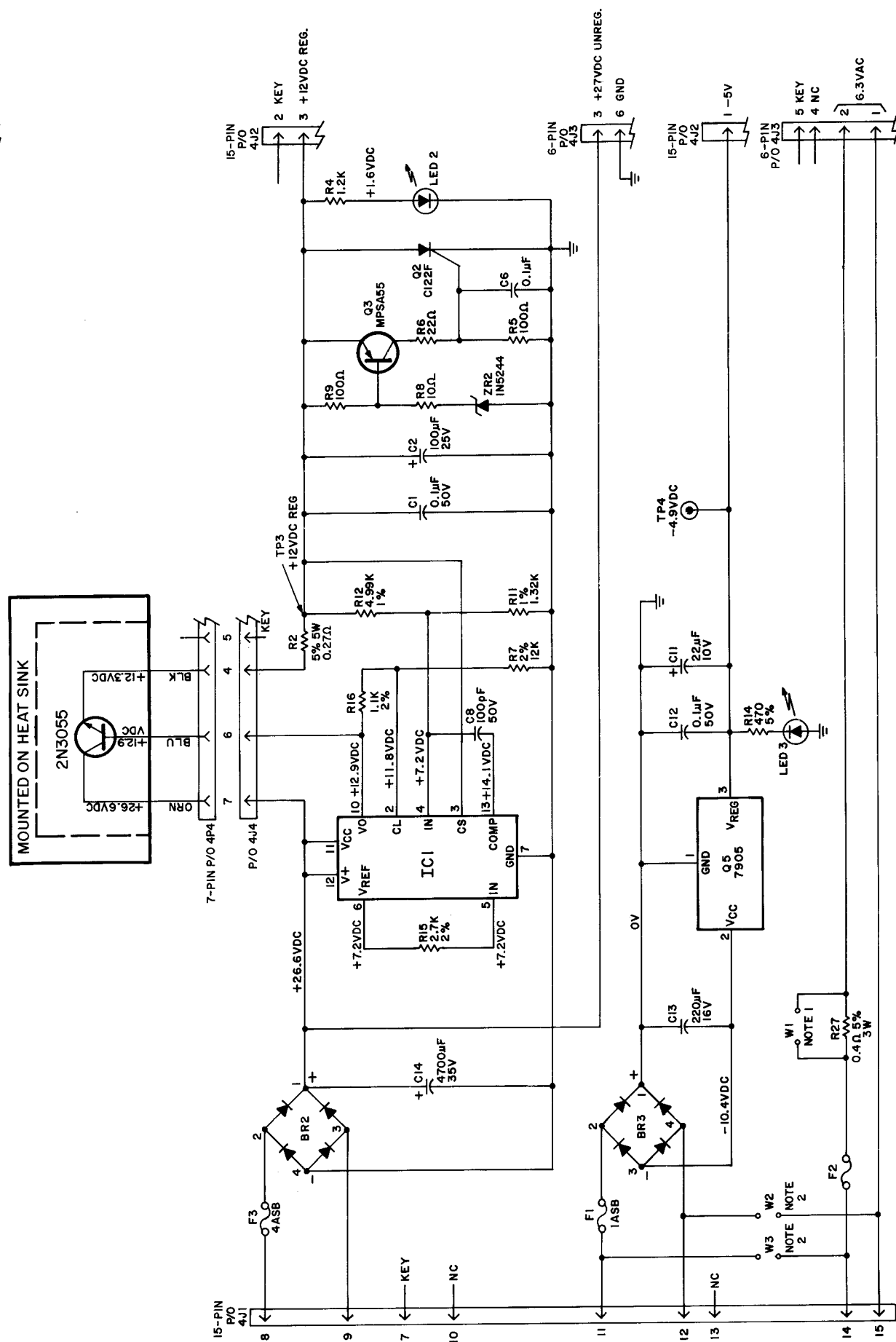
DESCRIPTION	REQ'D NO.
STOR. C.F. 5% 1/4W	1
TDR. C.F. 5% 1/4W	1



NOTES

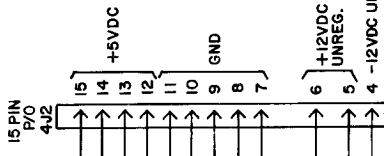
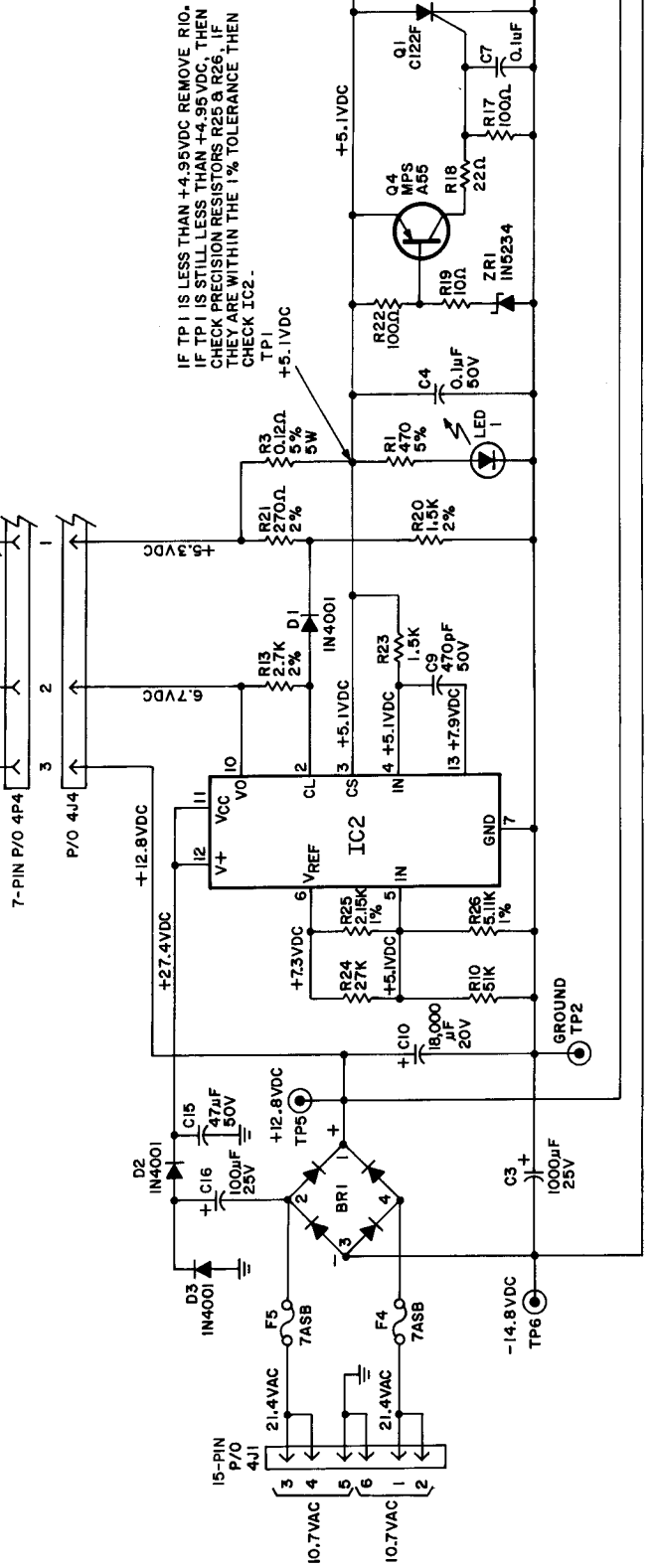
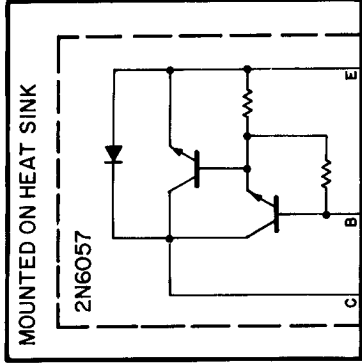
1. REMOVE R10 IF +5VDC IS LESS THAN 4.95 VDC.
2. BR1 MUST BE MOUNTED 1/8" ABOVE SURFACE OF BOARD.

55	5010-09682-00	R10	RESISTOR C.F. 51K ±5% 1/4W	1
56	5010-09324-00	R24	RESISTOR C.F. 27K ±5% 1/4W	1
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D NO.



- NOTES:
1. W1 IS NOT USED ON UPRIGHT GAMES.
 2. W2 & W3 ARE NOT USED.
 3. 1ASB 250V.

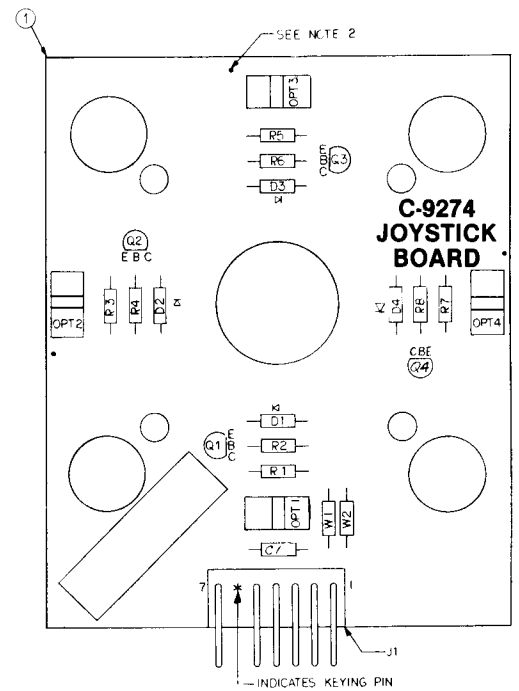
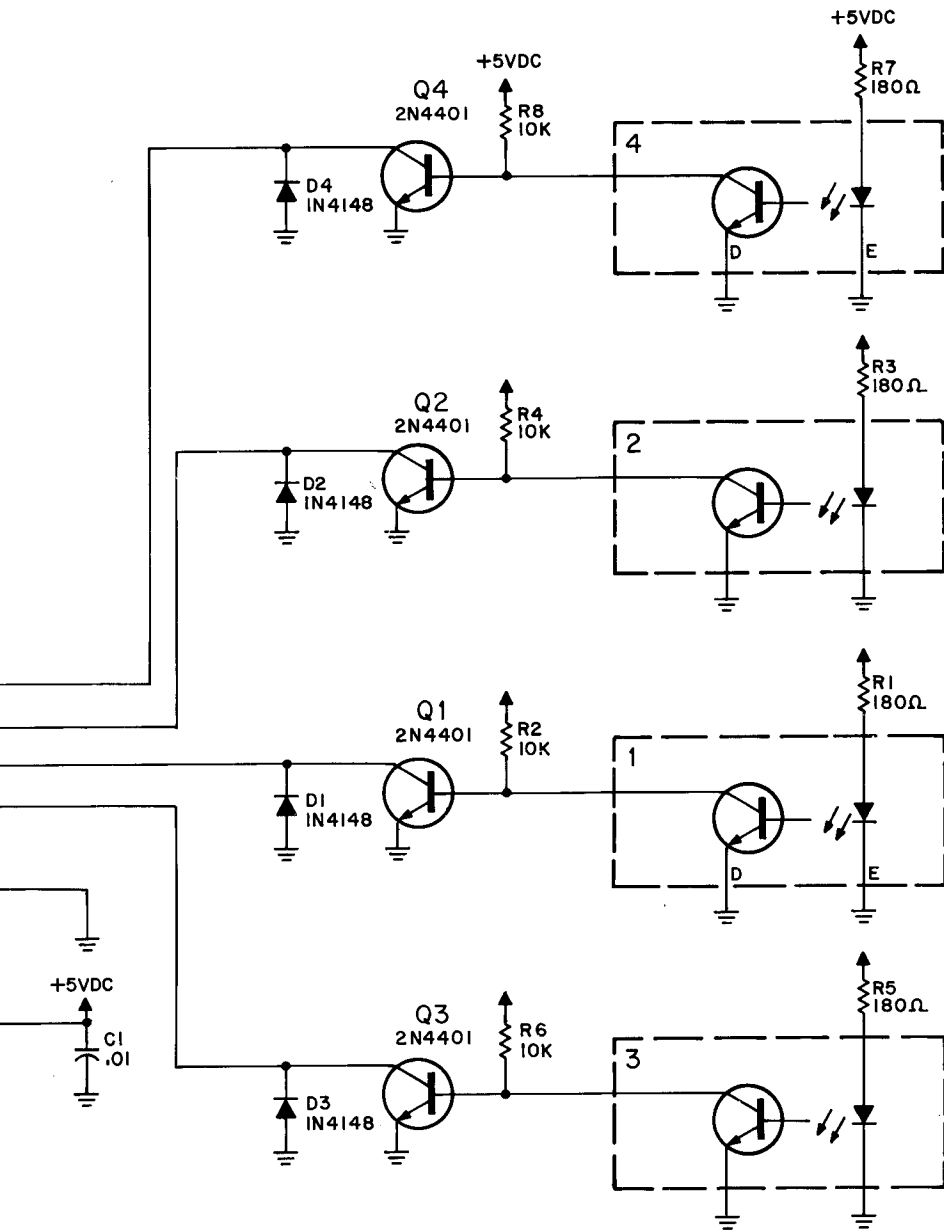
D-8784 Power Supply Board Schematic Diagram

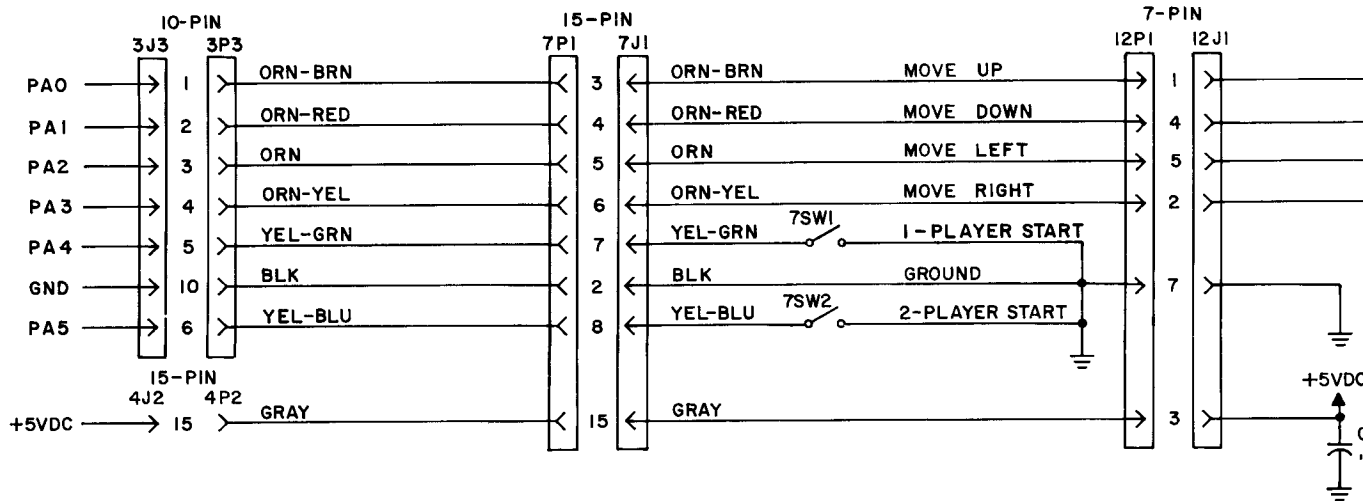
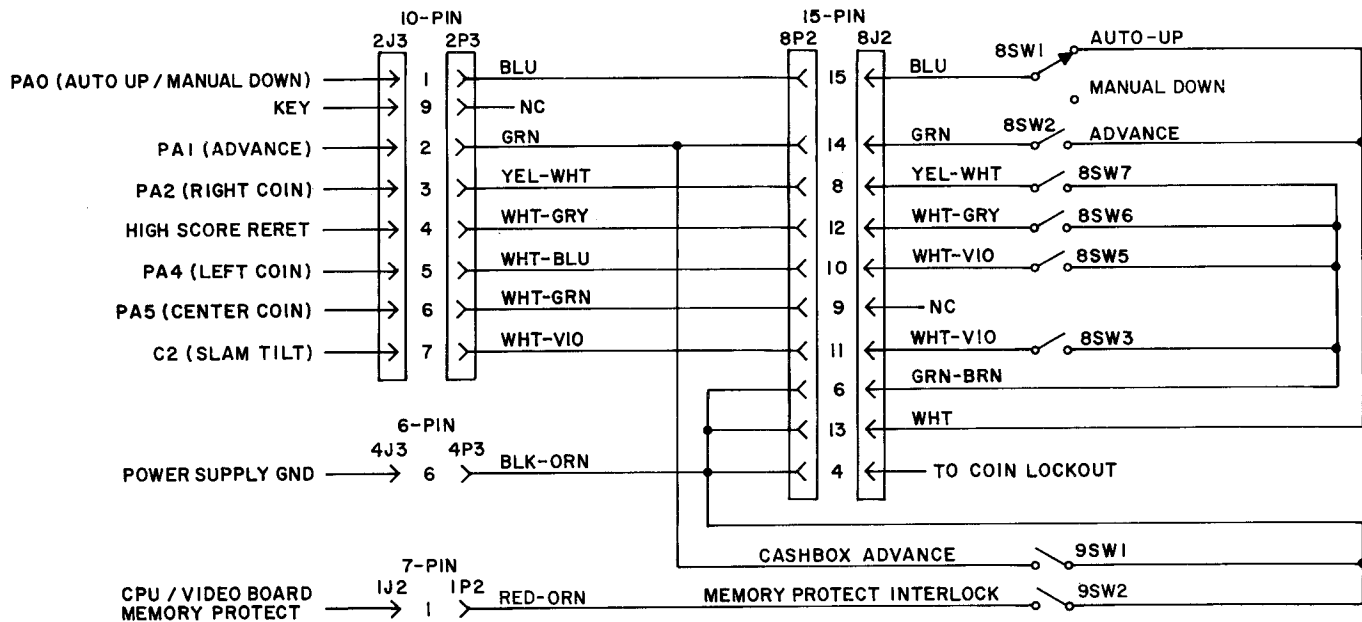
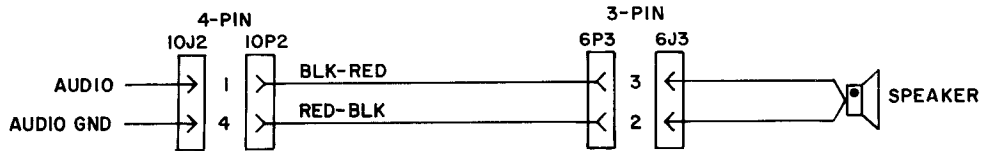
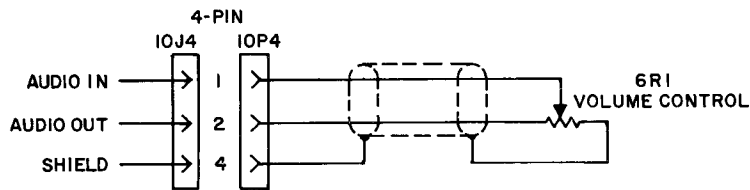


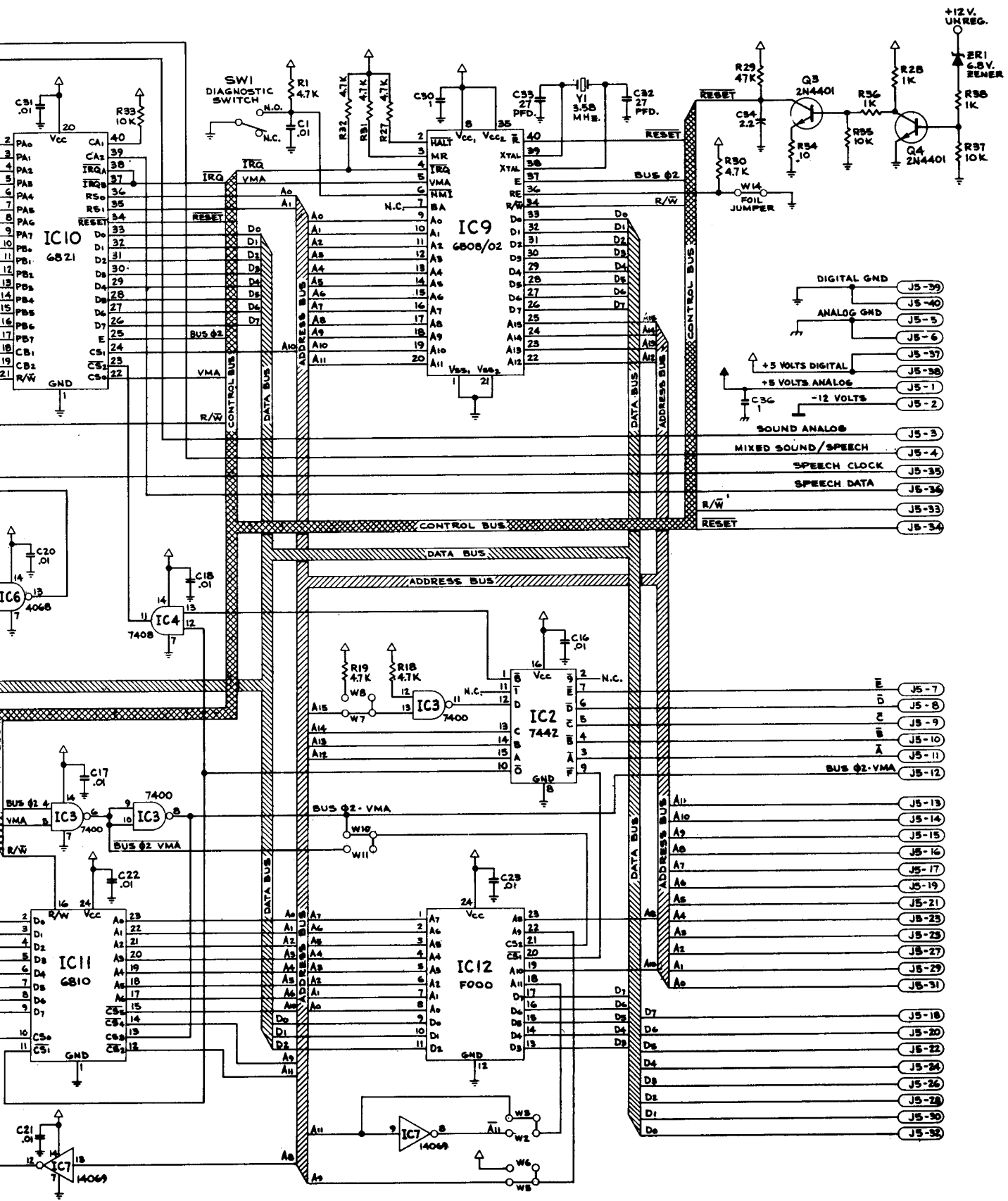
IF TP1 IS LESS THAN +4.95VDC REMOVE RIO. IF TP1 IS STILL LESS THAN +4.95VDC, THEN CHECK PRECISION RESISTORS R25 & R26. IF THEY ARE WITHIN THE 1% TOLERANCE THEN CHECK IC2.

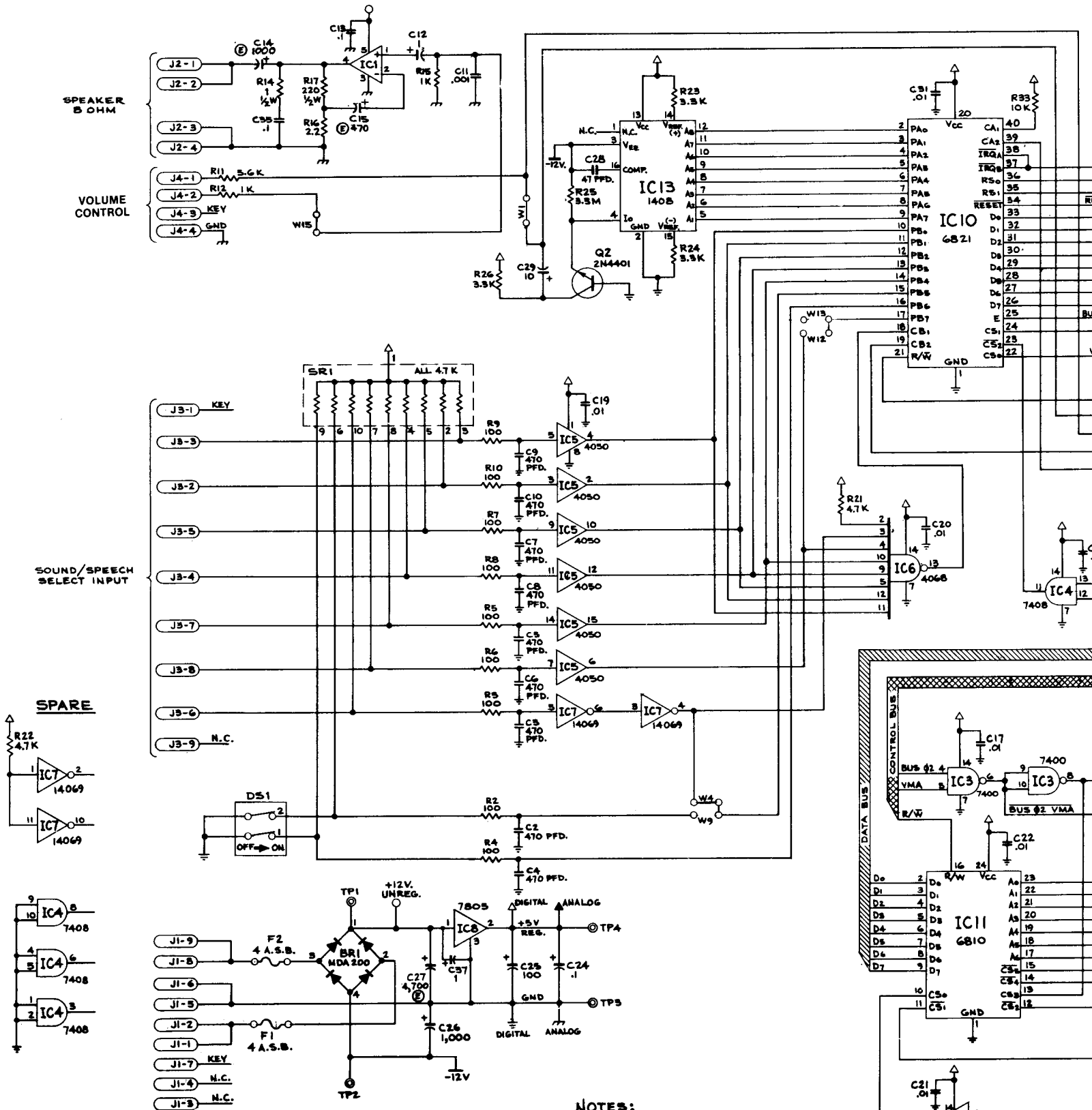
BILL OF MATERIAL				
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	QTY
1	5172 09870-00		BARE P.C BOARD	1
2	5070- 08919-00	D1 THRU D4	IN4148 DIODE	4
3	5010- 09034-00	R2, R4, R6, R8,	10K 1/4W 5% RESISTORS	4
4	5010- 09165-00	R1, R3, R5, R7,	180Ω 1/4W 5% RESISTORS	4
5	5160- 08938-00	Q1, Q2, Q3, Q4	2N4401 TRANSISTORS	4
6	5490- 09821-00	OPT. 1,2,3,4	OPTO INTER. MODULE	4
7	5791- 09921-00	J1	7 P RT. ANGLE HEADER	1
8	5010- 09534-00	W1, W2,	0 OHMS RESISTORS	2
9	5043- 08980-00	C1	CAPAXIAL CER. .01μ 50V±80-20	1
10				

NOTE: DOT INDICATES COLLECTOR OF OPTO.



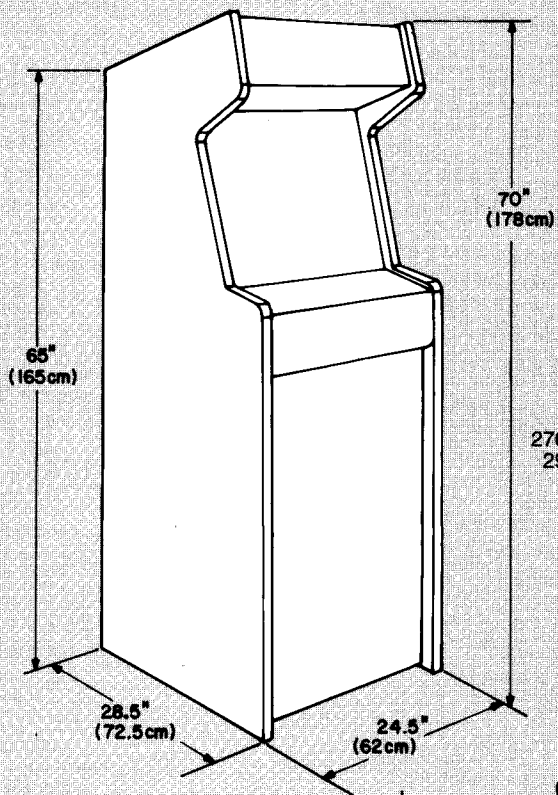






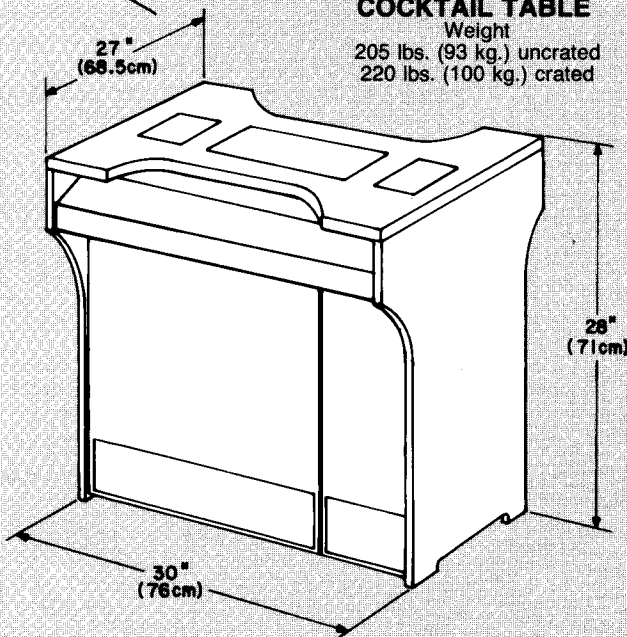
NOTES:

1. ALL RESISTORS, 1/4 WATT UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS, MFD. UNLESS OTHERWISE NOTED.



UPRIGHT

Weight
270 lbs. (122.5 kg.) uncrated
290 lbs. (131.5 kg.) crated



COCKTAIL TABLE

Weight
205 lbs. (93 kg.) uncrated
220 lbs. (100 kg.) crated

Mini-upright also available on special order.

POWER REQUIREMENTS

115/230VAC Nominal, 50/60Hz
@1.7/0.85A 192W
(20A surge for one cycle
at power turn on)
Normal Line=98-126VAC
196-252VAC
High Line*=113-145 VAC
226-290VAC
Low Line*=88-113VAC
176-226VAC

*Transformer jumpers required.
See service manual.

ENVIRONMENT

Operating Temperature
0° to +45°C ambient
(+32° to +113°F)
Storage Temperature
-40° to +65°C ambient
(-40° to +149°F)
90% RH at 40°C (104°F), non-condensing

MONITOR

19" Color Raster*
non-interlaced
UL, CSA & DHHS Approved
*13" monitor on mini-upright models

VIDEO SYSTEM**

256 Colors, 340 x 240 PIXEL Resolution
6809E Microprocessor
ROM: 48K BYTES
Video and Scratch RAM: 50K BYTES
CMOS RAM: 1Kx4

SOUND SYSTEM**

6808 Microprocessor
ROM: 4K BYTES

JOYSTICK

8-way optical-digital

**Patent pending

Specifications subject to change
without notice.

SERVICE

For the back-up that keeps you out-front,
call Williams toll-free at 800/621-1253.
In Illinois, call toll-free at 800/572-1324.

WARNING

Warning—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been certified to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to correct the interference.

Williams 
ELECTRONICS, INC.
3401 N. California Ave., Chicago, IL 60618
(312) 267-2240, Telex 253095

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