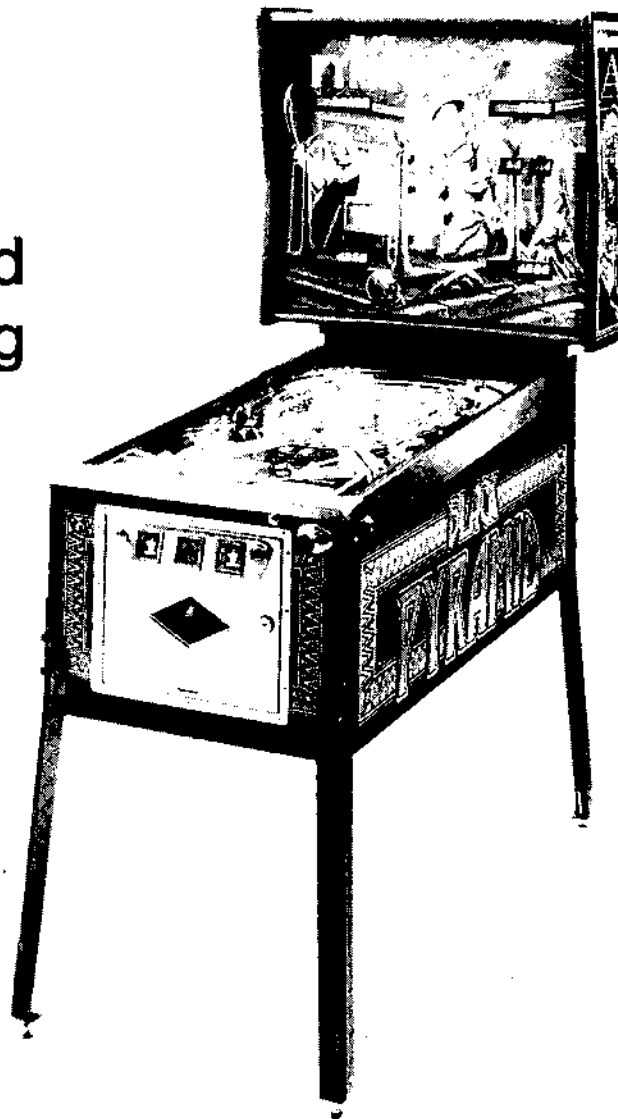


# BLACK PYRAMID

## Parts and Operating Manual



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July 11, 1984

S E R V I C E B U L L E T I N

GAME: BLACK PYRAMID

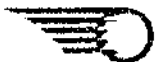
SUBJECT: ATTRACT MODE SOUND & CORRECTION ON PAGE SEVEN (7)  
OF THE GAME MANUAL

In order to shut off the attract mode sound, Dip Switch No. #30 on the MPU Board must be turned off. Please add this information to Page 7 of your game manual.

Also, on Page 7 the last switch setting for the Left Lane Extra Ball Build Up Adjustment (SW#7 on SW#8 on 50K) should read 'Most Liberal'.

Pete Gustafson  
Field Service Technician

PG/dd

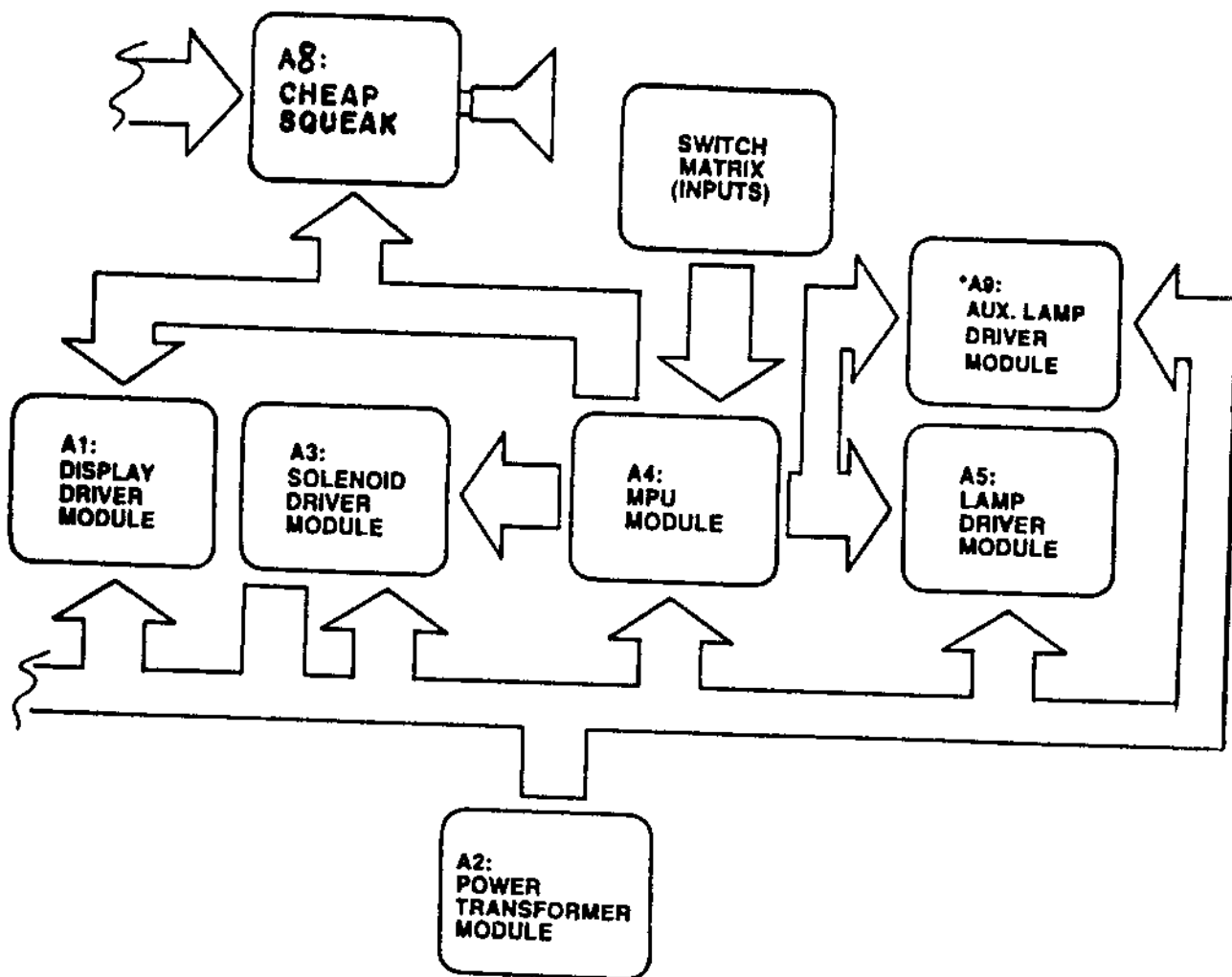


# Installation and General Game Operation Instructions

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# BLOCK DIAGRAM—ELECTRONIC PINBALL GAME



## I. INSTALLATION

### Assemble the game as follows:

Bolt legs to cabinet. Bolt back box to cabinet. Use flat washers under bolt heads. Gently feed cable connectors and ground braid through cable port in back box. Screw ground braid to braid in back box. Carefully and fully insert connectors on printed circuit assemblies.

On all games there are certain items that should be checked after shipment. These are visual inspections which may avoid time consuming service work later. Minor troubles caused by abusive handling in shipment are unavoidable. Cable connectors may be loosened, switches (especially tilt switches) may go out of adjustment. Plumb bob tilt switch should always be adjusted after game is set on location and leg levelers are adjusted.

Visual inspections before plugging in line cord:

1. Check that all cable connectors are completely seated on printed circuit assemblies.
2. Check that cables are clear of all moving parts.
3. Check for any wires that may have become disconnected.
4. Check switches for loose solder or other foreign material that may have come loose in shipment and could cause shorting of contacts.
5. Check wires on coils for proper soldering. Cold solder connections may not show up in factory inspection, but vibration in shipment may break contact.
6. Check that fuses are firmly seated and making good contact.
7. Check the transformer for any foreign material shorting across wiring lugs.
8. Check wiring of transformer to correspond to location voltage. See figure 1.

Check adjustment of the three (normally open) tilt switches:

1. Panel tilt on bottom of playfield panel.
2. Plumb bob tilt on left side of cabinet near front door.
3. Ball tilt above plumb bob tilt. Insert the smaller ball (15/16" dia.) into the ball tilt assembly, and adjust the bracket so the ball will roll free to contact the switch blade, if front of cabinet is

### TRANSFORMER CONNECTION INSTRUCTIONS

**REFER TO POWER SUPPLY SCHEMATIC  
IN GAME MANUAL FOR TABLE "A"**

115 VAC, 2-8, 3-6, 7-10
120 VAC, 2-8, 4-6, 7-11
220 VAC, 4-8, 7-9
240 VAC, 4-8, 7-11

PART OF POWER—TRANSFORMER MODULE A2, LOCATED IN LOWER CABINET

## II. GENERAL GAME OPERATION

### Place ball into playfield by outhole.

**Coin game.** Coin should be rejected. Plug in line cord. Move power ON-OFF master switch at bottom right front corner of cabinet to 'ON' position. The game will play a power-up tune to announce game-readiness. Drop targets are reset, scores are set to zero, alternating with the 'High Score to Date,' and the game is ready for play. Coin game. The game should accept the coin and post credits\* for coins accepted (adjustable). Pressing the credit button on the door will cause the outhole kicker to serve the ball to the shooter alley. The 1st player-up lite is lit. A game-up tune\* is played to announce play-readiness.

One player is posted each additional time the credit button is pressed (one to four can play). The credits are reduced by one each time the credit button is pressed until the credits are reduced to zero.

Shooting the ball initiates play.

The game awards all points earned by the player. If spinner is turning and scoring when the ball hits a target, the spinner and the target scores are awarded.

When the ball enters the outhole, the bonus score is added to the total score. The player-up and/or ball in play on the back box is advanced one position. The outhole kicker serves the ball to the shooter alley and play is resumed. This continues until each player has played the allowable number of balls per game (adjustable). At this time the 'Game Over' light is lit. A random Match\* number appears and the 'Match' light is lit. If the number is the same as the last two digits in a player's score, a free game is awarded.

Extra balls won during the course of the game are played immediately after the player's regular ball enters the outhole. The player-up and/or ball in play on the back box are not advanced for extra ball play. Bonus score is added to the player's score before the game serves the extra ball for play.

Scoring over 10,000,000 gives "High Score to Date" award.

At the end of the game, a 'High Score to Date' is alternately flashed with all 4 player scores. If the 'High Score to Date' is beat, this feature\* awards free games.

Tilting the game results in loss of a ball. The flippers, thumper-bumpers, etc., go 'dead.' Bonus points are not scored. The purpose of the tilt penalty is to discourage the player from jostling the machine in an attempt to prolong play. Game action becomes normal after the ball kicker assembly serves the ball to the shooter alley.

Slamming the machine results in loss of the game. All feature lights go out, the game goes 'dead,' and a time delay occurs. The purpose of the time delay is to discourage unnecessary abuse of the machine. After the delay, the 'Game Over' light lites and the power-up tune is played. The time delay occurs anytime one of the slam switches is made to contact. There are two factory installed slam switches, on the front door, and one on left side of cabinet. (Any number of slam switches could be installed by the operator, to meet his individual requirement.) The switch should be adjusted to have approximately 1/16" gap between the contacts. The weighted blade should be adjusted to attain the desired sensitivity. Decreasing the gap between contacts will make the switch more sensitive. Opening the gap will reduce sensitivity.

\*Some tunes and features can be disabled by operator if so desired. See Back Box Adjustments.

NOTE: Scoring and feature units will differ from game to game.

### III. BOOKKEEPING FUNCTIONS

The game is designed to help the operator perform certain accounting functions. The game can display the number of total plays and replays (free games). It can display the number of coins dropped down each coin chute. The bookkeeping functions are displayed on all player score displays simultaneously. An identification number, 05 to 15, appears on the Match/Ball in Play window as follows:

- 05— 00 to— 40 = Current Credits
- \*06— 10000 to—99999 = Total Plays (Payed & Free Games)
- \*07— 10000 to—99999 = Total Replays (Free Games)
- 08— 00 to—99999 = Game Percentage
- 09— 00 to—99999 = Total times 'High Score to Date' is beat
- \*10— 10000 to—99999 = Coins Dropped thru Coin Chute #1
- \*11— 10000 to—99999 = Coins Dropped thru Coin Chute #2\*\*
- \*12— 10000 to—99999 = Coins Dropped thru Coin Chute #3\*\*
- \*13— 00 to—99999 = Number of Specials awarded from Panel Specials Only
- \*14— 00 to—99999 = Number of minutes of Game Play
- \*15— 00 to—99999 = Number of Service Credits

The game displays the first bookkeeping entry if the Self-Test button (See Fig. III) on the inside of the front door is pressed ten times. Alternately push and release the Self-Test button at one second intervals. The number 05 appears in the 'Match/Ball in Play' window. Current credits appear on the player score displays. Each additional press of the button causes the next entry to be displayed.

After the data in each bookkeeping register is recorded, it can be set to zero simply by pressing switch button S33, located on A4, the MPU module in the back box (See Fig. III), or by pressing the Coin Chute #3 switch. Any or all registers can be cleared by alternating between the Self-Test button and the switch button S33 on the MPU module or Coin Chute #3 switch. The operator is given this option as a possible convenience and can elect to use or not use it as his needs direct.

Pressing the button 5 more times causes the game to play the power-up tune and light the Game Over light.

Service credits are designed to allow the serviceman to test the game under actual play conditions without disturbing the bookkeeping records that reside at identification numbers 06, 07, 10, 11 and 12.

To obtain Service Credits, push and release the Self-Test switch until identification number 05 appears in the 'Match/Ball in Play' window. Hold in the Credit button until the desired number of Service Credits (up to five) appears on the player score displays.

NOTE: If, upon accessing identification number 05, a number of credits greater than five is displayed, pressing the credit button has no effect.

Identification number 15 is reserved as a record of the number of Service Credits used.

\*The 10,000 level is pre-set at the factory; can be set to zero, initially, if desired.

\*\*If Coin Chute is not used in game, number displayed (if other than 00) on Player Score displays has no significance.

NOTE: If "Total Play" register is reset to zeroes then "Total Replays" register should also be reset to zeroes to maintain the game percentage value.

# BLACK PYRAMID

## Feature Operation & Scoring

### A) Top Saucer Feature

B-L-A-C-K arrows continue to flash back & forth. Their values are as follows:

From left to right 1st arrow score 25,000 spots "B" on black bonus, 2nd arrow score 5,000 flash left bumper and spots "L" on black bonus. 3rd arrow score 5,000, opens gate and spots "A" on black bonus. 4th arrow scores 5,000, flash right bumper and spots "C" on black bonus. 5th arrow score 25,000 and spots "K" on black bonus.

### B) Bumpers Feature

Score 100 points unlit 1,000 points lit and 3,000 points when flashing.

### C) 3 In Line Drop Target Feature

Score 5000 points each and respectively lite the 2X-3X and 5X bonus multipliers.

### D) Right Roll Up Line Feature

After the drop targets were knocked down score as follows:

Black arrow immediately will start flashing if black bonus was not completed. Rolling on the button will complete all 5 lites on black bonus and pyramid bonus, and the lane at this point will either score 50,000 points every time button is lit, or will alternate with Black Pyramid for completion of more of that feature depending on switch option #24.

### E) Left Roll Up Lane Feature

Roll over button scores as follows:

20,000, 30,000, 40,000, 50,000, X-Ball and Spl plus each time spot—a lite either on 200,000 pts. lite, or a lite on black bonus lite.

### F) Swinger Target Feature

Spots any unlit star and unlit 200,000 lite, however, if the arrow lines up with a lit lite, target will spot a lite on black bonus.

Lighting the last light on 200,000 will automatically award the player with 200,000 points. Completing the feature with one lit star will double the 200,000 value and completing the feature with 2 stars lit triples the 200,000 value, and also will give an automatic replay.

### SPECIAL REPLAY/X-BALL/NOVELTY MODES

Self-test positions 16 and 17 give the operator flexibility to award a replay ball or score (Novelty) when a special is scored. A combination of X-Ball, Novelty can be obtained through the following chart.

	Set to "03"	Set to "02"	Set to "01"
Self-test position 16	AWARD	AWARD	AWARD
Playfield X-Balls and Specials	REPLAY	X-BALL*	50,000
Swinger Target Special Arrow	REPLAY	X-BALL*	50,000
Bonus Special	REPLAY	*	50,000
Left Lane Special	X-BALL	X-BALL**	25,000
Left Lane X-Ball	Set to "03"	SET TO "02"	SET TO "01"
Self-test Position 17	AWARD	AWARD	AWARD
	REPLAY	X-BALL**	25,000

### Scoring Thresholds

\*50,000 if same player shoot again is lit.  
 \*\*25,000 if same player shoot again is lit.



## V. GAME ADJUSTMENTS

### A. Playfield Panel Post Adjustments:

Posts that control left and right outlane opening on panel can be removed to make access to outlanes easier or harder for ball to enter. See Figure II.

Easier entry will decrease playing time and scoring (conservative).  
Harder entry will increase playing time and scoring (liberal).

### B. Back Box Game Adjustments:

Each game has thirty-two switches located on A4, the MPU module, located in the back box, that allow play to be customized to the location. See Figure III. Credits per coin, maximum credits, credit display, balls per game, match feature, high game feature, special award and melody are selectable by means of the switches. The switches are contained in four-sixteen lead packages numbered S1-8, S9-16, S17-24, and S25-32 for easy identification. The "ON" toggle position is marked on the assembly. **Turn off power before making adjustments.**

#### Credits/Coin Adjustments:

The credits per coin are selectable by means of S17-S20 for coin chute #2 (Center). The switch settings and resultant credits/coin are as follows:

S20	S19	S18	S17	Credits/Coin	S20	S19	S18	S17	Credits/Coin
OFF	OFF	OFF	OFF	Same as Coin Chute #1 Settings	ON	OFF	OFF	OFF	8/1 Coin
OFF	OFF	OFF	ON	1/1 Coin	ON	OFF	OFF	ON	9/1 Coin
OFF	OFF	ON	OFF	2/1 Coin	ON	OFF	ON	OFF	10/1 Coin
OFF	OFF	ON	ON	3/1 Coin	ON	OFF	ON	ON	11/1 Coin
OFF	ON	OFF	OFF	4/1 Coin	ON	ON	OFF	OFF	12/1 Coin
OFF	ON	OFF	ON	5/1 Coin	ON	ON	OFF	ON	13/1 Coin
OFF	ON	ON	OFF	6/1 Coin	ON	ON	ON	OFF	14/1 Coin
OFF	ON	ON	ON	7/1 Coin	ON	ON	ON	ON	15/1 Coin

The credits given are selectable by means of switches 1-5 incl., for coin chute #1 and switches 9-13 incl., for coin chute #3. Thirty-one different credit ratios are available for each coin chute. The switch settings and resultant credits/coin are listed below.

### CREDITS/COIN ADJUSTMENTS

COIN CHUTE	SWITCHES					CREDITS	CREDITS	CREDITS	CREDITS	CREDITS
	5	4	3	2	1					
#1 (HINGE SIDE)										
OR #3	13	12	11	10	9					
(RIGHT SIDE)						1/1 Coin				
	OFF	OFF	OFF	OFF	OFF	2/1 Coin				
	OFF	OFF	OFF	ON	OFF	3/1 Coin				
	OFF	OFF	OFF	ON	ON	4/1 Coin				
	OFF	OFF	ON	OFF	OFF	5/1 Coin				
	OFF	OFF	ON	OFF	ON	6/1 Coin				
	OFF	OFF	ON	ON	OFF	7/1 Coin				
	OFF	OFF	ON	ON	ON	8/1 Coin				
	OFF	ON	OFF	OFF	OFF	9/1 Coin				
	OFF	ON	OFF	OFF	ON	12/1 Coin				
	OFF	ON	OFF	ON	OFF	14/1 Coin				
	OFF	ON	OFF	ON	ON	1/2 Coins*				
	OFF	ON	ON	OFF	OFF	2/2 Coins*				
	OFF	ON	ON	OFF	ON	3/2 Coins*				
	OFF	ON	ON	ON	OFF	4/2 Coins*				
	OFF	ON	ON	ON	ON	5/2 Coins*				
	ON	OFF	OFF	OFF	OFF	6/2 Coins*				
	ON	OFF	OFF	OFF	ON	7/2 Coins*				
	ON	OFF	OFF	ON	OFF	8/2 Coins*				
	ON	OFF	OFF	ON	ON	9/2 Coins*				
	ON	OFF	ON	OFF	OFF	12/2 Coins*				
	ON	OFF	ON	OFF	ON	14/2 Coins*				
	ON	OFF	ON	ON	OFF	1/1st Coin	2/2nd Coin			3/2
	ON	OFF	ON	ON	ON	0/1st Coin*	1/2nd Coin	1/3rd Coin	1/4th Coin	3/4
	ON	ON	OFF	OFF	OFF	0/1st Coin*	1/2nd Coin	0/3rd Coin**	2/4th Coin	3/4
	ON	ON	OFF	OFF	ON	1/1st Coin	1/2nd Coin	1/3rd Coin	2/4th Coin	5/4
	ON	ON	OFF	ON	OFF	1/1st Coin	2/2nd Coin	1/3rd Coin	3/4th Coin	7/4
	ON	ON	OFF	ON	OFF	1/1st Coin	2/2nd Coin	2/3rd Coin	2/4th Coin	7/4
	ON	ON	OFF	ON	ON	1/1st Coin	2/2nd Coin	2/3rd Coin	2/4th Coin	1/3
	ON	ON	ON	OFF	OFF	0/1st Coin***	0/2nd Coin***	1/3rd Coin		1/4
	ON	ON	ON	OFF	ON	0/1st Coin***	0/2nd Coin***	0/3rd Coin**	1/4th Coin	1/4
	ON	ON	ON	ON	OFF	0/1st Coin****	0/2nd Coin****	0/3rd Coin****	0/4th Coin****	1/5th Coin
	ON	ON	ON	ON	OFF	0/1st Coin****	0/2nd Coin****	1/3rd Coin	0/4th Coin****	1/5th Coin
	ON	ON	ON	ON	ON	0/1st Coin****	0/2nd Coin****	1/3rd Coin	0/4th Coin****	2/5

\*No Credits until 2nd coin is dropped.

\*\*No Credits until 4th coin is dropped.

\*\*\*No Credits until 3rd coin is dropped.

\*\*\*\*No Credits until 5th coin is dropped.

**MAXIMUM CREDITS:**

The maximum credits accepted by the machine limits the number of games that can be accumulated by coining, by winning replays or both. The maximum number of credits is selectable by means of switches 25 and 26. Four credit limits are available. Switch settings are listed below.

MAXIMUM CREDITS	SWITCHES	
	26	25
10	OFF	OFF
15	OFF	ON
25	ON	OFF
40	ON	ON

BALLS PER GAME:	# BALLS/GAME	SWITCHES	32	31
	5		OFF	ON
	4		ON	OFF
	3		OFF	OFF
	2		ON	ON

**MATCH FEATURE:**

When the Match Feature is ON, a random number appears on the Match/Credit window and the word Match is illuminated. If the number matches the tens digit in a player's score, a free game is awarded. The Match Feature creates an incentive to play.

MATCH	SWITCH 28
ON	ON
OFF	OFF

CREDIT DISPLAY:	CREDITS DISPLAYED	SWITCH 27
	YES	ON
	NO	OFF

**HIGH SCORE FEATURE:**

The game is designed to award an Extra Ball or Free Game at each of the two or three score levels. See Front Door Game Adjustments.

AWARD	SELF-TEST POSITION 16	SELF-TEST POSITION 17
REPLAY	SET TO "03"	SET TO "03"
EXTRA BALL	SET TO "02"	SET TO "02"
NOVELTY	SET TO "01"	SET TO "01"
NO AWARD	SET TO "00"	SET TO "00"

For combinations of replay/X-ball/Novelty Modes see page 4A "K. Special Replay/X-ball/Novelty Modes."

**HIGH SCORE TO DATE OR OVER 10,000,000 SCORE FEATURE:**

The game is designed to award free games as an option if high score to date is beat or player exceeds 10,000,000 points. Each time this happens, the high score will reset to 1,999,990 as new high score to beat. This score is displayed on all 4 player score displays at the end of each game as an incentive to play. Recommended setting is underlined.

HIGH SCORE TO DATE FEATURE	SELF-TEST POSITION 19
No Award	SET TO "00"
One Credit	SET TO "01"
Two Credits	SET TO "02"
<u>Three Credits</u>	SET TO "03"

State and local laws may regulate the use of the above features, and they have been designed to allow for appropriate adjustment in order to conform to such requirements.

## 0A44 BLACK PYRAMID GAME FEATURE OPTIONS

<b>Bonus Special Per Game</b>					
Liberal	SW 6	ON	Unlimited Spls Earned		
Conservative	SW 6	OFF	Only 1 Spl Earned		
<b>Left Lane Extra Ball Build Up Adjustment</b>					
Most Conservative	SW 7	OFF	SW 8	OFF	90K
Conservative	SW 7	ON	SW 8	OFF	80K
Liberal	SW 7	OFF	SW 8	ON	70K
Most Conservative	SW 7	ON	SW 8	ON	50K
<b>M &amp; I Return Lanes</b>					
Liberal	SW 14	ON	Lanes Tied Together		
Conservative	SW 14	OFF	Lanes Separated		
<b>Left Roll Up Lane 20,000 pts.</b>					
Liberal	SW 21	ON	Initially Lit		
Conservative	SW 21	OFF	Initially Unlit		
<b>Bonus Spl</b>					
Most Liberal	SW 22	ON	SW 23	ON	Spl On w/60K
Liberal	SW 22	OFF	SW 23	ON	Spl On w/120K
Conservative	SW 22	ON	SW 23	OFF	Spl ON after 120K
Conservative	SW 22	OFF	SW 23	OFF	Spl On after 120K
<b>Right Lane 50,000 pts.</b>					
Liberal	SW 24	ON	50 K Alternatives with Black Pyramid Arrows		
Conservative	SW 24	OFF	50K does not Alternate with Black Pyramid Arrows		

## C. FRONT DOOR GAME ADJUSTMENTS

### High Score Feature Adjustments:

The game is designed to award an extra ball (option) of a free game at each of three score levels. The recommended levels are on the score card in the game.

Any level from 10,000 to 990,000 can be set, as desired. It is also possible to reset or turn off (00) any or all of the levels, if desired.

1. Push and release Self-Test button (See Figure III) at one second intervals approximately six times or until identification number 01 appears on the 'Match/Ball in Play' display.
2. The number on the Player Score Displays is the score level.\* It can be increased, if desired, by holding the credit button in. To decrease the score level, hold the credit button in and depress and release the Self-Test button. Release the credit button when the desired number appears. Note that the level changes 10,000 points at a time. If the number '00' is left on the displays, the high score feature is eliminated for that level.
3. Repeat steps 1 and 2 for the second and third score levels. The identification numbers '02' and '03' on the Match/Ball in Play display are for the second and third levels, respectively.

### High Score to Date and 10,000,000 Feature:

The game is designed to award free games when 'High Score to Date' is beat, or if the player exceeds 10,000,000 points.

It is recommended that the level, which will build with play, be periodically reset to the factory recommended level to encourage game play. The adjustment procedure is the same as for the High Score Feature Adjustment, Steps 1 and 2. Continue pushing the Self-Test button until the identification number '04' appears on the 'Match/Ball in Play' display and then do Step 2.

Any level from '00' to 9,990,000 can be set as described. It is to be noted that '00' does NOT turn off the feature, as it does on High Score feature. The feature is turned off by self test position 19 as discussed under 'Back Box Game Adjustments.'

### SELF TEST SETUP FOR 16-19:

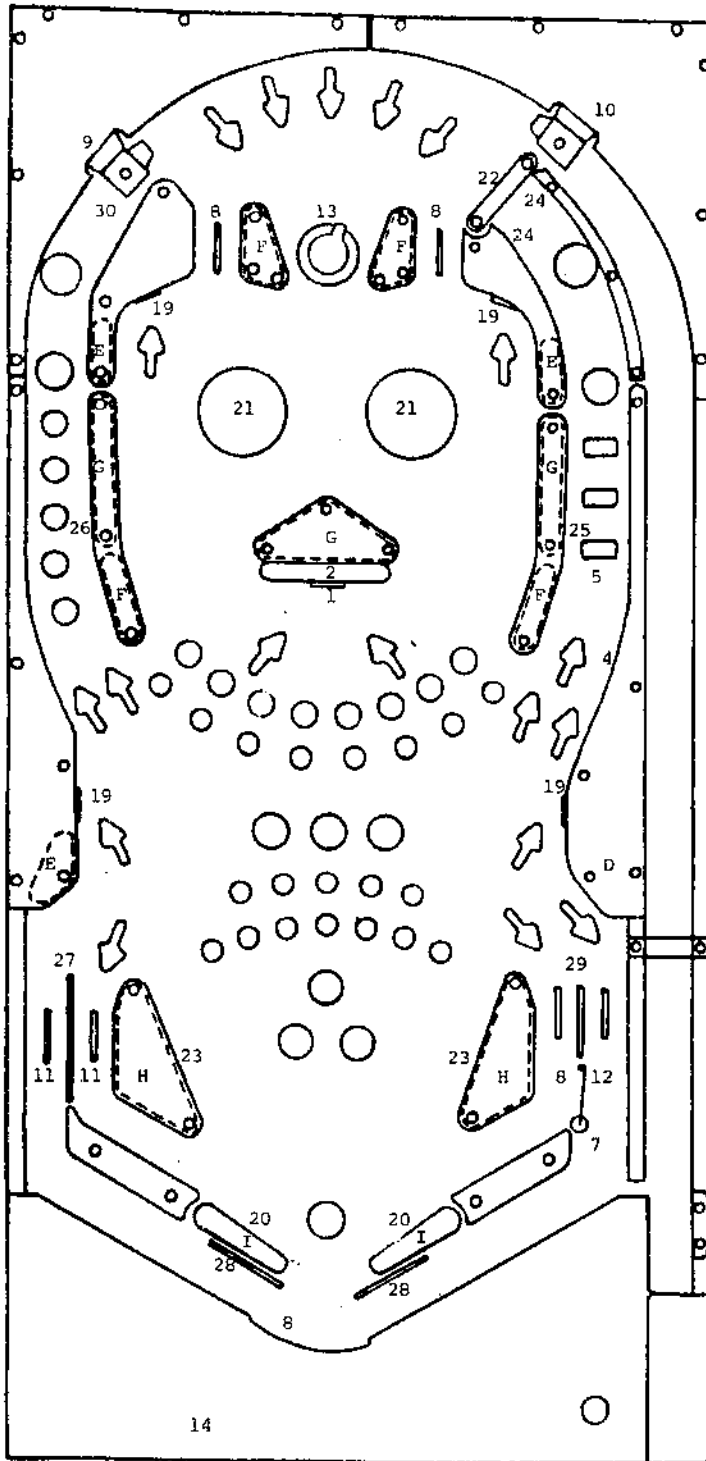
To set up positions 16-19 push and release self test button till 16 shows on match/ball in play. Now pulse replay button for recommended setup from "00" thru "03." Repeat for positions 17, 18 or 19.

### SOUND

In addition to game sounds, there is also a Master Volume Control located on the front door. (refer to page 10)

Please note that these module volume controls should be adjusted prior to setting the control on the front door.

\*Can be quickly set to '00' by pressing S33 on the MPU assembly in the back box or Coin Chute switch #3. (See Figure III.)

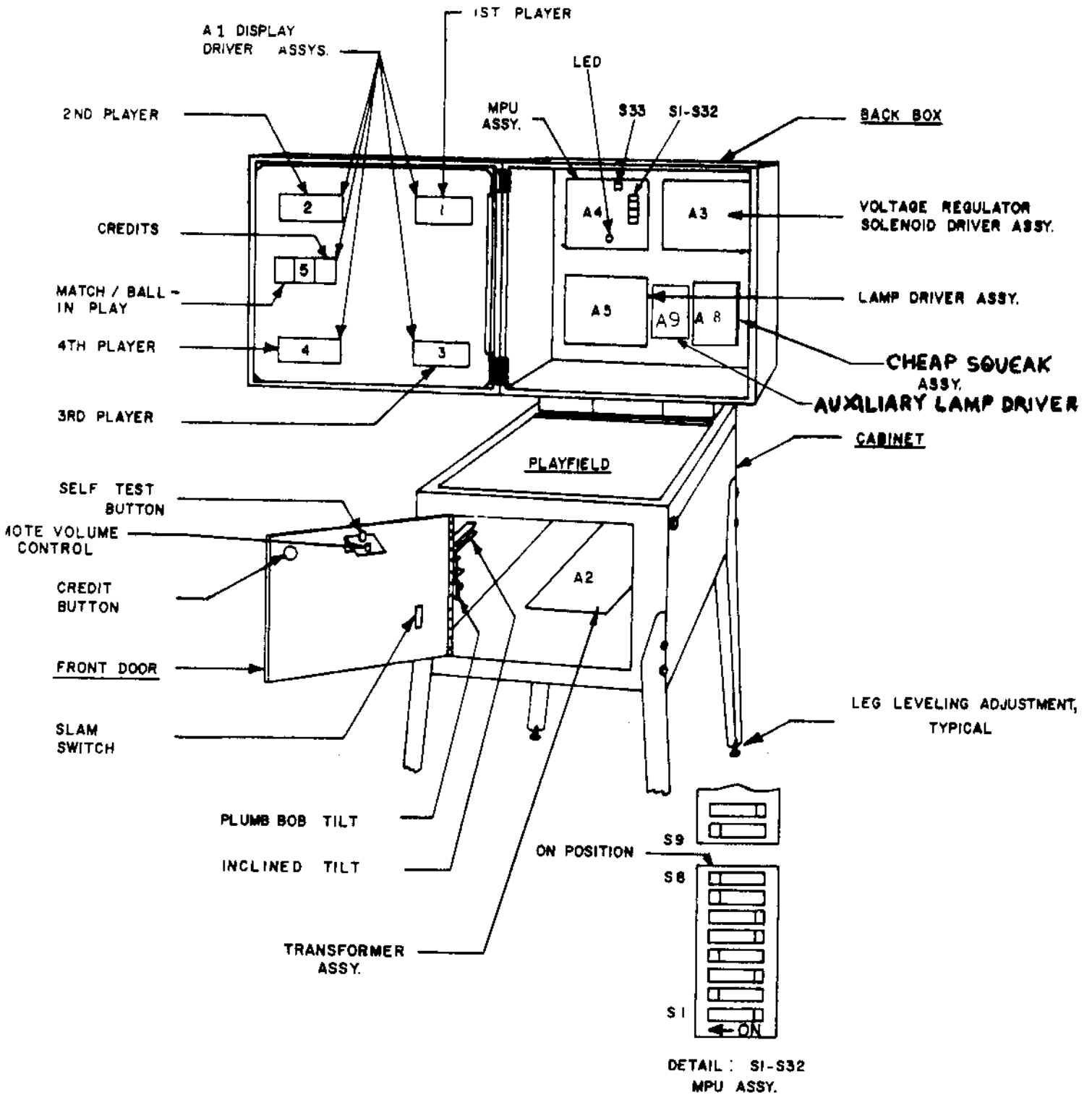


## OA44 BLACK PYRAMID RUBBER PARTS

- |              |                     |
|--------------|---------------------|
| A. 17-41-633 | (2) POST            |
| B. 17-41-637 | (10) POST           |
| C. 17-41-641 | (2) POST            |
| D. 17-41-642 | (1) 3/4" DIA.       |
| E. 17-41-643 | (3) 1" DIA.         |
| F. 17-41-644 | (4) 1 1/2" DIA.     |
| G. 17-41-645 | (3) 2" DIA.         |
| H. 17-41-646 | (2) 2 1/2" DIA.     |
| I. 17-41-687 | (2) FLIPPER (AMBER) |

## PANEL TOP PARTS

- |  |                |
|--|----------------|
| 1. Swinger Target Assy.                                | AA44-00012-0   |
| 2. Slide Guide Assy.                                   | AA44-00021-0   |
| 3. Ball Guide Assy.                                    | AA44-00025-0   |
| 4. Ball Guide Assy.                                    | AA44-00026-0   |
| 5. 3-In Line Drop Target                               | AA44-00028-0   |
| 6. Eject Hole Assy.                                    | AA44-00034-0   |
| 7. Free Gate Relay Assy.                               | AA44-00036-0   |
| 8. Wire Actuator Assy.                                 | A331-00042-0   |
| 9. Ball Gate Assy. (Left)                              | A360-00022-0   |
| 10. Ball Gate Assy. (Right)                            | A360-00023-0   |
| 11. Wire Actuator Assy.<br>(Right)                     | A360-00216-0   |
| 12. Wire Actuator Assy.<br>(Right)                     | A390-00044-0   |
| 13. Wire Actuator Assy.                                | A360-00217-0   |
| 14. Top Mounted Kicker<br>(Ball Rtn)                   | A360-00234-0   |
| 15. Switch & Diode Assy.                               | A360-00239-0   |
| 16. Switch & Diode Assy.                               | A360-00241-0   |
| 17. Switch & Diode Assy.                               | A360-00243-0   |
| 18. Switch & Diode Assy.                               | A360-00244-0   |
| 19. Target SW, Brkt. &<br>Diode Assy.                  | A390-00034-0   |
| 20. Mold Flipper Assy.-<br>Wht-Purch.                  | A967-00031-0   |
| 21. Thumper Bumper Assy.                               | A967-00053-0   |
| 22. Ball Gate Wire Assy.                               | A967-00057-0   |
| 23. Slingshot Kicker Coil<br>Assy.                     | A967-00059-0   |
| 24. Ball Guide Wire 6 <sup>19</sup> / <sub>64</sub>    | A44-00100-0    |
| 25. Ball Guide Wire 6 <sup>9</sup> / <sub>32</sub> RT  | A44-00106-0100 |
| 26. Ball Guide Wire 6 <sup>9</sup> / <sub>32</sub> LT  | A44-00106-0200 |
| 27. Ball Guide Wire L. 3 <sup>6</sup> / <sub>8</sub> " | 360-00175-0106 |
| 28. Buffer Wire L. 2 <sup>3</sup> / <sub>8</sub> "     | 360-00175-5300 |
| 29. Ball Guide Wire 2"                                 | 360-00175-5600 |
| 30. Ball Guide Wire 2 <sup>7</sup> / <sub>8</sub> "    | 360-00175-6500 |



**FIGURE III. ELECTRONIC PIN BALL MACHINE**

## RECOMMENDED

Instructions, Score Cards and High Score Feature Settings  
to be used on **Black Pyramid 0A44**

### REPLAYS

Instruction Card  
Score Card

1 Replay at 1,220,000  
1 Replay at 2,400,000

### 3-BALL

M-051-00A44-A030  
M-051-00A44-A038

### REPLAYS

Instruction Card  
Score Card

1 Replay at 2,000,000  
1 Replay at 3,000,000

### 5-BALL

M-051-00A44-A030  
M-051-00A44-A039

### EXTRA BALL

Instruction Card  
Score Card

1 Extra Ball at 2,300,000  
1 Extra Ball at 3,400,000

M-051-00A44-A031  
M-051-000A44-A039  
W/M-051-000A44-A073

## ADDITIONAL CARDS

### REPLAYS

M-051-00A44-A040	700,000	1,600,000
M-051-00A44-A041	800,000	1,700,000
M-051-00A44-A042	900,000	1,800,000
M-051-00A44-A043	1,000,000	1,900,000
M-051-00A44-A044	1,000,000	2,000,000
M-051-00A44-A045	1,100,000	2,100,000
M-051-00A44-A046	1,200,000	2,200,200
M-051-00A44-A047	1,200,000	2,300,000
M-051-00A44-A048	1,200,000	2,500,000
M-051-00A44-A049	1,300,000	2,500,000
M-051-00A44-A050	1,400,000	2,600,000
M-051-00A44-A051	1,500,000	2,700,000
M-051-00A44-A052	1,600,000	2,800,000
M-051-00A44-A053	1,700,000	2,800,000
M-051-00A44-A054	1,800,000	2,900,000
M-051-00A44-A055	1,900,000	2,900,000
M-051-00A44-A056	2,000,000	3,200,000
M-051-00A44-A057	2,100,000	3,300,000
M-051-00A44-A064	2,200,000	3,500,000
M-051-00A44-A065	2,300,000	3,600,000
M-051-00A44-A066	2,400,000	3,800,000
M-051-00A44-A067	2,500,000	4,000,000

### EXTRA BALL

M-051-00A44-A072	1,900,000	3,100,000
M-051-00A44-A073	2,300,000	3,400,000
M-051-00A44-A074	2,500,000	3,700,000
M-051-00A44-A075	2,700,000	3,900,000

### Instruction Card Novelty

M-051-00A44-A032  
M-051-00A44-A037  
M-051-00A44-A036

### BLANKS (3)

High Game to date recommended levels:  
(reset periodically)  
3 BALL 2,700,000  
5 BALL 3,200,000

**Black Pyramid OA44**  
**RECOMMENDED SWITCH SETTING FOR 3 AND 5 BALL**

		<b>3 Ball</b>	<b>5 Ball</b>
BONUS SPL PER GAME UNLIMITED	SW 6	ON	ON
LEFT LANE EXTRA-BALL LITE ON	SW 7	ON	OFF
M & I RETURN LANES	SW 8	ON	ON
LEFT LANE 20K LITE	SW 14	OFF	OFF
BONUS SPL ON	SW 21	ON	ON
	SW 22	ON	OFF
	SW 23	ON ON	
RIGHT LANE 50K ALTERNATE	SW 24	ON	OFF
BALLS PER GAME	SW 31	OFF	ON
	SW 32	OFF	OFF

**REPLAYS**

Instruction Card  
 Score Cards  
 Major Mode

**3-BALL**

M-051-00A44-A030  
 M-051-00A44-A038  
 Self-Test Position 16, 17  
 Set to "03"  
 Sw.28 ON  
 Self-Test Position 19  
 Set to "03"

**5-BALL**

M-051-00A44-A030  
 M-051-00A44-A039  
 Self-Test Position 16, 17  
 Set to "03"  
 SW.28 ON  
 Self-Test Position 19  
 Set to "03"

**X-BALL**

Instruction Card  
 Score Card  
 Major Mode  
 Match  
 High Score to Date

M-051-00A44-A031  
 M-051-00A44-A039- W/M-051-00A44-A073  
 Self-Test Position 16, 17  
 Set to "02"  
 SW.28 OFF  
 Self-Test Position 19  
 Set to "00"

**Novelty**

Instruction Card  
 Score Card  
 Major Mode  
 Match  
 High Score to Date

M-051-00A44-A032  
 M-051-00A44-A036  
 Self-Test Position 16, 17  
 Set to "01"  
 SW.28 OFF  
 Self-Test Position 19  
 Set to "00"

M-051-00A44-A032  
 M-051-00A44-0037  
 Self-Test Position 16, 17  
 Set to "01"  
 SW.28 OFF  
 Self-Test Position 19  
 Set to "00"



## VIII. ROUTINE MAINTENANCE ON LOCATION:

Self-Test routines are written into the game design. They are particularly useful for routine maintenance. The tests are described below. The first test is automatic and occurs on power-up. This test causes the MPU module A4 to examine itself for failures. Seven flashes of an LED indicates proper operation. The second series of self-diagnostic tests causes the MPU to 'exercise' each of the other modules in such a way as to make their faults, if any, obvious. See Figure III and Page ii.

It is recommended that these tests be used several times a week to check out the games before play. If faults are discovered, they may be corrected on location if the operator has a stock of replacement modules. See "Trouble Shooting on Location."

### **MPU Module Self-Test:**

At power on, the LED on the MPU module flashes once. (Flicker-Flash.) After a pause, it flashes six more times and goes out. A power-up tune is played to announce game readiness. This indicates proper MPU operating condition and successful completion of the power-up test.

### **Game Self-Diagnostic Tests:**

1. Pressing the Self-Test button inside the door initiates the Self-Test routine. See Figures III and IV. All switched lamps flash off and on continuously.
2. Pressing the Self-Test button again causes each digit on each display to cycle from 0 thru 9, and repeat continuously.
3. Pressing the Self-Test button again causes each solenoid to be energized, one at a time, in a continuous sequence. Hold both flipper buttons 'in' during this test. The number appearing on the Player Score displays is the same as the number assigned to the solenoid. The sound of a solenoid pulling-in as a number appears indicates proper operation. The absence of sound is improper. If sound is absent, see Page 17 for help in Solenoid identification.
4. Pressing Self-Test button again causes the sound module to play same tune repeatedly.
5. Pressing the Self-Test button again causes the MPU to search each switch assembly for stuck contacts. If any are found, the number of the first set encountered is flashed on the Player Score displays. The number remains until the fault is cleared. See Page 17 for help in Stuck Switch identification. Other numbers may follow if more stuck contacts are present. If there are no stuck switches, the Match/Ball in Play display flashes '0'.
6. Pressing the Self-Test button 20 more times causes the MPU to step thru the threshold and bookkeeping functions described previously and finally to repeat the power-up test. For more rapid exit to power-up, turn the game off, then on. The game is now ready to play.

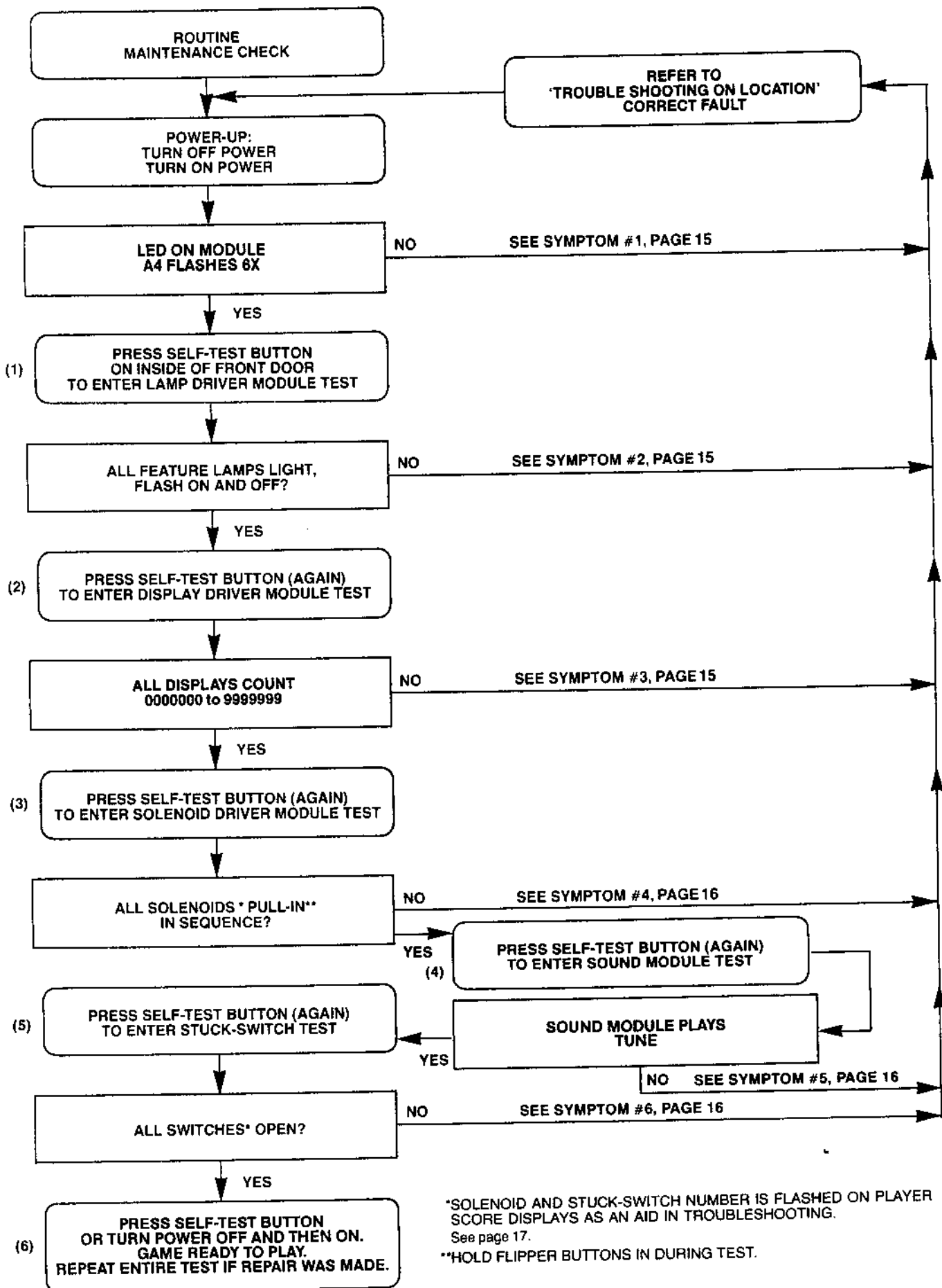
After successful completion of the Self Diagnostic Test procedure, set the game up for play. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no response, clean contacts by gently closing them on a clean business card or piece of paper and wiping until they wipe clean. Regap, if necessary, to 1/16". **Do not burnish or file Gold Plated Switch Contacts.**

## IX. TROUBLESHOOTING ON LOCATION

The game is designed to make troubleshooting easy. Several simple procedures are given herein that cover the greatest percentage of game failures. They are written for an operator on location and require module replacement. (See Figure III) Symptoms and the action to be taken are given for each type of problem.

If the problem is more complicated and is not solved by following this procedure, more detailed procedures are available from Bally. See the Parts List for ordering information.

**FIGURE IV. SELF-DIAGNOSTIC TEST MPU A4**



- 1A) **SYMPTOM:** Game does not play power-up tune when power is turned on. General illumination is present.
- ACTION:** A) Turn power OFF. Open back box. Locate light emitting diode (LED) on MPU module A4.  
 B) Turn Power ON. LED must flash 7X to indicate that module A4 is good. Correct flash sequence is flicker/flash-pause-and then six more flashes and LED goes out.  
 C. If LED does not come on, or does not flash, or flashes, but less than 7X, turn off power. Replace MPU module A4.
- CAUTION:** **Replacement MPU Module must have same Part Number or incorrect operation will result! See Parts List for MPU Module Part Number.**  
 Turn power ON.  
 D) If game is correct, it is now ready for play. If game is not correct, refer to Module Replacement procedure. (See Parts List.)
- 2A) **SYMPTOM:** Not all feature lamps light during game play.
- ACTION:** A) With power ON, open front door. Press button (Self-Test switch) once. If the game is correct, **all** feature lamps flash ON and OFF.  
 B) Carefully raise playfield or open back box to gain access to lamps.  
 C) Replace bulbs that do not flash.  
 D) If game is correct, it is now ready for play.  
 E) If game is not correct, turn power OFF. Replace Lamp Driver Module A5. Turn power ON and repeat A.  
 F) If game is correct, it is now ready for play.\*  
 G) If game is not correct, turn power OFF. Replace MPU module A4. See CAUTION, 1C. Turn power ON and repeat A.  
 H) If game is correct, it is now ready for play.\* If game is not correct, refer to Module Replacement procedure. (See Parts List.)
- 2B) **SYMPTOM:** One or some switched lamps always ON.
- ACTION:** Repeat 2AA, AB, AE, and AF and, if necessary AG & AH.
- 3A) **SYMPTOM:** Display digits improper on **one** or **several**, but less than all Display Driver module(s), A1. Improper: One or several segments always OFF, digits mottled or several segments or digit(s) always ON.
- ACTION:** A) With power ON, open front door. Press button (Self-Test switch) twice. If the game is correct, each digit on each Display Driver Module A1 (5 used/game) displays the count 1-9 and 0 continuously in all 6 digit positions. Note defective Display Driver modules.  
 B) Turn power OFF.  
**CAUTION: High Voltage is supplied to the Display Driver Modules, A1, from the Solenoid Driver/Voltage Regulator Module A3. Wait 30 seconds for High Voltage to Bleed Off.**  
 C) Replace Display Driver module(s) A1. Turn power ON. Repeat A.  
 D) If game is correct, it is now ready to play.\* If game is not correct, refer to Module Replacement procedure. (See Parts List.)
- 3B) **SYMPTOM:** All displays improper (all five display Driver modules). Improper: Digit(s) always on or off/segment(s) always on or off, all displays.
- ACTION:** A) Repeat 3AA, and AB.  
 B) Replace MPU module A4. See CAUTION NOTE, 1C. Turn power ON. Repeat A.

- C) If game is correct, it is now ready to play.\* If game is not correct, refer to Module Replacement procedure. (See Parts List.)
- 3C) **SYMPTOM:** One or several displays always off.  
**ACTION:** A) Do 3AA, AB, AC, and AD.  
 B) Repeat 3BB and BC, if necessary.
- 4A) **SYMPTOM:** Solenoid(s) do(es) not pull-in during course of game.  
**ACTION:** A) With power ON, open front door. Press button (Self-Test switch) three times.  
 B) If game was correct, each solenoid would be energized. A number is flashed on the Player Score displays as each solenoid is pulsed. Note any numbers that do not have the sound of a solenoid associated. See Solenoid Identification Table, Page 17 and Figure V.  
 C) Carefully lift the playfield (or open the back box) to gain access to the solenoid. Turn power OFF. Inspect the solenoid.  
 D) If a lead is broken off, repair. Repeat A & B. If game is correct, it is now ready for play.\* If solenoid wiring was correct, turn power OFF.  
 E) Replace Solenoid Driver/Voltage Regulator module A3. See CAUTION NOTE 3AB.  
 F) Repeat AA & AB. If game is correct, it is now ready to play.\* If game is not correct, turn power OFF.  
 G) Replace Sound Module A8.  
 H) Repeat AA and AB if game is correct. It is now ready to play. If game is not correct, turn power OFF."  
 I) Replace MPU module A4. See CAUTION NOTE, 1C.  
 J) Repeat A & B. If game is correct, it is now ready to play.\* If game is not correct, refer to Module Replacement Procedure. (See Parts List.)
- 4B) **SYMPTOM:** Solenoid(s) always energized—Note: if impulse solenoids (ball ejects, slingshots, thumper-bumpers, etc.) are energized continuously, they are subject to damage. Limit troubleshooting to one minute with power ON, followed by **five minutes with power OFF**. Repeat as necessary. Replace damaged solenoids.  
**ACTION:** Do 4AA, AB, AE, AF, AG, AH and if necessary, AI and AJ.
- 5) **SYMPTOM:** No Sound.  
**ACTION:** A) With Power ON, open front door, press Self-Test switch four times.  
 B) Turn volume control clockwise to Max.  
 C) If correct, sound will be heard. If incorrect, try seating speaker lead connector (J2) and input connector (J1).  
 D) If correct, sound will be heard. If incorrect, refer to Module Replacement procedure."
- 6) **SYMPTOM:** Feature (Drop Targets, etc.) does not score.  
**ACTION:** A) With power ON, open front door. Press button (Self-Test switch) five times.  
 B) If the game is correct, Match/Ball in Play display would flash '0'. If a number appears on the Player Score displays, see Switch Assembly Identification Table, Page 17 and Figure V.  
 C) Carefully lift the playfield. Locate the switch assembly identified from the number. Visually inspect the switch assembly. If the contacts are 'stuck', regap them to 1/16". See section under ADJUSTMENTS. Repeat A & B. If the game is correct, it is now ready to play.\* If game is not correct, turn the power OFF.  
 D) Replace MPU module A4. See CAUTION NOTE 1, C.  
 E) Repeat A & B. If the game is correct, it is now ready to play.\* If the game is not correct, refer to Module Replacement Procedure. (See Parts List).
- 7) **SYMPTOM:** Game blows fuse(s) repeatedly.  
**ACTION:** See Module Replacement Procedure. F.O. 560

\*Turn power On-Off switch OFF and then ON.

**GAME #A44 BLACK PYRAMID  
SOLENOID IDENTIFICATION TABLE**

<b>Self Test #</b>	<b>SOLENOID IDENTIFICATION</b>	<b>Self Test #</b>	<b>SOLENOID IDENTIFICATION</b>
01	LEFT SLINGSHOT	07	OUTHOLE
02	RIGHT SLINGSHOT	08	KNOCKER
03	LEFT THUMPER BUMPER	09	GATE
04	RIGHT THUMPER BUMPER	10	COIN LOCKOUT DOOR
05	SAUCER	11	K1 RELAY (FLIPPER ENABLE)
06	DROP TARGET RESET		

**SWITCH ASSEMBLY SELF – TEST DISPLAY NUMBERS**

<b>Switch Self Test #</b>	<b>DESCRIPTION</b>	<b>Switch Self Test #</b>	<b>DESCRIPTION</b>
01	LEFT SLINGSHOT	17	TOP LEFT BUMPER LANE
02	RIGHT SLINGSHOT	18	"P" TARGET
03	LEFT THUMPER BUMPER	19	"Y" TARGET
04	RIGHT THUMPER BUMPER	20	"R" TARGET
05	SWINGER TARGET	21	"A" TARGET
06	CREDIT BUTTON	22	"M" RETURN LANE
07	SAUCER	23	"I" RETURN LANE
08	OUTHOLE	24	TOP RIGHT BUMPER LANE
09	COIN III (RIGHT)	25	
10	COIN I (LEFT)	26	
11	COIN II (MIDDLE)	27	
12	30 POINT REBOUND (2)	28	GATE OUT LANE
13	TOP LEFT R.O. BUTTON	29	LEFT OUT LANE
14	TOP RIGHT R.O. BUTTON	30	2X IN LINE DROP TARGET
15	TILT	31	3X IN LINE DROP TARGET
16	SLAM	32	5X IN LINE DROP TARGET

#OA44 Black Pyramid

○ INDICATES SWITCH ASSEMBLY  
IDENTIFICATION NUMBERS

○ NOTE: CABINET: 15, 16,  
DOOR: 06, 09  
10, 11, 16

□ INDICATES SOLENOID  
IDENTIFICATION NUMBERS

NOTE: DOOR: 10

BACKBOX: 11

CABINET: 08

VECTOR SHOWING FOR EJECT SAUCER

BALL SHOULD EXIT TO RIGHT  
SIDE OF LEFT THUMPER AS  
SHOWN

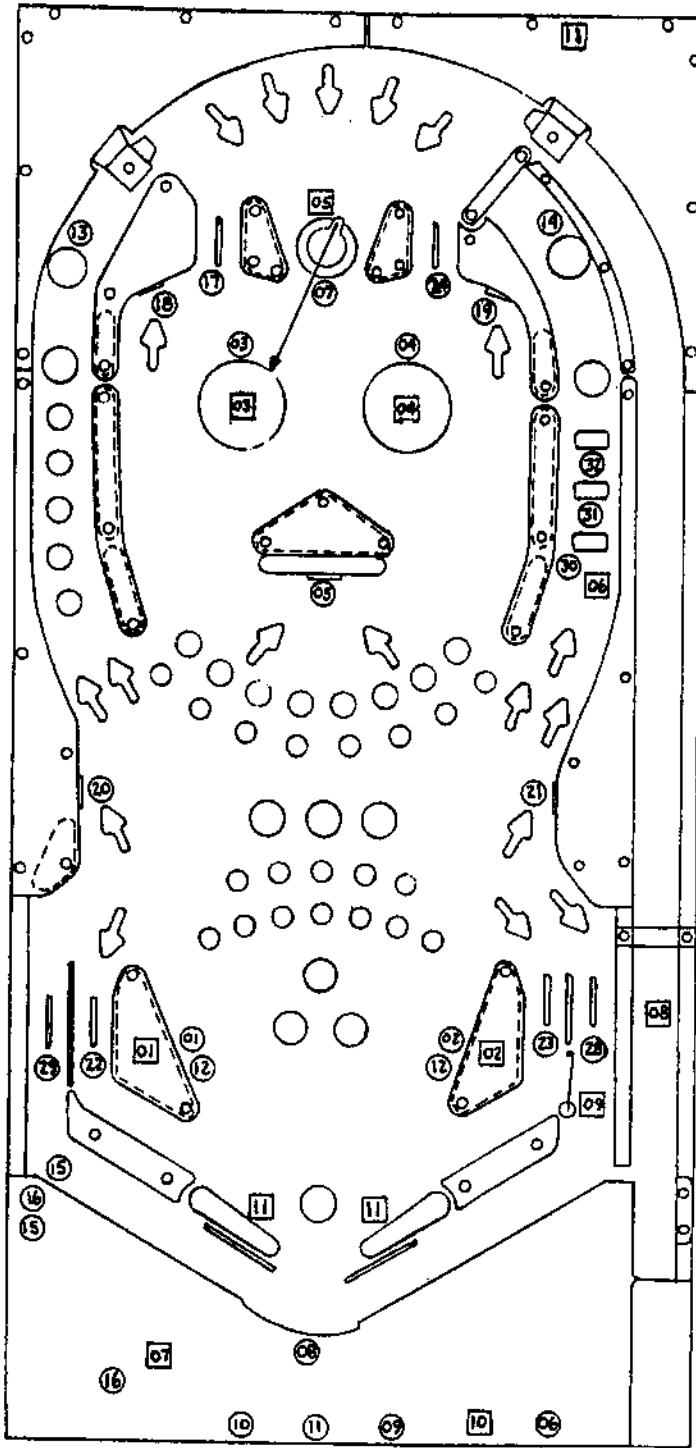


FIGURE V

## ASSEMBLY ADJUSTMENTS:

### GENERAL:

All switch assemblies consist of leaf springs, contacts, separators, plastic tubing and screws to hold them to the mounting surface. Before attempting to adjust a switch assembly, make sure that these screws are tight. If not, tighten screw closest to the contact end of the leaf spring first. This will prevent the assembly from being secured in such a manner that the leaf springs tend to fan out. In general, all leaf springs are adjusted for a 1/16" gap in the open position and .010" over-travel or wipe in the closed position. All contacts should be in good condition. Unless otherwise instructed, they should be dry or non-lubricated. All contacts should be free of dust and dirt. Contacts, with the exception of the flipper button switch assemblies, are plated to resist corrosion. Filing or burnishing breaks the finish and encourages corrosion. Clean by closing the contacts over a clean piece of paper (e.g., a business card) and wiping gently until the contacts are clean. For the flipper button switch assemblies **ONLY**: Tarnish can be removed with a contact file followed by burnishing tool. Severely pitted contacts must be replaced as an assembly. In general, contacts need be cleaned or replaced and adjusted only when they are found to be a source of game malfunction.

### X. SERVICE PARTS:

A parts catalogue is available upon request. The catalogue is illustrated and lists all replacement parts for each game manufactured by Bally. Requests should be addressed to:

BALLY MIDWAY MFG. CO.  
10601 WEST BELMONT AVENUE  
FRANKLIN PARK, ILLINOIS 60131  
ATTN: PARTS DEPARTMENT

### SERVICE HINTS:

The Bally playfield has an improved tuff-coat finish with excellent wearing properties. Its life expectancy, as well as play appeal, can be extended by periodic cleaning of the playfield.

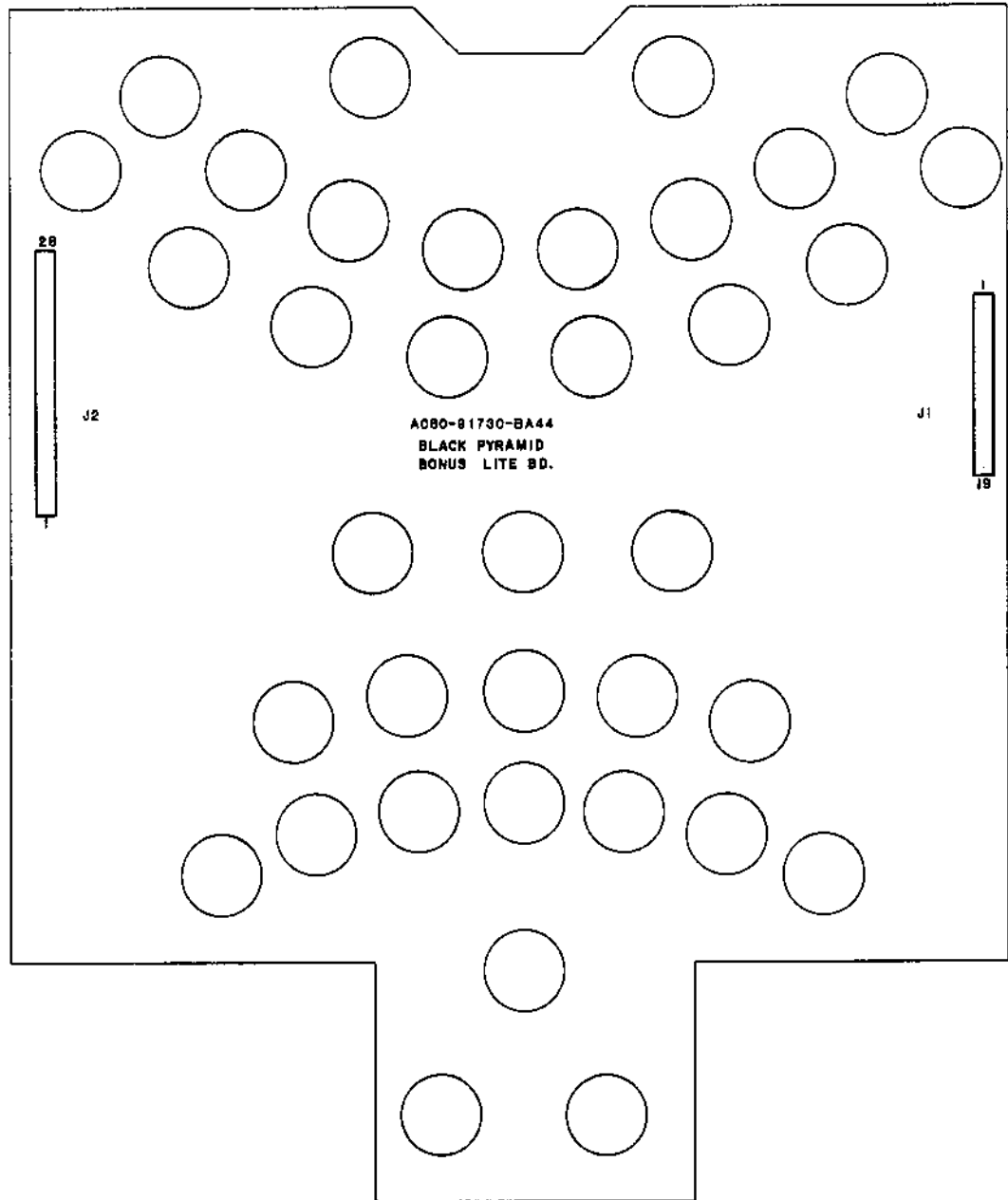
**DO:** Bally recommends you clean your playfield with Wildcat #125 (Wildcat Chemical Co., 1333 W. Seminary Drive, Ft. Worth, Texas 76115). Wildcat #125 is a combination cleaner and polish. Bally has tried and tested this product and found it to be very effective. If Wildcat #125 is not available, Bally suggests you ask your Distributor to order it. Inspect and hand polish the ball in a clean cloth. A chipped ball must be replaced. It can ruin the finish on the playfield in a short period of time.

**DON'T:** Use water in large quantities, highly caustic cleaners, abrasive cleaners or cleaning pads on the playfield. Do not allow a wax or polish build up. Waxes yellow with age and spoil play appeal.

## XI. PARTS LIST BLACK PYRAMID OA44

	MIDWAY PART NUMBER	BALLY PART NUMBER
<b>MISCELLANEOUS</b>		
Transformer (Domestic or Export) .....	MT00-00115-A000	E-122-142
Bulbs, #555 .....	0017-00003-0484	E-125-73
Fuse, 1 Amp. 3 AG Slow Blow (Playfield Solenoid Protection) .....	0017-00003-0103	E-133-44
Swinging Target Motor .....	AA44-00012-0000	
<b>ASSEMBLY COILS</b>		
Coin Lockout .....	A360-00208-0000	FO-36-7000
Flipper (2) .....	A360-00045-0000	AQ-25-500/ 34-4500
In-Line Drop Target Reset .....	A360-00209-000	NO-26-1900
Knocker .....	A360-00046-0000	AR-26-1200
Outhole Kicker .....	A360-00044-0000	AN-26-1200
Thumper Bumper (2) .....	A360-00044-0000	AN-26-1200
Saucer .....	A360-00211-0000	AO-27-1300
Gate .....	A390-00027-0000	GA-34-4000
Slingshot (2) .....	A360-00046-0000	AO-26-1200
<b>PLAYFIELD PARTS</b>		
See Figure II		
<b>MODULES</b>		
Lamp Driver A5 .....	A084-91613-A000	AS-2518-23
Display Driver A1 (4 used) .....	A084-91617-A000	AS-2518-58
Display Driver A1 (1 used) .....	A084-91491-A000	AS-2518-21
MPU A4 .....	A084-91624-AA44	
Transformer & Rectifier A2 .....	A365-00040-0100	
Rectifier Board (Part of A2) .....	A084-91616-A000	AS-2518-54
Cheap Squeak .....	A084-91603-AA44	
Auxiliary Lamp Driver A9 .....	A084-91614-A000	AS-2518-43
<b>REPAIRS PROCEDURES/AIDS</b>		
Module & Component Replacement .....		F.O. 560-1
AID (Assistance in Diagnostics) Kit, used with F.O. 560-1 .....		KIT #485-1
<b>MODULE COMPONENTS</b>		
SEE MODULE PARTS LIST		
<b>MODULE COMPONENT STARTER KITS</b>		
(Each kit contains an assortment of the most needed electronic parts for use in Module repair.)		
KIT #558—For Rectifier Board (Part of A2)		
KIT #503—For MPU Board A4 (less Memory U1-U6)		
KIT #492—For Solenoid Drive/Voltage Regulator A3		
KIT #493—For Display Drive A1		
KIT #494—For Lamp Drive A3		

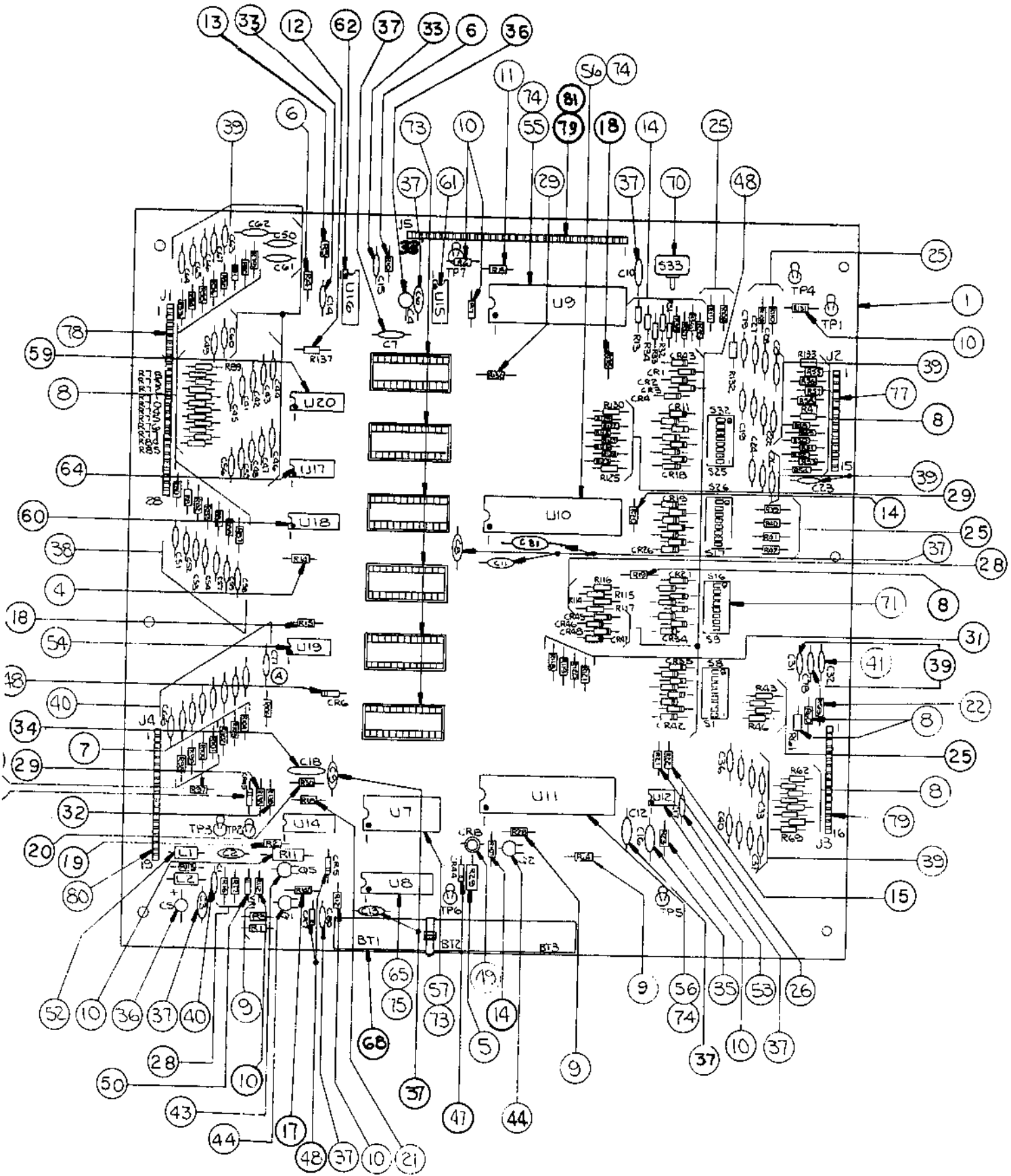




DESIGNATION NO.	DESCRIPTION	DESCRIPTION	QTY	DESIGNATION NO.	PART NUMBER
J1	19 PIN RT ANGLE CONN	19 PIN RT ANGLE CONN	1	J1	3CCC-16468-AF02
J2	28 PIN RT ANGLE CONN	28 PIN RT ANGLE CONN	1	J2	3CCC-16468-AED2
P.C.B.	A080-91730-BA44	P.C.B.			A080-91730-BA44

PROJECT ENG: A. AARSTAD		THIS DWG IS CONFIDENTIAL & PROPERTY OF MIDWAY MFG CO			
DIM. TOLERANCES UNLESS OTHERWISE SPEC		BLACK PYRAMID		MIDWAY MFG. CO.	
CONCENTRICITY TIR .002		DATE 5/9/84		FRANKLIN PK., IL. 60131 A BALLY CO.	
FRACTIONAL ± .184				REVISIONS	
DECIMAL ± .005				PART NO	
HOLE DIA + .002 - .000				M 0 5 1 - 0 0 A 4 4 - B 0 1 0	
ANGLE ± .12°					
DO NOT SCALE DWG.					
		BONUS LITE BD. ASSEMBLY DRWG A080-91730-BA44			

# A082-91624-A000 MPU MODULE

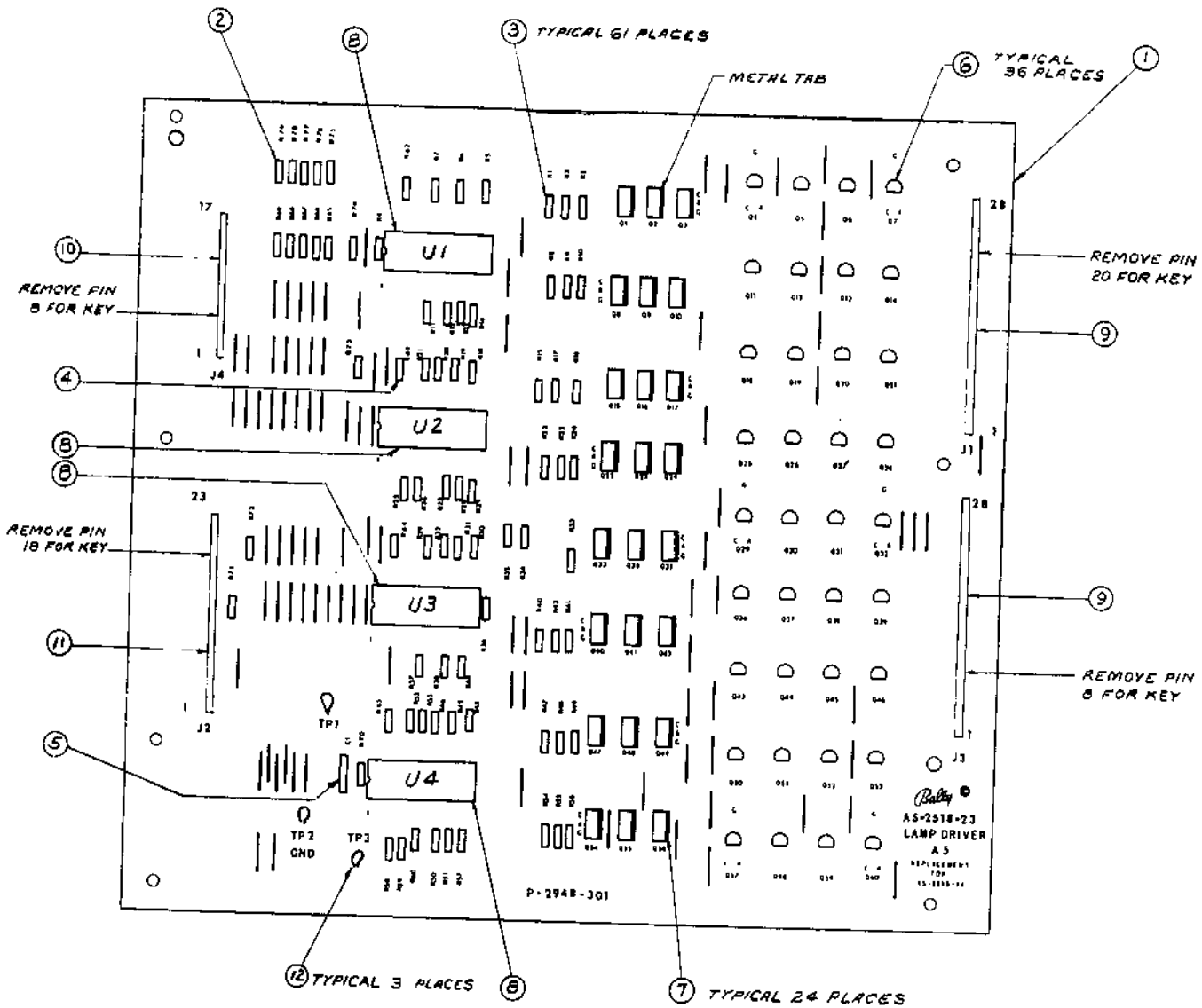


## A4: MPU MODULE COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A4 (see note 1)	A084-91624-AA44	MPU Module Complete
2	A4 (see note 2)	A082-91624-A000	MPU Module less Program Memory, U1-6 incl.
3-32	See Schematic		Resistors, See schematic for value
33	C14, C15	E-00586-0067	Capacitor, 470 PFD, 1kv
34	C18	E-00586-0088	Capacitor, .05 MFD, 16V
35	C16	E-00586-0081	Capacitor, .1 MFD, 100V
36	C4, C5	E-00586-0073	Capacitor, 4.5 MFD, 25V
37	C3, C6-C13, C17, C81	E-00586-0085	Capacitor, .01 MFD, 25V
38	C79, C41-C67	E-00586-0083	Capacitor, 470 PFD, 50V
39	C19-C31, C78, C33-C40	E-00586-0082	Capacitor, 390 PFD, 50V
40	C1, C2, C68-C77	E-00586-0084	Capacitor, 820 PFD, 50V
41	C32	E-00586-0077	Capacitor, 3000 PF, 1 kv
43	Q5	E-00585-0023	Transistor PNP (MPS-3702)
44	Q1, Q2	E-00585-0031	Transistor (2N3904)
47	CR44	E-00587-0006	Diode (1N4004)
48	CR1-CR7, CR11-CR43, CR45-CR49, CR52	E-00587-0014	Diode (1N4148)
49	CR8		
50	VR1	E-00679	LED (Green)
52	L1, L2	E-00598-0008	Diode Zener (8.2V, 1N9598)
53	U12	E-00604-0003	Inductor, 22 Micro Hy.
54	U19	E-00620-0004	Timer (555)
55	U9	E-00620-0005	Quad 2 Input (4011)
56	U10, U11	E-00620-0028	MPU I.C. (6800)
57	U7	E-00620-0029	PIA I.C. (6820)
59	U20	E-00620-0030	RAM I.C. (6810)
60	U14, U18	E-00620-0032	HEX Buffer I.C. (14502B)
61	U15	E-00620-0033	HEX Inverter (4049B)
62	U16	E-00620-0034	Quad Memory Drive (MC3459L)
64	U17	E-00620-0035	Dual Monostable (9602)
65	U8	E-00620-0041	Quad 2 Inputs (74L00N)
68	BT1, BT2, BT3	E-00620-0042	RAM (C MOS, P5101L-3)
70	S33	E-00628-0003	Battery
71	S1-S8, S9-S16, S17-S24, S25-S32	E-00658-0001	Push Button Switch
73		E-00677	DIP Switch
74		E-00712	24 Pin Socket
75		E-00712-0001	40 Pin Socket
77	J2	E-00712-0003	22 Pin Socket
78	J1	E-00715	15 Pin Wafer Connector
79	J3, J5	E-00715-0004	28 Pin Wafer Connector
80	J4	E-00715-0017	16 Pin Wafer Connector
81	J5	E-00715-0018	19 Pin Wafer Connector
		E-00715-0024	17 Pin Wafer Connector

NOTE: Order replacement memory chips U1-U6, specifying game, socket and part number stamped on chip.

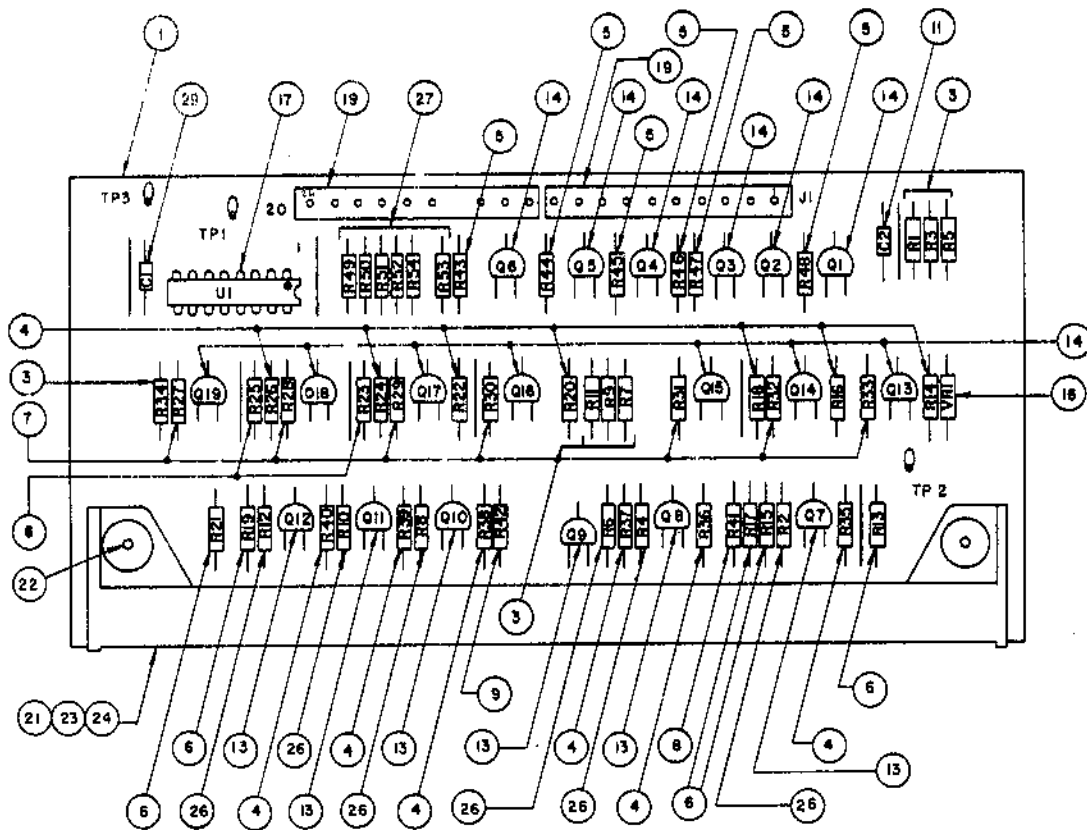
## AS-2518-23 LAMP DRIVER MODULE



### A5: LAMP DRIVER MODULE COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A5	AS-2518-23	Lamp Driver Module, Complete
2	R71-R79	E-00105-242	Resistor, 20k $\Omega$ , 5%, 1/4 W
3	R1-R60, R70	E-00105-0237	Resistor, 2k $\Omega$ , 5%, 1/4 W
4	R61-R69	E-00105-0256	Resistor, 2.2M $\Omega$ , 1/4 W
5	C1	E-00586-0065	Capacitor, .01 MFD, 500V
6	Q4-Q7, Q11-Q14, Q18-Q21, Q25-Q32, Q36-Q39, Q43-Q46, Q50-Q53, Q57-Q60	E-00585-0014	SCR, 2N5060
7	Q1-Q3, Q8-Q10, Q15-Q17, Q22-Q24, Q33-Q35, Q40-Q42, Q47-Q49, Q54-Q56	E-00585-0029	SCR, MCR106-1
8	U1-U4	E-00620-0037	I.C., Decoder, 14514B
9	J1, J3	E-00715-0004	28 Pin Wafer Connector
10	J4	E-00715-0024	17 Pin Wafer Connector
11	J2	E-00715-0014	23 Pin Wafer Connector
12	TP1, TP2, TP3	P-05399	Test Clip

## AS-2518-21 CREDIT DISPLAY DRIVER MODULE

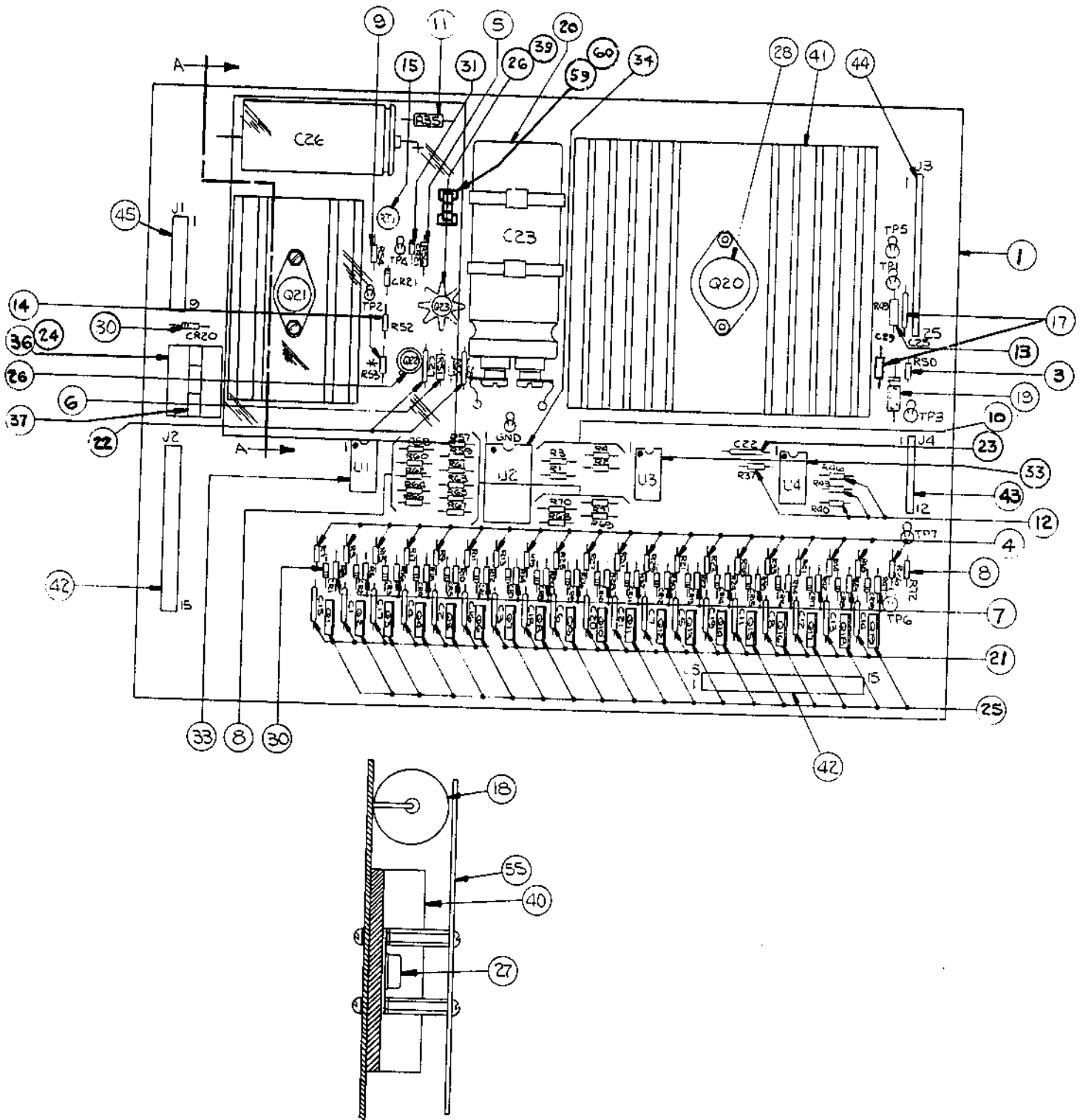


### A1: 6 DIGIT DISPLAY DRIVER MODULE COMPONENT PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	1	A1	AS-2518-21	6 Digit Display Driver, Complete
3	7	R1, R3, R5, R7, R9, R11, R34	E-105-331	Resistor, 100K $\Omega$
4	13	R14, R16, R18, R20, R22, R24, R26, R35, R36, R37, R38, R39, R40	E-105-227	Resistor, 300K $\Omega$
5	6	R43, R44, R45, R46, R47, R48	E-105-228	Resistor, 9.1K $\Omega$
6	7	R13, R15, R17, R19, R21, R23, R25	E-105-229	Resistor, 1.5K $\Omega$
7	7	R27, R28, R29, R30, R31, R32, R33	E-105-222	Resistor, 1.2K $\Omega$
8	1	R41	E-105-231	Resistor, 39K $\Omega$
9	1	R42	E-105-271	Resistor, 240K $\Omega$
10				
11	1	C2	E-586-65	Capacitor, .01 MFD, 500V
13	6	Q7, Q8, Q9, Q10, Q11, Q12	E-585-32	Transistor (2N5401)
14	13	Q1, Q2, Q3, Q4, Q5, Q6, Q13, Q14, Q15, Q16, Q17, Q18, Q19	E-585-33	Transistor (MPS-A42)
16	1	VR1	E-598-7	Zener Diode, 110V
17	1	U1	E-620-38	I.C. Decoder
18				
19	2	J1	E-715-34	10 Pin Wafer Pin Connector
21	1	DS1	E-680	Digital Display Panel
22	2		M-1836	Hi-Lo Screw, W/H
23	1		P-2399	Display Mounting (Top)
24	1		P-2399-1	Display Mounting (Bottom)
26	6	R2, R4, R6, R8, R10, R12	E-105-287	Resistor, 2.2K $\Omega$
27	6	R49, R50, R51, R52, R53, R54	E-105-242	Resistor, 20K $\Omega$
28	As Req'd			Wire Jumper
29	1	C1	E-586-85	Capacitor, .01 MFD, 25V

NOTE: INTERCHANGEABLE WITH AS-2518-15

# AS-2518-22 SOLENOID DRIVER/VOLTAGE REGULATOR MODULE



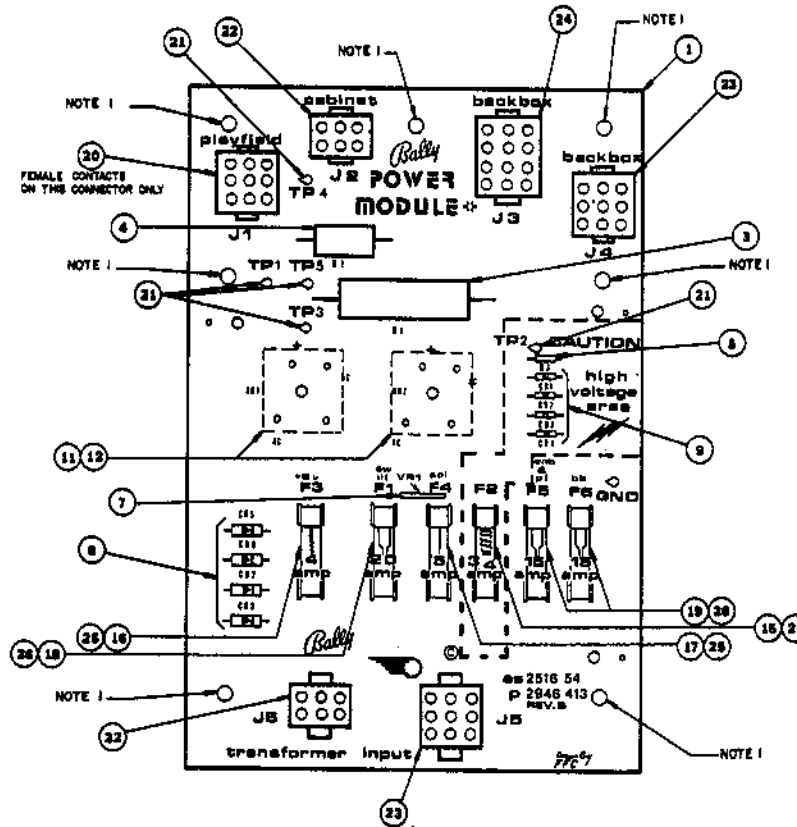
NOTE: INTERCHANGEABLE WITH AS-2518-16

### A3: SOLENOID DRIVER/VOLTAGE REGULATOR MODULE COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A3	AS-2518-22	Solenoid Driver/Voltage Regulator Module, Complete
3-14	Resistors		Resistor, See Schematic for value.
15	RT1	E-00599-0014	Pot. (Linear) 25K
17	C25, 29	E-00586-0014	Capacitor, .1 MFD, 20V
18	C26	E-00586-0059	Capacitor, 160 MFD, 350V
19	C24	E-00586-0063	Capacitor, 2 MFD @ 25V
20	C23	E-00586-0062	Capacitor, 11700 MFD, 20V
21	C1-C8, C11-C21	E-00586-0064	Capacitor, .002 MFD, 1kv
22	C27, C28	E-00586-0065	Capacitor, .01 MFD, 500V
24	K1	E-00146-0795	Relay, Printed Circuit
25	Q1-Q19	E-00585-0034	Transistor, SE9302
26	Q22, Q23	E-00585-0041	Transistor, 2N3440
27	Q21	E-00585-0042	Transistor, 2N3584
28	Q20	E-00710	+5V Regulator, LAS1405 or 78H05KC or LM323K
30	CR1-CR21	E-00587-0015	Diode (IN4004)
31	VR1	E-00598-0010	Diode, Zener 140V, IN5275A
33	U1, U3, U4	E-00681	I.C. Transistor Array, CA3081
34	U2	E-00620-0039	I.C. Binary to 1/16 Decoder, 74L154
36		E-00592-0002*	Relay Socket
37		M-1839*	Relay Holder
39		E-00682	Heat Sink, TO5
40		E-00682-0001	Heat Sink, TO66
41		E-00682-0002	Heat Sink, TO3 Case
42		E-00715-0039	15 Pin Wafer Connector
43		E-00715-0016	12 Pin Wafer Connector
44		E-00715-0020	25 Pin Wafer Connector
45		E-00715-0033	9 Pin Wafer Connector
55		M-1838	Shield-Plexiglass
59		E-00148-0021	Fuse Clips
60	F1	E-00133-0029	Fuse 8 AG-3/16 Amp.
23	C22	E-00586-0085	Capacitor, .01 MFD, 25V

\*USED WITH ITEM 24, E-00146-0791, PLUG IN RELAY ONLY

## AS-2518-54 RECTIFIER BOARD ASSEMBLY



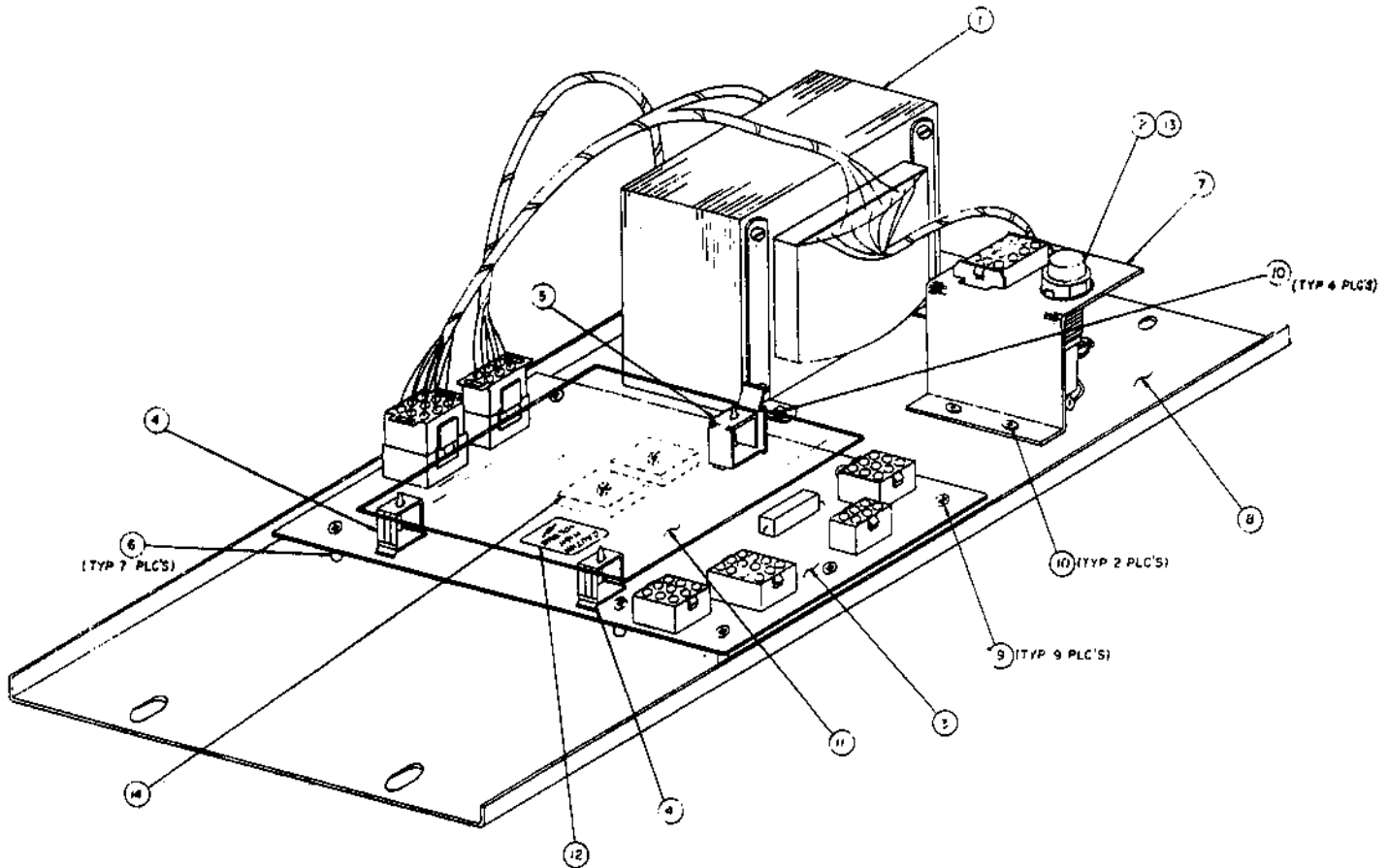
### (Part of) A2: POWER TRANSFORMER MODULE COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
0	A2	A365-00040-0100	Power Transformer Module, Complete
1	P/O A2	AS-2518-54	Rectifier Board Assembly, Complete
3	R1	E-00104-0092	Resistor, 10%, 600 Ohm, 10W
4	R2	E-00104-0091	Resistor, 25 Ohm, 5W
5	R3	E-00105-0226	Resistor, 5%, 100K Ohm, ¼W
7	VR1	E-00623	Varistor
8	CR5, CR6, CR7, CR8	E-00587-22 or 24	3A Diode
9	CR1, CR2, CR3, CR4	E-00587-0015	Diode (IN4004)
10			
11	Used with BR1-2	P-1973-480	Spacer
12	BR1, BR2	E-00602-0007	Bridge Rectifier
15	F2	E-00133-0028	Fuse, ¼A, 250V, 3AG
16	F3	E-00133-0004	Fuse, 4A, 32V, 3AG
17	F4 NOTE 1	E-00133-0005	Fuse 5A, 32V, 3AG
18	F1	E-00133-0027	Fuse, 20A, 32V, 3AG
19	F5, F6	E-00133-0015	Fuse, 15A, 32V, 3AG
20	J1	E-806-9	9 CKT Socket Header
21	TP1, 2, 3, 4, 5	P-05399	Test Clip
22	J2, J6	E-805-6	6 CKT Pin Header
23	J4, J5	E-805-9	9 CKT Pin Header
24	J3	E-805-12	12 CKT Pin Header
25	F2, 3, 4	E-00148-0021	Fuse Clips
26	F1, 5, 6	E-00148-0022	Fuse Clips (Low Resistance)

**NOTE 1**—All games with 4 or more flippers use 7A



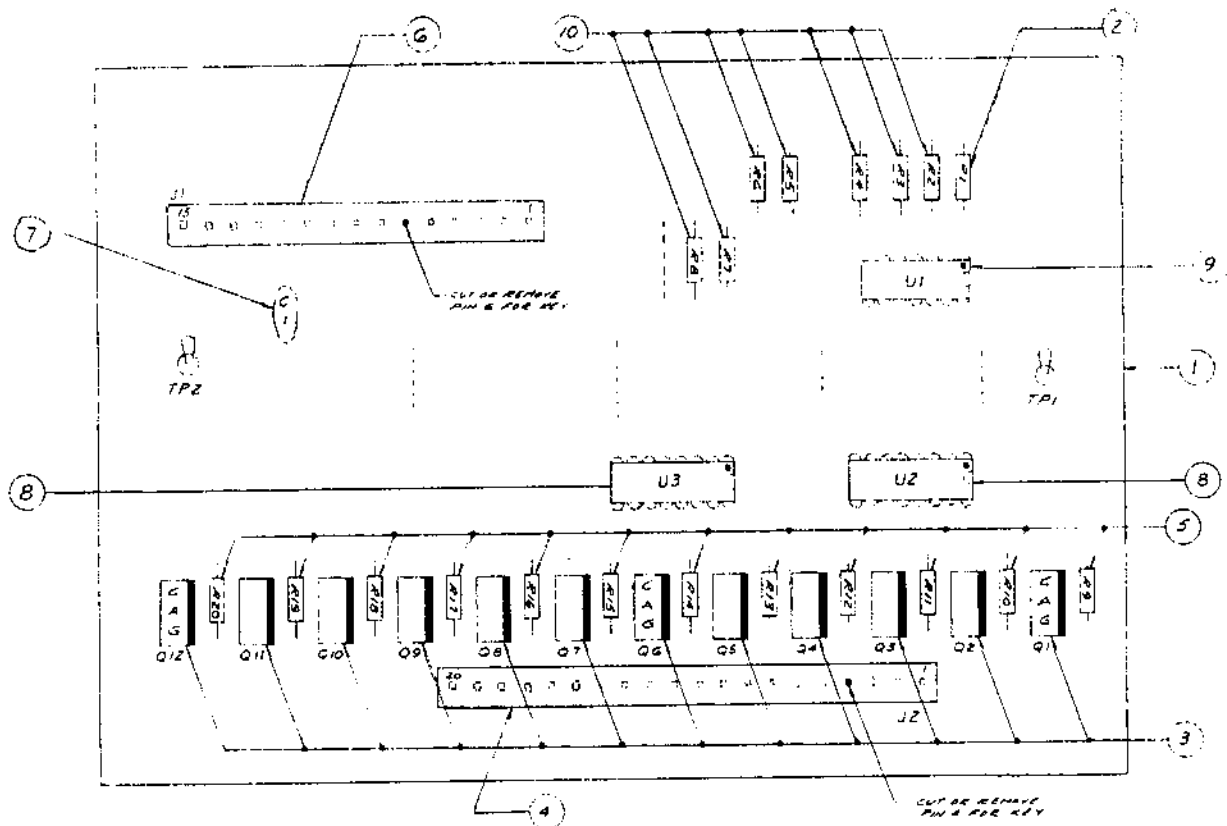
## A2: POWER TRANSFORMER MODULE



### COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
0	A2	A365-00040-0100	Power Transformer Module, Complete
1		AS-3071-2	Transformer
2		E-148-25	Fuse Holder
3	A2	AS-2518-54	Power Module Assy.
4		M-1829-4	Hinged Support
5		M-1829-3	Edge Holder
6		M-1829-5	Spacer
7		P-6442-244b	Fuse & Connect Brkt.
8		P-6442-246	Chassis
9		RLPP-832-1812	Screw
10		RLPP-1032-1806	Screw
11		P-2692-2	Shield
12		M-469-936a	High Voltage Sticker
13		E-133-24	3A S.B. Fuse
14		M-1834	H. S. Compound

## AS-2518-43 AUXILIARY LAMP DRIVER



### A9: AUXILIARY LAMP DRIVER COMPONENT PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART NO.	DESCRIPTION
1	1	A9	AS-2518-43	Auxiliary Lamp Driver, Complete
2	1	R1	E-105-173	Resistor 2.2 Meg. $\Omega$
3	12	Q1 Thru Q12	E-585-29	SCR MCR 106-1
4	2	J2	E-715-34	10 Pin Wafer Pin Connector
5	12	R9 Thru R20	E-105-237	Resistor 2K $\Omega$
6	1	J1	E-715-39	15 Pin Wafer Pin Connector
7	1	C1	E-00586-0065	Capacitor .01 MFD
8	2	U3, U2	E-620-84	MC14555B Binary 1 to 4
9	1	U1	E-620-85	MC14013B Dual D Flip Flop
10	7	R2 Thru R8	E-105-242	Resistor 20K $\Omega$

**BALLY/MIDWAY'S BLACK PYRAMID**

**U.R. #A44**

**ROM/EPROM PART NUMBERS**

**UNPROGRAMED MPU A084-91624-A000**  
**PROGRAMED MPU A084-91624-AA44**

POS.	MIDWAY PART NUMBER
U2	0A44-00803-0002
U6	0A44-00803-0001

JUMPERS	IN	OUT
E4-E12	**	
E7-E8	**	
E10-E11	**	
E13A-E14	**	
E29-E33	**	
E31-E32	**	
E16A-E34	**	

**UNPROGRAMED CHEAP SQUEAK A084-91603-C000**  
**PROGRAMED CHEAP SQUEAK A084-91603-AA44**

POS.	MIDWAY PART NUMBER
U3	0A44-00803-0003
U4	0A44-00803-0004

JUMPERS	IN	OUT
JW1		**
JW2		**
JW3		**
JW4		**
JW5		**
JW6	**	
JW7		**
JW8		**
JW9	**	
JW10		**
JW11		**
JW12	**	

**REVISIONS**

DATE	REVISIONS
5/4/84	RELEASE FOR PRODUCTION

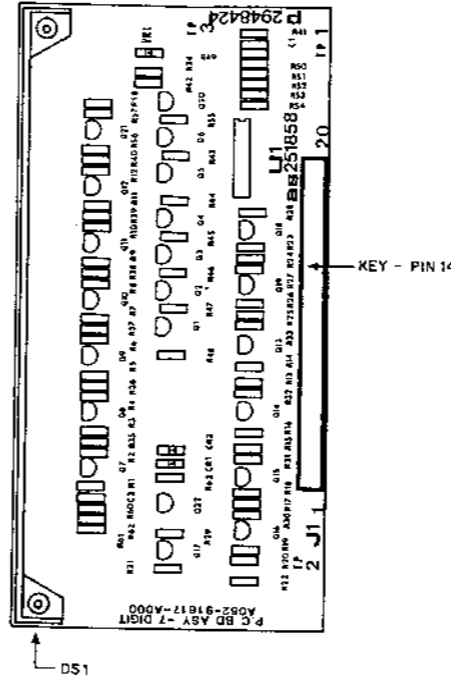
**M051-00A44-A081**

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION	DESIGNATION NO.	DESCRIPTION
C1	.01 MF 25V	CR1,CR2	1N4148
C2	.01 MF 500V	VR1	1N3045A/110V ZENER
R1	100K OHM 1/4W 5Z	Q1-Q6	MPS-A42
R2	2.2K OHM 1/4W 5Z	Q7-Q12	2N5401
R3	100K OHM 1/4W 5Z	Q13-Q20	MPS-A42
R4	2.2K OHM 1/4W 5Z	Q21	2N5401
R5	100K OHM 1/4W 5Z	Q22	MPS-A42
R6	2.2K OHM 1/4W 5Z	U1	MC14543
R7	100K OHM 1/4W 5Z	DS1	DISPLAY ASSY
R8	2.2K OHM 1/4W 5Z	J1	10 PIN WAFER KK-156 (2)
R9	100K OHM 1/4W 5Z	TP1-TP3	TEST LOOPS
R10	2.2K OHM 1/4W 5Z		7 DIGIT DISPLAY PCB
R11	100K OHM 1/4W 5Z		BUMPER
R12	2.2K OHM 1/4W 5Z		
R13	1.5K OHM 1/4W 5Z		
R14	300K OHM 1/4W 5Z		
R15	1.5K OHM 1/4W 5Z		
R16	300K OHM 1/4W 5Z		
R17	1.5K OHM 1/4W 5Z		
R18	300K OHM 1/4W 5Z		
R19	1.5K OHM 1/4W 5Z		
R20	300K OHM 1/4W 5Z		
R21	1.5K OHM 1/4W 5Z		
R22	300K OHM 1/4W 5Z		
R23	1.5K OHM 1/4W 5Z		
R24	300K OHM 1/4W 5Z		
R25	1.5K OHM 1/4W 5Z		
R26	300K OHM 1/4W 5Z		
R27-R33	1.2K OHM 1/4W 5Z		
R34	100K OHM 1/4W 5Z		
R35-R40	300K OHM 1/4W 5Z		
R41	39K OHM 1/4W 5Z		
R42	240K OHM 1/4W 5Z		
R43-R48	9.1K OHM 1/4W 5Z		
R49-R54	20K OHM 1/4W 5Z		
R55	9.1K OHM 1/4W 5Z		
R56	100K OHM 1/4W 5Z		
R57	2.2K OHM 1/4W 5Z		
R58	300K OHM 1/4W 5Z		
R59	NOT USED		
R60,R61	1.5K OHM 1/4W 5Z		
R62	300K OHM 1/4W 5Z		
R63	150K OHM 1/4W 5Z		

CROSS REFERENCE LIST

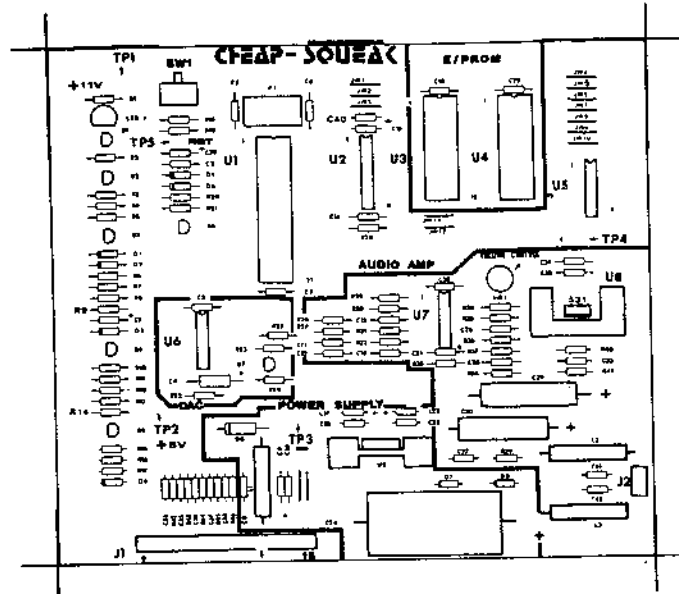
DESCRIPTION	QTY	DESIGNATION NO.	BALLY'S PART NOS.	MIDWAY'S PART NOS.
.01 MF 25V	1	C1	E-586-85	0360-00800-0005
.01 MF 500V	1	C2	E-586-65	0360-00800-0013
1.2K 1/4W 5Z	7	R27-R33	E-105-222	100E-00005-0063
1.5K 1/4W 5Z	9	R13,R15,R17,R19 R21,R23,R25,R60 R61	E-105-229	100E-00005-0065
2.2K 1/4W 5Z	7	R2,R4,R6,R8,R10 R12,R57	E-105-287	100E-00005-0069
9.1K 1/4W 5Z	7	R43-R48,R55	E-105-228	100E-00005-0087
20K 1/4W 5Z	6	R49-R54	E-105-242	100E-00005-0095
39K 1/4W 5Z	1	R41	E-105-231	100E-00005-0102
100K 1/4W 5Z	8	R1,R3,R5,R7,R9, R11,R34,R56	E-105-331	100E-00001-0011
150K 1/4W 5Z	1	R63	E-105-248	100E-00001-0120
240K 1/4W 5Z	1	R42	E-105-271	100E-00001-0125
300K 1/4W 5Z	15	R14,R16,R18,R20, R22,R24,R26,R35- R40,R58,R62	E-105-227	100E-00001-0127
1N3045A/110V ZENER	1	VR1	E-598-7	103E-00001-0028
1N4148	2	CR1,CR2	E-587-14	103E-00002-0005
2N5401	7	Q7-Q12,Q21	E-585-32	0360-00802-0006
MPS-A42	15	Q1-Q6,Q13-Q20,Q22	E-585-33	0360-00802-0007
MC14543	1	U1	E-620-38	0360-00803-0014
7 DIGIT DISPLAY DS1 MTG. HDW TACK-SCREW REPLACEMENT	1 2	DS1	E-680-7	0360-00804-0022 0095-00900-0000
DISPLAY MTG. TOP	1		P-2399	0017-00042-0155
DISPLAY MTG. BOTTOM	1		P-2399-1	0017-00042-0156
PRESSURE SENSITIVE TAPE				0017-00081-0095
BUMPER	1		R-206-9	0017-00041-0598
10 PIN WAFER KK156	2	J1	E-736-10	0151-00031-10XB
TEST LOOPS	3	TP1-TP3	P-5399	0017-00007-0131
7 DIGIT DISPLAY PCB.	1		P-2948-424	A080-91617-A000



PROJECT ENG: D. MACDONALD		USED ON		REVISIONS	
DATE: 12 09 83	DRG: TBE	SCALE: FULL	NO. REQ'D: 1 PER	Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL.	
SEVEN DIGIT DISPLAY ASSY DWG. A082-91617-A000			PART NO M051-00114-A05		

**DESCRIPTION LIST**

DESIGNATION NO.	DESCRIPTION	DESIGNATION NO.	DESCRIPTION
C1	6.8 UF @ 25V.	R1-R3	1N4004
C2,C3	TANT	R4,R5	1N4004
C4	.01 UF	D6	VN332,GP10
C5,C6	47 UF @ 16V	D7,D8	1N4004
C7-C9	21 PF,52	D9	1N9588
C10	-.01 UF	Q1	2N3205
C11	4.7 UF @ 25V.	Q2	2N4403
C12,C13	1000 PF	Q3	2N4304 PNP
C14	0.1 UF	Q4	2N4403 PNP
C15	47 PF	Q5	2N3904 PNP
C16	150 PF	Q6	2N4403 PNP
C17	220 PF	Q7	2N5305 PNP
C18	4.7 UF @ 25V.	U1	MC 6803
C19,C19	TANT	U2	LS373
C20,C21	0.1 UF	U3,U4	EPROM
C22	4.7 UF @ 25V.	U5	LS10
C23	TANT	U6	2N4296-B
C24	-.01 UF	U7	LM 3900
C25	4500 UF @ 25V	U8	75A 2202
C26	100 PF	U9	MC 7805
C27	300 PF		
C28	0.1 UF	L1,L2,L3	10 OHM CHoke
C29	-.01 UF	X01	40 PIN SOCKET
C30	470 UF @ 5V	X03,X04	28 PIN SOCKET
C31	1000 UF @ 16V		
C32	.33 UF	J1	-.045 PIN
C33	0.1 UF	J2	-.045 PIN
C34-C36	420 PF	TP1-TP5	TEST POINT
C37,C40	4.7 UF @ 25V	LEN 1	NY3234
C41,C42	-.22 UF		
R1	560 OHM	HEATSINK P/O U6	60308-TT
R2	47K OHM	HEATSINK P/O U9	61008
R3	910 OHM	SCREW P/O U8,U9	SCRW 6-32
R4	5.4K OHM	WRY P/O U8,U9	WRT 6-32
R5	62K OHM	P/O U8,U9	INSULATOR
R6	10K OHM		
R7	82K OHM	SW1	SWTCH P.C.B.
R8	10K OHM		
R9	47K OHM	X1	3.579 MHZ
R10	100 OHM		
R11	82 OHM		
R12	9.1K OHM		
R13	7.5K OHM		
R14	39K OHM		
R15,R16	3.7K OHM		
R17	1K OHM		
R18,R19	3.3K OHM		
R20	10K OHM		
R21	24K OHM		
R22	2.7K OHM		
R23	68 OHM		
R24	180 OHM		
R25,R26	100K OHM		
R27	475 OHM		
R28	120 OHM		
R29	120K OHM		
R30	130K OHM		
R31	100K OHM		
R32	200K OHM		
R33	390K OHM		
R34	470K OHM		
R35	24K OHM		
R36	180K OHM		
R37	390K OHM		
R38	2.2 OHM		
R39	1 OHM		
R40	430 OHM		
R41	220 OHM		
R42-R44	470 OHM		



**CROSS REFERENCE LIST**

DESCRIPTION	QTY	DESIGNATION NO.	PART NOS.	DESCRIPTION	QTY	DESIGNATION NO.	PART NOS.
27 PF,52	2	C5,C6	0360-00800-0052	PHAN. POT 0-1K 1/2W	1	V81	0360-00804-0003
47 PF	1	C14	0360-00800-0027				
100 PF	1	C25	0360-00800-0044	1N4004	3	R1-R3	1036-00002-0006
150 PF	1	C15	0360-00800-0053	1N4004	4	R4,R5,R7,R8	036-00003-0005
220 PF	1	C18	0360-00800-0054	VN332 ZENER	1	D6	1360-00001-0007
300 PF	1	C28	0360-00800-0055			D7	1036-00001-0002
820 PF	5	C34-C36	0360-00800-0054				
3000 PF	1	C11	0360-00800-0056				
.01 UF	9	C2,C3,C7-C9, C18,C19,C23, C28	0360-00800-0005	2N3904 PNP	2	Q3,Q5	1046-00001-0004
				2N4403 PNP	3	Q2,Q4,Q6	1046-00002-0004
				2N5305 PNP	2	Q1,Q7	1046-00001-0010
.05 UF	1	C33	0360-00800-0006	74LS10	1	U5	0360-00805-0046
0.1 UF	8	C12,C13,C20, C21,C27,C32	0360-00800-0058	74LS32	1	U2	0360-00803-0059
.22 UF	2	C22	0360-00800-0057	MC 6803,MPU	1	U1	0360-00803-0048
.33 UF	7	C31	0360-00800-0059	2N4296-B,PAK	1	U6	0360-00803-0049
1.7 UF @ 25V,	5	C70,C17,C22, C39,C40	0360-00800-0008	LM 3900,OP AMP	1	U7	0360-00803-0002
TANT	1	C1	0360-00800-0048	75A 2202, AUD AMP	1	U8	0360-00803-0009
6.8 UF @ 25V,	1			MC 7805,+5V REG.	1	U9	0360-00803-0050
TANT	1						
47 UF @ 16V	1	C4	0360-00800-0042	INDUCTOR 10 OH	3	L1,L2,L3	0360-00804-0031
470 UF @ 5V	7	C29	0360-00800-0021				
1000 UF @ 16V	1	C30	0360-00800-0064	28 PIN IC SOCKET	2	X03,X04	0360-00804-0028
4700 UF @ 25V	1	C24	0360-00800-0025	40 PIN IC SOCKET	1	X01	0360-00804-0018
1 OHM	1	R39	100E-00005-0002	-.045 50. PIN	15	J1	0017-00033-0480
2.2 OHM	1	R38	100E-00005-0003	-.045 50. PIN	2	J2	0017-00033-0480
88 OHM	1	R23	100E-00005-0029	TEST POINTS	5	YP1-TP5	0017-00007-0131
82 OHM	1	R11	100E-00005-0031	LED 1	1	LEN 1	0360-00804-0015
100 OHM	1	R10	100E-00005-0033	LER MV5254	1		0360-00804-0010
120 OHM	1	R28	100E-00005-0035	HEATSINK,60308-TT	1	P/O U6	0360-00804-0010
180 OHM	1	R24	100E-00005-0039	HEATSINK,61008	1	P/O U9	0360-00804-0032
220 OHM	1	R47	100E-00005-0041	NUT 6 X 32	2	P/O U8,U9	0017-00103-0005
430 OHM	1	R40	100E-00005-0050	SCREW 6 X 32	2	P/O U8,U9	0017-00103-0339
470 OHM	5	R42-R44	100E-00005-0051	INSULATOR, THERMAL	2	P/O U8,U9	0017-00042-0319
910 OHM	1	R1	100E-00005-0054	SWITCH	1	SW1	0017-00032-0034
1K OHM	1	R5	100E-00005-0059	CRYSTAL,3.579 MHZ	1	X1	0360-00804-0019
14 OHM	1	R17	100E-00005-0061	P.C.B.	1		4080-91603-8000
2.7K OHM	2	R15,R16,R22	100E-00005-0071				
3.3K OHM	3	R18,R19	100E-00005-0074				
5.4K OHM	1	R4	100E-00005-0082				
7.5K OHM	1	R13	100E-00005-0085				
9.1K OHM	1	R12	100E-00005-0087				
10K OHM	3	R6,R8,R20	100E-00005-0088				
16K OHM	1	R21	100E-00005-0165				
24K OHM	1	R35	100E-00005-0097				
39K OHM	1	R14	100E-00005-0102				
47K OHM	3	R2,R9,R27	100E-00005-0104				
82K OHM	1	R5	100E-00005-0107				
82K OHM	1	R7	100E-00005-0112				
100K OHM	3	R25,R26,R31	100E-00005-0115				
120K OHM	1	R29	100E-00005-0118				
150K	1	R30	100E-00005-0119				
180K	9	R34	100E-00005-0122				
200K	1	R32	100E-00005-0123				
390K	2	R33,R37	100E-00005-0130				
470K	1	R34	100E-00005-0132				

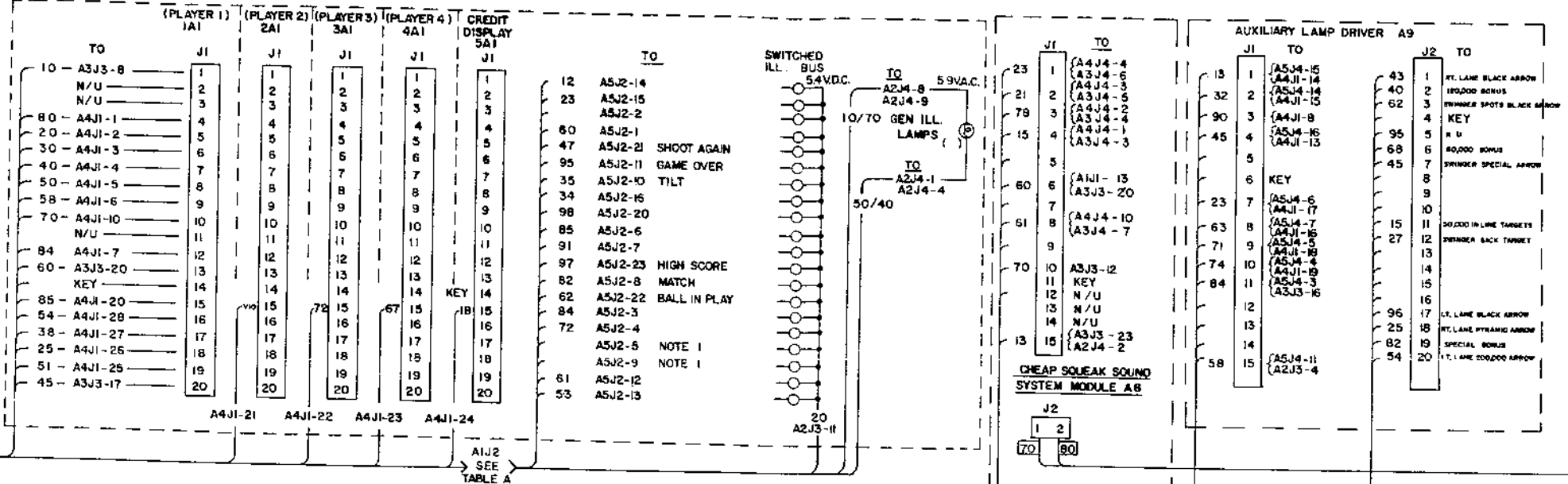
PROJECT ENG: D. MACDONALD			USED ON			MIDWAY MFG. CO.	
DO NOT SCALE Dwg.			FULL			PART NO.	
DIM TOLERANCES UNLESS OTHERWISE SPECIFIED			CHEAP SQUEAK PC BD. ASSY.			M751-00114 - B044	
DATE: 8/31/85			DATE: 8/31/85			DATE: 8/31/85	

TABLE A AIJ2

FROM	PIN	WIRE
A2J4-8	1	10
A2J4-1	2	50
A5J2-14	3	12
A5J2-2	4	PINK
A5J2-15	5	23
A5J2-16	6	34
A5J2-10	7	35
A5J2-21	8	47
A5J2-1	9	60
A2J3-11	10	20
A5J2-22	11	62
A5J2-6	12	85
A5J2-7	13	91
A5J2-11	14	95
A5J2-23	15	97
A5J2-20	16	98
A5J2-8	17	B2
	18	
	19	
	20	
	21	
	22	
A2J4-4	23	40
A2J4-9	24	70

INSERT TO BACK CAB. PLUG

AI INSERT

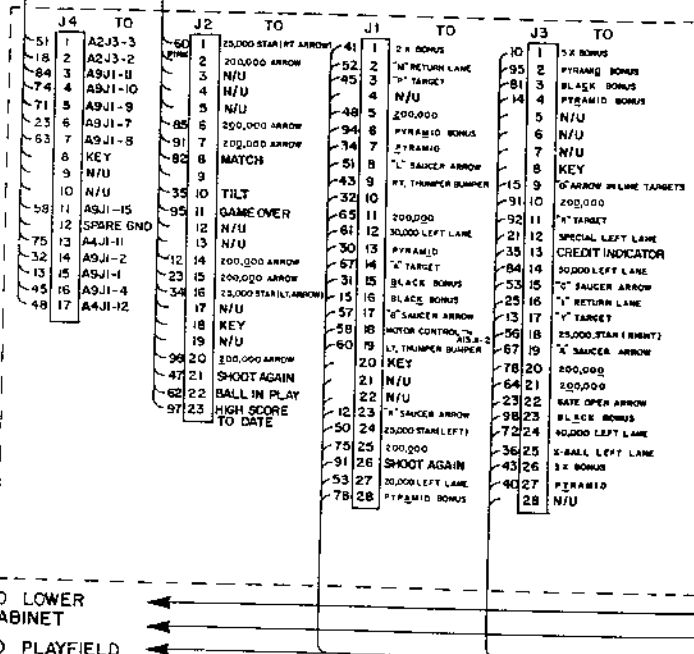


9 PIN PLUG

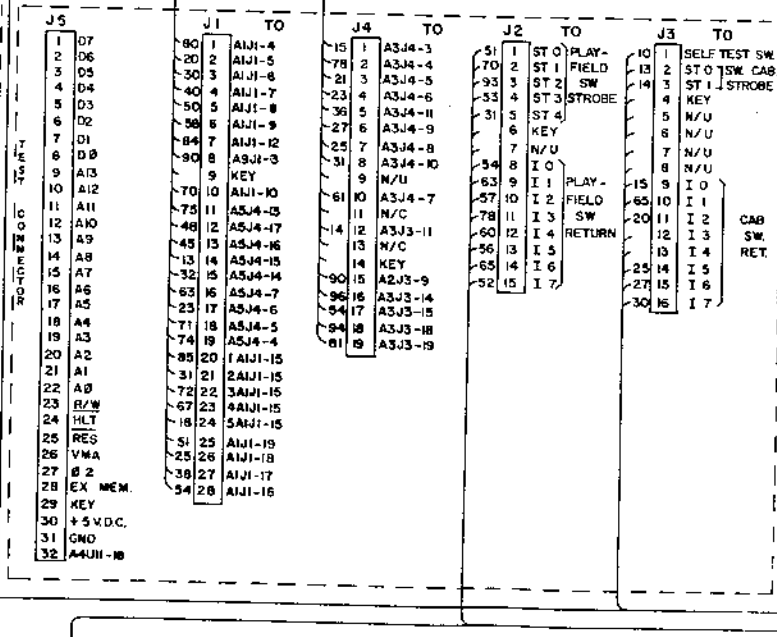
FROM	PIN	WIRE
A5J2-14	1	12
A5J2-2	2	PINK
A5J2-15	3	23
A5J2-16	4	34
A5J2-10	5	60
A5J2-8	6	85
A5J2-7	7	91
A5J2-11	8	95
A5J2-20	9	98

PANEL TO BACKBOX

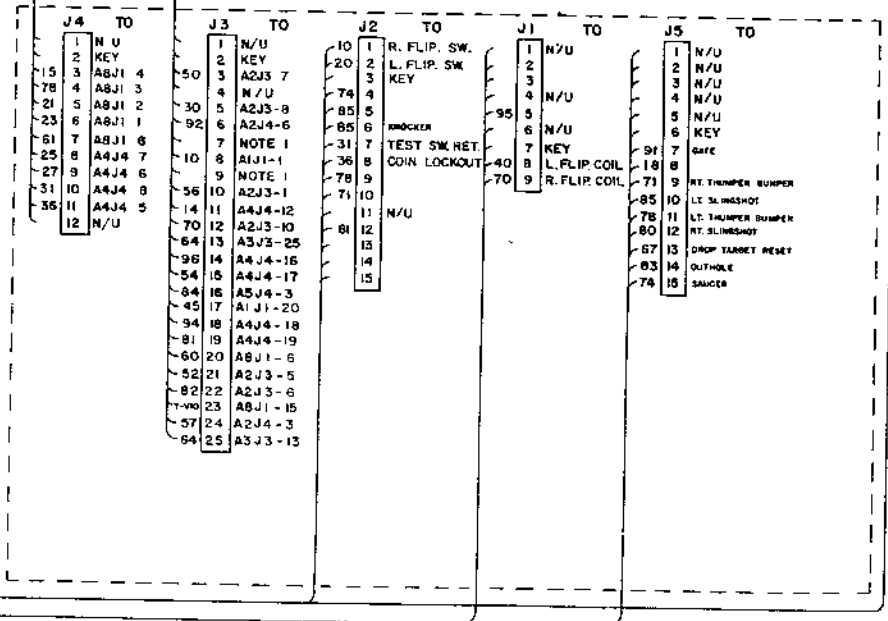
LAMP DRIVER A5



MPU A4



VOLTAGE REGULATOR / SOLENOID DRIVER A3



NOTES:

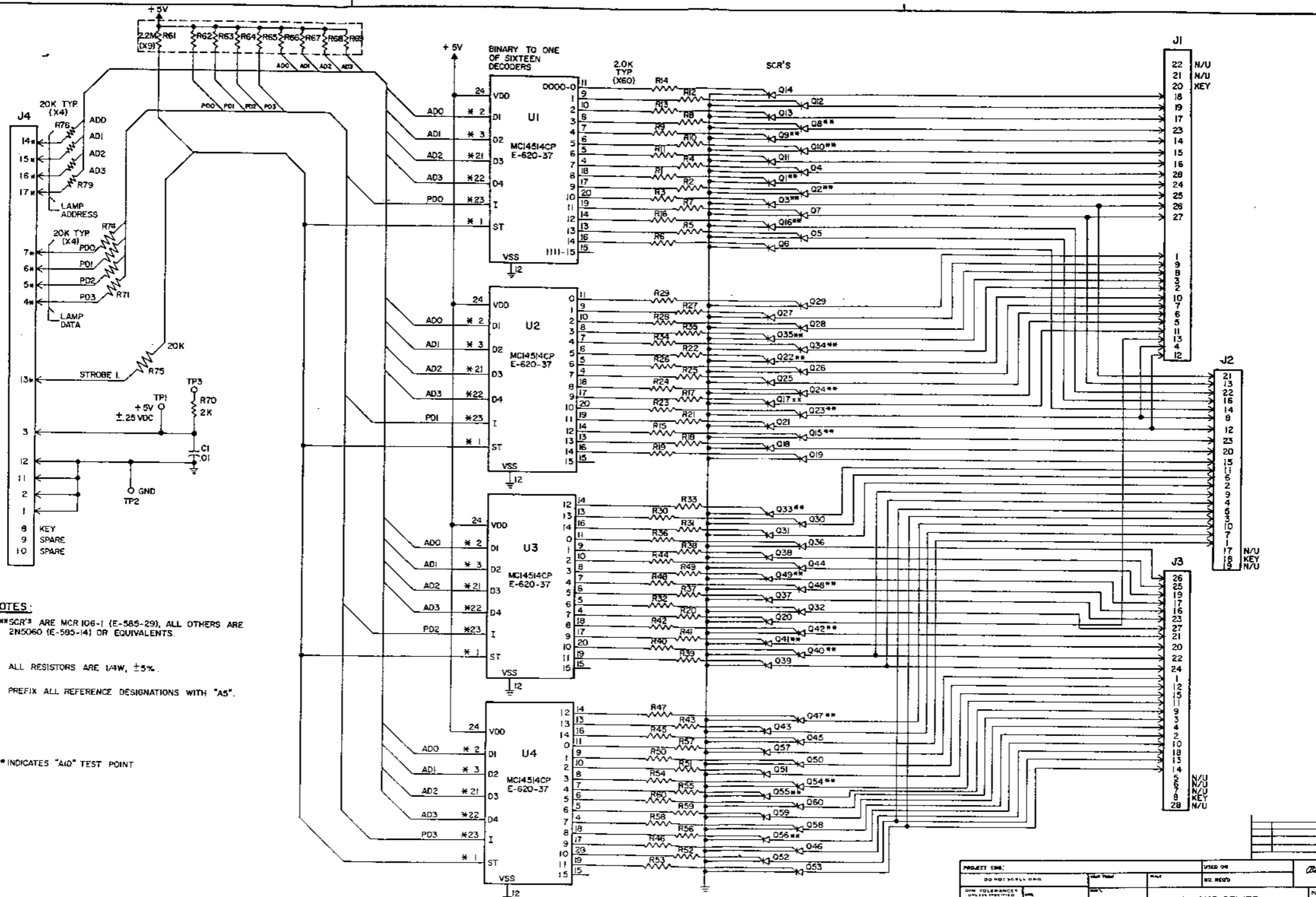
1. THESE PINS ARE RESERVED FOR FUTURE USE.
2. WIRE COLOR ARE SHOWN FOR ALL CONNECTOR PINS, SOME WIRE MAY NOT BE USED IN ALL GAMES.
3. \* INDICATES AID TEST POINT.

WIRE COLOR CODE

- 1-RED
- 2-BLUE
- 3-YELLOW
- 4-GREEN
- 5-WHITE
- 6-BROWN
- 7-ORANGE
- 8-BLACK
- 9-GRAY
- 0-NO TRACE

1. FIRST NUMBER = BODY COLOR  
 2. SECOND NUMBER = TRACER COLOR  
 EXAMPLE: 50 = WHITE  
 51 = WHITE RED

PROJECT ENG.	DO NOT SCALE DRAWING	DATE	USED ON	REVISIONS
			NO REQ.	
M KONOPR			WIRING DIAGRAM BACK BOX	
			BLACK PYRAMID	
			PART NO. MOSI-00044 - A015	



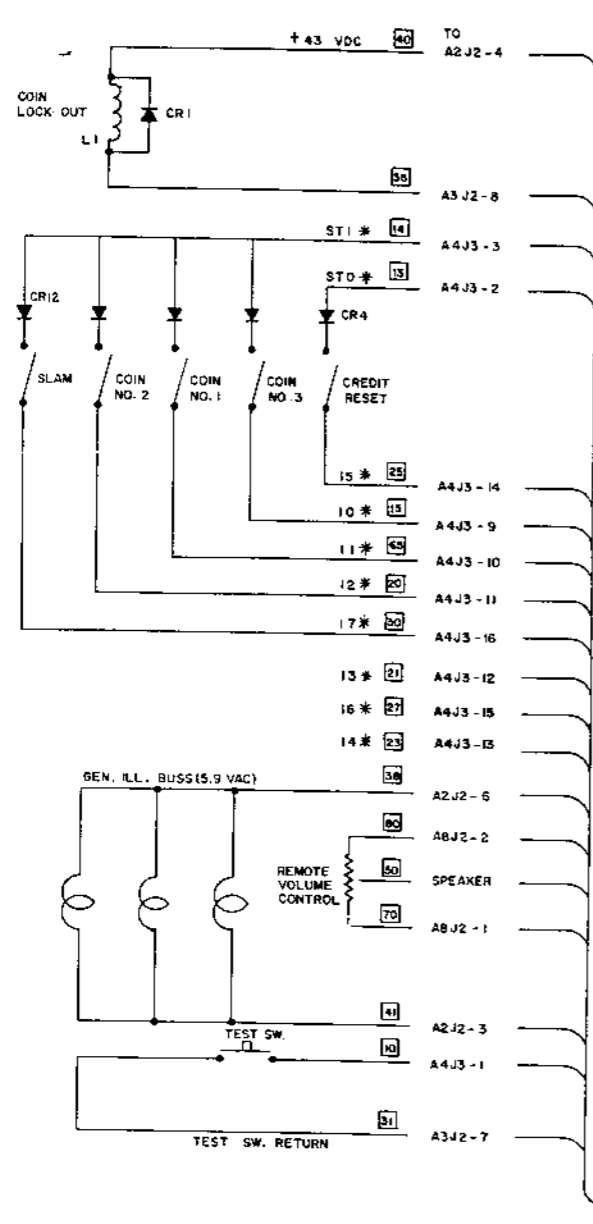
**NOTES:**

1. \*\*SCR'S ARE MCR 106-1 (E-585-29), ALL OTHERS ARE 2N5060 (E-585-14) OR EQUIVALENTS.
2. ALL RESISTORS ARE 1/4W, ±5%.
3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A5".
4. \* INDICATES "AID" TEST POINT

PROJECT ENG:		DATE:		USER OR NO. REV'D:		REVISIONS:	
DO NOT SCALE DIMS:		DATE:		NO. REV'D:		REVISED BY:	
DIM TOLERANCES UNLESS SPECIFIED:		DATE:		NO. REV'D:		REVISED BY:	
MATERIALS:		DATE:		NO. REV'D:		REVISED BY:	
DRAWN:		DATE:		NO. REV'D:		REVISED BY:	
CHECKED:		DATE:		NO. REV'D:		REVISED BY:	
APPROVED:		DATE:		NO. REV'D:		REVISED BY:	
PROJECT ENG:				USER OR NO. REV'D:			
DATE:				NO. REV'D:			
MATERIALS:				DATE:			
DRAWN:				DATE:			
CHECKED:				DATE:			
APPROVED:				DATE:			
PROJECT ENG:				USER OR NO. REV'D:			
DATE:				NO. REV'D:			
MATERIALS:				DATE:			
DRAWN:				DATE:			
CHECKED:				DATE:			
APPROVED:				DATE:			

A5 LAMP DRIVER SCHEMATIC

MIDWAY MFG. CO.  
FRANKLIN, PA. U.S.A.  
PART NO. M051-C0114-A049

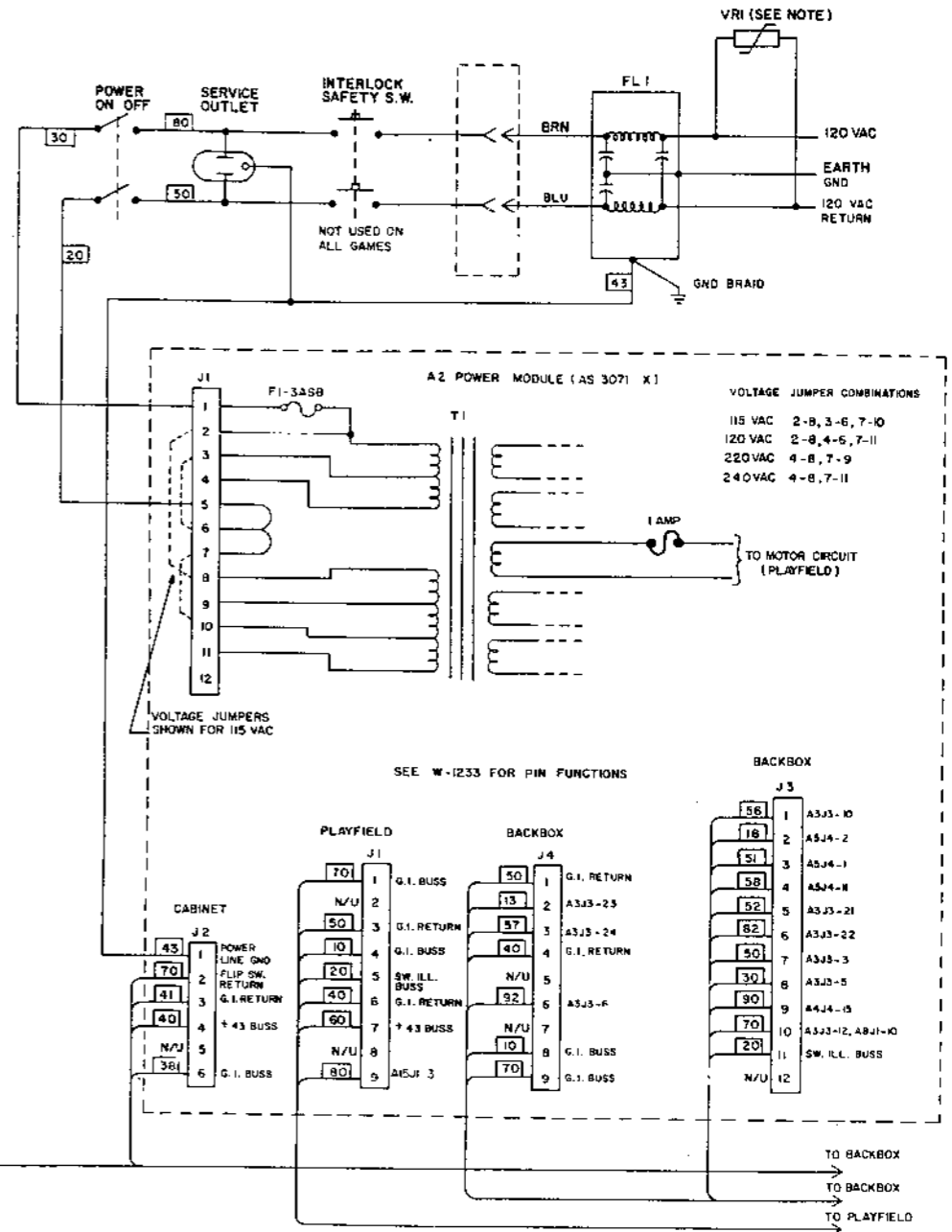
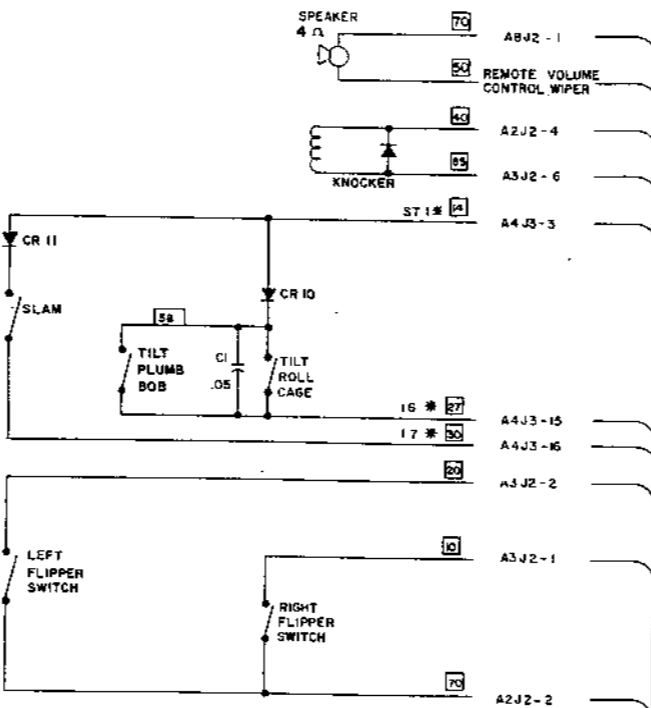


NOTES: (CAUTION)

1. USE BALLY PART NO. E-713 FOR 115-120 VAC.
2. USE BALLY PART NO. E-713-1 FOR 220-240 VAC
3. \* INDICATES AID TEST POINT.

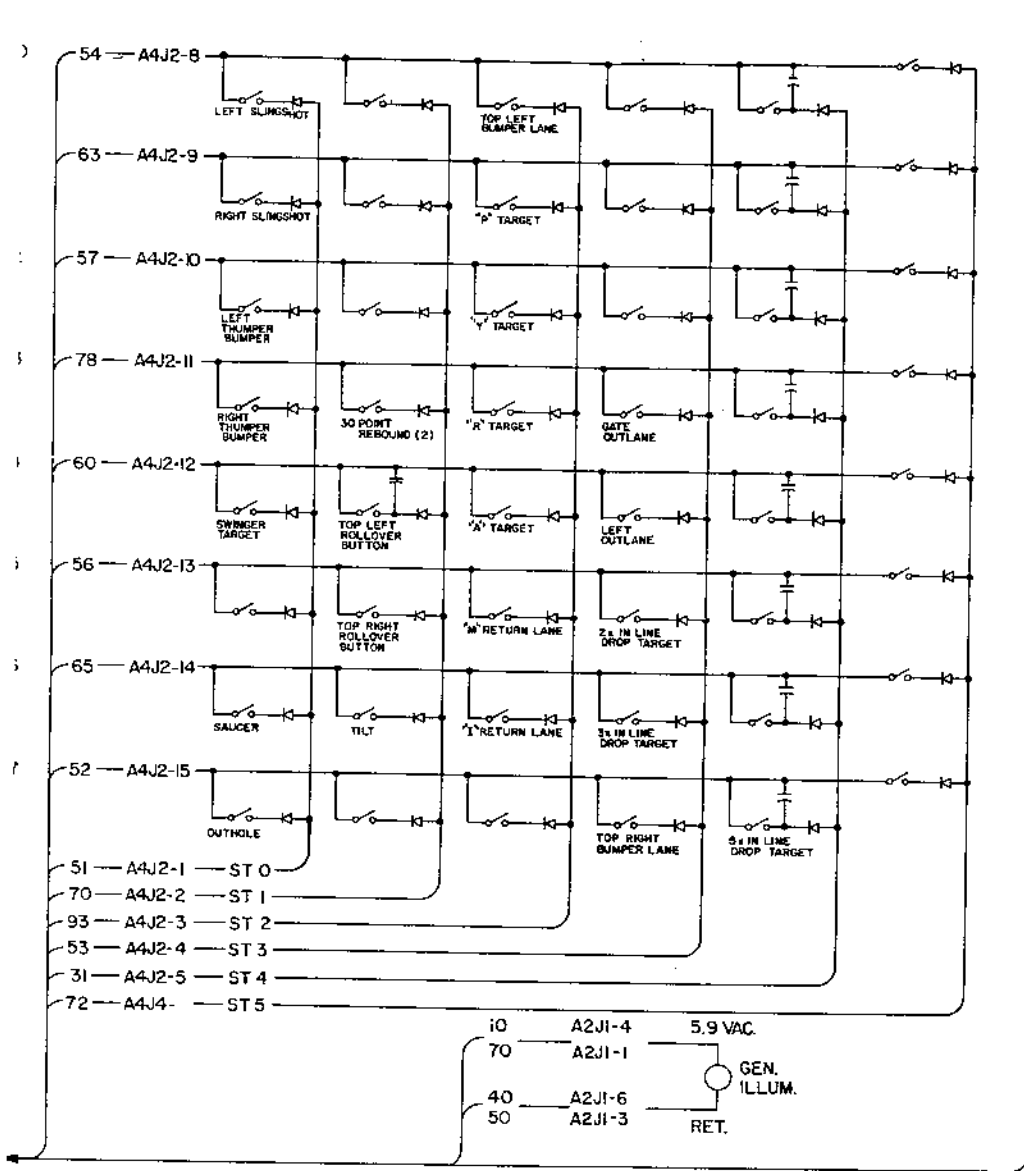
TO	J1 PIN	TO	J1 PIN
A4J3-9	1	A4J3-3	11
A4J3-10	2	A2J2-4	15
A4J3-11	3	A3J2-8	16
A4J3-12	4	A2J2-6	17
A4J3-13	5	A2J2-3	18
A4J3-14	6	A4J3-1	19
A4J3-15	7	A3J2-7	20
A4J3-16	8	SPEAKER	9
A4J3-2	10	ABJ2-1	12
DOOR PLUG		ABJ2-2	13

A7 CABINET ASS'Y. WIRING  
NOTE: DIODES ARE IN4004, (E-587-61)



PROJECT ENG		REVISED		USED ON		REVISIONS	
DATE	BY	DATE	BY	NO	REQD		
	M. KONOPA					BLACK PYRAMID	
						PART NO	
						MO51-00A44	-A014

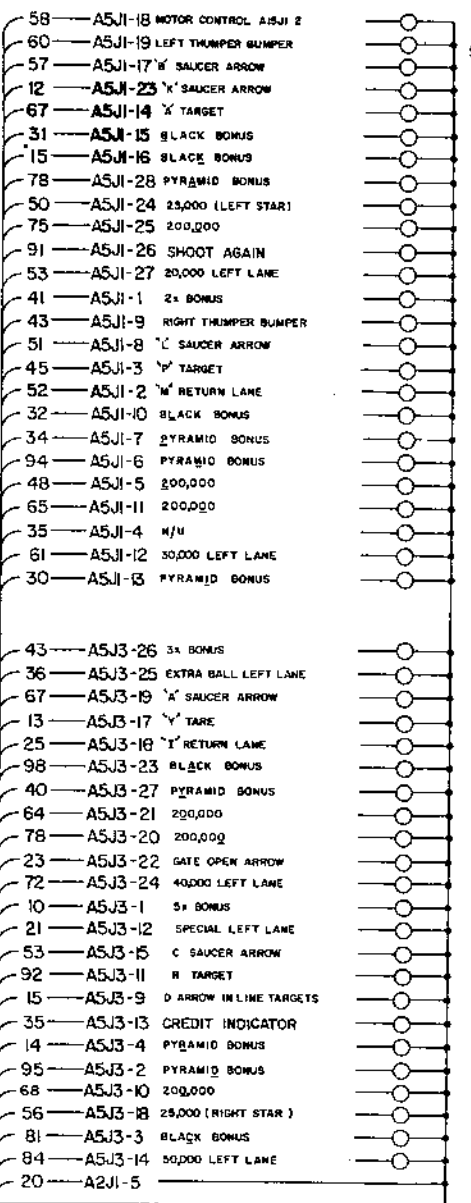
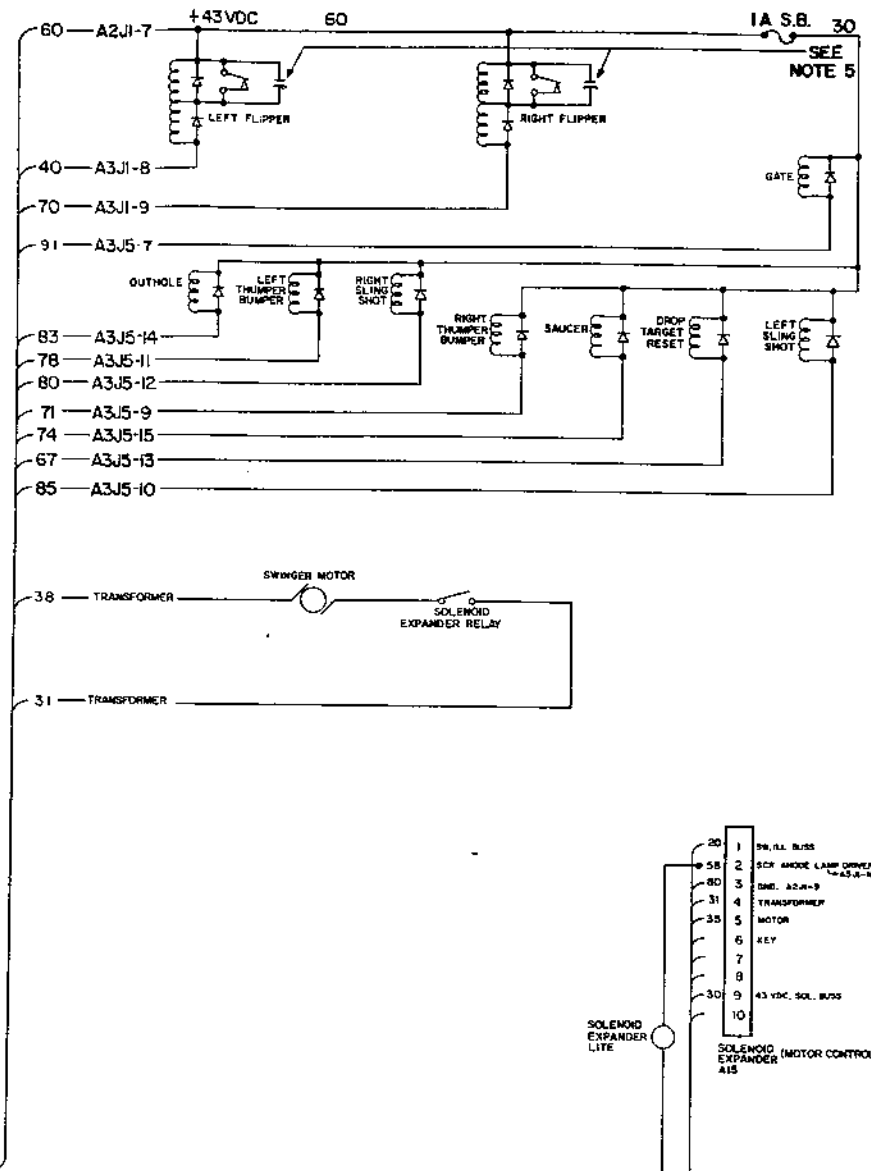
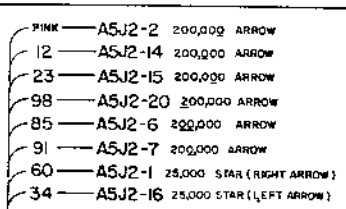
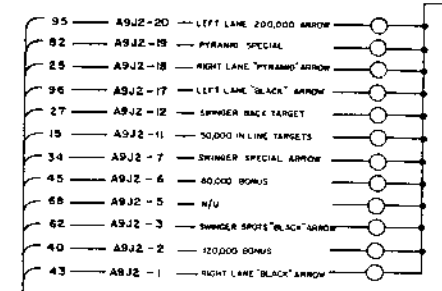




PLAYFIELD A6

NOTES

- . INDICATES NOT USED
- . N/U - NOT USED ON PLAYFIELD
- . \* INDICATES AID TEST POINT
- . COIL DIODES ARE IN4004 (E-587-6) SWITCH DIODES ARE IN4148 (E-587-14)
- . ALL CAPACITORS ARE .05 MFD. (E-586-80)
- . GERMANY ONLY - CAPACITOR .01 MFD. @ 500V. (E-586-65)



5.4 VDC

PROJECT ENG:	DESIGNED BY:	DATE:	USED ON:
DD PROJECT 11 1962	DR. M. KONOPA		NO RESD   PER
CHK. TOLERANCES:	DATE:		
BLACK PYRAMID			
PLAYFIELD			
PART NO.			
MOSI - 00A44 - A013			

## A5 LAMP LOCATION

SCR	DESCRIPTION	JACK	PIN NO.	WIRE COLOR
Q24	2X BONUS	J1	1	41
Q34**	RETURN LANE	J1	2	52
Q35**	TARGET	J1	3	45
Q24**	1ST "2" 200,000	J1	5	48
Q25	PYRAMID BONUS	J1	6	94
Q26	PYRAMID BONUS	J1	7	34
Q28	SAUCER ARROW	J1	8	51
Q27	RT THUMPER BUMPER	J1	9	43
Q26	BLACK BONUS	J1	10	32
Q17**	2ND "0" 200,000	J1	11	65
Q21	30,000 LEFT LANE	J1	12	61
Q9**	"A" TARGET	J1	14	67
Q10**	BLACK BONUS	J1	15	31
Q11	BLACK BONUS	J1	16	15
Q13	"B" SAUCER ARROW	J1	17	57
Q14	MOTOR CONTROL	J1	18	58
Q12	LT THUMPER BUMPER	J1	19	60
Q8**	SAUCER ARROW	J1	23	12
Q1**	25,000 STAR (LEFT)	J1	24	50
Q2**	3RD "0" 200,000	J1	25	75
Q3**	SHOOT AGAIN PLAYFIELD	J1	26	91
Q7	20,000 LEFT LANE	J1	27	53
Q4	PYRAMID BONUS	J1	28	78
Q45	25,000 STAR (RT ARROW)	J2	1	60
Q31	200,000 ARROW	J2	2	PINK
Q30	200,000 ARROW	J2	6	85
Q43	200,000 ARROW	J2	7	91
Q47	TILT	J2	10	35
Q33	GAME OVER	J2	11	95
Q6	200,000 ARROW	J2	14	12
Q19	200,000 ARROW	J2	15	23
Q5	25,000 STAR (LT ARROW)	J2	16	34
Q18	200,000 ARROW	J2	20	98
Q3**	SHOOT AGAIN BACKBOX	J2	21	47
Q16**	BALL IN PLAY	J2	22	62
Q15**	"HI" SCORE TO DATE	J2	23	97
Q23**	MATCH BACKBOX	J2	8	82
Q20	PYRAMID BONUS	J1	13	30
Q57	5X BONUS	J3	1	10
Q58	PYRAMID BONUS	J3	2	95
Q60	BLACK BONUS	J3	3	81
Q59	PYRAMID BONUS	J3	4	14
Q55**	"0" ARROW IN LINE TARGETS	J3	9	15
Q56**	4TH "0" 200,000	J3	10	91
Q54**	"R" TARGET	J3	11	92
Q50	SPECIAL LEFT LANE	J3	12	21
Q52	CREDIT INDICATOR	J3	13	35
Q53	50,000 LEFT LANE	J3	14	84
Q51	"C" SAUCER ARROW	J3	15	53
Q48**	"I" RETURN LANE	J3	16	25
Q49**	"Y" TARGET	J3	17	13
Q46	25,000 STAR (RIGHT)	J3	18	56
Q44	"A" SAUCER ARROW	J3	19	67
Q41**	1ST "0" 200,000	J3	20	78
Q42**	5TH "0" 200,000	J3	21	64

## A5 LAMP LOCATION CONT'D

SCR	DESCRIPTION	JACK	PIN NO.	WIRE COLOR
Q40**	OPEN GATE ARROW	J3	22	23
Q37	BLACK BONUS	J3	23	98
Q39	40,000 LEFT LANE	J3	24	72
Q38	EXTRA BALL LEFT LANE	J3	25	36
Q36	3X BONUS	J3	26	43
Q32	PYRAMID BONUS	J3	27	40

NOTE: \*\* INDICATES MCR 106-1 ALL OTHERS ARE 2N5060 OR EQUIVALENTS

## A9 AUX LAMP DRIVER LOCATION

SCR	DESCRIPTION	JACK	PIN NO.	WIRE COLOR
Q1	RT LANE BLACK ARROW	J2	1	43
Q2	120K BONUS	J2	2	40
Q3	SWINGER SPOTS BLACK ARROW	J2	3	62
Q5	60K BONUS	J2	6	68
Q6	SWINGER SPECIAL ARROW	J2	7	45
Q7	50,000 IN LINE TARGETS	J2	11	15
Q8	SWINGER BACK TARGET	J2	12	27
Q9	LT LANE BLACK ARROW	J2	17	96
Q10	LT LANE 200000	J2	20	54
Q11	SPECIAL BONUS	J2	19	82
Q12	SPOT "PYRAMID	J2	18	25

NOTE: SCR'S ARE MCR-106-1

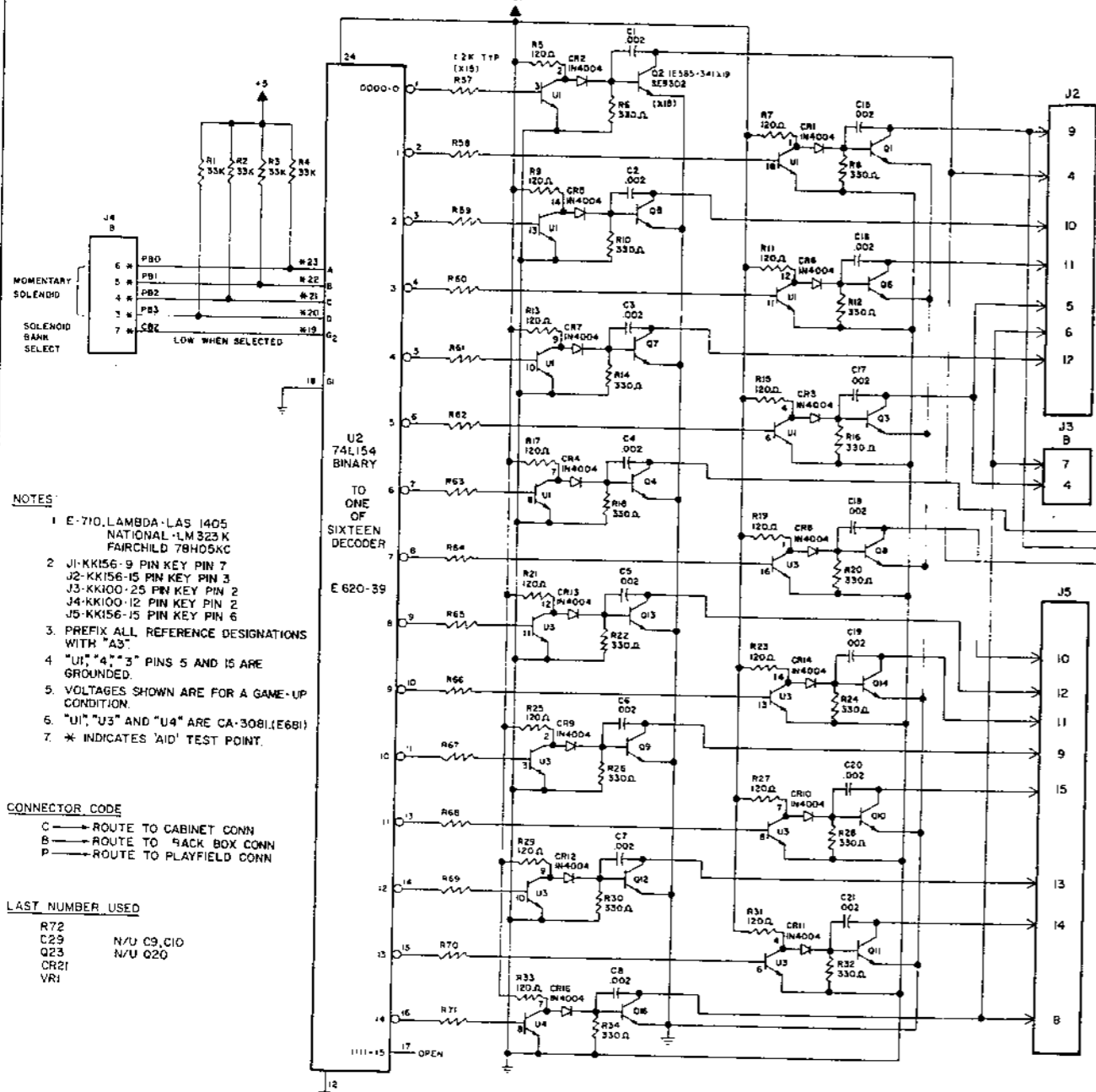
## A3 SOLENOID DRIVER LOCATION

TRANSISTOR	DESCRIPTION	JACK	PIN NO.	WIRE COLOR
Q8	LT SLING SHOT	J5	10	85
Q13	RT SLING SHOT	J5	12	80
Q14	LT THUMPER BUMPER	J5	11	78
Q9	RT THUMPER BUMPER	J5	9	71
Q10	SAUCER	J5	15	74
Q12	DROP TARGET RESET	J5	13	67
Q11	OUTHOLE	J5	14	83
Q1	GATE	J5	7	91
Q19	COIN LOCKOUT (DOOR)	J2	8	36
Q15	FLIPPER ENABLE	-	-	-
Q16	KNOCKER	J2	6	85

NOTE: TRANSISTORS ARE SE 9302 OR EQUIVALENT

## WIRE COLOR CODE

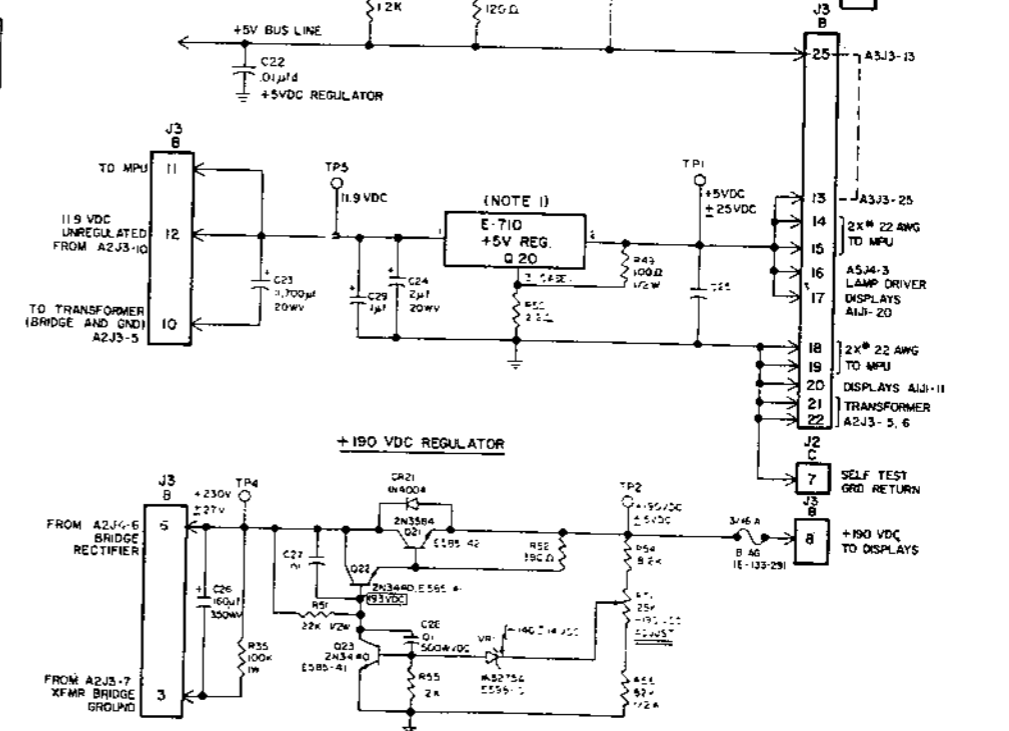
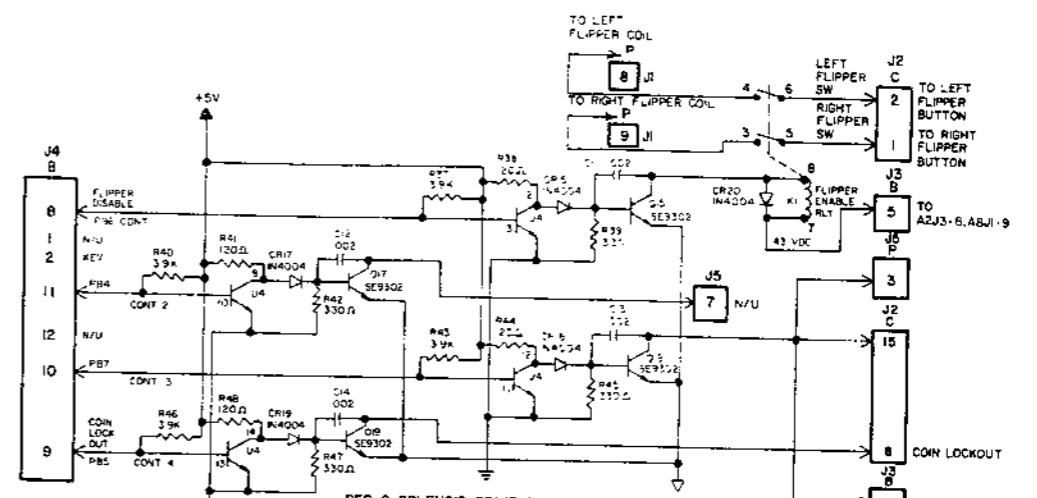
1-RED -R-	6-BROWN -BR-
2-BLUE -BLU-	7-ORANGE -O-
3-YELLOW -Y-	8-BLACK -B-
4-GREEN	9-GRAY
5-WHITE -W-	0-NO TRACER
J-JUMPER	
1-FIRST NUMBER-BODY COLOR	
2-SECOND NUMBER-TRACER COLOR	
EXAMPLE: 50 -WHITE	
51 -WHITE-RED	



- NOTES**
- 1 E-710, LAMBDA-LAS 1405 NATIONAL LM 323 K FAIRCHILD 78H05KC
  - 2 J1-KK156-9 PIN KEY PIN 7
  - 3 J2-KK156-15 PIN KEY PIN 3
  - 4 J3-KK100-25 PIN KEY PIN 2
  - 5 J4-KK100-12 PIN KEY PIN 2
  - 6 J5-KK156-15 PIN KEY PIN 6
  7. \* PREFIX ALL REFERENCE DESIGNATIONS WITH "A3".
  8. "U1", "4", "3" PINS 5 AND 15 ARE GROUNDED.
  9. VOLTAGES SHOWN ARE FOR A GAME-UP CONDITION.
  10. "U1", "U3" AND "U4" ARE CA-3081.(E681)
  11. \* INDICATES 'AID' TEST POINT.

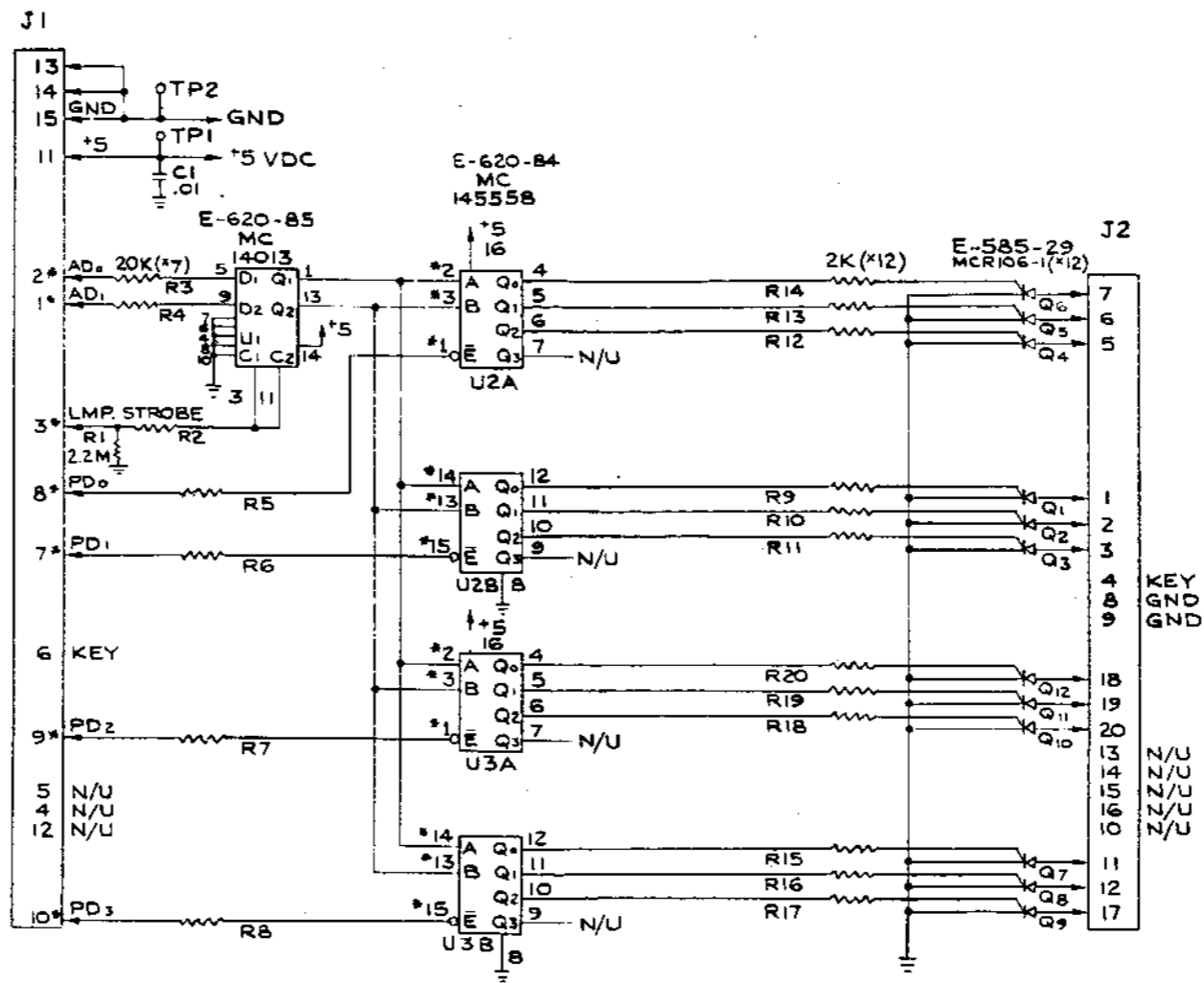
- CONNECTOR CODE**
- C → ROUTE TO CABINET CONN
  - B → ROUTE TO RACK BOX CONN
  - P → ROUTE TO PLAYFIELD CONN

- LAST NUMBER USED**
- R72 N/U
  - C29 N/U
  - Q23 N/U
  - CR21 N/U
  - VR1 N/U



PROJECT ENG:		DESIGNED BY:		CHECKED BY:	
DO NOT SCALE ORG		NO. REV'D		REVISED	
DATE: 10/25/68		BY: J. W. ...		BY: J. W. ...	

FRANKLIN MFG. CO.  
FRANKLIN, PA. U.S.A.



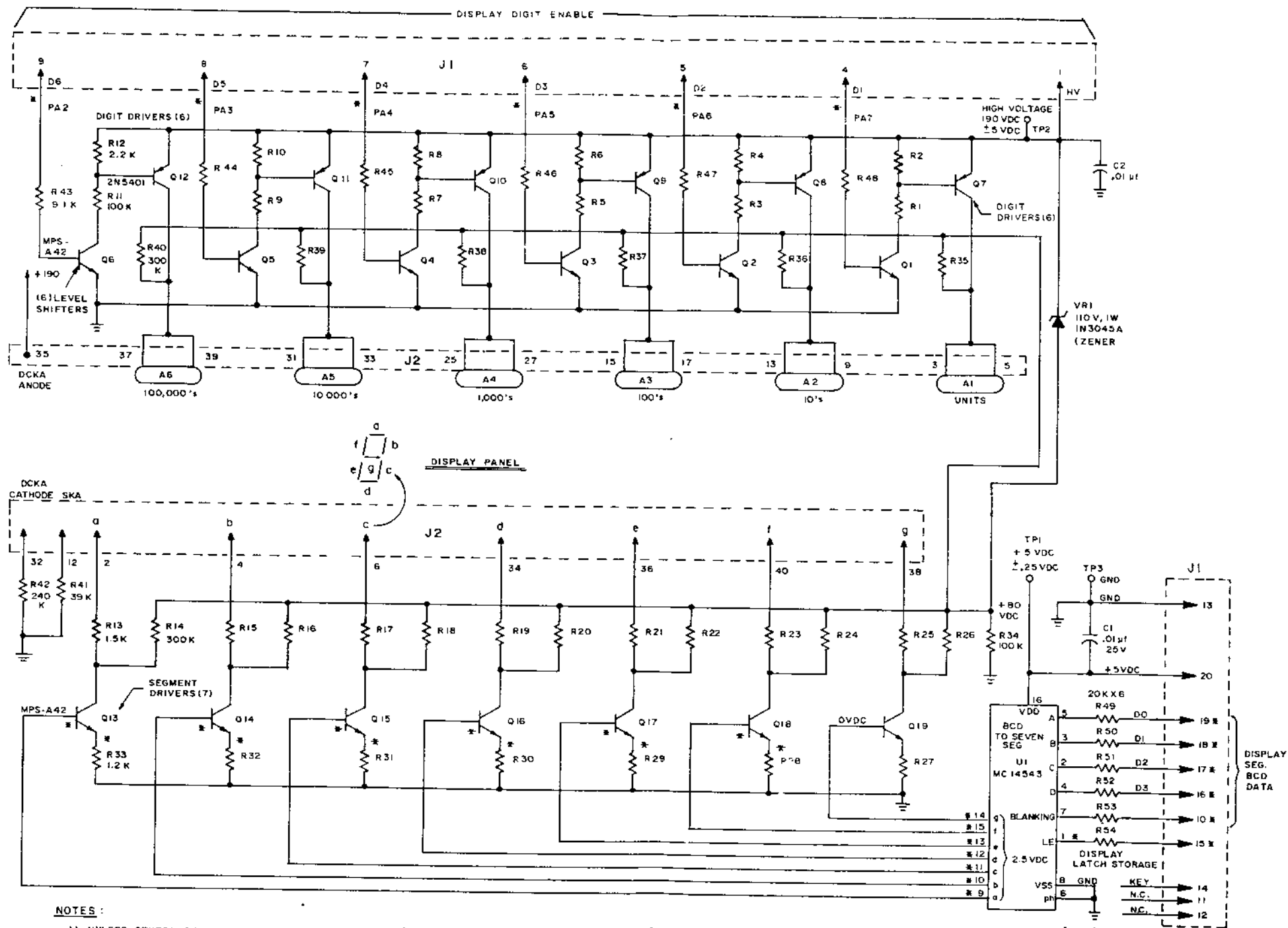
**NOTES:**

1. \* INDICATES "AID" TEST POINT.
2. ALL RESISTORS ARE 1/4 W, ± 5%
3. VOLTAGES SHOWN ARE FOR A GAME UP CONDITION.
4. SCR'S ARE MCR-106-1, (E-585-29)
5. PREFIX ALL REFERENCE DESIGNATION WITH "A9"

OPER	DEPT	DESCRIPTION	TOOL NO

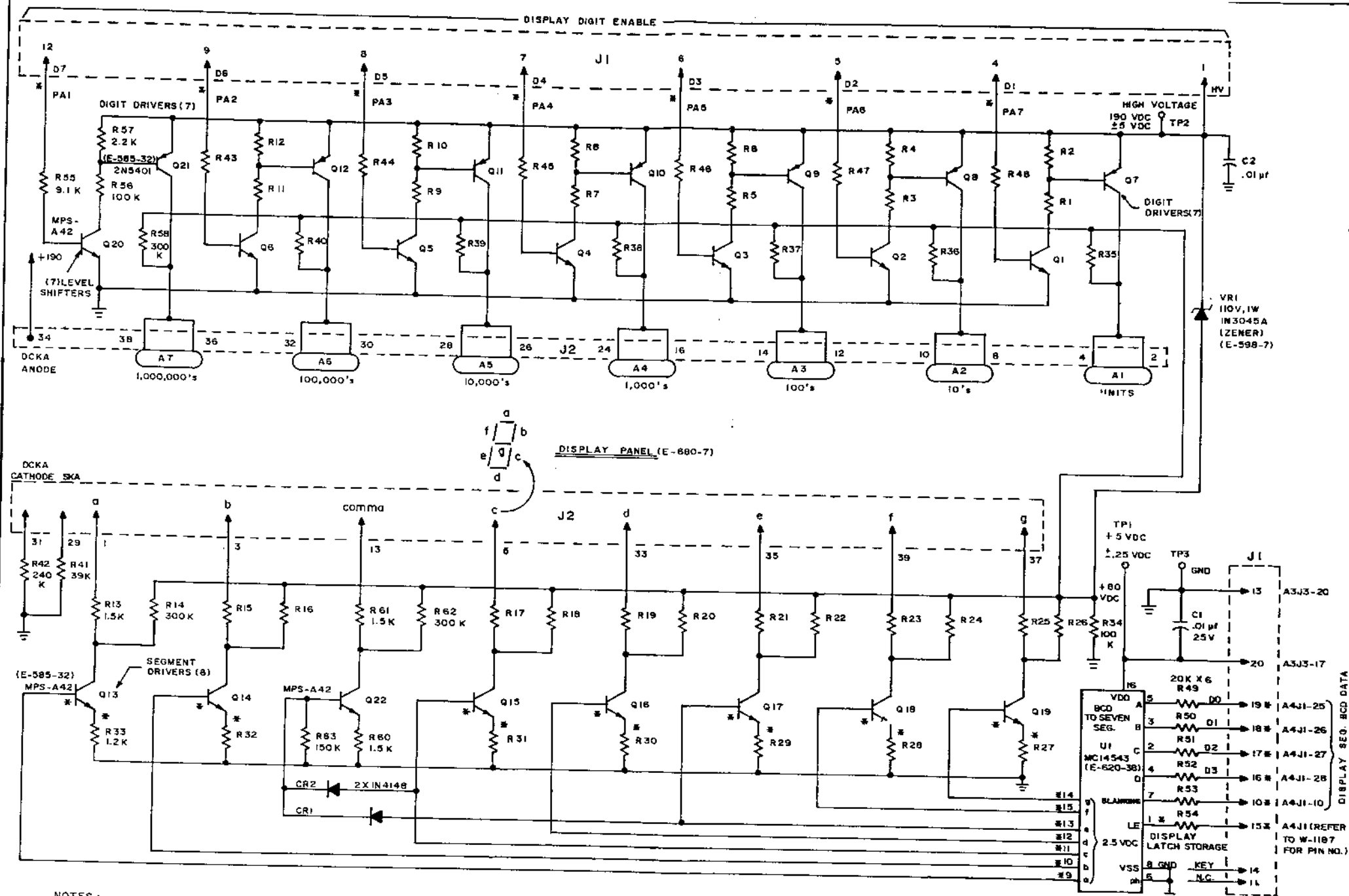
NO	LET	CHANGE	DATE	BY

REMOVE ALL BURRS		AP BY	DATE	<p><b>Bally MANUFACTURING CORP.</b> 2640 BELMONT AVENUE CHICAGO ILLINOIS</p>
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED FRACTIONS DECIMALS EXCEPT HOLE DIA'S ANGLES		CHK BY	DATE	
DO NOT SCALE DRAWING		AP BY	DATE	NAME (A9) AUXILIARY LAMP DRIVER BOARD ASSEM NO USED MATERIAL 1-21-8
M051-00114-A051				SCALE



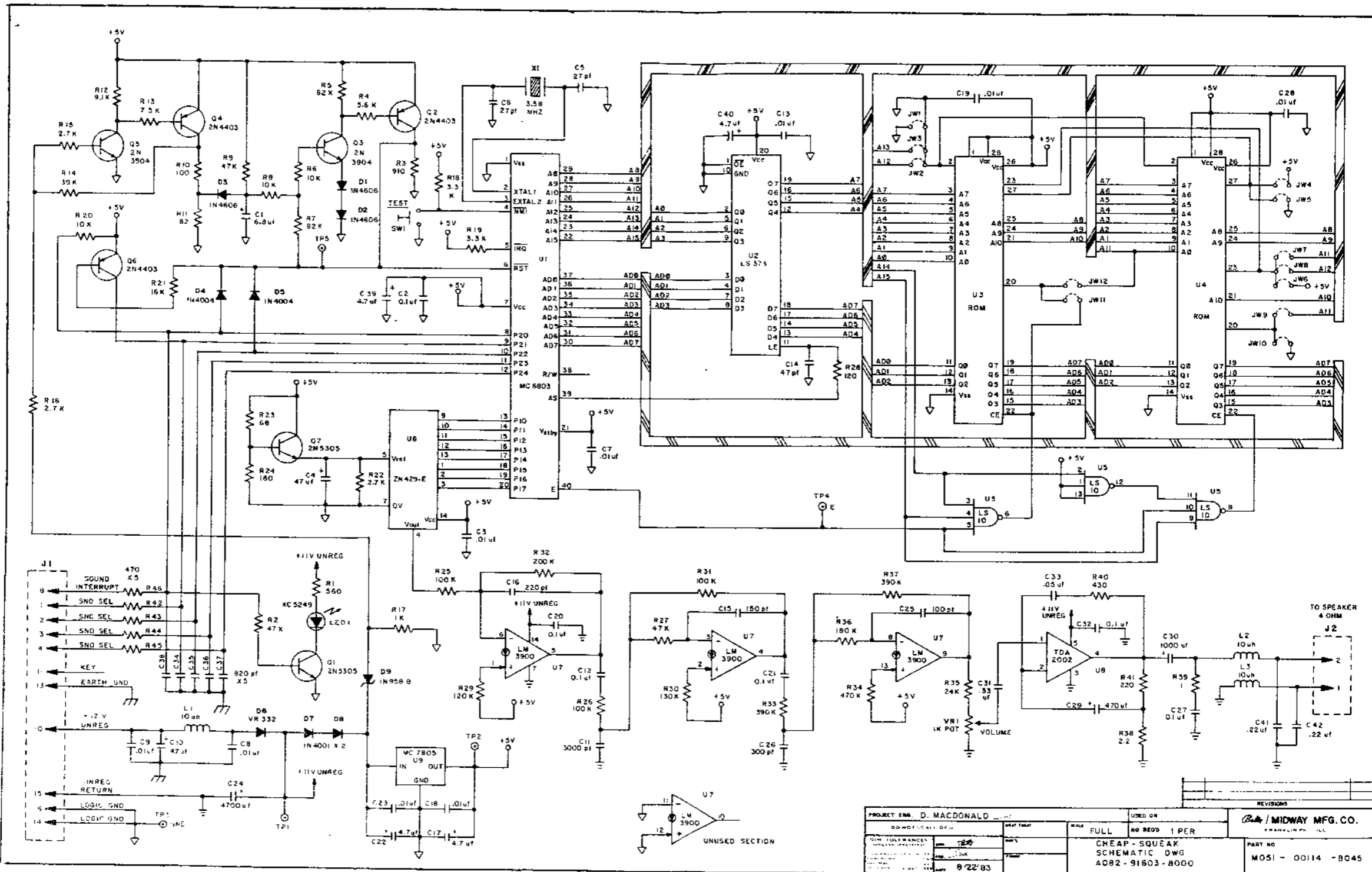
- NOTES:
- 1) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE  $\pm 5\%$ , 1/4 W.
  - 2) PREFIX ALL REFERENCE DESIG. WITH ASSY REF. DESIG. "A1"
  - 3) \* INDICATES "AID" TEST POINT.

PROJECT ENG: D. MACDONALD		USED ON PINBALL		REVISIONS	
DO NOT SCALE DIMS	DATE TEST	SCALE	NO REVD PER	Bally / MIDWAY MFG. CO. FRANKLIN PK ILL.	
DIM TOLERANCES UNLESS SPECIFIED	REV			PART NO.	
SIX DIGIT DISPLAY BOARD					

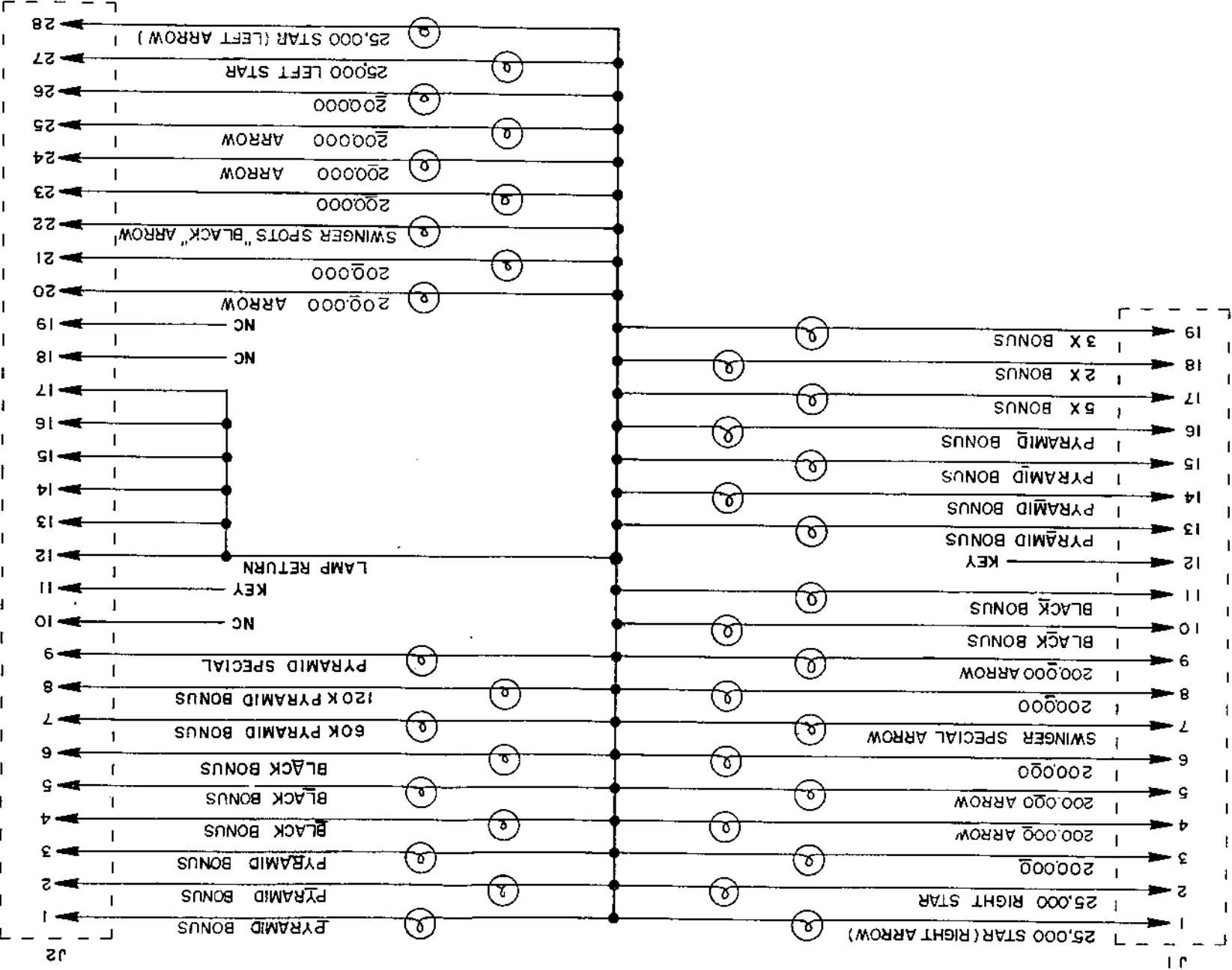


- NOTES:
- 1) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE  $\pm 5\%$ , 1/4W.
  - 2) PREFIX ALL REFERENCE DESIG. WITH ASSY REF. DESIG. "A1".
  - 3) \* INDICATES "AID" TEST POINT.

PROJECT ENR: D. MACDONALD		USED ON PINBALL		REVISIONS	
DO NOT SCALE DWG		NO. REQ'D	PER	MIDWAY MFG. CO.	
DIM. TOLERANCES UNLESS SPECIFIED		FULL		FRANKLIN PK. ILL.	
CONCENTRICITY UNLESS SPECIFIED		NO. REQ'D 1 PER		PART NO.	
FRACTIONAL		SEVEN DIGIT DISPLAY BOARD SCHEMATIC "A1"		M051 - 00114 - A057	



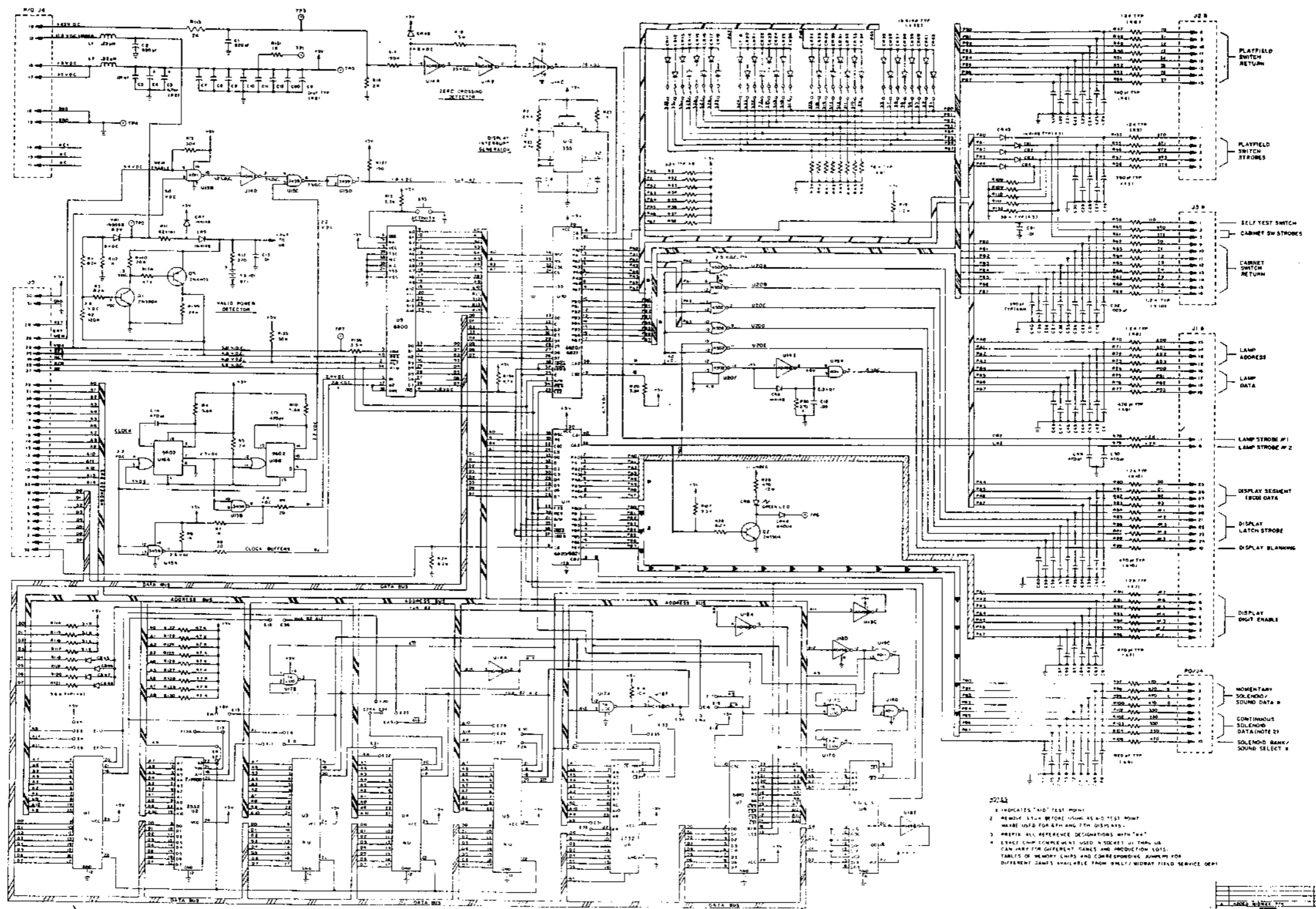
PROJECT ENG. D. MACDONALD		DATE		REVISED		REVISIONS	
NO.	DESCRIPTION	DATE	BY	NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR FABRICATION	8/22/83					
PROJECT ENG. D. MACDONALD				MIDWAY MFG. CO.			
CHEAP-SQUEAK SCHEMATIC DWG				PART NO. M051-00114-0045			
AC02-91603-8000							



PROJECT ENG: A. AARSTAD			HEAT TREAT			USED ON BLACK PYRAMID			Gasky / MIDWAY MFG. CO. FRANKLIN PK. ILL.		
DO NOT SCALE DWG.			SCALE FULL			NO. REQD PER			PART NO.		
DIM TOLERANCES UNLESS SPECIFIED:			FINISH			BLACK PYRAMID BONUS LITE PC BD.			MOSI - 00444-8011		
DATE 5/31/84			DATE			SCHEMATIC DWG. (A080-91730-BA44)					
ORN BAK			MATERIAL			BLACK PYRAMID					
DESIGNED BY			DRAWN BY			CHECKED BY					
DATE			DATE			DATE					

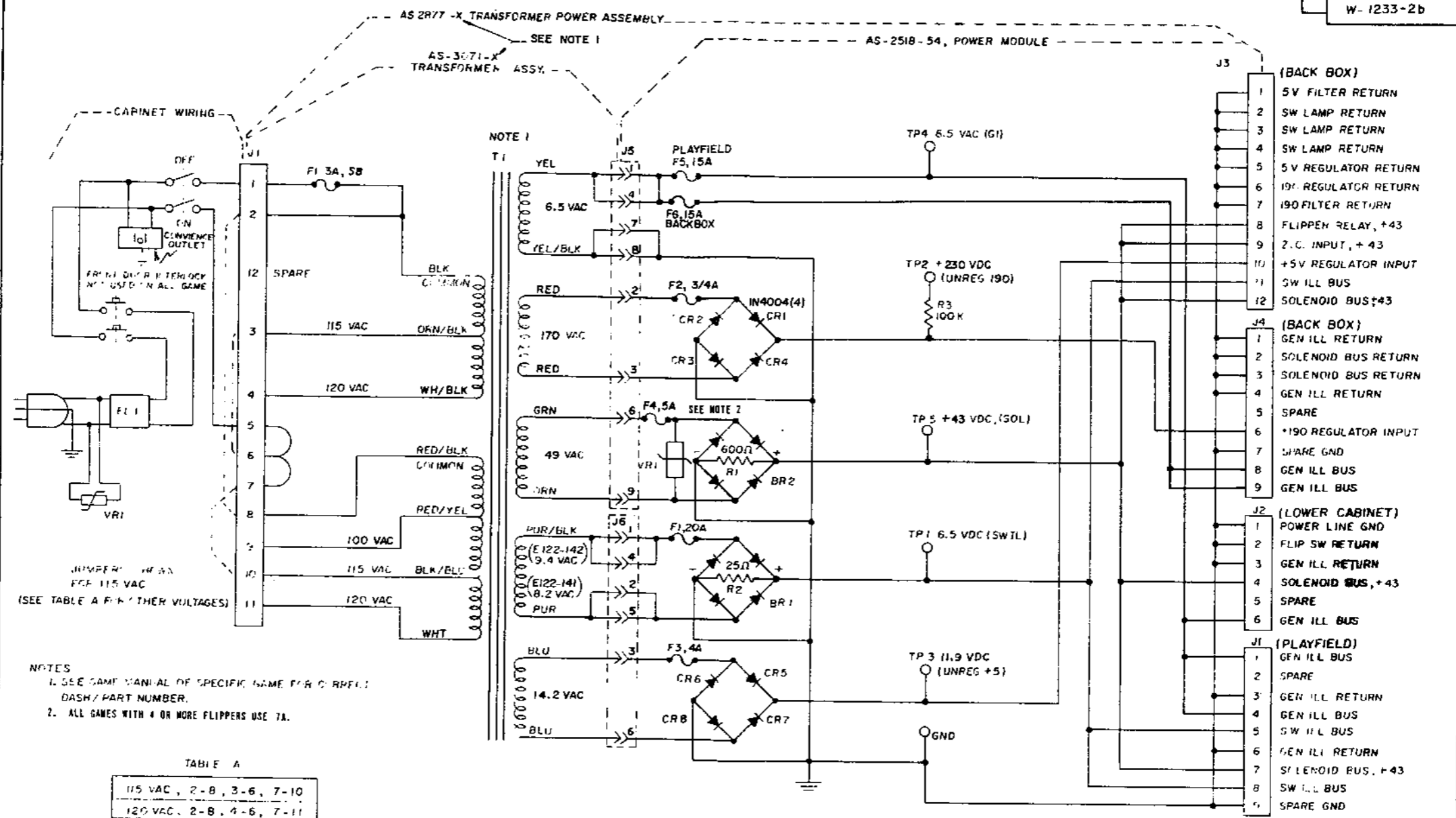
REVISIONS	





- NOTES
- 1 INDICATES "HOT" TEST POINT
  - 2 MEMORY DATA BEFORE USING AS I/O TEST POINT
  - 3 WIRE USED FOR 8V AND 7TH DISPLAY
  - 4 REFER ALL REFERENCE DESIGNATIONS WITH "X"
  - 5 EXACT CHIP COMPONENT USED IN SHEET IS THAT USE CAN VARY FOR DIFFERENT GAMES AND PRODUCTION LOTS. TABLES OF MEMORY CHIPS AND CORRESPONDING JUMPS FOR DIFFERENT GAMES AVAILABLE FROM SNEYD/MIDWAY FIELD SERVICE DEPT

DESIGNED BY: DUNCAN WARD	DATE: 11/11/77	REV: 1
DRAWN BY: JERRY WARD	DATE: 11/11/77	REV: 1
CHECKED BY: JERRY WARD	DATE: 11/11/77	REV: 1
APPROVED BY: JERRY WARD	DATE: 11/11/77	REV: 1
SNEYD/MIDWAY MFG. CO.		
MFG. CONTROL NO.		



NOTES  
 1. SEE GAME MANUAL OF SPECIFIC GAME FOR CORRECT DASH/PART NUMBER.  
 2. ALL GAMES WITH 4 OR MORE FLIPPERS USE 7A.

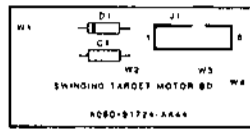
ALL DESIGN OPERATIVE AND PROCESS DATA PERTAINING TO THE ARTICLE SHOWN ON THIS SHEET IS THE PROPERTY OF BALLY MFG CORP. CHICAGO. ALL THIS INFORMATION IS DISCLOSED IN CONFIDENCE AND IS NOT TO BE COPIED, REPRODUCED, REVEALED TO OR APPROPRIATED BY OTHERS, IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE OWNERS. THE PRINT IS LOANED AND MUST NOT BE USED IN ANY MANNER DETRIMENTAL TO THE INTEREST OF THE OWNERS, AND MUST BE RETURNED ON DEMAND.

REMOVED ALL BURS	DR. BY FFC	DATE	 2640 BELMONT AVENUE CHICAGO, ILLINOIS # 1273				
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	CK. BY AMCR	DATE					
FRACTIONS ± .005	AP'D BY 3-D	DATE 7-13-82	PRINT CONTROL	DIE SIZE	C.C.	FT. PER M.	LBS. PER M.
DECIMALS ± .003	EXP. BY 3-D	DATE 7-13-82	NAME	POWER SUPPLY SCHEMATIC		ASSEM. NO. USED	SCALE
EXCEPT HOLE DIA'S	FINISH:		MATERIAL			PART NO.	SCALE
ANGLES ± 1/2°	HARDENING:				W-1233-2b		
DO NOT SCALE DRAWING							

**DESIGNATION LIST**

**CROSS REFERENCE LIST**

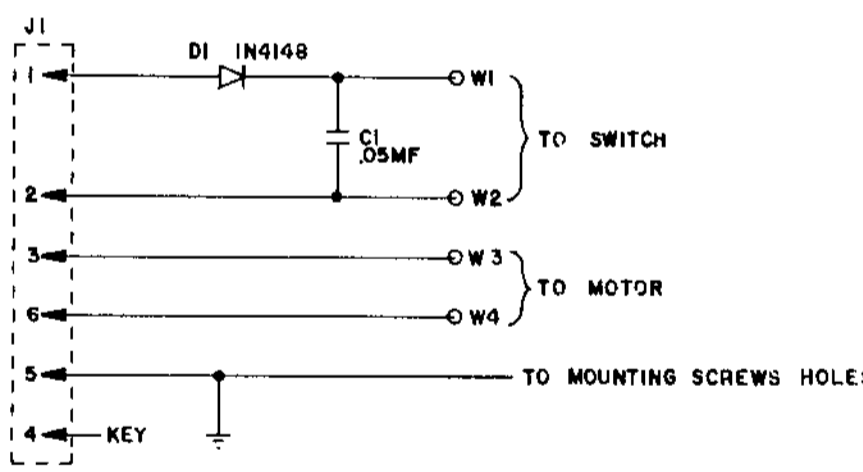
DESIGNATION NO.	DESCRIPTION
C1	.05 UF 16V
D1	1N4148
J1	KK-100 HEADER P.C.B.



DESCRIPTION	QTY	DESIGNATION NO.	PART NUMBER
.05 UF 16V	1	C1	0171-12206-AXXX
1N4148	1	D1	103E-00002-0005
KK-100) HEADER	1	J1	3CAC-16444-AF02
P.C.B.	1		A080-91724-AA44

REVISIONS	

PROJECT ENG: A. AARSTAD		USED ON BLACK PYRAMID		Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL	
DO NOT SCALE DWG.		HEAT TREAT	SCALE FULL	NO. REQ'D   PER	
DIM TOLERANCES UNLESS SPECIFIED	DRAWN BAK	MAT'L.	SWINGING TARGET MOTOR BD. ASSEMBLY DWG.		PART NO.
<small>FRACTIONAL 1/16 DECIMAL .005 HOLE DIA .001 .002</small>	DATE 5/15/84	FINISH	(A082-91724-AA44)		M051-00A44 -A008



REVISIONS	

PROJECT ENG: A. AARSTAD		USED ON BLACK PYRAMID		Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL	
DO NOT SCALE DWG.		HEAT TREAT	SCALE FULL	NO. REQ'D   PER	
DIM TOLERANCES UNLESS SPECIFIED	DRAWN BAK	MAT'L.	SWINGING TARGET MOTOR BD. SCHEMATIC		PART NO.
<small>FRACTIONAL 1/16 DECIMAL .005 HOLE DIA .001 .002</small>	DATE 2/24/84	FINISH	A080-91724-AA44		M051-00A44 -A009