Alien Star

GAME #689A



A Gottlieb PINBALL GAME

MYLSTAR

INSTRUCTION MANUAL

FLIPPERSPILL.COM

Provided by: Peter Koch

ALIEN STAR

(GAME #689)

INSTRUCTION MANUAL

Applicable for all games.

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ALIEN STAR

GAME PROM 689

SOUND PROM 689/S

FOR SERVICE, CALL TOLL FREE: 1-800-323-9121; (ILLINOIS): 1-800-942-1620

ADDENDUM

ATTACHED TO AND PART OF ALIEN STAR (GAME #689A)

INSTRUCTION MANUAL

GAME AS SHIPPED VARIES FROM THE INSTRUCTION MANUAL AS PRINTED

1. THE FOLLOWING CHANGES/ADDITIONS/DELETIONS INCORPORATE THE THREE COIN CHUTE FRONT DOOR ASSEMBLY USED IN THIS GAME.

INSIDE FRONT COVER

CHANGE: GAME PROM IS NOW 689A.

PAGE 7 VI. GAME ADJUSTMENTS, A. CONTROL BOARD SWITCH ADJUSTMENTS

CHANGE: SWITCHES 15 AND 16 IN THE ON-ON POSITION CHANGED TO A MAXIMUM CREDIT OF 20.

PAGE 11 VII. BOOKKEEPING AND SELF TEST, B. FLOW CHART

CHANGE: NOTE 2 CHANGED TO "ONLY IF CENTER COIN CHUTE IS INSTALLED IN FRONT DOOR ASSEMBLY."

PAGE 15 IX. GENERAL INFORMATION, C. FUSES

ADD: "SLO-BLO" TO THE F4, F6 AND F7 FUSE LISTINGS

ADD: F20 INPUT LINE FUSE 115V AC ..... 8 AMP SLO-BLO
220V AC ..... 4 AMP SLO-BLO

PAGE 27 X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LIST

DELETE: REMOVE PART NO. MA-488 PIGGYBACK BOARD ASSEMBLY WHICH IS NOW PART OF SOUND BOARD ASSEMBLY MA-490.

CHANGE: PIGGYBACK BOARD SCHEMATIC, PIN 22 (+5V) ON U9 SHOULD BE PIN 21.

ADD: PIGGYBACK BOARD SCHEMATIC, GND ON U9 IS PIN 12.

PAGE 42 TRANSFORMER PANEL/CABINET SCHEMATIC/WIRING DIAGRAM

CHANGE: MAKE THE FOLLOWING CHANGES AS SHOWN IN FIGURE 1, THE PARTIAL ILLUSTRATION OF THE TRANSFORMER PANEL/CABINET SCHEMATIC DIAGRAM ON PAGES 41 AND 42 IN THE INSTRUCTION MANUAL:

A) ADD FUSE F20 TO THE POWER INPUT LINE AS SHOWN.

B) CHANGE WIRE COLOR 700, BETWEEN POWER LINE INPUT AND F20 TO 766, ADD WIRE COLOR 700 FROM F20 FUSE (OUTPUT SIDE), TO THE JUNCTION OF THE 0 WIRE WHICH IS PART OF SW1 AND WIRE 700 WHICH GOES TO A12J6-1.

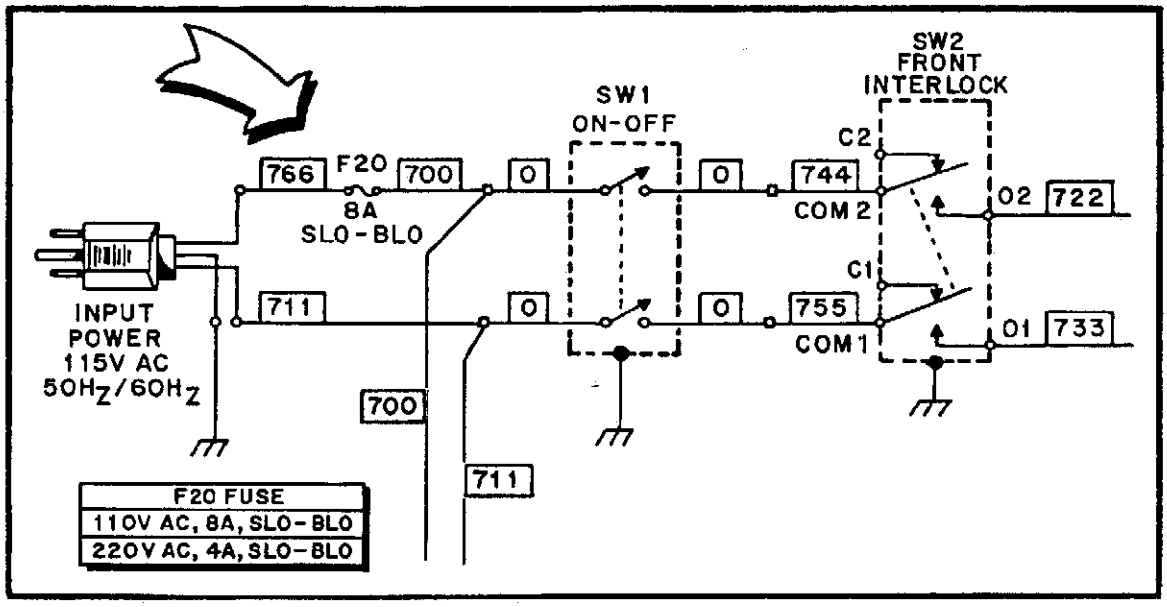


FIGURE 1

CHANGE: THE PARTIAL SCHEMATIC DIAGRAM DEPICTED IN FIGURE 2, INCLUDES ALL CHANGES PERTINENT TO THE THREE COIN CHUTE FRONT DOOR ASSEMBLY, ARROWS ON THE DRAWING INDICATE THE SPECIFIC CHANGES.

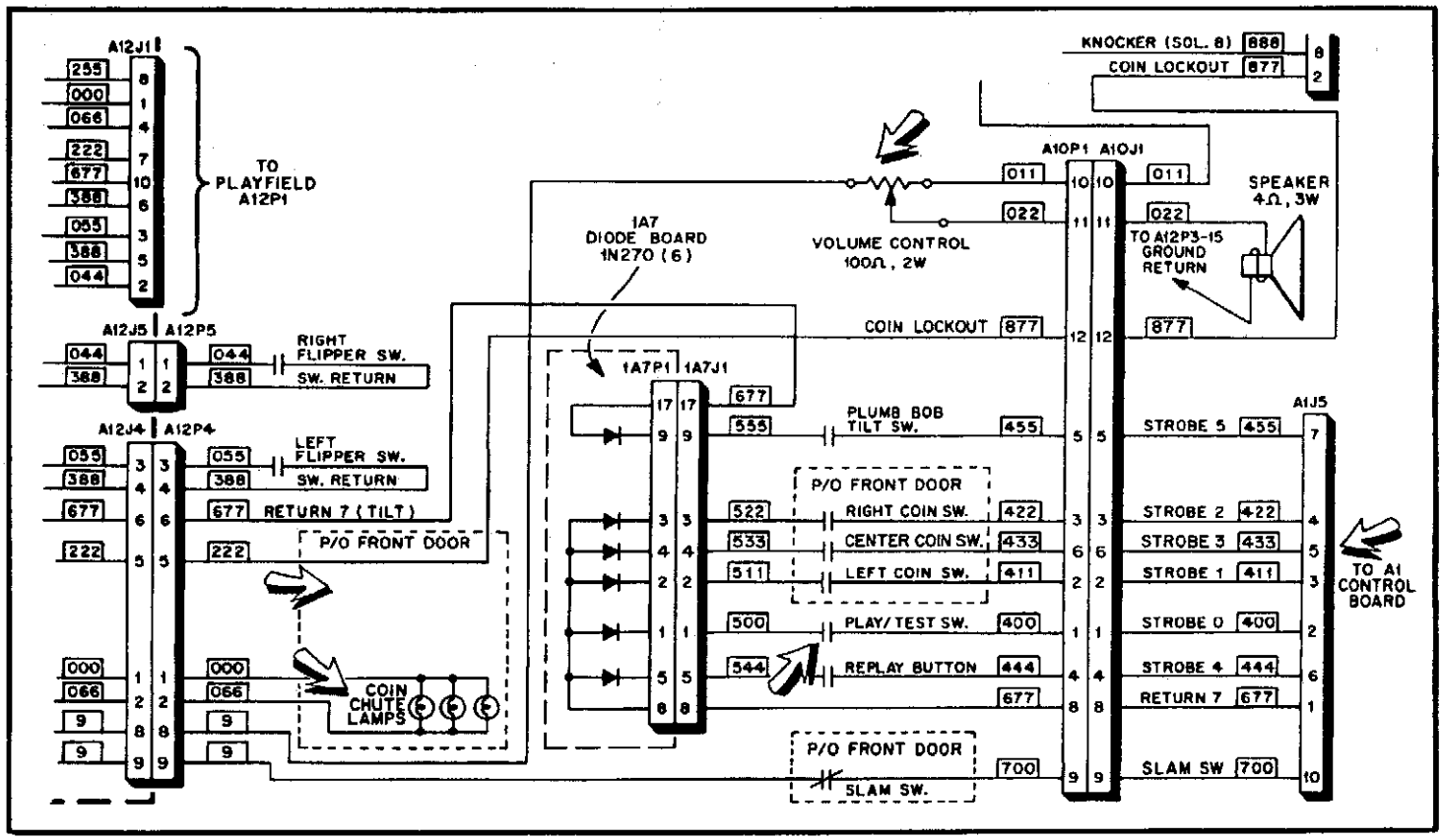


FIGURE 2

PAGE 45 XI. PARTS INFORMATION, CABINET PARTS

CHANGES AND ADDITIONS:

ITEM	DESCRIPTION	PART NO.
12.	FRONT DOOR ASSEMBLY (UNIVERSAL)	MA-661
	CABLE ASSEMBLY	MA-660
	SLAM SWITCH	FD-12
	6V DC LAMP, WEDGE BASE	FD-2
	FRAME, DOOR	FD-13
	THREE CHUTE DOOR	24160
	TWO CHUTE DOOR	24159
	BLACK BUTTON BEZEL	FD-14
	ENTRY/REJECT BUTTON	FD-15
	BUTTON SPRING	FD-16
	REJECT FLAP	FD-17
	CLAMP, FRAME	FD-18
	FLAT LOCK AND CAM ASSEMBLY	FD-19
	BASE PLATE WITH PIVOT AND STUD	FD-20
	MICROSWITCH BRACKET	FD-21
	CLEAR PLASTIC COVER FOR MICROSWITCH	FD-22
	COIN MICROSWITCH WITH WIRE	FD-23
	LAMPHOLDER	FD-24
	BLACK REJECT BEZEL	FD-26
14.	INTERLOCK SWITCH BRACKET	24148
	SWITCH	EL-66
	SWITCH COVER	21888
15.	CASHBOX	24152
	COVER	24153
	DIVIDERS (2) OR (3)	24146
	LOCATOR	24151
	LOCKEYE ASSEMBLY	23878
18.	DIODE BOARD ASSEMBLY	24142
	DIODE, 1N270 (6)	XO-265
21.	FUSES	
	F4, 8 AMP, SLO-BLO	EL-26
	F6, 8 AMP, SLO-BLO	EL-26
22.	FUSE HOLDER	EL-78
	F20, 8 AMP, SLO-BLO (110V AC)	EL-26
	F20, 4 AMP, SLO-BLO (220V AC)	EL-33
23.	MOUNTING BRACKET	24149
	CONTROL, VOLUME, 100 OHM, 2W	XO-104
	SWITCH, PLAY/TEST	EL-57

SYSTEM 80A

The 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

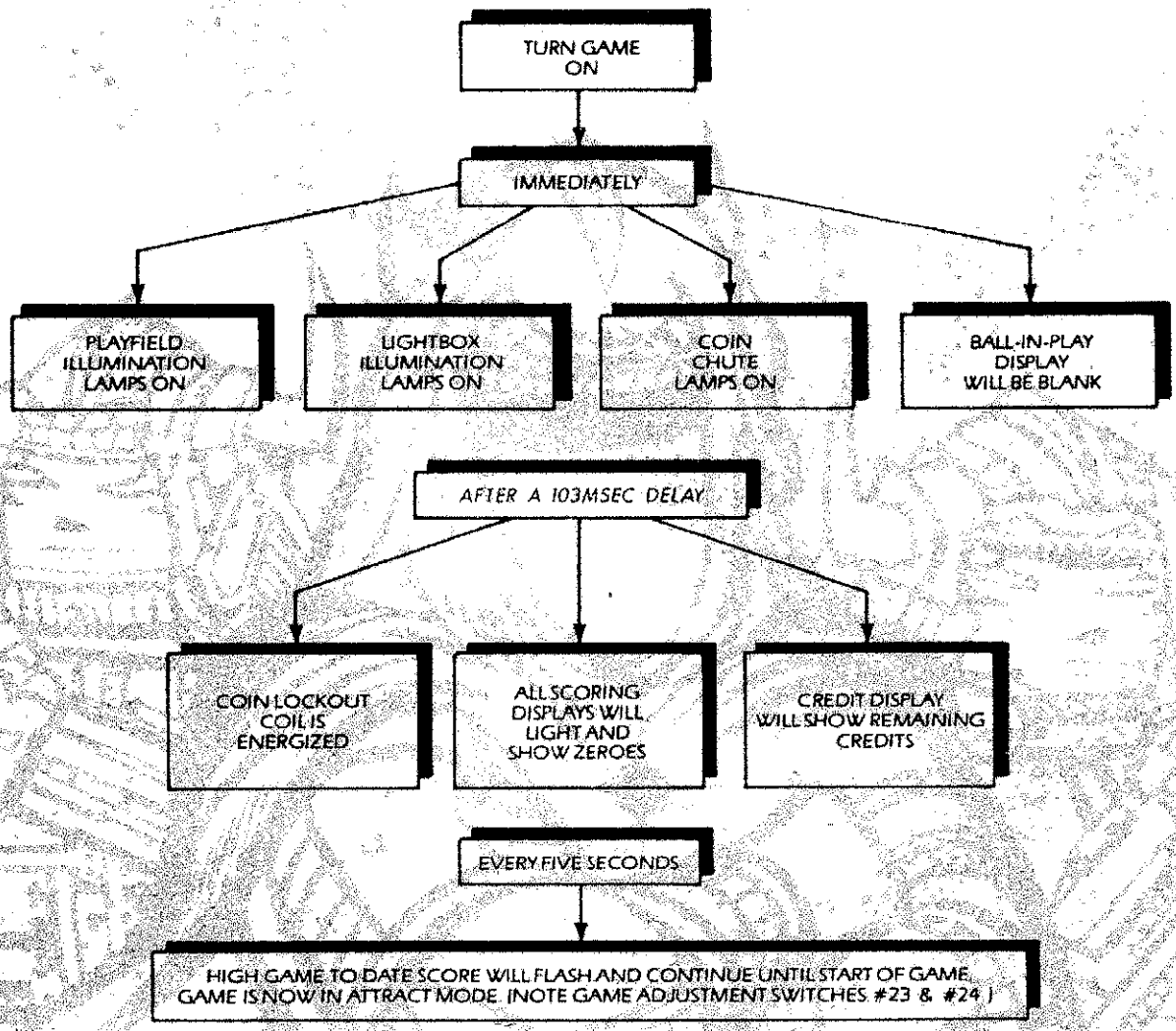
A. SET-UP

1. Bolt the legs to the cabinet.
2. Lift lightbox into an upright position. 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. Unlock the lightbox and remove the backglass.
5. Loosen and lower the shipping bracket at the top center of the lightbox insert panel.
6. Lift the insert; then swing it out.
7. Secure the lightbox to the cabinet with the bolts and washers provided.
8. Open the cabinet door and loosen the front moulding locking arm.
9. Remove the moulding from the playfield.
10. Slide the cabinet glass forward and remove it.
11. Raise the playboard, slide it forward and rest it on its support.
12. Unravel and straighten out the power line cord located at the rear of the pinball cabinet.
13. Proceed to "B. CHECK-OUT".

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 transformer for any foreign matter across terminals.
6. Be sure that the Transformer Panel power input connector A12J6, 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.
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

A. GAME START

The two balls 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. EXTRA BALLS

1. When the SHOOT AGAIN lamp is lit, neither the player-up nor the ball-in-play display changes when the ball enters the outhole.

2. Only one extra ball per ball-in-play is given.

E. 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.

F. 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.

G. 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. HGTD is periodically flashed in all players' displays. When a score higher than this is acheived, an award (dependent on Switches #23 and #24) is given.

4. All of the target banks will reset.

HOW TO PLAY Alien Star

TOP ROLLOVERS

- Unlit-Score 1000 points.
- Unlit-Score 500 points (5 BALL).
- Score 5000 points when either lamp lit.
- Score 1000 points when either lamp lit (5 BALL).
- Score 10,000 points and collect award corresponding to lit Rollover, (Collect BONUS, Advance Multiplier, hold BONUS, or Extra Ball) when both lamps lit.
- Score 5000 points when both lamps lit (5 BALL).
- Add BONUS and light corresponding upper lamp.

SPOT TARGETS

- Lit-Score 1000 points.
- Lit-Score 500 points (5 BALL).
- Flashing-Score 3000 points and add BONUS.
- Flashing-Score 1000 points and add BONUS (5 BALL).
- Completing Targets (all lit), lights a Lower Top Rollover lamp, Enables the hole for Capture, and resets the sequence.
- Lamps are memorized Ball to Ball.
- Lamps not memorized Ball to Ball (5 BALL).

HOLE

- Score 10,000 points.
- Capture ball and lock in Score Multiplier for MULTI-BALL when Flashing.
- Capture lamp memorized Ball to Ball.

SPINNER

- Unlit-Score 1000 points.
- Flashing-Score 10,000 points.
- Rotates score Multiplier lamps (at HOLE) when not in MULTI-BALL.

IV. GAME PLAY AND SCORING

ROLLUNDER

- Score 3000 points.
- Flashing-Enables Left Spot Target.

LEFT SPOT TARGET

- Score 3000 points.
- Flashing-Advance Multiplier if Rollunder was previously hit.

LEFT RETURN ROLLOVER

- Score 3000 points.
- Add BONUS.
- Start Rollunder and Left Spot Target Flashing for a time period.

RIGHT RETURN ROLLOVER

- Score 3000 points.
- Add BONUS.
- Start Spinner Flashing for a time period.

LEFT AND RIGHT OUTLANE ROLLOVERS

- Score 10,000 points.
- Award Special when lit.

POP BUMPERS

- Score 500 points.
- Score 100 points (5 BALL).
- Rotate Lower Top Rollover lamps.

10 POINT SWITCHES

- Score 10 points.
- Toggle Left and Right Outlane Rollovers (Special) when enabled.

MULTI-BALL

- During MULTI-BALL play, scoring is increased by the score Multiplier (located at HOLE).

SPECIAL

- Completing the top Rollover lamps (upper row), and the Spot Targets, will light the Left Outlane Rollover.

V. SOUND

The Sound Board installed in this game has been programmed for sound only.



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
S1	S2	S3	S4	S5	Left Coin Chute
S9	S10	S11	S12	S13	Right Coin Chute
S17	S18	S19	S20	S21	Center Coin Chute

					CREDITS/COINS
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

SWITCH 31 — BACKGROUND SOUND ENABLE
- ON: Background Sound Enabled
- OFF: Background Sound Disabled

SWITCH 32 — SPARE

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.

SWITCH BANK SETTINGS:

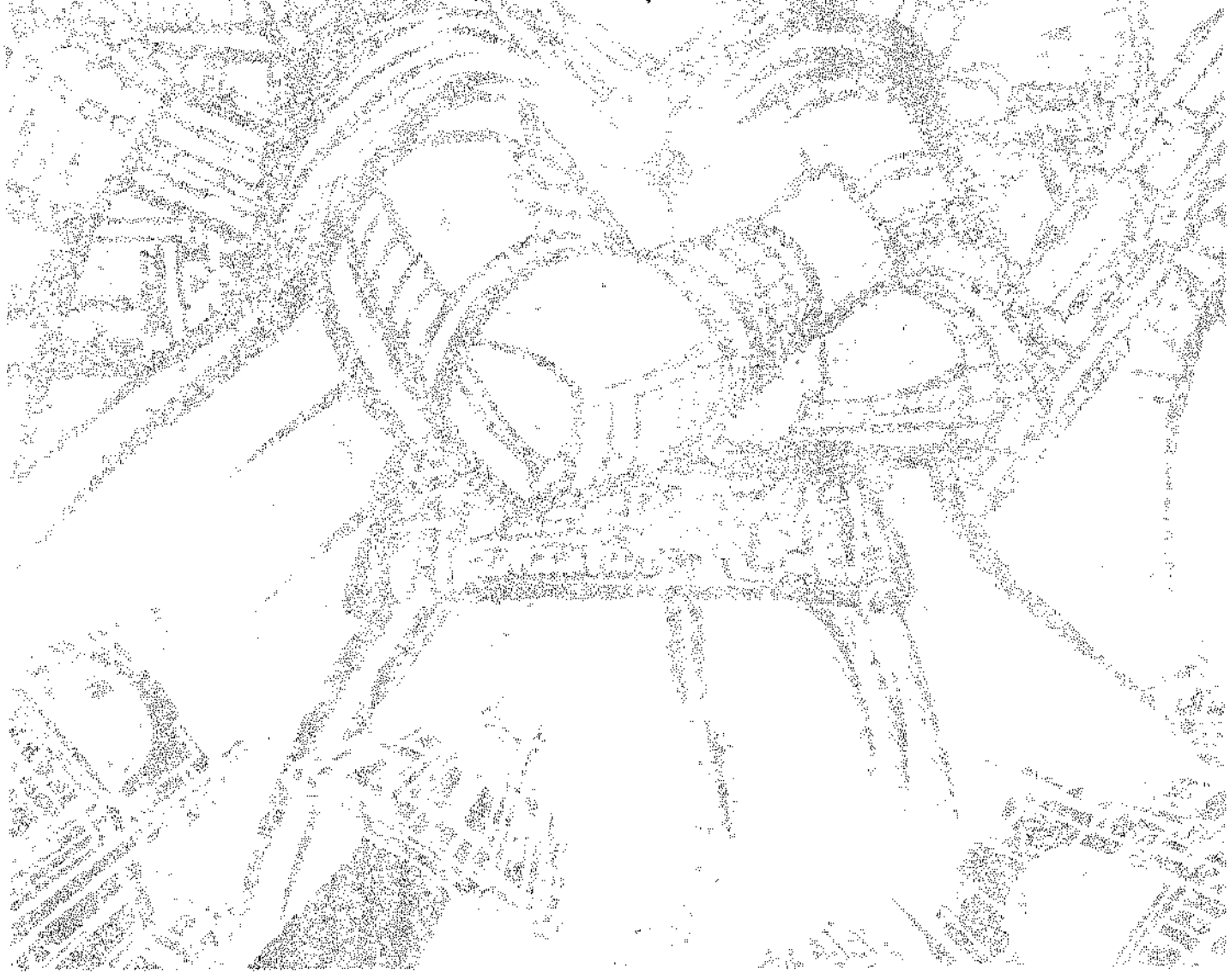
SB1-1 SOUND TEST ENABLE
ON Test Mode (Game Over Tune)
OFF Normal
SB1-2 NOT USED

By placing switch 1 on the Sound Board to the ON position, the Game Over Tune will continually play for test.

NOTE:
If switch 1 on the Sound Board is left in the ON position, upon power up the Game Over Tune will be the only tune played. Be certain switch 1 is in the OFF position for game play.

C. POST ADJUSTMENTS

The posts at the left and right outlanes can be repositioned for liberal/conservative play. 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 and information is displayed on the player's and credit displays. Bookkeeping is listed in Steps 16 through 20. Section VII A., details the Bookkeeping system, while Section VII B., details the Self/Test operation. The Flow Chart in Section VII D., gives the general 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 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, 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.

VII. BOOKKEEPING AND SELF TEST

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

SELECT APPROPRIATE BOOKKEEPING STEP BY PRESSING SELF/TEST BUTTON UNTIL STEP NUMBER APPEARS IN THE CREDIT DISPLAY AND THE 3RD & 4TH PLAYER'S DISPLAYS.

- STEP 11 FIRST HIGH SCORE LEVEL
- STEP 12 SECOND HIGH SCORE LEVEL
- STEP 13 THIRD HIGH SCORE LEVEL
- STEP 14 HIGH GAME TO DATE SCORE

PRESENT SCORE IS DISPLAYED IN PLAYER ONE SCORE DISPLAY. PRESS CREDIT BUTTON ONCE. THIS WILL ZERO OUT THE PRESENT SCORE. THEN PRESS AND HOLD CREDIT BUTTON UNTIL DESIRED SCORE IS DISPLAYED (INCREMENTED IN 100,000'S).

PRESS SELF/TEST BUTTON ONE MORE TIME TO ENTER NEW SCORE INTO BOOKKEEPING.

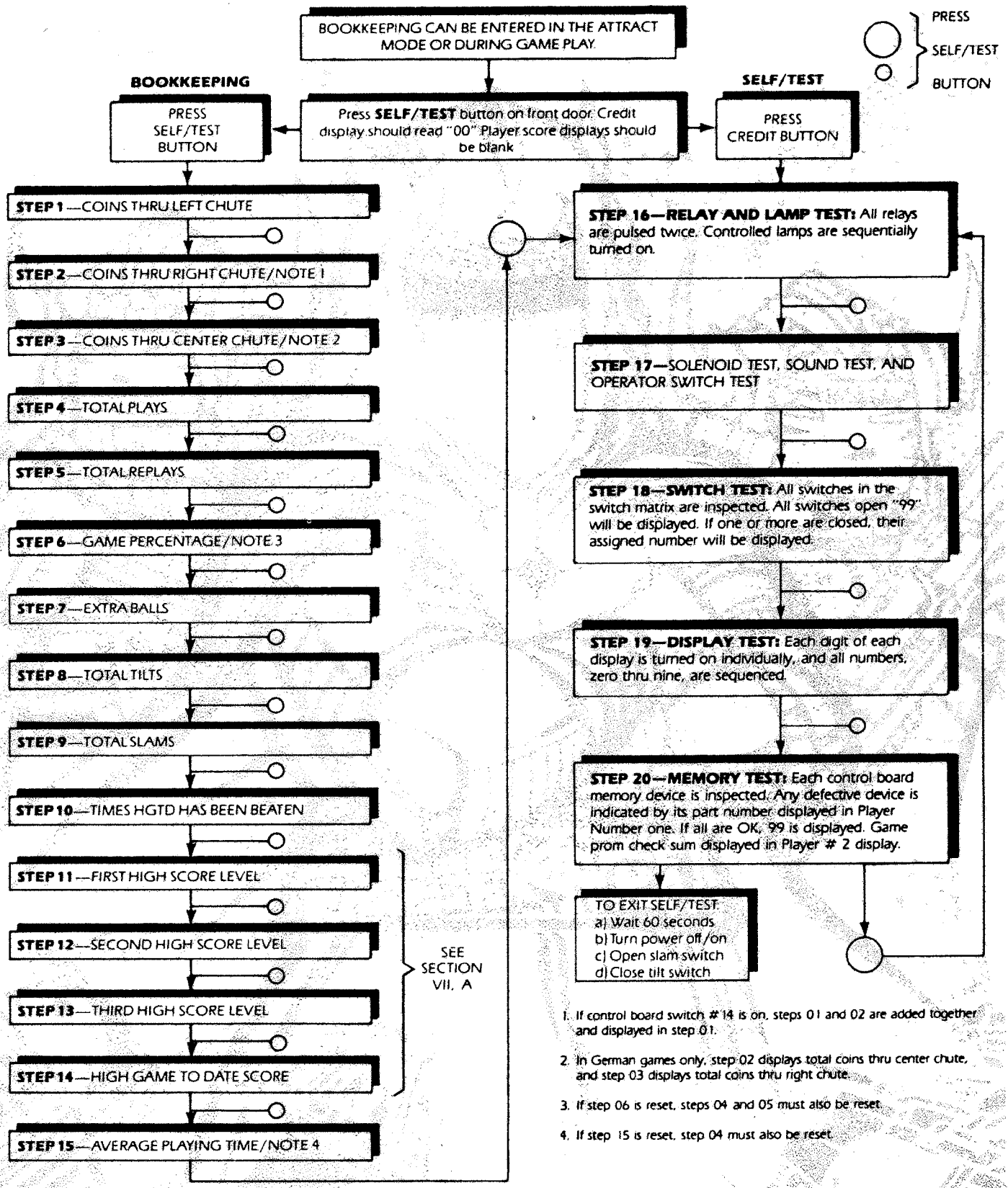
TO EXIT FROM BOOKKEEPING:
A. WAIT 60 SECONDS OR
B. TURN POWER OFF/ON OR
C. OPEN SLAM SWITCH OR
D. CLOSE TILT SWITCH.

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

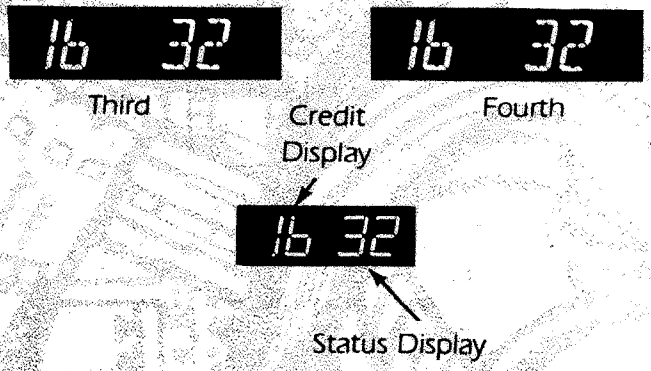


1. If control board switch # 14 is on, steps 01 and 02 are added together and displayed in step 01.
2. In German games only, step 02 displays total coins thru center chute, and step 03 displays total coins thru right chute.
3. If step 06 is reset, steps 04 and 05 must also be reset.
4. If step 15 is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

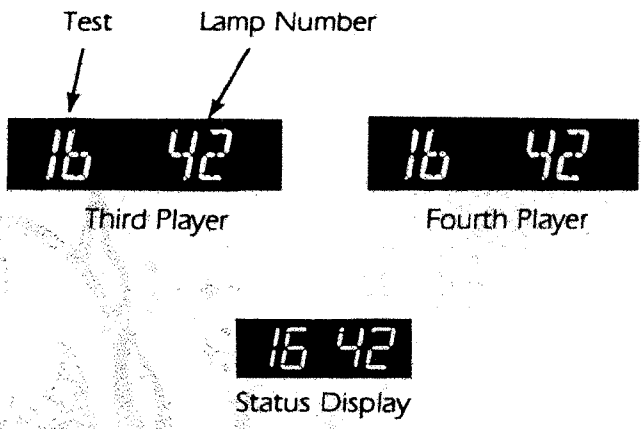


STEP 16—RELAY AND LAMP TEST

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

		A3 Driver Board Transistor Assignment (See Schematic)
Q (Game Over) Relay	-	A3J3 PIN #$\bar{A}$ Q1
T (Tilt) Relay	-	A3J3 PIN #$\bar{B}$ 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	Hole	Q60
Sol.2	Not Used	Q57/Q58
Sol.3	Not Used	Q54
Sol.4	Not Used	Q55
Sol.5	Not Used	Q61/Q62
Sol.6	Not Used	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

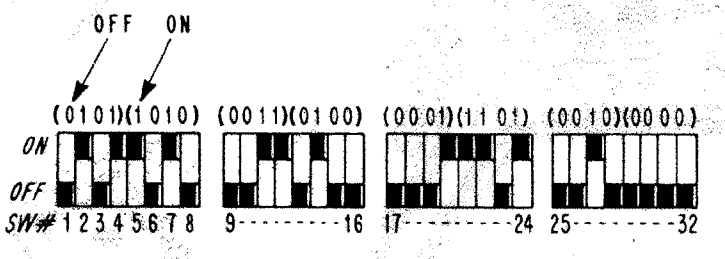
c. The first and second player's score displays show hexadecimal representative of the operator switch positions. Converting hexidecimal to binary will give the switch positions in binary form.

CONVERSION TABLE

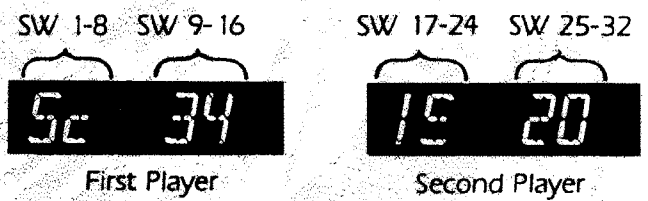
0 = OFF 1 = ON

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	E	13	1101
E	F	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:



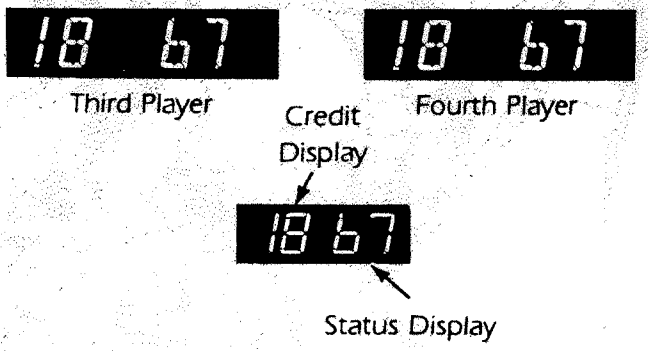
2) Switch all even numbered switches to the ON position and all odd switches to the OFF position. Display should show:



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 - Diode Boards
A8 - Pop Bumper Driver Boards
A14- 7-Digit Displays
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 Gray
9 White

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

C. FUSES

TRANSFORMER PANEL FUSES

F1	Sound/Speech Power Supply (A6)	12V AC	1/2 Amp
F2	Power Supply (A2)	10V AC	5 Amp SLO-BLO
F3	Displays	60V AC	1/4 Amp SLO-BLO
F4	Solenoids (+24V DC)	28V AC	8 Amp
F5	Controlled Lamps	8V AC	7-1/2 Amp
F6	Playboard Illumination	6.3V AC	8 Amp
F7	Lightbox Illumination	6.3V AC	10 Amp
F8	Primary Power	115V AC	5 Amp SLO-BLO
		230V AC	2-1/2 Amp SLO-BLO

PLAYFIELD FUSES

F9	Right Pop Bumper	2 Amp SLO-BLO
F10	Center Pop Bumper	2 Amp SLO-BLO
F11	Left Pop Bumper	2 Amp SLO-BLO
F12	Ball Release	1 Amp SLO-BLO
F13	Outhole, Hole	1 Amp SLO-BLO

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 POP BUMPERS	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.

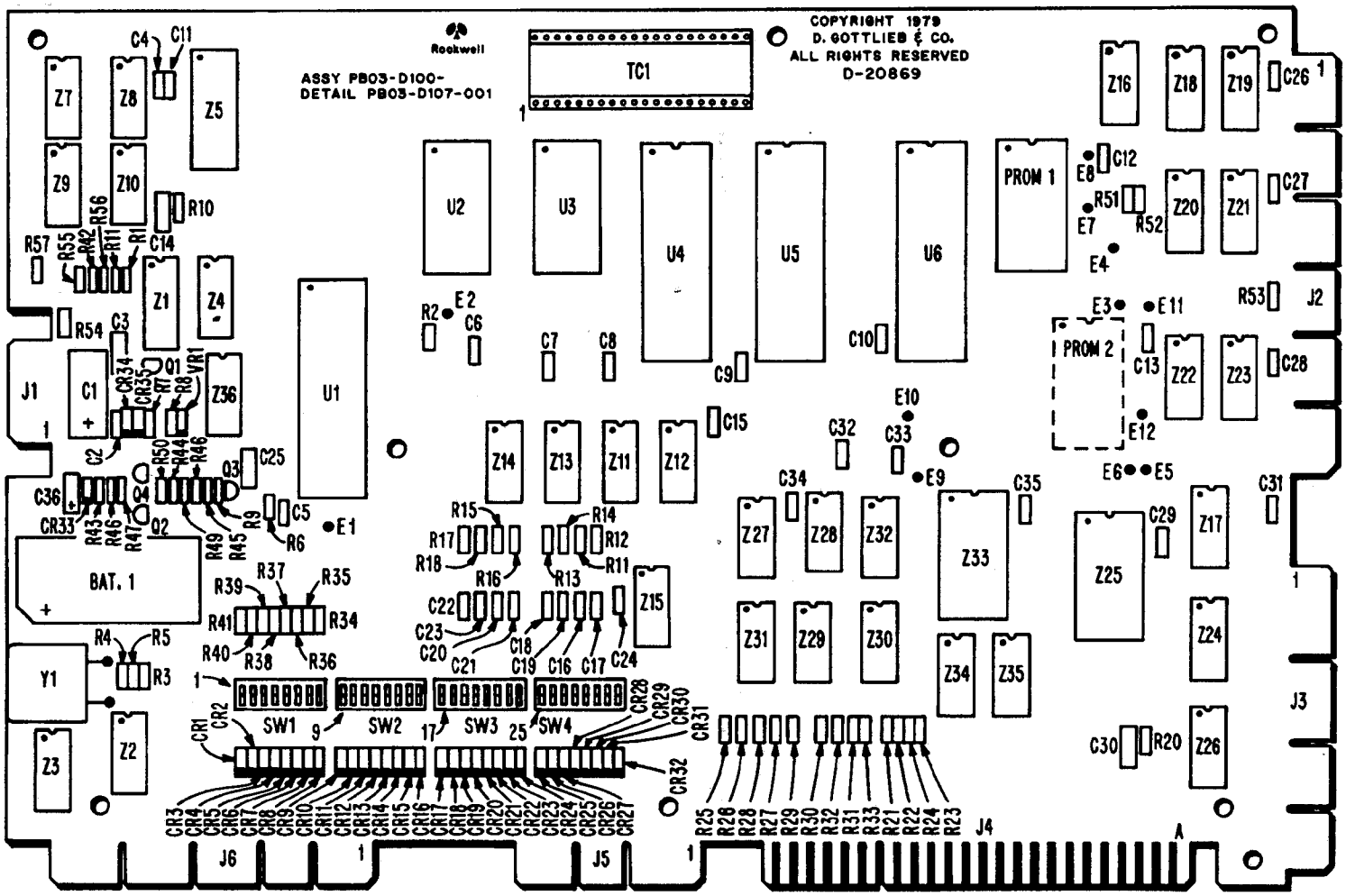
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

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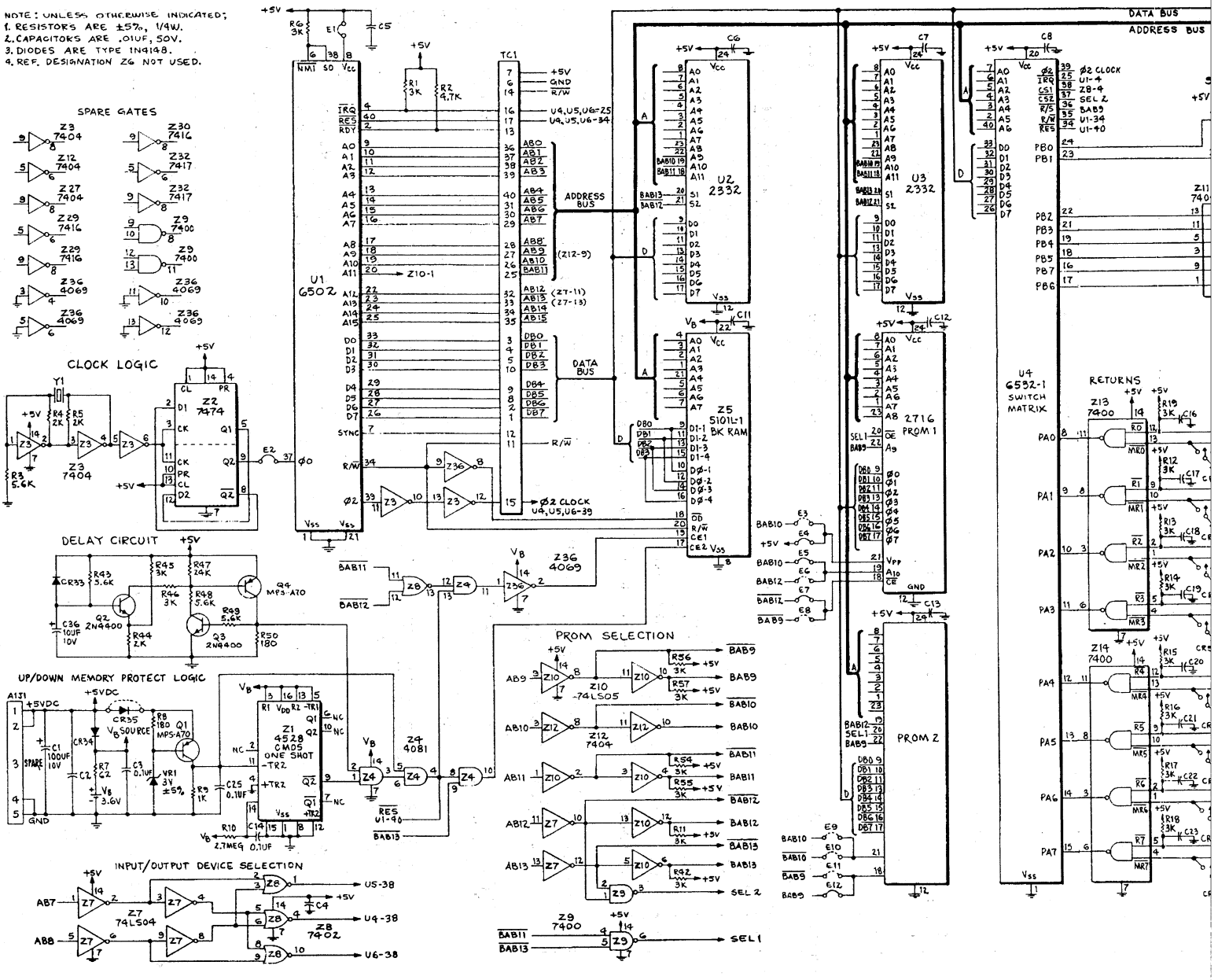
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

CONTROL BOARD (A1) COMPONENT LOCATION

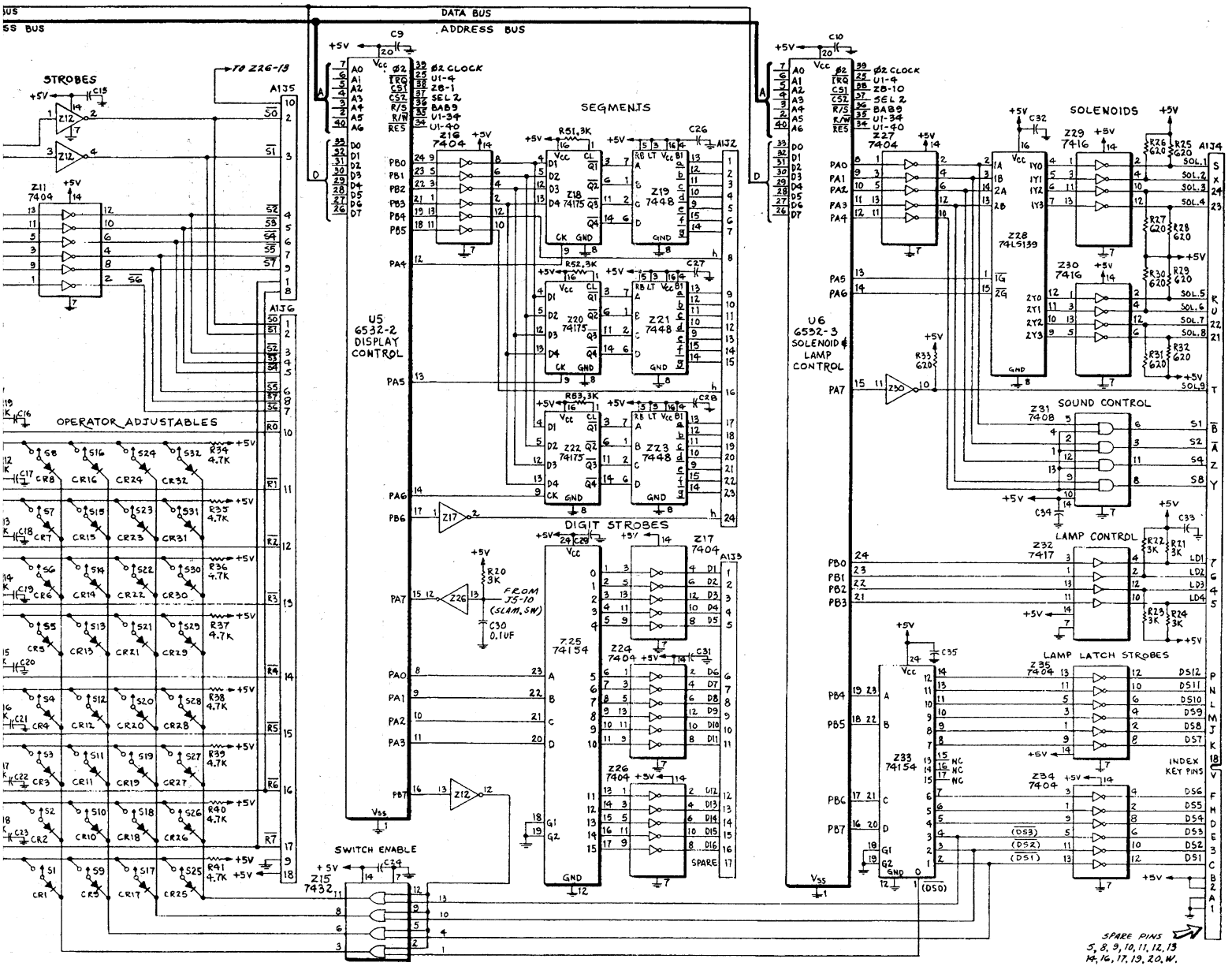


CONTROL BOARD (A1) PARTS LIST

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 5101-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.
SPARE GATES
Z3 7404
Z30 7416
Z12 7404
Z32 7417
Z27 7404
Z32 7417
Z29 7416
Z9 7400
Z29 7416
Z9 7400
Z36 4069
Z36 4069
Z36 4069
Z36 4069
U1 6502
U2 2332
U3 2332
Z5 5101L-1 8K RAM
2716 PROM 1
PROM 2
U4 6532-1 SWITCH MATRIX
RETURNS
ADDRESS BUS
DATA BUS
CLOCK LOGIC
DELAY CIRCUIT
UP/DOWN MEMORY PROTECT LOGIC
PROM SELECTION
INPUT/OUTPUT DEVICE SELECTION
Z10 74LS05
Z12 7404
Z7 74LS04
Z8 7402
Z36 4069
Z4 4081
Z9 7400
Z13 7400
Z19 7400
Z1 4528 CMOS ONE SHOT
SEL 1
SEL 2
U5-38
U4-38
U6-38

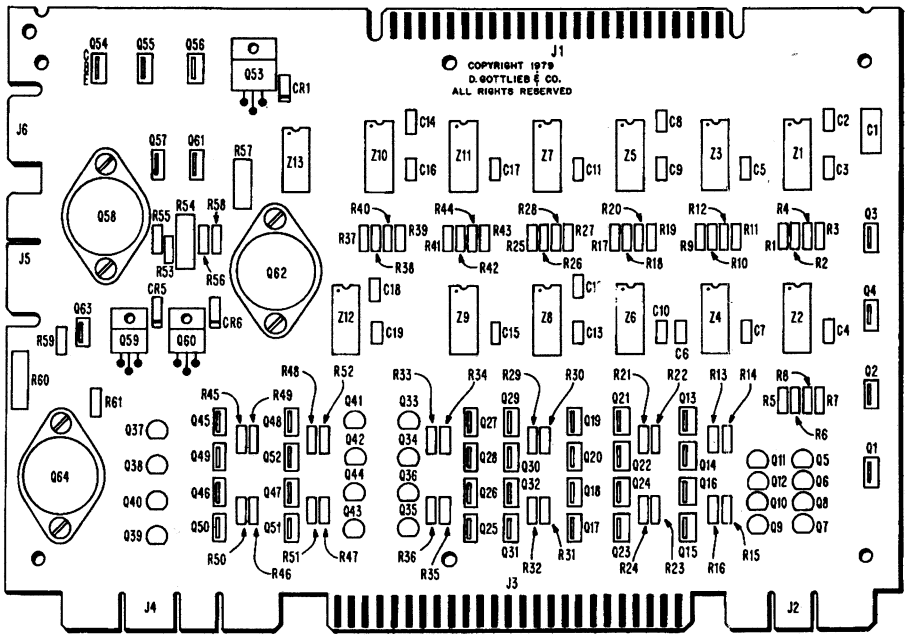
TIC DIAGRAMS, PARTS LISTS



MYLSTAR ELECTRONICS, INC.			
TITLE: CONTROL BOARD (A1)			
USED ON			
DRAWN: BWM	APPROVED	DATE: 12-20-80	E-20916

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

DRIVER BOARD (A3) COMPONENT LOCATION



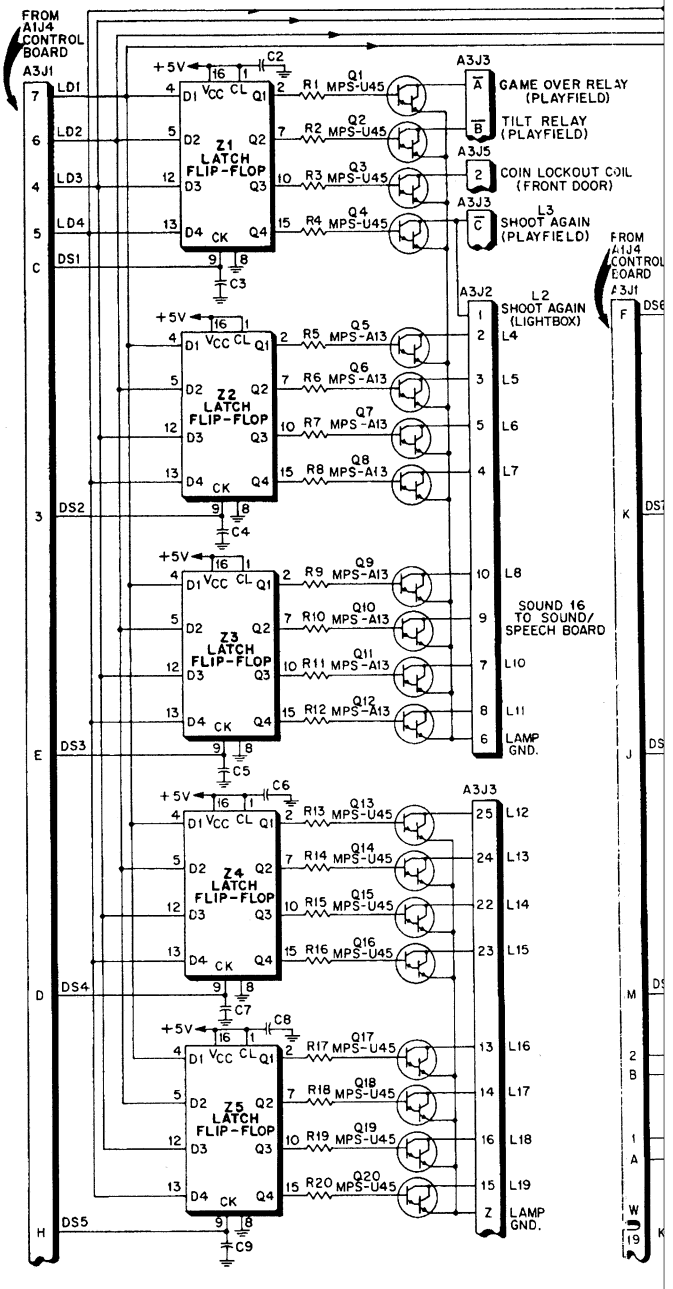
DRIVER BOARD (A3) PARTS LIST

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%, ¼W	XO-5
R54, R57, R60	Resistor, 91 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

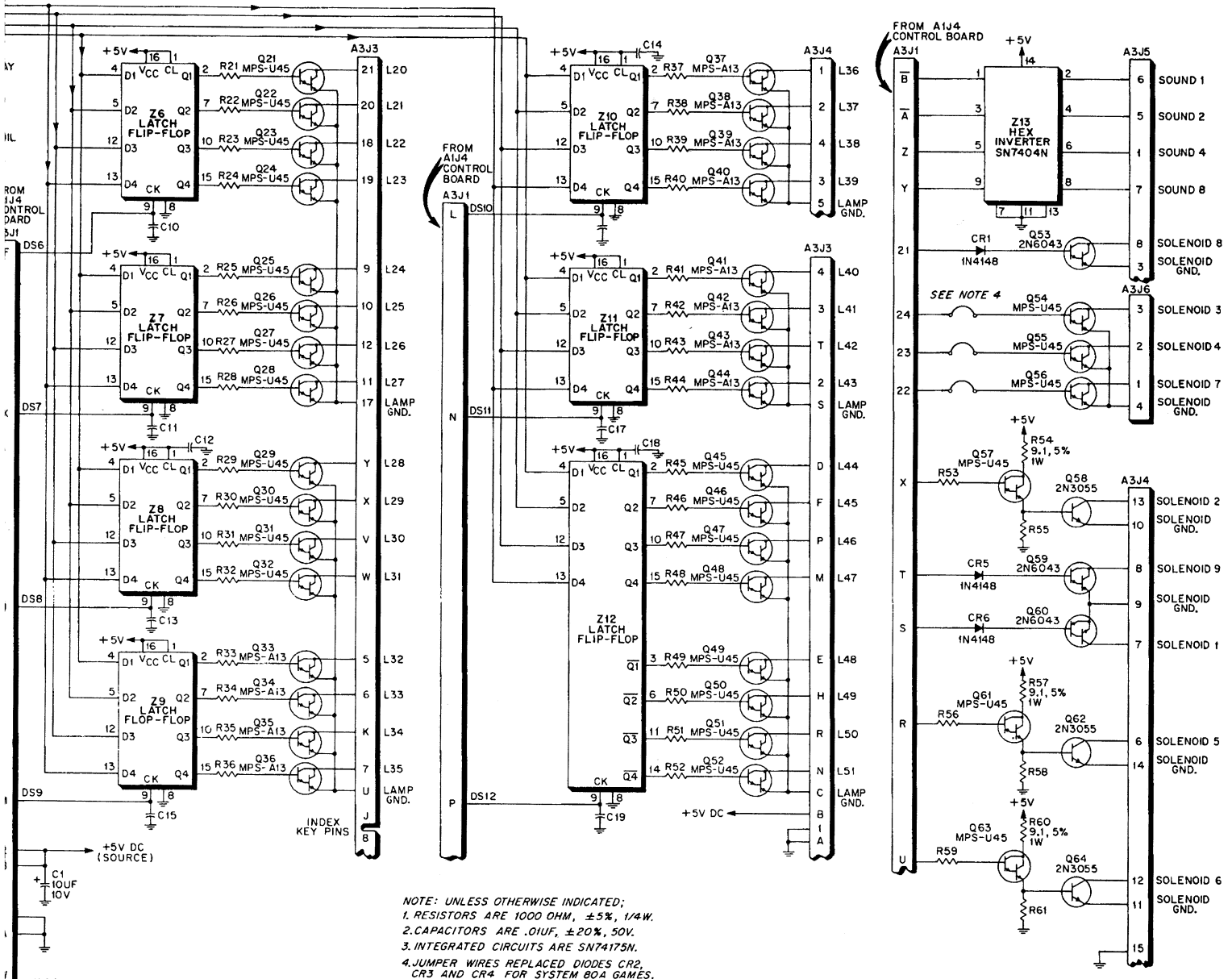
NOTE:

1. JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM 80A GAMES.

2. TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.



X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

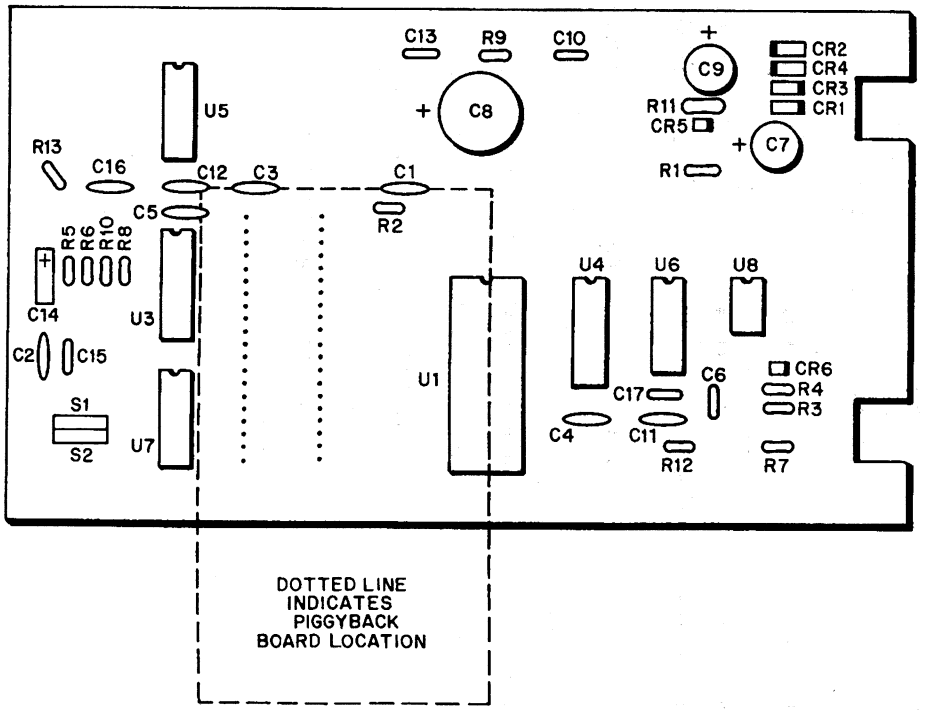


NOTE: UNLESS OTHERWISE INDICATED;
1. RESISTORS ARE 1000 OHM, ±5%, 1/4W.
2. CAPACITORS ARE .01UF, ±20%, 50V.
3. INTEGRATED CIRCUITS ARE SN74175N.
4. JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM 80A GAMES.
5. TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.

MYLSTAR ELECTRONICS, INC.			
TITLE: DRIVER BOARD (A3)			
USED ON			
DRAWN	APPROVED	DATE	E-20915
CD	RAY	12-12-80	

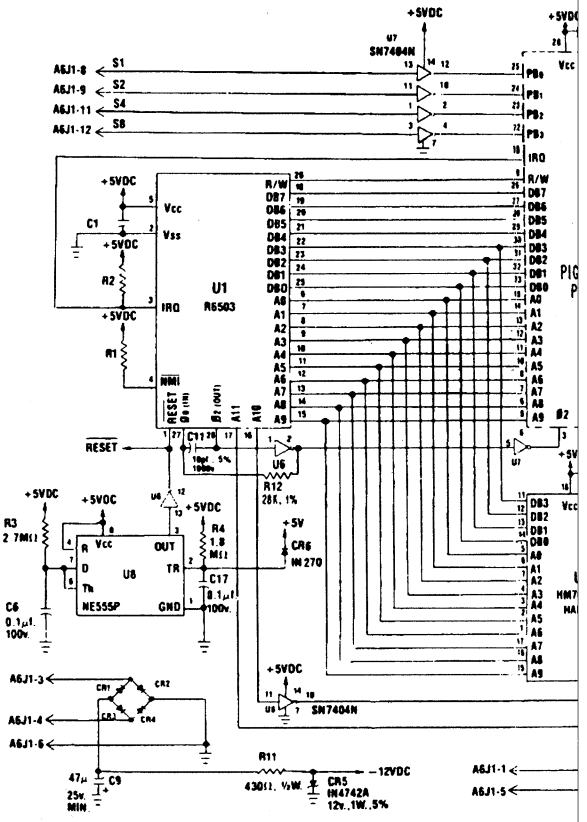
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

SOUND BOARD (A6) PARTS LIST



SOUND BOARD (A6) PARTS LIST

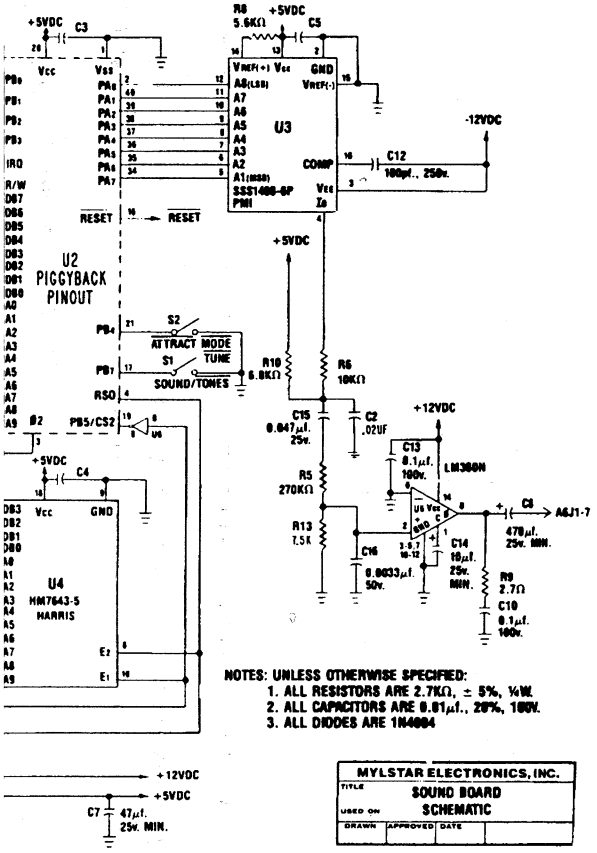
REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
	Sound Board Assembly	MA-490	C8	Capacitor, 470UF, 25V	XO-220
R1, R2, R7	Resistor, 2.7K ohm, 5%, 1/4W	XO-6	C11	Capacitor, 10PF, 1000V, 5%	XO-221
R3	Resistor, 2.7M ohm, 5%, 1/4W	XO-13	C12	Capacitor, 100PF, 250V, 20%	XO-223
R4	Resistor, 1.8M ohm, 5%, 1/4W	XO-12	C14	Capacitor, 10UF, 25V	XO-225
R5	Resistor, 270K ohm, 5%, 1/4W	XO-602	C15	Capacitor, .047UF, 25V, 20%	XO-222
R6	Resistor, 10K ohm, 5%, 1/4W	XO-18	C16	Capacitor, .0033UF, 50V, 20%	XO-224
R8	Resistor, 5.6K ohm, 5%, 1/4W	XO-19	U1	IC, R6503	XO-357
R9	Resistor, 2.7 ohm, 5%, 1/4W	XO-16	U3	IC, 1408-6P	XO-416
R10	Resistor, 6.8K ohm, 5%, 1/4W	XO-8	U4	IC, HM7643-5	PR-51
R11	Resistor, 430 ohm, 5%, 1/2W	XO-54	U5	IC, LM380N	XO-632
R12	Resistor, 28K ohm, 1%, 1/2W	XO-711	U6, U7	IC, SN7404N	XO-402
R13	Resistor, 7.5K ohm, 5%, 1/4W	XO-630	U8	IC, NE555P	XO-631
C1-C5	Capacitor, .01UF, 100V, 20%	XO-202	CR1, CR4	Diode, 1N4004	XO-254
C6, C10, C13, C17	Capacitor, 0.1UF, 100V, 20%	XO-626	CR5	Diode, Zener 12V, 5%, 1W, 1N4742A	XO-257
			CR6	Diode, 1N270	XO-265
C7, C9	Capacitor, 47UF, 25V	XO-219	S1, S2	Switch, DIP	XO-516



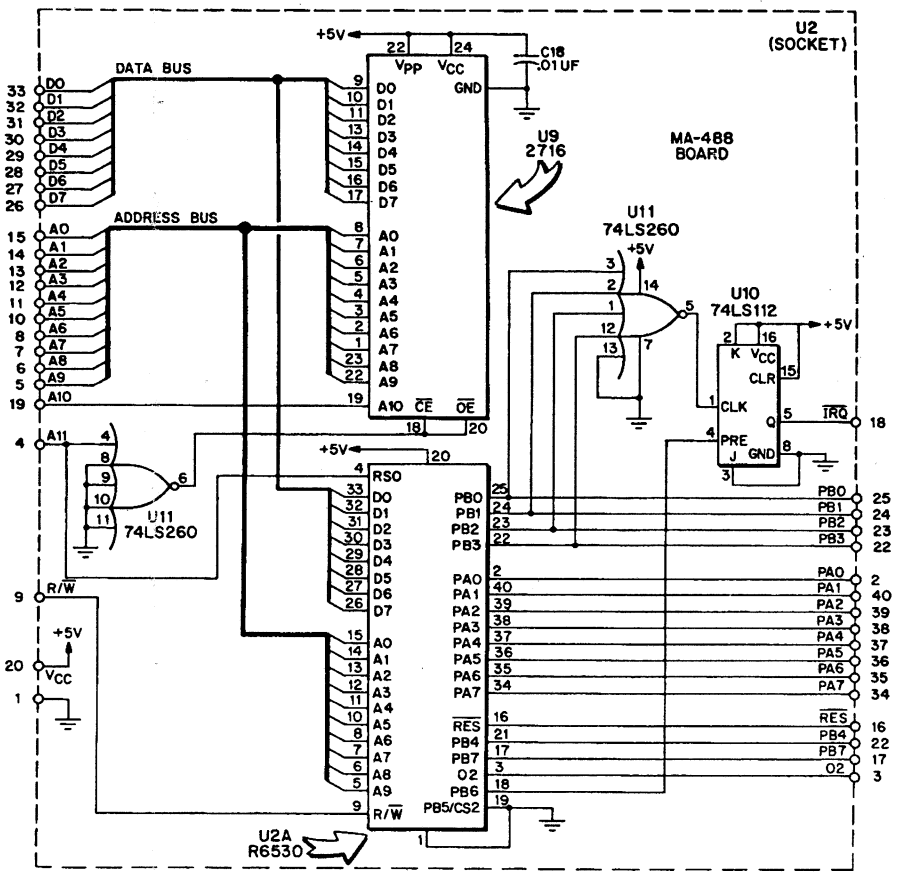
CAUTIO

THE SOUND BOARD INSTAL
IS NOT INTERCHANGEABLI
SOUND BOARD.

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

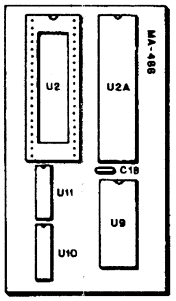


MYLSTAR ELECTRONICS, INC.			
TITLE: SOUND BOARD SCHEMATIC			
USED ON			
DRAWN	APPROVED	DATE	



MYLSTAR ELECTRONICS, INC.			
TITLE: PIGGYBACK BOARD SCHEMATIC			
USED ON			
DRAWN: PJL	APPROVED	DATE: 6-MAY-83	

PIGGYBACK BOARD COMPONENT LOCATION



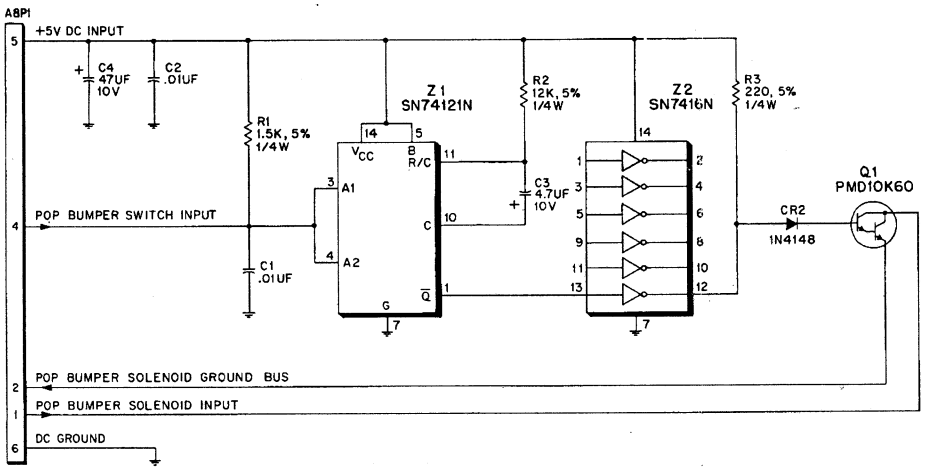
PIGGYBACK BOARD PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Piggyback Board Assembly	MA-488
C18	Capacitor, .01UF, 100V, 20%	XO-202
U2A	IC, R6530	XO-359
U9	IC, 2716 EPROM	PR-53
U10	IC, 74LS112	XO-629
U11	IC, 74LS260	XO-93
	Socket, 24 Pin	XO-529
	Socket, 40 Pin Wire Wrap	XO-710

UTION

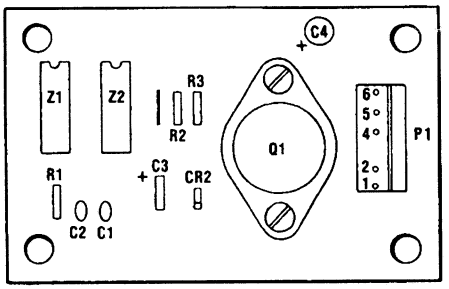
NSTALLED IN THIS GAME
CABLE WITH ANY OTHER

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



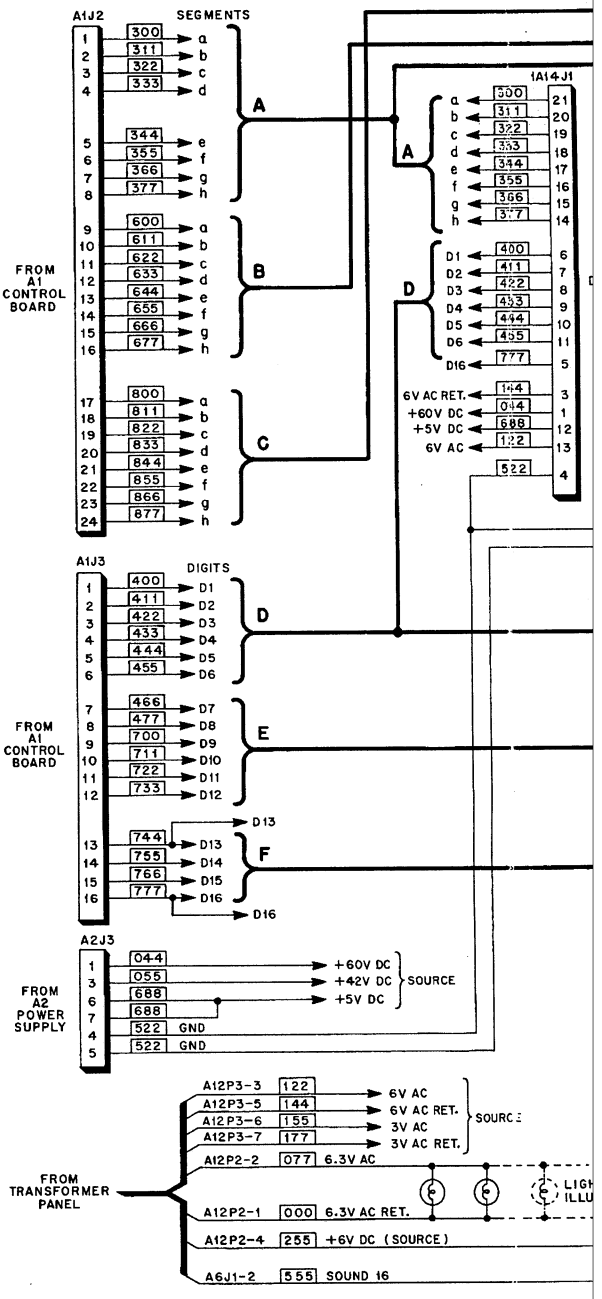
MYLSTAR ELECTRONICS, INC.			
TITLE: POP BUMPER DRIVER BOARD (A8)			
USED ON			
DRAWN	APPROVED	DATE 10-4-82	D-20923

POP BUMPER DRIVER BOARD (A8) COMPONENT LOCATION

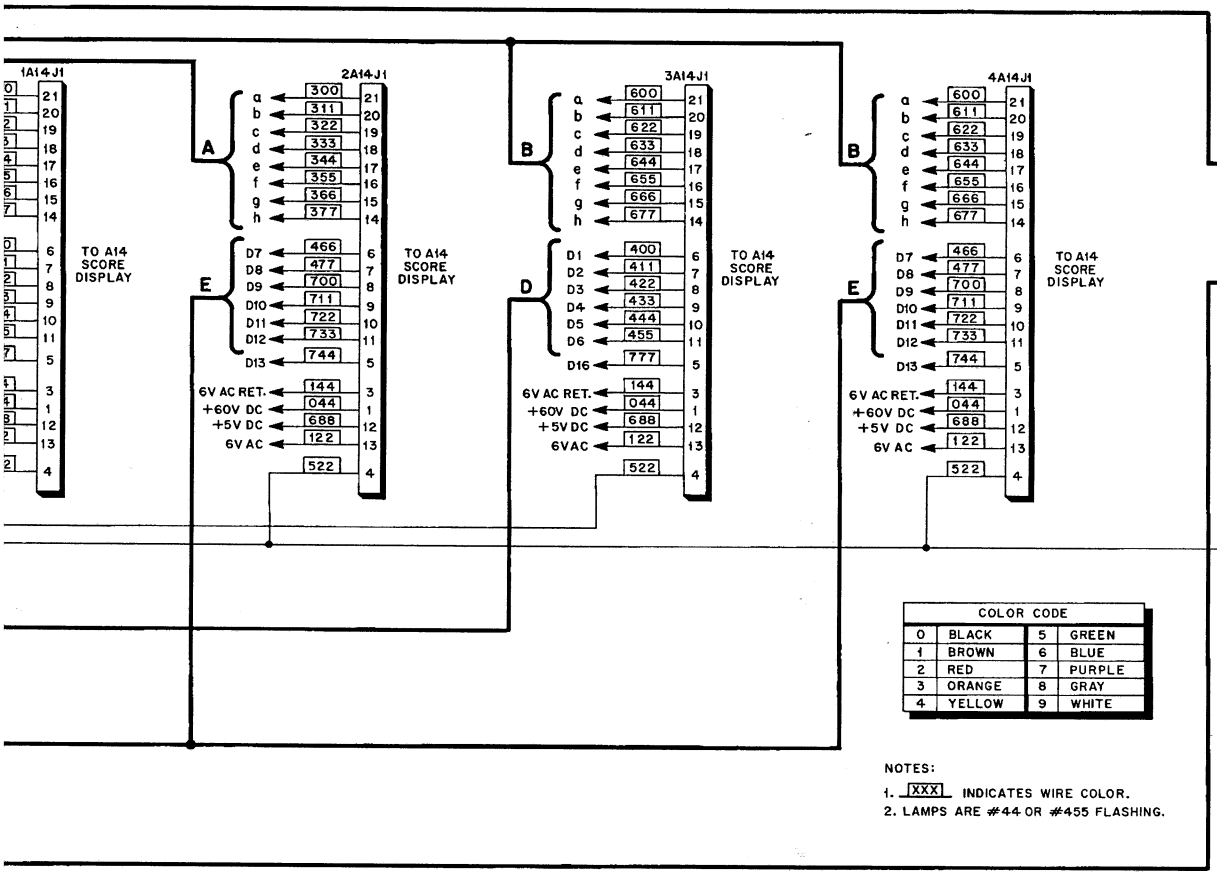


POP BUMPER DRIVER BOARD (A8) PARTS LIST

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

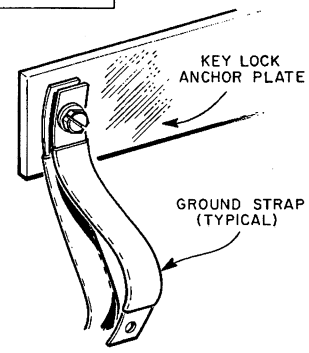


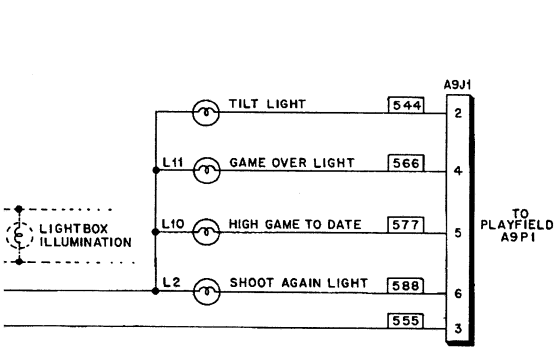
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

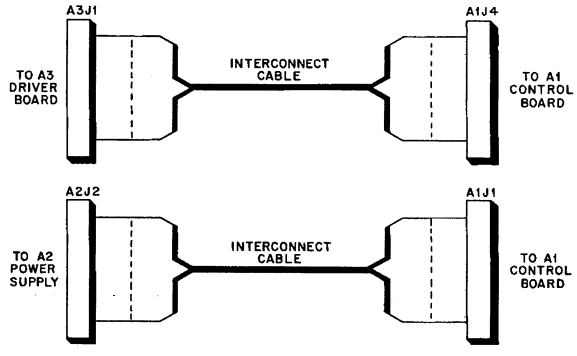


COLOR CODE			
0	BLACK	5	GREEN
1	BROWN	6	BLUE
2	RED	7	PURPLE
3	ORANGE	8	GRAY
4	YELLOW	9	WHITE

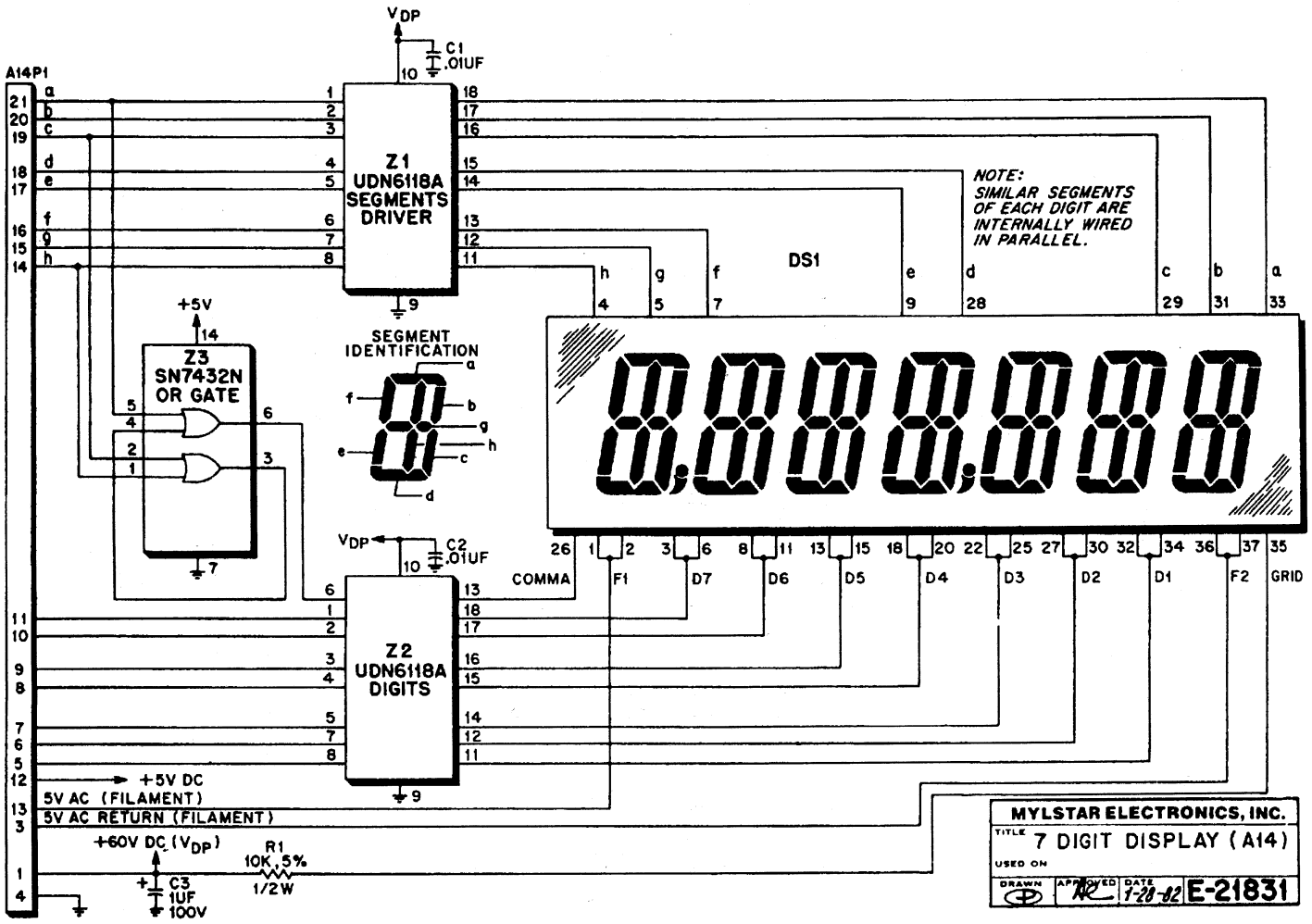
NOTES:
1. [XXX] INDICATES WIRE COLOR.
2. LAMPS ARE #44 OR #455 FLASHING.



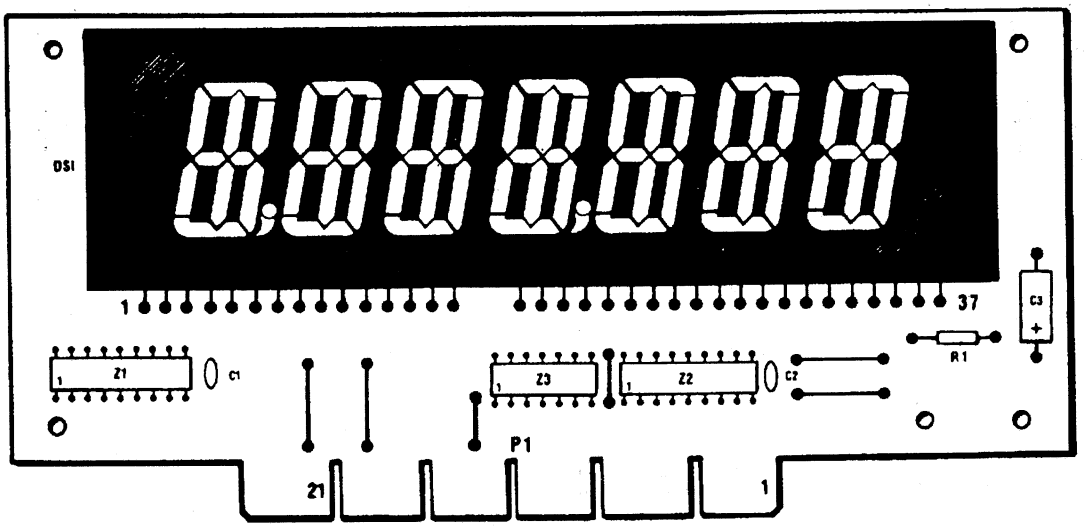




MYLSTAR ELECTRONICS, INC.			
LIGHTBOX, SCHEMATIC/ WIRING DIAGRAM			
DRAWN	APPROVED	DATE 6-MAR-84	E-23979

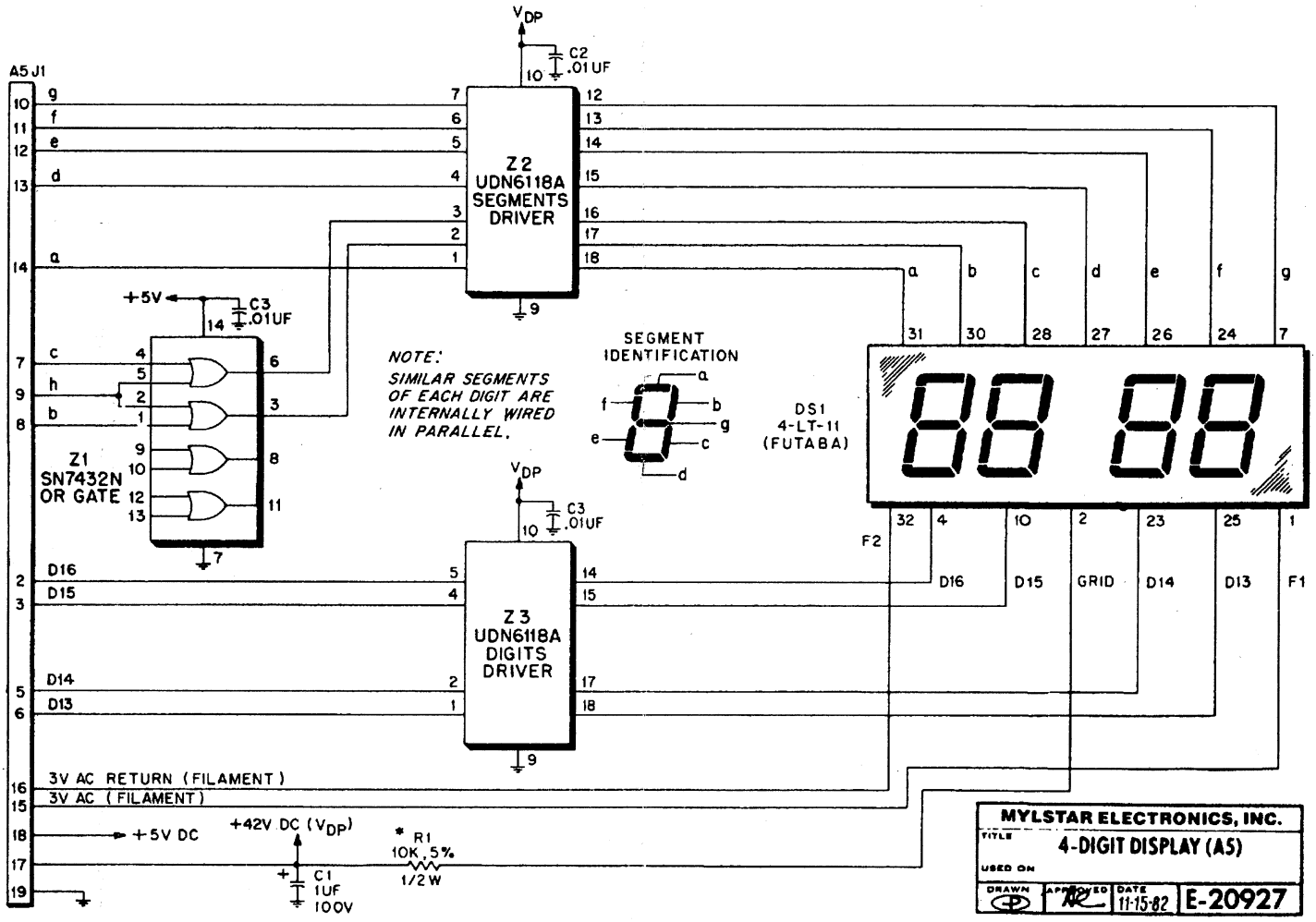


7-DIGIT DISPLAY (A14) COMPONENT LOCATION

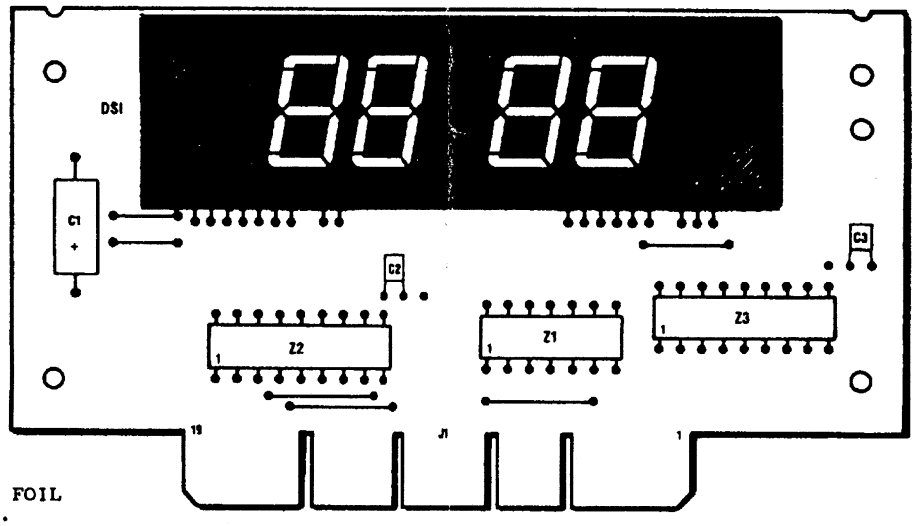


7-DIGIT DISPLAY (A14) PARTS LIST

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

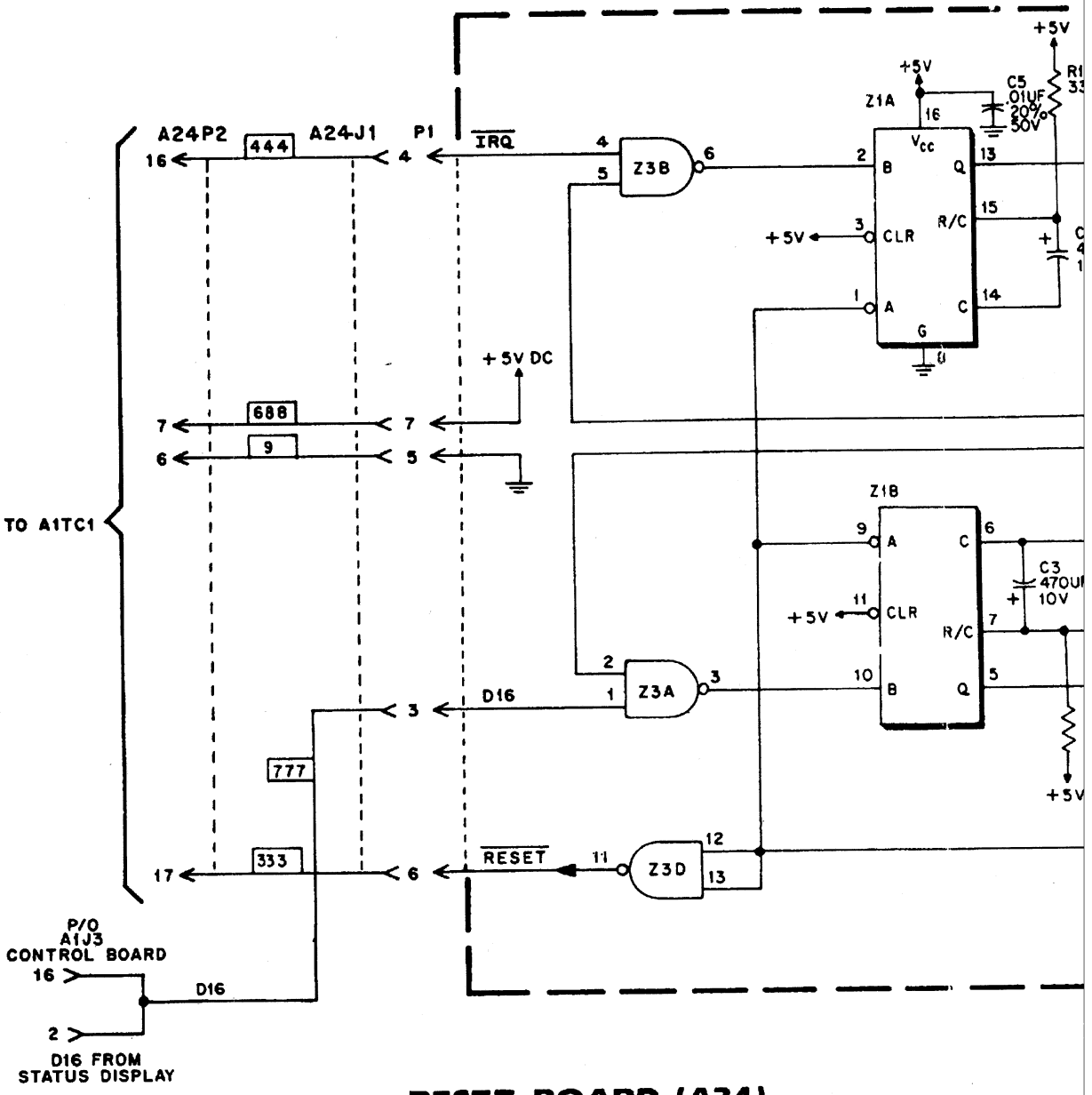


*NOTE:
R1 MOUNTED ON FOIL SIDE OF BOARD.

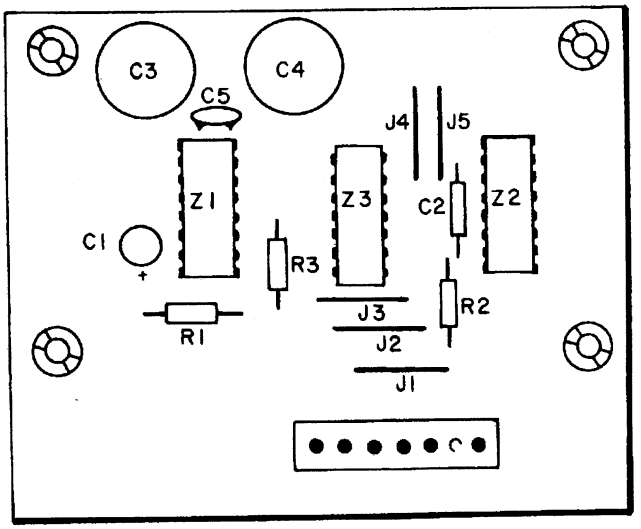
4-DIGIT DISPLAY (A5) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	4 DIGIT DISPLAY	MA-115
C1	Capacitor, 1 mfd., 100V Sprague 1E1400	XO-206
C2, C3	Capacitor, .01 mfd., 100V Kemet C320C103M1R5CA	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

X. WIRING AND SCHEMATIC DIAGRA



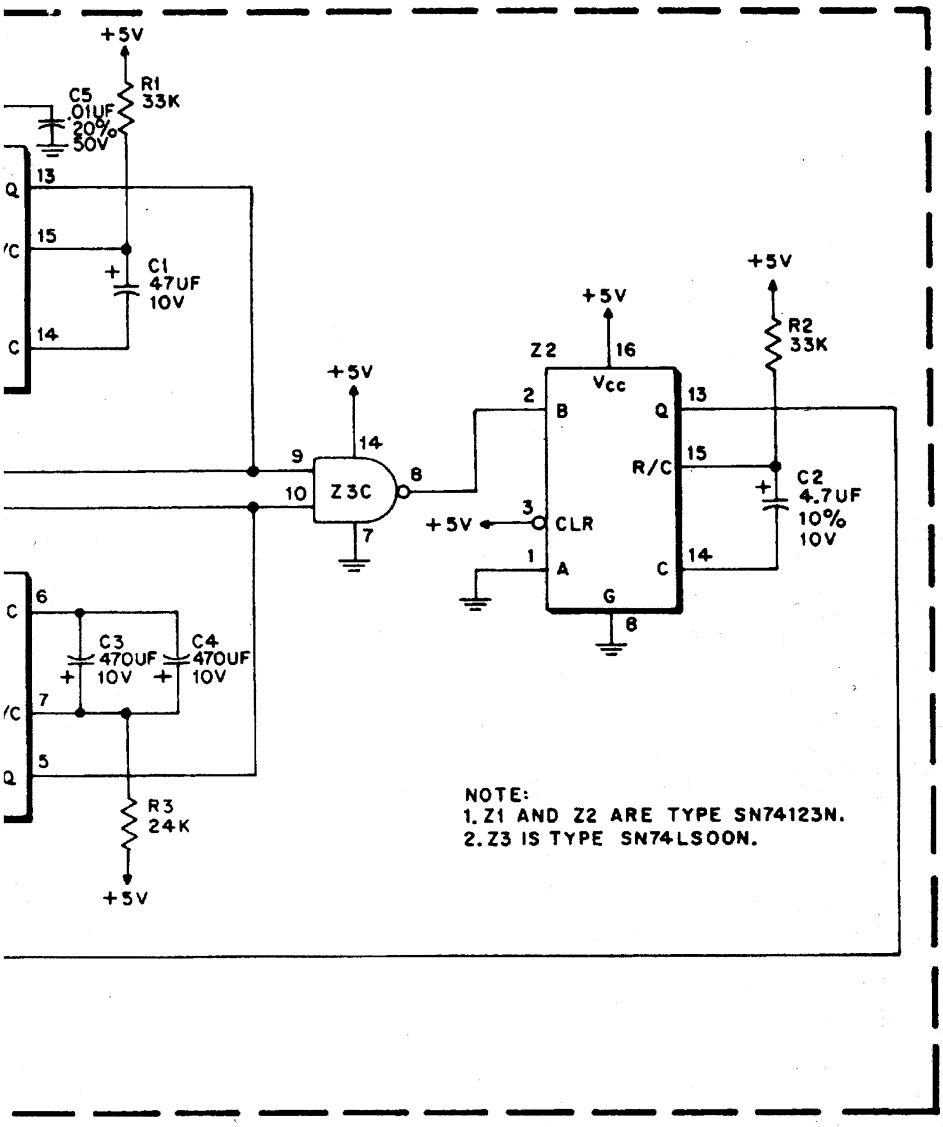
RESET BOARD (A24) COMPONENT LOCATION



RESET

REFERENC

R1, R2
R3
C1
C2
C3, C4
C5
Z1, Z2
Z3

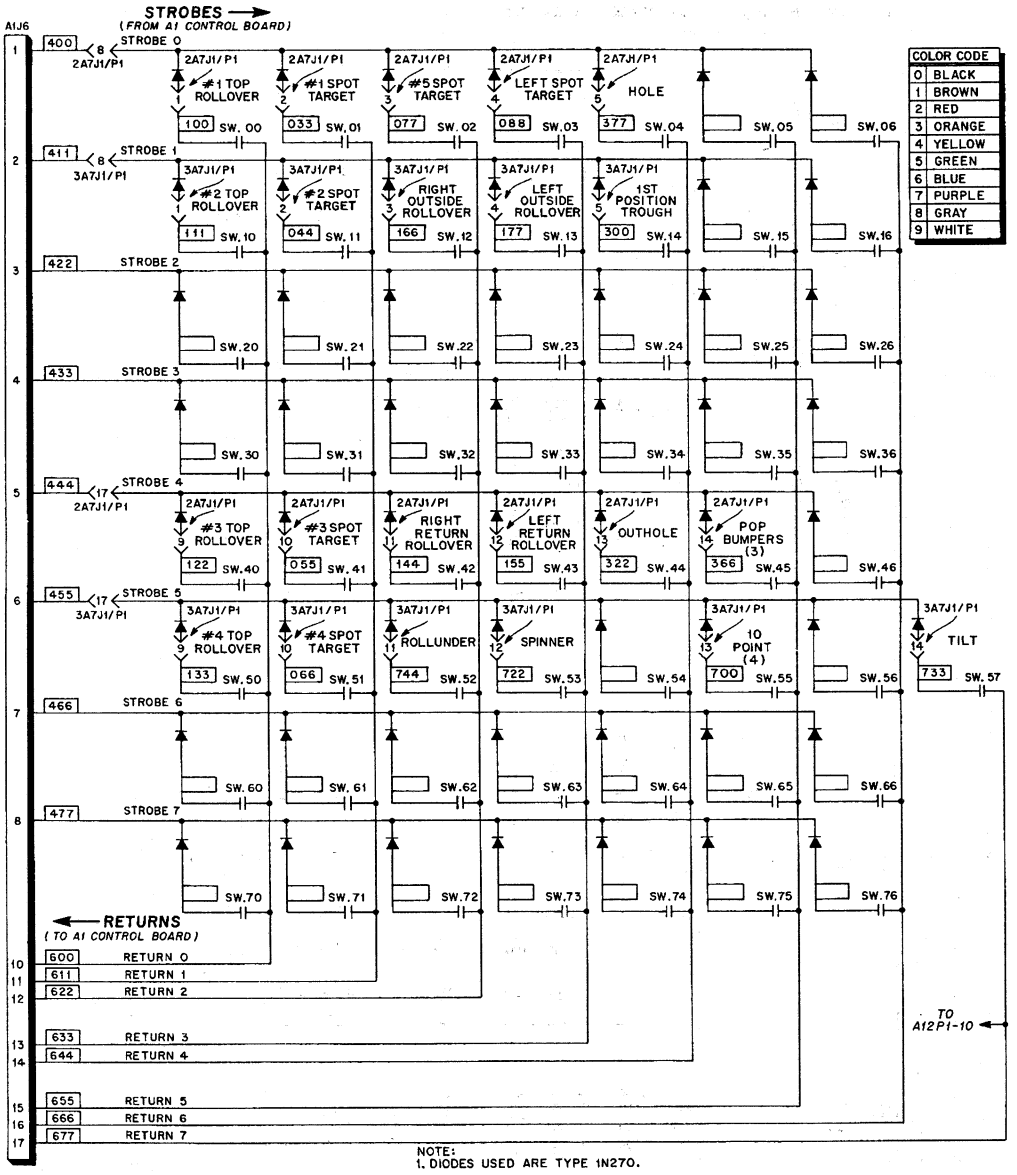


MYLSTAR ELECTRONICS, INC.			
TITLE RESET CIRCUIT BOARD			
USED ON			
DRAWN	APPROVED BAM	DATE 4-2-81	C-21063

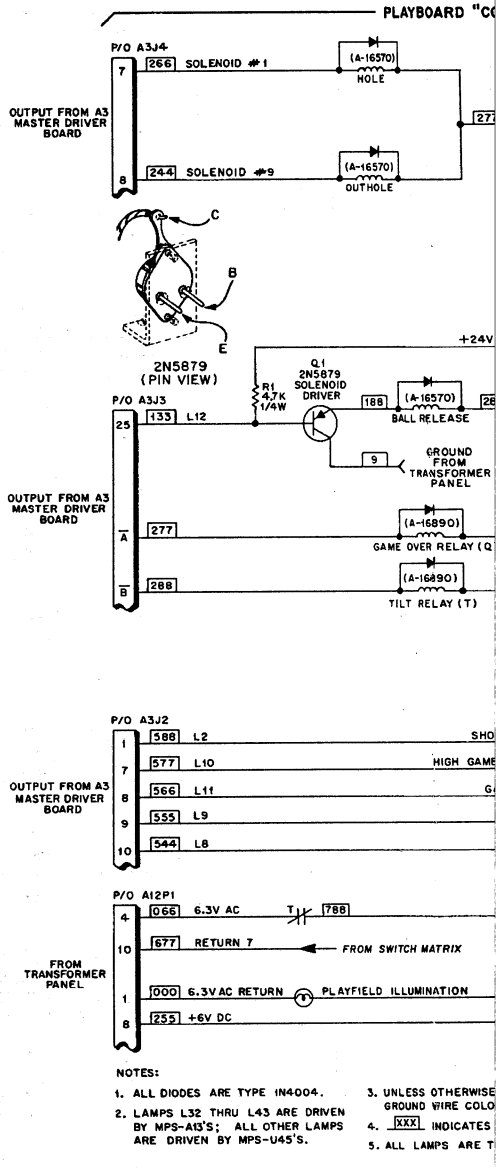
RESET BOARD (A24) PARTS LIST

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

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



NOTE:
1. DIODES USED ARE TYPE 1N270.

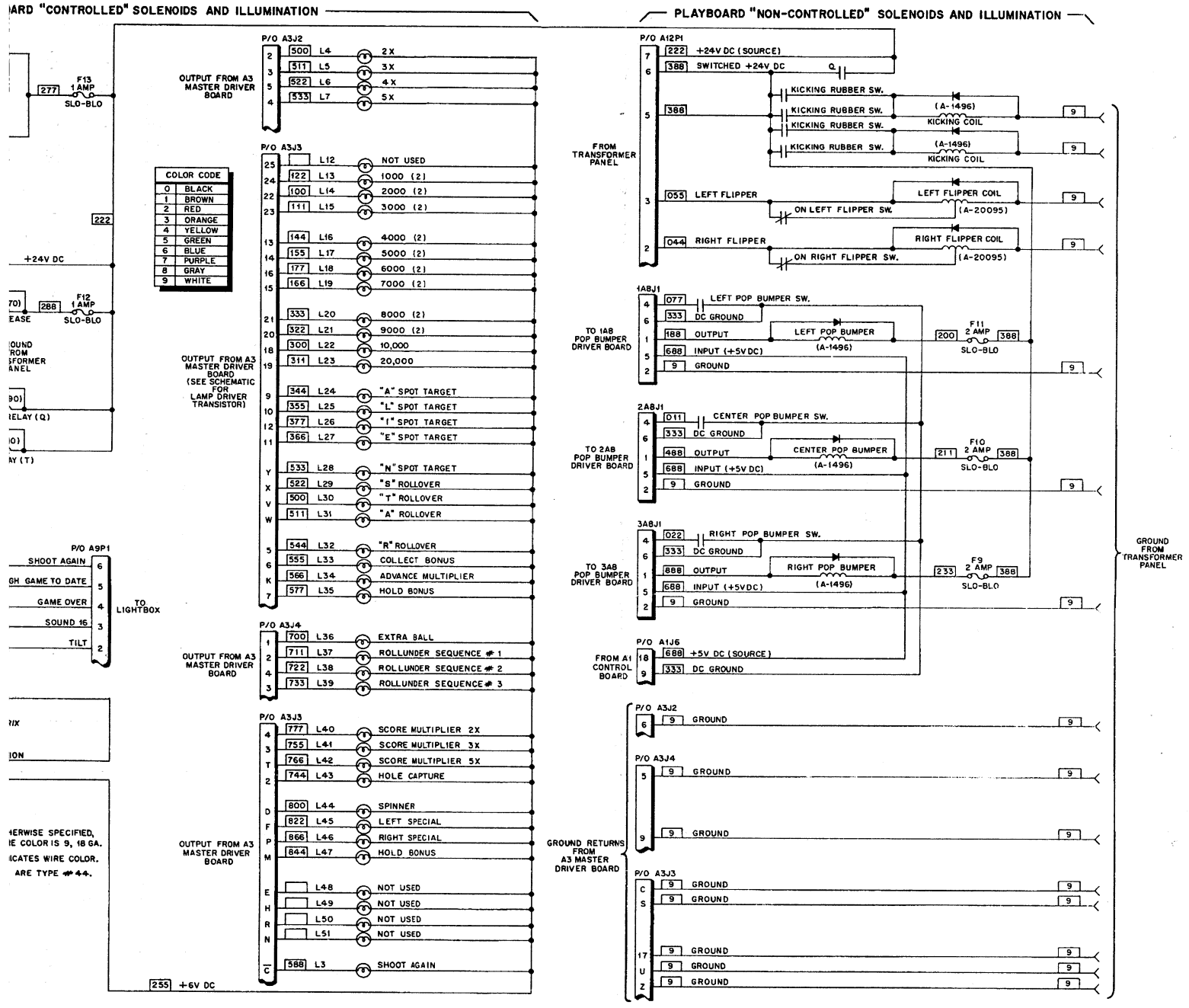


NOTES:
1. ALL DIODES ARE TYPE 1N4004.
2. LAMPS L32 THRU L43 ARE DRIVEN BY MPS-A13'S; ALL OTHER LAMPS ARE DRIVEN BY MPS-U45'S.
3. UNLESS OTHERWISE GROUND WIRE COLO
4. XXX INDICATES
5. ALL LAMPS ARE T

MYLSTAR ELECTRONICS, INC.			
TITLE: SWITCH MATRIX			
USED ON: GAME #689			
DRAWN	APPROVED	DATE 6-MAR-84	E-23977

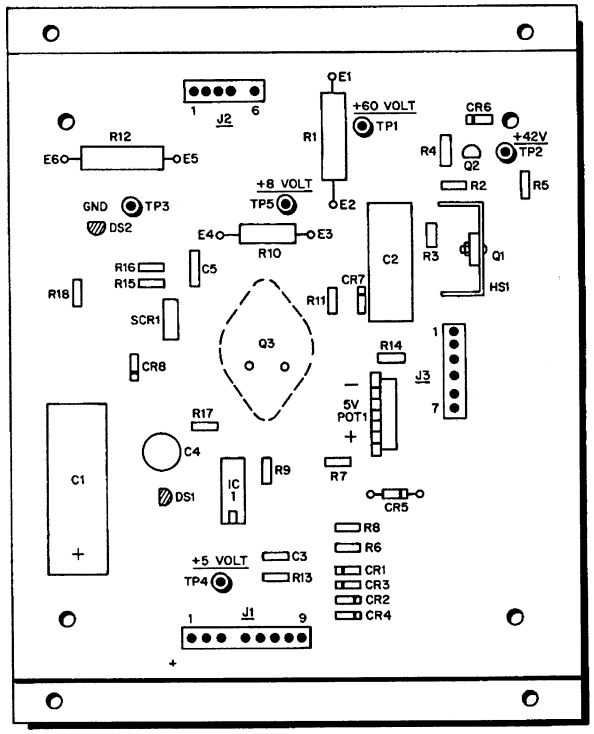
MYLSTAR ELECTRONICS, INC.			
PLAYFIELD, SOLENOIDS AND ILLUMINATION			
DRAWN	APPROVED	DATE 6-MAR-84	E-23978

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



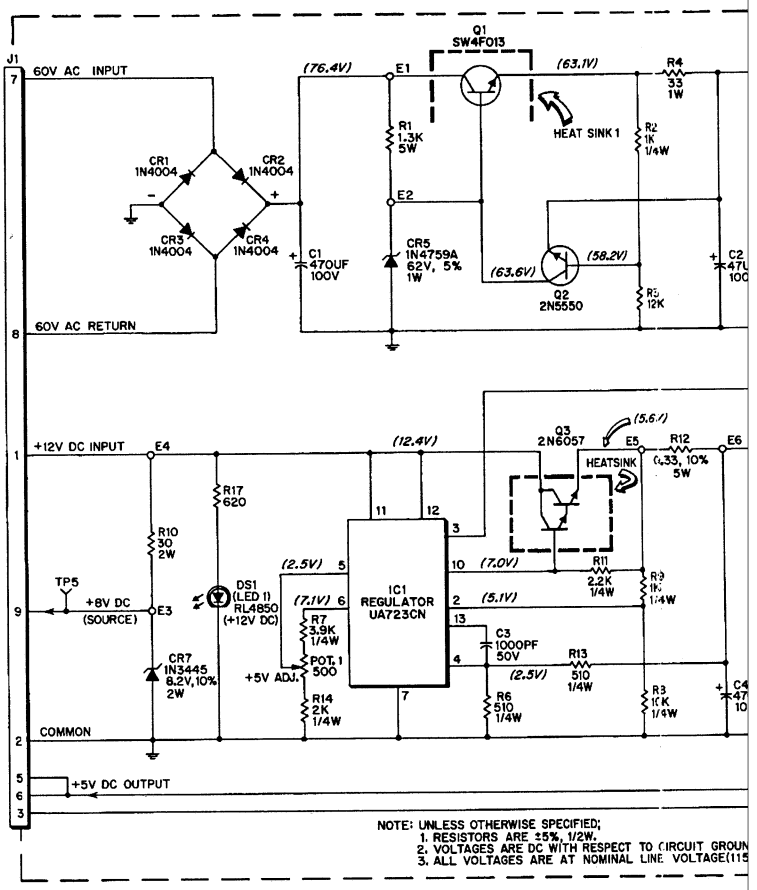
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

POWER SUPPLY (A2) COMPONENT LOCATION

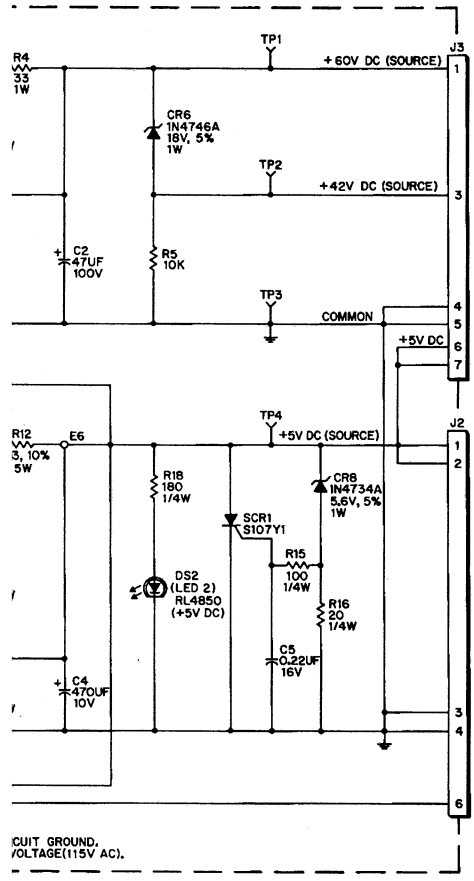


POWER SUPPLY (A2) PARTS LIST

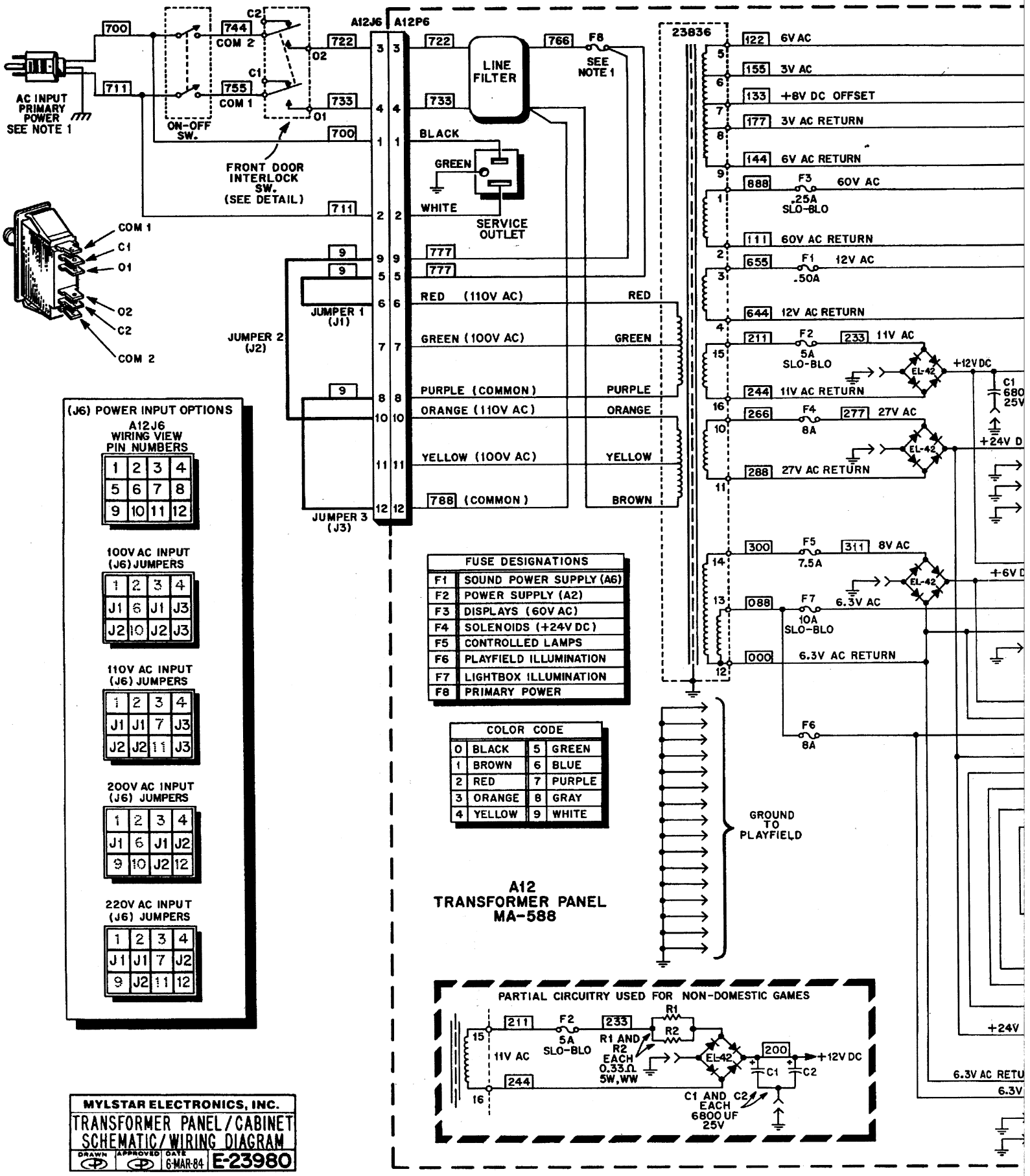
REFERENCE	DESCRIPTION	PART NUMBER
	POWER SUPPLY BOARD	MA-114
C1	Capacitor, 470 mfd., 100V	XO-233
C2	Capacitor, 47 mfd., 100V	XO-231
C3	Capacitor, 1000 Picofarad, 50V	XO-232
C4	Capacitor, 470 mfd., 10V	XO-279
C5	Capacitor, .2 mfd., +80%, -20%, 16V	XO-205
CR1-CR4	Diode 1N4004	XO-254
CR5	Diode Zener, 62V, 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, 2N6057	XO-311
R1	Resistor, 1.3K ohm, 10%, 5W	XO-156
R2, R9	Resistor, 1K ohm, 5%, ¼W	XO-5
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



SERVICE NOTES



MYLSTAR ELECTRONICS, INC.			
TITLE: POWER SUPPLY (A2)			
USED ON			
DRAWN: CP	APPROVED: BAM	DATE: 2-3-81	E-20922



(J6) POWER INPUT OPTIONS

A12J6 WIRING VIEW PIN NUMBERS

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

100V AC INPUT (J6) JUMPERS

1	2	3	4
J1	6	J1	J3
J2	10	J2	J3

110V AC INPUT (J6) JUMPERS

1	2	3	4
J1	J1	7	J3
J2	J2	11	J3

200V AC INPUT (J6) JUMPERS

1	2	3	4
J1	6	J1	J2
9	10	J2	12

220V AC INPUT (J6) JUMPERS

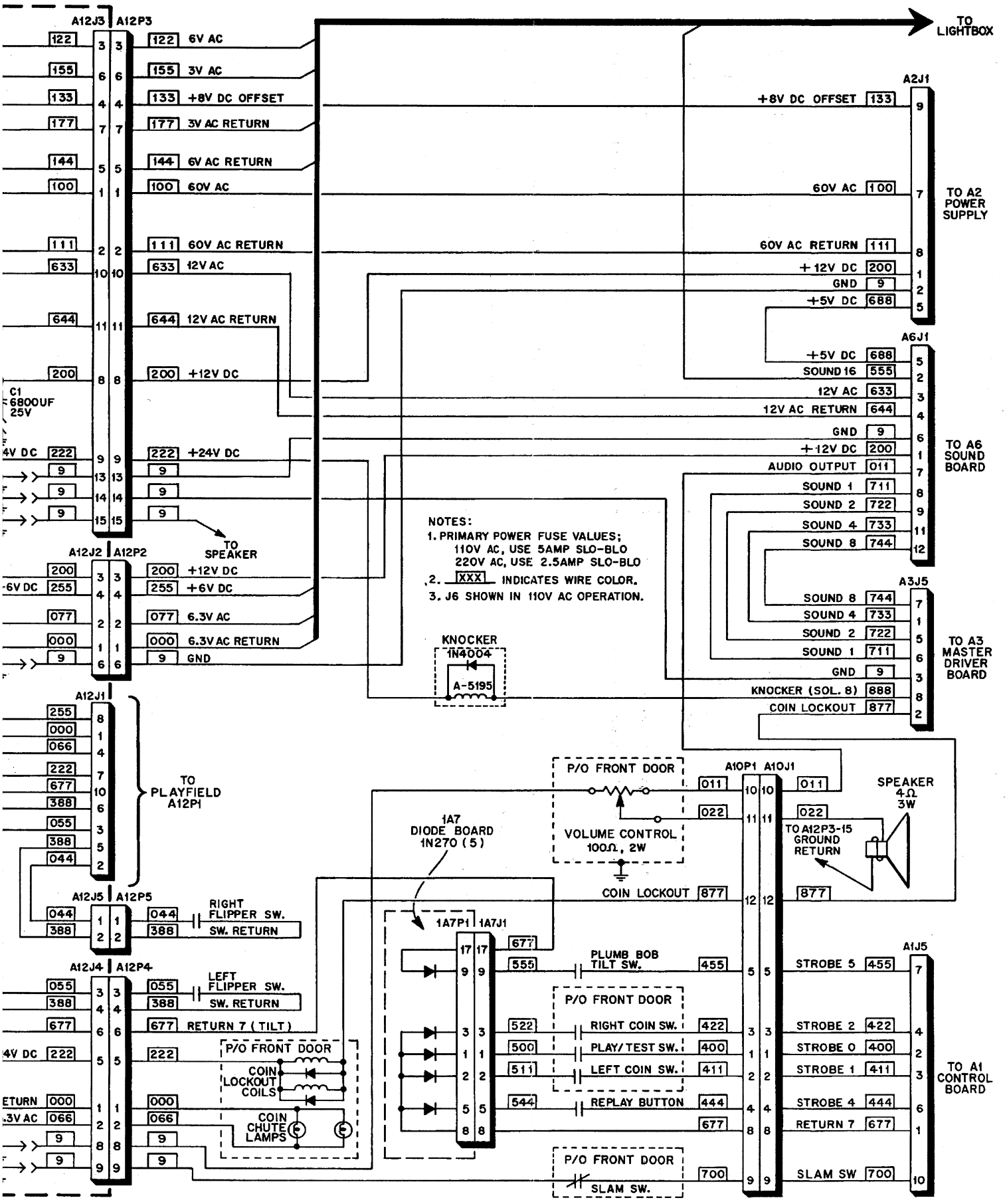
1	2	3	4
J1	J1	7	J2
9	J2	11	12

FUSE DESIGNATIONS	
F1	SOUND POWER SUPPLY (A6)
F2	POWER SUPPLY (A2)
F3	DISPLAYS (60V AC)
F4	SOLENOIDS (+24V DC)
F5	CONTROLLED LAMPS
F6	PLAYFIELD ILLUMINATION
F7	LIGHTBOX ILLUMINATION
F8	PRIMARY POWER

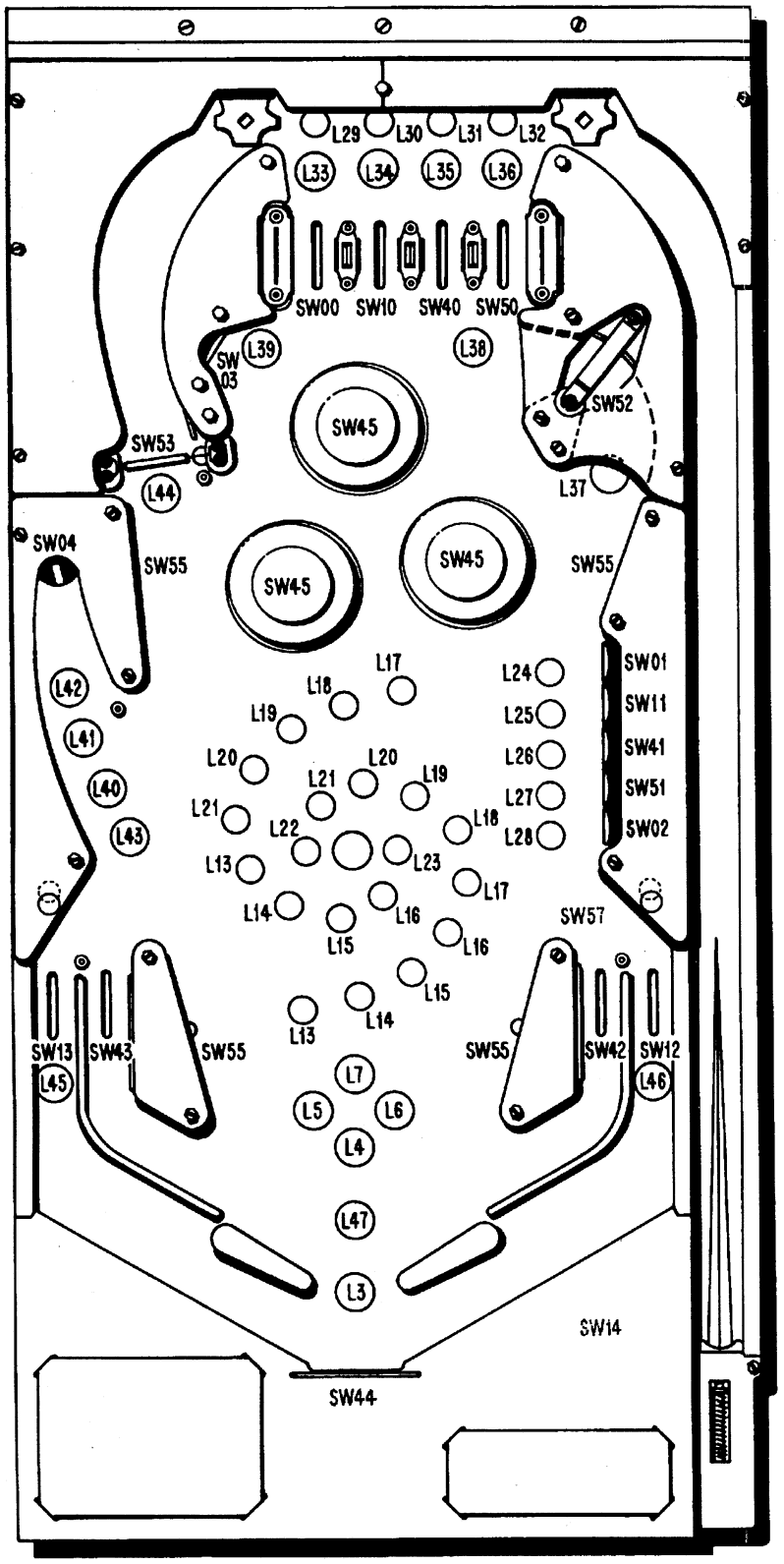
COLOR CODE			
0	BLACK	5	GREEN
1	BROWN	6	BLUE
2	RED	7	PURPLE
3	ORANGE	8	GRAY
4	YELLOW	9	WHITE

A12 TRANSFORMER PANEL MA-588

MYLSTAR ELECTRONICS, INC.			
TRANSFORMER PANEL/CABINET SCHEMATIC/WIRING DIAGRAM			
DRAWN	APPROVED	DATE	E-23980
		6-MAR-84	


A12J3 A12P3
122 6V AC
155 3V AC
133 +8V DC OFFSET
177 3V AC RETURN
144 6V AC RETURN
100 60V AC
111 60V AC RETURN
633 12V AC
644 12V AC RETURN
200 +12V DC
C1 6800UF 25V
222 +24V DC
TO SPEAKER
A12J2 A12P2
200 +12V DC
255 +6V DC
077 6.3V AC
000 6.3V AC RETURN
9 GND
A12J1
TO PLAYFIELD A12P1
A12J5 A12P5
044 RIGHT FLIPPER SW.
388 SW. RETURN
A12J4 A12P4
055 LEFT FLIPPER SW.
388 SW. RETURN
677 RETURN 7 (TILT)
P/O FRONT DOOR
COIN LOCKOUT COILS
COIN CHUTE LAMPS
TO LIGHTBOX
A2J1
+8V DC OFFSET 133
60V AC 100
60V AC RETURN 111
+12V DC 200
GND 9
+5V DC 688
TO A2 POWER SUPPLY
A6J1
+5V DC 688
SOUND 16 555
12V AC 633
12V AC RETURN 644
GND 9
+12V DC 200
AUDIO OUTPUT 011
SOUND 1 711
SOUND 2 722
SOUND 4 733
SOUND 8 744
TO A6 SOUND BOARD
A3J5
SOUND 8 744
SOUND 4 733
SOUND 2 722
SOUND 1 711
GND 9
KNOCKER (SOL. 8) 888
COIN LOCKOUT 877
TO A3 MASTER DRIVER BOARD
NOTES:
1. PRIMARY POWER FUSE VALUES;
110V AC, USE 5AMP SLO-BLO
220V AC, USE 2.5AMP SLO-BLO
2. XXX INDICATES WIRE COLOR.
3. J6 SHOWN IN 110V AC OPERATION.
KNOCKER
1N4004
A-5195
1A7 DIODE BOARD 1N270 (5)
1A7P1 1A7J1
P/O FRONT DOOR
VOLUME CONTROL 100Ω, 2W
A10P1 A10J1
011
022
SPEAKER 4Ω 3W
TO A12P3-15 GROUND RETURN
COIN LOCKOUT 877
PLUMB BOB TILT SW. 455
P/O FRONT DOOR
522 RIGHT COIN SW. 422
500 PLAY/TEST SW. 400
511 LEFT COIN SW. 411
544 REPLAY BUTTON 444
677
P/O FRONT DOOR
SLAM SW. 700
A1J5
STROBE 5 455
STROBE 2 422
STROBE 0 400
STROBE 1 411
STROBE 4 444
RETURN 7 677
SLAM SW 700
TO A1 CONTROL BOARD

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



PLAYBOARD SWITCH AND LAMP ASSIGNMENTS

LAMP NO.	LAMP ASSIGNMENT
L3	Shoot Again
L4	2X
L5	3X
L6	4X
L7	5X
L13	1000 (2)
L14	2000 (2)
L15	3000 (2)
L16	4000 (2)
L17	5000 (2)
L18	6000 (2)
L19	7000 (2)
L20	8000 (2)
L21	9000 (2)
L22	10,000
L23	20,000
L24	"A" Spot Target
L25	"L" Spot Target
L26	"I" Spot Target
L27	"E" Spot Target
L28	"N" Spot Target
L29	"S" Rollover
L30	"T" Rollover
L31	"A" Rollover
L32	"R" Rollover
L33	Collect Bonus
L34	Advance Multiplier
L35	Hold Bonus
L36	Extra Ball
L37	Rollunder Sequence #1
L38	Rollunder Sequence #2
L39	Rollunder Sequence #3
L40	Score Multiplier 2X
L41	Score Multiplier 3X
L42	Score Multiplier 5X
L43	Hole Capture
L44	Spinner
L45	Left Special
L46	Right Special
L47	Hold Bonus

SWITCH MATRIX NO.	SWITCH ASSIGNMENT	PART NO.
00	#1 Top Rollover	18892
01	#1 Spot Target	20867
02	#5 Spot Target	20867
03	Left Spot Target	20867
04	Hole	19857
10	#2 Top Rollover	18892
11	#2 Spot Target	20867
12	Right Outside Rollover	18892
13	Left Outside Rollover	18892
14	1st Position Trough	18892
40	#3 Top Rollover	18892
41	#3 Spot Target	20867
42	Right Return Rollover	18892
43	Left Return Rollover	18892
44	Outhole	18688
45	Pop Bumpers	
	Left	21353
	Center	21352
	Right	21352
50	#4 Top Rollover	18892
51	#4 Spot Target	20867
52	Rollunder	22672
53	Spinner	19353
55	10 Point (4)	22224
57	Tilt	9141

XI. PARTS INFORMATION

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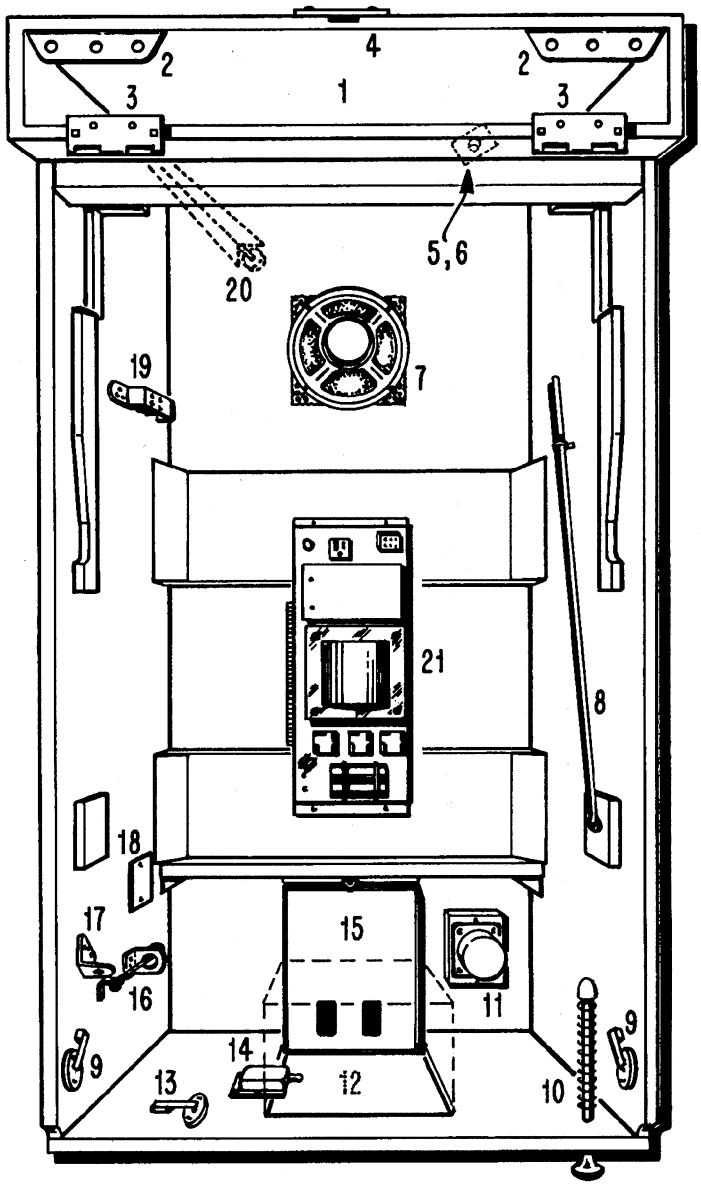
CABINET PARTS.....45

PLAYBOARD PARTS.....46

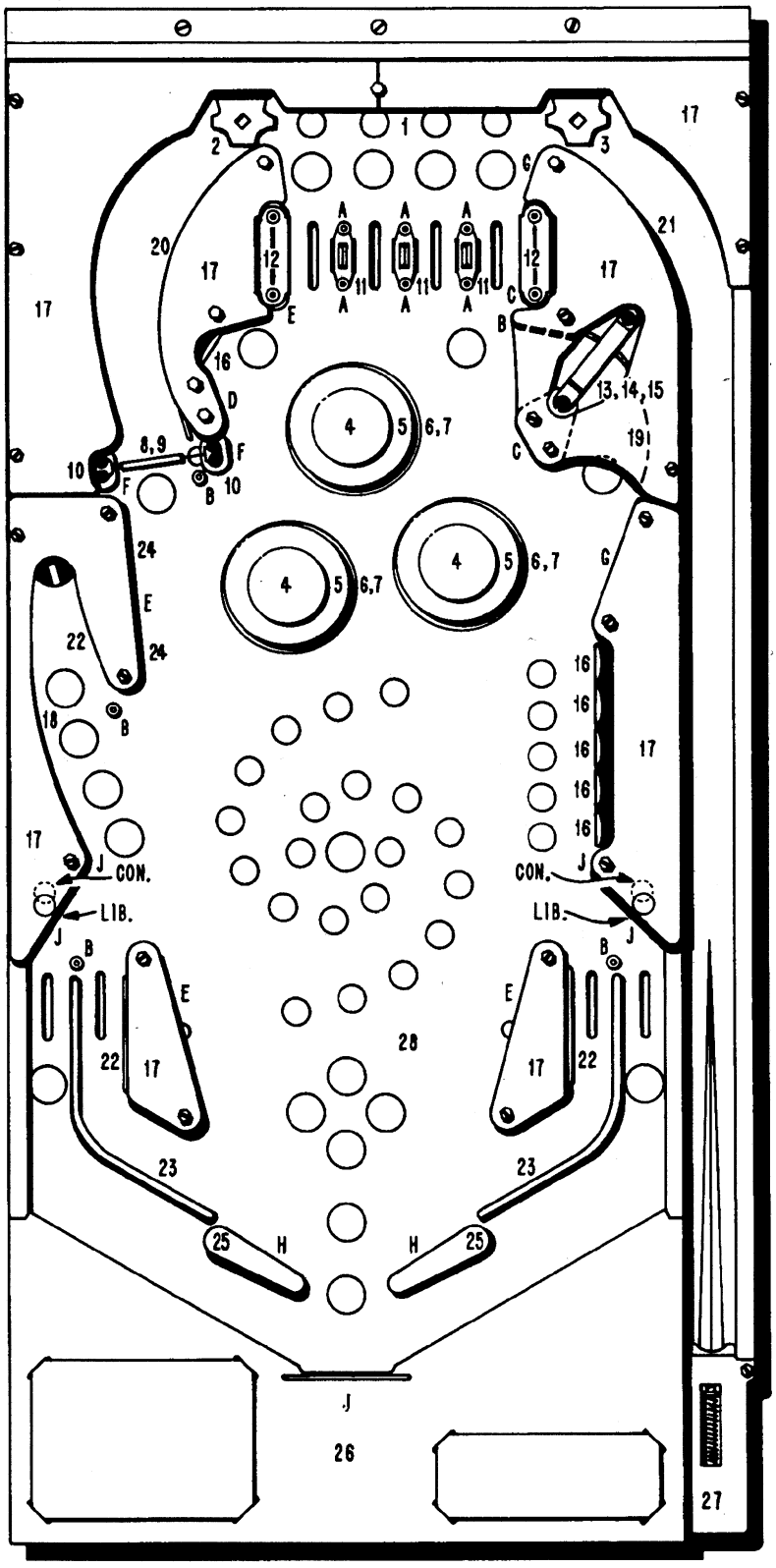
XI. PARTS INFORMATION

CABINET PARTS

ITEM	DESCRIPTION	PART NO.
1.	Cabinet (Specify Game)	
2.	Lightbox Mounting Bracket (2)	19916
3.	Butt Hinge, (Shown For Reference Only, P/O Lightbox Assy.) (2)	22734
4.	Latch Bar	22733
	Latch Assembly (P/O Lightbox)	21969
5.	Cable Assembly, Domestic (High Voltage)	MA-589
6.	Line Cord (Domestic)	23365
	Line Cord Cover Plate	21955
7.	Speaker, 4 Ohm, 3W	EL-83
	Speaker Guard	20931
8.	Prop Stick, Playfield	23940
9.	Flipper Switch Assembly (2)	17838
10.	Ball Shooter Assembly	8835
11.	Switch,On/Off	23799
	Switch Plate	18769
	Switch Housing	15163
12.	Front Door Assembly (Universal)	MA-590
	Bar, Locking	FD-10
	Cable Assembly	MA-597
	Cam Locking Assembly	FD-9
	Coil, Coin Lockout (2)	FD-11
	Control, Volume, 100 Ohm, 2W	XO-104
	Diode, 1N4004 (2)	XO-254
	Insert, Domestic (2)	FD-5
	Lamp, 6V Wedge (2)	FD-2
	Lock and Key Assembly with Hardware	FD-8
	Socket, Lamp Wedge (2)	FD-3
	Spring, Torsion	FD-4
	Switch, Coin (2)	FD-6
	Wire, Switch (2)	FD-7
	Switch, Slam	FD-12
13.	Replay Switch Assembly	18092
14.	Interlock Switch	EL-66
	Interlock Switch Cover	21888
15.	Cashbox	23879
	Cashbox Cover	23880
	Cashbox Lockeye Assembly	23878
16.	Plumb Bob Tilt Switch Assembly	
	Strike Plate	358
	Carbon, Tilt Bob	MH-30
	Rod, Tilt	357
17.	Locator Bracket	18578
18.	Diode Board Assembly	23839
	Diode, 1N270 (5)	XO-265
19.	Knocker Assembly	MA-12
20.	Cabinet Leg (4)	4337
	Leg Bolt (8)	3775
	3" Leg Adjuster (4)	MH-21
21.	Transformer Panel Assembly	MA-588
	Bridge Rectifier (3)	EL-42
	Cable Assembly (Secondary)	MA-596
	Capacitor, 6800UF, 25V	XO-774
	Filter, Line	EL-50
	Fuse Block (7 Pos.)	EL-11
	Fuse Cover (7 Pos.)	23805
	Fuse Holder (F8)	EL-78
	Fuses	
	F1, .50 Amp	EL-28
	F2, 5 Amp, SLO-BLO	EL-8
	F3, .25 Amp, SLO-BLO	EL-5
	F4, 8 Amp	EL-30
	F5, 7.5 Amp	EL-22
	F6, 8 Amp	EL-30
	F7, 10 Amp, SLO-BLO	EL-36
	F8, 5 Amp, SLO-BLO (110V AC)	EL-8
	F8, 2.5 Amp, SLO-BLO (220V AC)	EL-21
	Ground Bus Connector (3)	23833
	Outlet, Service	18133
	Resistor, 0.33 Ohm, 10% 5W, Wire-Wound	XO-154
	Transformer	23836



XI. PARTS INFORMATION



PLAYBOARD INFORMATION

RUBBER RINGS

ITEM	DESCRIPTION	PART NO.
A	Mini-Post (6)	15705
B	Mini-Post (5)	14793
C	1" (1)	10219
D	1/2" (1)	10218
E	2-1/2" (4)	10222
F	Siamese (2)	17493
G	2" (2)	10221
H	Red (2)	13151
J	5/16" (5)	10217

PARTS LIST

ITEM	DESCRIPTION	PART NO.
1.	Flat Rail	23834
2.	Arch Rebound Assy.	19646
3.	Arch Gate Assy.	19645
4.	Pop Bumper Cap, White (3)	21298
5.	Pop Bumper Body, White (3)	10435Z
6.	Pop Bumper Skirt, White (3)	10433Z
7.	Pop Bumper Trim Platter (3)	8246
8.	Swinging Target	20388
9.	Swinging Target Switch Rod	20406
10.	"L" Bracket (2)	17494
11.	Rollover Guide 1-1/2" Red (3)	15646U
12.	Guide Rail 2-1/8" Red (2)	9395U
13.	Rollunder Shield	4869
14.	Rollunder Spring	14236
15.	Rollunder Gate Wireform	21958
16.	Spot Target, White (6)	9398
17.	Plastic Shield Set	23869
18.	Flat Rail	21382
19.	Flat Rail	21376
20.	Ball Guide Rail	21164
21.	Ball Guide Rail	8514
22.	Ball Guide Rail (3)	4832
23.	Ball Guide Rail (2)	23833
24.	Ball Guide Rail (2)	18070
25.	Flipper, White (2)	13150
26.	Cardholder	13647
27.	Ball Shooter Gauge	9767
28.	Mylar Overlay	23920
	Plastic Post 1" (27)	11561PX
	Siamese Post (2)	17492Z
	Plastic Support Post (3)	20635P

LIMITED WARRANTY

Mylstar Electronics, Inc. warrants to the initial purchaser of the Mylstar Electronics, Inc. machine that the items listed in the following schedule as installed and used in the original Mylstar Electronics, Inc. machine will for the applicable period set forth in the schedule, computed from the initial date of purchase from an authorized Mylstar Electronics, Inc. distributor, be free of defects in materials and workmanship:

SCHEDULE

GAME	ITEM	WARRANTY PERIOD
Pinball	All Electronic Printed circuit boards	90 days
Pinball-Video	All Electronic Printed Circuit Boards	90 days
	Card Cage	90 days
	Television Monitor	30 days
Video	All Electronic Printed Circuit Boards	90 days
	Television Monitor	30 days

This Limited Warranty does not apply to any parts damaged in the course of handling or assembling by the customer or damage due to other than normal use or use in violation of instructions or reasonable practices, or further damaged in return shipment. This Limited Warranty is made only to the original customer, and is and shall be in lieu of all other warranties expressed or implied, and of all other obligations or liabilities on the part of Mylstar Electronics, Inc. and in no event shall Mylstar Electronics, Inc. be liable for any anticipated profits, consequential damages, loss of time, or other losses incurred by the customer in connection with the purchase or operation of Mylstar Electronics, Inc. machines or components thereof.

The registration card with each Mylstar Electronics, Inc. factory-wired machine must be filled in and returned to Mylstar Electronics, Inc. within ten days after date of purchase for this Limited Warranty to be effective. This Limited Warranty applies only to machines so registered.

THIS LIMITED WARRANTY IS IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS, AND OF ANY OTHER OBLIGATION ON THE PART OF THE SELLER AND MYLSTAR ELECTRONICS, INC.



MYLSTAR ELECTRONICS INC.

"**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 take whatever measures may be required to correct the interference."

A-22670



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