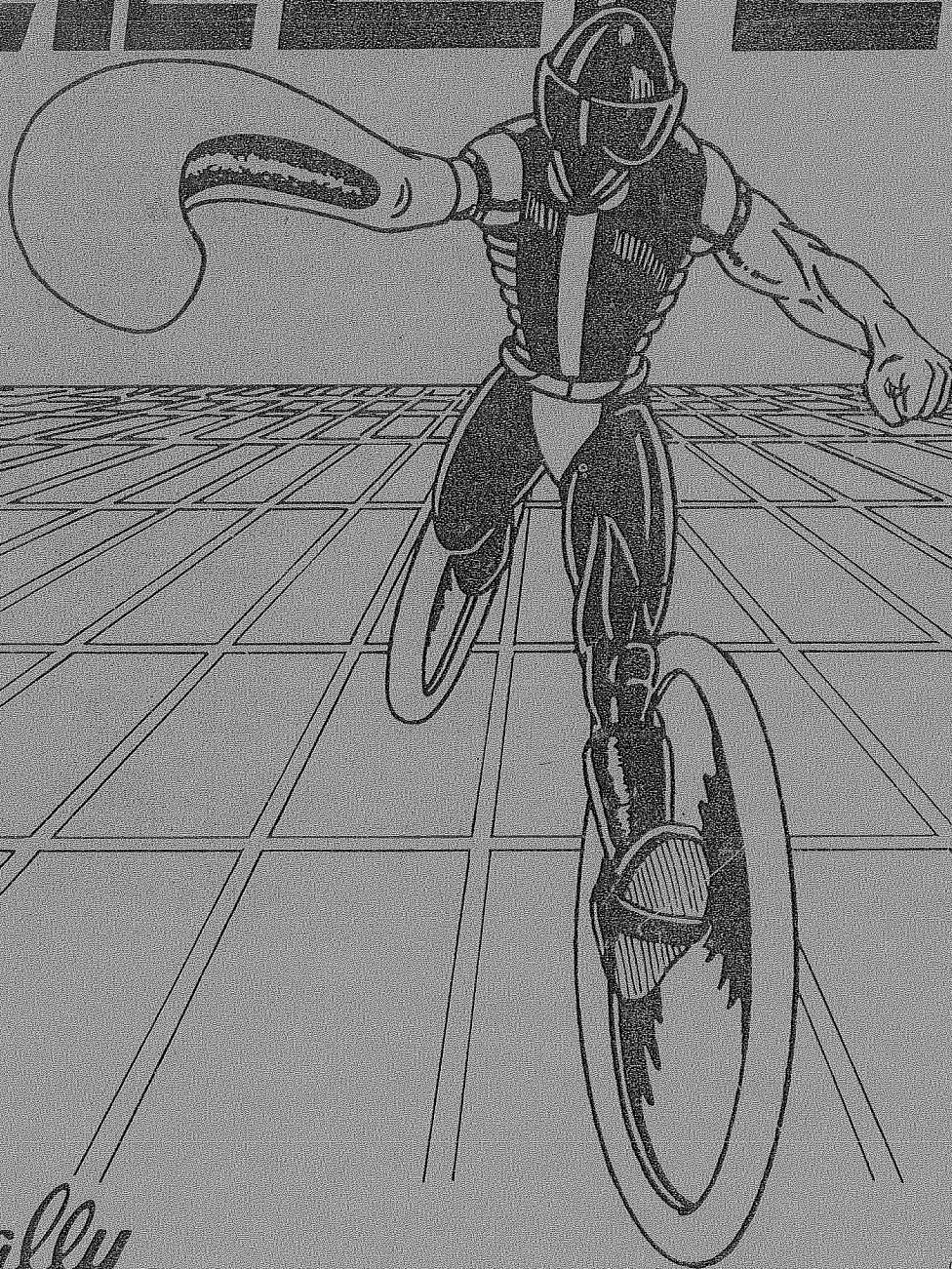


GAME 1247
FO 723

VECTAR™



Bally®

PINBALL DIVISION

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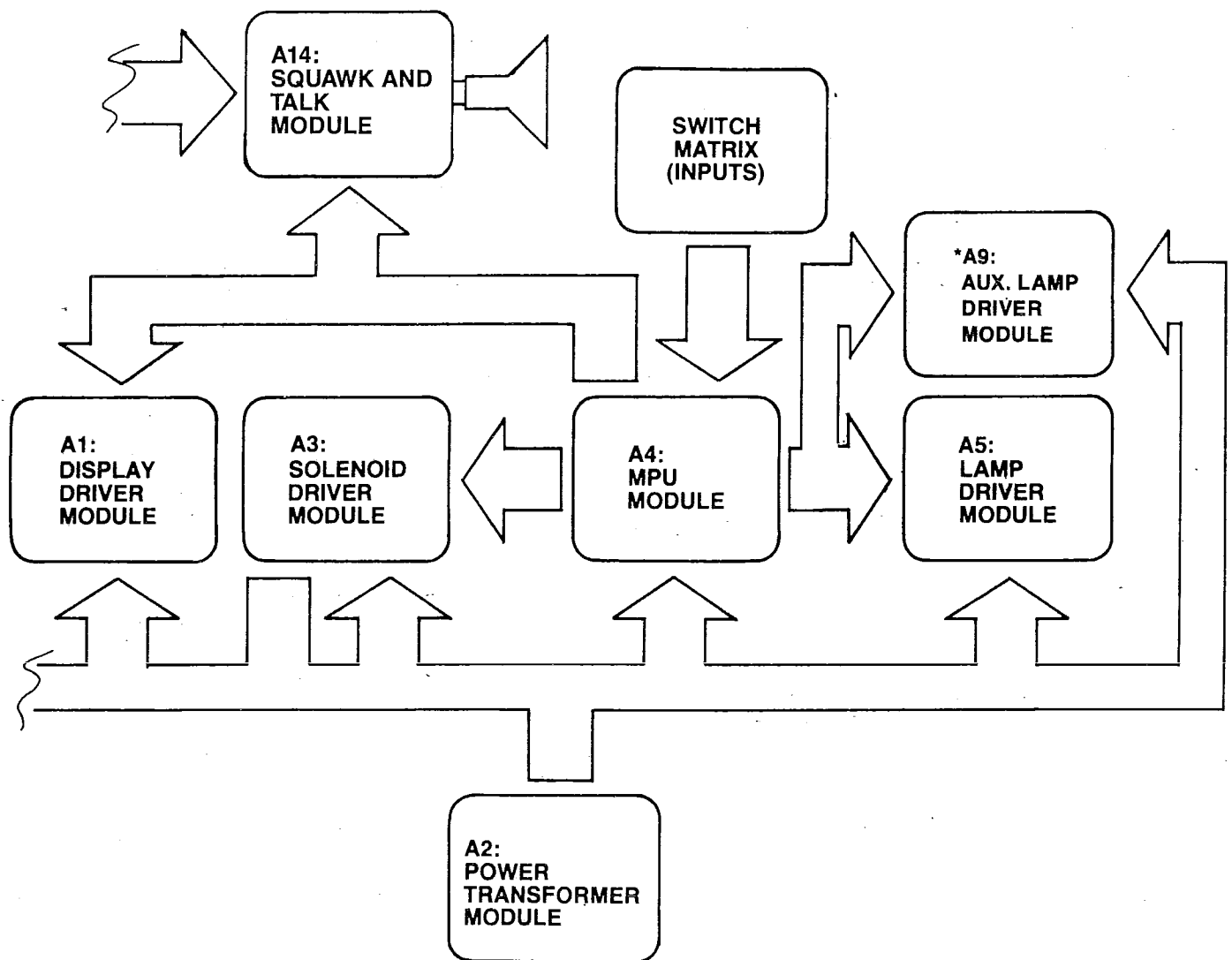
WARNING: THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTIONS MANUAL, MAY CAUSE INTERFERENCE TO RADIO COMMUNICATIONS. AS TEMPORARILY PERMITTED BY REGULATION IT HAS NOT BEEN TESTED FOR COMPLIANCE TO SUBPART J OF PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE INTERFERENCE IN WHICH CASE THE USER AT HIS OWN EXPENSE WILL BE REQUIRED TO TAKE WHATEVER MEASURES MAY BE REQUIRED TO CORRECT THE INTERFERENCE.

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

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

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

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

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

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

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

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

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

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

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

VECTOR #1247

FEATURE OPERATION & SCORING

A. FLIP-O-METER FEATURE

There is a readout in the center of the playfield which has 2 functions:

- 1) It displays your bonus score when the "Bonus Lite" is on.
- 2) It displays your flip speed and the fastest flip-to-date when the Flip-O-Meter lites are on.

Every time a ball enters the Vector-scan ramp (left side) and trigger the F.O.M. start switch, the F.O.M. readout starts to count down from 999 until the F.O.M. stops switch (right side) is made or to 000 on a slow flip. F.O.M. does not have to be qualified to capture a ball in order to have the readout function—it records your flip speed at all times (first 2 digits $\times$ 1000 is always added to your score if SW. #23 is ON).

A ball hitting the F.O.M. stop switch collects 3000 points for each lit top bonus arrow. It is then kicked back up onto the playfield or, if qualified to capture, down into the captive ball area.

Beating the fastest Flip-to-Date scores 1 special.

F.D.S. #14 allows more players to beat the fastest flip-to-date.

F.D.S. #14 ON — Self percentaging; every 8th game, the fastest flip-to-date is lowered by 20 points.
OFF—No change.

F.D.S. #24 ON — 700 FLIP SPEED awards X-Ball and lites one outlane special lite.
OFF—750 FLIP SPEED awards X-Ball and lites one outlane special lite.

F.D.S. #23 ON — First two numbers of flip speed are multiplied by 1000 and added to your score every time the ball is shot through the ramp.
OFF—First two numbers $\times$ 1000 only when F.O.M. qualified to capture a ball.

B. FLIP-O-METER DROP TARGETS 1-6 FEATURE

At the start of a game, targets 1, 2, and 3 (top level by F.O.M. entrance ramp) are up. If these targets are knocked down in sequence, you score 10K and qualify the F.O.M. to capture a ball (if F.D.S. #6 is ON; if #6 is OFF, 4-5-6 pop up).

If you knock down 1-2-3 out of sequence, 4-5-6 pop up; then you have to knock down 4-5-6 to qualify the F.O.M. to capture a ball. Making both V return lanes drops the next target in the 1-6 sequence. Targets 1-2-3 reset when a ball is captured and on a new ball (if switch #16 is OFF).

The 1-6 F.O.M. drop targets are controlled by F.D.S.'s #6, #15, and #16:

SWITCH #6: ON — 1-2-3 qualifies F.O.M. to capture.
OFF—1-2-3 does not qualify F.O.M. to capture, 4-5-6 pop up.

SWITCH #15: ON — 4-5-6 memory W/F.O.M. qualified on new ball.
OFF—4-5-6 reset W/F.O.M. qualified on new ball.

SWITCH #16: ON — Targets 1-6 on memory recall W/F.O.M. not qualified.
OFF—Targets 1-6 not on memory W/F.O.M. not qualified 1-2-3 resets on new ball.

C. F.O.M. DROP TARGET LITES 1-2-3

At the start of a new game, the 1-2-3 target lites are flashing. Each lite goes off when you drop its corresponding target. The lites always reset to the flashing mode whenever the bank resets.

If you start to hit the targets in sequence the remaining lites will continue to flash you will qualify the F.O.M. to capture a ball when you complete the sequence (if #6 is not ON).

If you hit the targets out of sequence, the remaining lites will stop flashing; upon completion of the top bank, the foremost bank (4-5-6) will reset up and the arrow will then flash and strobe randomly until the foremost bank is knocked down.

D. READOUT BONUS

advanced by X-Y-Z targets—3 adv.

advanced by T.B.—3 adv.

advanced by 1-6 D.T.'s—3 adv. + 9 adv.

advanced by H-Y-P-E targets—3 adv.

advanced by return lanes—3 adv.

advanced by outlanes—3 adv.

Collected in outhole; resettable from ball-to-ball or in memory.

F.D.S. #21 ON — Memory of readout bonus.
OFF—Reset ball-to-ball.

E. VECTOR BONUS

advanced by H-Y-P-E targets (SW #30 ON) (SW. #30 OFF = advance only W/L).

advanced by top R.O.B.

advanced by return lane.

Collected in outhole and bottom saucers; multipliers only in effect in outhole. The 20K lite is in memory; a special is awarded for 20K + 19 steps.

F.D.S. #30 ON — H-Y-P-E advances always.
OFF—H-Y-P-E advances only W/L

F. H-Y-P-E BONUS ARROWS FEATURE

The outhole and the top F.O.M. stop switch scores 3000 points for each lit arrow. Arrows lite from the H-Y-P-E feature.

When the F.O.M. is qualified to capture a ball, all of the arrows strobe left to right; if any arrows are lit when the strobing begins, they stay lit and only go off and only in the sequence of the strobing to indicate strobing.

G. H-Y-P-E FEATURE

At the start of a new ball, all of the H-Y-P-E lites are flashing. The lites go off when you hit their corresponding targets. The lites always reset to the flashing mode.

If you start to hit the targets in order (H-Y-P-E), the remaining lites continue to flash and you will lite all 8 of the bonus arrows at the top if the playfield upon completion, score 10K for completing them in sequence lite the readout bonus multiplier (2X or 3X, which ever is the next increment) and reset H-Y-P-E.

If you hit the targets out of order, the remaining lites reset and the "Release all Ball" arrow starts to flash. Making H-Y-P-E in order now keeps the lites flashing and releases all the balls that you have captured (your qualified balls). Making H-Y-P-E out of order turns off this arrow and stops the lites from flashing — (this arrow comes back on when H-Y-P-E is reset and at the start of a new ball if you have qualified balls captured.

H. H-Y-P-E LAST BALL FEATURE

There is a special feature that is available only on the last ball of each player's turn.

If you have captured any balls previously in the game and you hit H-Y-P-E in sequence, you will release them. If you hit H-Y-P-E out of sequence, you will release only 1 ball. (Release one ball arrow comes on). This out of sequence feature can only be used once per game and only on the last ball, if you have captured balls previously.

I. CAPTIVE BALL FEATURE

Targets 1-2-3 in sequence (and 4-5-6 if F.D.S. #6 is OFF) or targets 1-2-3-4-5-6 out of sequence qualifies the F.O.M. speed shot to capture a ball. When qualified, the "Capture W/L" lite flashes, along with the strobing of the top bonus arrows, (See H-Y-P-E feature), and upper panel G.I. flash.

If a ball enters the top saucer without being qualified to be captured, it will be kicked up onto the playfield.

If a ball enters the top saucer qualified to be captured, it will be kicked down into the captive ball area (see F.O.M. feature) and qualifier lite will come on drop targets 1-2-3 reset every time a ball is captured; plunger lites flash when a new ball is kicked out to the plunger after a ball is captured.

The balls that you have captured are remembered from ball-to-ball with these qualifier lites. If some other player releases the balls that you have captured, your qualifier lites will still remain on; then, your next shots into the top saucer will replace the balls that you lost, whether or not targets 1-6 are down.

You can release your captured balls by capturing all 3 balls or by hitting the H-Y-P-E targets (see H-Y-P-E feature).

F.D.S. #22 ON —Voice on game start
OFF—No Voice

J. X-Y-Z DROP TARGET FEATURE

At the start of a new ball, the X-Y-Z drop target lites are flashing. Each lite goes off when you drop its corresponding target. The lites always reset to the flashing mode. Knocking down the targets scores the lit value. This value is adjustable by two fixed data switches.

SWITCH #7 ON— 2x-3x-5x-25K—SPL
(lite value always scores and advances)

(LIBERAL)

Qualify	Qualify
Next	Next
Lite	Lite
Qualify	Qualify
Next	Next
Lite	Lite

(lit value advances every other time)

If you start to hit the target in the X-Y-Z sequence, the remaining lites will continue to flash, you will score 10K in addition to the lit value and drop one F.O.M. defending target upon completion of the bank.

If you hit the targets out of sequence, the remaining lites will stop flashing and remain on until hit.

You will score only the lit value upon completion of the bank.

These targets also reset when a ball is captured in addition to the completion of the bank and on a new ball.

K. TOP R.O.B. FEATURE

Each ball starts with the 5000 value lit. Every time a ball goes over the button, it scores the lit value and advances the lite to the next value. Once the value reaches 25,000, it remains there for the rest of the ball.

L. THUMPER BUMPER FEATURE

Bumper scores 5,000 + 3 bonus advances on 3 + 5 ball.

M. 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

X-Y-Z drop target Special

Bonus Special

Left or right out Special

Gate and Top right lane feature X-Ball

Self-Test Position 17

Set to "03"

AWARD

REPLAY

REPLAY

REPLAY

X-BALL

Set to "03"

AWARD

REPLAY

Set to "02"

AWARD

X-BALL*

X-BALL*

*

X-BALL**

Set to "02"

AWARD

X-BALL**

Set to "01"

AWARD

50,000

50,000

50,000

25,000

Set to "01"

AWARD

NO AWARD

Scoring Thresholds

(*) 50,000 if same player shoot again is lit.

(**) 25,000 if same player shoot again is lit.

V. GAME ADJUSTMENTS

A. Playfield Panel Post Adjustments:

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

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

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

B. Back Box Game Adjustments:

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

Credits/Coin Adjustments:

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

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

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

CREDITS/COIN ADJUSTMENTS

COIN CHUTE	SWITCHES					CREDITS	CREDITS	CREDITS	CREDITS	CREDITS	TOTAL CREDITS/COINS
#1 (HINGE SIDE)	5	4	3	2	1						
OR #3	13	12	11	10	9						
(RIGHT SIDE)	OFF	OFF	OFF	OFF	OFF	1/1 Coin					
	OFF	OFF	OFF	OFF	ON	2/1 Coin					
	OFF	OFF	OFF	ON	OFF	3/1 Coin					
	OFF	OFF	OFF	ON	ON	4/1 Coin					
	OFF	OFF	ON	OFF	OFF	5/1 Coin					
	OFF	OFF	ON	OFF	ON	6/1 Coin					
	OFF	OFF	ON	ON	OFF	7/1 Coin					
	OFF	OFF	ON	ON	ON	8/1 Coin					
	OFF	ON	OFF	OFF	OFF	9/1 Coin					
	OFF	ON	OFF	OFF	ON	12/1 Coin					
	OFF	ON	OFF	ON	OFF	14/1 Coin					
	OFF	ON	OFF	ON	ON	1/2 Coins*					
	OFF	ON	ON	OFF	OFF	2/2 Coins*					
	OFF	ON	ON	OFF	ON	3/2 Coins*					
	OFF	ON	ON	ON	OFF	4/2 Coins*					
	OFF	ON	ON	ON	ON	5/2 Coins*					
	ON	OFF	OFF	OFF	OFF	6/2 Coins*					
	ON	OFF	OFF	OFF	ON	7/2 Coins*					
	ON	OFF	OFF	ON	OFF	8/2 Coins*					
	ON	OFF	OFF	ON	ON	9/2 Coins*					
	ON	OFF	ON	OFF	OFF	12/2 Coins*					
	ON	OFF	ON	OFF	ON	14/2 Coins*					
	ON	OFF	ON	ON	OFF	1/1st Coin	2/2nd Coin				3/2
	ON	OFF	ON	ON	ON	0/1st Coin*	1/2nd Coin	1/3rd Coin	1/4th Coin		3/4
	ON	ON	OFF	OFF	OFF	0/1st Coin*	1/2nd Coin	0/3rd Coin**	2/4th Coin		3/4
	ON	ON	OFF	OFF	ON	1/1st Coin	1/2nd Coin	1/3rd Coin	2/4th Coin		5/4
	ON	ON	OFF	ON	OFF	1/1st Coin	2/2nd Coin	1/3rd Coin	3/4th Coin		7/4
	ON	ON	OFF	ON	ON	1/1st Coin	2/2nd Coin	2/3rd Coin	2/4th Coin		7/4
	ON	ON	ON	OFF	OFF	0/1st Coin***	0/2nd Coin***	1/3rd Coin			1/3
	ON	ON	ON	OFF	ON	0/1st Coin**	0/2nd Coin**	0/3rd Coin**	1/4th Coin		1/4
	ON	ON	ON	ON	OFF	0/1st Coin****	0/2nd Coin****	0/3rd Coin****	0/4th Coin****	1/5th 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		32	31
		26	25		
	10	OFF	OFF		
	15	OFF	ON		
	25	ON	OFF		
	40	ON	ON		
BALLS PER GAME:	# BALLS /GAME	SWITCHES			
	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.

	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"
	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.

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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," "01"

Most switches associated chimes without feature 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 clarities of speech and sound, adjust controls as follows:

- Turn remote volume control on front door all the way up.
- Turn the speech volume control on the printed circuit board full clockwise, then counterclockwise until speech is clear and understandable.
- Turn the sound volume control full clockwise, then turn counterclockwise until sound is not garbled.
- Then adjust remote volume control to desired volume level.

GAME FEATURE OPTIONS

Lower 3 left side drop target adjustment:

Liberal	SW. 6 ON	Making 3 upper left side targets will not reset 3 lower targets.
Conservative	SW. 6 OFF	Making 3 upper left side targets will reset 3 lower targets.

X-Y-Z drop targets spots multipliers lite adjustment:

Liberal	SW. 7 ON	Multipliers lite stays on till 2X, 3X, 5X bonus lites are made.
Conservative	SW. 7 OFF	Multipliers lite will be off then alternate.

X-Y-Z drop targets special lite adjustment:

Liberal	SW. 8 ON	25,000 lites then special then keeps on alternating.
Conservative	SW. 8 OFF	25,000 lites then special then 25,000 which stays on.

Vectorscan to date readout adjustment:

Liberal	SW. 14 ON	After every set of 8 total games played, whether 1 or more player will decrease readout by 20,000.
Conservative	SW. 14 OFF	Readout can only be decreased manually.

Vectorscan capture ball lite On, 3 lower left side targets adjustment:

Liberal	SW. 15 ON	With lite on 3 lower targets will go back down.
Conservative	SW. 15 OFF	With lite on 3 lower targets will reset.

Vectorscan capture ball lite Off, 3 upper and lower targets adjustment:

Liberal	SW. 16 ON	With lite off any targets down will go back down.
Conservative	SW. 16 OFF	With lite OFF targets down will reset.

Vectorscan bonus score readout adjustment:

Liberal	SW. 21 ON	Any bonus score readout will come back on for next ball.
Conservative	SW. 21 OFF	Any bonus score readout will reset to 1.

Coined game voice adjustment:

SW. 22 ON	Voice says "I Am A P.A.C....play analysis Computer...for your vector game play.
SW. 22 OFF	No Voice

Capture ball lite, vectorscan speed readout scoring adjustment:

Liberal	SW. 23 ON	Scores in top saucer first 2 numbers by thousands whether capture ball lite is on or not.
Conservative	SW. 23 OFF	Scores only when capture ball lite is on.

Vectorscan score readout threshold special and extra ball adjustment:

Liberal	SW. 24 ON	Hitting vector speed 700 or over will lite right out special and shoot again.
Conservative	SW. 24 OFF	Hitting vector speed 750 or over will lite right out special and shoot again. (Note hitting over 800 lites left and right out specials)

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.

H-Y-P-E target bonus advances adjustment:

Liberal	SW. 30 ON	Hitting targets advance bonus every time.
Conservative	SW. 30 OFF	Advances bonus only when lite is lit.

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 9,990,000 can be set, as desired. It is also possible to reset or turn off (00) any or all of the levels, if desired.

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

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

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

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

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

SELF TEST SETUP FOR 16-22:

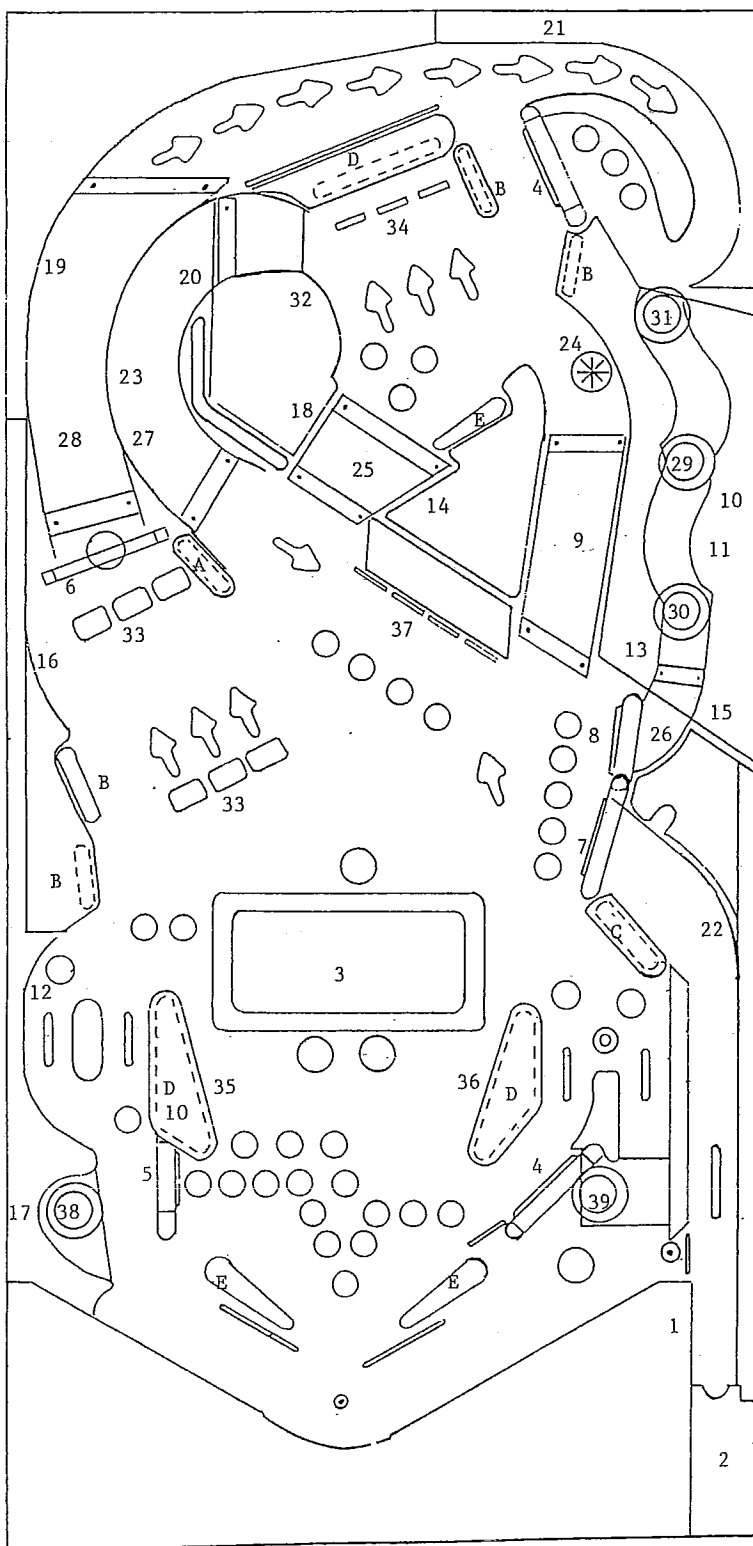
To set up positions 16-22 push and release self test button till 16 shows on match/ball in play. Now pulse replay button for recommended setup from "00" thru "03." Repeat for positions 17, 18, 19 or 22. Positions 20, 21 setups go from "00" thru "15."

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).



#1247 VECTOR RUBBER PARTS

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

PANEL PARTS

1. Bottom Arch	A-4016-3
2. Shooter Gauge	P-6359-55
3. Playfield Readout Cover	M-1949-2
4. Ball Gate & Wire	ASE-2250-24 (2)
5. Ball Gate & Wire	ASE-2250-91
6. Target Gate & Wire	ASE-2250-103
7. Ball Gate, Spring & Wire	ASE-2250-104
8. Ball Gate, Spring & Wire	ASE-2250-105
9. Ramp Assy.	A-4037-1
10. Screened Plastics	M-1330-193
11. Clear Plastic Assy.	A-2890-161
12. Ball Guide Assy.	A-3032-93
13. Ball Guide Assy.	A-3032-94
14. Ball Guide Assy.	A-3032-95
15. Ball Guide Assy.	A-3032-96
16. Ball Guide Assy.	A-3032-97
17. Ball Guide Assy.	A-3032-98
18. Ball Guide Assy.	A-3032-99
19. Ball Guide Assy.	A-3032-104
20. Ball Guide Assy.	A-3032-102
21. Ball Guide Assy.	A-3032-105
22. Ball Guide Assy.	A-3032-106
23. Ball Guide Assy.	A-3032-107
24. Ball Guide Assy.	A-3032-108
25. Ramp	P-8155-10
26. Ramp	P-8155-11
27. Ramp	P-8155-12
28. Ramp	P-8155-13
29. Eject Hole Assy.	ASE-428-60
30. Eject Hole Assy.	ASE-428-61
31. Two-Way Eject Hole	ASE-3054-2
32. Thumper Bumper	ASE-2999
33. Drop Target/Memory (3)	ASE-3038-6
34. Drop Target Assy. (3)	ASE-2795-61
35. Slingshot Assy.	ASE-2593-10
36. Slingshot Assy.	ASE-2593-6
37. Target Switch	ASE-2911-20 (4)
38. Eject Hole Assy.	ASE-428-59
39. Eject Hole Assy.	ASE-428-53

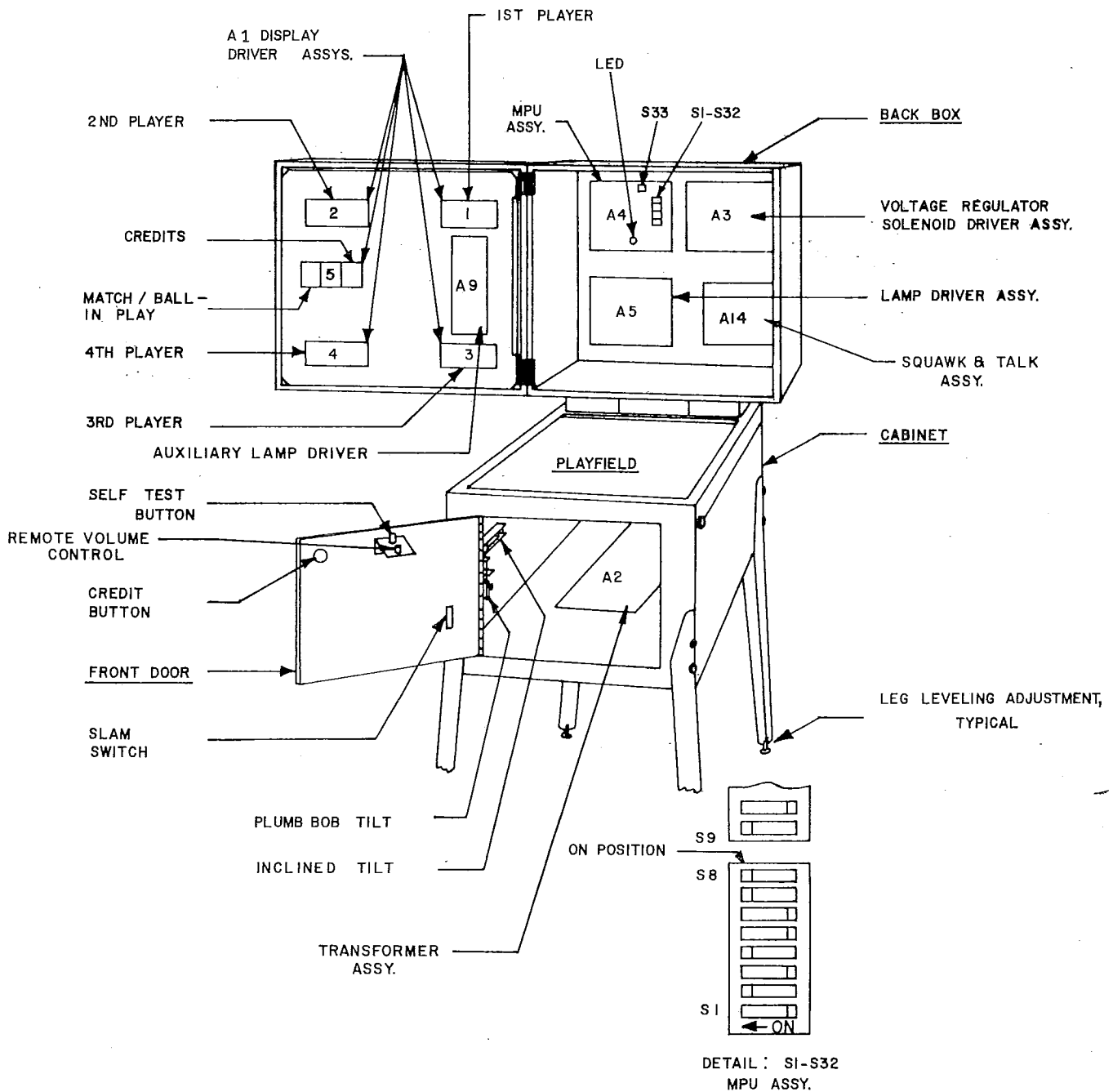


FIGURE III. ELECTRONIC PIN BALL MACHINE

RECOMMENDED

Instruction, Score Cards and High Score Feature Settings
to be used on VECTOR #1247

3-BALL

REPLAYS

Instruction Card	M-1508-104-E
Score Card	M-1508-104-B W/J
1 Replay at 700,000	
1 Replay at 1,400,000	

5-BALL

REPLAYS

Instruction Card	M-1508-104-E
Score Card	M-1508-104-A W/Q
1 Replay at 1,400,000	
1 Replay at 2,900,000	

EXTRA BALL

Instruction Card	M-1508-104-F
Score Card	M-1508-104-A W/NN
1 Extra Ball at 1,200,000	
1 Extra Ball at 2,800,000	

ADDITIONAL CARDS

REPLAYS

M-1508-104-H	600,000	1,200,000
M-1508-104-I	600,000	1,300,000
M-1508-104-J	700,000	1,400,000
M-1508-104-K	700,000	1,500,000
M-1508-104-L	800,000	1,500,000
M-1508-104-M	900,000	2,000,000
M-1508-104-N	1,000,000	2,200,000
M-1508-104-O	1,100,000	2,300,000
M-1508-104-P	1,300,000	2,700,000
M-1508-104-Q	1,400,000	2,900,000
M-1508-104-R	1,500,000	3,100,000

EXTRA BALL

M-1508-104-NN	1,200,000	2,800,000
M-1508-104-OO	1,500,000	3,300,000
M-1508-104-PP	1,800,000	3,600,000
M-1508-104-QQ	2,000,000	3,800,000

Instruction Card, Novelty
M-1508-104-G

BLANKS (3)

High game to date recommended levels;
(Reset periodically)
3 BALL 1,600,000
5 BALL 3,100,000

#1247 VECTOR

RECOMMENDED SETTINGS

RECOMMENDED REPLAY GAME SETTING FOR:

		3-BALL	5-BALL
LOWER 3 LEFT SIDE DROP TARGET	SW. 6	ON	OFF
X-Y-Z DROP TARGETS MULTIPLIERS LITE	SW. 7	ON	ON
X-Y-Z DROP TARGETS SPECIAL LITE	SW. 8	OFF	OFF
VECTORSCAN TO DATE READOUT	SW. 14	ON	ON
VECTORSCAN CAPTURE BALL LITE ON, 3 LOWER LEFT SIDE TARGETS	SW. 15	ON	OFF
VECTORSCAN CAPTURE BALL LITE OFF, 3 UPPER AND LOWER TARGETS	SW. 16	ON	ON
VECTORSCAN BONUS SCORE READOUT	SW. 21	ON	ON
COINED GAME VOICE	SW. 22	ON	ON
CAPTURE BALL LITE, VECTORSCAN SPEED READOUT SCORING	SW. 23	ON	OFF
VECTORSCAN SCORE READOUT THRESHOLD SPECIAL AND EXTRA BALL	SW. 24	OFF	OFF
NUMBER OF GAMES REPLAYS PER GAME	SW. 29	ON	ON
H-Y-P-E TARGET BONUS ADVANCES	SW. 30	ON	OFF
BALLS PER GAME	SW. 31	OFF	ON
BALLS PER GAME	SW. 32	OFF	OFF

REPLAYS

Instruction Card
Score Card
Major Mode

Match
High Score to Date

3-BALL

M-1508-104-E
M-1508-104-B W/J
Self Test Position 16, 17
Set to "03"
SW. 28 ON
Self Test Position 19
Set to "03"

5-BALL

M-1508-104-E
M-1508-104-A W/Q
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-1508-104-E
M-1508-104-A W/NN
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-1508-104-G
Self Test Position 16, 17
Set to "01"
SW. 28 OFF
Self Test Position 19
Set to "00"

M-1508-104-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.

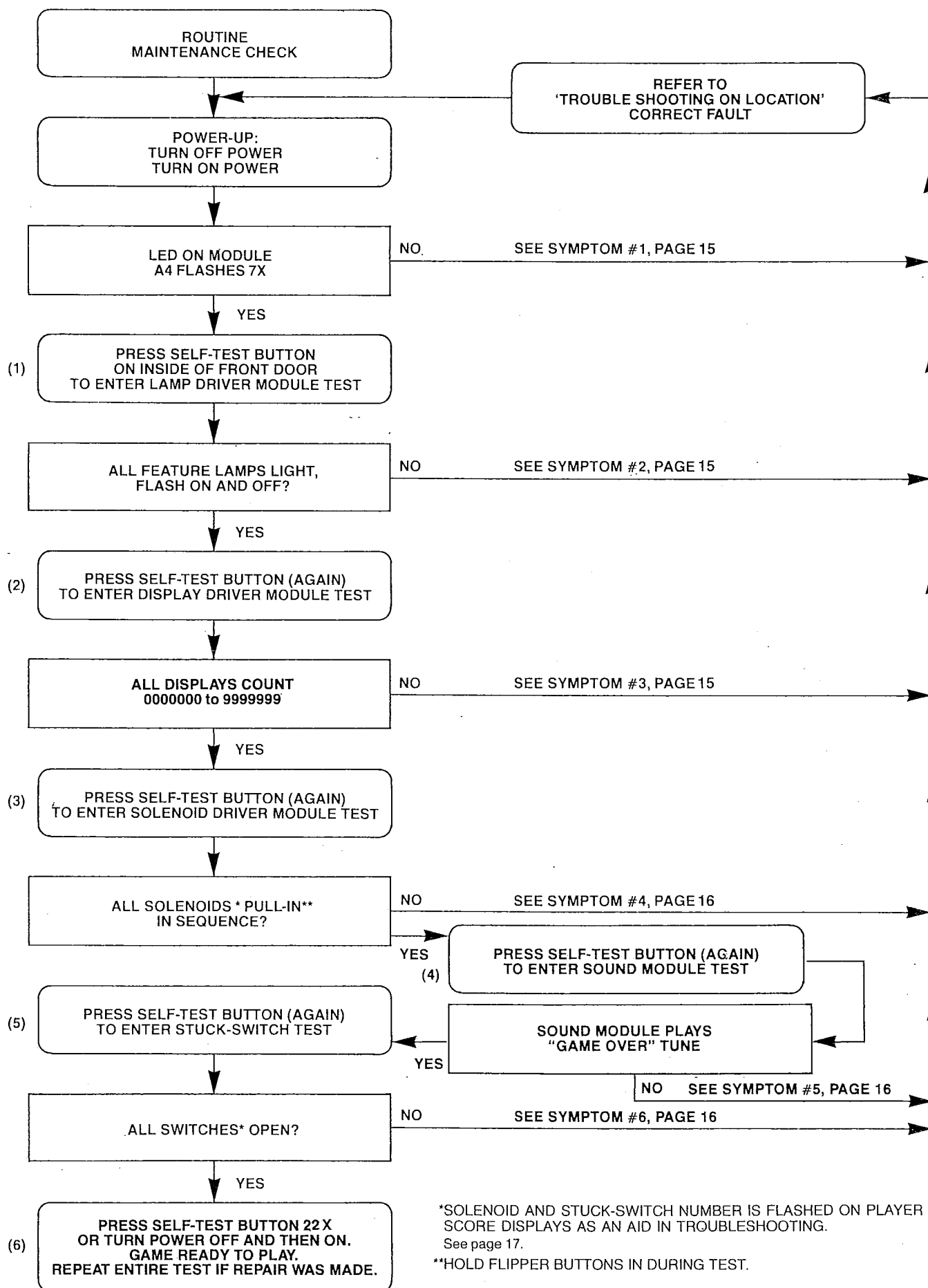
After successful completion of the Self Diagnostic Test procedure, set the game up for play. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no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

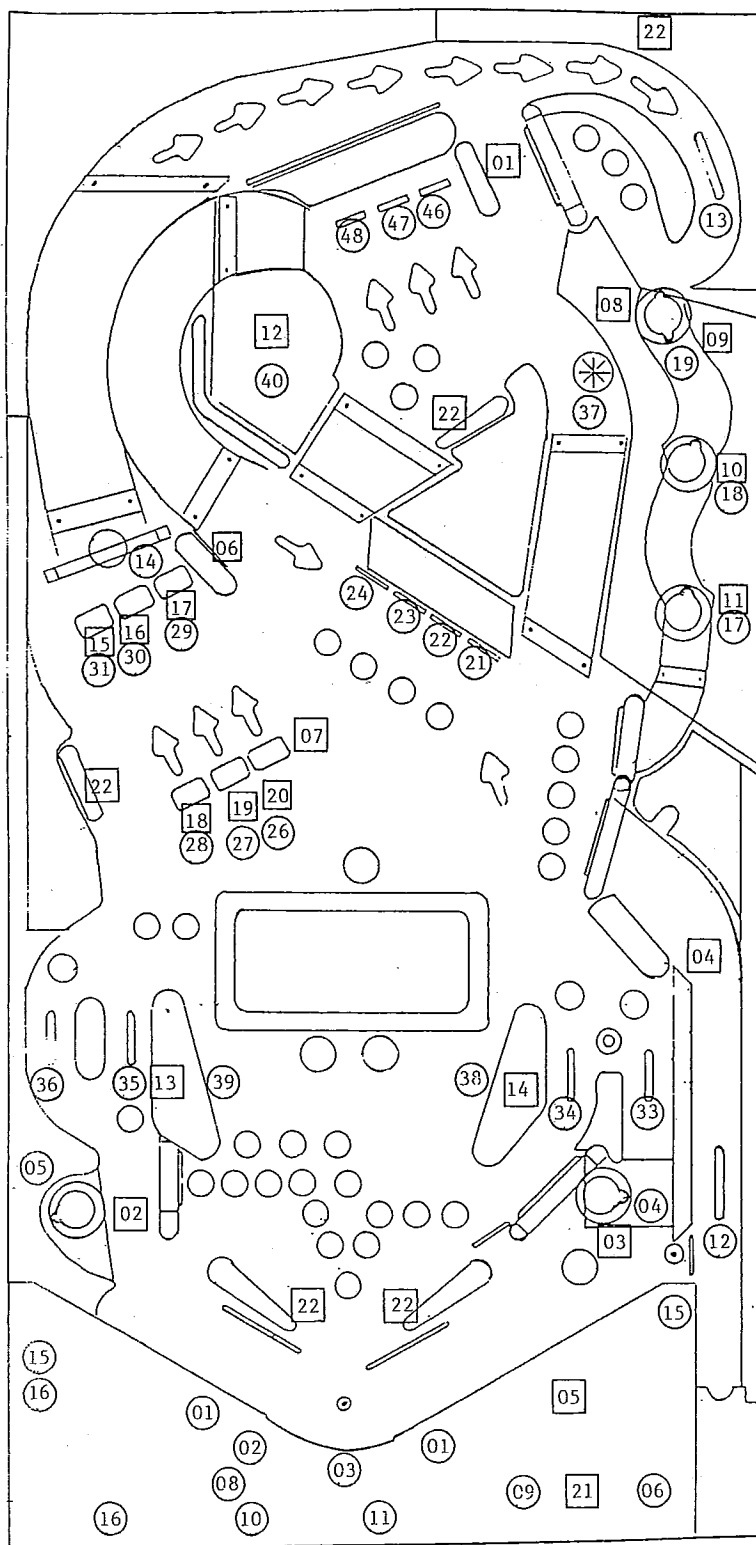
*Turn power On-Off switch OFF and then ON.

GAME #1247 VECTOR **SOLENOID IDENTIFICATION TABLE**

Self Test #	SOLENOID IDENTIFICATION	Self Test #	SOLENOID IDENTIFICATION
01	X-Y-Z DROP TARGET RESET	12	THUMPER BUMPER
02	LEFT BOTTOM SAUCER	13	LEFT SLINGSHOT
03	RIGHT BOTTOM SAUCER	14	RIGHT SLINGSHOT
04	KNOCKER	15	3 TOP DROP TARGET (LEFT)
05	OUTHOLE	16	3 TOP DROP TARGET (MIDDLE)
06	3 TOP DROP TARGET RESET	17	3 TOP DROP TARGET (RIGHT)
07	3 LOWER DROP TARGET RESET	18	3 LOWER DROP TARGET (LEFT)
08	CAPTIVE BALL #1 KICK UP	19	3 LOWER DROP TARGET (MIDDLE)
09	CAPTIVE BALL #1 KICK DOWN	20	3 LOWER DROP TARGET (RIGHT)
10	CAPTIVE BALL #2	21	COIN LOCKOUT DOOR
11	CAPTIVE BALL #3	22	K1 RELAY (FLIPPER ENABLE)

SWITCH ASSEMBLY SELF-TEST DISPLAY NUMBERS

Switch Self Test #	DESCRIPTION	Switch Self Test #	DESCRIPTION
01	#2 LEFT OF OUTHOLE & #1 RIGHT OF OUTHOLE	25	
02	#1 LEFT OF OUTHOLE	26	3 LOWER DROP TARGET (RIGHT)
03	OUTHOLE	27	3 LOWER DROP TARGET (MIDDLE)
04	RIGHT BOTTOM SAUCER	28	3 LOWER DROP TARGET (LEFT)
05	LEFT BOTTOM SAUCER	29	3 TOP DROP TARGET (RIGHT)
06	CREDIT BUTTON	30	3 TOP DROP TARGET (MIDDLE)
07		31	3 TOP DROP TARGET (LEFT)
08	PUSH BUTTON (Under Panel In Front)	32	
09	COIN III (RIGHT)	33	RIGHT OUTLANE
10	COIN I (LEFT)	34	RIGHT RETURN LANE
11	COIN II (MIDDLE)	35	LEFT OUTLANE
12	SHOOTER LANE	36	LEFT RETURN LANE
13	TOP RIGHT LANE	37	ADVANCE BONUS R.O. BUTTON
14	VECTORSCAN LEFT GATE	38	RIGHT SLINGSHOT
15	TILT (3)	39	LEFT SLINGSHOT
16	SLAM (2)	40	THUMPER BUMPER
17	CAPTIVE SAUCER (BOTTOM)	41	
18	CAPTIVE SAUCER (MIDDLE)	42	
19	CAPTIVE SAUCER (TOP)	43	
20		44	
21	"E" TARGET	45	
22	"P" TARGET	46	"Z" DROP TARGET
23	"Y" TARGET	47	"Y" DROP TARGET
24	"H" TARGET	48	"X" DROP TARGET



#1247 VECTOR

INDICATES SWITCH ASSEMBLY
IDENTIFICATION NUMBERS

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

INDICATES SOLENOID
IDENTIFICATION NUMBERS

NOTE: DOOR: 16
BACKBOX: 22
CABINET: 04

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

#1247 VECTOR

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 (4)	AQ-25-500/ 34-4500
Top Right Saucer (Kick Up and Down)	AT-29-2100
Top Right Middle Saucer	AT-29-2100
Top Right Lower Saucer	AT-29-2100
Knocker	AR-26-1200
Outhole Kicker	AT-27-1300
Sling-Shot (2)	AO-26-1200
Drop Target Reset (3)	NO-26-1900
Individual Drop Target (6)	CV-31-2000
Lower Saucers (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-2962-32
Transformer & Rectifier A2	AS-2877-6
Rectifier Board (Part of A2)	AS-2518-54
Squawk & Talk	AS-3107-9
Auxiliary Lamp Driver A9	AS-2518-52
Solenoid Expander	AS-2518-66
Aux. Driver (G.I. Flasher)	AS-2518-68
Triac Lamp Flasher A19 (2)	AS-2518-82

REPAIRS PROCEDURES/AIDS

Module & Component Replacement	F.O. 560-1
AID (Assistance in Diagnostics)	
Kit, used with F.O.560-1	KIT #485-1

MODULE COMPONENTS

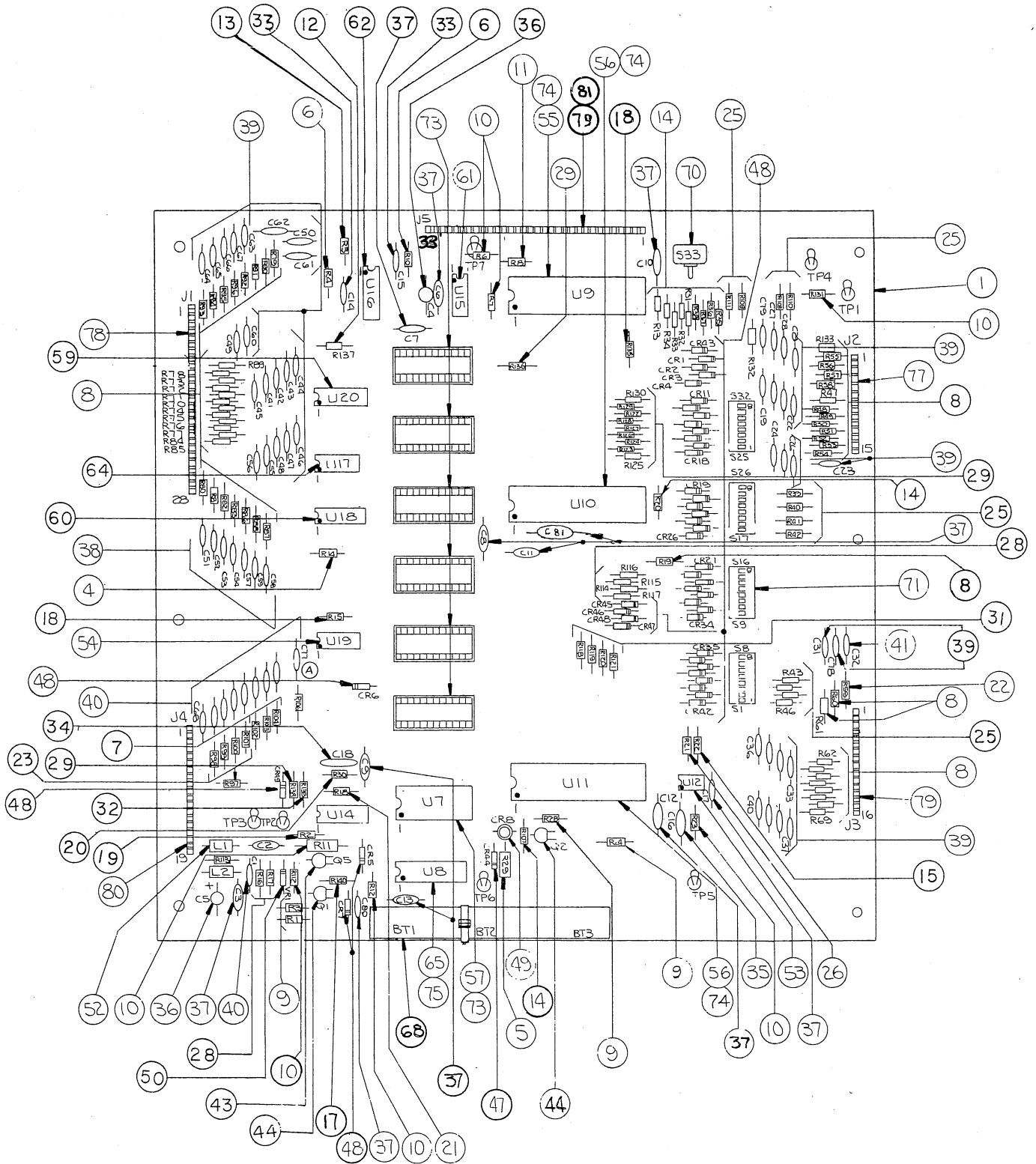
SEE MODULE PARTS LIST

MODULE COMPONENT STARTER KITS

(Each kit contains an assortment of the most needed electronic parts for use in Module repair.)

- KIT #558—For Rectifier Board (Part of A2)
- KIT #503—For MPU Board A4 (less Memory U1-U6)
- KIT #492—For Solenoid Drive/Voltage Regulator A3
- KIT #493—For Display Drive A1
- KIT #494—For Lamp Drive A5

AS-2518-35 MPU MODULE



A4: MPU MODULE COMPONENT PARTS LIST

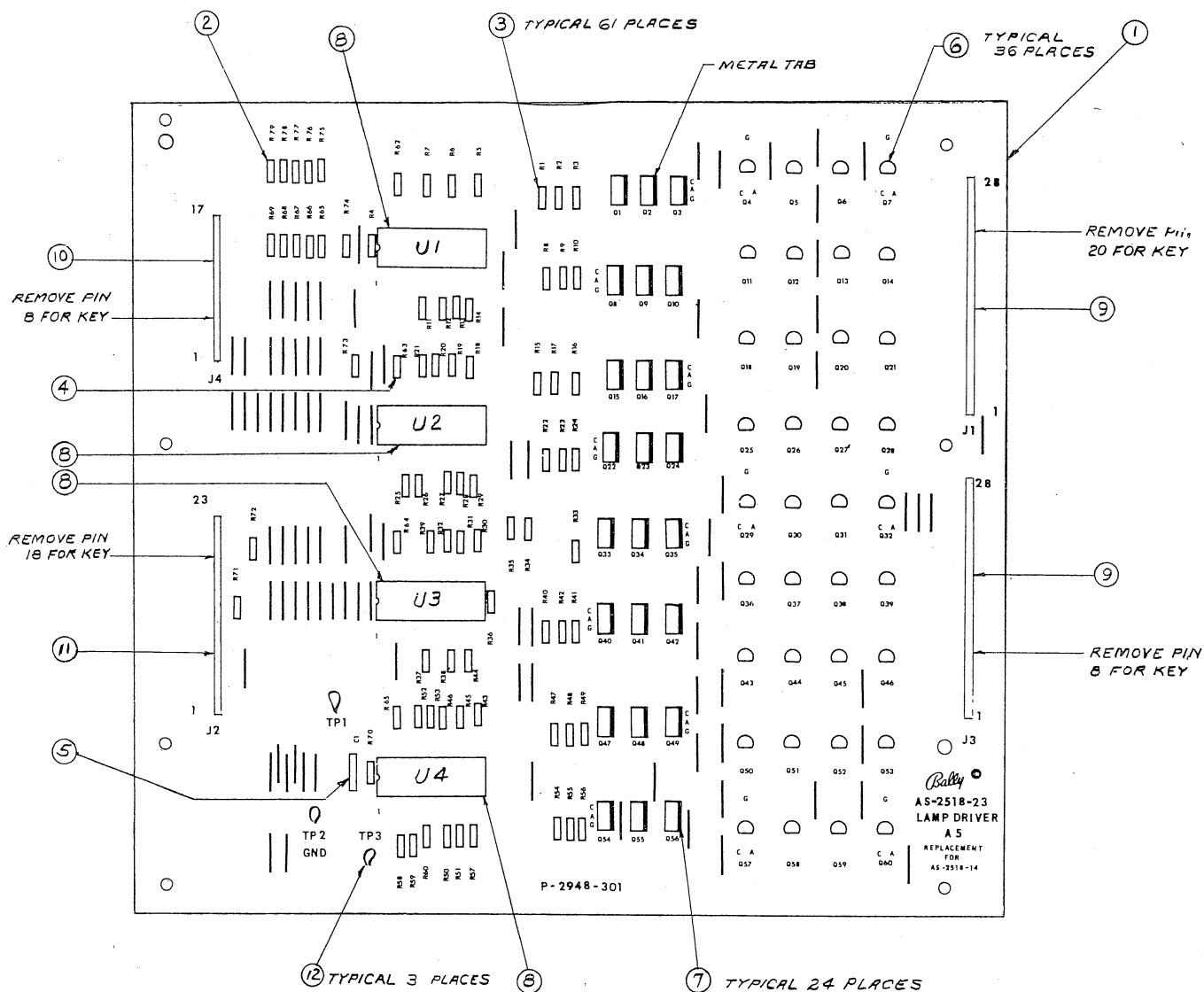
ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A4 (see note 1)	AS-2962-32	MPU Module Complete.
2	A4 (see note 2)	AS-2518-35	MPU Module less Program Memory, U1-6 incl.
3-32	See Schematic		Resistors, See schematic for value
33	C14, C15	E-00586-0067	Capacitor, 470 PFD, 1kv
34	C18	E-00586-0088	Capacitor, .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-2963-23: FRONTIER, AS-2962-21: XENON, AS-2962-24: FLASH GORDON, AS-2962-26: EIGHT BALL DELUXE, AS-2962-25: FIREBALL II, AS-2962-28: FATHOM, AS-2962-29: MEDUSA, AS-2962-30: CENTAUR AS-2962-31 ELEKTRA. AS-2962-32 VECTOR.

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

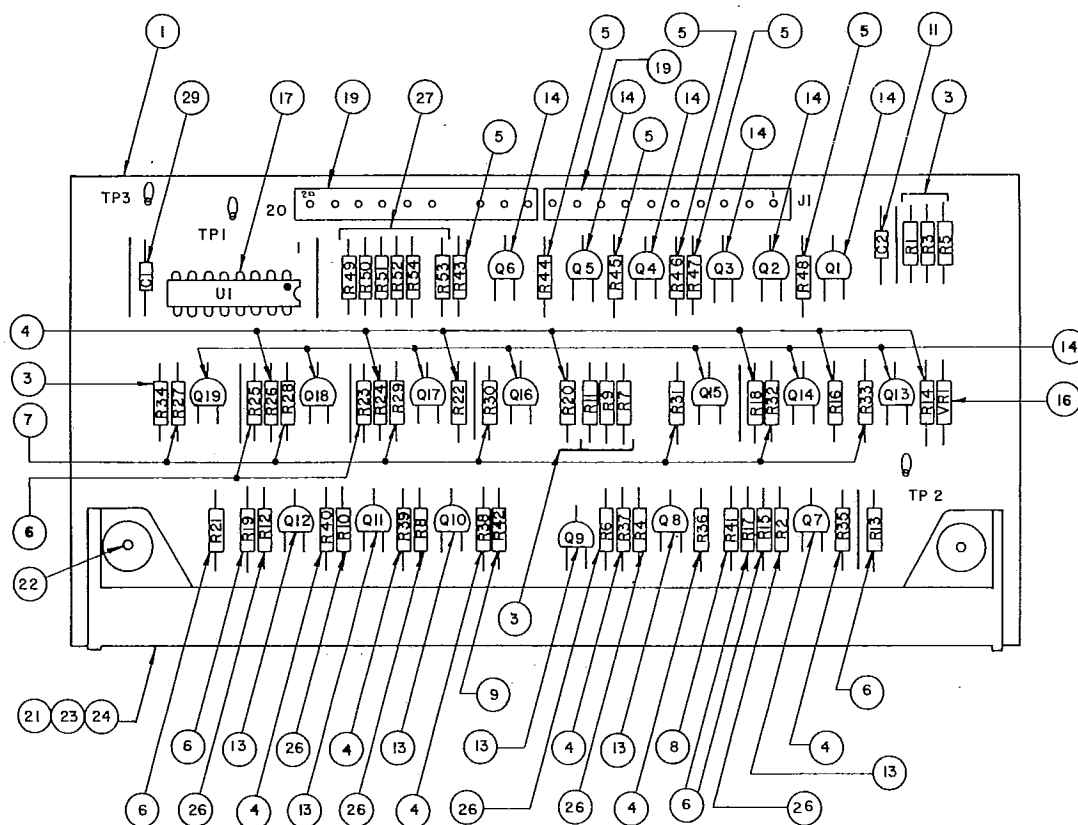
AS-2518-23 LAMP DRIVER MODULE



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

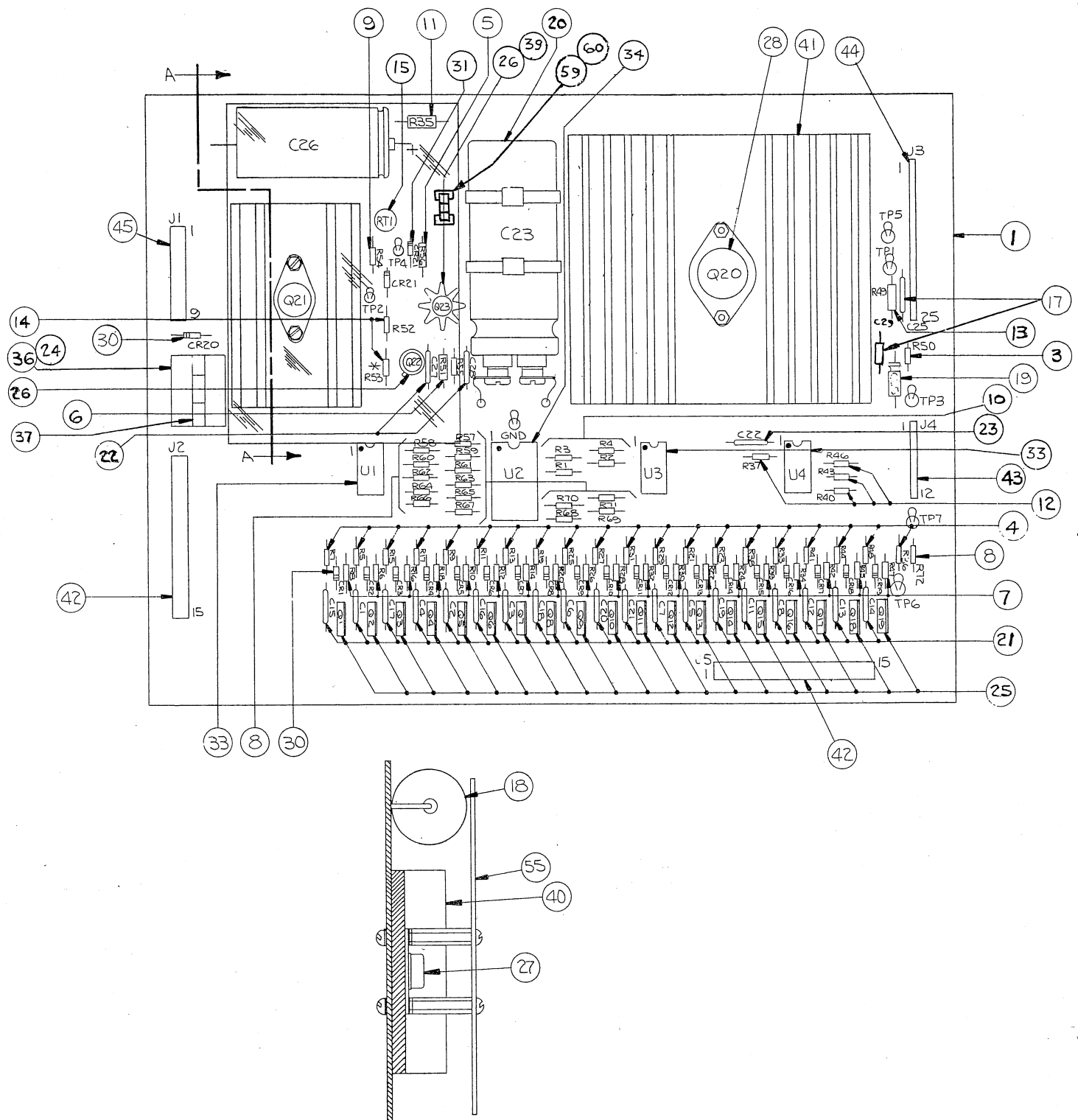


A1: 6 DIGIT DISPLAY DRIVER MODULE COMPONENT PARTS LIST

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

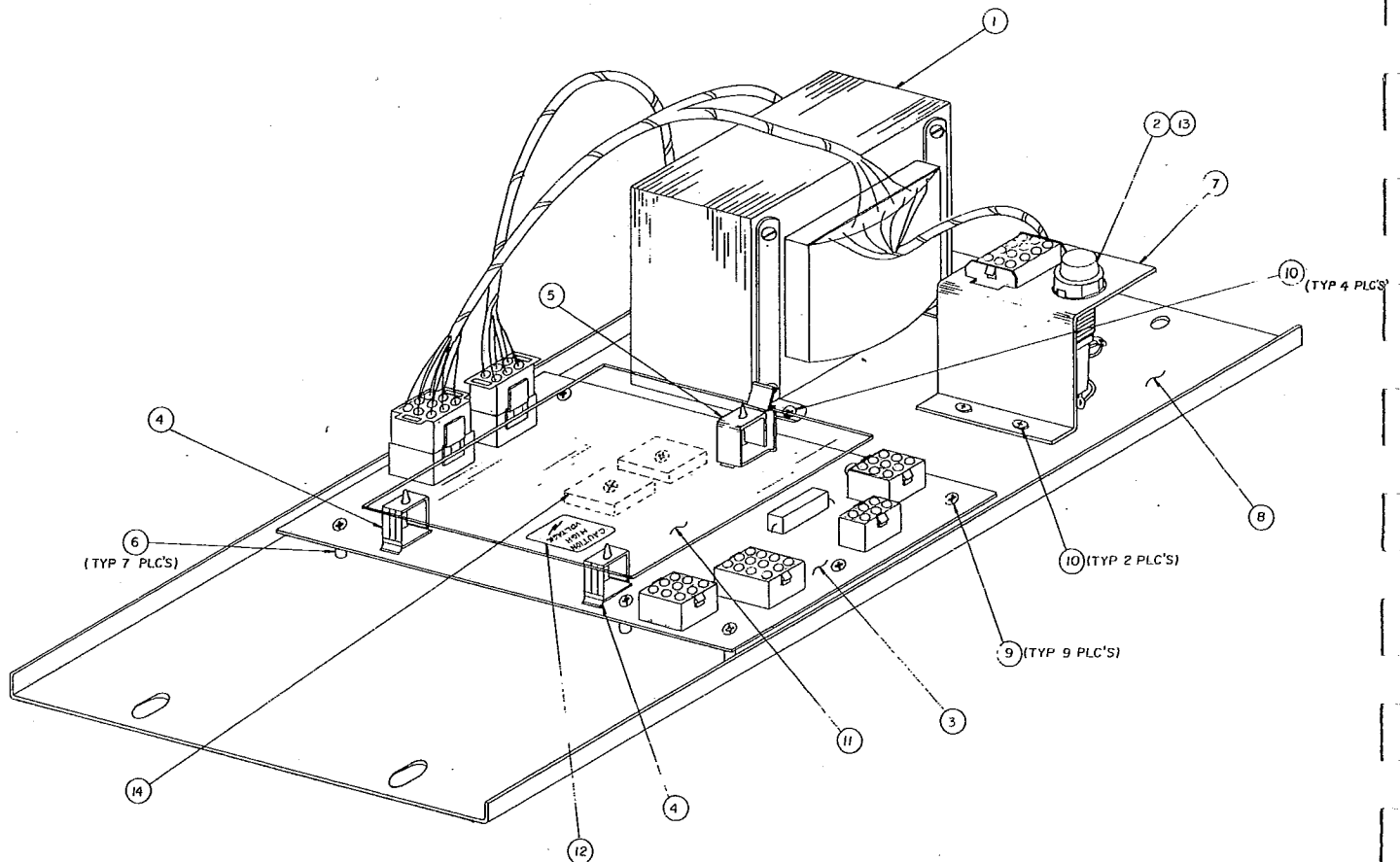
A3: SOLENOID DRIVER/VOLTAGE REGULATOR MODULE

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

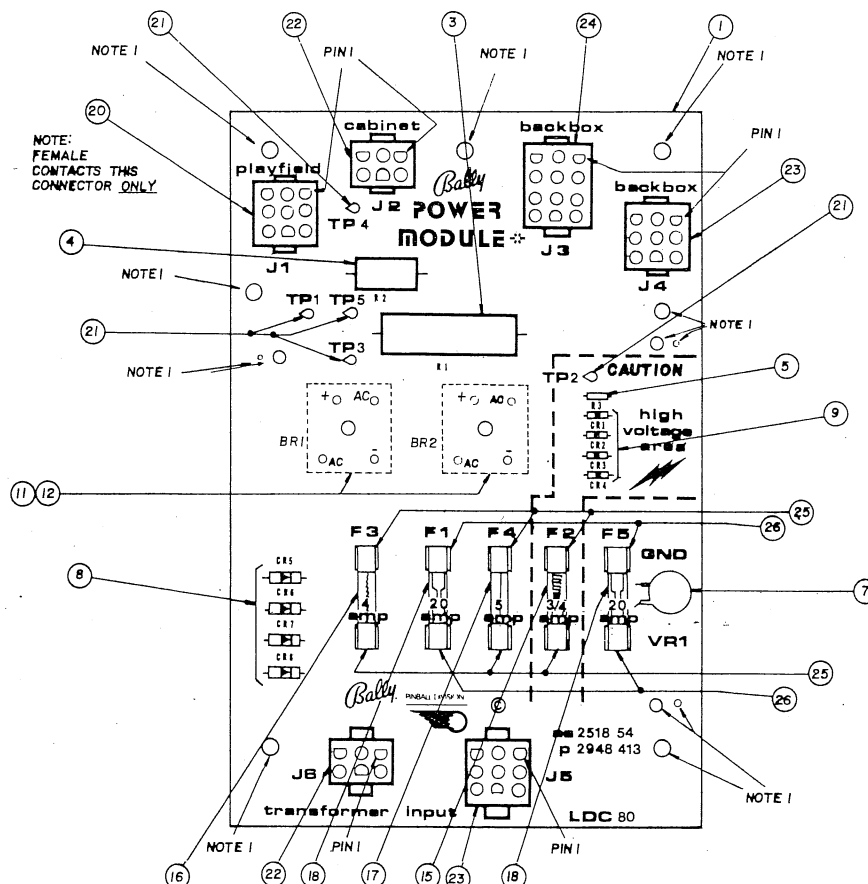
A2: POWER TRANSFORMER MODULE



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

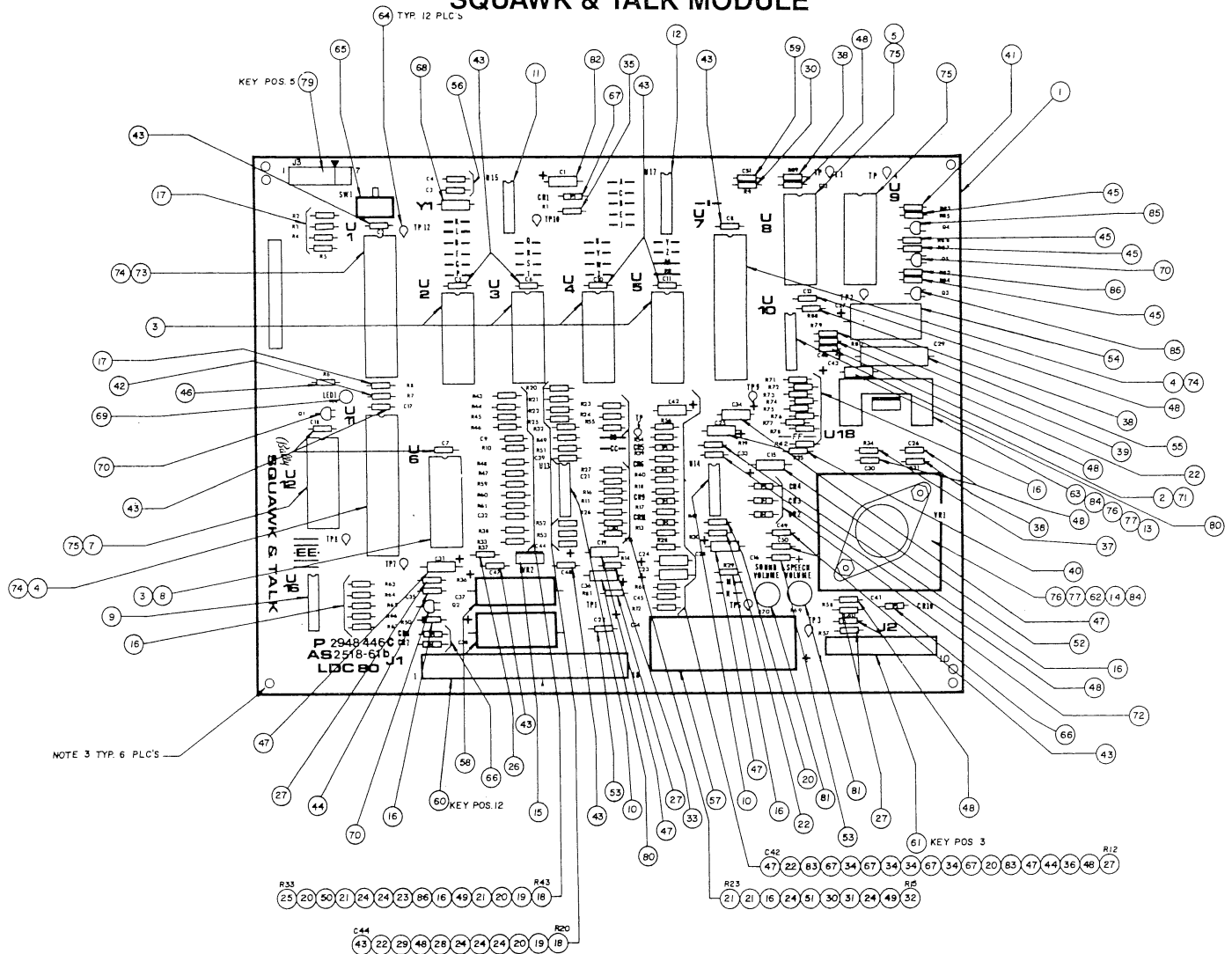


(Part of) A2: POWER TRANSFORMER MODULE COMPONENT PARTS LIST

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



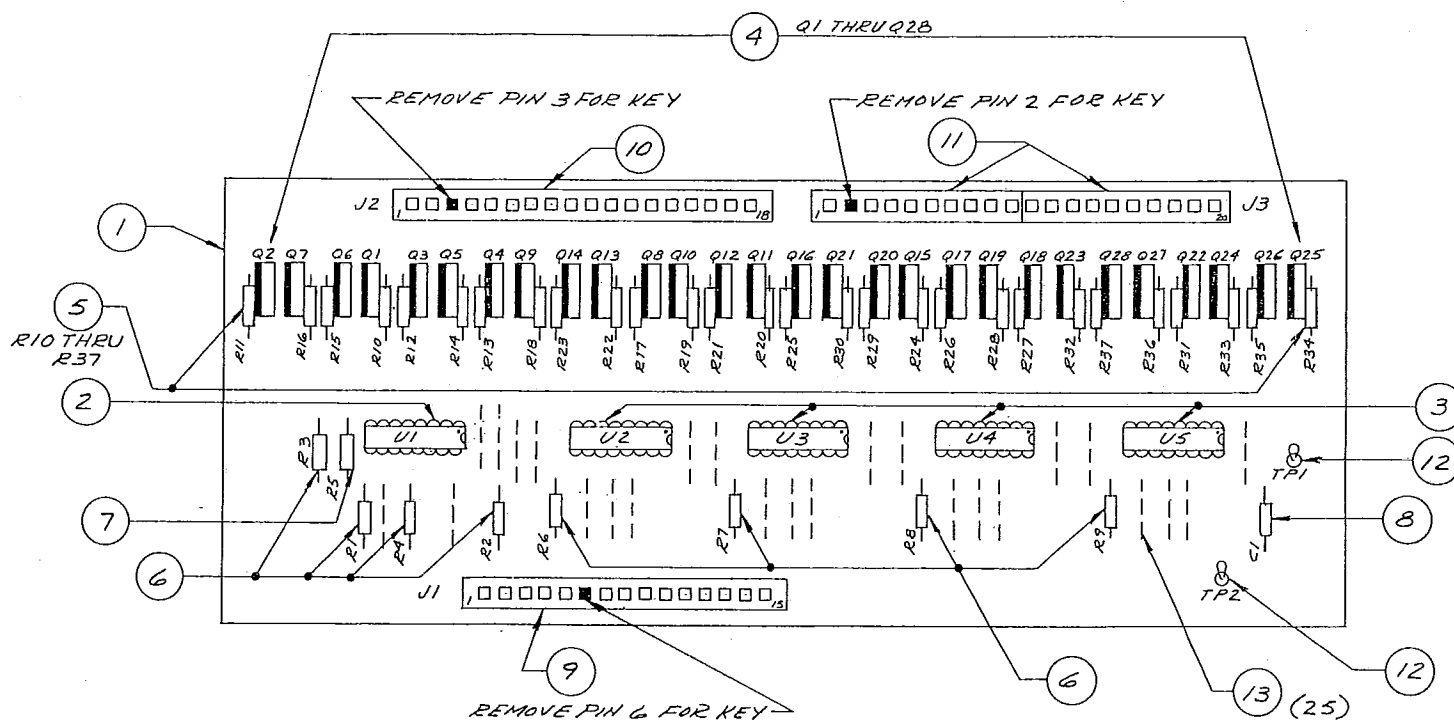
ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
1	1	A14	AS-2518-61B	Squawk & Talk Module, Complete
2	1	U10	AD 558 DAC	E-620-171
3	5	Used with U2 thru U6	24 Pin I.C. Socket	E-712
4	2	U7, U11	6821 P.I.A.	E-620-29
5	1	U8	Tms 5200 Speech	E-620-167
7	1	U12	AY3-8912 Sound	E-620-166
8	1	U6	6810 RAM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

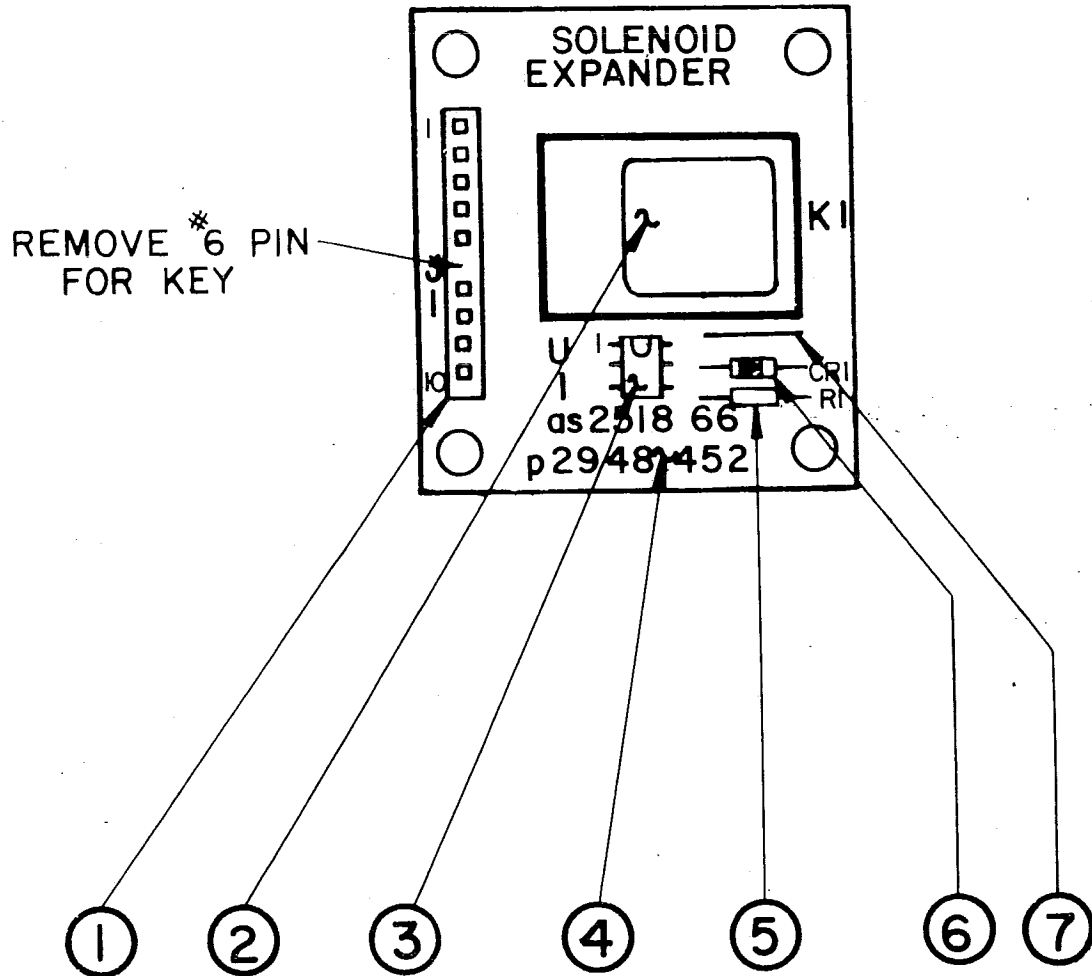
AS-2518-52 AUXILIARY LAMP DRIVER



A9: AUXILIARY LAMP DRIVER COMPONENT PARTS LIST

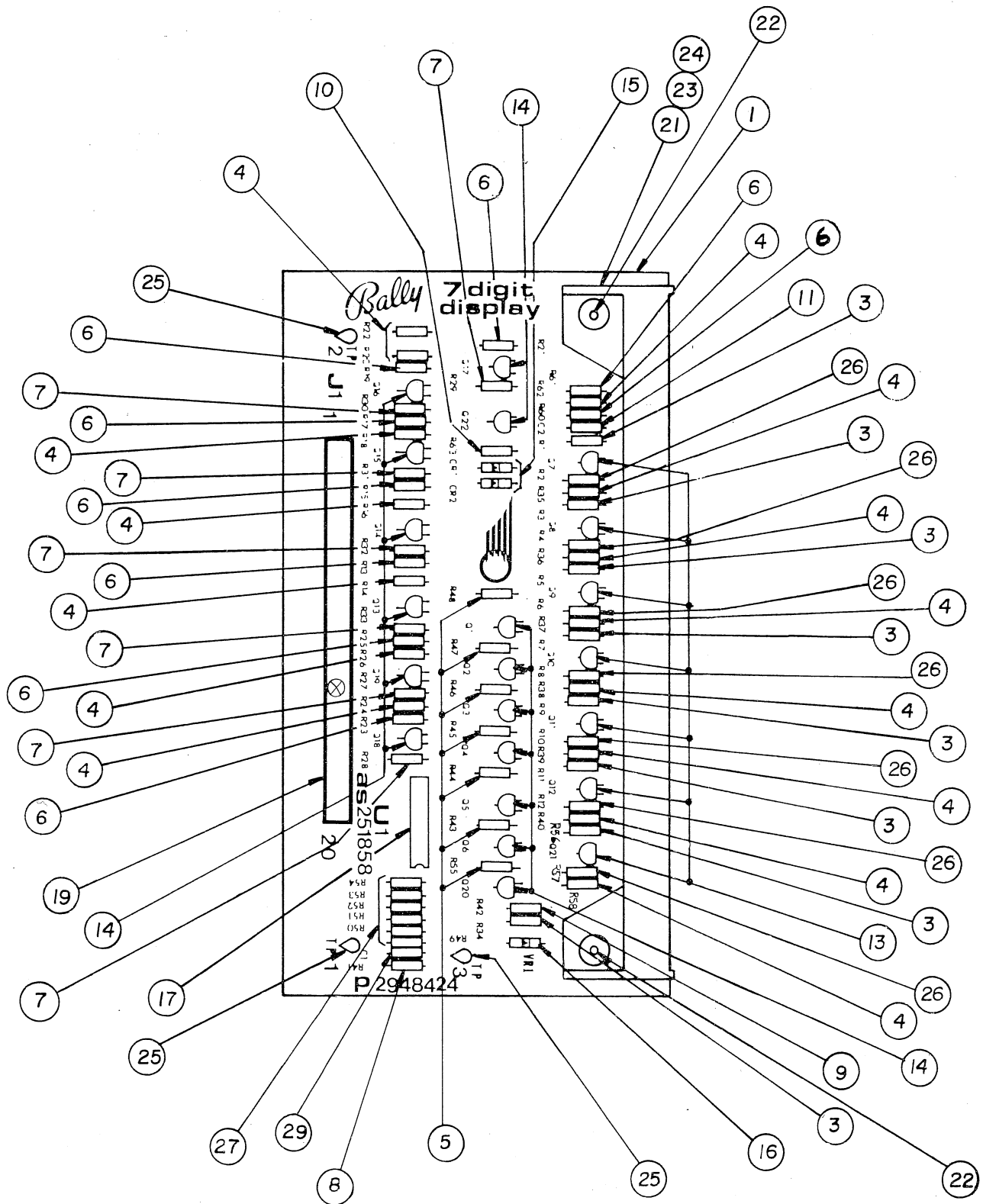
ITEM	QTY.	REFERENCE DESIGNATION	BALLY PART NO.	DESCRIPTION
1	1	A9	AS-2518-52	Auxiliary Lamp Driver, Complete
2	1	U1	E-620-134	Quad Flip Flop
3	4	U2 Thru U5	E-620-108	BCD to Decimal Decoder
4	28	Q1 Thru Q28	E-585-29	S.C.R.
5	28	R10 Thru R37	E-105-237	Resistor, 2K Ω , 1/4 W, 5%
6	8	R1-4, R6-9	E-105-242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

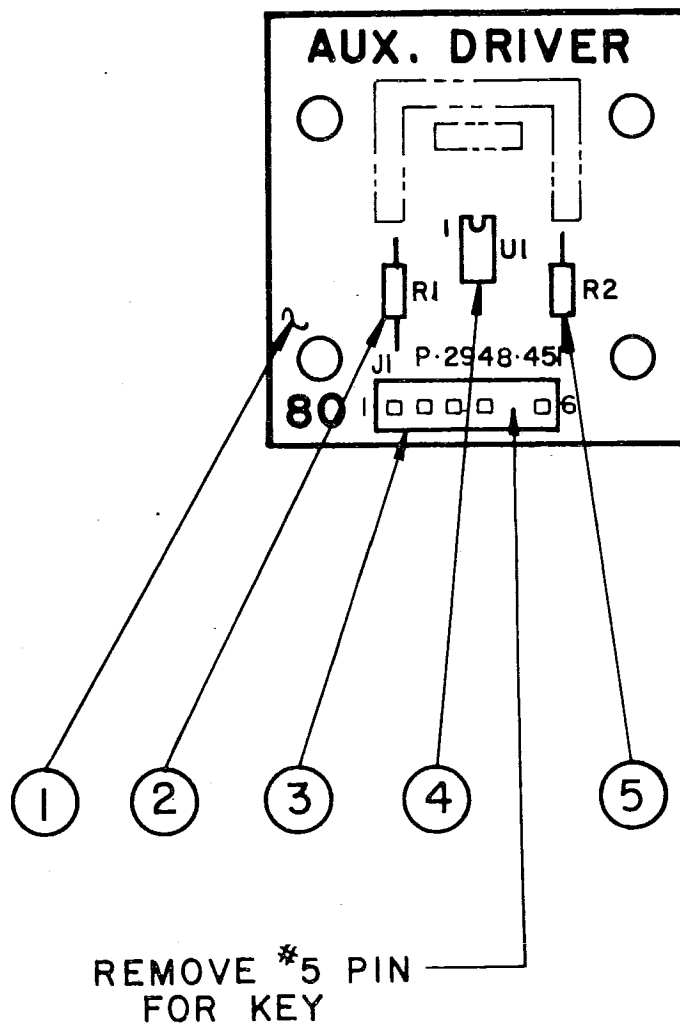


A1: 7 DIGIT DISPLAY DRIVER MODULE

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 (IN4148)
16	1	VR1	E-598-7	Zener Diode, 110V (IN3045A)
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

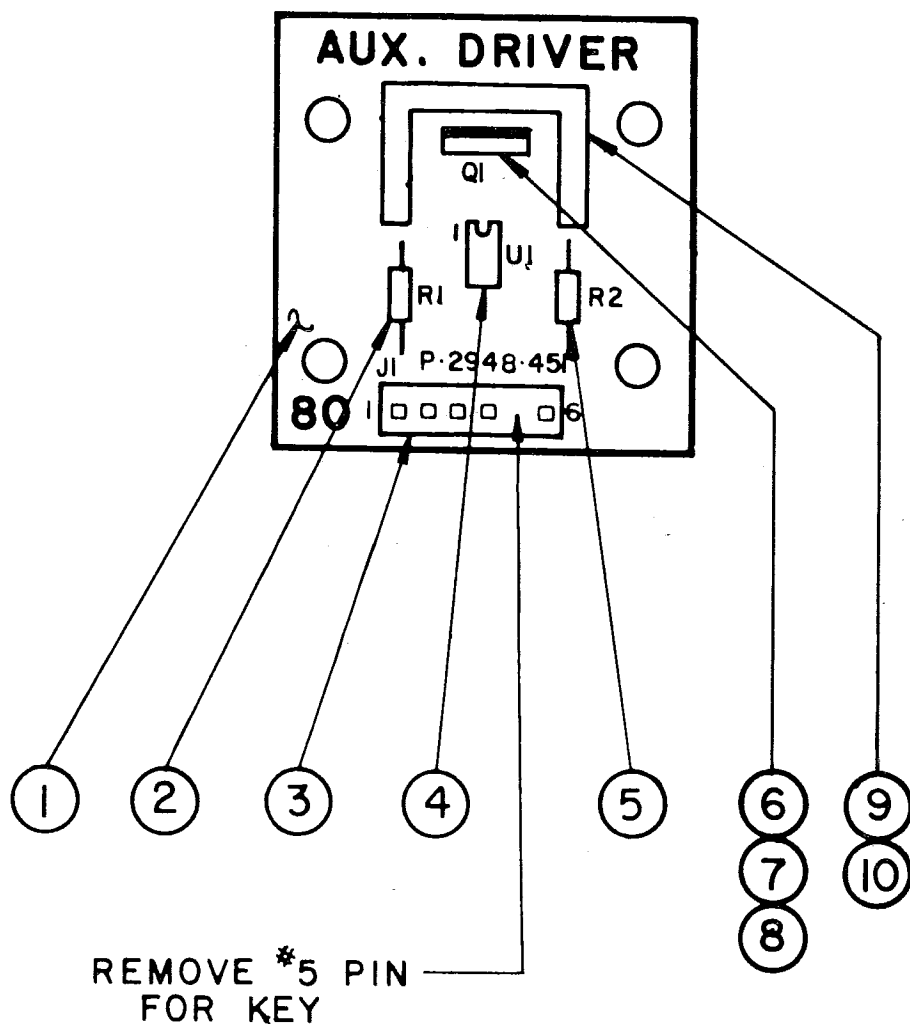
A17 Auxiliary Driver—G.I. Flasher
AS-2518-68



COMPONENTS PARTS LIST

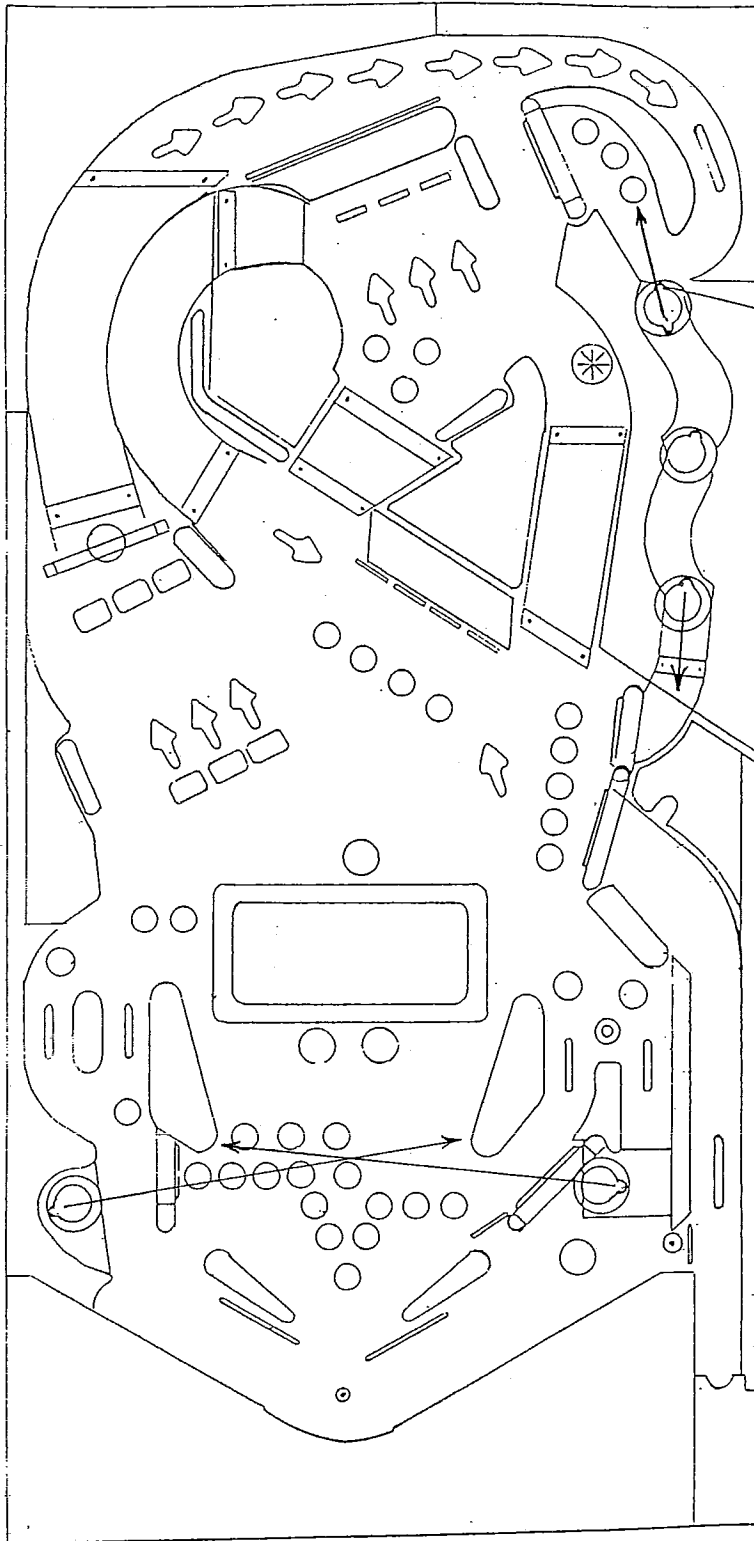
ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
1	1	P-2948-451	P.C. Board	M-645-584
2	1	R1	330 Ω , 5% 1/4W.	E-105-219
3	1	J1	6 Pin Wafer—KK156	E-736-6
4	1	U1	OPT./CP, MOC 3011	E-620-172
5	1	R2	10 Ω , 5%, 1/4W.	E-105-306
REF.			Schematic	W-1253 b

A19 Auxiliary Driver—TRIAC Lamp Flasher AS-2518-82



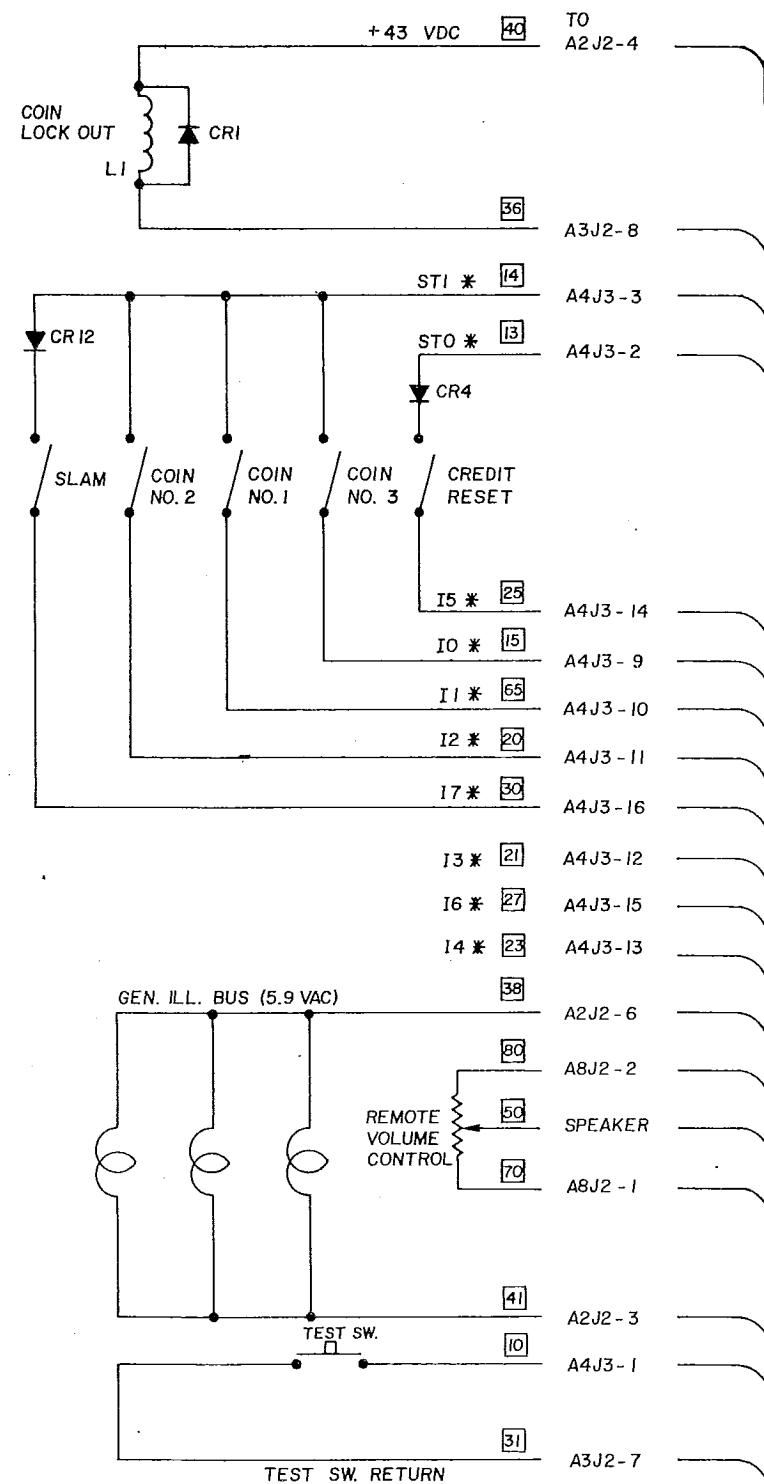
COMPONENTS PARTS LIST

ITEM	QTY.	REFERENCE DESIGNATION	DESCRIPTION	BALLY PART #
1	1	P-2948-451	P.C. Board	M-645-584
2	1	R1	330 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	TRIAC, T2800A	E-585-74
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-1261-b.



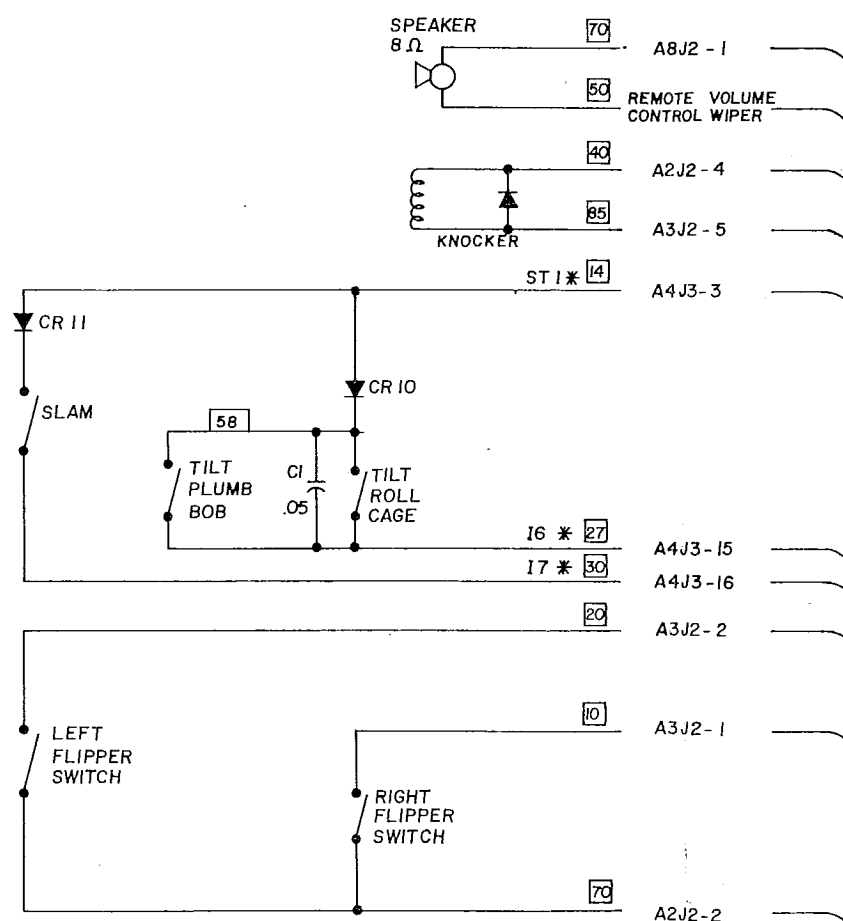
VECTOR DRAWING FOR VECTOR
BOTTOM LEFT AND RIGHT EJECT
SAUCERS.

BALL SHOULD HIT LOWER POSTS
OF SLINGSHOT AS SHOWN.



NOTES: (CAUTION)

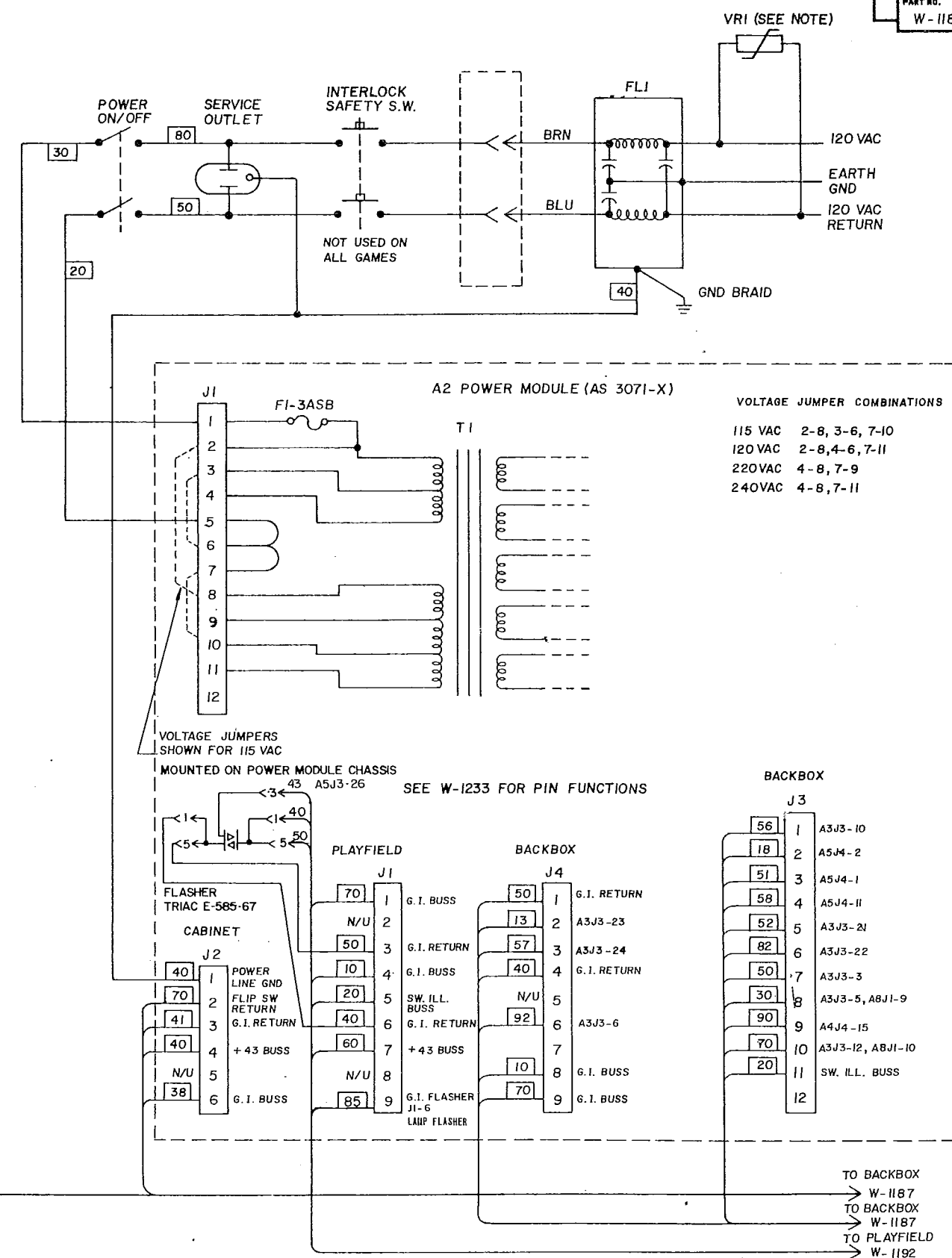
1. USE BALLY PART NO. E-713 FOR 115-120 VAC.
2. USE BALLY PART NO. E-713-1 FOR 220-240 VAC.
3. * INDICATES AID TEST POINT.



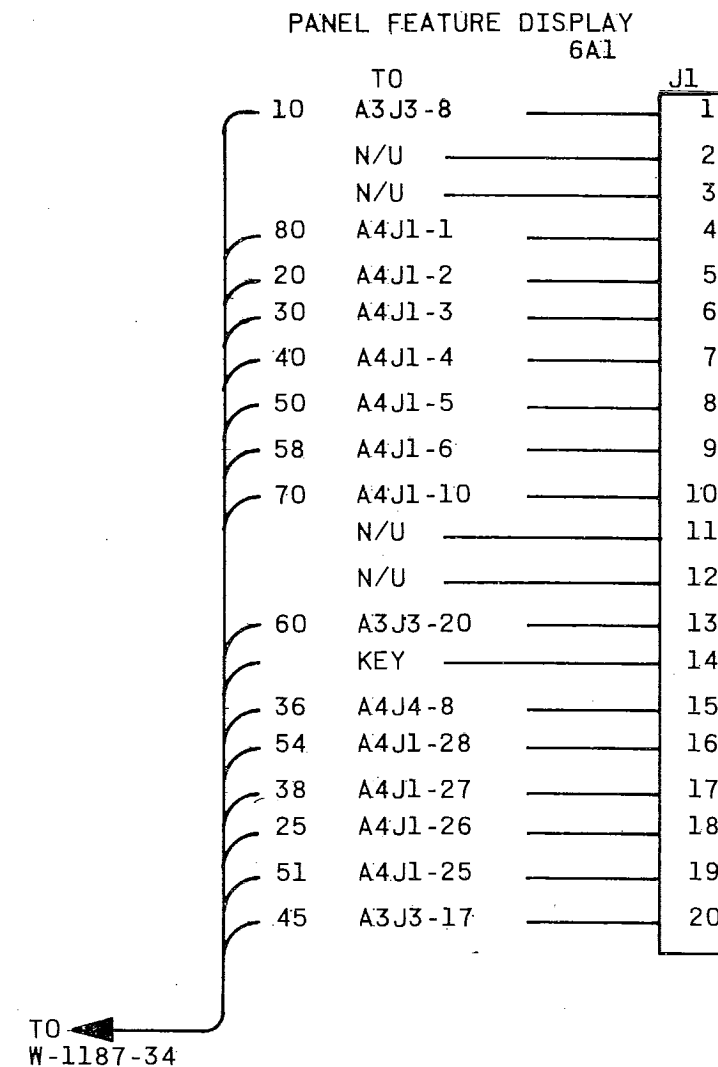
TO	J1 PIN	TO	J1 PIN
A4J3-9	1	A4J3-3	11
A4J3-10	2	A2J2-4	15
A4J3-11	3	A3J2-8	16
A4J3-12	4	A2J2-6	17
A4J3-13	5	A2J2-3	18
A4J3-14	6	A4J3-1	19
A4J3-15	7	A3J2-7	20
A4J3-16	8	SPEAKER	9
A4J3-2	10	A8J2-1	12
DOOR PLUG		A8J2-2	13

A7 CABINET ASS'Y. WIRING

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



					DETIMENTAL TO THE INTEREST OF THE OWNERS AND MUST BE RETURNED ON DEMAND.												
					REMOVE ALL WAIRS		DR BY DATE M.T. 12-11-71		Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS #1247								
					TOLERANCES ON DIMENSIONS: UNLESS OTHERWISE SPECIFIED FRACTIONS = OOB DECIMALS = .001 EXCEPT HOLE DIA S ANGLES = 3°		DR BY DATE M.T. 12-11-71										
					ADP BY DATE J.D. 11-20-71		PRINT CONTROL		DIE SIZE " C.C. FT. PER M. LBS. PER M.								
					ADP BY DATE M.T. 11-20-71		NAME		WIRING DIAGRAM - CABINET				ASSEM NO. USED		SCALE		
					FINISH:		MATERIAL		VECTOR				PART NO.				
					HARDENING:		CODE						W-1186-17 c				
					DO NOT SCALE DRAWING												
NO.		LET.		CHANGE		DATE		BY									



5.4 VDC

PART NO.
W-1255-4

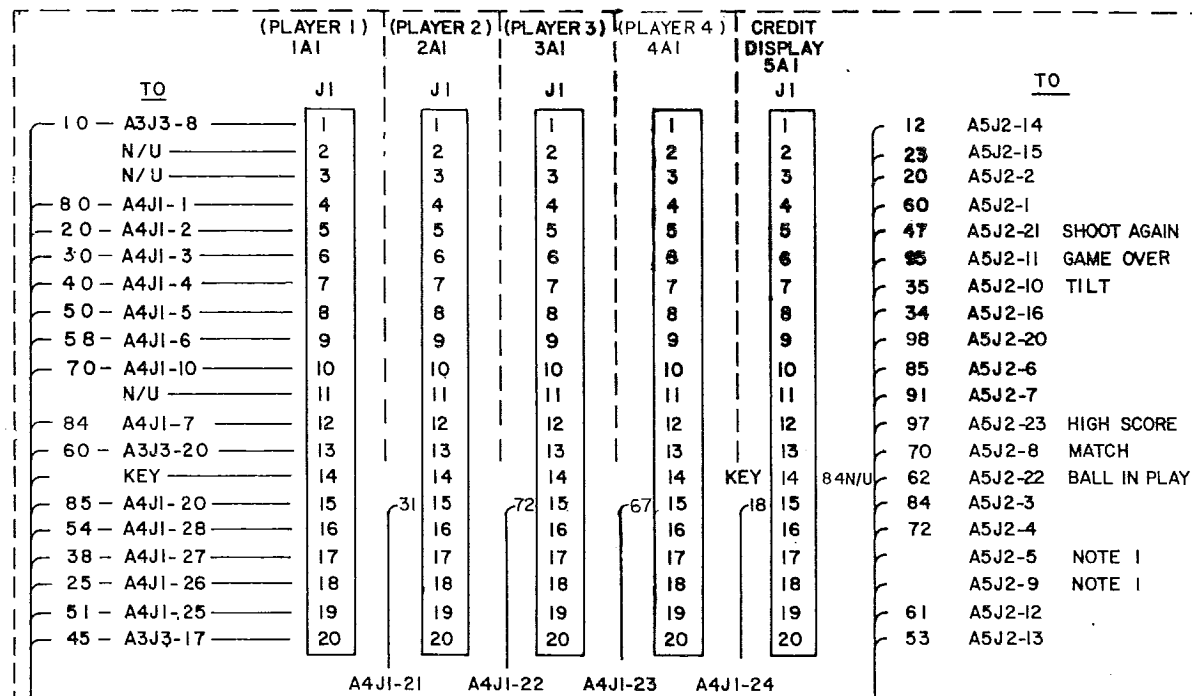
NO.	LET.	CHANGE	DATE	BY

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
A17J1-4	20	15
A5J2-2	21	67
A4J4-5	22	72
A4J4-16	23	96
A8J1-7	24	70

INSERT TO BACK CAB.
PLUG

AI INSERT



AIJ2
SEE
TABLE A

SWITCHED
ILL. BUS
54V.D.C.

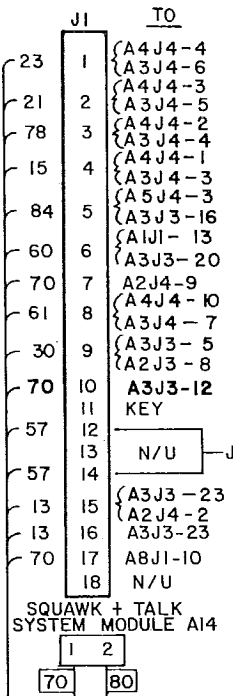
TO
A2J4-8
A2J4-9
5.9V.A.C.

10/70 GEN ILL.
LAMPS

TO
G.I. FLASHER
(BACK INSERT)

40-A2J1-6
50-A2J1-3
MOUNTED ON
POWER MODULE

20
A2J3-11



FROM	PIN	WIRE
A5J2-14	1	12
A5J2-15	2	23
A5J2-16	3	34
A5J2-26	4	43
A5J1-18	5	58
A5J2-1	6	60
A5J2-2	7	67
A4J4-5	8	72
A5J2-8	9	85
A5J2-7	10	91
A5J2-20	11	98
A2J1-9	13	95
	14	
	15	

PANEL TO BACK BOX

FROM	PIN	WIRE
A9J2-7	1	10
A9J2-14	2	12
A9J3-8	3	13
A9J3-15	4	14
A9J2-4	5	15
A9J2-11	6	18
A9J3-3	7	20
A9J3-12	8	21
A9J2-8	9	51
A9J2-15	10	52
A9J3-9	11	53
A9J3-16	12	56

PANEL TO BACK BOX

FROM	PIN	WIRE
A3J3-8	1	10
A4J1-2	2	20
A4J1-26	3	25
A4J1-3	4	30
A4J4-8	5	36
A4J1-27	6	38
A4J1-4	7	40
A3J3-17	8	45
A4J1-5	9	50
A4J1-28	10	51
A4J1-6	11	54
A3J3-20	12	58
A4J1-10	13	60
A4J1-1	14	70
A4J1-1	15	80

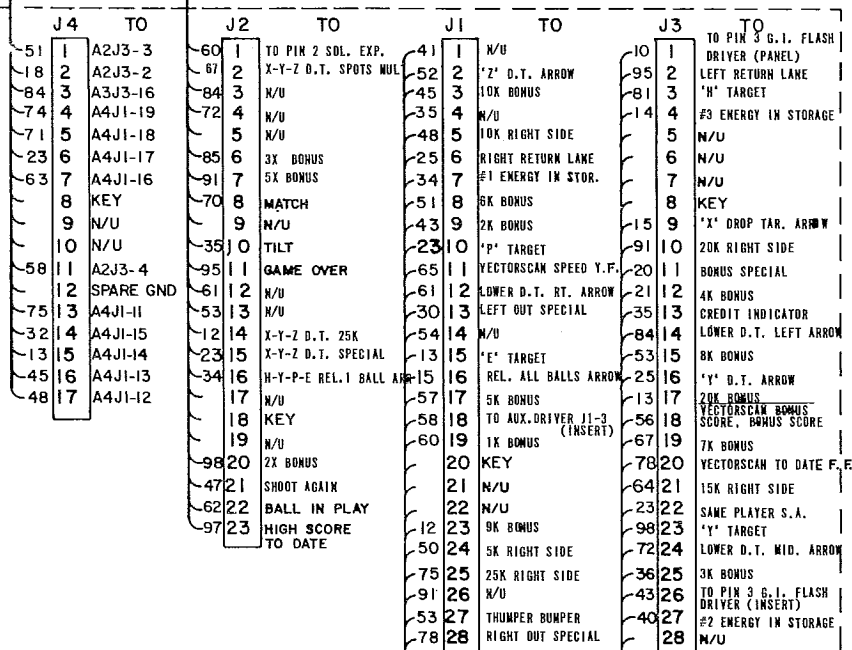
PANEL TO BACK BOX

W-1187-34 c

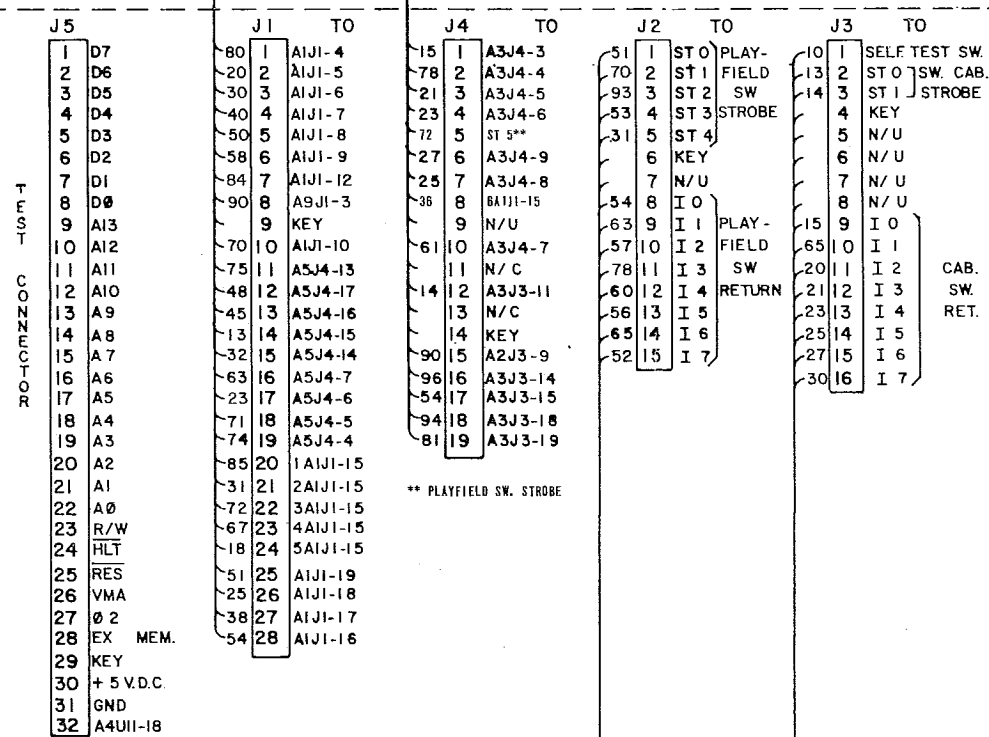
FROM	PIN	WIRE
A2J4-4	1	40
A2J4-1	2	50
A2J3-2	3	18
A2J3-3	4	51
A2J4-6	5	92
A2J3-11	6	20
A2J3-10	7	70
A2J3-8	8	30
A2J4-9	9	70
A2J4-8	10	10
A2J3-9	11	90
A2J3-4	12	58
A2J3-5	13	52
A2J3-6	14	82
A2J3-1	15	56
A2J3-7	16	50
A2J4-2	17	13
A2J4-3	18	57
A17J1-4	19	15

CABINET TO BACK BOX

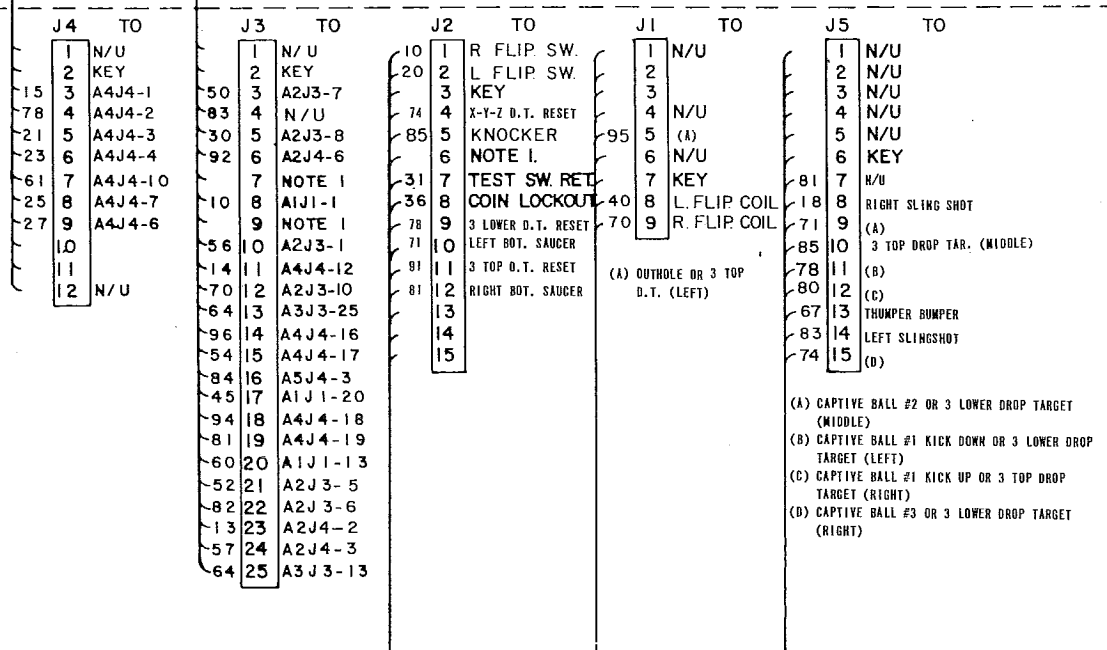
LAMP DRIVER A5



MPU A4



VOLTAGE REGULATOR / SOLENOID DRIVER A3



TO LOWER
CABINET
TO PLAYFIELD

NOTES:

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

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

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DR BY: M.T. DATE: 10-19-81
DATE: 10-19-81
AP'D BY: J.D. DATE: 11-20-81
DATE: 11-20-81

REMOVE ALL BURRS
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED
FRACTIONS - 1/64
DECIMALS - .005
ANGLES - °

DO NOT SCALE DRAWING

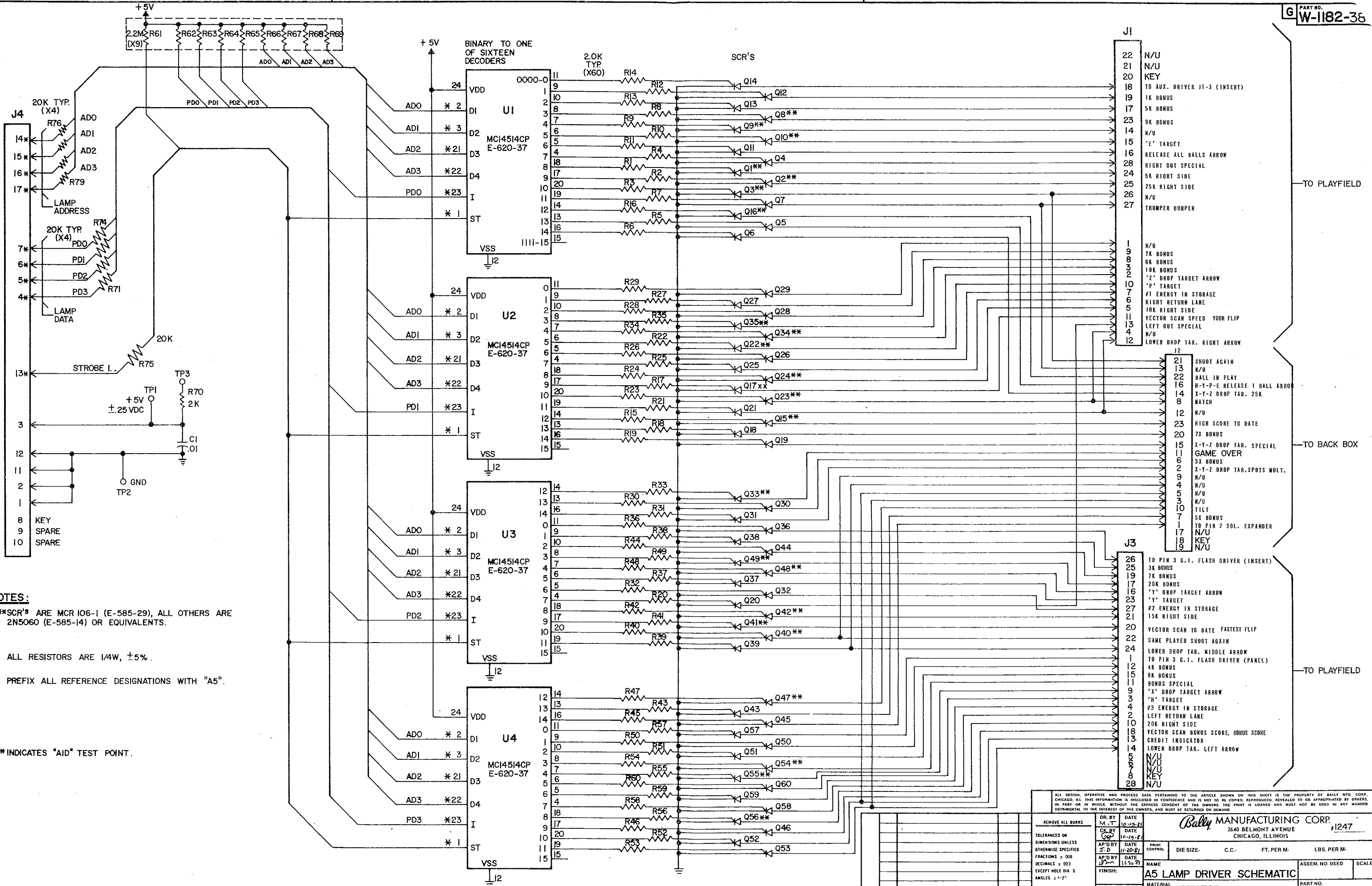
HARDENING: _____

NAME: WIRING DIAGRAM BACKBOX
MATERIAL: VECTOR
PART NO: W-1187-34c

ASSEMBLY NO: USED ON: _____

SCALE: _____

TOTAL: _____



NOTES:

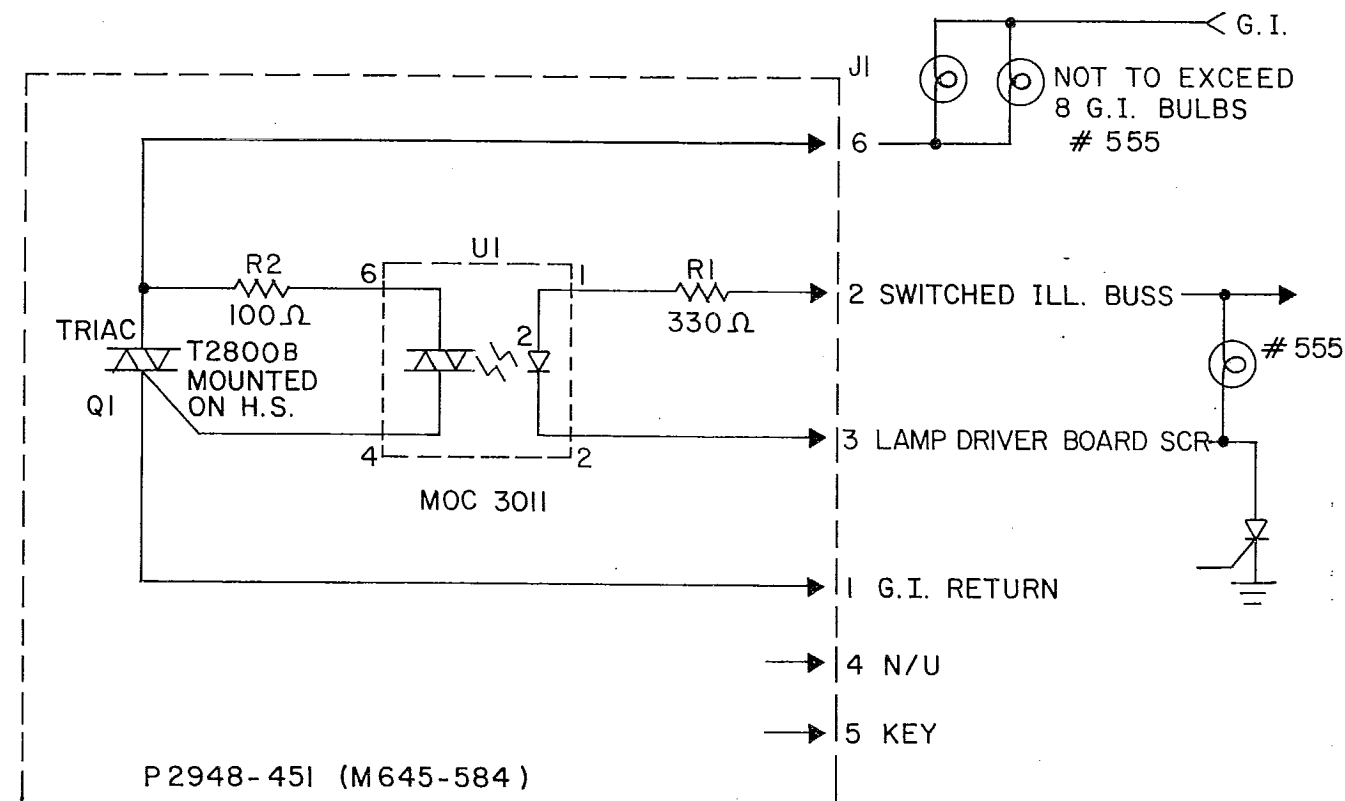
1. **SCR'S ARE MCR 106-1 (E-585-29), ALL OTHERS ARE 2N5060 (E-585-14) OR EQUIVALENTS.

2. ALL RESISTORS ARE 1/4W, $\pm 5\%$.

3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A5".

4. * INDICATES "AID" TEST POINT.



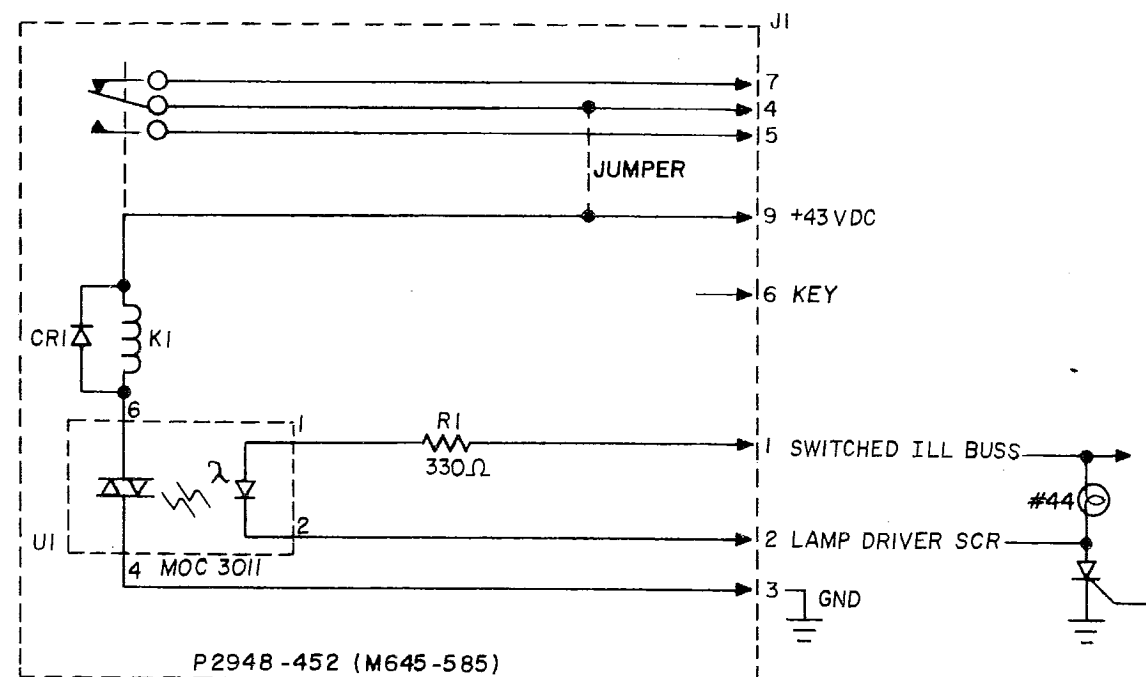


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REMOVE ALL BURRS		DR. BY <i>JCG</i>	DATE 9-22-81	Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS		# 1247			
		CK. BY	DATE	PRINT CONTROL	DIE SIZE	C.C.	FT. PER M.	LBS. PER M.	
		AP'D BY	DATE	NAME TRIAC LAMP FLASHER (A19) (SCHEMATIC)				ASSEM. NO. USED AS-2518-82	SCALE
		FINISH:	DATE	MATERIAL				PART NO. W-1261 <i>b</i>	
		HARDENING:							
NO.	LET.	CHANGE	DATE	RY					
					TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED FRACTIONS ± .008 DECIMALS ± .003 EXCEPT HOLE DIA.'S ANGLES ± 1/2° DO NOT SCALE DRAWING				

OPER.	DEPT.	DESCRIPTION	TOOL NO.

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

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)

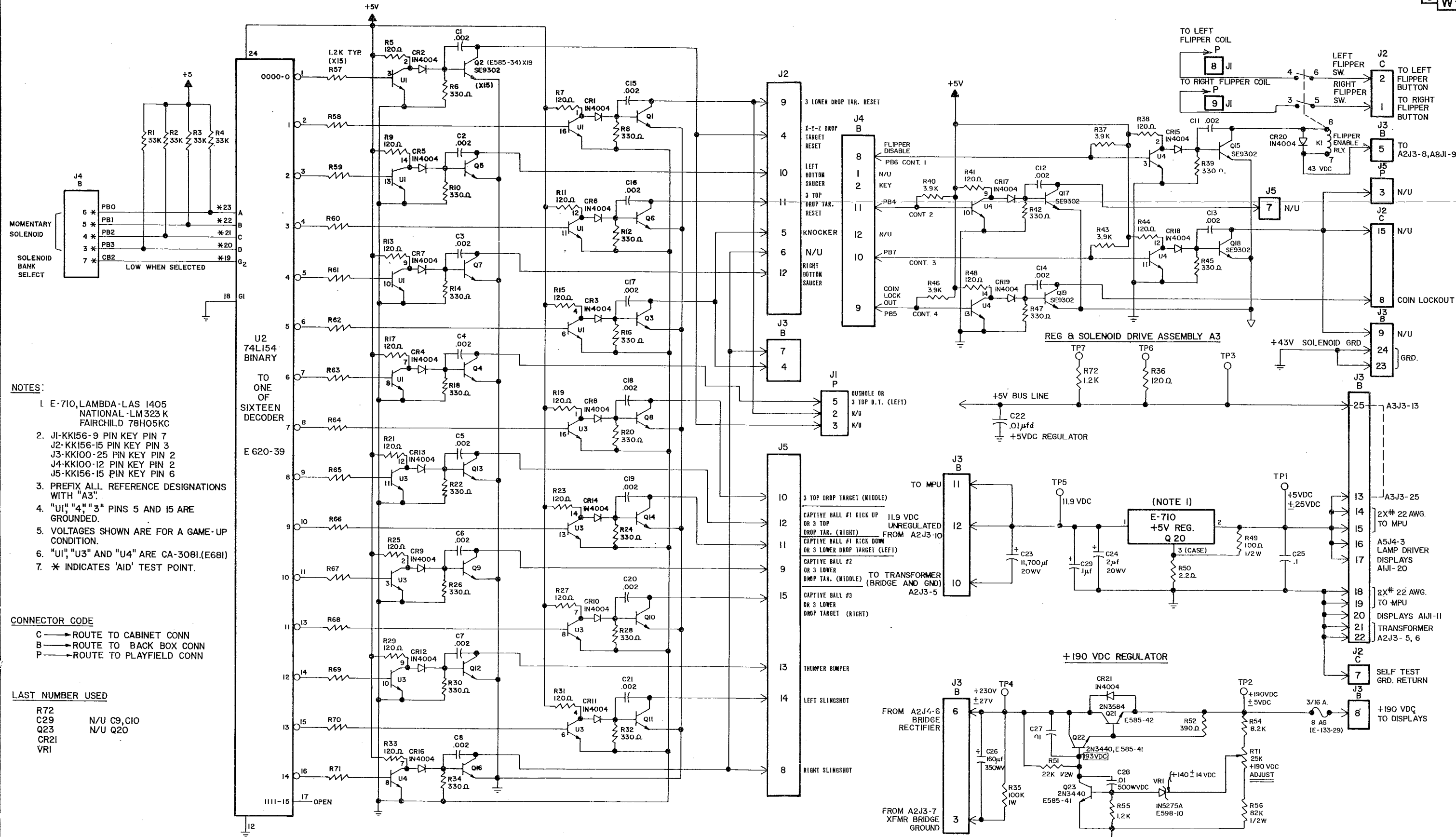
ASSEM. NO. USED
AS-2518-66

MATERIAL
CODE

PART NO.
W-1251 b

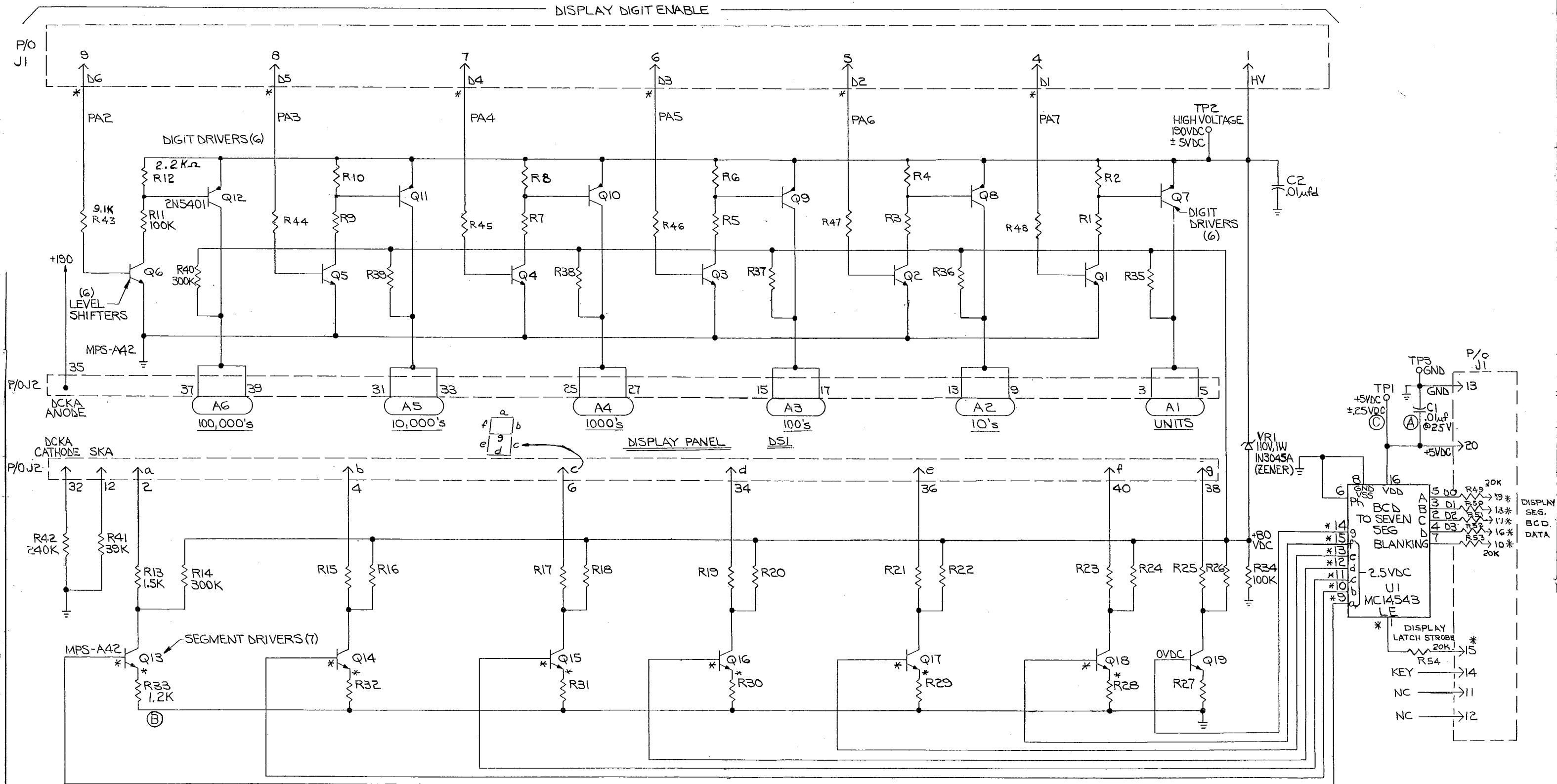
OPER.	DEPT.	DESCRIPTION	TOOL NO.
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NO.	LET.	CHANGE	DATE	BY
-----	------	--------	------	----



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 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 DATE		Bally MANUFACTURING CORP. #1247	
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		CK. BY DATE		2640 BELMONT AVENUE CHICAGO, ILLINOIS	
FRACTIONS ± 008		AP'D BY DATE		DIE SIZE C.C. FT. PER M. LBS. PER M.	
DECIMALS ± 003		J. D. DATE		NAME SOLENOID DRIVER VOLTAGE REGULATOR SCHEMATIC	
EXCEPT HOLE DIA'S		FINISH		ASSEM. NO. USED SCALE	
ANGLES ± 1/2°		HARDENING		PART NO. W-1183-38c	
DO NOT SCALE DRAWING		MATERIAL		VECTOR	
NO. LET. CHANGE DATE BY		CODE			



NOTES:

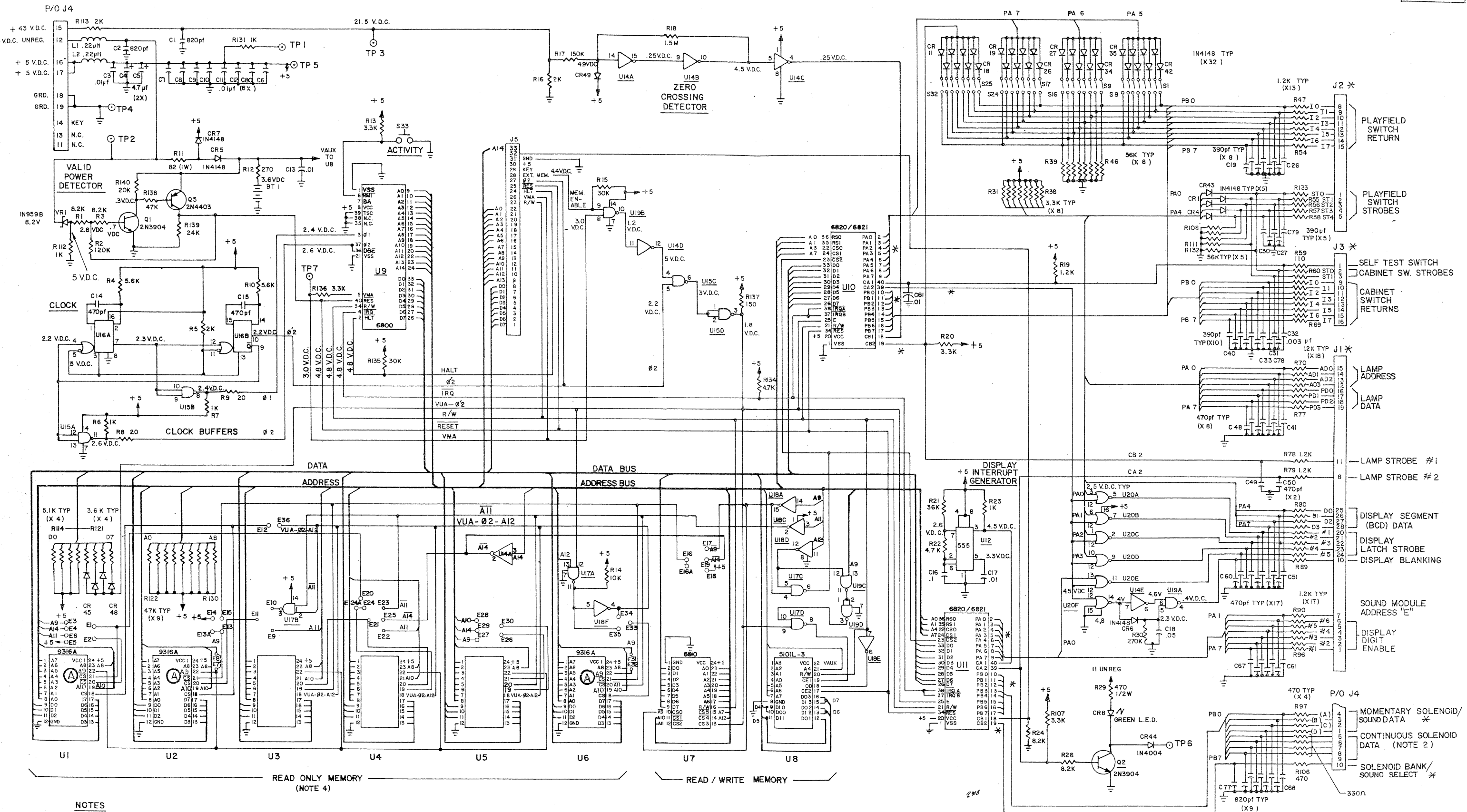
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE ± 5%, 1/4W.
2. PREFIX ALL REFERENCE DESIG. WITH ASSEMBLY REFERENCE DESIG. "A1"
3. * INDICATES 'AID' TEST POINT.

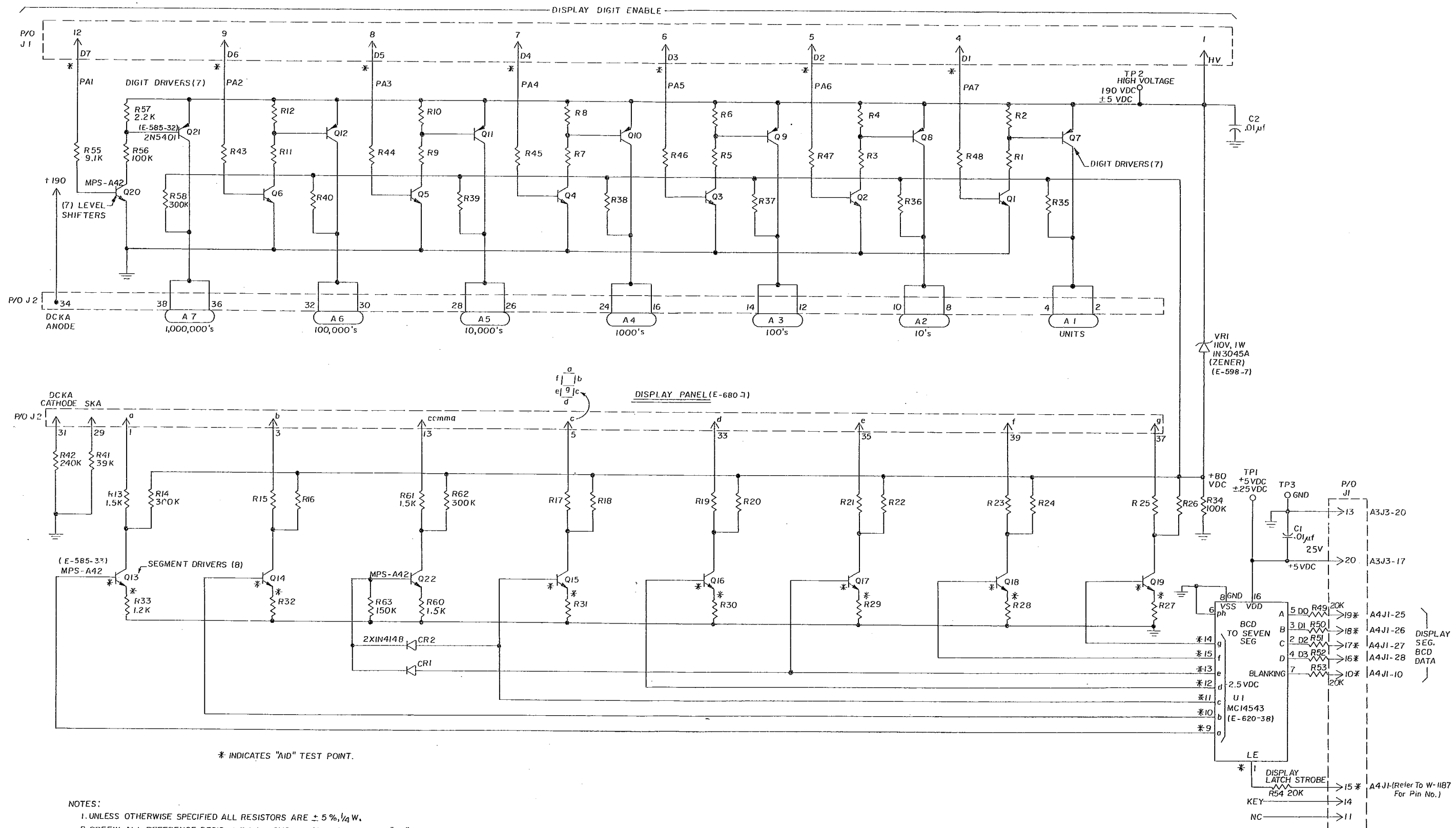
DIE SIZE --- C.C. --- FT. PER M --- LBS. PER M ---

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 ±		DECIMALS ±		ANGLES ±		DO NOT SCALE DRAWING	
DR. BY	DATE	DES	7/22	CK. BY	DATE	DES	7/22	PRINT	CONTROL	FILE	DATE
AP'D BY	DATE	DES	10/14/73	AP'D BY	DATE	DES	10/14/73	FINISH	DATE	DES	10/14/73
NAME				6 DIGIT DISPLAY BOARD SCHEMATIC "A1"				ASSEM. NO. USED ON W			
MATERIAL				AS-2518-21				PART NO.			
W-1184-1c											

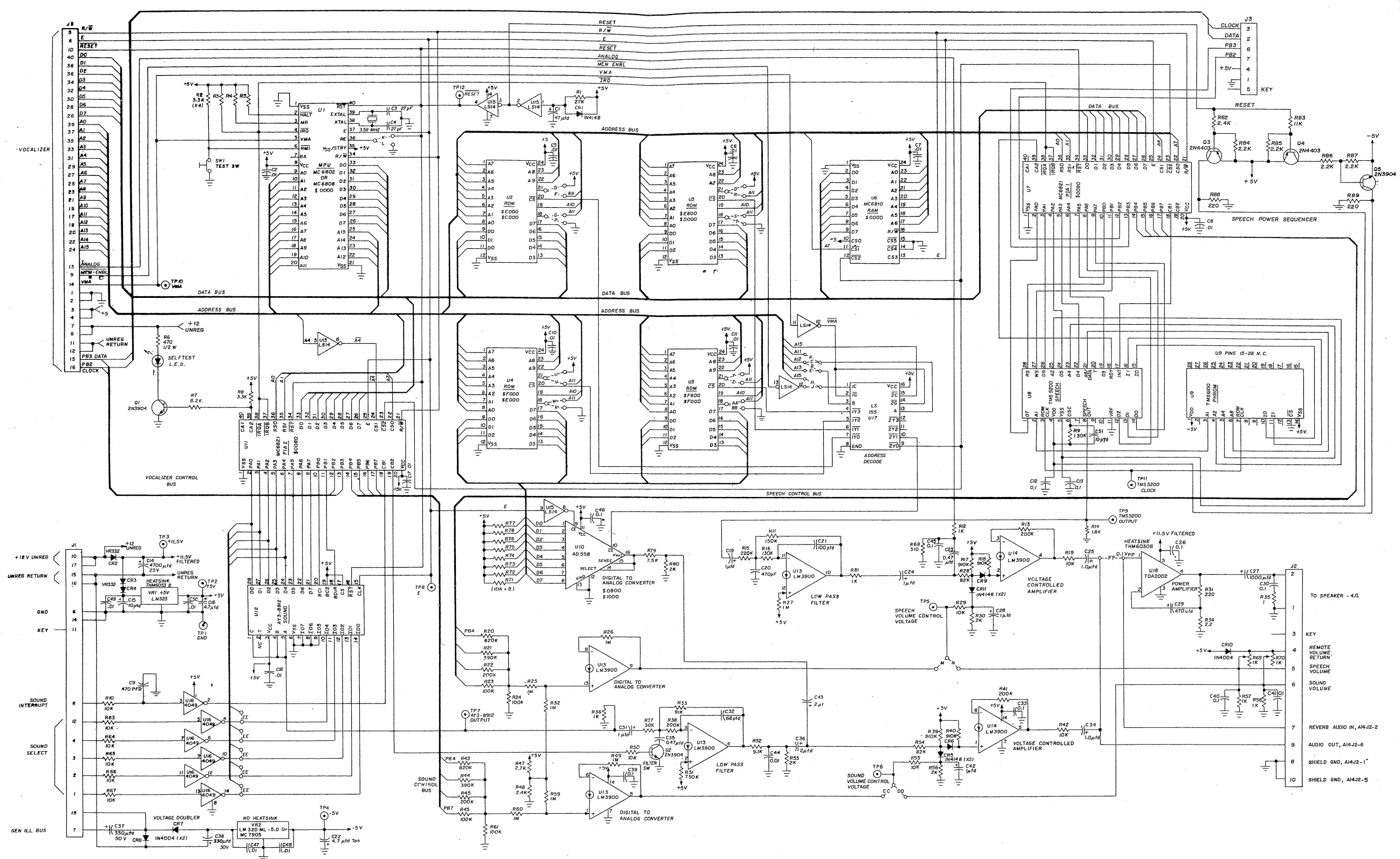
OPER.	DEPT.	DESCRIPTION	TOOL No.





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DR. BY FFC DATE 6-18-0		DATE 6-18-0		Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS		1210	
AP'D BY DATE 6-18-0		PRINT CONTROL		DIE SIZE: C.C. FT. PER M. LBS. PER M.		ASSEM. NO. USED AS-2518-58	
FINISH:		NAME 7 DIGIT DISPLAY BOARD SCHEMATIC "A1"		MATERIAL		SCALE	
DO NOT SCALE DRAWING		HARDENING:		CODE		PART NO. W-1184-2C	



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

LAST NUMBERS USED

- R89
- C51
- CR10
- U18
- VR2
- Q5
- TP12
- FF

SQUAWK & TALK TEST POINTS

- TP1 - GND
- TP2 - +5VDC
- TP3 - +11.5VDC
- TP4 - +5VDC
- TP5 - SPEECH VOLUME CONTROL VOLTAGE
- TP6 - SOUND VOLUME CONTROL VOLTAGE
- TP7 - AY3-8912 OUTPUT
- TP8 - E PULSE
- TP9 - TMS5200 OUTPUT
- TP10 - VMA
- TP11 - TMS5200 CLOCK
- TP12 - RESET

SQUAWK & TALK JUMPERS

- FROM - ROM JUMPERS
- 2716 9316 A,B,D,R,O,T,U,Y,X,BB
- 2532 9332 C,E,G,Q,S,U,W,Y,AA
- NO VOCALIZER H
- WITH VOCALIZER J
- 6808 MPU L (WITH 6810 RAM)
- 6802 MPU K (NO 6810 RAM)
- NO AY3-8912 EE
- NO "SAY IT AGAIN" FF

COMPUTER VOLUME CONTROL
REMOTE VOLUME CONTROL

SPEECH SOUND
DD N

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BALLY MANUFACTURING CORP.
2445 BELMONT AVENUE
CHICAGO, ILLINOIS 60614
1/83

NAME: SQUAWK & TALK SCHEMATIC A8
DATE: 1/83
DESIGNER: J. J. J.
CHECKED: J. J. J.
APPROVED: J. J. J.
SCALE: AS SHOWN
SHEET NO. 1 OF 1
PART NO. W-1250-2

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.

