

16-532-103  
March 25, 1985

# SOBERER

INSTRUCTION  
MANUAL



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# System-9 ROM Summary

IC	DESCRIPTION	TYPE	NUMBER	BOARD	PART NO.
Game-ROM 1	ROM 8Kx8	2764	U20	CPU	A-5343-10764
Game-ROM 2	ROM 4Kx8	2732	U19	CPU	A-5343-10765
Sound ROM	ROM 16Kx8	25128	U49	CPU	A-5343-10766
Speech ROM	ROM 4Kx8	2532	U6	Speech	A-5343-10806
Speech ROM	ROM 4Kx8	2532	U7	Speech	A-5343-10807
Speech ROM	ROM 4Kx8	2532	U8	Speech	A-5343-10808
Speech ROM	ROM 4Kx8	2532	U9	Speech	A-5343-10809

*2732 ROMS may also be used for the speech ROMS.*

## NOTICE

**TO ORDER REPLACEMENT ROMS** from your authorized **WILLIAMS** distributor, specify (1) part number (if available), (2) ROM-label color, (3) REV level (number) on the label, and (4) which game the ROM is used in.

## CONNECTOR CODE

**WILLIAMS USES A SPECIAL TECHNIQUE** to name plugs and jacks. Each connector receives a number, a letter and a number. A hyphen separates the plug or jack-designation from the pin number.

*For example 1J1-3 refers to a connector at board 1, specifies the jack (male or board) side of the connector, identifies the connector as number three on the board, and stipulates pin number three.*

- 1J1 is board 1, jack 1 (a CPU-Board jack).
- 3P6 is board 3, plug 6 (a Power-Supply plug).
- J-designations refer to the male part of a connector.
- P-designations refer to the female part of a connector.
- The prefix numbers for System-9 games are as listed below.
  - 1-CPU Board
  - 2-(not assigned)
  - 3-Power-Supply Board
  - 4-Master-Display Board
  - 5-Slave-Display Board
  - 6-Backbox
  - 7-Cabinet
  - 8-Playfield
  - 9-Insert Board
  - 10-(not assigned)
  - 11-(not assigned)
  - 12-Speech Board
  - 13-(not assigned)
  - 14-(not assigned)
  - 15-Flipper Power-Supply

## System-9 Control Locations

**THE ON-OFF SWITCH** is on the bottom of the cabinet near the right-front leg as you face the game.

**THE VOLUME CONTROL** is accessible through the coin door on the left cabinet-wall.

**DIAGNOSTIC SWITCHES.** ADVANCE, AUTO-UP/MANUAL-DOWN, and HIGH-SCORE RESET switches are located on the back of the coin door. Refer to **Game-Adjustment Procedure** and **Diagnostic Procedures** for operation.

**THE MEMORY-PROTECT SWITCH** must be open to clear bookkeeping totals and to make game adjustments. This switch is on the inside of the coin-door frame. It automatically opens when the coin door opens.

**ALL CIRCUITBOARDS** are in the backbox.

**THE CPU DIAGNOSTIC-SWITCH** operates the Memory-Chip Test explained in **Diagnostic Procedures**. This switch is on one edge of the CPU Board near a microprocessor (large, socketed) chip.

**THE SOUND DIAGNOSTIC-SWITCH** is on the CPU Board near the batteries. This switch is used to initiate the Sound Section Test. Refer to **Diagnostic Procedures**.

# **SORCERER**

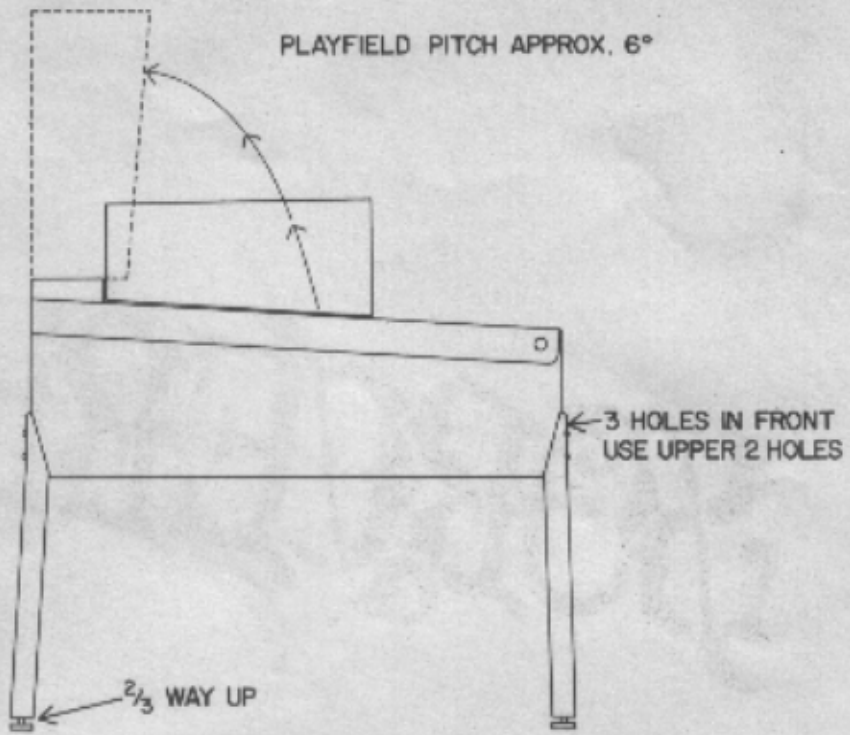
## **INSTRUCTION MANUAL**

**including procedures for...**

- **operation**
- **bookkeeping**
- **adjustment**
- **diagnostics**

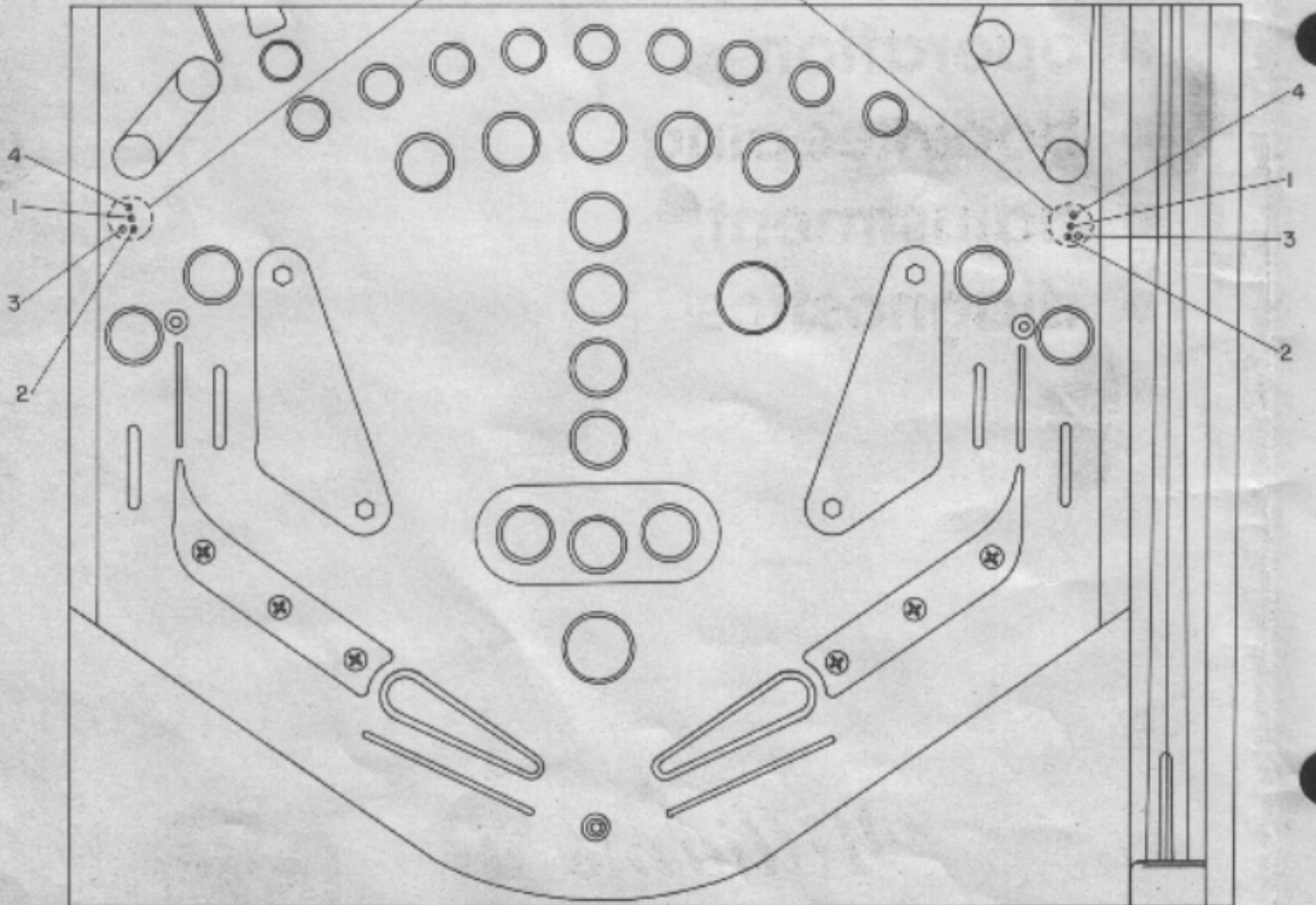
*Williams*® 

PLAYFIELD PITCH APPROX. 6°



ADJUSTABLE POSTS

- 1 = MODERATE
- 2 & 3 = LIBERAL
- 4 = CONSERVATIVE



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# Replacing System-9 Circuitboards

**CPU BOARD.** Your level-9, D-10535 CPU Board must be equipped with the ROMs specified in the **ROM Summary**. Only jumpers W2, W5 through W7, W9 and W11 should be connected. Substitute W1 for W2 when a 6802 microprocessor is used instead of a 6808 microprocessor.

**DISPLAY BOARDS.** Use the C-8363 Master Display Board with the C-8364 7-digit Slave Display. The C-8365 4-digit Slave Display is also used.

**POWER-SUPPLY BOARD.** Use the D-8345 board (equipped with a relay).

## Game Play

- **SPOTTING A-B-C-D...** advances bonus multiplier (2X, 4X, 6X, 8X), then scores 50,000.
- **SPOTTING S-O-R-C-E-R-E-R...** lights DEMON at 3-bank, spinners, **EXTRA BALL**, and **playfield SPECIAL**.
- **COMPLETING 3-BANK DROP TARGET...** lights one flipper return lane and awards flashing value, awards EXTRA BALL (when lit), and spots BONUS HELD OVER (with DEMON lit).
- **MAKING THE RAMP SHOT...** first time locks the ball; Second time: starts **MULTI-BALL™** play; Each successive time advances playfield multiplier.

## Game Operation

**GAME-OVER MODE.** Turn the game ON. The PLAYER-1 score shows 00, player scores display the high score and the GAME-OVER lamp lights. All playfield-lamps cycle in **Attract Mode**.

**CREDIT POSTING.** Insert coins. A sound is produced and the number of credits is displayed. If maximum credits\* are exceeded by coin or high score, credits are posted correctly. But the coin-lockout coil de-energizes until the remaining credits are below the maximum. No credits may be won (and coins are rejected) while the coin-lockout coil is de-energized.

**GAME START.** Push the CREDIT button. A start-up tune is played, a ball is served, and the CREDIT display is reduced by one. PLAYER 1 UP flashes until the first scoring-switch is made, and the BALL-IN-PLAY display shows 1. Additional players may enter the game by pushing the CREDIT button before BALL 2 is displayed.

**TILT.** With the first closure of the ball-roll or playfield tilts, or the third\* closure of the plumb-bob tilt, the player loses the rest of his turn. The slam tilt on the coin door returns the game to the **Game-Over Mode**.

**END OF GAME.** Match digits\* appear in the BALL-IN-PLAY display. Credit\* is awarded for a match. Match, high score and game-over sounds are made as appropriate. One replay is awarded for each score you beat in the displays.\*

## Game Setup

### WARNING

This game must be plugged into a properly-grounded outlet to prevent shock hazard and to assure proper game-operation. DO NOT use a "cheater" plug to defeat the ground pin on the line cord, and DO NOT cut off the ground pin.

**ENTERING GAME-OVER MODE.** With the coin door closed, plug the game in and turn it ON. The game should come on in **Game-Over Mode**.

1. If the game comes on in the **Bookkeeping Mode** [CREDITS display showing 04, BALL-IN-PLAY display showing 00, and PLAYER-1 display showing the game-identification number] turn the game OFF and ON again.
  - A. If the game now comes on in **Game-Over Mode**, bookkeeping totals have been reset to zero.
  - B. If the game still comes on in **Bookkeeping Mode**, open the coin door and turn the game OFF and ON twice. (A game without battery power will revert to factory settings.) Any changes from factory settings must be reentered.
2. If the game *always* comes on in **Bookkeeping Mode**, troubleshoot the game. With the game OFF, check for a *minimum* of 3.5VDC at pin 24 of the CMOS RAM, chip U18 on your CPU Board.
  - A. **Less than 3.5VDC.** Replace the three AA alkaline cells.
  - B. **No voltage.** Matching polarity, replace diode D3 (type 1N4148) on your CPU Board. Now recheck the voltage at pin 24 of chip U18.

## Bookkeeping Mode

### FUNCTIONS 01-17, 42-48

1. Set the AUTO-UP/MANUAL-DOWN switch to AUTO-UP and press ADVANCE. Test 04 is indicated in the CREDITS display. Function 00 in the MATCH display, and the game-identification number in the PLAYER-1 display.

\* indicates adjustable feature.

2. Press ADVANCE to display desired functions in the MATCH display (Refer to the **Bookkeeping Table**). Now record the corresponding totals (number of coins and total paid-credits) from the PLAYER-1 display. (To review a total that has been advanced past, use MANUAL-DOWN and press ADVANCE).
3. Use MANUAL-DOWN and press ADVANCE to display Function 50 in the MATCH display.

4. Returning to **Game-Over Mode**:

- A. Use AUTO-UP and press ADVANCE.
- B. OR: To zero bookkeeping totals *and* return to **Game-Over Mode**, (1) use AUTO-UP, (2) press the credit button to display 35 in the PLAYER-1 display, and (3) press ADVANCE.

**Bookkeeping Table**

FUNCTION	PLAYER-1 DISPLAY	PLAYER-2 DISPLAY
00	Game Identification (2535 1)	—
01	Coins, Left Chute (closest to coin-door hinge)	—
02	Coins, Center Chute	—
03	Coins, Right Chute	—
04	Total Paid-Credits	—
05	Special Credits	—
06	Replay-Score Credits	—
07	Match Credits	—
08	Total Credits	5 + 6 + 7 + 13
09	Total Extra Balls	—
10	Ball Time in Minutes	—
11	Total Balls Played	—
12	High Scores	(see below)
13	Backup High-Scores	0; 1, 2, 3, 4
14	Replay-Level 1	Times Exceeded
15	Replay-Level 2	Times Exceeded
16	Replay-Level 3	Times Exceeded
17	Replay-Level 4	Times Exceeded
42	Times <b>MULTI-BALL</b> play was achieved	—
43	Number of 3X's in <b>MULTI-BALL</b> play	—
44	Number of 5X's in <b>MULTI-BALL</b> play	—
45	Number of Ramps over 5X	—
46	Number of Bonus Holdovers	—
47	Number of Playfield Specials (from spotting S-O-R-C-E-R-E-R)	—
48	Times A-B-C-D was completed	—

## Game-Adjustment Procedure

### FUNCTIONS 13-41

*Coin door must be open to change settings*

1. Use AUTO-UP and press ADVANCE. Test 04 is indicated in the CREDITS display, function 00 in the MATCH display, and the game-identification number in the PLAYER-1 display.
2. To raise the function number in the MATCH display, use AUTO-UP and push ADVANCE. To lower the function number, use MANUAL-DOWN and push ADVANCE.
3. With the desired function indicated in the MATCH display, raise the value in the PLAYER-1 display by using AUTO-UP and pressing the credit button. Repeat this step until all adjustments have been made.
4. Hold down ADVANCE until Function 50 is indicated in the MATCH display. From Function

50 you can return to **Game-Over Mode** or restore factory settings. Perform either of the following as desired.

5. To return to **Game-Over Mode** use AUTO-UP and press ADVANCE.
6. To restore factory settings and zero bookkeeping totals:
  - A. Using AUTO-UP press the CREDIT button until 45 is indicated in the PLAYER-1 display.
  - B. Press ADVANCE. The game returns to Test 04, function 00.
  - C. Use MANUAL-DOWN and press ADVANCE to indicate function 50.
  - D. Return to **Game-Over Mode** by using AUTO-UP and pressing ADVANCE.
  - E. Press, and hold, HIGH-SCORE RESET to replace all four high scores with factory settings.

## High Scores

*Function 12 determines whether the game remembers the high scores.*

### NO HIGH-SCORE FEATURE...

1. Enter function 12.
2. Press the CREDIT button until the PLAYER-1 display is blank.
3. Use AUTO-UP and ADVANCE to enter **Game-Over Mode**.

### USING THE HIGH-SCORE FEATURE...

1. Enter function 12.
2. Hold down the CREDIT button until scores appear in *all four* score displays.
3. Use AUTO-UP and ADVANCE to enter function 13. One of function 13's five sub-functions will show in the PLAYER-2 display. Sub-function 0 shows the number of credits won from the high-score feature (in the PLAYER-1 display). Sub-functions 1 through 4 show (and allow you to adjust) the four backup high scores. These are the values that are restored when you press and hold the HIGH-SCORE RESET button.

4. Use AUTO-UP and the CREDIT button to change any of these values. At Game-Over Mode, one credit will be awarded for each of the top four scores that's beaten. The maximum number of credits awarded for a high score is determined by function 40.

5. To use the high-score feature *without awarding any credits*, set function 40 to 0.

### USING ONLY ONE HIGH SCORE...

1. Enter function 12.
2. Press the CREDIT button until a score appears in the PLAYER-1 display. The other displays should be blank.
3. Use AUTO-UP and ADVANCE to enter function 13. In the PLAYER-2 display function 13 shows the number of credits won from the high-score feature. The PLAYER-1 display shows (and allows you to adjust) the backup high-score. *(This value is restored when you press and hold HIGH-SCORE RESET.)*
4. Use AUTO-UP and the CREDIT button to change the backup high-scores. At Game-Over Mode, the number of credits indicated by function 40 will be awarded if someone beats the high score.
5. To use the high-score feature *without awarding credits*, set function 40 to 0.

**Game-Adjustment Table**

FUNCTION	DESCRIPTION	FACTORY SETTING <sup>1</sup>
12	High Scores	(see above)
13	Backup High Score(s) (High score credits awarded—function 40)	2,500,000
14	First Replay-Level	1,000,000
15	Second Replay-Level or Second-Highest Score	00
16	Third Replay-Level or Third-Highest Score	00
17	Fourth Replay-Level or Fourth-Highest Score	00
18	Maximum Credits	30
19	Standard and Custom Pricing-Control	01/02
20	Left Coin-Slot Multiplier	01
21	Center Coin-Slot Multiplier	04/10
22	Right Coin-Slot Multiplier	01/03
23	Coin Units Required For Credit	01
24	Units Required For Bonus Credit	00
25	Minimum Coin-Units	00
26	Match 00: Standard Match (awards 10% replays) 01: Match off	00
27	Special 00: Awards credit 01: Awards extra ball 02: Awards points	00
28	Replay 00: Awards credit 01: Awards extra ball 02: No award	00
29	Maximum Plumb-Bob Tilts (including warnings)	03
30	Number of Balls	03



**Game-Adjustment Table, continued**

31	Game-Adjustment #1 - Extra Ball Lamp in Memory 00: No-Conservative 01: Yes-Liberal	00
32	Game-Adjustment #2 - Reset Interval for Drop Targets 00-09 00: Fast 09: Slow	05
33	Game-Adjustment #3 - Bell 00: Off 01: On	01
34	Game-Adjustment #4 - Blink Interval for Drop Target Lights 00-09 00: Fast 09: Slow	05
35	Game-Adjustment #5 - Background Sound 00: Off 01: On	01
36	Game-Adjustment #7 - Sound for Attract Mode 00: Off 01: On	01
37	Game-Adjustment #8 - Bonus Holdover in Memory 00: Off 01: On	00
38	Game-Adjustment #9 - S-O-R-C-E-R-E-R Target Memory 00: Off-Conservative 01: On-Liberal	00
40	Maximum high-score credits 00: Displays high scores without credit payouts	03
41	Maximum Extra-Balls at any time	04
42-48	Foreground Bookkeeping-Totals (See <b>Bookkeeping Table</b> )	
49	Not Used	
50	Special Function 15: <b>Auto-Cycle Mode</b> 35: Zero bookkeeping totals 45: Restore factory settings & zero bookkeeping totals	

**NOTES**

- The second factory-setting value is with jumper W5 on the CPU Board removed.
- Functions 14 through 17 (replay levels) may be set to any multiple of 100,000 points. Setting function 40 to zero with function 13 set to *any score but zero* permits the high-score feature to operate but no credits are awarded.
- Setting functions 14 through 17 (replay levels) to zero disables the replay-score point.
- High scores are displayed or suppressed by adjusting function 12: Use AUTO-UP and press ADVANCE repeatedly until the number of high scores you wish to show (0, 1, 2, or all 4) appears on the displays. Now return to **Game-Over Mode**.

**Pricing Table**

•Indicates standard settings by adjusting ONLY function 19

Coin-Door Mechanism	Games/Price	Function							
		19	20	21	22	23	24	25	
Twin Quarter or Quarter, Dollar, Quarter (USA and Canada)	-1/25¢, 4/\$1	1	1	4	1	1	0	0	
	-1/50¢	3	1	4	1	2	0	0	
	-1/50¢, 2/75, 3/4x25¢	0	3	15	3	4	15	0	
	2/25¢, 8/\$1	0	2	8	2	1	0	0	
	1/25¢, 3/50, 6/\$1	0	1	4	1	1	2	0	
1DM, 5DM, 2DM (West Germany)	1/25¢, 5/\$1	0	1	4	1	1	4	0	
	1/50¢, 3/\$1	0	1	4	1	2	4	0	
	-1/1DM, 2/2DM, 6/5DM	2	6	12	30	5	0	0	
1/2x1DM, 1/2DM, 3/5DM	2/1DM, 5/2DM, 14/5DM	0	3	15	6	5	0	0	
		0	13	65	26	5	65	0	
		0	13	65	26	5	65	0	
1F, 5F, 10F (France)	-1/3x1F, 2/5F, 5/10F	4	2	10	20	5	20	0	
25-Cent	-1/25¢, 4/1¢	0	1	0	4	1	0	0	
1-Guilder (Netherlands)	1/25¢, 5/1¢	0	1	0	5	1	0	0	
5-Franc,	1/5F, 2/10F	0	1	0	2	1	0	0	
10-Franc (Belgium)	-1/10F	8	1	0	2	2	0	0	
1F, 2F (Switzerland)	-1/1F, 3/2F	7	3	0	6	2	0	0	
Twin 100-Yen (Japan)	-2/100Y	3	1	4	1	2	0	0	
Twin 100L (Italy)	-1/200 Lire	3	1	4	1	2	0	0	
20¢, \$1 (Australia)	-1/40¢, 3/\$1	5	1	0	6	2	0	0	
10P, 50P (UK)	-1/10P, 5/50P	6	1	5	1	1	0	0	
Any	Free Play	set function 18 to 0 for free play							

## Game Pricing

**PRICING MADE EASY.** Function 19 allows a shorthand method of setting the pricing functions. If a number from one to eight is entered into function 19, a corresponding standard setting (shown in the pricing table above) will be entered into the game. The rest of the pricing functions are automatically set for that standard.

**FOR CUSTOM SETTINGS** first set function 19 to zero. Then set the remaining values according to the pricing table.

**THE GAMES : PRICE RATIO** is equivalent to the ratio X : VC, where:

X = COIN-SLOT MULTIPLIER (the number at function 20, 21 or 22)  
 V = COIN VALUE  
 C = COIN UNITS REQUIRED FOR CREDIT (the number at function 23)

For example (assuming quarter chutes) at factory settings the variables produce 1 : 25x1 or one game for 25¢.

**UNITS REQUIRED FOR BONUS CREDIT** (function 24) is the number of games that must be purchased before a free game is awarded. The factory settings for this function is 0, which means the function is disabled.

**MINIMUM COIN-UNITS** (function 25) determines the number of games that must be purchased before play may begin. The factory setting for this function is 0. This 0 means that the MINIMUM COIN-UNITS feature is disabled.

## Diagnostic Procedures

### DISPLAY TEST

1. Use MANUAL-DOWN and press ADVANCE. Displays should indicate all 0's.
2. Use AUTO-UP. Displays should sequence from all 0's through all 9's. Comma segments should come on when the odd digits are displayed.
3. To stop cycling use MANUAL-DOWN. Press ADVANCE to step through the tests one number at a time. Use AUTO-UP to resume cycling.

### SOUND TEST

1. (From Display Test) Use AUTO-UP and press ADVANCE. Test 00 should be indicated in the CREDITS display and the MATCH display should sequence from 00 through 06. A different sound should be produced for each number.
2. To continuously pulse a single sound use MANUAL-DOWN. Press ADVANCE to step through sounds one at a time. Use AUTO-UP to resume sequencing.
3. Listen for the following words. Missing or damaged words indicate the failure of a particular ROM as shown below. For part-ordering information, see the ROM Summary at the beginning of this manual.

WORDS	ROM NO.	TYPE	BOARD
Feel	U4	2532	Speech
My	U4	2532	Speech
Power	U4	2532	Speech
<b>SORCERER</b>	U5	2532	Speech
You	U5	2532	Speech
Are	U6	2532	Speech
Well	U6	2532	Speech
Done	U6	2532	Speech
Mortal	U49	27128	CPU
I am	U49	27128	CPU
Master	U49	27128	CPU

## LAMP TEST

1. Refer to your system's **Lamp-Matrix Table** for lamp numbers and wiring. CPU-Board connections at jacks 1J6 (rows) and 1J7 (columns) are also shown there.
2. (From *Sound Test*) Use AUTO-UP and press ADVANCE. Test 01 should be indicated in the CREDITS display and all feature-lamps should flash.

## SOLENOID TEST

1. Refer to your **Solenoid Table** for solenoid numbers and wiring. CPU-Board connections at jacks 1J11 and 1J12 are also shown there.
2. (From *Lamp Test*) Use AUTO-UP and press ADVANCE. Test 02 should be indicated in the CREDITS display. The MATCH display sequences from 01 through 25. Corresponding solenoids are pulsed. The flipper relay is de-energized with sub-test 25.
3. Special solenoids (jet bumpers, kickers, etc.) are not pulsed during the *Solenoid Test*. Instead, you must check these solenoids manually. Press on their trigger switches or pull their switch-trigger lines low.
4. To continuously pulse a single solenoid use MANUAL-DOWN. Press ADVANCE to step through controlled solenoids one at a time. Use AUTO-UP to resume sequencing.

## SWITCH TEST

1. Refer to the **Switch-Matrix Table** for switch numbers and wiring. CPU-Board connections at jacks 1J8 (columns) and 1J10 (rows) are also shown there.
2. (From *Solenoid Test*) Use AUTO-UP and press ADVANCE. Test 03 should be indicated in the CREDITS display with the switch numbers sequencing in the BALL-IN-PLAY display.

As a switch number is displayed a sound is produced. As a switch is opened, its number is removed from the sequence. When all switches are open, the BALL-IN-PLAY display is blank and the sounds stop.

3. **HOLD DOWN EACH SWITCH** so its number is shown at least twice. A sound is produced and a switch number is momentarily indicated in the BALL-IN-PLAY display.

**ROW PROBLEMS.** If two switches in a row are indicated with only one switch closed, check for a short between the column wires.

**FOR MULTIPLE INDICATIONS** check the column wire for a short to ground.

**COLUMN PROBLEMS.** If two switches in a column are indicated with only one switch closed, check for a short between row wires.

4. **PLAYFIELD OR CPU BOARD?** To determine whether the problem is in the playfield or the CPU Board, remove connectors 1P8 and 1P10 from the CPU Board. Now enter the Switch Test. Use a jumper wire to simulate switch operation.

For example, on the Switch-Matrix Table notice that placing a jumper between 1J10-pin 9 and 1J8-pin 2 should produce an indication of switch 09 being closed.

## AUTO-CYCLE MODE

1. The **Auto-Cycle Mode** permits you to check intermittent problems in the playfield, backbox, cabinet and CPU Board.
2. Set function 50 of Test 04 (**Bookkeeping Mode**) to 15.
3. Press ADVANCE to start the **Auto-Cycle Mode**. This mode repeatedly sequences through the Display Test, Sound Test (00), Lamp Test (01), and Solenoid Test (02).
4. This sequence is repeated until the game is turned off and on.

## SYSTEM-9 MEMORY-CHIP TEST

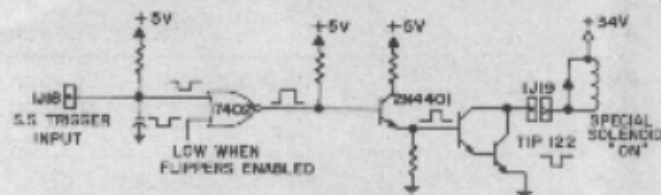
Press the DIAGNOSTIC button on the CPU Board. The CPU Board's seven-segment display provides the following indications.

INDICATION	PROBABLE CAUSE
0	test passed (game returns to <b>Game-Over Mode</b> )
1	CPU-Board lockup; also check memory-protect circuit and U18 CMOS RAM for stuck bits
2	U20 Game ROM 1 faulty
3	U20 Game ROM 1 faulty
4	U19 Game ROM 2 faulty
5	Blanking-signal stuck, coin door closed, memory-protect circuit faulty, or U18 CMOS RAM faulty
7	CPU-Board lockup or PIA U5 faulty
None	U20 Game-ROM 1 faulty

## SOUND-SECTION TEST FOR SYSTEM 9

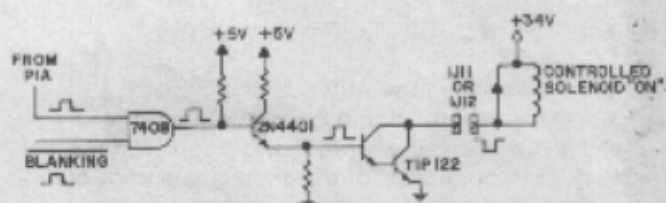
- PRESS THE DIAGNOSTIC BUTTON SW2** on the CPU Board. Several electronic sounds should be produced. This sequence of sounds is repeated until the game is turned OFF and back ON.
- NO SOUND IN DIAGNOSTIC TEST** (but sounds are present in the Self Test): Check the sound-select inputs (pins 2 through 9 of U 13) to see if they pulse during Test 00.
- NO SOUND:** Check the -12V-supply voltage on the CPU Board. If this voltage is low (or AC ripple seems too high)...
  - Check the gray and gray-green transformer secondary wires for 18.7VAC.
  - Check the -12V filter-capacitor C7 on the CPU Board;
  - Check for excessive AC [over 0.75 VAC] across C7 on the CPU Board.
- STILL NO SOUND:** Turn the volume control all the way up. With the game turned on, momentarily place a powered-up AC soldering-pencil on the center tap of the volume control. **DO NOT** use a soldering iron of over 40 watts. Cordless models will NOT work here.
  - If you hear a low hum**, the power-amplifier chip (TDA2002), volume control and speaker are okay.
  - If you don't hear a hum**, try the test again with the volume control turned halfway up.

## SPECIAL-SOLENOID LOGIC FOR "ON" STATE



**IN THE SOLENOID-OFF STATE**, (1) the switch trigger (eg., kicker switch) goes high. (2) Meanwhile the PIA line remains low. (3) The rest of the signals reverse their phase. *(These six solenoids aren't pulsed during the Solenoid Test. Instead, you must check them manually: Press on their trigger switches or pull their switch-trigger lines low.)*

## CONTROLLED-SOLENOID LOGIC FOR "ON" STATE



**IN THE SOLENOID-OFF STATE**, (1) the PIA line goes low (2) Meanwhile the BLANKING signal remains high. (3) The rest of the signals reverse their phase.

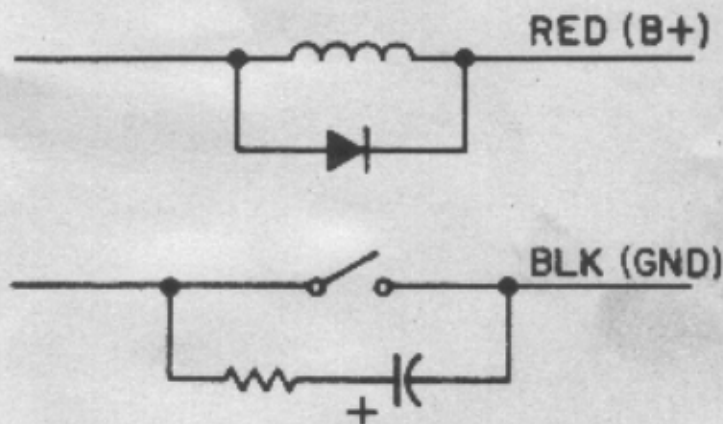
### System-9 Solenoid Table

SOL. NO.	FUNCTION	SOLENOID TYPE	WIRE COLOR	CONNECTIONS		DRIVER TRANS.	SOLENOID PART NO.
				CPU BOARD	PLAYFIELD/CABINET		
01	Outhole	controlled	GRY-BRN	1J11-1	8P3-1	Q47	SA-23-850-DC
02	Ramp Eject	controlled	GRY-RED	1J11-3	8P3-2	Q48	SG1-23-850-DC
03	Multi-Ball Eject	controlled	GRY-ORN	1J11-4	8P3-3	Q49	SG1-23-850-DC
04	3-Bank Drop Target	controlled	GRY-YEL	1J11-5	8P3-4	Q50	SA-3-23-850-DC
05	Demon Background	controlled	GRY-GRN	1J11-6	8P3-5	Q39	#63 Flashlamp
06	3-Bank Flash	controlled	GRY-BLU	1J11-7	8P3-6	Q40	#63 Flashlamp
07	<b>SORCERER</b> Bank	controlled	GRY-VIO	1J11-8	8P3-7	Q41	#63 Flashlamp
08	Flash Eyes (cabinet)	controlled	GRY-BLK	1J11-9	8P3-8	Q42	5580-08994-00
09	Not Used	controlled	BRN-BLK	1J12-1	8P3-9	Q54	—
10	Not Used	controlled	BRN-RED	1J12-2	8P3-10	Q55	—
11	General Illumination	controlled	BRN-ORN	1J12-4	3P7-1	Q56	5580-09555-00
12	Not Used	controlled	BRN-YEL	1J12-5	8P3-12	Q57	—
13	Not Used	controlled	BRN-GRN	1J12-6	8P3-13	Q58	—
14	Not Used	controlled	BRN-BLU	1J12-7	8P3-14	Q59	SA-4-23-850-DC
15	Bell	controlled	BRN-VIO	1J12-8	7P1-17	Q60	SM-29-1000-DC
16	Coin-Lockout Coil	controlled	BRN-GRY	1P12-9	7P1-18, 7P2-4	Q61	SM-35-4000-DC
*17	Left Kicker	special #1	BLU-BRN	1J19-7	8P3-17	Q75	SG1-23-850-DC
*18	Right Kicker	special #2	BLU-RED	1J19-4	8P3-18	Q77	SG1-23-850-DC
*19	Left Jet-Bumper	special #3	BLU-ORN	1J19-3	8P3-19	Q79	SG1-23-850-DC
*20	Lower Jet-Bumper	special #4	BLU-YEL	1J19-6	8P3-20	Q81	SG1-23-850-DC
*21	Right Jet-Bumper	special #5	BLU-GRN	1J19-8	8P3-21	Q83	SG1-23-850-DC
*22	Not Used	special #6	BLU-BLK	1J19-9	8P3-22	Q85	—
—	Top Flipper		BLK-BLU	1J19-2	7P1-30	—	FL24/600-30/2600-50VDC
—	Right Flipper*		ORN-VIO	1J19-1	7P1-7	—	FL23/600-30/2600-50VDC
—	Left Flipper*		ORN-GRY	1J19-2	7P1-9	—	FL23/600-30/2600-50VDC

#### \*NOTES

- Special-switch connections for solenoids 17 thru 21 are as follows:  
 17—ORN-BRN—1J18-5, 8P3-24  
 18—ORN-RED—1J18-3, 8P3-25  
 19—ORN-BLK—1J18-2, 8P3-26  
 20—ORN-YEL—1J18-4, 8P3-27  
 21—ORN-GRN—1J18-8, 8P3-28
- FLIPPER COILS.** This game requires 50-volt flipper coils. For proper operation, the replacement part shown **MUST** be used.
- Flipper-button connections:  
 Right—ORN-VIO—1J19-1, 7P1-7  
 Left—ORN-GRY—1J19-2, 7P1-9  
 Top—BLK-BLU—1J19-2, 7P1-30

- Typical wiring for solenoids and special switches follows.



### System 9 Lamp-Matrix Table

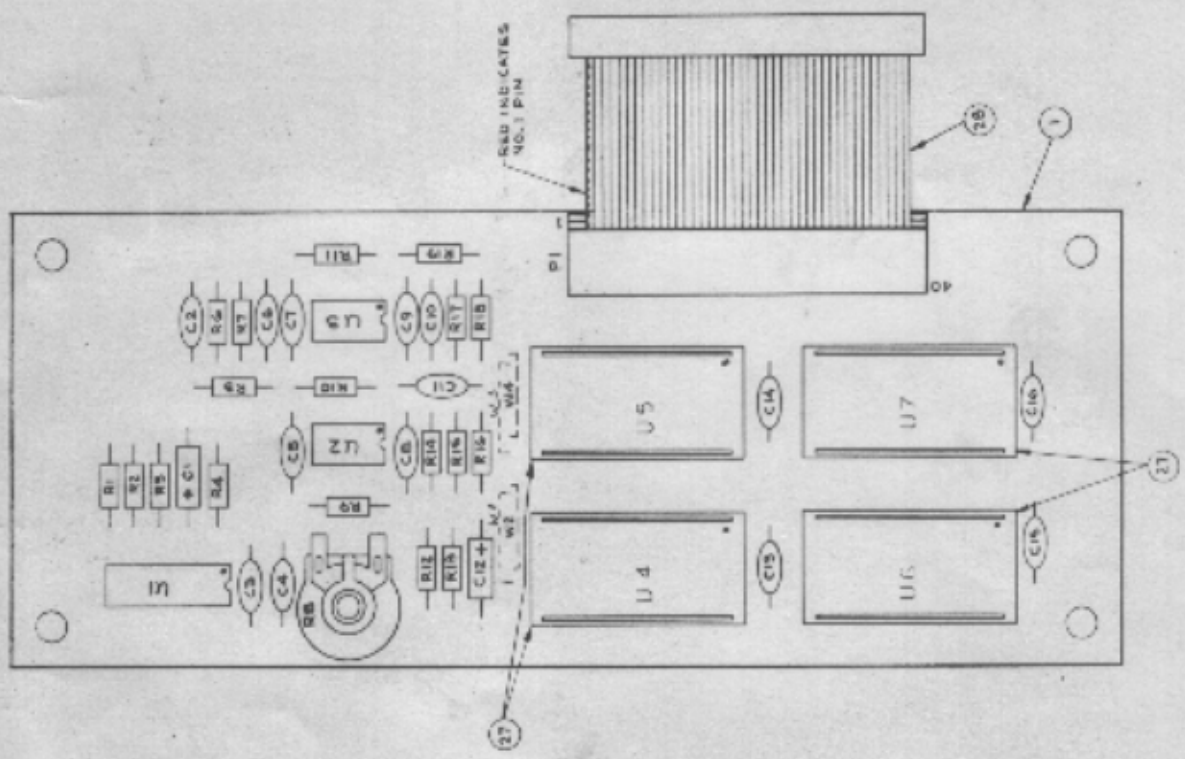
COLUMN ROW	1 YEL-BRN 1J7-1	2 YEL-RED 1J7-2	3 YEL-ORN 1J7-3	4 YEL-BLK 1J7-4	5 YEL-GRN 1J7-5	6 YEL-BLU 1J7-7	7 YEL-VIO 1J7-8	8 YEL-GRY 1J7-9
1 RED-BRN 1J6-1	Game Over Lamp 1	S 9	A 17	Right Drain 25	1 33	9 41	2X 49	Backglass Effect 57
2 RED-BLK 1J6-2	Match 2	O 10	B 18	Left Flipper Ret. 26	2 34	10 42	4X 50	Backglass Effect 58
3 RED-ORN 1J6-3	Tilt 3	R 11	C 19	Right Flipper Ret. 27	3 35	20 43	6X 51	Backglass Effect 59
4 RED-YEL 1J6-5	High-Score-To-Date 4	C 12	D 20	All Scores 2X 28	4 36	30 44	8X 52	Backglass Effect 60
5 RED-GRN 1J6-6	Shoot Again (Insert) 5	E 13	Extra Ball 21	All Scores 3X 29	5 37	40 45	Left Drop-Tgt 53	Backglass SORCERER art 61
6 RED-BLU 1J6-7	Ball-In-Play 6	R 14	Bonus Hold Over 22	All Scores 5X 30	6 38	50 46	Center Drop-Tgt 54	Backglass SORCERER art 62
7 RED-VIO 1J6-8	Shoot Again (Pld) 7	E 15	Demon 23	Light Below "S" 31	7 39	Lock 47	Right Drop-Tgt 55	Backglass SORCERER art 63
8 RED-GRY 1J6-9	Play-field Special 8	R 16	Left Drain 24	Light Below "R" 32	8 40	Release 48	Backglass Effect 56	Backglass SORCERER art 64

### System 9 Switch-Matrix Table

COLUMN ROW	1 GRN-BRN 1J8-1	2 GRN-RED 1J8-2	3 GRN-ORN 1J8-3	4 GRN-YEL 1J8-4	5 GRN-BLK 1J8-5	6 GRN-BLU 1J8-7	7 GRN-VIO 1J8-8	8 GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb-Tilt 1	Left Spinner S 9	A 17	Right Drain 25	Right Kicker 33	Not Used 41	Not Used 49	Not Used 57
2 WHT-RED 1J10-8	Ball-Roll Tilt 2	O 10	B 18	Left Flip Ret. 26	Left Drop-Tgt 34	UPR-L Switch 42	Not Used 50	Not Used 58
3 WHT-ORN 1J10-7	Credit Button 3	R 11	C 19	Right Flip Ret. 27	Center Drop-Tgt 35	Lane Switch 43	Not Used 51	Not Used 59
4 WHT-YEL 1J10-6	Right Coin 4	C 12	D 20	Outhole 28	Right Drop-Tgt 36	Lane Change 44	Not Used 52	Not Used 60
5 WHT-GRN 1J10-5	Center Coin 5	E 13	Left Jet 21	Ramp 1 29	Multi-Ball Ramp 37	Play-Field Tilt 45	Not Used 53	Not Used 61
6 WHT-BLU 1J10-3	Left Coin 6	R 14	Lower Jet 22	Ramp 2 30	Multi Ball SW 38	Not Used 46	Not Used 54	Not Used 62
7 WHT-VIO 1J10-2	Slam Tilt 7	E 15	Right Jet 23	Shooter Lane SW 31	Lower Right SW 39	Not Used 47	Not Used 55	Not Used 63
8 WHT-GRY 1J10-1	High-Score Reset 8	Right Spinner R 16	Left Drain 24	Left Kicker SW 32	Lower Left SW 40	Not Used 48	Not Used 56	Not Used 64

C-10716

SPEECH BOARD



ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	RECD. NO.
1	02681-00	U1	BASE PC BOARD	1
2	02681-00	U1	3MM CONTINUOUSLY VARIABLE SLOPE DELTA MODULATOR	1
3	02681-00	U3, U8	455 DUAL OP-AMP	2
4	02681-00	W2, W6	RESISTOR, C.F.	2
5	02681-00		Q OHM	
6				
7				
8				
9	5010-	R11	RESISTOR, FC, 220 K OHM 5% 1/4 WATT	1
10	02681-00	R1, R2, R3, R4, R5	RESISTOR, FC, 10 K OHM 5% 1/4 WATT	6
11	02681-00	R5	RESISTOR, FC, 43 K OHM 5% 1/4 WATT	1
12	02681-00	R6	RESISTOR, FC, 180 K OHM 5% 1/4 WATT	1
13	02681-00	R7	RESISTOR, FC, 36 K OHM 5% 1/4 WATT	1
14	02681-00	R8	POTENTIOMETER, 5K OHM	1
15	02681-00	R9, R10, R11, R12, R13, R14	RESISTOR, FC, 21 K OHM 5% 1/4 WATT	5
16	02681-00	R15, R16	RESISTOR, FC, 2.1 K OHM 5% 1/4 WATT	2
17	02681-00	R17	RESISTOR, FC, 15 K OHM 5% 1/4 WATT	1
18	02681-00	C4	CAPACITOR, POLYSTYRENE, 50T MFD, 50V	1
19	02681-00	C5	CAPACITOR, POLYSTYRENE, 100 MFD, 50V	1
20	02681-00	C6	CAPACITOR, POLYSTYRENE, 100 MFD, 50V	1
21	02681-00	C7, C8, C9, C10	CAPACITOR, CERAMIC, .01 MFD, 50V	9
22	02681-00	C1	CAPACITOR, TANTALUM, 1 MFD, 35V	1
23	02681-00	C2	CAPACITOR, POLYSTYRENE, 100 MFD, 50V	1
24	02681-00	C12	CAPACITOR, ELECTROLYTIC, 10 MFD, 16V	1
25	02681-00	C11	CAPACITOR, POLYSTYRENE, 4100 PFD, 50V	1
26	02681-00	C10	CAPACITOR, POLYSTYRENE, 1300 PFD, 50V	1
27	02681-00	PI	24 PIN SOCKET	4
28	02681-00		REBORN CABLE ASSEM.	1

NOTE:  
FOR SCHEMATIC, REFER TO DWG. # 16-8937.  
ASSEMBLY IS C-10717 - Same number  
ASSEMBLY INCLUDES 2532 or 2732 ROMS (M-17)  
SEE ROM SUMMARY FOR ROM PART NUMBERS

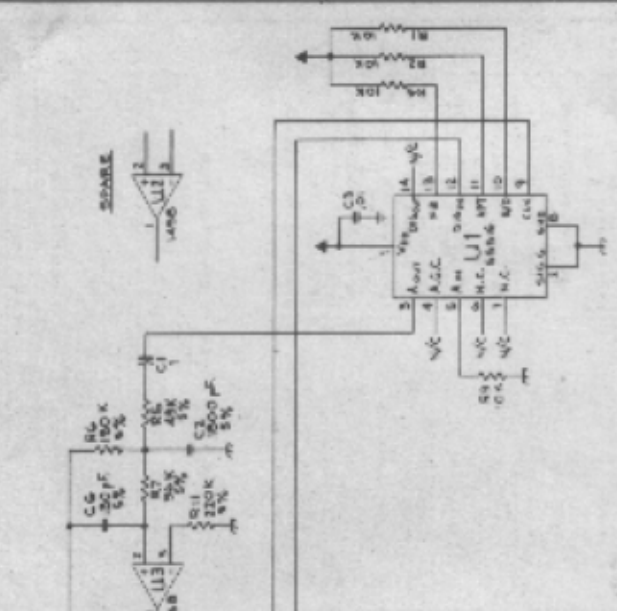
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DESIGNED BY	...		
CHECKED BY	...		
APPROVED BY	...		
DATE	10/11/66	BY	J. J. ...
DESIGNED BY	...		
CHECKED BY	...		
APPROVED BY	...		
DATE	10/11/66	BY	J. J. ...
DESIGNED BY	...		
CHECKED BY	...		
APPROVED BY	...		

REVISION	1	DATE	10/11/66
NEW PART RELEASE	YES	DATE	10/11/66
REVISION	1	DATE	10/11/66

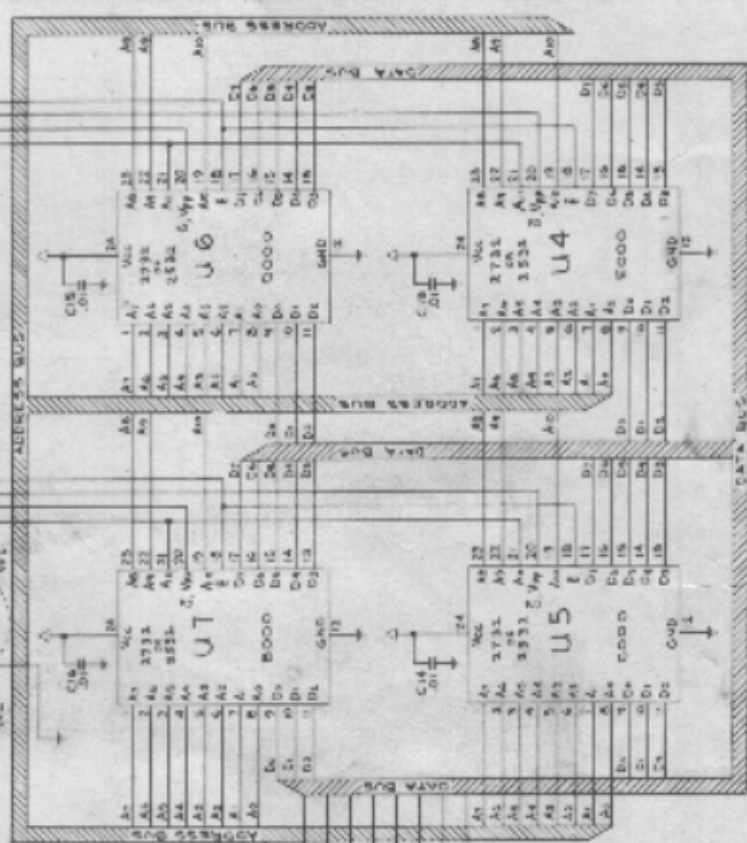
16-8937

- (PS-25) 500 OHM 1/2W
- (PS-26) ANALOG 500 OHM
- (PS-27) 10 OHM 1/2W
- (PS-28) 5 VOLTS DIGITAL
- (PS-29) 5 VOLTS ANALOG
- (PS-30) 2.5VDC
- (PS-31) SOUND ANALOG INPJT
- (PS-32) MIXED SOUND/SPEECH OUTPUT
- (PS-33) SPEECH CLOCK
- (PS-34) SPEECH DATA
- (PS-35) R/W V/C
- (PS-36) RESET V/C

SEE NOTES



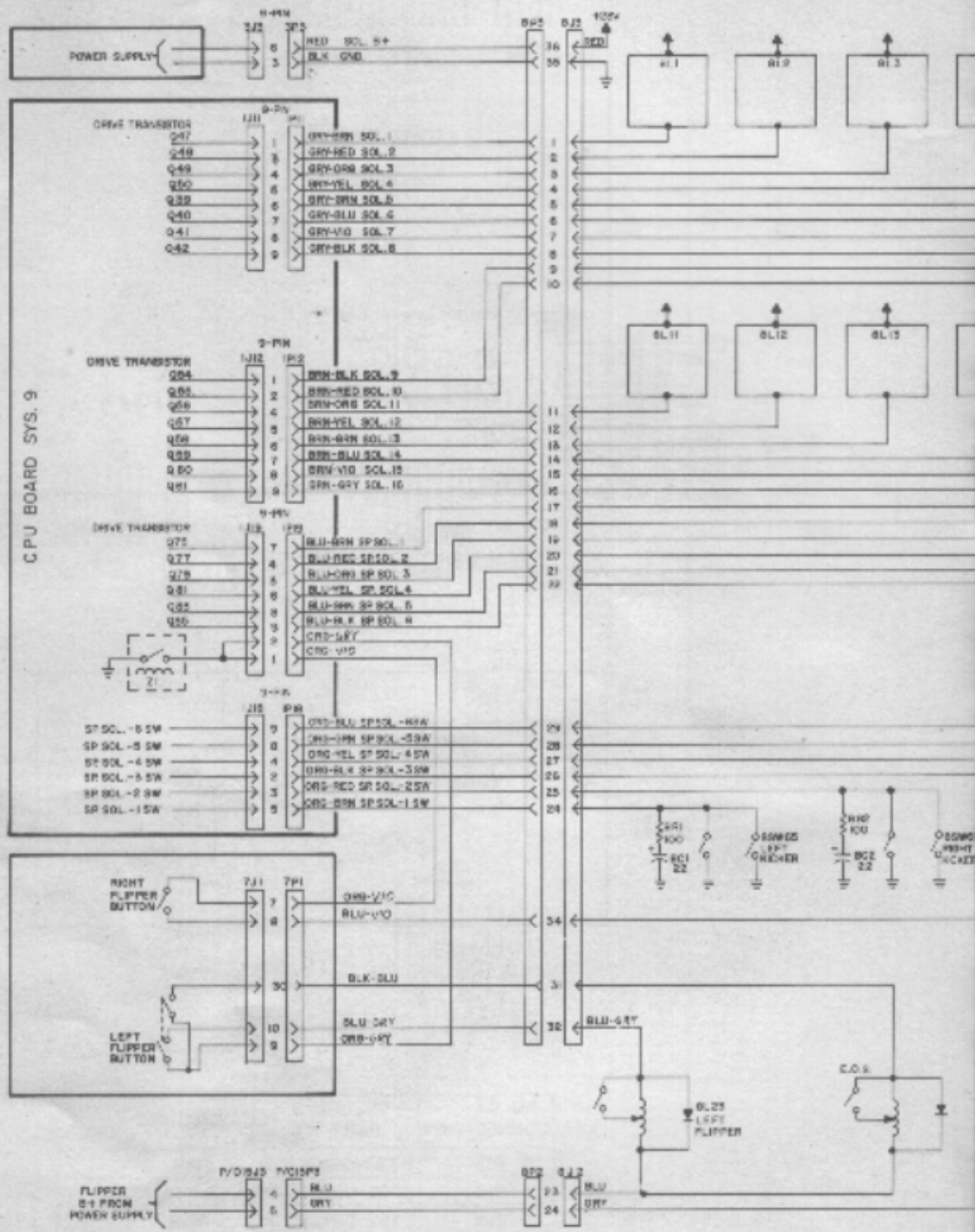
### SPEECH BOARD

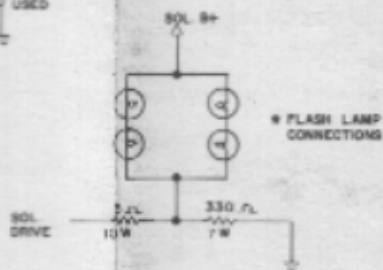
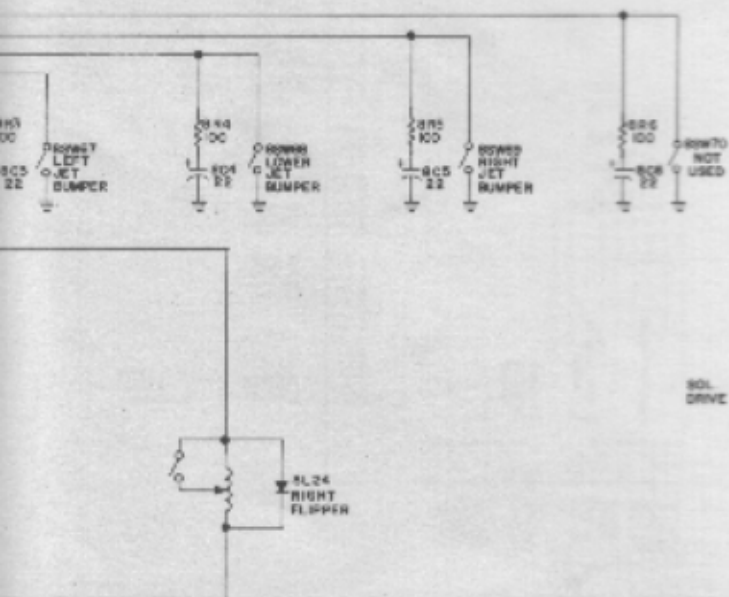
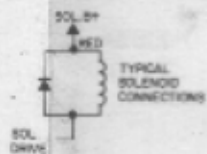
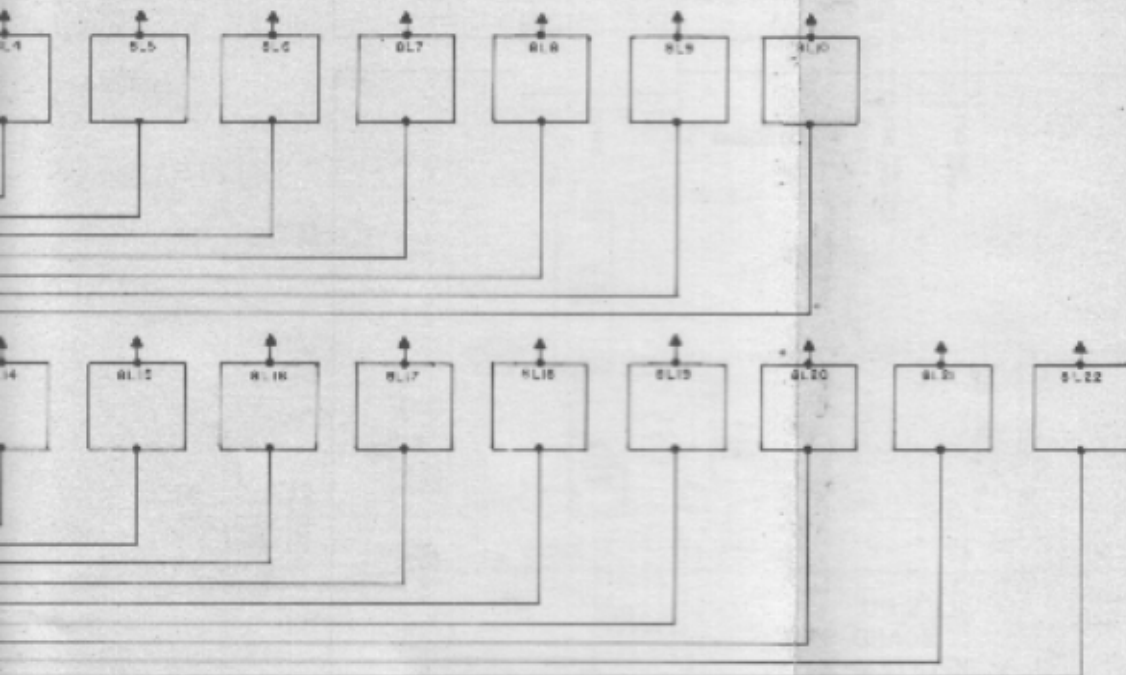


- NOTES:**
1. ALL RESISTORS, 1/4 WATT UNLESS OTHERWISE NOTED.
  2. ALL CAPACITORS, MFD.
  3. STUFF JUMPERS W/ 5% RES FOR 2532 & 2535.
  4. STUFF JUMPERS W/ 5% RES FOR 2732 & 2735.

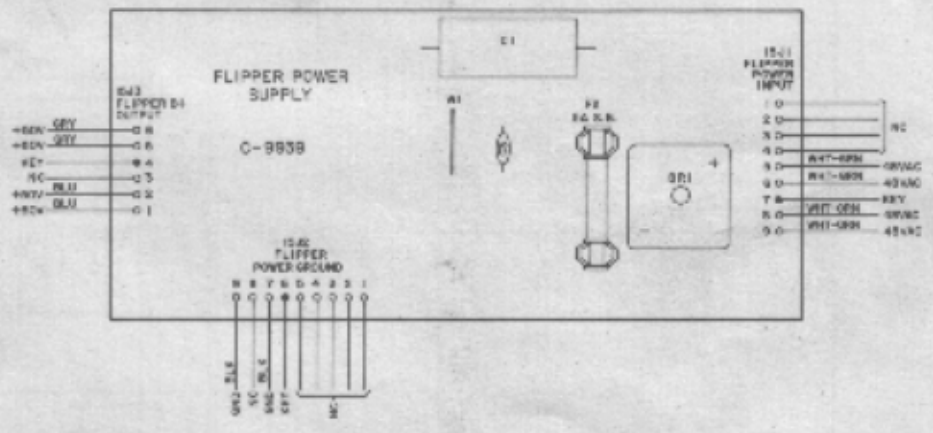
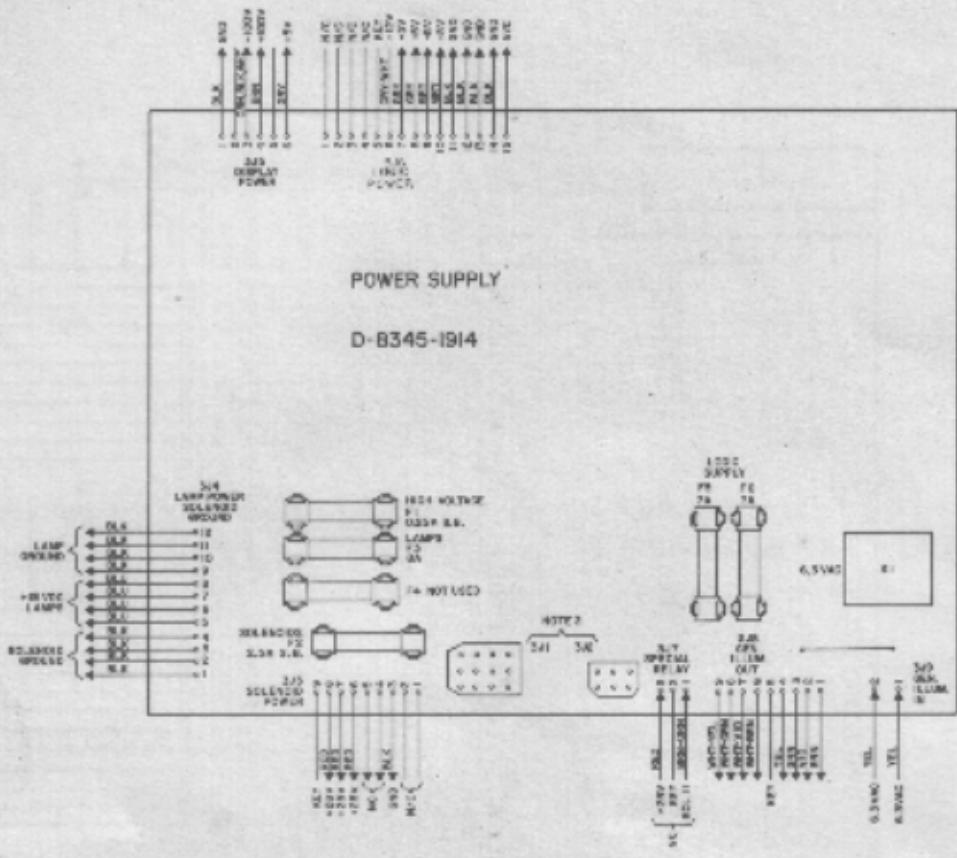
PREPARED BY WILLIAMS ELECTRONICS, INC. 1001 S. WASHINGTON ST., WASHINGTON, D.C. 20540		PART NO. 16-8937
DRAWN BY J. J. ...		REV. 1
CHECKED BY ...		DATE ...
APPROVED BY ...		WAVEFORM ...
TITLE SCHEMATIC, SPEECH MODULE		PART NO. 16-8937



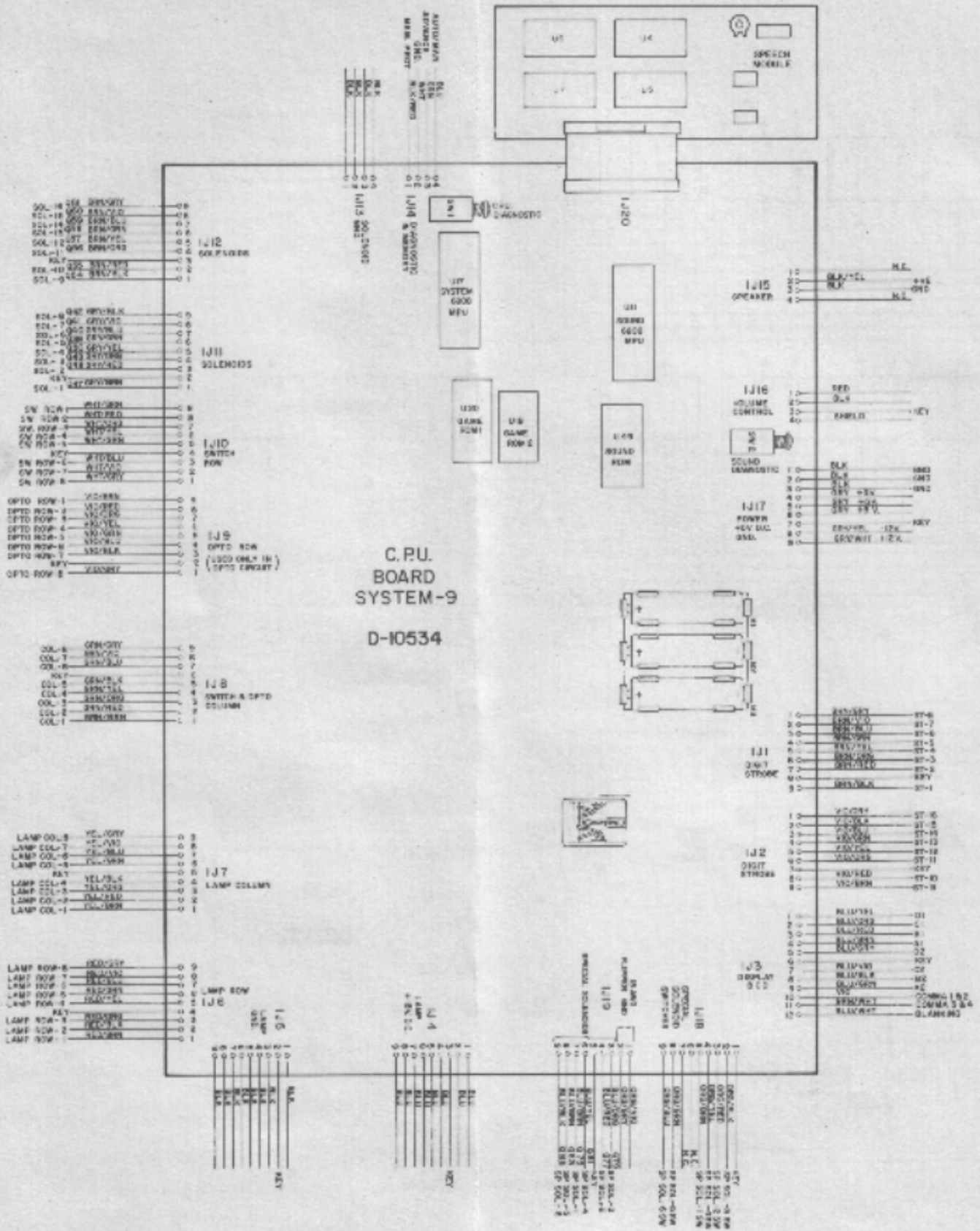




SYSTEM 9 PLAYFIELD-SOLENOID & SPECIAL-SWITCH WIRING DIAGRAM

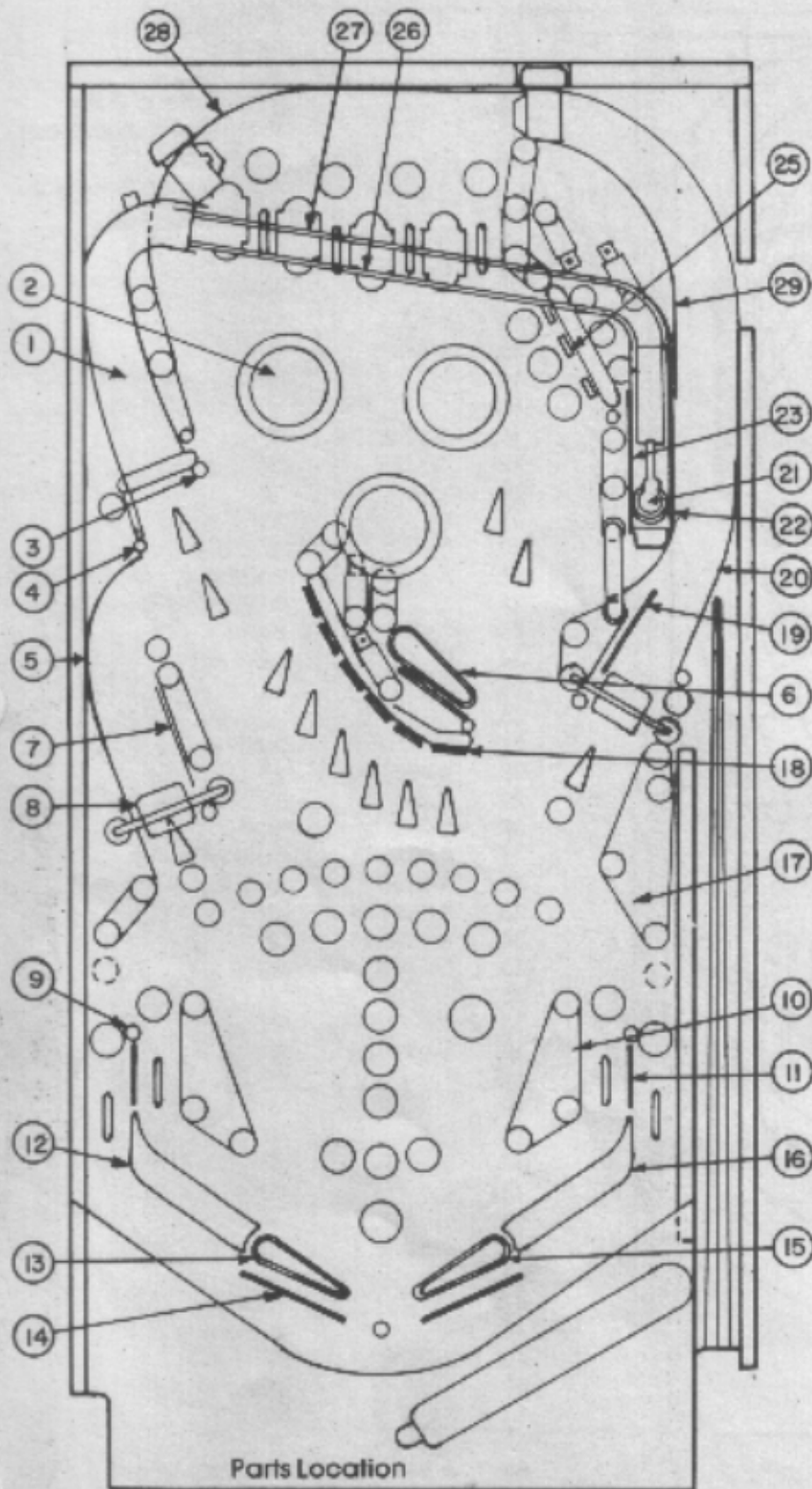


NO. OF CONNECTIONS	WILLIAMS PART NO.	LOCATIONS
4 PIN	5792-09103-00	IP6
4 PIN	5792-09288-00	IP3, IP4, IP5
9 PIN	5792-09359-00	IP9
9 PIN	5792-09290-00	IP1, IP2, IP4, IP5, IP6, IP7, IP8, IP9 IP10, IP11, IP12, IP17, IP18
12 PIN	5792-09103-00	IP3



C.P.U. BOARD SYSTEM 9

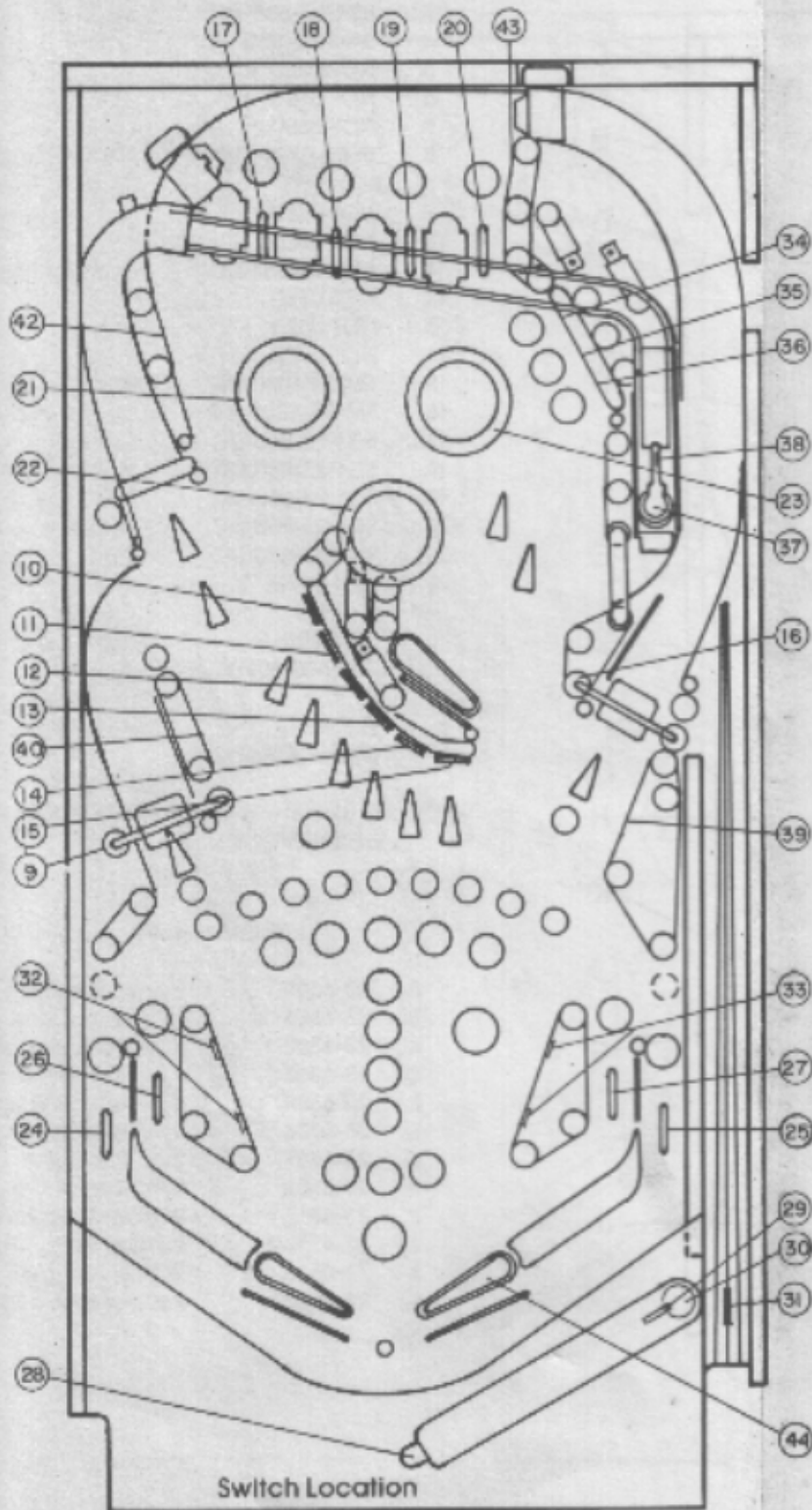
# PLAYFIELD PARTS



## PLAYFIELD PARTS

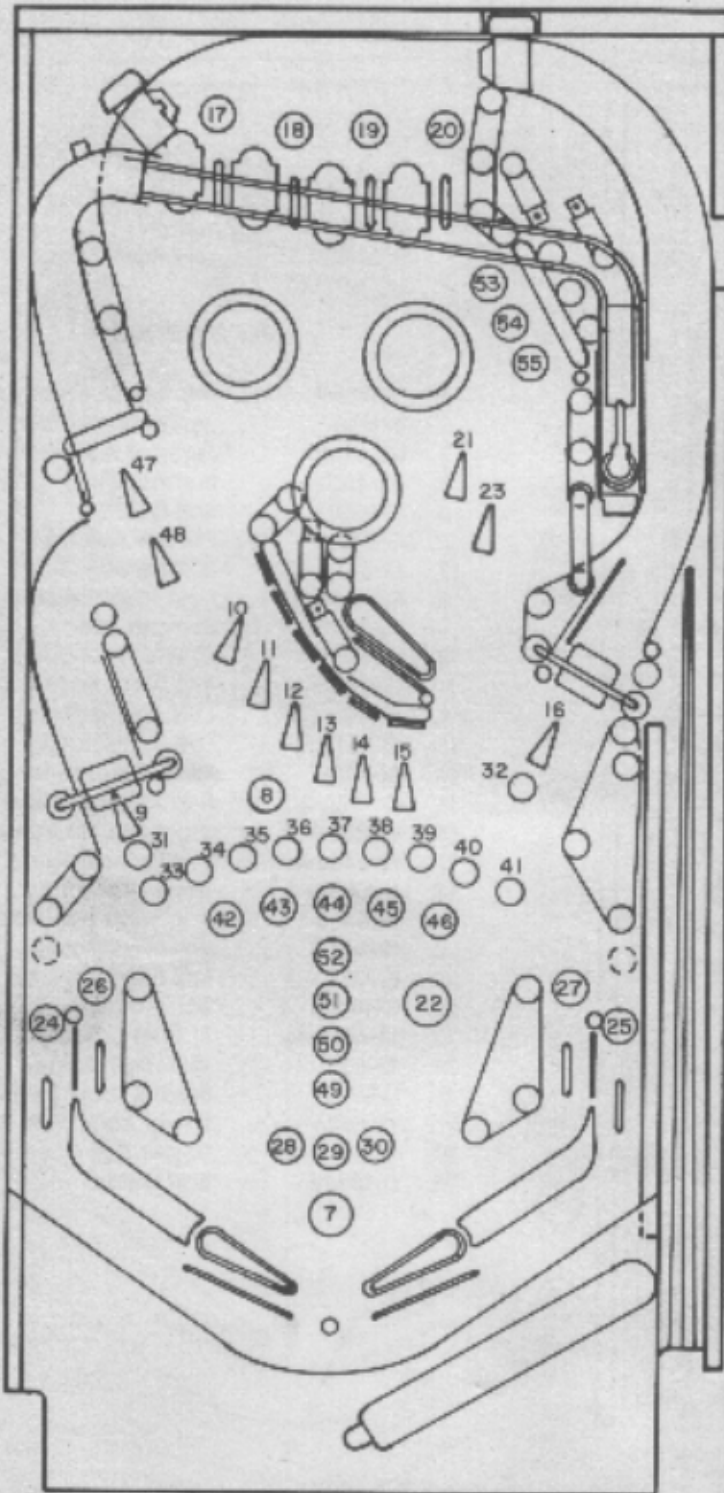
- |     |            |                               |
|-----|------------|-------------------------------|
| 1.  | D-10550    | Ball Chute Assembly           |
| 2.  | B-9414     | Jet Bumper Assembly           |
| 3.  | 02-4036    | Bumper Post                   |
| 4.  | 02-4003    | Bumper Post                   |
| 5.  | C-10552    | Ball Guide                    |
| 6.  | C-10605-L  | Flipper Assembly              |
| 7.  | 12-6466-12 | 3" Wire Ball Guide            |
| 8.  | B-9655-532 | Spin Target Assembly          |
| 9.  | 02-3905    | Bumper Post                   |
| 10. | 12-6466-8  | 2" Wire Ball Guide            |
| 11. | 12-6466-7  | 1 1/4" Wire Ball Guide        |
| 12. | A-8108-L   | Left Flipper Return Assembly  |
| 13. | C-9953-L   | Left Flipper Assembly         |
| 14. | 12-6468    | Wire Anti-Rebound             |
| 15. | C-9952-R   | Right Flipper Assembly        |
| 16. | A-8108-R   | Right Flipper Return Assembly |
| 17. | 12-6466-4  | 1" Wire Ball Guide            |
| 18. | A-10038    | Target Assembly               |
| 19. | 12-6466-11 | 2 3/4" Wire Ball Guide        |
| 20. | 12-6644    | Wire Ball Guide               |
| 21. | B-9361-R-3 | Ball Eject Assembly           |
| 22. | C-10548    | Ball Guide                    |
| 23. | 12-6466-16 | 4" Wire Ball Guide            |
| 24. | 12-6651    | Wire Ball Guide               |
| 25. | D-9355     | 3-Bank Drop Target            |
| 26. | 12-6626    | Lower Ball Chute Wire         |
| 27. | 12-6625    | Upper Ball Chute Wire         |
| 28. | D-10549    | Ball Guide                    |

# SWITCH LOCATIONS



ITEM NO.	ASSEMBLY NO.	FUNCTION
1.	A-8476	Plumb tilt
2.	B-6572	Ball Roll Tilt
3.	B-8536	Credit Button
4.	5647-10141-00	Right Coin Switch
5.	BLANK FOR DOMESTIC	Center Coin Switch
6.	5647-10141-00	Left Coin Switch
7.	SW-1A-127	Slam Tilt
8.	5647-09957-00	High Score Reset
9.	B-8307	Left Spinner, "S"
10.	A-9267	"O" Target
11.	"	"R" Target
12.	"	"C" Target
13.	"	"E" Target
14.	"	"R" Target
15.	"	"E" Target
16.	B-8307	Right Spinner, "R"
17.	B-8410	"A"
18.	"	"B"
19.	"	"C"
20.	"	"D"
21.	B-8316	Left Jet Bumper
22.	"	Lower Jet Bumper
23.	"	Right Jet Bumper
24.	B-8410	Left Drain
25.	"	Right Drain
26.	"	Left Flipper Return
27.	"	Right Flipper Return
28.	A-10417	Outhole
29.	B-8642	Ramp 1
30.	A-8659	Ramp 2
31.	B-8677	Shooter Lane
32.	B-8284	Left Kicker
33.	B-8284	Right Kicker
34.	A-9417	Left Drop Target
35.	"	Center Drop Target
36.	"	Right Drop Target
37.	A-10590	Ramp Eject for MULTIBALL
38.	A-8659	Ramp Switch for MULTIBALL
39.	A-4834-K	Lower Right Switch
40.	A-4834-K	Lower Left Switch
41.	NOT USED	NOT USED
42.	A-4834-K	Upper Left Switch
43.	A-4834-J	Lamp Shift
44.	B-9951	Lane Change
45.	B-8306	Playfield Tilt
46-64.	NOT USED	NOT USED

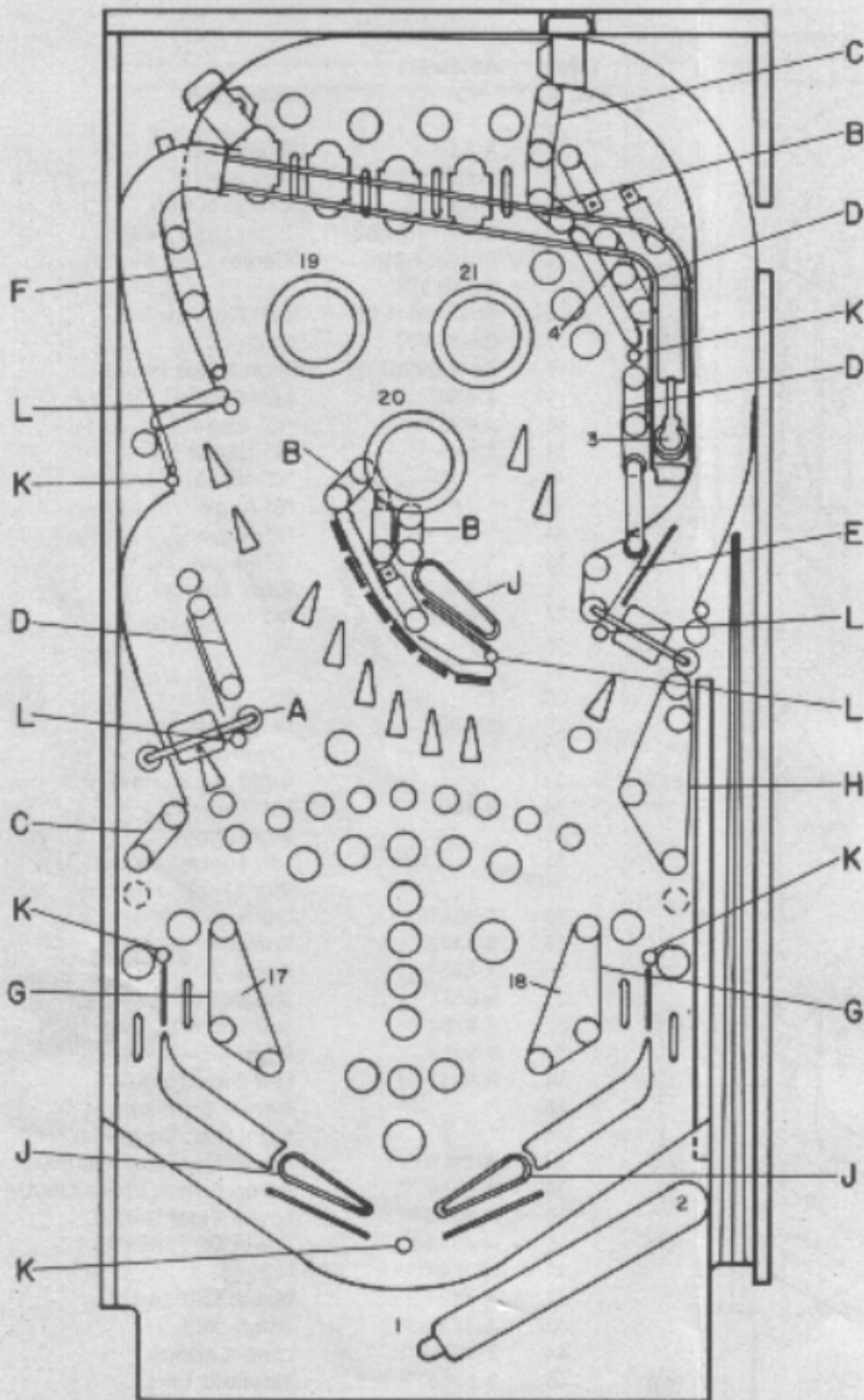
# LAMP LOCATIONS



ITEM NO.	ASSEMBLY NO.	FUNCTION
1.	A-8262	Game Over
2.	"	Match
3.	"	Tilt
4.	"	High Score to Date
5.	"	Shoot Again (Backglass)
6.	"	Ball-in-Play
7.	A-8265	Shoot Again (Playfield)
8.	A-8265	Special
9.	B-9558-41	"S"
10.	B-8445	"O"
11.	"	"R"
12.	"	"C"
13.	B-8443	"E"
14.	"	"R"
15.	"	"E"
16.	A-8265	"R"
17.	A-8265	"A"
18.	"	"B"
19.	"	"C"
20.	"	"D"
21.	A-8265	Extra Ball
22.	"	Bonus Hold Over
23.	"	DEMON
24.	"	Left Drain
25.	"	Right Drain
26.	"	Left Flipper Return
27.	"	Right Flipper Return
28.	B-9558-42	2X
29.	"	3X
30.	"	5X
31.	B-9558-41	Light Below "S"
32.	A-8265	Light Below "R"
33.	B-9558-41	"1"
34.	B-9558-21	"2"
35.	"	"3"
36.	"	"4"
37.	"	"5"
38.	B-9558-39	"6"
39.	"	"7"
40.	"	"8"
41.	"	"9"
42.	B-8445	"10"
43.	"	"20"
44.	"	"30"
45.	A-8265	"40"
46.	"	"50"
47.	"	Lock
48.	"	Release
49.	B-9558-21	2X
50.	"	4X
51.	"	6X
52.	"	8X
53.	A-8449	Left Drop Target
54.	"	Center Drop Target
55.	"	Right Drop Target
56-64	GENERAL ILLUMINATION	

# SOLENOIDS AND RUBBERS

# SOLENOIDS



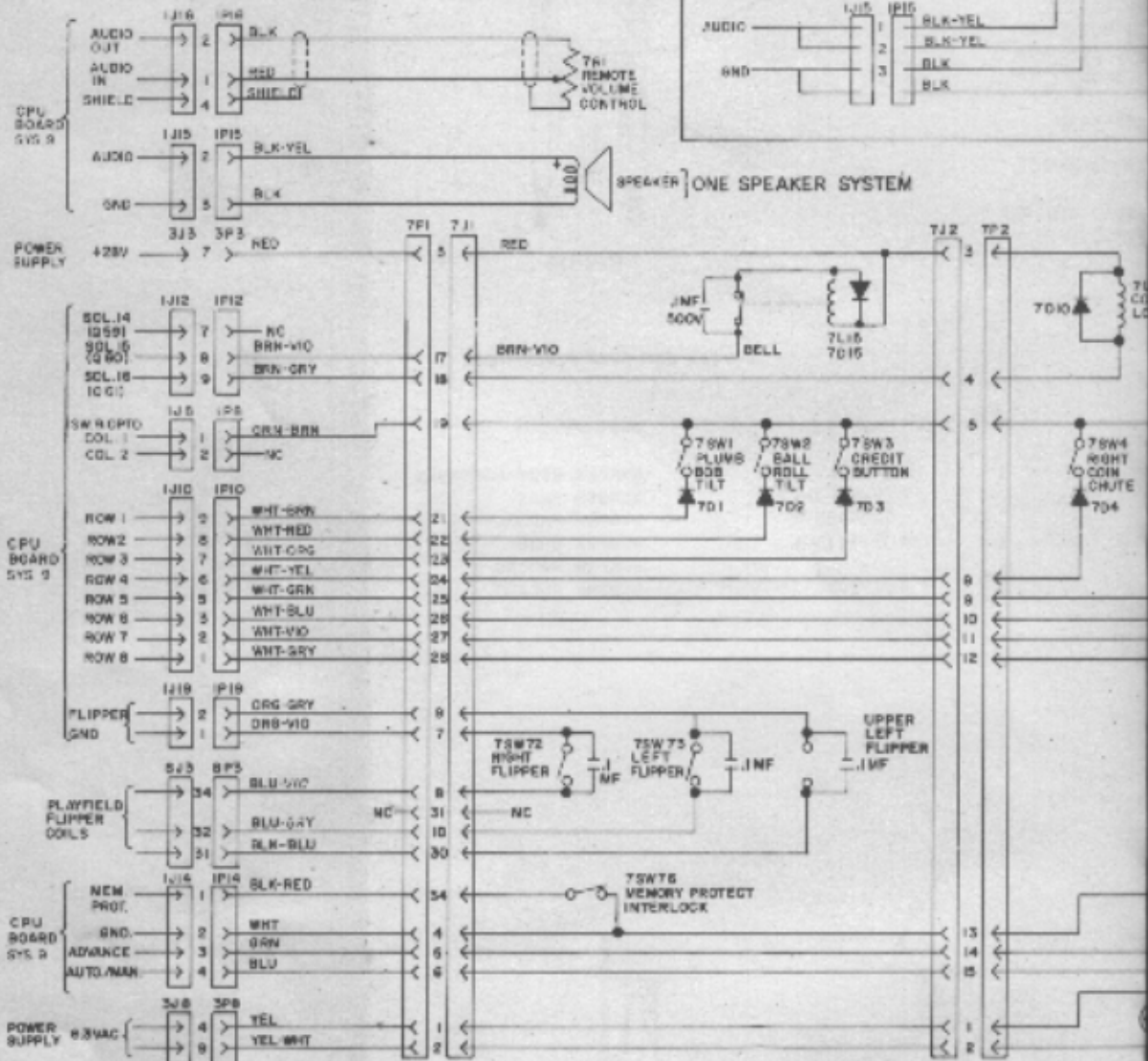
ITEM NO.	ASSEMBLY NO.	FUNCTION
1.	SA-23-850-DC	Outhole
2.	SG1-23-850-DC	Ramp Eject
3.	SG1-23-850-DC	MULTI-BALL Eject
4.	SA-3-23-850-DC	3-Bank Drop T
5.	NOT USED	-
6.	NOT USED	-
7.	NOT USED	-
8.	5580-08994-00	Flipper-Enable Relay
9.	NOT USED	-
10.	NOT USED	-
11.	5580-09555-00	General Illumin
12.	NOT USED	-
13.	NOT USED	-
14.	NOT USED	-
15.	SM-29-1000-DC	Bell
16.	SM-35-4000-DC	Coin-Lockout
17.	SG1-23-850-DC	Left Kicker
18.	SG1-23-850-DC	Right Kicker
19.	SG1-23-850-DC	Left Jet Bumper
20.	SG1-23-850-DC	Lower Jet Bump
21.	SG1-23-850-DC	Right Jet Bump
22.	NOT USED	-
	FL24/600-30/2600-50VDC	Top Flipper
	FL23/600-30/2600-50VDC	Right Flipper
	FL23/600-30/2600-50VDC	Left Flipper

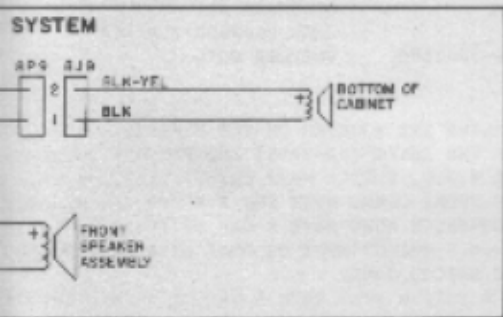
## RUBBER PARTS

A.	23-6300	5/8" Rubber Ring
B.	23-6301	3/4" Rubber Ring
C.	23-6302	1" Rubber Ring
D.	23-6303	1 1/4" Rubber Ring
E.	23-6304	1 1/2" Rubber Ring
F.	23-6306	2 1/2" Rubber Ring
G.	23-6307	2 3/4" Rubber Ring
H.	23-6308	3 3/4" Rubber Ring
I.	23-6313-1	Rubber Grommet
J.	23-6519-4	Rubber Ring - Red
K.	23-6535	Rubber Bumper
L.	23-6552	Rubber Sleeving

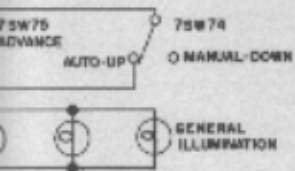
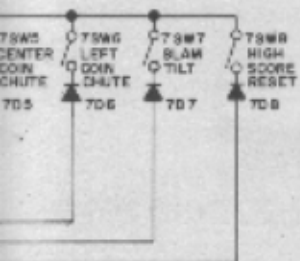


CABLE: H-8527





OUT



CABINET WIRING DIAGRAM

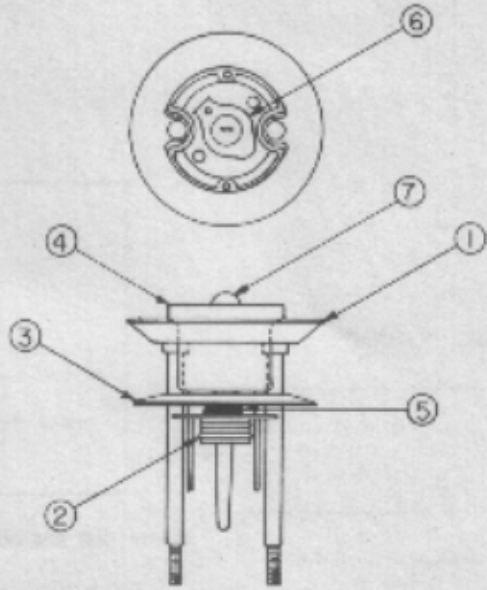
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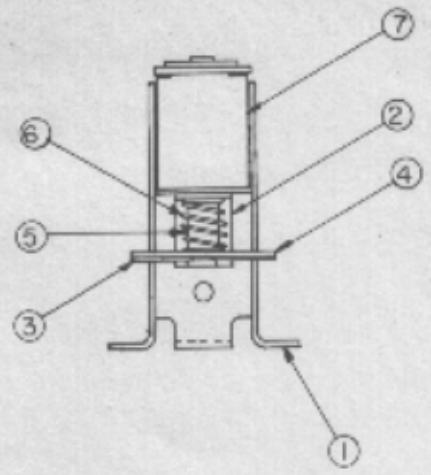
THOUT ANY

NOID BRACKET  
VENT SCREW



B-9414

B-9414 JET BUMPER ASSEMBLY

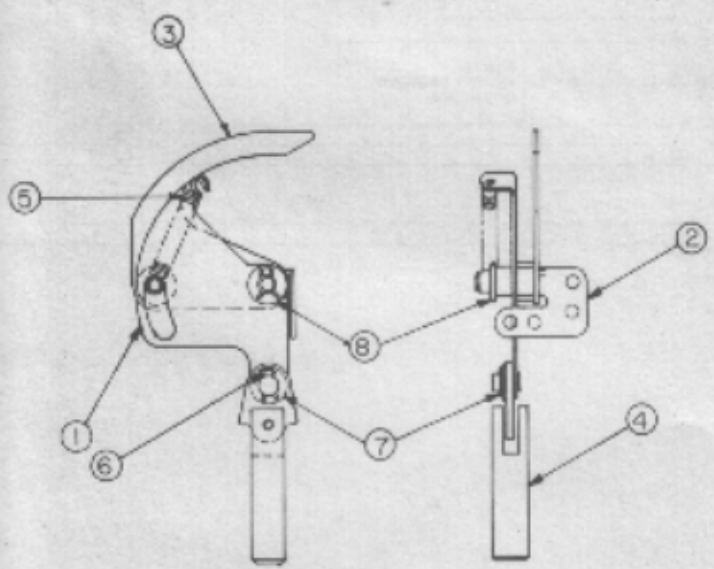


B-9415

B-9415 JET BUMPER COIL ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION
1	A-4754	BUMPER RING ASSEMBLY
2	03-6009-A5	BUMPER BASS
3	03-6035-5	BUMPER WAFER
4	03-7443-5	BUMPER BODY
5	10-7	BUMPER SPRING
6	24-6416	BUMPER SOCKET

ITEM NO.	PART NO.	DESCRIPTION
1	B-7417	BRACKET AND STOP ASSEMBLY
2	01-1747	COIL RETAINING BRACKET
3	01-5492	ARMATURE LINK STEEL
4	01-5493	ARMATURE LINK BAKELITE
5	02-3406-1	COIL PLUNGER
6	10-326	ARMATURE SPRING
7	901-23-850-DC	SOLENOID COIL



B-9361-R-3

B-9361-R-3 BALL EJECT ASSEMBLY RIGHT

ITEM NO.	PART NO.	DESCRIPTION
1	A-6949-R	SPRING PLATE
2	A-6950-R	MOUNTING BRACKET ASSEMBLY
3	A-7471-R	EJECT CAM ASSEMBLY
4	A-5103	COIL PLUNGER ASSEMBLY
5	10-362	SPRING-EJECT
6	12-6227	HAIR PIN CLIP
7	4700-00030-00	17/64 X 1/2 X 15G
8	4700-00103-00	17/64 X 1/2 X .015

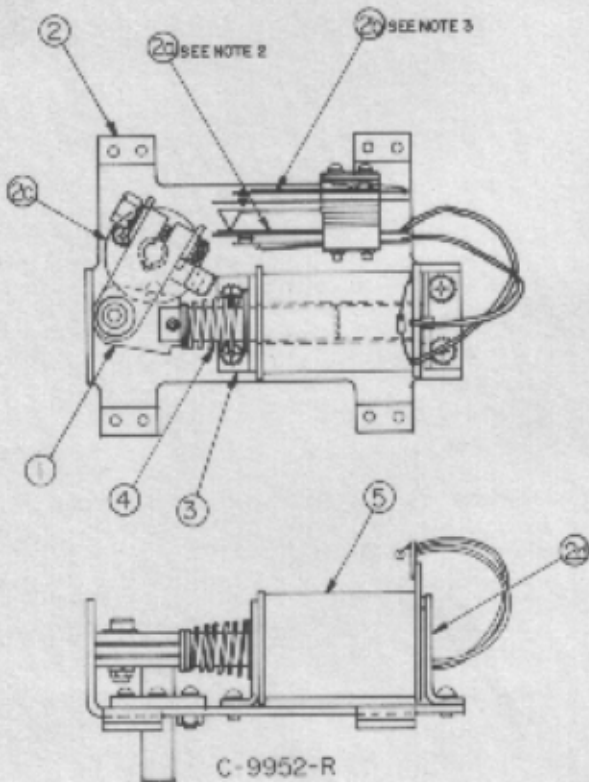
Flipper Assemblies

C-9952-R-

ITEM NO.	PART NO.	DESCRIPTION
1	B-10655-R	CRANK LINK ASSEMBLY
2	C-9954-R	FLIPPER BASE/ LAKE CHANGE ASS
2a	03-7811	END OF STROKE
2b	SW-1A-150	LAKE CHANGE SWITCH
2c	03-7568	FLIPPER BUSHING
2d	A-10280	FLIPPER STOP BRKT ASSM
3	01-7695	SOLENOID BRACKET
4	10-376	COIL PLUNGER SPRING
5	PL 23/600-30-2600	FLIPPER COIL

NOTES:

1. FLIPPER ASSEMBLIES ARE MOUNTED ON THE PLAYFIELD IN CONJUNCTION WITH THE PLASTIC FLIPPER AND SHAFT (20-9250) AND FLIPPER RUBBER (20-9250).
2. THE TIP OF THE B.O.S. SWITCH MUST TRAVEL  $.015, +.010, -.010$  BEFORE THE CONTACTS FULLY OPEN. WITH THE FLIPPER IN THE ACTUAL POSITION THE B.O.S. SWITCH CONTACTS MUST HAVE A GAP OF  $.062 \pm .015$  INCH. ADJUSTMENT OF THE B.O.S SWITCH MUST BE MADE AT A MINIMUM DISTANCE OF  $.25$  INCHES FROM THE SWITCH BODY.
3. THE LAKE CHANGE SWITCH MUST HAVE A GAP OF  $.046 \pm .015$  INCH BEFORE FULLY OPEN.
4. ALL MOVING ELEMENTS OF THE ASSEMBLY MUST OPERATE FREELY WITHOUT EVIDENCE OF BINDING.
5. COIL PLUNGER SPRING MUST FIT WITHIN THE 4 LOGS OF THE SOLENOID BRACKET.
6. FOR COIL REPLACEMENT REMOVE ITEM 3 SOLENOID BRACKET TO PREVENT DAMAGE.



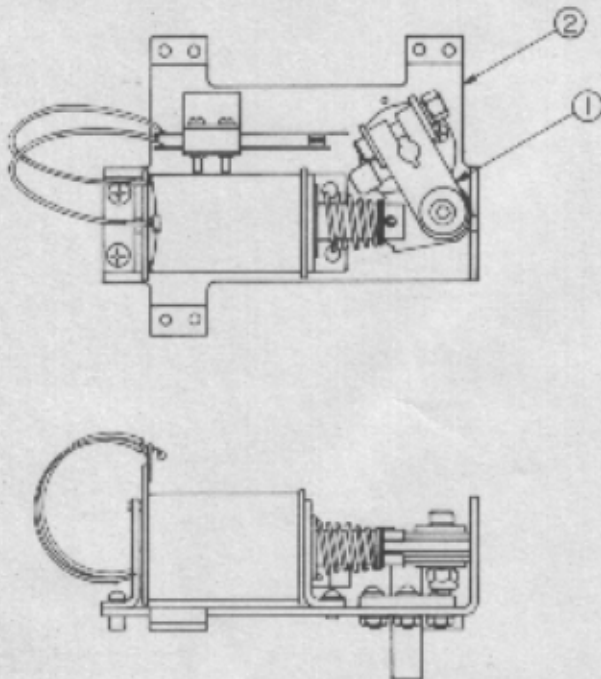
C-9952-R

C-10605-L UNIQUE PARTS

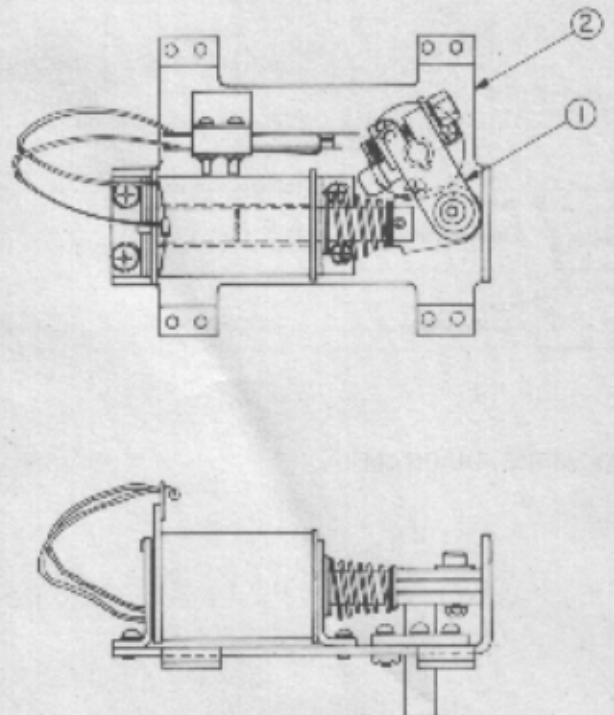
ITEM NO.	PART NO.	DESCRIPTION
1	B-10655-L	CRANK LINK ASSEMBLY, LEFT
2	C-10604	FLIPPER SUB BASE ASSEMBLY

C-9953-L UNIQUE PARTS

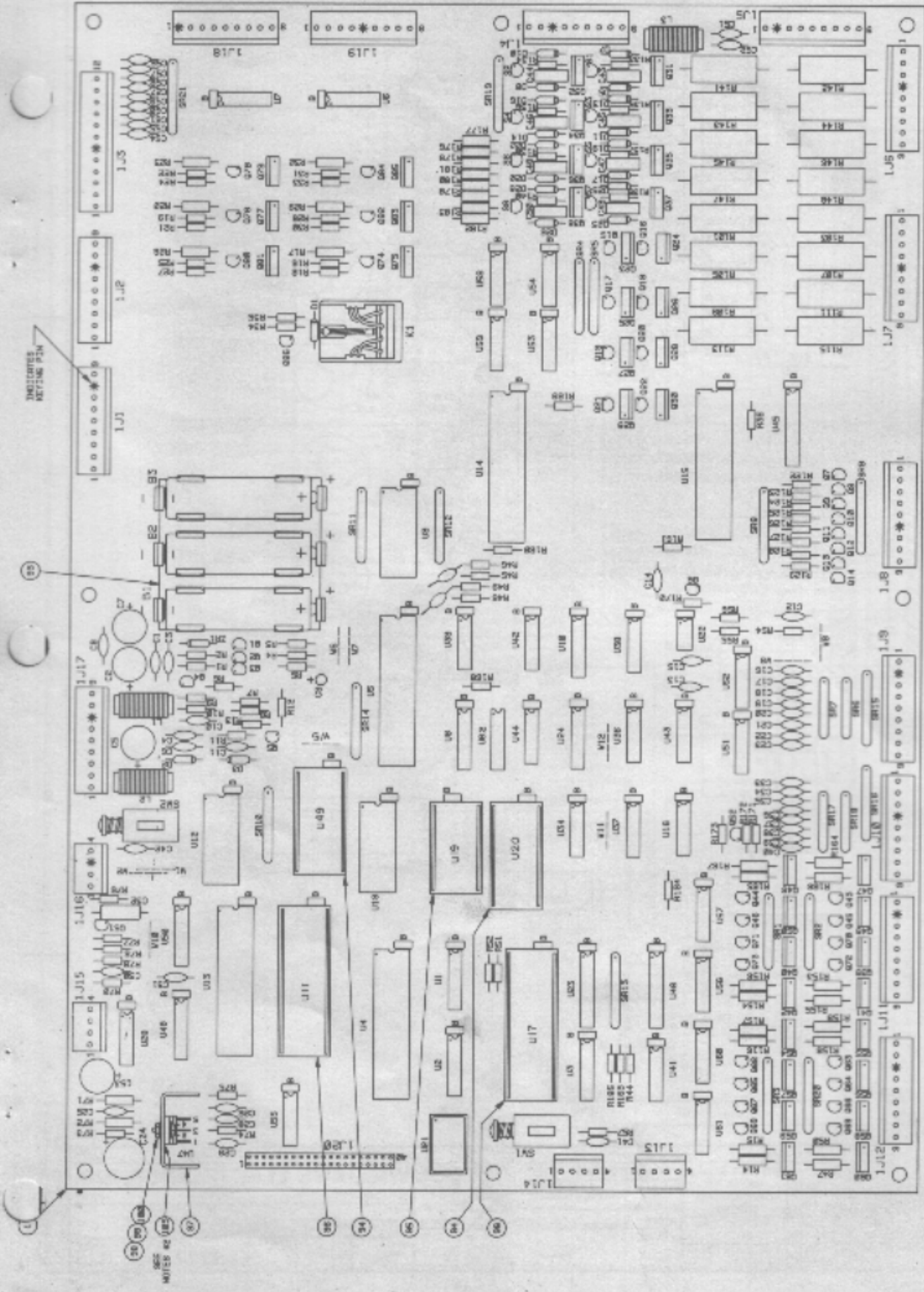
ITEM NO.	PART NO.	DESCRIPTION
1	B-10655-L	CRANK LINK ASSEMBLY, LEFT
2	C-9957-L	FLIPPER SUB BASE ASSEMBLY



C-10605-L



C-9953-L



**NOTES:**

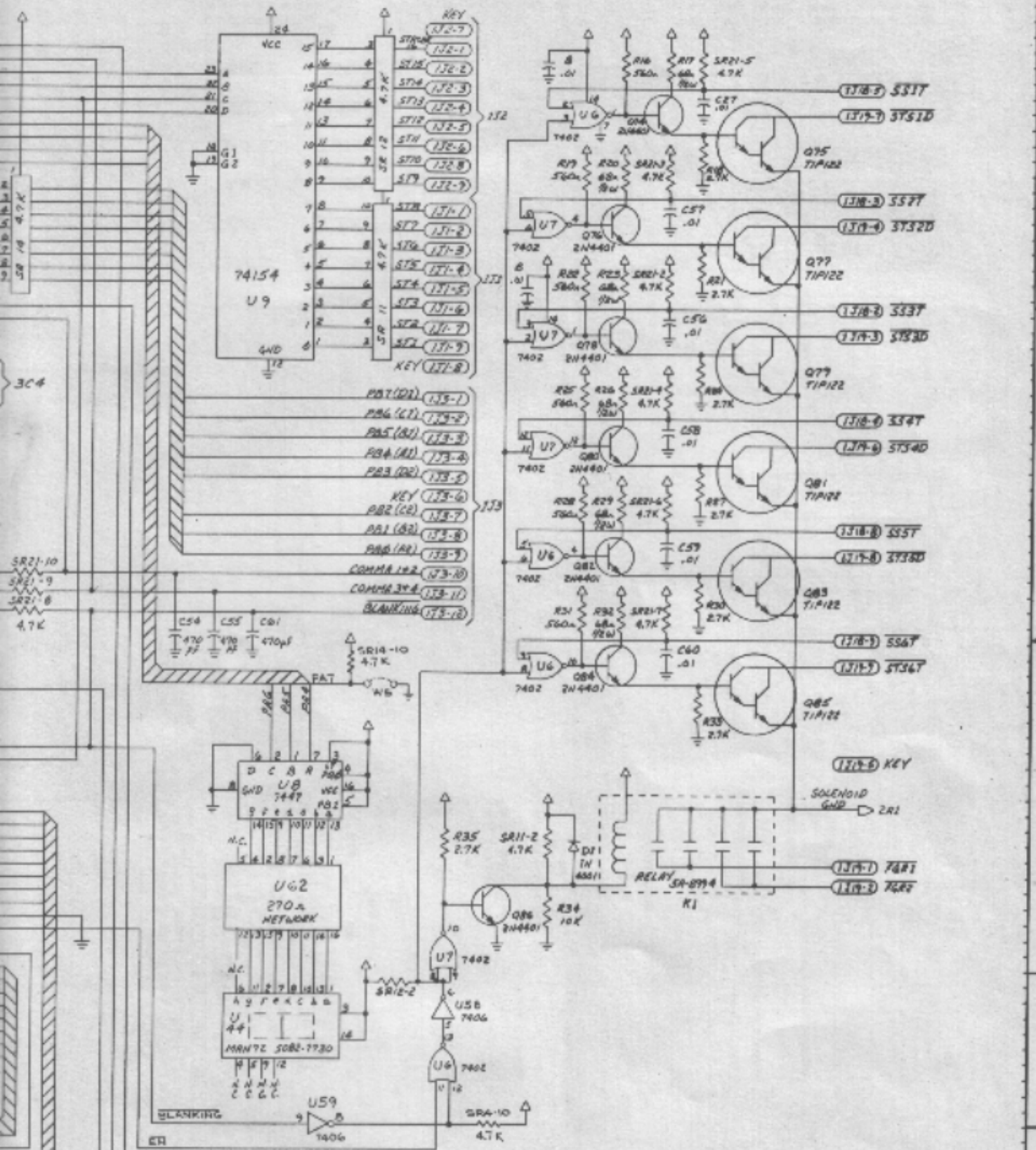
1. FOR SCHEMATIC, REFER TO DRAWING NO. 16-8923.

10						
9						
8						
7						
6						

**CHART**

NAME OF GAME	ASSY. NO.	ITEM 3	ITEM 4	ITEM 5	ITEM 6	QUANTITY	REMARKS
STAR-10535A	5243-A-5343-10762					16-8850	W12





ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
<p><b>WILLIAMS ELECTRONICS, INC.</b>            3401 N. CALIFORNIA AVE. CHICAGO IL 60618            NAME: SCHEMATIC, CPU SYS 9            SCALE: 1/4" = 1" PART NO: 16-8923</p>							
<p>REMOVE BURRS - BREAK SHARP EDGES            TOLERANCES UNLESS OTHERWISE SPECIFIED            FRACTIONAL: .1254 ANGULAR: 1°            DECIMAL: .005 FILLETS: D2C MAX            MATERIAL: <i>HL</i></p>							
<p>DO NOT SCALE WORK TO DIMENSIONS SHOWN            CHECKED BY: DATE: 8/1/64            FIRST PROJECT NO: 530            FIRST USAGE: C-10534</p>							

16-8923

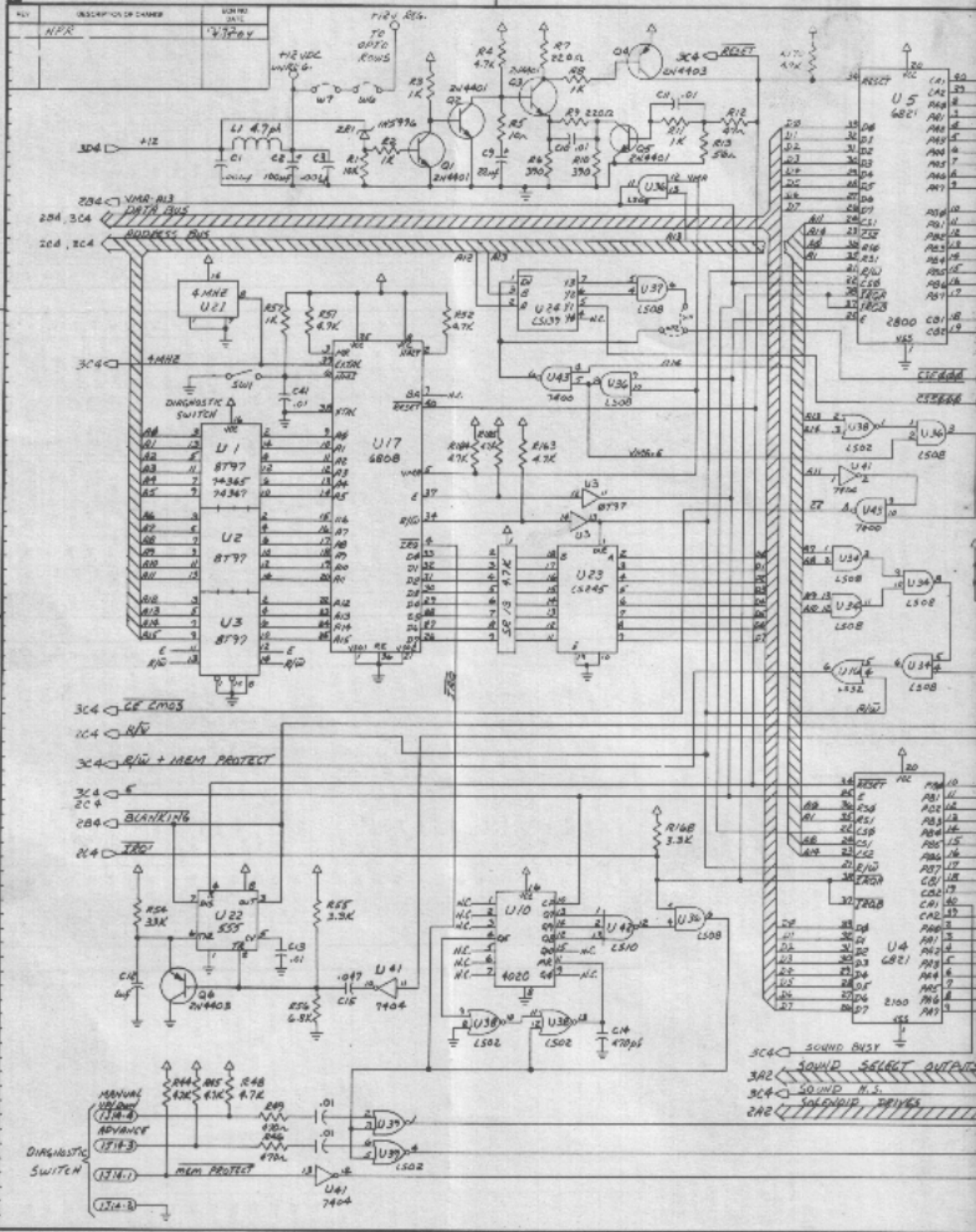
REV	DESCRIPTION OF CHANGE	ISSUE DATE
NFR		12/22/84

D

C

B

A



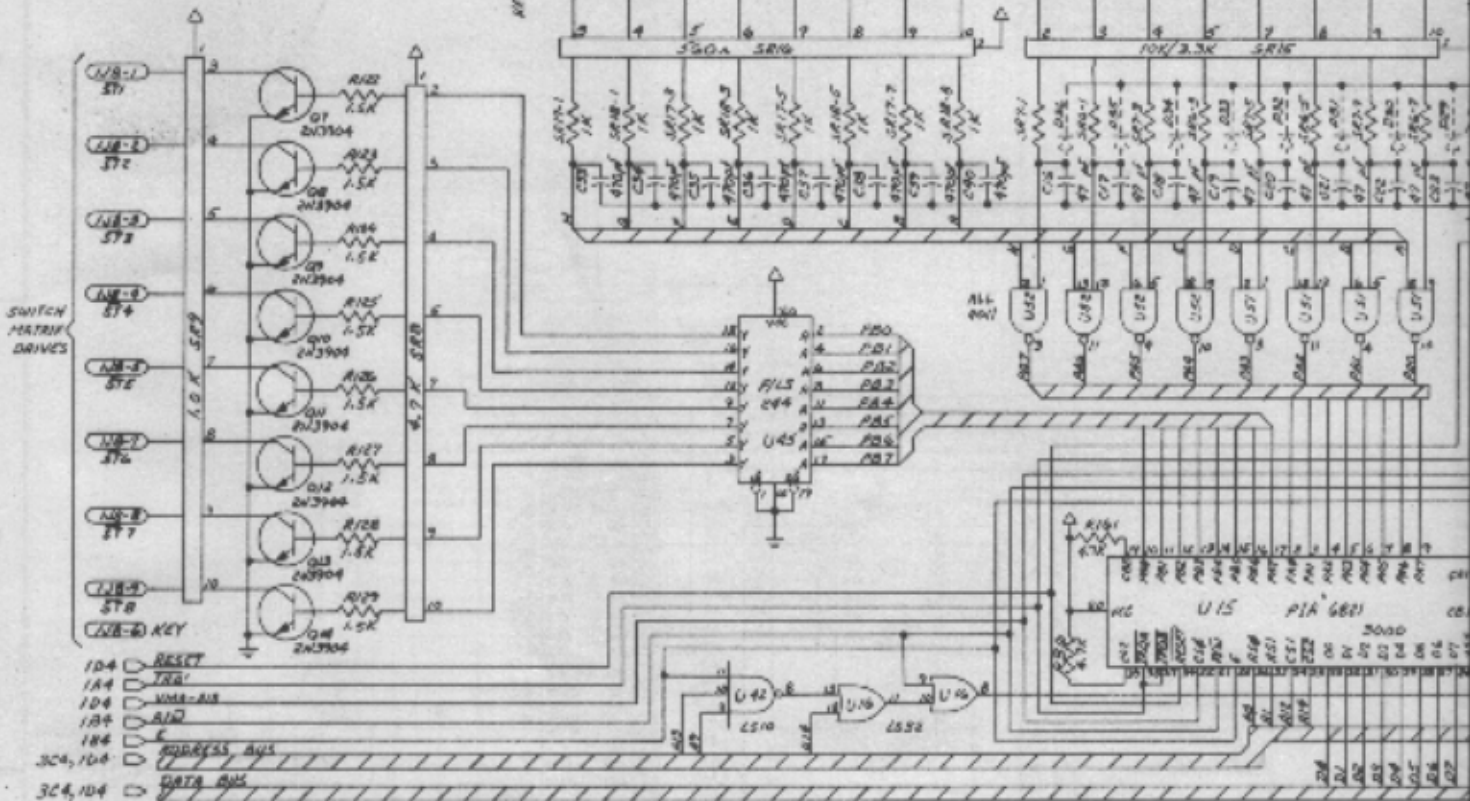


REV	DESCRIPTION OF CHANGE	DATE
1/PP		12/2/82

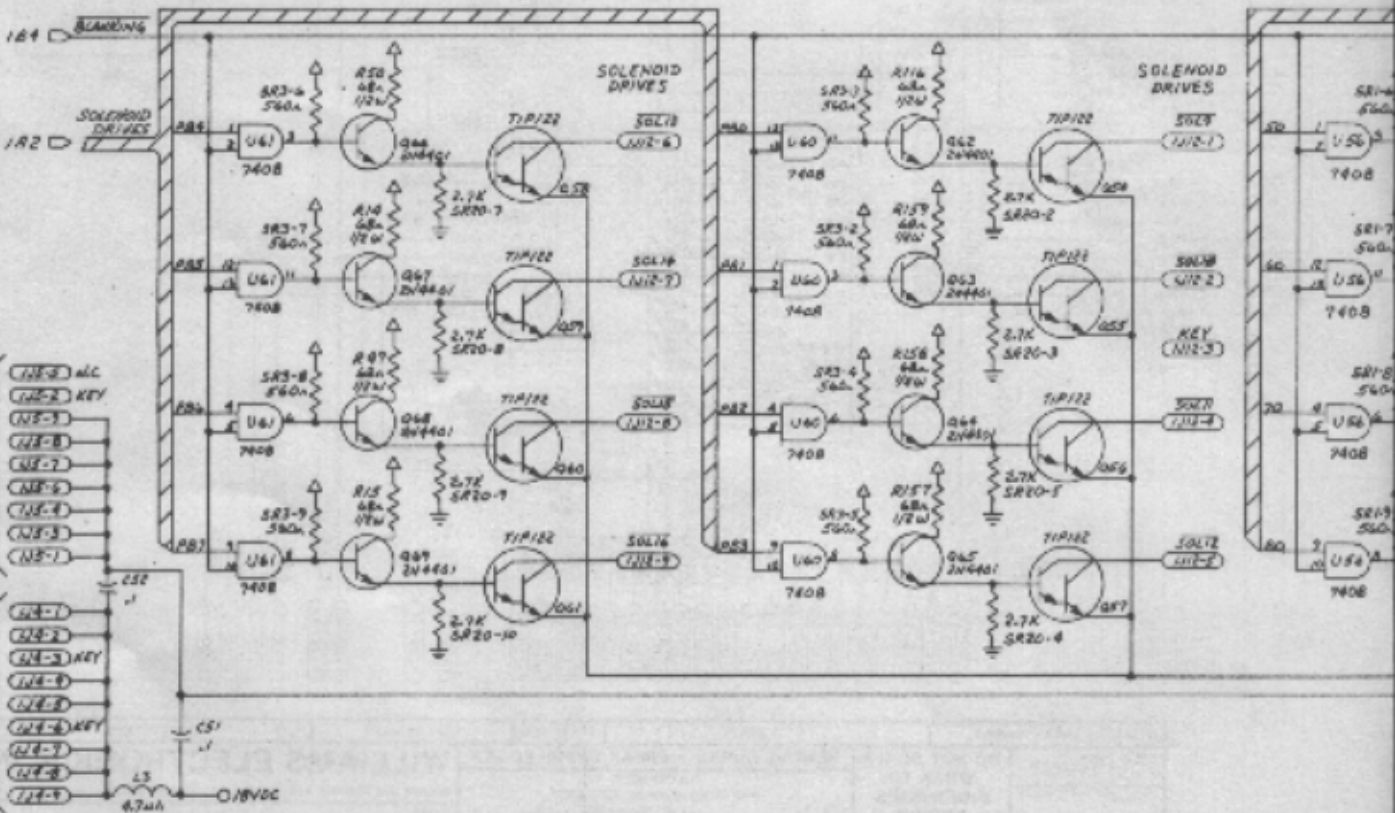
MECHANICAL

SWITCH MATRIX INPUTS

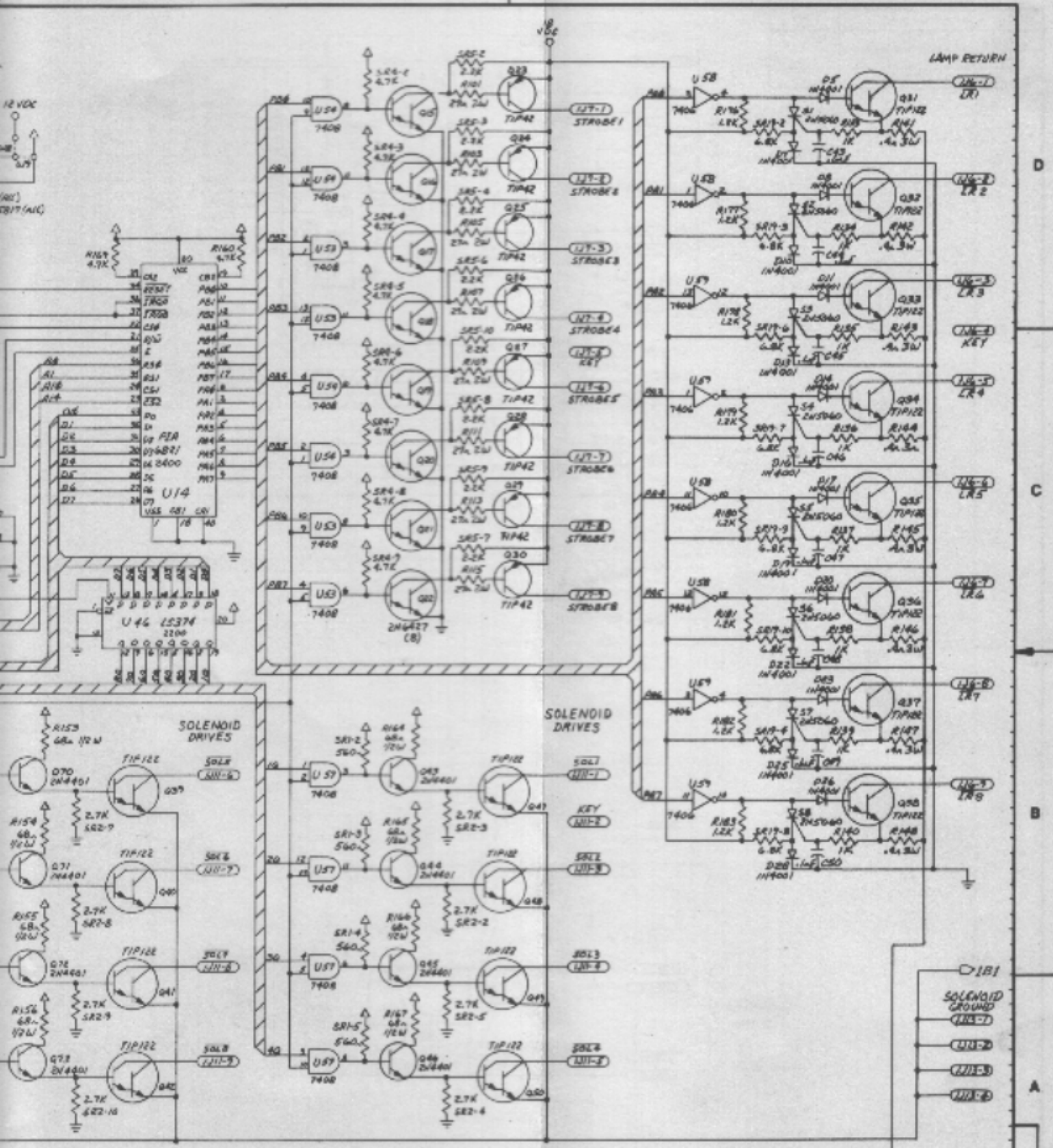
OPTICS



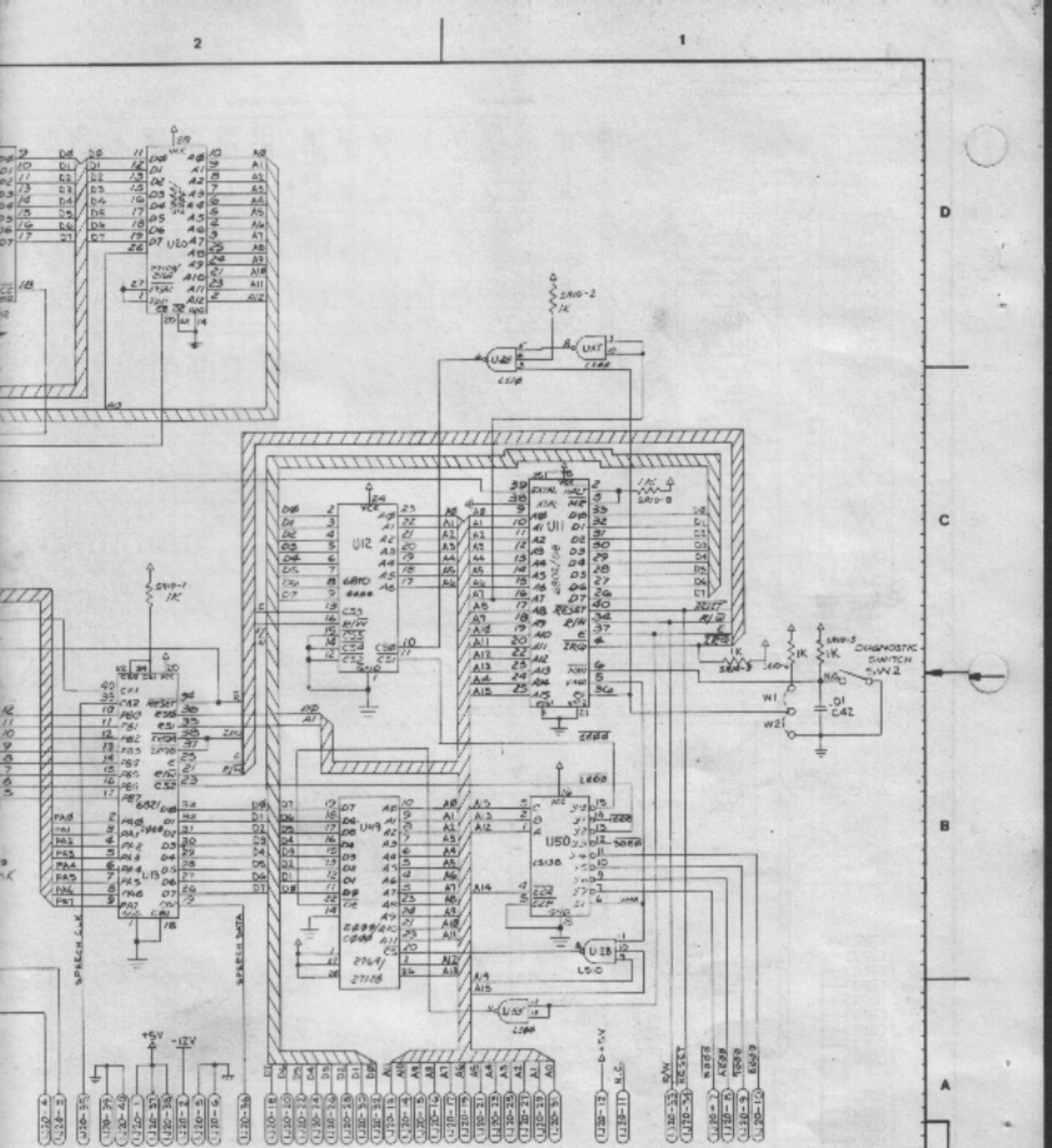
- 104 BKCT
- 1A4 TR
- 104 XMA-A18
- 104 A10
- 184 E
- 304, 104 ADDRESS BUS
- 304, 104 DATA BUS



- 104 ALL
- 104 KEY
- 104-2
- 104-3
- 104-4
- 104-5
- 104-6
- 104-7
- 104-8
- 104-9
- 104-10



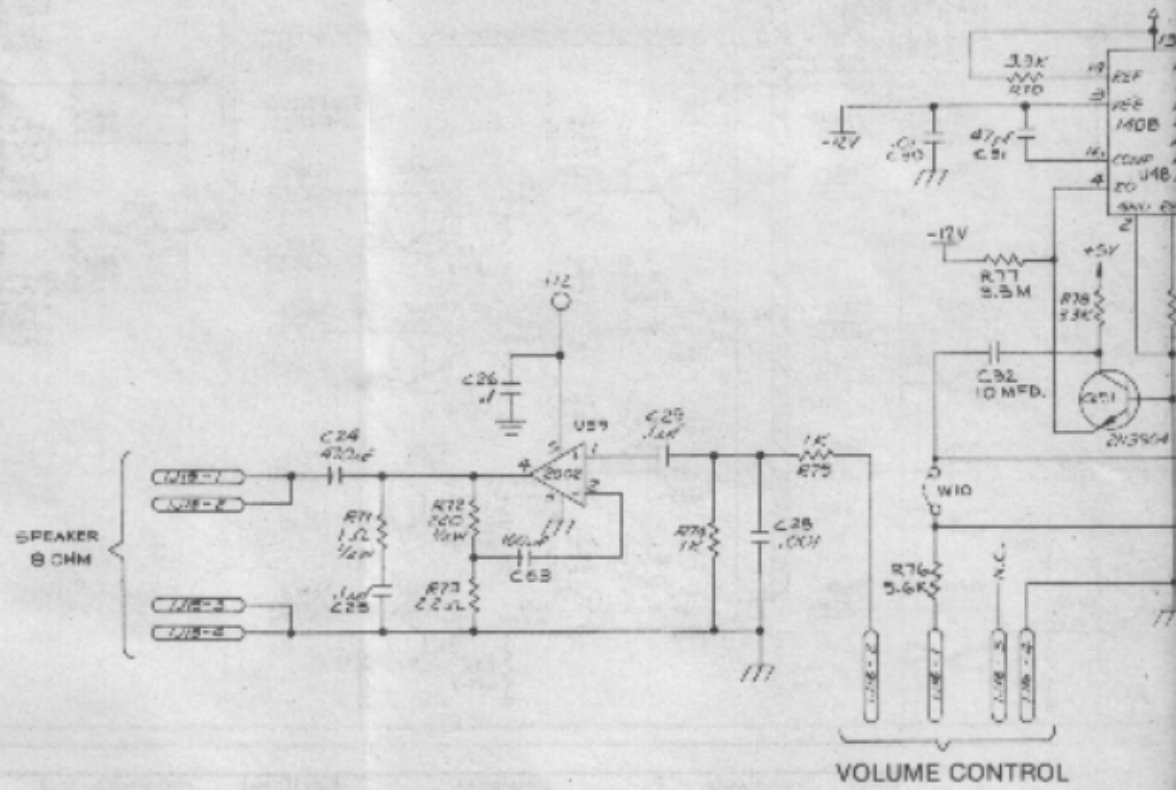
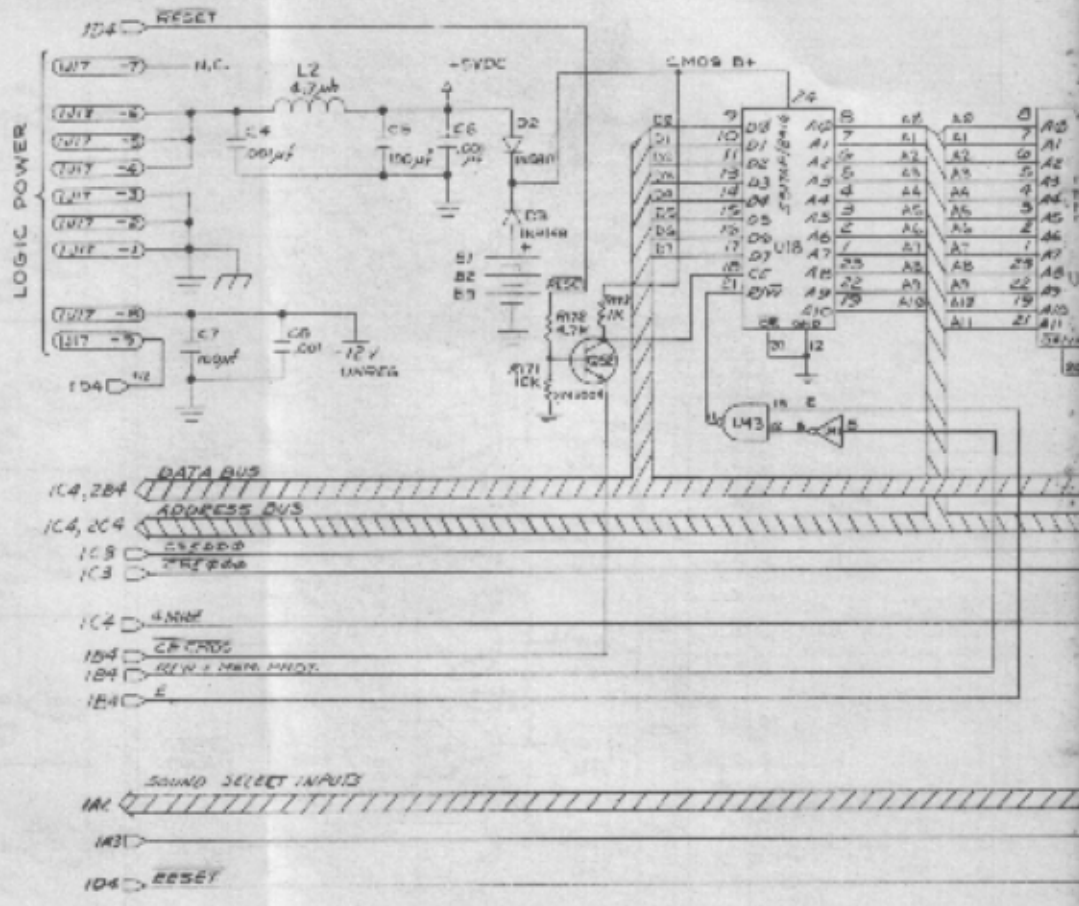
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR S. WICKSCHER		DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS - BREAK SHARP EDGES		WILLIAMS ELECTRONICS, INC.	
DRAWN BY J. K. W. 10/15/64		FIRST PROJECT NO 530		TOLERANCES UNLESS OTHERWISE SPECIFIED		3401 N. CALIFORNIA AVE. CHICAGO IL 60618	
CHECKED BY S.C.H. 5/1/68		MATERIAL		FRACTIONAL 1/64 ANGULAR 1°		NAME SCHEMATIC, CPU 515 9	
APPROVAL R.W. 7-15-64		DATE 7-15-64		DECIMAL 1.005 FILETS 0.020 MAX		SCALES X 2.00 X 3	
		REV -		PART NO 16-8923		REV	

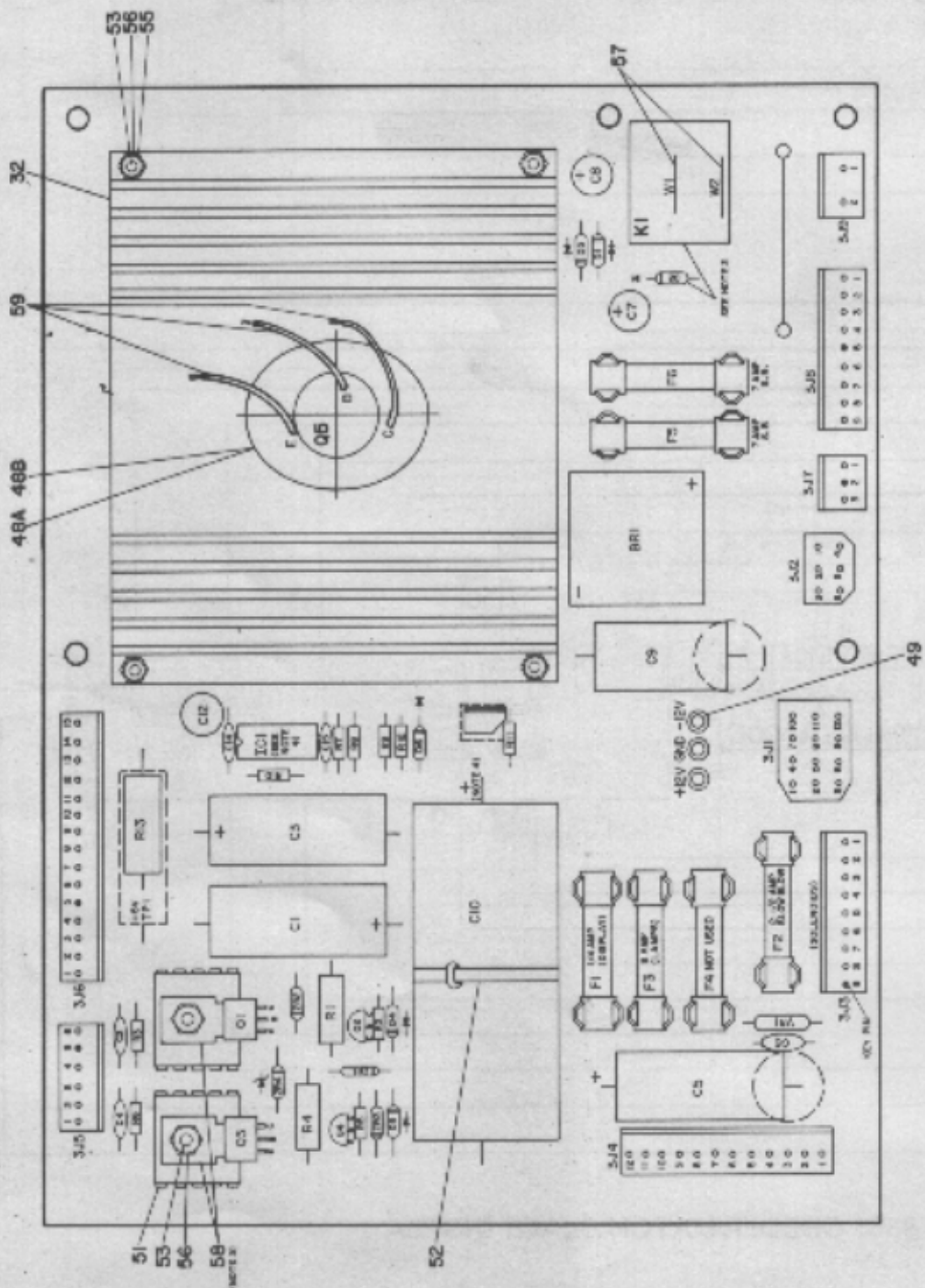


ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ. ENGR <b>S. WERSCHLER</b>		<b>DO NOT SCALE</b> <b>WORK TO</b> <b>DIMENSIONS</b> <b>SHOWN</b>		<b>REMOVE BURRS - BREAK SHARP EDGES</b> TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONAL .0154 ANGULAR .1° DECIMAL .005 FELTS .02 MAX		<b>WILLIAMS ELECTRONICS, INC.</b> 340-N CALIFORNIA AVE CHICAGO 8 ILL 60608	
DESIGNED BY DATE 1/20/74		FIRST PROJECT NO 530		MATERIAL		NAME <b>SCHEMATIC, CPU SYSTEM-9</b>	
CHECKED BY DATE 1/20/74		APPROVAL DATE 1/20/74		SCALE 1:1		PART NO <b>16-8923</b>	

16-8923

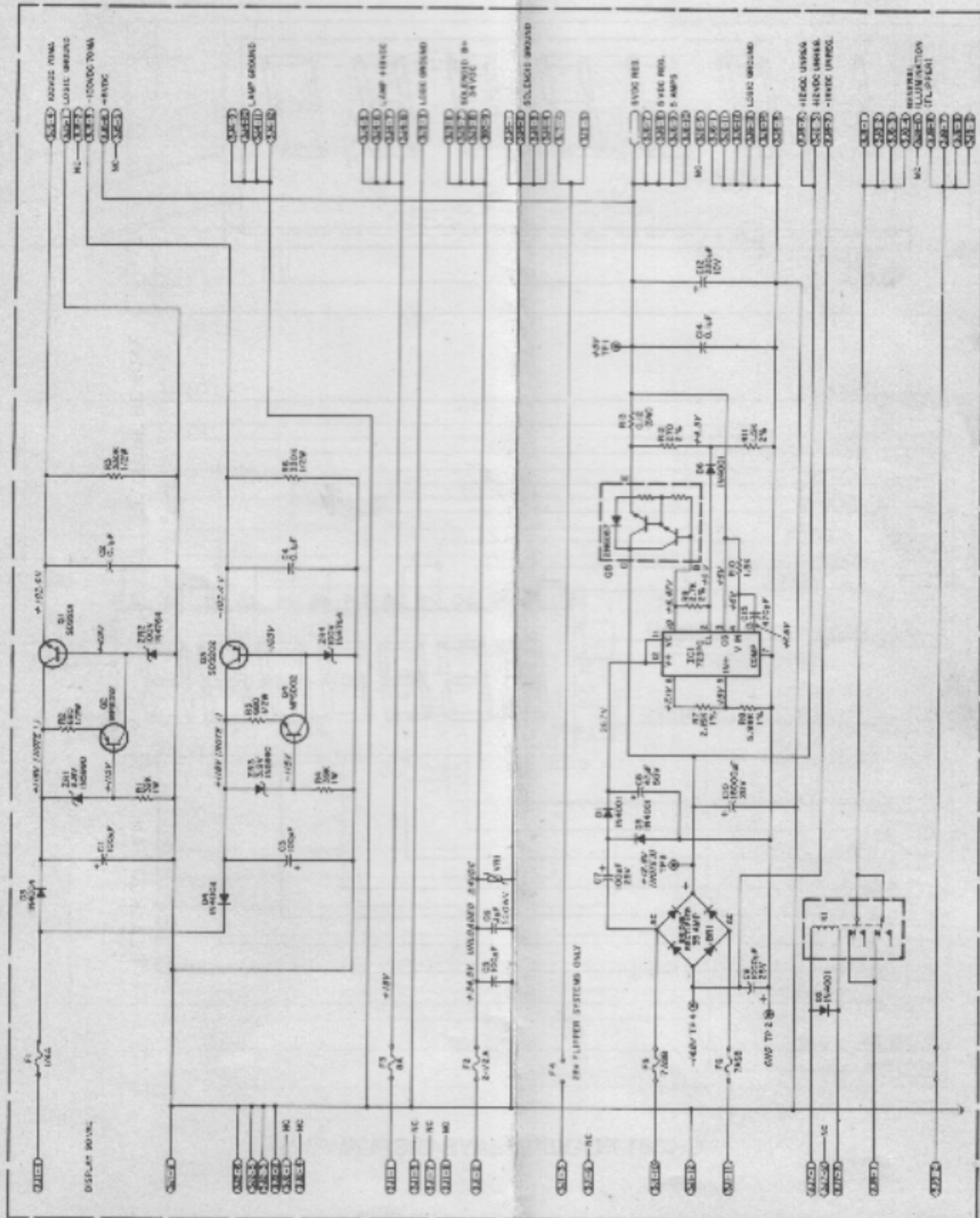
REV	DESCRIPTION OF CHANGE	DATE
1	NPR	11/19/77
		4. 11. 81





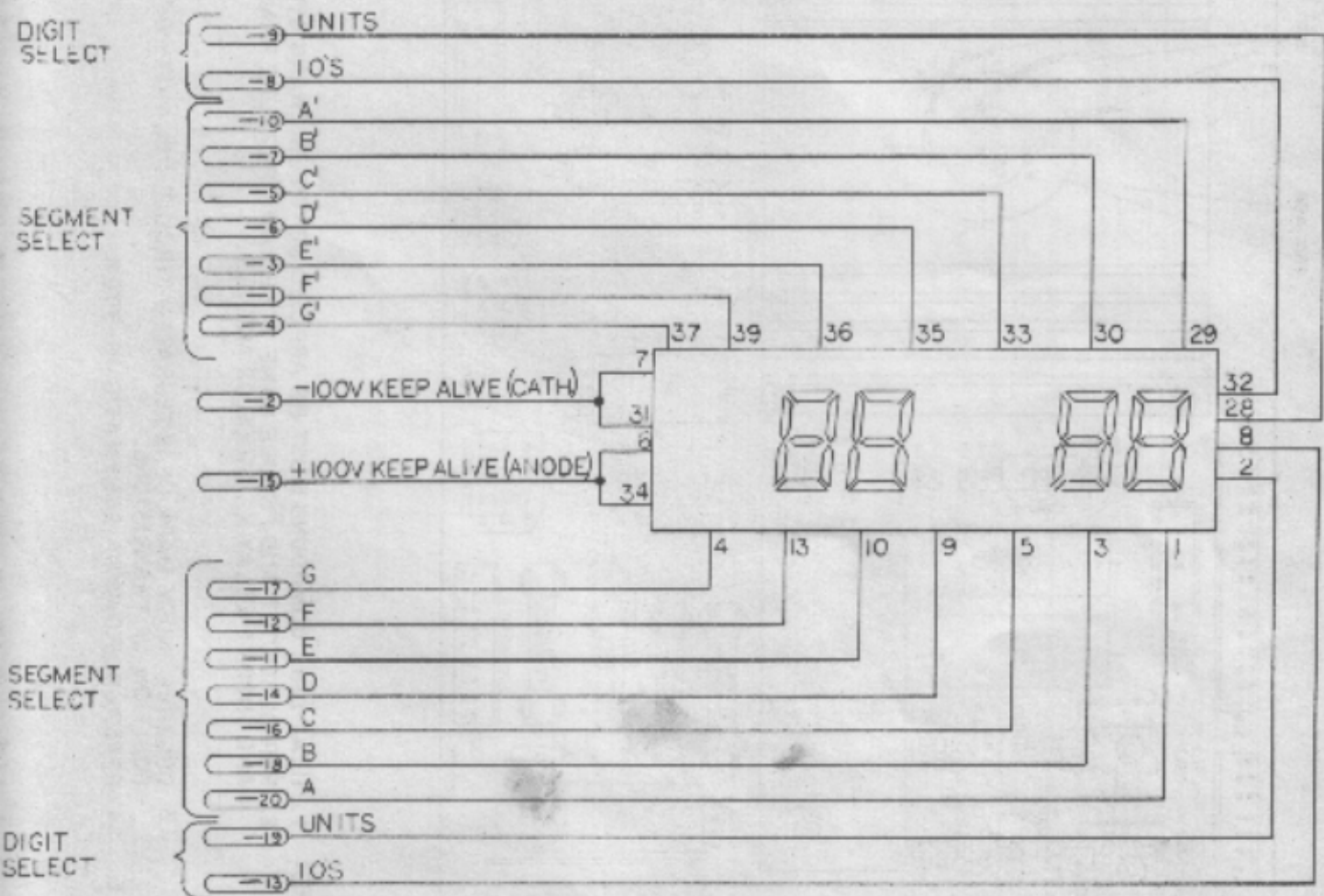
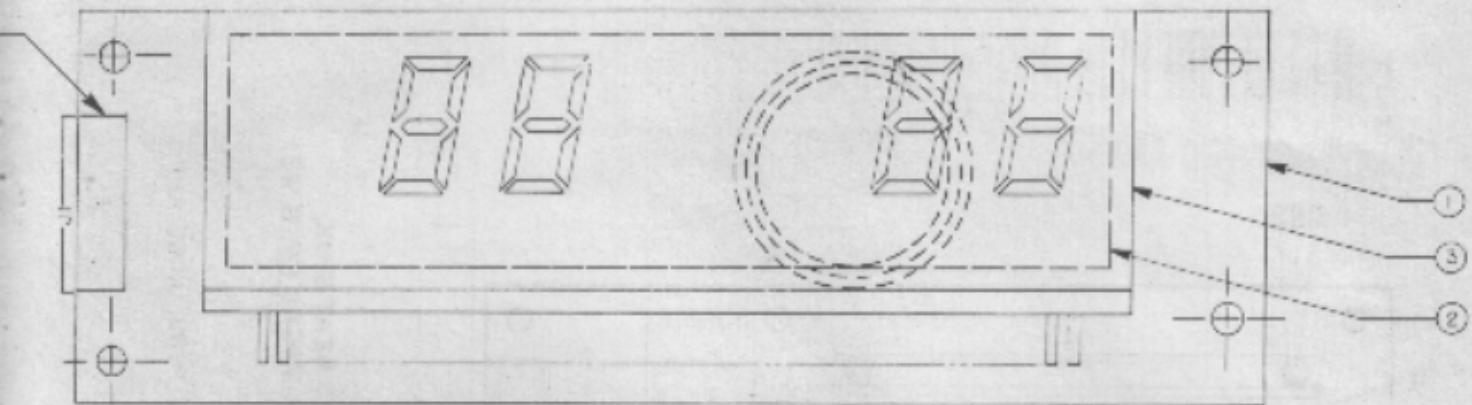
ITEM NO.	PART NO.	QUANTITY	DESCRIPTION
1	901-00111-01	47	RESISTOR, 1/4W, 10K
2	901-00111-02	47	RESISTOR, 1/4W, 10K
3	901-00111-03	47	RESISTOR, 1/4W, 10K
4	901-00111-04	47	RESISTOR, 1/4W, 10K
5	901-00111-05	47	RESISTOR, 1/4W, 10K
6	901-00111-06	47	RESISTOR, 1/4W, 10K
7	901-00111-07	47	RESISTOR, 1/4W, 10K
8	901-00111-08	47	RESISTOR, 1/4W, 10K
9	901-00111-09	47	RESISTOR, 1/4W, 10K
10	901-00111-10	47	RESISTOR, 1/4W, 10K
11	901-00111-11	47	RESISTOR, 1/4W, 10K
12	901-00111-12	47	RESISTOR, 1/4W, 10K
13	901-00111-13	47	RESISTOR, 1/4W, 10K
14	901-00111-14	47	RESISTOR, 1/4W, 10K
15	901-00111-15	47	RESISTOR, 1/4W, 10K
16	901-00111-16	47	RESISTOR, 1/4W, 10K
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18	901-00111-18	47	RESISTOR, 1/4W, 10K
19	901-00111-19	47	RESISTOR, 1/4W, 10K
20	901-00111-20	47	RESISTOR, 1/4W, 10K
21	901-00111-21	47	RESISTOR, 1/4W, 10K
22	901-00111-22	47	RESISTOR, 1/4W, 10K
23	901-00111-23	47	RESISTOR, 1/4W, 10K
24	901-00111-24	47	RESISTOR, 1/4W, 10K
25	901-00111-25	47	RESISTOR, 1/4W, 10K
26	901-00111-26	47	RESISTOR, 1/4W, 10K
27	901-00111-27	47	RESISTOR, 1/4W, 10K
28	901-00111-28	47	RESISTOR, 1/4W, 10K
29	901-00111-29	47	RESISTOR, 1/4W, 10K
30	901-00111-30	47	RESISTOR, 1/4W, 10K
31	901-00111-31	47	RESISTOR, 1/4W, 10K
32	901-00111-32	47	RESISTOR, 1/4W, 10K
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34	901-00111-34	47	RESISTOR, 1/4W, 10K
35	901-00111-35	47	RESISTOR, 1/4W, 10K
36	901-00111-36	47	RESISTOR, 1/4W, 10K
37	901-00111-37	47	RESISTOR, 1/4W, 10K
38	901-00111-38	47	RESISTOR, 1/4W, 10K
39	901-00111-39	47	RESISTOR, 1/4W, 10K
40	901-00111-40	47	RESISTOR, 1/4W, 10K
41	901-00111-41	47	RESISTOR, 1/4W, 10K
42	901-00111-42	47	RESISTOR, 1/4W, 10K
43	901-00111-43	47	RESISTOR, 1/4W, 10K
44	901-00111-44	47	RESISTOR, 1/4W, 10K
45	901-00111-45	47	RESISTOR, 1/4W, 10K
46	901-00111-46	47	RESISTOR, 1/4W, 10K
47	901-00111-47	47	RESISTOR, 1/4W, 10K
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66	901-00111-66	47	RESISTOR, 1/4W, 10K
67	901-00111-67	47	RESISTOR, 1/4W, 10K
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69	901-00111-69	47	RESISTOR, 1/4W, 10K
70	901-00111-70	47	RESISTOR, 1/4W, 10K
71	901-00111-71	47	RESISTOR, 1/4W, 10K
72	901-00111-72	47	RESISTOR, 1/4W, 10K
73	901-00111-73	47	RESISTOR, 1/4W, 10K
74	901-00111-74	47	RESISTOR, 1/4W, 10K
75	901-00111-75	47	RESISTOR, 1/4W, 10K
76	901-00111-76	47	RESISTOR, 1/4W, 10K
77	901-00111-77	47	RESISTOR, 1/4W, 10K
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87	901-00111-87	47	RESISTOR, 1/4W, 10K
88	901-00111-88	47	RESISTOR, 1/4W, 10K
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91	901-00111-91	47	RESISTOR, 1/4W, 10K
92	901-00111-92	47	RESISTOR, 1/4W, 10K
93	901-00111-93	47	RESISTOR, 1/4W, 10K
94	901-00111-94	47	RESISTOR, 1/4W, 10K
95	901-00111-95	47	RESISTOR, 1/4W, 10K
96	901-00111-96	47	RESISTOR, 1/4W, 10K
97	901-00111-97	47	RESISTOR, 1/4W, 10K
98	901-00111-98	47	RESISTOR, 1/4W, 10K
99	901-00111-99	47	RESISTOR, 1/4W, 10K
100	901-00111-100	47	RESISTOR, 1/4W, 10K

- 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.



1. DISPLAY VOLTS MUST BE MEASURED WITH DISPLAY DISPLAY
2. DISPLAY ON A DISPLAY ON A DISPLAY ON A DISPLAY
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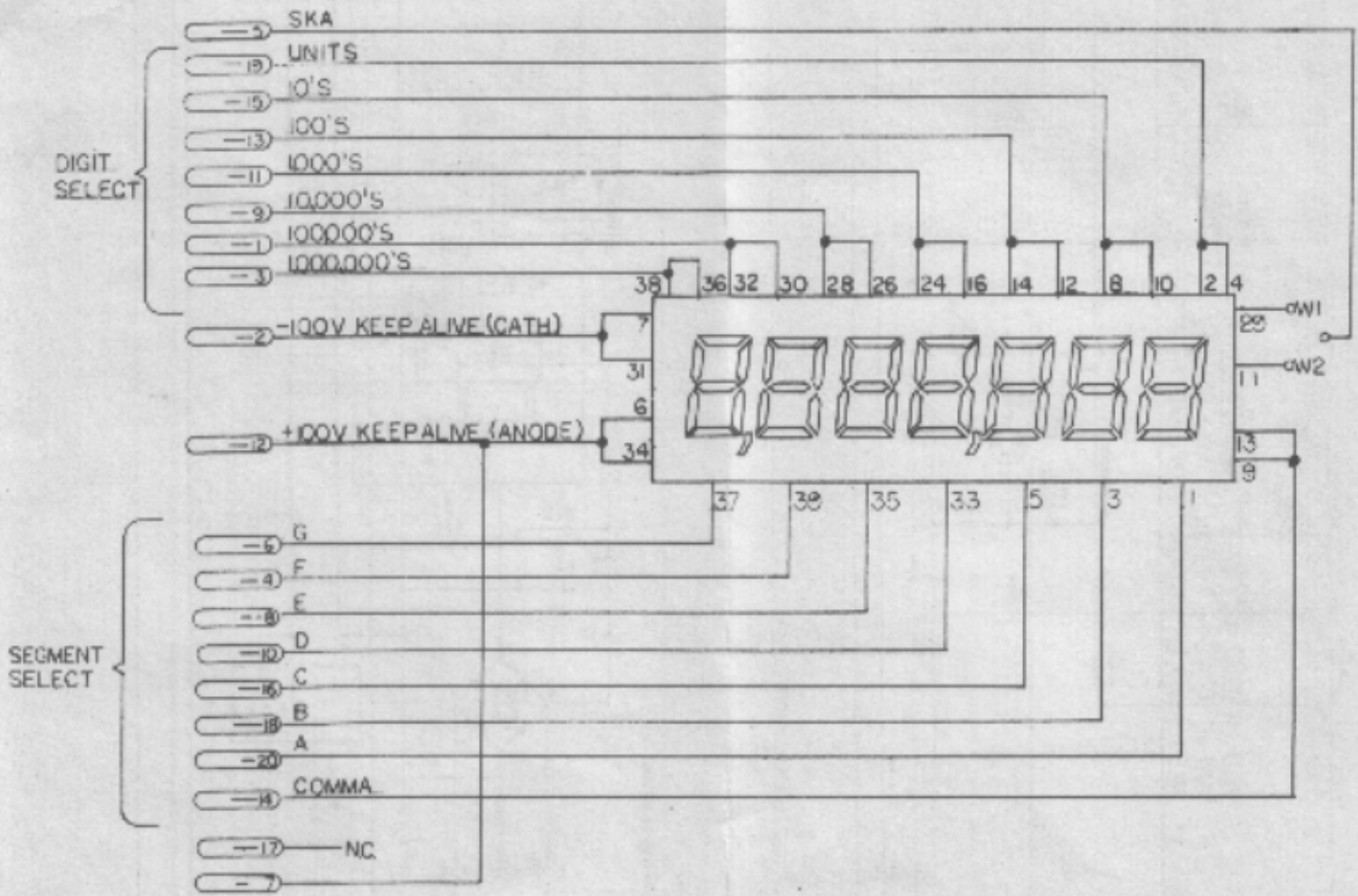
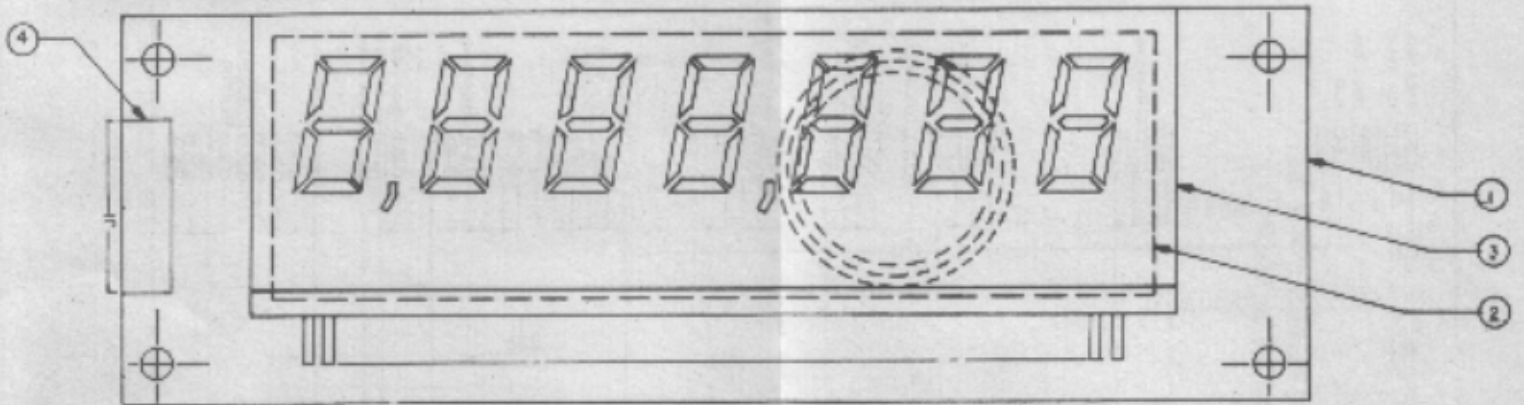
BILL OF MATERIAL				
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D
1	23-6544B-00		CREDIT/MATCH SLAVE PCB BOARD	1
2	23-6544		FOAM DISPLAY - BACK	1
3	8470-0244B-00		4 DIGIT DISPLAY	1
4	5181-0244B-00		20 PIN AIRCRAFT CONNECTER	1
5	23-6544		FOAM DISPLAY - FRONT	1
6	03-1513-1		CAP LUG	1



C 8365 CREDIT/MATCH SLAVE DISPLAY

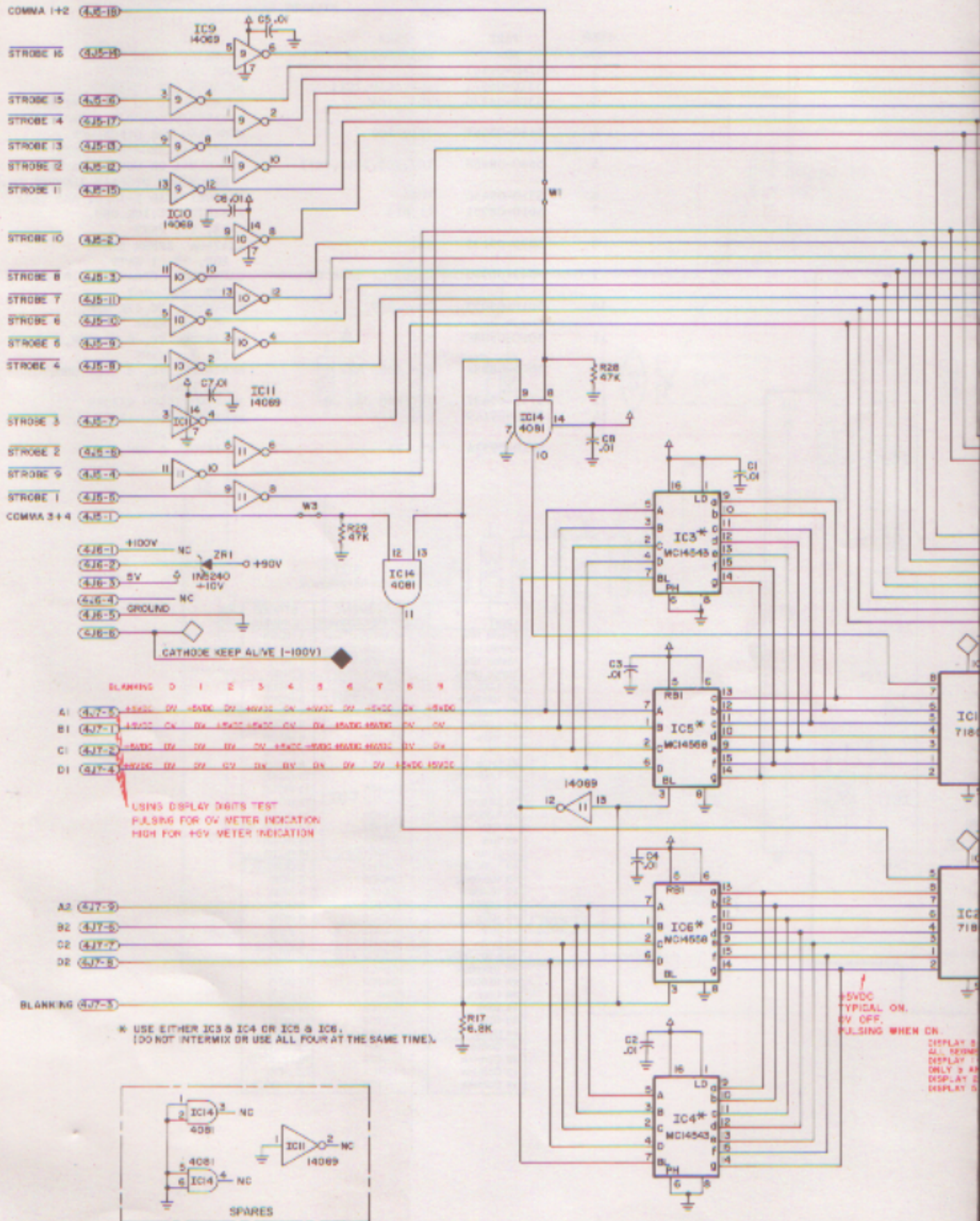
### BILL OF MATERIAL

ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D
1	5761-0845B-1P		SLAVE DISPLAY P.C. BOARD	1
2	33-1645		DISPLAY MFG ADHESIVE FOAM	1
3	8670-0845B-1P		7 DIGIT DISPLAY	1
4	5761-0845B-1P	J1	20 PIN RIBBON HEADER	1
5	03-1613-L		CAPLUG	1



C 8364 PLAYER SLAVE DISPLAY





BLANKING 0 1 2 3 4 5 6 7 8 9

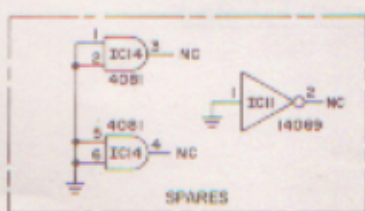
- A1 (4J7-5) +5VDC 0V +5VDC 0V +5VDC 0V +5VDC 0V +5VDC 0V +5VDC
- B1 (4J7-1) +5VDC 0V 0V +5VDC +5VDC 0V 0V +5VDC +5VDC 0V 0V
- C1 (4J7-3) +5VDC 0V 0V 0V 0V +5VDC +5VDC +5VDC +5VDC 0V 0V
- D1 (4J7-4) +5VDC 0V 0V 0V 0V 0V 0V 0V 0V 0V +5VDC +5VDC

USING DISPLAY DIGITS TEST PULSING FOR 0V METER INDICATION HIGH FOR +5V METER INDICATION

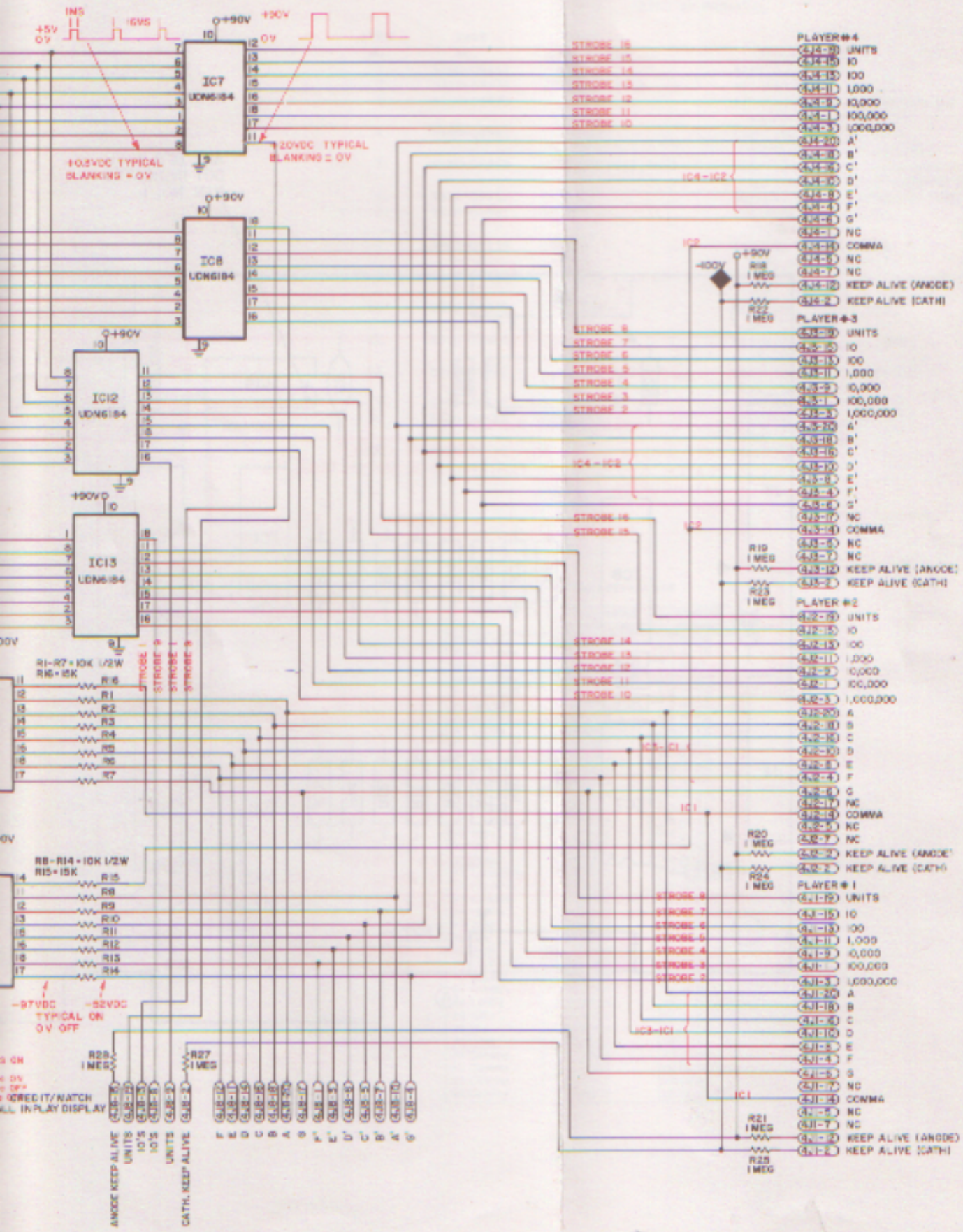
- A2 (4J7-9)
- B2 (4J7-6)
- C2 (4J7-7)
- D2 (4J7-8)

BLANKING (4J7-3)

\* USE EITHER IC3 & IC4 OR IC5 & IC6. (DO NOT INTERMIX OR USE ALL FOUR AT THE SAME TIME).

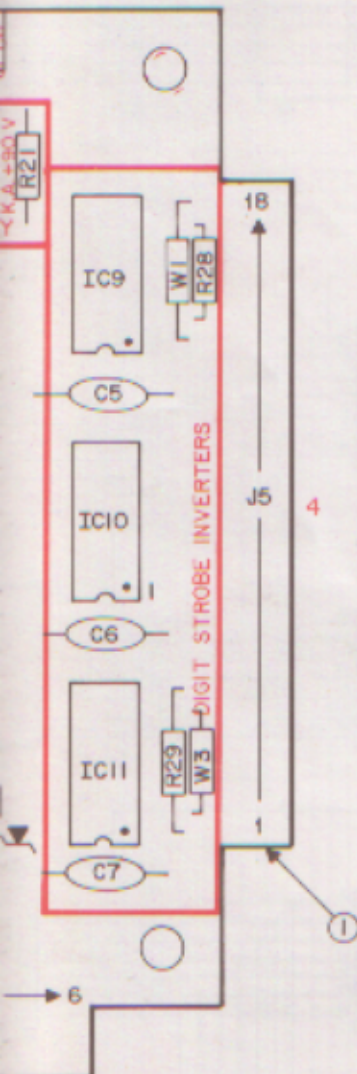


+5VDC TYPICAL ON, 0V OFF, PULSING WHEN ON. DISPLAY 0 ALL REMAIN ONLY 0 ON DISPLAY 0



BILL OF MATERIAL

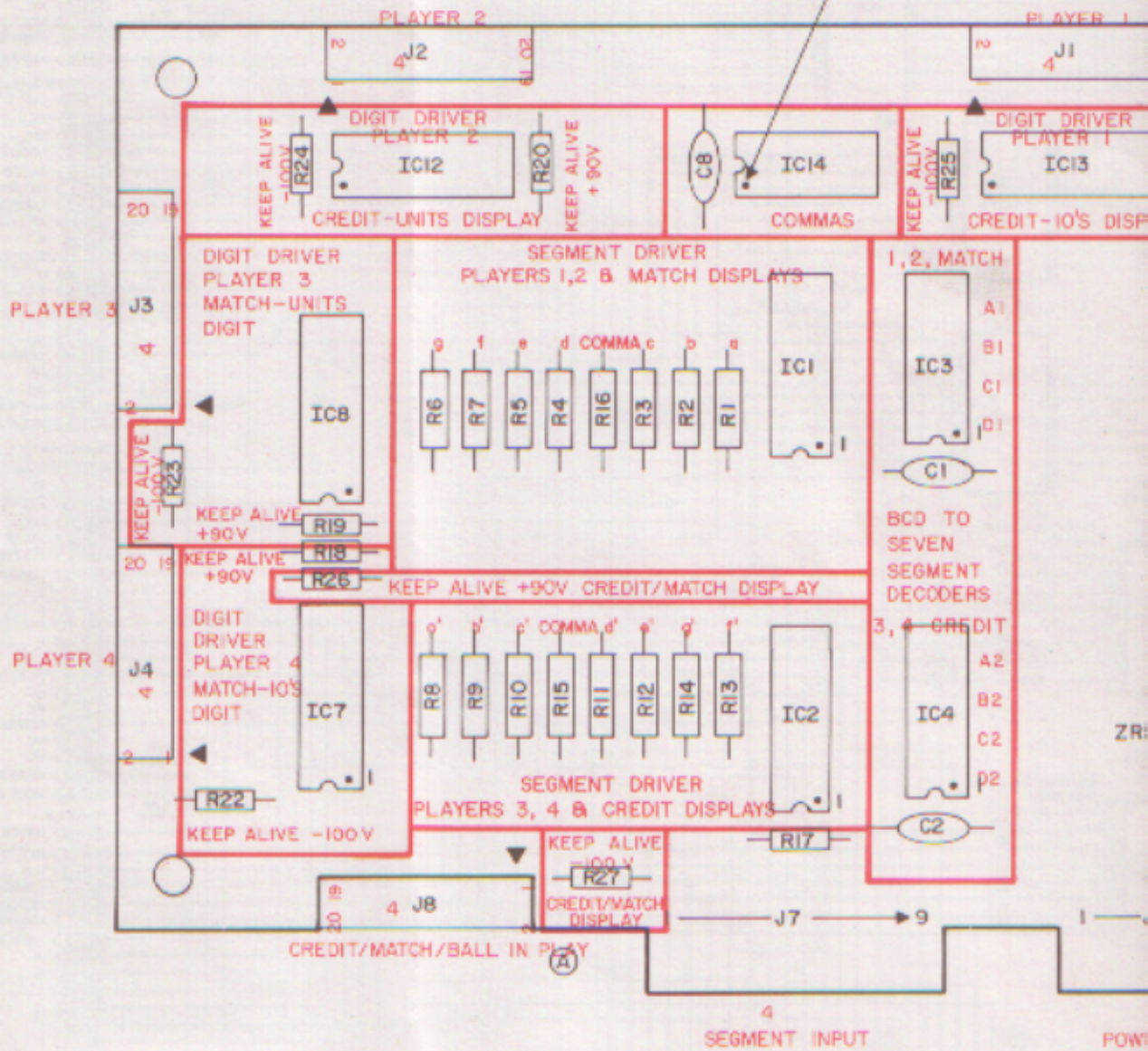
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D NO.
1	5760-09461		BARE P.C. BOARD	1
2	5310-08971	IC9, IC10, IC11	MCI4069 HEX INVERTER	3
3	5310-08970	IC3, IC4	MCI4543 BCD TO SEVEN SEGMENT LATCH/DECODER/DRIVER	2
4	5680-08969	IC1, IC2	UDN-7180 GAS DISCHARGE DISPLAY SEGMENT DRIVER	2
5	5680-08968	IC7, IC8, IC12, IC13	UDN-6184A OR UDN-6118A GAS DISCHARGE DISPLAY SEGMENT DR.	4
6	5310-09450	IC14	NC14081 QUAD 2-INPUT AND GATE	1
7	5010-08981	R1-R14	RESISTOR, FC, 10K OHM, 5%, 1/2 WATT	14
8	5075-09135	#R1	IN4740A ZENER DIODE 10V, 5%, 1 WATT	1
9	5043-08980	C1, C2 C3 THRU C8	CAPACITOR, CERAMIC, 0.01 MFD., 50V, +80 -20%	6
10	5010-09035	R28, R29	RESISTOR, FC, 47K OHM, 5%, 1/4 WATT	2
11	5010-09086	R17	RESISTOR, FC, 6.8K OHM, 5%, 1/4 WATT	1
12	5010-08982	R18 THRU R27	RESISTOR, FC, 3 MEG. OHM, 5%, 1/4 WATT	10
13	5791-09437	J1 THRU J4, J8	20 PIN RIBBON HEADER	5
14	5010-09149	R15, R16	RESISTOR, FC, 15K OHM, 5%, 1/2 WATT	2
15	5010-09534	W1, W3	RESISTOR, 0 OHM	2



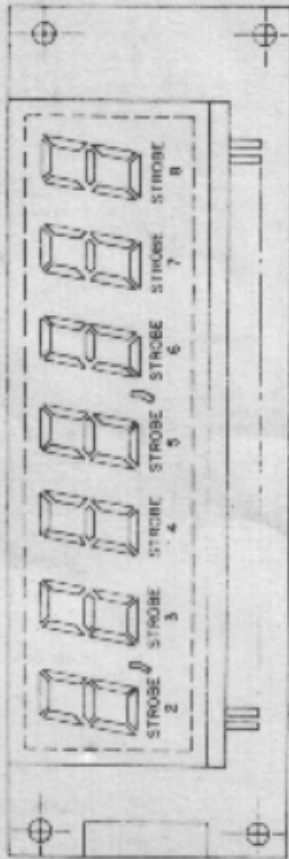
DIGIT CROSS REFERENCE

DIGIT	7-SEGMENT DECODER/DRIVER	STROBE (DRIVER)
Credit 10's	IC4/IC2	1 (IC13)
Credit Units	IC4/IC2	9 (IC12)
Match 10's	IC3/IC1	1 (IC7)
Match Units	IC3/IC1	9 (IC8)
#1 1,000,000	IC3/IC1	2 (IC13)
#1 100,000's	IC3/IC1	3 (IC13)
#1 10,000's	IC3/IC1	4 (IC13)
#1 1,000's	IC3/IC1	5 (IC13)
#1 100's	IC3/IC1	6 (IC13)
#1 10's	IC3/IC1	7 (IC13)
#1 Units	IC3/IC1	8 (IC13)
#2 1,000,000's	IC3/IC1	10 (IC12)
#2 100,000's	IC3/IC1	11 (IC12)
#2 10,000's	IC3/IC1	12 (IC12)
#2 1,000's	IC3/IC1	13 (IC12)
#2 100's	IC3/IC1	14 (IC12)
#2 10's	IC3/IC1	15 (IC12)
#2 Units	IC3/IC1	16 (IC12)
#3 1,000,000's	IC4/IC2	2 (IC8)
#3 100,000's	IC4/IC2	3 (IC8)
#3 10,000's	IC4/IC2	4 (IC8)
#3 1,000's	IC4/IC2	5 (IC8)
#3 100's	IC4/IC2	6 (IC8)
#3 10's	IC4/IC2	7 (IC8)
#3 Units	IC4/IC2	8 (IC8)
#4 1,000,000's	IC4/IC2	10 (IC7)
#4 100,000's	IC4/IC2	11 (IC7)
#4 10,000's	IC4/IC2	12 (IC7)
#4 1,000's	IC4/IC2	13 (IC7)
#4 100's	IC4/IC2	14 (IC7)
#4 10's	IC4/IC2	15 (IC7)
#4 Units	IC4/IC2	16 (IC7)
#1 Comma	-IC1	2,5 (IC13)
#2 Comma	-IC2	10,13 (IC12)
#3 Comma	-IC1	2,5 (IC8)
#4 Comma	-IC2	10,13 (IC7)

ALL IC'S WITH  
DOT INDICATES  
PIN NO. 1

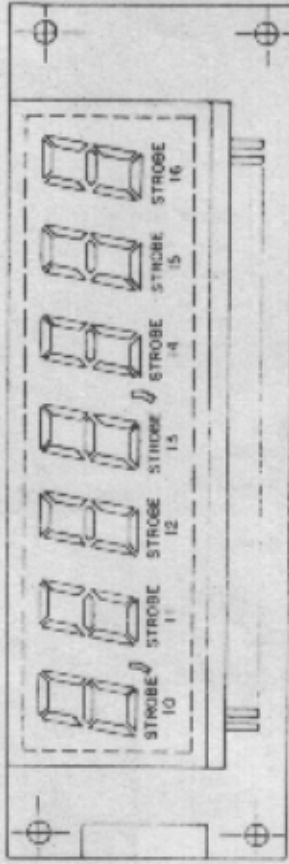


PLAYERS #1 AND 3



5J1  
5J3

PLAYERS #2 AND 4



5J2  
5J4

4J1/5J1 (PLAYER 1)

- 1 100,000's
- 2 -100V KEEP ALIVE
- 3 1,000,000's
- 4 1 SEGMENT
- 5 N/C
- 6 9 SEGMENT
- 7 +100V (N/C)
- 8 e SEGMENT
- 9 10,000's
- 10 d SEGMENT
- 11 1,000's
- 12 -100V KEEP ALIVE
- 13 100's
- 14 COMMA
- 15 10's
- 16 c SEGMENT
- 17 N/C
- 18 b SEGMENT
- 19 UNITS
- 20 a SEGMENT

4J2/5J2 (PLAYER 2)

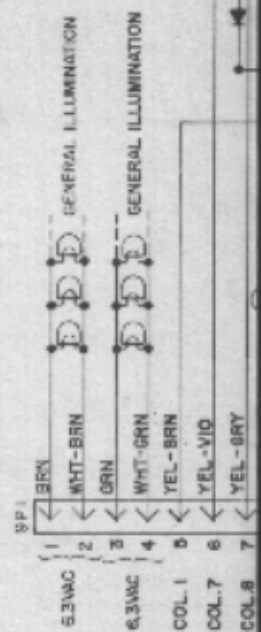
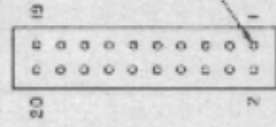
- 1 100,000's
- 2 -100V KEEP ALIVE
- 3 1,000,000's
- 4 f SEGMENT
- 5 N/C
- 6 g SEGMENT
- 7 +100V (N/C)
- 8 e' SEGMENT
- 9 10,000's
- 10 d' SEGMENT
- 11 1,000's
- 12 +100V KEEP ALIVE
- 13 100's
- 14 COMMA
- 15 10's
- 16 c' SEGMENT
- 17 N/C
- 18 b' SEGMENT
- 19 UNITS
- 20 a' SEGMENT

4J8/5J5 (CREDIT/MATCH)

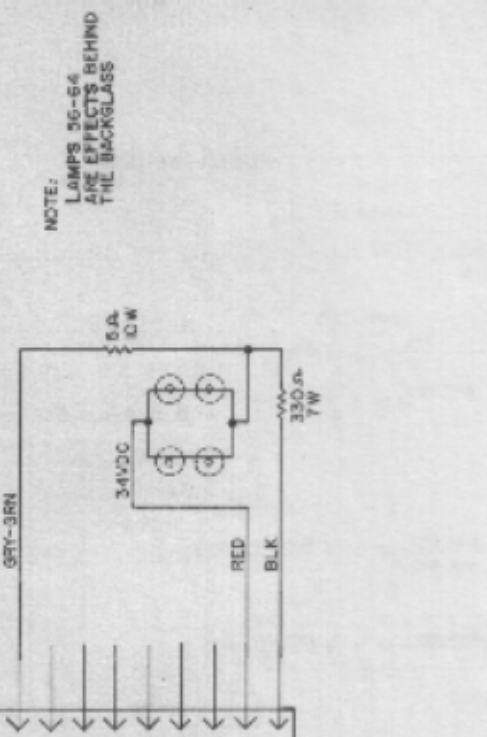
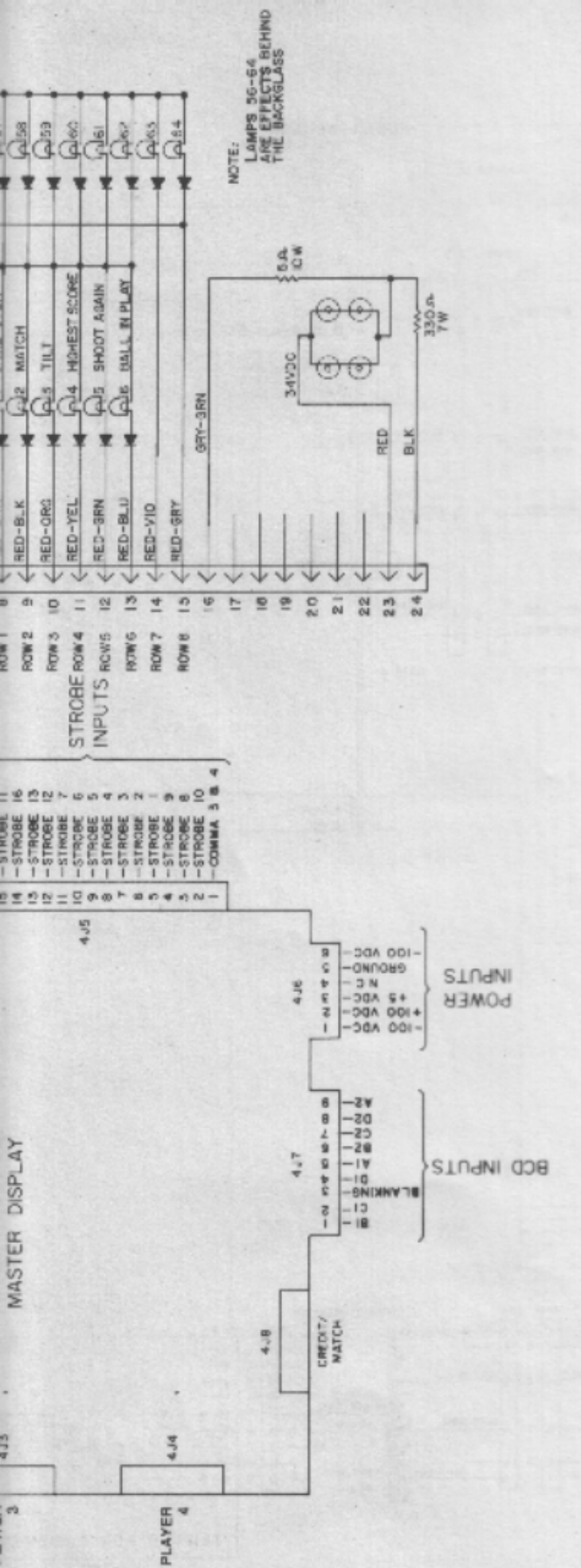
- 1 f' Segment (Credit)
- 2 -100V Keep Alive
- 3 e' Segment
- 4 g' Segment
- 5 c' Segment
- 6 d' Segment
- 7 b' Segment
- 8 10's
- 9 Units
- 10 a' Segment
- 11 e Segment
- 12 f Segment
- 13 10's
- 14 d Segment
- 15 +100V Keep Alive
- 16 c Segment
- 17 g Segment
- 18 b Segment
- 19 Units
- 20 a Segment

Credit

DETAIL A  
4J1 - 4J4, 4J8  
5J1 - 5J5  
CONNECTORS

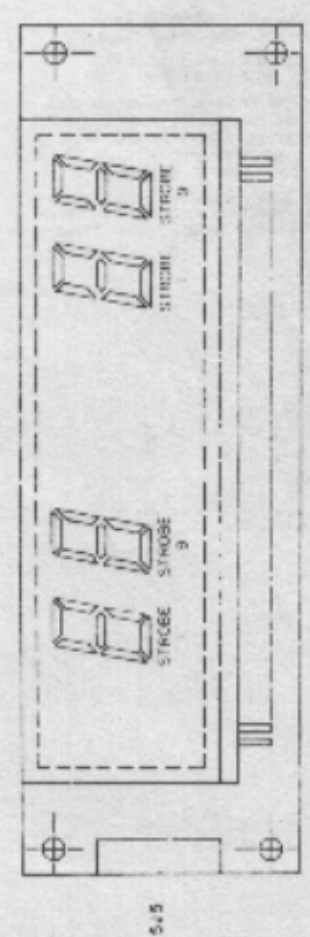


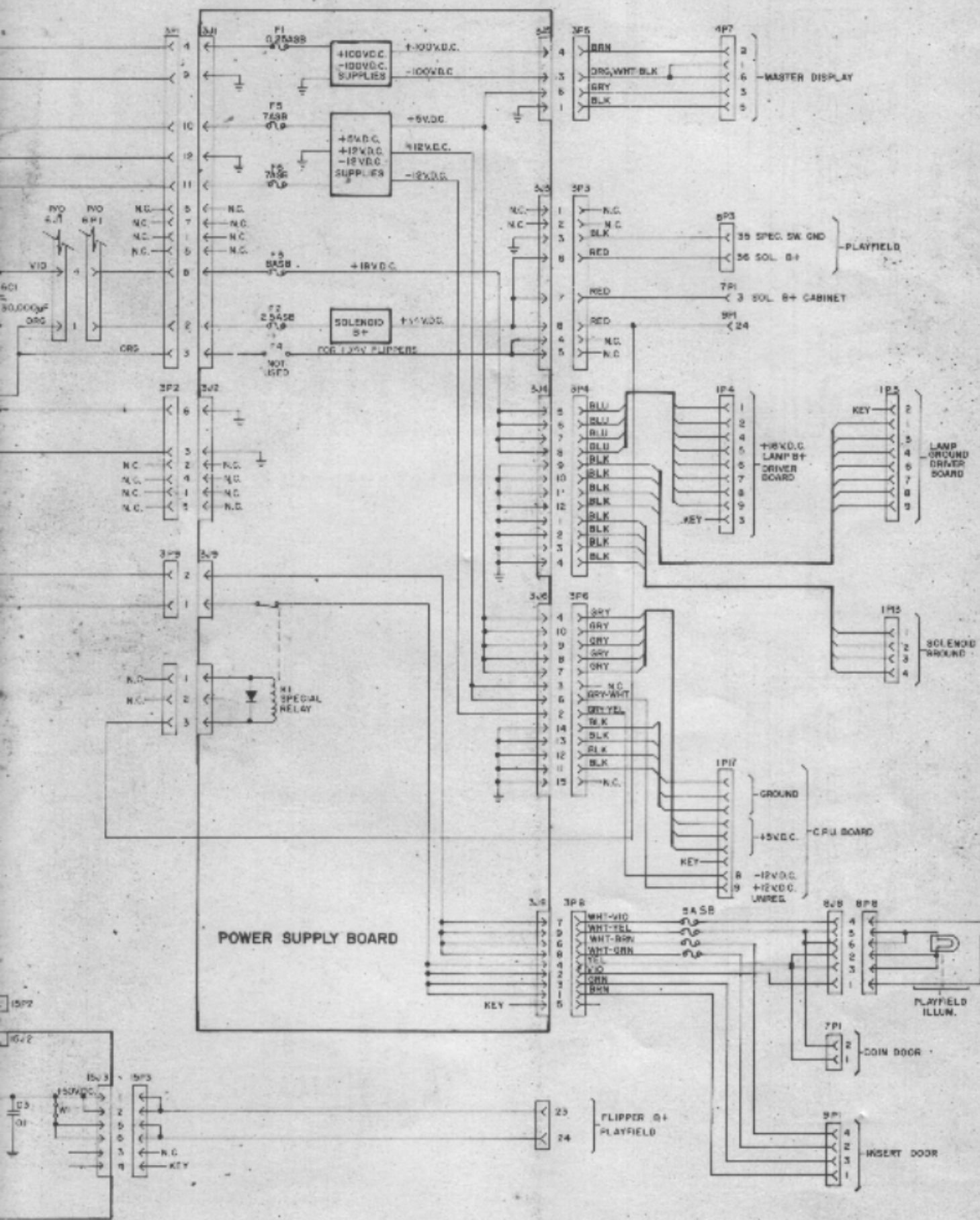
18 - COMMA | 5 2  
17 - STROBE | 4



NOTE:  
LAMPS 56-54  
ARE EFFECTS BEHIND  
THE BACKGLASS

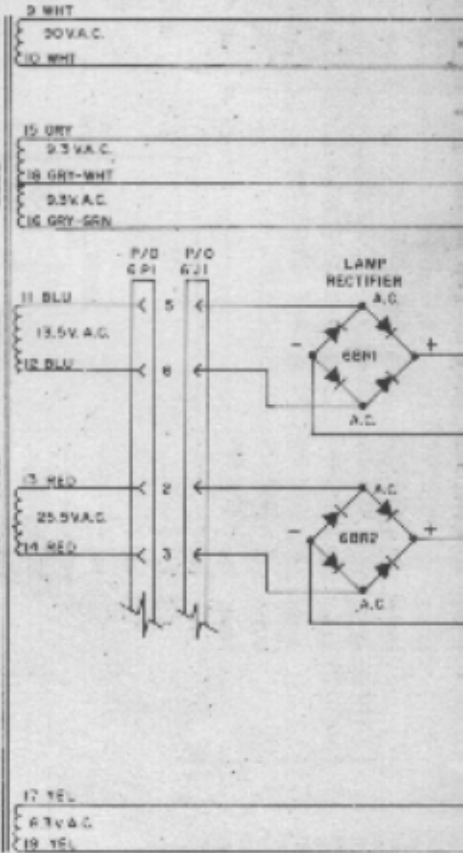
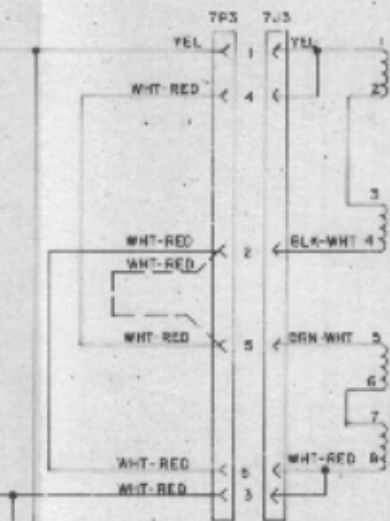
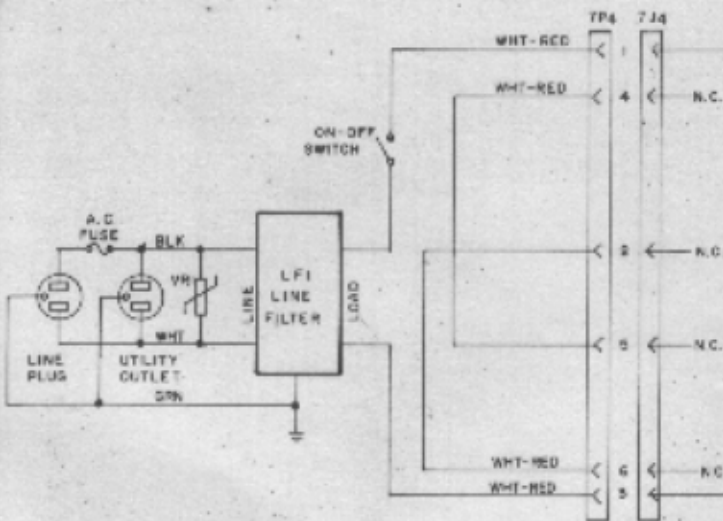
CREDITS / BALL IN PLAY





**POWER WIRING**

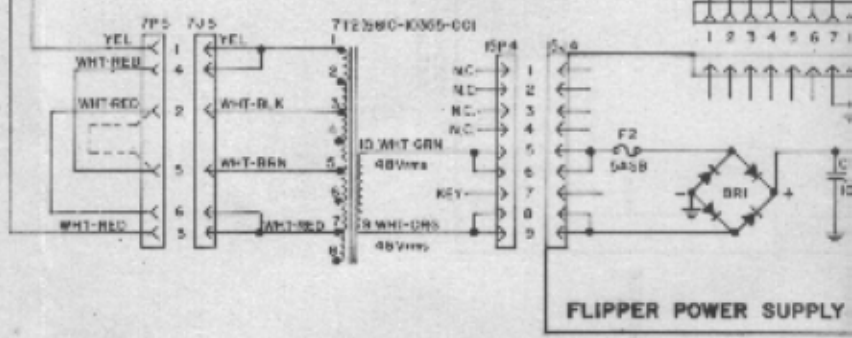
771 (5610-09563-00)



NOTE 3

NOTE 4

- NOTES:
1. FOR 105 OR 117V.A.C., 64 FUSE AND 150K VARISTOR 5017-09044 ARE USED.
  2. FOR 210 OR 225V.A.C., 4A FUSE AND 275V VARISTOR 5017-09063 ARE USED.
  3. JUMPER WIRES ON TP3 AND TP6 SHOWN WITH SOLID LINES ARE CONNECTED FOR 117V.A.C. OPERATION. ONLY THE ONE SHOWN WITH A DASHED LINE IS CONNECTED FOR 220V.A.C. OPERATION.
  4. FOR LOW-LINE CONDITIONS (105 OR 110V.A.C.) MOVE BLK-WHT WIRE FROM 771-4 TO 771-3 AND MOVE 2 WHT-RED WIRES FROM 771-5 TO 771-7.



**FLIPPER POWER SUPPLY**



**System 9 Lamp-Matrix Table**

COLUMN ROW	1 YEL-BRN 1J7-1	2 YEL-RED 1J7-2	3 YEL-ORN 1J7-3	4 YEL-BLK 1J7-4	5 YEL-GRN 1J7-6	6 YEL-BLU 1J7-7	7 YEL-VIO 1J7-8	8 YEL-GRY 1J7-9
1 RED-BRN 1J6-1	Game Over Lamp 1	S 9	A 17	Right Drain 25	1 33	9 41	2X 49	Backglass Effect 57
2 RED-BLK 1J6-2	Match 2	O 10	B 18	Left Flipper Ret. 26	2 34	10 42	4X 50	Backglass Effect 58
3 RED-ORN 1J6-3	Tilt 3	R 11	C 19	Right Flipper Ret. 27	3 35	20 43	6X 51	Backglass Effect 59
4 RED-YEL 1J6-5	High-Score-To-Date 4	C 12	D 20	All Scores 2X 28	4 36	30 44	8X 52	Backglass Effect 60
5 RED-GRN 1J6-6	Shoot Again (Insert) 5	E 13	Extra Ball 21	All Scores 3X 29	5 37	40 45	Left Drop-Tgt 53	Backglass SORCERER art 61
6 RED-BLU 1J6-7	Ball-In-Play 6	R 14	Bonus Hold Over 22	All Scores 5X 30	6 38	50 46	Center Drop-Tgt 54	Backglass SORCERER art 62
7 RED-VIO 1J6-8	Shoot Again (Pfid) 7	E 15	Demon 23	Light Below "S" 31	7 39	Lock 47	Right Drop-Tgt 55	Backglass SORCERER art 63
8 RED-GRY 1J6-9	Play-field Special 8	R 16	Left Drain 24	Light Below "R" 32	8 40	Release 48	Backglass Effect 56	Backglass SORCERER art 64

**System 9 Switch-Matrix Table**

COLUMN ROW	1 GRN-BRN 1J8-1	2 GRN-RED 1J8-2	3 GRN-ORN 1J8-3	4 GRN-YEL 1J8-4	5 GRN-BLK 1J8-5	6 GRN-BLU 1J8-7	7 GRN-VIO 1J8-8	8 GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb-Tilt 1	Left Spinner S 9	A 17	Right Drain 25	Right Kicker 33	Not Used 41	Not Used 49	Not Used 57
2 WHT-RED 1J10-8	Ball-Roll Tilt 2	O 10	B 18	Left Flpr Ret. 26	Left Drop-Tgt 34	UPR-L Switch 42	Not Used 50	Not Used 58
3 WHT-ORN 1J10-7	Credit Button 3	R 11	C 19	Right Flpr Ret. 27	Center Drop-Tgt 35	Lane Switch 43	Not Used 51	Not Used 59
4 WHT-YEL 1J10-6	Right Coin 4	C 12	D 20	Outhole 28	Right Drop-Tgt 36	Lane Change 44	Not-Used 52	Not Used 60
5 WHT-GRN 1J10-5	Center Coin 5	E 13	Left Jet 21	Ramp 1 29	Multi-Ball Ramp 37	Play-Field Tilt 45	Not Used 53	Not Used 61
6 WHT-BLU 1J10-3	Left Coin 6	R 14	Lower Jet 22	Ramp 2 30	Multi Ball SW 38	Not Used 46	Not Used 54	Not Used 62
7 WHT-VIO 1J10-2	Slam Tilt 7	E 15	Right Jet 23	Shooter-Lane SW 31	Lower Right SW 39	Not Used 47	Not Used 55	Not Used 63
8 WHT-GRY 1J10-1	High-Score Reset 8	Right Spinnter R 16	Left Drain 24	Left Kicker SW 32	Lower Left SW 40	Not Used 48	Not Used 56	Not Used 64

## Warnings & Notices

### WARNING

**FOR SAFETY AND RELIABILITY, WILLIAMS** does not recommend or authorize any substitute parts or modifications of **WILLIAMS** equipment.

**USE OF NON-WILLIAMS PARTS** and modifications of game circuitry may adversely affect game play, or may cause injuries.

**SUBSTITUTE PARTS OR EQUIPMENT MODIFICATIONS** may void FCC type-acceptance.

**SINCE THIS GAME IS PROTECTED** by Federal copyright, trademark and patent laws, unauthorized game-conversions may be illegal under Federal law.

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### 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 tested and found 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.

### NOTICE

**SORCERER, MULTI-BALL** and **LANE CHANGE** are trademarks of **WILLIAMS ELECTRONICS, INC.**

### WARNING

**FCC STICKER.** Check the back of your game to see that an FCC-certification sticker was attached to your game at the factory.

All games that leave **WILLIAMS'** plants have been tested and found to comply with FCC Rules. As the sticker is proof of this fact, *legal repercussions to the owner and distributor of the game* may result if the sticker is missing.

If you receive any **WILLIAMS** game (manufactured after December 1982) that has no FCC sticker, call **WILLIAMS** for advice or write us a note on your game-registration card. *Be sure the card bears your game's serial number.*

### CAUTION

**RAISING THE PLAYFIELD.** Take special care when raising the **SORCERER** playfield. This game has several fragile plastic pieces above the level of the playfield. If the weight of the playfield were to rest against them, these pieces might break.

### CAUTION

**BACKBOX SETUP.** When you raise the Backbox into its upright position, be careful not pinch the cable assemblies in either the hinge or in the surface between the Backbox and the playfield cabinet. A pinched cable assembly can adversely affect the game's operation or result in severed wires.

### RF-INTERFERENCE NOTICE

**CABLE-HARNESS PLACEMENTS** and ground-strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by FCC regulations.

**TO MAINTAIN THESE LEVELS,** reposition harnesses and reconnect ground straps to their original placements if they should be disconnected during maintenance.

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