

GAME 1248
FO 721

Bally® ELEKTRA



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PINBALL DIVISION

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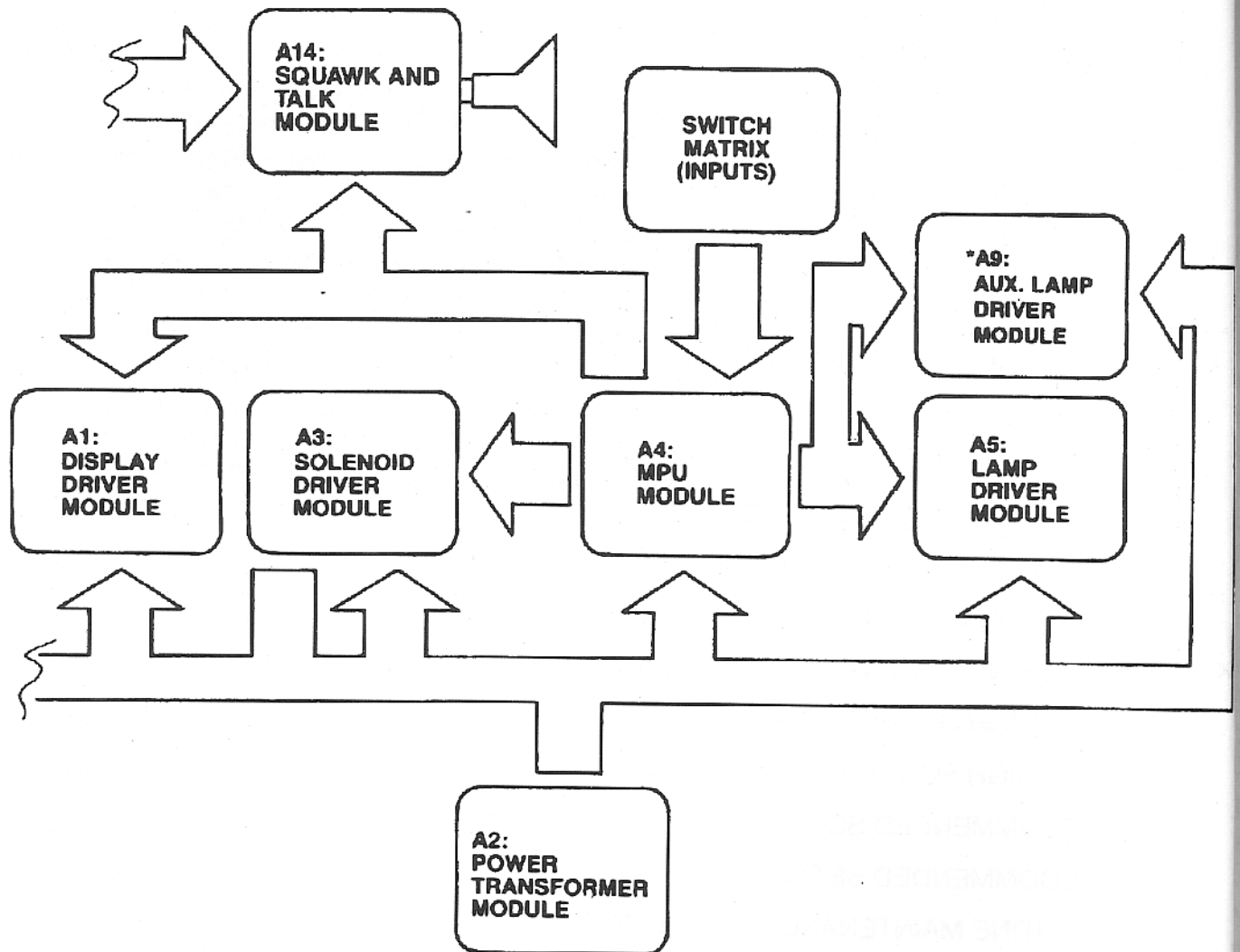
Installation and General Game Operation Instructions

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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 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— 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.

FEATURE OPERATION & SCORING

A. BONUS FEATURE

Two separate bonus one of 1000 to 39000 and a second one of 5000 to 195000 may be scored. The first bonus applies to the two upper levels and the second one applies to the mini playfield.

The first bonus advances one step at a time each time the ball goes into the saucers, the top left rollover buttons are lit and the right outlane rollover is activated. The first bonus advances two steps at a time when the top stand-up targets are lit, when all lower stand-up targets are lit, the left outlane rollover scores two bonus advances at all times. The second bonus advances five bonus at a time when the three left and right stand up targets are lit.

B. BONUS COLLECT AND BONUS MULTIPLIER'S FEATURE

Making the center three stand up targets once will open the gate and twice lites the ball shooter lane arrow for collect bonus, the lit bonus score is added to the player's total score. If 2X, 3X or 5X is lit the score will be twice, three or five times. A tilt nullifies the bonus score. The bonus multipliers are lit by knocking down first inline drop target for 2X, the second one for 3X and making the stand up target with the captured ball for 5X.

C. TOP STAND-UP TARGETS FEATURE

Making 1-2-3 when flashing awards two Elektra units and lites top left rollover buttons, if actuated in the direction in which they move 4-5-6 will flash. Making 4-5-6 will lite top saucer arrow for lock ball.

D. TOP CAPTIVE BALL FEATURE

Making 2X and 3X by knocking down the inline drop targets will also flash 4 and 5 when 1-2-3 are lit, making them the stand-up target.

1st time lites 5X, 10 Elektra units, arrow 6 flashes and scores 25,000, at all times.

2nd time rewards 10 Elektra units.

Switch #6 Memory for advancing 4-5-6 arrows.

ON: Liberal

OFF: Conservative

E. TOP SPECIAL FEATURE

Making 1-2-3 targets and 4-5-6 arrows lites top right rollover button for special which will flash ON and OFF every 10 seconds. Actuating rollover button when flashing scores a special.

Switch #23 Memory for top special

ON: Liberal

OFF: Conservative

F. SECOND LEVEL CENTER TARGETS FEATURE

Making center targets: 1st time opens lower gate:

2nd time lites collect bonus

Making the center targets will also release the right captured ball, advance the left targets and lites the outlane special if the left targets are lit; the special will alternate from side to side.

Switch #22 Memory for center targets.

ON: Liberal

OFF: Conservative

Switch #7 Advancing left targets.

ON: Liberal

OFF: Conservative

G. SECOND LEVEL LEFT BLUE TARGETS FEATURE

Making flashing light which can rotate with the left flipper button, flashes 3 lights. Making those 3 flashing lights, flashes 5 lights. Making these 5 lights, lites right saucer arrow for lock ball and left outlane for 10 Elektra units. Making center target only at this time lites outlane special, which alternates from side to side. When ball is captured in the right saucer, making the center targets will release it. Repeating the lights cycle releases the captured ball. Each flashing target scores 2 Elektra units.

Switch #8 lights setting 1-3-5 or 1-2-3-4-5

ON: Liberal

OFF: Conservative

Switch #24 Memory for specials

ON: Liberal

OFF: Conservative

H. MULTI-BALL AND EXTRA BALL FEATURE

Multi-ball play can be achieved when unlocking the top captured ball by making 1-2-3 targets, also when unlocking the lower captured ball by making the center targets or completing the left targets lights cycle. If a ball is captured on the top saucer, locking the second ball into the lower saucer will release both captured balls, and vice-and-versa. Extra ball is achieved by capturing a ball into the top and right saucer. Right saucer lites spinner which rotates from side to side when actuated.

I. ELEKTRA UNITS AND MINI PLAYFIELD FEATURE

The mini playfield can be actuated only after the ball in play drains and a minimum of 6 Elektra units have been earned. When the player loses 1st ball while some Elektra units remain the ball will come back into play, if the game is set for it, see switch setting. The play on the mini playfield can be terminated when Elektra units have been used up, again depending ON the switch setting.

Switch #14 Minimum time required.

ON: Liberal (6 units)

OFF: Conservative (10 units)

Switch #15 Kick if time remains

ON: Liberal (Yes)

OFF: Conservative (No)

Switch # 16 End of game when time expires.

ON: Liberal (No)

OFF: Conservative (Yes)

Switch #24 Memory for time

ON: Liberal

OFF: Conservative

To lite 2X multiplier can be accomplished

— By Making 1-2-3 in order.

— By Making 3-4-5 in order.

— By making 1-2-3-4-5-6 in any order.

Making 2X when lit the score will be double.

Making 1-2-3 increases left rollover score to 1000 points by lighting left arrow and making 4-5-6 increases right rollover score to 1000 points by lighting right arrow.

J. 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.

Self test position 16 playfield X-Balls and Specials	Set to "03" AWARD	Set to "02" AWARD	Set to "01" AWARD
Rollover button Special	REPLAY	X-BALL*	50,000
Bonus Special	REPLAY	X-BALL*	50,000
Left or right out Special	REPLAY	X-BALL*	50,000
Top and Right saucer feature X-Ball	X-BALL	X-BALL**	25,000
Self-Test Position 17	Set to "03" AWARD	Set to "02" AWARD	Set to "01" AWARD
Scoring Thresholds	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 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	TOTAL CREDITS/COIN
#1 (HINGE SIDE)	5	4	3	2	1						
OR #3 (RIGHT SIDE)	13	12	11	10	9						
OFF	OFF	OFF	OFF	OFF	OFF	1/1 Coin					
OFF	OFF	OFF	OFF	OFF	ON	2/1 Coin					
OFF	OFF	OFF	ON	OFF	OFF	3/1 Coin					
OFF	OFF	OFF	ON	ON	ON	4/1 Coin					
OFF	OFF	ON	OFF	OFF	OFF	5/1 Coin					
OFF	OFF	ON	OFF	ON	ON	6/1 Coin					
OFF	OFF	ON	ON	OFF	OFF	7/1 Coin					
OFF	OFF	ON	ON	ON	ON	8/1 Coin					
OFF	ON	OFF	OFF	OFF	OFF	9/1 Coin					
OFF	ON	OFF	OFF	ON	ON	12/1 Coin					
OFF	ON	OFF	ON	OFF	OFF	14/1 Coin					
OFF	ON	OFF	ON	ON	ON	1/2 Coins*					
OFF	ON	ON	OFF	OFF	OFF	2/2 Coins*					
OFF	ON	ON	OFF	ON	ON	3/2 Coins*					
OFF	ON	ON	ON	ON	OFF	4/2 Coins*					
OFF	ON	ON	ON	ON	ON	5/2 Coins*					
ON	OFF	OFF	OFF	OFF	OFF	6/2 Coins*					
ON	OFF	OFF	OFF	ON	ON	7/2 Coins*					
ON	OFF	OFF	ON	OFF	OFF	8/2 Coins*					
ON	OFF	OFF	ON	ON	ON	9/2 Coins*					
ON	OFF	ON	OFF	OFF	OFF	12/2 Coins*					
ON	OFF	ON	OFF	ON	ON	14/2 Coins*					
ON	OFF	ON	ON	ON	OFF	1/1st Coin	2/2nd Coin				3/2
ON	OFF	ON	ON	ON	ON	0/1st Coin*	1/2nd Coin	1/3rd Coin	1/4th Coin		3/4
ON	ON	OFF	OFF	OFF	OFF	0/1st Coin*	1/2nd Coin	0/3rd Coin**	2/4th Coin		3/4
ON	ON	OFF	OFF	ON	ON	1/1st Coin	1/2nd Coin	1/3rd Coin	2/4th Coin		5/4
ON	ON	OFF	ON	OFF	OFF	1/1st Coin	2/2nd Coin	1/3rd Coin	3/4th Coin		7/4
ON	ON	OFF	ON	ON	ON	1/1st Coin	2/2nd Coin	2/3rd Coin	2/4th Coin		7/4
ON	ON	ON	OFF	OFF	OFF	0/1st Coin***	0/2nd Coin***	1/3rd Coin			1/3
ON	ON	ON	OFF	ON	ON	0/1st Coin**	0/2nd Coin**	0/3rd Coin**	1/4th Coin		1/4
ON	ON	ON	ON	OFF	OFF	0/1st Coin****	0/2nd Coin****	0/3rd Coin****	0/4th Coin****	1/5th Coin	1/5
ON	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		32	31
	5			OFF	ON
	4			ON	OFF
	3			OFF	OFF
	2			ON	ON

MATCH FEATURE:

When the Match Feature is ON, a random number appears on the Match/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.

CREDIT DISPLAY:	MATCH	SWITCH 28
	ON OFF	ON OFF
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	SELF TEST POSITION 16	SELF TEST POSITION 17
	REPLAY	SET TO "03"
	EXTRA BALL	SET TO "02"
	NOVELTY	SET TO "01"
	NO AWARD	SET TO "00"

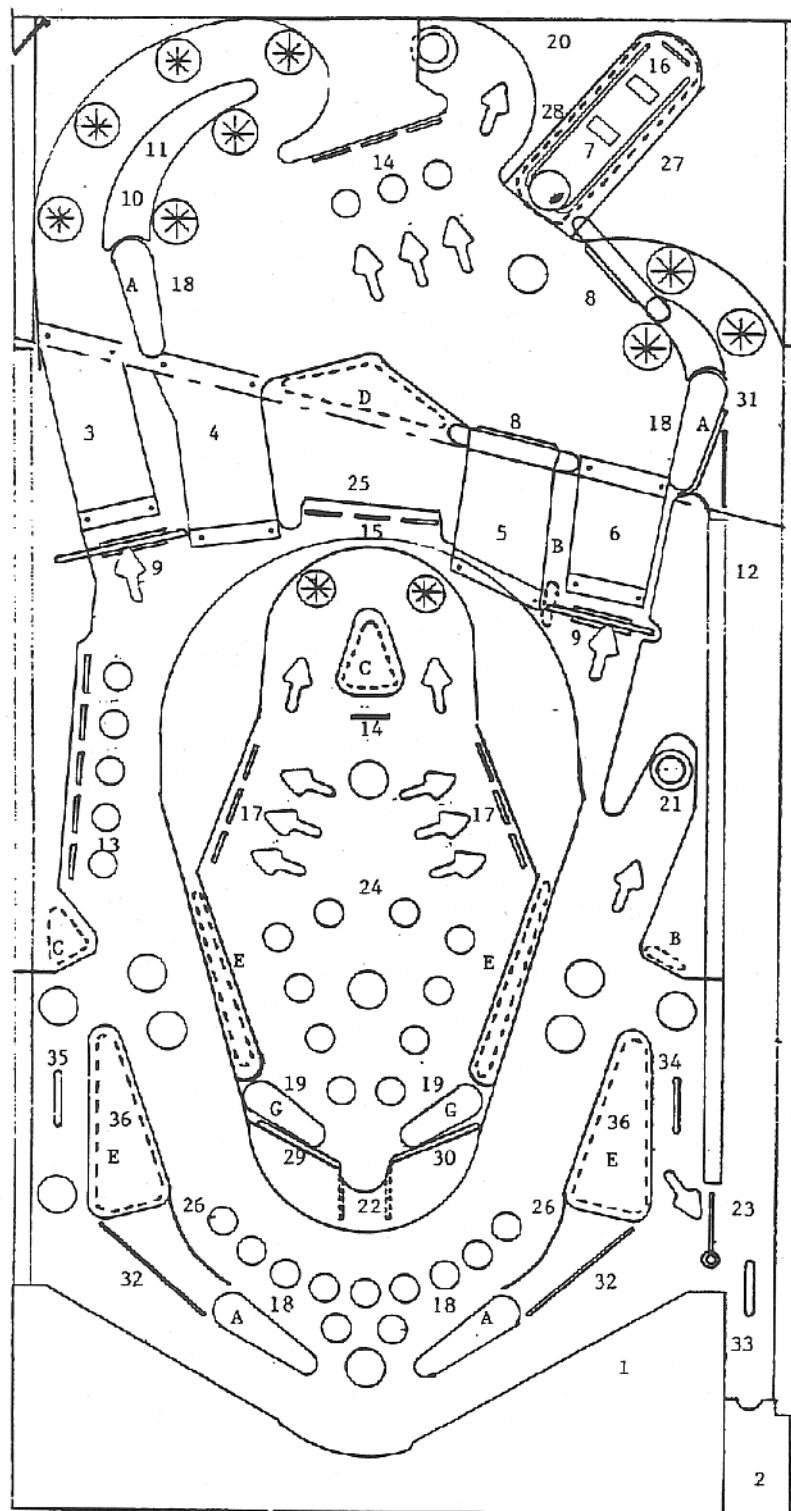
For combinations of replay/X-ball/Novelty Modes see page 4A "K. Special Replay/X-ball/Novelty Modes"

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 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.



#1248 ELEKTRA

RUBBER PARTS

A.	R-533-1	FLIPPER	(4)
B.	R-521	3/4" DIA	(4)
C.	R-521-1	1" DIA	(2)
D.	R-521-3	2" DIA	(1)
E.	R-521-4	2 1/2" DIA	(3)
F.	R-521-5	3" DIA	(1)
G.	R-533-3	FLIPPER	(2)
H.	R-521-7	4" DIA	(1)

PANEL PARTS

1.	Bottom Arch	A-4016-4	
2.	Shooter Gauge	P-6359-54	
3.	Left Outside Ramp	P-8155-9	
4.	Left Inside Ramp	P-8155-8	
5.	Right Inside Ramp	P-8155-6	
6.	Right Outside Ramp	P-8155-7	
7.	(2) Drop Target	ASE-2993-20	
8.	Gate & Wire Assm.	ASE-2250-24	(2)
9.	Spinner Assm.	ASE-2250-101	(2)
10.	Screened Plastics	M-1330-196	
11.	Clear Plastics & Bushing	A-2890-160	
12.	Shooter Lane Ramp	P-8155-5	
13.	Target Switch (Blue)	ASE-2911-83	(5)
14.	Target Switch (Green)	ASE-2911-85	(4)
15.	Target Switch (Red)	ASE-2911-82	(3)
16.	Target Switch (Red)	ASE-2911-87	(1)
17.	Target Switch (Amber)	ASE-2911-86	(6)
18.	Molded Flipper	A-3994-5	(4)
19.	Transparent Flipper	A-4013-1	(2)
20.	Eject Hole	ASE-428-41	
21.	Eject Hole	ASE-428-49	
22.	Ball Kicker Assm.	ASE-1566-27	
23.	Channel Gate Wire	M-1335-1	
24.	Playfield Plexiglass	M-1960	
25.	Light Reflector	P-8183	
26.	Ball Guide	A-3032-90	
27.	Ball Guide Wire	M-121-122	
28.	Ball Guide Wire	M-121-123	
29.	Ball Guide Wire	M-121-120	
30.	Ball Guide Wire	M-121-121	
31.	Ball Guide Wire	M-121-93	
32.	Ball Guide Wire	M-121-124	(2)
33.	Wire Actuator	ASE-2806-36	
34.	Wire Actuator	ASE-2806-34	
35.	Wire Actuator	ASE-2806-35	
36.	Slingshot Assm.	ASE-2593-9	(2)

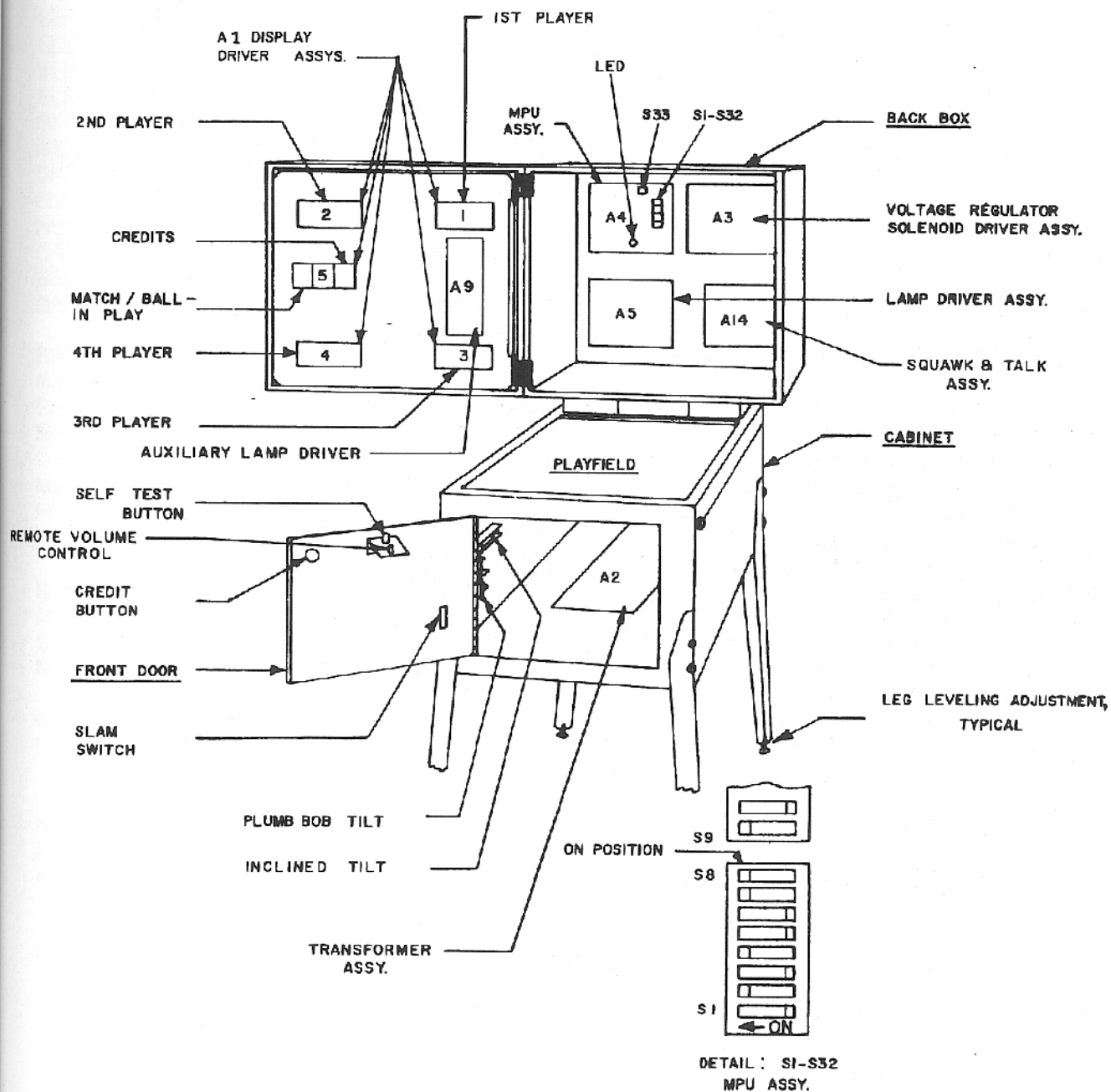


FIGURE III. ELECTRONIC PIN BALL MACHINE

RECOMMENDED

Instruction, Score Cards and High Score Feature Settings
to be used on Elektra #1248

3-BALL

REPLAYS

Instruction Card	M-1508-103-E
Score Card	M-1508-103-B
1 Replay at 1,000,000	
1 Replay at 1,500,000	

5-BALL

REPLAYS

Instruction Card	M-1508-103-E
Score Card	M-1508-103-A
1 Replay at 1,100,000	
1 Replay at 2,000,000	

EXTRA BALL

Instruction Card	M-1508-103-F
Score Card	M-1508-103-A W/00-1
1 Extra Ball at 1,000,000	
1 Extra Ball at 2,000,000	

ADDITIONAL CARDS

REPLAYS

M-1508-H-1	400,000	950,000
M-1508-I-1	450,000	1,000,000
M-1508-J-1	500,000	1,000,000
M-1508-K-1	500,000	1,100,000
M-1508-L-1	550,000	1,100,000
M-1508-M-1	600,000	1,100,000
M-1508-N-1	650,000	1,200,000
M-1508-O-1	700,000	1,200,000
M-1508-P-1	700,000	1,400,000
M-1508-Q-1	800,000	1,400,000
M-1508-R-1	900,000	1,400,000
M-1508-S-1	900,000	1,500,000
M-1508-T-1	1,000,000	1,500,000
M-1508-U-1	1,000,000	1,600,000
M-1508-V-1	1,000,000	1,800,000
M-1508-W-1	1,000,000	2,000,000
M-1508-X-1	1,100,000	1,800,000
M-1508-Y-1	1,100,000	2,000,000
M-1508-FF-1	1,200,000	2,000,000
M-1508-GG-1	1,300,000	2,000,000
M-1508-HH-1	1,400,000	2,100,000
M-1508-II-1	1,400,000	2,200,000

EXTRA BALL

M-1508-NN-1	1,000,000	1,600,000
M-1508-OO-1	1,000,000	2,000,000
M-1508-PP-1	1,200,000	2,200,000
M-1508-QQ-1	1,400,000	2,400,000

Instruction Card, Novelty
M-1508-103-G

BLANKS (3)

High game to date recommended levels;
(reset periodically)
3 BALL 1,700,000
5 BALL 2,200,000

#1248 ELEKTRA

RECOMMENDED SETTINGS

RECOMMENDED REPLAY GAME SETTING FOR:

INLINE DROP TARGET ADVANCE TOP 4, 5,
 6 ARROWS
 CENTER 3 RED TARGETS TO ADVANCE
 LEFT BLUE TARGET LITES
 LEFT SIDE 5 BLUE TARGET LITE ADVANCE
 ELEKTRA UNIT FEATURE 6 OR 10 SECONDS
 ELEKTRA UNIT TIME LOWER OUTHOLE KICKER
 ELEKTRA UNIT END OF TIME
 50 OR 60 HZ
 MIDDLE 3 RED TARGETS LITE
 SPECIAL ROLLOVER BUTTON LITE
 ELEKTRA UNIT TIME LOWER OUTHOLE KICKER
 NUMBER OF REPLAYS PER GAME
 GAME OVER ATTRACT
 BALLS PER GAME
 BALLS PER GAME

SW. 6

SW. 7

SW. 8

SW. 14

SW. 15

SW. 16

SW. 21

SW. 22

SW. 23

SW. 24

SW. 29

SW. 30

SW. 31

SW. 32

3-BALL

ON

ON

ON

ON

ON

ON

ON

ON

ON

OFF

ON

ON

OFF

OFF

5-BALL

ON

OFF

OFF

OFF

OFF

ON

ON

OFF

ON

ON

ON

ON

ON

OFF

REPLAYS

Instruction Card
 Score Card
 Major Mode

Match
 High Score to Date

3-BALL

M-1508-103-E

M-1508-103-B

Self Test Position 16, 17
 Set to "03"

SW. 28 ON

Self Test Position 19
 Set to "03"

5-BALL

M-1508-103-E

M-1508-103-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-1508-103-E

M-1508-103-A W/00-1

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-1508-103-G

Self Test Position 16, 17
 Set to "01"

SW. 28 OFF

Self Test Position 19
 Set to "00"

M-1508-103-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.

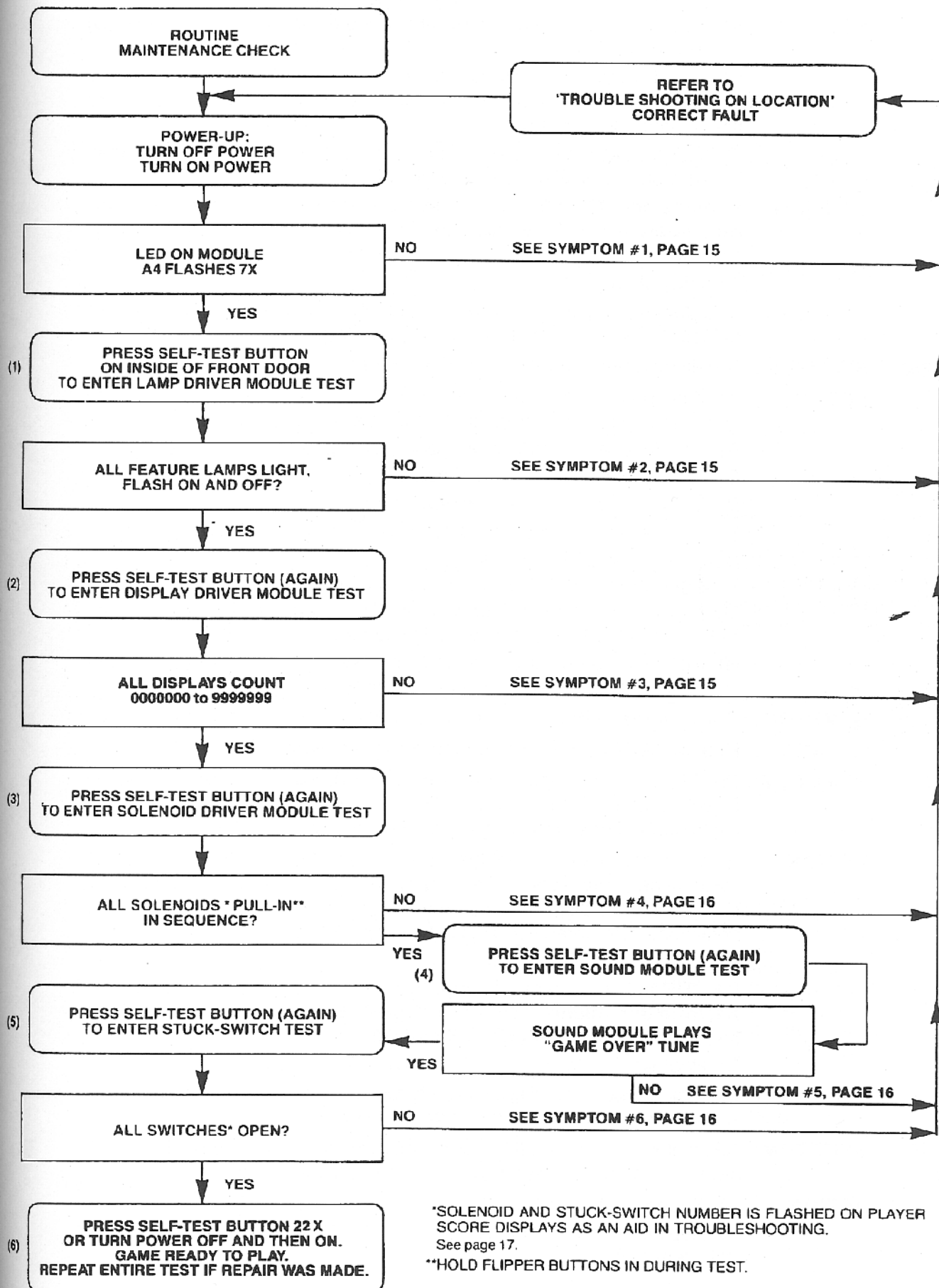
After successful completion of the Self Diagnostic Test procedure, set the game up for play. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no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



*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.

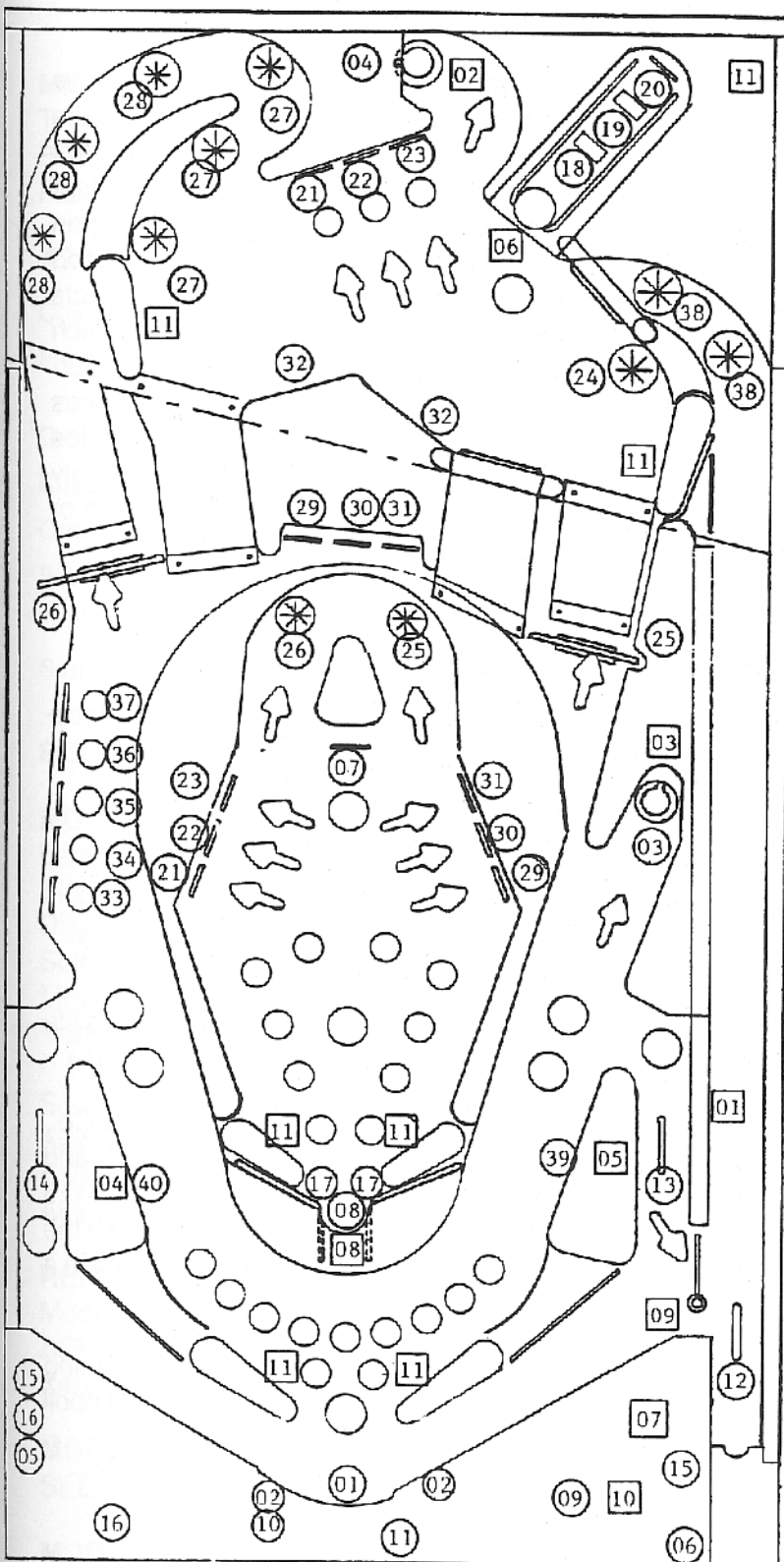
GAME #1248 ELEKTRA
SOLENOID IDENTIFICATION TABLE

Self	
Test #	SOLENOID IDENTIFICATION
01	KNOCKER
02	TOP SAUCER
03	RIGHT SAUCER
04	LEFT SLINGSHOT
05	RIGHT SLINGSHOT
06	INLINE DROP TARGET RESET
07	OUTHOLE KICKER
08	LOWER LEVEL SAUCER
09	RIGHT OUTLANE GATE
10	COIN LOCKOUT DOOR
11	K1 RELAY (FLIPPER ENABLE)

NOTE: TO TEST LOWER PANEL
 FLIPPERS PRESS AND HOLD TEST
 BUTTON ON LEFT SIDE OF
 TOP PANEL.

Switch	
Self	
Test #	DESCRIPTION
01	OUTHOLE
02	LEFT AND RIGHT OF OUTHOLE
03	RIGHT SAUCER
04	TOP SAUCER
05	LEFT FLIPPER BUTTON
06	CREDIT BUTTON
07	2X BONUS TARGET (LOWER LEVEL)
08	SAUCER (LOWER LEVEL)
09	COIN III (RIGHT)
10	COIN I (LEFT)
11	COIN II (MIDDLE)
12	SHOOTER LANE ROLLOVER
13	RIGHT OUTLANE
14	LEFT OUTLANE
15	TILT (3)
16	SLAM (2)
17	FLIPPERS E.O.S. (LOWER LEVEL)
18	1ST INLINE DROP TARGET
19	2ND INLINE DROP TARGET
20	INLINE BACK TARGET
21	#1 TOP TARGET & LOWER LEVEL #1 TARGET
22	#2 TOP TARGET & LOWER LEVEL #2 TARGET

Switch	
Self	
Test #	DESCRIPTION
23	#3 TOP TARGET & LOWER LEVEL #3 TARGET
24	SPECIAL ROLLOVER BUTTON
25	RIGHT SPINNER & LOWER LEVEL RIGHT R.O. BUTTON
26	LEFT SPINNER & LOWER LEVEL LEFT R.O. BUTTON
27	TOP RIGHT 3 R.O. BUTTONS
28	TOP LEFT 3 R.O. BUTTONS
29	MIDDLE #1 TARGET (L) & LOWER LEVEL #4 TARGET
30	MIDDLE #2 TARGET & LOWER LEVEL #5 TARGET
31	MIDDLE #3 TARGET (R) & LOWER LEVEL #6 TARGET
32	10 POINT REBOUND (2)
33	LEFT SIDE #1 TARGET (BOTTOM)
34	LEFT SIDE #2 TARGET
35	LEFT SIDE #3 TARGET
36	LEFT SIDE #4 TARGET
37	LEFT SIDE #5 TARGET (TOP)
38	TOP SHOOTER LANE R.O. BUTTON (2)
39	RIGHT SLINGSHOT
40	LEFT SLINGSHOT



#1248 ELEKTRA

INDICATES SWITCH ASSEMBLY IDENTIFICATION NUMBERS

NOTE: CABINET: 15, 16, 05
DOOR: 06, 09
10, 11, 16

INDICATES SOLENOID IDENTIFICATION NUMBERS

NOTE: DOOR: 10
BACKBOX: 11
CABINET: 01

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

#1248 ELEKTRA

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 (6)	AQ-25-500/ 34-4500
Gate	GA-34-4000
Knocker	AR-26-1200
Outhole Kicker (Upper & Lower Playfield)	AO-27-1300
Sling-Shot (2)	AO-26-1200
Drop Target Reset	NO-26-1900
Saucer (2)	AO-27-1300

PLAYFIELD PARTS

See Figure II

MODULES

Lamp Driver A5	AS-2518-23
Display Driver A1 (2 used)	AS-2518-21
Display Driver A1 (4 used)	AS-2518-58
Solenoid Drive/Voltage Regulator A3	AS-2518-22
MPU A4	AS-2962-31
Transformer & Rectifier A2	AS-2877-6
Rectifier Board (Part of A2)	AS-2518-54
Squawk & Talk	AS-3107-8
Auxiliary Lamp Driver A9	AS-2518-52
Solenoid Expander	AS-2518-66
Aux. Driver (G.I. Flasher)	AS-2518-68

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

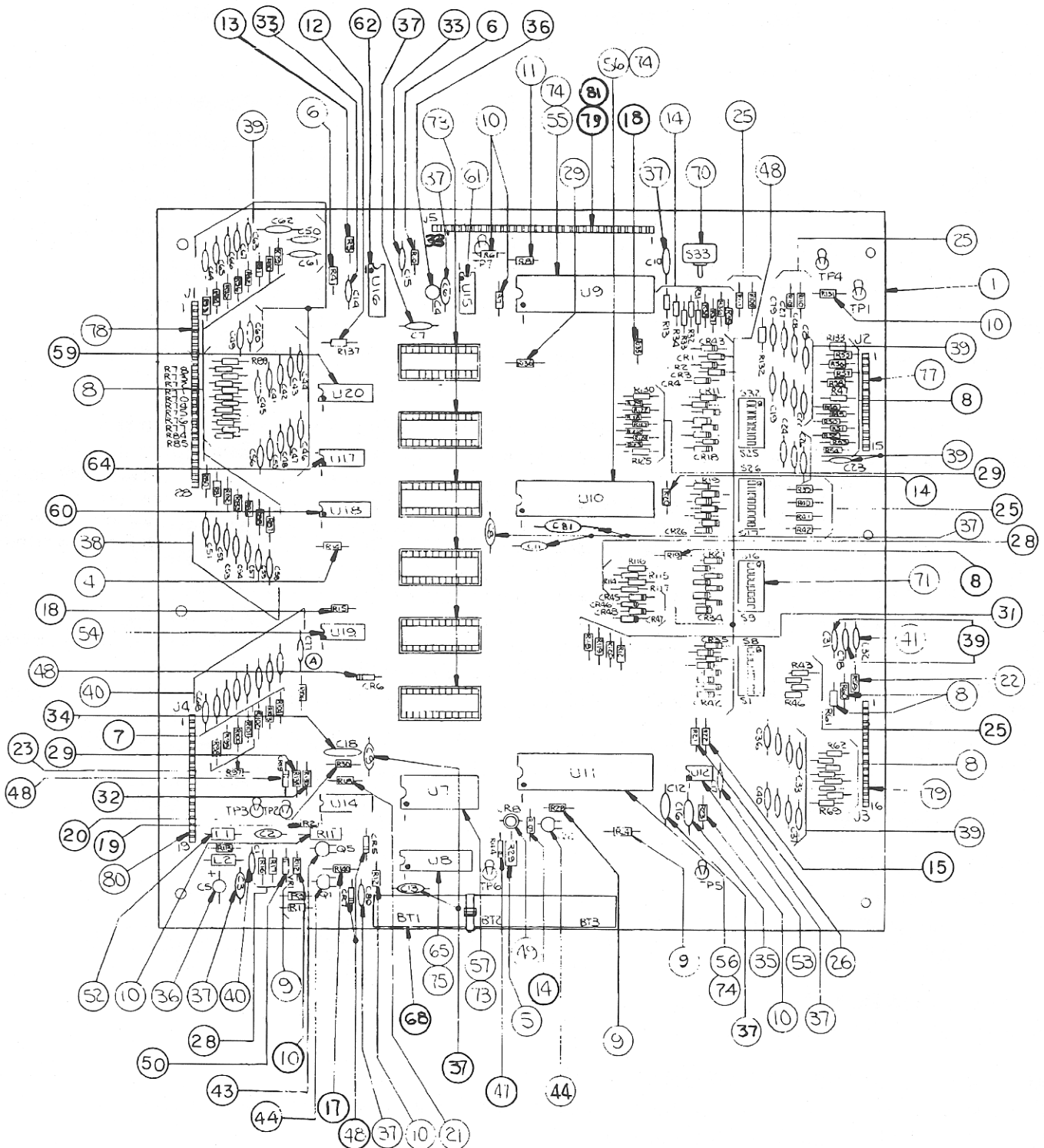
SEE MODULE PARTS LIST

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

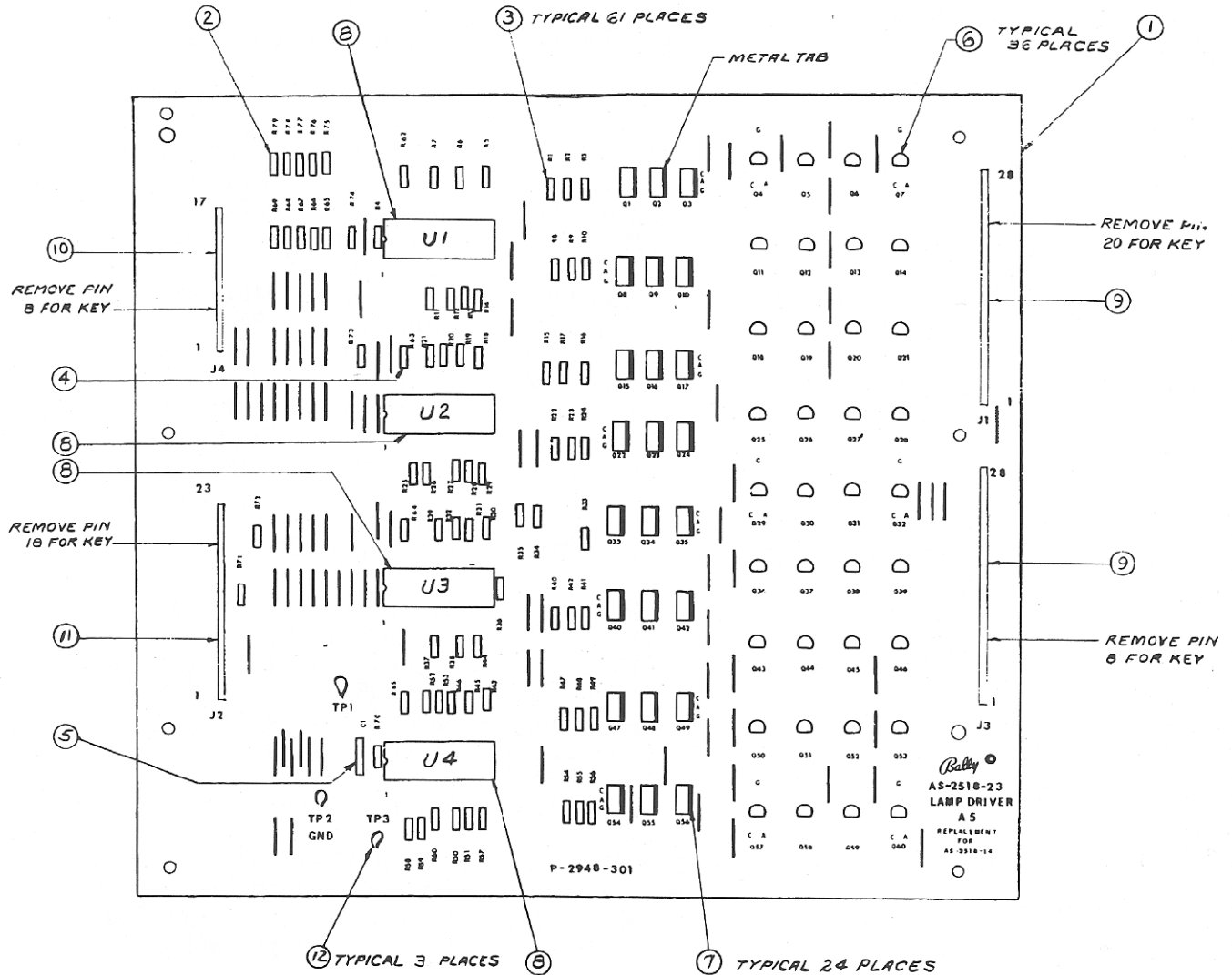
ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A4 (see note 1)	AS-2962-31	MPU Module Complete.
2	A4 (see note 2)	AS-2518-35	MPU Module less Program Memory, U1-6 incl.
3-32	See Schematic		Resistors, See schematic for value
33	C14, C15	E-00586-0067	Capacitor, 470 PFD, 1kv
34	C18	E-00586-0088	Capacitor, .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 GLOBETERS, AS-2962-12: DOLLY PARTON, AS-2962-13: SILVERBALL MANIA, AS-2962-18: MYSTIC, AS-2962-20: HOTDOGGIN, AS-2962-22: SKATEBALL, AS-2962-23: FRONTIER, AS-2962-21: XENON, AS-2962-24: FLASH GORDON, AS-2962-26: EIGHT BALL DELUXE, AS-2962-25: FIREBALL II, AS-2962-28: FATHOM, AS-2962-29: MEDUSA, AS-2962-30: CENTAUR, AS-2962-31 ELEKTRA.

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

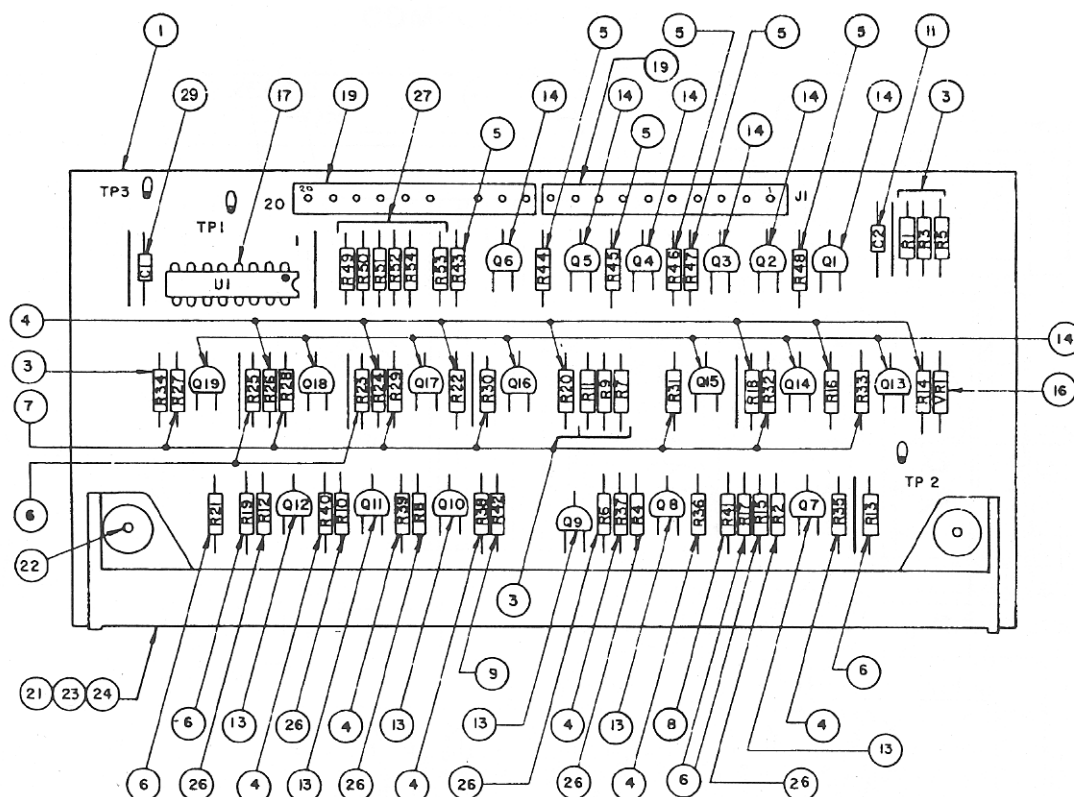
AS-2518-23 LAMP DRIVER MODULE



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

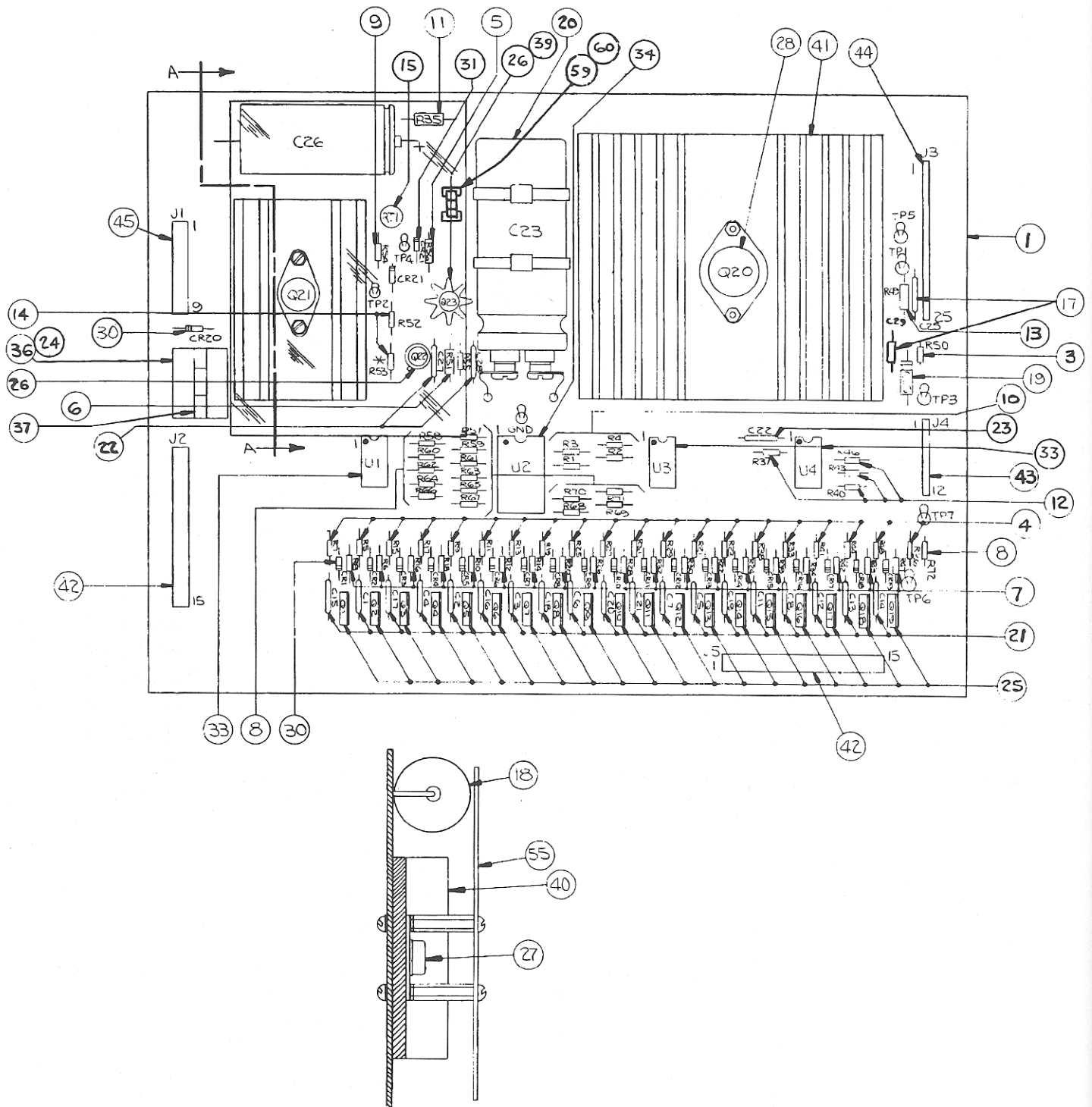


A1: 6 DIGIT DISPLAY DRIVER MODULE COMPONENT PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	1	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

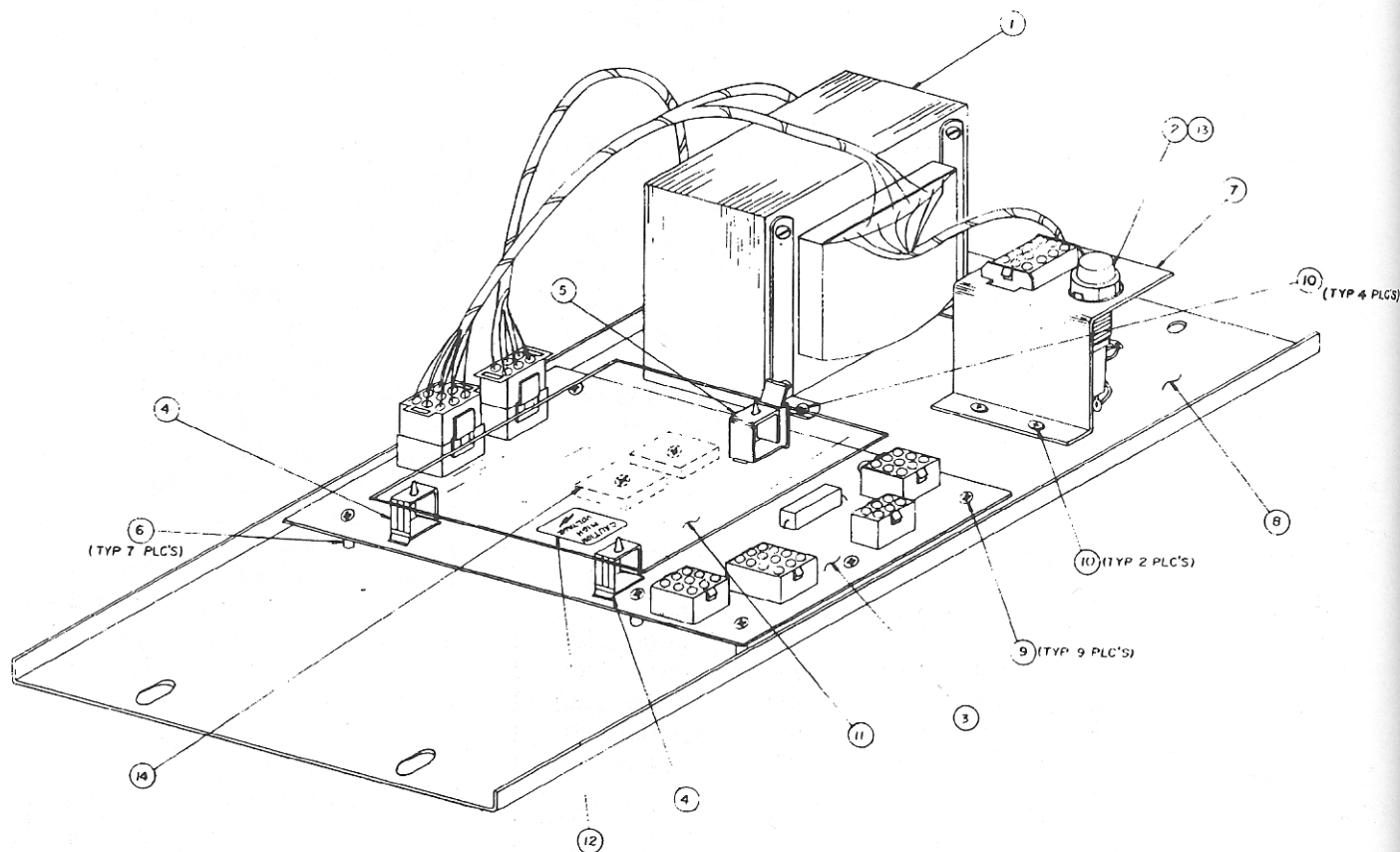
A3: SOLENOID DRIVER/VOLTAGE REGULATOR MODULE

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 (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

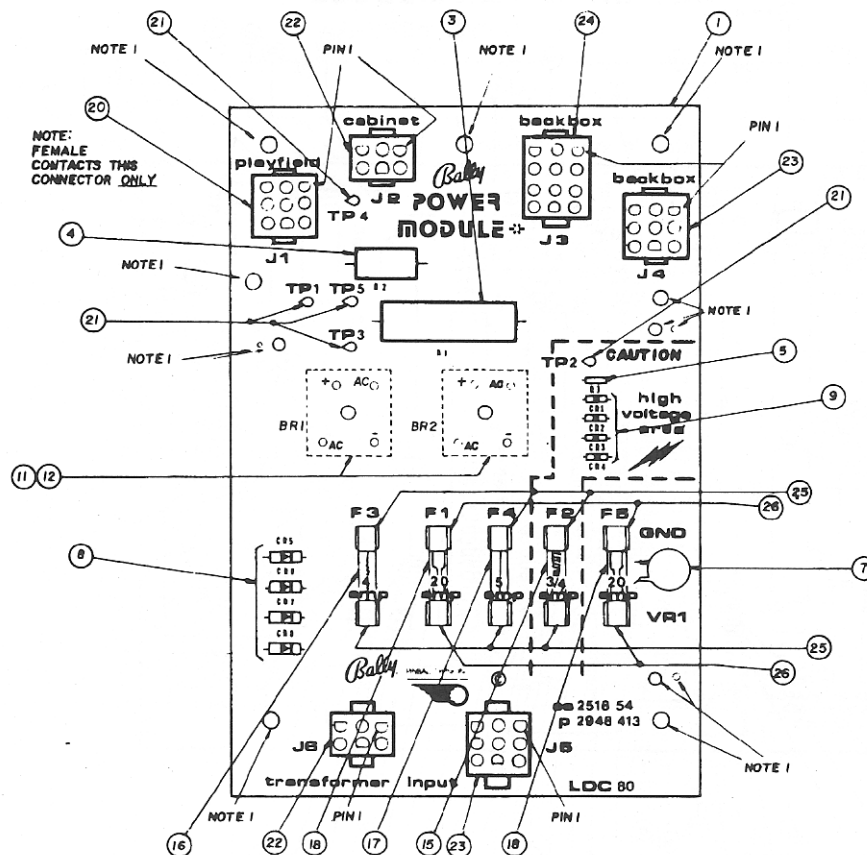
A2: POWER TRANSFORMER MODULE



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

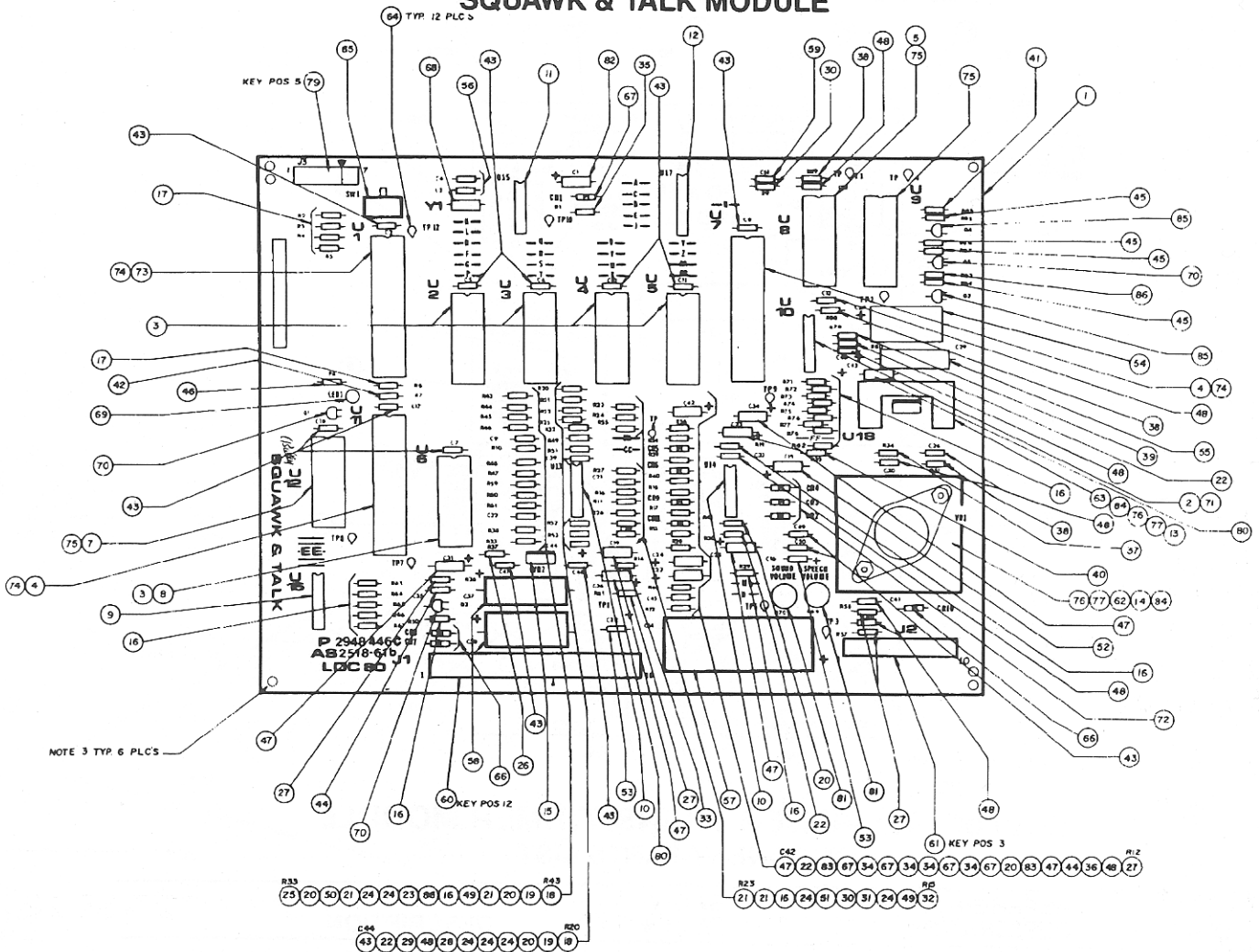


**(Part of) A2: POWER TRANSFORMER MODULE
COMPONENT PARTS LIST**

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 NOTE 1	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)

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

AS 2518-61B SQUAWK & TALK MODULE



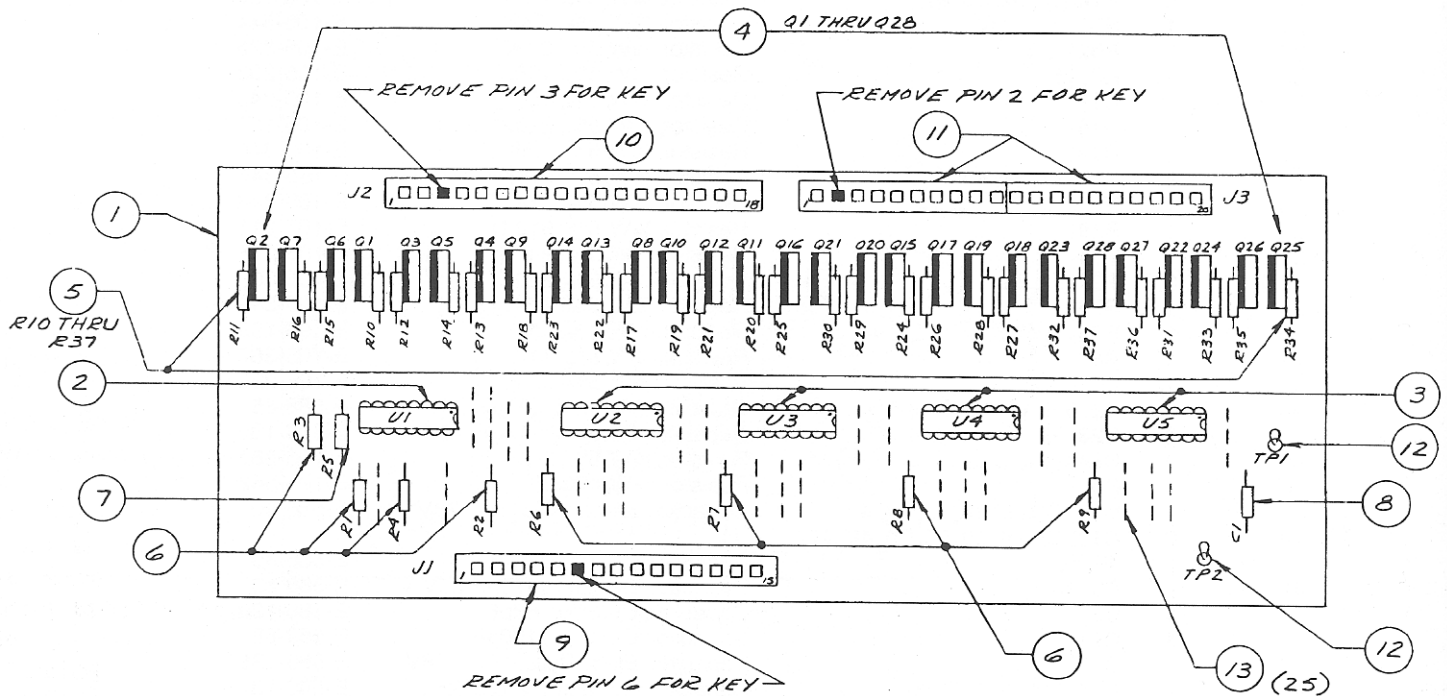
ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
1	1	A14	AS-2518-61 B	Squawk & Talk Module, Complete
2	1	U10	AD 558 DAC	E-620-171
3	5	Used with U2 thru U6	24 Pin I.C. Socket	E-712
4	2	U7, U11	6821 P.I.A.	E-620-29
5	1	U8	Tms 5200 Speech	E-620-167
7	1	U12	AY3-8912 Sound	E-620-166
8	1	U6	6810 RAM (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 Schmidt 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 2518-61B

COMPONENTS PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
26	1	R37	Resistor, 1/4W, 5%, 30K	E-105-245
27	5	R12, 36, 57, 58, 81	Resistor, 1/4W, 5%, 1K	E-105-230
28	1	R51	Resistor, 1/4W, 5%, 750K	E-105-344
29	1	R52	Resistor, 1/4W, 5%, 9.1K	E-105-228
30	2	R9, 16	Resistor, 1/4W, 5%, 130K	E-105-203
31	1	R11	Resistor, 1/4W, 5%, 150K	E-105-248
32	1	R15	Resistor, 1/4W, 5%, 220K	E-105-161
33	1	R14	Resistor, 1/4W, 5%, 1.8K	E-105-346
34	4	R17, 18, 39, 40	Resistor, 1/4W, 5%, 910K	E-105-347
35	1	R1	Resistor, 1/4W, 5%, 27K	E-105-243
36	1	R68	Resistor, 1/4W, 5%, 510 Ω	E-105-311
37	1	R34	Resistor, 1/4W, 5%, 2.2 Ω	E-105-211
38	3	R31, 88, 89	Resistor, 1/4W, 5%, 220 Ω	E-105-303
39	1	R79	Resistor, 1/4W, 5%, 7.5K	E-105-345
40	1	R35	Resistor, 1/4W, 5%, 1 Ω	E-105-196
41	1	R83	Resistor, 1/4W, 5%, 11K	E-105-360
42	1	R7	Resistor, 1/4W, 5%, 8.2K	E-105-223
43	14	C2, 5-8, 10, 11, 17, 18, 44, 47-50	Capacitor, Ceramic, .01 μ F, 25V	E-586-85
44	2	C23, 35	Capacitor, Ceramic, .47 μ F, 16V	E-586-130
45	4	R84-87	Resistor, 1/4W, 5%, 2.2K	E-105-287
46	1	R6	Resistor, 1/4W, 470 Ω	E-105-342
47	7	C19, 24, 25, 28, 31, 34, 42	Capacitor, Electrolytic, 1 μ F, 25V	E-586-90
48	10	C12, 13, 26, 30, 33, 39, 40, 41, 45, 46	Capacitor, Ceramic, .1 μ F, 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, 10 μ F, 16V	E-586-135
53	2	C16, 22	Capacitor, Tantalum, 4.7 μ F, 25V	E-586-73
54	1	C27	Capacitor, Electrolytic, 1000 μ F, 16V	E-586-136
55	1	C29	Capacitor, Electrolytic, 470 μ F, 6V	E-586-124
56	2	C3, 4	Capacitor, Ceramic, 27pF	E-586-121
57	1	C14	Capacitor, Electrolytic, 4700 μ F, 25V	E-586-123
58	2	C37, 38	Capacitor, Electrolytic, 330 μ F, 50V	E-586-147
59	1	C51	Capacitor, Monolithic, 10pF	E-586-150
60	1	J1	18 Pin Wafer Connector (156)	E-736-18
61	1	J2	10 Pin Wafer Connector(156)	E-736-10
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 (1N4004)	E-587-15
67	5	CR1, 5, 6, 9, 11	Diode (1N4148)	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, 3A, 50V. min.	E-587-24
73	1	U1	6808 or 6802 (SEE NOTE 1)	
			Microprocessor	E-620-125 or 128
74	3	Used with U1, 7, 11	Socket, I.C. 40 Pin	E-712-1
75	3	Used with U8, 9, 12	Socket, I.C. 28 Pin	E-712-28
76	3	Used with U18, VR1	Screw	LSPR-00632-1106
77	3	Used with U18, VR1	Nut	N-00632-2112
78				
79		J3	Header, 7 Pin	E-766-7
80	2	C36, 43	Capacitor, 2 μ F, 25V	E-586-63
81	2	R69, 70	Pot. 1K	E-599-16
82	1	C1	Capacitor, Electrolytic, 47 μ F	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, 1/4W, 5%, 2.4K	E-105-312
			JUMPERS—SEE NOTES	

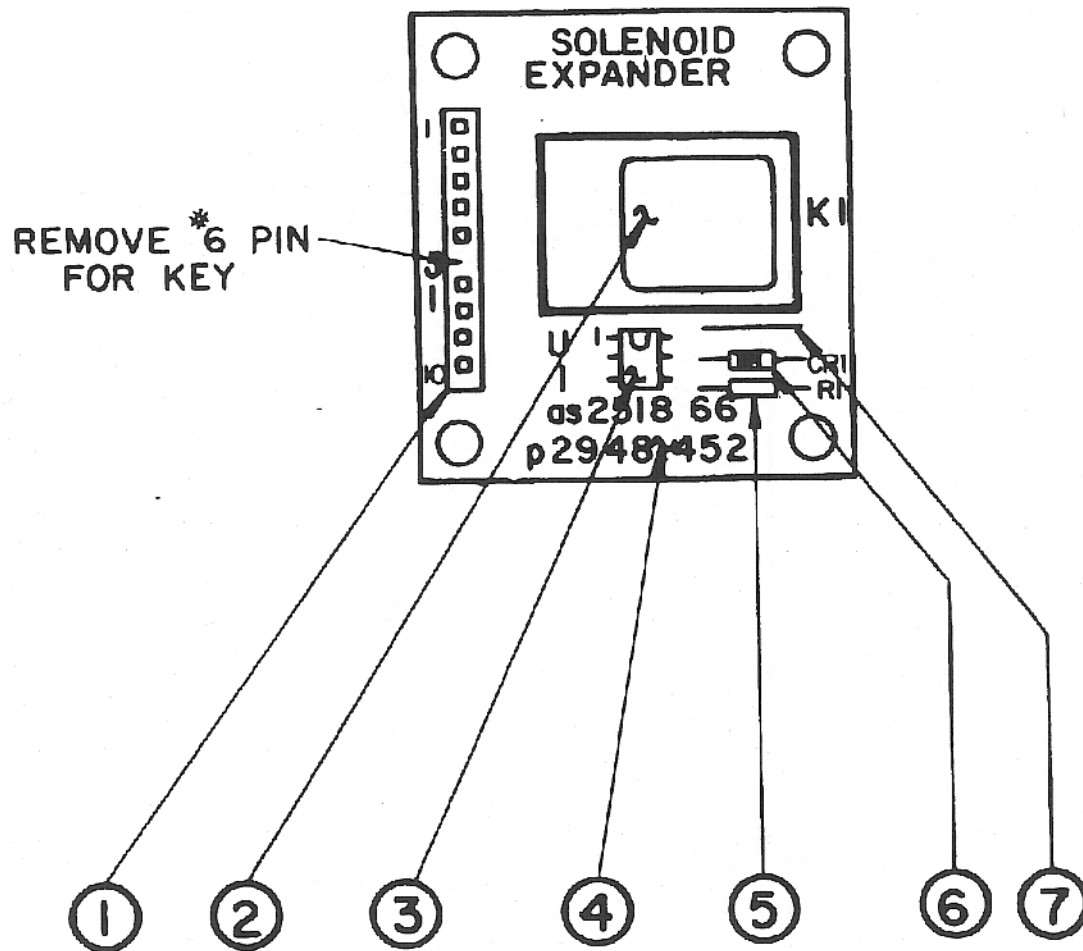
AS-2518-52 AUXILIARY LAMP DRIVER



A9: AUXILIARY LAMP DRIVER COMPONENT PARTS LIST

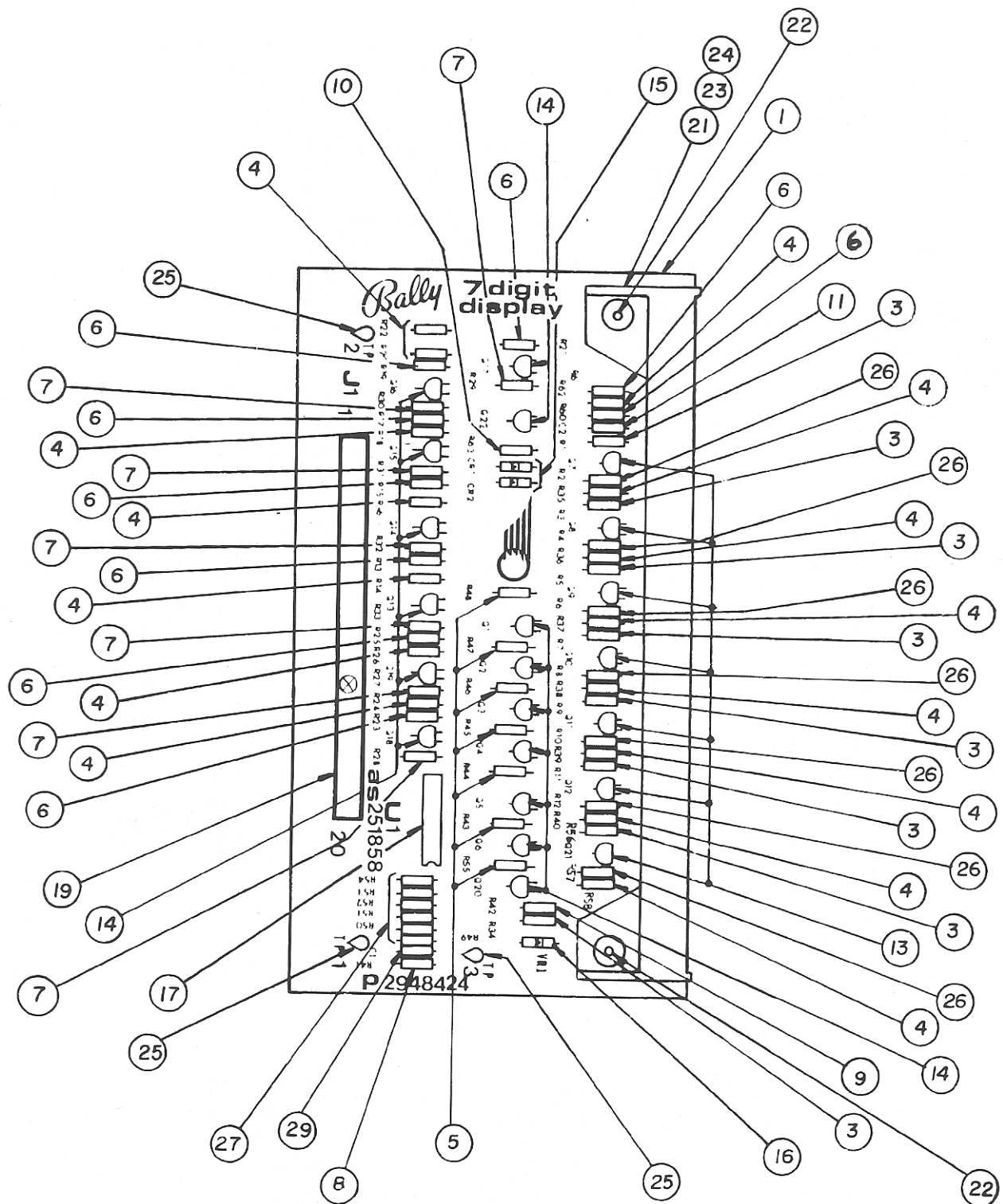
ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART NO.	DESCRIPTION
1	1	A9	AS-2518-52	Auxiliary Lamp Driver, Complete
2	1	U1	E-620-134	Quad Flip Flop
3	4	U2 Thru U5	E-620-108	BCD to Decimal Decoder
4	28	Q1 Thru Q28	E-585-29	S.C.R.
5	28	R10 Thru R37	E-105-237	Resistor, 2K Ω , 1/4 W, 5%
6	8	R1-4, R6-9	E-105-242	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

A15: SOLENOID EXPANDER ASSEMBLY **AS-2518-66**



ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	J1	E-736-10	10 Pin 'Molex' KK156
2	K1	E-146-795	48 V. Relay
3	U1	E-620-172	MOC 3011
4	P-2948-452	M-645-585	P.C. Board
5	R1	E-105-219	330 Ohm Resistor
6	CR1	E-587-15	IN4004 Diode
7		Jumper	AWG. 22 1½"
Ref.		W-1251b	Schematic

AS-2518-58 DISPLAY DRIVER MODULE

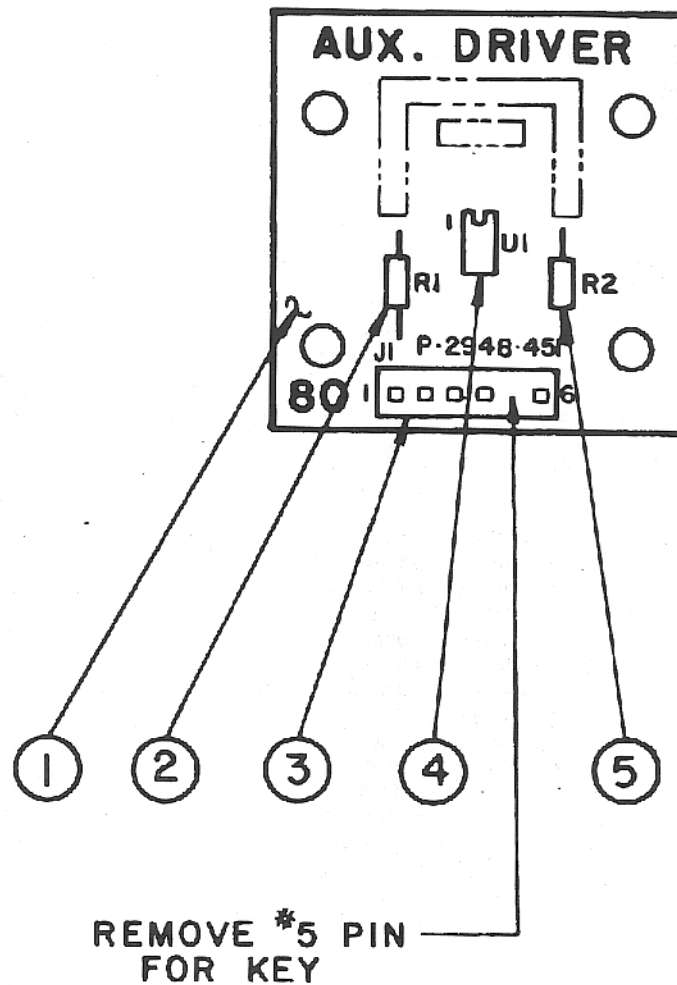


A1: 7 DIGIT DISPLAY DRIVER MODULE

COMPONENTS PARTS LIST

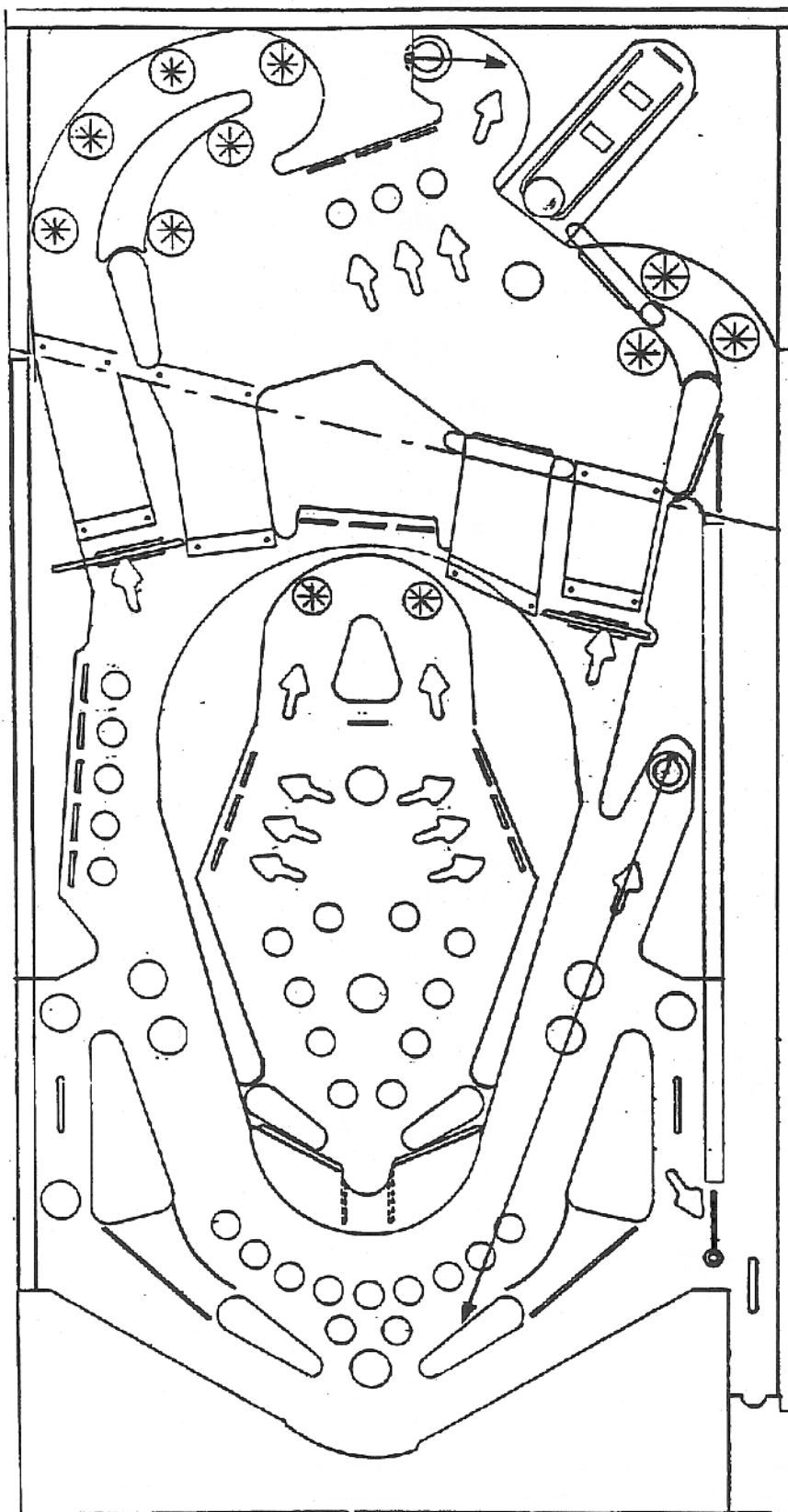
ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	1	A1	AS-2518-58	7 Digit Display Driver, Complete
3	8	R1, R3, R5, R7, R9, R11, R34, R56	E-105-331	Resistor, 100K Ω
4	15	R14, R16, R18, R20, R22, R24, R26, R35, R36, R37, R38, R39, R40, R58, R62	E-105-227	Resistor, 300K Ω
5	7	R43, R44, R45, R46, R47, R48, R55	E-105-228	Resistor, 9.1K Ω
6	9	R13, R15, R17, R19, R21, R23, R25, R61, R60	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	1	R63	E-105-248	Resistor, 150K Ω
11	1	C2	E-586-65	Capacitor, .01 MFD, 500V
13	7	Q7, Q8, Q9, Q10, Q11, Q12, Q21	E-585-32	Transistor (2N5401)
14	15	Q1, Q2, Q3, Q4, Q5, Q6, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q22	E-585-33	Transistor (MPS-A42)
15	2	CR1-2	E-587-14	Diode (1N4148)
16	1	VR1	E-598-7	Zener Diode, 110V (1N3045A)
17	1	U1	E-620-38	I.C. Decoder (MC14543)
18				
19	2	J1	E-736-10	10 Pin Wafer Pin Connector (KK-156)
21	1	DS1	E-680-7	7 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)
25	3	TP1-3	P-5399	Test Clip
26	7	R2, R4, R6, R8, R10, R12, R57	E-105-287	Resistor, 2.2K Ω
27	6	R49, R50, R51, R52, R53, R54	E-105-242	Resistor, 20K Ω
28				
29	1	C1	E-586-85	Capacitor, .01 MFD, 25V

A17 Auxiliary Driver—G.I. Flasher
AS-2518-68



COMPONENTS PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
1	1	P-2948-451	PC. Board	M-645-584
2	1	R1	330 Ω , 5% $\frac{1}{4}$ W.	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	10 Ω , 5%, $\frac{1}{4}$ W.	E-105-306
REF.			Schematic	W-1253 b



VECTOR DRAWING FOR
ELEKTRA 2 EJECT
SAUCERS.

TOP SAUCER BALL TO
EJECT OUT AS SHOWN.

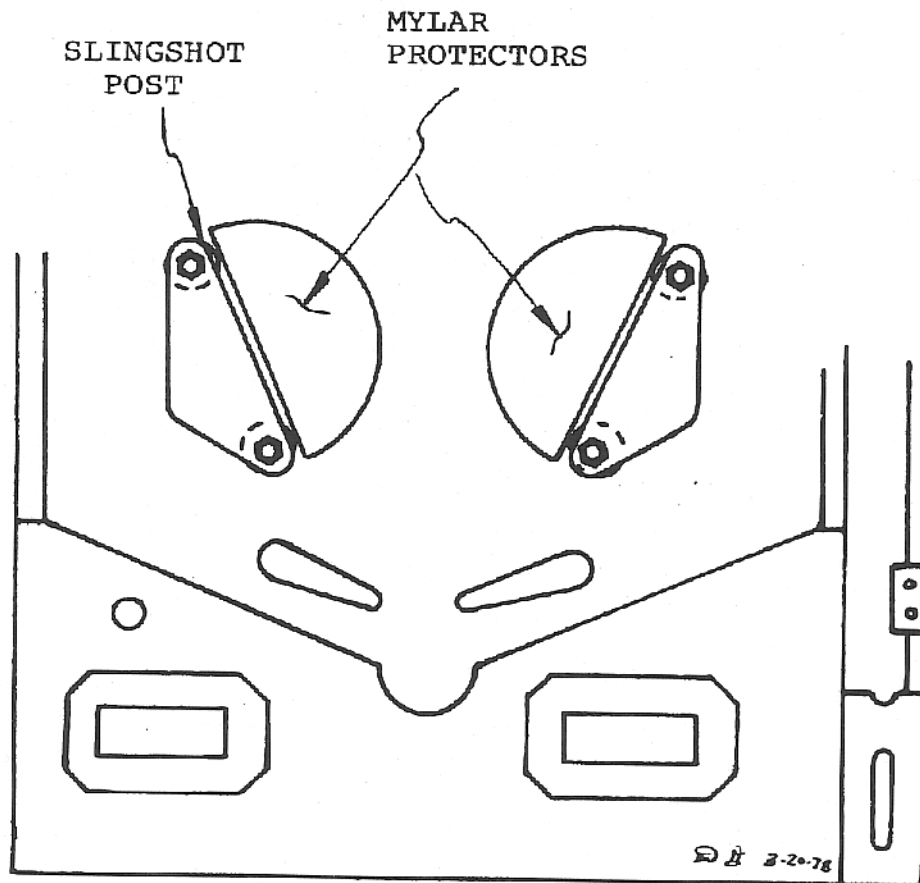
RIGHT SAUCER BALL TO HIT
CENTER OF RIGHT FLIPPER.

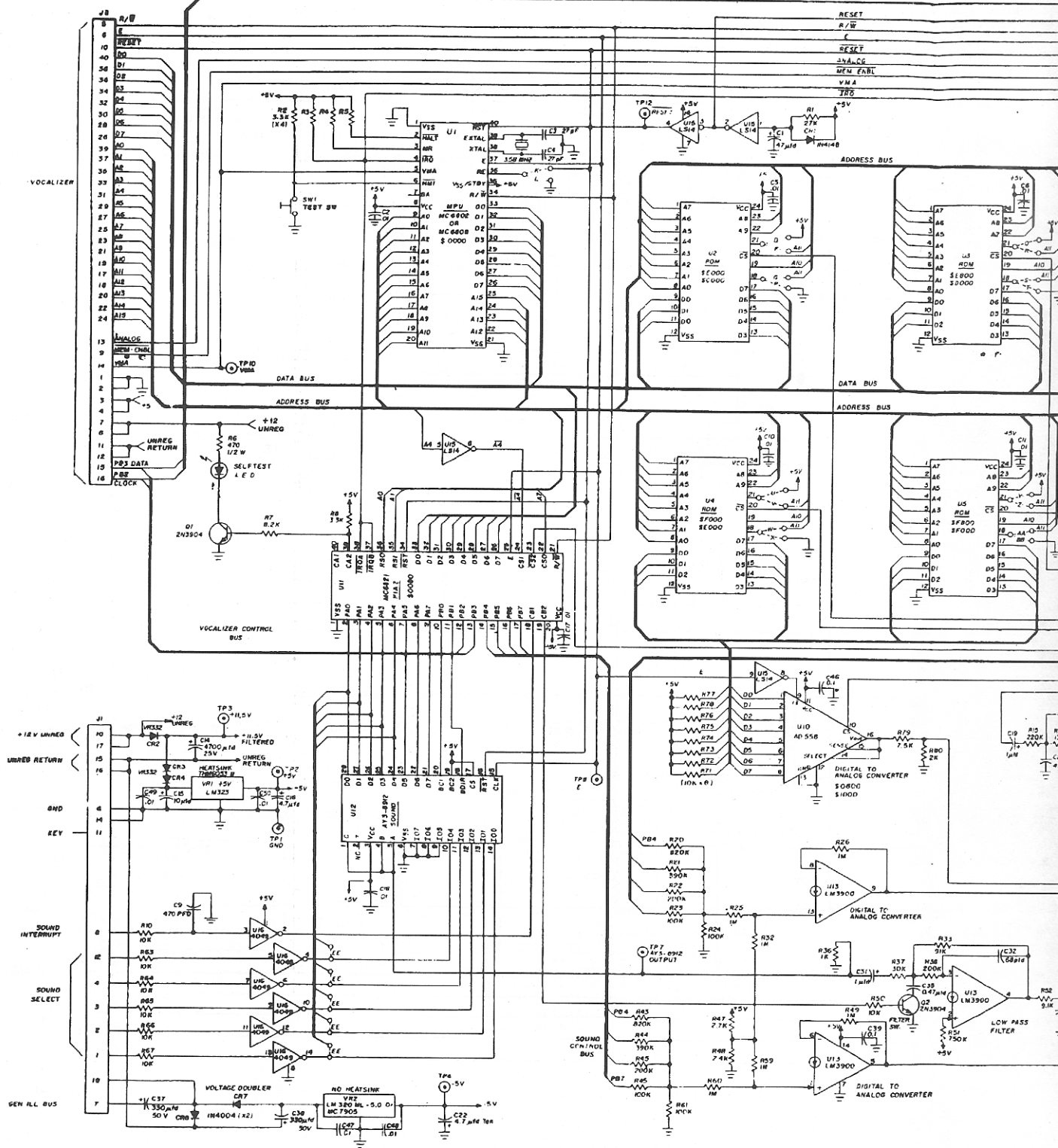
PLAYFIELD MYLAR PROTECTORS

FO-589

ENCLOSED ARE TWO MYLAR PROTECTORS WHICH MAY BE ATTACHED TO THE PLAYFIELD IN FRONT OF THE SLINGSHOT KICKERS AS SHOWN IN SKETCH. THESE WILL HELP TO PRESERVE PAINT FINISH IN FRONT OF SLINGSHOTS.

TO APPLY, SIMPLY REMOVE PAPER BACKING AND PLACE MYLAR WITH FLAT EDGE TOUCHING THE TWO SLINGSHOT POSTS.





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

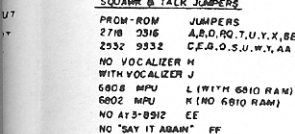
LAST NUMBERS USED

SQUAWK & TALK TEST POINTS

SQUAWK & TALK JUMPER

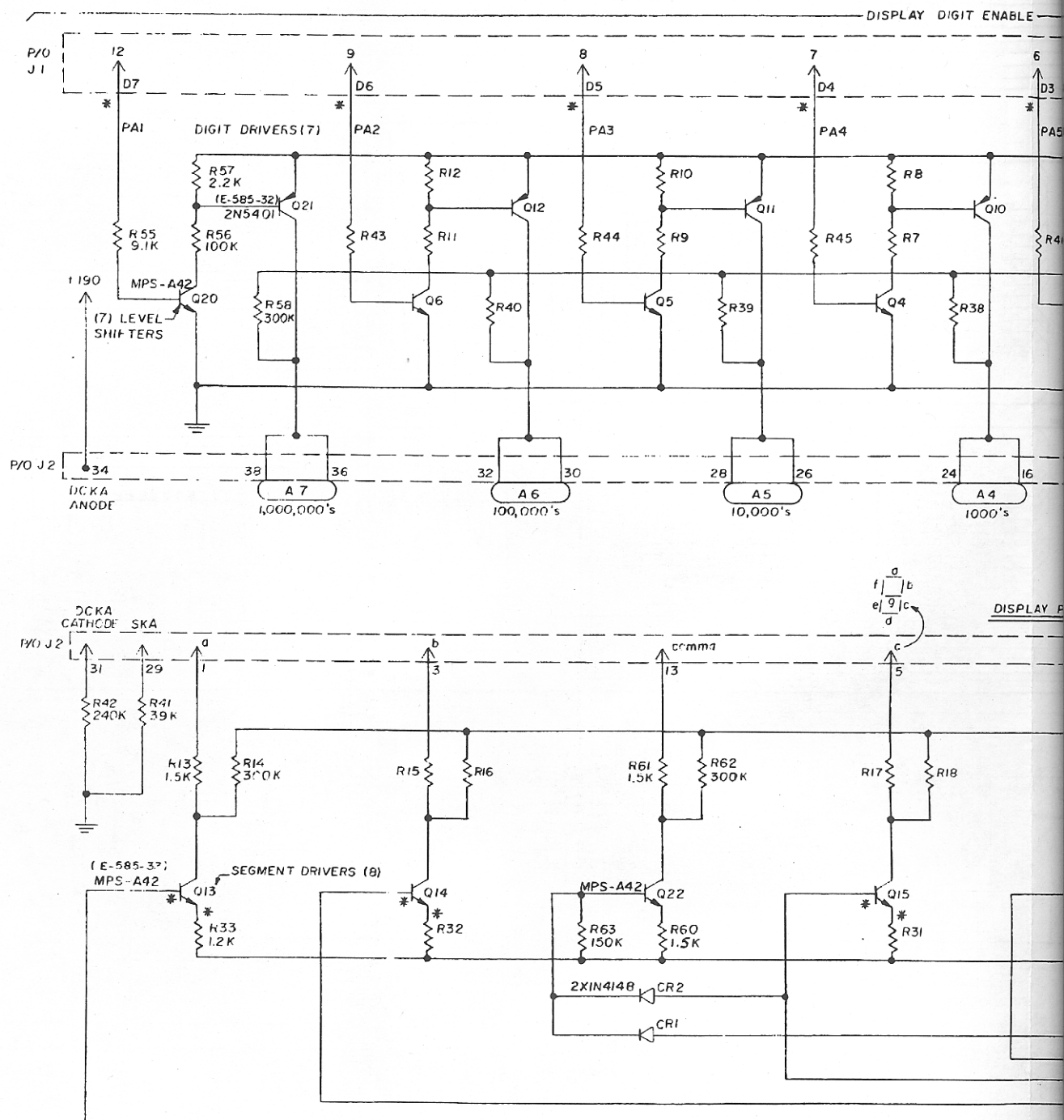
TP1-GND
TP2-+5VDC
TP3-+11.5VDC
TP4-+5VDC
TP5-+5VDC
TP6-+5VDC
TP7-+5VDC
TP8-+5VDC
TP9-+5VDC
TP10-+5VDC
TP11-+5VDC
TP12-+5VDC

TP10-+5VDC
TP11-+5VDC
TP12-+5VDC
TP13-+5VDC
TP14-+5VDC
TP15-+5VDC
TP16-+5VDC
TP17-+5VDC
TP18-+5VDC
TP19-+5VDC
TP20-+5VDC
TP21-+5VDC
TP22-+5VDC
TP23-+5VDC
TP24-+5VDC
TP25-+5VDC
TP26-+5VDC
TP27-+5VDC
TP28-+5VDC
TP29-+5VDC
TP30-+5VDC
TP31-+5VDC
TP32-+5VDC
TP33-+5VDC
TP34-+5VDC
TP35-+5VDC
TP36-+5VDC
TP37-+5VDC
TP38-+5VDC
TP39-+5VDC
TP40-+5VDC
TP41-+5VDC
TP42-+5VDC
TP43-+5VDC
TP44-+5VDC
TP45-+5VDC
TP46-+5VDC
TP47-+5VDC
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TP57-+5VDC
TP58-+5VDC
TP59-+5VDC
TP60-+5VDC
TP61-+5VDC
TP62-+5VDC
TP63-+5VDC
TP64-+5VDC
TP65-+5VDC
TP66-+5VDC
TP67-+5VDC
TP68-+5VDC
TP69-+5VDC
TP70-+5VDC
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TP79-+5VDC
TP80-+5VDC
TP81-+5VDC
TP82-+5VDC
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TP84-+5VDC
TP85-+5VDC
TP86-+5VDC
TP87-+5VDC
TP88-+5VDC
TP89-+5VDC
TP90-+5VDC
TP91-+5VDC
TP92-+5VDC
TP93-+5VDC
TP94-+5VDC
TP95-+5VDC
TP96-+5VDC
TP97-+5VDC
TP98-+5VDC
TP99-+5VDC
TP100-+5VDC



<u>SPEECH</u>	<u>SOUND</u>
CC	M

[illegible]

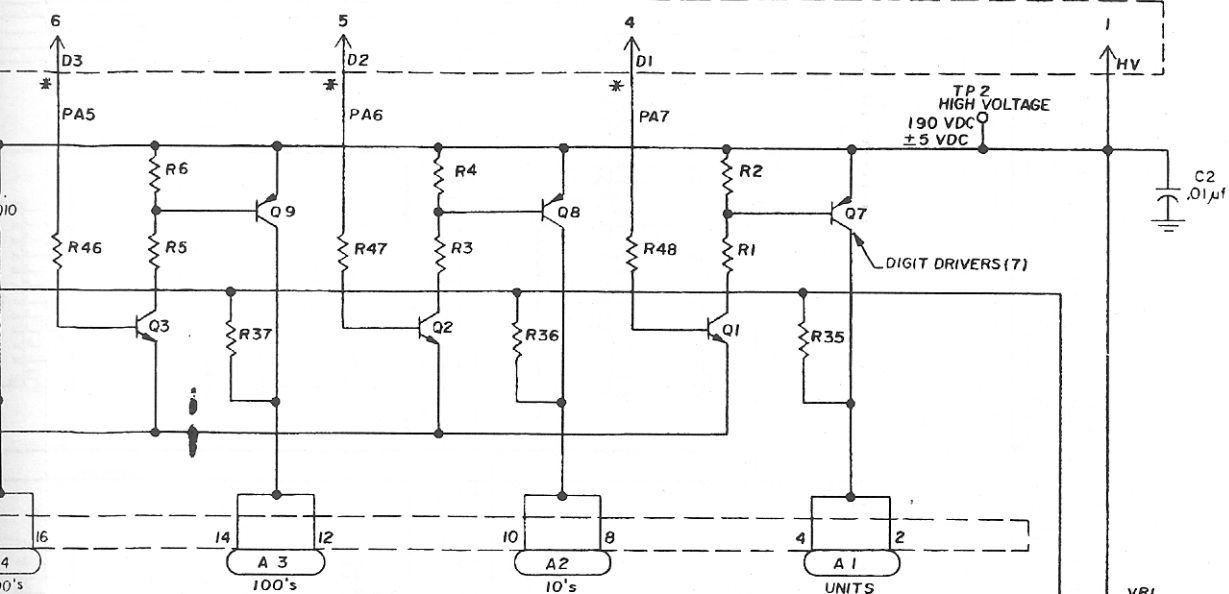


* INDICATES "Aid" TEST POINT.

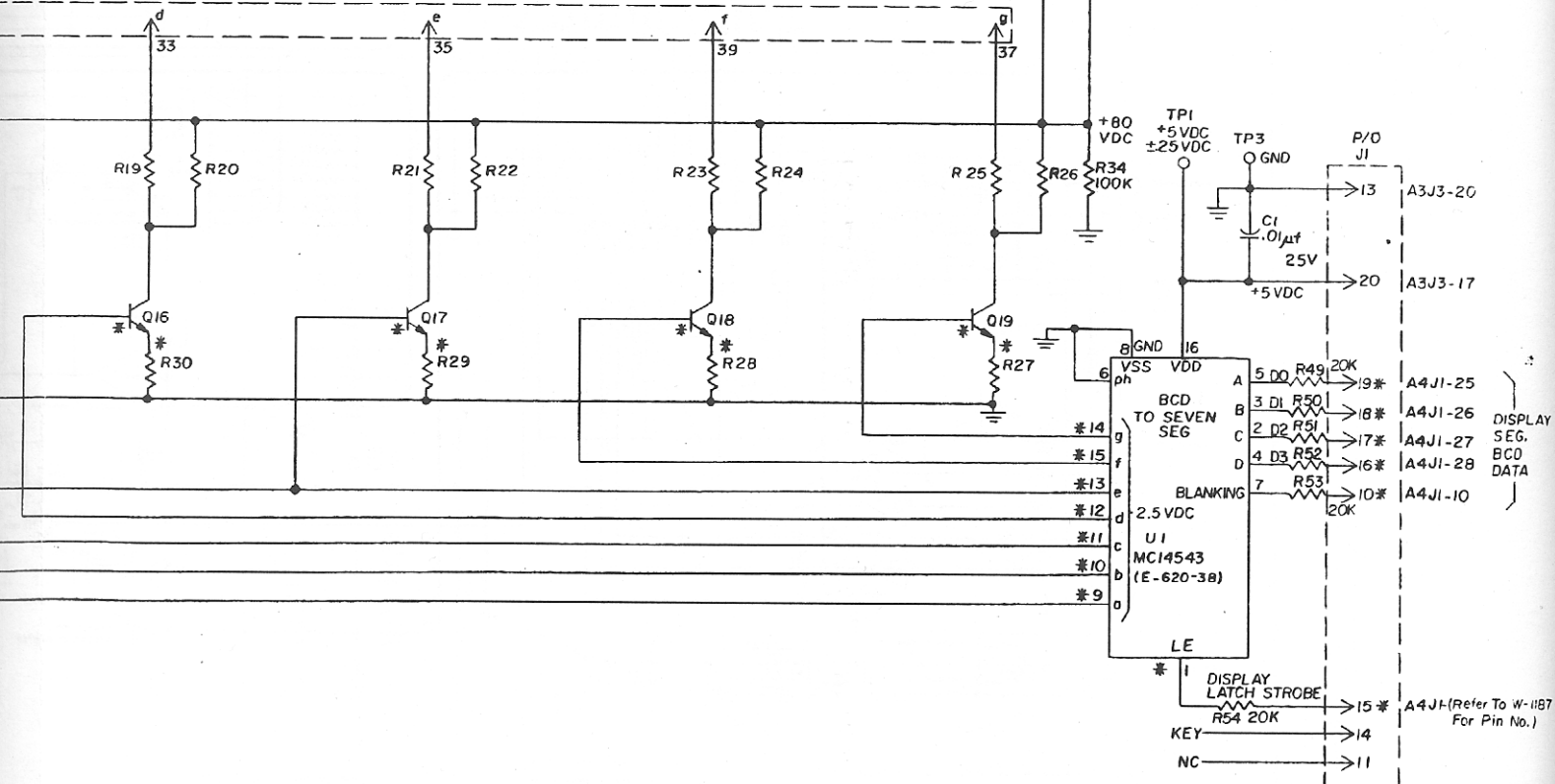
NOTES:

1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE $\pm 5\%$, $1/4$ W.
2. PREFIX ALL REFERENCE DESIG. WITH ASSEMBLY REFERENCE DESIG. "A I".

NABLE

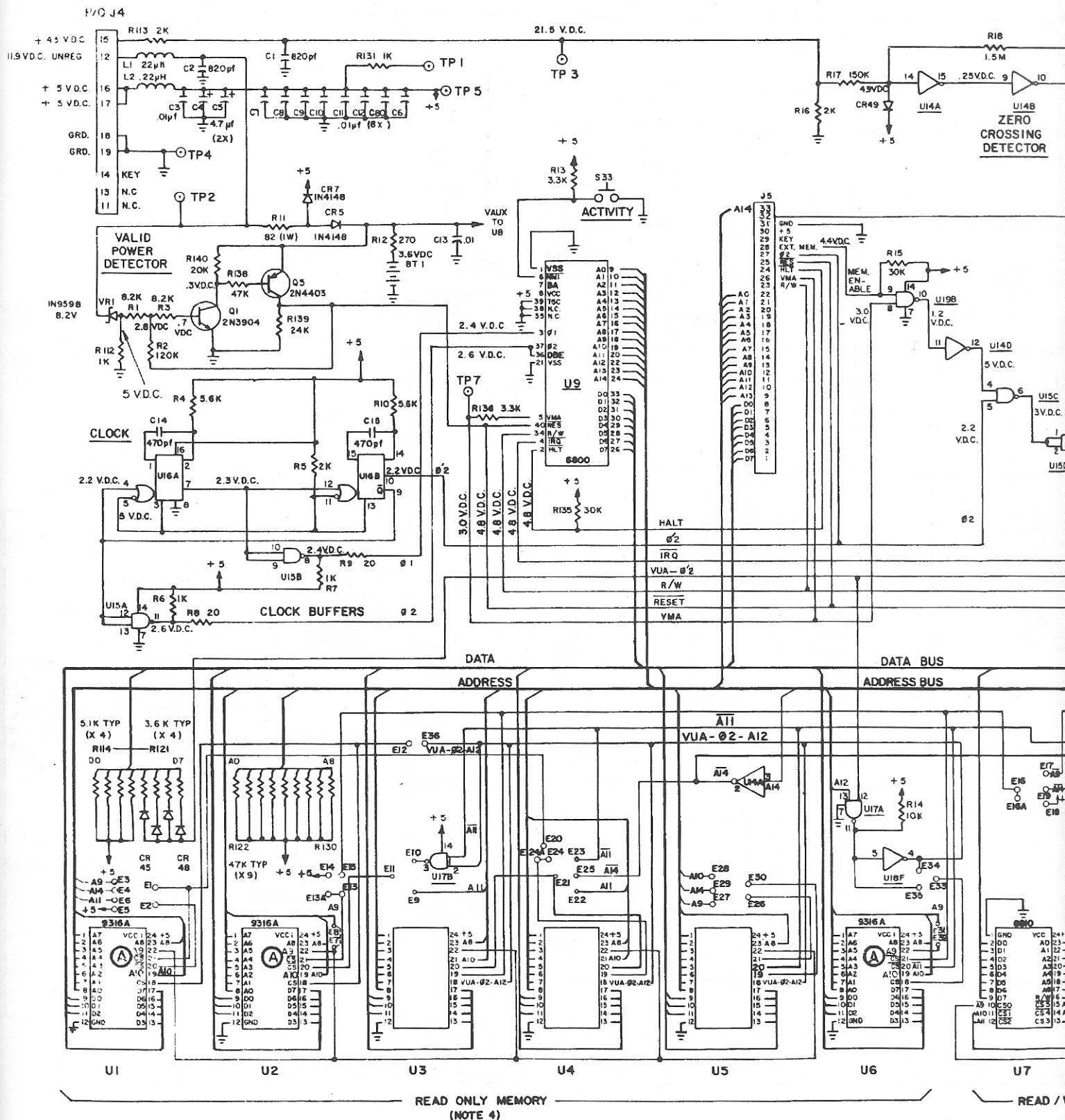


DISPLAY PANEL (E-680-7)



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.

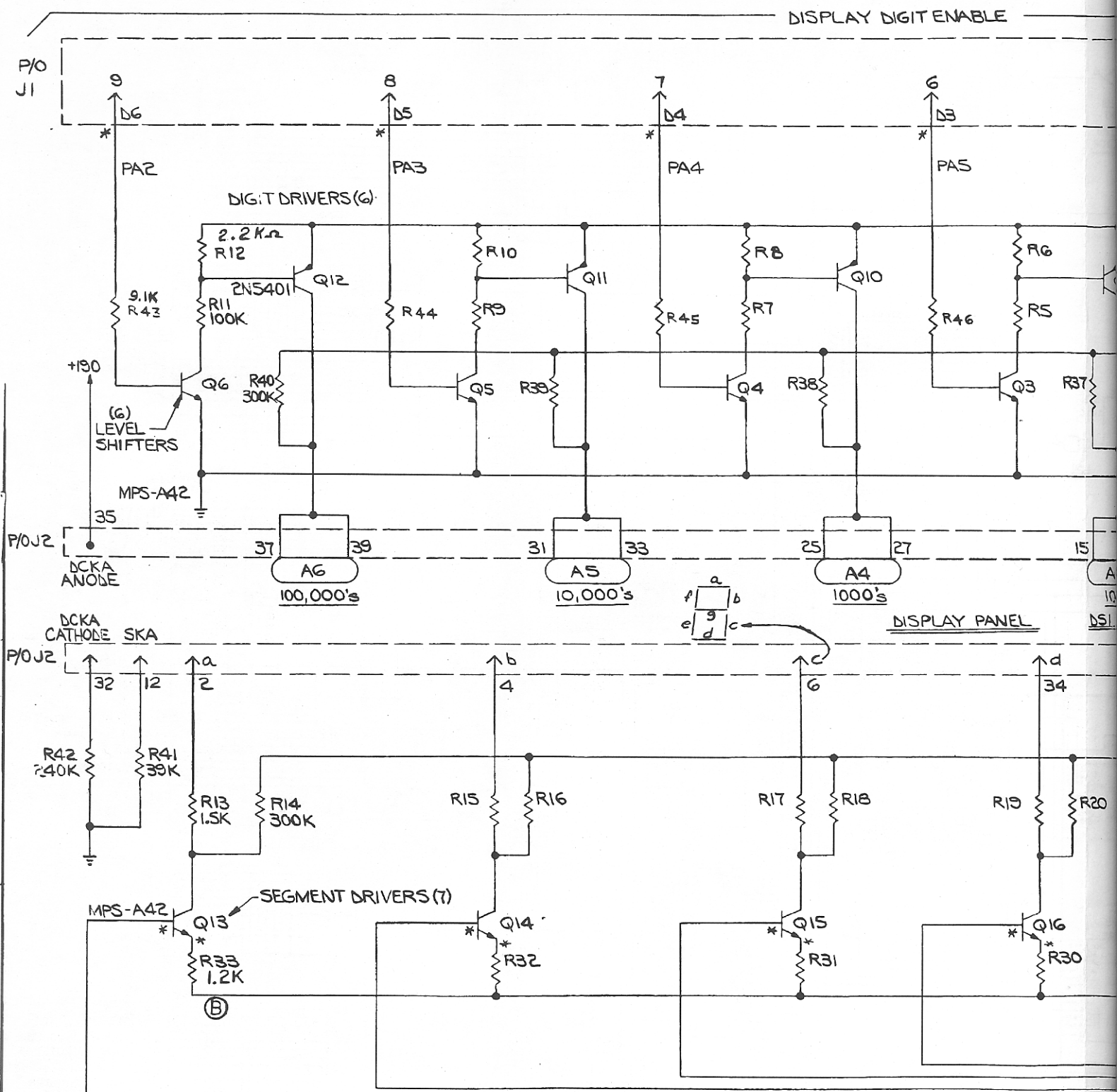
REMOVE ALL BURS		DR. BY FFC		DATE 6-18-0		Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS		#1210	
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		CK. BY CPC		DATE 6-17-0		DIE SIZE		C.C.	
FRACTIONS ± .000		APP'D BY CPC		DATE 6-17-0		FT. PER M.		LBS. PER M.	
DECIMALS ± .003		FINISH		NAME 7 DIGIT DISPLAY BOARD SCHEMATIC "A1"		ASSEM. NO. USED A5-2518-58		SCALE	
EXCEPT HOLE DIA.'S ANGLES ± 1/2°		HARDENING		MATERIAL		PART NO. W-1184-2c			
DO NOT SCALE DRAWING		CODE							
NO.	LET.	CHANGE	DATE	BY					

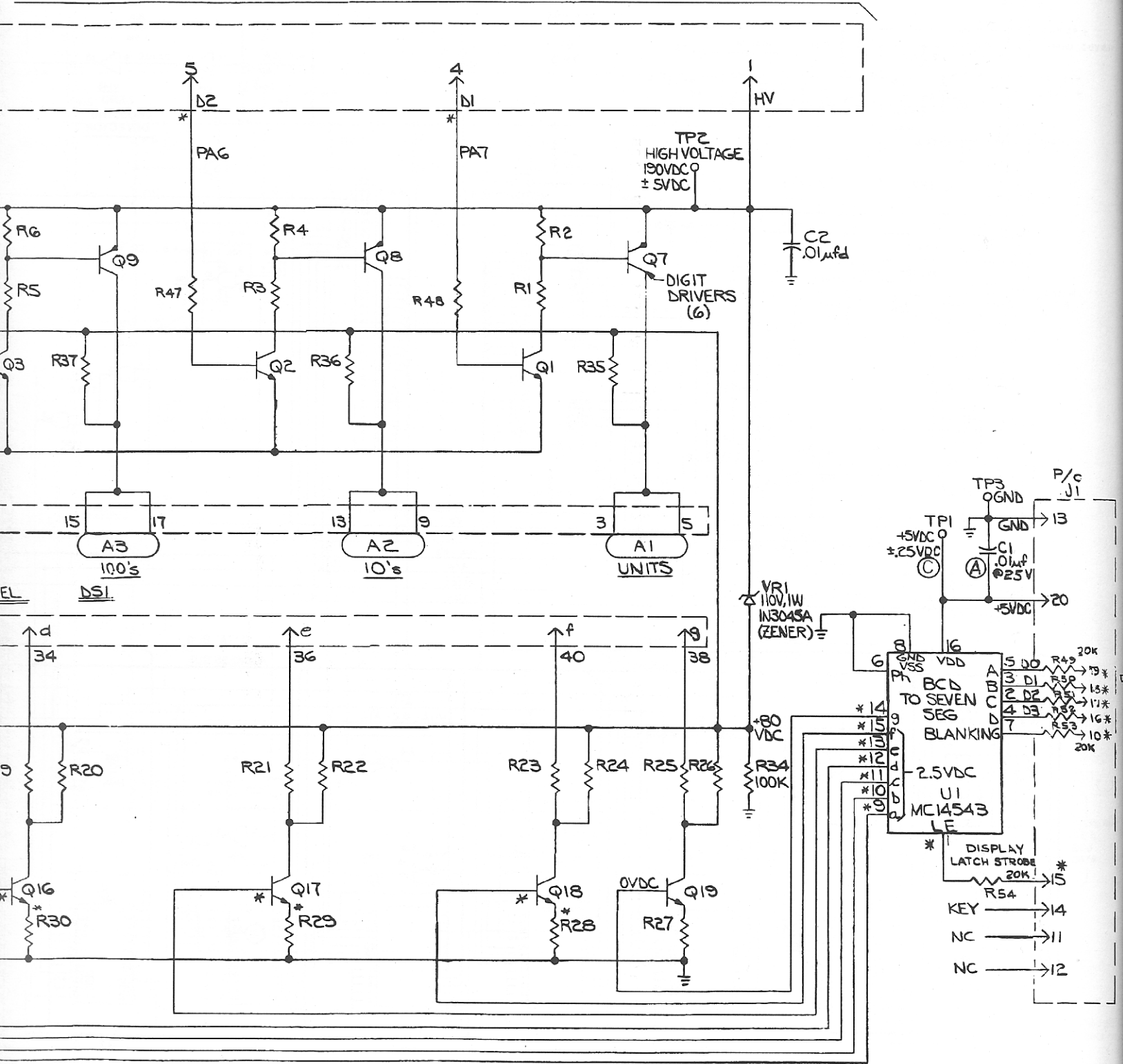


NOTES

- * INDICATES "AID" TEST POINT.
- REMOVE A3J4 BEFORE USING AS A1 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.

144



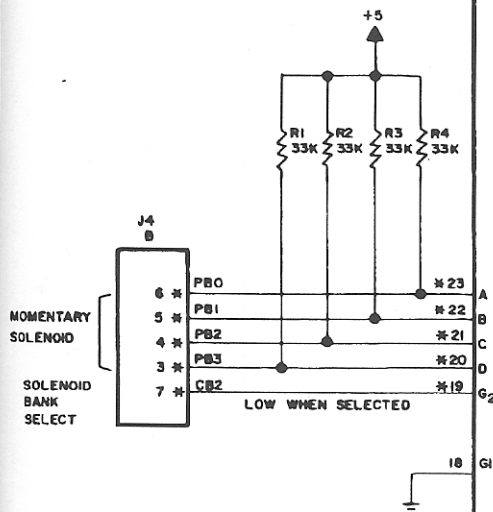


DIE SIZE — C.C. — FT. PER M — LBS. PER M —

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

REMOVE ALL BURRS		DE. BY: DATE: 05/17/77		BALLY MANUFACTURING CORP.		
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		CH. BY: DATE: 06/07/77		2640 BELMONT AVENUE CHICAGO, ILLINOIS		
FRACTIONS: 1/16, 1/8, 1/4, 1/2, 3/4, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		PRINT CONTROL: 001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 016, 017, 018, 019, 020, 021, 022, 023, 024, 025, 026, 027, 028, 029, 030, 031, 032, 033, 034, 035, 036, 037, 038, 039, 040, 041, 042, 043, 044, 045, 046, 047, 048, 049, 050, 051, 052, 053, 054, 055, 056, 057, 058, 059, 060, 061, 062, 063, 064, 065, 066, 067, 068, 069, 070, 071, 072, 073, 074, 075, 076, 077, 078, 079, 080, 081, 082, 083, 084, 085, 086, 087, 088, 089, 090, 091, 092, 093, 094, 095, 096, 097, 098, 099, 100		TOTAL		
DO NOT SCALE DRAWING		HARDENING: 001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 016, 017, 018, 019, 020, 021, 022, 023, 024, 025, 026, 027, 028, 029, 030, 031, 032, 033, 034, 035, 036, 037, 038, 039, 040, 041, 042, 043, 044, 045, 046, 047, 048, 049, 050, 051, 052, 053, 054, 055, 056, 057, 058, 059, 060, 061, 062, 063, 064, 065, 066, 067, 068, 069, 070, 071, 072, 073, 074, 075, 076, 077, 078, 079, 080, 081, 082, 083, 084, 085, 086, 087, 088, 089, 090, 091, 092, 093, 094, 095, 096, 097, 098, 099, 100		NAME: 6 DIGIT DISPLAY BOARD SCHEMATIC A		ASSEMB. NO. USED: AS-2518
NO. LET. CHANGE DATE BY CK.		MATERIAL		PART NO. W-1184		

3	C	WAS VAG	6-20-86		J.D.
2	B	WAS 1K	3-28-80		J.D.
1	A	WAS 500V	4-15-79		J.D.
NO.	LET.	CHANGE	DATE	BY	CK.



NOTES:

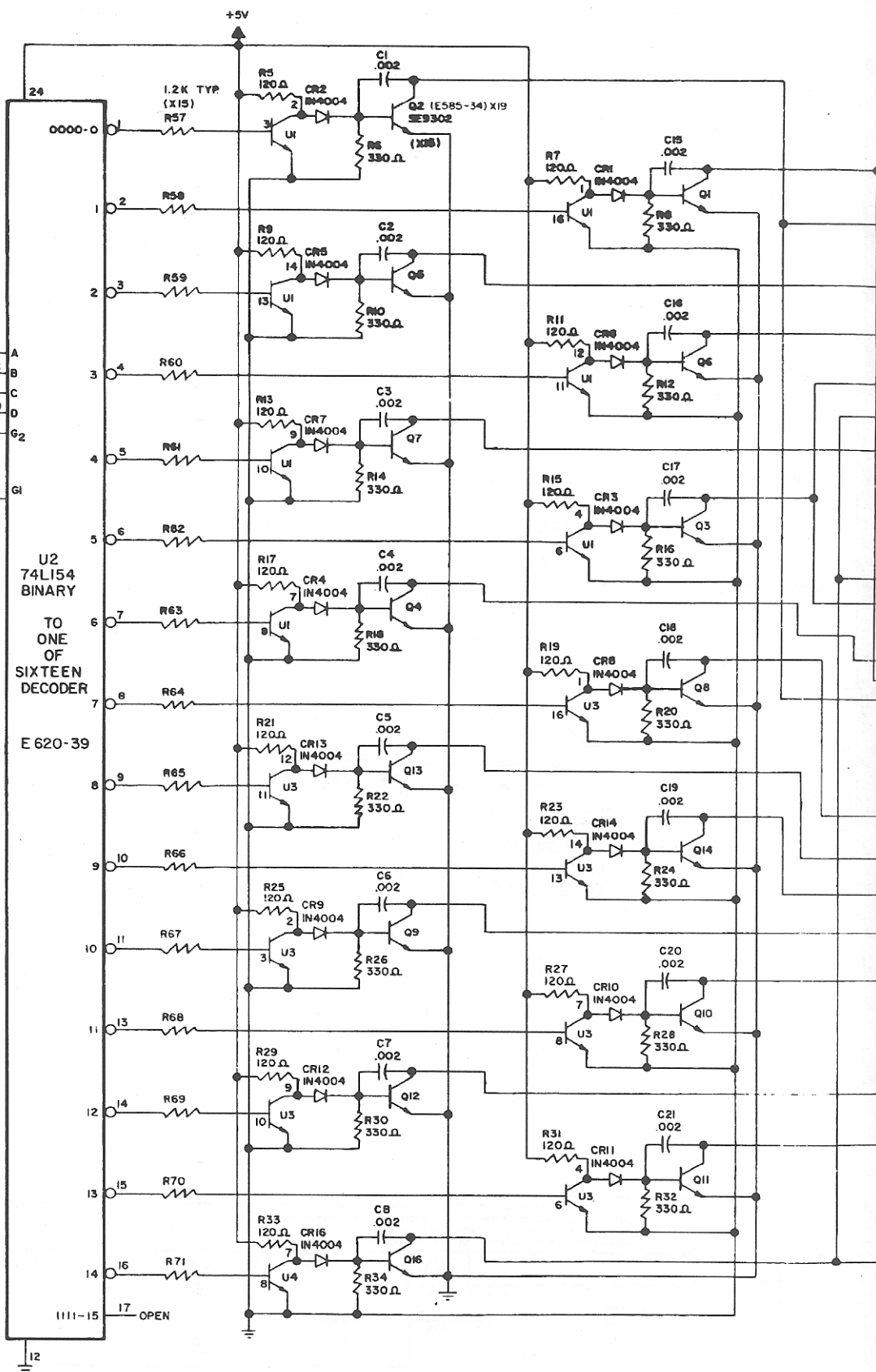
1. E-710, LAMBDA-LAS 1405 NATIONAL -LM 323 K FAIRCHILD 78H05KC
2. J1-KK156-9 PIN KEY PIN 7
J2-KK156-15 PIN KEY PIN 3
J3-KK100-25 PIN KEY PIN 2
J4-KK100-12 PIN KEY PIN 2
J5-KK156-15 PIN KEY PIN 6
3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A3".
4. "U1", "U4", "U3" PINS 5 AND 15 ARE GROUNDED.
5. VOLTAGES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

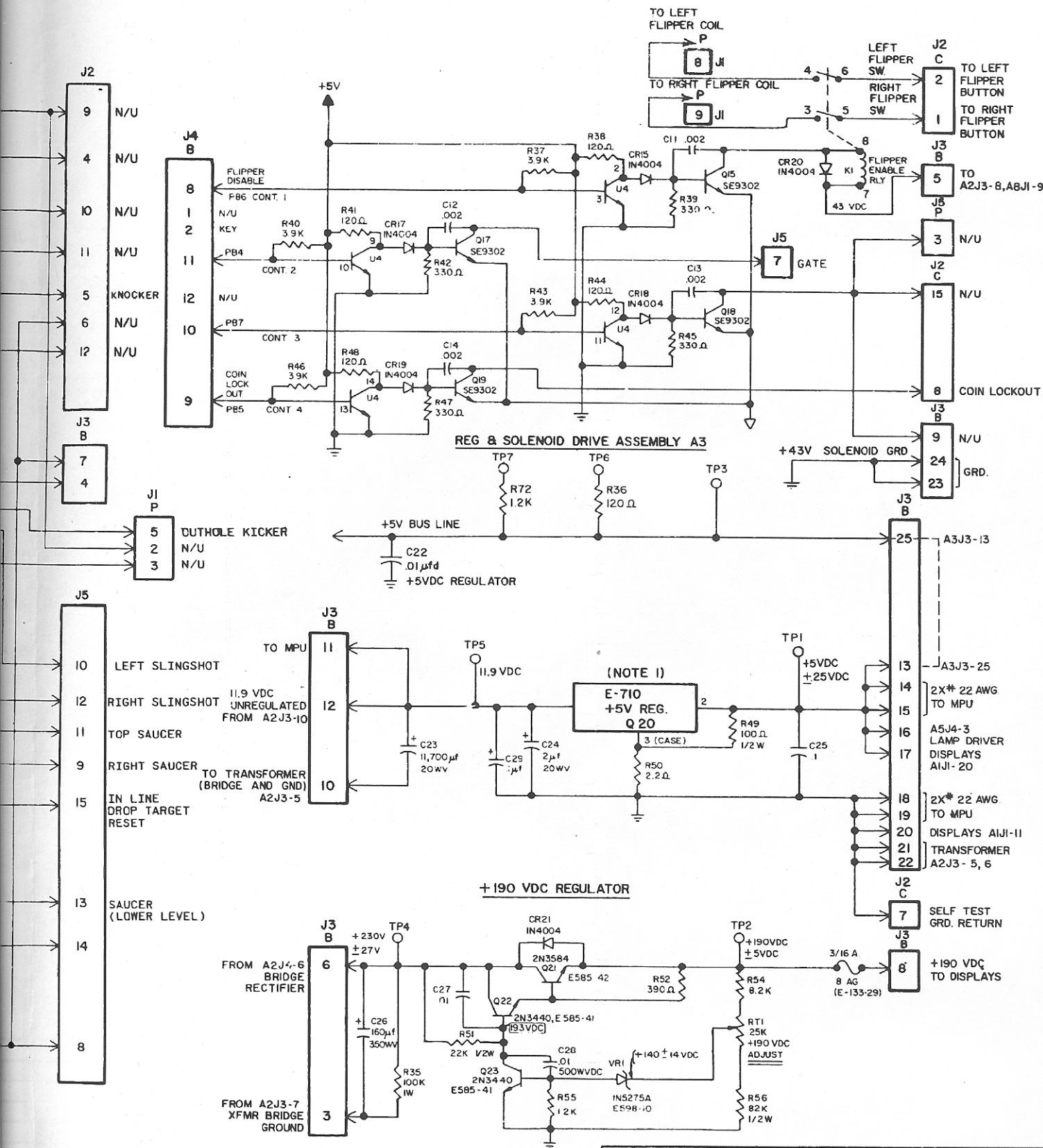
CONNECTOR CODE

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

LAST NUMBER USED

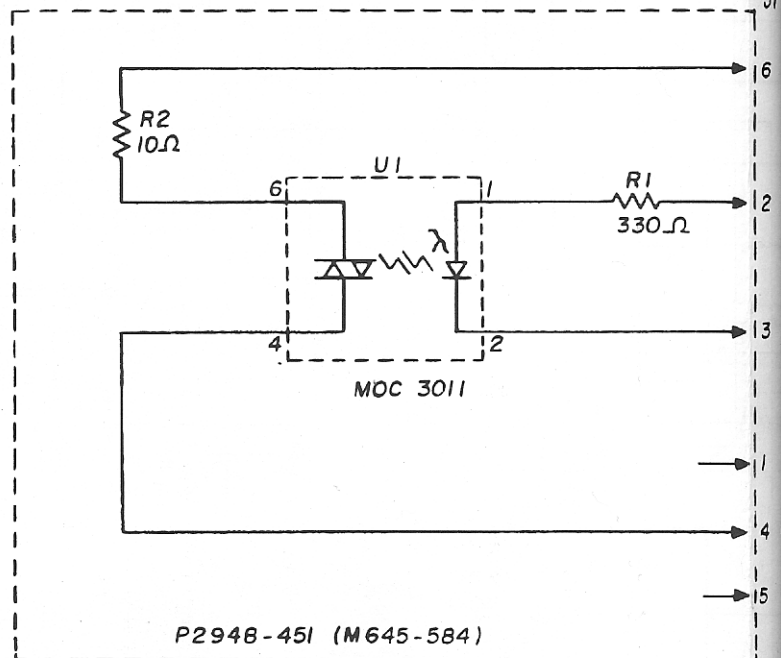
- R72
C29 N/U C9, C10
Q23 N/U Q20
CR21
VRI





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 INTERESTS OF THE OWNERS, AND MUST BE RETURNED ON DEMAND.

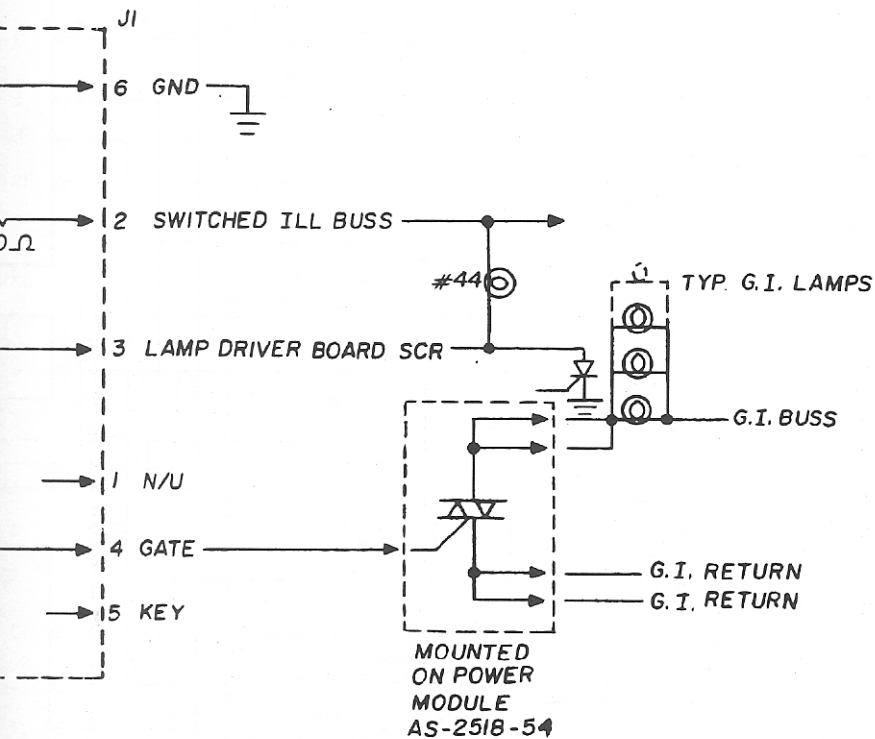
REMOVE ALL BURRS		DR. BY: M.T. DATE: 9-3-81		Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS # 1248	
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED: FRACTIONS - 008 DECIMALS - .001 EXCEPT HOLE DIA. 5 ANGLES - 1/2"		CK. BY: J.D. DATE: 9-28-81		DIE SIZE: C.C. FT. PER M. LBS. PER M.	
DO NOT SCALE DRAWING		AP'D BY: J.D. DATE: 9-28-81		NAME: SOLENOID DRIVER VOLTAGE REGULATOR SCHEMATIC	
		AP'D BY: J.D. DATE: 9-28-81		ASSEM. NO. USED	
		FINISH:		PART NO. W-1183-37	
		HARDENING			
		MATERIAL: ELEKTRA			



OPER.	DEPT.	DESCRIPTION	TOOL NO.	NO.	LET.	CHANGE
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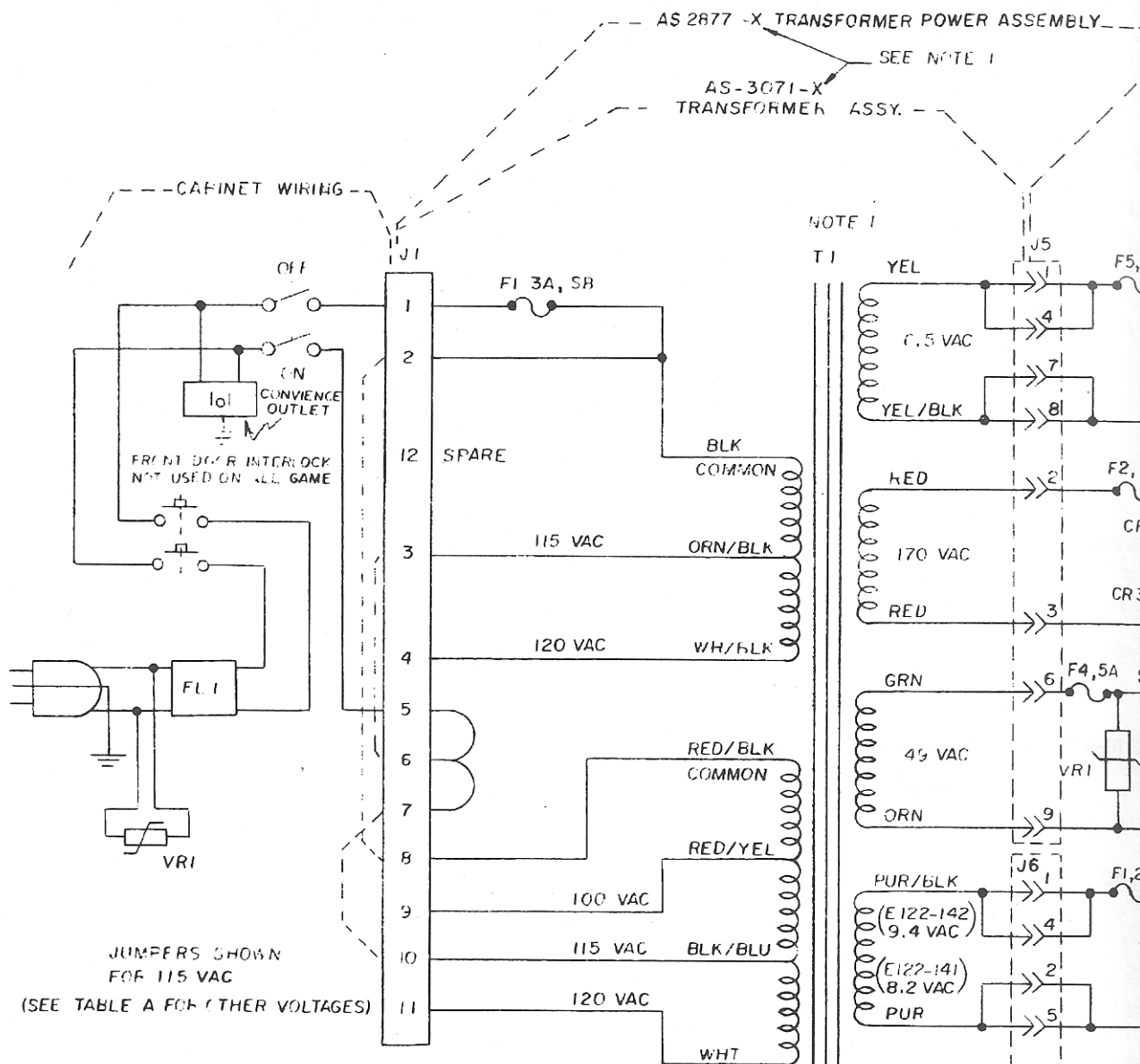
PART NO.

W-1253 b



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REMOVE ALL BURRS		DR. BY FFC	DATE 1-22-81	Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS				#1219	
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		CK. BY	DATE					PRINT CONTROL	
FRACTIONS $\pm .008$		AP'D BY FFC	DATE 1-23-81	NAME		ASSEM. NO. USED		SCALE	
DECIMALS $\pm .003$		AP'D BY FFC	DATE 1-23-81	G I FLASHER (SCHEMATIC)		AS-2518-68		☒	
EXCEPT HOLE DIA S		FINISH:		MATERIAL		PART NO.			
ANGLES $\pm 1/2^\circ$		☒		☒		W-1253 b			
DO NOT SCALE DRAWING		HARDENING:		CODE					
CHANGE	DATE	BY							



NOTES

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

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

OPER

DEPT

DESCRIPTION

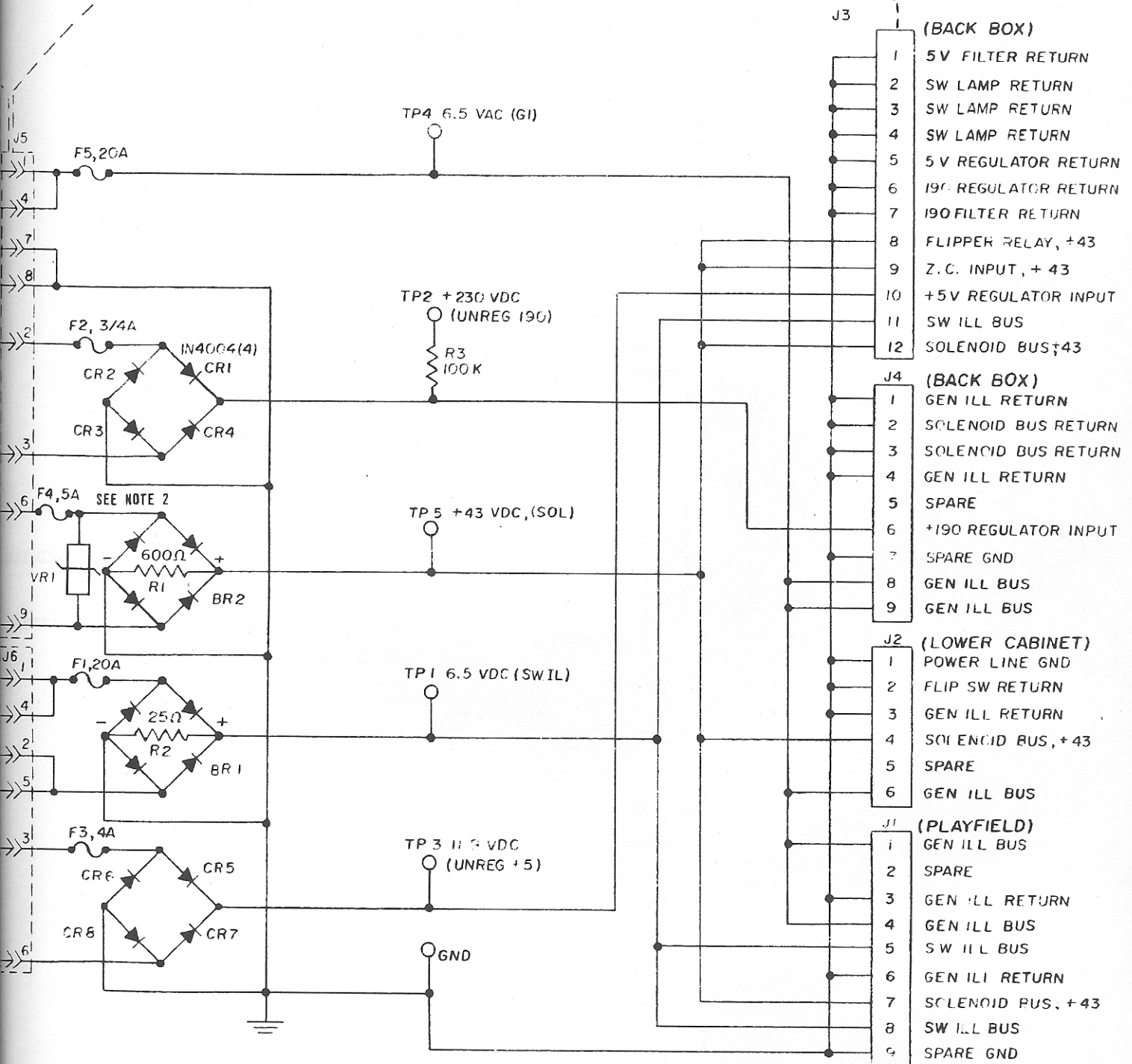
TOOL NO.

PART NO.

W-1233 b

ASSEMBLY

AS-2518-54, POWER MODULE



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REMOVE ALL BURRS

TOLERANCES ON
DIMENSIONS UNLESS
OTHERWISE SPECIFIED
FRACTIONS ± 008
DECIMALS ± 003
EXCEPT HOLE DIA.'S
ANGLES ± 1/2°

DO NOT SCALE DRAWING

DR. BY FFC	DATE 7-10-80
CK. BY AMCR	DATE 7-11-80
AP'D BY	DATE
AP'D BY	DATE
FINISH:	
HARDENING:	

Bally MANUFACTURING CORP.

FEB 20 1981

2640 BELMONT AVENUE
CHICAGO, ILLINOIS

1196

PRINT
CONTROL

DIE SIZE-

C.C.-

FT. PER M-

LBS. PER M-

NAME

POWER SUPPLY SCHEMATIC

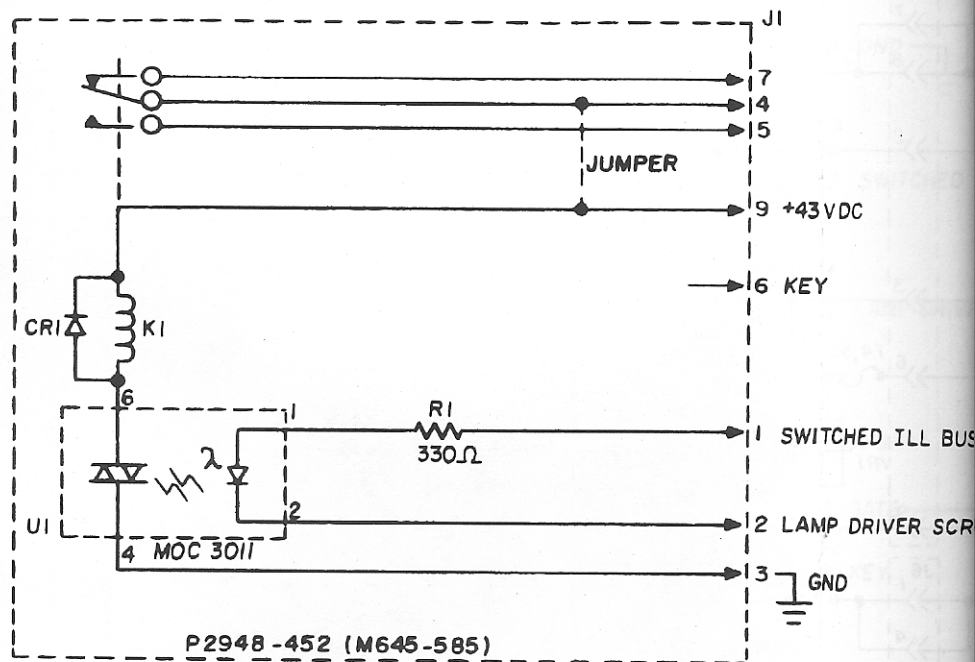
MATERIAL

ASSEM. NO. USED

SCALE

PART NO.

W-1233 b

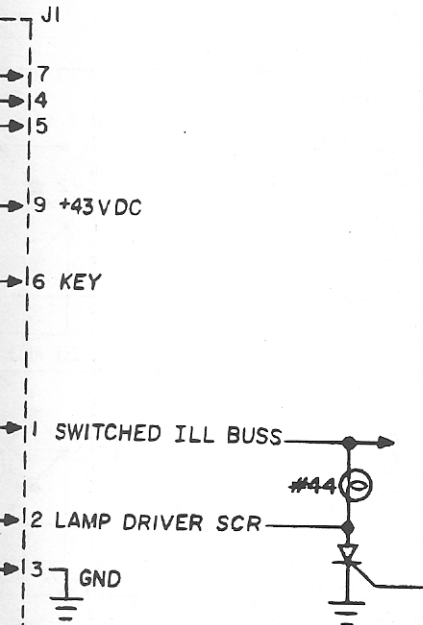


OPER.	DEPT.	DESCRIPTION	TOOL NO.
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					DIMEN
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					FRACT
					DECIM
					EXCEPT
					ANGLE
					DO M

PART NO.

W-1251 b



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

TOLERANCES ON
 DIMENSIONS UNLESS
 OTHERWISE SPECIFIED
 FRACTIONS $\pm .008$
 DECIMALS $\pm .003$
 EXCEPT HOLE DIA.'S
 ANGLES $\pm 1/2^\circ$

DO NOT SCALE DRAWING

DR. BY
 FFC
 CK. BY
 DATE
 1-21-81

AP'D BY
 DATE
 1-23-81
 AP'D BY
 DATE
 1-23-81

FINISH:

HARDENING:

Bally MANUFACTURING CORP.

2640 BELMONT AVENUE
 CHICAGO, ILLINOIS

1220

PRINT
CONTROL

DIE SIZE.

C.C.

FT. PER M.

LBS. PER M.

NAME

SOLENOID EXPANDER (SCHEMATIC)

ASSEM. NO. USED

AS-2518 -66

SCALE

PART NO.

W-1251 b

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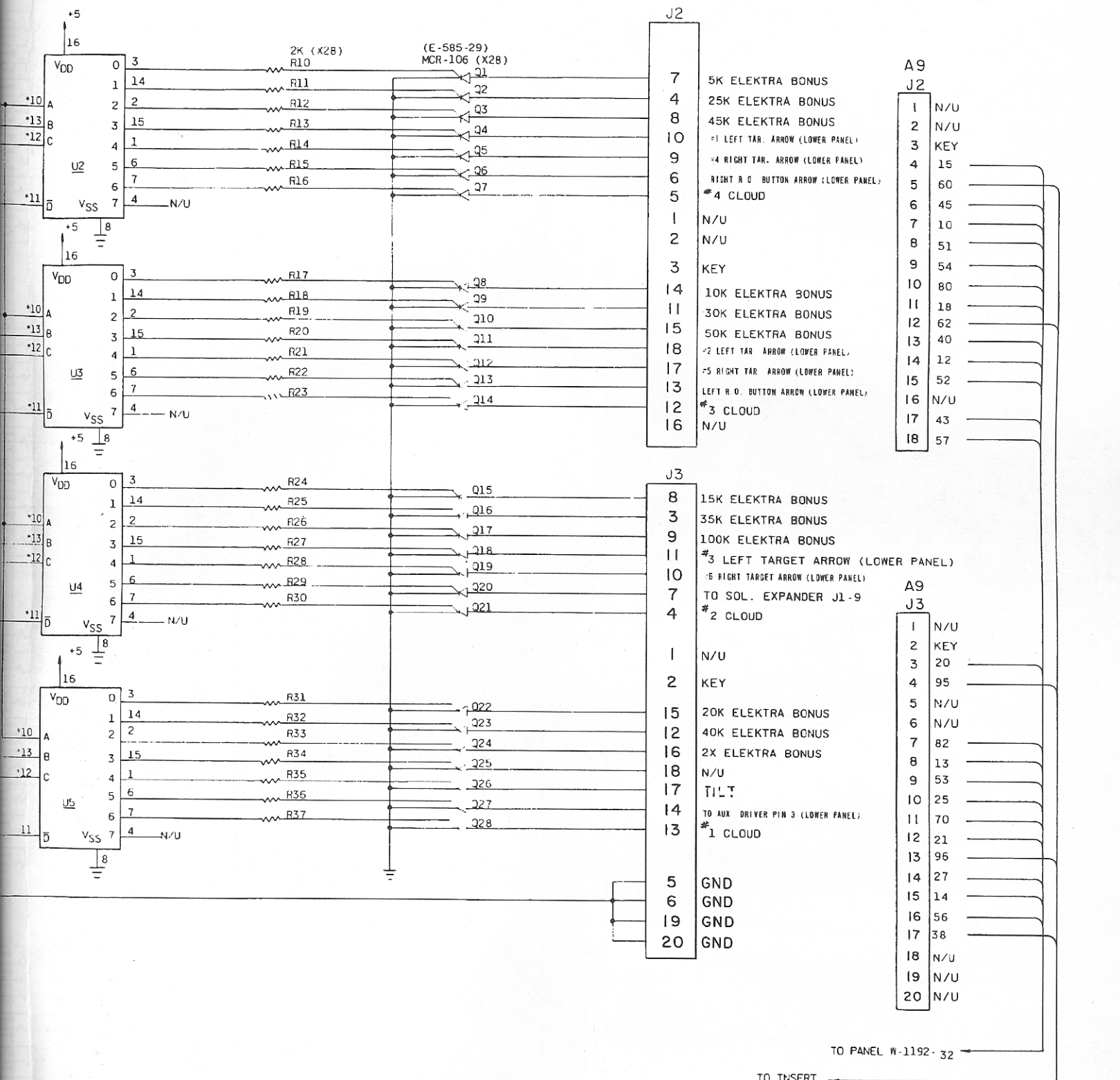
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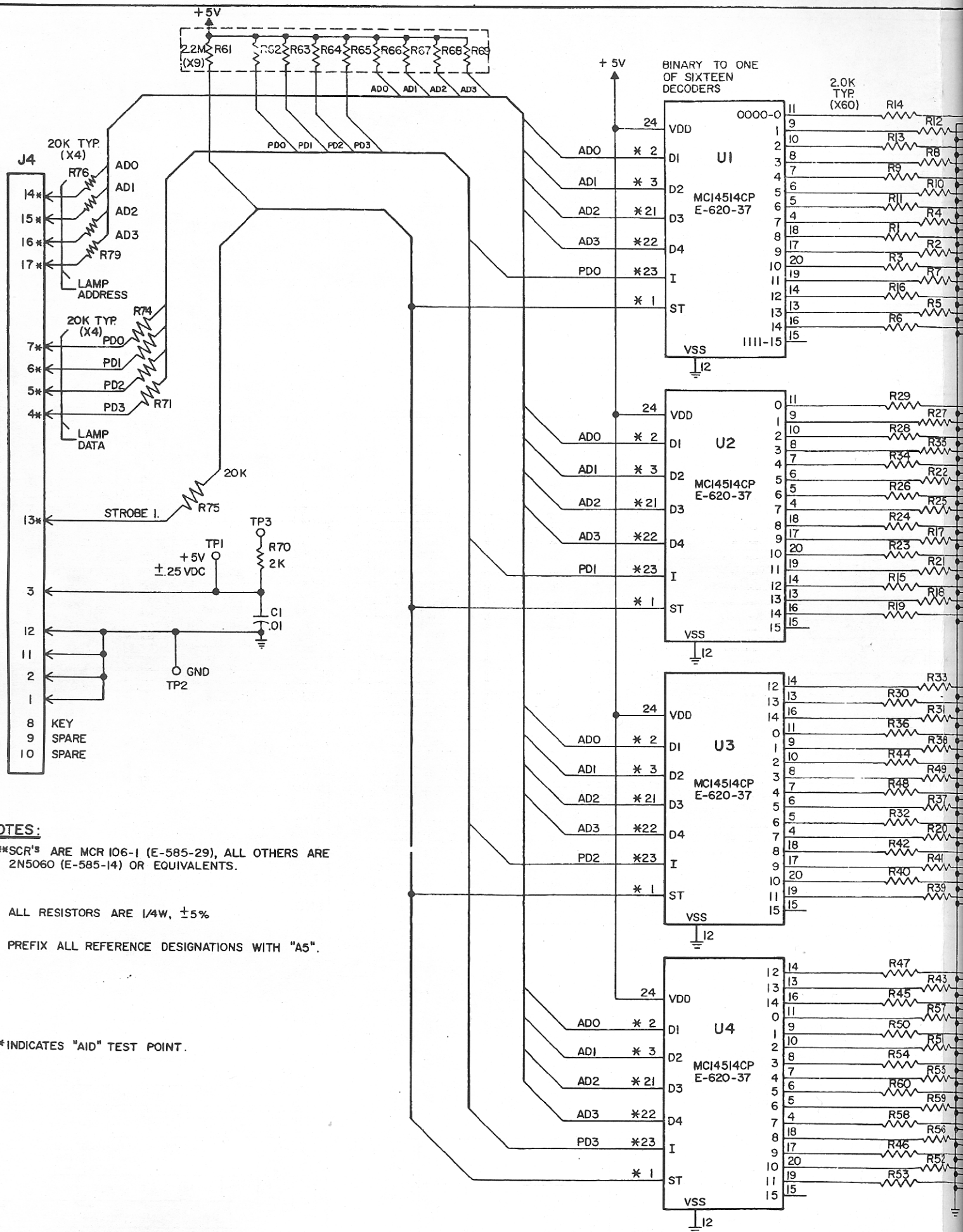
D₁₈₀

(E-620-108)
MC140288 (X4)

TO INSERT

TO PANEL W-1192-32

REMOVE ALL BURS TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED FINISH: 12-1/2 DIA 5 ANGLES DO NOT SCALE DRAWING				DR BY DATE CR BY DATE APD BY DATE APD BY DATE FINISH: 12-1/2 DIA 5 ANGLES HARDENING				ALL DESIGN OPERATIVE AND PROCESS DATA PERTAINING TO THE ARTICLES SHOWN ON THIS SHEET IS THE PROPERTY OF BALLY MANUFACTURING CORP. THIS INFORMATION IS DISCLOSED IN CONFIDENCE AND IS NOT TO BE COPIED, REPRODUCED, RELEASED, OR APPLIED IN ANY MANNER IN PART OR IN WHOLE, WITHOUT THE EXPRESS CONSENT OF THE OWNER. THE PRINT IS LOANED AND MUST BE RETURNED ON DEMAND. Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS 60648 DIE SIZE - CC FT PERM - LBS PERM - NAME: AUXILIARY LAMP DRIVER A9 MATERIAL: ELEKTRA PART NO: W-1207-12			
NO	LET	CHANGE	DATE	BY	ASSEMBLY	USED	SCALE				



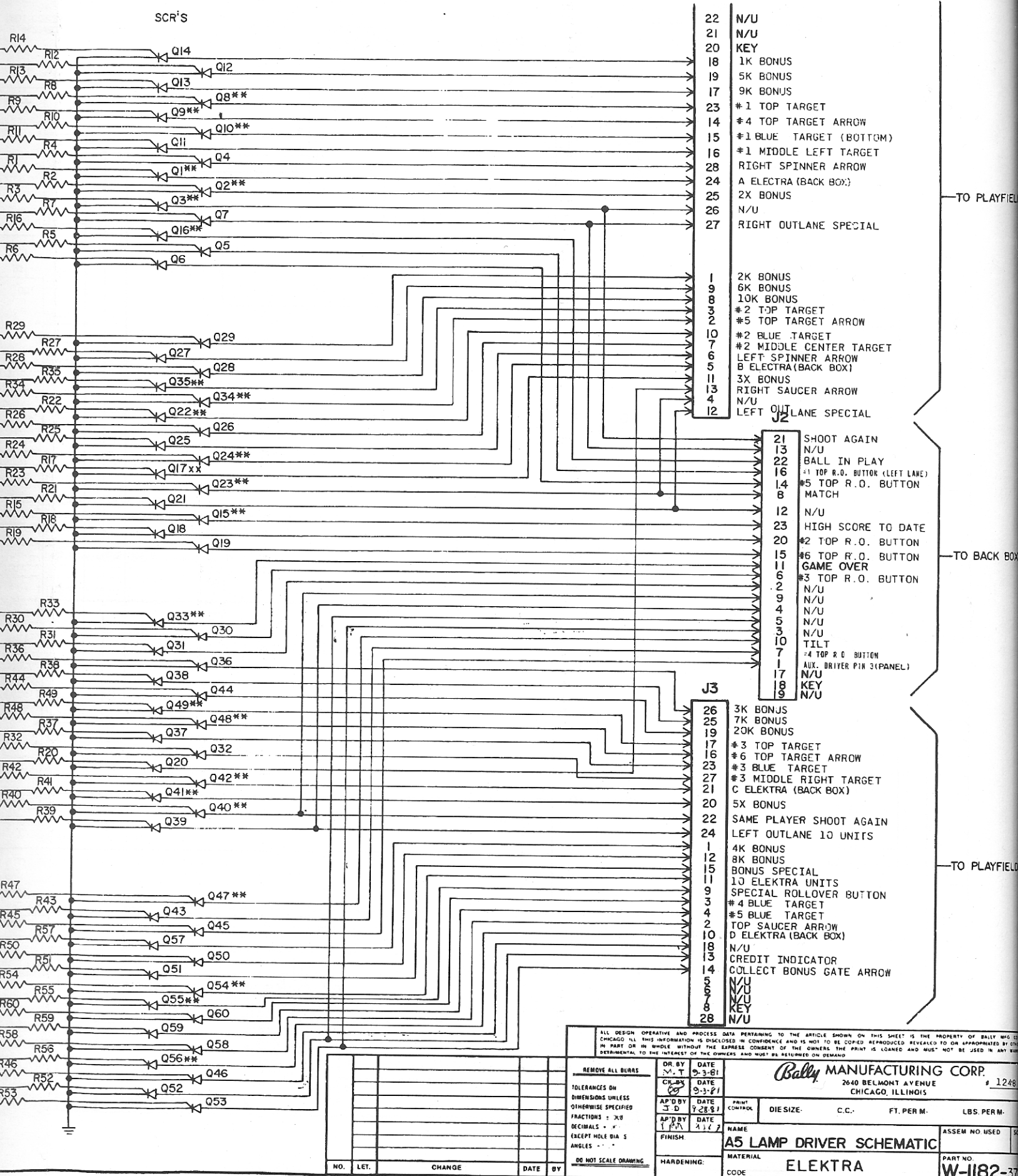
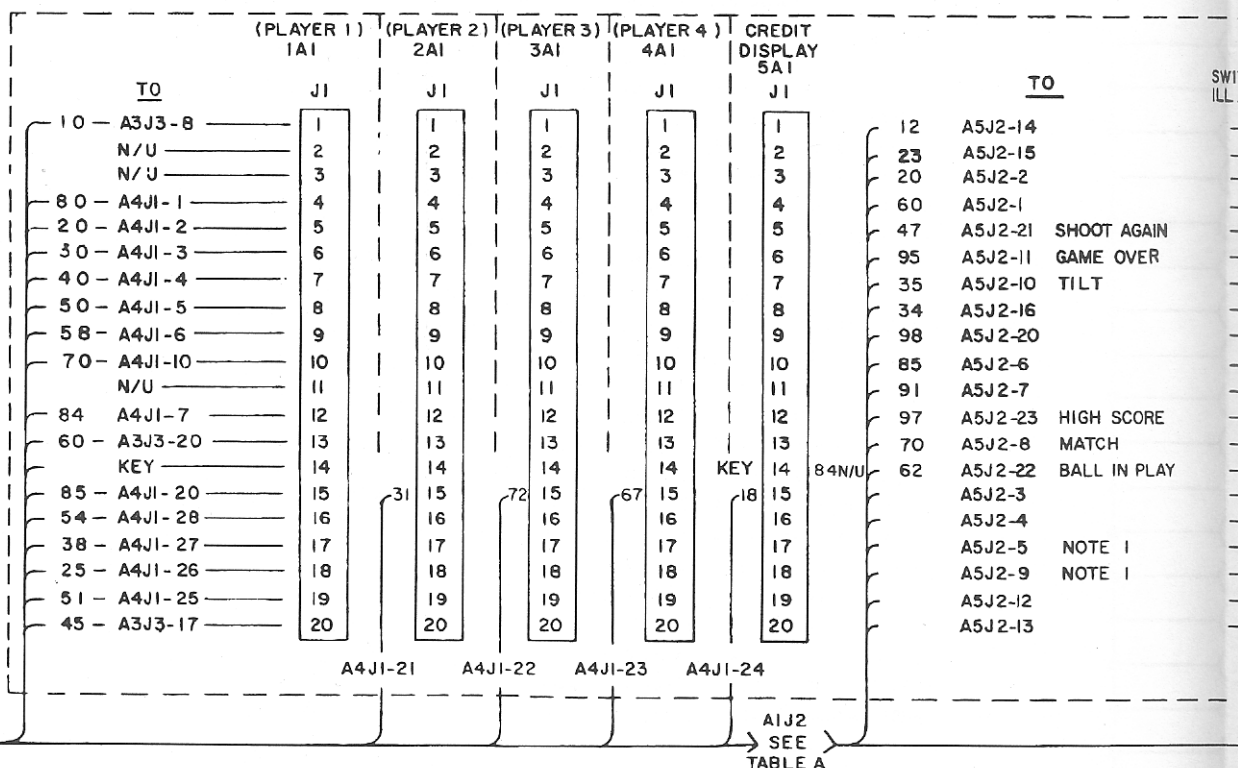


TABLE A AIJ2

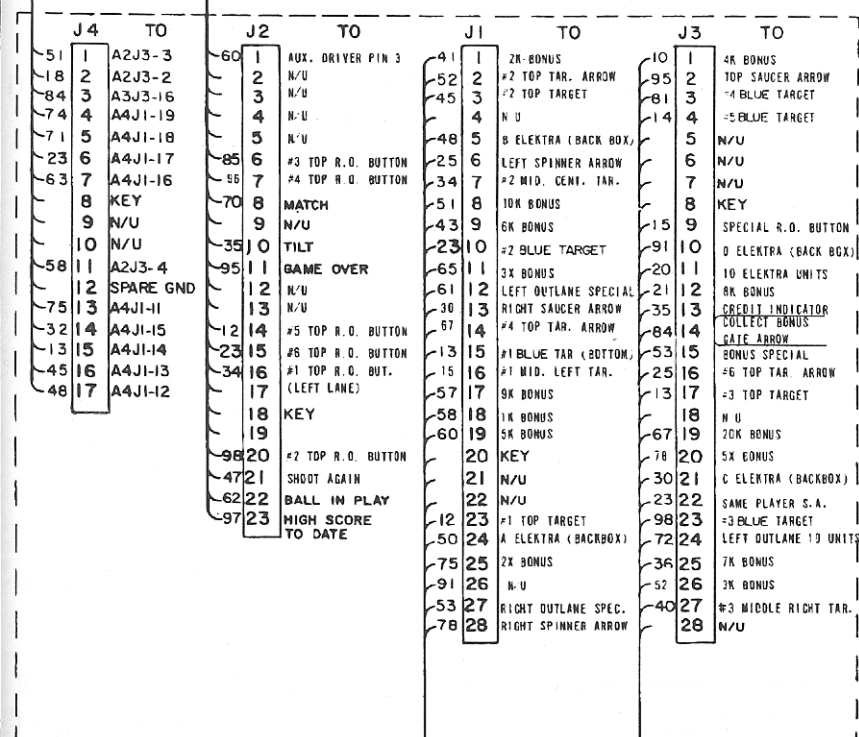
FROM	PIN	WIRE
A2J3-11	1	20
A5J2-14	2	12
A2J4-1	3	50
A2J4-8	4	10
A5J2-23	5	97
A5J2-15	6	23
A5J2-22	7	62
A5J2-8	8	70
A5J2-1	9	60
A5J2-2	10	20
A5J2-11	11	95
A5J2-21	12	47
A5J2-10	13	35
A5J2-7	14	91
A5J2-6	15	85
A5J2-20	16	98
A5J2-16	17	34
A2J4-4	18	40
A2J4-9	19	70
	20	
	21	
A4J4-8	22	31
	23	
A8J1-7	24	70

INSERT TO BACK CAB.
PLUG

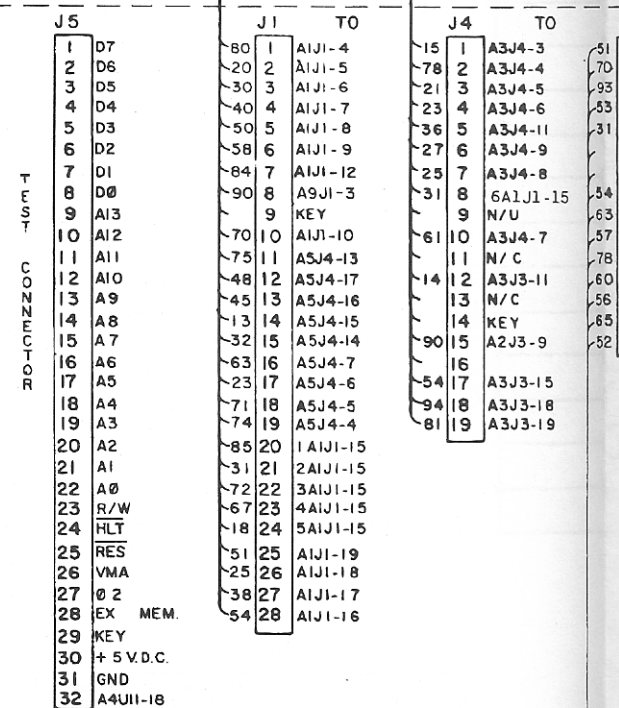
AI INSERT



LAMP DRIVER A5



MPU A4

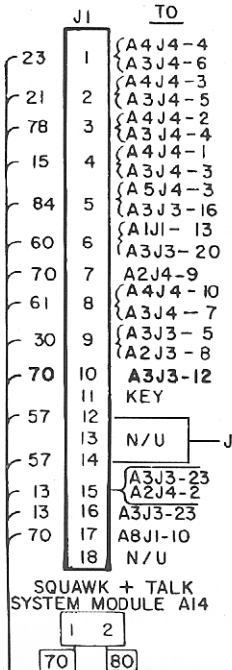
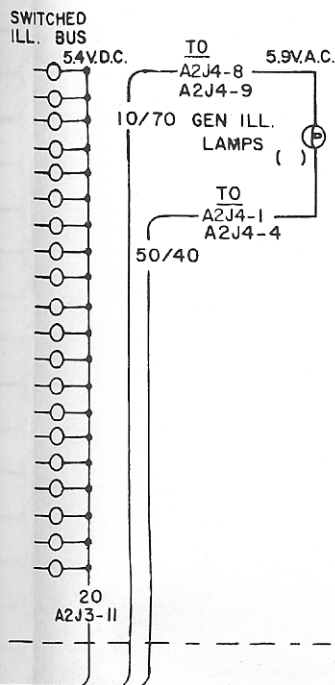


TO LOWER
CABINET

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.



24 PIN PLUG		
FROM	PIN	WIRE
A2J4-4	1	40
A2J4-1	2	50
A2J3-2	3	18
A2J3-3	4	51
A2J4-6	5	92
A2J3-11	6	20
A2J3-10	7	70
A2J3-8	8	30
A2J4-9	9	70
A2J4-8	10	10
A2J3-9	11	90
A2J3-4	12	58
A2J3-5	13	52
A2J3-6	14	82
A2J3-1	15	56
A2J3-7	16	50
A2J4-2	17	13
A2J4-3	18	57

CABINET TO BACK BOX

12 PIN PLUG		
FROM	PIN	WIRE
A9J2-7	1	10
A9J2-14	2	12
A9J2-4	3	15
A9J3-11	4	18
A9J2-13	5	40
A9J2-17	6	43
A9J2-6	7	45
A9J2-8	8	51
A9J2-15	9	52
A9J2-9	10	54
A9J2-18	11	57
A9J2-10	12	80

PANEL TO BACK BOX

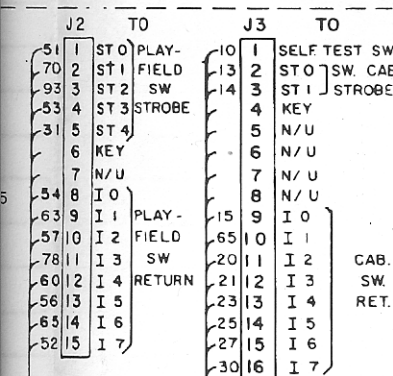
12 PIN PLUG		
FROM	PIN	WIRE
A9J3-8	1	13
A9J3-15	2	14
A9J3-3	3	20
A9J3-12	4	21
A9J3-10	5	25
A9J3-14	6	27
A9J3-9	7	53
A9J3-16	8	56
A9J3-11	9	70
A9J3-7	10	82

PANEL TO BACK BOX

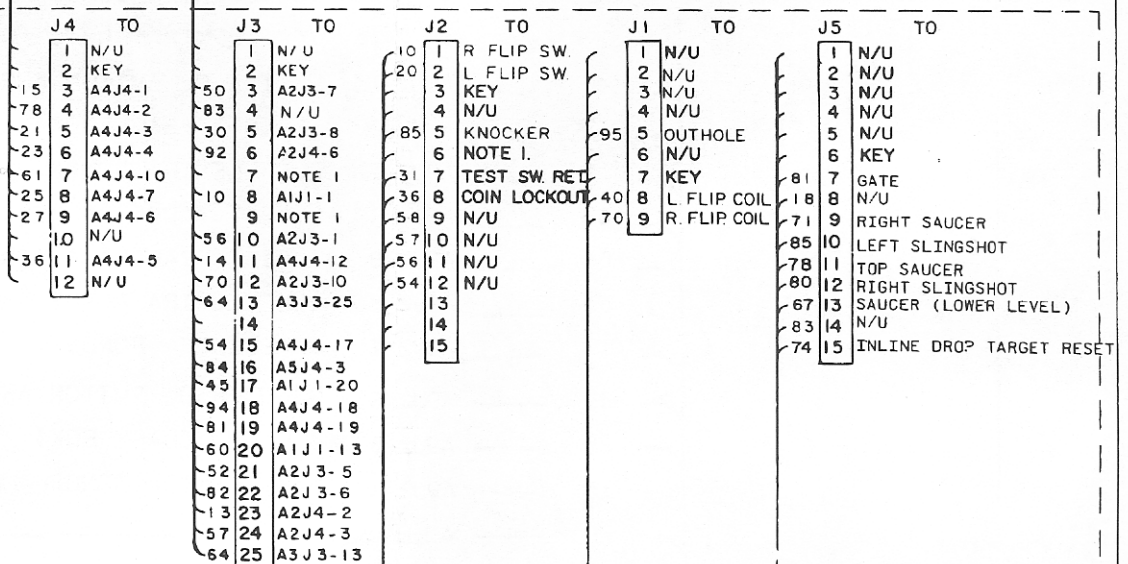
12 PIN PLUG		
FROM	PIN	WIRE
A5J2-14	1	12
A5J2-15	2	23
A5J3-21	3	30
A5J2-16	4	34
A5J1-5	5	48
A5J1-24	6	50
A5J2-7	7	60
A5J2-6	8	85
A5J3-10	9	91
A5J2-7	10	96
A5J2-20	11	98

PANEL TO BACK BOX

A4



VOLTAGE REGULATOR / SOLENOID DRIVER A3



WIRE COLOR CODE

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

REMOVE ALL BURRS

TOLERANCES UNLESS OTHERWISE SPECIFIED

FRACTIONS: 1/64

DECIMALS: .001

ANGLES: 1°

DO NOT SCALE DRAWING

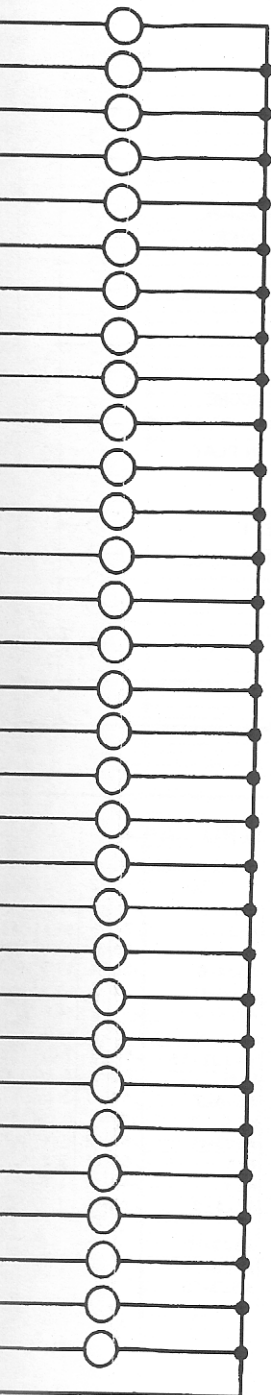
DR BY M.T.	DATE 9-8-81	Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS		#1248
AP'D BY J.D.	DATE 9-24-81	PRINT CONTR.	TOTAL	SCALE
AP'D BY J.D.	DATE 9-24-81	NAME WIRING DIAGRAM BACKBOX		
FINISH	MATERIAL		PART NO.	
HARDENING	FI FKTRA		W-1187-33	

LET	CHANGE	DATE	BY	CHK

PART NO.

W-1255-3

b



5.4 VDC

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

TOLERANCES ON
DIMENSIONS UNLESS
OTHERWISE SPECIFIED
FRACTIONS + .002
DECIMALS + .001
EXCEPT HOLE DIA S
ANGLES + .1°

DO NOT SCALE DRAWING

DR. BY
M. TDATE
9-3-81CK. BY
J. DDATE
9-3-81AP'D BY
J. DDATE
9-28-81AP'D BY
J. DDATE
9-28-81

FINISH:

HARDENING:

PRINT
CONTROL

Bally MANUFACTURING CORP.

2640 BELMONT AVENUE
CHICAGO, ILLINOIS

1248

DIE SIZE.

C.C.

FT. PER M.

LBS. PER M.

NAME
WIRING DIAGRAM
PLAYFIELD

ASSEM. NO. USED

SCALE

MATERIAL

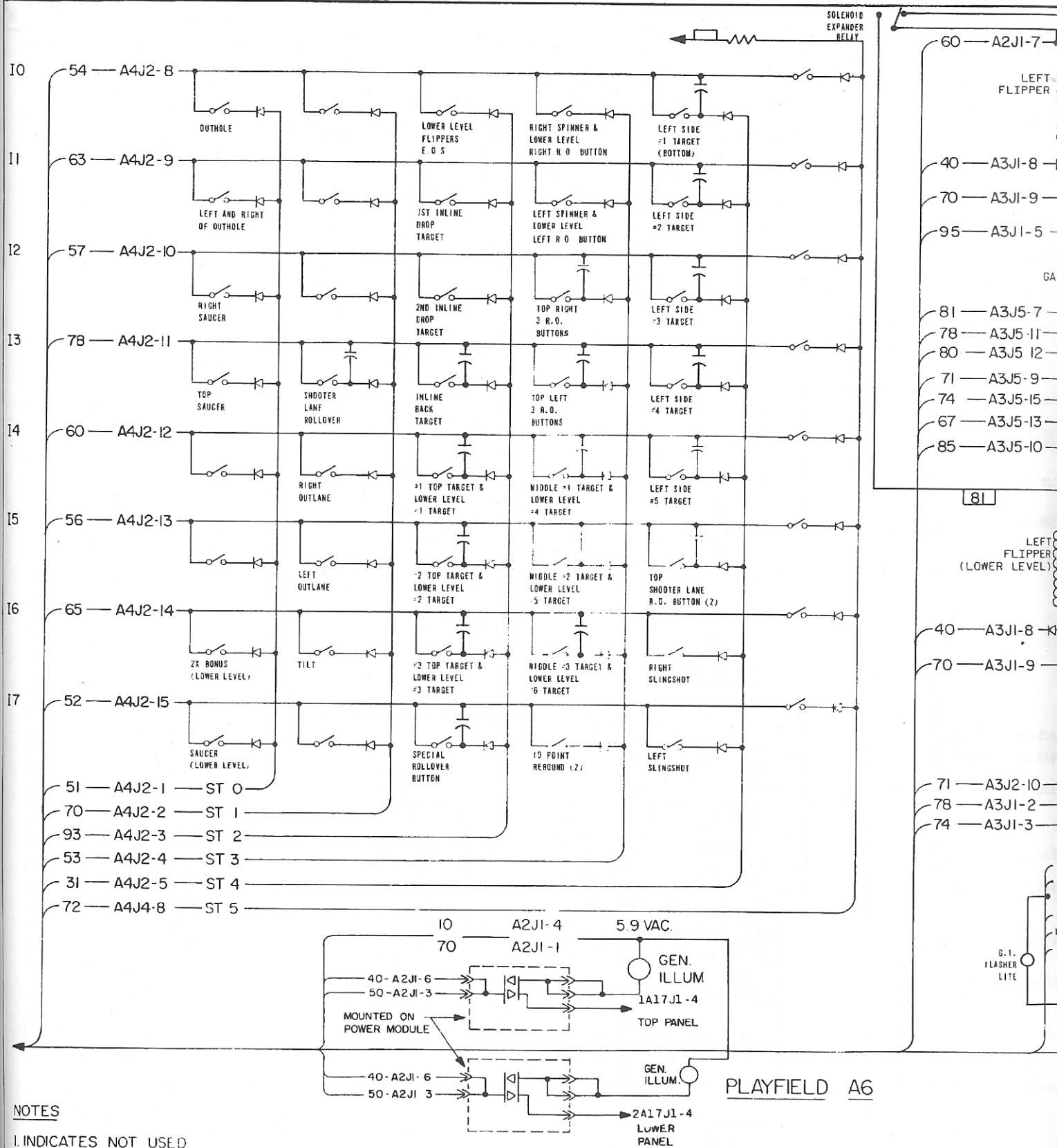
CONF

ELEKTRA

PART NO.

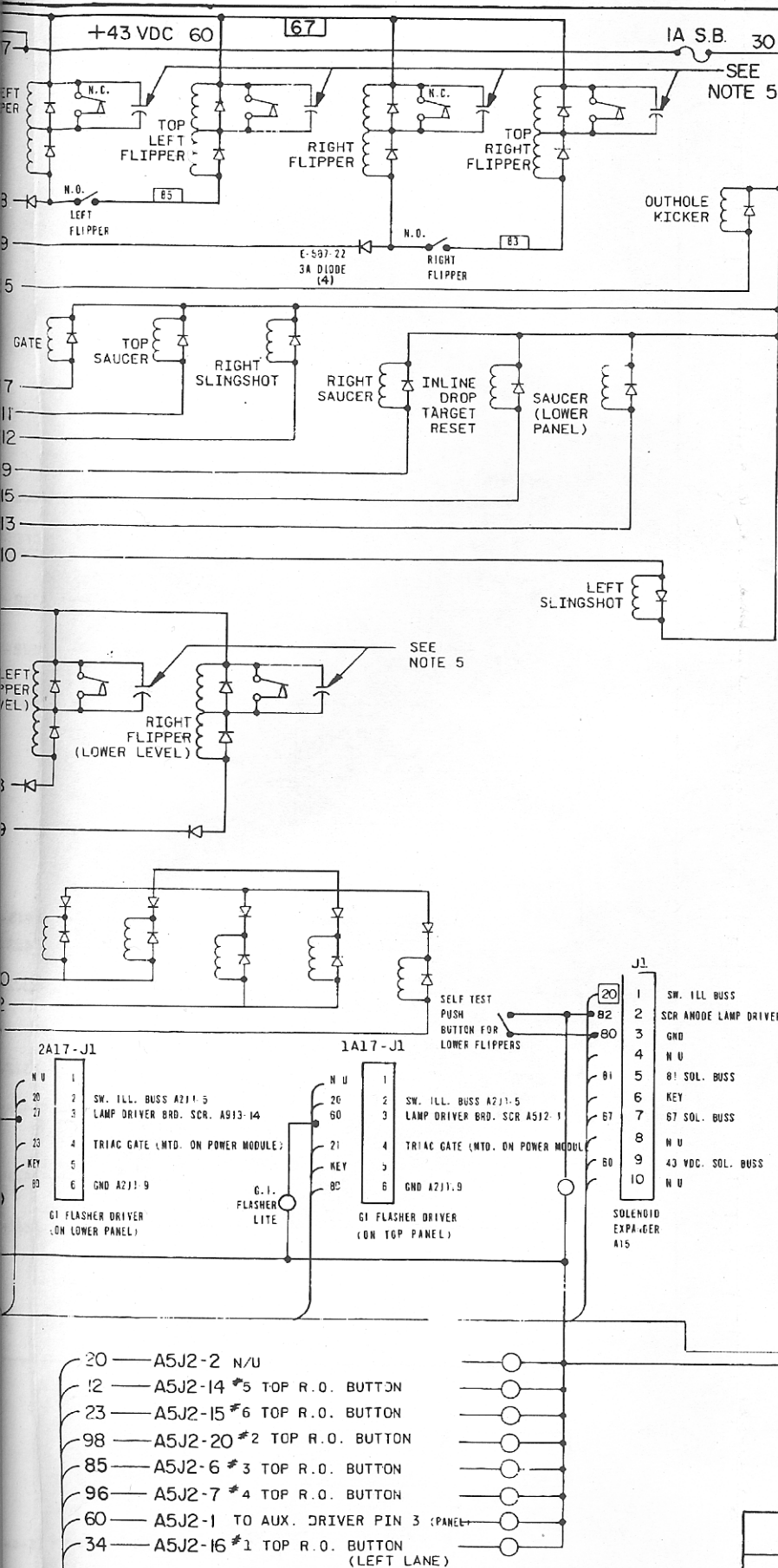
W-1255-3

b



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)



- 58 A5J1-18 1K BONUS** **60 A5J1-19 5K BONUS** **57 A5J1-17 9K BONUS** **12 A5J1-23 #1 TOP TARGET** **67 A5J1-14 #4 TOP TARGET ARROW** **13 A5J1-15 #1 BLUE TARGET (BOTTOM)** **15 A5J1-16 #1 MIDDLE LEFT TARGET** **78 A5J1-28 RIGHT SPINNER ARROW** **50 A5J1-24 A ELEKTRA (BACK BOX)** **75 A5J1-25 2X BONUS** **91 A5J1-26 N/U** **53 A5J1-27 RIGHT OUTLANE SPECIAL** **41 A5J1-1 2K BONUS** **43 A5J1-9 6K BONUS** **51 A5J1-8 10K BONUS** **45 A5J1-3 #2 TOP TARGET** **52 A5J1-2 #5 TOP TARGET ARROW** **23 A5J1-10 #2 BLUE TARGET** **34 A5J1-7 #2 MIDDLE CENTER TARGET** **25 A5J1-6 LEFT SPINNER ARROW** **48 A5J1-5 B ELEKTRA (BACK BOX)** **65 A5J1-11 3X BONUS** **35 A5J1-4 N/U** **61 A5J1-12 LEFT OUTLANE SPECIAL** **30 A5J1-13 RIGHT SAUCER ARROW**

- 52 A5J3-26 3K BONUS** **36 A5J3-25 7K BONUS** **67 A5J3-19 20K BONUS** **13 A5J3-17 #3 TOP TARGET** **25 A5J3-16 #6 TOP TARGET ARROW** **98 A5J3-23 #3 BLUE TARGET** **40 A5J3-27 #3 MIDDLE RIGHT TARGET** **30 A5J3-21 C ELEKTRA (BACK BOX)** **78 A5J3-20 5X BONUS** **23 A5J3-22 SAME PLAYER SHOOT AGAIN** **72 A5J3-24 LEFT OUTLANE 10 UNITS** **10 A5J3-1 4K BONUS** **21 A5J3-12 8K BONUS** **53 A5J3-15 BONUS SPECIAL** **20 A5J3-11 10 ELEKTRA UNITS** **15 A5J3-9 SPECIAL R.O. BUTTON** **35 A5J3-13 CREDIT INDICATOR** **14 A5J3-4 #5 BLUE TARGET** **95 A5J3-2 TOP SAUCER ARROW** **91 A5J3-10 D ELEKTRA (BACK BOX)** **56 A5J3-18 N/U** **81 A5J3-3 #4 BLUE TARGET** **84 A5J3-14 COLLECT BONUS GATE ARROW** **20 A2J1-5 FEATURE LAMP BUS**

5.4 VDC

DATE 9-28-81 BY J.B. APPROVED J.B. DATE 9-28-81 FINISH 9-28-81 HARDENING		Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS 60648 DIE SIZE CC FT PER M LBS PER M	
WIRING DIAGRAM PLAYFIELD		ASSEMBLY NO. USED SCA.	
MATERIAL F1 FKTRA		PART NO. 100 37	

