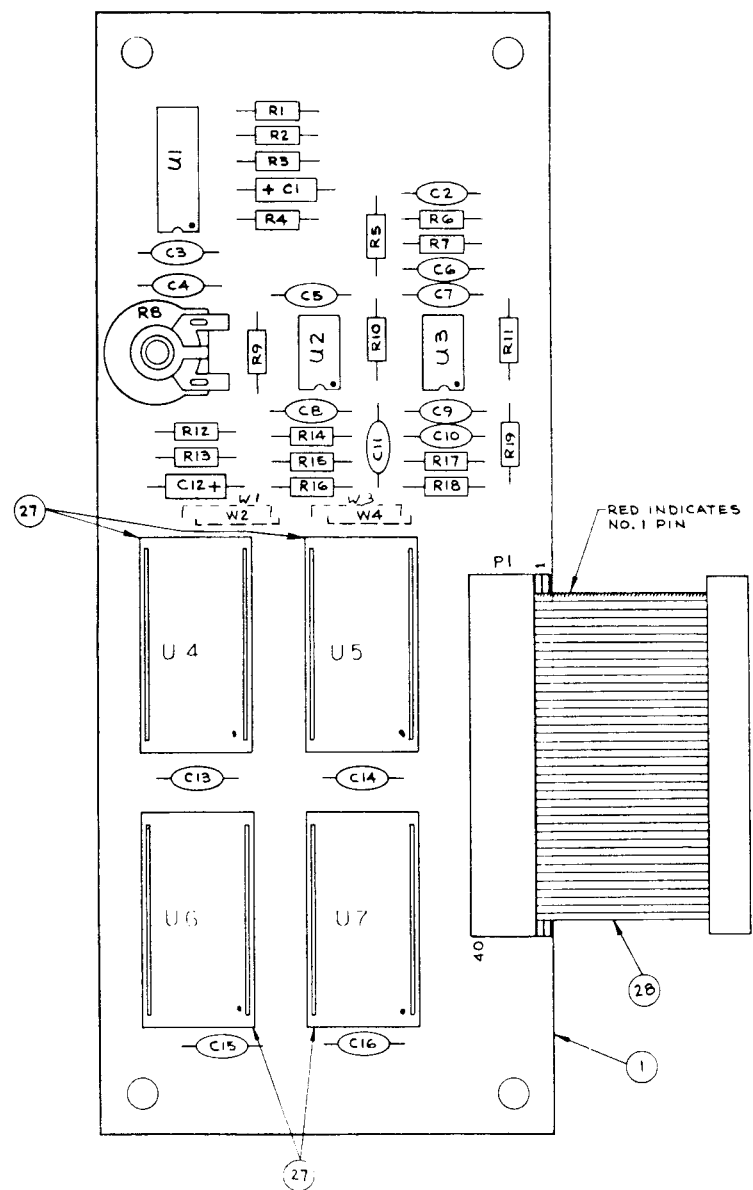


C-10716

SPEECH BOARD



BILL OF MATERIAL

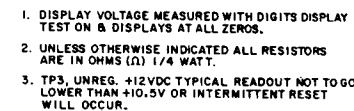
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQD. NO.
1	5376-10805-00		BARE P.C. BOARD	1
2	3370-09691-00	U1	555M CONTINUOUSLY VARIABLE SLOPE DELTA MODULATOR	1
3	5370-09321-00	U2, U3	1458 DUAL OP-AMP.	2
4	5010-09534-00	W2, W4	RESISTOR, C.F., 0 OHM	2
5				
6				
7				
8				
9				
10	5010-08896-00	R11	RESISTOR, FC, 220 K OHM 5% 1/4 WATT	1
11	5010-09034-00	R1, R2, R3, R4, R14, R16	RESISTOR, FC, 10 K OHM 5% 1/4 WATT	6
12	5010-08824-00	R5	RESISTOR, FC, 43 K OHM 5% 1/4 WATT	1
13	5010-09333-00	R6	RESISTOR, FC, 180 K OHM 5% 1/4 WATT	1
14	5010-09342-00	R7	RESISTOR, FC, 36 K OHM 5% 1/4 WATT	1
15	5010-09183-00	RB	POTENTIOMETER, 5K OHM	1
16	5010-09329-00	R9, R10, R15, R18, R19	RESISTOR, FC, 27 K OHM 5% 1/4 WATT	5
17	5010-08997-00	R12, R13	RESISTOR, FC, 2.7 K OHM 5% 1/4 WATT	2
18	5010-08772-00	R17	RESISTOR, FC, 15 K OHM 5% 1/4 WATT	1
19	5043-09030-00	C4	CAPACITOR, .047 MFD. 20% 50 VOLT	1
20	5046-09350-00	C6	CAPACITOR, POLYSTYRENE 180 PFD. 5% 100 VOLT	1
21	5043-09380-00	C3, C5, C7, C8, C9, C13 THRU C16	CAPACITOR, CERAMIC, .01 MFD. 50% 20% 50 VOLT	9
22	5041-09021-00	C1	CAPACITOR, TANTALUM, 1 MFD. 20% 25 VOLT	1
23	5046-09347-00	C2	CAPACITOR, POLYSTYRENE 1800 PFD. 5% 50 VOLT	1
24	5040-09343-00	C12	CAPACITOR, ELECTROLYTIC, 10 MFD. 20% 20 VOLT LOW LEAK	1
25	5046-09346-00	C11	CAPACITOR, POLYSTYRENE 4700 PFD. 5% 50 VOLT	1
26	5046-09346-00	C10	CAPACITOR, POLYSTYRENE 1200 PFD. 5% 50 VOLT	1
27	5700-09009-00		24 PIN SOCKET	4
28	5715-09352-00	PI	RIBBON CABLE ASSEM.	1

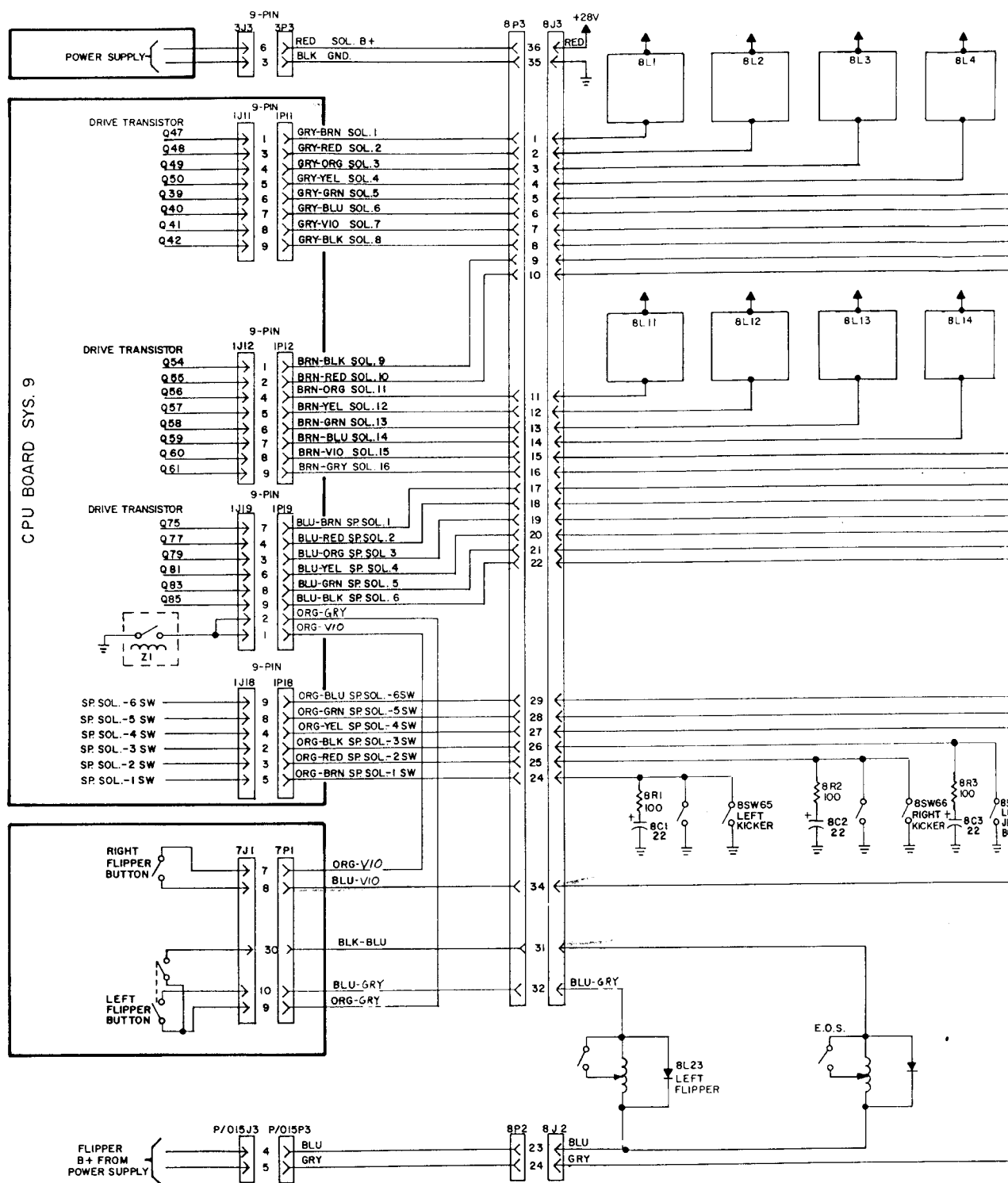
NOTE:

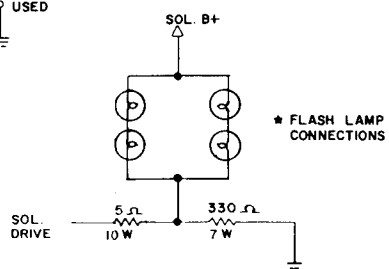
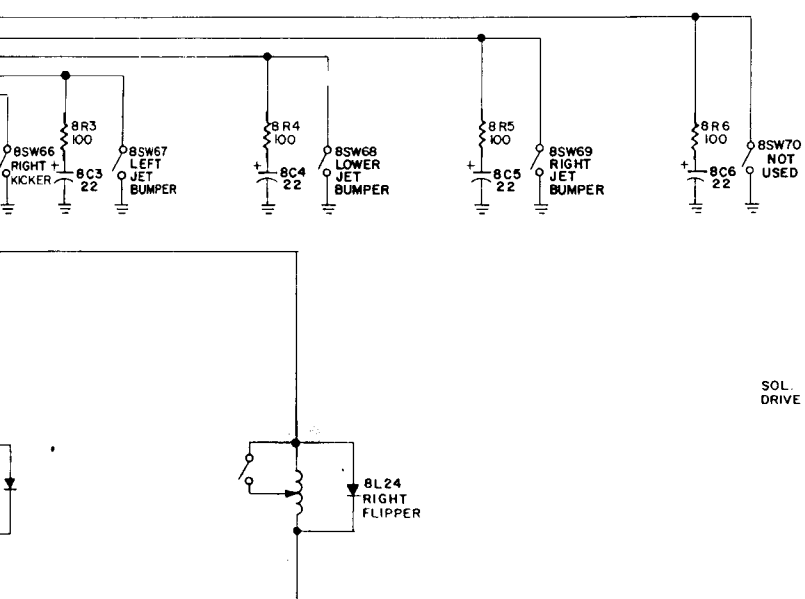
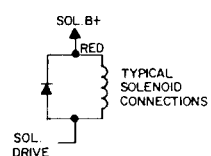
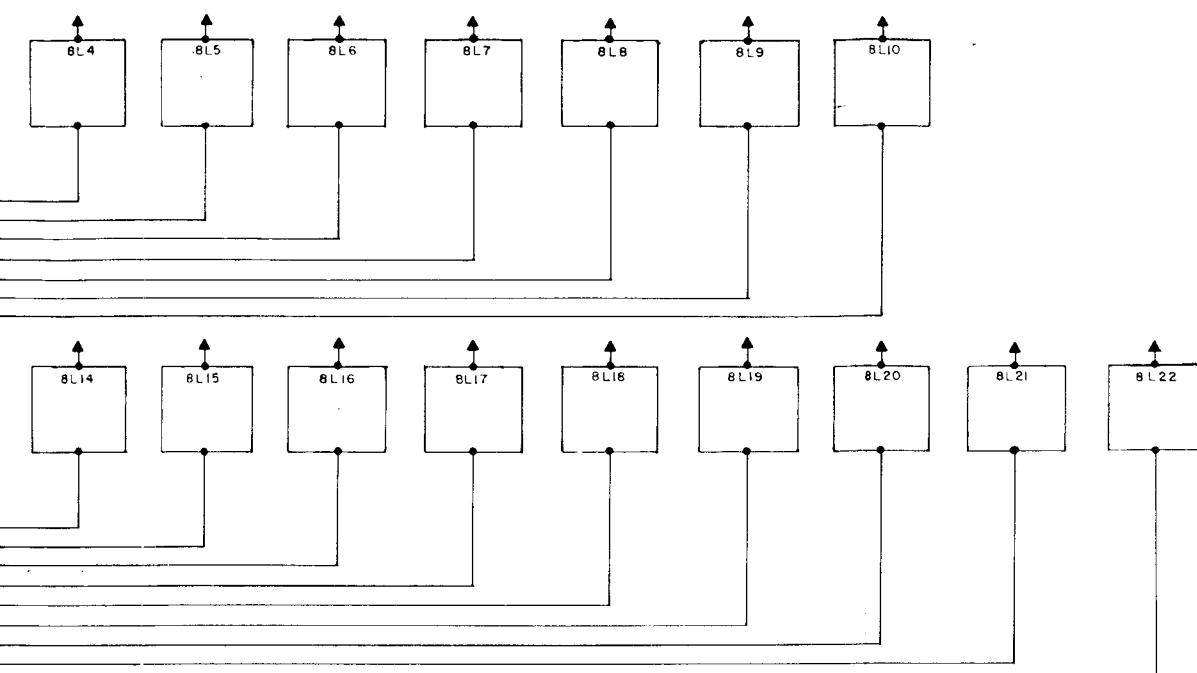
FOR SCHEMATIC, REFER TO DWG. #16-8937.
 ASSEMBLY IS C-10717 - Same number
 ASSEMBLY INCLUDES 2532 or 2732 ROMS (U4-U7)
 SEE ROM SUMMARY FOR ROM PART NUMBERS

TOLERANCES		1		C-10717	
UNLESS OTHERWISE SPECIFIED		QTY		ASSEMBLY ON	
FRACTIONAL	3/164	WILLIAMS ELECTRONICS, INC.			
DECIMAL	1/100	SUBSIDIARY OF THE BEESUNG CORP. OF DELAWARE			
HOLE DIA.	1/16	2801 N. CALIFORNIA CHICAGO, ILL. 60618 CORNELIA 7-2820			
ANGULAR	1/16	NAME SPEECH MODULE SUB-ASSEM.			
CONCENTRICITY	1/16	MATERIAL			
SCREW THREADS	1/16	HEAT TREATMENT			
DATE		APPROVED		SCALE	
2-27-89		R4H		2:1	
M. LOFFREY				C-10716	

REVISION	NEW PART RELEASE	3/7/88
LETTER	REVISION	BY

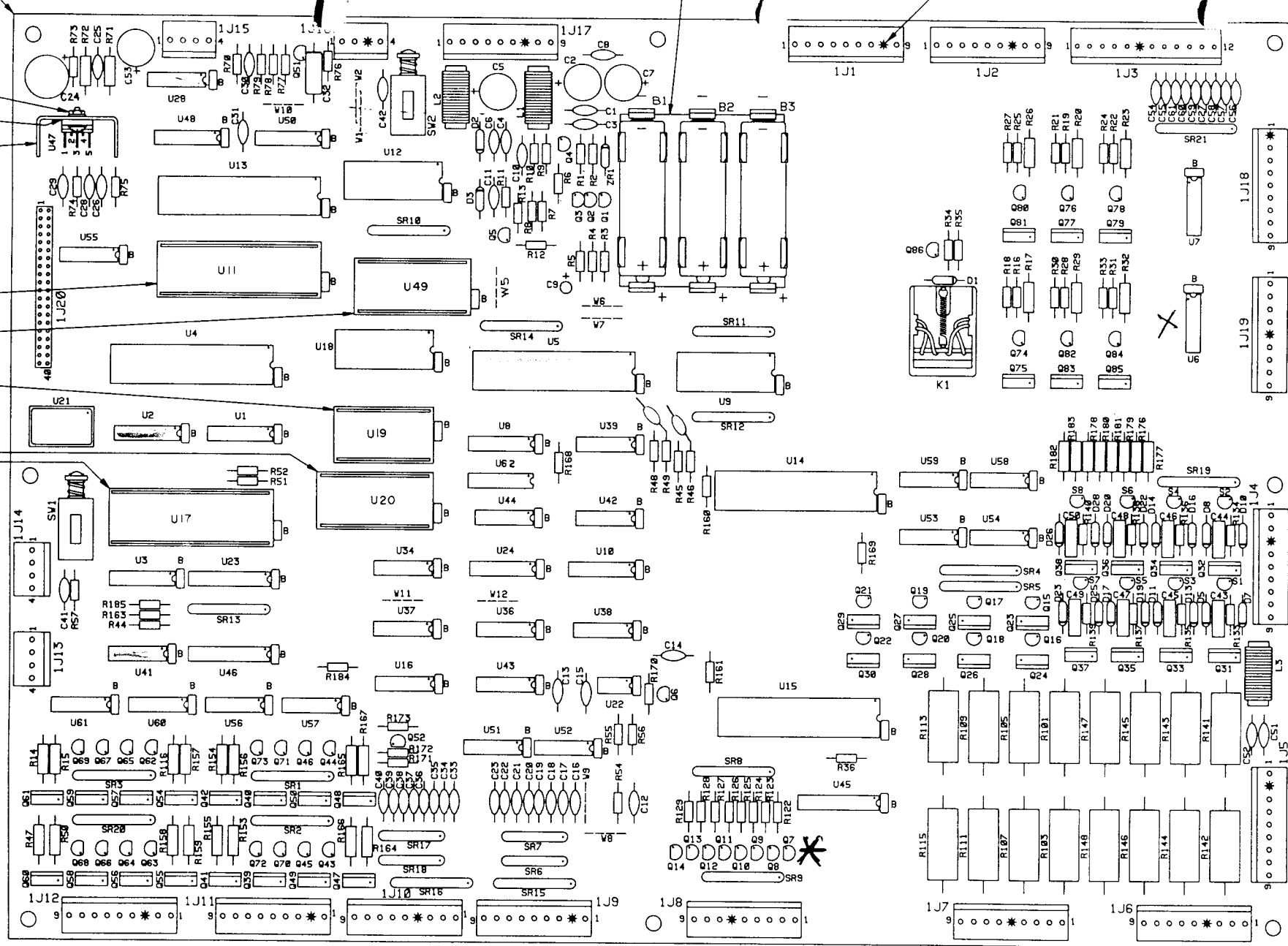






SYSTEM 9 PLAYFIELD-SOLENOID & SPECIAL-SWITCH WIRING DIAGRAM

SEE
NOTES #2



NOTES:

1. FOR SCHEMATIC, REFER TO DRAWING NO. 16-8923.
2. USE THERMAL COMPOUND BETWEEN ITEM #24 (U47) AND ITEM #97.
3. FOR GERMAN GAMES CUT W5.

10				
9				
8				
7				
6	SEE CHART		LABEL - PCB ASSY. ID.	1
5	SEE CHART	U49	SOUND ROM ASSY.	1
4	SEE CHART	U20	GAME ROM-1 ASSY.	1
3	SEE CHART	U10	GAME ROM-2 ASSY.	1

CHART

NAME OF GAME	ASSY. NO.	ITEM 3	ITEM 4	ITEM 5	ITEM 6	JUMPERS TO BE DELETED
STAR-LIGHT	D-10535-530	A-5343-10761	A-5343-10760	A-5343-10762	16-8850-117	W12
SPACE SHUTTLE	D-10535-535	NOT USED	A-5343-10767	A-5343-10768	16-8850-120	W10
STRIKE ZONE	D-10535-1916	A-5343-10794	A-5343-10793	A-5343-10795	16-8850-124	W12
SORCERER	D-10535	A-5343	A-5343	A-5343		W10

1. FOR SCHEMATIC, REFER TO DRAWING NO. 16-8923.
2. USE THERMAL COMPOUND BETWEEN ITEM #24 (U47) AND ITEM #97.
3. FOR GERMAN GAMES CUT W5.

NOTES:

1. FOR SCHEMATIC, REFER TO DWG. #16-8923.
2. DIODE, 2N4001.
D1, D5, D7, D8, D10, D11, D13, D14, D16, D17, D19, D20, D22, D23, D25, D26, D28.
3. RESISTOR, 4.7K OHM.
R4, R56, R44, R45, R48, R51, R52, R160, R161, R163, R169, R170, R172, R184, R185.
4. RESISTOR, 1.0K OHM.
R2, R3, R8, R11, R57, R74, R75, R133, THRU R140, R173.
5. CAPACITOR, .01 MFD.
BYPASS (B) 48 CAPACITORS, C10, C11, C13, C30, C41, C56 THRU C60, C42, C27.

6. FOR ITEMS #53 AND #55 RESISTORS MUST BE MOUNTED 1/8" ABOVE SURFACE OF PCB.
7. RESISTOR, 68 OHM 1/2 WATT.
R14, R15, R17, R20, R23, R26, R29, R32, R47, R50, R116, R153 THRU R159, R164 THRU R167.
8. RESISTOR, 27 OHM 2 WATT.
R101, R103, R105, R107, R109, R111, R113, R115.
9. TRANSISTOR, TIP122.
Q31 THRU Q42, Q47 THRU Q50, Q54 THRU Q61, Q75, Q77, Q79, Q81, Q83, Q85.

10. TRANSISTOR, 2N4401.
Q1, Q2, Q3, Q5, Q43 THRU Q46, Q62 THRU Q73, Q74, Q76, Q78, Q80, Q82, Q84, Q86.
11. JUMPERS: STANDARD
W2, W6, W7, W9, W10, W11, W5.
OPTIONS

FOR SPEEDX DELETE W10
FOR 27128 DELETE W11
(GAME) ADD W12

ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.
7				
6	SEE CHART		LABEL - PCB ASSY. ID.	1
5	SEE CHART	U49	SOUND ROM ASSY.	1
4	SEE CHART	U20	GAME ROM-1 ASSY.	1
3	SEE CHART	U19	GAME ROM-2 ASSY.	1
2	5400-09250-00	U11, U17	I.C., 6808, MICROPROCESSOR	2
1	D-10534		CPU PCB SUB-ASSEM.	1

ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.
------	----------	------------------	-------------	------

12. USE THERMAL COMPOUND BETWEEN ITEM #24 (U47) AND ITEM #97.
13. RESISTOR, 2.7K OHM.
R18, R21, R24, R27, R30, R33, R35.
14. 9-PIN CONNECTOR.
1J1, 1J2, 1J4 THRU 1J12, 1J17, 1J18, 1J19.

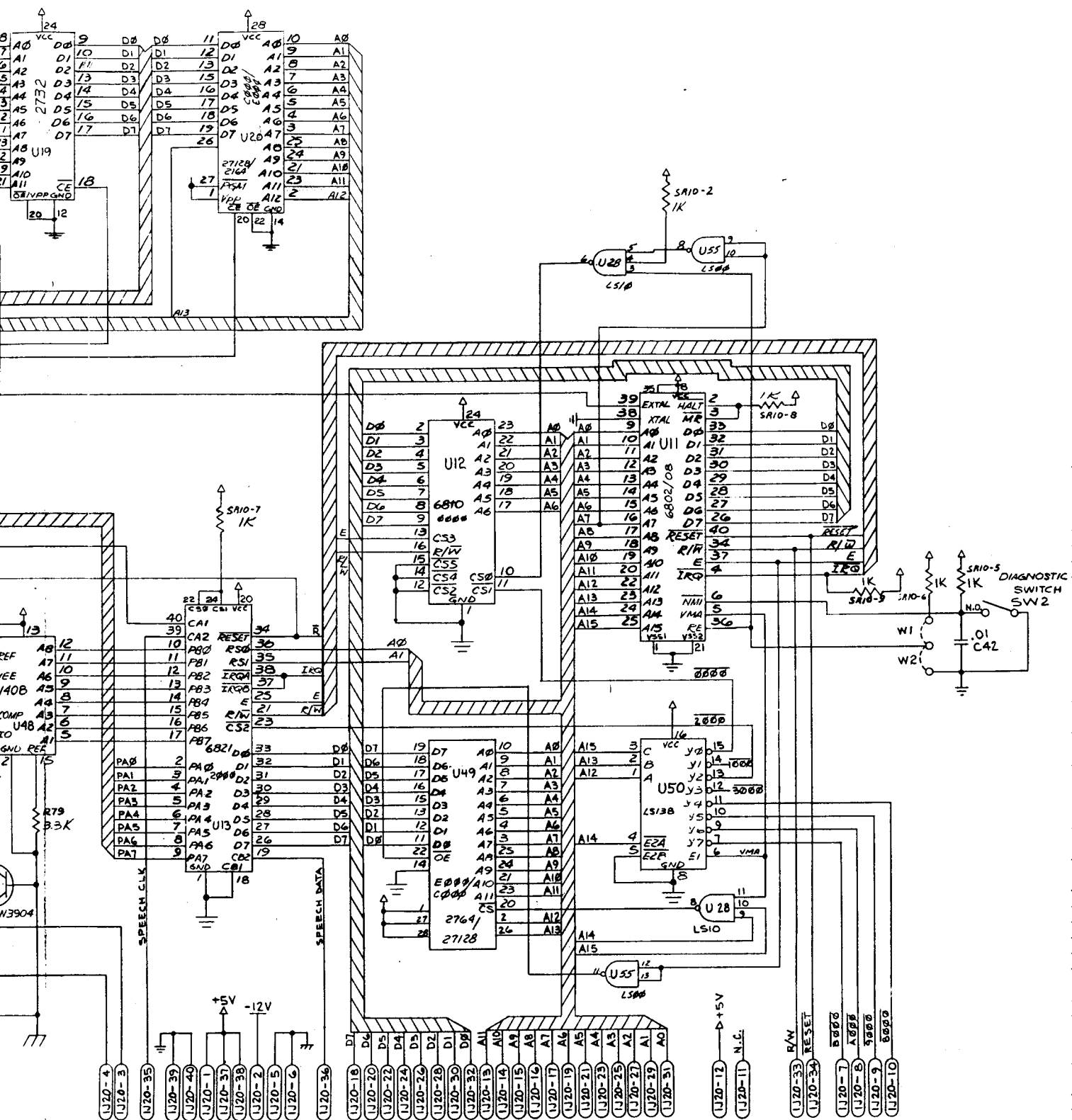
119				
118				
117				
116				
115				
114				
113				
112				
111				
110				
109				
108				
107				
106	5791-09349-00	1J20	40-PIN HEADER, RIBBON CABLE	1
105	20-9229	SEE NOTE #12	THERMAL COMPOUND	.010 OZ.
104	5791-09043-00	1J3	12-PIN HEADER, 09-65-1121	1
103	5791-09028-00	1J13 THRU 1J16	4-PIN HEADER, 09-65-1041	4
102	5791-09027-00	SEE NOTE #14	9-PIN HEADER, 09-65-1091	14
101	5580-09094-00	K1	RELAY, 4P, 40 OHM 6V	1
100	4703-00007-00		#6 EXT. LOCKWASHER	1
99	4406-01117-00		6-32 HEX. NUT	1
98	4006-01003-06		6-32 X 3/8" P-PH-S	1
97	5705-09199-00		HEATSINK #6030	1
96	5700-09085-00		40-PIN SOCKET	2
95	5700-09024-00		24-PIN SOCKET	1
94	5700-10176-00		28-PIN SOCKET	2
93	5801-09021-00		BATTERY HOLDER #171	1
92	5800-10628-00	B1, B2, B3	BATTERY PACK, ALKALINE, 4.5V	0
91	5800-09022-00		BATTERY, ALKALINE, 1.5V (A-A)	3
90	5551-09022-00	L1, L2, L3	INDUCTOR, 4.7 uH 3A	3
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.

90	5641-09653-00	SW1, SW2	PUSH BUTTON SWITCH, SPST	2
89				
88	5043-09030-00	C15	CAPACITOR, AXIAL, .047 MFD. 50V +/-20%	1
87	5041-09031-00	C12	CAP., TANT., AXIAL, 1 MFD. 25V +/-20%	1
86	5040-09493-00	C9	CAP., ELECT., RADIAL, 22 MFD. 10V +/-20%	1
85	5043-09065-00	C14, C33 THRU C40, C54, C55, C61	CAPACITOR, AXIAL, 470 PFD. 50V +/-20%	12
84	5045-09796-00	C43 THRU C50	CAP., POLYCARBONATE, RAD., .1 MFD. 100V +/-10%	8
83	5040-09776-00	C24	CAP., ELECT., RADIAL, 470 MFD. 16V +/-20%	1
82	5040-09421-00	C2, C5, C7, C53	CAP., ELECT., RADIAL, 100 MFD. 25V +/-20%	4
81	5043-09044-00	C31, C16 THRU C23	CAPACITOR, AXIAL, 47 PFD. 50V +/-20%	9
80	5040-09343-00	C32	CAP., ELECT., AXIAL, LOW L, 10 MFD. 20V +/-20%	1
79	5043-09096-00	C25, C26, C29, C51, C52	CAPACITOR, AXIAL, .1 MFD. 50V +/-20%	5
78	5043-09045-00	C1, C3, C4, C6, C8, C28	CAPACITOR, AXIAL, 1K PFD. 50V +/-20%	6
77	5043-09080-00	SEE NOTE #5	CAPACITOR, AXIAL, .01 MFD. 50V +/-20%	60
76	5019-09792-00	SR2, SR20	SIP, 9R 10-PIN, 2.7K OHM .125 W/R 5%	2
75				
74	5019-10501-00	U62	DIP, 8R 16-PIN, 270 OHM .125 W/R 5%	1
73	5019-09780-00	SR6, SR7, SR17, SR18	SIP, 4R 8-PIN, 1K OHM 5%	4
72	5019-09669-00	SR9, SR10	SIP, 9R 10-PIN, 1.0K OHM .125 W/R 5%	2
71	5019-10472-00	SR15	SIP, 9R 10-PIN, 3.3K OHM .125 W/R 5%	1
70	5019-09785-00	SR5	SIP, 9R 10-PIN, 2.2K OHM 1/4 WATT 5%	1
69	5019-09009-00	SR1, SR3, SR16	SIP, 9R 10-PIN, 560 OHM .125 W/R 5%	3
68	5019-09362-00	SR4, SR8, SR11 THRU SR14, SR21	SIP, 9R 10-PIN, 4.7K OHM .125 W/R 5%	7
67	5019-09783-00	SR19	SIP, 9R 10-PIN, 6.8K OHM .125 W/R 5%	1
66	5010-10631-00	R176 THRU R183	RESISTOR, C.F., 1.5K OHM 5% 1/4 WATT	8
65	5010-09085-00	R122 THRU R129	RESISTOR, C.F., 3.3K OHM 5% 1/4 WATT	8
64	5010-09179-00	R77	RESISTOR, C.F., 3.3M OHM 5% 1/4 WATT	1
63	5010-09416-00	R46, R49	RESISTOR, C.F., 470 OHM 5% 1/4 WATT	2
62	5010-09160-00	R7, R9	RESISTOR, C.F., 220 OHM 5% 1/4 WATT	2
61	5010-10170-00	R12	RESISTOR, C.F., 47 OHM 5% 1/4 WATT	1
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.

60	5010-10171-00	R13	RESISTOR, C.F., 56 OHM 5% 1/4 WATT	1
59	5010-10003-00	R6, R10	RESISTOR, C.F., 330 OHM 5% 1/4 WATT	2
58	5010-09161-00	R73	RESISTOR, C.F., 2.2 OHM 5% 1/4 WATT	1
57	5010-09181-00	R71	RESISTOR, C.F., 1 OHM 5% 1/2 WATT	1
56	5010-09181-00	R72	RESISTOR, C.F., 220 OHM 5% 1/2 WATT	1
55	5010-09099-00	SEE NOTES #6 AND #8	RESISTOR, C.F., 27 OHM 5% 2 WATT	8
54	5010-09093-00	SEE NOTE #7	RESISTOR, C.F., 39 OHM 5% 1/2 WATT	22
53	5012-09032-00	R141 THRU R148	RESISTOR, WIREWOUND, 2.7K OHM 5% 3 WATT	8
52	5010-09097-00	SEE NOTE #13	RESISTOR, C.F., 5.6K OHM 5% 1/4 WATT	7
51	5010-09363-00	R76	RESISTOR, C.F., 5.6K OHM 5% 1/4 WATT	1
50	5010-09086-00	R56	RESISTOR, C.F., 6.8K OHM 5% 1/4 WATT	1
49	5010-09034-00	R1, R34, R171	RESISTOR, C.F., 10K OHM 5% 1/4 WATT	3
48	5010-09083-00	R55, R78, R79, R70, R168	RESISTOR, C.F., 3.3K OHM 5% 1/4 WATT	5
47	5010-09113-00	R54	RESISTOR, C.F., 33K OHM 5% 1/4 WATT	1
46	5010-09084-00	SEE NOTE #4	RESISTOR, C.F., 1.0K OHM 5% 1/4 WATT	16
45	5010-09091-00	SEE NOTE #3	RESISTOR, C.F., 4.7K OHM 5% 1/4 WATT	15
44	5010-09534-00	SEE NOTE #11	RESISTOR, C.F., 8 OHM 1/4 WATT	7
43	5010-09039-00	R5	RESISTOR, C.F., 10 OHM 5% 1/4 WATT	1
42	5010-09092-00	R16, R19, R22, R25, R28, R31	RESISTOR, C.F., 560 OHM 5% 1/4 WATT	6
41				
40	5075-09019-00	ZR1	ZENER DIODE, 1N5996A 6.0V .5W	1
39	5070-09266-00	D2	SILICON DIODE, 1N5017 1.0 A.	1
38	5070-09019-00	D3	SILICON DIODE, 1N4148 150 mA.	1
37	5070-09059-00	SEE NOTE #2	DIODE, 1N4001	17
36	5130-09010-00	S1 THRU S8	SILICON CONTROL RECT., 2N5060 .8A 30V	8
35	5010-09016-00	Q4, Q6	TRANSISTOR, TO-92, 2N4403, PNP	2
34	5160-10269-00	Q7 THRU Q14 Q51, Q52	TRANSISTOR, TO-92, 2N3904, PNP	10
33	5010-09030-00	SEE NOTE #10	TRANSISTOR, TO-92, 2N4401, NPN	27
32	5162-09410-00	SEE NOTE #9	TRANSISTOR, TO-220, TIP122, NPN	30
31	5191-09078-00	Q23 THRU Q30	TRANSISTOR, TO-220, TIP42, PNP	8
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.

30	5162-09076-00	Q15 THRU Q22	TRANSISTOR, TO-92, 2N6427 NPN DARLINGTON	8
29	5280-09049-00	U6, U7	I.C., 7402, QUAD 2-INPUT NOR	2
28	5310-09155-00	U51, U52	I.C., MC14011, QUAD 2-INPUT NAND	2
27	5280-09074-00	U50, U59	I.C., 7406, HEX. INVERTER OPEN C.	2
26	5280-09073-00	U53, U54, U56, U57, U60, U61	I.C., 7408, QUAD 2-INPUT AND	6
25	5281-09067-00	U45	I.C., 74LS244, OCTAL BUFFER	1
24	5370-09156-00	U47	I.C., TDA2002, AUDIO AMPLIFIER	1
23	5300-09003-00	U12	I.C., 6810, 128 X 8 STATIC RAM	1
22	5281-09745-00	U50	I.C., 74LS138, 3 TO 8 LINE DECODER	1
21	5371-09152-00	U48	I.C., MC14009, D/A CONVERTER	1
20	5281-09486-00	U46	I.C., 74LS374, OCTAL D-TYPE FLIP-FLOP	1
19	5281-09500-00	U16	I.C., 74LS32, QUAD 2-INPUT OR	1
18	5281-09499-00	U55	I.C., 74LS00, QUAD 2-INPUT NAND	1
17	5280-09013-00	U41	I.C., 7404, HEX. INVERTER	1
16	5281-09235-00	U28, U42	I.C., 74LS10, TRIPLE 3-INPUT NAND	2
15	5281-09247-00	U38, U39	I.C., 74LS02, QUAD 2-INPUT NOR	2
14	5281-09743-00	U34, U36, U37	I.C., 74LS08, QUAD 2-INPUT AND	3
13	5310-09236-00	U10	I.C., 4020, COUNTER 14 BIT CMOS	1
12	5431-09449-00	U22	I.C., MC1455, TIMER	1
11	5521-10506-00	U21	OSCILLATOR, 4 MHZ.	1
10	5671-09411-00	U44	I.C., MAN72A, 7 SEG. LED DISPLAY	1
9	5280-09407-00	U8	I.C., 7447, BCD TO 7 SEG. DECODER	1
8	5281-09246-00	U24	I.C., 74LS139, DUAL 2 TO 4 LINE DECODER	1
7	5280-09010-00	U9	I.C., 74154, 4 TO 16 DECODER	1
6	5340-10139-00	U18	I.C., 5517-2, 2K X 8 CMOS ST. RAM	1
5	5430-09072-00	U4, U5, U13, U14, U15	I.C., 6820/6821, PIA	5
4	5281-09308-00	U23	I.C., 74LS245, OCTAL BUS TRANSCEIVER	1
3	5370-09099-00	U1, U2, U3	I.C., 8797, HEX. TRISTATE BUFFER	3
2	5280-09073-00	U43	I.C., 7400, QUAD 2-INPUT NAND	1
1	5784-10749-00		BARE PC BOARD	1
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY.

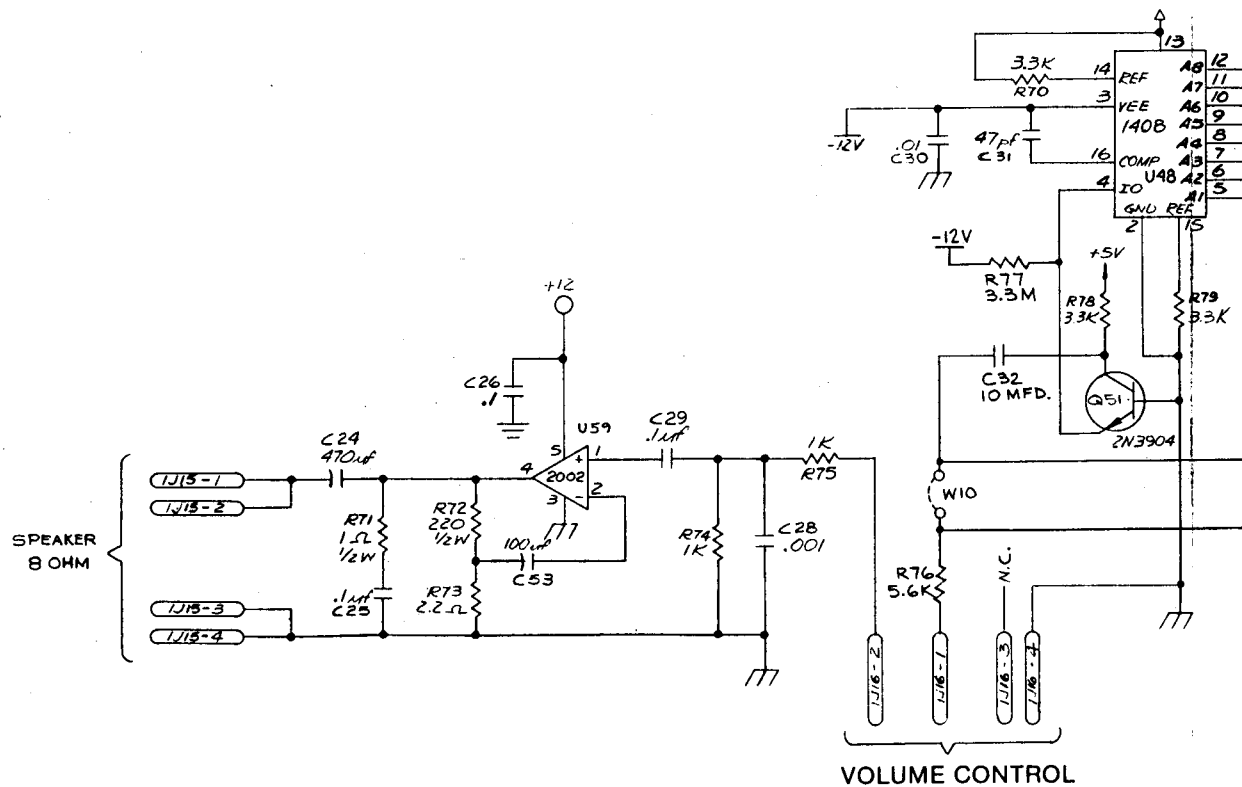
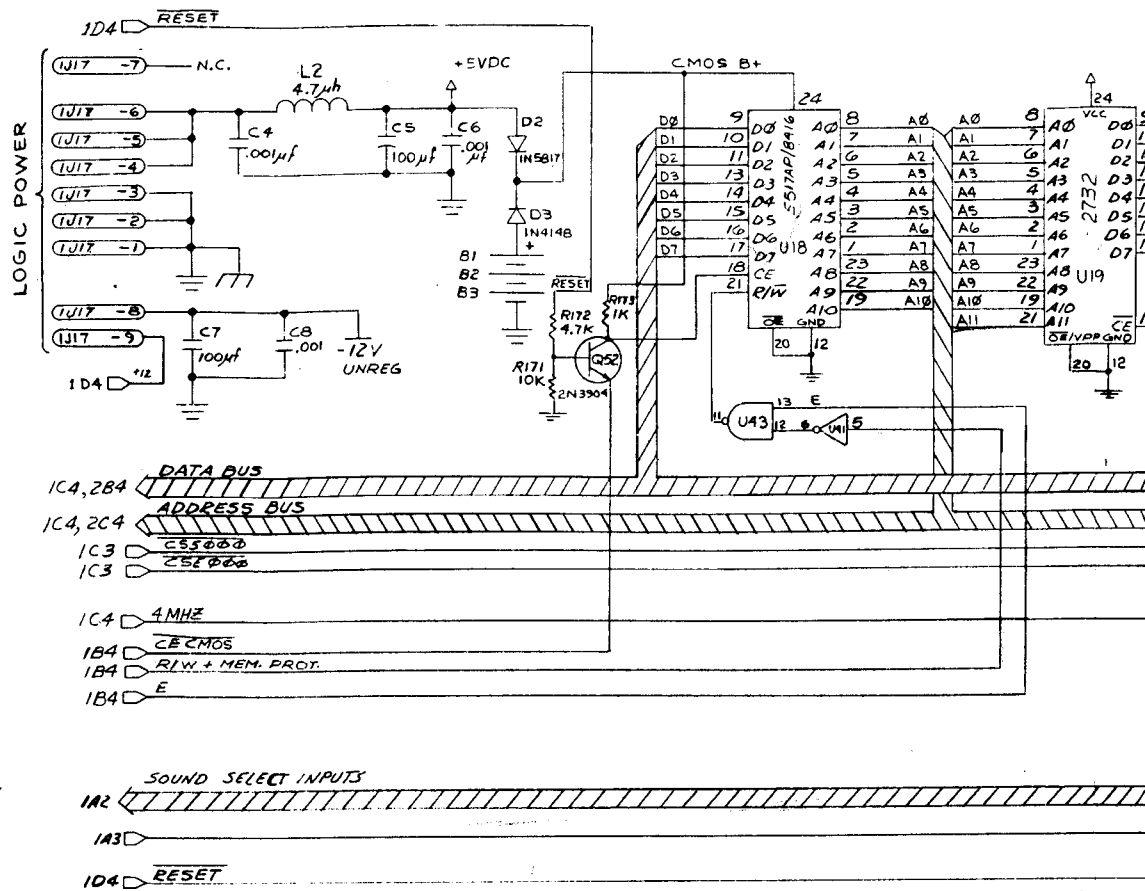
BILL OF MATERIAL



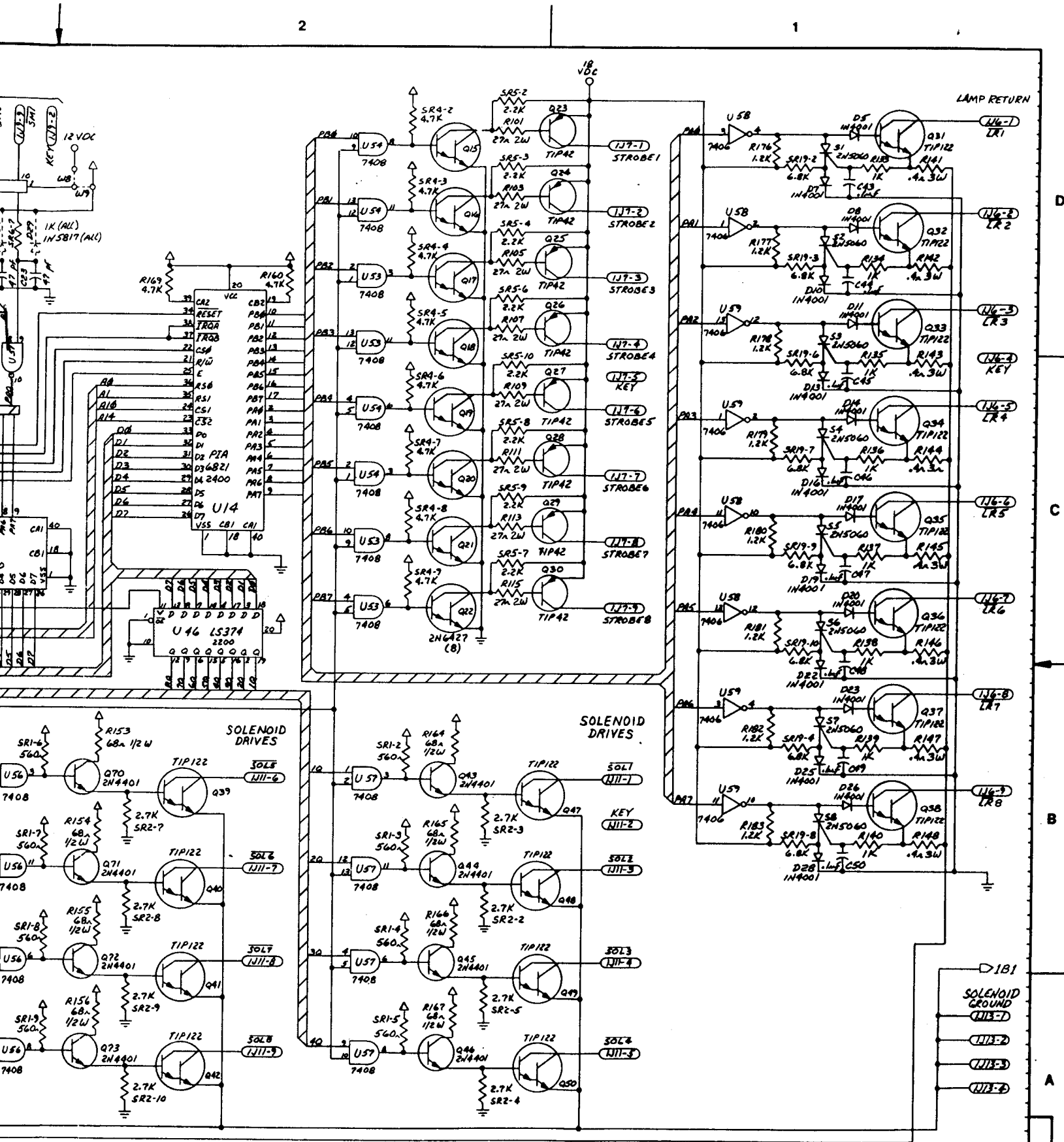
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	S. HERSCHLER			WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618 NAME SCHEMATIC, CPU SYSTEM-9			
OWN BY	DATE						
CHECKED BY	DATE	FIRST PROJECT NO	530	SCALE		SHT 3 OF 3	PART NO
APPROVAL	DATE	FIRST USAGE	QTY			16-8923	

16-8923

REV	DESCRIPTION OF CHANGE	ECN NO DATE
	NPR	13192 1-19-84







ITEM		PART NUMBER		DESCRIPTION		QTY	ITEM	PART NUMBER		DESCRIPTION		QTY	
PROJ. ENGR S. HERSCHLER		DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS - BREAK SHARP EDGES		WILLIAMS ELECTRONICS, INC.							
DWN. BY						DATE		3401 N. CALIFORNIA AVE.		CHICAGO IL		60618	
J. TURKINGTON						9/11/84		NAME		SCHEMATIC, CPU SYS 9			
CHECKED BY						DATE		FIRST PROJECT NO		530			
S.C.K.		9/12/84				FRACTIONAL		UNLESS OTHERWISE SPECIFIED		±1/64 ANGULAR		±1°	
APPROVAL		DATE		FIRST USAGE		DECIMAL		±.005 FILLETS		.020 MAX			
K.W.		9-18-84		0-10534		MATERIAL							
				QTY									
				1									
				</									

WILLIAMS ELECTRONICS, INC.

3401 N. CALIFORNIA AVE. CHICAGO IL. 60618

NAME

SCHEMATIC, CPU SYS 9

SCALE

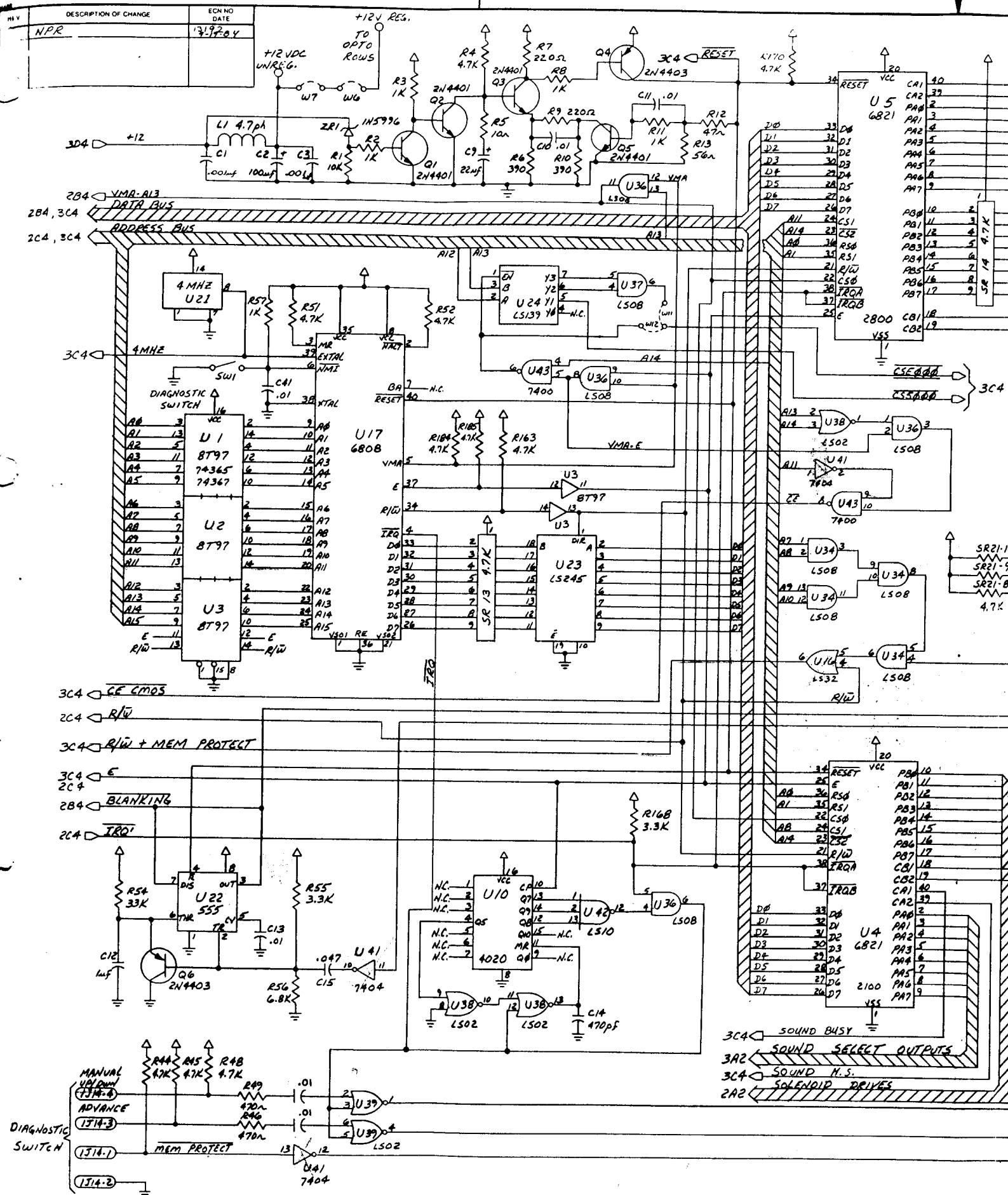
SHT. 2 OF 3

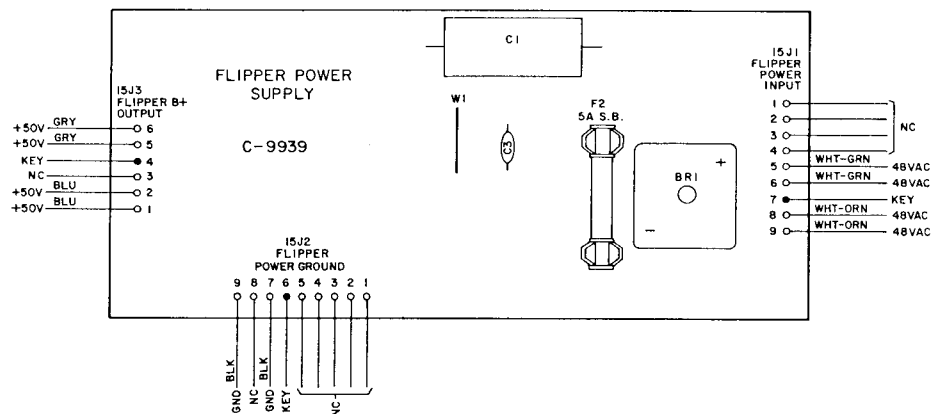
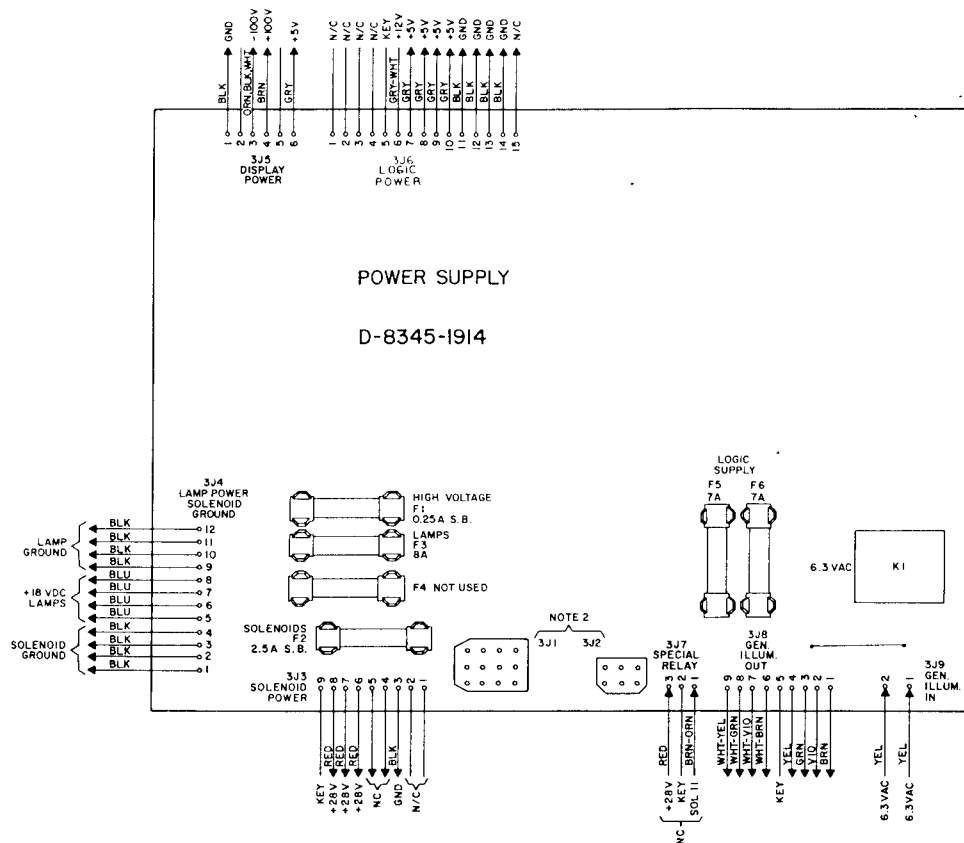
PART NO. 16-8923

REV

16-8923

HS V	DESCRIPTION OF CHANGE	ECN NO DATE
NPR		13/12/04





NO. OF CONNECTIONS	WILLIAMS PART NO.	LOCATIONS
4 PIN	5792-09103-00	IP16
4 PIN	5792-09288-00	IP13, IP14, IP15
9 PIN	5792-09359-00	IP19
9 PIN	5792-09290-00	IP1, IP2, IP4, IP5, IP6, IP7, IP8, IP9 IP10, IP11, IP12, IP17, IP18
12 PIN	5792-09103-00	IP3

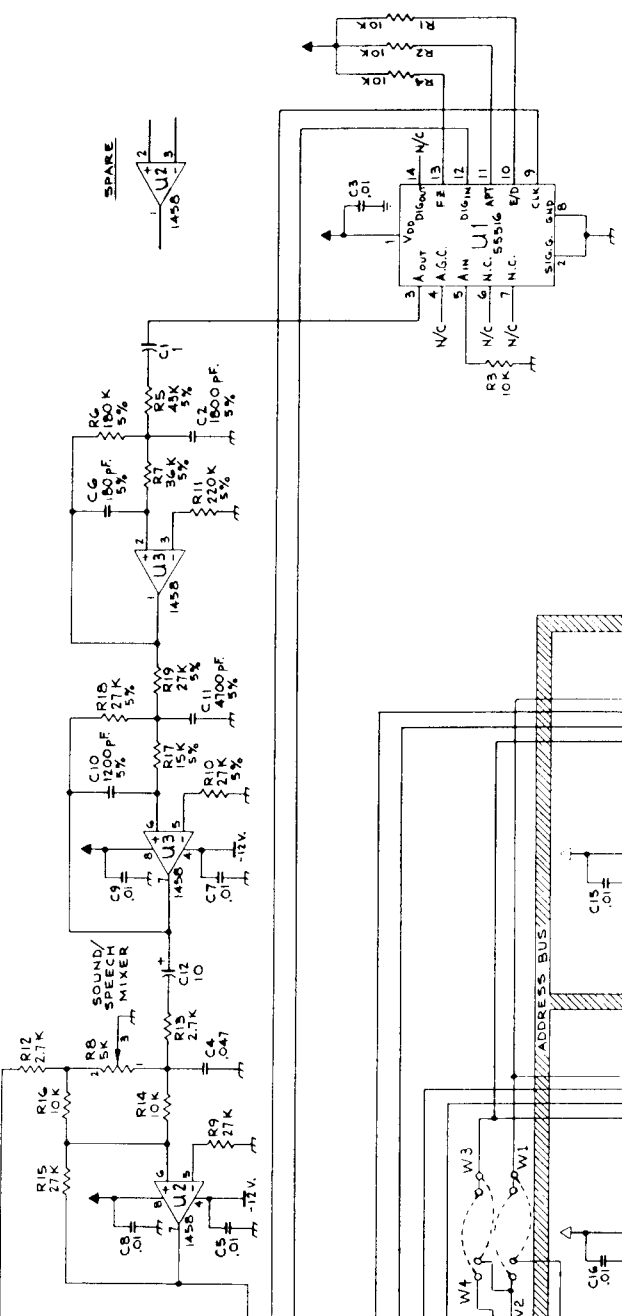
Backbox Wiring

- PS-39 DIGITAL GND
- PS-40 ANALOG GND
- PS-5
- PS-6
- PS-37 +5 VOLTS DIGITAL
- PS-38 +5 VOLTS ANALOG
- PS-1 -12 VOLTS
- PS-2
- PS-3 SOUND ANALOG INPUT
- PS-4 MIXED SOUND/SPEECH OUTPUT
- PS-35 SPEECH CLOCK
- PS-36 R/W N/C
- PS-34 RESET N/C

- PS-1
- PS-8
- PS-9
- PS-10
- PS-11
- PS-12
- PS-13
- PS-14
- PS-15
- PS-16
- PS-17
- PS-18
- PS-19
- PS-20
- PS-21
- PS-22
- PS-23
- PS-24
- PS-25
- PS-26
- PS-27
- PS-28
- PS-29
- PS-30
- PS-31
- PS-32

SEE NOTES W4

SPEECH BOARD



NOTES:

1. ALL RESISTORS, 1/4 WATT, UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS, MFD, UNLESS OTHERWISE NOTED.
3. STUFF JUMPERS W2 & W4 FOR 2532 EPROMS.
4. STUFF JUMPERS W1 & W3 FOR 2732 EPROMS.

TOLERANCES		C-10716	
UNLESS OTHERWISE SPECIFIED		WILLIAM ELECTRONICS, INC.	
PRECISION		1601 N. CALIFORNIA, CHICAGO, ILL. 60610	
DECIMAL		NAME SCHEMATIC, SPEECH MODULE	
DATE		MATERIAL	
CONCENTRATION		HEAT TREATMENT	
C-10716		16-8937	

REVISION	BY
NEW PART RELEASE	JUN 85