

BLACK PYRAMID

Parts and Operating Manual



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T.M.

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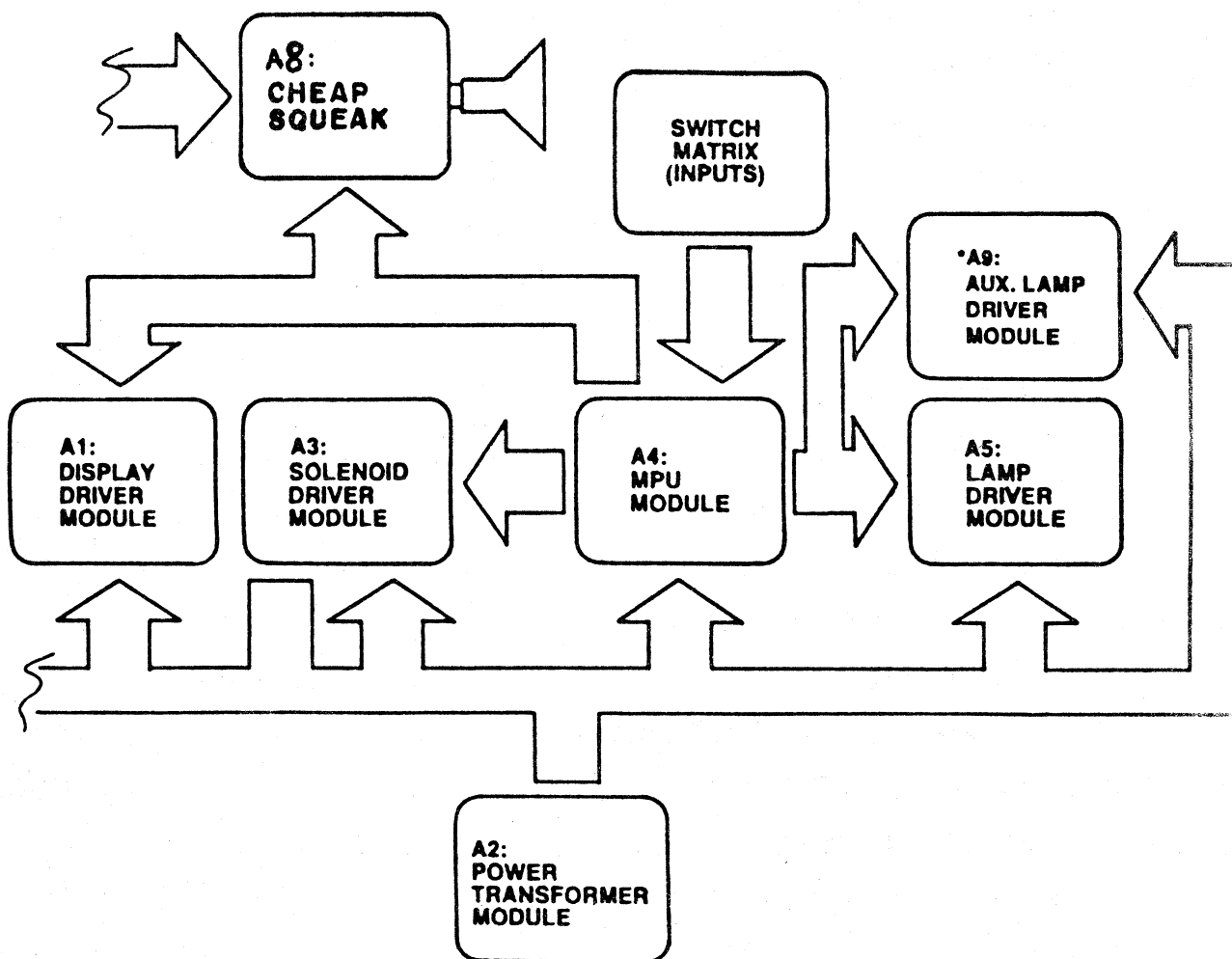


Installation and General Game Operation Instructions

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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 (Paid & 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.

Liting 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
#1 (HINGE SIDE)	5	4	3	2	1					
OR #3	13	12	11	10	9					
(RIGHT SIDE)	OFF	OFF	OFF	OFF	OFF	1/1 Coin				
	OFF	OFF	OFF	OFF	ON	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	ON	1/1st Coin	2/2nd Coin	2/3rd Coin	2/4th Coin	7/4
	ON	ON	ON	OFF	OFF	0/1st Coin***	0/2nd Coin***	1/3rd Coin		1/3
	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****	1/5
	ON	ON	ON	ON	ON	0/1st Coin***	0/2nd Coin***	1/3rd Coin	0/4th Coin****	1/5th Coin

*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

10
15
25
40

SWITCHES

26	25
OFF	OFF
OFF	ON
ON	OFF
ON	ON

BALLS PER GAME:**# BALLS/GAME**

5
4
3
2

SWITCHES

32	31
OFF	ON
ON	OFF
OFF	OFF
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

ON
OFF

SWITCH 28

ON
OFF

CREDIT DISPLAY:**CREDITS DISPLAYED**

YES
NO

SWITCH 27

ON
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

REPLAY
EXTRA BALL
NOVELTY
NO AWARD

SELF-TEST POSITION 16

SET TO "03"
SET TO "02"
SET TO "01"
SET TO "00"

SELF-TEST POSITION 17

SET TO "03"
SET TO "02"
SET TO "01"
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

No Award
One Credit
Two Credits
Three Credits

SELF-TEST POSITION 19

SET TO "00"
SET TO "01"
SET TO "02"
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

Bonus Special Per Game

Liberal	SW 6	ON	Unlimited Spls Earned
Conservative	SW 6	OFF	Only 1 Spl Earned

Left Lane Extra Ball Build Up Adjustment

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

M & I Return Lanes

Liberal	SW 14	ON	Lanes Tied Together
Conservative	SW 14	OFF	Lanes Separated

Left Roll Up Lane 20,000 pts.

Liberal	SW 21	ON	Initially Lit
Conservative	SW 21	OFF	Initially Unlit

Bonus Spl

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

Right Lane 50,000 pts.

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:

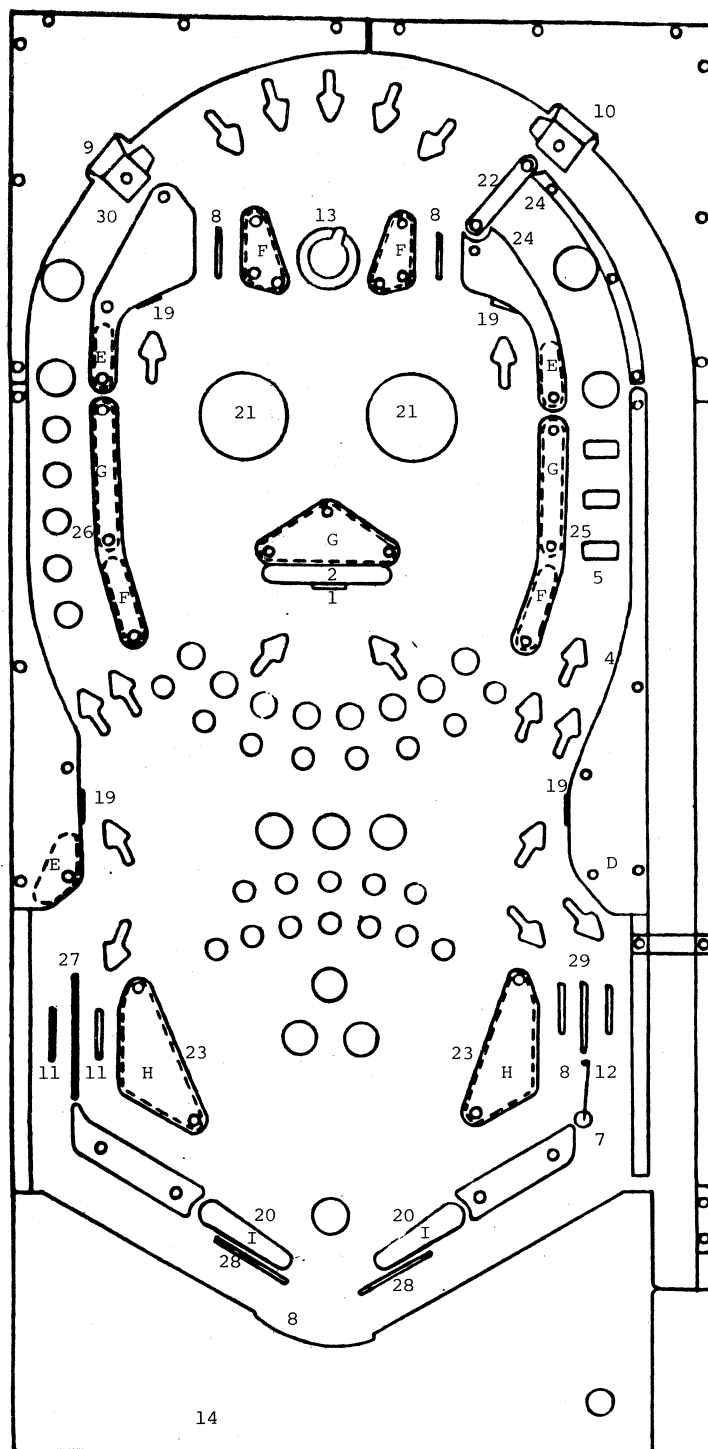
To set up positions 16-19 push and release self test button till 16 shows on match/ball in play. Now pulse replay button for recommended setup from "00" thru "03." Repeat for positions 17, 18 or 19.

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. (Right) | A360-00216-0 |
| 12. Wire Actuator Assy. (Right) | A390-00044-0 |
| 13. Wire Actuator Assy. | A360-00217-0 |
| 14. Top Mounted Kicker (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. & Diode Assy. | A390-00034-0 |
| 20. Mold Flipper Assy.-Wht-Purch. | A967-00031-0 |
| 21. Thumper Bumper Assy. | A967-00053-0 |
| 22. Ball Gate Wire Assy. | A967-00057-0 |
| 23. Slingshot Kicker Coil Assy. | A967-00059-0 |
| 24. Ball Guide Wire 6 ¹⁹ / ₆₄ | A44-00100-0 |
| 25. Ball Guide Wire 6 ⁹ / ₃₂ RT | A44-00106-0100 |
| 26. Ball Guide Wire 6 ⁹ / ₃₂ LT | A44-00106-0200 |
| 27. Ball Guide Wire L 3 ⁵ / ₈ " | 360-00175-0106 |
| 28. Buffer Wire L 2 ³ / ₈ " | 360-00175-5300 |
| 29. Ball Guide Wire 2" | 360-00175-5600 |
| 30. Ball Guide Wire 2 ⁷ / ₈ " | 360-00175-6500 |

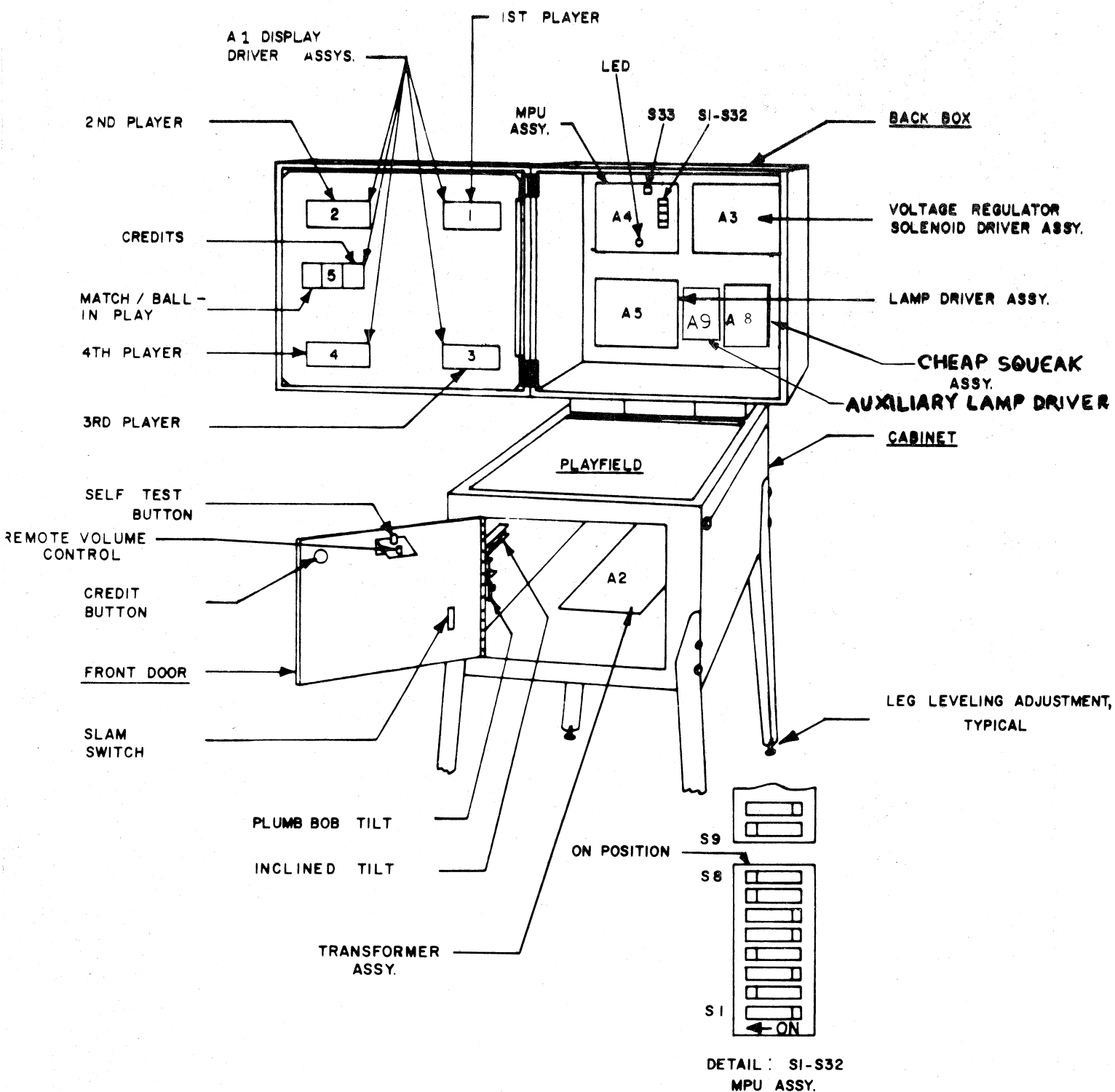


FIGURE III. ELECTRONIC PIN BALL MACHINE

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

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

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

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**

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

REPLAYS

Instruction Card
Score Cards
Major Mode

Match
High Score to Date

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.

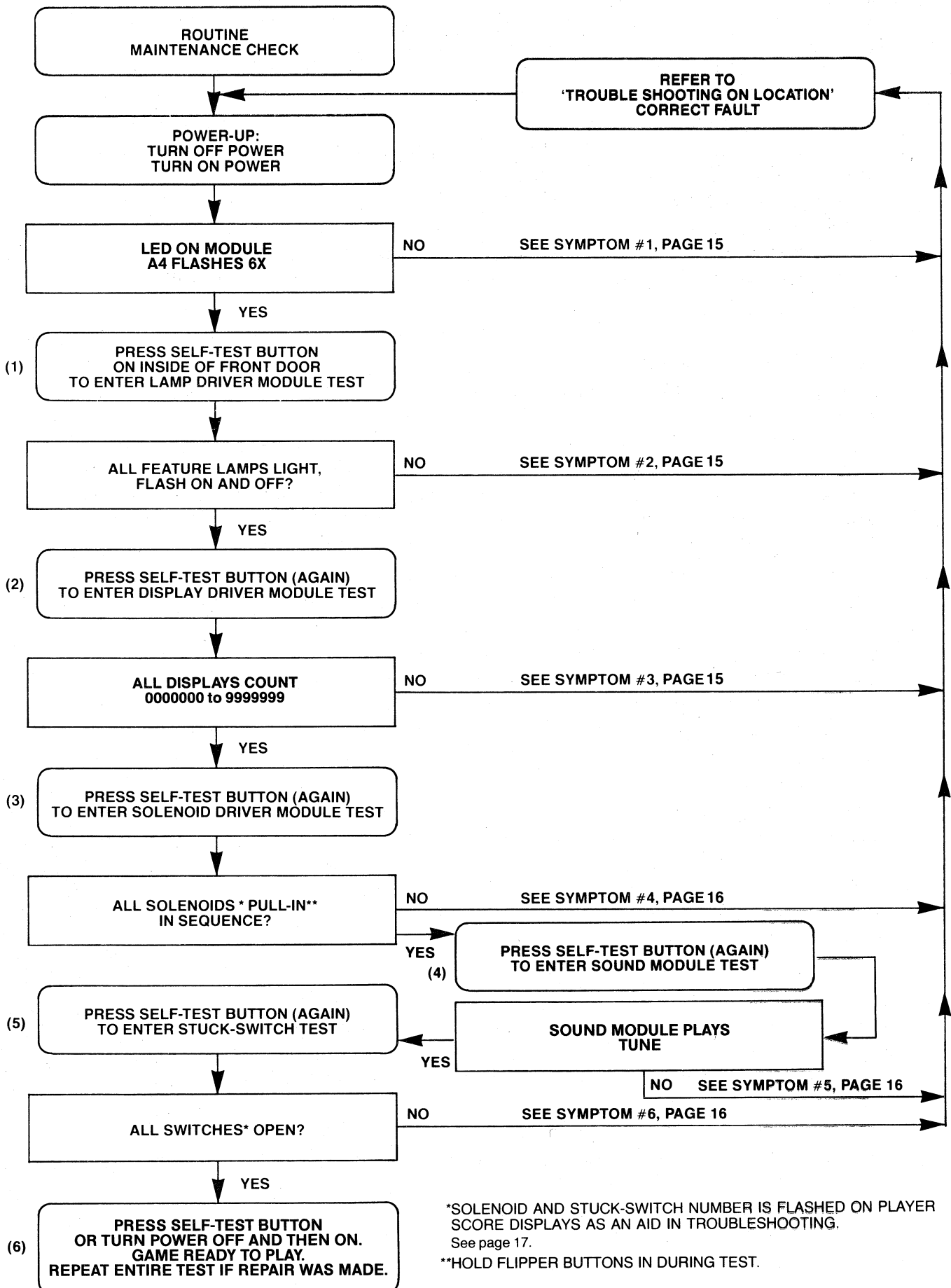
After successful completion of the Self Diagnostic Test procedure, set the game up for play. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no 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



*SOLENOID AND STUCK-SWITCH NUMBER IS FLASHED ON PLAYER SCORE DISPLAYS AS AN AID IN TROUBLESHOOTING.
See page 17.

**HOLD FLIPPER BUTTONS IN DURING TEST.

- 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.

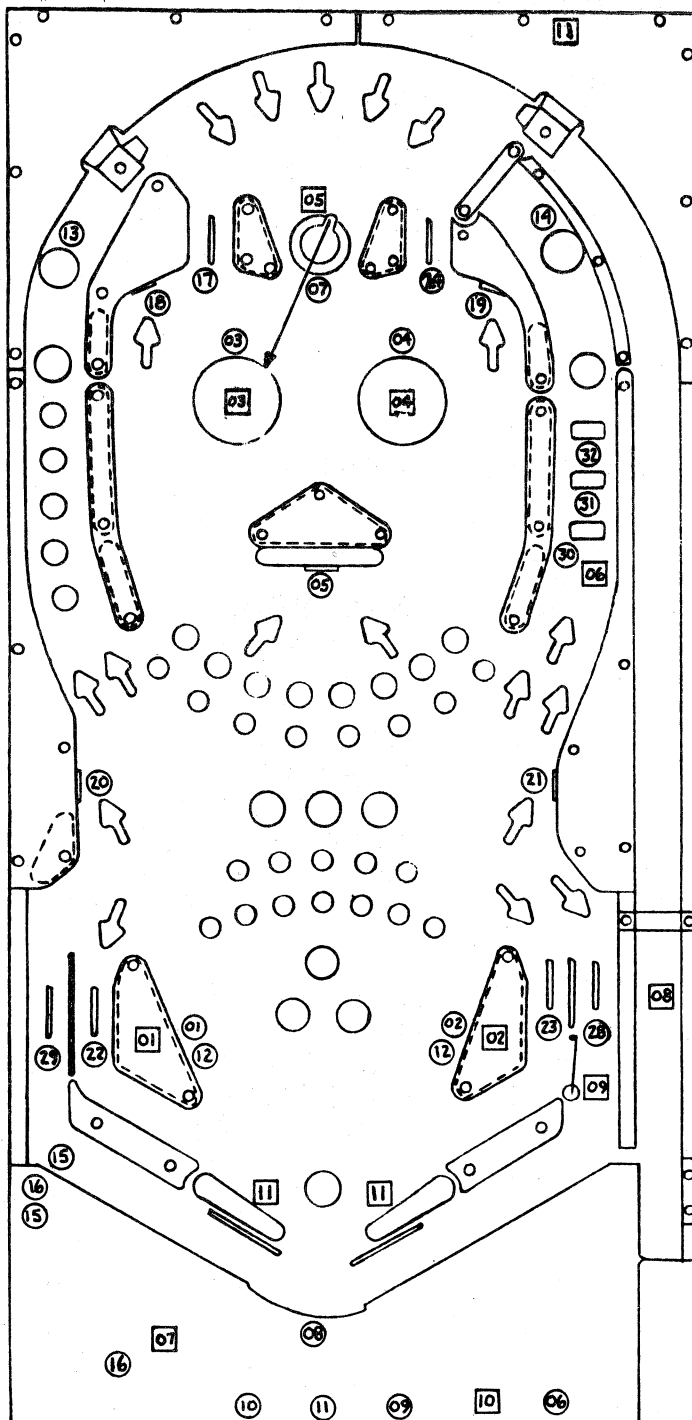
GAME #A44 BLACK PYRAMID **SOLENOID IDENTIFICATION TABLE**

Self Test #	SOLENOID IDENTIFICATION	Self Test #	SOLENOID IDENTIFICATION
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

Switch Self Test #	DESCRIPTION	Switch Self Test #	DESCRIPTION
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.

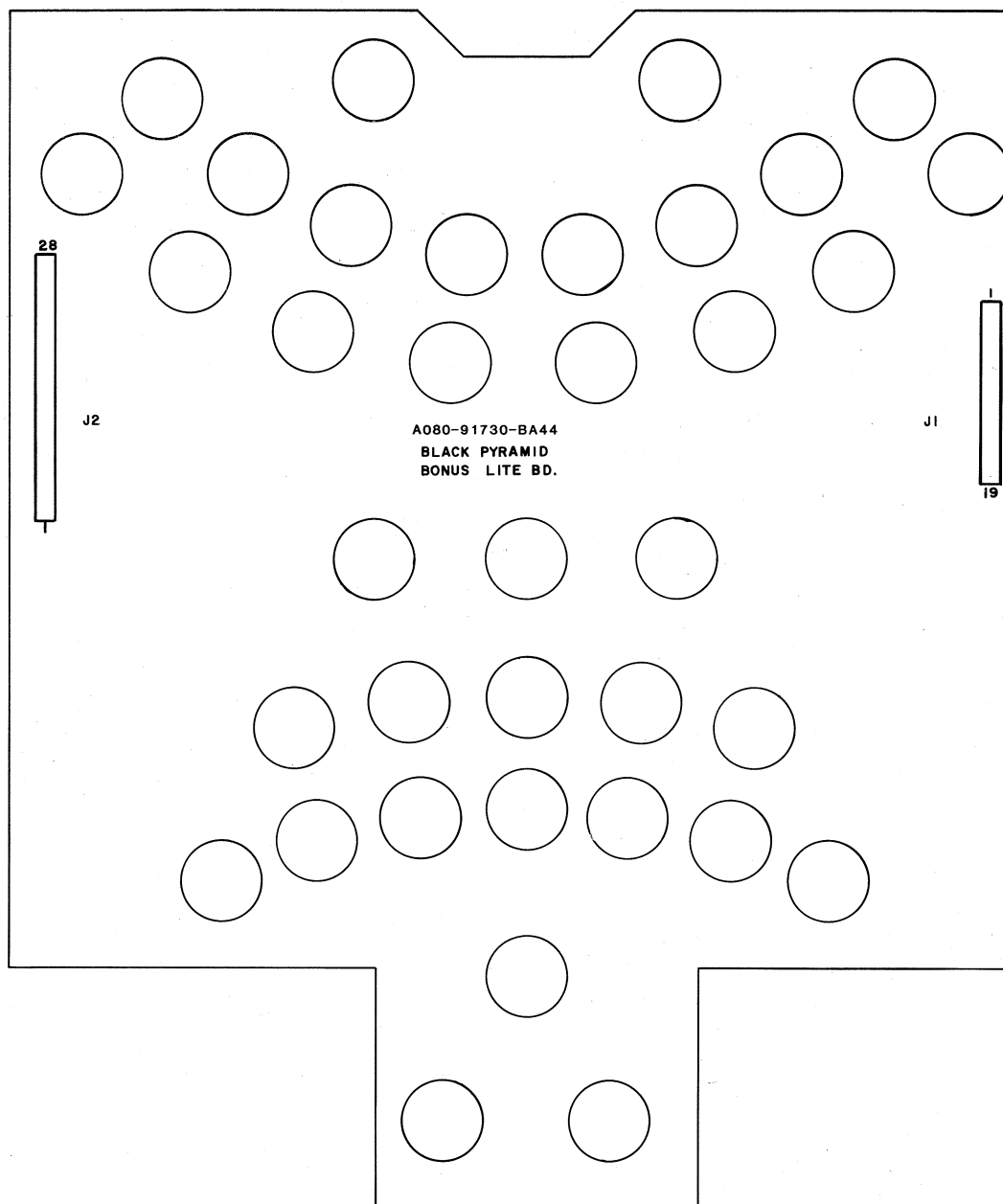
DO: Bally recommends you clean your playfield with Wildcat #125 (Wildcat Chemical Co., 1333 W. Seminary Drive, Ft. Worth, Texas 76115). Wildcat #125 is a combination cleaner and polish. Bally has tried and tested this product and found it to be very effective. If Wildcat #125 is not available, Bally 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

MISCELLANEOUS	MIDWAY PART NUMBER	BALLY PART NUMBER
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	
ASSEMBLY COILS		
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
PLAYFIELD PARTS		
See Figure II		
MODULES		
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
REPAIRS PROCEDURES/AIDS		
Module & Component Replacement		F.O. 560-1
AID (Assistance in Diagnostics) Kit, used with F.O. 560-1		KIT #485-1
MODULE COMPONENTS		
SEE MODULE PARTS LIST		
MODULE COMPONENT STARTER KITS		
(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		

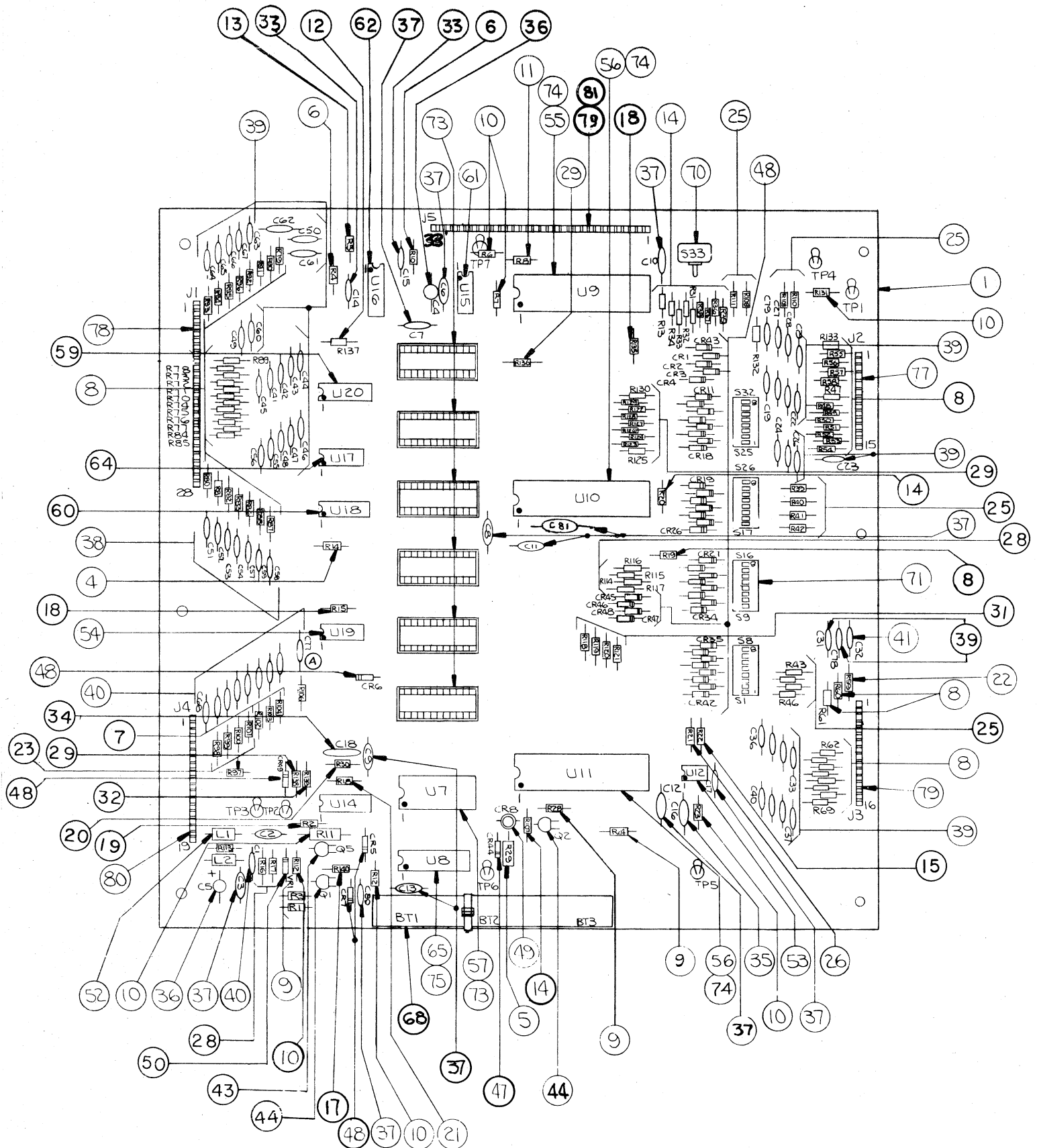


DESIGNATION NO.	DESCRIPTION
J1	19 PIN RT ANGLE CONN
J2	28 PIN RT ANGLE CONN
P.C.B.	A080-91730-BA44

DESCRIPTION	QTY	DESIGNATION NO.	PART NUMBER
19 PIN RT ANGLE CONN	1	J1	3CCC-16468-AF02
28 PIN RT ANGLE CONN	1	J2	3CCC-16468-AE02
P.C.B.			A080-91730-BA44

PROJECT ENG: A. AARSTAD		THIS DWG IS CONFIDENTIAL & PROPERTY OF MIDWAY MFG. CO	
DIM. TOLERANCES UNLESS OTHERWISE SPEC CONCENTRICITY TIR .002 FRACTIONAL ± 1/64 DECIMAL ± .005 HOLE DIA + .002 - .000 ANGLE ± 1/2° DO NOT SCALE DWG.		BLACK PYRAMID FIRST USED IN: <i>MM</i> DATE: 5/9/84 MECH CHK: <i>MM</i> FINISH: <i>MM</i>	
MIDWAY MFG. CO. FRANKLIN PK., IL. 60131 A BALLY CO.		BONUS LITE BD. ASSEMBLY DRWG A080-91730-BA44	
REVISIONS PART NO. M05100A44-B010			

A082-91624-A000 MPU MODULE

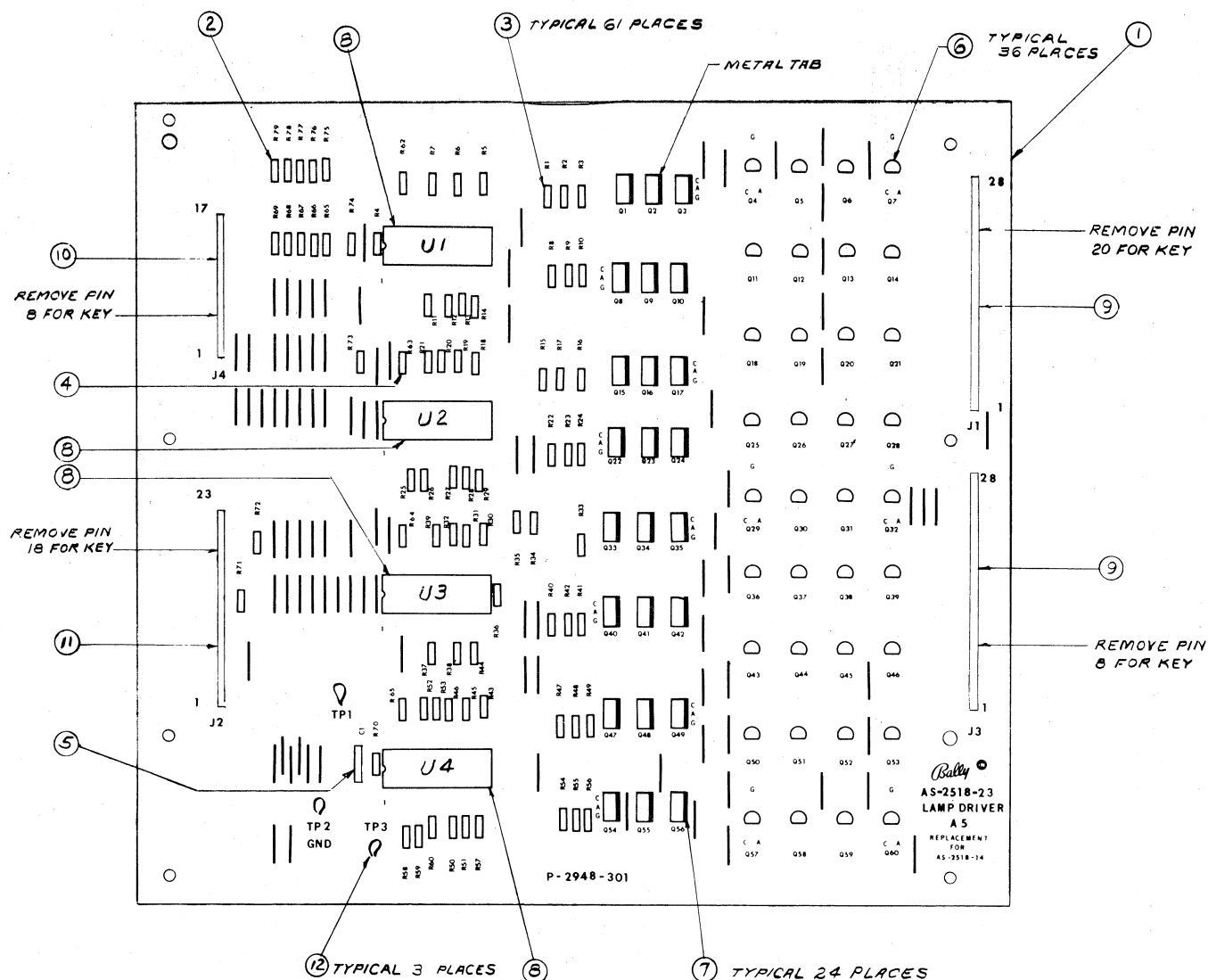


A4: MPU MODULE COMPONENT PARTS LIST

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 (IN4004)
48	CR1-CR7, CR11-CR43, CR45-CR49, CR52	E-00587-0014	Diode (IN4148)
49	CR8	E-00679	LED (Green)
50	VR1	E-00598-0008	Diode Zener (8.2V, IN9598)
52	L1, L2	E-00604-0003	Inductor, 22 Micro Hy.
53	U12	E-00620-0004	Timer (555)
54	U19	E-00620-0005	Quad 2 Input (4011)
55	U9	E-00620-0028	MPU I.C. (6800)
56	U10, U11	E-00620-0029	PIA I.C. (6820)
57	U7	E-00620-0030	RAM I.C. (6810)
59	U20	E-00620-0032	HEX Buffer I.C. (14502B)
60	U14, U18	E-00620-0033	HEX Inverter (4049B)
61	U15	E-00620-0034	Quad Memory Drive (MC3459L)
62	U16	E-00620-0035	Dual Monostable (9602)
64	U17	E-00620-0041	Quad 2 Inputs (74L00N)
65	U8	E-00620-0042	RAM (C MOS, P5101L-3)
68	BT1, BT2, BT3	E-00628-0003	Battery
70	S33	E-00658-0001	Push Button Switch
71	S1-S8, S9-S16, S17-S24, S25-S32	E-00677	DIP Switch
73		E-00712	24 Pin Socket
74		E-00712-0001	40 Pin Socket
75		E-00712-0003	22 Pin Socket
77	J2	E-00715	15 Pin Wafer Connector
78	J1	E-00715-0004	28 Pin Wafer Connector
79	J3, J5	E-00715-0017	16 Pin Wafer Connector
80	J4	E-00715-0018	19 Pin Wafer Connector
81	J5	E-00715-0024	17 Pin Wafer Connector

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

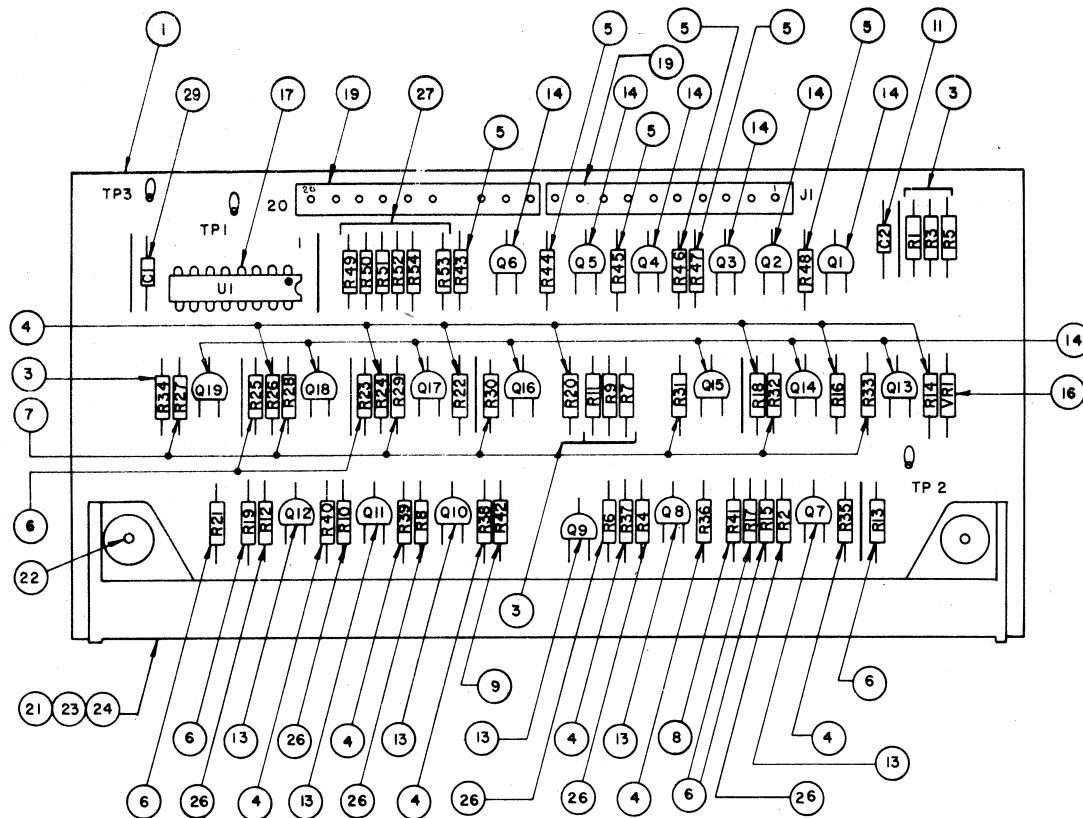
AS-2518-23 LAMP DRIVER MODULE



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 Ω , 5%, 1/4 W
3	R1-R60, R70	E-00105-0237	Resistor, 2k Ω , 5%, 1/4 W
4	R61-R69	E-00105-0256	Resistor, 2.2M Ω , 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

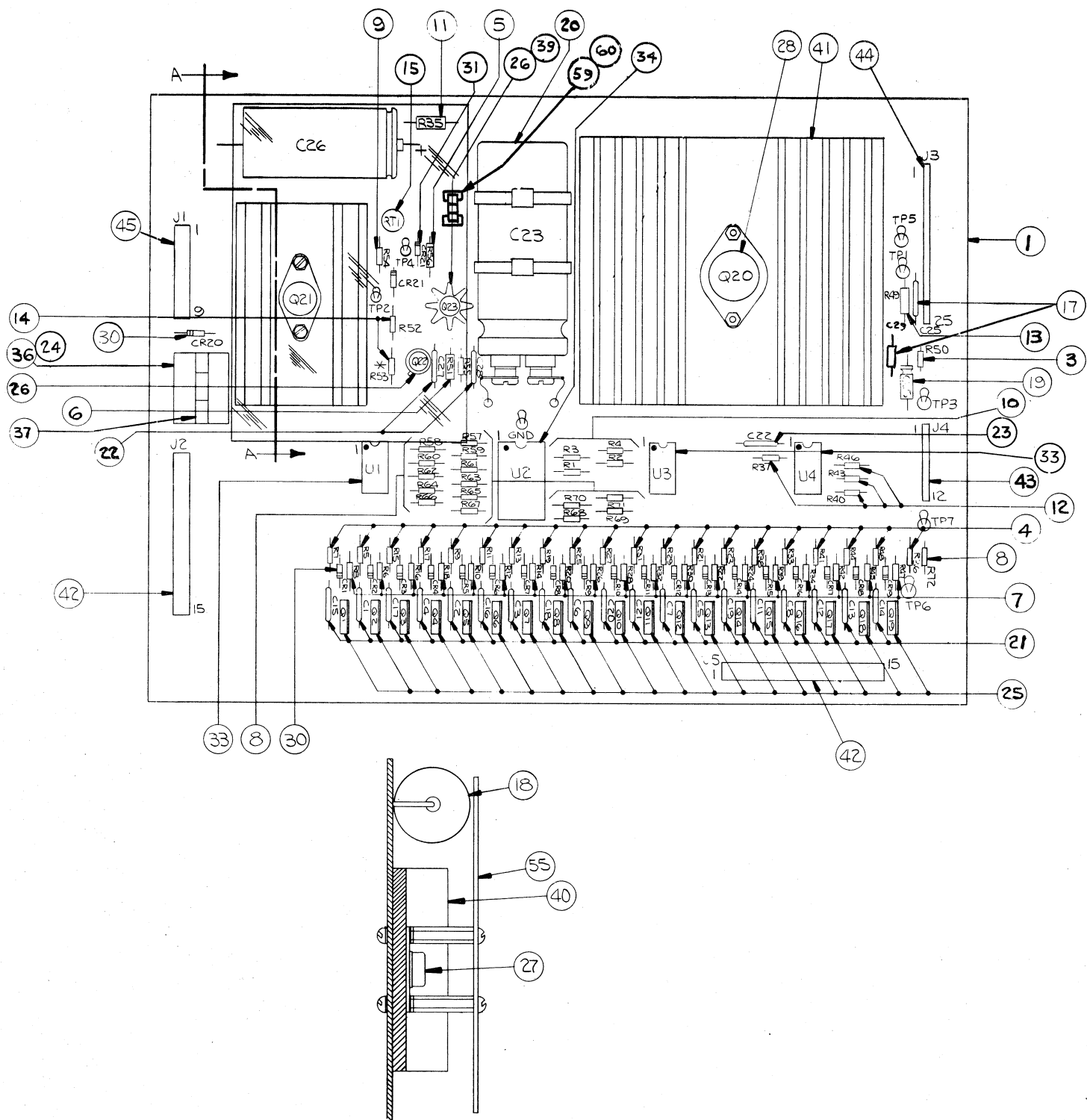


A1: 6 DIGIT DISPLAY DRIVER MODULE COMPONENT PARTS LIST

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 Ω
4	13	R14, R16, R18, R20, R22, R24, R26, R35, R36, R37, R38, R39, R40	E-105-227	Resistor, 300K Ω
5	6	R43, R44, R45, R46, R47, R48	E-105-228	Resistor, 9.1K Ω
6	7	R13, R15, R17, R19, R21, R23, R25	E-105-229	Resistor, 1.5K Ω
7	7	R27, R28, R29, R30, R31, R32, R33	E-105-222	Resistor, 1.2K Ω
8	1	R41	E-105-231	Resistor, 39K Ω
9	1	R42	E-105-271	Resistor, 240K Ω
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 Ω
27	6	R49, R50, R51, R52, R53, R54	E-105-242	Resistor, 20K Ω
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

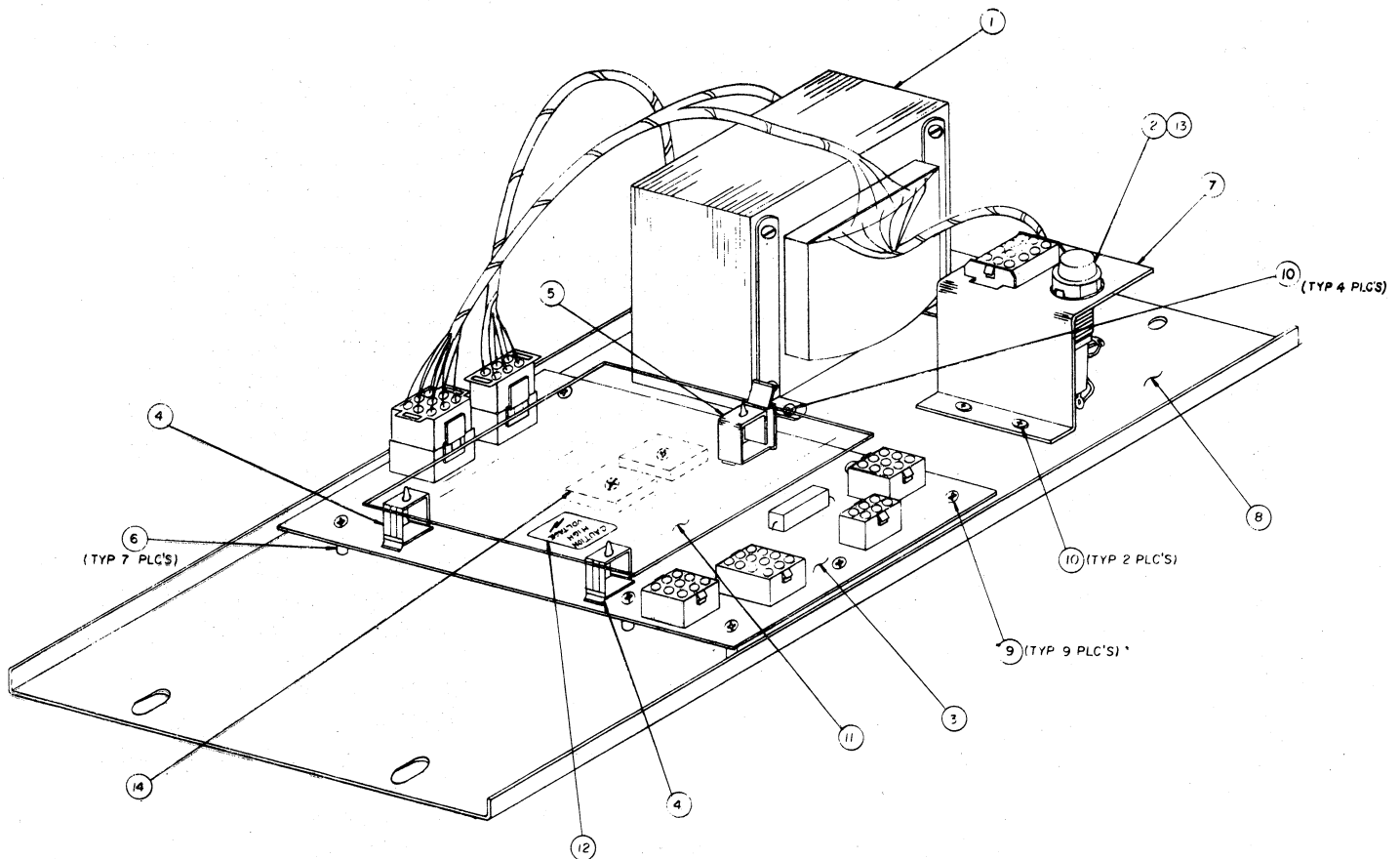
A3: SOLENOID DRIVER/VOLTAGE REGULATOR MODULE

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 (1N4004)
31	VR1	E-00598-0010	Diode, Zener 140V, 1N5275A
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

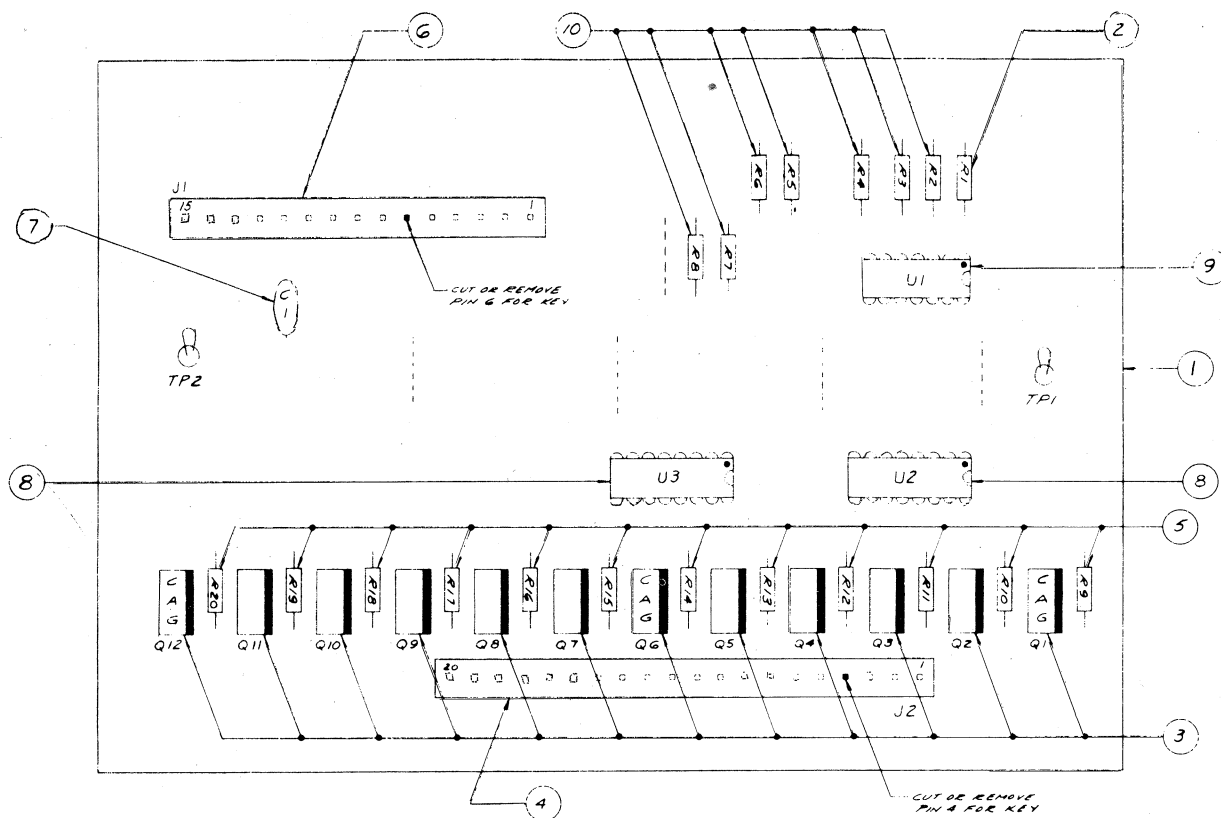
A2: POWER TRANSFORMER MODULE



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

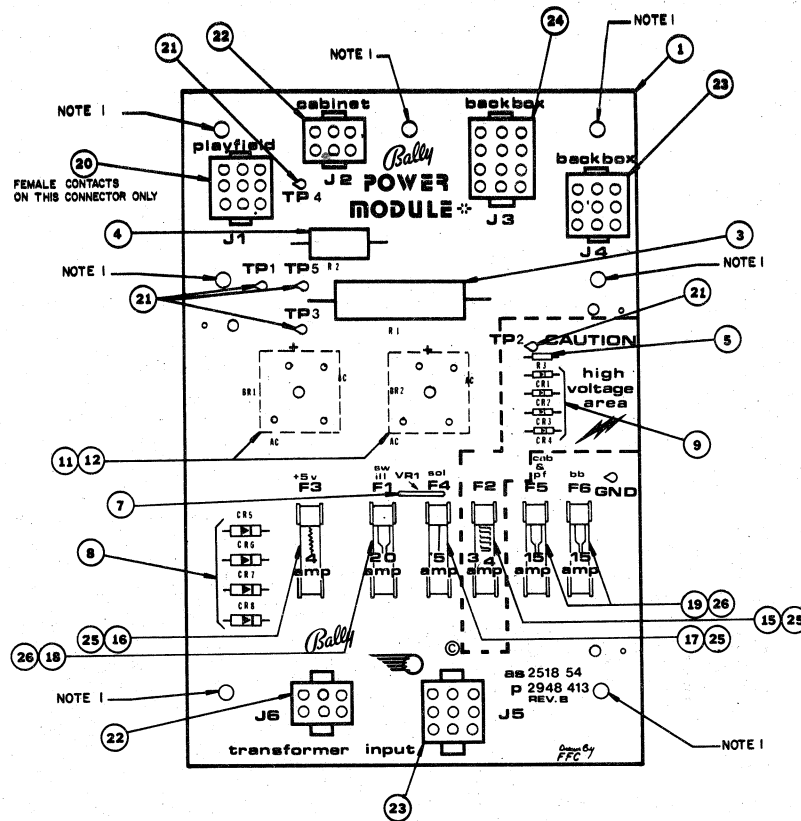
AS-2518-43 AUXILIARY LAMP DRIVER



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. Ω
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 Ω
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 Ω

AS-2518-54 RECTIFIER BOARD ASSEMBLY



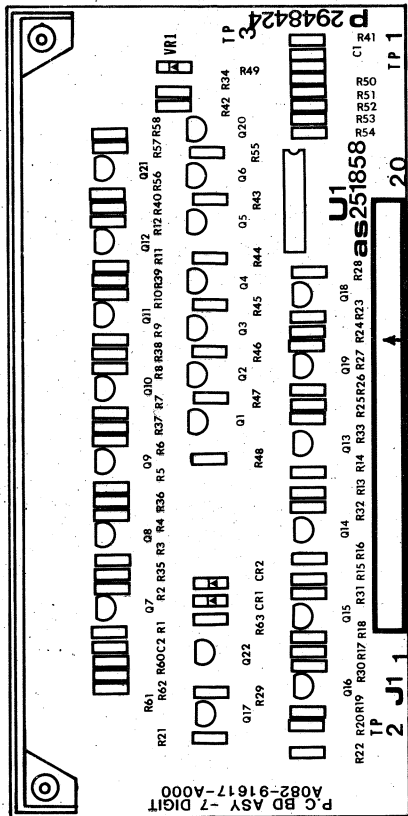
(Part of) A2: POWER TRANSFORMER MODULE COMPONENT PARTS LIST

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, ¾A, 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

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 5%	Q1-Q6	MPS-A42
R2	2.2K OHM 1/4W 5%	Q7-Q12	2N5401
R3	100K OHM 1/4W 5%	Q13-Q20	MPS-A42
R4	2.2K OHM 1/4W 5%	Q21	2N5401
R5	100K OHM 1/4W 5%	Q22	MPS-A42
R6	2.2K OHM 1/4W 5%	U1	MC14543
R7	100K OHM 1/4W 5%	DS1	DISPLAY ASS'Y
R8	2.2K OHM 1/4W 5%	J1	10 PIN WAFER KK-156 (2)
R9	100K OHM 1/4W 5%	TP1-TP3	TEST LOOPS
R10	2.2K OHM 1/4W 5%		7 DIGIT DISPLAY PCB
R11	100K OHM 1/4W 5%		BUMPER
R12	2.2K OHM 1/4W 5%		
R13	1.5K OHM 1/4W 5%		
R14	300K OHM 1/4W 5%		
R15	1.5K OHM 1/4W 5%		
R16	300K OHM 1/4W 5%		
R17	1.5K OHM 1/4W 5%		
R18	300K OHM 1/4W 5%		
R19	1.5K OHM 1/4W 5%		
R20	300K OHM 1/4W 5%		
R21	1.5K OHM 1/4W 5%		
R22	300K OHM 1/4W 5%		
R23	1.5K OHM 1/4W 5%		
R24	300K OHM 1/4W 5%		
R25	1.5K OHM 1/4W 5%		
R26	300K OHM 1/4W 5%		
R27-R33	1.2K OHM 1/4W 5%		
R34	100K OHM 1/4W 5%		
R35-R40	300K OHM 1/4W 5%		
R41	39K OHM 1/4W 5%		
R42	240K OHM 1/4W 5%		
R43-R48	9.1K OHM 1/4W 5%		
R49-R54	20K OHM 1/4W 5%		
R55	9.1K OHM 1/4W 5%		
R56	100K OHM 1/4W 5%		
R57	2.2K OHM 1/4W 5%		
R58	300K OHM 1/4W 5%		
R59	NOT USED		
R60,R61	1.5K OHM 1/4W 5%		
R62	300K OHM 1/4W 5%		
R63	150K OHM 1/4W 5%		



CROSS REFERENCE LIST

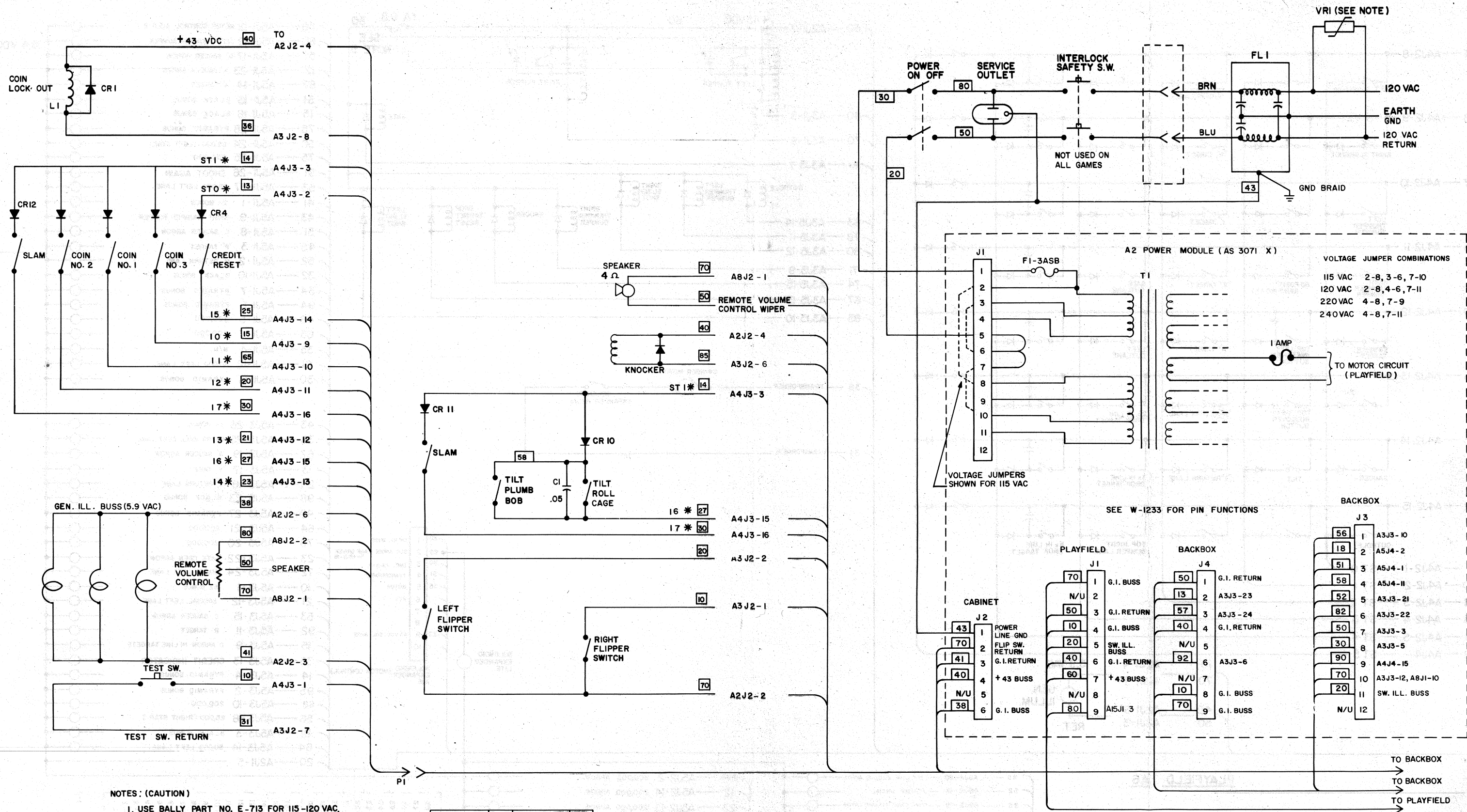
DESCRIPTION	QTY	DESIGNATION NO.	BALLY'S PART NOS.	MIDWAY'S PART NOS.
.01 MF 25V	1	C1	E-586-85	0360-00800-0005
.01 MF 500V	1	C2	E-586-65	0360-00800-0013
1.2K 1/4W 5%	7	R27-R33	E-105-222	100E-00005-0063
1.5K 1/4W 5%	9	R13,R15,R17,R19 R21,R23,R25,R60 R61	E-105-229	100E-00005-0065
2.2K 1/4W 5%	7	R2,R4,R6,R8,R10 R12,R57	E-105-287	100E-00005-0069
9.1K 1/4W 5%	7	R43-R48,R55	E-105-228	100E-00005-0087
20K 1/4W 5%	6	R49-R54	E-105-242	100E-00005-0095
39K 1/4W 5%	1	R41	E-105-231	100E-00005-0102
100K 1/4W 5%	8	R1,R3,R5,R7,R9, R11,R34,R56	E-105-331	100E-00001-0011
150K 1/4W 5%	1	R63	E-105-248	100E-00001-0120
240K 1/4W 5%	1	R42	E-105-271	100E-00001-0125
300K 1/4W 5%	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
DISPLAY MTG. TOP	1		P-2399	0017-00042-0155
DISPLAY MTG. BOTTOM PRESSURE SENSITIVE TAPE	1		P-2399-1	0017-00042-0156
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

REVISIONS

PROJECT ENG: D. MACDONALD		USED ON		Bally / MIDWAY MFG.CO.	
DO NOT SCALE DWG		HEAT TREAT	SCALE	FRANKLIN PK. ILL	
			FULL		
DIM. TOLERANCES UNLESS SPECIFIED		DRK. <i>TPB</i>	MAT'L	PART NO.	
CONCENTRICITY TYP. .001		CKD.	FINISH	M051 - 00114 - A056	
FUNCTIONAL		DATE			
HOLE DIA. .4 .001 .000		12 09 / 83	SEVEN DIGIT DISPLAY ASSY DWG. A082-91617-A000		

DESCRIPTION LIST

DESIGNATION NO.	DESCRIPTION	DESIGNATION NO.	DESCRIPTION
C1	6.8 UF @ 25V,	D1-D3	1N4606
	TANT	D4,D5	1N4004
C2,C3	.01 UF	D6	VR332,6P30
C4	47 UF @ 16V	D7,D8	1N4004
C5,C6	27 PF,5%	D9	1N9588
C7-C9	.01 UF		
C10	4.7 UF @ 25V,	Q1	2N5305
	TANT	Q2	2N4403
C11	3000 PF	Q3	2N3904 NPN
C12,C13	0.1 UF	Q4	2N4403 PNP
C14	47 PF	Q5	2N3904 NPN
C15	150 PF	Q6	2N4403 PNP
C16	220 PF	Q7	2N5305 NPN
C17	4.7 UF @ 25V,		
	TANT	U1	MC 6803
C18,C19	.01 UF	U2	LS373
C20,C21	0.1 UF	U3,U4	EPROM
C22	4.7 UF @ 25V,	U5	LS10
	TANT	U6	ZN429E-8
C23	.01 UF	U7	LM 3900
C24	4700 UF @ 25V	U8	TDA 2002
C25	100 PF	U9	MC 7805
C26	300 PF		
C27	0.1 UF	L1,L2,L3	10 UH CHOKE
C28	.01 UF		
C29	470 UF @ 6V	XU1	40 PIN SOCKET
C30	1000 UF @ 16V	XU3,XU4	28 PIN SOCKET
C31	.33 UF		
C32	0.1 UF	J1	.045 PIN
C33	.05 UF	J2	.045 PIN
C34-C38	820 PF		
C39,C40	4.7 UF @ 25V	TP1-TP5	TEST POINT
	TANT		
C41,C42	.22 UF	LED 1	MV5254
R1	560 OHM	HEATSINK P/O U8	6030B-TT
R2	47K OHM	HEATSINK P/O U9	6100B
R3	910 OHM	SCREW P/O U8,U9	SCREW 6-32
R4	5.6K OHM	NUT P/O U8,U9	NUT 6-32
R5	62K OHM		
R6	10K OHM	P/O U8,U9	INSULATOR
R7	82K OHM		
R8	10K OHM	SW1	SWITCH P.C.B.
R9	47K OHM		
R10	100 OHM	X1	3.579 MHZ
R11	82 OHM		
R12	9.1K OHM		
R13	7.5K OHM		
R14	39K OHM		
R15,R16	2.7K OHM		
R17	1K OHM		
R18,R19	3.3K OHM		
R20	10K OHM		
R21	15K OHM		
R22	2.7K OHM		
R23	68 OHM		
R24	180 OHM		
R25,R26	100K OHM		
R27	47K 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-R46	470 OHM		
VR 1	PHAN. PGT O-1K 1/2W		



NOTES: (CAUTION)

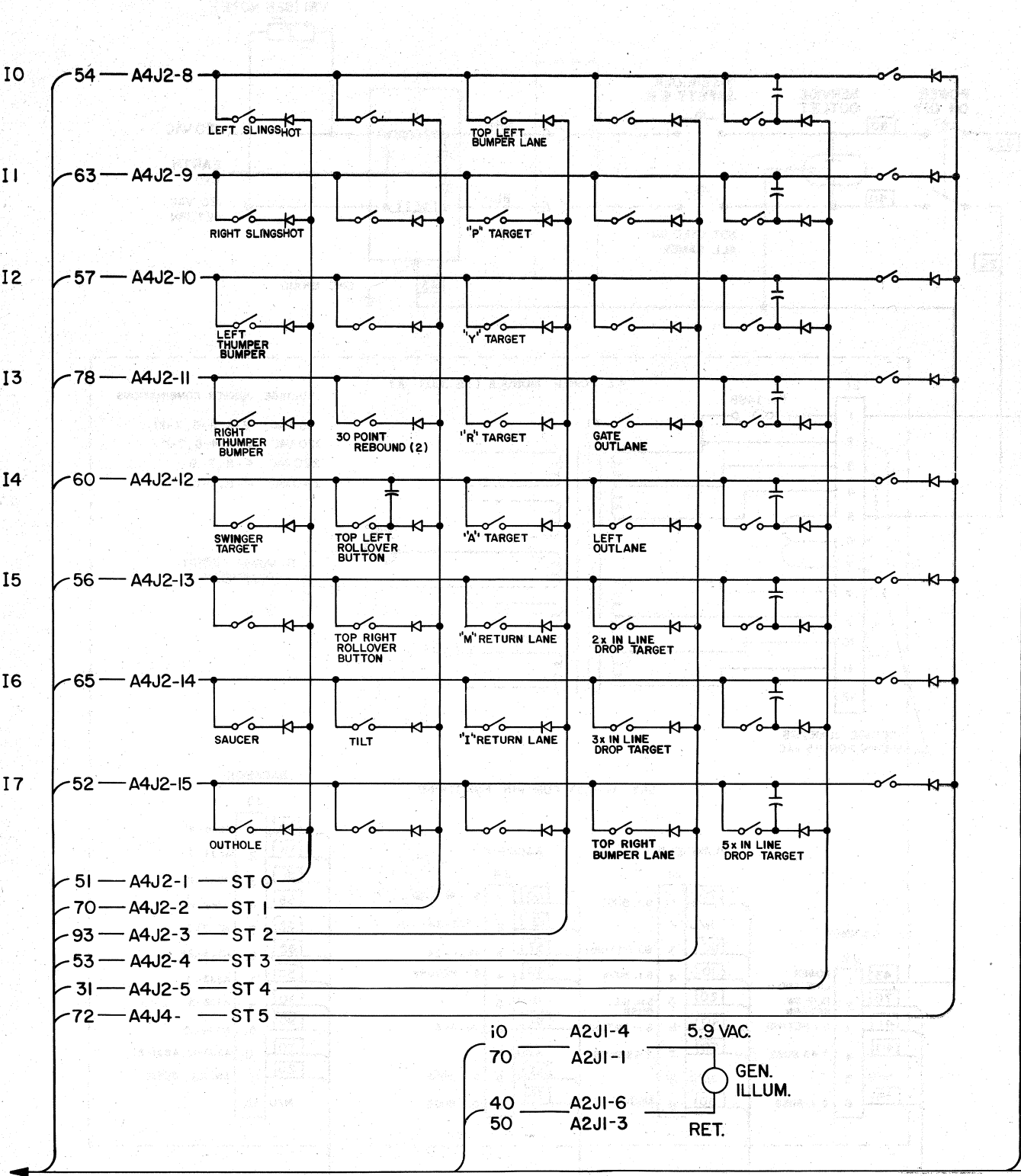
1. USE BALLY PART NO. E-713 FOR 115-120 VAC.
2. USE BALLY PART NO. E-713-1 FOR 220-240 VAC
3. * INDICATES AID TEST POINT.

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	A8J2-1	12
DOOR PLUG		A8J2-2	13

A7 CABINET ASS'Y. WIRING

NOTE: DIODES ARE IN4004, (E-587-6)

PROJECT ENG:		USED ON		REVISIONS	
DO NOT SCALE DWG		NO. REQ'D		Bally / MIDWAY MFG. CO.	
DIM TOLERANCES UNLESS SPECIFIED		SCALE		FRANKLIN PK. ILL.	
M. KONOPIA		BLACK PYRAMID		PART NO.	
CONCENTRICITY F.R. 0.01		CABINET WIRING SCHEMATIC		M051 - OOA44 - A014	
HOLE DIA. ±.002		DATE 5/16/84			

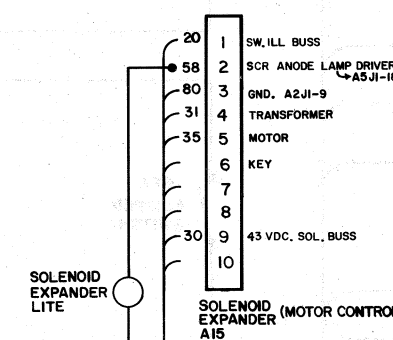
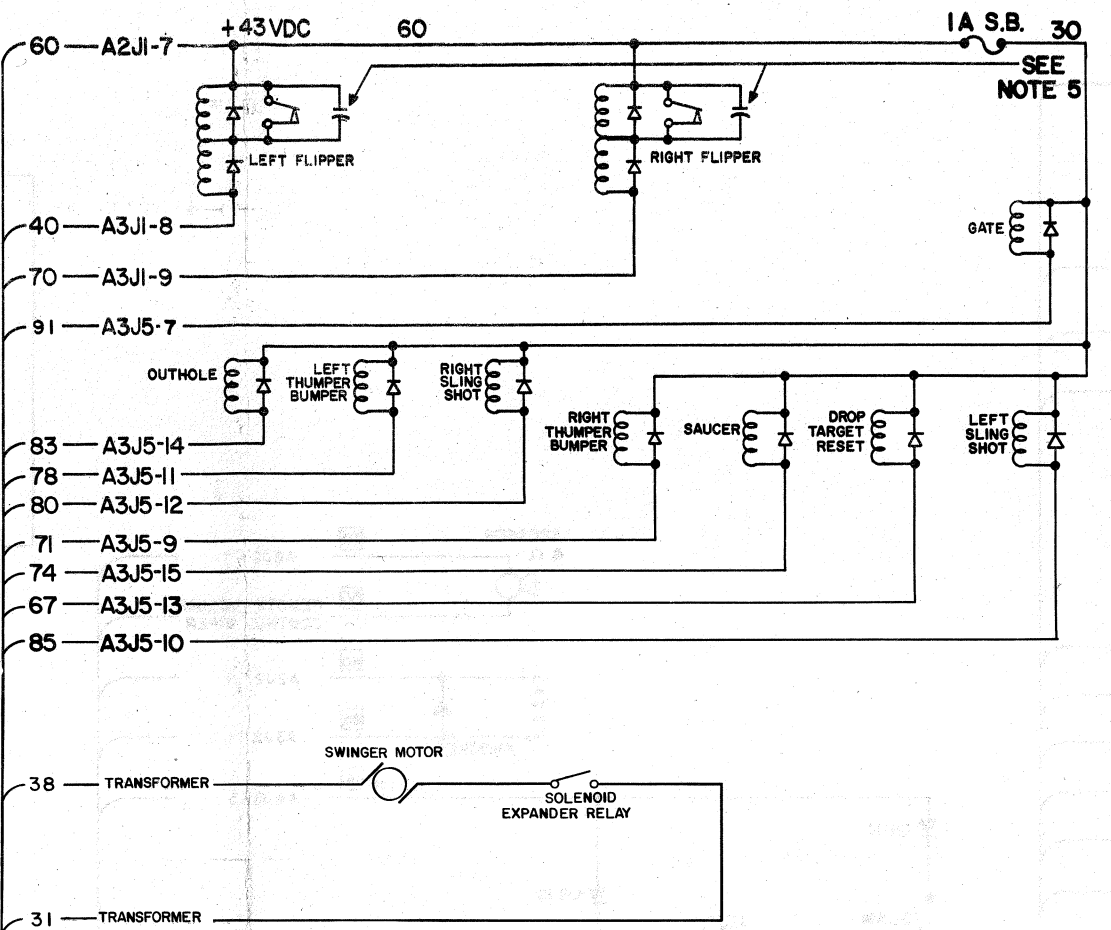


NOTES

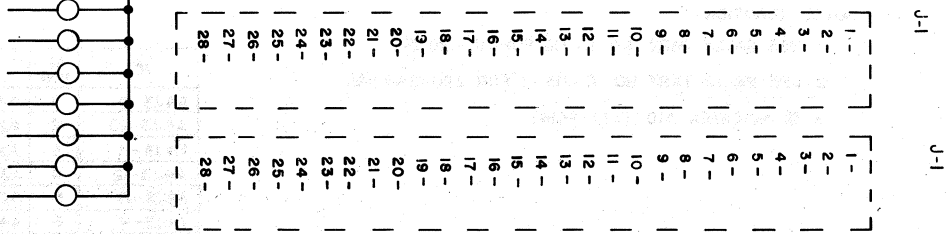
- 1. INDICATES NOT USED
- 2. N/U = NOT USED ON PLAYFIELD
- 3. * INDICATES AID TEST POINT
- 4. COIL DIODES ARE IN4004 (E-587-6) SWITCH DIODES ARE IN4148 (E-587-14) ALL CAPACITORS ARE .05 MFD. (E-586-80)
- 5. GERMANY ONLY - CAPACITOR .01 MFD. @ 500 V. (E-586-65)

PLAYFIELD A6

- 95 — A9J2-20 — LEFT LANE 200,000 ARROW
- 82 — A9J2-19 — PYRAMID SPECIAL
- 25 — A9J2-18 — RIGHT LANE "PYRAMID" ARROW
- 96 — A9J2-17 — LEFT LANE "BLACK" ARROW
- 27 — A9J2-12 — SWINGER BACK TARGET
- 15 — A9J2-11 — 50,000 IN LINE TARGETS
- 34 — A9J2-7 — SWINGER SPECIAL ARROW
- 45 — A9J2-6 — 80,000 BONUS
- 68 — A9J2-5 — N/U
- 62 — A9J2-3 — SWINGER SPOTS "BLACK" ARROW
- 40 — A9J2-2 — 120,000 BONUS
- 43 — A9J2-1 — RIGHT LANE "BLACK" ARROW



- 58 — A5J1-18 MOTOR CONTROL A15J1 2
- 60 — A5J1-19 LEFT THUMPER BUMPER
- 57 — A5J1-17 "B" SAUCER ARROW
- 12 — A5J1-23 "K" SAUCER ARROW
- 67 — A5J1-14 "A" TARGET
- 31 — A5J1-15 BLACK BONUS
- 15 — A5J1-16 BLACK BONUS
- 78 — A5J1-28 PYRAMID BONUS
- 50 — A5J1-24 25,000 (LEFT STAR)
- 75 — A5J1-25 200,000
- 91 — A5J1-26 SHOOT AGAIN
- 53 — A5J1-27 20,000 LEFT LANE
- 41 — A5J1-1 2x BONUS
- 43 — A5J1-9 RIGHT THUMPER BUMPER
- 51 — A5J1-8 "L" SAUCER ARROW
- 45 — A5J1-3 "P" TARGET
- 52 — A5J1-2 "M" RETURN LANE
- 32 — A5J1-10 BLACK BONUS
- 34 — A5J1-7 PYRAMID BONUS
- 94 — A5J1-6 PYRAMID BONUS
- 48 — A5J1-5 200,000
- 65 — A5J1-11 200,000
- 35 — A5J1-4 N/U
- 61 — A5J1-12 30,000 LEFT LANE
- 30 — A5J1-13 PYRAMID BONUS
- 43 — A5J3-26 3x BONUS
- 36 — A5J3-25 EXTRA BALL LEFT LANE
- 67 — A5J3-19 "A" SAUCER ARROW
- 13 — A5J3-17 "Y" TARE
- 25 — A5J3-16 "I" RETURN LANE
- 98 — A5J3-23 BLACK BONUS
- 40 — A5J3-27 PYRAMID BONUS
- 64 — A5J3-21 200,000
- 78 — A5J3-20 200,000
- 23 — A5J3-22 GATE OPEN ARROW
- 72 — A5J3-24 40,000 LEFT LANE
- 10 — A5J3-1 5x BONUS
- 21 — A5J3-12 SPECIAL LEFT LANE
- 53 — A5J3-15 C SAUCER ARROW
- 92 — A5J3-11 R TARGET
- 15 — A5J3-9 D ARROW IN LINE TARGETS
- 35 — A5J3-13 CREDIT INDICATOR
- 14 — A5J3-4 PYRAMID BONUS
- 95 — A5J3-2 PYRAMID BONUS
- 68 — A5J3-10 200,000
- 56 — A5J3-18 25,000 (RIGHT STAR)
- 81 — A5J3-3 BLACK BONUS
- 84 — A5J3-14 50,000 LEFT LANE
- 20 — A2J1-5



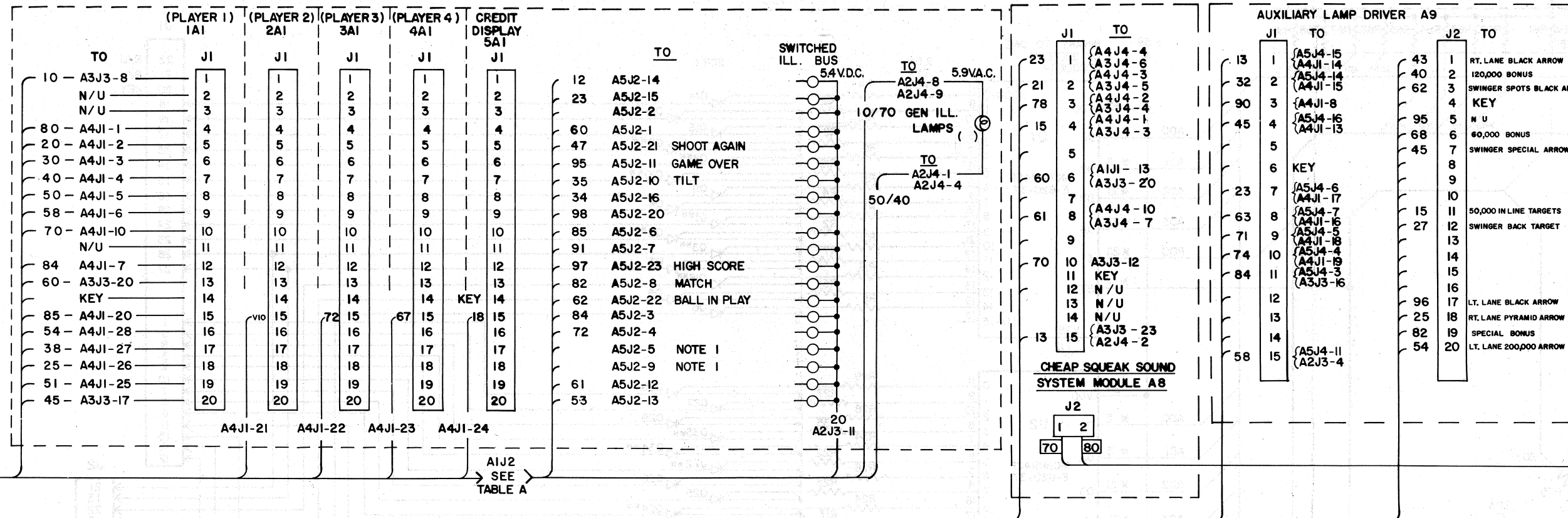
PROJECT ENG:		USED ON		Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL.
DO NOT SCALE DWG.		NO. REQ'D PER		
DIM. TOLERANCES UNLESS SPECIFIED		DATE		PART NO. M051-00A44 - A013
CONCENTRICITY FRACTIONAL DECIMAL HOLE DIA		DATE 5/16/84		

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	82
	18	
	19	
	20	
	21	
	22	
A2J4-4	23	40
A2J4-9	24	70

INSERT TO BACK CAB.
PLUG

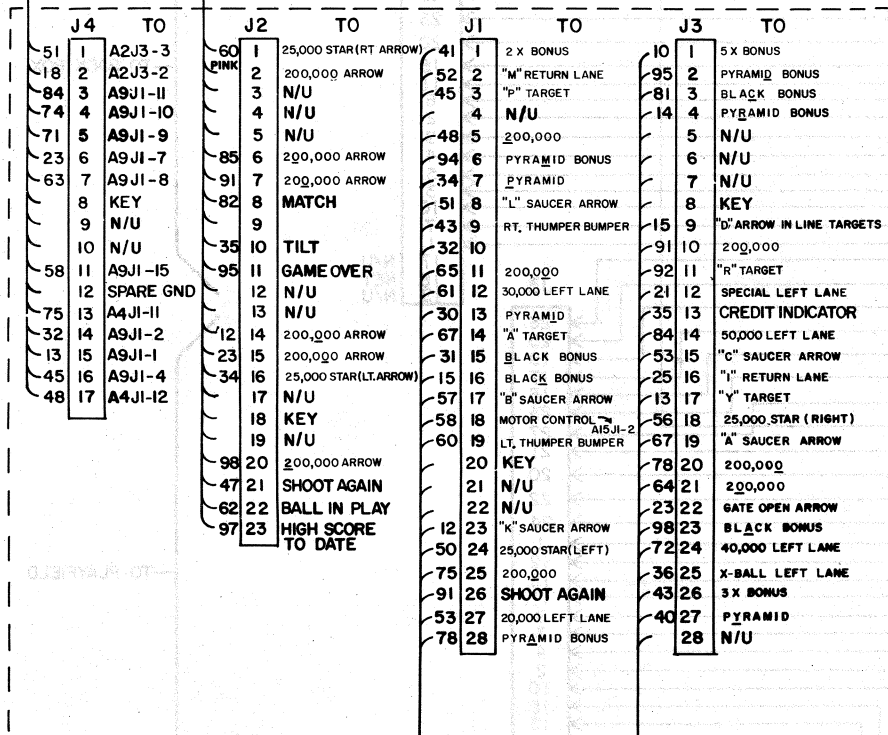
AI INSERT



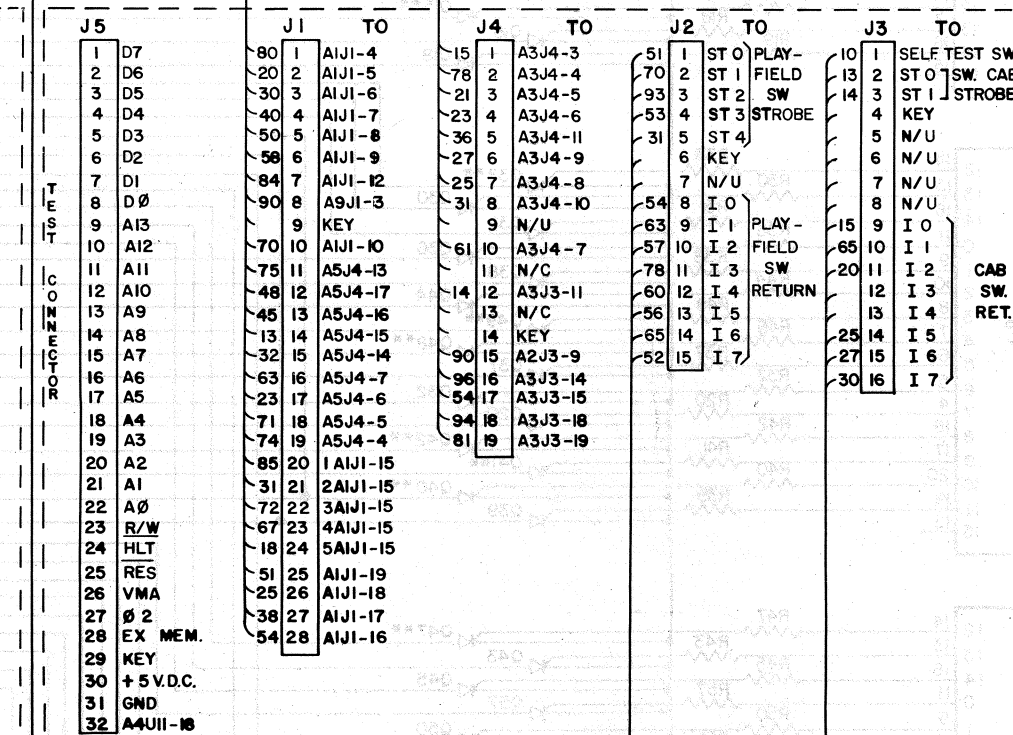
FROM	PIN	WIRE
A5J2-14	1	12
A5J2-2	2	PINK
A5J2-15	3	23
A5J2-16	4	34
A5J2-1	5	60
A5J2-6	6	85
A5J2-7	7	91
A5J2-20	8	98
	9	

PANEL TO BACKBOX

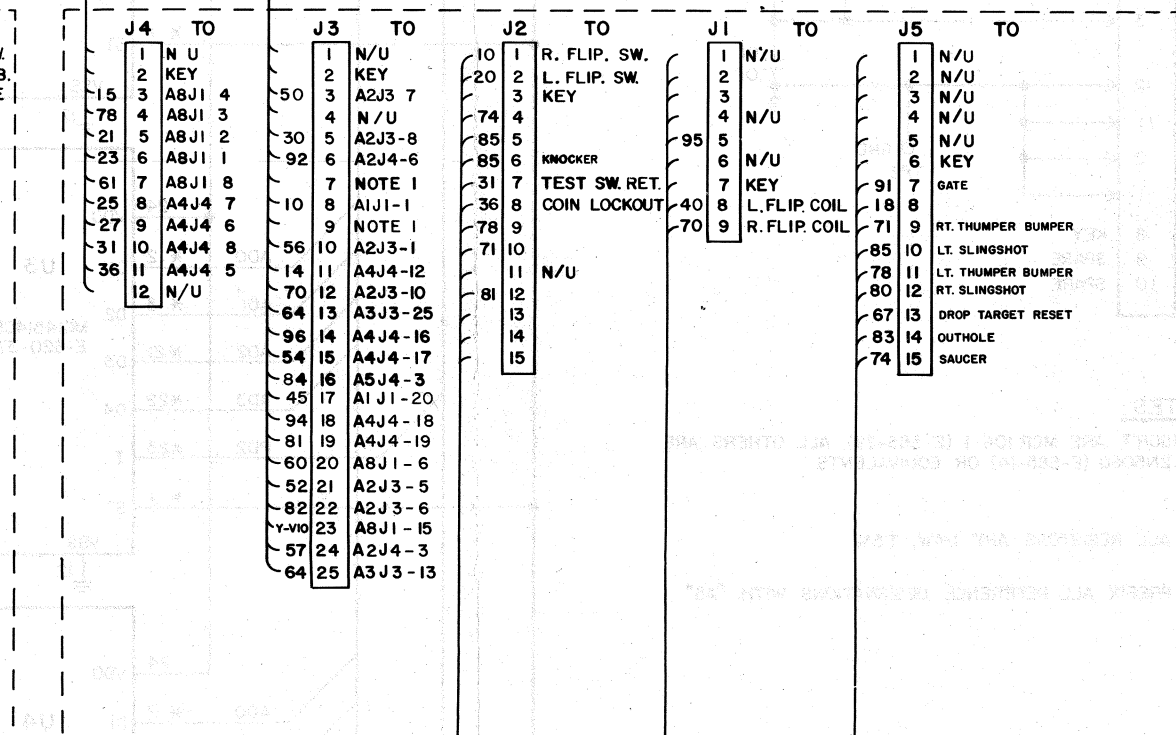
LAMP DRIVER A5



MPU A4



VOLTAGE REGULATOR / SOLENOID DRIVER A3

TO LOWER CABINET
TO PLAYFIELD

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 | 6-BROWN |
| 2-BLUE | 7-ORANGE |
| 3-YELLOW | 8-BLACK |
| 4-GREEN | 9-GRAY |
| 5-WHITE | 0-NOT TRACE |

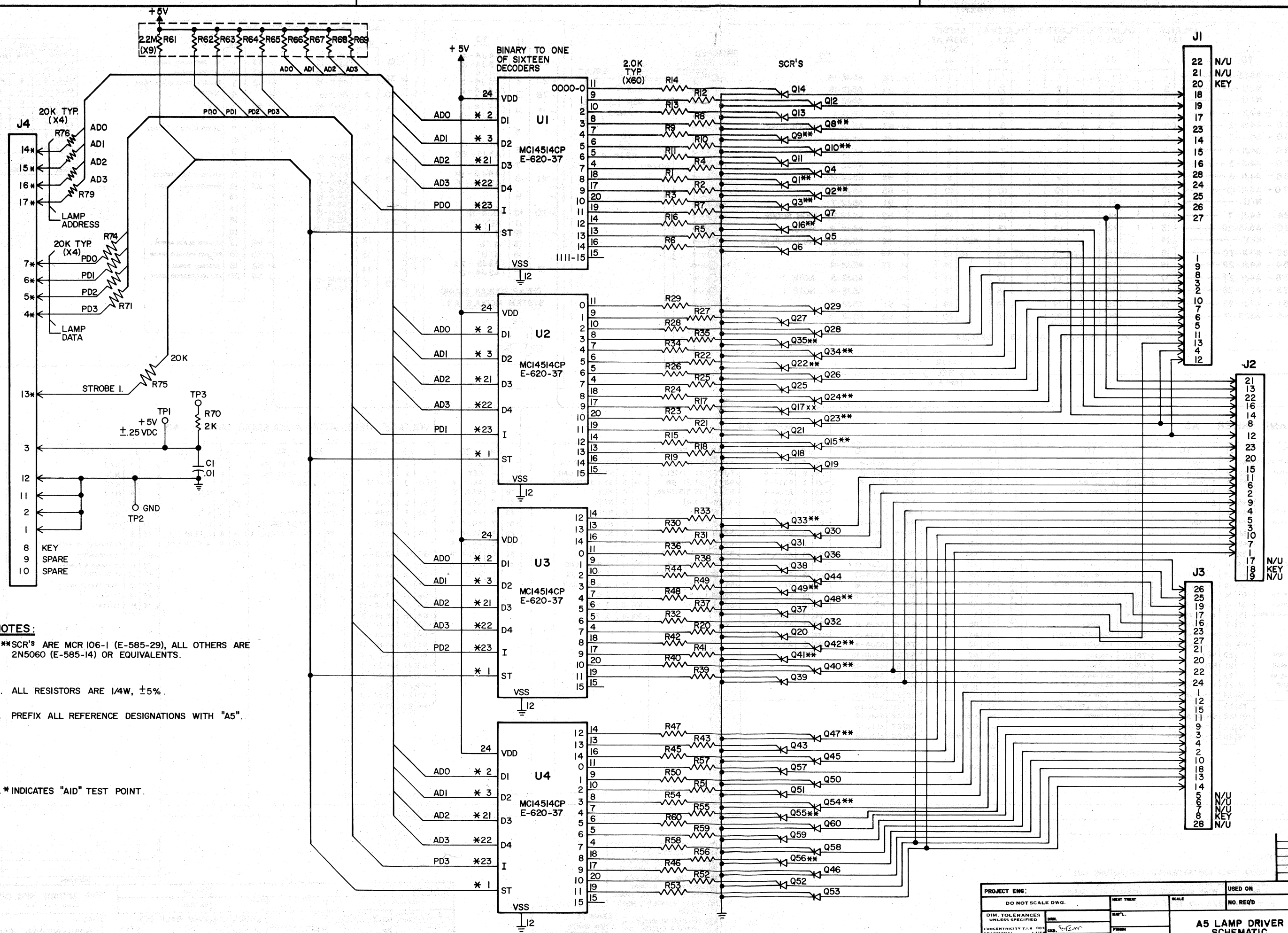
1. FIRST NUMBER = BODY COLOR

2. SECOND NUMBER = TRACER COLOR

EXAMPLE:

50 = WHITE
51 = WHITE RED

PROJECT ENG:		USED ON		REVISIONS	
DO NOT SCALE DWG.		NO. REQ'D		Rally / MIDWAY MFG. CO.	
DIM. TOLERANCES UNLESS SPECIFIED		SCALE		FRANKLIN PK. ILL.	
DRA. M. KONOPA		WIRING DIAGRAM BACK BOX		PART NO.	
DATE 5/16/84		BLACK PYRAMID		M051-000A44 - A015	



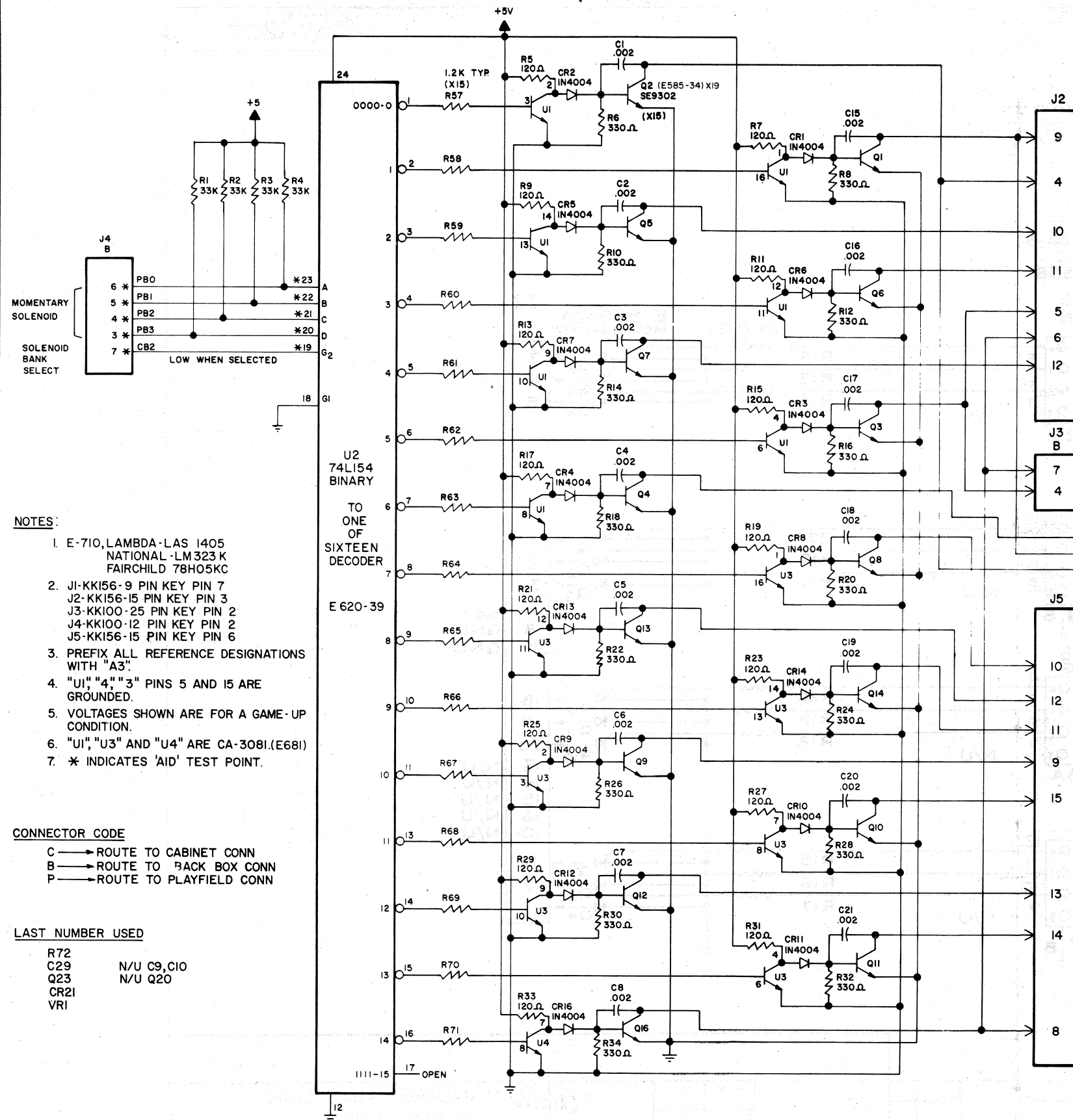
- NOTES:
- 1.**SCR'S ARE MCR 106-1 (E-585-29), ALL OTHERS ARE 2N5060 (E-585-14) OR EQUIVALENTS.
 - 2. ALL RESISTORS ARE 1/4W, $\pm 5\%$.
 - 3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A5".
 - 4.* INDICATES "AID" TEST POINT.

TO PLAYFIELD

TO BACK BOX

TO PLAYFIELD

PROJECT ENG:		DO NOT SCALE DWG.		HEAT TREAT		SCALE		USED ON		NO. REQ'D		REVISIONS	
DIM. TOLERANCES UNLESS SPECIFIED		CONCENTRICITY T.I.R. .003		FRACTIONAL .001		DECIMAL .002		HOLE DIA. .002		DATE		A5 LAMP DRIVER SCHEMATIC	
PART NO. M051-00114 -A049										Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL.			



NOTES:

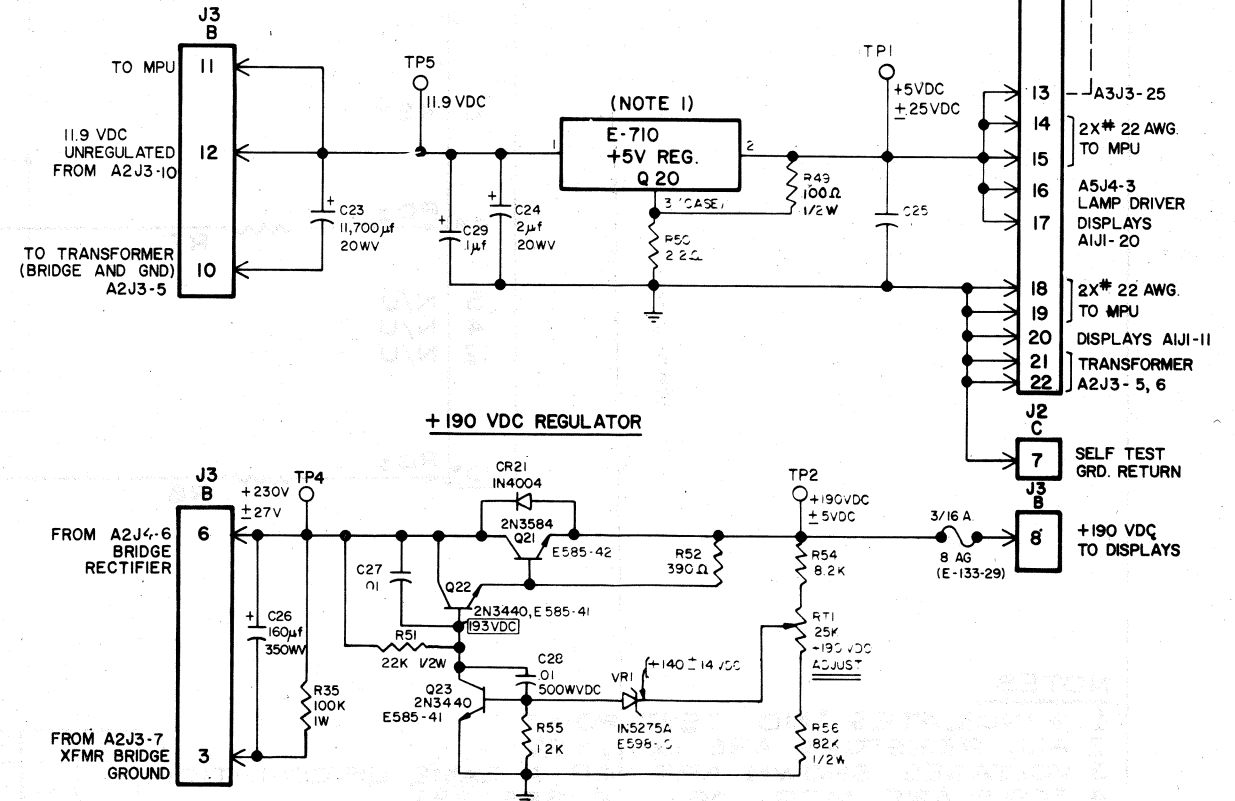
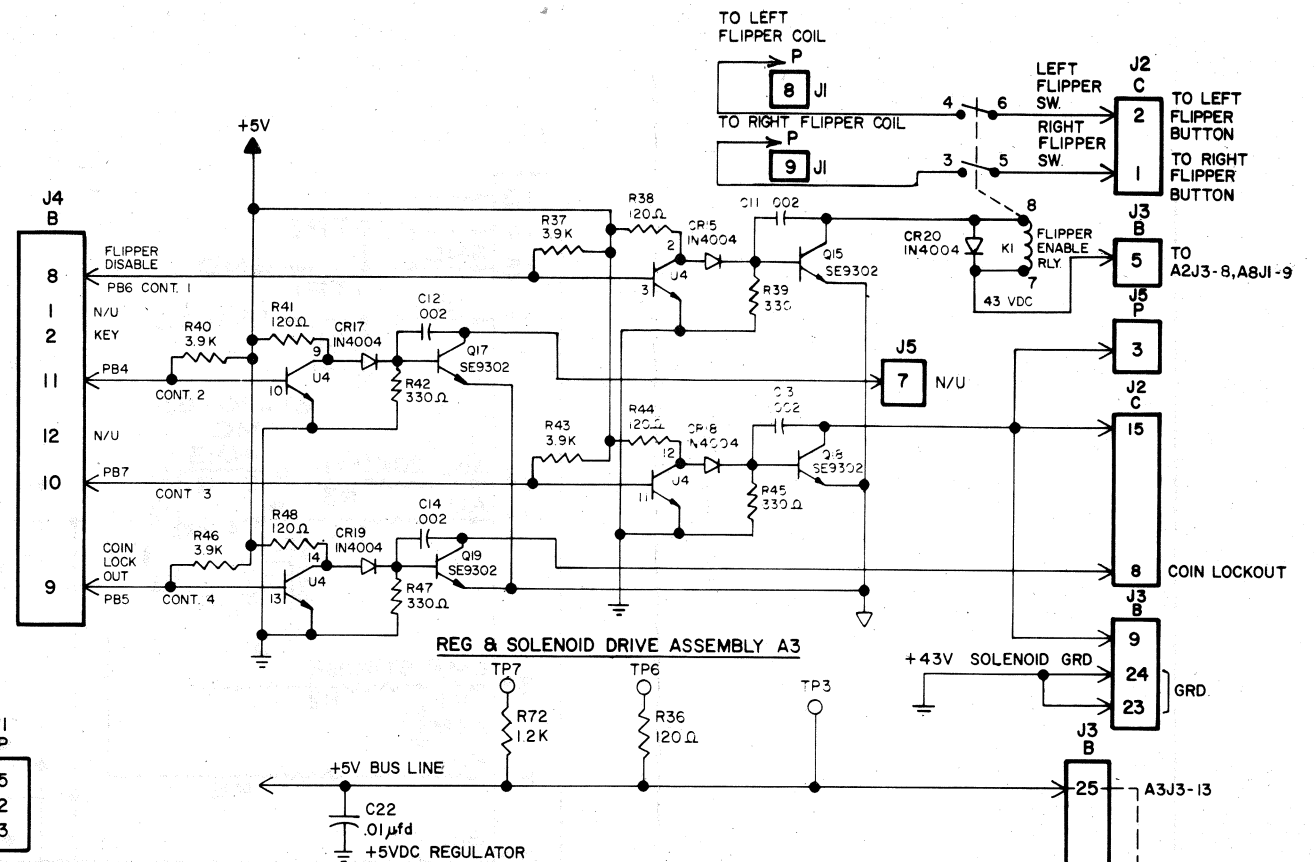
1. E-710, LAMBDA-LAS 1405 NATIONAL-LM323 K FAIRCHILD 78H05KC
2. J1-KK156-9 PIN KEY PIN 7
J2-KK156-15 PIN KEY PIN 3
J3-KK100-25 PIN KEY PIN 2
J4-KK100-12 PIN KEY PIN 2
J5-KK156-15 PIN KEY PIN 6
3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A3"
4. "U1", "U4", "U3" PINS 5 AND 15 ARE GROUNDED.
5. VOLTAGES SHOWN ARE FOR A GAME-UP CONDITION.
6. "U1", "U3" AND "U4" ARE CA-3081.(E681)
7. * INDICATES 'AID' TEST POINT.

CONNECTOR CODE

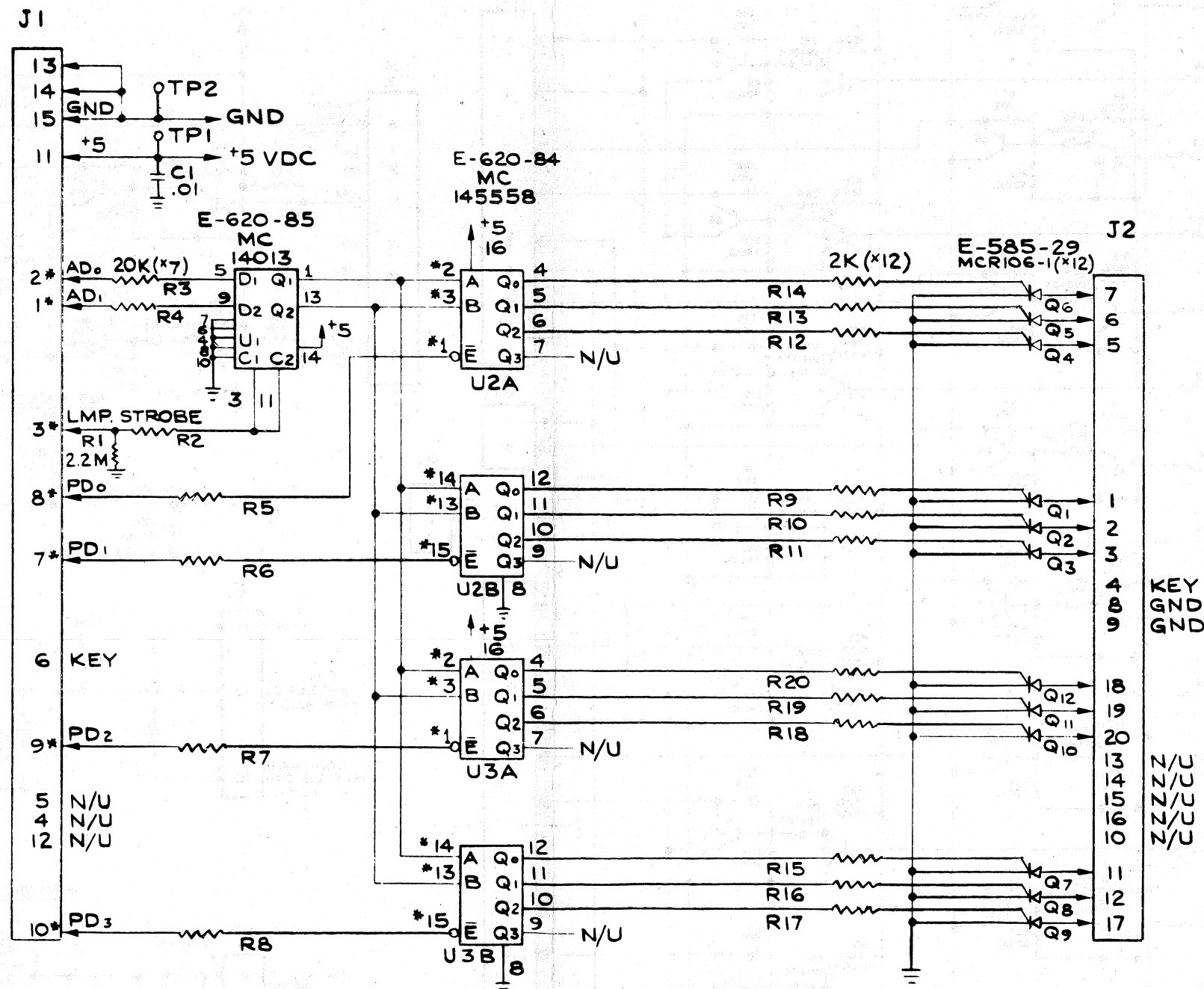
- C → ROUTE TO CABINET CONN
- B → ROUTE TO BACK BOX CONN
- P → ROUTE TO PLAYFIELD CONN

LAST NUMBER USED

- R72 N/U C9, C10
- C29 N/U Q20
- CR21
- VRI



PROJECT ENG:		USED ON		REVISIONS
DO NOT SCALE DWG.		NO. REQ'D		
DIM. TOLERANCES UNLESS SPECIFIED		SCALE		Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL.
CONCENTRICITY F.R. 90°		NO. REQ'D		
FRACTIONAL 1/16		NO. REQ'D		PART NO. M051-00114-A047
DECIMAL .005		NO. REQ'D		
HOLE DIA. .002-.005		NO. REQ'D		



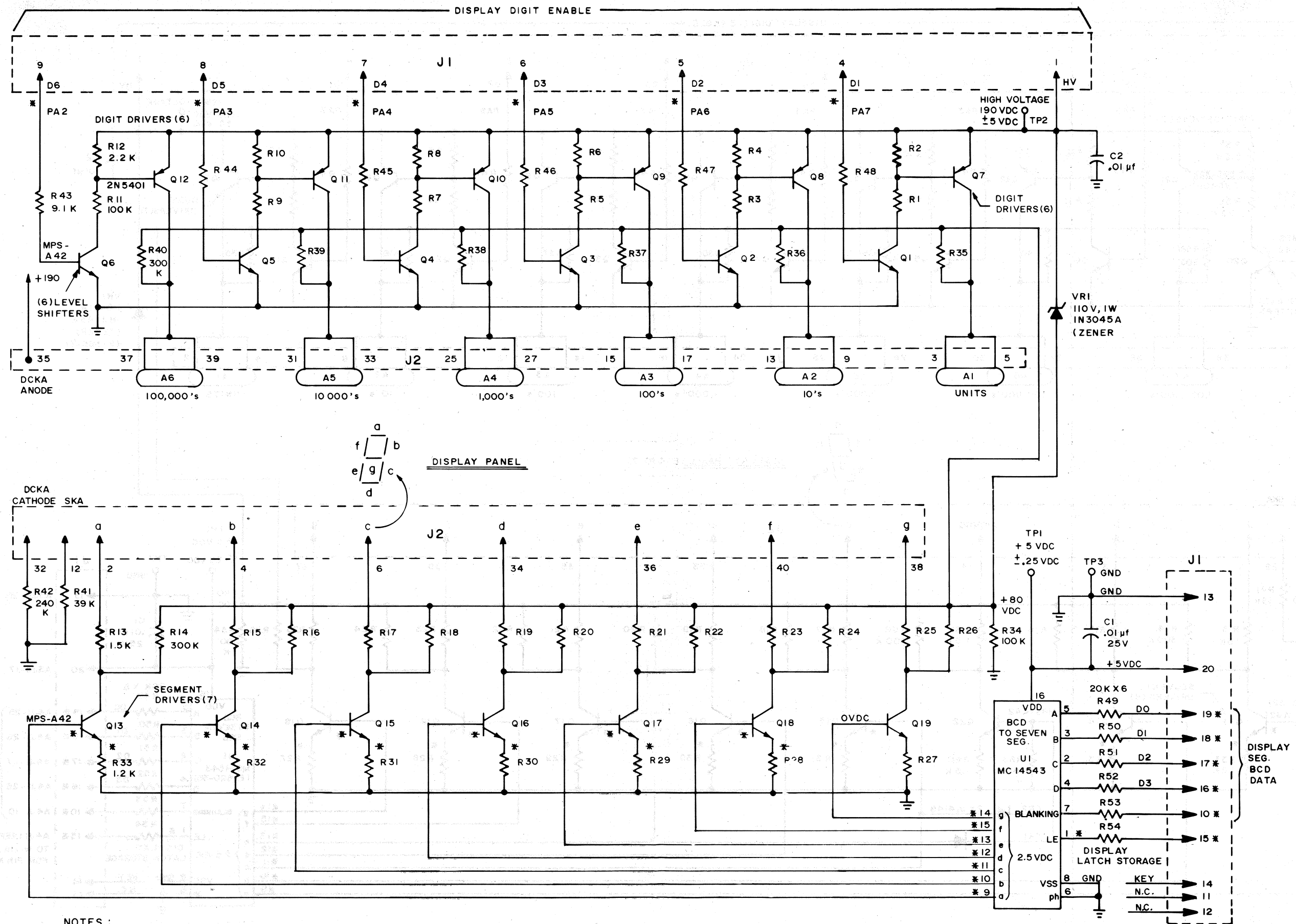
NOTES:

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"

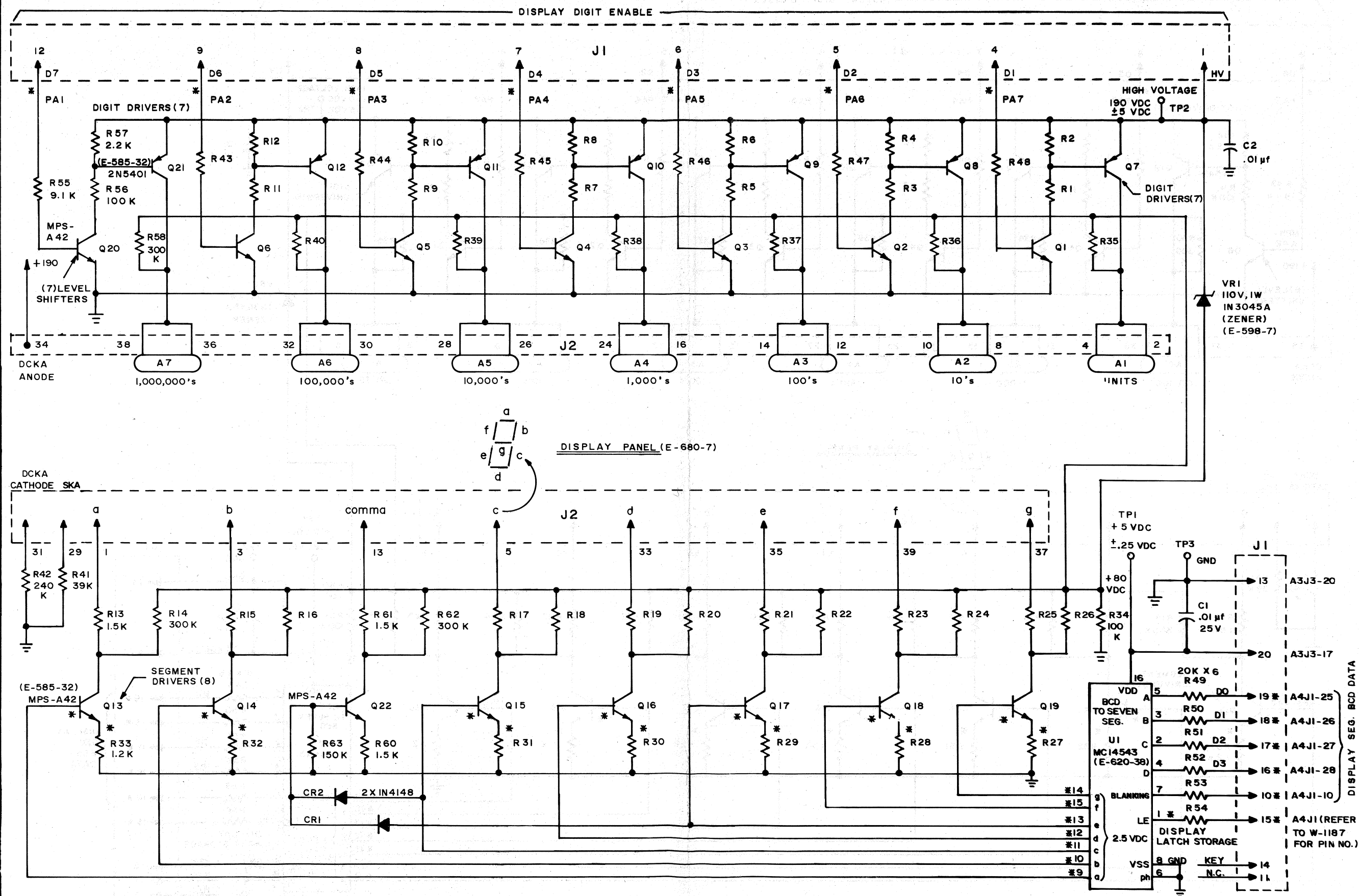
OPER.	DEPT.	DESCRIPTION	TOOL NO.

NO.	LET.	CHANGE	DATE	BY

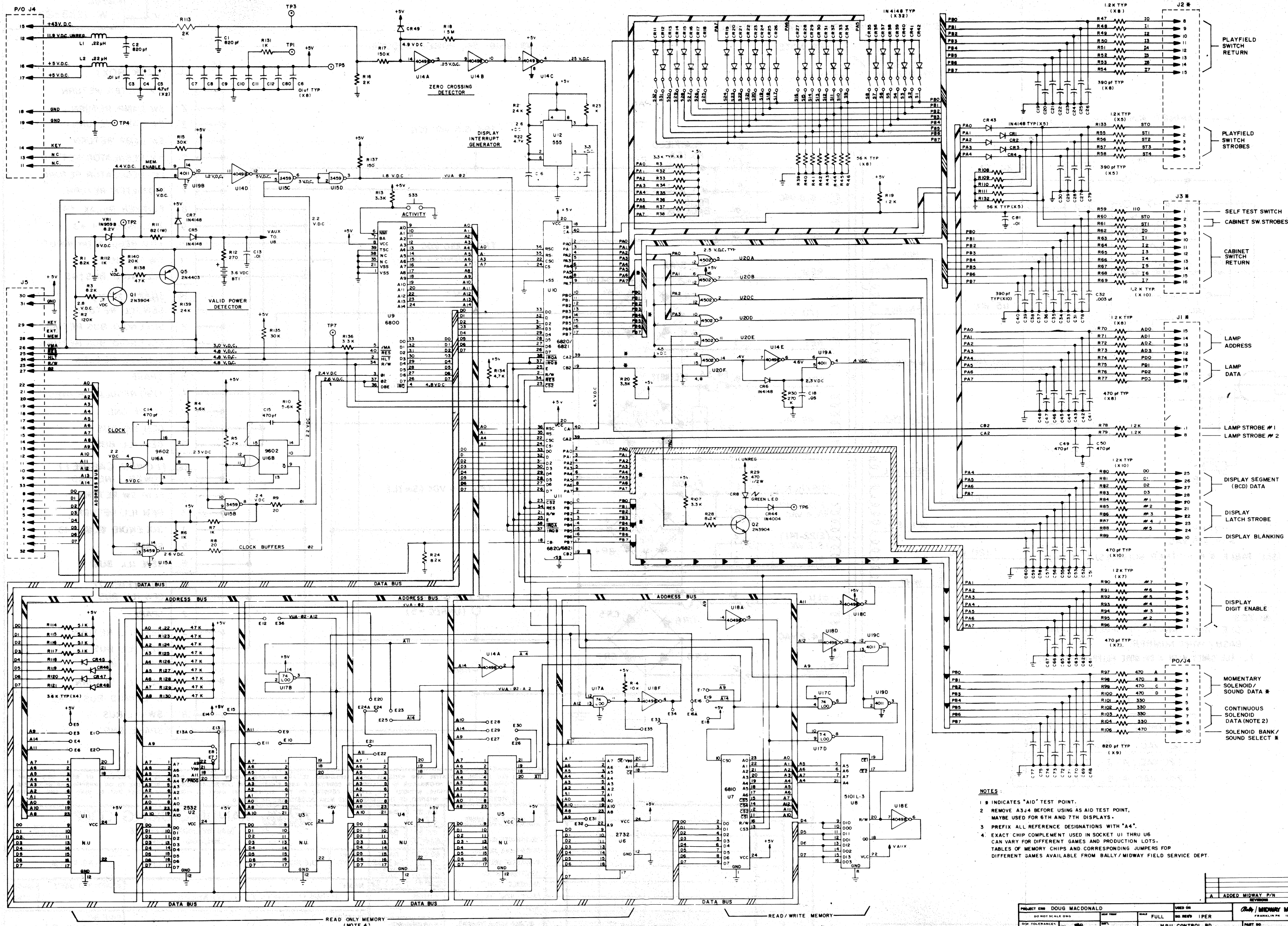
ALL DESIGN, OPERATIVE AND PROCESS DATA PERTAINING TO THE ARTICLE SHOWN ON THIS SHEET IS THE PROPERTY OF BALLY MANUFACTURING CORP. IT IS TO BE KEPT IN CONFIDENCE AND NOT BE LOANED, REPRODUCED, COPIED, RELEASED TO OR APPROPRIATED BY OTHERS IN PART OR IN WHOLE WITHOUT THE EXPRESS CONSENT OF THE OWNERS. THE PRINT IS VALID AND MUST NOT BE REPRODUCED IN ANY MANNER DETRIMENTAL TO THE INTEREST OF THE OWNERS AND MUST BE RETURNED ON DEMAND.			
REMOVE ALL BURRS TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED FRACTIONS . . . DECIMALS . . . EXCEPT HOLE DIA'S ANGLES . . . DO NOT SCALE DRAWING		DR BY CR BY AP'D BY DATE FINISH HARDENING	DATE DATE DATE DATE DATE
Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS		PRINT CONTROL NAME (A9) AUXILIARY LAMP DRIVER BOARD MATERIAL CODE	ASSEM NO USED SCALE
M051-00114-A051			



PROJECT ENG: D. MACDONALD		USED ON PINBALL		REVISIONS	
DO NOT SCALE DWG		HEAT TREAT	SCALE FULL	NO. REQ'D PER	
DIM TOLERANCES UNLESS SPECIFIED		MAT'L	SIX DIGIT DISPLAY BOARD SCHEMATIC "A1"		PART NO.
UNIVERSITY MICROFILMS		FINISH	A084-91491-A000		MO51-00114-A029
DATE 5/17/83		FRANKLIN PK ILL		MIDWAY MFG. CO.	

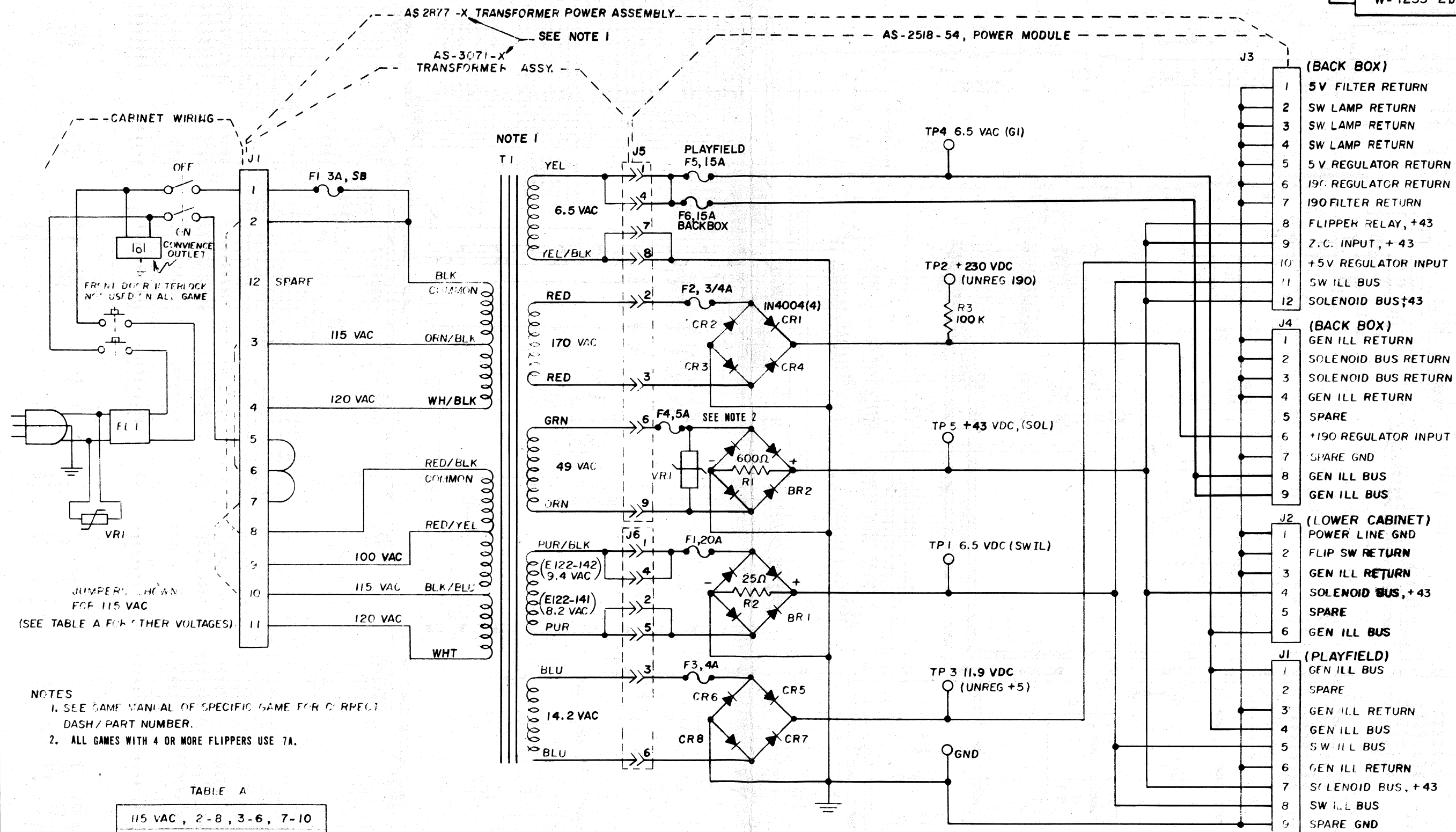


PROJECT ENG: D. MACDONALD		USED ON PINBALL		REVISIONS	
DO NOT SCALE DWG.		NO. REQ'D 1 PER		Bally / MIDWAY MFG. CO.	
DIM. TOLERANCES UNLESS SPECIFIED		SCALE FULL		FRANKLIN PK. ILL.	
CONCENTRICITY T.I.R. 0.03		HEAT TREAT		PART NO.	
FRACTIONAL 1/64		FINISH		M051 - 00114 - A057	
DECIMAL 0.005		5/13/83		SEVEN DIGIT DISPLAY BOARD SCHEMATIC "A1"	
HOLE DIA. $\pm .002$ - .005				A084-91617-A000	



NOTES:

1. INDICATES "AID" TEST POINT.
2. REMOVE A3J4 BEFORE USING AS AID TEST POINT. MAYBE USED FOR 6TH AND 7TH DISPLAYS.
3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A4".
4. EXACT CHIP COMPLEMENT USED IN SOCKET U1 THRU U6 CAN VARY FOR DIFFERENT GAMES AND PRODUCTION LOTS. TABLES OF MEMORY CHIPS AND CORRESPONDING JUMPERS FOR DIFFERENT GAMES AVAILABLE FROM BALLY/MIDWAY FIELD SERVICE DEPT.



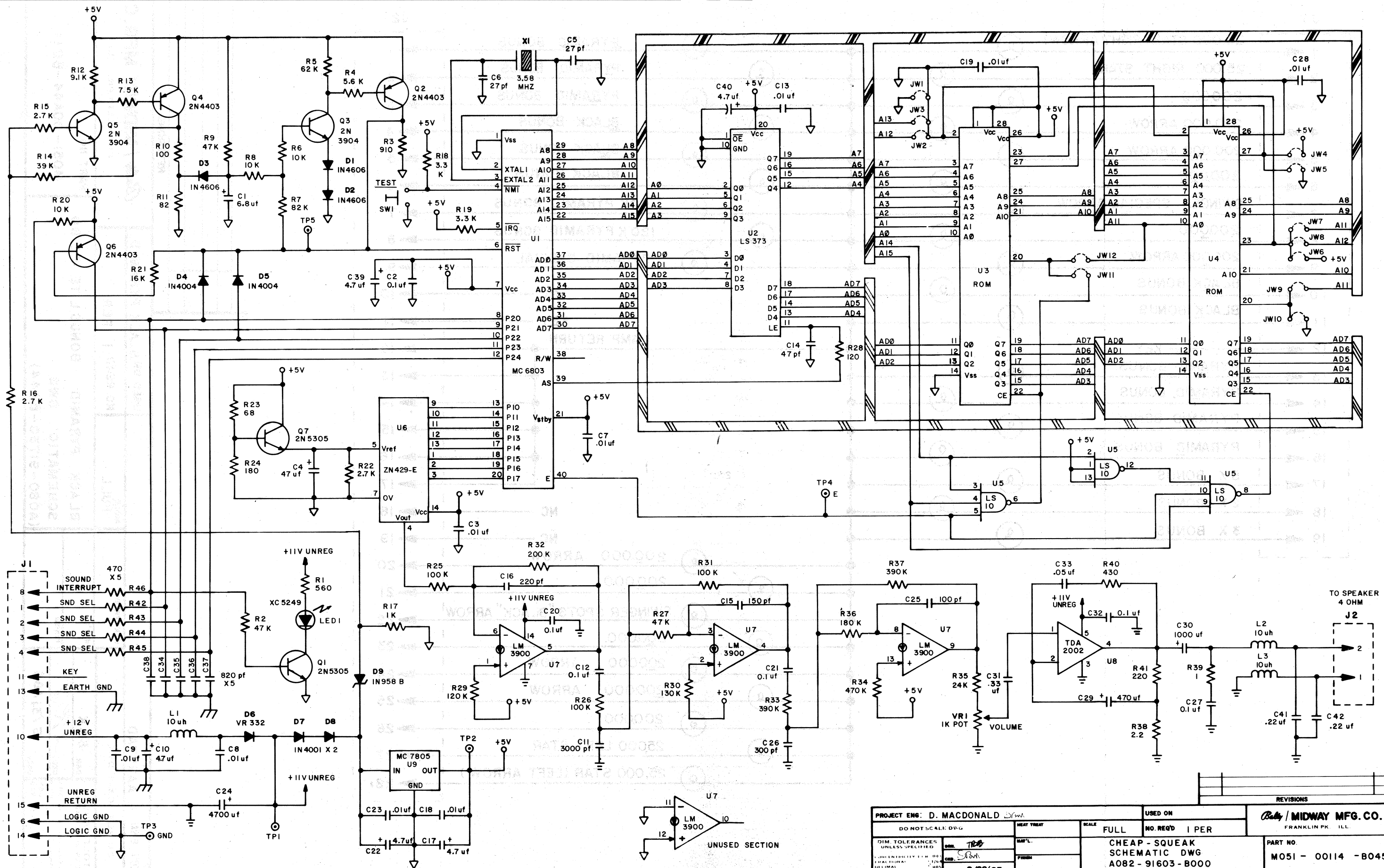
NOTES
1. SEE GAME MANUAL OF SPECIFIC GAME FOR CORRECT DASH / PART NUMBER.
2. ALL GAMES WITH 4 OR MORE FLIPPERS USE 7A.

ALL DESIGN, OPERATIVE AND PROCESS DATA PERTAINING TO THE ARTICLE SHOWN ON THIS SHEET IS THE PROPERTY OF BALLY MFG. CORP., CHICAGO, ILL. 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.

REMOVE ALL BURRS		DR. BY FFC		DATE	
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		CK. BY AMCR		DATE	
FRACTIONS ± .008		AP'D BY J.D.		DATE 7-13-82	
DECIMALS ± .003		FINISH:		PRINT CONTROL	
ANGLES ± 1/2°		HARDENING:		DIE SIZE: C.C. FT. PER M. LBS. PER M.	
DO NOT SCALE DRAWING		NAME		POWER SUPPLY SCHEMATIC	
		MATERIAL		ASSEM. NO. USED	
		CODE		SCALE	
				PART NO. W-1233-2b	

OPER.	DEPT.	DESCRIPTION	TOOL NO.

NO.	LET.	CHANGE	DATE	BY

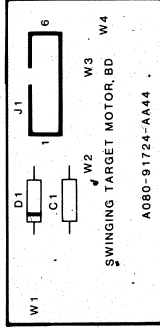


DESIGNATION LIST

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

CROSS REFERENCE LIST

DESCRIPTION	QTY	DESIGNATION NO.	PART NUMBER
.05 UF 16V	1	C1	0171-122D6-AXKX
1N4148	1	D1	103E-00002-0005
KK-100 HEADER	1	J1	3CAC-16444-AF02
P.C.B.			A080-91724-AA44



PROJECT ENG: A. AARSTAD

DO NOT SCALE DWG.

DIM. TOLERANCES UNLESS SPECIFIED	DRN. BAK
CONCENTRICITY T.I.R. .003	CUS. 1-1/2
FRACTIONAL .001	DATE 5/15/84
DECIMAL .001	
HOLE DIA. +.002-.000	

HEAT TREAT

SCALE FULL

NO. REQ'D 1 PER

USED ON BLACK PYRAMID

Midway / MIDWAY MFG. CO.

FRANKLIN PK. ILL.

PART NO. M051 - 00A44 - A008

SWINGING TARGET MOTOR BD. ASSEMBLY DWG.

(A082-91724-AA44)

REVISIONS

PROJECT ENG: A. AARSTAD

DO NOT SCALE DWG

DIM. TOLERANCES UNLESS SPECIFIED	DRN. BAK
CONCENTRICITY T.I.R. .003	CUS. 1-1/2
FRACTIONAL .001	DATE 2/24/84
DECIMAL .001	
HOLE DIA. +.002-.000	

HEAT TREAT

SCALE FULL

NO. REQ'D 1 PER

USED ON BLACK PYRAMID

Midway / MIDWAY MFG. CO.

FRANKLIN PK. ILL.

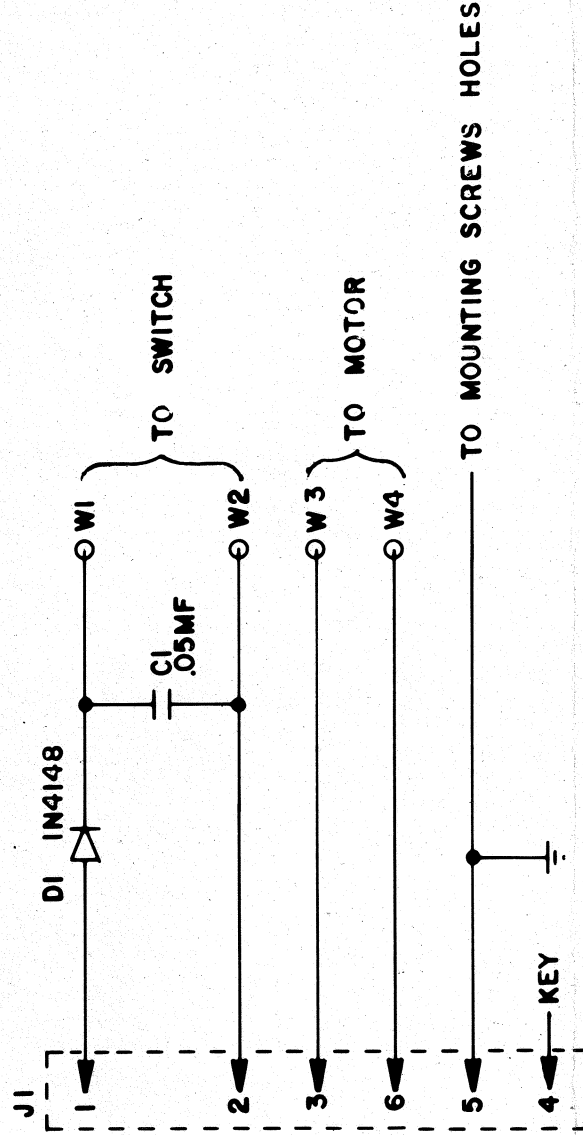
SWINGING TARGET MOTOR BD. SCHEMATIC

PART NO.

M051 - 00A44 - A009

A080-91724-AA44

REVISIONS



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

5/4/84	RELEASE FOR PRODUCTION	

M051-00A44-A081

