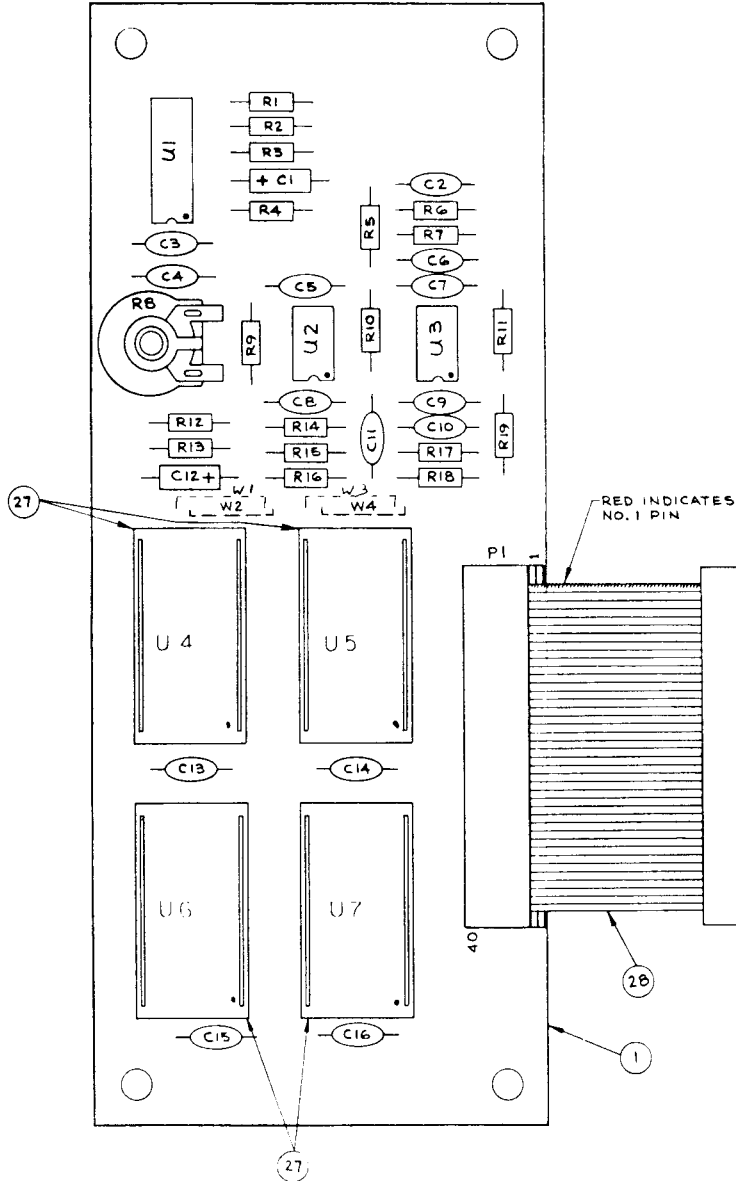


C-10716

SPEECH BOARD



BILL OF MATERIAL

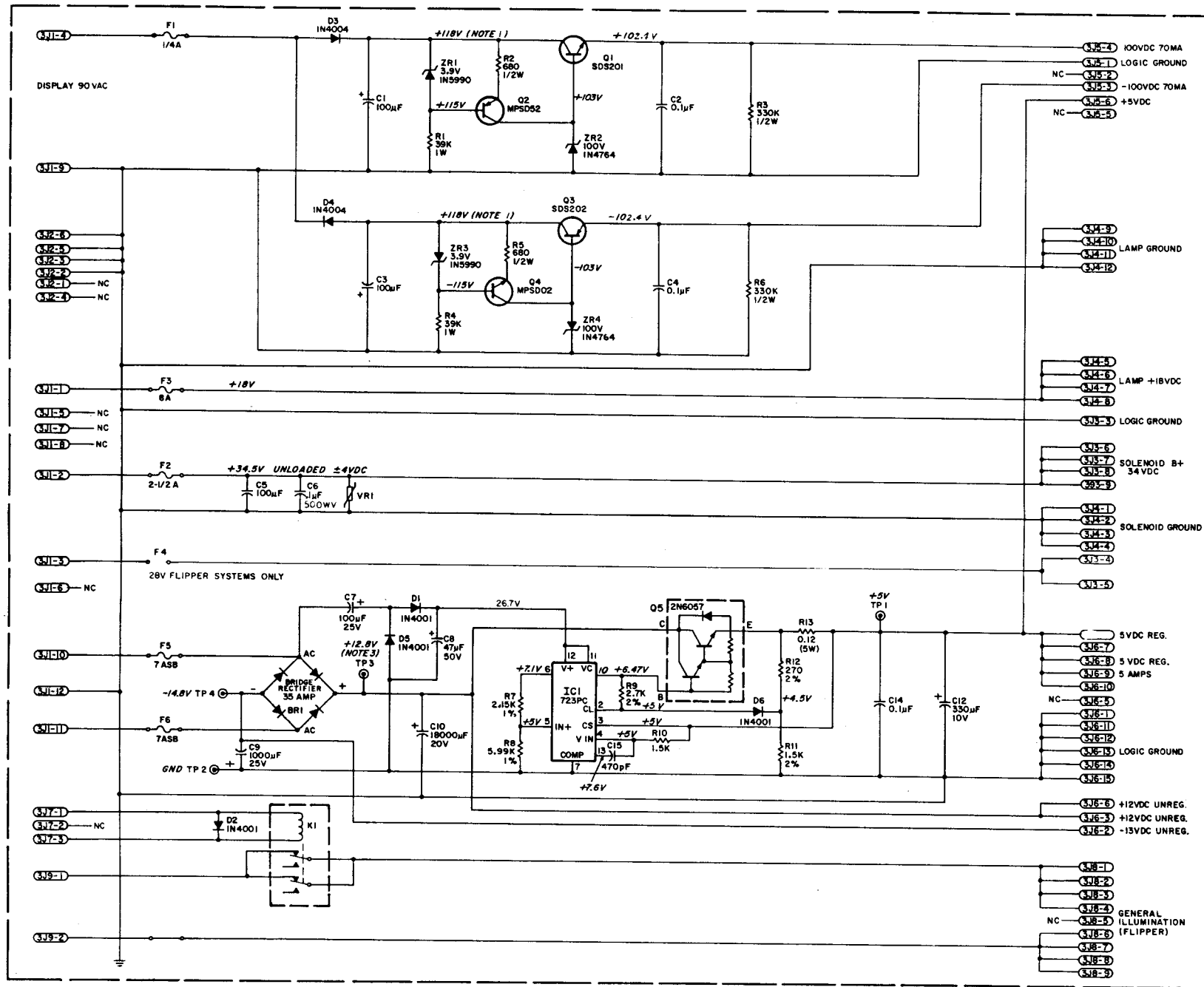
| ITEM NO. | PART NO. | PART DESIGNATION | DESCRIPTION | REQ'D NO. |
|----------|---------------|----------------------------------|---|-----------|
| 1 | 5374-10805-00 | | BARE P.C. BOARD | 1 |
| 2 | 3370-09691-00 | U1 | 995M CONTINUOUSLY VARIABLE SLOPE DELTA MODULATOR | 1 |
| 3 | 5370-09327-00 | U2, 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, 10K OHM 5% 1/4 WATT | 6 |
| 12 | 5010-08824-00 | R5 | RESISTOR, FC, 43K OHM 5% 1/4 WATT | 1 |
| 13 | 5010-09333-00 | R6 | RESISTOR, FC, 180K OHM 5% 1/4 WATT | 1 |
| 14 | 5010-09342-00 | R7 | RESISTOR, FC, 36K 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, 27K OHM 5% 1/4 WATT | 5 |
| 17 | 5010-08997-00 | R12, R13 | RESISTOR, FC, 2.7K OHM 5% 1/4 WATT | 2 |
| 18 | 5010-08772-00 | R17 | RESISTOR, FC, 15K OHM 5% 1/4 WATT | 1 |
| 19 | 5046-09350-00 | C4 | CAPACITOR, .047 MFD. 20% 50 VOLT | 1 |
| 20 | 5046-09350-00 | C6 | CAPACITOR, POLYSTYRENE 180 PFD. 5% 100 VOLT | 1 |
| 21 | 5046-09350-00 | 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 | 5370-09009-00 | | 24 PIN SOCKET | 4 |
| 28 | 5015-09552-00 | PI | RIBBON CABLE ASSEM. | 1 |

NOTE:

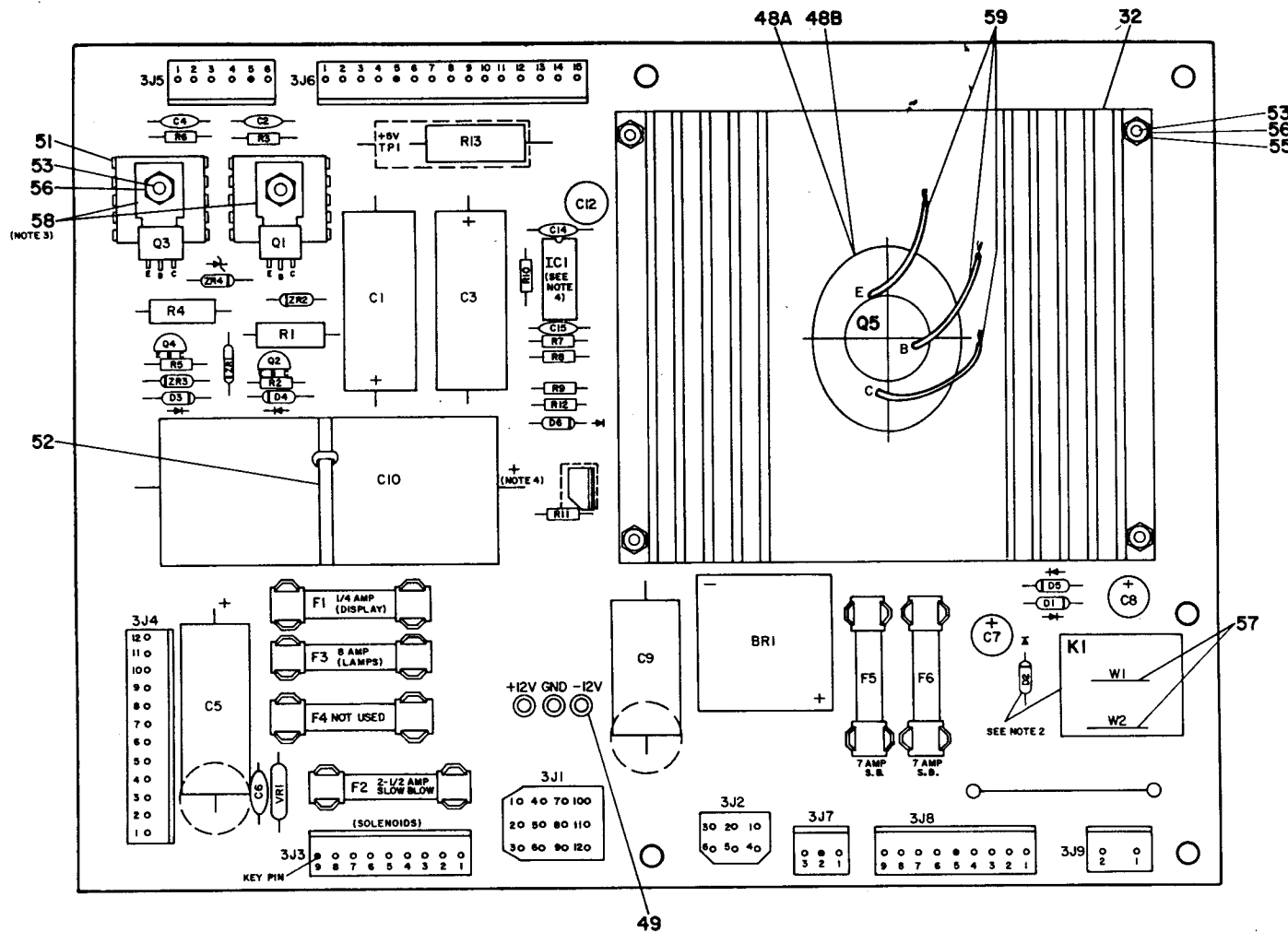
FOR SCHEMATIC, REFER TO DWG. #14-8937.
 ASSEMBLY IS C-10717 - same number
 ASSEMBLY INCLUDES 2532 or 2732 ROMS (U4-U7)
 SEE ROM SUMMARY FOR ROM PART NUMBERS

| | | | |
|-----------------|------------------|-------|---------|
| REVISION LETTER | NEW PART RELEASE | 13746 | 2/11/88 |
| | REVISION | BY | |

| | | | | | |
|----------------------------|---------|--|----------------|---------|--|
| TOLERANCES | | 1 | | C-10717 | |
| UNLESS OTHERWISE SPECIFIED | | BY: _____ | | | |
| FRACTIONAL | ± 1/100 | WILLIAMS ELECTRONICS, INC. | | | |
| DECIMAL | ± .005 | SUBSIDIARY OF THE BEHRING CORP. OF DELAWARE | | | |
| HOLE DIA. | ± .001 | 2801 N. CALIFORNIA CHICAGO, ILL. 60618 CORNELIA JENSEN | | | |
| ANGULAR | ± 1/16 | NAME: SPEECH MODULE SUB-ASSEM. | | | |
| CONCENTRICITIES | ± .001 | MATERIAL | HEAT TREATMENT | FINISH | |
| SCREW THREADS | CLASS 2 | | | | |
| DRN | DATE | APP'D | SCALE | C-10716 | |
| M. LOFFREDA | 2-27-89 | R44 | 2:1 | | |

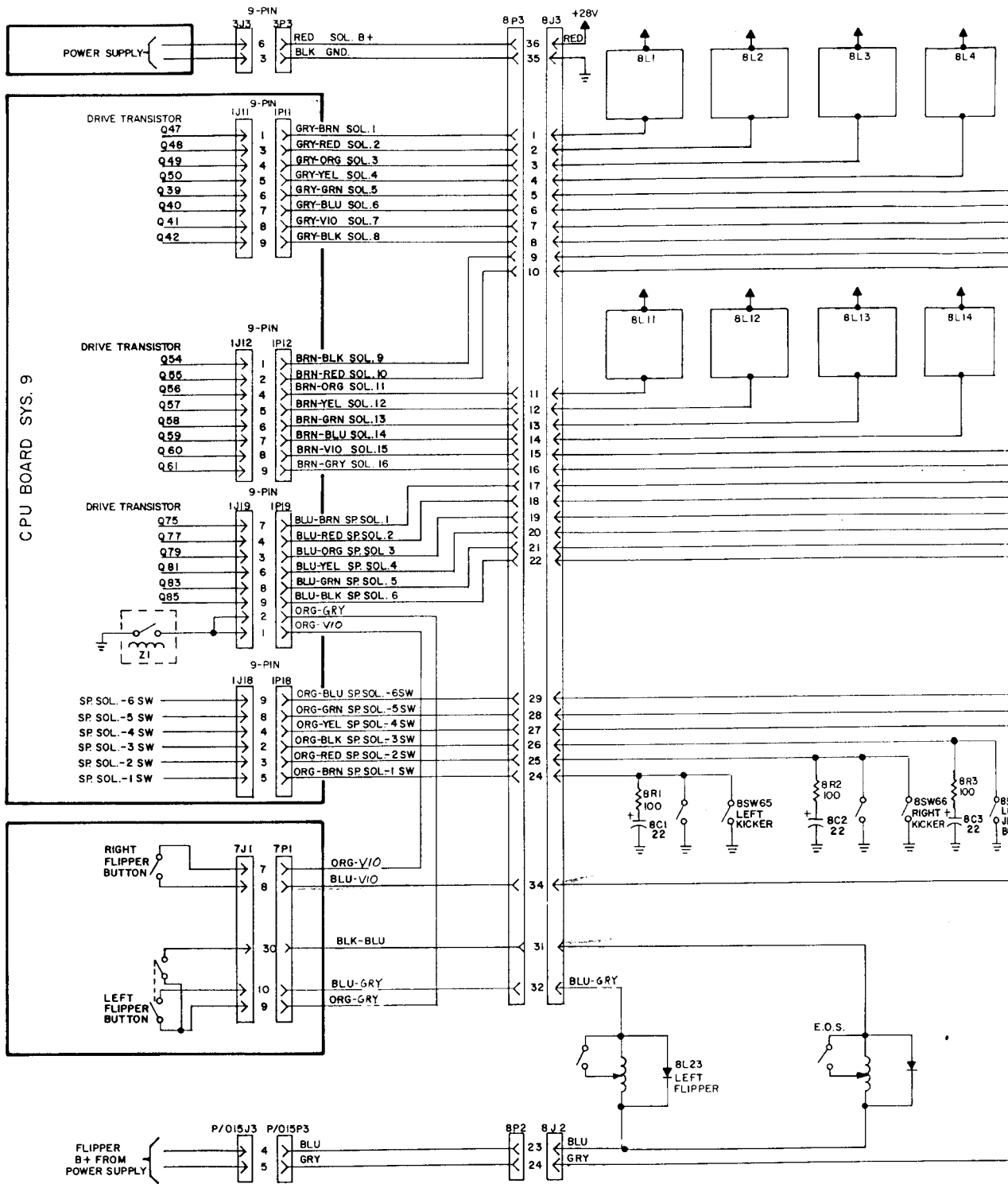


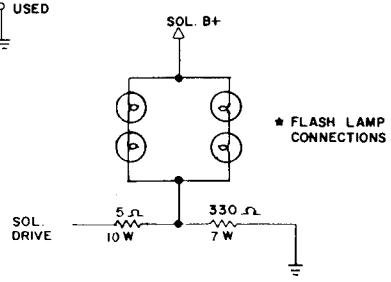
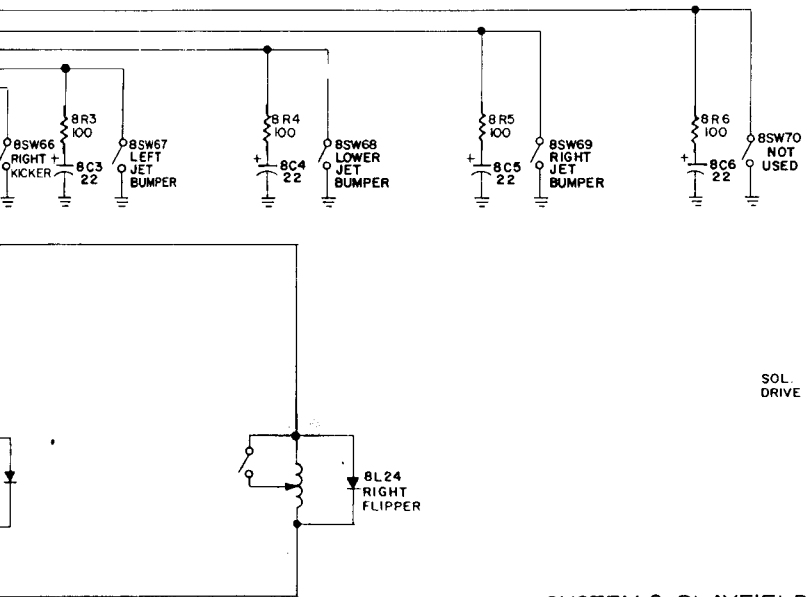
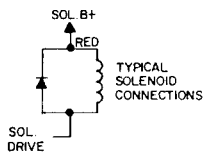
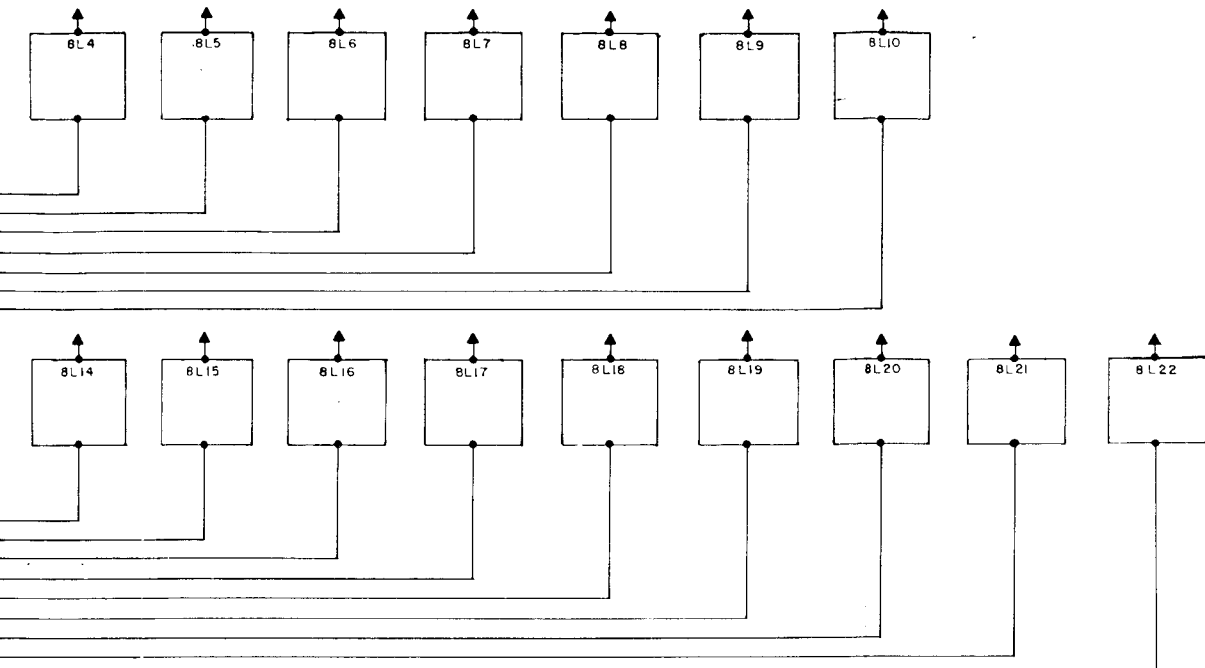
1. DISPLAY VOLTAGE MEASURED WITH DIGITS DISPLAY TEST ON & DISPLAYS AT ALL ZEROS.
2. UNLESS OTHERWISE INDICATED ALL RESISTORS ARE IN OHMS (Ω) 1/4 WATT.
3. TP3, UNREG. +12VDC TYPICAL READOUT NOT TO GO LOWER THAN +10.5V OR INTERMITTENT RESET WILL OCCUR.



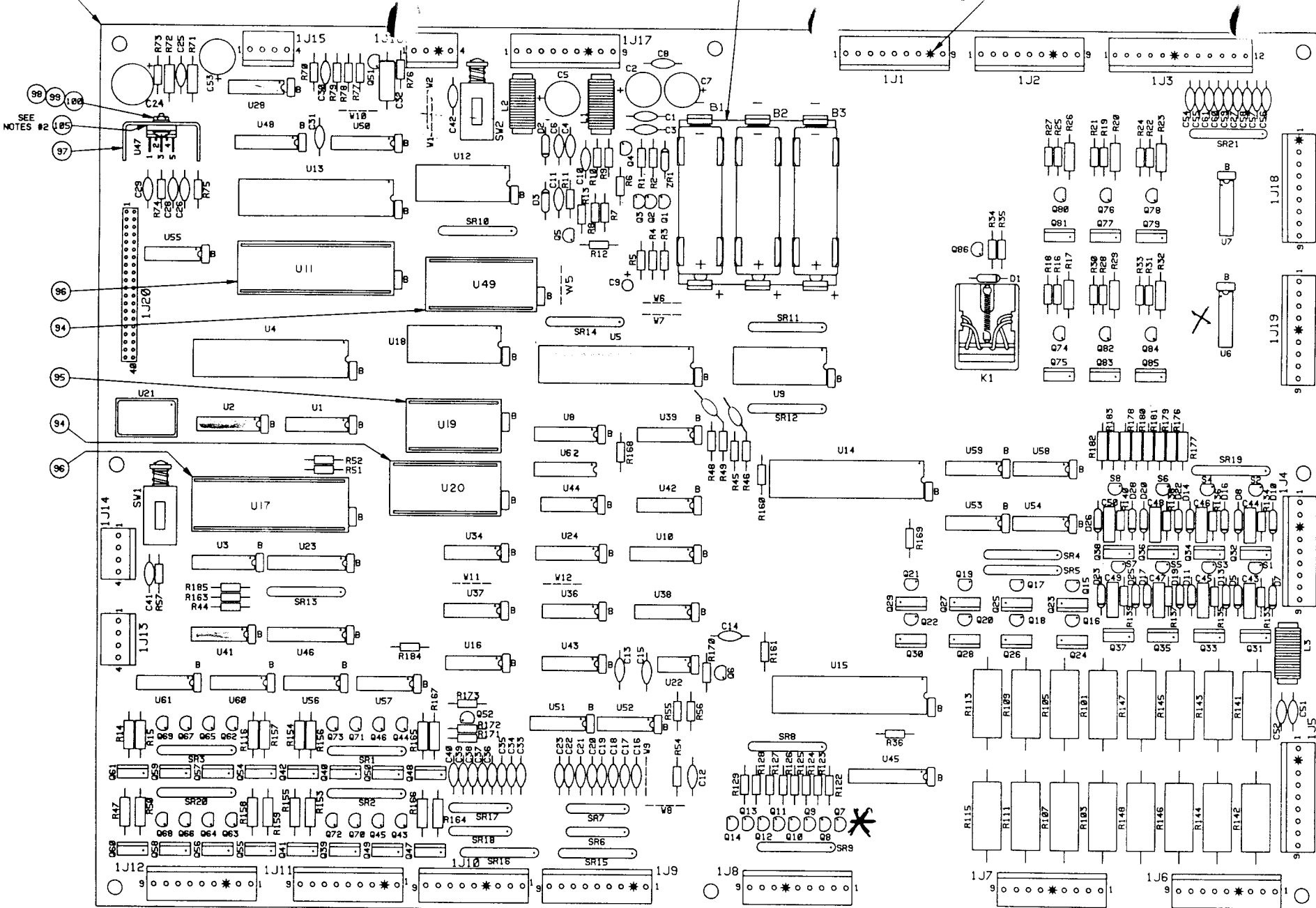
| ITEM NO. | PART NO. | DESIGNATION | DESCRIPTION |
|----------|---------------|----------------|---|
| 1 | 5765-09466-00 | | Bare P.C. Board |
| 2 | 5013-09426-00 | R7 | Resistor, 2.15K, 1/4 W |
| 3 | 5010-09427-00 | R8 | Resistor, 4.95K, 1/4 W |
| 4 | 5010-09427-00 | R11 | Resistor, 1.5K, 24, 1/4 W |
| 5 | 5010-09085-00 | R10 | Resistor, 1.5K, 24, 1/4 W |
| 6 | 5010-09541-00 | R9 | Resistor, 2.7K, 24, 1/4 W |
| 7 | 5010-09509-00 | R12 | Resistor, 370 Ohm, 24, 1/4 W |
| 8 | 5012-09429-00 | R13 | Power Resistor, 0.12 Ohm, 5k, 5 W |
| 9 | 5010-09536-00 | R1, R4 | Resistor, 39K, 5k, 1 W |
| 10 | 5010-09061-00 | R2, R5 | Resistor, 680 Ohm, 2 W |
| 11 | 5010-09069-00 | R3, R6 | Resistor, 330K, 5k, 1/2 W |
| 12 | 5040-09419-00 | C10 | Cap., Electrolytic, 16,000 uFD, 20V, Axial |
| 13 | 5040-09470-00 | C9 | Cap., Electrolytic, 1000 uFD, 25V Radial or Axial |
| 14 | 5040-09423-00 | C12 | Cap., Electrolytic, 330 uFD, 10V, Radial |
| 15 | 5043-09045-00 | C15 | Cap., 470 pFD |
| 16 | 5040-09053-00 | C1, C3 | Capacitor, 100 uFD, Elect., 150V |
| 17 | 5040-09070 | C5 | Capacitor, 100 uFD, Elect., 100V, Axial or Radial |
| 18 | 5043-09072-00 | | Capacitor, 0.1 uFD, 50V |
| 19 | 5043-09444-00 | C14 | Capacitor, 0.1 uFD, 50V, Disc. |
| 20 | 5070-06258 | D1, D2, D5, D6 | Diode, 1N4001 |
| 21 | 5070-09054-00 | D3, D4 | Diode, 1N4004 |
| 22 | 5075-09059-00 | R81, R83 | Inner, 1M592, 3.9V, 5k |
| 23 | 5075-09060-00 | R82, R84 | Inner, 1M474, 100V, 5k |
| 24 | 5440-09424-00 | IC1 | Voltage Regulator, MC1723 PC |
| 25 | 5043-09443-00 | C2, C4, C8 | Capacitor, 0.1 uFD, 100V, Disc. |
| 26 | 5040-09421-00 | C7 | Capacitor, 100 uFD, 25V, Radial |
| 27 | 5040-09422-00 | C6 | Capacitor, 47 uFD, 50V, Radial |
| 28 | 5144-09057-00 | Q1 | Transistor, 2N2901 PNP |
| 29 | 5144-09058-00 | Q2 | Transistor, 2N2902 PNP |
| 30 | 5194-09058-00 | Q3 | Transistor, 2N2902 PNP |
| 31 | 5194-09055-00 | Q2 | Transistor, 2N2902 PNP |
| 32 | 5162-09425-00 | Q5 | Transistor, Power, 2N6051 PNP |
| 33 | 5705-09431-00 | | Heat Sink |
| 34 | 5791-09074-00 | 3J6 | Connector, 15-pin (M) |
| 35 | 5791-09027-00 | 3J3, 3J8 | Connector, 9-pin (M) |
| 36 | 5791-09038-00 | 3J2 | Connector, 6-pin (M) |
| 37 | 5791-09067-00 | 3J5 | Connector, 6-pin (M) |
| 38 | 5791-09043-00 | 3J4 | Connector, 12-pin (M) |
| 39 | 5791-09435-00 | 3J7 | Connector, 3-pin (M) |
| 40 | 5791-09436-00 | 3J9 | Connector, 2-pin (M) |
| 41 | 5791-09048-00 | 3J1 | Connector, 12-pin (M) |
| 42 | 5732-09178-00 | | Fuse Holder |
| 43 | 5731-09128-00 | F2 | Fuse, 2-1/2 AMP, S.S. |
| 44 | 5730-09071-00 | F3 | Fuse, 8 AMP |
| 45 | | F4 | NOT USED |
| 46 | 5731-04763-00 | F1 | Fuse, 20 AMP |
| 47 | 5017-09044-00 | VR1 | Variable |
| 48A | 5700-09445-00 | | Socket |
| 48B | 5701-09652-00 | | Rica Insulator |
| 48C | 5580-09555-00 | K1 | Relay, 24VDC, 10 AMP, DPST |
| 49 | 5424-09248 | | Terminal, 41502-1 (Test Post) |
| 50 | 5100-09418-00 | BR-1 | Bridge Rectifier, 35 AMP, 100V |
| 51 | 5705-09042-00 | | Heat Sink |
| 52 | 03-7520-1 | | Tie Wrap |
| 53 | 4085-01016-07 | | 5-40 x 7/16 RH Mech Screw |
| 54 | 4708-00004-00 | | .146 x 3/8, 21 GA |
| 55 | 4700-00013-00 | | Ln #5, Split |
| 56 | 4405-01117-00 | | 5-40 Hex Nut |
| 57 | | 41, 42 | Jumper, 1/8 AWG |
| 58 | 20-9229 | | Thermal Compound |
| 59 | | | Lead Wire, 1/8 AWG (1") |
| 60 | 5731-09432-00 | F5, F5 | Fuse, 7 AMP, 50, 250V |

- NOTES:**
- HEAT SINK COMPOUND MUST BE APPLIED BETWEEN TRANSISTOR AND HEAT SINK.
 - FOR BLACKOUT AND FUTURE GAME WITH SAME FEATURE REMOVE JUMPERS (W1 & W2) AND INSERT RELAY K1, DIODE D2 AND 3J7.
 - OBSERVE INDEX MARK OF INTEGRATED CIRCUIT, POLARITY OF CAPACITORS, DIODE AND POSITION OF TRANSISTORS.
 - REFERENCE DWG'S: SCHEMATIC 16-8786.





SYSTEM 9 PLAYFIELD-SOLENOID & SPECIAL-SWITCH WIRING DIAGRAM



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 W11 |
| 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 |

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

| 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. | | |
|---------------|--------------|------------------|--------------|--------------|-------------|------------|
| 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-10535-532 | A-5343-10765 | A-5343-10764 | A-5343-10766 | | W10 W11 |

NOTES:

- FOR SCHEMATIC, REFER TO DWG. #16-8923.
- DIODE, 2N4001.
D1, D5, D7, D8, D10, D11, D13, D14, D16, D17, D19, D20, D22, D23, D25, D26, D28.
- RESISTOR, 4.7K OHM.
R4, R56, R44, R45, R48, R51, R52, R160, R161, R163, R169, R170, R172, R184, R185.
- RESISTOR, 1.0K OHM.
R2, R3, R9, R11, R57, R74, R75, R133, THRU R140, R173.
- CAPACITOR, .01 MFD.
BYPASS (B) 48 CAPACITORS, C10, C11, C13, C30, C41, C56 THRU C60, C42, C27.
- FOR ITEMS #53 AND #55 RESISTORS MUST BE MOUNTED 1/8" ABOVE SURFACE OF PCB.
- RESISTOR, 68 OHM 1/2 WATT.
R14, R15, R17, R20, R23, R26, R29, R32, R47, R50, R116, R153 THRU R159, R164 THRU R167.
- RESISTOR, 27 OHM 2 WATT.
R101, R103, R105, R107, R109, R111, R113, R115.
- TRANSISTOR, TIP122.
Q31 THRU Q42, Q47 THRU Q50, Q54 THRU Q61, Q75, Q77, Q79, Q81, Q83, Q85.
- TRANSISTOR, 2N4401.
Q1, Q2, Q3, Q5, Q43 THRU Q46, Q62 THRU Q73, Q74, Q76, Q78, Q80, Q82, Q84, Q86.
- JUMPERS: STANDARD
W2, W6, W7, W9, W10, W11, W5.
OPTIONS
- USE THERMAL COMPOUND BETWEEN ITEM #24 (U47) AND ITEM #97.
- RESISTOR, 2.7K OHM.
R18, R21, R24, R27, R30, R33, R35.
- 9-PIN CONNECTOR.
1J1, 1J2, 1J4 THRU 1J12, 1J17, 1J18, 1J19.

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

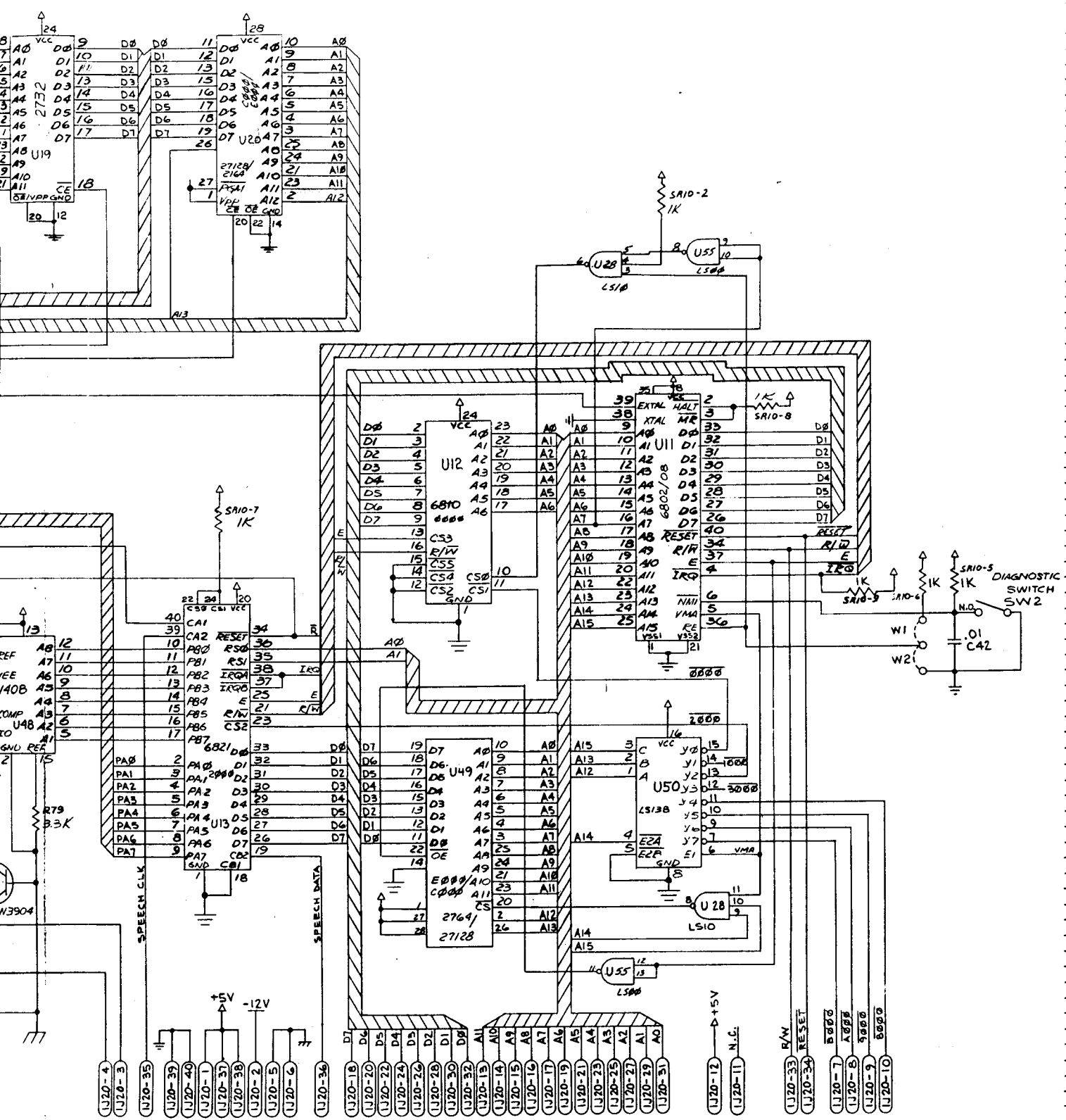
| 119 | | | | |
|------|---------------|------------------|-------------------------------|----------|
| 118 | | | | |
| 117 | | | | |
| 116 | | | | |
| 115 | | | | |
| 114 | | | | |
| 113 | | | | |
| 112 | | | | |
| 111 | | | | |
| 110 | | | | |
| 109 | | | | |
| 108 | | | | |
| 107 | | | | |
| 106 | 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 | 5580-08994-00 | 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 | 5700-08985-00 | | 40-PIN SOCKET | 2 |
| 95 | 5700-09024-00 | | 24-PIN SOCKET | 1 |
| 94 | 5700-10176-00 | | 28-PIN SOCKET | 2 |
| 93 | 5881-09021-00 | | BATTERY HOLDER #171 | 1 |
| 92 | 5800-10628-00 | B1, B2, B3 | BATTERY PACK, ALKALINE, 4.5V | 0 |
| | 5800-09022-00 | | BATTERY, ALKALINE, 1.5V (A-A) | 3 |
| 91 | 5551-09822-00 | 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 +50-10% | 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 +50-10% | 1 |
| 82 | 5040-09421-00 | C2, C5, C7, C53 | CAP., ELECT., RADIAL, 100 MFD, 25V +50-10% | 4 |
| 81 | 5043-09844-00 | 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 | 5043-08996-00 | C25, C26, C29, C51, C52 | CAPACITOR, AXIAL, .1 MFD, 50V +/-20% | 5 |
| 78 | 5043-09845-00 | C1, C3, C4, C6, C8, C28 | CAPACITOR, AXIAL, 1K PFD, 50V +/-20% | 6 |
| 77 | 5043-09880-00 | 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 | SRS, 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 | 5019-09808-00 | 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, 8.8K 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., 3.3K 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., 390 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 | 5010-09361-00 | R72 | RESISTOR, C.F., 220 OHM 5% 1/2 WATT 1 | |
| 55 | 5010-08999-00 | SEE NOTES #6 AND #8 | RESISTOR, C.F., 27 OHM 5% 1/2 WATT 8 | |
| 54 | 5010-08993-00 | SEE NOTE #7 | RESISTOR, C.F., 68 OHM 5% 1/2 WATT 22 | |
| 53 | 5012-09837-00 | R141 THRU R149 | RESISTOR, WIREWOUND, 27 OHM 5% 3 WATT 8 | |
| 52 | 5010-08997-00 | SEE NOTE #13 | RESISTOR, C.F., 5.6K OHM 5% 1/4 WATT 7 | |
| 51 | 5010-09363-00 | R76 | RESISTOR, C.F., 8.8K OHM 5% 1/4 WATT 1 | |
| 50 | 5010-09086-00 | R56 | RESISTOR, C.F., 1.5K 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 | 5010-08991-00 | 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 | 5010-08992-00 | 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, 1N5817 1.0 A, 1 | |
| 38 | 5070-08919-00 | D3 | SILICON DIODE, 1N4148 150 mA, 1 | |
| 37 | 5070-09259-00 | SEE NOTE #2 | DIODE, 1N4001 17 | |
| 36 | 5130-09014-00 | S1 THRU S8 | SILICON CONTROL RECT., 2N5060, .8A 30V 8 | |
| 35 | 5130-09016-00 | Q4, Q6 | TRANSISTOR, TO-92, 2N4403, PNP 2 | |
| 34 | 5160-10269-00 | Q7 THRU Q14 | TRANSISTOR, TO-92, 2N3904, PNP 10 | |
| 33 | 5160-08936-00 | SEE NOTE #10 | TRANSISTOR, TO-92, 2N4401, NPN 27 | |
| 32 | 5162-09410-00 | SEE NOTE #9 | TRANSISTOR, TO-220, TIP122, NPN 30 | |
| 31 | 5191-08978-00 | Q23 THRU Q30 | TRANSISTOR, TO-220, TIP42, PNP 8 | |
| ITEM | PART NO. | PART DESIGNATION | DESCRIPTION | QTY. |

| 30 | 5162-08976-00 | Q15 THRU Q22 | TRANSISTOR, TO-92, 2N6427 NPN DARLINGTON 8 | |
|------|---------------|------------------------------|--|------|
| 29 | 5280-08948-00 | 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 | 5280-08974-00 | U58, U59 | I.C., 7406, HEX. INVERTER OPEN C. 2 | |
| 26 | 5280-08973-00 | 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., 7408, AUDIO AMPLIFIER 1 | |
| 23 | 5340-09003-00 | 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., MC1408, D/A CONVERTER 1 | |
| 20 | 5281-09406-00 | 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 | 5430-08972-00 | U4, U5, U13, U14, U15 | I.C., 6820/6821, PIA 5 | |
| 4 | 5281-09308-00 | U23 | I.C., 74LS245, OCTAL BUS TRANSCEIVER 1 | |
| 3 | 5370-08989-00 | U1, U2, U3 | I.C., 8197, HEX. TRISTATE BUFFER 3 | |
| 2 | 5280-09073-00 | U43 | I.C., 7408, QUAD 2-INPUT NAND 1 | |
| 1 | 5784-10749-00 | | BARE PC BOARD 1 | |
| ITEM | PART NO. | PART DESIGNATION | DESCRIPTION | QTY. |

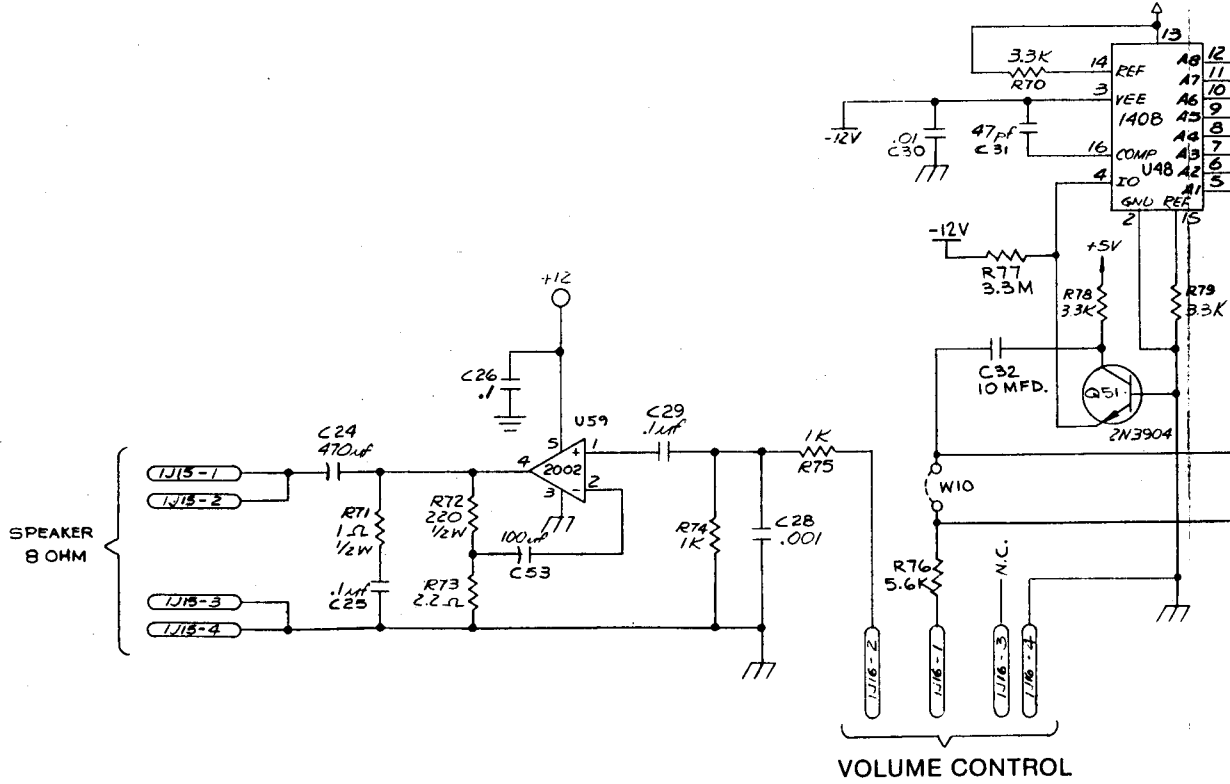
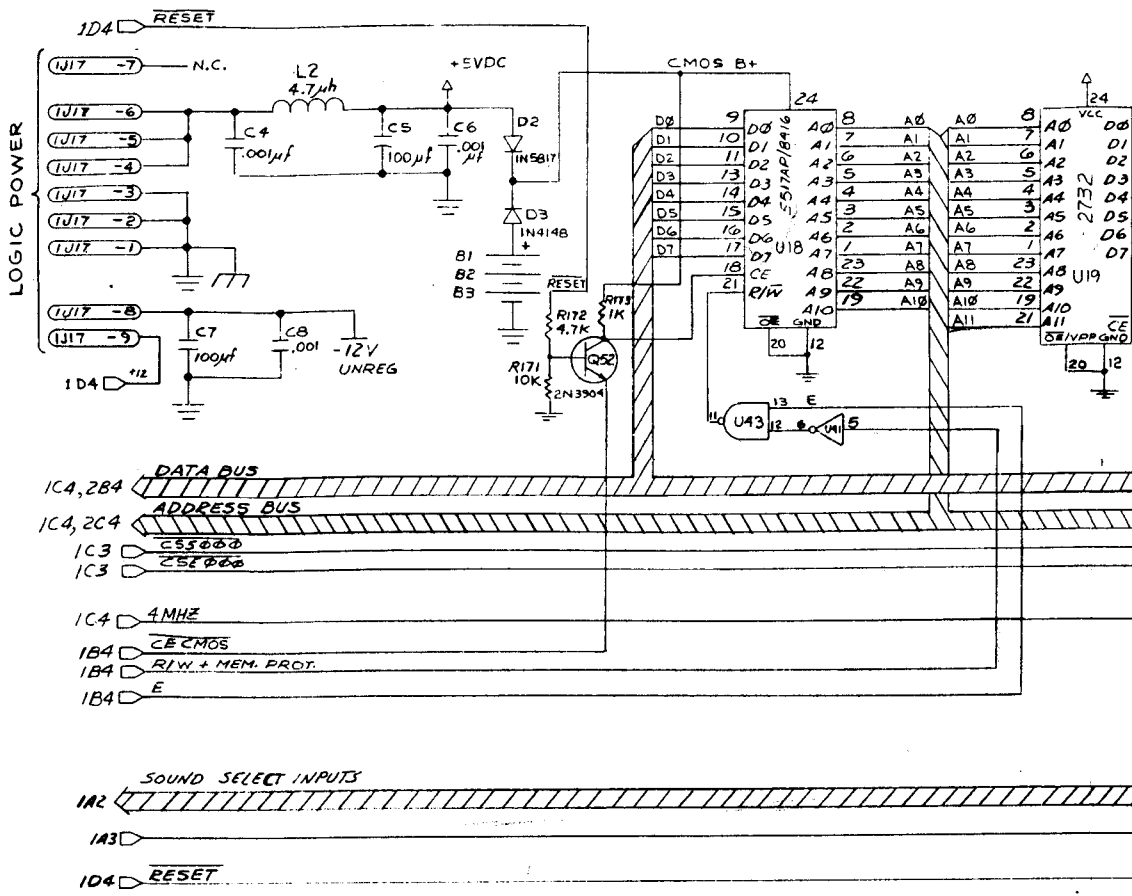
BILL OF MATERIAL

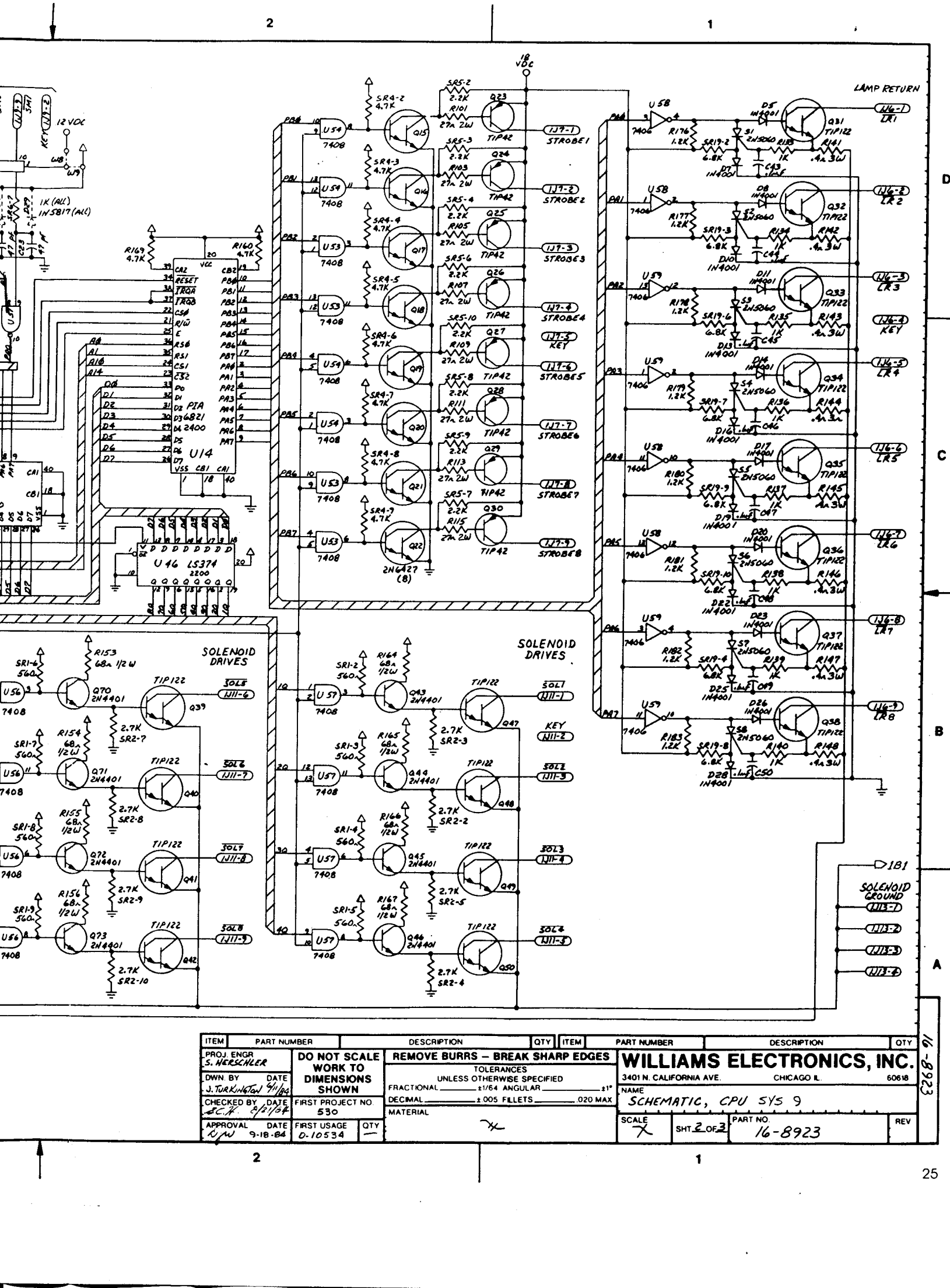


| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|---------------------------|-------------|--|-----|--|-------------|--|-----|
| PROJ ENGR S. HERSCHLER | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS - BREAK SHARP EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DOWN BY DATE | | FIRST PROJECT NO 530 | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N CALIFORNIA AVE CHICAGO IL 60618 | |
| CHECKED BY DATE | | MATERIAL | | FRACTIONAL 1/64 ANGULAR 1° | | NAME SCHEMATIC, CPU SYSTEM-9 | |
| APPROVAL DATE | | FIRST USAGE D-10534 | | DECIMAL ±.005 FILLETS .020 MAX | | SCALE SHT 3 OF 3 | |
| | | QTY | | | | PART NO. 16-8923 | |
| | | | | | | REV | |

16-8923

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

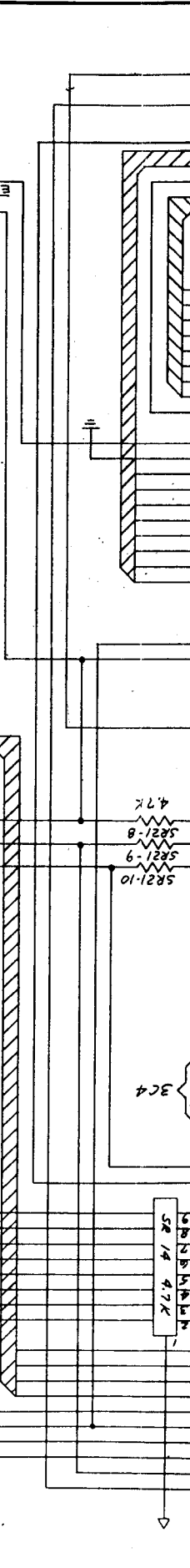
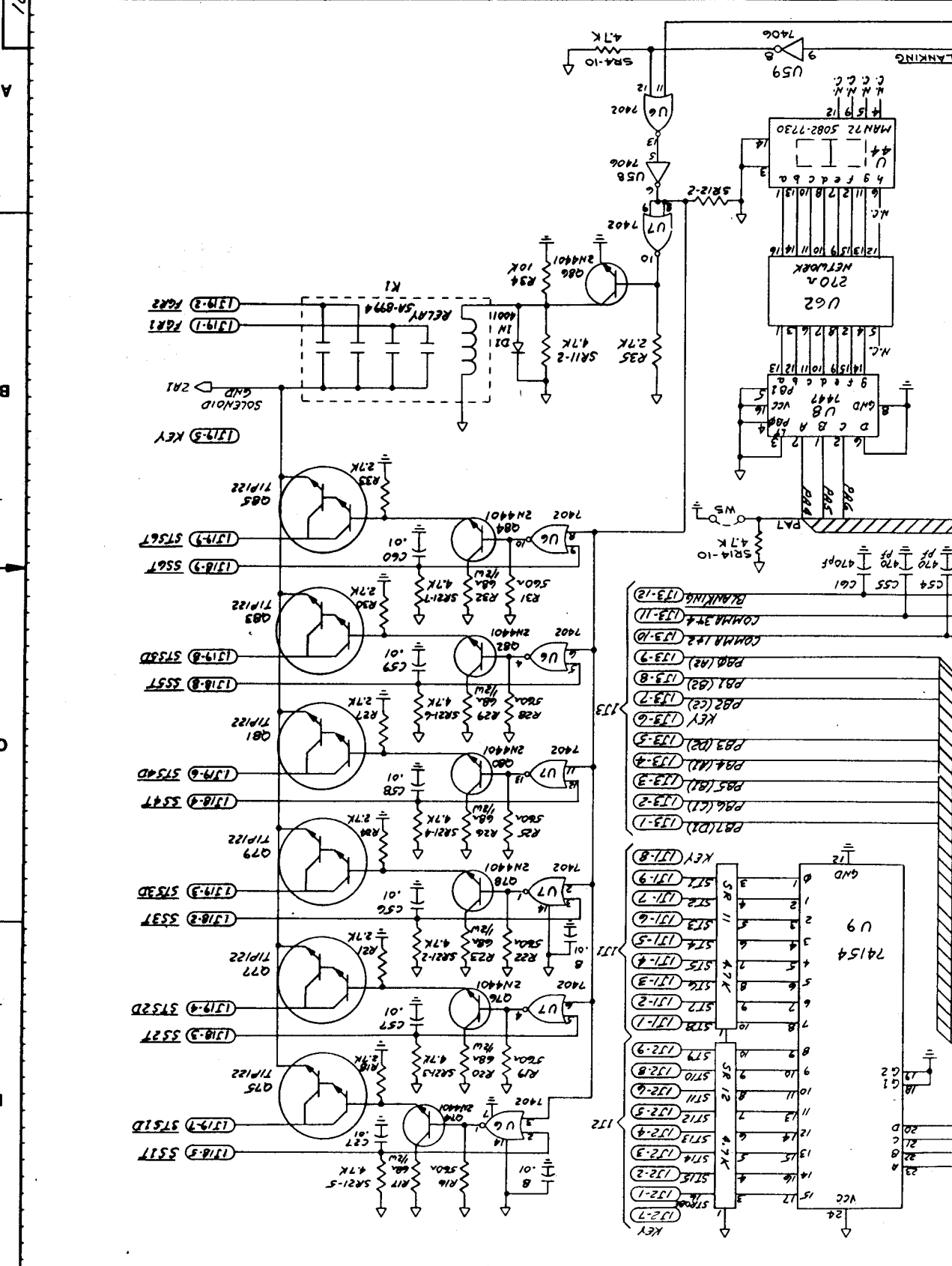




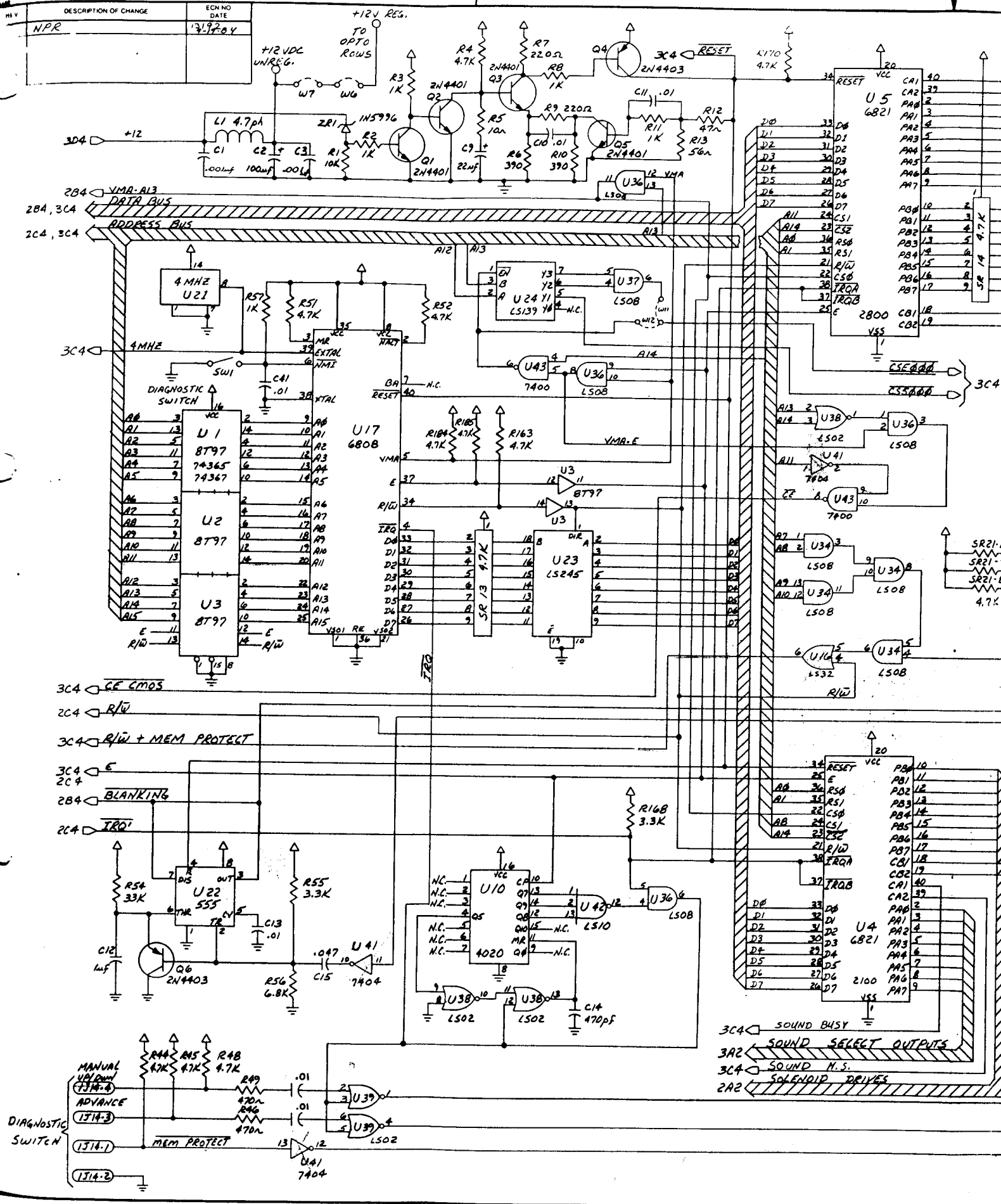
| ITEM | PART NUMBER | DESCRIPTION | QTY | ITEM | PART NUMBER | DESCRIPTION | QTY |
|-------------------------------------|-------------|--|-----|---|-------------|-----------------------------------|-----|
| PROJ ENGR S. HERSCHLER | | DO NOT SCALE WORK TO DIMENSIONS SHOWN | | REMOVE BURRS - BREAK SHARP EDGES | | WILLIAMS ELECTRONICS, INC. | |
| DWN BY DATE J. TURKINGTON 9/1/84 | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | 3401 N. CALIFORNIA AVE. CHICAGO IL. 60618 | | NAME | |
| CHECKED BY DATE S.C.K. 8/2/84 | | FRACTIONAL $\pm 1/64$ ANGULAR $\pm 1^\circ$ | | DECIMAL $\pm .005$ FLEETS $\pm .020$ MAX | | SCHEMATIC, CPU SYS 9 | |
| APPROVAL DATE K.W. 9-18-84 | | FIRST PROJECT NO. 530 | | MATERIAL | | SCALE X | |
| FIRST USAGE D-10534 | | QTY | | X | | SHT 2 OF 3 PART NO. 16-8923 | |
| | | | | | | REV | |

16-8923

| | | | | |
|---|-------|-----|-----|---------|
| REV | SCALE | SHT | LOF | 16-8923 |
| WILLIAMS ELECTRONICS, INC. | | | | |
| 3401 N. CALIFORNIA AVE. CHICAGO, ILL. 60618 | | | | |
| NAME: SCHEMATIC, CPU SYS 9 | | | | |
| PART NO: 16-8923 | | | | |
| TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | |
| FRACTIONAL: 1/64 ANGULAR: 020 MAX | | | | |
| DECIMAL: .005 FILLETS | | | | |
| REMOVE BURRS - BREAK SHARP EDGES | | | | |
| DIMENSIONS SHOWN | | | | |
| DO NOT SCALE | | | | |
| WORK TO DIMENSIONS | | | | |
| CHECKED BY DATE: 8/1/68 | | | | |
| FIRST PROJECT NO: 530 | | | | |
| MATERIAL | | | | |
| APPROVAL DATE: 9-18-64 | | | | |
| FIRST USAGE QTY: 1 | | | | |
| DWN BY DATE: 1/1/68 | | | | |
| PROJECT ENGINEER: S. HESSLER | | | | |



| | |
|-----------------------|---------|
| DESCRIPTION OF CHANGE | ECN NO |
| NPR | 131920Y |



4 3

MANUAL (1314-4) 47K R44
ADVANCE (1314-3) 47K R45
MEM PROTECT (1314-7) 47K R48

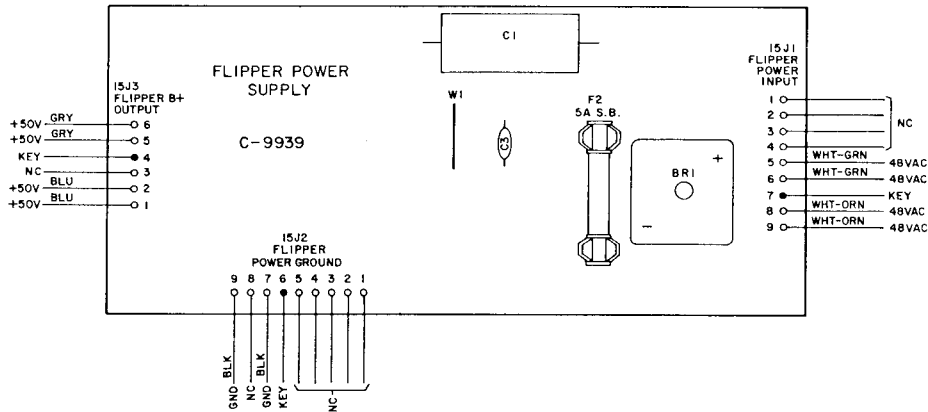
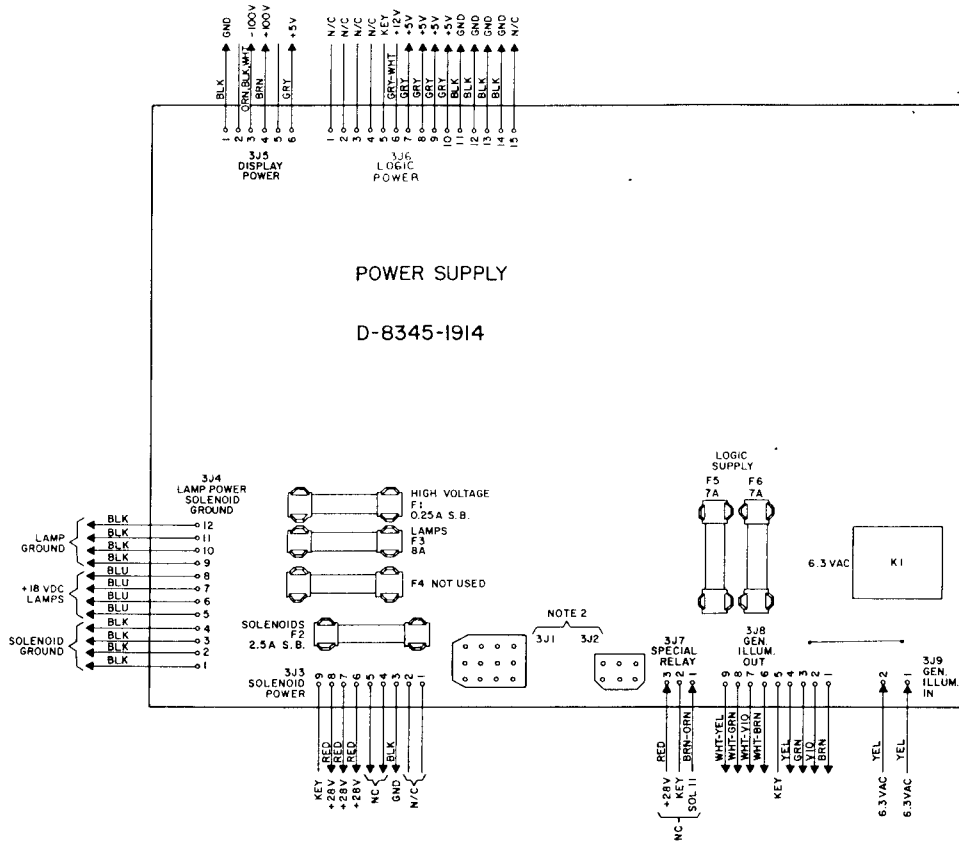
DIAGNOSTIC SWITCH

3C4 ← CE CMOS
2C4 ← R/W
3C4 ← R/W + MEM PROTECT
3C4 ← E
2C4 ← BLANKING
2C4 ← TRQ1

3C4 ← SOUND BUSY
3A2 ← SOUND SELECT OUTPUTS
3C4 ← SOUND H.S.
2A2 ← SOLENOID DRIVES

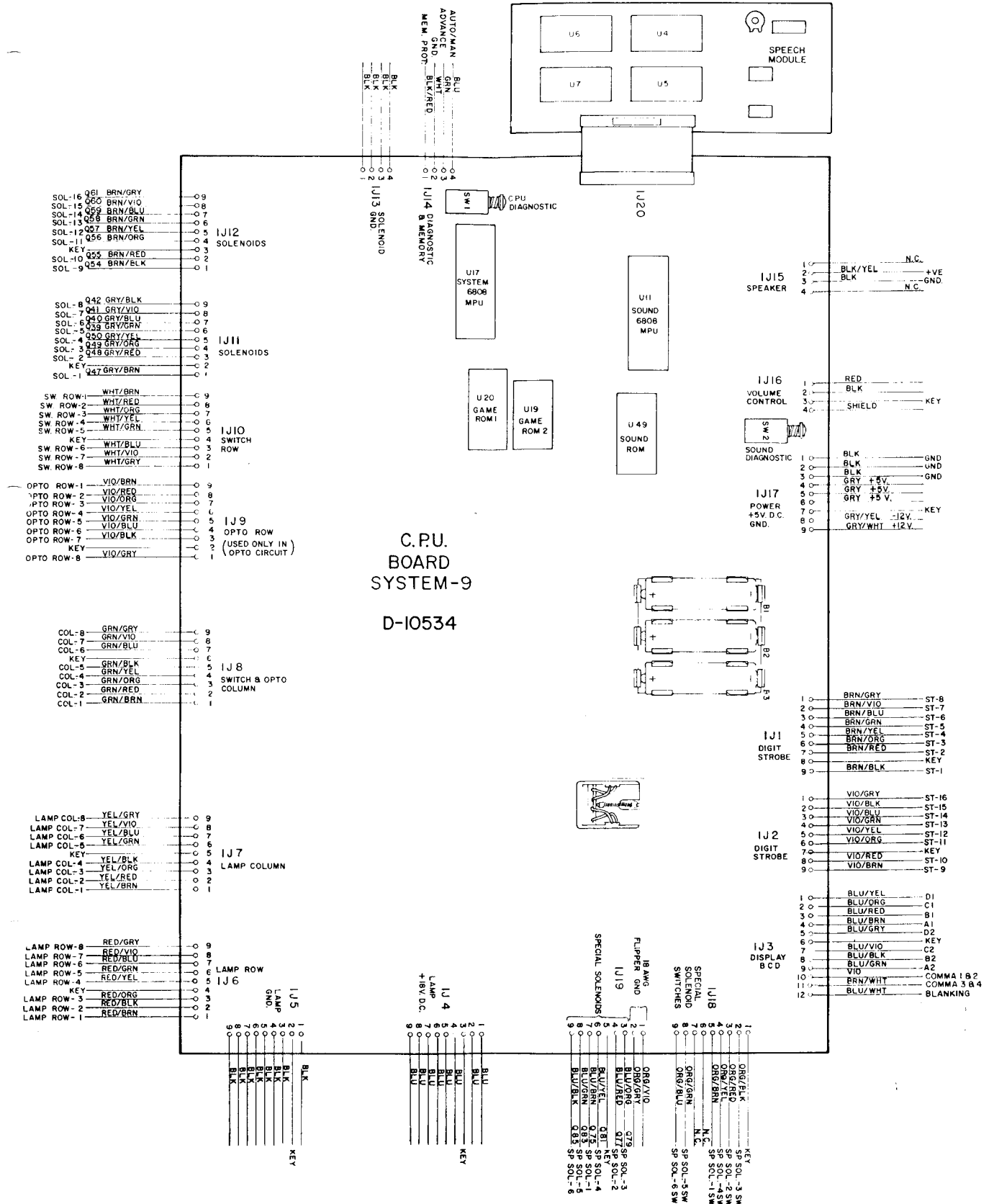
4 3

24



| 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

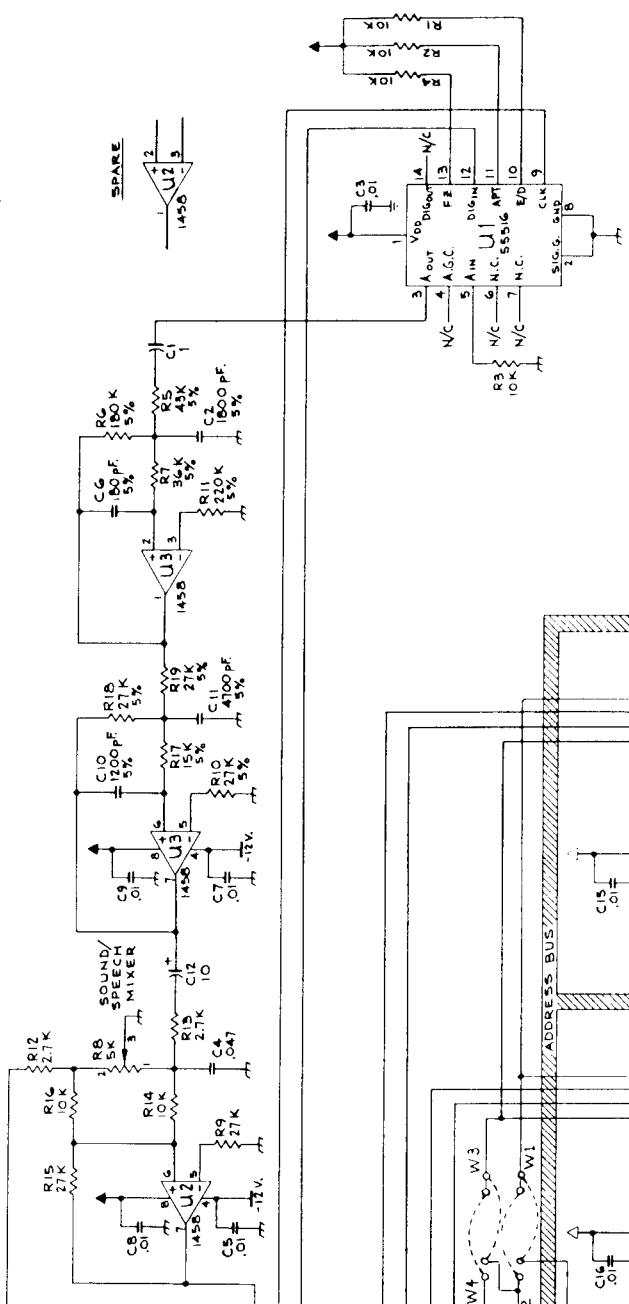


C.P.U. BOARD SYSTEM 9

- 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
- PS-33 R/W N/C
- PS-34 RESET N/C
- PS-7 E
- PS-8 D
- PS-9 C
- PS-10 B
- PS-11 A
- PS-12 BUS 02.VMA
- PS-13 A11
- PS-14 A10
- PS-15 A9
- PS-16 A8
- PS-17 A7
- PS-18 A6
- PS-19 A5
- PS-20 A4
- PS-21 A3
- PS-22 A2
- PS-23 A1
- PS-24 A0
- PS-25 D7
- PS-26 D6
- PS-27 D5
- PS-28 D4
- PS-29 D3
- PS-30 D2
- PS-31 D1
- PS-32 D0

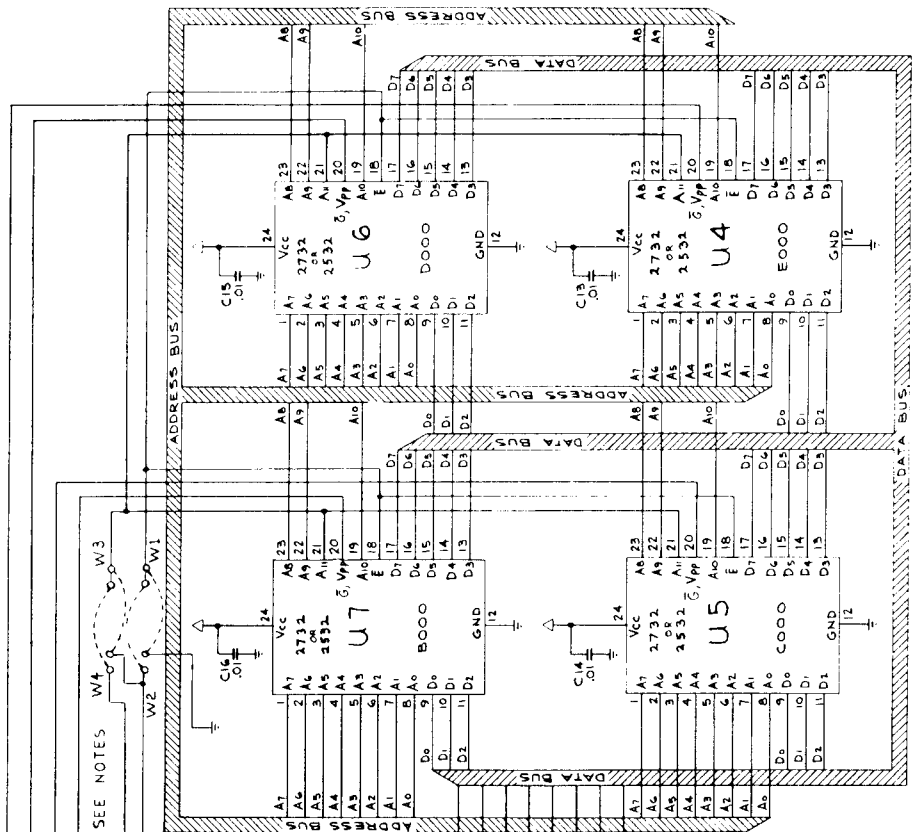
SEE NOTES W1, W2, W3

SPEECH BOARD



NOTES:

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



| | | |
|----------------------------|---|---------|
| TOLERANCES | 1 | C-10716 |
| UNLESS OTHERWISE SPECIFIED | | |
| PRECISION | 100 | |
| RESISTORS | 100 | |
| CAPACITORS | 100 | |
| CONCENTRATIONS | 100 | |
| TEMPERATURE | 100 | |
| DATE | 1-27-85 | DMW |
| REV | 16-8937 | |
| WILLIAMS ELECTRONICS, INC. | 4000 WILSON AVENUE, CHICAGO, ILL. 60649 | |
| NAME | SCHEMATIC, SPEECH MODULE | |
| MATERIAL | | |

| | | |
|-----------------|------------------|--------|
| REVISION LETTER | REVISION | BY |
| | 13965 | JJM/85 |
| | NEW PART RELEASE | |