

GAME 1222
FO 703



Bally[®]

PINBALL DIVISION

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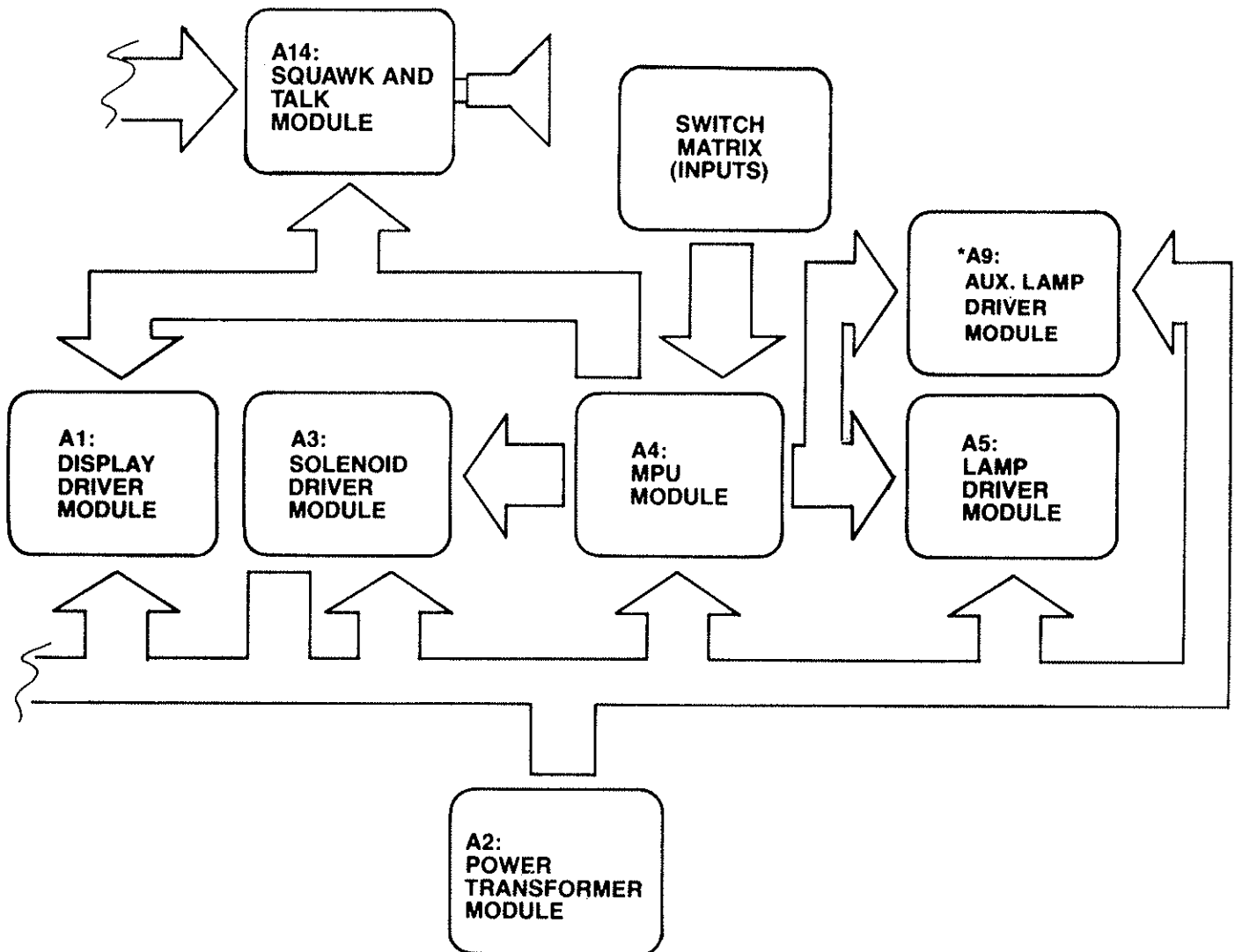
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Installation and General Game Operation Instructions

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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 raised.

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 1,000,000 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— 100000 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.

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FEATURE OPERATION & SCORING

A. BONUS FEATURE

A bonus of 1000 to 59,000 may be scored. The game starts with a bonus of 1000 points. The bonus advances one step at a time each. At the time a drop target is knocked down, the center stand up targets are lit, the top rollover buttons are lit, the top center lane is actuated, the top lanes 1 and 2 are lit and the lanes A and B are lit. The outlane rollovers score two bonus advances at all times.

B. MEMORY BONUS FEATURE

When a bonus of 10 to 19,000, 20,000 to 39,000 and a bonus of 40,000 to 59,000 is achieved, the respective 10,000, 20,000 and 40,000 bonus could remain in memory and be lit at the start of each ball.

Switch #7 Memory for 10,000, 20,000, 40,000 bonus and special.

ON: Liberal

OFF: Conservative

C. BONUS MULTIPLIERS AND BONUS SPECIAL FEATURE

The bonus multipliers are lit as follows:

Making 1 and 2 lanes advances the multipliers.

Making top 3 targets on spots multiplier lite.

On single drop target making the back target when spots multiplier lite is lit.

Switch #8 Memory for multipliers

ON: Liberal

OFF: Conservative

Switch #23 Memory for 1 and 2

ON: Liberal

OFF: Conservative

D. TOP DROP TARGETS FEATURE

Light rotates, when the last drop target is knocked down on the spots letter lite, the light stops and flashes, then a letter of a spell out EMBRYON will lite and the light starts rotating once more. Hitting the last target when lite is on extra ball, collect bonus or spots multiplier, the feature is collected and the lite stays on. Now the special flashes with the 3 spots letter lites till it is collected at which time the target feature cycle starts all over again. This feature is controlled by SW. below so that making it the first time it will flash the feature.

SW. #6

ON: Liberal

OFF: Conservative

E. FLIPSAVE FEATURE

Making A and B lites flipsave lite. Actuating the right outlane rollover starts flipsave lite flashing to energize flipsave flipper for 5 seconds.

Switch #24 Memory for A and B

ON: Liberal

OFF: Conservative

G. TOP CENTER LANE FEATURE

Making 1 and 2 flashes center lane value for:

1st time 10,000

2nd time 20,000

3rd time EXTRA BALL

4th time SPECIAL

Switch #14 Memory for top center lane values.

ON: Liberal

OFF: Conservative

H. LEFT SIDE CAPTIVE BALL FEATURE

Making drop targets increases captive stand up target value.

1st time for 10,000

2nd time for 20,000

3rd time for EXTRA BALL

4th time for SPECIAL

Switch #16 Memory for stand up target values.

ON: Liberal

OFF: Conservative

I. RIGHT SIDE CAPTIVE BALL FEATURE

Making drop target increases stand up target value.
 1st time for 10,000
 2nd time for 20,000
 3rd time for spot a multiplier

Switch #15 Memory for stand up target values.

ON: Liberal
 OFF: Conservative

J. CENTER CAPTIVE BALLS FEATURE

Each time a stand up target is hit an appropriate right or left outside stand up target lites. Making all four targets flashes spot letters lite which indicates that everytime an inside target is hit a letter from the spellout EMBRYON lites. If both targets are hit simultaneously two letters lite reenforced by a bright flash of light.

Switch #21 Memory for outside targets (2 at one time)

ON: Liberal
 OFF: Conservative

K. SPELLOUT EMBRYON MULTIBALL FEATURE AND OUTLANE SPECIAL FEATURE

Spelling E-M-B-R-Y-O-N lites the top saucer for a lock ball. When a ball is locked in the saucer the single target release ball lite flashes. Making the captive stand up target releases the ball from saucer.

When more than one player is set and the ball in play drains after locking a ball the up coming player utilizes the locked ball for his ball in play by simply pushing the right flipper button like indicated by the flashing light on the lower arch.

Making locks ball arrow twice lites outlane specials.

L. SPECIAL REPLAY/X-BALL/NOVELTY MODES

Self test position 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.

Self test position 16	Set to "03"	Set to "02"	Set to "01"
Playfield X-balls and Specials	Award	Award	Award
Bonus Special	Replay	X-Ball*	50,000
Top Lane Special	Replay	X-Ball*	50,000
Top 3 Drop Target Special	Replay	X-Ball*	50,000
Side 3 Drop Target Special	Replay	X-Ball*	50,000
Left or Right Outlane Special	Replay	X-Ball*	50,000
Top 3 Drop Target X-Ball	X-Ball	X-Ball**	25,000
Side 3 Drop Target X-Ball	X-Ball	X-Ball**	25,000
Top Lanes X-Ball	X-Ball	X-Ball**	25,000
Self Test Position 17	Set to "03"	Set to "02"	Set "01"
Scoring Thresh Holds	Award	Award	Award
	Replay	X-Ball**	No Award

(*) 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 outline 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	TOTAL CREDITS/COINS
	5	4	3	2	1						
#1 (HINGE SIDE)	13	12	11	10	9						
OR #3											
(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****	1/5th Coin	1/5
	ON	ON	ON	ON	ON	0/1st Coin***	0/2nd Coin***	1/3rd Coin	0/4th Coin****	1/5th 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	
	5	32	31
		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/Ball in Play 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 1,000,000 SCORE FEATURE:

The game is designed to award free games as an option if high score to date is beat or player exceeds 1,000,000 points. Each time this happens, the winning score becomes the 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.

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SOUND OPTION

The game is designed to make several tones and noises to announce power-up, game-up, etc. The tones are intended to attract attention to the game and increase game usage. The tones are controlled by pressing self test button until the #18 shows on the match/ball in play display. Now pulse replay button to desired sound setting.

Setting "00"

Most switches associated chimes without feature background.

Setting "01"

Playfield switches associated chimes with background.

Setting "02"

Most scoring will have noise effect without background.

Setting "03"

Most all scoring will have a noise effect with background.

NOTE—TO CORRECT CLARITY OF SPEECH AND SOUND, ADJUST CONTROLS:
FIRST TURN THE 2 CONTROLS ALL THE WAY UP. NOW TURN THE CONTROLS BACK ¼ OF A TURN. NEXT TURN REMOTE VOLUME CONTROL ON FRONT DOOR ALL THE WAY UP, THEN TURN IT BACK ¼ OF A TURN.

GAME FEATURE OPTIONS:

Top drop targets features adjustment:

Liberal	SW. 6 ON	Making all 3 targets for any feature lite will collect that feature.
Conservative	SW. 6 OFF	Making all 3 targets for any feature lite will only flash the lite till it is made a 2nd time.

Bonus values lite adjustment:

Liberal	SW. 7 ON	Lit bonus value will come on for next ball.
Conservative	SW. 7 OFF	Lit bonus value will not come on for next ball.

2X, 3X, 4X, 5X bonus lite adjustment:

Liberal	SW. 8 ON	Any lit bonus lite will come on for next ball.
Conservative	SW. 8 OFF	Any lit bonus lite will not come on for next ball.

Top feature lane arrows lite adjustment:

Liberal	SW. 14 ON	Any lit arrows will come on for next ball.
Conservative	SW. 14 OFF	Any lit arrows will not come on for next ball.

Single drop target value lites adjustment:

Liberal	SW. 15 ON	Any lit lite made after hitting back target will come on for next ball.
Conservative	SW. 15 OFF	Any lit lite will not come on for next ball.

3 Side drop target value lites adjustment:

Liberal	SW. 16 ON	Any lit lite not flashing will come on for next ball.
Conservative	SW. 16 OFF	Any lit lite will not come on for next ball.

Center outside target 1 or 2 lite adjustment:

Liberal	SW. 21 ON	Hitting inside left or right target will lite 2 outside lites.
Conservative	SW. 21 OFF	Hitting inside left or right target will lite 1 outside lite.

Center outside target lite adjustment.

Liberal	SW. 22 ON	Any lit center outside target lites will come on for next ball.
Conservative	SW. 22 OFF	Any lit center outside target lites will not come on for next ball.

"1" or "2" Top lane lite adjustment:

Liberal	SW. 23 ON	Lite 1 or 2 will come on for next ball.
Conservative	SW. 23 OFF	Lite 1 or 2 will not come on for next ball.

"A" and "B" lane lite adjustment:

Liberal	SW. 24 ON	Any lit A and B will come on for next ball.
Conservative	SW. 24 OFF	Any lit A and B will not come on for next ball.

Number of games replays per game adjustment:

Liberal	SW. 29 ON	All replays earned will be collected.
Conservative	SW. 29 OFF	Only 1 replay per player per game.

Game over attract adjustment:

Liberal	SW. 30 ON	Voice says "Activate Embryon."
Conservative	SW. 30 OFF	No Voice.

C. FRONT DOOR GAME ADJUSTMENTS

High Score Feature Adjustments:

The game is designed to award an extra ball (option) or 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 1,000,000 Feature:

The game is designed to award free games when 'High Score to Date' is beat, or if the player exceeds 1,000,000 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 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 16-22:

To set up positions 16-22 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, 19 or 22. Positions 20, 21 setups go from "00" thru "15."

SOUND

In addition to individual volume controls for speech and other game sounds on the Squawk and Talk Board. 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).

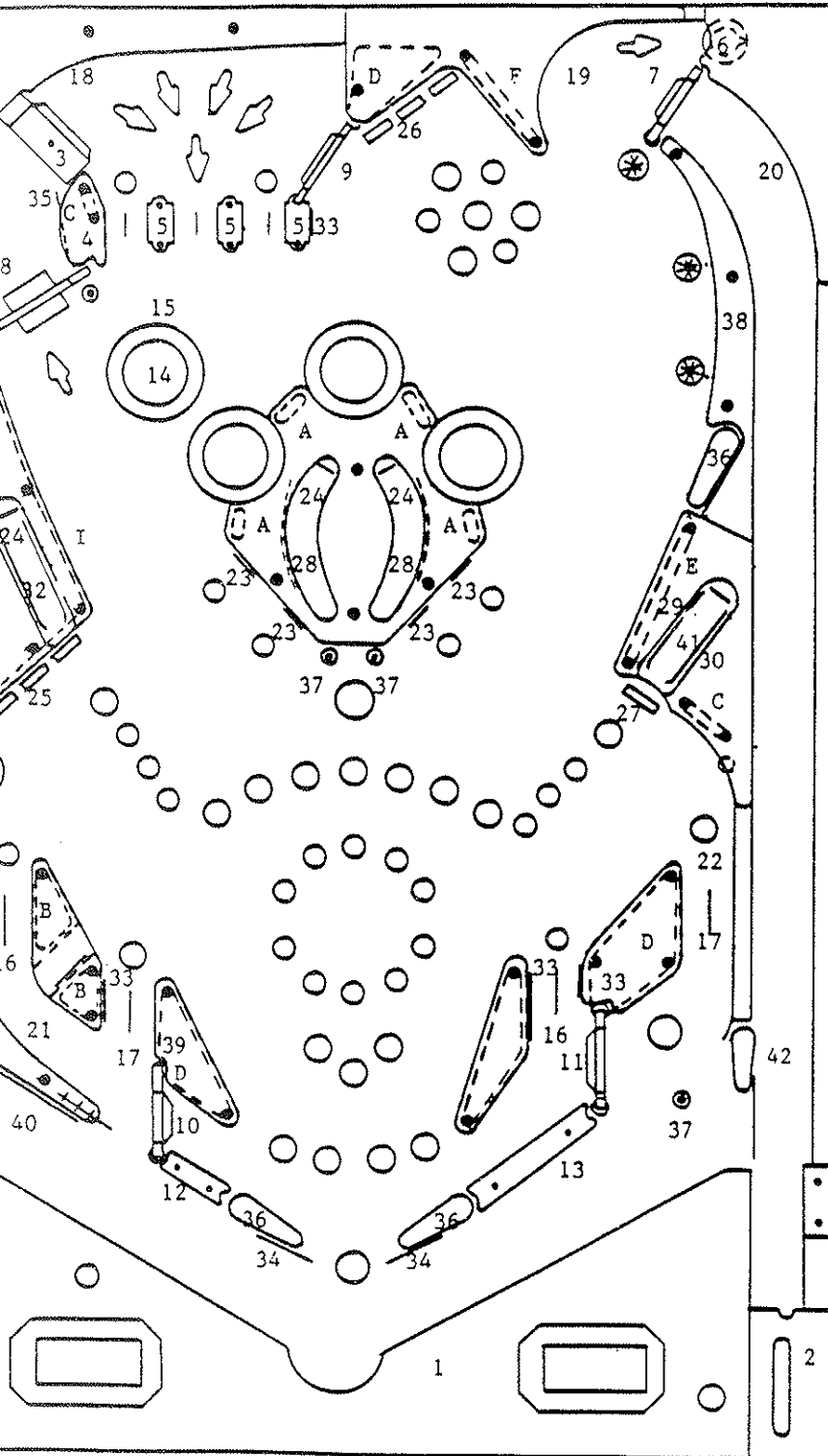
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PANEL TOP PARTS

- | | | |
|-----------------------------|--------------|-----|
| 1. Bottom Arch | P-5871-85 | |
| 2. Shooter Gauge | P-6359-50 | |
| 3. Ball Gate | A-1475-15 | |
| 4. Plastic Guide | C-694-2 | |
| 5. Plastic Guide | C-693-2 | (3) |
| 6. Eject Hole | ASE-428-44 | |
| 7. Gate & Wire Assy. | ASE-2250-11 | |
| 8. Spinner Assy. | ASE-2250-86 | |
| 9. Gate & Wire Assy. | ASE-2250-24 | |
| 10. Gate & Wire Assy. | ASE-2250-77 | |
| 11. Gate & Wire Assy. | ASE-2250-89 | |
| 12. Ball Guide Assy. | A-2898-43 | |
| 13. Ball Guide Assy. | A-2898-42 | |
| 14. Bumper Cap | A-4009-3 | (4) |
| 15. Bumper Collar | C-1018-2 | (4) |
| 16. Wire Actuator | ASE-2806-10 | |
| 17. Wire Actuator | ASE-28-6-9 | |
| 18. Ball Guide Assy. | A-3032-70 | |
| 19. Ball Guide Assy. | A-3032-71 | |
| 20. Ball Guide Assy. | A-3032-72 | |
| 21. Ball Guide Assy. | A-3032-73 | |
| 22. Ball Guide | P-6244-119 | |
| 23. Target Switch | ASE-2911-21 | (4) |
| 24. Target Switch | ASE-2911-3 | (3) |
| 25. Drop Target Assy. | ASE-2795-86 | |
| 26. Drop Target Assy. | ASE-2795-87 | |
| 27. Drop Target Assy. | ASE-2993-13 | |
| 28. Guide Wire | M-121-113 | (2) |
| 29. Guide Wire | M-121-111 | |
| 30. Guide Wire | M-121-112 | |
| 31. Guide Wire | M-121-110 | |
| 32. Guide Wire | M-121-109 | |
| 33. Guide Wire | M-121-90 | (4) |
| 34. Guide Wire | M-121-53 | (2) |
| 35. Guide Wire | M-121-24 | |
| 36. Molded Flipper | A-3994 | (3) |
| 37. Mini Post | A-2836-2 | (4) |
| 38. Screened Plastics (Set) | A-2890-157 | |
| 39. Screened Plastics (Set) | M-1330-186 | |
| 40. Guide Wire | M-121-18 | |
| 41. Target Switch | ASE-982-1311 | |
| 42. Transparent Flipper | A-4013-1 | |

RUBBER PARTS

- | | | | |
|----|---------|---------|------|
| A. | R-521 | 3/4" | (4) |
| B. | R-521-1 | 1" | (4) |
| C. | R-521-2 | 1 1/2" | (2) |
| D. | R-521-3 | 2" | (5) |
| E. | R-521-4 | 2 1/2" | |
| F. | R-521-5 | 3" | |
| G. | R-243 | 5/16" | (13) |
| H. | R-533-3 | FLIPPER | (3) |
| I. | R-521-9 | 5" | |



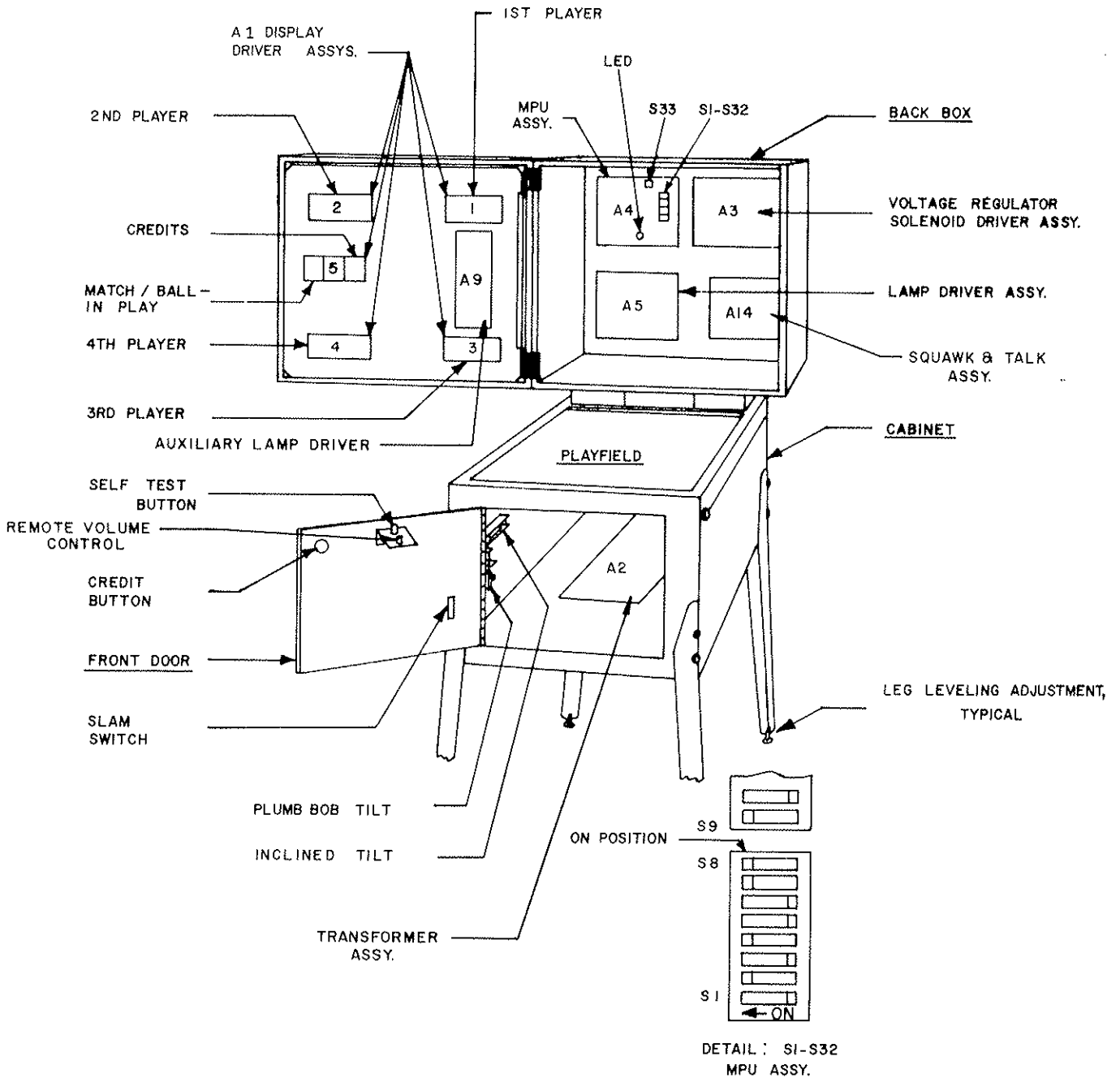


FIGURE III. ELECTRONIC PIN BALL MACHINE

RECOMMENDED

Instruction, Score Cards and High Score Feature Settings
To Be Used On Embryon #1222

3-BALL

REPLAYS

Instruction Card	M-1508-99-E
Score Card	M-1508-99-B
1 Replay at 400,000	
1 Replay at 700,000	

5-BALL

REPLAYS

Instruction Card	M-1508-99-E
Score Card	M-1508-99-A
1 Replay at 500,000	
1 Replay at 800,000	

EXTRA BALL

Instruction Card	M-1508-99-F
Score Card	M-1508-99-A W/AAA-1
1 Extra Ball at 450,000	
1 Extra Ball at 850,000	

ADDITIONAL CARDS

REPLAYS

M-1508-AAA	400,000	700,000
M-1508-BBB	450,000	750,000
M-1508-CCC	250,000	550,000
M-1508-DDD	300,000	600,000
M-1508-EEE	350,000	650,000
M-1508-FFF	450,000	700,000
M-1508-GGG	450,000	850,000
M-1508-HHH	500,000	800,000
M-1508-JJJ	550,000	850,000
M-1508-KKK	600,000	900,000

EXTRA BALL

M-1508-AAA-1	450,000	850,000
M-1508-BBB-1	500,000	850,000
M-1508-CCC-1	600,000	950,000
M-1508-DDD-1	650,000	980,000

Instruction Card, Novelty
M-1508-99-G

BLANKS (3)

High game to date recommended levels;
(Reset periodically)
3 BALL 780,000
5 BALL 880,000

#1222 EMBRYON

RECOMMENDED SETTINGS

RECOMMENDED REPLAY GAME SETTING FOR:		3-BALL	5-BALL
TOP DROP TARGET FEATURES	SW. 6	ON	OFF
BONUS VALUES LITE	SW. 7	ON	OFF
2X, 3X, 4X, 5X BONUS LITE	SW. 8	ON	OFF
TOP FEATURE LANE ARROWS	SW. 14	ON	ON
SINGLE DROP TARGET VALUE LITES	SW. 15	ON	OFF
3 SIDE DROP TARGET VALUE LITES	SW. 16	ON	OFF
CENTER OUTSIDE TARGET 1 OR 2 LITE	SW. 21	ON	OFF
CENTER OUTSIDE TARGET LITE	SW. 22	ON	OFF
"1" OR "2" TOP LANE LITE	SW. 23	ON	OFF
"A" AND "B" LANE LITE	SW. 24	ON	OFF
NUMBER OF REPLAYS PER GAME	SW. 29	ON	ON
GAME OVER ATTRACT	SW. 30	ON	ON
BALL PER GAME	SW. 31	OFF	ON
BALLS PER GAME	SW. 32	OFF	OFF

REPLAY

Instruction Card
 Score Card
 Major Mode

 Match
 High Score to Date

3-BALL

M-1508-99-E
 M-1508-99-B
 Self Test Position 16, 17
 Set to "03"
 SW. 28 ON
 Self Test Position 19
 Set to "03"

5-BALL

M-1508-99-E
 M-1508-99-A
 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-1508-99-E
 M-1508-99-A W/AAA-1
 Self Test Position 16, 17
 Set to "02"
 SW. 28 OFF
 Self Test Position 19
 Set to "00"

NOVELTY

Instruction Card
 Major Mode

 Match
 High Score to Date

M-1508-99-G
 Self Test Position 16, 17
 Set to "01"
 SW. 28 OFF
 Self Test Position 19
 Set to "00"

M-1508-99-G
 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 the "Game Over" 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 22 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.

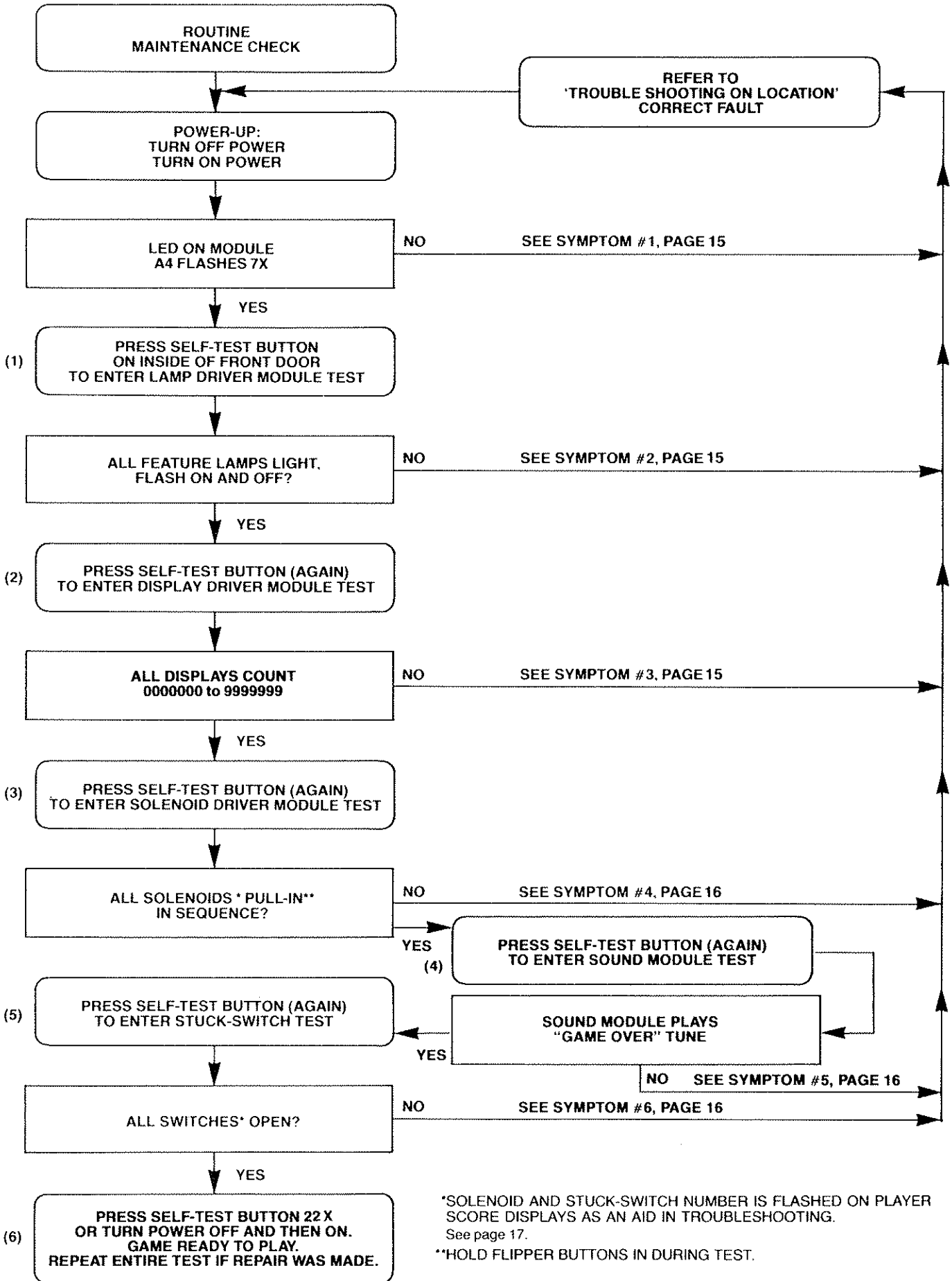
After successful completion of the Self Diagnostic Test procedure, set the game up for play. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no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



- 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 #1222 EMBRYON (FIGURE V)
SOLENOID IDENTIFICATION TABLE**

Self Test #	SOLENOID IDENTIFICATION	Self Test #	SOLENOID IDENTIFICATION
01	LEFT SLINGSHOT	09	SINGLE DROP TARGET RESET
02	RIGHT SLINGSHOT	10	LEFT SIDE 3 BANK RESET
03	LEFT TOP THUMPER BUMPER	11	TOP 3 BANK RESET
04	LEFT BOTTOM THUMPER BUMPER	12	SAUCER
05	RIGHT TOP THUMPER BUMPER	13	COIN LOCKOUT DOOR
06	RIGHT BOTTOM THUMPER BUMPER	14	KI RELAY (FLIPPER ENABLE)
07	KNOCKER	15	RIGHT OUTLANE FLIPPER
08	OUTHOLE KICKER		

SWITCH ASSEMBLY SELF-TEST DISPLAY NUMBERS

Switch Self Test #	DESCRIPTION	Switch Self Test #	DESCRIPTION
01	10 POINT REBOUND (4)	21	3 TOP DROP TARGETS (CENTER)
02	ROLLOVER BUTTON (3)	22	3 TOP DROP TARGETS (LOWER)
03	RIGHT FLIPPER BUTTON	23	#1 ROLLOVER
04	SAUCER	24	#2 ROLLOVER
05	#1 LEFT AND RIGHT OF OUTHOLE	25	3 LEFT DROP TARGETS (UPPER)
06	CREDIT BUTTON	26	3 LEFT DROP TARGETS (CENTER)
07	TILT (3)	27	3 LEFT DROP TARGETS (LOWER)
08	OUTHOLE	28	LEFT SIDE CAPTIVE BALL TARGET
09	COIN III (RIGHT)	29	CENTER RIGHT UPPER TARGET
10	COIN I (LEFT)	30	CENTER RIGHT LOWER TARGET
11	COIN II (MIDDLE)	31	CENTER LEFT LOWER TARGET
12	"A" ROLLOVER	32	CENTER LEFT UPPER TARGET
13	"B" ROLLOVER	33	RIGHT CENTER INSIDE TARGET
14	RIGHT OUTLANE	34	LEFT CENTER INSIDE TARGET
15	LEFT OUTLANE	35	RIGHT SLINGSHOT
16	SLAM (2)	36	LEFT SLINGSHOT
17	SINGLE DROP TARGET*	37	RIGHT BOTTOM THUMPER BUMPER
18	SPINNER	38	RIGHT TOP THUMPER BUMPER
19	TOP CENTER ROLLOVER	39	LEFT BOTTOM THUMPER BUMPER
20	3 TOP DROP TARGETS (UPPER)	40	LEFT TOP THUMPER BUMPER

*WITH TARGET DOWN PULSE BACK TARGET. #17—
STOPS FLASHING AND "0" STARTS FLASHING.

NOTE: SLINGSHOT & THUMPER BUMPER COILS
WILL ENERGIZE WHEN SWITCH IS MADE.

#1222 EMBRYON

○ INDICATES SWITCH ASSEMBLY IDENTIFICATION NUMBERS
 NOTE: CABINET: 07,16,03
 DOOR: 06, 09
 10, 11, 16

□ INDICATES SOLENOID IDENTIFICATION NUMBERS
 NOTE: DOOR: 13
 BACKBOX: 14
 CABINET: 07

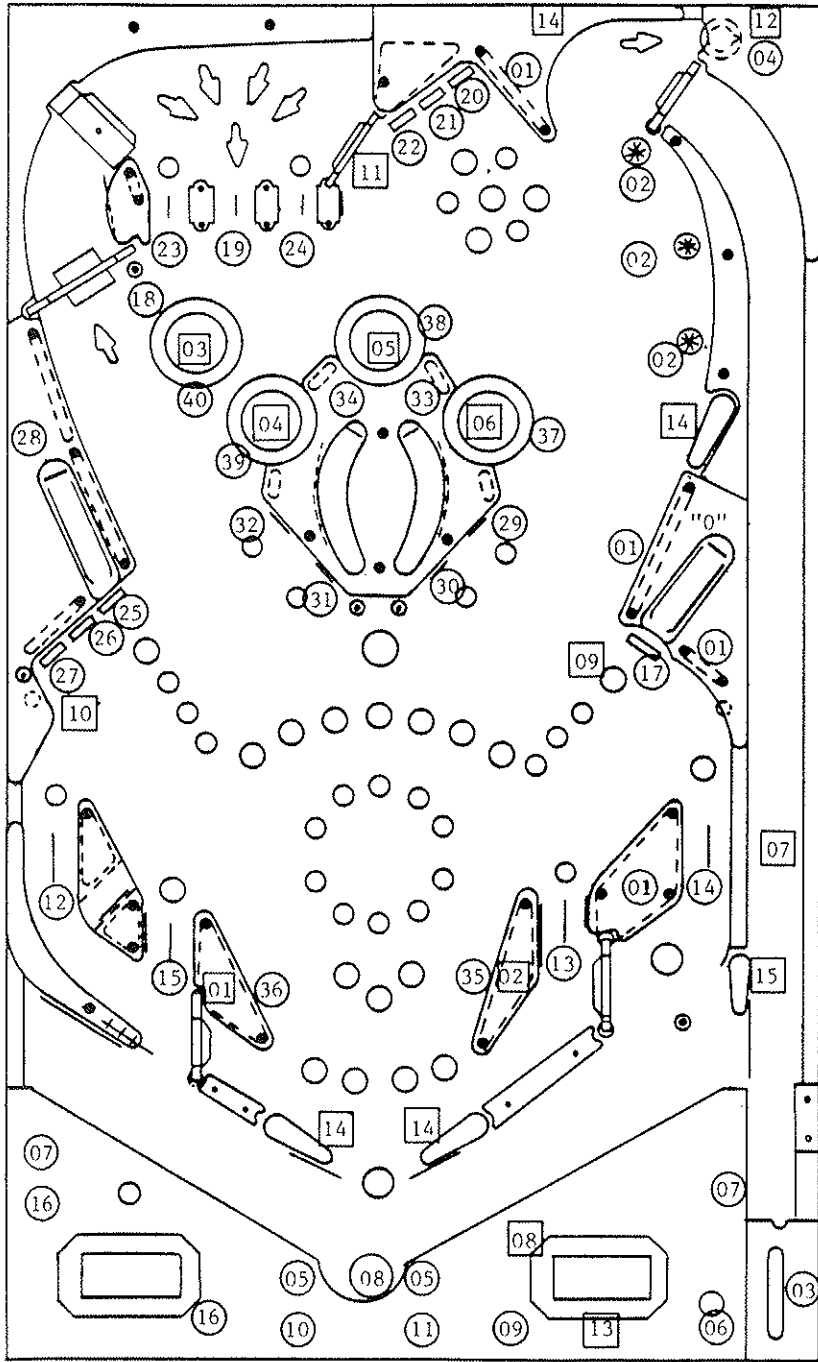


FIGURE V

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" overtravel 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 a 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 MANUFACTURING CORPORATION
2640 WEST BELMONT AVENUE
CHICAGO, ILLINOIS 60618
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

#1222 EMBRYON

MISCELLANEOUS	PART NUMBER
Transformer (Domestic or Export)	E-122-142
Bulbs, #555	E-125-73
Fuse, 1 Amp. 3 AG Slow Blow (Playfield Solenoid Protection)	E-133-44

ASSEMBLY COILS

Coin Lockout	FO-36-7000
Flipper (3)	AQ-25-500/ 34-4500
Right Outlane Flipper	AO-27-1300
Knocker	AR-26-1200
Outhole Kicker	AO-27-1300
Thumper Bumper (4)	AN-26-1200
Sling-Shot (2)	AO-26-1200
Drop Target Reset (2)	NO-26-1900
Single Drop Target Reset	AO-27-1300
Saucer (1)	AO-27-1300

PLAYFIELD PARTS

See Figure II

MODULES

Lamp Driver A5	AS-2518-23
Display Driver A1 (5 used)	AS-2518-21
Solenoid Driver/Voltage Regulator A3	AS-2518-22
MPU A4	AS-2962-27
Transformer & Rectifier A2	AS-2877-6
Rectifier Board (Part of A2)	AS-2518-54
Squawk & Talk	AS-3107-4
Auxiliary Lamp Driver A9	AS-2518-52
Aux. Driver (SCR Lamp Flasher)	AS-2518-67

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

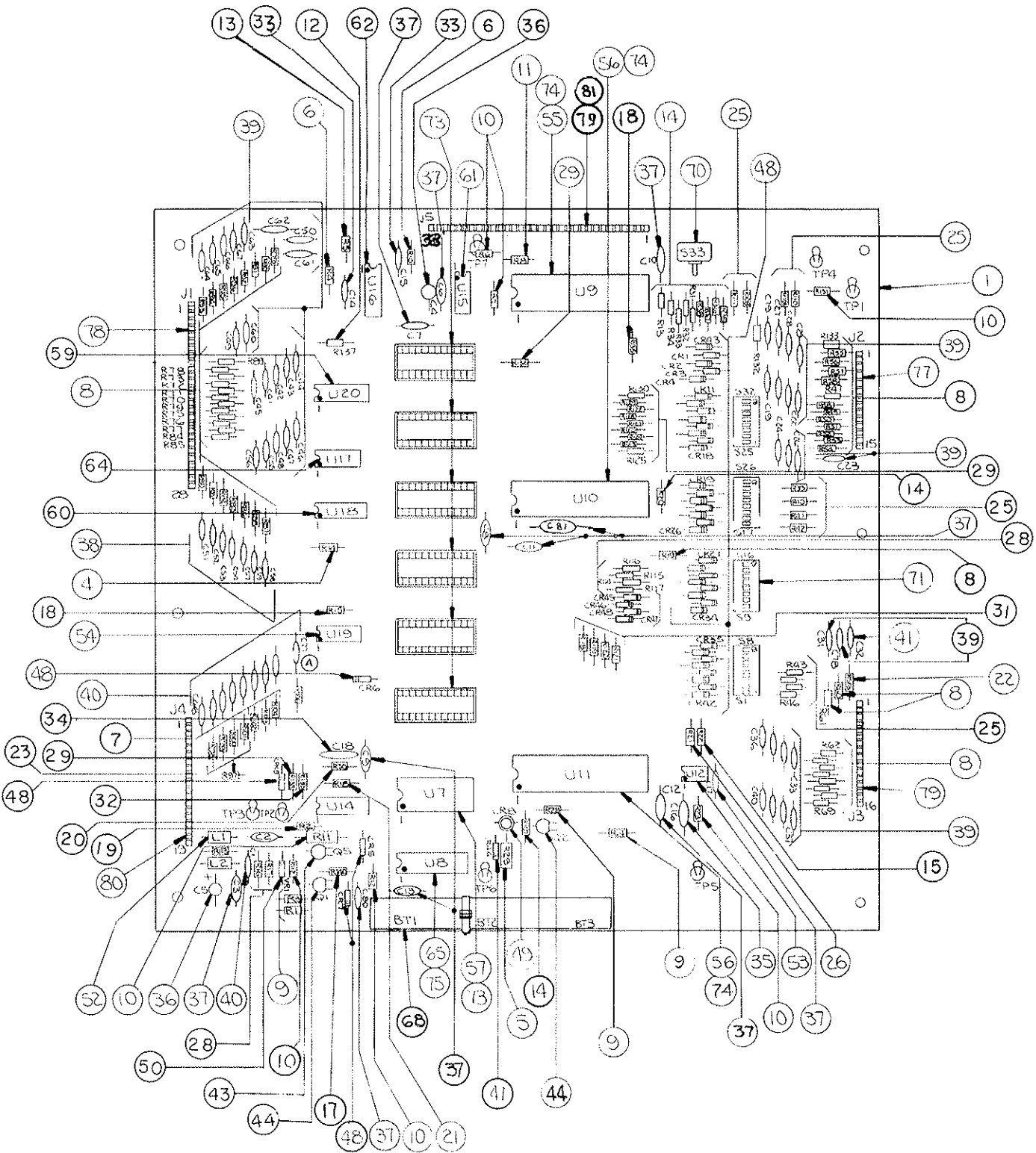
SEE MODULE PARTS LIST

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 Driver/Voltage Regulator A3
KIT #493—For Display Driver A1
KIT #494—For Lamp Driver A5

AS-2518-35 MPU MODULE



A4: MPU MODULE COMPONENT PARTS LIST

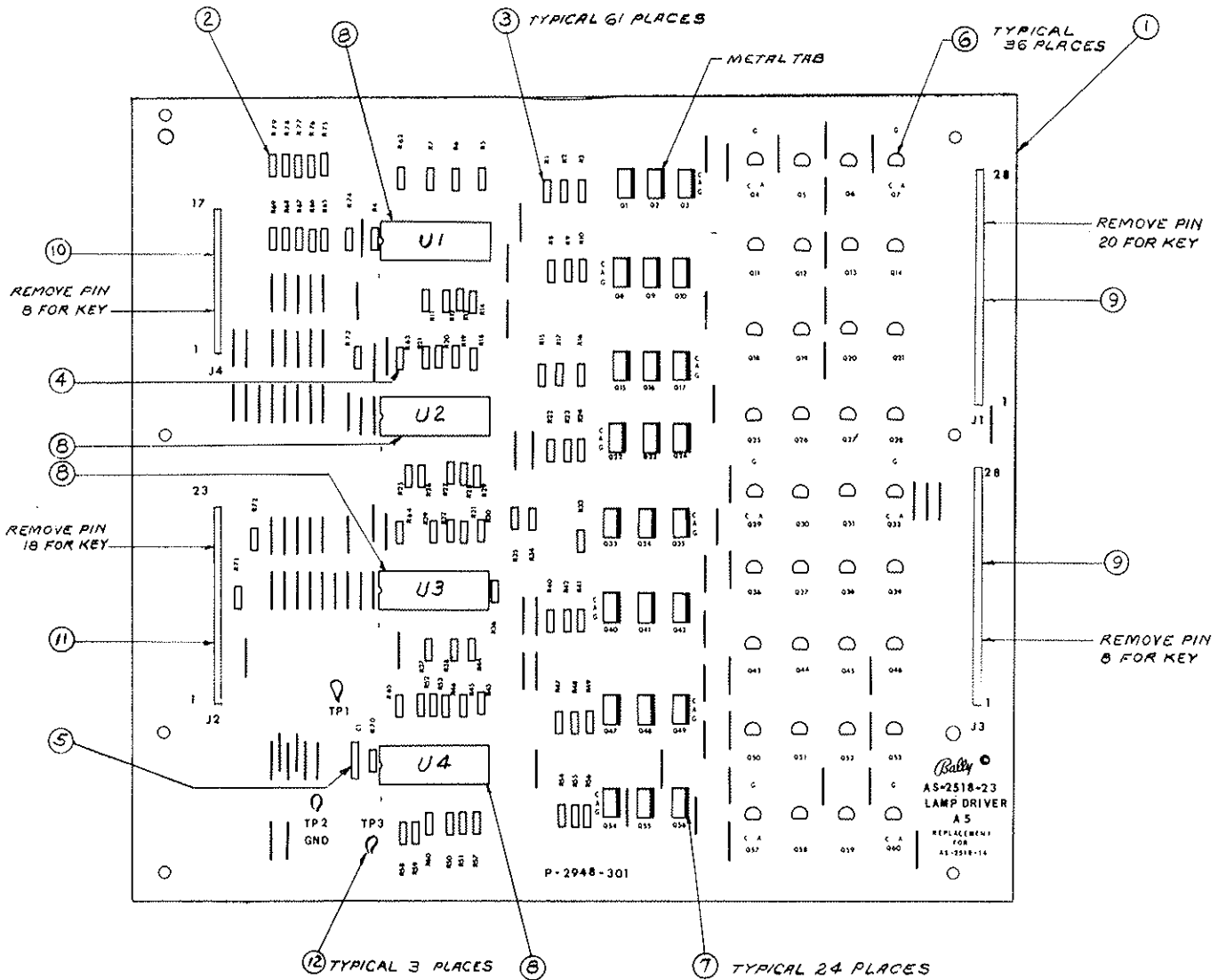
ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A4 (see note 1)	AS-2962-27	MPU Module Complete.
2	A4 (see note 2)	AS-2518-35	MPU Module less Program Memory, U1-6 incl.
3-32	See Schematic		Resistors, See schematic for value
33	C14, C15	E-00586-0067	Capacitor, 470 PFD, 1kv
34	C18	E-00586-0088	Capacitor, .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, 1kv
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	E-00587-0014	Diode (1N4148)
49	CR8	E-00679	LED (Green)
50	VR1	E-00598-0008	Diode Zener (8.2V, 1N9598)
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 1:

When ordering, fill in dash number. For example, AS-2962-0: LOST WORLD, AS-2962-2: SIX MILLION DOLLAR MAN, AS-2962-3: PLAYBOY, AS-2962-4: VOLTAN, AS-2962-5: SUPERSONIC, AS-2962-6: STAR TREK, AS-2962-7: KISS, AS-2962-8: PARAGON, AS-2962-9: GROUND SHAKER, AS-2962-10: HARLEM GLOBETTERS, AS-2962-12: DOLLY PARTON, AS-2962-13: SILVERBALL MANIA, AS-2962-18: MYSTIC, AS-2962-20: HOTDOGGIN, AS-2962-22: SKATEBALL, AS-2963-23: FRONTIER, AS-2962-21: XENON, AS-2962-24: FLASH GORDON, AS-2962-26: EIGHT BALL DELUXE, AS-2962-25: FIREBALL II, AS-2962-27: EMBRYON.

NOTE 2: Order replacement memory chips U1-U6, specifying game, socket and part number stamped on chip.

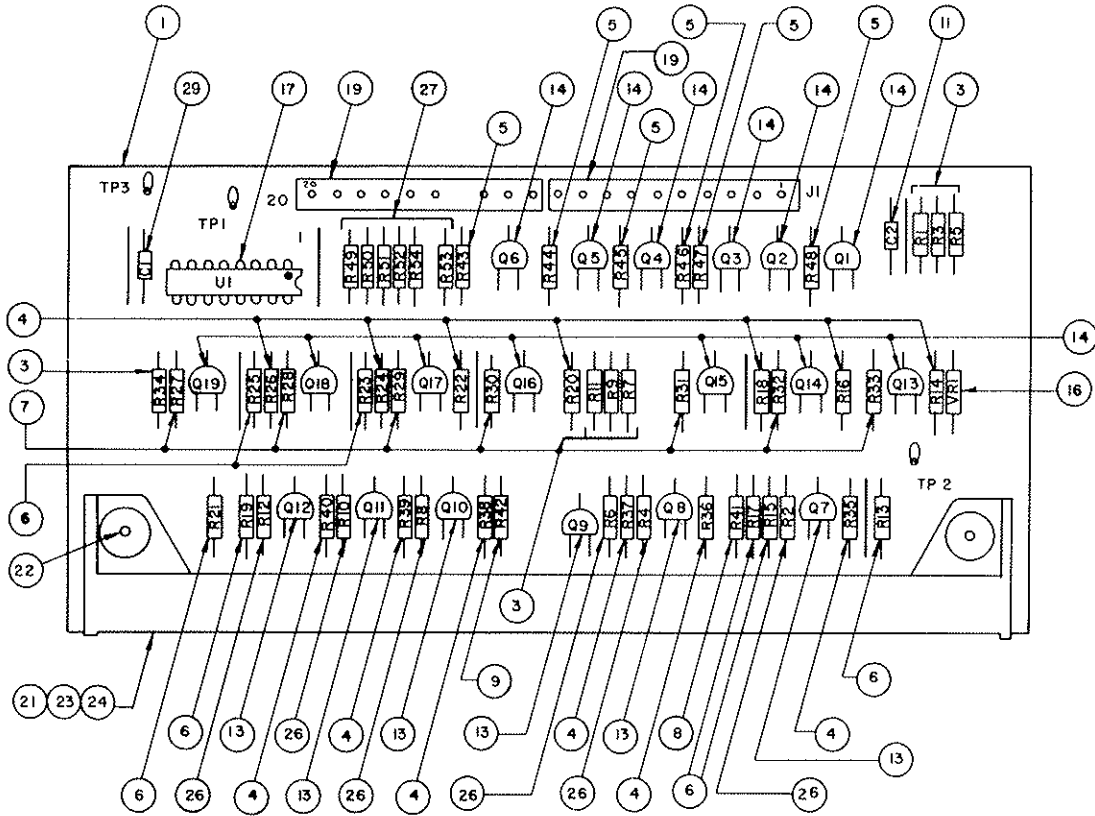
AS-2518-23 LAMP DRIVER MODULE



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

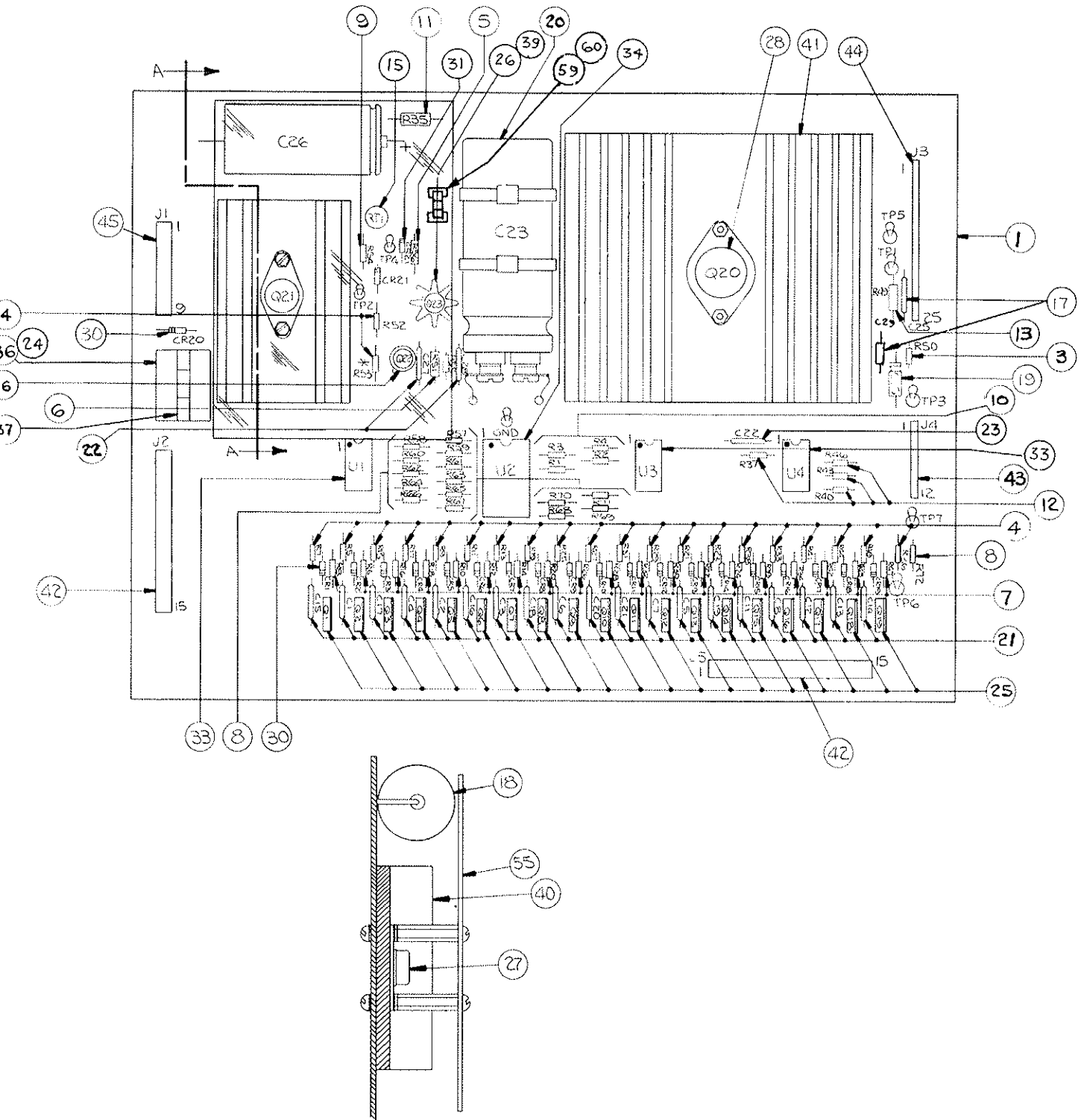


A1: 6 DIGIT DISPLAY DRIVER MODULE COMPONENT PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	1		P-2948-296	P.C. Board, M-645-392
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

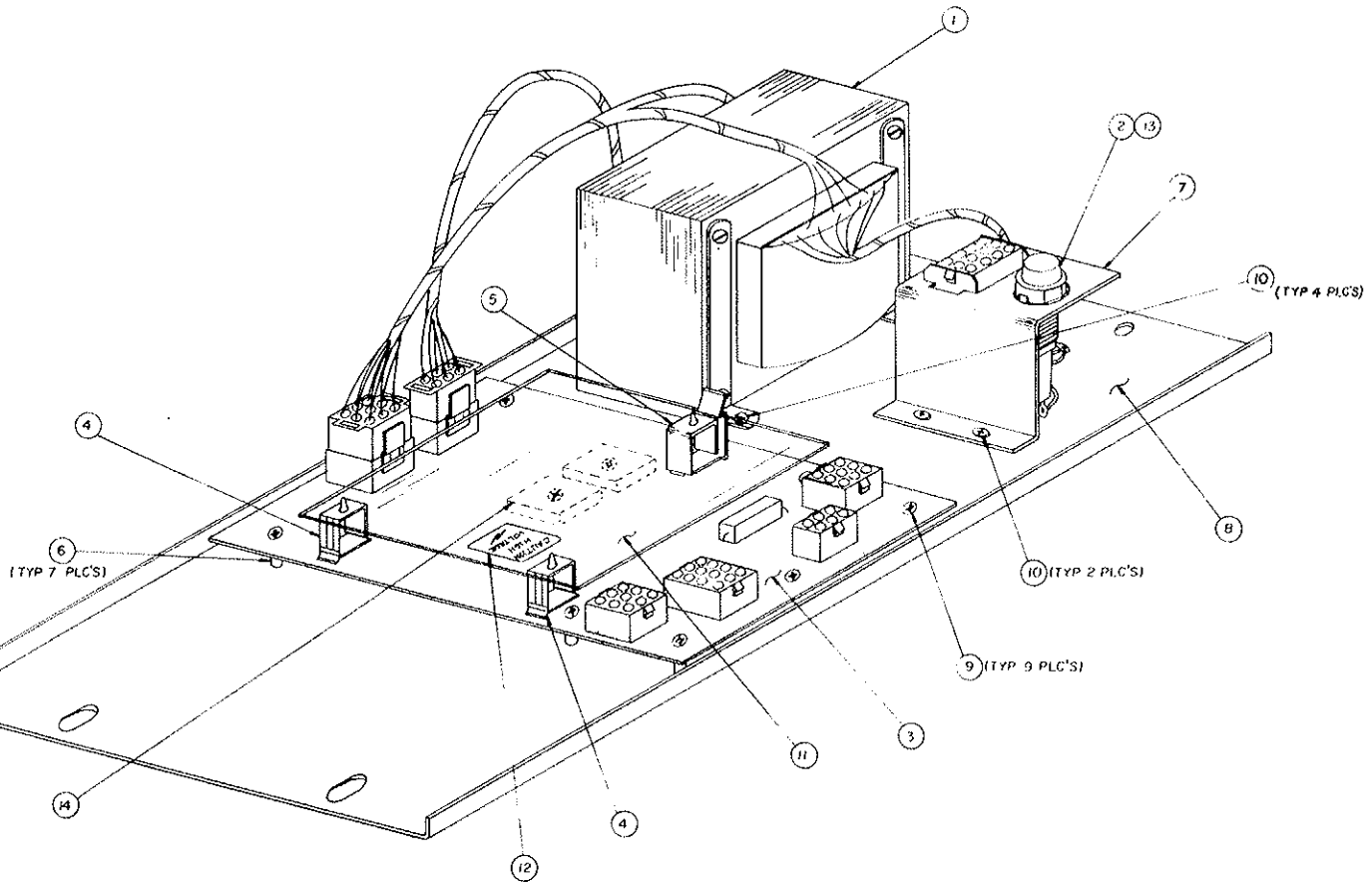
A3: SOLENOID DRIVER/VOLTAGE REGULATOR MODULE

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 (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

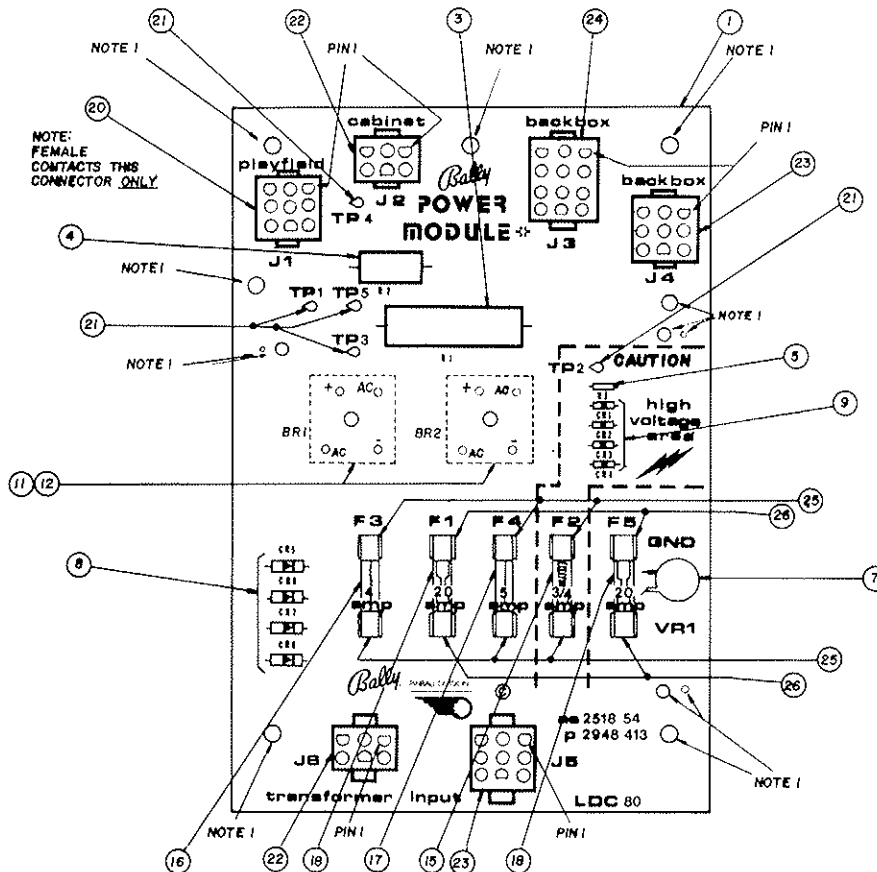
A2: POWER TRANSFORMER MODULE



COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
0	A2	AS-2877-6	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

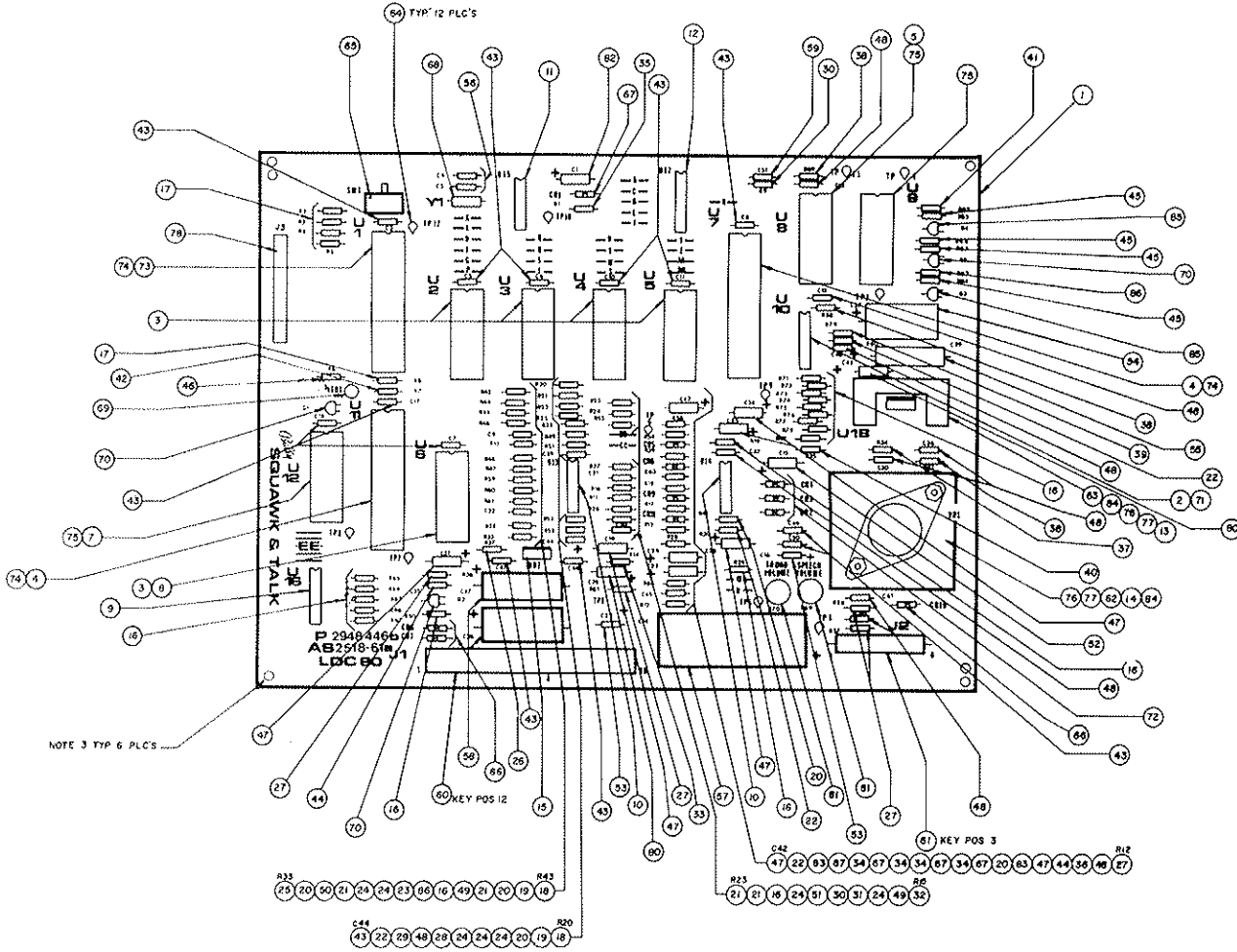
AS-2518-54 RECTIFIER BOARD ASSEMBLY



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

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
0	A2	AS-2877-6	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, 1/4W
7	VR1	E-00623	Varistor
8	CR5, CR6, CR7, CR8	E-00587-0022	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-00602-0006	Bridge Rectifier
15	F2	E-00133-0028	Fuse, 3/4A, 250V, 3AG
16	F3	E-00133-0004	Fuse, 4A, 32V, 3AG
17	F4	E-00133-0005	Fuse 5A, 32V, 3AG
18	F1, F5	E-00133-0027	Fuse, 20A, 32V, 3AG
19			
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	E-00148-0022	Fuse Clips (Low Resistance)

SQUAWK & TALK MODULE AS 2518-61A



ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
1	1	PWB	M-645-577b	P-2948-446b
2	1	U10	AD 558 DAC	E-620-171
3	5	Used with U2 thru U6	24 Pin I.C. Socket	E-712
4	2	U7, U11	6821 P.I.A.	E-620-29
5	1	U8	Tms 5200 Speech	E-620-167
7	1	U12	AY3-8912 Sound	E-620-166
8	1	U6	6810 RAM (SEE NOTE 1)	E-620-30
9	1	U16	4049 Hex Inverter	E-620-33
10	2	U13, U14	LM 3900	E-620-126
11	1	U15	74LS14 Schmitt Inverter	E-620-169
12	1	U17	74LS155	E-620-168
13	1	U18	TDA 2002 Power Amp	E-620-127
14	1	VR1	LM323, 5V Regulator	E-710
15	1	VR2	7905, -5V Regulator	E-620-165
16	19	R10, 19, 29, 42, 50, 63-67, 71-78, 55	Resistor, 1/4W, 10K	E-105-185
17	5	R2-5,8	Resistor, 1/4W, 5%, 3.3K	E-105-238
18	2	R20, 43	Resistor, 1/4W, 5%, 820K	E-105-343
19	2	R21, 44	Resistor, 1/4W, 5%, 390K	E-105-310
20	5	R13, 22, 38, 41, 45	Resistor, 1/4W, 200K	E-105-225
21	4	R23, 24, 46, 61	Resistor, 1/4W, 5% 100K	E-105-226
22	4	R30, 53, 56, 80	Resistor, 1/4W, 5% 2K	E-105-237
23	1	R47	Resistor, 1/4W, 5%, 2.7K	E-105-151
24	7	R25, 26, 27, 32, 49, 59, 60	Resistor, 1/4W, 5% 1m	E-105-285
25	1	R33	Resistor, 1/4W, 5%, 91K	E-105-313

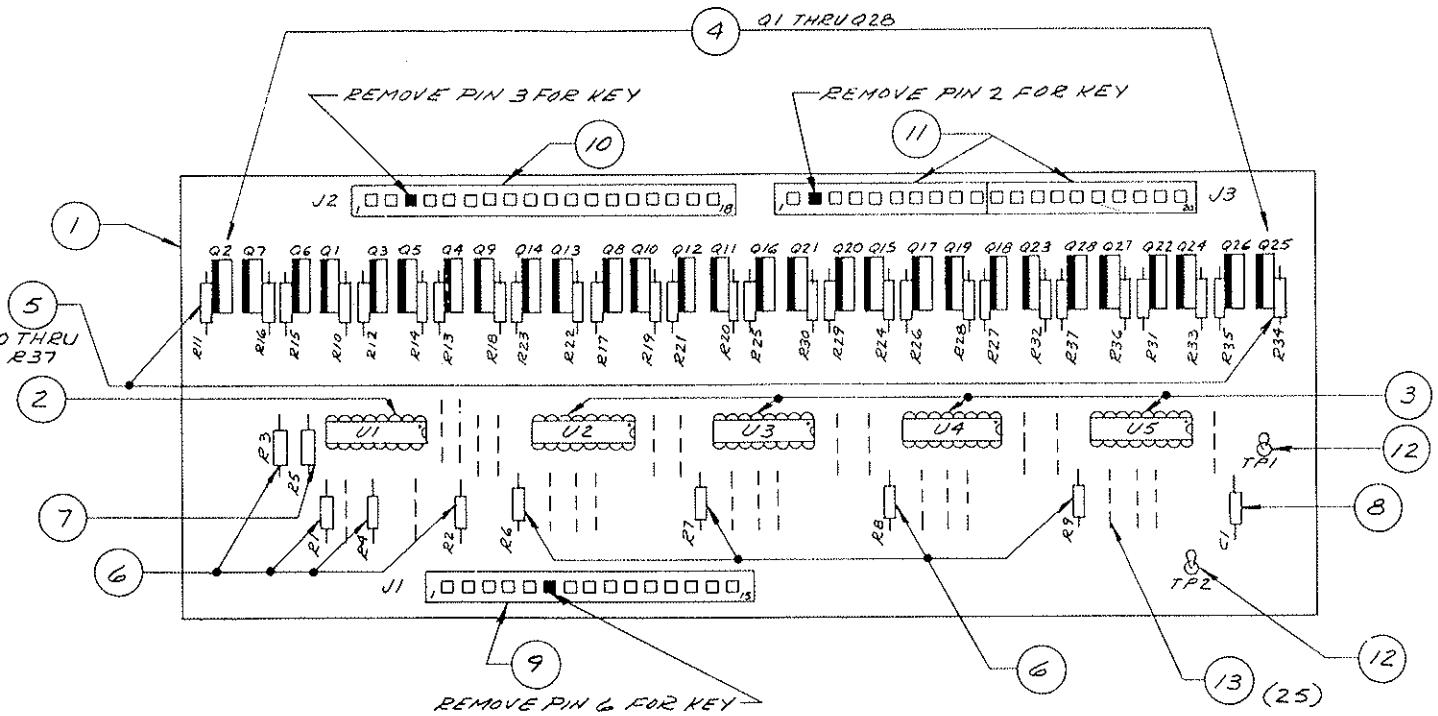
**SQUAWK & TALK MODULE
AS 2518-61A**

COMPONENTS PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
26	1	R37	Resistor, ¼W, 5%,30K	E-105-245
27	5	R12, 36, 57, 58, 81	Resistor, ¼W, 5%, 1K	E-105-230
28	1	R51	Resistor, ¼W, 5%, 750K	E-105-344
29	1	R52	Resistor, ¼W, 5%, 9.1K	E-105-228
30	2	R9, 16	Resistor, ¼W, 5%, 130K	E-105-203
31	1	R11	Resistor, ¼W, 5%, 150K	E-105-248
32	1	R15	Resistor, ¼W, 5%, 220K	E-105-161
33	1	R14	Resistor, ¼W, 5%, 1.8K	E-105-346
34	4	R17, 18, 39, 40	Resistor, ¼W, 5%, 910K	E-105-347
35	1	R1	Resistor, ¼W, 5%, 27K	E-105-243
36	1	R68	Resistor, ¼W, 5%, 510 Ω	E-105-311
37	1	R34	Resistor, ¼W, 5%, 2.2 Ω	E-105-211
38	3	R31, 88, 89	Resistor, ¼W, 5%, 220 Ω	E-105-303
39	1	R79	Resistor, ¼W, 5%, 7.5K	E-105-345
40	1	R35	Resistor, ¼W, 5%, 1 Ω	E-105-196
41	1	R83	Resistor, ¼W, 5%, 11K	E-105-360
42	1	R7	Resistor, ¼W, 5%, 8.2K	E-105-223
43	14	C2, 5-8, 10, 11, 17, 18, 44, 47-50	Capacitor, Ceramic, .01μF, 25V	E-586-85
44	2	C23, 35	Capacitor, Ceramic, .47μF, 16V	E-586-130
45	4	R84-87	Resistor, ¼W, 5%, 2.2K	E-105-287
46	1	R6	Resistor, ¼W, 470Ω	E-105-342
47	7	C19, 24, 25, 28, 31, 34, 42	Capacitor, Electrolytic, 1μF, 25V	E-586-90
48	10	C12, 13, 26, 30, 33, 39, 40, 41, 45, 46	Capacitor, Ceramic, .1μF, 25V	E-586-89
49	2	C9, 20	Capacitor, Ceramic, 470pF, 50V	E-586-83
50	1	C32	Capacitor, Ceramic, 68pF	E-586-120
51	1	C21	Capacitor, Ceramic, 100pF	E-586-68
52	1	C15	Capacitor, Electrolytic, 10μF, 16V	E-586-135
53	2	C16, 22	Capacitor, Tantalum, 4.7μF, 25V	E-586-73
54	1	C27	Capacitor, Electrolytic, 1000μF, 16V	E-586-136
55	1	C29	Capacitor, Electrolytic, 470μF, 6V	E-586-124
56	2	C3, 4	Capacitor, Ceramic, 27pF	E-586-121
57	1	C14	Capacitor, Electrolytic, 4700μF, 25V	E-586-123
58	2	C37, 38	Capacitor, Electrolytic, 330μF, 50V	E-586-147
59	1	C51	Capacitor, Monolythic, 10pF	E-586-150
60	1	J1	18 Pin Wafer Connector (156)	E-736-18
61	1	J2	6 Pin Wafer Connector (156)	E-736-6
62	1	Used with VR1	Heatsink, 6053B	E-682-11
63	1	Used with U18	Heatsink, 6030B	E-682-8
64	12		Test Points	P-5399
65	1	SW. 1	P.C.B. Switch	E-658-1
66	3	CR7, 8, 10	Diode (IN4004)	E-587-15
67	5	CR1, 5, 6, 9, 11	Diode (IN4148)	E-587-14
68	1	Y1	Crystal, 3.579	E-744-5
69	1	LED1	LED	E-679
70	3	Q1-2, 5	Transistor, 2N3904	E-585-31
71	1	Used with U10	Socket I.C. 16 Pin	E-712-16
72	3	CR2-4	Diode, VR332	E-587-22
73	1	U1	6808 or 6802 (SEE NOTE 1)	
74	3	Used with U1, 7, 11	Microprocessor	E-620-125 or 128
75	3	Used with U8, 9, 12	Socket, I.C. 40 Pin	E-712-1
76	3	Used with U18, VR1	Socket, I.C. 28 Pin	E-712-28
77	3	Used with U18, VR1	Screw	LSPR-00632-1106
78	2	J3	Nut	N-00632-2112
			Header, 20 Pin	E-766-20
80	2	C36, 43	Capacitor, 2μF, 16V	E-586-63
81	2	R69, 70	Pot. 1K	E-599-16
82	1	C1	Capacitor, Electrolytic, 47μF	E-586-148
83	2	R28, 54	Resistor, 82K	E-105-341
84	AR	Used with U18, VR1	Thermal Compound	M-1834
85	2	Q3, 4	Transistor, 2N4403	E-585-23
86	2	R82, 48	Resistor, ¼W, 5%, 2.4K	E-105-312

JUMPERS—SEE NOTES

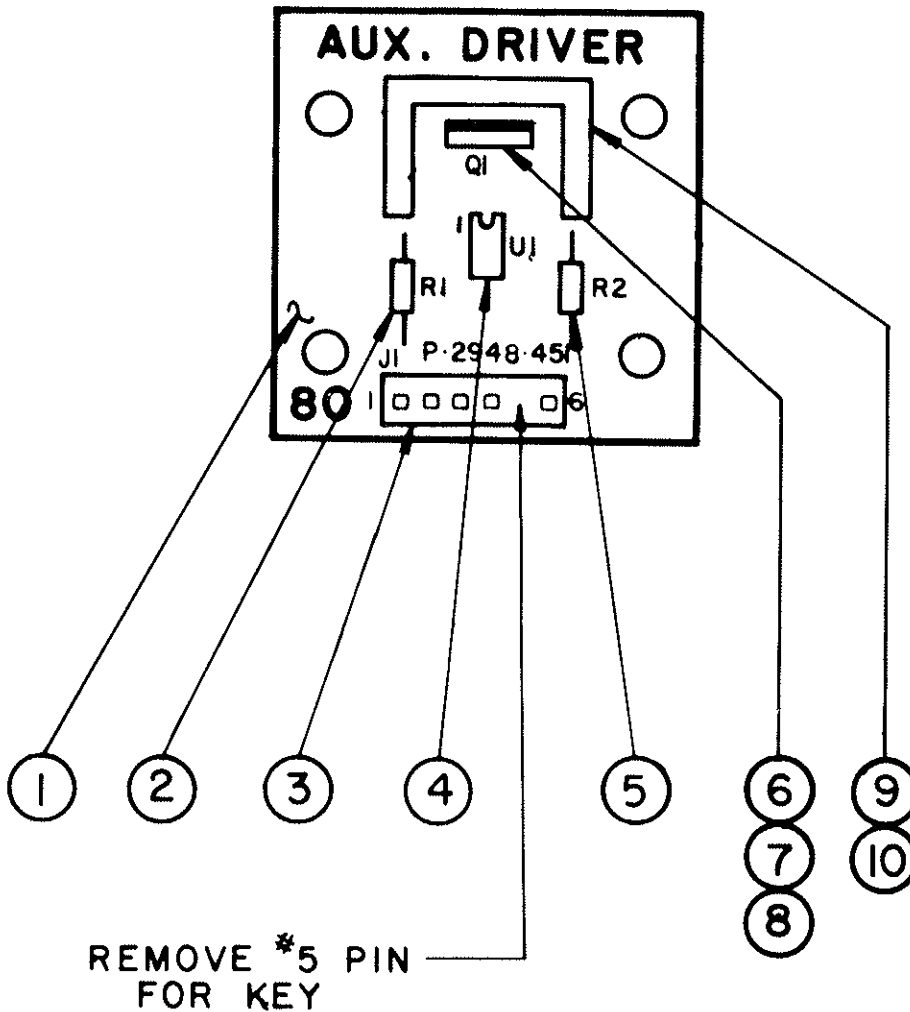
AS-2518-52 AUXILIARY LAMP DRIVER



A9: AUXILIARY LAMP DRIVER COMPONENT PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART NO.	DESCRIPTION
1	1		P-2948-504	P.C.B. (M-645-512)
2	1	U1	E-620-134	Quad Flip Flop
3	4	U2 Thru U5	E-620-108	BCD to Decimal Decoder
4	28	Q1 Thru Q28	E-585-29	S.C.R.
5	28	R10 Thru R37	E-105-237	Resistor, 2K Ω , 1/4 W, 5%
6	8	R1-4, R6-9	E-105-242	Resistor, 20K Ω , 1/4 W, 5%
7	1	R5	E-105-173	Resistor, 2.2M, 1/4 W, 5%
8	1	C1	E-586-85	Capacitor, .01 μ f, 25V, \pm 20 %
9	1	J1	E-736-15	Connector, KK156 15 Pin
10	1	J2	E-736-18	Connector, KK156 18 Pin
11	2	J3	E-736-10	Connector, KK156 10 Pin
12	2	TP1, TP2	P-5399	Test Point
13	25		M-1777-126	Jumper

A16 Auxiliary Driver—SCR Lamp Flasher
AS-2518-67

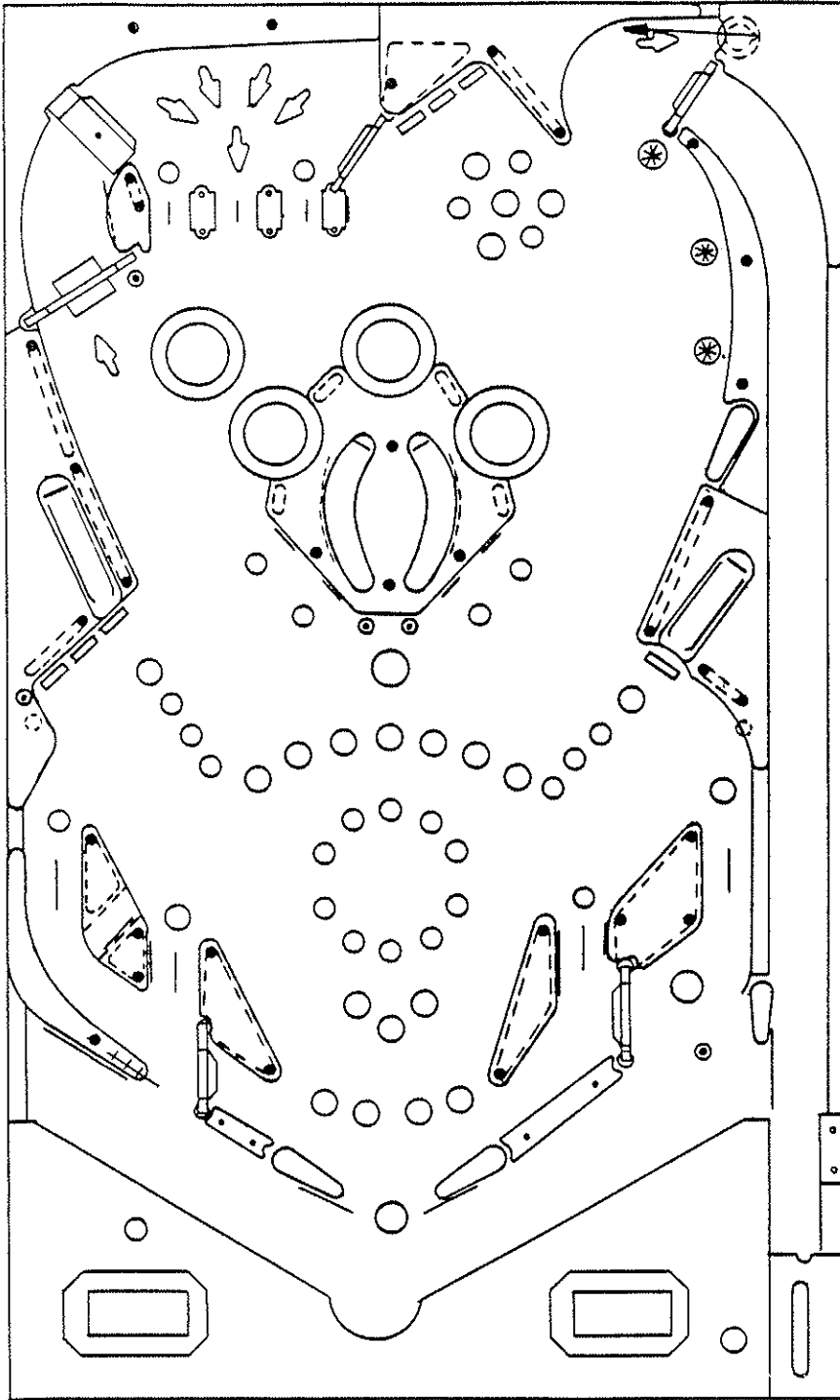


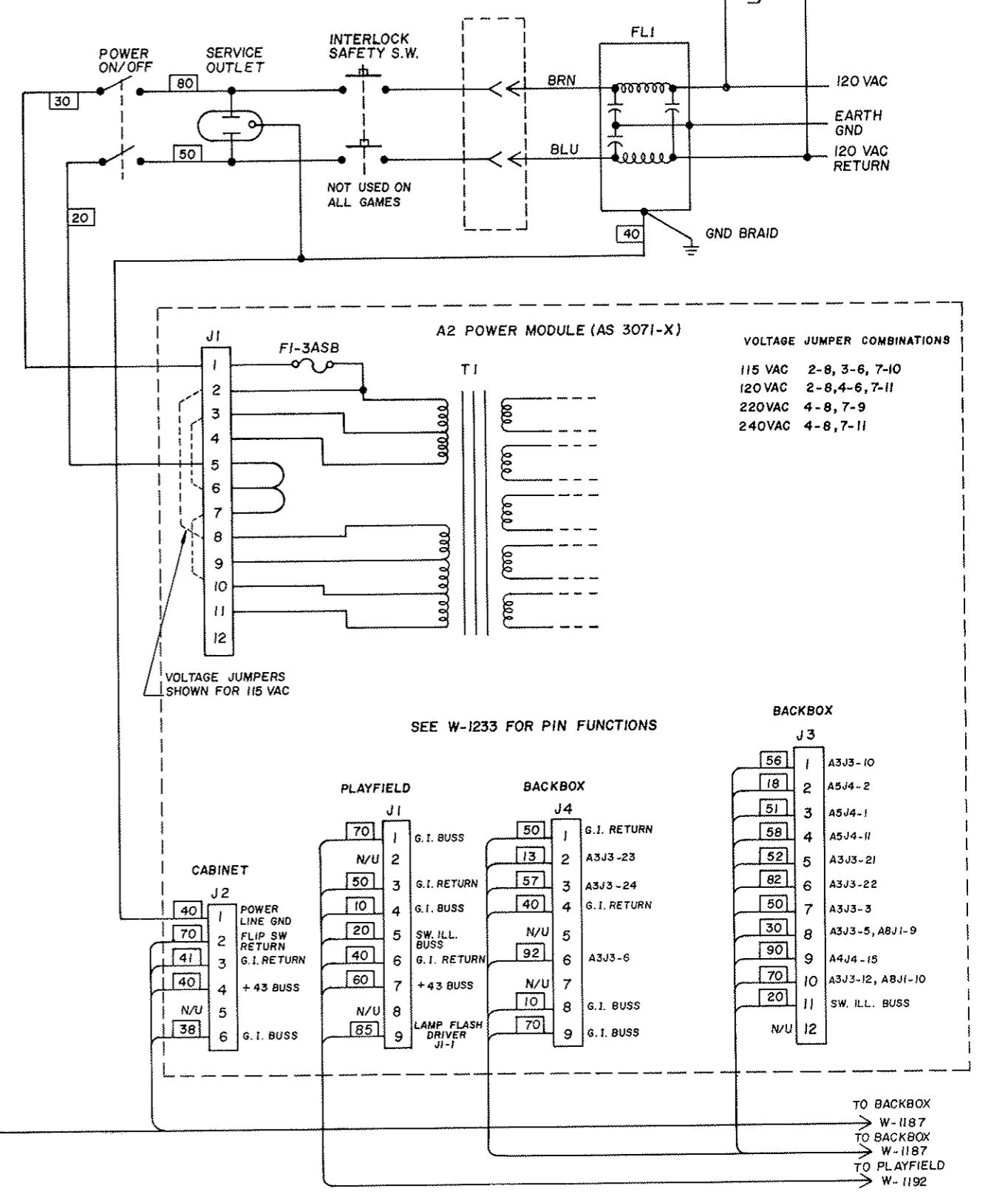
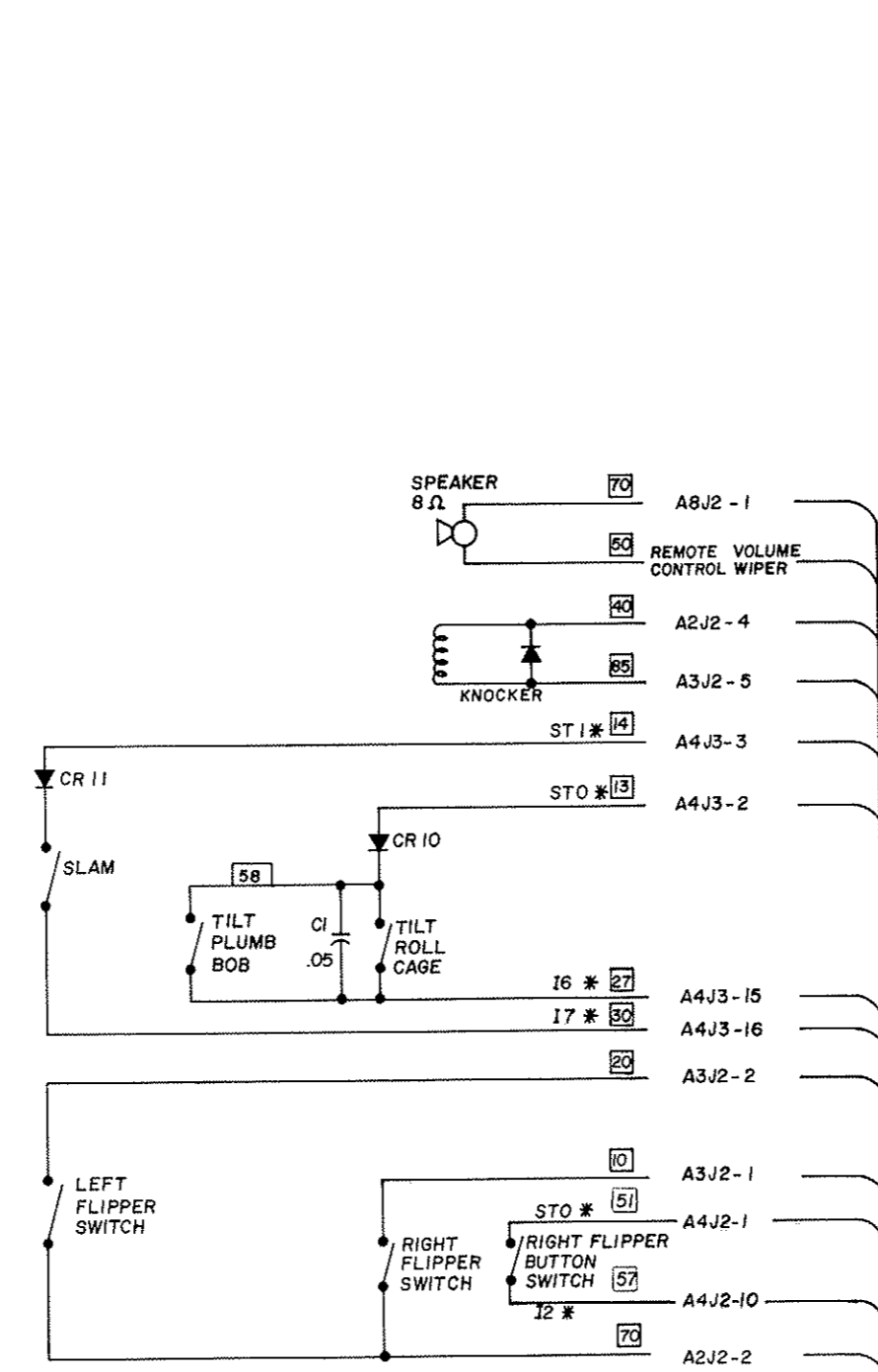
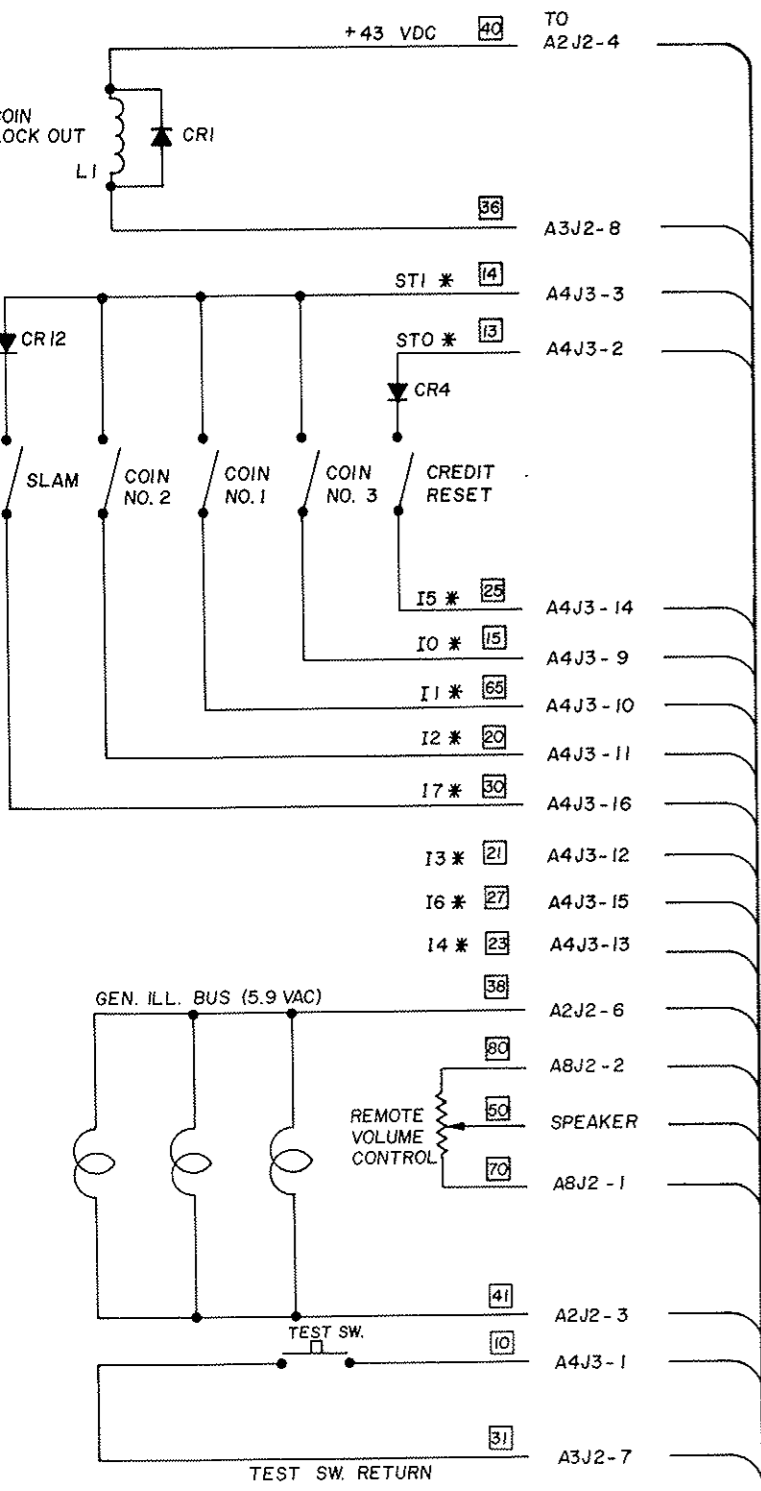
COMPONENTS PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
1	1	P-2948-451	P.C. Board	M-645-584
2	1	R1	300 Ω , 5%, 1/4W.	E-105-219
3	1	J1	6 Pin Wafer—KK156	E-736-6
4	1	U1	OPT./CP, MOC 3011	E-620-172
5	1	R2	100 Ω , 5%, 1/4W.	E-105-301
6	1	Q1	SCR, S2800A	E-585-65
7	1		Bolt, #6-32 3/8" LG.	LSPR-00632-1106
8	1		Nut, #6-32	N-00632-2112
9	1		Heat Sink, 6030BTT	E-682-8
10	AR		Thermal Grease	M-1834
REF.			Schematic	W-1252-b

VECTOR DRAWING FOR EMBRYON
EJECT SAUCER

To kick out along side of
scoop.





- 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)

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REMOVE ALL BURRS
TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS - 1/16
DECIMALS - .015
EXCEPT HOLE DIA. 5
ANGLES -

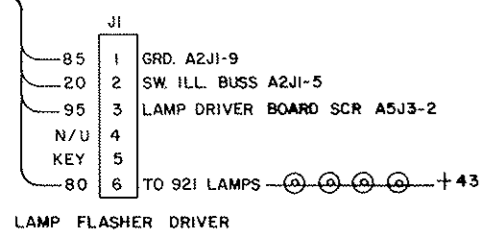
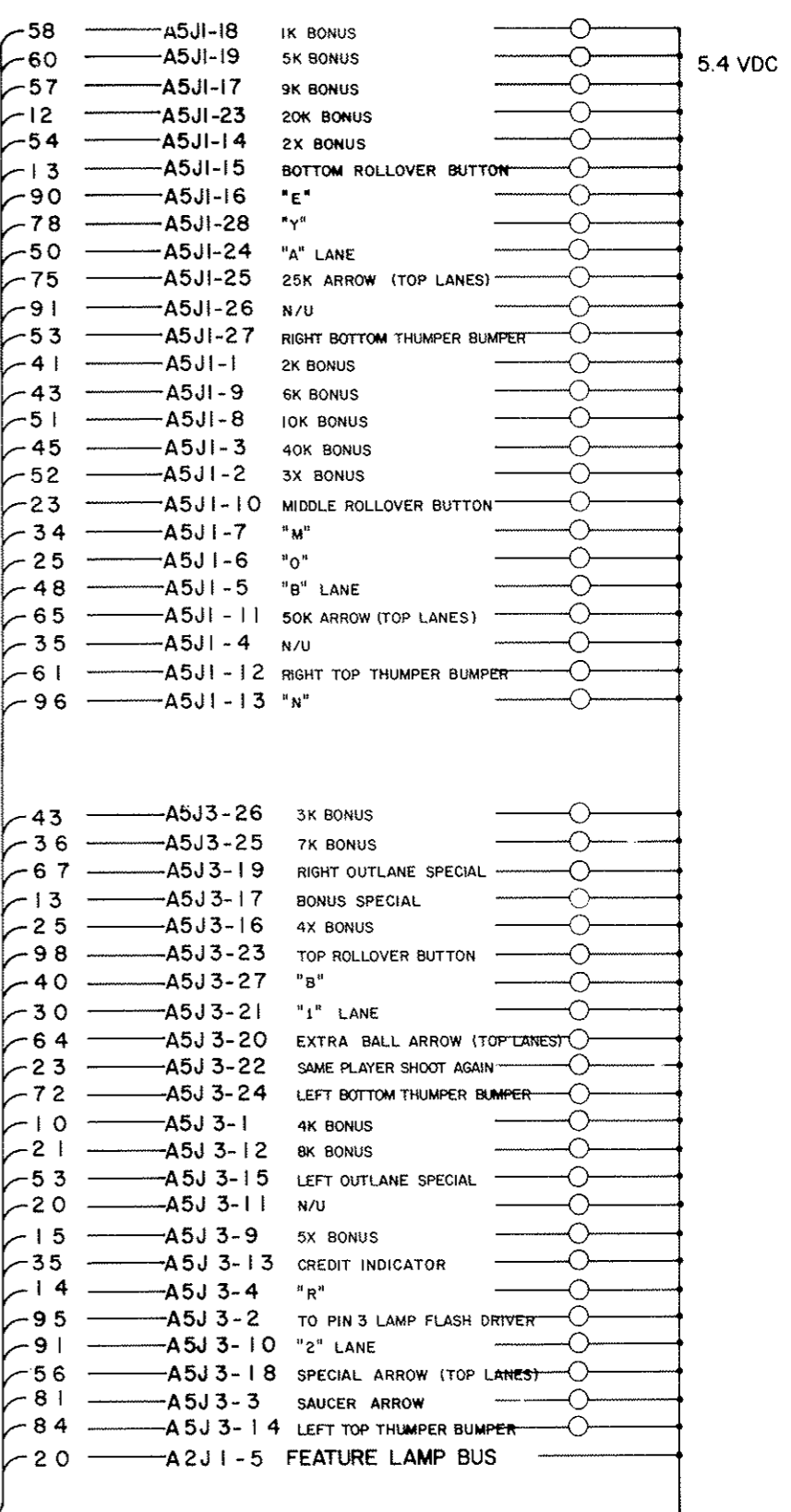
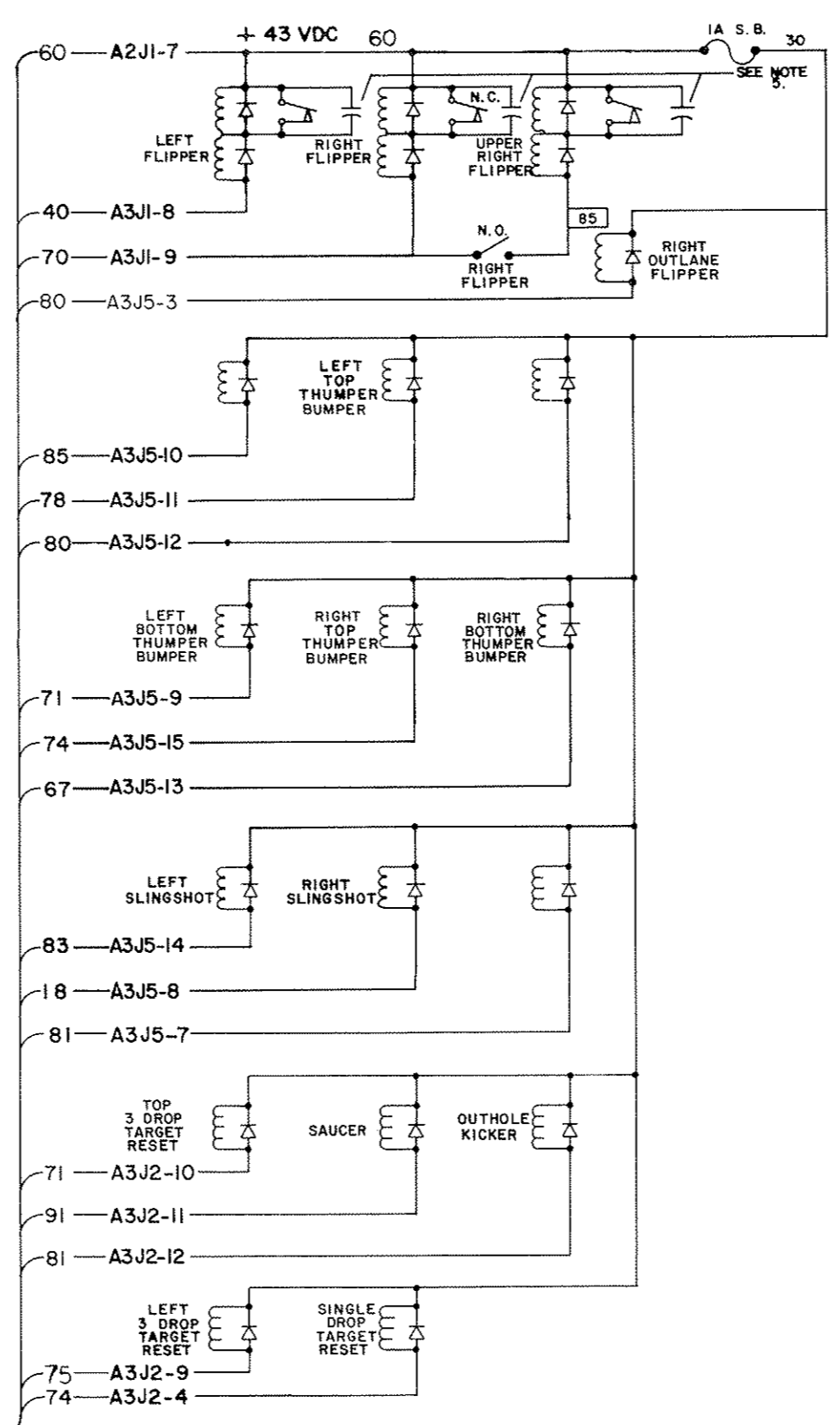
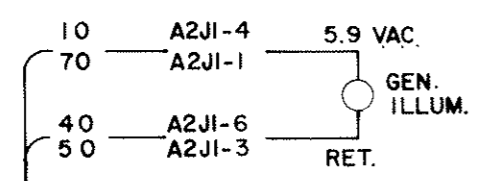
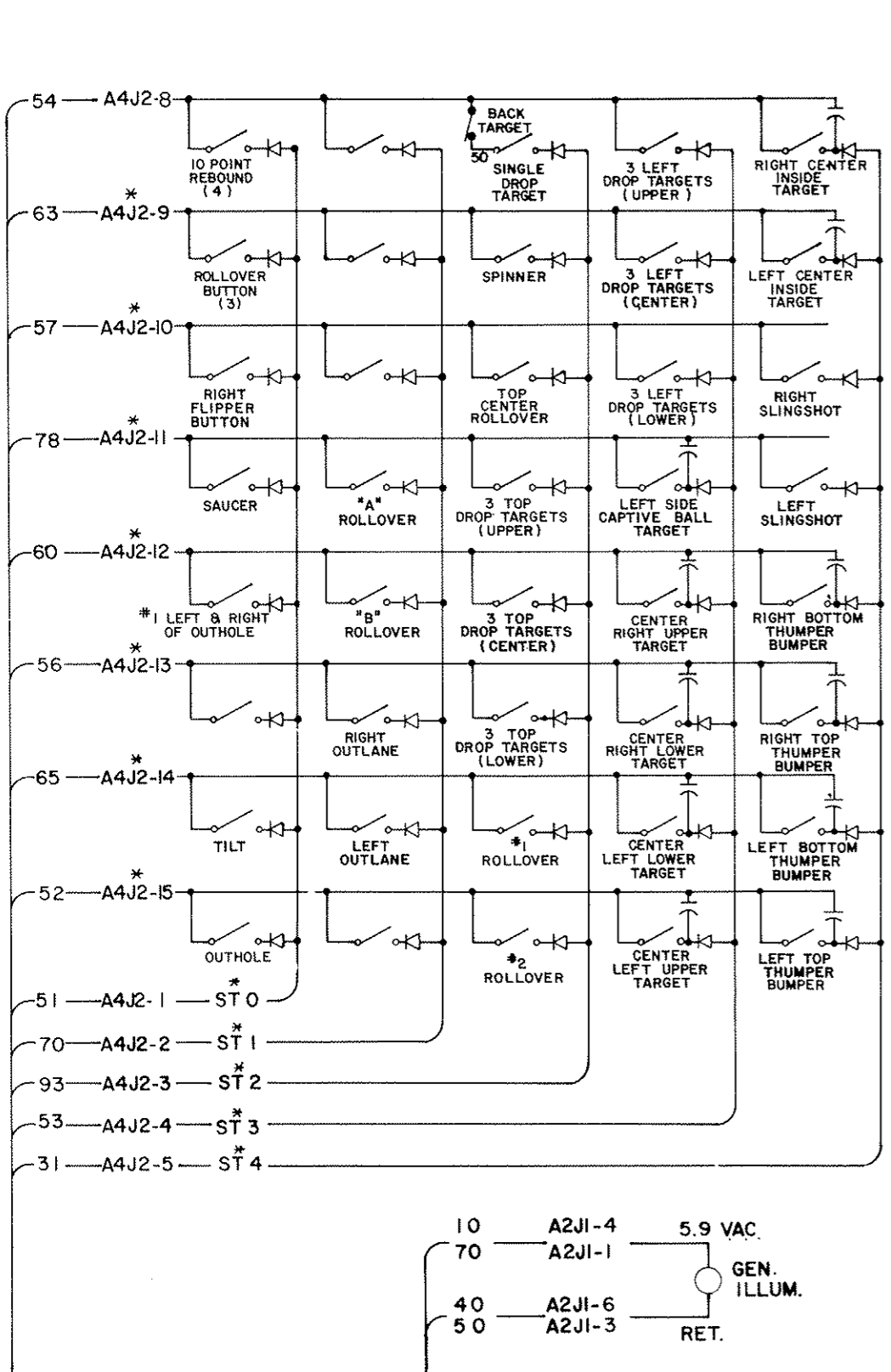
DR. BY DATE
CK. BY DATE
AP'D BY DATE
FINISH
HARDENING

Bally MANUFACTURING CORP.
2640 BELMONT AVENUE
CHICAGO, ILLINOIS. #1222

DIE SIZE: C.C. FT. PER M. LBS. PER M.
NAME: WIRING DIAGRAM - CABINET
MATERIAL: EMBRYON
ASSEM NO. USED
SCALE
PART NO. W-1186-12 c

DEPT.	DESCRIPTION	TOOL NO.

NO.	LET.	CHANGE	DATE	BY



- NOTES**
- INDICATES NOT USED
 - N/U = NOT USED ON PLAYFIELD
 - *INDICATES AID TEST POINT
 - COIL DIODES ARE IN4004, (E-587-6) SWITCH DIODES ARE IN 4148, (E-587-14)
ALL CAPACITORS ARE .05 MFD. (E-586-80)
 - GERMANY ONLY - CAPACITOR .01 MFD. @ 500V. (E-586-65)

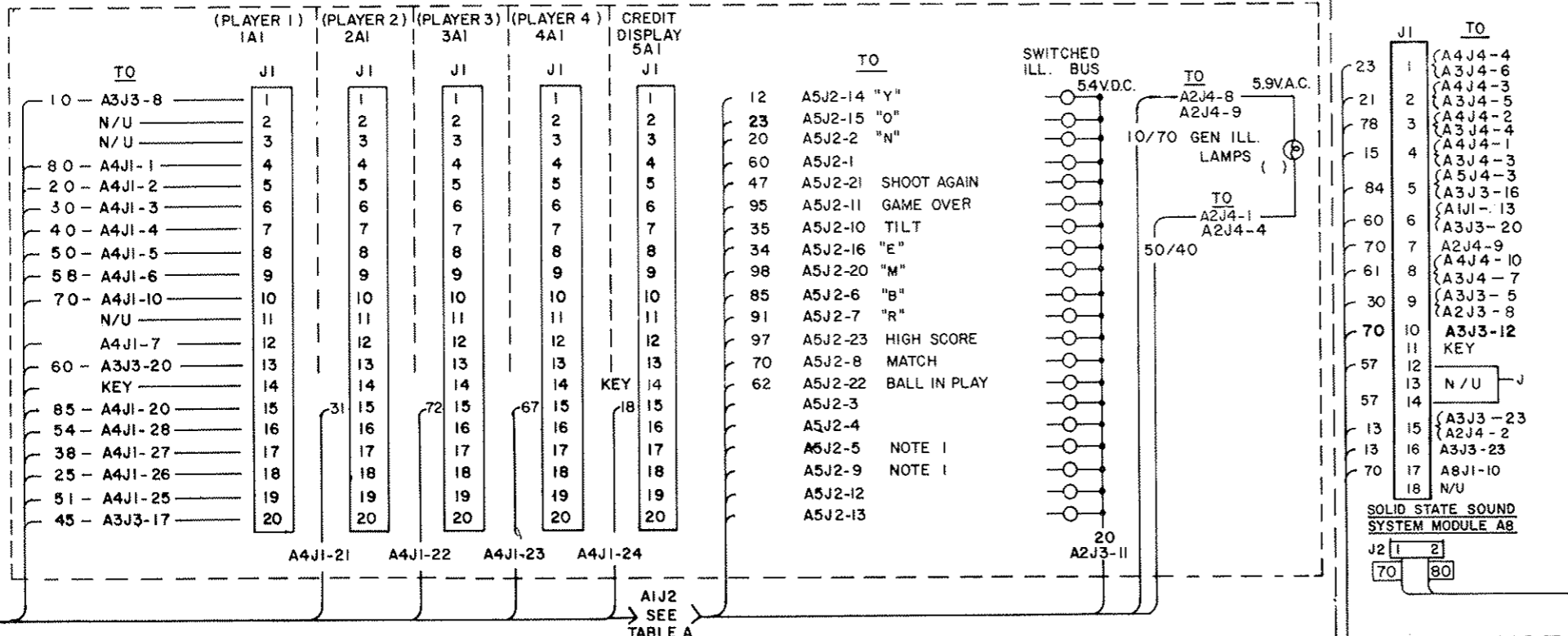
PLAYFIELD A6

REMOVE ALL BURRS		DR BY DATE JCG 9/30/81		Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS	
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		AP'D BY DATE J D 4-8-81		#1222	
FRACTIONS - 1/4		AP'D BY DATE J D 4/7/81		WIRING DIAGRAM PLAYFIELD	
DECIMALS - .005		FINISH		ASSEM NO USED ON W	
ANGLES - 2		HARDENING		PART NO W-1192-29c	
DO NOT SCALE DRAWING		MATERIAL EMBRYON			
LET	CHANGE	DATE	BY	CK	

TABLE A AIJ2

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

AI INSERT

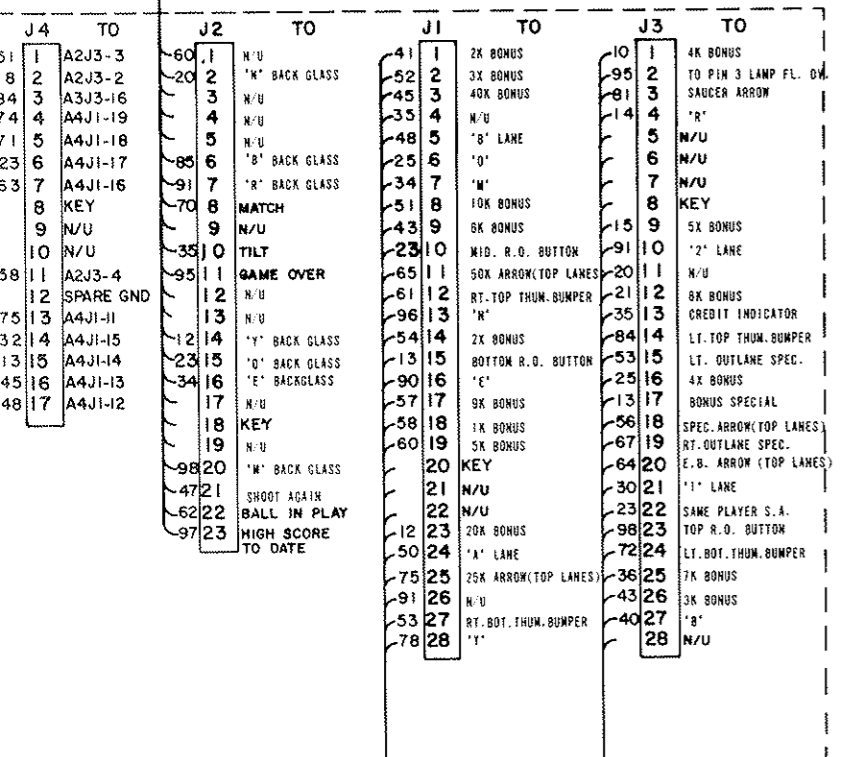


24 PIN PLUG			15 PIN PLUG			15 PIN PLUG		
FROM	PIN	WIRE	FROM	PIN	WIRE	FROM	PIN	WIRE
A2J4-4	1	40	A9J2-7	1	10	A9J3-8	1	13
A2J4-1	2	50	A9J2-14	2	12	A9J3-15	2	14
A2J3-2	3	18	A9J2-4	3	15	A9J3-3	3	20
A2J3-3	4	51	A9J2-11	4	18	A9J3-12	4	21
A2J4-6	5	92	A9J2-13	5	40	A9J3-10	5	25
A2J3-11	6	20	A9J2-17	6	43	A9J3-14	6	27
A2J3-10	7	70	A9J2-6	7	45	A9J3-9	7	53
A2J3-8	8	30	A9J2-8	8	51	A9J3-16	8	56
A2J4-9	9	70	A9J2-15	9	52	A9J3-11	9	70
A2J4-8	10	10	A9J2-9	10	54	A9J3-18	10	72
A2J3-9	11	90	A9J2-18	11	57	A9J3-7	11	82
A2J3-4	12	58	A9J2-5	12	60	A9J3-4	12	95
A2J3-5	13	52	A9J2-12	13	62	A9J3-13	13	96
A2J3-6	14	82	A9J2-10	14	80			
A2J3-1	15	56		15				
A2J3-7	16	50	PANEL TO BACK BOX			PANEL TO BACK BOX		
A2J4-2	17	13	PANEL TO BACK BOX			PANEL TO BACK BOX		
A2J4-3	18	57	CABINET TO BACK BOX			CABINET TO BACK BOX		

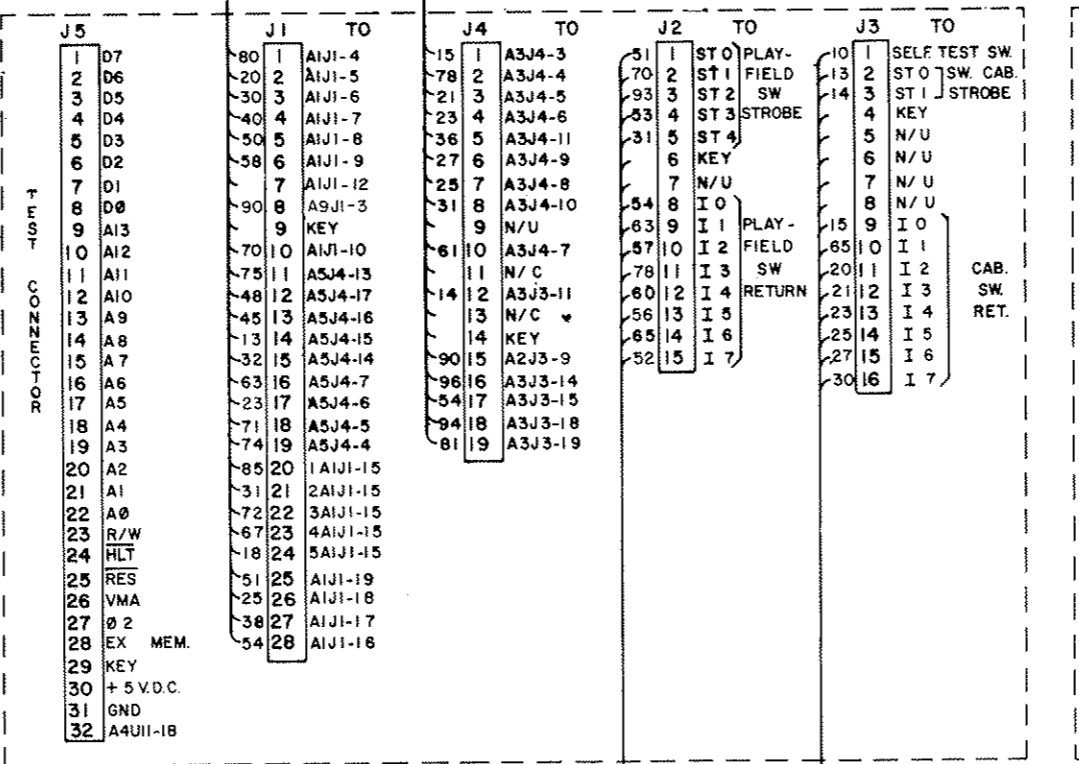
INSERT TO BACK CAB. PLUG

AIJ2 SEE TABLE A

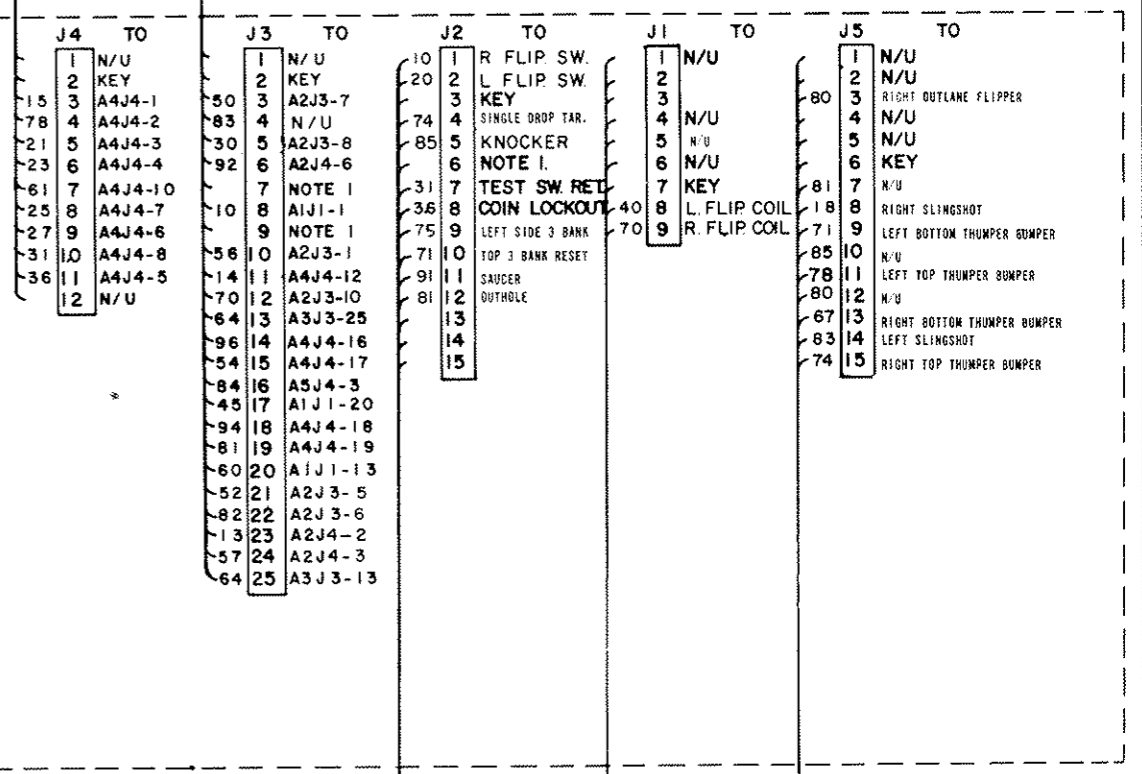
LAMP DRIVER A5



MPU A4



VOLTAGE REGULATOR / SOLENOID DRIVER A3



LOWER CABINET 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-NO TRACE

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REMOVE ALL BURRS

TOLERANCES UNLESS OTHERWISE SPECIFIED: FRACTIONS - 1/64 DECIMALS - .005 ANGLES - 1

DO NOT SCALE DRAWING

DR BY DATE

CR BY DATE

APD BY DATE

FINISH

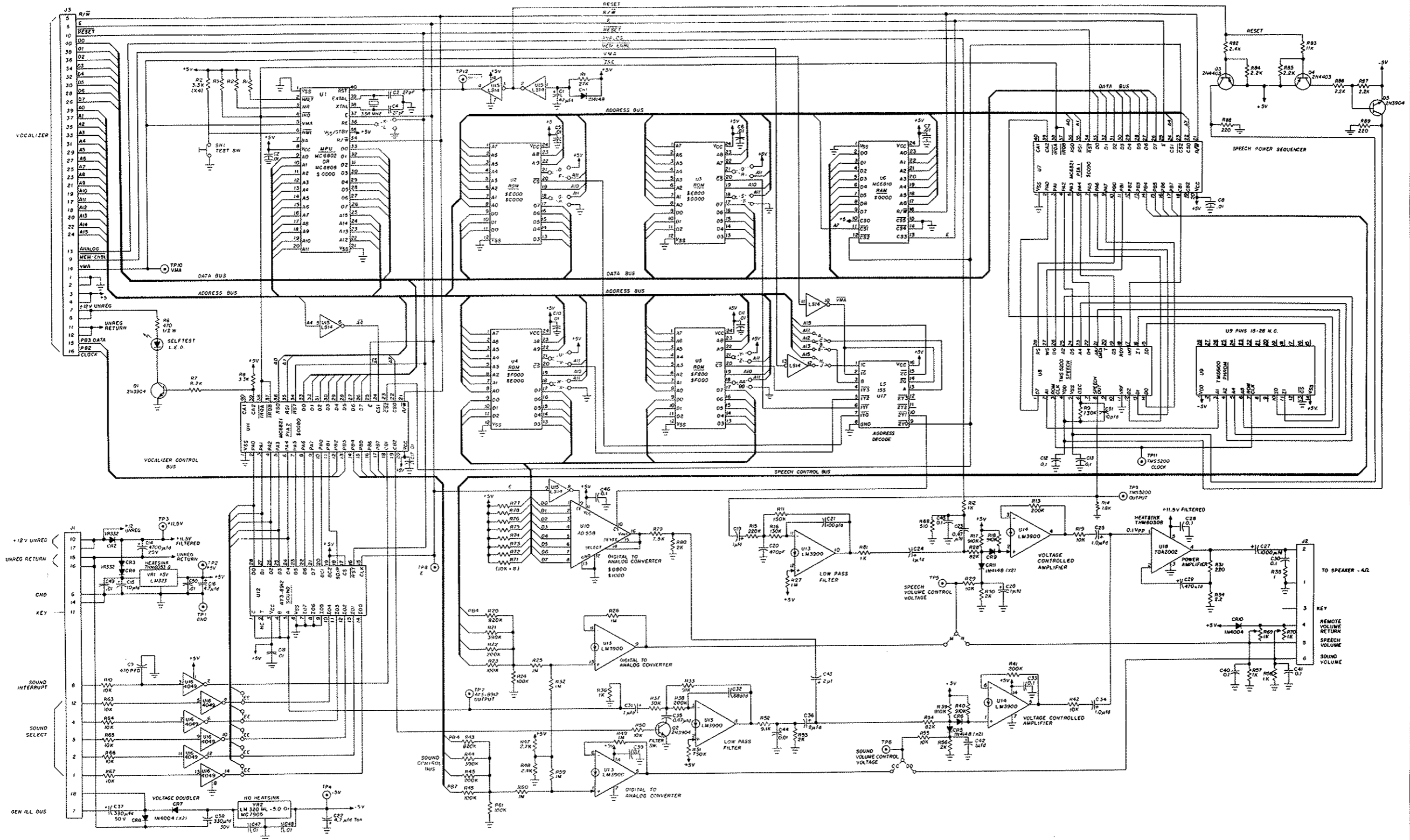
HARDENING

MATERIAL EMBRYON

WIRING DIAGRAM BACKBOX

ASSEMBLY NO. USED ON

PART NO. W-1187-29c



NOTES:
1. UNLESS OTHERWISE INDICATED ALL RESISTOR VALUES ARE IN OHMS.

LAST NUMBERS USED
R89
C81
C10
U18
VR 2
Q5
TP12
EE

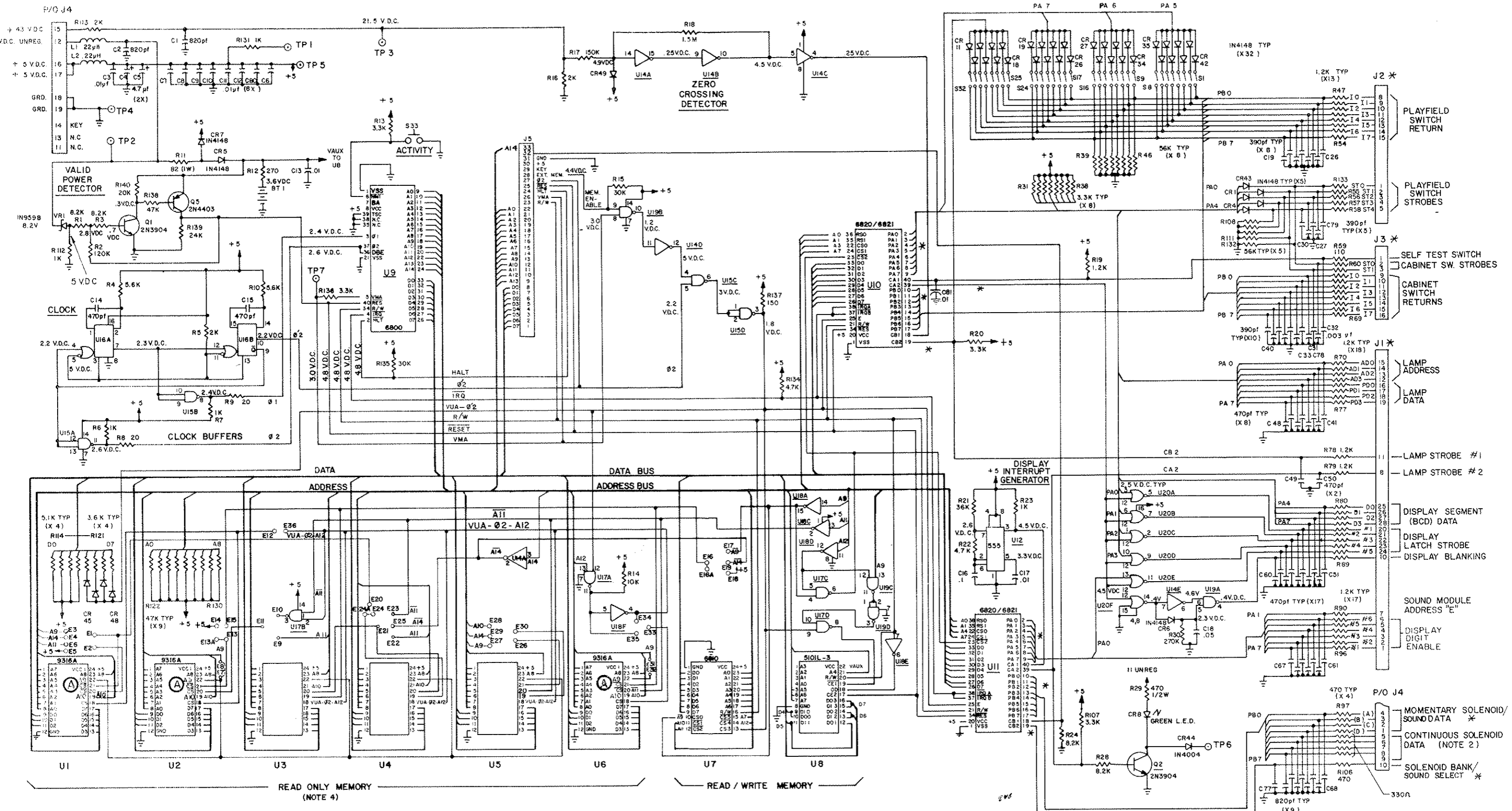
SQUAWK & TALK TEST POINTS
TP1 - GND
TP2 - +5VDC
TP3 - +11.5VDC
TP4 - +5VDC
TP5 - SPEECH VOLUME CONTROL VOLTAGE
TP6 - SOUND VOLUME CONTROL VOLTAGE
TP7 - 3.3-8912 OUTPUT
TP8 - E FULCR
TP9 - TMS3200 OUTPUT
TP10 - VMA
TP11 - TMS3200 CLOCK
TP12 - RESET

SQUAWK & TALK JUMPERS
FROM - ROM JUMPERS
2716 2316 A.D.D.O.T.U.V.X.BB
2532 9332 C.E.G.O.S.U.W.Y.AA
NO VOCALIZER H
WITH VOCALIZER J
6808 MPU L (WITH 8810 RAM)
6802 MPU M (NO 6810 RAM)
NO AY3-8912 EE

COMPUTER VOLUME CONTROL
REMOTE VOLUME CONTROL

SPEECH SOUND
CC M
DD N

REVISIONS		DATE	BY	CHKD BY
1	INITIALS			
2	REVISIONS			
3	DATE			
4	BY			
5	CHKD BY			
6	DATE			
7	BY			
8	CHKD BY			
9	DATE			
10	BY			
11	CHKD BY			
12	DATE			
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96	DATE			
97	BY			
98	CHKD BY			
99	DATE			
100	BY			

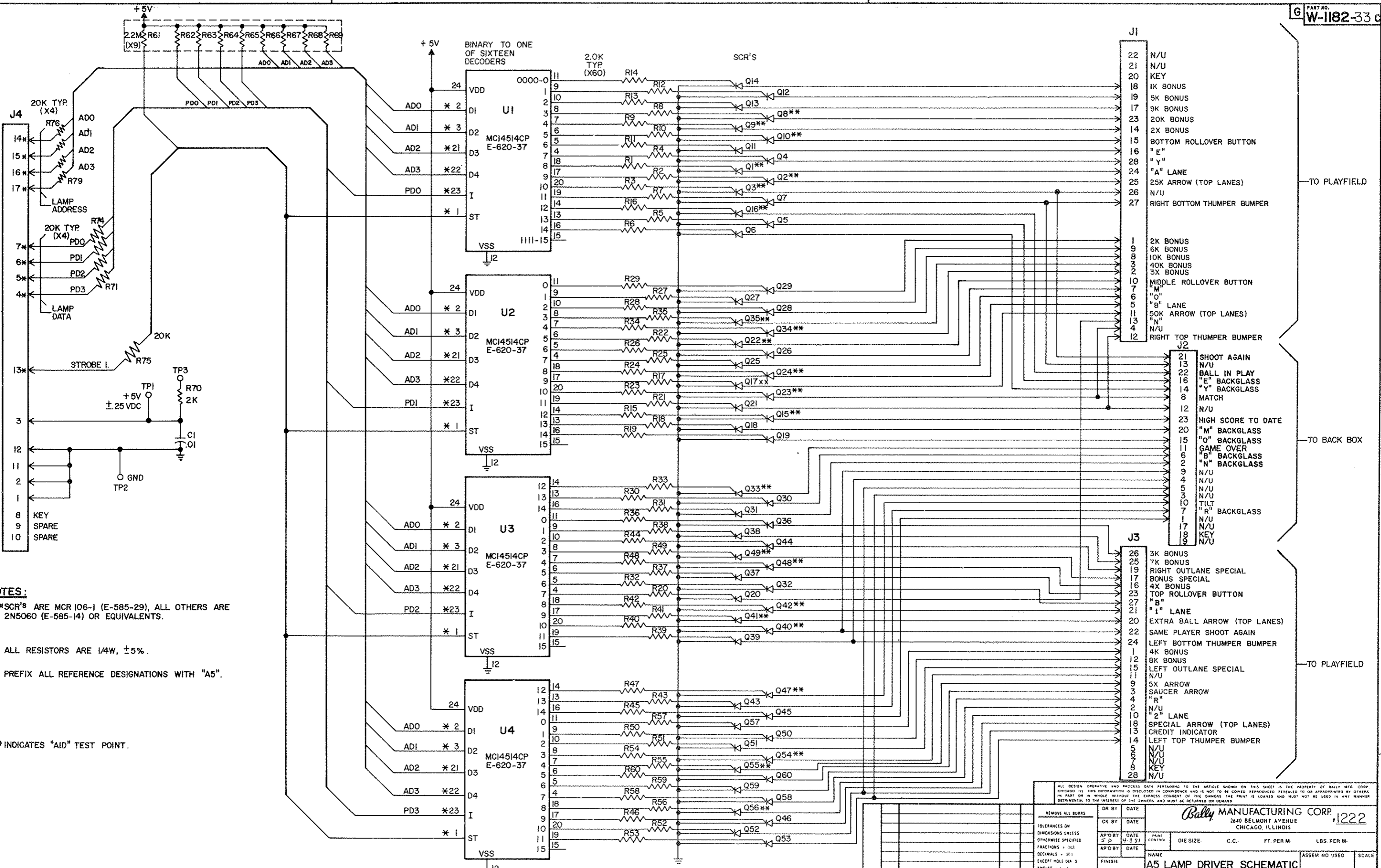


NOTES

* INDICATES "AID" TEST POINT.
 REMOVE A3J4 BEFORE USING AS AID TEST POINT.
 PREFIX ALL REFERENCE DESIGNATIONS WITH "A4".
 EXACT CHIP COMPLEMENT USED IN SOCKETS U1 THRU U6 CAN VARY FOR DIFFERENT GAMES AND PRODUCTION LOTS.
 TABLES OF MEMORY CHIPS AND CORRESPONDING JUMPERS FOR DIFFERENT GAMES AVAILABLE FROM BALLY FIELD SERVICE DEPARTMENT.

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REMOVE ALL BURRS		DATE: 5-23-74		Bally MANUFACTURING CORP		2640 BELMONT AVENUE		CHICAGO, ILLINOIS		1119-E	
TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS: 1/64 DECIMALS: .005 ANGLES: 1°		DATE: 5-23-74		PRINT CONTROL		TOTAL		SCALE		ASSEMBLY NO. USED ON W	
DO NOT SCALE DRAWING		FINISH		NAME		M.P.U. CONTROL BOARD SCHEMATIC		PART NO.		W-1181-3c	
No. LET		CHANGE		DATE		BY		CR			



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Bally MANUFACTURING CORP.
 2640 BELMONT AVENUE
 CHICAGO, ILLINOIS 60647

1222

NAME: A5 LAMP DRIVER SCHEMATIC
 MATERIAL: EMBRYON
 PART NO: W-1182-33 c

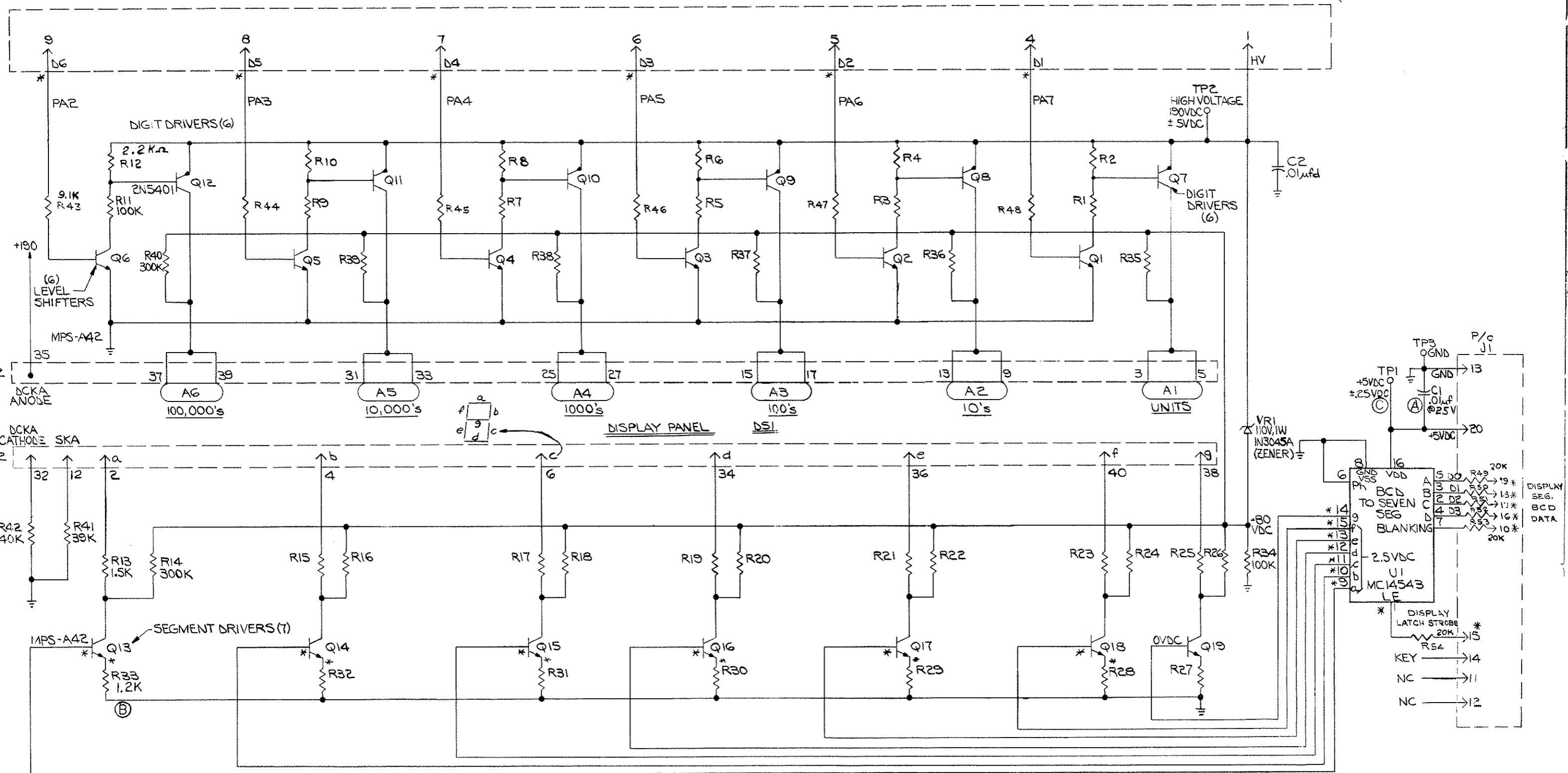
DR BY	DATE	DR BY	DATE
CK BY	DATE	CK BY	DATE
AP'D BY	DATE	AP'D BY	DATE
AP'D BY	DATE	AP'D BY	DATE
FINISH	DATE	FINISH	DATE
HARDENING	DATE	HARDENING	DATE

REMOVE ALL BARRS
 TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED
 FRACTIONALS - 1/32
 DECIMALS - .001
 EXCEPT HOLE DIA'S
 ANGLES - 45°
 DO NOT SCALE DRAWING

NO	LET	CHANGE	DATE	BY

DEPT.	DESCRIPTION	TOOL NO.

DISPLAY DIGIT ENABLE



- NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE ± 5%, 1/4W.
 2. PREFIX ALL REFERENCE DESIG. WITH ASSEMBLY REFERENCE DESIG. "A1"
 3. * INDICATES 'AID' TEST POINT.

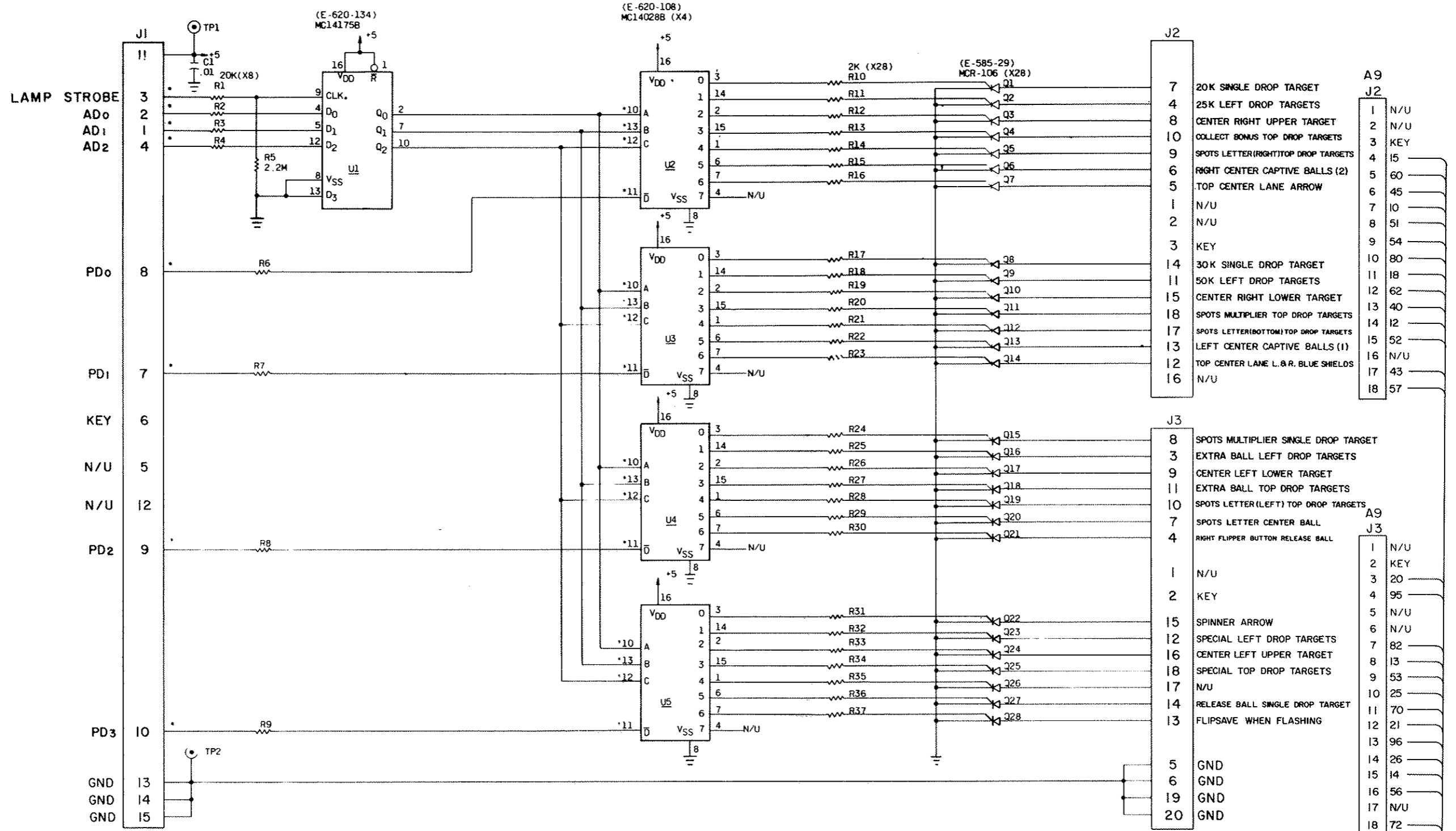
DIE SIZE — C.C. — FT. PER M — LBS. PER M —

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REMOVE ALL BURRS		DR. BY DATE	Bally MANUFACTURING CORP. #1120-E	
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		CK. BY DATE	2640 BELMONT AVENUE	
FRACTIONS: DECIMALS: ANGLES: DO NOT SCALE DRAWING		APP'D BY DATE	CHICAGO, ILLINOIS	
		FINISH	MAY 10 1977	
		HARDENING	NAME: 6 DIGIT DISPLAY BOARD SCHEMATIC 'A1'	
			MATERIAL: AS-2518-21	
			PART NO. W-1184-1c	

3	C	WAS VAC	6-20-80	J.D.
2	B	WAS 1K	9-28-80	J.O.
1	A	WAS 500V	4-16-79	J.D.
NO.	LET.	CHANGE	DATE	BY

DEPT.	DESCRIPTION	TOOL No.
-------	-------------	----------



A9 TO J1

13	1	A5J4-15
32	2	A5J4-14
90	3	A4J1-8
45	4	A5J4-16
	5	KEY
	6	KEY
23	7	A5J4-6
63	8	A5J4-7
71	9	A5J4-5
74	10	A5J4-4
84	11	A5J4-3
	12	
	13	
	14	
58	15	A5J4-11

A9 J2

1	N/U
2	N/U
3	KEY
4	15
5	60
6	45
7	10
8	51
9	54
10	80
11	18
12	62
13	40
14	12
15	52
16	N/U
17	43
18	57

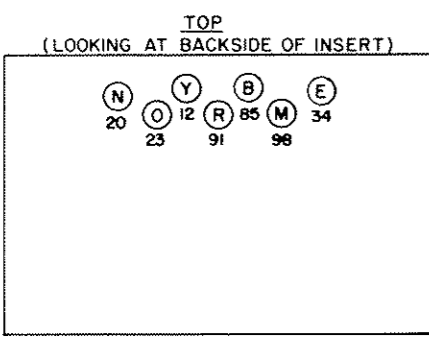
J3 A9

8	SPOTS MULTIPLIER SINGLE DROP TARGET	1	N/U
3	EXTRA BALL LEFT DROP TARGETS	2	KEY
9	CENTER LEFT LOWER TARGET	3	20
11	EXTRA BALL TOP DROP TARGETS	4	95
10	SPOTS LETTER(LEFT) TOP DROP TARGETS	5	N/U
7	SPOTS LETTER CENTER BALL	6	N/U
4	RIGHT FLIPPER BUTTON RELEASE BALL	7	82
1	N/U	8	13
2	KEY	9	53
15	SPINNER ARROW	10	25
12	SPECIAL LEFT DROP TARGETS	11	70
16	CENTER LEFT UPPER TARGET	12	21
18	SPECIAL TOP DROP TARGETS	13	96
17	N/U	14	26
14	RELEASE BALL SINGLE DROP TARGET	15	14
13	FLIPSAVE WHEN FLASHING	16	56
5	GND	17	N/U
6	GND	18	72
19	GND	19	N/U
20	GND	20	N/U

TO PANEL W-1255

TO INSERT

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



EMBRYON LIGHTS

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DESIGNED BY	DATE	DR BY	DATE
CHECKED BY	DATE	CK BY	DATE
AP'D BY	DATE	AP'D BY	DATE
DATE	DATE	DATE	DATE
FINISH	FINISH	FINISH	FINISH

Bally MANUFACTURING CORP.
2640 BELMONT AVENUE
CHICAGO, ILLINOIS 60622

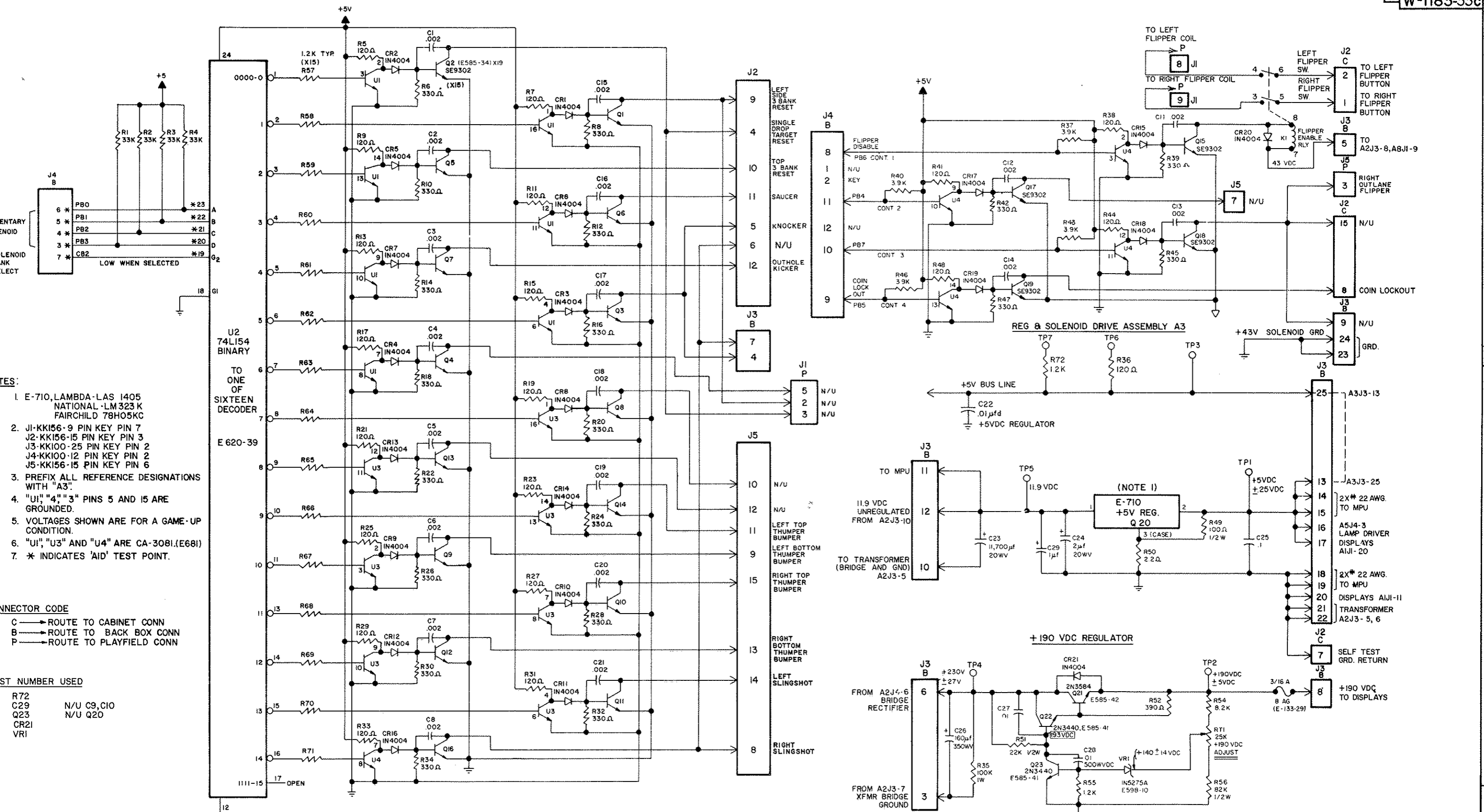
DIE SIZE - CC - FT PER M. - LBS PER M. -

AUXILIARY LAMP DRIVER A9

EMBRYON

ASSEM NO USED:
SCALE:
PART NO: W-1207-8 c

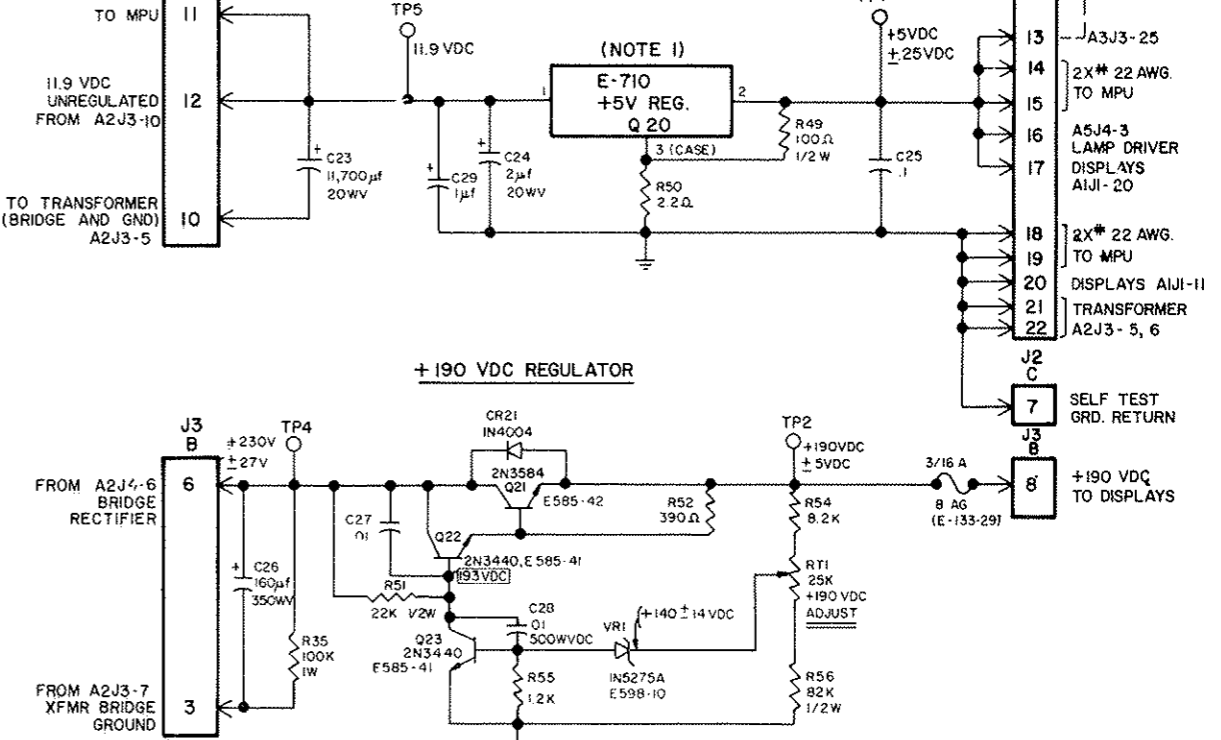
TO W-1187-29



- TESTS:
1. E-710, LAMBDA-LAS 1405 NATIONAL -LM323K 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

- COMPONENT NUMBER USED
- R72 N/U C9, C10
 - C29 N/U Q20
 - Q23 N/U Q20
 - CR21 N/U Q20
 - VRI



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REMOVE ALL BURS	OR BY	DATE
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	CK. BY	DATE
FRACTIONS - 1/16	AP'D BY	DATE
DECIMALS - 0.03	AP'D BY	DATE
EXCEPT HOLE DIA'S	FINISH:	
ANGLES - 1/2"	HARDENING:	
DO NOT SCALE DRAWING		

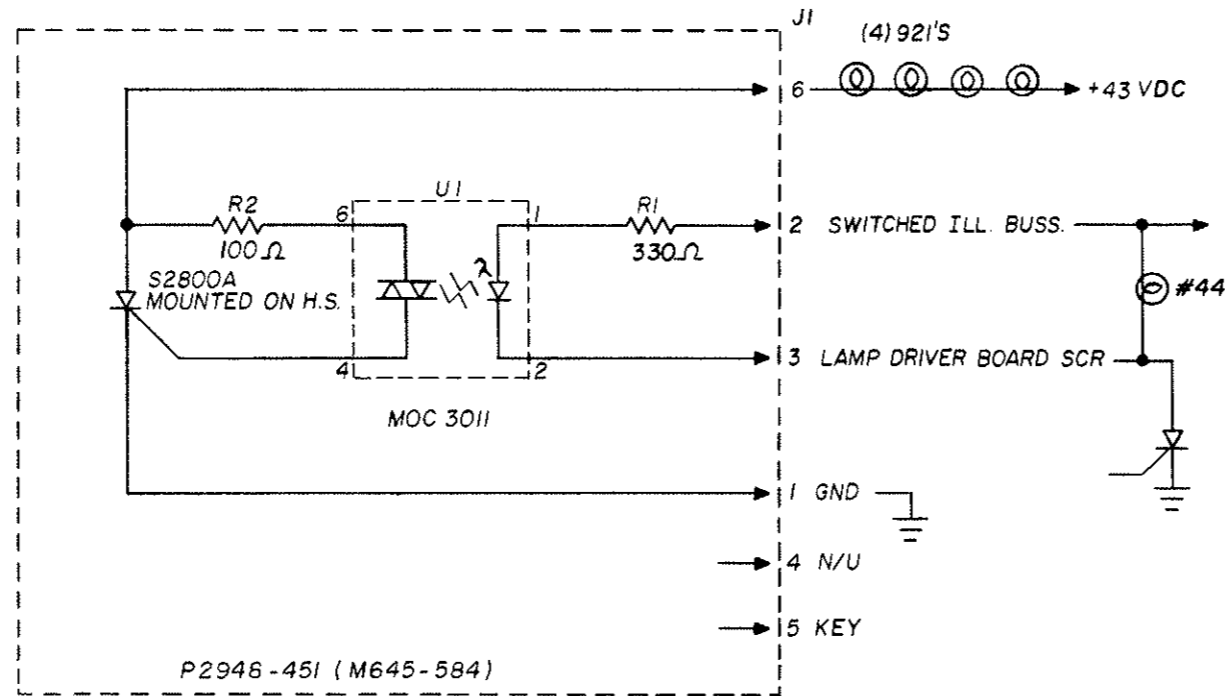
Bally MANUFACTURING CORP. 1222
 7640 BELMONT AVENUE
 CHICAGO, ILLINOIS

NAME: SOLENOID DRIVER VOLTAGE REGULATOR SCHEMATIC
 MATERIAL: EMBRYON
 PART NO: W-1183-33c

DEPT.	DESCRIPTION	TOOL NO.

NO.	LET.	CHANGE	DATE	BY

PART NO.
W-1252 b



P2946-451 (M645-584)

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REMOVE ALL BURRS		DR. BY FFC	DATE 1-22-81	Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS #1219	
		CK. BY	DATE		
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		AP'D BY J.S.	DATE 1-22-81	PRINT CONTROL	DIE SIZE: C.C. FT. PER M. LBS. PER M.
FRACTIONS ± .008		AP'D BY J.S.	DATE 1-23-81	NAME	ASSEM. NO. USED
DECIMALS ± .003		FINISH: <input checked="" type="checkbox"/> X		SCR LAMP FLASHER (SCHEMATIC)	AS-2518-67
EXCEPT HOLE DIA.'S		HARDENING: <input checked="" type="checkbox"/> X		MATERIAL	SCALE
ANGLES ± 1/2°		DO NOT SCALE DRAWING		CODE	PART NO.
					W-1252 b

OPER.	DEPT.	DESCRIPTION	TOOL NO.

NO.	LET.	CHANGE	DATE	BY

PART NO.
W-1233

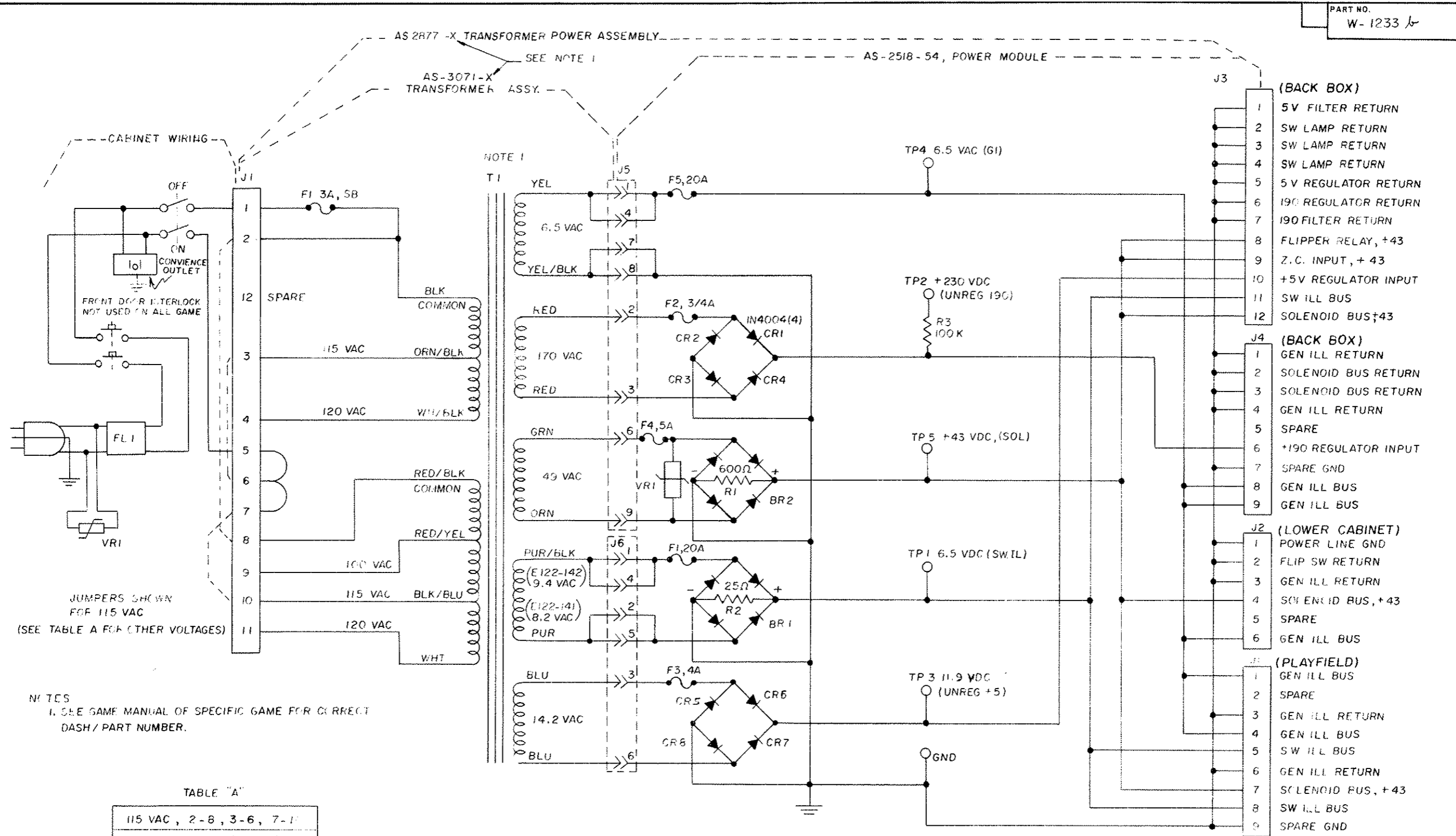


TABLE "A"

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

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OPER.	DEPT.	DESCRIPTION	TOOL NO.

NO.	LET.	CHANGE	DATE	BY

REMOVE ALL BURRS	DR. BY FFC	DATE 7-10-80	Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS # 1196				
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED FRACTIONS ± .008 DECIMALS ± .003 EXCEPT HOLE DIA'S ANGLES ± 1/2°	CK. BY AMCR	DATE 7-11-80					
DO NOT SCALE DRAWING	AP'D BY	DATE	PRINT CONTROL	DIE SIZE	C.C.	FT. PER M.	LBS. PER M.
	FINISH:		NAME	POWER SUPPLY SCHEMATIC			ASSEM. NO. USED
	HARDENING:		MATERIAL				PART NO. W-1233
			CODE				SCALE