

PRELIMINARY OWNER/OPERATOR'S SECTION

FIREBALL CLASSIC

Bally

MIDWAY MFG. CO.

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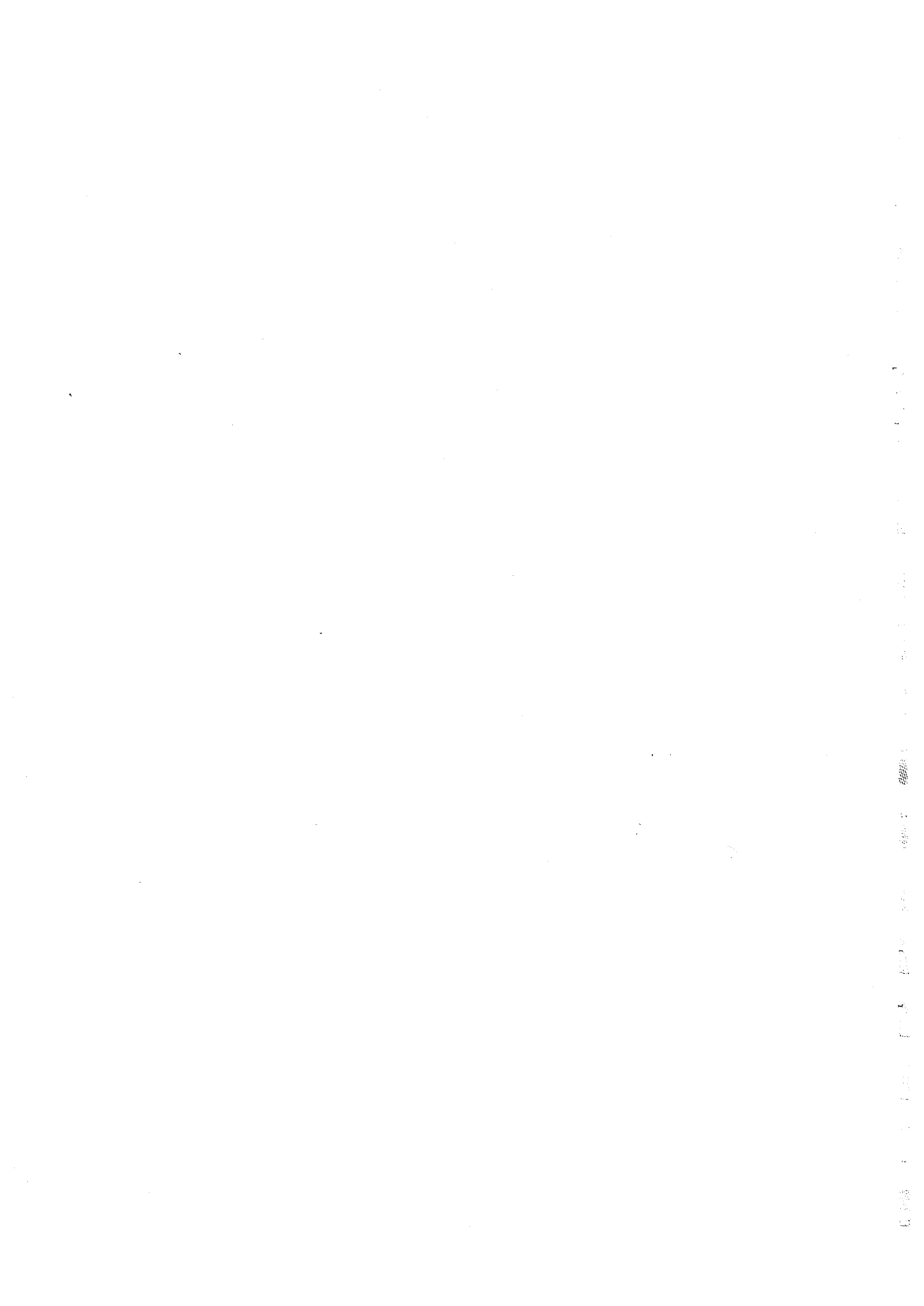


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PLEASE NOTE:

A complete OPERATOR'S MANUAL was not available when your new game was shipped. If you will complete the enclosed postage free card and drop it in the mail to us, BALLY/MIDWAY MFG. CO. will be happy to send you the OPERATOR'S MANUAL for your new game by return mail.

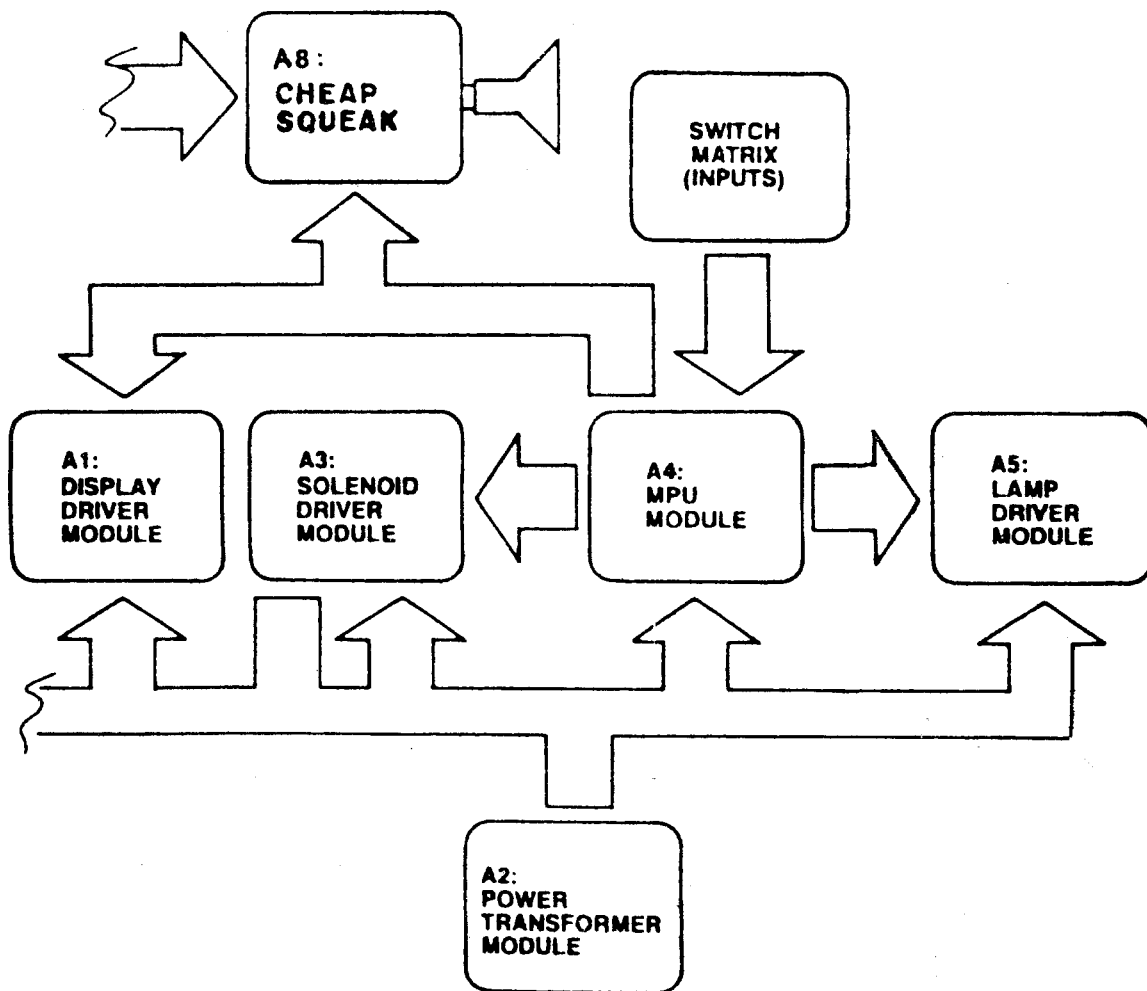


OWNER/OPERATOR'S SECTION

TABLE OF CONTENTS

DESCRIPTION	Page
I. INSTALLATION	1
II. GENERAL GAME OPERATION	2
III. BOOKKEEPING FUNCTIONS	3
IV. FEATURE OPERATION AND SCORING	5
V. GAME ADJUSTMENTS	5
A. PLAYFIELD ADJUSTMENTS	5
B. BACKBOX ADJUSTMENTS	5
CREDITS/COIN	5
MAXIMUM CREDITS	6
BALLS/GAME	6
MATCH FEATURE OPTION	6
CREDIT DISPLAY	6
HIGH SCORE FEATURE OPTION	6
HIGH SCORE TO DATE	6
GAME FEATURE OPTIONS	7
SOUND OPTION	7
C. FRONT DOOR GAME ADJUSTMENTS	
HIGH SCORE FEATURE	8
HIGH SCORE TO DATE FEATURE	8
VI. RECOMMENDED SCORE CARDS	11
VII. RECOMMENDED SETTINGS	12
VIII. ROUTINE MAINTENANCE ON LOCATION	13
IX. TROUBLE SHOOTING ON LOCATION	13
X. SERVICE/PARTS	19
XI. PARTS LIST	20

BLOCK DIAGRAM-ELECTRONIC PINBALL GAME



BOOKKEEPING FUNCTION QUICK REFERENCE

- 01 High Score Threshold #1 - See Page 8
- 02 High Score Threshold #2 - See Page 8
- 03 High Score Threshold #3 (if used) -
See Page 8
- 04 High Score to Date Register - See Page 8
- 05 Current Credits - See Page 3
- 06 Total Plays - See Page 3
- 07 Total Replays - See Page 3
- 08 Game Percentage - See Page 3
- 09 Total Times "High Score to Date" is
Beaten - See Page 3
- 10 Coins Dropped Thru Coin Chute #1 (Left) -
See Page 3
- 11 Coins Dropped Thru Coin Chute #2 (Middle)-
See Page 3
- 12 Coins Dropped Thru Coin Chute #3 (Right) -
See Page 3
- 13 Number of Specials Awarded Only From
Playfield Features - See Page 3
- 14 Total Number Minutes of Game Play -
See Page 3
- 15 Number of Service Credits - See Page 3
- 16 Playfield Special Award Feature -
See Page 6
- 17 High Score Special Award Feature -
See Page 6
- 18 Sound Option - See Page 7 (Sound Options
& Feature Options)
- 19 High Score to Date Award Feature -
See Page 6
- 20 Not used
- 21 Not used

BACK BOX ADJUSTMENTS

Each game has thirty-two switches located on the MPU module, located in the backbox, that allows play to be customized to the location (See Fig. 3). Credits per coin, maximum credits, credit display, balls (3 or 5) per game, match feature, high game feature special award, are selectable by means of 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" position is marked on the assembly. **TURN OFF POWER BEFORE MAKING ADJUSTMENTS, MAKE ADJUSTMENTS BEFORE TURNING POWER BACK ON.**

FIREBALL FIXED SWITCH ADJUSTMENT

- 32 Balls Per Game - See Page 6
- 31 Balls Per Game - See Page 6
- 30 Attract Sound - See Page 7
- 29 1 Credit Awarded Per Player Per Game -
See Page 7
- 28 Match Feature - See Page 6
- 27 Credit Display - See Page 6
- 26 Maximum Credits - See Page 5
- 25 Maximum Credits - See Page 5
- 24 Ball on Playfield - See Page 7
- 23 Ball(s) Kicked From Saucer at Game Over-
See Page 7
- 22 Boop Ball Arrow On With Multiplier -
See Page 7
- 21 Boop Ball Arrow On With Multiplier -
See Page 7
- 20 Middle Coin Chute #2 Adjustment -
See Page 5
- 19 Middle Coin Chute #2 Adjustment -
See Page 5
- 18 Middle Coin Chute #2 Adjustment -
See Page 5
- 17 Middle Coin Chute #2 Adjustment -
See Page 5
- 16 Recall Bonus - See Page 7
- 15 Lane Specials Per Game - See Page 7
- 14 Bonus Special Per Game - See Page 7
- 13 Right Coin Chute #3 Adjustment -
See Page 5
- 12 Right Coin Chute #3 Adjustment -
See Page 5
- 11 Right Coin Chute #3 Adjustment -
See Page 5
- 10 Right Coin Chute #3 Adjustment -
See Page 5
- 09 Right Coin Chute #3 Adjustment -
See Page 5
- 08 Initial Bonus Special With 50K Thru 200K-
See Page 7
- 07 Initial Bonus Special With 50K Thru 200K-
See Page 7
- 06 Additional Special With 50K or 100K -
See Page 7
- 05 Left Coin Chute # Adjustment - See Page 5
- 04 Left Coin Chute # Adjustment - See Page 5
- 03 Left Coin Chute # Adjustment - See Page 5
- 02 Left Coin Chute # Adjustment - See Page 5
- 01 Left Coin Chute # Adjustment - See Page 5

DETACHING OF PIN-GAME BACK BOX

When the back box is in an up-right position and the 3/8" hold-down bolts are removed, the back box can be removed from the main cabinet by lifting the right corner of the back box (about 3/4") and pulling it slightly towards you. Now both hinges are disengaged and the back box can be removed.

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. 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 turned 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 '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

* 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.

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 lights 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, one on the front door, and one on the left side of the 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.

III. BOOKKEEPING FUNCTIONS

The game is designed to help the operator perform certain accounting functions. The game can display the number of total plays and replays (free games). It can display the number of coins dropped down each coin chute. The bookkeeping functions are displayed on all player score displays simultaneously. An identification number, 05 to 15, appears on the Match/Ball in Play window as follows:

- 05 - 00 to - 40 = Current Credits
- *06 - 10000 to -99999 = Total Plays (Paid & Free Games)
- *07 - 10000 to -99999 = Total Replays (Free Games)
- 08 - 00 to -99999 = Game Percentage
- 09 - 00 to -99999 = Total times "High Score to Date" is beat
- *10 - 10000 to -99999 = Coins Dropped thru Coin Chute #1
- *11 - 10000 to -99999 = Coins Dropped thru Coin Chute #2**
- *12 - 10000 to -99999 = Coins Dropped thru Coin Chute #3**
- *13 - 00 to -99999 = Number of Specials awarded from Playfield Specials Only
- *14 - 00 to -99999 = Number of minutes of Game Play (Total)
- *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

* 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.

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 total number of Service Credits obtained.

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.

IV FEATURE OPERATIONS & SCORING

A) TOP RAMP (Skill Shot) scores 50,000 pts., advances Bonus 3 steps and flashes two Top Bumper lites to score 3,000 pts. each.

B) LOWER RAMP (Skill Shot) Scores 20,000 pts. and lites two Top Bumpers to score 1,000 pts. each.

C) WOTAN HOLE (Captive Ball) Feature:

When a ball goes into the Wotan Hole, another ball is released from the ball trough to the Shooter Lane and the same player continues to play. The ball in the Wotan Hole remains captive until the Wotan Mushroom-Bumper is hit, or until the target in left lane is hit by a permanent Captive Ball. When the ball is released from the Wotan Hole, all Playfield Score Values will be doubled, and if the gate at the bottom of the Shooter Lane is open, the ball is returned to the Shooter Lane, the gate closes, and the same player continues to play. If the gate is closed, the ball is returned to playing area of the Playfield.

D) ODIN HOLE (Captive Ball) Feature:

When a ball goes into the Odin Hole another ball is released to the Shooter Lane and the same player continues to play. The ball in the Odin Hole remains captive until the Odin Mushroom-Bumper is hit, or until the target in the left lane is hit by a permanent Captive Ball. The ball in the Odin Hole will flash the Odin Hole score lites. When the Captive Ball is released, the flashing lites stop and the game will score the lighted score. All Playfield Score Values will be doubled when the Odin Hole Ball is released.

E) LEFT LANE (Permanent Captive Ball) Feature:

The ball in the left Lane is activated when hit by another ball. The target at the top releases both Captive Balls in the Wotan and/or the Odin Holes and opens the gate at the bottom of the Right

Shooter Lane, plus it lites the Multipliers (2X-3X and 5X) and when the target Special Arrow is lit (when the target switch is activated) it will light the Right Outlane Arrow to score Special. In addition the target scores 30,000 pts. every time it is hit. All Playfield Score Values will be tripled when the Odin and the Wotan Balls released at the same time.

F) ON KICKER FEATURE:

The "On Kicker" is located at the Left Out Roll-Over Alley, and operates when "On Kicker" lite is flashing and the ball actuates the Left Out Roll-Over, the ball is kicked back into play area of the Playfield instead of going into the Outhole. "On Kicker" feature as activated by the "On Kicker Roll-Over Button" (top button above spinning rubber disc) and de-activated by "Off Kicker Roll-Over Buttons (2) (lower left and right of spinning disc).

G) DOUBLE PLAYFIELD SCORE VALUE FEATURE:

All Playfield Score Values are doubled when 2 balls are on Playfield simultaneously and while the Double Score Value lite is flashing.

H) TRIPLE PLAYFIELD SCORE VALUE FEATURE:

All Playfield Score Values are tripled when 3 balls are on Playfield simultaneously and while triple Playfield Score Value is flashing.

I) BONUS SCORE FEATURE:

Outhole scores 5,000 pts. for each lit bonus lite times Multipliers if any.

J) SPECIAL REPLAY/X-BALL/NOVELTY MODES:

Self-Test positions 16 and 17 give the operator flexibility to award a replay ball or score (Novelty) when a special is scored. A combination of X-Ball, Novelty can be obtained through the following chart:

	Set to "03"	Set to "02"	Set to "01"
Self-Test position 16			
Playfield X-Balls and Specials	AWARD	AWARD	AWARD
Bonus Special	REPLAY	NO AWARD	50,000
Right Lane Special	REPLAY	NO AWARD	50,000
Fire Ball Bonus Special	REPLAY	NO AWARD	50,000
Self-Test position 17	Set to "03"	Set to "02"	Set to "01"
Scoring Thresholds	AWARD	AWARD	AWARD
	REPLAY	NO AWARD	25,000

V. GAME ADJUSTMENTS

A. PLAYFIELD PANEL POST ADJUSTMENTS:

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

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

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

B. BACK BOX GAME ADJUSTMENTS:

Each game has thirty-two switches located on A4,

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		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

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:

ratios are available for each coin chute. The switch settings and resultant credits/coin are listed below.

CREDITS/COIN ADJUSTMENTS

COIN CHUTE	5	4	3	2	1	CREDITS	CREDITS	CREDITS	CREDITS	TOTAL CREDITS/COINS
#1(HINGE SIDE)	13	12	11	10	9					
OR #3						1/1 Coin				
(RIGHT SIDE)					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	1/4th	3/4
	ON	ON	OFF	OFF	OFF	0/1ST Coin*	1/2nd Coin	0/3rd**	2/4th	3/4
	ON	ON	OFF	OFF	ON	1/1ST Coin	1/2nd Coin	1/3rd	2/4th	5/4
	ON	ON	OFF	ON	OFF	1/1ST Coin	2/2nd Coin	1/3rd	3/4th	7/4
	ON	ON	OFF	ON	ON	1/1ST Coin	2/2nd Coin	2/3rd	2/4th	7/4
	ON	ON	ON	OFF	OFF	0/1ST Coin***	0/2nd Coin***	1/3rd	1/3	
	ON	ON	ON	OFF	ON	0/1ST Coin**	0/2nd Coin**	0/3rd**	1/4th	
	ON	ON	ON	ON	OFF	0/1ST Coin****	0/2nd Coin****	0/3rd****	0/4th****	1/5th
	ON	ON	ON	ON	ON	0/1ST Coin****	0/2nd Coin****	1/3rd	0/4th****	1/5th

*No Credits until 2nd coin is dropped.

***No Credits until 3rd coin is dropped.

**No Credits until 4th coin is dropped.

****No Credits until 5th coin is dropped.

MAXIMUM CREDITS:

The maximum credits accepted by the machine limits the number of games that can be accumulated by coining, by winning replays or both. The maximum number of credits is selectable by means of switches 25 and 26. Four credit limits are available. Switch settings are listed below.

MAXIMUM CREDITS	SWITCHES	26	25
10	OFF	OFF	OFF
15	OFF	ON	ON
25	ON	OFF	OFF
40	ON	ON	ON

BALLS PER GAME:

# BALLS/ GAME	SWITCHES	32	31
5	OFF	OFF	ON
4	ON	ON	OFF
3	OFF	OFF	OFF
2	ON	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 GIVEN	SELF TEST POSITION 16 (Playfield)	SELF TEST POSITION 17 (High Score)
REPLAY	SET TO "03"	SET TO "03"
NO AWARD	SET TO "02"	SET TO "02"
✓ NOVELTY	SET TO "01" ✓	SET TO "01"
NO AWARD	SET TO "00"	SET TO "00"

For combinations of replay/X-ball/Novelty Modes see page 4 "J". "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 beaten 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"
Three Credits	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.

GAME FEATURE OPTIONS:

3-BALL GAME:

ADDITIONAL SPL EVERY 100K.	SW. 6	OFF
INITIAL BONUS SPL WITH 150K.	SW. 7	ON
INITIAL BONUS SPL WITH 150K.	SW. 8	OFF
BONUS SPL PER GAME UNLIMITED.	SW. 14	ON
LANE SPL PER GAME "ONE".	SW. 15	OFF
RECALL ON BONUS LITES.	SW. 16	ON
BOOP BALL ARROW ON WITH 4X.	SW. 21	ON
BOOP BALL ARROW ON WITH 4X.	SW. 22	OFF
BALLS DO NOT KICK OUT OF THE SAUCERS ON GAME OVER.	SW. 23	OFF
IF THERE IS A BALL ON SHOOTER LANE, BALL WILL NOT KICK OUT OF THE OUTHOLE.	SW. 24	OFF
GAME IS SET FOR 3 BALLS.	SW. 31	OFF
GAME IS SET FOR 3 BALLS.	SW. 32	OFF

5-BALL GAME:

ADDITIONAL SPL EVERY 100K.	SW. 6	OFF
INITIAL BONUS SPL WITH 200K.	SW. 7	OFF
INITIAL BONUS SPL WITH 200K.	SW. 8	OFF
BONUS SPL PER GAME ONE.	SW. 14	OFF
LANE SPL PER GAME ONE.	SW. 15	OFF
RECALL ON BONUS LITES.	SW. 16	ON
BOOP BALL ARROW ON WITH 5X.	SW. 21	OFF
BOOP BALL ARROW ON WITH 5X.	SW. 22	OFF
BALLS DO NOT KICK OUT OF THE SAUCERS ON GAME OVER.	SW. 23	OFF
IF THERE'S A BALL ON SHOOTER LANE, BALL WILL NOT KICK OUT OF THE OUTHOLE.	SW. 24	OFF
GAME IS SET FOR 5 BALLS.	SW. 31	ON
GAME IS SET FOR 5 BALLS.	SW. 32	OFF

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 display. Now pulse replay button to desired sound setting.

Setting "00"

Most switches associated chimes without feature background.

Setting "01"

Playfield switches associated chimes with background.

Setting "02"

Most scoring will have a noise effect without background.

Setting "03"

Most all scoring will have a noise effect with background.

C. FRONT DOOR GAME ADJUSTMENTS

HIGH SCORE FEATURE ADJUSTMENTS:

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

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

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

HIGH SCORE TO DATE AND 10,000,000 FEATURE:

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

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

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

SELF-TEST SETUP FOR 16-19:

To set up positions 16-19 push and release Self-Test

button till 16 shows on match/ball in play. Now pulse replay button for recommended setup from "00" thru "03". Repeat for positions 17, 18, and 19.

SOUND

In addition to game sounds, there is also a Master Volume Control located on the front door. (refer to page 10)

Please note that the 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.)

FIREBALL CLASSIC

RUBBER PARTS

- A. 17-41-633 (2) POST
- B. 17-41-637 (4) POST
- C. 17-41-643 (1) 1" DIA.
- D. 17-41-644 (2) 1-1/2" DIA.
- E. 17-41-645 (4) 2" DIA.
- F. 17-41-646 (1) 2-1/2" DIA.
- G. 17-41-647 (3) 3" DIA.
- H. 17-41-687 (2) FLIPPER (YELLOW)
- I. 17-41-716 (3) M.B.

PANEL TOP PARTS

- 1. BOTTOM ARCH 0A40-00121-00XF
- 2. SHOOTER GAUGE 0A40-00123-0000
- 3. BUFFER WIRE 0360-00175-5300
- 4. KICK-BACK ASSY AA40-00025-0000
- 5. TOP MOUNTED KICKER (BALL RETURN) A360-00234-0000
- 6. SLINGSHOT KICKER (COIL ASSY) A967-00059-0000
- 7. MOLD FLIPPER ASSY (WHT. PURCH.) A967-00031-0000
- 8. FREE GATE RELAY ASSY AA44-00036-0000
- 9. BALL SPINNER ASSY AA40-00039-0000
- 10. ROLLOVER BUTTONS 0017-00042-0681
- 11. MUSHROOM BUMPER CAP (YELLOW) 0365-00936-0300
- 12. POST-MUSHROOM BUMPER 0365-00937-0800
- 13. THUMPER BUMPER ASSY A967-00053-0000
- 14. RAMP HOOD 0A40-00119-0000
- 15. RAMP SUPPORT (FRONT) 0A40-00109-0000
- 16. BALL GUIDE (SHOOTER LANE) 0A40-00108-00XF
- 17. SIDE RAIL (RIGHT) 0A40-00504-0000
- 18. SIDE RAIL (LEFT) 0A40-00505-0000
- 19. INSIDE RAIL 0A40-00503-0000
- 20. BALL GATE AND WIRE ASSY A360-00213-0000
- 21. BALL GATE AND WIRE ASSY AA40-00033-0000
- 22. BALL GATE AND WIRE ASSY AA40-00034-0000
- 23. BALL GUIDE WIRE ASSY 1-1/8" 0360-00175-0105
- 24. BALL GUIDE WIRE ASSY 2-9/16" 0360-00175-2900
- 25. BALL GUIDE WIRE ASSY 6-1/2" 0360-00175-3400
- 26. BALL GUIDE WIRE ASSY 2-7/8" 0360-00175-6500
- 27. BALL GUIDE WIRE ASSY 3-5/16" 0360-00175-7600

*ASE 2308-22**

AA44-00036-0000
AA40-00039-0000

1/2" M

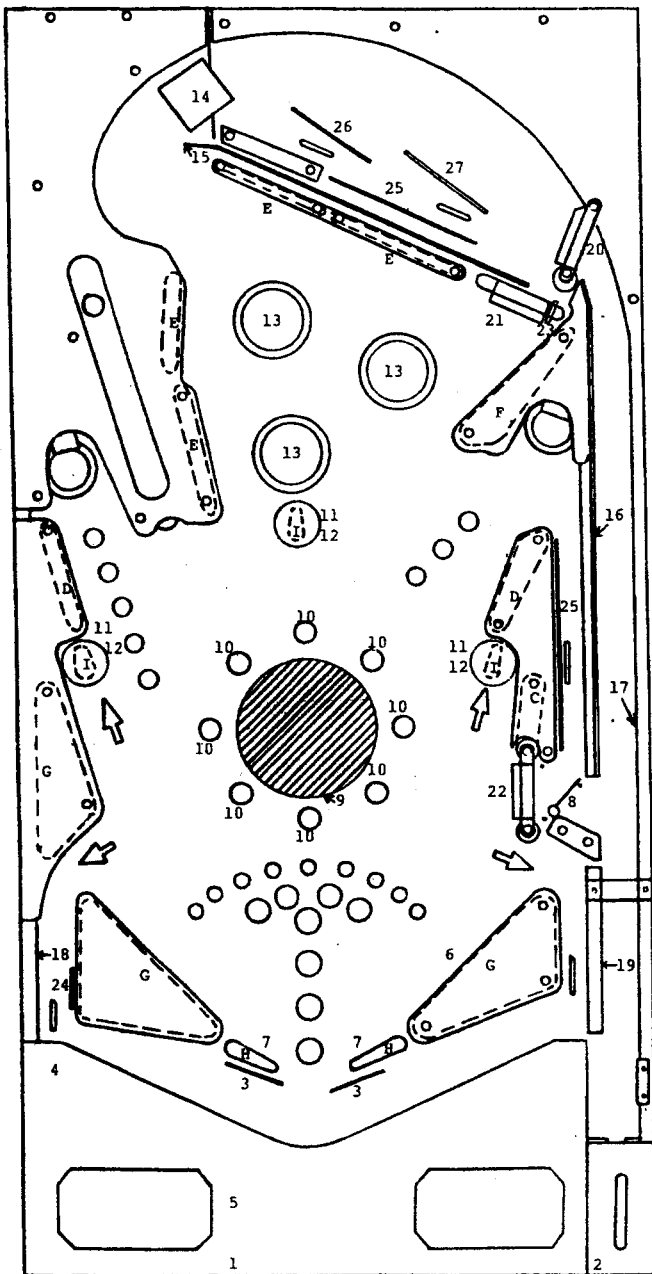


FIGURE II

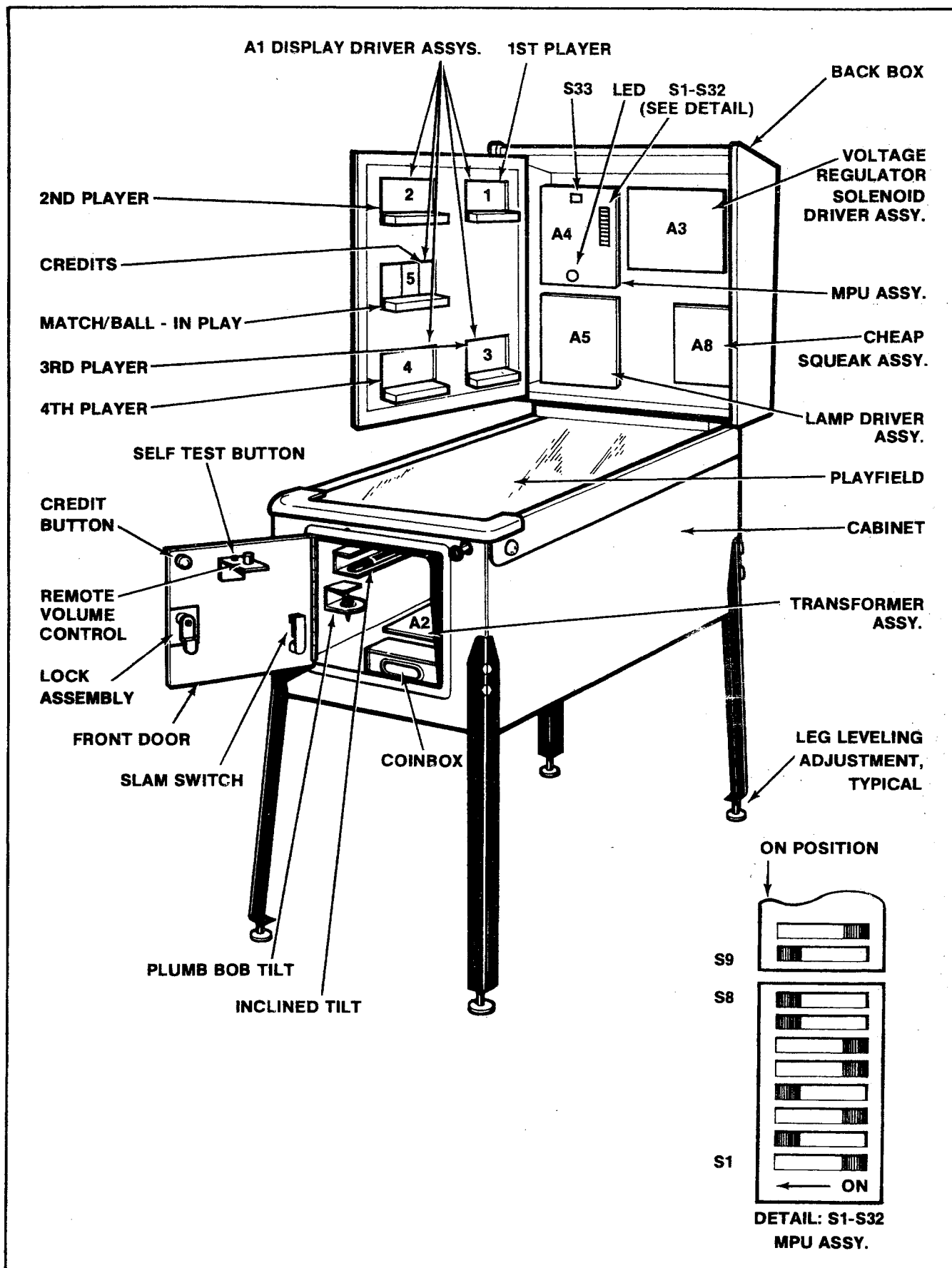


FIGURE III. ELECTRONIC PIN BALL MACHINE

RECOMMENDED

Instructions, Score Cards and High Score Feature Settings to be used on **Your New Game.**

REPLAYS
Instruction Card
Score Card

3-BALL
M051-00A40-A030
M051-00A40-A038

REPLAYS
Instruction Card
Score Card

5-BALL
M051-00A40-A031
M051-00A40-A039

1 Replay at 1,000,000
1 Replay at 2,800,000

1 Replay at 2,200,000
1 Replay at 4,800,000

ADDITIONAL CARDS

REPLAYS

M-051-00A40-A040	700,000	2,500,000
M-051-00A40-A041	800,000	2,600,000
M-051-00A40-A042	900,000	2,700,000
M-051-00A40-A043	1,100,000	2,900,000
M-051-00A40-A044	1,200,000	3,000,000
M-051-00A40-A045	1,300,000	3,100,000
M-051-00A40-A046	1,400,000	3,200,000
M-051-00A40-A047	1,500,000	3,300,000
M-051-00A40-A048	1,600,000	3,400,000
M-051-00A40-A049	1,700,000	3,500,000
M-051-00A40-A050	1,800,000	3,600,000
M-051-00A40-A051	1,900,000	3,700,000

RECOMMENDED SWITCH SETTINGS

SW#	3 BALL	5 BALL
ADDITIONAL SPL EVERY:	#6 OFF (100K)	OFF (100K)
INITIAL BONUS SPL WITH:	#7 ON (150K)	OFF (200K)
INITIAL BONUS SPL WITH:	#8 OFF (150K)	OFF (200K)
BONUS SPL PER GAME:	#14 ON (UNLIMITED)	OFF (ONE)
LANE SPL PER GAME:	#15 OFF (ONE)	OFF (ONE)
RECALL ON BONUS LIGHTS:	#16 ON ON	
BOOP BALL ARROW ON WITH:	#21 ON (4X)	OFF (5X)
BOOP BALL ARROW ON WITH:	#22 OFF (4X)	OFF (5X)
BALLS DO NOT KICK OUT OF THE SAUCERS ON GAME OVER:	#23 OFF OFF	
IF THERE'S A BALL ON SHOOTER LANE, BALL WILL NOT KICK OUT OF THE OUTHOLE:	#24 OFF OFF	
GAME IS SET FOR:	#31 OFF (3 BALLS)	ON (5 BALLS)
GAME IS SET FOR:	#32 OFF (3 BALLS)	OFF (5 BALLS)

VIII. ROUTINE MAINTENANCE ON LOCATION:

Self-Test routines are written into the game design. They are particularly useful for routine maintenance. The tests are described below. The first test is automatic and occurs on power-up. This test causes the MPU module A4 to examine itself for failures. Seven flashes of an LED indicates proper operation. The second series of self-diagnostic tests causes the MPU to "exercise" each of the other modules in such a way as to make their faults, if any, obvious. See Figure III and Page ii.

It is recommended that these tests be used several times a week to check out the games before play. If faults are discovered, they may be corrected on location if the operator has a stock of replacement modules. See "Trouble Shooting on Location".

MPU Module Self-Test:

At power on, the LED on the MPU module flashes once. (Flicker-Flash.) After a pause, it flashes six more times and goes out. A power-up tune is played to announce game readiness. This indicates proper MPU operating condition and successful completion of the power-up test.

Game Self-Diagnostic Tests:

1. Pressing the Self-Test button inside the door initiates the Self-Test routine. See Figures III and IV. All switched lamps flash off and on continuously.
2. Pressing the Self-Test button again causes each digit on each display to cycle from 0 thru 9, and repeat continuously.
3. Pressing the Self-Test button again causes each solenoid to be energized, one at a time, in a continuous sequence. Hold both flipper buttons "in" during this test. The number appearing on the Player Score displays is the same as the number assigned to the solenoid. The sound of a solenoid pulling-in as a number appears indicates proper operation. The absence of sound is improper. If sound is absent, See Page 17 for help in Solenoid Identification.
4. Pressing Self-Test button again causes the sound module to play same tune repeatedly.
5. Pressing the Self-Test button again causes the MPU to search each switch assembly for stuck contacts. If any are found, the number of the first set encountered is flashed on the Player Score displays. The number remains until the

fault is cleared. See Page 17 for help in Stuck Switch Identification. Other numbers may follow if more stuck contacts are present. If there are no stuck switches, the Match/Ball in Play display flashes "0".

6. Pressing the Self-Test button 20 more times causes the MPU to step thru the threshold and bookkeeping functions described previously and finally to repeat the power-up test. For more rapid exit to power-up, turn the game off, then on. The game is now ready to play.

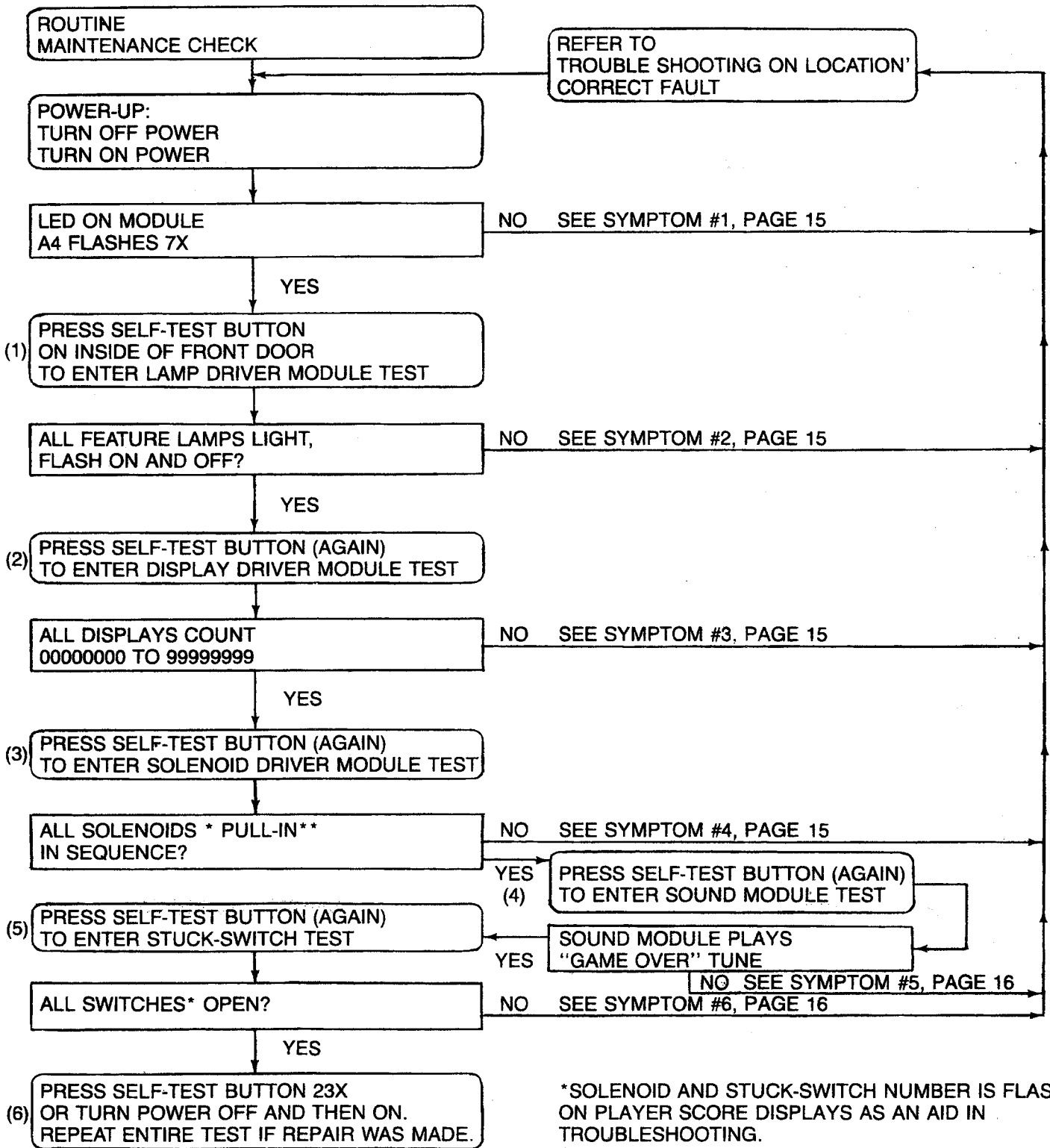
After successful completion of the Self Diagnostic Test Procedure, set the game up for play. Exercise each roll-over, thumper bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no response, clean contacts by gently closing them on a clean business card or piece of paper and wiping until they wipe clean. Re-gap, 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/Midway. 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. Check fuses. If fuses are good, 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 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, AN, 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.

* Turn power On-Off switch OFF and then 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.

WARNING: 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 for 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. (NOTE: If most of the Playfield Solenoids DO NOT operate, check the Playfield Fuse to see if it is blown. It generally can be found near the Flipper Assemblies.) 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 & 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 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. (NOTE: When troubleshooting Playfield Solenoid Circuits, be advised that a constantly energized Solenoid [i.e. Thumper Bumper] will blow the Playfield Fuse in a few seconds. To avoid replacing the Fuse repeatedly, Try to isolate the faulty Solenoid Circuit as soon as the game power switch is flipped ON.)

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", re-gap 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 game is correct, it is now ready to play.* If 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. 560-3.

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

FIREBALL CLASSIC

SOLENOID IDENTIFICATION TABLE

SELF □ TEST#	SOLENOID IDENTIFICATION	SELF □ TEST#	SOLENOID IDENTIFICATION
01	LEFT SAUCER	08	RIGHT SLINGSHOT
02	RIGHT SAUCER	09	OUTHOLE
03	ITALIAN KICKER CONTROLLER	10	OUTHOLE
04	TOP BUMPER	11	KNOCKER
05	MID BUMPER	12	GATE
06	BOTTOM BUMPER LOCKOUT	13	COIN BOX
07	LEFT SLINGSHOT	14	FLIPPERS

SWITCH ASSEMBLY IDENTIFICATION TABLE

SWITCH SELF O TEST#	DESCRIPTION	SWITCH SELF O TEST#	DESCRIPTION
01	SLINGSHOT (RIGHT) 20K	17	TOP LANE 20K
02	SLINGSHOT (LEFT)	18	BUTTON 1K
03	BOTTOM BUMPER	19	BUTTON OFF KICKER
04	MID BUMPER	20	BUTTON ON KICKER
05	TOP BUMPER	21	OUTLANE (RIGHT)
06	CREDIT	22	OUTLANE (LEFT)
07	REBOUNDERS	23	SAUCER (RIGHT)
08	OUTHOLE	24	SAUCER (LEFT) TARGET
09	COIN III (RIGHT) — To ERASE	25	RELEASE BALLS
10	COIN I (LEFT)	26	
11	COIN II (MIDDLE)	27	
12	MUSHROOM BUMPER (RIGHT)	28	OUTHOLE #3
13	MUSHROOM BUMPER (MIDDLE)	29	OUTHOLE #2
14	MUSHROOM BUMPER (LEFT)	30	OUTHOLE #1
15	TILT	31	GATE LANE
16	SLAM	32	TOP LANE 50K

* R.O.B. Denotes Roll Over Button.

FIREBALL CLASSIC

□ INDICATES SWITCH ASSEMBLY
IDENTIFICATION NUMBERS

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

○ INDICATES SOLENOID
IDENTIFICATION NUMBERS:

NOTE: DOOR: 13
CABINET: 11

VECTORS SHOWING FOR EJECT SAUCERS

LEFT EJECT SAUCER: BALL SHOULD EXIT
TO RIGHT FLIPPER AS SHOWN

RIGHT EJECT SAUCER: BALL SHOULD EXIT
TO FREE BALL GATE LANE AS SHOWN

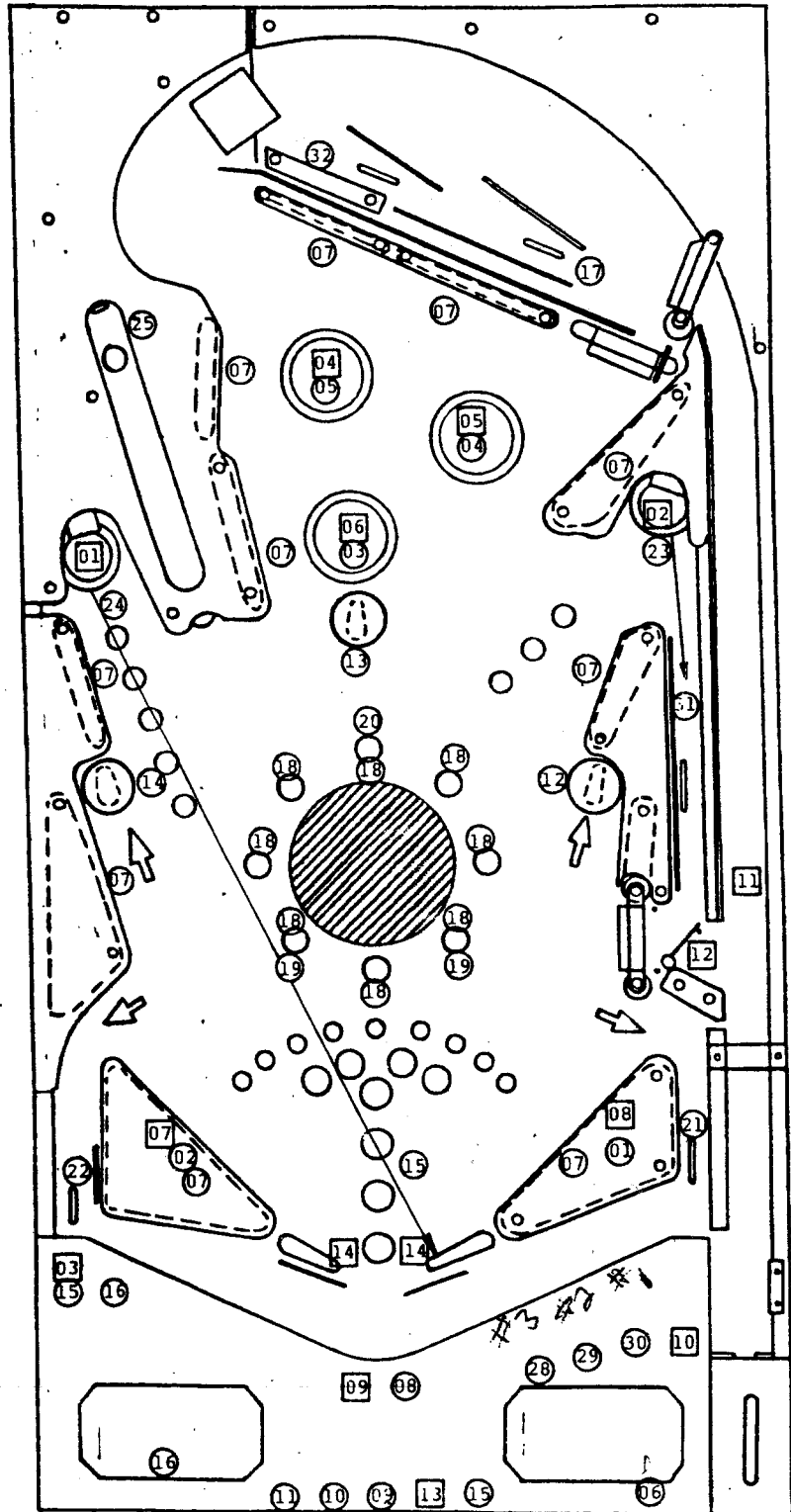


FIGURE V

ASSEMBLY ADJUSTMENTS:

GENERAL:

All switch assemblies consist of leaf springs, contacts, separators, plastic tubing and screws to hold them to the mounting surface. Before attempting to adjust a switch assembly, make sure that these screws are tight. If not, tighten screw closest to the contact end of the leaf spring first. This will prevent the assembly from being secured in such a manner that the leaf springs tend to fan out. In general, all leaf springs are adjusted for a 1/16" gap in the open position and .010" over-travel or wipe in the closed position. All contacts should be in good condition. Unless otherwise instructed, they should be dry or non-lubricated. All contacts should be free of dust and dirt. Contacts, with the exception of the flipper button switch assemblies, are plated to resist corrosion. Filing or burnishing breaks the finish and encourages corrosion. Clean by closing the contacts over a clean piece of paper (e.g., a business card) and wiping gently until the contacts are clean. For the flipper button switch assemblies **ONLY**: Tarnish can be removed with a contact file followed by burnishing tool. Severely pitted contacts must be replaced and adjusted only when they are found to be a source of game malfunction.

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 and cleaning pads on the playfield, or allow a wax or polish build up. Waxes yellow with age and spoil appeal.

X. SERVICE PARTS:

A parts catalogue is available upon request. The catalogue is illustrated and lists all replacement parts for each game manufactured by Bally. Requests should be addressed to:

**BALLY MIDWAY MFG. CO.
10601 WEST BELMONT AVENUE
FRANKLIN PARK, ILLINOIS 60131
ATTN: PARTS DEPARTMENT**

SERVICE HINTS:

The bally playfield has an improved tuff-coat finish with excellent wearing properties. Life expectancy of the playfield, as well as play appeal, can be extended by periodic cleaning.

DO: Bally recommends you clean your playfield with Wildcat #125 (Wildcat Chemical Co. 1349 East Seminary Drive; Fort Worth, Texas 76115; Phone 1-817/924-8321). Wildcat #125 is a combination cleaner and polish. Bally has tried and tested this product and found it to be very effective. If

XI. PARTS LIST FIREBALL CLASSIC

	BALLY PART NUMBER	MIDWAY PART NUMBER
MISCELLANEOUS		
Transformer (Domestic or Export)	MT00-00114-A000	
Bulbs, #555 (75)	0017-00003-0484	E-125-73
Fuse, 1 Amp. 3 AG Slow Blow (Playfield Solenoid Protection)	0017-00003-0103	E-133-44
Fuse, 3 AMP, 3 AG Slow Blow	0017-00003-0262	
Back Glass	0A40-00905-00XF	
Ball Shooter Rod Assy. (Cabinet)	A360-00280-0000	ASE-2378-5
ASSEMBLY SWITCHES		
Rebound (8)	A360-00069-0000	ASW-A10-0047
Roll Over Button (8)	A390-00022-0000	
Saucer (2)	AA40-00036-0000	
Credit (door)	A360-00068-0000	ASW-A1-0146
Spinner	A360-00058-0000	ASW-A1-0151
Outhole	360-00055-0000	ASW-A1-0143
Coin (3) (Door)	0017-00005-0195	
Right Sling Shot (2)	A360-00069-0000	ASW-A10-0000
Left Sling Shot (2)	A360-00069-0000	ASW-A10-0047
Thumper Bumper (3)	A967-00074-0000	
Tilt	A360-00057-0000	ASW-A1-0145
Tilt (Cabinet)	A360-00054-0000	ASW-A0-0013
Slam (Cabinet)	A360-00076-0000	ASW-A2-0073
Slam (Door)	A360-00076-0000	ASW-A2-0073
Lanes (Out Lane & Ball Lane) (2)	A360-00069-0000	ASW-A10-0047
Lane (Upper Skill Shot & Lower Skill Shot) (2)	A360-00069-0000	ASW-A10-0047
Free Ball Gate Lane	A360-00069-0000	ASW-A10-0047
Free Ball Gate	AA40-00036-0000	
Mushroom Bumper (3)	AA40-00032-0000	
Ball Ramp (3)	0017-00032-0123	
Flipper-Break (2)	A365-00045-0000	
Flipper-Make (2) (Cabinet)	A360-00071-0000	ASW-A10-0061
ASSEMBLY COILS		
Coin Lockout	A360-00208-0000	FO-36-7000
Flipper(2)	A360-00045-0000	AQ-25-500/ 34-4500
Ball Release	A360-00211-0000	AO-27-1300
Kickback	A365-00055-0000	
Knocker	A360-00046-0000	AR-26-1200
Outhole Kicker	A360-00044-0000	AN-26-1200
Thumper Bumper(3)	A360-00044-0000	AN-26-1200
Saucer (2)	A360-00211-0000	AO-27-1300
Free Ball Gate	A390-00029-0000	GA-34-4000
Slingshot (2)	A360-00046-0000	AO-26-1200

XI. PARTS LIST FIREBALL CLASSIC

MIDWAY PART NUMBER	BALLY PART NUMBER
-----------------------	----------------------

PLAYFIELD PARTS

See Figure II

Playfield Glass	0360-00921-0000
Playfield & Inserts	AA40-00501-00XF
Playfield Mylar	0A40-00902-0000
Clear Plastic Set	AA40-00012-00XF
Screened Plastic Set	AA40-00900-00XF
Roll-Over Button (8)	0017-00042-0681
Thumper Bumper Cap Assembly (2)	AA40-00030-0000
Thumper Bumper Cap With Tape	AA40-00035-0000
Collar-Thumper Bumper-Amber (3)	0017-00042-0403
Thumper Bumper Locking Ring (3)	0017-00042-0414
Thumper Bumpers Mylar-Combo	0A40-00910-0000
Flipper (2)	A967-00031-0000
Boop-Ball Target & Switch Assembly	A967-00019-0000

MODULES

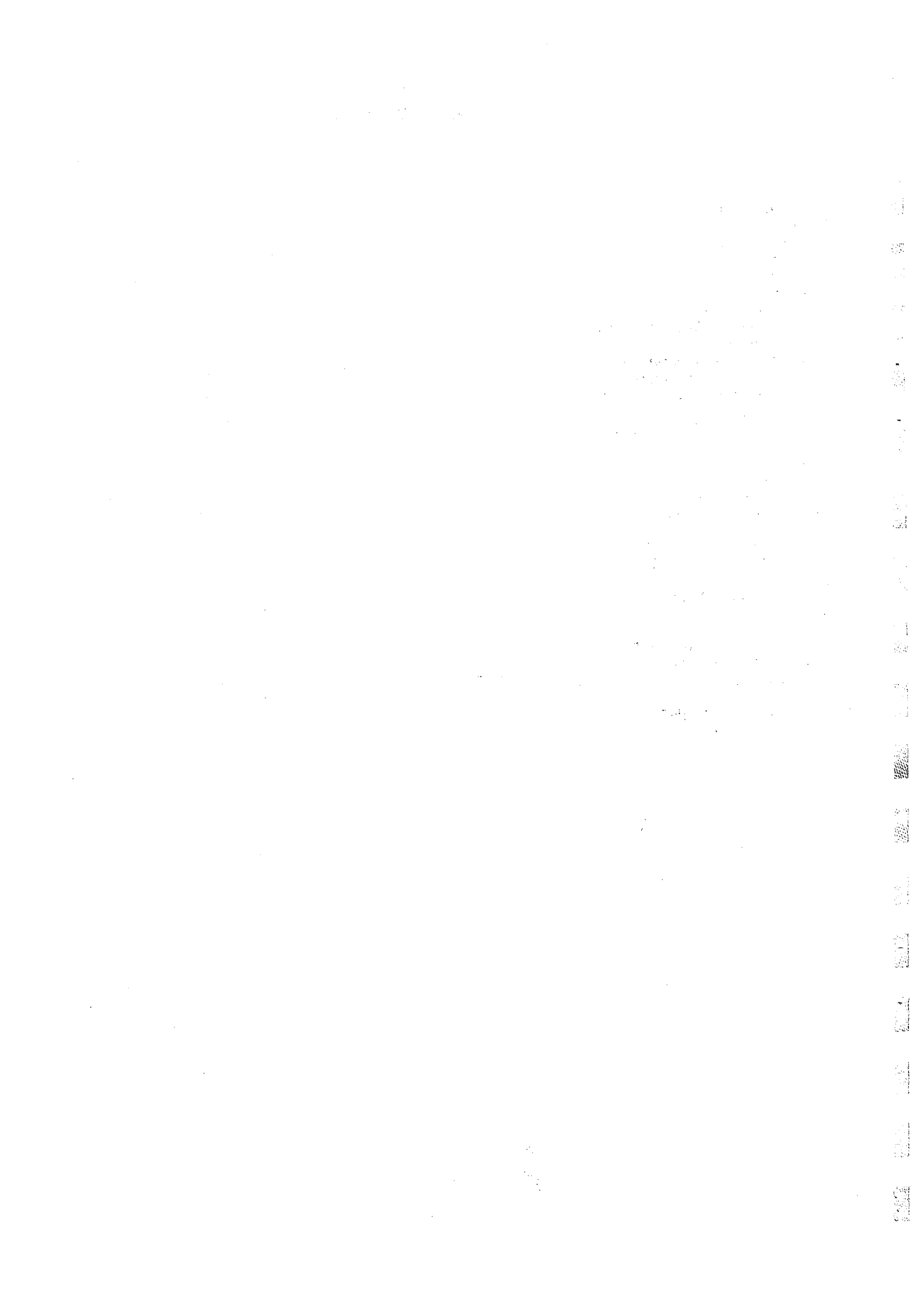
Lamp Driver A5	A084-91613-A000	AS-2518-23
Display Driver A1 (4 used)	A084-91617-A000	AS-2518-58
Display Driver A1 (1 used)	A084-91491-A000	AS-2518-21
MPU A4	A084-91638-AA40	
Transformer & Rectifier A2	AA40-00037-0000	
Rectifier Board (Part of A2)	A084-91616-A000	AS-2518-54
Cheap Squeak	A084-91603-AA40	
Solenoid/Voltage Regulator	A084-91612-0000	
Solenoid Expander	A084-91618-A000	

REPAIR PROCEDURES/AIDES

Module & Component Replacement	F.O. 560-3
AID (Assistance in Diagnostics) Kit, used with F.O. 560-1	KIT #485-1

MODULE COMPONENTS

SEE MODULE PARTS LIST



BALLY/MIDWAY'S FIREBALL CLASSIC PIN
#A40
ROM/EPROM PART NUMBERS

UNPROGRAMED MPU A084-91638-D000
PROGRAMED MPU A084-91638-AA40

POS.	MIDWAY PART NUMBER
U2	0A40-00803-0002
U6	0A40-00803-0001

JUMPERS	IN	OUT
E4 -E12	**	
E7 -E8	**	
E10 -E11	**	
E13A-E14	**	
E29 -E33	**	
E31 -E32	**	
E16A-E34	**	

UNPROGRAMED CHEAP SQUEAK A084-91603-C000
PROGRAMED CHEAP SQUEAK A084-91603-AA40

POS.	MIDWAY PART NUMBER
U3	0A40-00803-0003
U4	0A40-00803-0004

JUMPERS	IN	OUT
JW1		**
JW2		**
JW3		**
JW4		**
JW5		**
JW6	**	
JW7		**
JW8		**
JW9	**	
JW10		**
JW11		**
JW12	**	

REVISIONS

11/28/84	RELEASE FOR PRODUCTION	

M051-00A40-A008

PRELIMINARY ELECTRICAL SECTION

FIREBALL CLASSIC

Bally

MIDWAY MFG. CO.

10601 W Belmont Avenue
Franklin Park, Illinois 60131
U.S.A.



Phone (312) 451-9200 Cable Address MIDCO Telex No.: 72-1596

MO51-00A40-A014

"IMPORTANT NOTICE"

**ALL 3 PLAYFIELD BALLS MUST BE INSERTED
IN THE OUTHOLE TROUGH.**

M051-00A40-A016

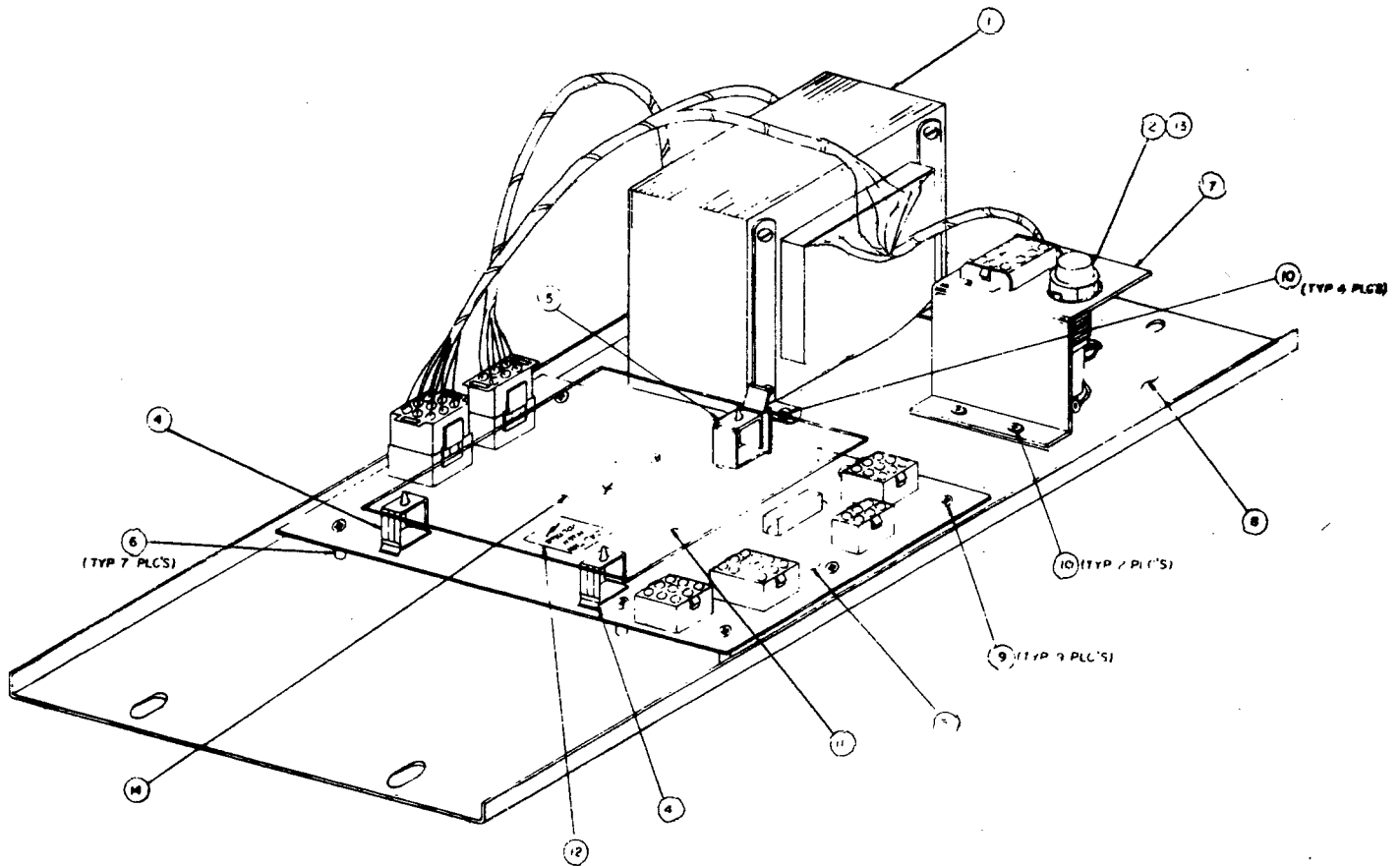
PLEASE NOTE:

A complete OPERATOR'S MANUAL was not available when your new game was shipped. If you will complete the enclosed postage free card and drop it in the mail to us, BALLY/MIDWAY MFG. CO. will be happy to send you the OPERATOR'S MANUAL for your new game by return mail.

**ELECTRICAL SECTION
TABLE OF CONTENTS**

DESCRIPTION	PAGE
POWER TRANSFORMER MODULE - COMPONENT LAYOUT	2
POWER MODULE P.C.B. - COMPONENT LAYOUT	3
SOLENOID DRIVER/VOLTAGE REGULATOR P.C.B. - COMPONENT LAYOUT	4
SOLENOID EXPANDER P.C.B. - COMPONENT LAYOUT	5
MPU P.C.B. - COMPONENT LAYOUT	6
LAMP DRIVER P.C.B. - COMPONENT LAYOUT	7
CHEAP SQUEAK P.C.B. - COMPONENT LAYOUT	8
6-DIGIT DISPLAY P.C.B. - COMPONENT LAYOUT	9
7-DIGIT DISPLAY P.C.B. - COMPONENT LAYOUT	10
CABINET - WIRING DIAGRAM	11
PLAYFIELD - WIRING DIAGRAM	12
BACKBOX - WIRING DIAGRAM	13
POWER TRANSFORMER MODULE - SCHEMATIC	14
POWER MODULE P.C.B. - SCHEMATIC	15
SOLENOID DRIVER/VOLTAGE REGULATOR P.C.B. - SCHEMATIC	16
SOLENOID EXPANDER P.C.B. - SCHEMATIC	17
MPU P.C.B. - SCHEMATIC	18
LAMP DRIVER P.C.B. - SCHEMATIC	19
CHEAP SQUEAK P.C.B. - SCHEMATIC	20
6-DIGIT DISPLAY P.C.B. - SCHEMATIC	21
7-DIGIT DISPLAY P.C.B. - SCHEMATIC	22
EPROM LIST	INSIDE BACK COVER

A2: POWER TRANSFORMER MODULE



A2: POWER TRANSFORMER MODULE COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
0	A2	AA40-00037-0000	POWER TRANSFORMER MODULE, COMPLETE
1		MT00-00114-0000	TRANSFORMER
2		E-148-25	FUSE HOLDER
3	A2	AS-2518-54	POWER MODULE ASSEMBLY
4		M-1829-4	HINGED SUPPORT
5		M-1829-3	EDGE HOLDER
6		M-1829-5	SPACER
7		P-6442-244b	FUSE & CONNECT BRACKET
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	3 AMP SLOW BLOW FUSE
14		M-1834	H. S. COMPOUND
15	(NOT SHOWN)	104E-00016-0014	TRIAC, MAC 38-2

NOTE 1 - ALL GAMES WITH 4 OR MORE FLIPPERS USE 7A

DESIGNATION LIST

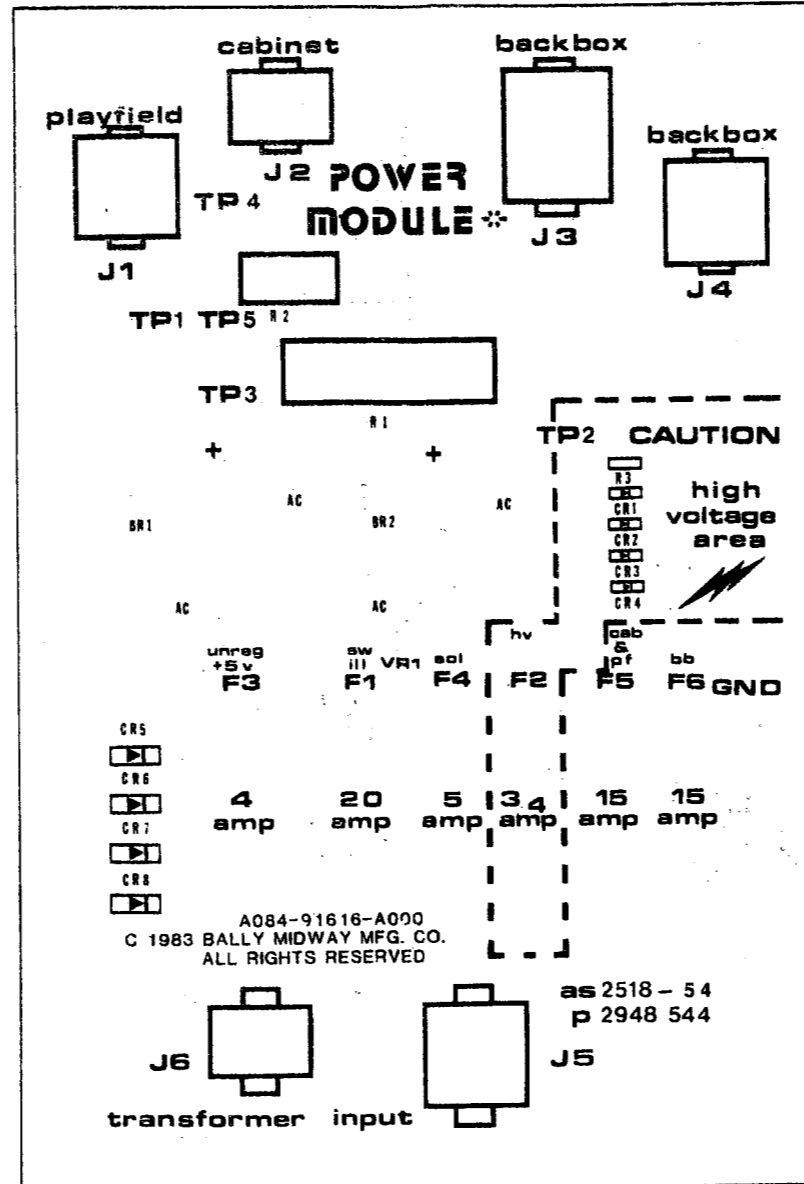
DESIGNATION NO.	DESCRIPTION
R1	600 OHM 10W 10%
R2	25 OHM 5W 10%
R3	100K OHM 1/4W 5%
VR1	VARISTOR
CR1-CR4	IN4004
CR5-CR8	GP30A/V330
HR1,HR2	KBPC35-02-W BRIDGE
P/O HR1,HR2	SPACER
F1	20 AMP FUSE - NOTE 1
F2	3/4 AMP FUSE
F3	4 AMP FUSE
F4	5 AMP FUSE - NOTE 2
F5,F6	15 AMP FUSE
P/O F1,F5,F6	FUSE CLIP BUSHMAN
P/O F2,F3,F4	FUSE CLIP LITTELFUSE
J1	9 COND. M&L PIN HEADER
J2	6 COND. M&L PIN HEADER
J3	12 COND. M&L PIN HEADER
J4	9 COND. M&L PIN HEADER
J5	9 COND. M&L PIN HEADER
J6	6 COND. M&L PIN HEADER
TP1-TP5,GND	TEST POINTS
PCB	POWER MODULE

NOTE 1 USE 10AMP FUSE WITH TRANSFORMER
MTOO-00114-A000

NOTE 2 USE 6 AMP FUSE WITH 3 FLIPPER GAME
AND 7 AMP FUSE WITH 4 FLIPPER GAME

CROSS REF. LIST

DESCRIPTION	QTY	DESIGNATION NO.	PART NOS.
250 OHM 5W 10%	1	R2	100E-00002-0028
600 OHM 10W 10%	1	R1	100E-00002-0049
100K OHM 1/4W 5%	1	R3	100E-00005-0115
VARISTOR	1	VR1	115E-00001-0002
IN4004	4	CR1-CR4	103E-00003-0005
GP30A/V330	4	CR5-CR8	0360-00801-0007
KBPC35-02-W	2	BR1,HR2	103E-00005-0005
SPACER	2	P/O HR1,HR2	118E-00001-0001
3/4 AMP FUSE	1	F2	0017-00003-0177
4 AMP FUSE	1	F3	0017-00003-0176
5 AMP FUSE/LEC	1	F4	0017-00003-0175
15 AMP FUSE	2	F5,F6	0017-00003-0173
20 AMP FUSE	1	F1	0017-00003-0173
FUSE CLIP BUSHMAN	6	P/O F1,F5,F6	0017-00071-0034
FUSE CLIP LITTELFUSE	6	P/O F2,F3,F4	0017-00071-0033
6 COND. M&L PIN HEADER	2	J2,J6	0017-00021-0424
9 COND. M&L PIN HEADER	2	J4,J5	0017-00021-0425
9 COND. M&L SOCKET HEADER	1	J1	0017-00021-0426
12 COND. M&L PIN HEADER	1	J3	0017-00021-0427
TEST POINTS	6	TP1-TP5,GND	0017-00007-0131
POWER MODULE		PCB	A080-91616-A000



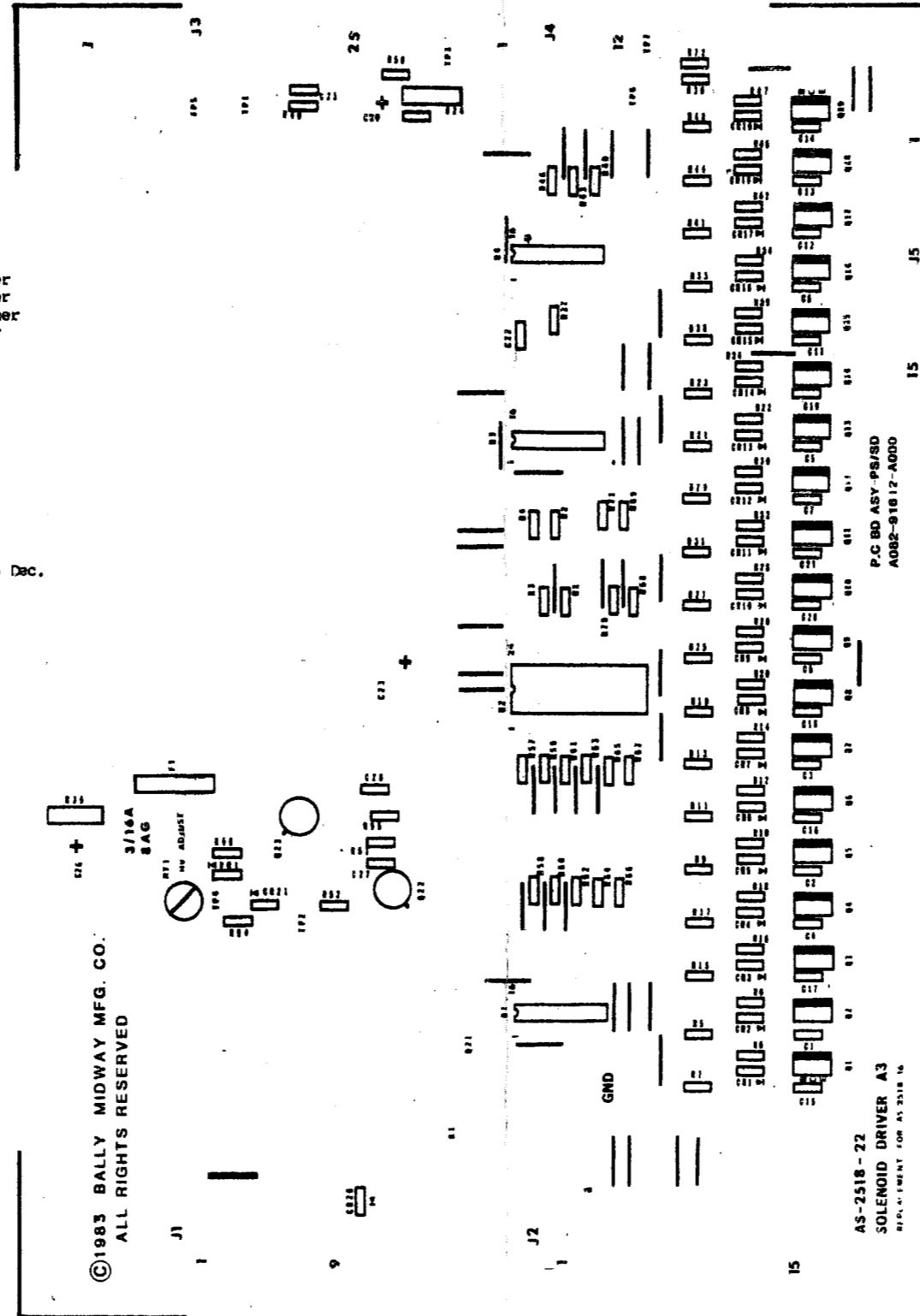
REVISIONS

PROJECT ENG: A. AARSTAD		USED ON		Bally / MIDWAY MFG. CO. FRANKLIN PK ILL
DO NOT SCALE DWG	HEAT TREAT	SCALE FULL	NO. REQ'D 1 PER	
DIM TOLERANCES UNLESS SPECIFIED	DRG. BAK	MAT'L.	ASSEMBLY DWG. POWER MODULE	PART NO.
DATE 11/13/84	DATE	FINISH	A082-91616-A000	M051-00114 -A054

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
C1-C8	.002 uf 1KV Cer.
C11-C21	.002 uf 1KV Cer.
C22	.01 uf 50V Cer.
C23	11,000 uf 20V Elec.
P/O C23	Cable Tie
P/O C23	Jumper Wire 24awg.
C24	2 uf 25V Elec.
C25	.1uf 20V Cer.
C26	160 uf 350V Elec.
P/O C26	Cable Tie
C27, C28	.01 uf 500V Cer.
C29	.1 uf 20V Cer.
R1-R4	33K 1/4 W 5%
R5	120 ohm 1/4 W 5%
R6	330 ohm 1/4 W 5%
R7	120 ohm 1/4 W 5%
R8	330 ohm 1/4 W 5%
R9	120 ohm 1/4 W 5%
R10	330 ohm 1/4 W 5%
R11	120 ohm 1/4 W 5%
R12	330 ohm 1/4 W 5%
R13	120 ohm 1/4 W 5%
R14	330 ohm 1/4 W 5%
R15	120 ohm 1/4 W 5%
R16	330 ohm 1/4 W 5%
R17	120 ohm 1/4 W 5%
R18	330 ohm 1/4 W 5%
R19	120 ohm 1/4 W 5%
R20	330 ohm 1/4 W 5%
R21	120 ohm 1/4 W 5%
R22	330 ohm 1/4 W 5%
R23	120 ohm 1/4 W 5%
R24	330 ohm 1/4 W 5%
R25	120 ohm 1/4 W 5%
R26	330 ohm 1/4 W 5%
R27	120 ohm 1/4 W 5%
R28	330 ohm 1/4 W 5%
R29	120 ohm 1/4 W 5%
R30	330 ohm 1/4 W 5%
R31	120 ohm 1/4 W 5%
R32	330 ohm 1/4 W 5%
R33	120 ohm 1/4 W 5%
R34	330 ohm 1/4 W 5%
R35	100K 1W 5%
R36	120 ohm 1/4 W 5%
R37	3.9K 1/4 W 5%
R38	120 ohm 1/4 W 5%
R39	330 ohm 1/4 W 5%
R40	3.9K 1/4 W 5%
R41	120 ohm 1/4 W 5%
R42	330 ohm 1/4 W 5%
R43	3.9K 1/4 W 5%
R44	120 ohm 1/4 W 5%
R45	330 ohm 1/4 W 5%
R46	3.9K 1/4 W 5%
R47	330 ohm 1/4 W 5%
R48	120 ohm 1/4 W 5%
R49	100 ohm 1/2 W 5%
R50	2.2 ohm 1/4 W 5%
R51	22K 1/2 W 5%
R52	390 ohm 1/4 W 5%
R54	8.2K 1/4 W 5%
R55	1.2K 1/4 W 5%
R56	82K 1/2 W 5%
R57-R72	1.2K 1/4 W 5%
RT1	0-25K Linear Pot 1/4 W

DESIGNATION NO.	DESCRIPTION
CR1-CR21	IN4004 Diode
Q1-Q19	2N6045 NPN Darl.
Q20	LM323 +5V Reg.
Q21	2N3584 NPN
HEATSINK P/O Q21	Heatsink T066
INSULATOR P/O Q21	Insulator T066
SCREWS P/O Q20, Q21	6-32 X 12 Screw
SCREWS P/O Q21	6-32 X 5 Screw
NUTS P/O Q20, Q21	6-32 Hex Nut
WASHERS P/O Q20, Q21	145-.290-019 Lockwasher
WASHERS P/O Q21	145-.313-019 Lockwasher
WASHERS P/O Q20, Q21	145-.375-032 Flat Washer
HEX SPACERS	6-32 Tapped Hex-Spacer
SHIELD P/O Q21	Plexiglass
HEATSINK P/O Q20	Heatsink T03
INSULATOR P/O Q20	Insulator T03
TAPE LABEL P/O Q21	High Voltage Label
Q22, Q23	2N3440 NPN
HEATSINK P/O Q23	Heatsink T05
INSULATOR P/O Q22, Q23	Insulator T05
TP1-TP7, GND.	TEST POINTS
VN1	IN5275A Zener
U1	CA3081 Xstr Array
U2	74LS154 Binary Tr 1/16 Dec.
U3, U4	CA3041 Xstr Array
JW1-JW49	Tin 22awg Jumper
TW1, TW2	Cable Tie 7-5/8"
F1	3/16 A 8AG Fuse
CLIP P/O F1	Fuse Clip
I1, I2	.045 Auto Insert Pins
J3, J4	.025 Auto Insert Pins
I5	.045 Auto Insert Pins
K1	4R VDC Relay
	P.C.B.



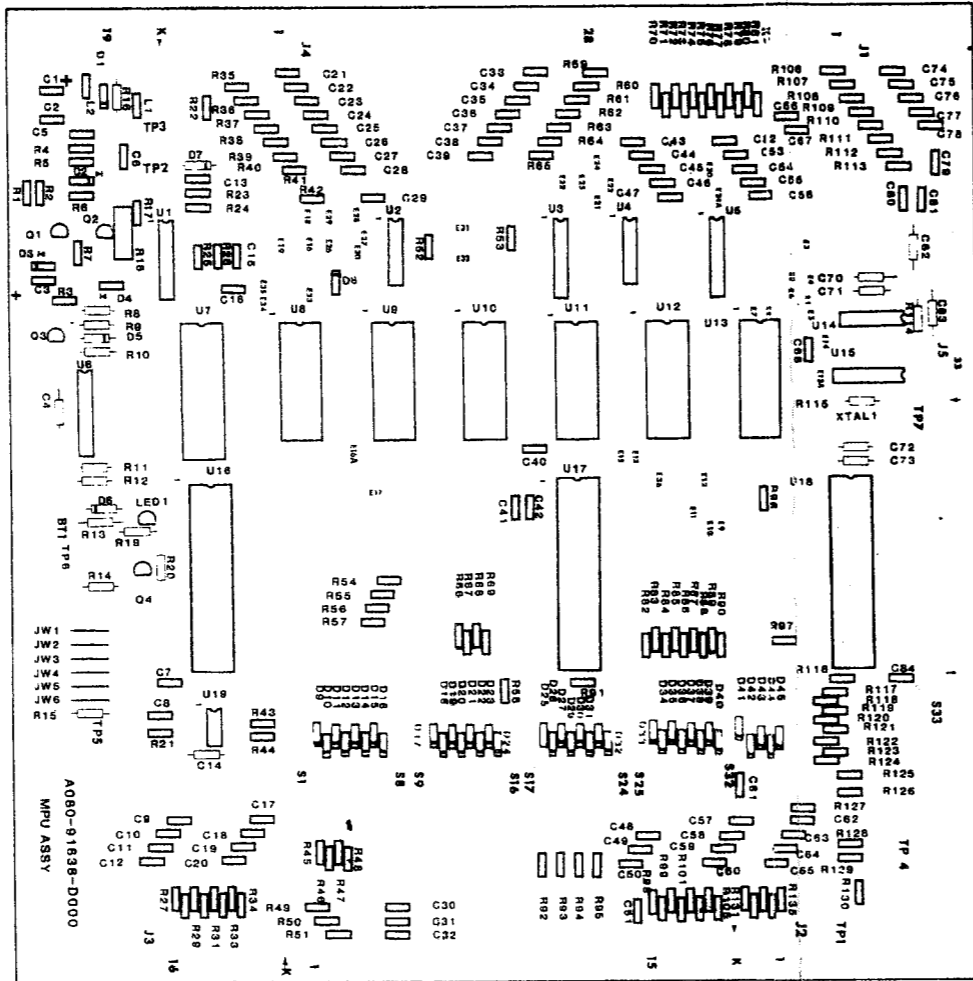
CROSS REF. LIST

DESCRIPTION	QTY	DESIGNATION NO.	PART NOS.
.002 uf 1KV Cer.	19	C1-C8, C11-C21	0360-00800-0012
.01 uf 50V Cer.	1	C22	0360-00800-0005
.01 uf 500V Cer.	2	C27, C28	0360-00800-0013
.1 uf 20V Cer.	2	C25, C29	0360-00800-0026
2 uf 25V Elec.	1	C24	0360-00800-0019
160 uf 350V Elec.	1	C26	0360-00800-0020
11,000 uf 20V Elec.	1	C23	0360-00800-0024
2.2 OHM 1/4W 5%	1	R50	100E-00005-0003
120 OHM 1/4W 5%	20	R5, R7, R9, R11, R13 R15, R17, R19, R21, R23 R25, R27, R29, R31, R33 R36, R38, R41, R44, R48	100E-00005-0035
330 OHM 1/4W 5%	19	R6, R8, R10, R12, R14 R16, R18, R20, R22, R24 R26, R28, R30, R32, R34 R39, R42, R45, R47	100E-00005-0047
390 OHM 1/4W 5%	1	R52	100E-00005-0049
1.2K 1/4W 5%	17	R55, R57-R72	100E-00005-0063
3.9K 1/4W 5%	4	R37, R40, R43, R46	100E-00005-0077
8.2K 1/4W 5%	1	R54	100E-00005-0086
33K 1/4W 5%	4	R1-R4	100E-00005-0100
100 OHM 1/2W 5%	1	R49	100E-00006-0021
22K 1/2W 5%	1	R51	100E-00006-0065
82K 1/2W 5%	1	R56	100E-00006-0072
100K 1W 5%	1	R35	100E-00007-0037
RT1	1	0-25K Linear Pot 1/4W	0360-00804-0004
IN4004	21	CR1-CR21	103E-00003-0005
IN5275A 2 Zener	1	VR1	103E-00001-0027
LM323 +5V Reg.	1	Q20	0360-00003-0021
2N3440 NPN	2	Q22, Q23	104E-00003-0002
2N3584 NPN	1	Q21	104E-00005-0002
2N6045 NPN Darl.	19	Q1-Q19	0360-00802-0008
CA3081 Xstr Array	3	U1, U3, U4	0360-00803-0007
74LS154 Bin. to 1/16 Dec.	1	U2	0360-00803-0024
TIN 22awg Jumper	49	JW1-JW49	117E-00001-0001
3/16 A 8awg Fuse	1	F1	0017-00003-0206
Fuse Clip	2	P/O F1	0017-00071-0033
.045 Auto Insert Pins	36	J1, J2, J5	0304-00804-0010
.025 Auto Insert Pins	35	J3, J4	0304-00804-0009
TEST POINT	8	TP1-TP7, GND.	0017-00007-0131
Jumper Wire 24awg.	2	P/O C26	0017-00033-0448
Solder Lug	2	P/O C26	0017-00021-0257
Heatsink T05	1	P/O Q23	112E-00001-0004
Insulator T05	2	P/O Q22, Q23	0017-00042-0151
Heatsink T066	1	P/O Q21	112E-00001-0002
Insulator T066	1	P/O Q21	0017-00042-0158
6-32 X 12 Screw	4	P/O Q20, Q21	0017-00101-0132
6-32 X 5 Screw	2	P/O Q21	0017-00101-0767
6-32 Hex Nut	4	P/O Q20, Q21	0017-00103-0005
145-.290-019 Lockwasher	4	P/O Q20, Q21	0017-00104-0008
145-.313-019	4	P/O Q21	0017-00104-0009
145-.375-032 Flat Washer	4	P/O Q20, Q21	0017-00104-0106
6-32 Tapped Hex Spacer	2	Hex Spacer P/O Q21	0017-00042-0248
Heatsink T03	1	Heatsink P/O Q20	112E-00001-0003
Insulator T03	1	Insulator P/O Q20	0017-00042-0119
High Voltage Label	1	Tape Label P/O Q21	M051-00044-0000
48VDC Relay	1	K1	114E-00001-0011
P.C.B.	1	Solenoid Driver/Pwr Sply Bd.	A080-91612-A000

REVISIONS

PROJECT ENG: A. AARSTAD		USED ON		Bally / MIDWAY MFG. CO. FRANKLIN PK ILL
DO NOT SCALE DWG		HEAT TREAT	NO. REQ'D	
DIM TOLERANCES UNLESS SPECIFIED	DRW. BAK	MAT'L	ASSEMBLY DWG. SOLENOID DRIVER/PWR. SUPPLY BD.	
DATE 11/27/84	FINISH	PART NO. M051-00114 - A046		
A080-91612-A000				

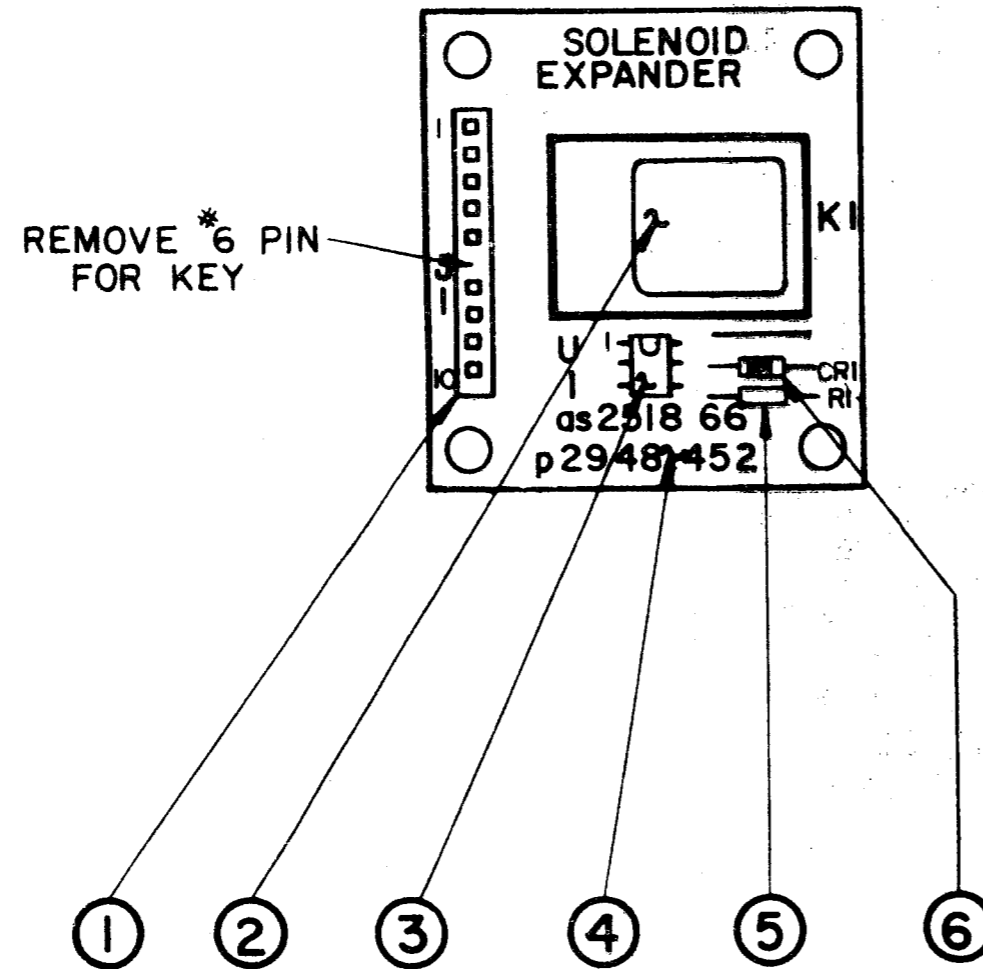
DESIGNATION NO.	DESCRIPTION	DESIGNATION NO.	DESCRIPTION
C1	4.7 UF TANT	R49,R50	1.2K
C2-C4	.01 UF	R51	110
C5,C6	820 PF	R52	30K
C7	.01 UF	R53	10K
C8	.1 UF	R54-R57	5.1K
C9-C12	390 PF	R58-R65	1.2K
C13	.015 UF	R66-R69	5.1K
C14	.01 UF	R70-R81	1.2K
C15	4.05 UF	R82-R90	47K
C16	.01 UF	R91	3.3K
C17-C20	390 PF	R92-R95	56K
C21-C29	820 PF	R96	3.3K
C30,C31	390 PF	R97	30K
C32	3000 PF	R98-R113	1.2K
C33-C39	470 PF	R114	1.5M
C40-C42	.01 UF	R115	750K
C43-C47	470 PF	R116-R124	3.3K
C48-C51	390 PF	R125-R129	56K
C52-C56	470 PF	R130	1K
C57-C65	390 PF	R131-R135	1.2K
C66,C67	470 PF		
C68	.01 UF	D1	1N4148 *
C70	4.7 UF FANT	D2	1N9588 ZENER
C71	.01 UF	D3-D5	1N4148
C72,C73	33 PF	D6	1N4148
C74-C81	390 PF	D7-D45	1N4148
C82	.22 UF	LED 1	LED (GREEN)
C83,C84	.01 UF		
H1,R2	3K	Q1	2N3904
H3	270	Q2	2N4403
H4	2K	Q3,Q4	2N3904
H5	150K	U1	4049B
H6	1K	U2	4011
H7	9.1K	U3	4049B
H8	680	U4	74LS00
H9	100K	U5	4502
H10	1.5K	U6	5114 RAM
H11	3K	U7	74LS00
H12	750	U8,U17	6821
H13	470 1/2W	U9	6802
H14	4.7K	U10	555
H15	8.2K	BT 1	BATTERY 3.6VDC
H16	2K *	S1-S32	DIP SWITCH
H17	33K *	S33	PUSH BUTTON SW
H18	82 1W	U6	18 PIN SOCKET
H19	3.3K	U7	28 PIN SOCKET
H20	8.2K	U8,U12	24 PIN SOCKET
H21	1K	U16-U18	40 PIN SOCKET
H22	470	J1-J5	.025 SQ PIN
H23	7.5K	TP1-TP7	TEST POINT LOOP
H24	2K		TY-WRAP JUMPR WIRE
H25	1.5M	L1,L2	.22 UH INDUCTOR
H26	270K	XTAL 1	CRYSTAL 2.000 MHZ
H27-R34	1.2K	P.C.B	A084-91638-DU00
H35-R37	470		
H38-R41	330		
H42	470		
H43	24K		
H44	4.7K		
H45-R48	56K		



DESCRIPTION	QTY	DESIGNATION NO.	PART NOS.	DESCRIPTION	QTY	DESIGNATION NO.	PART NOS.
33 PF AX CER	2	C72,C73	0395-00800-0002	1N4004	1	D6	103E-00003-0005
390 PF AX CER	23	C9-C12,C17-C20, C30,C31,C48-C51, C57-C65	0360-00800-0001	1N4148	43	D1,D3-D5,D7-D45	103E-00002-0005
470 PF AX CER	27	C33-C39,C43-C47, C52-C56,C66,C67, C74-C81	0360-00800-0002	1N9588 ZENER	1	D2	103E-00001-0002
820 PF AX CER	11	C5,C6,C21-C29	0360-00800-0004	LED	1	LED 1	119E-00001-0001
3000 PF	1	C32	0360-00800-0025	2N3904	3	Q1,Q3,Q4	104E-00001-0006
.01 UF	13	C2-C4,C7,C14, C16,C40-C42,C68, C71,C83,C84	0360-00800-0005	2N4403	1	Q2	104E-00002-0006
.015 UF	1	C13	0395-00800-0001	555	1	U19	0360-00803-0001
.05 UF	1	C15	0360-00800-0006	4011	1	U2	0360-00803-0010
.1 UF	1	C8	0360-00800-0007	4049B	2	U1,U3	0360-00803-0011
.22 UF TANT	2	C82	0360-00800-0057	4502	1	U5	0360-00803-0005
		C1,C70	0360-00800-0008	5114 RAM	1	U6	0395-00803-0003
				6802	1	U18	0395-00803-0002
				6821	2	U16,U17	0360-00803-0017
				74LS00	2	U4,U14	0360-00803-0052
				74NC4538	1	U15	0395-00803-0001
82,1W	1	R18	100E-00007-0014	BATTERY 3.6VDC	1	BT 1	0017-00003-0172
110	1	R51	100E-00005-0034				
270	1	R3	100E-00005-0044				
330	4	R58-R41	100E-00005-0047				
470,1/2W	1	R13	100E-00006-0034				
470	5	R22,R35-R37,R42	100E-00005-0051				
680	1	R8	100E-00005-0056				
750	1	R12	100E-00005-0057				
1K	3	R6,R21,R130	100E-00005-0061				
1.2K	51	R27-R34,R49,R50, R58-R65,R70-R81, R98-R113,R131- R135	100E-00005-0063				
1.5K	1	R10	100E-00005-0065				
2K	3	R4,R24(R16 OPT.)	100E-00005-0068				
3K	3	R1,R2,R11	100E-00005-0073				
3.3K	12	R19,R91,R96,R116- R124	100E-00005-0074				
4.7K	2	R14,R44	100E-00005-0079				
5.1K	8	R54-R57,R66-R69	100E-00005-0080				
7.5K	1	R23	100E-00005-0085				
8.2K	2	R15,R20	100E-00005-0086				
9.1K	1	R7	100E-00005-0087				
10K	1	R53	100E-00005-0088				
24K	1	R43	100E-00005-0097				
30K	2	R52,R97	100E-00005-0099				
33K	1	R17	100E-00005-0100				
47K	9	R82-R90	100E-00005-0104				
56K	13	R45-R48,R92-R95, R125-R129	100E-00005-0106				
100K	1	R9	100E-00005-0115				
150K	1	R5	100E-00005-0120				
270K	1	R26	100E-00005-0126				
750K	1	R115	100E-00005-0137				
1.5M	2	R25,R114	100E-00005-0143				

PROJECT ENG: A. AARSTAD		USED ON PINBALL		REVISIONS	
DO NOT SCALE DIMS	DATE	NO REQS	Bathy / MIDWAY MFG. CO. FRANKLIN, PA. U.S.A.		
TIM TOLERANCES UNLESS SPECIFIED	DES. J.S.	6802 MPU ASSY DRAWING A084-91638-DU00		PART NO M051 - 00114 - 0076	
DECIMAL	DATE 9/18/84				

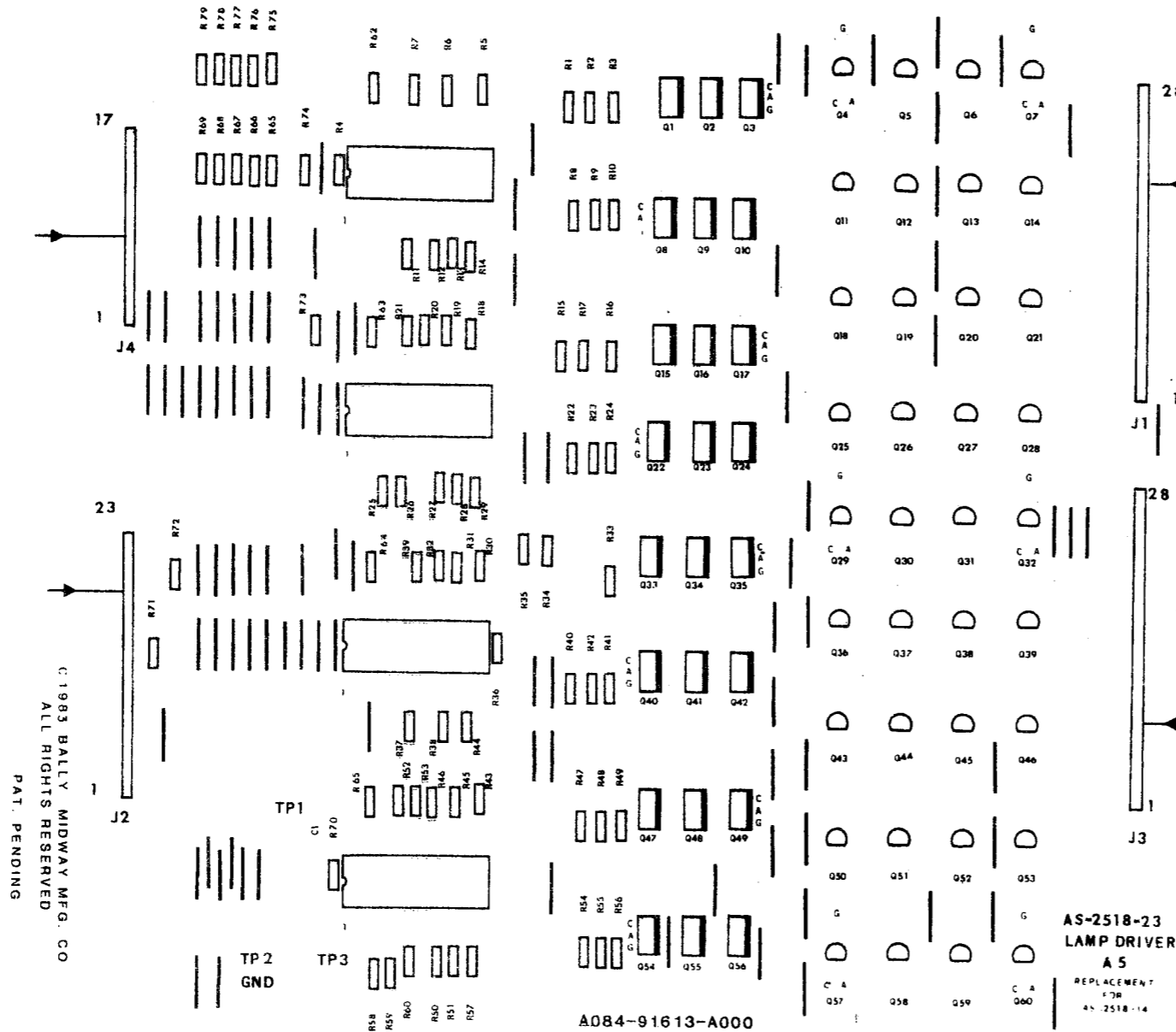
A15: SOLENOID EXPANDER ASSEMBLY
AS-2518-66



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
Ref.		W-1251-1	Schematic

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
C1	.01 MF 500V
R1-R60	2K 5% 1/4W
R61-R69	2.2M 5% 1/4W
R70	2K 5% 1/4W
R71-R79	20K 5% 1/4W
Q1-Q3	MCR106-1
Q4-Q7	2N5060
Q8-Q10	MCR106-1
Q11-Q14	2N5060
Q15-Q17	MCR106-1
Q18-Q21	2N5060
Q22-Q24	MCR106-1
Q25-Q32	2N5060
Q33-Q35	MCR106-1
Q36-Q39	2N5060
Q40-Q42	MCR106-1
Q43-Q46	2N5060
Q47-Q49	MCR106-1
Q50-Q53	2N5060
Q54-Q56	MCR106-1
Q57-Q60	2N5060
U1-U4	MC14514B
J1	28 PIN WAFER CONN.
J2	23 PIN WAFER CONN.
J3	28 PIN WAFER CONN.
J4	17 PIN WAFER CONN.
TP1-TP3	TEST CLIP LABEL JUMPER, 22 AWG P.C. BOARD



CROSS REFERENCE LIST

DESCRIPTION	QTY	DESIGNATION NO.	BALLY'S PART NOS.	MIDWAY'S PART NOS.
.01 MF 500V	1	C1	E-00586-0065	0360-00800-0013
2.2M 5% 1/4W	9	R61-R69	E-00105-0256	0062-33983-1XXX
2K 5% 1/4W	61	R1-R60, R70	E-00105-0237	0062-19383-1XXX
20K 5% 1/4W	9	R71-R79	E-00105-0242	0062-24183-1XXX
MCR106-1	24	Q1-Q3, Q8-Q10, Q15-Q17, Q22-Q24, Q33-Q35, Q40-Q42, Q47-Q49, Q54-Q56	E-00585-0029	0360-00802-0009
2N5060	36	Q4-Q7, Q11-Q14, Q18-Q21, Q25-Q32, Q36-Q39, Q43-Q46, Q50-Q53, Q57-Q60	E-00585-0014	0360-00802-0005
MC14514B	4	U1-U4	E-00620-0037	0360-00803-0013
17 PIN WAFER CONN.	1	J4	E-00715-0013	0151-00030-17XB
23 PIN WAFER CONN.	1	J2	E-00715-0014	0151-00030-23XB
28 PIN WAFER CONN.	2	J1, J3	E-00715-0004	0151-00030-28XB
TEST CLIP LABEL	3	TP1-TP3	P-05399	0017-00007-0131
JUMPER, 22 AWG	1			0017-00081-0097
P.C. BOARD	99		M-1777-126	0069-230XX-XBKX
	1		P-02948-0301	A080-91613-A000

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 PAT. PENDING

REVISIONS

PROJECT ENG	USED ON	Bally / MIDWAY MFG. CO. FRANKLIN PK ILL
DO NOT SCALE DWG	SCALE FULL NO REQ'D I PER	
DIM TOLERANCE UNLESS SPECIFIED	DATE 05/31/83	LAMP DRIVER ASSY DWG A084-91613-A000
PART NO		M051 - 00114 - A04

FIREBALL CLASSIC QM40

DESCRIPTION	JACK	PIN	WIRE COLOR
RT. ARROW SPCL.	J3	2	95
BALL IN PLAY	J2	22	62
BALL RELEASE	J1	5	48
BONUS 2K	J1	23	12
BONUS 4K	J1	3	45
BONUS 6K	J3	17	13
BONUS 8K	J3	11	93
BONUS 10K	J1	14	67
BONUS 12K	J1	2	52
BONUS 14K	J3	16	25
BONUS 16K	J3	9	15
BONUS 18K	J1	15	31
BONUS 20K	J1	16	15
BONUS 40K	J1	7	34
BONUS 60K	J3	27	40
BONUS SPCL.	J3	4	14
CREDIT INDICATOR	J3	13	35
GAME OVER BACK BOX	J2	11	95
HIGH SCORE BACK BOX	J2	23	97
LT. KICKER ARROW	J3	23	98
MATCH	J2	8	82
MOTOR CONTROL	J3	3	81
RT. MUSHROOM ARROW	J3	10	91
LT. MUSHROOM ARROW	J3	21	64
SAUCER LT. 10K	J1	18	58
SAUCER LT. 20K	J1	1	41
SAUCER LT. 30K	J3	26	43
SAUCER LT. 40K	J3	1	10
SAUCER LT. 50K	J1	19	60
SAUCER RT. BOT. 30K	J1	9	43
SAUCER RT. MID. 30K	J3	25	36
SAUCER RT. TOP 30K	J3	12	21
SPSA BACK BOX	J2	21	47
SPSA PLAYFIELD	J2	26	91
SPCL. RT. LITE	J1	24	50
THUMPER BUMPER TOP & MID.	J1	10	32
TILT	J2	10	35
2X	J1	17	57
3X	J1	8	51
4X	J3	19	67
5X	J3	15	53
VALUE DOUBLE	J3	20	78
VALUE TRIPLE	J3	18	56

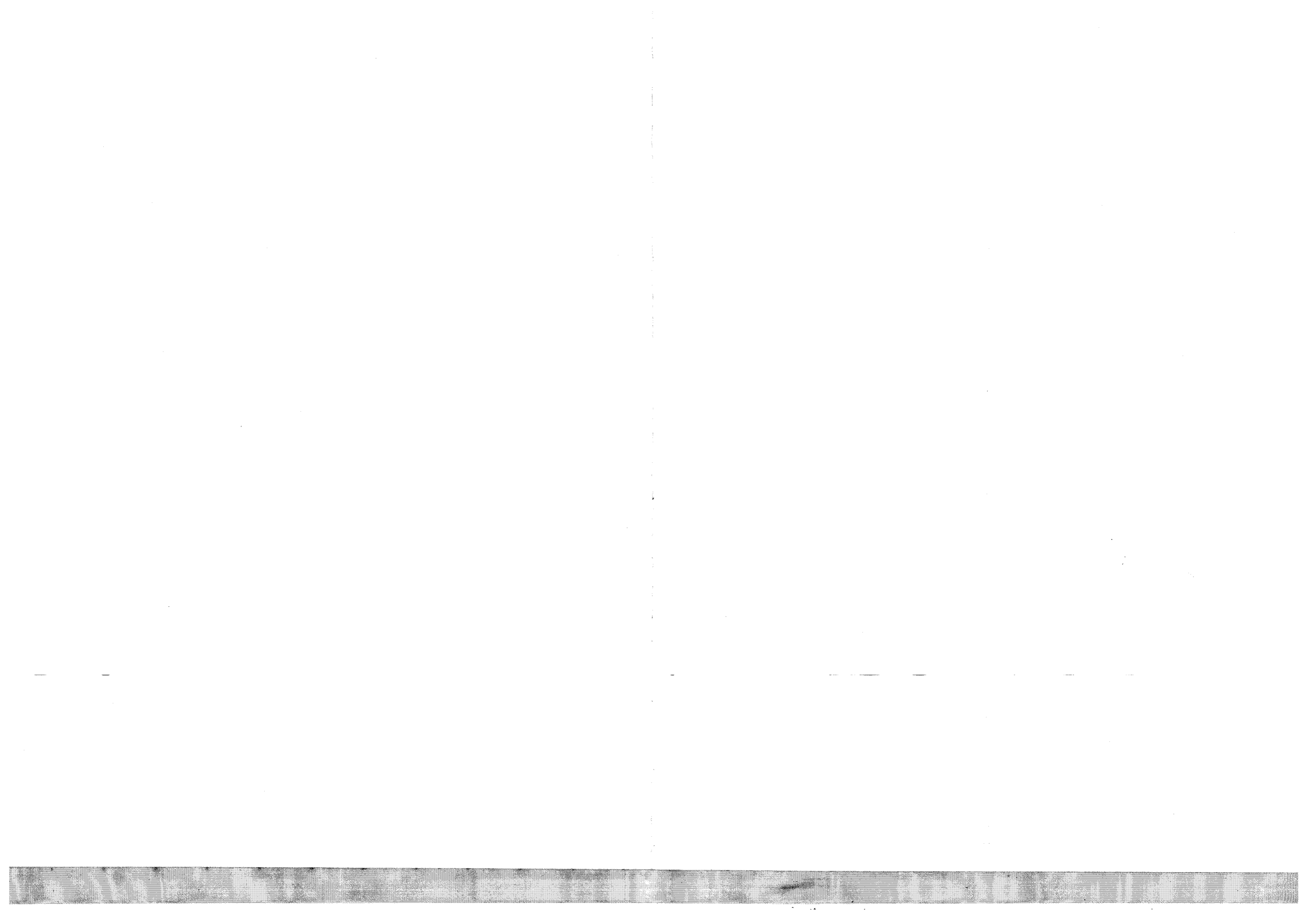
NOTE: ** INDICATES MCR 106-1 ALL OTHERS ARE -2N5060 OR EQUIVALENT.

FIREBALL CLASSIC SOLENOID DRIVER LOCATIONS AS

TRANSISTOR	DESCRIPTION	JACK	PIN	WIRE COLOR
Q14	BUMPER BOTTOM	J5	11	78
Q13	BUMPER MIDDLE	J5	12	80
Q8	BUMPER TOP	J5	10	85
Q19	COIN BOX LOCKOUT	J2	8	36
	FLIPPERS			
Q17	GATE	J5	7	91
Q4	SIDE RETURN KICKER	J1	5	95
Q16	KNOCKER	J2	5	85
Q12	OUTHOLE	J5	13	67
Q11	BALL RELEASE	J5	14	83
Q2	SAUCER LT.	J1	3	
Q1	SAUCER RT.	J1	2	
Q9	SLINGSHOT LT.	J5	9	71
Q10	SLINGSHOT RT.	J5	15	74

NOTE: TRANSISTORS ARE SE9302 OR EQUIVALENT.

WIRE COLOR CODE	
1 - RED -R-	6 - BROWN -BR-
2 - BLUE -BLU-	7 - ORANGE -O-
3 - YELLOW -Y-	8 - BLACK -B-
4 - GREEN	9 - GRAY
5 - WHITE -W-	0 - NO TRACER
J - JUMPER	
1 - FIRST NUMBER-BODY COLOR	
2 - SECOND NUMBER-TRACER COLOR	
EXAMPLE: 50 - WHITE	
51 - WHITE-RED	

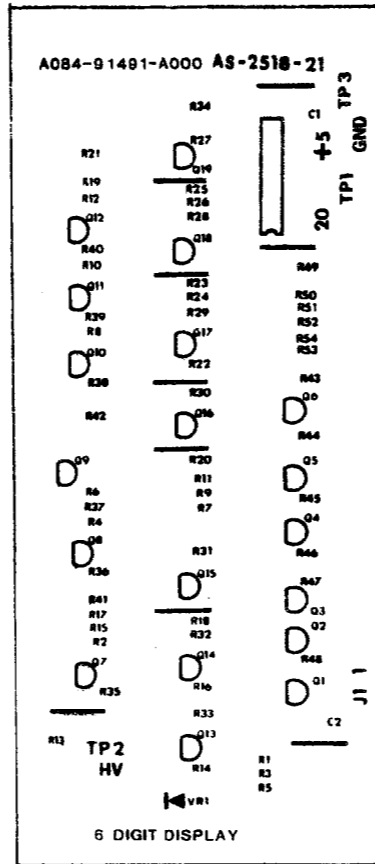


DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION	DESIGNATION NO.	DESCRIPTION
C1	.01 MF 25V	DS1MH	TACK-SCREW RPLCMNT
C2	.01 MF 500V		DISPLAY MTG. TOP
R1	100K OHM 1/4W 5%		DISPLAY MTG. BOTTOM
R2	2.2K OHM 1/4W 5%		PRESSURE SENSITIVE
R3	100K OHM 1/4W 5%		TAPE
R4	2.2K OHM 1/4W 5%		BUMPER
R5	100K OHM 1/4W 5%	J1	.045 SQ. PIN
R6	2.2K OHM 1/4W 5%		
R7	100K OHM 1/4W 5%	TP1-TP3	TEST POINTS
R8	2.2K OHM 1/4W 5%		
R9	100K OHM 1/4W 5%		JUMPER TIN 22 AWG
R10	2.2K OHM 1/4W 5%		
R11	100K OHM 1/4W 5%	A080-91491-A000	6 DIGIT DISPLAY
R12	2.2K OHM 1/4W 5%		
R13	1.5K OHM 1/4W 5%		
R14	300K OHM 1/4W 5%		
R15	1.5K OHM 1/4W 5%		
R16	300K OHM 1/4W 5%		
R17	1.5K OHM 1/4W 5%		
R18	300K OHM 1/4W 5%		
R19	1.5K OHM 1/4W 5%		
R20	300K OHM 1/4W 5%		
R21	1.5K OHM 1/4W 5%		
R22	300K OHM 1/4W 5%		
R23	1.5K OHM 1/4W 5%		
R24	300K OHM 1/4W 5%		
R25	1.5K OHM 1/4W 5%		
R26	300K OHM 1/4W 5%		
R27-R33	1.2K OHM 1/4W 5%		
R34	100K OHM 1/4W 5%		
R35-R40	300K OHM 1/4W 5%		
R41	39K OHM 1/4W 5%		
R42	240K OHM 1/4W 5%		
R43-R48	9.1K OHM 1/4W 5%		
R49-R54	20K OHM 1/4W 5%		
VR1	IN3045A		
Q1-Q6	MPS-A42		
Q7-Q12	2N5401		
Q13-Q20	MPS-A42		
U1	MC14543		
DS1	6 DIGIT DISPLAY PANEL		

CROSS REF. LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NUMBER
.01 MF 25V	1	C1	0360-00800-0005
.01 MF 500V	1	C2	0360-00800-0013
1.2K 1/4W 5%	7	R27-R33	100E-00005-0063
1.5K 1/4W 5%	7	R13, R15, R17, R19	100E-00005-0065
		R21, R23, R25	
2.2K 1/4W 5%	6	R2, R4, R6, R8, R10	100E-00005-0069
		R12	
9.1K 1/4W 5%	6	R43-R48	100E-00005-0087
20K 1/4W 5%	6	R49-R54	100E-00005-0095
39K 1/4W 5%	1	R41	100E-00005-0102
100K 1/4W 5%	7	R1, R3, R5, R7, R9	100E-00001-0011
METAL FILM		R11, R34	
240K 1/4W 5%	1	R42	100E-00005-0125
300K 1/4W 5%	13	R14, R16, R18, R20,	100E-00005-0127
		R22, R24, R26, R35-	
		R40	
IN3045A	1	VR1	103E-00001-0028
2N5401	6	Q7-Q12	104E-00002-0007
MPS-A42	13	Q1-Q6 Q13-Q20	104E-00001-0016
MC14543	1	U1	0360-00803-0014
6 DIGIT DISPLAY	1	DS1	0360-00804-0016
DS1 MTG. HDW			
TACK-SCREW RPLCMNT	2	DS1MH	0095-00900-0000
DISPLAY MTG. TOP	1		0017-00042-0155
DISPLAY MTG. BOTTOM	1		0017-00042-0156
PRESSURE SENSITIVE TAPE			0017-0081-0095
BUMPER	1		0017-00041-0598
.045 SQ. PIN	1	J1	0304-00804-0010
TEST POINTS	3	TP1-TP3	0017-00007-0131
JUMPER TIN 22 AWG	9		117E-00001-0001
6 DIGIT DISPLAY PCB.	1		A080-91491-A000



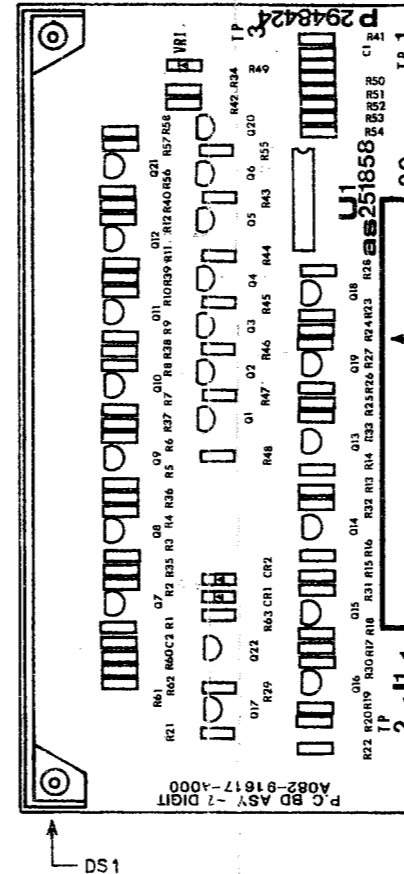
PROJECT ENG: A. AARSTAD		USED ON		REVISIONS	
DO NOT SCALE DWG.		HEAT TREAT	SCALE FULL	NO. REQ'D	PER
DIM TOLERANCES UNLESS SPECIFIED		ASSEMBLY DWG. SIX DIGIT DISPLAY		PART NO. MO51-00114 -A028	
DRG. BAK	DATE 11/14/84	A082-91491-A000		Bally / MIDWAY MFG. CO. FRANKLIN PK ILL	

DESIGNATION LIST

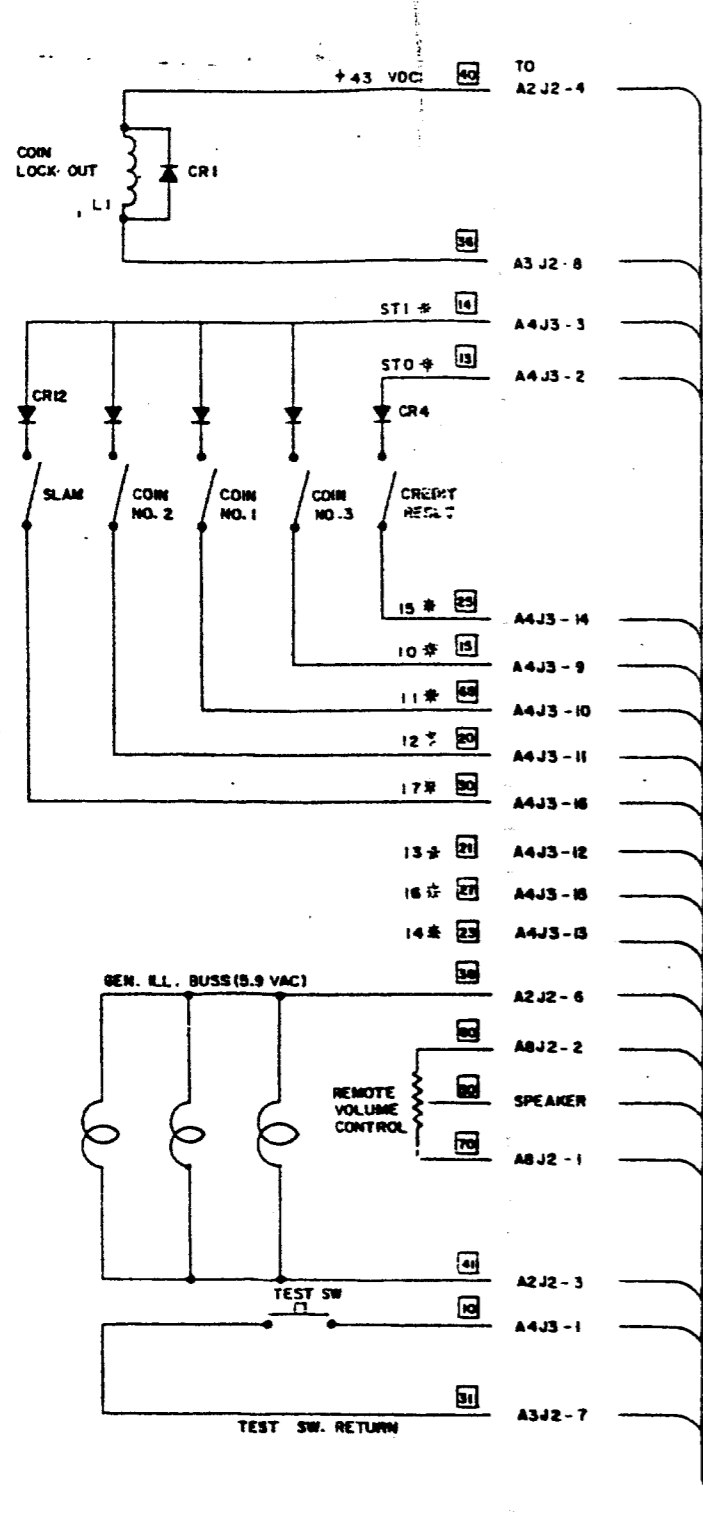
DESIGNATION NO.	DESCRIPTION	DESIGNATION NO.	DESCRIPTION
C1	.01 MF 25V	CR1,CR2	1N4148
C2	.01 MF 500V	VR1	1N3045A/110V ZENER
R1	100K OHM 1/4W 5%	Q1-Q6	MPS-A42
R2	2.2K OHM 1/4W 5%	Q7-Q12	2N5401
R3	100K OHM 1/4W 5%	Q13-Q20	MPS-A42
R4	2.2K OHM 1/4W 5%	Q21	2N5401
R5	100K OHM 1/4W 5%	Q22	MPS-A42
R6	2.2K OHM 1/4W 5%	U1	MC14543
R7	100K OHM 1/4W 5%	DS1	DISPLAY ASS'Y
R8	2.2K OHM 1/4W 5%	J1	10 PIN WAFER KK-156 (2)
R9	100K OHM 1/4W 5%	TP1-TP3	TEST LOOPS
R10	2.2K OHM 1/4W 5%		7 DIGIT DISPLAY PCB
R11	100K OHM 1/4W 5%		BUMPER
R12	2.2K OHM 1/4W 5%		
R13	1.5K OHM 1/4W 5%		
R14	300K OHM 1/4W 5%		
R15	1.5K OHM 1/4W 5%		
R16	300K OHM 1/4W 5%		
R17	1.5K OHM 1/4W 5%		
R18	300K OHM 1/4W 5%		
R19	1.5K OHM 1/4W 5%		
R20	300K OHM 1/4W 5%		
R21	1.5K OHM 1/4W 5%		
R22	300K OHM 1/4W 5%		
R23	1.5K OHM 1/4W 5%		
R24	300K OHM 1/4W 5%		
R25	1.5K OHM 1/4W 5%		
R26	300K OHM 1/4W 5%		
R27-R33	1.2K OHM 1/4W 5%		
R34	100K OHM 1/4W 5%		
R35-R40	300K OHM 1/4W 5%		
R41	39K OHM 1/4W 5%		
R42	240K OHM 1/4W 5%		
R43-R48	9.1K OHM 1/4W 5%		
R49-R54	20K OHM 1/4W 5%		
R55	9.1K OHM 1/4W 5%		
R56	100K OHM 1/4W 5%		
R57	2.2K OHM 1/4W 5%		
R58	300K OHM 1/4W 5%		
R59	NOT USED		
R60,R61	1.5K OHM 1/4W 5%		
R62	300K OHM 1/4W 5%		
R63	150K OHM 1/4W 5%		

CROSS REFERENCE LIST

DESCRIPTION	QTY	DESIGNATION NO.	BALLY'S PART NOS.	MIDWAY'S PART NOS.
.01 MF 25V	1	C1	E-586-85	0360-00800-0005
.01 MF 500V	1	C2	E-586-65	0360-00800-0013
1.2K 1/4W 5%	7	R27-R33	E-105-222	100E-00005-0063
1.5K 1/4W 5%	9	R13,R15,R17,R19 R21,R23,R25,R60 R61	E-105-229	100E-00005-0065
2.2K 1/4W 5%	7	R2,R4,R6,R8,R10 R12,R57	E-105-287	100E-00005-0069
9.1K 1/4W 5%	7	R43-R48,R55	E-105-228	100E-00005-0087
20K 1/4W 5%	6	R49-R54	E-105-242	100E-00005-0095
39K 1/4W 5%	1	R41	E-105-231	100E-00005-0102
100K 1/4W 5%	8	R1,R3,R5,R7,R9, R11,R34,R56	E-105-331	100E-00001-0011
150K 1/4W 5%	1	R63	E-105-248	100E-00001-0120
240K 1/4W 5%	1	R42	E-105-271	100E-00001-0125
300K 1/4W 5%	15	R14,R16,R18,R20, R22,R24,R26,R35- R40,R58,R62	E-105-227	100E-00001-0127
1N3045A/110V ZENER	1	VR1	E-598-7	103E-00001-0028
1N4148	2	CR1,CR2	E-587-14	103E-00002-0005
2N5401	7	Q7-Q12,Q21	E-585-32	0360-00802-0006
MPS-A42	15	Q1-Q6,Q13-Q20,Q22	E-585-33	0360-00802-0007
MC14543	1	U1	E-620-38	0360-00803-0014
7 DIGIT DISPLAY DS1 MTG. HDW TACK - SCREW REPLACEMENT	1 2	DS1	E-680-7	0360-00804-0022 0095-00900-0000
DISPLAY MTG. TOP	1		P-2399	0017-00042-0155
DISPLAY MTG. BOTTOM	1		P-2399-1	0017-00042-0156
PRESSURE SENSITIVE TAPE				0017-00081-0095
BUMPER	1		R-206-9	0017-00041-0598
10 PIN WAFER KK156	2	J1	E-736-10	0151-00031-10XB
TEST LOOPS	3	TP1-TP3	P-5399	0017-00007-0131
7 DIGIT DISPLAY PCB.	1		P-2948-424	A080-91617-A000



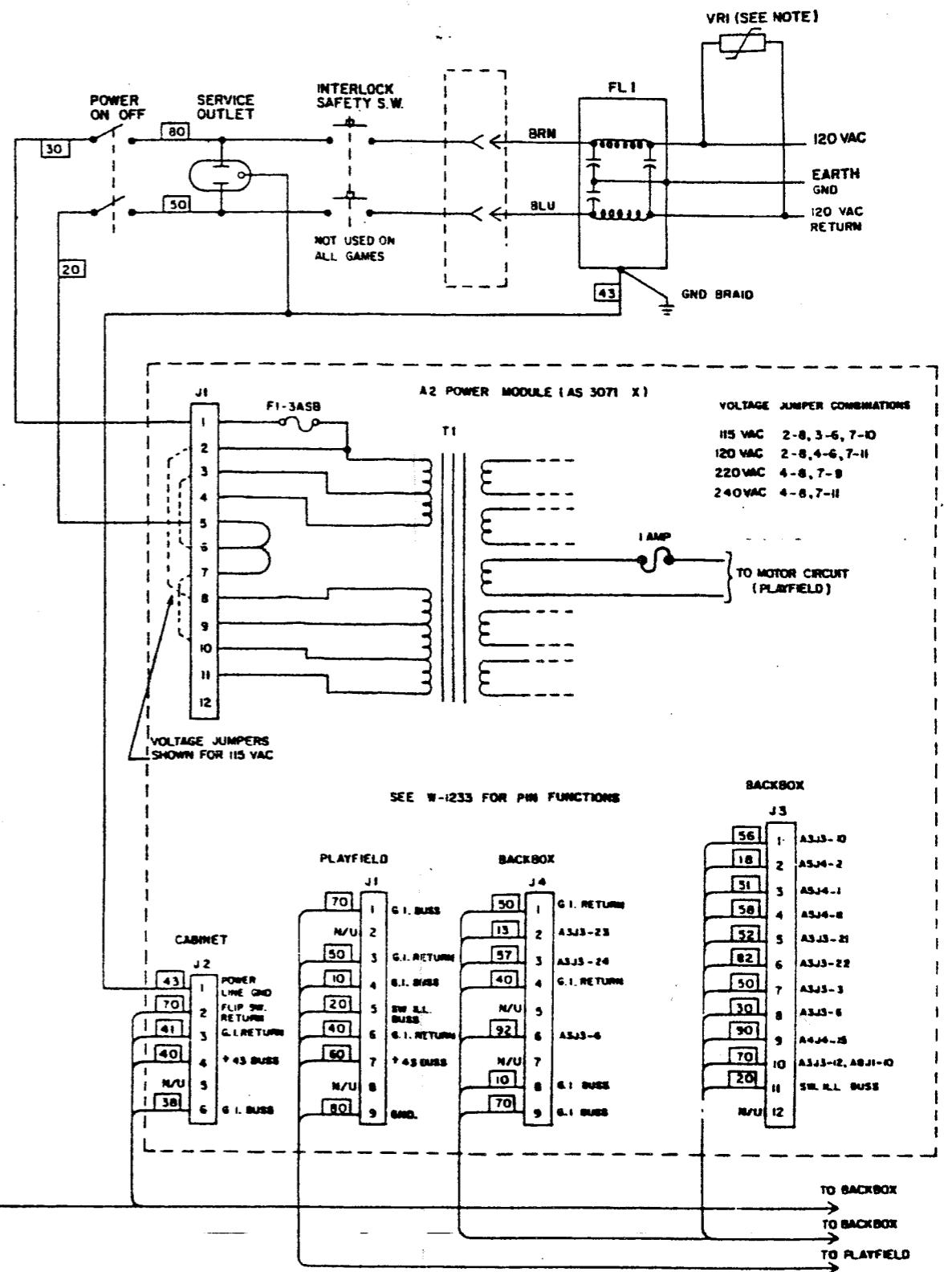
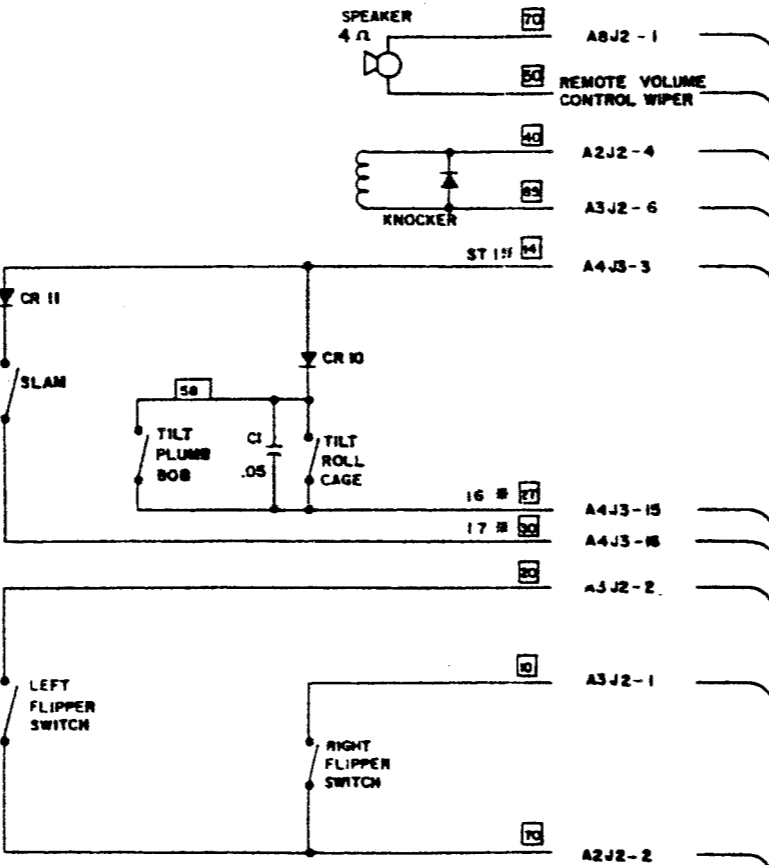
PROJECT ENG: D. MACDONALD		USED ON		REVISIONS	
DO NOT SCALE DWG.		HEAT TREAT	SCALE	NO. REQ'D PER	
DIM. TOLERANCE - UNLESS SPECIFIED		MAT'L	FULL	Bally / MIDWAY MFG. CO. FRANKLIN PK ILL	
DRG. TBK	FINISH	SEVEN DIGIT DISPLAY ASSY DWG. A082-91617-A000		PART NO. M051 - 00114 - A056	
CHKD					
DATE 12-09-83					



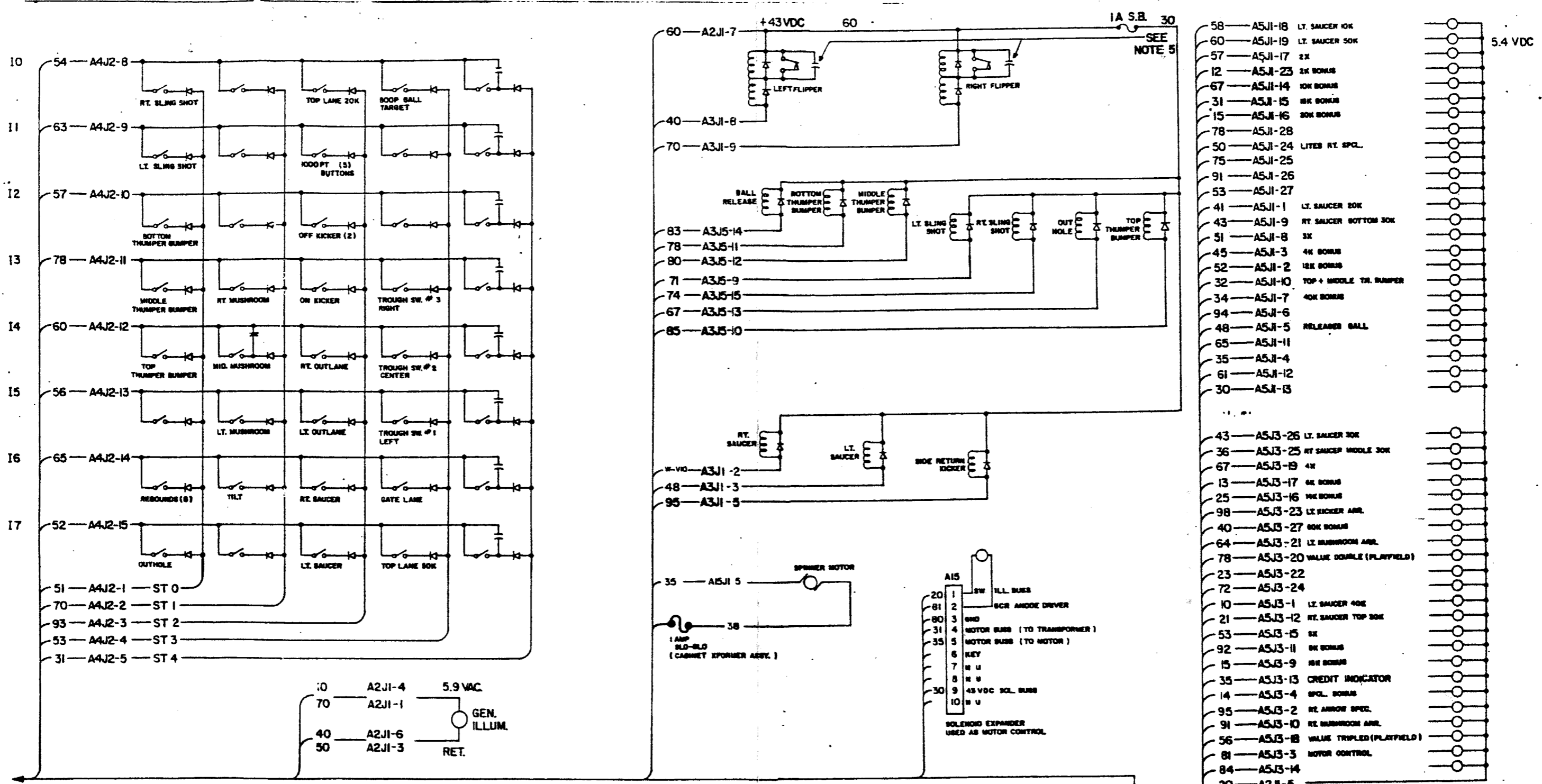
- NOTES: (CAUTION)
1. USE BALLY PART NO. E-713 FOR 115-120 VAC.
 2. USE BALLY PART NO. E-713-1 FOR 220-240 VAC
 3. * INDICATES AID TEST POINT.

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

A7 CABINET ASS'Y. WIRING
NOTE: DIODES ARE 1N4004. (E-587-6)



PROJECT ENG	DATE	REVISED	BY
DESIGNED BY	DATE	REVISED	BY
CHECKED BY	DATE	REVISED	BY
FIREBALL CLASSIC			CABINET WIRING SCHEMATIC
MONEY MFG. CO.			PART NO. MO51-00A40-4009



PLAYFIELD A6

- NOTES**
1. INDICATES NOT USED
 2. N/U = NOT USED ON PLAYFIELD
 3. * INDICATES AID TEST POINT
 4. COIL DIODES ARE IN4004
ALL CAPACITORS ARE .05 MFD.
 5. GERMANY ONLY - CAPACITOR .01 MFD. @ 500 V.

SWITCH DIODES ARE IN4148

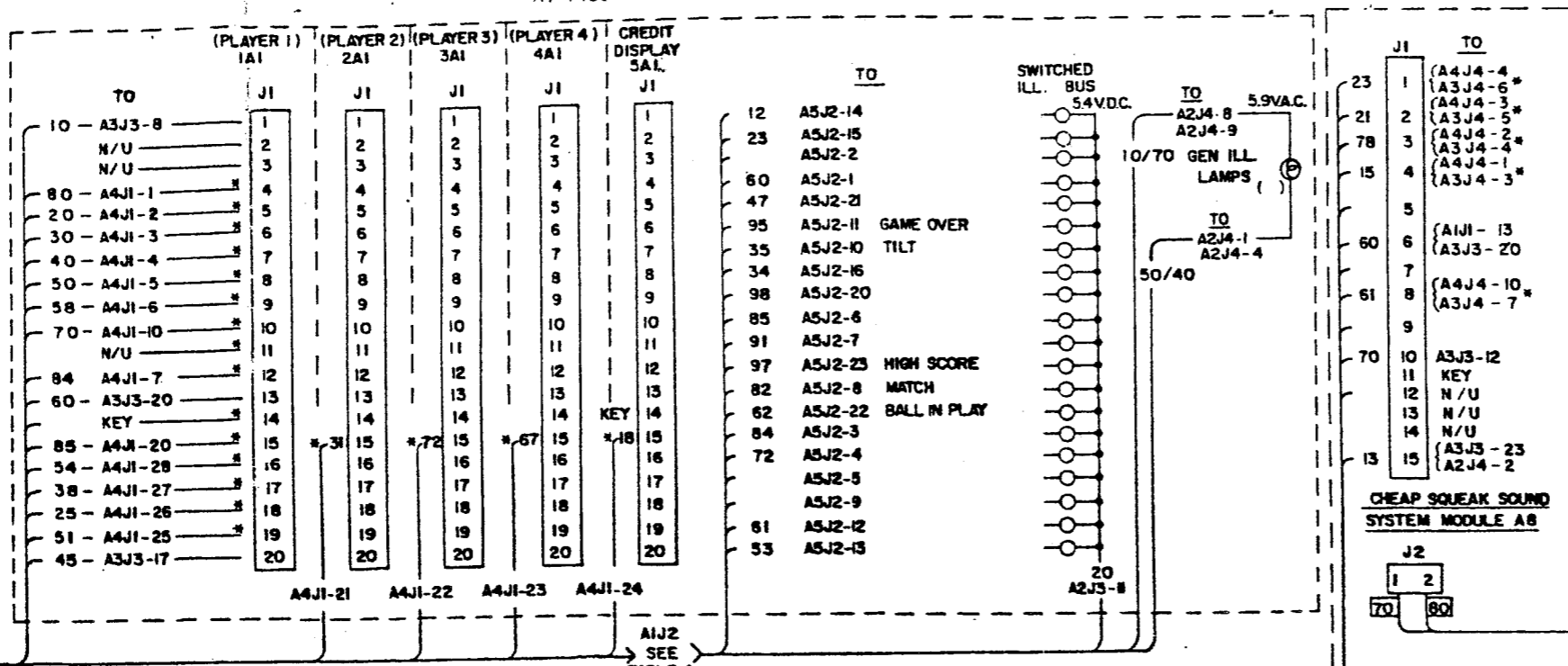
WIRE COLOR CODE	
1-RED	6-BROWN
2-BLUE	7-ORANGE
3-YELLOW	8-BLACK
4-GREEN	9-GRAY
5-WHITE	0-NO TRACE

PROJECT 158	ISSUED ON	MIDWAY MFG. CO.
REVISED BY	NO. REV'S PER	
FIRE BALL CLASSIC PLAYFIELD WIRING SCHEMATIC		PART NO. MOSI-00A40-A010

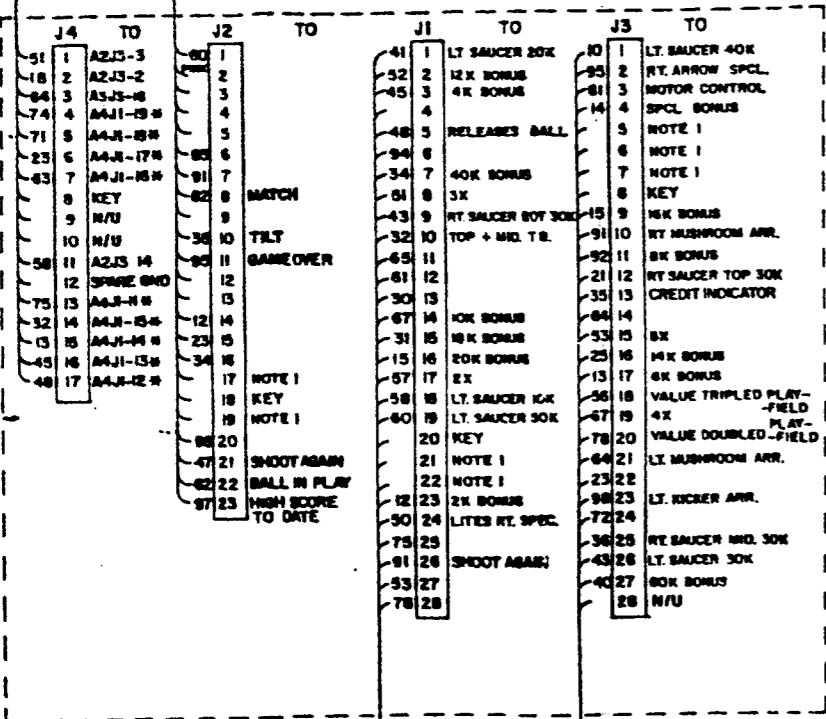
TABLE A AIJ2

FROM	PIN	WIRE
A2J4-8	1	10
A2J4-1	2	50
A5J2-14	3	12
A5J2-2	4	PINK
A5J2-15	5	23
A5J2-16	6	34
A5J2-10	7	35
A5J2-21	8	47
A5J2-1	9	60
A2J3-11	10	20
A5J2-22	11	62
A5J2-6	12	85
A5J2-7	13	91
A5J2-11	14	95
A5J2-23	15	97
A5J2-20	16	98
A5J2-8	17	82
	18	
	19	
	20	
	21	
	22	
A2J4-4	23	40
A2J4-9	24	70

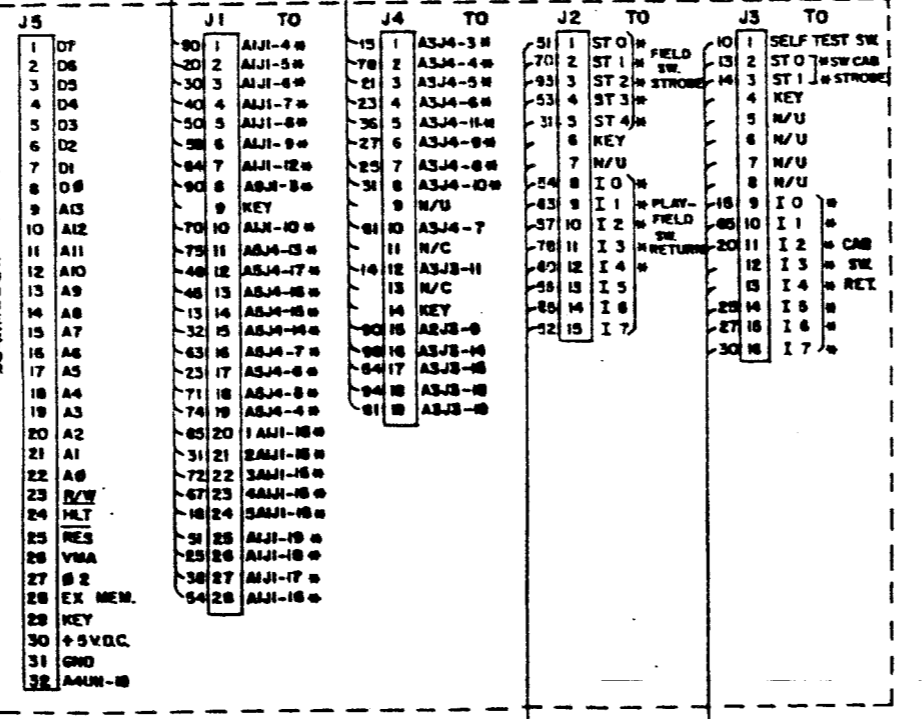
INSERT TO BACK CAB. PLUG



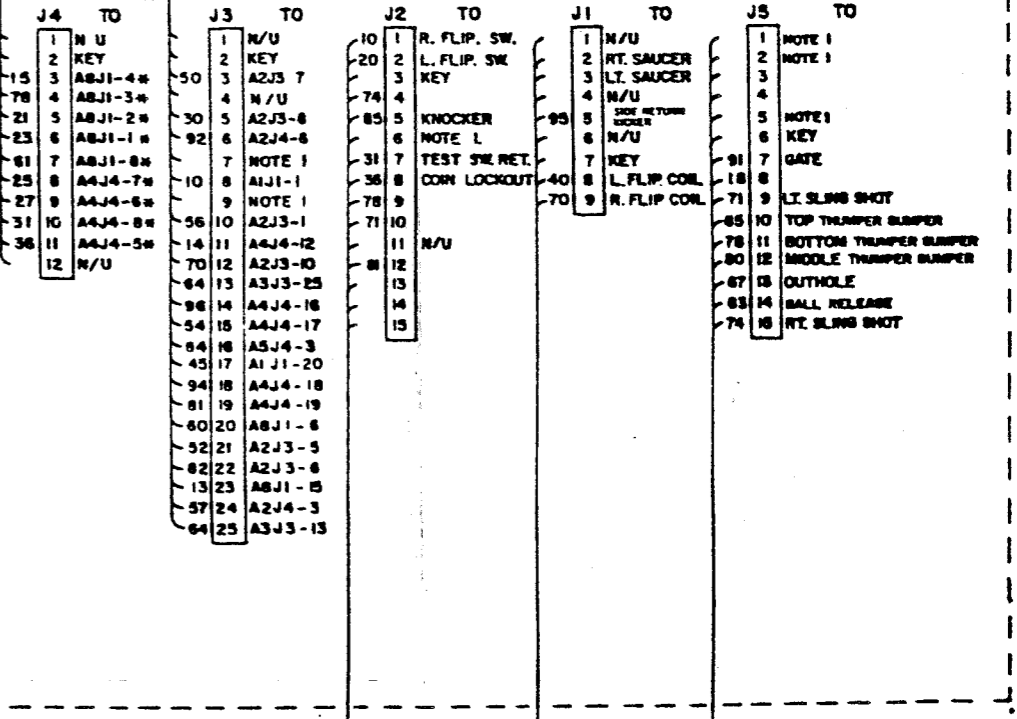
LAMP DRIVER A5



MPU A4



VOLTAGE REGULATOR / SOLENOID DRIVER A3



- 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

EXAMPLE:
 1. FIRST NUMBER = BODY COLOR
 2. SECOND NUMBER = TRACER COLOR
 50 = WHITE
 51 = WHITE RED

PROJECT #100

DATE: 10/10/64

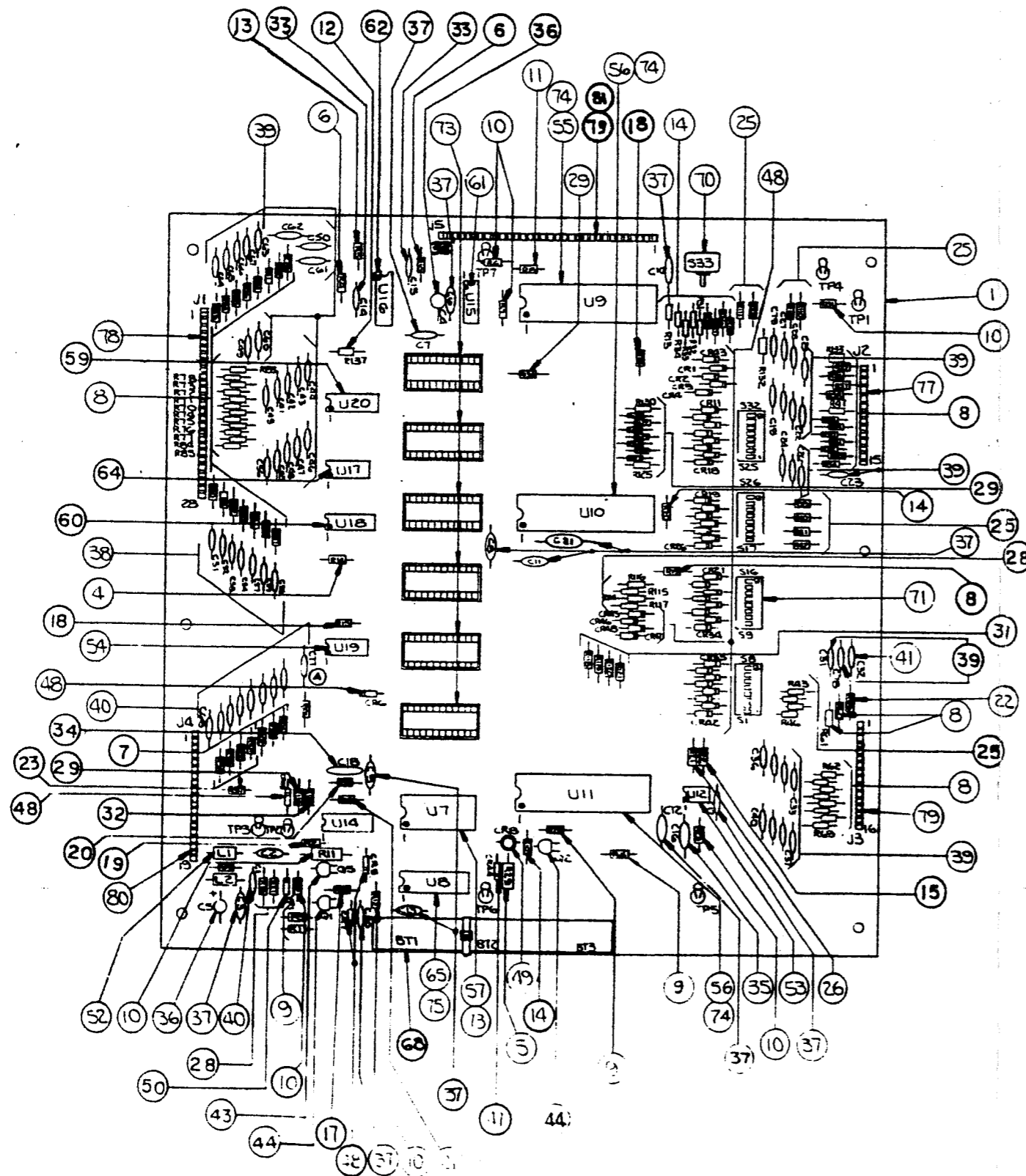
DESIGNER: M. KOMOPA

WIRING DIAGRAM BACK BOX

FIRE BALL CLASSIC PINGBALL

MOSEI - 00840-A011

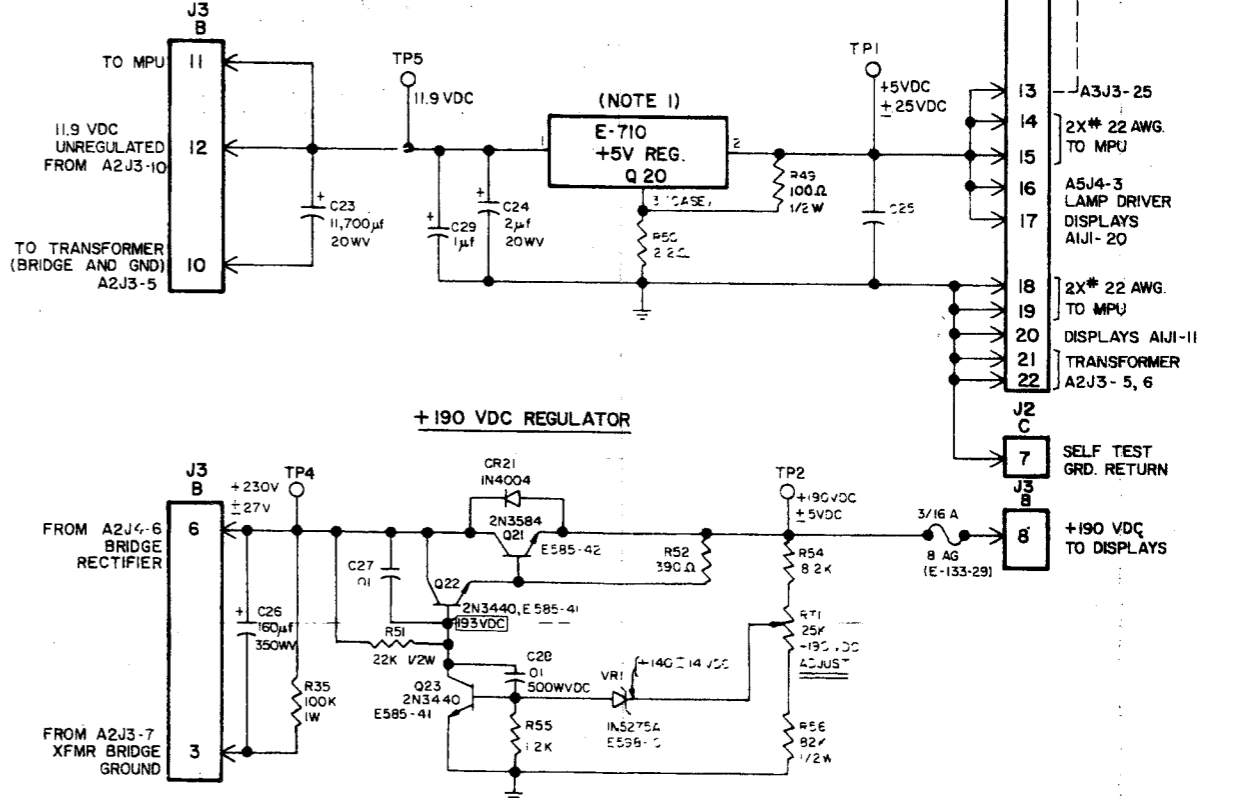
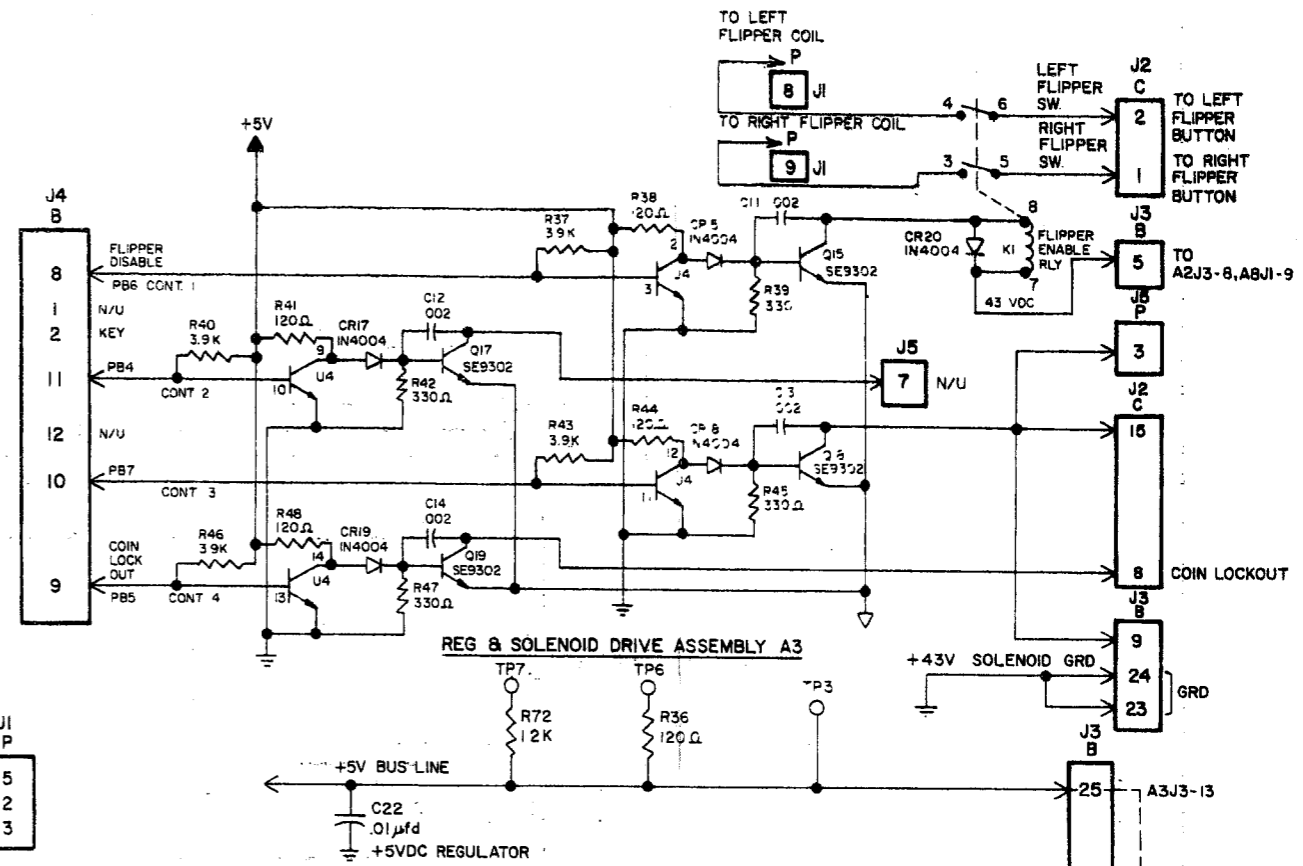
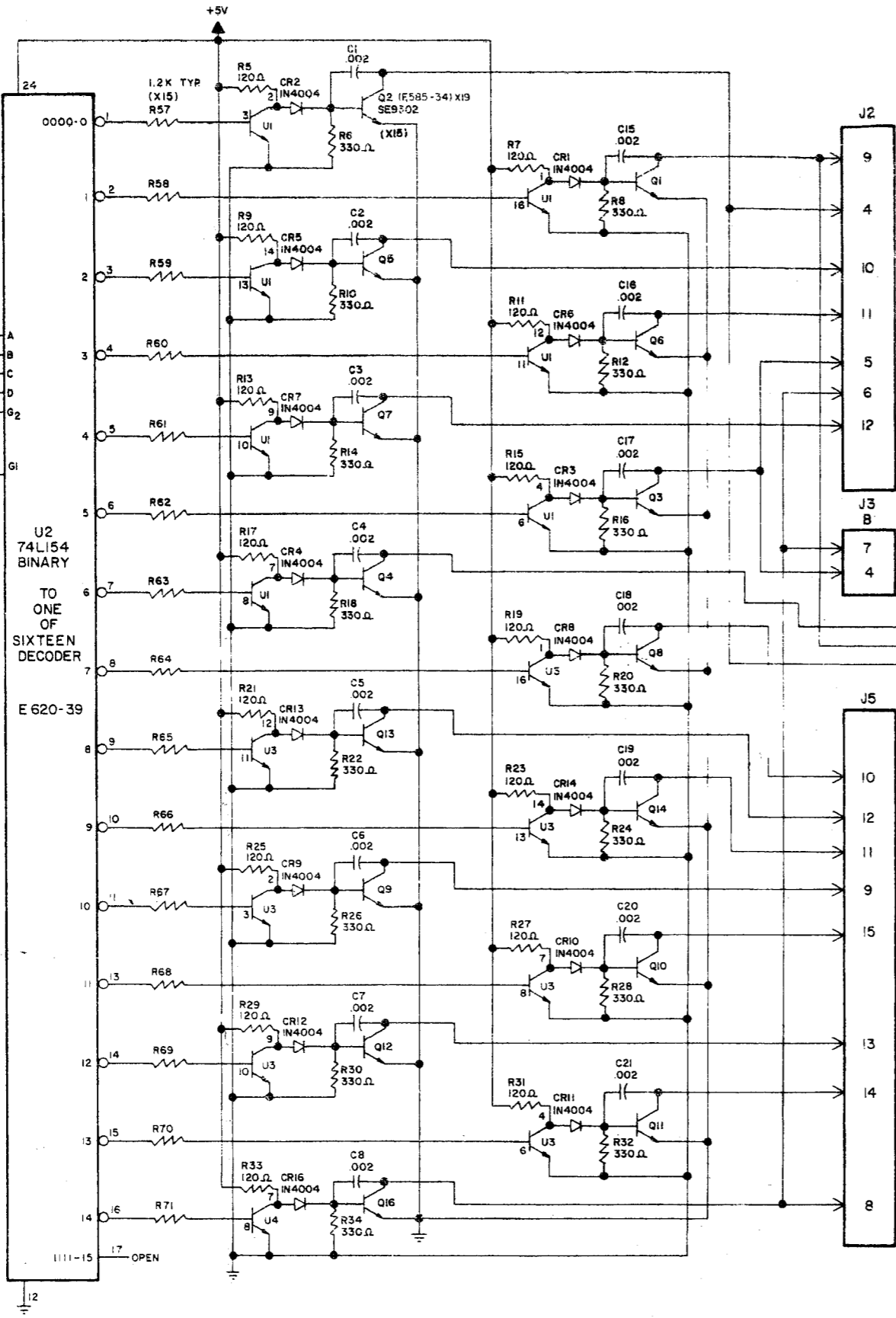
A082-91624-A000 MPU MODULE



A4: MPU MODULE
COMPONENT PARTS LIST

ITEM	REFERENCE DESIGNATION	BALLY PART #	DESCRIPTION
1	A4 (see note 1)	A084-91624-AA40	MPU Module Complete.
2	A4 (see note 2)	A082-91624-A000	MPU Module less Program Memory, U1-6 incl.
3-32	See Schematic		Resistors, See schematic for value
33	C14, C15	E-00586-0067	Capacitor, 470 PFD, 1kv
34	C18	E-00586-0088	Capacitor, .05 MFD, 16V
35	C16	E-00586-0081	Capacitor, .1 MFD, 100V
36	C4, C5	E-00586-0073	Capacitor, 4.5 MFD, 25V
37	C3, C6-C13, C17, C81	E-00586-0085	Capacitor, .01 MFD, 25V
38	C79, C41-C67	E-00586-0083	Capacitor, 470 PFD, 50V
39	C19-C31, C78, C33-C40	E-00586-0082	Capacitor, 390 PFD, 50V
40	C1, C2, C68-C77	E-00586-0084	Capacitor, 820 PFD, 50V
41	C32	E-00586-0077	Capacitor, 3000 PF, 1 kv
43	Q5	E-00585-0023	Transistor PNP (MPS-3702)
44	Q1, Q2	E-00585-0031	Transistor (2N3904)
47	CR44	E-00587-0006	Diode (1N4004)
48	CR1-CR7, CR11-CR43, CR45-CR49, CR52	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: Order replacement memory chips U1-U6, specifying game, socket and part number stamped on chip.



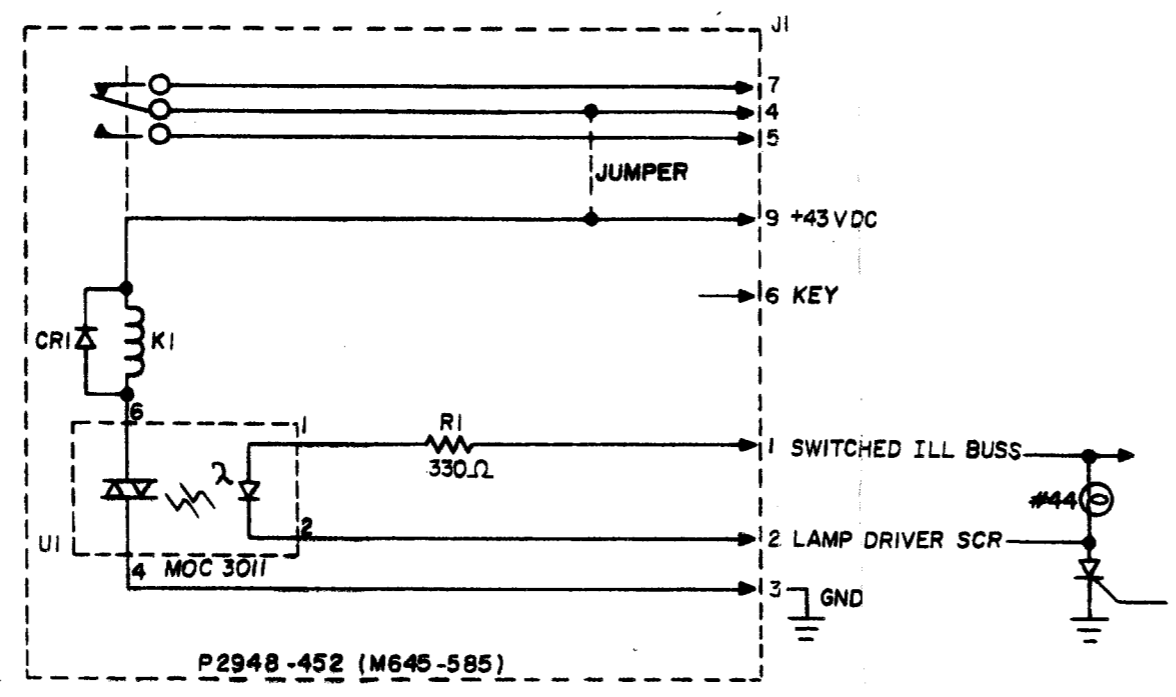
- NOTES:**
- E-710, LAMBDA-LAS 1405 NATIONAL -LM323K FAIRCHILD 78H05KC
 - J1-KK156-9 PIN KEY PIN 7
J2-KK156-15 PIN KEY PIN 3
J3-KK100-25 PIN KEY PIN 2
J4-KK100-12 PIN KEY PIN 2
J5-KK156-15 PIN KEY PIN 6
 - PREFIX ALL REFERENCE DESIGNATIONS WITH "A3"
 - "U1", "4", "3" PINS 5 AND 15 ARE GROUNDED.
 - VOLTAGES SHOWN ARE FOR A GAME-UP CONDITION.
 - "U1", "U3" AND "U4" ARE CA-3081.(E681)
 - * INDICATES 'AID' TEST POINT.

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

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

PROJECT ENG:	USED ON	NO. REQ'D	REVISIONS
DO NOT SCALE DWG.	SCALE		
DIM. TOLERANCES UNLESS SPECIFIED			
CONCENTRICITY ±.005			
FRACTIONAL DECIMAL			
HOLE DIA. ±.001-0.005			
SOLENOID DRIVER VOLTAGE REGULATOR SCHEMATIC			PART NO. MO51-00114-A047

OPER.	DEPT.	DESCRIPTION	TOOL NO.

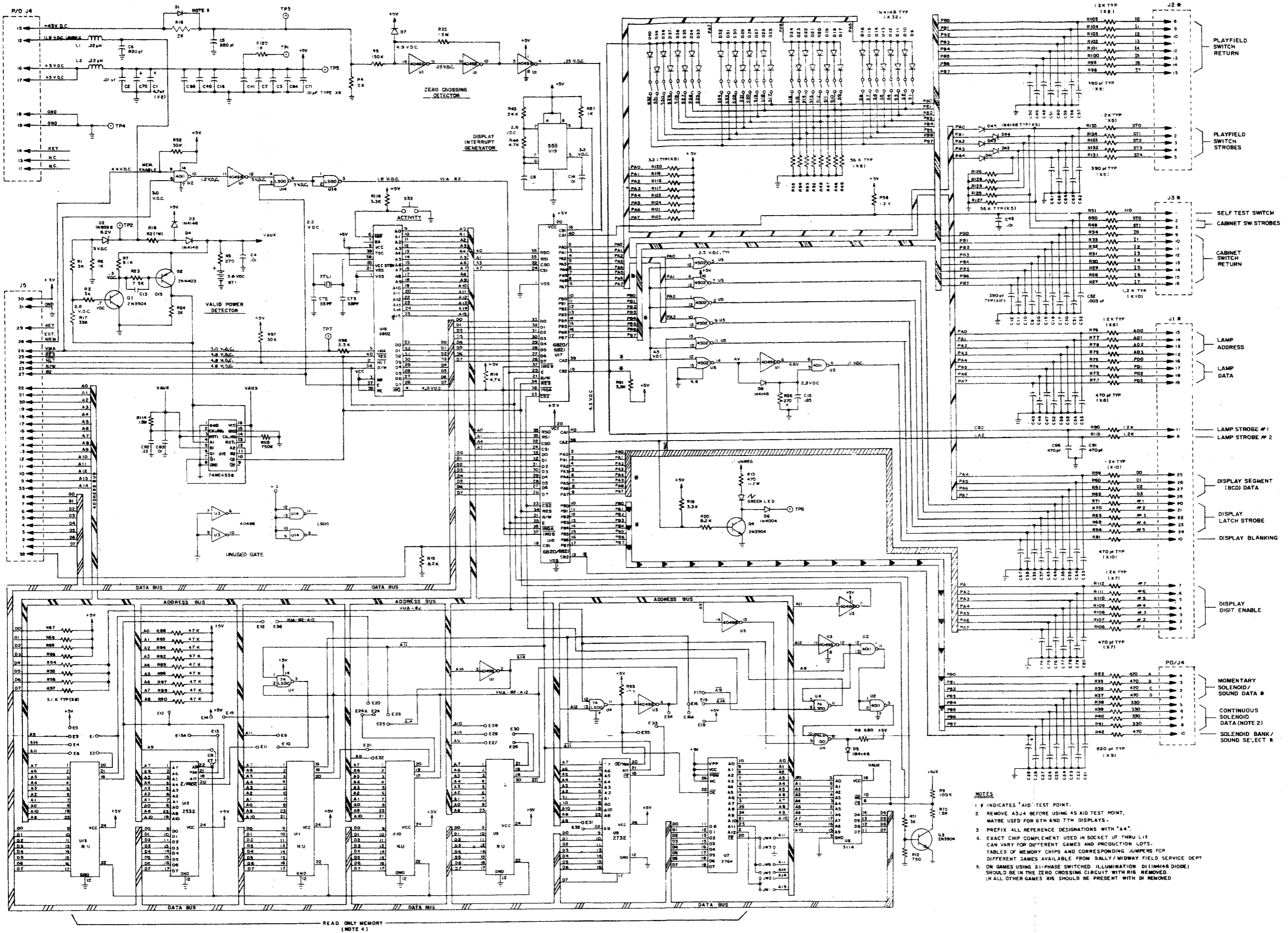


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REMOVE ALL BURRS		DR. BY FFC	DATE 1-21-81	Bally MANUFACTURING CORP. 2640 BELMONT AVENUE CHICAGO, ILLINOIS # 1220	
		CK. BY	DATE		
TOLERANCES ON DIMENSIONS UNLESS OTHERWISE SPECIFIED		AP'D BY DGM	DATE 1-23-81	PRINT CONTROL	DIE SIZE- C.C. FT. PER M. LBS. PER M.
FRACTIONS ± .008		AP'D BY DGM	DATE 1-23-81	NAME	ASSEM. NO. USED
DECIMALS ± .003		FINISH:		SOLENOID EXPANDER (SCHEMATIC)	AS-2518-66
EXCEPT HOLE DIA.'S		HARDENING:		MATERIAL	PART NO.
ANGLES ± 1/2°				CODE	W-1251 b
DO NOT SCALE DRAWING					

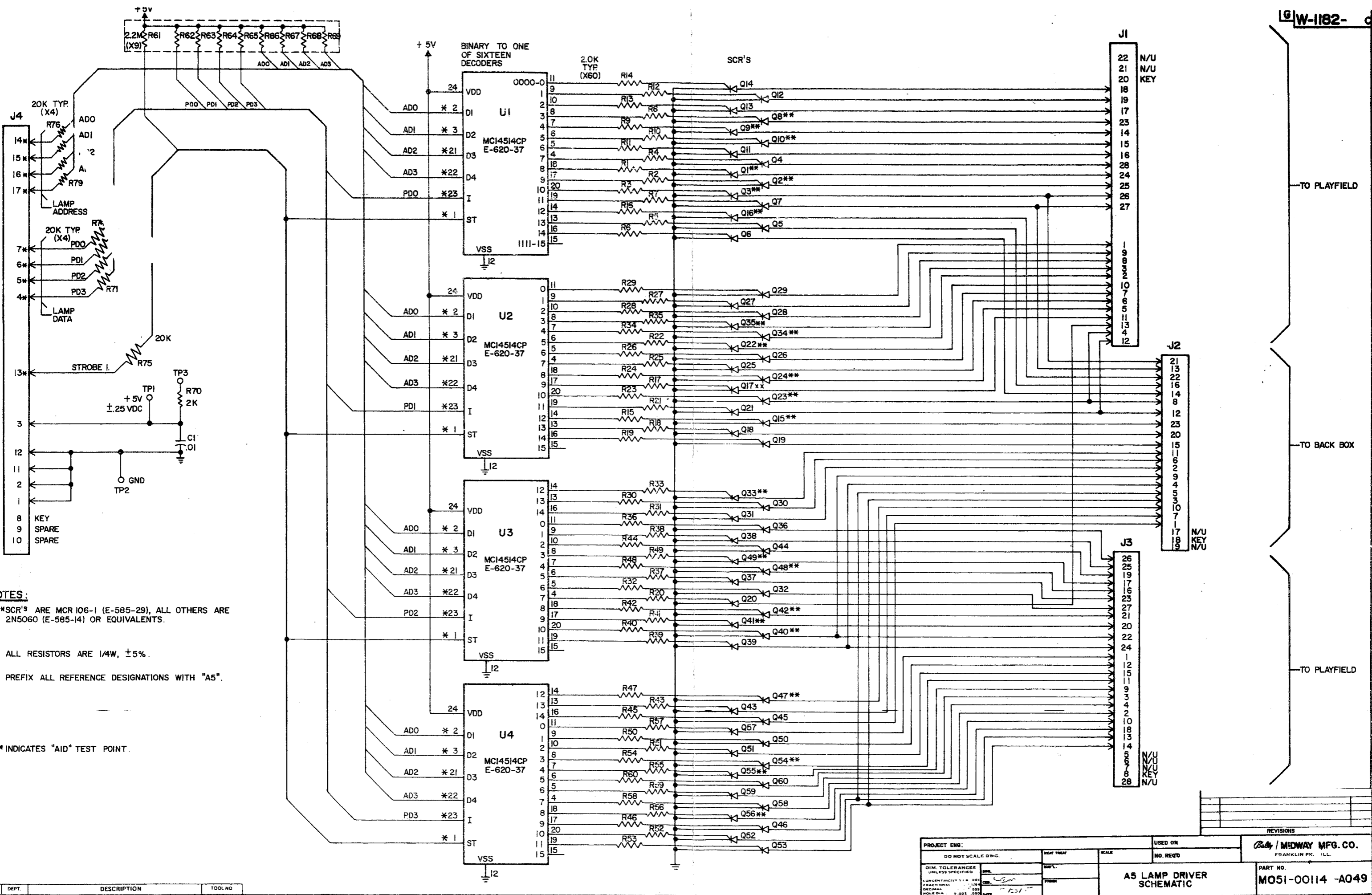
OPER.	DEPT.	DESCRIPTION	TOOL NO.

NO.	LET.	CHANGE	DATE	BY



- NOTES
1. # INDICATES "AID" TEST POINT.
 2. REMOVE ASJ4 BEFORE USING AS AID TEST POINT, MAYBE USED FOR 6TH AND 7TH DISPLAYS.
 3. PREFIX ALL REFERENCE DESIGNATIONS WITH "A4".
 4. EXACT CHIP COMPLEMENT USED IN SOCKET U7 THRU U13 CAN VARY FOR DIFFERENT GAMES AND PRODUCTION LOTS. TABLES OF MEMORY CHIPS AND CORRESPONDING JUMPERS FOR DIFFERENT GAMES AVAILABLE FROM BALLY/MIDWAY FIELD SERVICE DEPT.
 5. ON GAMES USING 3-PHASE SWITCHED ILLUMINATION DI (1N4148 DIODE) SHOULD BE IN THE ZERO CROSSING CIRCUIT WITH R16 REMOVED. IN ALL OTHER GAMES R16 SHOULD BE PRESENT WITH DI REMOVED.

MARK STEINER
 FULL SERVICE PER
 SCHEMATIC DRAWING
 5802 MPU CONTROL BD
 A080-91638-0000
 MOSI = 00114 - D077
 M051 = 00114 - D077
 11/77/84



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

ALL RESISTORS ARE 1/4W, ±5%.
 PREFIX ALL REFERENCE DESIGNATIONS WITH "A5".

* INDICATES "AID" TEST POINT.

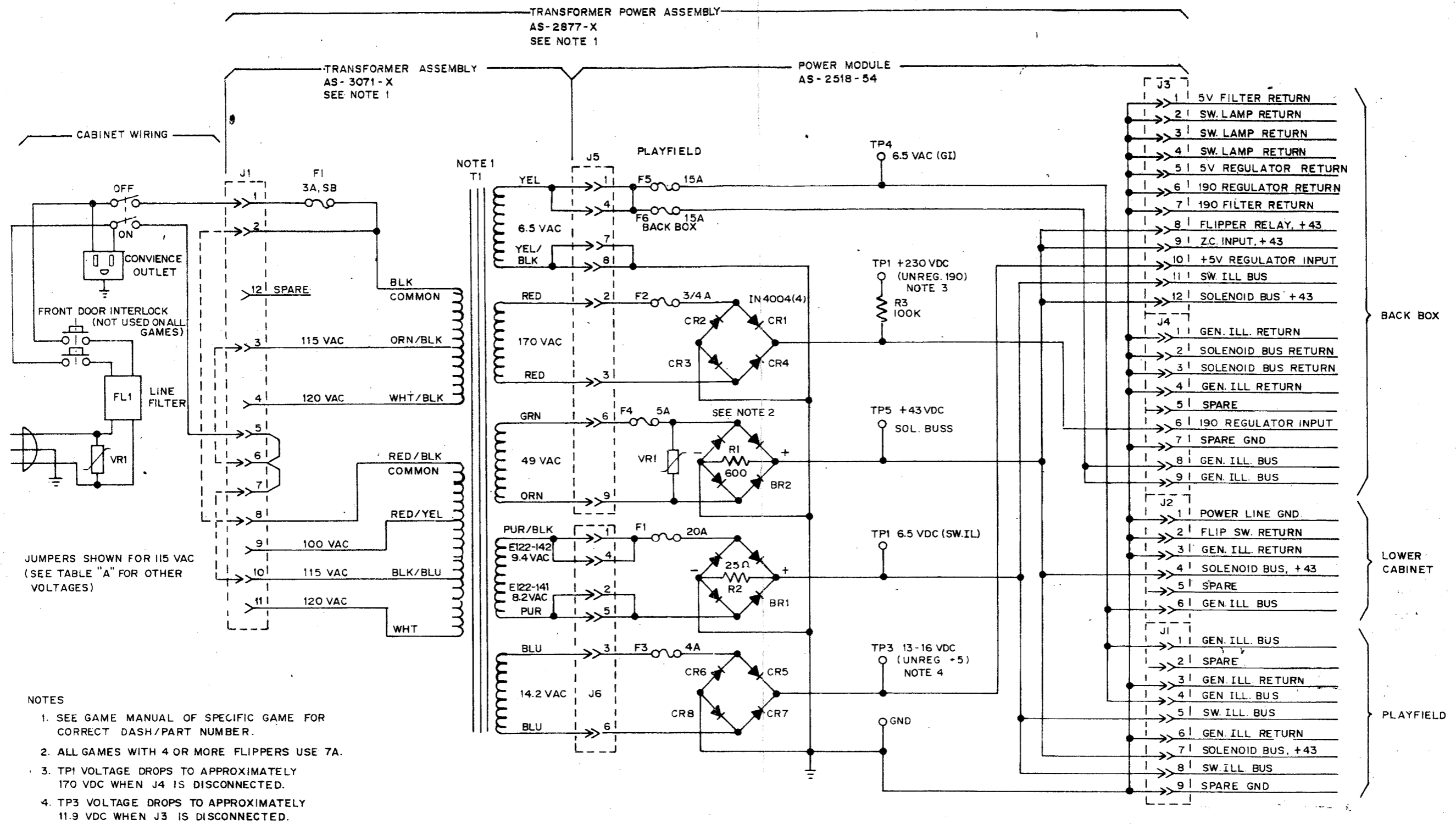
DEPT.	DESCRIPTION	TOOL NO.

PROJECT ENG:		USED ON		REVISIONS	
DO NOT SCALE DWG.	SCALE	NO. REQ'D			
DIM. TOLERANCES UNLESS SPECIFIED				Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL.	
FRACTIONAL DECIMAL				PART NO. MO51-00114 -A049	
HOLE DIA. .001 .002		DATE 1-21-57			

TO PLAYFIELD

TO BACK BOX

TO PLAYFIELD



JUMPERS SHOWN FOR 115 VAC
(SEE TABLE "A" FOR OTHER
VOLTAGES)

- NOTES
1. SEE GAME MANUAL OF SPECIFIC GAME FOR CORRECT DASH/PART NUMBER.
 2. ALL GAMES WITH 4 OR MORE FLIPPERS USE 7A.
 3. TP1 VOLTAGE DROPS TO APPROXIMATELY 170 VDC WHEN J4 IS DISCONNECTED.
 4. TP3 VOLTAGE DROPS TO APPROXIMATELY 11.9 VDC WHEN J3 IS DISCONNECTED.

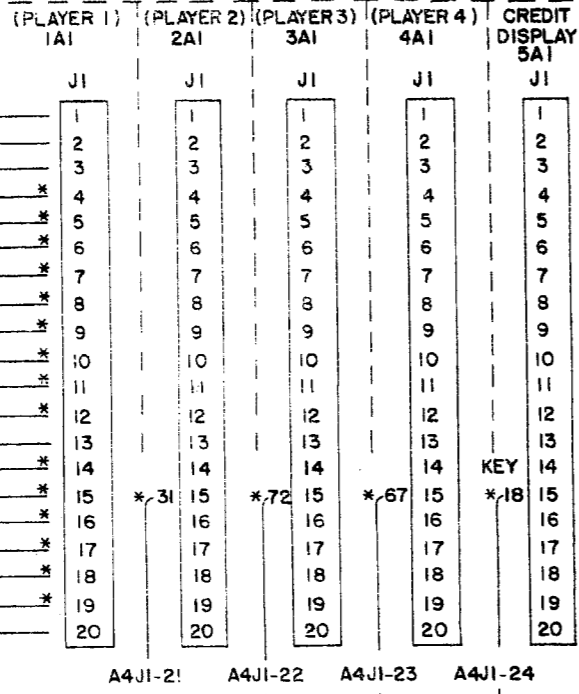
TABLE "A"

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	

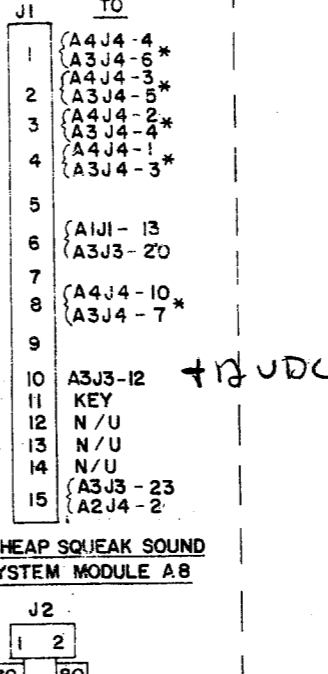
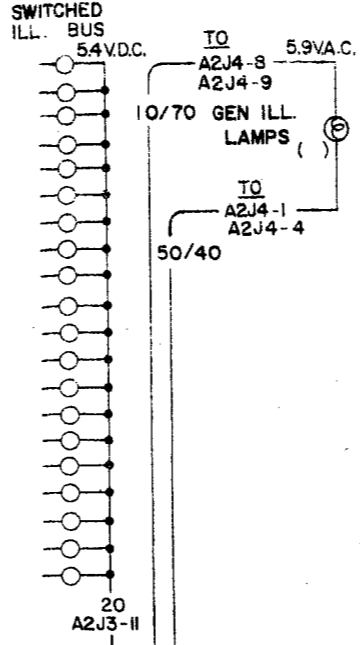
PROJECT ENG: A. AARSTAD		USED ON		REVISIONS
DO NOT WRITE IN THESE SPACES		HEAT TREAT	SCALE FULL	
DRW: <i>ad</i>	MAT'L	SHEMATIC DWG		PART NO. M051 - 00114 - A055
CHKD:	FINISH	POWER MODULE		
DATE: 5/5/84		A080-91616-A000		

Bally / MIDWAY MFG. CO.
FRANKLIN, PA.

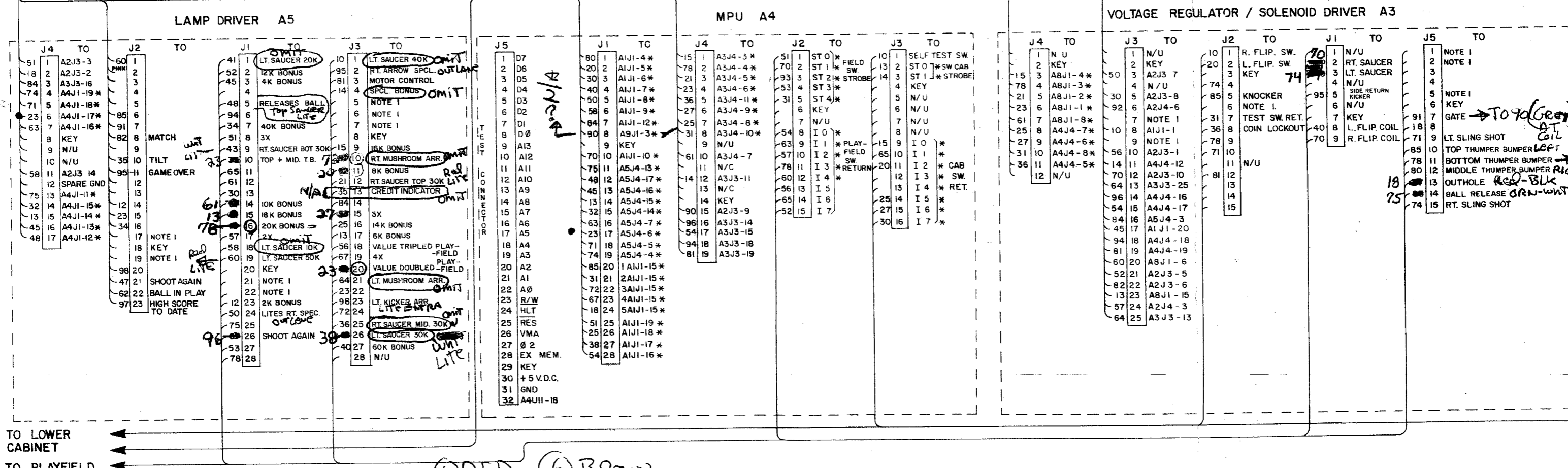
FROM	PIN	WIRE
A2J4-8	1	10
A2J4-1	2	50
A5J2-14	3	12
A5J2-2	4	PINK
A5J2-15	5	23
A5J2-16	6	34
A5J2-10	7	35
A5J2-21	8	47
A5J2-1	9	60
A2J3-11	10	20
A5J2-22	11	62
A5J2-6	12	85
A5J2-7	13	91
A5J2-11	14	95
A5J2-23	15	97
A5J2-20	16	98
A5J2-8	17	82
	18	
	19	
	20	
	21	
	22	
A2J4-4	23	40
A2J4-9	24	70



INSERT TO BACK CAB. PLUG



USE FOR PLAY FIELD WIRING



- 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.

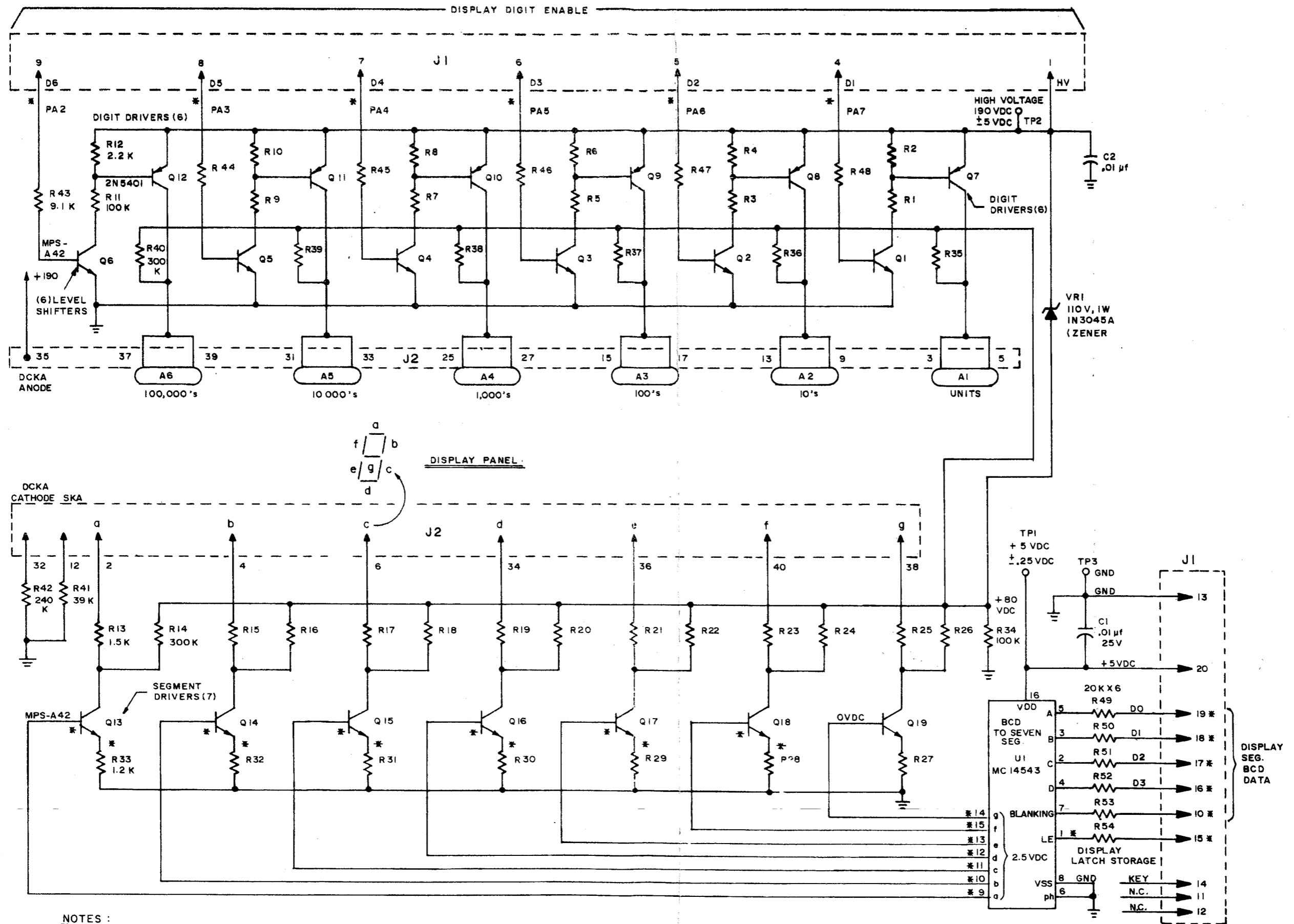
- ① RED
- ② Blue
- ③ Yellow
- ④ Green
- ⑤ WHITE
- ⑥ BROWN
- ⑦ ORANGE
- ⑧ BLACK
- ⑨ Grey
- ⑩

WIRE COLOR CODE

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

EXAMPLE:
50 = WHITE
51 = WHITE RED

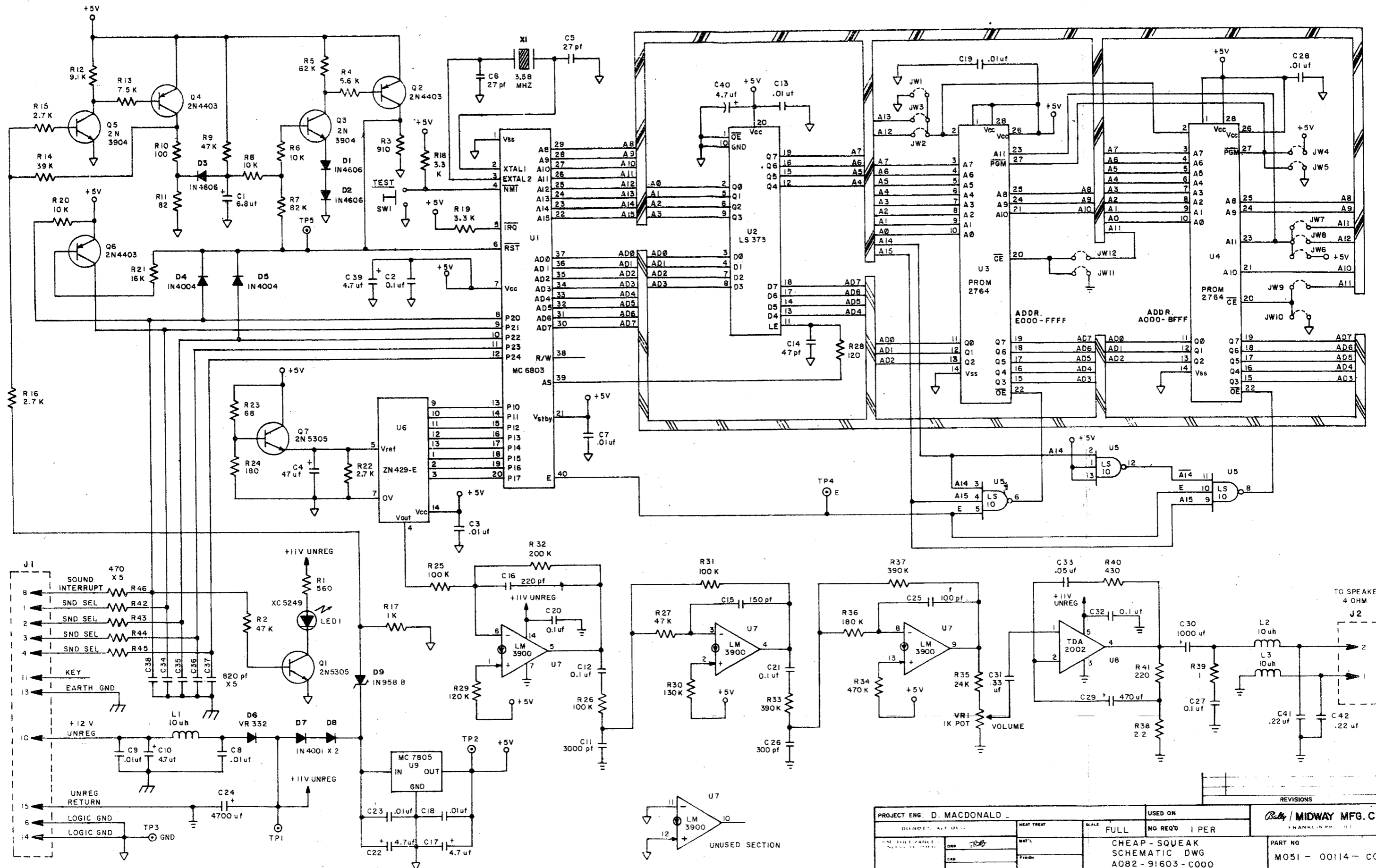
PROJECT ENG.			USED ON			REVISIONS
DO NOT SCALE DWG.	HEAT TREAT	SCALE	NO REQ'D	MIDWAY MFG. CO.		REVISED
TOLERANCES UNLESS SPECIFIED	DES. M. KONOPA			FRANKLIN PK. ILL.		
	CAD.			PART NO.		
	FIRING			MO51 - OOA40-A011		



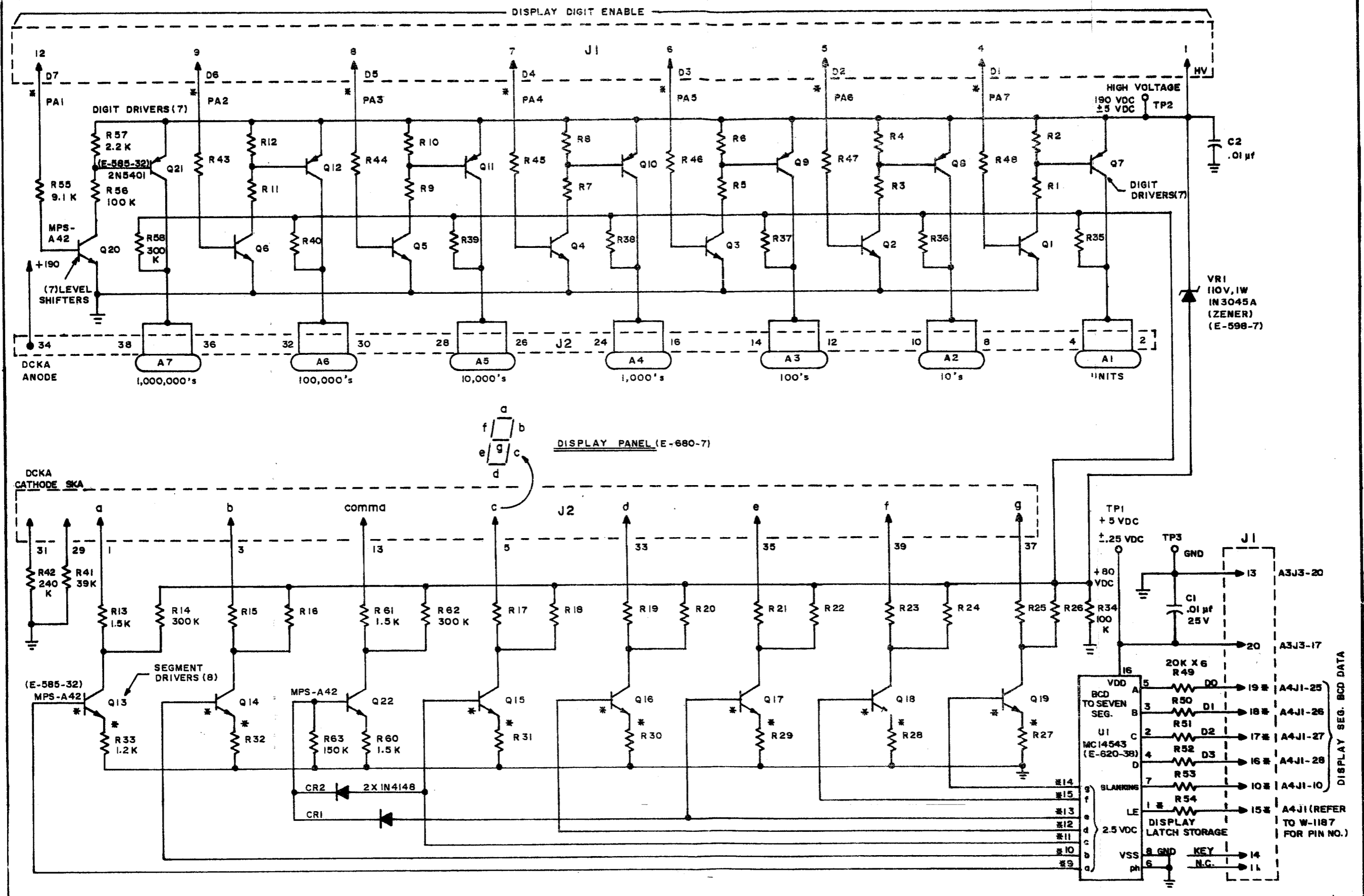
NOTES :

- 1) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE $\pm 5\%$, 1/4 W.
- 2) PREFIX ALL REFERENCE DESIG. WITH ASSY REF. DESIG. "A1"
- 3) * INDICATES "AID" TEST POINT.

PROJECT ENG: D. MACDONALD		USED ON PINBALL		REVISIONS	
DO NOT SCALE DWG	HEAT TREAT	SCALE FULL	NO. REQ'D 1 PER	Bally / MIDWAY MFG. CO. FRANKLIN PK ILL	
DIM TOLERANCES UNLESS SPECIFIED	DRS. <i>DB</i>	MAP'L.	SIX DIGIT DISPLAY BOARD SCHEMATIC "A1"	PART NO. MO51-00114 -A029	
DATE 5/17/83	CHK. <i>Don S/1818</i>	FINISH	A084-91491-A000		

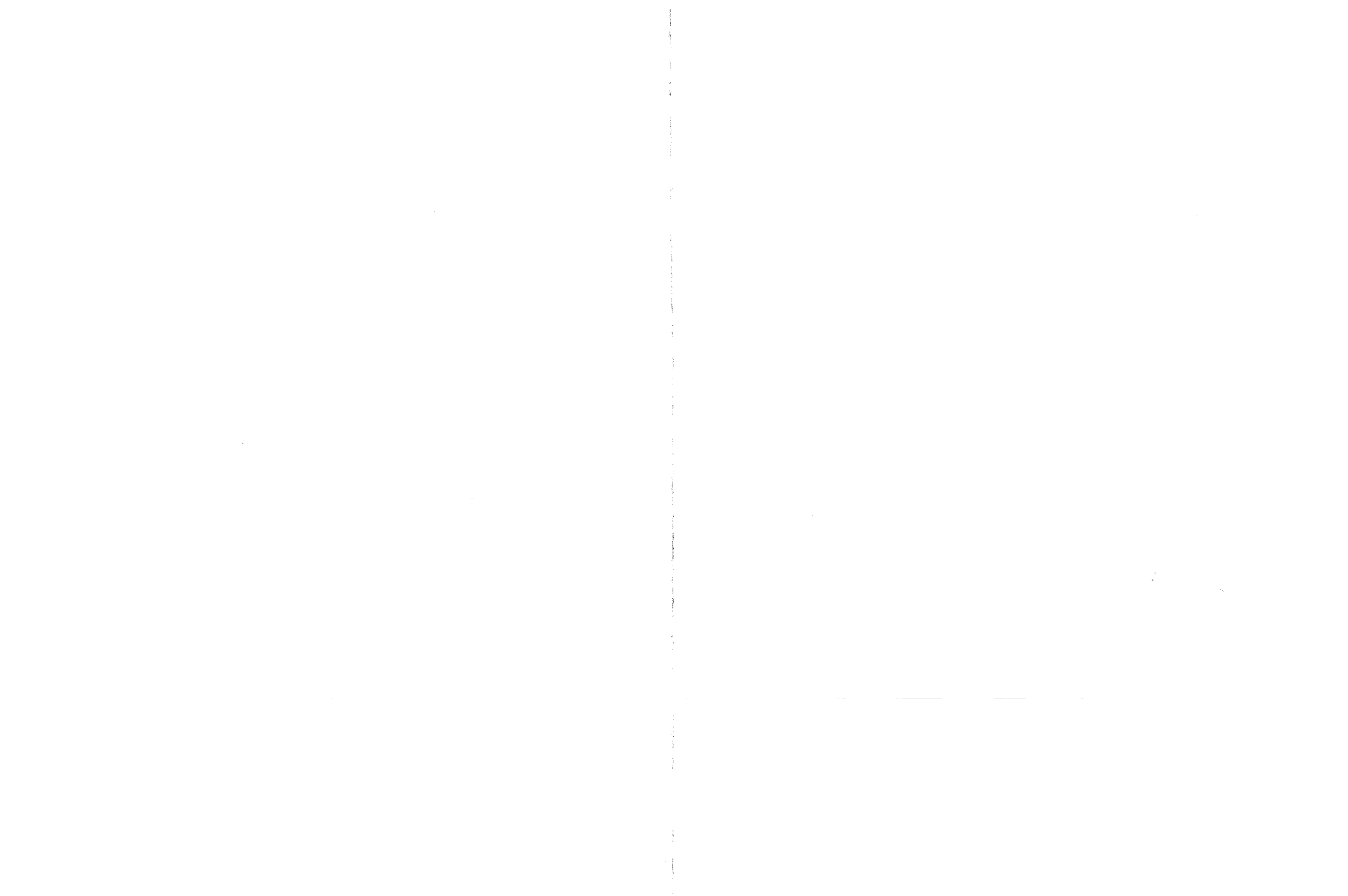


PROJECT ENG. D. MACDONALD		USED ON		Baby / MIDWAY MFG. CO.	
DATE	REV	SCALE	FULL	NO REQ'D	PER
DATE	REV	SCALE	FULL	NO REQ'D	PER
DATE	REV	SCALE	FULL	NO REQ'D	PER
CHEAP-SQUEAK SCHEMATIC DWG A082-91603-C000				PART NO M051-00114-C045	
DATE C 9: 84		FRANKLIN		REV	



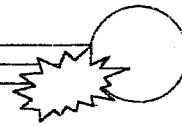
- NOTES:**
- 1) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE $\pm 5\%$, 1/4 W.
 - 2) PREFIX ALL REFERENCE DESIG. WITH ASSY REF. DESIG. "A1".
 - 3) * INDICATES "AID" TEST POINT.

PROJECT ENG: D. MACDONALD		USED ON PINBALL		REVISIONS	
DO NOT SCALE DWG.		HEAT TREAT	SCALE FULL	NO. REQ'D PER	
DIM. TOLERANCES UNLESS SPECIFIED		CONCENTRICITY ± 0.02		SEVEN DIGIT DISPLAY BOARD SCHEMATIC "A1" A084-91617-A000	
FRACTIONAL ± 0.005		DECIMAL ± 0.002		PART NO. MO51-00114-A057	
HOLE DIA. ± 0.002		DATE 5/13/83		FRANKLIN PK. ILL.	





STEVE YOUNG'S



THE PINBALL RESOURCE

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E-Mail: PBResource@idsi.net