

Williams® 
ELECTRONICS GAMES, INC.

March 1993
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BRAM STOKER'S
Dracula™



OPERATIONS MANUAL

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

Williams Electronics Games, Inc.
3401 N. California
Chicago, IL 60618

Jumper Charts

Display		W1	W2
1M/2M/4M ROM	In	In	Out
512K/1M ROM	Out	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	Out
German	In	In	In	In	Out
Spanish	In	Out	In	In	In

SOLENOID / FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections		Drive Connections		Drive Wire Color	Solenoid Part Number	
			Playfield	Cabinet	Playfield	Cabinet			Playfield
01	Shooter	High Power	J107-3		Q82	J130-1	Vio-Brn	AE-23-800	
02	Coffin Popper	High Power	J107-3		Q80	J130-2	Vio-Red	AE-24-900	
03	Castle Popper	High Power	J107-3		Q78	J130-4	Vio-Org	AE-26-1500	
04	Right Ramp Down	High Power	J107-3		Q76	J130-5	Vio-Yel	AE-26-1200	
05	Crypt Popper	High Power	J107-3		Q64	J130-6	Vio-Grn	AE-26-1500	
06	Wire Ramp Ball Popper	High Power	J107-3		Q66	J130-7	Vio-Blu	AE-23-800	
07	Knocker	High Power	J107-3		Q68	J130-8	Vio-Blk	AE-23-800	
08	Shooter Ramp Entry	High Power	J107-3		Q70	J130-9	Vio-Gry	AE-26-1500	
09	Left Sling	Low Power	J107-2		Q56	J127-1	Brn-Blk	AE-26-1200	
10	Right Sling	Low Power	J107-2		Q56	J127-3	Brn-Red	AE-26-1200	
11	Left Jet	Low Power	J107-2		Q54	J127-4	Brn-Red	AE-26-1200	
12	Right Jet	Low Power	J107-2		Q52	J127-5	Brn-Org	AE-26-1200	
13	Bottom Jet	Low Power	J107-2		Q50	J127-6	Brn-Grn	AE-26-1200	
14	Right Ramp Up	Low Power	J107-2		Q48	J127-7	Brn-Blu	SM1-28-900	
15	Outhole	Low Power	J107-2		Q46	J127-8	Brn-Vio	AE-27-1200	
16	Trough	Low Power	J107-2		Q44	J127-9	Brn-Gry	AE-26-1200	
17	T.R. Corner / Dracula FL	Flasher	J107-6	J106-5	Q42	J126-1	Blk-Brn	(3) #906	
18	Jackpot / Stoker FL	Flasher	J107-6	J106-5	Q40	J126-2	Blk-Red	(1) #906	
19	3-bank / House FL	Flasher	J107-6	J106-5	Q38	J126-3	Blk-Org	(1) #89	
20	T.L. Corner / Mina FL	Flasher	J107-6	J106-5	Q36	J126-4	Blk-Yel	(1) #89, (1) #906	
21	Castle / Helsing FL	Flasher	J107-6	J106-5	Q28	J126-5	Blu-Grn	(2) #89	
22	R. Ramp / L. Logo FL	Flasher	J107-6	J106-5	Q30	J126-6	Blu-Blk	(1) #906	
23	R. Ramp / R. Logo FL	Flasher	J107-6	J106-5	Q34	J126-7	Blu-Vio	(1) #906	
24	Asylum / Renfield FL	Flasher	J107-6	J106-5	Q32	J126-8	Blu-Gry	(1) #89	
25	L. Drop Target	Low Power	J107-1	J106-5	Q26	*J122-1	Blu-Brn	AE-26-1200	
26	Speaker Panel FL	Low Power	J107-1	J106-5	Q24		Blu-Red	(3) #906	
27	Magnet	Low Power	J107-1	J106-5	Q22	*J122-3	Blu-Org	20-9831	
28	Magnet's Motor	Low Power	J107-6	J106-5	Q20	J122-4	Blu-Yel	14-7981	
	General Illumination		Playfield	Backbox		Playfield	Backbox	Playfield	Backbox
01	Lower Playfield / Insert	G.I.	J121-1	J120-1	Q18	J121-7	Whit-Brn	#555	#555
02	Upper Playfield / Insert	G.I.	J121-2	J120-2	Q10	J121-8	Whit-Org	#555	#555
03	Center Playfield / Insert	G.I.	J121-3	J120-3	Q14	J121-9	Whit-Yel	#555	#555
04	Insert	G.I.		J120-5	Q16	J120-10	Whit-Grn	#555	#555
05	Insert	G.I.		J120-6	Q12	J120-11	Whit-Vio	#555	#555
	Flipper Circuits		Playfield	Power	Hold	Playfield	Power	Hold	
	Lower Left Flipper	Flipper	J907-6,7 (Gry-Yel)	Q3	Q9	J902-7,9	Org-Blu	Org-Blu	FL-15411
	Lower Right Flipper	Flipper	J907-8,9 (Blu-Yel)	Q4	Q11	J902-11,13	Blu-Vio	Org-Grn	FL-15411
33	Up/Down Post Diverter	Up Lt. F. Power	J907-2	Q1	Q5	J902-3	Blk-Blu	Org-Gry	AE-26-1500
34	Right Gate	Up Lt. F. Hold	J907-1			J902-1		Org-Gry	AE-26-1500
35	Dis. Castle Release Post	Up Rt. F. Power	J907-5	Q2		J902-6	Blk-Yel	Org-Vio	AE-26-1500
36	Left Ball Gate Actuator	Up Rt. F. Hold	J907-4		Q7	J902-4			A-14406

* J122-1, 3 have tieback diodes at J122-5, 8 respectively.

Bram Stoker's
DraculaTM

Love never dies.

Williams Electronics Games, Inc. reserves the rights to make modifications and improvements to its products. The specifications and parts identified in this manual are subject to change without notice.

Dracula Game Story

The Movie

The game is based on the new Francis Ford Coppola movie *Dracula* which is based on the original story by Bram Stoker. Coppola has created such blockbuster movies as *The Godfather I, II & III* and *Apocalypse Now*.

The story begins with the Romanian Prince Vlad and his armies waging war against the Turks. He returns from battle only to find his beloved Elizabeth lying dead in a pool of blood. She had received a deceitful letter stating that Prince Vlad had been killed in battle, so she flung herself from the castle turret.

Dracula renounces God and vows to avenge her death with "All the powers of darkness", then drinks a cup of her blood.

The story goes on with Dracula going through various transformations from a young man to an old man, a wolf, a bat, and also a green mist.

The main story line is Dracula trying to win the hand of Mina, whom he thinks is the reincarnation of Elizabeth, and the battles he must do with Van Helsing, the 'Vampire Killer' who is trying to destroy him.

Dracula is a MUST SEE movie which opens in the United States November 13th, 1992. Yes, that's Friday the 13th. What good timing.

The Game

The game designer tried to follow the story line as closely as possible with the features on this game. At the very top of the playfield is the entrance to 'Video Mode' which simulates 'wolves' being hunted in the graveyard. The left side represents the 'Carfax Abby', Dracula's manor house in London. The right side is 'Dracula's Castle' in Romania. The shot under the right ramp leads into a 'coffin', plus there are many more movie tie-ins. My favorite feature is the 'green mist'. When certain shots are made a ball is transported across the playfield by means of a magnet under the board. A light also moves in unison with the magnet. The playfield art in that area is a 'mist' and when the light and ball move it seems that the ball is floating in the 'mist'.

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Dracula...the Rules and Shot Maps

Skill Shot

Try to time hitting the top left drop targets with the three 'gargoyles' on the back panel. The left face scores 500K and the right face scores 100K. The center face advances V-I-D-E-O, scores 1 Million and increases up to 5 Million maximum.

V-I-D-E-O and 'Video Mode'

Making V-I-D-E-O shot scores 100K - 500K - 1 Million - 3 Million - 5 Million and 'Video Mode Lit'. Entering the hole behind the drop target starts 'Video Mode' when lit. During 'Video Mode', 'werewolves' will be coming at you from the left or the right or both. Use the flipper buttons to fire each shot, either left or right, but use your shots sparingly because you only have five more bullets than there are 'werewolves'. The closer the 'werewolves' are the more they are worth. Successfully destroying all of them scores 5 Million - 10 Million - 15 Million - 20 Million - 25 Million maximum. Plus, there is a bonus for each unused bullet; five bullets left=10 Million, four bullets left=5 Million, three bullets left=1 Million, two bullets left=500K, one bullet left=100K.

3-banks and 'Castle' Multiball

Making either 3-bank by first hitting the two outside targets, then hitting the flashing center target turns On the Castle Lock light for a timed period. Making shot up the left ramp will now lock ball in the 'castle'. Repeat for 3 locks, then 'Castle' Multiball starts, (you will be given credit for each ball that you lock, even if someone else releases the balls). During 'Castle' Multiball, 'Castle' Jackpot is scored by entering the 'tunnel' above the left jet bumper after you re-lock a ball into the 'castle'. 'Castle' Jackpot values are 15 Million - 25 Million - 35 Million - 50 Million and are increased by the jet bumpers.

Right Ramp and 'Coffin' Multiball

Consecutive shots up the right ramp score and advance lit value - 500K - 1 Million - 1.5 Million - 2 Million - 2.5 Million. Left return lane when lit lights ramp for double value. After scoring 2.5 Million, ramp lifts to enable locking balls in 'coffin' (balls do not actually lock in 'coffin', but you are given credit for them). After 3rd ball is locked, start 'Coffin' Multiball. Spell D-R-A-C-U-L-A to collect 'Coffin' Jackpot - 20 Million - 30 Million - 40 Million - 50 Million with two balls in play and 40 Million - 60 Million - 80 Million - 100 Million with three balls in play. Spot letters on 'Coffin' Shot.

Left Ramp and 'Mist' Multiball and Extra Ball

Making required number of shots (see score display) up left ramp lights Extra Ball, lights 'Mist' Multiball and starts 'Bat' Mode. Extra Ball is lit on the hole above the left jet bumper. Enter the hole, when lit, and a ball will mysteriously move across the playfield floating above the 'green mist'. Use your ball to try and hit the moving ball to free it. If you do, start 'Mist' Multiball, all ramps and tunnels are worth 10 Million each and all targets score 250K. During 'Bat' Mode, wake all 'bats' by hitting targets within time limit. Value starts at 50 Million decreasing down to 2 Million.

Multi - Multiball

During any multiball you have the opportunity to start a second or third multiball at the same time. If two multiball features are in play, all jackpots score 2X. If all three are in play, all jackpots score 3X.

Dungeon Shot, Rats and Specials

Making required number of shots into 'Dungeon' starts 'Rat' Mode or lights outlane for Extra Ball and Special. During 'Rat' Mode, try and destroy as many 'rats' as possible during timed interval. The 'rat' value and bonus increases with each target you hit.

The 'Asylum'

The 'Asylum', where 'Renfield' is kept prisoner, is located just above the left 3-bank. Falling into the 'Asylum' scores 5 Million.

? Mystery

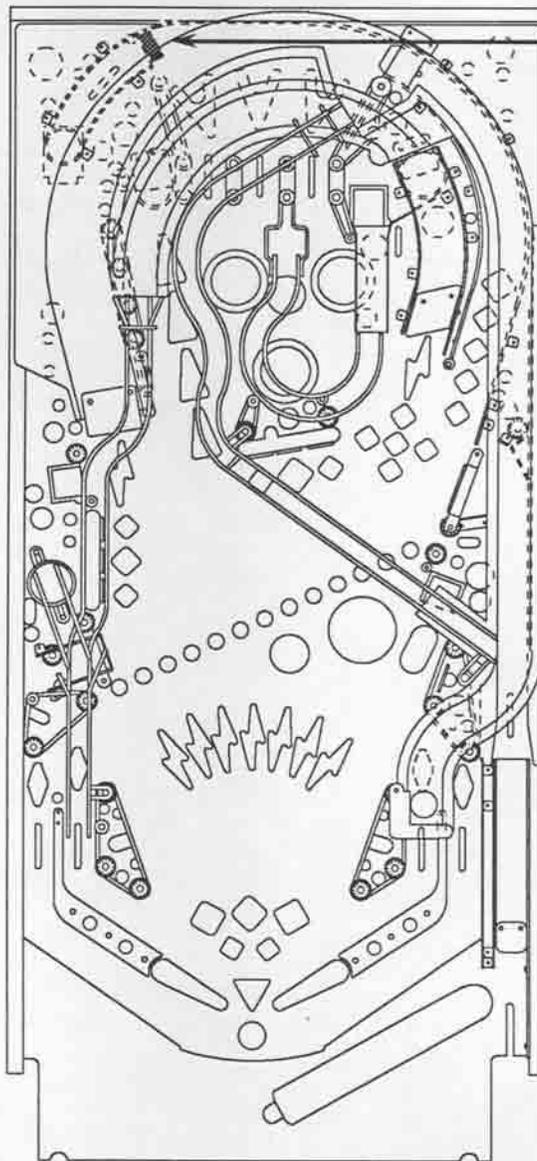
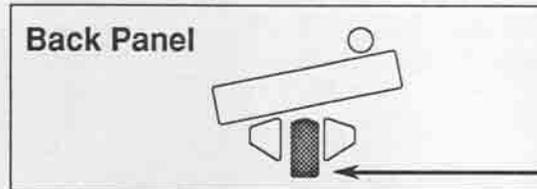
Right return lane lights left tunnel for Mystery Score - Extra Ball, Points, Locks, Video Mode, Bonus X, etc.

Bonus 'X'

The three top lanes advance the Bonus Multiplier.

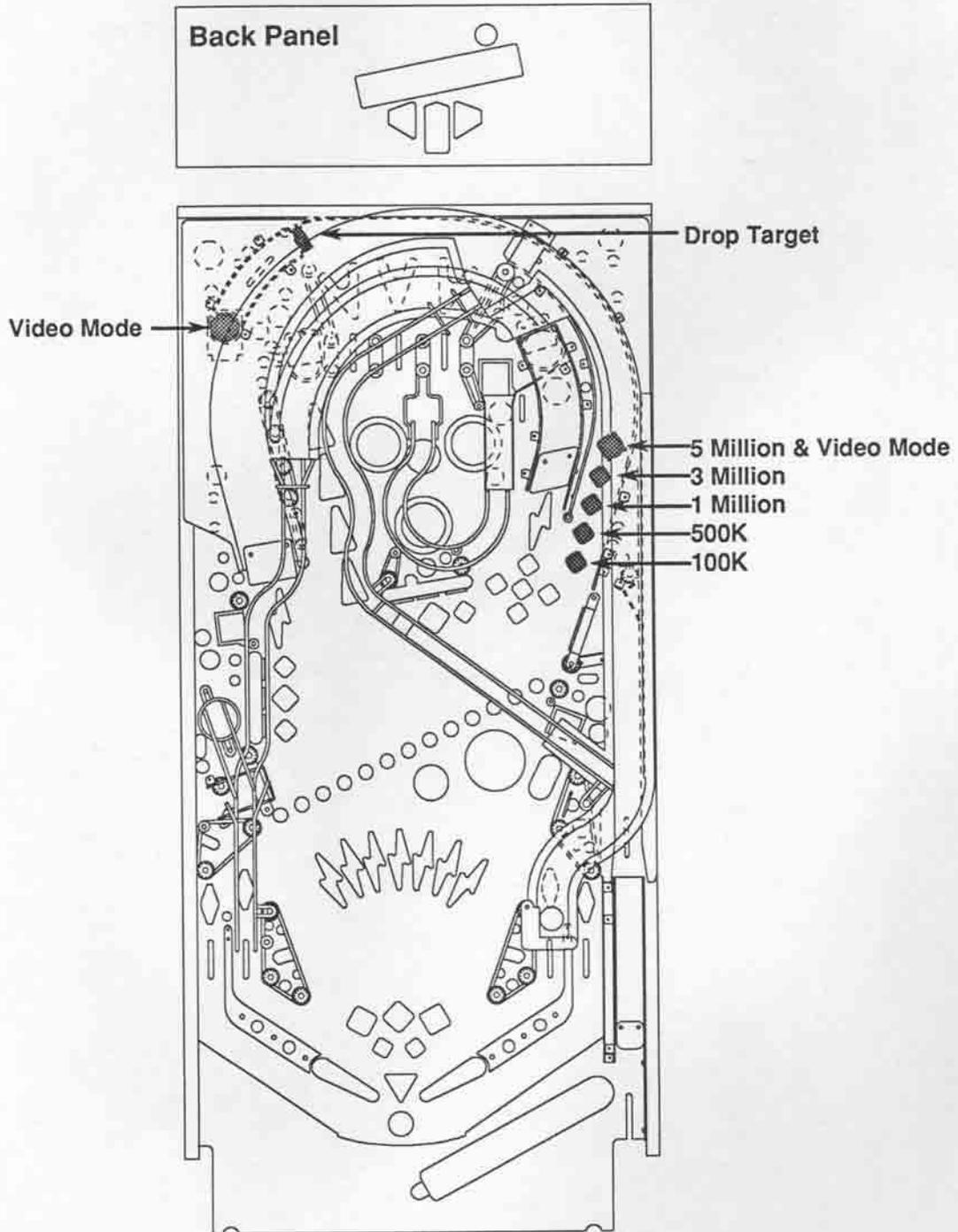
Skill Shot

Try to time the top left drop targets with the three 'gargoyles' on the back panel. The left face scores 500K and the right face scores 100K. The center face advances V-I-D-E-O, scores 1 Million and increases up to 5 Million maximum.



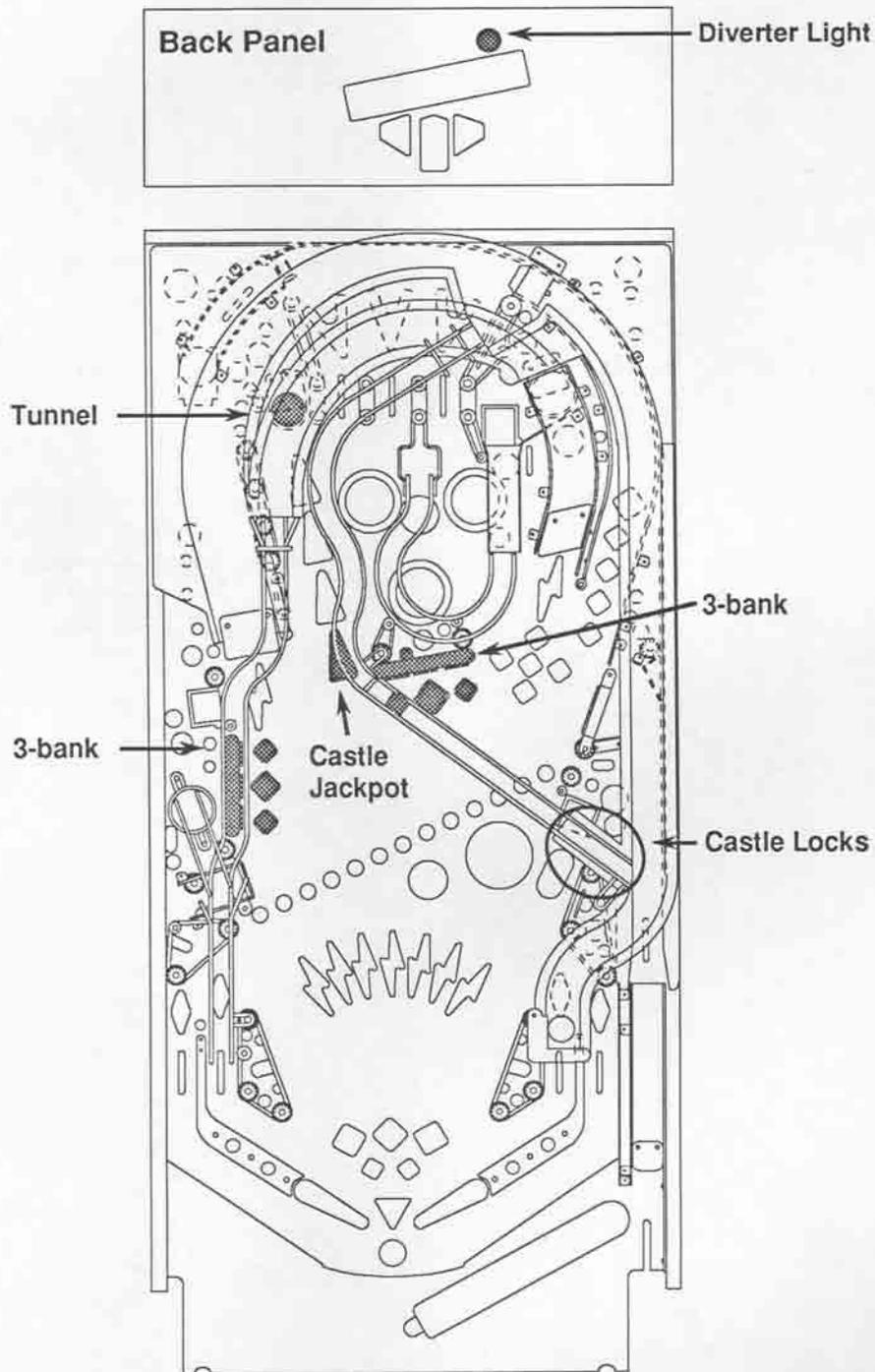
V-I-D-E-O and 'Video Mode'

Making V-I-D-E-O shot scores 100K - 500K - 1 Million - 3 Million - 5 Million and 'Video Mode Lit'. Entering the hole behind the drop targets starts 'Video Mode', 'werewolves' will be coming at you from the left or right or both. Use the flipper buttons to fire each shot, either left or right, but use your shots sparingly because you only have five more shots than there are 'werewolves'. The closer the 'werewolves' are the more they are worth. Successfully destroying all of them scores 5 Million - 10 Million - 15 Million - 20 Million - 25 Million maximum. Plus, there is a bonus for each unused bullet; five bullets left = 10 Million, four bullets left = 5 Million, three bullets left = 1 Million, two bullets left = 500K, one bullet left = 100K.



3-bank and 'Castle' Multiball

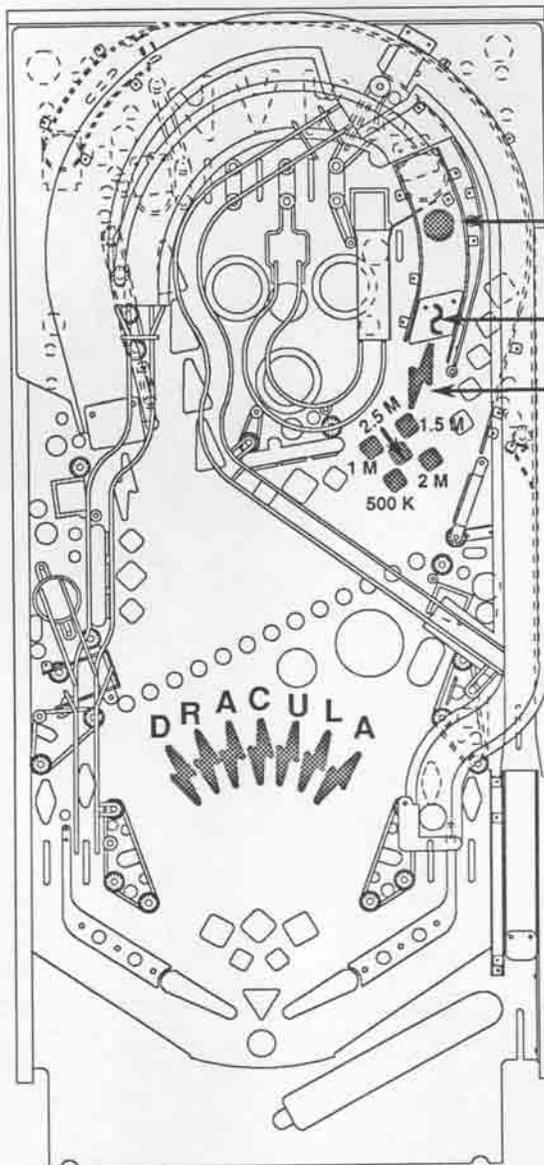
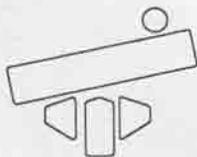
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Right Ramp and 'Coffin' Multiball

Consecutive shots up the right ramp score and advance lit value - 500K - 1 Million - 1.5 Million - 2 Million - 2.5 Million. Left return lane when lit lights ramp for double value. After scoring 2.5 Million, ramp lifts to enable locking balls in 'coffin' (balls do not actually lock in 'coffin', but you are given credit for them). After 3rd ball is locked, start 'Coffin' Multiball. Spell D-R-A-C-U-L-A to collect 'Coffin' Jackpot - 20 Million - 30 Million - 40 Million - 50 Million - with two balls in play and - 40 Million - 60 Million - 80 Million - 100 Million with three balls. Spot letters on 'Coffin' Shot.

Back Panel



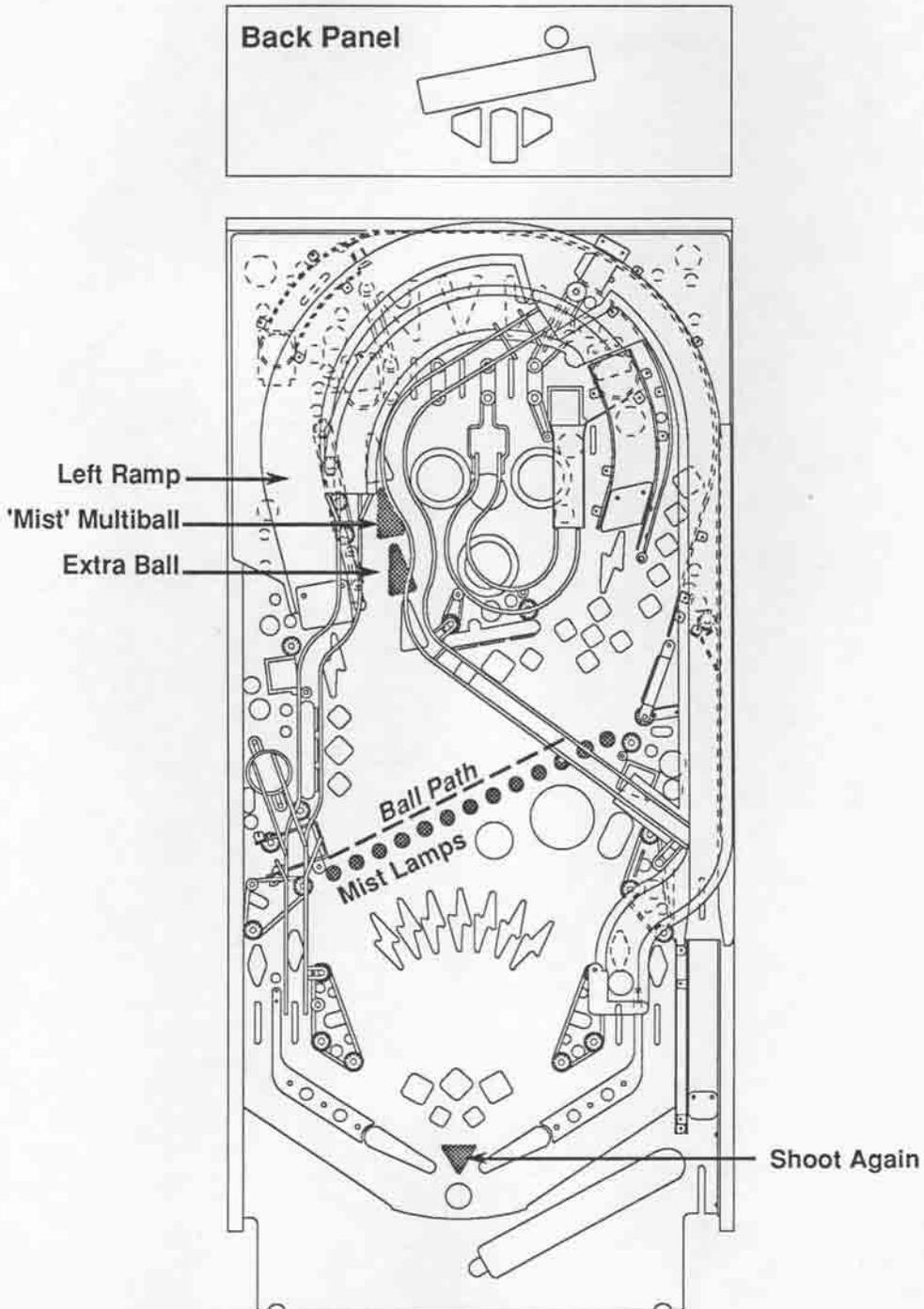
Lock (when lit)

Lift Ramp

Ramp 2X Light

Left Ramp and 'Mist' Multiball and Extra Ball

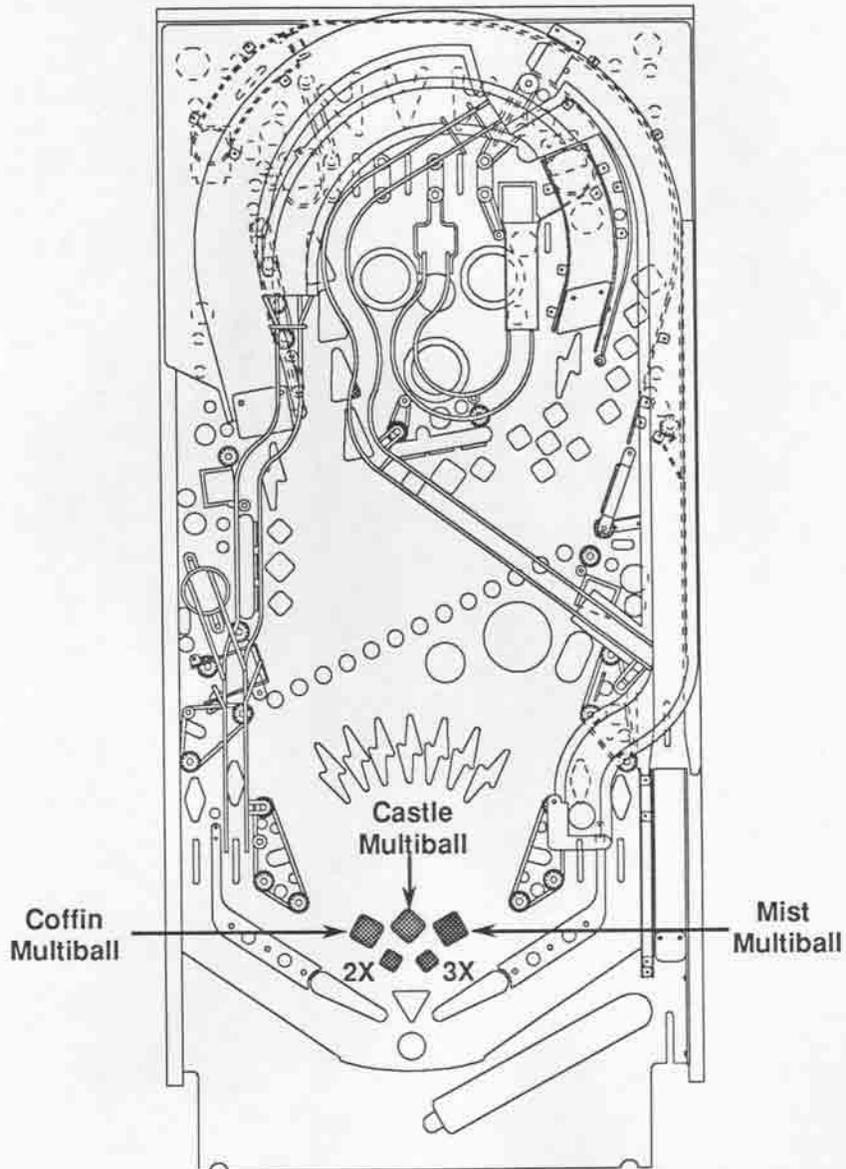
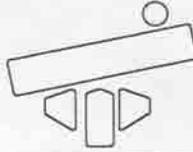
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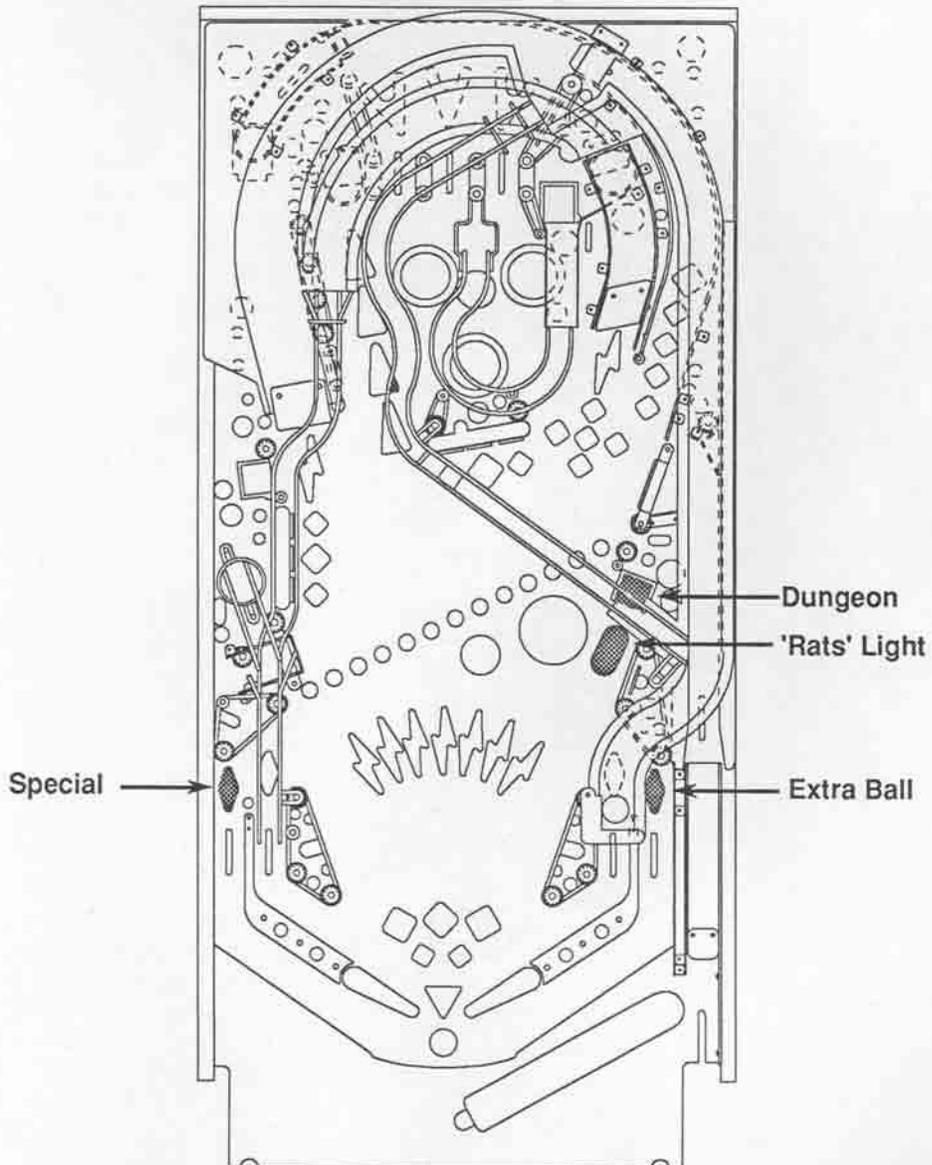
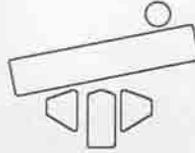
Back Panel



Dungeon Shot, Rats and Specials

Making required number of shots into 'Dungeon' starts 'Rat' Mode or lights outline for Extra Ball and Special. During 'Rat' Mode, try and destroy as many 'rats' as possible during timed interval. The 'rat' value and bonus increases with each target you hit.

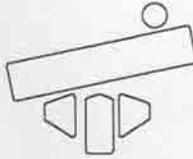
Back Panel



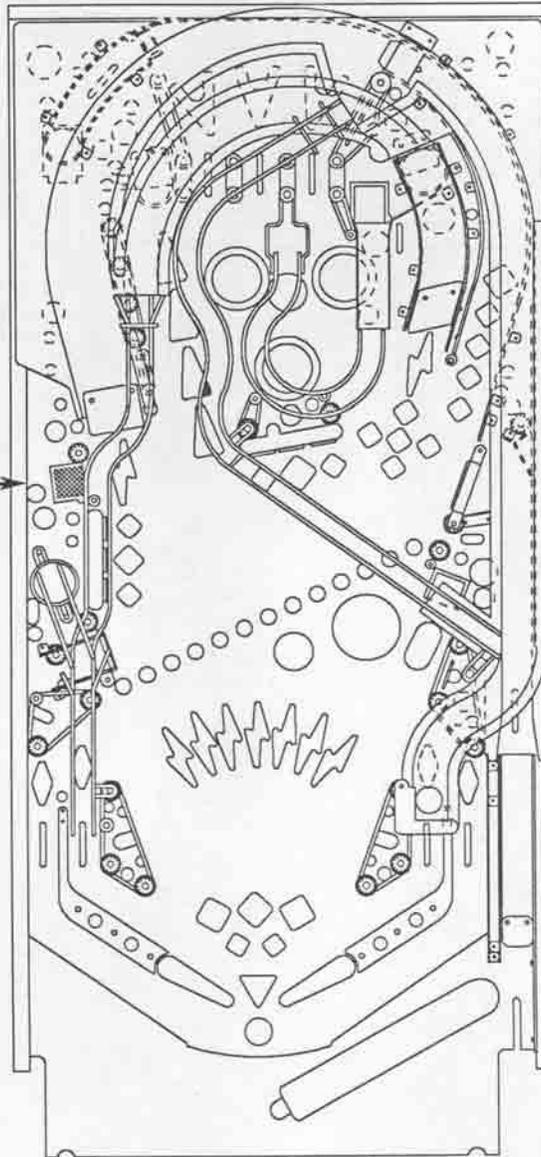
The 'Asylum'

The 'Asylum', where 'Renfield' is kept prisoner, is located just above the 3-bank. Falling into the 'Asylum' scores 5 Million.

Back Panel



'Asylum' →

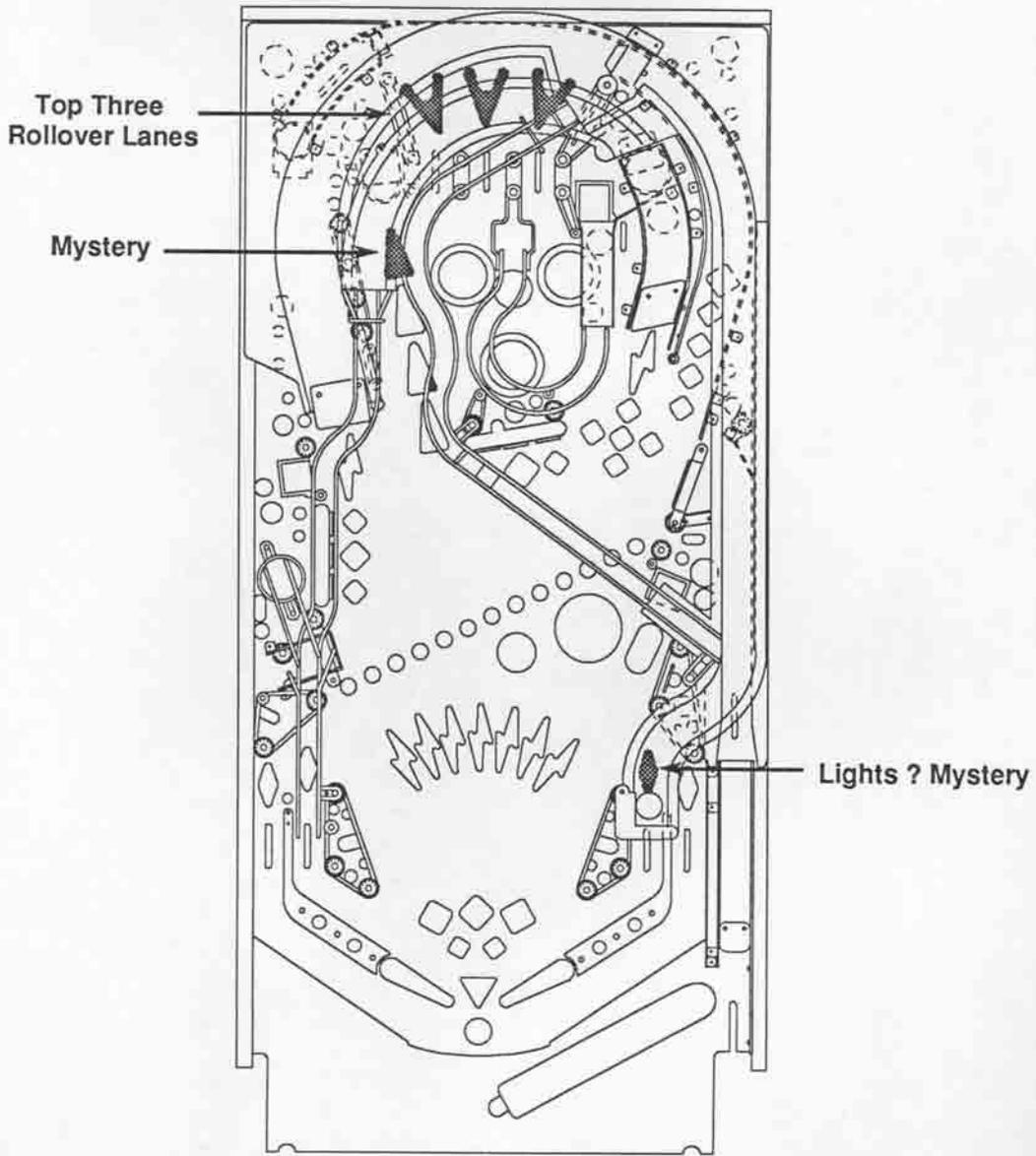
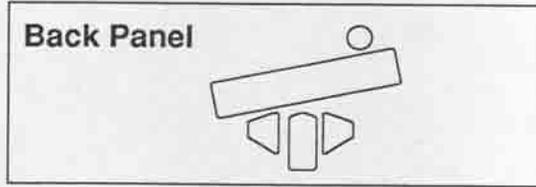


? Mystery

Right return lane lights left tunnel for Mystery Score - Extra Ball, Points, Locks, Video Mode, Bonus X, etc.

Bonus 'X'

The top three rollover lanes advance Bonus Multiplier.



Section 1

Game Operation & Test Information

ROM SUMMARY

IC	Type	Location	Board	Part Number
Game ROM 1	27c040	U6	CPU	A-5343-50001-1
Music/Speech ROM	27c020	U15	Audio	A-5343-50001-3
Music/Speech ROM	27c010	U18	Audio	A-5343-50001-4

PINBALL GAME ASSEMBLY INSTRUCTIONS

Dracula IS A 4 BALL GAME

Power: Domestic 120V @ 60Hz
Foreign 230V @ 50Hz

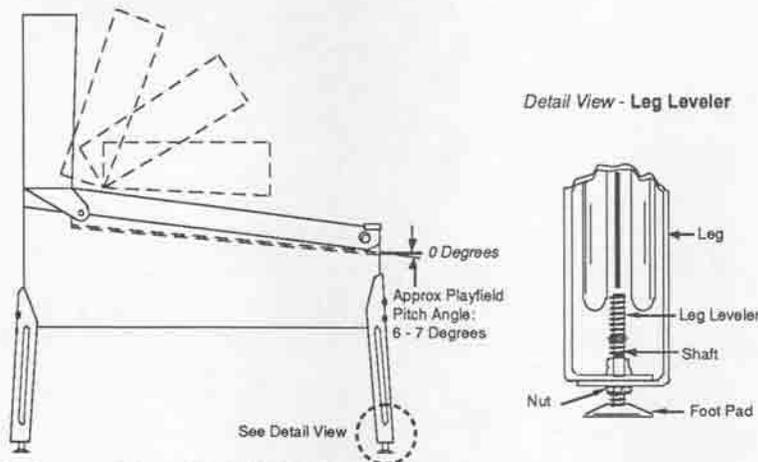
Temp: 32°F to 100° F
(0°C to 38°C)

Humidity: Not to exceed 95% relative.

Dimensions: Width: 26" approx.
Depth: 56" approx.

Weight: Height: 85" approx.
285 lbs approx. (crated)

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.



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

4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.
5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass. 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 and latch the Insert Board. Replace the Speaker Panel. Reinstall the backglass, and lock the backbox.

CAUTION

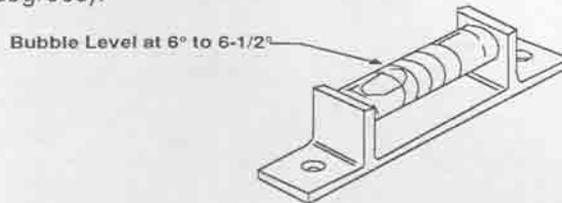
FAILURE TO INSTALL the backbox mounting hardware properly can cause personal injury.
NEVER TRANSPORT a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

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. Move the molding latch lever toward the left side of the game. 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.

8. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). **NOTE:** It is recommended that this measurement be made ON the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.

9. The TRU-PITCH™ level is located on the shooter rail. This allows the operator to accurately pitch the game - WITHOUT REMOVING THE GLASS - when it is first set in a new location. The first line on the level is approximately 6 degrees. Every line after that is approximately another 1/2 degree of pitch. We recommend you pitch the game with the NOSE of the bubble between the first and second line on the level (between 6 and 6-1/2 degrees).



! IMPORTANT !

Playfield pitch angle can affect the operation of the plumb bob tilt. 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. The unit is factory installed for a 6-1/2 degree angle. If an adjustment is necessary, loosen the screw at the bottom of the unit. Move the pointer, one groove at a time to the left or the right, depending on the degree desired. Hold the pointer in place and tighten screw.

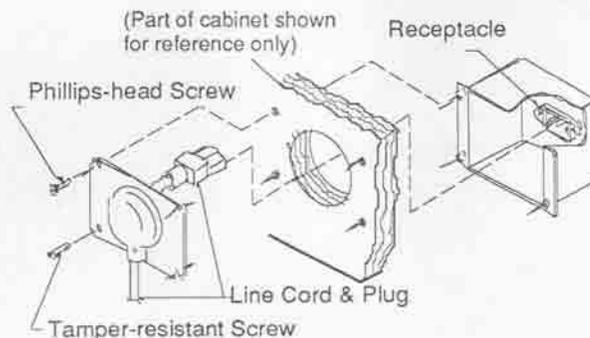
10. Move the game into the desired location; recheck the level and pitch angle of the playfield.

11. Be sure the **required number** of ball are installed. **Dracula** uses four balls.

12. Install playfield mylars if desired. **NOTE:** The **Dracula** playfield is coated with a special hardcoat surface and does not require a protective mylar. However, mylars can be purchased through your local Williams Distributor. Specify part number 03-8860-1 for full playfield mylar.

13. Clean and reinstall the playfield cover glass. Prepare the game for player operation.

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



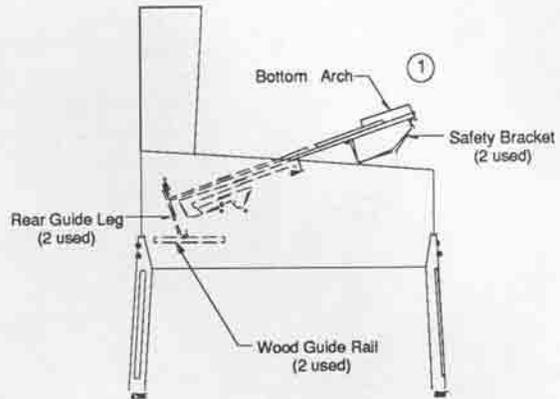
RAISING THE PLAYFIELD

CAUTION

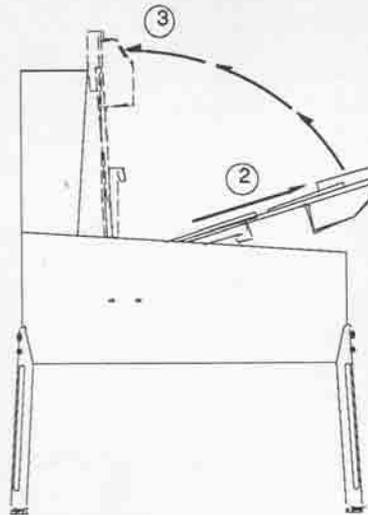
Do not raise the playfield straight up! This game uses a slide assembly to raise and lower the playfield.

To raise the playfield.

1. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails or be used to slide out playfield.

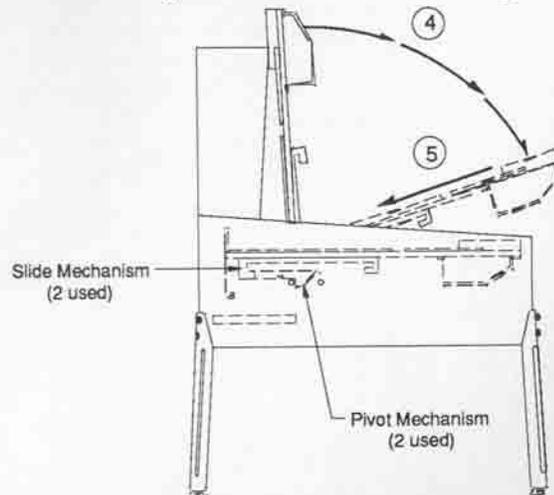


2. Pull the playfield out toward you until it stops (rest position) and raise it approximately 3". Be sure playfield is in locked position and does not slide back into the cabinet. If it does, repeat Step 2 before proceeding to Step 3.
3. Rotate playfield to upright service position (lean on backbox) by pulling toward you and up. Listen for the sound of a click; this insures locking and pivoting sequence.



To lower the playfield.

4. Rotate the playfield to the rest position. This unlocks the pivoting mechanism.
5. Push back playfield into cabinet and into playing position.



GAME 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 Buttons

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 Buttons have two modes of operation Normal Function and Test Function.

Normal Function

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

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

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

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

Test Function

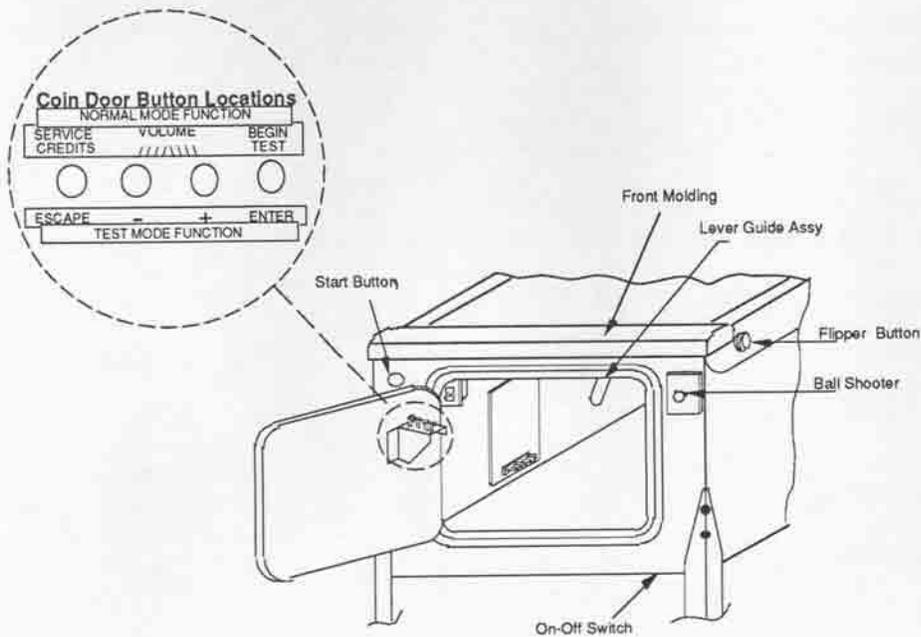
The Escape button allows you to get out of a menu selection or return to the Attract Mode.

The Up (+) button allows you to cycle forward through the menu selections or adjustment choices.

The Down (-) button allows you to cycle backward through the menu selections or adjustment choices.

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

Holding the Enter button for five seconds, during the Attract Mode, resets the High Scores.



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. 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.

Note: After the game has been on location for a time, the Start-up Tests may contain messages concerning game problems. The section entitled 'Error 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, number, and software revision. The message changes. The display shows the sound software revision, the revision level of the system software, and the date the software was revised.

Example:

	DRACULA		Sound Rev. L-1
50001		Rev. L-X	SY. 0.X0 X-X-93

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.

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

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

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

TILTS. Actuating the Cabinet Tilt switch 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 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

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

MAIN MENU

B. Bookkeeping Menu	
	B.1 Main Audits
	B.2 Earning Audits
	B.3 Standard Audits
	B.4 Feature Audits
	B.5 Histograms
	B.6 Time-stamps
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 Time Histograms
	P.7 Time-Stamped
	P.8 All Data
T. Test Menu	
	T.1 Switch Edges Test
	T.2 Switch Levels Test
	T.3 Single Switches Test
	T.4 Solenoid Test
	T.5 Flasher Test
	T.6 General Illumination Test
	T.7 Sound and Music Test
	T.8 Single Lamps Test
	T.9 All Lamps Test
	T.10 Lamp & Flasher Test
	T.11 Display Test
	T.12 Flipper Coil Test
	T.13 Ordered Lamps Test
	T.14 Top Right Ramp Test
	T.15 Magnet 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
	U.10 Clear Credits
	U.11 Auto Burn-in
A. Adjustments Menu	
	A.1 Standard Adjustments
	A.2 Feature Adjustments
	A.3 Pricing Adjustments
	A.4 H.S.T.D. Adjustments
	A.5 Printer Adjustments

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.

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

B. BOOKKEEPING MENU

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

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

B.1 Main Audits

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

B.2 Earning Audits

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

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

B.3 Standard Audits

B.3	01	Games Started	00
B.3	02	Total Plays*	00
B.3	03	Total Free Play	00
B.3	04	Free Play Percent	00
B.3	05	Replay Awards	00
B.3	06	Percent Replays	00
B.3	07	Special Awards	00
B.3	08	Percent Special	00
B.3	09	Match Awards	00
B.3	10	Percent Match	00
B.3	11	H.S.T.D. Credits	00
B.3	12	Percent H.S.T.D	00
B.3	13	Extra Ball	00
B.3	14	Percent Extra Ball	00
B.3	15	Tickets Awarded	00
B.3	16	Percent Tickets	00
B.3	17	Left Drains	00
B.3	18	Right Drains	00
B.3	19	Average Ball Time	00
B.3	20	Average Game Time	00
B.3	21	Play Time	00:00:00
B.3	22	Minutes On	00
B.3	23	Balls Played	00
B.3	24	Tilts	00
B.3	25	Replay 1 Awards	00
B.3	26	Replay 2 Awards	00
B.3	27	Replay 3 Awards	00
B.3	28	Replay 4 Awards	00
B.3	29	1 Player Games	00
B.3	30	2 Player Games	00
B.3	31	3 Player Games	00
B.3	32	4 Player Games	00
B.3	33	H.S.T.D. Reset Count	00
B.3	34	Burn-in Time†	00:00:00
B.3	35	1st Replay Level	00
B.3	36	Left Flipper	00
B.3	37	Right Flipper	00

* "Total Plays" only counts on completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored. Operation for test and service do not affect audits.

† This audit is not resettable.

B.4 Feature Audits

B.4	01	Outlane Lit	00%	00
B.4	02	Outlane Special	00%	00
B.4	03	Outlane Extra Ball	00%	00
B.4	04	Loop Extra Ball Lit	00%	00
B.4	05	Video Mode Extra Ball	00%	00
B.4	06	Mystery Extra Ball	00%	00
B.4	07	All Locks	00%	00
B.4	08	All Multiballs	00%	00
B.4	09	Carriage Total	00%	00
B.4	10	Carriage 1st	00%	00
B.4	11	Castle Multiball Total	00%	00
B.4	12	Castle Multiball 1st	00%	00
B.4	13	Coffin Multiball Total	00%	00
B.4	14	Coffin Multiball 1st	00%	00
B.4	15	Bonus X's	00%	00
B.4	16	Altars Total	00%	00
B.4	17	Altars 1st	00%	00
B.4	18	Altars 2nd	00%	00
B.4	19	Altars 3rd	00%	00
B.4	20	Altars 4th	00%	00
B.4	21	Altars 5th	00%	00
B.4	22	Rat Mode Total	00%	00
B.4	23	Rat Mode 1st	00%	00
B.4	24	Loops Total	00%	00
B.4	25	Loops 1st	00%	00
B.4	26	Loops 2nd	00%	00
B.4	27	Loops 3rd	00%	00
B.4	28	Loops 4th	00%	00
B.4	29	Loops 5th	00%	00
B.4	30	Bat Mode Total	00%	00
B.4	31	Bat Mode 1st	00%	00
B.4	32	Mystery Total	00%	00
B.4	33	Mystery 1st	00%	00
B.4	34	Video Mode Total	00%	00
B.4	35	Video Mode 1st	00%	00
B.4	36	Video Modes Won	00%	00
B.4	37	Video Modes Lost	00%	00
B.4	38	Ball Save	00%	00
B.4	39	Magnet Faults	00%	00
B.4	40	T.R. Ramp Faults	00%	00
B.4	41	Other Sw. Faults	00%	00
B.4	42	2X Multi-Multiball	00%	00
B.4	43	3X Multi-Multiball	00%	00
B.4	44	Mist Multiball Attempts	00%	00

B.5 Histograms

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

B.6 Time-Stamps

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

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

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

P. PRINTOUTS MENU

(optional board required)

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

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

If no Printer is attached the the message "Waiting for Printer" appears in the displays.

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

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

T. TEST MENU

- T.1 Switch Edges Test
- T.2 Switch Levels Test
- T.3 Single Switch Test
- T.4 Solenoid Test
- T.5 Flasher Test
- T.6 General Illumination Test
- T.7 Sound & Music Test
- T.8 Single Lamps Test
- T.9 All Lamps Test
- T.10 Lamp & Flasher Test
- T.11 Display Test
- T.12 Flipper Coil Test
- T.13 Ordered Lamps Test
- T.14 Top Right Ramp Test
- T.15 Magnet Test

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

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

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

T.1 Switch Edges Test Press each switch one at a time. The name and number of the switch is shown in the display. If a switch other than the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit.

T.2 Switch Levels Test This test automatically cycles through all switches that are detected closed. The name and number of each switch that is detected is shown in the display. A filled square indicates the switch's position in the matrix.

T.3 Single Switches Test The Single Switch Test isolates a particular switch by blocking signals from all other switches. Use the Up or Down buttons to select the switch to be tested.

T.4 Solenoid Test

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

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

T.5 Flasher Test

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

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

T.6 General Illumination Test

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

- Stopped - 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.
- Running - Press the Enter button any time during Stopped 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.

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

- Running - The 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 advances 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/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.
- Stopped - 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.

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

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

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

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

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

T.12 Flipper Coil Test

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

- Repeat - The Repeat mode pulses a single flipper. After entering this test, flipper coil 01 shows in the display and the corresponding coil activates. Press the Up or Down button to cycle through the flipper coils, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to move to the next mode.
- Stopped - The Stopped mode halts the Flipper Coil Test. Press Enter during the Repeat mode and the test stops. No coils 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 - The Running mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed.

T.13 Ordered Lamps Test

The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example - Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through the lamps. Lamps light in a clock-wise or counter clock-wise direction starting from the bottom of the playfield. Direction depends on which button, Up or Down, is pressed. 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.

T.14 Top Right Ramp Test

The Dot Matrix display shows a side view of the Up/Down Ramp. The bottom line of the display shows a "test running" or "error" line.

This test is similar in function to the coil test. The different sub-tests can be selected by the Up and Down buttons. And there are three modes to this test (controlled by the Enter button).

- RUNNING - Automatically cycle through the different sub-tests.
- REPEAT - Remain on the same sub-test.
- STOPPED - Turn off all coils, remain on this sub-test.

DOT MATRIX DIAGRAM

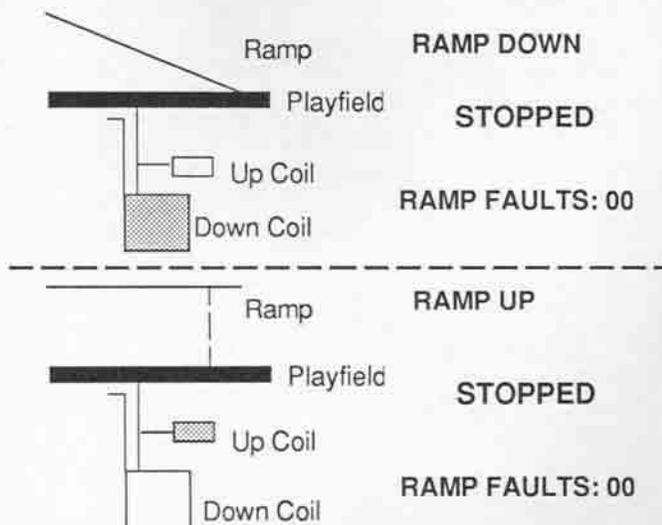
Switches

When the Right Ramp Down switch is closed, the ramp will be shown in the down position.

Coils

When the Right Ramp Down coil is activated, the coil is 100% filled.

When the Right Ramp Up coil is activated, the coil is also 100% filled.



T.15 Magnet Test (also see Maintenance Information)

The Dot Matrix display shows a

front view of the magnet, shooter lane, shooter ramp, trough and outhole.

A switch or motor is considered "active" if its area is filled in. The 24" opto beam shown by a dotted line (this represents the infrared beam). The bottom line of the display shows a "test moving", or "error" line.

This test is similar in function to the coil test. The different sub-tests can be selected by the Up and Down buttons. There are three modes to this test (controlled by the Enter button).

- RUNNING - Automatically cycle through the different sub-tests.
- REPEAT - Remain on the same sub-test.
- STOPPED - Turn off all coils, remain on this sub-test. (Note: Ignore errors generated by Stopped Mode.)

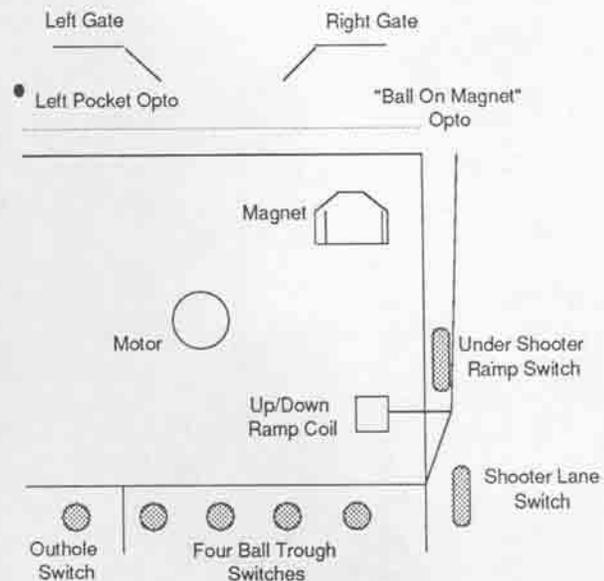
DOT MATRIX DIAGRAM

Switches

- Left Pocket Opto
- Main "Ball On Magnet" Opto
- Under Shooter Ramp Switch
- Shooter Lane Switch
- 4 Trough Switches
- 1 Outhole Switch

Coils

- 2 Gates (left and right)
- 1 Magnet
- 1 Lifting Shooter Ramp
- Motor On/Off (On = filled in motor picture.)
- Controlled Lamp (not shown on Dot Matrix Display).



Sub-Tests

- Unload Magnet: Magnet moves without a ball. The display shows the location of the magnet.
- Opto Check 1: Controlled lamps and flashlamps blink to see if they interfere with the opto beam when it is covered and uncovered.
- Load Magnet: Ball is loaded onto the magnet. The Up/Down coil is filled in when activated.
- Opto Check 2: Same as Opto Check 1.
- Magnet On + Left: The ball moves across the playfield. The left and right gates lift up to allow the ball to pass underneath. The magnet and motor shown on the display are filled in, and the location of the ball is shown on the dotted line. (**Note:** There are two balls shown when only one is in the Left Opto Pocket because two opto switches are activated when a ball enters. The Left Opto Pocket is shown as a dot when it sees a beam and as a ball when the beam is broken.)
- Opto Check 3: Same as Opto Check 1.
- Magnet On + Right: Same as Magnet On + Left.
- Magnet Off + Left: The magnet moves across the playfield without a ball. The motor, shown on the display, is filled in when it is activated.
- Magnet Off + Right: Same as Magnet Off + Left.

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

U. Utilities Menu

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

U.1 Clear Audits Press the Enter button to clear the Standard Audits (except Burn-in Time), Feature Audits, and Histograms.

U.2 Clear Coins Press the Enter button to clear the Earnings Audits.

U.3 Reset H.S.T.D. Press the Enter button to clear the High Score to Date Table and the Grand Champion.

U.4 Set Time and Date Press the Enter button to activate the time and date. Use the Up or Down button to change the value, then press the Enter button to lock in that value. If a mistake is made press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

U.5 Custom Message Set A.1 20 to 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 a mistake is made, 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 the 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 Enter is pressed, the custom message is cleared and no message is displayed. If Escape is pressed, the original message remains intact.

U.6 Set Game I.D. This utility allows for the installation of 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.

U.8 Factory Reset Press the Enter button to restore the adjustments to their factory setting, clear the Audits, H.S.T.D Table, and Custom Message/Game I.D.

U.9 Presets Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

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

U.9 01 Install Extra Easy
MUCH LESS difficult than factory setting.

U.9 02 Install Easy
Somewhat LESS difficult than factory setting.

U.9 03 Install Medium
About the SAME as factory setting.

U.9 04 Install Hard
Some what MORE difficult than factory setting

U.9 05 Install Extra Hard
MUCH MORE difficult than factory setting.

Difficulty Setting Table for U.S., Canadian and 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 09	Pre-light Video Mode	3 Lamps	2 Lamps	None	None	None
A.2 10	Video Mode Award	5 Lamps	1 Lamp	None	None	None
A.2 11	Bonus 'X' memory	Yes	Yes	Yes	Yes	Yes
A.2 12	Castle Lock Timer	20 sec	15 sec	15 sec	13 sec	12 sec
A.2 13	Castle Jackpot	30 sec	30 sec	20 sec	20 sec	20 sec
A.2 14	Jet Timer	10 sec	10 sec	10 sec	10 sec	10sec
A.2 15	Pre-light Coffin	2 lamps	0 lamps	0 Lamps	0 Lamps	0 Lamps
A.2 16	Coffin Ramp Time	15 sec	15 sec	15 sec	15 sec	15 sec
A.2 17	Left Ramp Time	10 sec	10 sec	10 sec	10 sec	10 sec
A.2 18	Mystery Time	10 sec	8 sec	5 sec	5 sec	5 sec
A.2 19	Mystery Pre-light	Ball Start	Game Start	Game Start	Game Start	Not Lit
A.2 20	Mystery: Castle Lock	10%	10 %	10%	8%	5%
A.2 21	Mystery: Coffin Lock	10%	10 %	10%	8%	5%
A.2 22	Mystery: Video Mode	10%	15%	10%	8%	5%
A.2 23	Mystery: Bonus 'X'	33%	25%	25%	20%	15%
A.2 24	Video Mode Diff.	Easy	Medium	Medium	Medium	Hard
A.2 25	1st Loop Bonus	Loop 6	Loop 3	Loop 6	Loop 6	Loop 6
A.2 26	Other Loop Bonus	Loop 6	Loop 6	Loop 6	Loop 6	Loop 10
A.2 27	1st Mist Multiball lit	Loop 5	Loop 5	Loop 5	Loop 5	Loop 7
A.2 28	Other Mist Multiball	Loop 10	Loop 10	Loop 10	Loop 15	Loop 15
A.2 29	1st Bats	Loop 2	Loop 2	Loop 3	Loop 3	Loop 3
A.2 30	Other Bats	Loop 5	Loop 6	Loop 10	Loop 10	Loop10
A.2 31	Bats Time	20 sec	15 sec	15 sec	15 sec	15 sec
A.2 32	Number of Bats	10	15	15	20	25
A.2 33	Outlane Lit At	Altar 10	Altar 15	Altar 15	Altar 20	Altar 25
A.2 34	1st Rats at	Altar 2	Altar 2	Altar 3	Altar 3	Altar 3
A.2 35	Next Rats at	Altar 3	Altar 4	Altar 5	Altar 5	Altar 5
A.2 36	Number of Rats	10	15	15	20	25
A.2 37	Rats Timer	20 sec	15 sec	15 sec	15 sec	15 sec

Difficulty Setting Table for German and 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 09	Pre-light Video Mode	3 Lamps	None	None	None	None
A.2 10	Video Mode Award	5 Lamps	None	None	None	None
A.2 11	Bonus 'X' memory	Yes	Yes	Yes	Yes	Yes
A.2 12	Castle Lock Timer	20 sec	15 sec	13 sec	12 sec	10 sec
A.2 13	Castle Jackpot	30 sec	20 sec	20 sec	20 sec	20 sec
A.2 14	Jet Timer	10 sec	10 sec	10 sec	10 sec	10 sec
A.2 15	Pre-light Coffin	2 lamps	None	None	None	None
A.2 16	Coffin Ramp Time	15 sec	15 sec	15 sec	15 sec	15 sec
A.2 17	Left Ramp Time	10 sec	10 sec	10 sec	10 sec	10 sec
A.2 18	Mystery Time	10 sec	5 sec	5 sec	5 sec	5 sec
A.2 19	Mystery Pre-light	Ball Start	Game Start	Game Start	Not Lit	Not Lit
A.2 20	Mystery: Castle Lock	10%	10%	8%	5%	3%
A.2 21	Mystery: Coffin Lock	10%	10%	8%	5%	3%
A.2 22	Mystery: Video Mode	10%	10%	8%	5%	3%
A.2 23	Mystery: Bonus 'X'	33%	25%	20%	15%	10%
A.2 24	Video Mode Diff.	Easy	Medium	Medium	Hard	Ex. Hard
A.2 25	1st Loop Bonus	Loop 6	Loop 6	Loop 6	Loop 6	Loop 6
A.2 26	Other Loop Bonus	Loop 6	Loop 6	Loop 6	Loop 10	Loop 10
A.2 27	1st Mist Multiball lit	Loop 5	Loop 5	Loop 5	Loop 7	Loop 7
A.2 28	Other Mist Multiball	Loop 10	Loop 10	Loop 15	Loop 15	Loop 20
A.2 29	1st Bats	Loop 2	Loop 3	Loop 3	Loop 3	Loop 3
A.2 30	Other Bats	Loop 5	Loop 10	Loop 10	Loop 10	Loop 10
A.2 31	Bats Time	20 sec	15 sec	15 sec	15 sec	15 sec
A.2 32	Number of Bats	10	15	20	25	30
A.2 33	Outlane Lit At	Altar 10	Altar 15	Altar 20	Altar 25	Altar 30
A.2 34	1st Rats at	Altar 2	Altar 3	Altar 3	Altar 3	Altar 3
A.2 35	Next Rats at	Altar 3	Altar 5	Altar 5	Altar 5	Altar 5
A.2 36	Number of Rats	10	15	20	25	30
A.2 37	Rats Timer	20 sec	15 sec	15 sec	15 sec	15 sec

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

Preset Adjustments Table for U.S. and Canadian Games

Adj #	Adj Description	Install 5-ball U.9 06	Install 3-ball U.9 07
U.9 03	Install Medium	Not Used	Yes
U.9 04	Install Hard	Yes	Not Used

- U.9 08 Install Add -A -Ball** This option deletes all Free Play awards and replaces 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 07	High Score 3 Credits	00
A.4 08	High Score 4 Credits	00

- U.9 09 Install Ticket** This option deletes Credit awards and replaces them with Ticket awards. Individual adjustments are affected as follows:

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

U.9 12 Not Used

U.9 13 Not Used

U.9 14 Not Used

U.9 15 Not Used

U.9 16 Not Used

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

Adjustments U.9 17 through U.9 22 are used to modify game pricing and type of game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups.

Preset Adjustments Table 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	6spiele/5DM	6spiele/5DM	6spiele/5DM	7spiele/5DM	7spiele/5DM	7spiele/5DM
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	H.S.T.D. 1 Credits	01	01	00	01	01	00
A.4 06	H.S.T.D. 2 Credits	00	00	00	00	00	00
A.4 07	H.S.T.D. 3 Credits	00	00	00	00	00	00
A.4 08	H.S.T.D. 4 Credits	00	00	00	00	00	00
A.4 10	Backup Champion	500,000,000	500,000,000	00	500,000,000	500,000,000	00
A.4 11	Backup H.S.T.D. 1	450,000,000	450,000,000	00	450,000,000	450,000,000	00
A.4 12	Backup H.S.T.D. 2	400,000,000	400,000,000	00	400,000,000	400,000,000	00
A.4 13	Backup H.S.T.D. 3	350,000,000	350,000,000	00	350,000,000	350,000,000	00
A.4 14	Backup H.S.T.D. 4	300,000,000	300,000,000	00	300,000,000	300,000,000	00

• For German Jumpered CPU Boards only.

German Jumpers are:

W14 W15 W16 W17 W18
In In In In Out

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

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

Preset Adjustments Table for French Games

Adj#	Adj Description	French 1 U.9 23	French 2 U.9 24	French 3 U.9 25	French 4 U.9 26	French 5 U.9 27	French 6 U.9 28
A.2 04	Auto Ex. Ball	20%	15%	25%	25%	20%	20%

* For French Jumpered CPU Boards only.

French Jumpers are:

W14 W15 W16 W17 W18
In In In Out Out

U.10 Clear Credits Press the Enter button to clear the game Credits.

U.11 Auto Burn-in Press the Enter button to activate Auto Burn-in. This utility automatically cycles 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, the General Illumination Test, and the Flipper Coil Test. All of the test run are run concurrently. The time spent on the burn-in cycle, and the total time the game has spent in burn-in are displayed.

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

A. ADJUSTMENTS MENU

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

A.1 Standard Adjustments

- A.1 01 **Balls Per Game**
A "game" is defined by specifying the number of balls to be played.
Range: 1 to 10.

- A.1 02 **Tilt Warnings**
The number of total actuations of the plumb bob mechanism that can occur before the game is "tilted".
Range: 1 to 10.

- A.1 03 **Maximum Extra Balls**
The number of Extra Balls that a player may accumulate.
Range: 0 to 10.

- A.1 04 **Maximum Extra Balls/Ball in Play**
The number of Extra Balls to be awarded per ball in play.

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

- A.1 05 **Replay System**
The type of replay system to be used.

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

- A.1 06 **Replay Percent***
The percentage of replays the players are able to earn when Auto Replay is used.
Range: 5% to 50%.

- A.1 07 **Replay Start***
Replay start value when Auto% Replay is used.
Range: 15,000,000 to 250,000,000.

*For Auto% Replay.

A.1 08 Replay Levels* *For Auto% Replay.
The number of replay levels used by the Auto% Replay mode. The range of this setting is 1 through 4. When two replay levels are chosen, the second replay level is automatically adjusted to twice the starting replay level. When three of four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

A.1 09 Replay Level 1**
A.1 10 Replay Level 2**
A.1 11 Replay Level 3**
A.1 12 Replay Level 4** ** For Fixed Replay
The value to be used for the first, second, third, and fourth Fixed Replay.
Range: 00 to 250,000,000.

A.1 13 Replay Boost
The replay score can be temporarily boosted by the selected amount EACH time the player reaches or exceeds the replay score. This temporary boost is cancelled when credits equal 0, the player inserts another coin, or when Begin Test is pressed.

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

A.1 14 Replay Award
The form of award automatically provided when the player exceeds any replay level for either Auto% Replay or Fixed Replay.

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

A.1 15 Special Award
The award automatically provided when the player scores a special.

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

A.1 16 Match Award
The award automatically provided when the players wins a match.

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

A.1 17 Extra Ball Ticket
A Ticket is awarded when the player earns an Extra Ball.

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

- A.1 18 Maximum Ticket/Player**
The amount of Tickets each player can earn.
Range: 00 to 100.
- A.1 19 Match Feature**
The desired percentage for the Match Feature occurring at the end of the game.
- OFF - Match Feature is not available.
1 - 50% - 1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects a random two-digit number at the end of the game and compares each players score for an identical two digits in the rightmost two positions. A match of these two digit results in an award of a Credit or a Ticket.
- A.1 20 Custom Message**
The message displayed during the Attract Mode.
- YES - A message is displayed
NO - A message is not displayed.
- A.1 21 Language**
The language the game uses: English, French, or German.
- A.1 22 Clock Style**
The style of clock the game uses: A.M./P.M. or 24 Hours.
- A.1 23 Date Style**
The style of date the game uses: Month/Date/Year, or Date/Month/Year.
- A.1 24 Show Date and Time**
The date and time show in the Attract Mode.
- YES - Show 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 game program dims the General Illumination for special effects and during the Attract Mode.
- YES - Dim the General Illumination during the Attract Mode.
NO - Do Not dim the General Illumination.
- A.1 26 Tournament Play**
Equalize Multi-ball and Jackpots during multi-player games, (do not carry over to next player).
- YES - Keep Multi-ball and Jackpots equal.
NO - Do Not Keep Multi-ball and Jackpots equal.

- A.1 27 Euro. Scr. Format**
Use either commas or dots between digits when numbers are displayed.
- YES - Dots instead of commas, (example- 1.000.000).
NO - Commas instead of dots, (example- 1, 000, 000).
- A.1 28 Minimum Volume Control**
The volume can be turned Off.
- YES - Volume can be turned Off.
NO - Volume can be turned Down but not Off.
- A.1 29 General Illumination Power Saver**
This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played. Power Saver Level (A.1 30) determines how dimness of lamps Using this feature substantially increases the life of the lamps.
- Setting: - OFF, 2 to 60 minutes.
- A.1 30 Power Saver Level**
When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.
- Range: 4 to 7. (4=dimkest)
- A.1 31 Ticket Expansion Board**
When a Ticket Expansion Board is connected, full control of the ticket dispenser is available. This includes a ticket low/error lamp, resume on ticket jam switch and manual ticket dispense switch.
- YES - Ticket Expansion Board is connected.
NO - Ticket Expansion Board is NOT installed in the game.
- A.1 32 No Bonus Flips**
The activation of flippers during the end of ball "bonus" sequence. Setting to "YES" may extend the life of the flipper mechanisms.
- A.1 33 Game Restart**
When the Start button is pressed during or after the 2nd ball, the game in progress will end and a new game will begin. This adjustment has three settings to determine how this is handled.
- NEVER - Do not allow a new game start until the current game is over.
SLOW - Restart if the Start button is pressed continuously for over 1/2 second. This helps to prevent the unintended restart of game in progress.
INSTANTLY - Restart as soon as the Start button is pressed.
- When the Start button is pressed during game over, or during the 1st ball (to add a player), it is always handled instantly.

A.2 Feature Adjustments

- A.2 01 Ball Time**
This is the desired ball time for this game. The game will award more features to the players that are under this time.
- Settings: OFF = Do not use this.
 1-99 = Desired ball time.
- A.2 02 Automatic % Special and Match**
Auto-adjust Specials through the "Percent Match Awards" (A.1 19). When this is set to YES, the Special & Match awards are regulated by adjustment "Percent Match Awards".
- Settings: YES = Auto-adjust Specials and Match to A.1 19 percent.
 NO = Do not Auto-adjust Special.
- A.2 03 Ball Saver**
After ball start, this is the amount of time that "Ball Saver" lamp is lit. It allows players who drain within this time to be served another ball.
- Settings: OFF = There is no Ball Saver.
 1-50 seconds = Minimum amount of time for ball to be on playfield.
- A.2 04 Automatic Extra Ball**
Automatically adjusts the award of an Extra Ball for all sources of extra balls. It does this by modifying feature adjustments 05, 06 and 07.
- Settings: OFF = do not auto adjust extra ball
 1 to 99% = Auto adjust extra ball to this percentage per game.
- A.2 05 1st Extra Ball Lit At**
The number of loops (Left Ramp Shots) required to light the first extra ball.
- Settings: 1 to 99 loops
- A.2 06 Next Extra Ball At**
This is the number of loops (Left Ramp Shots) required to light the second extra ball. The third extra ball is twice this value, the fourth extra ball is three times this value, etc.
- Settings: 1 to 99 loops
- A.2 07 Video Mode Extra Ball At**
After completing this amount of Video Mode waves, an extra ball is awarded to the player.
- Settings: 1 to 99 waves
- A.2 08 Volume Change**
This temporarily increases the volume of the game.
- Settings: YES = O.K. to occasionally increase game volume.
 NO = Keep volume constant.

- A.2 09 **Pre-light Video Mode**
This pre-lights the Video Mode lamps at game start.
Settings: 0 to 5 lamps pre-lit
- A.2 10 **Video Mode Award**
This pre-lights the Video Mode lamps whenever a player kills all the werewolves during Video Mode.
Settings: 0 to 5 lamps pre-lit
- A.2 11 **Bonus 'X' Memory**
This retains or sets the Outhole Bonus Multiplier to 1X at the start of a ball.
Settings: YES = Retain the current Outhole Bonus Multiplier.
 NO = Set the Outhole Bonus to 1X at the start of a game.
- A.2 12 **Castle Lock Timer**
The amount of time a Castle Lock is lit (for Castle Multiball). It is activated by either 3-bank targets in the middle of the playfield, or by the loop shot (every other loop bonus award).
Settings: 1 to 99 seconds
- A.2 13 **Castle Jackpot**
This controls the amount of time a ball is temporarily locked in the castle, during Castle Multiball, for Castle Jackpot.
Settings: 0 to 120 seconds
- A.2 14 **Jet Timer**
This controls the amount of time Castle Jackpot can be increased, from the Jet Bumpers. The Jet Timer is started by completing the top three lanes.
Settings: 0 to 120 seconds
- A.2 15 **Pre-light Coffin**
This pre-lights the Coffin Lamps (for Coffin Locks) at game start.
Setting: 0 to 4 lamps
- A.2 16 **Coffin Ramp Time**
This controls the amount of time the Coffin 2X Lamp remains on. It allows increased ramp scores and double spotting "DRACULA" for Coffin Jackpot.
Settings: 0 to 120 seconds
- A.2 17 **Left Ramp Time**
This controls the amount of time the left ramp increases its score.
Settings: 0 to 120 seconds

- A.2 18 **Mystery Time**
This controls the amount of time the Mystery Lamp remains on when the right return lane switch is activated.
Settings: 0 to 120 seconds
- A.2 19 **Mystery Pre-light**
This controls when or if the Mystery Lamp is pre-lit.
Settings: NOT LIT = Use timer only.
 LIT AT BALL START.
 LIT AT GAME START.
- A.2 20 **Mystery: Castle Lock**
This controls the Mystery award rate for enabling Castle Locks.
Settings: 0 to 99% per game
- A.2 21 **Mystery: Coffin Lock**
This controls the Mystery award rate for enabling Coffin Locks.
Settings: 0 to 99% per game
- A.2 22 **Mystery: Video Mode Lit**
This controls the Mystery rate for enabling Video Mode.
Settings: 0 to 99%
- A.2 23 **Mystery: Bonus "X"**
This controls the Mystery award rate for advancing Outhole Bonus Multiplier.
Settings: 0 to 99%
- A.2 24 **Video Mode Difficulty**
This controls how hard the Video Mode plays.
Settings: EXTRA EASY - EASY - MEDIUM - HARD - EXTRA HARD
- A.2 25 **1st Loop Bonus**
Number of loops before advancing Coffin or Castle one more step closer to lighting a lock.
Note: This is used for the first award.
Settings: 1 to 99 loops
- A.2 26 **Other Loop Bonus**
Number of loops before advancing Coffin or Castle one more step closer to lighting a lock.
Note: This is used after the first award.
Settings: 1 to 99 loops

- A.2 27 **1st Carriage Lit**
Number of loops before lighting Mist Multiball ready lamp. **Note:** This is used for the first award.
Settings: 0 to 99 loops
- A.2 28 **Other Carriages**
Number of loops before lighting Mist Multiball ready lamp. **Note:** This is used after first award.
Settings: 5 to 99 loops
- A.2 29 **1st Bats**
Number of loops before starting Bat Mode. **Note:** This is used for the first award.
Settings: 0 to 99 loops
- A.2 30 **Other Bats**
Number of loops before starting Bat Mode. **Note:** This is used after the first award.
Settings: 2 to 99 loops
- A.2 31 **Bats Time**
Amount of time Bat Mode will last.
Settings: 0 to 45 seconds
- A.2 32 **Number of Bats**
Number of Bats to start for Bat Mode.
Settings: 5 to 30 Bats.
- A.2 33 **Outlane Lit At**
Number of shots into Rat Hole before lighting outlanes.
Settings: 1 to 99 altar
- A.2 34 **1st Rats At**
Number of shots into Rat Hole before lighting outlanes. **Note:** This is used for the first award.
Settings: 1 to 99 altar
- A.2 35 **Next Rats At**
Number of shots into Rat Hole before lighting outlanes. **Note:** This is used after first award.
Settings: 1 to 99 altar

- A.2 36 Number Of Rats**
Number of rats for the start of Rat Mode.
Settings: 5 to 99 rats
- A.2 37 Rat Timer**
Length of time for Rat Mode.
Settings: 1 to 120 seconds
- A.2 38 Timed Plunger**
This is the time allowed for a player to hit the plunger switch (or the "launch ball" switch) to start a ball. When this time is exceeded, the ball is automatically launched.
Settings: OFF = Do not automatically launch the ball.
5-120 seconds = Time allowed before the ball is automatically launched.
- A.2 39 Flipper Plunger**
If the "launch ball" switch is malfunctioning, set this adjustment to "YES" to use the left flipper to fire the plunger. Normally, the software tries to detect a malfunctioning "launch ball" switch and will automatically use the left flipper to launch a ball. Also, the plumb-bob tilts' first switch hit will also launch a ball.
Setting: NO = Do not use the left flipper to launch a ball.
YES = Use the left flipper to launch a ball.
- A.2 40 Fancy Attract Mode General Illumination**
When set to "YES", it allows the Attract Mode to blink the General Illumination lamps in an effect to attract more players. When set to "NO", General Illumination lamps are just left ON.
- A.2 41 Attract Mode Sounds**
This allows the game to make sounds, during the Attract Mode (Game Over Mode), on a regular basis.
Settings: A LOT = After a game is played it will make a lot of sounds.
SOME = After a game is played it will make 10 sounds.
NONE = After a game is played it will make no sound.
- A.2 42 Magnet**
Set to DISABLED to stop operation of the entire magnet assembly.
Settings: ENABLE - DISABLE
- A.2 43 Family Mode**
Set to "YES" to eliminate certain speech and graphic material that might be offensive to sensitive people.
Settings: YES - NO
- A.2 44 Game Over Unlock**
This controls if next player can have balls left in the locks. A player must still "earn" their Castle Locks.
Setting: NO = Keep the balls locked between games.
YES = Unlock any locked ball at game over.

A. 3 Pricing Adjustments

- A.3 01 Game Pricing (if set to custom, then 02 to 09 are available)**
The cost of a game is selected from the Standard Pricing Table or by installing Custom pricing.
- A.3 02 Left Coin Units**
A.3 03 Center Coin Units
A.3 04 Right Coin Units
A.3 05 4th Slot Units
The number of coin units purchased by a coin passing through the left, center, right, or fourth coin chute.
- A.3 06 Units/Credits**
Defines the number of coin units required to obtain 1 credit. A coin unit counter in the game program totals the number of coin units purchased through all coin chutes prior to each game. If the total number of these coin units exceeds or matches the Unit per Credit value by a multiple (or more, coin units) of the specified Units per Credit value the Credits display shows the proper number of credits. The coin unit counter retains any remaining coin units, until the start of Ball 2; then the coin unit counter is cleared (its contents are zeroed).
- A.3 07 Units/Bonus**
Additional credits are to be indicated in the credits display, when a certain number of coin units are accumulated.
- A.3 08 Bonus Credits**
The number of credits that are awarded when the Units/Bonus level is achieved.
- A.3 09 Minimum Units**
No credits are to be posted (indicated in the credit display), until the credits unit counter reaches a particular value, by setting this value to 02 (or more).
- A.3 10 Coin Door Type (if set to custom, then 11 to 15 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 coin system is used to display the Earning Audits.
- A.3 12 Left Slot Value**
A.3 13 Center Slot Value
A.3 14 Right Slot Value
A.3 15 4th Slot Value
The monetary value of the left, center, right, or fourth coin chute.
- A.3 16 Maximum Credits**
The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 99. Reaching the specified setting prevents the award of any credits.

A.3 17

Free Play

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

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

A.3 18

Hide Coin Audits

The coin audits may, or may not, be displayed.

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

A.3 19

1 Coin Buy-in

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

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

A.3 20

Base Coin Size

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.

A.3 22

Dollar Bill Slot

The system normally requires 150 msec between coin pulses. This is too long a delay for a fast-pulsing dollar bill validator. This adjustment may be used to tell the game that there is a fast-pulsing dollar bill validator connected to one of the coin switches.

- NONE = No validator connected.
- LEFT = Validator connected to left slot.
- CENTER = Validator connected to center slot.
- RIGHT = Validator connected to right slot.
- FOURTH = Validator connected to fourth.

A.3 23

Minimum Coin Msec.

This is the minimum width required for coin pulses to be accepted as valid coins. This may be changed to prevent certain kinds of cheating.

Pricing Table

Country	Coin Chutes				Games/Coins	Display	Pricing Adjustments A3									
	Left Chute	Center	4th Right	Right			02	03	04	05	06	07	08	09		
USA	25c	\$1.00*	25c	-	1/25c, 4/\$1 ² 1/50c, 2/75c, 3/\$1 ² 1/50c, 2/\$1 ² 1/25c, 3/\$1 ² 1/50, 2/\$1.00, 6/\$2.00 1/50, 2/\$1.00, 5/\$2.00 1/50, 2/\$1.00, 4/\$1.50, 6/\$2.00 ^{1,2} 1/25c, 3/50c, 6/\$1 1/25c, 5/\$1	USA 4/\$1.00 50c, 75c, \$1.00 USA 2/\$1.00 USA 3/\$1.00 USA 6/\$2.00 USA 5/\$2.00 6/\$2.00 4/\$1.50 CUSTOM CUSTOM									01 04 01 00 01 02 01 00 01 00 01 00 01 04 01 00	
Canada	25c	-	\$1.00	-	1/50c, 2/75c, 3/\$1 ² 1/50c, 2/\$1 ²	CANADA 1 CANADA 2										
Austria	5sch 5sch	10sch -	10sch 10sch	- -	1/2x5sch, 3/2x10sch ² 2/5sch, 5/10sch	AUSTRIA CUSTOM										02 00 05 00 01 00 01 00
Australia	20c	\$1	\$1	\$2	1/\$1, 3/\$2 ²	AUSTRALIA										
U.K.	£1.00	50P	20P	10P	1/3x10P, 2/50P, 4/£1 ²	U. KINGDOM										
Switzerland	1Fr	2Fr	5Fr	-	1/1Fr, 3/2Fr, 7/5Fr ²	SWISS										
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr, 1/20Fr, 3/50Fr ²	BELGIUM										
Germany	1DM	2DM	5DM	-	1/2DM, 2/3DM, 3/4DM, 5/5DM ^{1,2} 1/1DM, 2/2DM, 5/5DM ² 1/1DM, 2/2DM, 6/5DM ^{1,2} 1/1DM, 3/2DM, 9/5DM 1/2x1DM, 1/2DM, 3/5DM 2/1DM, 5/2DM, 14/5DM	GER. 1/2DM GER. 1/1DM GER. 6/5DM CUSTOM CUSTOM CUSTOM									09 18 45 00 05 00 01 00 03 06 15 00 05 00 01 00 13 26 65 00 05 65 01 00	
Holland	1G	-	1G	-	1/1G	HOLLAND										
Sweden	1Kr 5Kr	5Kr 5Kr	10Kr 5Kr	- -	1/5x1Kr, 1/5kr, 2/10Kr ^{1,2} 1/5Kr ²	SWEDEN 1 SWEDEN 2										
France	1Fr 1Fr 1Fr 1Fr 1Fr 1Fr 1Fr	5Fr 5Fr 5Fr 5Fr 5Fr 5Fr 5Fr	10Fr 10Fr 10Fr 10Fr 10Fr 10Fr 10Fr	20Fr 20Fr 20Fr 20Fr 20Fr 20Fr 20Fr	1/3x1Fr, 2/5Fr, 5/10Fr, 10/20Fr ^{2,3} 1/2x1Fr, 3/5Fr, 7/10Fr, 14/20Fr ^{2,3} 1/5Fr, 3/10Fr, 7/2x10Fr, 7/20Fr ^{1,2,3} 2/5Fr, 4/10Fr, 9/2x10Fr, 9/20Fr ^{2,3} 2/5Fr, 5/10Fr, 11/2x10Fr, 11/20Fr ^{2,3} 1/5Fr, 3/10Fr, 6/20Fr ^{2,3}	TARIF 1 TARIF 2 TARIF 3 TARIF 4 TARIF 5 TARIF 6										
Italy	500L	500L	500L	-	1/500L ² 1/2x500L, 3/4x500L ^{1,2}	ITALY 1 ITALY 2										
Spain	100P 25P 25P 25P 25P	- - - - -	500P 100P 100P 100P 100P	- - - - -	1/100P, 6/500P ² 1/25P, 5/100P 1/25P, 4/100P 1/2x25P, 2/100P 1/2x25P, 3/100P	SPAIN CUSTOM CUSTOM CUSTOM CUSTOM										01 00 04 00 01 04 01 00 01 00 04 00 01 00 01 00 01 00 04 00 02 00 01 00 03 00 12 00 04 00 01 06
Japan	100¥	-	100¥	-	1/100¥ ²	JAPAN										
Chile	Token	-	Token	-	1/1Token ²	CHILE										
Denmark	1Kr	5Kr	10Kr	-	1/2x1 Kr, 3/5Kr, 7/10Kr ²	DENMARK										
Finland	1Mka	-	5Mka	-	1/2x1Mka, 3/5Mka ²	FINLAND										
New Zealand	\$1.00	-	\$2.00	-	1/\$1, 3/\$2	NEW ZEALAND										
Norway	5Kr	-	10Kr	-	1/5Kr, 2/10Kr, 5/20Kr ²	NORWAY										
Argentina	10c	10c	10c	-	1/1 Token ²	ARGENTINA										
Hungary	10F	10F	20F	-	1/1x20F, 1/2x10F, 3/2x20F ²	HUNGARY										

Note: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.
* Only if Bill Acceptor and Center Coin Chute are available.

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

A.4 01 Highest Scores

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

OFF - No high scores are recorded, or displayed.

ON - The four highest scores are stored in memory and displayed in the Attract Mode.

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

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

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

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

ON - The "Highest" High Score is retained in memory and displayed.

OFF - The "Highest" High Score is not retained.

A.4 04 Champion Credits

The number of credits or tickets awarded for a Grand Champion Score. Range: 00 to 10.

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

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

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

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

The number of credits or tickets awarded whenever a player exceeds the first, second, third, or fourth highest score. Range: 00 to 10.

A.4 09 High Score Reset Every

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

A.4 10 Backup Champion

The Back-up Grand Champion Score. Range: 00 to 999,000,000.

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

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

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

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

The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached. Range: 00 - 999,000,000.

A.5 Printer Adjustments (optional board required)

- A.5 01 **Column Width**
The column width to be printed. Range: 22 to 80.
- A.5 02 **Lines Per Page**
The amount of lines per page. Range: 20 to 80.
- A.5 03 **Pause Every Page**
Choose whether the printer pauses at the end of a page.
- YES - The printer does pause.
 NO - The printer doesn't pause.
- A.5 04 **Printer Type**
Select the type of printer: Parallel, Serial or ADP.
- A.5 05 **Serial Baud Rate**
Select which baud rate to use for serial or ADP communications (bit rate): 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.

ERROR MESSAGES

The WPC game program has the capability to aid the operator and service personnel. At Game Turn-on, or after pressing the Begin Test switch, once the game has been operating for an extended period, the display may signal with 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 game.

Check Switch ##.

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

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

Pinball Missing.

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

xxxxx Sw. Is Stuck On.

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

Ground Short Row-N, Wht-xxx.

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

1. Slam tilt (or other coin door switch) touching the grounded coin door.
2. A leaf-type, playfield switch touching a grounded part.
3. Players poking metallic objects (wires, coat 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 is NOT a switch problem; however, for most games it is a very rare possibility.

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. Go to U.4 of the Utilities Menu and set the time and date.

Factory Settings Restored.

This message indicates that the CMOS RAM (U8) 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. (Readings taken with an analog meter.) This message can also indicate that there is an open diode on a 50V coil and noise is entering the circuit.

Top Right Ramp DOWN ERROR

Top Right Ramp UP ERROR

The trap door did not get to its intended position. Go to "T14 Top Right Ramp Test" and check the RAMP DOWN switch, the ramp linkage and the coils for proper operation.

Magnet Left Error

Magnet Right Error

Magnet Power Error

Magnet Load Error

Magnet Unload Error

The Magnet unit had a problem.

Left or right errors are most likely switch problems.

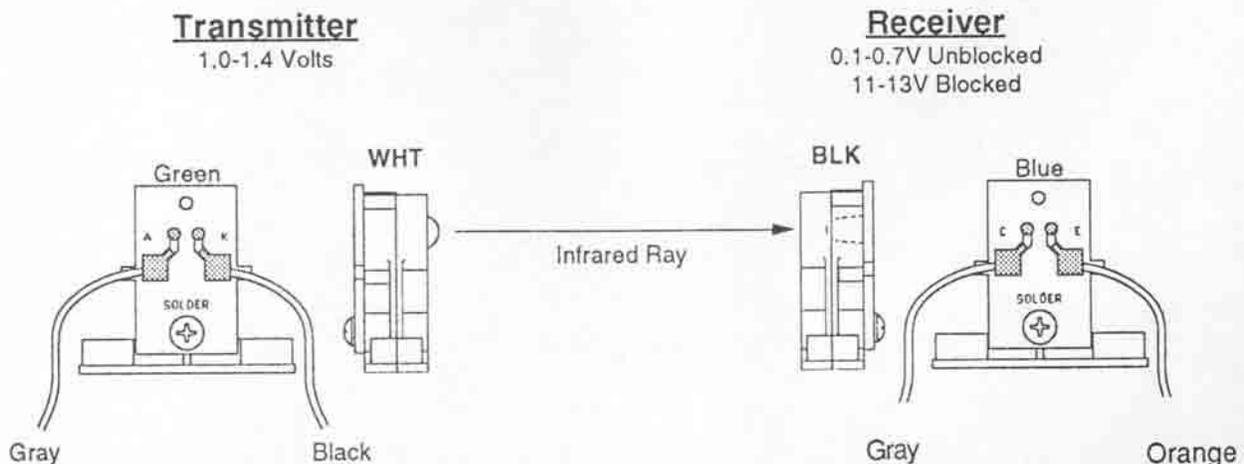
Power errors usually means a loose wire or connector to magnet.

Load error can mean a faulty shooter ramp, a ball on the magnet opto, or no ball in the trough.

Unload error can mean faulty "Ball On Magnet" opto (sw. #82), left gate, right gate opto or right gate.

Opto Theory

The opto receiver (detector) should be approximately 0.1 - 0.7 volts when the opto beam is unblocked and approximately 11 - 13 volts when the opto beam is blocked. The opto transmitter (emitter L.E.D.) should always be approximately 1.4 volts. **Note:** The transmitter (L.E.D.) is larger than the receiver (it protrudes further from its case).



CPU L.E.D.'s

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

CPU Board L.E.D. Error Codes

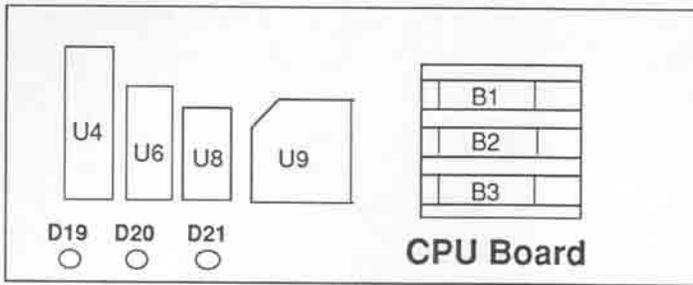
Center L.E.D. blinks one time	-	U6 ROM Failure
Center L.E.D. blinks two times	-	U8 RAM Failure
Center L.E.D. blinks three times	-	U9 Custom Chip Failure

Sound Board Beep Error Codes

Upon Game Turn-On:

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

LED List

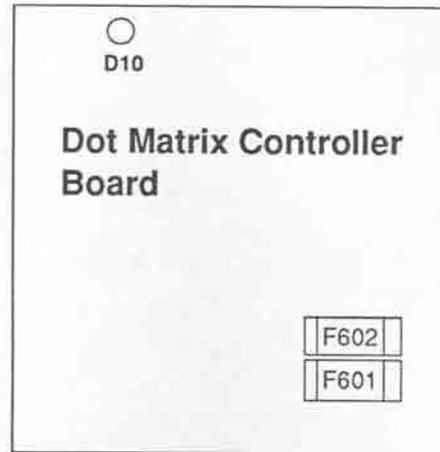


CPU Board

D19 , Blanking
D20, Diagnostic
D21, +5vdc

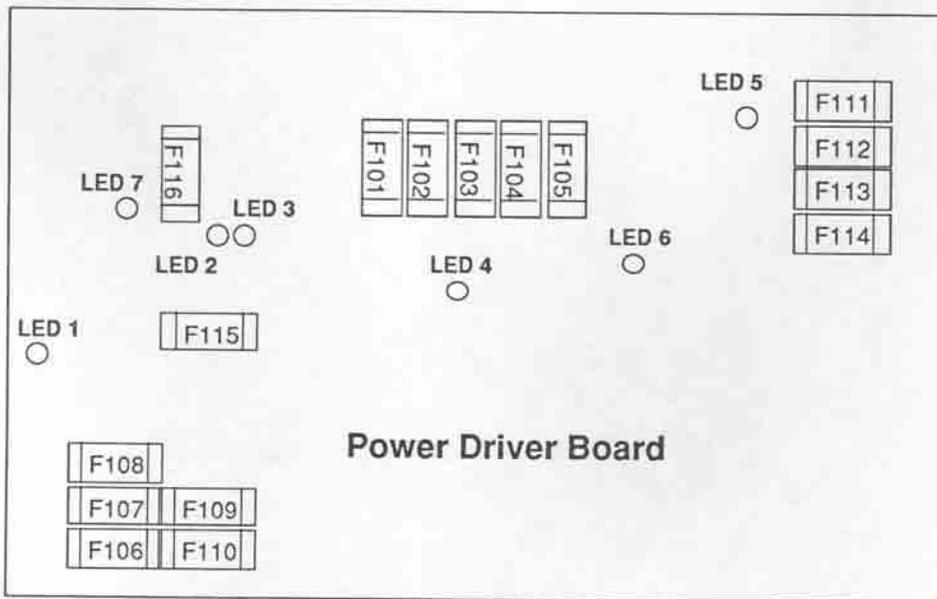
At game Turn-On = D19 & D21 On, D20 Off

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



Dot Matrix Controller Board

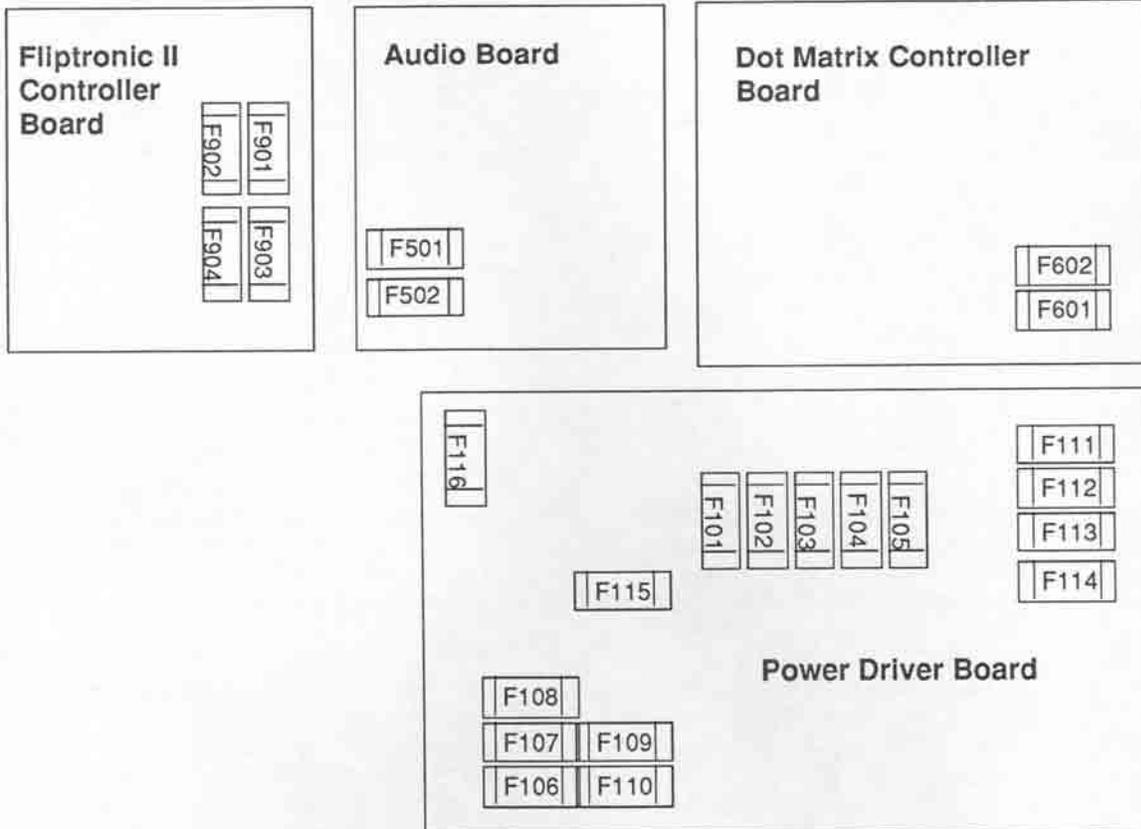
D10, +5V Circuit, Normally On



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

Fuse List



Audio Board

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

Dot Matrix Controller Board

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

Power Driver Board

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

Fliptronic II Controller Board

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

Line Filter

Domestic Game 8A, N.B.
 Foreign Game 5A, S.B.

MAINTENANCE INFORMATION

LUBRICATION

The two main lubrication points of the Ball Release mechanism are the pivots for the arm. The mechanisms of other playfield devices are somewhat similar to the Ball Release 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

Playfield Switches

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

Flipper Switches

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

CLEANING

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

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

MAGNET and the LONG BEAM OPTO SWITCH

Even though the magnet does not need to rest against the Magnet Left side switch (#81) or the Magnet Right side switch (#83) it is recommended that the switches be adjusted so that the magnet does rest against each side. This eliminates any marginal switch adjustments.

The Ball On Magnet switch (#82) is a long beam opto and does not function like a short beam opto. With the short beam optos, the transmitter is always "on" and the receiver detects this constant "on" beam and produces a voltage drop. The long beam opto transmits a modulated 40Khz (40,000 hertz) infrared beam, and the receiver detects this signal (much like an AM radio, or a remote control for a TV). Simply checking for voltages on the receiver and transmitter of long beam optos DOES NOT ensure proper operation.

The long beam opto, Ball On Magnet switch (#82), is a critical switch. Failure of this device can lead to false "end of ball" conditions or multiple balls on the playfield (just like a bad trough switch). This also can confuse or mislead the error messages relating to the magnet. It is vital that this opto switch function correctly. If it cannot be made functional, then disable the magnet unit by using Feature game adjustment A.2 42 until it can be fixed. Setting this adjustment to DISABLE causes the game to ignore the magnet unit and start Mist Multiball via the Mist Multiball shot.

The long beam opto can reflect under the ball when the ball is in the middle of the playfield. The anti-reflection "L" bracket in the left pocket eliminates most of this reflection and software eliminates the rest.

The long beam opto sender LED (white case) should be adjusted toward the front of the game. It can be adjusted by loosening the three screws that hold the white case in place then sliding the device toward the front of the game.

MAGNET and the SHORT BEAM OPTO SWITCHES

From the Magnet test, enter the sub-test Opto Check 1. The controlled lamps and flashlamps blink to see if they interfere with the opto beam when it is covered and uncovered. If there is any flasher or lamp interference in this test, the most common problem is that the sending LED and/or the receiving opto has moved in its white/black plastic housing and are NOT pointing at each other. Both should be firmly soldered to their PC boards, without any exposed wires between the device and the PC board. Other problems can be that either plastic housing is not pointing at each other.

From the Magnet test, enter the sub-test Opto Check 2. As in sub-test Opto Check 1, the controlled lamps and flashlamps blink to see if they interfere with the opto beam when it is covered and uncovered. If there is any flasher or lamp interference in this test, the most likely problem is that the ground of the shielded cable is not grounded properly.

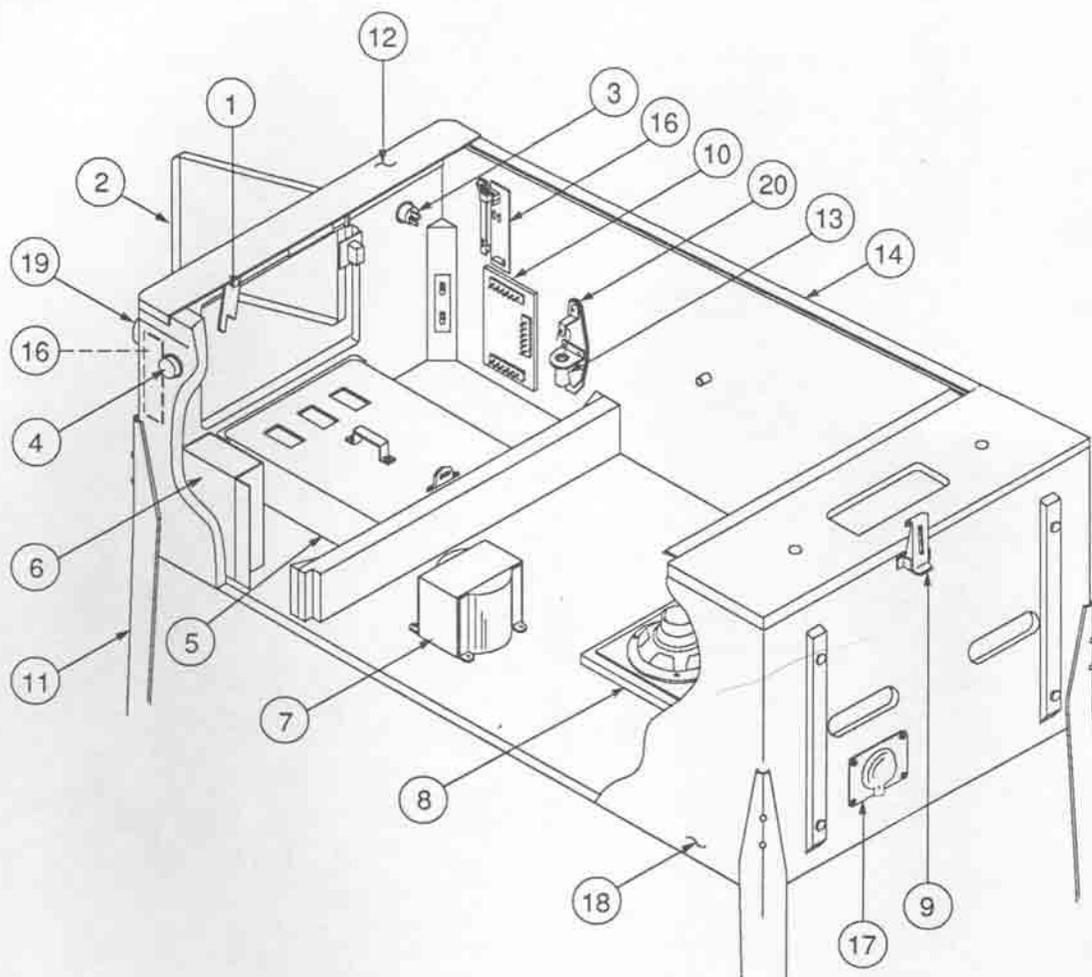
Section 2

Parts Information

Line Filter/Cordset Application Chart

COUNTRY	LINE FILTER ASSY.			CORDSET								
	A-15707-120V	A-15707-230V		5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00	H-15756
UNITED STATES	●			●								
CANADA	●			●								
TAIWAN	●			●								
MEXICO	●			●								
CENTRAL AMERICA	●			●								
SOUTH KOREA	●			●								
PUERTO RICO	●			●								
AUSTRIA		●			●							
BELGIUM		●			●							
FINLAND		●			●							
FRANCE		●			●							
GREECE		●			●							
HOLLAND		●			●							
HUNGARY		●			●							
NETHERLANDS		●			●							
NETH. ANTILLES		●			●							
NORWAY		●			●							
POLAND		●			●							
PORTUGAL		●			●							
SPAIN		●			●							
SWEDEN		●			●							
TURKEY		●			●							
WEST GERMANY		●			●							
UNITED KINGDOM		●				●						
IRELAND		●				●						
HONG KONG		●				●						
DENMARK		●					●					
ITALY		●						●				
CHILE		●						●				
PEOPLE'S REP. OF CHINA		●						●				
SWITZERLAND		●							●			
AUSTRALIA		●								●		
NEW ZEALAND		●								●		
ARGENTINA		●								●		
JAPAN	●										●	●

Cabinet Parts



Cabinet Parts:

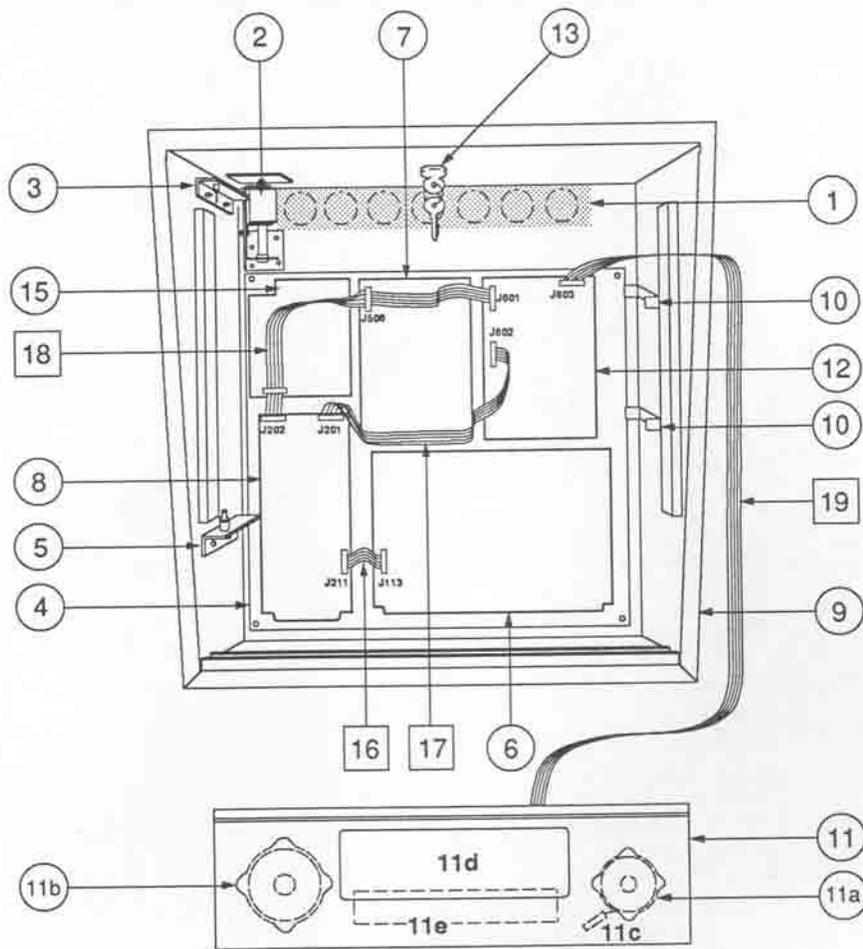
Item	Part Number	Description	Item	Part Number	Description
1.	D-9174-3	Lever Guide Assembly	14.	A-12359-3	Side Molding Assembly
2.	A-14148-1	Coin Door - 2 Slot	15.	*	Cordset
3.	20-9663-1	Start Button	16.	A-15878	Double Opto Assy. (2 Used)
4.	B-12273-4	Flipper Button - Red (2 Used)	17.	01-10714	Line Cord Cover
5.	A-16367-1	Cashbox Assembly	18.	11-1067-50001	Wood Cabinet
6.	*	Line Filter Assembly	19.	A-15896-1	Lit Sw. Button Assembly
7.	5610-12835-00	WPC Transformer, 115/230v	20.	A-15361	Tilt Mechanism Assembly
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 Assembly			
12.	D-12615	Front Molding Assembly			
13.	20-6502-A	Plum Bob			

Miscellaneous Parts:

08-7028-T	Tempered Playfield Glass: 21" x 43"
20-6500	Steel Ball, 1-1/16" (4)

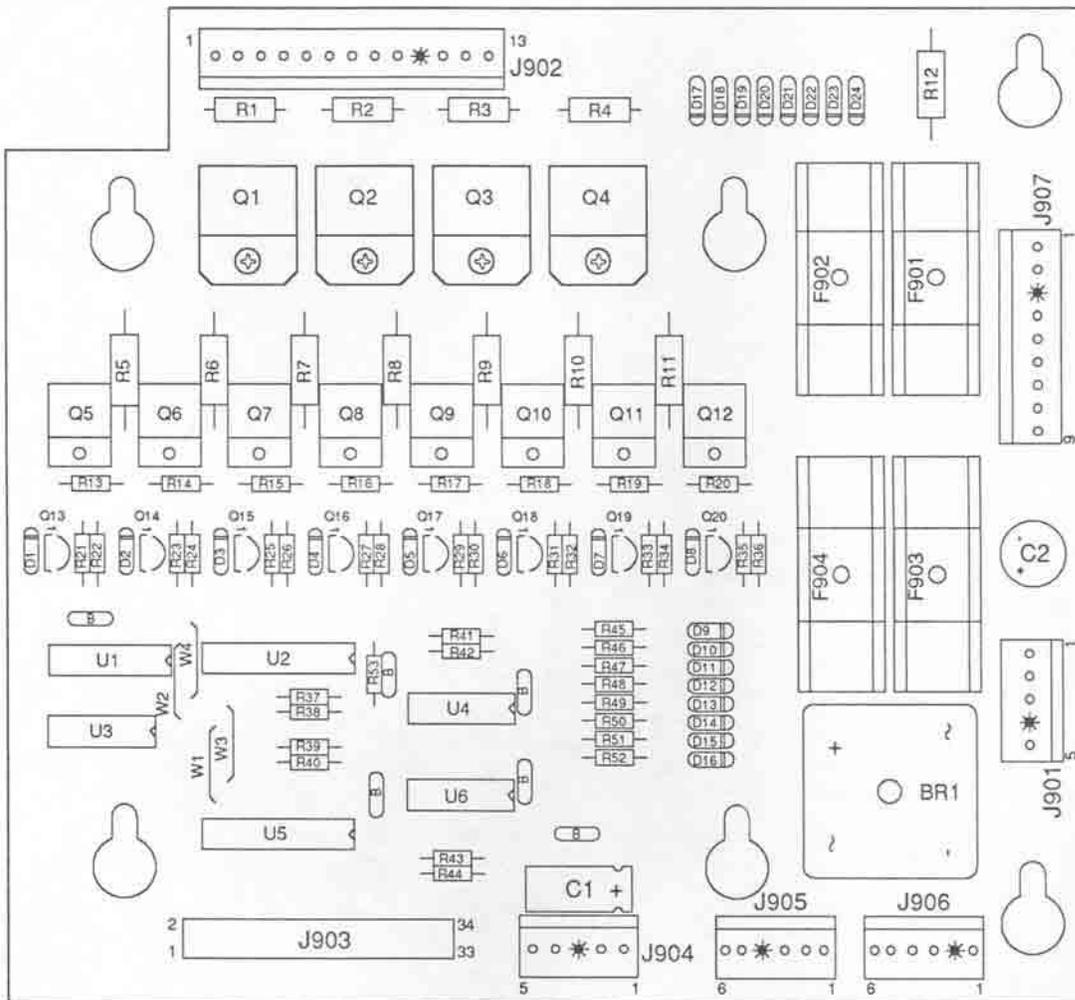
* See Application Chart (p.2-2).

Backbox Assembly



Item	Part Number	Description	Item	Part Number	Description
1.	01-6645	Venting Screen	14.	50001-IN	Insert Board
2.	B-10686-1	Knocker & Bracket Assy.	15.	A-15472	Fliptronic II Board
3.	A-12497	Upper Insert Bd Hinge Assy.	Ribbon Cables:		
4.	A-14092-3	Mounting Plate Assembly	16.	5795-12653-03	Ribbon Cable, 3"
5.	A-12498	Lower Insert Bd Hinge Assy.	17.	5795-13018-00	Ribbon Cable, 22"
6.	A-12697-1	Power Driver Assembly	18.	5795-10938-14	Ribbon Cable, 14"
7.	A-12738-50001	WPC Sound Board	19.	5795-12838-30	Ribbon Cable, 30"
8.	A-12742-50001	WPC CPU Board	Miscellaneous Parts:		
9.	A-14376-50001	Backbox Assembly	A-8552-50001	Tempered Backglass Assy.	
10.	01-9047	Insert Stop Bracket	08-7456	Backbox Glass: 27" x 18-7/8"	
11.	A-16254	Speaker / Display Assy.	31-1357-50001	Screened Translight	
a)	5555-12924-00	Speaker, 4Ω, 15w	03-8228-2	Glass Channel Top (1)	
b)	5555-12856-00	Speaker, 5-1/4", 4Ω, 25w	03-8228-3	Glass Channel Edge (2)	
c)	5045-12914-00	Cap., 10μfd., 50v, (±20%)	03-8229-1	Glass Lift Channel (1)	
d)	5901-12784-00	Dot Matrix Display/Driver Bd.			
e)	A-16424	3-Flash Lamp PCB Assy.			
12.	A-14039	Dot Matrix Controller Board			
13.	A-13379	Lock & Plate Assembly			
a)	20-9637	Lock & Cam Kit			

A-15472 Fliptronic II Board

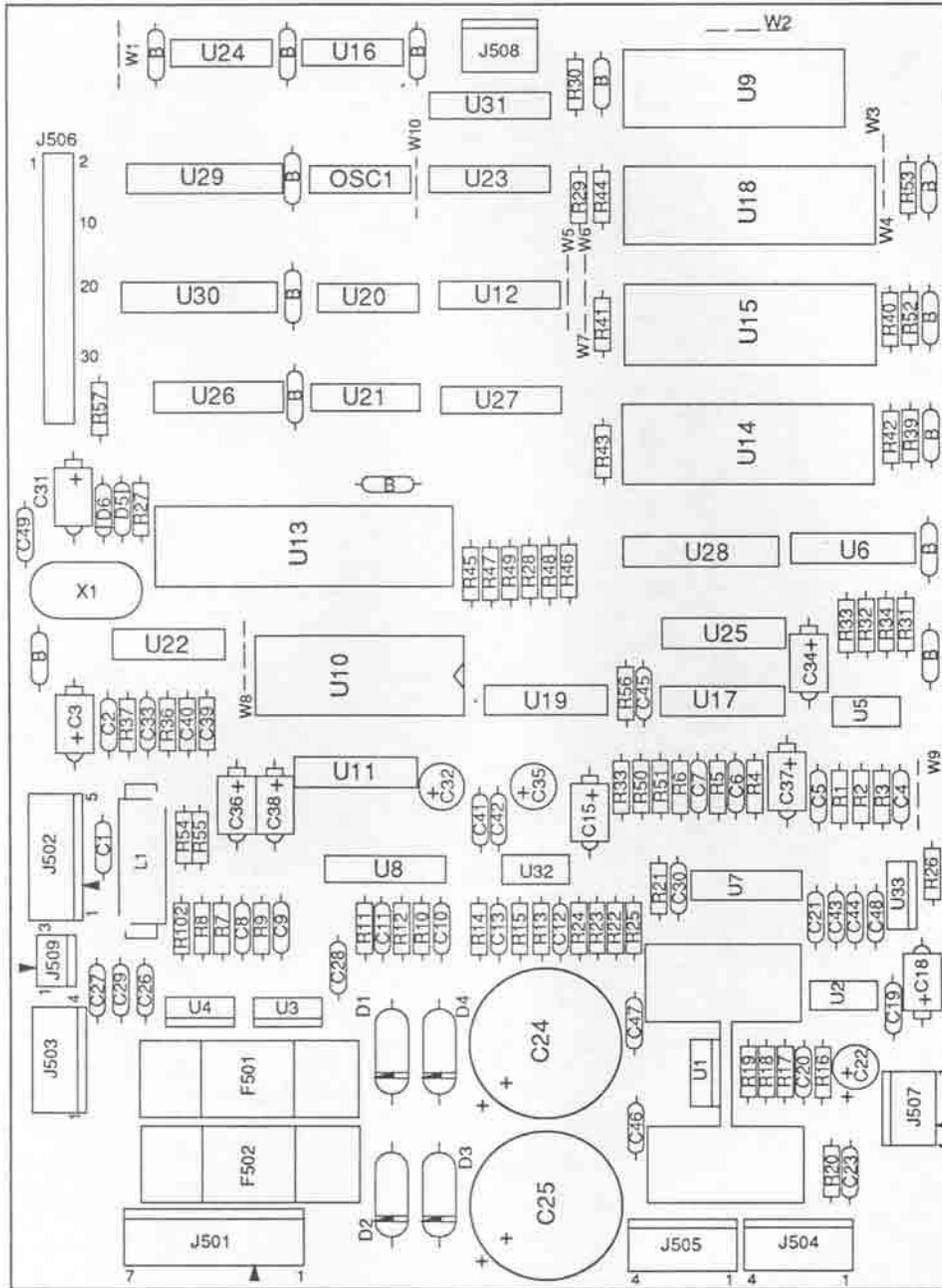


Part Number	Designator	Description	Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink	5070-09054-00	D1 - D24	Diode 1N4004
20-9684	Q5-Q12	Fastener Snap	5162-12635-00	Q5-Q12	Transistor TIP102 NPN
4008-01003-08	Q1-Q4	Mach. Screw, 6-32	5190-09016-005	Q13 - Q20	Transistor 2N4403 PNP
4406-01128-00	Q1-Q4	Nut 6-32 KEPS	191-12179-00	Q1-Q4	Transistor TIP36C PNP
5010-09034-00	R37 - R44, R53	Resistor, 10K Ω , 1/4w, 5%	5315-12009-00	U2	IC 74HCT374
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45 - R52	Resistor, 1K Ω , 1/4w, 5%	5315-12031-00	U5	IC 74HCT244
5010-09361-00	R1 - R4	Resistor, 220 Ω , 1/2w, 5%	5315-12812-00	U1	IC 74HCT138
5010-09416-00	R21, R23, R25, R27, R29, R31, R33, R35	Resistor, 470 Ω , 1/4w, 5%	5315-12951-00	U3	IC 74HCT00
5010-09534-00	W3, W4	Resistor, 0 Ω	5370-12272-00	U4, U6	IC LM339 QUAD COMP
5010-10171-00	R13 - R20	Resistor, 56 Ω , 1/4w, 5%	5791-10862-09	J907	Connector, 9-pin Header Sq. Pin
5011-12956-00	R5 - R12	Resistor, 2.7K Ω , 1w, 5%	5791-10862-05	J901, J904	Connector, 5-pin Header Sq. Pin
5040-08986-00	C1	Capacitor, 100M, 10v	5791-10862-13	J902	Connector, 13-pin Header Sq. Pin
5043-08980-00	B	Capacitor, .01 μ F, 50v	5791-12461-08	J905, J906	Connector, Str Sq. Pin Header .100
5040-09537-00	C2	Capacitor, 100 μ F, 100v	5791-12516-00	J903	34 HEN 2x17 STR
			5100-09690-00	BR1	Bridge Rectifier
			5731-10356-00	F901 - F904	Fuse S-B, 3A., 250v
			5733-12060-01	-	Fuse Holder (F901-F904)

A-12738-50001 WPC Audio Board

Part No.	Designator	Description	Part No.	Designator	Description
01-9980		Shield: Wire Protector	5070-08919-00	D5, D6	Diode, 1N4148
4004-01005-06	U1	Mach. Screw, 4-40 x 3/8	5070-09045-00	D1-D4	Diode MR501, 3.0A
4104-01012-04	U1	Sh. Mach. Screw, #4 x 1/4	5250-10495-00	U3	Reg. 7912 1.0A -12v.
4404-01119-00	U1	Nut, 4-40 SNUIT	5281-09215-00	U22	IC, 74LS04 Hex INV
5010-08772-00	R21	Resistor, 15K Ω , 1/4w, 5%	5281-09246-00	U12	IC, 74LS139 2-4 Dec.
5010-12065-00	R22, R25	Resistor, 120K Ω , 1/4w, 5%	5281-09486-00	U28-U30	IC, 74LS374 8 Dual Flipflop
5010-08991-00	R51	Resistor, 4.7K Ω , 1/4w, 5%	5281-09487-00	U6, U23-U25	IC, 74LS74 Dual Flipflop
5010-10987-00	R23, R24	Resistor, 56K Ω , 1/4w, 5%	5281-09500-00	U31	IC, 74LS32
5010-09034-00	R13, R14, R29-R31, R33, R34, R50, R45-R49	Resistor, 10K Ω , 1/4w, 5%	5281-09745-00	U26, U27	IC, 74LS138 DMLTPX
5010-09035-00	R4	Resistor, 47K Ω , 1/4w, 5%	5281-09850-00	U20	IC, 74LS11 Tripple AND
5010-09036-00	R35	Resistor, 100 Ω , 1/4w, 5%	5281-10577-00	U16	IC, 74LS125 Q/B Bfr
5010-09134-00	R1, R2, R6, R8, R9, R11, R12	Resistor, 150K Ω , 1/4w, 5%	5370-11086-00	U10	IC, YM2151 Sound
5010-09162-00	R26, R102	Resistor, 100K Ω , 1/4w, 5%	5371-11087-00	U11	IC, YM3012 D/A
5010-08774-00	R3, R5, R17, R19	Resistor, 22K, 1/4w, 5%	5400-10320-00	U13	IC, MPU 68B09E
5010-09269-00	R15	Resistor, 12K Ω , 1/4w, 5%	5284-12651-00	U21	IC 4584
5010-09358-00	R18, R32	Resistor, 1K Ω , 1/4w, 5%	5340-12278-00	U9	S/Ram 2064
5010-09416-00	R28, R36, R37, R39-R44 R52, R53, R57	Resistor, 470 Ω , 1/4w, 5%	5370-09691-00	U17	IC, 55536 CVSD
5010-09534-00	W3, W5, W7-W10	Resistor, 0 Ω	5370-12260-00	U2	IC, 3340 Elec Atten
5010-10171-00	R38, R56	Resistor, 56 Ω , 1/4w, 5%	5370-12728-00	U1	IC, Audio Amp LM1875
5010-10258-00	R16	Resistor, 1M, 1/4w, 5%	5370-12730-00	U7, U8	IC, Op Amp TL084
5010-10650-00	R7, R10	Resistor, 62K, 1/4w, 5%	5370-12742-00	U32	IC, Op Amp TL082
5010-10989-00	R54, R55, R27	Resistor, 470K, 1/4w, 5%	5371-12727-00	U19	Dac AD7524
5010-12752-00	R20	Resistor, 1 Ω , 1/4w, 5%	5432-12726-00	U5	EE Prom Pot X9503
5040-08986-00	C3	Capacitor, 100M, 10v (\pm 20%)	5460-12423-00	U4	IC, LM7812
5040-09332-00	C15, C18, C34, C36, C38	Capacitor, 47 μ fd., 25v, Axial	5460-12743-00	U33	LM7809 TO-220
5040-11036-00	C32, C35	Capacitor, 47 μ fd., 16v, Rad	5520-09020-00	X1	Crystal, 3.58 MHz.
5040-12729-00	C24, C25	Capacitor, 4700 μ fd., 35v.	5521-10931-00	OSC1	Oscillator, 8.0 MHz.
5040-12750-00	C22	Capacitor, 22 μ fd., 35v, Rad.	5551-09822-00	L1	Ind, 4.7UH 3.0A.
5041-09031-00	C26-C29, C37, C46-C48	Capacitor, 1 μ fd. TANT	5700-08985-00	U13	Socket, IC 40-pin, .6"
5041-09243-00	C20, C21	Capacitor, 10 μ fd. TANT	5700-09004-00	U10	Socket, IC 24-pin, .6"
5043-08980-00	C41-C44, B(15)	Capacitor, .01M, 50v, (+80, -20)	5700-09006-00	U11	Socket, IC 16-pin, .3"
5043-08996-00	C1, C2	Capacitor, .1 μ fd., 50v, 10%	A-5343-50001-2	U14	IC, Audio ROM
5048-11027-00	C8, C10	Capacitor, 33pfd., 50v, 10%	A-5343-50001-3	U15	IC, Audio ROM
5048-11028-00	C45	Capacitor, 22pfd., 50V, Axial	A-5343-50001-4	U18	IC, Audio ROM
5048-11029-00	C33, C49	Capacitor, 100pfd., 50v	5700-12088-00	U1	Socket, IC 32-pin (U15, U18)
5048-11030-00	C12	Capacitor, 470pfd., 50v	5705-12755-00		Heatsink 5299B-220
5048-11031-00	C19, C31	Capacitor, .001 μ fd., 50v, 10%	5731-10356-00	F501, F502	Fuse, 3A, S-B, 250v
5048-11065-00	C13	Capacitor, .0022 μ fd., 50v, 10%, Ax.	5733-12060-01		Fuse Holder (F501, F502)
5048-11072-00	C39, C40	Capacitor, .0033 μ fd.	5791-10862-04	J504, J505	Connector, 4-pin Header Sq. .156
5048-12036-00	C23	Capacitor, .22 μ fd., 10v, Ceramic	5791-10862-05	J502	Connector, 5-pin Header Sq. .156
5048-12745-00	C4, C6	Capacitor, 1800pfd., 50V, 10%	5791-10862-07	J501	Connector, 7-pin Header Sq. .156
5048-12746-00	C5, C7	Capacitor, 330pfd., 50V	5791-12462-03	J509	Connector, 3-pin Header Sq. .100
5048-12748-00	C9, C11, C30	Capacitor, 220pfd., 50V	5791-12462-04	J508	Connector, 4-pin Header Sq. .100
			5791-12516-00	J506	34 Hen 2x17 STR

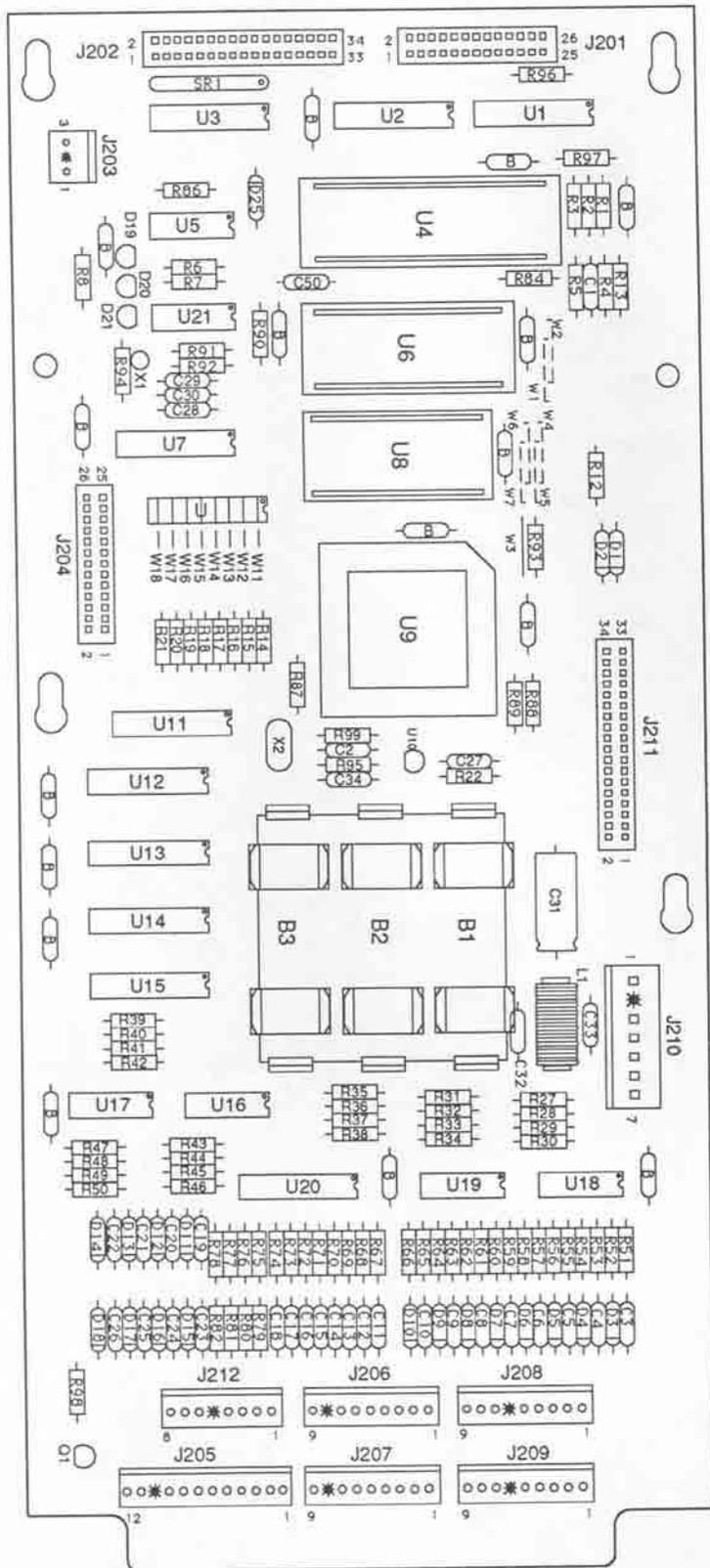
A-12738-50001 WPC Audio Board



A-12742-50001 WPC CPU Board

<u>Item</u>	<u>Part Number</u>	<u>Designator</u>	<u>Description</u>
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
47	A-5343-50001-1	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")

A-12742-50001 WPC CPU Board

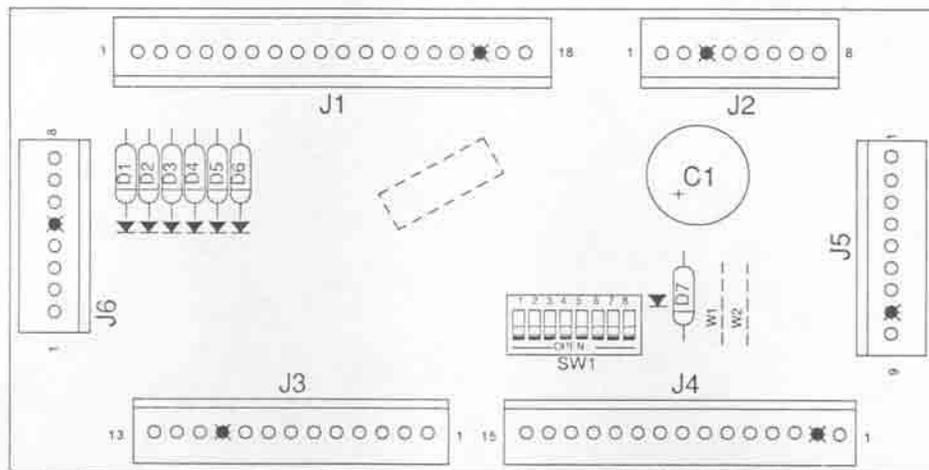


A-12697-1 WPC Power Driver Assembly

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

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

A-14689 WPC Coin Door Interface Board

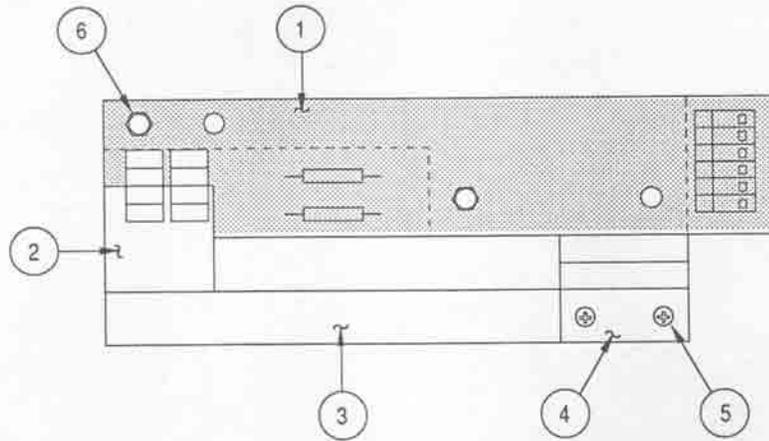


<u>Part Number</u>	<u>Designator</u>	<u>Description</u>
5070-09054-00	D1-D7	Diode, 1N4004, 1.0A.
5791-10862-18	J1	Connector, 18-pin Header Str Sq.
5791-10862-08	J2, J6	Connector, 8-pin Header Str Sq.
5791-10862-13	J3	Connector, 13-pin Header Str Sq.
* 5791-10862-15	J4	Connector, 15-pin Header Str Sq.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

Notes:

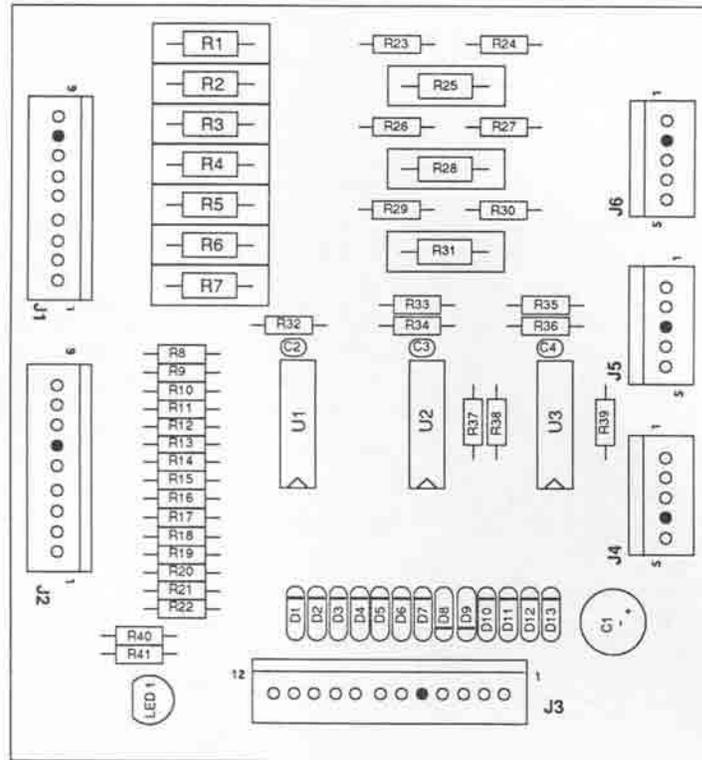
1. For Belgium, France, Finland, Sweden and England use A-14689-1 Coin Door Interface Board.
2. * = Used on Electronic Coin Door only.

A-15878 Double Flipper Opto Assembly



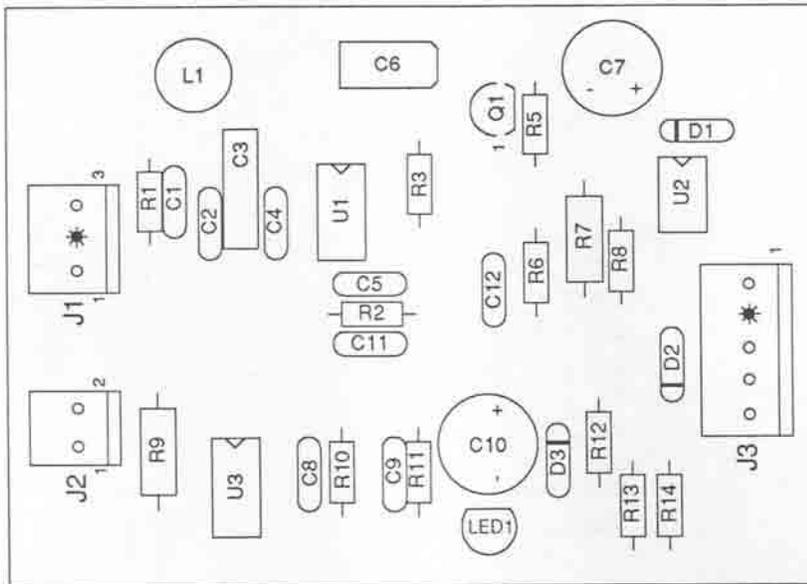
<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	A-15894	PC Board Assembly
	5010-08930-00	Resistor 470Ω, 1/2w, 5%
	5490-12451-00	Opto Inter Lg. 10ma.
	5791-12273-07	Connector, 7-pin Header
2.	01-11250	Interrupter Opto
3.	06-86	Back Up Blade (2)
4.	A-15893	Opto Board Mtg. Bracket
5.	4006-01003-04	MS 6-32 x 1/4 P-PH (2)
6.	4406-01119-00	Nut #6 ESN (2)

A-15430 10-Switch Opto Assembly



<u>Part Number</u>	<u>Designator</u>	<u>Description</u>
5040-10974-00	C1	Capacitor, 100 μ fd, 35v (+80, -20%)
5043-08980-00	C2 - C4	Capacitor, 0.01 μ fd, 50v (+1, -20%)
5671-09019-00	LED1	Display LED 1 Red
5370-12272-00	U1 - U3	IC LM339 Quad
5070-09054-00	D1 - D13	Diode 1N4004 1.0A.
5010-12928-00	R1- R7, R25, R28, R31	Resistor, 270 Ω , 2w, 5%
5010-09999-00	R8 - R21, R23, R24, R26 R27, R29, R30	Resistor, 2K Ω , 1/4w, 5%
5010-09314-00	R22	Resistor, 1.2K Ω , 1/4w, 5%
5010-09162-00	R32, R35, R39, R40, R41	Resistor, 100K Ω , 1/4w, 5%
5010-08774-00	R33, R34, R36	Resistor, 22K Ω , 1/4w, 5%
5010-09034-00	R37, R38	Resistor, 10K Ω , 1/4w, 5%
5791-10862-12	J3	Connector, 12-pin Header STR Sq. Pin .156
5791-10862-09	J1, J2	Connector, 9-pin Header STR Sq. Pin .156
5791-10862-05	J4 - J6	Connector, 5-pin Header STR Sq. Pin .156

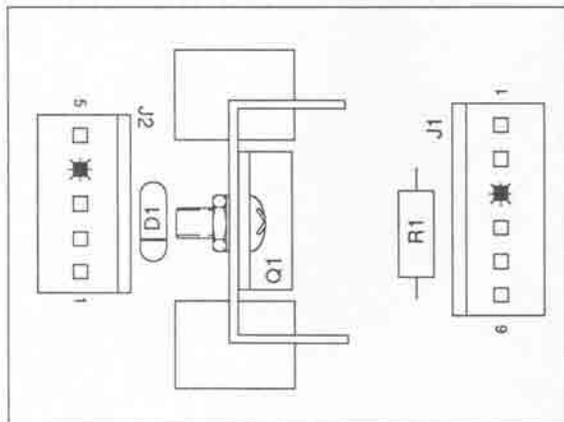
A-15646 24-Switch Opto Assembly



<u>Part Number</u>	<u>Designator</u>	<u>Description</u>
5370-10891-00	U1	I.C. Opto Receiver MC3373
5490-10892-00	U2	I.C. Opto Isolator
5431-10449-00	U3	I.C. 555 Timer
5192-13267-00	Q1	Transistor, MPSA77 PNP
5043-10893-00	C3	Capacitor, .0015 μ fd
5043-09065-00	C4, C12	Capacitor, 470 μ pf
5043-08996-00	C5, C11	Capacitor, .1 μ fd
5041-10588-00	C6	Capacitor, 6.8 μ fd
5043-08980-00	C8	Capacitor, .01 μ fd
5048-12577-00	C2	Capacitor, .47 μ fd
5043-09845-00	C1, C9	Capacitor, .001 μ fd
5070-09054-00	D1 - D3	Diode 1N4004, 1.0A.
5040-10974-00	C7, C10	Capacitor, 100 μ fd, 35v (+80, -20%)
5010-10631-00	R1	Resistor, 1.2K Ω , 1/4w, 5%
5010-09162-00	R2, R6	Resistor, 100K Ω , 1/4w, 5%
5010-09768-00	R3	Resistor, 180 Ω , 1/4w, 5%
5010-09039-00	R4, R12	Resistor, 10 Ω , 1/4w, 5%
5010-09324-00	R5	Resistor, 27K Ω , 1/4w, 5%
5010-08930-00	R7	Resistor, 470 Ω , 1/4w, 5%
5010-13509-00	R9	Resistor, 330 Ω , 1/2w, 5%
5010-09034-00	R8	Resistor, 10K Ω , 1/4w, 5%
5010-10022-00	R10	Resistor, 7.5K Ω , 1/4w, 5%
5010-08773-00	R11	Resistor, 18K Ω , 1/4w, 5%
5010-09085-00	R13	Resistor, 1.5K Ω , 1/4w, 5%
5671-09019-00	LED1	Display LED Red
5791-12273-03	J1	Connector, 3-pin Header STR SQ.
5791-12273-02	J2	Connector, 2-pin Header STR SQ.
5791-12273-05	J3	Connector, 5-pin Header STR SQ.
5551-10890-00	L1	Inductor 10 μ H

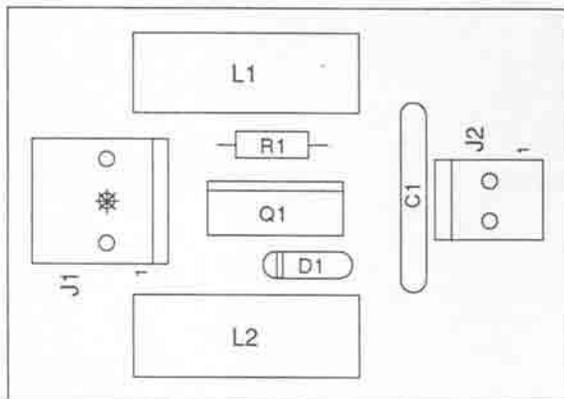
Printed Circuit Boards

A-16697-1 High Current Driver Assembly



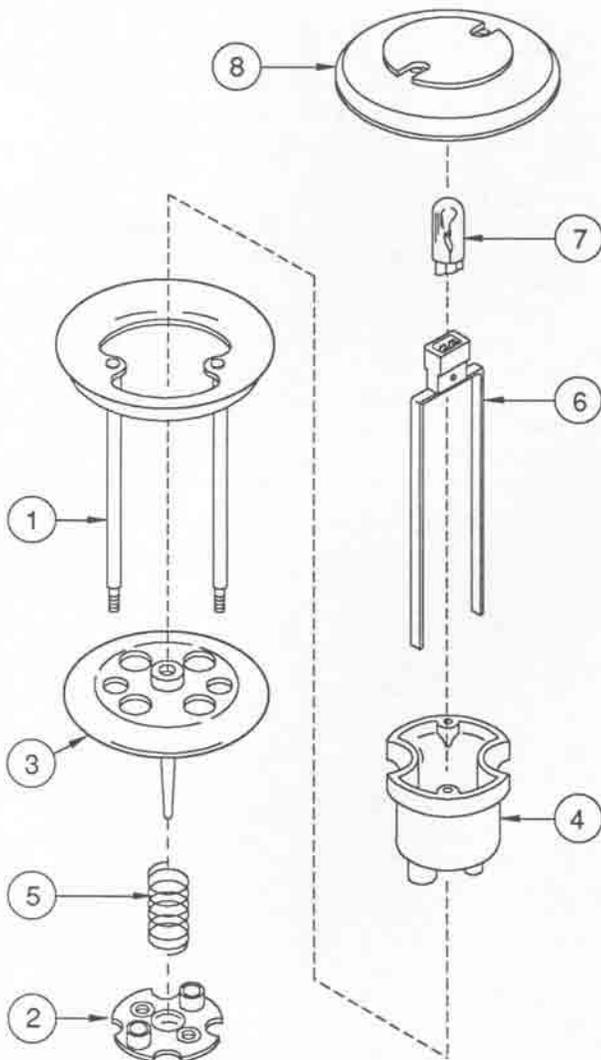
Part Number	Designator	Description
4406-01119-00	-	Nut 4-40 KEPS
4006-01003-06	-	Mach. Screw, 6-32 x 3/8 P-PH-S
4004-01005-06	-	Mach. Screw, 4-40 x 3/8 P-PH-S
5705-12805-00	-	Heatsink
5010-09361-00	R1	Resistor, 220Ω, 1/2w, 5%
5070-09054-00	D1	Diode, 1N4004, 1.0A.
5191-12179-00	Q1	Transistor, TIP36C PNP
5791-10862-05	J2	Connector, 5-pin STR Sq. .156
5791-10862-06	J1	Connector, 6-pin STR Sq. .156

A-15542 Motor EMI Board



Part Number	Designator	Description
5551-09822-00	L1, L2	Ind. 4.7MH3AMP
5791-12273-03	J1	Connector, 3-pin Header Sq.
5791-12273-02	J2	Connector, 2-pin Header Sq.
5070-09054-00	D1	Diode 1N4004, 1.0A.

B-9414-3 Jet Bumper Assembly

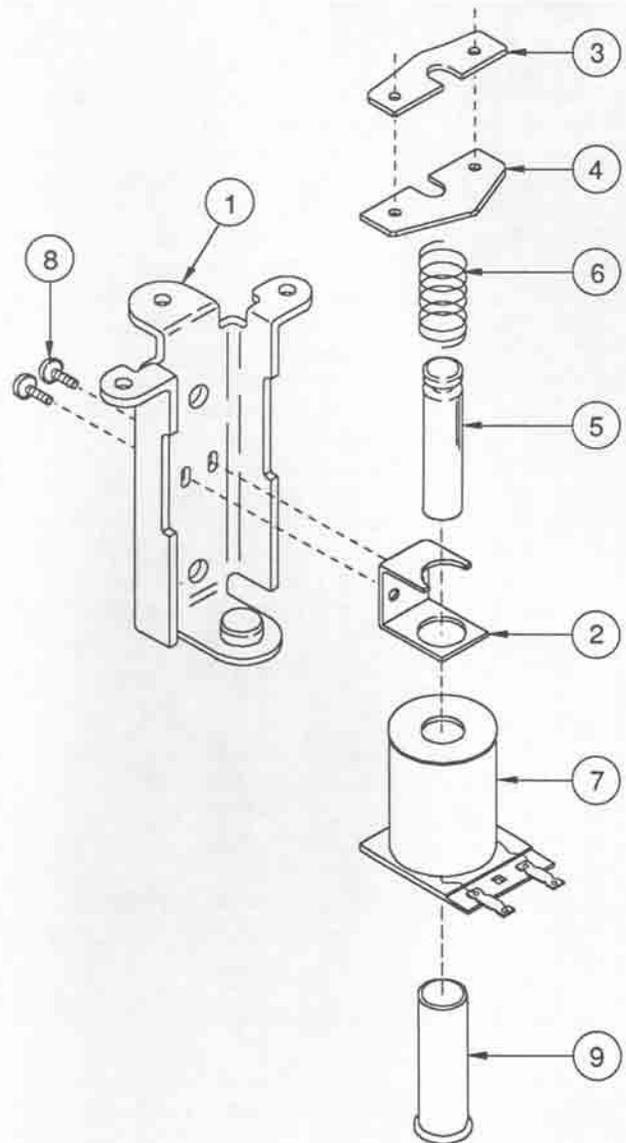


Item	Part Number	Description
1.	A-4754	Bumper Ring Assembly
2.	03-6009-A5	Bumper Base, White
3.	03-6035-4	Bumper Wafer, Red
4.	03-7443-5	Bumper Body, White
5.	10-7	Spring
6.	24-8776	Socket - Wedge Base
7.	24-8768	Bulb #555 (6.3V., 0.25A.)

Associated Parts:

8.	03-8254-9	Jet Bumper Cap, Transparent Red (3 Used)
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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

A-15205-R-4 Fliptronic II Flipper Assembly (Lower Right)
A-15205-L-4 Fliptronic II Flipper Assembly (Lower Left)

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	B-13104-R	Flipper Base Assy, Right
	* B-13104-L	Flipper Base Assy, Left
2.	SW-1A-193	Switch Assembly
3.	4701-00002-00	Lockwasher, #6 Split
4.	4105-01019-10	Sh. Metal Screw, #5 x 5/8 P-RH-A
5.	4008-01079-05	Mach. Screw, 8-32 x 5/16 H-SOC
6.	4701-00003-00	Lockwasher, #8 Split
7.	01-9375	Switch Mounting Bracket
8.	20-6516	Speednut, Tinnerman
9.	4010-01066-06	Cap Screw, 10-32 x 3/8, SH
10.	4701-00004-00	Lockwasher, #10 Split
11.	A-12111	Flipper Stop Assembly
12.	FL-15411	Flipper Coil (Orange)
a)	03-7066-5	Coil Tubing
13.	01-7695	Solenoid Bracket
14.	4006-01017-04	Mach. Screw, 6-32 x 1/4 P-RH-S
15.	10-364	Spring
16.	B-13882-R	Crank Link Assembly, Right
	* B-13882-L	Crank Link Assembly, Left
a)	B-13884-R	Flipper Crank Assembly, Right
	* B-13884-L	Flipper Crank Assembly, Left
b)	A-10656	Flipper Link Assembly
c)	02-4179	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8 SH
e)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut, 10-32 ESN
17.	23-6577	Bumper Plug, 5/8"
18.	03-7568	Flipper Bushing
19.	4006-01005-06	Mach. Screw, 6-32 x 3/8 P-PH
20.	4406-01117-00	Nut, 6-32 Hex.

Flipper Notes:

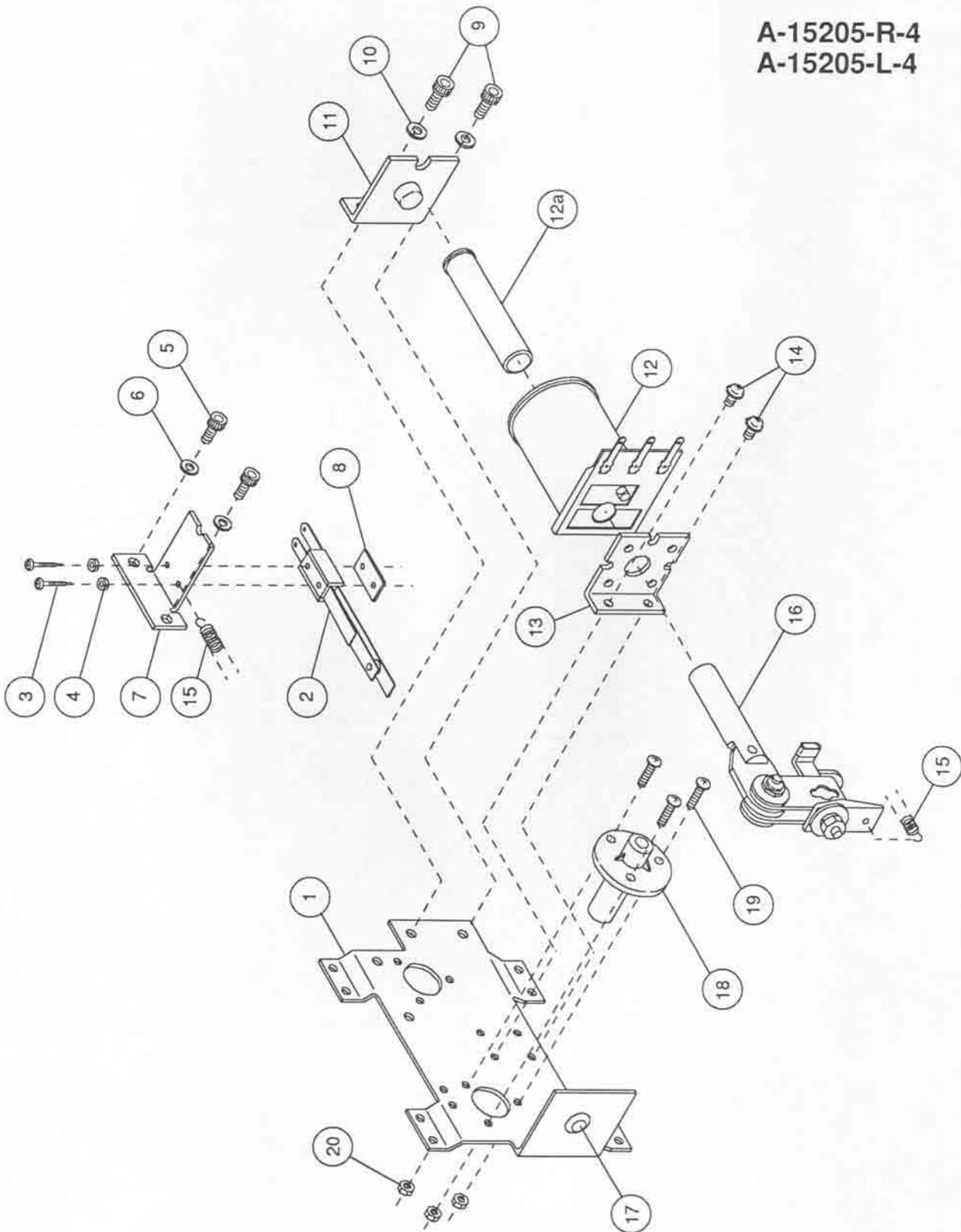
- * Items for Left Flipper Assembly ONLY.
- Each Flipper Assembly is mounted beneath the playfield, in conjunction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.
- With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of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

Associated Parts for Left & Right Flippers:

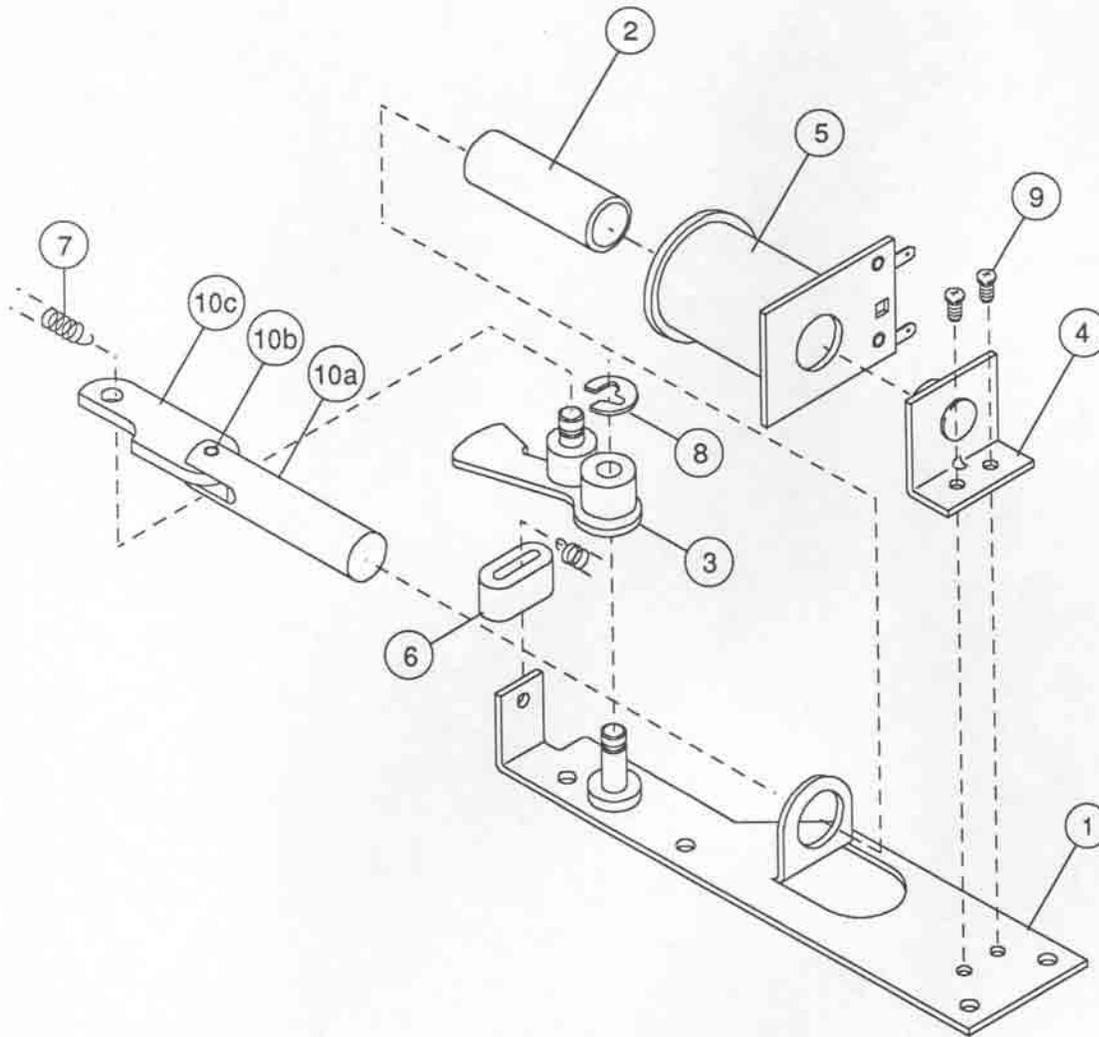
21.	23-6678-7	Flipper Rubber (Black)
22.	20-9250-4	Flipper & Shaft (Red)

Fliptronic II Flipper Assembly

A-15205-R-4
A-15205-L-4

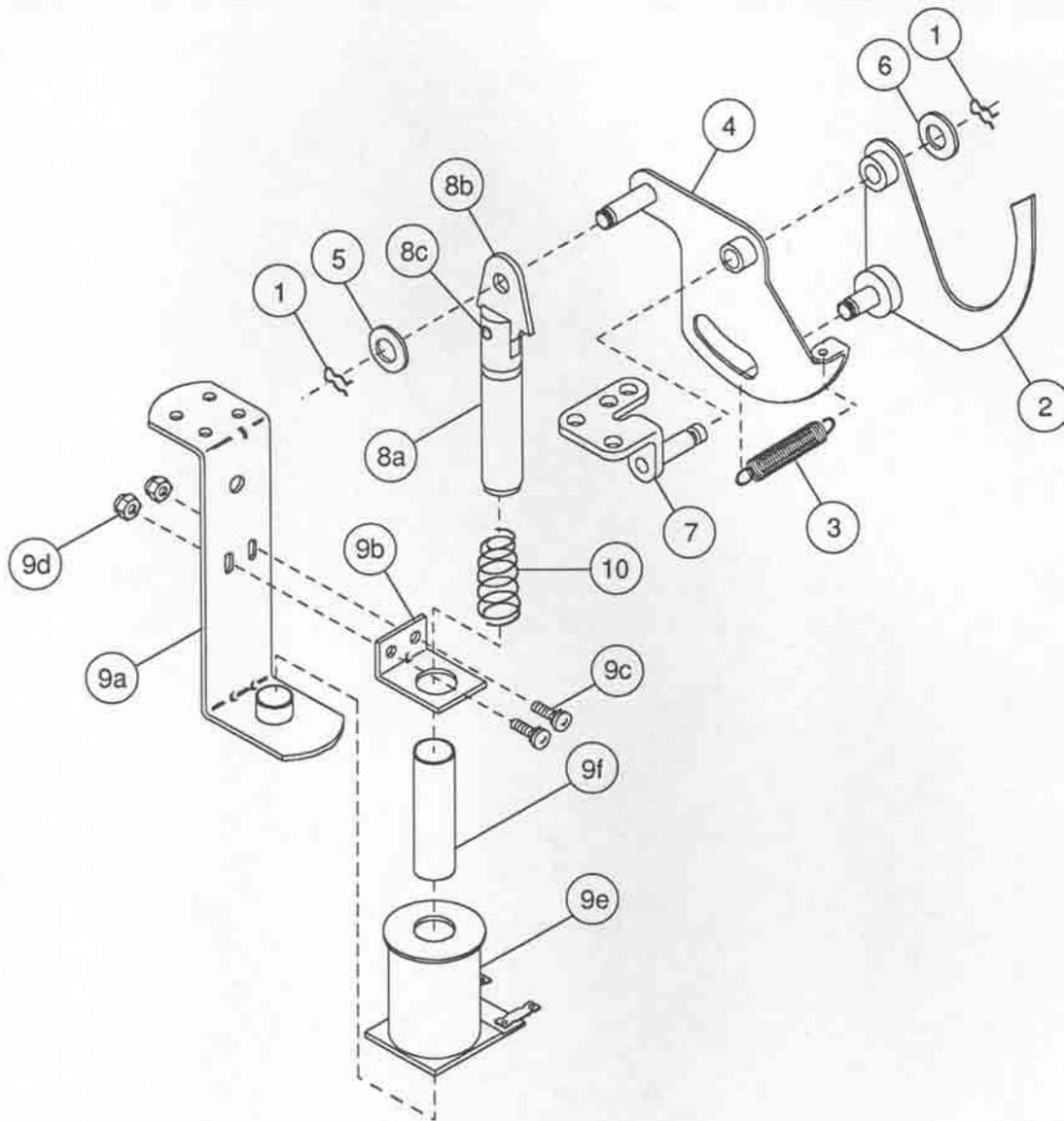


A-8039-3 Outhole Kicker Assembly



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

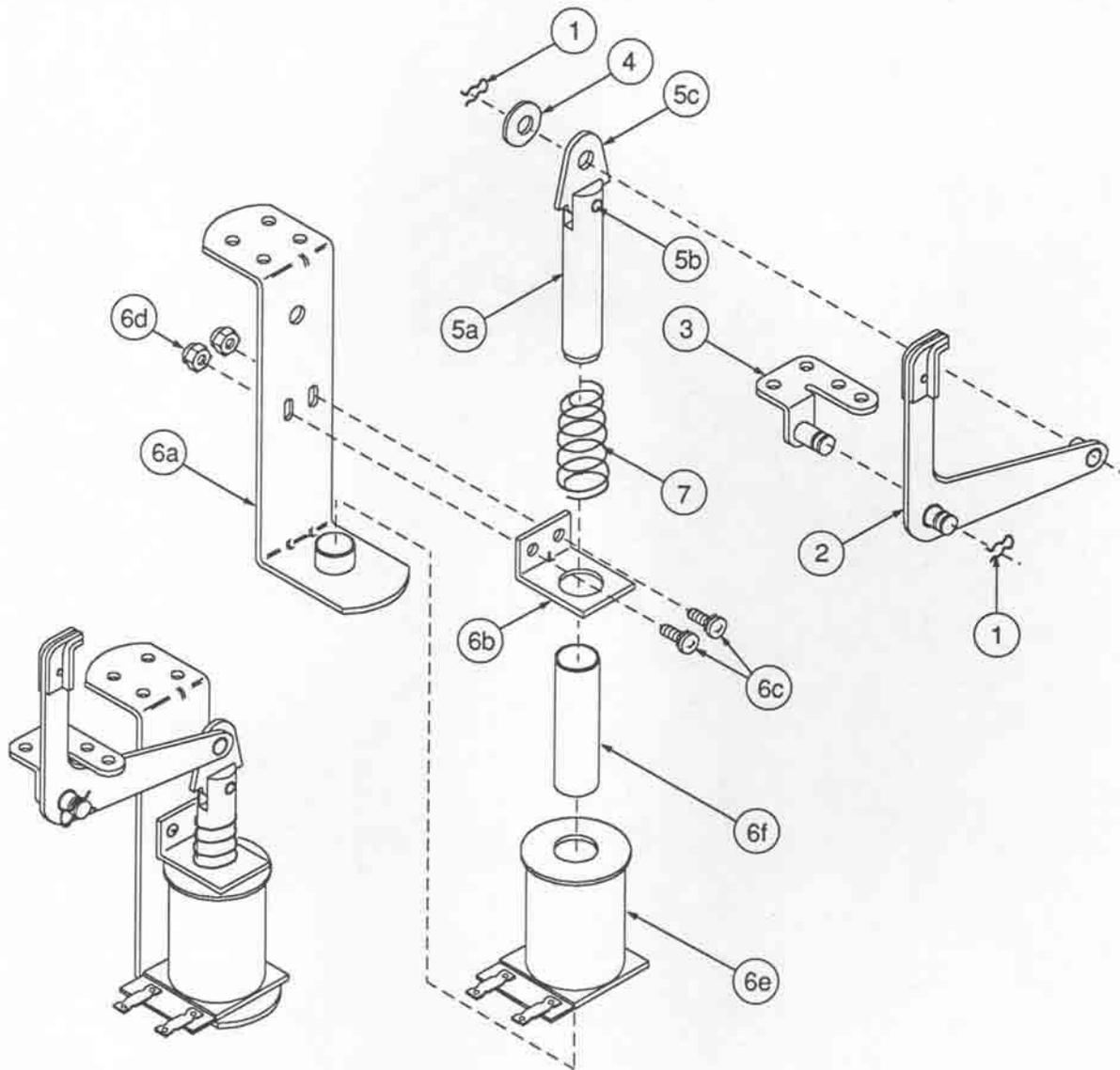
C-9638 Ball Shooter Lane Feeder Assembly



Associated Parts:

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

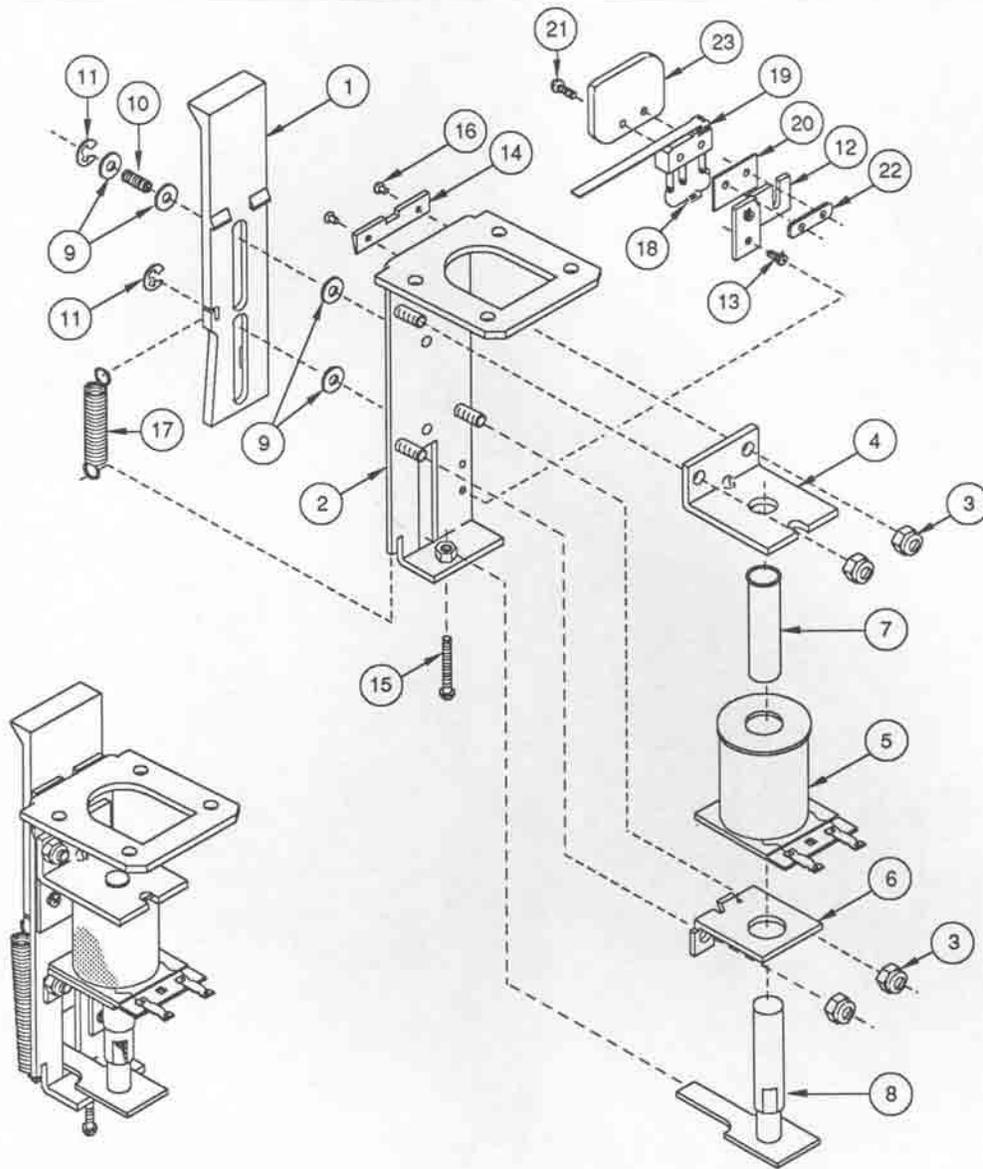
B-12665 Kicker Arm (Slingshot) Assembly



Associated Parts for Right & Left Kickers:

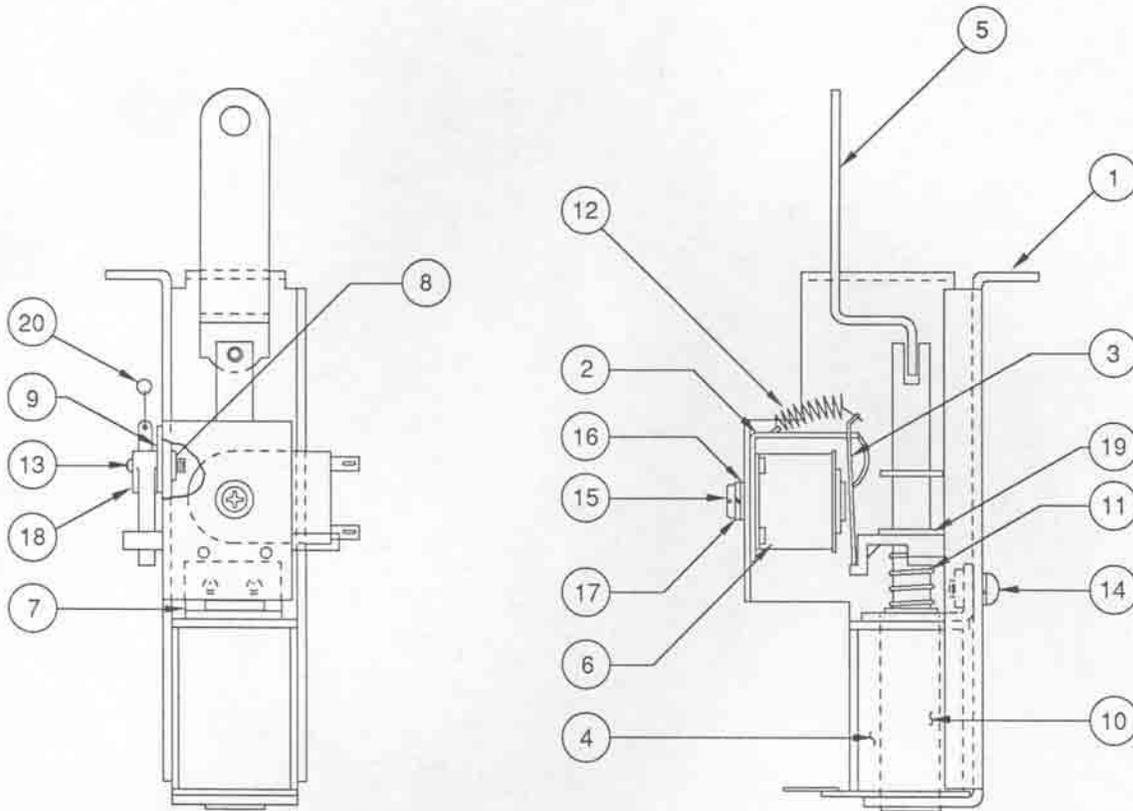
<u>Item</u>	<u>Part Number</u>	<u>Description</u>	<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	12-6227	Hairpin Clip	6.	B-9362-R-3	Coil & Bracket Assy., Right
2.	A-12664	Kicker Crank Assembly		B-9362-L-2	Coil & Bracket Assy., Left
3.	A-5653	Mounting Bracket Assembly	a)	B-7572-1	Bracket & Stop Assembly
4.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.	b)	01-8-508-S	Coil Retaining Bracket
5.	A-5103	Coil Plunger Assembly	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8
a)	02-2364	Coil Plunger	d)	4406-01119-00	Nut, 6-32 ESN
b)	03-8085	Armature Link	e)	AE-26-1200	Coil Assembly
c)	20-8716-5	Roll Pin, 1/8 x 7/16"	f)	03-7066	Coil Tubing
			7.	10-128	Spring

A-16267 1-Bank Drop Target Assembly



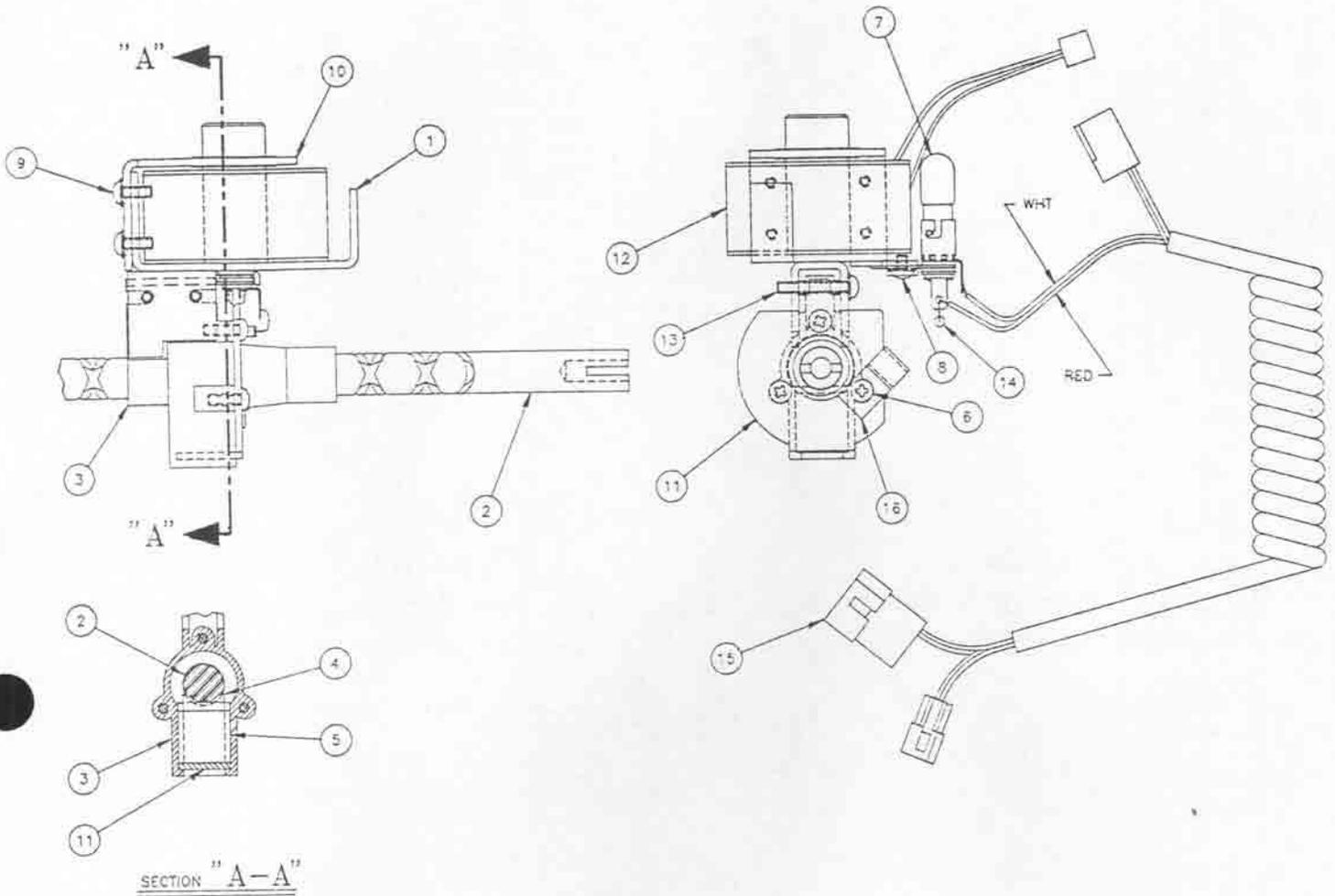
<u>Item</u>	<u>Part Number</u>	<u>Description</u>	<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	03-8033	Target - Flush	13.	4006-010003-03	Mach. Screw, 6-32 x 3/16 P-PH
2.	A-14617	Bracket & Post Assembly	14.	03-8034	Stop Single Target
3.	4408-01119-00	Nut 8-32 ESNA	15.	4010-01025-14	Mach. Screw, 10-32 x 7/8 P-RH
4.	A-11397	Stop Bracket Assembly	16.	07-6688-17N	Rivet, 5/32 x 7/32"
5.	AE-26-1200	Coil Assembly	17.	10-433	Extension Spring
6.	01-8413	Coil Mounting Bracket	18.	5070-09054-00	Diode 1N4001
7.	03-7066-4	Tubing	19.	5647-12693-31	Switch
8.	A-11388-2	Plate & Reset Plate Assembly	20.	01-8600	Switch Insulator
9.	4700-00072-00	Flatwasher	21.	4002-01105-10	Mach. Screw, 2-56 x 5/8 P-PH-S
10.	10-392	Spring	22.	01-8240	Nut Plate
11.	20-8712-25	"E" Ring	23.	03-8630	Actuator Guide
12.	01-10183	Switch Bracket			

A-16264 Lift Ramp Assembly



<u>Item</u>	<u>Part Number</u>	<u>Description</u>	<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	A-16043	Bracket Lift Sub-Assembly	12.	10-96	Spring
2.	A-6892	Frame & Eyelet	13.	4002-01105-08	Mach. Screw, 2-56 x 1/2 P-PH
3.	A-15821	Armature Sub-Assembly	14.	4008-01017-05	Mach. Screw, 8-32 x 5/16 P-RH-S
4.	AE-26-1200	Coil Assembly	15.	4008-01021-07	Mach. Screw, 8-32 x 7/16 PRH-BR
5.	A-16248	Post Lift Ramp Lift Sub-Assembly	16.	4700-00089-00	Flatwasher, 11/64 x 7/16 x 16ga.
6.	SM1-28-900DC	Coil Assembly	17.	4701-00003-00	Lockwasher #8 Split
7.	01-9794	Coil Retainer Bracket	18.	5647-12693-36	Mini-Switch
8.	01-8240	Nut Plate	19.	20-8712-43	"E"-Ring
9.	01-8600	Insulator	20.	5070-09054-00	Diode 1N4004
10.	03-7066	Tubing	21.	H-16437	Cable Assembly
11.	10-437	Kicker Spring			

A-16266 Coil Magnet & Screw Assembly



Item	Part Number	Description	Item	Part Number	Description
1.	A-16136	Mounting Magnet Sub-Assy.	9.	4008-01003-06	Mach. Screw, #8-32 x 3/8 P-PH-S
2.	02-4707	Reversing Screw	10.	A-16308	Bracket & Eyelet Assembly
3.	03-8771	Carrier Body	11.	03-8842	Carrier Cap
4.	02-4343	Follower-Rev. Screw	12.	20-9831	Coil Magnet Assembly
5.	20-9567	Bushing, Bronze	13.	4006-01003-14	Mach. Screw, #6-32 x 7/8 P-PH-S
6.	4106-01001-07	Sh. Metal Screw, #6x7/16 P-PH-A	14.	5070-09054-00	Diode 1N4004 1.0A.
7.	A-16205	Light Socket & Bulb Assembly	15.	A-16311	Cable Assembly
8.	4006-01003-03	Mach. Screw, #6-32 x 3/16"	16.	03-7655-4	Cable Clamp, 1/4"

Ball Popper Assemblies

A-16261 Coffin Ball Popper Assembly

<u>Item</u>	<u>Part Number</u>	<u>Description</u>	<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	A-16140	Ball Popper Sub-Assy.	9.	4106-01004-06	Sh. Metal Screw, #6 x 3/8 P-PH-ST
2.	AE-24-900	Coil Assembly	10.	A-14231	LED Assembly
3.	03-7067	Tubing Coil	11.	A-14232	Photo Transistor Assembly
4.	10-135	Solenoid Spring	12.	4104-01001-06	Sh. Metal Screw, #4 x 3/8 P-PH
5.	23-6420	Rubber Grommet	13.	03-8506-1	Opto Mounting Base, White
6.	01-10895	Coil Bracket	14.	03-8506	Opto Mounting Base, Black
7.	A-13270	Bell Armature Assembly	15.	H-16335	Cable Assembly
8.	4408-01119-01	Nut 8-32 ESN			

A-16262 Crypt Ball Popper Assembly (Parts listed replace same items of A-16261)

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	A-16139	Ball Popper Sub-Assy.
2.	AE-26-1200	Coil Assembly

A-16263 Castle Ball Popper Assembly (Parts listed replace same items of A-16261)

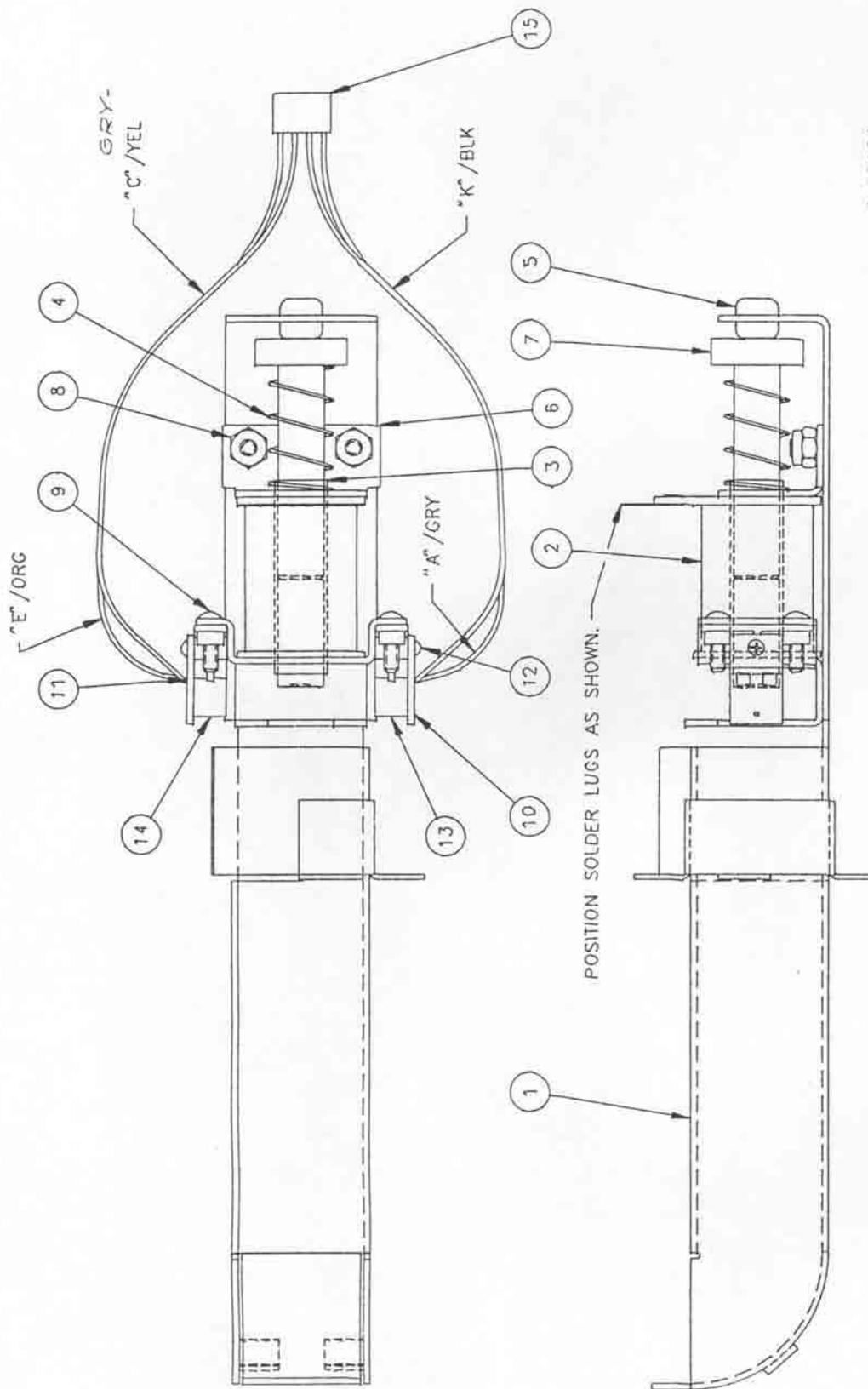
<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	A-16162	Ball Popper Sub-Assy.
2.	AE-26-1500	Coil Assembly

A-16256 Wire Ramp Ball Popper Assembly (Parts listed replace same items of A-16261)

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	A-16143	Ball Popper Sub-Assembly
2.	AE-23-800	Coil Assembly
3.	01-11115	Plate-Clamp Supp.
* 16.	4008-01003-04	Mach. Screw, #8-32 x 1/4 P-PH-S
* 17.	03-7655-16	Wire Harness Clip
* 18.	4006-01027-04	Mach. Screw, #6-32 x 1/4 P-RWH
* 19.	H-16229	Playfield Opto Cable

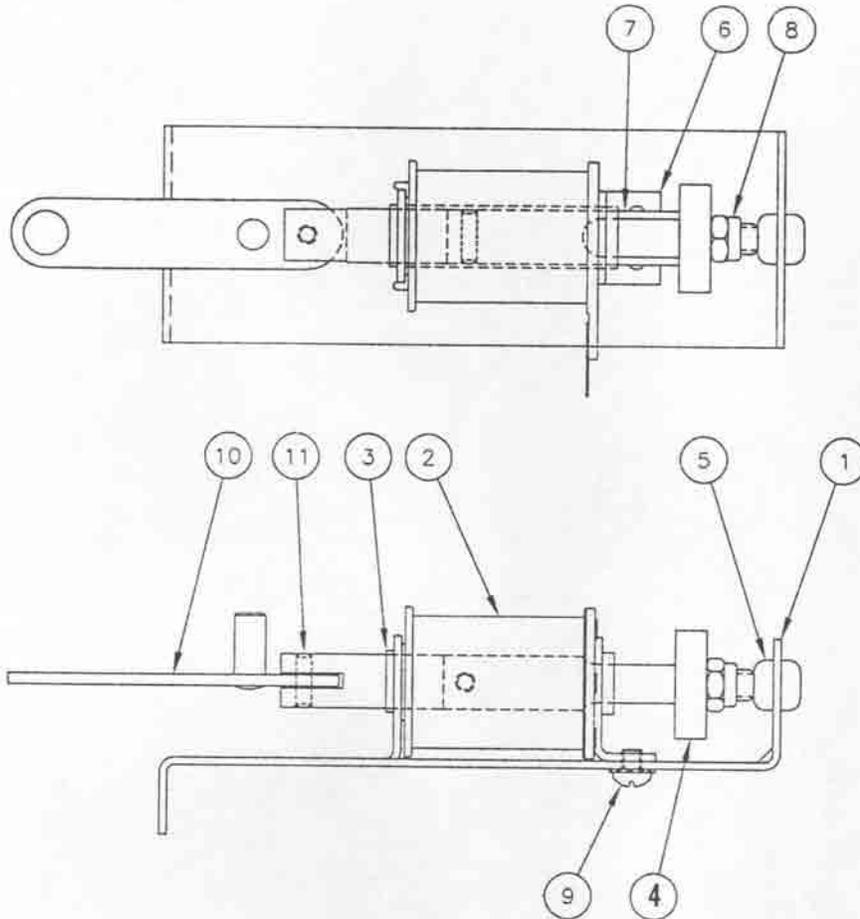
* Not Shown.

Ball Popper Assembly



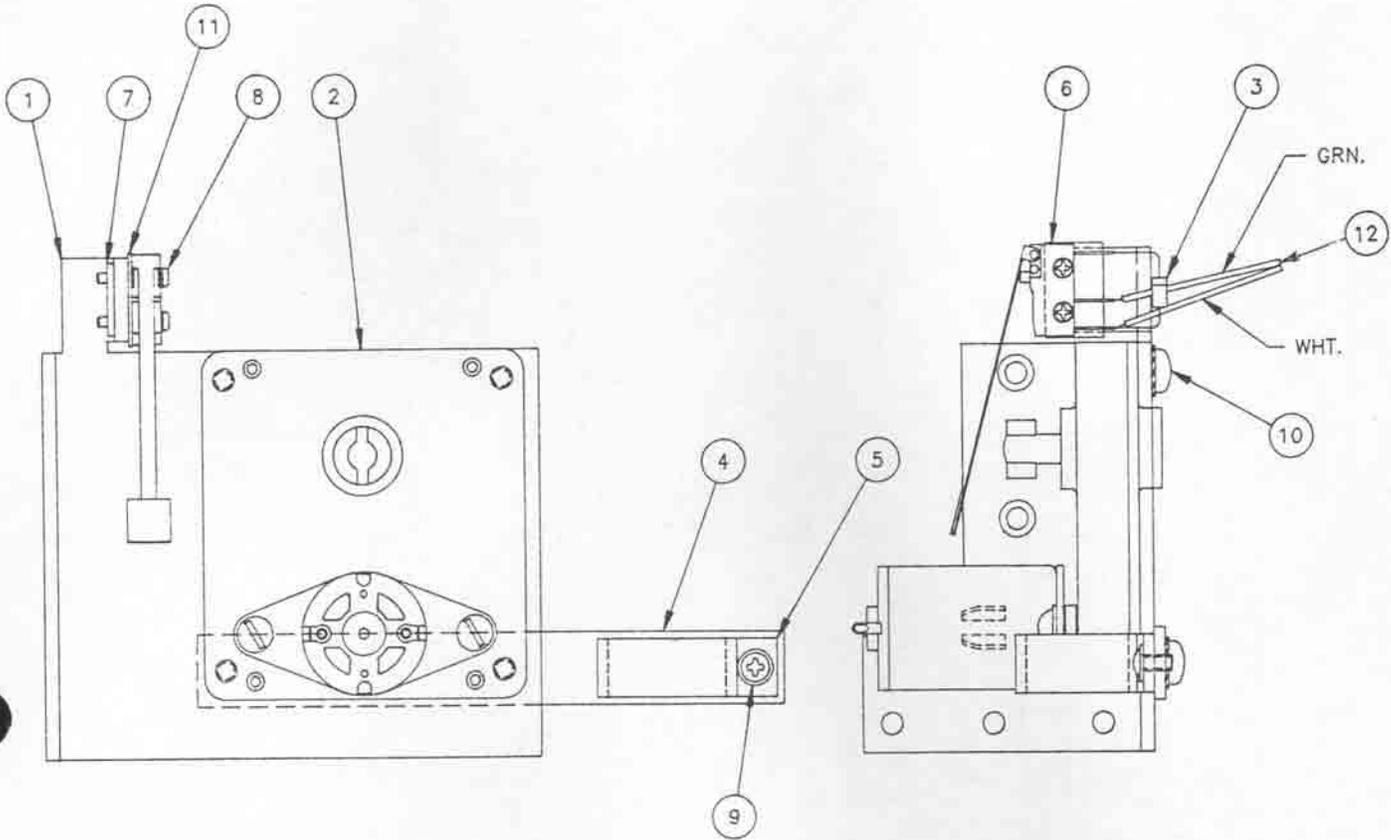
A-16261
Coffin Ball Popper Assembly

A-16245 Entry Ramp Mechanism Assembly



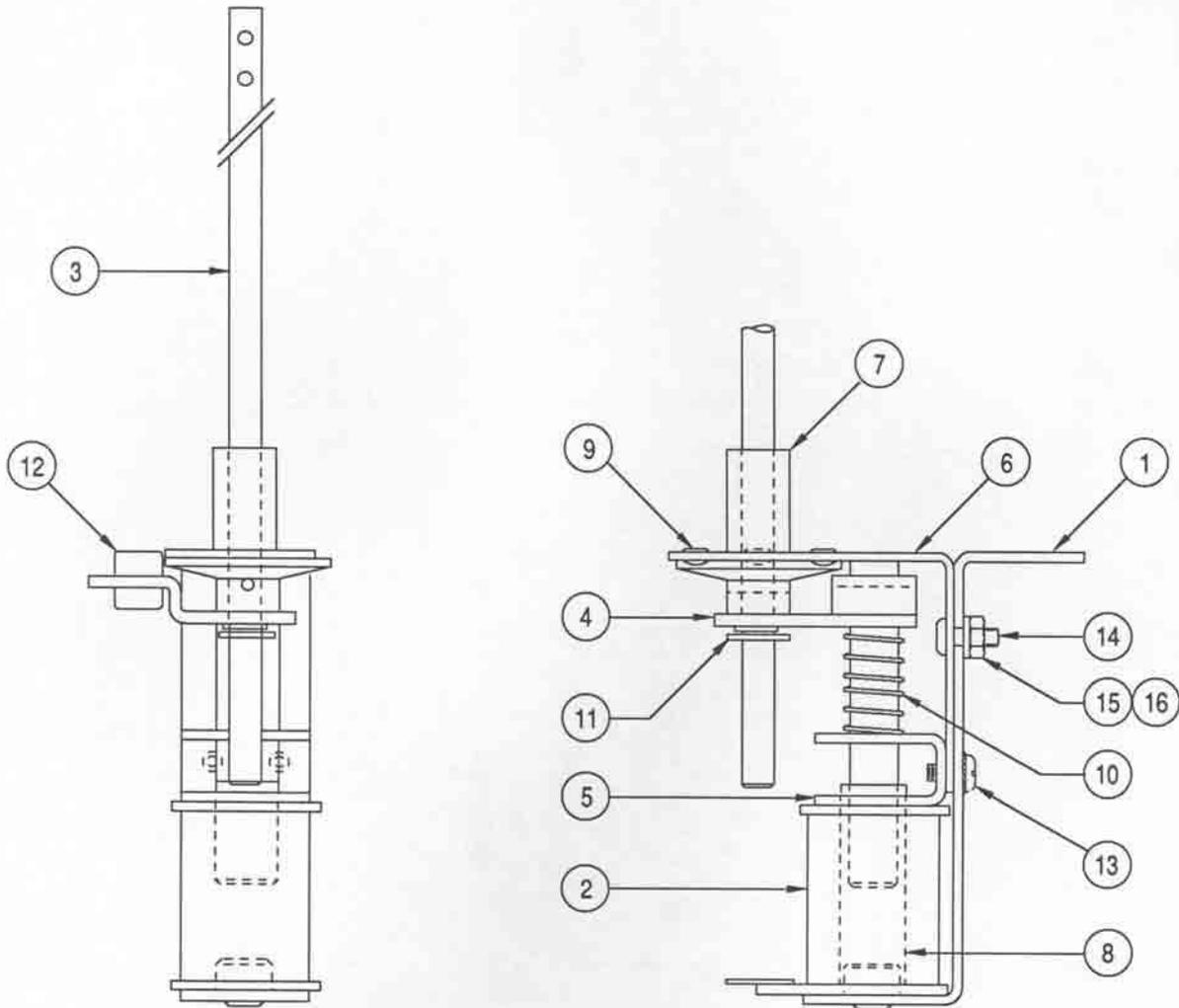
<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	01-11081	Coil Mounting Bracket
2.	AE-26-1500	Coil Assembly
3.	03-7067	Coil Tubing
4.	02-2963	Bell Armature Stop
5.	23-6420	Rubber Grommet
6.	01-8-508-T	Solenoid Bracket
7.	A-16150	Solenoid Plunger Sub-Assy.
8.	4420-01119-00	Nut, 1/4-20 ESN
9.	4008-01017-03	Mach. Screw, #8-32x3/16 P-RH-S
10.	A-16147	Link Sub-Assy-Entry Ramp
11.	20-8716-5	Roll Pin, 3/32 x 7/16"

A-16050 Motor Assembly

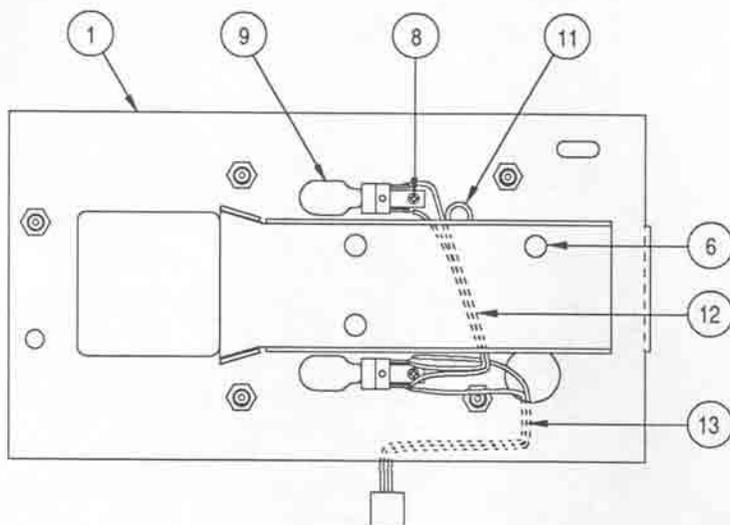


<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	01-11086	Motor Mounting Bracket
2.	14-7981	Motor
3.	5070-09054-00	Diode 1N4004
4.	01-11116	Plate-Cable Supp.
5.	03-7655-16	Clip
6.	5647-12693-14	Subminiature Switch
7.	01-8240	Nut Plate
8.	4002-01105-08	Mach. Screw #2-56 x 1/2 P-PH-S
9.	4006-01027-04	Mach. Screw #6-32 x 1/4 RWH
10.	4010-01006-08	Mach. Screw #10-32 x 1/2 P-PH-S
11.	01-8600	Insulator
12.	H-16437	Cable Assembly

A-16265 Up/Down Post Assembly

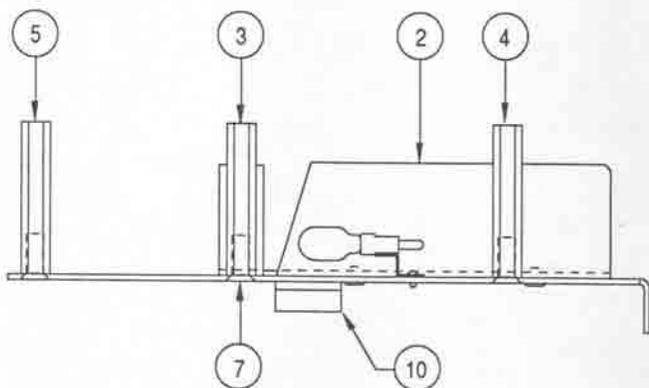


<u>Item</u>	<u>Part Number</u>	<u>Description</u>	<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	B-7572-1	Bracket & Stop Assembly	9.	07-6688-19N	Rivet, 1/8 x 7/32" Long
2.	AE-26-1500	Coil Assembly	10.	10-399	Compression Spring
3.	A-16146	Up/Down Post Assembly	11.	20-8712-25	"E" Retaining Spring
4.	A-16153	Link Up/Down Sub-Assy.	12.	23-6420	Rubber Grommet
5.	01-11112	Coil Bracket	13.	4006-01005-06	Mach. Screw, 6-32 x 3/8 P-PH-S
6.	01-11080	Support Bracket	14.	4008-01005-06	Mach. Screw, 8-32 x 3/8 P-PH-S
7.	03-7065	Kick-Off Bushing	15.	4408-01128-00	Nut 8-32 KEPS
8.	03-7066	Coil Tubing	16.	4701-00003-00	Lockwasher #8 Split



A-16260 Coffin Plate Assembly

Item	Part Number	Description
1.	01-11133	Coffin Mounting Plate
2.	01-11075	Coffin Trough
3.	02-4252-66	F-F Spacer, #6-32 x 1.66
4.	02-4252-67	F-F Spacer, #6-32 x 1.60
5.	02-4252-68	F-F Spacer, #6-32 x 1.72
6.	07-6688-18N	Rivet, 3/16 x 1/8 Nickel
7.	4006-01041-06	Mach. Screw, #6-32 x 3/8
8.	4006-01003-04	Mach. Screw, #6-32 x 1/4
9.	A-12336-1	Socket & Bulb Assembly
10.	03-7722-4	Kwick Klip
11.	20-8790-1	Nylined Bearing
12.	CW-30022-4	Wire Jmp., Yellow
13.	H-16300	Flashlamp Cable

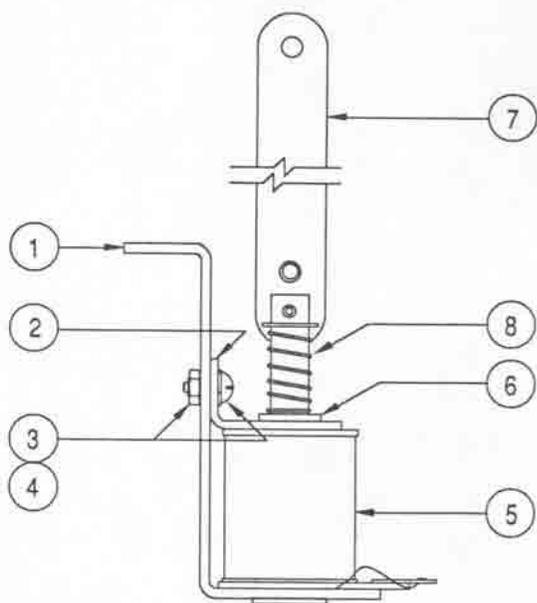


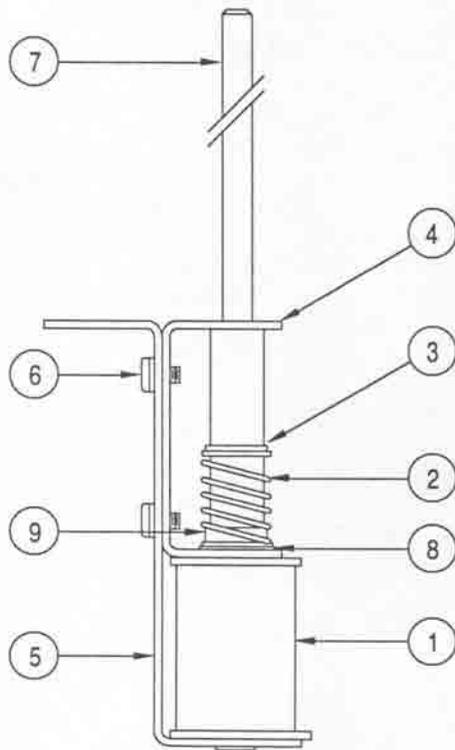
B-13935 Coil & Bracket Assembly

Item	Part Number	Description
1.	B-7572-1	Bracket & Stop Assembly
2.	01-8-508-S	Coil Retaining Bracket
3.	4006-01017-06	Mach. Screw, 6-32 x 3/8
4.	4406-01119-00	Nut, 6-32 ESN
5.	AE-26-1500	Coil Assembly
6.	03-7066	Coil Tubing

Associated Parts:

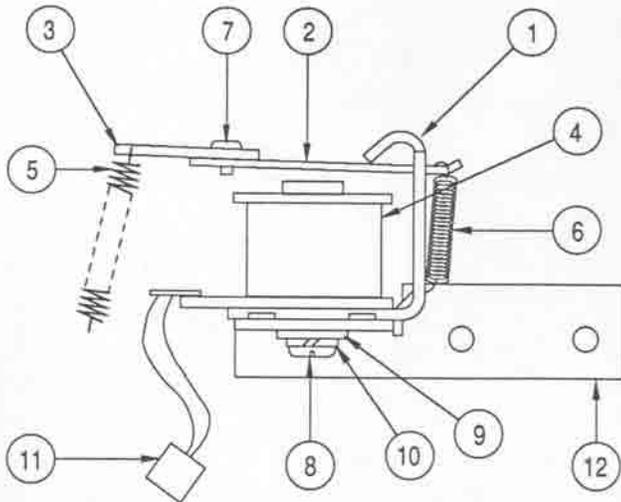
7.	A-16269	Link & Plunger Assembly
8.	10-128	Spring





A-16268 Disappear Post Assembly

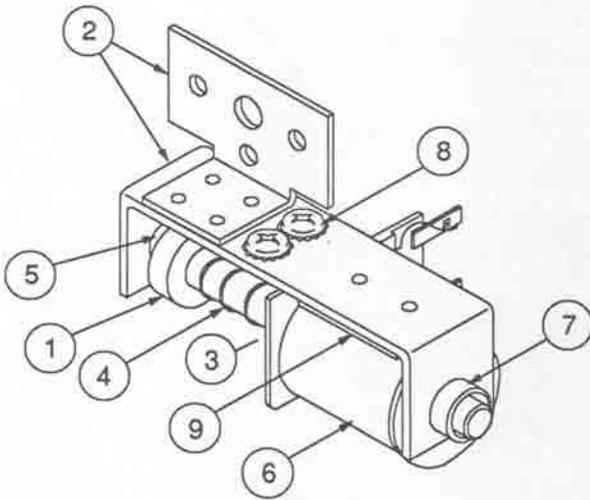
<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	AE-26-1500	Coil Assembly
2.	10-135	Spring
3.	20-8712-43	"E"-Ring, 7/16" Shaft
4.	01-10008	Coil Stop Bracket
5.	B-7572-1	Bracket & Stop Assembly
6.	4006-01005-04	Mach. Screw, #6-32 x 1/4 P-PH-S
7.	02-4720	Disappearing Post
8.	01-10024	Insulator
9.	03-7066-3	Tubing, 1-7/8" Long



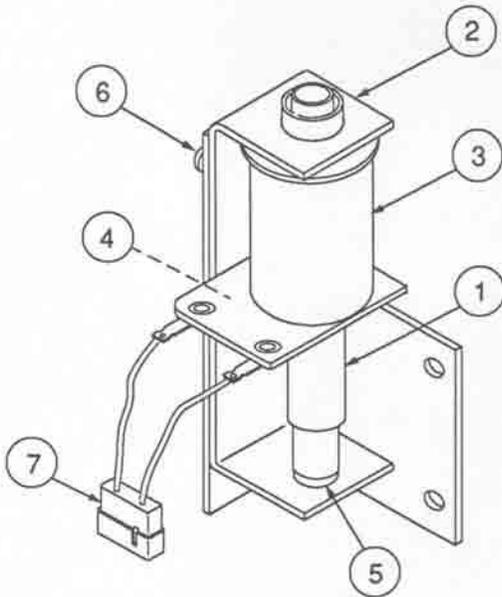
A-16246 Ball Gate Actuator Assembly

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1.	A-6892	Frame & Eyelet Assembly
2.	A-15821	Armature Sub-Assembly
3.	01-11166	Armature Tip
4.	A-14406	Coil Assembly
5.	10-120	Spring
6.	10-194	Extension Spring
7.	4006-01003-03	Mach. Screw, 6-32 x 3/16 P-PH-S
8.	4008-01021-07	Mach. Screw, 8-32 x 7/16 P-RH-BR
9.	4700-00089-00	Flatwasher, 11/64 x 7/16 x 16ga.
10.	4701-00003-00	Lockwasher #8 Split
11.	H-16299	Gate Cable
12.	01-11076	Support Bracket

A-14525 Kicker Bracket Assembly



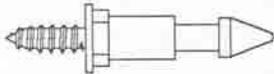
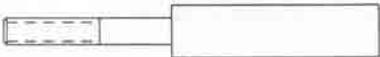
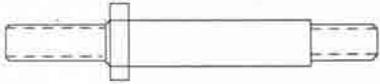
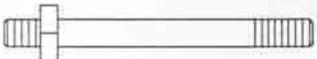
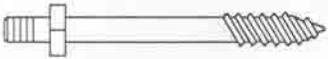
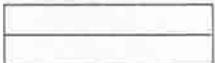
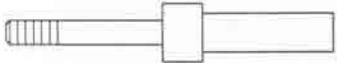
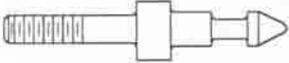
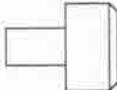
Item	Part Number	Description
1.	A-6306-2	Bell Armature Assembly
2.	A-14526	Mounting Bracket Assembly
3.	01-8-508-T	Solenoid Bracket
4.	10-135	Solenoid Spring
5.	23-6420	Rubber Grommet
6.	AE-23-800	Coil Assembly
7.	03-7067-5	Coil Tubing
8.	4008-01017-04	Mach. Screw, #8-32 x 5/16 P-RH
9.	03-8523	Insulator



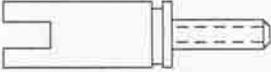
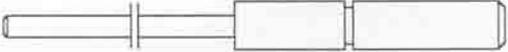
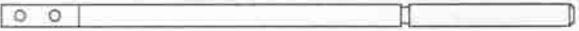
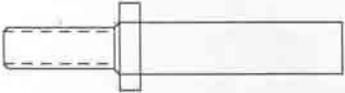
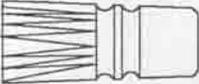
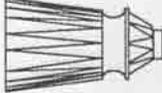
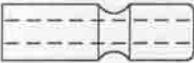
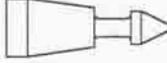
B-10686-1 Knocker Assembly

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

Metal & Plastic Posts

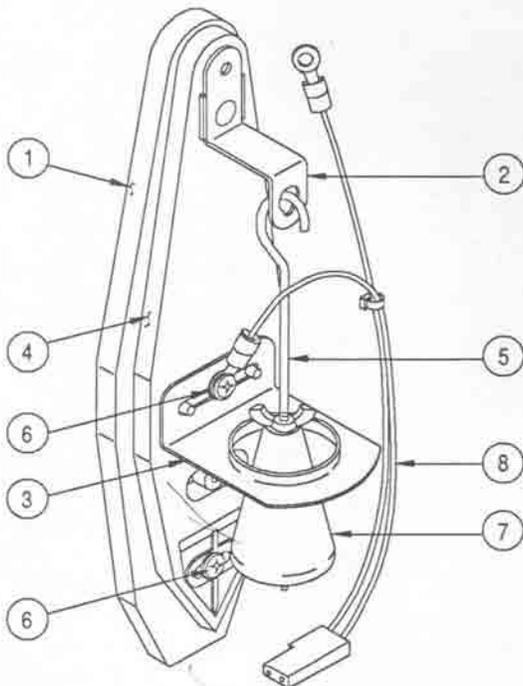
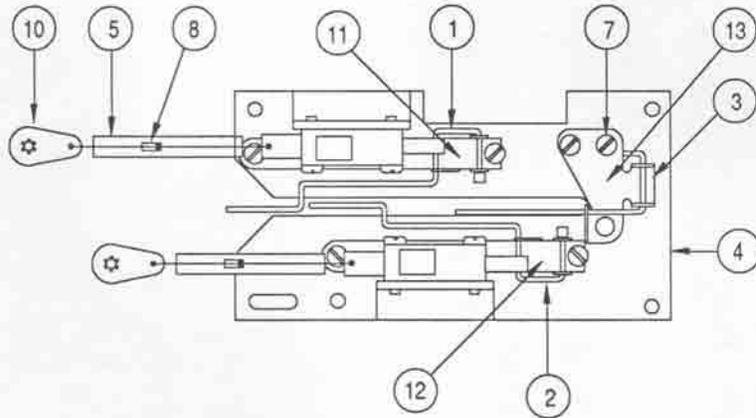
	<u>Part Number</u>	<u>Description / Quantity</u>
	02-3905	Bumper Post #8 WS (6)
	02-4020	Support Post (8)
	02-4252-10	Spacer 6-32 x 5/8" (3)
	02-4252-18	Spacer 6-32 x 1-1/8" (2)
	02-4252-38	Spacer 6-32 x 2-3/8" (1)
	02-4252-66	Spacer 6-32 x 1.66" (2)
	02-4252-67	Spacer 6-32 x 1.60" (2)
	02-4252-68	Spacer 6-32 x 1.72" (1)
	02-4322-20	MF Spacer #8-32 x 3.31" (1)
	02-4342-1	Bumper Post, 6-32 x 1/2" (2)
	02-4424-1	Post 6-32/8-32 2-1/32" (18)
	02-4425-1	Post 8-32/ #8-32 2-13/64" (4)
	02-4425-2	Post 8-32/ #8-32 2-13/64" (2)
	02-4426-1	Post #6-32 /8 1-29/32" (6)
	02-4436-7	F-F Spacer, 8-32 x 1-1/2" (1)
	02-4436-12	F-F Spacer, 8-32 x 1-3/8" (1)
	02-4657	Mounting Post, 6-32 x 4.38" (1)
	02-4659	Mini Post (8)
	02-4660	Single Bumper Post (2)
	02-4703	Armature Stop (1)

Metal & Plastic Posts (Continued)

	<u>Part Number</u>	<u>Description / Quantity</u>
	02-4706	Post Lift Ramp (1)
	02-4720	Disappearing Post (1)
	02-4732	Up/Down Post (1)
	02-4748	Bumper Post (1)
	02-4765-1	Mounting Post, 8-32 x 3.62" (1)
	02-4765-2	Mounting Post, 8-32 x 2.75" (1)
	02-4765-3	Mounting Post, 8-32 x 2.81" (1)
	02-4765-4	Mounting Post, 8-32 x 2.68" (1)
	02-4765-5	Mounting Post, 8-32 x 4.81" (1)
	03-8130-13	Double Star Bumper Post, Clear (1)
	03-8319-9	Star Post #8 (19)
	03-8365-9	Post 3/8 x 1-3/16", Clear (19)
	03-8044-9	Post 3/8 x 1-3/16", Tr. Red (1)

C-11615 Switch & Plate Assembly

Item	Part Number	Description
1.	12-6546	Wire Form
2.	12-6547	Wire Form
3.	12-6747	Wire Form
4.	B-11616	Bracket & Mtg. Plate Assy.
5.	RM-21-03	Coil Tubing
6.	4004-01003-10	MS 4-40 x 5/8" Long
7.	4005-01005-02	MS 5-40 x 1/8 Long
8.	5070-09054-00	Diode 1N40004
9.	5647-09957-00	Micro Switch
10.	5825-09372-00	Solder Lug
11.	01-60-A	Switch Bracket
12.	01-60-F	Switch Bracket
13.	01-3411	Switch Bracket

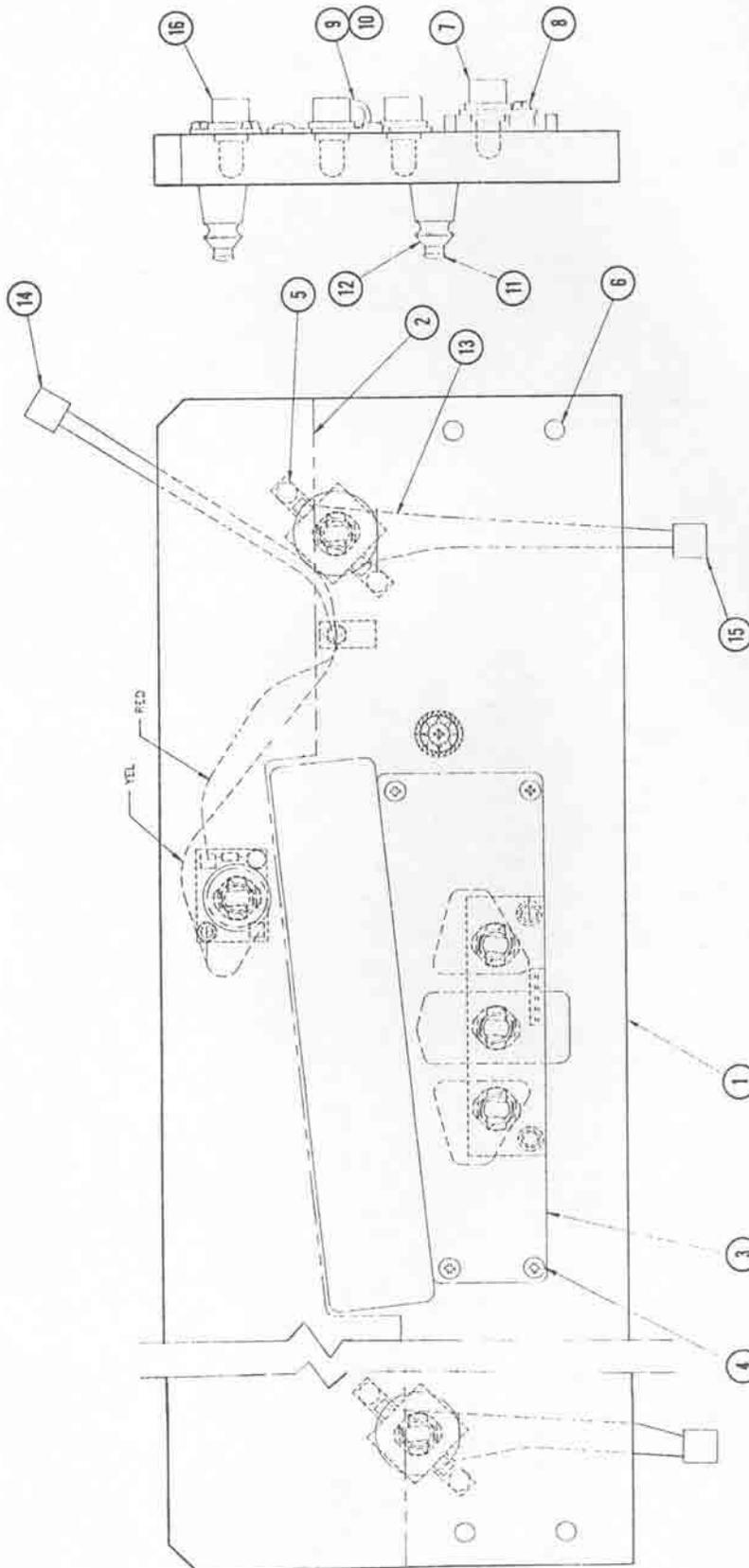


A-15361 Tilt Mechanism Assembly

Item	Part Number	Description
1.	A-15360	Mount Plate, Tilt Mech.
2.	01-3444	Bracket, Tilt Upper
3.	01-3445	Bracket, Tilt Lower
4.	03-8668	Pendulum, Tilt Mech.
5.	12-6331	Wire, Plum Bob
6.	4006-01027-06	MS, 6-32 x 3/8 PH-WHD

Associated Parts

7.	20-6502-A	Plum Bob
8.	H-15478	Cable



Item	Part Number	Description	Item	Part Number	Description
1.	A-116426	Back Panel	9.	03-7655-4	Harness Clip, 1/4"
2.	31-1745-1	Decal, Top	10.	4106-01115-06Y	Sh. Metal Screw, #6 x 3/8 PL-HWH-A
3.	31-1745-5	Playfield Plastic	11.	4108-01001-24	Sh. Metal Screw, #8 x 1-1/2 P-PH-A
4.	4106-01033-08	Sh. Metal Screw, #6 x 1/2 P-TH-A	12.	03-8319-9	Star Post #8, Tr. Red
5.	4104-01001-06	Sh. Metal Screw, #4 x 3/8 P-PH-A	13.	C-13337	Single Flashlamp Assembly
6.	4506-01106-16B	SSS #6-32 X 1"	14.	H-16295	Cable Assembly
7.	A-16337-1	3-Lamp PCB w/Spacers	15.	H-16300	Cable Assembly
8.	4106-01115-16	Sh. Metal Screw, #6 x 1" PL-HWH-YEL	16.	B-12224	Single Lamp Assembly

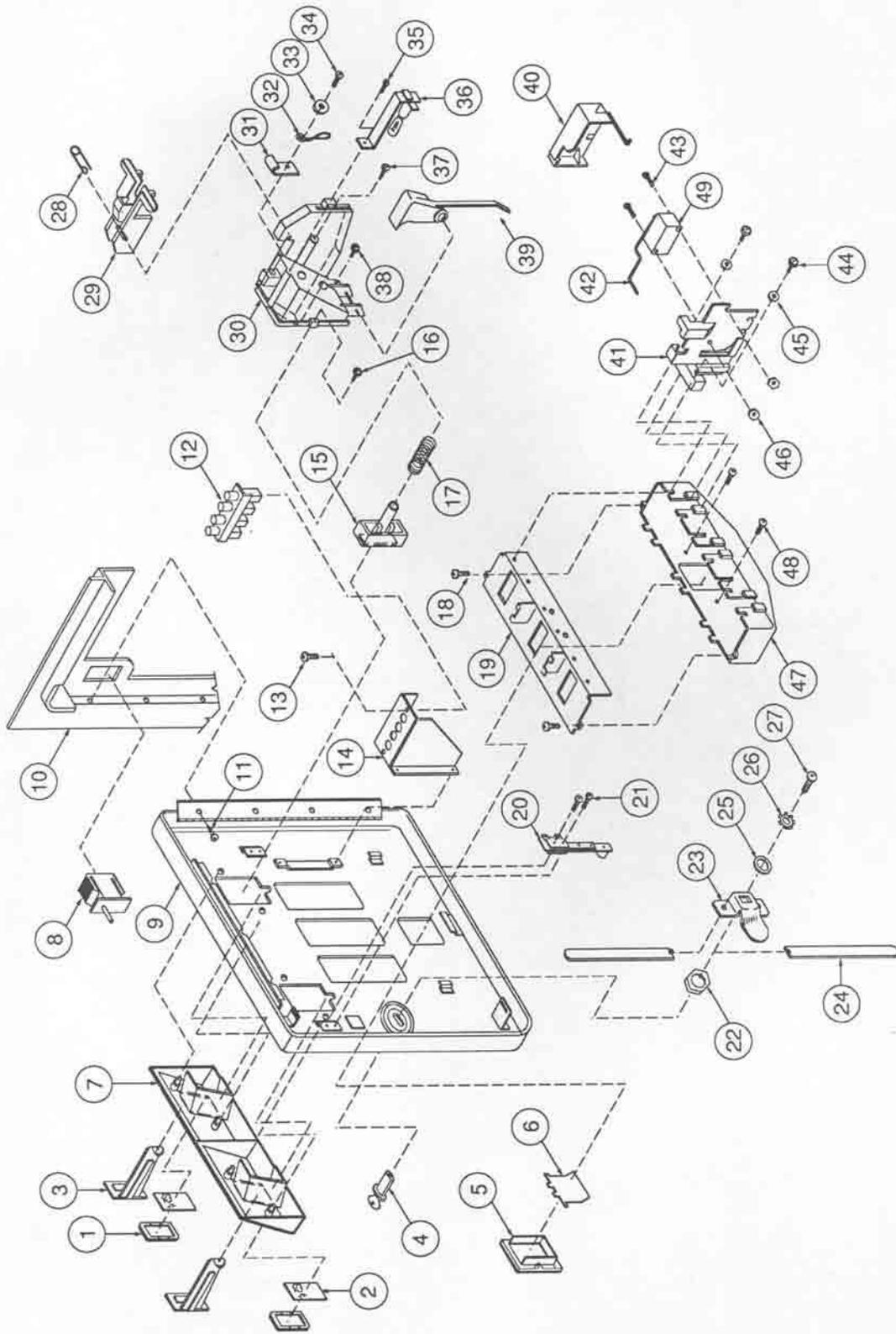
Coin Door Assembly

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

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

<u>Item</u>	<u>Part No.</u>	<u>Description</u>	<u>Quantity</u>
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	27-1037	Plastic Button	1
16	27-1078	M/C Screw, 6-32 x 3/8	2 or 3
17	27-1039	Conical Spring	2 or 3
18	27-1079	Self-tapping Screw, #6 x 1/4	2
19	27-1077-1	Coinbox Cover	1
20	27-1066	Slam Switch	1
21	27-1067	M/C Screw, 4-40 x 1/2	2
22	27-1017	Nut (key)	1
23	27-1012	Locking Cam	1
24	27-1011	Locking Arm	2
25	27-1020	Washer	1
26	27-1018	Star Washer	1
27	27-1019	M/C Screw, 1/4-28 x 5/16	1
28	27-1089	R-Ring	1
29	27-1083	Retainer	1
30	27-1081	Coin Inlet Chute	2 or 3
31	27-1088	Cable Clamp	2 or 3
32	27-1025	Key Hook	1
33	27-1086	Washer, #6	2 or 3
34	27-1078	M/C Screw, 6-32 x 3/8	1 or 2
	27-1113	M/C Screw, 6-32 x 7/16	1
35	27-1079	Self-tapping Screw, #6 x 1/4	2 or 3
36	27-1084	Lamp Socket	2 or 3
	27-1085	Lamp	2 or 3
37	27-1096	Self-tapping Screw, #5 x 3/8	2 or 3
38	27-1087	M/C Screw, 6-32 x 5/8	2 or 3
39	27-1082	Lever Arm	2 or 3
40	27-1097	Switch Cover	2 or 3
41	27-1091-1	Coin Accept Chute	2 or 3
42	27-1075	Wire Form (Small)	2 or 3
	or		
	27-1093	Wire Form (Large)	
43	27-1094	M/C Screw, 4-40 x 7/8	4 or 6
44	27-1087	M/C Screw, 6-32 x 5/8	4 or 6
45	27-1086	Washer, #6	4 or 6
46	27-1095	Nut, 4-40 ESNA	4 or 6
47	27-1076-1	Coin Return Box	1
48	27-1078	M/C Screw, 6-32 x 3/8	2
49	27-1092	Microswitch	2 or 3

Coin Door Assembly

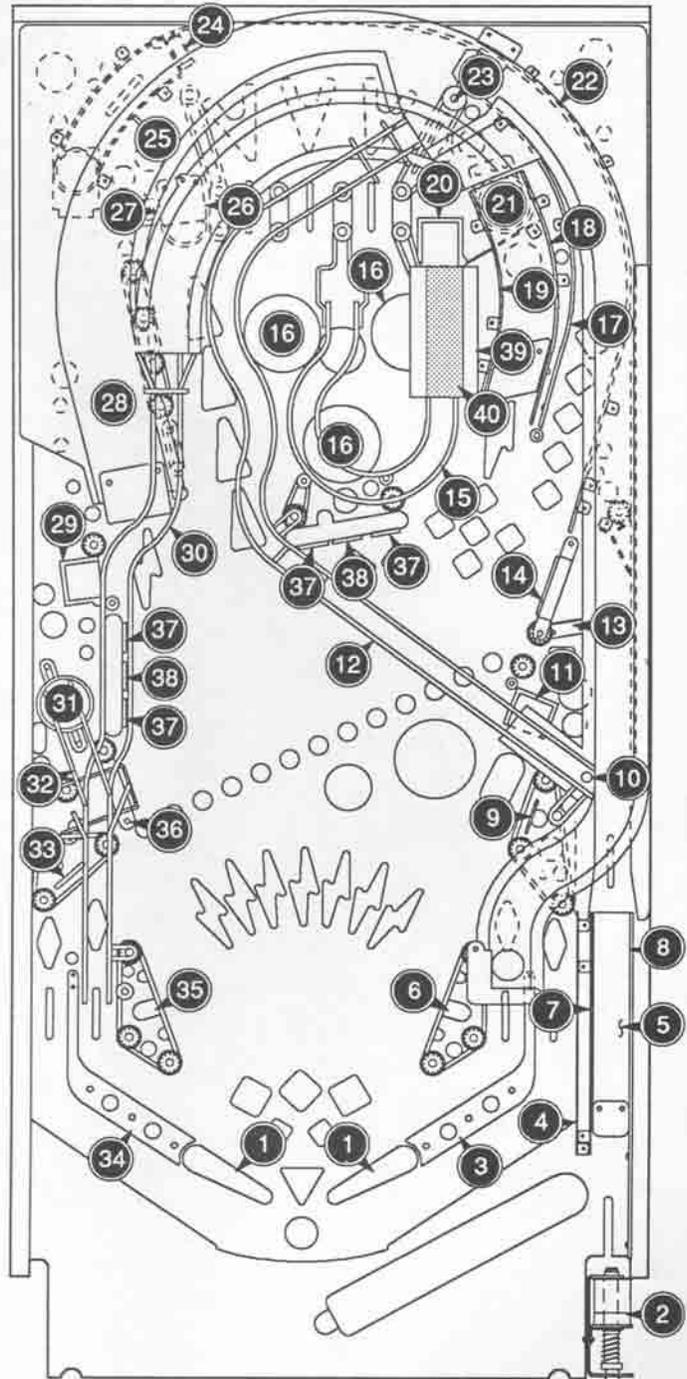


UPPER PLAYFIELD PARTS LOCATIONS

Item	Part Number	Description
1	20-9250-4	Flipper Shaft & Paddle
2	A-14525	Shooter Kicker Assy.
3	A-16306-1	Ball Guide
4	01-11098	Ball Guide
5	A-16247	Entry Ramp Assy
5a)	A-16245	Enter Ramp Mech.
6	B-12665	Right Sling
6a)	B-9362-R-3	Coil & Brkt Assy
7	01-11092	Ball Guide
8	A-16142	Ball Guide
9	12-6466-5	Wireform
10	A-16268	Dis. Castle Release Post
11	A-16263	Castle Popper
12	12-7055	Center Wire Ramp
13	A-16258	Gate & Wire Assy
14	A-16259	Gate & Wire Assy
14a)	B-13935	Coil & Brkt. Assy
15	12-7058	Coffin Wire Ramp
16	A-9415-2	Jet Bumper
17	A-16141	Ball Guide
18	A-16144	Ball Guide
19	01-11099	Ball Guide
20	A-16261	Coffin Popper
21	A-16264	Lift Ramp Assy
22	A-16145	Ball Guide
23	A-16265	Up/Down Post Diverter
24	A-16267	1-bank Drop Target
25	01-11097	Ball Guide
26	01-11904	Ball Guide
27	01-11903	Ball Guide
28	01-11283	Bottom Opto Mtg. Brkt.
29	A-16262	Crypt Popper
30	12-7056	Left Wire Ramp
31	A-16256	Wire Ramp Popper
32	12-7057	Ball Popper Wire Ramp
33	01-11095	Ball Guide
34	A-16306-2	Ball Guide
35	B-12665	Left Sling
35a)	B-9362-L-2	Coil & Brkt. Assy.
36	A-16246	Ball Gate Actuator
36a)	A-16257	Gate & Wire Assy
37	A-14691-2	Green Standup Tgt.
38	A-14691-4	Red Standup Tgt.
39	A-16260	Coffin Plate Assembly
40	A-16398	Cover-Coffin & Decal Assy.

NOT SHOWN

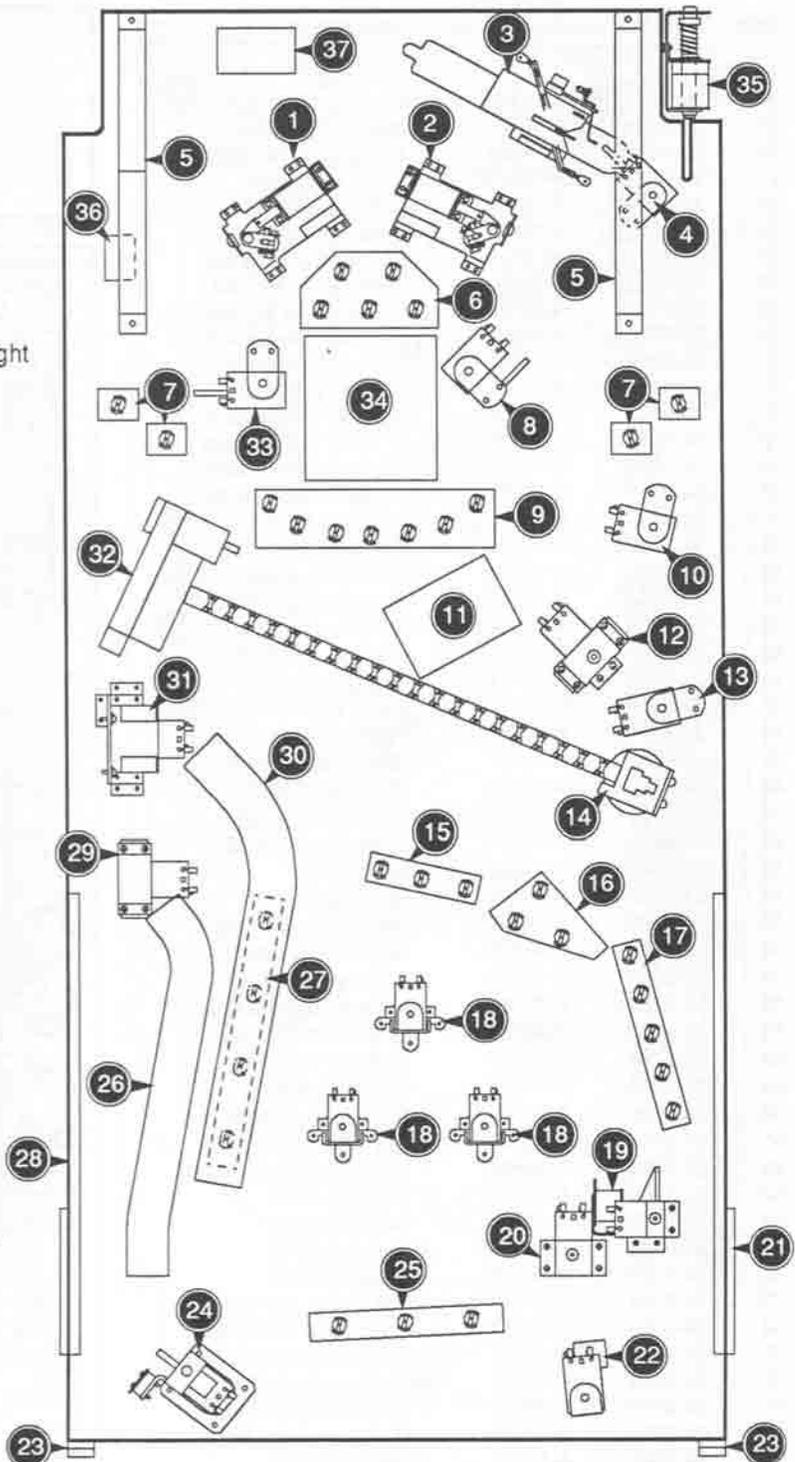
A-13204-50001	Bottom Arch Assy.
15-50001-1	Instruction Card
20-9041	Tinnerman Speednut
20-9045	Instruction Card Cover
23-6313-1	Rubber Grommet
31-1008-50001	Screened Bottom Arch
A-15894	Flipper Opto Cabinet Switch Bd.
01-3569-1	Ball Return Runway
03-8860-1	*Full Playfield Mylar
03-8860-2	Jet Bumper Mylar
03-8860-3	Left Return Mylar
03-8860-4	Right Return Mylar
20-6500	Steel Ball



* The Dracula hardcoat playfield does not require a full mylar. However Mylars can be purchased through your local Williams Distributor.

LOWER PLAYFIELD PARTS

Part Number	Description
A-15205-L-4	Lower Left Flipper Assembly
A-15205-R-4	Lower Right Flipper Assembly
C-11615	Micro-Switch Plate
C-9638	Multiball Eject Assembly
10-128	Spring
B-9362-R-3	Coil & Bracket Assembly
01-10721	Safety Bracket (2 Used)
A-16111	5-Lamp Board
B-12224	Single Lamp Board
B-12665	Kicker Arm (Slingshot) Assy., Right
B-9362-R-3	Coil & Bracket Assembly
10-128	Spring
B-8284-1	Kicker Switch Assembly
A-16110	7-Lamp Board
A-16268	Disappear Post Assembly
A-15646	24-Opto Switch Board
A-16263	Castle Ball Popper Assembly
A-16269	Link & Plunger Assembly
B-13935	Coil & Bracket Assembly
A-16266	Coil Magnet & Screw Assembly
A-15470	3-Lamp Board
A-16108	4-Lamp Board
A-16109	5-Lamp Board
A-9415-2	Jet Bumper Coil Assy. (3 Used)
B-12030-2	Switch & Diode Assy. (3 Used)
A-16264	Lift Ramp Assembly
A-16261	Coffin Ball Popper Assembly
A-15421-2	Playfield Slide Assembly, Right
A-16265	Up/Down Post Assembly
01-10726	Rear Guide Leg (2 Used)
A-16267	1-Bank Drop Target Assembly
A-16106	3-Lamp Board
A-16252	Lwr. Center Ramp Assembly
A-16107	4-Lamp Board
A-15421-1	Playfield Slide Assembly, Left
A-16262	Crypt Ball Popper Assembly
A-16253	Lower Left Ramp
A-16256	Wire Ramp Ball Popper Assy.
A-16050	Motor Assembly
B-12665	Kicker Arm (Slingshot) Assy., L.
B-9362-L-2	Coil & Bracket Assembly
10-128	Spring
B-89284-1	Kicker Switch Assembly
A-15430	10-Opto Switch Assembly
A-14525	Kicker Bracket Assembly
A-15542	Motor EMI Board
C-13509	High Current Driver Assembly

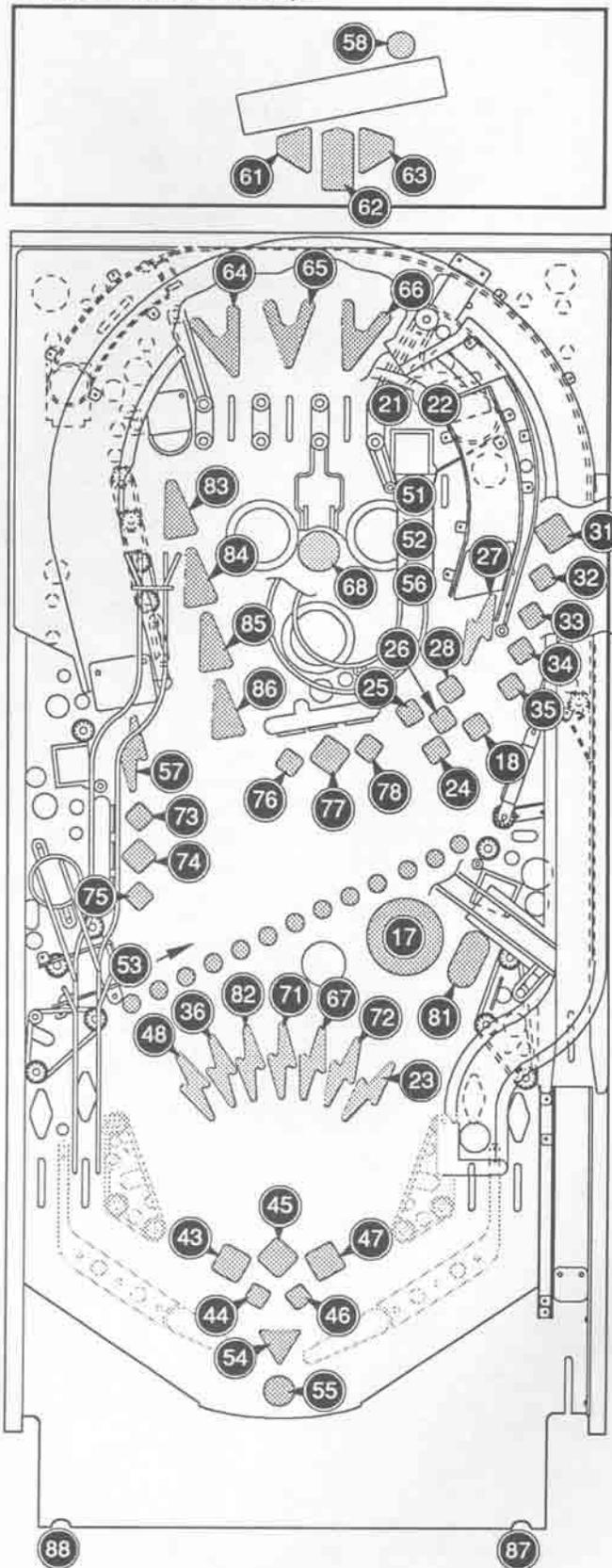


Underside of Playfield, Viewed in Raised Position

LAMPS LOCATIONS

A-16399 Back Panel Assy.

Item	Bulb No.	Lamp Assy No.	Description
11-15			Not Used
16	24-6549	A-11754	R. Ramp: Lock #44
17	24-6549	A-11754	Dracula Face #44
18	24-8768	A-16108	R. Ramp: 2 Mil. #555
21	24-6549	A-16366-1	Coffin Lock 1 #44
22	24-6549	A-16366-1	Coffin Lock 2 #44
23	24-8768	A-16110	Dracul(a) #555
24	24-8768	A-16108	R. Ramp: .5 Mil. #555
25	24-8768	A-16108	R. Ramp: 1 Mil. #555
26	24-8768	A-16108	R. Ramp: 2.5 Mil. #555
27	24-8768	A-16108	R. Ramp: Double #555
28	24-8768	A-16108	R. Ramp: 1.5 Mil. #555
31	24-8768	A-16109	R. Lane: V(i)deo #555
32	24-8768	A-16109	R. Lane: V(i)deo #555
33	24-8768	A-16109	R. Lane: V(i)deo #555
34	24-8768	A-16109	R. Lane: Vid(e)o #555
35	24-8768	A-16109	R. Lane: Vide(o) #555
36	24-8768	A-16110	D(r)acula #555
37	24-8768	B-12224	Left Drain #555
38	24-8768	B-12224	Left Return #555
41	24-8768	B-12224	Right Return #555
42	24-8768	B-12224	Right Drain #555
43	24-8768	A-16111	Coffin M. Ball #555
44	24-8768	A-16111	Playfield 2X #555
45	24-8768	A-16111	Castle M. Ball #555
46	24-8768	A-16111	Playfield 3X #555
47	24-8768	A-16111	Mist M. Ball #555
48	24-8768	A-16110	(D)racula #555
51	24-8768	A-16523	Coffin Lamp 1 #555
52	24-8768	A-16523	Coffin Lamp 2 #555
53	24-6549	A-11905	Magnet #44
54	24-6549	A-11754	Shoot Again #44
55	24-6549	A-11754	Love Never Dies #44
56	24-8768	A-16523	Coffin Lamp 3 #555
57	24-8768	A-16511	L. Ramp Lock #555
58	24-8768	B-12224	L. Ramp Diverted #555
61	24-8768	A-16337	L. Skill 100K #555
62	24-8768	A-16337	M. Skill 1 Mil. #555
63	24-8768	A-16337	R Skill 500K #555
64	24-8768	A-16106	T. 3-lane: Left #555
65	24-8768	A-16106	T. 3-lane: Middle #555
66	24-8768	A-16106	T. 3-lane: Right #555
67	24-8768	A-16110	Drac(u)la #555
68	24-6549	A-11754	Jet Insert #44
71	24-8768	A-16110	Dra(c)ula #555
72	24-8768	A-16110	Dracu(l)la #555
73	24-8768	A-16511	Left 3-bank Top #555
74	24-8768	A-16511	Left 3-bank Middle #555
75	24-8768	A-16511	Left 3-bank Bottom #555
76	24-8768	A-16337	M. 3-bank Left #555
77	24-8768	A-16337	M. 3-bank Middle #555
78	24-8768	A-16337	M. 3-bank Right #555
81	24-6549	A-11754	Rats Mode #44
82	24-8768	A-16110	Dr(a)cula #555
83	24-8768	A-16107	T.L. Hole: Mystery #555
84	24-8768	A-16107	T.L. Hole: Carriage #555
85	24-8768	A-16107	T.L. Hole: Ex. Ball #555
86	24-8768	A-16107	T.L. Hole: Jackpot #555
87	----	A-15896-1	Launch Ball
88	----	20-9663-1	Game Start



SOLENOID/FLASHER LOCATION

Item No.	Coil/Flasher No.	Assy No.	Description
01	AE-23-800	A-14525	Shooter
02	AE-24-900	A-16261	Coffin Popper
03	AE-26-1500	A-16263	Castle Popper
04	AE-26-1200	A-16264	Right Ramp Down
05	AE-26-1200	A-16262	Crypt Popper
06	AE-23-800	A-16256	Wire Ramp Ball Popper
07	AE-23-800	B-10686-1	*Knocker
08	AE-26-1500	A-16245	Shooter Ramp Entry
09	AE-26-1200	B-9362-L-2	Left Sling
10	AE-26-1200	B-9362-R-3	Right Sling
11	AE-26-1200	A-9415-2	Left Jet
12	AE-26-1200	A-9415-2	Right Jet
13	AE-26-1200	A-9415-2	Bottom Jet
14	SM1-28-900	A-16264	Right Ramp Up
15	AE-27-1200	A-8039-3	Outhole
16	AE-26-1200	B-9362-R-3	Trough
17	24-8802	A-12336-1	T.R. Corner FL #906
	24-8802	----	Dracula FL #906
18	24-8802	A-12336-1	Jackpot FL #906
	24-8802	----	Stoker FL #906
19	24-8704	A-8798	3-bank FL #89
	24-8802	----	House FL #906
20	24-8704,24-8802	A-12336-1,A-8798	T.L. Corner FL#89,#906
	24-8802	----	Mina FL #906
21	24-8704	A-8798	Castle FL #89
	24-8802	----	Helsing FL #906
22	24-8802	A-12336-1	L. Ramp FL #906
	24-8802	----	L. Logo FL #906
23	24-8802	A-12336-1	R. Ramp FL #906
	24-8802	----	R. Logo FL #906
24	24-8704	A-8798	Asylum FL #89
	24-8802	----	Renfield FL #906
25	AE-26-1200	A-16267	L. Drop Target
26	24-8802	----	Speaker Panel FL
27	20-9831	A-16266	Magnet
28	14-7981	A-16050	Magnet's Motor
33	AE-26-1500	A-16265	Up/Dn Post Diverter
34	AE-26-1500	B-13935	Right Gate
35	AE-26-1500	A-16268	Dis. Castle Release Pst
36	A-14406	A-16246	Left Ball Gate Actuator

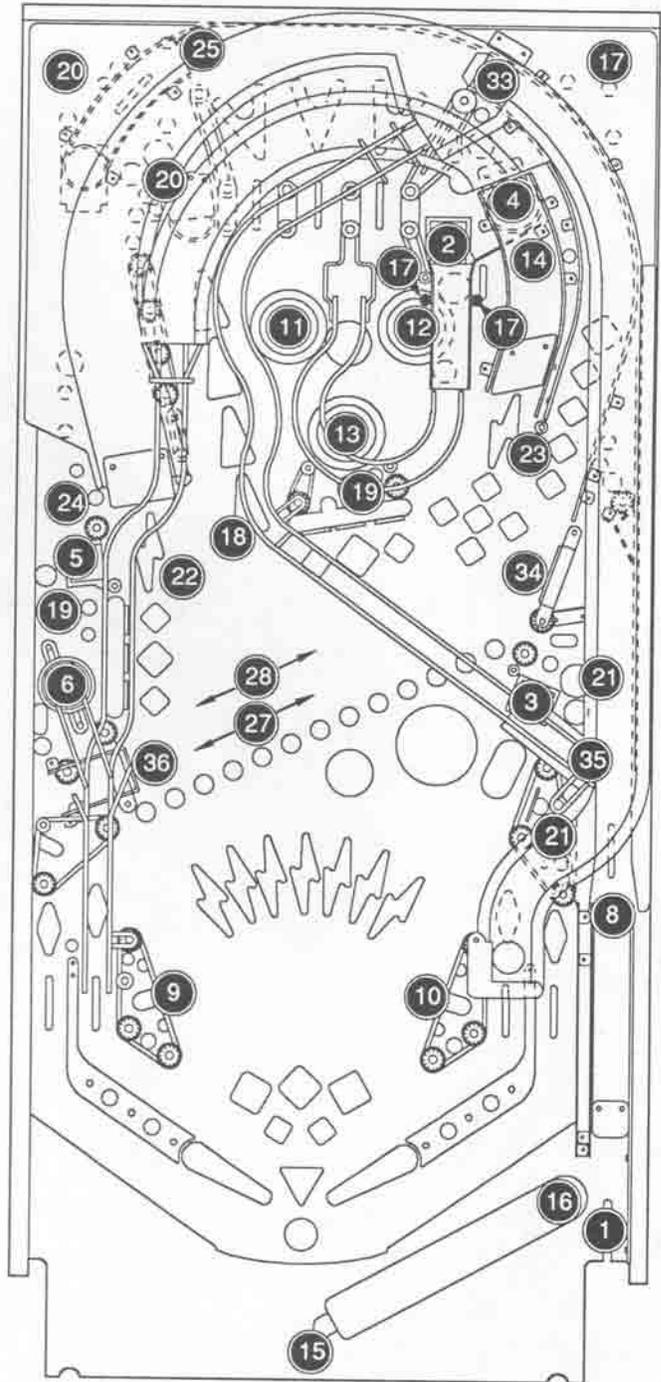
General Illumination

01	24-8768	----	*Lower Playfield, Insert
02	24-8768	----	*Upper Playfield, Insert
03	24-8768	----	*Center Playfield, Insert
04	24-8768	----	*Insert
05	24-8768	----	*Cabinet, Insert

Flippers

FL-15411	A-15205-L-4	*Lower Left Flipper
FL-15411	A-15205-R-4	*Lower Right Flipper

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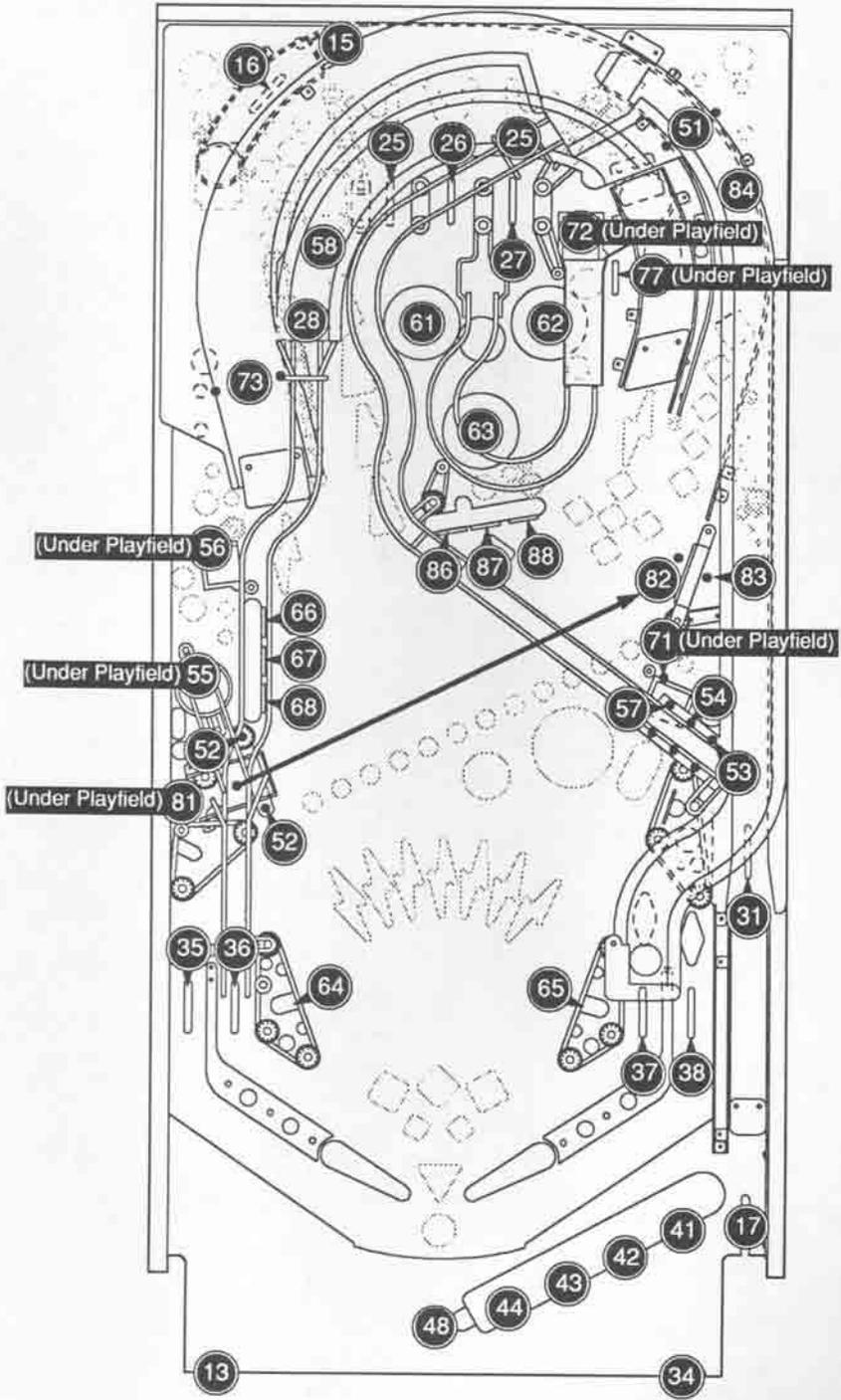


SWITCH LOCATIONS

Item	Switch No.	Where Used
F1	SW-1A-193	Lwr Rt. Flipper EOS
F2	5490-12451-00	Lwr Rt. Flipper Cab.
F3	SW-1A-193	Lwr Lt. Flipper EOS
F4	5490-12451-00	Lwr Lt. Flipper Cab.
13	20-9663-1	Start Button
14	A-6502-A	†Plumb Bob Tilt
15	5647-12693-31	L. Drop Target
16	5647-12693-19	L. Drop Score
17	5647-12693-04	Shooter Lane
18		Not Used
21	SW-1A-117	†Slam Tilt
22	5643-09288-00	†Coin Door Closed
23		Not Used
24	5643-09288-00	†Always Closed
25	5647-12693-19	Top 3-lane Left
26	5647-12693-19	Top 3-lane Middle
27	5647-12693-19	Top 3-lane Right
28	5647-12693-21	R. Ramp Score
31	5647-12693-19	Under Shooter Ramp
32-33		Not Used
34	A-15896-1	Launch Ball
35	5647-12693-19	Left Drain
35	5647-12693-19	Left Return
37	5647-12693-19	Right Return
38	5647-12693-19	Right Drain
41	5647-12693-08	Trough 1 Ball
42	5647-09957-00	Trough 2 Balls
43	5647-09957-00	Trough 3 Balls
44	5647-09957-00	Trough 4 Balls
45-47		Not Used
48	5647-12133-12	Outhole
51	A-14315 (LED)	Opto T.R. Lane
	A-14316 (Trans)	
52	A-14315 (LED)	Opto Mag. Lt. Pocket
	A-14316 (Trans)	
53	A-14315 (LED)	Opto Castle 1
	A-14316 (Trans)	
54	A-14315 (LED)	Opto Castle 2
	A-14316 (Trans)	
55	A-14315 (LED)	Opto Wire Ramp Popper
	A-14316 (Trans)	
56	A-14315 (LED)	Opto Crypt Popper
	A-14316 (Trans)	
57	A-14315 (LED)	Opto Castle 3
	A-14316 (Trans)	
58	5647-12693-13	Mystery Hole
61	SW-11A-37	Left Jet Bumper
62	SW-11A-37	Right Jet Bumper
63	SW-11A-37	Bottom Jet Bumper
64	SW-1A-114 (Kick)	*Left Sling
	SW-1A-120 (Score)	
65	SW-1A-114 (Kick)	*Right Sling
	SW-1A-120 (Score)	
66	A-14691-2	Left 3-bank Top
67	A-14691-4	Left 3-bank Middle
68	A-14691-2	Left 3-bank Bottom
71	A-14315 (LED)	Opto Castle Popper
	A-14316 (Trans)	
72	A-14315 (LED)	Opto Coffin Popper
	A-14316 (Trans)	
73	A-14315 (LED)	Opto L. Ramp Entry
	A-14316 (Trans)	
74-76		Not Used

† Not Shown

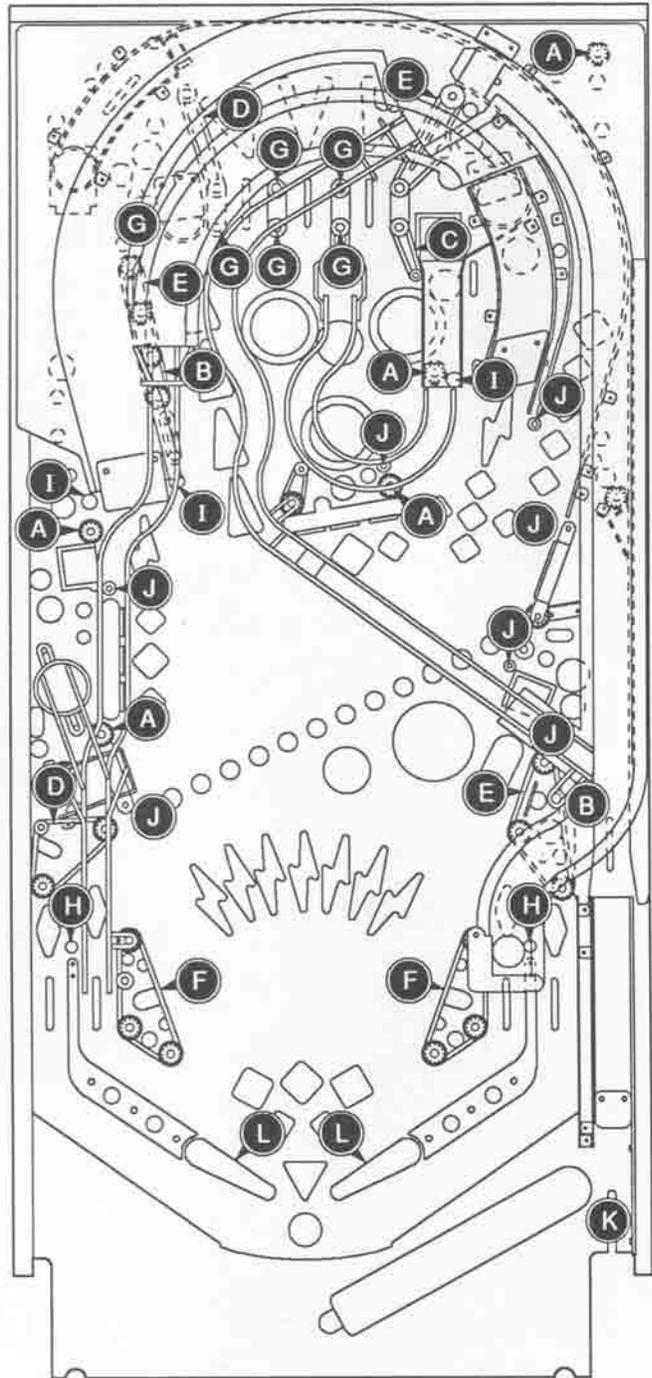
* The Score slingshot switches have diodes across them.



Item	Switch No.	Where Used
77	5647-12693-36	R. Ramp Up
78		Not Used
81	5647-12693-14	Magnet Left
82	A-14315 (LED)	Ball On Magnet
	A-14316 (Trans)	
83	5647-12693-14	Magnet Right
84	5647-12693-21	L. Ramp Score
85	5647-12693-21	L. Ramp Diverted
86	A-14691-2	Middle 3-bank Left
87	A-14691-4	Middle 3-bank Middle
88	A-14691-2	Middle 3-bank Right

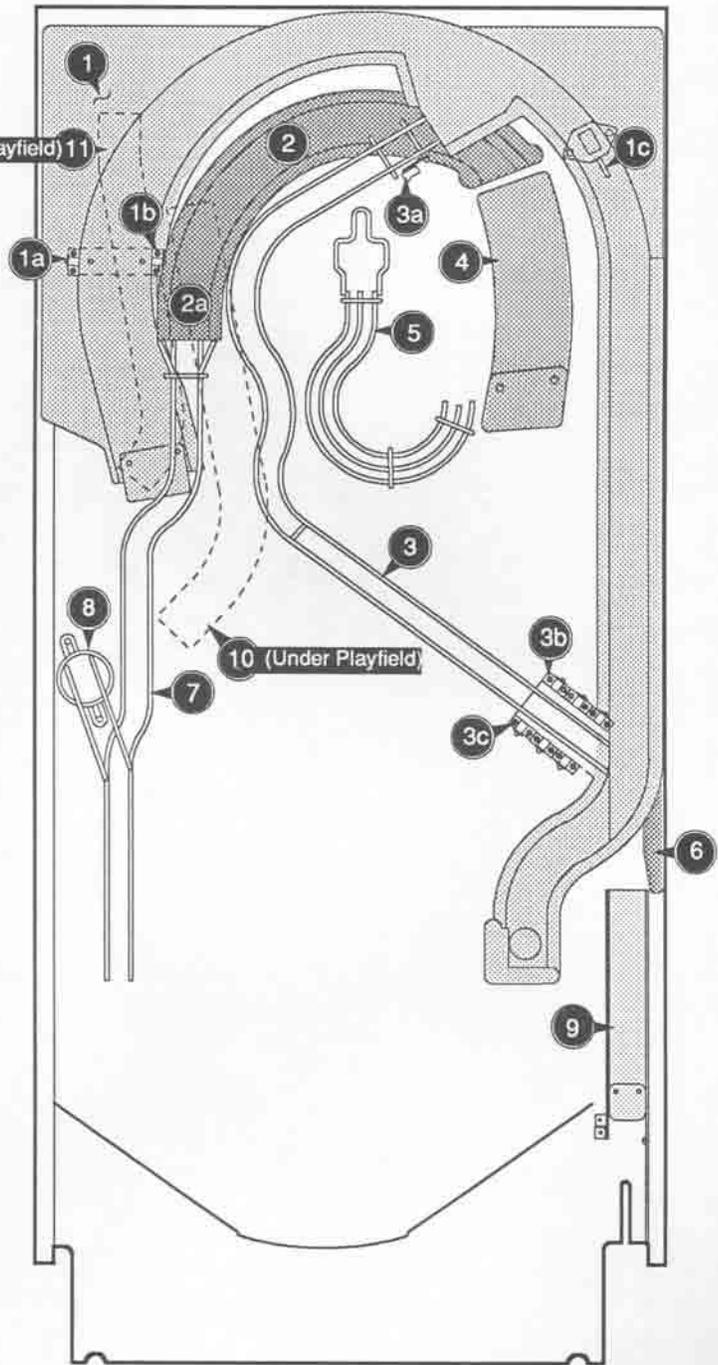
RUBBER PARTS LOCATIONS

<u>Item</u>	<u>Part No.</u>	<u>Qty</u>	<u>Description</u>
A	23-6300	5	5/16" Rubber Ring
B	23-6301	3	3/4" Rubber Ring
C	23-6302	1	1" Rubber Ring
D	23-6304	2	1-1/2" Rubber Ring
E	23-6305	3	2" Rubber Ring
F	23-6306	2	2-1/2" Rubber Ring
G	23-6641-1	6	White Rubber Ring
H	23-6535	2	Rubber Bumper
I	23-6552	3	Yellow Sleeve Bumper
J	23-6556	7	Black Sleeve Bumper
K	23-6327	1	Shooter Tip
L	23-6678-7	2	Flipper Rubber Ring



RAMPS LOCATIONS

Item	Part Number	Description
1.	A-16250	Main Ramp Assembly
a)	A-14316	LED Assembly
b)	A-14315	Photo Transistor Assembly
c)	5647-12693-21	Subminiature Switch (Under Playfield) 11
2.	A-16251	Upper Center Ramp Assy.
a)	5647-12693-21	Subminiature Switch
3.	A-16249	Wire Ramp Assembly, Center
a)	5647-12693-21	Subminiature Switch
b)	A-16457-1	3 IR LED PCB Assy. w/ Opto
c)	A-16458-1	3 Opto PCB Assy. w/Opto
4.	A-16270	Center Ramp Assembly
5.	12-7058	Wire Ramp, Coffin
6.	A-16415	Entry Ramp Assembly
7.	12-7056	Wire Ramp, Left
8.	12-7057	Wire Ramp, Ball Popper
9.	A-16247	Entry Ramp Assembly
10.	A-16253	Lwr. Left Ramp Assy.
a)	5647-12693-13	Mini-Micro Switch
11.	A-16252	Lwr. Center Ramp Assy.



Unique Parts List

<u>Part Number</u>	<u>Description</u>	<u>Part Number</u>	<u>Description</u>
A-12738-50001	WPC Sound Board Assembly	A-16268	Disappear Post Assembly
A-12742-50001	WPC CPU Board Assembly	A-16270	Center Ramp Assembly
A-13204-50001	Bottom Arch Assembly	A-16306-1	Flipper Ball Guide Assembly
A-13769-50001	Playfield & Insert Assembly	A-16306-2	Flipper Ball Guide Assembly
A-14376-50001	Backbox Assembly	A-16337-1	3-Lamp Board w/Spacers
A-15646-1	24-Switch Opto Board	A-16366-	Playfield Plastic Set
A-16050	Motor Assembly	A-16367-1	Cashbox Assembly
A-16106-1	3-Lamp Board w/Spacers	A-16397	Coffin & Decals Assembly
A-16107-1	4-Lamp Board w/Spacers	A-16399	Back Panel & Decal Assy.
A-16108-1	4-Lamp Board w/Spacers	A-16415	Entry Ramp Assembly
A-16109-1	5-Lamp Board w/Spacers	A-16417	High Current PCB w/Spacer
A-16110-1	7-Lamp Board w/Spacers	A-16426	Back Panel & Insert Assembly
A-16111-1	5-Lamp Board w/Spacers	A-16441	Bottom Opto Assembly
A-16141	Ball Guide Assembly	A-8552-50001	Backglass Assembly
A-16242	Ball Guide Assembly	02-4176-51	M-F Spacer, 8-32 x 1.72"
A-16144	Ball Guide Assembly	02-4252-66	F-F Spacer, 6-32 x 1.66"
A-16145	Main Ball Guide Assembly	02-4252-67	F-F Spacer, 6-32 x 1.60"
A-16146	Up/Down Post Assembly	02-4252-68	F-F Spacer, 6-32 x 1.72"
A-16152	Ball Deflector Up/Down Assy.	02-4322-20	Post, 8-32 x 3.31"
A-16245	Entry Ramp Mech. Assembly	02-4765-1	Mounting Post
A-16246	Ball Gate Actuator Assembly	03-8860-2	Playfield Mylar
A-16247	Entry Ramp Assembly	03-8860-3	Playfield Mylar
A-16249	Wire Ramp Assy. - Center	03-8860-4	Playfield Mylar
A-16250	Main Ramp Assembly	11-1067-50001	Wood Cabinet
A-16251	Upper-Center Ramp Assy.	12-7055	Wire Ramp, Center
A-16252	Lower-Center Ramp Assy.	12-7056	Wire Ramp, Left
A-16253	Lower Left Ramp Assembly	12-7057	Wire Ball Popper
A-16254	Speaker/Display Assembly	12-7058	Coffin Wire Ramp
A-16256	Wire Ramp Ball Popper Assy.	12-7064	Right Gate Wire
A-16257	Gate & Wire Assembly	12-7065	Left Gate Wire
A-16258	Gate & Wire Assembly	12-7066	Ball Gate Wire
A-16259	Gate & Wire Assembly	31-1002-50001	Screened Playfield
A-16260	Coffin Plate Assembly	31-1008-50001	Screened Bottom Arch
A-16261	Coffin Ball Popper Assembly	31-1009-50001	Screened Shooter Gauge
A-16262	Crypt Ball Popper Assembly	31-1357-50001	Screened Translite
A-16263	Right Ball Popper Assembly	31-1420-50001	Screened Speaker Panel
A-16264	Lift Ramp Assembly	31-1744-	Playfield Plastic Set
A-16265	Up/Down Post Assembly	31-1745-	Decal Set (Top)
A-16266	Coil Magnet & Screw Assy.	31-1746-	Decal Set (Bottom)
A-16267	1-Bank Drop Target Assembly	36-50001	Playfield Hardcoat

Cable List

<u>Part Number</u>	<u>Description</u>	<u>Part Number</u>	<u>Description</u>
H-11835	Knocker Cable	H-16288	General Switch Cable
H-13870	Black Jumper Cable	H-16289	Left Ramp Switch
H-14584	Dot Matrix Display	H-16290	Transmitter Cable
H-14790	A.C. Cable	H-16291	Receiver Opto Caable
H-14792-1	A.C. Jumper Cable	H-16292	Castle Opto Cable
H-14792-2	A.C. Jumper Cable	H-16293	24" Receiver Cable
H-15011	Speaker Panel Cable	H-16294	24" Transmitter Cable
H-15476	Logic Power Cable	H-16295	General Lamp Cable
H-15478	Tilt Switch Cable	H-16296	Coffin Lamp Cable
H-15587	Speaker Lamp Cable	H-16297	Magnet Lamp Cable
H-15736	Secondary Cable	H-16299	Gate Coil Cable
H-16125	Playfield Switch Cable	H-16300	Flash Lamp Cable
H-16126	Playfield Lamp Cable	H-16335	Playfield Opto Cable
H-16127	Playfield Solenoid Cable	H-16436	3-Flash Cable
H-16128	Cabinet Cable	H-16437	Mini-Switch Cable
H-16129	Insert Cable		

Section 3

Schematics, Wiring Diagrams, and Circuit Theory

CONNECTOR & COMPONENT IDENTIFICATION

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

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

Prefix numbers for the WPC circuit boards are listed below.

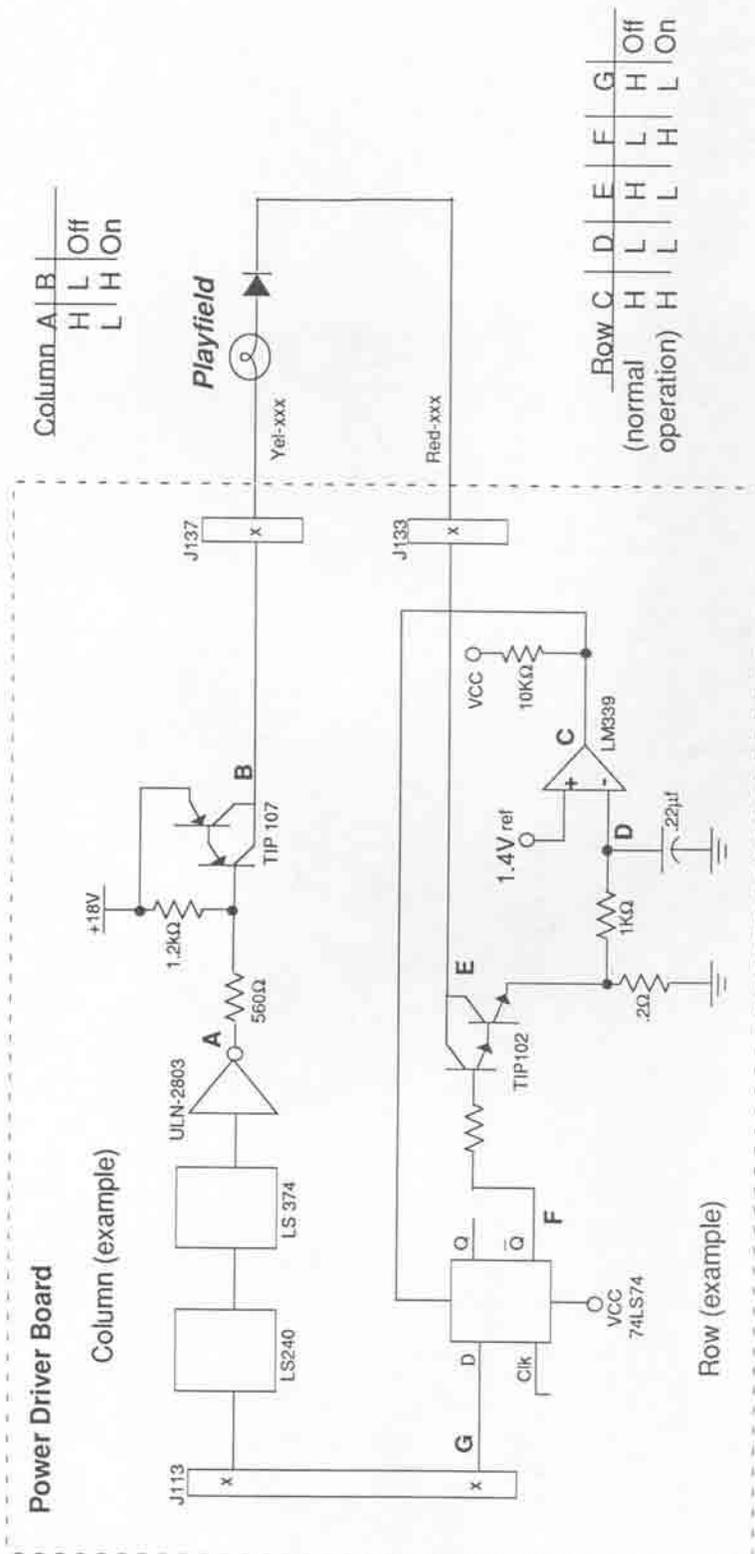
- 1- Power Driver Board
- 2- CPU Board
- 5- Sound Board
- 6- Dot Matrix Controller
Dot Matrix Display/Driver Board
- 9-Flitronic II Controller Board

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

LAMPS

Column / Row		Lamp Matrix							
		1	2	3	4	5	6	7	8
1	Red-Brown J133-1 Q90	Not Used 11	Coffin Lock 1 21	R. Lane: Video "V" 31	Right Return 41	Coffin Lamp 1 51	Left Skill 100K 61	Dracula "C" 71	Rats Mode 81
2	Red-Black J133-2 Q89	Not Used 12	Coffin Lock 2 22	R. Lane: Video "I" 32	Right Drain 42	Coffin Lamp 2 52	M. Skill 1 Million 62	Dracula "L" 72	Dracula "A" 82
3	Red-Orange J133-4 Q88	Not Used 13	Dracula "A" 23	R. Lane: Video "D" 33	Coffin Multiball 43	Magnet 53	R. Skill 100K 63	Left 3-bank Top 73	T.L. Hole: Mystery 83
4	Red-Yellow J133-5 Q87	Not Used 14	R. Ramp: 0.5 Million 24	R. Lane: Video "E" 34	Playfield 2X 44	Shoot Again 54	Top 3-lane Left 64	Left 3-bank Middle 74	T.L. Hole: Carriage 84
5	Red-Green J133-6 Q86	Not Used 15	R. Ramp: 1 Million 25	R. Lane: Video "O" 35	Castle Multiball 45	Love Never Dies 55	Top 3-lane Middle 65	Left 3-bank Bottom 75	T.L. Hole: Ex-ball 85
6	Red-Blue J133-7 Q85	R. Ramp Lock 16	R. Ramp: 2.5 Million 26	Dracula "R" 36	Playfield 3X 46	Coffin Lamp 3 56	Top 3-lane Right 66	Middle 3-bank Left 76	T.L. Hole: Jackpot 86
7	Red-Violet J133-8 Q84	Dracula Face 17	R. Ramp: Double 27	Left Drain 37	Mist Multiball 47	L. Ramp Lock 57	Dracula "U" 67	Middle 3-bank Middle 77	Launch Ball 87
8	Red-Gray J133-9 Q83	R. Ramp: 2 Million 18	R. Ramp: 1.5 Million 28	Left Return 38	Dracula "D" 48	L. Ramp Diverted 58	Jet Insert 68	Middle 3-bank Right 78	Game Start 88

Lamp Matrix Circuit



The processor sends a signal to the column circuit causing the output of the ULN-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time the processor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of TIP102 causes the transistor to conduct bringing the row circuit to ground and turning the lamp On.

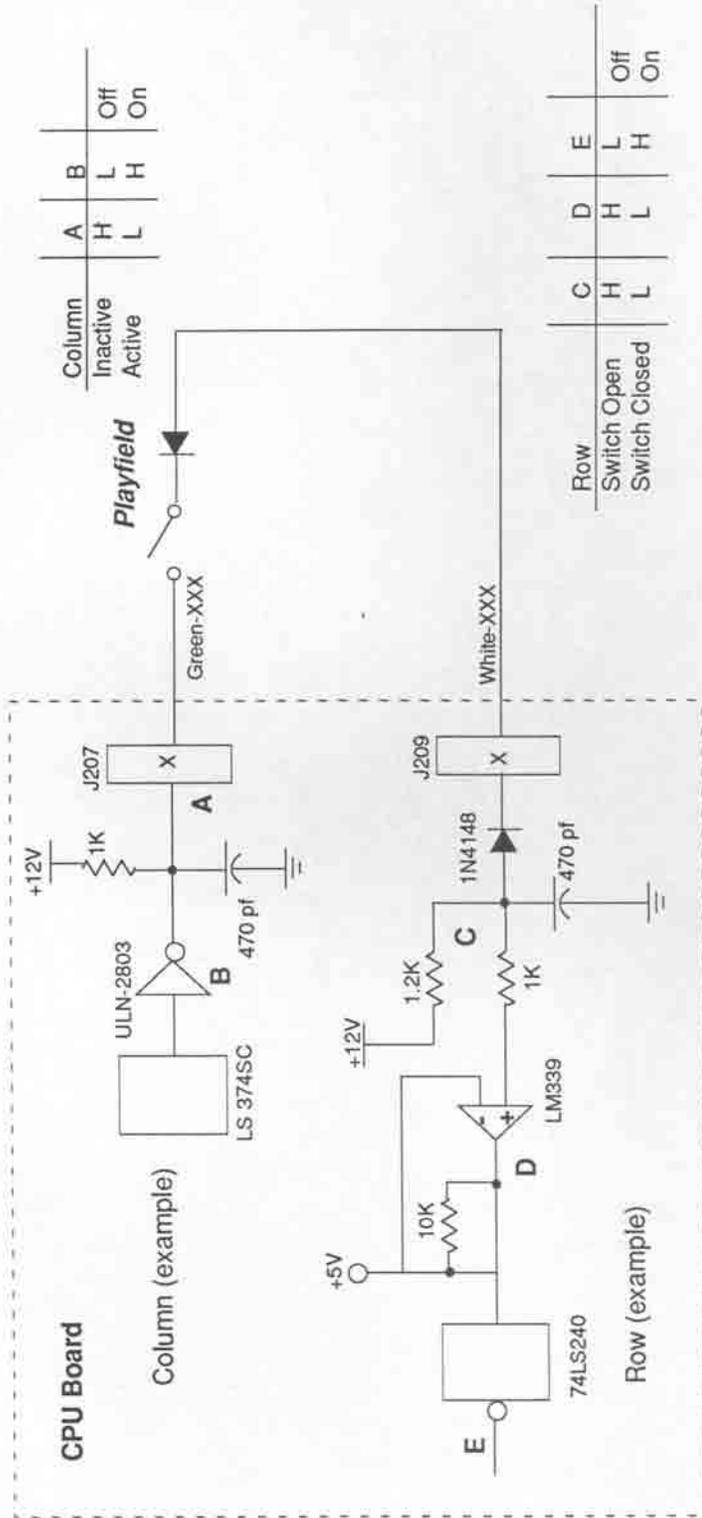
The processor changes the input of the 74LS74 to a high state to turn the lamp Off.

In overcurrent conditions the lamp is shut Off through the comparator. If the voltage at the negative input of the LM339 rises above 1.4V the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit Off.

SWITCHES

		Switch Matrix							
		White	White	White	White	White	White	White	Green
Dedicated Grounded Switches	Column	1	2	3	4	5	6	7	8
D1	Row	1	2	3	4	5	6	7	8
Orange-Brown J205-1 Left Coin Chute	White-Brown J209-1 U18-11	Not Used	Slam Tilt	Under Shooter Ramp	Trough 1 Ball	Opto T.R. Lane	Left Jet	Opto Castle Popper	Magnet Left
Orange-Red J205-2 Center Coin Chute	White-Red J209-2 U18-9	Not Used	Coin Door Closed	Not Used	Trough 2 Balls	Opto Magnet L. Pocket	Right Jet	Opto Coffin Popper	Ball On Magnet
Orange-Black J205-3 Right Coin Chute	White-Orange J209-3 U18-5	Start Button	Ticket Opto.	Not Used	Trough 3 Balls	Opto Castle 1	Bottom Jet	Opto L. Ramp Entry	Magnet Right
Orange-Yellow J205-4 4th Coin Chute	White-Yellow J209-4 U18-7	Plumb Bob Tilt	Always Closed	Launch Ball	Trough 4 Balls	Opto Castle 2	Left Sling	Not Used	L. Ramp Score
Orange-Green J205-6 Normal Function Service Escape Credits	White-Green J209-5 U19-11	L. Drop Target	Top 3-lane Left	Left Drain	Not Used	Opto Wire Ramp Popper	Right Sling	Not Used	L. Ramp Diverted
Orange-Blue J205-7 Normal Function Volume Down	White-Blue J209-7 U19-9	L. Drop Score	Top 3-lane Middle	Left Return	Not Used	Opto Crypt Popper	Left 3-bank Top	Not Used	Middle 3-bank Left
Orange-Violet J205-8 Normal Function Volume Up	White-Violet J209-8 U19-5	Shooter Lane	Top 3-lane Right	Right Return	Not Used	Opto Castle 3	Left 3-bank Middle	R. Ramp Up	Middle 3-bank Middle
Orange-Gray J205-9 Normal Function Begin Test	White-Gray J209-9 U19-7	Not Used	R. Ramp Score	Right Drain	Outhole	Mystery Hole	Left 3-Bank Bottom	Not Used	Middle 3-bank Right
		Green-Brown J207-1 U20-18	Green-Red J207-2 U20-17	Green-Orange J207-3 U20-16	Green-Yellow J207-4 U20-15	Green-Black J207-5 U20-14	Green-Blue J207-6 U20-13	Green-Violet J207-7 U20-12	Green-Gray J207-8 U20-11
		Flipper Grounded Switches							
		Black-Green J906-1							
		Lower Right E.O.S. Switch							
		Blue-Violet J905-1							
		Lower Right Flipper Button							
		Black-Blue J906-3							
		Lower Left E.O.S. Switch							
		Blue-Gray J905-2							
		Lower Left Flipper Button							
		Black-Violet J906-4							
		Upper Right E.O.S. Switch							
		Black-Yellow J905-3							
		Upper Right Flipper Button							
		Black-Gray J906-5							
		Upper Left E.O.S. Switch							
		Black-Blue J905-5							
		Upper Left Flipper Button							

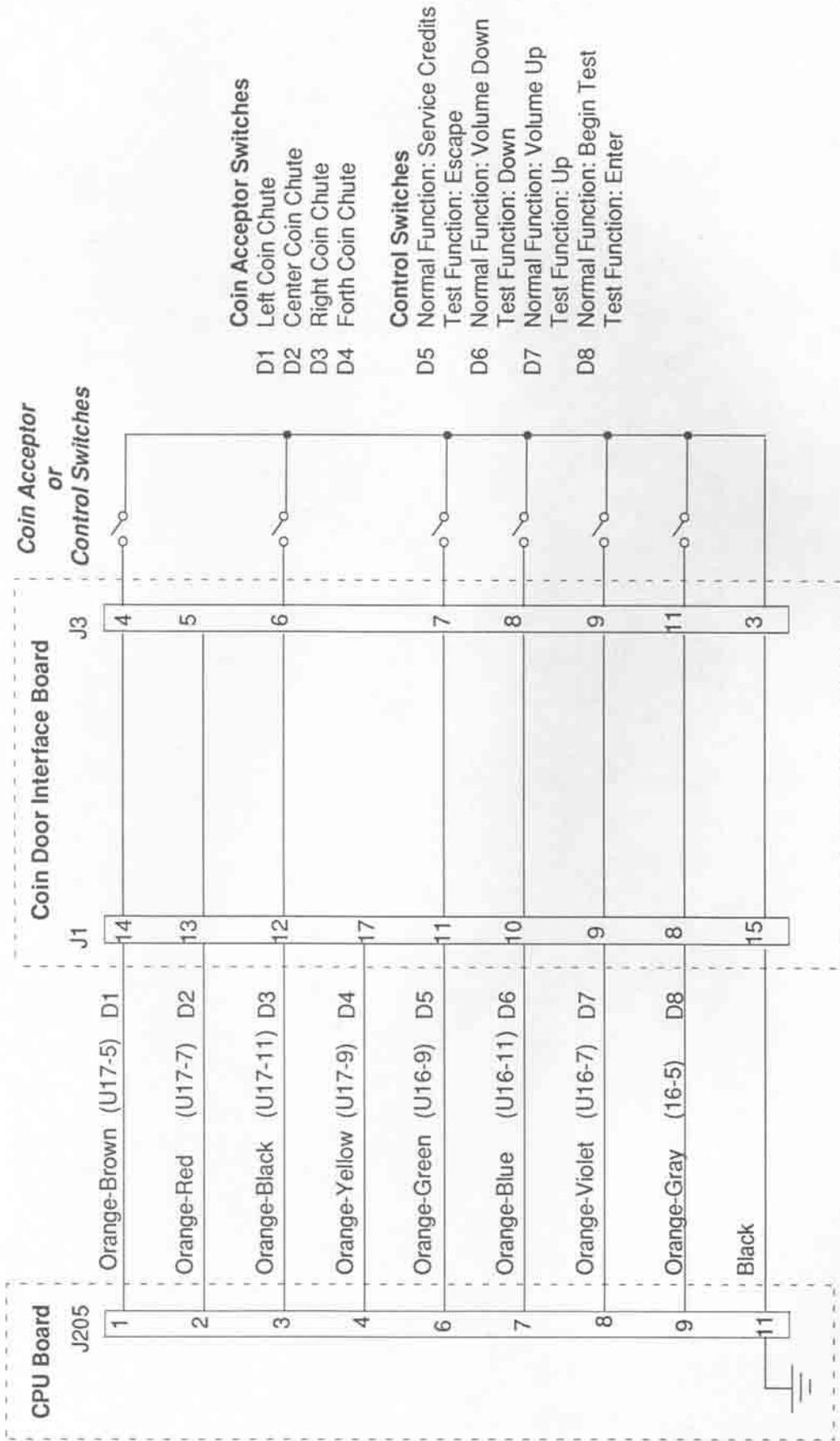
Switch Matrix Circuit



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

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

Dedicated Switches



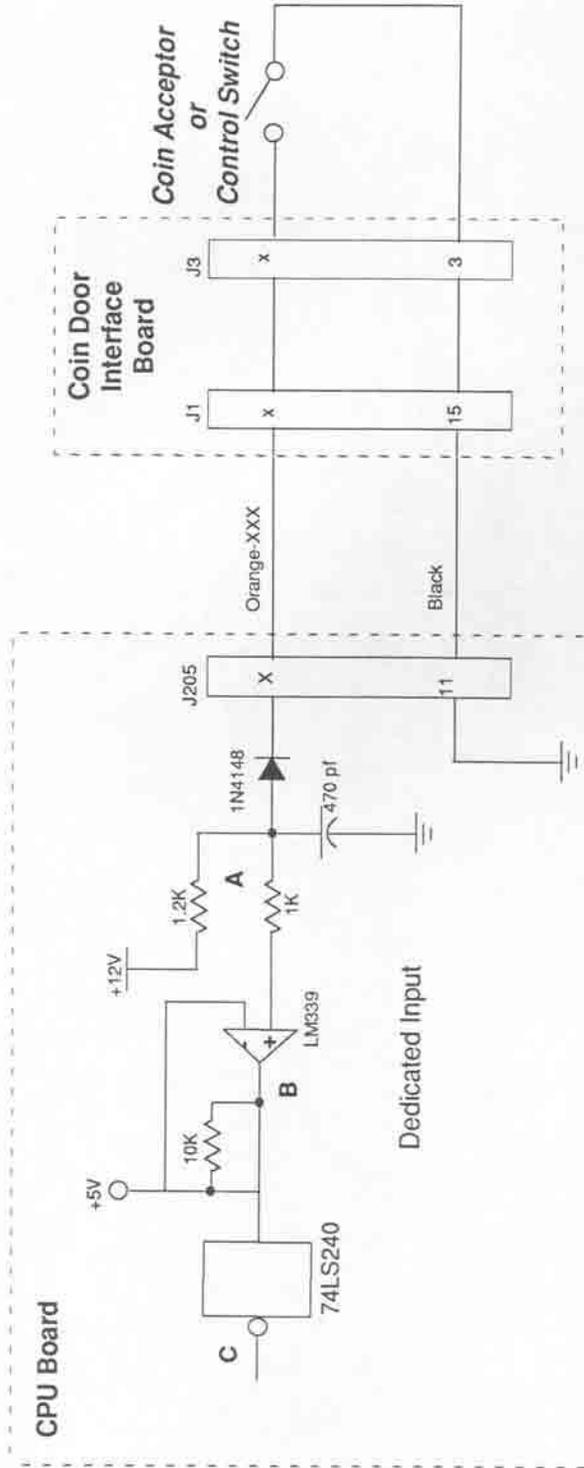
Coin Acceptor Switches

- D1 Left Coin Chute
- D2 Center Coin Chute
- D3 Right Coin Chute
- D4 Forth Coin Chute

Control Switches

- D5 Normal Function: Service Credits
- D6 Test Function: Escape
- D7 Normal Function: Volume Down
- D7 Test Function: Down
- D7 Normal Function: Volume Up
- D7 Test Function: Up
- D8 Normal Function: Begin Test
- D8 Test Function: Enter

Dedicated Switch Circuit



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

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

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

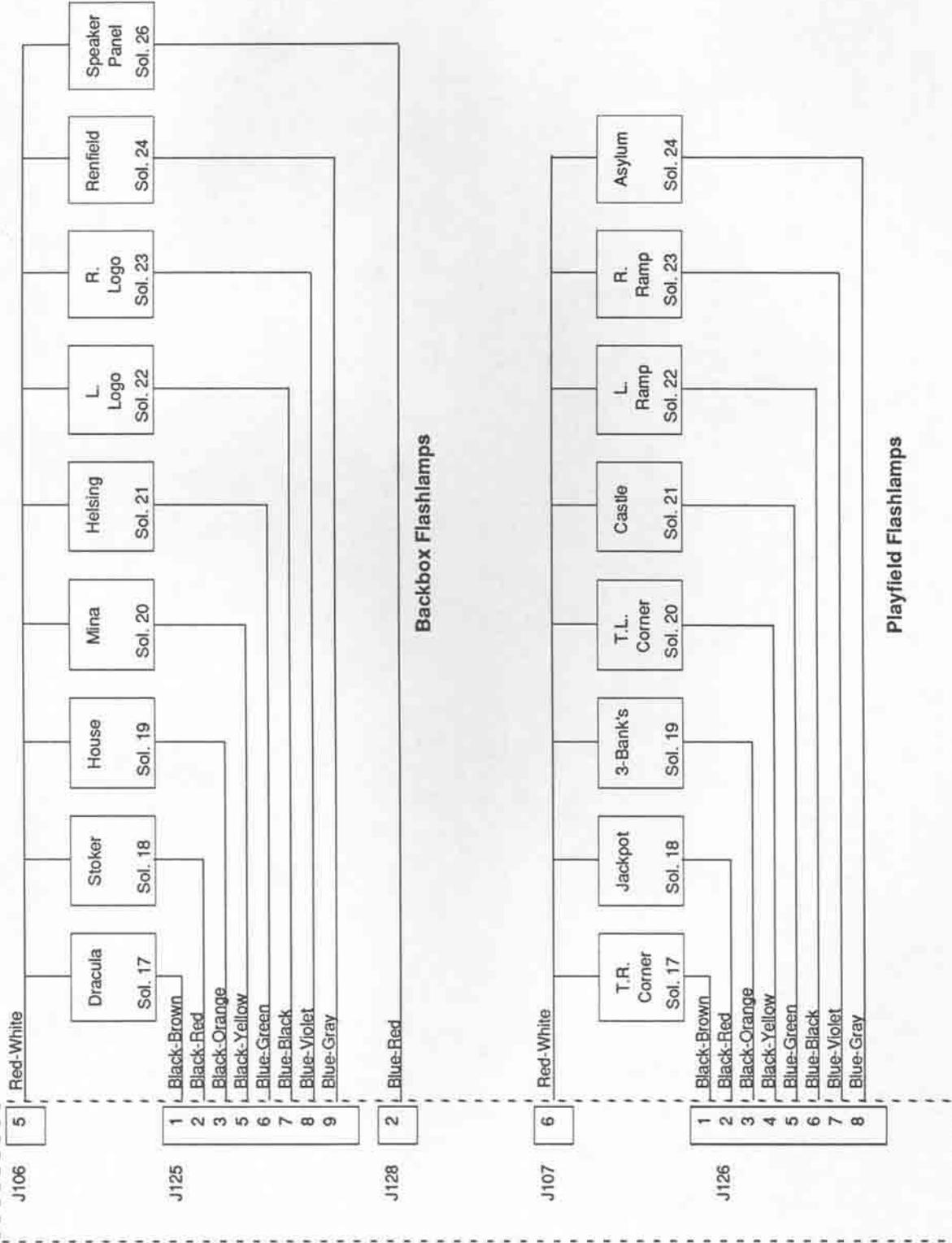
SOLENOID / FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections		Drive Xister	Drive Connections		Drive Wire Color	Solenoid Part Number	
			Playfield	Backbox		Backbox	Cabinet		Playfield	Backbox
01	Shooter	High Power	J107-3		Q82	J130-1		Vio-Brn	AE-23-800	
02	Coffin Popper	High Power	J107-3		Q80	J130-2		Vio-Red	AE-24-900	
03	Castle Popper	High Power	J107-3		Q78	J130-4		Vio-Org	AE-26-1500	
04	Right Ramp Down	High Power	J107-3		Q76	J130-5		Vio-Yel	AE-26-1200	
05	Crypt Popper	High Power	J107-3		Q64	J130-6		Vio-Grn	AE-26-1500	
06	Wire Ramp Ball Popper	High Power	J107-3		Q66	J130-7		Vio-Blu	AE-23-800	
07	Knocker	High Power	J107-3		Q68	J130-8		Vio-Blk	AE-23-800	
08	Shooter Ramp Entry	High Power	J107-3		Q70	J130-9		Vio-Gry	AE-26-1500	
09	Left Sling	Low Power	J107-2		Q58	J127-1		Brn-Blk	AE-26-1200	
10	Right Sling	Low Power	J107-2		Q56	J127-3		Brn-Red	AE-26-1200	
11	Left Jet	Low Power	J107-2		Q54	J127-4		Brn-Org	AE-26-1200	
12	Right Jet	Low Power	J107-2		Q52	J127-5		Brn-Yel	AE-26-1200	
13	Bottom Jet	Low Power	J107-2		Q50	J127-6		Brn-Grn	AE-26-1200	
14	Right Ramp Up	Low Power	J107-2		Q48	J127-7		Brn-Blu	SM1-28-900	
15	Outhole	Low Power	J107-2		Q45	J127-8		Brn-Vio	AE-27-1200	
16	Trough	Low Power	J107-2		Q44	J127-9		Brn-Gry	AE-26-1200	
17	T.R. Corner / Dracula FL	Flasher	J107-6	J106-5	Q42	J126-1	J125-1	Blk-Brn	(3) #906	(1) #906
18	Jackpot / Stoker FL	Flasher	J107-6	J106-5	Q40	J126-2	J125-2	Blk-Red	(1) #906	(1) #906
19	3-bank / House FL	Flasher	J107-6	J106-5	Q38	J126-3	J125-3	Blk-Org	(1) #89	(1) #906
20	T.L. Corner / Mina FL	Flasher	J107-6	J106-5	Q36	J126-4	J125-5	Blk-Yel	(1) #89, (1) #906	(1) #906
21	Castle / Heising FL	Flasher	J107-6	J106-5	Q28	J126-5	J125-6	Blu-Grn	(2) #89	(1) #906
22	L. Ramp / L. Logo FL	Flasher	J107-6	J106-5	Q30	J126-6	J125-7	Blu-Blk	(1) #906	(1) #906
23	R. Ramp / R. Logo FL	Flasher	J107-6	J106-5	Q34	J126-7	J125-8	Blu-Vio	(1) #906	(1) #906
24	Asylum / Renfield FL	Flasher	J107-6	J106-5	Q32	J126-8	J125-9	Blu-Gry	(1) #89	(1) #906
25	L. Drop Target	Low Power	J107-1		Q26	*J122-1		Blu-Brn	AE-26-1200	
26	Speaker Panel FL	Low Power	J107-1	J106-5	Q24		J128-2	Blu-Red		(3) #906
27	Magnet	Low Power	J107-1		Q22	*J122-3		Blu-Org	20-9831	
28	Magnet's Motor	Low Power	J107-6		Q20	J122-4		Blu-Yel	14-7981	
	General Illumination		Playfield	Backbox	Cabinet	Playfield	Backbox	Cabinet	Playfield	Backbox
01	Lower Playfield / Insert	G.I.	J121-1	J120-1	Q18	J121-7	J120-7		Wht-Brn	#555
02	Upper Playfield / Insert	G.I.	J121-2	J120-2	Q10	J121-8	J120-8		Wht-Org	#555
03	Center Playfield / Insert	G.I.	J121-3	J120-3	Q14	J121-9	J120-9		Wht-Yel	#555
04	Insert	G.I.		J120-5	Q16		J120-10		Wht-Grn	#555
05	Insert	G.I.		J120-6	Q12		J120-11	J119-1	Wht-Vio	#555
	Flipper Circuits		Playfield	Power	Hold	Playfield	Power	Hold		
	Lower Left Flipper	Flipper	J907-6,7 (Gry-Yel)	Q3	Q9	J902-7,9	Blu-Gry	Org-Blu		FL-15411
	Lower Right Flipper	Flipper	J907-8,9 (Blu-Yel)	Q4	Q11	J902-11,13	Blu-Vio	Org-Grn		FL-15411
33	Up/Down Post Diverter	Up Lt. F. Power	J907-2	Q1	Q5	J902-3	Blk-Blu	Org-Gry		AE-26-1500
34	Right Gate	Up Rt. F. Hold	J907-1		Q5	J902-1		Org-Gry		AE-26-1500
35	Dis. Castle Release Pst	Up Rt. F. Power	J907-5	Q2	Q7	J902-6	Blk-Yel			AE-26-1500
36	Left Ball Gate Actuator	Up Rt. F. Hold	J907-4		Q7	J902-4		Org-Vio		A-14406

* J122-1, 3 have tieback diodes at J122-5, 8 respectively.

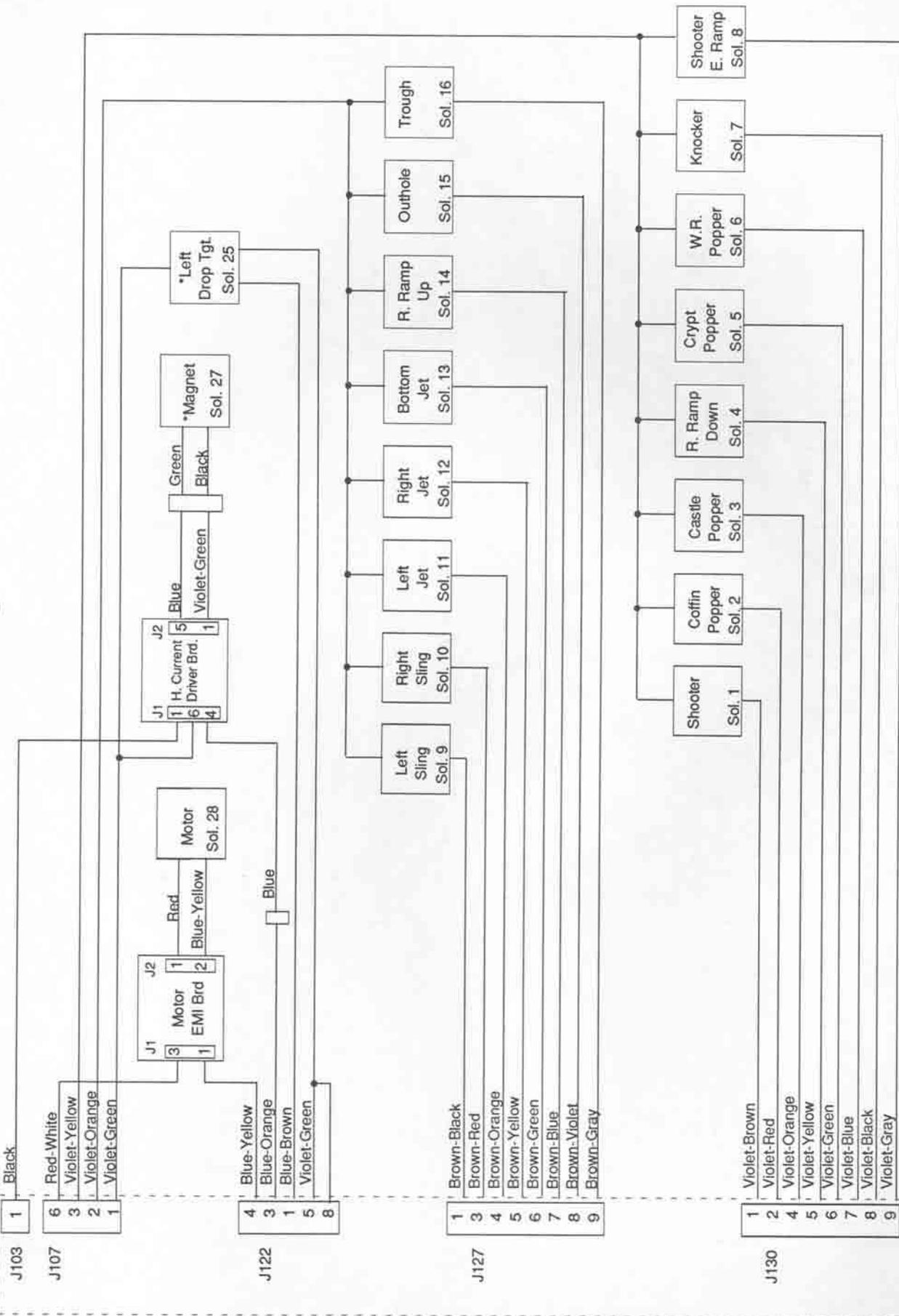
Flashlamp Wiring

Power Driver Board



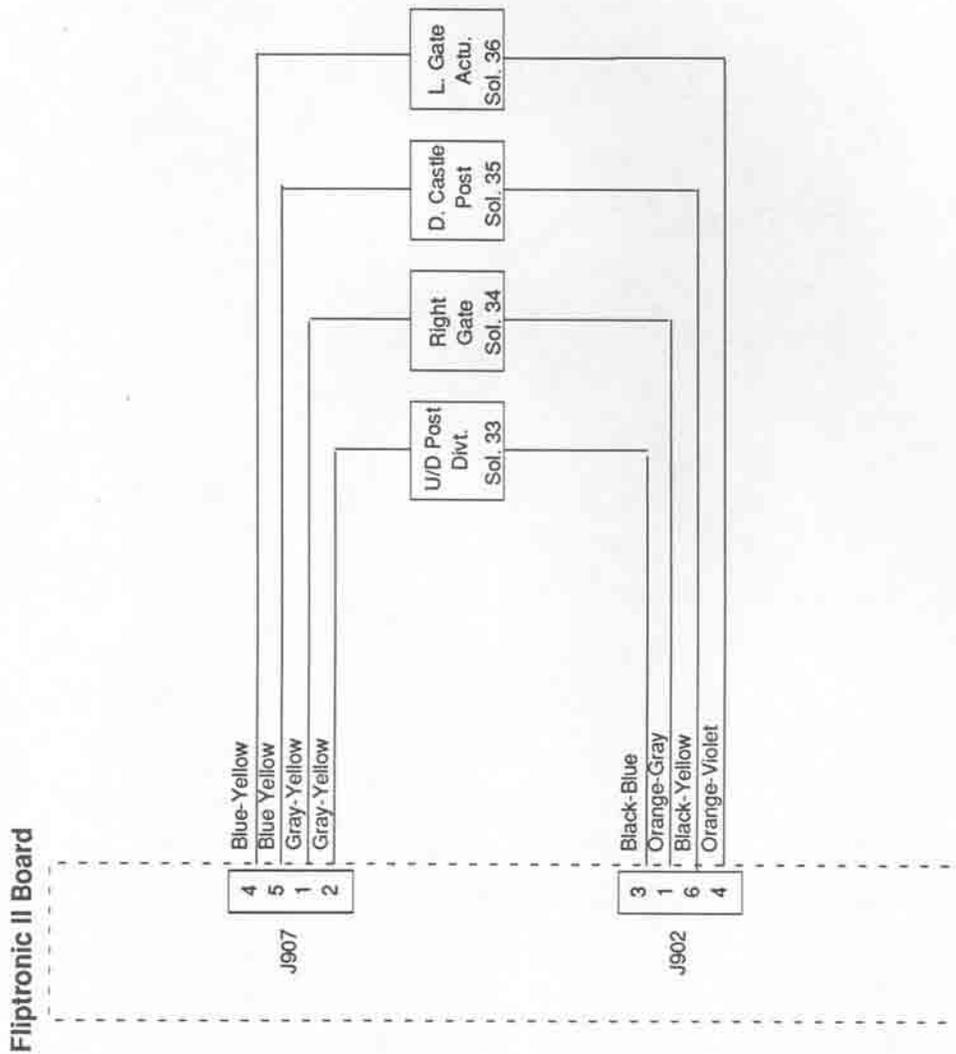
Solenoid Wiring

†Power_Driver Board

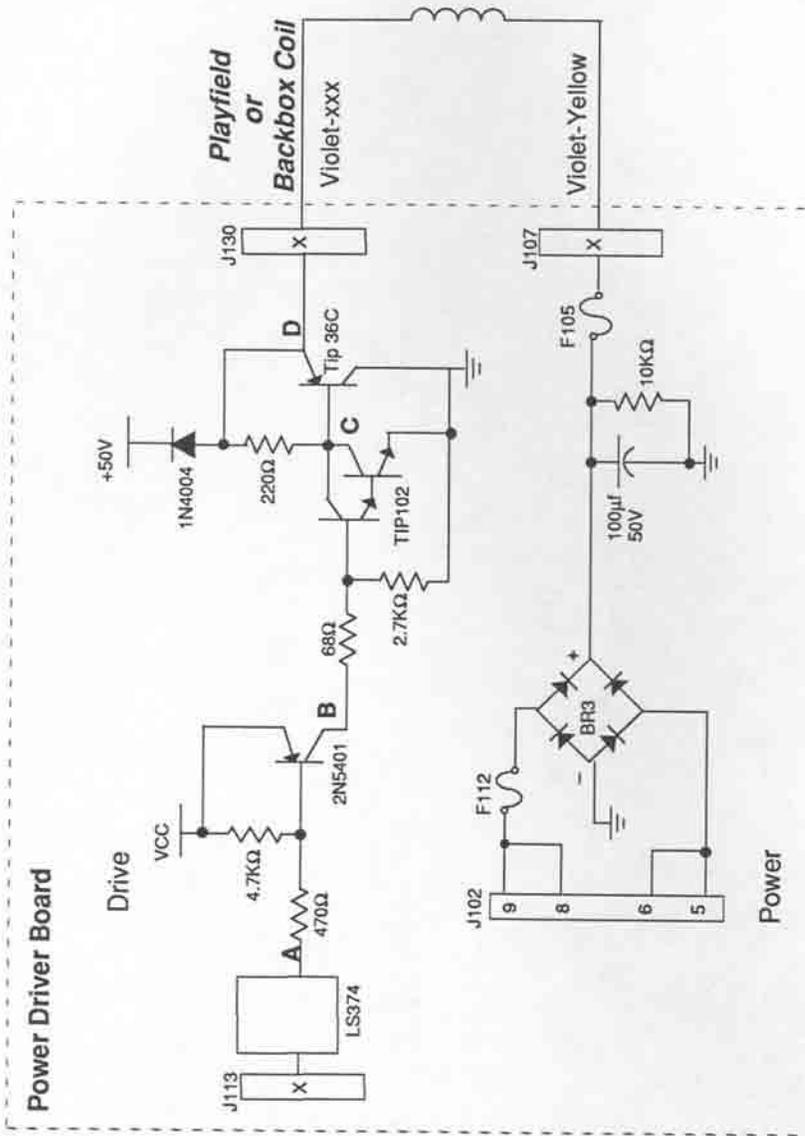


† See next page for Solenoid Wiring for Solenoids 33, 34, 35, and 36.
 * Solenoids 25 and 27 have tieback diodes.

Solenoid Wiring Continued...

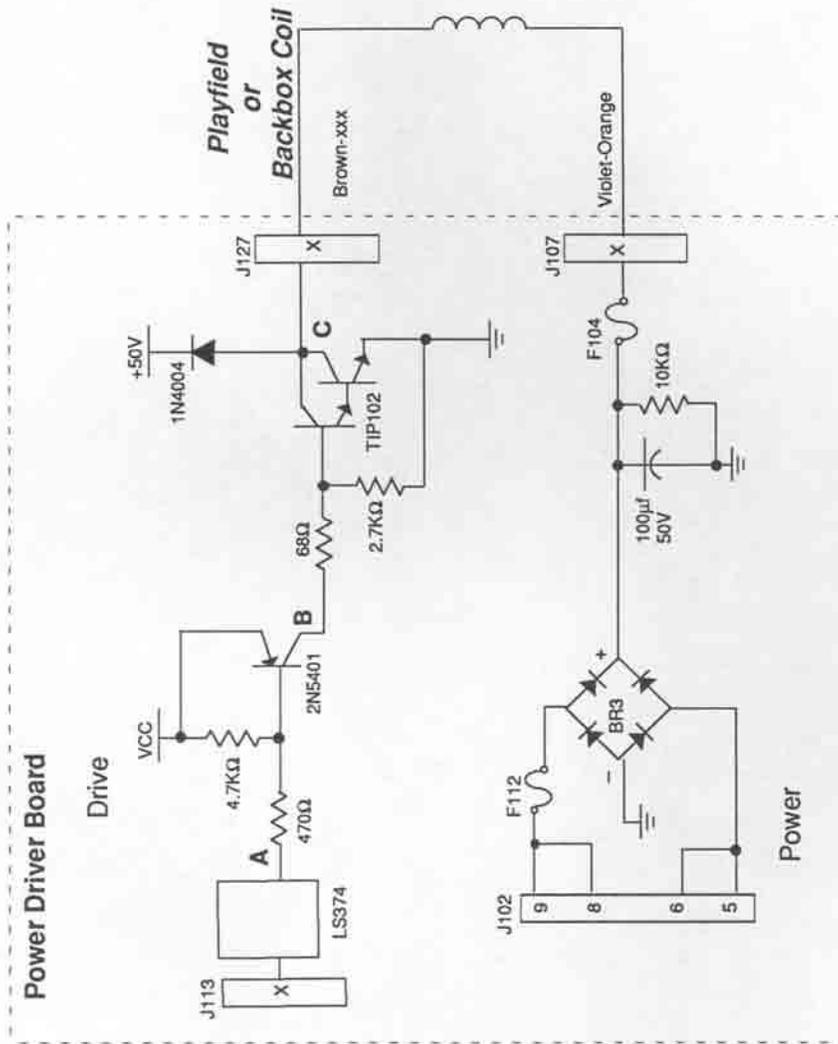


High Power Solenoid Circuit



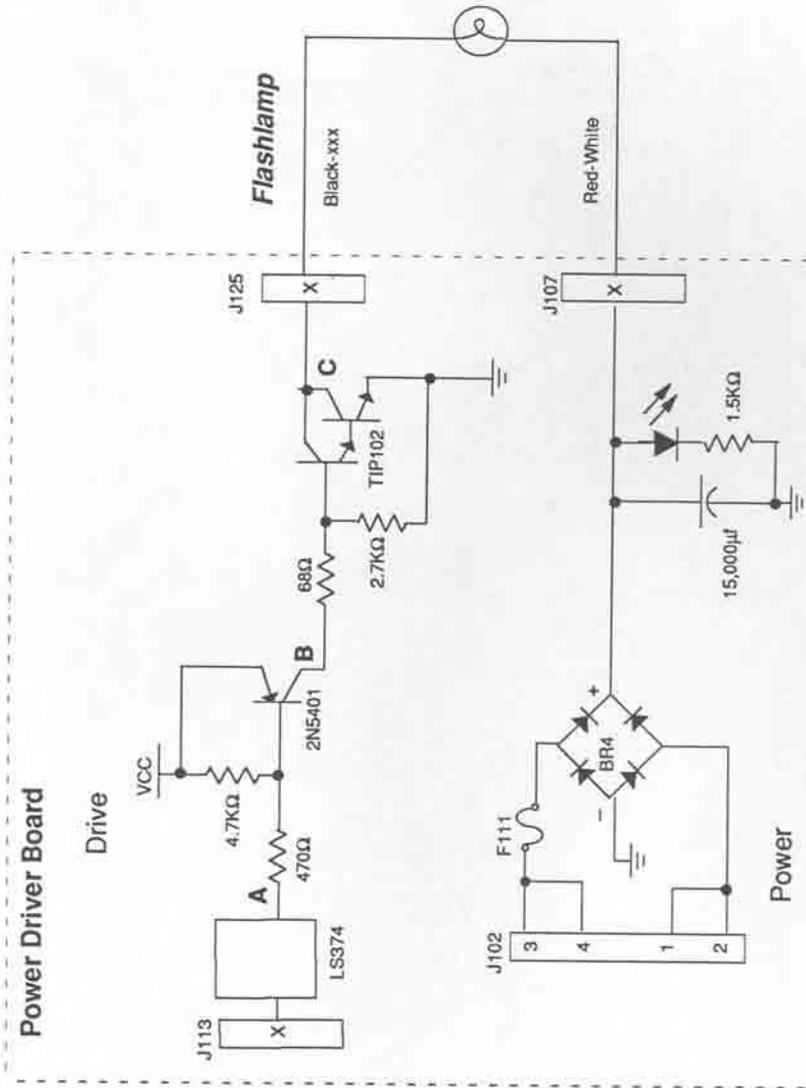
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" the collector of the 2N5401 transistor is high. A high at point "B" causes point "C" the collector of the TIP102 transistor, and point "D" the emitter of the TIP36 transistor to drop low. When point "D" is low the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

Low Power Solenoid Circuit



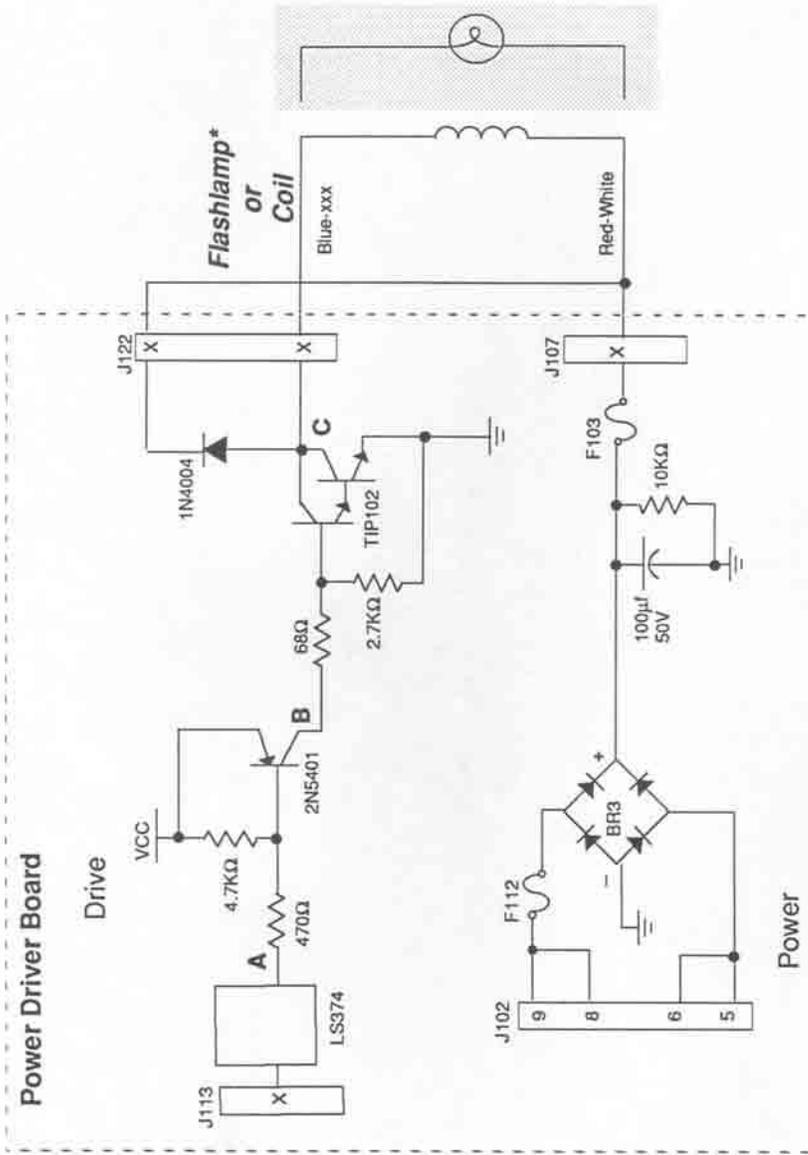
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the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

Flashlamp Circuit



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

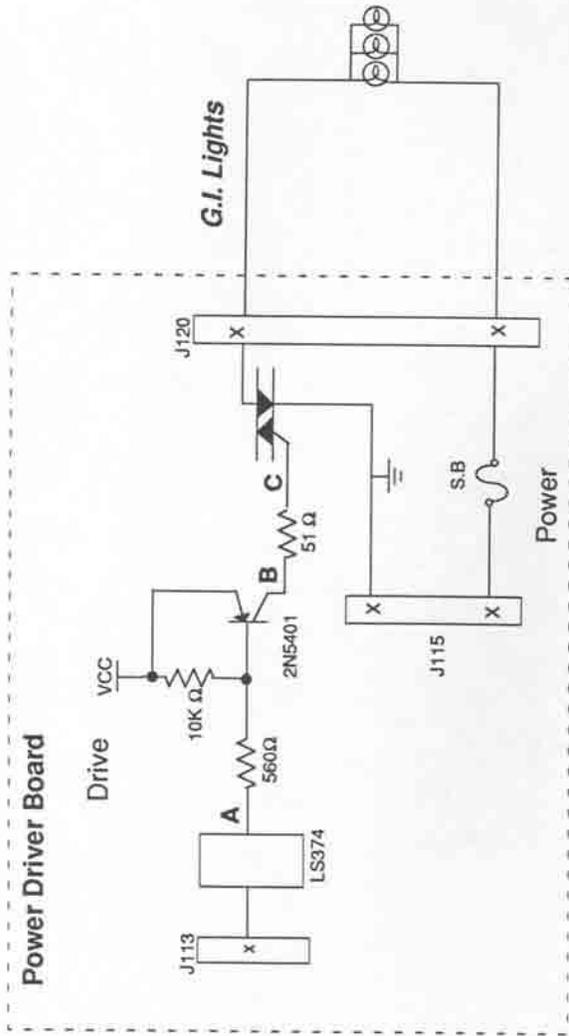
Special (General Purpose) Solenoid Circuit



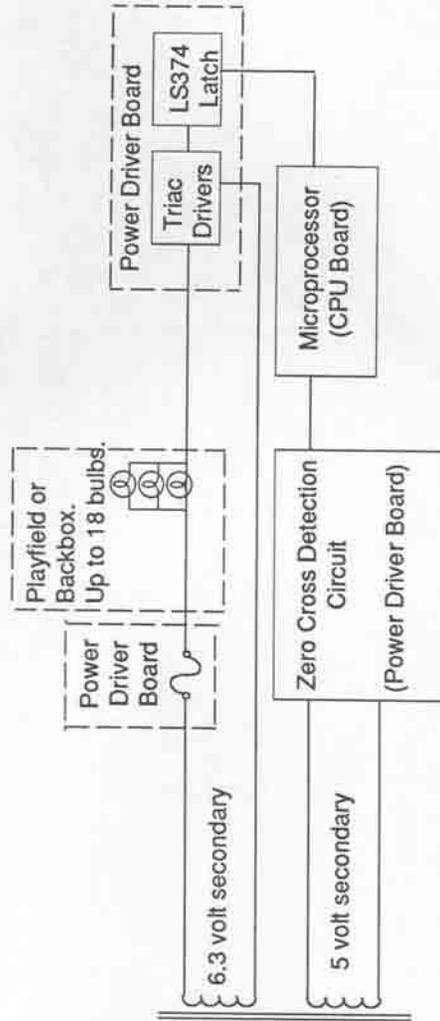
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the transistor and the coil/flashlamp turns On. When point "A" toggles high the coil/flashlamp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

* Tieback Diode is not used for flashlamp circuit.

General Illumination Circuit

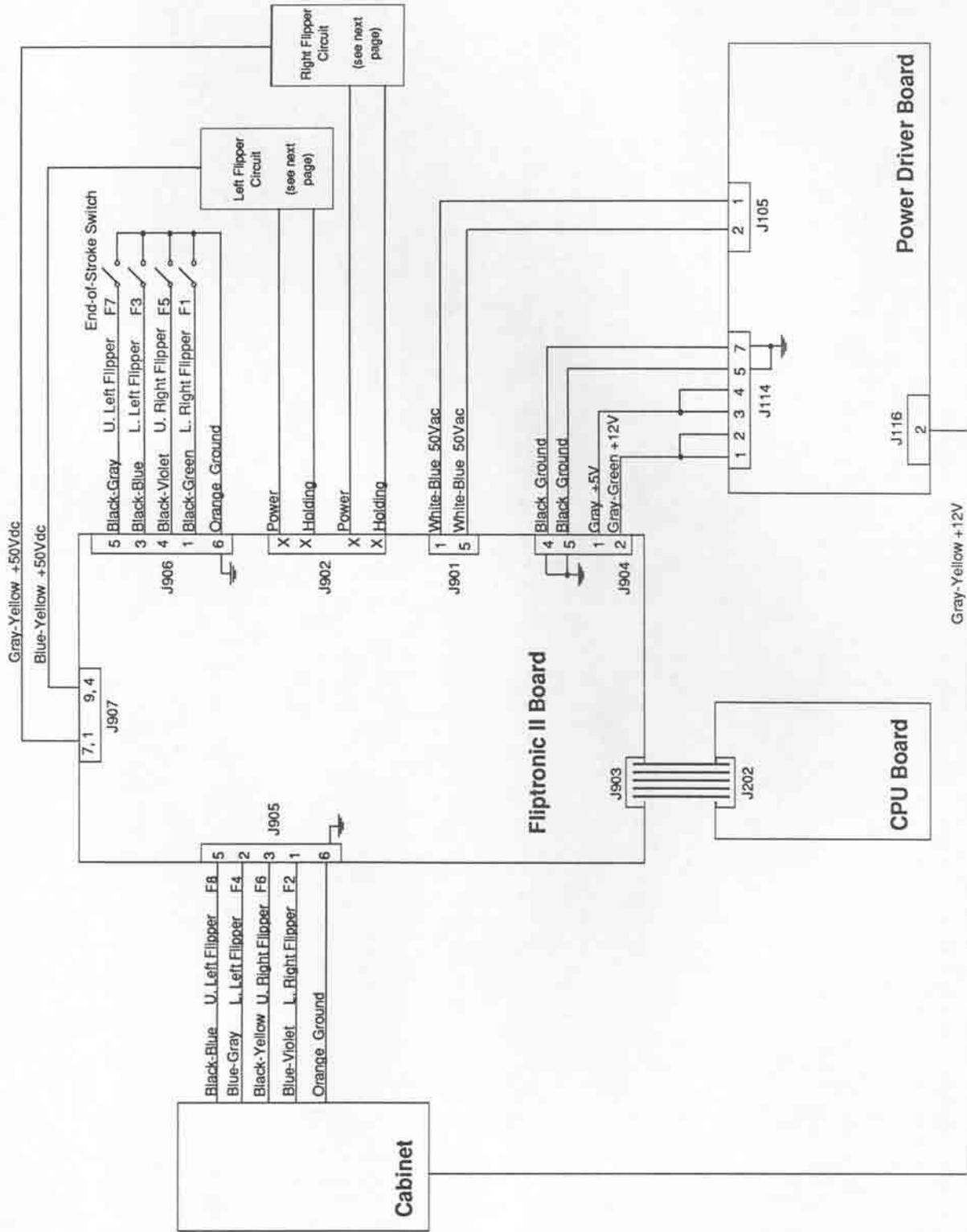


Block Diagram of General Illumination Circuit



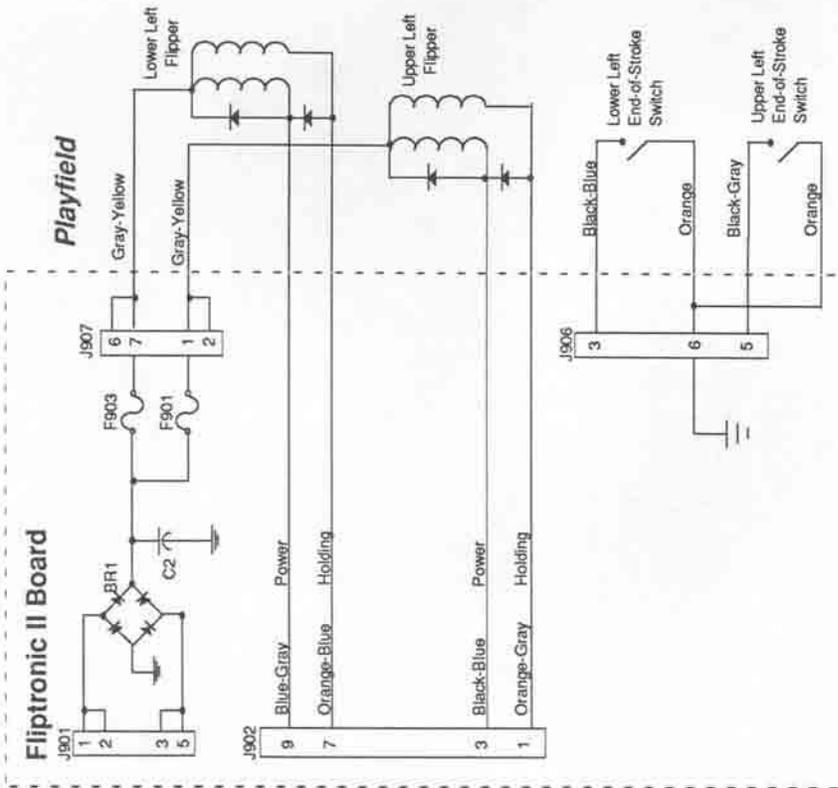
When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired General Illumination string lights.

Fliptronic II Flipper Circuit Diagram

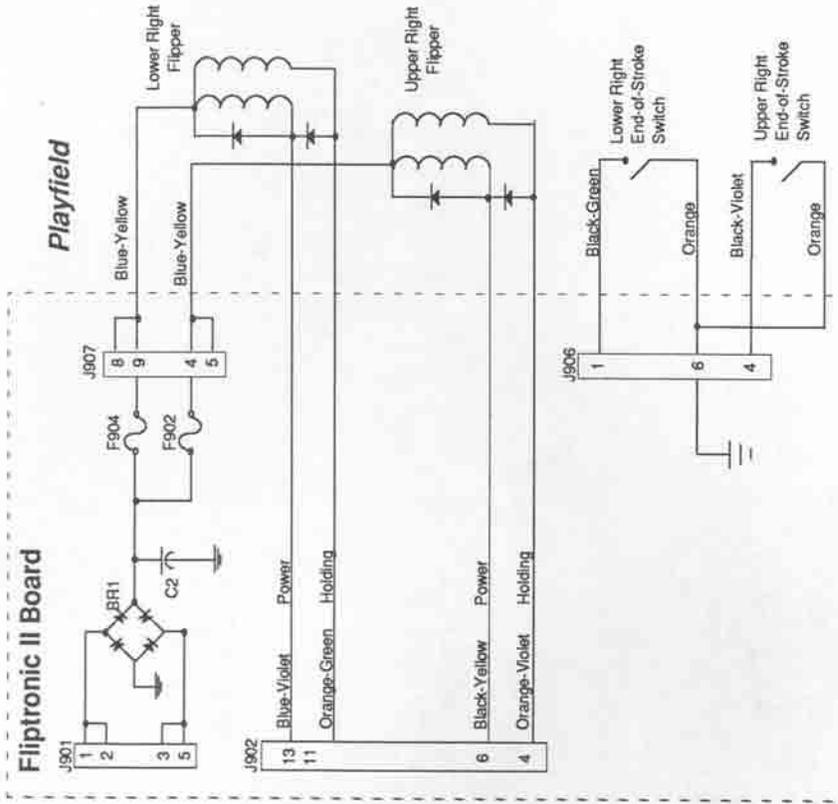


Fliptronic II Flipper Circuits

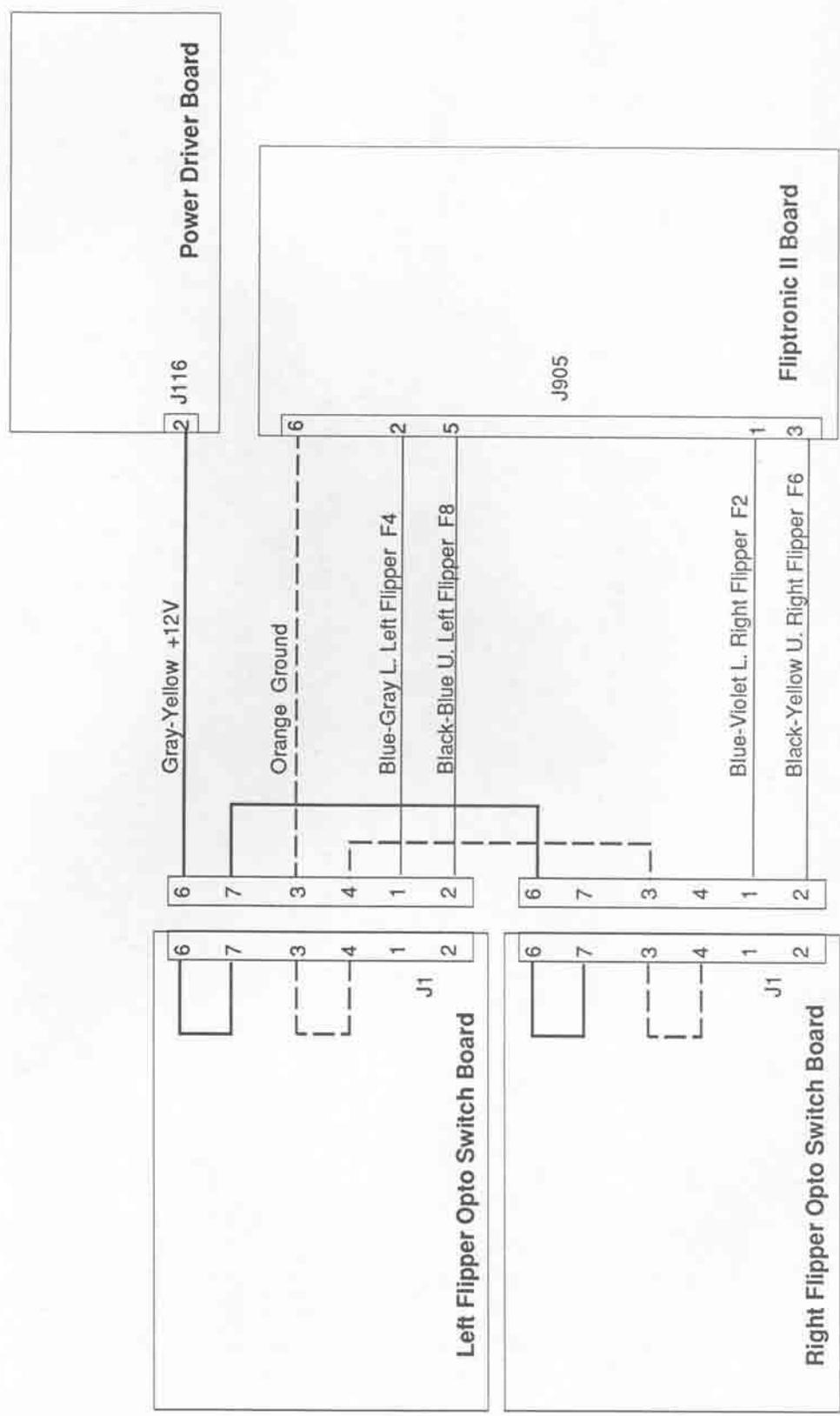
Left Flipper Circuit



Right Flipper Circuit

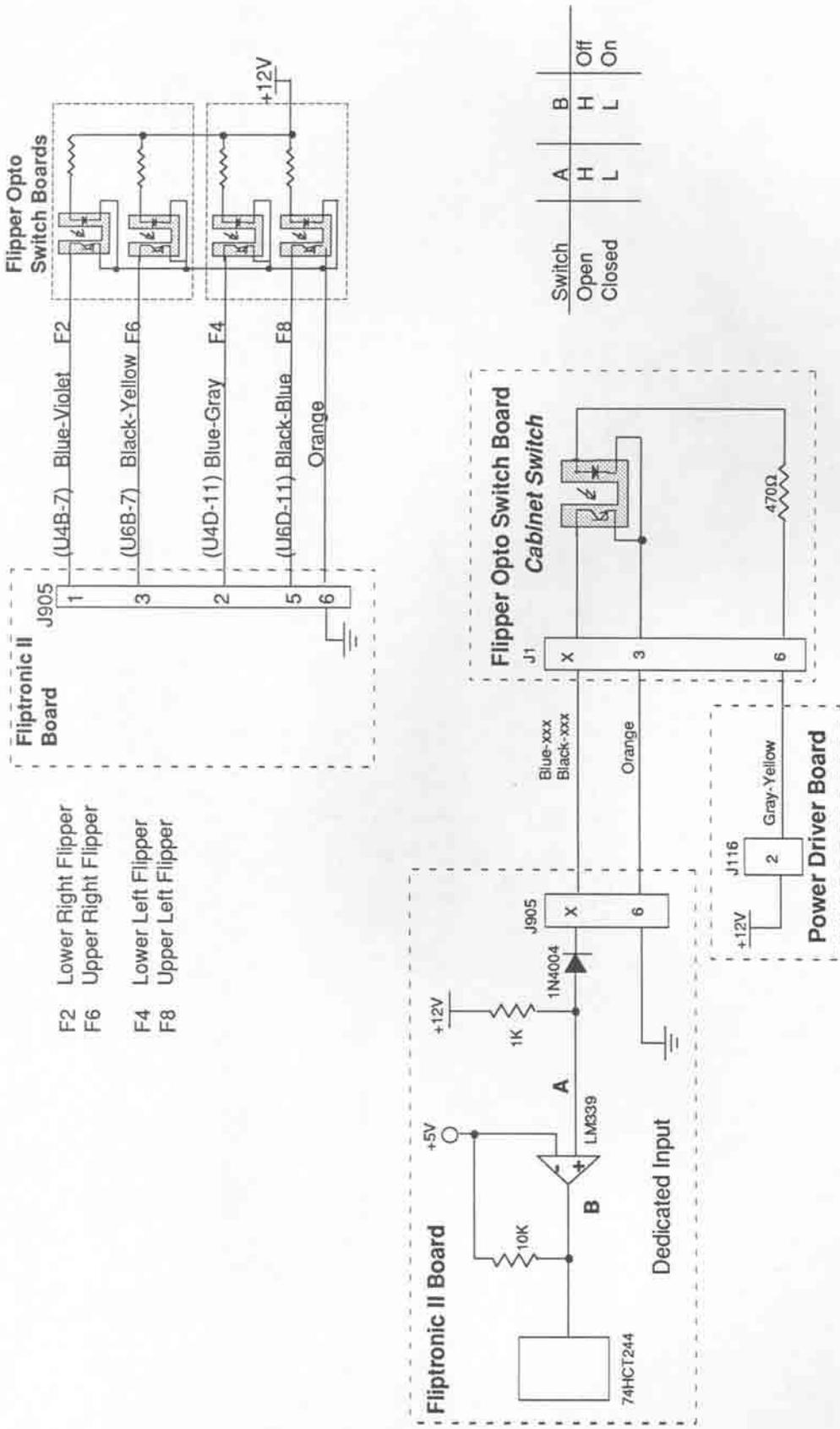


Fliptronic II Flipper Cabinet Switch Circuit Diagram



Fliptronic II Flipper Cabinet Switches

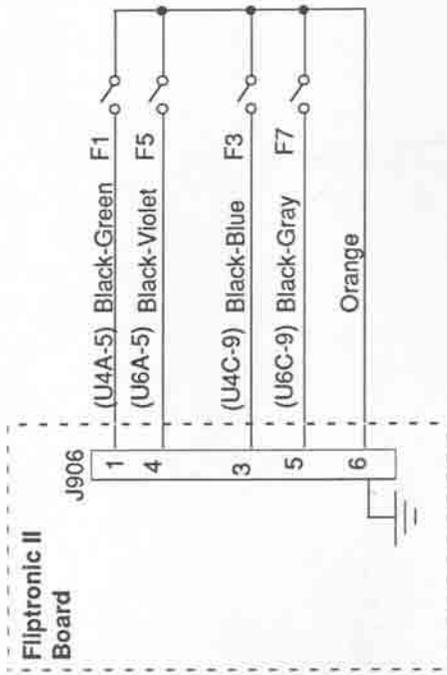
- F2 Lower Right Flipper
- F6 Upper Right Flipper
- F4 Lower Left Flipper
- F8 Upper Left Flipper



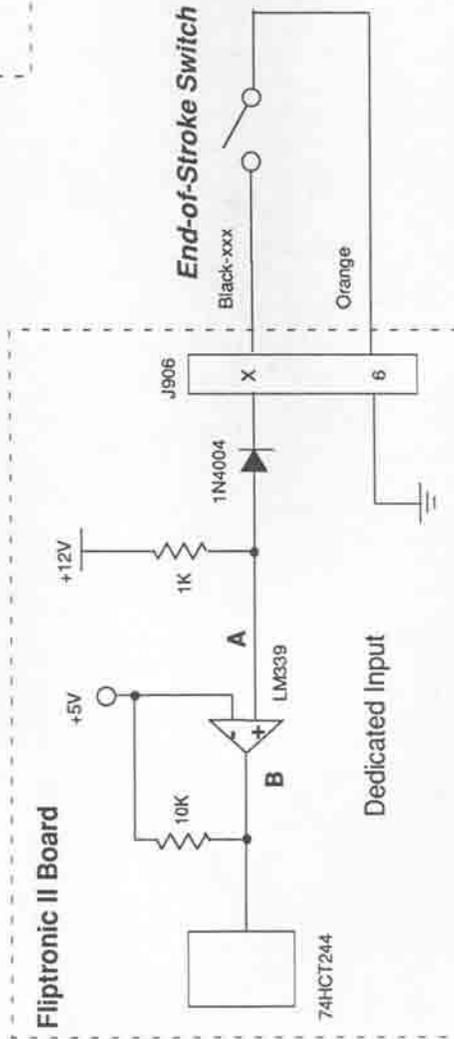
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

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

Fliptronic II Flipper End-of-Stroke Switches



- F1 Lower Right Flipper
- F5 Upper Right Flipper
- F3 Lower Left Flipper
- F7 Upper Left Flipper

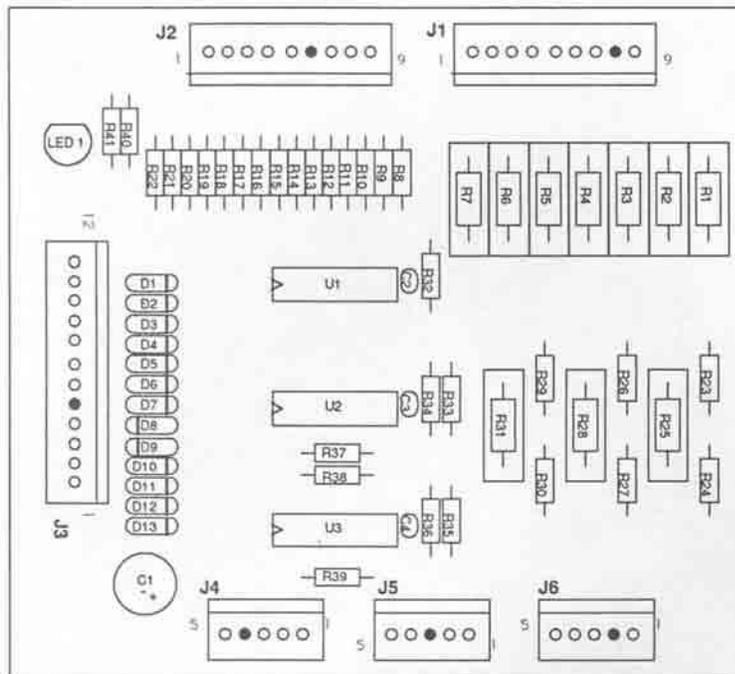


Switch	A	B
Open	H	H
Closed	L	L

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

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

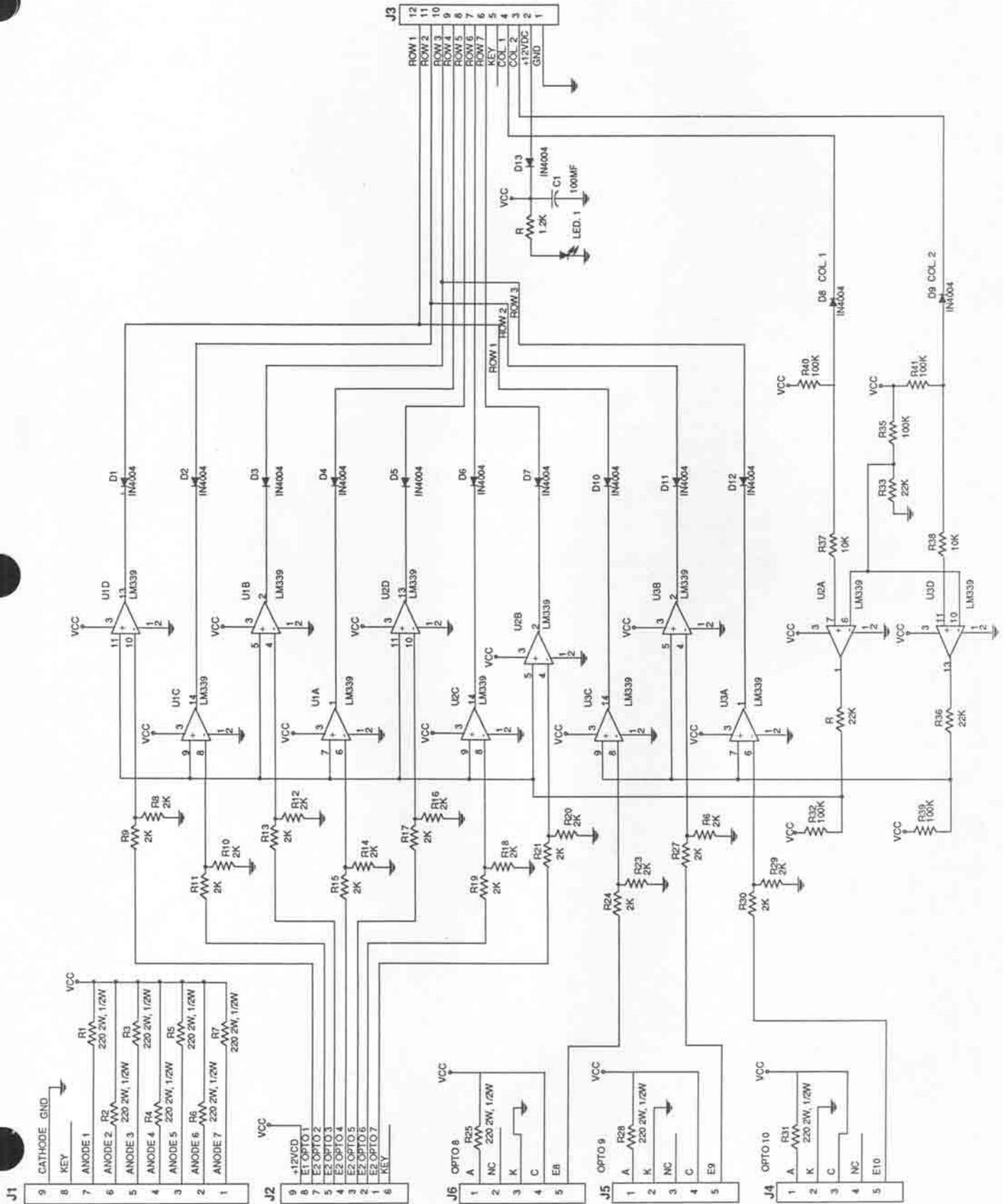
A-15430 10 Sw.-Opto PCB Assembly



- | | | | |
|---------|--|--------|---|
| J1 - 1 | Gray-Violet (Switch 57, Castle 3) to LED board anode | J5 - 1 | Gray-Red (Switch 72, Coffin Popper) to LED board anode |
| J1 - 2 | Gray-Blue (Switch 56, Crypt Popper) to LED board anode | J5 - 2 | NC |
| J1 - 3 | Gray-Green (Switch 55, Wire Ramp Popper) to LED board anode | J5 - 3 | Key |
| J1 - 4 | Gray-Black (Switch 54, Castle 2) to LED board anode | J5 - 4 | NC |
| J1 - 5 | Gray-Orange (Switch 53, Castle 1) to LED board anode | J5 - 5 | Orange-Red (Switch 72, Coffin Popper) to Photo Transistor board emitter |
| J1 - 6 | Gray-Red (Switch 52, Magnet Left Pocket) to LED board anode | | |
| J1 - 7 | Gray-Brown (Switch 51, T.R. Lane) to LED board anode | | |
| J1 - 8 | Key | | |
| J1 - 9 | Black (Ground) to LED board cathode | | |
| J2 - 1 | Orange-Violet (Switch 57, Castle 3) to Photo Transistor board emitter | | |
| J2 - 2 | Orange-Blue (Switch 56, Crypt Popper) to Photo Transistor board emitter | | |
| J2 - 3 | Orange-Green (Switch 55, Wire Ramp Popper) to Photo Transistor board emitter | | |
| J2 - 4 | Orange-Yellow (Switch 54, Castle 2) to Photo Transistor board emitter | | |
| J2 - 5 | Orange-Black (Switch 53, Castle 1) to Photo Transistor board emitter | | |
| J2 - 6 | Key | | |
| J2 - 7 | Orange-Red (Switch 52, Magnet Left Pocket) to Photo Transistor board emitter | | |
| J2 - 8 | Orange-Green (Switch 51, T.R. Lane) to Photo Transistor board emitter | | |
| J2 - 9 | Gray-Yellow (+12V) to Photo Transistor board collector | | |
| J3 - 1 | Black (Ground) from Power Driver Board J118-3 | J6 - 1 | Gray-Brown (Switch 71, Castle Popper) to LED board anode |
| J3 - 2 | Gray-Yellow (+12V) from Power Driver Board J118-2 | J6 - 2 | Key |
| J3 - 3 | Green-Violet (Switch Column 7) from CPU J207-7 | J6 - 3 | NC |
| J3 - 4 | Green-Black (Switch Column 5) from CPU J207-5 | J6 - 4 | NC |
| J3 - 5 | Key | J6 - 5 | Orange-Brown (Switch 71, Castle Popper) to Photo Transistor board emitter |
| J3 - 6 | White-Violet (Switch Row 7) from CPU J209-8 | | |
| J3 - 7 | White-Blue (Switch Row 6) from CPU J209-7 | | |
| J3 - 8 | White-Green (Switch Row 5) from CPU J209-5 | | |
| J3 - 9 | White-Yellow (Switch Row 4) from CPU J209-4 | | |
| J3 - 10 | White-Orange (Switch Row 3) from CPU J209-3 | | |
| J3 - 11 | White-Red (Switch Row 2) from CPU J209-2 | | |
| J3 - 12 | White-Green (Switch Row 1) from CPU J209-1 | | |
| J4 - 1 | Gray-Orange (Switch 73, Left Ramp Entry) to LED board anode | | |
| J4 - 2 | NC | | |
| J4 - 3 | NC | | |
| J4 - 4 | Key | | |
| J4 - 5 | Orange-Black (Switch 73, Left Ramp Entry) to Photo Transistor board emitter | | |

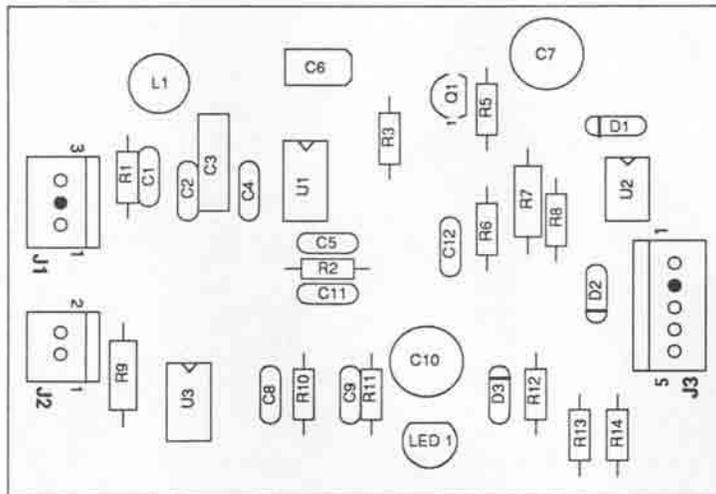
A-15430

10 Sw.-PCB Schematic

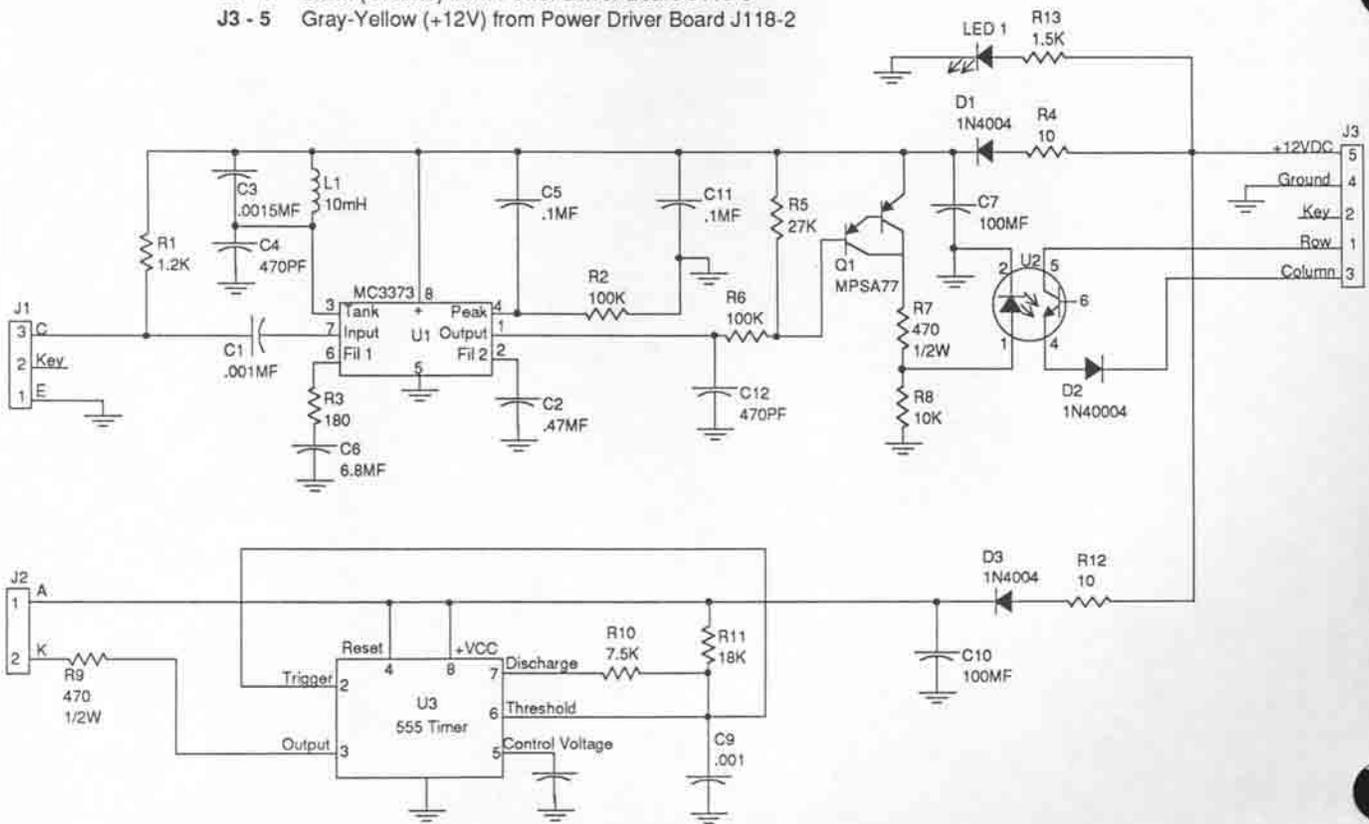


A-15646

24-Opto PCB Assembly & Schematic



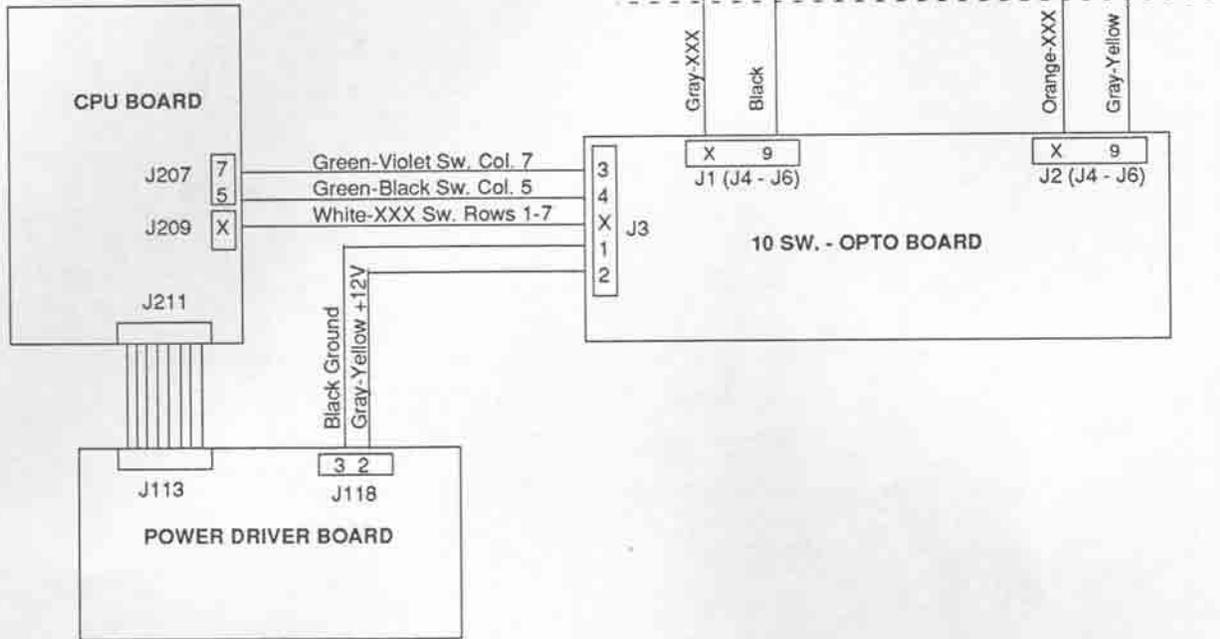
- J1 - 1 Black/Drain (Silver) (Switch 82, Ball On Magnet) to Photo Transistor Board emitter
- J1 - 2 Key
- J1 - 3 Red (+12V) to Photo Transistor Board collector
- J2 - 1 Gray (Switch 82, Ball On Magnet) to LED board anode
- J2 - 2 Black (Ground) to LED board cathode
- J3 - 1 White-Red (Switch Row 2) from CPU J209-2
- J3 - 2 Key
- J3 - 3 Green-Gray (Switch Column 8) from CPU J207-9
- J3 - 4 Black (Ground) from Power Driver Board J118-3
- J3 - 5 Gray-Yellow (+12V) from Power Driver Board J118-2



10 SW. - OPTO CIRCUIT BLOCK DIAGRAM

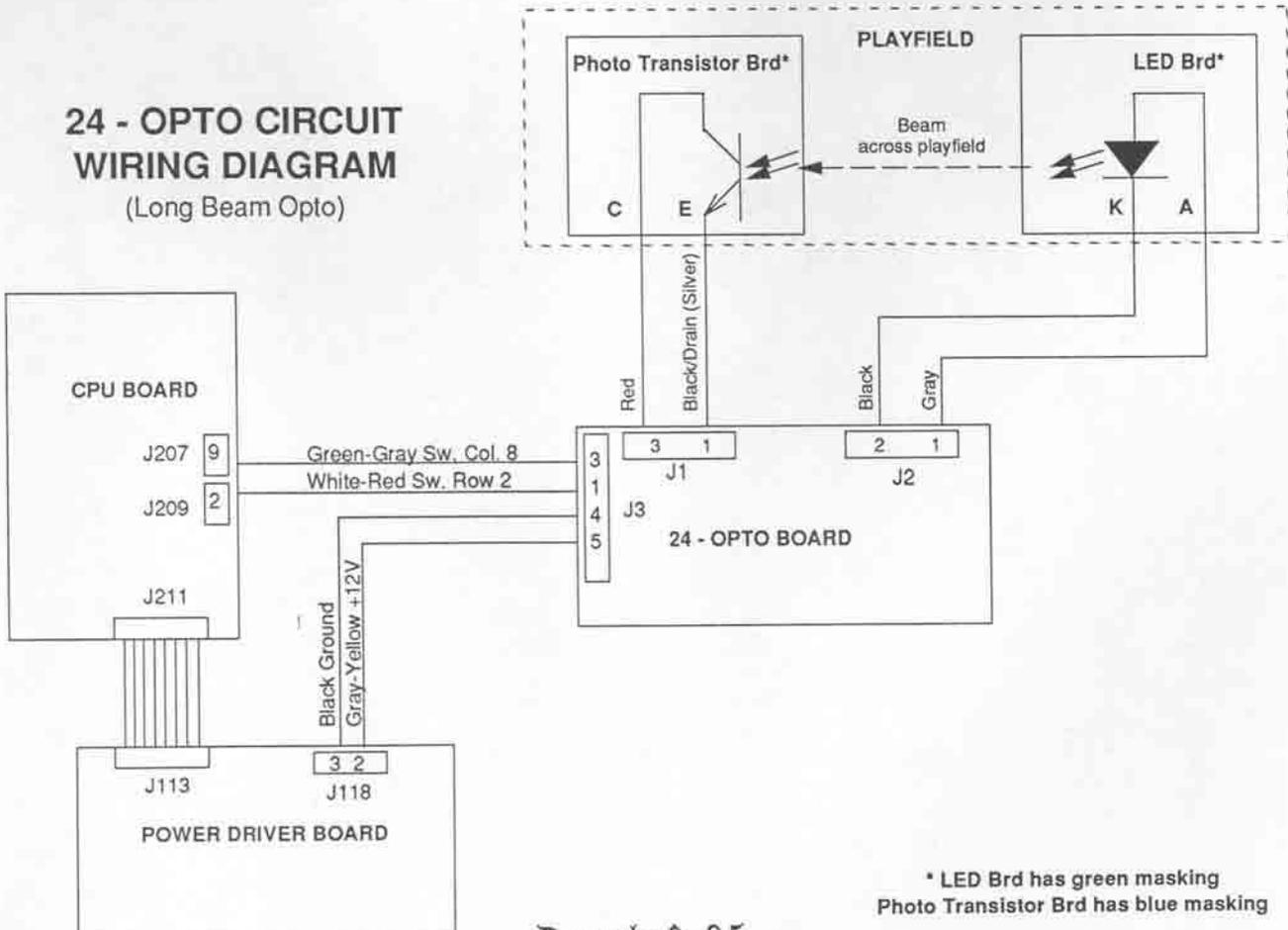
(Short Beam Optos)

(Note: This diagram represents 10 opto switch circuits.)



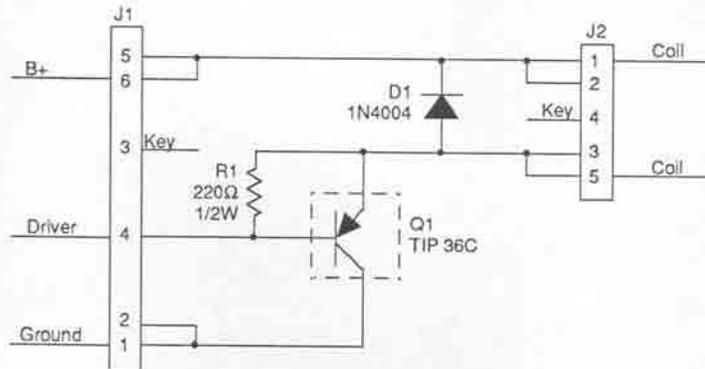
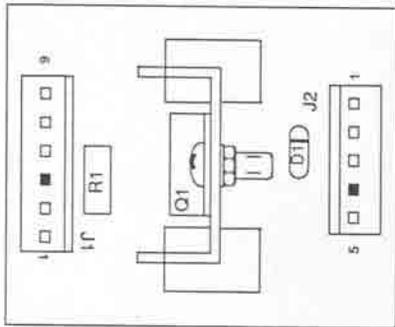
24 - OPTO CIRCUIT WIRING DIAGRAM

(Long Beam Opto)



* LED Brd has green masking
Photo Transistor Brd has blue masking

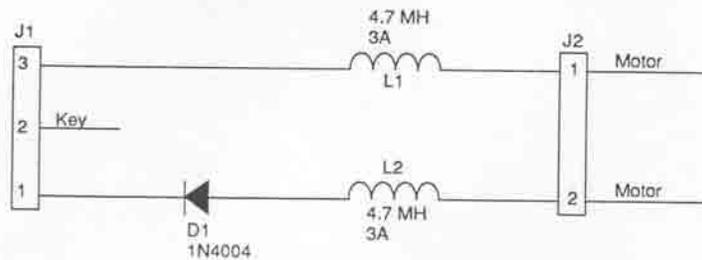
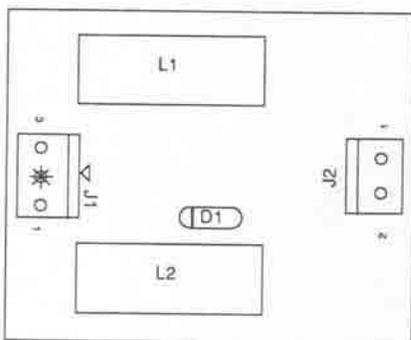
A-16697-1 High Current Driver Assembly



- J1 - 1 Black (Ground) from Power Driver Board J103-1
- J1 - 2 NC
- J1 - 3 Key
- J1 - 4 Blue (Blue-Orange, Sol. 27 drive) from Power Driver Board J122-1
- J1 - 5 NC
- J1 - 6 Violet-Green (+50V) from Power Driver Board J107-1

- J2 - 1 Violet-Green to Magnet
- J2 - 2 NC
- J2 - 3 NC
- J2 - 4 Key
- J2 - 5 Blue to Magnet

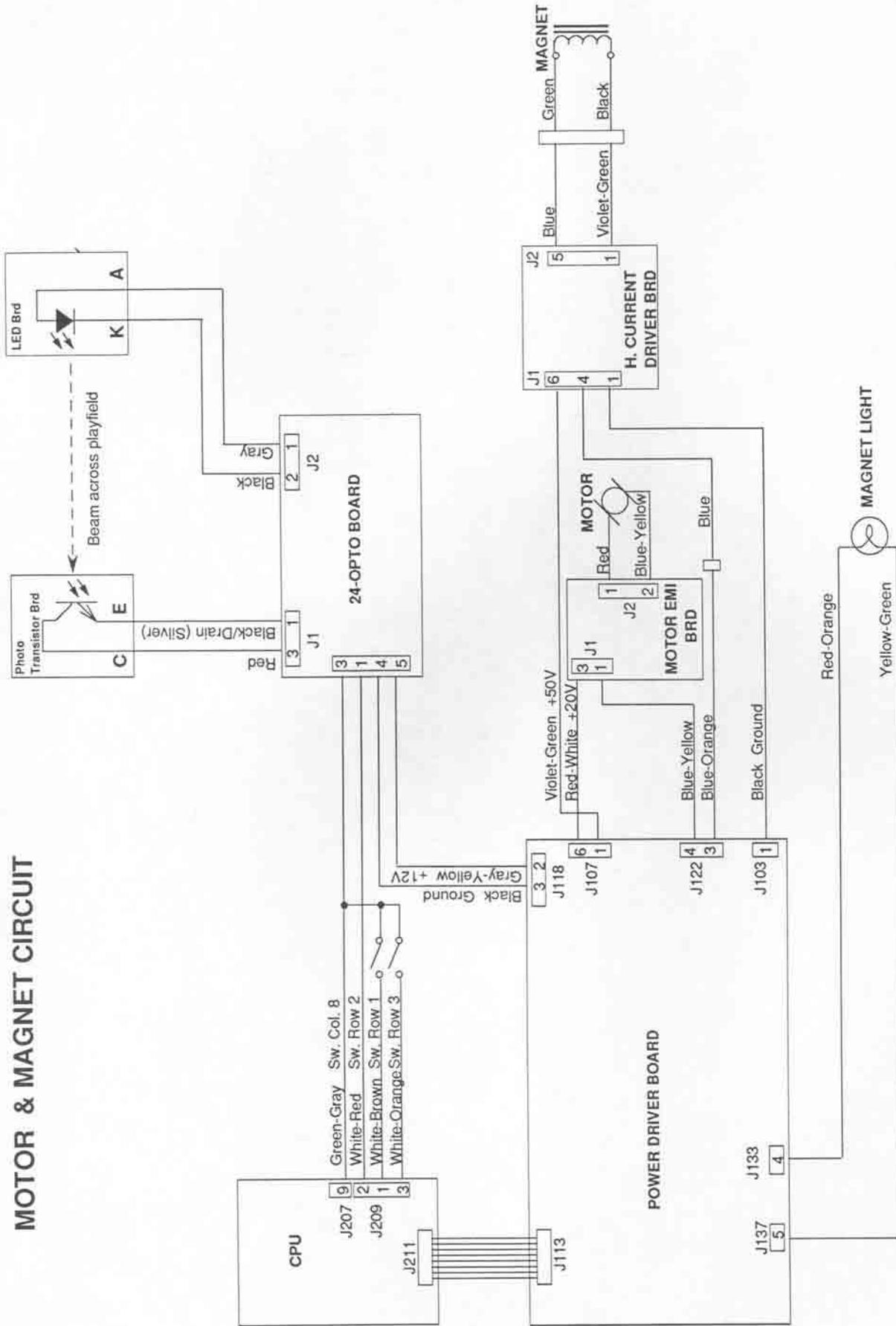
A-15542 Motor EMI Board Assembly



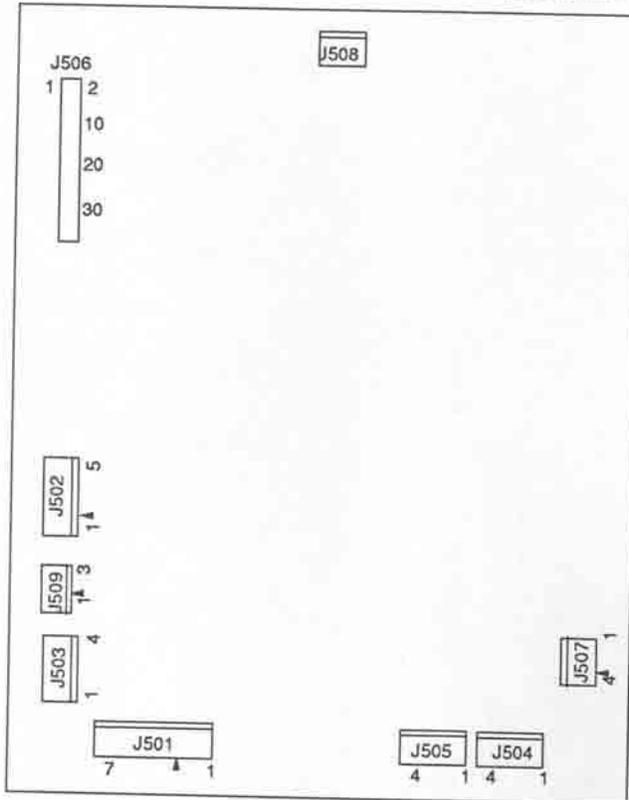
- J1 - 1 Blue-Yellow (Sol. 28 drive) from Power Driver Board J122-4
- J1 - 2 Key
- J1 - 3 Red-White (+20V) from Power Driver Board J107-6

- J2 - 1 Red to Motor
- J2 - 2 Blue-Yellow to Motor

MOTOR & MAGNET CIRCUIT



A-12738-50001 Audio Board Interboard Wiring



- J501 - 1 Gray-Green (18VAC) from xformer secondary
- J501 - 2 Gray-Green (18VAC) loop from J501-1
- J501 - 3 N/C
- J501 - 4 Gray (18VAC) from xformer secondary
- J501 - 5 Gray (18VAC) loop from J501-4
- J501 - 6 Gray-White (18VAC) from xformer secondary
- J501 - 7 Gray-White (18VAC) loop from J501-6

- J502 - 1 Gray (+5V) from Power Driver Board J114-3,4
- J502 - 2 N/C
- J502 - 3 Gray (+5V) from Power Driver Board J114-3,4
- J502 - 4 Black (Grd) from Power Driver Board J114-5,7
- J502 - 5 Black (Grd) from Power Driver Board J114-5,7

J503 - Not Used

- J504 - 1 N/C
- J504 - 2 N/C
- J504 - 3 Black (signal) to speaker
- J504 - 4 N/C

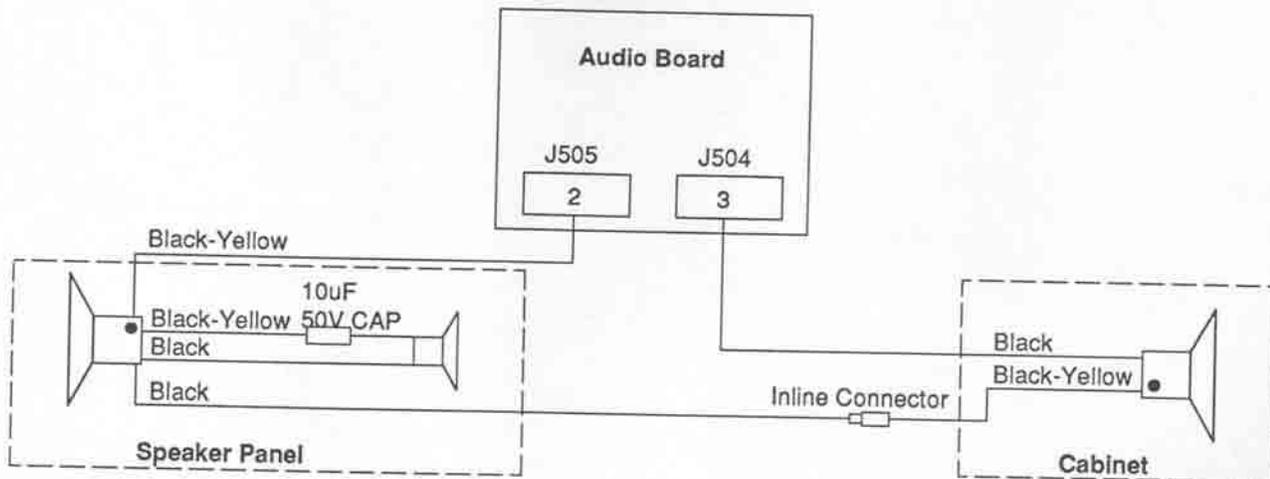
- J505 - 1 N/C
- J505 - 2 Black-Yellow (signal) to speaker
- J505 - 3 N/C
- J505 - 4 N/C

J506, 4-pin Ribbon Cable (data) To/from J601; J903; J202

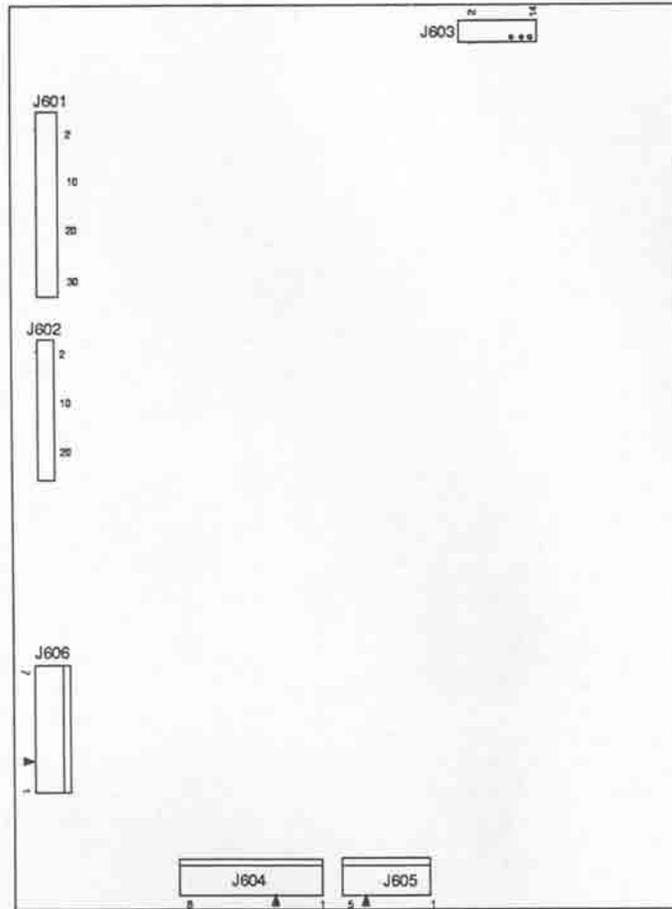
J507 - Not Used

- | | |
|--------------|--------------|
| J508 - 1 N/C | J509 - 1 N/C |
| J508 - 2 N/C | J509 - 2 N/C |
| J508 - 3 N/C | J509 - 3 N/C |
| J508 - 4 N/C | |

Speaker Wiring Diagram



A-14039 Dot Matrix Controller Board Interboard Wiring



J601, 34-pin Ribbon Cable (data) To/from J202; J903; J506

J602, 26-pin Ribbon Cable (data) To/from J201

J603, 14-pin Ribbon Cable (data) To/from Dot Matrix Display/Driver

- J604 - 1 Orange (-125V) to Display/Driver pin 1
- J604 - 2 Blue (-113V) to Display/Driver pin 2
- J604 - 3 N/C
- J604 - 4 Black (Grd) to Display/Driver pin 4
- J604 - 5 Black (Grd) to Display/Driver pin 5
- J604 - 6 Gray (+5V) to Display/Driver pin 6
- J604 - 7 Gray-Yellow (+12V) to Display/Driver pin 7
- J604 - 8 Brown (+62V) to Display/Driver pin 8

J605 - 1 White (80VAC) from xformer secondary

J605 - 2 White (80VAC) from xformer secondary

J605 - 3 Violet (100VAC) from xformer secondary

J605 - 4 N/C

J605 - 5 Violet (100VAC) from xformer secondary

J606 - 1 Black (Grd) loop from J606-3

J606 - 2 N/C

J606 - 3 Black (Grd) from Power Driver Brd J117-3

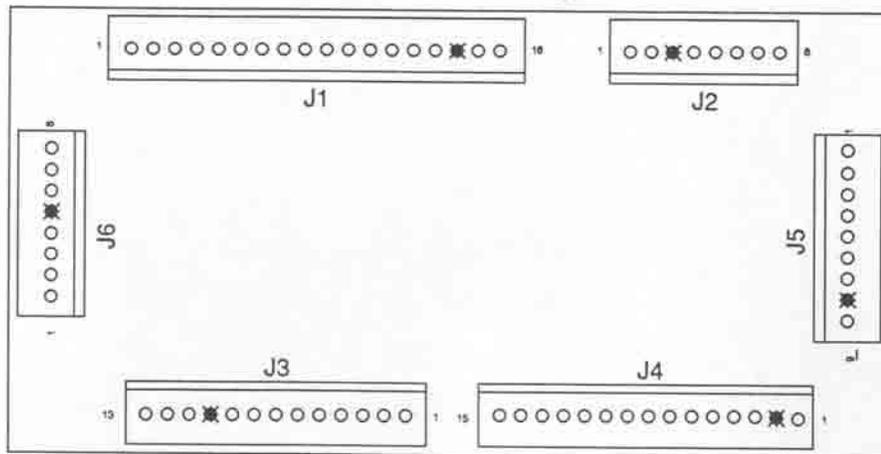
J606 - 4 Gray (+5V) loop from J606-5

J606 - 5 Gray (+5V) from Power Driver Brd J117-4

J606 - 6 Gray-Yellow (+12V) loop from J606-7

J606 - 7 Gray-Yellow (+12V) from Power Driver Brd J117-2

A-14689 Coin Door Interface Board Interboard Wiring



- J1 - 1 Green-Brown (sw. col. 1) from CPU J212-1
- J1 - 2 Red-Gray (lamp row 8) from Power Driver Brd J134-9
- J1 - 3 White-Yellow (sw. row 4) from CPU J212-8
- J1 - 4 White-Orange (sw. row 3) from CPU J212-7
- J1 - 5 White-Red (sw. row 2) from CPU J212-6
- J1 - 6 White-Brown (sw. row 1) from CPU J212-4
- J1 - 7 Green-Red (sw. col. 2) from CPU J212-2
- J1 - 8 Orange-Gray (dedicated sw. row 8) from CPU J205-9
- J1 - 9 Orange-Violet (dedicated sw. row 7) from CPU J205-8
- J1 - 10 Orange-Blue (dedicated sw. row 6) from CPU J205-7
- J1 - 11 Orange-Green (dedicated sw. row 5) from CPU J205-6
- J1 - 12 Orange-Black (dedicated sw. row 3) from CPU J205-3
- J1 - 13 Orange-Red (dedicated sw. row 2) from CPU J205-2
- J1 - 14 Orange-Brown (dedicated sw. row 1) from CPU J205-1
- J1 - 15 Black (Grd) from CPU J205-10
- J1 - 16 N/C
- J1 - 17 Orange-Yellow (dedicated sw. row 4) from CPU J205-4
- J1 - 18 Orange-White (sw. enable) from CPU J205-12

J4 - Not Used

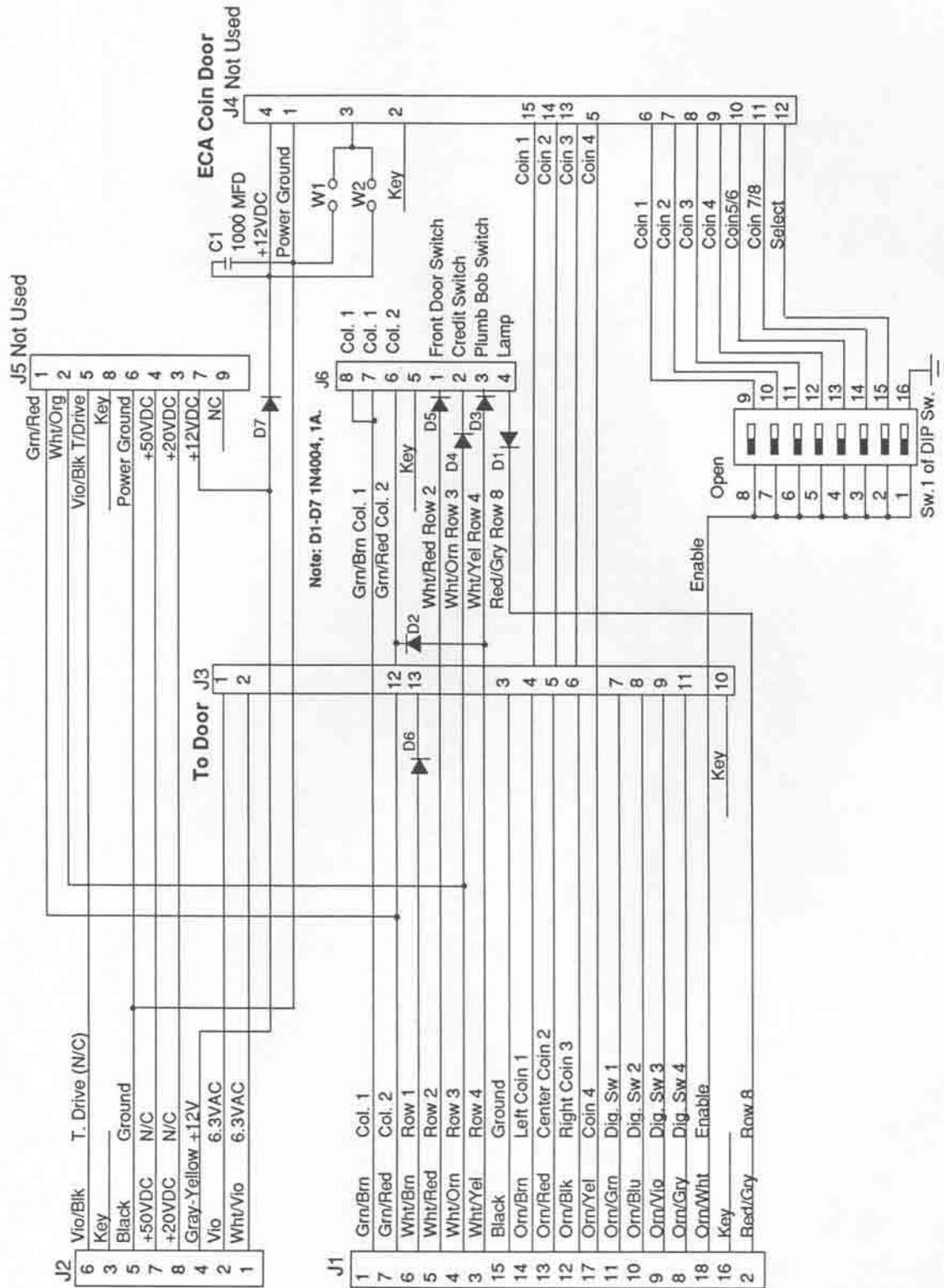
J5 - Not Used

- J6 - 1 White-Red (sw. row 2) to cabinet
- J6 - 2 White-Orange (sw. row 3) to cabinet
- J6 - 3 White-Yellow (sw. row 3) to cabinet
- J6 - 4 Red-Gray (lamp row 8) to cabinet
- J6 - 5 N/C
- J6 - 6 Green-Red (sw. col 2) to cabinet
- J6 - 7 Green-Brown (sw. col 1) to cabinet
- J6 - 8 Green-Brown (sw. col. 1) to cabinet

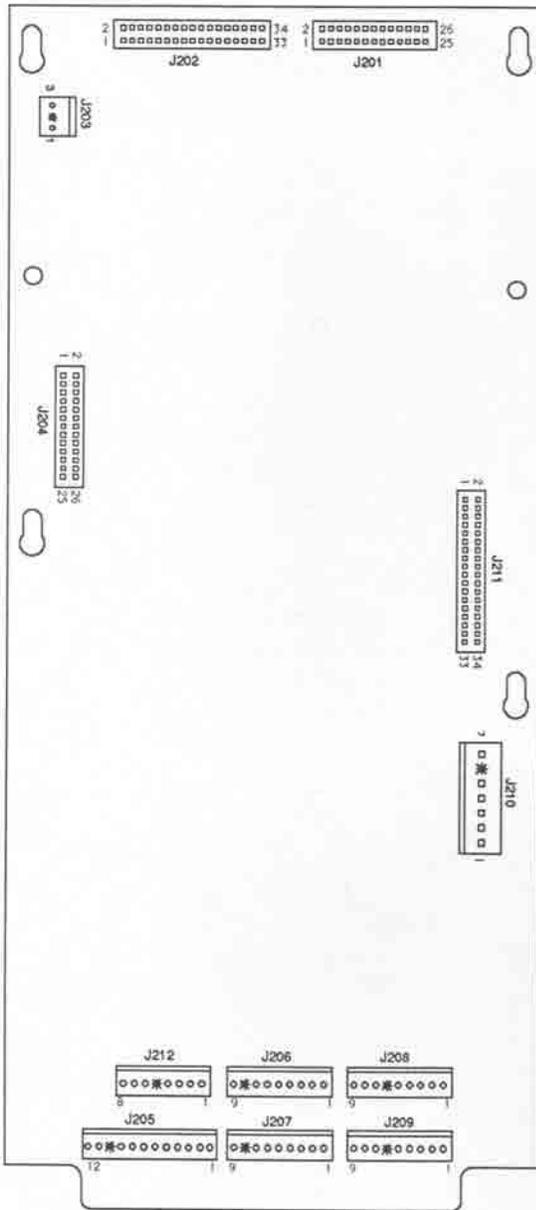
- J2 - 1 Violet (G.I. return) from Power Driver Board J119-3
- J2 - 2 Violet-White (G.I. 6.8VAC) from Power Driver Board J119-1
- J2 - 3 N/C
- J2 - 4 Gray-Yellow (+12V) from Power Driver Board J116-2
- J2 - 5 Black (Grd) from Power Driver Board J116-3
- J2 - 6 N/C
- J2 - 7 N/C
- J2 - 8 N/C

- J3 - 1 Violet (G.I. return) to coin door
- J3 - 2 White-Violet (G.I. 6.8VAC) to coin door
- J3 - 3 Black (Grd) to Door
- J3 - 4 Orange-Brown (dedicated sw. row 1) to coin door
- J3 - 5 N/C
- J3 - 6 Orange-Black (dedicated sw. row 3) to coin door
- J3 - 7 Orange-Green (dedicated sw. row 4) to coin door
- J3 - 8 Orange-Blue (dedicated sw. row 6) to coin door
- J3 - 9 Orange-Violet (dedicated sw. row 7) to coin door
- J3 - 10 N/C
- J3 - 11 Orange -Gray (dedicated sw. row 8) to coin door
- J3 - 12 Green-Red (sw. col. 2) to coin door
- J3 - 13 White-Brown (sw. row 1) to coin door

A-14689 Coin Door Interface Board Schematic



A-12742-50001 CPU Board



J201, 26-pin Ribbon Cable (data) To/from J602

J202, 34-pin Ribbon Cable (data) To/from J903; J506; J601

J203 - Not Used

J204 - Not Used

- J205 - 1 Orange-Brown (ded. sw. row 1) to Coin Door Brd J1-14
- J205 - 2 Orange-Red (ded. sw. row 2) to Coin Door Brd J1-13
- J205 - 3 Orange-Black (ded. sw. row 3) to Coin Door Brd J1-12
- J205 - 4 Orange-Yellow (ded. sw. row 4) to Coin Door J1-17
- J205 - 5 N/C
- J205 - 6 Orange-Green (ded. sw. row 5) to Coin Door Brd J1-11
- J205 - 7 Orange-Blue (ded. sw. row 6) to Coin Door Brd J1-10
- J205 - 8 Orange-Violet (ded. sw. row 7) to Coin Door Brd J1-9
- J205 - 9 Orange-Gray (ded. sw. row 8) to Coin Door Brd J1-8
- J205 - 10 Black (Grd) to Coin Door Brd J1-15
- J205 - 11 N/C
- J205 - 12 Orange-White (sw. enable) to Coin Door Brd J1-18

- J206 - 1 N/C
- J206 - 2 N/C
- J206 - 3 N/C
- J206 - 4 N/C
- J206 - 5 N/C
- J206 - 6 N/C
- J206 - 7 N/C
- J206 - 8 N/C
- J206 - 9 N/C

- J207 - 1 Green-Brown (sw. col. 1) to playfield switches
- J207 - 2 Green-Red (sw. col. 2) to playfield/cabinet switches
- J207 - 3 Green-Orange (sw. col. 3) to playfield switches
- J207 - 4 Green-Yellow (sw. col. 4) to playfield switches
- J207 - 5 Green-Black (sw. col. 5) to playfield switches
- J207 - 6 Green-Blue (sw. col. 6) to playfield switches
- J207 - 7 Green-Violet (sw. col. 7) to playfield switches
- J207 - 8 N/C
- J207 - 9 Green-Gray (sw. col. 8) to playfield switches

- J208 - 1 N/C
- J208 - 2 N/C
- J208 - 3 N/C
- J208 - 4 N/C
- J208 - 5 N/C
- J208 - 6 N/C
- J208 - 7 N/C
- J208 - 8 N/C
- J208 - 9 N/C

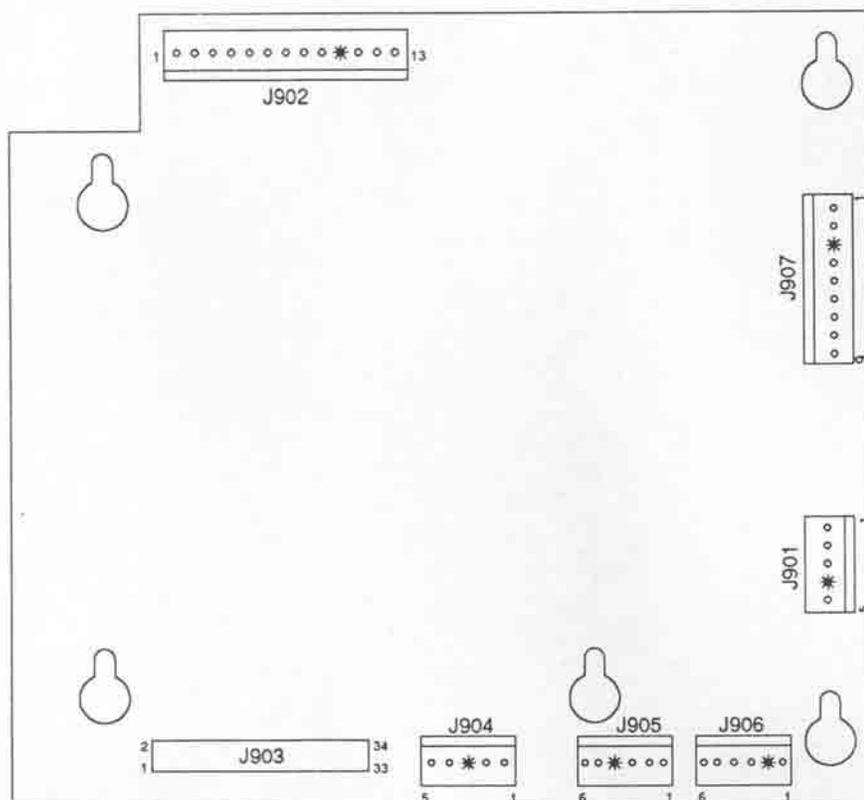
- J209 - 1 White-Brown (sw. row 1) to playfield switches
- J209 - 2 White-Red (sw. row 2) to playfield switches
- J209 - 3 White-Orange (sw. row 3) to playfield switches
- J209 - 4 White-Yellow (sw. row 4) to playfield switches
- J209 - 5 White-Green (sw. row 5) to playfield switches
- J209 - 6 N/C
- J209 - 7 White-Blue (sw. row 6) to playfield switches
- J209 - 8 White-Violet (sw. row 7) to playfield switches
- J209 - 9 White-Gray (sw. row 8) to playfield switches

- J210 - 1 Black (Grd) from Power Driver Brd J114-5,7
- J210 - 2 N/C
- J210 - 3 Black (Grd) from Power Driver Brd J114-5,7
- J210 - 4 Gray (+5V) from Power Driver Brd J114-3,4
- J210 - 5 Gray (+5V) from Power Driver Brd J114-3,4
- J210 - 6 Gray-Green (+12V) from Power Driver Brd J114-1,2
- J210 - 7 Gray-Green (+12V) from Power Driver Brd J114-1,2

J211, 34-pin Ribbon Cable (data) To/from J113

- J212 - 1 Green-Brown (sw. col. 1) to Coin Door Brd J1-1
- J212 - 2 Green-Red (sw. col. 2) to Coin Door J1-7
- J212 - 3 N/C
- J212 - 4 White-Brown (sw. row 1) to Coin Door Brd J1-6
- J212 - 5 N/C
- J212 - 6 White-Red (sw. row 2) to Coin Door Brd J1-5
- J212 - 7 White-Orange (sw. row 3) Coin Door Brd J1-4
- J212 - 8 White-Yellow (sw. row 4) to Coin Door Brd J1-3

A-15472 Fliptronic II Board Interboard Wiring



- J901 - 1 White-Blue (50VAC) from Power Driver Board J104-2
- J901 - 2 White-Blue (50VAC) loop from J901-1
- J901 - 3 White-Blue (50VAC) from Power Driver Board J104-1
- J901 - 4 N/C
- J901 - 5 White-Blue (50VAC) loop from J901-3

- J902 - 1 Orange-Gray (holding) upper left flipper coil
- J902 - 2 Black-Blue (power) upper left flipper coil
- J902 - 3 N/C
- J902 - 4 Orange-Violet (holding) upper right flipper coil
- J902 - 5 N/C
- J902 - 6 Black-Yellow (power) upper right flipper coil
- J902 - 7 Orange-Blue (holding) lower left flipper coil
- J902 - 8 N/C
- J902 - 9 Blue-Gray (power) lower left flipper coil
- J902 - 10 N/C
- J902 - 11 Orange-Green (holding) lower right flipper coil
- J902 - 12 N/C
- J902 - 13 Blue-Violet (power) lower right flipper coil

J903, 34-pin Ribbon Cable (data) To/from J202; J601; J506

- J904 - 1 Gray (+5V) from Power Driver Board J114-3,4
- J904 - 2 Gray-Green (+12V) from Power Driver Board J114-1,2
- J904 - 3 N/C
- J904 - 4 Black (Grd) from Power Driver Board J114-5,7
- J904 - 5 Black (Grd) from Power Driver Board J114-5,7

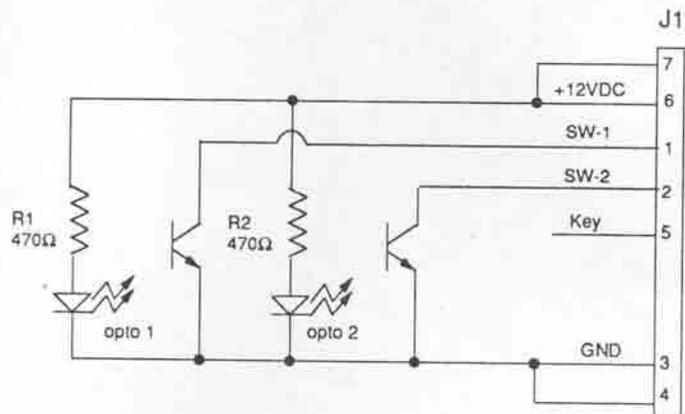
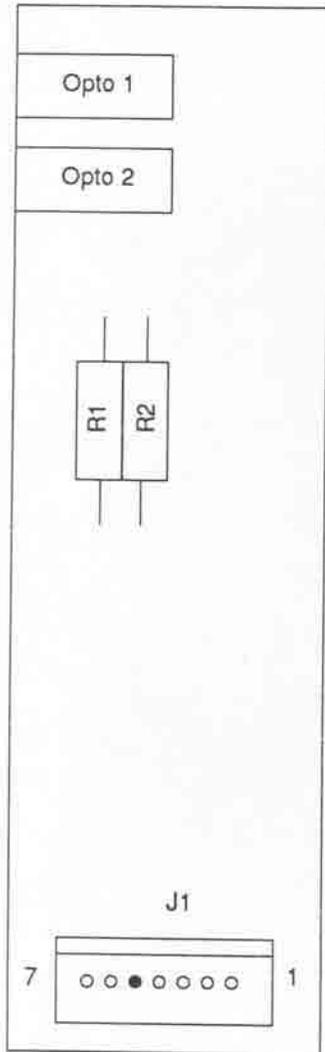
- J905 - 1 Blue-Violet to right opto switch board J1-1
- J905 - 2 Blue-Gray to left opto switch board J1-1
- J905 - 3 Black-Yellow to right opto switch board J1-2
- J905 - 4 N/C
- J905 - 5 Black-Blue to left opto switch board J1-2
- J905 - 6 Orange (Grd) to left opto switch board J1-3

- J906 - 1 Black-Green to lower right EOS switch
- J906 - 2 N/C
- J906 - 3 Black-Blue to lower left EOS switch
- J906 - 4 N/C
- J906 - 5 N/C
- J906 - 6 Orange (Grd) to EOS switches

- J907 - 1 Gray-Yellow (+50V) to upper left flipper coil
- J907 - 2 Gray-Yellow (+50V) loop from J907-1
- J907 - 3 N/C
- J907 - 4 Blue-Yellow (+50V) to upper right flipper coil
- J907 - 5 Blue-Yellow (+50V) loop from J907-4
- J907 - 6 Gray-Yellow (+50V) to lower left flipper coil
- J907 - 7 Gray-Yellow (+50V) loop from J907-6
- J907 - 8 Blue-Yellow (+50V) to lower right flipper coil
- J907 - 9 Blue-Yellow (+50V) loop from J907-8

NOTE: In this game, the upper right and upper left flipper circuits are used to drive solenoids 33, 34, 35 and 36.

A-15878
Flipper Cabinet Opto Switch Board & Schematic



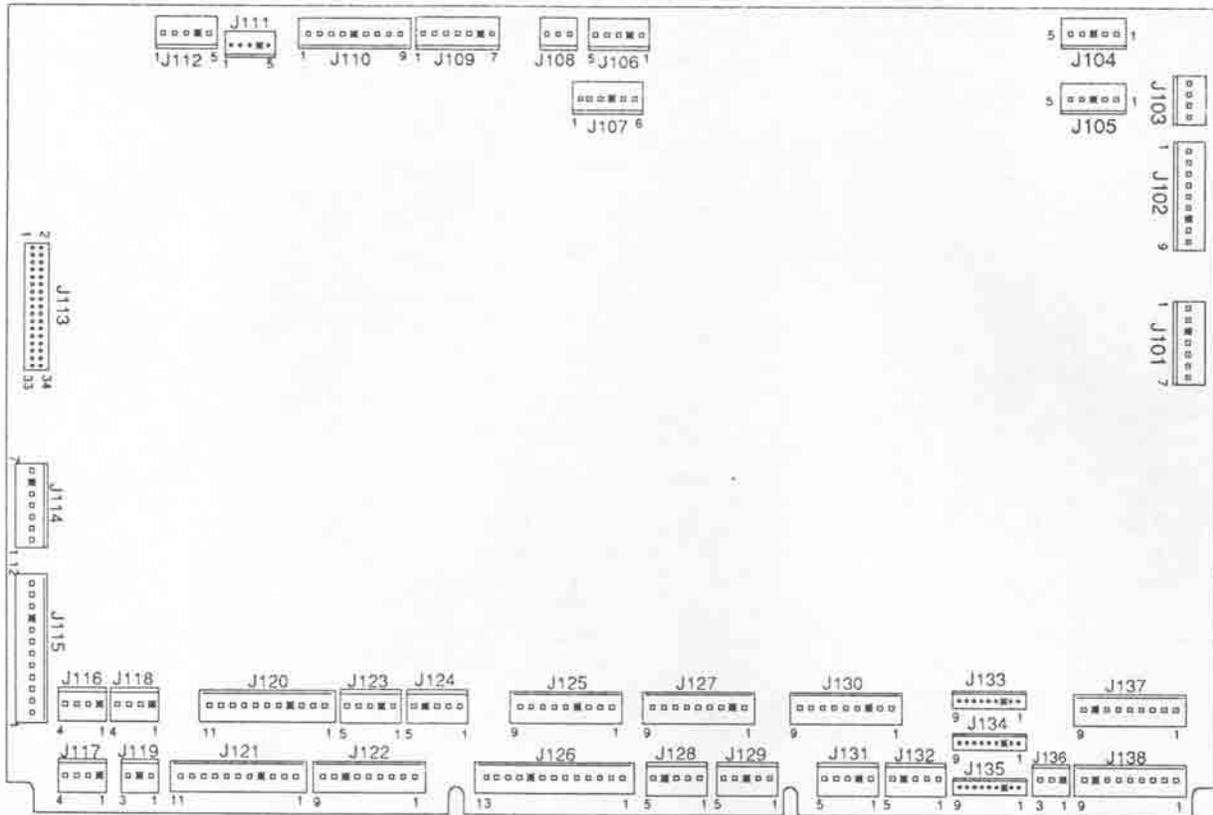
Left Side Flipper Cabinet Opto Switch Board

- J1 - 1 Blue-Gray from Fliptronic II Board J905-2
- J1 - 2 Black-Blue from Fliptronic II Board J905-5
- J1 - 3 Orange from Fliptronic II Board J905-6
- J1 - 4 N/C
- J1 - 5 N/C
- J1 - 6 Gray-Yellow from Fliptronic II Board J904-2
- J1 - 7 Gray-Yellow from Fliptronic II Board J904-2

Right Side Flipper Cabinet Opto Switch Board

- J1 - 1 Blue-Violet from Fliptronic II Board J905-1
- J1 - 2 Black-Yellow from Fliptronic II Board J905-3
- J1 - 3 Orange from Fliptronic II Board J905-6
- J1 - 4 Orange from Left Side Flipper Cabinet Opto Switch Brd J1-3
- J1 - 5 N/C
- J1 - 6 N/C
- J1 - 7 Gray-Yellow from Left Side Flipper Cabinet Opto Switch Brd J1-6

A-12697-1 Power Driver Board



- | | | | |
|----------|--|----------|--|
| J101 - 1 | Red (9VAC) from xformer secondary | J105 - 1 | N/C |
| J101 - 2 | Red (9VAC) from xformer secondary | J105 - 2 | N/C |
| J101 - 3 | N/C | J105 - 3 | N/C |
| J101 - 4 | Blue-White (13VAC) from xformer secondary | J105 - 4 | N/C |
| J101 - 5 | Blue-White(13VAC) loop from J101-4 | J105 - 5 | N/C |
| J101 - 6 | Blue-White (13VAC) from xformer secondary | J106 - 1 | N/C |
| J101 - 7 | Blue-White (13VAC) loop from J101-6 | J106 - 2 | N/C |
| | | J106 - 3 | N/C |
| J102 - 1 | White-Red (16VAC) loop from J102-2 | J106 - 4 | N/C |
| J102 - 2 | White-Red (16VAC) from xformer secondary | J106 - 5 | Red-White (+20V) to backbox flashlamps |
| J102 - 3 | White-Red (16VAC) loop from J102-4 | | |
| J102 - 4 | White-Red (16VAC) from xformer secondary | J107 - 1 | Violet-Green (+50V) to coils |
| J102 - 5 | Black-Yellow (16VAC) loop from J102-6 | J107 - 2 | Violet-Orange (+50V) to coils |
| J102 - 6 | Black-Yellow (16VAC) from xformer secondary | J107 - 3 | Violet-Yellow (+50V) to coils |
| J102 - 7 | N/C | J107 - 4 | N/C |
| J102 - 8 | Black-Yellow (16VAC) loop from J102-9 | J107 - 5 | N/C |
| J102 - 9 | Black-Yellow (16VAC) from xformer secondary | J107 - 6 | Red-White (+20V) to playfield |
| J103 - 1 | Black (ground) to High Current Driver board J1-1 | | |
| J103 - 2 | N/C | J108 - 1 | N/C |
| J103 - 3 | N/C | J108 - 2 | N/C |
| J103 - 4 | N/C | J108 - 3 | N/C |
| | | J109 - 1 | N/C |
| J104 - 1 | White-Blue (50VAC) to Fliptronic II Board J901-3 | J109 - 2 | N/C |
| J104 - 2 | White-Blue (50VAC) to Fliptronic II Board J901-1 | J109 - 3 | N/C |
| J104 - 3 | N/C | J109 - 4 | N/C |
| J104 - 4 | N/C | J109 - 5 | N/C |
| J104 - 5 | N/C | J109 - 6 | N/C |
| | | J109 - 7 | N/C |

Power Driver Board Interboard Wiring

J110 - 1 N/C
 J110 - 2 N/C
 J110 - 3 N/C
 J110 - 4 N/C
 J110 - 5 N/C
 J110 - 6 N/C
 J110 - 7 N/C
 J110 - 8 N/C
 J110 - 9 N/C

J111 - 1 N/C
 J111 - 2 N/C
 J111 - 3 N/C
 J111 - 4 N/C
 J111 - 5 N/C

J112 - 1 White-Green (9.8VAC) from xformer secondary
 J112 - 2 White-Green (9.8VAC) loop from J112-1
 J112 - 3 White-Green (9.8VAC) from xformer secondary
 J112 - 4 N/C
 J112 - 5 White-Green (9.8VAC) loop from J112-3

J113, 34-pin Ribbon Cable (data) To/from CPU J211

J114 - 1 Gray-Green (+12V) to J210-6,7; J904-2
 J114 - 2 Gray-Green (+12V) to J210-6,7; J904-2
 J114 - 3 Gray (+5V) to J210-4,5; J502-1,3; J904-1
 J114 - 4 Gray (+5V) to J210-4,5; J502-1,3; J904-1
 J114 - 5 Black (Grd) to J210-1,3; J502-4,5; J904-4,5
 J114 - 6 N/C
 J114 - 7 Black (Grd) to J210-1,3; J502-4,5; J904-4,5

J115 - 1 Yellow-White (6.8VAC) from xformer secondary
 J115 - 2 White-Brown (6.8VAC) from xformer secondary
 J115 - 3 White-Brown (6.8VAC) from xformer secondary
 J115 - 4 White-Orange (6.8VAC) from xformer secondary
 J115 - 5 White-Yellow (6.8VAC) from xformer secondary
 J115 - 6 White-Yellow (6.8VAC) from xformer secondary
 J115 - 7 Orange (6.8VAC) from xformer secondary
 J115 - 8 Orange (6.8VAC) from xformer secondary
 J115 - 9 N/C
 J115 - 10 Green (6.8VAC) from xformer secondary
 J115 - 11 Brown (6.8VAC) from xformer secondary
 J115 - 12 Brown (6.8VAC) from xformer secondary

J116 - 1 N/C
 J116 - 2 Gray-Yellow (+12V) to Coin Door J2-4
 J116 - 3 Black (Grd) to Coin Door J2-5
 J116 - 4 N/C

J117 - 1 N/C
 J117 - 2 Gray-Yellow (+12V) to Dot Matrix Controller J606-7
 J117 - 3 Black (Grd) to Dot Matrix Controller J606-3
 J117 - 4 Gray (+5V) to Dot Matrix Controller J606-5

J119 - 1 White-Violet (6.8VAC) G.I. to Coin Door Brd J2-2
 J119 - 2 N/C
 J119 - 3 Violet (return) G.I. to Coin Door Brd J2-1

J118 - 1 N/C
 J118 - 2 Gray-Yellow (+12V) to 24-Opto Brd J3-5; 10 Sw. Opto Brd J3-2
 J118 - 3 Black (ground) to 24-Opto Brd J3-4; 10 Sw. Opto Brd J3-1
 J118 - 4 N/C

J120 - 1 Brown (return) G.I. to backbox
 J120 - 2 Orange (return) G.I. to backbox
 J120 - 3 Yellow (return) G.I. to backbox
 J120 - 4 N/C
 J120 - 5 Green (return) G.I. to backbox
 J120 - 6 Violet (return) G.I. to backbox
 J120 - 7 White-Brown (6.8VAC) G.I. to backbox
 J120 - 8 White-Orange (6.8VAC) G.I. to backbox
 J120 - 9 White-Yellow (6.8VAC) G.I. to backbox
 J120 - 10 White-Green (6.8VAC) G.I. to backbox
 J120 - 11 White-Violet (6.8VAC) G.I. to backbox

J121 - 1 Brown (return) G.I. to playfield
 J121 - 2 Orange (return) G.I. to playfield
 J121 - 3 Yellow (return) G.I. to playfield
 J121 - 4 N/C
 J121 - 5 N/C
 J121 - 6 N/C
 J121 - 7 White-Brown (6.8VAC) G.I. to playfield
 J121 - 8 White-Orange (6.8VAC) G.I. to playfield
 J121 - 9 White-Yellow (6.8VAC) G.I. to playfield
 J121 - 10 N/C
 J121 - 11 N/C

J122 - 1 Blue-Brown (sol. 25 drive) to playfield coil
 J122 - 2 N/C
 J122 - 3 Blue-Orange (sol. 27 drive) to playfield coil
 J122 - 4 Blue-Yellow (sol. 28 drive) to playfield coil
 J122 - 5 Violet-Green (sol. 25 tieback diode) to playfield coil
 J122 - 6 N/C
 J122 - 7 N/C
 J122 - 8 Violet-Green (sol. 27 tieback diode) to playfield coil
 J122 - 9 N/C

J123 - 1 N/C
 J123 - 2 N/C
 J123 - 3 N/C
 J123 - 4 N/C
 J123 - 5 N/C

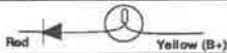
J124 - 1 N/C
 J124 - 2 N/C
 J124 - 3 N/C
 J124 - 4 N/C
 J124 - 5 N/C

J125 - 1 Black-Brown (sol. 17 drive) to backbox flashlamp
 J125 - 2 Black-Red (sol. 18 drive) to backbox flashlamp
 J125 - 3 Black-Orange (sol. 19 drive) to backbox flashlamp
 J125 - 4 N/C
 J125 - 5 Black-Yellow (sol. 20 drive) to backbox flashlamp
 J125 - 6 Blue- Green (sol. 21 drive) to backbox flashlamp
 J125 - 7 Blue-Black (sol. 22 drive) to backbox flashlamp
 J125 - 8 Blue-Violet (sol. 23 drive) to backbox flashlamp
 J125 - 9 Blue-Gray (sol. 24 drive) to backbox flashlamp

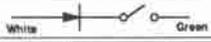
Power Driver Board Interboard Wiring Continued...

J126 - 1	Black-Brown (sol. 17 drive) to playfield flashlamps	J133 - 1	Red-Brown (lamp row 1) to playfield lamps
J126 - 2	Black-Red (sol. 18 drive) to playfield flashlamps	J133 - 2	Red-Black (lamp row 2) to playfield lamps
J126 - 3	Black-Orange (sol. 19 drive) to playfield flashlamps	J133 - 3	N/C
J126 - 4	Black-Yellow (sol. 20 drive) to playfield flashlamps	J133 - 4	Red-Orange (lamp row 3) to playfield lamps
J126 - 5	Blue-Green (sol. 21 drive) to playfield flashlamps	J133 - 5	Red-Yellow (lamp row 4) to playfield lamps
J126 - 6	Blue-Black (sol. 22 drive) to playfield flashlamps	J133 - 6	Red-Green (lamp row 5) to playfield lamps
J126 - 7	Blue-Violet (sol. 23 drive) to playfield flashlamps	J133 - 7	Red-Blue (lamp row 6) to playfield lamps
J126 - 8	Blue-Gray (sol. 24 drive) to playfield flashlamps	J133 - 8	Red-Violet (lamp row 7) to playfield lamps
J126 - 9	N/C	J133 - 9	Red-Gray (lamp row 8) to playfield lamps
J126 - 10	N/C		
J126 - 11	N/C	J134 - 1	N/C
J126 - 12	N/C	J134 - 2	N/C
J126 - 13	N/C	J134 - 3	N/C
		J134 - 4	N/C
J127 - 1	Brown-Black (sol. 9 drive) to playfield coil	J134 - 5	N/C
J127 - 2	N/C	J134 - 6	N/C
J127 - 3	Brown-Red (sol. 10 drive) to playfield coil	J134 - 7	N/C
J127 - 4	Brown-Orange (sol. 11 drive) to playfield coil	J134 - 8	N/C
J127 - 5	Brown-Yellow (sol. 12 drive) to playfield coil	J134 - 9	Red-Gray (lamp row 8) to coin door
J127 - 6	Brown-Green (sol. 13 drive) to playfield coil		
J127 - 7	Brown-Blue (sol. 14 drive) to playfield coil	J135 - 1	N/C
J127 - 8	Brown-Violet (sol. 15 drive) to playfield coil	J135 - 2	N/C
J127 - 9	Brown-Gray (sol. 16 drive) to playfield coil	J135 - 3	N/C
		J135 - 4	N/C
J128 - 1	N/C	J135 - 5	N/C
J128 - 2	Blue-Red (sol. 26 drive) to Speaker Panel flashlamps	J135 - 6	N/C
J128 - 3	N/C	J135 - 7	N/C
J128 - 4	N/C	J135 - 8	N/C
J128 - 5	N/C	J135 - 9	N/C
J129 - 1	N/C	J136 - 1	N/C
J129 - 2	N/C	J136 - 2	N/C
J129 - 3	N/C	J136 - 3	Yellow-Gray (lamp column 8) to coin door
J129 - 4	N/C		
J129 - 5	N/C	J137 - 1	Yellow-Brown (lamp column 1) to playfield lamps
		J137 - 2	Yellow-Red (lamp column 2) to playfield lamps
J130 - 1	Violet-Brown (sol. 1 drive) to playfield coil	J137 - 3	Yellow-Orange (lamp column 3) to playfield lamps
J130 - 2	Violet-Red (sol. 2 drive) to playfield coil	J137 - 4	Yellow-Black (lamp column 4) to playfield lamps
J130 - 3	N/C	J137 - 5	Yellow-Green (lamp column 5) to playfield lamps
J130 - 4	Violet-Orange (sol. 3 drive) to playfield coil	J137 - 6	Yellow-Blue (lamp column 6) to playfield lamps
J130 - 5	Violet-Yellow (sol. 4 drive) to playfield coil	J137 - 7	Yellow-Violet (lamp column 7) to playfield lamps
J130 - 6	Violet-Green (sol. 5 drive) to playfield coil	J137 - 8	N/C
J130 - 7	Violet-Blue (sol. 6 drive) to playfield coil	J137 - 9	Yellow-Gray (lamp column 8) to playfield lamps
J130 - 8	Violet-Black (sol. 7 drive) to playfield coil		
J130 - 9	Violet-Gray (sol. 8 drive) to playfield coil	J138 - 1	N/C
		J138 - 2	N/C
J131 - 1	N/C	J138 - 3	N/C
J131 - 2	N/C	J138 - 4	N/C
J131 - 3	N/C	J138 - 5	N/C
J131 - 4	N/C	J138 - 6	N/C
J131 - 5	N/C	J138 - 7	N/C
		J138 - 8	N/C
J132 - 1	N/C	J138 - 9	N/C
J132 - 2	N/C		
J132 - 3	N/C		
J132 - 4	N/C		
J132 - 5	N/C		

LAMPS

Lamp Matrix										
										
Column	1	2	3	4	5	6	7	8		
Row	Yellow-Brown J137-1 Q68	Yellow-Red J137-2 Q67	Yellow-Orange J137-3 Q66	Yellow-Black J137-4 Q65	Yellow-Green J137-5 Q64	Yellow-Blue J137-6 Q63	Yellow-Violet J137-7 Q62	Yellow-Gray J137-8 Q61		
1	Red-Brown J133-1 Q69 11	Not Used 21	Coffin Lock 1 31	R. Lane: Video "V" 41	Right Return 51	Coffin Lamp 1 61	Left Skill 100K 71	Dracula "C" 81	Rats Mode 91	
2	Red-Black J133-2 Q68 12	Not Used 22	Coffin Lock 2 32	R. Lane: Video "I" 42	Right Drain 52	Coffin Lamp 2 62	M. Skill 1 Million 72	Dracula "L" 82	Dracula "A" 92	
3	Red-Orange J133-4 Q68 13	Not Used 23	Dracula "A" 33	R. Lane: Video "D" 43	Coffin Multiball 53	Magnet 63	R. Skill 100K 73	Left 3-bank Top 83	T.L. Hole: Mystery 93	
4	Red-Yellow J133-5 Q67 14	Not Used 24	R. Ramp: 0.5 Million 34	R. Lane: Video "E" 44	Playfield 2X 54	Shoot Again 64	Top 3-lane Left 74	Left 3-bank Middle 84	T.L. Hole: Carriage 94	
5	Red-Green J133-6 Q66 15	Not Used 25	R. Ramp: 1 Million 35	R. Lane: Video "O" 45	Castle Multiball 55	Love Never Dies 65	Top 3-lane Middle 75	Left 3-bank Bottom 85	T.L. Hole: Ex-ball 95	
6	Red-Blue J133-7 Q65 16	R. Ramp Lock 26	R. Ramp: 2.5 Million 36	Dracula "R" 46	Playfield 3X 56	Coffin Lamp 3 66	Top 3-lane Right 76	Middle 3-bank Left 86	T.L. Hole: Jackpot 96	
7	Red-Violet J133-8 Q64 17	Dracula Face 27	R. Ramp: Double 37	Left Drain 47	Mist Multiball 57	L. Ramp Enter 67	Dracula "U" 77	Middle 3-bank Middle 87	Launch Ball 97	
8	Red-Gray J133-9 Q63 18	R. Ramp: 2 Million 28	R. Ramp: 1.5 Million 38	Left Return 48	Dracula "D" 58	L. Ramp Lock 68	Jet Insert 78	Middle 3-bank Right 88	Game Start 98	

SWITCHES

Switch Matrix											
											
Column	1	2	3	4	5	6	7	8			
Row	Green-Brown J207-1 U20-16	Green-Red J207-2 U20-17	Green-Orange J207-3 U20-16	Green-Yellow J207-4 U20-15	Green-Black J207-5 U20-14	Green-Blue J207-6 U20-13	Green-Violet J207-7 U20-12	Green-Gray J207-8 U20-11			
D1	Orange-Brown J205-1 Left Coin Chute 11	White-Brown J206-1 U16-11 21	Not Used 31	Slam Tilt 41	Under Shooter Ramp 51	Trough 1 Ball 61	Opto T.R. Lane 71	Left Jet 81	Opto Castle Popper 91	Magnet Left 01	Black-Green J206-1 Lower Right E.O.S. Switch F1
D2	Orange-Red J205-2 Center Coin Chute 12	White-Red J206-2 U16-9 22	Not Used 32	Coin Door Closed 42	Not Used 52	Trough 2 Balls 62	Opto Magnet L. Pocket 72	Right Jet 82	Opto Coffin Popper 92	Ball On Magnet 02	Blue-Violet J205-1 Lower Right Flipper Button F2
D3	Orange-Black J205-3 Right Coin Chute 13	White-Orange J206-3 U16-5 23	Start Button 33	Ticket Opto. 43	Not Used 53	Trough 3 Balls 63	Opto Castle 1 73	Bottom Jet 83	Opto L. Ramp Entry 93	Magnet Right 03	Black-Blue J206-3 Lower Left E.O.S. Switch F3
D4	Orange-Yellow J205-4 4th Coin Chute 14	White-Yellow J206-4 U16-7 24	Plumb Bob Tilt 34	Always Closed 44	Launch Ball 54	Trough 4 Balls 64	Opto Castle 2 74	Left Sling 84	Not Used 94	L. Ramp Score 04	Blue-Gray J205-2 Lower Left Flipper Button F4
D5	Orange-Green J205-6 Normal Function Service Credits 15	White-Green J206-5 U19-11 25	L. Drop Target 35	Top 3-lane Left 45	Left Drain 55	Not Used 65	Opto Wire Ramp Popper 75	Right Sling 85	Not Used 95	L. Ramp Diverted 05	Black-Violet J206-4 Upper Right E.O.S. Switch F5
D6	Orange-Blue J205-7 Normal Function Volume Down 16	White-Blue J206-7 U19-9 26	L. Drop Score 36	Top 3-Lane Middle 46	Left Return 56	Not Used 66	Opto Crypt Popper 76	Left 3-bank Top 86	Not Used 96	Middle 3-bank Left 06	Black-Yellow J205-3 Upper Right Flipper Button F6
D7	Orange-Violet J205-8 Normal Function Volume Up 17	White-Violet J206-8 U19-5 27	Shooter Lane 37	Top 3-lane Right 47	Right Return 57	Not Used 67	Opto Castle 3 77	Left 3-bank Middle 87	R. Ramp Up 97	Middle 3-bank Middle 07	Black-Gray J206-5 Upper Left E.O.S. Switch F7
D8	Orange-Gray J205-9 Normal Function Begin Test 18	White-Gray J206-9 U19-7 28	Not Used 38	R. Ramp Score 48	Right Drain 58	Outhole 68	Mystery Hole 78	Left 3-Bank Bottom 88	Not Used 98	Middle 3-bank Right 08	Black-Blue J205-5 Upper Left Flipper Button F8

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.

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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.

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