



Operations Manual Includes
Operations & Adjustments
Testing & Problem Diagnosis
Parts Information
Wiring Diagrams & Schematics

Williams Electronics Games, Inc.



FLIPPERSPILL.COM

Jumper Charts

ROM	W1	W2
1M / 2M	In	Out
512 / 1M	Out	In

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

Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color	Connections Playfield - Insert - Hood	Driver Trnstr	Solenoid Part Number Flashlamp Type
01	Backbox Motor	High Power	Vio-Brn	J132-1	Q82	A-14750
02	Left Bank	High Power	Vio-Red	J130-2	Q80	AE-26-1200
03	Not Used	High Power	Vio-Org		Q78	
04	Left Juggler	High Power	Vio-Yel	J130-5	Q76	AE-24-900
05	Right Juggler	High Power	Vio-Grn	J130-6	Q64	AE-26-1500
06	Ferris Wheels	High Power	Vio-Blu	J130-7	Q66	A-14593-1
07	Knocker	High Power	Vio-Blk	J130-8	Q68	AE-23-800
08	Not Used	High Power	Vio-Gry		Q70	
09	Outhole	Low Power	Brn-Blk	J127-1	Q58	AE-27-1200
10	Ball Release	Low Power	Brn-Red	J127-3	Q56	AE-26-1200
11	Left Slingshot	Low Power	Brn-Org	J127-4	Q54	AE-25-1500
12	Right Slingshot	Low Power	Brn-Yel	J127-5	Q52	AE-26-1500
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		Q44	
17	Right Side Flasher	Flasher	Blk-Brn	J126-1 J125-1	Q42	#906 2 PL - 1 BB
18	Top Right Flasher	Flasher	Blk-Red	J126-2 J125-2	Q40	#906 2 PL - 1 BB
19	All Scores X5 Flasher	Flasher	Blk-Org	J126-3 J125-3	Q38	#906 1 PL - 1 BB
20	Comet Million Flasher	Flasher	Blk-Yel	J126-4 J125-5	Q36	#906 1 PL - 1 BB
21	Jackpot Flasher	Special	Blu-Grn	J126-5 J125-6	Q28	#906 1 PL - 1 BB
22	Ferris Wheel Flasher	Special	Blu-Blk	J126-6 J125-7	Q30	#906 1 PL - 1 BB
23	Top Left Flasher	Special	Blu-Vio	J126-7 J125-8	Q34	#906 2 PL - 1 BB
24	Left Return Flasher	Special	Blu-Gry	J126-8 J125-9	Q32	#89/#906 1 PL - 1 Hood
25	Right Return Flasher	Special	Blu-Brn	J122-1 J123-1	Q26	#89/#906 1 PL - 1 Hood
26	Jet Bumper Flasher	Special	Blu-Red	J122-2 J123-3	Q24	#906 1 PL - 1 BB
27	Dunk the Dummy Flasher	Special	Blu-Org	J122-3 J123-4	Q22	#89/#906 1 PL - 1 BB
28	Left Side Flasher	Special	Blu-Yel	J122-4 J123-5	Q20	#89/#906 1 PL - 1 BB
General Illumination				Playfield - Insert - Cabinet		
01	Backbox G.I.	G.I.	Wht-Brn	J121-7	Q18	#555
02	Backbox G.I.	G.I.	Wht-Org	J121-8	Q10	#555
03	Playfield G.I.	G.I.	Wht-Yel	J120-9	Q14	#44
04	Backbox G.I.	G.I.	Wht-Grn	J121-10	Q16	#555
05	Playfield G.I.	G.I.	Wht-Vio	J120-11 J119-1	Q12	#44
	Lower Right Flipper		Blu-Yel	J109-7		FL-11630
	Lower Left Flipper		Gry-Yel	J109-5		FL-11630

Williams Electronics Games, Inc. reserves the right to make modifications and improvements to its product.

The specifications and parts identified in this manual are subject to change without notice.

Contents

Rules & Playfield Shots	A- I
Section 1 - Game Operation & Test Information	
(System WPC) ROM Summary	1-1
Pinball Game Assembly Instructions	1-2
Figure 1. Pinball Assembly, Playfield Pitch Angle, and Leg Levelers Detail	1-2
Game Control Locations	1-4
Figure 2. Pinball Game Control Locations	1-4
Game Operation	1-5
Menu System Operation	1-7
Main Menu	1-7
Bookkeeping Menu	1-8
Main Audits	1-8
Earnings Audits	1-9
Standard Audits	1-9
Feature Audits	1-10
Histograms	1-11
Time-Stamps	1-11
Printouts Menu	1-12
Test Menu	1-13
Switch Edges, Switch Levels & Single Switch Tests	1-13
Solenoid Test	1-14
Flasher Test	1-14
General Illumination Test	1-15
Sound and Music Test	1-15
Single Lamp, All Lamp, and Flasher and Lamp Test	1-16
Display Test	1-16
Utilities Menu	1-17
Clear Audits & Coins, Reset H.S.T.D & Time-Date, Message, Game I.D.	1-17
Factory Adjusts, Factory Reset & Setting Table, Presets	1-18
Game Difficulty Table for U.S./Canadian & French Games	1-19
Game Difficulty Table for German/European Games	1-21
Preset U.S./Canadian Games, Install Add-A-Ball	1-21
Install Ticket, Novelty, Buy-in	1-22
Preset German Games	1-23
Preset French Games, Clear Credits, Auto Burn-in	1-24
Adjustment Menu	1-25
Standard Adjustments Menu	1-25
Feature Adjustments	1-29
Pricing Adjustments	1-31
Pricing Table	1-33
H.S.T.D. Adjustments	1-34
Printer Adjustments	1-35
Problem Analysis	1-36
CPU Board & Sound Board Error Codes	1-37
Maintenance Information	1-38
Fuse List	1-39
L.E.D. List	1-40

Contents

Section 2 - Game Parts Information

Cabinet Parts	2-2
Backbox Assembly.	2-3
Location Diagram	2-4
Audio Board.	2-5
CPU Board.	2-6
Power Driver Board	2-8
Dot Matrix Controller Board	2-10
Coin Door Interface, Opto Ramp Switch Assembly	2-12
Relay, 3-bank Target Opto Board.	2-13
Flippers	2-14
Shooter Lane Feeder & Outhole Kicker.	2-16
Kicker (sling) Assembly.	2-17
Jet Bumper Assembly.	2-18
Ball Popper, Knocker Assembly	2-19
Ball Eject Assembly.	2-20
3-Bank Drop Target Assembly.	2-21
Disc & Motor Assembly	2-22
Ferris Wheel Assembly	2-23
Coin Door Assembly.	2-24
Posts	2-26
Juggler Assembly, Cable List.	2-28
Trough Switches, Standup Target	2-29
Playfield Parts.	2-30
Lamp Locations	2-32
Switch Locations	2-33
Solenoid/Flasher Location.	2-34
Rubber Rings Locations.	2-35
Unique Parts	2-36

Section 3 - Wiring Diagrams And Schematics

Connector & Component Identification	3-1
Switch Circuits	3-2
Lamp Circuits.	3-4
Solenoid Circuits	3-6
Solenoid Wiring	3-9
Switch & Lamp Interboard Wiring	3-10
Solenoid & Flipper Interboard Wiring	3-11
General Illumination, Power Circuits & Logic Circuits.	3-12
Display & Sound Circuits.	3-13
Flipper Circuit Wiring	3-14
Coin Door Interface Board Schematic & Wiring	3-15
3-Bank Drop Target Opto Board Schematic & Wiring	3-16
Relay Board Schematic & Wiring	3-17
Ramp Switch Opto Board Schematic & Wiring	3-18

Hurricane

Rules

&

Shot Maps

HURRICANE RULES

SKILL SHOT

Entry shot goes to the left flipper & lites 'HURRICANE' Ramp for 250K. Each consecutive "SKILL SHOT" is increased by 250K, up to 1 Million.

"HURRICANE RAMP"

When lit, consecutive shots up the HURRICANE RAMP scores and increases value; 200K - 225K - 250K - 275K (adj. shots to reach million) - 1 Million - 1 Million & Spot Letter in "P-A-L-A-C-E".

When lit, ramp also starts "CLOWN TIME" (see below) & scores SPECIAL. Four right targets re-lite ramp.

PALACE' & 'JACKPOT'

Spelling P-A-L-A-C-E lites "JUGGLER" for 'JACKPOT'. Both banks lite HURRICANE Ramp to spot letter in "P-A-L-A-C-E".

"JUGGLER", 'MULTI-BALL' & 3 BANK

Making 3 bank lites a lock lite on "JUGGLER". Locking two balls in "JUGGLER" releases the third ball for 3 ball Multi-Ball. During Multi-Ball "HURRICANE" Ramp scores 1, 2 & 5 Million for consecutive shots, then 1, 2 & 5 Million thereafter. Loading 2 or 3 balls, at the same time, onto the "FERRIS WHEEL" scores 1 & 2 Million respectively. At the end of Multi-Ball, for every second that Multi-Ball has been played, you will receive that much time in multiple playfield scores; X2 - X3 - X5. Multiplier value is selected at random.

SPECIAL

SPECIAL lites at the start of the third Multi-Ball. (Operator adjustable Feature.)

"COMET RAMP"

When lit, "COMET RAMP" scores and advances value with consecutive shots; 50K - 100K - 200K - 300K - Unlimited Million.

"DUNK THE DUMMY", BONUS 'X' & EXTRA BALL

Hit the target once to lite it and a second time to "DUNK THE DUMMY" which will advance BONUS MULTIPLIER; 2X - 3X - 4X - 5X - 6X - 500K - 1 Million. Flashing multiplier lites one of four lower lanes for EXTRA BALL.

"FERRIS WHEELS"

Left 3 bank lites "FERRIS WHEELS" to score "FERRIS WHEEL BONUS", which is increased by jet bumpers. Right return lane lites FERRIS WHEEL "Quick Score" for 200K and increases by 50K for each shot thereafter.

"MYSTERY ?" & 4 BANK

Four right targets lite 'JUGGLER' for MYSTERY SCORE. Playfield scores X2 - X3 - Points - Advance 'X' - Spot Letter In P-A-L-A-C-E - Lite Lock - Extra Ball - Special, Etc.

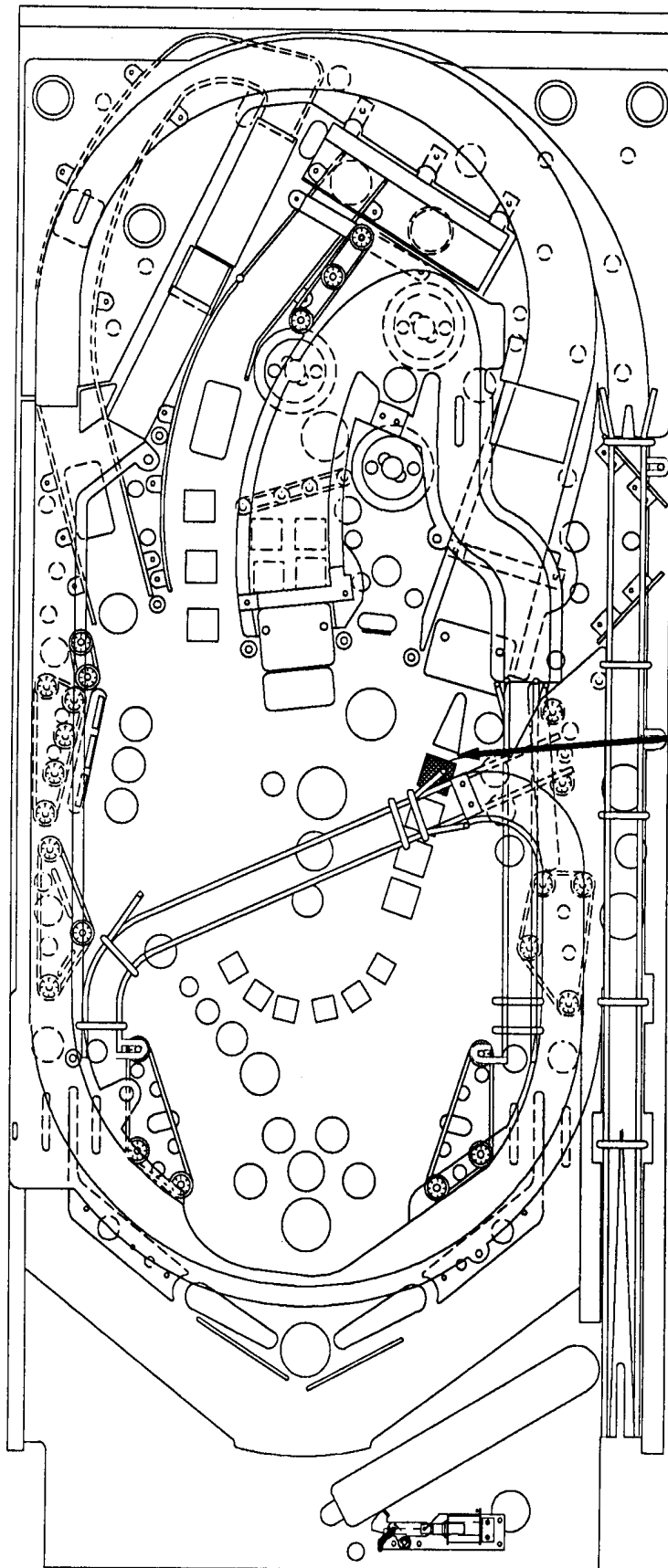
"CLOWN TIME" & CLOWN FACE

Lighting all 6 parts of the 'CLOWN FACE' lites the "HURRICANE RAMP" to start "CLOWN TIME" for timed interval (adjustable).

CLOWN FACE: Left Cheek - Left 3 Bank, Right Cheek - Right 4 Bank, Left Eye - 'FERRIS WHEELS', Right Eye - 'HURRICANE' Ramp (when lit), Nose - Dunk the Dummy, Mouth - 300K shot on 'COMET' Ramp.

During "CLOWN TIME" all targets score 50K each and all major shots score increasing values for consecutive shots.

Hurricane Skill Shot

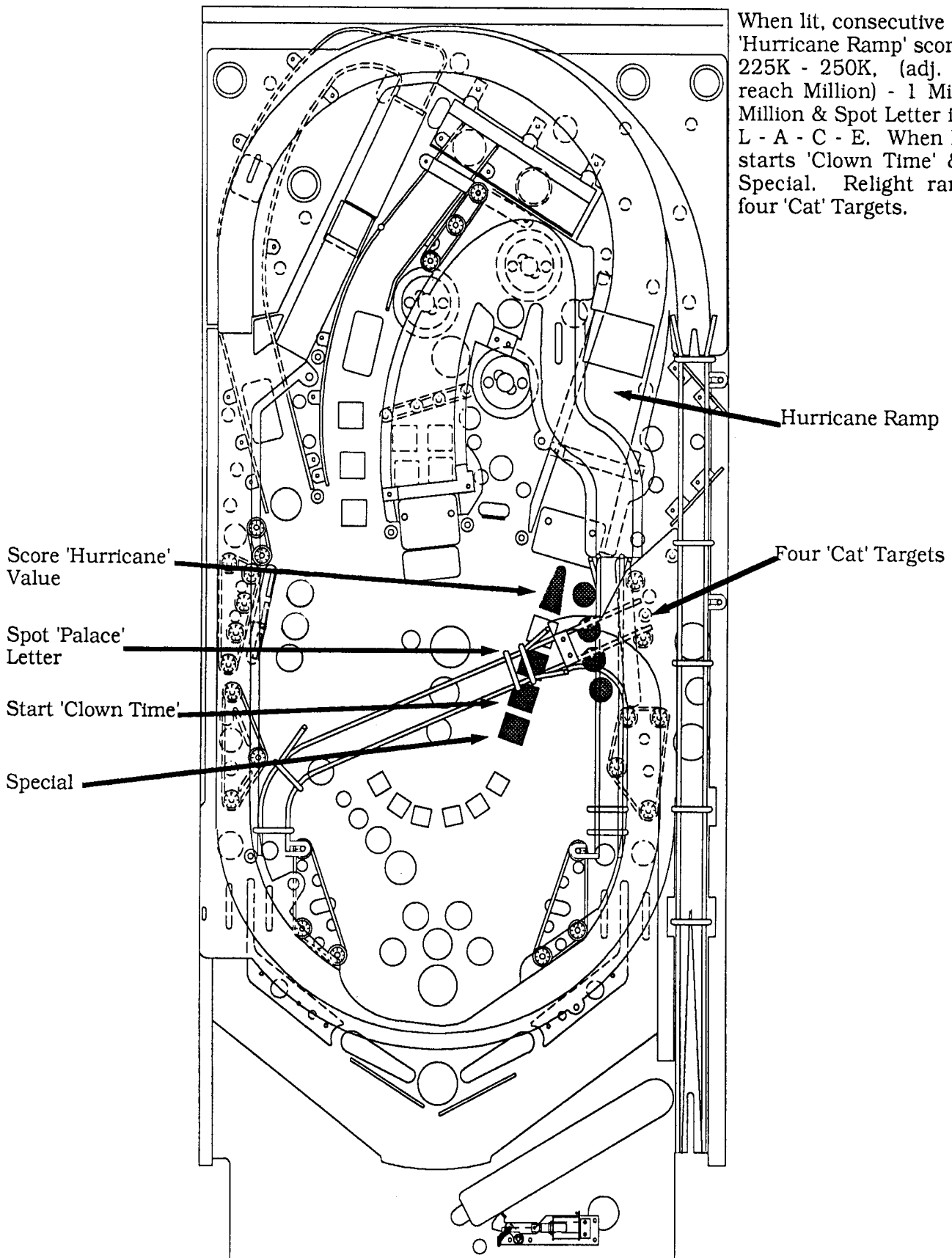


Plunger shot goes to the
Left Flipper & lights
Hurricane Ramp for
250K. Each consecutive
'Skill Shot' increases by
500K - 1M - 1.5M - 2M -
etc.

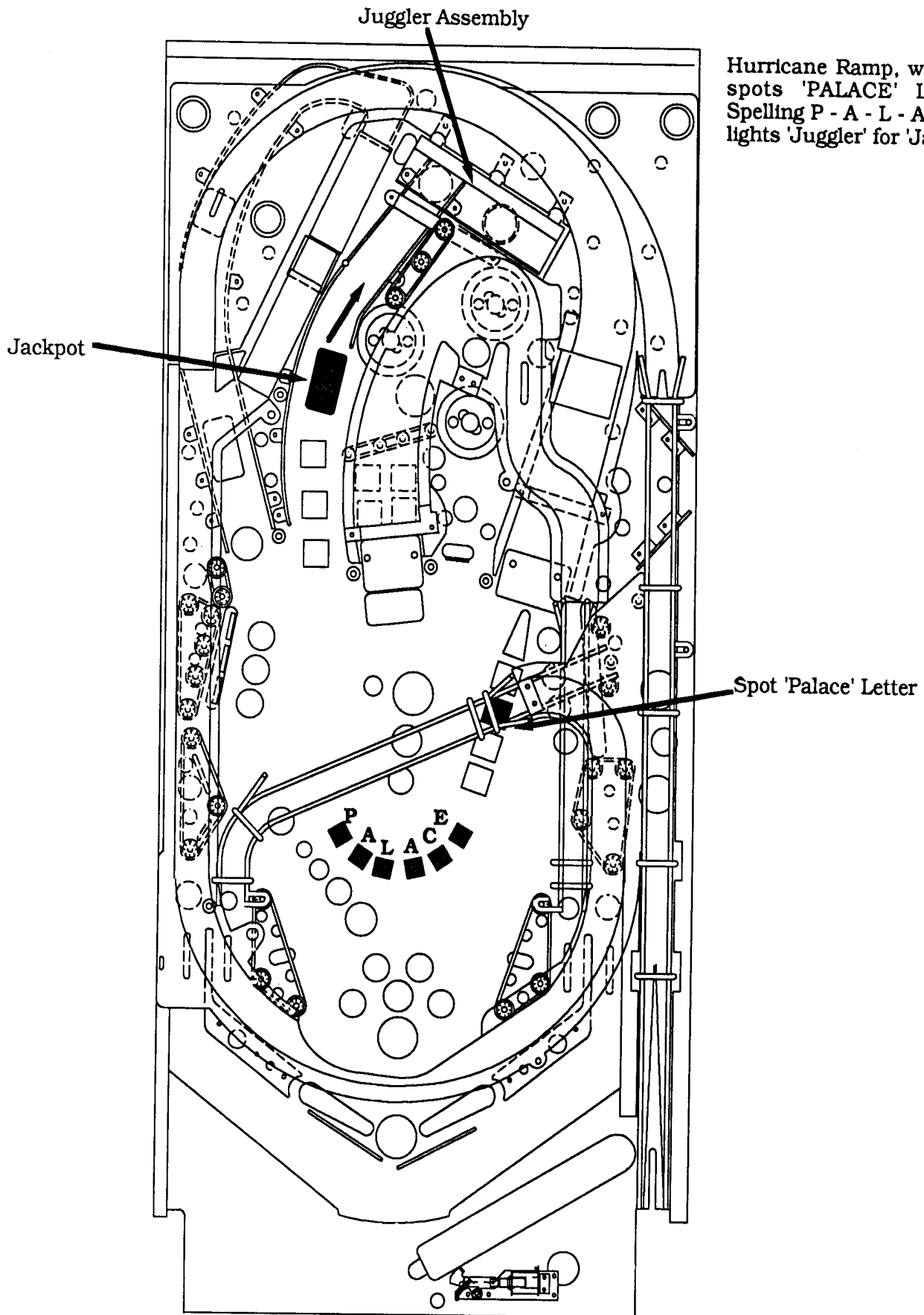
Skill Shot

Hurricane Hurricane Ramp

When lit, consecutive shots up 'Hurricane Ramp' score 200K - 225K - 250K, (adj. shots to reach Million) - 1 Million - 1 Million & Spot Letter in P - A - L - A - C - E. When lit, ramp starts 'Clown Time' & scores Special. Relight ramp with four 'Cat' Targets.

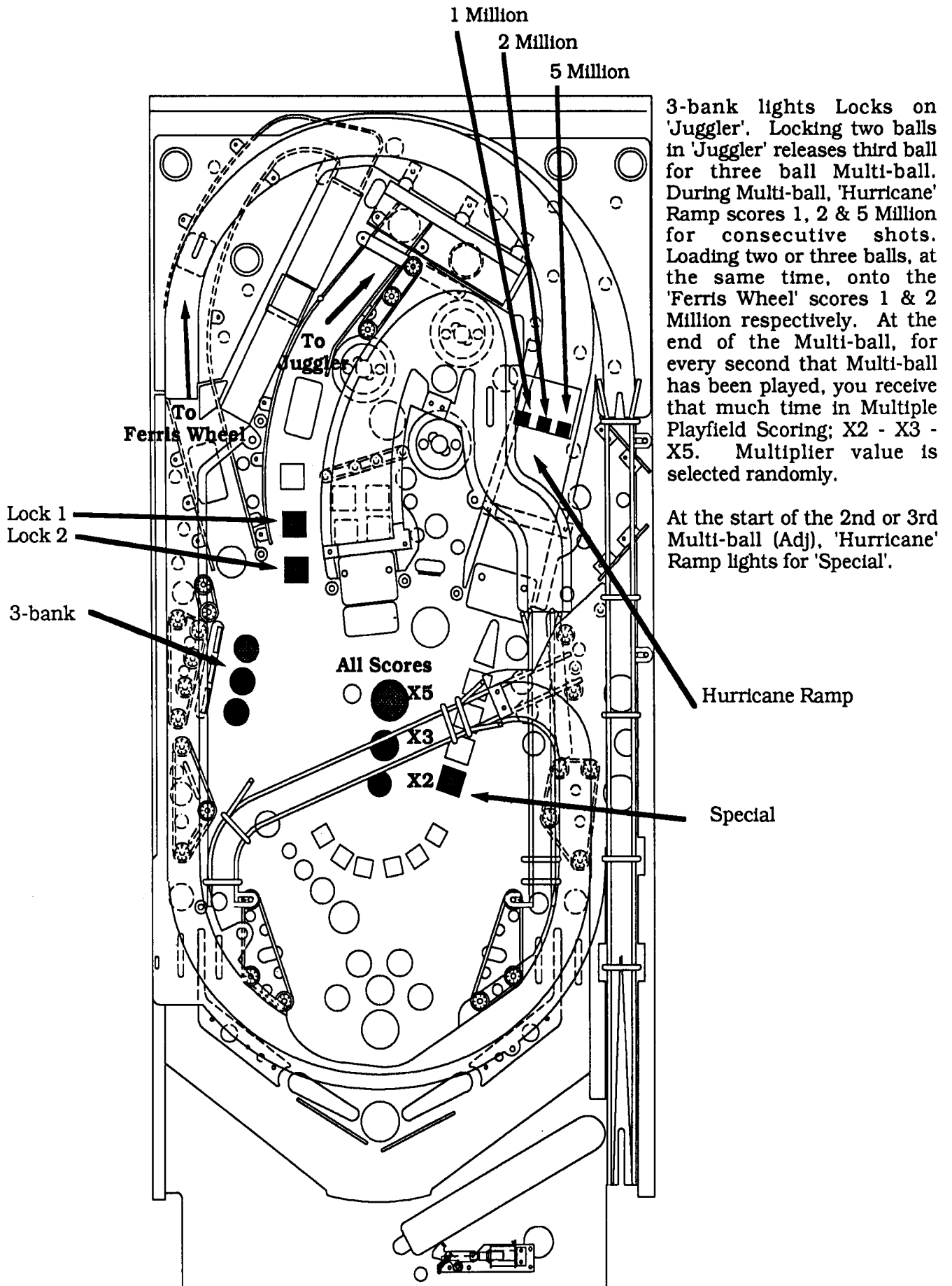


Hurricane Palace & Jackpot



Hurricane Ramp, when lit,
spots 'PALACE' Letters.
Spelling P - A - L - A - C - E
lights 'Juggler' for 'Jackpot'.

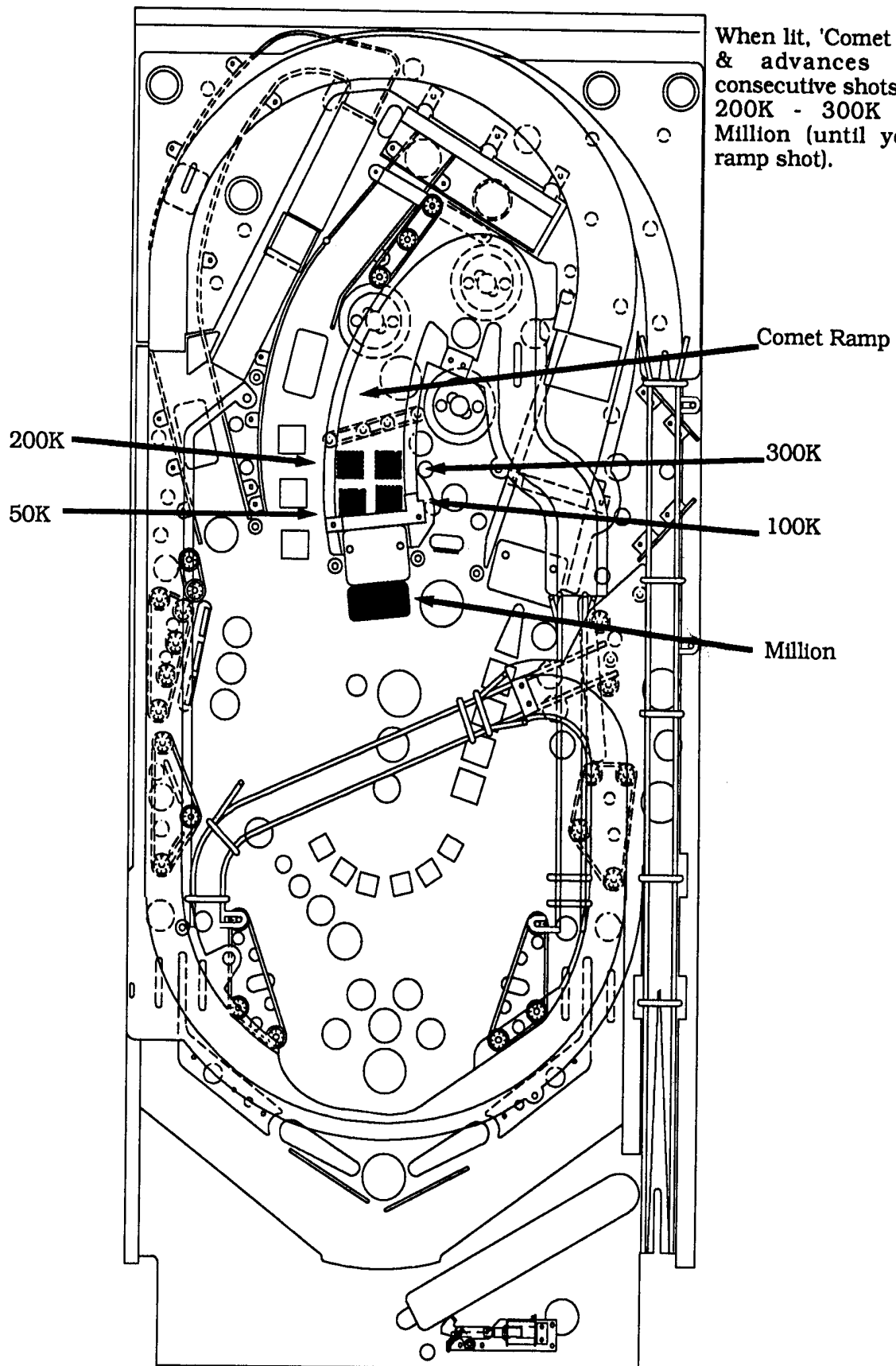
Hurricane Juggler & Multi-ball & Special



3-bank lights Locks on 'Juggler'. Locking two balls in 'Juggler' releases third ball for three ball Multi-ball. During Multi-ball, 'Hurricane' Ramp scores 1, 2 & 5 Million for consecutive shots. Loading two or three balls, at the same time, onto the 'Ferris Wheel' scores 1 & 2 Million respectively. At the end of the Multi-ball, for every second that Multi-ball has been played, you receive that much time in Multiple Playfield Scoring; X2 - X3 - X5. Multiplier value is selected randomly.

At the start of the 2nd or 3rd Multi-ball (Adj), 'Hurricane' Ramp lights for 'Special'.

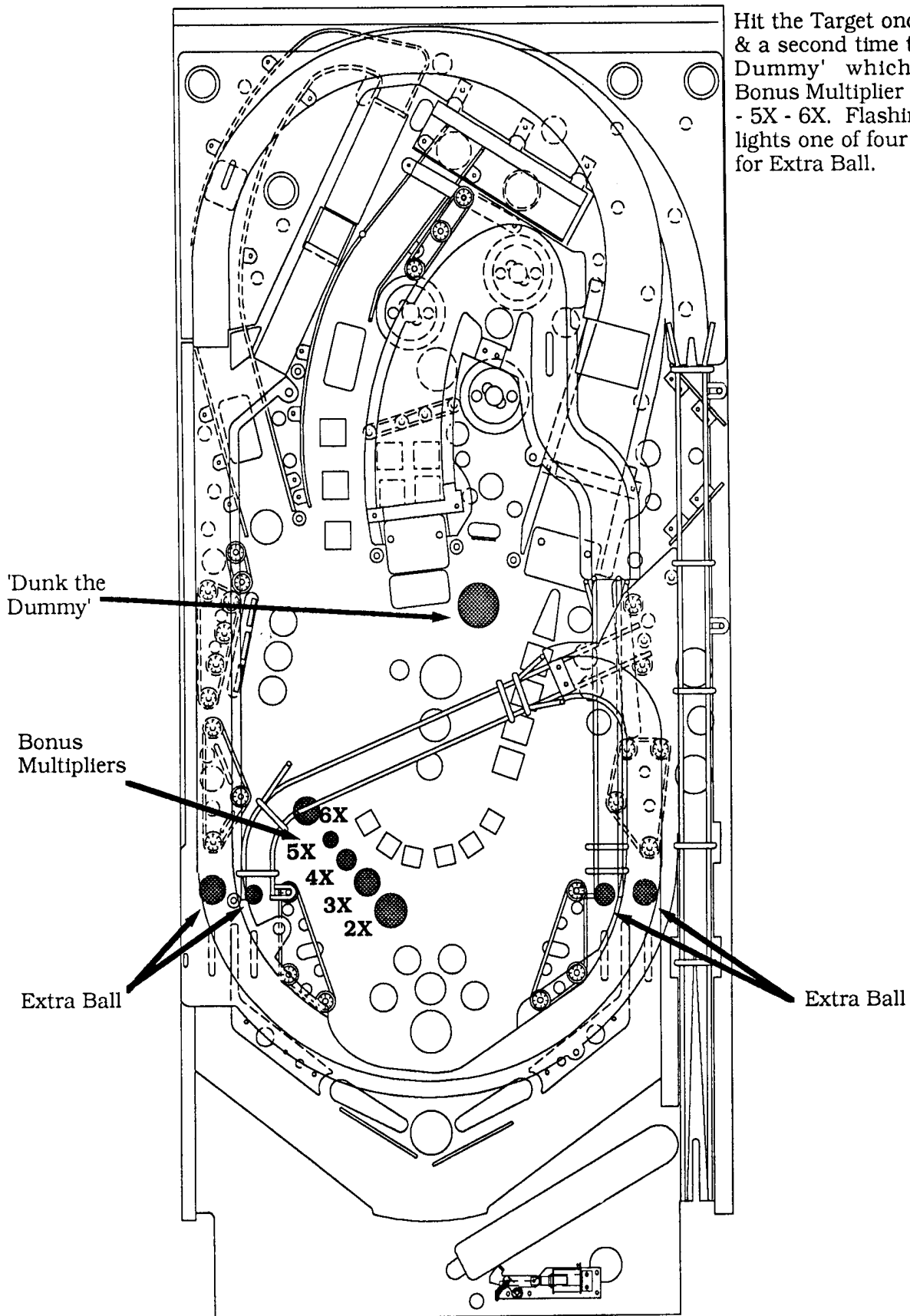
Hurricane Comet Ramp



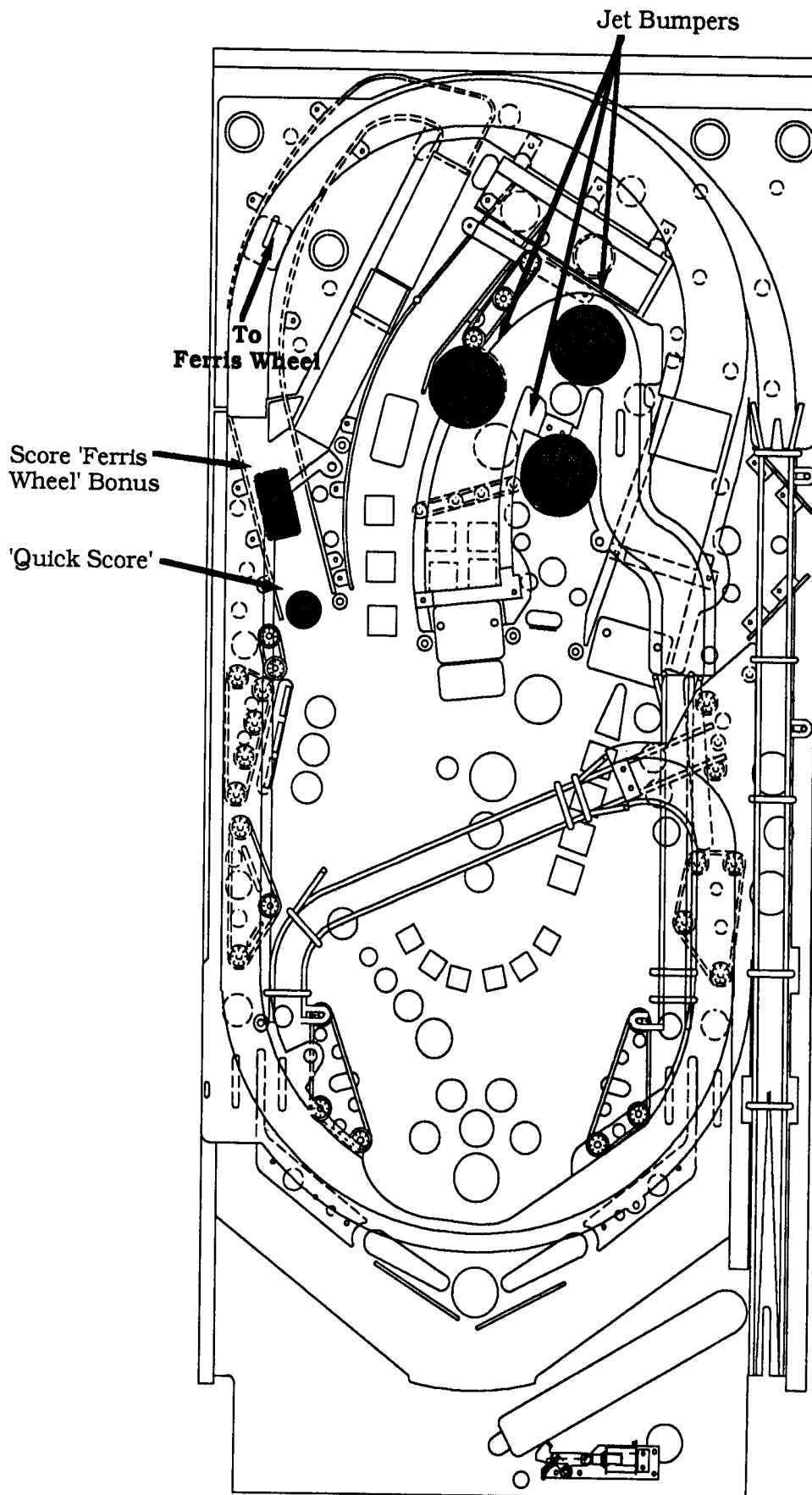
When lit, 'Comet Ramp' scores & advances value with consecutive shots 50K - 100K - 200K - 300K - unlimited Million (until you miss the ramp shot).

Hurricane

Dunk the Dummy, Bonus X & Extra Ball

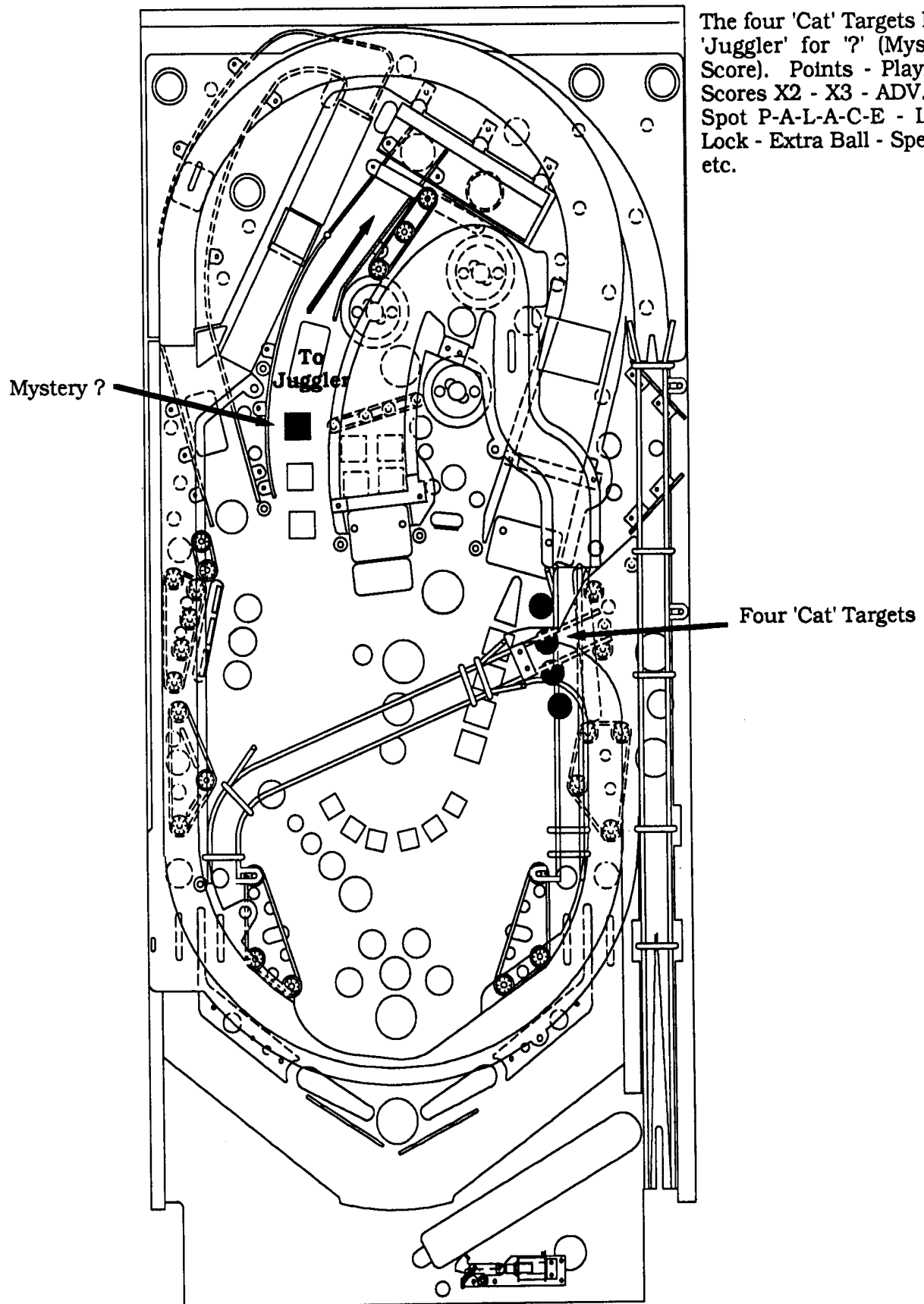


Hurricane Ferris Wheel



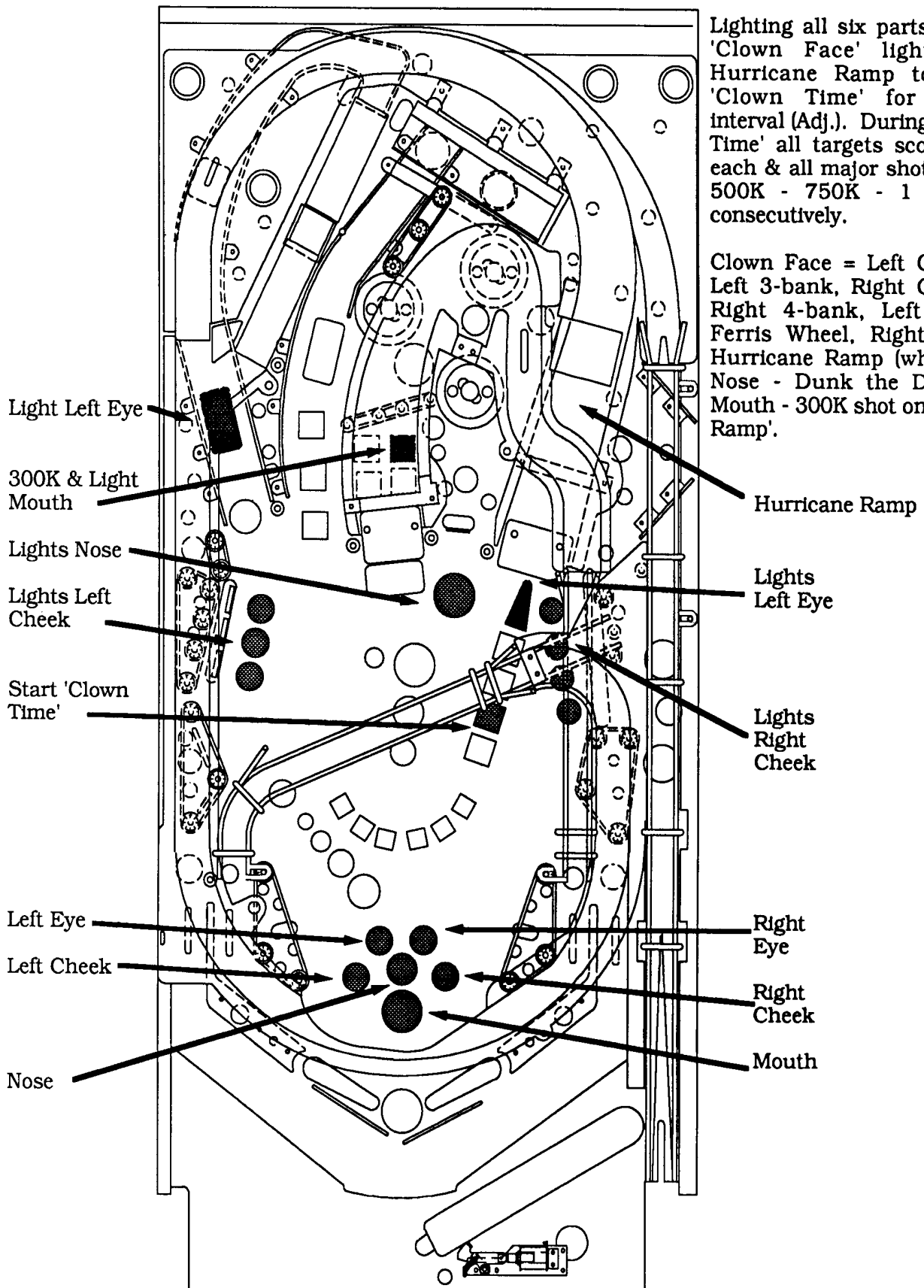
Left 3-bank lights 'Ferris Wheel' to score 'Ferris Wheel Bonus', which is increased by Jet Bumpers. Right Return Lane lights 'Quick Score' for an additional 200K & increases for each 'Quick Score' thereafter.

Hurricane Mystery ?



The four 'Cat' Targets light 'Juggler' for '?' (Mystery Score). Points - Playfield Scores X2 - X3 - ADV. 'X' - Spot P-A-L-A-C-E - Light Lock - Extra Ball - Special, etc.

Hurricane Clown Time



Lighting all six parts of the 'Clown Face' lights the Hurricane Ramp to start 'Clown Time' for timed interval (Adj.). During 'Clown Time' all targets score 50K each & all major shots score 500K - 750K - 1 Million consecutively.

Clown Face = Left Cheek - Left 3-bank, Right Cheek - Right 4-bank, Left Eye - Ferris Wheel, Right Eye - Hurricane Ramp (when lit), Nose - Dunk the Dummy, Mouth - 300K shot on 'Comet Ramp'.

Section 1

Game Operation Information



Assembly & Operation

Hurricane WPC ROM Summary

Game Assembly Instructions

Game Play

Menu System Operation

Audits

Test/Diagnostic Procedures

Utilities

Adjustments

ROM SUMMARY				
IC	Type	Location	Board	Part Number
Game ROM 1	27020	U6	CPU	A-5343-50012-1
Music/Speech ROM 2	27010	U14	Audio	A-5343-50012-2
Music/Speech ROM 3	27010	U15	Audio	A-5343-50012-3
Music/Speech ROM 4	27010	U18	Audio	A-5343-50012-4

NOTICE

To order a replacement ROM from your authorized WILLIAMS ELECTRONICS GAMES distributor, specify: (1) part number (if available); (2) ROM label color; (3) ROM level (number) on the label; (4) which game the ROM is used in.

Pinball Game Assembly Instructions

CAUTION

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

Hurricane is a three ball game.

1. Remove all cartons, parts, and other 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 Figure 1 for details.

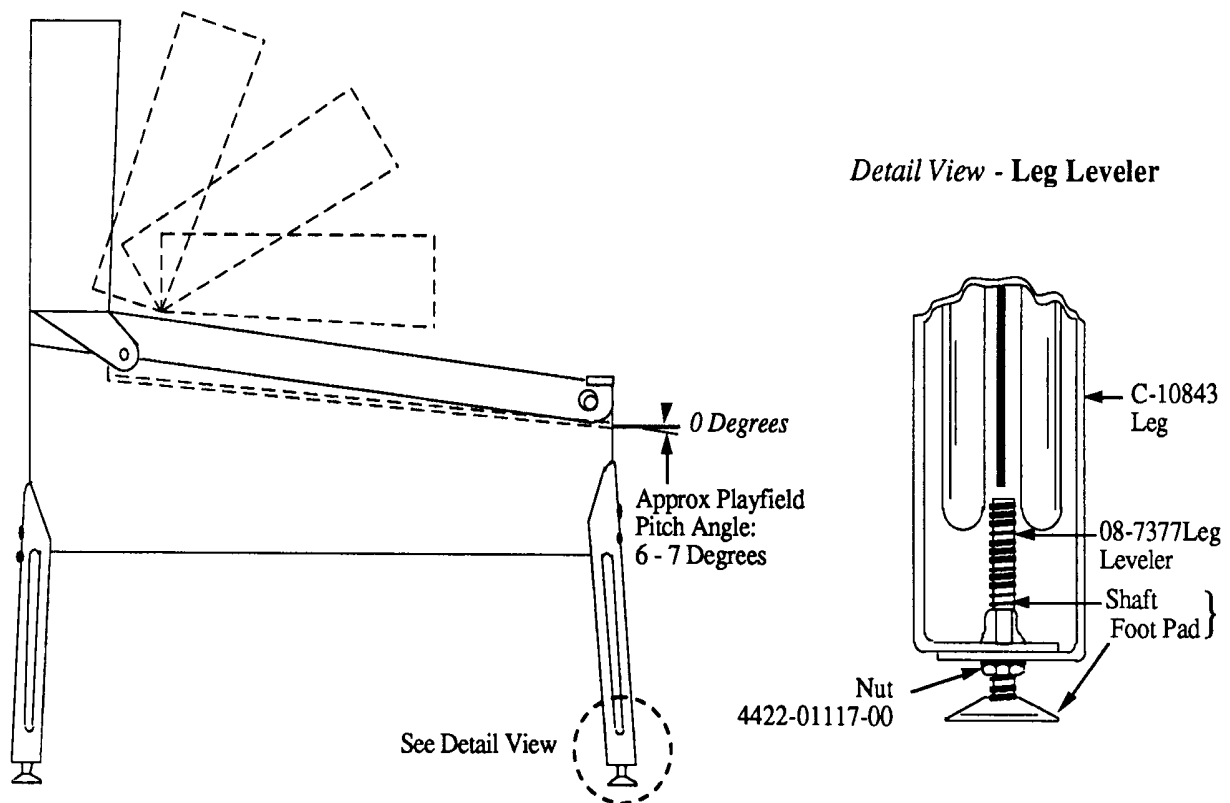


Figure 1. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

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. Carefully lift up the Speaker Panel and lay it down on the playfield glass. (Be careful not to damage the Dot Matrix Display/Driver.) This allows access to the bolt holes used for securing the backbox upright. To secure the backbox, install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet. Close the Insert Board and latch it in position. Replace the Speaker Panel. 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 toward 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) and playfield pitch angle (incline) of approximately 6-7 degrees.

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, as shown in Figure 1.

! IMPORTANT !

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.

9. Move the game into the desired location; recheck the level and pitch angle of the playfield.

10. Verify that the required number of balls are installed in the game. Hurricane uses 3 balls.

11. Install playfield mylars if desired.

Note: The **Hurricane** playfield is coated with a covering called Diamond Plate™ and does not require a protective mylar. However, mylars can be purchased through your local Williams Distributor. Specify part number 03-7960-50012-1 for full playfield mylar.

12. Clean and reinstall the playfield cover glass, reversing the procedure of step 7. Prepare the game for player operation.

Control Locations

Cabinet Switches

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

The Start Button is a 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 Switch puts credits on the game that are not included in the game audits.

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

The Volume Down Switch 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 Switch starts the Menu System Operation and changes the Coin Door Switches from Normal Function to Test Function.

Test Function

The Escape Switch allows you to get out of a menu selection or return to the Attract Mode.

The Up Switch allows you to cycle forward through the menu selections or adjustment choices.

The Down Switch allows you to cycle backward through the menu selections or adjustment choices.

The Enter Switch allows you to get into a menu selection or lock in an adjustment choice.

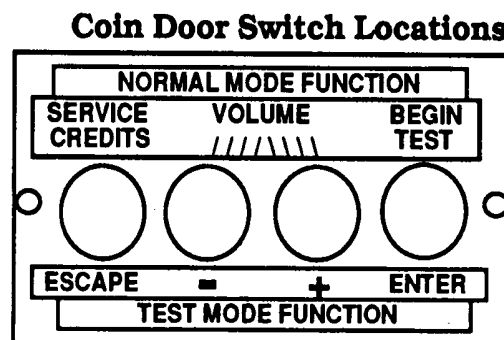


Figure 2. Coin Door Switches

Game Operation

CAUTION

After assembly and installation at its 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, using the On-Off switch. In normal operation, Testing shows in the displays as the game performs Start-up Tests. Once the Start-up Tests have been successfully completed the last score is displayed. After that, the game goes into the Attract Mode (playfield and backbox lamps flashing, sounds being heard, etc., if the operator does not change the Factory Setting).

Note: After the game has been on location for a period of time, the Start-up Tests may contain messages concerning game problems. The section entitled 'Problem Analysis Messages' contains more details concerning messages displayed at each game turn-on.

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

Example:	Hurricane	Sound Rev. L-1
50012	Rev. L-X	SY. 0X0 X-X-91

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 that the game is operating satisfactorily. Successful completion of the tests in the Test Menu routine shows that the game is ready to begin earning your investment return.

Attract Mode*. After completing the Test Menu routine, press the Escape button three times to enter the Attract Mode. During the Attract Mode, playfield and backbox lamps blink. The player score displays exhibit a series of messages informing the player concerning:

- A. Recent highest scores*;
- B. A "custom message"
- C. The score to achieve to obtain a Replay award*;

These (or similar) displays reappear occasionally, accompanied by sounds and music, until a player initiates game play by inserting a coin, or when credits are available, pressing the Start button.

Credit Posting. Insert coin(s). A sound is heard for each coin, and the player score 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. Additional players may enter the game by pressing the Start button once for each player, before the end of play on the first ball.

* - operator-adjustable feature

Tilts Actuating the Slam Tilt switch on the coin door inside the cabinet ends the current game and then 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 a 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 display (1 through 4) match the random digits. Match, high score, and game over sounds are made, as appropriate.

Game Over Mode. The **Game Over** display shows in the display. Then, the high scores flash. The game proceeds to the Attract Mode.

* - operator-adjustable feature

Menu System Operation

Hurricane 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-Stamp	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-Stamp
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 and Music Test
T.8	Single Lamps
T.9	All Lamps
T.10	Lamp & Flasher Test
T.11	Display 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; (ex. A.1, A.2, A.3, A.4).

Press Down

Decreases sequence; (ex. A.4, A.3, A.2, A.1).

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

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

Hurricane 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. To return to the Attract Mode while viewing the Main Menu, or to return to a previous menu selection, press the Escape button. Press the Start button for HELP at any time.

Main Menu

- B. Bookkeeping**
- P. Printouts** (optional board required)
- T. Tests**
- U. Utilities**
- A. Adjustments**

The game 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 Bookkeeping Menu selections. Press the Enter button to activate the desired Bookkeeping Group when that group appears in the displays.

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**

Once you have entered the desired Bookkeeping Group, press the Up or Down button to cycle through the audits in that group. Audits cannot be set, they can only be cleared by using U1 and U2 from the Utilities Menu.

One-Button Audit System

Information from the Bookkeeping Menu is obtainable directly from the Attract Mode. Continually pressing the Enter button, while in the Attract Mode, will cycle through all of the game audits.

B.1 Main Audits

These audits (which appear in other groups) are the most important, and are grouped here for easier access.

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

Press the Escape button to return to the Bookkeeping Menu. Press the Up button to advance to the next desired Bookkeeping Group, (or press the Down button to return to a previous group). Press the Enter button to activate that group. Press the Up or Down button to cycle through the available audits in that group.

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	* Note: These Audits are NOT Resettable. They are a record of the earnings of the game since the "CLOCK 1ST SET" Time -Stamp.
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	

Press the Escape button to return to the Bookkeeping Menu. Press the Up button to advance to the next desired Bookkeeping Group, (or the Down button to return to a previous group). Press the Enter button to activate. Press the Up or Down button to cycle through the available audits.

B.3 Standard Audits

B.3	01	Games Started	00	•As a new WPC feature, the "Total Plays" counter only counts completed games. A game is considered completed when the final ball begins. Audit information from an incomplete game is ignored. Therefore operation for test and service do not affect the Audits.
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 Standard Audits continued

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

Press the Escape button to return to the Bookkeeping Menu. Press the Up button to advance to the next desired Bookkeeping Group, (or press the Down button to return to a previous group). Press the Enter button to activate that group. Press the Up or Down button to cycle through the available audits in that group.

B.4 Feature Audits

B.4	01	Left Flippers	00	# of Left Flipper Hits
B.4	02	Right Flippers	00	# of Right Flipper Hits
B.4	03	Palace Letters	00	# of Palace Letters made
B.4	04	Jackpot Lit	00	# of times Jackpot is Lit
B.4	05	Jackpots	00	# of times Jackpot is scored
B.4	06	Clown Time	00	# of times Clown Time is started
B.4	07	Clown Tricks	00	# of total Clown Tricks
B.4	08	Left Drop Bank	00	# of times Left Bank is completed
B.4	09	Right Standups	00	# of times Right Bank is completed
B.4	10	Ferris Wheels	00	# of any balls in the Ferris Wheel
B.4	11	Multi-balls	00	# of total Multi-balls
B.4	12	M.B. Hurricane Ramp	00	# of Hurricane Ramps made during M.B.
B.4	13	Hurricane Ramps	00	# of any Hurricane Ramps made
B.4	14	Hurricane Millions	00	# of Hurricane Ramps worth 1 Million
B.4	15	Comet Ramps	00	# of any Comet Ramps made
B.4	16	Comet Million	00	# of Comet Ramps worth 1 Million
B.4	17	Skill Shot Award	00	# of completed Skill Shots
B.4	18	Bonus 2X	00	# of Balls worth 2X
B.4	19	Bonus 3X	00	# of Balls worth 3X
B.4	20	Bonus 4X	00	# of Balls worth 4X
B.4	21	Bonus 5X	00	# of Balls worth 5X
B.4	22	Bonus 6X	00	# of Balls worth 6X or more
B.4	23	Mystery Wheel	00	# of times Mystery Wheel is made

Press the Escape button to return to the Bookkeeping Menu. Press the Up button to the advance to the next desired Bookkeeping Group, (or press the Down button to return to a previous Bookkeeping Group). Press the Enter button to activate that group. Press the Up or Down button to cycle through the available audits in that group.

B.5 Histograms

B.5	01	0.0-1.9 Million Scores	00%	00
B.5	02	2.0-4.9 Million Scores	00%	00
B.5	03	5.0-9.9 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

Press the Escape button to return to the Bookkeeping Menu. Press the Up button to the advance to the next desired Bookkeeping Group, (or press the Down button to return to a previous Bookkeeping Group). Press the Enter button to activate that group. Press the Up or Down button to cycle through the available audits in that group.

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 Escape button to return to the Bookkeeping Menu. Then, either press the Up or Down button to return to a previous Bookkeeping Menu Group, or press the Escape button again to return to the Main Menu. Once in the Main Menu either press the Up button to advance to the next menu selection, the Printouts Menu, or press the Down button to return to a previous Main Menu selection.

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 when that group appears in the displays.

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-Stamped**
- 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 the message "Waiting for Printer" appears in the displays.

Note: Set the print specification from the Adjustment Menu, A.5 Printer Adjustments.

Press the Escape button to return to the Printouts Menu. Then, either press the Up or Down button to return to a previous Printouts Menu Group, or press the Escape button again to return to the Main Menu. Once in the Main Menu press the Up button to advance to the next menu selection, the Test Menu, or press the Down button to return to a previous Main Menu selection.

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 the desired test when that test appears in the displays.

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**

Note: During the Switch Tests - unless otherwise stated - a flashing cross indicates your location in the matrix, a square indicates a closed switch, and a dot indicates an open switch. For all switches, the number on the left indicates the column, the number on the right indicates the row. Example- Switch 23 means 2nd column, 3rd row.

T.1 Switch Edges

To activate the Switch Edges Test, from the Test Menu, press the Enter button. 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.

To test the Left and Right Flipper switches, press the Left or Right Flipper button. The flipper name and switch number should show in the display. Any other results indicate the system has detected a problem with the flipper switch circuit.

Press Escape to return to the Test Menu. Press the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.2 Switch Levels

Once the test name is shown under the Test Menu, press the Enter button. 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 position in the matrix.

Press the Escape button to return to the Test Menu. Press the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.3 Single Switches

Once the test name is shown under the Test Menu, press the Enter button. 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. Press the Start button to obtain wire color, connector, and fuse information of any switch when that switch is displayed.

Press the Escape button to return to the Test Menu. Press the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.4 Solenoid Test

Once the test name is shown under the Test Menu, press the Enter button. The Solenoid Test has three modes, Repeat, Stop, and Running. Only one solenoid should pulse at a time. The system has detected a problem if, more than one solenoid pulses, a solenoid comes On and stays On, or no solenoid pulses during the Repeat or Running test modes. Press the Start button to see the wire color, driver number, connector, and fuse information for any coil.

- Repeat- Repeat mode allows you to pulse 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 you press the Up or Down button to move to the next one. Either press the Escape button to return to the Test Menu, or press the Enter button to move to the next mode.
- Stop - Stop mode allows you to stop 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 move to the next mode.
- Running - Running mode allows you to cycle through the solenoids automatically. Press the Enter button during the Stop mode. The display shows you the name and number of the solenoid currently being pulsed.

Either press the Enter button to return to the Repeat mode, or press the Escape button to return to the Test Menu. Once in the Test Menu press, the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.5 Flasher Test

Once the test name is shown under the Test Menu, press the Enter button. This tests the flashlamp part of the solenoid circuit exclusively. This, like the Solenoid Test, has three modes, Repeat, Stop, and Running. 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 no circuit pulses during the Repeat or Running modes. Press the Start button to see the wire color, driver number, connector, and fuse information of any flashlamp circuit.

- Repeat - Repeat mode allows you to pulse a single flashlamp. Once you have entered this test, the name and number of the first flashlamp circuit shows in the display and the corresponding bulb(s) flashes. Press the Up or Down button to cycle through all of the flashlamps circuits one at a time. The same circuit pulses until you press the Up or Down button to move to the next one. Either, press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - Stop mode allows you to stop the Flasher Test. Press the Enter button during the Repeat mode. The Flasher Test stops. No flashlamp circuit should be turned On during this mode. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Running - Running mode allows you to cycle through the flashlamps automatically. Press the Enter button during the Stop mode. The display shows the name and number of the circuit currently being pulsed, and the corresponding bulb(s) flashes.

Either press the Enter button to return to the Repeat mode or, press the Escape button to return to the Test Menu. Once in the Test Menu, press the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.6 General Illumination

Once the test name is shown under the Test Menu, press the Enter button. This test allows you to check all of the General Illumination circuits. There are two modes of operation, Stop and Run. To obtain wire color, driver number, connector, and fuse information, press the Start button when the desired General Illumination circuit appears in the display.

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 shows in the display while the corresponding lamps lights. If any other results occur the system has detected an error.

Run - Press the Enter button any time during Stop mode and the General Illumination Test cycles through automatically. For each circuit shown in the display the corresponding bulbs should light. If any other results occurs the system has detected a problem.

Either press the Enter button to return to Stop mode, or the Escape button to return to the Test Menu. Once in the Test Menu press the Up button to advance to the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.7 Sound and Music Test

Once the test name is shown under the Test Menu, press the Enter button. The Sound and Music Test allows you to check the audio circuits. This test has three modes for testing the sound and music circuits, Running, Repeat and Stop.

Running - Running mode steps through a sequence of sounds and music. Pressing the Up or Down button during this portion of the Sound and Music test allows you to advance to a particular sound or tune without having to wait for the program to play all the sounds available in the test. A sound or tune should be heard for each name and number that appears in the display. Any other results indicates the system has detected a problem.

Repeat - Press the Enter button at any time during the Running mode to cause the program to stop and repeat a particular sound or 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. Nothing should be heard. Any other results indicates the system has detected a problem.

Use the Enter button to return to the Running test mode, or the Escape button to return to the Test Menu. Once in the Test Menu press the Up button to display the next test, (or the Down button to return to a previous test) . Press the Enter button to activate that test.

T.8 Single Lamp Test

For all lamps, the number on the left indicates the column, the number on the right indicates the row. Example- Lamp 23 means 2nd column, 3rd row.

Once the test name is shown under the Test Menu, press the Enter button. This test allows you to test 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 indicates the system has detected a problem. Press the Start button to obtain wire color, connector, and fuse information when the desired lamp is lit.

Press the Escape button to return to the Test Menu. Press the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.9 All Lamps Test

Once the test name is shown under the Test Menu, press the Enter button. This test causes all the controlled lamps to flash at the same time. Every controlled lamp should flash. Any other results indicates the system has detected a problem.

Press the Escape button to return to the Test Menu. Press the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.10 Lamp and Flasher Test

Once the test name is shown under the Test Menu, press the Enter button. 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.

Press the Escape button to return to the Test Menu. Press the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

T.11 Display Test

Once the test name is shown under the Test Menu, press the Enter button. This test automatically turns On and Off every dot in the Dot Matrix Display. A series of patterns appear in sequence. The patterns start with one line, turned On, moving across the screen vertically, then horizontally. The screen inverts and one line, turned Off, moves across the screen vertically, then horizontally. The second pattern is a series of lines, turned On, moving across the screen diagonally. The screen inverts and there is a series of lines, turned Off, moving across the screen diagonally. The third pattern is gridlines turned On, then turned Off. The last pattern is a box forming an outline of dots around the matrix that are turned On. After the box outline the test repeats itself.

Press the Escape button to return to the Test Menu. Press the Up button to display the next test, (or the Down button to return to a previous test). Press the Enter button to activate that test.

Press the Escape button to return to the Test Menu. Then, either press the Up or Down button to return to a previous Test, or press the Escape button again to return to the Main Menu. Once in the Main Menu, press the Up button to move to the next menu selection, the Utilities Menu, or press the Down button to return to a previous Main Menu selection.

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 the desired Utility or Utility Group when it appears in the display. If you change a utility setting and realize you have made a mistake, press the Escape button while "Saving Adjustment Value" is still in the display. The original setting is retained and the new setting is ignored.

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. Press the Up button to display the next utility.

U.2 Clear Coins

Press the Enter button to clear the Earnings Audits. Press the Up button to display the next utility.

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

Press the Enter button to clear the High Score to Date Table and the Grand Champion. Press the Up button to display the next utility.

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 you make a mistake press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained. Press the Up button to move to the next utility.

- U.5 Custom Message Note:** Set A.1 20 to ON before trying to write a Custom Message. Press the Enter button to begin entry of the custom message. Use the Up or Down button to rotate letters. Use the Start button to rotate punctuation marks, (if desired). 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 you press Escape 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 rotate letters. Use the Start button to rotate punctuation marks, (if desired). 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, then press the Up button to display the next utility.

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. Press the Up button to display the next utility.

Factory Setting Table

Adj #	Adj Description	U.S.A.	German	French	European
A.1 06	Replay Percent	10%	10%	10%	10%
A.1 09	Replay Level 1	20, 000, 000	25, 000, 000	20, 000, 000	25, 000, 000
A.1 13	Replay Boost	3, 000, 000	3, 000, 000	3, 000, 000	3, 000, 000
A.4 10	Backup Champion	60, 000, 000	65, 000, 000	60, 000, 000	65, 000, 000
A.4 11	Backup H.S.T.D. 1	40, 000, 000	50, 000, 000	40, 000, 000	50, 000, 000
A.4 12	Backup H.S.T.D. 2	35, 000, 000	45, 000, 000	35, 000, 000	45, 000, 000
A.4 13	Backup H.S.T.D. 3	30, 000, 000	40, 000, 000	30, 000, 000	40, 000, 000
A.4 14	Backup H.S.T.D. 4	25, 000, 000	35, 000, 000	25, 000, 000	35, 000, 000

U.9 Presets

Press the Enter button to activate the Presets Group. 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 you realize you have made a mistake, 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 operator can change the game play difficulty adjustments to a combination that is MUCH LESS difficult than the Factory Settings. The Game Difficulty Setting Table lists the adjustments and the settings that comprise the 'Extra Easy' Group.

U.9 02 Install Easy

The operator can change the game play difficulty adjustments to a combination that is somewhat LESS difficult than the Factory Settings. The Game Difficulty Setting Table lists the adjustments and the settings that comprise the 'Easy' Group.

U.9 03 Install Medium

The operator can change the game play difficulty adjustments to a combination that is about the SAME difficulty as the Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the 'Medium' Group.

U.9 04 Install Hard

The operator can change the game play difficulty adjustments to a combination that is somewhat MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the 'Hard' Group.

U.9 05 Install Extra Hard

The operator can change the game play difficulty adjustments to a combination that is MUCH MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the 'Extra Hard' Group.

Game Difficulty Setting Table for U.S./Canadian/French Games

Adj #	Adj Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03 (factory)	Hard U.9 04	Extra Hard U.9 05
A.2 01	Extra Ball Percent	35%	30%	25%	20%	17%
A.2 02	Special Percent			4%		
A.2 03	Extra Ball Lights At	2X	3X	3X	3X	4X
A.2 04	Special Lights At	2MB	3MB	3MB	3MB	3MB
A.2 05	Multi-ball Difficulty	Easy	Easy	Easy	Medium	Medium
A.2 06	Ferris Wheel Difficult	Easy	Medium	Medium	Medium	Hard
A.2 07	Dummy Timer	25 sec	21 sec	18 sec	15 sec	12 sec
A.2 08	Hurricane Difficulty	Easy	Easy	Medium	Medium	Medium
A.2 09	Hurricane Timer	20 sec	15 sec	13 sec	11 sec	11 sec
A.2 10	Hurricane Million	2 ramps	3 ramps	3 ramps	4 ramps	5 ramps
A.2 11	Comet Difficulty	Easy	Easy	Easy	Medium	Medium
A.2 12	Comet Timer	15 sec	12 sec	10 sec	8 sec	8 sec
A.2 13	Comet Start	200 K	200 K	100 K	100 K	50 K
A.2 14	Palace Timer	15 sec	10 sec	8 sec	8 sec	8 sec
A.2 15	Palace Start	PALAC	PALA	PAL	PAL	PA
A.2 16	Palace Lights	Always	Always	Always	Always	Game
A.2 17	Jackpot Timer	Slow	Slow	Slow	Fast	Fast
A.2 18	Clown Lights	Always	Always	Always	Always	Always
A.2 19	Family Mode			No		
A.2 20	Match Effect			Short		

Game Difficulty Setting Table for German/European Games

Adj #	Adj Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03 (factory)	Hard U.9 04	Extra Hard U.9 05
A.2 01	Extra Ball Percent	35%	30%	25%	20%	17%
A.2 02	Special Percent					
A.2 03	Extra Ball Lights At	3X	3X	3X	4X	4X
A.2 04	Special Lights At	3MB	3MB	3MB	3MB	3MB
A.2 05	Multi-ball Difficulty	Easy	Easy	Medium	Medium	Medium
A.2 06	Ferris Wheel Difficult	Medium	Medium	Medium	Hard	Hard
A.2 07	Dummy Timer	21 sec	18 sec	15 sec	12 sec	10 sec
A.2 08	Hurricane Difficulty	Easy	Medium	Medium	Medium	Medium
A.2 09	Hurricane Timer	15 sec	13 sec	11 sec	11 sec	9 sec
A.2 10	Hurricane Timer	3 ramps	3 ramps	4 ramps	5 ramps	5 ramps
A.2 11	Comet Difficulty	Easy	Easy	Medium	Medium	Medium
A.2 12	Comet Timer	12 sec	10 sec	8 sec	8 sec	7 sec
A.2 13	Comet Start	200K	100K	100K	50K	50K
A.2 14	Palace Timer	10 sec	8 sec	8 sec	8 sec	7 sec
A.2 15	Palace Start	PALA	PAL	PAL	PA	P
A.2 16	Palace Lights	Always	Always	Always	Game	Game
A.2 17	Jackpot Timer	Slow	Slow	Fast	Fast	Fast
A.2 18	Clown Lights	Always	Always	Always	Always	Always
A.2 19	Family Mode					
A.2 20	Match Effect					

U.9 06 Install 5 Ball

The operator can change the game to 5 ball play, including the changing of certain features to the recommended 5-ball level. The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the 'Install 5 Ball' Group.

U.9 07 Install 3 Ball

The operator can change the game to 3 ball play, including the changing of certain features to the recommended 3-ball level. The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the 'Install 3 Ball' Group.

Preset game Adj's Table for U.S./Canadian Games

Adj #	Adj Description	Install 5-ball U.9 06	Install 3-ball U.9 07
A.1 01	Balls/Game	5	3
A.1 07	Replay Start	25 Million	20 Million
A.4 10	Backup Champion	80 Million	60 Million
A.4 12	Backup H.S.T.D. 1	50 Million	40 Million
A.4 13	Backup H.S.T.D. 2	45 Million	35 Million
A.4 14	Backup H.S.T.D. 3	40 Million	30 Million
A.4 15	Backup H.S.T.D. 4	35 Million	25 Million
A.2 05	Multi-ball Difficulty	Medium	Easy
A.2 07	Dummy Timer	15 sec	18 sec
A.2 09	Hurricane Timer	11 sec	13 sec
A.2 10	Hurricane Million	4 Ramps	3 Ramps
A.2 11	Comet Difficulty	Medium	Easy
A.2 12	Comet Timer	8 sec	10 sec
A.2 17	Jackpot Timer	Fast	Slow

U.9 08 Install Add -A -Ball

The operator utilizes this option to delete all Free Play awards and replace them with Extra Ball awards. Individual adjustments are affected, as follows:

Ad	Name	New Setting
A.1 13	Replay Boost	Off
A.1 14	Replay Award	Ex. Ball
A.1 15	Special Award	Ex. 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

The operator utilizes this option to delete Credit awards and replace them with Ticket awards. Individual adjustments are affected as follows.

Ad	Name	New Settings
A.1 14	Replay Award	Ticket
A.1 15	Special Award	Ticket
A.1 16	Match Award	Ticket
A.1 17	Ex. Ball Ticket	Yes
A.1 31	Ticket Expan.Brd.	Yes
A.4 02	H.S.T.D. Award	Ticket

U.9 10 Install Novelty

The operator utilizes this option to removes all Free Play and Extra Ball awards. Individual adjustments are affected as follows:

Ad	Name	New Setting
A.1 04	Max. Ex. 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

The operator uses this option to automatically set game pricing to 1 for 50¢/2 for \$1.00 and 1 Coin Buy-in (A.3 19) to YES.

- U.9 17 Install German 1•**
The operator uses this adjustment to modify the game pricing and the type of game play. The Preset Game Adjustments Table for German Games lists the adjustments and settings that comprise the 'Install German 1' Group.
- U.9 18 Install German 2•**
The operator uses this adjustment to modify the game pricing and the type of game play. The Preset Game Adjustment Table for German Games lists the adjustments and settings that comprise the 'Install German 2' Group.
- U.9 19 Install German 3•**
The operator uses this adjustment to modify the game pricing and the type of game play. The Preset Game Adjustments Table for German Games lists the adjustments and settings that comprise the 'Install German 3' Group.
- U.9 20 Install German 4•**
The operator uses this adjustment to modify the game pricing and the type of game play. The Preset Game Adjustments Table for German Games lists the adjustments and settings that comprise the 'Install German 4' Group.
- U.9 21 Install German 5•**
The operator uses this adjustment to modify the game pricing and the type of game play. The Preset Game Adjustments Table for German Games lists the adjustments and settings that comprise the 'Install German 5' Group.
- U.9 22 Install German 6•**
The operator uses this adjustment to modify the game pricing and the type of game play. The Preset Game Adjustments Table for German Games lists the adjustments and settings that comprise the 'Install German 6' Group.

Preset Game Adjustments for German 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	Ex. Ball	Points	Credit	Ex. 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	65,000,000	65,000,000	00	65,000,000	65,000,000	00
A.4 11	Backup High Score 1	50,000,000	50,000,000	00	50,000,000	50,000,000	00
A.4 12	Backup High Score 2	45,000,000	45,000,000	00	45,000,000	45,000,000	00
A.4 13	Backup High Score 3	40,000,000	40,000,000	00	40,000,000	40,000,000	00
A.4 14	Backup High Score 4	35,000,000	35,000,000	00	35,000,000	35,000,000	00

• For German Jumpared CPU Boards only.

German Jumpers are:

<u>W14</u>	<u>W15</u>	<u>W16</u>	<u>W17</u>	<u>W18</u>
In	In	In	In	Out

- U.9 23 Install French 1***
The operator uses this adjustment to modify the game pricing and the type of game play.
- U.9 24 Install French 2***
The operator uses this adjustment to modify the game pricing and the type of game play.
- U.9 25 Install French 3***
The operator uses this adjustment to modify the game pricing and the type of game play.
- U.9 26 Install French 4***
The operator uses this adjustment to modify the game pricing and the type of game play.
- U.9 27 Install French 5***
The operator uses this adjustment to modify the game pricing and the type of game play.
- U.9 28 Install French 6***
The operator uses this adjustment to modify the game pricing and the type of game play.

*** For French Jumped CPU Boards only. French Jumpers are:**

<u>W14</u>	<u>W15</u>	<u>W16</u>	<u>W17</u>	<u>W18</u>
In	In	In	Out	In

Press the Escape button to return to the Presets menu. Then press the Up button to display the next utility, (or the Down button to return to a previous utility).

U.10 Clear Credits

Press the Enter button to clear the game Credits. Press the Up button to display the next utility.

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 helps in finding intermittent problems. The tests that Auto Burn-in cycles through are the Display Test, the Sound and Music Test, the All Lamps Test, the Solenoid Test, the Flashers Test, and the G.I. Test.

Press the Escape button to return to the Utilities Menu. Then, either press the Up or Down button to return to a previous Utility or press the Escape button again to return to the Main Menu. Once in the Main Menu, press the Up button to move to the next menu selection, the Adjustments Menu, or press the Down button to return to a previous Main Menu selection.

Press the Enter button to activate the Adjustments Menu, once the menu name is shown under the Main Menu. Then, use the Up or Down button to cycle through the Adjustments Menu selections. Press the Enter button to activate the desired adjustments group when it appears in the display.

Once you have entered the adjustment group desired, press the Up or Down button to cycle through the available adjustments in that group. When the desired adjustment appears press the Enter button to activate that 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. When the desired value is displayed press Enter to lock in the value. If you realize you have made an error, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

A. Adjustment 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**
The operator defines a "game" by specifying the number of balls to be played. The range of this setting is 1 through 10.
- A.1 02 Tilt Warnings**
The operator specifies the number of total actuations of the plumb bob mechanism that can occur before the game is "tilted". The range of this setting is 1 through 10.
- A.1 03 Maximum Extra Balls**
The operator chooses the number of Extra Balls that a player may accumulate. The range of this setting is 1 through 10, or "No Extra Ball" (extra ball disabled).
- A.1 04 Maximum Extra Balls/Ball in Play**
The operator chooses the number of Extra Balls to be awarded per ball in play. The range of this setting is:
 - Off - No maximum number of Extra Ball per ball in play.
 - 1-10 - 1 through 10 Extra Balls per ball in play.
- A.1 05 Replay System**
The operator chooses the replay system to be used. The choices are:
 - Fixed - Replay value is set by the operator and does not change during game play.
 - Auto%- Replay starting value is set by the operator and change every 50 games to comply with the percentage of replays desired.

- A.1 06 Replay Percent***
The operator chooses the percentage of replays the players are able to earn when Auto Replay is used. The range of this setting is 5% to 50%.
- A.1 07 Replay Start***
The operator chooses the replay starting value when Auto% Replay is used. The range of this setting is 15, 000, 000 to 250, 000, 000.
- A.1 08 Replay Levels***
The operator chooses the number of replay levels used by the Auto% Replay mode. The range of this setting is 1 through 4. When the operator chooses two replay levels, the second replay level is automatically adjusted to twice 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 value.
- A.1 09 Replay Level 1****
The operator chooses the value to be used for the first Fixed Replay. The range of this setting is 00 to 250, 000, 000.
- A.1 10 Replay Level 2****
The operator chooses the value to be used for the second Fixed Replay. The range of this setting is 00 to 250, 000, 000.
- A.1 11 Replay Level 3****
The operator chooses the value to be used for the third Fixed Replay. The range of this setting is 00 to 250, 000, 000.
- A.1 12 Replay Level 4****
The operator chooses the value to be used for the fourth Fixed Replay. The range of this setting is 00 to 250, 000, 000.
- A.1 13 Replay Boost**
The operator chooses if 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 cancelled when Credits=0, when the player inserts another coin, or when Begin Test is pressed. The range of this setting is Off, 1, 000, 000 to 50, 000, 000.
- A.1 14 Replay Award**
For either Auto% Replay or Fixed Replay the operator can choose the form of the award automatically provided when the player exceeds any replay level. The choices are:
- 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.

*For Auto % Replay. ** For Fixed Replay

- A.1 15 Special Award**
The operator can choose the award automatically provided when the player scores a special. The choices are:
- 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 operator can choose the award automatically provided when the players wins a match. The choices are:
- Credit - Winning a Match awards a Credit.
 - Ticket - Winning a Match awards a Ticket.
- A.1 17 Extra Ball Ticket**
The operator can choose whether a Ticket is awarded when the player earns an Extra Ball. The choices are:
- 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 operator can choose the amount of Tickets each player can earn. The range of this setting is 00 to 100.
- A.1 19 Match Feature**
The operator can choose the desired percentage for the Match Feature occurring at the end of the game. The range of this setting is:
- Off - Match Feature is not available.
 - 1 -50% - 1% is 'hard'; 50% is 'extremely easy'. During the Match Feature the game 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 digit results in an award of a Credit or a Ticket.
- A.1 20 Custom Message**
The operator chooses if a message is displayed during the Attract Mode. The choices are:
- On - A message is displayed
 - Off - A message is not displayed.
- A.1 21 Language**
The operator chooses what language the game uses. The choices are English, French, or German.
- A.1 22 Clock Style**
The operator chooses what style of clock the game uses. The choices are A.M./P.M. or 24 Hours.
- A.1 23 Date Style**
The operator chooses what style of date the game uses. The choices are Month/Date/Year, or Date/Month/Year.

- A.1 24 Show Date and Time**
The operator chooses whether the date and time show in the Attract Mode. The choices are:
- Yes - Show the date, time in status report or in the Attract Mode.
No - Do Not show date, time in status report or in the Attract Mode.
- A.1 25 Allow Dim Illumination**
The operator chooses whether to allow the game program to dim the General Illumination for special effects and during the Attract Mode. The choices are:
- Yes - Dim the General Illumination during the Attract Mode.
No - Do Not dim the General Illumination.
- A.1 26 Tournament Play**
The operator chooses whether to equalize Multi-ball and Jackpots during multi-player games, (do not carry over to next player). The choices are:
- Yes - Keep Multi-ball and Jackpots equal.
No - Do Not Keep Multi-ball and Jackpots equal.
- A.1 27 Euro. Scr. Format**
The operator chooses whether to have commas or dots between digits when numbers are displayed. The choices are:
- 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 operator chooses whether the volume can be turned Off. The choices are:
- Yes - Volume can be turned Off.
No - Volume can be turned Down but not Off.
- A.1 29 G.I. Power Saver**
This adjustment allows the General Illumination and Controlled lamps to be dimmed following a time interval after a game is played. A.1 30 (Power Saver Level) determines how dim the lamps get. Using this feature substantially increases the life of the lamps. The range of this setting is Off, 2 through 60 minutes.
- A.1 30 Power Saver Level**
When A.1 29 (G.I. Power Saver) is set to On, this adjustment controls the intensity of the G.I. and Controlled lamps once the game has been idle for a specified time period. The range of this setting is 4 through 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. The choices are:
- Yes - Ticket Expansion Board is connected.
No - Ticket Expansion Board is NOT installed in the game.

Press the Escape button to return to the Adjustments Menu. Press the Up button to advance to the next desired Adjustments Group, (or press the Down button to return to a previous group). Press the Enter button to activate. Use the Up or Down button to cycle through the available adjustments.

A.2 Feature Adjustments

A.2 01 Extra Ball Percent

The operator chooses the percent of games that award an Extra Ball. The range of this setting is 1% through 50%.

A.2 02 Special Percent

The operator chooses the percent of games that Special is awarded. The range of this setting is 1% through 20%.

A.2 03 Extra Ball Lights At

The operator chooses what Bonus X level, when achieved, lights the Extra Ball. The range of this setting is Off through 6X.

A.2 04 Special Lights At

The operator chooses during which Multi-ball the Special Lights turn On. The range of this setting is Off through 6 Multi-balls.

A.2 05 Multi-ball Difficulty

The operator chooses the difficulty of the Multi-ball feature. The choices are:

- | | | |
|--------|---|--|
| Easy | - | For first Multi-ball, both locks are enabled together. |
| Medium | - | Locks must be enabled separately. |

A.2 06 Ferris Wheel Difficulty

The operator chooses the difficulty of the Ferris Wheel feature. The choices are:

- | | | |
|----------|---|---|
| Easy | - | Ferris Wheel is lit at ball start. |
| Medium | - | Ferris Wheel is lit at game start. |
| Hard | - | Ferris Wheel is Off at game start. |
| Ex. Hard | - | Ferris Wheel is Off at each ball start. |

A.2 07 Dummy Timer

The operator chooses how long the Dummy stays lit after it has been hit. The range of this setting is 5 seconds through 40 seconds.

A.2 08 Hurricane Difficulty

The operator chooses the difficulty of the Hurricane feature. The choices are:

- | | | |
|--------|---|--------------------------------------|
| Easy | - | Hurricane is lit at each ball start. |
| Medium | - | Hurricane is lit at game start. |
| Hard | - | Hurricane is Off at game start. |

A.2 09 Hurricane Timer

The operator chooses how long it takes for the Hurricane Ramp to time down. The range of this setting is 5 seconds to 40 second.

A.2 10 Hurricane Million

The operator chooses how many Ramp Shots it initially takes to score 1 Million points. The range of this setting is 3 Ramps to 13 Ramps.

A.2 11 Comet Difficulty

The operator chooses the difficulty of the Comet feature. The choices are:

- | | | |
|--------|---|----------------------------------|
| Easy | - | Comet is lit at each ball start. |
| Medium | - | Comet is lit at game start. |
| Hard | - | Comet is Off at game Start. |

- A.2 12 Comet Timer**
The operator chooses how long it takes for the Comet Ramp to time down. The range of this setting is 5 seconds to 40 seconds.
- A.2 13 Comet Start**
The operator chooses which Comet light is turned On at game start. The choices are 50,000 - 100,000 - 200,000 - 300,000.
- A.2 14 Palace Timer**
The operator chooses how long it takes for the Palace Light to time down. The range of this setting is 5 seconds to 40 seconds.
- A.2 15 Palace Start**
The operator choose how many letters in P-A-L-A-C-E are lit after a failed Jackpot attempt. The range of this setting is None through P-A-L-A-C.
- A.2 16 Palace Lights**
The operator chooses whether the Palace Lights remain in memory. The choices are:
- Always - Palace Lights are carried over from game to game.
 - Player - Each player builds Palace Lights separately.
 - Game - Each new game resets Palace Lights.
- A.2 17 Jackpot Timer**
The operator chooses how fast the Jackpot times down. The choices are:
- Fast - Jackpot times down fast.
 - Slow - Jackpot times down slow.
- A.2 18 Clown Lights**
The operator chooses whether the Clown Lights remain in memory. The choices are:
- Always - Clown Lights are carried over from game to game.
 - Player - Each player builds Clown Lights separately.
 - Game - Each new game resets Clown Lights.
- A.2 19 Family Mode**
The operator choose whether the game refrains from derogatory speech calls. The choices are:
- No - Game makes all speech calls.
 - Yes - Game refrains from using speech call "Come On, Ugly".
- A2. 20 Match Effect**
The operator how long the Match feature, at the end of the game, runs. The choices are Short or Long.

Press the Up button to advance to the next desired Adjustment Group, (or press the Down button to return to a previous Adjustment Group). Press the Enter button to activate that group. Press the Up or Down button to cycle through the available adjustments in that group.

A.3 Pricing Adjustments

- A.3 01 Game Pricing (if set to custom, then 02 to 09 are available)**
The operator chooses the cost for a game from a selection of Standard pricing or by installing Custom pricing.
- A.3 02 Left Coin Units**
The operator can specify the number of coin units purchased by a coin passing through the left coin chute.
- A.3 03 Center Coin Units**
The operator can specify the number of coin units purchased by a coin passing through the center coin chute.
- A.3 04 Right Coin Units**
The operator can specify the number of coin units purchased by a coin passing through the right coin chute.
- A.3 05 4th Slot Units**
The operator can specify the number of coin units purchased by a coin passing through the fourth coin chute.
- A.3 06 Units/Credits**
The operator 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**
The operator can specify that 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 operator specifies the number of credits that are awarded when the Units/Bonus level is achieved.
- A.3 09 Minimum Units**
The operator can specify that 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 and 20 are available)**
This adjustment is used to pre-set adjustments 11 to 15 based on standard coin doors (U.S.A., German, etc.).
- A.3 11 Collection Text**
The operator chooses what coin system is used to display the Earning Audits.
- A.3 12 Left Slot Value**
The operator can specify the monetary value of the left coin chute.
- A.3 13 Center Slot Value**
The operator can specify the monetary value of the center coin chute.

- A.3 14 Right Slot Value**
The operator can specify the monetary value of the right coin chute.
- A.3 15 4th Slot Value**
The operator can specify the monetary value of the 4th coin chute.
- A.3 16 Maximum Credits**
The operator can specify 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 operator can specify whether a player can operate the game without a coin (free play) or with a coin. The choices are:
- No - A coin is necessary for game play.
 - Yes - Game play is free; no coin required.
- A.3 18 Hide Coin Audits**
The operator chooses whether or not to show the coin audits. The choices are:
- 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 the game pricing is set to 1 for 50¢/2 for \$1.00 the operator chooses whether 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. The choices are:
- 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**
This number is used for 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.

Press the Escape button to return to the Adjustment Menu. Press the Up button to advance to the next desired Adjustment Group, (or press the Down button to return to a previous Adjustment Group). Press the Enter button to activate that group. Press the Up or Down button to cycle through the available adjustments in that group.

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	
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/\$	U.S.A. 4/\$1.00 50-75-1.00 U.S.A. 2/\$1.00 U.S.A. 3/\$1.00 CUSTOM CUSTOM	01	04	01	00	01	02	01	00	
Canada	25¢	-	\$1.00	-	1/50¢, 2/75¢, 3/\$1 ² 1/50¢, 2/\$1 ²	CANADA 1 CANADA 2									
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	20P	10 P	1/3x10 P, 2/50 P, 4/£1.00 ²	U. KINGDOM									
Switzerland	1 Fr	2 Fr	5 Fr	-	1/1 Fr, 3/2 Fr, 7/5 Franc ²	SWISS									
Belgium	5Fr	20 Fr	50 Fr	-	1/4 x 5F, 1/20 F, 3/50 Franc ²	BELGIUM									
West Germany	1 DM	2 DM	5 DM	-	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	1 Hfl 25¢ 1G	2.5 Hfl - -	2.5 Hfl 1G 1G	- - -	1/1 Hfl, 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 5 Fr	10 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 1/2x25 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									
Antilles, Nthrlnd	25¢	-	1G	-	1/25¢, 4/1 Guilder ²	ANTILLES									
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	1 Mka	-	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	N. ZEALAND CUSTOM	01	00	01	00	03	00	00	01	
Norway	5Kr	-	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									
Hungary	10 F	10F	20 F	-	1/1x20F, 1/2x10F, 3/2x20 Forint	HUNGARY									
Notes: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.															

Notes: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.

* Only if Dollar Bill Acceptor and Center Coin Chute is Available.

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

A.4 01 Highest Scores

The operator specifies whether the game is to maintain a record of the four highest scores achieved to date. The choices are:

- 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 operator chooses the award given for achieving the High Score To Date, or the Champion H.S.T.D.. The choices are a Credit or a Ticket.

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

The operator chooses whether the "Highest" High Score is displayed in the Attract Mode. This score is not cleared when "High Score Reset Every" occurs. The choices are:

- On - The "Highest" High Score is retained in memory and 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. The range of this setting is 00 through 10.

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

The operator selects the number of credits or tickets to be awarded whenever a player exceeds the previous Highest Score. The range of this setting is 00 to 10.

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

The operator selects the number of credits or tickets to be awarded whenever a player exceeds the second highest score. The range of this setting is 00 to 10.

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

The operator selects the number of credits or tickets to be awarded whenever a player exceeds the third highest score. The range of this setting is 00 to 10.

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

The operator selects the number of credits or tickets to be awarded whenever a player exceeds the fourth highest score. The range of this setting is 00 to 10.

A.4 09 High Score Reset Every

The operator can specify that the game will provide an automatic reset of the displayed "Highest scores", and the number of games to be played before the reset occurs. The values provided upon reset are those selected by the operator in the Back-up High Scores. The range of this setting is OFF (disabled) and 250 to 20,000.

A.4 10 Backup Champion

The operator sets the Back-up Grand Champion Score. The range of this setting is 00 through 999,000,000.

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

The operator can set the Back-up High Score value. The game automatically restores this value when the High Score Reset Every value is reached. The range of this setting is 00 to 999,000,000.

- A.4 12 Backup H.S.T.D. 2**
The operator can set the second Back-up High Score value. The game automatically restores this value when the High Score Reset Every value is reached. The range of this setting is 00 to 999, 000, 000.
- A.4 13 Backup H.S.T.D. 3**
The operator can set the third Back-up High Score value. The game automatically restores this value when the High Score Reset Every value is reached. The range of this setting is 00 to 999, 000, 000.
- A.4 14 Backup H.S.T.D. 4**
The operator can set the fourth Back-up High Score value. The game automatically restores this value when the High Score Reset Every value is reached. The range of this setting is 00 to 999, 000, 000.

Press the Up button to advance to the next desired Adjustment Group, (or press the Down button to return to a previous Adjustment Group). Press the Enter button to activate that group. Press the Up or Down button to cycle through the available adjustments in that group.

A.5 Printer Adjustments (optional board required)

- A.5 01 Column Width**
Choose the column width to be printed. The range of this setting is 22 to 80.
- A.5 02 Lines Per Page**
Choose the amount of lines per page. The range of this setting is 20 to 80.
- A.5 03 Pause Every Page**
Choose whether the printer pauses at the end of a page. The choices are:
- | | | |
|-----|---|----------------------------|
| Yes | - | The printer does pause. |
| No | - | The printer doesn't pause. |
- A.5 04 Printer Type**
Select the type of printer. The choices are: Parallel, Serial or ADP.
- A.5 05 Serial Baud Rate**
Select which baud rate to use for serial or ADP communications (bit rate). The choices are 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 the printer is not ready. |
| Ignore | - | D.T.R. signal is ignored. |

Press the Escape button to return to the Adjustments Menu. Then, either press the Up or Down button to return to a previous Adjustments Menu Group, or press the Escape button again to return to the Main Menu. Once in the Main Menu either use the Up or Down buttons to return to a previous menu selection, or press the Escape button again to return to the Attract Mode.

Problem Analysis 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 a message, "Press ENTER for Test Report". This indicates that 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 **Hurricane** 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) by displaying the message "Adjust Switch ##", listing each problem switch by number. (The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep **Hurricane** earning, until the service technician can repair the problem, bringing the game back to its normal operation.)

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.

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

xxxx 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 .

Frequent appearance of this message requires activation of the Switch Levels Test to locate the switch causing the "WHT-xxx ROW x SHORT" message. Possible 'row short' causes are: 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 hangers, 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 +4V, 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.

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.

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

D20 blinks one time -	ROM Error U6
D20 blinks two times -	RAM Error U8
D20 blinks three times -	Custom Chip Failure U9

Sound Board Beep Error Codes**Upon Game Turn-On:**

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

Maintenance Information

Regular maintenance is essential to a game's continuing contribution to the operator's earnings.

Lubrication

The two main lubrication points of the Ball Shooter Lane Feeder mechanism are the pivots for the arm. The mechanisms of other playfield devices are somewhat similar to the Ball Shooter Lane Feeder Device, 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 the Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, with a Williams' part number of EI165, is a recommended lubricant.

Switch Contacts

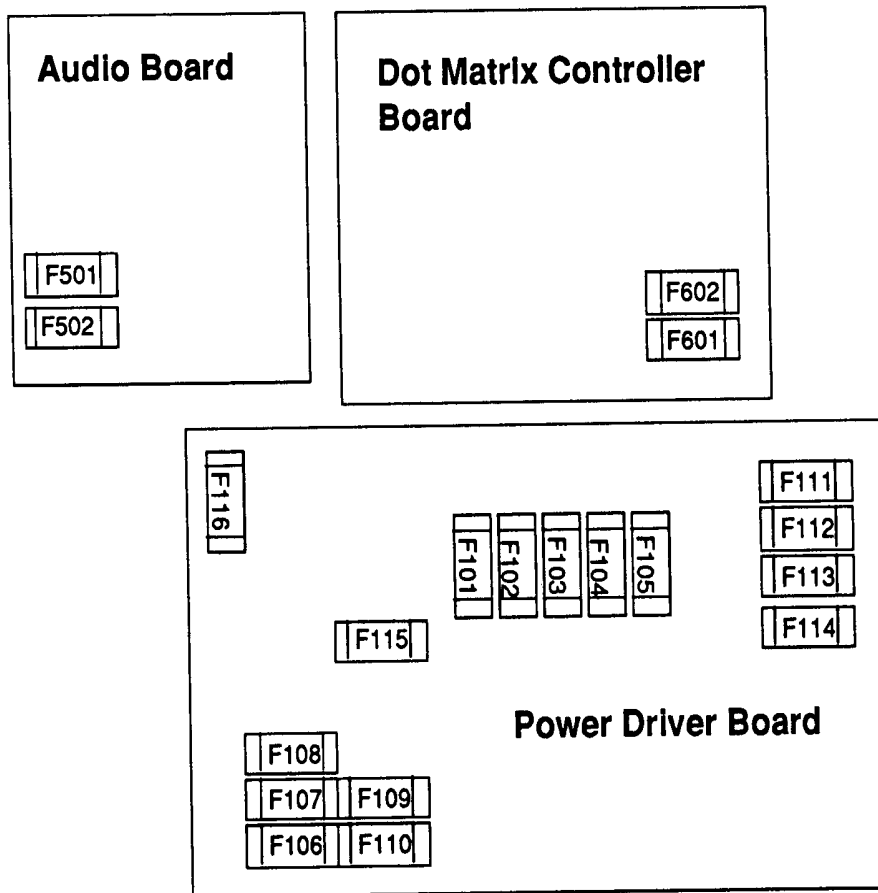
For proper game operation, switch contacts should be free of dust, dirt, contamination, and corrosion. Blade switch contacts are plated to resist corrosion. Cleaning blade switch contacts requires gentle closing of the contacts on a clean business card or piece of paper, and then pulling the paper about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

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.

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 2.5A, S.B.

F102 Right Flipper 2.5A, S.B.

F103 Solenoid 25-28 3A, S.B.

F104 Solenoids 9-16 3A, S.B.

F105 Solenoids 1-8 3A, S.B.

F106 G.I. #2 Wht-Vio 5A, S.B.

F107 G.I. #3 Wht-Yel 5A, S.B.

F108 G.I. #5 Wht-Grn 5A, S.B.

F109 G.I. #4 Wht-Orn 5A, S.B.

F110 G.I. #1 Wht-Brn 5A, S.B.

F111 Flasher Secondary 5A, S.B.

F112 Solenoid Secondary 5A, S.B.

F113 +5V Logic 5A, S.B.

F114 +18V Lamp Matrix 8A, N.B.

F115 +12V Switch Matrix 3/4A, S.B.

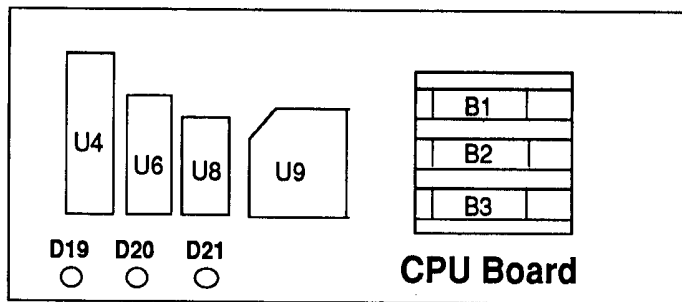
F116 +12V Secondary 3A, S.B.

Line Filter

Domestic Game 8A, N.B.

Foreign Game 4A, S.B.

LED List

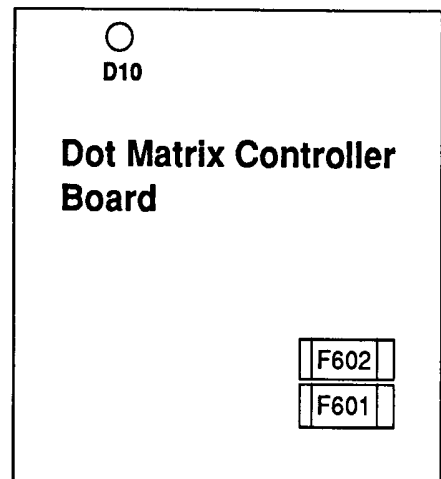


CPU Board

D19 , Blanking
D20, Diagnostic
D21, +5vdc

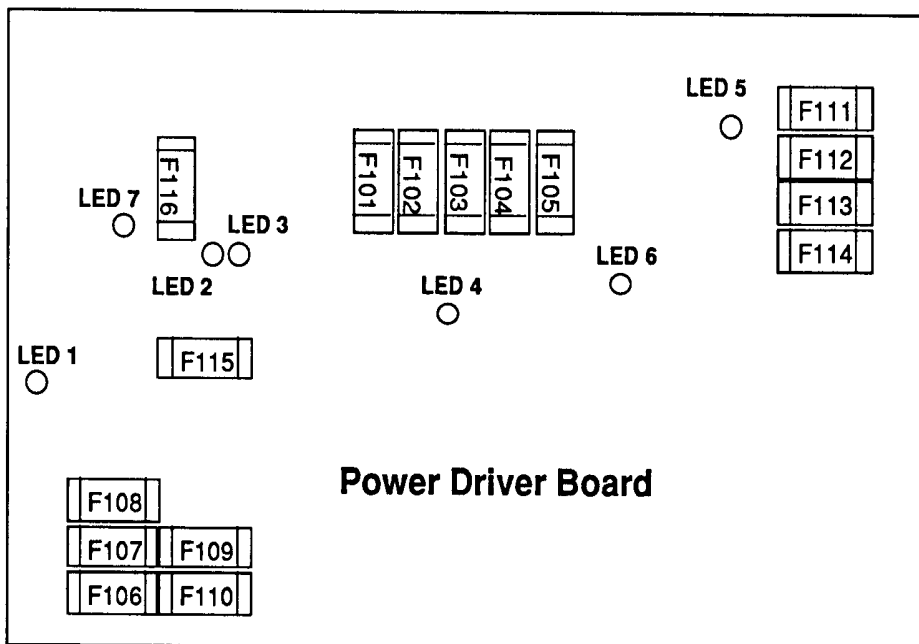
At game Turn-On = D19 & D21 On, D20 Off

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



Dot Matrix Controller Board

D10, +5V Circuit, Normally 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

Section 2

Game Parts Information

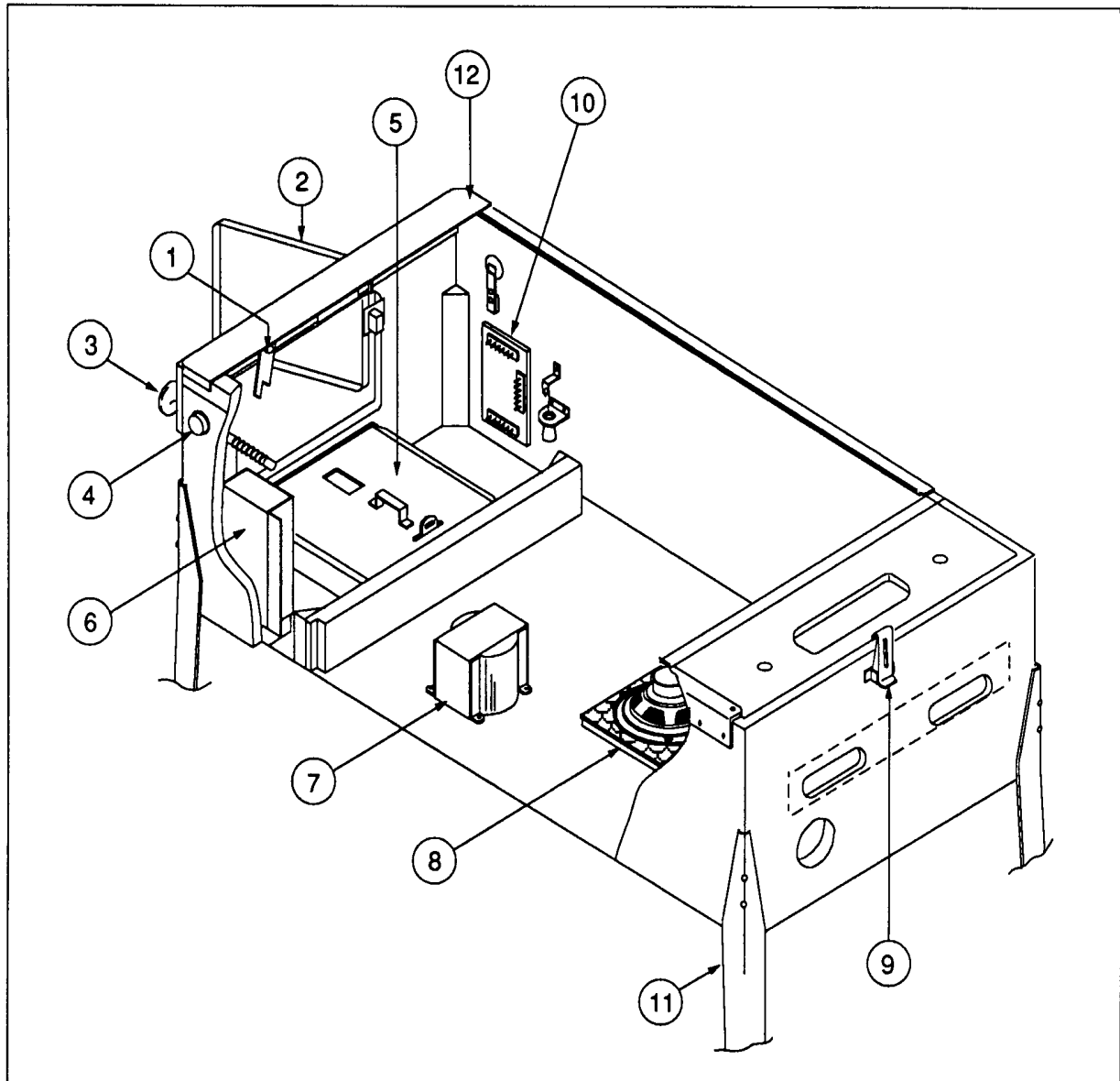


Inside this section:

Cabinet Assembly
Backbox Assembly
Major Mech. Location Diagram
WPC Audio Board
WPC System CPU Board
WPC Power Driver Board
Dot Matrix Controller Board

Major Mechanism Assemblies
Playfield Parts
Lamps
Switches
Solenoids/Flashers

Cabinet Parts



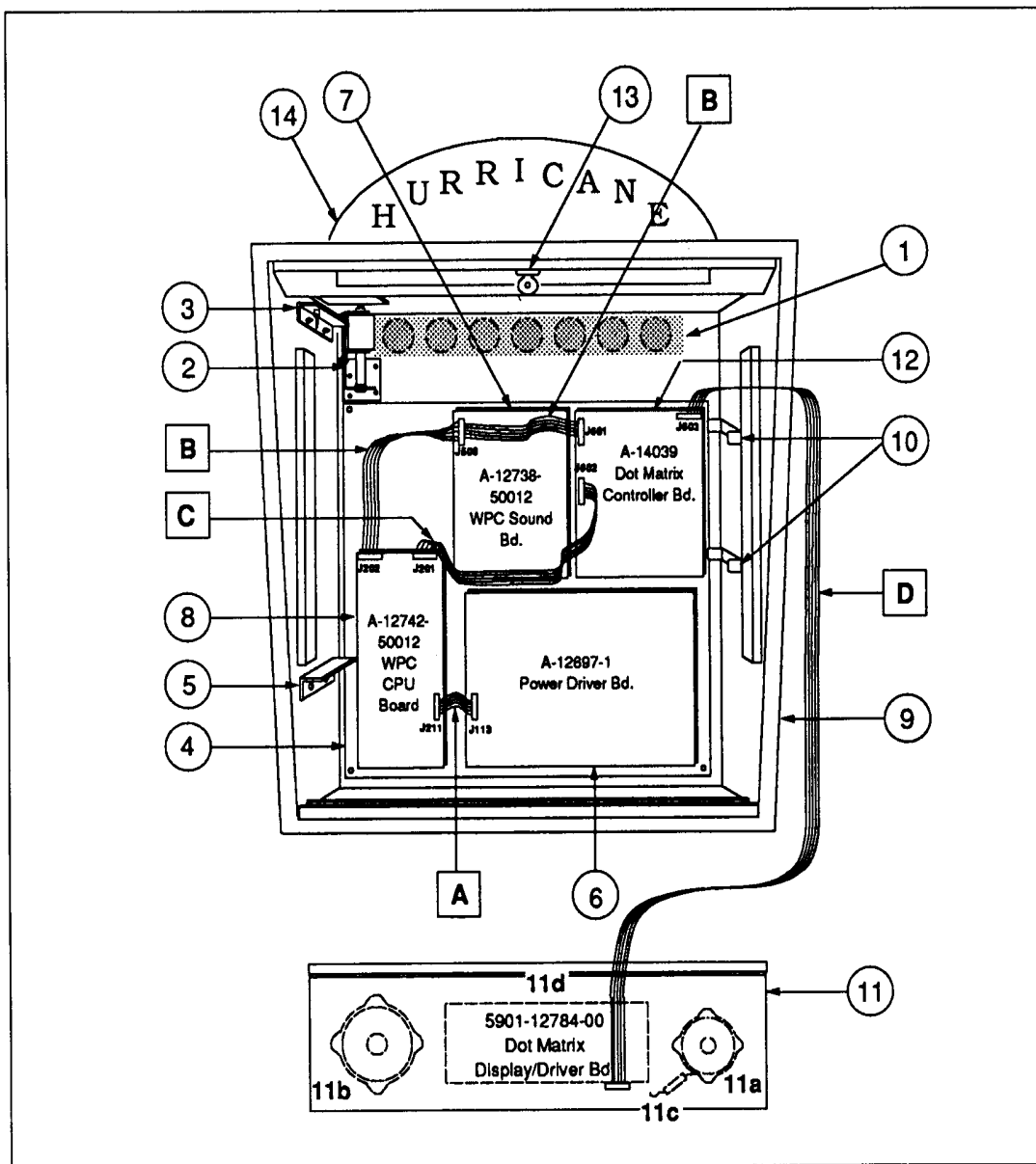
Cabinet Parts

Item	Part Number	Description
1.	D-9174-2	Lever Guide Assembly
2.	A-14148-1	Coin Door - 2 Slot
3.	B-12445-1	Ball Shooter Assembly
a)	10-149	Spring
4.	B-12273-4	Flipper Button-Red (2 Used)
5.	A-14407-1	Cashbox Assembly
6.	A-14744-USA	Line Filter Assembly
7.	5610-12835-00	Transformer, 115/230v
8.	5555-12929-00	Speaker, 4Ω, 6", 25w
9.	20-9347	Toggle Latch
10.	A-14689	WPC Coin Door Interface Bd.
11.	C-10843	Metal Leg
12.	D-12615	Front Molding Assy.

Miscellaneous Parts

Part Number	Description
08-7028-T	Tempered Playfield Glass: 21" x 43"
A-8552-50012	Backglass Assembly
08-7456	Backbox Glass: 27" X 18-7/8"
31-1357-50012	Screened Backglass
20-6500	Steel Ball, 1-1/16" (3)

Backbox Assembly



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-14092-1	Mounting Plate Assembly
5.	A-12498	Lower Insert Bd Hinge Assy.
6.	A-12697-1†	Power Driver Assembly
7.	A-12738-50012†	WPC Sound Board
8.	A-12742-50012†	WPC CPU Board
9.	A-14958-50012	Backbox Assembly
10.	01-9047	Insert Stop Bracket
11.	A-14902	Speaker / Display Assy.
a)	5555-12924-00	Speaker, 4Ω, 15w
b)	5555-12856-00	Speaker, 5-1/4", 4Ω, 25w
c)	5045-12914-00	Cap., 10μfd., 50v, (±20%)
d)	5901-12784-00	Dot Matrix Display/Driver Bd.
e)	31-1420-50012	Screened Speaker Panel

Item Part Number Description

12.	A-14039†	Dot Matrix Controller Board
13.	A-13379	Lock & Plate Assembly
a)	20-9637	Lock & Cam Kit
14.	A-15051	Crown & Decal Assembly
15.	50012-IN	Insert Board
a)	01-6571	Hinge Mounting Bracket
b)	01-6655	Insert Latch
c)	A-14750	Disc & Motor Assy.
d)	C-13337	Single Flashlamp

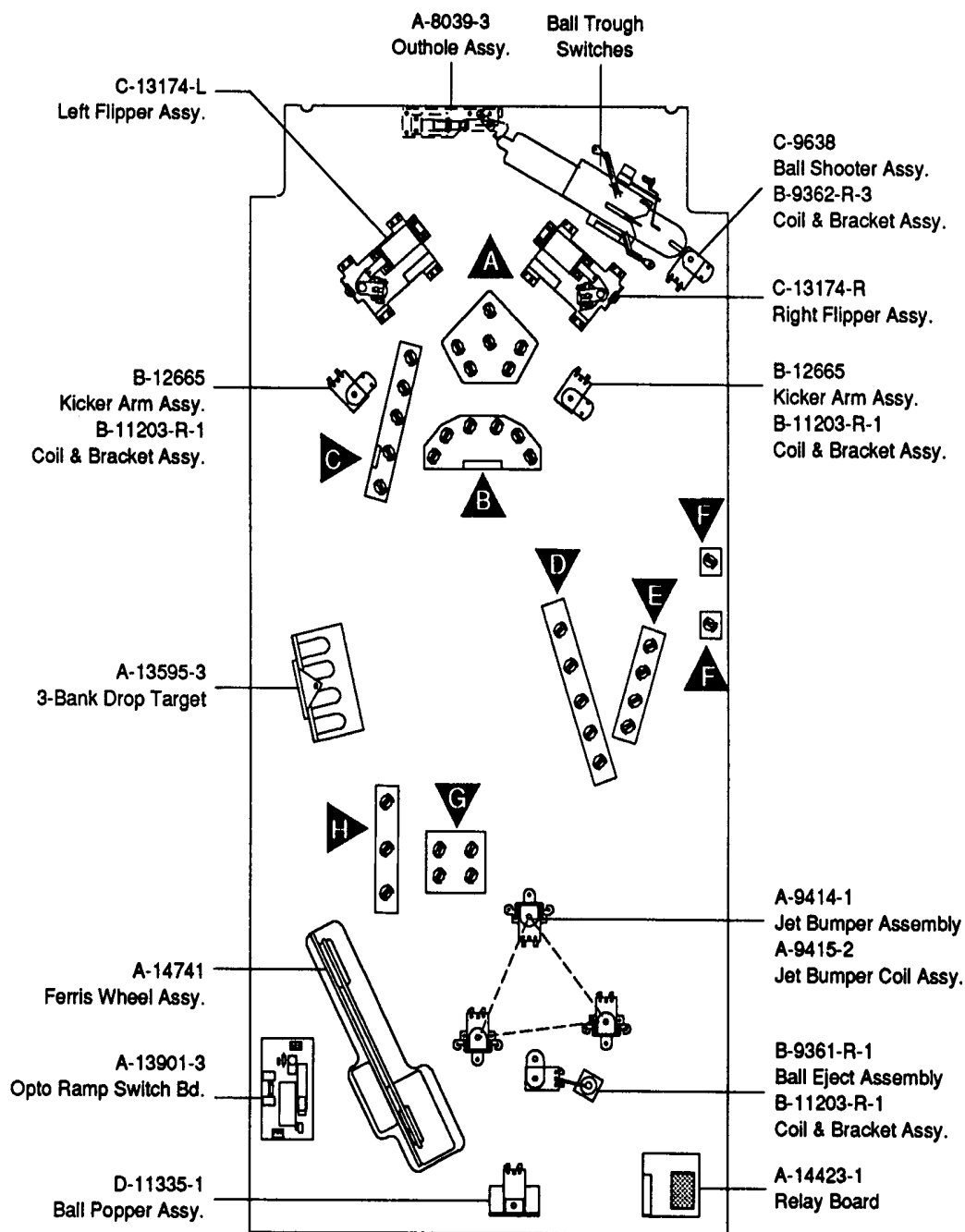
RIBBON CABLES:

A.	5795-12653-03	Ribbon Cable, 3"
B.	5795-12837-01	Ribbon Cable, 18"
C.	5795-10938-14	Ribbon Cable, 14"
D.	5795-12838-30	Ribbon Cable, 30"

† = Refer to Individual Unit's Parts List

Locations Diagram - Game Major Mechanisms

Underside of Playfield, Viewed in Raised Position

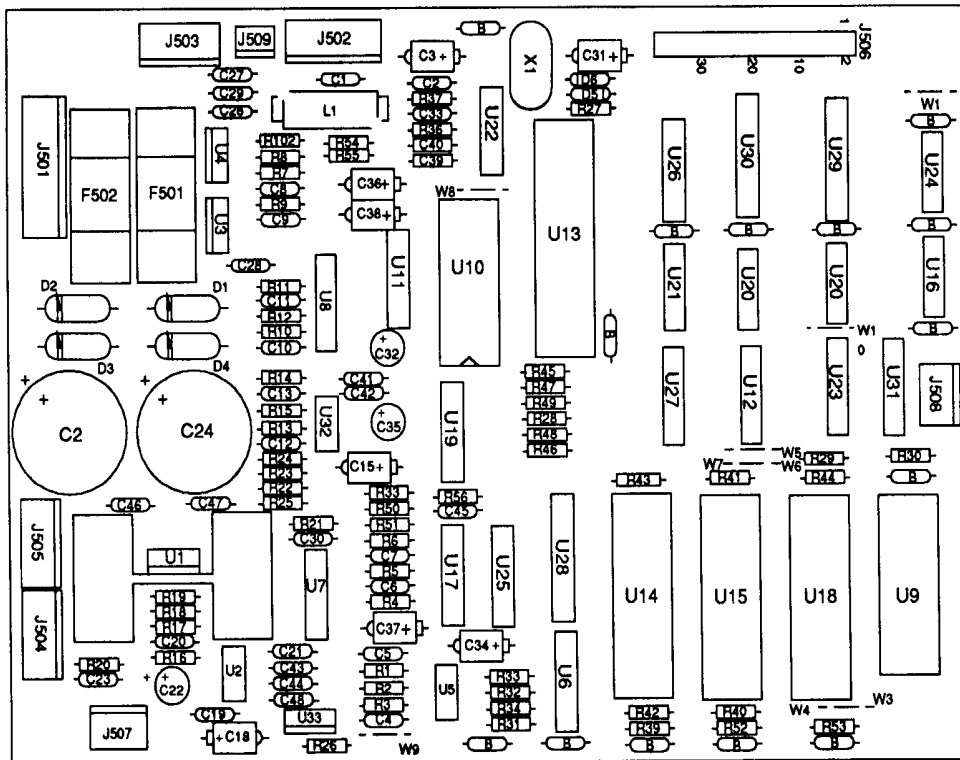


▲ Lamp Boards

Item	Part Number	Description	Item	Part Number	Description
A	A-14846	6-Lamp Assembly	E	C-12877	4-Lamp Assembly
B	A-14847	6-Lamp Assembly	F	C-13337	Single Lamp Board
C	A-14848	5-Lamp Assembly	G	A-14849	4-Lamp Assembly
D	A-14978	5-Lamp Assembly	H	C-13911	3-Lamp Assembly

Note: 24-8768 Bulb #555 (6.3v) used on all lamp boards.

A-12738-50012 WPC Audio Board



Part No.	Ckt Designator	Description
01-9980		Shield: Wire Protector
20-9229	U1	Thermal Compound
4004-01005-06	U1	Mach. Screw, 4-40 x 3/8
4104-01012-04	U1	Sh. Mach. Screw, #4 x 1/4
4404-01119-00	U1	Nut, 4-40 SNUIT
5010-09324-00	R21	Resistor 27KΩ, 1/4w, 5%
5010-12065-00	R22, R25	Resistor, 120KΩ, 1/4w, 5%
5010-08991-00	R51	Resistor, 4.7KΩ, 1/4w, 5%
5010-09034-00	R13, R14, R29-R31, R33, R34, R50, R45-R49	Resistor, 10KΩ, 1/4w, 5%
5010-09035-00	R4	Resistor, 47KΩ, 1/4w, 5%
5010-09036-00	R35	Resistor, 100Ω, 1/4w, 5%
5010-09134-00	R1, R2, R6, R8, R9, R11, R12, R23, R24	Resistor, 150KΩ, 1/4w, 5%
5010-09162-00	R26, R102	Resistor, 100KΩ, 1/4w, 5%
5010-08774-00	R3, R5, R17, R19	Resistor, 22K, 1/4w, 5%
5010-09269-00	R15	Resistor, 12KΩ, 1/4w, 5%
5010-09358-00	R18, R32	Resistor, 1KΩ, 1/4w, 5%
5010-09416-00	R28, R39, R40-R44	Resistor, 470Ω, 1/4w, 5%
5010-09534-00	R52, R53, R57, R36, R37	Resistor, 470Ω, 1/4w, 5%
5010-10171-00	W3, W5, W7-W10	Resistor, 0Ω
5010-10258-00	R38, R56	Resistor, 56Ω, 1/4w, 5%
5010-10650-00	R16	Resistor, 1M, 1/4w, 5%
5010-10689-00	R7, R10	Resistor, 82K, 1/4w, 5%
5010-10989-00	R54, R55, R27	Resistor, 470K, 1/4w, 5%
5010-12752-00	R20	Resistor, 1Ω, 1/4w, 5%
5040-08986-00	C3	Capacitor, 100M, 10v (±20%)
5040-09332-00	C15, C18, C34, C36, C38	Capacitor, 47μfd., 25v, Axial
5040-11036-00	C32, C35	Capacitor, 47μfd., 16v, Rad.
5040-12729-00	C24, C25	Capacitor, 4700μfd., 35v
5040-12750-00	C22	Capacitor, 22μfd., 35v, Rad.
5041-09031-00	C26-C29, C37, C46-C48	Capacitor, 1μfd. TANT
5041-09243-00	C20, C21	Capacitor, 10μfd. TANT
5043-08980-00	C41-C44, B(15)	Capacitor, .01M, 50v, (+80, -20)
5043-08986-00	C1, C2	Capacitor, .1μfd., 50v, 10%
5048-11027-00	C8, C10	Capacitor, 33pfd., 50v, 10%
5048-11028-00	C45	Capacitor, 22pfd., 50V, Axial
5048-11029-00	C33, C49	Capacitor, 100pfd., 50v
5048-11030-00	C12	Capacitor, 470pfd., 50v
5048-11031-00	C19, C31	Capacitor, .001μfd., 50v, 10%
5048-11065-00	C13	Capacitor, .0022μfd., 50v, 10%, Ax.
5048-11072-00	C39, C40	Capacitor, .0033μfd.
5048-12036-00	C23	Capacitor, .22μfd., 10v, Ceramic
5048-12745-00	C4, C6	Capacitor, 1800pfd., 50V, 10%
16-8850-341		PCB Label

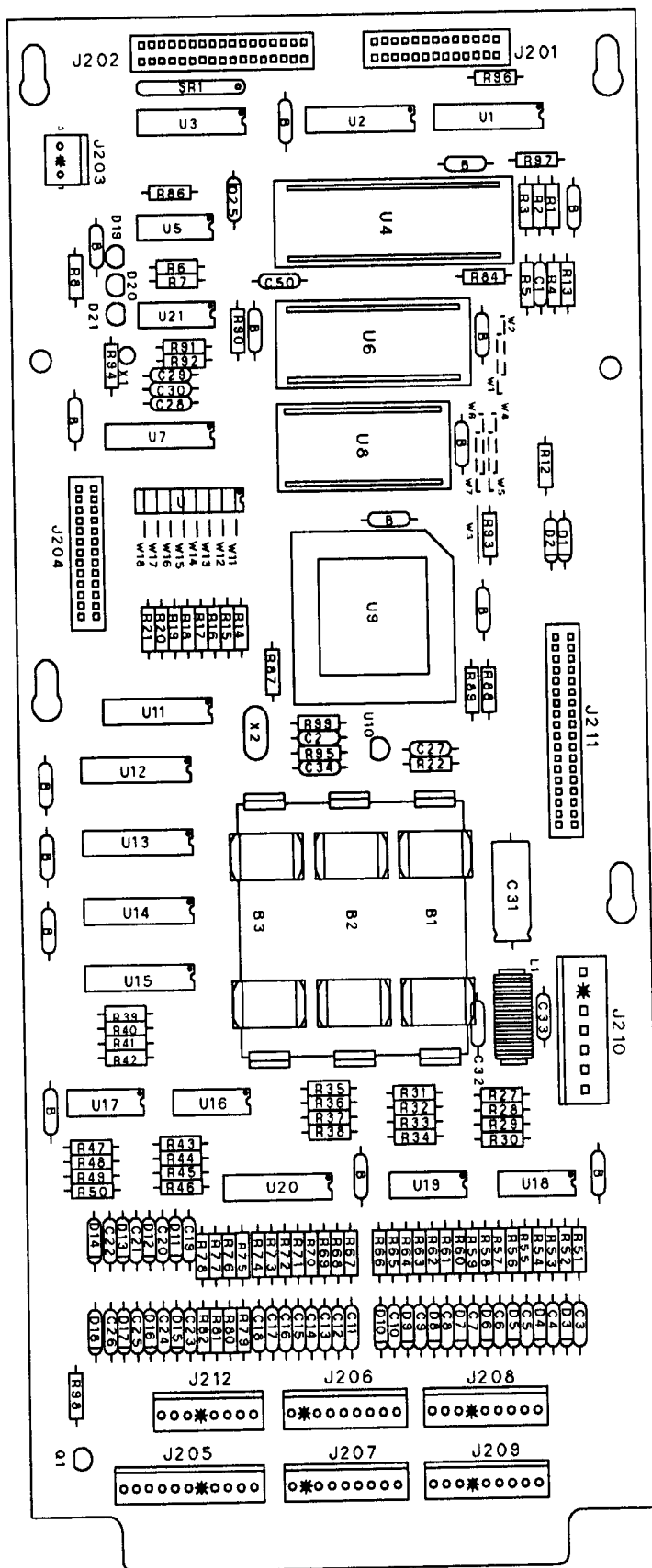
Part No.	Ckt Designator	Description
5048-12746-00	C5, C7	Capacitor, 330pfd., 50V
5048-12748-00	C9, C11, C30	Capacitor, 220pfd., 50V
5070-08919-00	D5, D6	Diode, 1N4148
5070-09045-00	D1-D4	Diode MR501, 3.0A.
5250-10495-00	U3	Reg. 7912 1.0A -12v
5281-09215-00	U22	IC, 74LS04 Hex INV
5281-09246-00	U12	IC, 74LS139 2-4 Dec.
5281-09486-00	U28-U30	IC, 74LS374 8 Dual Flipflop
5281-09487-00	U6, U23-U25	IC, 74LS74 Dual Flipflop
5281-09500-00	U31	IC, 74LS32
5281-09745-00	U26, U27	IC, 74LS138 DMLTPX
5281-09850-00	U20	IC, 74LS11 Tripple AND
5281-10577-00	U16	IC, 74LS125 Q/B Bfr
5370-11086-00	U10	IC, YM2151 Sound
5371-11087-00	U11	IC, YM3012 D/A
5400-10320-00	U13	IC, MPU 68B09E
5284-12651-00	U21	IC 4584
5340-12278-00	U9	S/Ram 2064
5370-09691-00	U17	IC, 55536 CVSD
5370-12260-00	U2	IC, 3340 Elec Atten
5370-12728-00	U1	IC, Audio Amp LM1875
5370-12730-00	U7, U8	IC, Op Amp TL084
5370-12742-00	U32	IC, Op Amp TL082
5371-12727-00	U19	Dac AD7524
5432-12726-00	U5	EE Prom Pot X9503
5480-12423-00	U4	IC, LM7812
5480-12743-00	U33	LM7809 TO-220
5520-09020-00	X1	Crystal, 3.58 MHz.
5521-10931-00	OSC1	Oscillator, 8.0 MHz.
5551-09822-00	L1	Ind, 4.7UH 3.0A.
5700-08985-00	U13	Socket, IC 40-pin, .6"
5700-09004-00	U10	Socket, IC 24-pin, .6"
5700-09006-00	U11	Socket, IC 16-pin, .3"
A-5343-50012-4	U18	IC, Audio ROM
A-5343-50012-3	U15	IC, Audio ROM
A-5343-50012-2	U14	IC, Audio ROM
5700-12088-00		Socket, IC 32-pin (U14, U15, U18)
5705-12755-00	U1	Heatsink 5299B-220
5731-08633-00	F501, F502	Fuse, 3A, S-B
5733-12060-01		Fuse Holder (F501, F502)
5766-12433-00		PCB-Sound 90
5791-10862-04	J504, J505	Connector, 4-pin Header Sq. .156
5791-10862-05	J502	Connector, 5-pin Header Sq. .156
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-12742-50012 WPC CPU Board

Item	Part Number	Designator	Description
1	5010-09034-00	R14-R22, R27-R42, R86, R90, R94, R98	Resistor, 10K Ω , 1/4w, 5%
2	5010-09085-00	R1, R2, R4, R93, R96, R97	Resistor, 1.5K Ω , 1/4w, 5%
3	5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Resistor, 1.2K Ω , 1/4w, 5%
4	5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84	Resistor, 1K Ω , 1/4w, 5%
5	5010-09416-00	R5-R8, R12, R13, R87-R89	Resistor, 470 Ω , 1/4w, 5%
6	5010-09534-00	W1, W4, W7, W13 - W18	Resistor, 0 Ω
7	5010-10258-00	R95, R99	Resistor, .01 μ fd Ω , 1/4w, 5%
8	5010-10989-00	R92	Resistor, 470K Ω , 1/4w, 5%
9	5010-12104-00	R91	Resistor, 22 μ fd, 1/4w, 5%
10	5019-09362-00	SIP 1	SIP, 9R, 10-pin, 4.7K Ω , 5%
11	5040-08986-00	C31	Capacitor, 100 μ fd, 10v ($\pm$ 20%)
12	5043-08980-00	B	Capacitor, .01 μ fd, 50v, (+80, -20%)
13	5043-09030-00	C27	Capacitor, 0.047 μ fd, 50v ($\pm$ 20%)
14	5043-09065-00	C3 - C26	Capacitor, 470pfd, 50v ($\pm$ 20%)
15	5043-09491-00	C2, C29, C30, C34	Capacitor, 22pfd, 1KV, ($\pm$ 10%)
16	5043-09492-00	C28	Capacitor, 100pfd, 50v, ($\pm$ 10%)
17	5043-09845-00	C32, C33	Capacitor, 1KP, 50v, ($\pm$ 20%)
18	5070-08919-00	D2 - D18	Diode, 1N4148, 150MA
19	5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.
20	5160-10269-00	Q1	Transistor, 2N3904, NPN
21	5162-12422-00	U20	IC, ULN, 2803A
22	5281-09308-00	U3	IC, 74LS245, Octal Bus Trncv
23	5281-09486-00	U14	IC, 74LS374, 8D F/F
24	5281-09851-00	U5	IC, 74LS14, SMT/TRG
25	5281-09867-00	U1, U2, U7	IC, Octal Buffer, 74LS244
26	5281-10182-00	U11, U12, U13, U15	IC, 74LS240 Driver
27	5284-12651-00	U21	IC, 4584
28	5340-12278-00	U8	S/RAM 2064
29	5370-12272-00	U16 - U19	IC, LM339, Quad. Comp
30	5370-12687-00	U10	MC, 34064 Reset Chip
31	5520-10438-00	X2	Crystal, 8.0MHz.
32	5520-12084-00	X1	Crystal 32.768 KHz
33	5551-09822-00	L1	ILN, 4.7 UH 3A
34	5671-09019-00	D19 - D21	DSPL LED RED
35	5700-08985-00	U4	Socket, IC 40P, .6"
36	5700-12088-00	U6	Socket, IC 32P, .6"
37	5700-12424-00	U9	Socket, 84 Pin PLCC
38	5791-10850-00	J201, J204	Connector, 26-pin Header Str Sq.
39	5791-10862-07	J210	Connector, 7-pin Header Str Sq.
40	5791-12461-08	J212	Connector, 8-pin Header Str Sq.
41	5791-12461-09	J206 - J209	Connector, 9-pin Header Sq. pin
42	5791-12461-12	J205	Connector, 12-pin Header Sq. pin
43	5791-12516-00	J202, J211	34 Hen 2x17 STR
44	5881-09021-00	B1 - B3	Battery Holder "AA"
45	5048-11033-00	C50	Capacitor, 0.022 μ f, 10v
46	*		PCB Label
47	A-5343-50012	U6	Game PROM Assembly
48	5410-12426-00	U9	WPC-89 ASIC
49	5400-10320-00	U4	IC MPU 68B09E
50	5880-09022-00	B1 - B3	Battery, Alkaline, 1.5v ("AA")
51	*		Bare PC Board

- Notes:**
1. See separate manual for schematics.
 2. * = Not available for individual sale.

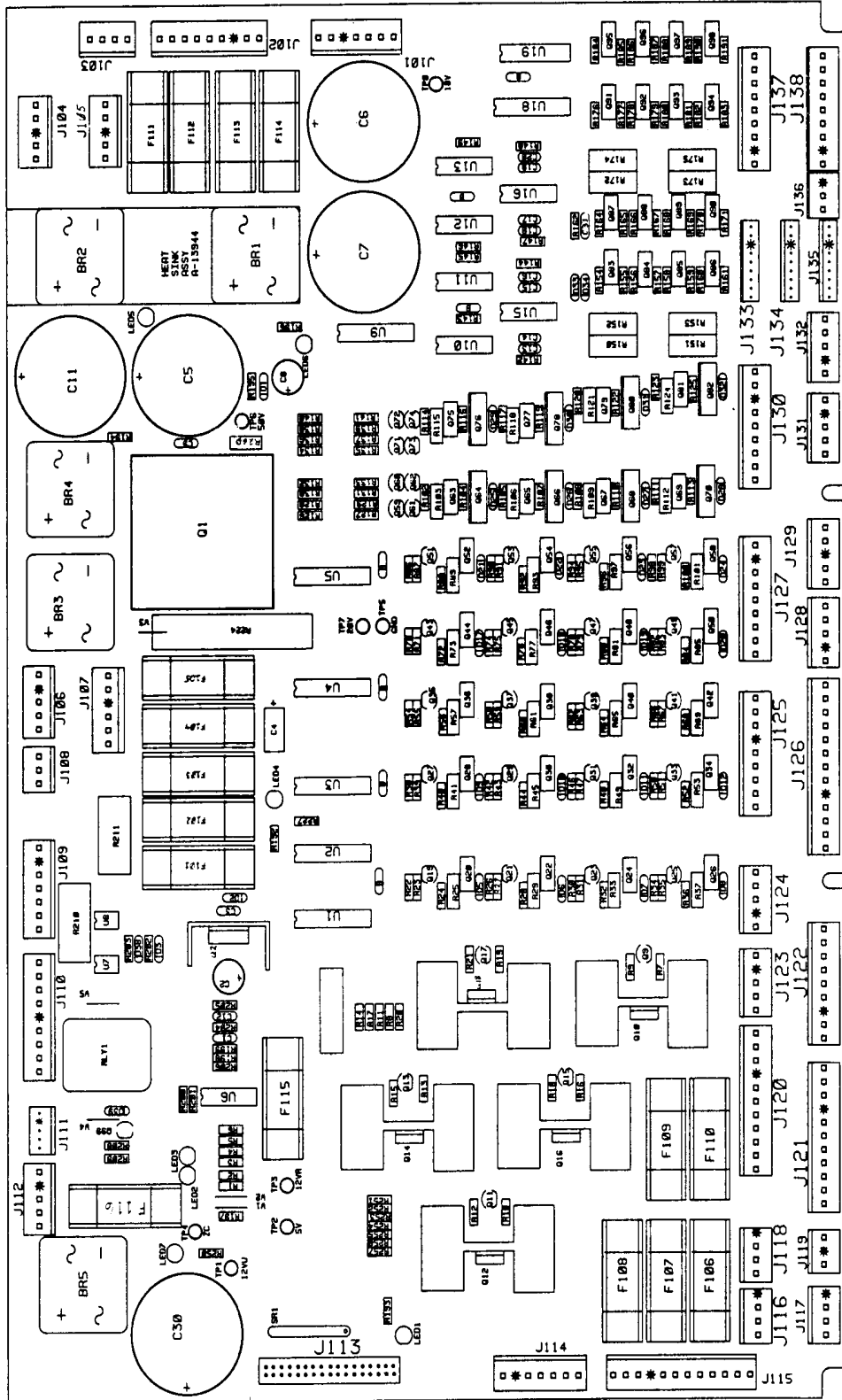
A-12742-50012 WPC CPU Board



A-12697-1 WPC Power Driver Assembly

Item	Part Number	Ckt Designator	Description	Item	Part Number	Ckt Designator	Description
1	*	Q2, Q10, Q12, Q14, Q16, Q18	Thermal Compound	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
2	4006-01005-06	Q1, Q2	Mach. Screw, 6-32 x 3/8	42	5191-12179-00	Q64, Q66, Q68, Q70, Q76 Q78, Q80, Q82	Transistor, TIP36C PNP
3	4406-01128-00	Q1, Q2	Nut, 6-32 KEPS	43	5192-12428-00	Q91-Q98	Transistor, TIP 107
4	4004-01005-06	Q10, Q12, Q14, Q16, Q18	Mach. Screw, 4-40 x 3/8	44	5250-12634-00	Q1	Reg LM 323 5v
5	4404-01119-00	Q10, Q12, Q14, Q16, Q18	Nut, 4-40 SNUT	45	5281-09486-00	U1-U5, U18	IC, 74LS374 8 Dual D Flipflop
6	5010-08981-00	R260	Resistor, 10KΩ, 1/2w, 5%	46	5281-09487-00	U10-U13	IC, 74LS74 Dual D flipflop
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%	47	5281-10182-00	U9	IC, 74LS240, L/Dvr
8	5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191, R208	Resistor, 560Ω, 1/4w, 5%	48	5370-12272-00	U6, U15, U16	IC, LM339 Quad. Comp
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%	49	5460-12423-00	Q2	IC, LM 7812
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%	50	5490-10892-00	U7, U8	Opto Isolator, 4N25
11	5010-08998-00	R155, R157, R159, R161, R165, R167, R169, R171	Resistor, 2.2KΩ, 1/4w, 5%	51	5580-08994-01	RLY 1	Relay 4PDT 6VDC5A VS
12	5010-09034-00	R3, R4, R6, R142-R149, R197-R198	Resistor, 10KΩ, 1/4w, 5%	52	5671-09019-00	LED1 - LED7	Display LED Red
13	5010-09085-00	R194, R196, R251, R253-R257	Resistor, 1.5KΩ, 1/4w, 5%	53	5701-09652-00	Q1	Thermal Pad TO-3
14	5010-09086-00	R252	Resistor, 6.8KΩ, 1/4w, 5%	54	5705-09199-00	Q2	Heatsink, #6030B
15	5010-09224-00	R1, R2, R192, R201-R205	Resistor, 270Ω, 1/4w, 5%	55	Not Used		
16	5010-09314-00	R176, R178, R180, R182, R184, R186, R188, R190	Resistor, 1.2KΩ, 1/4w, 5%	56	5705-12637-00	Q1	Heatsink 5054
17	5010-09324-00	R206	Resistor, 27KΩ, 1/4w, 5%	57	5705-12638-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
18	5010-09358-00	R154, R156, R158, R160, R164, R166, R168, R170, R162, R193, R199, R200, R250	Resistor, 1KΩ, 1/4w, 5%	58	5733-12060-01		Fuse Holder, F101-F116
19	5010-09361-00	R104, R107, R110, R113, R116, R119, R122, R125	Resistor, 220Ω, 1/4w, 5%	59	*		Bare PC Board
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%	60	5791-10862-03	J108, J119, J136	Connector, 3-pin Header STR Sq.
21	5010-09534-00	W1, W2	Resistor, 0Ω	61	5791-10862-04	J103, J116-J118	Connector, 4-pin Header STR Sq.
22	5010-11079-00	R7, R10, R13, R16, R19	Resistor, 51Ω, 1/4w, 5%	62	5791-10862-05	J112, J104-J106, J123, J124, J128, J129, J131, J132, J105	Connector, 5-pin Header STR Sq.
23	5010-12427-00	R150-R153, R172-R175	Resistor, 22Ω, 1w, 5%	63	5791-10862-06	J107	Connector, 6-pin Header STR Sq.
24	5012-12632-00	R224	Resistor, 12Ω, 10w, 5%	64	5791-10862-07	J101, J109, J114	Connector, 7-pin Header STR Sq.
25	5012-12238-00	R210, R211	Resistor, 3.3KΩ, 5w, 10%	65	5791-10862-09	J102, J110, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header STR Sq.
26	5019-10143-00	SR1	SIP, 9R, 10 pin, 470Ω, 5%	66	5791-10862-11	J120, J121	Connector, 11-pin Header STR Sq.
27	5040-08986-00	C4	Capacitor, 100μfd, 10v (±20%)	67	5791-10862-12	J115	Connector, 12-pin Header STR Sq.
28	5040-09421-00	C2	Capacitor, 100μfd, 25v (+50, -10%)	68	5791-10862-13	J126	Connector, 13-pin Header STR Sq.
29	5040-09537-00	C8	Capacitor, 100μfd, 100v (±20%)	69	5791-12481-05	J111	Connector, 5-pin Header STR Sq.
30	5040-12313-00	C5, C6, C7, C11, C30	Capacitor, 15,000μfd, 25v (±20%)	70	5791-12481-09	J133-J135	Connector, 9-pin Header STR Sq.
31	5043-08980-00	B-BYPASS	Capacitor, .01μfd, 50v (+80, -20%)	71	5791-12516-00	J113	34 HEN 2x17 STR
32	5043-08996-00	C13-C20, C31	Capacitor, 1μfd, 50v (±20%)	72	5824-09248-00	TP1-TP8	Test Point #1502-1
33	5043-09845-00	C1, C12	Capacitor, 1,000pfd, 50v (±20%)	73	5041-09183-00	C9	Capacitor, 2.2μfd TANT
34	5048-10994-00	C3	Capacitor, .33μfd, 50v (±20%) Ax.	74-100	Not Used		
35	5070-08919-00	D33, D34	Diode, 1N4148, 150MA.	101	*		ID Label
36	5070-09054-00	D1-D3, D5-D12, D17-D32, D38, D39	Diode, 1N4004, 1.0A.	102	5730-09071-00	F114	Fuse, 8A, 32v
37	5100-09690-00	BR1-BR5	Bridge Rectifier, 35A., 200v	103	5731-09128-00	F101, F102	Fuse, S-B, 2.5A., 250v
38	5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac, BT138E	104	Not Used		
39	5162-12422-00	U19	IC, ULN 2803	105	5731-09651-00	F106-F113	Fuse, S-B, 5A., 250v
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	106	Not Used		

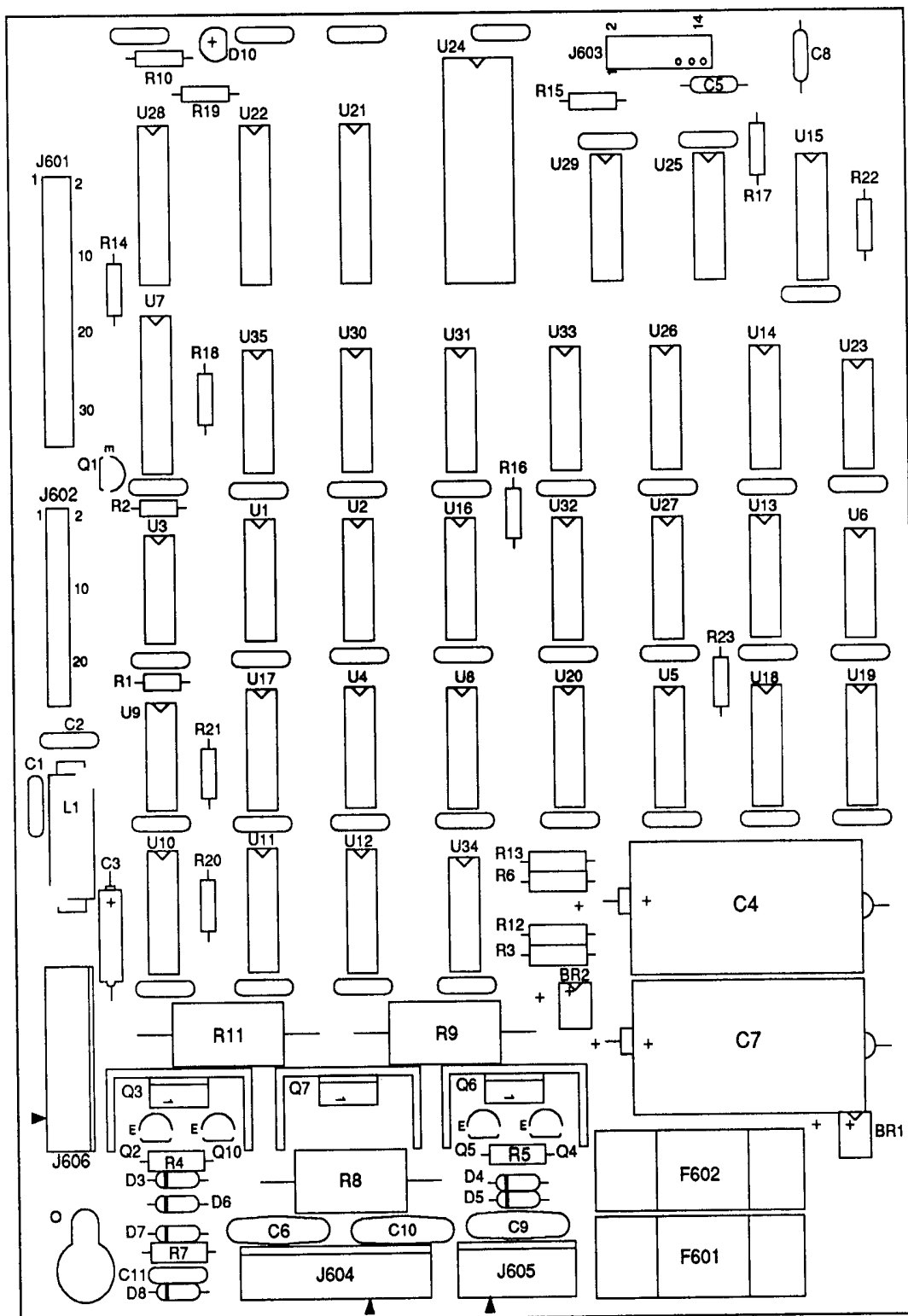
- Notes:**
1. See separate manual for schematics.
 2. * = Not available for individual sale.



A-14039 Dot Matrix Controller Assembly

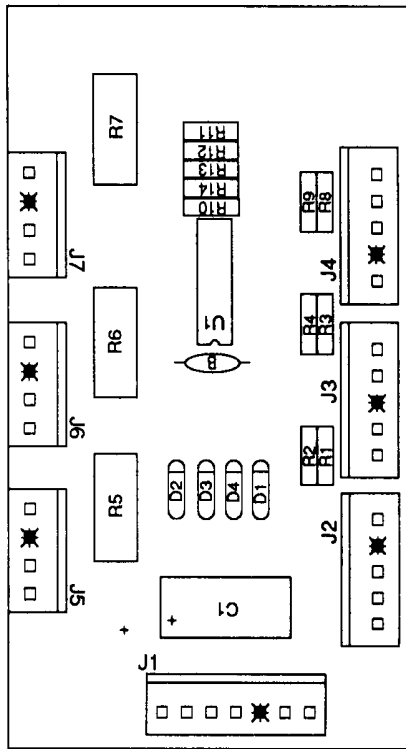
Item	Part Number	Ckt Designator	Description
1	5010-08991-00	R1	Resistor, 4.7K Ω , 1/4w, 5%
2	5010-09224-00	R10	Resistor, 270 Ω , 1/4w, 5%
3	5010-12832-00	R3, R6, R12, R13	Resistor, 47K Ω , 1/2w, 5%
4	5010-12841-00	R4, R5	Resistor, 120 Ω , 1/2w, 5%
5	5012-12830-00	R9	Resistor, 1.8K Ω , 5w, 5%
6	5012-12842-00	R11	Resistor, 120 Ω , 5w, 5%
7	5012-12843-00	R8	Resistor, 4.7K, 5w, 5%
8	5040-08986-00	C3	Capacitor, 100 μ fd., 10v, ($\pm$ 20%)
9	5040-12324-00	C4, C7	Capacitor, 150 μ fd., 160v, ($\pm$ 50%)
10	5043-08980-00	BYPASS	Capacitor, .01 μ fd., 50v, (+80, -20%)
11	5043-09072-00	C6, C9, C10	Capacitor, .1 μ fd., 500v, (+80, -20%)
12	5043-09845-00	C1, C2, C11	Capacitor, 1KP, 50v, ($\pm$ 20%)
13	5070-09054-00	D7	Diode, 1N4004, 1.0A.
14	5075-12824-00	D6, D8	Zener, 1N4742A, 12v
15	5075-12826-00	D3	Zener, 1N4759, 62v
16	5075-12823-00	D4, D5	Zener, 1N4758A, 62v
17	5100-12833-00	BR1, BR2	Bridge, 400v, 1A.
18	5160-10269-00	Q1	Transistor, 2N3904 NPN
19	5164-09056-00	Q2, Q10	Transistor, MPSD02, NPN
20	5164-12154-00	Q3, Q7	Transistor, MJE15030 NPN
21	5194-09055-00	Q4, Q5	Transistor, MPSD52 PNP
22	5194-12155-00	Q6	Transistor, MJE15031 PNP
23	5281-09738-00	U16, U25 - U27	IC, 74LS157
24	5281-10033-00	U3	IC, 74LS30
25	5281-10043-00	U31 - U33, U35	IC, 74LS175
26	5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
27	5311-10947-00	U9	IC, 74HC125
28	5311-10951-00	U10, U11	IC, 74HC161
29	5311-10977-00	U6	IC, 74HC04
30	5311-12817-00	U29	IC, 74HC165
31	5311-12819-00	U21	IC, 74HC688
32	5311-12820-00	U23	IC, 74HC27
33	5311-12822-00	U13 - U15	IC, 74HC193
34	5315-12009-00	U22	IC, 74HCT374
35	5315-12812-00	U1, U2, U30	IC, 74HCT138
36	5281-09308-00	U28	IC, 74HCT245
37	5315-12815-00	U8, U34	IC, 74HCT08
38	5315-12816-00	U19	IC, 74HCT32
39	5315-12821-00	U7	IC, 74HCT240
40	5340-12278-00	U24	S/RAM 2064 150NS
41	5551-09822-00	L1	IND 4.7 μ H, 3.0A.
42	5671-09019-00	D10	Display LED Red
43	5705-09199-00	Q3, Q6, Q7	Heatsink 6030B
44	5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
45	5733-12060-00		Fuse Holder (F601, F602)
46	5791-10850-00	J602	Connector, 26-pin STR Sq.
47	5791-10862-05	J605	Connector, 5-pin Header Sq.
48	5791-10862-07	J606	Connector, 7-pin Header Sq.
49	5791-10862-08	J604	Connector, 8-pin Header Sq.
50	5791-12516-00	J601	34 Hen 17x2 STR
51	5791-12827-00	J603	14 Hen 7x2 STR
52	5010-09036-00	R14-R23	Resistor, 100 Ω , 1/4w, 5%
53	*	Q3, Q6, Q7	Thermal Compound
54	4406-01003-06	Q3, Q6, Q7	Mach. Screw, 6-32 x 3/8
55	4406-01128-00	Q3, Q6, Q7	Nut, 6-32 KEPS
56	5043-09492-00	C5, C8	Capacitor, 100P, 50v, ($\pm$ 10%)
57	5010-10171-00	R7	Resistor, 56 Ω , 1/4w, 5%
58	*		Bare PC Board

- Notes:**
1. See separate manual for schematics.
 2. * = Not available for individual sale.



A-13901-3

Opto Ramp Switch Assembly

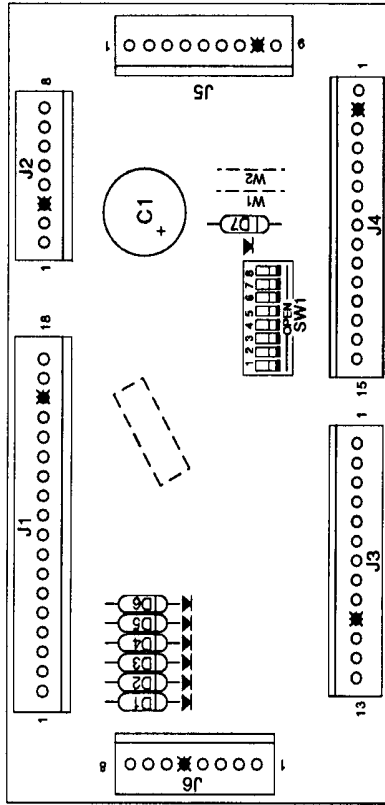


Part Number	Designator	Description
5010-08774-00	R10, R13	Resistor, 22ΩK, 1/4w, 5%
5010-09034-00	R14	Resistor, 10KΩ, 1/4w, 5%
5010-09162-00	R11, R12	Resistor, 100KΩ, 1/4w, 5%
5010-09999-00	R1 - R4, R8, R9	Resistor, 2KΩ, 1/4w, 5%
5010-12733-00	R5 - R7	Resistor, 220Ω, 1w, 5%
5040-12298-00	C1	Capacitor, 100μfd., 40v (+50, -10%)
5043-08980-00	B	Capacitor, .01μfd., 50v (+80, -20%)
5070-09054-00	D1 - D4	Diode, 1N4004
5370-12272-00	U1	IC, LM339 Quad.
5791-12273-05	J2	Connector, 5-pin Header Sq.
5791-12273-07	J1	Connector, 7-pin Header Sq.
5791-12273-04	J5	Connector, 4-pin Header Sq.
*		Label
*		Bare PC Board

Notes: 1. See Section 3 for schematic.
2. * = Not available for individual sale.

A-14689

WPC Coin Door Interface Board

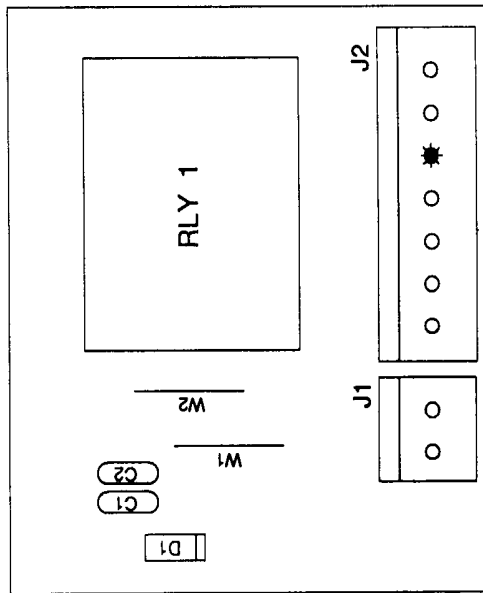


Part Number	Designator	Description
5070-09054-00	D1-D7	Diode, 1N4004, 1.0A.
5791-10862-18	J1	Connector, 18-pin Header Str Sq.
5791-10862-08	J2, J6	Connector, 8-pin Header Str Sq.
5791-10862-13	J3	Connector, 13-pin Header Str Sq.
*		I.D. Label
*		Bare PC Board
†5791-10862-15	J4	Connector, 15-pin Header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

Note:

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

A-14423-1 Relay Board

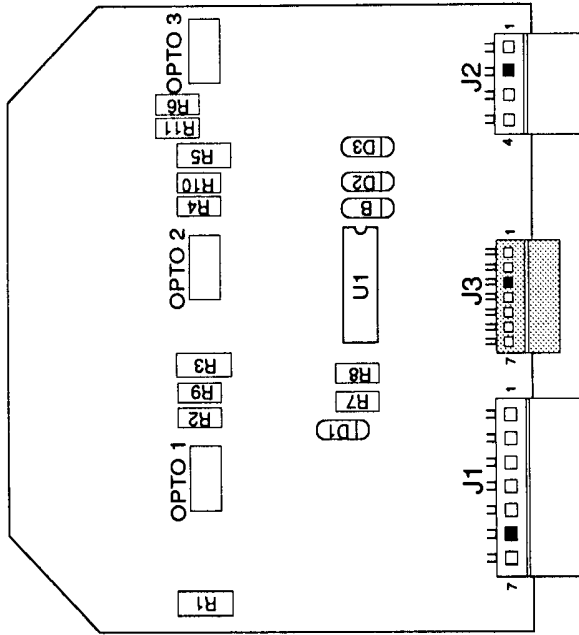


Part Number	Designator	Description
5580-12782-00	RLY 1	Relay Dp-dt Sealed Vented, 12v
5070-09054-00	D1	Diode, 1N4004
5791-12273-02	J1	Connector, 2-pin Header
5791-12273-07	J2	Connector, 7-pin Header
5010-09534-00	W1, W2	Resistor, 0Ω
*		Bare PC Board

Notes:

1. See Section 3 for schematic.
2. * = Not available for individual sale.

C-13205 3-Bank Drop Target Opto Board



Part Number	Designator	Description
5010-08930-00	R1, R3, R5	Resistor, 470Ω, 1/2w, 5%
5010-09324-00	R2, R4, R6	Resistor, 27KΩ, 1/4w, 5%
5010-08774-00	R7	Resistor, 22KΩ, 1/4w, 5%
5010-09162-00	R8	Resistor, 100KΩ, 1/4w, 5%
5043-08980-00	B	Capacitor, .01μfd (+80, -20%)
5370-12272-00	U1	IC LM339 Quad. Comp
5490-10159-00	OPTO 1 - OPTO 3	Opto Inter MDL L/G
5070-09054-00	D1 - D3	Diode, 1N4004
5791-10869-07	J1	Connector, 7-pin Header
5791-10869-04	J2	Connector, 4-pin Header
5010-08773-00	R9 - R11	Resistor, 18KΩ, 1/4w, 5%
*		Bare PC Board

A-15318-R
A-15318-L

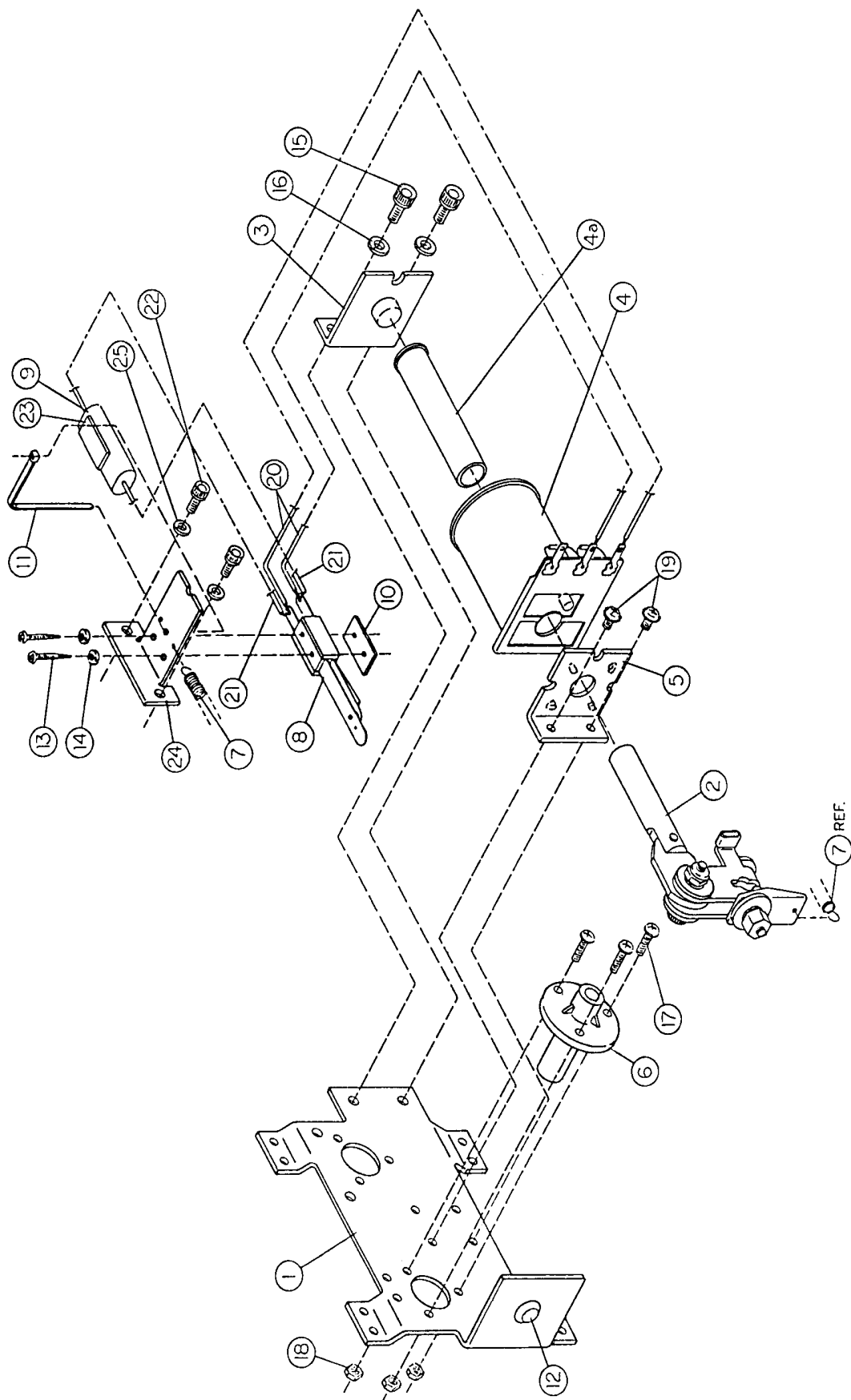
Flipper Assembly (Right)
Flipper Assembly (Left)

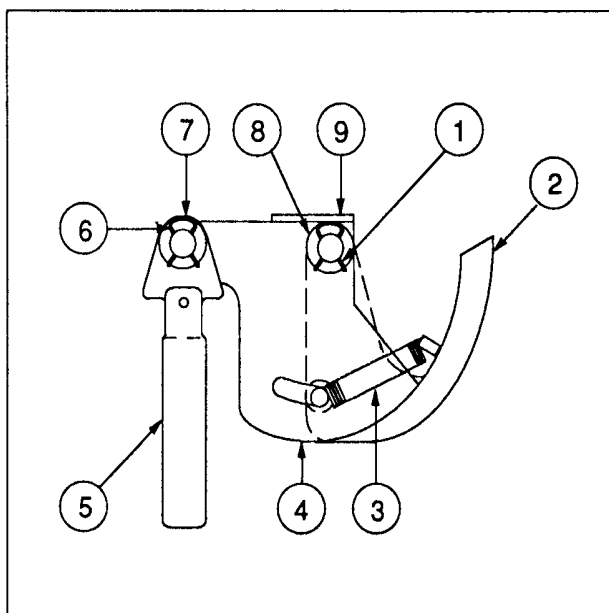
Item	Part Number	Description	Flipper Assembly Notes...
1.	B-13104-R	Flipper Base Assy, Right	1. Each Flipper Assembly on the Lower Playfield is mounted beneath the playfield, in conjunction with the plastic Flipper Paddle and Shaft (20-9250) and Flipper Rubber (23-6519) on the upper side of the playfield. 2. The tip of the EOS Switch must travel 0.150 (+ .010, - .000) inch, before the contacts fully open, with the flipper in the actuated position. The EOS Switch contacts must have a gap of 0.062 (± .015) inch. Adjustment of the EOS Switch must be made at a minimum distance of 0.25 inch from the switch body. 3. All moving elements of the assembly must operate freely, with no evidence of binding. 4. For coil replacement, remove the Solenoid Bracket (Item 5) to prevent screw damage. 5. Use Loctite™ 242 when reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing. 6. When replacing their Bumper Plug (item 12) to restore proper flipper operation, readjust the flipper paddle and shaft position. 7. Solid-color blue wire connects to the banded end of each diode, mounted on the connector end of the Flipper Coil (item 4). Trace-color wire connects to the unbanded end of the diode.
†	B-13104-L	Flipper Base Assy, Left	
2.	B-13882-R	Crank Link Assembly, Right	
†	B-13882-L	Crank Link Assembly, Left	
3.	A-12111	Flipper Stop Assembly	
4.	FL-11630	Flipper Coil (Red)	
a)	*	Coil Tubing	
5.	01-7695	Solenoid Bracket	
6.	03-7568	Flipper Bushing	
7.	10-364	Spring	
8.	03-7811	End of Stroke (EOS) Sw.	
9.	5045-12098-00	Capacitor, 2.2 µFd, 250v, 20%	
10.	20-6516	Speednut, Tinnerman	
11.	*	Ty-Wrap, Nylon	
12.	23-6577	Bumper Plug	
13.	4105-01019-10	Sh. Metal Screw, #5 x 5/8	
14.	4701-00002-00	Lockwasher, #6 Split	
15.	4010-01066-06	Cap Screw, 10-32 x 3/8, SH	
16.	4701-00004-00	Lockwasher, #10 Split	
17.	4006-01005-06	Mach. Screw, 6-32 x 3/8 P-RH-S	
18.	4406-01117-00	Nut, 6-32 Hex.	
19.	4006-01017-04	Mach. Screw, 6-32 x 1/4 P-RH-S	
20.	*	Wire, 18 AWG, Blue	
21.	*	#18 Vinyl Sleeve	
22.	4008-01079-05	Cap Screw, 8-32 x 5/16	
23.	*	Tape, Double-sided	
24.	01-9375	Switch Mounting Bracket	
25.	4701-00003-00	Lockwasher, #8 Split	

Notes:

1. * = Not available for individual sale.
2. † = Items for Left Flipper Assembly Only.

A-15318-R & A-153184-L Flipper Assembly (Left & Right)



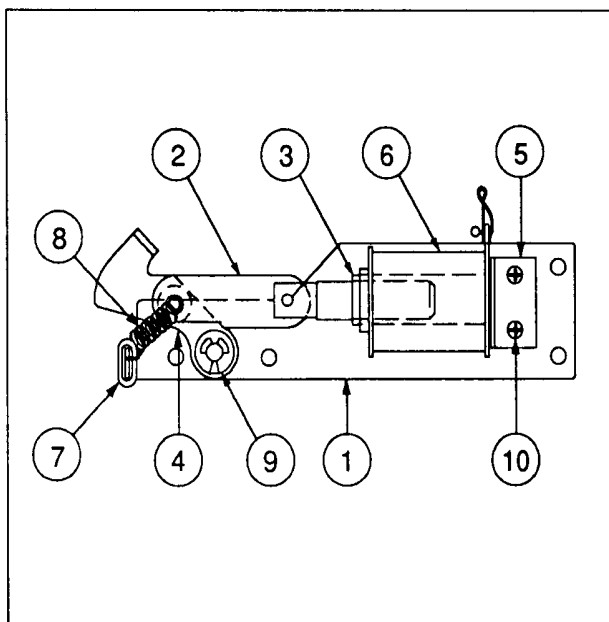


C-9638 Ball Shooter Lane Feeder

Item	Part Number	Description
1.	12-6227	Hair Pin Clip
2.	A-8247	Eject Cam Assembly
3.	10-362	Ejector Spring (Plain)
4.	A-6949-L	Spring Plate Assembly
5.	A-8050-1	Coil Plunger Assy, 2-1/8"
a)	*	Coil Plunger, 2-1/8"
b)	*	Roll Pin, 1/8 x 7/16
c)	*	Armature Link
6.	12-6227	Hair Pin Clip
7.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.
8.	4700-00103-00	Flatwasher, 17/64 x 1/2 x 28ga.
9.	A-8268	Mounting Bracket Assembly

Associated Parts

B-9362-R-3	Coil & Bracket Assembly
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
4006-01017-06	Mach. Screw, 6-32 x 3/8
4406-01119-00	Nut, 6-32 ESN
AE-26-1200	Coil Assembly
03-7066	Coil Tubing
10-128	Spring



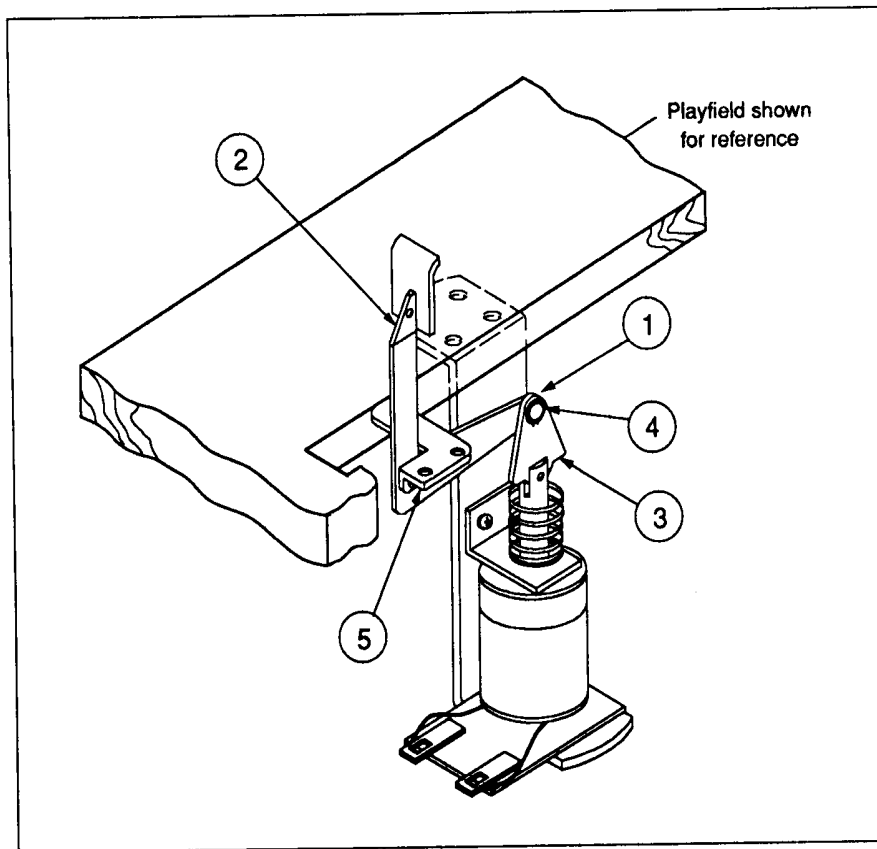
A-8039-3 Outhole Kicker Assembly

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

Note:

* = Not available for individual sale.

B-12665 Kicker Arm (Slingshot) Assembly w/Coil & Bracket Assembly : B-11203-R-1



Item	Part Number	Description
1.	12-6227	Clip, Hairpin
2.	A-12664	Kicker Crank Assembly
3.	A-5103	Coil Plunger Assembly
a)	*	Coil Plunger
b)	*	Roll Pin, 1/8 x 7/16
c)	*	Armature Link
4.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.
5.	A-5653	Mounting Bracket Assembly

Associated Parts for Left Kicker

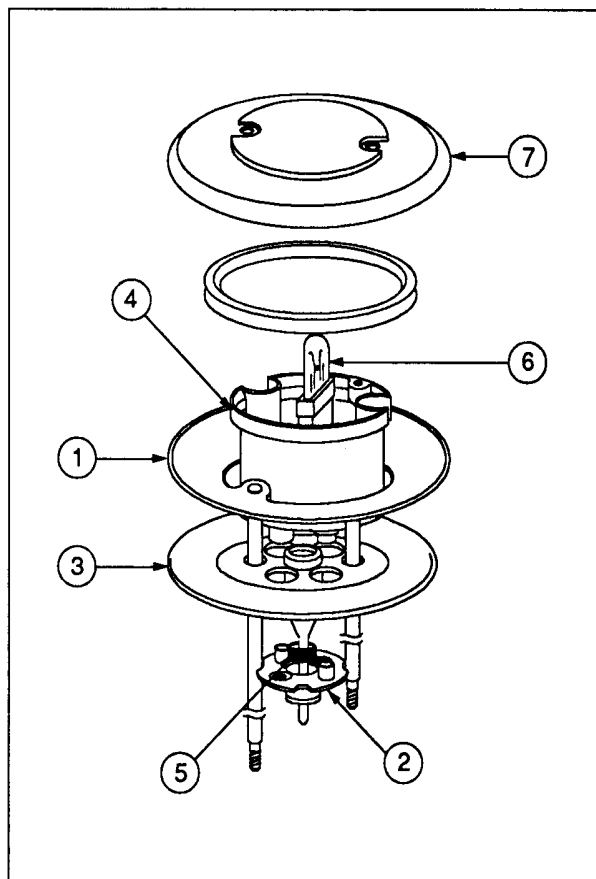
B-11203-R-1	Coil & Bracket Assembly
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
4006-01017-06	Mach. Screw, 6-32 x 3/8
4406-01119-00	Nut, 6-32 ESN
AE-26-1500	Coil Assembly
03-7066	Coil Tubing
10-128	Spring

Associated Parts for Right Kicker

B-11203-R-1	Coil & Bracket Assembly
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
4006-01017-06	Mach. Screw, 6-32 x 3/8
4406-01119-00	Nut, 6-32 ESN
AE-26-1500	Coil Assembly
03-7066	Coil Tubing
10-128	Spring

Note:

* = Not available for individual sale.

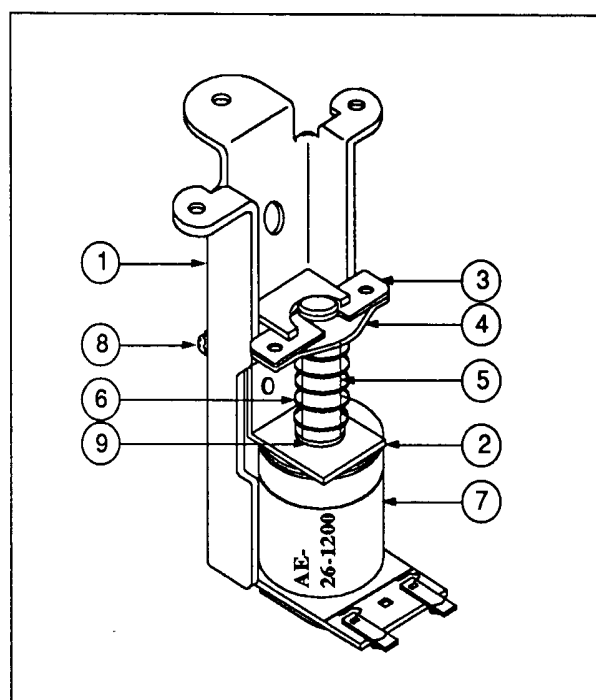


B-9414-1 Jet Bumper Assembly

Item	Part Number	Description
1.	A-4754	Bumper Ring Assembly
2.	03-6009-A5	Bumper Base - White
3.	03-6035-1	Bumper Wafer - Blue
4.	03-7443-5	Bumper Body - White
5.	10-7	Spring - Jet Bumper
6.	A-11199	Socket & Bulb Assy.

Associated Part:

7.	03-8254-9	Jet Bumper Cap - Red
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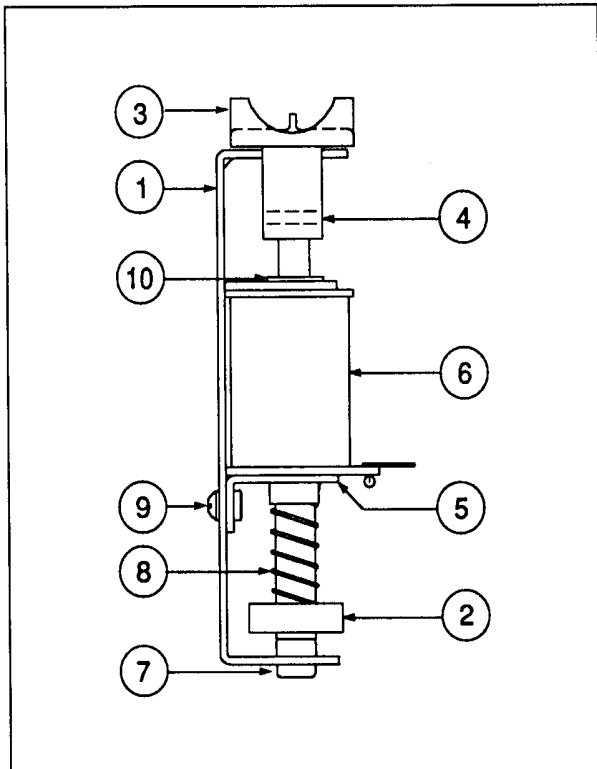


A-9415-2 Jet Bumper Coil Assembly

Item	Part Number	Description
1.	B-7417	Bracket & Stop Assembly
2.	01-1747	Coil Retaining Bracket
3.	01-5492	Armature Link, Steel
4.	01-5493	Armature Link, Bakelite
5.	02-3406-1	Coil Plunger
6.	10-326	Armature Spring
7.	AE-26-1200	Coil Assembly
8.	4006-01017-04	Mach. Screw, 6-32 x 1/4
9.	03-7066	Coil Tubing

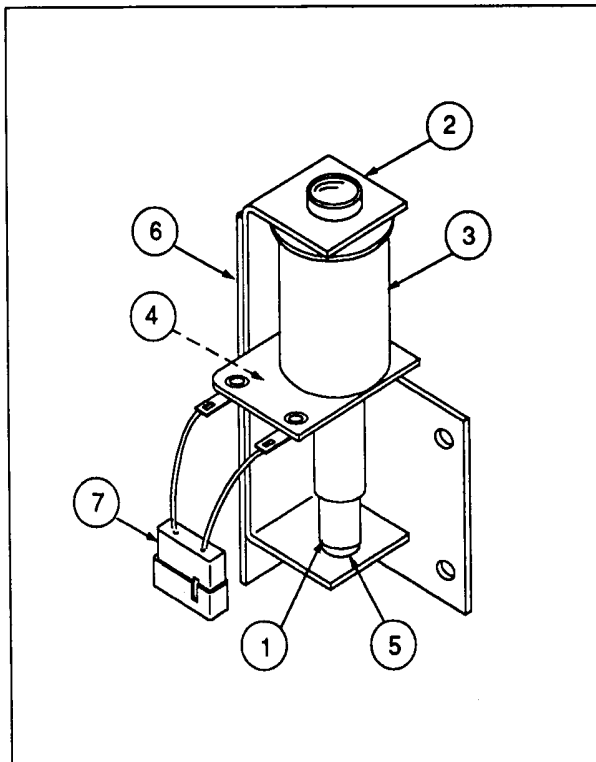
Associated Parts

B-12030-2	Jet Bumper Sw & Diode Assy
B-12029-2	Jet Bumper Sw & Brkt. Assy
SW-11A-37	Jet Bumper Switch Assy
5070-09054-00	Diode, 1N4004



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

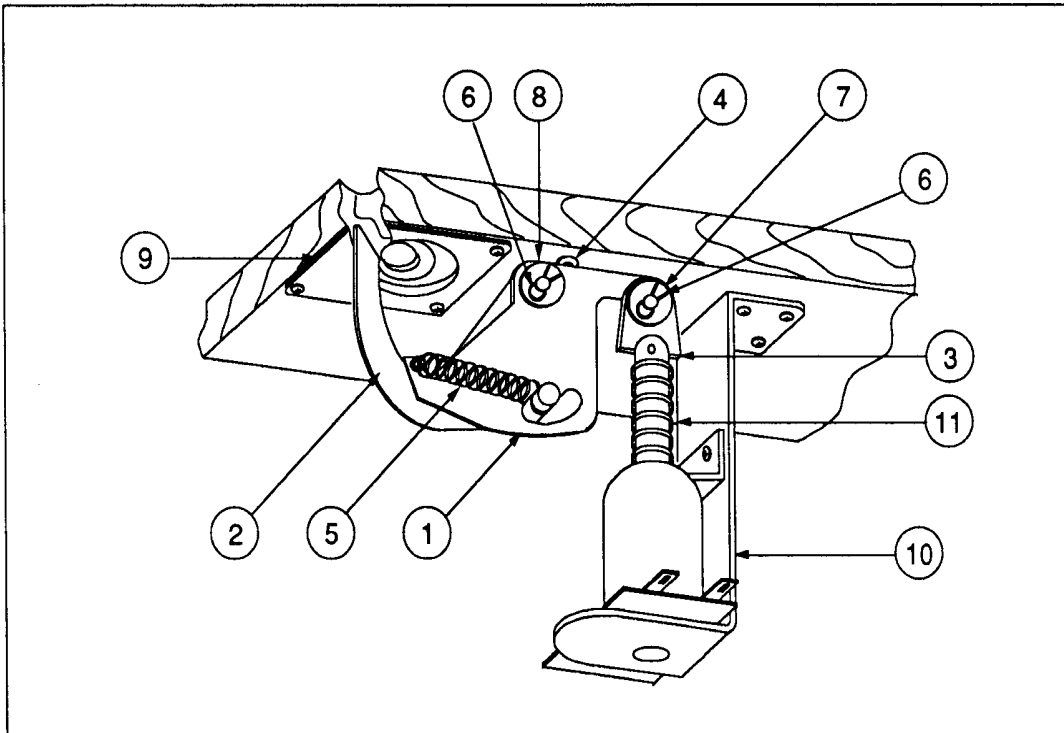


B-10686-1 Knocker Assembly

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

B-9361-R-1 Ball Eject Assembly

w/Coil & Bracket Assembly: B-11203-R-1



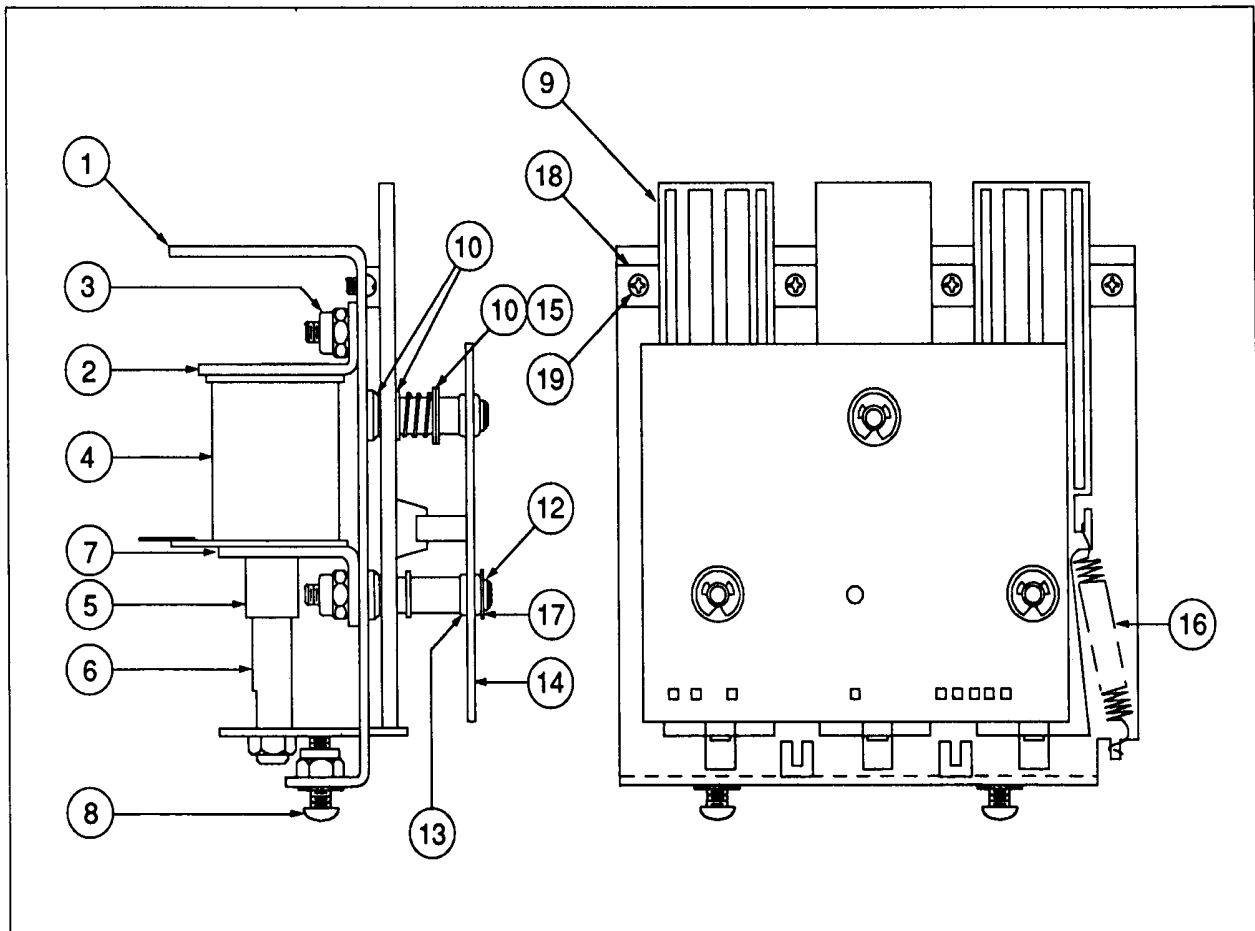
Item	Part Number	Description
1.	A-6949-R	Spring Plate
2.	A-7471-R	Eject Cam Assembly
3.	A-8050-1	Plunger Assy., 2-1/8"
a)	*	Plunger Coil
b)	*	Armature Link
c)	*	Roll Pin, 1/8 x 7/16"
4.	A-8268	Mounting Bracket Assy.
5.	10-362	Eject Spring
6.	12-6227	Hairpin Clip
7.	4700-00030-00	FW, 17/64 x 1/2 x 15ga.
8.	4700-00103-00	FW, 17/64 x 1/2 x 28ga.

Associated Parts:

9.	03-7351-1-9	Eject Shield
10.	B-11203-R-1	Coil & Bracket Assy.
a)	AE-26-1500	Coil Assembly
b)	B-7572-1	Bracket & Stop Assy.
c)	01-8-508-S	Coil Retainer Bracket
d)	03-7066	Coil Tubing
e)	4006-01017-06	Mach. Screw, 6-32 x 3/8
f)	4406-01119-00	Nut, 6-32 ESN
11.	10-128	Spring

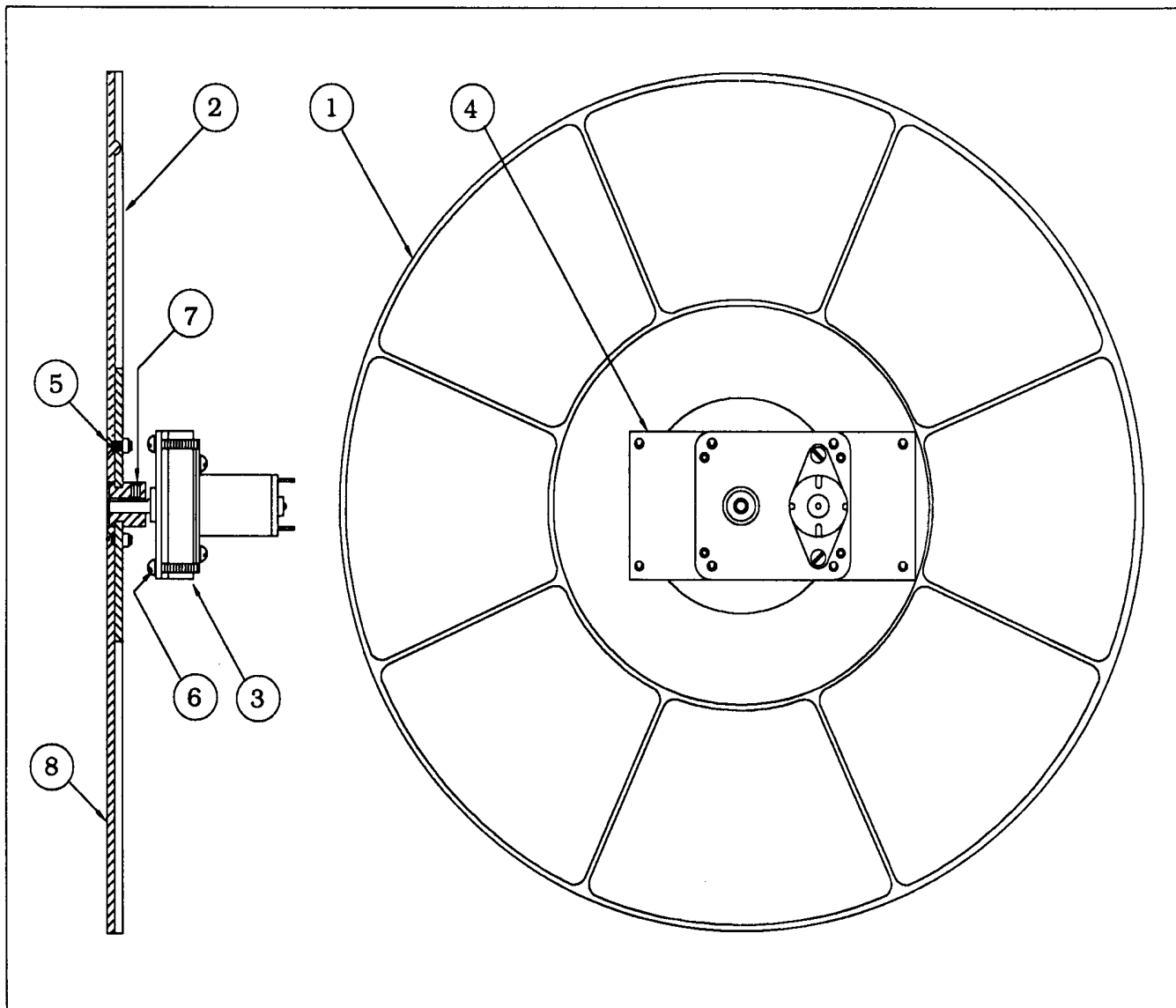
Note: * = Not available for individual sale.

A-13595-3 3-Bank Drop Target Assembly



Item	Part Number	Description
1.	A-13593-3	3-Bank Drop Tgt. Sub-Assembly
2.	A-11397	Stop Bracket Assembly
3.	4408-01119-00	Nut, 8-32 ESNA
4.	AE-26-1200	Coil Assembly
5.	03-7066-4	Coil Tubing
6.	A-11389	Plunger Reset Plate
7.	01-8413	Coil Mounting Bracket
8.	4010-01025-14	Mach. Screw, 10-32 x 7/8
9.	03-8036	Target, Plain
10.	4700-00072-00	Flatwasher, 17/64 x 1/2 x 21ga.
11.	10-392	Spring
12.	20-8712-18	"E"-Ring, 3/16" Shaft
13.	23-6626	Rubber Grommet
14.	C-13205	3-Bank Opto Board (See p. 2-13)
15.	20-8712-25	"E"-Ring, 1/4" Shaft
16.	10-364	Extension Spring
17.	4700-00016-00	Flatwasher, 3/16 x 7/16 x 17ga.
18.	03-8334-3	Target, 3-15/16"
19.	4004-01005-04	Mach. Screw, 4-40 x 1/4"

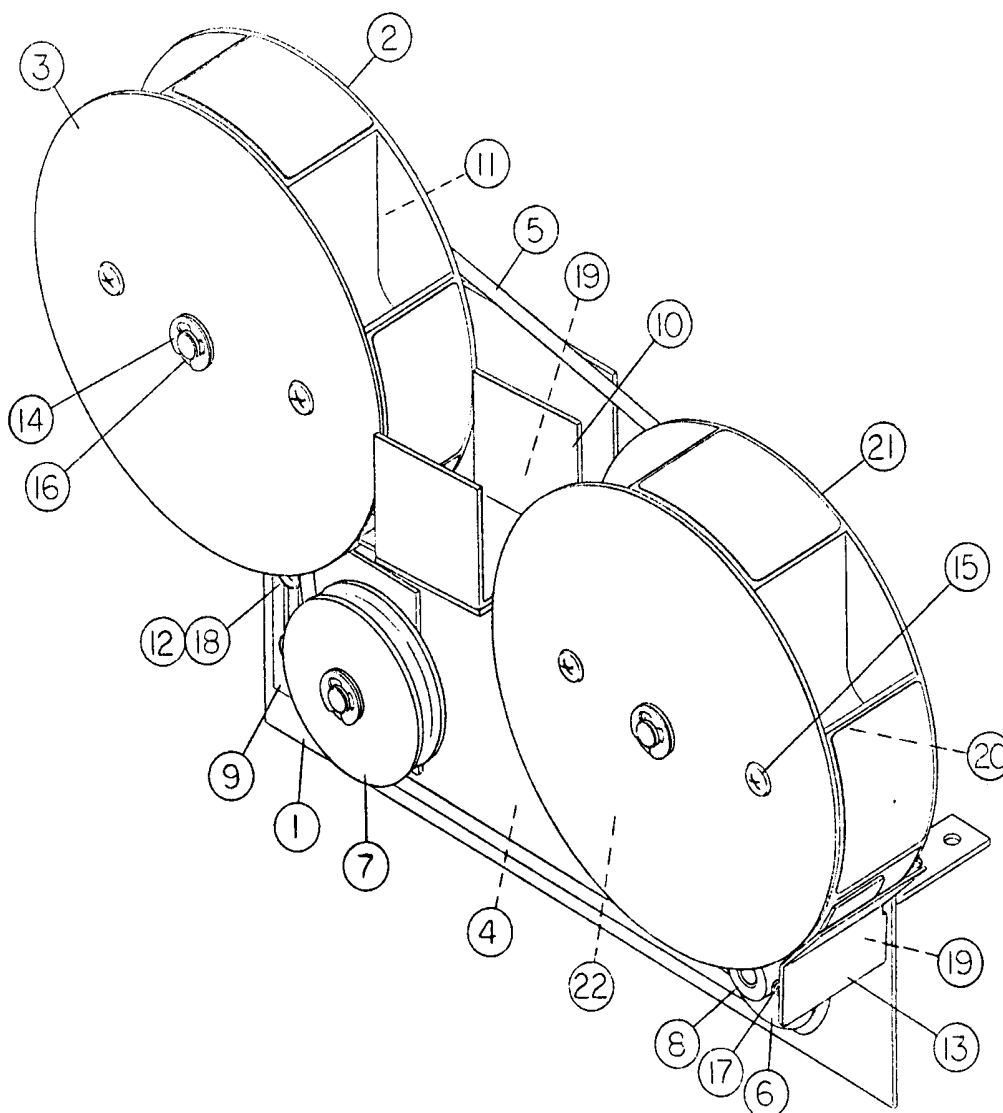
A-14750 Disc & Motor Assembly



Item	Part Number	Description
1.	03-8593	Disc
2.	A-14748	Retainer Plate Assy.
3.	14-7967	Gear Motor
4.	A-14749	Mounting Plate Assy.
5.	4006-01041-06B	Mach. Screw, 6-32 x 3/8
6.	4010-01006-10	Mach. Screw, 10-32 x 5/8
7.	4008-01076-06	Mach. Set 8-32 x 3/8
8.	*	Decal

Note: * = Not available for individual sale.

A-14741 Ferris Wheel Assembly



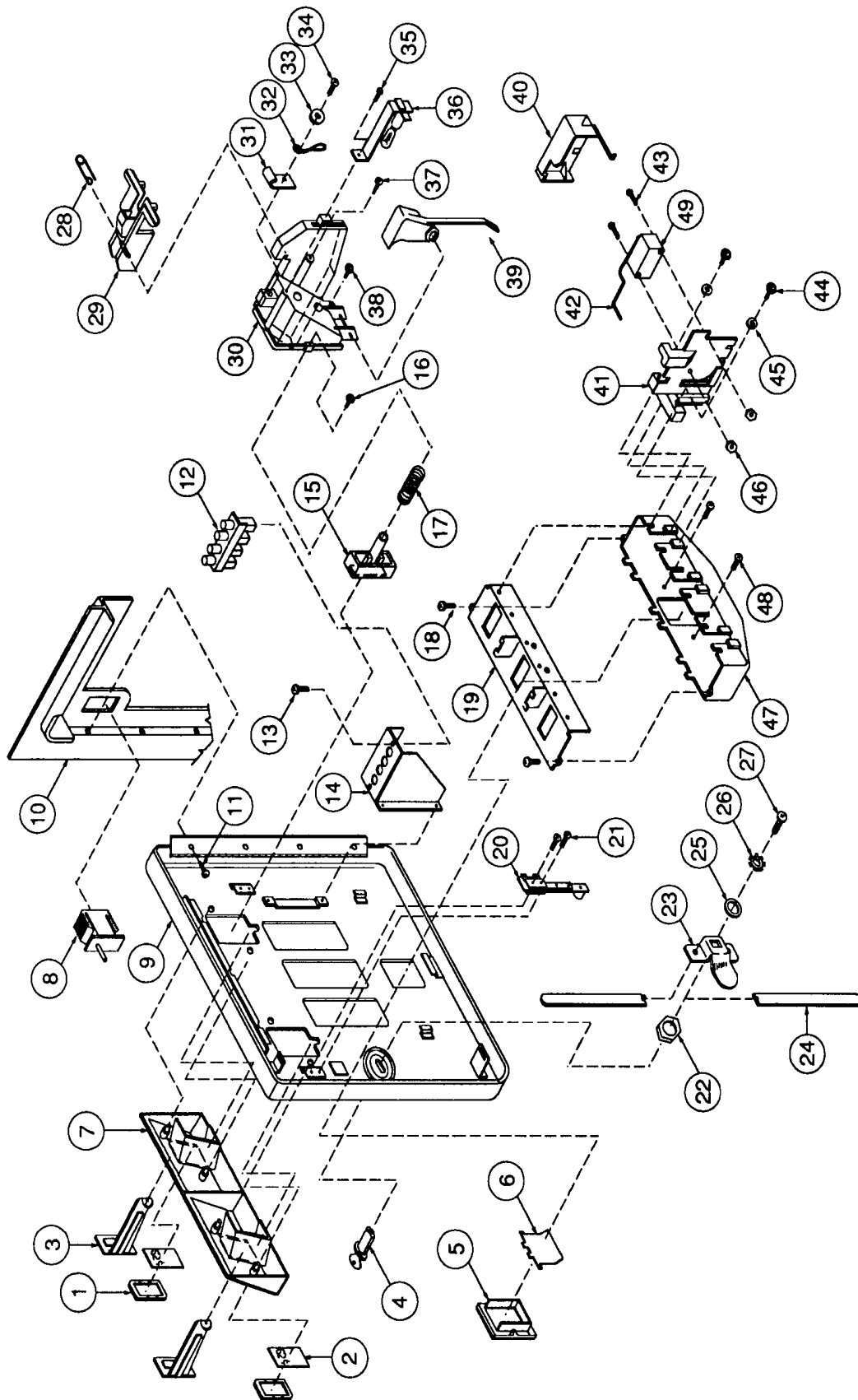
Item	Part Number	Description
1.	A-14740	Main Mounting Plate Assembly
2.	03-8124	Ferris Wheel, Red
3.	03-8125	Ferris Wheel Cover (2 Used)
4.	A-14593-1	Motor Assembly
5.	23-6663	Drive Belt
6.	03-8086	Pulley
7.	03-8281	Pulley
8.	02-4290	Collar
9.	A-14737	Pulley Bracket Assembly
10.	A-14743	Mini-Ramp Assembly
11.	03-8126	Drive Belt Washer
12.	4006-01017-05	Sems #6-32 x 5/116 P-RH (2)
13.	A-14738	Left Wheel Guide Assembly
14.	20-8712-25	"E" Ring (3 used)
15.	4106-01033-08	SMS #6 x 1/2 PH (4 used)
16.	4700-00072-00	FW 17/64id x 1/2 od (3 used)
17.	4008-01076-06	Set Screw #8-32 x 3/8
18.	4700-00007-00	FW 5/32 id x 7/16 od (2 used)
19.	4006-01017-04	Sems #6-32 x 1/4 P-RH (4)
20.	03-8126-1	Drive Belt Washer
21.	03-8124-1	Ferris Wheel, Blue

A-14148-1 Coin Door Assembly

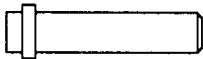
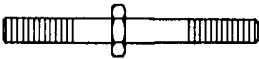
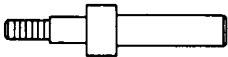
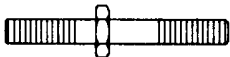
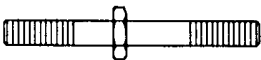
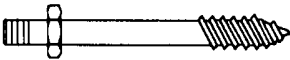
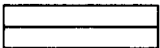
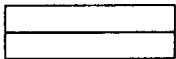
U.S.A. Door with Decals

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	Not Used		
29	Not Used		
30	27-1112	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

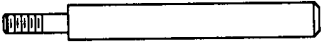
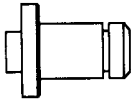
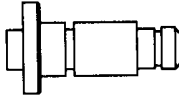
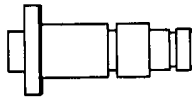
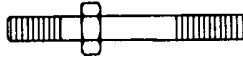
Coin Door Assembly



Metal & Plastic Posts

	Part Number	Description	Quantity
	02-3409	Spring Post	2
	02-3905	Bumper Post, #8 WS	2
	02-4003	Bumper Post, 8-32	2
	02-4020	Support Post	4
	02-4036	Rubber Bumper Post	6
	02-4424-1	Spring Post, 6-32 x 8-32	13
	02-4425-1	Post, 8-32/ #8-32	4
	02-4426-1	Post, #6-32 / #8 SMS	14
	02-4322-1	M-F Spacer, 8-32 x 3/8	3
	02-4252-18	F-F Spacer, 6-32 x 1-1/8"	2
	02-4252-26	F-F Spacer, 6-32 x 1-5/8"	5
	02-4252-65	F-F Spacer, 6-32 x 3-1/16"	1
	02-4434	Post, #8 x 1"	1
	02-4008	Mini Post	2
	02-4436-10	Spacer, 1/4 x 2-1/2"	2
	02-4436-17	Spacer, 1/4 x 3-3/8"	1
	02-4436-18	Spacer, 1/4 x 1-11/16"	1

Metal & Plastic Posts (Continued)

	Part Number	Description	Quantity
	02-4554-2	Spacer Post 8-32 x 4-1/4"	2
	02-4554-4	Spacer Post 8-32 x 3-3/4"	1
	02-4554-6	Spacer Post 8-32 x 4-1/16"	1
	02-4554-7	Spacer Post 8-32 x 4-7/16"	1
	02-4554-8	Spacer Post 8-32 x 4-5/8"	1
	02-4554-9	Spacer Post 8-32 x 2"	3
	02-4271-1	Post	2
	02-4271-2	Post	3
	02-4271- 3	Post	2
	03-8319-9	Star Post, #8 (Trp. Red)	17
	03-8319-10	Star Post , #8 (Trp. Blue)	9
	02-8365-9	Post, 3/8 x 3/16" (Trp. Red)	3
	02-8365-10	Post, 3/8 x 3/16" (Trp. Blue)	8
	02-4002- 3	Post, Fastening Screw	1

A-14787 Juggler Assembly

Item	Part Number	Description
1.	11-1036	Mini Playfield
2.	A-14722	Ball Guide Assembly
3.	A-14729	Ball Guide Assembly
4.	31-1637	Plastic Overlay
5.	03-8365-10	Post
6.	02-4426-1	Post
7.	23-6645	Bumper Pad
8.	01-10284	Jungle Mounting Bracket
9.	01-10268	Deflector Bracket
10.	A-14935	Lug, Diode & Lamp Assy.
11.	A-12336-1	Socket & Bulb Assembly
12.	4406-01119-00	Hex. Nut, #6-32 ESN
13.	4106-01033-08	Sh. Metal Screw, #6 x 1/2
14.	4106-01115-06Y	Sh. Metal Screw, #6-20 x 3/8
15.	*	Playfield Plastic
16.	H-14892	Juggler Harness
17.	03-7655-4	Harness Clip

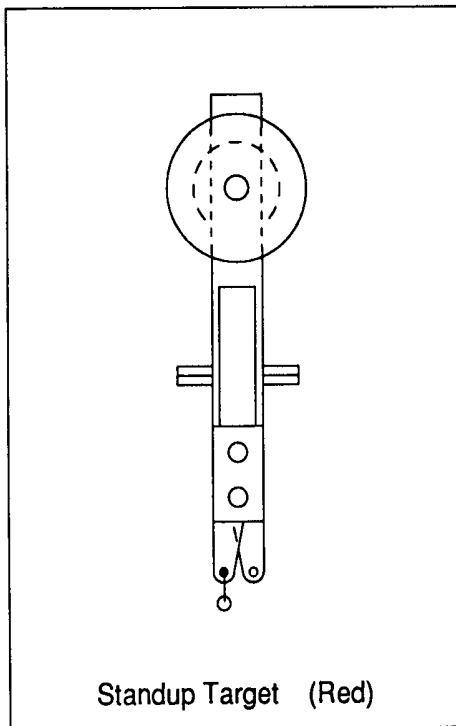
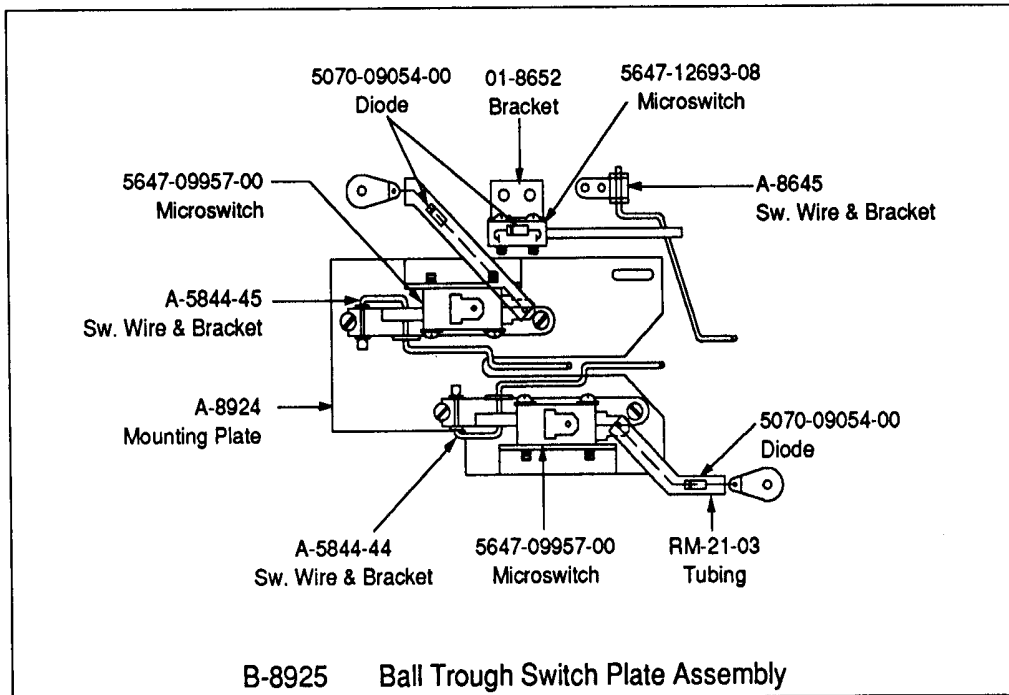
Cable List

Part Number	Description
H-11835	Knocker Cable
H-13870	Black Jumper Cable
H-14020	Cable
H-14582	Secondary Cable
H-14583	Logic Power Cable
H-14584	Dot Matrix Display Cable
H-14790	A.C. Cable
H-14792-1	A.C. Jumper Cable
H-14792-2	A.C. Jumper Cable
H-14884	Playfield Switch Cable
H-14885	Playfield Lamp Cable
H-14886	Playfield Solenoid Cable
H-14887	Cabinet Cable
H-14888	Insert Cable
H-14889	Flash Cable
H-14890	Ramp Switch Cable
H-14891	3-Lamp Stop Cable
H-14892	4-Lamp Juggler Cable
H-14893	Opto Transmitter Cable
H-14894	Opto Detector Cable
H-14895	Crown Cable
H-15011	Speaker Panel Cable

Note: * = Not available for individual sale.

Ball Trough Switches

(Viewed from underside of playfield to show locations)



B-11854-4 Standup Target Assembly

Part Number	Description
5070-06258-00	Standup Target Switch
SW-1A-170-4	Diode 1N4001

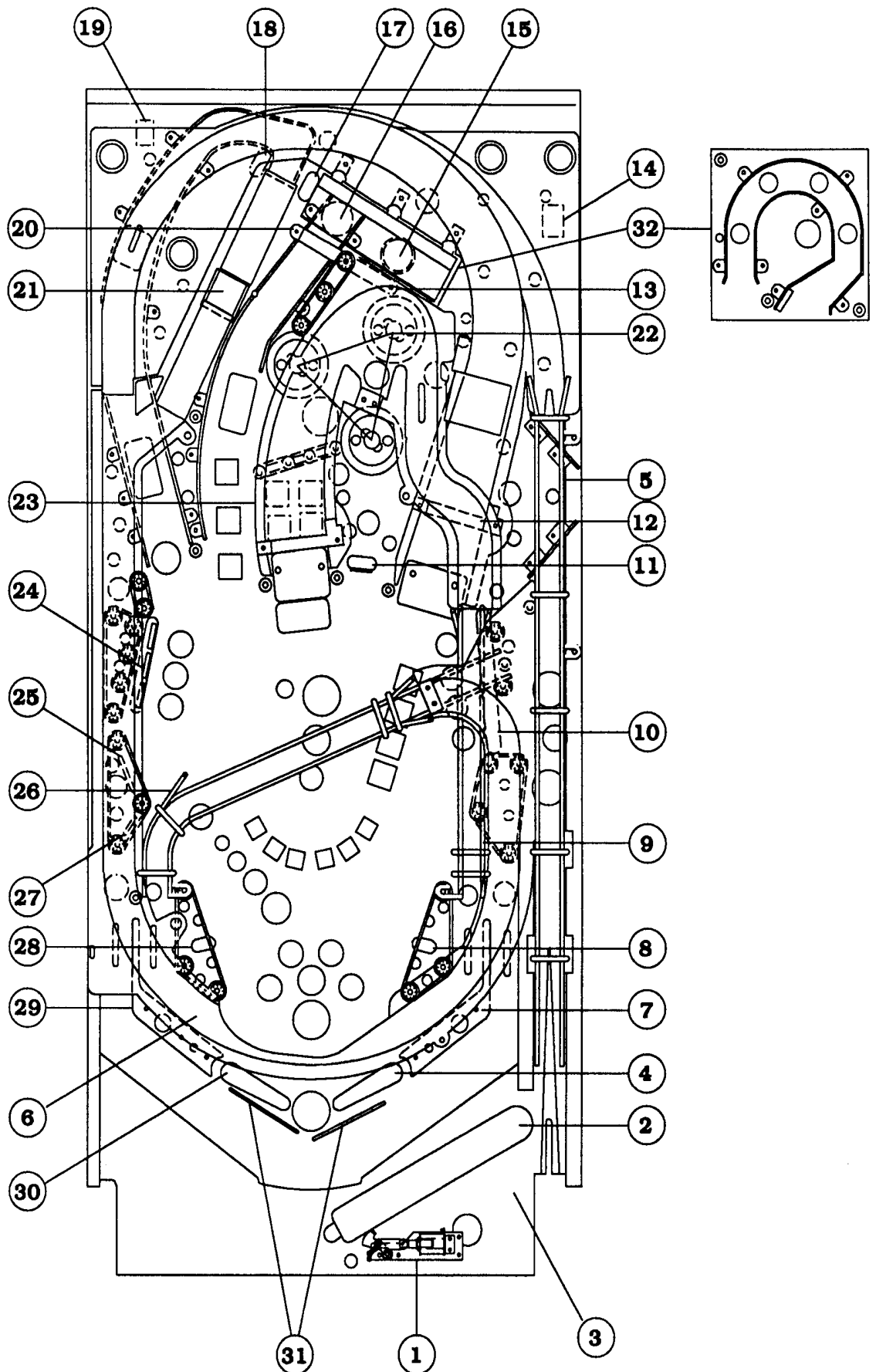
Playfield Parts

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	A-10417	Outhole Switch
2	B-8925	Switch Plate
3a	B-9362-R-3	Coil & Bracket
b	A-11619-2	Switch
c	C-9638	Outhole Eject
4	C-13174-R	Right Flipper
5	12-6982	Entry Ramp
6	A-14709	Hurricane Ramp
7	B-12363-R	Flipper Return Guide
8a	B-11203-R-1	Slingshot Coil & Bracket
b	B-8284-1	Slingshot Switch
9	12-6980	Center Ramp
10	B-11854-4	Stand-up Targets
11	B-11854-4	Stand-up Targets
12	A-14708	Hurricane Top Ramp
13	A-14786	Ball Gate
14	A-13901-3	Opto Board
15a	B-9361-R	Ball Eject Coil & Bracket
b	A-9381-R	Switch Assembly
16a	D-11335-1	Ball Popper Coil & Bracket
b	A-11657	Ball Popper Switch Assembly
17	A-14725	Opto Mounting Assembly
18	A-14724	Opto Mounting Assembly
19	A-14423-1	Relay Assembly
20	A-14788	Ball Gate
21	A-14741	Ferris Wheel
22a	A-9415-2	Jet Bumper Coil & Bracket
b	B-12030-2	Switch Assembly
23	A-14710	Comet Ramp
24	A-13595-3	3-bank Drop Target
25	12-6981	Lower Ramp
27	12-6466-3	Wireform
28a	B-11203-R-1	Sling Coil & Bracket
b	B-8284-1	Sling Switch
29	B-12363-J	Flipper Return Guide
30	C-13174-L	Left Flipper
31	12-6468	Rebound Wire
32	A-14787	Juggler Assembly

Not Shown

A-13204	Bottom Arch Assembly
12-6842	Wire Fence
16-50012-1	Instruction Card
20-9041	Tinnerman
20-9045	Instruction Card
23-6313-1	Grommet
31-1008-50012	Screened Bottom Arch
31-1-50012	Screened Playfield Plastic Set
31-1002-50012	Screened Playfield
03-7557	Slingshot Mylar
03-7960-50012-1	Full Playfield Mylar
03-7960-50012-2	Ramp Mylar
03-7960-50012-3	Ramp Mylar
03-7960-50012-4	Jet Bumper Mylar
20-6550	Steel Ball

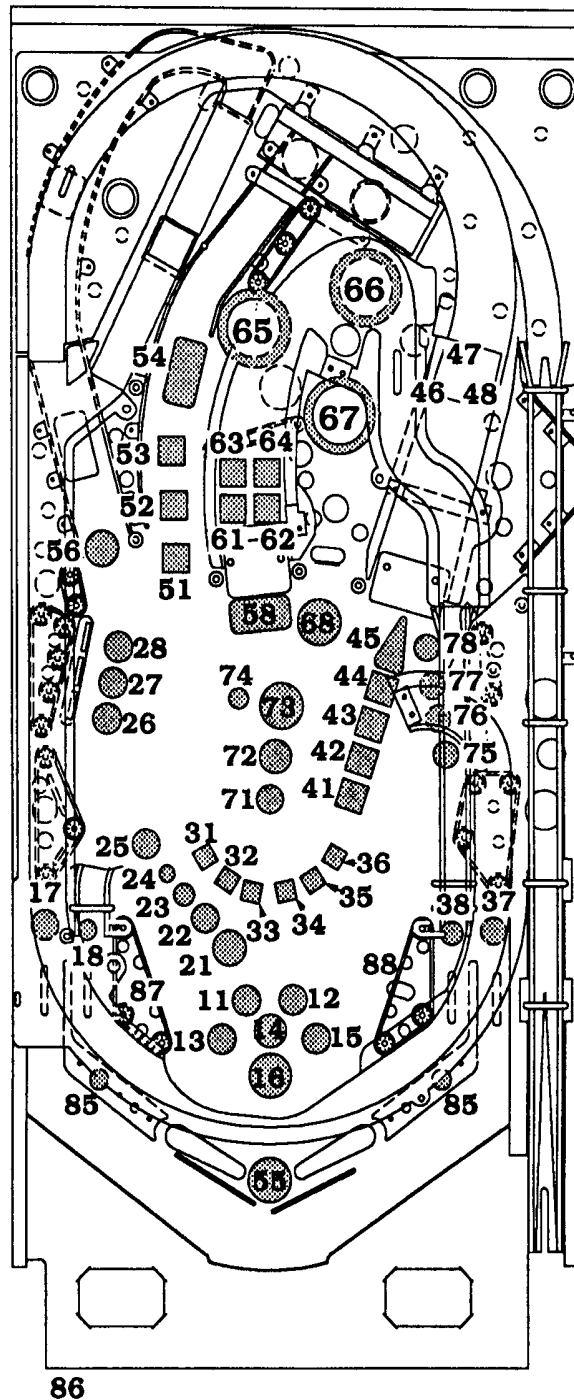
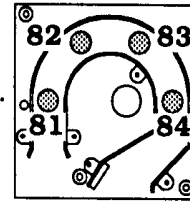
Playfield Parts Locations



Lamp Locations

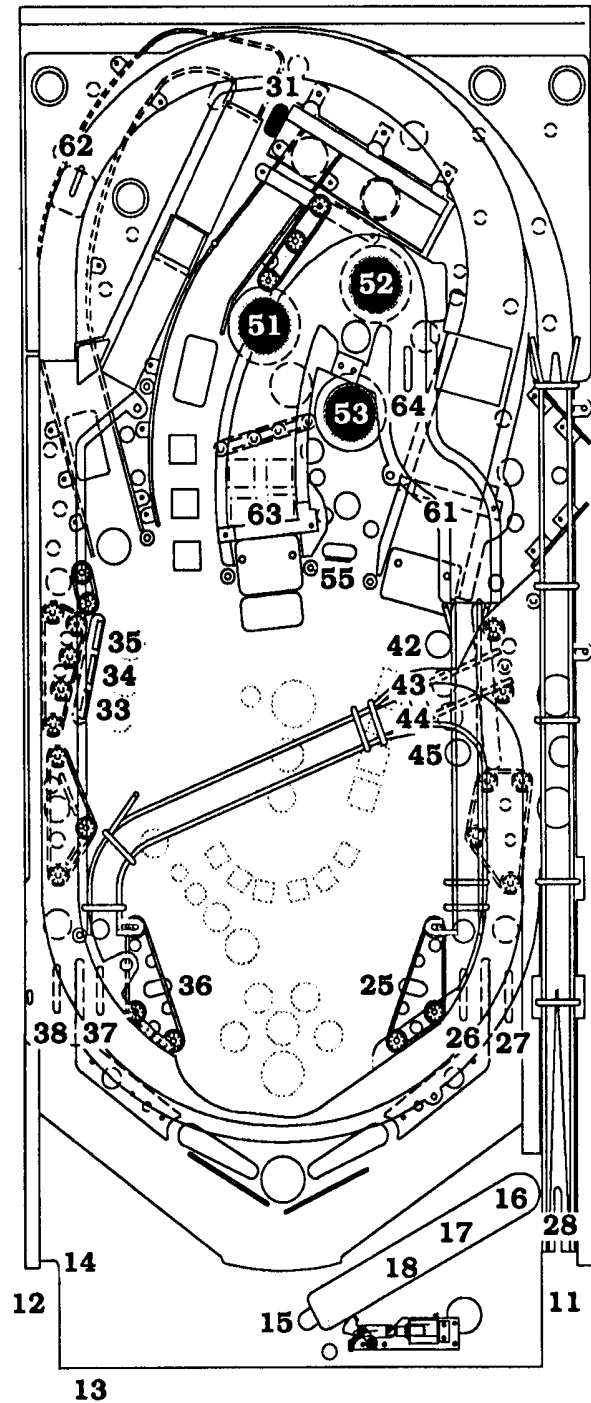
Item No.	Bulb No.	Description
11	24-8768	Lt Clown Eye #555
12	24-8768	Rt Clown Eye #555
13	24-8768	Lt Clown Cheek #555
14	24-8768	Clown Nose #555
15	24-8768	Rt Clown Cheek #555
16	24-8768	Clown Mouth #555
17	24-6549	Lt Outlane #44
18	24-6549	Lt Return Lane #44
21	24-8768	Bonus 2X #555
22	24-8768	Bonus 3X #555
23	24-8768	Bonus 4X #555
24	24-8768	Bonus 5X #555
25	24-8768	Bonus 6X #555
26	24-6549	Lt Drop 1 #44
27	24-6549	Lt Drop 2 #44
28	24-6549	Lt Drop 3 #44
31	24-8768	Palace "P" #555
32	24-8768	Palace "A" #555
33	24-8768	Palace "L" #555
34	24-8768	Palace "A" #555
35	24-8768	Palace "C" #555
36	24-8768	Palace "E" #555
37	24-6549	Rt Outlane #44
38	24-6549	Rt Return Lane #44
41	24-8768	Special #555
42	24-8768	Clown Time #555
43	24-8768	Spot Palace #555
44	24-8768	Skill Shot #555
45	24-8768	Hurricane Value #555
46	24-8768	Hurricane 1 Mil. #555
47	24-8768	Hurricane 2 Mil. #555
48	24-8768	Hurricane 5 Mil. #555
51	24-8768	Lock 2 #555
52	24-8768	Lock 1 #555
53	24-8768	Mystery #555
54	24-6549	Jackpot #44
55	24-6549	Play Again #44
56	24-6549	Quick Score #44
57	24-6549	Ferris Wheel #44
58	24-6549	Million #44
61	24-8768	Comet 50K #555
62	24-8768	Comet 100K #555
64	24-8768	Comet 500K #555
65	24-6549	Lt Jet Bumper #44
66	24-6549	Rt Jet Bumper #44
67	24-6549	Bot Jet Bumper #44
68	24-6549	Dunk Dummy #44
71	24-6549	All Scores 2X #44
72	24-6549	All Scores 3X #44
73	24-6549	All Scores 5X #44
74	24-6549	Palace Clock #44
75	24-8768	Rt Stand-up 4 #555
76	24-8768	Rt Stand-up 3 #555
77	24-8768	Rt Stand-up 2 #555
78	24-8768	Rt Stand-up 1 #555
81	24-8768	Juggler 1 #555
82	24-8768	Juggler 2 #555
83	24-8768	Juggler 3 #555
84	24-8768	Juggler 3 #555
85	24-6549	Flipper Lanes #44
86	24-6549	Start Button #44
87	24-6549	Lt Sling #44
88	24-6549	Rt Sling #44

Juggler Assy.



Switch Locations

<u>Item No.</u>	<u>Switch No.</u>	<u>Switch Assy No.</u>	<u>Description</u>
11	SW-10A-48	A-9990-1	Rt Flipper
12	SW-10A-48	A-9990-1	Lt Flipper
13	—	20-9663-3	Start Button
14	—	20-6502-A	Plumb Bob Tilt
15	5647-12133-12	A-10417	Outhole
16	5647-12693-08	A-11680	Trough 1
17	5647-09557-00	B-8925	Trough 2
18	5647-09557-00	B-8925	Trough 3
21	—	20-1066	Slam Tilt
22	—	A-8630	Coin Door Closed
23	—	(optional)	Ticket Opto
24	—	A-8630	Always Closed
25	B-11203-R-1	B-8284-1	Rt Sling
26	5647-12693-19	A-12688	Rt Return
27	5647-12693-19	A-12688	Rt Outlane
28	5647-12693-04	A-11619-2	Ball Shooter
31	A-14232	A-14725	Ferris Wheel
32	—	—	Not Used
33	—	A-13595-3	Lt Drop 1
34	—	A-13595-3	Lt Drop 2
35	—	A-13595-3	Lt Drop 3
36	B-11203-R-1	B-8284-1	Lt Sling
37	5647-12693-19	A-12688	Lt Return
38	5647-12693-19	A-12688	Lt Outlane
41	—	—	Not Used
42	SW-1A-170-4	B-11854-4	Rt Stand-up 1
43	SW-1A-170-4	B-11854-4	Rt Stand-up 2
44	SW-1A-170-4	B-11854-4	Rt Stand-up 3
45	SW-1A-170-4	B-11854-4	Rt Stand-up 4
46	—	—	Not Used
47	—	—	Not Used
48	—	—	Not Used
51	SW-11A-37	B-12030-2	Lt Jet Bumper
52	SW-11A-37	B-12030-2	Rt Jet Bumper
53	SW-11A-37	B-12030-2	Bot Jet Bumper
54	—	—	Not Used
55	SW-1A-170-4	B-11854-4	Dunk Dummy
56	—	A-11657	Lt Juggler
57	5647-12133-11	A-9381-R	Rt Juggler
58 to 88	—	—	Not Used



Solenoid/Flasher Locations

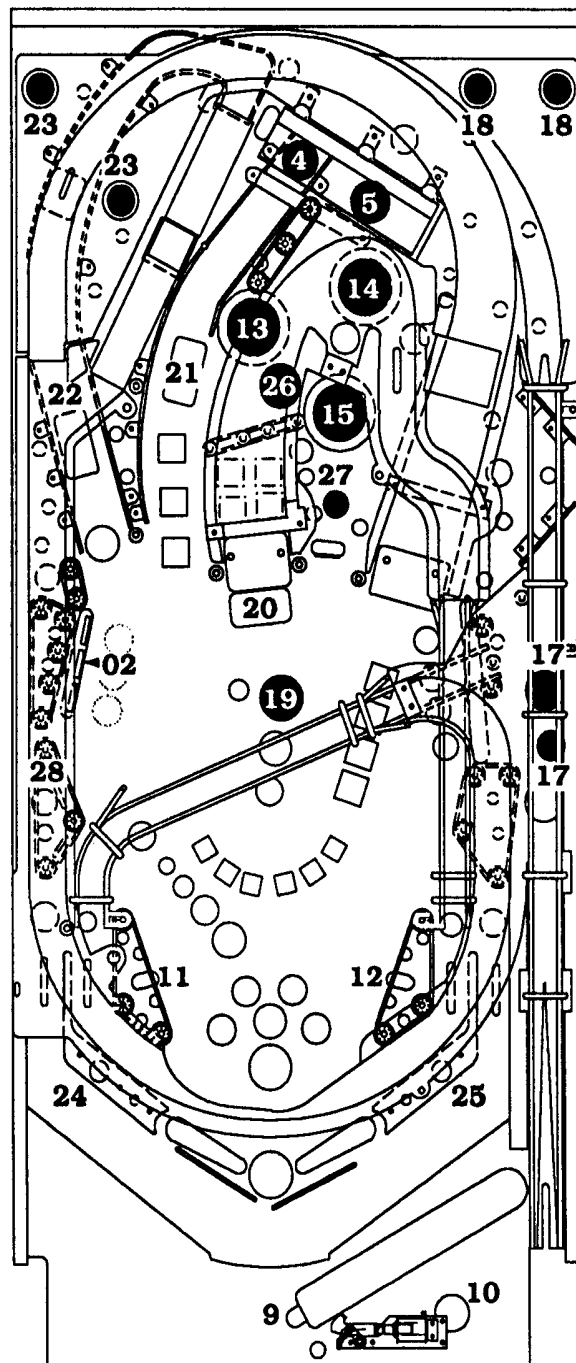
<u>Item No.</u>	<u>Coll/Flasher No.</u>	<u>Assy No.</u>	<u>Description</u>
01	14-7967	A-14750	Backbox Motor
02	AE-26-1200	A-13595-3	Lt Drop Tgt Bank
03	—	—	Not Used
04	AE-24-900	D-11335-1	Lt Juggler
05	AE-26-1500	B-9361-R-1	Rt Juggler
06	14-7964-1	A-14593-1	Ferris Wheel
07	AE-23-800	B-10686-1	Knocker
08	—	—	Not Used
09	AE-27-1200	A-8039-3	Outhole
10	AE-26-1200	B-9362-R-3	Ball Release
11	AE-26-1500	B-11203-R-1	Lt Slingshot
12	AE-26-1500	B-11203-R-1	Rt Slingshot
13	AE-26-1200	A-9415-2	Lt Jet Bumper
14	AE-26-1200	A-9415-2	Rt Jet Bumper
15	AE-26-1200	A-9415-2	Bot Jet Bumper
16	—	—	Not Used
17	24-8802	C-13337	Rt Side Flashers #906
	24-8802	A-12336-1	Insert Flasher #906
18	24-8802	C-13337	Top Rt Flashers #906
	24-8802	A-12336-1	Insert Flashes #906
19	24-8802	A-12336-1	All Scores 5X Flasher #906
	24-8802	A-12336-1	Insert Flasher #906
20	24-8802	A-12336-1	Comet Mil Flasher #906
	24-8802	A-12336-1	Insert Flasher
21	24-8802	A-12336-1	Jackpot Flasher #906
	24-8802	A-12336-1	Insert Flasher #906
22	24-8802	A-12336-1	Ferris Wheel Flasher #906
	24-8802	A-12336-1	Insert Flasher #906
23	24-8802	C-13337	Top Lt Flashers #906
	24-8802	A-12336-1	Insert Flasher #906
24	24-8704	A-8798	Lt Return Flasher #89
	24-8802	A-12336-1	Hood Flasher #906
25	24-8704	A-8798	Rt Return Flasher #89
	24-8802	A-12336-1	Hood Flasher #906
26	24-8802	A-12336-1	Jet Bumper Flasher #906
27	24-8704	A-8798	Dunk Dummy Flasher #89
	24-8802	A-12336-1	Insert Flasher #906
28	24-8704	A-8798	Lt Side Flasher #89
	24-8802	A-12336-1	Insert Flasher #906

General Illumination

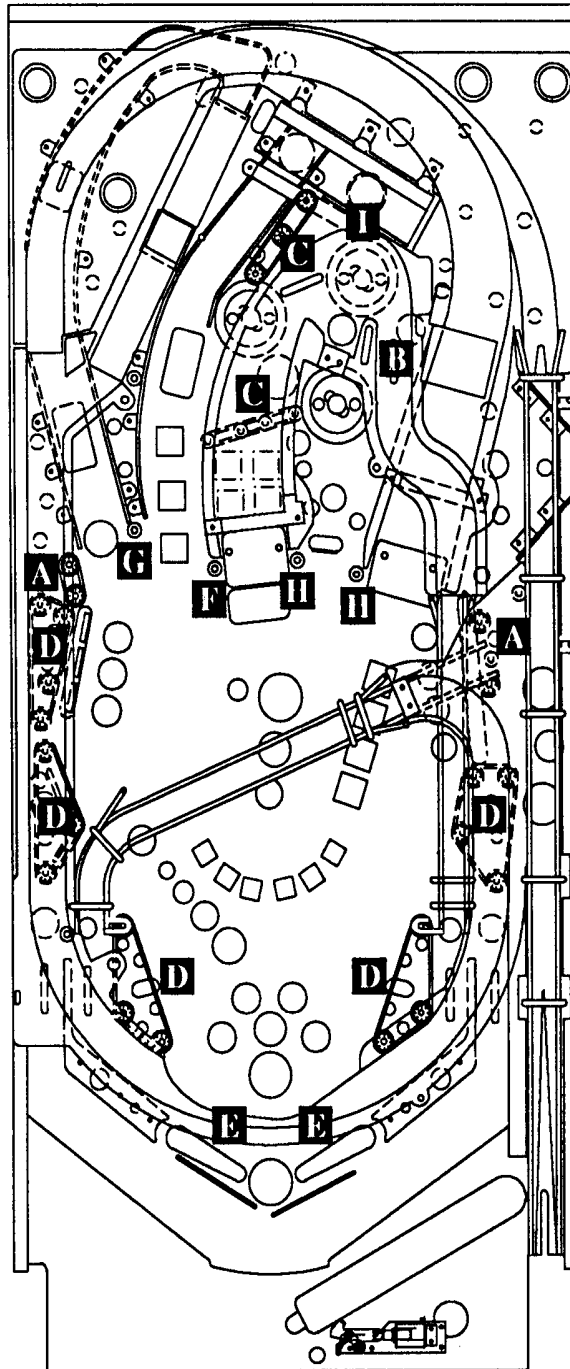
01	24-8768	—	Backbox G.I. #555
02	24-8768	—	Backbox G.I. #555
03	24-6549	A-11905	Playfield G.I. #44
04	24-8768	—	Backbox G.I. #555
05	24-6549	A-11905	Playfield G.I. #44

Flippers

FL-11630	C-13174-L	Left Flipper Assembly
FL-11630	C-13174-R	Right Flipper Assembly



Rubber Ring Locations



Item	Part Number	Description	Quantity
A	23-6300	Rubber Ring, 5/16"	2
B	23-6301	Rubber Ring, 3/4"	1
C	23-6303	Rubber Ring, 1-1/4"	2
D	23-6306	Rubber Ring, 2-1/2"	5
E	23-6519-4	Rubber Ring, Flipper	2
F	23-6552	Rubber Sleeve, Yellow	1
G	23-6556	Rubber Sleeve, Blue	1
H	23-6579	Rubber Bumper Ring 3/4"	2
I	23-6641-1	Rubber Ring, White	1

Unique Parts

Part Number	Description
A-11619-2	Shooter Lane Switch
A-12738-50012	WPC Sound Board
A-12742-50012	WPC CPU Assembly
A-13204-50012	Bottom Arch Assembly
A-13769-50012	Playfield & Insert Assy.
A-13901-3	Opto Ramp Switch
A-14708	Ramp Assembly - Top
A-14709	Ramp Assembly - Bottom
A-14710	Comet Ramp Assembly
A-14722	Ball Guide Assembly
A-14723	Ball Guide Assembly
A-14724	Opto Mtg. Bracket Assy.
A-14725	Opto Mtg. Bracket Assy.
A-14726	Ramp Assembly
A-14727	Ball Guide Assembly
A-14728	Ball Guide Assembly
A-14729	Ball Guide Assembly
A-14730	Ball Guide Assembly
A-14731	Ball Guide Assembly
A-14738	Guide Wheel Assy. - Left
A-14739	Guide Wheel Assy. - Right
A-14741	Ferris Wheel Assembly
A-14743	Mini Ramp Assembly
A-14750	Disc & Motor Assembly
A-14786	Ball Gate & Wire Assy.
A-14787	Juggler Assembly
A-14788	Ball Gate & Wire Assembly
A-14845	3-Lamp Board
A-14846	6-Lamp Board
A-14847	6-Lamp Board
A-14848	5-Lamp Board
A-14849	4-Lamp Board
A-14902	Speaker/Display Assembly
A-14934	Dome Panel Assy.
A-14935	Lug Diode & Lamp Assembly
A-14958-50012	Backbox Assembly
A-14978	5-Lamp Board
A-15009	Playfield Plastic Assy.
A-15051	Crown & Decal Assy.
A-8552-50012	Backglass Assembly
02-4554-2	Spacer Post 8-32 x 4-1/4
02-4554-4	Spacer Post 8-32 x 3-3/4
02-4554-6	Spacer Post 8-32 x 4-1/16
02-4554-7	Spacer Post 8-32 x 4-7/16
02-4554-8	Spacer Post 8-32 x 4-5/8
02-4554-9	Spacer Post 8-32 x 2
5555-12924-00	Speaker, 4Ω, 15w Tweeter
5555-12929-00	Speaker, 4Ω, 15w, 6"

Section 3

Wiring Diagrams & Schematics



Circuit Wiring & Board Schematics

Interboard Wiring
Solenoid Wiring
Flipper Wiring
Coin Door Interface Schematic
Coin Door Circuit Wiring
Game Specific Board Schematics
Game Specific Circuit Wiring

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 refers to jack 1 of board 1 (a Power Driver 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 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 (no prefix)

Switch Circuits

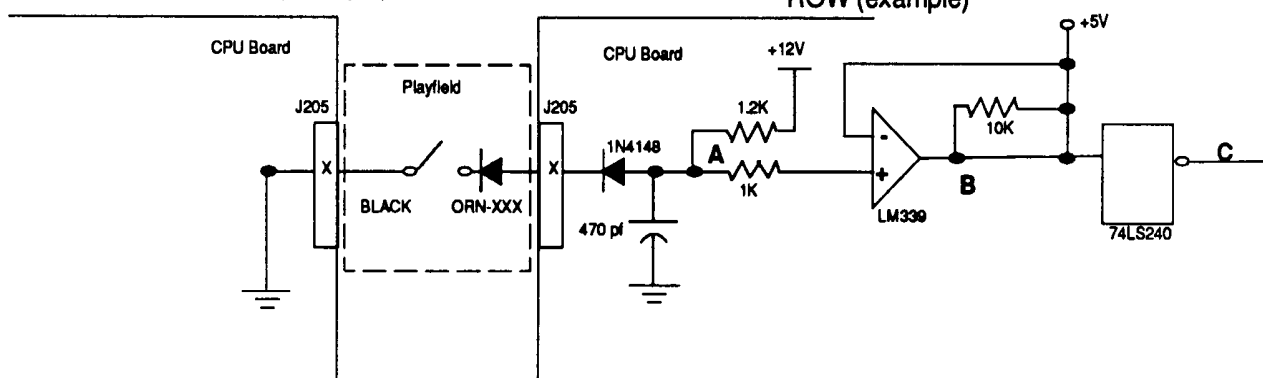
Switch Martix Table

White  Green

Dedicated Grounded Switches	Column Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-8 U20-11
Orange-Brown Left Coin Chute D1	White-Brown J209-1 U19-11	Right Flipper 11	Slam Tilt 21	Ferris Wheel 31	Not Used 41	Left Jet Bumper 51	Hurricane Entry 61	Not Used 71	Not Used 81
Orange-Red Center Coin Chute D2	White-Red J209-2 U19-9	Left Flipper 12	Coin Door Closed 22	Not Used 32	Right Stand-up 1 42	Right Jet Bumper 52	Hurricane Exit 62	Not Used 72	Not Used 82
Orange-Black Right Coin Chute D3	White-Orange J209-3 U19-5	Start Button 13	Ticket Dispenser 23	Left Drop Target 1 33	Right Stand-up 2 43	Bottom Jet Bumper 53	Comet Entry 63	Not Used 73	Not Used 83
Orange-Yellow 4th Coin Chute D4	White-Yellow J209-4 U19-7	Plumb Bob Tilt 14	Test Position, Always Closed 24	Left Drop Target 2 34	Right Stand-up 3 44	Not Used 54	Comet Exit 64	Not Used 74	Not Used 84
Orange-Green Normal Function Test Function Service Escape Credits D5	White-Green J209-5 U19-11	Outhole 15	Right Slingshot 25	Left Drop Target 3 35	Right Stand-up 4 45	Dunk the Dummy 55	Not Used 65	Not Used 75	Not Used 85
Orange-Blue Normal Function Test Function Volume Down D6	White-Blue J209-7 U19-9	Trough 1 16	Right Return 26	Left Slingshot 36	Not Used 46	Left Juggler 56	Not Used 66	Not Used 76	Not Used 86
Orange-Violet Normal Function Test Function Volume Up D7	White-Violet J209-8 U19-5	Trough 2 17	Right Outlane 27	Left Return 37	Not Used 47	Right Juggler 57	Not Used 67	Not Used 77	Not Used 87
Orange-Gray Normal Function Test Function Begin Enter Test D8	White-Gray J209-9 U19-7	Trough 3 18	Ball Shooter 28	Left Outlane 38	Not Used 48	Not Used 58	Not Used 68	Not Used 78	Not Used 88

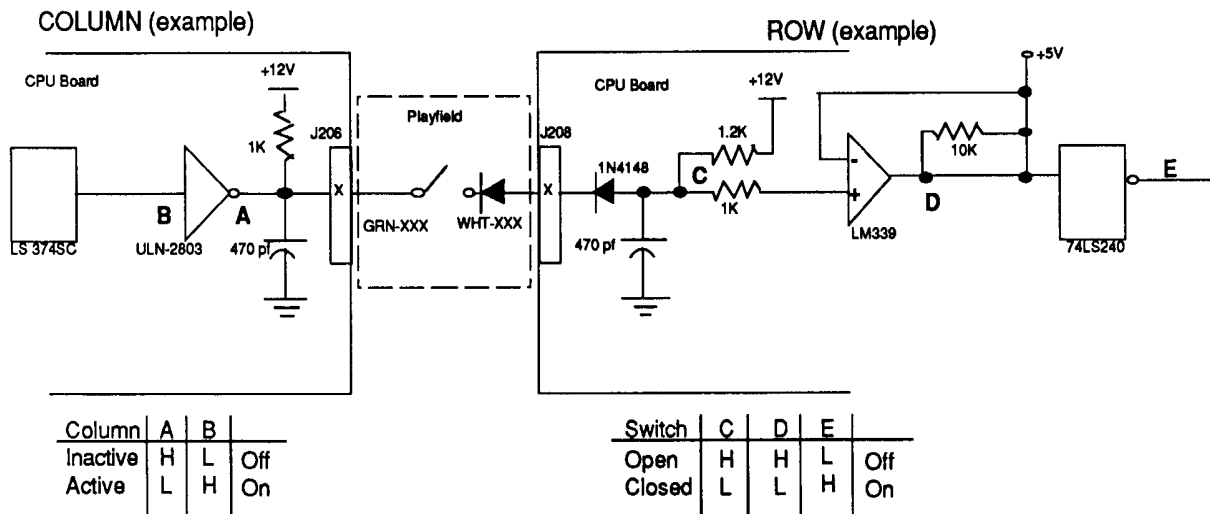
Dedicated Switch Circuit

DEDICATED GROUND (example)

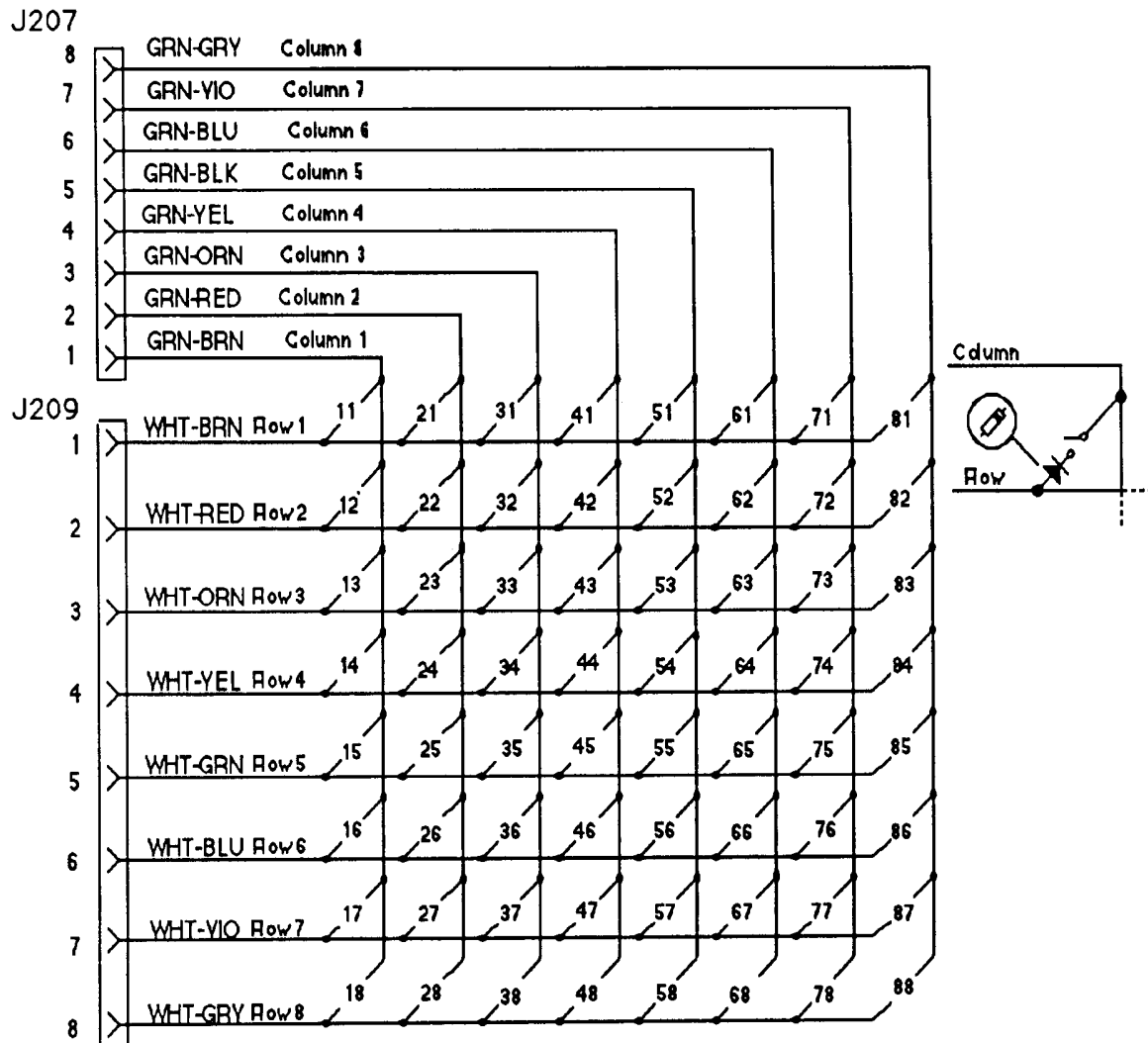


Switch	A	B	C	
Open	H	H	L	Off
Closed	L	L	H	On

Switch Matrix Circuit



Typical Switch Matrix Connections



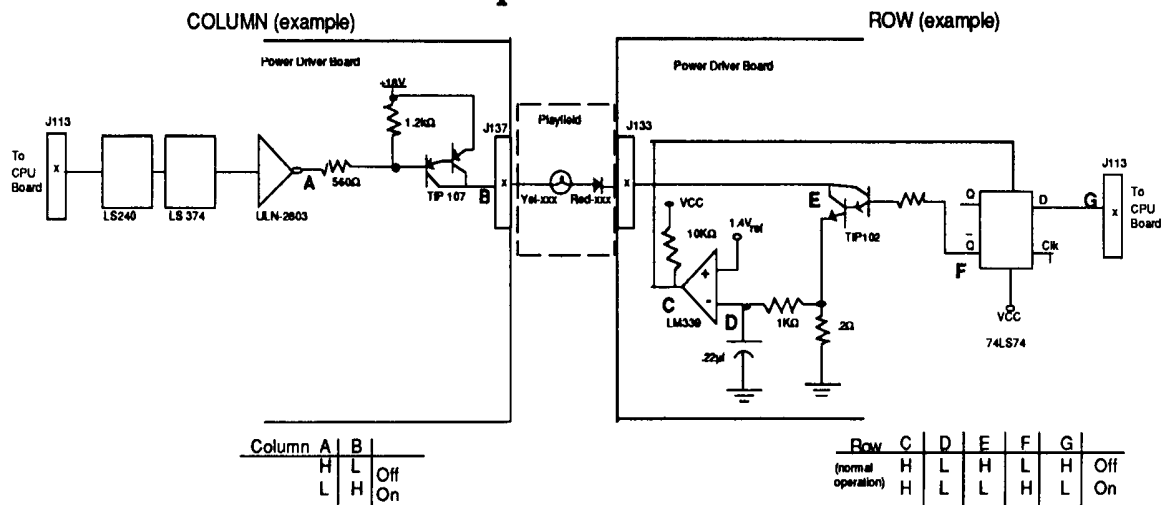
Lamp Circuit

Lamp Matrix Table

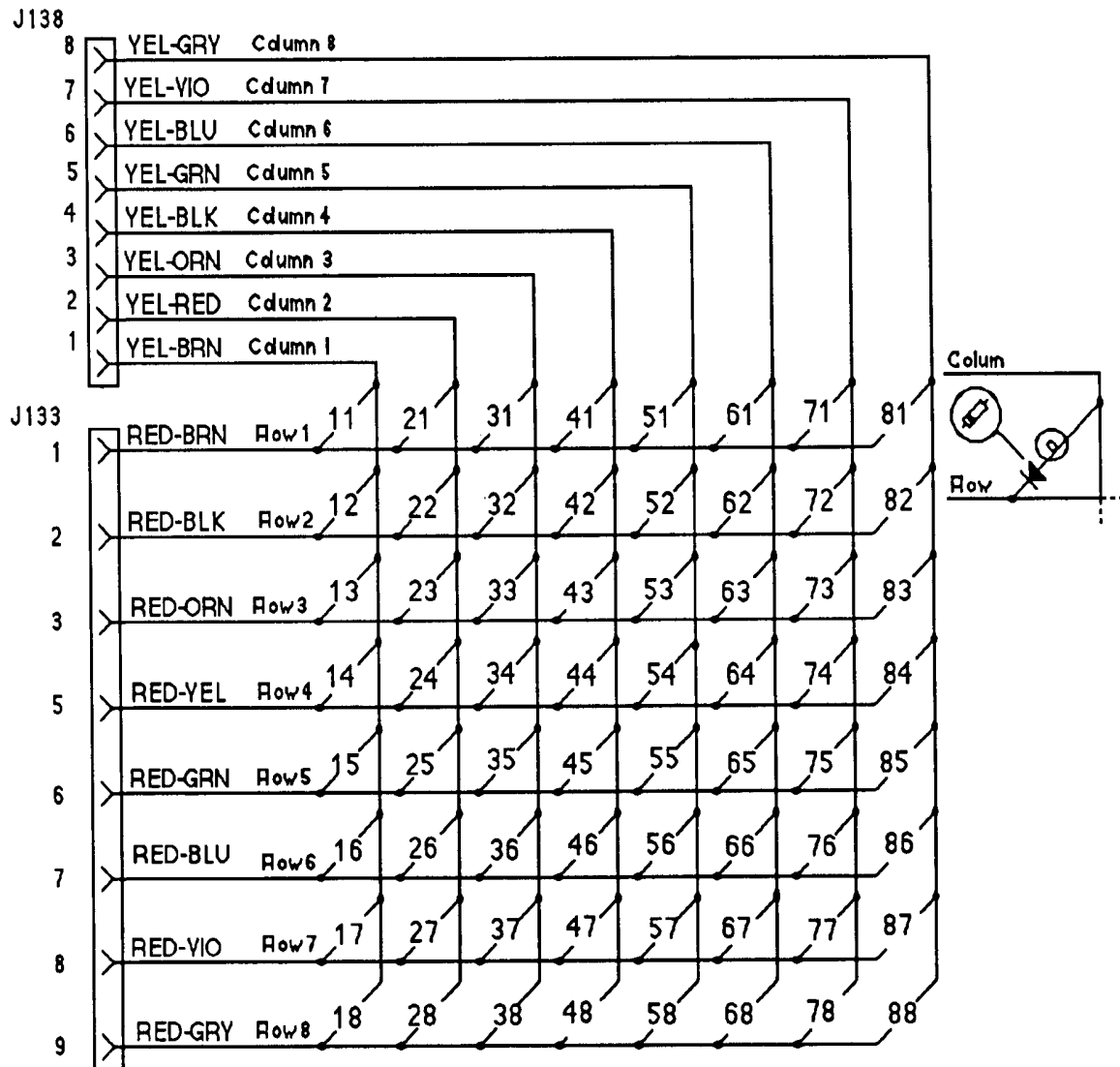
Yellow (B+) Red

Column Row	1 Yellow-Brown J138-1 Q96	2 Yellow-Red J138-2 Q97	3 Yellow-Orange J138-3 Q98	4 Yellow-Black J138-4 Q95	5 Yellow-Green J138-5 Q84	6 Yellow-Blue J138-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-8 Q91
1 Red-Brown J133-1 Q90	Left Clown Eye 11	Bonus 2X 21	Palace "P" 31	Special 41	Lock 2 51	Comet 50K 61	All Scores X2 71	Juggler 1 81
2 Red-Black J133-2 Q89	Right Clown Eye 12	Bonus 3X 22	Palace "A" 32	Clown Time 42	Lock 1 52	Comet 100K 62	All Scores X3 72	Juggler 2 82
3 Red-Orange J133-4 Q88	Left Clown Cheek 13	Bonus 4X 23	Palace "L" 33	Spot Palace 43	Mystery 53	Comet 200K 63	All Scores X5 73	Juggler 3 83
4 Red-Yellow J133-5 Q87	Clown Nose 14	Bonus 5X 24	Palace "A" 34	Skill Shot 44	Jackpot 54	Comet 300K 64	Palace Clock 74	Juggler 4 84
5 Red-Green J133-6 Q86	Right Clown Cheek 15	Bonus 6X 25	Palace "C" 35	Hurricane Value 45	Play & Again 55	Left Jet Bumper 65	Right Stand-up 4 75	Flipper Lanes 85
6 Red-Blue J133-7 Q85	Clown Mouth 16	Left Drop 1 26	Palace "E" 36	Hurricane 1 Million 46	Quick Score 56	Right Jet Bumper 66	Right Stand-up 3 76	J138-3 Start Button 86
7 Red-Violet J133-8 Q84	Left Outlane 17	Left Drop 2 27	Right Outlane 37	Hurricane 2 Million 47	Ferris Wheel 57	Bottom Jet Bumper 67	Right Stand-up 2 77	Left Sling 87
8 Red-Gray J133-9 Q83	Left Return Lane 18	Left Drop 3 28	Right Return Lane 38	Hurricane 3 Million 48	Million 58	Dunk the Dummy 68	Right Stand-up 1 78	Right Sling 88

Lamp Matrix Circuit



Typical Lamp Matrix Connections

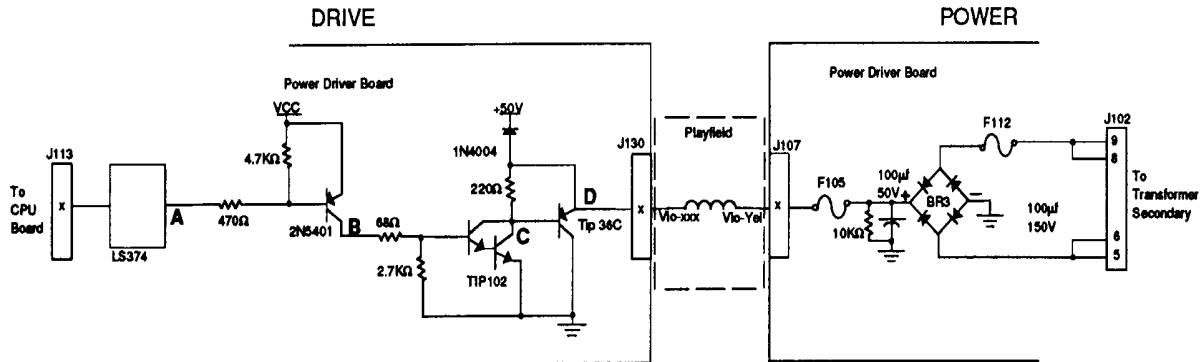


Solenoid Circuits

Solenoid Table

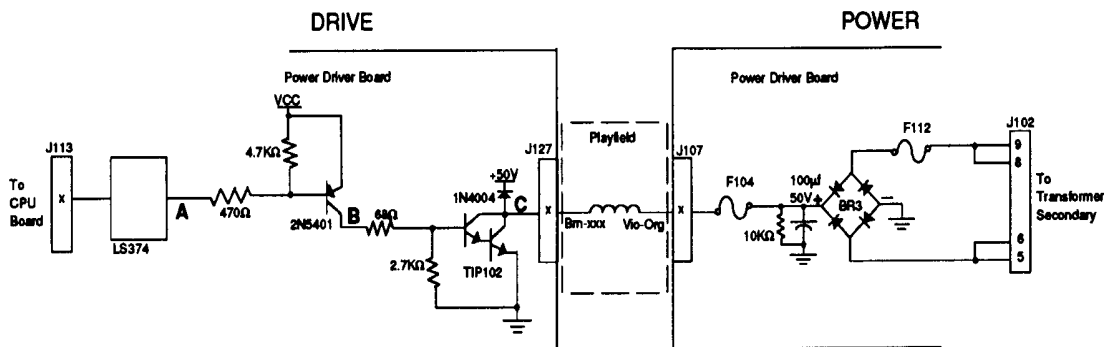
Sol. No.	Function	Solenoid Type	Wire Color	Connections Playfield - Insert - Hood	Driver Trnstr	Solenoid Part Number Flashlamp Type
01	Backbox Motor	High Power	Vio-Brn	J132-1	Q82	A-14750
02	Left Bank	High Power	Vio-Red	J130-2	Q80	AE-26-1200
03	Not Used	High Power	Vio-Org		Q78	
04	Left Juggler	High Power	Vio-Yel	J130-5	Q76	AE-24-900
05	Right Juggler	High Power	Vio-Grn	J130-6	Q64	AE-26-1500
06	Ferris Wheels	High Power	Vio-Blu	J130-7	Q66	A-14593-1
07	Knocker	High Power	Vio-Blk	J130-8	Q68	AE-23-800
08	Not Used	High Power	Vio-Gry		Q70	
09	Outhole	Low Power	Brm-Blk	J127-1	Q58	AE-27-1200
10	Ball Release	Low Power	Brm-Red	J127-3	Q56	AE-26-1200
11	Left Slingshot	Low Power	Brm-Org	J127-4	Q54	AE-25-1500
12	Right Slingshot	Low Power	Brm-Yel	J127-5	Q52	AE-26-1500
13	Left Jet Bumper	Low Power	Brm-Grn	J127-6	Q50	AE-26-1200
14	Right Jet Bumper	Low Power	Brm-Blu	J127-7	Q48	AE-26-1200
15	Bottom Jet Bumper	Low Power	Brm-Vio	J127-8	Q46	AE-26-1200
16	Not Used	Low Power	Brm-Gry		Q44	
17	Right Side Flasher	Flasher	Blk-Brn	J126-1 J125-1	Q42	#906 2 PL - 1 BB
18	Top Right Flasher	Flasher	Blk-Red	J126-2 J125-2	Q40	#906 2 PL - 1 BB
19	All Scores X5 Flasher	Flasher	Blk-Org	J126-3 J125-3	Q38	#906 1 PL - 1 BB
20	Comet Million Flasher	Flasher	Blk-Yel	J126-4 J125-5	Q36	#906 1 PL - 1 BB
21	Jackpot Flasher	Special	Blu-Grn	J126-5 J125-6	Q28	#906 1 PL - 1 BB
22	Ferris Wheel Flasher	Special	Blu-Blk	J126-6 J125-7	Q30	#906 1 PL - 1 BB
23	Top Left Flasher	Special	Blu-Vio	J126-7 J125-8	Q34	#906 2 PL - 1 BB
24	Left Return Flasher	Special	Blu-Gry	J126-8 J125-9	Q32	#89/#906 1 PL - 1 Hood
25	Right Return Flasher	Special	Blu-Brm	J122-1 J123-1	Q26	#89/#906 1 PL - 1 Hood
26	Jet Bumper Flasher	Special	Blu-Red	J122-2 J123-3	Q24	#906 1 PL - 1 BB
27	Dunk the Dummy Flasher	Special	Blu-Org	J122-3 J123-4	Q22	#89/#906 1 PL - 1 BB
28	Left Side Flasher	Special	Blu-Yel	J122-4 J123-5	Q20	#89/#906 1 PL - 1 BB
General Illumination						
				Playfield - Insert - Cabinet		
01	Backbox G.I.	G.I.	Wht-Brn	J121-7	Q18	#555
02	Backbox G.I.	G.I.	Wht-Org	J121-8	Q10	#555
03	Playfield G.I.	G.I.	Wht-Yel	J120-9	Q14	#44
04	Backbox G.I.	G.I.	Wht-Grn	J121-10	Q16	#555
05	Playfield G.I.	G.I.	Wht-Vio	J120-11 J119-1	Q12	#44
	Lower Right Flipper		Blu-Yel	J109-7		FL-11630
	Lower Left Flipper		Gry-Yel	J109-5		FL-11630

High Power Solenoid Circuit



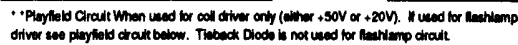
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" the collector of the 2N5401 transistor is high. A high at point "B" causes point "C" the collector of the TIP102 transistor, and point "D" the emitter of the TIP36 transistor to drop low. When point "D" is low the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

Low Power Solenoid Circuit



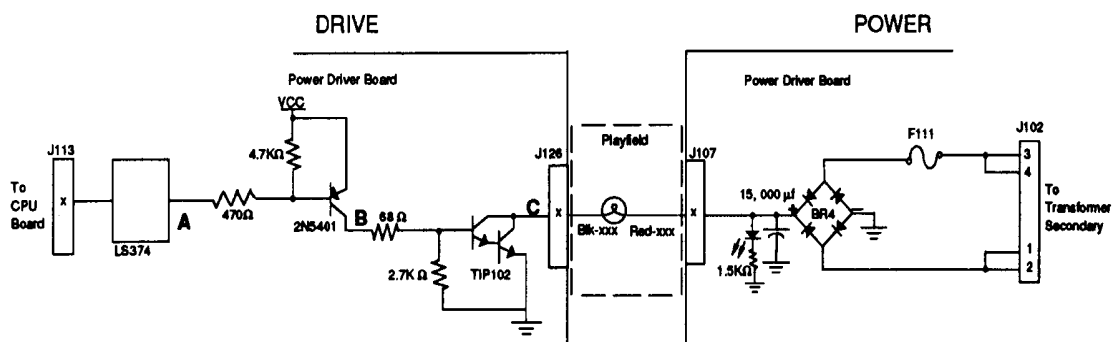
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driver high. A high at point "B" turns On the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the TIP102 transistor and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

Special (General Purpose) Solenoid Circuit



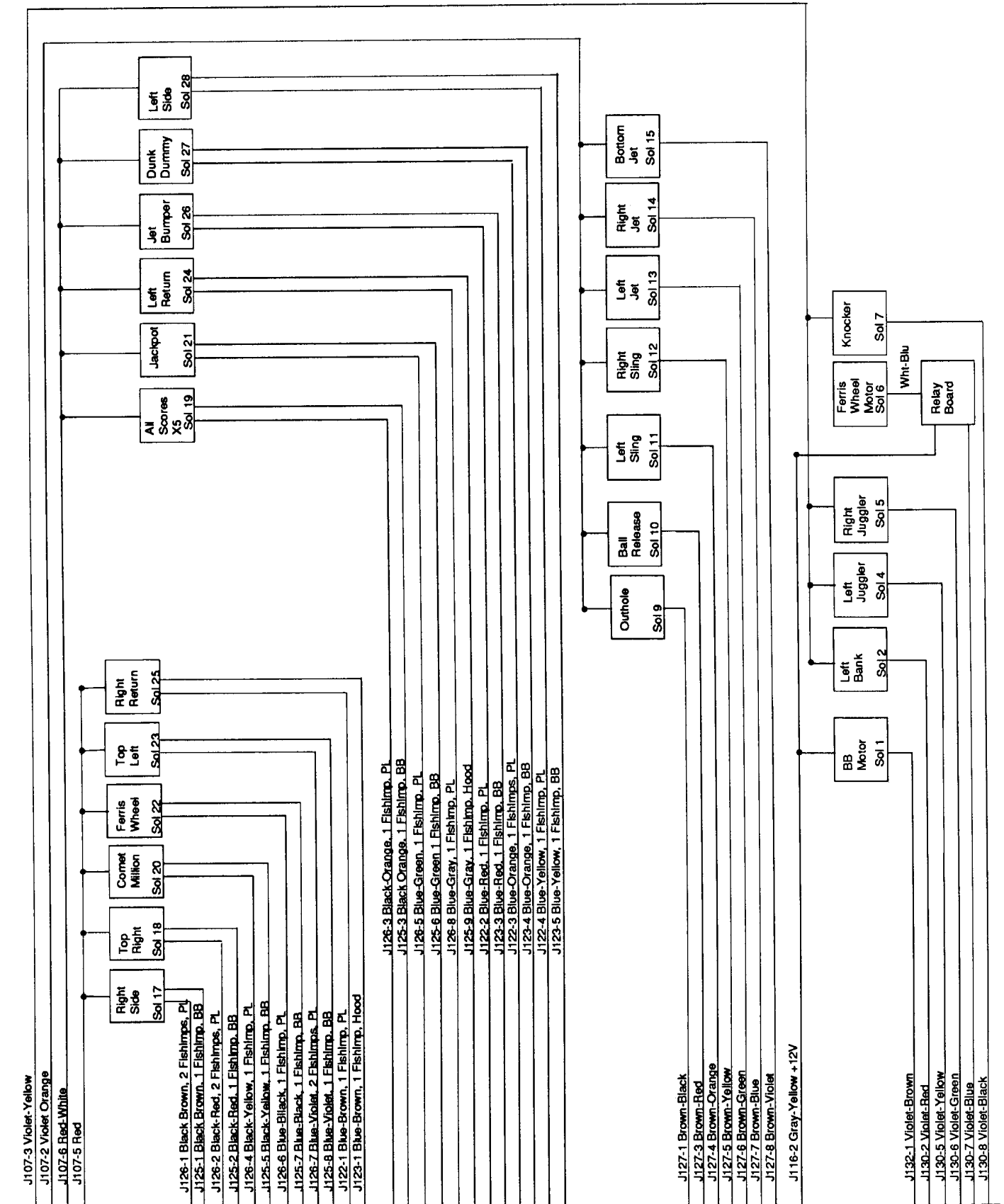
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the TIP102 transistor and turns On. When point "A" toggles high the coil/flashlamp turns Off.

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 TIP102 transistor and turns On. When point "A" toggles high the circuit shuts Off.

Solenoid Wiring



Power Driver Board

Interboard Wiring

Switch Circuits

Wire Color	Function	Connector from CPU		
		To Playfield	To Cabinet	Transistor
Green-Brown	Column 1	J207-1	J212-1	U20-18
Green-Red	Column 2	J207-2	J212-2	U20-17
Green-Orange	Column 3	J207-3		U20-16
Green-Yellow	Column 4	J207-4		U20-15
Green-Black	Column 5	J207-5		U20-14
Green-Blue	Column 6	J207-6		U20-13
Green-Violet	Column 7	Not Used		U20-12
Green-Gray	Column 8	Not Used		U20-11
White-Brown	Row 1	J209-1	J212-4	U18-11
White-Red	Row 2	J209-2	J212-6	U18-9
White-Orange	Row 3	J209-3	J212-7	U18-5
White-Yellow	Row 4	J209-4	J212-8	U18-7
White-Green	Row 5	J209-5		U19-11
White-Blue	Row 6	J209-7		U19-9
White-Violet	Row 7	J209-8		U19-5
White-Gray	Row 8	J209-9		U19-7
Orange-Brown	Direct 1 Left Coin		J205-1	U17-5
Orange-Red	Direct 2 Center Coin		J205-2	U17-7
Orange-Black	Direct 3 Right Coin		J205-3	U17-11
Orange-Yellow	Direct 4 4th Coin		J205-4	U17-9
Orange-Green	Direct 5 Escape/Service		J205-6	U16-9
Orange-Blue	Direct 6 Down/Vol Down		J205-7	U16-11
Orange-Violet	Direct 7 Up/ Vol Up		J205-8	U16-7
Orange-Gray	Direct 8 Enter/Test		J205-9	U16-5
Black	Ground		J205-10	
Orange-White	Enable		J205-12	

Lamp Circuits

Wire Color	Function	Connectors from Power Driver Board		
		To Playfield	To Cabinet	Transistor
Yellow-Brown	Column 1	J138-1		Q98
Yellow-Red	Column 2	J138-2		Q97
Yellow-Orange	Column 3	J138-3		Q96
Yellow-Black	Column 4	J138-4		Q95
Yellow-Green	Column 5	J138-5		Q94
Yellow-Blue	Column 6	J138-6		Q93
Yellow-Violet	Column 7	J138-7		Q92
Yellow-Gray	Column 8	J138-9	J136-3	Q91
Red-Brown	Row 1	J133-1		Q90
Red-Black	Row 2	J133-2		Q89
Red-Orange	Row 3	J133-4		Q88
Red-Yellow	Row 4	J133-5		Q87
Red-Green	Row 5	J133-6		Q86
Red-Blue	Row 6	J133-7	J135-7	Q85
Red-Violet	Row 7	J133-8		Q84
Red-Gray	Row 8	J133-9		Q83

Interboard Wiring

Solenoid Circuits

Connectors from Power Driver Board

Wire Color	Function	To Playfield	To Insert	To Hood	Transistor
Violet-Brown	Solenoid 1, High Power		J132-1		Q82
Violet-Red	Solenoid 2, High Power	J130-2			Q80
Violet-Orange	Solenoid 3, High Power	Not Used			Q78
Violet-Yellow	Solenoid 4, High Power	J130-5			Q76
Violet-Green	Solenoid 5, High Power	J130-6			Q64
Violet-Blue	Solenoid 6, High Power	J130-7			Q66
Violet-Black	Solenoid 7, High Power	J130-8			Q68
Violet-Gray	Solenoid 8, High Power	Not Used			Q70
Brown-Black	Solenoid 9, Low Power	J127-1			Q58
Brown-Red	Solenoid 10, Low Power	J127-3			Q56
Brown-Orange	Solenoid 11, Low Power	J127-4			Q54
Brown-Yellow	Solenoid 12, Low Power	J127-5			Q52
Brown-Green	Solenoid 13, Low Power	J127-6			Q50
Brown-Blue	Solenoid 14, Low Power	J127-7			Q48
Brown-Violet	Solenoid 15, Low Power	J127-8			Q46
Brown-Gray	Solenoid 16, Low Power	Not Used			Q44
Black-Brown	Sol. 17, Flasher 1, No Diode	J126-1	J125-1		Q42
Black-Red	Sol. 18, Flasher 2, No Diode	J126-2	J125-2		Q40
Black-Orange	Sol. 19, Flasher 3, No Diode	J126-3	J125-3		Q38
Black-Yellow	Sol. 20, Flasher 4, No Diode	J126-4	J125-5		Q36
Blue-Green	Sol. 21, Special 1 Drive	J126-5	J125-6		Q28
Blue-Black	Sol. 22, Special 2 Drive	J126-6	J125-7		Q30
Blue-Violet	Sol. 23, Special 3 Drive	J126-7	J125-8		Q34
Blue-Gray	Sol. 24, Special 4 Drive	J126-8		J125-9	Q32
Blue-Brown	Sol. 25, Special 5 Drive	J122-1		J123-1	Q26
Blue-Red	Sol. 26, Special 6 Drive	J122-2	J123-3		Q24
Blue-Orange	Sol. 27, Special 7 Drive	J122-3	J123-4		Q22
Blue-Yellow	Sol. 28, Special 8 Drive	J122-4	J123-5		Q20

Flipper Circuits

Connectors from Power
Driver Board

Wire Color	Function	To Playfield
Gray-Yellow	Left Flipper Power	J109-5
Blue-Yellow	Right Flipper Power	J109-7
Black-Blue	Upper Left Flipper	Not Used
Blue-Gray	Lower Left Flipper	J109-3
Black-Yellow	Upper Right Flipper	Not Used
Blue-Violet	Lower Right Flipper	J109-4
Black-Blue	Upper Left Flipper	J110-9, Not Used
Blue-Gray	Lower Left Flipper	J110-7
Black-Yellow	Upper Right Flipper	J110-8, Not Used
Blue-Violet	Lower Right Flipper	J110-6
Orange-Gray	Left Flipper Ground	J110-2, 1
Orange-Violet	Right Flipper Ground	J110-4, 3

Interboard Wiring

General Illumination Circuits

Wire Color	Function	Connectors from Power Driver Board			
		To Playfield	To Cabinet	To Insert	Triac
Brown	Feed 1			J121-1	Q18
Orange	Feed 2			J121-2	Q10
Yellow	Feed 3	J120-3			Q14
Green	Feed 4			J121-5	Q16
Violet	Feed 5	J120-6	J119-3		Q12
					Fuse
White-Brown	Return 1			J121-7	F107
White-Orange	Return 2			J121-8	F106
White-Yellow	Return 3	J120-9			F110
White-Green	Return 4			J121-10	F108
White-Violet	Return 5	J120-11	J119-1		F109

Power Circuits		Connectors from Power Driver Board			
Wire Color	Function	To Cabinet	To Dot Controller	To Playfield	To PC Boards
Gray	Digital +5V		J117-4		J114-3, 4
Gray-Green	Switch +12V				J114-1, 2
Gray-Yellow	Analog +12V	J116-2 (coin door)	J117-2	J118-2 (relay) J116-2 (opto board)	J114-5, 7
Black	Ground	J116-3 (coin door)	J117-3	J116-3 (opto board)	
				To Insert	
Gray-Yellow	Analog +12V	J116-2 (motor)			

Power Circuits		Connectors from Power Driver Board	
Wire Color	Function	To Playfield	To Insert
Violet-Yellow	High Power 50V	J107-3	
Violet-Orange	Low Power 50V	J107-2	
Violet-Green	Other 50V	Not Used	
Red	Flasher 20V	J107-5	J106-5
Red-White	Flasher 20V	J107-6	
White-Blue	50VAC	J104-1	
White-Blue	50VAC	J104-2	
Black	Ground	Not Used	

Logic Circuits

Wire Color	Function	
Ribbon Cable	Data	J201 To /from Dot Matrix Controller
Ribbon Cable	Data	J202 To /from Sound Board & Dot Matrix Controller
Ribbon Cable	Data	J204 Not Used

Connectors from Power Driver Board		
Black	Ground	J210-1
Black	Ground	J210-3
Gray	+5VDC	J210-4
Gray	+5VDC	J210-5
Gray-Green	+12VDC	J210-6
Gray-Green	+12VDC	J210-7
Ribbon Cable	Data	J211

Interboard Wiring

Display Circuits

Wire Color	Function	
Ribbon Cable	Data	J601 To/from CPU & Sound Board
Ribbon Cable	Data	J602 To/from CPU Board
Ribbon Cable	Data	J603 To/from Dot Matrix Display/Driver Board

Connector to Dot Matrix Display/Driver

Orange	-125V	J604-1
Blue	-113V	J604-2
Black	Ground	J604-4
Black	Ground	J604-5
Gray	+5V	J604-6
Gray-Yellow	+12V	J604-7
Brown	+62V	J604-8

Connector from Transformer (AC)

White	80VAC	J605-1
White	80VAC	J605-2
Violet	100VAC	J605-3
Violet	100VAC	J605-5

Connector from Power Driver Board

Black	Ground	J606-1
Black	Ground	J606-3
Gray	+5V	J606-4
Gray	+5V	J606-5
Gray-Yellow	+12V	J606-6
Gray-Yellow	+12V	J606-7

Sound Circuits

Wire Color	Function	
Ribbon Cable	Data	J506 To/from CPU Board & Dot Matrix Controller

Connector From Transformer Secondary

Gray-Green	+12VDC	J501-1
Gray-Green	+12VDC	J501-2
Gray	+5VDC	J501-4
Gray	+5VDC	J501-5
Gray-White	-12VDC	J501-6
Gray-White	-12VDC	J501-7

Power from CPU/Power Driver Board

Gray	+5VDC	J502-1
Gray	+5VDC	J502-3
Black	Ground	J502-4
Black	Ground	J502-5

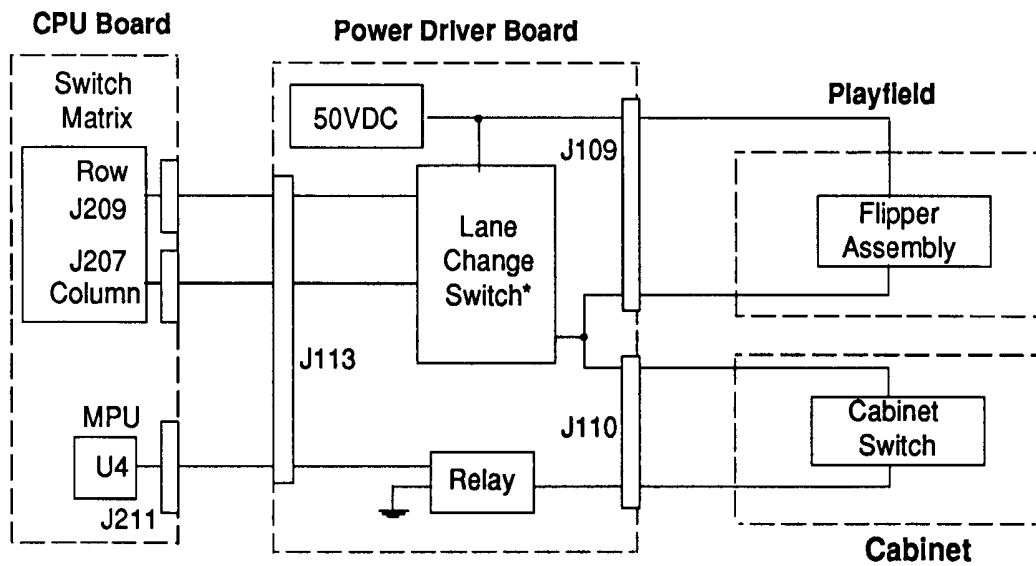
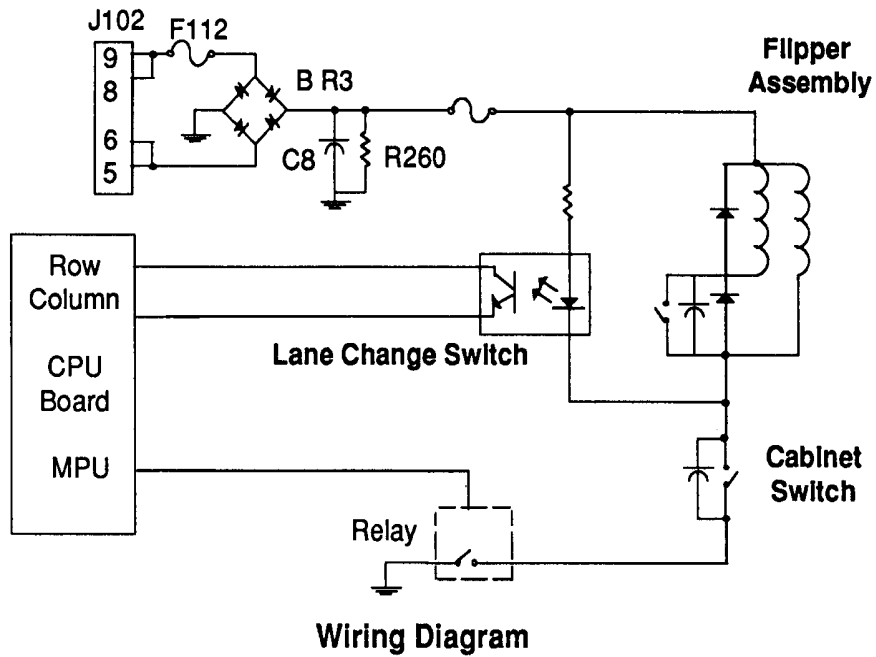
Cabinet Speaker Connection

Black	Speaker	J504-3
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Backbox Speaker Connection

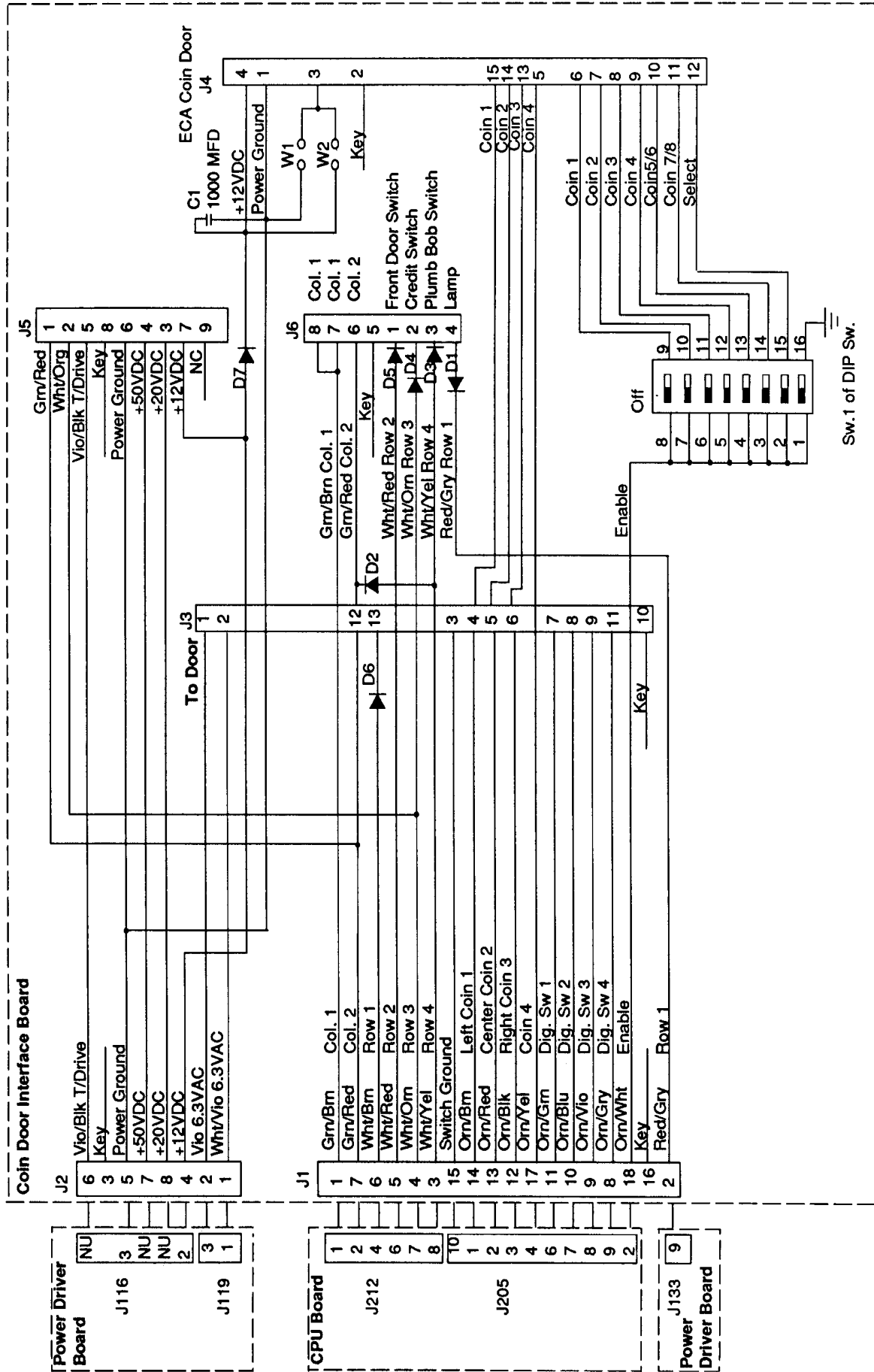
Black-Yellow	Speaker	J505-1
Black-Yellow	Speaker	J505-2
Black	Speaker	J505-4

Flipper Circuit Wiring



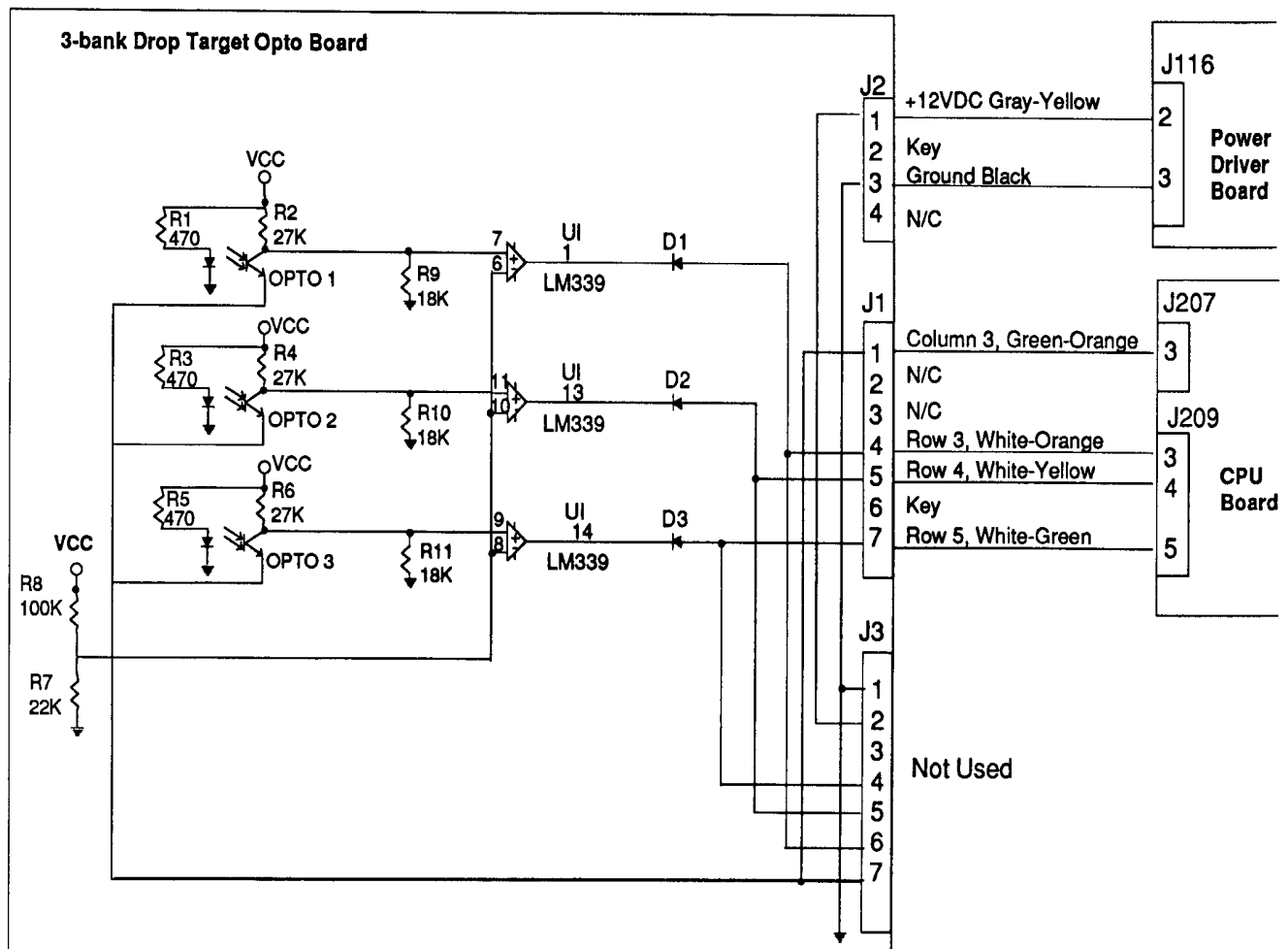
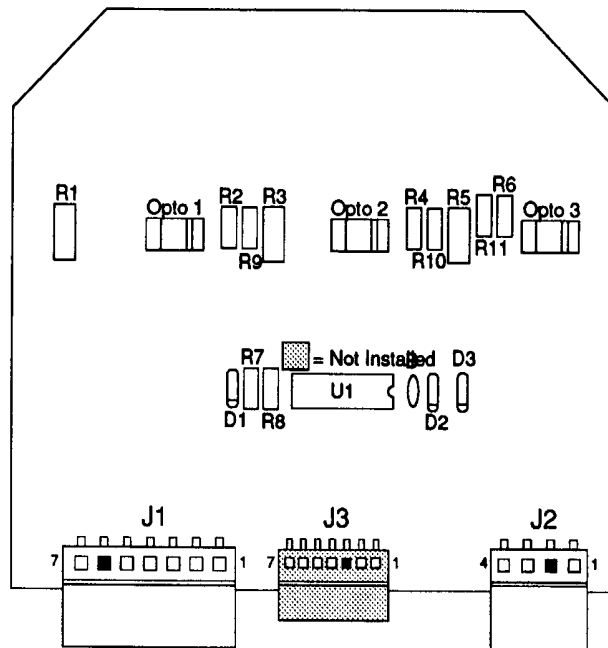
* Note: If the Lane Change Feature is not used, the software ignores Lane Change.

A-14689 Coin Door Interface Board Schematic & Wiring

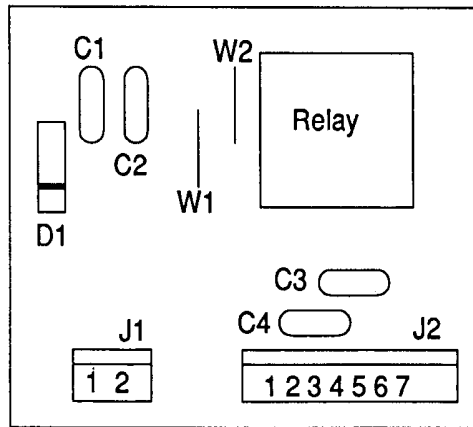


C-13205

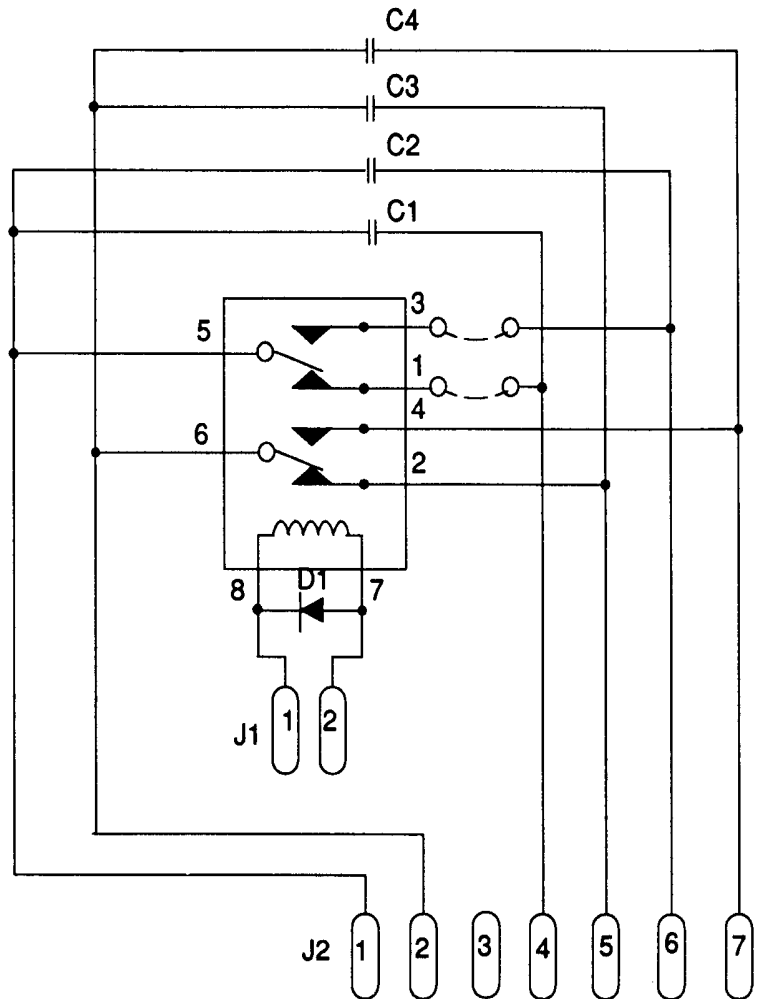
3-bank Drop Target Opto Board Schematic and Wiring



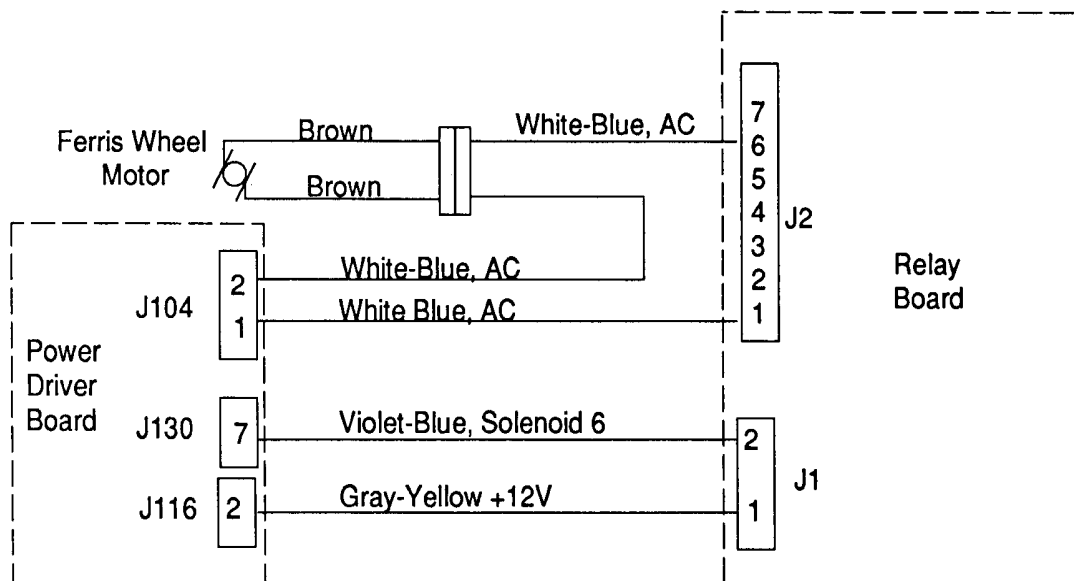
A-14423-1 **Relay Board Schematic and Wiring**



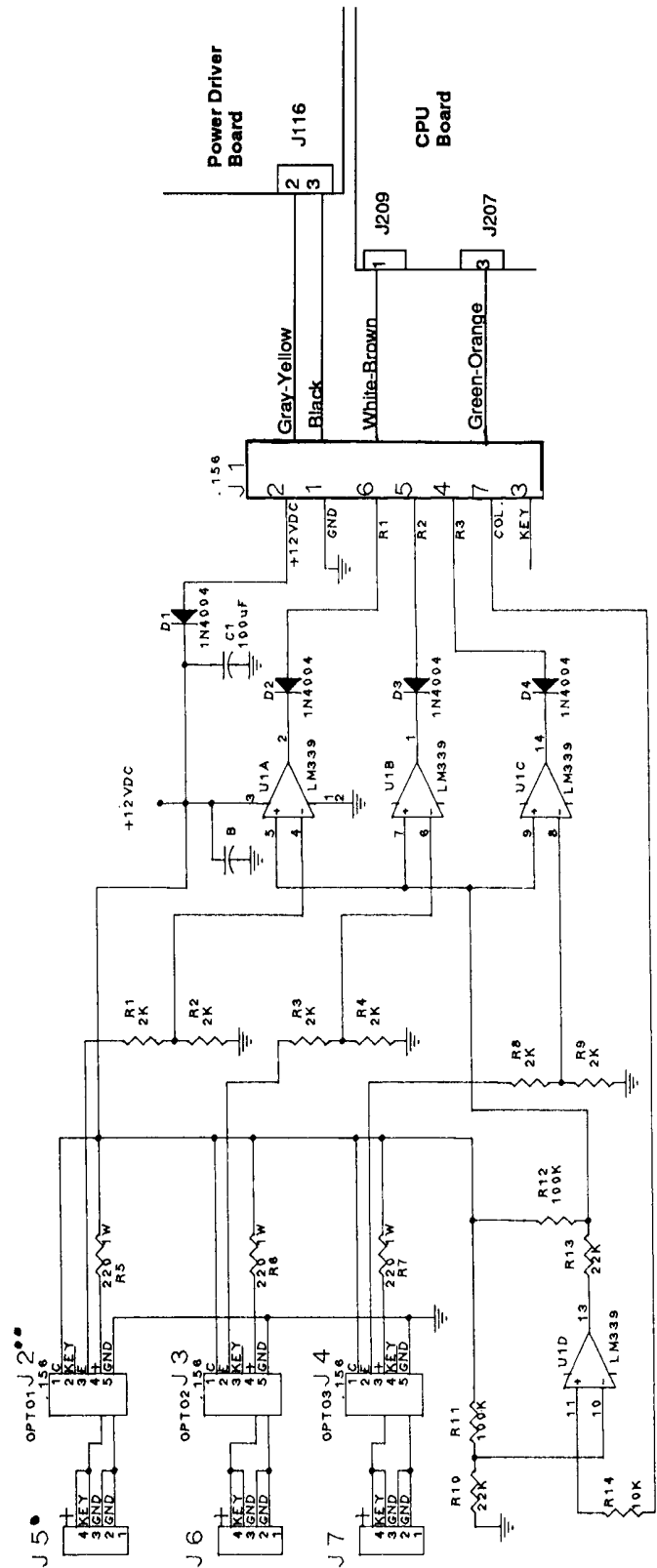
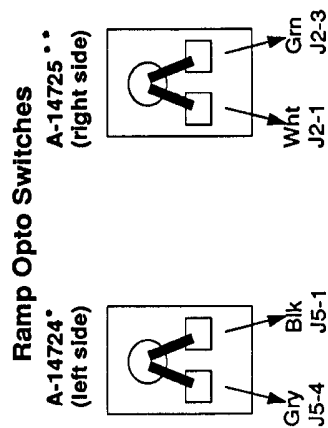
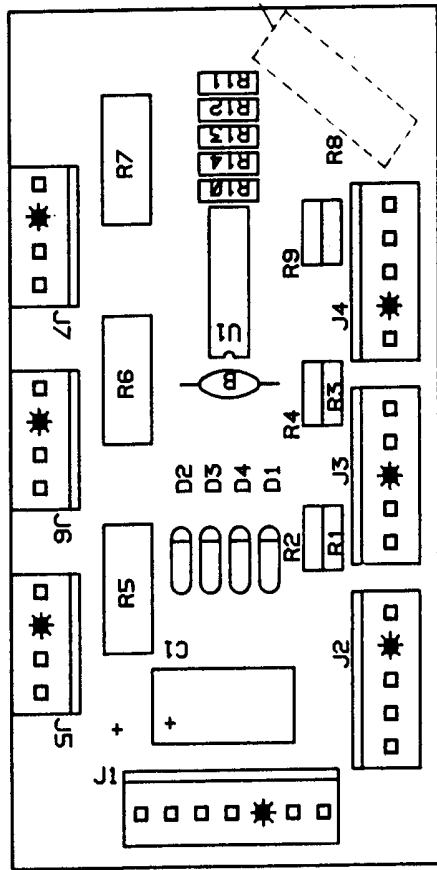
Relay Board



Relay Board Schematic



A-13901-3 Opto Board Schematic and Wiring



Lamp Matrix

Lamp Matrix				Yellow (B+)  Red				
Column	1 Yellow-Brown J138-1 Q98	2 Yellow-Red J138-2 Q97	3 Yellow-Orange J138-3 Q96	4 Yellow-Black J138-4 Q95	5 Yellow-Green J138-5 Q94	6 Yellow-Blue J138-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-8 Q91
Row								
1 Red-Brown J133-1 Q90	Left Clown Eye 11	Bonus 2X 21	Palace "P" 31	Special 41	Lock 2 51	Comet 50K 61	All Scores X2 71	Juggler 1 81
2 Red-Black J133-2 Q89	Right Clown Eye 12	Bonus 3X 22	Palace "A" 32	Clown Time 42	Lock 1 52	Comet 100K 62	All Scores X3 72	Juggler 2 82
3 Red-Orange J133-4 Q88	Left Clown Cheek 13	Bonus 4X 23	Palace "L" 33	Spot Palace 43	Mystery 53	Comet 200K 63	All Scores X5 73	Juggler 3 83
4 Red-Yellow J133-5 Q87	Clown Nose 14	Bonus 5X 24	Palace "A" 34	Skill Shot 44	Jackpot 54	Comet 300K 64	Palace Clock 74	Juggler 4 84
5 Red-Green J133-6 Q86	Right Clown Cheek 15	Bonus 6X 25	Palace "C" 35	Hurricane Value 45	Play It Again 55	Left Jet Bumper 65	Right Stand-up 4 75	Flipper Lanes 85
6 Red-Blue J133-7 Q85	Clown Mouth 16	Left Drop 1 26	Palace "E" 36	Hurricane 1 Million 46	Quick Score 56	Right Jet Bumper 66	Right Stand-up 3 76	J138-3 Start Button 86
7 Red-Violet J133-8 Q84	Left Outlane 17	Left Drop 2 27	Right Outlane 37	Hurricane 2 Million 47	Ferris Wheel 57	Bottom Jet Bumper 67	Right Stand-up 2 77	Left Sling 87
8 Red-Gray J133-9 Q83	Left Return Lane 18	Left Drop 3 28	Right Return Lane 38	Hurricane 3 Million 48	Million 58	Dunk the Dummv 68	Right Stand-up 1 78	Right Sling 88

Switch Matrix

White  Green

Dedicated Grounded Switches		Column Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-8 U20-11
Orange-Brown Left Coin Chute D1	1 White-Brown J209-1 U18-11	Right Flipper 11	Slam Tilt 21	Ferris Wheel 31	Not Used 41	Left Jet Bumper 51	Hurricane Entry 61	Not Used 71	Not Used 81	
Orange-Red Center Coin Chute D2	2 White-Red J209-2 U18-9	Left Flipper 12	Coin Door Closed 22	Not Used 32	Right Stand-up 1 42	Right Jet Bumper 52	Hurricane Exit 62	Not Used 72	Not Used 82	
Orange-Black Right Coin Chute D3	3 White-Orange J209-3 U18-5	Start Button 13	Ticket Dispenser 23	Left Drop Target 1 33	Right Stand-up 2 43	Bottom Jet Bumper 53	Comet Entry 63	Not Used 73	Not Used 83	
Orange-Yellow 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	Plumb Bob Tilt 14	Test Position, Always Closed 24	Left Drop Target 2 34	Right Stand-up 3 44	Not Used 54	Comet Exit 64	Not Used 74	Not Used 84	
Orange-Green Normal Function Test Function Service Credits Escape D5	5 White-Green J209-5 U19-11	Outhole 15	Right Slingshot 25	Left Drop Target 3 35	Right Stand-up 4 45	Dunk the Dummy 55	Not Used 65	Not Used 75	Not Used 85	
Orange-Blue Normal Function Test Function Volume Down Down D6	6 White-Blue J209-7 U19-9	Trough 1 16	Right Return 26	Left Slingshot 36	Not Used 46	Left Juggler 56	Not Used 66	Not Used 76	Not Used 86	
Orange-Violet Normal Function Test Function Volume Up Up D7	7 White-Violet J209-8 U19-5	Trough 2 17	Right Outlane 27	Left Return 37	Not Used 47	Right Juggler 57	Not Used 67	Not Used 77	Not Used 87	
Orange-Gray Normal Function Test Function Begin Test Enter D8	8 White-Gray J209-9 U19-7	Trough 3 18	Ball Shooter 28	Left Outlane 38	Not Used 48	Not Used 58	Not Used 68	Not Used 78	Not Used 88	

WARNINGS & NOTICES

WARNING

FOR SAFETY AND RELIABILITY, substitute parts and equipment modifications are not recommended. Use of Non-WILLIAMS parts or modifications of game circuitry, may adversely affect game play, or may cause injuries.

SUBSTITUTE PART OR EQUIPMENT MODIFICATIONS may void FCC Type Acceptance.

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NOTICE

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WARNING

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generated, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RF Interference Notice

CABLE HARNESS PLACEMENTS and ground strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by the FCC Rules.

TO MAINTAIN THESE LEVELS, reposition harnesses and reconnect ground straps to their original placements, if they become disconnected during maintenance.

FCC STICKER. Check the back of your game to verify that an FCC-certification sticker was attached to your game at the factory. All games that leave the WILLIAMS plant have been tested and found to comply with FCC Rules. Because the sticker is proof of this fact, legal repercussions to the owner and distributor may result, if the sticker is missing. If you receive a game, manufactured after December 1982, that has no FCC sticker, call WILLIAMS for advice or write us a note on your Game Registration Card. Be sure that the card bears your game's serial number.

CALL your authorized
FOR SERVICE... WILLIAMS Distributor.



CAUTION **Transport this game ONLY**
with hinged backbox DOWN!

WILLIAMS ELECTRONICS GAMES, INC.
3401 N. California
Chicago, IL 60618

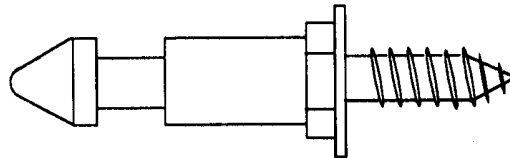
Hurricane Manual Amendment

The following corrections/changes have been made to the Hurricane Operations Manual. Please keep this amendment with your manual.

Page 2-3 **Item 11**
Speaker/Display Assembly part number should be A-15259.

Page 2-15 Left Flipper Assembly part number should be A-15318-L.

Page 2-26 #8 WS Bumper Post, part number 02-3905, should be pictured as follows:



Page 2-30 **Item 4**
Right Flipper part number should be A-15318-R.

Item 30
Left Flipper part number should be A-15318-L.

Page 2-35 **Item E**
Flipper Rubber Rings have been changed. The new part number is 23-6678-7.

Page 3-4 and Back Cover Lamps #65-Left Jet Bumper, #66-Right Jet Bumper and #67-Bottom Jet Bumper are not used.

Hurricane Manual Amendment

The following corrections/changes have been made to the Hurricane Operations Manual. Please keep this amendment with your manual.

Page 2-13 Jet Bumper Assembly

The Jet Bumper Assembly has changed. The new part number is **A-15545-1** and contains the following:

Item	Part Number	Description
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base
3	03-6035-1	Bumper Wafer-Blue
4	03-7443-5	Bumper Body
5	10-7	Bumper Spring

Page 2-16 Ball Shooter Lane Feeder-Associated Parts.

The coil and bracket assembly associated with the Ball Shooter Lane Feeder has changed. The new part number is **A-14375-1** and contains the following:

Part Number	Description
B-11493	Bracket & Stop Assembly
AE-26-1200	Coil Assembly Complete
01-8-508-S	Coil Retainer Bracket
4006-01017-06	MS 6-32 x 3/8 P-RH
4406-01119-00	Nut 6-32 ESN

Page 2-29 Standup Targets

The Standup Targets has changed. The new part number is **B-12039-4** and contains the following:

Part Number	Description
SW-1A-170-4	Standup Target Switch
5070-09054-00	Diode, 1N4004, 1.0A

Page 2-30 Item 10 and 11

The Standup Targets have changed. The new part number is **B-12039-4** (see above).

Item 25

This should be listed as a wireform, part number 12-6466-6.

Item 26

This should be listed as Lower Ramp, part number 12-6981.

Item 29

The Flipper Return Guide should be listed as part number B-12363-L.