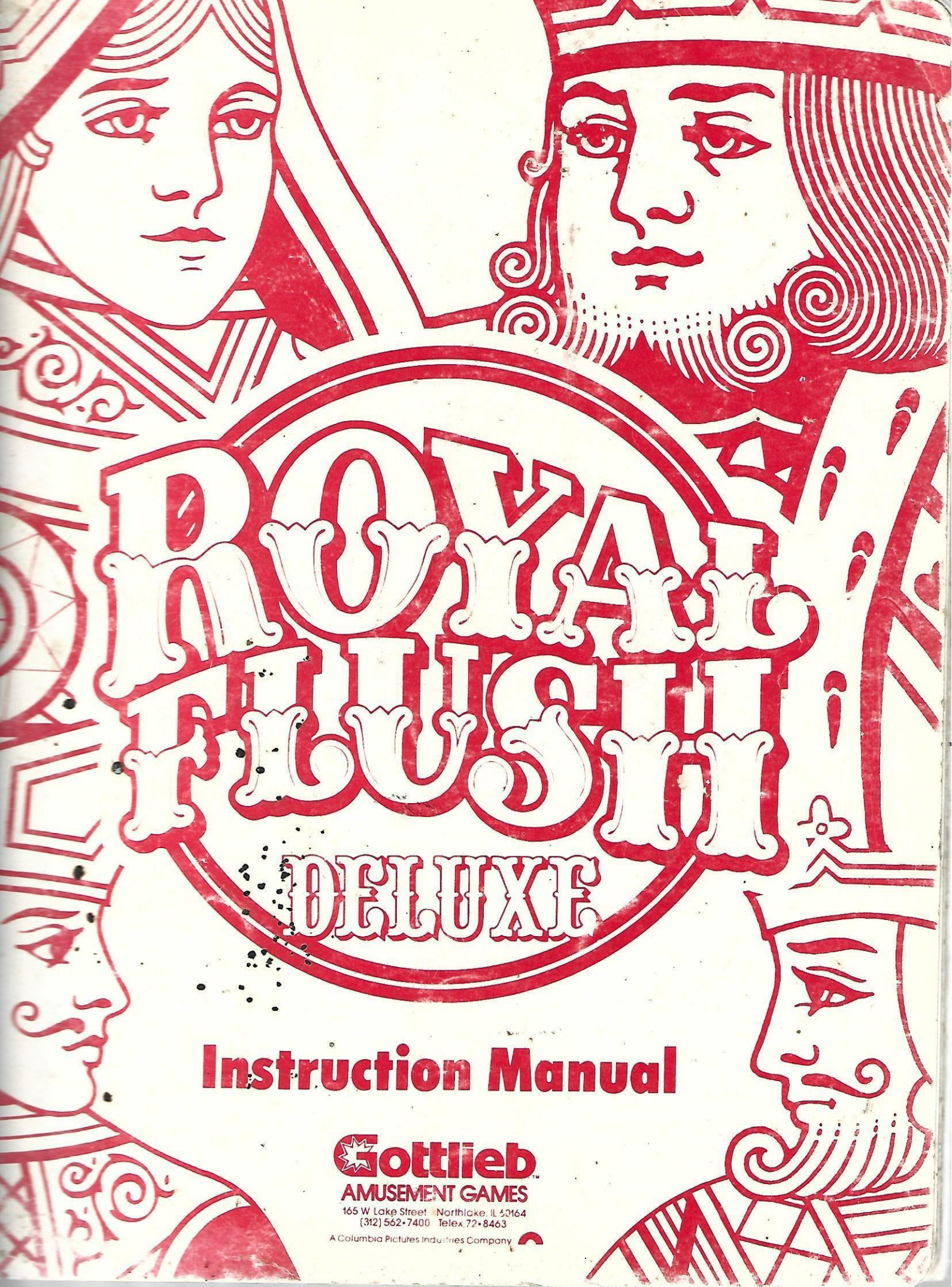

Instruction Manual

Gottlieb
AMUSEMENT GAMES
165 W Lake Street Northlake IL 60164
(312) 562-7400 Telex 72-8463
A Columbia Pictures Industries Company

ROYAL FLUSH DELUXE

(GAME #681)

FINAL EDITION

APPLICABLE TO ALL GAMES
NOT HAVING THE LETTER "S"
IN THEIR SERIAL NUMBER

TABLE OF CONTENTS

		PAGE
I.	INSTALLATION	1
II.	INITIALIZATION	2
III.	GAME OPERATION	2
IV.	GAME PLAY AND SCORING	4
V.	SOUND	6
VI.	GAME ADJUSTMENTS	7
VII.	BOOKKEEPING AND SELF TEST	9
VIII.	OPTIONS	14
IX.	GENERAL INFORMATION	15
X.	WIRING AND SCHEMATIC DIAGRAMS	17
XI.	PARTS INFORMATION	44

ROYAL FLUSH DELUXE PROMS

GAME PROM 681/2

SOUND PROMS 681/S1, 681/S2

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ADDENDUM

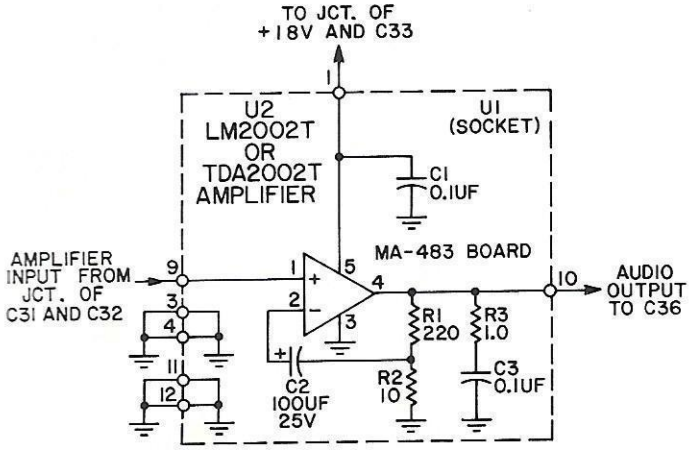
ATTACHED TO AND PART OF ROYAL FLUSH DELUXE GAME #681

INSTRUCTION MANUAL

GAME AS SHIPPED VARIES FROM THE INSTRUCTION MANUAL AS PRINTED

1. The game number has been changed to #681A.
2. The existing Sound Board (MA-309) becomes an MA-484 with the addition of the Piggyback Board (MA-483) mounted on the Sound Board. Delete the following parts from the SOUND BOARD ASSY. parts list on page 25 of the instruction manual:

C37	Capacitor, 4.7UF, 35V	XO-291
R18, R21	Resistor, 100K ohm,5%, 1/4W	XO-45
R22	Resistor, 2K ohm, 5%, 1/4W	XO-14
U23	IC, LM379S	XO-395
Delete:	Sound Board Assembly	MA-309
Add:	Sound Board Assembly	MA-484



Add the following parts list for the Piggyback Board on page 25 of the instruction manual.

C1,C3	Capacitor, 0.1UF, 50V	XO-230
C2	Capacitor, 100UF, 25V	XO-212
R1	Resistor, 220 ohm, 5%, 1/2W	XO-185
R2	Resistor, 10 ohm, 5%, 1/4W	XO-32
R3	Resistor, 1 ohm, 5%, 1/2W	XO-593
U1	Socket, 14 Pin	XO-619
U2	IC, LM2002T or TDA2002T	XO-550
	Clip Heat Sink	XO-472

In addition, the Sound/Speech Power Supply Board (A7) was MA-188, now becomes MA-481 with the following changes. These changes should be implemented on page 40, SOUND/SPEECH POWER SUPPLY (A7) PARTS LIST, in the instruction manual:

DELETE:		
R1	Resistor, 430 ohm, 5%, 1/2W	XO-54
ADD:		
R1	Resistor, 1.5K ohm, 5%, 1/2W	XO-58
Delete:		
CR1	Diode, Zener 30V, 5%, 1W, 1N4751A	XO-271
ADD:		
CR1	Diode, Zener 18V, 5%, 1W, 1N4746A	XO-258

NOTE: Connector A7P1 pin 2 now has +18V DC instead of the previous +30V DC. Change the voltage on the schematic on top of page 40, SOUND/SPEECH POWER SUPPLY, in the instruction manual.

SYSTEM 80A

Gottlieb's enhanced System 80 Program, System 80A, will permanently replace System 80 in future games.

System 80A has improved bookkeeping and self test capabilities, permits the use of seven digit displays and allows for greater coin/credit combination flexibility. The control boards' ROM memory chips, U2 and U3, have been reprogrammed for System 80A. They have also been socketed. In doing so, the control board can be used for either system by simply using the appropriate set of ROM memory chips.

The part numbers of each set are as follows:

SYSTEM	U2 PART NO.	U3 PART NO.	SOCKET PART NO.
80	XO-363	XO-362	XO-529
80A	XO-326	XO-327	XO-529

The ROMS are labeled as follows:

SYSTEM	U2	U3
80	R3273-12	R3272-12
80A	XO-326	XO-327

I. INSTALLATION

A. SET-UP

1. Bolt the legs to the cabinet.

2. Lift lightbox into an upright postion. Be sure none of the cables are crimped in between the lightbox and cabinet.

3. Engage the snap in the rear of the lightbox to the cabinet.

4. Open the cabinet door and loosen the front moulding locking arm.

5. Remove the moulding from the playfield.

6. Slide the cabinet glass forward and remove it.

7. Raise the playboard, slide it forward and rest it on its supports.

8. From the inside of the cabinet, remove the binding strap from the power cord. Feed the cord to the outside of the cabinet through the black plastic line cord housing.

9. Unlock the lightbox and remove the backglass.

10. Loosen and lower the shipping bracket at the top center of the lightbox insert panel.

11. Lift the insert; then swing it out.

12. Secure the lightbox to the cabinet with the bolts and washers provided.

B. CHECK-OUT

1. Check that all cables are clear of moving parts.

2. Check for any loose wires.

3. Check switches for loose solder or other foreign matter.

4. Be certain all fuses are firmly seated.

5. Check transformers for any foreign matter across terminals.

6. Be sure transformer wiring corresponds to the supply voltage.

7. Check the setting of the normally open tilt switch on the underside of the playfield. One blade should be free-floating with a weight on the end.

8. Reassemble and level the game.

9. The plumb-bob tilt can be adjusted by loosening the wing nut and raising the plumb-bob to increase its sensitivity, or lowering it to decrease its sensitivity.

   The ball-roll tilt can be adjusted by loosening the front screw and raising the tilt bracket to increase sensitivity, or lowering it to decrease its sensitivity.

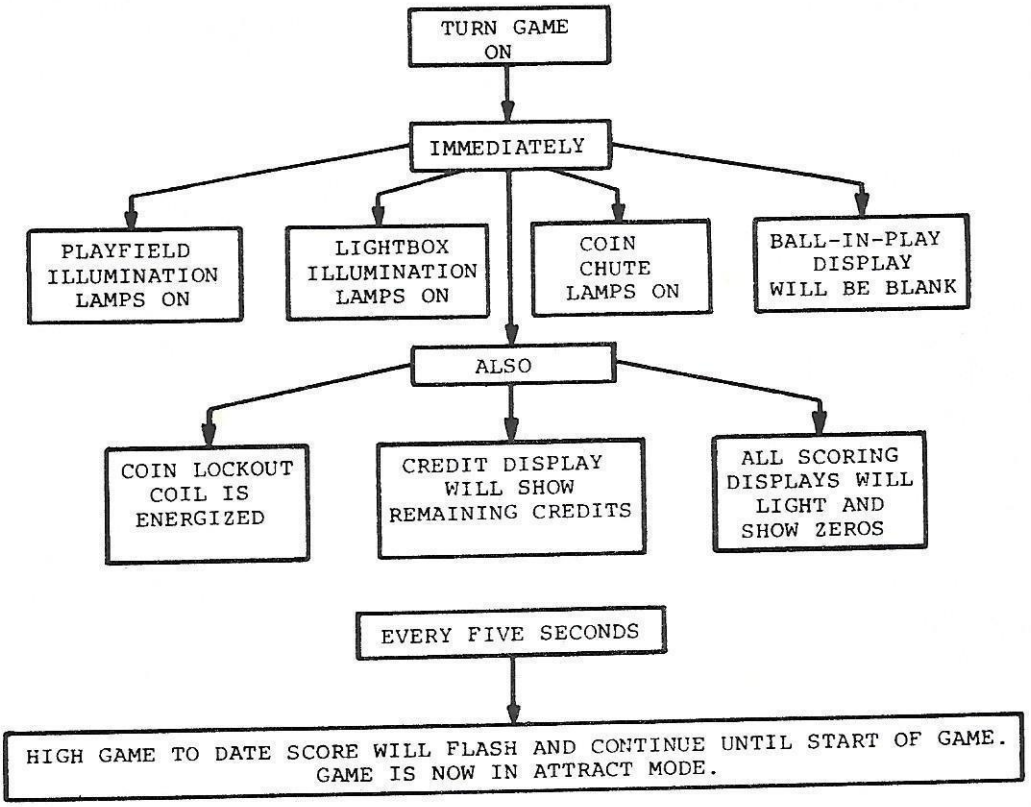
10. With the line cord unplugged, drop a coin into one of the chutes. It should be rejected.

11. Plug the line-cord into a properly grounded 3-wire receptacle ONLY!

12. Refer to Section VI to make all necessary game adjustments.

II. INITIALIZATION, III. GAME OPERATION

II. INITIALIZATION



III. GAME OPERATION

A. GAME START

The ball must be in the ball return trough to start a game.

1. Insert coins into coin chute.
   a. Coin chute tune is played.
   b. Total credits are displayed in status display.

2. Press Credit Button to start game.
   a. Credit tune is played.
   b. Total credits displayed decrease by one.

3. All playfield features reset.

4. The first player score display flashes 2 zeros.

5. When the ball is released to the shooter, the playfield-controlled lamps flash.

B. FIRST PLAYER

1. First player's score display flashes two zeros.

2. The other player's displays are now blank.

3. A "1" appears on the ball-in-play display.

4. When the ball enters the outhole, any bonus earned is scored.

C. ADDITIONAL PLAYERS

1. Additional players are indicated by 2 zeros (not flashing) in each corresponding player's display.

2. After the maximum number of players are added, or no more

credits remain, the Credit Button has no effect.

3. Additional players can be added anytime the first player's ball is still in play. If the Credit Button is pressed after the first player's first ball has entered the outhole, all players' scores will be erased with the first player's score display showing a flashing zero, indicating a new game only for the first player.

D. TILT MODE

1. Tilting the game results in a loss of ball in play.
2. When the game is tilted, all the playfield lamps go off.
3. All accumulated bonus and bonus multipliers are lost.

E. SLAM MODE

1. If the normally closed slam switch (located inside front door) is opened, the entire game is ended for all players.
2. The GAME OVER lamp comes on.
3. The entire switch matrix is inactive for three seconds.
4. All coins will be rejected if dropped into any coin chute during the three-second delay.
5. If the match feature exists (dependent on Switch #26), a replay can be won even if the game is slammed.
6. Game returns to the attract mode.

F. GAME OVER

1. When the last ball enters the outhole, the GAME OVER lamp continually flashes.
2. A random number appears in the ball-in-play display. If this number matches the last two digits in any player's score, a replay (dependent on Switch #27) is awarded.
3. HIGH GAME TO DATE is periodically flashed in all players score displays. When a score higher than HIGH GAME TO DATE is achieved, an award (dependent on Switches #23 and #24) is given.
4. All of the target banks will reset.

IV. GAME PLAY AND SCORING

TOP LEFT ROLLOVER, LEFT SPOT TARGET

- Scores 500 points.
- Scores 5000 points when lit.
- Turns top left rollover lamp off.
- Turns left spot target lamp off.
- Lights left outlane rollover lamp.
- Lights right return rollover lamp.
- Lights corresponding colored lamp at hole kicker.

TOP CENTER ROLLOVER, TOP SPOT TARGET

- Scores 500 points.
- Scores 5000 points when lit.
- Turns top center rollover lamp off.
- Turns top spot target lamp off.
- Lights left side rollover lamp.
- Lights right side rollover lamp.
- Lights corresponding colored lamp at hole kicker.

TOP RIGHT ROLLOVER, RIGHT SPOT TARGET

- Scores 500 points.
- Scores 5000 points when lit.
- Turns top right rollover lamp off.
- Turns right spot target lamp off.
- Lights left return rollover lamp.
- Lights right outlane rollover lamp.
- Lights corresponding colored lamp at hole kicker.

SPECIAL

- Lighting all three lamps at the hole kicker lights the hole kicker for special.
- Awarded when ball enters hole kicker when lit.

HOLE KICKER

- Scores 10,000 points plus 10,000 points for each lit lamp at the hole kicker (40,000 points maximum).
- Awards special when lit.

IV. GAME PLAY AND SCORING

DROP TARGETS

- Scores 10,000 points plus 10,000 points for each lit lamp at the hole kicker (40,000 points maximum).
- Scores 1000 points plus 1000 points for each lit lamp at the hole kicker (4000 points maximum) (5 ball).
- Completing proper combinations lights corresponding bonus lamps (left side lights first).

BONUS

- Ball entering outhole collects bonus.
- Ball entering open gate when all bonus lamps are lit collects bonus, resets target bank and turns off all bonus lamps.
- Double bonus lit on last ball only.

RIGHT SIDE ROLLOVER

- Scores 5000 points.
- Scores 30,000 points when lit.
- Opens gate.

LEFT SIDE ROLLOVER

- Scores 5000 points.
- Scores 30,000 points when lit.

LEFT OUTLANE ROLLOVER, LEFT RETURN ROLLOVER, RIGHT OUTLANE ROLLOVER, RIGHT RETURN ROLLOVER

- Scores 5000 points.
- Scores 30,000 points when lit.

DIP TARGETS

- Lights when drop target in front of it is down.
- Left target scores 500 points when lit (behind the black king).
- Right target scores 500 points when lit (behind the black jack).
- Center target scores 3000 points when lit (behind the red queen).

POP BUMPER

- Scores 1000 points.
- Scores 3000 points when lit.
- Lights with center DIP target (behind the red queen).

VI. GAME ADJUSTMENTS

A. CONTROL BOARD SWITCH ADJUSTMENTS

NOTE: The following switch adjustments pertaining to system 80A only. There are 32 switches on the control board which permit adjustment of the game parameters. These switches are contained in four packages of eight switches each, as shown below.

COIN CHUTE COMBINATIONS
SYSTEM 80A

SWITCHES					COIN CHUTE ADJUSTMENTS	CREDITS/COINS
S1	S2	S3	S4	S5	Left Coin Chute	
S9	S10	S11	S12	S13	Right Coin Chute	
S17	S18	S19	S20	S21	Center Coin Chute	
OFF	OFF	OFF	OFF	OFF		1/1
OFF	OFF	OFF	OFF	ON		2/1
OFF	OFF	OFF	ON	OFF		3/1
OFF	OFF	OFF	ON	ON		4/1
OFF	OFF	ON	OFF	OFF		5/1
OFF	OFF	ON	OFF	ON		6/1
OFF	OFF	ON	ON	OFF		7/1
OFF	OFF	ON	ON	ON		8/1
OFF	ON	OFF	OFF	OFF		9/1
OFF	ON	OFF	OFF	ON		10/1
OFF	ON	OFF	ON	OFF		1/2
OFF	ON	OFF	ON	ON		2/2
OFF	ON	ON	OFF	OFF		3/2
OFF	ON	ON	OFF	ON		4/2
OFF	ON	ON	ON	OFF		5/2
OFF	ON	ON	ON	ON		6/2
ON	OFF	OFF	OFF	OFF		7/2
ON	OFF	OFF	OFF	ON		8/2
ON	OFF	OFF	ON	OFF		9/2
ON	OFF	OFF	ON	ON		10/2
ON	OFF	ON	OFF	OFF		1/3
ON	OFF	ON	OFF	ON		2/3
ON	OFF	ON	ON	OFF		1/4
ON	OFF	ON	ON	ON		3/4
ON	ON	OFF	OFF	OFF		1/5

*All of the above do not give credits until the last coin is inserted.

SWITCHES 6, 7 AND 8 — SPARES

SWITCH 14 — COIN CHUTE 1 & 2 CONTROL
- ON ..... Same
- OFF ..... Separate

SWITCHES 15 16 — MAXIMUM CREDITS

15	16	
OFF	OFF	8
OFF	ON	10
ON	OFF	15
ON	ON	25

SWITCH 22 — PLAYFIELD SPECIAL
- ON ..... Extra Ball
- OFF ..... Special

SWITCHES 23 24 — HIGH GAME TO DATE AWARDS

23	24	
OFF	OFF	None
OFF	ON	None
ON	OFF	2 Replay
ON	ON	3 Replay

SWITCH 25 — BALLS/GAME
- ON 3
- OFF 5

SWITCH 26 — MATCH
- ON ..... On
- OFF ..... Off

SWITCH 27 — REPLAY LIMIT
- ON 1
- OFF ..... No Limit

SWITCH 28 — NOVELTY
- ON ..... Yes
- OFF ..... Normal

SWITCH 29 — GAME MODE
- ON ..... Extra Ball
- OFF ..... Replay

SWITCH 30 — 3RD COIN CHUTE CREDIT CONTROL
- ON ..... Add 9
- OFF ..... No Effect

SWITCHES 31 32 — NOT USED
- ON .....
- OFF .....

ADDITIONAL COIN CHUTE COMBINATIONS
CREDIT INCENTIVES

ALL OF THE BELOW CANNOT HAVE 9 CREDITS ADDED BASED ON SWITCH 30

SWITCHES

S1	S2	S3	S4	S5 -	Left Coin Chute
S9	S10	S11	S12	S12 -	Right Coin Chute
S17	S18	S19	S20	S21 -	Center Coin Chute

					COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN		TOTAL COIN/ TOTAL CREDIT
ON	ON	OFF	OFF	ON	1st/1	2nd/2				=	2/3
ON	ON	OFF	ON	OFF	1st/0	2nd/1	3rd/1	4th/1		=	4/3
ON	ON	OFF	ON	ON	1st/0	2nd/1	3rd/0	4th/2		=	4/3
ON	ON	ON	OFF	OFF	1st/1	2nd/1	3rd/1	4th/2		=	4/5
ON	ON	ON	OFF	ON	1st/1	2nd/2	3rd/1	4th/3		=	4/7
ON	ON	ON	ON	OFF	1st/1	2nd/2	3rd/2	4th/2		=	4/7
ON	ON	ON	ON	ON	1st/0	2nd/0	3rd/1	4th/0	5th/1	=	5/2

VI. GAME ADJUSTMENTS

B. SOUND ADJUSTMENTS

The speaker output is controlled by the potentiometer mounted on the front door.

Turning the potentiometer counter clockwise will decrease the volume. Turning it clockwise will increase the volume.

IMPORTANT: Each of the potentiometers installed on the Sound Board have been factory adjusted. The potentiometer settings should never be changed except when performing the recommended calibration procedure.

SWITCH BANK (SB1) SETTINGS:

SB1-1	NOT USED	
SB1-2	NOT USED	
SB1-3	SB1-4	Attract Mode
OFF	OFF	Disabled
ON	OFF	Every 10 Seconds
OFF	ON	Every 2 Minutes
ON	ON	Every 4 Minutes
SB1-5	ON	Background Sound Enabled
	OFF	Background Sound Disabled
SB1-6	NOT USED	
SB1-7	NOT USED	
SB1-8	NOT USED	

C. POST ADJUSTMENTS

The upper and lower posts of the left and right outlanes can be repositioned for liberal/conservative game play. The upper post at the mouth of the Right Side Roll-over can also be repositioned. The smaller opening produces a more liberal game play.

VII. BOOKKEEPING AND SELF TEST

The circuitry in this game helps the operator perform many Bookkeeping and Self/Test functions. These functions are accessed by the Self/Test Switch inside the front door. Information is displayed on the player's and credit display. Bookkeeping is listed in Steps 01 through 15. Section VII, A details the Bookkeeping system, while Section VII, C details the Self/Test operation. The Flow Chart in Section VII, B gives the order and function of both Bookkeeping and Self/Test steps.

A. BOOKKEEPING SYSTEM 80A

- See Flow Chart for Bookkeeping Assignments.
- Bookkeeping Steps (01-15) are displayed in the credit display and the 3rd and 4th player's score display.
- Information for the particular bookkeeping step displayed will appear in the 1st player's score display.
- All bookkeeping information is checked against itself to insure that it is correct. If any data is invalid or bad, that information will flash while it is displayed.

I. STEPPING THROUGH BOOKKEEPING

1. Press the SELF-TEST button inside the front door.

   Double zeros (00) should appear in the designated bookkeeping step displays.

2. Press the SELF-TEST button again. Step 01 and its information will be displayed.

3. Pressing the SELF-TEST button will increment the bookkeeping step number and the appropriate information will be displayed.

   NOTE: . If the SELF-TEST button is not pressed within 60 seconds of each step, the game will return to the attract mode.

   Pressing the SELF-TEST button after Step 15 will start the SELF-TEST function (Step 16-20). At this point Bookkeeping cannot be reentered by pressing the SELF-TEST button. To reenter, turn the game OFF/ON, open the slam switch, close a tilt switch, or wait 60 seconds. The game will return to the attract mode. Then press the SELF-TEST button.

4. To exit from Bookkeeping at any time:

   a. Wait 60 seconds or
   b. Turn power OFF/ON or
   c. Open slam switch or
   d. Close a tilt switch.

II. HOW TO SET BOOKKEEPING INFORMATION TO ZERO

1. For a Particular Bookkeeping Step

   a. Advance Bookkeeping so the step to be zeroed is displayed.

   b. Press the replay button. Notice all zeros will appear in the 1st player's display.

   c. Press the SELF-TEST button. This will enter zeros into memory. Note: If the SELF-TEST button is not pressed, the bookkeeping memory will retain its information.

2. Zeroing All Bookkeeping Steps Except #11, 12, 13 and 14.

   (These are the replay level and high game to date scores)

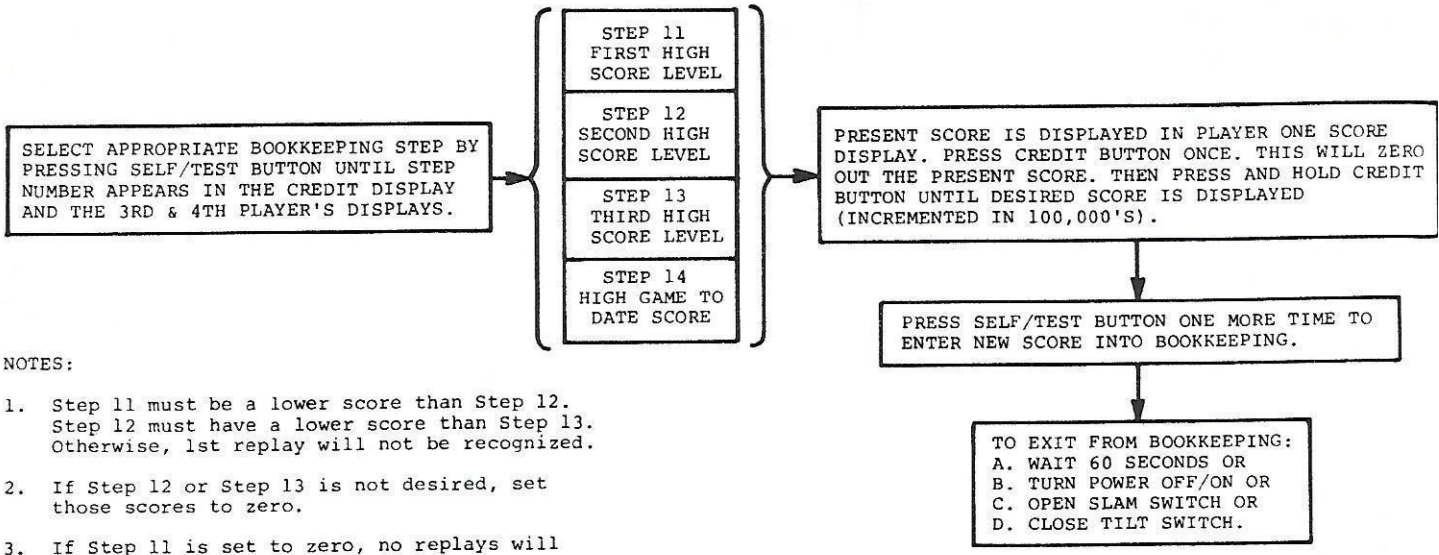
   a. Go to Step #15.

   b. Press the credit button. Step 15 data will zero.

   c. Press the SELF-TEST button.

   d. Zeroing is complete.

III. HOW TO RESET HIGH SCORE LEVELS OR HIGH GAME TO DATE SCORES



NOTES:

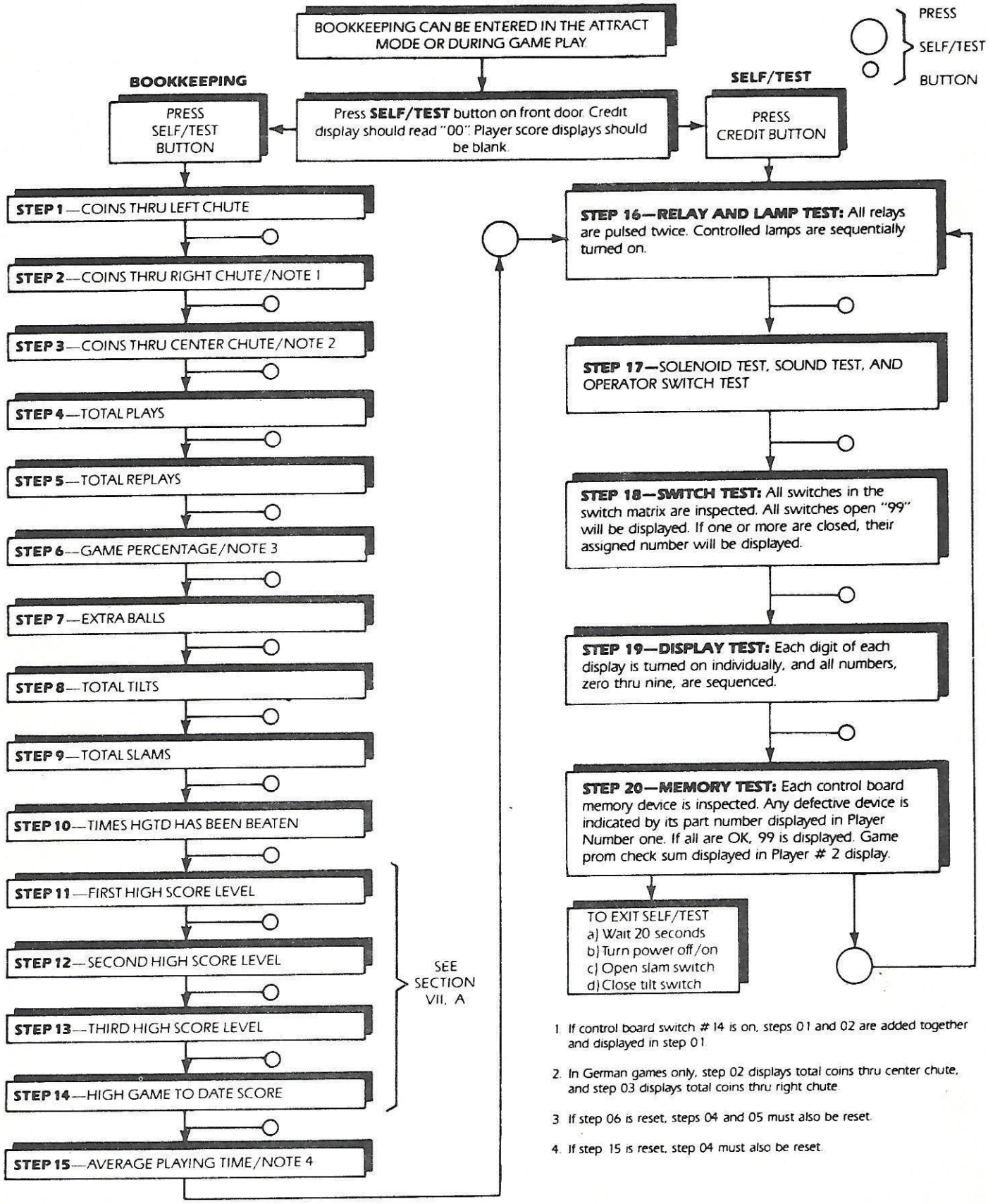
1. Step 11 must be a lower score than Step 12. Step 12 must have a lower score than Step 13. Otherwise, 1st replay will not be recognized.

2. If Step 12 or Step 13 is not desired, set those scores to zero.

3. If Step 11 is set to zero, no replays will be awarded, no matter what the settings are for Step 12 and Step 13.

VII. BOOKKEEPING AND SELF TEST

B. FLOW CHART

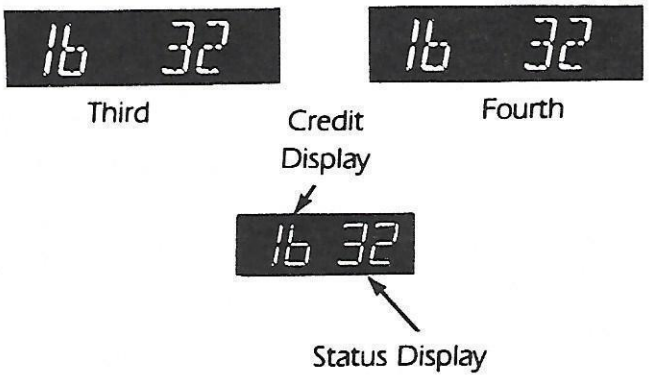


1. If control board switch # 14 is on, steps 01 and 02 are added together and displayed in step 01.
2. In German games only, step 02 displays total coins thru center chute, and step 03 displays total coins thru right chute.
3. If step 06 is reset, steps 04 and 05 must also be reset.
4. If step 15 is reset, step 04 must also be reset.

C. SELF/TEST

- Steps 16 through 20 are SELF/TEST or game tests the operator can use for quick troubleshooting.
- All the tests are explained in the flow chart.
- Each test can be repeated by pressing the replay button on the front door.
- If the SELF/TEST button or the replay button is not pressed within 20 seconds after completion of a tests complete cycle, the game will return to the attract mode.

EXAMPLE:

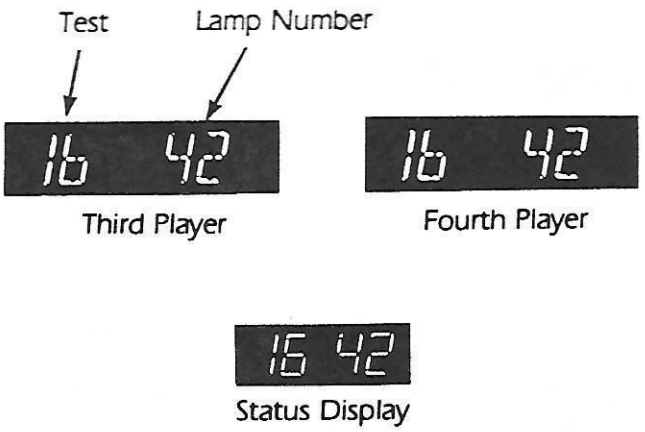


STEP 16—RELAY AND LAMP TEST

a. Relay Test-All relays are pulsed twice in the following order:

		A3 Driver Board Transistor Assignment (See Schematic)
O (Game Over) Relay	-	A3J3 PIN #$\overline{A}$ Q1
T (Tilt) Relay	-	A3J3 PIN #$\overline{B}$ Q2
Coin Lockout Relay	-	A3J5 PIN #2 Q3

b. Lamp Test-Lamps are sequentially strobed. Lamp assignment numbers appear in the third and fourth player's score display and the status display:



Lamp number (L9, L16, etc.) can be referenced to the Driver Board Schematic where the specific transistor for each lamp can be identified.

To repeat test, push the credit button. To advance to test # 17, push the Self/Test Button.

STEP 17—SOLENOID TEST, SOUND TEST, OPERATOR SWITCH TEST.

a. Solenoid Test-Each solenoid on the playfield is sequentially pulsed. The solenoid number displayed identifies which solenoid is being tested. The following chart lists solenoid assignments.

NUMBER DISPLAYED	ASSIGNMENT	A3 DRIVER BOARD TRANSISTOR ASSIGN. SEE SCHEMATIC
Sol. 1	Not Used	Q60
Sol. 2	Target Bank Reset	Q57/Q58
Sol. 3	Not Used	Q54
Sol. 4	Not Used	Q55
Sol. 5	Hole	Q61/Q62
Sol. 6	Target Bank Reset	Q63/Q64
Sol. 7	Not Used	Q56
Sol. 8	Knocker	Q53
Sol. 9	Outhole	Q59

b. Sound Test-Immediately after the solenoid test, the sound enable signals (inputted to the A6 Sound Board) will be tested in the following order:

VII. BOOKKEEPING AND SELF TEST

SOUND ENABLE	NUMBER DISPLAYED	A3 DRIVER BOARD TRANSISTOR ASSIGN. SEE SCHEMATIC	
S16	17 (combination S1 & S16)	A3J2	PIN 9
S8	8	A3J5	PIN 7
S2	2	A3J5	PIN 5
S4	4	A3J5	PIN 1
S1	1	A3J5	PIN 6

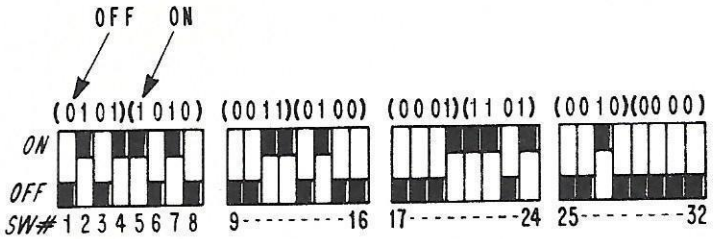
c. The first and second player's score displays show hexadecimal representative of the operator switch positions. Converting hexidecimal to binary will give the switch positions in binary form.

CONVERSION TABLE

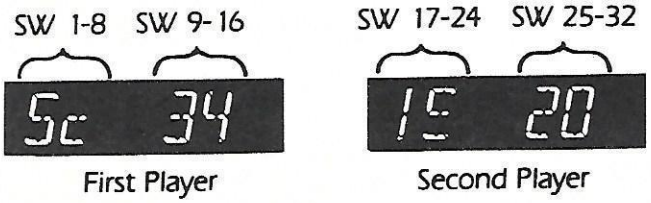
0 = OFF 1 = ON

DISPLAYED HEXIDECIMAL		DECIMAL	BINARY
0	0	0	0000
1	1	1	0001
2	2	2	0010
3	3	3	0011
4	4	4	0100
5	5	5	0101
6	6	6	0110
7	7	7	0111
8	8	8	1000
9	9	9	1001
A	C	10	1010
B	J	11	1011
C	L	12	1100
D	C	13	1101
E	E	14	1110
F	BLANK	15	1111

EXAMPLE:



DISPLAYED



Checking Switches

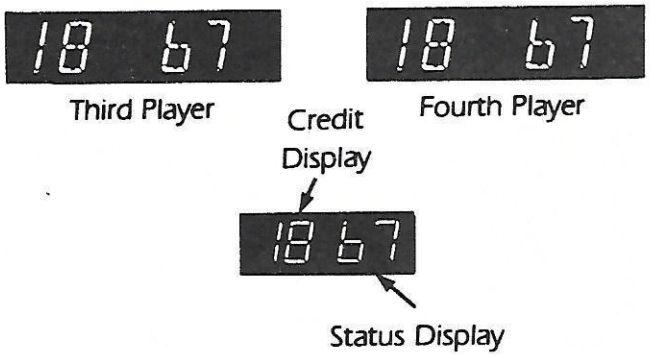
1) Switch all odd number switches to the ON position, and all even switches to the OFF position. Display should show:

2) Switch all even numbered switches to the ON position and all odd switches to the OFF position. Display should show:

To repeat test # 17, push the credit button.

To advance to test # 18, push the Self/Test switch.

STEP 18—SWITCH TEST



1) All switches open. 99 will be displayed. (Note: The slam switch is not part of the switch test (normally closed).

2) Switch(es) closed. Designated number(s) will be sequentially displayed. The last switch number will remain displayed, unless test is repeated.

VII. BOOKKEEPING AND SELF TEST

STEP 19—DISPLAY TEST: Each digit of each display is individually turned on, and numbers zero through nine are sequenced.

- Test number is not displayed.

> **NOTE:** On the second and fourth player displays only, the least significant digits are strobed first. Then the most significant digits and the remaining digits are sequentially strobed. This is normal operation.

STEP 20—MEMORY TEST - Each control based memory device is checked. If all are good, a 99 will be displayed.

If a memory chip located on the A 1 Control Board is defective, a corresponding number in the following chart will be displayed.

NUMBER DISPLAYED	CHIP ASSIGNMENT/ DESCRIPTION
99	All Memory Good
5 10 1	Z5 Bookkeeping Ram
2332-1	U2 Background Rom
2332-2	U3 Background Rom
6532-1	U4 Ram
6532-2	U5 Ram
6532-3	U6 Ram
27 16*	Prom 1 Game E Prom

Player #2 displays the check sum for the game prom in hexidecimal. Refer to the conversion Table for interpretation.

To repeat test #20, push the credit button. To advance to Step # 16, push the Self/Test button.

* James Bond (658) and later System 80 games up to and including Haunted House will display 764 1-1 for a bad 27 16 game prom.

VIII. OPTIONS

There are no options for this game.

IX. GENERAL INFORMATION

A. PRINTED CIRCUIT BOARDS ARE DESIGNATED AS FOLLOWS:

A1 - Control Board
A2 - Power Supply
A3 - Driver Board
A5 - Status Display
A6 - Sound Board
A7 - Sound/Speech Power Supply
A8 - Pop Bumper Driver Boards
A14 - 7-Digit Display
A24 - Reset Board

Printed circuit board connectors will be labeled AX-JX. For example, A3-J4 is the connector J4 on the driver board (A3).

B. WIRE COLORS ARE SHOWN AS NUMBERS:

0 Black
1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Blue
7 Purple
8 Slate
9 White

For example, 688 is a BLUE-SLATE-SLATE striped wire.

C. FUSES

BOTTOM CABINET FUSES

F1	Sound/Speech Power Supply	12VAC	1/2 Amp
F2	Power Supply	10VAC	5 Amp SLO-BLO
F3	Displays	60VAC	1/4 Amp SLO-BLO
F4	Solenoids	25VAC	8 Amp SLO-BLO
F5	Controlled Lamps	8VAC	7-1/2 Amp
F6	Playboard Illumination	6.3VAC	7-1/2 Amp
F7	Lightbox Illumination	6.3VAC	10 Amp
F8	Sound/Speech Power Supply	+24VDC	1 Amp SLO-BLO
F9	Primary Power	115VAC	5 Amp SLO-BLO
		230VAC	2½ Amp SLO-BLO

PLAYFIELD FUSES

F10	Pop Bumper	2 Amp SLO-BLO
F11	Outhole and Hole	1 Amp SLO-BLO
F12	9 Position Target Bank Reset	2 Amp SLO-BLO

IX. GENERAL INFORMATION

D. COIL CHART

SOLENOID COILS					
PART NUMBER	GENERAL USAGE	RESISTANCE (OHMS)	NUMBER OF TURNS	WIRE GAUGE	WRAPPER COLOR
A-1496	KICKING TARGET KICKING RUBBERS POP BUMPERS	2.95	635	#23	Yellow
A-4893	UP KICKER POP BUMPERS BALL KICKER	2.1	535	#22	Red
A-5194	UP KICKER GONG KICKING TARGETS	4.5	780	#24	Blue
A-5195	CONTACT KICKER KNOCKER HOLE KICKER	12.3	1305	#26	White
A-16570	HOLE KICKER, OUTHOLE	15.5	1450	#27	Green
A-17875	FLIPPERS	2.8/40.0	560/1100	#24/31	Yellow
A-17891	5 BANK RESET	3.35	850	#22	White
A-18102	3 BANK RESET, 7 BANK RESET USES 2	9.0	1430	#24	Red
A-18318	4 BANK RESET	6.7	1130	#24	Orange
A-19300	BALL KICKER	7.8	1075	#25	Orange
A-20095	SUPER FLIPPER	1.55/35.5	450/900	#22/31	Red
A-21741	UP KICKER	2.5	575	#23	Orange
RELAY COILS					
A-16890	Q, T, AND COIN LOCKOUT RELAYS	231.0	4000	#35	Orange
A-20558	GATE RELAY	156.0	3400	#34	White
A-18642	MEMORY/ DROP TARGETS	58.0	1590	#33	White

* Coils may vary from game to game Check game manual for exact coil usage

E. SOUND BOARD (A6) TEST

1. Game must be in game over mode to initiate test.
2. Pressing the test button on the sound board will initiate test.
3. After the test button has been pressed, the sound board must correctly reproduce all of the sounds of game play and scoring. If not, the board is defective.

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

TABLE OF CONTENTS

PAGE

CONTROL BOARD (A1)
COMPONENT LOCATION AND PARTS LIST..... 18
SCHEMATIC DIAGRAM..... 19

DRIVER BOARD (A3)
COMPONENT LOCATION AND PARTS LIST..... 22
SCHEMATIC DIAGRAM..... 23

SOUND BOARD (A6)
COMPONENT LOCATION AND PARTS LIST..... 25
SCHEMATIC DIAGRAM..... 26

POP BUMPER DRIVER BOARD (A8)
COMPONENT LOCATION AND PARTS LIST..... 28
SCHEMATIC DIAGRAM..... 28

LIGHTBOX WIRING..... 29

7-DIGIT DISPLAY (A14)
COMPONENT LOCATION AND PARTS LIST..... 31
SCHEMATIC DIAGRAM..... 31

4-DIGIT DISPLAY (A5)
COMPONENT LOCATION AND PARTS LIST..... 32
SCHEMATIC DIAGRAM..... 32

RESET BOARD (A24)
COMPONENT LOCATION AND PARTS LIST..... 33
SCHEMATIC DIAGRAM..... 33

PLAYBOARD
PLAYBOARD SWITCH MATRIX..... 35
PLAYBOARD ILLUMINATION AND SOLENOIDS..... 36

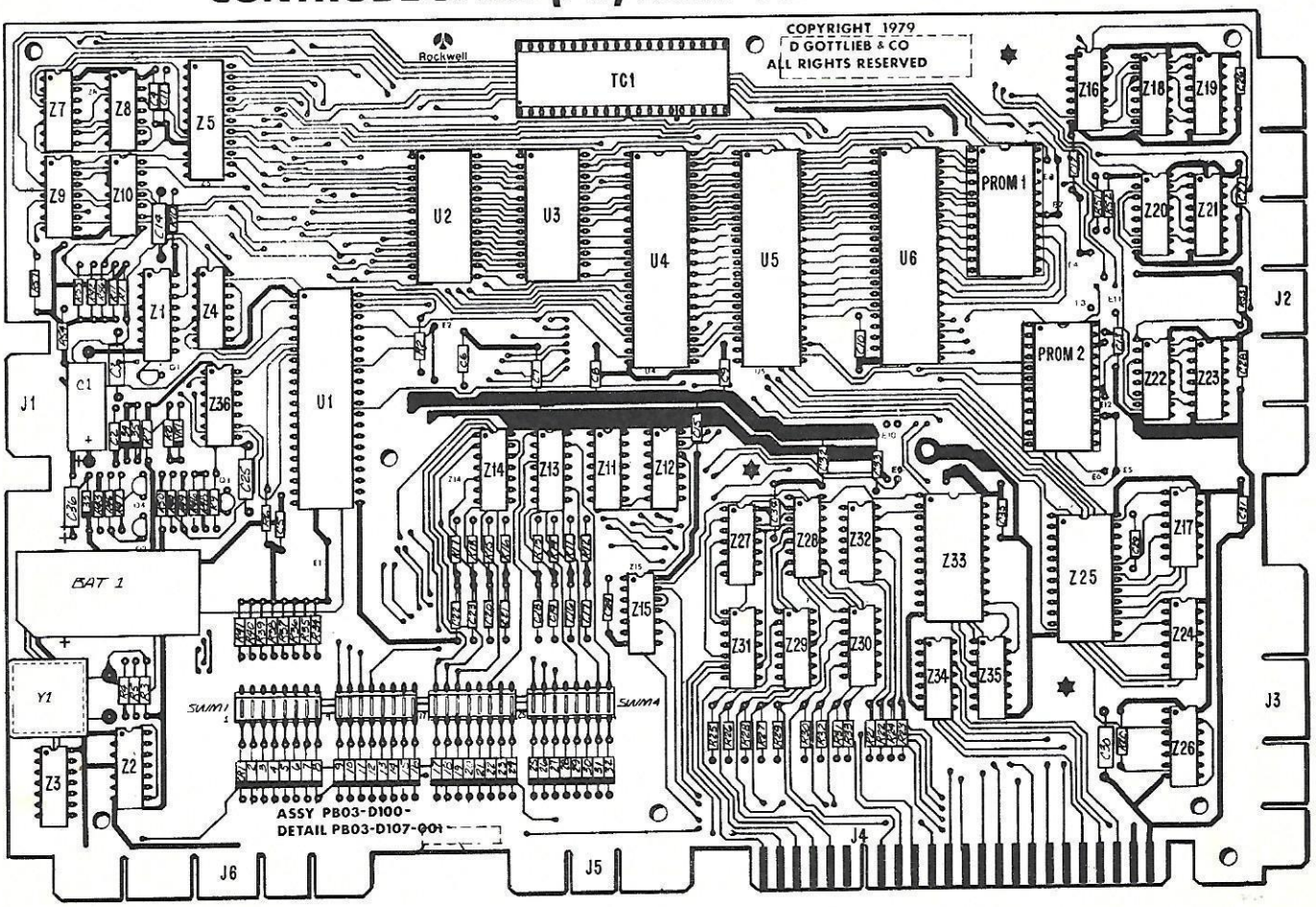
POWER SUPPLY (A2)
COMPONENT LOCATION AND PARTS LIST..... 38
SCHEMATIC DIAGRAM..... 39

SOUND/SPEECH BOARD POWER SUPPLY (A7)
COMPONENT LOCATION AND PARTS LIST..... 40
SCHEMATIC DIAGRAM..... 40

BOTTOM BOARD AND CABINET SCHEMATIC..... 41

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

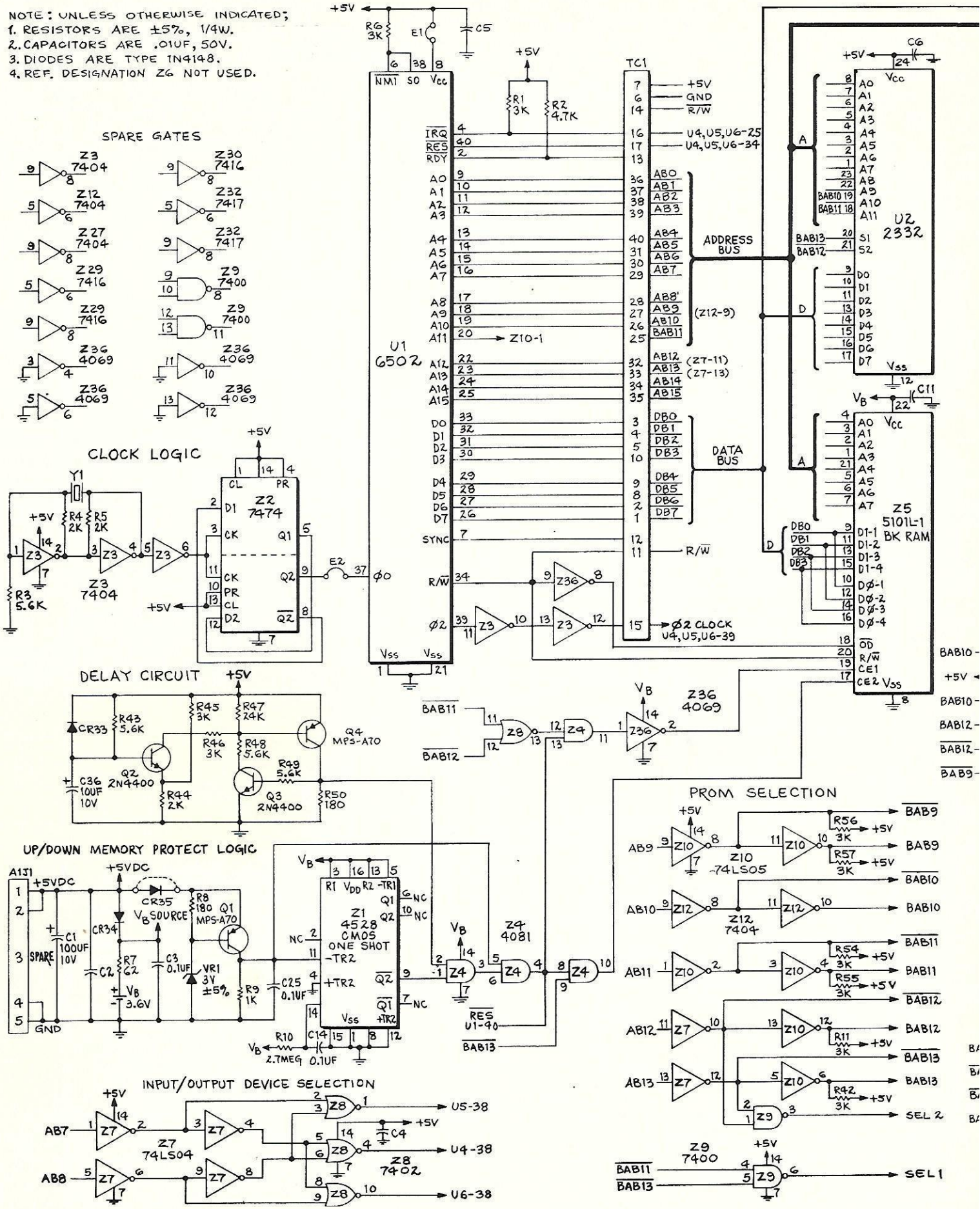
CONTROL BOARD (A1) COMPONENT LOCATION

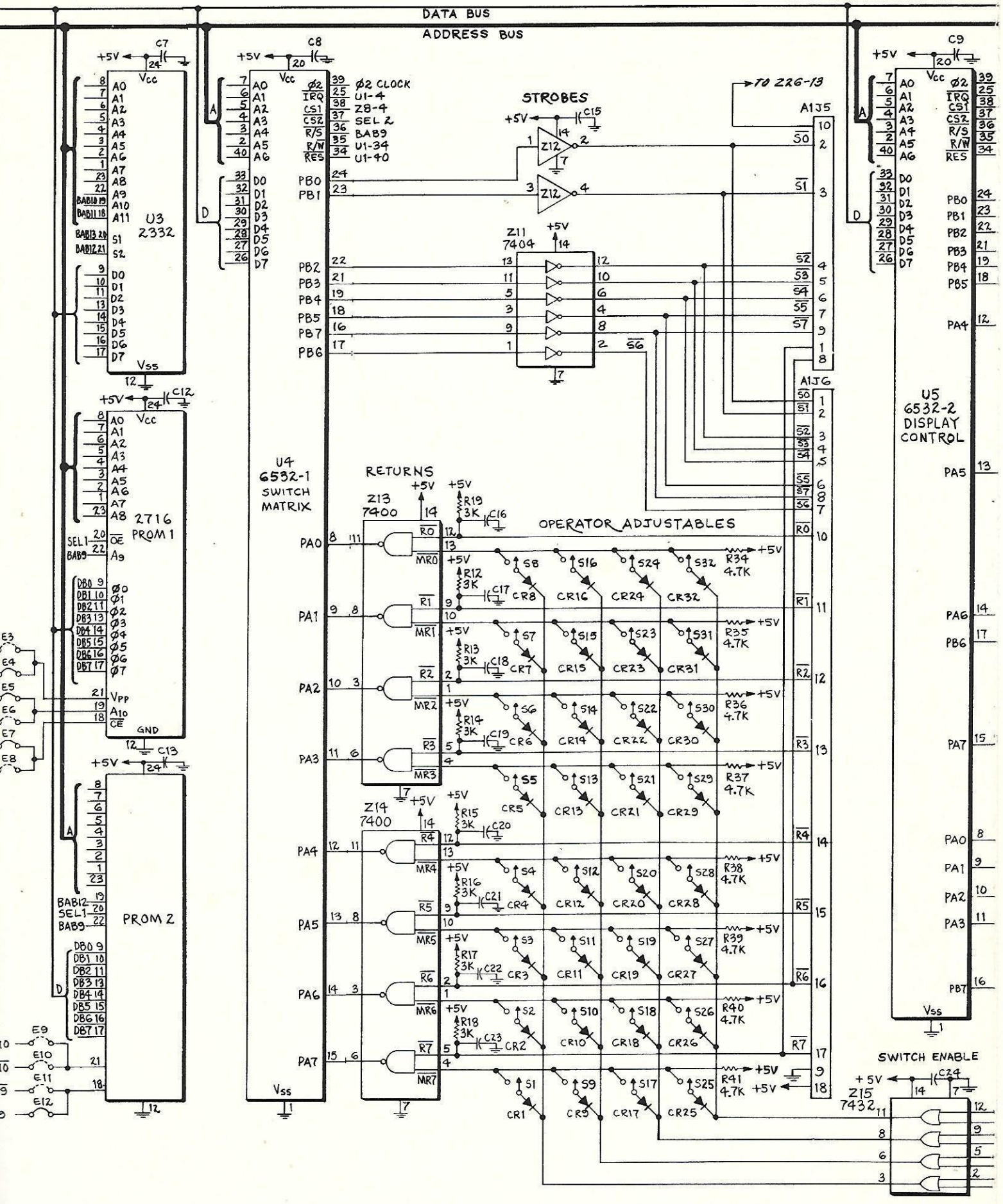


CONTROL BOARD (A1) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	CONTROL BOARD	MA-291
Bat. 1	Battery-3.6V 326R10-002	XO-458
C1	Capacitor, 100 mfd., 10V	XO-211
C2, C4-C13, C15-C24, C26-C29, C31-C35	Capacitor, .01 mfd., 50V	XO-229
C3, C14, C25, C30	Capacitor, 1 mfd., 50V	XO-230
C36	10 mfd., 10V, TNT-AX CAP	XO-209
CR1-CR35	Diode, GP IN4148	XO-261
Q1, Q4	Transistor-PNP MPS-A70	XO-309
Q2, Q3	Transistor, NPN (Motorola) 2N4400	XO-313
R1, R6, R11-R24, R42, R45, R46, R48, R51-R57	Resistor, 3.0K ohm, 5%, ¼W	XO-23
R2, R34-R41	Resistor, 4.7K ohm, 5%, ¼W	XO-7
R3, R43, R49	Resistor, 5.6K ohm, 5%, ¼W	XO-19
R4, R5, R44	Resistor, 2.0K ohm, 5%, ¼W	XO-14
R7	Resistor, 62 ohm, 5%, ¼W	XO-3
R8, R50	Resistor, 180 ohm, 5%, ¼W	XO-24
R9	Resistor, 1K ohm, 5%, ¼W	XO-5
R10	Resistor, 2.7M ohm, 5%, ¼W	XO-13
R25-R33	Resistor, 620 ohm, 5%, ¼W	XO-4
R47	Resistor, 24K ohm, 5%, ¼W	XO-10
SW1-SW4	Dip Switch 1008-692	XO-505
TC1	Socket, 40 Pin 640379-3	XO-530
U1	CPU R6502-13	XO-360
U2	ROM	XO-326
U3	ROM	XO-327
U4, U5, U6	PRIOT R6532-18	XO-361
VR1	Diode-3.0V, 5% IN5225B or IN5987B	XO-269
Y1	Crystal, 3.579545 MHZ	XO-456
Z1	IC-Cmos-Dual 1 Shot SCL4528BE	XO-414
Z2	IC-Dual Flip Flop SN7474N	XO-423
Z3, Z11, Z12, Z16, Z17, Z24, Z26, Z27, Z34, Z35	IC-Hex Inverter SN7404N	XO-402
Z4	IC-Cmos-Quad 2 Input "And" SCL4081BE	XO-401
Z5	IC-Static Ram S5101-L	XO-356
Z7	IC-Hex Inverter SN74LS04N	XO-418
Z8	IC-2 Input "Nor" SN7402N	XO-421
Z9, Z13, Z14	IC-2 Input "Nand" SN7400N	XO-420
Z10	IC-Open Collector Inverter SN74LS05N	XO-411
Z15	IC-2 Input "Or" SN7432N	XO-407
Z18, Z20, Z22	IC-"D" Flip Flop SN74175N	XO-410
Z19, Z21, Z23	IC-4 to 7 Decoder SN7448N	XO-408
Z25, Z33	IC-4-16 Decoder SN74154N	XO-409
Z28	IC-2 to 4 Decoder SN74LS139N	XO-419
Z29, Z30	IC-Hex Inverter—OC/HV SN7416N	XO-405
Z31	IC-2 Input "And" SN7408N	XO-404
Z32	IC-Hex Buffer—OC SN7417N	XO-406
Z36	IC-Cmos SCL4069B	XO-424
	Socket 24 Pin 640361-3	XO-529

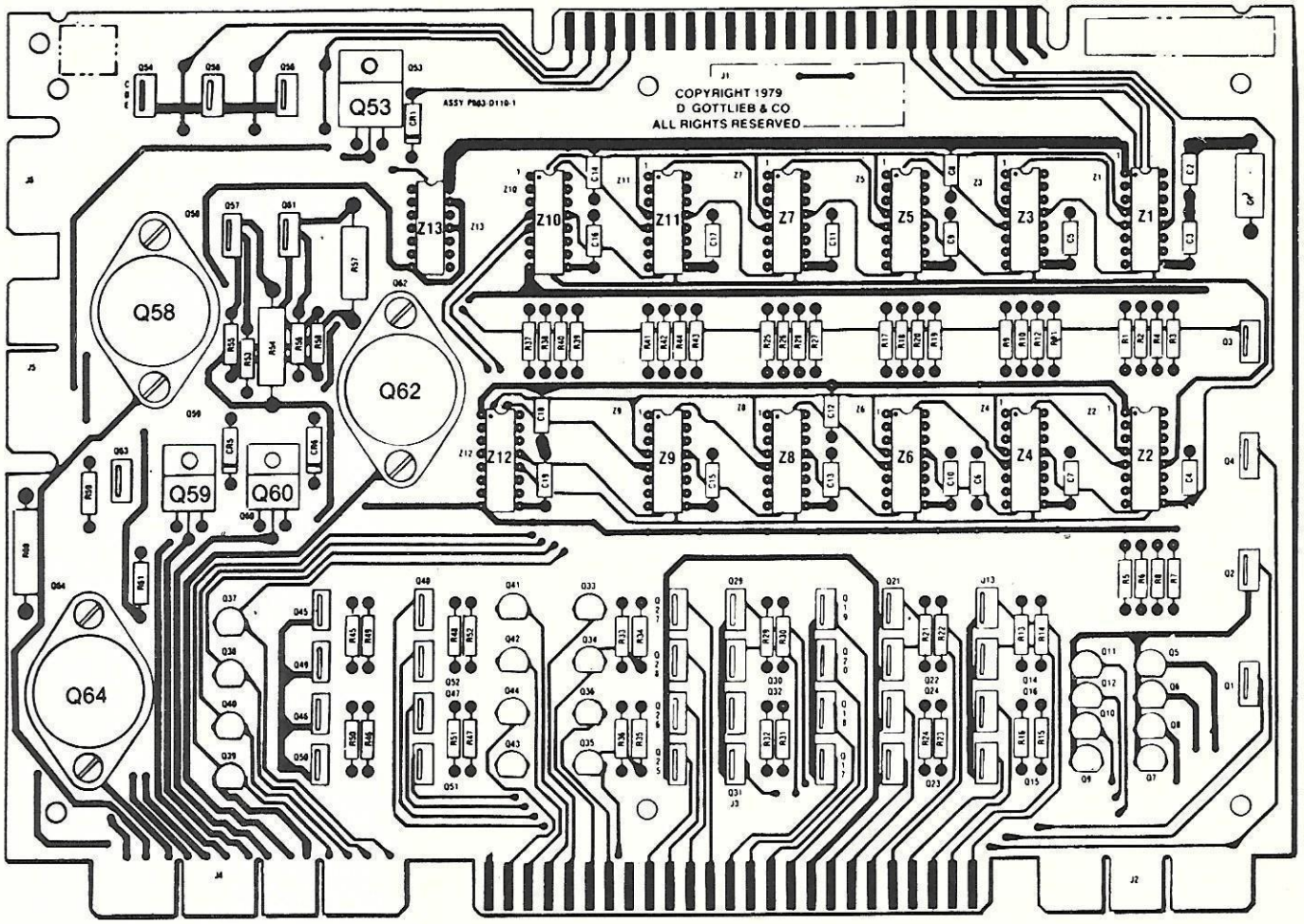
NOTE: UNLESS OTHERWISE INDICATED;
1. RESISTORS ARE ±5%, 1/4W.
2. CAPACITORS ARE .01UF, 50V.
3. DIODES ARE TYPE IN4148.
4. REF. DESIGNATION Z6 NOT USED.

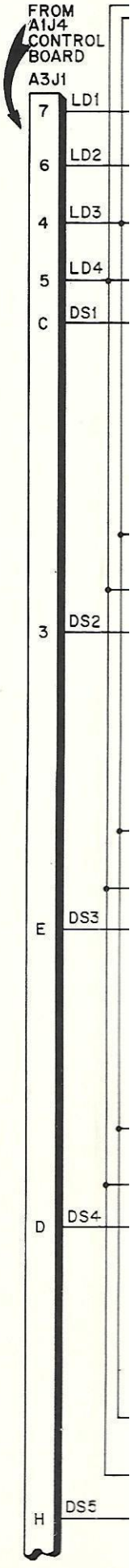



DATA BUS
ADDRESS BUS
U3 2332
U4 6532-1 SWITCH MATRIX
U5 6532-2 DISPLAY CONTROL
2716 PROM 1
PROM 2
STROBES
RETURNS
OPERATOR ADJUSTABLES
SWITCH ENABLE
Ø2 CLOCK
U1-4
Z8-4
SEL 2
BAB9
U1-34
U1-40
TO Z26-13
Z11 7404
Z12
Z13 7400
Z14 7400
Z15 7432
R19 3K
R12 3K
R13 3K
R14 3K
R15 3K
R16 3K
R17 3K
R18 3K
R34 4.7K
R35 4.7K
R36 4.7K
R37 4.7K
R38 4.7K
R39 4.7K
R40 4.7K
R41 4.7K
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
CR9
CR10
CR11
CR12
CR13
CR14
CR15
CR16
CR17
CR18
CR19
CR20
CR21
CR22
CR23
CR24
CR25
CR26
CR27
CR28
CR29
CR30
CR31
CR32

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

DRIVER BOARD (A3) COMPONENT LOCATION



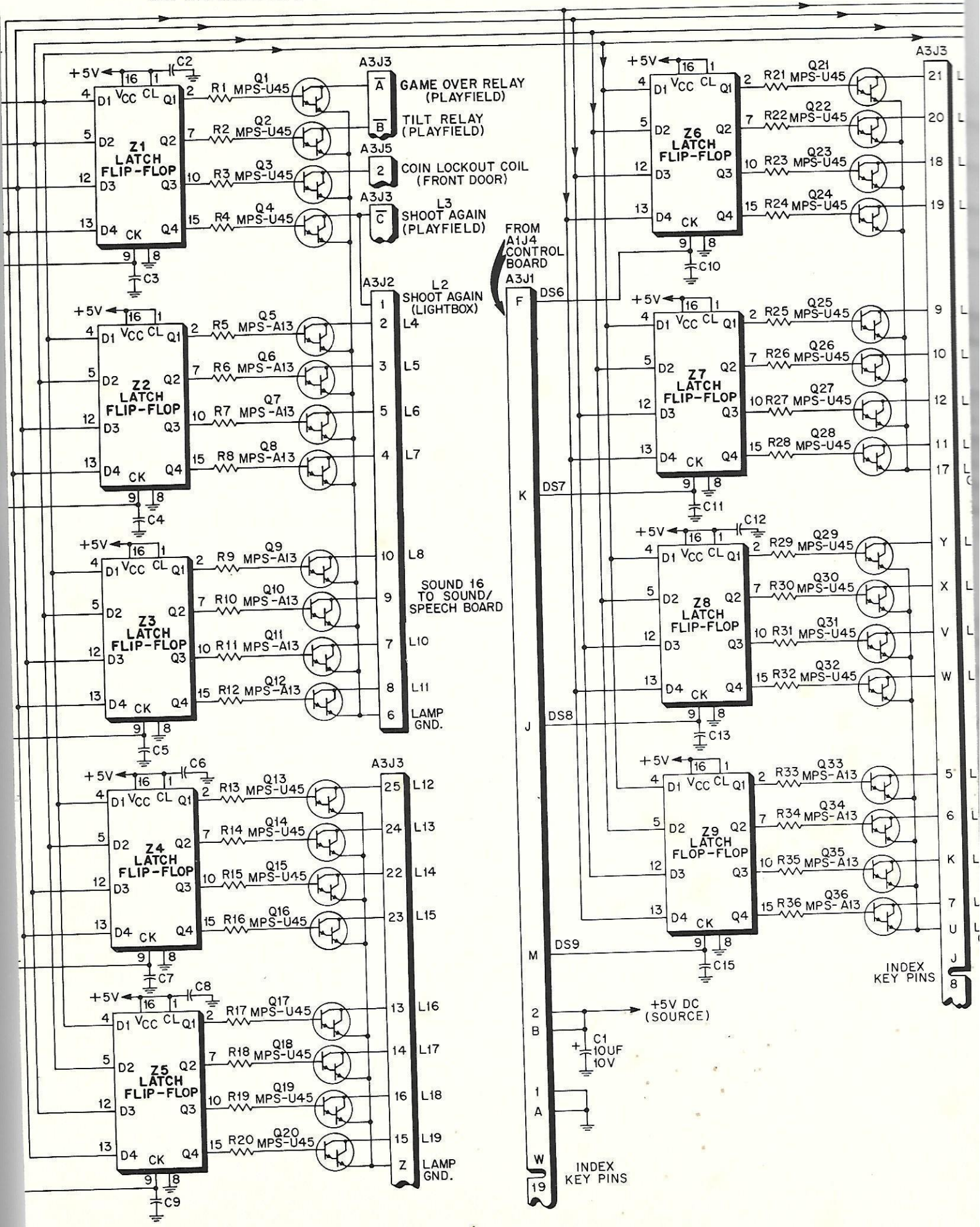


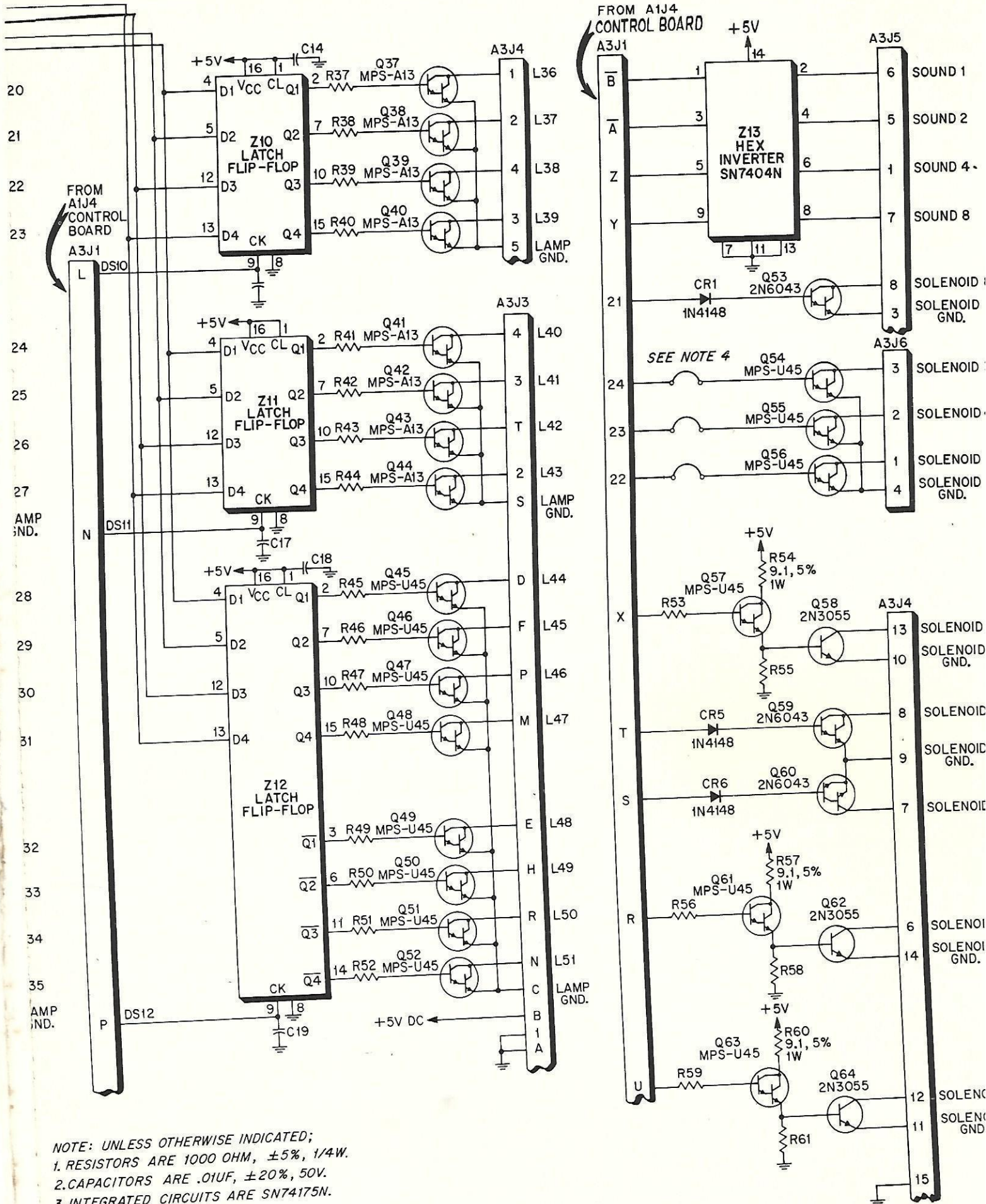
DRIVER BOARD (A3) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	DRIVER BOARD	MA-295
C1	Capacitor, 10 mfd, 10V Tantalum	XO-209
C2-C19	Capacitor, 01 mfd, 50V Ceramic	XO-229
CR1-CR6	Diode—Silicon 1N4148	XO-261
R1-R53, R61, R55, R56, R58, R59	Resistor 1.0K ohm, 5%, 4W	XO-5
R54, R57, R60	Resistor, 9.1 ohm, 5%, 1W	XO-158
Q1-Q4, Q13-Q32, Q45-Q52, Q54-Q57, Q63	Transistor, NPN, Darlington MPS-U45	XO-306
Q5-Q12, Q33-Q44	Transistor, NPN, Darlington MPS-A13	XO-304
Q53, Q59, Q60	Transistor, NPN, Darlington 2N6043	XO-303
Q58, Q62, Q64	Transistor, NPN, 2N3055	XO-301
Z1-Z12	IC-Quad "D" Latch Flip Flop SN74175N	XO-410
Z13	IC-Hex Inverter SN7404N	XO-402
	Insulator-Thermalloy 43-03-4	XO-512

NOTE:

1. *JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM 80A GAMES.*
2. *TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.*


A3J3
GAME OVER RELAY (PLAYFIELD)
TILT RELAY (PLAYFIELD)
A3J5
COIN LOCKOUT COIL (FRONT DOOR)
A3J3
L3
SHOOT AGAIN (PLAYFIELD)
FROM A1J4 CONTROL BOARD
A3J1
A3J2
L2
SHOOT AGAIN (LIGHTBOX)
L4
L5
L6
L7
L8
SOUND 16 TO SOUND/ SPEECH BOARD
L10
L11
LAMP GND.
A3J3
L12
L13
L14
L15
L16
L17
L18
L19
Z
LAMP GND.
INDEX KEY PINS
+5V DC (SOURCE)
C1 10UF 10V
INDEX KEY PINS
Z1 LATCH FLIP-FLOP
Z2 LATCH FLIP-FLOP
Z3 LATCH FLIP-FLOP
Z4 LATCH FLIP-FLOP
Z5 LATCH FLIP-FLOP
Z6 LATCH FLIP-FLOP
Z7 LATCH FLIP-FLOP
Z8 LATCH FLIP-FLOP
Z9 LATCH FLOP-FLOP
Q1 MPS-U45
Q2 MPS-U45
Q3 MPS-U45
Q4 MPS-U45
Q5 MPS-A13
Q6 MPS-A13
Q7 MPS-A13
Q8 MPS-A13
Q9 MPS-A13
Q10 MPS-A13
Q11 MPS-A13
Q12 MPS-A13
Q13 MPS-U45
Q14 MPS-U45
Q15 MPS-U45
Q16 MPS-U45
Q17 MPS-U45
Q18 MPS-U45
Q19 MPS-U45
Q20 MPS-U45
Q21 MPS-U45
Q22 MPS-U45
Q23 MPS-U45
Q24 MPS-U45
Q25 MPS-U45
Q26 MPS-U45
Q27 MPS-U45
Q28 MPS-U45
Q29 MPS-U45
Q30 MPS-U45
Q31 MPS-U45
Q32 MPS-U45
Q33 MPS-A13
Q34 MPS-A13
Q35 MPS-A13
Q36 MPS-A13

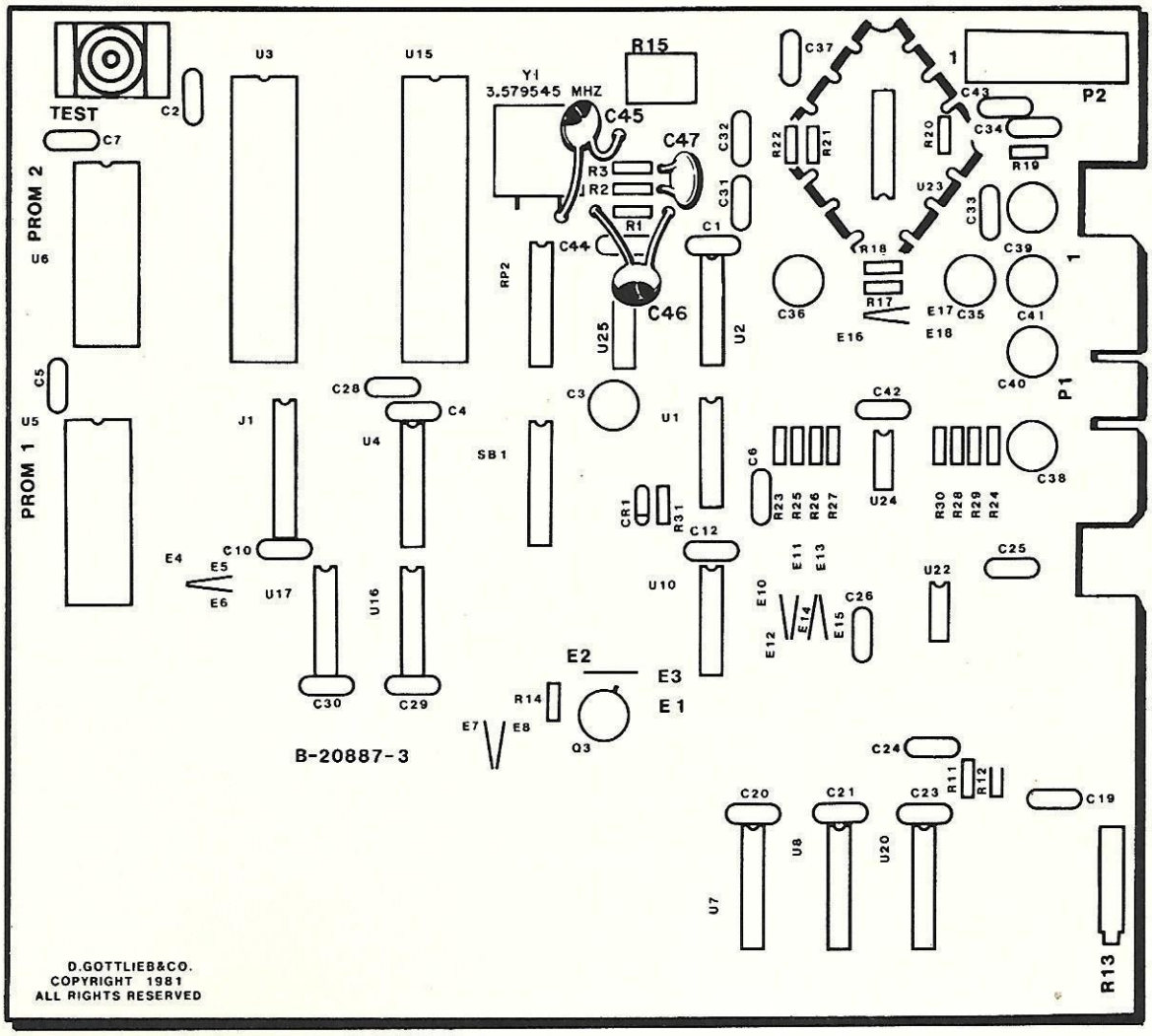


NOTE: UNLESS OTHERWISE INDICATED;
1. RESISTORS ARE 1000 OHM, ±5%, 1/4W.
2. CAPACITORS ARE .01UF, ±20%, 50V.
3. INTEGRATED CIRCUITS ARE SN74175N.
4. JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM 80A GAMES.
5. TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.

D. GOTTLIEB & CO.			
TITLE: DRIVER BOARD (A3)			
USED ON			
DRAWN	APPROVED	DATE	E-20
	BAM	12-12-80	

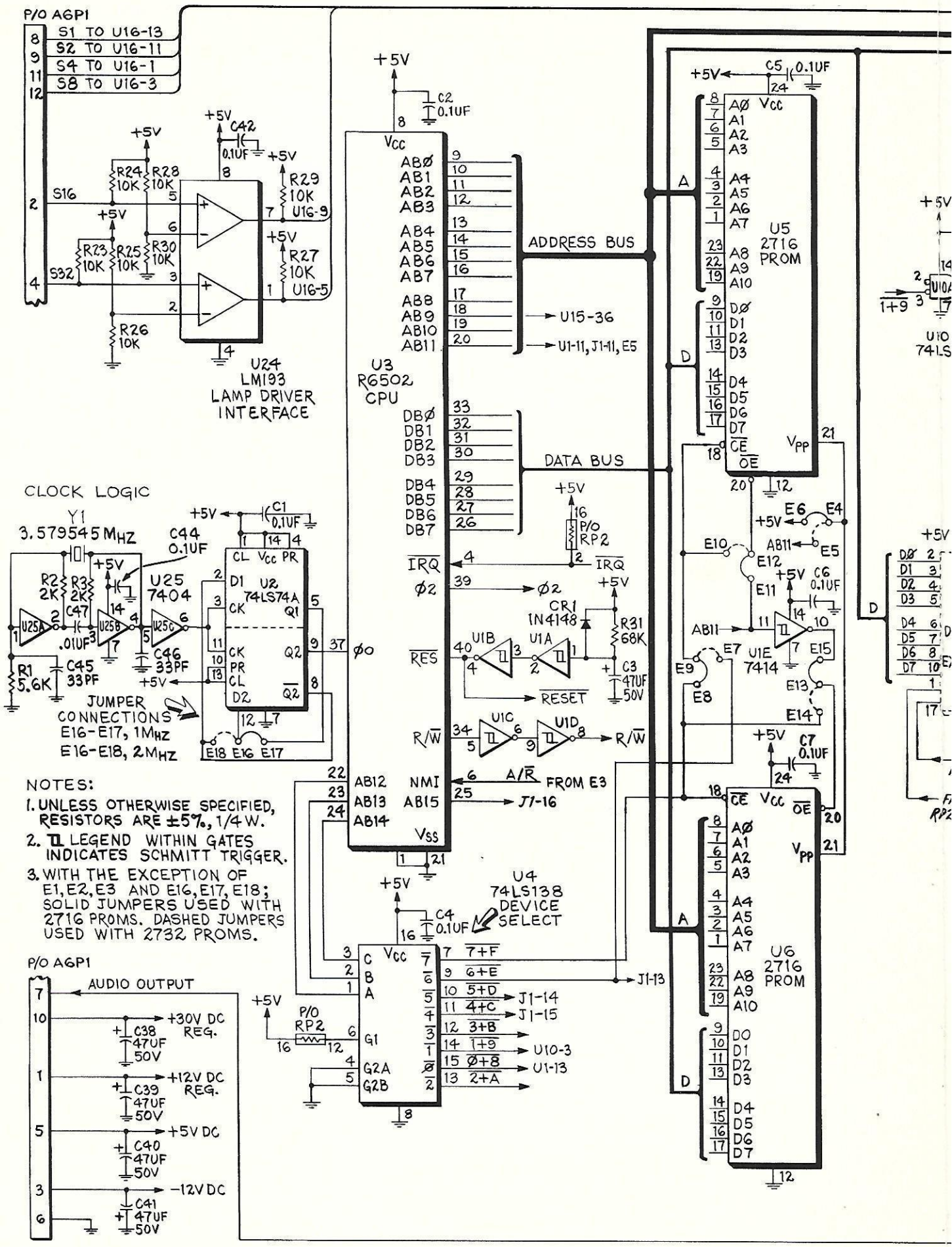
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

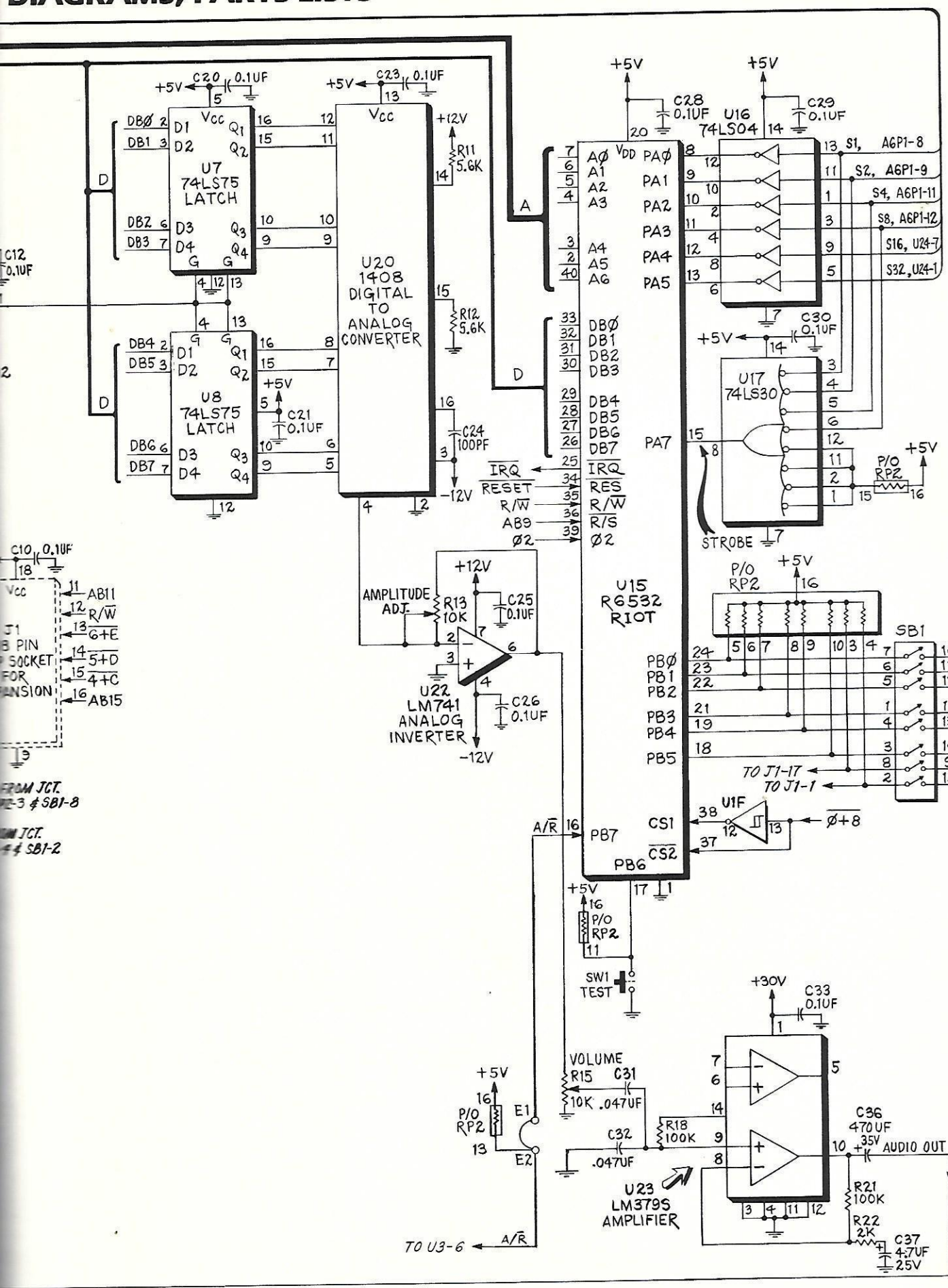
SOUND BOARD ASSY. (A6), COMPONENT LOCATION



SOUND BOARD ASSY. (A6), PARTS LIST

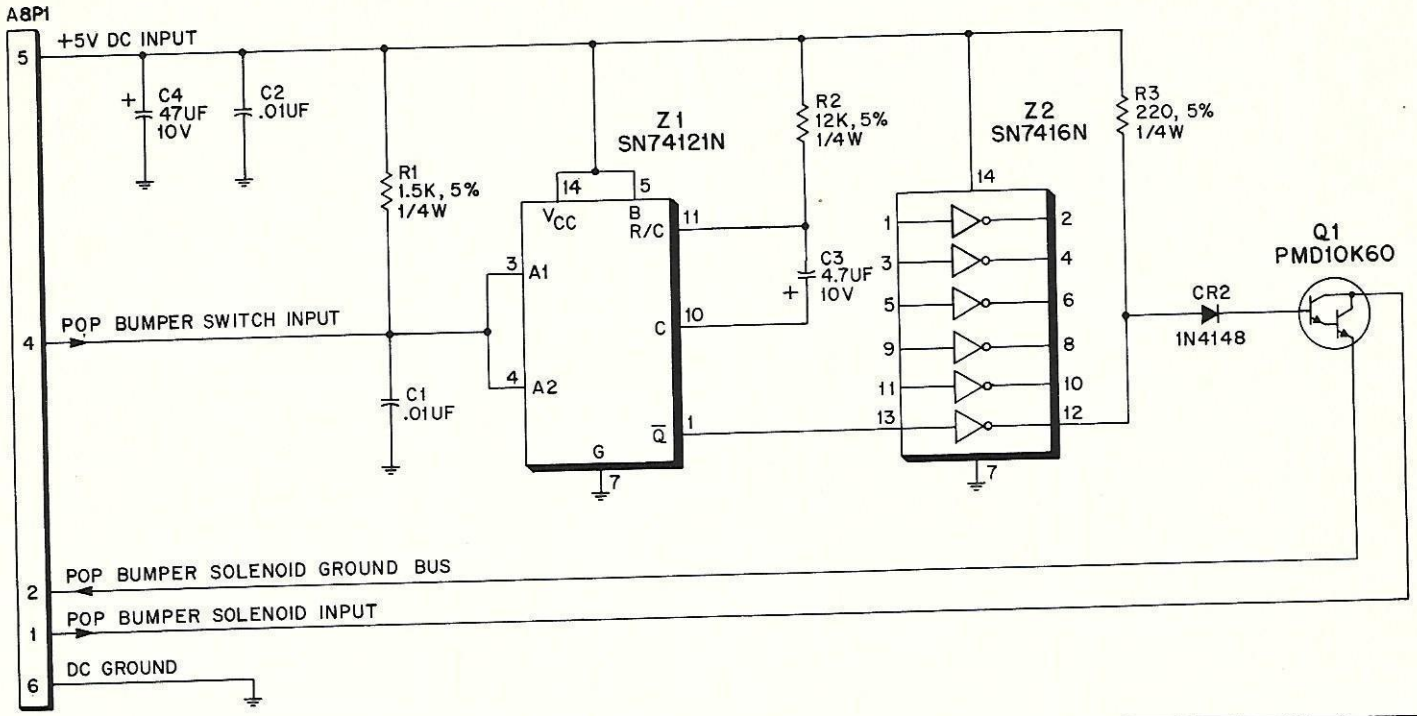
REFERENCE	DESCRIPTION	PART NUMBER
	Sound Board Assembly	MA-309
C1, C2	Capacitor, 0.1UF, 25V	XO-248
C4-C7, C10		
C12, C20, C21		
C23, C25, C26		
C28, C29, C30		
C33, C42, C44		
C31, C32	Capacitor, .047UF, 25V	XO-222
C37	Capacitor, 4.7UF, 35V	XO-291
C3', C38-C41	Capacitor, 47UF, 50V	XO-210
C24	Capacitor, 100PF	XO-223
C36	Capacitor, 470UF, 35V	XO-284
C45, C46	Capacitor, 33PF	XO-277
C47	Capacitor, .01UF, 100V	XO-202
CR1	Diode, 1N4148	XO-261
R1, R11, R12	Resistor, 5.6K ohm, 5%, 1/4W	XO-19
R2, R3	Resistor, 2K ohm, 5%, 1/4W	XO-14
R13	Potentiometer, 10K ohm	XO-108
R23-R30	Resistor, 10K ohm, 5%, 1/4W	XO-18
R15	Potentiometer, 10K ohm	XO-109
R18, R21	Resistor, 100K ohm, 5%, 1/4W	XO-45
R22	Resistor, 2K ohm, 5%, 1/4W	XO-14
R31	Resistor, 68K ohm, 5%, 1/4W	XO-189
RP2	Resistor, DIP	XO-168
SB1	Switch, DIP	XO-505
SW1	Switch, Momentary Pushbutton	XO-515
U1	IC, 7414	XO-397
U2	IC, SN74LS74N	XO-434
U3	CPU, R6502-13	XO-360
U4	IC, SN74LS138N	XO-437
U5, U6	EPROM, 2716	PR-53
U7	IC, SN74LS75	XO-394
U10	IC, SN74LS02N	XO-428
U15	RRIOT, R6532-18	XO-361
U16	IC, SN74LS04N	XO-418
U17	IC, SN74LS30N	XO-432
U20	Converter, PMI, 1408A-6P	XO-416
U22	IC, LM741CP	XO-393
U23	IC, LM379S	XO-395
U24	IC, Dual Comparitor, LM193	XO-396
U25	Inverter, 7404	XO-402
Y1	Crystal, 3.579545MHZ	XO-456
	Socket, 22 Pin DIP	XO-467
	Socket, 24 Pin (2)	XO-529
	Socket, 40 Pin (2)	XO-530


P/O AGP1
S1 TO U16-13
S2 TO U16-11
S4 TO U16-1
S8 TO U16-3
U24
LM193
LAMP DRIVER
INTERFACE
U3
R6502
CPU
ADDRESS BUS
DATA BUS
U15-36
U1-11, J1-11, E5
U5
2716
PROM
U6
2716
PROM
U4
74LS138
DEVICE
SELECT
CLOCK LOGIC
Y1
3.579545 MHZ
U25
7404
U2
74LS74A
U1E
7414
CR1
IN4148
JUMPER
CONNECTIONS
E16-E17, 1MHZ
E16-E18, 2MHZ
NOTES:
1. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE ±5%, 1/4 W.
2. ⊓ LEGEND WITHIN GATES INDICATES SCHMITT TRIGGER.
3. WITH THE EXCEPTION OF E1, E2, E3 AND E16, E17, E18; SOLID JUMPERS USED WITH 2716 PROMS. DASHED JUMPERS USED WITH 2732 PROMS.
P/O AGP1
AUDIO OUTPUT
+30V DC REG.
+12V DC REG.
+5V DC
-12V DC



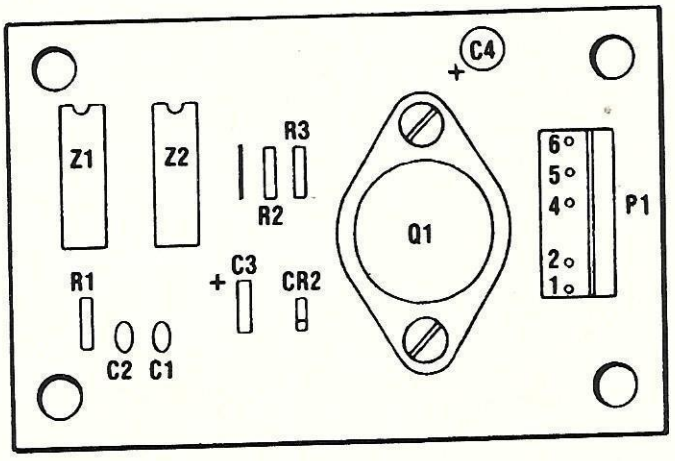
D. GOTTLIEB & CO.	
TITLE	SOUND BOARD A6
USED ON	
DRAWN	APPROVED AC DATE 1-23-83 E-22922

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



D. GOTTLIEB & CO.			
TITLE POP BUMPER DRIVER BOARD (A8)			
USED ON			
DRAWN	APPROVED	DATE 10-4-82	D-20923

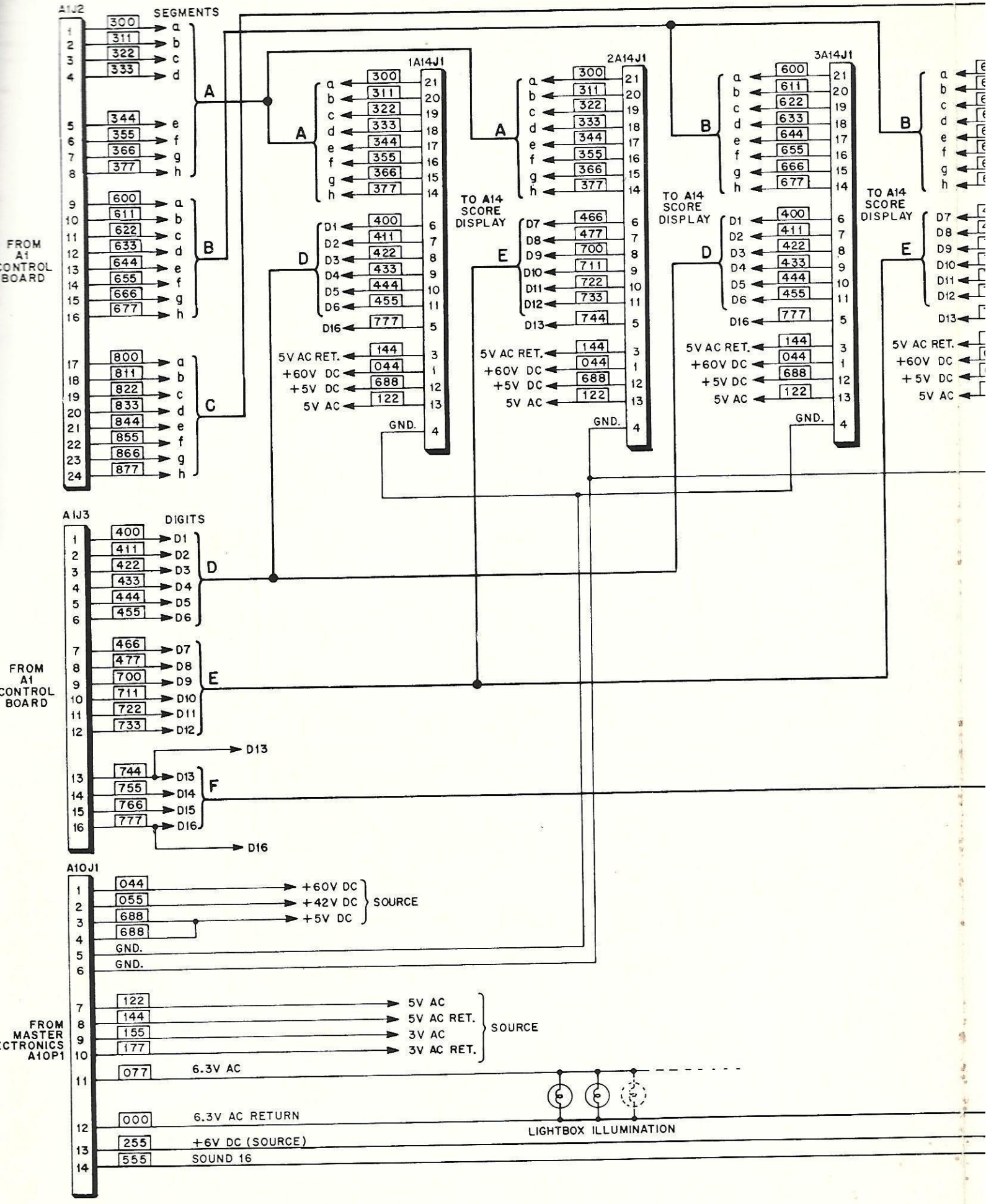
POP BUMPER DRIVER BOARD (A8) COMPONENT LOCATION

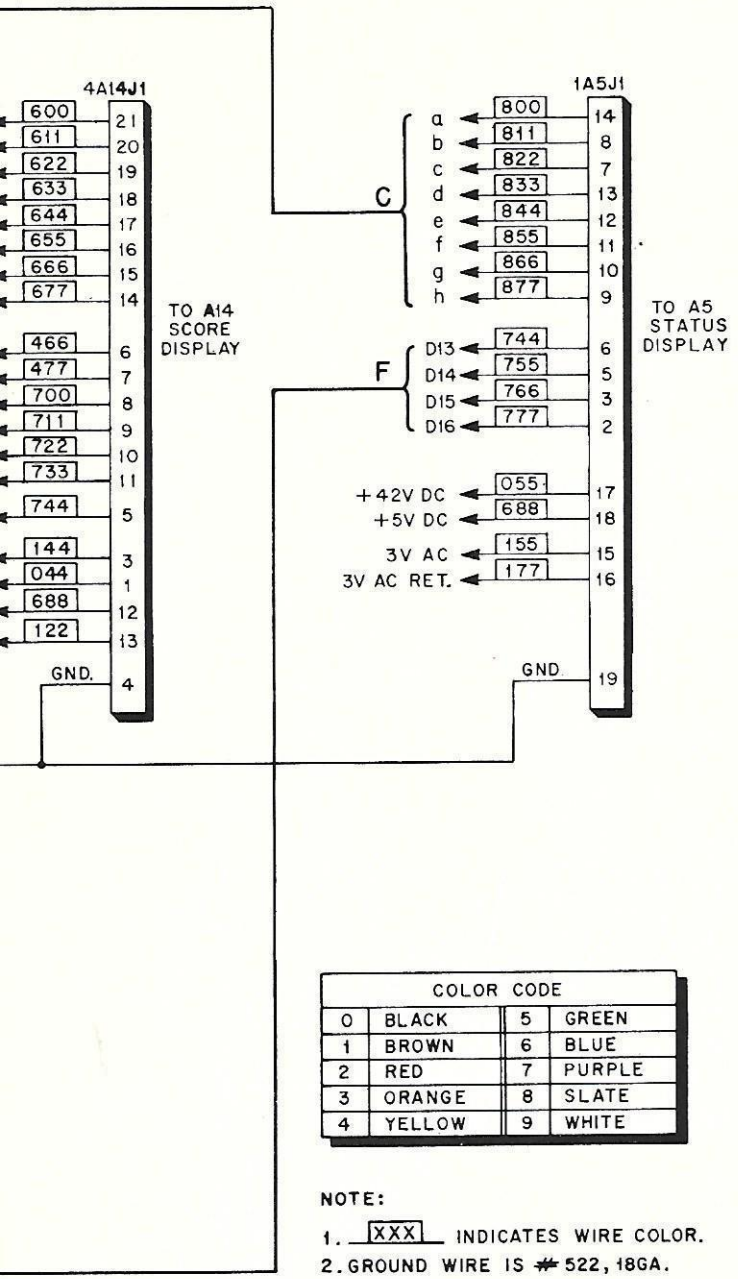


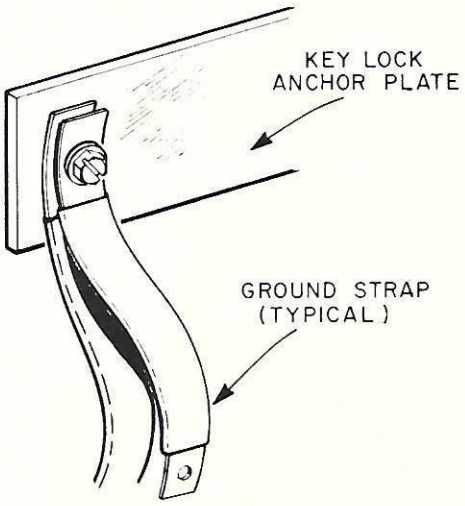
POP BUMPER DRIVER BOARD (A8) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	POP BUMPER DRIVER BOARD	A-19741
C1, C2	Capacitor, .01 mfd., 100V	XO-202
C3	Capacitor, 4.7 mfd., 10%, 10V, Tantalum, Axial	XO-226
C4	Capacitor, 47 mfd., 10V	XO-227
CR2	Diode 1N4148	XO-261
P1	Connector 09-65-1061	XO-502
R1	Resistor, 1.5K ohm, 5%, ¼W	XO-20
R2	Resistor, 12K ohm, 5%, ¼W	XO-9
R3	Resistor, 220 ohm, 5% ¼W	XO-21
Q1	Transistor-Lambda PMD10K60	XO-311X
Z1	IC SN74121N	XO-417X
Z2	IC SN7416N	XO-405X

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



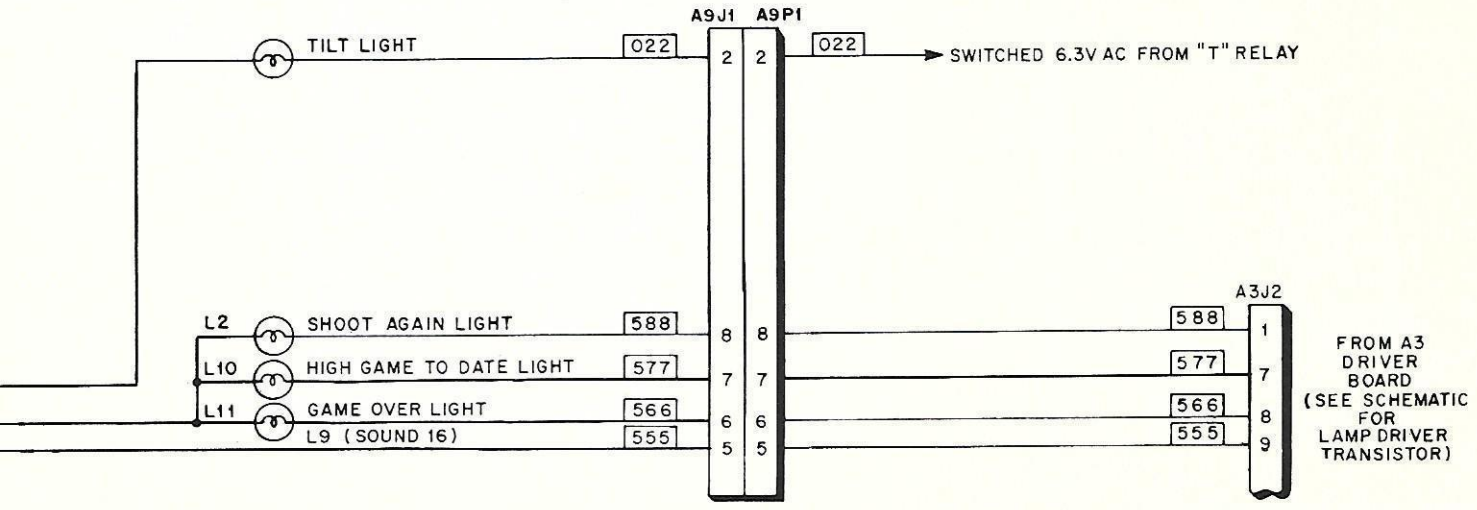




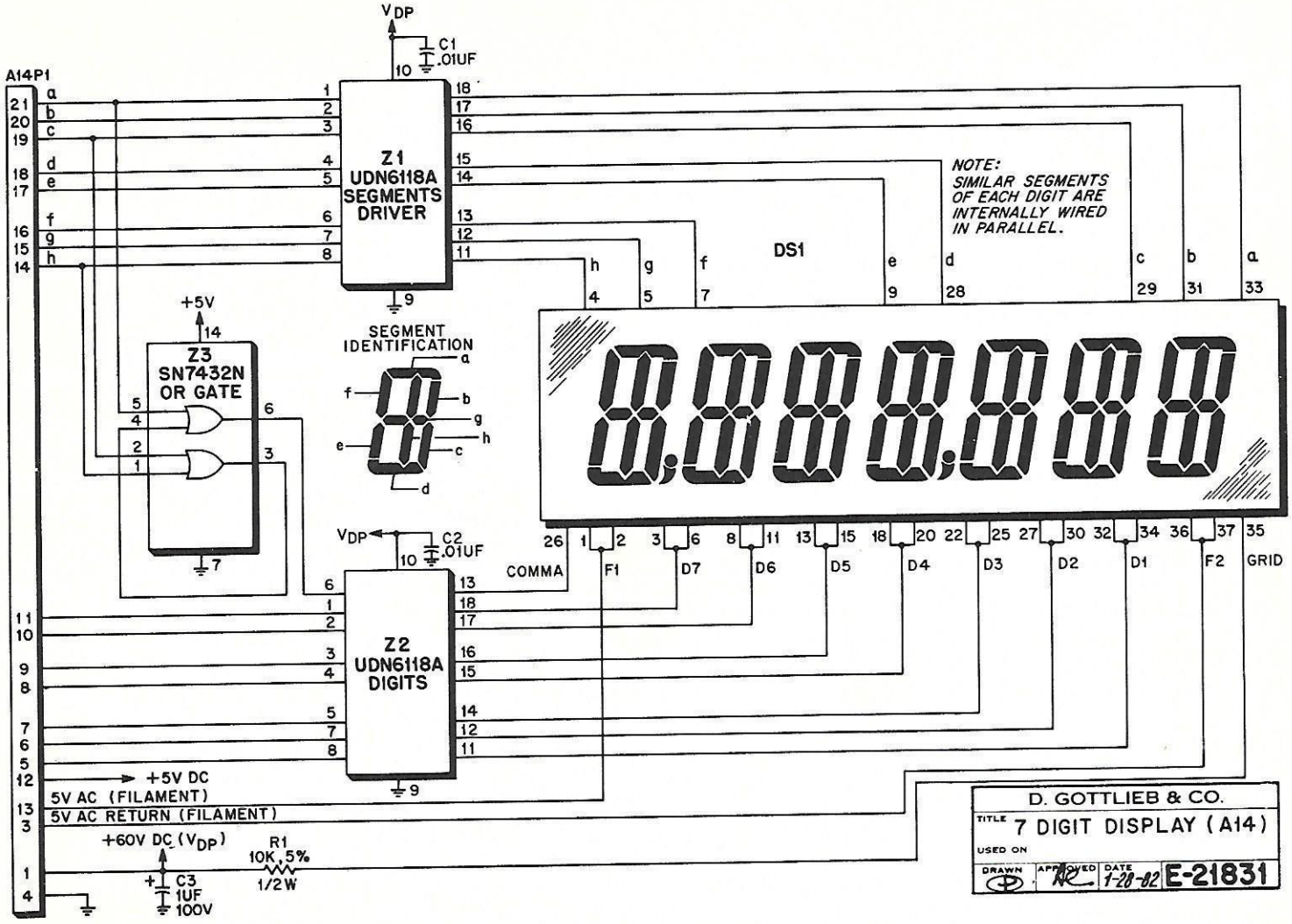
COLOR CODE			
0	BLACK	5	GREEN
1	BROWN	6	BLUE
2	RED	7	PURPLE
3	ORANGE	8	SLATE
4	YELLOW	9	WHITE

NOTE:

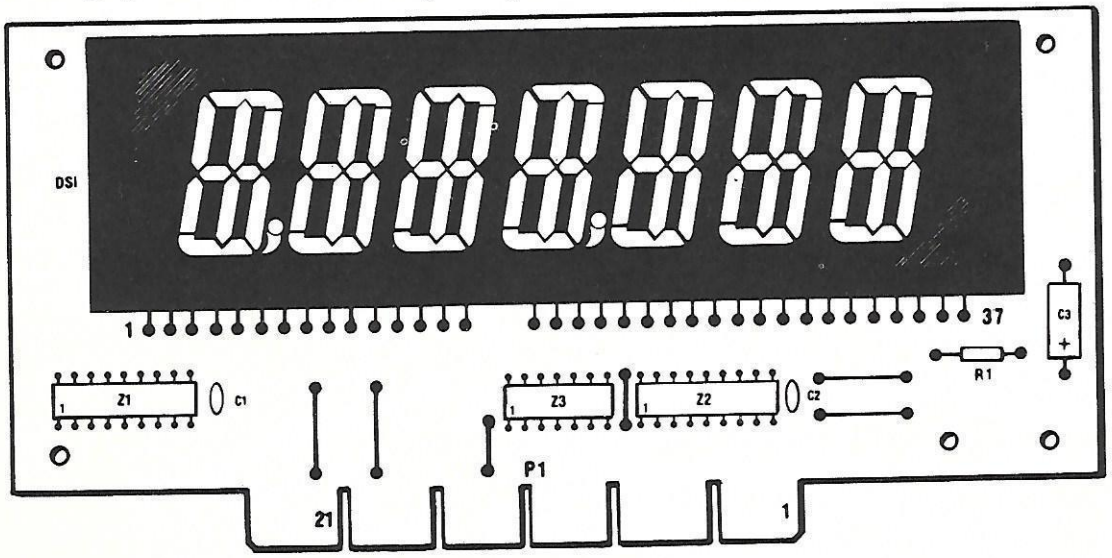
1. [XXX] INDICATES WIRE COLOR.
2. GROUND WIRE IS #522, 18GA.
3. NAME AND SCENE LAMPS ARE #44 OR #455 FLASHING.



D. GOTTLIEB & CO.			
TITLE LIGHTBOX SCHEMATIC DIAGRAM			
USED ON GAME #681			
DRAWN	APPROVED	DATE	E-22892
	RC	2-8-83	

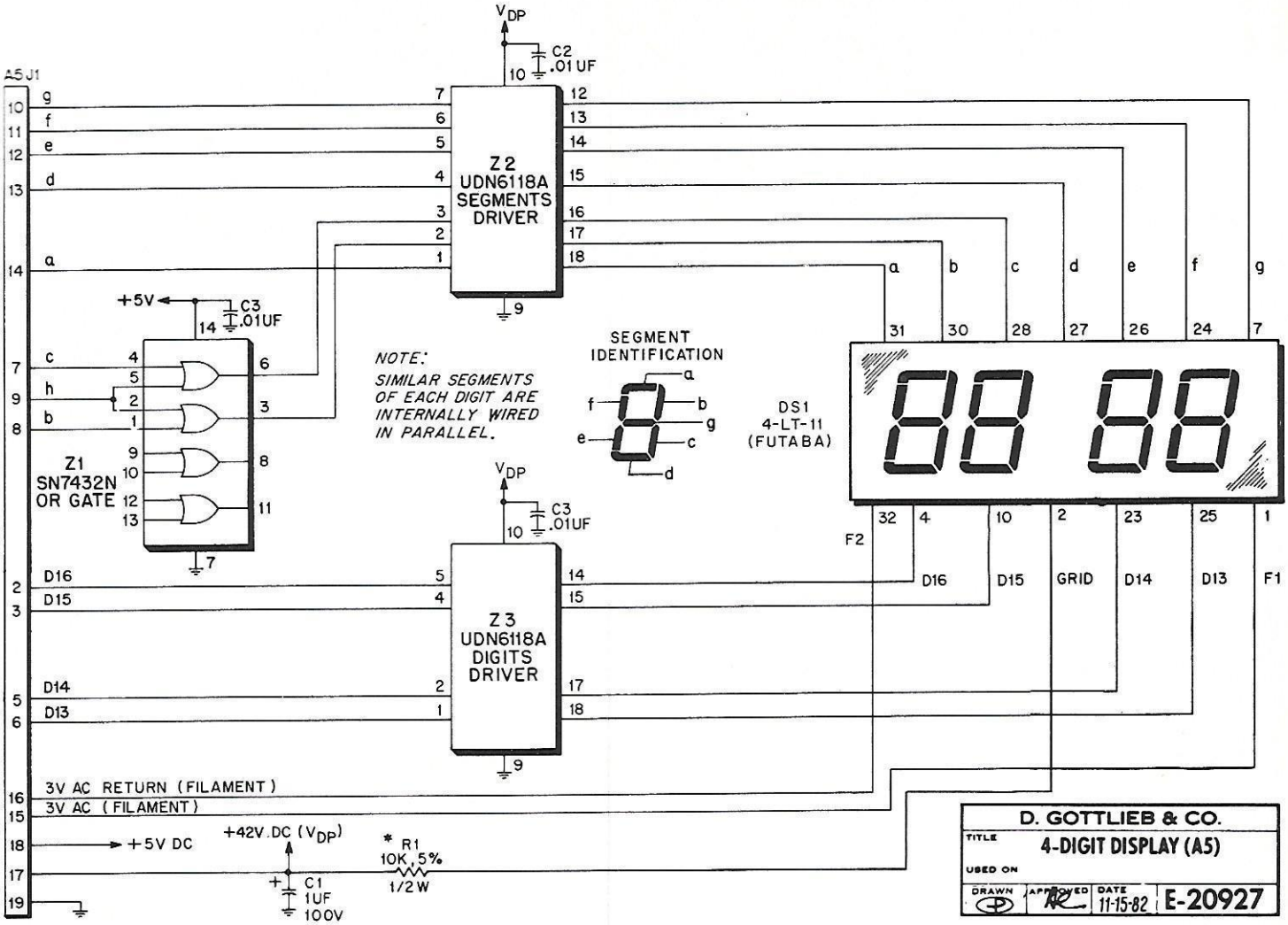


7-DIGIT DISPLAY (A14) COMPONENT LOCATION

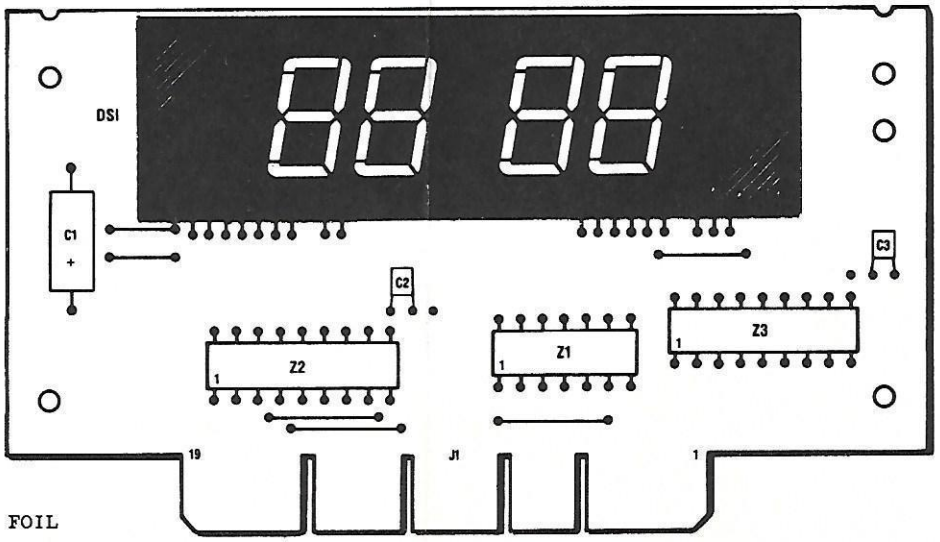


7-DIGIT DISPLAY (A14) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	7 DIGIT DISPLAY	MA-238
C1, C2	Capacitor .01 mfd. 100V Kemet	XO-202
C3	Capacitor 1 mfd 100V Sprague	XO-206
DS1	7 Digit Display Tube - FUTABA	XO-477
R1	Resistor, 10K Ohm, 5%, ½W	XO-62
Z1, Z2	IC-Fluorescent Display Driver-Sprague	XO-415
Z3	IC Quad or Gate	XO-407



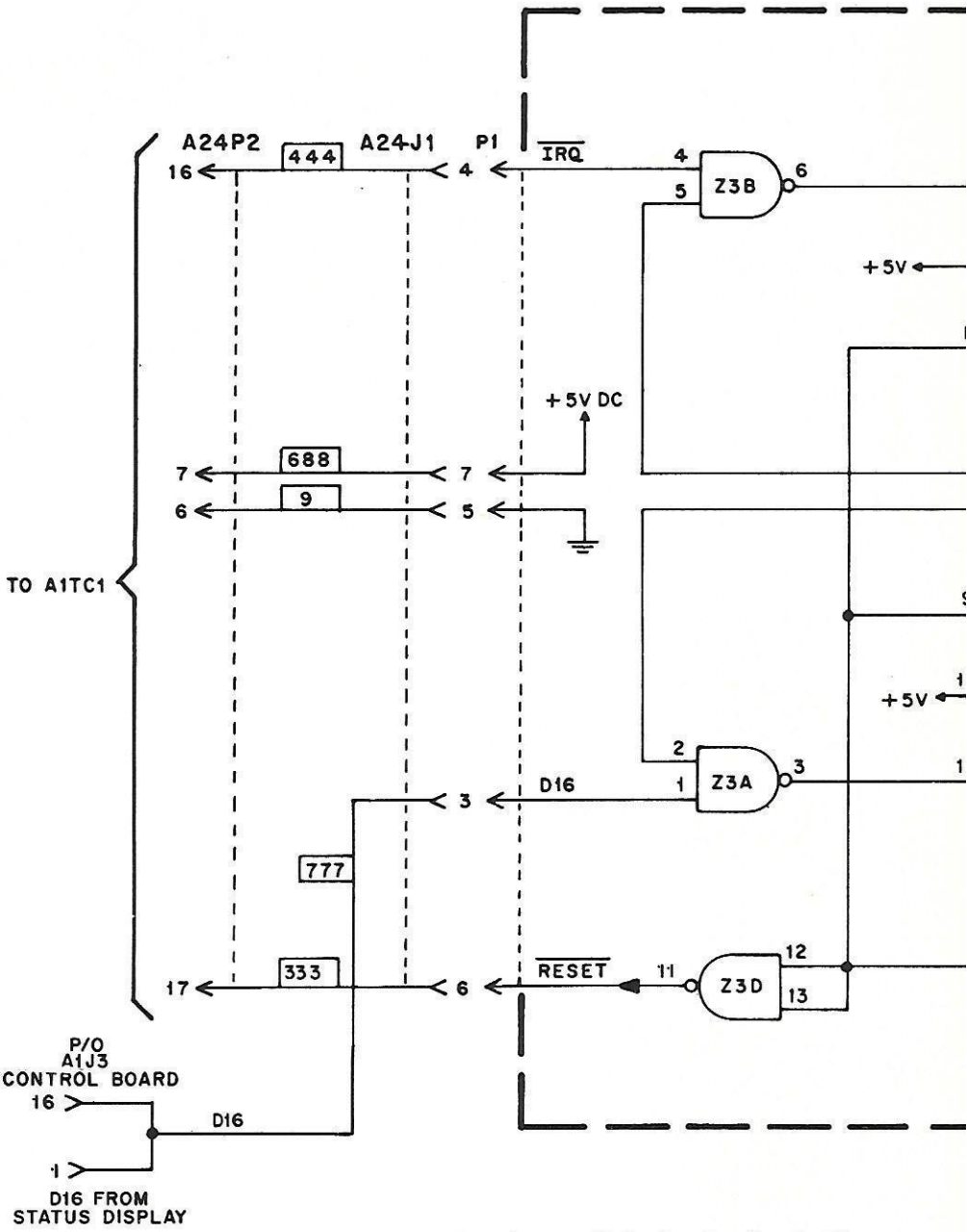
4-DIGIT DISPLAY (A5) COMPONENT LOCATION



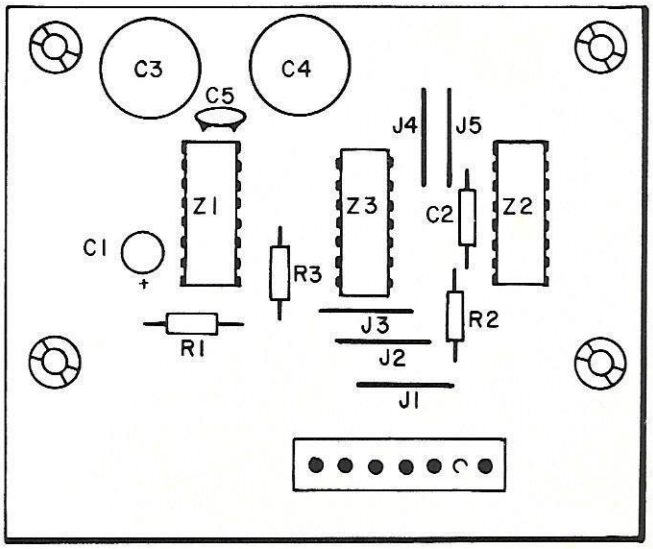
*NOTE:
R1 MOUNTED ON FOIL SIDE OF BOARD.

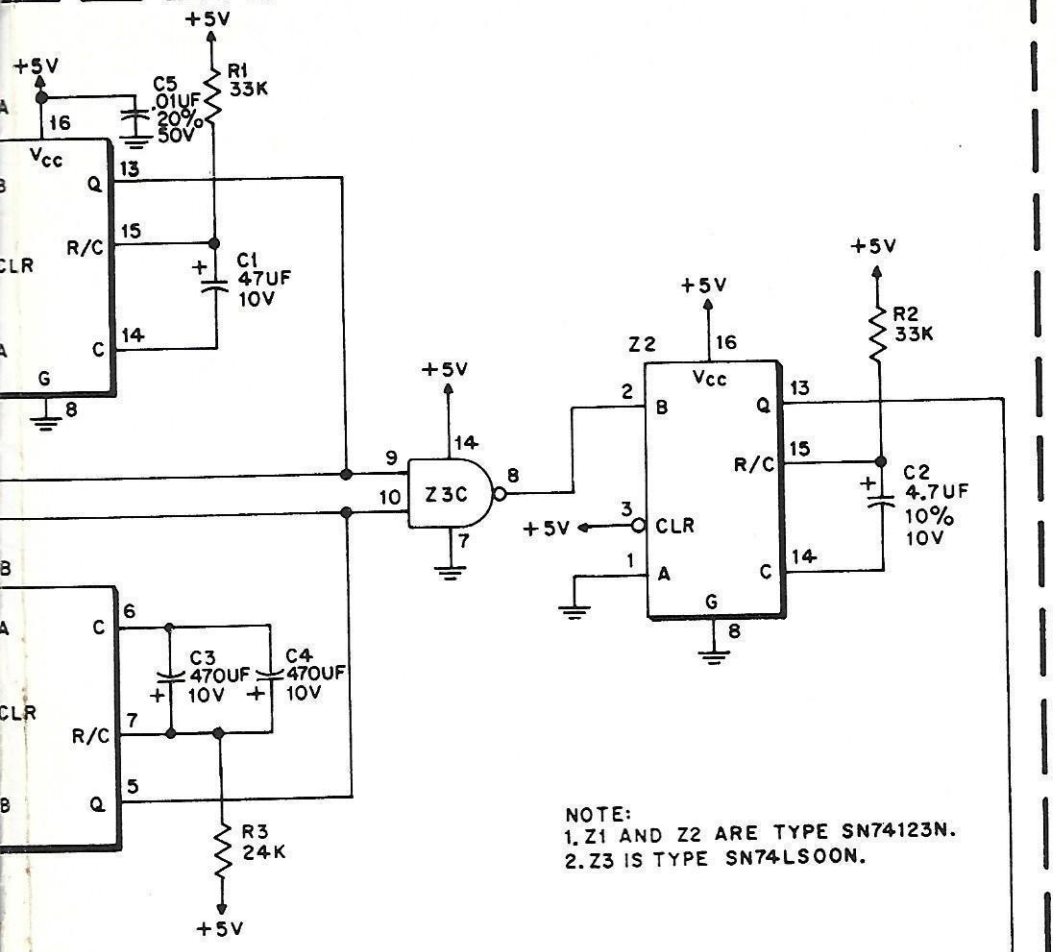
4-DIGIT DISPLAY (A5) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	4 DIGIT DISPLAY	MA-115
C1	Capacitor, 1 mfd., 100V Sprague TE1400	XO-206
C2, C3	Capacitor, .01 mfd., 100V Kemet C320C103MIR5CA	XO-202
DS1	4-Digit Display Tube-Futaba 4-LT-11	XO-455X
* R1	Resistor, 10K Ohm, 5%, ½W	XO-62
Z1	IC-Quad or Gate—T.I. SN7432N	XO-407
Z2, Z3	IC-Fluorescent Display Driver—Sprague UDN6118A	XO-415



RESET BOARD (A24) COMPONENT LOCATION

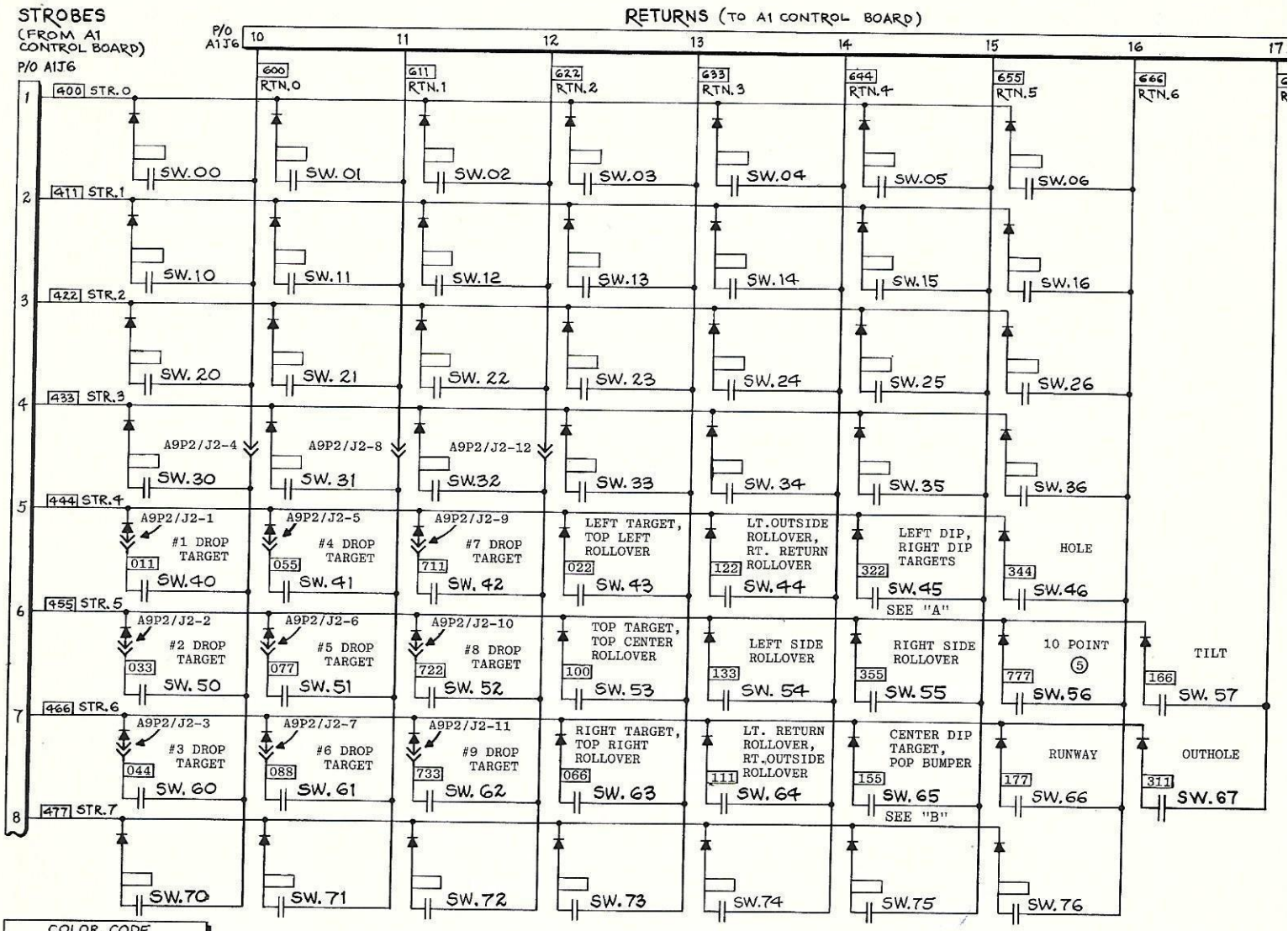




D. GOTTLIEB & CO.			
TITLE RESET CIRCUIT BOARD			
USED ON			
DRAWN	APPROVED BAM	DATE 4-2-81	C-21063

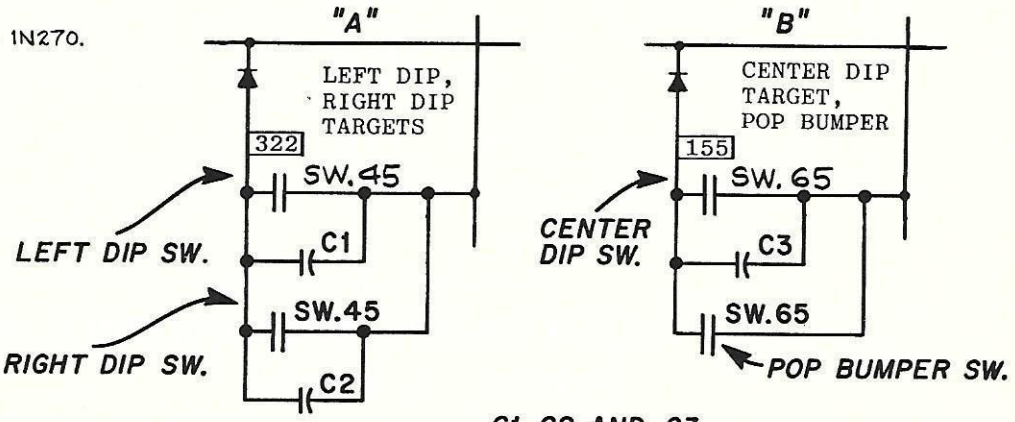
RESET BOARD (A24) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	RESET BOARD	MA-164
R1, R2	Resistor 33K ohm, 5%, ¼W.	XO-43
R3	Resistor 24K ohm, 5%, ¼W.	XO-10
C1	Capacitor 47 µfd., 10V.	XO-227
C2	Capacitor 4.7 µfd., 10V.	XO-226
C3, C4	Capacitor 470 µfd., 16V.	XO-214
C5	Capacitor .01 µfd., 50V.	XO-229
Z1, Z2	IC 74123N	XO-398
Z3	IC 74LS00N	XO-427
	7 Pin Connector	XO-526



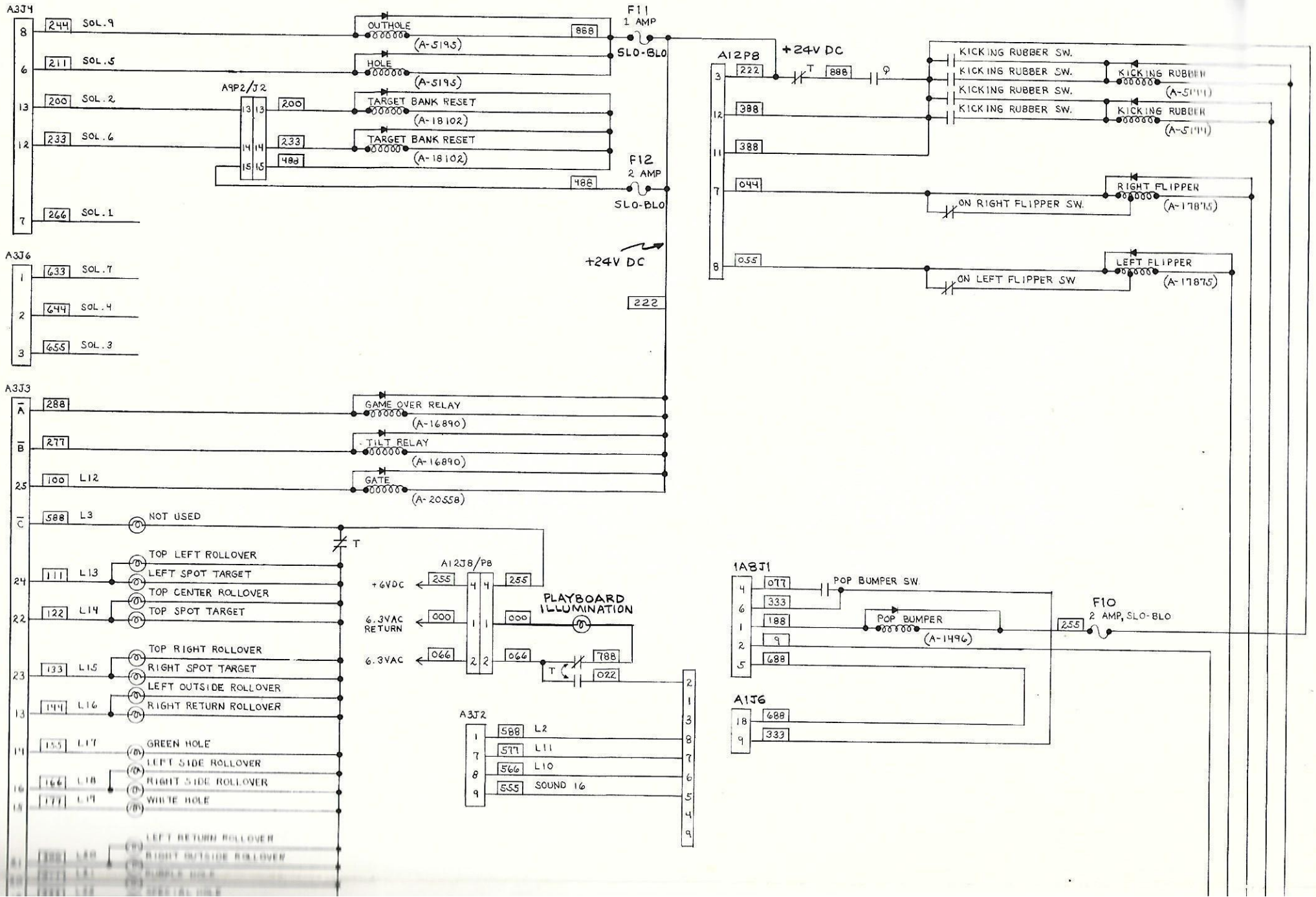
COLOR CODE			
0	BLACK	5	GREEN
1	BROWN	6	BLUE
2	RED	7	PURPLE
3	ORANGE	8	SLATE
4	YELLOW	9	WHITE

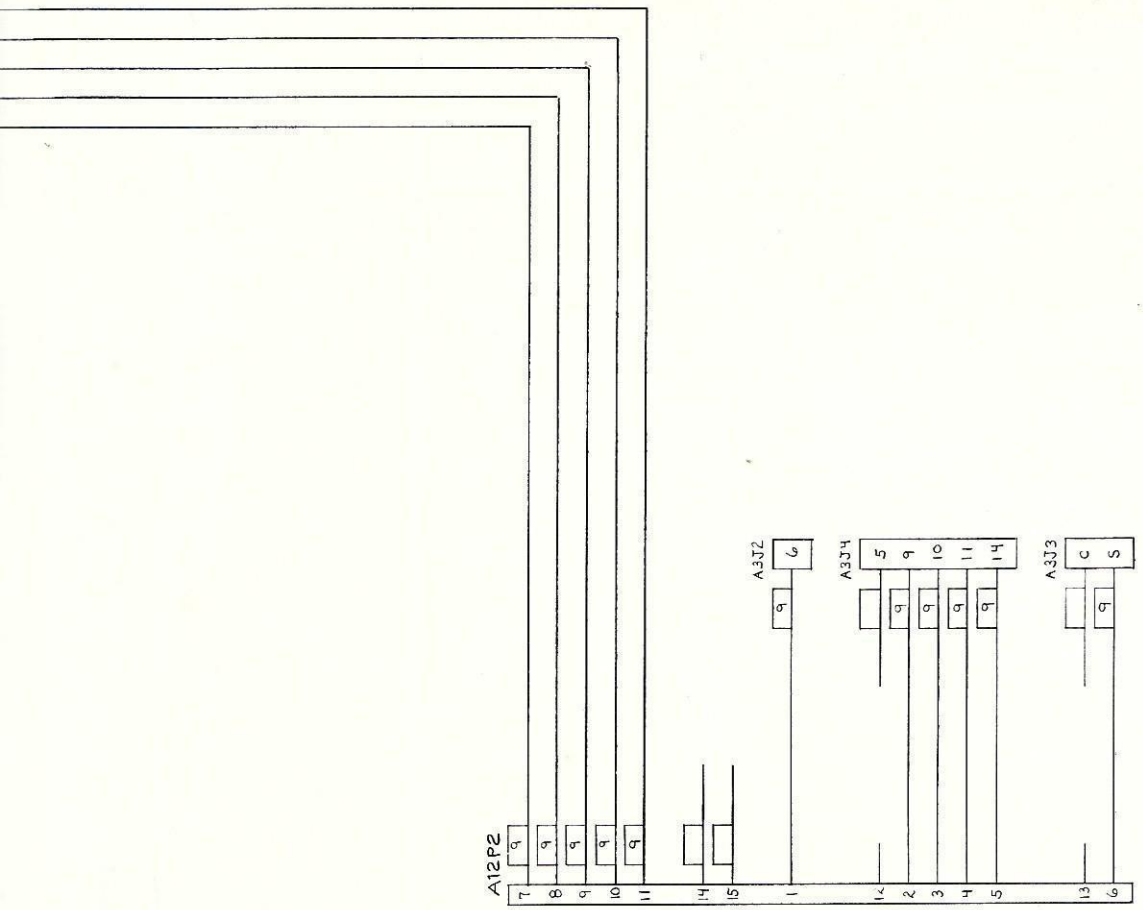
NOTE:
1. ALL DIODES ARE 1N270.



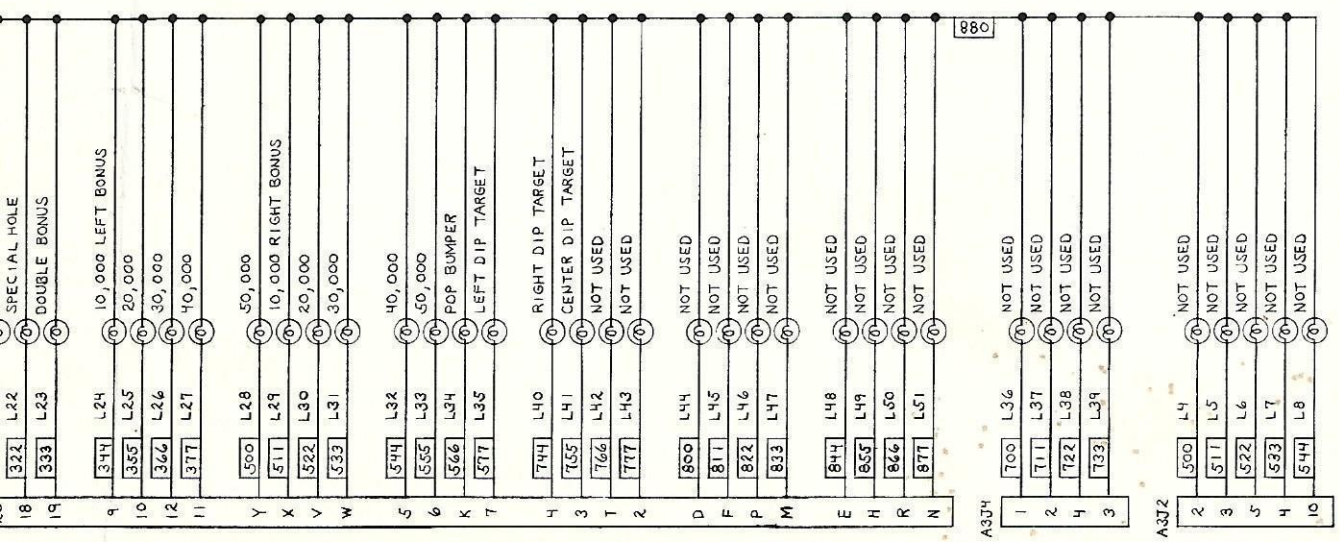
C1, C2 AND C3
0.47UF, 50V

D. GOTTLIEB & CO.			
TITLE	SWITCH MATRIX		
USED ON	GAME #681		
DRAWN	APPROVED	DATE	E-22891
	AC	9-FEB-83	

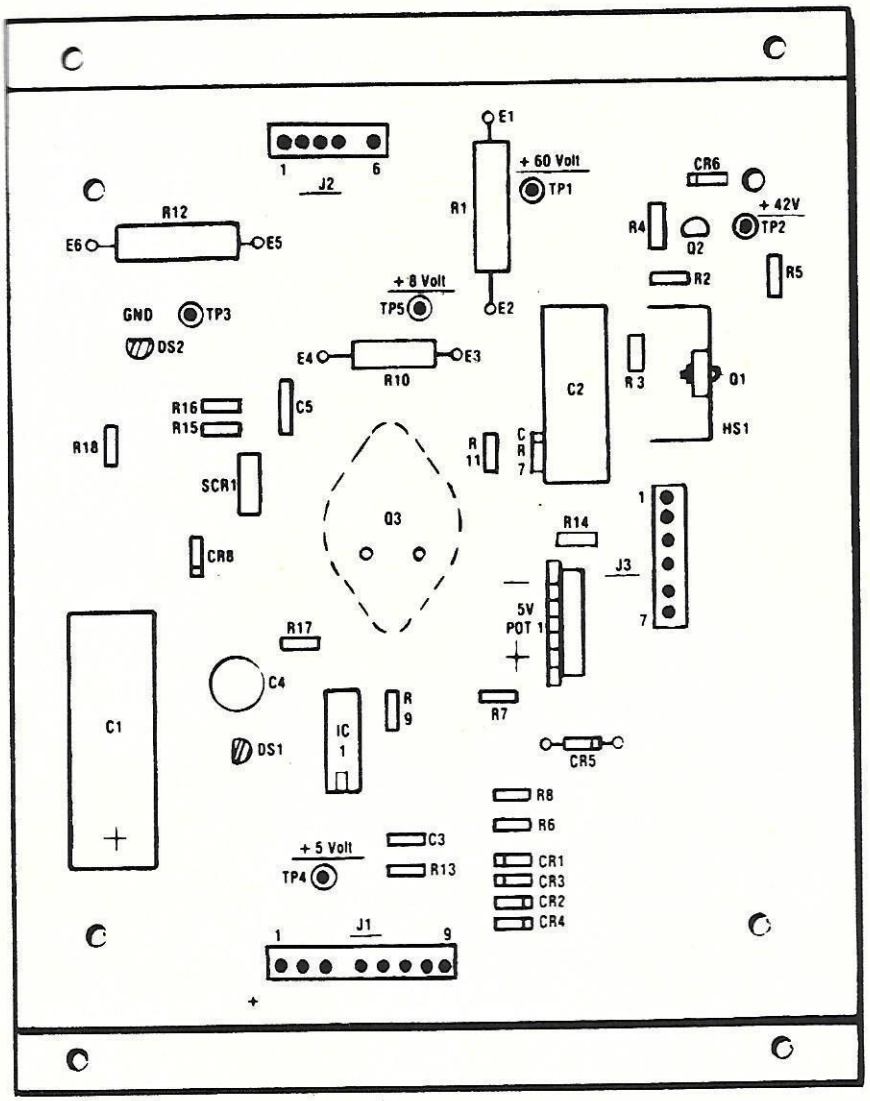

A3J4
8
6
13
12
7
244 SOL.9
211 SOL.5
200 SOL.2
233 SOL.6
266 SOL.1
OUTHOLE
(A-5195)
HOLE
(A-5195)
A9P2/J2
TARGET BANK RESET
(A-18102)
TARGET BANK RESET
(A-18102)
868
200
233
488
488
F11
1 AMP
SLO-BLO
F12
2 AMP
SLO-BLO
+24V DC
222
A12P8
+24V DC
222
888
9
388
388
044
055
KICKING RUBBER SW.
KICKING RUBBER SW.
KICKING RUBBER SW.
KICKING RUBBER SW.
KICKING RUBBER
(A-5111)
KICKING RUBBER
(A-5111)
ON RIGHT FLIPPER SW.
RIGHT FLIPPER
(A-17875)
ON LEFT FLIPPER SW
LEFT FLIPPER
(A-17875)
A3J6
1
2
3
633 SOL.7
644 SOL.4
655 SOL.3
A3J3
288
277
100 L12
588 L3
GAME OVER RELAY
(A-16890)
TILT RELAY
(A-16890)
GATE
(A-20558)
NOT USED
T
TOP LEFT ROLLOVER
LEFT SPOT TARGET
TOP CENTER ROLLOVER
TOP SPOT TARGET
TOP RIGHT ROLLOVER
RIGHT SPOT TARGET
LEFT OUTSIDE ROLLOVER
RIGHT RETURN ROLLOVER
GREEN HOLE
LEFT SIDE ROLLOVER
RIGHT SIDE ROLLOVER
WHITE HOLE
LEFT RETURN ROLLOVER
RIGHT OUTSIDE ROLLOVER
111 L13
122 L14
133 L15
144 L16
155 L17
166 L18
177 L19
24
22
23
13
11
16
15
A12J8/P8
+6VDC
6.3VAC RETURN
6.3VAC
255
000
066
PLAYBOARD ILLUMINATION
788
022
A3J2
588 L2
577 L11
566 L10
555 SOUND 16
1A8J1
077
333
188
9
688
POP BUMPER SW.
POP BUMPER
(A-1496)
A1J6
688
333
F10
2 AMP, SLO-BLO

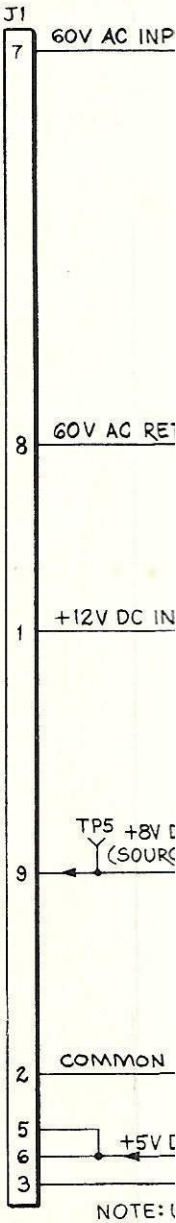


D. GOTTLIEB & CO.			
TITLE	PLAYFIELDS SOLENOIDS AND ILLUMINATION		
USED ON	GAME #681		
DRAWN	APPROVED	DATE 9-FEB-83	E-22893



POWER SUPPLY (A2) COMPONENT LOCATION

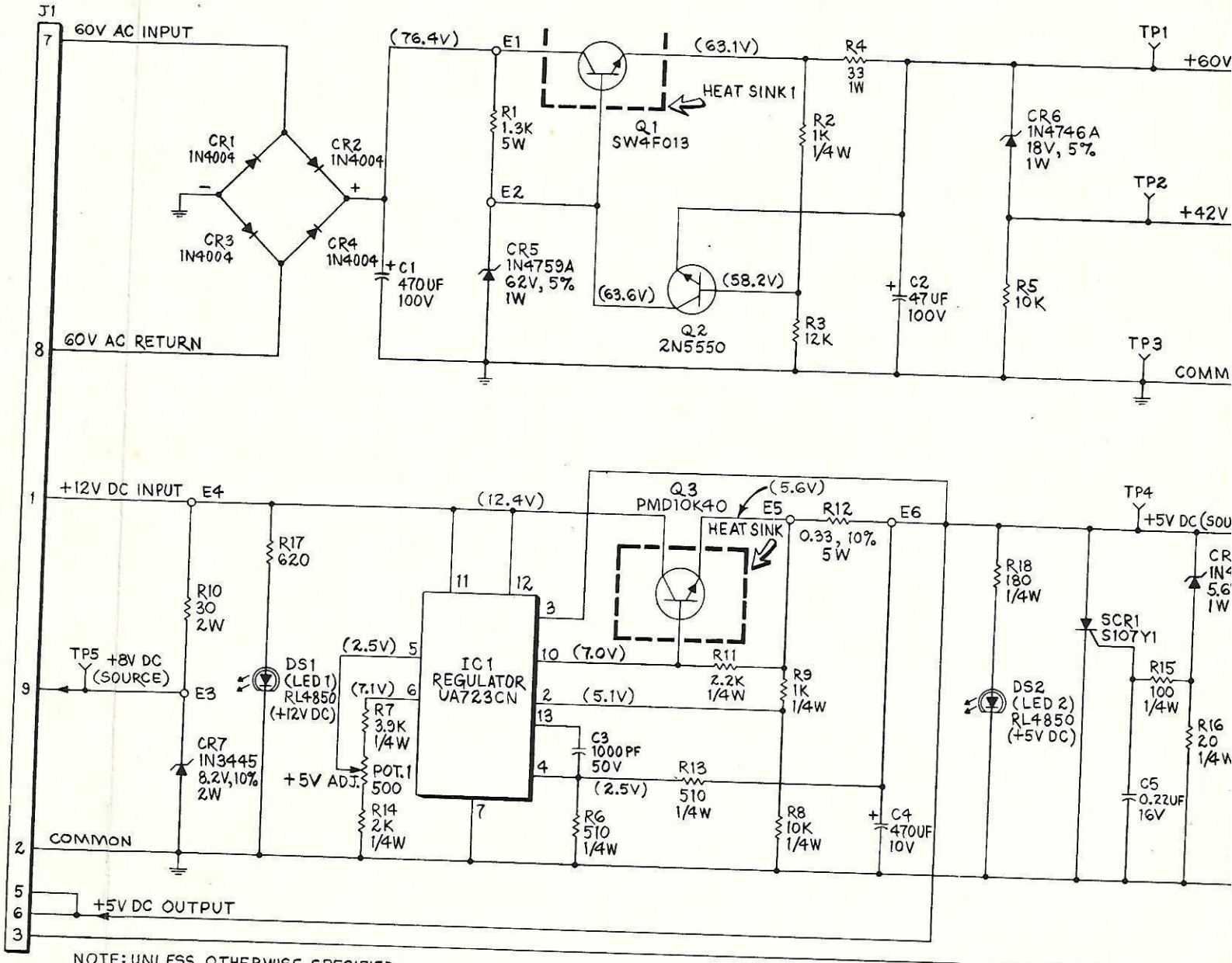




POWER SUPPLY (A2) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	POWER SUPPLY BOARD	MA-114
C1	Capacitor, 470 mfd., 100V	XO-233
C2	Capacitor, 47 mfd., 100V	XO-231
C3	Capacitor, 1000 Picofarad, 50V	XO-232
C4	Capacitor, 470 mfd., 10V	XO-279
C5	Capacitor, .2 mfd., +80%, -20%, 16V	XO-205
CR1-CR4	Diode 1N4004	XO-254
CR5	Diode Zener, 62V, 5%, 1W 1N4759A	XO-267
CR6	Diode Zener, 18V, 5%, 1W 1N4746A	XO-258
CR7	Diode Zener, 8.2V, 10%, 2W 1N3445	XO-266
CR8	Diode Zener, 5.6V, 5%, 1W 1N4734A	XO-255
DS1, DS2	Diode, Light Emitting CM4-22	XO-268
IC1	IC-14 Pin Dip UA723CN	XO-422
J1	Connector, 9 Pin, Molex	XO-527
J2	Connector, 6 Pin, Molex	XO-525
J3	Connector, 7 Pin, Molex	XO-526
POT1	Potentiometer, 500 ohm, CTS 115R501A	XO-101
Q1	Transistor, NPN, SW4F013	XO-307
Q2	Transistor, NPN, 2N5550	XO-314
Q3	Transistor, Darlington, Lambda PMD10K40	XO-315
R1	Resistor, 1.3K ohm, 10%, 5W	XO-156
R2, R9	Resistor, 1K ohm, 5%, ¼W	XO-5

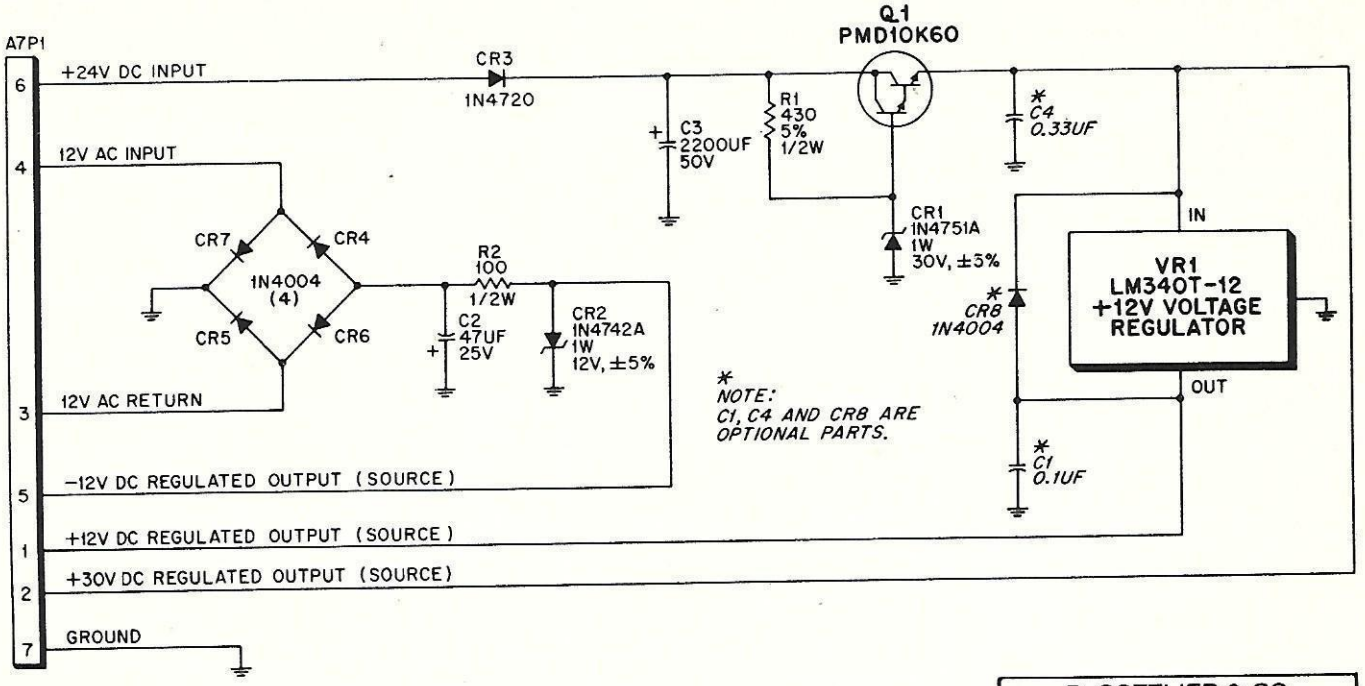
REFERENCE	DESCRIPTION	PART NUMBER
R3	Resistor, 12K ohm, 5%, ½W	XO-63
R4	Resistor, 33 ohm, 5%, 1W	XO-159
R5	Resistor, 10K ohm, 5%, ½W	XO-62
R6, R13	Resistor, 510 ohm, 5%, ¼W	XO-25
R7	Resistor, 3.9K ohm, 5%, ¼W	XO-39
R8	Resistor, 10K ohm, 5%, ¼W	XO-18
R10	Resistor, 30 ohm, 5%, 2W	XO-155
R11	Resistor, 2.2K ohm, 5%, ¼W	XO-27
R12	Resistor, .33 ohm, 10%, 5W (wirewound)	XO-154
R14	Resistor, 2K ohm, 5%, ¼W	XO-14
R15	Resistor, 100 ohm, 5%, ¼W	XO-28
R16	Resistor, 20 ohm, 5%, ¼W	XO-29
R17	Resistor, 620 ohm, 5%, ½W	XO-66
R18	Resistor, 180 ohm, 5%, ¼W	XO-24
SCR1	Silicon Controlled Rectifier S107Y1	XO-451
	Eyelet G52-3	XO-524
	Heat Sink, Thermalloy	XO-528
	Insulator, INS-3	XO-522
	Insulator, DM 111	XO-523
	Spacer — 6-32 Thread x 5/32	XO-518
	Spacer — 6-32 Thread x ⅛	XO-519



NOTE: UNLESS OTHERWISE SPECIFIED,
1. RESISTORS ARE ± 5%, 1/2W.
2. VOLTAGES ARE DC WITH RESPECT TO CIRCUIT GROUND.
3. ALL VOLTAGES ARE AT NOMINAL LINE VOLTAGE (115V AC).

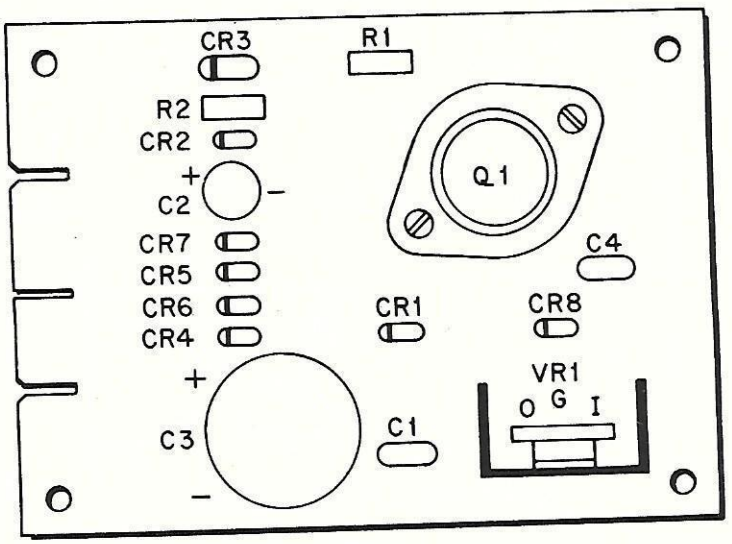
D. GOTTLIEB		
TITLE	POWER SUP	
USED ON		
DRAWN	APPROVED	DATE
	BAM	2-3-81

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



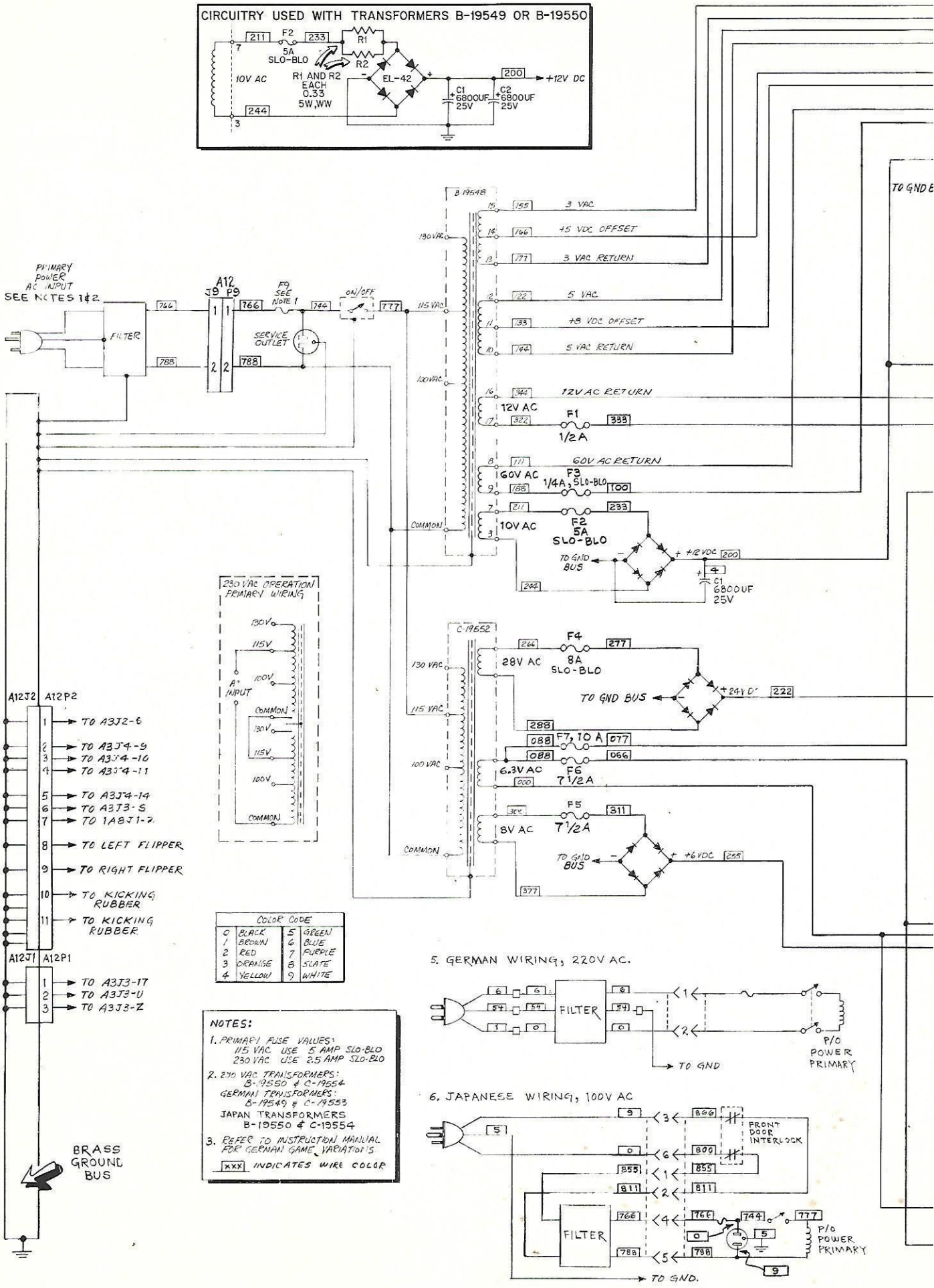
D. GOTTLIEB & CO.			
TITLE: SOUND/SPEECH BOARD POWER SUPPLY A7			
USED ON			
DRAWN	APPROVED	DATE 8-5-81	D-21343

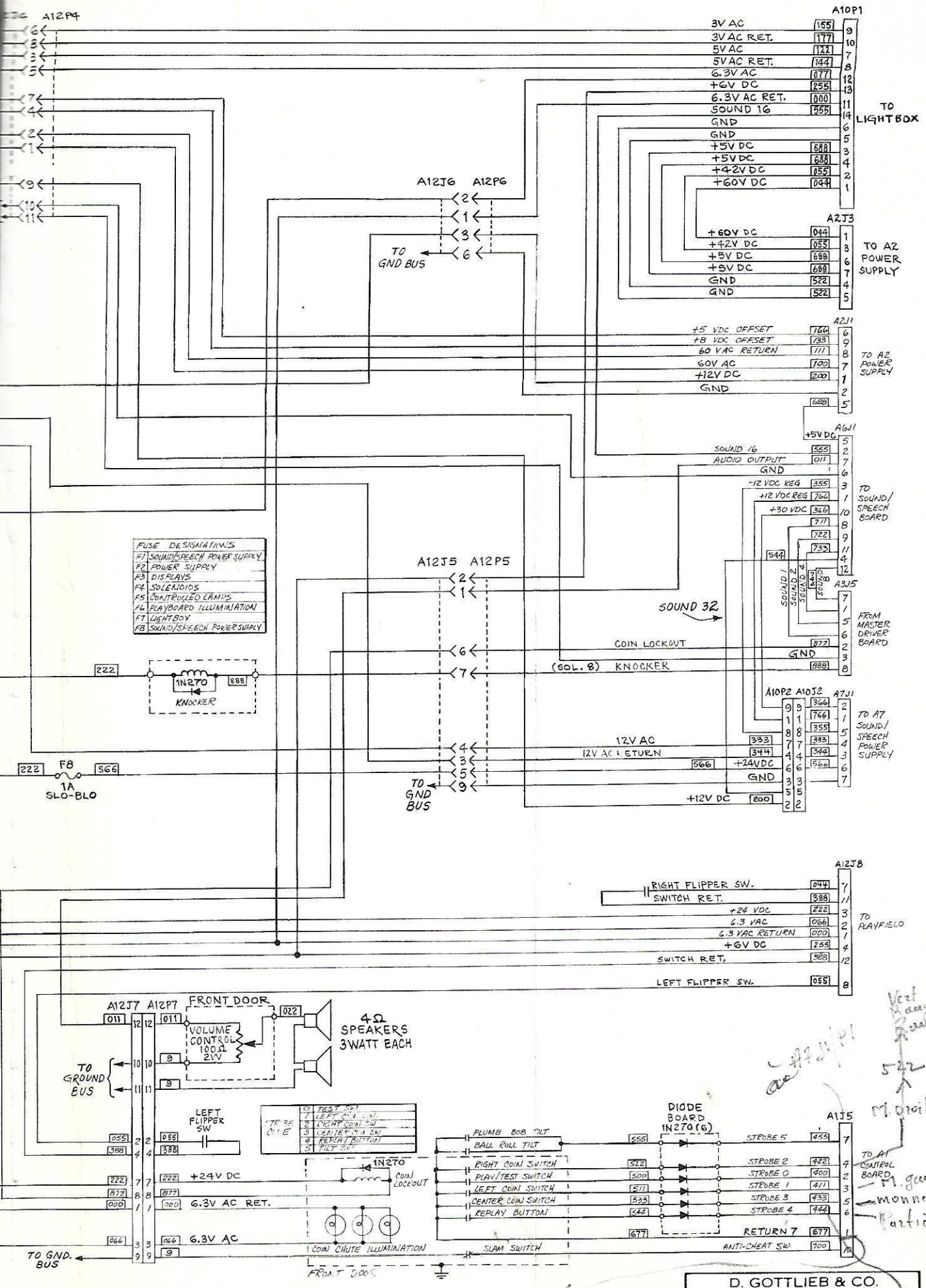
SOUND/SPEECH POWER SUPPLY (A7) COMPONENT LOCATION

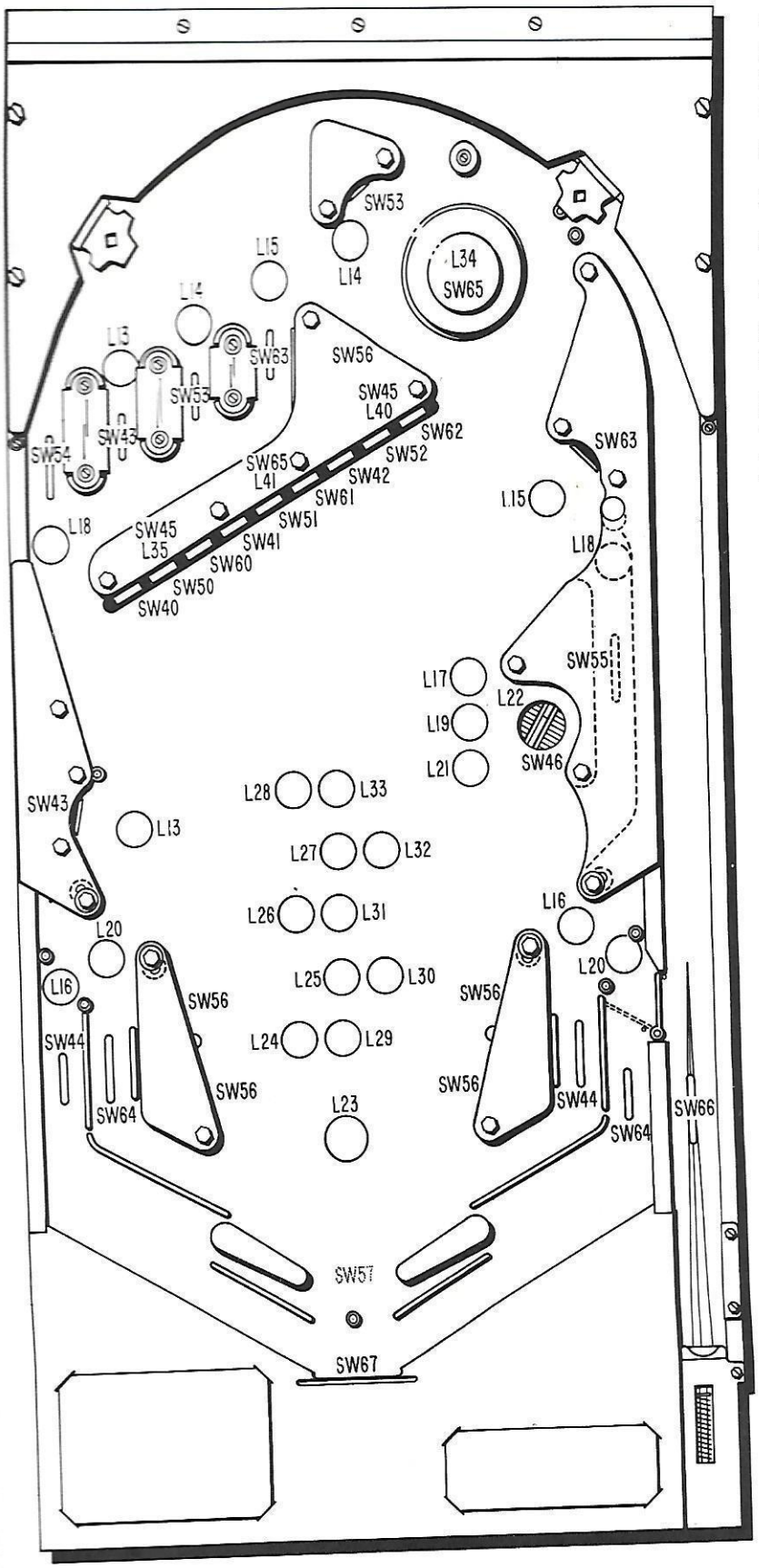


SOUND/SPEECH POWER SUPPLY (A7) PARTS LIST

REFERENCE	DESCRIPTION	PART NO.
	SOUND/SPEECH POWER SUPPLY BOARD	MA-188
C1	Capacitor 0.1UF, 50V	XO-230
C2	Capacitor 47UF, 25V	XO-219
C3	Capacitor 2200 UF, 50V	XO-290
C4	Capacitor 0.33 UF	XO-250
CR1	Diode, Zener 30V, 5%, 1W 1N4751A	XO-271
CR2	Diode, Zener 12V, 5%, 1W 1N4742A	XO-257
CR3	Diode 1N4720	XO-260
CR4, CR5, CR6, CR7, CR8	Diode 1N4004	XO-254
R1	Resistor 430 ohm, 5%, ½ Watt	XO-54
R2	Resistor 100 ohm, 5%, ½ Watt	XO-52
Q1	Transistor, Darlington Pair PMD10K60	XO-311
VR1	+12 Volt Voltage Regulator LM 340T-12	XO-473


CIRCUITRY USED WITH TRANSFORMERS B-19549 OR B-19550
10V AC
R1 AND R2 EACH 0.33 5W,WW
EL-42
+12V DC
C1 6800UF 25V
C2 6800UF 25V
F2 5A SLO-BLO
B 19548
3 VAC
+5 VDC OFFSET
3 VAC RETURN
5 VAC
+8 VDC OFFSET
5 VAC RETURN
12V AC RETURN
12V AC
F1 1/2A
60V AC RETURN
60V AC
F3 1/4A, SLO-BLO
10V AC
F2 5A SLO-BLO
TO GND BUS
+12 VDC
C1 6800UF 25V
C-19552
F4 8A SLO-BLO
28V AC
+24V DC
F7, 10 A
6.3V AC
F6 7 1/2A
F5 7 1/2A
8V AC
+6VDC
PRIMARY POWER AC INPUT SEE NOTES 1&2
FILTER
A12 J9 P9
F9 SEE NOTE 1
SERVICE OUTLET
ON/OFF
115 VAC
100 VAC
COMMON
230 VAC OPERATION PRIMARY WIRING
A12J2 A12P2
TO A3J2-6
TO A3J4-9
TO A3J4-10
TO A3J4-11
TO A3J4-14
TO A3J3-S
TO 1A8J1-2
TO LEFT FLIPPER
TO RIGHT FLIPPER
TO KICKING RUBBER
TO KICKING RUBBER
A12J1 A12P1
TO A3J3-17
TO A3J3-U
TO A3J3-Z
BRASS GROUND BUS
COLOR CODE
0 BLACK
1 BROWN
2 RED
3 ORANGE
4 YELLOW
5 GREEN
6 BLUE
7 PURPLE
8 SLATE
9 WHITE
NOTES:
1. PRIMARY FUSE VALUES: 115 VAC USE 5 AMP SLO-BLO 230 VAC USE 2.5 AMP SLO-BLO
2. 230 VAC TRANSFORMERS: B-19550 & C-19554 GERMAN TRANSFORMERS: B-19549 & C-19553 JAPAN TRANSFORMERS B-19550 & C-19554
3. REFER TO INSTRUCTION MANUAL FOR GERMAN GAME VARIATIONS
XXX INDICATES WIRE COLOR
5. GERMAN WIRING, 220V AC.
FILTER
TO GND
P/O POWER PRIMARY
6. JAPANESE WIRING, 100V AC
FRONT DOOR INTERLOCK
FILTER
TO GND.
P/O POWER PRIMARY


A12P4
A10P1
3V AC
3V AC RET.
5V AC
5V AC RET.
6.3V AC
+6V DC
6.3V AC RET.
SOUND 16
GND
GND
+5V DC
+5V DC
+42V DC
+60V DC
TO LIGHTBOX
A2J3
+60V DC
+42V DC
+5V DC
+5V DC
GND
GND
TO A2 POWER SUPPLY
A12J6 A12P6
TO GND BUS
A2J1
+5 VDC OFFSET
+8 VDC OFFSET
60 VAC RETURN
60V AC
+12V DC
GND
TO A2 POWER SUPPLY
+5V DC
A6J1
SOUND 16
AUDIO OUTPUT
GND
-12 VDC REG
+12 VDC REG
+30 VDC
TO SOUND/SPEECH BOARD
FUSE DESIGNATIONS
F1 SOUND/SPEECH POWER SUPPLY
F2 POWER SUPPLY
F3 DISPLAYS
F4 SOLENOIDS
F5 CONTROLLED LAMPS
F6 PLAYBOARD ILLUMINATION
F7 LIGHTBOX
F8 SOUND/SPEECH POWER SUPPLY
A12J5 A12P5
SOUND 32
A3J5
FROM MASTER DRIVER BOARD
COIN LOCKOUT
GND
(SOL. 8) KNOCKER
222
1N270
KNOCKER
A10P2 A10J2
A7J1
TO A7 SOUND/SPEECH POWER SUPPLY
12V AC
12V AC RETURN
+24VDC
GND
+12V DC
222 F8 566
1A SLO-BLO
TO GND BUS
A12J8
RIGHT FLIPPER SW.
SWITCH RET.
+24 VDC
6.3 VAC
6.3 VAC RETURN
+6V DC
SWITCH RET.
LEFT FLIPPER SW.
TO PLAYFIELD
A12J7 A12P7
FRONT DOOR
VOLUME CONTROL 100Ω 2W
4Ω SPEAKERS 3WATT EACH
TO GROUND BUS
LEFT FLIPPER SW
TO BE CLOSED
0 TEST SW
1 LEFT COIN SW
2 RIGHT COIN SW
3 CENTER COIN SW
4 REPLAY BUTTON
5 TILT SW
PLUMB BOB TILT
BALL ROLL TILT
DIODE BOARD IN270(6)
A1J5
TO A1 CONTROL BOARD
RIGHT COIN SWITCH
PLAY/TEST SWITCH
LEFT COIN SWITCH
CENTER COIN SWITCH
REPLAY BUTTON
STROBE 5
STROBE 2
STROBE 0
STROBE 1
STROBE 3
STROBE 4
RETURN 7
ANTI-CHEAT SW
1N270
COIN LOCKOUT
+24V DC
6.3V AC RET.
6.3V AC
COIN CHUTE ILLUMINATION
SLAM SWITCH
FRONT DOOR
TO GND. BUS
D. GOTTLIEB & CO.
TITLE BOTTOM BOARD AND CABINET
USED ON GAME #681
DRAWN
APPROVED
DATE 9-FEB-83
E-22894
42



PLAYBOARD SWITCH AND LAMP ASSIGNMENTS

LAMP NO.	LAMP ASSIGNMENT
L13	Top Left Rollover Left Spot Target
L14	Top Center Rollover Top Spot Target
L15	Top Right Rollover Right Spot Target
L16	Left Outside Rollover Right Return Rollover
L17	Green Hole
L18	Left Side Rollover Right Side Rollover
L19	Amber Hole
L20	Left Return Rollover Right Outside Rollover
L21	Red Hole
L22	Special Hole
L23	Double Bonus
L24	10,000 Left Bonus
L25	20,000 Left Bonus
L26	30,000 Left Bonus
L27	40,000 Left Bonus
L28	50,000 Left Bonus
L29	10,000 Right Bonus
L30	20,000 Right Bonus
L31	30,000 Right Bonus
L32	40,000 Right Bonus
L33	50,000 Right Bonus
L34	Pop Bumper
L35	Left DIP Target
L40	Right DIP Target
L41	Center DIP Target

SWITCH MATRIX NO.	SWITCH ASSIGNMENT		PART NO.
40	#1 Drop Target		B-18094
41	#4 Drop Target		B-18094
42	#7 Drop Target		B-18094
43	Left Target		B-20867
	Top Left Rollover		B-18892
44	Left Outside Rollover		B-18892
	Right Return Rollover		B-19754
45	Left DIP Target		B-22820
	Right DIP Target		B-22820
46	Hole		B-19857
50	#2 Drop Target		B-18095
51	#5 Drop Target		B-18095
52	#8 Drop Target		B-18095
53	Top Target		B-20867
	Top Center Rollover		B-18892
54	Left Side Rollover		B-18892
55	Right Side Rollover		B-18892
56	10 points (5)	(4 Lower)	B-22224
		(Upper)	B-22227
57	Tilt		B-9141
60	#3 Drop Target		B-18093
61	#6 Drop Target		B-18093
62	#9 Drop Target		B-18093
63	Right Target		B-20867
	Top Right Rollover		B-19388
64	Left Return Rollover		B-18892
	Right Outside Rollover		B-18892
65	Center DIP Target		B-22820
	Pop Bumper		B-21353
66	Runway		B-19754
67	Outhole		B-18892

XI. PARTS INFORMATION

TABLE OF CONTENTS

PAGE

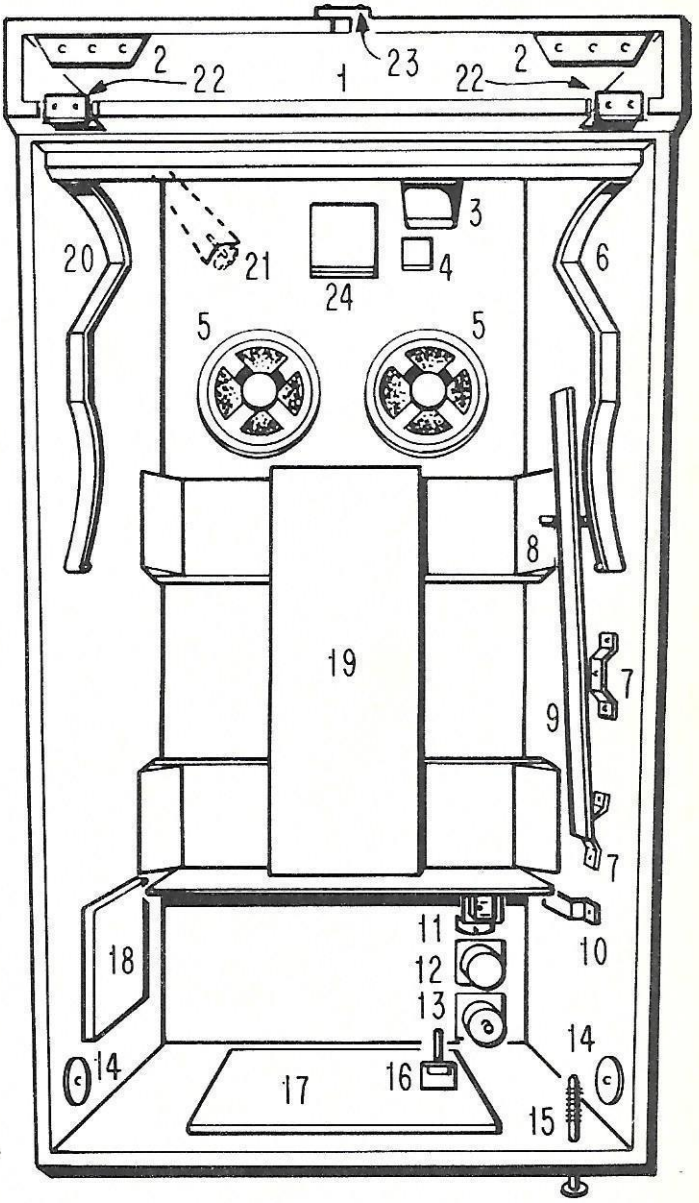
CABINET PARTS..... 45

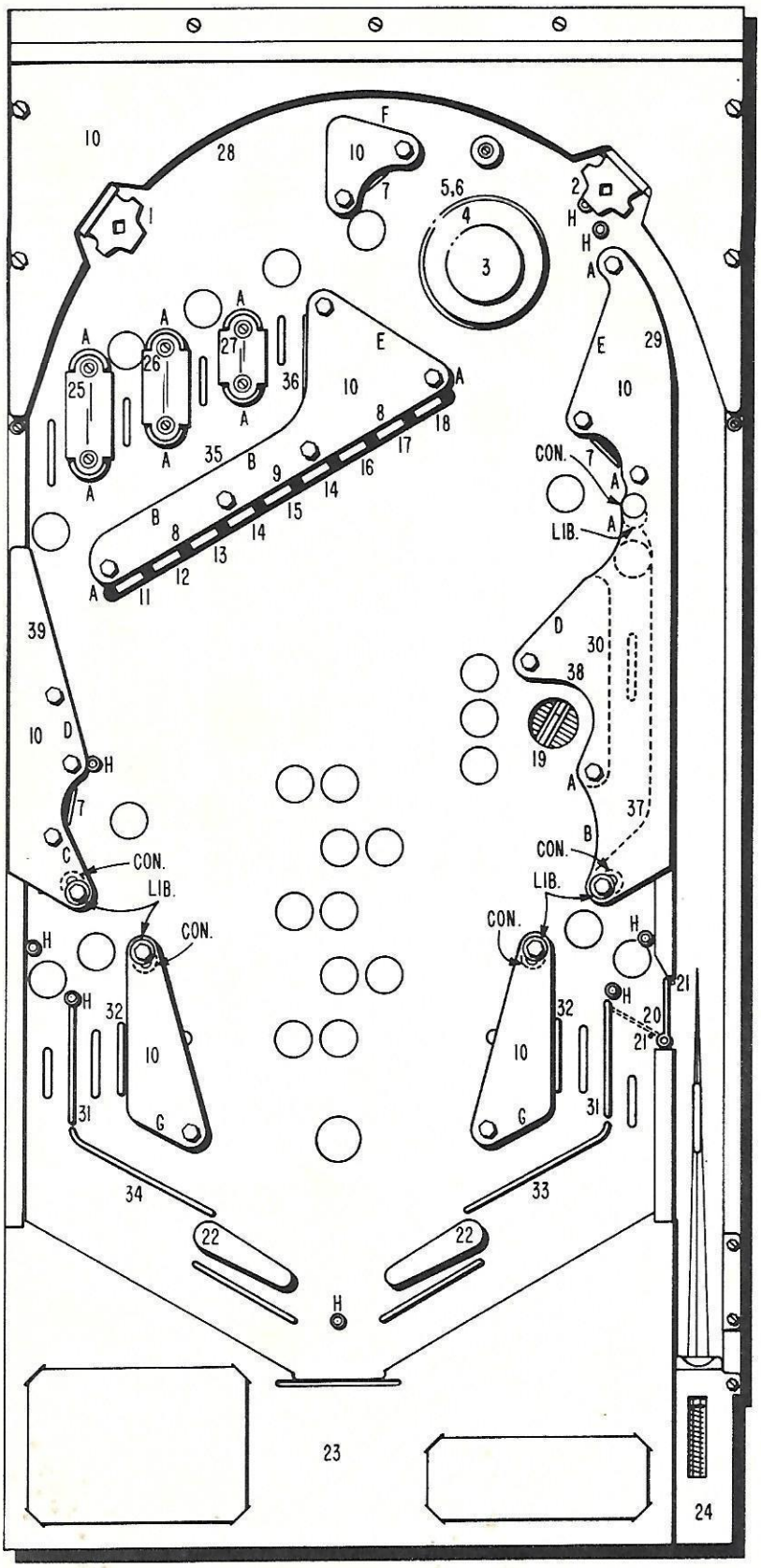
PLAYBOARD PARTS..... 46

XI. PARTS INFORMATION

CABINET PARTS

ITEM	DESCRIPTION	PART NO.
1.	Cabinet	Specify Game
2.	Lightbox Mounting Bracket (2)	A-19916
3.	Line Cord Housing	C-18534
4.	Line Filter	EL-50
5.	Speakers, 4 Ohm (2)	EL-83
6.	Right Playboard Support	D-19932
7.	Front Rest Saddle (2)	A-21960
8.	Stop Bracket	A-5024
9.	Playboard Prop	B-21625
10.	Knocker	MA-12
11.	Convenience Outlet	MA-17
12.	Switch, On/Off	A-18317
	Switch Housing	B-15163
13.	Fuse Assembly	MA-186
14.	Flipper Switch Assembly	B-17838
15.	Ball Shooter	B-8835
16.	Pot and Mounting Bracket	MA-185
17.	Front Door Assembly	Specify Game
18.	Ball Roll Tilt	MA-344
	6 Diode and Term Strip	A-21028
19.	Transformer Board Assembly	MA-332
	Bridge Rectifier (3)	EL-42
	Capacitor, 6800 UF, 25 Volt (2)	XO-228
	F1, 1/2 Amp Fuse	EL-28
	F2, 5 Amp SLO-BLO Fuse	EL-8
	F3, 1/4 Amp SLO-BLO Fuse	EL-5
	F4, 8 Amp SLO-BLO Fuse	EL-26
	F5, 7½ Amp Fuse	EL-22
	F6, 7½ Amp Fuse	EL-22
	F7, 10 Amp Fuse	EL-23
	F8, 1 Amp SLO-BLO Fuse	EL-6
20.	Left Playboard Support	D-19931
21.	Cabinet Leg (4)	D-4337
	3" Leg Adjuster	MH-21
22.	Hinge (shown for reference only-P/O Lightbox)	B-22734
23.	Latch Bar	A-22733
	Latch Assembly (P/O Lightbox)	A-21969
24.	Ground Strap Bracket	B-22156





PLAYBOARD PARTS

RUBBER RINGS

A	A-10217	5/16"	(12)
B	A-10218	1/2"	(3)
C	A-10219	1"	(1)
D	A-10220	1-1/2"	(2)
E	A-10221	2"	(2)
F	A-10222	2-1/2"	(1)
G	A-10223	3"	(2)
H	A-15705	Mini	(8)

PARTS LIST

1.	A-19646	Arch Rebound
2.	A-19645	Arch Gate
3.	A-16883	Pop Bumper Cap, White
4.	C-10435Z	Pop Bumper Body, White
5.	C-10433Z	Pop Bumper Skirt, White
6.	B-8246	Pop Bumper Trim Platter
7.	A-9374Z	Targer, White (3)
8.	A-15747W	DIP Target, Blue (2)
9.	A-15749U	DIP Target, Red
10.	D-22803	Plastic Shield Set
11.	A-13449U	Drop Target, Red
12.	A-13448Y	Drop Target, Black
13.	A-13448U	Drop Target, Red
14.	A-13447Y	Drop Target, Black (2)
15.	A-13447U	Drop Target, Red
16.	A-13446U	Drop Target, Red
17.	A-13446Y	Drop Target, Black
18.	A-13445U	Drop Target, Red
19.	A-11151	Hole Liner
20.	A-13652	Gate Wireform
21.	A-10542	Pin (2)
22.	C-13150	Flipper, White (2)
23.	D-13647	Cardholder
24.	C-9767	Ball Shooter Guage
25.	A-9398Z	Rollover Guide, White
26.	A-9396Z	Rollover Guide, White
27.	A-9394Z	Rollover Guide, White
28.	D-22747	Arch Shield Retainer
29.	A-4831	Ball Guide Rail
30.	A-4833	Ball Guide Rail
31.	A-4832	Ball Guide Rail (2)
32.	A-6612	Ball Guide Rail (2)
33.	A-14571	Ball Guide Rail
34.	A-14572	Ball Guide Rail
35.	A-12570	Ball Guide Rail
36.	A-17106	Ball Guide Rail
37.	A-8688	Metal Flat Rail
38.	A-5867	Metal Shield
39.	A-22818	Metal Flat Rail
	A-14792	Mini Post Screw (11)
	C-11561PX	Plastic Post (37)

A

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