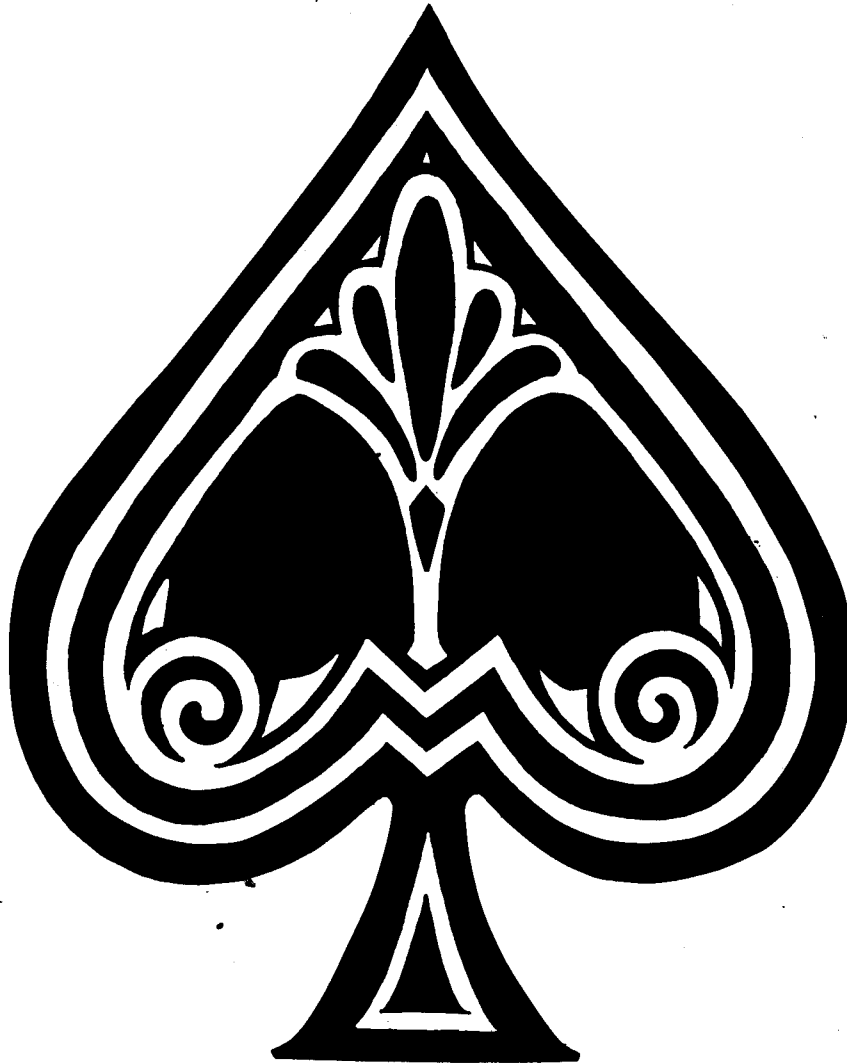




BLACK JACK



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Bally

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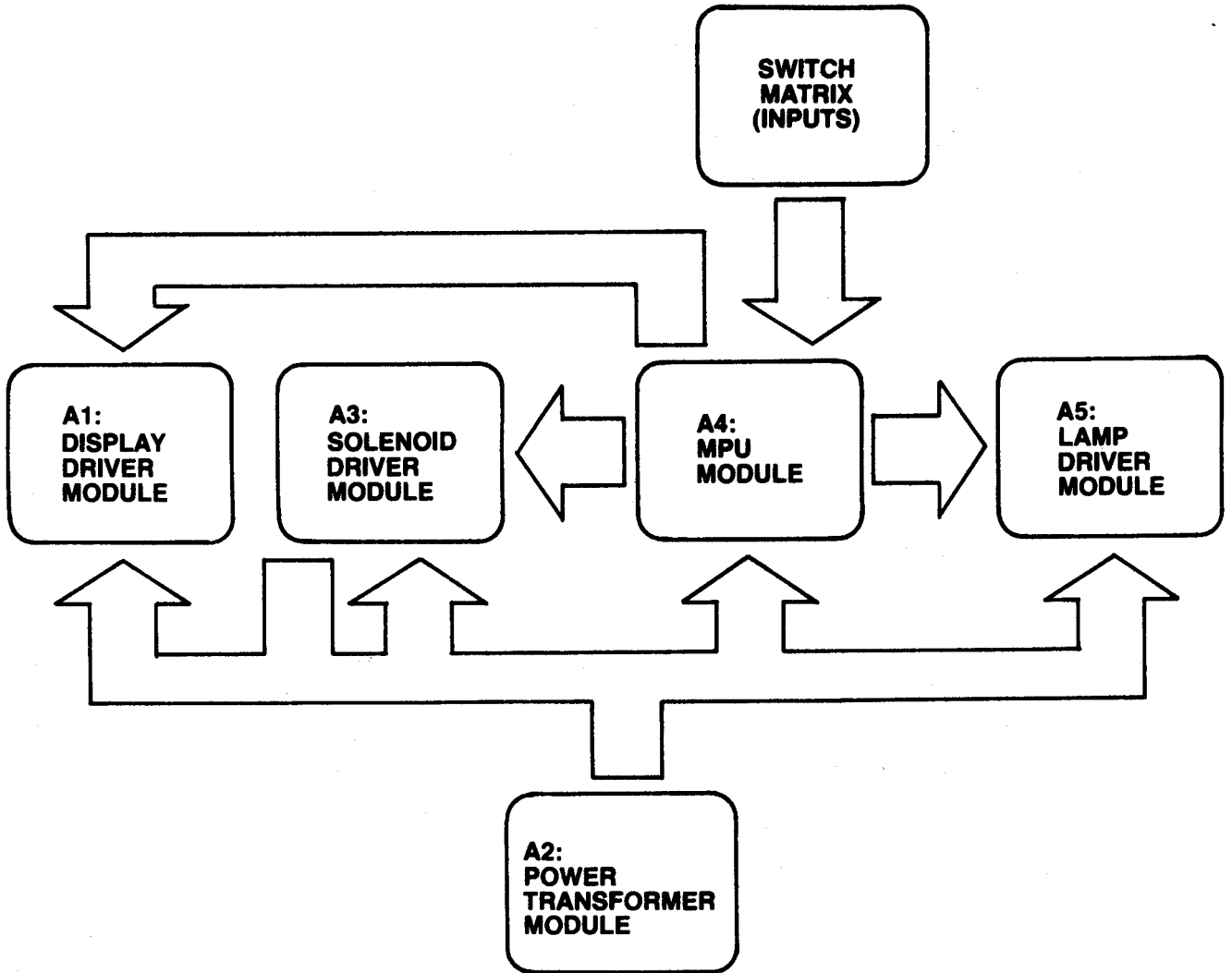
GAME #1092-E BLACK JACK

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:

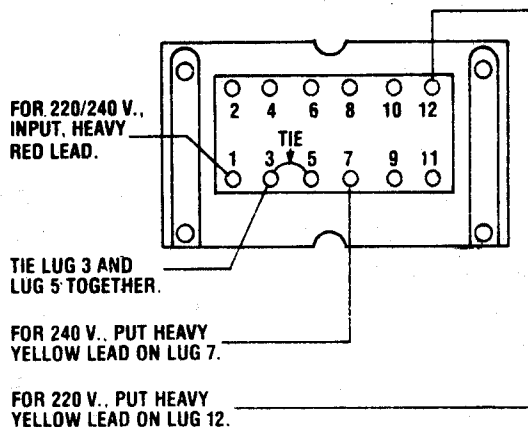
1. Check that all cable connectors are completely seated on printed circuit assemblies.
2. Check that cables are clear of all moving parts.
3. Check for any wires that may have become disconnected.
4. Check switches for loose solder or other foreign material that may have come loose in shipment and could 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.

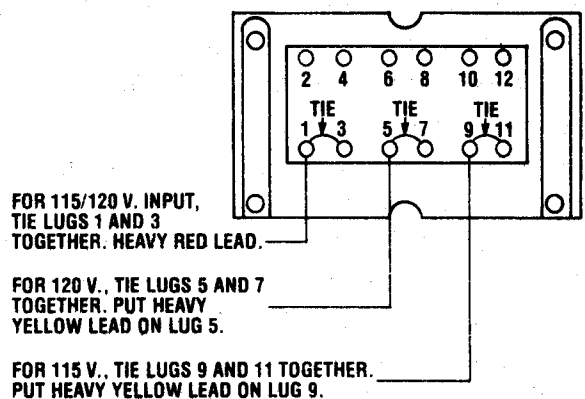
TRANSFORMER CONNECTION INSTRUCTIONS

E-122-125 TRANSFORMER WIRING FOR 220/240 V.,
50/60 CYCLE INPUT.



VARISTOR, BALLY PART NO. E-713-1,
LOCATED IN CABINET, MUST BE USED
FOR OPERATION AT 220 V. OR 240 V.A.C.

E-122-125 TRANSFORMER WIRING FOR 115/120 V.,
50/60 CYCLE INPUT.



VARISTOR, BALLY PART NO. E-713,
LOCATED IN CABINET, MUST BE USED
FOR OPERATION AT 115 OR 120 V.A.C.

FIGURE I. TRANSFORMER

(PART OF POWER—TRANSFORMER MODULE A2, LOCATED IN BACK BOX).

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 Game 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. The bonus score is advanced to 1000 points.

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. Rebound switches score 10 points. Thumper-bumpers, when not lit, score 10 points.

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 bonus score is advanced to 1000 points. 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 and the bonus is set to 1000 points before the game serves the extra ball for play.

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 is one factory installed slam switch on the front door. (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.

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 11 appears on the Match/Ball in Play window as follows:

- 05— 00 to— 40 = Current Credits
- *06—10000 to—999999 = Total Plays (Paid & Free Games)
- *07—10000 to—999999 = Total Replays (Free Games)
- 08— 00 to—999999 = Total times 'High Score to Date' is beat
- *09—10000 to—999999 = Coins Dropped thru Coin Chute #1
- *10—10000 to—999999 = Coins Dropped thru Coin Chute #2**
- *11—10000 to—999999 = Coins Dropped thru Coin Chute #3**

The game displays the first bookkeeping entry if the Self-Test button (See Fig. III) on the inside of the front door is pressed nine 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). Any or all registers can be cleared by alternating between the Self-Test button and the switch button on the MPU module. 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 once more with the eleventh entry displayed causes the game to play the power-up tune and light the Game-Over light.

*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.

#1092-E BLACK JACK

IV. FEATURE AND SCORING OPERATION

A. BONUS SCORE FEATURE:

A bonus score of 1000 to 29,000 points may be scored. The game starts with a bonus score of 1000 points. The bonus score advances one step each time the ball goes through one of the top lanes, goes through either the right or the left return lanes, goes through the right side saucer lane or when the spinner reaches either the midpoint or top of the spinner indicator lights.

B. BONUS COLLECT AND BONUS MULTIPLIER:

When the ball goes into the outhole: The lit bonus score is added to the player's total score; If the 2X lite is lit, the bonus score is added to the player's total score twice; If the 3X lite is lit, the bonus score is added three times; If the 5X lite is lit, the bonus score is added five times. A tilt nullifies the bonus score.

C. BEATING THE DEALER FEATURE:

Near the center of the playfield there are two sets of five cards numbered 17 to 21. The upper set is the player's hand and the lower set is the dealer's hand. When the ball goes through an upper lane, or hits a change player's hand target, the player's hand is advanced one position. When the ball hits a change dealer's hand target or the spinner the dealer's hand is advanced one position.

BEATING THE DEALER FEATURE ADJUSTMENTS

Liberal SW. 32 ON

Player Wins on Ties

Conservative SW. 32 OFF

Player Loses on Ties

"Beating the Dealer" occurs when both of the following takes place:

- 1) The player's hand is greater than the dealer's hand. (See Lib-Con Adj.)
- 2) The ball goes into the saucer. After "Beating the Dealer," the "Beating the Dealer Score" is awarded. The five scores possible are 2X, 3X, 5X, Extra Ball and Special. Also, after "Beating the Dealer," the "Beating the Dealer Score" is advanced one step.

D. CARD LANES FEATURE:

Making the Club lights the Club thumper bumper for 100 points; Making the Spade lights the Spade thumper bumper for 100 points; Making the Diamond and Heart lights the Diamond and Heart thumper bumper for 1000 points.

When Club, Diamond, Spade and Heart lanes are made, the spinner lites to score 1000 points and the left and right outlanes lite to score 50,000 points.

CARD LANE FEATURE ADJUSTMENT

| | | |
|--------------|----------------------|-----------------------|
| Liberal | SW. 31 OFF | SW. 30 ON |
| Normal | SW. 31 ON | SW. 30 OFF |
| Conservative | SW. 31 OFF | SW. 30 OFF |

The liberal setting will allow the 1000 when lit spinner and the 50,000 when lit lanes to be held for the entire game once they are made.

The normal setting will hold the top lanes in memory unless all four are out. Then they will reset at the end of that ball.

In the conservative setting the lanes reset at the end of the ball in play.

E. SPECIAL: REPLAY/X-BALL/NOVELTY MODES:

Switches #14 and #15 give the operator the flexibility to award a replay, extra ball or score (novelty) when a special is scored in the 'Beat the Dealer Hole.' The following chart explains the settings.

| | REPLAY | X-BALL | NOVELTY |
|-----------------------|---------------|------------------------|----------------|
| Switches | S14, S15 ON | S14 OFF S15 ON | S14, S15 OFF |
| X-BALL | X-Ball | X-Ball (See Note 1) | 50,000 |
| Special | Replay | 50,000 | 50,000 |
| Scoring Thresholds | Replay | X-Ball | No Award |

Note 1: X-Ball = 20,000 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 moved 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 S25-S28 for coin chute #2. The switch settings and resultant credits/coin are as follows:

| S28 | S27 | S26 | S25 | Credits/Coin |
|-----|-----|-----|-----|--------------------------------|
| OFF | OFF | OFF | OFF | Same as Coin Chute #1 Settings |
| OFF | OFF | OFF | ON | 1/1 Coin |
| OFF | OFF | ON | OFF | 2/1 Coin |
| OFF | OFF | ON | ON | 3/1 Coin |
| OFF | ON | OFF | OFF | 4/1 Coin |
| OFF | ON | OFF | ON | 5/1 Coin |
| OFF | ON | ON | OFF | 6/1 Coin |
| OFF | ON | ON | ON | 7/1 Coin |
| ON | OFF | OFF | OFF | 8/1 Coin |
| ON | OFF | OFF | ON | 9/1 Coin |
| ON | OFF | ON | OFF | 10/1 Coin |
| ON | OFF | ON | ON | 11/1 Coin |
| ON | ON | OFF | OFF | 12/1 Coin |
| ON | ON | OFF | ON | 13/1 Coin |
| ON | ON | ON | OFF | 14/1 Coin |
| ON | ON | ON | ON | 15/1 Coin |

The credits given per coin 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 #1 (HINGE SIDE) OR #3 | SWITCHES | | | | | CREDITS/COIN |
|--|----------|-----|-----|-----|-----|--------------|
| | 5 | 4 | 3 | 2 | 1 | |
| | 13 | 12 | 11 | 10 | 9 | |
| OFF | OFF | OFF | OFF | OFF | OFF | 3/2 COINS** |
| OFF | OFF | OFF | OFF | OFF | ON | 3/2 COINS** |
| OFF | OFF | OFF | OFF | ON | OFF | 1/COIN |
| OFF | OFF | OFF | ON | ON | | 1/2 COINS* |
| OFF | OFF | ON | OFF | OFF | | 2/COIN |
| OFF | OFF | ON | OFF | ON | | 2/2 COINS* |
| OFF | OFF | ON | ON | OFF | | 3/COIN |
| OFF | OFF | ON | ON | ON | | 3/2 COINS* |
| OFF | ON | OFF | OFF | OFF | | 4/COIN |
| OFF | ON | OFF | OFF | ON | | 4/2 COINS* |
| OFF | ON | OFF | ON | OFF | | 5/COIN |
| OFF | ON | OFF | ON | ON | | 5/2 COINS* |
| OFF | ON | ON | OFF | OFF | | 6/COIN |
| OFF | ON | ON | ON | OFF | | 6/2 COINS* |
| OFF | ON | ON | ON | ON | | 7/COIN |
| OFF | ON | ON | ON | ON | | 7/2 COINS* |
| ON | OFF | OFF | OFF | OFF | | 8/COIN |
| ON | OFF | OFF | OFF | ON | | 8/2 COINS* |
| ON | OFF | OFF | ON | OFF | | 9/COIN |
| ON | OFF | OFF | ON | ON | | 9/2 COINS* |
| ON | OFF | ON | OFF | OFF | | 10/COIN |
| ON | OFF | ON | OFF | ON | | 10/2 COINS* |
| ON | OFF | ON | ON | OFF | | 11/COIN |
| ON | OFF | ON | ON | ON | | 11/2 COINS* |
| ON | ON | OFF | OFF | OFF | | 12/COIN |
| ON | ON | OFF | OFF | ON | | 12/2 COINS* |
| ON | ON | OFF | ON | OFF | | 13/COIN |
| ON | ON | OFF | ON | ON | | 13/2 COINS* |
| ON | ON | ON | OFF | OFF | | 14/COIN |
| ON | ON | ON | OFF | ON | | 14/2 COINS* |
| ON | ON | ON | ON | OFF | | 15/ COIN |
| ON | ON | ON | ON | ON | | 15/2 COINS* |

*No Credits until second coin is dropped.

**One Credit for first coin. Two Credits for second coin provided that no scoring occurred between 1st and 2nd coin drops. If scoring occurred, second coin gives one credit.

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 17, 18 and 19. Eight credits limits are available. Switch settings are listed below.

| MAXIMUM CREDITS | SWITCHES | | |
|-----------------|----------|-----|-----|
| | 19 | 18 | 17 |
| 5 | OFF | OFF | OFF |
| 10 | OFF | OFF | ON |
| 15 | OFF | ON | OFF |
| 20 | OFF | ON | ON |
| 25 | ON | OFF | OFF |
| 30 | ON | OFF | ON |
| 35 | ON | ON | OFF |
| 40 | ON | ON | ON |

BALLS PER GAME:

| # BALLS/GAME | SWITCH 16 |
|--------------|-----------|
| 5 | ON |
| 3 | OFF |

MATCH FEATURE:

When the Match Feature is ON, a random number appears in 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 21 |
|-------|-----------|
| ON | ON |
| OFF | OFF |

CREDIT DISPLAY:

| CREDITS DISPLAYED | SWITCH 20 |
|-------------------|-----------|
| YES | ON |
| NO | OFF |

HIGH SCORE FEATURE:

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

| AWARD | SWITCH 15 | SWITCH 14 |
|------------|-----------|-----------|
| REPLAY | ON | ON |
| EXTRA BALL | ON | OFF |
| NO AWARD | OFF | OFF |

MELODY OPTION:

The game is designed to play several melodies to announce power-up, game-up, etc. The tunes are intended to attract attention to the game and increase game usage. The tunes are controlled by switch 8.

| TUNES | SWITCH 8 |
|-------|----------|
| ON | ON |
| OFF | OFF |

HIGH SCORE TO DATE FEATURE:

The game is designed to award free games as an option if high game to date is beat. Each time this happens, the winning score becomes the new high game 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 | SWITCH 7 | SWITCH 6 |
|----------------------------|-----------|-----------|
| No Award | OFF | OFF |
| One Credit | OFF | ON |
| Two Credits | ON | OFF |
| <u>Three Credits</u> | <u>ON</u> | <u>ON</u> |

C. Front Door Game Adjustments:

High Score Feature Adjustments:

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

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

1. Push and release Self-Test button (see Figure III) at one second intervals approximately five times or until 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, reset to '00' and then hold the credit button in. 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 number '02' and '03' on the Match/Ball in Play display are for the second and third levels, respectively.

High Score to Date Feature:

The game is designed to award free games when 'High Score to Date' is beat.

It is recommended that the level, which will build with game 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 number '04' appears on the Match/Ball in Play display and then do Step 2.

Any level from '00' to 990,000 can be set as described. It is to be noted that '00' does **not** turn off the feature, as it does on High Score feature. The feature is turned off by positioning switches S6 and S7 to the 'OFF' position, and 'ON' by positioning switches as discussed under "Back Box Game Adjustments.

*Can be quickly set to '00' by pressing S33 on the MPU assembly in the back box. See Figure III.

#1092-E BLACK JACK

RUBBER PARTS

| | | | |
|----|---------|------------|------|
| A. | R-521-2 | 1½" Dia. | (3) |
| B. | R-521-4 | 2½" Dia. | (5) |
| C. | R-521-5 | 3" Dia. | (1) |
| D. | R-406-3 | Flippers | (2) |
| E. | R-243 | 5/16" Dia. | (12) |

PANEL TOP PARTS

| | | |
|-----|-------------------------|--------------|
| 1. | ARCH RAIL | M-1774 |
| 2. | RAIL POST (3) | C-907 |
| 3. | RAIL POST CAP (3) | C-908 |
| 4. | BOTTOM ARCH | P-5871-55 |
| 5. | SHOOTER GUIDE | P-6359-21 |
| 6. | BALL GATE (L) | A-1475-10 |
| 7. | BALL GATE (R) | A-1475-9 |
| 8. | SCREENED PLASTICS (SET) | M-1330-134 |
| 9. | THUMPER CAP | A-3713-30 |
| 10. | THUMPER CAP | A-3713-31 |
| 11. | THUMPER CAP | A-3713-32 |
| 12. | TARGET ASSY. (RED) (2) | ASE-2911-3 |
| 13. | TARGET ASSY. (YEL) (2) | ASE-2911-21 |
| 14. | FLIPPER & SHAFT ASSY. | AS-2214-24 |
| 15. | SPINNER GATE | AS-2250-50 |
| 16. | MINI POST & RUBBER (3) | AS-2836-1 |
| 17. | PLASTIC GUIDE (2) | C-696-1 |
| 18. | PLASTIC GUIDE (3) | C-695-1 |
| 19. | ROLLOVER WIRE | AS-2806 (9) |
| 20. | OUTHOLE WIRE | AS-2806-21 |
| 21. | GUIDE WIRE | M-121-64 |
| 22. | GUIDE WIRE | M-121-18 (2) |
| 23. | GUIDE WIRE | M-121-43 |
| 24. | GUIDE WIRE | M-121-44 |
| 25. | GUIDE WIRE | M-121-53 (2) |
| 26. | GUIDE RAIL ASSY. | A-3032-22 |
| 27. | GUIDE RAIL ASSY. | A-3032-23 |
| 28. | GUIDE WIRE | M-121-30 |
| 29. | GUIDE WIRE | M-121-47 |

CONS. — CONSERVATIVE
 MED. — MEDIUM
 LIB. — LIBERAL

INDICATES MOVEABLE POSTS
 FOR SCORING ADJUSTMENTS.

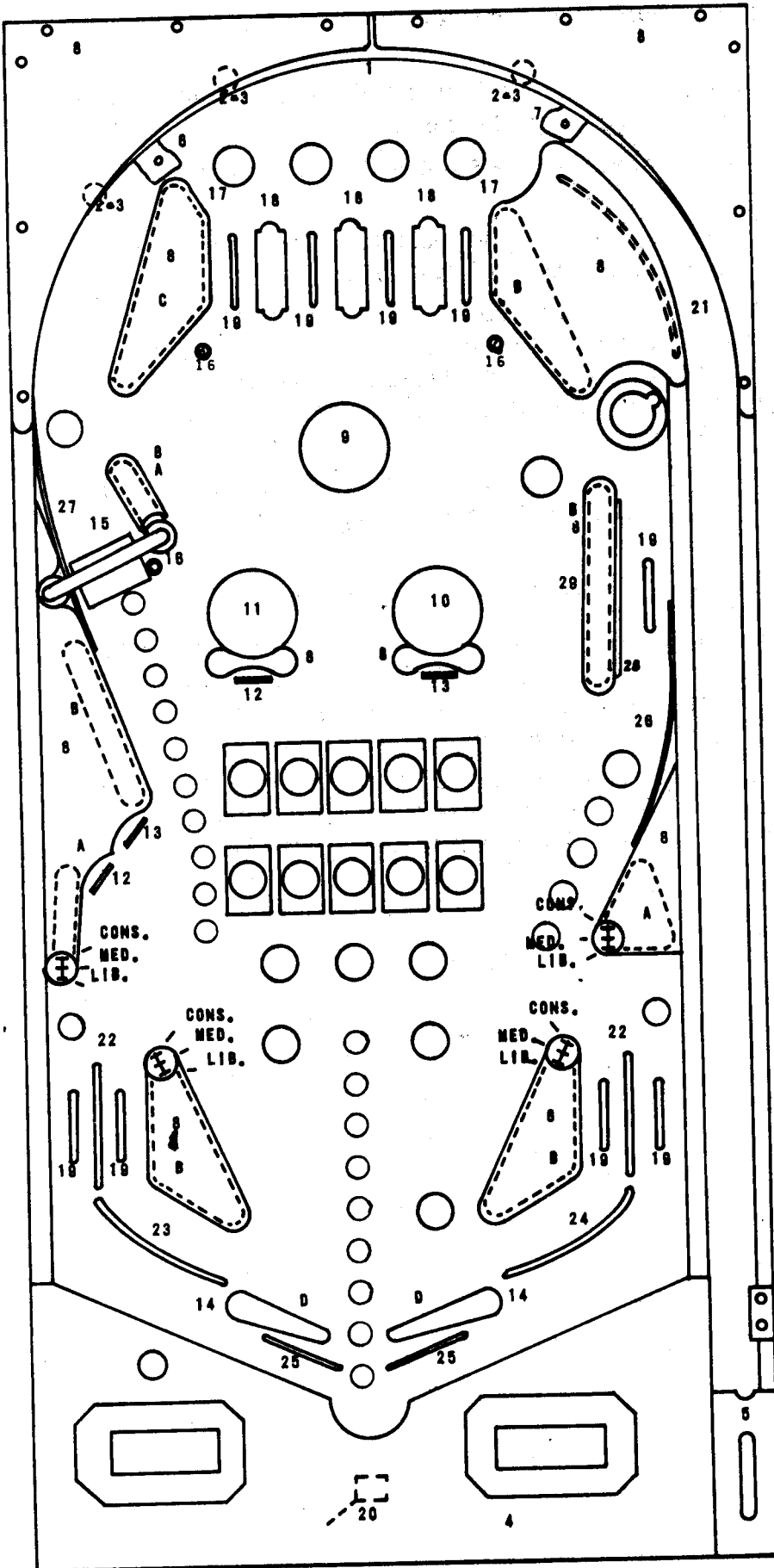


FIGURE II

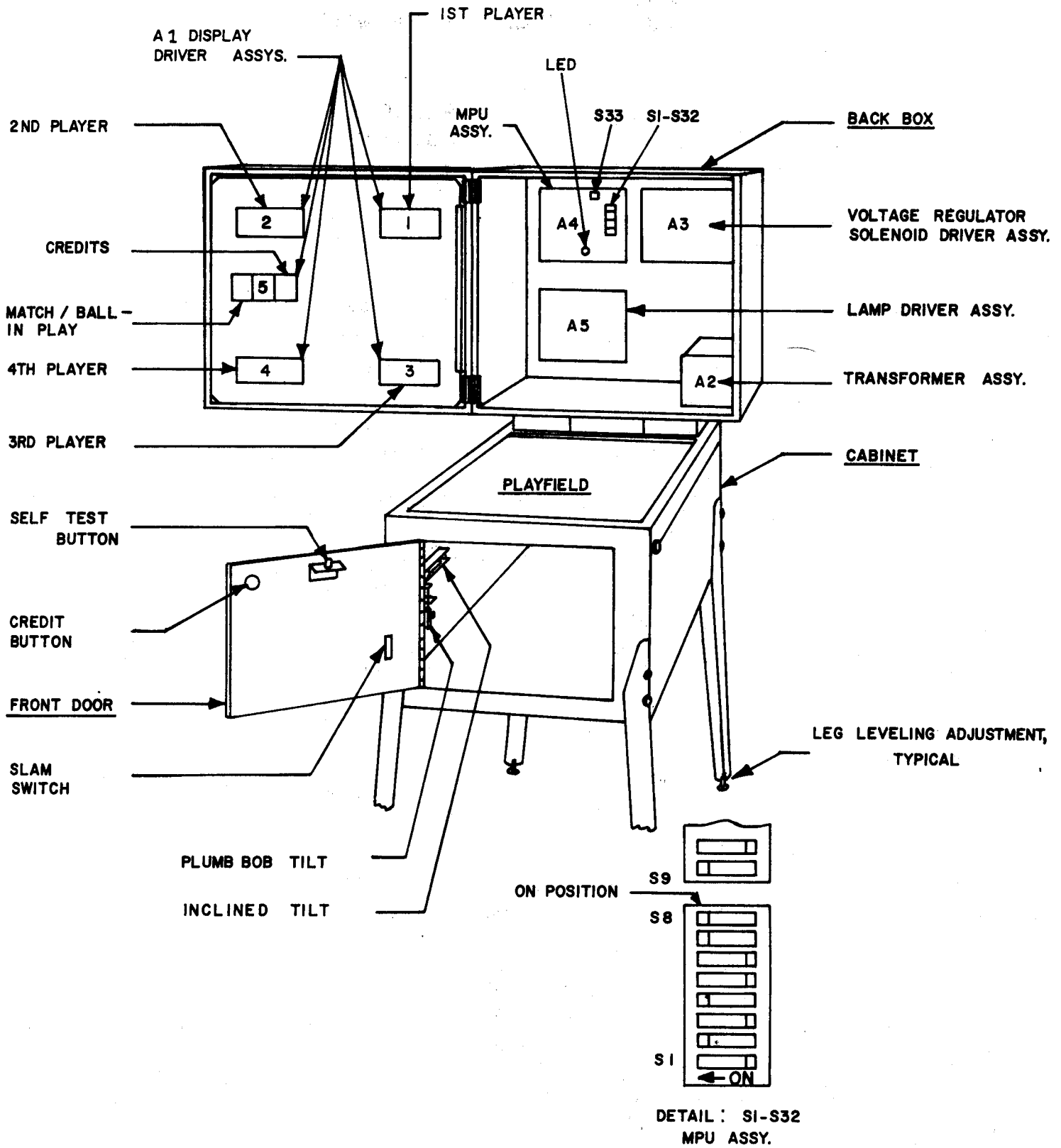


FIGURE III. ELECTRONIC PIN BALL MACHINE

RECOMMENDED:

Instruction, Score Cards and High Score feature settings to be used on **BLACK JACK ELECTRONIC, #1092-E.**

3-BALL

REPLAYS

Instruction Card M-1508-73-E
 Score Card M-1508-73-D w/73N
 *Score Card M-1508-73-B w/73N
 1 Replay at 240,000
 1 Replay at 460,000

EXTRA BALL

Instruction Card M-1508-73-G
 Score Card M-1508-73-EE
 1 Extra Ball at 220,000
 1 Extra Ball at 500,000

5-BALL

REPLAYS

Instruction Card M-1508-73-E
 Score Card M-1508-73-C w/73-JJ
 *Score Card M-1508-73-A w/73-JJ
 1 Replay at 260,000
 1 Replay at 480,000

EXTRA BALL

Instruction Card M-1508-73-G
 Score Card M-1508-73-HH
 1 Extra Ball at 280,000
 1 Extra Ball at 590,000

*USE FOR END OF GAME REPLAY AWARD. USE WITH INSERT CARDS (7), M-1508-68B

(ALL PLAYFIELD POSTS IN MEDIUM POSITION)

ADDITIONAL CARDS

REPLAYS

| | | | |
|--------------|---------|---------|---------|
| M-1508-73-J | 160,000 | 380,000 | |
| M-1508-73-K | 180,000 | 400,000 | |
| M-1508-73-L | 200,000 | 420,000 | |
| M-1508-73-M | 220,000 | 440,000 | |
| M-1508-73-N | 240,000 | 460,000 | |
| M-1508-73-O | 300,000 | 520,000 | |
| M-1508-73-P | 320,000 | 540,000 | |
| M-1508-73-Q | 340,000 | 560,000 | |
| M-1508-73-R | 380,000 | 600,000 | |
| M-1508-73-S | 180,000 | 350,000 | 470,000 |
| M-1508-73-T | 200,000 | 370,000 | 490,000 |
| M-1508-73-U | 220,000 | 390,000 | 510,000 |
| M-1508-73-V | 240,000 | 410,000 | 530,000 |
| M-1508-73-W | 260,000 | 430,000 | 550,000 |
| M-1508-73-X | 280,000 | 450,000 | 570,000 |
| M-1508-73-Y | 300,000 | 470,000 | 590,000 |
| M-1508-73-Z | 320,000 | 490,000 | 610,000 |
| M-1508-73-AA | 340,000 | 510,000 | 630,000 |
| M-1508-73-BB | 360,000 | 530,000 | 650,000 |
| M-1508-73-CC | 380,000 | 600,000 | 790,000 |
| M-1508-73-JJ | 260,000 | 480,000 | |

EXTRA BALL

| | | |
|--------------|---------|---------|
| M-1508-73-DD | 200,000 | 480,000 |
| M-1508-73-EE | 220,000 | 500,000 |
| M-1508-73-FF | 240,000 | 520,000 |
| M-1508-73-GG | 260,000 | 570,000 |
| M-1508-73-HH | 280,000 | 590,000 |
| M-1508-73-II | 300,000 | 610,000 |

INSTRUCTION CARD, NOVELTY

M-1508-73-I

BLANKS (3)

High Score to Date Recommended levels: (Reset Periodically)

| | |
|--------|---------|
| 3-BALL | 540,000 |
| 5-BALL | 560,000 |

#1092-E BLACK JACK RECOMMENDED SETTINGS

| | Recommended Settings for: | 3-BALL | 5-BALL |
|--|---------------------------|--------|--------|
| Special: Replay | Sw. 14 | ON | ON |
| | Sw. 15 | ON | ON |
| Saucer, X-Ball, Special 4 Top Rollovers | Sw. 24 | OFF | OFF |
| | Sw. 30 | ON | OFF |
| | Sw. 31 | OFF | ON |
| Dealer or Player Win | Sw. 32 | ON | ON |

The following chart gives recommendations for three typical types of operation.

REPLAY

3-BALL

5-BALL

| | | |
|--------------------|--------------------|---------------------|
| Instruction Card | M-1508-73-E | M-1508-73-E |
| Score Card | M-1508-73-B w/73-N | M-1508-73-A w/73-JJ |
| Major Mode | Sw. 14,15 ON | Sw. 14,15 ON |
| Match | Sw. 21 ON | Sw. 21 ON |
| High Score to Date | Sw. 6, 7, ON | Sw. 6, 7, ON |

X-BALL

| | | |
|--------------------|------------------|------------------|
| Instruction Card | M-1508-73-G | M-1508-73-G |
| Score Card | M-1508-73-B w/EE | M-1508-73-D w/HH |
| Major Mode | Sw. 14 OFF | Sw. 14 OFF |
| | Sw. 15 ON | Sw. 15 ON |
| Match | Sw. 21 OFF | Sw. 21 OFF |
| High Score to Date | Sw. 6, 7 OFF | Sw. 6, 7 OFF |

NOVELTY

| | | |
|--------------------|----------------|----------------|
| Instruction Card | M-1508-73-I | M-1508-73-I |
| Major Mode | Sw. 14, 15 OFF | Sw. 14, 15 OFF |
| Match | Sw. 21 OFF | Sw. 21 OFF |
| High Score to Date | Sw. 6, 7 OFF | Sw. 6, 7 OFF |

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 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.'
5. Pressing the Self-Test button eleven 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.

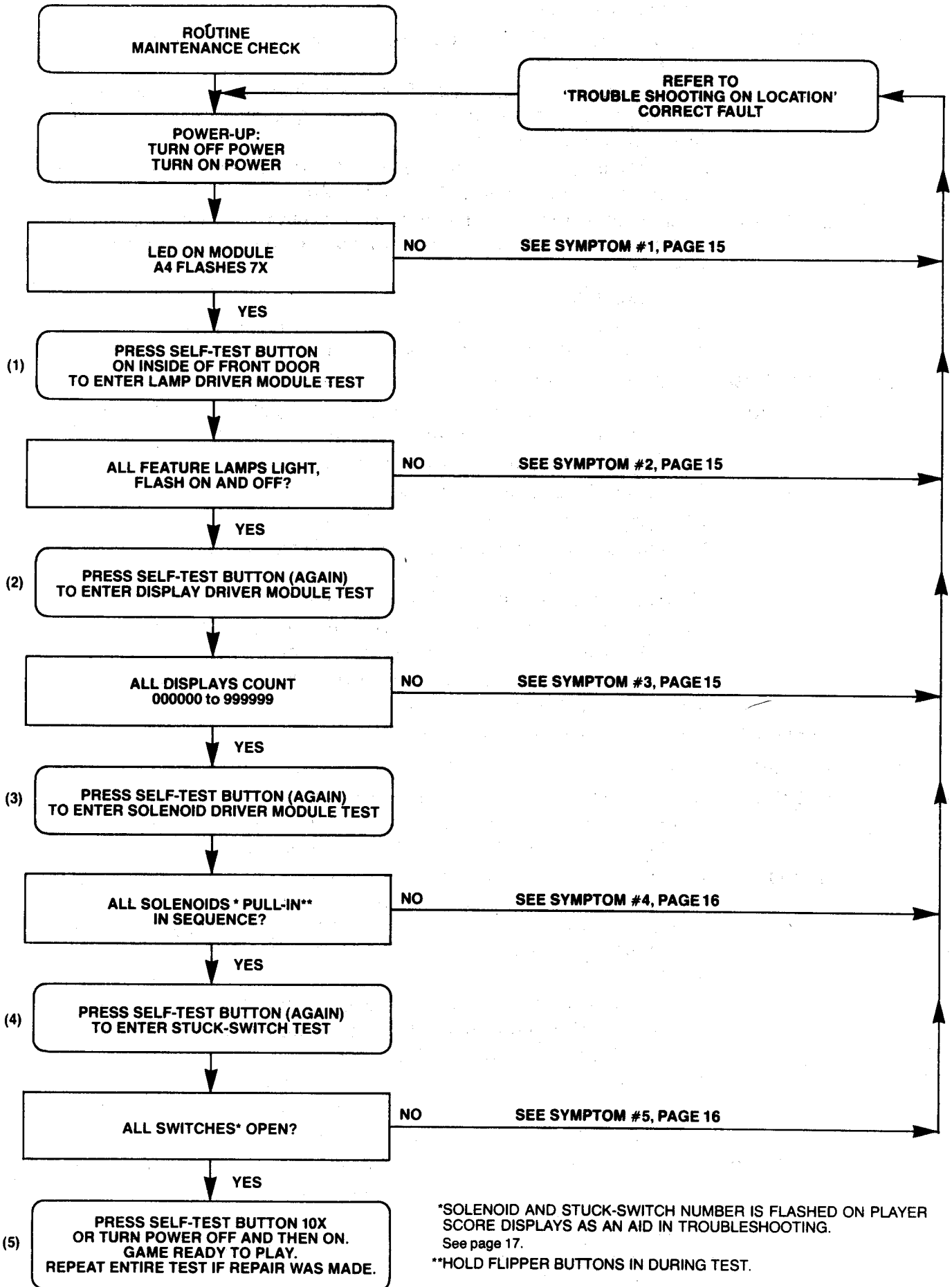
After successful completion of the Self Diagnostic Test procedure, set the game up for play. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no 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 MPU module A4. See CAUTION NOTE, 1C.

H) 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 (chimes, 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 and if necessary, AG and AH.

5) **SYMPTOM:** Feature (Drop Targets, etc.) does not score.

ACTION: A) With power ON, open front door. Press button (Self-Test switch) four 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.)

6) **SYMPTOM:** Game blows fuse(s) repeatedly.

ACTION: See Module Replacement Procedure. F.O. 560

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

GAME #1092-E BLACK JACK (FIGURE V)

SOLENOID IDENTIFICATION TABLE

| SELF-TEST # | SOLENOID IDENTIFICATION |
|-------------|-------------------------|
| 01 | OUTHOLE KICKER |
| 02 | KNOCKER |
| 03 | BEAT DEALER SAUCER |
| 04 | CHIME 10 |
| 05 | CHIME 100 |
| 06 | CHIME 1000 |
| 07 | CHIME EXTRA |
| 08 | LEFT THUMPER BUMPER |

| SELF-TEST # | SOLENOID IDENTIFICATION |
|-------------|---------------------------|
| 09 | RIGHT THUMPER BUMPER |
| 10 | CENTER THUMPER BUMPER |
| 11 | LEFT SLINGSHOT |
| 12 | RIGHT SLINGSHOT |
| 13 | COIN LOCKOUT |
| 14 | K1 RELAY (FLIPPER ENABLE) |

SWITCH ASSEMBLY SELF-TEST DISPLAY NUMBERS

| SELF-TEST # | SWITCH DESCRIPTION |
|-------------|---------------------------|
| 04 | RIGHT LANE |
| 05 | SPINNER |
| 06 | CREDIT BUTTON |
| 07 | TILT (3) |
| 08 | OUTHOLE |
| 09 | COIN III RIGHT |
| 10 | COIN I LEFT |
| 11 | COIN II (MIDDLE, IF USED) |
| 16 | SLAM (2) |
| 25 | CHANGE DEALER TARGET (2) |
| 26 | CHANGE PLAYER TARGET (2) |
| 27 | HEART LANE |
| 28 | SPADE LANE |

| SELF-TEST # | SWITCH DESCRIPTION |
|-------------|----------------------------|
| 29 | DIAMOND LANE |
| 30 | CLUB LANE |
| 31 | L & R FLIPPER FEEDER LANES |
| 32 | BEAT DEALER SAUCER |
| 33 | RIGHT OUTLANE |
| 34 | LEFT OUTLANE |
| 35 | 10 POINT REBOUND (2) |
| 36 | RIGHT SLINGSHOT |
| 37 | LEFT SLINGSHOT |
| 38 | CENTER THUMPER BUMPER |
| 39 | RIGHT THUMPER BUMPER |
| 40 | LEFT THUMPER BUMPER |

#1092-E BLACK JACK

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

□ INDICATES SOLENOID IDENTIFICATION NUMBERS.
 NOTE: CABINET; 04, 05, 06, 07
 DOOR; 14
 BACK BOX; 02, 15

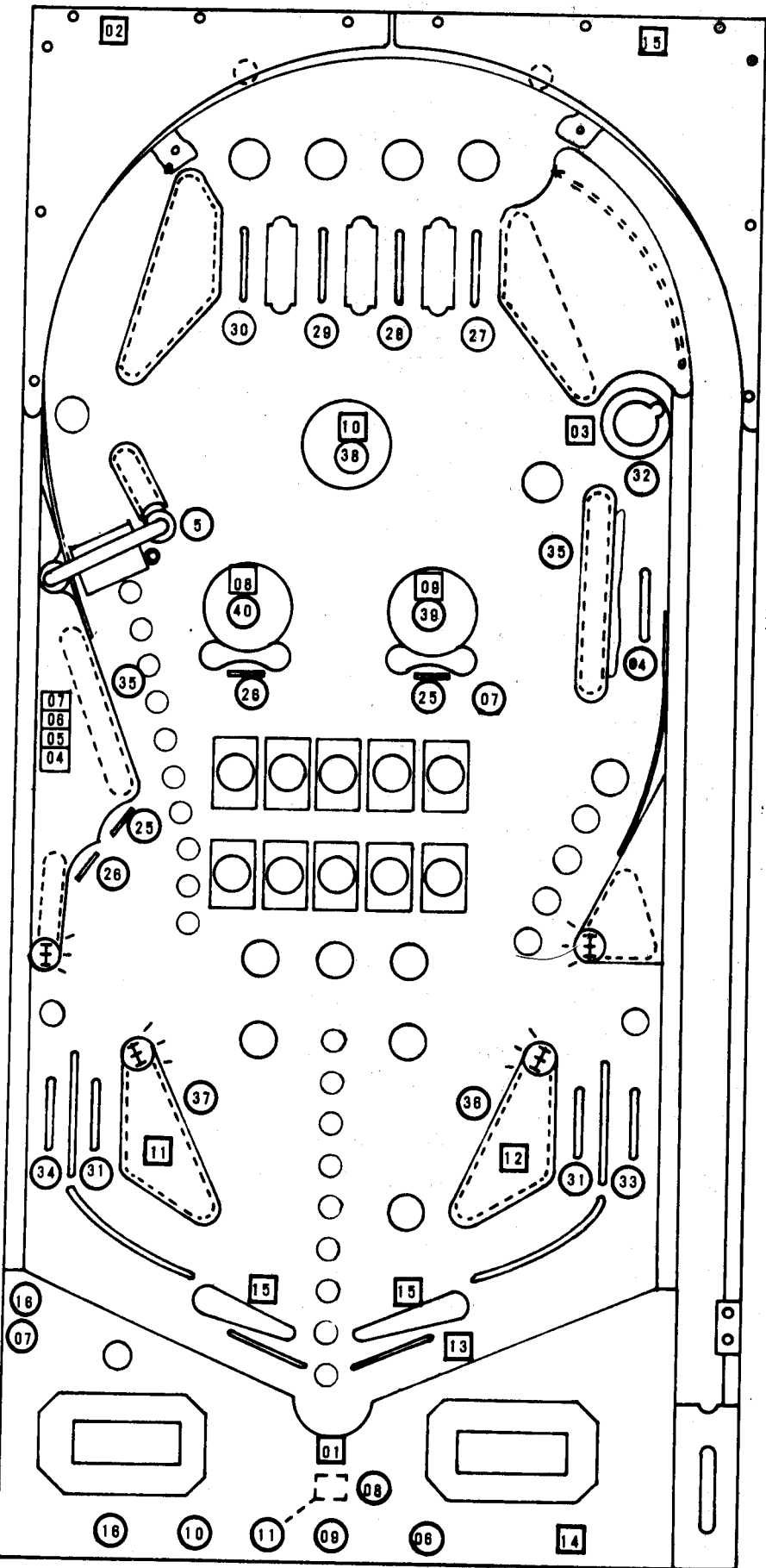


FIGURE V

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
#1092-E BLACK JACK

| MISCELLANEOUS | PART NUMBER |
|--|--------------------|
| Transformer (Domestic or Export) | E-122-125 |
| Bulbs, #44 | E-125-22 |

| ASSEMBLY COILS | |
|--------------------------------|-----------------------|
| Chimes (4) | CN-31-2000 |
| Coin Lockout | FO-36-7000 |
| Flipper Left & Right (2) | AQ-25-500/ 34-4500 |
| Knocker | AR-26-1200 |
| Outhole Kicker | AN-26-1200 |
| Saucer | AO-27-1300 |
| Thumper-Bumper (3) | AN-26-1200 |
| Sling-shot (2) | AN-26-1200 |

PLAYFIELD PARTS See Figure II

| MODULES | |
|--|------------|
| Lamp Driver A5 | AS-2518-23 |
| Display Driver A1 (5 Used) | AS-2518-21 |
| Solenoid Driver/Voltage Regulator A3 | AS-2518-22 |
| MPU A4 | AS-2887-7 |
| Transformer & Rectifier A2 | AS-2877-1 |
| Rectifier Board (Part of A2) | AS-2518-18 |

| REPAIR PROCEDURES/AIDS | |
|---------------------------------------|----------|
| Module & Component Replacememnt | F.O. 560 |
| AID (Assistance in Diagnostics) | |
| Kit, used with F.O. 560 | KIT #485 |

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 #490—Rectifier Board (Part of A2)
Kit #503—MPU Board A4 (Less Memory U1-U6)
Kit #492—Solenoid Driver/Voltage Regulator A3
Kit #493—Display Driver A1
Kit #494—Lamp Driver A5

A4: MPU MODULE COMPONENT PARTS LIST

| ITEM | REFERENCE DESIGNATION | BALLY PART # | DESCRIPTION |
|------|------------------------------------|--------------|---|
| 1 | A4 (see note 1) | AS-2887-7 | MPU Module Complete. Black Jack |
| 2 | A4 (see note 2) | AS-2518-17 | MPU Module less Program Memory, U1-6 incl. |
| 3-32 | See Schematic | | Resistors, See schematic for value. |
| 34 | C18 | E-00586-0019 | Capacitor, .05 MFD, 100V |
| 35 | C16 | E-00586-0023 | Capacitor, .1 MFD, 100V |
| 36 | C4, C5 | E-00586-0073 | Capacitor, 4.5 MFD, 25V |
| 37 | C3, C6-C13, C17 | E-00586-0065 | Capacitor, .01 MFD, 500V |
| 38 | C14, C15, C79, C41-C67 | E-00586-0067 | Capacitor, 470 PFD, 1kv |
| 39 | C19-C31, C78, C33-C40 | E-00586-0069 | Capacitor, 390 PFD, 1kv |
| 40 | C1, C2, C68-C77 | E-00586-0070 | Capacitor, 820 PFD, 1kv |
| 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 (IN4004) |
| 48 | CR1-CR7, CR11-CR43, CR45-CR48 | E-00587-0014 | Diode (IN4148) |
| 49 | CR8 | E-00679 | LED (Green) |
| 50 | VR1 | E-00598-0008 | Diode Zener (8.2V, IN9598) |
| 52 | L1, L2 | E-00604-0003 | Inductor, 22 Micro Hy. |
| 53 | U12 | E-00620-0004 | Timer (555) |
| 54 | U19 | E-00620-0005 | Quad 2 Input (4011) |
| 55 | U9 | E-00620-0028 | MPU I.C. (6800) |
| 56 | U10, U11 | E-00620-0029 | PIA I.C. (6820) |
| 57 | U7 | E-00620-0030 | RAM I.C. (6810) |
| 59 | U20 | E-00620-0032 | HEX Buffer I.C. (14502B) |
| 60 | U14, U18 | E-00620-0033 | HEX Inverter (4049B) |
| 61 | U15 | E-00620-0034 | Quad Memory Driver (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 | J4, J5 | E-00715-0004 | 28 Pin Wafer Connector |
| 79 | J3 | E-00715-0017 | 16 Pin Wafer Connector |
| 80 | J1 | E-00715-0018 | 19 Pin Wafer Connector |
| 81 | J5 | E-00715-0023 | 4 Pin Wafer Connector |

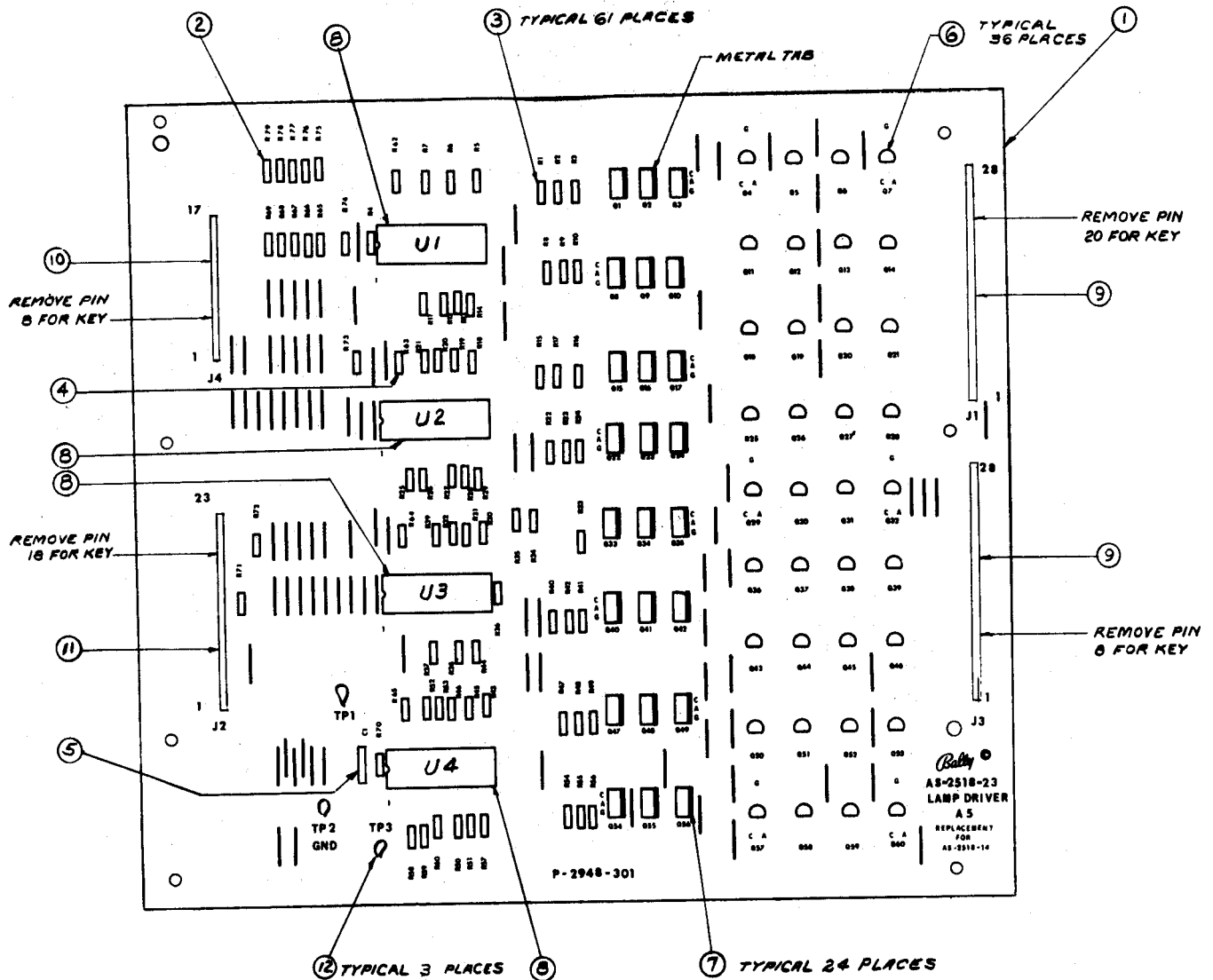
NOTE 1:

When ordering, fill in dash number. For example, AS-2887-1: FREEDOM, AS-2887-2: NIGHT RIDER, AS-2887-3: EVEL KNIEVEL, AS-2887-4: EIGHT BALL, AS-2887-5: POWER PLAY, as 2887-6: Mata-Hari, as 2887-7: BLACK JACK.

NOTE 2:

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

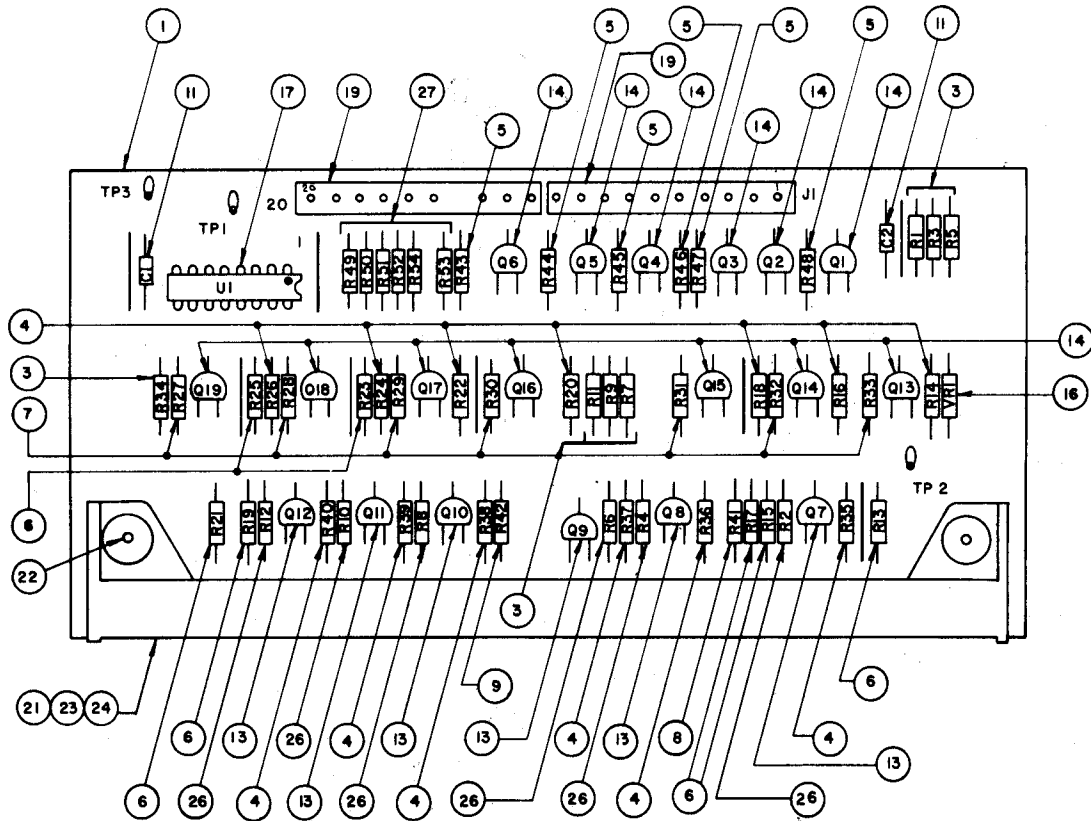
AS-2518-23 LAMP DRIVER MODULE



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-00715-0013 | 17 Pin Wafer Connector |
| 11 | J2 | E-00715-0014 | 23 Pin Wafer Connector |
| 12 | TP1, TP2, TP3 | P-05399 | Test Clip |

AS-2518-21 DISPLAY DRIVER MODULE

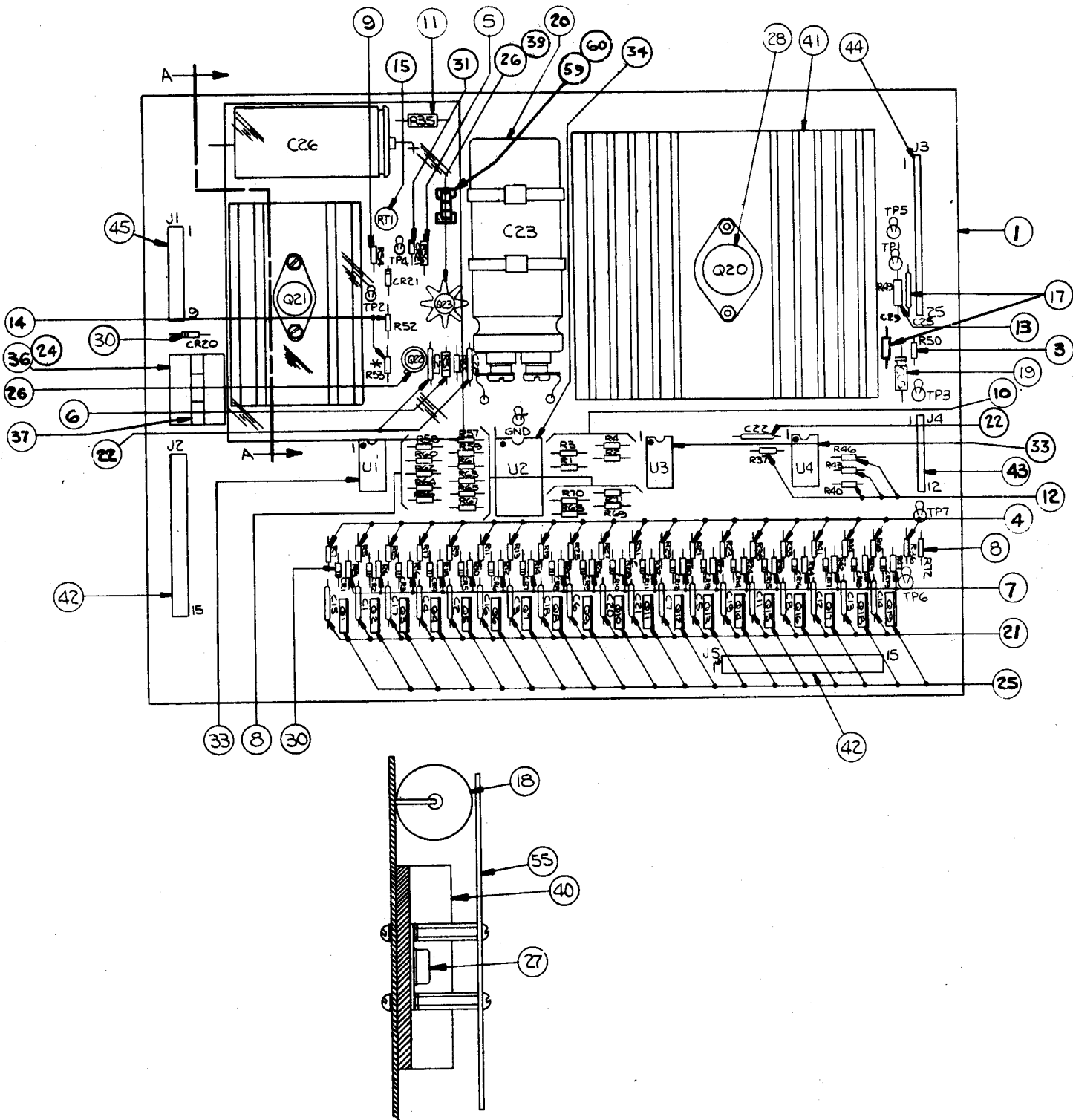


A1: DISPLAY DRIVER MODULE COMPONENT PARTS LIST

| ITEM | QTY. | REFERENCE DESIGNATION | BALLY PART # | DESCRIPTION |
|------|----------|---|--------------|----------------------------|
| 1 | 1 | | P-2948-296 | P.C. Board, M-645-392 |
| 3 | 7 | R1, R3, R5, R7, R9, R11, R34 | E-105-226 | 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-105-230 | Resistor, 1K Ω |
| 8 | 1 | R41 | E-105-231 | Resistor, 39K Ω |
| 9 | 1 | R42 | E-105-271 | Resistor, 240K Ω |
| 10 | | | | |
| 11 | 2 | C1, C2 | E-586-65 | Capacitor, .01 MFD |
| 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-715-11 | 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 |

NOTE: INTERCHANGEABLE WITH AS-2518-15

AS-2518-22 SOLENOID DRIVER/VOLTAGE REGULATOR MODULE

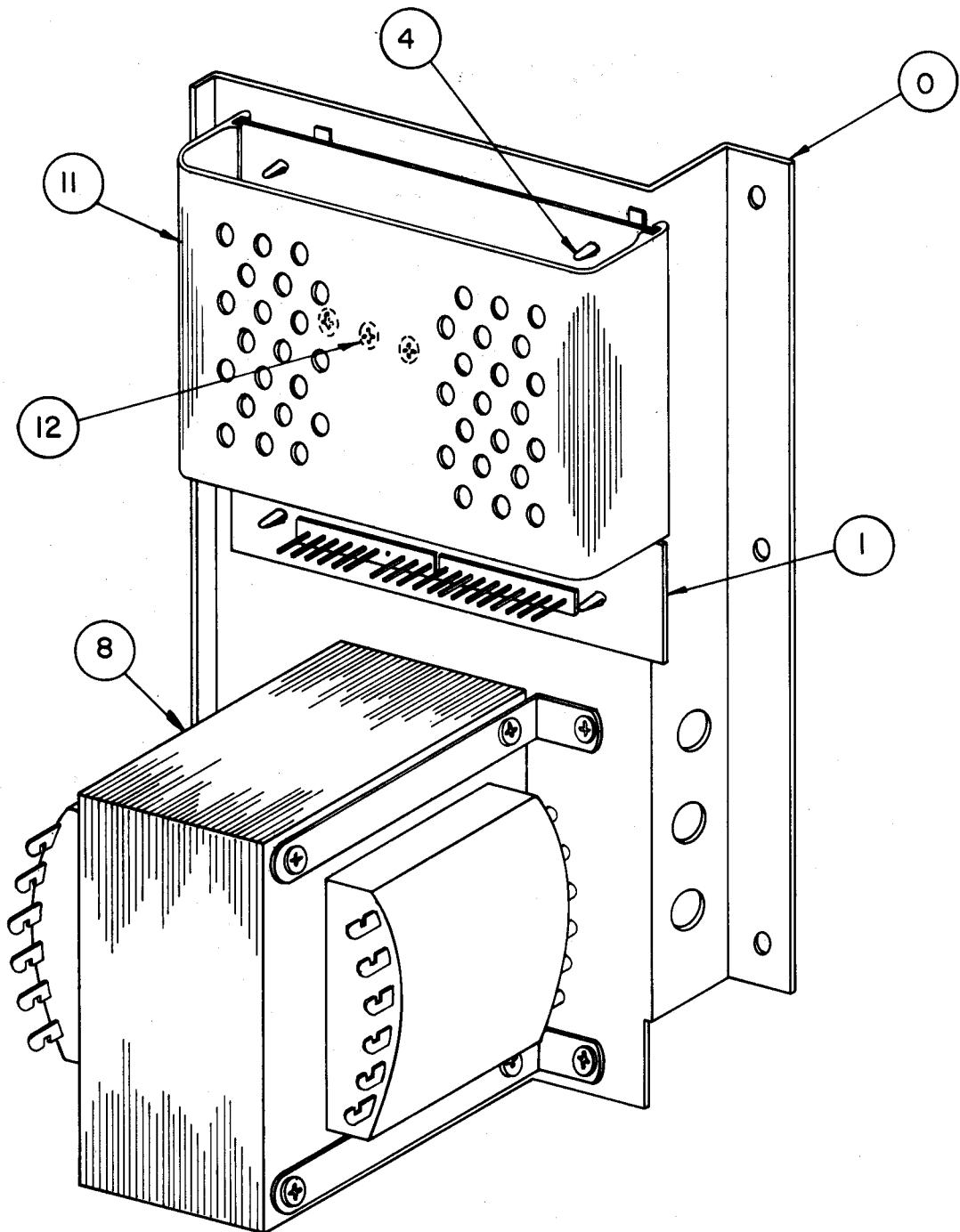


NOTE: INTERCHANGEABLE WITH AS-2518-16

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 | C22, 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 | <u>I.C. Transistor Array, CA3081</u> |
| 34 | U2 | E-00620-0039 | <u>I.C. Binary to 1/16 Decoder, 74L154</u> |
| 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-00715-0013 | 15 Pin Wafer Connector |
| 43 | | E-00715-0016 | 12 Pin Wafer Connector |
| 44 | | E-00715-0020 | 25 Pin Wafer Connector |
| 45 | | E-00715-0021 | 9 Pin Wafer Connector |
| 55 | | M-1837 | Shield-Plexiglass |
| 59 | | E-00148-0021 | Fuse Clips |
| 60 | F1 | E-00133-0029 | Fuse 8 AG-3/16 Amp. |

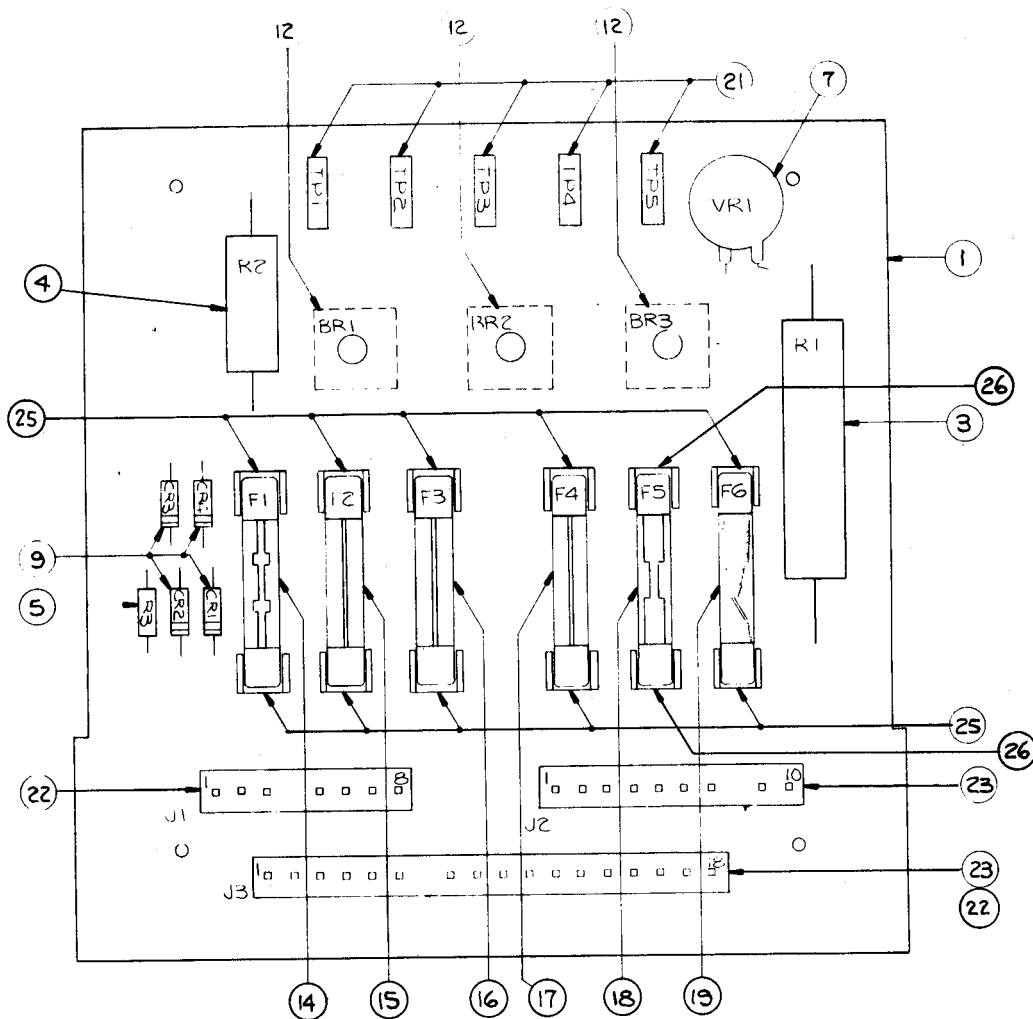
*USED WITH ITEM 24, E-00146-0791, PLUG IN RELAY ONLY



**A2: POWER TRANSFORMER MODULE
COMPONENT PARTS LIST**

| ITEM | REFERENCE DESIGNATION | BALLY PART # | DESCRIPTION |
|------|-----------------------|---------------|------------------------------------|
| 0 | A2 | AS-2877-1 | Power Transformer Module, Complete |
| 1 | | AS-2518-18 | Rectifier Board Assembly |
| 4 | | M-1829-2a | Circuit Board Support (4 Req'd.) |
| 8 | | E-00122-0125c | Transformer 120/240V, 50/60 Hz |
| 11 | | P-2692b | P.C.B Cover |
| 12 | | M-1834 | Heat Sink Compound |

AS-2518-18 RECTIFIER BOARD ASSEMBLY



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

| ITEM | REFERENCE DESIGNATION | BALLY PART # | DESCRIPTION |
|------|-----------------------|--------------|------------------------------------|
| 1 | P/O A2 | AS-2518-18 | 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 |
| 9 | CR1, CR2, CR3, CR4 | E-00587-0006 | Diode (IN4004) |
| 12 | BR1, BR2, BR3 | E-00602-0003 | Bridge Rectifier (VJ248 VARO) |
| 14 | F1 | E-00133-0010 | Fuse, 10A, 32V, 3AG |
| 15 | F2 | E-00133-0028 | Fuse, 3/4A, 250V, 3AG, S.B. |
| 16 | F3 | E-00133-0004 | Fuse, 4A, 32V, 3AG |
| 17 | F4 | E-00133-0005 | Fuse, 5A, 32V, 3AG |
| 18 | F5 | E-00133-0027 | Fuse, 20A, 32V, 3AG |
| 19 | F6 | E-00133-0024 | Fuse, 3A, 3AG, S.B. |
| 21 | | E-00684 | Test Point |
| 22 | J1, J3 | E-00715-0010 | 8 Pin Wafer Connector |
| 23 | J2, J3 | E-00715-0011 | 10 Pin Wafer Connector |
| 25 | | E-00148-0021 | Fuse Clips |
| 26 | | E-00148-0022 | Fuse Clips |