

Bally

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OPERATIONS MANUAL

INCLUDES

Operations and Adjustments

Testing and Problem Diagnosis

Parts Information

Reference Diagrams and Schematics



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Jumper Charts

Display	W1	W2
1MEG, 2MEG, 4 MEG EPROM	In	Out
512K, 1 MEG EPROM	Out	In

Country	W14	W15	W16	W17	W18
America	In	In	In	In	In

Solenoid/Flasher Table

Sol. No.	Function	Solenoid Type	Wire Color	Connection	Driver Trnstr	Solenoid No. Flashlamp Type
01	Ball Popper	High Power	Vio-Brn	J130-1	Q82	AE-24-900
02	Outhole	High Power	Vio-Red	J130-2	Q80	AE-27-1200
03	Cannon Motor	High Power	Vio-Orn	J130-4	Q78	14-7965 20V
04	Ball Release	High Power	Vio-Yel	J130-5	Q76	AE-26-1200
05	Right Slingshot	High Power	Vio-Grn	J130-6	Q64	AE-26-1500
06	Left Slingshot	High Power	Vio-Blu	J130-7	Q66	AE-26-1500
07	Knocker	High Power	Vio-Blk	J130-8	Q68	AE-23-800
08	Cannon Kicker	Low Power	Vio-Gry	J130-9	Q70	A-15016
09	Left Ball Lockup	Low Power	Brn-Blk	J127-1	Q58	AE-26-1500
10	Ramp Up	Low Power	Brn-Red	J127-3	Q56	AE-26-1200
11	Ramp Down	Low Power	Brn-Org	J127-4	Q54	SM1-29-1000-DC
12	Not Used	Low Power	Brn-Yel	J127-5	Q52	
13	Left Jet Bumper	Low Power	Brn-Grn	J127-6	Q50	AE-26-1200
14	Right Jet Bumper	Low Power	Brn-Blu	J127-7	Q48	AE-26-1200
15	Bottom Jet Bumper	Low Power	Brn-Vio	J127-8	Q46	AE-26-1200
16	Not Used	Low Power	Brn-Gry	J127-9	Q44	
17	Left Bottom Flasher	Flasher	Blk-Brn	J125-1, J126-1	Q42	#906,#89
18	Left Top Flasher	Flasher	Blk-Red	J125-2, J126-2	Q40	#906,#89
19	Right Bottom Flasher	Flasher	Blk-Org	J125-3, J126-3	Q38	#906,#89
20	Right Top Flasher	Flasher	Blk-Yel	J125-5, J126-4	Q36	#906,#89
21	Right Ramp Flasher	Flasher	Blu-Grn	J125-6, J126-5	Q28	#906,#89
22	Left Ramp Flasher	Flasher	Blu-Blk	J125-7, J126-6	Q30	#906,#89
23	Locker Open Flasher	Low Power	Blu-Vio	J125-8, J126-7	Q34	#906
24	Left Sword Flasher	Low Power	Blu-Gry	J125-9, J126-8	Q32	#906
25	Top Popper Flasher	Flasher	Blu-Brn	J123-1	Q26	#906
26	Cannon Flasher	Flasher	Blu-Red	J123-2	Q24	#906
27	Fire Button Flasher	Flasher	Blu-Org	J123-3	Q22	#906
28	Right Sword Flasher	Flasher	Blu-Yel	J123-4	Q20	#906
G. I. Circuits						
01	Jet & Back Ramp String	G.I.	Brown	J120-1	Q18	#555
02	Top Playfield String	G.I.	Orange	J120-2	Q10	#555
03	Bottom Playfield String	G.I.	Yellow	J120-3	Q14	#555
04	Left Insert String	G.I.	Green	J121-5	Q16	#555
05	Right Insert String	G.I.	Violet	J121-6	Q12	#555
	Lower Right Flipper		Blu-Yel	J907-8,9	Q4, Q11	FL-11629 (BLUE)
	Lower Left Flipper		Gry-Yel	J907-6,7	Q3, Q9	FL-11629 (BLUE)
	Upper Right Flipper		Blu-Yel	J907-4,5	Q2, Q7	FL-11630 (RED)

J1XX = Power Driver Board, J9XX = Fliptronic II Board

Midway Manufacturing Company reserves the rights to make modifications and improvements to its products. The specifications and parts identified in this manual are subject to change without notice.

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BLACK ROSE

**PLAYFIELD SHOT MAPS
&
RULES**

RULES

MULTIBALL & BONUS MULTIPLIER

Complete "L-O-C-K" rollover lanes to activate PIRATES' COVE "LOCK1" lamp. Additional completions of "L-O-C-K" awards bonus multiplier.

LOADING CANNON

Open Davy Jones' Locker by scoring opening shooter skill shot, by completing lower, middle, and upper 3-bank targets, or by making consecutive shots up ramp from side flipper.

SINKING A SHIP

Shoot flashing jewels or treasures from the cannon to collect displayed awards and add letters in the "S-I-N-K-S-H-I-P" sequence. Also, add letters by shooting the flashing ramps during multiball play. Completion of "SINKSHIP" enables Broadside Cannon Shot to sink the ship.

SPECIAL

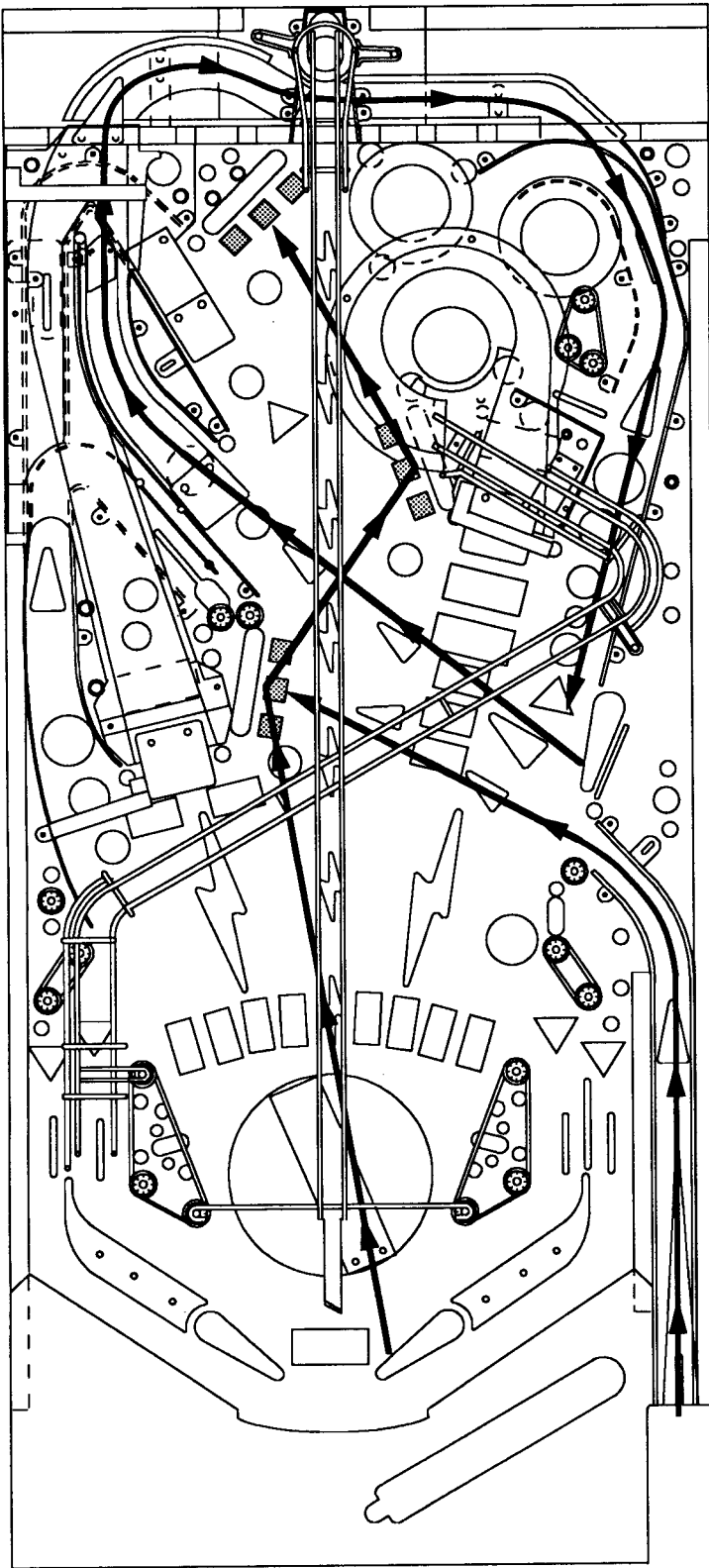
Sinking multiple ships from the cannon lights "SPECIAL".

EXTRA BALL

Complete Whirlpool ramp sequence before it times out to collect "EXTRA BALL".

JACKPOT

Light "JACKPOT" by completing all BROADSIDE center mast values.



"DAVY JONES' LOCKER"

To open Davy Jones' Locker:

- 1) Skill Shot - Hit flashing lower 3-bank targets from shooter at beginning of ball play.
- 2) Complete lower, middle and upper 3-bank targets during ball play. See: "Doubleloon Target Shot"
- 3) Make consecutive shots up locker ramp from side flipper.
- 4) 3-Bank Rebound - Scoring any target on all three 3-banks in rapid succession immediately opens "Davy Jones' Locker."

Multiball:

Score Jewel when Flashing.

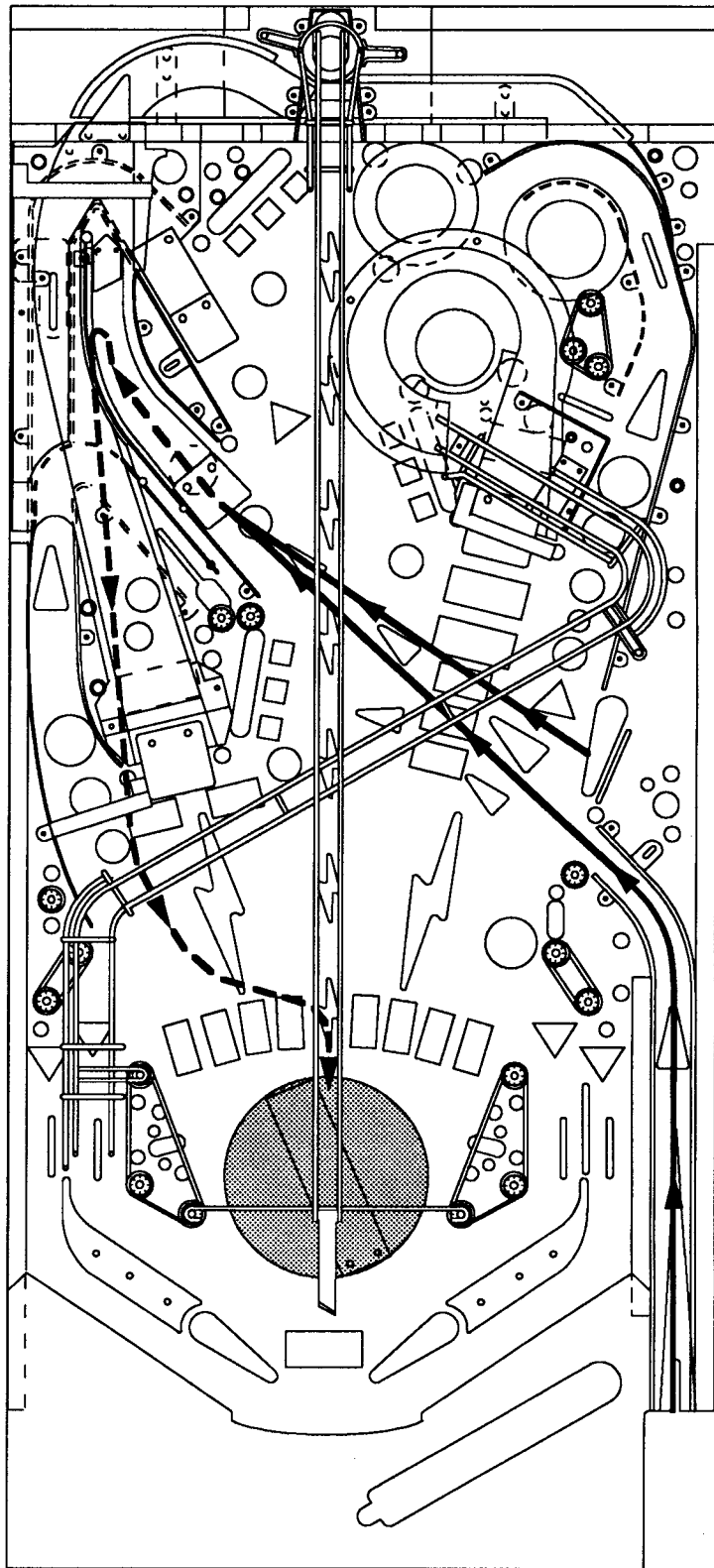
When Locker is open, see: "Load Cannon Shot".

"LOADING CANNON"
(LOCKER OPEN)

To Load Cannon:

- 1) Shoot from side flipper.
- 2) Shoot from shooter at beginning of ball play.

When Locker is closed, see: "Davy Jones' Locker".



"SIDE FLIPPER/LEFT "FLIPPER COMBINATION"

3-Way Combination:

- 1) Start 3-way combination by shooting left ramp with lower right flipper or by exiting the jet bumper area and using the upper right flipper.
- 2) Complete shots #1 and #2 in sequence for Big Score.

2-Way Combination:

- 1) Start 2-way combination by shooting shot #1 from the upper right flipper.
- 2) Complete shot #2 for Big Score.

Multiball:

Score Jewel when Flashing.

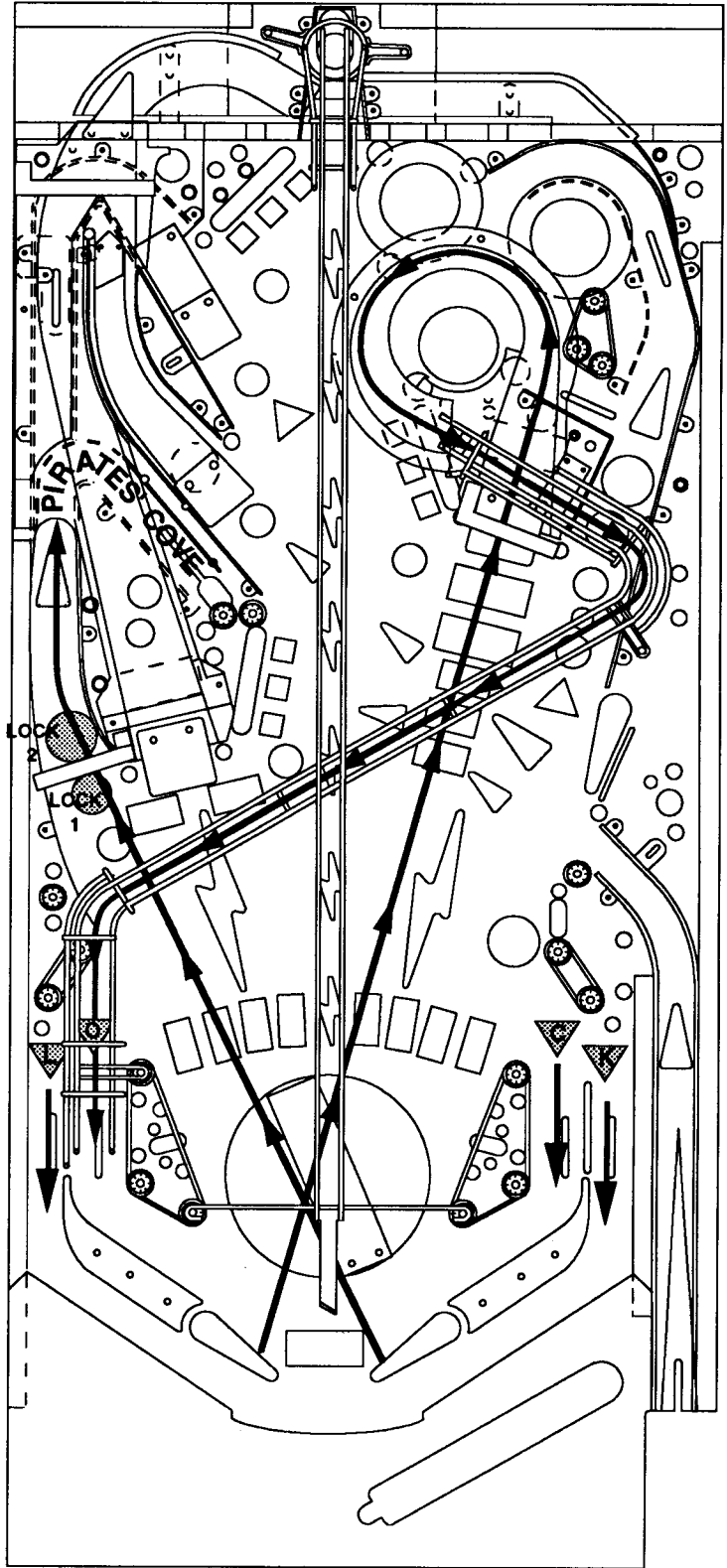
"PIRATES' COVE"

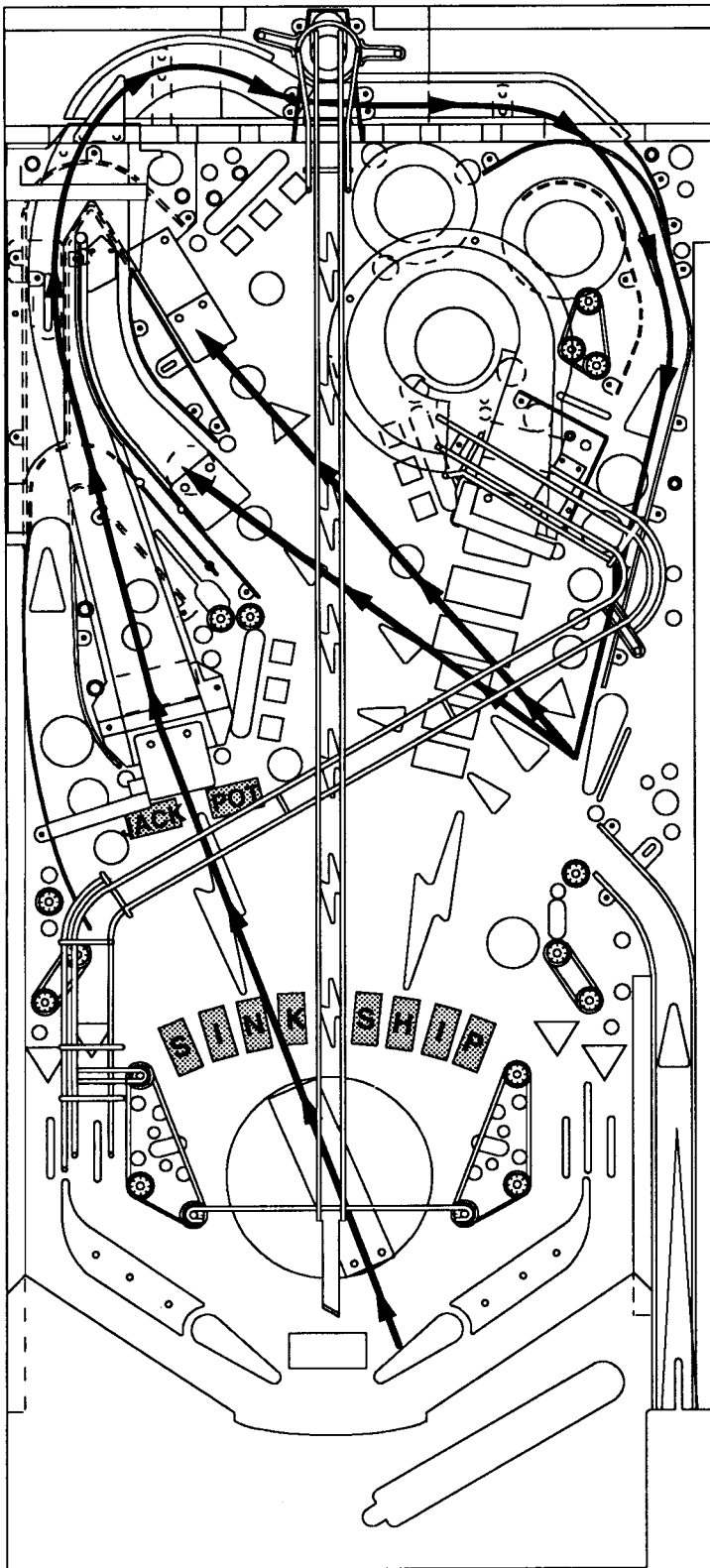
Shoot "Pirates' Cove" when flashing to lock ball for Multiball:

- 1) Complete "L-O-C-K" rollover lane lamps at bottom of playfield, or spot letters by shooting into "Pirates' Cove", to start "LOCK 1" lamp flashing. Additional completions of "L-O-C-K" awards bonus multiplier.
- 2) Shoot into "Pirates' Cove" when "LOCK 1" lamp is flashing to release a second ball to the shooter for 2-Ball Multiball play.
- 3) 3-Ball Multiball is achieved after locking both balls into "Pirates' Cove" during 2-Ball Multiball. A third ball will now be released to the shooter.
- 4) Score "Special" when lit.

Multiball:

Score Jewel when Flashing.





"LEFT RAMP"

Shoot left ramp to:

- 1) Score "Jackpot" when jackpot lamps are flashing.
- 2) Double score of Locker (middle) Ramp.
- 3) Start 3-Way Combination shot, (see Side Flipper/Left Flipper Combination, shot map D).

Multiball:

- 1) Add letter in "S-I-N-K S-H-I-P" sequence when ramp is flashing.
- 2) Score Ramp Treasure when flashing.

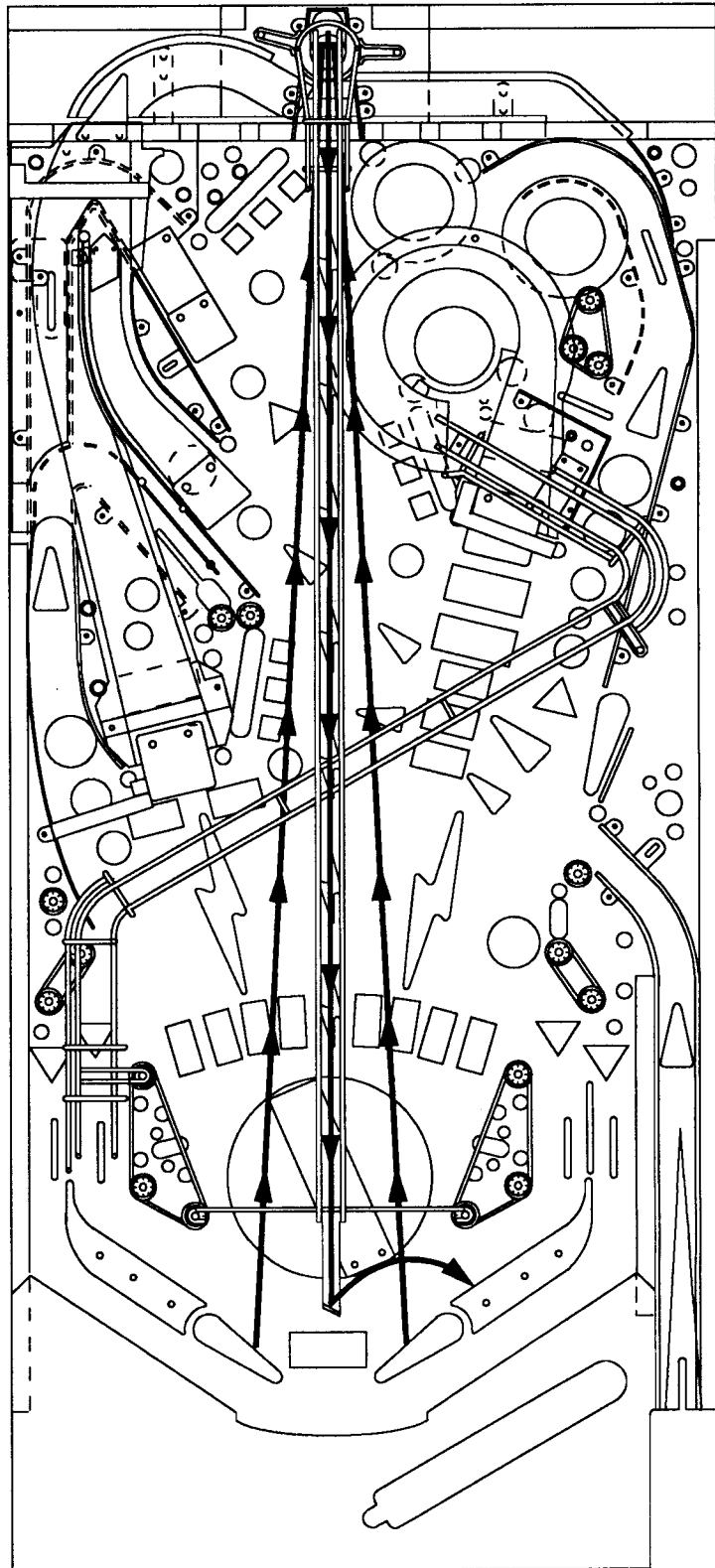
"BROADSIDE" POPPER

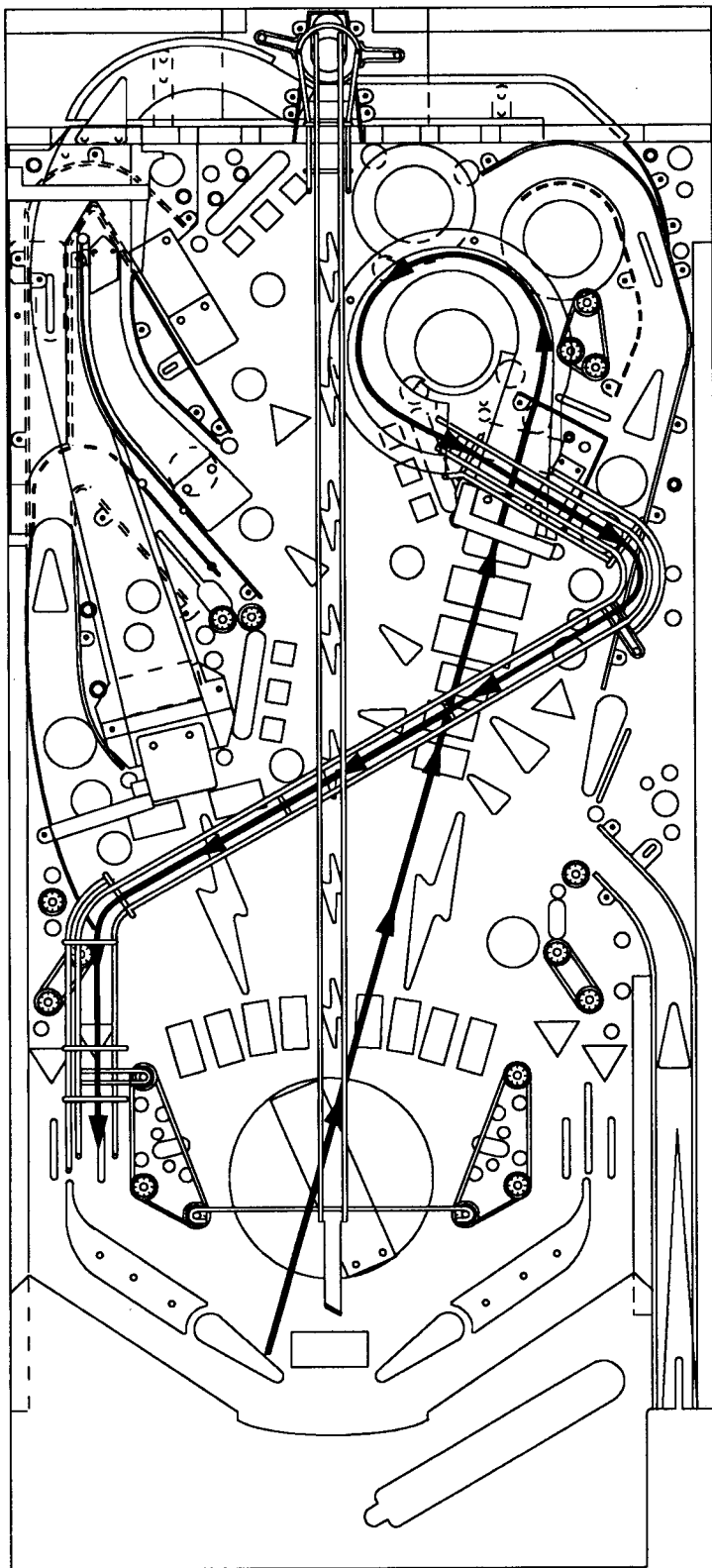
Shooting "Broadside" Popper:

- 1) Scores lit value of sequencing Broadside Bonus.
- 2) Completion of center mast (Broadside Bonus) lamps, lights "Jackpot" at left ramp.
- 3) During 1-Ball play if center mast is not lit, popper shot will start instant re-light. Shoot ball back into popper before time runs out to re-light Broadside Bonus.

Multiball:

Score Jewel when Flashing.





"WHIRLPOOL RAMP"

Shoot "Whirlpool Ramp" to:

- 1) Advance scoring level.
- 2) Award Extra Ball or Million at top value.

Multiball:

- 1) Add letter in "S-I-N-K S-H-I-P" sequence when ramp is flashing.
- 2) Score ramp treasure when flashing.

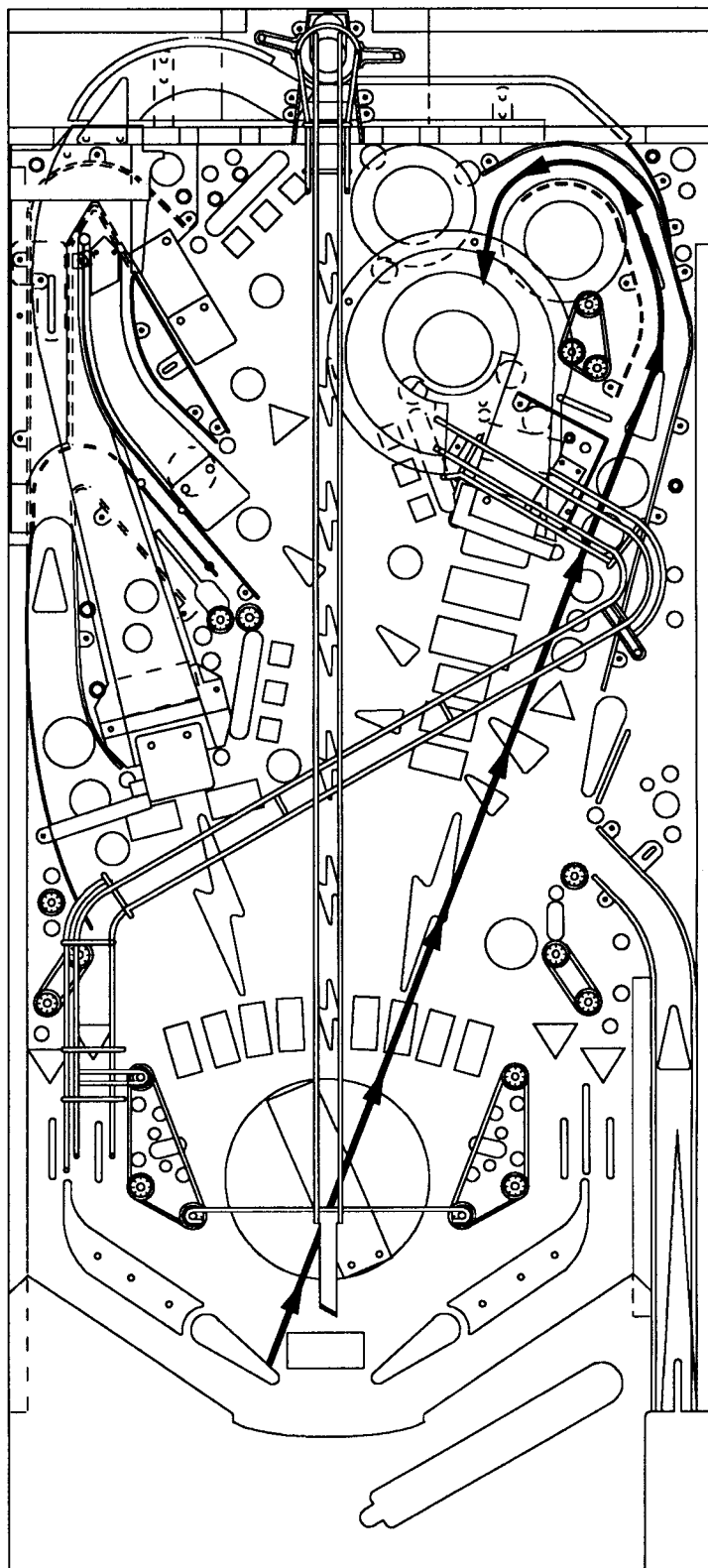
**"RIGHT ROLLOVER
TO JETS"**

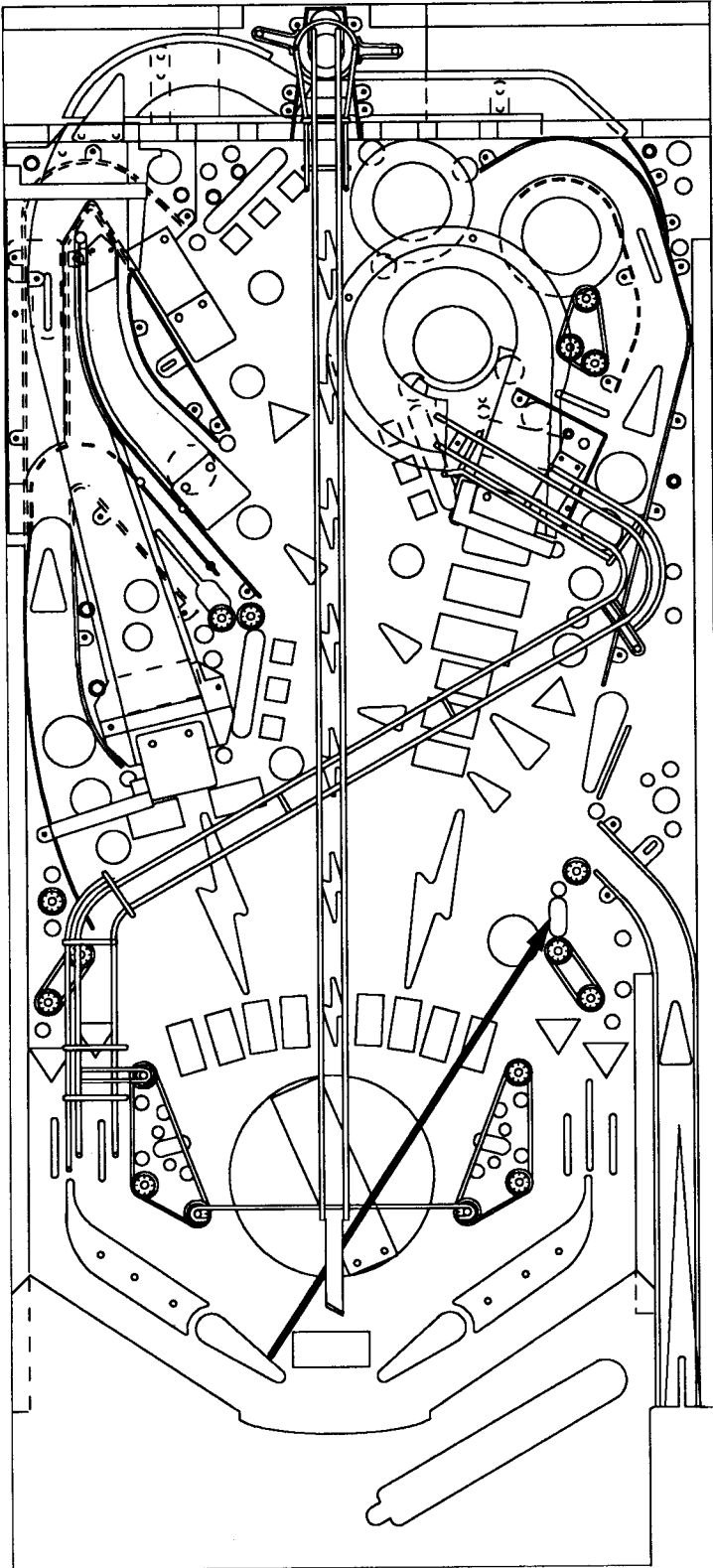
Shoot rollover to:

- 1) Advance scoring value of Jet Bumpers.
- 2) Score "Special" when lit.

Multiball:

Score Jewel when Flashing.



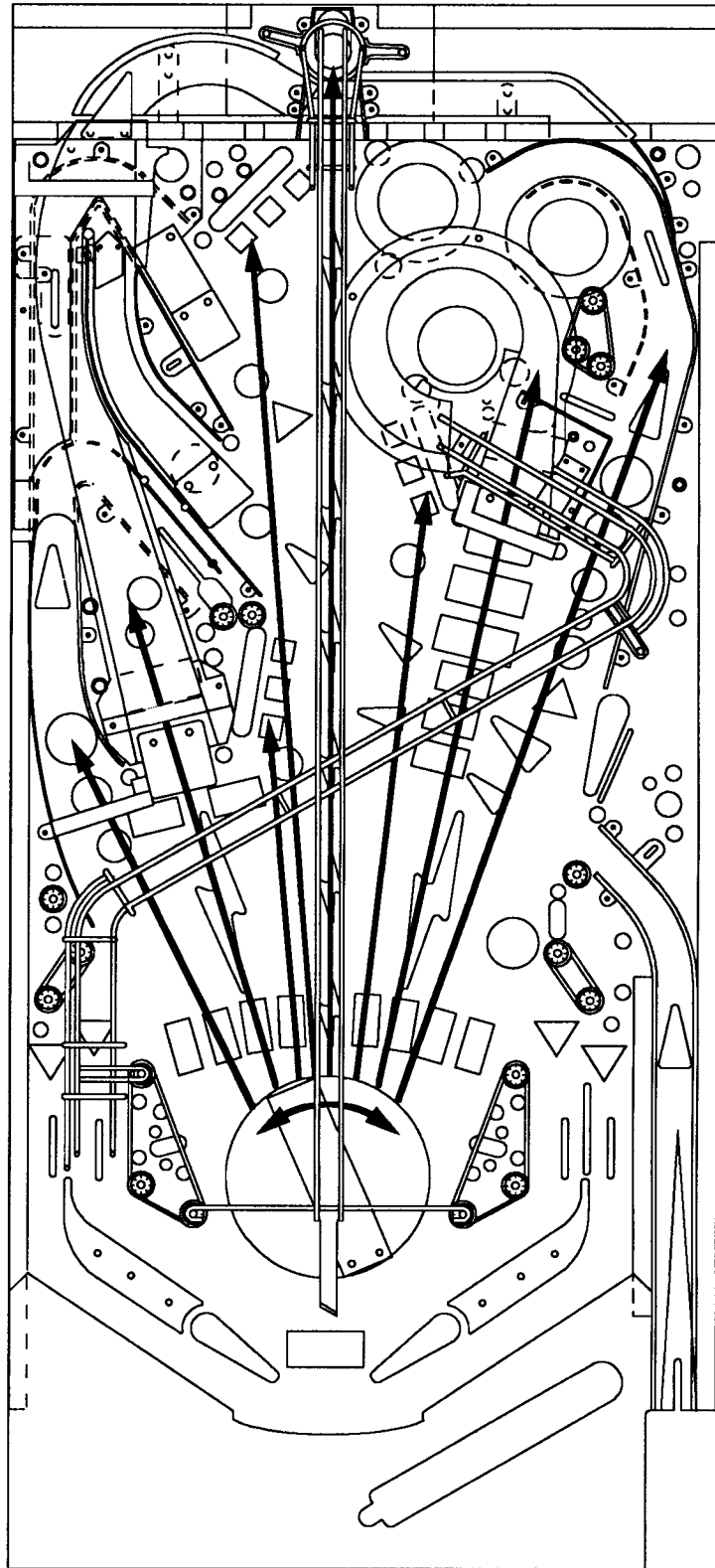


"DOUBLOON TARGET"

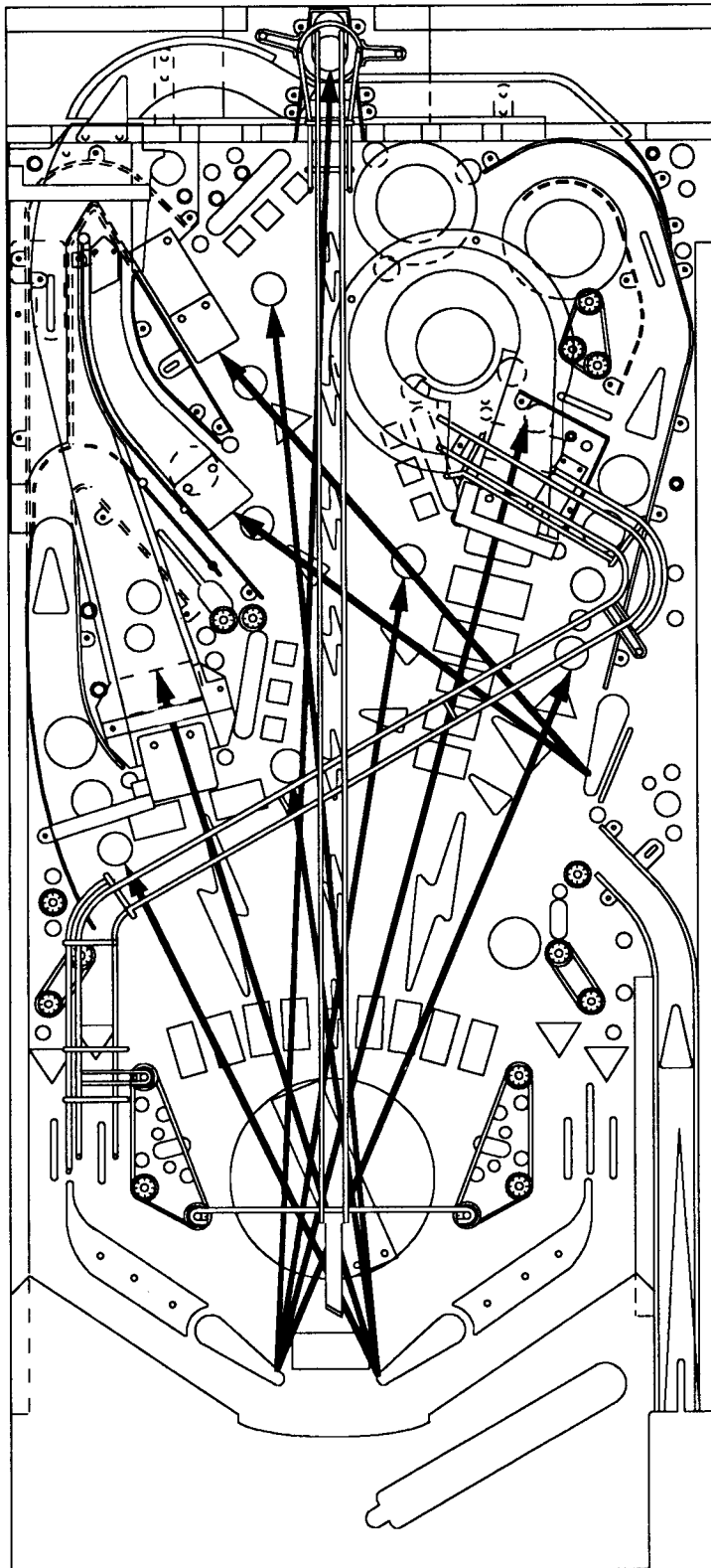
- 1) Hit "Doubloon" stand-up target when lit to spot a 3-bank target.
- 2) Hit target when flashing to restart "Broadside Bonus" values sequencing.

SHOOTING "CANNON"

- 1) Press "Fire" button when flashing and cannon is aimed at desired target.
- 2) Shoot flashing Jewel & Treasure targets from cannon to collect displayed feature and award letter in "S-I-N-K S-H-I-P".
- 3) Completion of "S-I-N-K S-H-I-P" letters lights center "Broadside" shot to sink the ship and collect ship value.



FIRE



"HIDDEN TREASURE"

1) Collect all Jewels & Treasure Chests during Multiball to start Hidden Treasure Bonus.

All Jewels & Treasure Chests hit thereafter are worth big points each until the end of Multiball play.

Notes...

A series of horizontal dotted lines for writing notes, spanning the width of the page.

Section 1

Game Operation & Test Information

BLACK ROSE (System WPC) ROM Summary

IC	TYPE	LOCATION	BOARD	PART NUMBER
Game ROM 1	27020	U6	CPU	A-5343-20013-1
Music/Speech ROM 2	27010	U15	Audio	A-5343-20013-2
Music/Speech ROM 3	27010	U18	Audio	A-5343-20013-3
Music/Speech ROM 4	27010	U14	Audio	A-5343-20013-4

NOTICE

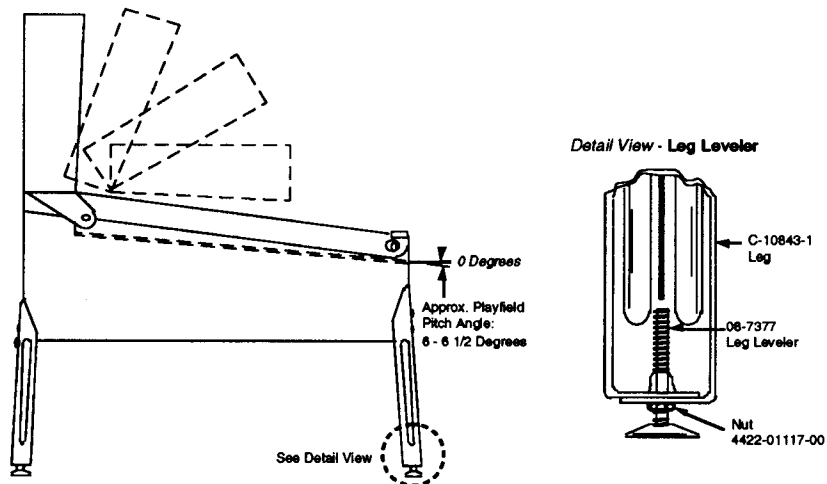
Order replacement ROMs from your authorized **MIDWAY MANUFACTURING CO.** distributor. Specify: (1) part number (if available); (2) ROM level (number) on the label; (3) game the ROM is used in.

PINBALL GAME ASSEMBLY INSTRUCTIONS

BLACK ROSE IS A 3 BALL GAME.

Power:	Domestic 120V @ 60 Hz	Dimensions:	Width: 26" Approx. Depth: 55" Approx. Height: 77" Approx.
Temp:	32° F to 100° F (0° C to 38° C)	Weight:	Approx. 297 lbs. (crated)
Humidity:	Not to exceed 95% relative.		

1. Remove all cartons, parts, and miscellaneous items from the shipping container and set them aside.
2. Place the cabinet on a support and attach rear legs using leg bolts. Leg levelers and leg bolts are provided among the parts in the cash box.
3. Attach the front legs (after installing leg levelers), using leg bolts. See diagram below..



Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.
5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass, storing it carefully to avoid scratches. Remove the shipping block holding the Insert Board. Unlatch and open the Insert Board. This allows access to the bolt holes used for securing the backbox upright. Install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox. Close the Insert Board and latch it in position. Reinstall the backglass, and lock the backbox.

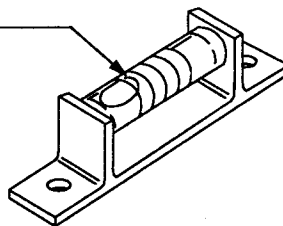
CAUTION

FAILURE TO INSTALL the backbox mounting hardware properly can cause personal injury.
NEVER TRANSPORT a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

6. Extend each leg leveler slightly below the leg bottom, so that all four foot pads protrude approximately the same distance. Remove the cabinet from its support and place it on the floor.
7. Unlock and open the coin door. Move the molding latch lever toward the left side of the game, to release the front molding. Lift the front molding off the playfield cover glass, return the latch lever to the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game, storing it carefully to avoid breakage.

8. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). NOTE: It is recommended that these measurements be made ON the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.
9. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be accurately adjusted WITHOUT REMOVING THE GLASS. The first line (closest to the front of game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch for Black Rose is between 6 and 6 1/2 degrees. The NOSE of the bubble is between the first and second line on the level (see diagram below).

TRU-PITCH™ level between 6 and 6 1/2 degrees.



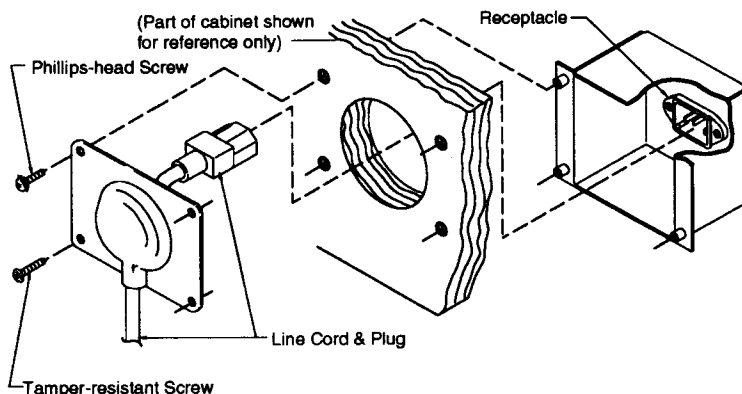
CAUTION

Playfield pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting.

10. Move the game into the desired location; recheck the level and pitch angle of the playfield.
11. Verify that the **required number** of balls are installed in the game. **BLACK ROSE** uses 3 balls.
12. Install playfield mylars if desired.

NOTE: The **Black Rose** playfield is specially coated with a Diamond Plate™ surface and does not require a protective mylar. However, playfield mylars can be purchased through your local Bally Distributor. Specify part number 03-7960-20013-1 for full playfield mylar.

13. Clean and reinstall the playfield cover glass, reversing the procedure of step 7.
14. To attach line cord, remove envelope stapled to the inside cabinet (near cashbox). Remove the four Phillips-head screws that mount the line cord cover plate to the rear cabinet. Match the prongs on the plug with the holes in the receptacle and push line cord securely into place. Make sure cord is aligned with the indentation of plate (indentation should point toward bottom of cabinet). Remount line cord cover plate. If desired, tamper resistant screws have been provided in an envelope marked "Security Screws" (located in cashbox) to remount cover plate. Prepare the game for player operation.



GAME CONTROL LOCATIONS

Cabinet Switches

The On-Off switch is located on the bottom of the cabinet near the right front leg.

The Start Button is the pushbutton to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

Coin Door Switches

The operator controls all game adjustments, obtains bookkeeping information, and diagnoses problems, using only four pushbutton switches mounted on the inside of the coin door. The Coin Door Switches have two modes of operation Normal Function and Test Function.

Normal Function

The Service Credits button puts credits on the game that are not included in any of the game audits.

The Volume Up button raises the sound level of the game. Press and hold the button until the desired level is reached.

The Volume Down button lowers the sound level of the game. Press and hold the button until the desired level is reached. See Adjustment A.1 28 to shut sound OFF completely.

The *Begin Test button starts the Menu System Operation and changes the Coin Door Switches from Normal Function to Test Function.

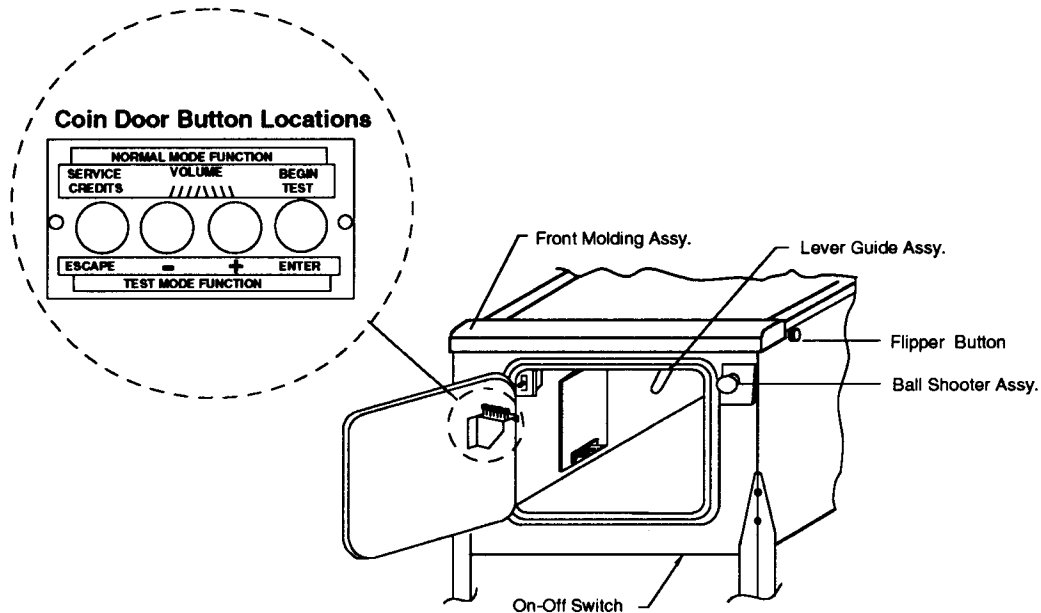
Test Function

The Escape button exits a menu selection or returns to the Attract Mode.

The Up button cycles forward through the menu selections or adjustment choices.

The Down button cycles backward through the menu selections or adjustment choices.

The *Enter button enters a menu selection or locks in an adjustment choice.



****To reset High Score, hold down the Begin Test/Enter switch for 5 seconds, while in the Attract Mode.***

GAME OPERATION

CAUTION

After assembly and installation at the site location, this game must be plugged into a properly grounded outlet to prevent shock hazard, and to assure proper game operation. DO NOT use a 'cheater' plug to defeat the ground pin on the line cord. DO NOT cut off the ground pin.

POWERING UP. With the coin door closed, plug the game in and switch it On. In normal operation, testing will show in the display as the game performs Start-Up Tests. Once the Start-Up Tests have been successfully completed the last score is displayed. Afterward, the game goes into the Attract Mode.

Note: After the game has been on location for a period of time, the Start-Up Tests may contain messages concerning game problems. See 'Error Messages' for more detailed information regarding messages.

Open the coin door and press the Begin Test Switch. The display shows the game name, number, and software revision. The message changes. The display shows the sound software revision, revision level of the system software and date the game software was revised.

Example:

	BLACK ROSE	Sound Rev. L-1
	20013	Sy.2.03 11/1/91
	Rev. L-1	

Press the Enter button to enter the WPC Menu System (refer to the section entitled 'Menu System Operation' for more information). Perform the entire Test Menu routine to verify the game is operating satisfactorily.

ATTRACT MODE*. After completing the Test Menu routine, press the Escape button three times to enter the Attract Mode. During the Attract Mode the display shows a series of messages informing the player of the recent highest scores*, "custom messages*", and the score to achieve to obtain a replay award*

CREDIT POSTING. Insert coin(s). A sound is heard for each coin and the display shows the number of credits purchased. So long as the number of maximum allowable credits* are NOT exceeded by coin purchase or high score, credits are posted correctly.

STARTING A GAME. Press the Start button once. A startup sound plays and the credit amount shown in the display decreases by one. The display flashes 00 (until the first playfield switch is actuated), and shows ball 1. If credits are posted, additional players may enter the game by pressing the Start button once for each player, before the end of play on the first ball.

TILTS. Actuating the Slam Tilt switch inside the cabinet ends the current game and proceeds to the Game Over Mode. With the third closure* of the plumb bob tilt switch, the player loses the remaining play of that ball, but can complete the game.

END OF GAME. All earned scores and bonuses are awarded. If a player's final score exceeds the specified value, the player receives a designated award for achieving the current highest score. A random digit set* appears in the display. Credit* may be awarded when the last two digits of any player's score match the random digits. Match, high score, and game over sounds are made, as appropriate.

GAME OVER MODE. Game Over will show in the display. Afterward, the high scores flash and the game proceeds to the Attract Mode.

*Operator-adjustable feature.

MENU SYSTEM OPERATION

This game operates on a Menu System. The Main Menu allows you to choose from several main categories, which in turn lead to other menus to choose from. To enter the Menu System, open the coin door and press the Begin Test button. The displays show the Game I.D. Mode. Press the Enter button and the Main Menu appears. To cycle through the Main Menu selections press either the Up or Down button. Activate any selection by pressing the Enter button when the desired selection appears in the displays. Return to the Attract Mode or a previous menu selection, press the Escape button. Press the Start button for HELP at any time.

Main Menu

B. Bookkeeping Menu	
	B.1 Main Audits Etc., etc.
	B.2 Earnings Audits Etc., etc.
	B.3 Standard Audits Etc., etc.
	B.4 Feature Audits Etc., etc.
	B.5 Histograms Etc., etc.
	B.6 Time-Stamps Etc., etc.
P. Printouts Menu	
	P.1 Earnings Data
	P.2 Main Audits
	P.3 Standard Audits
	P.4 Feature Audits
	P.5 Score Histograms
	P.6 Game Time Histograms
	P.7 Time-Stamps
	P.8 All Data
T. Test Menu	
	T.1 Switch Edges
	T.2 Switch Levels
	T.3 Single Switches
	T.4 Solenoid Test
	T.5 Flasher Test
	T.6 General Illumination
	T.7 Sound & Music Test
	T.8 Single Lamps
	T.9 All Lamps
	T.10 Lamp & Flasher Test
	T.11 Display Test
	T.12 Cannon Test
U. Utilities Menu	
	U.1 Clear Audits
	U.2 Clear Coins
	U.3 Reset H.S.T.D.
	U.4 Set Time & Date
	U.5 Custom Message
	U.6 Set Game I.D.
	U.7 Factory Adjustments
	U.8 Factory Resets
	U.9 Presets Etc., etc.
	U.10 Clear Credits
	U.11 Auto Burn-In
A. Adjustments Menu	
	A.1 Standard Adjustments Etc., etc.
	A.2 Feature Adjustments Etc., etc.
	A.3 Pricing Adjustments Etc., etc.
	A.4 H.S.T.D. Adjustments Etc., etc.
	A.5 Printer Adjustments

Press Escape

To move out of a menu selection.

Press Enter

To get into a menu selection.

Press Up

Increases sequence; Example A.1, A.2, A.3, A.4.

Press Down

Decreases Sequence; Example A.4, A.3, A.2, A.1.

Use Up and Down to cycle through the selections in a menu.

Use Escape and Enter to move into and out of the selected menu

Bookkeeping is the first category available from the Main Menu. Press the Enter button to activate the Bookkeeping Menu. Press the Up or Down button to cycle through the selections. Press the Enter button to activate a selection. Once activated, press the Up or Down button to cycle through the available audits. Audits cannot be set, they can only be cleared by using U1 and U2 from the Utilities Menu. Press the Escape button to return to the Bookkeeping Menu. Press it again to return to the Main Menu.

B. BOOKKEEPING MENU

- B.1 Main Audits**
- B.2 Earning Audits**
- B.3 Standard Audits**
- B.4 Feature Audits**
- B.5 Histograms**
- B.6 Time-Stamped**

One Button Audit System. The Bookkeeping Menu is obtainable directly from the Attract Mode. Repeatedly pressing the Enter button, while in the Attract Mode, will cycle through all of the game audits.

B.1 Main Audits

B.1	01	Total Earnings	00
B.1	02	Recent Earnings	00
B.1	03	Free Play Percent	00
B.1	04	Average Ball Time	00
B.1	05	Average Game Time	00
B.1	06	Total Plays	00
B.1	07	Replay Awards	00
B.1	08	Percent Replays	00
B.1	09	Extra Balls	00
B.1	10	Percent Extra Ball	00

B.2 Earning Audits*

B.2	01	Recent Earnings	00
B.2	02	Recent Left Slot	00
B.2	03	Recent Center Slot	00
B.2	04	Recent Right Slot	00
B.2	05	Recent 4th Slot	00
B.2	06	Recent Paid Credits	00
B.2	07	Recent Service Credits	00
B.2	08	Total Earnings*	00
B.2	09	Total Left Slot*	00
B.2	10	Total Center Slot*	00
B.2	11	Total Right Slot*	00
B.2	12	Total 4th Slot*	00
B.2	13	Total Paid Credits*	00
B.2	14	Total Service Credits*	00

*These audits are NOT resettable. They are a record of the earnings of the game since the "CLOCK 1ST SET" Time-Stamp.

B.3 Standard Audits

B.3	01	Games Started	00
B.3	02	Total Plays*	00
B.3	03	Total Free Play	00
B.3	04	Free Play Percent	00
B.3	05	Replay Awards	00
B.3	06	Percent Replays	00
B.3	07	Special Awards	00
B.3	08	Percent Special	00
B.3	09	Match Awards	00
B.3	10	Percent Match	00
B.3	11	H.S.T.D. Credits	00
B.3	12	Percent H.S.T.D	00
B.3	13	Extra Ball	00
B.3	14	Percent Extra Ball	00
B.3	15	Tickets Awarded	00
B.3	16	Percent Tickets	00
B.3	17	Left Drains	00
B.3	18	Right Drains	00
B.3	19	Average Ball Time	00
B.3	20	Average Game Time	00
B.3	21	Minutes of Play	00
B.3	22	Minutes On	00
B.3	23	Balls Played	00
B.3	24	Tilts	00
B.3	25	Replay 1 Awards	00
B.3	26	Replay 2 Awards	00
B.3	27	Replay 3 Awards	00
B.3	28	Replay 4 Awards	00
B.3	29	1 Player Games	00
B.3	30	2 Player Games	00
B.3	31	3 Player Games	00
B.3	32	4 Player Games	00
B.3	33	H.S.T.D. Reset Count	00
B.3	34	Burn-in Cycles	00
B.3	35	1st Replay Level	00

* "Total Plays" only counts completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored, therefore test and servicing operations do not affect the Audits.

B.4 Feature Audits

B.4	01	Extra Ball Lit From Random Award	00
B.4	02	Jackpot Lit From Random Award	00
B.4	03	Special Lit	00
B.4	04	Swing From The Riggings Total Plays	00
B.4	05	Swing From The Riggings Total Wins	00
B.4	06	Walk The Plank Total Plays	00
B.4	07	Walk The Plank Total Wins	00
B.4	08	Knife Throw Total Plays	00
B.4	09	Knife Throw Total Wins	00
B.4	10	Collected Millions+ In Millions Mode	00
B.4	11	Collected A Double Broadside In Double Broadside Mode	00
B.4	12	Sneak Attack Collected	00
B.4	13	Ricochet Collected	00
B.4	14	Re-light Broadside Bonus From Right Single Stand-up Time-Down	00
B.4	15	Re-light Broadside Bonus From Center Broadside Shot Time-Down	00
B.4	16	Bonus Multiplier Collected	00
B.4	17	Shot To The Jets Made	00
B.4	18	Maximum Jet Shot Value Attained	00
B.4	19	Number Of Ships Sunk	00
B.4	20	Number Of SINK SHIP Letters Collected	00
B.4	21	Re-light Broadside Bonus From Right Single Stand-up	00
B.4	22	Instant Reload Collected	00
B.4	23	Hidden Treasure Mode Collected	00
B.4	24	2 Way Combination Shot Collected	00
B.4	25	3 Way Combination Shot Collected	00
B.4	26	Skill Shot Collected	00
B.4	27	Number Of Cannon Shots That Missed	00
B.4	28	Number Of Cannon Shots That Collected A Feature	00
B.4	29	Number Of Cannon Shots That Collected A Letter	00
B.4	30	Lock Was Enabled	00
B.4	31	2 Ball Multiball Collected	00
B.4	32	3 Ball Multiball Collected	00
B.4	33	Ball Time Locked In 2 Ball Multiball	00
B.4	34	Instant Multiball Collected	00
B.4	35	Locker (Ramp) Opened By Collecting All Stand-up Target Banks	00
B.4	36	Locker (Ramp) Opened By Making Consecutive Middle Ramps	00
B.4	37	Jackpot Lit From A Broadside Bonus Feature	00
B.4	38	Jackpot Collected	00
B.4	39	Middle Ramp Made	00
B.4	40	Right Ramp Made	00
B.4	41	Multi Bonus Collected	00
B.4	42	Number Of Balls Saved From Draining	00

B.5 Histograms

B.5	01	0-1.9 Million Scores	00%	00
B.5	02	2-4.9 Million Scores	00%	00
B.5	03	5-9.9 Million Scores	00%	00
B.5	04	10-19 Million Scores	00%	00
B.5	05	20-29 Million Scores	00%	00
B.5	06	30-39 Million Scores	00%	00
B.5	07	40-49 Million Scores	00%	00
B.5	08	50-69 Million Scores	00%	00
B.5	09	70-99 Million Scores	00%	00
B.5	10	100-149 Million Scores	00%	00
B.5	11	150-199 Million Scores	00%	00
B.5	12	200-299 Million Scores	00%	00
B.5	13	Over 300 Million	00%	00
B.5	14	Game Time 0.0-1.0 Mins	00%	00
B.5	15	Game Time 1.0-1.5 Mins	00%	00
B.5	16	Game Time 1.5-2.0 Mins	00%	00
B.5	17	Game Time 2.0-2.5 Mins	00%	00
B.5	18	Game Time 2.5-3.0 Mins	00%	00
B.5	19	Game Time 3.0-3.5 Mins	00%	00
B.5	20	Game Time 3.5-4.0 Mins	00%	00
B.5	21	Game Time 4-5 Mins	00%	00
B.5	22	Game Time 5-6 Mins	00%	00
B.5	23	Game Time 6-8 Mins	00%	00
B.5	24	Game Time 8-10 Mins	00%	00
B.5	25	Game Time 10-15 Mins	00%	00
B.5	26	Game Time Over 15 Mins	00%	00

B.6 Time-Stamps

The Time-Stamps Menu allows you to view dates and times that are important to game software.

B.6	01	Current Time
B.6	02	Clock 1st Set
B.6	03	Clock Last Set
B.6	04	Audits Cleared
B.6	05	Coins Cleared
B.6	06	Factory Setting
B.6	07	Last Game Start
B.6	08	Last Replay
B.6	09	Last H.S.T.D. Reset
B.6	10	Champion Reset
B.6	11	Last Printout
B.6	12	Last Service Credit

Press the Enter button to activate the Printouts Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Printouts Menu selections. Press the Enter button to activate the desired Printouts group. Press again to return to the Main Menu.

P. PRINTOUTS MENU

(optional board required)

- P.1 Earnings Data
- P.2 Main Audits
- P.3 Standard Audits
- P.4 Feature Audits
- P.5 Score Histograms
- P.6 Time Histograms
- P.7 Time-Stamps
- P.8 All Data

The Printouts Menu is a combination of the other menus. This menu allows you to access and print information in the available menu selections.

If no printer is attached the message "Waiting for Printer" appears in the displays.
Note: Set print specification from the Adjustment Menu, A.5 Printer Adjustments.

Press the Enter button to activate the Test Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Test Menu selections. Press the Enter button to activate a test. Press the Escape button to return to the Test Menu. Press again to return to the Main Menu. Note: During any test, press the Start button to obtain the wire color, driver number, connector number, and fuse location.

T. TEST MENU

T.1	Switch Edges
T.2	Switch Levels
T.3	Single Switch
T.4	Solenoid Test
T.5	Flasher Test
T.6	General Illumination
T.7	Sound & Music Test
T.8	Single Lamps
T.9	All Lamps
T.10	Lamp & Flasher Tests
T.11	Display Test
T.12	Motor Test

The switch matrix, on the left side of the display, shows the state of all switches. A dot indicates the switch is open, and a square indicates the switch is closed. The numbers assigned to each switch indicate where the switch is located in the matrix. The number on the left indicates the column, and the number on the right indicates the row. Example: Switch 23 is 2nd column, 3rd row.

A short to ground, on either the row or column wire, appears as a shorted row(s). However, a column wire shorted to ground disappears when all the indicated row switches are open. A row wire shorted to ground does not disappear.

A shorted diode in the switch matrix can cause other switches to appear closed. These "phantom" switches (though not actually closed) complete a rectangle in the switch matrix. Therefore, if two switches in the same column are closed (example; #22 and #24), and a third switch is pressed in another column but in the same row as one of the first two (example; #32), the "phantom" switch #34 is falsely indicated as closed. The switch with the shorted diode is diagonally opposite the "phantom" switch (in this case #22).

T.1 Switch Edges

Press each switch one at a time. The name and number of the switch is shown in the display. If a switch other than the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit.

T.2 Switch Levels

This test automatically cycles through all switches that are detected closed. The name and number of each switch that is detected is shown in the display. A filled square indicates the switch's position in the matrix.

T.3 Single Switches

The Single Switch Test isolates a particular switch by blocking signals from all other switches. Use the Up or Down buttons to select the switch to be tested.

T.4 Solenoid Test

The Solenoid Test has three modes: Repeat, Stop, and Run. Only one solenoid should pulse at a time. The system has detected a problem if; more then one solenoid pulses, a solenoid comes On and stays On, or during the Repeat or Run modes, no solenoid pulses.

- Repeat - The Repeat mode pulses a single solenoid. After entering this test, Solenoid 1 shows in the display. and the corresponding solenoid activates. Press the Up or Down button to cycle through the solenoids, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - The Stop mode halts the Solenoid Test. Press Enter during the Repeat mode and the Solenoid Test Stops. No solenoids should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.
- Running - The Run mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

T.5 Flasher Test

This tests the flashlamp part of the solenoid circuit exclusively. This, like the Solenoid Test has three test modes: Repeat, Stop, and Run. During this test, only one flashlamp circuit should pulse at a time. The system has detected a problem if more than one circuit pulses, a circuit stays On, or during the Repeat or Run modes, no circuit pulses.

- Repeat - The Repeat mode pulses a single flashlamp. After entering this test, the name and number of the first flashlamp circuit will show in the display and the corresponding bulb(s) flash. Press the Up or Down button to cycle through all of the flashlamp circuits one at a time. The same circuit pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - The Stop mode halts the Flasher Test. No flashlamp circuit should be active during this mode. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.
- Running - The Run mode cycles through the flashlamps automatically. The display shows the name and number of the flashlamp circuit currently being pulsed and the corresponding bulb(s) flash. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

T.6 General Illumination

This test checks all of the General Illumination circuits. There are two modes of operation: Stop and Run.

- Stop - Press the Up or Down buttons to cycle through the General Illumination Test manually. All illumination is tested first, followed by an individual circuit test. The circuit name and number will show in the display while the corresponding lamps light. If any other results occur the system has detected an error.
- Run - Press the Enter button any time during Stop test mode and the General Illumination Test cycles through automatically. For each circuit shown in the displays the corresponding bulbs should light. If any other results occurs the system has detected a problem.

T.7 Sound and Music Test The Sound and Music Test allows you to check the audio circuits. This test has three modes for testing the sound and music circuits: Run, Repeat, and Stop.

- Run - This Run mode steps through a sequence of sounds and music. Pressing the Up or Down button during this portion of the Sound and Music test advances to a particular sound/tune without having to wait for the program to play all the sounds available in the test. A sound/tune should be heard for each name and number that appears in the display. Any other results indicate the system has detected a problem.
- Repeat - Press the Enter button at any time during the Run mode to cause the program to stop and repeat a particular sound/tune. The same sound should repeat continuously until the Up or Down button is pressed. Any other results indicates the system has detected a problem.
- Stop - Press the Enter button at any time during the Repeat mode to stop this test altogether. No sound/tune should be heard. Any other results indicates the system has detected a problem.

T.8 Single Lamp Test The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example: Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through this test. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicate the system has detected a problem.

T.9 All Lamps Test This test causes all the controlled lamps to flash at the same time. Every controlled lamp should flash. Any other results indicate the system has detected a problem.

T.10 Lamp and Flasher Test This test causes all the flashlamps and the controlled lamps to flash at the same time. The controlled lamps blink, while the flashlamps cycle from highest to lowest. Any other results indicates the system has detected a problem.

T.11 Display Test This test automatically every dot in the Dot Matrix Display. A series of patterns appear in sequence. Each pattern turns On and Off a section of dots. Every dot on the display should be turned On and Off during this test.

T.12 Cannon Test This test allows the operator to toggle the cannon motor on and off. It also activates the cannon kicker and left lockup coils to allow balls to be kicked out of these devices when testing. The display will show the status of the cannon kicker switch (SW.35 CANNON = OPEN, or SW.35 CANNON = CLOSED), and the motor (MOTOR = ON, or MOTOR = OFF). This test allows for easier adjustment of the cannon kick out range. The cannon should be able to kick the ball out and make the far right shot to the jets, and the far left shot to the lockup. The test buttons are used as follows:

The ENTER, UP, and DOWN buttons will toggle the cannon motor ON or OFF.
The ESCAPE button will return to the Test Menu when pressed at anytime during the test.

Press the Enter button to activate the Utilities Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Utility Menu selections. Press the Enter button to activate a selection. Use the Up or Down button to rotate the settings. Press the Enter button to lock in a setting. If a mistake is made while changing a setting, press the Escape button while "Saving Adjustment Value" is still in the display. The original setting is retained and the new setting is ignored. Press the Escape button to return to the Utilities Menu. Press it again to return to the Main Menu.

U. UTILITIES MENU

U.1	Clear Audits
U.2	Clear Coins
U.3	Reset H.S.T.D.
U.4	Set Time & Date
U.5	Custom Message
U.6	Set Game I.D.
U.7	Factory Adjustments
U.8	Factory Resets
U.9	Presets
U.10	Clear Credits
U.11	Auto Burn-in

U.1 Clear Audits

Press the Enter button to clear the Standard Audits, Feature Audits, and Histograms.

U.2 Clear Coins

Press the Enter button to clear the Earnings Audits.

U.3 Reset H.S.T.D.

Press the Enter button to clear the High Score to Date Table and the Grand Champion.

U.4 Set Time and Date

Press the Enter button to activate the time and date. Use the Up or Down button to change the value, then press the Enter button to lock in that value. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

U.5 Custom Message

Set A.1 20 to YES before writing a Custom Message. Press the Enter button to begin entry of the custom message. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation. If you make a mistake, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once your message is complete, press and hold the Enter button until "Message Stored" is displayed.

Press the Escape button to cancel the new message. The message "Press Enter to Reset" appears. If you press Enter, the custom message is cleared and no message is displayed. If Escape is pressed, the original message remains intact.

U.6 Set Game I.D.

This utility allows the operator to install a message, such as game location, that only appears on printouts . Press the Enter button to activate Set Game I.D.. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation.

U.7 Factory Adjustment

Press the Enter button to restore the adjustments to factory settings.

U.8 Factory Reset

Press the Enter button to restore the adjustments to their factory setting, clear the Audits, H.S.T.D Table, and Custom Message/Game I.D.

U.9 Presets

Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

U.9 01 Install Extra Easy

The game play difficulty adjustments can be changed to a combination that is MUCH LESS to MUCH MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the individual groups.

U.9 02 Install Easy

Somewhat LESS difficult than factory setting.

U.9 03 Install Medium

About the SAME as factory setting.

U.9 04 Install Hard

Somewhat MORE difficult than factory setting.

U.9 05 Install Extra Hard

MUCH MORE difficult than factory setting.

Game Difficulty Setting Table for U.S./Canada

Adj. No.	Adjustment Description	Extra Easy	Easy	Medium (factory)	Hard	Extra Hard
		U.9 01	U.9 02	U.9 03	U.0 04	U.9 05
A.2 01	Lock Time-down	30 Sec.	25 Sec.	20 Sec.	15 Sec.	10 Sec.
A.2 02	Right Ramp Time	30 Sec.	25 Sec.	20 Sec.	15 Sec.	10 Sec.
A.2 03	Ramp Open Start	01	02	02	02	03
A.2 04	Ramp Open Max	03	05	06	07	09
A.2 05	Combo 1st Timer	15 Sec.	10 Sec.	5 Sec.	5 Sec.	4 Sec.
A.2 06	Combo 2nd Timer	15 Sec.	10 Sec.	5 Sec.	5 Sec.	4 Sec.
A.2 07	Reload Timer	30 Sec.	25 Sec.	20 Sec.	15 Sec.	15 Sec.
A.2 08	Middle Ramp Time	15 Sec.	10 Sec.	6 Sec.	6 Sec.	5 Sec.
A.2 09	Extra Ball Percent	35%	30%	25%	20%	15%
A.2 10	Jackpot Lit Percent	25%	20%	15%	13%	10%
A.2 11	Random Game Award	Easy	Medium	Medium	Medium	Hard
A.2 12	Skill Shot	Easy	Easy	Easy	Medium	Hard
A.2 14	Jewel Reset	4 Jewels	5 Jewels	6 Jewels	8 Jewels	10 Jewels
A.2 15	Millions Timer	40 Sec.	35 Sec.	30 Sec.	25 Sec.	20 Sec.
A.2 16	Enable Lock	Easy	Easy	Hard	Hard	Hard
A.2 17	Broadside Bonus	Easy	Easy	Easy	Medium	Hard
A.2 21	Special Lit After	1 SUNK	1 SUNK	2 SUNK	2 SUNK	3 SUNK
A.2 28	Double Broadside Timer	40 Sec.	35 Sec.	30 Sec.	25 Sec.	20 Sec.
A.2 29	Ball Saver	10 Sec.	8 Sec.	7 Sec.	6 Sec.	5 Sec.
A.2 31	Multiball Bonus	Easy	Easy	Easy	Easy	Hard
A.2 32	Sinkship Start	SINKSH	SINKS	SINK	SIN	SI

U.9 06 Install 5 Ball

U.9 07 Install 3 Ball

Adjustments U.9 06 and U.9 07 can be used to change a game to 3 or 5 ball play, including the changing of certain features to the recommended 3- and 5-ball level. The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the individual groups.

Preset Game Adjustments Table for U.S./Canadian Games

Adjustment Number	Adjustment Description	Install 5-Ball U.9 06	Install 3 Ball U.9 07
A.1 01	Balls Per Game	5	3
A.1 07	Replay Start	35,000,000	20,000,000
A.2 30	Consolation Ramp/Extra Ball	90 Seconds	60 Seconds

U.9 08 Install Add-A-Ball

This option deletes all Free Play awards and replace them with Extra Ball awards. Individual adjustments are affected, as follows:

<u>Adjustment</u>	<u>Name</u>	<u>New Setting</u>
A.1 13	Replay Boost	Off
A.1 14	Replay Award	Extra Ball
A.1 15	Special Award	Extra Ball
A.1 17	Extra Ball Ticket	No
A.1 19	Match Feature	Off
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 08	High Score 3 Credits	00
A.4 07	High Score 4 Credits	00

U.9 09 Install Ticket

This option deletes Credit awards and replace them with Ticket awards. Individual adjustments are affected, as follows:

<u>Adjustment</u>	<u>Name</u>	<u>New Setting</u>
A.1 14	Replay Award	Ticket
A.1 15	Special Award	Ticket
A.1 16	Match Award	Ticket
A.1 17	Extra Ball Ticket	Yes
A.1 31	Ticket Expansion Board	Yes
A.4 02	H.S.T.D. Award	Ticket

U.9 10 Install Novelty

This option removes all Free Play and Extra Ball awards. Individual adjustments are affected, as follows:

<u>Adjustment</u>	<u>Name</u>	<u>New Setting</u>
A.1 04	Max. Extra Ball	Off
A.1 05	Replay System	Fixed
A.1 09	Replay Level 1	Off
A.1 10	Replay Level 2	Off
A.1 11	Replay Level 3	Off
A.1 12	Replay Level 4	Off
A.1 15	Special Award	Points
A.1 19	Match Feature	Off
A.4 01	Highest Score	On
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 07	High Score 3 Credits	00
A.4 08	High Score 4 Credits	00

U.9 11 Install Buy-in

This option automatically sets game pricing to 1 for 50¢/2 for \$1.00, and 1 Coin Buy-in (A.3 19) to YES.

U.9 12 through 16 Not Used

U.9 17 through 28 For International games only, see section four.

U.10 Clear Credits

Press the Enter button to clear the game Credits.

U.11 Auto Burn-in

Press the Enter button to activate Auto Burn-in. This utility allows you to automatically cycle through several tests. This will help in find intermittent problems. The tests that Auto Burn-in cycle through are: the Display Test, Sound and Music Test, All Lamps Test, Solenoid Test, Flashers Test, and General Illumination Test.

Press the Enter button to activate the Adjustments Menu, once the menu name is shown under the Main Menu. Press the Up or Down button to cycle through the Adjustment Menu selections. Press the Enter button to activate the selection. Press the Up or Down button to cycle through the available adjustments. Press the Enter button to activate an adjustment. When an adjustment is activated, the setting value begins to flash. Use the Up or Down button to raise or lower the setting value. Press Enter to lock in the value. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained. Press the Enter button to return to the Adjustments Menu. Press it again to return to the Main Menu.

A. ADJUSTMENTS MENU

- A.1 Standard Adjustments
- A.2 Feature Adjustments
- A.3 Pricing Adjustments
- A.4 H.S.T.D Adjustments
- A.5 Printer Adjustments (optional board required)

A.1 Standard Adjustments

A.1 01 Balls Per Game

A "game" is defined by specifying the number of balls to be played.
Range: 1-10

A.1 02 Tilt Warnings

The number of total actuations of the plumb bob mechanism that can occur before the game is "tilted".
Range: 1-10

A.1 03 Maximum Extra Balls

The number of extra balls that a player may accumulate.
Range: 1-10

A.1 04 Maximum Extra Balls/Ball in Play

The number of extra balls to be awarded per ball in play.

OFF - No maximum number of Extra Balls per ball in play.
1-10 - 1 through 10 Extra Balls per ball in play.

A.1 05 Replay System

The type of replay system to be used.

Fixed - Replay value is set and does not change during game play.
Auto% - Replay starting value is set and changes every 50 games to comply with the percentage of replays desired.

A.1 06 Replay Percent*

The percentage of replays the players are able to earn when Auto Replay is used.
Range: 5-50%

A.1 07 Replay Start*

The replay start value when Auto% Replay is used. The range of this setting is 1, 000, 000 to 20, 000, 000.

A.1 08 Replay Levels*

The number of replay levels used by the Auto% Replay mode. The range of this setting is 1 to 4. When two replay levels are chosen, the second replay level is automatically adjusted to twice the starting replay level value. When three of four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

*For Auto % Replay.

A.1 09 Replay Level 1

A.1 10 Replay Level 2

A.1 11 Replay Level 3

A.1 12 Replay Level 4

The values used for the 1st through 4th levels of Fixed Replay. Range: 00 - 25,000,000.

A.1 13 Replay Boost

The replay score can be temporarily boosted by the selected amount EACH time the player reaches or exceeds the replay score. This temporary boost is canceled when credits equal 0, the player inserts another coin, or Begin Test is pressed.

ON - Score is boosted between 500, 000 and 5, 000, 000 points.
OFF - Replay score is not boosted.

A.1 14 Replay Award

For the form of award automatically provided when the player exceeds any replay level for either Auto% Replay, or Fixed Replay.

Credit - Reaching each Replay level awards credit.
Ticket - Reaching each Replay level awards a ticket.
Ball - Reaching each Replay level awards an Extra Ball.
Audit - Reaching each Replay level awards nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards.

A.1 15 Special Award

The award automatically provided when the player scores a special.

Credit - Scoring a Special awards a Credit.
Ticket - Scoring a Special awards a Ticket.
Ball - Scoring a Special awards an Extra Ball.
Points - Scoring a Special awards 1 Million points.

A.1 16 Match Award

The award automatically provided when the players wins a match.

Credit - Winning a Match awards a Credit.
Ticket - Winning a Match awards a Ticket.

A.1 17 Extra Ball Ticket

A Ticket is awarded when the player earns an Extra Ball.

YES - The player is awarded a Ticket in addition to an Extra Ball.
NO - The player is not awarded a Ticket.

A.1 18 Maximum Ticket/Player

The amount of Tickets each player can earn.
Range 00 - 100

A.1 19 Match Feature

The desired percentage for the Match Feature occurring at the end of the game.

OFF - Match Feature is not available.

1 -50% - 1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects a random two-digit number at the end of the game and compares each players score for an identical two digits in the rightmost two positions. A matching of these two digits results in an award of a Credit or a Ticket.

A.1 20 Custom Message

The message displayed during the Attract Mode.

YES - A message is displayed

NO - A message is not displayed.

A.1 21 Language

The language the game uses: English, French, or German.

A.1 22 Clock Style

The style of clock the game uses: A.M./P.M., or 24 Hours.

A.1 23 Date Style

The style of date the game uses: Month/Date/Year, or Date/Month/Year.

A.1 24 Show Date and Time

The date and time show in the Attract Mode.

YES - Show date and time in status report, or Attract Mode.

NO - Do Not show date and time in status report or Attract Mode.

A.1 25 Allow Dim Illumination

The game program dims the General Illumination for special effects during the Attract Mode.

YES - Dim General Illumination during Attract Mode.

NO - Do Not dim General Illumination.

A.1 26 Tournament Play

Equalize Multiball and Jackpots during multi-player games, (do not carry over to next player).

YES - Keep Multiball and Jackpots equal.

NO - Do Not Keep Multiball and Jackpots equal.

A.1 27 Euro. Scr. Format

Use either commas or dots between digits when numbers are displayed.

- YES - Dots instead of commas, (example 1.000.000).
- NO - Commas instead of dots, (example 1,000,000).

A.1 28 Minimum Volume Control

The volume can be turned Off.

- YES - Volume can be turned Off.
- NO - Volume can be turned Down but not Off.

A.1 29 General Illumination Power Saver

This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played. Power Saver Level (A.1 30) determines how dimness of lamps. Using this feature will substantially increase the life of the lamps.

Setting: - Off, 2-60 Minutes

A.1 30 Power Saver Level

When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.

Range: 4-7

A.1 31 Ticket Expansion Board

When a Ticket Expansion Board is connected, full control of the ticket dispenser is available. This includes a ticket low/error lamp, resume on ticket jam switch, and manual ticket dispense switch.

- Yes - Ticket Expansion Board is connected.
- No - Ticket Expansion Board is NOT installed in the game.

A.1 32 No Bonus Flips

The activation of flippers during the end of ball "bonus" sequence. Setting this to "YES" may extend the life of the flipper mechanisms.

A.1 33 Game Restart

When the start button is pressed during or after the 2nd ball, the game in progress will end and a new game will begin. This adjustment has 3 settings to determine how this is handled.

- Never: - Do not allow a new game to start until the current game is over.
- Slow: - Restart if the start button is pressed continuously for over 1/2 second. This helps to prevent the unintended restart of game in progress.
- Instantly: - Restart as soon as the start button is pressed.

When the start button is pressed during game over, or during the 1st ball (to add a player), it is always handled instantly.

A.2 Feature Adjustments

A.2 01 LOCK TIME-DOWN RATE

The rate at which a ball will be held in lockup during two ball multiball. Setting range is from 1 to 99 seconds.

Factory Default: 20 Seconds

A.2 02 RIGHT RAMP TIME-DOWN RATE

The rate at which the five lights in front of the right ramp time-down once lit. Setting range is from 1 to 99 seconds.

Factory Default: 20 Seconds

A.2 03 MIDDLE RAMP OPEN

The number of consecutive middle ramp loops that are needed to open the middle ramp. Setting range is from 1 to 10 loops.

Factory Default: 2 Loops

A.2 04 MIDDLE RAMP OPEN MAXIMUM COUNT

The highest number of consecutive middle ramp loops that are needed to open the middle ramp. Setting range is from 2 to 20 loops.

Factory Default: 6 Loops

A.2 05 COMBINATION SHOT 1 TIME-DOWN

The rate at which the first combination shot times down once lit (top left loop). Setting range is from 1 to 99 seconds.

Factory Default: 5 Seconds

A.2 06 COMBINATION SHOT 2 TIME-DOWN

The rate at which the second combination shot times down once lit (far right shot). Setting range is from 1 to 99 seconds.

Factory Default: 5 Seconds

A.2 07 CANNON RELOAD TIME-DOWN RATE

The rate at which the ramp stays open after the cannon is shot and missed allowing an instant reload. Setting range is from 1 to 99 seconds.

Factory Default: 20 Seconds

A.2 08 MIDDLE RAMP TIME-DOWN RATE

The rate at which the three lights in front of the middle ramp time-down once lit. Setting range is from 5 to 99 seconds.

Factory Default: 6 Seconds

A.2 09 EXTRA BALL RANDOM AWARD

The percentage of times the game will award or offer an extra ball when Rigging Swing, Walk the Plank, Knife Throw, or Polly is activated. Percentage is based on total number of extra balls collected, skill or random. Setting range is from 1 to 99 percent.

Factory Default: 20 Percent

A.2 10 JACKPOT LIT RANDOM AWARD

The percentage of times the game will award or offer Jackpot Lit when Rigging Swing, Walk the Plank, Knife Throw, or Polly is activated. Percentage is based on total number of Jackpot Lits collected, skill or random. Setting range is from 1 to 99 percent.

Factory Default: 15 Percent

A.2 11 RANDOM GAME AWARDS

The awards given or offered in the Rigging Swing, Walk the Plank, Knife Throw, and Polly. When Extra Ball or Jackpot Lit is not given by a random award, then the award given will be based on this adjustment.

- EASY** - Valuable point/features will be awarded more often.
- MEDIUM** - Valuable point/features will be awarded evenly.
- HARD** - Valuable point/features will be awarded less often.

Factory Default: MEDIUM

A.2 12 SKILL SHOT LEVEL

The difficulty of the plunger skill shot.

- EASY** - Skill shot has only one level of difficulty.
- MEDIUM** - Skill shot has two levels of difficulty.
- HARD** - Skill shot has three levels of difficulty.

Factory Default: EASY

A.2 13 HIDDEN TREASURE

The way Hidden Treasure Mode works from player to player, and game to game.

- ALWAYS** - Jewels hold over from game to game, all players share the same set of jewels.
- PLAYER** - Jewels hold over from game to game (last player), each player has their own set of jewels.
- GAME** - Jewels are reset at the start of each game, all players share the same set of jewels.

Factory Default: ALWAYS

A.2 14 HIDDEN TREASURE JEWEL RESET

The number of jewels needed for Hidden Treasure Mode to start.

Factory Default: 6 Jewels

A.2 15 MILLIONS MODE TIME-DOWN RATE

The amount of time Millions Mode will be active once collected. Setting range is from 5 to 99 seconds.

Factory Default: 30 Seconds

A.2 16 LOCK ENABLE DIFFICULTY

The way a lock can be enabled.

- EASY** - Lock light lanes remain lit after MULTIBALL.
- HARD** - Lock lanes are cleared at the end of MULTIBALL.

Factory Default: HARD

A.2 17 BROADSIDE BONUS LITE

How the center broadside bonus feature is lit.

- EASY** - Broadside is lit (turned on) at the start of each ball.
- MEDIUM** - Broadside is carried over from ball to ball.
- HARD** - Broadside is turned off at the start of each ball.

Factory Default: EASY

A.2 18 CANNON SHOTS RESET

Select whether or not the cannon shot jewels will be cleared, or reset after sinking a ship. *NOTE:* This adjustment is only used if A.2 26 CANNON SHOT FEATURE LEVELS is set to OFF and A.2 27 CANNON FEATURE LEVEL START is set to 0.

- EASY** - Cannon shot jewels are reset after sinking a ship.
- HARD** - All cannon shot jewels must be collected for a reset.

Factory Default: EASY

A.2 19 ATTRACT MODE SOUNDS

Select whether or not the attract mode has sound to attract the player.

- ON** - The attract mode does have sound.
- OFF** - The attract mode does not have sound.

Factory Default: OFF

A.2 20 SPECIAL LIT PERCENTAGE

The percentage of times the game will lite Special after sinking 'X' number of ships ('X' is set by adjustment A.2 21 SPECIAL LIT). If Special has been collected within this percentage, the Special Lit timer will last 10 seconds. If Special has not been collected within this percentage, the Special Lit timer will last 30 seconds. The setting range is 1 to 99 percent.

Factory Default: 7 Percent

A.2 21 SPECIAL LIT AFTER 'X' NUMBER OF SHIPS

The number of ships that must be sunk before Special is lit. Setting range is from 1 to 9 ships sunk.

Factory Default: 2 SHIPS SUNK

A.2 22 SWING FROM THE RIGGINGS VIDEO GAME LEVEL START

The level of difficulty in which the SWING FROM THE RIGGING game starts. Setting range level is from 1 to 4. Level 1 is the easiest and level 4 is the hardest.

Factory Default: Level 1

A.2 23 WALK THE PLANK VIDEO GAME LEVEL START

The level of difficulty in which the WALK THE PLANK game starts. Setting range level is from 1 to 4. Level 1 is the easiest and level 4 is the hardest.

Factory Default: Level 1

A.2 24 KNIFE THROW VIDEO GAME LEVEL START

The level of difficulty in which the KNIFE THROW game starts. Setting range level is from 1 to 4. Level 1 is the easiest and level 4 is the hardest.

Factory Default: Level 1

A.2 25 VIDEO GAMES LEVELS

Select whether or not the video games automatically get one level harder each time they are played.

- ON** - Video games get one level harder each time played.
- OFF** - Video games stay at the level selected in adjustments A.2 21, A.2 22, and A.2 23.

Factory Default: ON

A.2 26 CANNON SHOT FEATURE LEVELS

Select whether or not the cannon shot feature level remains fixed on one level, or goes up one level each time the feature is collected.

- ON** - Cannon shot feature level goes up each time collected.
- OFF** - Cannon shot feature level stays fixed at level set by adjustment A.2 27 CANNON FEATURE LEVEL START.

Factory Default: ON

A.2 27 CANNON FEATURE LEVEL START

The level at which the cannon shot feature will start. *NOTE:* If this adjustment is set to level ZERO, then the cannon shot features will be turned off and only letters will be awarded for the cannon shot. All cannon shots must then be hit once before they can be hit again. Also see A.2 18 CANNON SHOT RESET. Settings range level is from 0 to 15.

Factory Default: Level 1

A.2 28 DOUBLE BROADSIDE MODE TIME-DOWN RATE

The time that Double Broadside mode will be active once collected. Setting range is from 5 to 99 seconds.

Factory Default: 30 Seconds

A.2 29 BALL SAVER

The amount of time that the ball saver is active per ball. *NOTE:* Ball saver will return the ball to the shooter if the player has not had 'X' amount of play time that ball.

- 0** - Ball saver is turned off.
- 1-30** - Number of ball play time seconds that the ball will be returned to the player is lost.

Factory Default: 7 Seconds

A.2 30 CONSOLATION LOCKER OPEN/EXTRA BALL TIME

Choose whether a less skilled player can obtain an extra ball easier and have the locker (ramp) open at the start of the players last ball. An extra ball will be easier to collect and the locker (ramp) will open on the players last ball if their score is less than 3 million points and their game time is less than or equal to the CONSOLATION LOCKER/EXTRA BALL TIME.

- OFF** - Turn OFF Consolation Locker (ramp) Open/Extra Ball.
- 1-99** - Number of game time seconds for Locker (ramp) Open/Extra Ball.

Factory Default: 60 Seconds

A.2 31 MULTIBALL MULTI BONUS RESET

Select whether or not Multiball 'MULTI BONUS' resets after each multiball, or is carried over from each multiball mode that game.

- EASY** - MULTI BONUS carries over from multiball to multiball.
- HARD** - MULTI BONUS resets after each multiball.

Factory Default: EASY

A.2 32 SINKSHIP LETTERS LITE AT GAME START

Select the number of letters in SINKSHIP are lit at the start of a game. The more letters lit the easier it is to sink a ship.

- ALL OFF** - No letters are lit at game start.
- S-SINKSHIP** - 1 to 8 letters are lit at game start.

Factory Default: SINK letters lit.

A.2 33 MOST SHIPS SUNK HIGH SCORE BACKUP

The starting number of ships the player must sink to get a Most Ships Sunk High Score. This value is used whenever the game has been Factory Restored (U.8), or Factory Adjusted (U.7). Setting range is 1 to 20 ships sunk.

Factory Default: 2 ships sunk.

A.2 34 SINKSHIP LETTERS DIFFICULTY

Select how SINKSHIP letters are collected during multiball.

- EASY** - All ramps light 1 letter in SINKSHIP during 2 ball multiball, and all ramps light 2 letters in SINKSHIP during 3 ball multiball.
- MEDIUM** - Right and left ramps light 1 letter in SINKSHIP during 2 ball multiball, and right and left ramps light 2 letters in SINKSHIP during 3 ball multiball.
- HARD** - Right and left ramp alternately light 1 letter in SINKSHIP during 2 ball multiball, and right and left ramps light 1 letter in SINKSHIP during 3 ball multiball.

Factory Default: EASY

A.2 35 VIDEO MODE FLIPPERS

Select whether or not the flipper buttons will be used in the video game modes (Rigging Swing, Walk the Plank, Knife Throw). If the fire button on the front molding breaks or is lost, set this adjustment ON to allow the flipper buttons to work the same as the fire button did in the video game modes.

- ON** - Flipper buttons will work the same way as the front molding fire button during video game modes.
- OFF** - Flippers will NOT work during video game modes.

Factory Default: ON

A.3 Pricing Adjustments

A.3 01 Game Pricing (if set to custom, then 02 to 09 are available)

The cost of a game is selected from the Standard Pricing Table or by installing Custom pricing.

A.3 02 Left Coin Units

A.3 03 Center Coin Units

A.3 04 Right Coin Units

A.3 05 4th Slot Units

The number of coin units purchased by a coin passing through the left, center, right, and fourth coin chutes.

A.3 06 Units/Credits

Defines the number of coin units required to obtain 1 credit. A coin unit counter in the game program totals the number of coin units purchased through all coin chutes prior to each game. If the total number of these coin units exceeds or matches the Unit per Credit value by a multiple (or more, coin units) of the specified Units per Credit value the Credits display shows the proper number of credits. The coin unit counter retains any remaining coin units, until the start of Ball 2; then the coin unit counter is cleared (its contents are zeroed).

A.3 07 Units/Bonus

Additional credits are to be indicated in the credits display, when a certain number of coin units are accumulated.

A.3 08 Bonus Credits

The number of credits that are awarded when the Units/Bonus level is achieved.

A.3 09 Minimum Units

No credits are to be posted (indicated in the credit display), until the credits unit counter reaches a particular value, by setting this value to 02 (or more).

A.3 10 Coin Door Type (if set to custom, then 11 to 15 are available)

This adjustment is used to preset adjustments 11 through 15, based on standard coin doors (U.S.A., German, Etc.).

A.3 11 Collection Text

The coin system used to display the Earning Audits.

A.3 12 Left Slot Value

A.3 13 Center Slot Value

A.3 14 Right Slot Value

A.3 15 4th Slot Value

The monetary value of the left, center, right, and 4th coin chutes.

A.3 16 Maximum Credits

The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 10. Reaching the specified setting prevents the award of any credits.

A.3 17 Free Play

The player can operate the game without a coin (free play) or with a coin.

- NO - A coin is necessary for game play.
- YES - Game play is free; no coin required.

A.3 18 Hide Coin Audits

The coin audits may, or may not be displayed.

- YES - The coin audits are not displayed.
- NO - The coin audits are displayed.
- HIDE NAMES - The coin audit value is shown but not the audit name.

A.3 19 1 Coin Buy-in

If game pricing is set to 1 for 50¢/2 for \$1.00 the player is allowed to 'buy-in' a subsequent game for 1 coin. The number of games that may be purchased at this cost is determined by the number of players in the previous game; that is, if the previous game had three players, 3 Credits can be purchased at the rate of 1 coin per credit.

- YES - The player has 10 seconds to buy-in at 1 coin per game.
- NO - The buy-in feature is disabled.

A.3 20 Base Coin Size

The number of ticket per coin calculations.

A.3 21 Coin Meter Units

It is possible to connect a coin meter to the knocker coil driver which will log all coins through all slots. This adjustment activates the use of the knocker driver for this purpose, and determines the value of each unit on the meter. For example, to show the total amount of money collected as "total quarters", set this adjustment to "0.25". To show the amount of money collected as "total dollars", set this adjustment to "1.00".

Setting this adjustment to anything other than Off establishes the coin unit for a meter attached to the knocker driver, and overrides use of the knocker during awards.

Pricing Table U.S./Canada

Country	Coin Chute				Games/Coin	Display	Pricing Adjustments A.3														
	Left	Center	Right	4th Chute			02	03	04	05	06	07	08	09							
USA	25 ¢	*\$1.00	25¢	-	1/25¢, 4/\$1 ² 1/50¢, 2/75¢, 3/\$1 ^{1,2} 1/50¢, 2/\$1 ² 1/25¢, 3/\$1 ² 1/25¢, 3/50¢, 6/\$1 1/25¢, 5/\$1	U.S.A. 4/\$1.00 50-75-1.00 U.S.A. 2/\$1.00 U.S.A. 3/\$1.00 CUSTOM CUSTOM															
Canada	25 ¢	-	\$1.00	-	1/50¢, 2/75¢, 3/\$1 ² 1/50¢, 2/\$1 ²	CANADA 1 CANADA 2															

NOTES: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.
* Only if center coin chute and dollar bill acceptor are available.

A.4 H.S.T.D. Adjustments

A.4 01 Highest Scores

The game maintains a record of the four highest scores achieved to date.

- OFF - No high scores are recorded, or displayed.
- ON - The four highest scores are stored in memory and displayed in the Attract Mode.

A.4 02 H.S.T.D. Award

The award given for achieving the High Score To Date, or the Champion H.S.T.D: Credit or Ticket.

A.4 03 Champion H.S.T.D.

The "Highest" High Score is displayed in the Attract Mode. This score is not cleared when "High Score Reset Every" occurs.

- ON - The "Highest" High Score is retained in memory and is displayed.
- OFF - The "Highest" High Score is not retained.

A.4 04 Champion Credits

The operator chooses the number of credits or tickets awarded for a Grand Champion Score. Range: 00 - 10.

A.4 05 H.S.T.D. 1 Credits

A.4 06 H.S.T.D. 2 Credits

A.4 07 H.S.T.D. 3 Credits

A.4 08 H.S.T.D. 4 Credits

The number of credits or tickets to be awarded whenever a player exceeds the 1st, 2nd, 3rd, and 4th highest scores. Range: 00 - 10.

A.4 09 High Score Reset Every

The number of games to be played before an automatic reset of the displayed "Highest Score" occurs. The values provided upon reset are those selected by the operator in the Back-up High Scores. Range: OFF (disabled); 250 to 20,000.

A.4 10 Backup Champion

The Back-up Grand Champion Score. Range: 00 - 99,900,000.

A.4 11 Backup H.S.T.D. 1

A.4 12 Backup H.S.T.D. 2

A.4 13 Backup H.S.T.D. 3

A.4 14 Backup H.S.T.D. 4

The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached. Range: 00 - 99,900,000.

A.5 Printer Adjustments (optional board required)

A.5 01 Column Width

The column width to be printed. Range: 22 - 80.

A.5 02 Lines Per Page

The amount of lines per page. Range: 20 - 80.

A.5 03 Pause Every Page

Choose whether the printer pauses at the end of a page.

- YES - The printer does pause.
- NO - The printer does not pause.

A.5 04 Printer Type

Select the type of printer . Choices: Parallel, Serial, or ADP.

A.5 05 Serial Baud Rate

The baud rate used for Serial or ADP communications (bit rate). Choices: 300, 600, 1200, 2400, 4800, or 9600.

A.5 06 Serial D.T.R. (Data Terminal Ready)

When a Serial Printer is used, this line may be connected to a printer output line signaling that the printer is busy.

- Normal - Normal D.T.R. signal goes low to indicate the printer is not ready.
- Inverted - Inverted D.T.R. (busy) signal goes high to indicate printer is not ready.
- Ignore - D.T.R. signal is ignored.

ERROR MESSAGES

The WPC game program has the capability to aid the operator and service personnel. At Game Turn-on, or after pressing the Begin Test switch, (once the game has been operating for an extended period), the display may signal with the message, "Press ENTER for Test Report". This indicates the game program has detected a possible problem with the game.

To obtain details of the problem, open the coin door and press the Begin Test switch. Press the Enter button to begin displaying the message(s). The following messages apply to your game.

Check Switch ##.

This message indicates that at least one switch was stuck 'On' at game turn-on or has NOT been actuated during ball play (for 90 balls or ≈30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep the game earning, until the service technician can repair the problem.

To verify the problem, refer to the Test Menu text describing Switch Testing, and check each reported switch using applicable switch tests. Always check switch operation using a ball, to simulate game conditions. Switch problems may often be resolved by adjusting the wire switch actuators, fixing switch circuitry problems, securing loose connectors, etc. Mechanisms using 'opto switches' (drop targets, etc.) need to be checked for proper power connections (+12V dc and ground).

Pinball Missing.

This game normally uses three balls; however, it will operate with one ball. This message announces that a ball is missing or stuck. When the ball is located, return it to the game via the Outhole. Other possibilities for this problem could be malfunctions of the Ball Trough switches or the Ball Shooter switch.

xxxxx Sw. is Stuck On.

This message indicates that a switch, which is not usually On, remains in the On position after the game is switched On. The stuck switch is essential for game play (for example, a coin chute switch, the slam tilt switch, the plumb bob tilt switch), and should be cleared to permit proper game operation.

Ground Short Row-N, Wht-xxx.

This message indicates that the switch wires being called out are touching a grounded part on the playfield or coin door. The following should be checked:

1. Slam Tilt (or other coin door) switch touching the grounded coin door.
2. A leaf-type, playfield switch touching a grounded part.
3. Players poking metallic objects (wires, coat hanger, etc.) into the game
4. Switch cable insulation pierced or damaged allowing bare wire contact with a grounded part
5. All switches in a row closing at the same time. Note: This instance is NOT a switch problem; however, for most games this is a very rare possibility.

Factory Settings Restored.

This message indicates that the CMOS RAM no longer retains any custom Pricing or Game Adjustment settings and has reverted to factory default settings. Generally, the following CPU checks will isolate the cause of the CMOS RAM memory failure. The voltage at pin 28 and pin 26 of U8 should be +5V (game turned On) and at least +4V (game turned Off). When the voltage drops below +4 V, memory reset occurs. Check the batteries and battery holder. Be sure that the batteries are good and that there is no contamination on the battery holder terminals. Turn the game OFF, and use an ohmmeter to check diodes D1 and D2 on the CPU Board. D1 should read 0 ohms when forward-biased and infinite ohms when reverse-biased. D2 should read 15 ohms when forward-biased and infinite ohms when reverse-biased. Note: Readings taken from Analog Meter. This message can also indicate that there is an open diode on a 50V coil and noise is entering the circuit.

U6 Checksum Error.

The game ROM checksum is invalid. If this occurs replace the game ROM.

Time and Date Not Set.

The real time clock is not running. If this occurs go to U.4 of the Utilities Menu and set the time and date.

Warning Ramp Open/Closed Not Reliable

This message indicates there is a problem with the up/down ramp reliably opening or closing. This means the ramp will sometimes not close or open when told to. Check to make sure switch 54, ramp down, is definitely closed when the ramp is down, and positively open when the ramp is up. Check the wires for loose connections or improper wiring. Also, check to make sure the ramp up coil (10), and the ramp down coil (11), are functioning properly. Make sure the mechanical mechanism is working smoothly. The ramp flap should be able to move up and down freely.

Error-Ramp not opening/closing-check sw./CL.

This message indicates there is a problem with the up/down ramp opening or closing. The ramp has failed to open or close after three tries in a row. Check to make sure switch 54, ramp down, is definitely closed when the ramp is down, and positively open when the ramp is up. Check the wires for loose connections or improper wiring. Also, check to make sure the ramp up coil (10), and the ramp down coil (11), are functioning properly. Make sure the mechanical mechanism is working smoothly. The ramp flap should be able to move up and down freely.

CPU L.E.D.'s

The CPU has three L.E.D.'s located on the upper left side of the board: D19, D20, and D21. On game power-up D19 and D21 turn On for a moment then, D19 turns Off and D20 starts to blink rapidly. D21 remains On. The system has detected a problem if the following happens:

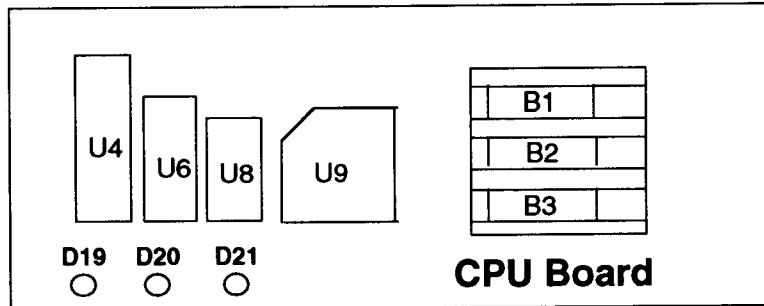
CPU Board L.E.D. Error Codes

Center L.E.D. blinks one time	-	ROM Error U6
Center L.E.D. blinks two times	-	RAM Error U8
Center L.E.D. blinks three times	-	Custom Chip Failure U9

Sound Board Beep Error Codes Upon Game Turn-On:

1 Beep	=	Sound Board O.K.
2 Beeps	=	U9 Failure (RAM)
3 Beeps	=	U18 Failure (ROM)
4 Beeps	=	U15 Failure (ROM), if used
5 Beeps	=	U14 Failure (ROM), if used

LED List



CPU Board

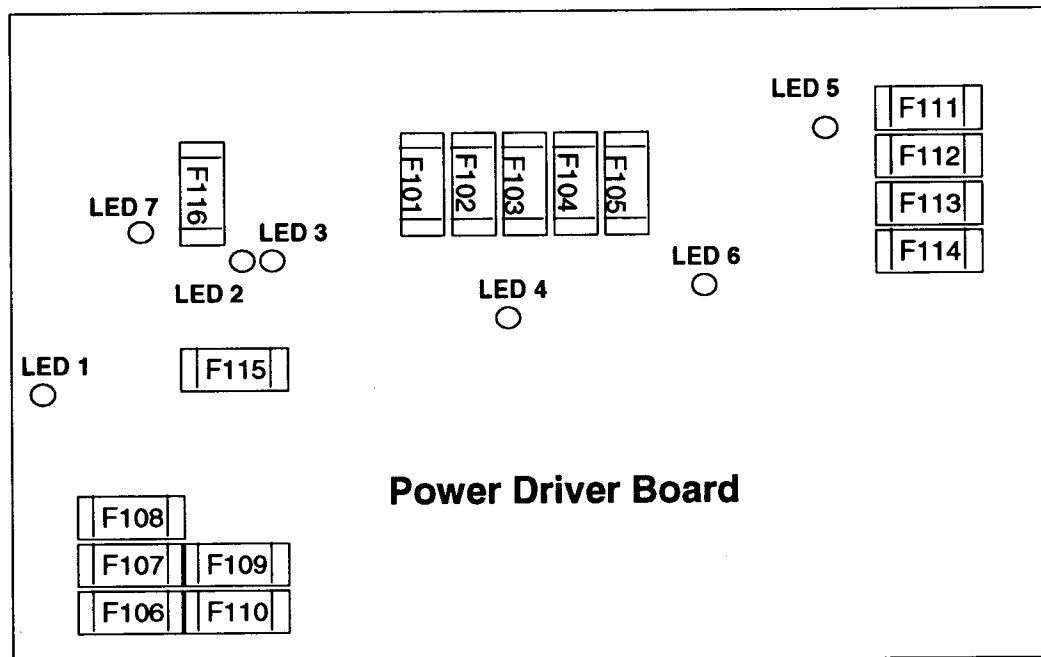
D19, Blanking

D20, Diagnostic

D21, +5vdc

At Game Turn-On = D19 & D21 On, D20 Off

During Normal Operation = D19 Off, D20 flashing, D21 On



Power Driver Board

LED 1, +12vdc, Switch Circuit, Normally On

LED 2, High/Low Line Voltage Sensor, Normally On

LED 3, High/Low Line Voltage Sensor, Normally Off

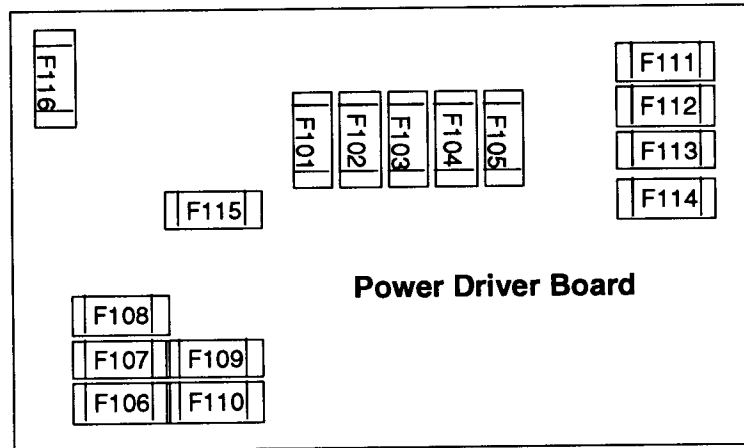
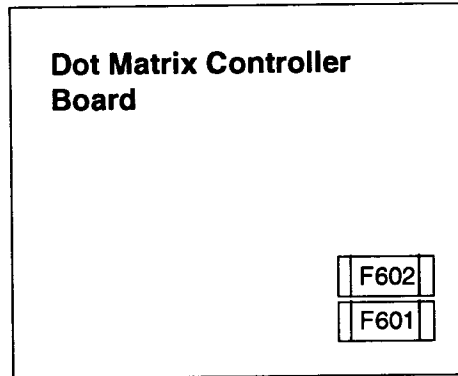
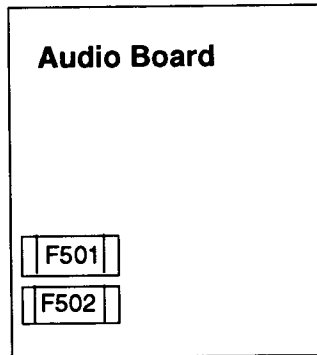
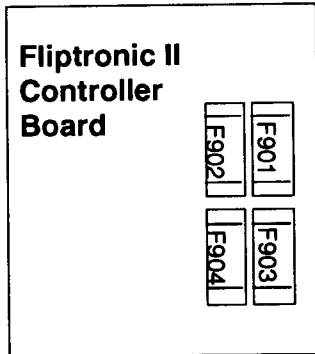
LED 4, +5vdc, Digital Circuit, Normally On

LED 5, +20vdc, Flashlamp Circuit, Normally On

LED 6, +18vdc, Lamps Circuit, Normally On

LED 7, +12vdc, Power Circuit (Motors, Relays, Etc.), Normally On

Fuse List



Audio Board

F501 -25V Circuit 3A, S.B.
 F502 +25V Circuit 3A, S.B.

Dot Matrix Controller Board

F601 +62V Circuit 3/8A, S.B.
 F602 -113V and -125V Circuits 3/8A, S.B.

Power Driver Board

F101 Left Flipper 3A, S.B. (Not Used)
 F102 Right Flipper 3A, S.B. (Not Used)
 F103 Solenoid #25-#28 3A, S.B.
 F104 Solenoid #9-#16 3A, S.B.
 F105 Solenoid #1-#8 3A, S.B.
 F106 G.I. #5 Wht-Vio 5A, S.B.
 F107 G.I. #4 Wht-Grn 5A, S.B.
 F108 G.I. #3 Wht-Yel 5A, S.B.
 F109 G.I. #2 Wht-Org 5A, S.B.
 F110 G.I. #1 Wht-Brn 5A, S.B.
 F111 Flasher Secondary 5A, S.B.
 F112 Solenoid Secondary 7A, S.B.
 F113 +5V Logic 5A, S.B.
 F114 +18V Lamp Matrix 8A, N.B.
 F115 +12V Switch Matrix 3/4A, S.B.
 F116 +12V Secondary 3A, S.B.

Fliptronic II Controller Board

F901 Upper Left Flipper 3A, S.B.
 F902 Upper Right Flipper 3A, S.B.
 F903 Lower Left Flipper 3A, S.B.
 F904 Lower Right Flipper 3A, S.B.

Line Filter

U.S., Canada 8A

MAINTENANCE INFORMATION

LUBRICATION

The two main lubrication points of the Ball Shooter Lane Feeder mechanism are the pivots for the arm. The mechanism of other playfield devices are somewhat similar and have the same lubrication requirements. A medium viscosity oil (switch target grease) is satisfactory for these devices.

Because of the functional design (arm-actuated via solenoid plunger operation), the pivot points of the Left and Right Kickers ("Slingshots") all require lubrication as a regular servicing procedure.

Lubrication to ensure proper operation also applies to the target blades of Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, (Williams' part number of EI 165), is a recommended lubricant.

SWITCH CONTACTS

Playfield Switches

For proper game operation, switch contacts should be free of dust, dirt, contamination, and corrosion. Blade switch contacts are plated to resist corrosion. Cleaning blade switch contacts requires gentle closing of the contacts on a clean business card or piece of paper, and then pulling the paper about 2 inches, which should restore the clean contact surface. Adjust the switch contacts to a 1/16-inch gap.

Flipper Switches

This game uses the new Fliptronic II Electronic Flipper System. The end-of-Stroke switches are NORMALLY OPEN and should close when the flipper is energized. All end-of-stroke switches and flipper button cabinet switches are gold flashed computer grade leaf switches. Only low computer current is carried through these switches. DO NOT FILE or abrasively clean these switches! DO NOT REPLACE these switches with the old style tungsten high current type switches, as intermittent operation could occur. Please note that unlike the old style of flipper, an end-of-stroke switch failure will not harm the flipper. The game will notify the operator of a switch being mis-adjusted in the test report, but will continue to play. The end-of-stroke switches are a means by which the new electronic flippers feel and play with all of the subtleties of the old flippers.

CLEANING

Good game action and extended playfield life are the results of regular playfield cleaning. During each collection stop, the playfield glass should be removed and thoroughly cleaned and the playfield should be wiped off with a clean, lint-free cloth. The game balls should be cleaned and inspected for any chips, nicks, or pits. Replace any damaged balls to prevent playfield damage.

Regular, more extensive, playfield cleaning is recommended. However, avoid excessive use of water and caustic or abrasive cleaners because they tend to damage the playfield surface. Playfield wax (or any carnauba based wax), or polish may be used sparingly, to prevent a buildup on the playfield surface. Do not use cleaners containing petroleum distillates on any playfield plastics because they may dissolve the plastic material or damage the artwork.

CANNON ASSEMBLY

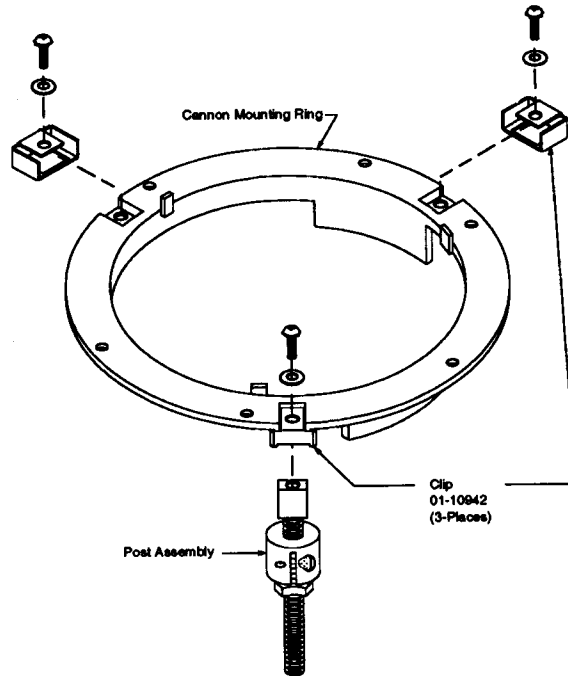
READ ALL INSTRUCTIONS BEFORE BEGINNING

CLIP INSTALLATION

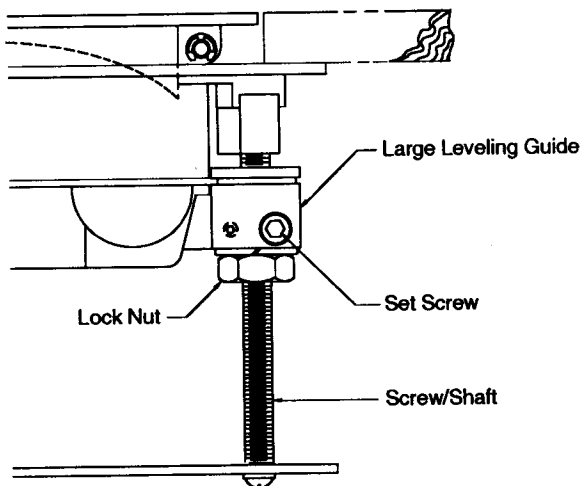
It is a necessity that the Cannon Mounting Ring have the reinforcing clips attached prior to screwing in the Post Assembly. *Missing clips could result in permanent damage to the unit during the cannon level adjustment.*

To install and/or replace clips:

1. Remove Cannon Assembly from playfield.
2. Remove Post Assembly from plastic ring.
3. Insert clips.
4. Assemble Post Assembly to plastic ring.
5. Return Cannon Assembly to same position on playfield and make the necessary adjustments.



CANNON LEVEL ADJUSTMENT



1. Secure large leveling guide with vice grips (or comparable tool) while using an open-end wrench to loosen lock nut. Be careful not to let the entire locked screw/shaft assembly turn! This may result in permanent damage to the unit.
2. Once the lock nut is loose, use an allen-wrench to loosen leveling guide set screw.
3. Rotate leveling guide (clockwise to raise, counter-clockwise to lower) to align the top of the mechanism with the top of the playfield. Adjust the remaining two guides if necessary. To check adjustment, return playfield to the horizontal playing position.
4. Reverse step sequence to re-secure the assembly.

Section 2

Game Parts Information

Parts Lists & Diagrams

Cabinet Parts

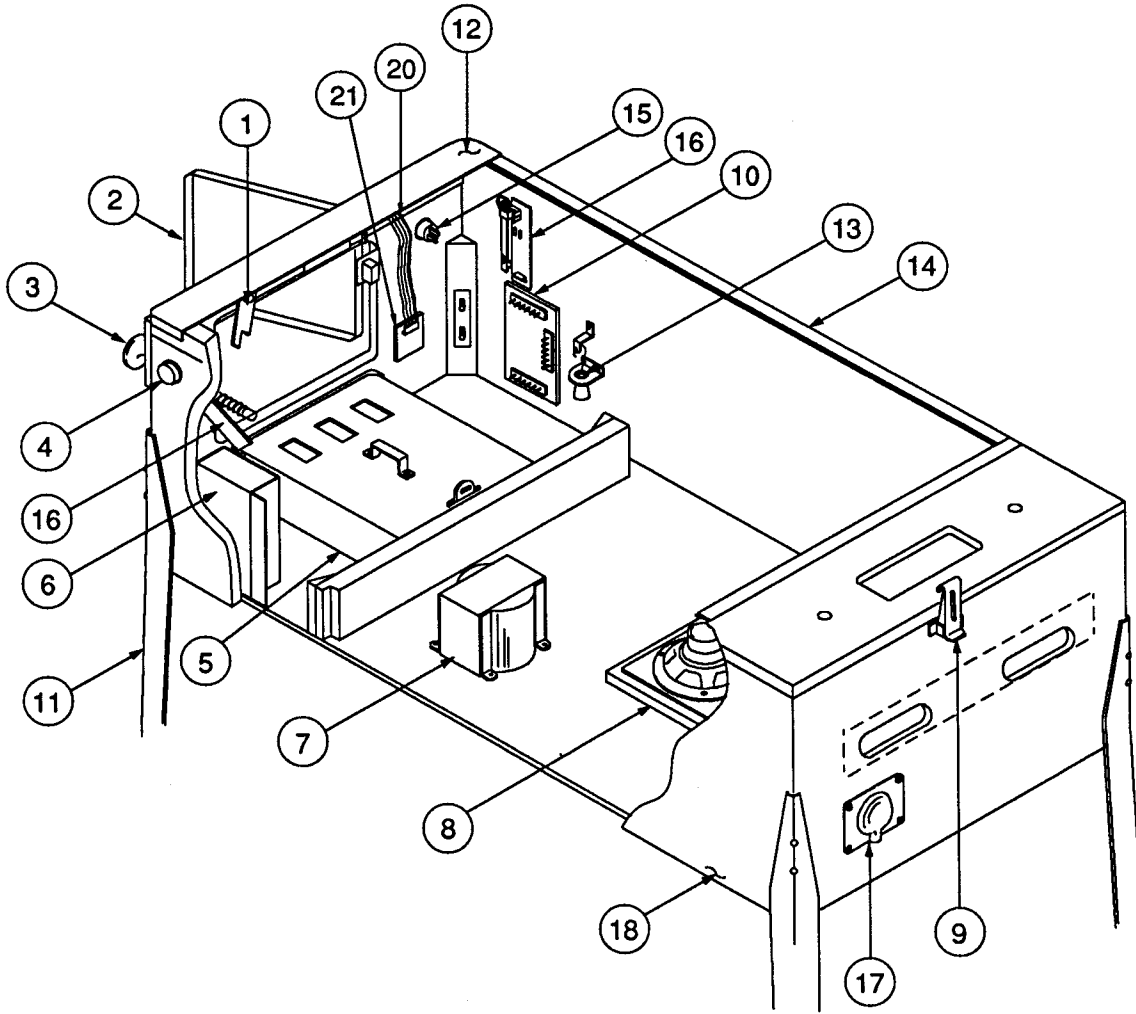
Playfield Circuit Boards

Major Mechanism Assemblies

Playfield Parts

Major Mechanism Locations Diagram

Cabinet Parts



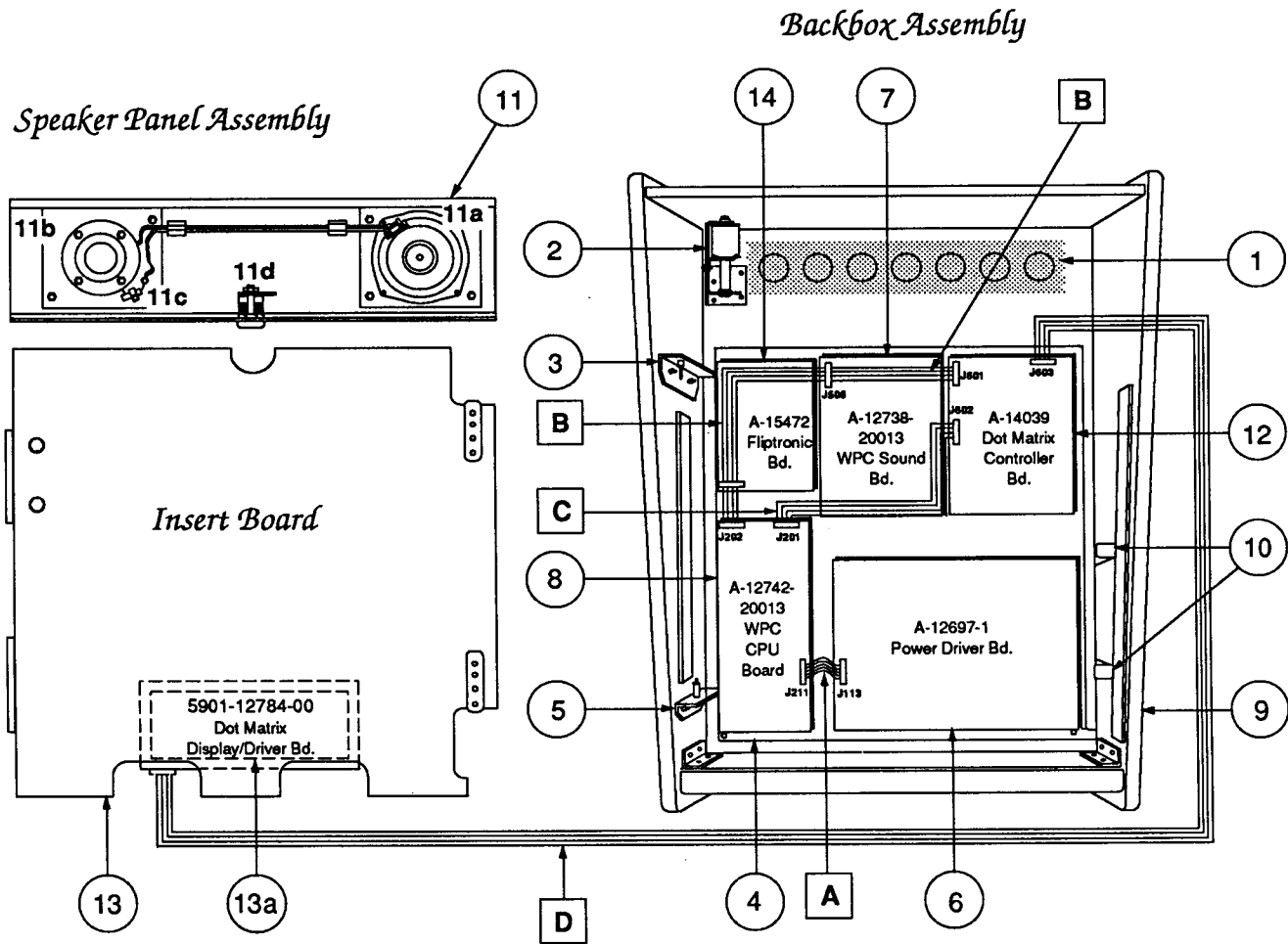
Item	Part Number	Description	Item	Part Number	Description
1.	D-9174-3	Lever Guide Assembly	12.	A-14864	Front Molding Assy. w/Button
2.	A-14148-1	Coin Door - 2 Slot	a)	31-1567-5	Button, Red
3.	B-12445-3	Ball Shooter Assembly	13.	20-6502-A	Plum Bob
a)	10-149	Rod Spring	14.	A-12359-3	Side Molding Assembly
b)	10-148-3	Shooter Spring	15.	20-9663-1	Start Button
4.	B-12273-4	Flipper Button - Red (2 Used)	16.	A-15894	Flipper Opto Board
5.	A-14656-1	Cashbox Assembly	17.	01-10714	Line Cord Cover
6.	*	Line Filter Assembly	18.	11-944-20013	Black Rose Wood Cabinet
7.	5610-12835-00	WPC Transformer, 115/230v	19.	*	Cordset
8.	5555-12929-00	Speaker, 4Ω, 6", 25w	20.	5641-12673-00	Switch: 5-Position Membrane
9.	20-9347	Toggle Latch	21.	C-13940	5-Switch & Diode Board
10.	A-14689	WPC Coin Door Interface Bd.			
11.	C-10843-1	Metal Leg Assembly			

* See Application Chart.

Line Filter/Cordset Application Chart

COUNTRY	LINE FILTER ASSY. A-15707-120V	CORDSET 5850-13271-00
UNITED STATES	●	●
CANADA	●	●

Backbox Parts



Item	Part Number	Description
1.	01-6645	Venting Screen
2.	B-10686-1	Knocker & Bracket Assy.
3.	A-12497	Upper Insert Bd Hinge Assy.
4.	A-14092-3	Mounting Plate Assembly
5.	A-12498	Lower Insert Bd Hinge Assy.
6.	A-12697-1	Power Driver Assembly
7.	A-12738-20013	WPC Sound Board
8.	A-12742-20013	WPC CPU Board
9.	A-13767-20013	Backbox Assembly
10.	01-9047	Insert Stop Bracket
11.	A-15157	Speaker / Display Assy.
a)	5555-12924-00	Speaker, 4Ω, 15w Tweeter
b)	5555-12856-00	Speaker, 4Ω, 5-1/4"
c)	5045-12914-00	Capacitor, 10μfd 50v, ±20%
d)	20-9637	Lock & Cam Kit Assembly
12.	A-14039	Dot Matrix Controller Board
13.	20013-IN	Insert Board
a)	01-6571	Hinge Mounting Bracket
b)	01-6655	Insert Latch
c)	5901-12784-00	Dot Matrix Display/Driver Bd.
14.	A-15472	Fliptronic II Board

Ribbon Cables:

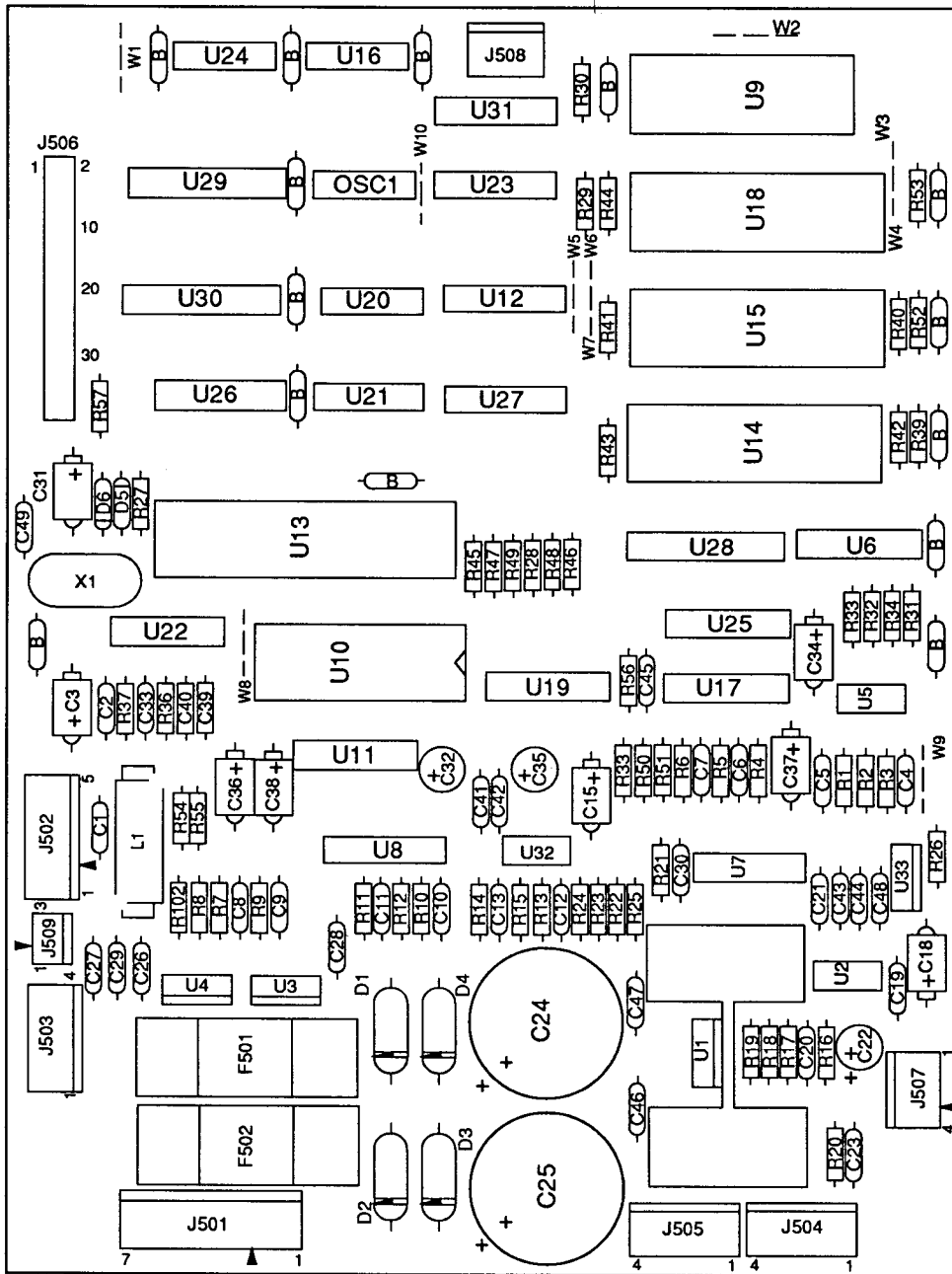
Item	Part Number	Description
A.	5795-12653-03	Ribbon Cable, 3"
B.	5795-13018-00	Ribbon Cable, 22"
C.	5795-10938-14	Ribbon Cable, 14"
D.	5795-12838-60	Ribbon Cable, 60"

Miscellaneous Parts:

A-8552-20013	Tempered Backglass Assy.
08-7463	Backbox Glass: 27" x 23-1/2"
31-1357-20013	Screened Translight
03-8228-2	Glass Channel Top (1)
03-8228-1	Glass Channel Edge (2)
03-8229-1	Glass Lift Channel (1)

Part No.	Designator	Description	Part No.	Designator	Description
01-9980		Shield: Wire Protector	5048-12748-00	C9, C11, C30	Capacitor, 220pfd., 50V
4004-01005-06	U1	Mach. Screw, 4-40 x 3/8	5070-08919-00	D5, D6	Diode, 1N4148
4104-01012-04	U1	Sh. Mach. Screw, #4 x 1/4	5070-09045-00	D1-D4	Diode MR501, 3.0A
4404-01119-00	U1	Nut, 4-40 SNUT	5250-10495-00	U3	Reg. 7912 1.0A -12v.
5010-08772-00	R21	Resistor, 15K Ω , 1/4w, 5%	5281-09215-00	U22	IC, 74LS04 Hex INV
5010-12065-00	R22, R25	Resistor, 120K Ω , 1/4w, 5%	5281-09246-00	U12	IC, 74LS139 2-4 Dec.
5010-08991-00	R51	Resistor, 4.7K Ω , 1/4w, 5%	5281-09486-00	U28-U30	IC, 74LS374 8 Dual Flipflop
5010-10987-00	R23, R24	Resistor, 56K Ω , 1/4w, 5%	5281-09487-00	U6, U23-U25	IC, 74LS74 Dual Flipflop
5010-09034-00	R13, R14, R29-R31, R33, R34, R50, R45-R49	Resistor, 10K Ω , 1/4w, 5%	5281-09500-00	U31	IC, 74LS32
5010-09035-00	R4	Resistor, 47K Ω , 1/4w, 5%	5281-09745-00	U26, U27	IC, 74LS138 DMLTPX
5010-09036-00	R35	Resistor, 100 Ω , 1/4w, 5%	5281-09850-00	U20	IC, 74LS11 Tripple AND
5010-09134-00	R1, R2, R6, R8, R9, R11, R12	Resistor, 150K Ω , 1/4w, 5%	5281-10577-00	U16	IC, 74LS125 Q/B Bfr
5010-09162-00	R26, R102	Resistor, 100K Ω , 1/4w, 5%	5370-11086-00	U10	IC, YM2151 Sound
5010-08774-00	R3, R5, R17, R19	Resistor, 22K, 1/4w, 5%	5371-11087-00	U11	IC, YM3012 D/A
5010-09269-00	R15	Resistor, 12K Ω , 1/4w, 5%	5400-10320-00	U13	IC, MPU 68B09E
5010-09358-00	R18, R32	Resistor, 1K Ω , 1/4w, 5%	5284-12651-00	U21	IC 4584
5010-09416-00	R28, R36, R37, R39-R44 R52, R53, R57	Resistor, 470 Ω , 1/4w, 5%	5340-12278-00	U9	S/Ram 2064
5010-09534-00	W3, W5, W7-W10	Resistor, 0 Ω	5370-09691-00	U17	IC, 55536 CVSD
5010-10171-00	R38, R56	Resistor, 56 Ω , 1/4w, 5%	5370-12260-00	U2	IC, 3340 Elec Atten
5010-10258-00	R16	Resistor, 1M, 1/4w, 5%	5370-12728-00	U1	IC, Audio Amp LM1875
5010-10650-00	R7, R10	Resistor, 62K, 1/4w, 5%	5370-12730-00	U7, U8	IC, Op Amp TL084
5010-10989-00	R54, R55, R27	Resistor, 470K, 1/4w, 5%	5370-12742-00	U32	IC, Op Amp TL082
5010-12752-00	R20	Resistor, 1 Ω , 1/4w, 5%	5371-12727-00	U19	Dac AD7524
5040-08986-00	C3	Capacitor, 100M, 10v (\pm 20%)	5432-12726-00	U5	EE Prom Pot X9503
5040-09332-00	C15, C18, C34, C36, C38	Capacitor, 47 μ fd., 25v, Axial	5460-12423-00	U4	IC, LM7812
5040-11036-00	C32, C35	Capacitor, 47 μ fd., 16v, Rad	5460-12743-00	U33	LM7809 TO-220
5040-12729-00	C24, C25	Capacitor, 4700 μ fd., 35v.	5520-09020-00	X1	Crystal, 3.58 MHz.
5040-12750-00	C22	Capacitor, 22 μ fd., 35v, Rad.	5521-10931-00	OSC1	Oscillator, 8.0 MHz.
5041-09031-00	C26-C29, C37, C46-C48	Capacitor, 1 μ fd. TANT	5551-09822-00	L1	Ind, 4.7UH 3.0A.
5041-09243-00	C20, C21	Capacitor, 10 μ fd. TANT	5700-08985-00	U13	Socket, IC 40-pin, .6"
5043-08980-00	C41-C44, B(15)	Capacitor, .01M, 50v, (+80, -20)	5700-09004-00	U10	Socket, IC 24-pin, .6"
5043-08996-00	C1, C2	Capacitor, .1 μ fd., 50v, 10%	5700-09006-00	U11	Socket, IC 16-pin, .3"
5048-11027-00	C8, C10	Capacitor, 33pfd., 50v, 10%	A-5343-20013-2	U14	IC, Audio ROM
5048-11028-00	C45	Capacitor, 22pfd., 50V, Axial	A-5343-20013-3	U15	IC, Audio ROM
5048-11029-00	C33, C49	Capacitor, 100pfd., 50v	A-5343-20013-4	U18	IC, Audio ROM
5048-11030-00	C12	Capacitor, 470pfd., 50v	5700-12088-00	U1	Socket, IC 32-pin (U15, U18)
5048-11031-00	C19, C31	Capacitor, .001 μ fd., 50v, 10%	5705-12755-00		Heatsink 5299B-220
5048-11065-00	C13	Capacitor, .0022 μ fd., 50v, 10%, Ax.	5731-10356-00	F501, F502	Fuse, 3A, S-B, 250v
5048-11072-00	C39, C40	Capacitor, .0033 μ fd.	5733-12060-01		Fuse Holder (F501, F502)
5048-12036-00	C23	Capacitor, .22 μ fd., 10v, Ceramic	5791-10862-04	J504, J505	Connector, 4-pin Header Sq. .156
5048-12745-00	C4, C6	Capacitor, 1800pfd., 50V, 10%	5791-10862-05	J502	Connector, 5-pin Header Sq. .156
5048-12746-00	C5, C7	Capacitor, 330pfd., 50V	5791-10862-07	J501	Connector, 7-pin Header Sq. .156
			5791-12462-03	J509	Connector, 3-pin Header Sq. .100
			5791-12462-04	J508	Connector, 4-pin Header Sq. .100
			5791-12516-00	J506	34 Hen 2x17 STR

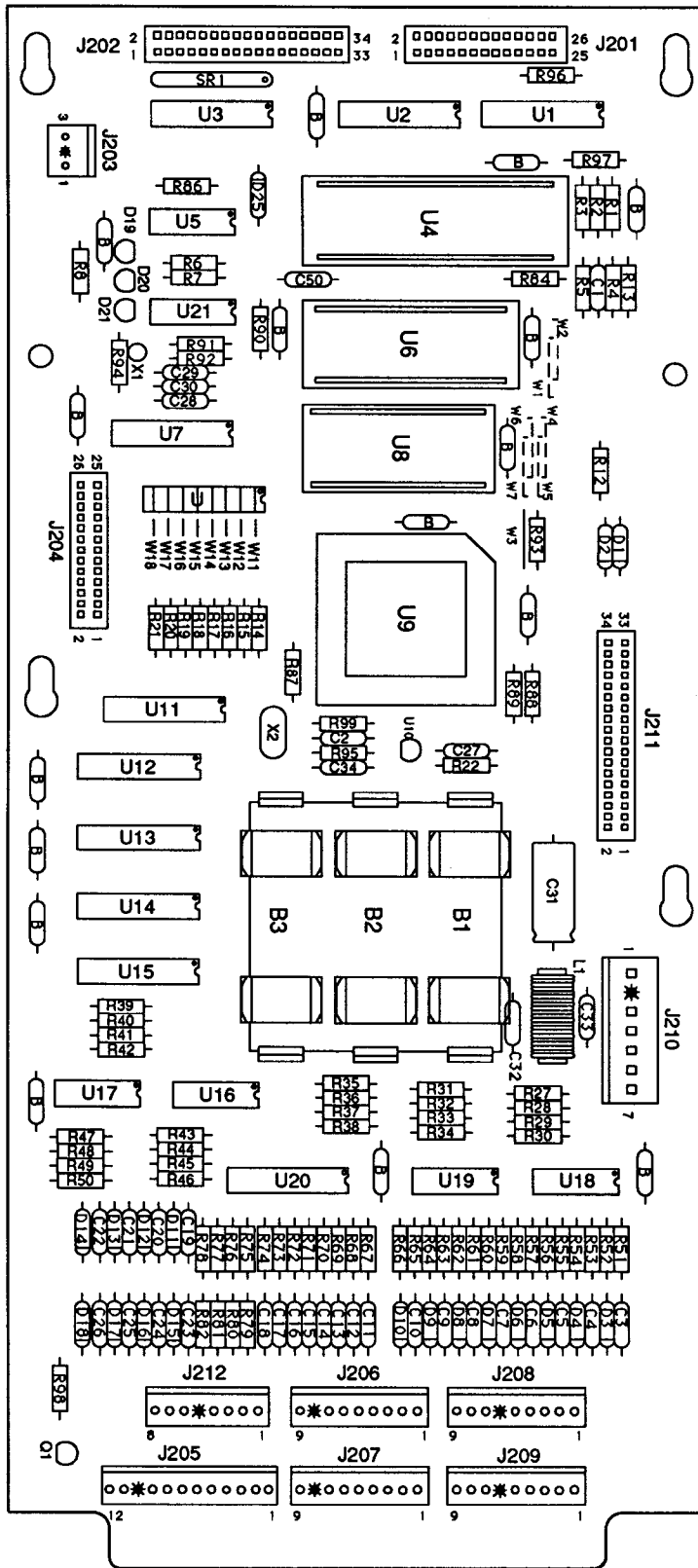
A-12738-20013 WPC Audio Board



A-12742-20013 WPC CPU Board

Part Number	Designator	Description
5010-09034-00	R14-R22, R27-R42, R86, R90, R94, R98	Resistor, 10K Ω , 1/4w, 5%
5010-09085-00	R1, R2, R4, R93, R96, R97	Resistor, 1.5K Ω , 1/4w, 5%
5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Resistor, 1.2K Ω , 1/4w, 5%
5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84	Resistor, 1K Ω , 1/4w, 5%
5010-09416-00	R5-R8, R12, R13, R87-R89	Resistor, 470 Ω , 1/4w, 5%
5010-09534-00	W1, W4, W7, W13 - W18	Resistor, 0 Ω
5010-10258-00	R95, R99	Resistor, .01 μ fd Ω , 1/4w, 5%
5010-10989-00	R92	Resistor, 470K Ω , 1/4w, 5%
5010-12104-00	R91	Resistor, 22 μ fd, 1/4w, 5%
5019-09362-00	SIP 1	SIP, 9R, 10-pin, 4.7K Ω , 5%
5040-08986-00	C31	Capacitor, 100 μ fd, 10v (\pm 20%)
5043-08980-00	B	Capacitor, .01 μ fd, 50v, (+80, -20%)
5043-09030-00	C27	Capacitor, 0.047 μ fd, 50v (\pm 20%)
5043-09065-00	C3 - C26	Capacitor, 470pfd, 50v (\pm 20%)
5043-09491-00	C2, C29, C30, C34	Capacitor, 22pfd, 1KV, (\pm 10%)
5043-09492-00	C28	Capacitor, 100pfd, 50v, (\pm 10%)
5043-09845-00	C32, C33	Capacitor, 1KP, 50v, (\pm 20%)
5070-08919-00	D2 - D18	Diode, 1N4148, 150MA
5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.
5160-10269-00	Q1	Transistor, 2N3904, NPN
5162-12422-00	U20	IC, ULN, 2803A
5281-09308-00	U3	IC, 74LS245, Octal Bus Trncv
5281-09486-00	U14	IC, 74LS374, 8D F/F
5281-09851-00	U5	IC, 74LS14, SMT/TRG
5281-09867-00	U1, U2, U7	IC, Octal Buffer, 74LS244
5281-10182-00	U11, U12, U13, U15	IC, 74LS240 Driver
5284-12651-00	U21	IC, 4584
5340-12278-00	U8	S/RAM 2064
5370-12272-00	U16 - U19	IC, LM339, Quad. Comp
5370-12687-00	U10	MC, 34064 Reset Chip
5520-10438-00	X2	Crystal, 8.0MHZ.
5520-12084-00	X1	Crystal 32.768 KHz
5551-09822-00	L1	ILN, 4.7 UH 3A
5671-09019-00	D19 - D21	DSPL LED RED
5700-08985-00	U4	Socket, IC 40P, .6"
5700-12088-00	U6	Socket, IC 32P, .6"
5700-12424-00	U9	Socket, 84 Pin PLCC
5791-10850-00	J201, J204	Connector, 26-pin Header Str Sq.
5791-10862-07	J210	Connector, 7-pin Header Str Sq.
5791-12461-08	J212	Connector, 8-pin Header Str Sq.
5791-12461-09	J206 - J209	Connector, 9-pin Header Sq. pin
5791-12461-12	J205	Connector, 12-pin Header Sq. pin
5791-12516-00	J202, J211	34 Hen 2x17 STR
5881-09021-00	B1 - B3	Battery Holder "AA"
5048-11033-00	C50	Capacitor, 0.022 μ f, 10v
A-5343-20013-1	U6	Game PROM Assembly
5410-12426-00	U9	WPC-89 ASIC
5400-10320-00	U4	IC MPU 68B09E
5880-09022-00	B1 - B3	Battery, Alkaline, 1.5v ("AA")

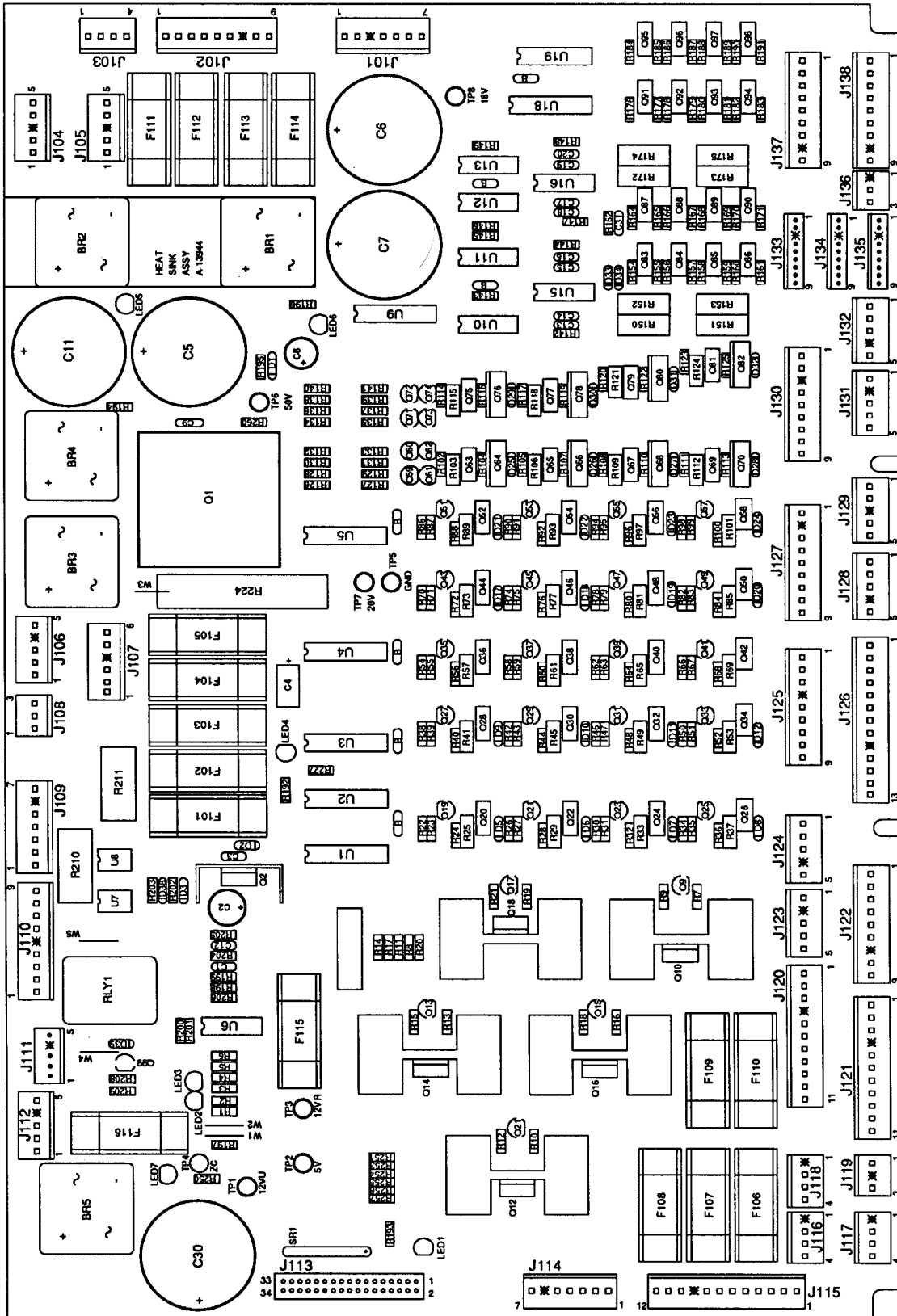
A-12742-20013 WPC CPU Board



A-12697-1 WPC Power Driver Assembly

Item	Part Number	Ckt Designator	Description	Item	Part Number	Ckt Designator	Description
1	Not Used			32	5043-08996-00	C13-C20, C31	Capacitor, .1µfd, 50v (±20%)
2	4006-01005-06	Q1, Q2	Mach. Screw, 6-32 x 3/8	33	5043-09845-00	C1, C12	Capacitor, 1,000µfd, 50v (±20%)
3	4406-01128-00	Q1, Q2	Nut, 6-32 KEPS	34	5048-10994-00	C3	Capacitor, .33µfd, 50v (±20%) Ax.
4	4004-01005-06	Q10, Q12, Q14, Q16, Q18	Mach. Screw, 4-40 x 3/8	35	5070-08919-00	D33, D34	Diode, 1N4148, 150MA.
5	4404-01119-00	Q10, Q12, Q14, Q16, Q18	Nut, 4-40 SNUT	36	5070-09054-00	D1-D3, D5-D12, D17-D32, D38, D39	Diode, 1N4004, 1.0A.
6	5010-08981-00	R260	Resistor, 10KΩ, 1/2w, 5%	37	5100-09690-00	BR1-BR5	Bridge Rectifier, 35A., 200v
7	5010-08991-00	R9, R12, R15, R18, R21, R23, R27, R31, R35, R39, R43, R47, R51, R55, R59, R63, R67, R71, R75, R79, R83, R87, R91, R95, R99, R126, R128, R130, R132, R134, R136, R138, R140, R209, R227	Resistor, 4.7KΩ, 14w, 5%	38	5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac, BT138E
8	5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191	Resistor, 560Ω, 1/4w, 5%	39	5162-12422-00	U19	IC, ULN 2803
9	5010-08993-00	R25, R29, R33, R37, R41, R45, R49, R53, R57, R61, R65, R69, R73, R77, R81, R85, R89, R93, R97, R101, R103, R106, R109, R112, R115, R118, R121, R124	Resistor, 68Ω, 1/4w, 5%	40	5162-12635-00	Q20, Q22, Q24, Q26, Q28, Q30, Q32, Q34, Q36, Q38, Q40, Q42, Q44, Q46, Q48, Q50, Q52, Q54, Q56, Q58, Q63, Q65, Q67, Q69, Q75, Q77, Q79, Q81, Q83 - Q90	Transistor, TIP 102
10	5010-08997-00	R24, R28, R32, R36, R40, R44, R48, R52, R56, R60, R64, R68, R72, R76, R80, R84, R88, R92, R96, R100, R102, R105, R108, R111, R114, R117, R120, R123, R195	Resistor, 2.7KΩ, 1/4w, 5%	41	5194-09055-00	Q9, Q11, Q13, Q15, Q17, Q19, Q21, Q23, Q25, Q27, Q29, Q31, Q33, Q35, Q37, Q39, Q41, Q43, Q45, Q47, Q49, Q51, Q53, Q55, Q57, Q59-Q62, Q71-Q74, Q99	Transistor, 2N5401 PNP
11	5010-08998-00	R155, R157, R159, R161, R165, R167, R169, R171	Resistor, 2.2KΩ, 1/4w, 5%	42	5191-12179-00	Q64, Q66, Q68, Q70, Q76, Q78, Q80, Q82	Transistor, TIP36C PNP
12	5010-09034-00	R3, R4, R6, R142-R149, R197-R198	Resistor, 10KΩ, 1/4w, 5%	43	5192-12428-00	Q91-Q98	Transistor, TIP 107
13	5010-09085-00	R194, R196, R251, R253-R257	Resistor, 1.5KΩ, 1/4w, 5%	44	5250-12634-00	Q1	Reg LM 323 5v
14	5010-09086-00	R252	Resistor, 6.8KΩ, 1/4w, 5%	45	5281-09486-00	U1-U5, U18	IC, 74LS374 8 Dual D Flipflop
15	5010-09224-00	R1, R2, R192, R201- R205, R208	Resistor, 270Ω, 1/4w, 5%	46	5281-09487-00	U10-U13	IC, 74LS74 Dual D Flipflop
16	5010-09314-00	R176, R178, R180, R182, R184, R186, R188, R190	Resistor, 1.2KΩ, 1/4w, 5%	47	5281-10182-00	U9	IC, 74LS240, L/Drvr
17	5010-09324-00	R206	Resistor, 27KΩ, 1/4w, 5%	48	5370-12272-00	U6, U15, U16	IC, LM339 Quad. Comp
18	5010-09358-00	R154, R156, R158, R160, R164, R166, R168, R170, R162, R193, R199, R200, R250	Resistor, 1KΩ, 1/4w, 5%	49	5460-12423-00	Q2	IC, LM 7812
19	5010-09361-00	R104, R107, R110, R113, R116, R119, R122, R125	Resistor, 220Ω, 1/4w, 5%	50	5490-10892-00	U7, U8	Opto Isolator, 4N25
20	5010-09416-00	R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141	Resistor, 470Ω, 1/4w, 5%	51	5580-08994-01	RLY 1	Relay 4PDT 6VDC5A VS
21	5010-09534-00	W1, W2	Resistor, 0Ω	52	5671-09019-00	LED1 - LED7	Display LED Red
22	5010-11079-00	R7, R10, R13, R16, R19	Resistor, 51Ω, 1/4w, 5%	53	5701-09652-00	Q1	Thermal Pad TO-3
23	5010-12427-00	R150-R153, R172-R175	Resistor, .22Ω, 1w, 5%	54	5705-09199-00	Q2	Heatsink #6030B
24	5012-12632-00	R224	Resistor, .12Ω, 10w, 5%	55	Not Used		Heatsink 5054
25	5012-12238-00	R210, R211	Resistor, 3.3KΩ, 5w, 10%	56	5705-12637-00	Q1	Heatsink 5298B
26	5019-10143-00	SR1	SIP, 9R, 10 pin, 470Ω, 5%	57	5705-12638-00	Q10, Q12, Q14, Q16, Q18	Fuse Holder, F101-F116
27	5040-08986-00	C4	Capacitor, 100µfd, 10v (±20%)	58	5733-12060-01		
28	5040-09421-00	C2	Capacitor, 100µfd, 25v (+50, -10%)	59	Not Used		
29	5040-09537-00	C8	Capacitor, 100µfd, 100v (±20%)	60	5791-10862-03	J108, J119, J136	Connector, 3-pin Header STR Sq.
30	5040-12313-00	C5, C6, C7, C11, C30	Capacitor, 15,000µfd, 25v (±20%)	61	5791-10862-04	J103, J116-J118	Connector, 4-pin Header STR Sq.
31	5043-08980-00	B-BYPASS	Capacitor, .01µfd, 50v (+80, -20%)	62	5791-10862-05	J112, J104-J106, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header STR Sq.
				63	5791-10862-06	J107	Connector, 6-pin Header STR Sq.
				64	5791-10862-07	J101, J109, J114	Connector, 7-pin Header STR Sq.
				65	5791-10862-09	J102, J110, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header STR Sq.
				66	5791-10862-11	J120, J121	Connector, 11-pin Header STR Sq.
				67	5791-10862-12	J115	Connector, 12-pin Header STR Sq.
				68	5791-10862-13	J126	Connector, 13-pin Header STR Sq.
				69	5791-12461-05	J111	Connector, 5-pin Header STR Sq.
				70	5791-12461-09	J133-J135	Connector, 9-pin Header STR Sq.
				71	5791-12516-00	J113	34 HEN 2x17 STR
				72	5824-09248-00	TP1-TP8	Test Point #1502-1
				73	5041-09163-00	C9	Capacitor, 2.2µfd TANT
				74-100	Not Used		
				101	Not Used		
				102	5730-09071-00	F114	Fuse, 8A, 32v
				103	Not Used		
				104	5731-09432-00	F112	Fuse, S-B, 7A., 250v
				105	5731-09651-00	F106 - F111, F113	Fuse, S-B, 5A., 250v
				106	Not Used		
				107	5731-10356-00	F101 - F105, F116	Fuse, S-B, 3A., 250v
				108	5730-09797-00	F115	Fuse, S-B, 3/4A., 250v
				109	5705-12698-00		Heatsink #62365
				110	4010-01006-00		Mach. Screw, 10-32 x 5/8

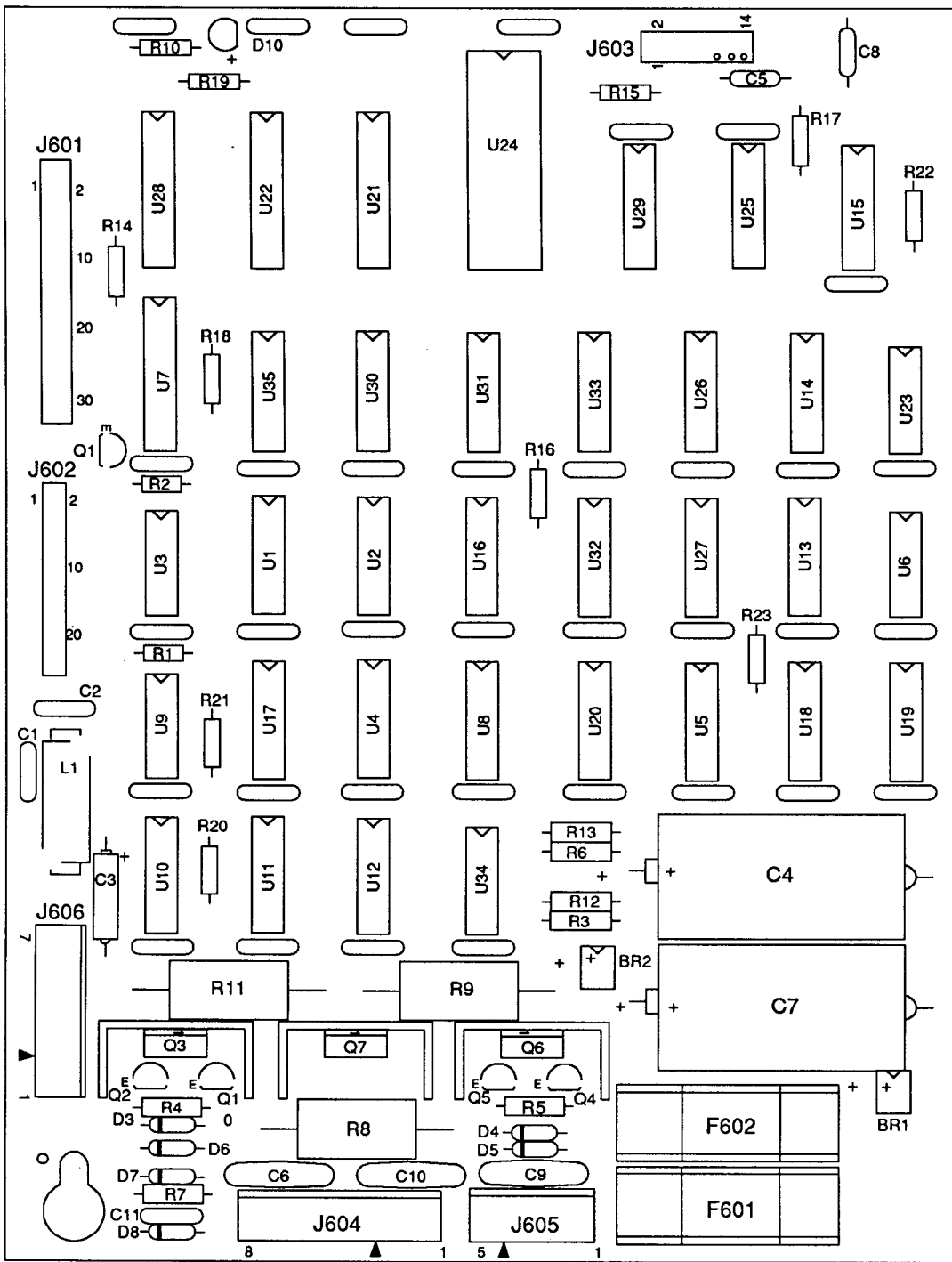
A-12697-1 WPC Power Driver Assembly



A-14039 Dot Matrix Controller Assembly

Part Number	Ckt Designator	Description
5010-08991-00	R1	Resistor, 4.7K Ω , 1/4w, 5%
5010-09224-00	R10	Resistor, 270 Ω , 1/4w, 5%
5010-12832-00	R3, R6, R12, R13	Resistor, 47K Ω , 1/2w, 5%
5010-12841-00	R4, R5	Resistor, 120 Ω , 1/2w, 5%
5012-12830-00	R9	Resistor, 1.8K Ω , 5w, 5%
5012-12842-00	R11	Resistor, 120 Ω , 5w, 5%
5012-12843-00	R8	Resistor, 4.7K, 5w, 5%
5010-10171-00	R7	Resistor, 56 Ω , 1/4w, 5%
5040-08986-00	C3	Capacitor, 100 μ fd., 10v, (\pm 20%)
5040-12324-00	C4, C7	Capacitor, 150 μ fd., 160v, (\pm 50%)
5043-08980-00	BYPASS	Capacitor, .01 μ fd., 50v, (+80, -20%)
5043-09072-00	C6, C9, C10	Capacitor, .1 μ fd., 500v, (+80, -20%)
5043-09845-00	C1, C2, C11	Capacitor, 1KP, 50v, (\pm 20%)
5043-09492-00	C5, C8	Capacitor, 100P, 50v, (\pm 10%)
5070-09054-00	D7	Diode, 1N4004, 1.0A.
5075-12824-00	D6, D8	Zener, 1N4742A, 12v
5075-12823-00	D4, D5	Zener, 1N4758A, 62v
5075-12826-00	D3	Zener, 1N4759A, 62v
5100-12833-00	BR1, BR2	Bridge, 400v, 1A.
5160-10269-00	Q1	Transistor, 2N3904 NPN
5164-09056-00	Q2, Q10	Transistor, MPSD02, NPN
5164-12154-00	Q3, Q7	Transistor, MJE15030 NPN
5194-09055-00	Q4, Q5	Transistor, MPSD52 PNP
5194-12155-00	Q6	Transistor, MJE15031 PNP
5281-09738-00	U16, U25 - U27	IC, 74LS157
5281-10033-00	U3	IC, 74LS30
5281-10043-00	U31 - U33, U35	IC, 74LS175
5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
5311-10947-00	U9	IC, 74HC125
5311-10951-00	U10, U11	IC, 74HC161
5311-10977-00	U6	IC, 74HC04
5311-12817-00	U29	IC, 74HC165
5311-12819-00	U21	IC, 74HC688
5311-12820-00	U23	IC, 74HC27
5311-12822-00	U13 - U15	IC, 74HC193
5315-12009-00	U22	IC, 74HCT374
5315-12812-00	U1, U2, U30	IC, 74HCT138
5281-09308-00	U28	IC, 74HCT245
5315-12815-00	U8, U34	IC, 74HCT08
5315-12816-00	U19	IC, 74HCT32
5315-12821-00	U7	IC, 74HCT240
5340-12278-00	U24	S/RAM 2064 150NS
5551-09822-00	L1	IND 4.7 μ H, 3.0A.
5671-09019-00	D10	Display LED Red
5705-09199-00	Q3, Q6, Q7	Heatsink 6030B
5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
5733-12060-00		Fuse Holder (F601, F602)
5791-10850-00	J602	Connector, 26-pin STR Sq.
5791-10862-05	J605	Connector, 5-pin Header Sq.
5791-10862-07	J606	Connector, 7-pin Header Sq.
5791-10862-08	J604	Connector, 8-pin Header Sq.
5791-12516-00	J601	34 Hen 17x2 STR
5791-12827-00	J603	14 Hen 7x2 STR
5010-09036-00	R14-R23	Resistor, 100 Ω , 1/4w, 5%
4006-01003-06	Q3, Q6, Q7	Mach. Screw, 6-32 x 3/8
4406-01128-00	Q3, Q6, Q7	Nut, 6-32 KEPS

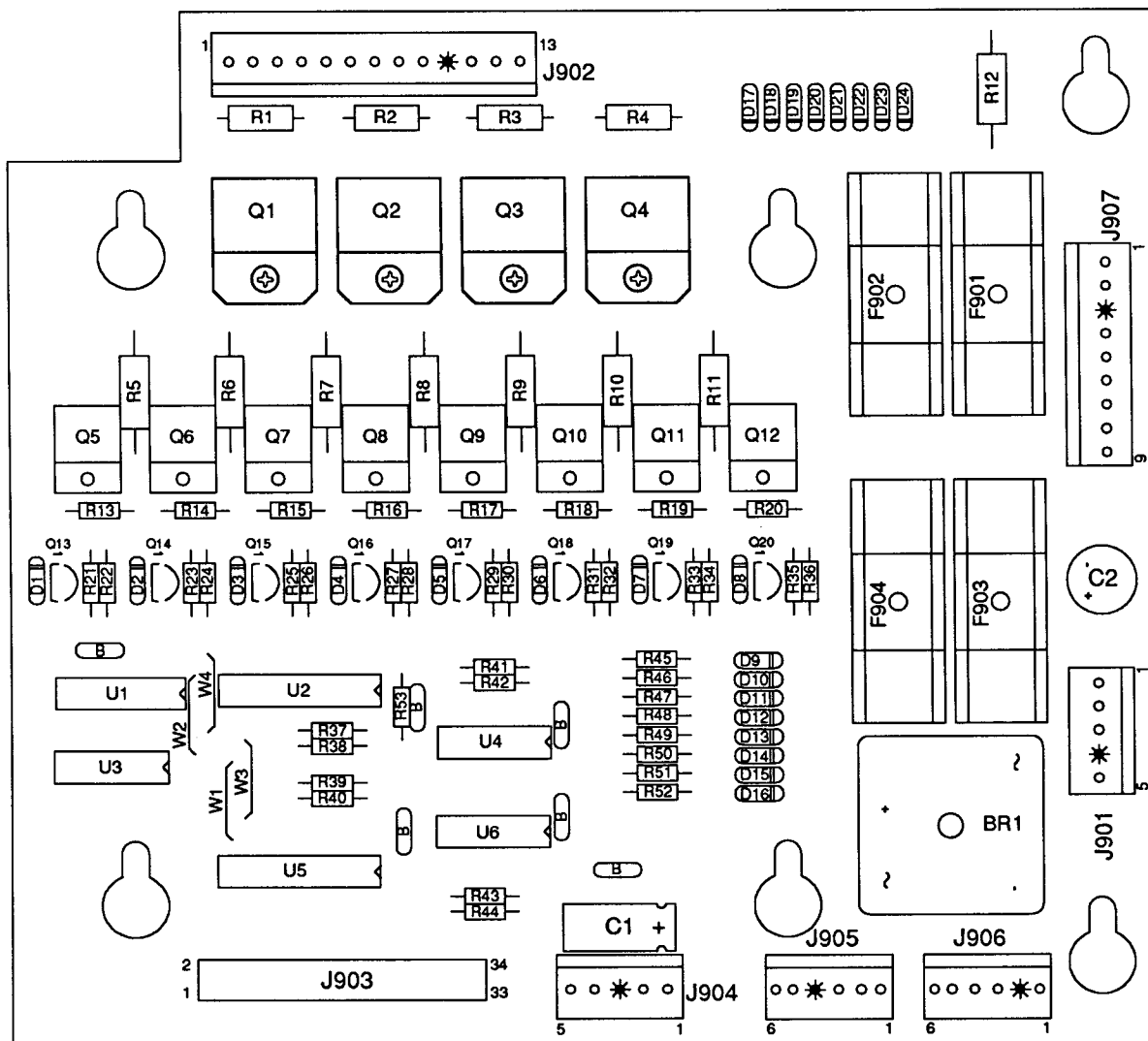
A-14039 Dot Matrix Controller Assembly



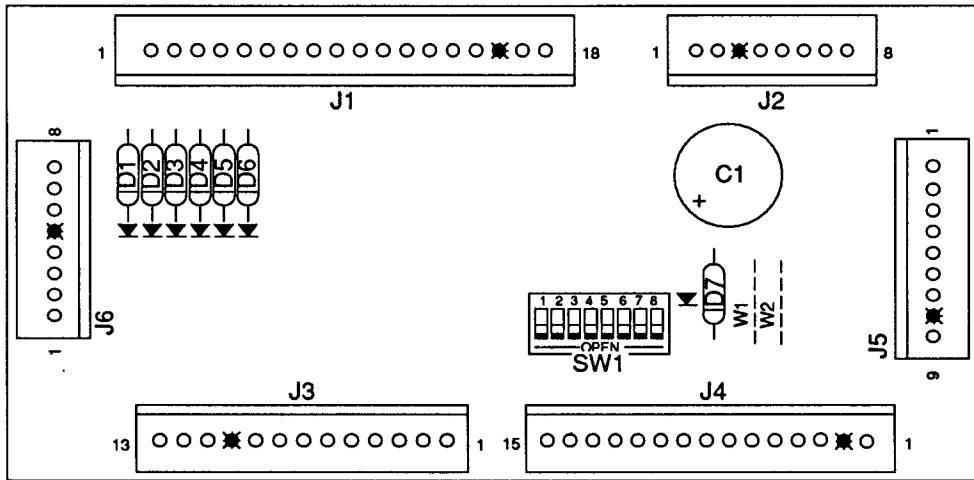
A-15472 Fliptronic II Board

Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink
20-9684	Q5-Q12	Fastener Snap
4006-01003-08	Q1-Q4	Mach. Screw, 6-32
4406-01128-00	Q1-Q4	Nut 6-32 KEPS
5010-09034-00	R37 - R44, R53	Resistor, 10K Ω , 1/4w, 5%
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45 - R52	Resistor, 1K Ω , 1/4w, 5%
5010-09361-00	R1 - R4	Resistor, 220 Ω , 1/2w, 5%
5010-09416-00	R21, R23, R25, R27, R29, R31, R33, R35	Resistor, 470 Ω , 1/4w, 5%
5010-09534-00	W3, W4	Resistor, 0 Ω
5010-10171-00	R13 - R20	Resistor, 56 Ω , 1/4w, 5%
5011-12956-00	R5 - R12	Resistor, 2.7K Ω , 1w, 5%
5040-08986-00	C1	Capacitor, 100M, 10v
5043-08980-00	B	Capacitor, .01 μ F, 50v
5040-09537-00	C2	Capacitor, 100 μ F, 100v
5070-09054-00	D1 - D24	Diode 1N4004
5162-12635-00	Q5-Q12	Transistor TIP102 NPN
5190-09016-00	Q13 - Q20	Transistor 2N4403 PNP
5191-12179-00	Q1-Q4	Transistor TIP36C PNP
5315-12009-00	U2	IC 74HCT374
5315-12031-00	U5	IC 74HCT244
5315-12812-00	U1	IC 74HCT138
5315-12951-00	U3	IC 74HCT00
5370-12272-00	U4, U6	IC LM339 QUAD COMP
5791-10862-09	J907	Connector, 9-pin Header Sq. Pin
5791-10862-05	J901, J904	Connector, 5-pin Header Sq. Pin
5791-10862-13	J902	Connector, 13-pin Header Sq. Pin
5791-12461-06	J905, J906	Connector, Str Sq. Pin Header .100
5791-12516-00	J903	34 HEN 2x17 STR
5100-09690-00	BR1	Bridge Rectifier
5731-10356-00	F901 - F904	Fuse S-B, 3A., 250v
5733-12060-01	-	Fuse Holder (F901-F904)

A-15472 Fliptronic II Board



A-14689 WPC Coin Door Interface Board

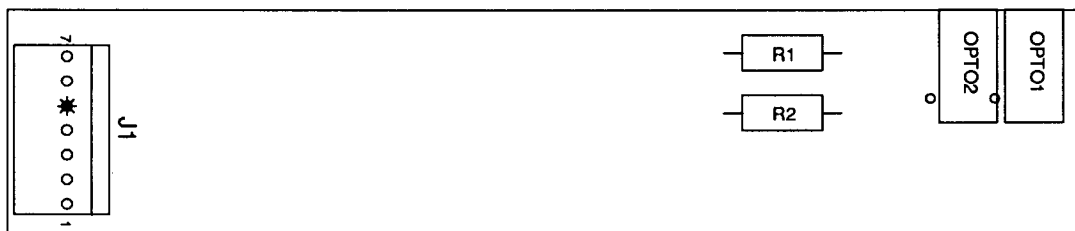


Part Number	Designator	Description
5070-09054-00	D1-D7	Diode, 1N4004, 1.0A.
5791-10862-18	J1	Connector, 18-pin Header Str Sq.
5791-10862-08	J2, J6	Connector, 8-pin Header Str Sq.
5791-10862-13	J3	Connector, 13-pin Header Str Sq.
* 5791-10862-15	J4	Connector, 15-pin Header Str Sq.
* 5791-10862-09	J5	Connector, 9-pin Header Str Sq.
* 5645-09025-00	SW1	Switch DIP 8-Position

Notes:

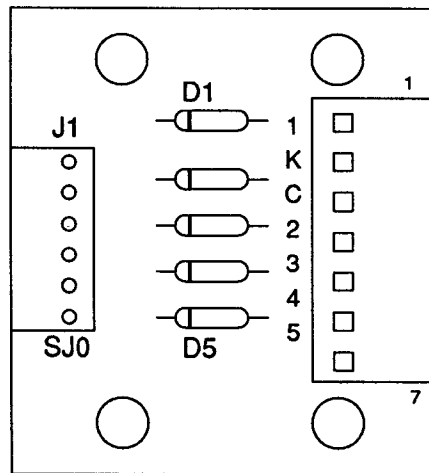
1. For Belgium, France, Finland, Sweden and England use A-14689-1 Coin Door Interface Board.
2. * = Used on Electronic Coin Door only.

A-15894 Flipper Opto Board



Part Number	Designator	Description
5010-08930-00	R1, R2	Resistor 470Ω, 1/2w, 5%
5490-12451-00	OPTO1, OPTO2	Opto Inter Lg. 10ma.
5791-12273-07	J1	Connector, 7-pin Header

C-13940 5-Switch & Diode Assembly



Part Number	Designator	Description
5070-09054-00	D1 - D5	Diode 1N4004, 1.0A.
5791-10862-07	J2	Connector, 7-pin Header Sq.
5791-12462-06	J1	Connector, 6-pin Header Sq.

A-14876-R-3 Fliptronic II Flipper Assembly (Lower Right)
A-14876-L-3 Fliptronic II Flipper Assembly (Lower Left)

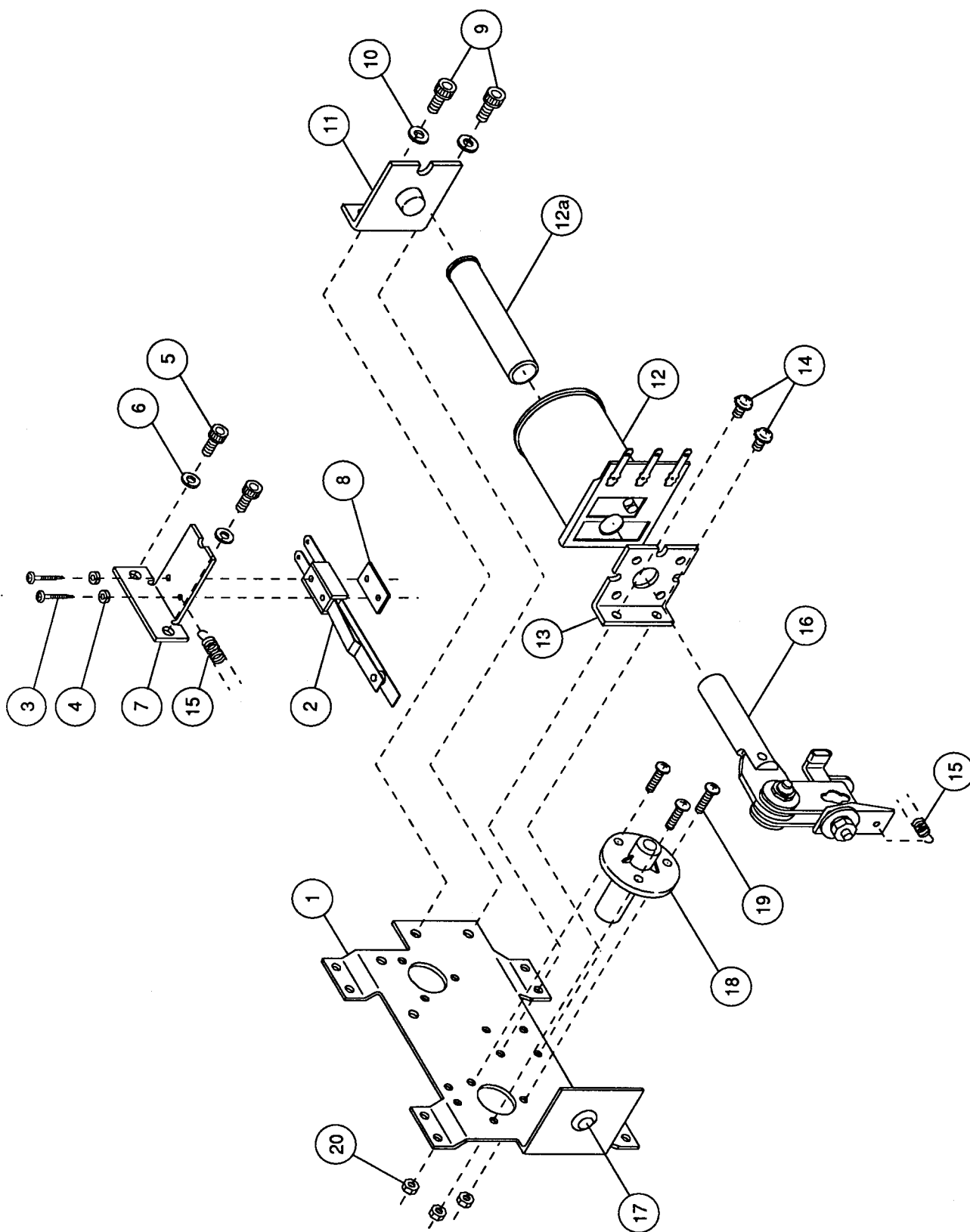
Item	Part Number	Description
1.	A-14877-R	Flipper Base Assy, Right
	* A-14877-L	Flipper Base Assy, Left
2.	SW-1A-193	Switch Assembly
3.	4701-00002-00	Lockwasher, #6 Split
4.	4105-01019-10	Sh. Metal Screw, #5 x 5/8 P-RH-A
5.	4008-01079-05	Mach. Screw, 8-32 x 5/16 H-SOC
6.	4701-00003-00	Lockwasher, #8 Split
7.	01-9375	Switch Mounting Bracket
8.	20-6516	Speednut, Tinnerman
9.	4010-01066-06	Cap Screw, 10-32 x 3/8, SH
10.	4701-00004-00	Lockwasher, #10 Split
11.	A-12111	Flipper Stop Assembly
12.	FL-11629	Flipper Coil (Blue)
a)	03-7066-5	Coil Tubing
13.	01-7695	Solenoid Bracket
14.	4006-01017-04	Mach. Screw, 6-32 x 1/4 P-RH-S
15.	10-364	Spring
16.	B-13882-R	Crank Link Assembly, Right
	* B-13882-L	Crank Link Assembly, Left
a)	B-13884-R	Flipper Crank Assembly, Right
	* B-13884-L	Flipper Crank Assembly, Left
b)	A-10656	Flipper Link Assembly
c)	02-4179	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8 SH
e)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut, 10-32 ESN
17.	23-6577	Bumper Plug, 5/8"
18.	03-7568	Flipper Bushing
19.	4006-01005-06	Mach. Screw, 6-32 x 3/8 P-PH
20.	4406-01117-00	Nut, 6-32 Hex.

Notes:

1. * Items for Left Flipper Assembly ONLY.
2. Each Flipper Assembly is mounted beneath the playfield, in conjunction with the Plastic Flipper & Shaft, (20-9250-6) and Flipper Rubber (23-6519-4) on the upper side of the playfield.
3. With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 (±.015) inch. When flipper is activated switch must close.
4. Any adjustment of the E.O.S. Switch must be made at a minimum distance of 0.25 inch from the switch body.
5. Longer blade of E.O.S. Switch must be straight. Gap adjustment is done by adjusting shorter blade.
6. All moving elements of the assembly must operate freely without any evidence of binding.
7. Apply Loctite™ 242 when reattaching screws to the Flipper Stop Assy, the Solenoid Bracket, and the Flipper Bushing.

Associated Parts for Left & Right Flippers:

21.	23-6519-4	Flipper Rubber (Red)
22.	20-9250-6	Flipper & Shaft (Yellow)



A-15205-R**Fliptronic II Flipper Assembly (Upper Right)**

Item	Part Number	Description
1.	B-13104-R	Flipper Base Assembly
2.	SW-1A-193	Switch Assembly
3.	4701-00002-00	Lockwasher, #6 Split
4.	4105-01019-10	Sh. Metal Screw, #5 x 5/8 P-RH-A
5.	4008-01079-05	Mach. Screw, 8-32 x 5/16 H-SOC
6.	4701-00003-00	Lockwasher, #8 Split
7.	01-9375	Switch Mounting Bracket
8.	20-6516	Speednut, Tinnerman
9.	4010-01066-06	Cap Screw, 10-32 x 3/8, SH
10.	4701-00004-00	Lockwasher, #10 Split
11.	A-12111	Flipper Stop Assembly
12.	FL-11630	Flipper Coil (Red)
a)	03-7066-5	Coil Tubing
13.	01-7695	Solenoid Bracket
14.	4006-01017-04	Mach. Screw, 6-32 x 1/4 P-RH-S
15.	10-364	Spring
16.	B-13882-R	Crank Link Assembly
a)	B-13884-R	Flipper Crank Assembly
b)	A-10656	Flipper Link Assembly
c)	02-4179	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8 SH
e)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut, 10-32 ESN
17.	23-6577	Bumper Plug, 5/8"
18.	03-7568	Flipper Bushing
19.	4006-01005-06	Mach. Screw, 6-32 x 3/8 P-PH
20.	4406-01117-00	Nut, 6-32 Hex.

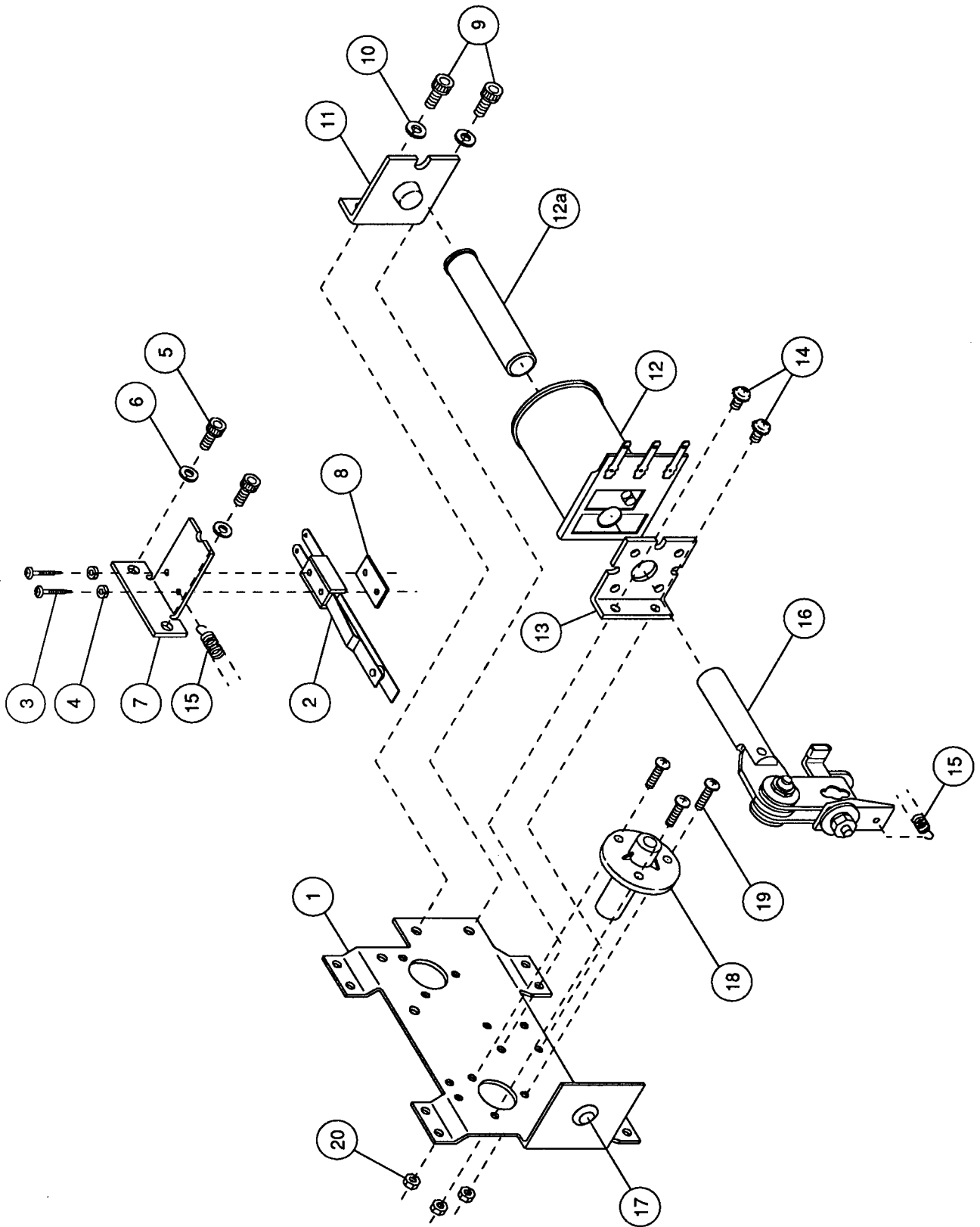
Associated Parts:

21.	23-6519-4	Flipper Rubber (Red)
22.	20-9250-6	Flipper & Shaft (Yellow)

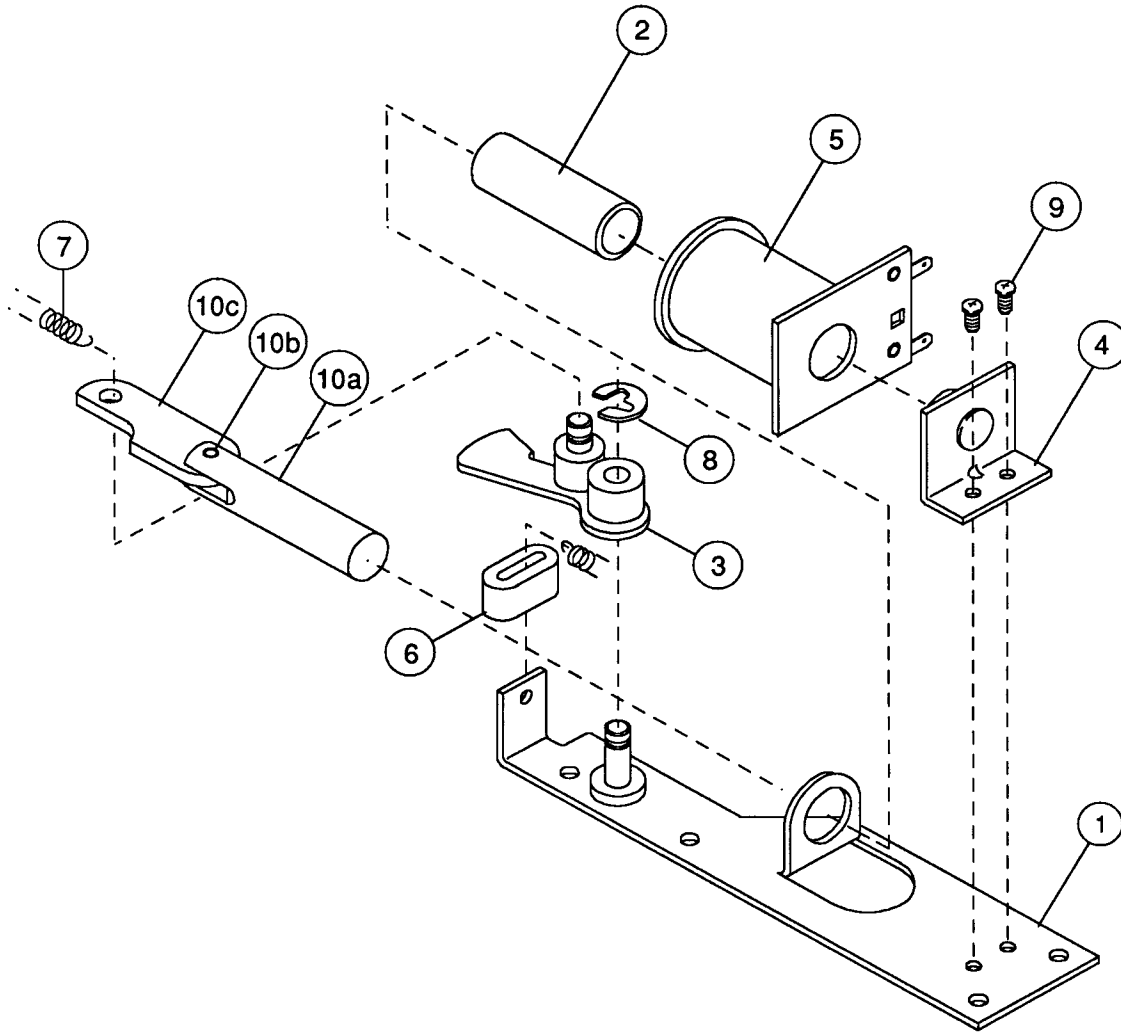
Notes:

1. Each Flipper Assembly is mounted beneath the playfield, in conjunction with the Plastic Flipper & Shaft, (20-9250-6) and Flipper Rubber (23-6519-4) on the upper side of the playfield.
2. With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 (\pm .015) inch. When flipper is activated switch must close.
3. Any adjustment of the E.O.S. Switch must be made at a minimum distance of 0.25 inch from the switch body.
4. Longer blade of E.O.S. Switch must be straight. Gap adjustment is done by adjusting shorter blade.
5. All moving elements of the assembly must operate freely without any evidence of binding.
6. Apply Loctite™ 242 when reattaching screws to the Flipper Stop Assy, the Solenoid Bracket, and the Flipper Bushing.

A-15205-R Fliptronic II Flipper Assembly

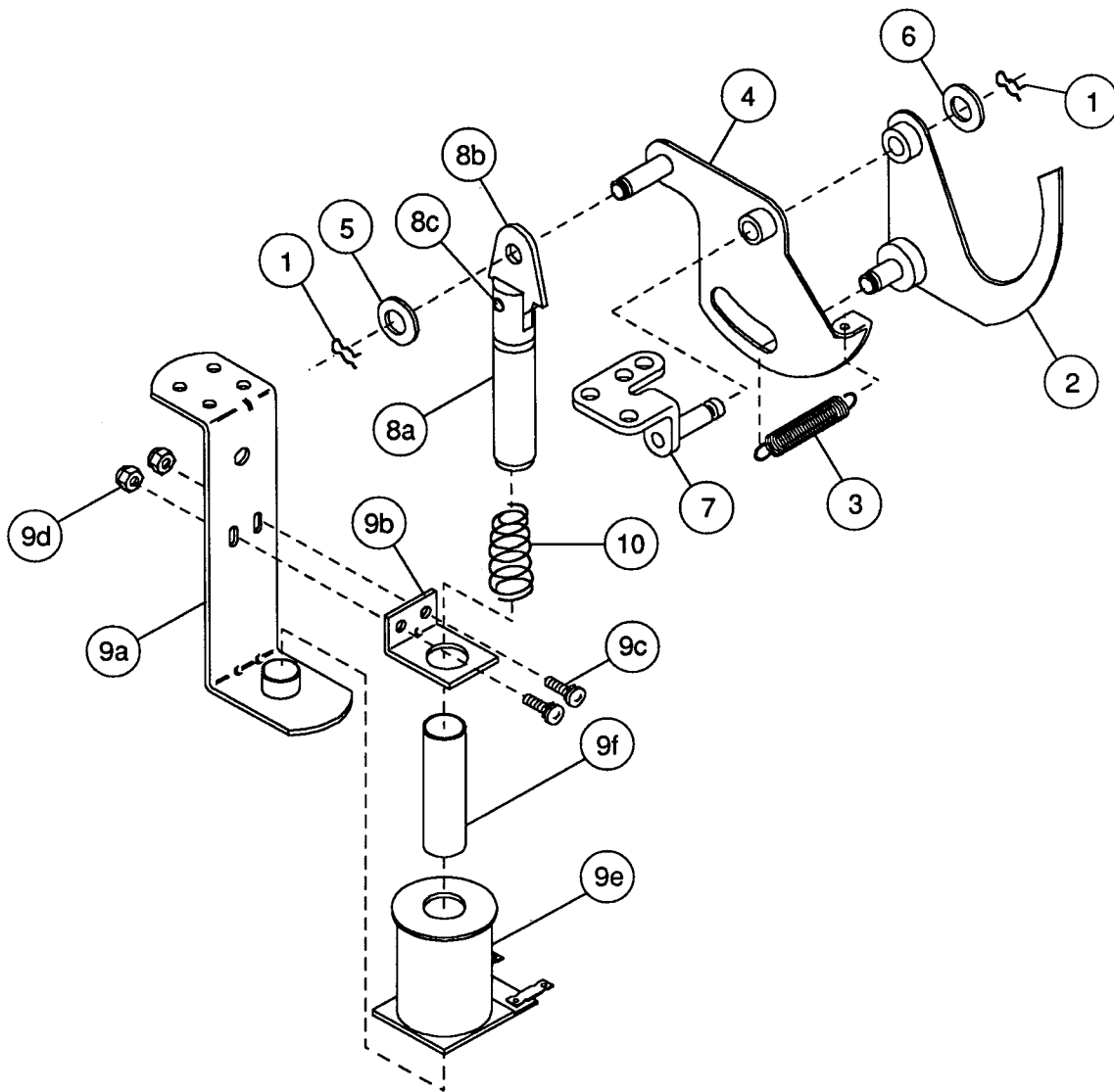


A-8039-3 Outhole Kicker Assembly



Item	Part Number	Description
1.	A-6378	Mounting Plate Assembly
2.	03-7066	Coil Tubing
3.	A-6889	Kicker Lever Assembly
4.	A-8038	Coil Stop Assembly
5.	AE-27-1200	Coil Assembly
6.	03-7176-1	Striker Ring
7.	10-101-4	Spring-Reset
8.	20-8712-25	"E" Ring, 1/4" Shaft
9.	4006-01003-03	Mach. Screw, 6-32 x 3/16"
10.	A-8335	Coil Plunger Assembly
a)	02-2364	Coil Plunger
b)	20-8716-5	Roll Pin, 1/8 x 7/16"
c)	01-4251	Ball Return Link

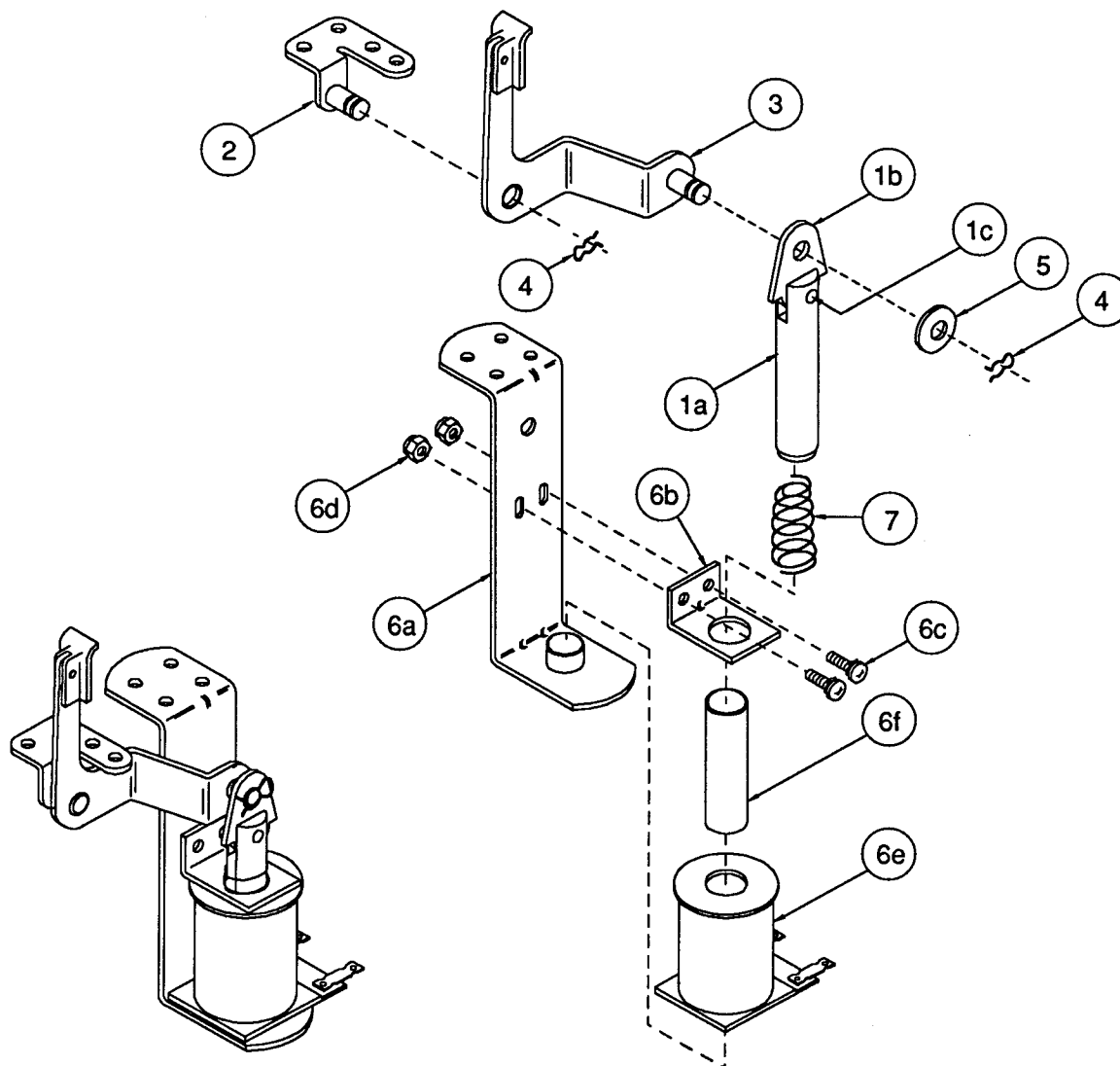
C-9638 Ball Shooter Lane Feeder Assembly



Associated Parts:

Item	Part Number	Description	Item	Part Number	Description
1.	12-6227	Hairpin Clip	9.	B-9362-L-2	Coil & Bracket Assembly
2.	A-8247	Eject Cam Assembly	a)	B-7572-1	Bracket & Stop Assembly
3.	10-362	Ejector Spring (Plain)	b)	01-8-508-S	Coil Retaining Bracket
4.	A-6949-L	Spring Plate Assembly	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8
5.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.	d)	4406-01119-00	Nut, 6-32 ESN
6.	4700-00103-00	Flatwasher, 17/64 x 1/2 x 28ga.	e)	AE-26-1200	Coil Assembly
7.	A-8268	Mounting Bracket Assembly	f)	03-7066	Coil Tubing
8.	A-8050-1	Coil Plunger Assembly	10.	10-128	Spring
a)	02-3407-2	Coil Plunger Assy, 2-1/8"			
b)	03-8085	Armature Link			
c)	20-8716-5	Roll Pin, 1/8 x 7/16"			

Kicker Arm (Slingshot) Assembly



A-14875-1

Kicker Arm Assembly - Left

Item	Part Number	Description
1.	A-15103	Coil Plunger Assembly
a)	02-2364	Coil Plunger
b)	03-8085	Armature Link
c)	20-8716-5	Roll Pin, 1/8 x 7/16"
2.	A-5653	Mounting Bracket Assembly
3.	A-14872-2	Crank Assembly
4.	12-6227	Hairpin Clip
5.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.

Associated Parts for Left & Right Kickers:

Item	Part Number	Description
6.	B-11203-L-1	Coil & Bracket Assy., Left
	B-11203-R-1	Coil & Bracket Assy., Right
a)	B-7572-1	Bracket & Stop Assembly
b)	01-8-508-S	Coil Retaining Bracket
c)	4006-01017-06	Mach. Screw, 6-32 x 3/8
d)	4406-01119-00	Nut, 6-32 ESN
e)	AE-26-1200	Coil Assembly
f)	03-7066	Coil Tubing
7.	10-128	Spring

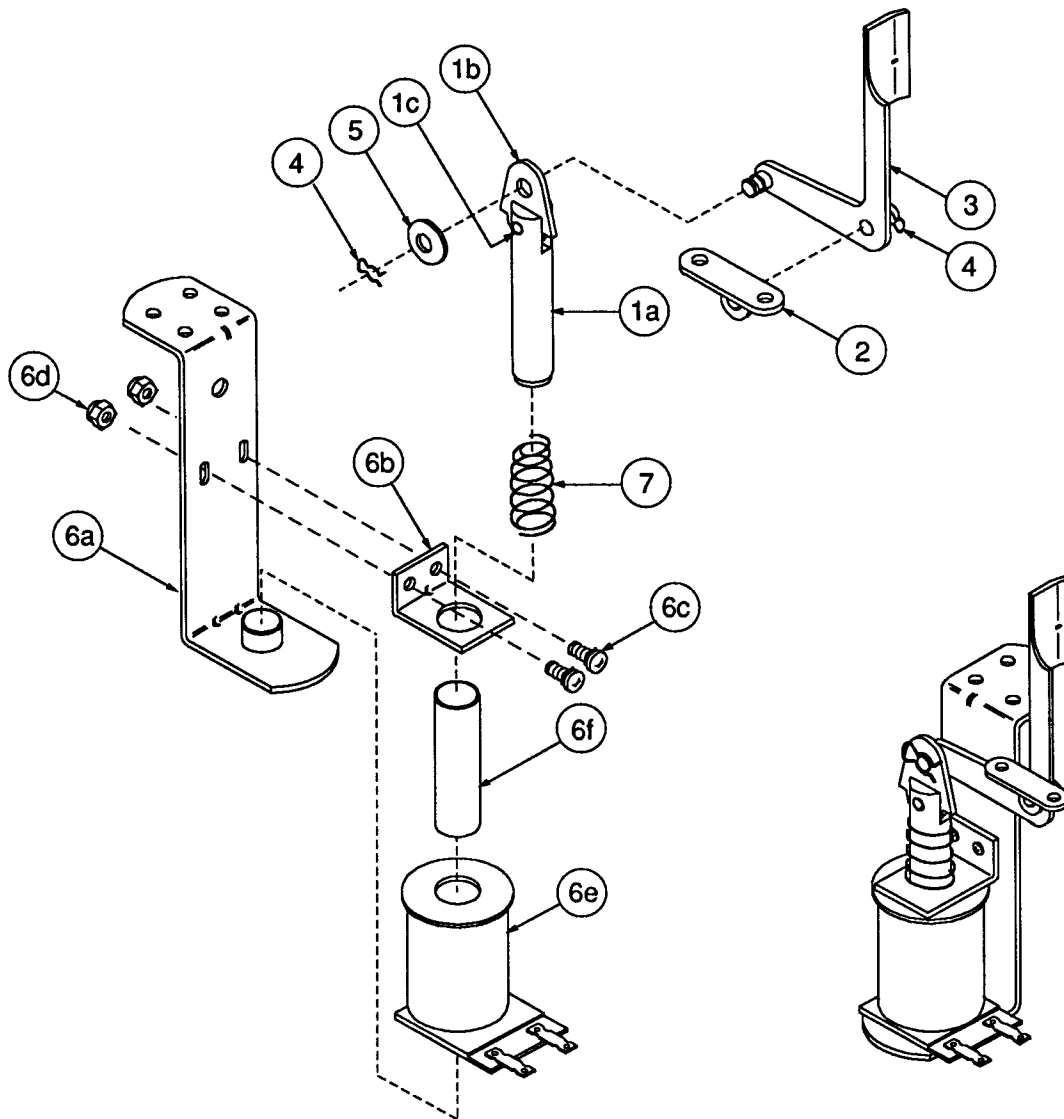
A-14875-2

Kicker Arm Assembly - Right

(Parts listed replace same items of A-14875-1)

3.	A-14872-1	Crank Assembly
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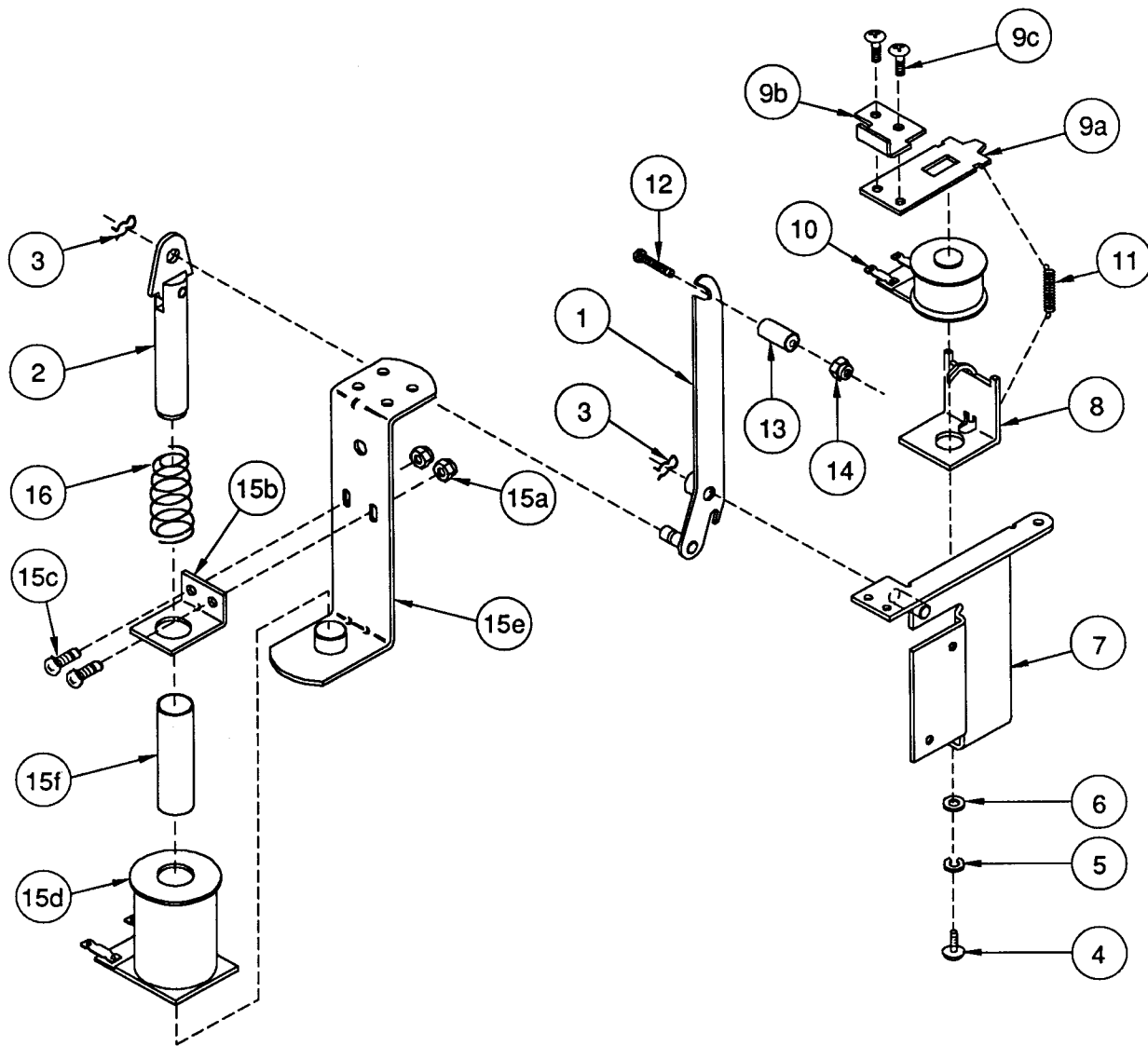
A-14874 Kicker Arm (Slingshot) Assembly



Associated Parts

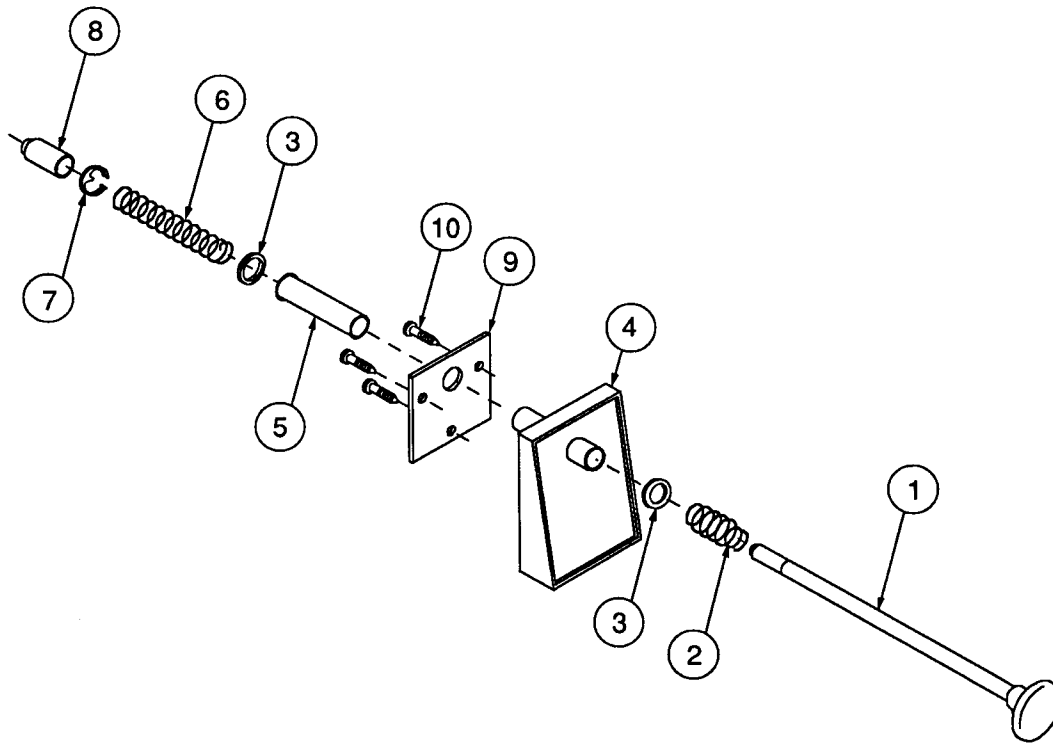
Item	Part Number	Description	Item	Part Number	Description
1.	A-5103	Coil Plunger Assembly	6.	B-11203-R-1	Coil & Bracket Assembly
a)	02-2364	Coil Plunger	a)	B-7572-1	Bracket & Stop Assembly
b)	03-8085	Armature Link	b)	01-8-508-S	Coil Retaining Bracket
c)	20-8716-5	Roll Pin, 1/8 x 7/16"	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8
2.	A-14871	Mounting Bracket Assembly	d)	4406-01119-00	Nut, 6-32 ESN
3.	A-5652-1	Kicker Crank Assembly	e)	AE-26-1500	Coil Assembly
4.	12-6227	Hairpin Clip	f)	03-7066	Coil Tubing
5.	4700-00030-00	Flatwasher, 9/32 x 1/2 x 15ga.	7.	10-128	Spring

A-14918 Ramp Lifting Mechanism Assembly



Item	Part Number	Description	Item	Part Number	Description
1.	A-14870	Lift Crank Assembly	12.	4008-01005-24	Mach. Screw, #8-32 x 1.50 Ph.
2.	A-8050	Plunger Assembly, 2-1/4"	13.	02-4610	Roller
3.	12-6227	Hairpin Clip	14.	4408-01119-00	Nut #8-32 ESN
4.	4008-01021-07	Mach. Screw, 8-32 x 7/16	Associated Parts:		
5.	4701-00003-00	Lockwasher #8 Split	15.	B-9362-R-3	Coil & Bracket Assembly
6.	4700-00089-00	Flatwasher, 11/64 x 7/16 x 16ga.	a)	B-7572-1	Bracket & Stop Assembly
7.	B-11302	Lift Mech. Bracket Assembly	b)	01-8-508-S	Coil & Retaining Bracket
8.	A-6892	Frame & Eyelet Assembly	c)	4006-01017-06	Mach. Screw, 6-32 X 3/8
9.	A-11139	Armature Assembly	d)	4406-01119-00	Nut, 6-32 ESN
a)	A-8936	Armature Sub- Assembly	e)	AE-26-1200	Coil Assembly
b)	01-8390	Lift Crank Lock	f)	03-7066	Coil Tubing
c)	4006-01003-00	Mach. Screw. 6-32 x 3/16	16.	10-128	Spring
10.	SM1-29-1000DC	Coil Assembly			
11.	10-363	Extension Spring			

B-12445-3 Ball Shooter Assembly



Item	Part Number	Description
1.	20-9253-7	Rod Assembly
2.	10-149	Rod Spring
3.	4700-00051-00	FW, 25/64 x 5/8 x 16ga.
4.	21-6645-1	Ball Shooter Housing
5.	03-7357	Shooter Sleeve
6.	10-148-3	Shooter Spring
7.	20-8718-1	"C" Retaining Ring
8.	23-6327	Rubber Shooter Tip

Associated Parts

9.	01-3535	Mounting Plate
10.	4010-01006-10	MS, #10-32 x 5/8

A-12842-3 Jumper Bumper Assembly

Item	Part Number	Description	Item	Part Number	Description
1.	AE-26-1200	Coil Assembly	18.	03-6035-7	Wafer, White
2.	B-12749	Core Plug & Bracket Assy.	19.	10-326	Compression Spring
3.	03-8324-5	Thunder Bumper Base, Wht.	20.	4408-01119-00	Nut, 8-32 ESN (3)
4.	01-9166	Switch Plate	21.	4406-01119-00	Nut, 6-32 ESN (2)
5.	01-9321	Switch Plate	22.	B-13267	Switch & Diode Assembly
6.	01-9319	Plunger Bracket	a)	SW-1A-187	Switch
7.	01-9117	Mounting Bracket	b)	5070-09054-00	Diode, 1N4004, 1.0A.
8.	02-3406-1	Plunger Coil	23.	4008-01070-14	Mach. Screw, 8-32 x 7/8 (3)
9.	4705-00002-00	Spring Washer, 1/2" (1)	24.	4005-01016-18B	Mach. Screw, 5-40 x 1-1/8 (2)
10.	01-9116	Bracket Plate	25.	4008-01015-04	TT, 8-32 x 1/4 (1)
11.	01-9320	Plate, Bakelite	26.	4008-01015-06	TT, 8-32 x 3/8 (2)
12.	10-411	Compression Spring	27.	4108-01001-10	Sh. Metal Screw, #8 x 5/8 (2)
13.	A-14271	Socket Assembly	28.	03-7066	Coil Tubing
14.	4701-00001-00	Lockwasher #4 Split	29.	03-8291-13	Thumper Bumper Cap, Clear
15.	4700-00002-00	Flatwasher (2)	30.	4004-01005-08	Mach. Screw, 4-40 x 1/2 (2)
16.	03-8292-7	Body, Black	31.	03-6047-16	Spacer, 1-1/16"(2)
17.	A-12854	Flange & Stud Assembly			

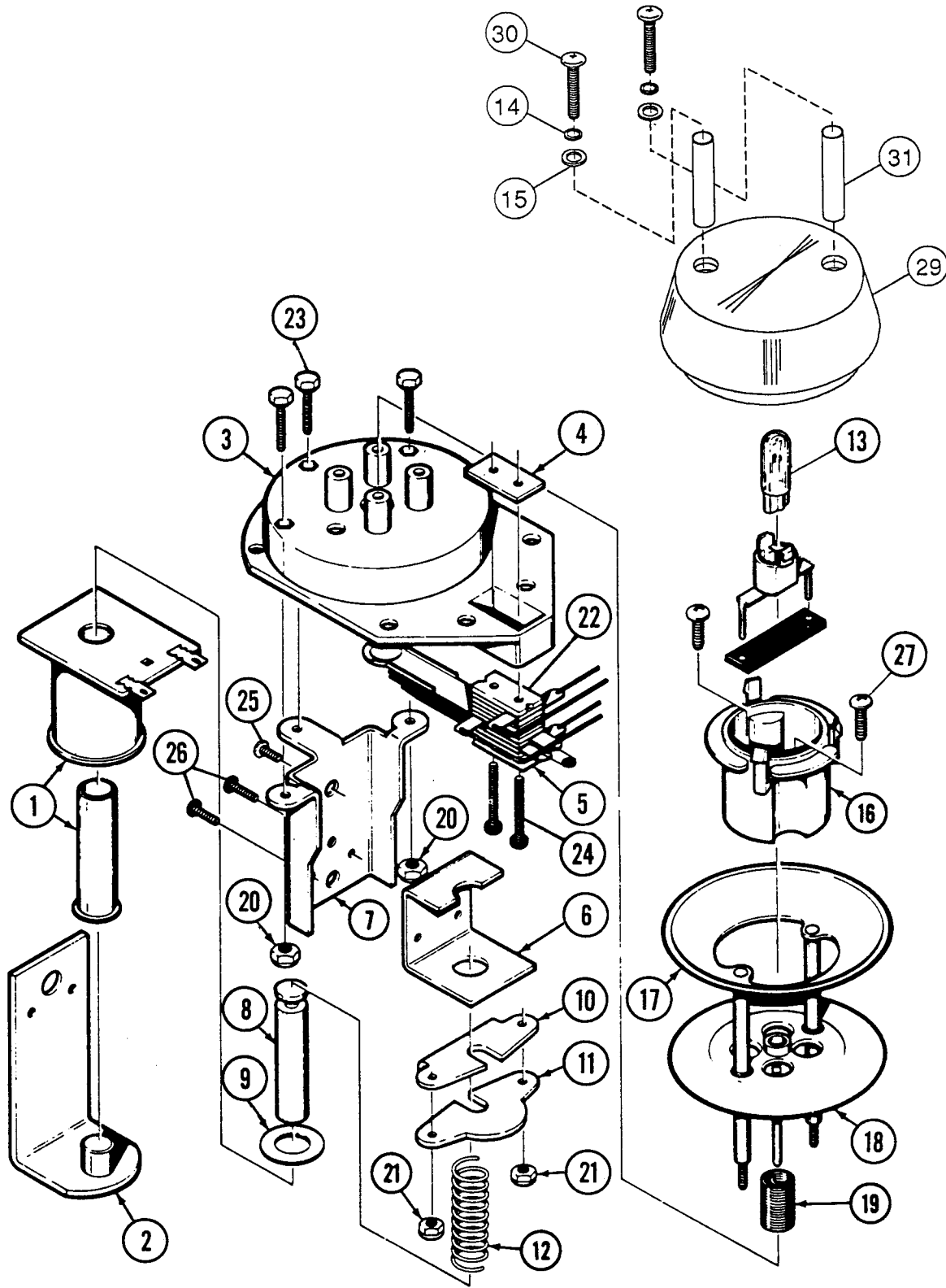
A-12872-1 Thumper Bumper Assembly

(Parts listed replace same items of A-12842-3)

Item	Part Number	Description
14.	Not Used	
15.	Not Used	
16.	03-8325-5	Body
17.	A-4754	Flange & Stud Assembly
18.	03-6035-5	Wafer, White
29 - 31	Not Used	

A-12842-3
A-12872-1

Jumper Bumper Assembly & Thumper Bumper Assembly

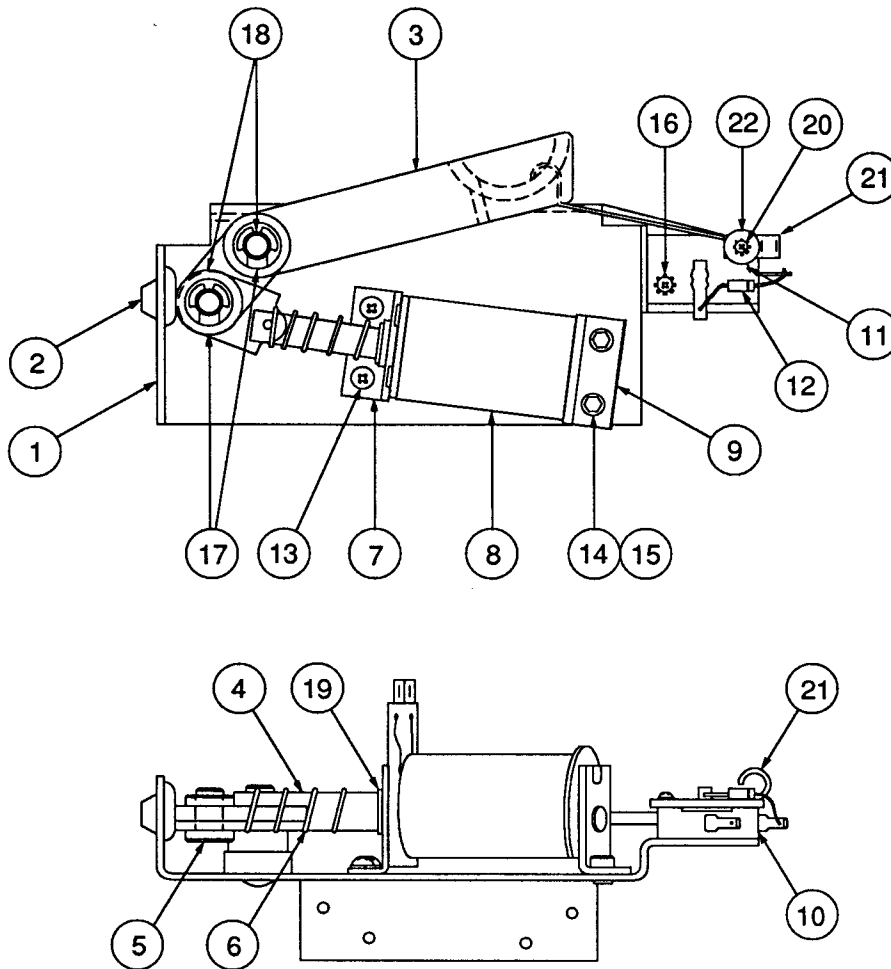


A-14635 Cannon Assembly

Item	Part Number	Description
1.	03-8566	Body
2.	03-8565	Door
3.	02-4537	Pin
4.	20-8712-25	"E"-Retaining Ring
5.	03-8567	Mounting Ring
6.	A-15020	Mounting Plate Assembly
7.	4608-01081-10	Hi-Fast #8 Plain Hex.
8.	A-14640	Catapult Assembly (See p. 2-30)
9.	4408-01119-00	Nut ESN #8-32
10.	02-4596	Post
11.	4700-00021-00	Flatwasher
12.	4008-01017-08	Mach. Screw, 8-32 x 1/2
13.	14-7965	Motor
14.	01-10190	Ring Nut
15.	01-10376	Spacer
16.	01-10190-1	Ring Nut
17.	4008-01017-28	Mach. Screw, #8-32 x 1-3/4 SEMS
18.	4006-01017-08	Mach. Screw, #6-32 x 1/2 SEMS
19.	-	Loctite
20.	4010-01066-06	Soc. Hd. Scew
21.	02-4582	Guide
22.	01-10189	Base Plate
23.	4008-01017-10	Soc. Head Screw, #8 x 5/8
24.	EI-204	Magnalube
25.	4421-01135-01	Nut Jam, 5/16-18
26.	H-15012	Motor Cable
27.	03-7520-2	Ty-Wrap
28.	H-14991	Catapult Cable
29.	* 31-1656-5	Decal - Top
30.	* 31-1656-7	Decal - Top
31.	* 31-1656-8	Decal - Top
32.	* 31-1656-1	Decal - Top
33.	* 31-1656-2	Decal - Top
34.	H-14957	Cable
35.	4701-00016-00	Spring Lockwasher (Split)

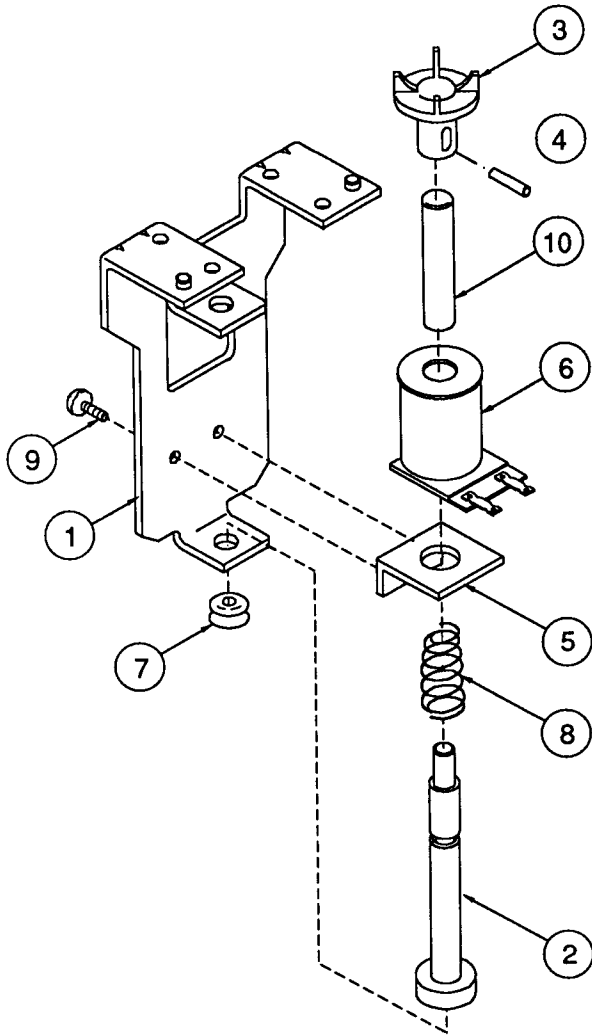
* Not available for individual sale. Order Decal Set 31-1656.

A-14640 Catapult Assembly



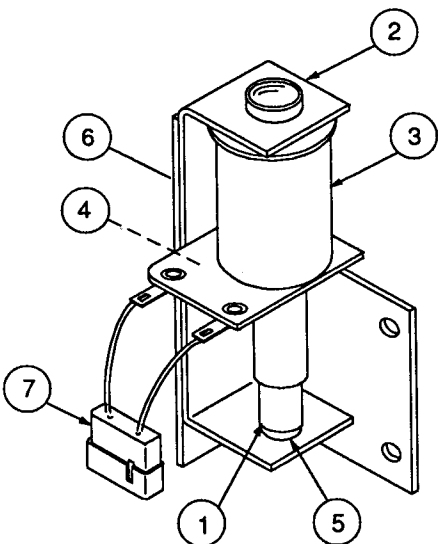
Item	Part Number	Description	Item	Part Number	Description
1.	A-14637	Bracket Assembly	12.	5070-09054-00	Diode 1N4004
2.	23-6577	Plug Bumper	13.	4008-01017-04	Mach. Screw, 8-32 x 1/4
3.	03-8089	Catapult Arm	14.	4010-01066-06	Cap Screw, #10-32 x 3/8
4.	A-15175	Plunger Assembly	15.	4701-00004-00	Lockwasher #10 Split
5.	02-4301	Catapult Arm Pin	16.	4004-01003-10	Mach. Screw, 4-40 x 5/8
6.	10-422	Spring	17.	4700-00104-00	Flatwasher, 5/16 x 1/2 x 16ga.
7.	01-7695	Coil Mounting Bracket	18.	20-8712-31	Retaining Ring
8.	A-15016	Coil Assembly	19.	03-7066-5	Coil Tubing
9.	A-12111	Flipper Stop Bracket Assy.	20.	4004-01003-12	Mach. Screw, 4-40 x 3/4
10.	5647-12133-12	Switch	21.	03-7655-4	Cable Clamp
11.	A-7438-1	Terminal Strip	22.	4700-00005-00	Flatwasher, 9/64 x 7/16 16ga.

D-11335-1 Ball Popper Assembly



Item	Part Number	Description
1.	B-11631	Bracket Assembly
2.	A-11336	Armature Assembly
3.	03-8053	Ball Popper Cap
4.	20-9314-7	Dowel Pin, 3/32 x 1/2"
5.	01-9794	Mounting Bracket
6.	AE-24-900	Coil Assembly
7.	23-6420	Rubber Grommet
8.	10-135	Spring
9.	4008-01017-04	Mach. Screw, #8-32 x 5/16
10.	03-7067	Coil Tubing

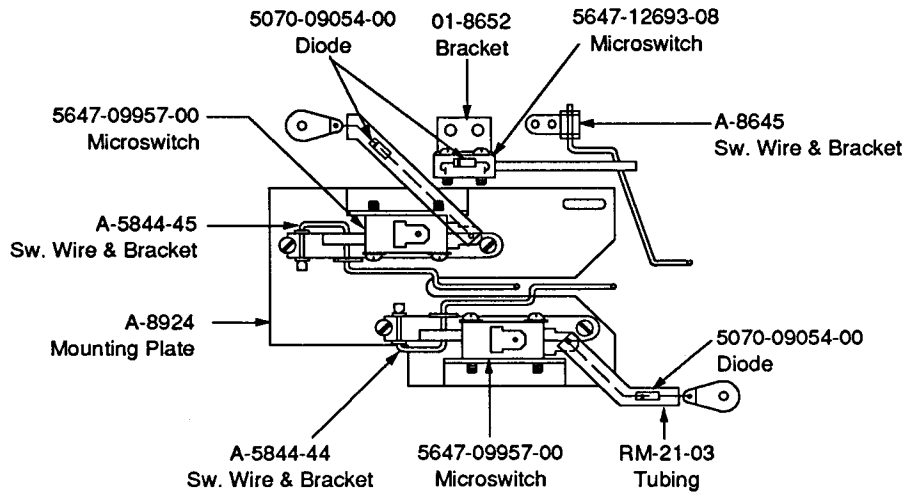
B-10686-1 Knocker Assembly



Item	Part Number	Description
1.	A-5387	Coil Plunger Assembly
2.	B-7409-2	Mtg. Bracket Assembly
3.	AE-23-800	Coil Sub-Assembly
4.	01-8-508-T	Coil Retaining Bracket
5.	23-6420	Rubber Grommet
6.	4008-01017-06	Mach. Screw, 8/32 x 3/8
7.	H-11835	Knocker Cable
8.	03-7067-5	Coil Tubing

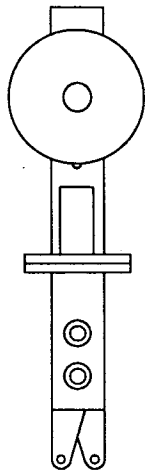
Ball Trough Switches

(Viewed from underside of playfield to show locations)



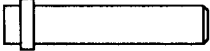
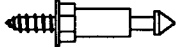


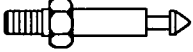
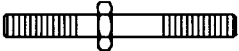
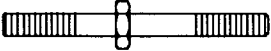
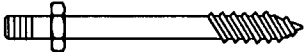
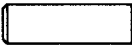
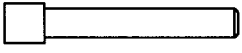
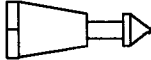

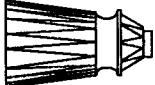
B-8925 Ball Trough Switch Plate Assembly

Standup Target Assemblies



Part Number	Description
A-15118-2	Standup Target, Green
A-15118-4	Standup Target, Red
A-15118-5	Standup Target, White
A-15118-6	Standup Target, Yellow

Metal & Plastic Posts

	Part Number	Description	Quantity
	02-3409	Spring Post	1
	02-3905	Bumper Post #8	4
	02-4036	Mini Post	6
	02-4176-20	M-F Spacer, 8-32 x 1-1/4"	2
	02-4176-32	M-F Spacer, 8-32 x 2"	1
	02-4176-40	M-F Spacer, 8-32 x 2-1/2"	1
	02-4177-2	Ball Guide Post	2
	02-4424-1	Spring Post, 6-32 x 8-32	4
	02-4425-1	Post, 8-32 / #8-32	1
	02-4426-1	Post, #6-32 / #8 SMS	18
	02-4433	Post, #8 x 1-3/16"	1
	02-4596	Post	3
	03-8044-13	Mini Plastic Post - Clear	2
	03-8365-10	Post, Trans. Blue	1
	03-8319-13	Star Post #8 - Clear	23

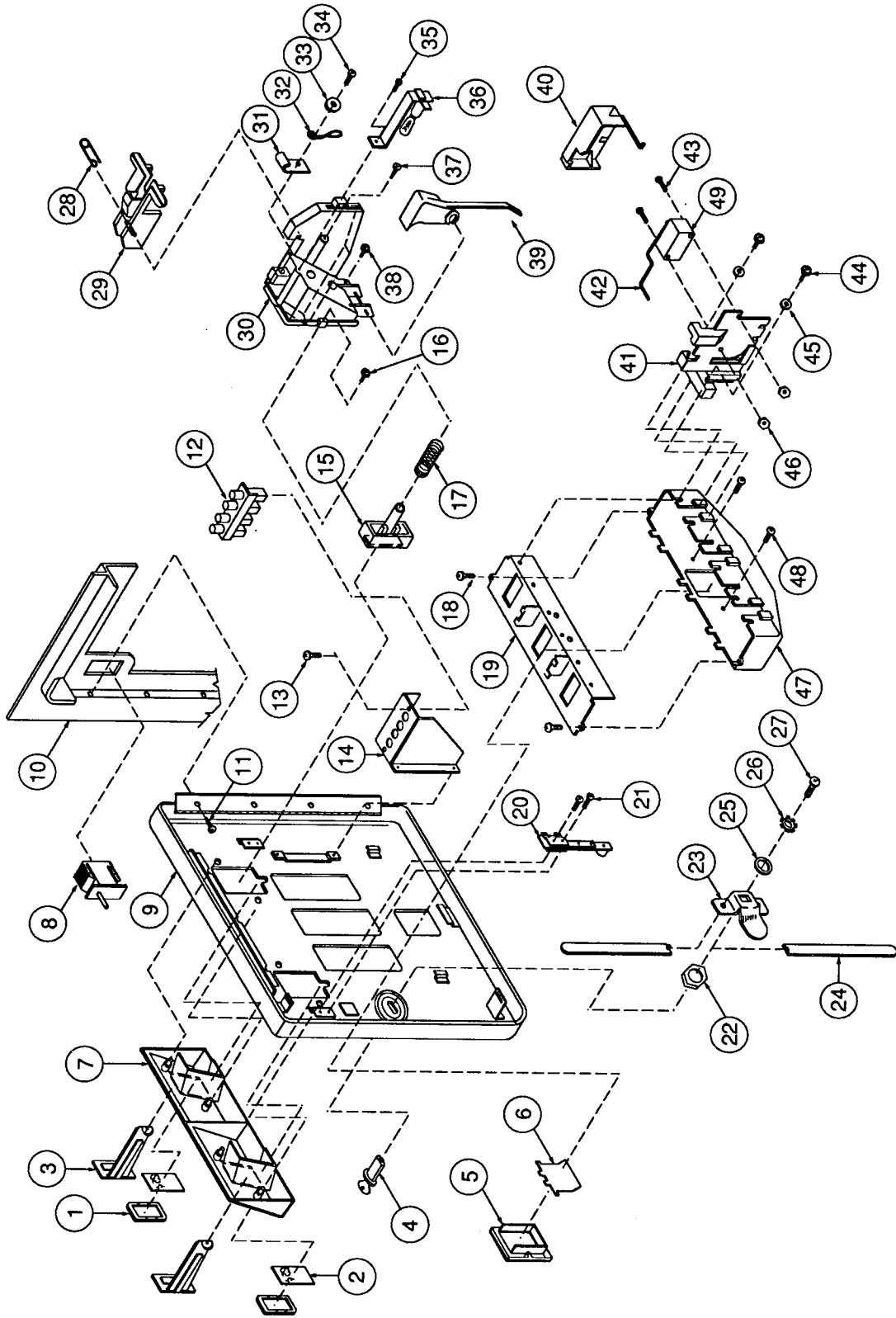
Coin Door Assembly

A-14148-1 U.S.A. Door with Decals

09-17002-x 2-Chute Door
 09-17003-x 3-Chute Door
 ("x" is the country designator)

Item	Part No.	Description	Quantity
1	27-1038	Button Cover	2 or 3
2	27-1041-1→ 58	Price Panel	2 or 3
3	27-1026-1→ 17	Coin Entry Plate	2 or 3
4	27-1016	Lock Assembly	1
5	27-1061-1	Coin Return - Bezel	1
6	27-1062	Coin Return Flap	1
7	27-1021	Button Housing - 2-slot	1
	27-1022	Button Housing - 3-slot	1
8	27-1111	Interlock Switch	1
9	27-1006-1	Coin Door , 2-Slot	1
	27-1007-1	Coin Door , 3-Slot	1
10	27-1005	Coin Door Frame	1
11	27-1003	M/C Screw, 6-32 x 3/16	4
12	5641-12724-00	Diagnostic Switch	1
13	27-1101	M/C Screw, 4-40 x 1/4	2
14	01-9885	Bracket, Diagnostic Switch	1
15	03-7601-4	Button, Red	2
	03-7601-7	Button, Black	2
16	27-1078	M/C Screw, 6-32 x 3/8	2 or 3
17	27-1039	Conical Spring	2 or 3
18	27-1079	Self-tapping Screw, #6 x 1/4	2
19	27-1077-1	Coinbox Cover	1
20	27-1066	Slam Switch	1
21	27-1067	M/C Screw, 4-40 x 1/2	2
22	27-1017	Nut (key)	1
23	27-1012	Locking Cam	1
24	27-1011	Locking Arm	2
25	27-1020	Washer	1
26	27-1018	Star Washer	1
27	27-1019	M/C Screw, 1/4-28 x 5/16	1
28	27-1089	R-Ring	1
29	27-1083	Retainer	1
30	27-1081	Coin Inlet Chute	2 or 3
31	27-1088	Cable Clamp	2 or 3
32	27-1025	Key Hook	1
33	27-1086	Washer, #6	2 or 3
34	27-1078	M/C Screw, 6-32 x 3/8	1 or 2
	27-1113	M/C Screw, 6-32 x 7/16	1
35	27-1079	Self-tapping Screw, #6 x 1/4	2 or 3
36	27-1084	Lamp Socket	2 or 3
	27-1085	Lamp	2 or 3
37	27-1096	Self-tapping Screw, #5 x 3/8	2 or 3
38	27-1087	M/C Screw, 6-32 x 5/8	2 or 3
39	27-1082	Lever Arm	2 or 3
40	27-1097	Switch Cover	2 or 3
41	27-1091-1	Coin Accept Chute	2 or 3
42	27-1075	Wire Form (Small)	2 or 3
	or		
	27-1093	Wire Form (Large)	
43	27-1094	M/C Screw, 4-40 x 7/8	4 or 6
44	27-1087	M/C Screw, 6-32 x 5/8	4 or 6
45	27-1086	Washer, #6	4 or 6
46	27-1095	Nut, 4-40 ESNA	4 or 6
47	27-1076-1	Coin Return Box	1
48	27-1078	M/C Screw, 6-32 x 3/8	2
49	27-1092	Microswitch	2 or 3

Coin Door Assembly



Cable List

Part Number	Description
H-11835	Knocker Cable
H-13870	Black Jumper Cable
H-14695	Dot Display Cable
H-14790	A.C. Cable
H-14792-1	A.C. Jumper Cable
H-14792-2	A.C. Jumper Cable
H-14957	General Switch Cable
H-14985	Playfield Switch Cable
H-14986	Playfield Lamp Cable
H-14987-1	Playfield Solenoid Cable
H-14988-1	Cabinet Cable
H-14989	Insert Cable
H-14991	Catapult Cable
H-14992	Back Panel Cable
H-15012	Motor Cable
H-15119	G.I. Lamp Cable
H-15151	Under Ramp Switch Cable
H-15153	Double Ramp Cable
H-15154	Left Ramp Cable
H-15192	Speaker/Display Cable
H-15476	Logic Power Cable
H-15478	Tilt Switch cable
H-15600	Middle Ramp Switch Cable
H-15736	Secondary Cable

Unique Parts

Part Number	Description	Part Number	Description
A-12738-20013	WPC Sound Board	A-14941	Ball Guide Assembly
A-12742-20013	WPC CPU Board	A-14967	Deflector Assembly
A-13204-20013	Bottom Arch Assembly	A-14981-1	Flipper Ball Guide Assy. - Right
A-13767-20013	Backbox Assembly	A-14981-2	Flipper Ball Guide Assy. - Left
A-13769-20013	Playfield & Insert Assembly	A-15016	Coil Assembly
A-14635	Cannon Assembly	A-15019	Ring Nut Assembly
A-14640	Catapult Assembly	A-15020	Plate Assembly
A-14656-1	Cashbox Assembly	A-15043	Ramp Assembly
A-14823	Trough Assembly	A-15098	Back Panel Assembly
A-14824	Lower Trough Assembly	A-15118-2	Standup Target Assembly, Green
A-14825	Back Trough Assembly	A-15118-4	Standup Target Assembly, Red
A-14826	Ramp Assembly	A-15118-5	Standup Target Assembly, White
A-14831	Ramp Assembly	A-15118-6	Standup Target Assembly, Yellow
A-14832	Ball Guide Assembly	A-15131	Ball Gate & Switch Assembly
A-14833	Ball Guide Assembly	A-15132	Ball Gate & Switch Assembly
A-14834	Ball Guide Assembly	A-15133	Ball Gate & Switch Assembly
A-14835	Ball Guide Assembly	A-15140	8-Lamp PCB Assembly
A-14836	Ball Guide Assembly	A-15141	8-Lamp PCB Assembly
A-14837	Ball Guide Assembly	A-15142	8-Lamp PCB Assembly
A-14838	Ball Guide Assembly	A-15155	Shield Assembly
A-14839	Ball Guide Assembly	A-15156	Reflector Assembly
A-14840	Ball Guide Assembly	A-15157	Speaker Panel Assembly
A-14841	Ball Guide Assembly	A-15205-R-3	Flipper Assembly
A-14842	Ball Guide Assembly	A-15219	Playfield Plastic Assembly
A-14843	Ball Guide Assembly	A-15281	Ball Gate Assembly
A-14844	Ball Guide Assembly	A-5343-20013-1	ROM Game Assembly
A-14864	Front Molding Assembly/w Button	A-5343-20013-2	ROM Music/Speech
A-14868	Ball Gate Assembly	A-5343-20013-3	ROM Assembly
A-14874	Kicker Assembly	A-5343-20013-4	ROM Assembly
A-14875-1	Kicker Assembly - Left	A-8552-20013	Backglass Assembly
A-14875-2	Kicker Assembly - Right		
A-14876-L-3	Flipper Assembly - Left	02-4176-20	M-F Spacer, 8-32 x 1-1/4
A-14876-R-3	Flipper Assembly - Right	02-4176-40	M-F Spacer, 8-32 x 1-1/2
A-14878	Ramp Assembly	02-4177-2	Mini Post
A-14918	Ramp Lifting Mach. Assembly	02-4596	Post

Playfield Parts

Item	Part Number	Description	Item	Part Number	Description
1	31-1567-5	Red Button	36	12-6466-8	2" Wire Guide
2	01-8419	Playfield Holdown Brkt.	37	A-14834	Ball Guide
3	A-13204-20013	Bottom Arch Assy.	38	A-14833	Ball Guide
4	A-14876-L-3	Left Flipper Assy.	39	A-15118-5	Stand Up Target, White
	20-9250-7	Black Flipper & Shaft	40	A-14875-2	Nylon Kicker Assy., Right
5	A-14981-1	Right Ball Guide Assy.		B-11203-R-1	Coil & Brkt. Assy.
6	A-14635	Cannon Assy.		10-128	Spring
7	B-11700-1	Kicker Switch Assy.	41	A-14981-2	Left Ball Guide Assy.
8	A-14875-1	Nylon Kicker Assy., Left	42	A-14876-R-3	Right Flipper Assy.
	B-11203-L-1	Coil & Brkt. Assy.		20-9250-7	Black Flipper & Shaft
	10-128	Spring	43	C-9638	Multiball Eject Assy.
9	12-6466-9	2 1/4" Wire Guide	44	B-8925	Micro Switch Plate Assy.
10	01-9510	#8 Adjustment Plate	45	12-6542	Wire Gate
11	A-14843	Ball Guide	46	01-3569-1	Ball Return Runway
12	A-15132	Ball Gate & Switch Assy.	47	B-8623	Guide & Baffle Assy.
	01-10636	Switch Cover Clip	48	01-5575	Bottom Arch Mtg. Brkts.
	20-9672	Switch Protect Cover	49	A-8039-3	Ball Release Assy.
13	A-15118-6	Stand Up Targets, Yellow (3)	50	C-8235	Ball Runway Assy.
14	A-14844	Ball Guide	51	A-8645	Wire Form & Brkt. Assy.
15	A-14820	Switch & Brkt. Assy.	52	B-9362-L-2	Coil & Brkt. Assy.
	A-14874	Kicker Assy.		10-128	Spring
	B-11203-R-1	Coil & Brkt. Assy.	53	A-15802	Level & Mount
	10-128	Spring			
16	A-14821	Switch & Brkt. Assy.			
	A-14918	Ramp Lifting Mechanism			
	B-9362-R-3	Coil & Brkt. Assy.			
	01-10351	Ball Guide Entrance			
	10-128	Spring			
17	A-14839	Ball Guide			
18	A-14841	Ball Guide			
19	A-14832	Ball Guide			
20	A-14866	Ramp Extention			
21	A-14836	Ball Guide			
22	02-4176-40	8-32x2 1/2" Spacer			
23	A-15118-4	Stand Up Target, Red (3)			
24	D-11335-1	Ball Popper Assy.			
25	A-14842	Ball Guide Assy.			
	A-14868	Ball Gate Assy			
	A-14868	Ball Gate Assy.			
26	A-15098	Back Panel Assy.			
27	A-12872-1	Thumper Bumper Assy.			
	03-8276-10	Collar, Blue			
	03-8277-10	Cap, Blue			
28	A-12842-3	Jumper Bumper Assy.			
29	A-14840	Ball Guide			
30	A-14835	Ball Guide			
31	A-14837	Ball Guide			
32	A-14838	Ball Guide			
33	A-15118-2	Stand Up Target, Green (3)			
34	A-15131	Ball Gate & Switch Assy.			
	01-10636	Switch Cover Clip			
	20-9672	Switch Protect Cover			
35	A-15205-R	Right Flipper Assy.			
	20-9250-7	Black Flipper & Shaft			

Not Shown:

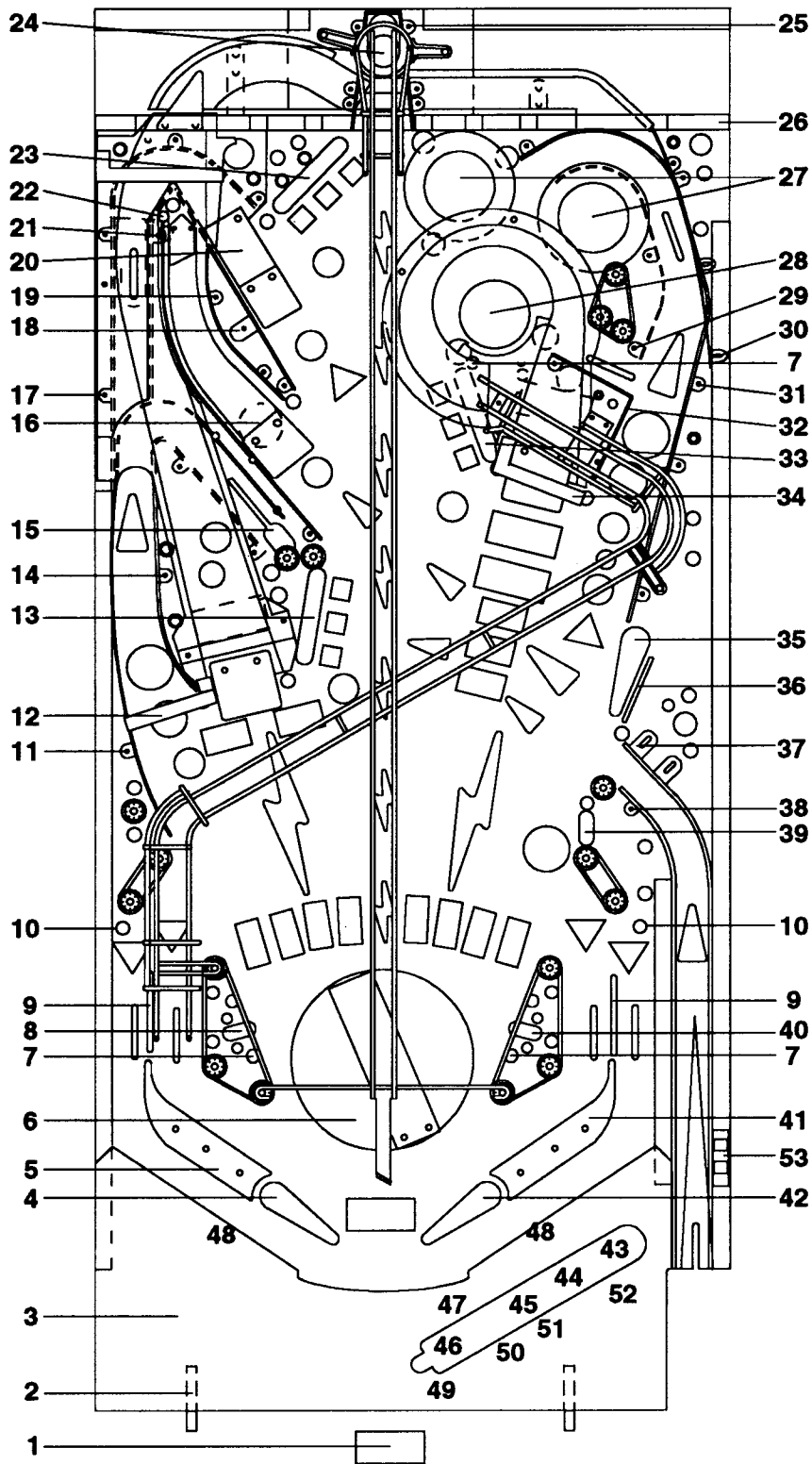
A-14967	Deflector Assy
A-15155	Shield Assy.
A-15156	Reflector Assy.
03-7557	Slingshot Mylar
*03-7960-20013-1	Full Playfield Mylar
03-7960-20013-2	Jet Bumper Mylar
03-7960-20013-3	Drop Mylar
03-8063-4	Light Sleeve, Red (12)
08-7028-T	Playfield Glass
20-6500	1 1/16" Black Pinball (3)
31-1002-20013	Screened Playfield
31-1009-20013	Shooter Gauge

Optional Equipment:
60404

WPC Ticket Dispenser Kit

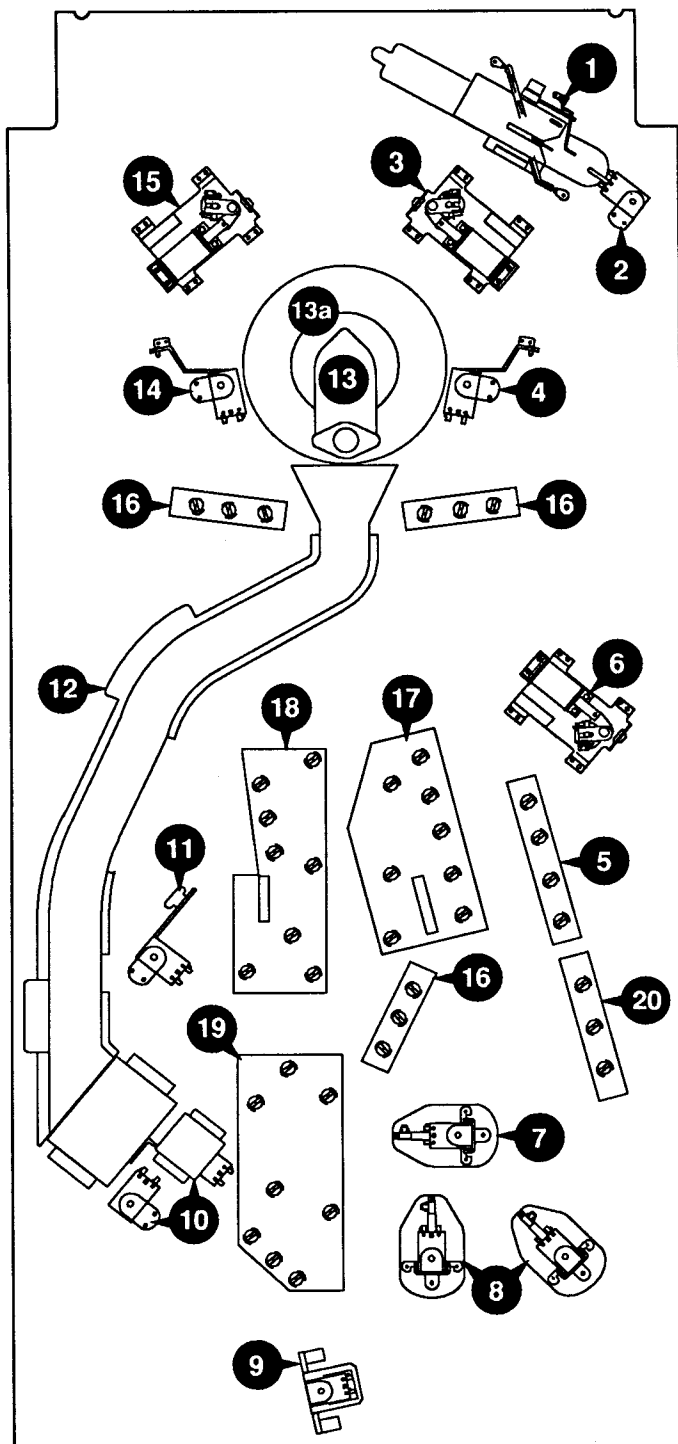
* The **BLACK ROSE** Diamond Plate™ playfield does not require a full mylar. However, mylars can be purchased thru your local Bally Distributor.

Playfield Parts Locations



Lower Playfield Parts

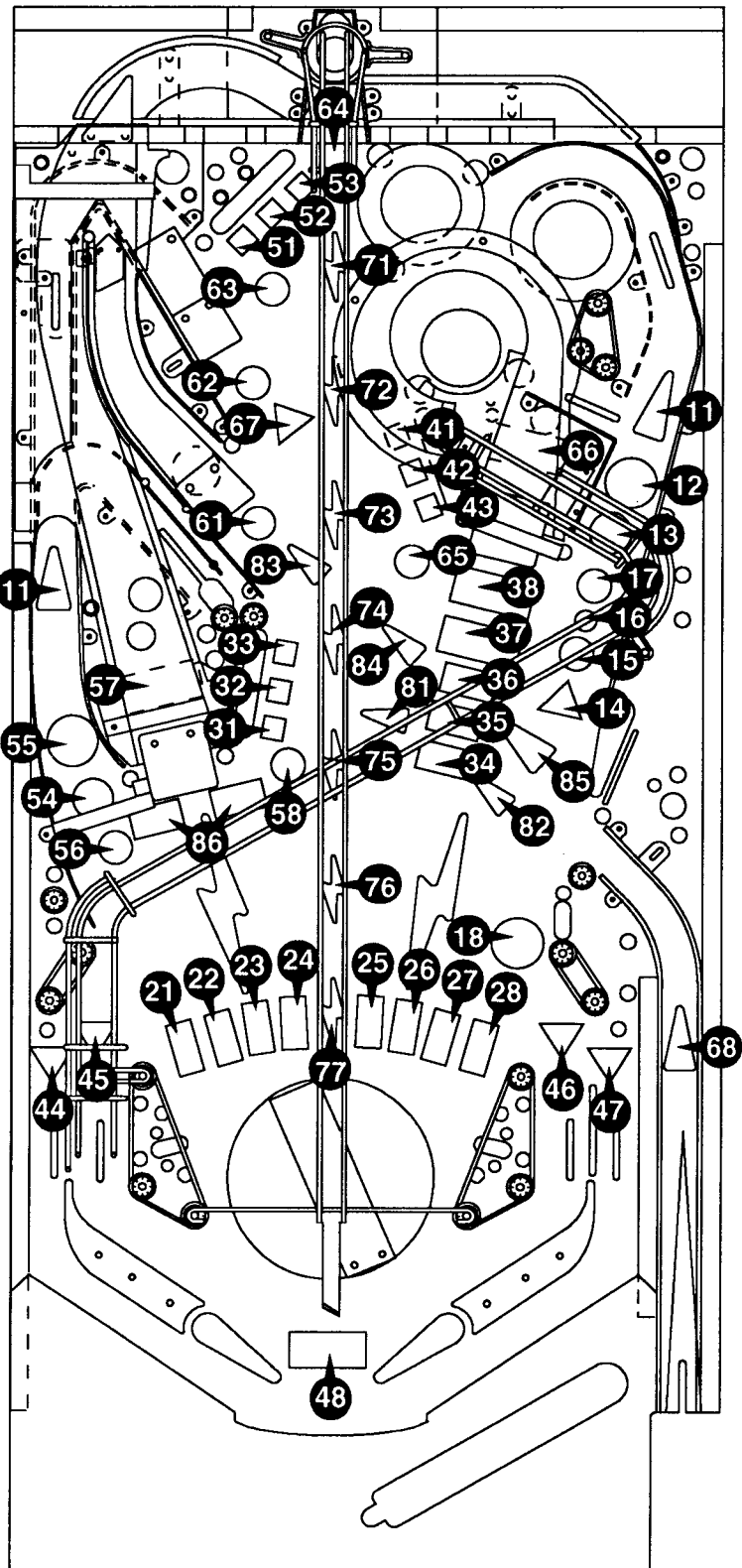
Item	Part Number	Description
1.	B-8925	Ball Trough Switches
2.	C-9638	Ball Shooter Assembly
a)	B-9362-L-2	Coil & Bracket Assembly
3.	A-14876-R	Flipper Assembly, Lower-Right
4.	A-14875-1	Kicker Arm Assembly
a)	B-11203-L-1	Coil & Bracket Assembly
5.	C-13028	4-Lamp Board Assembly
6.	A-15205-R	Flipper Assembly, Upper-Right
7.	A-12842-3	Jumper Bumper Assembly
8.	A-12872-1	Thumper Bumper Assembly
9.	D-11335-1	Ball Popper Assembly
10.	A-14918	Ramp Lifting Mechanism
a)	B-9362-R-3	Coil & Bracket Assembly
11.	A-14874	Kicker Assembly
a)	B-11203-R-1	Coil & Bracket Assembly
12.	A-14824	Lower Trough Assembly
13.	A-14635	Cannon Assembly
a)	A-14640	Catapult Assembly
14.	A-14875-2	Kicker Arm Assembly
a)	B-11203-L-1	Coil & Bracket Assembly
15.	A-14876-L	Flipper Assembly, Lower-Left
16.	C-13361	3-Lamp Board Assembly
17.	A-15140	8-Lamp Board Assembly
18.	A-15141	8-Lamp Board Assembly
19.	A-15142	8-Lamp Board Assembly
20.	C-12982	3-Lamp Board Assembly



Underside of Playfield, Viewed in Raised Position

Lamp Locations

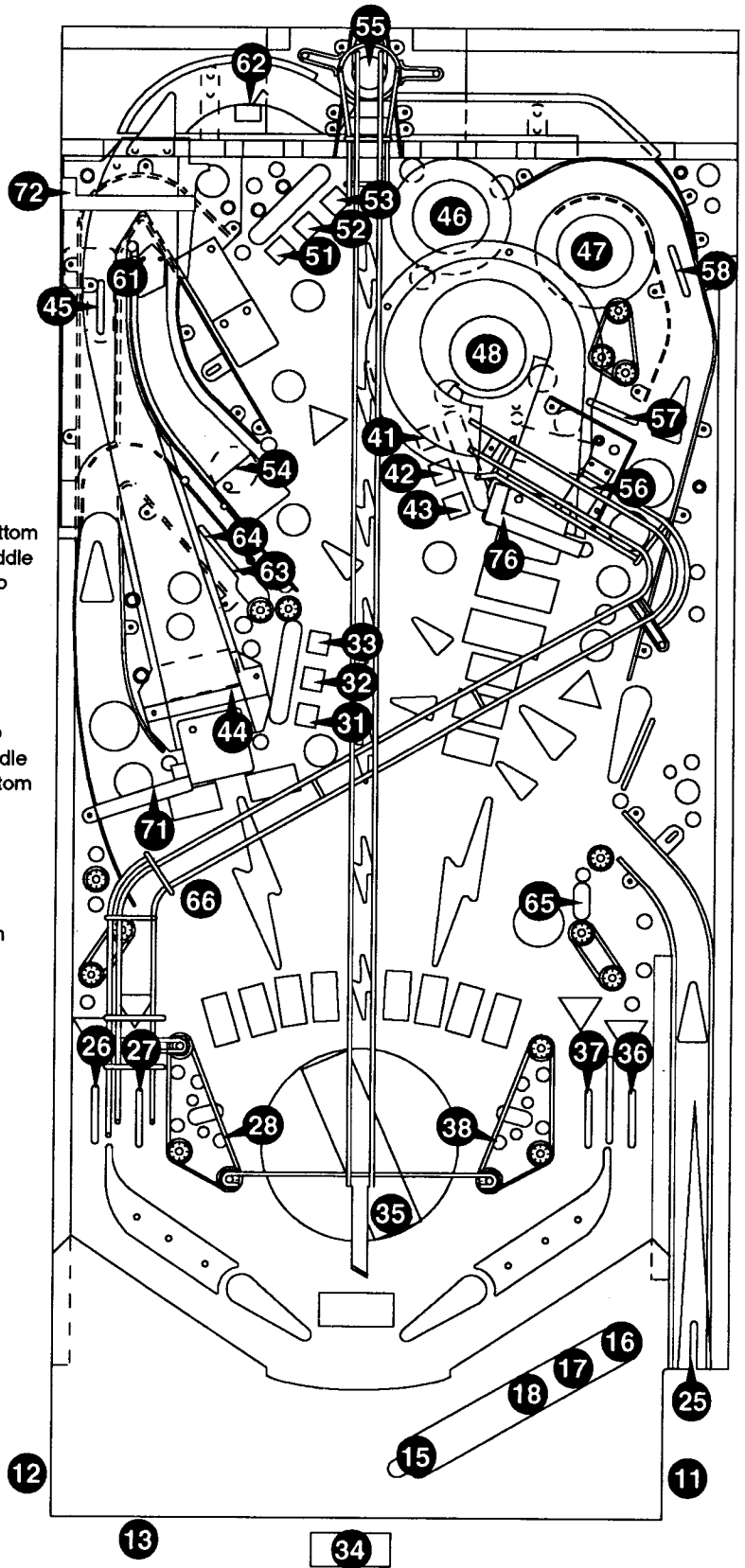
Item No.	Bulb No.	Lamp Assy. No.	Description
11	24-6549	A-11754	Special #44
	24-8768	C-12982	Special #555
12	24-8768	C-12982	Jet Enter 8K #555
13	24-8768	C-12982	Jet Enter 4K #555
14	24-8768	C-13028	Jet Enter 2K #555
15	24-8768	C-13028	Jet Enter 1K #555
16	24-8768	C-13028	Jet Enter Jewel #555
17	24-8768	C-13028	Sequence Shot 2 #555
18	24-6549	A-11271	Single Standup #44
21	24-8768	C-13361	Letter (S) I N K #555
22	24-8768	C-13361	Letter S (I) N K #555
23	24-8768	C-13361	Letter S I (N) K #555
24	24-6549	A-11754	Letter S I N (K) #44
25	24-6549	A-11754	Letter (S) H I P #44
26	24-8768	C-13361	Letter S (H) I P #555
27	24-8768	C-13361	Letter S H (I) P #555
28	24-8768	C-13361	Letter S H I (P) #555
31	24-8768	A-15141	Bottom Standups Bottom #555
32	24-8768	A-15141	Bottom Standups Middle #555
33	24-8768	A-15141	Bottom Standups Top #555
34	24-8768	A-15140	Ramp 100K #555
35	24-8768	A-15140	Right Ramp 200K #555
36	24-8768	A-15140	Right Ramp 300K #555
37	24-8768	A-15140	Right Ramp 400K #555
38	24-8768	A-15140	Right Ramp Million #555
41	24-8768	C-13361	Middle Standups Top #555
42	24-8768	C-13361	Middle Standups Middle #555
43	24-8768	C-13361	Middle Standups Bottom #555
44	24-6549	A-11271	Left Drain #44
45	24-6549	A-11271	Left Return #44
46	24-6549	A-11271	Right Return #44
47	24-6549	A-11271	Right Drain #44
48	24-6549	A-11754	Shoot Again #44
51	24-8768	A-15142	Top Standups Bottom #555
52	24-8768	A-15142	Top Standups Middle #555
53	24-8768	A-15142	Top Standups Top #555
54	24-6549	A-11754	Lock 1 #44
55	24-6549	A-11754	Lock 2 #44
56	24-6549	A-11754	Lockup Jewel #44
57	24-6549	A-11271	Left Ramp Coins #44
58	24-6549	A-11271	Bottom Standup Jewel #44
61	24-8768	A-15141	Middle Ramp Jewel #555
62	24-8768	A-15142	Top Loop Jewel #555
63	24-8768	A-15142	Top Standup Jewel #555
64	24-6549	A-11271	Broadside Jewel #44
65	24-8768	A-15140	Bottom Standup Jewel #555
66	24-6549	A-11271	Right Ramp Jewel #44
67	24-8768	A-15142	Sequence Shot 1 #555
68	24-6549	A-11754	Multiball Release #44
71	24-8768	A-15142	Millions #555
72	24-8768	A-15142	Rigging Swing #555
73	24-8768	A-15141	Treasure Chest #555
74	24-8768	A-15141	Walk the Plank #555
75	24-8768	A-15141	Instant Multiball #555
76	24-6549	A-11271	Knife Throw #44
77	24-6549	A-11754	Polly #44
78	24-8768	---	Insert Left #555
81	24-8768	A-15140	Skill Shot 1 #555
82	24-6549	A-11271	Skill Shot 2 #44
83	24-8768	A-15141	Middle Ramp Left #555
84	24-8768	A-15140	Middle Ramp Middle #555
85	24-6549	A-11271	Middle Ramp Right #44
86	24-6549	A-11271	Jackpot #44
87	24-8768	---	Insert Right #555
88	---	20-9663-7	Credit Button



88

Switch Locations

Item	Switch Number	Switch Assy.	Description
11	SW-1A-192	A-15060	Right Flipper
12	SW-1A-191	A-15058	Left Flipper
13	---	20-9663-7	Start Button
14	---	20-6502-A	*Plumb Bob
15	5647-12133-12	A-10417	Outhole
16	5647-12693-08	A-11680	Right Trough
17	5647-09957-00	B-8925	Center Trough
18	5647-09957-00	B-8925	Left Trough
21	---	27-1066	*Slam Tilt
22	---	A-8630	*Coin Door Closed
23	---	Not Used	*Ticket Opto.
24	---	A-8630	*Always Closed
25	5647-12693-04	A-11619	Shooter
26	5647-12693-19	A-12688-1	Left Outlane
27	5647-12693-19	A-12688-1	Left Flipper Lane
28	SW-A1-120	B-11700-1	Left Sling
31	---	A-15118-6	Bottom Standups Bottom
32	---	A-15118-6	Bottom Standups Middle
33	---	A-15118-6	Bottom Standups Top
34	5641-12673-00	---	Fire Button
35	5647-12133-12	A-14640	Cannon Kicker
36	5647-12693-19	A-12688	Right Outlane
37	5647-12693-19	A-12688	Right Return
38	SW-1A-120	B-11700-1	Right Slingshot
41	---	A-15118-2	Middle Standups Top
42	---	A-15118-2	Middle Standups Middle
43	---	A-15118-2	Middle Standups Bottom
44	5647-12693-36	A-14042	Left Ramp Enter
45	5647-12693-19	A-12688-1	Top Left Loop
46	SW-1A-187	B-13267	Left Jet
47	SW-1A-187	B-13267	Bottom Jet
48	SW-1A-187	B-13267	Right Jet
51	---	A-15118-4	Top Standups Bottom
52	---	A-15118-4	Top Standups Middle
53	---	A-15118-4	Top Standups Top
54	5647-12693-49	A-14821	Up/Down Ramp
55	SW-1A-167	A-11657	Ball Popper
56	5647-12693-21	A-14827	Right Ramp Made
57	5647-12693-19	A-12688	Exit Jet Bumpers
58	5647-12693-19	A-12688	Enter Jet Bumper
61	5647-12693-21	A-14824	Subway Top
62	5647-12693-21	A-14825	Backboard Ramp
63	5647-12693-50	A-14820	Lockup 1
64	5647-12693-51	A-14820	Lockup 2
65	---	A-15118-5	Right Single Standup
66	5647-12693-21	A-14824	Subway Bottom
67-68	---	---	Not Used
71	5647-12693-36	A-15132	Lockup Enter
72	5647-12693-11	A-15133	Middle Ramp
73-75	---	---	Not Used
76	5647-12693-11	A-15131	Right Ramp Enter
77-88	---	---	Not Used



Solenoid/Flasher Locations

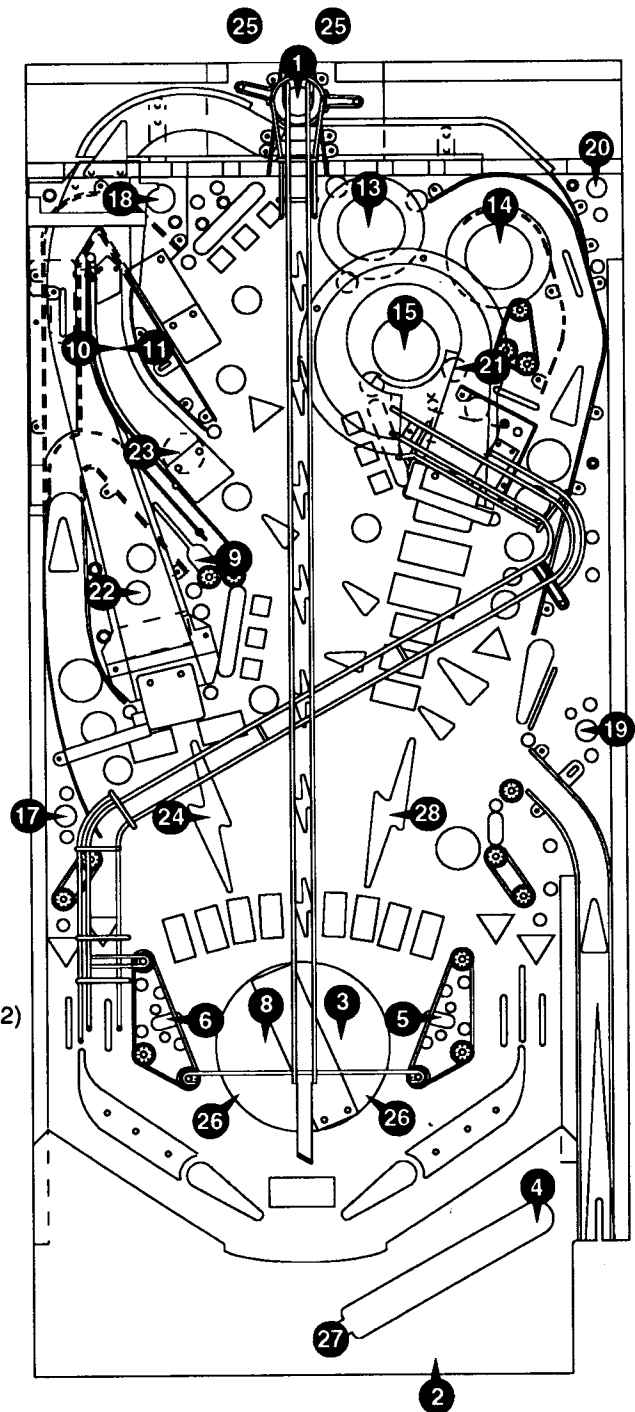
Item	Coil/Flasher No.	Assy. No.	Description
01	AE-24-900	D-11335-1	Ball Popper
02	AE-27-1200	A-8039-3	Outhole
03	14-7965	A-14635	Cannon Motor 20V
04	AE-26-1200	B-9362-L-2	Ball Release
05	AE-26-1500	B-11203-R-1	Right Slingshot
06	AE-26-1500	B-11203-L-1	Left Slingshot
07	AE-23-800	B-10686-1	Knocker (Not Shown)
08	A-15016	A-14640	Cannon Kicker
09	AE-26-1500	B-11203-R-1	Left Ball Lockup
10	AE-26-1200	B-9362-R-3	Ramp Up
11	SM1-29-1000-DC	A-14918	Ramp Down
12	---	---	Not Used
13	AE-26-1200	A-12872-1	Left Jet Bumper
14	AE-26-1200	A-12872-1	Right Jet Bumper
15	AE-26-1200	A-12842-3	Bottom Jet Bumper
16	---	---	Not Used
17	24-8802	---	Left Bottom Flasher #906
	24-8802	---	Backbox Insert #906
18	24-8704	A-8798	Left Top Flasher #89
	24-8802	---	Backbox Insert #906
19	24-8802	---	Right Bottom Flasher #906
	24-8802	---	Backbox Insert #906
20	24-8704	A-8798	Right Top Flasher #89
	24-8802	---	Backbox Insert #906
21	24-8704	A-8798	Right Ramp Flasher #89
	24-8802	---	Backbox Insert #906
22	24-8704	A-8798	Left Ramp Flasher #89
	24-8802	---	Backbox Insert #906
23	24-8704	A-12336-1	Locker Open Flasher #906
	24-8802	---	Backbox Insert #906
24	24-8802	A-12336-1	Left Sword Flasher #906
	24-8802	---	Backbox Insert #906
25	24-8802	C-13337	Top Popper Flasher #906 (2)
26	24-8802	A-12336-1	Cannon Flasher (2) #906
27	24-8802	A-12336-1	Fire Button Flasher #906
	24-8802	---	Backbox Insert #906
28	24-8802	A-12336-1	Right Sword Flasher #906
	24-8802	---	Backbox Insert #906

General Illumination Circuits

*01	24-6549	---	Jets & Back Ramp #44
	24-8768	---	Jets & Back Ramp #555
*02	24-6549	---	Top Playfield #44
	24-8768	---	Top Playfield #555
*03	24-6549	---	Bottom Playfield #44
	24-8768	---	Bottom Playfield #555
*04	24-8768	---	Left Insert #555
*05	24-8768	---	Right Insert #555

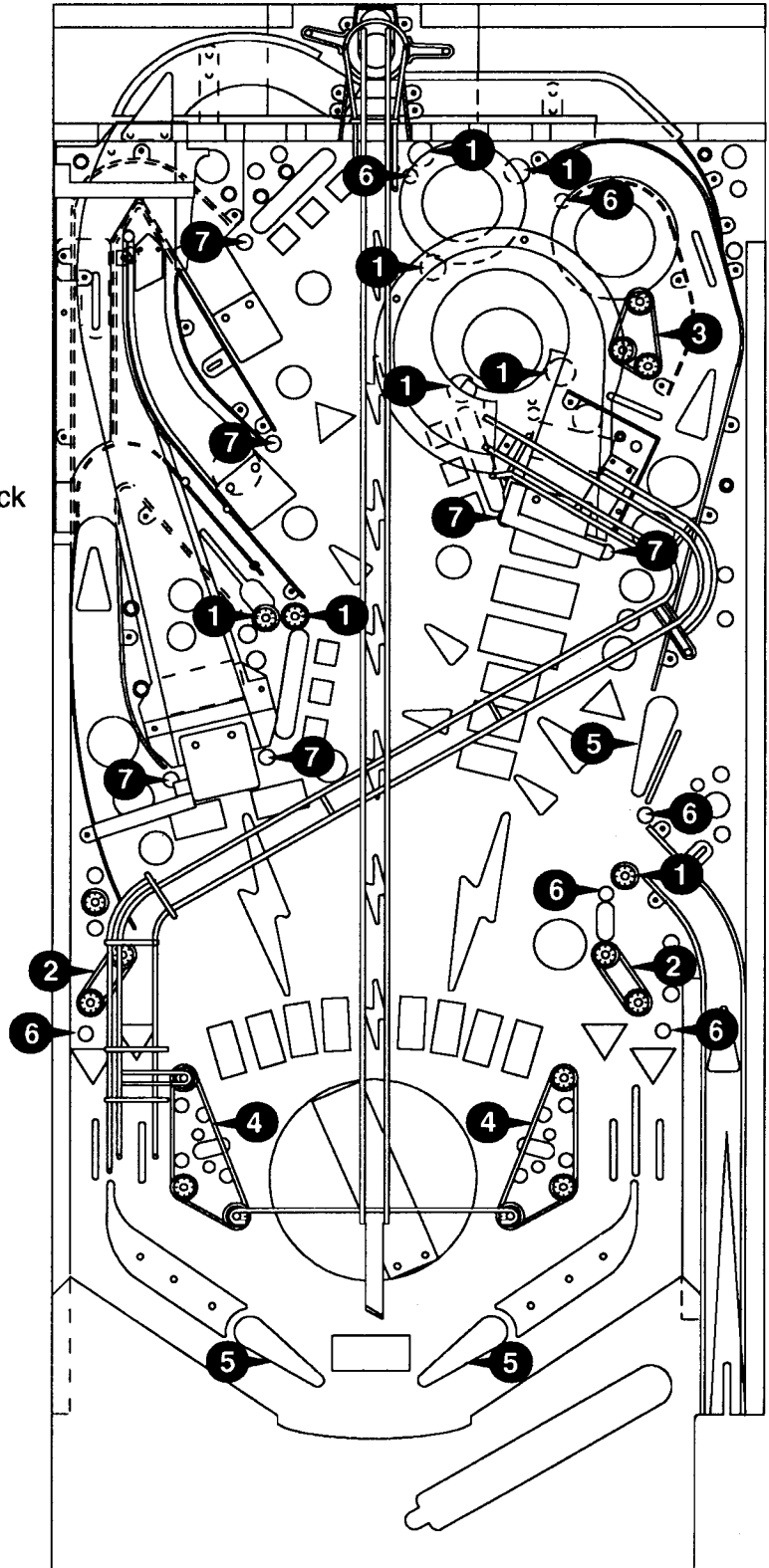
*	FL-11629	A-14876-L-3	Left Flipper Assy.
*	FL-11629	A-14876-R-3	Right Flipper Assy.
*	FL-11630	A-15205-R-3	Upper Right Flipper Assy.

*Not Shown



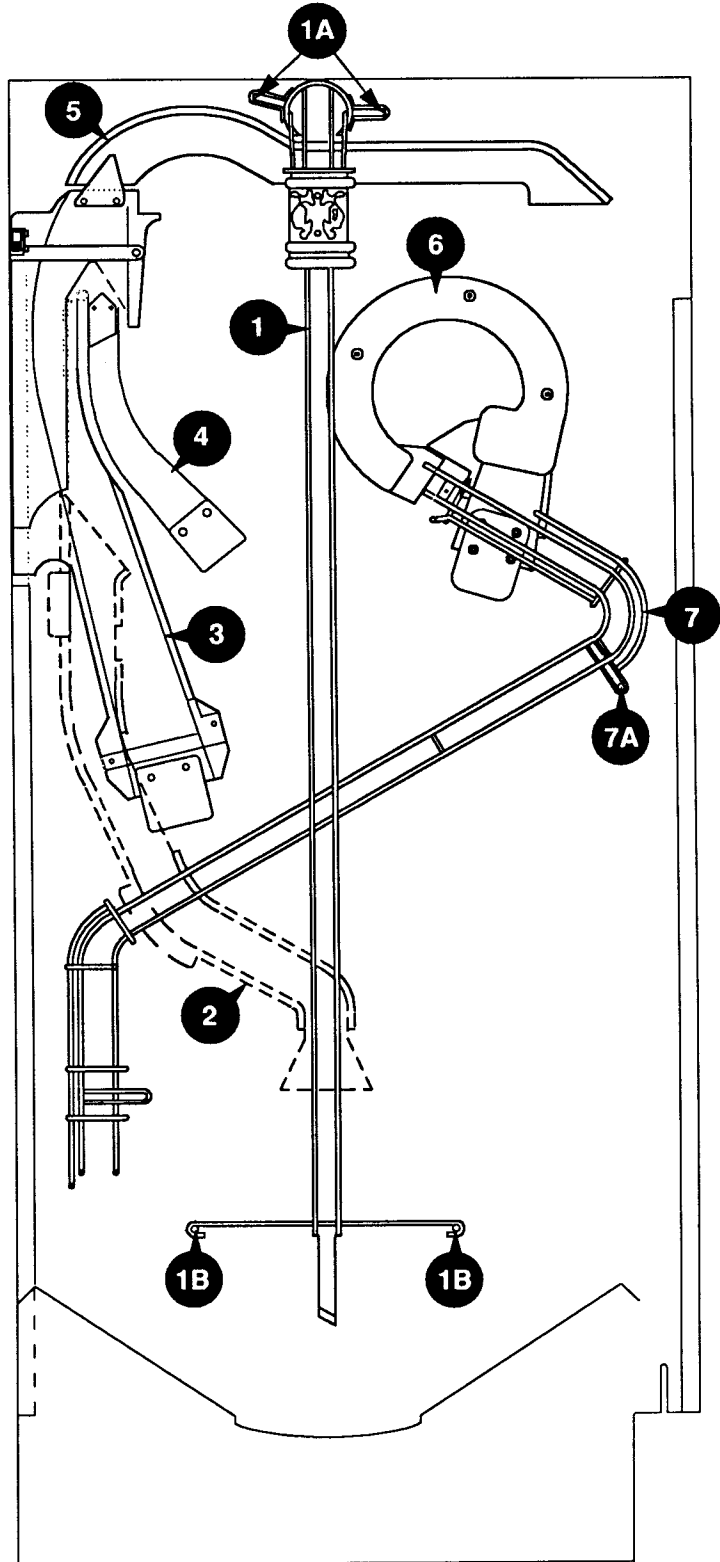
Rubber Parts

ITEM	PART NO.	QTY	DESCRIPTION
1	23-6300	8	5/16" Rubber Ring
2	23-6302	2	1" Rubber Ring
3	23-6303	1	1 1/4" Rubber Ring
4	23-6306	2	2 1/2" Rubber Ring
5	23-6519-4	3	Flipper Rubber
6	23-6535	6	Rubber Bumper
7	23-6556	6	Bumper Sleeve Black



Ramp Locations

Item	Part Number	Description
1	A-15043	Center Wire Ramp
1A	02-4176-20	8-32 x 1-1/4" Spacer
1B	02-4252-10	6-32 x 5/8" Spacer
2	A-14824	Lower Ramp Assembly
3	A-14826	Ramp Assembly
4	A-14831	Lift Ramp Assembly
5	A-14825	Back Trough Assembly
6	A-14878	Ramp Assembly
7	A-14827	Wire Ramp & Switch Assy.
7A	02-4176-32	8-32 x 2" Spacer



Notes...

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Section 3

Wiring Diagrams and Schematics

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack receives a number that identifies the circuit board and position on that board that it connects to. J-designations refer to the male part of a connector. P-designations refer to the female part of a connector. For example, J101 designates jack 1 of board 1 (a Power Driver Board Board jack); P206 designates plug 6 of board 2 (a CPU Board plug). Identifying the specific pin number of a connector involves a hyphen, which separates the pin number from the plug or jack designation. For example, J101-3 refers to pin 3 of jack 1 on board 1.

Other game components may also have similar numbers to clarify their locations or related circuits. For example, F501 refers to a fuse located on the Sound Board.

Prefix numbers for the WPC circuit boards are listed below.

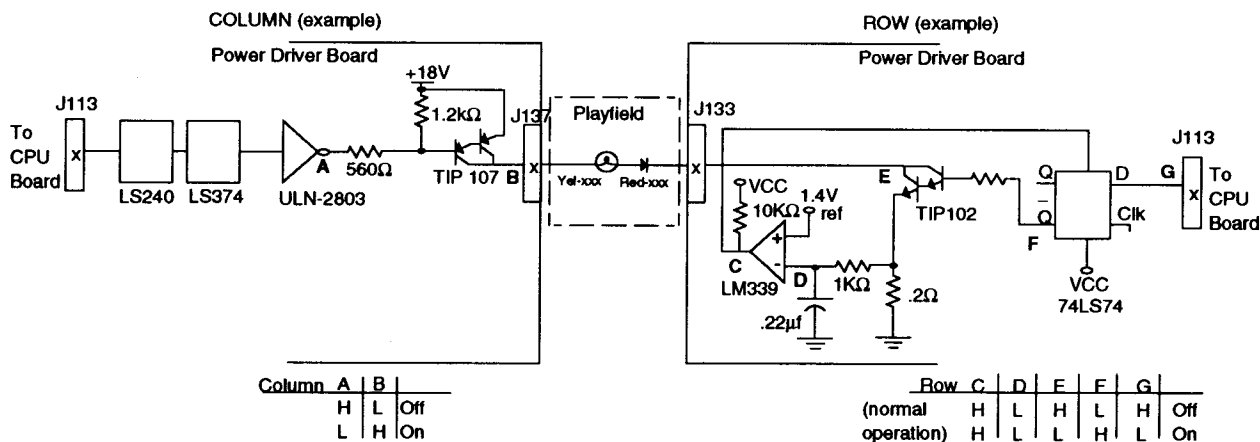
- 1-Power Driver Board
- 2-CPU Board
- 5-Sound Board
- 6-Dot Matrix Controller
- Dot Matrix Display/Driver Board
- 9-Fliptronic II Controller Board

Schematics for standard WPC backbox boards are found in the WPC Schematics Manual. Playfield, cabinet, and all other backbox board schematics are found in this section.

LAMP MATRIX

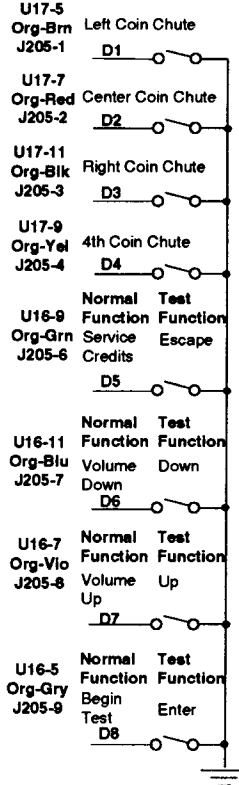
Column	1	2	3	4	5	6	7	8
Row	Q98 Yel-Brn J137-1	Q97 Yel-Red J137-2	Q96 Yel-Org J137-3	Q95 Yel-Blk J137-4	Q94 Yel-Grn J137-5	Q93 Yel-Blu J137-6	Q92 Yel-Vio J137-7	Q91 Yel-Gry J137-9
1	Q90 Red-Brn J133-1 Special	Letter (S) INK	Bottom Standup Bottom	Middle Standup Top	Top Standup Bottom	Middle Ramp Jewel	Millions	Skill (Open)
2	Q89 Red-Blk J133-2 Jet Enter 8K	Letter S (I) NK	Bottom Standup Middle	Middle Standup Middle	Top Standup Middle	Top Loop Jewel	Rigging Swing	Skill (Locker)
3	Q88 Red-Org J133-4 Jet Enter 4K	Letter SI (N) K	Bottom Standup Top	Middle Standup Bottom	Top Standup Top	Top Standup Jewel	Treasure Chest	Middle Ramp 200K
4	Q87 Red-Yel J133-5 Jet Enter 2K	Letter SIN (K)	Right Ramp 100K	Left Outlane	Lockup 1	Broadside Jewel	Walk The Plank	Middle Ramp 300K
5	Q86 Red-Grn J133-6 Jet Enter 1K	Letter (S) HIP	Right Ramp 200K	Left Return Lane	Lockup 2	Bottom Standup Jewel	Instant Multi-ball	Middle Ramp 400K
6	Q85 Red-Blu J133-7 Jet Enter Jewel	Letter S (H) IP	Right Ramp 300K	Right Return Lane	Lockup Jewel	Right Ramp Coins	Knife Throw	Jackpot
7	Q84 Red-Vio J133-8 Combo Shot Right	Letter SH (I) P	Right Ramp 400K	Right Outlane	Left Ramp Coins	Sequence Shot 1	Polly	Insert Right
8	Q83 Red-Gry J133-9 Right Single Standup	Letter SHI (P)	Right Ramp Million	Shoot Again	Bottom Standup Jewel	Multi-ball Ready	Insert Left	Credit Button

LAMP CIRCUIT



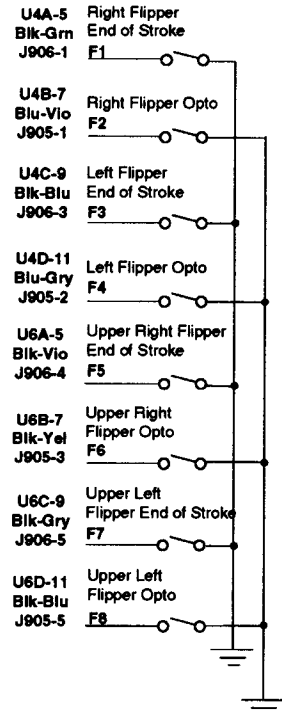
SWITCH MATRIX

Dedicated Switches

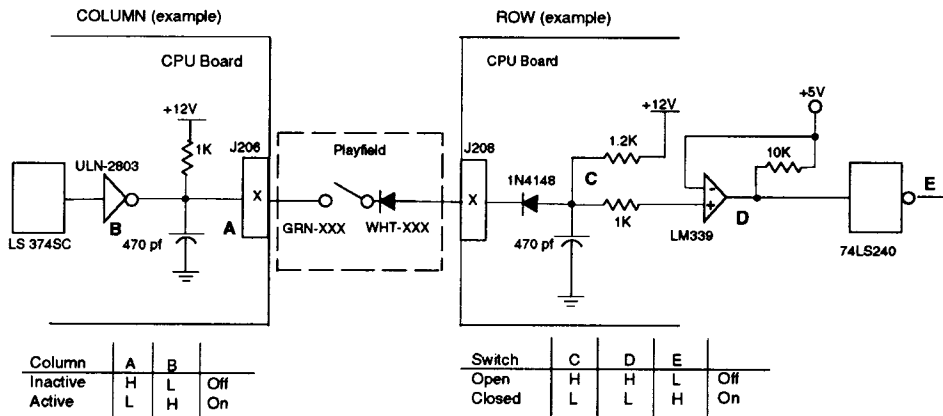


Column	1	2	3	4	5	6	7	8
U20-18 Grn-Brn J206-1	U20-17 Grn-Red J206-2	U20-16 Grn-Org J206-3	U20-15 Grn-Yel J206-4	U20-14 Grn-Blk J206-5	U20-13 Grn-Blu J206-6	U20-12 Grn-Vio J206-7	U20-11 Grn-Gry J206-8	
U18-11 Wht-Brn J208-1	U18-9 Wht-Red J208-2	U18-5 Wht-Org J208-3	U18-7 Wht-Yel J208-4	U19-11 Wht-Grn J208-5	U19-9 Wht-Blu J208-7	U19-5 Wht-Vio J208-8	U19-7 Wht-Gry J208-9	
11	21	31	41	51	61	71	81	
12	22	32	42	52	62	72	82	
13	23	33	43	53	63	73	83	
14	24	34	44	54	64	74	84	
15	25	35	45	55	65	75	85	
16	26	36	46	56	66	76	86	
17	27	37	47	57	67	77	87	
18	28	38	48	58	68	78	88	

Flipper Switches



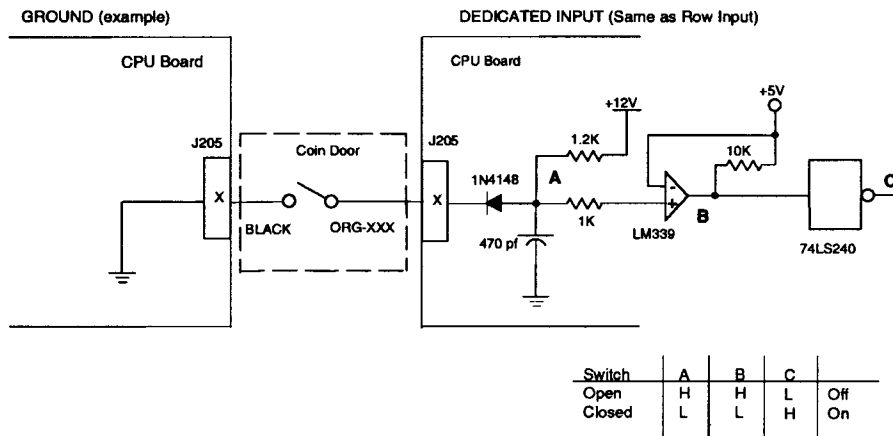
Switch Matrix Circuit



The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low the column side is active.

When a switch closes the row side of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Corresponding row and column switches must be low at the same time, for the switch to be considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

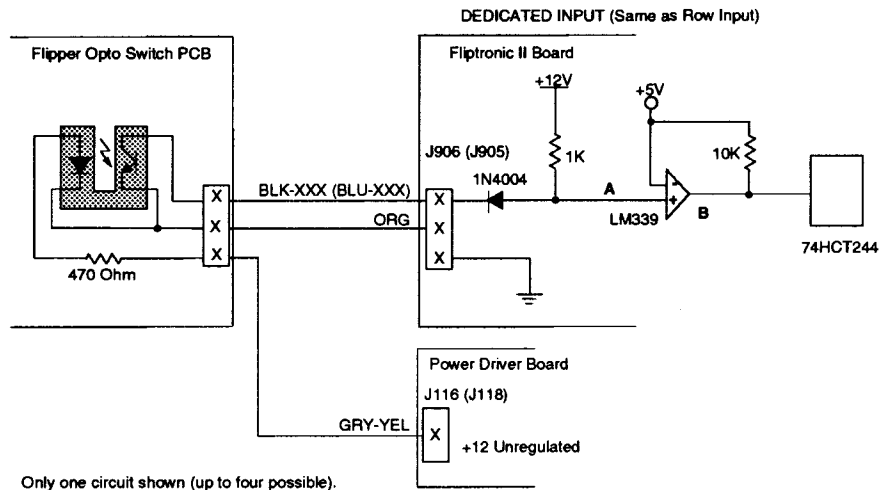
Dedicated Switch Circuit



The dedicated switches operate similar to switches in the matrix except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).

When a switch closes the row side of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Since the row circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

Flipper Switch Circuit



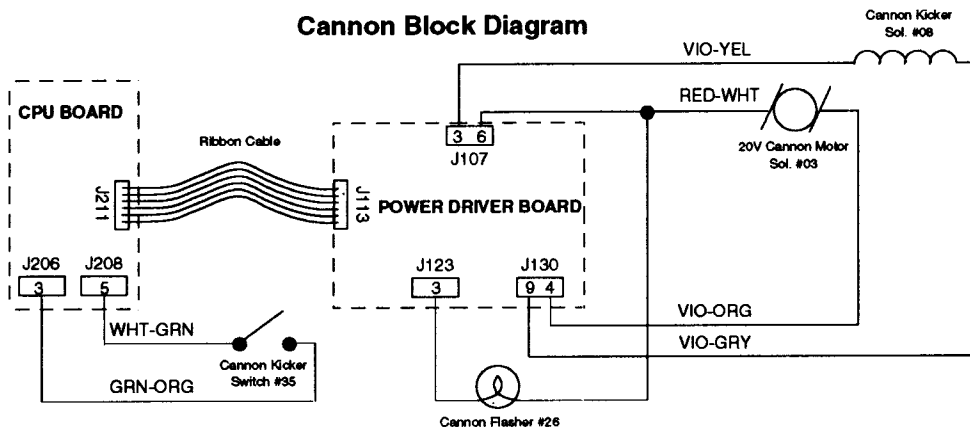
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

When a switch closes the row side of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Since the row circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

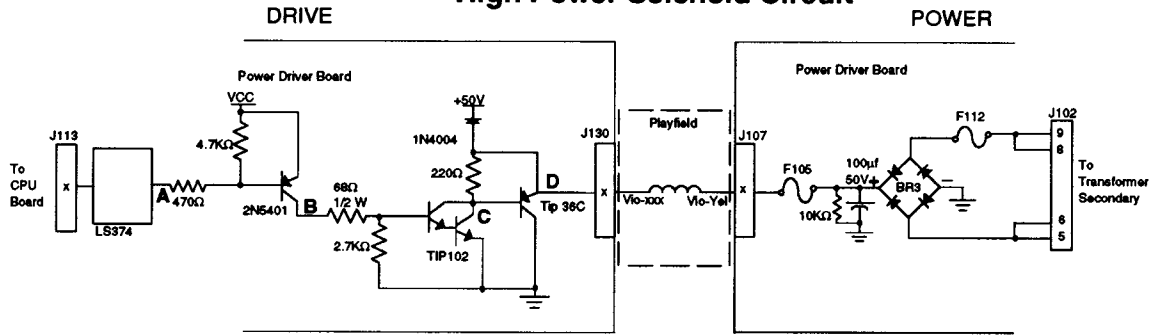
SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Wire Color	Connection	Driver Trnstr	Part No. Flashlamp Type
01	Ball Popper	High Power	Vio-Brn	J130-1	Q82	AE-24-900
02	Outhole	High Power	Vio-Red	J130-2	Q80	AE-27-1200
03	Cannon Motor	High Power	Vio-Orn	J130-4	Q78	14-7965 20V
04	Ball Release	High Power	Vio-Yel	J130-5	Q76	AE-26-1200
05	Right Slingshot	High Power	Vio-Grn	J130-6	Q64	AE-26-1500
06	Left Slingshot	High Power	Vio-Blu	J130-7	Q66	AE-26-1500
07	Knocker	High Power	Vio-Blk	J130-8	Q68	AE-23-800
08	Cannon Kicker	Low Power	Vio-Gry	J130-9	Q70	A-15016
09	Left Ball Lockup	Low Power	Brn-Blk	J127-1	Q58	AE-26-1500
10	Ramp Up	Low Power	Brn-Red	J127-3	Q56	AE-26-1200
11	Ramp Down	Low Power	Brn-Org	J127-4	Q54	SM1-29-1000-DC
12	Not Used	Low Power	Brn-Yel	J127-5	Q52	
13	Left Jet Bumper	Low Power	Brn-Grn	J127-6	Q50	AE-26-1200
14	Right Jet Bumper	Low Power	Brn-Blu	J127-7	Q48	AE-26-1200
15	Bottom Jet Bumper	Low Power	Brn-Vio	J127-8	Q46	AE-26-1200
16	Not Used	Low Power	Brn-Gry	J127-9	Q44	
17	Left Bottom Flasher	Flasher	Blk-Brn	J125-1, J126-1	Q42	#906,#89
18	Left Top Flasher	Flasher	Blk-Red	J125-2, J126-2	Q40	#906,#89
19	Right Bottom Flasher	Flasher	Blk-Org	J125-3, J126-3	Q38	#906,#89
20	Right Top Flasher	Flasher	Blk-Yel	J125-5, J126-4	Q36	#906,#89
21	Right Ramp Flasher	Flasher	Blu-Grn	J125-6, J126-5	Q28	#906,#89
22	Left Ramp Flasher	Flasher	Blu-Blk	J125-7, J126-6	Q30	#906,#89
23	Locker Open Flasher	Low Power	Blu-Vio	J125-8, J126-7	Q34	#906
24	Left Sword Flasher	Low Power	Blu-Gry	J125-9, J126-8	Q32	#906
25	Top Popper Flasher	Flasher	Blu-Brn	J123-1	Q26	#906
26	Cannon Flasher	Flasher	Blu-Red	J123-2	Q24	#906
27	Fire Button Flasher	Flasher	Blu-Org	J123-3	Q22	#906
28	Right Sword Flasher	Flasher	Blu-Yel	J123-4	Q20	#906
G. I. Circuits						
01	Jet & Back Ramp String	G.I.	Brown	J120-1	Q18	#555
02	Top Playfield String	G.I.	Orange	J120-2	Q10	#555
03	Bottom Playfield String	G.I.	Yellow	J120-3	Q14	#555
04	Left Insert String	G.I.	Green	J121-5	Q16	#555
05	Right Insert String	G.I.	Violet	J121-6	Q12	#555
	Lower Right Flipper		Blu-Yel	J907-8,9	Q4, Q11	FL-11629 (BLUE)
	Lower Left Flipper		Gry-Yel	J907-6,7	Q3, Q9	FL-11629 (BLUE)
	Upper Right Flipper		Blu-Yel	J907-4,5	Q2, Q7	FL-11630 (RED)

Cannon Block Diagram

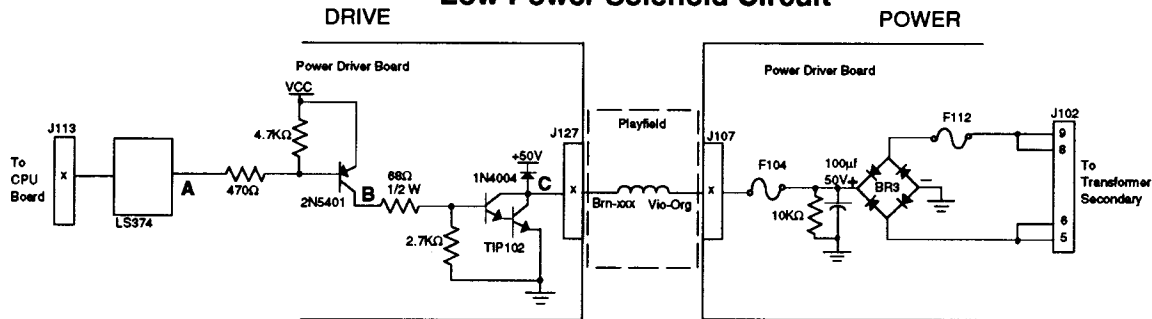


High Power Solenoid Circuit



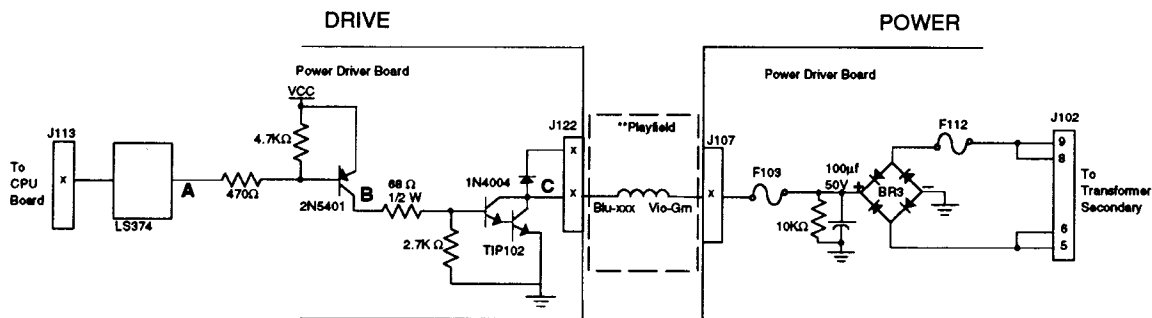
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" the collector of the 2N5401 transistor is high. A high at point "B" causes point "C" the collector of the TIP102 transistor, and point "D" the emitter of the TIP36 transistor to drop low. When point "D" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

Low Power Solenoid Circuit



The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

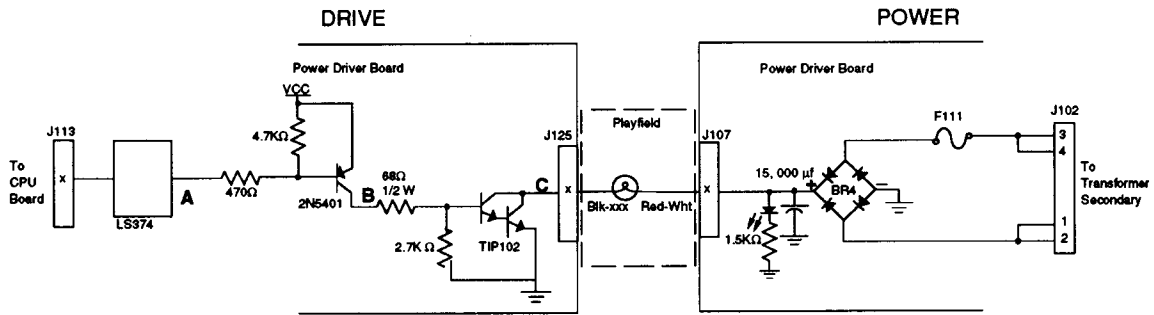
Special (General Purpose) Solenoid Circuit



* "Playfield Circuit When used for coil driver only (either +50V or +20V). If used for flashlamp driver see playfield circuit below. Tieback Diode is not used for flashlamp circuit.

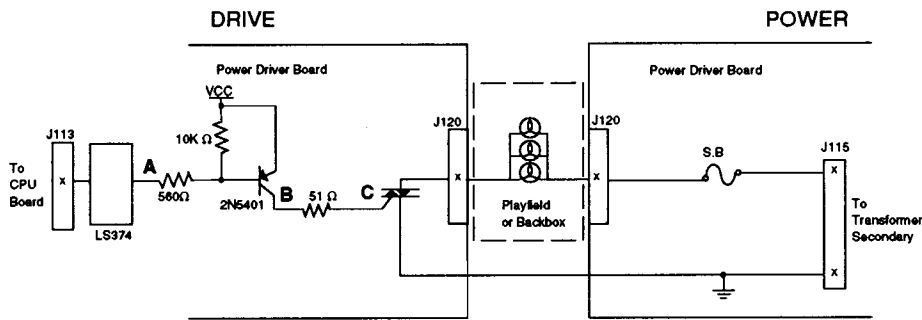
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the transistor and the coil/flashlamp turns On. When point "A" toggles high the coil/flashlamp turns Off.

Flashlamp Circuit

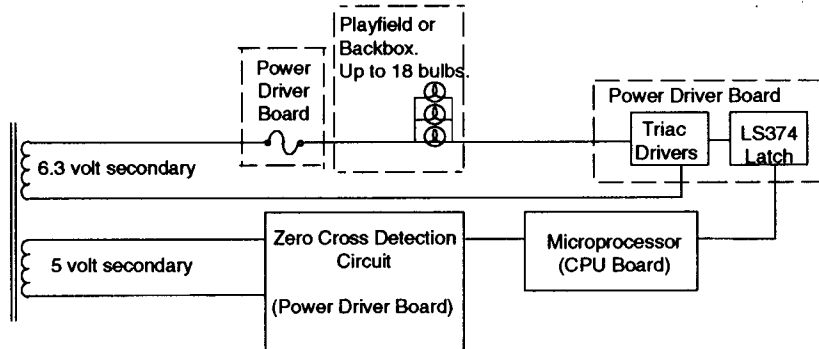


The Microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When Point "C" is low the flashlamp is grounded through the transistor and the flashlamp turns On. When point "A" toggles high the circuit shuts Off.

General Illumination Circuit

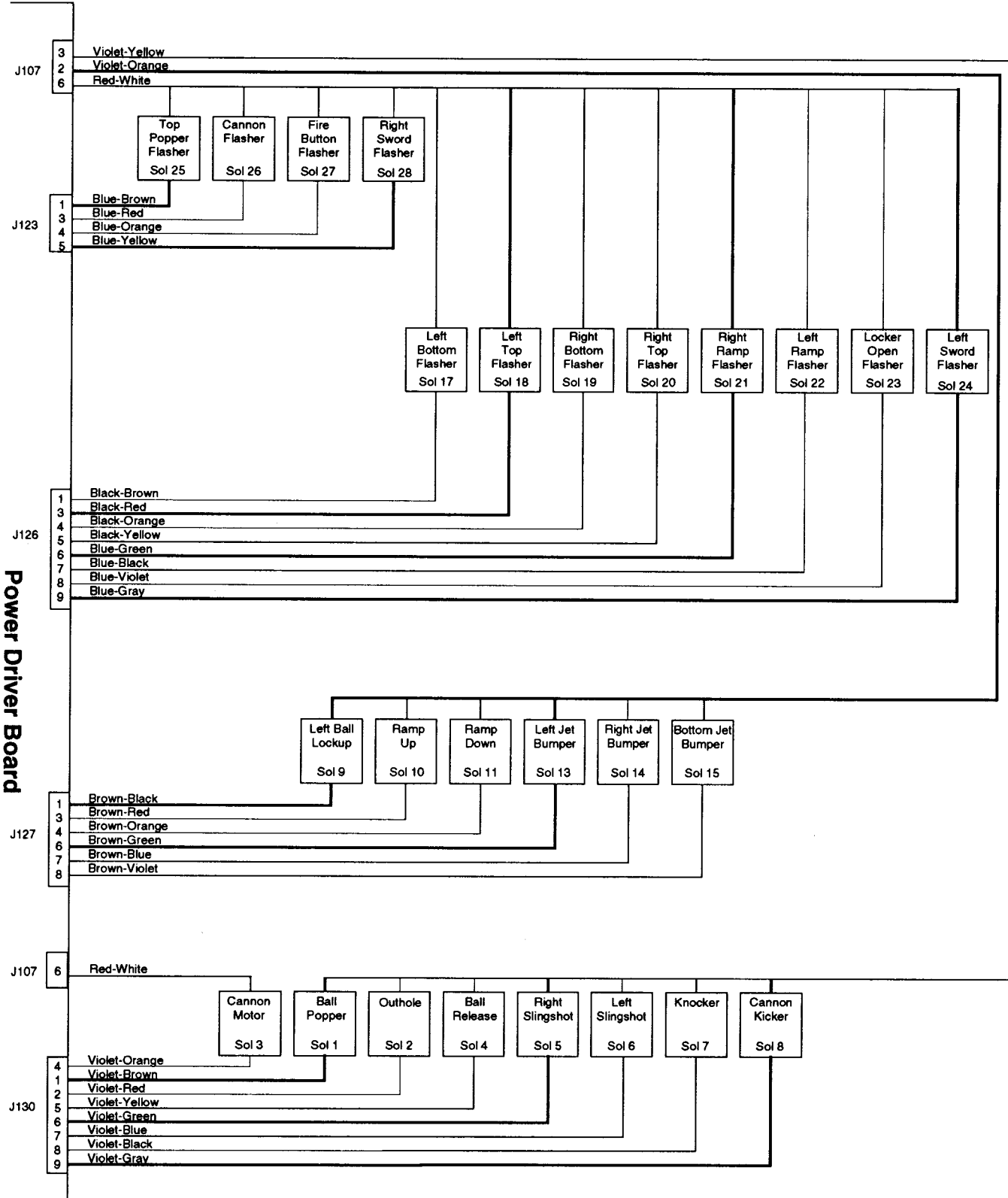


Block Diagram of General Illumination Circuit

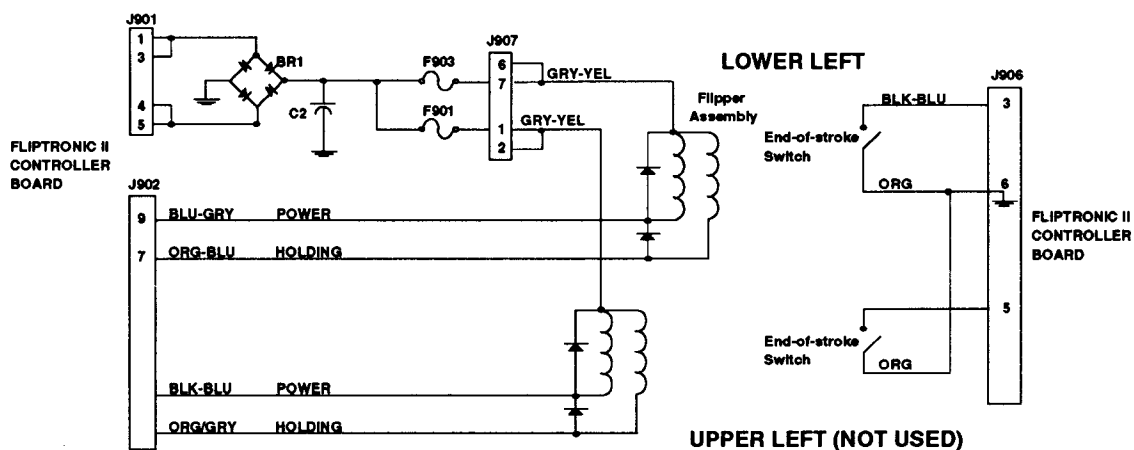


When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired General Illumination string lights.

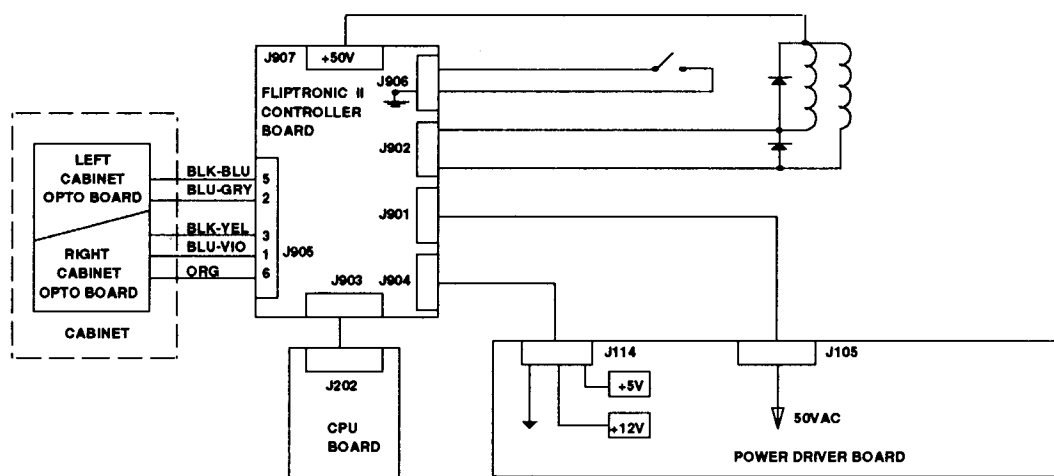
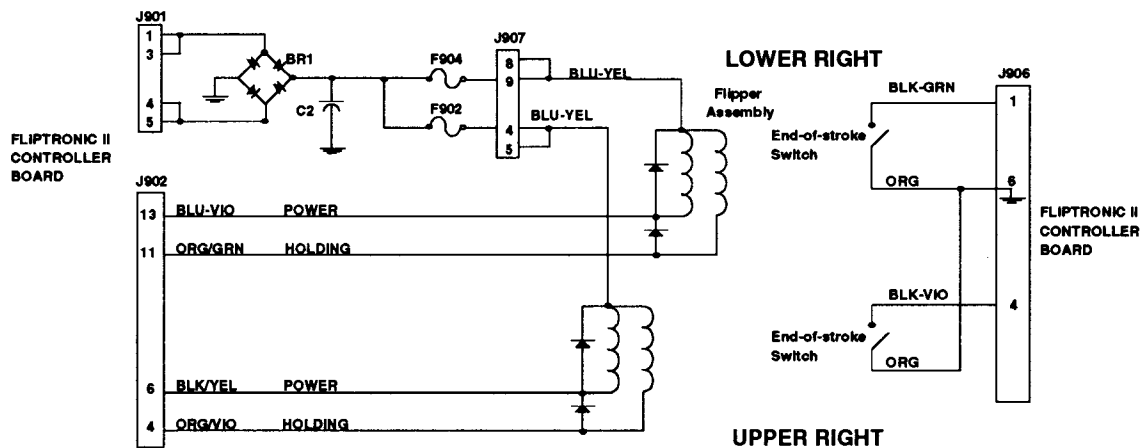
SOLENOID WIRING



Left Flipper Circuit

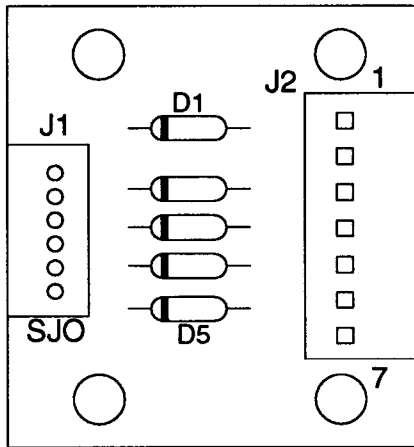


Right Flipper Circuit



Block Diagram Of Flipper Circuit

5 POSITION SWITCH & DIODE P.C. BOARD C-13940

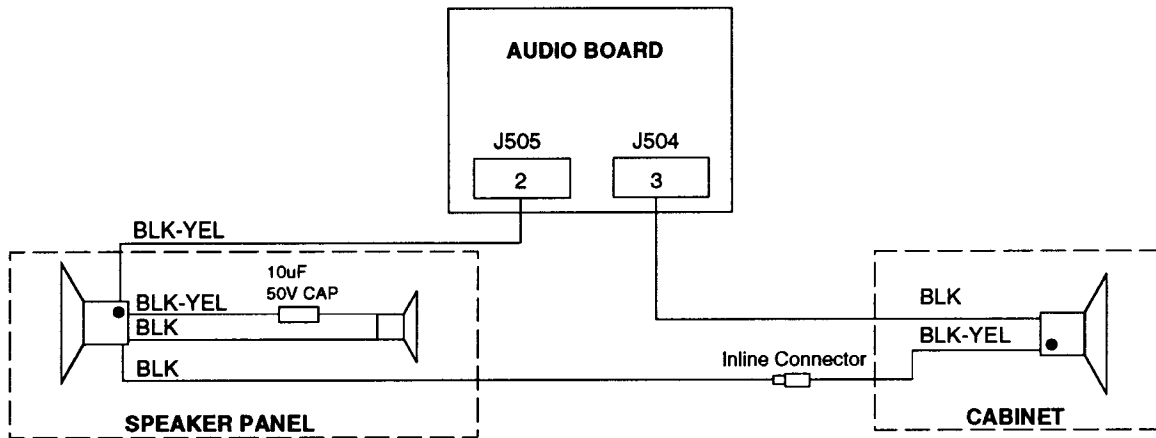


J1 Ribbon cable to 5 position switch membrane

- J2-1 Not Used
- J2-2 Key
- J2-3 Green-Orange from J212-3
- J2-4 Not Used
- J2-5 White-Yellow to J6-3
- J2-6 Not Used
- J2-7 Not Used

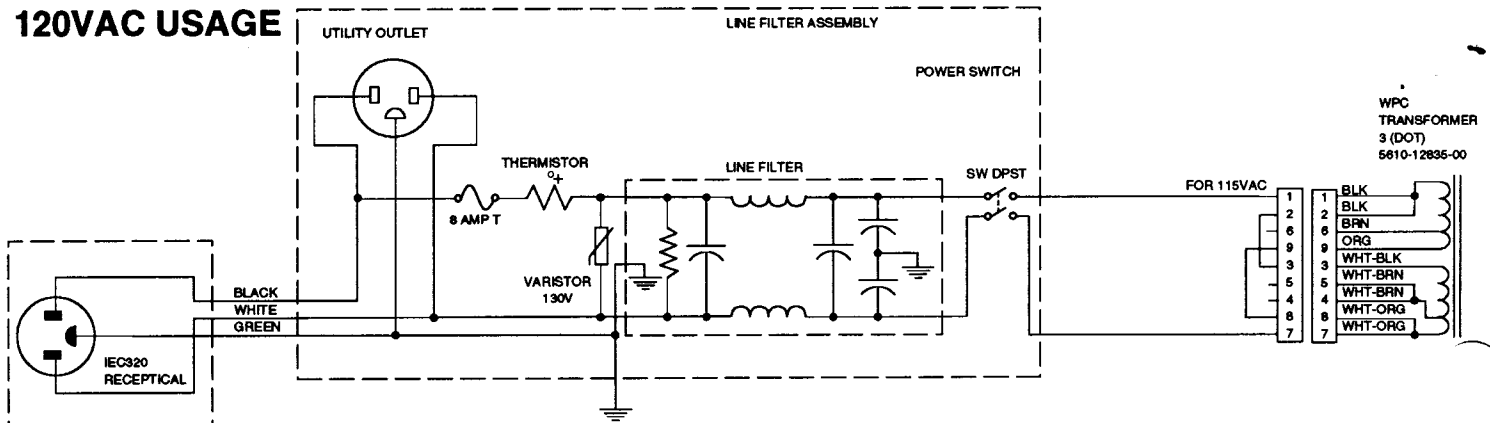
P.C. Board Legend	
J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

SPEAKER WIRING DIAGRAM

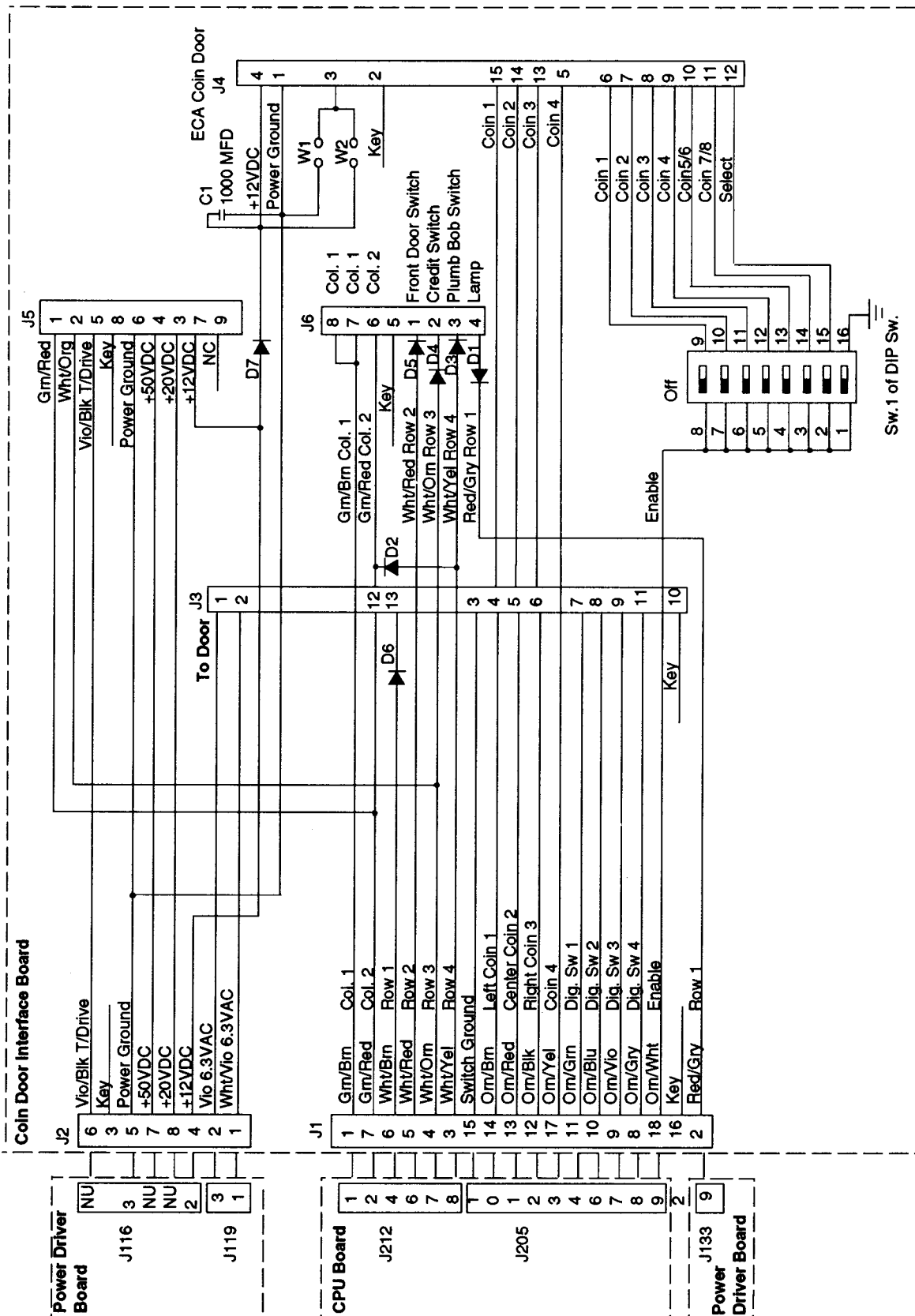


IEC320 POWER WIRING SCHEMATIC

120VAC USAGE



Coin Door Interface Board Schematic A-14689



Flipper Opto Switch Board A-15894

Left Side Flipper Opto Switch Board

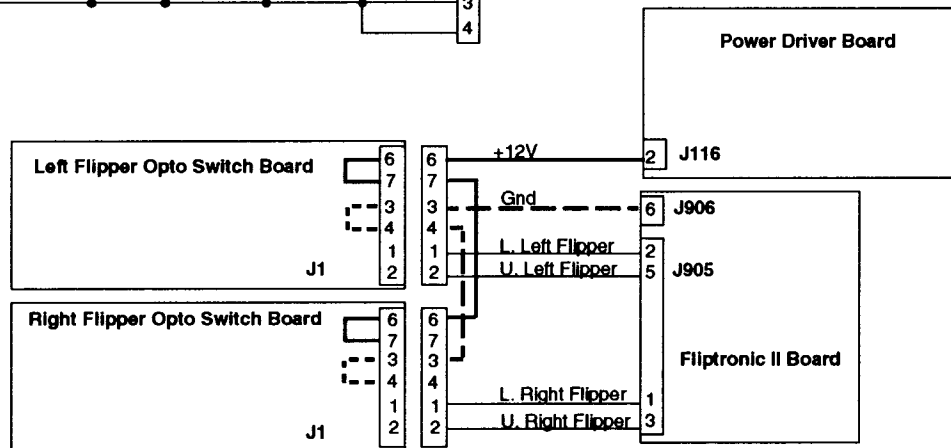
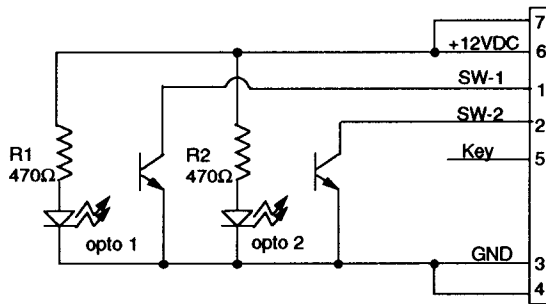
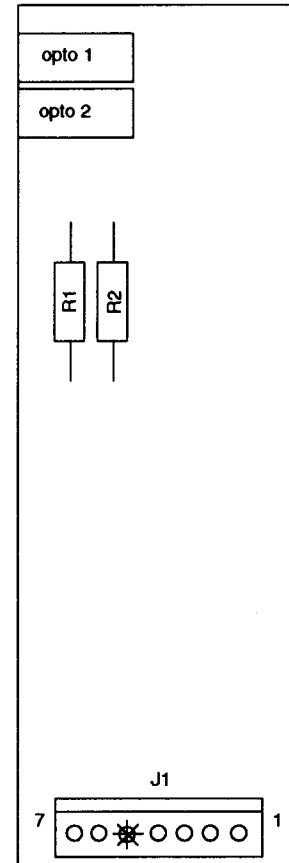
- J1 - 1 Blue-Gray (lower flipper) from Fliptronic II Board J905-2
- J1 - 2 Black-Blue (upper flipper) from Fliptronic II Board J905-5
- J1 - 3 Orange (Switch Grd) from Fliptronic II Board J906-6
- J1 - 4 Orange (Switch Grd) loop from J1-3
- J1 - 5 Key
- J1 - 6 Gray-Yellow (+12V) from Power Driver Board J116-2
- J1 - 7 Gray-Yellow (+12V) loop from J1-6

Right Side Flipper Opto Switch Board

- J1 - 1 Blue-Violet (lower flipper) from Fliptronic II Board J905-1
- J1 - 2 Black-Yellow (upper flipper) from Fliptronic II Board J905-3
- J1 - 3 Orange ((Switch Grd) loop from Left Side Opto Board J1-4
- J1 - 4 N/C
- J1 - 5 Key
- J1 - 6 Gray-Yellow (+12V) from Power Driver Board J116-2
- J1 - 7 Gray-Yellow (+12V) loop from J1-6

Please Note:

The Left Flipper Opto Switch Board must be connected in order for the Right Flipper Opto Switch Board to operate because power and ground are connected through the printed circuit board.



POWER DRIVER BOARD A-12697-1

J101-1 Red, 9VAC from transformer secondary
 J101-2 Red, 9VAC from transformer secondary
 J101-3 Key
 J101-4 Blue-White, 13VAC from transformer secondary
 J101-5 Blue-White, loop from J101-4
 J101-6 Blue-White, 13VAC from transformer secondary
 J101-7 Blue-White, loop from J101-6

J102-1 White-Red, loop from J102-2
 J102-2 White-Red, 16VAC from transformer secondary
 J102-3 White-Red, loop from J102-4
 J102-4 White-Red, 16VAC from transformer secondary
 J102-5 Black-Yellow, loop from J102-6
 J102-6 Black-Yellow, 16VAC from transformer secondary
 J102-7 Key
 J102-8 Black-Yellow, loop from J102-9
 J102-9 Black-Yellow, 16VAC from transformer secondary

J103 Not Used

J104 Not Used

J105-1 White-Blue, 50VAC to J901-1
 J105-2 White-Blue, 50VAC to J901-3
 J105-3 Key
 J105-4 Not Used
 J105-5 Not Used

J106-1 Not Used
 J106-2 Not Used
 J106-3 Not Used
 J106-4 Key
 J106-5 Red, +20V to insert flashlamps

J107-1 Not Used
 J107-2 Violet-Orange, 50V to coils
 J107-3 Violet-Yellow, 50V to coils
 J107-4 Key
 J107-5 Not Used
 J107-6 Red/White, +20V to playfield flashlamps

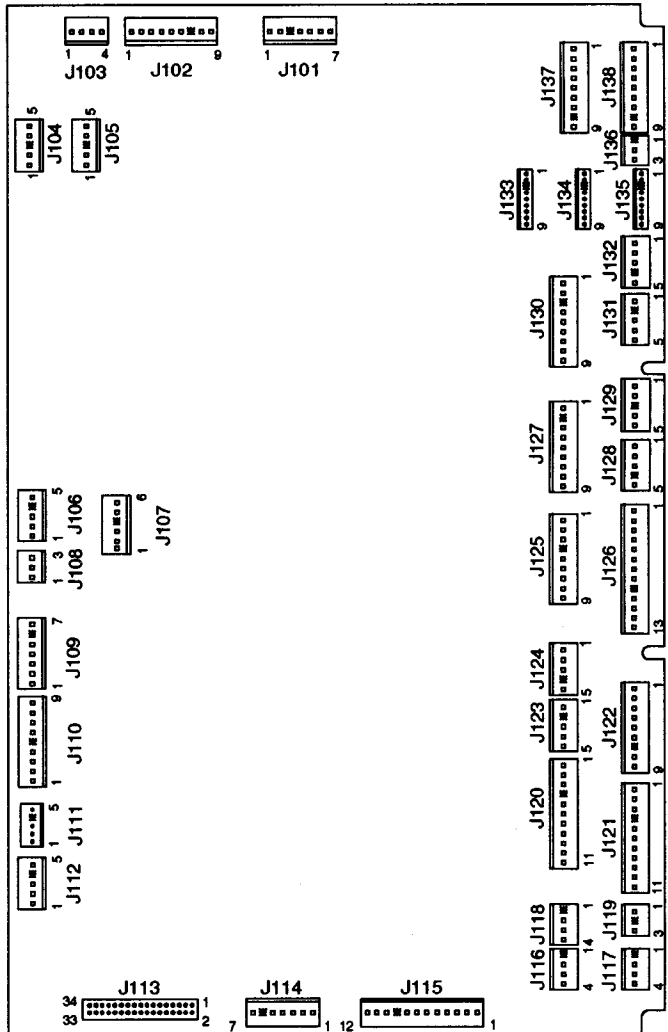
J108 Not Used

J109 Not Used

J110 Not Used

J111 Not Used

J112-1 White-Green, 9.8VAC from transformer secondary
 J112-2 White-Green, loop from J112-1
 J112-3 White-Green, 9.8VAC from transformer secondary
 J112-4 Key
 J112-5 White-Green, loop from J112-3



J113 Ribbon Cable, Data to/from J211

J114-1 Gray/Green, +12VDC to J210-7
 J114-2 Gray/Green, +12VDC to J210-6; J904-2
 J114-3 Gray, +5VDC to J210-5; J502-3
 J114-4 Gray, +5VDC to J210-4; J502-1; J904-1
 J114-5 Black, Ground to J210-3; J502-5; J904-5
 J114-6 Key
 J114-7 Black, Ground to J210-1; J502-4; J904-4

P.C. Board Legend	
J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Fliptronic II Board

POWER DRIVER BOARD CONTINUED...

J115-1 Yellow-White, 6.8VAC from transformer secondary
 J115-2 Yellow, 6.8VAC from transformer secondary
 J115-3 Yellow, loop from J115-2
 J115-4 Yellow, 6.8VAC from transformer secondary
 J115-5 Yellow, loop from J115-4
 J115-6 Yellow, 6.8VAC from transformer secondary
 J115-7 Yellow-White, 6.8VAC from transformer secondary
 J115-8 Yellow-White, 6.8VAC loop from J115-7
 J115-9 Key
 J115-10 Yellow-White, 6.8VAC from transformer secondary
 J115-11 Yellow-White, 6.8VAC loop from J115-10
 J115-12 Yellow-White, 6.8VAC from transformer secondary

J116-1 Key
 J116-2 Gray-Yellow, +12VDC to coin door; J2-4
 J116-3 Black, Ground to coin door; J2-5
 J116-4 Not Used

J117-1 Key
 J117-2 Gray-Yellow, +12VDC J606-7
 J117-3 Black, Ground to J606-3
 J117-4 Gray, +5VDC to J606-5

J118 Not Used

J119-1 White-Violet, 6.8VAC G.I. to coin door; J2-2
 J119-2 Key
 J119-3 Violet, Return G.I. to coin door; J2-1

J120-1 Brown, Return G.I. to insert board
 J120-2 Orange, Return G.I. to insert board
 J120-3 Yellow, Return G.I. to insert board
 J120-4 Key
 J120-5 Not Used
 J120-6 Not Used
 J120-7 White-Brown, 6.8VAC to insert board
 J120-8 White-Orange, 6.8VAC to insert board
 J120-9 White-Yellow, 6.8VAC to insert board
 J120-10 Not Used
 J120-11 Not Used

J121-1 Not Used
 J121-2 Not Used
 J121-3 Not Used
 J121-4 Key
 J121-5 Green, Return G.I. to insert
 J121-6 Violet, Return G.I. to Insert
 J121-7 Not Used
 J121-8 Not Used
 J121-9 Not Used
 J121-10 White-Green, Return G.I. to insert
 J121-11 White-Violet, 6.8VAC to insert

J122 Not Used

J123-1 Blue-Brown, Sol 25, Special 5 Drive
 J123-2 Key
 J123-3 Blue-Red, Sol 26, Special 6 Drive
 J123-4 Blue-Orange, Sol 27, Special 7 Drive
 J123-5 Blue-Yellow, Sol 28, Special 8 Drive

J124 Not Used

J125-1 Black-Brown, Sol 17 to insert board flashlamp
 J125-2 Black-Red, Sol 18 to insert board flashlamp
 J125-3 Black-Orange, Sol 19 to insert board flashlamp
 J125-4 Key
 J125-5 Black-Yellow, Sol 20 to insert board flashlamp
 J125-6 Blue-Green, Sol 21 to insert board flashlamp
 J125-7 Blue-Black, Sol 22 to insert board flashlamp
 J125-8 Blue-Violet, Sol 23 to insert board flashlamp
 J125-9 Blue-Gray, Sol 24 to insert board flashlamp

J126-1 Black-Brown, Sol 17 to playfield flashlamp
 J126-2 Black-Red, Sol 18 to playfield flashlamp
 J126-3 Black-Orange, Sol 19 to playfield flashlamp
 J126-4 Black-Yellow, Sol 20 to playfield flashlamp
 J126-5 Blue-Green, Sol 21 to playfield flashlamp
 J126-6 Blue-Black, Sol 22 to playfield flashlamp
 J126-7 Blue-Violet, Sol 23 to playfield flashlamp
 J126-8 Blue-Gray, Sol 24 to playfield flashlamp
 J126-9 Key
 J126-10 Not Used
 J126-11 Not Used
 J126-12 Not Used
 J126-13 Not Used

J127-1 Brown-Black, Sol 9 to playfield coil
 J127-2 Key
 J127-3 Brown-Red, Sol 10 to playfield coil
 J127-4 Brown-Orange, Sol 11 to playfield coil
 J127-5 Not Used
 J127-6 Brown-Green, Sol 13 to playfield coil
 J127-7 Brown-Blue, Sol 14 to playfield coil
 J127-8 Brown-Violet, Sol 15 to playfield coil
 J127-9 Not Used

J128 Not Used

J129 Not Used

P.C. Board Legend	
J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

POWER DRIVER BOARD CONTINUED...

J130-1 Violet-Brown, Sol 1 to playfield coil
J130-2 Violet-Red, Sol 2 to playfield coil
J130-3 Key
J130-4 Violet-Orange, Sol 3 to playfield coil
J130-5 Violet-Yellow, Sol 4 to playfield coil
J130-6 Violet-Green, Sol 5 to playfield coil
J130-7 Violet-Blue, Sol 6 to playfield coil
J130-8 Violet-Black, Sol 7 to playfield coil
J130-9 Violet-Gray, Sol 8 to playfield coil

J131 Not Used

J132-1 Not Used
J132-2 Not Used
J132-3 Blue-Orange, to insert flasher
J132-4 Key
J132-5 Blue-Yellow, to insert flasher

J133-1 Red-Brown, Row 1 to playfield lamps
J133-2 Red-Black, Row 2 to playfield lamps
J133-3 Key
J133-4 Red-Orange, Row 3 to playfield lamps
J133-5 Red-Yellow, Row 4 to playfield lamps
J133-6 Red-Green, Row 5 to playfield lamps
J133-7 Red-Blue, Row 6 to playfield lamps
J133-8 Red-Violet, Row 7 to playfield lamps
J133-9 Red-Gray, Row 8 to playfield lamps

J134-1 Not Used
J134-2 Not Used
J134-3 Key
J134-4 Not Used
J134-5 Not Used
J134-6 Not Used
J134-7 Not Used
J134-8 Not Used
J134-9 Red/Gray, Row 8 to cabinet lamp

J135-1 Not Used
J135-2 Not Used
J135-3 Key
J135-4 Not Used
J135-5 Not Used
J135-6 Not Used
J135-7 Not Used
J135-8 Red/Violet, Row 7 to insert lamp
J135-9 Red/Gray, Row 8 to insert lamp

J136-1 Key
J136-2 Not Used
J136-3 Yellow/Gray, Col 8 to cabinet lamp

J137-1 Yellow/Brown, Col 1 to playfield lamps
J137-2 Yellow/Red, Col 2 to playfield lamps
J137-3 Yellow/Orange, Col 3 to playfield lamps
J137-4 Yellow/Black, Col 4 to playfield lamps
J137-5 Yellow/Green, Col 5 to playfield lamps
J137-6 Yellow/Blue, Col 6 to playfield lamps
J137-7 Yellow/Violet, Col 7 to playfield lamps
J137-8 Key
J137-9 Yellow/Gray, Col 8 to playfield lamps

J138-1 Not Used
J138-2 Not Used
J138-3 Not Used
J138-4 Not Used
J138-5 Not Used
J138-6 Not Used
J138-7 Yellow/Violet, Col 7 to insert lamps
J138-8 Key
J138-9 Yellow/Gray, Col 8 to insert lamps

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Filiptronic II Board

CPU BOARD A-12742-20013

J201 Ribbon Cable, Data to J602

J202 Ribbon Cable, Data to J903; J506; J601

J203 Not Used

J204 Not Used

J205-1 Orange-Brown, Dir Sw 1, Left Coin to J1-14

J205-2 Orange-Red, Dir Sw 2, Center Coin to J1-13

J205-3 Orange-Black, Dir Sw 3, Right Coin to J1-12

J205-4 Orange-Yellow, Dir Sw 4, 4th Coin J1-17

J205-5 Key

J205-6 Orange-Green, Dir Sw 5, Escape/Service to J1-11

J205-7 Orange-Blue, Dir Sw 6, Down/Volume Down to J1-10

J205-8 Orange-Violet, Dir Sw 7, Up/Volume Up to J1-9

J205-9 Orange-Gray, Dir Sw 8, Enter/Test to J1-8

J205-10 Black, Ground to J1-15

J205-11 Not Used

J205-12 Orange-White, Enable to J1-18

J206-1 Green-Brown, Sw Col 1 to Playfield Switches

J206-2 Green-Red, Sw Col 2 to Playfield Switches

J206-3 Green-Orange, Sw Col 3 to Playfield Switches

J206-4 Green-Yellow, Sw Col 4 to Playfield Switches

J206-5 Green-Black, Sw Col 5 to Playfield Switches

J206-6 Green-Blue, Sw Col 6 to Playfield Switches

J206-7 Green-Violet, Sw Col 7 to Playfield Switches

J206-8 Key

J206-9 Green-Gray, Not Used

J207 Not Used

J208-1 White-Brown, Sw Row 1 to Playfield Switches

J208-2 White-Red, Sw Row 2 to Playfield Switches

J208-3 White-Orange, Sw Row 3 to Playfield Switches

J208-4 White-Yellow, Sw Row 4 to Playfield Switches

J208-5 White-Green, Sw Row 5 to Playfield Switches

J208-6 Key

J208-7 White-Blue, Sw Row 6 to Playfield Switches

J208-8 White-Violet, Sw Row 7 to Playfield Switches

J208-9 White-Gray, Sw Row 8 to Playfield Switches

J209 Not Used

J210-1 Black, Ground from J114-7

J210-2 Key

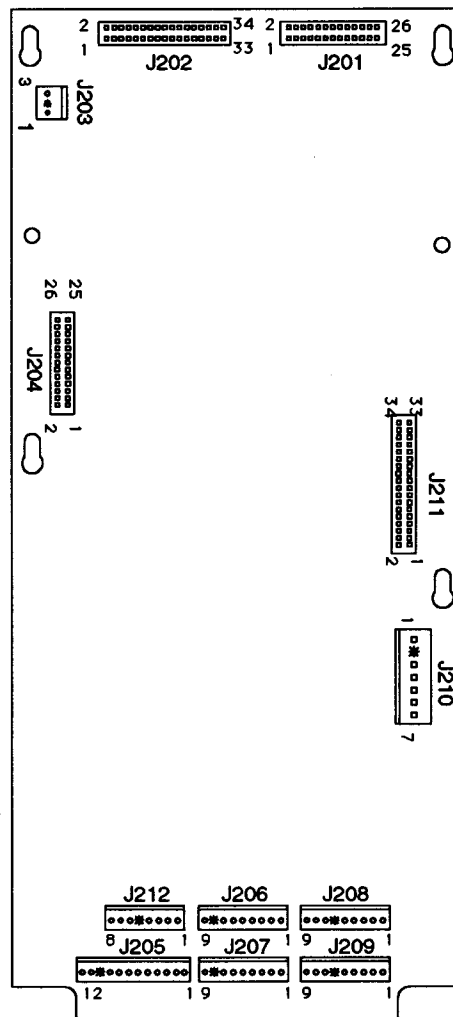
J210-3 Black, Ground from J114-5

J210-4 Gray, +5VDC from J114-4

J210-5 Gray, +5VDC from J114-3

J210-6 Gray-Green, +12VDC from J114-2

J210-7 Gray-Green, +12VDC from J114-1



J211 Ribbon Cable, Data from J113

J212-1 Green-Brown, Sw Col 1 to J1-1

J212-2 Green-Red, Sw Col 2 to J1-7

J212-3 Green-Orange, Sw Col 3 to J2-3 on 5-Sw. & Diode P.C.

J212-4 White-Brown, Sw Row 1 to J1-6

J212-5 Key

J212-6 White-Red, Sw Row 2 to J1-5

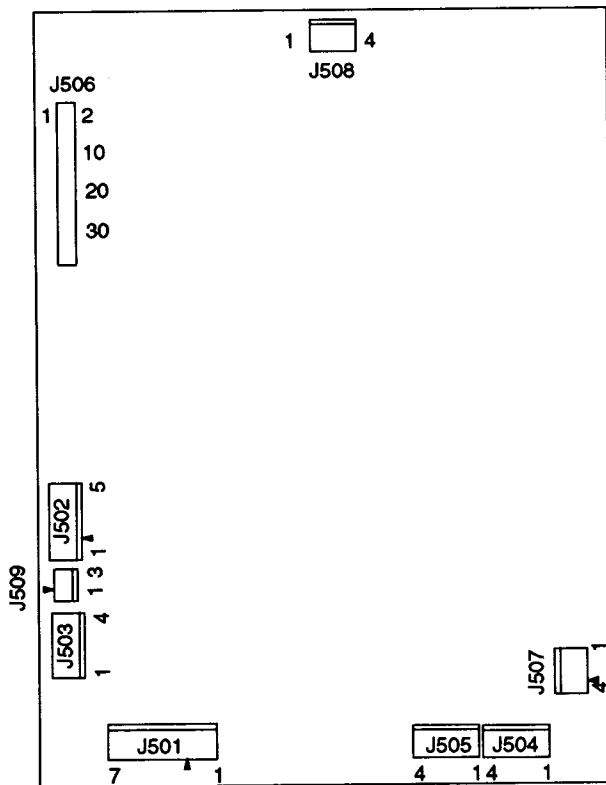
J212-7 White-Orange, Sw Row 3 to J1-4

J212-8 White-Yellow, Sw Row 4 to J1-3

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Fliptronic II Board

AUDIO BOARD A-12738-20013



J501-1 Gray-Green, 20VAC from transformer secondary
 J501-2 Gray-Green, loop from J501-1
 J501-3 Key
 J501-4 Gray, 20VAC from transformer secondary
 J501-5 Gray, 20VAC loop from J501-4
 J501-6 Gray-White, 20VAC loop from transformer secondary
 J501-7 Gray-White, 20VAC loop from J501-6

J502-1 Gray, +5VDC from J114-4
 J502-2 Key
 J502-3 Gray, +5VDC from J114-3
 J502-4 Black, Ground from J114-7
 J502-5 Black, Ground from J114-5

J503 Not Used

J504-1 Not Used
 J504-2 Not Used
 J504-3 Black, Signal to speaker
 J504-4 Not Used

J505-1 Not Used
 J505-2 Black-Yellow, Signal to speaker
 J505-3 Not Used
 J505-4 Not Used

J506 Ribbon Cable, Data to/from J601; J903; J202

J507 Not Used

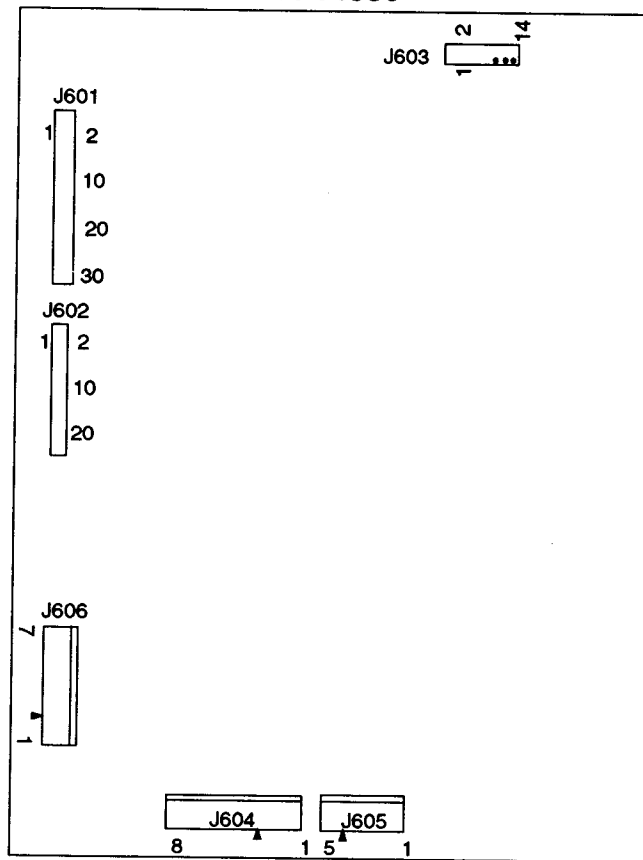
J508 Not Used

J509 Not Used

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Fliptronic II Board

DOT MATRIX CONTROLLER BOARD A-14039



J601 Ribbon Cable, Data to/from J202; J903; J506

J602 Ribbon Cable, Data from J201

J603 Ribbon Cable, Data to Dot Matrix Display Driver

J604-1 Orange, -125V to Dot Matrix Display Driver Pin 1

J604-2 Blue, -113V to Dot Matrix Display Driver Pin 2

J604-3 Key

J604-4 Black, Ground to Dot Matrix Display Driver Pin 4

J604-5 Black, Ground to Dot Matrix Display Driver Pin 5

J604-6 Gray, +5V to Dot Matrix Display Driver Pin 6

J604-7 Gray-Yellow, +12V to Dot Matrix Display Driver Pin 7

J604-8 Brown, +62 to Dot Matrix Display Driver Pin 8

J605-1 White, 80VAC from transformer secondary

J605-2 White, 80VAC from transformer secondary

J605-3 Violet, 100VAC from transformer secondary

J605-4 Key

J605-5 Violet, 100VAC from transformer secondary

J606-1 Black, Ground loop from J606-3

J606-2 Key

J606-3 Black, Ground from J117-3

J606-4 Gray, +5V loop from J606-5

J606-5 Gray, +5V from J117-4

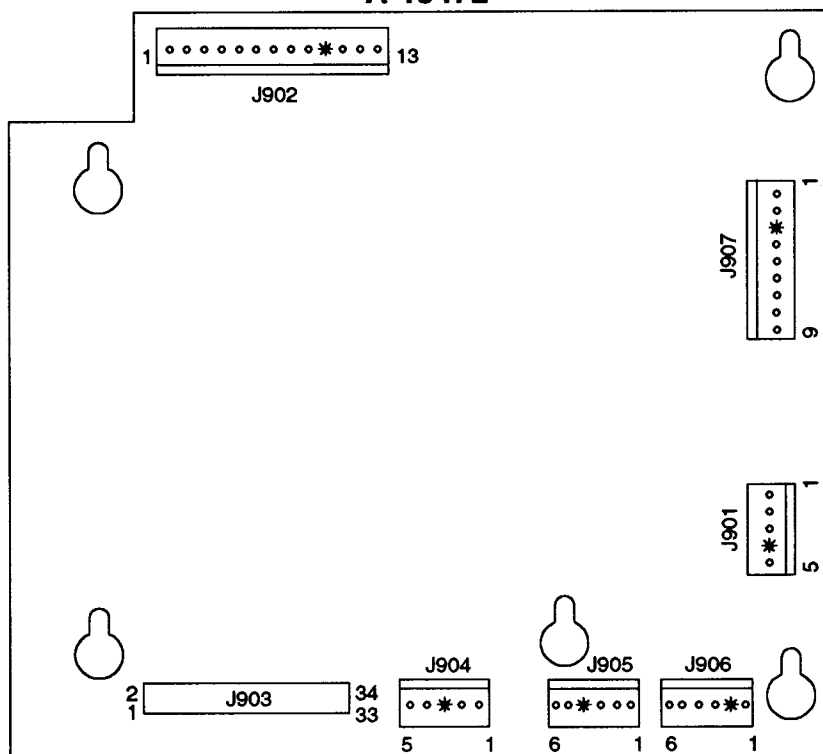
J606-6 Gray-Yellow, +12V loop from J606-7

J606-7 Gray-Yellow, +12V from J117-2

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

FLIPTRONIC II BOARD A-15472



- J901-1 White-Blue, 50VAC loop from J105-1
- J901-2 White-Blue, loop from J901-1
- J901-3 White-Blue, 50VAC loop, from J105-2
- J901-4 Key
- J901-5 White-Blue, loop from J901-3

- J902-1 Not Used
- J902-2 Not Used
- J902-3 Not Used
- J902-4 Orange-Violet, holding to upper right flipper
- J902-5 Not Used
- J902-6 Black-Yellow, power to upper right flipper
- J902-7 Orange-Blue, holding to lower left flipper
- J902-8 Not Used
- J902-9 Blue-Gray, power to lower left flipper
- J902-10 Key
- J902-11 Orange-Green, holding to lower right flipper
- J902-12 Not Used
- J902-13 Blue-Violet, power to lower right flipper

- J903 Ribbon Cable, data to/from J202; J506; J601

- J904-1 Gray, +5V from J114-4
- J904-2 Gray-Green, +12V from J114-2
- J904-3 Key
- J904-4 Black, Ground from J114-7
- J904-5 Black, Ground from J114-5

- J905-1 Blue-Violet, to right flipper button opto
- J905-2 Blue-Gray, to left flipper button opto
- J905-3 Black-Yellow, to right flipper button opto
- J905-4 Key
- J905-5 Black-Blue, to left flipper button opto
- J905-6 Orange, Ground to cabinet optos

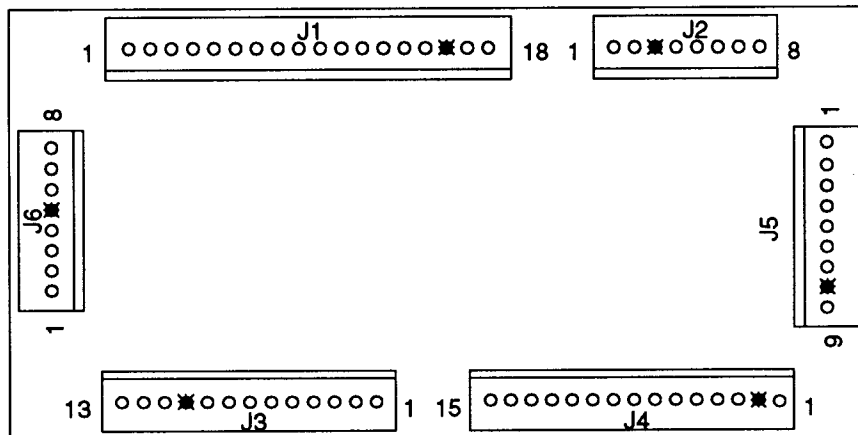
- J906-1 Black-Green, to lower right end-of-stroke switch
- J906-2 Key
- J906-3 Black-Blue, to lower left end-of-stroke switch
- J906-4 Black-Violet, to upper right end-of-stroke switch
- J906-5 Not Used
- J906-6 Orange, Ground to end-of-stroke switches

- J907-1 Not Used
- J907-2 Not Used
- J907-3 Key
- J907-4 Blue-Yellow, +50V to upper right flipper
- J907-5 Blue-Yellow, loop from J907-4
- J907-6 Gray-Yellow, +50V to lower left flipper
- J907-7 Gray-Yellow, loop from J907-6
- J907-8 Blue-Yellow, +50V to lower right flipper
- J907-9 Blue-Yellow, loop from J907-8

P.C. Board Legend

J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Fliptronic II Board

COIN DOOR INTERFACE BOARD A-14689



- | | |
|---|--|
| <p>J1-1 Green-Brown, switch column 1 from J212-1
 J1-2 Red-Gray, lamp row 8 from J134-9
 J1-3 White-Yellow, switch row 4 from J212-8
 J1-4 White-Orange, switch row 3 from J212-7
 J1-5 White-Red, switch row 2 from J212-6
 J1-6 White-Brown, switch row 1 from J212-4
 J1-7 Green-Red, switch column 2 from J212-2
 J1-8 Orange-Gray, dedicated switch row 8 from J205-9
 J1-9 Orange-Violet, dedicated switch row 7 from J205-8
 J1-10 Orange- Blue, dedicated switch row 6 from J205-7
 J1-11 Orange-Green, dedicated switch row 5 from J205-6
 J1-12 Orange-Black, dedicated switch row 3 from J205-3
 J1-13 Orange-Red, dedicated switch row 2 from J205-2
 J1-14 Orange-Brown, dedicated switch row 1 from J205-1
 J1-15 Black, Ground from J205-10
 J1-16 Key
 J1-17 Orange-Yellow, dedicated switch row 4 from J205-4
 J1-18 Orange-White, switch enable from J205-12</p> <p>J2-1 Violet, G.I. return from J119-3
 J2-2 White-Violet, G.I. 6.8VAC from J119-1
 J2-3 Key
 J2-4 Gray-Yellow, +12V from J116-2
 J2-5 Black, Ground from J116-3
 J2-6 Not Used
 J2-7 Not Used
 J2-8 Not Used</p> <p>J3-1 Violet, G.I. return to coin door
 J3-2 White-Violet, G.I. 6.8VAC to coin door
 J3-3 Black, Ground to coin door
 J3-4 Orange-Brown, dedicated switch row 1 to coin door
 J3-5 Not Used
 J3-6 Orange-Black, dedicated switch row 3 to coin door
 J3-7 Orange-Green, dedicated switch row 4 to coin door
 J3-8 Orange-Blue, dedicated switch row 6 to coin door
 J3-9 Orange-Violet, dedicated switch row 7 to coin door
 J3-10 Key
 J3-11 Orange-Grey, dedicated switch row 8 to coin door
 J3-12 Green-Brown, switch column 1 to coin door
 J3-13 White-Brown, switch row 1 to coin door</p> | <p>J4 Not Used
 J5 Not Used
 J6-1 White-Red, switch row 2 to cabinet
 J6-2 White-Orange, switch row 3 to cabinet
 J6-3 White-Yellow, switch row 4 to cabinet
 J6-4 Red-Gray, lamp row 8 to cabinet
 J6-5 Key
 J6-6 Green-Red, switch column 2 to cabinet
 J6-7 Green-Brown, switch column 1 to cabinet
 J6-8 Green-Brown, switch column 1 to cabinet</p> |
|---|--|

P.C. Board Legend	
J1-J6	Coin Door Interface Board
J1xx	Power Driver Board
J2xx	CPU Board
J5xx	Audio Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

Section 4

International

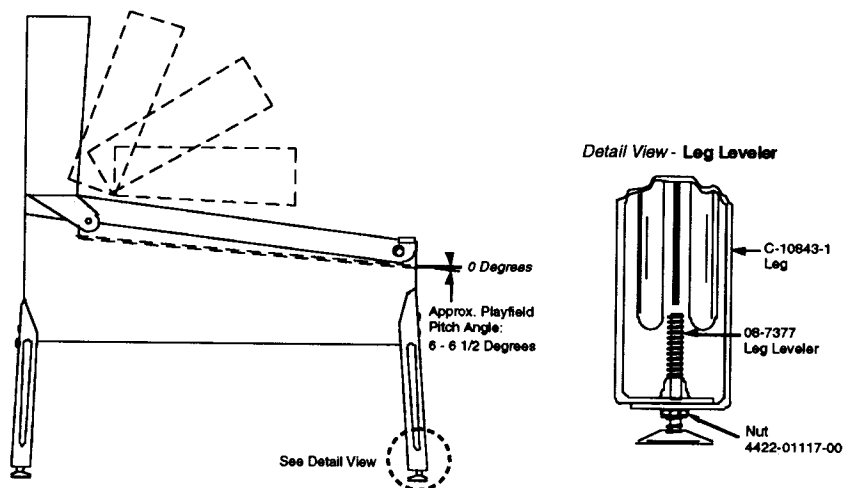


PINBALL GAME ASSEMBLY INSTRUCTIONS

BLACK ROSE IS A 3 BALL GAME.

<u>Power:</u>	Foreign 230V @ 50 Hz Japan 100V @ 50Hz	<u>Dimensions:</u>	Width: 26" Approx. Depth: 55" Approx. Height: 77" Approx.
<u>Temp.:</u>	32° F to 100° F (0° C to 38° C)	<u>Weight:</u>	Approx. 297 lbs. (crated)
<u>Humidity:</u>	Not to exceed 95% relative.		

1. Open the shipping container; remove all cartons, parts, and other items, and set them aside.
2. Place the cabinet on a support and attach rear legs using leg bolts. Leg levelers and leg bolts are provided among the parts in the cash box.
3. Attach the front legs (after installing leg levelers), using leg bolts. See diagram below..



Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

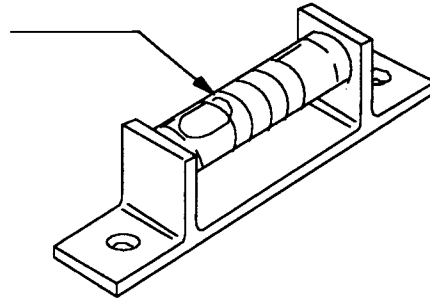
4. Reach into the cabinet and backbox and ensure that the interconnecting cables are free to move (not kinked or pinched). Be careful to avoid damaging wires at any stage of the assembly process.
5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass, storing it carefully to avoid scratches. Remove the shipping block holding the Insert Board. Unlatch and open the Insert Board. This allows access to the bolt holes used for securing the backbox upright. Install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox. Close the Insert Board and latch it in position. Reinstall the backglass, and lock the backbox.

CAUTION

FAILURE TO INSTALL the backbox mounting hardware properly can cause personal injury. **NEVER TRANSPORT** a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

6. Extend each leg leveler slightly below the leg bottom, so that all four foot pads are extended about the same distance. Remove the cabinet from its support and place it on the floor.
7. Unlock and open the coin door. Locate the Molding Latch Lever, and move the lever toward the left side of the game, to release the front molding. Lift the front molding off the playfield cover glass, return the latch lever to the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game, storing it carefully to avoid breakage.
8. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). NOTE: It is recommended that these measurements be made ON the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.
9. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be accurately adjusted WITHOUT REMOVING THE GLASS. The first line (closest to the front of game) on the level is approximately 6 degrees. Every line after that is approximately another 1/2 degree of pitch. The recommended pitch for Black Rose is between 6 and 6 1/2 degrees. The NOSE of the bubble is between the first and second line on the level (see diagram below).

TRU-PITCH™ level between 6 and 6 1/2 degrees.



CAUTION

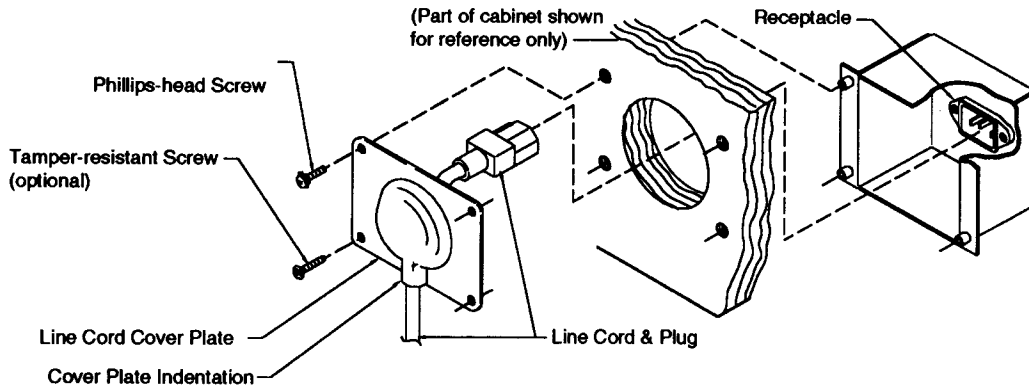
Playfield pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting.

10. Move the game into the desired location; recheck the level and pitch angle of the playfield.
11. Verify that the **required number** of balls are installed in the game. **BLACK ROSE** uses 3 balls.
12. Install playfield mylars if desired.

NOTE: The **Black Rose** playfield is specially coated with a Diamond Plate™ surface and does not require a protective mylar. However, playfield mylars can be purchased through your local Bally Distributor. Specify part number 03-7960-20013-1 for full playfield mylar.

13. Clean and reinstall the playfield cover glass, reversing the procedure of step 7.

14. To attach line cord, remove envelope stapled to the inside cabinet (near cashbox). Remove the four Phillips-head screws that mount the line cord cover plate to the rear cabinet. Match the prongs on the plug with the holes in the receptacle, and push line cord securely into place. Make sure cord is aligned with the indentation on cover plate (indentation should point toward bottom of cabinet). Remount line cord cover plate. If desired, four tamper resistant screws have been provided in an envelope marked "Security Screws" (located in cashbox) to remount cover plate.



LINE FILTER/CORDSET APPLICATION CHART

COUNTRY	LINE FILTER ASSEMBLY		CORDSET	CORDSET								
	A-15707-120V	A-15707-230V		5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	H-15756	
TAIWAN	●		●									
MEXICO	●		●									
CENTRAL AMERICA	●		●									
SOUTH KOREA	●		●									
PUERTO RICO	●		●									
AUSTRIA		●		●								
BELGIUM		●		●								
FINLAND		●		●								
FRANCE		●		●								
GREECE		●		●								
HOLLAND		●		●								
HUNGARY		●		●								
NETHERLANDS		●		●								
NETH. ANTILLES		●		●								
NORWAY		●		●								
POLAND		●		●								
PORTUGAL		●		●								
SPAIN		●		●								
SWEDEN		●		●								
TURKEY		●		●								
WEST GERMANY		●		●								
UNITED KINGDOM		●			●							
IRELAND		●			●							
HONG KONG		●			●							
DENMARK		●				●						
ITALY		●					●					
CHILE		●						●				
PEOPLE'S REP. OF CHINA		●						●				
SWITZERLAND		●							●			
AUSTRALIA		●								●		
NEW ZEALAND		●									●	
ARGENTINA		●										●
JAPAN	●											●

Line Filter Fuse List

Japan 8A
Foreign 5A, S.B.

U.9 Presets

Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

U.9 01 Install Extra Easy

The game play difficulty adjustments can be changed to a combination that is MUCH LESS to MUCH MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the individual groups.

U.9 02 Install Easy

Somewhat LESS difficult than factory setting.

U.9 03 Install Medium

About the SAME as factory setting.

U.9 04 Install Hard

Somewhat MORE difficult than factory setting.

U.9 05 Install Extra Hard

MUCH MORE difficult than factory setting.

Game Difficulty Setting Table for French Games

Adj. No.	Adjustment Description	Extra Easy	Easy	Medium (factory)	Hard	Extra Hard
		U.9 01	U.9 02	U.9 03	U.0 04	U.9 05
A.2 01	Lock Time-down	30 Sec.	25 Sec.	20 Sec.	15 Sec.	10 Sec.
A.2 02	Right Ramp Time	30 Sec.	25 Sec.	20 Sec.	15 Sec.	10 Sec.
A.2 03	Ramp Open Start	01	02	02	02	03
A.2 04	Ramp Open Max	03	05	06	07	09
A.2 05	Combo 1st Timer	15 Sec.	10 Sec.	5 Sec.	5 Sec.	4 Sec.
A.2 06	Combo 2nd Timer	15 Sec.	10 Sec.	5 Sec.	5 Sec.	4 Sec.
A.2 07	Reload Timer	30 Sec.	25 Sec.	20 Sec.	15 Sec.	15 Sec.
A.2 08	Middle Ramp Time	15 Sec.	10 Sec.	6 Sec.	6 Sec.	5 Sec.
A.2 09	Extra Ball Percent	30%	25%	20%	15%	10%
A.2 10	Jackpot Lit Percent	25%	20%	15%	13%	10%
A.2 11	Random Game Award	Easy	Medium	Medium	Medium	Hard
A.2 12	Skill Shot	Easy	Easy	Easy	Medium	Hard
A.2 14	Jewel Reset	4 Jewels	5 Jewels	6 Jewels	8 Jewels	10 Jewels
A.2 15	Millions Timer	40 Sec.	35 Sec.	30 Sec.	25 Sec.	20 Sec.
A.2 16	Enable Lock	Easy	Easy	Hard	Hard	Hard
A.2 17	Broadside Bonus	Easy	Easy	Easy	Medium	Hard
A.2 21	Special Lit After	1 SUNK	1 SUNK	2 SUNK	2 SUNK	3 SUNK
A.2 28	Double Broadside Timer	40 Sec.	35 Sec.	30 Sec.	25 Sec.	20 Sec.
A.2 29	Ball Saver	10 Sec.	8 Sec.	7 Sec.	6 Sec.	5 Sec.
A.2 31	Multiball Bonus	Easy	Easy	Easy	Easy	Hard
A.2 32	Sinkship Start	SINKSH	SINKS	SINK	SIN	SI
A.2 34	Sinkship Letters	Easy	Easy	Easy	Medium	Medium

Game Difficulty Setting Table for German/European Games

Adj. No.	Adjustment Description	Extra Easy	Easy	Medium (factory)	Hard	Extra Hard
		U.9 01	U.9 02	U.9 03	U.0 04	U.9 05
A.2 01	Lock Time-down	25 Sec.	20 Sec.	15 Sec.	12 Sec.	10 Sec.
A.2 02	Right Ramp Time	25 Sec.	20 Sec.	15 Sec.	12 Sec.	10 Sec.
A.2 03	Ramp Open Start	01	02	02	02	03
A.2 04	Ramp Open Max	06	06	06	07	09
A.2 05	Combo 1st Timer	10 Sec.	8 Sec.	5 Sec.	5 Sec.	4 Sec.
A.2 06	Combo 2nd Timer	10 Sec.	8 Sec.	5 Sec.	5 Sec.	4 Sec.
A.2 07	Reload Timer	30 Sec.	25 Sec.	20 Sec.	20 Sec.	15 Sec.
A.2 08	Middle Ramp Time	15 Sec.	10 Sec.	6 Sec.	6 Sec.	5 Sec.
A.2 09	Extra Ball Percent	25%	20%	15%	12%	10%
A.2 10	Jackpot Lit Percent	20%	15%	10%	8%	5%
A.2 11	Random Game Award	Easy	Medium	Medium	Medium	Hard
A.2 12	Skill Shot	Easy	Easy	Easy	Medium	Hard
A.2 14	Jewel Reset	5 Jewels	6 Jewels	7 Jewels	9 Jewels	10 Jewels
A.2 15	Millions Timer	40 Sec.	35 Sec.	30 Sec.	25 Sec.	20 Sec.
A.2 16	Enable Lock	Easy	Hard	Hard	Hard	Hard
A.2 17	Broadside Bonus	Easy	Easy	Easy	Medium	Hard
A.2 21	Special Lit After	1 SUNK	2 SUNK	2 SUNK	3 SUNK	4 SUNK
A.2 28	Double Broadside Timer	40 Sec.	35 Sec.	30 Sec.	20 Sec.	20 Sec.
A.2 29	Ball Saver	7 Sec.	Off	Off	Off	Off
A.2 31	Multiball Bonus	Easy	Easy	Easy	Hard	Hard
A.2 32	Sinkship Start	SINK	SIN	SI	S	ALL OFF
A.2 34	Sinkship Letters	Easy	Medium	Medium	Hard	Hard

- U.9 17 Install German 1•
- U.9 18 Install German 2•
- U.9 19 Install German 3•
- U.9 20 Install German 4•
- U.9 21 Install German 5•
- U.9 22 Install German 6•

Adjustments U.9 17 through U9 22 are used to modify game pricing and type of game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups. **NOTE:** German Replay starts at 50,000,000.

Preset Game Adjustments Table for German/European Games

Adj. #	Adj. Description	German 1 U.9 17	German 2 U.9 18	German 3 U.9 19	German 4 U.9 20	German 5 U.9 21	German 6 U.9 22
A.1 14	Replay Award	Credit	Ticket	Audit	Credit	Ticket	Audit
A.1 15	Special Award	Credit	Extra Ball	Points	Credit	Extra Ball	Points
A.1 16	Match Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.1 19	Match Feature	7%	7%	Off	7%	7%	Off
A.3 01	Game Pricing	6 spiele/5 DM	6 spiele/5 DM	6 spiele/5 DM	7 spiele/5 DM	7 spiele/5 DM	7 spiele/5 DM
A.4 02	H.S.T.D. Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.4 04	Champion Credits	03	03	00	03	03	00
A.4 05	High Score 1 Credits	01	01	00	01	01	00
A.4 06	High Score 2 Credits	00	00	00	00	00	00
A.4 07	High Score 3 Credits	00	00	00	00	00	00
A.4 08	High Score 4 Credits	00	00	00	00	00	00
A.4 10	Backup Champion	100,000,000	100,000,000	00	100,000,000	100,000,000	00
A.4 11	Backup High Score 1	90,000,000	90,000,000	00	90,000,000	90,000,000	00
A.4 12	Backup High Score 2	80,000,000	80,000,000	00	80,000,000	80,000,000	00
A.4 13	Backup High Score 3	70,000,000	70,000,000	00	70,000,000	70,000,000	00
A.4 14	Backup High Score 4	60,000,000	60,000,000	00	60,000,000	60,000,000	00

- U.9 23 Install French 1*
- U.9 24 Install French 2*
- U.9 25 Install French 3*
- U.9 26 Install French 4*
- U.9 27 Install French 5*
- U.9 28 Install French 6*

Adjustments U.9 23 through U.9 26 are used to modify game pricing and type of play. The Preset Game Adjustments Table for French Games lists the adjustments and settings that comprise the individual groups.

Preset Game Adjustments Table for French Games

Adj. #	Adj. Description	French1 U.9 23	French 2 U.9 24	French3 U.9 25	French4 U.9 26	French5 U.9 27	French6 U.9 28
U.9 06	Install 5 Ball	N/A	N/A	N/A	N/A	N/A	Yes

JUMPER CHART

Country	W14	W15	W16	W17	W18
European	In	In	Out	In	In
French	In	In	In	Out	In
German	In	In	In	In	Out

Standard Adjustments

A.1 14 Replay Award

For the form of award automatically provided when the player exceeds any replay level for either Auto% Replay, or Fixed Replay.

- Credit - Reaching each Replay level awards credit.
- Ticket - Reaching each Replay level awards a ticket.
- Ball - Reaching each Replay level awards an Extra Ball.
- Audit - Reaching each Replay level awards nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards.

A.1 15 Special Award

The award automatically provided when the player scores a special.

- Credit - Scoring a Special awards a Credit.
- Ticket - Scoring a Special awards a Ticket.
- Ball - Scoring a Special awards an Extra Ball.
- Points - Scoring a Special awards 1 Million points.

A.1 16 Match Award

The award automatically provided when the players wins a match.

- Credit - Winning a Match awards a Credit.
- Ticket - Winning a Match awards a Ticket.

A.1 19 Match Feature

The desired percentage for the Match Feature occurring at the end of the game.

- OFF - Match Feature is not available.
- 1 -50% - 1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects a random two-digit number at the end of the game and compares each players score for an identical two digits in the rightmost two positions. A matching of these two digits results in an award of a Credit or a Ticket.

A.1 21 Language

The language the game uses: English, French, or German.

A.2 Feature Adjustments

A.2 01 LOCK TIME-DOWN RATE

The rate at which a ball will be held in lockup during two ball multiball. Setting range is from 1 to 99 seconds.

Factory Default: 20 Seconds

A.2 02 RIGHT RAMP TIME-DOWN RATE

The rate at which the five lights in front of the right ramp time-down once lit. Setting range is from 1 to 99 seconds.

Factory Default: 20 Seconds

A.2 03 MIDDLE RAMP OPEN

The number of consecutive middle ramp loops that are needed to open the middle ramp. Setting range is from 1 to 10 loops.

Factory Default: 2 Loops

A.2 04 MIDDLE RAMP OPEN MAXIMUM COUNT

The highest number of consecutive middle ramp loops that are needed to open the middle ramp. Setting range is from 2 to 20 loops.

Factory Default: 6 Loops

A.2 05 COMBINATION SHOT 1 TIME-DOWN

The rate at which the first combination shot times down once lit (top left loop). Setting range is from 1 to 99 seconds.

Factory Default: 5 Seconds

A.2 06 COMBINATION SHOT 2 TIME-DOWN

The rate at which the second combination shot times down once lit (far right shot). Setting range is from 1 to 99 seconds.

Factory Default: 5 Seconds

A.2 07 CANNON RELOAD TIME-DOWN RATE

The rate at which the ramp stays open after the cannon is shot and missed allowing an instant reload. Setting range is from 1 to 99 seconds.

Factory Default: 20 Seconds

A.2 08 MIDDLE RAMP TIME-DOWN RATE

The rate at which the three lights in front of the middle ramp time-down once lit. Setting range is from 5 to 99 seconds.

Factory Default: 6 Seconds

A.2 09 EXTRA BALL RANDOM AWARD

The percentage of times the game will award or offer an extra ball when Rigging Swing, Walk the Plank, Knife Throw, or Polly is activated. Percentage is based on total number of extra balls collected, skill or random. Setting range is from 1 to 99 percent.

Factory Default: 25 Percent

A.2 10 JACKPOT LIT RANDOM AWARD

The percentage of times the game will award or offer Jackpot Lit when Rigging Swing, Walk the Plank, Knife Throw, or Polly is activated. Percentage is based on total number of Jackpot Lits collected, skill or random. Setting range is from 1 to 99 percent.

Factory Default: 15 Percent

A.2 11 RANDOM GAME AWARDS

The awards given or offered in the Rigging Swing, Walk the Plank, Knife Throw, and Polly. When Extra Ball or Jackpot Lit is not given by a random award, then the award given will be based on this adjustment.

- EASY** - Valuable point/features will be awarded more often.
- MEDIUM** - Valuable point/features will be awarded evenly.
- HARD** - Valuable point/features will be awarded less often.

Factory Default: MEDIUM

A.2 12 SKILL SHOT LEVEL

The difficulty of the plunger skill shot.

- EASY** - Skill shot has only one level of difficulty.
- MEDIUM** - Skill shot has two levels of difficulty.
- HARD** - Skill shot has three levels of difficulty.

Factory Default: EASY

A.2 14 HIDDEN TREASURE JEWEL RESET

The number of jewels needed for Hidden Treasure Mode to start.

Factory Default: 6 Jewels

A.2 15 MILLIONS MODE TIME-DOWN RATE

The amount of time Millions Mode will be active once collected. Setting range is from 5 to 99 seconds.

Factory Default: 30 Seconds

A.2 16 LOCK ENABLE DIFFICULTY

The way a lock can be enabled.

- EASY** - Lock light lanes remain lit after MULTIBALL.
- HARD** - Lock lanes are cleared at the end of MULTIBALL.

Factory Default: HARD

A.2 17 BROADSIDE BONUS LITE

How the center broadside bonus feature is lit.

- EASY** - Broadside is lit (turned on) at the start of each ball.
- MEDIUM** - Broadside is carried over from ball to ball.
- HARD** - Broadside is turned off at the start of each ball.

Factory Default: EASY

A.2 21 SPECIAL LIT AFTER 'X' NUMBER OF SHIPS

The number of ships that must be sunk before Special is lit. Setting range is from 1 to 9 ships sunk.

Factory Default: 2 SHIPS SUNK

A.2 28 DOUBLE BROADSIDE MODE TIME-DOWN RATE

The time that Double Broadside mode will be active once collected. Setting range is from 5 to 99 seconds.

Factory Default: 30 Seconds

A.2 29 BALL SAVER

The amount of time that the ball saver is active per ball. *NOTE:* Ball saver will return the ball to the shooter if the player has not had 'X' amount of play time that ball.

- 0** - Ball saver is turned off.
- 1-30** - Number of ball play time seconds that the ball will be returned to the player is lost.

Factory Default: 7 Seconds

A.2 31 MULTI-BALL MULTI BONUS RESET

Select whether or not Multi-ball 'MULTI BONUS' resets after each multi-ball, or is carried over from each multi-ball mode that game.

- EASY** - MULTI BONUS carries over from multiball to multiball.
- HARD** - MULTI BONUS resets after each multiball.

Factory Default: EASY

A.2 32 SINKSHIP LETTERS LITE AT GAME START

Select the number of letters in SINKSHIP are lit at the start of a game. The more letters lit the easier it is to sink a ship.

- ALL OFF** - No letters are lit at game start.
- S-SINKSHIP** - 1 to 8 letters are lit at game start.

Factory Default: SINK letters lit.

A.3 Pricing Adjustments

A.3 01 Game Pricing (if set to custom, then 02 to 09 are available)

The cost of a game is selected from the Standard Pricing Table or by installing Custom pricing.

A.3 02 Left Coin Units

A.3 03 Center Coin Units

A.3 04 Right Coin Units

A.3 05 4th Slot Units

The number of coin units purchased by a coin passing through the left, center, right, and fourth coin chutes.

A.3 06 Units/Credits

Defines the number of coin units required to obtain 1 credit. A coin unit counter in the game program totals the number of coin units purchased through all coin chutes prior to each game. If the total number of these coin units exceeds or matches the Unit per Credit value by a multiple (or more, coin units) of the specified Units per Credit value the Credits display shows the proper number of credits. The coin unit counter retains any remaining coin units, until the start of Ball 2; then the coin unit counter is cleared (its contents are zeroed).

A.3 07 Units/Bonus

Additional credits are to be indicated in the credits display, when a certain number of coin units are accumulated.

A.3 08 Bonus Credits

The number of credits that are awarded when the Units/Bonus level is achieved.

A.3 09 Minimum Units

No credits are to be posted (indicated in the credit display), until the credits unit counter reaches a particular value, by setting this value to 02 (or more).

A.3 10 Coin Door Type (if set to custom, then 11 to 15 are available)

This adjustment is used to preset adjustments 11 through 15, based on standard coin doors (U.S.A., German, Etc.).

A.3 11 Collection Text

The coin system used to display the Earning Audits.

A.3 12 Left Slot Value

A.3 13 Center Slot Value

A.3 14 Right Slot Value

A.3 15 4th Slot Value

The monetary value of the left, center, right, and 4th coin chutes.

A.3 16 Maximum Credits

The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 10. Reaching the specified setting prevents the award of any credits.

A.3 17 Free Play

The player can operate the game without a coin (free play) or with a coin.

- NO - A coin is necessary for game play.
- YES - Game play is free; no coin required.

A.3 18 Hide Coin Audits

The coin audits may, or may not be displayed.

- YES - The coin audits are not displayed.
- NO - The coin audits are displayed.
- HIDE NAMES - The coin audit value is shown but not the audit name.

A.3 19 1 Coin Buy-in

If game pricing is set to 1 for 50¢/2 for \$1.00 the player is allowed to 'buy-in' a subsequent game for 1 coin. The number of games that may be purchased at this cost is determined by the number of players in the previous game; that is, if the previous game had three players, 3 Credits can be purchased at the rate of 1 coin per credit.

- YES - The player has 10 seconds to buy-in at 1 coin per game.
- NO - The buy-in feature is disabled.

A.3 20 Base Coin Size

The number of ticket per coin calculations.

A.3 21 Coin Meter Units

It is possible to connect a coin meter to the knocker coil driver which will log all coins through all slots. This adjustment activates the use of the knocker driver for this purpose, and determines the value of each unit on the meter. For example, to show the total amount of money collected as "total quarters", set this adjustment to "0.25". To show the amount of money collected as "total dollars", set this adjustment to "1.00".

Setting this adjustment to anything other than Off establishes the coin unit for a meter attached to the knocker driver, and overrides use of the knocker during awards.

Pricing Table

Country	Coin Chute				Games/Coin	Display	Pricing Adjustments A.3								
	Left	Center	Right	4th Chute			02	03	04	05	06	07	08	09	
Austria	5 Sch 5 Sch	10 Sch -	10 Sch 10 Sch	- -	1/2x5 Sch, 3/2x10 Sch ² 2/5 Sch, 5/10 Schilling	AUSTRIA CUSTOM	02	00	05	00	01	00	01	00	
Australia	20¢	\$1	\$1	\$2	1\$1, 3/\$2 ²	AUSTRALIA									
United Kingdom	£1.00	50 P	-	20 P	1/3x10P, 2/50P, 4/£1.00, 4/5x20P	U. KINGDOM									
Switzerland	1 Fr	2 Fr	5 Fr	-	1/1 Fr, 3/2 Fr, 7/5 Franc ²	SWISS									
Belgium	5 Fr	20 Fr	50 Fr	-	1/4 x 5F, 1/20 F, 3/50 Franc ²	BELGIUM									
West Germany	1DM	2DM	5DM	-	1/1 DM, 2/2 DM, 7/5 DMark ² 1/1 DM, 2/2 DM, 6/5 DM ^{1,2} 1/1 DM, 3/2 DM, 9/5 DM 1/2x1 DM, 1/2 DM, 3/5 DM 2/1 DM, 5/2 DM, 14/5 DM	GER. 7/6 DM GER. 6/5 DM CUSTOM CUSTOM CUSTOM	09	18	45	00	05	00	01	00	
Netherlands	1HFI 25 ¢ 1G	2.5HFI -	2.5HFI 1G 1G	- - -	1/1 HFI, 3/2.5 Holland Florin ² 1/25¢, 5/1 Guilder 1/1 Guilder ²	NETHERLAND CUSTOM HOLLAND	01	00	05	00	01	00	01	00	
Sweden	5 Kr	5 Kr	5 Kr	-	1/5 Krona ²	SWEDEN									
France	1 Fr 1 Fr 1 Fr 1 Fr 1 Fr 1 Fr	5 Fr 5 Fr 5 Fr 5 Fr 5 Fr	10 Fr 10 Fr 10 Fr 10 Fr 10 Fr	- - - - - -	1/3x1 F, 2/5 F, 5/10 Franc ^{2,3} 1/2x1 F, 3/5 F, 7/10 Franc ^{2,3} 1/5 F, 3/10 F, 7/2x10 Franc ^{2,3} 2/5 F, 4/10 F, 9/2x10 Franc ^{1,2,3} 2/5 F, 5/10 F, 11/2x10 Franc ^{2,3} 1/5 F, 3/10 Franc ^{2,3}	TARIF 1 TARIF 2 TARIF 3 TARIF 4 TARIF 5 TARIF 6									
Italy	500L	500L	500L	-	1/500 Lire ²	ITALY									
Spain	100 P 25 P 25 P 25 P 25 P	- - - - -	500 P 100 P 100 P 100 P 100 P	- - - - -	1/100 P, 6/500 Peseta ² 1/25 P, 5/100 Peseta 1/25 P, 4/100 Peseta 1/2x25 P, 2/100 Peseta 1/25x25 P, 3/100 Peseta	SPAIN CUSTOM CUSTOM CUSTOM CUSTOM	01	00	04	00	01	04	01	00	
Japan	100 ¥	-	100 ¥	-	1/100 Yen ²	JAPAN									
Chile	Token	-	Token	-	1/1 Token ²	CHILE									
Denmark	1 Kr	5 Kr	10 Kr	-	1/2x1 Kr, 3/5 Kr, 7/10 Krone ²	DENMARK									
Finland	1Mka	-	5 Mka	-	1/2x1 Mka, 3/5 Markka ²	FINLAND									
New Zealand	\$1.00 20¢	- -	\$2.00 20¢	- -	1/\$1.00, 3/\$2.00 1/3x20¢ ²	NEW ZEALAND CUSTOM	01	00	01	0	03	00	00	01	
Norway	5 Kr	-	10 Kr	-	1/5 Kr, 2/10 Kr, 5/20 Krone ²	NORWAY									
Argentina	10 ¢	10¢	10¢	-	1/1 Token ²	ARGENTINA									
Greece	10 D	20 D	50 D	-	1/2x10D, 1/20D, 3/50 Drachma ²	GREECE									

NOTES: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.
* Only if center coin chute and dollar bill acceptor are available.

A.4 H.S.T.D. Adjustments

A.4 01 Highest Scores

The game maintains a record of the four highest scores achieved to date.

- OFF - No high scores are recorded, or displayed.
- ON - The four highest scores are stored in memory and displayed in the Attract Mode.

A.4 02 H.S.T.D. Award

The award given for achieving the High Score To Date, or the Champion H.S.T.D: Credit or Ticket.

A.4 03 Champion H.S.T.D.

The "Highest" High Score is displayed in the Attract Mode. This score is not cleared when "High Score Reset Every" occurs.

- ON - The "Highest" High Score is retained in memory and is displayed.
- OFF - The "Highest" High Score is not retained.

A.4 04 Champion Credits

The operator chooses the number of credits or tickets awarded for a Grand Champion Score. Range: 00 - 10.

A.4 05 H.S.T.D. 1 Credits

A.4 06 H.S.T.D. 2 Credits

A.4 07 H.S.T.D. 3 Credits

A.4 08 H.S.T.D. 4 Credits

The number of credits or tickets to be awarded whenever a player exceeds the 1st, 2nd, 3rd, and 4th highest scores. Range: 00 - 10.

A.4 09 High Score Reset Every

The number of games to be played before an automatic reset of the displayed "Highest Score" occurs. The values provided upon reset are those selected by the operator in the Back-up High Scores. Range: OFF (disabled); 250 to 20,000.

A.4 10 Backup Champion

The Back-up Grand Champion Score. Range: 00 - 99,900,000.

A.4 11 Backup H.S.T.D. 1

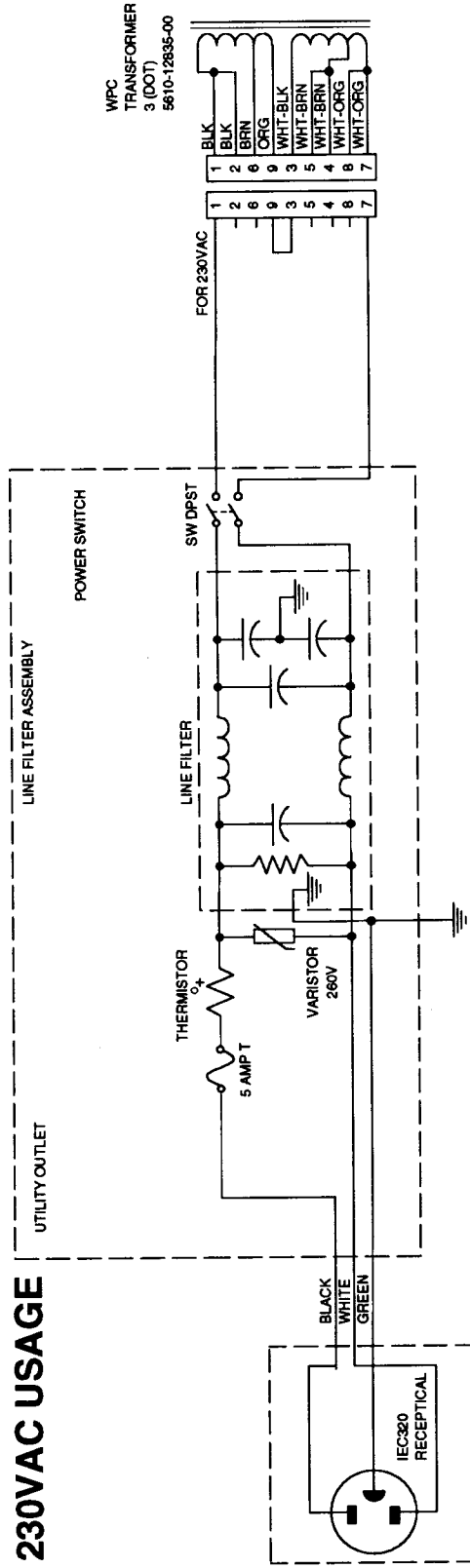
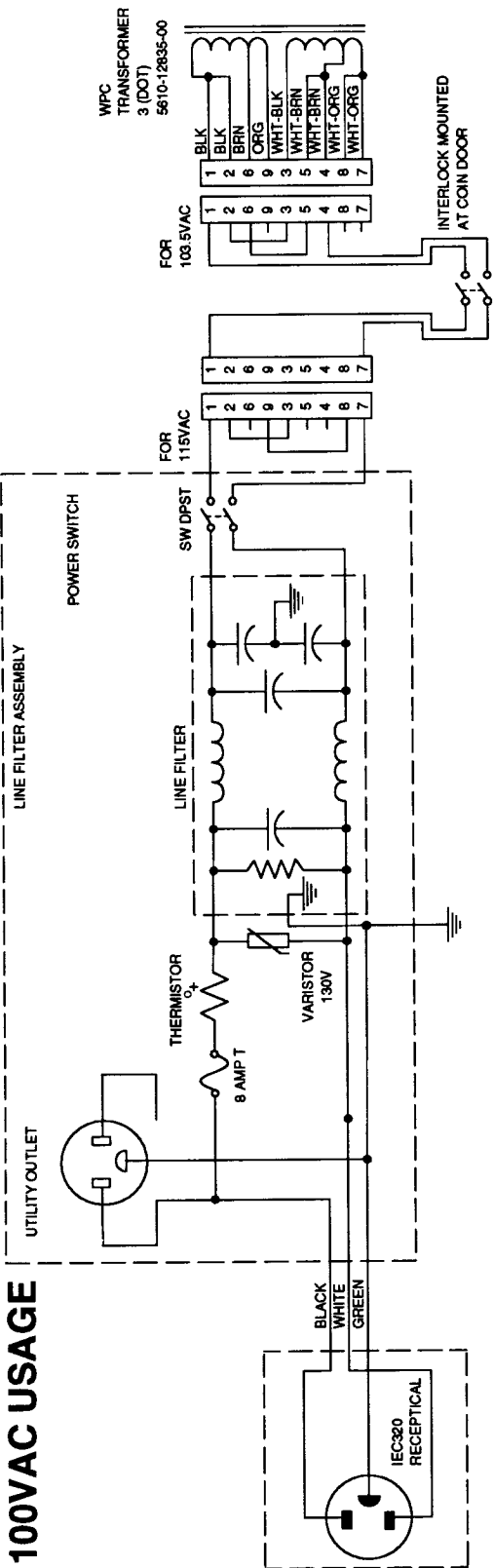
A.4 12 Backup H.S.T.D. 2

A.4 13 Backup H.S.T.D. 3

A.4 14 Backup H.S.T.D. 4

The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached. Range: 00 - 99,900,000.

POWER WIRING SCHEMATICS



LAMP MATRIX

Column	1	2	3	4	5	6	7	8	
Row	Q98 Yel-Brn J137-1	Q97 Yel-Red J137-2	Q96 Yel-Org J137-3	Q95 Yel-Blk J137-4	Q94 Yel-Grn J137-5	Q93 Yel-Blu J137-6	Q92 Yel-Vio J137-7	Q91 Yel-Gry J137-9	
1	Q90 Red-Brn J133-1	Special	Letter (S) INK	Bottom Standup Bottom	Middle Standup Top	Top Standup Bottom	Middle Ramp Jewel	Millions	Skill (Open)
2	Q89 Red-Blk J133-2	Jet Enter 8K	Letter S (I) NK	Bottom Standup Middle	Middle Standup Middle	Top Standup Middle	Top Loop Jewel	Rigging Swing	Skill (Locker)
3	Q88 Red-Org J133-4	Jet Enter 4K	Letter SI (N) K	Bottom Standup Top	Middle Standup Bottom	Top Standup Top	Top Standup Jewel	Treasure Chest	Middle Ramp 200K
4	Q87 Red-Yel J133-5	Jet Enter 2K	Letter SIN (K)	Right Ramp 100K	Left Outlane	Lockup 1	Broadside Jewel	Walk The Plank	Middle Ramp 300K
5	Q86 Red-Grn J133-6	Jet Enter 1K	Letter (S) HIP	Right Ramp 200K	Left Return Lane	Lockup 2	Bottom Standup Jewel	Instant Multi-ball	Middle Ramp 400K
6	Q85 Red-Blu J133-7	Jet Enter Jewel	Letter S (H) IP	Right Ramp 300K	Right Return Lane	Lockup Jewel	Right Ramp Coins	Knife Throw	Jackpot
7	Q84 Red-Vio J133-8	Combo Shot Right	Letter SH (I) P	Right Ramp 400K	Right Outlane	Left Ramp Coins	Sequence Shot 1	Polly	Insert Right
8	Q83 Red-Gry J133-9	Right Single Standup	Letter SHI (P)	Right Ramp Million	Shoot Again	Bottom Standup Jewel	Multi-ball Ready	Insert Left	Credit Button

SWITCH MATRIX

Dedicated Switches

UIC	Color	Function	Switch
U17-5	Org-Brn	Left Coin Chute	D1
U17-7	Org-Red	Center Coin Chute	D2
U17-11	Org-Blk	Right Coin Chute	D3
U17-9	Org-Yel	4th Coin Chute	D4
U16-9	Org-Grn	Normal Function Service Credits	D5
U16-11	Org-Blu	Normal Function Volume Down	D6
U16-7	Org-Vio	Normal Function Volume Up	D7
U16-5	Org-Gry	Normal Function Begin Test	D8

Column	1	2	3	4	5	6	7	8	
Row	U20-18 Grn-Brn J206-1	U20-17 Grn-Red J206-2	U20-16 Grn-Org J206-3	U20-15 Grn-Yel J206-4	U20-14 Grn-Blk J206-5	U20-13 Grn-Blu J206-6	U20-12 Grn-Vio J206-7	U20-11 Grn-Gry J206-9	
1	U18-11 Wht-Brn J206-1	Not Used	Slam Tilt	Bottom Standup Bottom	Middle Standup Top	Top Standup Bottom	Subway Top	Lockup Enter	Not Used
2	U18-9 Wht-Red J206-2	Not Used	Coin Door Closed	Bottom Standup Middle	Middle Standup Middle	Top Standup Middle	Backboard Ramp	Middle Ramp	Not Used
3	U18-5 Wht-Org J206-3	Start Button	Ticket Opto	Bottom Standup Top	Middle Standup Bottom	Top Standup Top	Lockup 1	Not Used	Not Used
4	U18-7 Wht-Yel J206-4	Plumb Bob Tilt	Always Closed	Fire Button	Left Ramp Enter	Ramp Down	Lockup 2	Not Used	Not Used
5	U19-11 Wht-Grn J206-5	Outhole	Shooter	Cannon Kicker	Top Left Loop	Ball Popper	Right Single Standup	Not Used	Not Used
6	U19-9 Wht-Blu J206-7	Right Trough	Left Outlane	Right Outlane	Left Jet	Right Ramp Made	Subway Bottom	Right Ramp Enter	Not Used
7	U19-5 Wht-Vio J206-8	Center Trough	Left Return Lane	Right Return Lane	Right Jet	Jet Bumpers Exit	Not Used	Not Used	Not Used
8	U19-7 Wht-Gry J206-9	Left Trough	Left Sling	Right Slingshot	Bottom Jet	Jet Bumper Enter	Not Used	Not Used	Not Used

Flipper Switches

U4A-5 Blk-Grn J906-1	Right Flipper End of Stroke	F1
U4B-7 Blu-Vio J905-1	Right Flipper Opto	F2
U4C-9 Blk-Blu J906-3	Left Flipper End of Stroke	F3
U4D-11 Blu-Gry J905-2	Left Flipper Opto	F4
U6A-5 Blk-Vio J906-4	Upper Right Flipper End of Stroke	F5
U6B-7 Blk-Yel J905-3	Upper Right Flipper Opto	F6
U6C-9 Blk-Gry J906-5	Upper Left Flipper End of Stroke	F7
U6D-11 Blk-Blu J905-5	Upper Left Flipper Opto	F8

WARNINGS & NOTICES

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