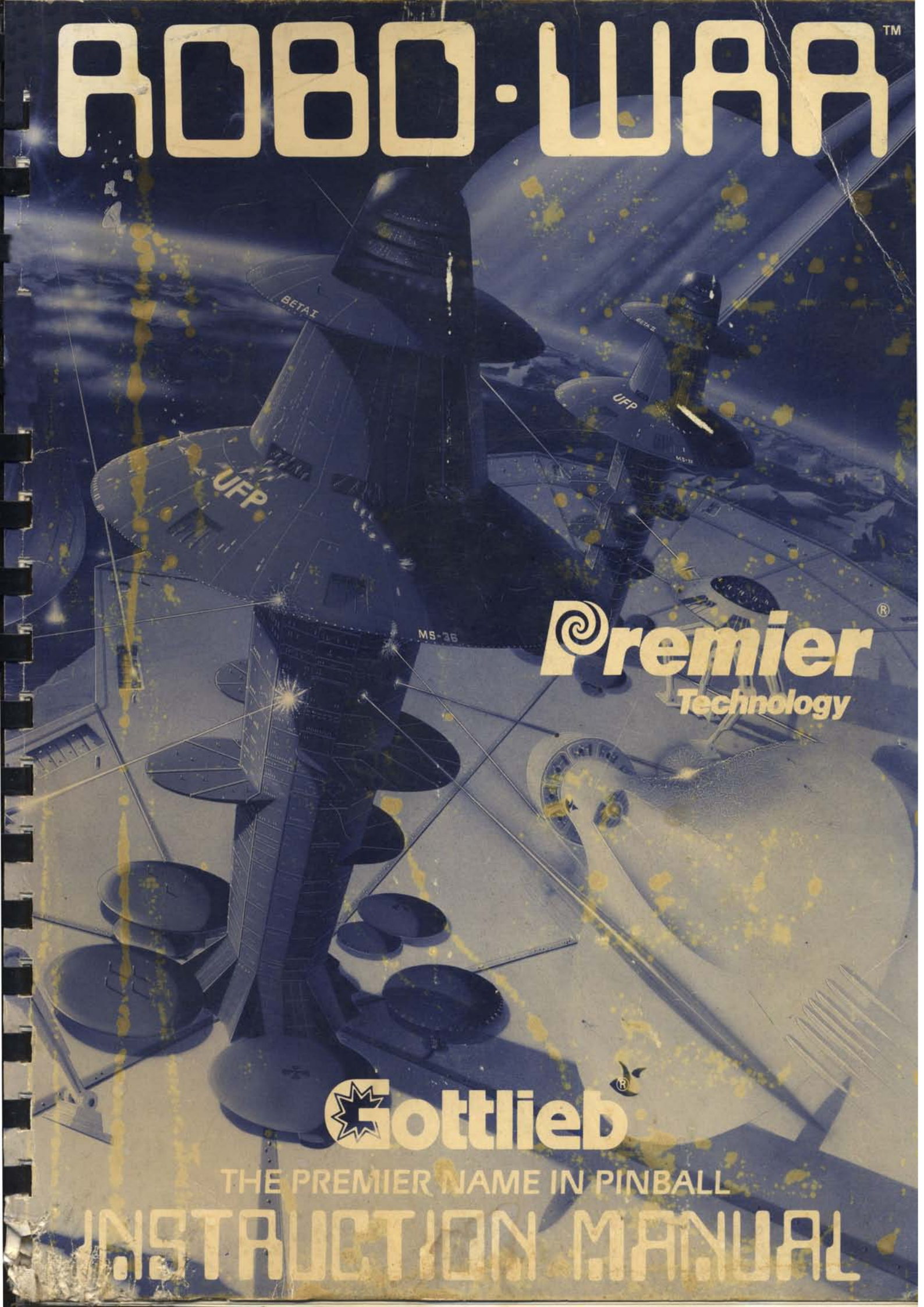


# ROBO-WARR™



**Premier**  
Technology®

**Gottlieb**®

THE PREMIER NAME IN PINBALL

# INSTRUCTION MANUAL

ROBO-WAR  
(GAME #714)  
(2 BALL GAME)

INSTRUCTION MANUAL  
Applicable for all games.

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GAME PROMS:	SOUND PROMS:
714/PROM 1	714/DROM 1
714/PROM 2	714/YROM 1

NOTE: ANY PROM CHANGES DURING PRODUCTION WILL BE INDICATED BY A REVISION NUMBER FOLLOWING THE GAME NUMBER. CONSULT YOUR DISTRIBUTOR FOR ANY PROM CHANGE UPDATE.

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SUPPLEMENTAL ADDENDUM

ATTACHED TO AND A PART OF ALL  
SYSTEM 80B ALPHANUMERIC DISPLAY  
GAME INSTRUCTION MANUALS

DISPLAY BOARD(A4)

1. THE ALPHANUMERIC DISPLAY BOARD(A4) IN THIS GAME MAY BE DIFFERENT THAN THE ONE AS ILLUSTRATED ON PAGE(S) 34 AND 35-36.
2. THE DIFFERENT DISPLAY BOARD (A4), PART NO. MA-644F, CONTAINS DISPLAYS DS1 AND DS2, PART NOS. XO-870.
3. THE DISPLAY BOARDS AS AN ASSEMBLY ARE INTERCHANGEABLE; HOWEVER, THE DISPLAY(S) DS1 AND DS2 ARE NOT INTERCHANGEABLE FROM ONE ASSEMBLY TO ANOTHER.
4. TO QUICKLY DETERMINE WHICH DISPLAY BOARD (A4) IS USED IN THIS GAME, OBSERVE THE LOCATION OF THE VACUUM EXHAUST TIP.

FIGURE 1A. DISPLAY BOARD (A4), (MA-644), DISPLAY(S) XO-840  
FIGURE 1B. DISPLAY BOARD (A4), (MA-644F), DISPLAY(S) XO-870

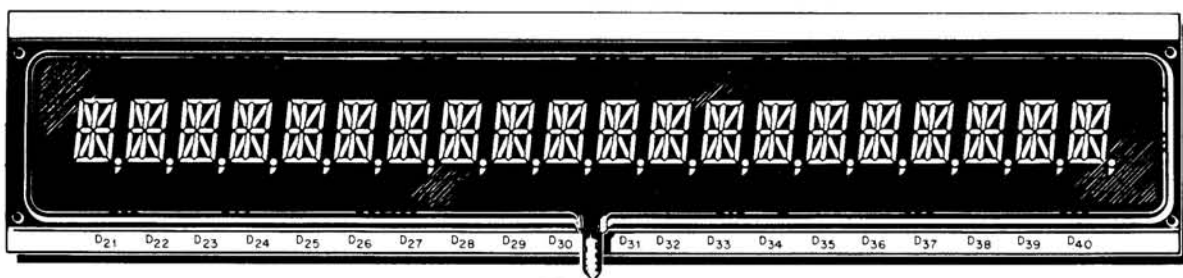


FIGURE 1A.

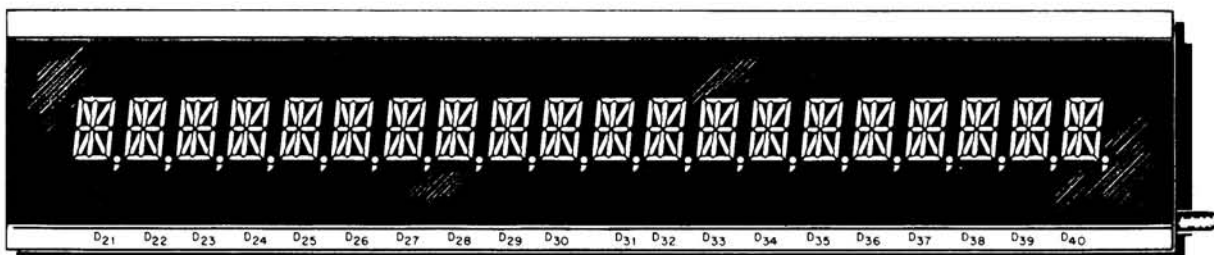


FIGURE 1B

5. THE DIFFERENT DISPLAYS, XO-840 AND XO-870, ARE ELECTRICALLY EQUIVALENT. HOWEVER, THE PINOUT NUMBERING SEQUENCES ARE DIFFERENT. FIGURE 2 ILLUSTRATES THE SCHEMATIC PORTION OF MA-644F UTILIZING THE XO-870 DISPLAYS.

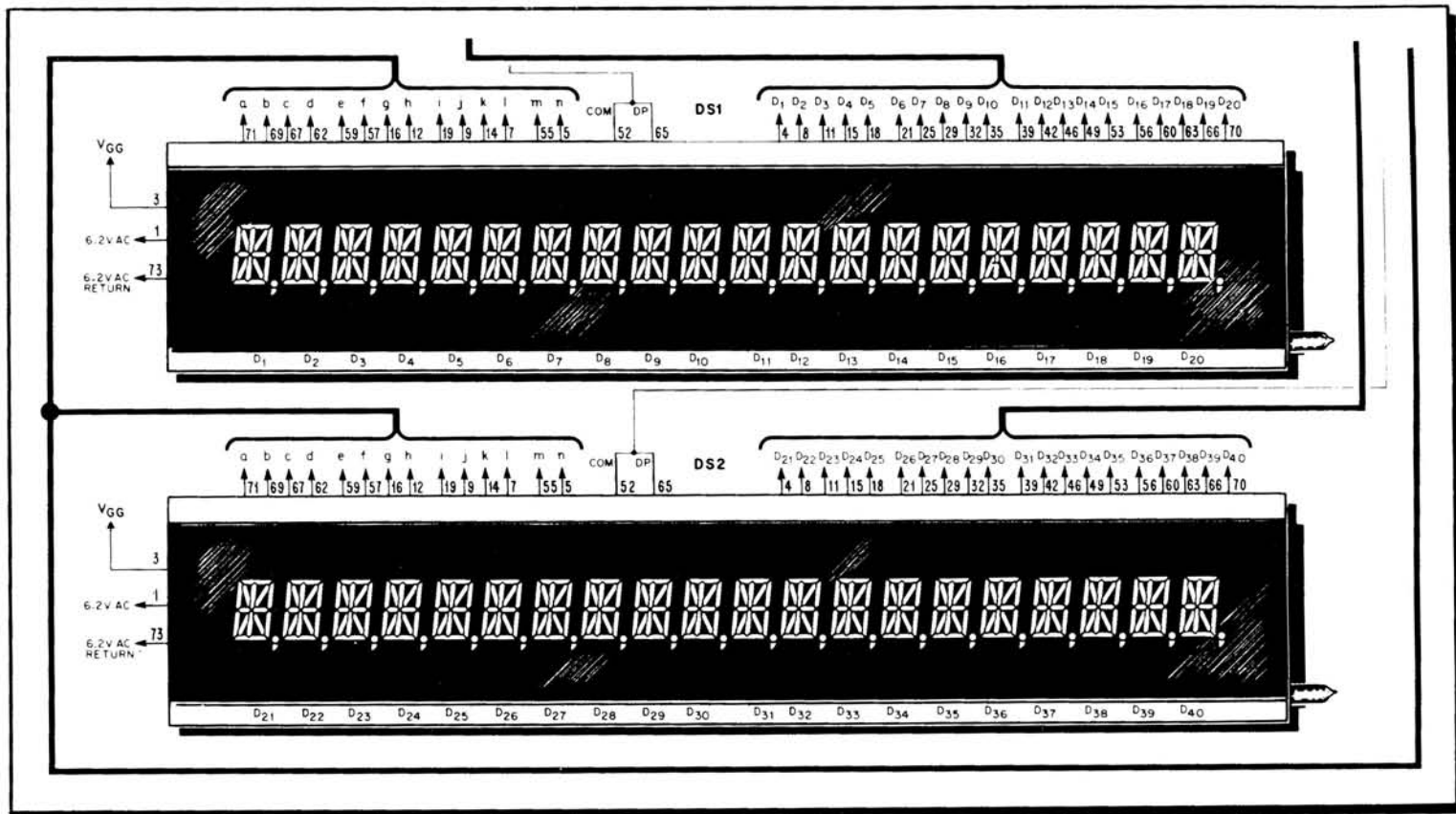


FIGURE 2.



## **SYSTEM 80B OVERVIEW**

System 80B contains three new circuit boards. These are the Alphanumeric Display, the Power Supply, and the Control Board Piggyback which is attached to the Control Board. The Alphanumeric Display takes the place of the Four and Seven Digit Displays used in System 80A games. The new Power Supply takes the place of the System 80A Power Supply. The Control Board Piggyback takes the place of ROMS (U2-U3) used in System 80A games.

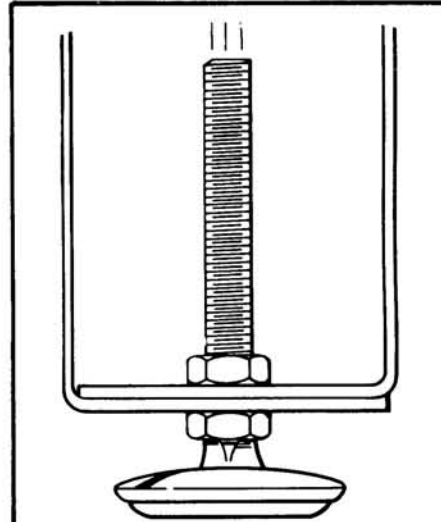
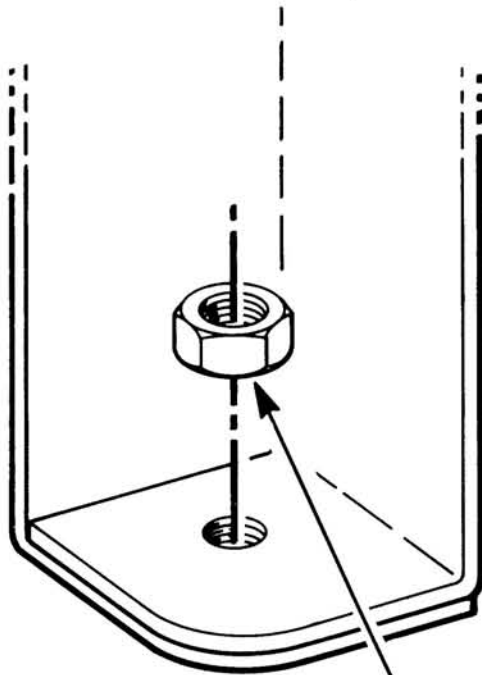
Some of the new features of System 80B are:

- 1) Capability to display messages.
- 2) Enhanced bookkeeping and self-test.
- 3) Players can enter their initials if they achieve a high score.
- 4) Top five high scores are displayed in the attract mode.
- 5) Automatic Replay percentaging.

**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."

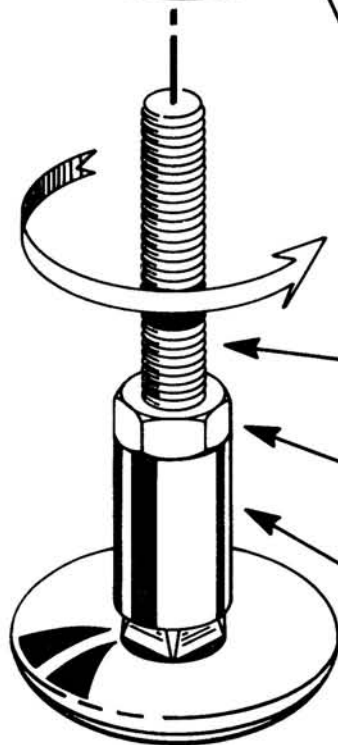
# SET-UP PROCEDURE

TO ADJUST PLAYFIELD PITCH ANGLE (6°)  
(REAR LEGS ONLY)



## NOTE:

FRONT LEG ADJUSTERS  
MUST BE INSERTED TO  
THEIR MAXIMUM THREAD  
DEPTH AND SECURED  
WITH A NUT ON EACH  
SIDE OF THE LEG.



4. TIGHTEN LOCKING NUT.
3. ATTACH ASSEMBLY TO LEG.
2. FASTEN NUT TO SLEEVE.
1. INSERT 1" SLEEVE  
(PART NO. 25317)

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# 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. To remove the lightbox backglass and gain servicing access to the electronics panel and fluorescent lamp assembly, proceed as follows:

Unlock the lightbox, grasp the bottom of the Alphanumeric display panel assembly and pull towards you releasing the display panel assembly from the nylon roller catch assembly, located on the back side of the lower right hand corner of the display panel assembly.

Pull the display panel assembly toward you and lift up as it pivots on its hinge to the uppermost position, let down slightly and it will lock in the open position via the lid support.

The backglass is held in place in the retaining groove at the bottom ledge of the lightbox and the wood retaining tabs on each side. Lift the backglass up about an inch, pull the bottom of the backglass toward you and slide it down past the two wood retaining tabs, carefully set aside.

To replace the backglass, slide the backglass up behind the wood retaining tabs and set down into the bottom retaining groove.

Lift the display panel assembly up slightly and disengage the lid support, pivot down and push in to engage the roller catch assembly. Lock the lightbox.

5. Secure the lightbox to the cabinet with the bolts and washers provided.
6. Open the cabinet door and loosen the front moulding locking arm.
7. Remove the moulding from the playfield.
8. Slide the cabinet glass toward you and remove it.
9. Raise the playboard, slide it forward and rest it on its support.
10. Unravel and straighten out the power line cord located at the rear of the pinball cabinet.
11. 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 A12J7, 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. Lower the playfield into the cabinet. Using the leg adjusters, level the playfield and set the pitch. Recommended pitch is  $5-1/2^{\circ}$ - $6^{\circ}$ , SEE ILLUSTRATION AT LEFT.
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.

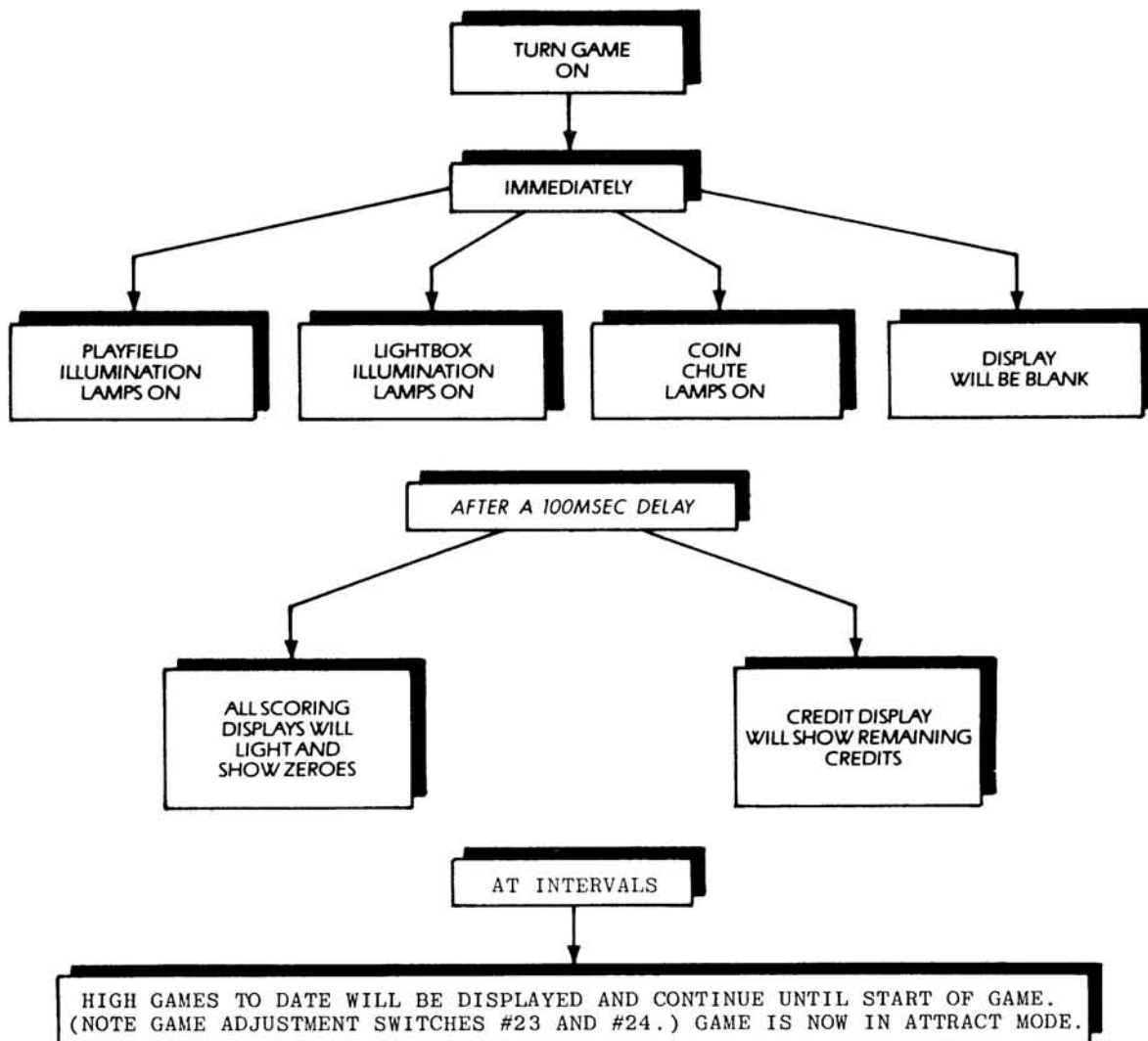
The ball-roll tilt can be adjusted by loosening the front screw and raising the tilt bracket to increase sensitivity, or lowering it to decrease its sensitivity.

10. Reinstall the cabinet glass, front moulding and the lightbox assembly.
11. Plug the line-cord into a properly grounded 3-wire receptacle ONLY!
12. Refer to Section VI to make all necessary game adjustments.
13. CAUTION! If this game has been subjected to extreme cold, allow to warm up to room temperature.



## II. INITIALIZATION, III. GAME OPERATION

### II. INITIALIZATION



### III. GAME OPERATION

#### A. GAME START

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 the center of the lower 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 two zeros.

#### B. FIRST PLAYER

1. First player's score display flashes two zeros.
2. The other player's displays are now blank.
3. The ball-in-play is displayed in the center of the upper display.

### III. GAME OPERATION

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

#### C. ADDITIONAL PLAYERS

1. Additional players are indicated by two 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 during the first ball in play.

#### D. EXTRA BALLS

1. When the SHOOT AGAIN lamp is lit, neither the player-up nor the ball-in-play 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 entire switch matrix is inactive for three seconds.
3. If the match feature exists (dependent on Switch #26), a replay can be won even if the game is slammed.
4. Game returns to the attract mode.

#### G. GAME OVER

1. A random match 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 #26) is awarded.
2. The High Games To Date are periodically displayed, dependent on Switches #23 and #24. When the Highest Game To Date is beaten, an award (dependent on Switches #23 and #24) is given.
3. All of the drop targets will reset (when used).

## IV. GAME PLAY AND SCORING

# ROBO-WARR™

## HOW TO PLAY

### TOP DROP TARGETS

- SCORE 5000.
- TURN OFF CORRESPONDING LAMP WHEN FLASHING.
- COMPLETING ALL TARGETS RESETS TARGETS AND STARTS LAMPS STROBING.
- HITTING TARGET WHEN LIT WHILE STROBING LIGHTS A POP BUMPER, SCORES 100,000, ADDS A LETTER TO R-O-B-O-W-A-R, AND RESTARTS SEQUENCE.
- ADDS 5000 X MULTIPLIER TO MULTI-BONUS DURING MULTI-BALL.
- (5-BALL) SCORE 3000.
- (5-BALL) ADDS 3000 X MULTIPLIER TO MULTI-BONUS DURING MULTI-BALL.

### RIGHT DROP TARGETS

- SCORE 5000.
- COMPLETING ALL TARGETS RESETS BANK.
- COMPLETING ALL TARGETS WHEN FLASHING RESETS THE CENTER DROP TARGETS AND STARTS THEM FLASHING.
- ADDS 5000 X MULTIPLIER TO MULTI-BONUS DURING MULTI-BALL.
- (5-BALL) SCORE 3000.
- (5-BALL) ADDS 3000 X MULTIPLIER TO MULTI-BONUS DURING MULTI-BALL.

### CENTER DROP TARGETS

- SCORE 5000.
- COMPLETING BOTH TARGETS RESETS BANK.
- COMPLETING BOTH TARGETS WHEN FLASHING STARTS THE LEFT DROP TARGET FLASHING.
- ADDS 5000 X MULTIPLIER TO MULTI-BONUS DURING MULTI-BALL.
- (5-BALL) SCORE 3000.
- (5-BALL) ADDS 3000 X MULTIPLIER TO MULTI-BONUS DURING MULTI-BALL.

### LEFT DROP TARGET

- SCORE 5000.
- RESET TARGET.
- LIGHT AN EXTRA BALL LAMP (TOP ROLLOVERS), RESET THE RIGHT DROP TARGETS, AND ADD A LETTER TO R-O-B-O-W-A-R (BASED ON SW. #31 WHEN FLASHING).
- SCORE 100,000 WHEN FLASHING IF EXTRA BALL HAS ALREADY BEEN WON.
- ADDS 5000 X MULTIPLIER TO MULTI-BONUS DURING MULTI-BALL.
- (5-BALL) SCORE 3000.
- (5-BALL) ADDS 3000 X MULTIPLIER TO MULTI-BONUS DURING MULTI-BALL.

### TOP ROLLOVERS

- SCORE 5000 UNLIT.
- SCORE 10,000 WHEN LIT (WHITE).
- AWARD EXTRA BALL WHEN LIT (PURPLE).
- COMPLETING THE TOP ROLLOVERS (R-O-B-O) ADDS A LETTER TO R-O-B-O-W-A-R, SCORES 100,000, AND RESETS THE TOP ROLLOVERS.
- (5-BALL) SCORE 3000 UNLIT.

### HOLE

- SCORE 50,000.
- CAPTURE BALL IF NOT IN MULTI-BALL.
- SCORE MULTI-BONUS VALUE AND RESTORE IT IN MULTI-BALL.

### SPINNER

- SCORE 1000 UNLIT.
- ROTATE SPECIAL LAMPS WHEN ENABLED.
- SCORE 10,000 WHEN FLASHING.



## IV. GAME PLAY AND SCORING

### STARGATE ROLLUNDER

- NO SCORE.
- ADVANCE MULTIPLIER WHEN LIT.

### STARGATE SPOT TARGET

- SCORE 10,000.
- ADVANCE MULTIPLIER WHEN LIT.
- RELEASE CAPTURED BALL AND LOWER RAMP (MULTI-BALL).

### TOP RIGHT ROLLUNDER

- SCORE 10,000.
- ADVANCE MULTIPLIER WHEN LIT.

### LEFT SIDE SPOT TARGET

- SCORE 5000.
- ADVANCE MULTIPLIER WHEN LIT.
- AWARD SPECIAL WHEN LIT.

### RIGHT SIDE ROLLOVER

- SCORE 10,000.
- AWARD SPECIAL WHEN LIT.

### LEFT RETURN ROLLOVER

- SCORE 5000.
- AWARD SPECIAL WHEN LIT.
- (5-BALL) SCORE 3000.

### RIGHT RETURN ROLLOVER

- SCORE 5000.
- ADVANCE MULTIPLIER WHEN LIT
- START SPINNER FLASHING FOR A TIME PERIOD.
- (5-BALL) SCORE 3000.

### LEFT AND RIGHT OUT ROLLOVERS

- SCORE 50,000.
- RIGHT OUT ROLLOVER AWARDS SPECIAL WHEN LIT.

### SHOOTER LANE ROLLOVER

- NO SCORE.

### RIGHT FLIPPER SWITCH

- ROTATE TOP ROLLOVER LAMPS (R-O-B-O).
- DISPLAY MULTI-BONUS AND CURRENT REPLAY LEVEL (AUTO-PERCENTAGING ONLY) WHEN BUTTON IS HELD IN.

### POP BUMPERS

- SCORE 1000 UNLIT.
- SCORE 10,000 WHEN LIT.
- ROTATE POP BUMPER LAMPS, "ADV X" LAMPS, EXTRA BALL LAMPS, AND SPECIAL LAMPS IF ANY ARE LIT.

### RUBBER SWITCHES

- SCORE 30.
- ROTATE ADVANCE MULTIPLIER LAMPS, EXTRA BALL LAMPS, AND SPECIAL LAMPS IF ANY ARE LIT.

### OUTHOLE

- SCORE 10,000 X MULTIPLIER FOR EACH LETTER LIT IN R-O-B-O-W-A-R.
- SCORE 70,000 X MULTIPLIER FOR EACH PREVIOUS COMPLETION OF R-O-B-O-W-A-R.
- COLLECT MULTI-BONUS AFTER LAST BALL IN PLAY.

# 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 80B** 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 80B					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	ON	OFF	6/1	
OFF	OFF	ON	ON	ON	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.

**SWITCH 6** HIGH GAMES TO DATE CONTROL  
ON RESET HIGH GAMES #2-#5 ON POWER OFF  
OFF NO EFFECT

**SWITCH 7** ATTRACT MODE SOUND  
ON ENABLED  
OFF DISABLED

**SWITCH 8** AUTO-PERCENTAGE CONTROL  
ON ENABLED  
OFF DISABLED (NORMAL HIGH SCORE MODE)

**SWITCH 14** COIN CHUTE LEFT AND RIGHT CONTROL  
ON SAME  
OFF SEPARATE

**SWITCHES 15 16** MAXIMUM CREDITS  
OFF OFF 8  
OFF ON 10  
ON OFF 15  
ON ON 20

**SWITCH 22** PLAYFIELD SPECIAL  
ON EXTRA BALL  
OFF SPECIAL

**SWITCHES 23 24** HIGHEST GAME TO DATE AWARDS  
OFF OFF NONE (NOT DISPLAYED)  
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 SCORE 500,000 IN PLACE OF EXTRA BALL AND SPECIAL  
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** PLAYFIELD SPECIAL CONTROL  
ON COMPLETING THE ALPHA I, II AND III SEQUENCE ADDS A LETTER TO R-O-B-O-W-A-R. (LIBERAL)  
OFF NO LETTER ADDED. (CONSERVATIVE)

**SWITCH 32** MULTIPLIER CONTROL  
ON LIGHT 3(3-BALL) OR 2(5-BALL) "ADV X" LAMPS ON PLAYFIELD (LIBERAL)  
OFF LIGHT 2(3-BALL) OR 1(5-BALL) "ADV X" LAMPS ON PLAYFIELD (CONSERVATIVE)

#### ADDITIONAL COIN CHUTE COMBINATIONS CREDIT INCENTIVES

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

SWITCHES					COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	COIN/CREDIT GIVEN	TOTAL COIN/TOTAL CREDIT
S1	S2	S3	S4	S5	Left Coin Chute					
S9	S10	S11	S12	S13	Right Coin Chute					
S17	S18	S19	S20	S21	Center Coin Chute					
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

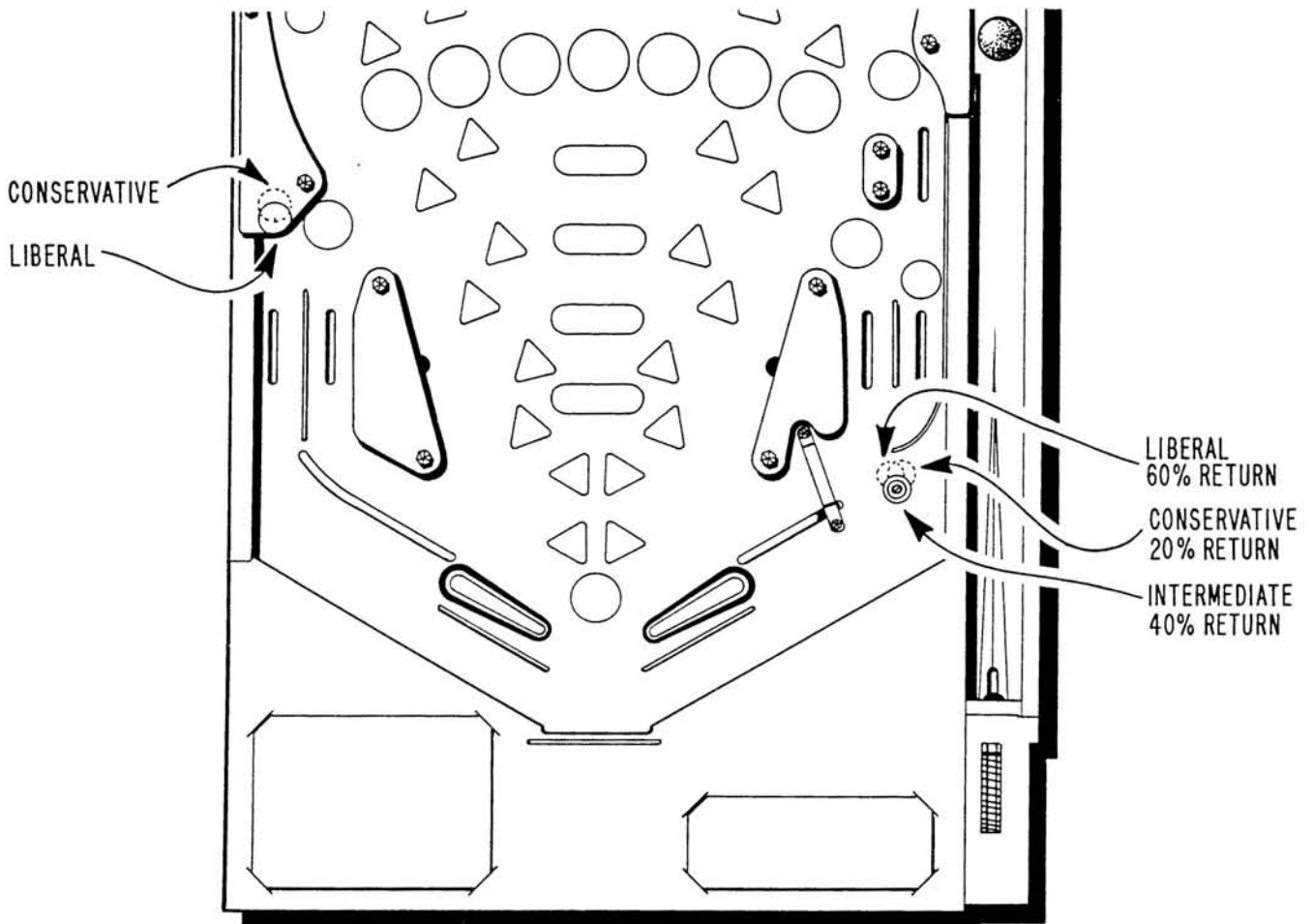
The speaker(s) output is controlled by the potentiometer mounted on a bracket located inside the cabinet next to the front door hinge.

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

### C. POST ADJUSTMENTS

The post at the mouth of the left side outlane can be positioned for liberal/conservative play. The smaller opening produces a more liberal game.

The post located in the lower right hand corner of the play-field can be adjusted from liberal to conservative to intermediate as illustrated below.





## 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.

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 80B

- See Flow Chart for Bookkeeping Assignments (1-15).

#### I. STEPPING THROUGH BOOKKEEPING

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

"TEST MODE" should appear in the upper display.

2. Press the SELF-TEST button again. Step 1 and its information will be displayed.
3. Pressing the SELF-TEST button will increment the bookkeeping step number and appropriate information will be displayed.

Pressing the SELF-TEST button after Step 15 will start the SELF-TEST function (Step 16-21). At this point Bookkeeping cannot be re-entered by pressing the SELF-TEST

button. To reenter, turn the game OFF/ON or open the slam switch. The game will return to the attract mode. Then press the SELF-TEST button.

4. To exit from Bookkeeping at any time:
  - a. Turn power OFF/ON or
  - b. Open slam switch.

### II. HOW TO SET BOOKKEEPING INFORMATION TO ZERO

#### 1. For a Particular Bookkeeping Step

Applicable only to:

- Step 1 - Left chute coins
- Step 2 - Right chute coins
- Step 3 - Center chute coins

- a. Advance Bookkeeping so the step to be zeroed is displayed.
- b. Press the credit button. Notice information replaced by zeros.

#### 2. Zeroing All Bookkeeping Steps

Except Auto-Percentaging setting (Step 6), Replay Levels (Steps 11-13), and Highest Game To Date Score (Step 14).

- a. Go to Step 15 (average playin time).
- b. Press the credit button. The message "Bookkeeping Cleared" will be displayed.
- c. Zeroing is complete.

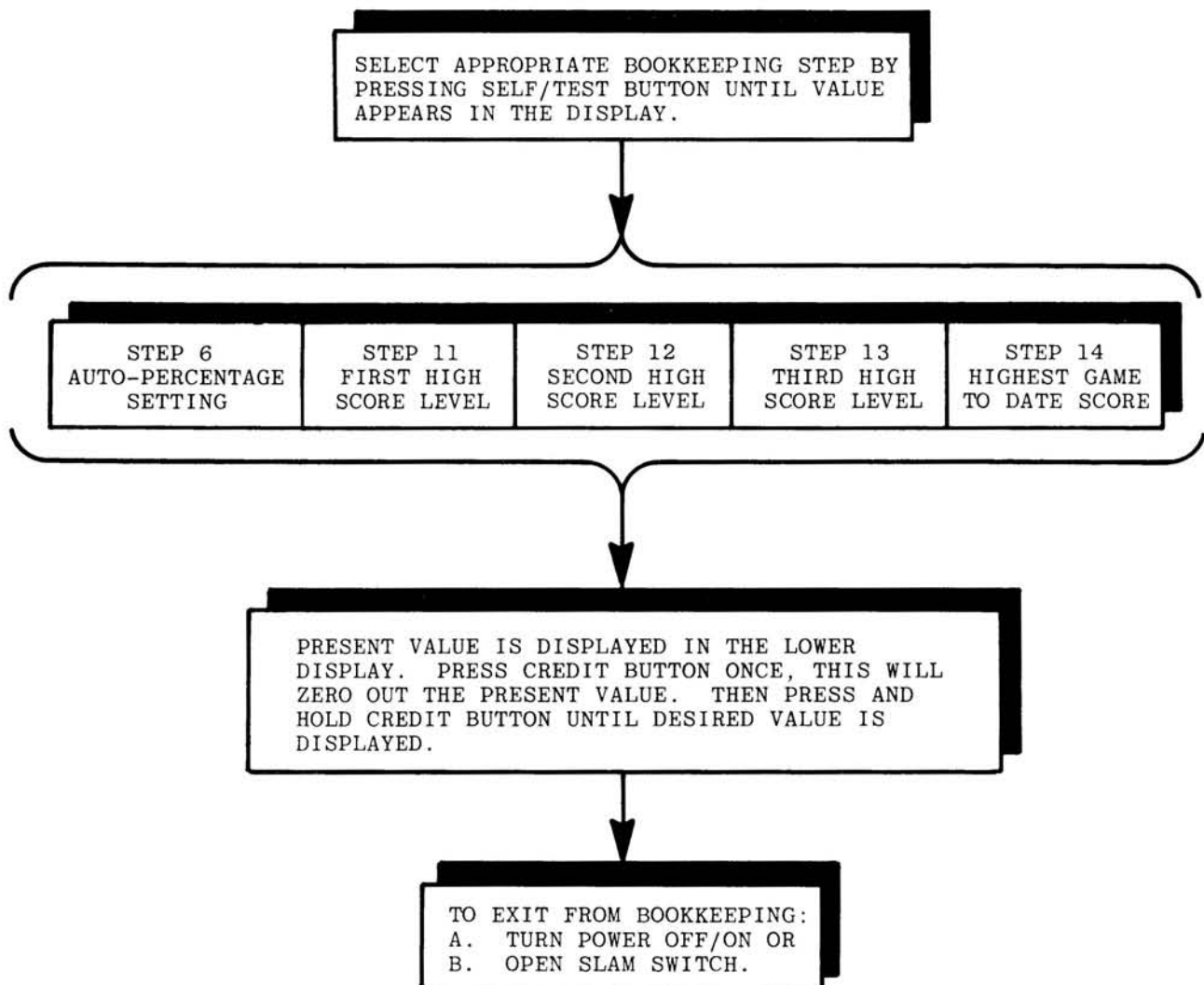
## HOW TO USE AUTOMATIC REPLAY PERCENTAGING

Move Control Board switch #8 to the on position to enable Auto-Percentaging. Set the desired percent payout while in Step 6 of bookkeeping (See Page 9). When Auto-Percentaging is enabled, only the first High Score Replay Level is used. The second and third levels are ignored.

Periodically the first Replay Level will be adjusted by 100,000 points at a time. After 10,000 games have been played, the Total Plays (Step 4), Total Replays (Step 5), and Game Time (Step 15) bookkeeping values are reset to 0 (Refer to Page 10).

## VII. BOOKKEEPING AND SELF TEST

### III. HOW TO SET/RESET AUTO-PERCENTAGE SETTING, HIGH SCORE LEVELS OR HIGH GAME TO DATE SCORES.

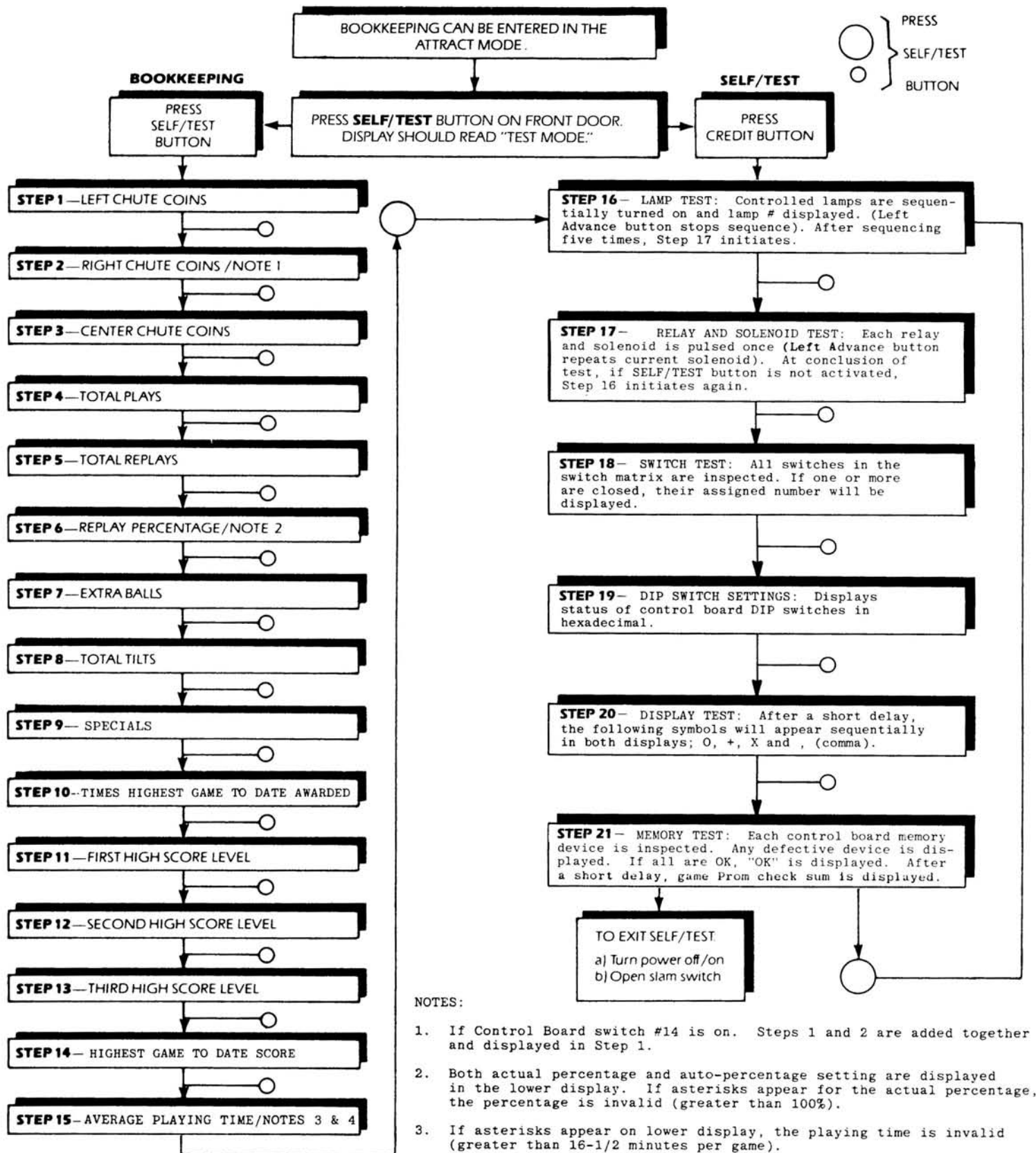


#### NOTES:

1. Step 11 must be a lower score than Step 12.  
Step 12 must have a lower score than Step 13.  
Otherwise, the scores will not be recognized.
2. If Step 12 or Step 13 is not desired, set those scores to zero.
3. If Step 14 is reset, all High Games to Date scores are reset.
4. High Score Levels may range from 100,000 to 9,900,000 in increments of 100,000.
5. Only the first High Score Level is used when auto-percentaging (switch 8) is enabled.

# VII. BOOKKEEPING AND SELF TEST

## B. FLOW CHART



### NOTES:

1. If Control Board switch #14 is on. Steps 1 and 2 are added together and displayed in Step 1.
2. Both actual percentage and auto-percentage setting are displayed in the lower display. If asterisks appear for the actual percentage, the percentage is invalid (greater than 100%).
3. If asterisks appear on lower display, the playing time is invalid (greater than 16-1/2 minutes per game).
4. Pressing the credit button during this step will reset all book-keeping information except:  
Step 6 - Auto-percentage setting  
Steps 11 thru 13 - Replay levels  
Step 14 - Highest game to date

## VII. BOOKKEEPING AND SELF TEST

### C. SELF/TEST

- Steps 16 through 21 are SELF/TEST or game tests the operator can use for quick troubleshooting.
- All the tests are explained in the flow chart.
- To advance to the next test, press the SELF/TEST switch.
- Each test can be repeated by pressing the credit button.

#### STEP 16—LAMP TEST

- a. Lamp Test—Lamps are sequentially strobed. Lamp assignment numbers appear in the lower display.

The Left Advance button stops lamp sequencing for repeated flashing of active lamp. (Single Step Mode).

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

#### STEP 17—RELAY AND SOLENOID TEST

- a. Relay Test—All relays are pulsed in the following order with their corresponding lamp driver number appearing in the lower display.

The left advance button stops sequencing for repeated activation of relay or solenoid. (Single Step Mode).

A3 Driver Board Transistor  
Assignment (See Schematic)

Q (Game Over) Relay.....A3J3 PIN- $\bar{A}$ (Q1)  
T (Tilt) Relay.....A3J3 PIN- $\bar{B}$ (Q2)  
(Any other relays which may be used).

- b. 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	Left Top Dome	Q60
Sol.2	Left Center Dome	Q57/Q58
Sol.3	Stargate Lamps	Q54
Sol.4	Right Side Lamp	Q55
Sol.5	Left Bottom Dome	Q61/Q62
Sol.6	Right Top Dome	Q63/Q64
Sol.7	Left Side Lamp	Q56
Sol.8	Knocker Assembly	Q53
Sol.9	Outhole	Q59

#### STEP 18—SWITCH TEST

- a. If all switches are open, "ALL SWITCHES OPEN" appears in the lower display. (Note: Slam switch is not part of this test.)
- b. If any switch(es) are closed, their corresponding matrix location will appear sequentially in the lower display.

#### STEP 19—DIP SWITCH SETTINGS

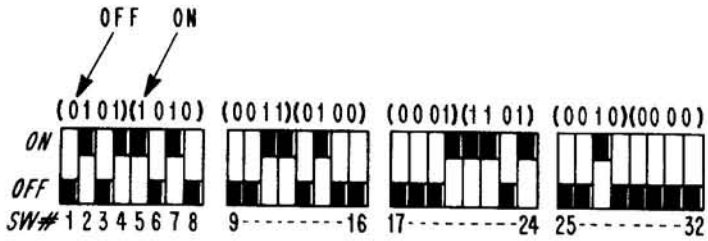
- a. The status of the Control Board (A1) switches appears in the lower display.

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

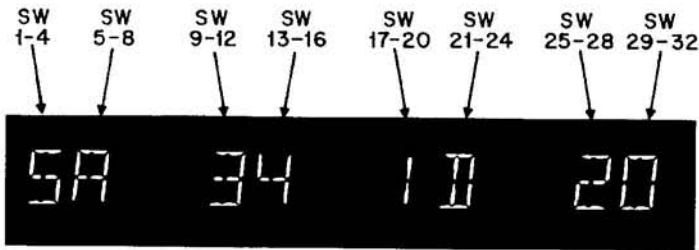
## VII. BOOKKEEPING AND SELF TEST

### CONTROL BOARD (A1) SWITCHES

#### EXAMPLE



#### DISPLAYED



### Checking Switches

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



- 2) Switch all even numbered switches to the ON position and all odd switches to the OFF position. Press credit button. Display should now show:



### STEP 20—DISPLAY TEST

After a short delay, the following characters will appear sequentially in all digit positions; O, +, X and , (comma).

### STEP 21—MEMORY TEST

Each control based memory device is checked. If all are good, an "OK" will be displayed.

If a memory chip located on the A1 Control Board is defective, its number will be displayed. If no devices are found to be defective, "OK" is displayed in the lower display. Then after a short delay the Game Prom check sum will be displayed.



## VIII. THEORY OF OPERATION

This section will cover only the differences between System 80A and System 80B. Figure 1 is a block diagram indicating the interconnections between the modules of System 80B.

### A. CONTROL BOARD (A1)

The Piggyback Board eliminates the need for the ROMS (U2-U3) and the game prom (PROM 1) used in System 80A. The new game prom for each game is a 2764 EPROM labeled with the game number. This device is plugged into the Piggyback Board which is soldered into the Control Board.

The use of the Alphanumeric Display eliminates the need for Z19, Z21, Z22, Z23, Z24, Z25 (System 80A Display Control), and connector A1J3. The Control Board transmits information to the Display Board via a data bus (DATA 0 - DATA 7) and control lines (LD1, LD2, and RESET) from A1J2 to 1A4J1. The state of the LD1 and LD2 lines determine whether the upper or lower display tube receives the information on the data bus.

### B. POWER SUPPLY (A2)

The new Power Supply develops a regulated +5V DC only and supplies it to the Control Board (VCC), Display Board (VSS), and Sound Board (VCC).

### C. DISPLAY BOARD (A4)

This board takes the place of the four and seven digit displays used in System 80A games. During game play the upper display contains the scores of players one and two along with the ball in play (center). The lower display contains the scores of players three and four along with the amount of credits remaining (center). During Game Over the display information alternates between the scores from the previous game and the current High Games To Date.

The Display Board incorporates two vacuum fluorescent display tubes and three display controllers (U1-U2-U3). Each tube consists of a filament, grids (digits), and anodes (segments). U1 controls the digits of the upper display tube. U2 controls the digits of the lower display tube. U3 controls the segments of both tubes. When power is supplied to the game, the Control Board sends a negative going reset pulse to the base of Q1. This resets the display system. The digit information is multiplexed using an internal clock in U1 to control the refresh rate. This makes it appear as if all the digits are being enabled at once.

# VIII. THEORY OF OPERATION

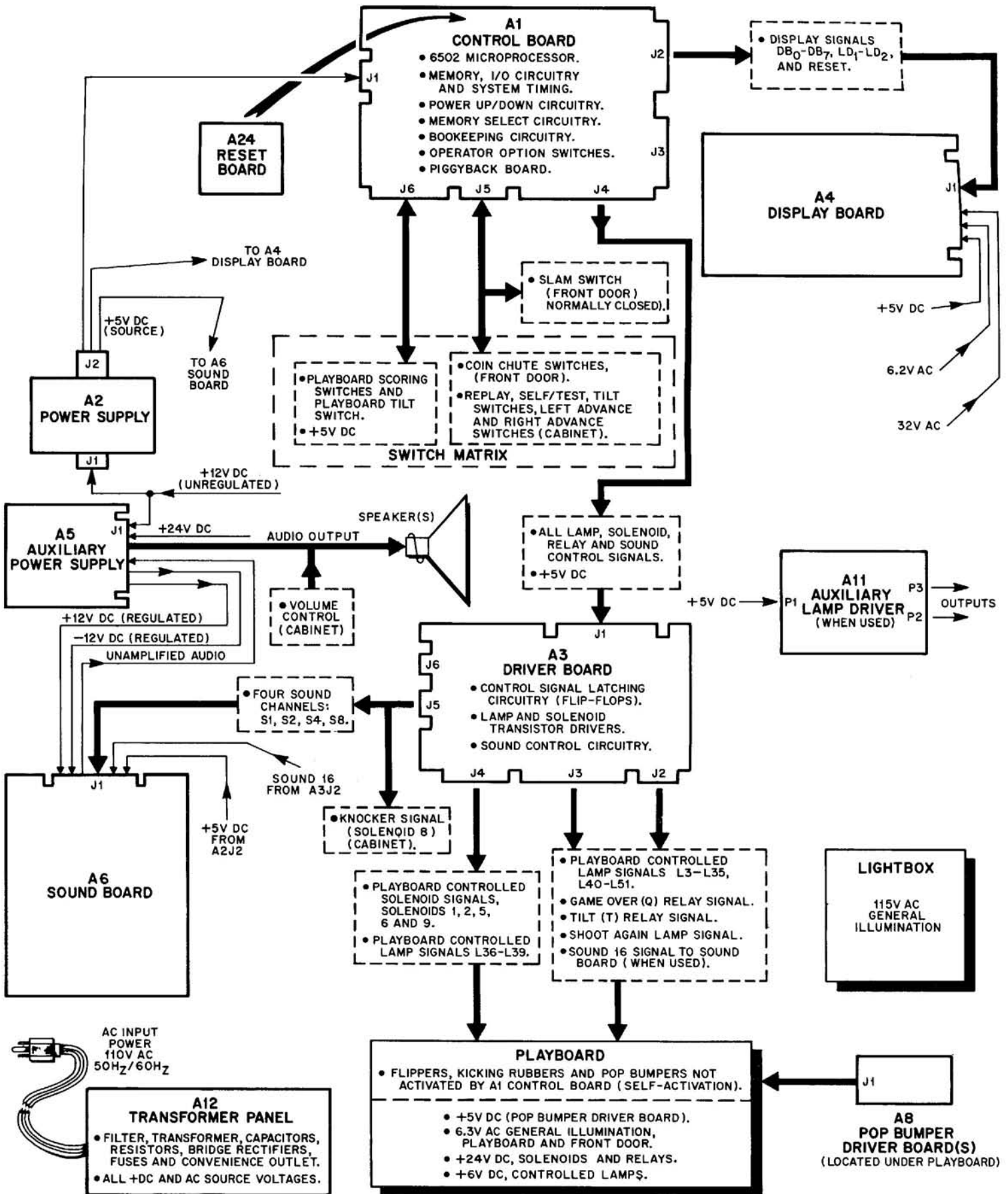


FIGURE I. SYSTEM 80B BLOCK DIAGRAM

## VIII. THEORY OF OPERATION

The Display Board is supplied with 32V AC from the transformer panel. Voltages VGG, VDD, and VCO are then developed from this input. The transformer panel also supplies 6.2V AC to the display tube filaments.

The filaments are biased 7.5V DC above VGG (VCO) by the zener diode VR1. Figure 2 shows the basic drive circuitry and waveform for a single digit and segment of the display.

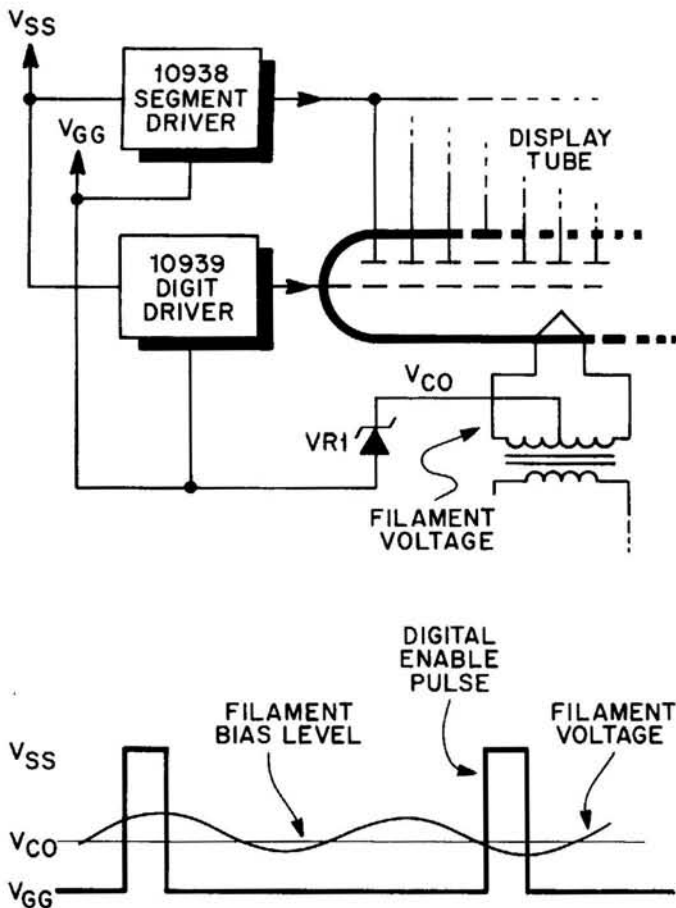


FIGURE 2. BASIC DRIVE CIRCUIT

### D. SOUND BOARD (A6)

The MA-886 Sound Board consists of two 6502 microprocessor systems, a dual DAC, a programmable switched

capacitor filter, two programmable sound generators, input ports to receive commands from the game Control Board, and a low level audio output, which is sent to the MA-767 Auxiliary Power Supply Board for amplification.

The Sound Board requires three supply voltages: +5V DC, +12V DC and -12V DC. In addition a power up reset signal is required from the Control Board.

### SYSTEM CLOCK

A 4 MHz oscillator is configured with R11, R12, C14, C15, C22, XTAL-1 and T1. This 4 MHz clock is divided by 4 to a 1 or 2 MHz clock for both processors' clock input, pin 37 of N1 and T3. A 2 MHz clock from S1 pin 14 is presented to the two AY-3-8913 Programmable Sound Generators, H4 and K4, at pin 20. A 250 KHz signal from S1 pin 11 is the clock for the programmable timer section consisting of N5, H5, T5 and K5, pin 2.

### INPUT CODE LATCH SYSTEM

Eight input lines from the Control Board come in on A6P1 and are pulled up by S1P1 and sent to the two input code latches A3 and B2, one for each microprocessor system. A2, pin 8, becomes a logic high when any of it's inputs are low. This output is connected to pin 11 of the input code latches (A3 and B2). A positive edge at pin 11 causes A3 and B2 to latch the data at their inputs. A2 pin 8 is also connected to the clock inputs of two flip flops, A4 pin 3 and A4 pin 11. When A2 pin 8 goes high, both flip flops are clocked, setting both  $\bar{Q}$  outputs low. The  $\bar{Q}$  outputs, A4 pin 6 and pin 8, are connected to both of the 6502's active low interrupt request lines, T3 and N1, pin 4. The  $\bar{Q}$  outputs of A4 will stay low until the associated 6502 reads its input port therefore clearing the interrupt.

## VIII. THEORY OF OPERATION

### SYSTEM EPROMS

The sound board is designed to accommodate different types of EPROMS. Jumpers JP1, 2, 3 and 4 should be set to the proper position based on the EPROM being used, (See Schematic Diagram).

### RESET

The Sound Board receives an external reset signal from A1J2 pin 24. This active low reset signal is pulled up by R34 and sent to G5, pin 1 (2-input AND gate). However, if a manual reset is desired, pushing switch SW2 will reset the processor.

### MAIN SUMMER

The main summer consists of R13 through R17 and B1, pins 12, 13 and 14. B1 pin 14 is the main output from the Sound Board, at A6P2 pin 9, and will swing plus or minus 5V peak to peak.

## IX. GENERAL INFORMATION

### A. PRINTED CIRCUIT BOARDS ARE DESIGNATED AS FOLLOWS:

A1 - Control Board  
 A2 - Power Supply  
 A3 - Driver Board  
 A4 - Display Board  
 A5 - Auxiliary Power Supply  
 A6 - Sound Board  
 A7 - Diode Board  
 A8 - Pop Bumper Driver Board  
 A11 - Auxiliary Lamp Driver  
 A13 - Resistor Board  
 A16 - Transistor Driver Board  
 A17 - Diode Board  
 A19 - Switching Diode Board  
 A24 - Reset Board

### B. WIRE COLORS ARE SHOWN AS NUMBERS:

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

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

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

### C. FUSES

#### TRANSFORMER PANEL FUSES

F1	Sound/Speech Power Supply (A6)...	12V AC	....	1/2 Amp
F2	Power Supply (A2).....	10V AC	....	6-1/4 Amp SLO-BLO
F3	Display.....	32V AC	....	1/4 Amp SLO-BLO
F4	Solenoids (+24V DC).....	28V AC	....	8 Amp SLO-BLO
F5	Controlled Lamps.....	8V AC	....	10 Amp SLO-BLO
F6	Playboard Illumination.....	6.3V AC	....	5 Amp SLO-BLO
F7	Lightbox Illumination.....	115V AC	....	1/2 Amp SLO-BLO
F8	Primary Power.....	110V AC	....	5 Amp SLO-BLO
		220V AC	....	2-1/2 Amp SLO-BLO
F9	Display Filament.....	6.2V AC	....	1 Amp
F9A	Display Filament.....	6.2V AC	....	1 Amp
F20	Input Line.....	110V AC	....	8 Amp SLO-BLO
		220V AC	....	4 Amp SLO-BLO

#### PLAYBOARD FUSES

F10	Stargate Ramp.....	2.5 Amp Slo-Blo
F11	Ball Release.....	1 Amp Slo-Blo
F12	Outhole.....	1 Amp Slo-Blo
F13	1 Bank Reset, Hole.....	1 Amp Slo-Blo
F14	2 Bank Reset, 3 Bank Reset, 4 Bank Reset.....	2 Amp Slo-Blo
F15	Top Left Pop Bumper.....	2 Amp Slo-Blo
F16	Top Right Pop Bumper.....	2 Amp Slo-Blo
F17	Bottom Pop Bumper.....	2 Amp Slo-Blo



## IX. GENERAL INFORMATION

### D. COIL CHART

<b>SOLENOID COILS</b>					
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	11.6	1305	#26	White
A-16570	HOLE KICKER, OUTHOLE	15.5	1450	#27	Green
A-17875	FLIPPERS	2.8/40	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
A-24161	INTERMEDIATE FLIPPER	2.2/40	520/1050	#23/31	Blue
<b>RELAY COILS</b>					
A-16890	O, 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
A-19508	MEMORY/ DROP TARGETS	35.0	1250	#32	YELLOW

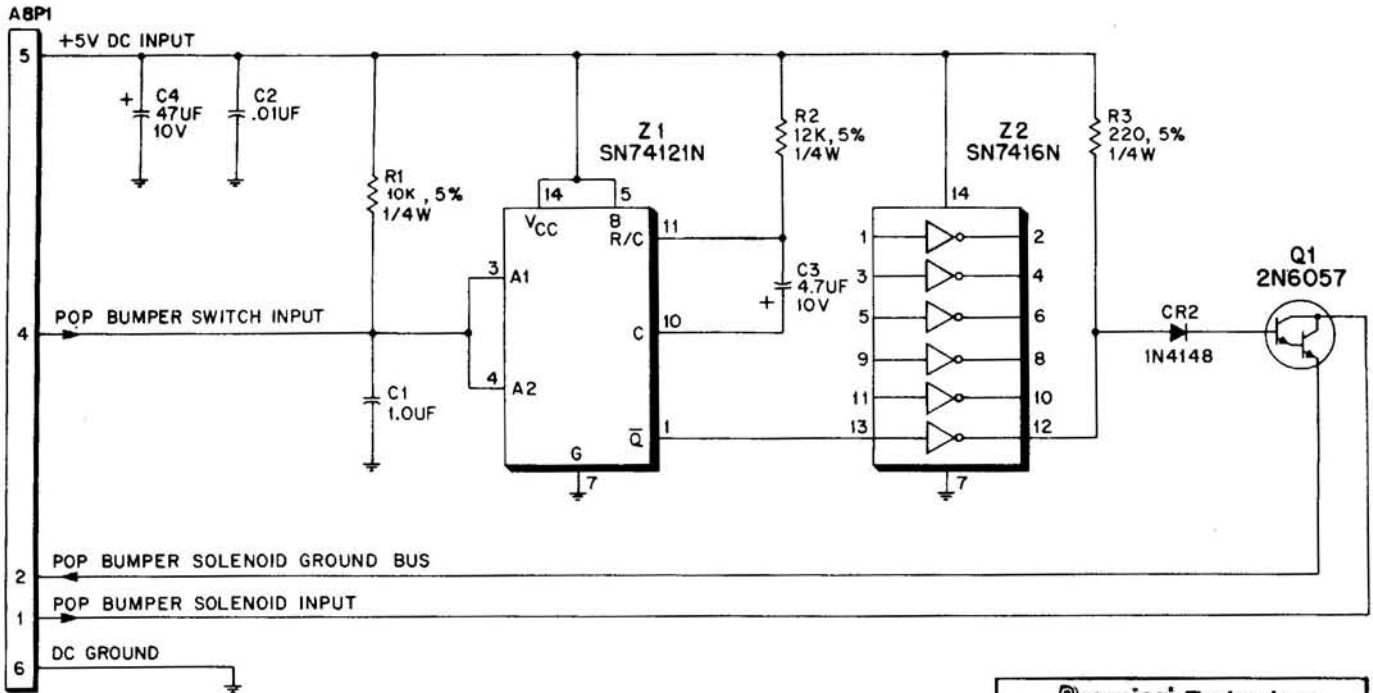
\*Coils may vary from game to game. Check game manual for exact coil usage.

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

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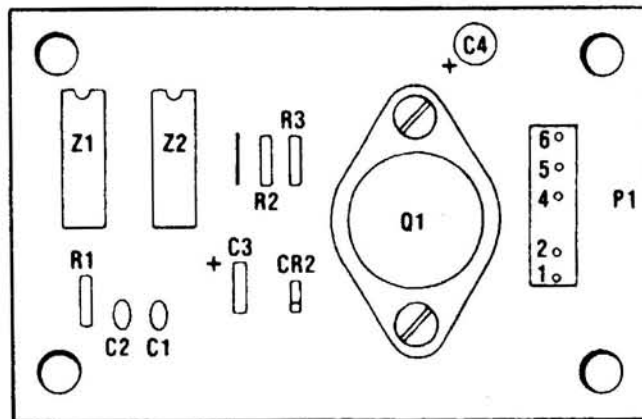
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# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



<b>Premier Technology</b>			
TITLE POP BUMPER DRIVER BOARD (A8)			
USED ON			
DRAWN G.P.S.	APPROVED A.C.	DATE 10-4-82	D-20923

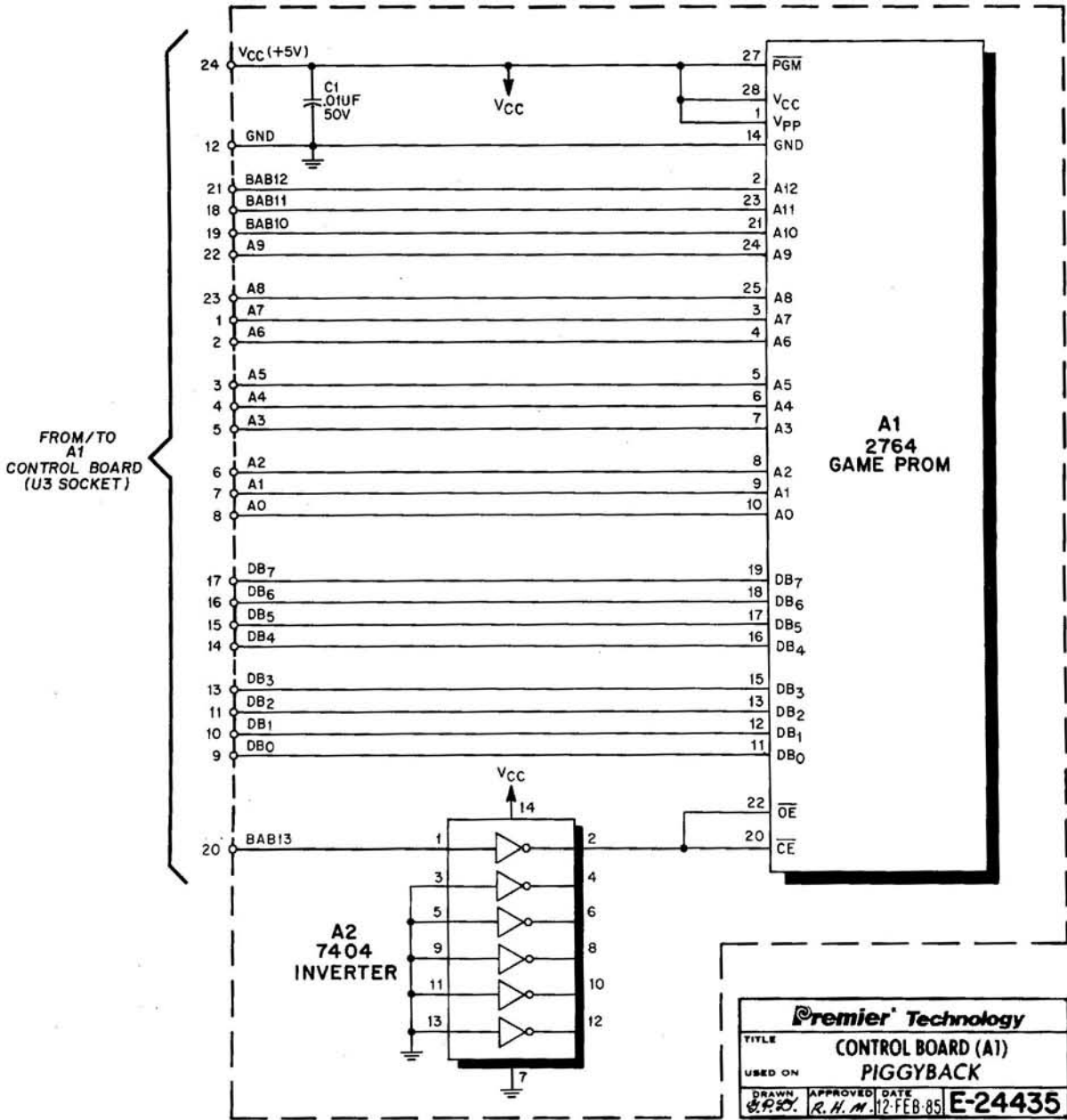
## POP BUMPER DRIVER BOARD (A8) COMPONENT LOCATION



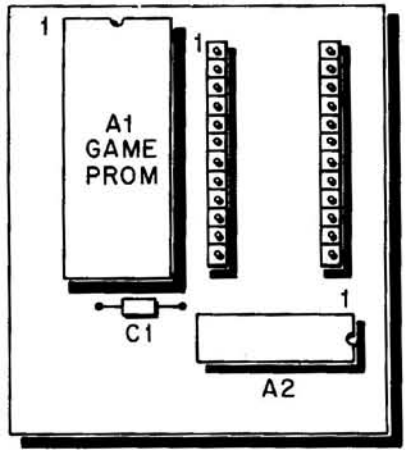
## POP BUMPER DRIVER BOARD (A8) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	POP BUMPER DRIVER BOARD	A-19741
C1	Capacitor, 1 UF, 50V, Non-Polarized	XO-294
C2	Capacitor, .01 UF, 100V	XO-202
C3	Capacitor, 4.7 UF, 10%, 10V Tantalum, Axial	XO-226
C4	Capacitor, 47 UF, 10V	XO-227
CR2	Diode 1N4148	XO-261
P1	Connector	XO-879
R1	Resistor, 10K ohm, 1/4W, 5%	XO-18
R2	Resistor, 12K ohm, 1/4W, 5%	XO-9
R3	Resistor, 220 ohm, 1/4W, 5%	XO-21
Q1	Transistor, Darlington 2N6057	XO-311
Z1	IC SN74121N	XO-417
Z2	IC SN7416N	XO-405

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



**CONTROL BOARD (A1),  
PIGGYBACK  
COMPONENT LOCATION**

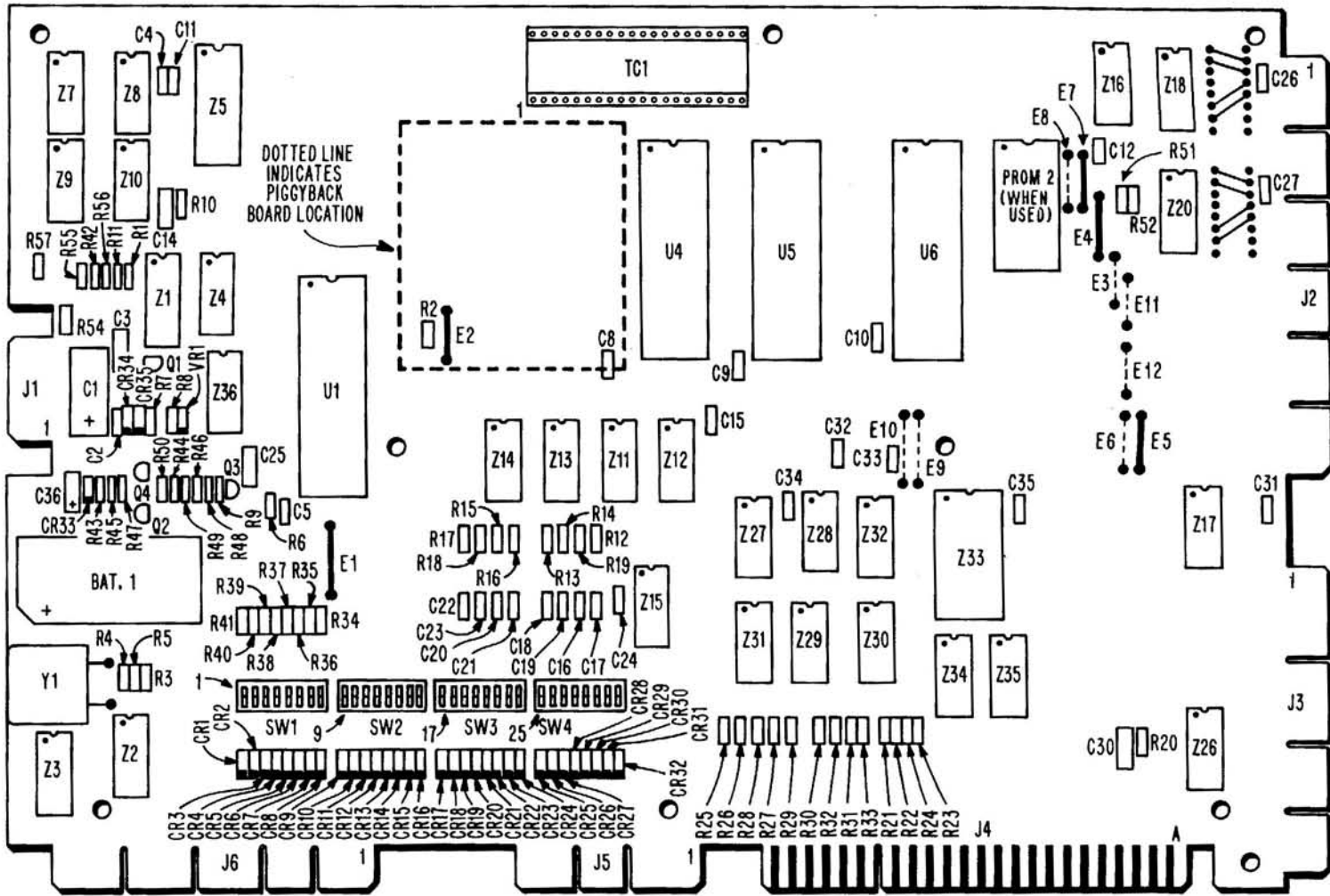


**CONTROL BOARD (A1),  
PIGGYBACK  
PARTS LIST**

REFERENCE	DESCRIPTION	PART NUMBER
A1	Control Board (A1), Piggyback	MA689
A2	Game Prom, 2764	XO-489
C1	IC, 7404 Inverter	XO-402
	Capacitor, .01uF, +80% -20%, 50V	XO-229
	Socket, 28 Pin	XO-536

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

## CONTROL BOARD (A1) COMPONENT LOCATION



## CONTROL BOARD (A1) PARTS LIST

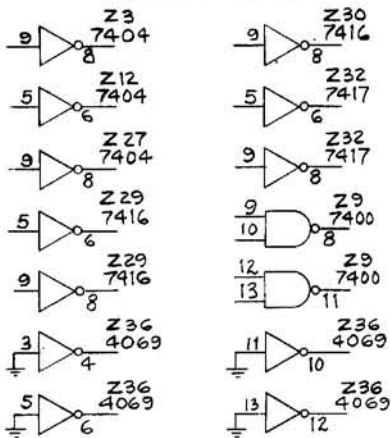
REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
	CONTROL BOARD	MA-774	R47	Resistor, 24K ohm, 5%, 1/4W	XO-10
Bat. 1	Battery-3.6V NI-CAD	XO-458	SW1-SW4	Dip Switch 1008-692	XO-505
C1	Capacitor, 100 mfd., 10V	XO-211	TC1	Socket, 40 Pin 640379-3	XO-530
C2, C4, C5,	Capacitor, .01 mfd., 50V	XO-229	U1	CPU R6502P	XO-360
C8-C12,			U4, U5, U6	PRIOT R6532P	XO-361
C15-C24,			VRI	Diode-3.0V, 5% IN5225B or IN5987B	XO-269
C26, C27,			Y1	Crystal, 3.579545 MHZ	XO-456
C31-C35			Z1	IC-Cmos-Dual 1 Shot SCL4528BE	XO-414
C3, C14, C25,	Capacitor, .1 mfd., 50V	XO-230	Z2	IC-Dual Flip Flop SN7474N	XO-423
C30			Z3, Z11, Z12,	IC-Hex Inverter SN7404N	XO-402
C36	10 mfd., 10V, TNT-AX CAP	XO-209	Z16, Z17,		
CR1-CR35	Diode, GP IN4148	XO-261	Z26, Z27, Z34,		
Q1, Q4	Transistor-PNP MPS-A70	XO-309	Z35		
Q2, Q3	Transistor, NPN (Motorola) 2N4400	XO-313	Z4	IC-Cmos-Quad 2 Input "And" SCL4081BE	XO-401
R1, R6	Resistor, 3.0K ohm, 5%, 1/4W	XO-23	Z5	IC-Static Ram S5101-L	XO-356
R11-R24			Z7	IC-Hex Inverter SN74LS04N	XO-418
R42, R45,			Z8	IC-2 Input "Nor" SN7402N	XO-421
R46, R48,			Z9, Z13, Z14	IC-2 Input "Nand" SN7400N	XO-420
R51, R52,			Z10	IC-Open Collector Inverter SN74LS05N	XO-411
R54-R57			Z15	IC-2 Input "Or" SN7432N	XO-407
R2, R34-R41	Resistor, 4.7K ohm, 5%, 1/4W	XO-7	Z18, Z20	IC-"D" Flip Flop SN74175N	XO-410
R3, R43, R49	Resistor, 5.6K ohm, 5%, 1/4W	XO-19	Z33	IC-4-16 Decoder SN74154N	XO-409
R4, R5, R44	Resistor, 2.0K ohm, 5%, 1/4W	XO-14	Z28	IC-2 to 4 Decoder SN74LS139N	XO-419
R7	Resistor, 62 ohm, 5%, 1/4W	XO-3	Z29, Z30	IC-Hex Inverter-OC/HV SN7416N	XO-405
R8, R50	Resistor, 180 ohm, 5%, 1/4W	XO-24	Z31	IC-2 Input "And" SN7408N	XO-404
R9	Resistor, 1K ohm, 5%, 1/4W	XO-5	Z32	IC-Hex Buffer-OC SN7417N	XO-406
R10	Resistor, 2.7M ohm, 5%, 1/4W	XO-13	Z36	IC-Cmos SCL4069B	XO-424
R25-R33	Resistor, 620 ohm, 5%, 1/4W	XO-4		Socket 24 Pin 640361-3	XO-529

CONTROL BOARD (A1), PIGGYBACK MA689

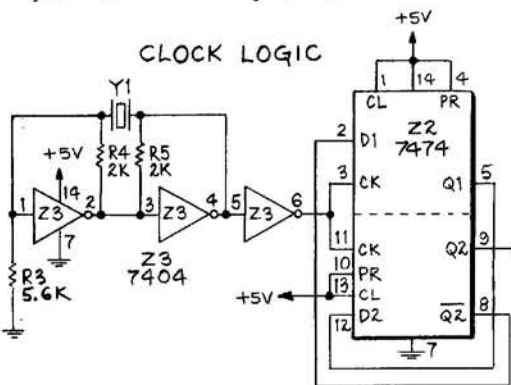


NOTE: UNLESS OTHERWISE INDICATED;  
 1. RESISTORS ARE ±5%, 1/4W.  
 2. CAPACITORS ARE .01UF, 50V.  
 3. DIODES ARE TYPE 1N4148.  
 4. REF. DESIGNATION Z6 NOT USED.

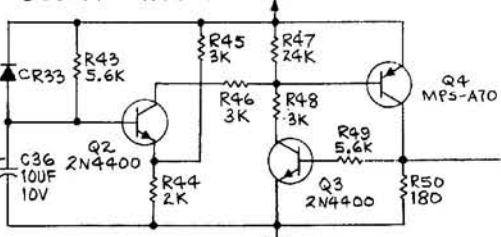
SPARE GATES



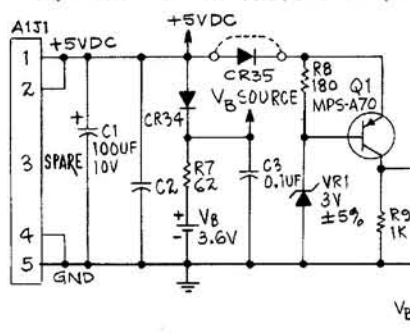
CLOCK LOGIC



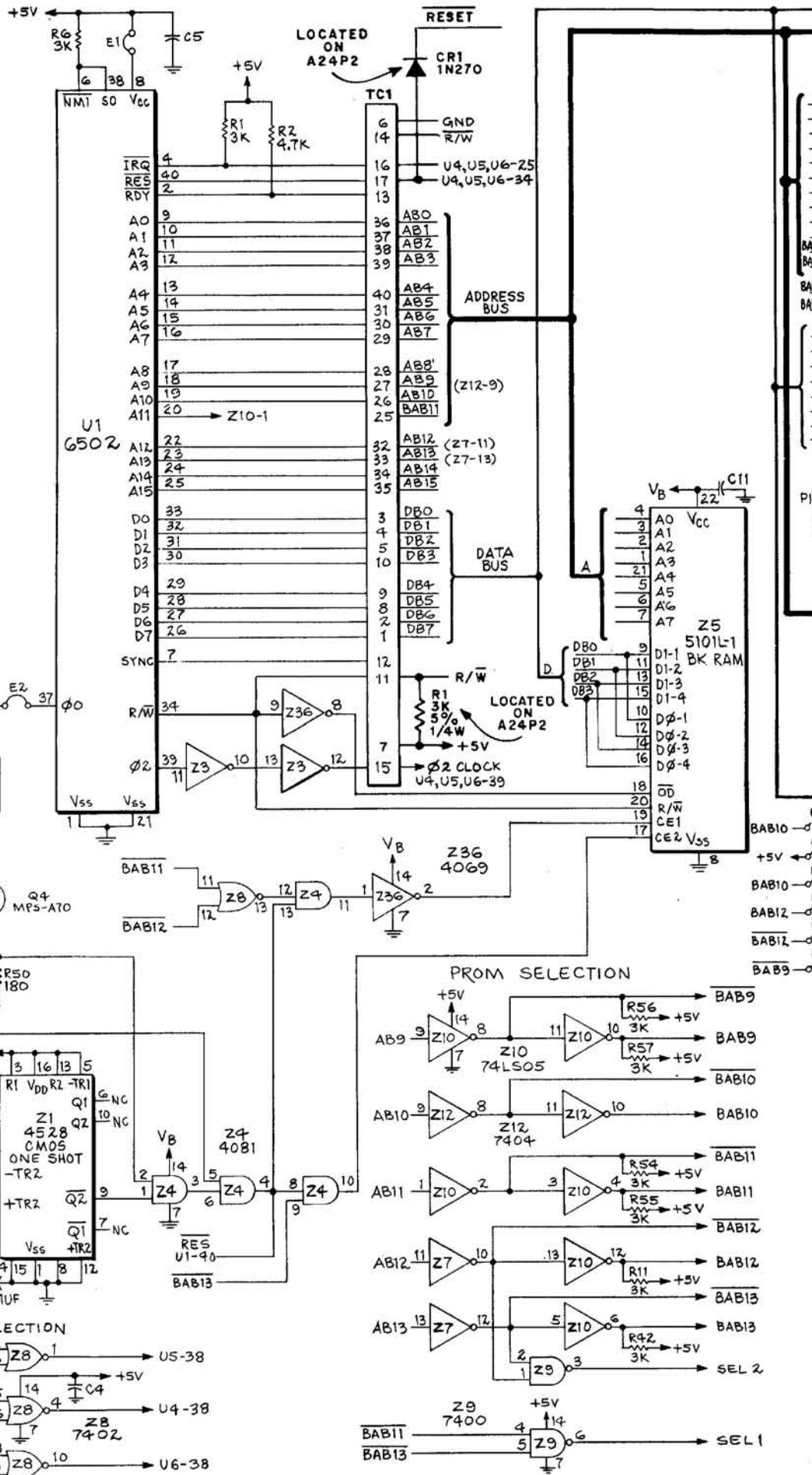
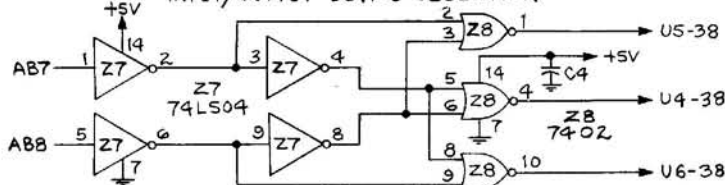
DELAY CIRCUIT



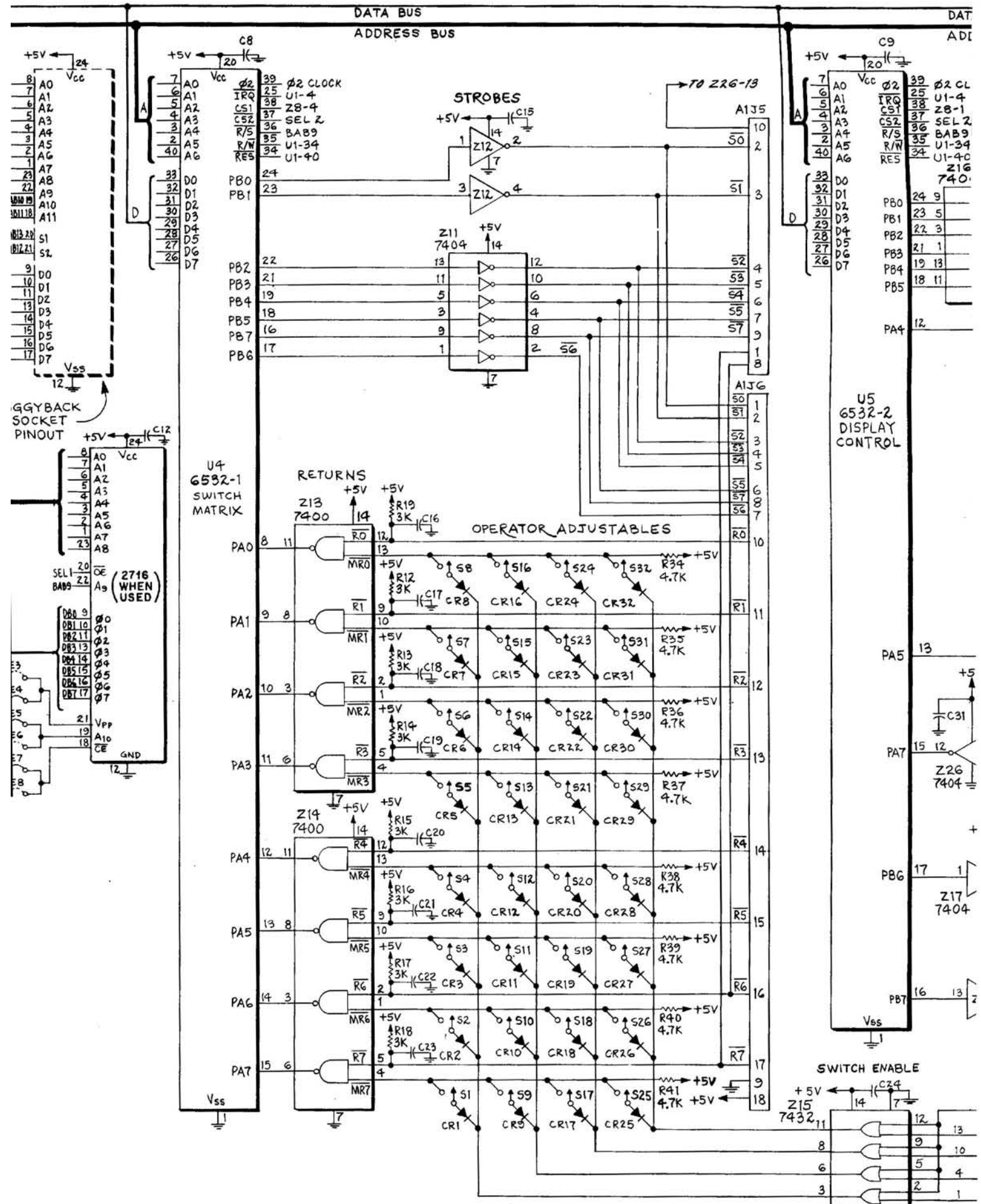
UP/DOWN MEMORY PROTECT LOGIC

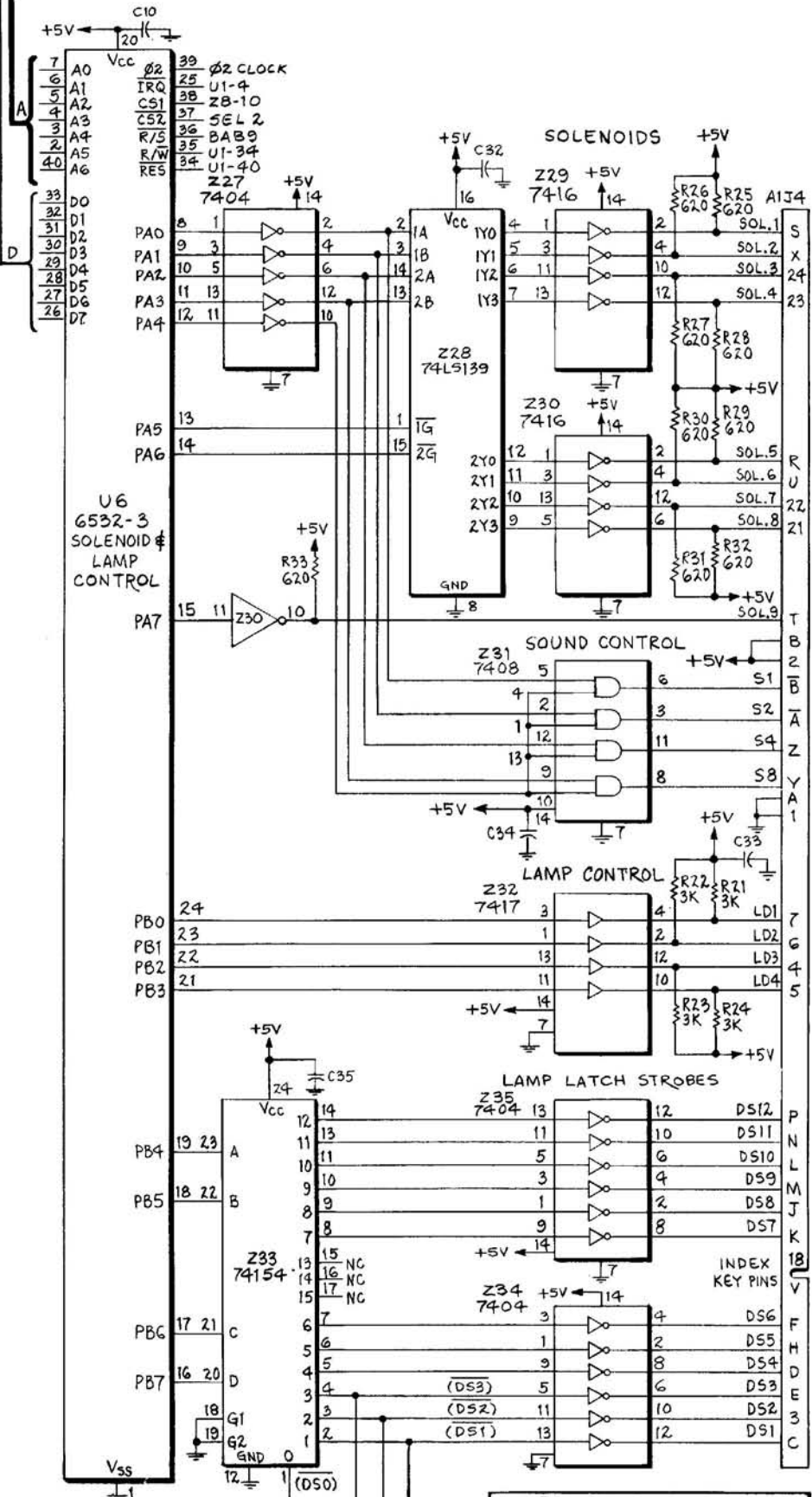
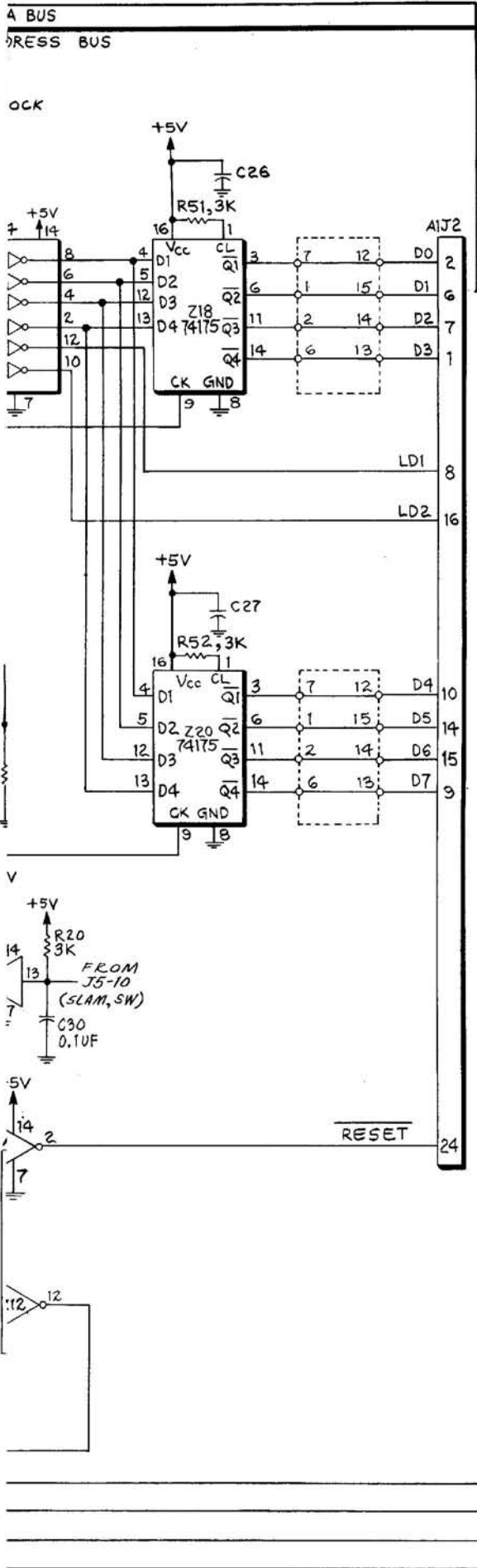


INPUT/OUTPUT DEVICE SELECTION



# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS





**Premier Technology**

TITLE  
**CONTROL BOARD (A1)**

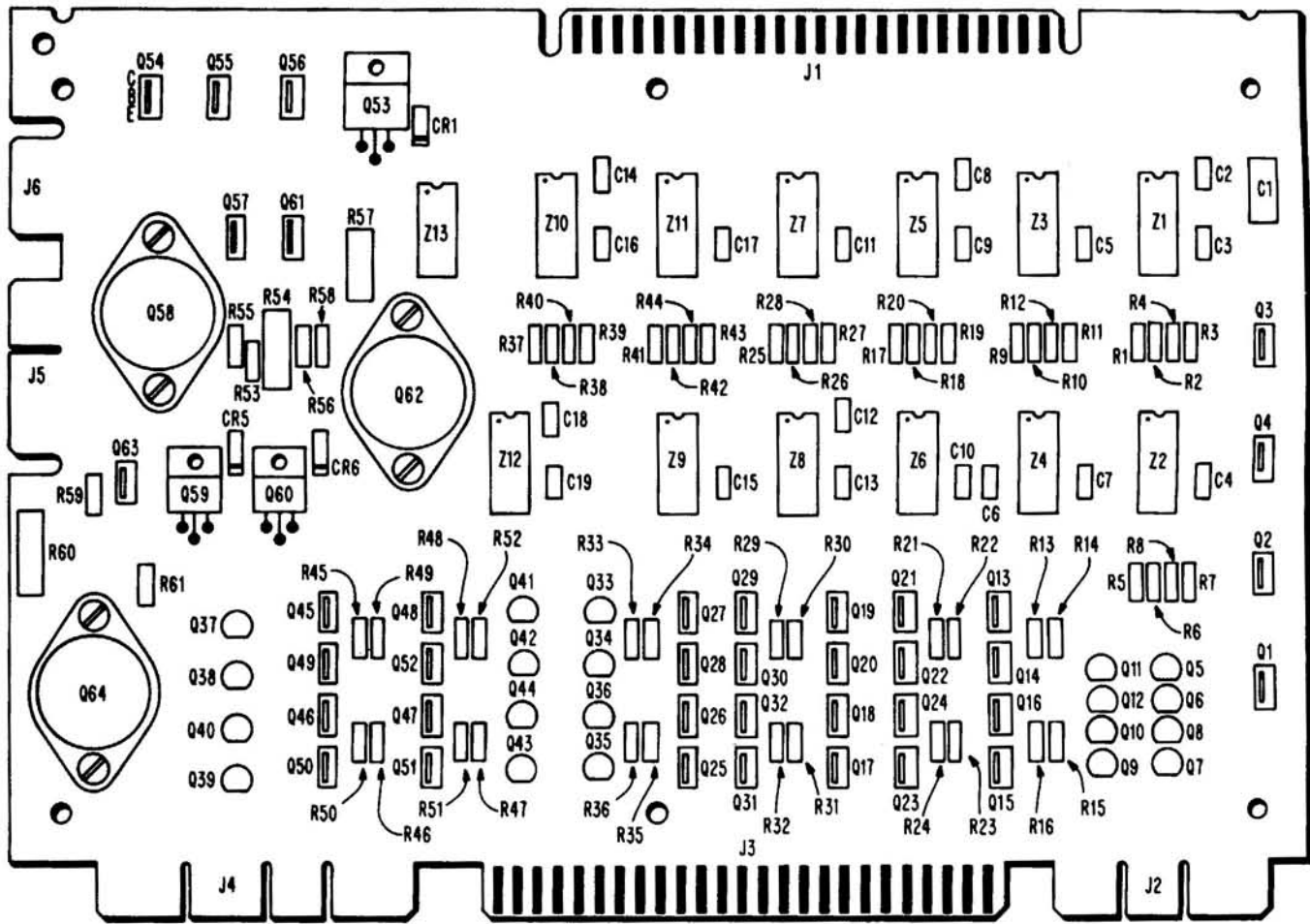
USED ON

DRAWN BY **R.P.** APPROVED DATE **12 FEB 85**

**E-24436**

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

## DRIVER BOARD (A3) COMPONENT LOCATION



FROM  
A1J4  
CONTR  
BOARD  
A3J1



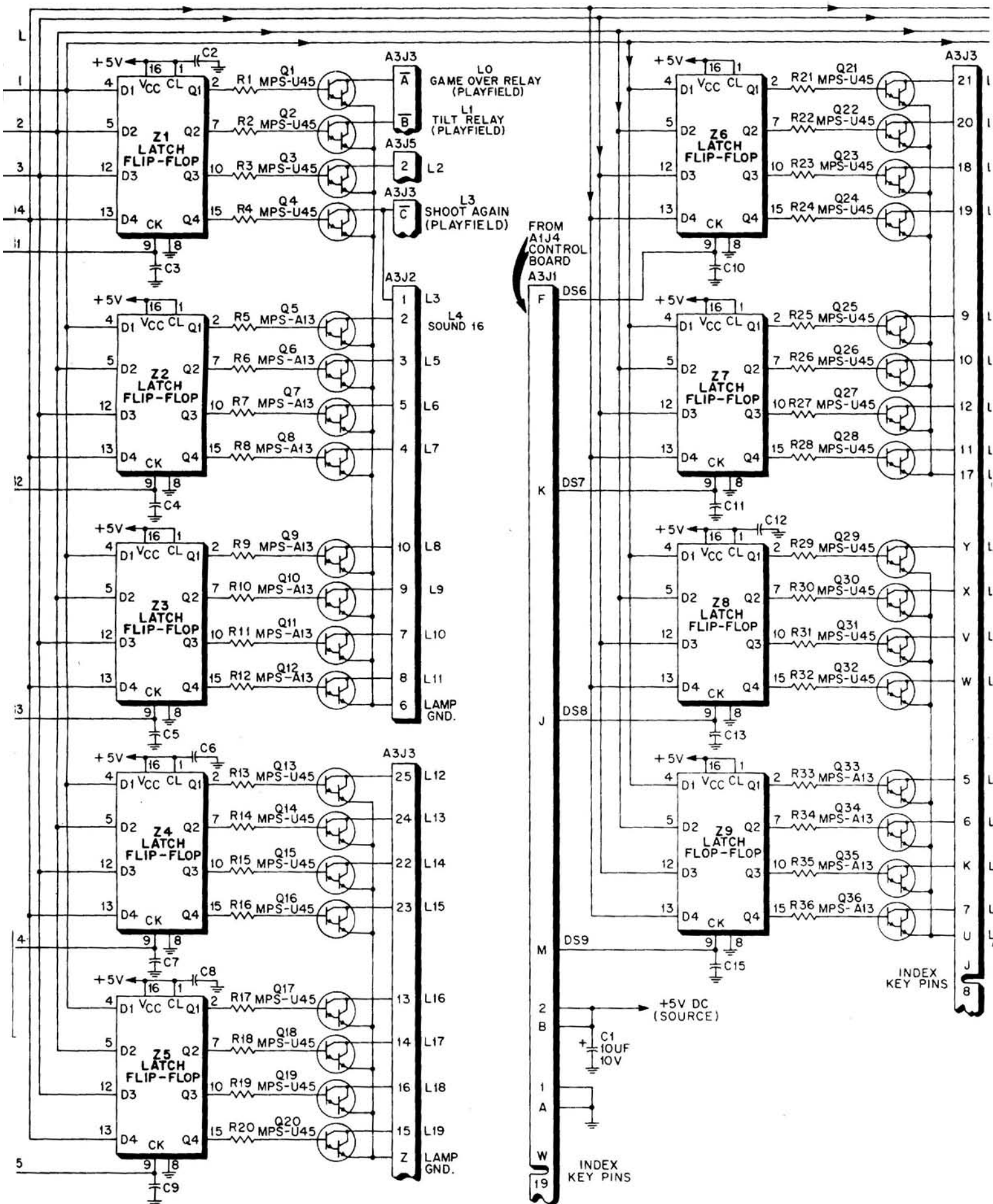
## DRIVER BOARD (A3) PARTS LIST

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 10K ohm, 5%, 1/4W	XO-5
R54, R57, R60	Resistor, 91 ohm, 5%, 1W	XO-158
Q1-Q4, Q13- Q32, Q45-Q52, Q54-Q57, Q61, 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 2N604 3	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:**

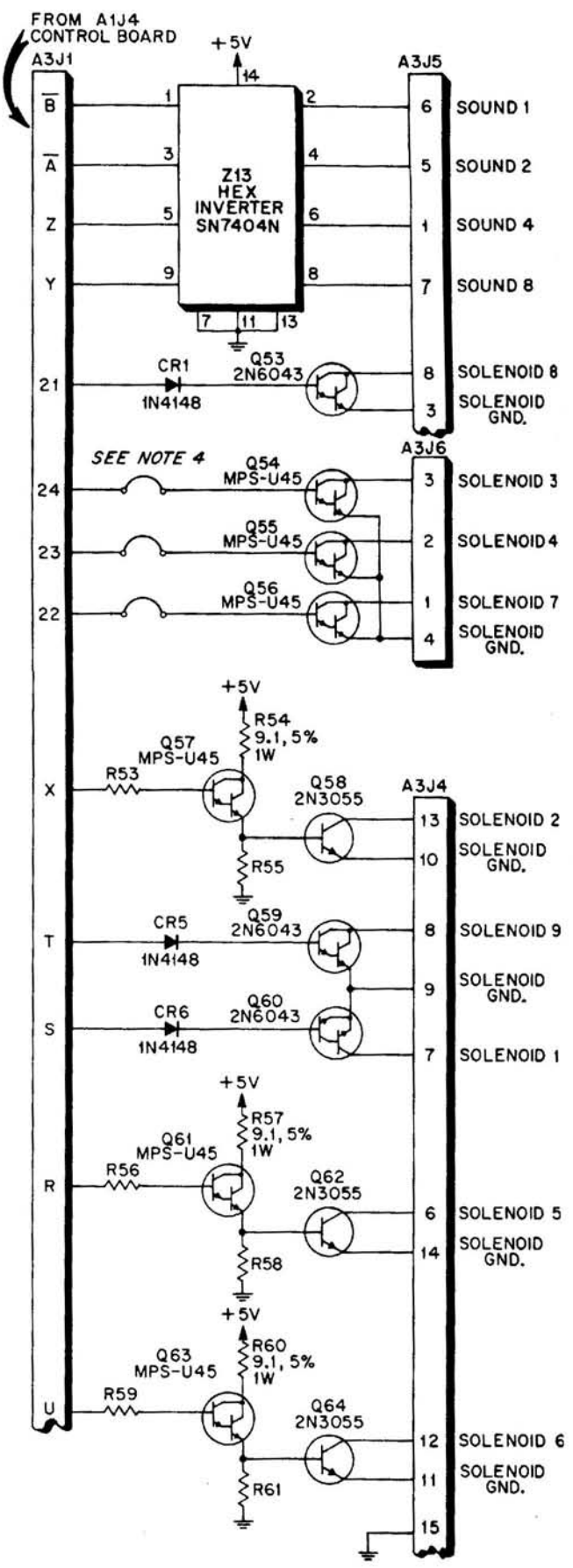
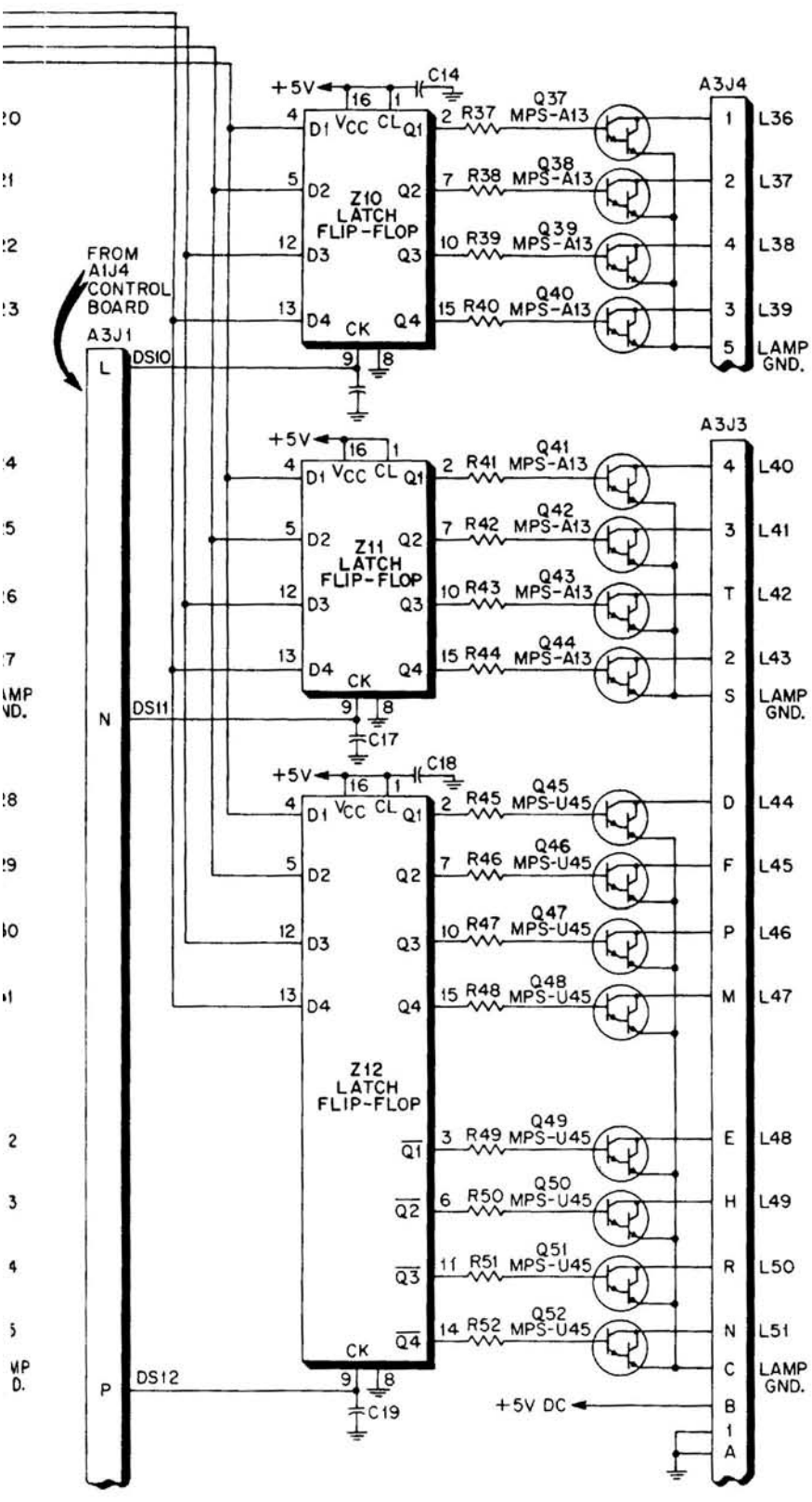
- JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM BOA AND BOB GAMES.
- TRANSISTOR TYPES MPS-U45 AND NSD-U45 ARE INTERCHANGEABLE.

# X. WIRING AND SCHEMAT





# C DIAGRAMS, PARTS LISTS

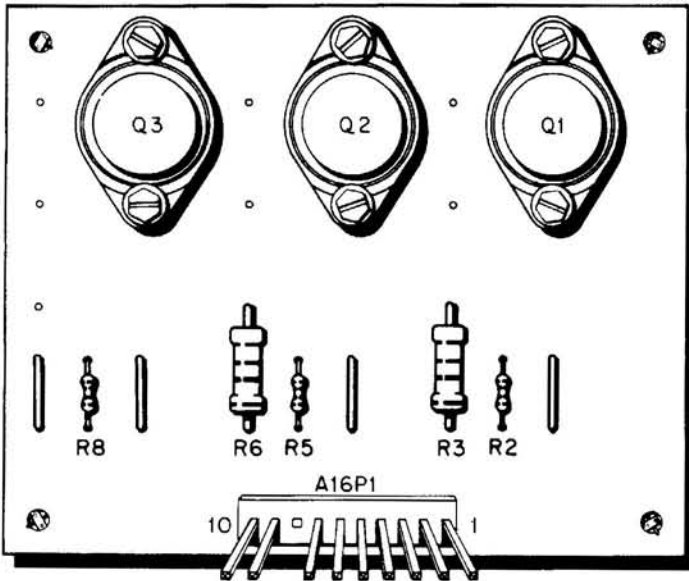


NOTE: UNLESS OTHERWISE INDICATED;  
 1. RESISTORS ARE 1000 OHM, ±5%, 1/4W.  
 2. CAPACITORS ARE .01UF, ±20%, 50V.  
 3. INTEGRATED CIRCUITS ARE SN74175N.  
 4. JUMPER WIRES REPLACED DIODES CR2, CR3 AND CR4 FOR SYSTEM BOA AND BOB GAMES.  
 5. TRANSISTOR TYPES MPS-U45 AND NDS-U45 ARE INTERCHANGEABLE.

<b>Premier Technology</b>			
TITLE DRIVER BOARD (A3)			
USED ON			
DRAWN B.P.S.	APPROVED B.A.M.	DATE 12-12-80	E-20915

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

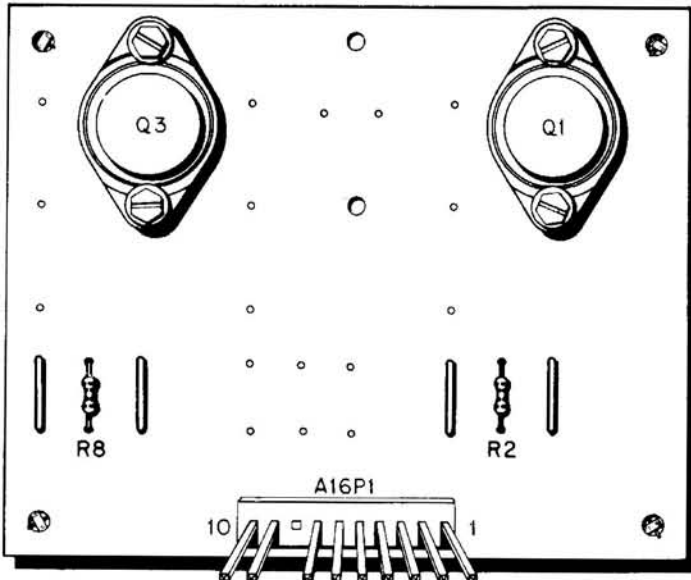
## TRANSISTOR DRIVER BOARD (A16) COMPONENT LOCATION



## TRANSISTOR DRIVER BOARD (A16) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Transistor Driver Board Assembly (2A16)	MA-1104
Q1-Q3	Transistor, MJ2955	XO-799
R2, R5, R8	Resistor, 4.7K Ohm, 5%, 1/4W	XO-7
R3, R6	Resistor, 8 Ohm, 5W, WW	XO-876
P1	10 Position Connector	XO-879
	Circuit Board Support (4)	MP-40

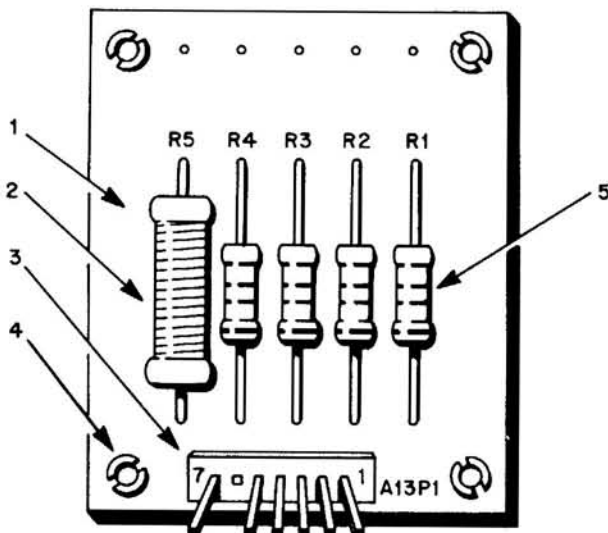
## TRANSISTOR DRIVER BOARD (A16) COMPONENT LOCATION



## TRANSISTOR DRIVER BOARD (A16) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Transistor Driver Board Assembly (2A16)	MA-1079
Q1	Transistor, MJ2955	XO-799
Q3	Transistor, 2N5879	XO-323
R2, R8	Resistor, 4.7K Ohm, 5%, 1/4W	XO-7
P1	10 Position Connector	XO-879
	Circuit Board Support (4)	MP-40

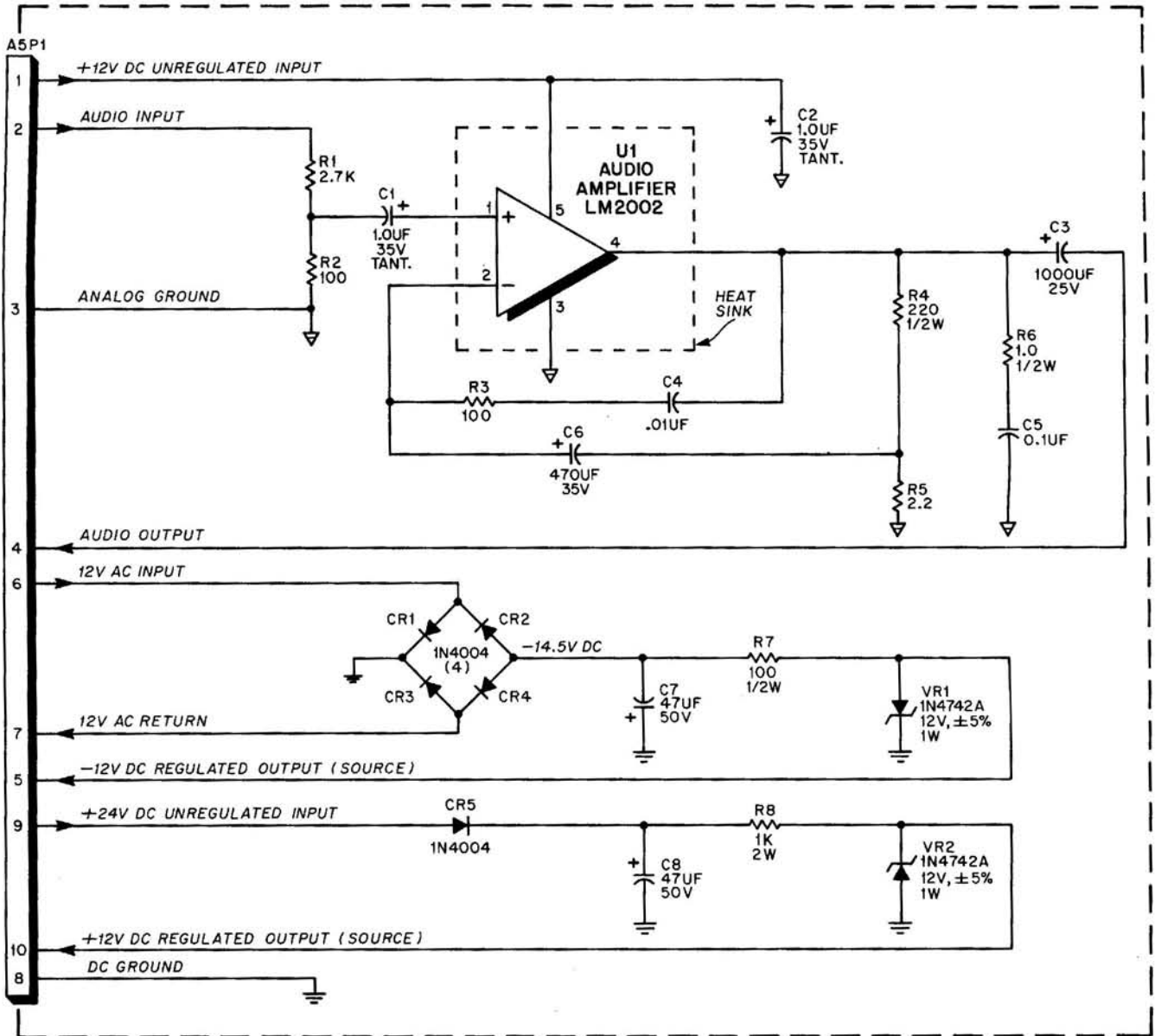
## RESISTOR BOARD (A13)



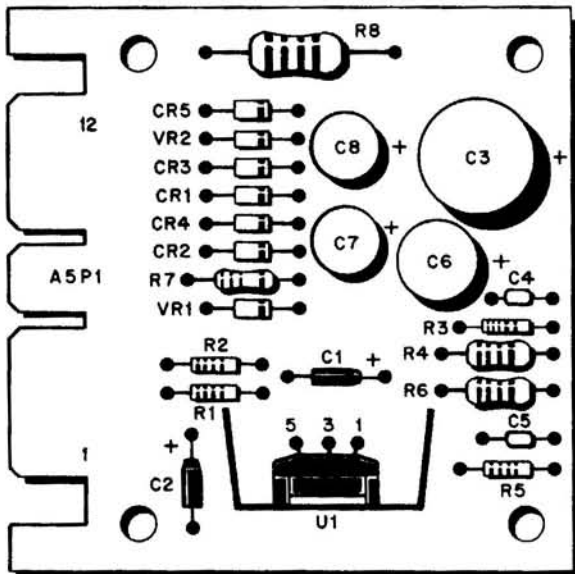
## RESISTOR BOARD (A13) PARTS LIST

ITEM	DESCRIPTION	PART NO.
1	Resistor Board Assembly (A13)	MA-1101
2	Resistor, 4 Ohm, 7W, 5%, WW	XO-878
3	7 Position Connector (A13P1)	XO-879
4	Spacer (4)	23984
5	Resistor, 8 Ohm, 5W, WW (4)	XO-876

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



## AUXILIARY POWER SUPPLY (A5) COMPONENT LOCATION



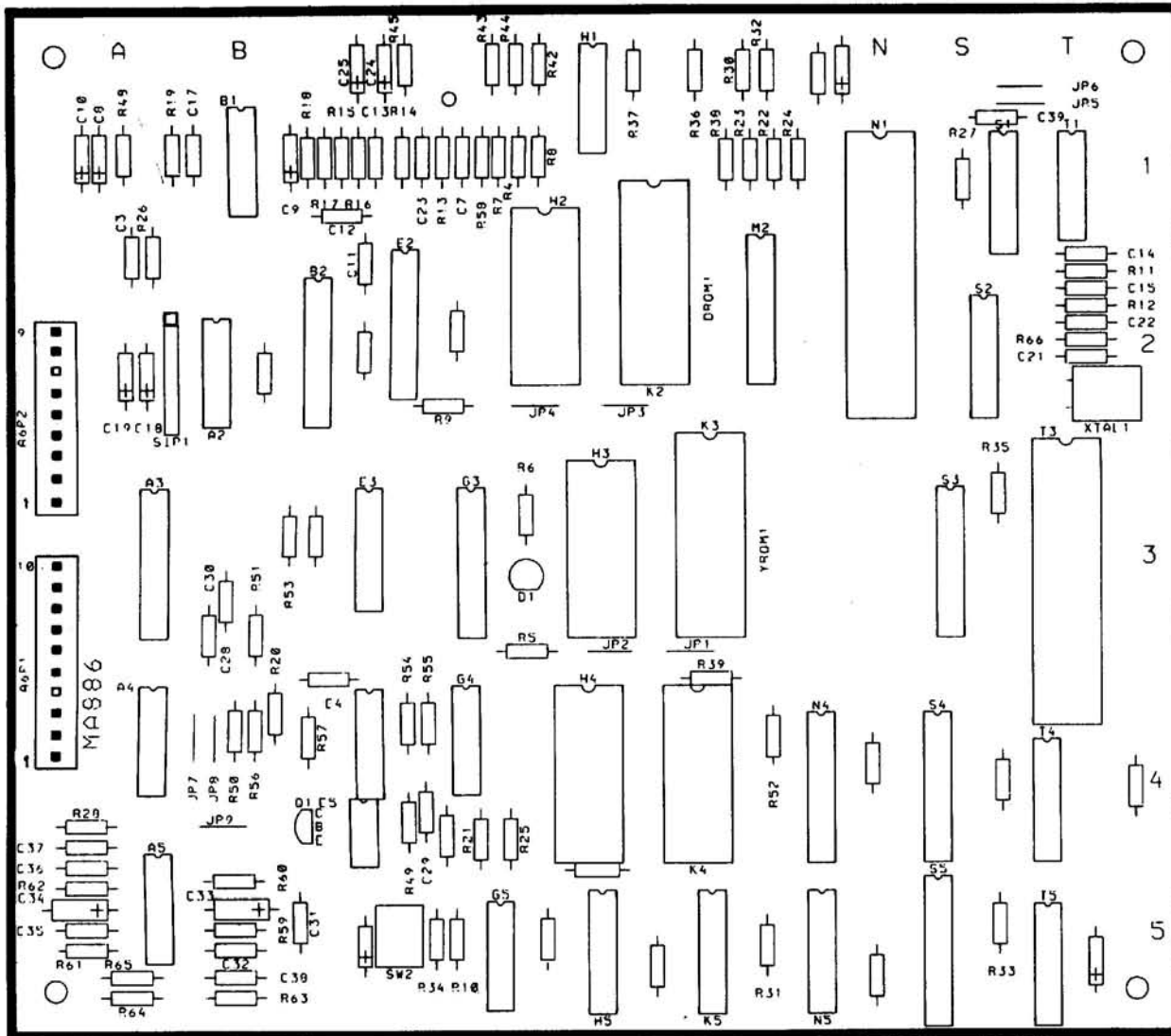
<b>Premier Technology</b>			
TITLE <b>AUXILIARY POWER SUPPLY (A5)</b>			
USED ON			
DRAWN 8/20	APPROVED R.H.M.	DATE 9-0CT-85	<b>E-24715</b>

## AUXILIARY POWER SUPPLY (A5) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Auxiliary Power Supply	MA-767
C1, C2	Capacitor, 1UF, 10%, 35V, TANT	XO-715
C3	Capacitor, 1000UF, 25V	XO-874
C4	Capacitor, .01UF, +80% -20%, 50V	XO-229
C5	Capacitor, 0.1UF, +80% -20%, 50V	XO-230
C6	Capacitor, 470UF, 35V	XO-284
C7, C8	Capacitor, 47UF, 50V	XO-210
CR1-CR5	Diode, 1N4004	XO-254
R1	Resistor, 2.7K Ohm, 5%, 1/4W	XO-6
R2, R3	Resistor, 100 Ohm, 5%, 1/4W	XO-28
R4	Resistor, 220 Ohm, 5%, 1/2W	XO-185
R5	Resistor, 2.2 Ohm, 5%, 1/4W	XO-595
R6	Resistor, 1 Ohm, 5%, 1/2W	XO-593
R7	Resistor, 100 Ohm, 5%, 1/2W	XO-52
R8	Resistor, 1K Ohm, 5%, 2W	XO-627
U1	Audio Amplifier, LM2002	XO-550
VR1, VR2	Diode, Zener, 1N4742A, 12V, +5%, 1W	XO-257
	Heat Sink	XO-472

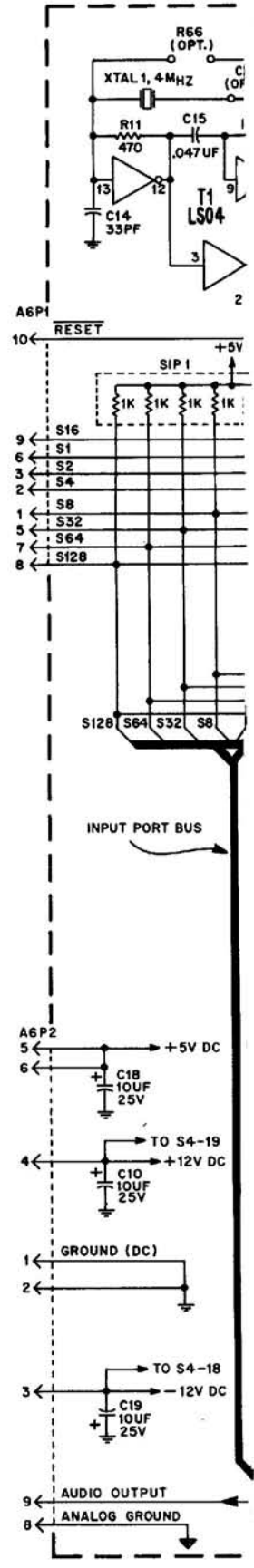
# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

## SOUND BOARD (A6) COMPONENT LOCATION



## SOUND BOARD (A6) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER	REFERENCE	DESCRIPTION	PART NUMBER
C7, C13, C17, C23, C29, C37, C8, C9, C10, C18, C19, C24, C25, C33, C34	Sound Board Assembly Capacitor, 1UF, 20%, 50V (Non-Polarized)	MA-886 XO-746	R20, R34	Resistor, 4.7K Ohm, 5%, 1/4W	XO-7
C11, C12	Capacitor, 10UF, 20%, 25V (Tantalum)	XO-127	R24, R56	Resistor, 2.2K Ohm, 5%, 1/4W	XO-27
C14, C22	Capacitor, 10UF, 20%, 25V (Tantalum)	XO-127	R36, R45, R61, R62, R63, R64	Resistor, 33K Ohm, 5%, 1/4W	XO-43
C28, C30, AND FOURTEEN UNMARKED CAPACITORS	Capacitor, 10PF, +80%-20%, 50V	XO-635	R37	Resistor, 2.7K Ohm, 5%, 1/4W	XO-6
C31, C32	Capacitor, 0.1UF, 10%, 50V	XO-784	R49, R59, R60	Resistor, 100K Ohm, 5%, 1/4W	XO-45
C35	Capacitor, 1000PF, 10%, 100V	XO-296	R57	Resistor, 12K Ohm, 5%, 1/4W	XO-9
C36	Capacitor, 2200PF, 10%, 100V	XO-289	R65	Resistor, 27K Ohm, 5%, 1/4W	XO-11
C38	Capacitor, .0033UF, 10%, 100V	XO-600	A2	IC, 7430, 8 Input NAND Gate	XO-643
C39	Capacitor, 220PF, 10%, 100V	XO-694	A3, B2, S5	IC, 74LS374, Octal "D" Flip Flop	XO-96
D1	Diode, MV5752, (LED, Red)	XO-270	A4, E4, H1	IC, 74LS74, Dual "D" Flip Flop	XO-434
R4, R7, R8, R22, R23	Resistor, 68 Ohm, 5%, 1/4W	XO-748	A5, B1, H1	IC, LM324, Quad Op-Amp	XO-644
R5, R9, R10, R27, R28, R31, R33, R35, R39, R52, R54, R55	Resistor, 1K Ohm, 5%, 1/4W	XO-5	E2	IC, AD7528J, Multiplier DAC	XO-647
R6	Resistor, 240 Ohm, 5%, 1/4W	XO-173	E3	IC, 74HC592, 8 Bit Counter	XO-892
R11, R12	Resistor, 470 Ohm, 5%, 1/4W	XO-35	E5	IC, MF-4CN-50, Switched Capacitor Filter	XO-894
R13, R14, R21, R25	Resistor, 3K Ohm, 5%, 1/4W	XO-23	G3, N4	IC, 74LS377, Octal "D" Flip Flop	XO-97
R15	Resistor, 18K Ohm, 5%, 1/4W	XO-762	G4, T1	IC, 74LS04, Hex Inverter	XO-418
R16, R17, R30, R32, R38, R42, R43, R44, R50, R51	Resistor, 10K Ohm, 5%, 1/4W	XO-18	G5	IC, 74HC08, Quad 2 Input "AND" Gate	XO-872
R18, R53	Resistor, 6.8K Ohm, 5%, 1/4W	XO-8	H2, H3	IC, 6116P-3, 2K x 8 RAM	XO-193
			H4, K4	IC, AY-3-8913, Sound Generator	XO-646
			H5, K5, N5, S1, T5	IC, 74LS161, Synchronous Presettable Binary Counter	XO-440
			K2, K3	IC, Specified Per Game	XO-79
			M2	IC, 74LS245, Octal Bus Transceiver	XO-893
			N1, T3	IC, 6502A, CPU	XO-419
			S2	IC, 74LS139, Dual 1 of 4 Decoder	XO-891
			S3	IC, 74HCT245, Octal Bus Transceiver	XO-437
			T4	IC, 74LS138, 1 of 8 Decoder	XO-895
			Q1	Transistor, 2N4264, Level Shifter	XO-493
			SIP 1	Resistor Pack 8 x 1K Ohm	XO-897
			SW2	Switch, Pushbutton	XO-366
			XTAL 1	Crystal, 4 MHz	XO-879
			A6P1, A6P2	Connector (2)	XO-536 XO-469
				28 Pin Dip Socket (2)	XO-536
				Jumper, 22 Gauge (7)	XO-469



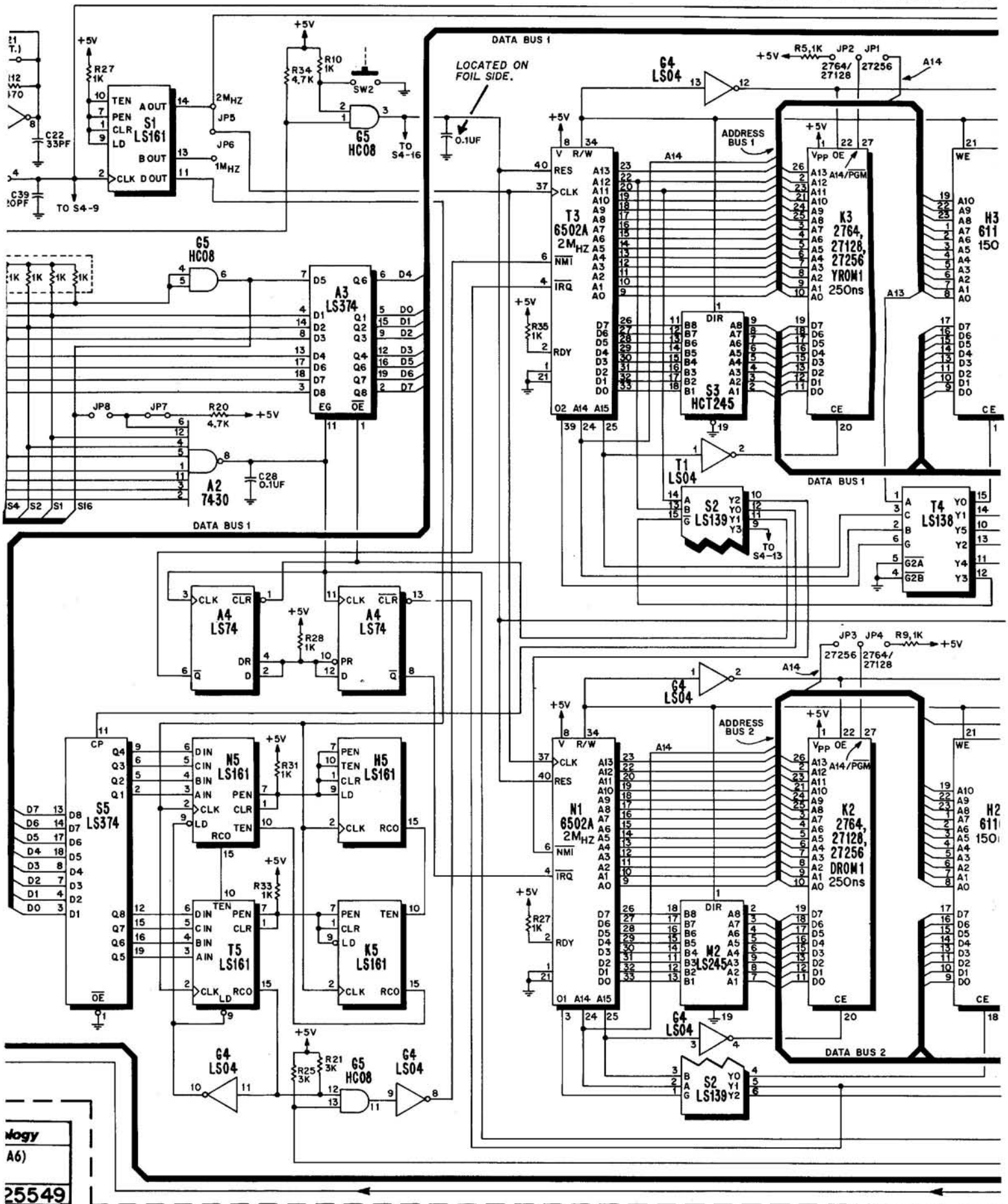
**Premier Techn**

**TITLE**  
**SOUND BOARD**

USED ON

DRAWN APPROVED DATE  
G.P.C. R.H.M. 6 AUG 87 E

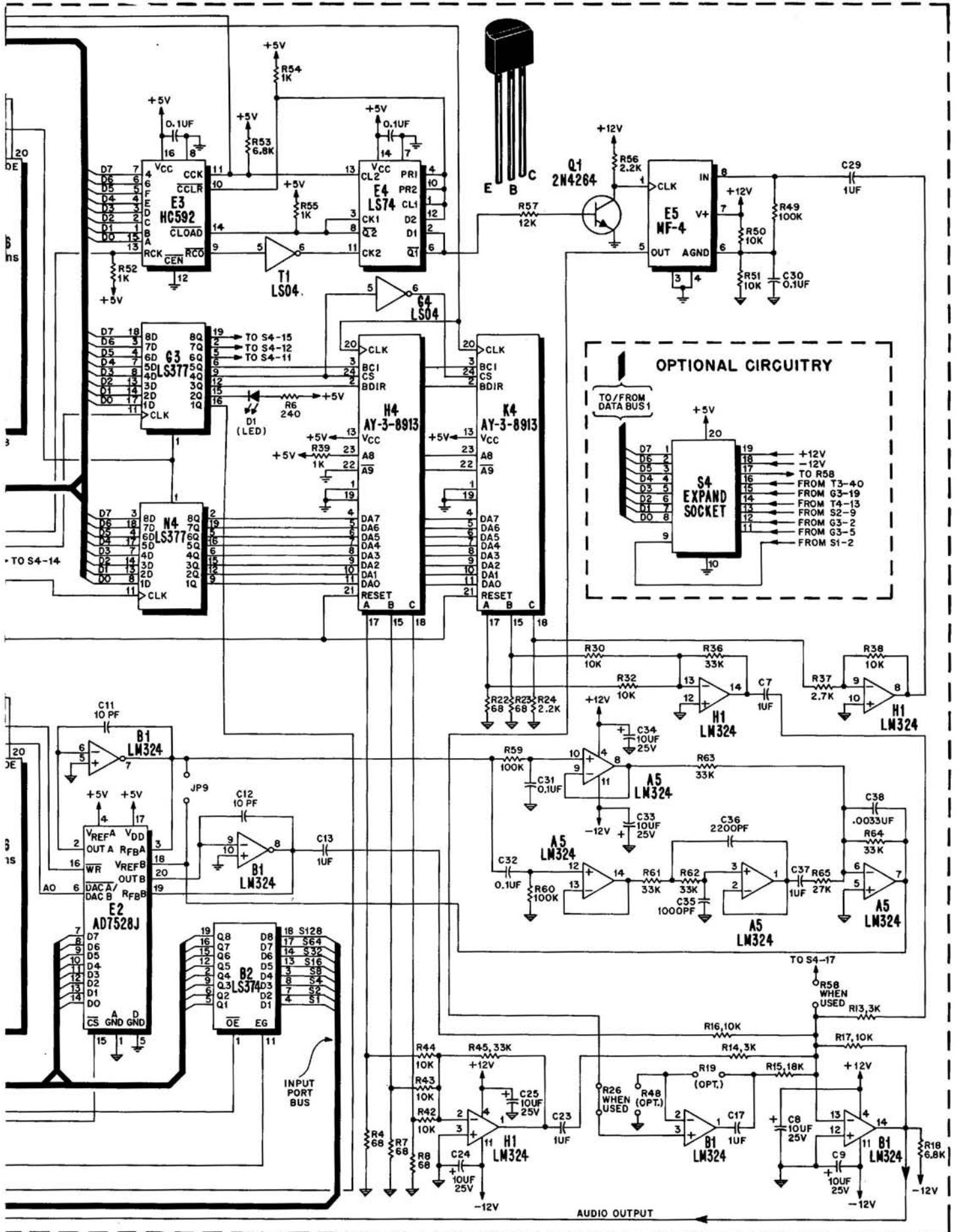
# X. WIRING AND SCHEMAT



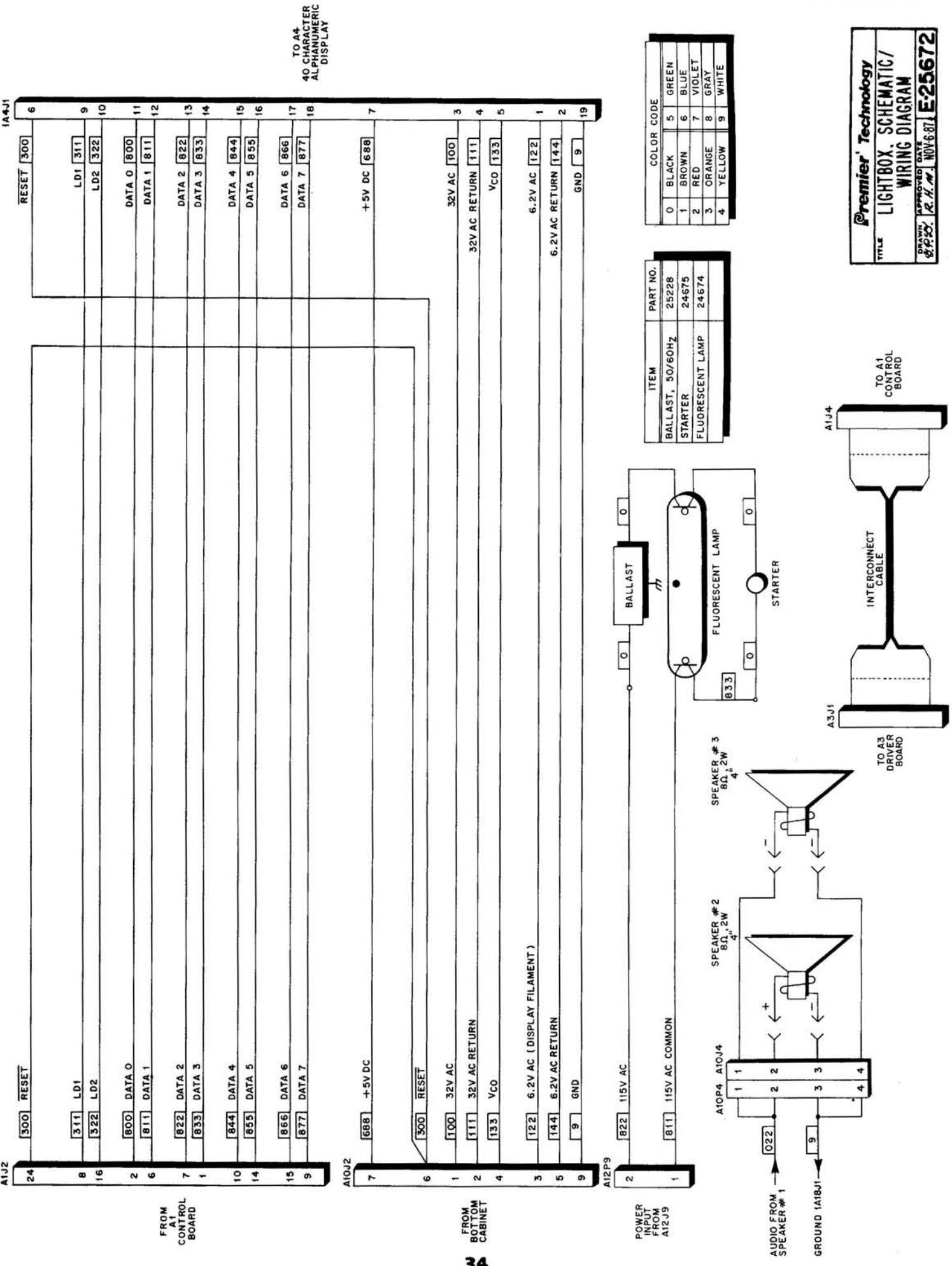
logy  
A6)  
25549



# IC DIAGRAMS, PARTS LISTS



# X. WIRING AND SCHEMATIC



TO A4  
40 CHARACTER  
ALPHANUMERIC  
DISPLAY

FROM  
A1  
CONTROL  
BOARD

FROM  
BOTTOM  
CABINET

POWER  
INPUT  
FROM  
A12J9

AUDIO FROM  
SPEAKER #1

GROUND (A18J1)

TO A1  
CONTROL  
BOARD

TO A3  
DRIVER  
BOARD

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

ITEM	PART NO.
BALLAST, 50/60HZ	25228
STARTER	24675
FLUORESCENT LAMP	24674

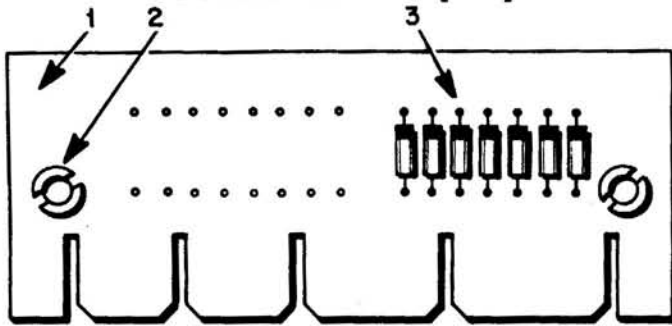
**Premier Technology**

TITLE: LIGHTBOX, SCHEMATIC/  
WIRING DIAGRAM

DRAWN: R.H.M. APPROVED DATE: NOV-68 E:25672

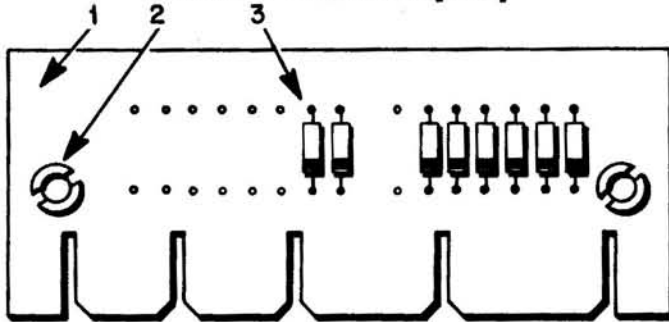
# IC DIAGRAMS, PARTS LISTS

## DIODE BOARD (A7)



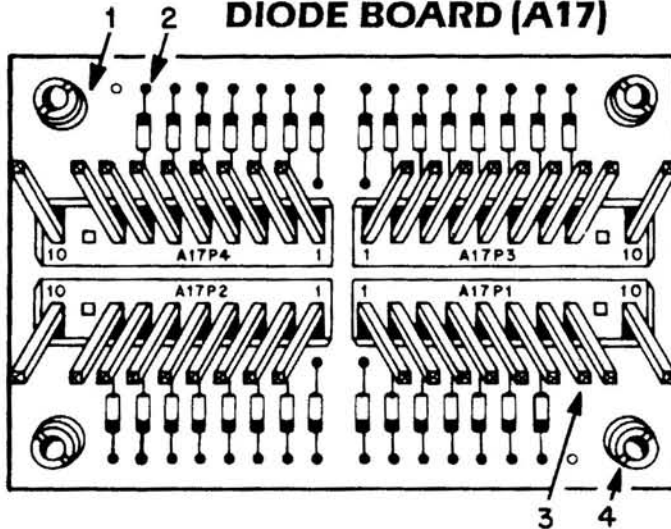
DIODE BOARD (A7)		
ITEM	DESCRIPTION	PART NO.
1	Diode Board Assembly (A7)	25833
2	Spacer (2)	23984
3	Diode, 1N270 (7)	XO-265

## DIODE BOARD (A7)



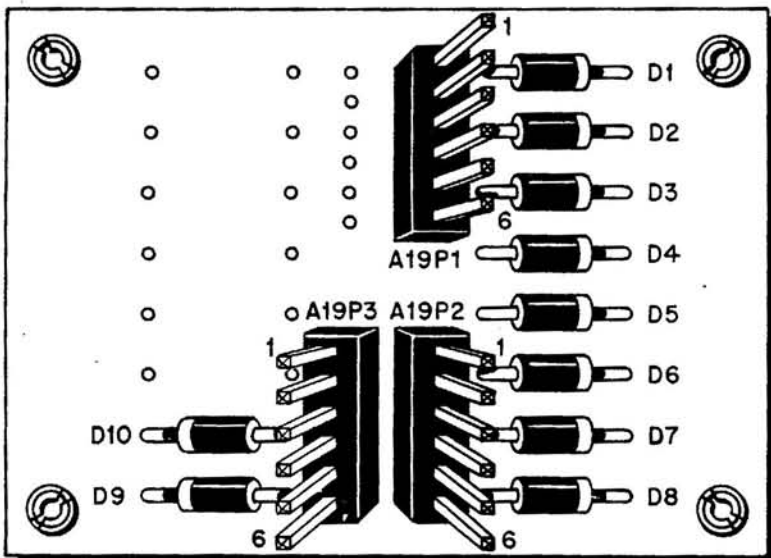
DIODE BOARD (A7)		
ITEM	DESCRIPTION	PART NO.
1	Diode Board Assembly (A7)	24252
2	Spacer (2)	23984
3	Diode, 1N270 (8)	XO-265

## DIODE BOARD (A17)



DIODE BOARD (A17)		
ITEM	DESCRIPTION	PART NO.
1	Diode Board Assembly (1A17)	MA-987
2	Diode, 1N270 (30)	XO-265
3	10 Position Connector (4)	XO-879
4	Spacer (4)	23984

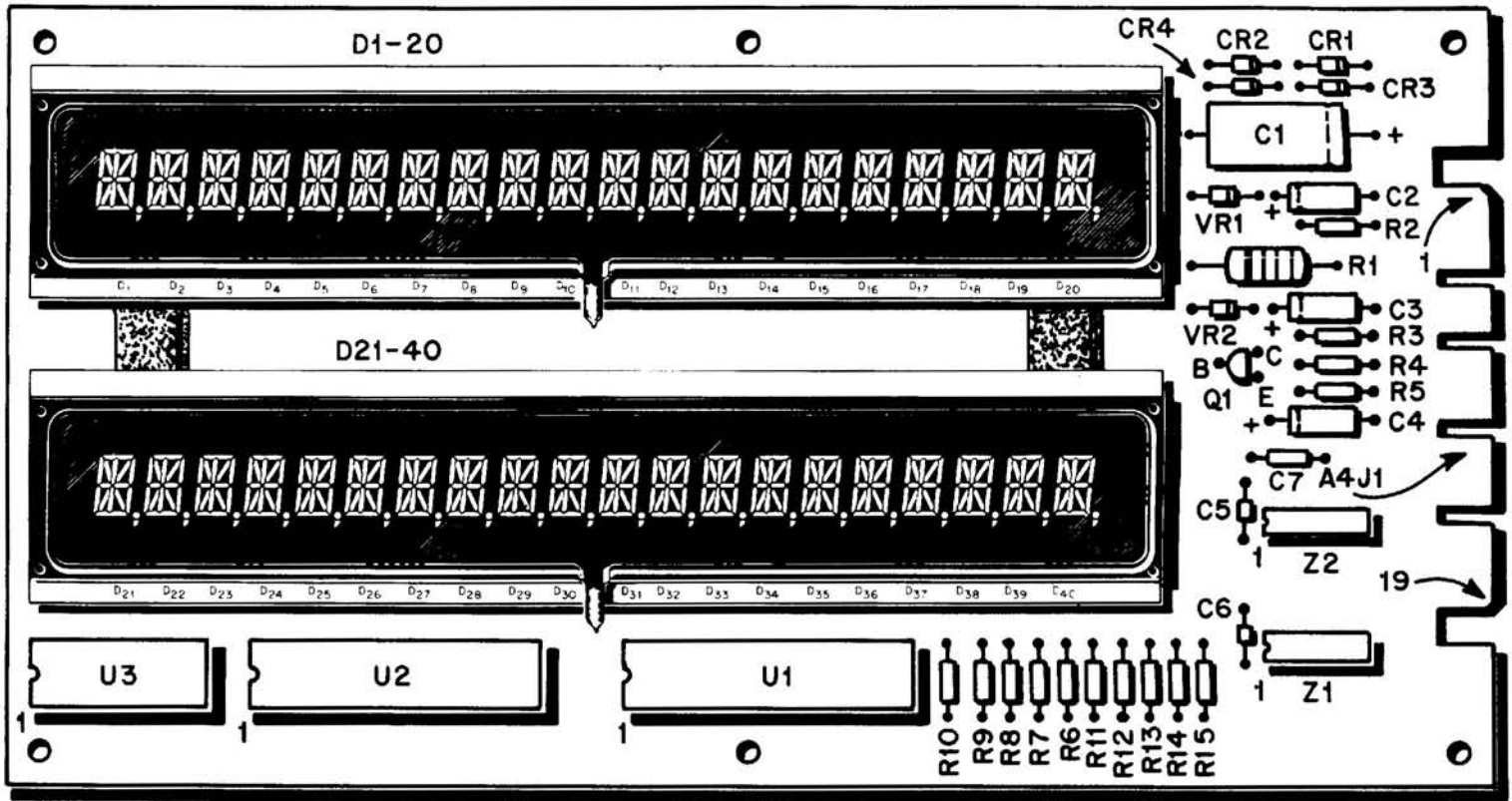
## SWITCHING DIODE BOARD (A19)



SWITCHING DIODE BOARD (A19)		
ITEM	DESCRIPTION	PART NO.
	Switching Diode Assembly (A19)	MA-1102
D1-D8	Diode, 1N5401 (10)	XO-263
A19P1, A19P2	6 Position Connector (2)	XO-879
	Spacer (4)	23984

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

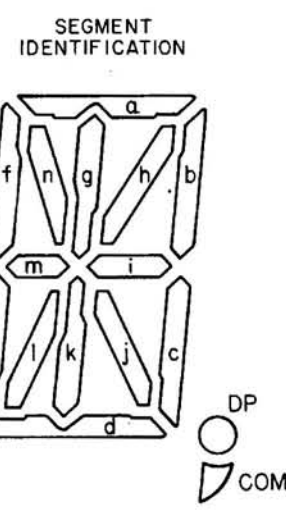
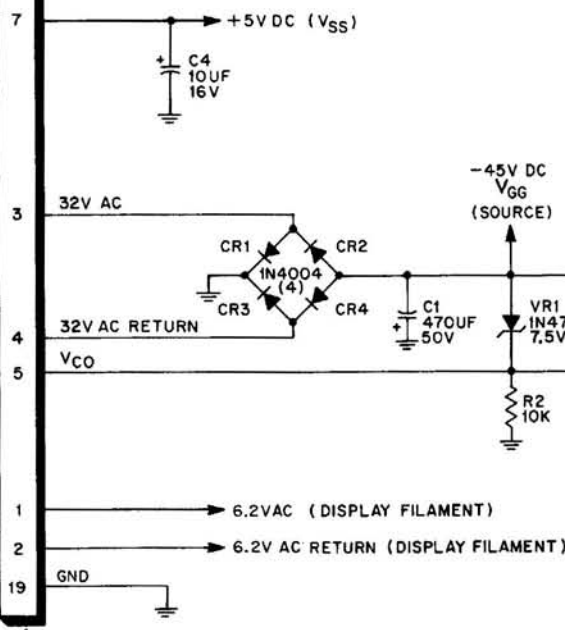
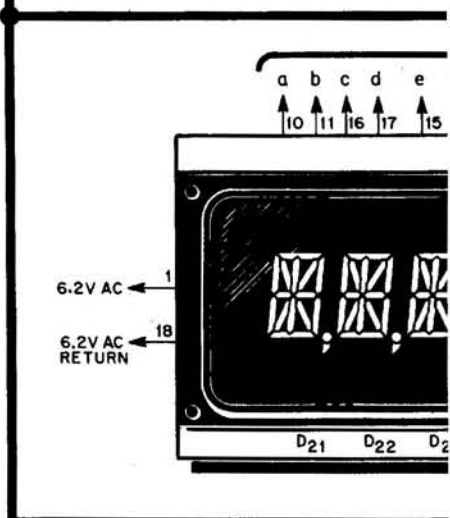
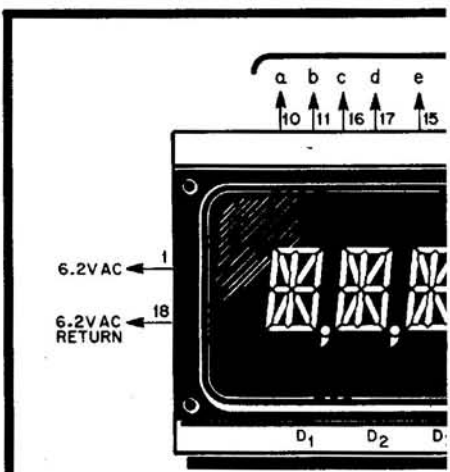
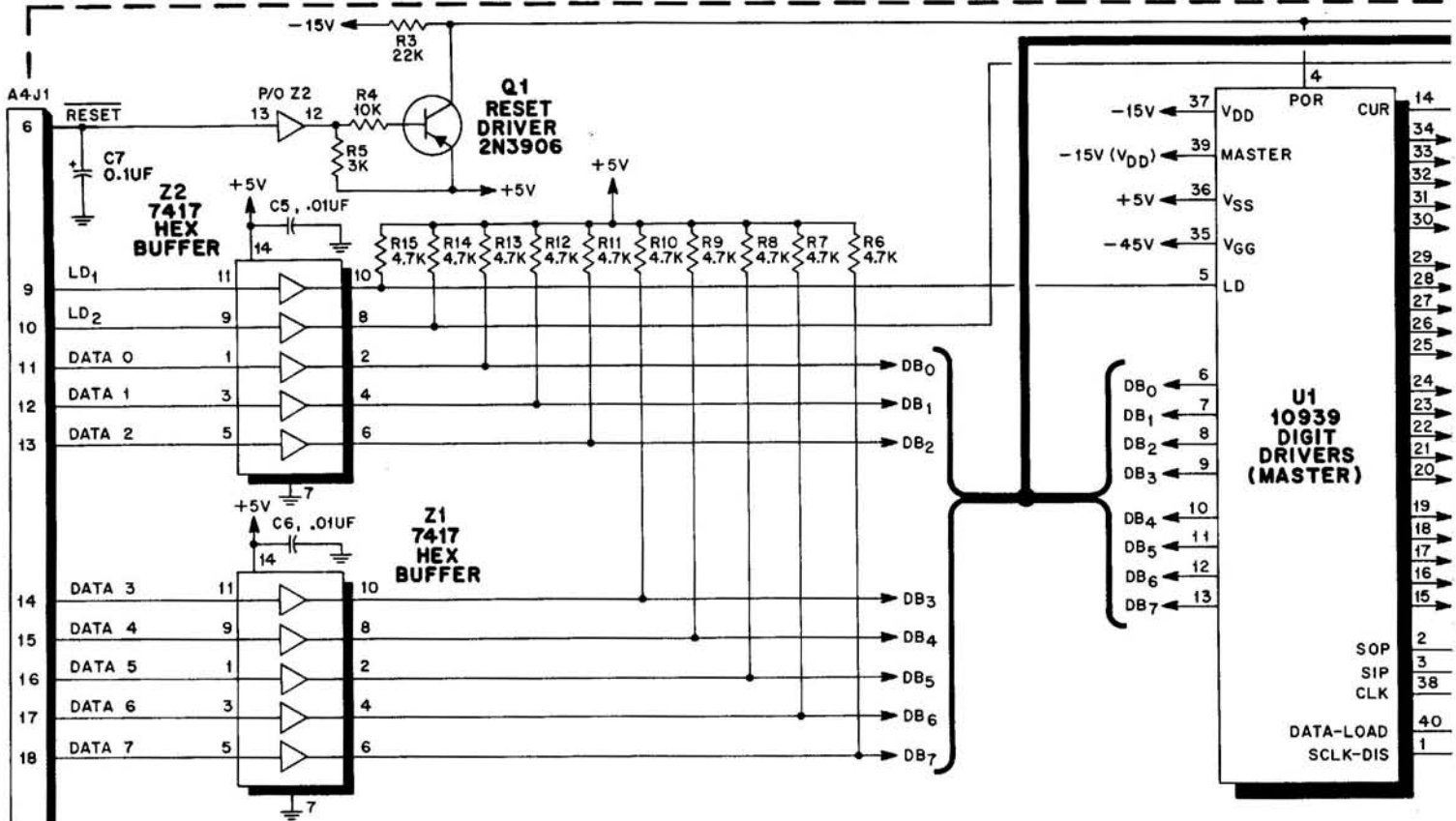
## DISPLAY BOARD (A4) COMPONENT LOCATION



## DISPLAY BOARD (A4) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Display Board (A4)	MA644
C1	Capacitor, 470UF, 50V	XO-847
C2, C3, C4	Capacitor, 10UF, 16V	XO-846
C5, C6	Capacitor, .01UF, +80% -20%	XO-229
C7	Capacitor, 0.1UF, 50V	XO-230
CR1-CR4	Diode, 1N4004	XO-254
DS1, DS2	Display, Alphanumeric	XO-840
Q1	Transistor, PNP, 2N3906	XO-588
R1	Resistor, 1K, 5%, 2W	XO-627
R2, R4	Resistor, 10K, 5%, 1/4W	XO-18
R3	Resistor, 22K, 5%, 1/4W	XO-42
R5	Resistor, 3K, 5%, 1/4W	XO-23
R6-R15	Resistor, 4.7K, 5%, 1/4W	XO-7
U1, U2	IC, Digit Drivers, 10939	XO-841
U3	IC, Segment Drivers, 10941	XO-842
VR1	Diode, Zener, 1N4737A, 7.5V	XO-844
VR2	Diode, Zener, 1N4744A, 15V	XO-843
Z1, Z2	IC, Hex Buffer, 7417	XO-406
	Tape, Vinyl Foam	24127-1

# X. WIRING AND SCHEMATIC

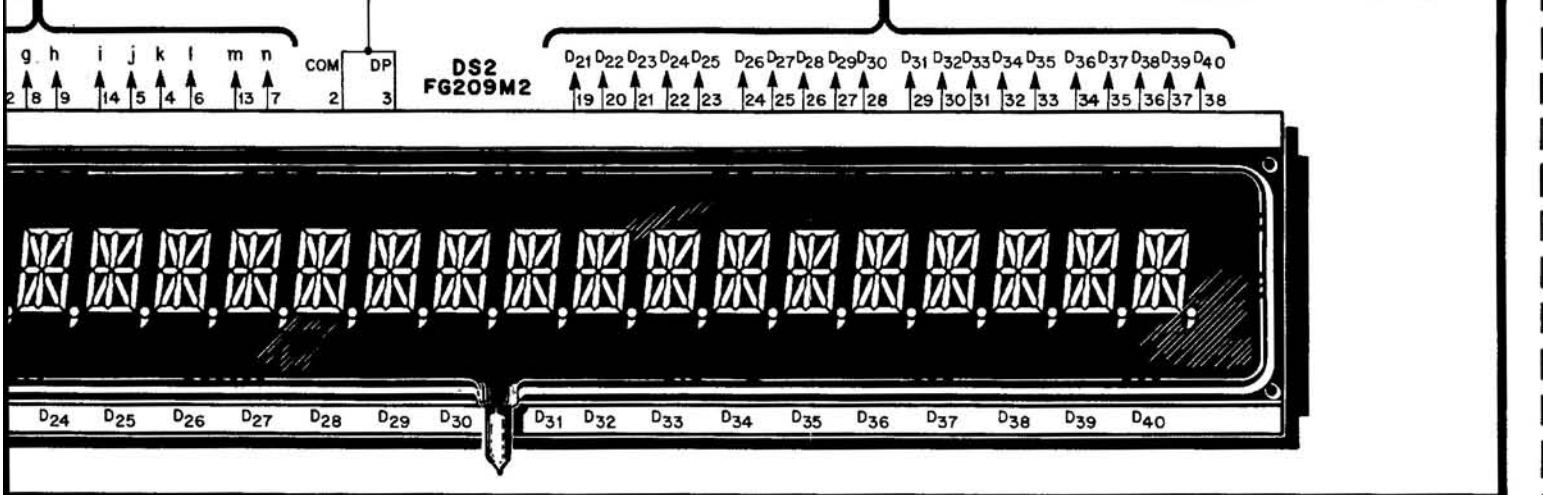
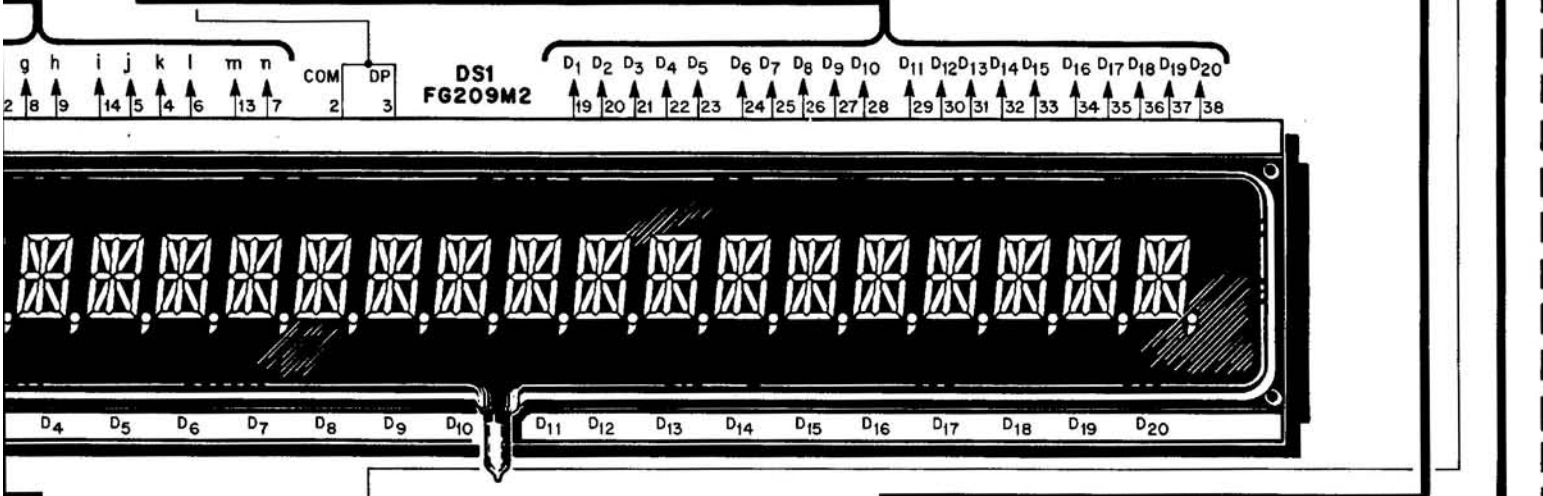
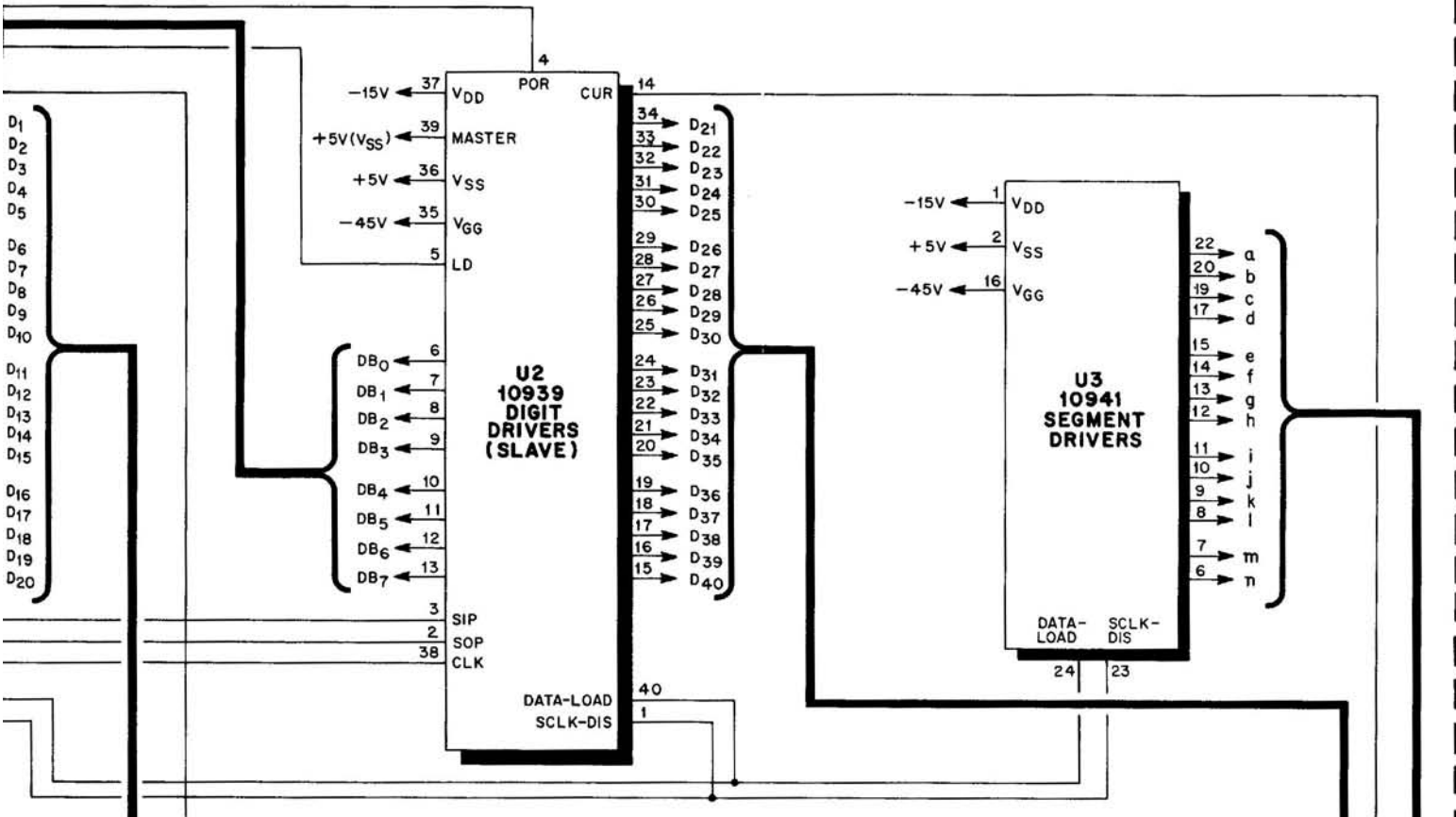


NOTE:  
 1. UNLESS OTHERWISE INDICATED, RESISTORS ARE  $\pm 5\%$ , 1/4W.  
 2. SIMILAR SEGMENTS OF EACH CHARACTER ARE INTERNALLY WIRED IN PARALLEL.

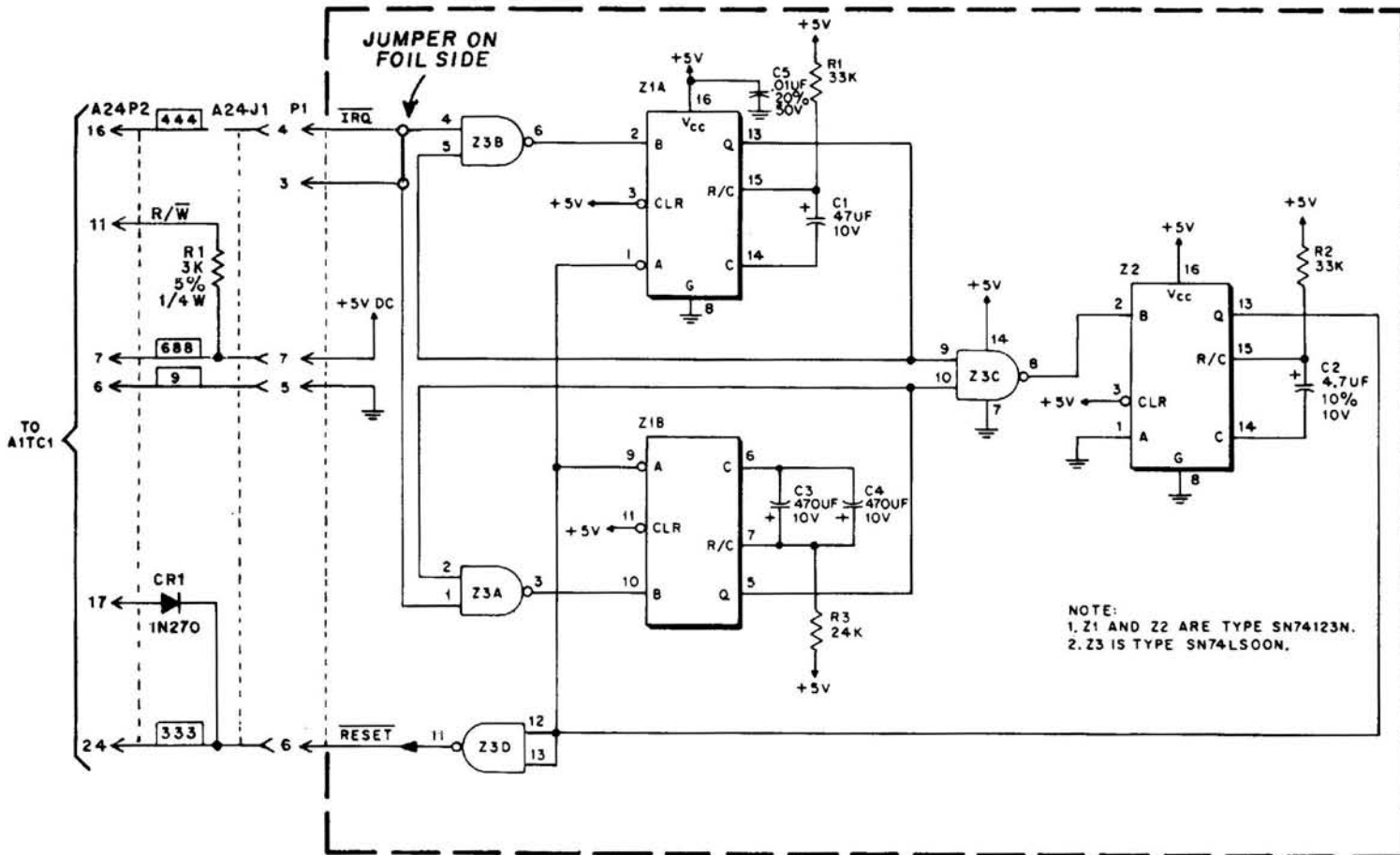
**Premier Technology**  
 TITLE: DISPLAY BOARD (A4)  
 USED ON:  
 DRAWN: R.H.M. APPROVED DATE: 12 FEB 85  
 E-24438



# DIAGRAMS, PARTS LISTS

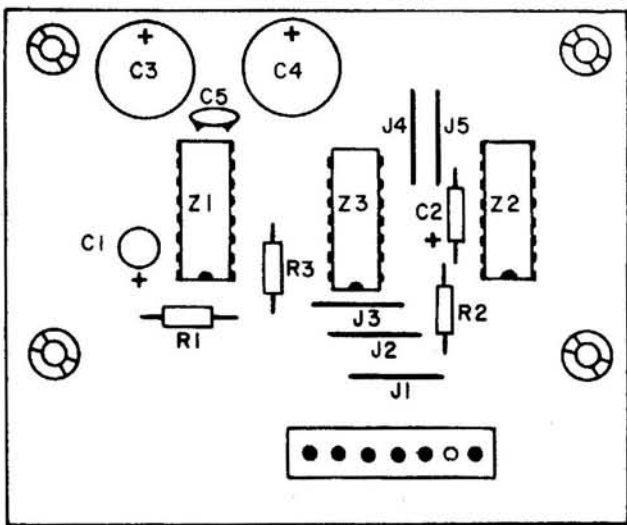


# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



<b>Premier Technology</b>			
TITLE <b>RESET CIRCUIT BOARD</b>			
USED ON			
DRAWN <i>SP</i>	APPROVED <i>BAM</i>	DATE <b>6-AUG-87</b>	<b>C-21063</b>

## RESET BOARD (A24) COMPONENT LOCATION

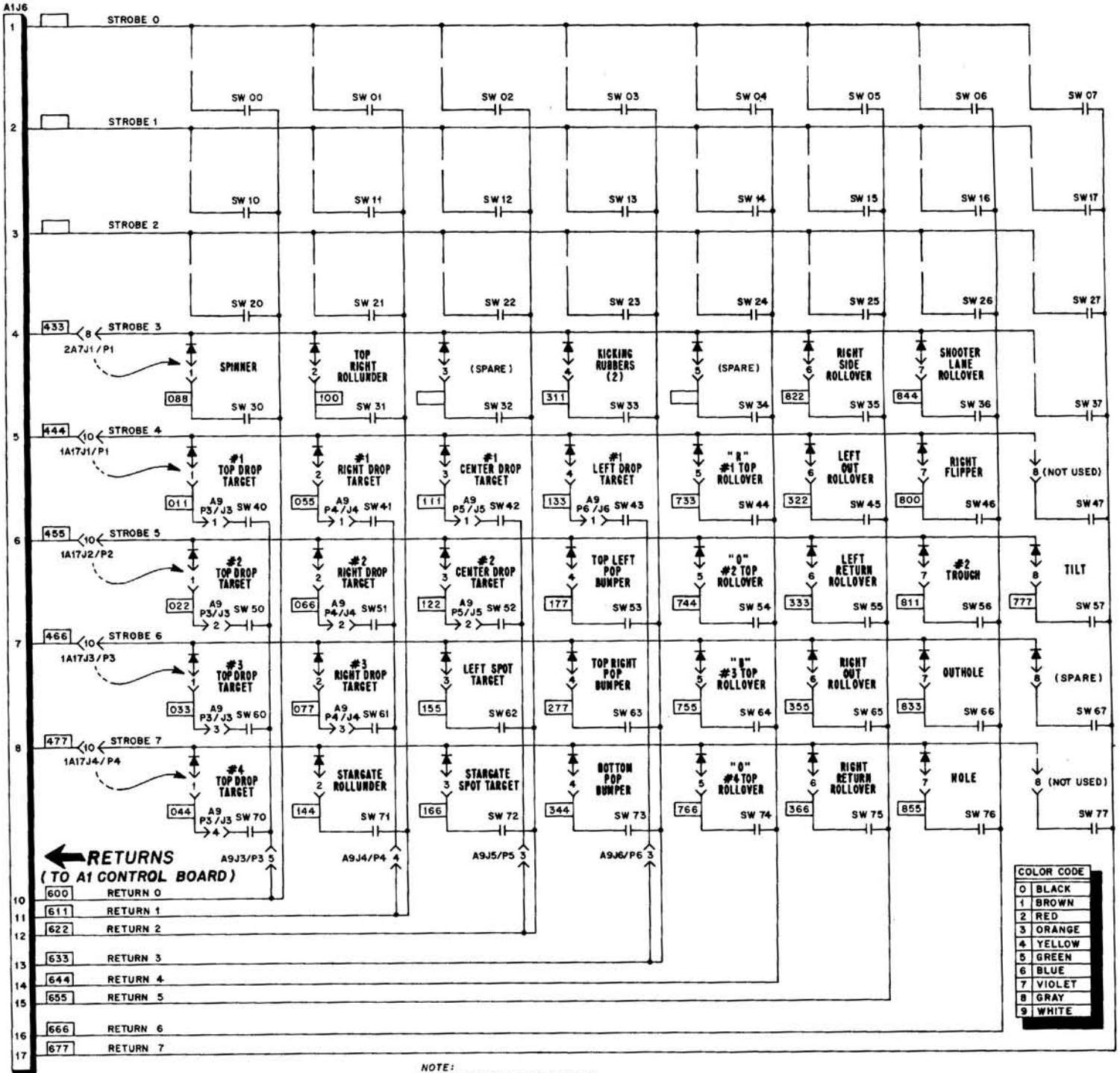


## RESET BOARD (A24) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Reset Board Assembly	MA-980
R1, R2	Resistor 33K Ohm, 5%, 1/4W	XO-43
R3	Resistor 24K Ohm, 5%, 1/4W	XO-10
C1	Capacitor 47UF, 10V	XO-227
C2	Capacitor 4.7UF, 10V	XO-226
C3, C4	Capacitor 470UF, 10V	XO-214
C5	Capacitor .01UF	XO-202
Z1, Z2	IC, 74123N	XO-398
Z3	IC, 74LS00N	XO-427
A24P2/ A24J2	Cable Assembly	MA-796
	7 Pin Connector	XO-879

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

**STROBES** →  
(FROM A1 CONTROL BOARD)



NOTE:  
1. DIODES USED ARE TYPE 1N270.  
2. DIODE BOARD ASSEMBLIES;  
1A17 PART NO. MA-987  
2A17 PART NO. 25833

<b>Premier Technology</b>			
TITLE	SWITCH MATRIX		
USED ON	GAME # 714		
DRAWN	APPROVED	DATE	E-25886
R.P.O.	R.H.M.	APR-2-88	

# X. WIRING AND SCHEMATIC

## PLAYBOARD "CONTROLLED" SOLENOIDS AND ILLUMINATION

REFERENCE	PART NO.
#44 LAMP	LA-0
#67 LAMP	LA-5
D1-D10 (1N5401)	XO-263

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

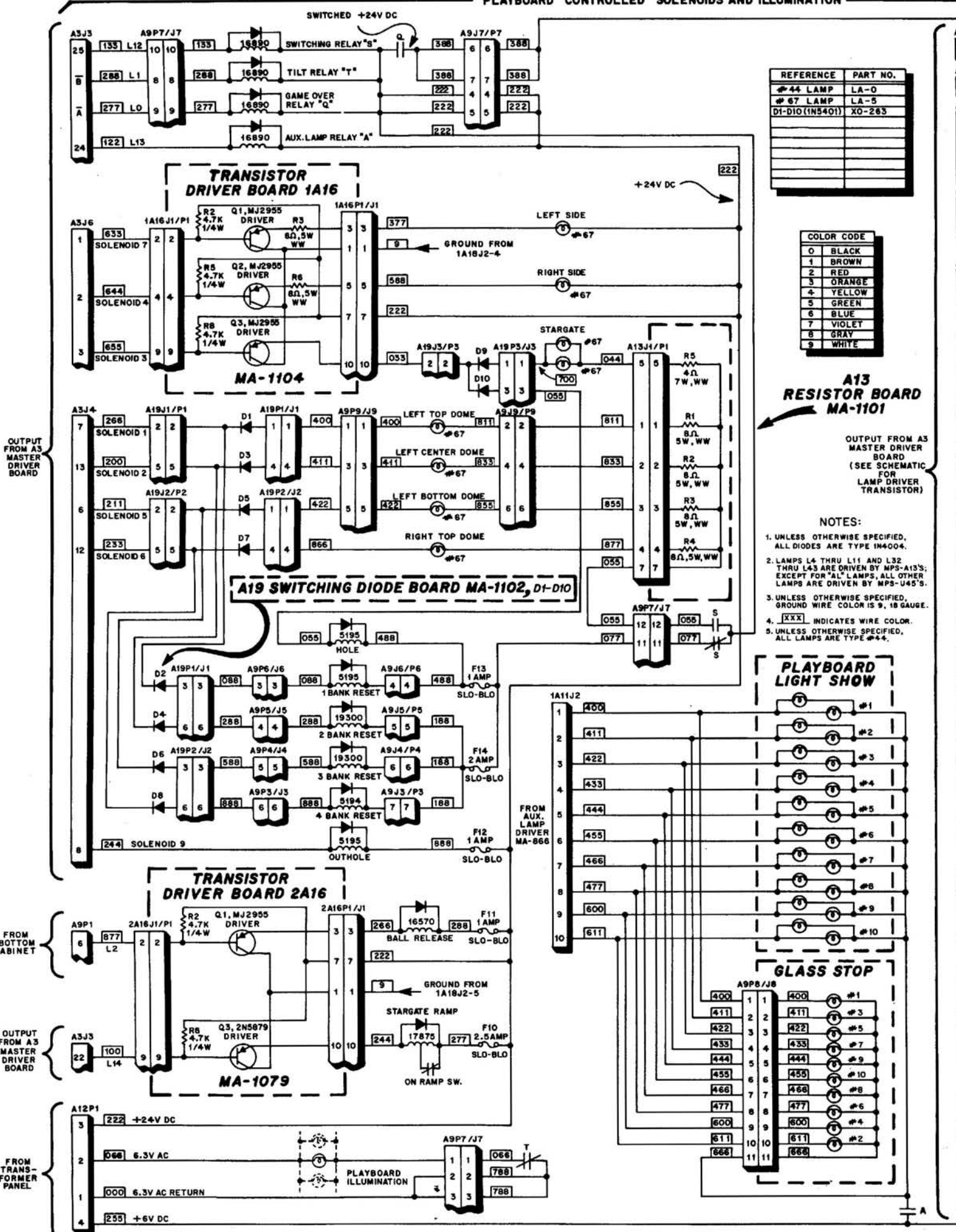
**A13 RESISTOR BOARD MA-1101**

OUTPUT FROM A3 MASTER DRIVER BOARD (SEE SCHEMATIC FOR LAMP DRIVER TRANSISTOR)

- NOTES:
- UNLESS OTHERWISE SPECIFIED, ALL DIODES ARE TYPE 1N4004.
  - LAMPS L4 THRU L11 AND L32 THRU L43 ARE DRIVEN BY MPS-A13'S; EXCEPT FOR "AL" LAMPS, ALL OTHER LAMPS ARE DRIVEN BY MPS-U45'S.
  - UNLESS OTHERWISE SPECIFIED, GROUND WIRE COLOR IS 9, 18 GAUGE.
  - XXX INDICATES WIRE COLOR.
  - UNLESS OTHERWISE SPECIFIED, ALL LAMPS ARE TYPE #44.

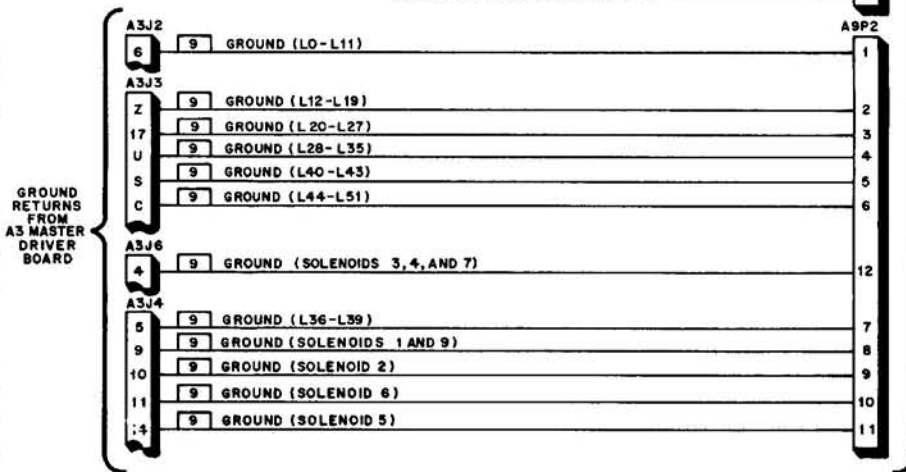
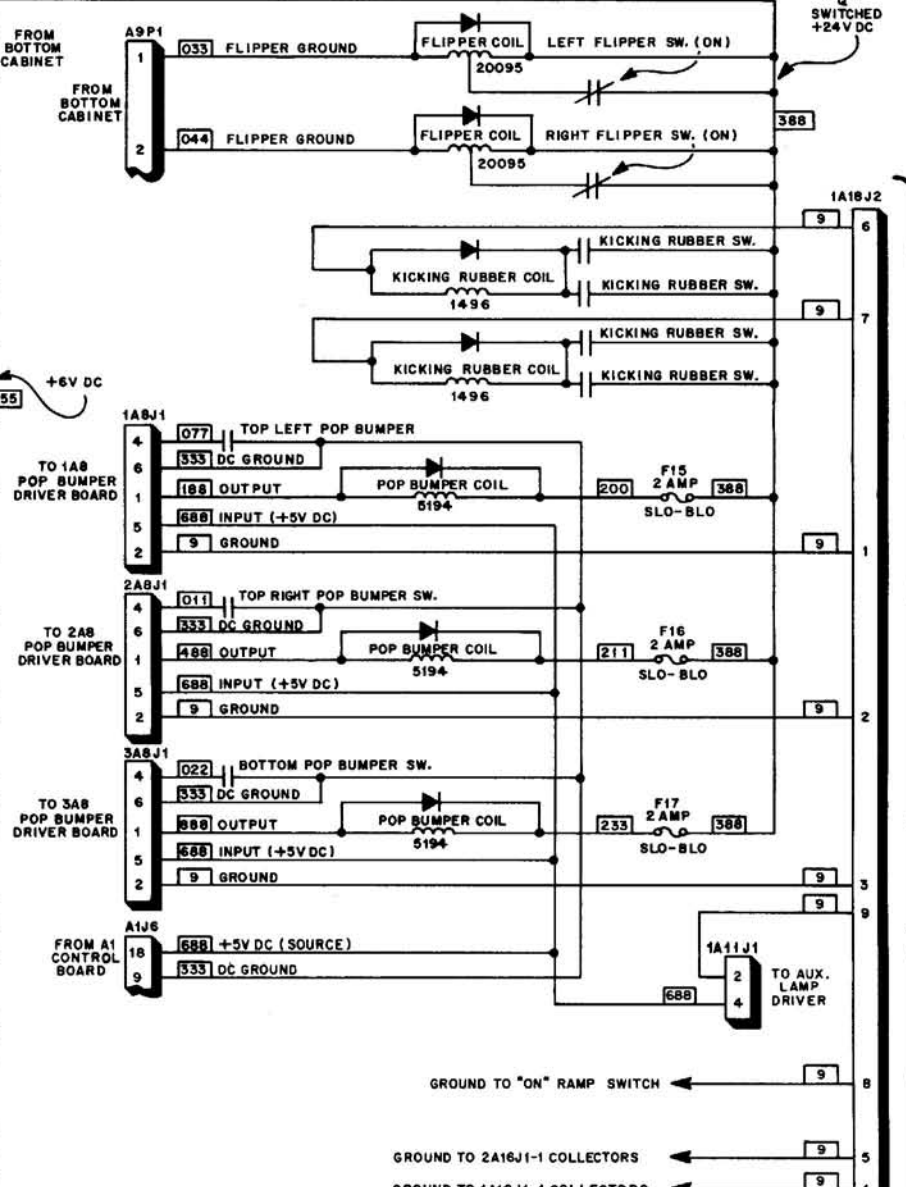
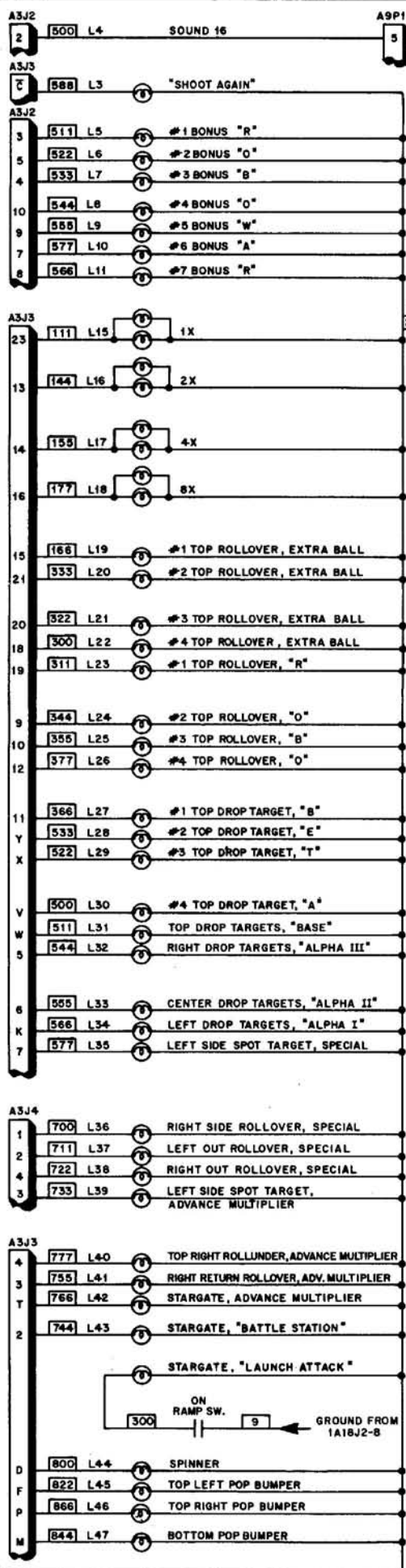
**PLAYBOARD LIGHT SHOW**

**GLASS STOP**



# C DIAGRAMS, PARTS LISTS

## PLAYBOARD "NON-CONTROLLED" SOLENOIDS

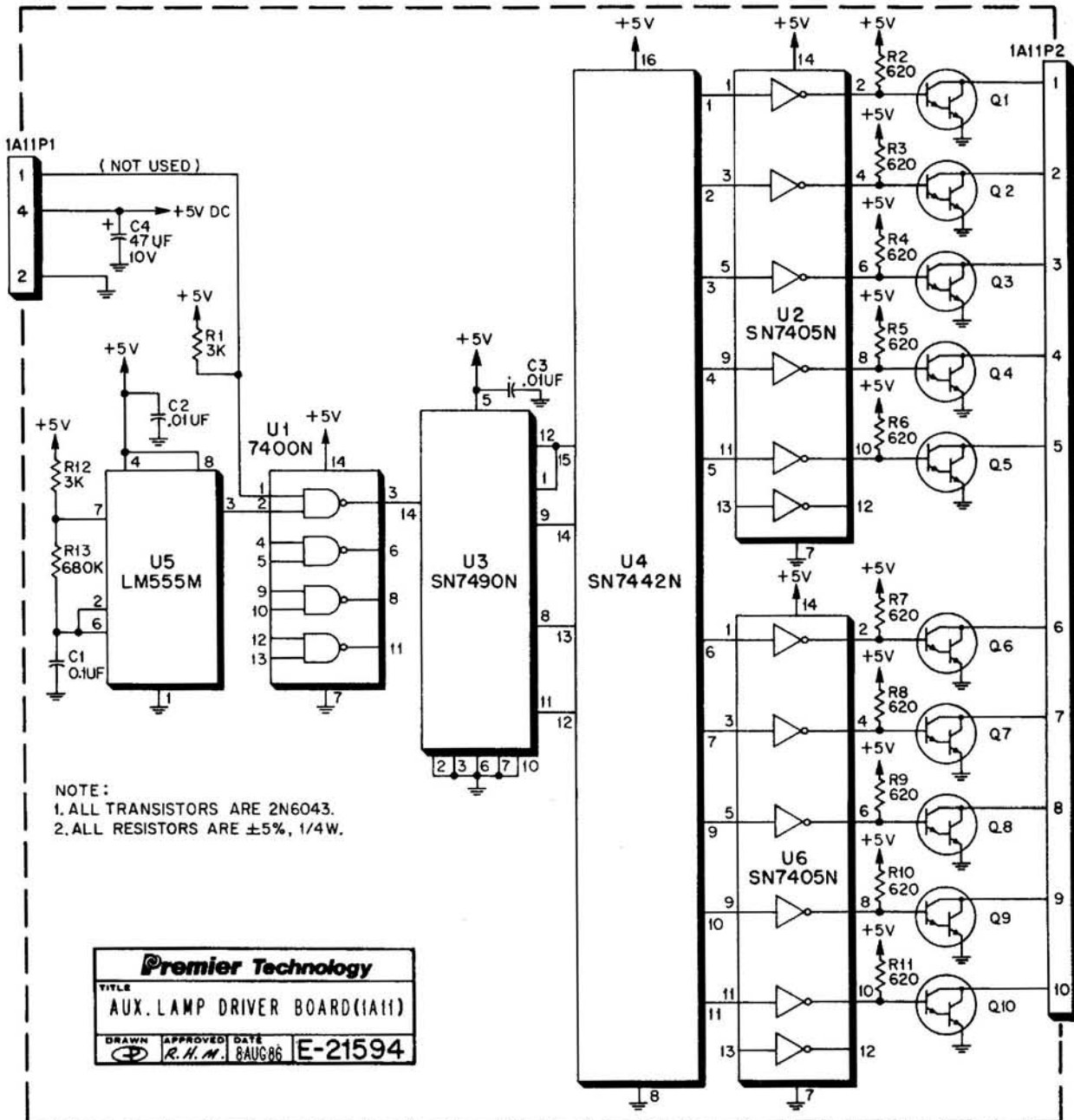


GROUPS FROM TRANSFORMER PANEL

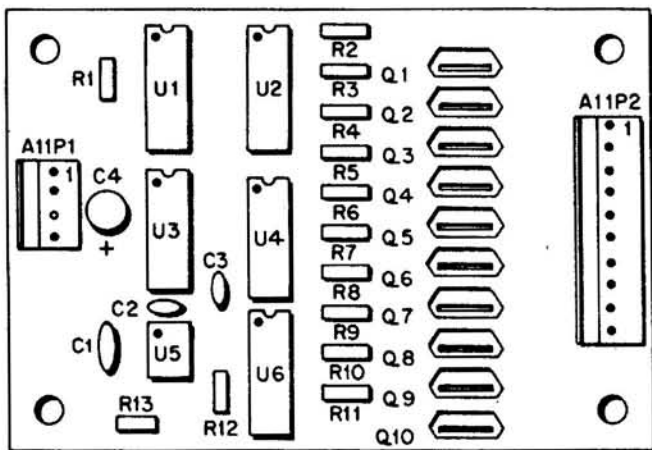
**Premier Technology**  
 TITLE: **PLAYBOARD SOLENOIDS AND ILLUMINATION**  
 DRAWN: *R.P.D.* APPROVED: *R.H.M.* DATE: APR 2 88  
**E-25887**



# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



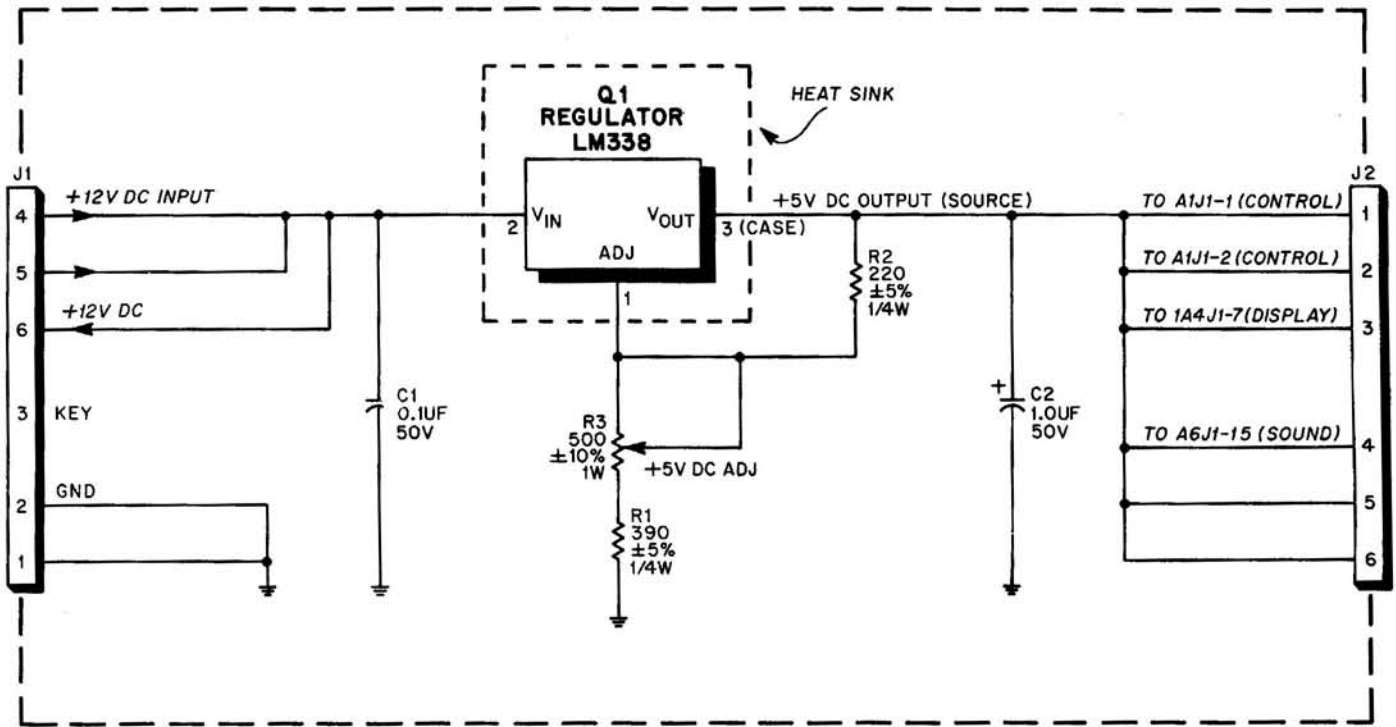
**AUXILIARY LAMP DRIVER BOARD (A11) COMPONENT LOCATION**



**AUXILIARY LAMP DRIVER BOARD (A11) PARTS LIST**

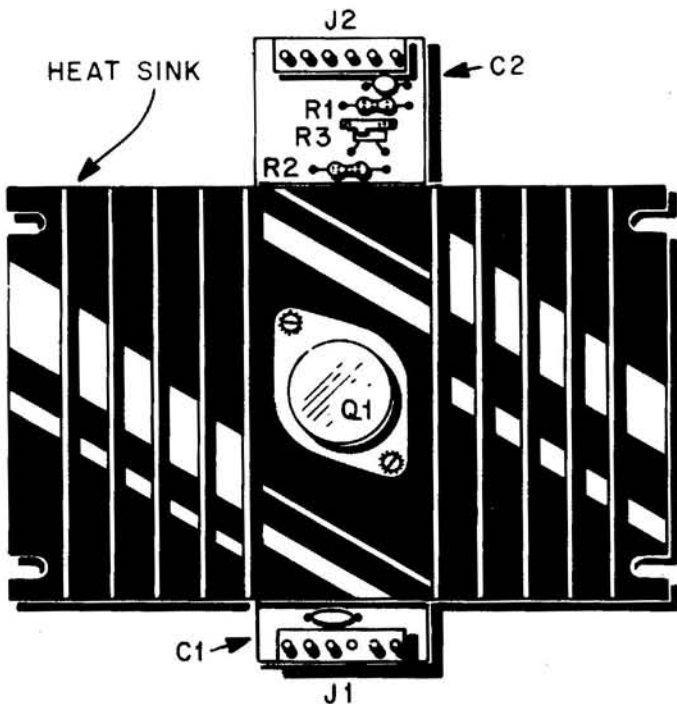
REFERENCE	DESCRIPTION	PART NUMBER
	Auxiliary Lamp Driver Assembly	MA-866
C1	Capacitor, .1 MFD, 100V Ceramic Radial Lead	XO-626
C2-C3	Capacitor, .01 MFD, 100V Radial Lead	XO-202
C4	Capacitor, 47 MFD, 10V Electrolytic Radial Lead	XO-227
Q1-Q10	Transistor, 2N6043 NPN Darlington	XO-303
R1,R12	Resistor, 3K Ohm, 5%, 1/4 W	XO-23
R2-R11	Resistor, 620K Ohm, 5%, 1/4 W	XO-4
R13	Resistor, 680K Ohm, 5%, 1/4 W	XO-669
U1	I.C. 2-Input NAND, 7400	XO-420
U2,U6	I.C. Inverter, 7405	XO-403
U3	I.C. Decade Counter, 7490	XO-425
U4	I.C. Decoder, 7442	XO-426
U5	I.C. Timer, NE555	XO-631
P2	10 Position Connector	XO-531
P1	4 Position Connector	XO-532

# X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



<b>Premier Technology</b>			
TITLE		POWER SUPPLY (A2)	
USED ON			
DRAWN	APPROVED	DATE	E-24441
S.P.O.	R.H.M.	12 FEB 85	

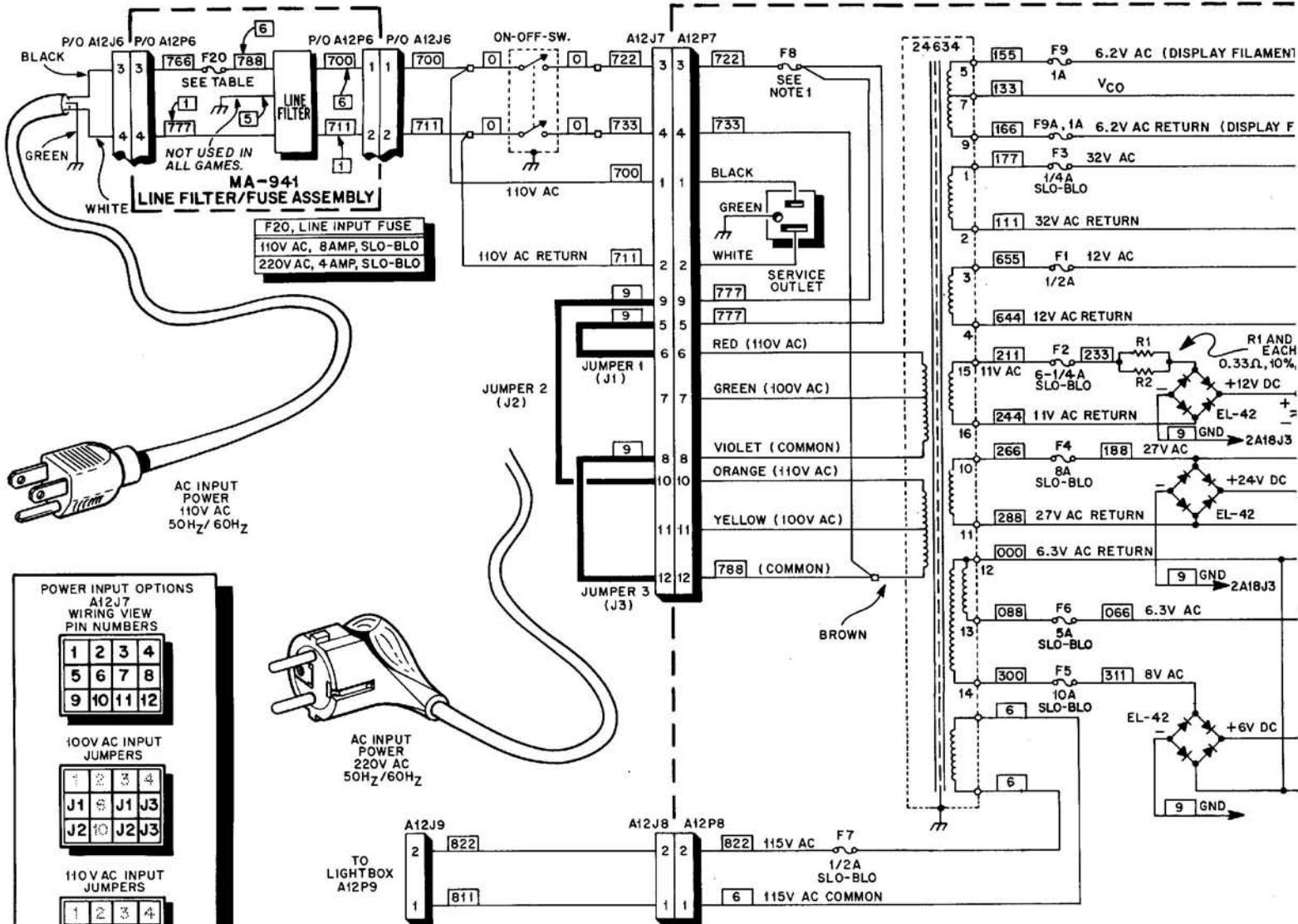
## POWER SUPPLY (A2) COMPONENT LOCATION



## POWER SUPPLY (A2) PARTS LIST

REFERENCE	DESCRIPTION	PART NUMBER
	Power Supply (A2)	MA-831
C1	Capacitor, 0.1µF, +80% -20%, 50V	XO-230
C2	Capacitor, 1µF, 10%, 50V	XO-217
J1, J2	Connector, 6 Pin	XO-879
Q1	Regulator, LM338, (5 Amp)	XO-839
R1	Resistor, 390 ohm, 5%, 1/4W	XO-845
R2	Resistor, 220 ohm, 5%, 1/4W	XO-21
R3	Resistor, (Pot) 500 ohm, 10%, 1W	XO-112
	Heat Sink	XO-534
	Insulator, (Regulator)	XO-522
	Insulator, (Regulator)	XO-523

# X. WIRING AND SCHEMATIC



**POWER INPUT OPTIONS**  
A12J7  
WIRING VIEW  
PIN NUMBERS

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

**100V AC INPUT JUMPERS**

J1	6	J1	J3
J2	10	J2	J3

**110V AC INPUT JUMPERS**

J1	J1	7	J3
J2	J2	11	J3

**200V AC INPUT JUMPERS**

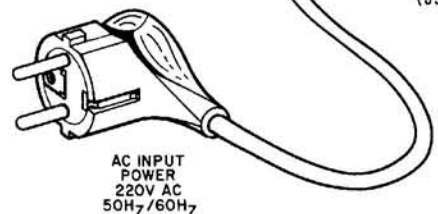
J1	6	J1	J2
9	J2	11	12

**210V AC INPUT JUMPERS**

J1	6	J1	J2
9	J2	11	12

**220V AC INPUT JUMPERS**

J1	J1	7	J2
9	J2	11	12



**COLOR CODE**

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

**FUSE DESIGNATIONS**

F1	SOUND POWER SUPPLY (A6)
F2	POWER SUPPLY (A2)
F3	DISPLAYS (32V AC)
F4	SOLENOIDS (+24V DC)
F5	CONTROLLED LAMPS
F6	PLAYFIELD ILLUMINATION
F7	LIGHTBOX ILLUMINATION
F8	PRIMARY POWER (SEE NOTE 1)
F9	DISPLAY FILAMENT (6.2V AC)
F9A	DISPLAY FILAMENT (6.2V AC)
F20	LINE INPUT (SEE TABLE)

- NOTES:**
1. PRIMARY POWER FUSE VALUES:  
110V AC, 5AMP SLO-BLO  
220V AC, 2.5AMP SLO-BLO
  2. XXX INDICATES WIRE COLOR.
  3. A12J7 SHOWN IN 110V AC OPERATION.
- ⊥ CIRCUIT GROUND  
⏏ EARTH GROUND

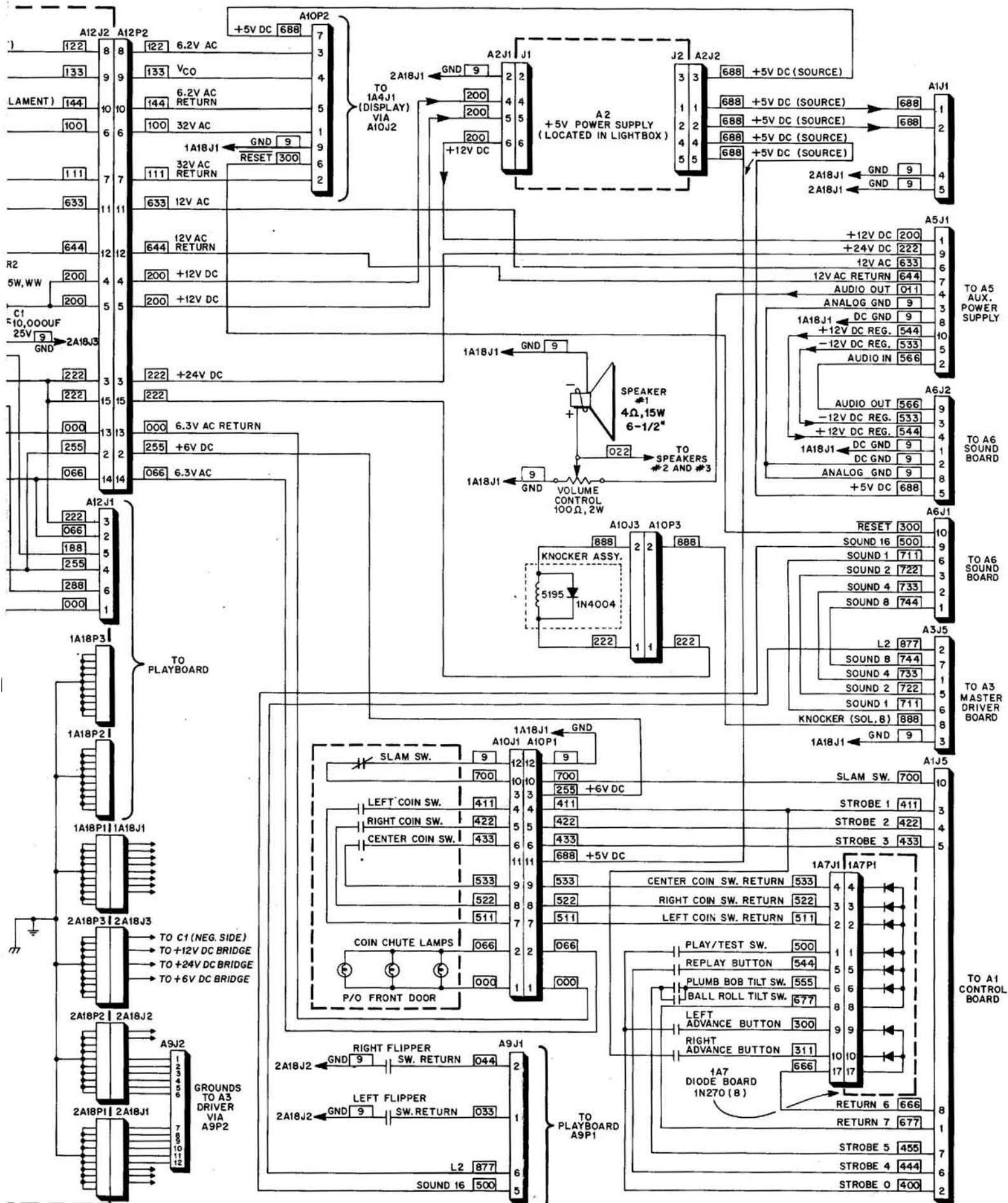
**A12  
TRANSFORMER PANEL  
MA-1111  
USED WITH  
SYSTEM 80B**

**Premier Technology**

TITLE: **TRANSFORMER PANEL/CABINET SCHEMATIC/WIRING DIAGRAM**

DRAWN: **R.P.S.** APPROVED: **R.H.M.** DATE: **APR-2-88** **E-25888**

# C DIAGRAMS, PARTS LISTS



# XI. PARTS INFORMATION

## TABLE OF CONTENTS

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EXPLODED VIEW.....	52
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# XI. PARTS INFORMATION

## PLAYBOARD SWITCH AND LAMP ASSIGNMENTS

### LAMP NUMBER LAMP ASSIGNMENT

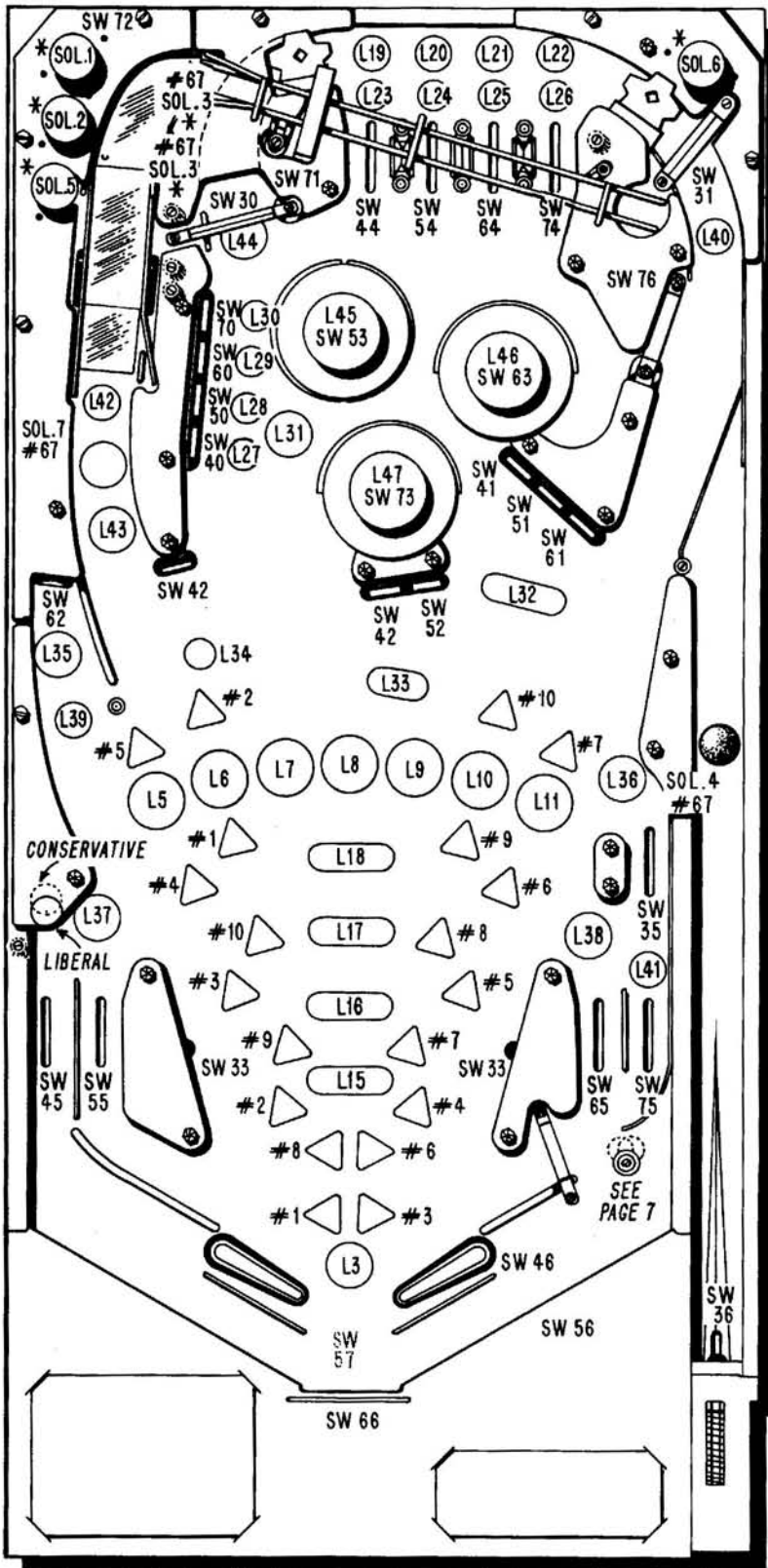
L3	"Shoot Again"
L4	Sound 16
L5	#1 Bonus "R"
L6	#2 Bonus "O"
L7	#3 Bonus "B"
L8	#4 Bonus "O"
L9	#5 Bonus "W"
L10	#6 Bonus "A"
L11	#7 Bonus "R"
L15	1X
L16	2X
L17	4X
L18	8X
L19	#1 Top Rollover, Extra Ball
L20	#2 Top Rollover, Extra Ball
L21	#3 Top Rollover, Extra Ball
L22	#4 Top Rollover, Extra Ball
L23	#1 Top Rollover, "R"
L24	#2 Top Rollover, "O"
L25	#3 Top Rollover, "B"
L26	#4 Top Rollover, "O"
L27	#1 Top Drop Target, "B"
L28	#2 Top Drop Target, "E"
L29	#3 Top Drop Target, "T"
L30	#4 Top Drop Target, "A"
L31	Top Drop Targets, "Base"
L32	Right Drop Targets, "Alpha III"
L33	Center Drop Targets, "Alpha II"
L34	Left Drop Targets, "Alpha I"
L35	Left Side Spot Target, Special
L36	Right Side Rollover, Special
L37	Left Return Rollover, Special
L38	Right Out Rollover, Special
L39	Left Side Spot Target, Advance Multiplier
L40	Top Right Rollunder, Advance Multiplier
L41	Right Return Rollover, Advance Multiplier
L42	Stargate, Advance Multiplier
L43	Stargate, "Battle Station"
L44	Spinner
L45	Top Left Pop Bumper
L46	Top Right Pop Bumper
L47	Bottom Pop Bumper

### SWITCH MATRIX NUMBER

### SWITCH ASSIGNMENT

### PART NO.

SW 30	Spinner	19353
SW 31	Top Right Rollunder	24622
SW 33	Kicking Rubber	
	Scoring Switch (2)	18808
	Actuating Switch and Bracket (4)	22224
SW 35	Right Side Rollover	25824
SW 36	Shooter Lane Rollover	*25938
SW 40	#1 Top Drop Target	*25896
SW 41	#1 Right Drop Target	*25896
SW 42	#1 Center Drop Target	*25896
SW 43	#1 Left Drop Target	*25894
SW 44	"R" #1 Top Rollover	*25937
SW 45	Left Out Rollover	25824
SW 46	Right Flipper	25434
SW 50	#2 Top Drop Target	*25896
SW 51	#2 Right Drop Target	*25897
SW 52	#2 Center Drop Target	*25897
SW 53	Top Left Pop Bumper	21353
SW 54	"O" #2 Top Rollover	*25937
SW 55	Left Return Rollover	25824
SW 56	#2 Trough	25824
SW 57	Tilt (With Bracket)	9141
SW 60	#3 Top Drop Target	*25897
SW 61	#3 Right Drop Target	*25895
SW 62	Left Spot Target With Bracket	25460U
SW 63	Top Right Pop Bumper	21353
SW 64	"B" #3 Top Rollover	*25937
SW 65	Right Out Rollover	25824
SW 66	Outhole	25825
SW 70	#4 Top Drop Target	*25895
SW 71	Stargate Rollunder	21137
SW 72	Stargate Spot Target With Bracket	25460Z
SW 73	Bottom Pop Bumper	21353
SW 74	"O" #4 Top Rollover	*25937
SW 75	Right Return Rollover	*25938
SW 76	Hole	18635



#### NOTE:

- L0 Enables Relay "Q", L1 Enables Relay "T", L2 Enables Ball Release, L12 Enables Relay "S", L13 Enables Relay "A", L14 Enables Stargate Ramp.
- The Following Devices Are Dependent Upon The State Of The "S" Relay. (Identified by \* in illustration)

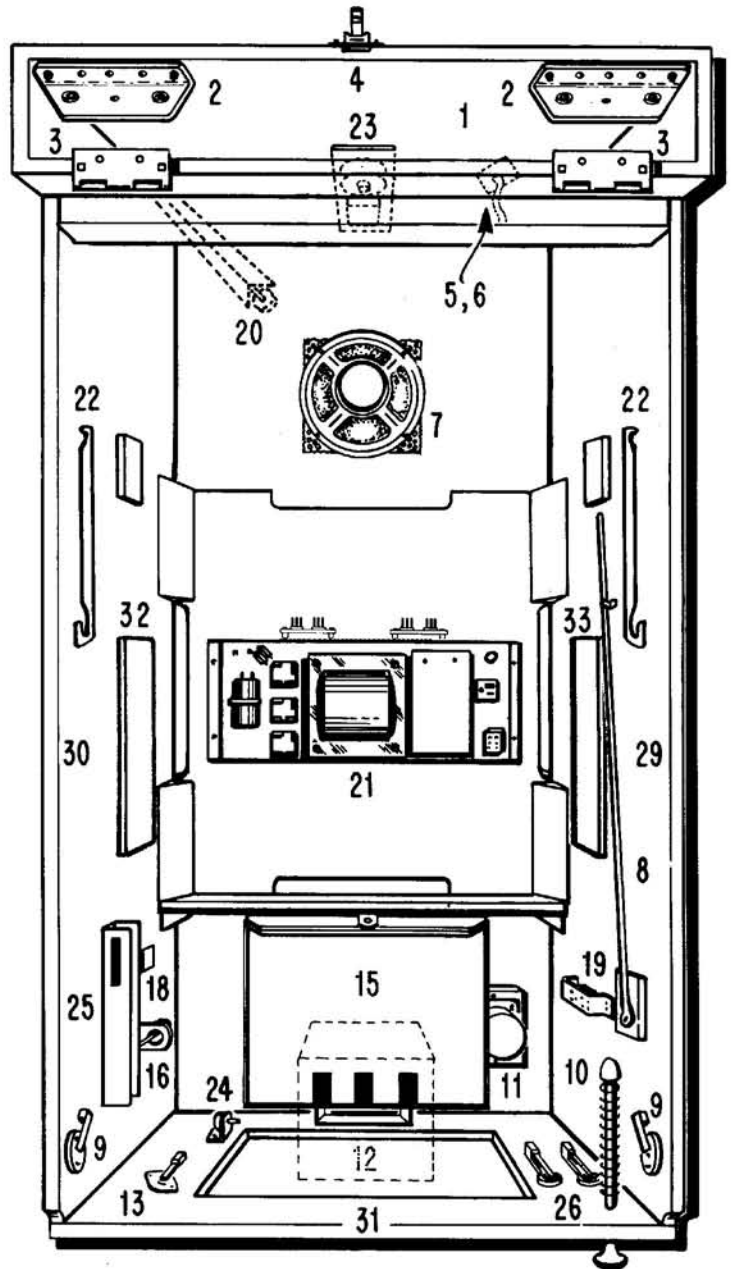
DEVICE	"S" OFF	"S" ON
Sol. 1	1 Bank Reset	Left Top Dome #67
Sol. 2	2 Bank Reset	Left Center Dome #67
Sol. 3	Hole	Stargate #67 (2)
Sol. 5	3 Bank Reset	Left Bottom Dome #67
Sol. 6	4 Bank Reset	Right Top Dome #67

- \* New Switches Used.

# XI. PARTS INFORMATION

## CABINET PARTS

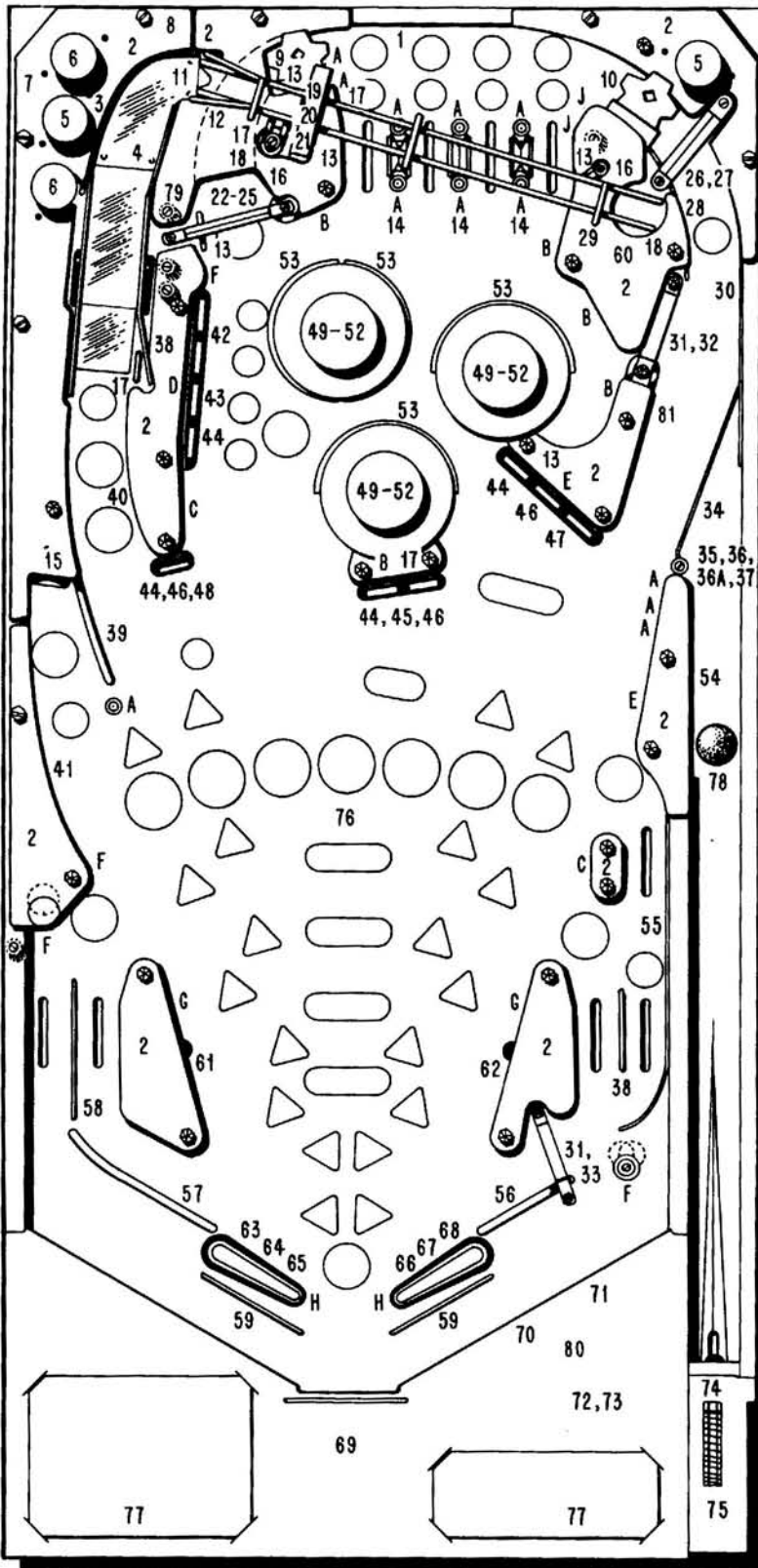
ITEM	DESCRIPTION	PART NO.
1.	Cabinet	25694-714
2.	Lightbox Mounting Bracket (2)	19916
3.	Butt Hinge, (Shown For Reference Only, P/O Lightbox Assy.) (2)	22734
4.	"U" Bolt (P/O Lightbox) Latch Assembly (P/O Cabinet)	24659 21969
5.	Cable Assembly, Domestic (High Voltage)	MA-1007
6.	Line Cord (Domestic) Line Cord Cover Plate	23365 21955
7.	Speaker, 4 Ohm, 15W, 6-1/2" Speaker Guard	EL-83 20931
8.	Prop Stick, Playfield	23940
9.	Flipper Switch Assembly (2)	17838-3
10.	Ball Shooter Assembly	25879
11.	Switch, On/Off Switch Plate (2) Switch Housing	23799 18769 15163
12.	Front Door Assembly (Universal) Cable Assembly Slam Switch 6V DC Lamp, Wedge Base Frame, Door Three Chute Door Black Button Bezel Entry/Reject Button Button Spring Reject Flap Clamp, Frame Flat Lock and Cam Assembly Base Plate with Pivot and Stud Microswitch Bracket Clear Plastic Cover for Microswitch Coin Microswitch with Wire Lampholder Black Reject Bezel	MA-688 MA-676 24567 FD-2 FD-13 24159 FD-14 FD-15 FD-16 FD-17 FD-18 FD-19 FD-20 FD-21 FD-22 FD-23 FD-24 FD-26
13.	Replay Switch Assembly	18092
15.	Cashbox Cover Liner (Small) (3) Liner (Large) (2)	25309 25315 24870 24871
16.	Plumb Bob Tilt Switch Assembly Strike Plate Carbon, Tilt Bob Rod, Tilt Bracket	358 MH-30 357 22043
18.	Diode Assembly Diode, 1N270 (8)	24252 XO-265
19.	Knocker Assembly Bell Assembly (Gong) (When Used)	MA-12 MA-352
20.	Cabinet Leg (4) (Black) (4) (When Used) (Gold) (4) (When Used) Leg Bolt (8) 3" Leg Adjuster (4) 1" Sleeve (2) 3/8-16, Jam Nut (8)	4337 4337Y 4337T 3775 MH-21 25317 FA-665
21.	Transformer Panel Assembly Bridge Rectifier (3) Cable Assembly (Secondary) Capacitor, 10,000UF, 25V Filter, Line Fuse Block (8 Pos.) Fuse Cover Fuse Holder (F7 and F8) (2) Fuses F1, 1/2 Amp F2, 6-1/4 Amp, SLO-BLO F3, 1/4 Amp, SLO-BLO F4, 8 Amp, SLO-BLO F5, 10 Amp, SLO-BLO F6, 5 Amp, SLO-BLO F7, 1/2 Amp SLO-BLO F8, 5 Amp, SLO-BLO (110V AC) F8, 2.5 Amp, SLO-BLO (220V AC) F9, 1 Amp F9A, 1 Amp Ground Bus Assembly (2) Outlet, Service Resistor, 0.33 Ohm, 10% 5W, Wire-Wound (2) Transformer	MA-1111 EL-42 MA-1038 XO-830 EL-50 EL-10 23805 EL-78 EL-28 EL-29 EL-5 EL-26 EL-36 EL-8 EL-20 EL-8 EL-21 EL-3 EL-3 25374 18133 XO-154 24634
22.	Cabinet Pivot Bracket (Left) Cabinet Pivot Bracket (Right)	25658 25657



ITEM	DESCRIPTION	PART NO.
23.	Line Filter Assembly Fuse Holder F20, 8 Amp, SLO-BLO (110V AC) F20, 4 Amp, SLO-BLO (220V AC) Line Filter Line Filter (Germany)	MA-941 EL-78 EL-26 EL-33 EL-50 EL-51
24.	Mounting Bracket Control, Volume, 100 Ohm, 2W Switch, PLAY/TEST	24149 XO-199 EL-57
25.	Ball Roll Tilt Housing and Switch Assembly Switch	24394 24393
26.	Button Holder and Switch (2) Pushbutton (2) (Black)	23503 24293Y
28.	Lightbox (Not Shown)	25926-714
29.	Right Moulding (Not Shown)	22735
30.	Left Moulding (Not Shown)	22736
31.	Front Moulding (Not Shown)	16951
32.	Mounting Board Assembly A11 Aux. Lamp Driver Board A13 Resistor Board A19 Switching Diode Board	MA-1100 MA-866 MA-1101 MA-1102
33.	Mounting Board Assembly Pop Bumper Driver Board (3)	MA-1054 19741

# XI. PARTS INFORMATION

## PLAYBOARD PARTS INFORMATION



### PARTS LIST

ITEM	DESCRIPTION	PART NO.
1	Flat Rail	25904
2	Plastic Shield Set (12 Pieces)	25909
3	Ball Guide Rail	4833
4	Stargate Ramp Assembly (See Exploded View Illustration)	
5	Plastic Dome Hat, Yellow	25147T
6	Plastic Dome Hat, Clear	25147P
7	Plastic Rivet (8)	MP-10
8	Spot Target Assembly, White	25460Z
9	Arch Rebound Assembly	19645
10	Arch Rebound Assembly	19646
11	Ball Guide Rail	4832
12	Wireform Ramp	25892
13	Ball Guide Rail (5)	17650
14	Rollover Guide, Red (3)	15646U
15	Spot Target Assembly, Red	25460U
16	Ramp Spacer	25907
17	Ball Guide Rail (4)	18070
18	Ball Guide Rail (2)	21961
19	Wireform Gate	25965
20	Gate Shield	25300
21	Rollunder Spring	25301
22	Swinging Target Assembly	24494
23	Swinging Target Rod	20406
24	Nylon Washer (2)	20407
25	Target Shield	14043
26	Gate Shield	4705
27	Wireform Gate	22118
28	Ball Guide Rail	20786
29	Ball Guide Rail	4831
30	Flat Rail	25905
31	Gate Shield (2)	17300
32	Wireform Gate	22112
33	Wireform Gate	21696
34	Wireform Gate	25153
35	Hairpin Fastener	6947
36	Ball Gate Shaft	23408
36A	Shaft Bushing	4546
37	Ball Gate Torsion Spring	23409
38	Ball Guide Rail (2)	3722
39	Ball Guide Rail	19331
40	Ball Guide Rail	25902
41	Flat Rail	21382
42	Drop Target Bank Assembly (4 Pos.)	MA-1075
43	Drop Target Arm, White (4)	11905Z
44	Drop Target Decal (10)	25911
45	Drop Target Bank Assembly (2 Pos.)	MA-1097
46	Drop Target Arm, Green (6)	11905S
47	Drop Target Bank Assembly (3 Pos.)	MA-1098
48	Drop Target Bank Assembly (1 Pos.)	MA-1096
49	Pop Bumper Cap, White (3)	10434Z
50	Pop Bumper Decal (3)	25910
51	Pop Bumper Skirt, White (3)	10433Z
52	Pop Bumper Body and Socket, White (3)	MA-27
53	Pop Bumper Trim Platter (4)	25732
54	Ball Guide Rail	13833
55	Flat Rail	25901
56	Ball Guide Rail	25899
57	Ball Guide Rail	24507
58	Ball Guide Rail	13782
59	Ball Snubber Rail (2)	13798
60	Ball Hole Kicker Assembly (See Exploded View Illustration)	MA-853
61	Contact Kicker Assembly	MA-135A
62	Contact Kicker Assembly	MA-135
63	Left Flipper Assembly	MA-937A
64	Left Flipper Coil	20095
65	Left Flipper Switch	25743
66	Right Flipper Assembly	MA-938D
67	Right Flipper Coil	20095
68	Right Flipper Switch	25434
69	Cardholder	13647-714
70	Ball Return Unit Assembly	21622
71	Ball Return Gate Assembly	20607
72	Ball Return Fence	23855
73	Ball Return Gate Fence	23856
74	Ball Shooter Gauge	9767-714
75	Ball Shooter Assembly	25879
76	Mylar Overlay	25914
77	Playboard Rest Brackets (2) (Located On Playboard Bottom)	21194
78	1-1/16" Steel Ball (2)	21864
79	Plastic Support Post (4)	20635P
80	Wireform Gate	20601
81	Ball Guide Rail	6612

### RUBBER RINGS

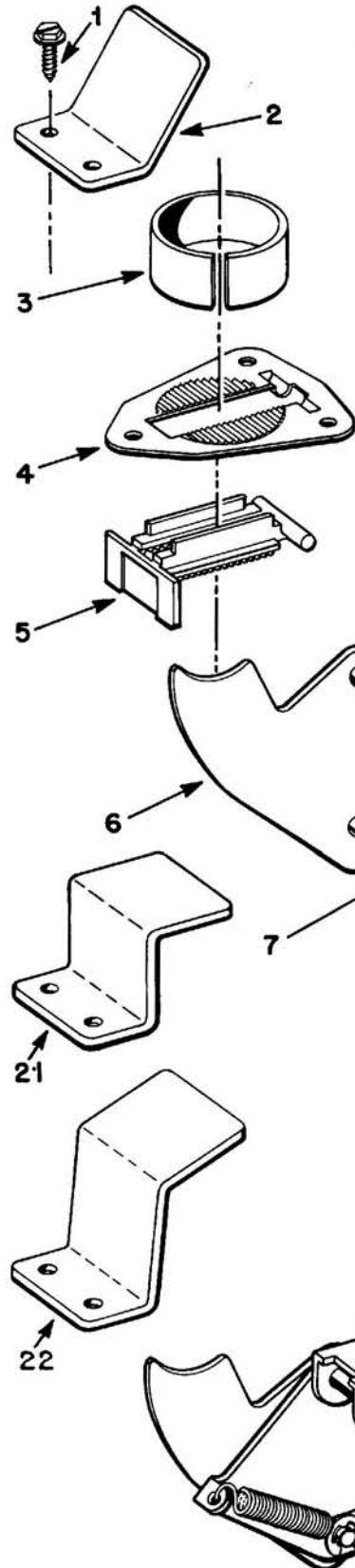
ITEM	DESCRIPTION	PART NO.
A	Mini-Post (12)	15705
B	1" (5)	10219
C	3/4" (2)	10218
D	2"	10221
E	1-1/2" (2)	10220
F	5/16" (4)	10217
G	2-1/2" (2)	10222
H	Flipper, Red (2)	13151
J	Sm. Mini-Post (2)	14793

### MISCELLANEOUS PARTS

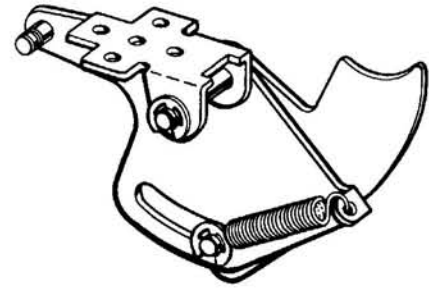
DESCRIPTION	PART NO.
Plastic Support Post	20635P
Mini-Post Screw	14792
Plastic Post 1"	11561P
Siamese Post	17492
"Q" Relay	MA-23
"T" Relay	MA-25
"S" Relay	MA-1052

# XI. PARTS INFORMATION

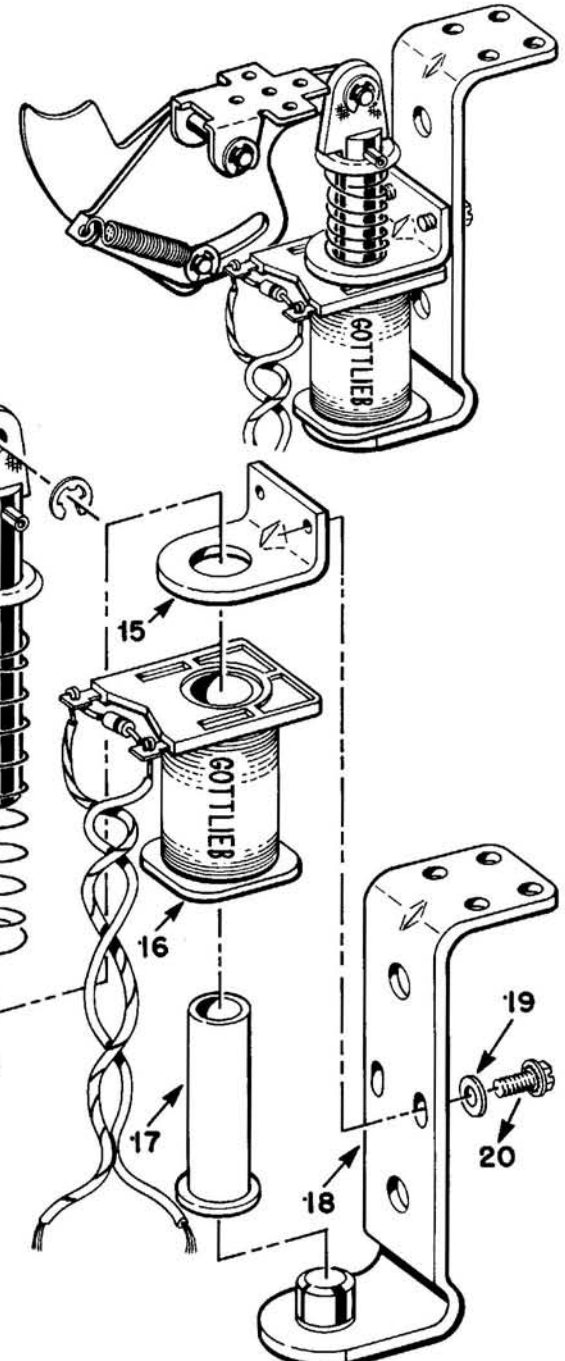
## BALL HOLE KICKER PARTS



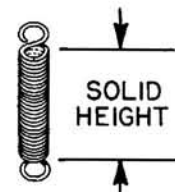
ITEM	DESCRIPTION	PART NO.
1	6 x 1/2" HWHMS (2)	FA-270
2	Ball Snubber	16038
3	Metal Hole Liner	11151
4	Hole Base Plate	15707
5	Hole Switch Arm	15708
6	Ball Cam (See Tables)	
7	Nylon Washer	6443
8	Spring Cam (See Tables)	
9	Spring (See Tables)	
10	Fulcrum	15819
11	E-Ring (3)	FA-682
12	Link And Plunger Assy.	22234
13	Spring Retaining Washer	22233
14	Spring	1636
15	Mounting Bracket	15409
16	Coil With Diode	
17	Coil Sleeve	5064
18	Coil Stop And Mounting Bracket	20597
19	#8 Washer (2)	FA-617
20	8-32 x 5/16" HWHMS SEMS(2)	FA-67
21	Ball Snubber	21532
22	Ball Snubber	21159
23	Spring Cam (15° OFFSET)	18993



ASSEMBLY WITH FULCRUM	BALL CAM	SPRING CAM (NO SPRING)	SPRING	SPRING SOLID HEIGHT
A-15827	A-15822	A-15826	A-9758	5/8"
A-15828	A-15822	A-15826	A-15598	11/16"
A-16083	A-15822	A-15826	A-8727	7/8"
A-25842	A-15822	A-18993	A-15598	11/16"



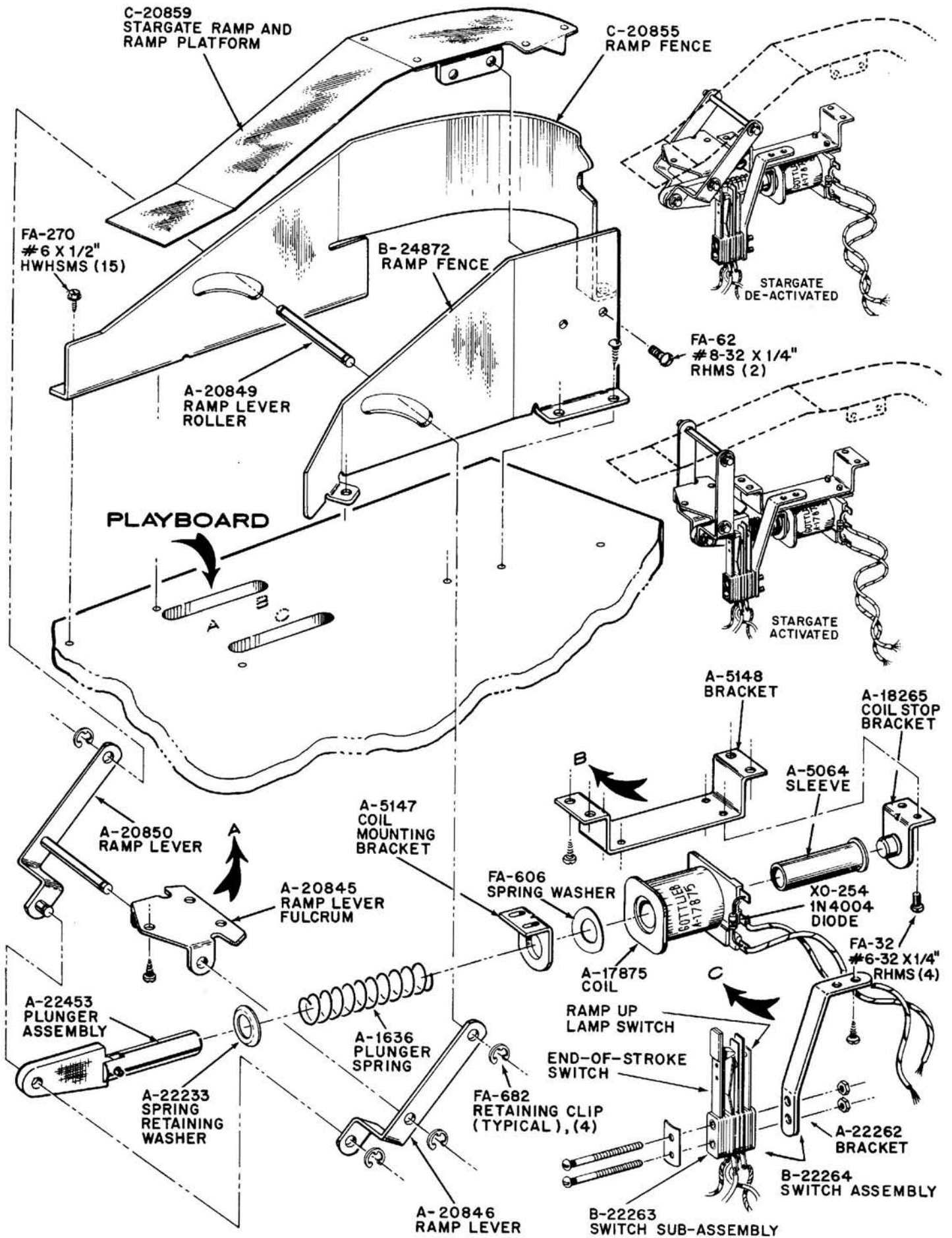
ASSEMBLY WITH FULCRUM	BALL CAM	SPRING CAM (NO SPRING)	SPRING	SPRING SOLID HEIGHT
A-16045	A-16044	A-16043	A-9758	5/8"
A-16085	A-16044	A-16043	A-8727	7/8"
A-16086	A-16044	A-16043	A-15598	11/16"





# XI. PARTS INFORMATION

## STARGATE RAMP





# XI. PARTS INFORMATION

## UNIQUE PARTS

The following listing denotes new parts and assemblies unique to ROBO-WAR, Game #714. Part Numbers prefixed with an asterisk (\*) will be illustrated or can be located on pages 48, 49, 50, 51 or 52. Numbers in parenthesis ( ) indicate multiple quantities.

### PLAYBOARD

<u>DESCRIPTION</u>	<u>PART NO.</u>
WIREFORM RAMP.....	*25892
BALL GUIDE RAIL.....	*25899
FLAT RAIL.....	*25901
BALL GUIDE RAIL.....	*25902
FLAT RAIL.....	*25904
FLAT RAIL.....	*25905
RAMP SPACER.....	*25907
POP BUMPER DECAL (3).....	*25910
DROP TARGET DECAL (10).....	*25911
MYLAR OVERLAY.....	*25914
DROP TARGET BANK ASSEMBLY, 4 POSITION.....	*MA-1075
DROP TARGET BANK ASSEMBLY, 1 POSITION.....	*MA-1096
DROP TARGET BANK ASSEMBLY, 2 POSITION.....	*MA-1097
DROP TARGET BANK ASSEMBLY, 3 POSITION.....	*MA-1098
RELAY STRIP ASSEMBLY.....	MA-1099
GLASS STOP ASSEMBLY.....	MA-1089
GLASS STOP PLEXIGLASS (SCREENED).....	25898
SHAFT BUSHING.....	*4546
HAIRPIN FASTENER.....	*6947
BALL GATE SHAFT.....	*23408
BALL GATE TORSION SPRING.....	*23409
GATE WIREFORM.....	*25153
LAMP SOCKET.....	25934
ROLLOVER SWITCH (4).....	*25937
ROLLOVER SWITCH (2).....	*25938
SWITCH ASSEMBLY.....	*22264
ROLLUNDER GATE.....	*25965

### LIGHTBOX

<u>DESCRIPTION</u>	<u>PART NO.</u>
STYRENE ARTWORK (BACKGLASS).....	24747-71
TRANSISTOR DRIVER BOARD, 1A16.....	MA-1104
TRANSISTOR DRIVER BOARD, 2A16.....	MA-1079
HINGE.....	25919
LID SUPPORT.....	25920
LOCK STRIKE.....	25921
LOCK CAM.....	25922
ROLLER CATCH.....	25936

### CABINET

<u>DESCRIPTION</u>	<u>PART NO.</u>
RESISTOR BOARD.....	*MA-1101
SWITCHING DIODE BOARD.....	*MA-1102

## **SERVICE NOTES**



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