INDIANAPOLIS
500 ®

Operations Manual Includes:

Operations & Adjustments • Testing & Problem Diagnosis • Parts Information • Reference Diagrams & Schematics

DIP SWITCH SETTINGS AND JUMPERS

EPROM Jumper Settings for U6	W1	W2
1MEG, 2MEG, 4 MEG EPROM	In	Out

Dip Switch Chart

Country	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
America	Off	Off	On	On	On	On	On	On
Euopean	Off	Off	On	On	On	Off	On	On
French	Off	Off	On	On	On	On	Off	Off
German	Off	Off	On	On	On	On	On	Off
Spain	Off	Off	On	On	Off	On	On	On

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Voltage Connections Backbox	Voltage Connections Cabinet	Drive Xister	Drive Connections Playfield	Drive Connections Backbox	Drive Connections Cabinet	Drive Wire Color	Solenoid Part number Flashlamp Type Playfield	Solenoid Part number Flashlamp Type Backbox
01	Auto Plunger	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-23-800	
02	Upper Popper	High Power	J107-2			Q80	J130-2			Vio-Red	AE-24-900	
03	Upper Eject	High Power	J107-2			Q78	J130-4			Vio-Org	AE-26-1200	
04	Lower Eject	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-28-1500	
05	Turbo Popper	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-24-900	
06	Not Used	High Power				Q66				---	---	
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	Left Jet	High Power	J107-2			Q70	J130-9			Vio-Gry	AE-26-1200	
09	Right Jet	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	Center Jet	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	Left Sling	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	Right Sling	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	Trough	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1500	
14	Upper Popper Flasher	Low Power	J107-6			Q48	J127-7			Brn-Blu	#906	
15	Top Left Corner Flasher	Low Power	J107-6			Q46	J127-8			Brn-Vio	#906	
16	Top Right Corner Flasher	Low Power	J107-6			Q44	J127-9			Brn-Gry	#906	
17	Turbo Motor	Flasher	J116-2			Q42	J126-1			Blk-Brn	14-8021.1	
18	Race Track Motor	Flasher	J116-2			Q40	J126-2			Blk-Red	14-8022	
19	Orange Car Flasher	Flasher	J107-6			Q38	J126-3			Blk-Org	#906	
20	Yellow Car Flasher	Flasher	J107-6			Q36	J126-4			Blk-Yel	#906	
21	Blue Car Flasher	Flasher	J107-6			Q28	J126-5			Blu-Grn	#906	
22	Green Car Flasher	Flasher	J107-6			Q30	J126-6			Blu-Blk	#906	
23	Left Jet Flasher	Flasher	J107-6			Q34	J126-7			Blu-Vio	#906	
24	Right Jet Flasher	Flasher	J107-6			Q32	J126-8			Blu-Gry	#906	
25	Center Jet Flasher	Gen. Purpose	J107-6			Q26	J122-1			Blu-Brn	#906	
26	Right Side Flasher	Gen. Purpose	J107-6			Q24	J122-2			Blu-Red	#906	
27	Left Side Flasher (2)	Gen. Purpose	J107-6			Q22	J122-3			Blu-Org	#906 (2)	
28	Right Ramp Enter Flasher	Gen. Purpose	J107-6			Q20	J122-4			Blu-Yel	#906	
35	Diverter Power	High Power	J907-8,9			Q1	J902-3			Yel-Gry	A-20099	
36	Diverter Hold	Low Power	J907-8,9			Q5	J902-1			Org-Gry	A-20099	

	General Illumination		Voltage Connections Playfield	Backbox	Cabinet	Drive Xister	Playfield	Backbox	Cabinet	Drive Wire Color	Flashlamp Playfield	Flashlamp Backbox
01	Upper Left Playfield	G.I.	J121-1	J120-1		Q18	J121-7	J120-7		Wht-Brn	#44	#555
02	Upper Right Playfield	G.I.	J121-2			Q10	J121-8			Wht-Org	#44, #555	
03	Lower Playfield	G.I.	J121-3	J120-3		Q14	J121-9	J120-9		Wht-Yel	#44	#555
04	Backbox-Coindoor	G.I.		J120-5		Q16		J120-10		Wht-Grn		#555
05	Backbox Title	G.I.		J120-6		Q12		J120-11		Wht-Vio		#555

	Flipper Circuits		Voltage Connections Playfield	Drive Transistors Power	Drive Transistors Hold	Drive Connectors Playfield	Drive Wire Colors Power	Drive Wire Colors Hold	Coil Part No.	Coil Color
29		Lwr. Rt. Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn		FL-11629	BLUE
30	Lower Right Flipper	Lwr. Rt. Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn		
31		Lwr. Lt. Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu		FL-11629	BLUE
32	Lower Left Flipper	Lwr. Lt. Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu		
33		Upr. Rt. Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio		FL-11629	BLUE
34	Upper Right Flipper	Upr. Rt. Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio		
35		Upr. Lt. Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry		SEE	ABOVE
36	Upper Left Flipper	Upr. Lt. Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry		

J1xx=Power Driver Board; J9xx=Fliptronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb
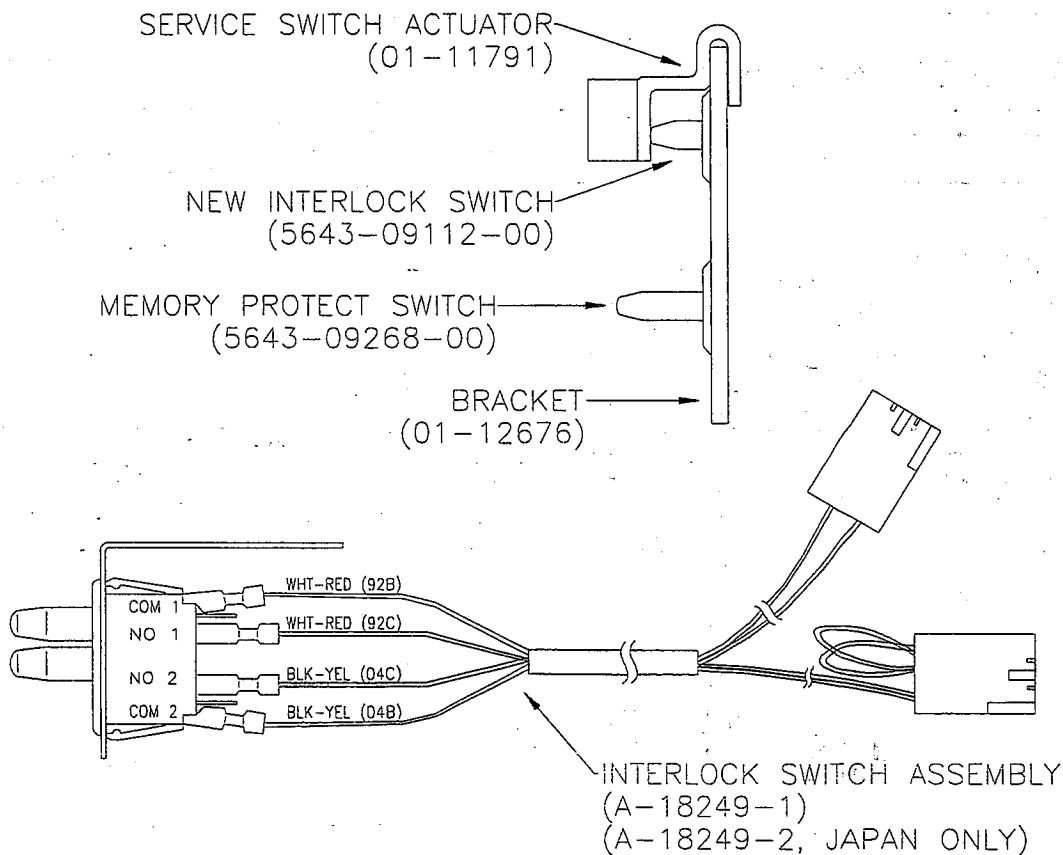
IMPORTANT NOTICE

PLEASE READ

This pinball game is equipped with a SAFETY FEATURE to prevent shocks from the solenoid circuit when the coin door is open. A new interlock switch assembly (part no. A-18249-1), located at the left of the coin door opening, has been added to the game. This assembly is a bracket containing the existing memory protect switch on the bottom and a new interlock switch on the top. When the coin door is open, the new interlock switch opens, breaking the connection to the +50V and +20V winding of the transformer secondary.

A special tool called the Service Switch Actuator is provided for the serviceman/technician that repairs the game. This tool is painted yellow and located in a bag stapled inside the cabinet. The Service Switch Actuator slips over the interlock switch and holds it closed while the coin door is open, allowing the serviceman to test and repair the solenoid circuit.

Hold the top interlock switch in, then slide the short end of the Service Switch Actuator over the top of the interlock switch bracket and the long end over the center of the switch plunger to hold it in.

SERVICE SWITCH ACTUATOR
(01-11791)

NEW INTERLOCK SWITCH
(5643-09112-00)

MEMORY PROTECT SWITCH
(5643-09268-00)

BRACKET
(01-12676)

COM 1
NO 1
NO 2
COM 2

WHT-RED (92B)
WHT-RED (92C)
BLK-YEL (04C)
BLK-YEL (04B)

INTERLOCK SWITCH ASSEMBLY
(A-18249-1)
(A-18249-2, JAPAN ONLY)

ATTENTION

This game uses a new Security CPU Board that is not downward compatible to the CPU boards used in previous games. The new board has an added security chip that can be interchanged between other Indianapolis 500 games and software revision levels. The CPU board itself is interchangeable with later model games, but must be equipped with the correct security chip and software for that specific game.

The games' electronic ID number is shown in the display during power-up. The number displayed is the same nine digit number printed on the security chip label. The first three digits are the project number without a country specific code. An example of the power-up display is shown below, the electronic ID number is bolded.

TESTING	
50026	EPROM D.0 A
526 100020 65349	

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Section 3 - Wiring Diagrams and Schematics 3-1

Bally's

INDIANAPOLIS
500®

Game Rules and Shotmaps

INDIANAPOLIS 500 RULES

OBJECT: *To win the most challenging race in the world...the Indianapolis 500 and take a victory lap.*

SKILL SHOT: *After Ball Launch, shoot left ramp to collect Skill Shot Award.*

SPEEDWAY AWARD: *Outer left loop shot lights Speedway Award. Outer right loop shot awards lit speedway item.*

TURBO MULTI-BALL™: *Outer left loop shot lights Turbo Lock. Lock two balls for TURBO Multi-ball. Shoot for Jackpots on ramps, or relock all three balls in the turbo for Super Jackpot!*

PIT STOP MULTI-BALL™: *Complete the P-I-T lanes at the top of the playfield to light "PIT STOP". Shoot right ramp when PIT STOP is lit to start pit stop.*

LIGHT-UP TARGETS: *Shoot Light-up Targets when flashing. Complete Light-up Bank waves for Jackpots.*

SOUVENIR: *Collect the Indy Souvenirs and discover the secrets that each unlocks. Collect all souvenirs for Jackpot.*

VICTORY LAP: *Complete any race status section to light Victory Lap!*

SKILL SHOT

Shoot up left ramp while yellow car is flashing for Skill Shot. For Secret Skill Shot, shoot up right ramp which will start "Go For The Pole". To complete "Go For The Pole" shoot the right ramp 4 times while the blue car is flashing. Points are awarded both for each ramp shot and for getting "on the pole".

YELLOW CAR

BLUE CAR

SKILL SHOT

SECRET
SKILL SHOT

GO FOR
THE POLE
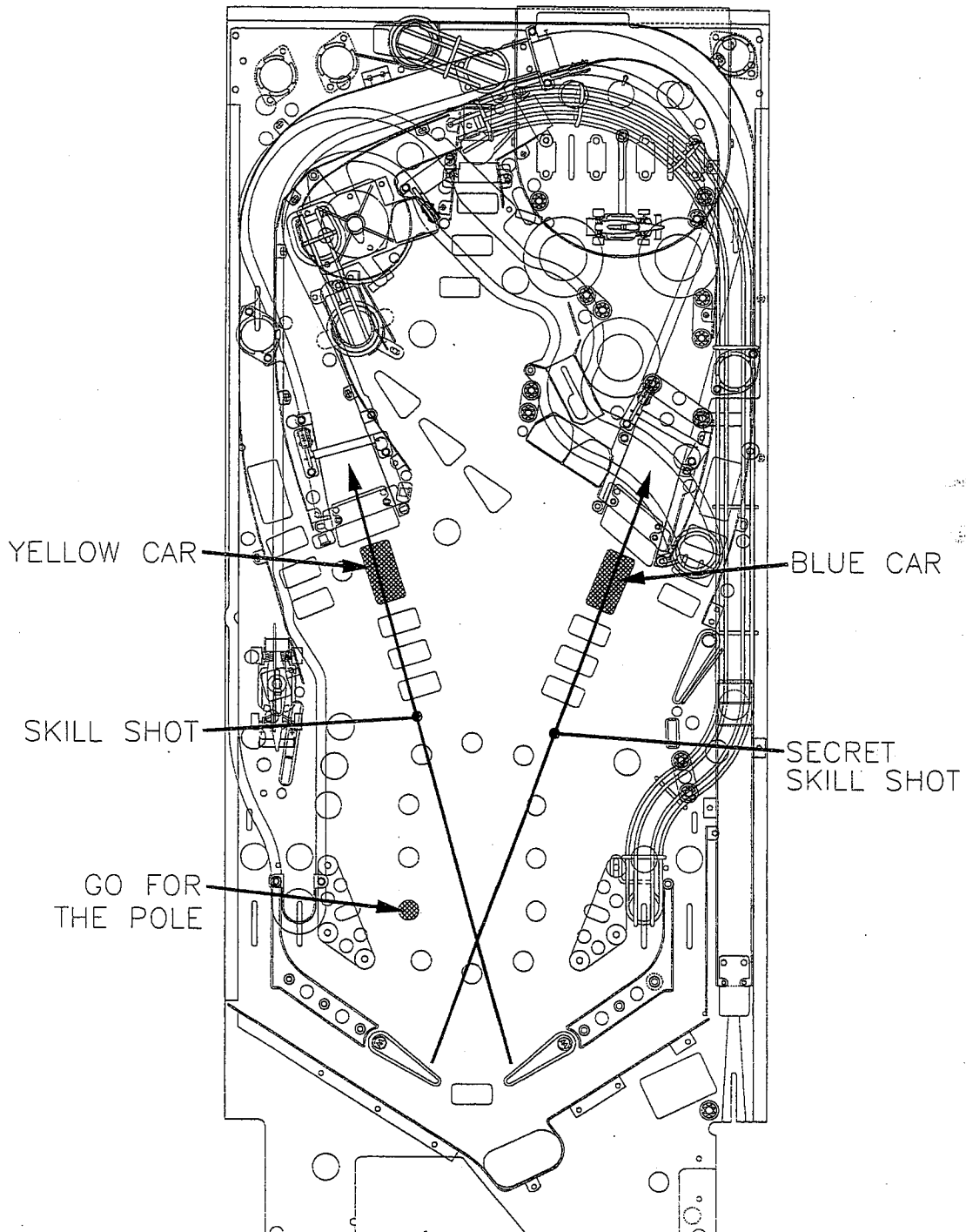
HIT THE WALL

Complete the 3 lower left targets to light the right loop for the "Hit The Wall" Award.

HIT
THE
WALL

D
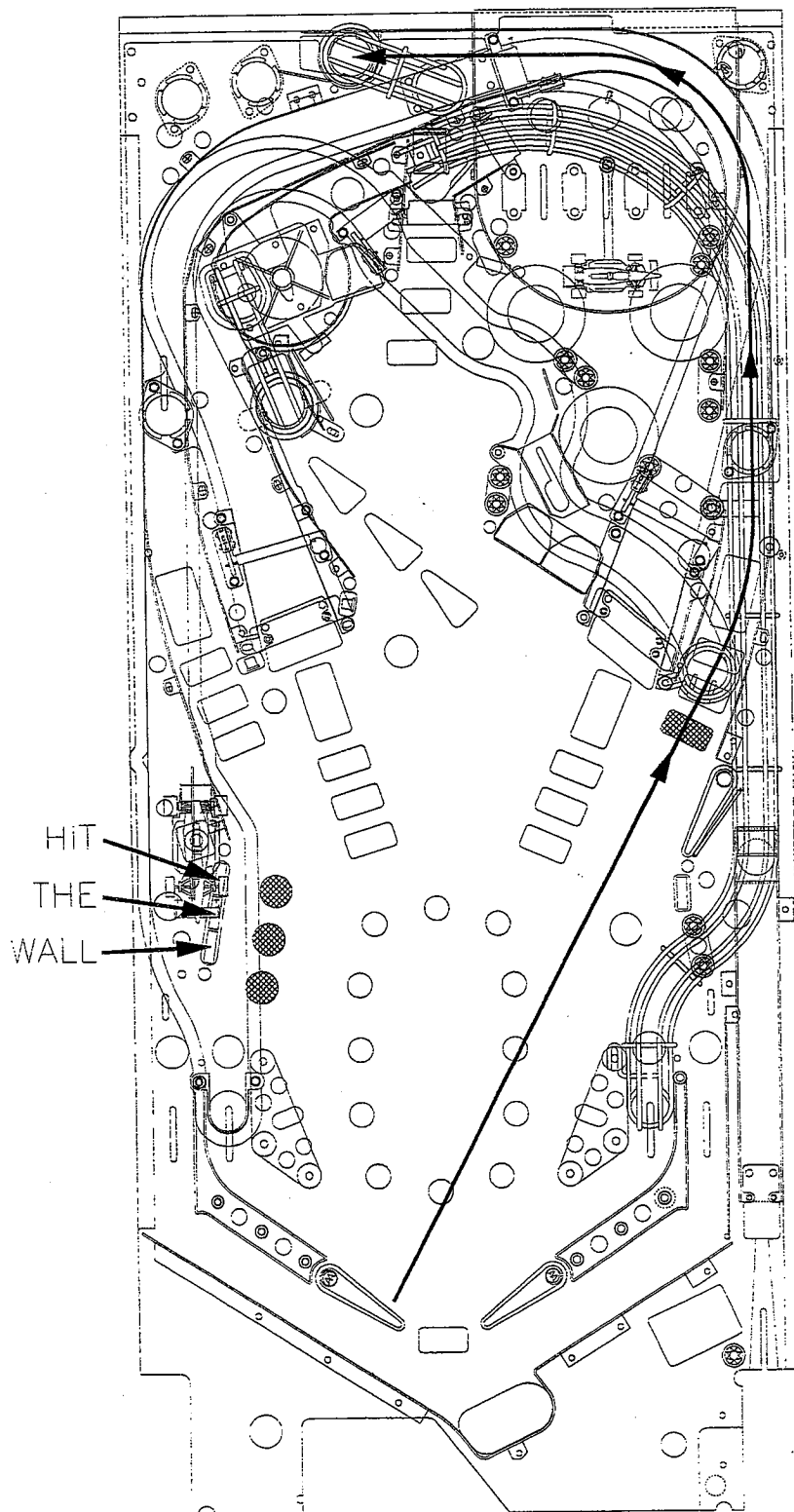
CHANGE SET-UP

Repeated hits to the small blue target at the left ramp entrance lights the right loop for "Change Set-Up". When collected the player uses the flipper buttons to choose an Award. Awards include Points, Extra Balls, Laps, and a Special. This award can also be collected from the center kickout channel.

BLUE
TARGET

CHANGE
SET-UP
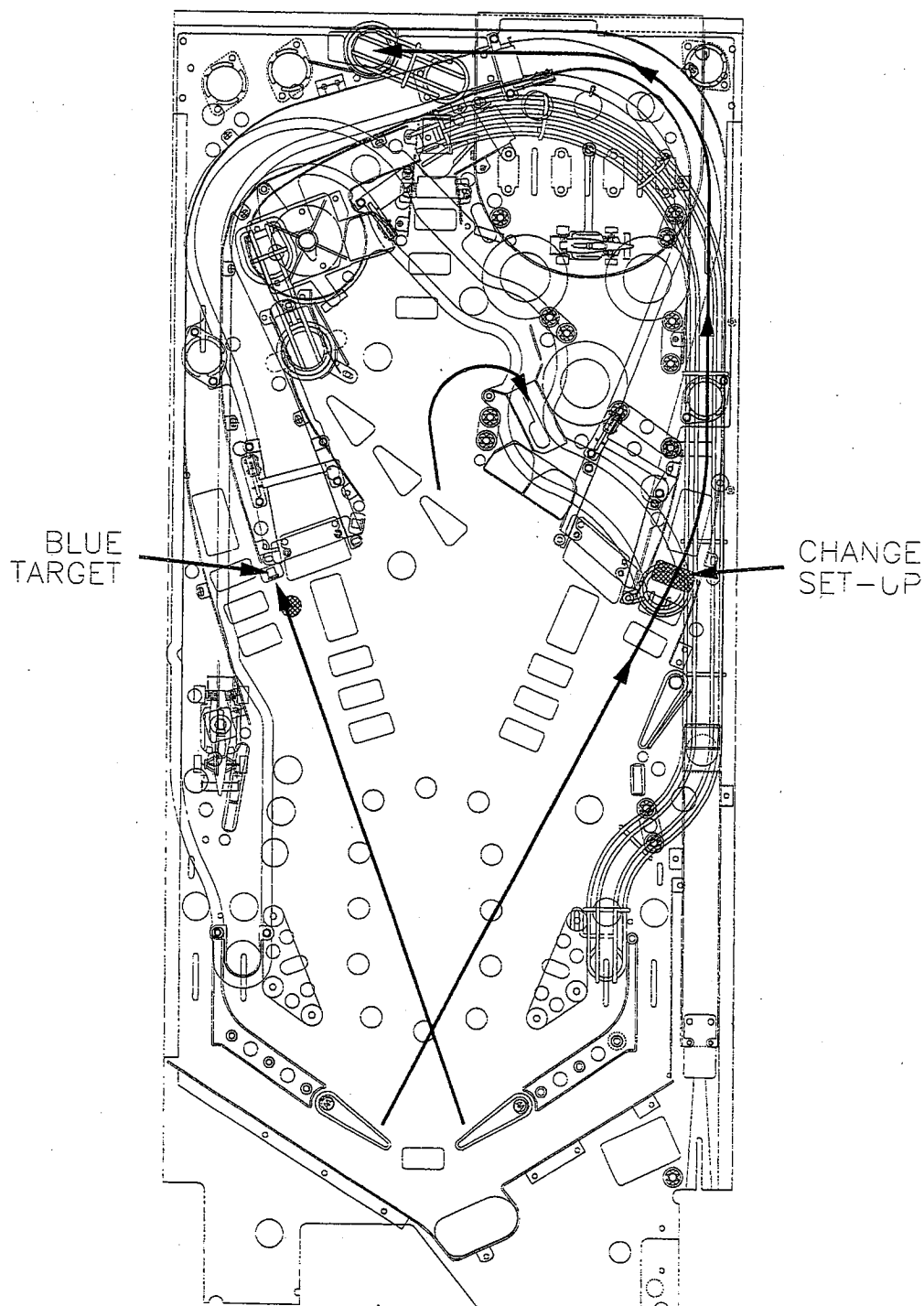
FAST LAPS

Consecutive shots up the right ramp increases the Spinning Car Speed and builds Point Values.

PASS

The "Pass" feature allows a player to advance position from 33rd to 1st place. (Note: Each "Hit the Wall" collected will also advance the player one position.) Position contributes to the end of the race Victory Lap value.

PASS →

FAST LAPS
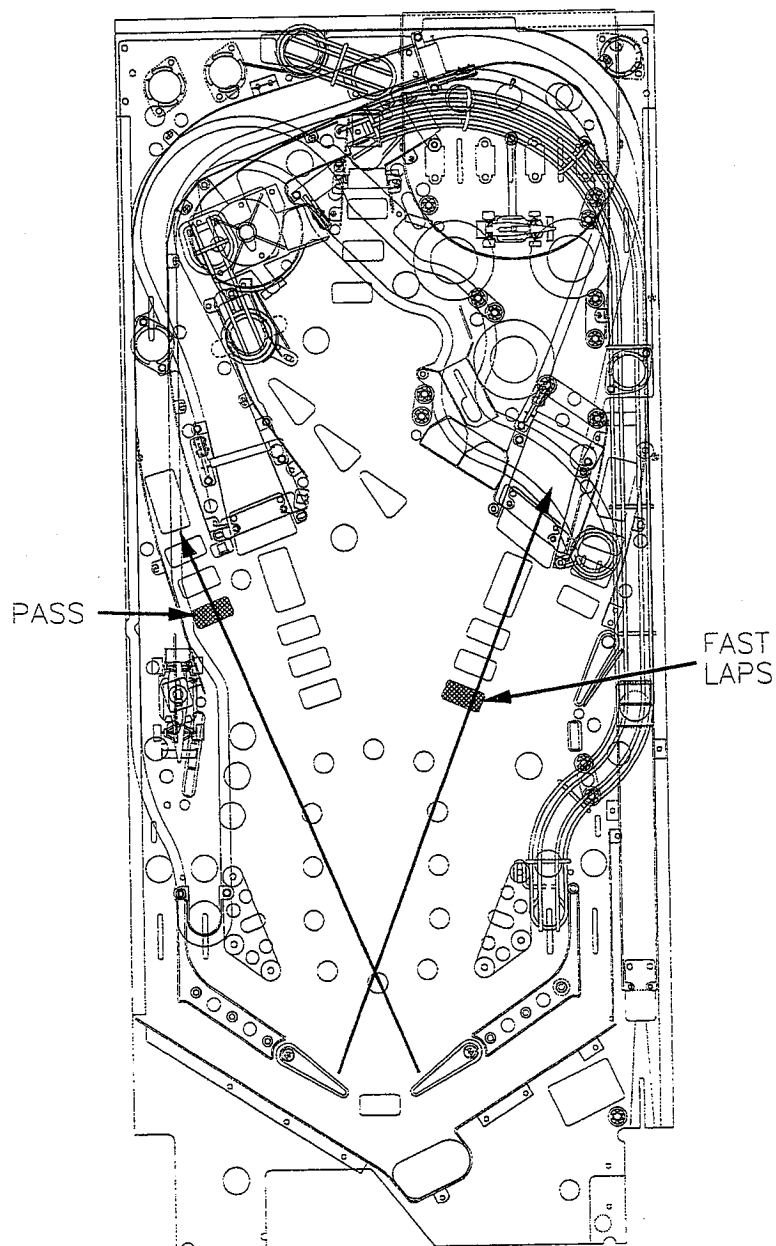
SOUVENIRS

Lighting all I-N-D-Y rollover lanes lights the left ramp "Souvenir" Award. Collecting the Souvenir Awards Points, and some Souvenirs will also boost other playfield features.

SOUVENIR

N

I

D

Y
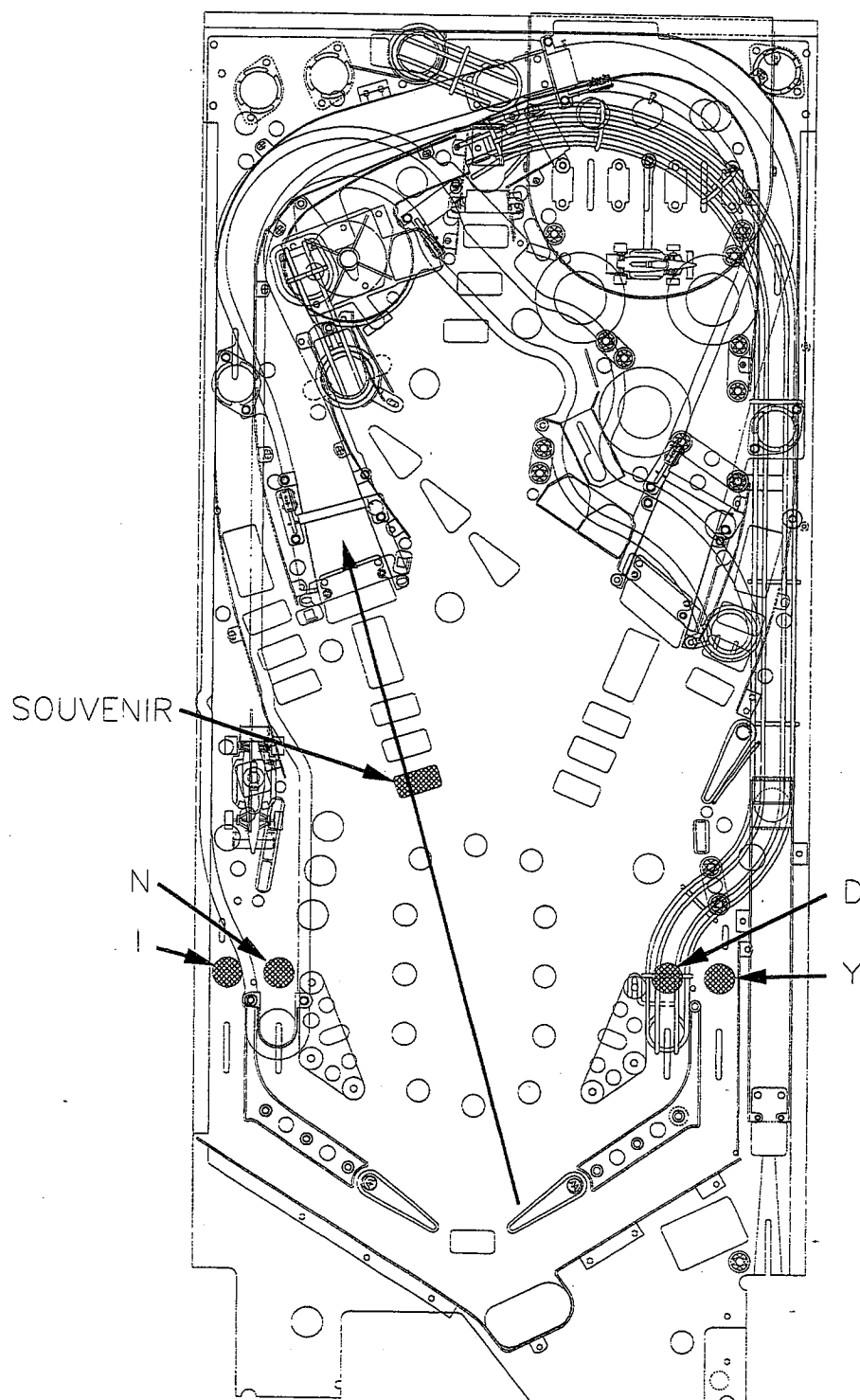
LIGHT-UP TARGETS

Hitting a Light-Up Target will light 1 of the 4 sections for each hit. Four hits to each target completes a "Light-Up Wave". Each wave awards increasing points, and waves aslo contribute to the end of race Victory Lap value.

LIGHT-UP
TARGET

LIGHT-UP
TARGETS

H
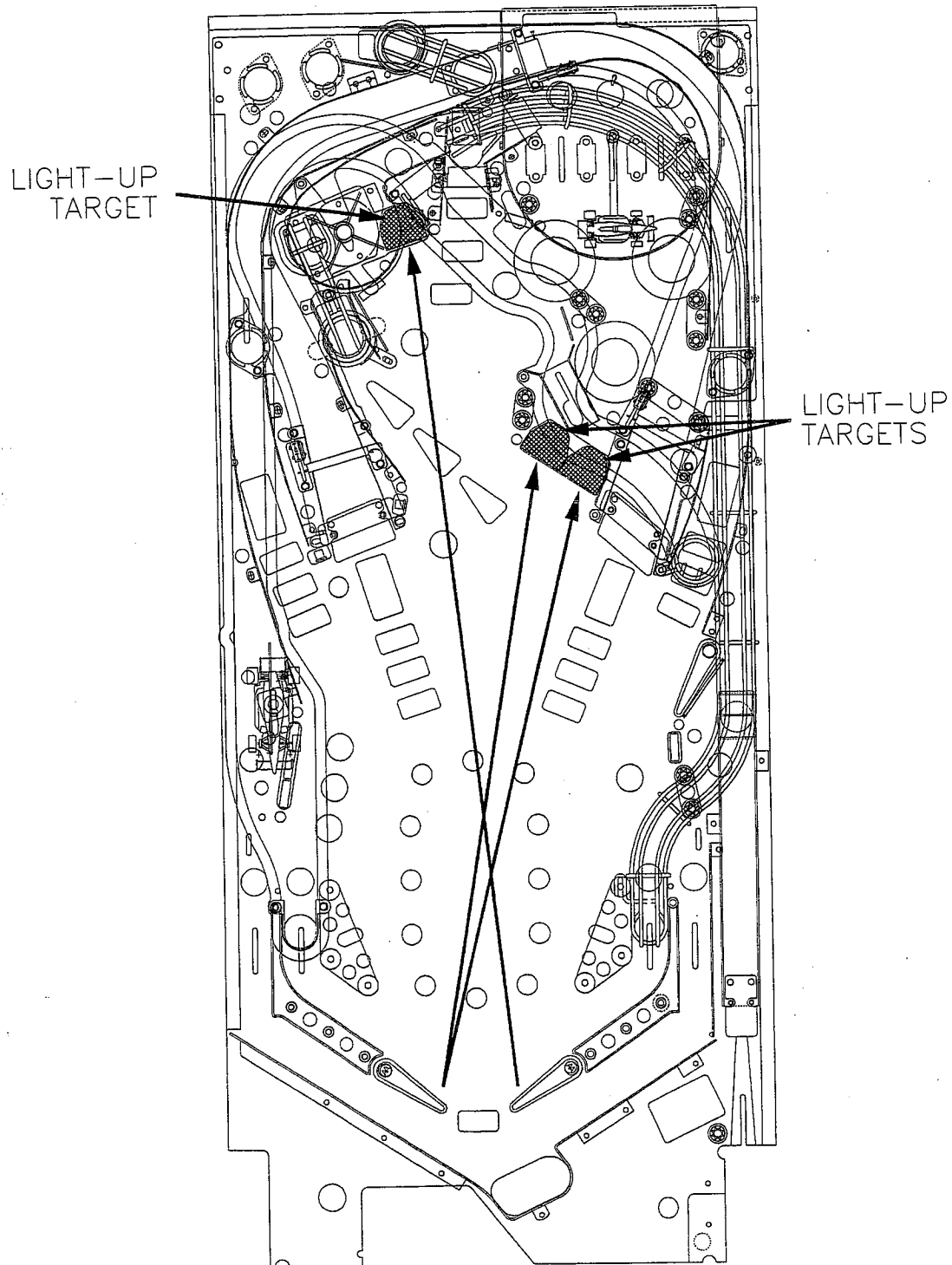
PIT STOP AND PIT STOP MULTI-BALL™

Lighting all P-I-T rollover lanes lights the right ramp "Pit Stop" award. Shooting the right ramp will lock the ball in the "Pit Lane" lockup, and a second ball will be served. Shooting the right ramp will release the first ball and start "Pit Stop Multi-ball". All flashing cars are Jackpot Shots. The number of Jackpot Shots available is determined by the length of time the player needed to make the second right ramp shot.

P-I-T LANES

PIT LOCK
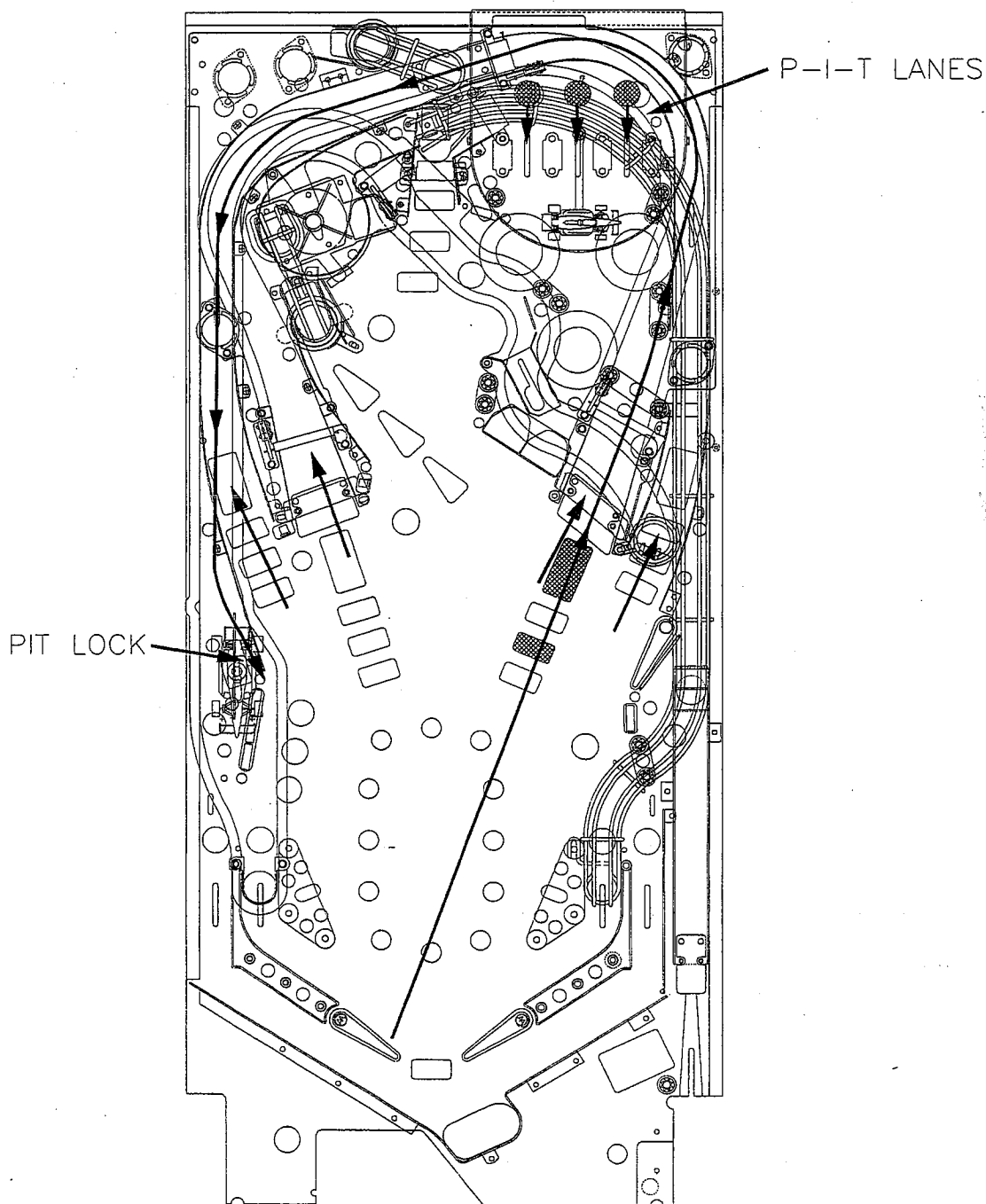
TURBO MULTI-BALL™

Shoot left loop to light lock when "Light Lock" is lit. Shoot balls into Turbo when "Lock" is lit to lock balls. Locking two balls in the Turbo will start a 3-ball Multi-ball. Jackpots are available on the two ramps. Re-locks are available in the Turbo - locking one ball boosts Jackpot values for several seconds. Re-locking a second ball boosts Jackpot values even higher, and re-locking the third ball awards a Super Jackpot. Locking all balls on the playfield in the Turbo also will cause an additional ball to be served onto the playfield, for a maximum of four balls.

TURBO
LOCK

LIGHT
LOCK

JACKPOT

J
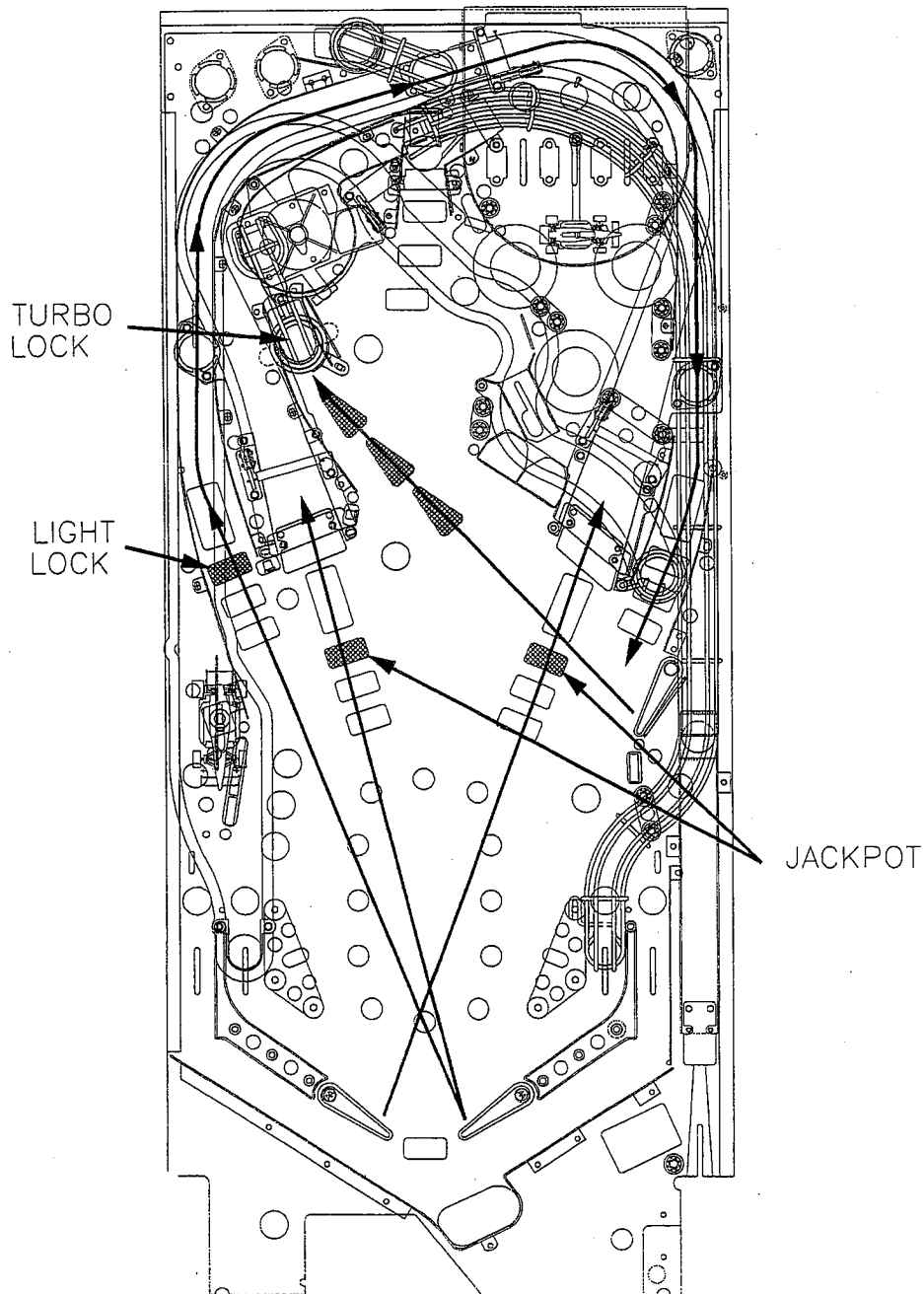
SPEEDWAY AWARDS

Shoot left ramp when "Light Speedway" is lit to light "Award Speedway". Shoot right ramp when "Award Speedway" is lit to collect Speedway award. Speedway awards include both immediate awards and modes.
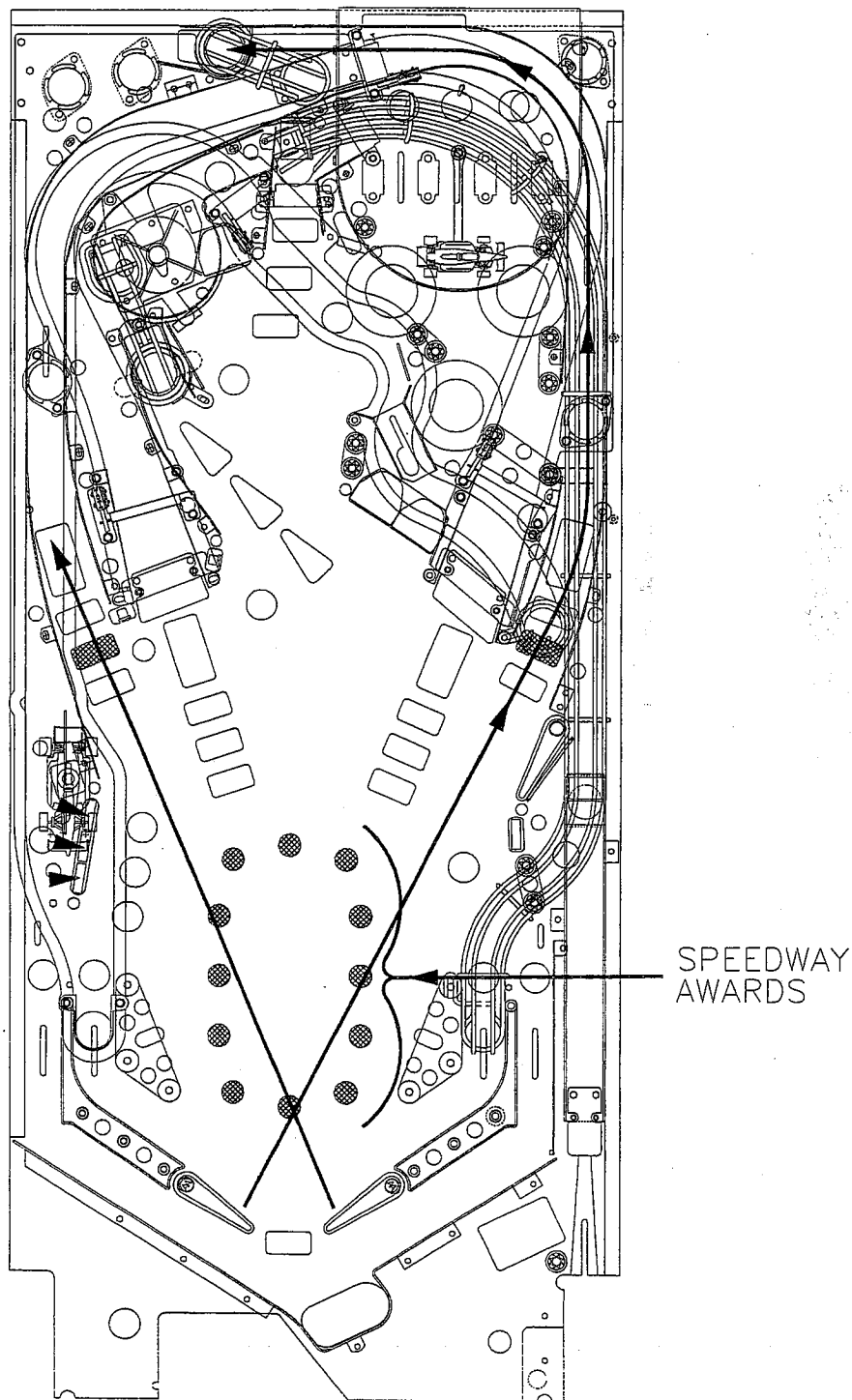
SPEEDWAY
AWARDS

EXTRA BALLS

Extra ball can be lit by repeated shots to the right ramp, by collecting "Light Extra Ball" in the speedway, by completing the required number of Light-Up Target waves, or by choosing it in "Change Set-Up". Extra balls are collected by shooting the top center eject saucer when "Extra Ball" is lit.

LIGHT-UP
TARGET

EXTRA BALL

LIGHT-UP
TARGETS

SPEEDWAY
EXTRA BALL

L
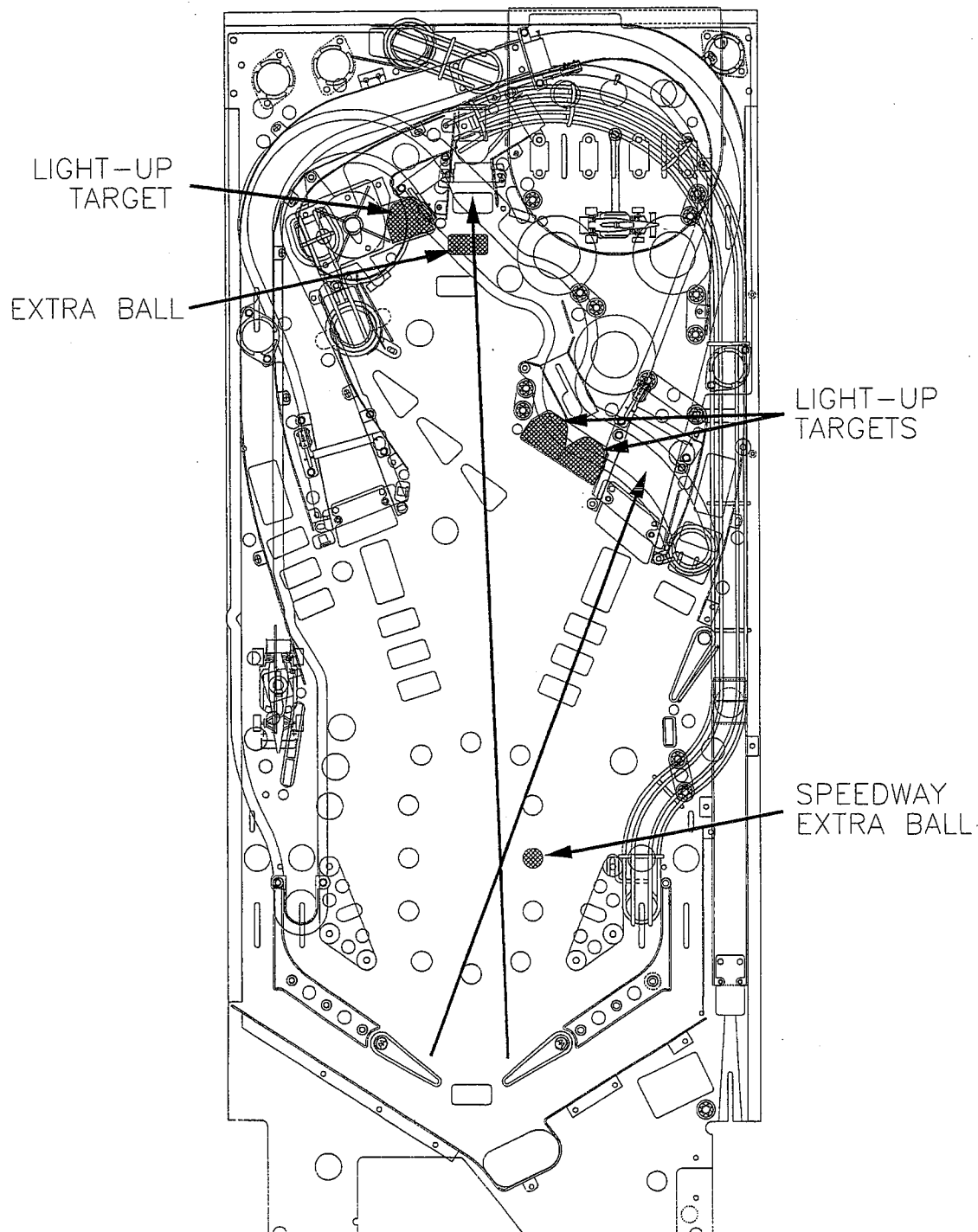
VICTORY LAP

Victory Lap is lit by finishing the race in one or more of the following ways:

1) 200 Laps - Laps are awarded by shooting loops, ramps and through various Speedway Awards.

2) Advancing to 1st Place - Race position can be advanced by the "Pass" shot and by "Hit the Wall".

3) Completing all Light-Up Target waves.

4) Completing all Speedway Awards.

Victory Lap value is determined by the number of the above goals which are achieved.

Collect Victory Lap by shooting the center eject hole.

SECTION ONE

GAME OPERATION
AND TEST INFORMATION

(System WPC) ROM Summary

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	U6	A-5343-50026-1A (Domestic)
Game 1	27c040	CPU	U6	A-5343-50026-1F (French)
Game 1	27c040	CPU	U6	A-5343-50026-1X (Foreign)
Music/Speech	27c040	Audio	SU2	A-5343-50026-S2
Music/Speech	27c040	Audio	SU3	A-5343-50026-S3
Music/Speech	27c040	Audio	SU4	A-5343-50026-S4
Music/Speech	27c040	Audio	SU5	A-5343-50026-S5
Music/Speech	27c040	Audio	SU6	A-5343-50026-S6
Music/Speech	27c040	Audio	SU7	A-5343-50026-S7

NOTICE
Order replacement ROMs from your authorized MIDWAY MANUFACTURING CO. Distributor. Specify:
(1) Part Number (if available); (2) ROM Level (number on the label); (3) Game in which ROM is used.

PINBALL GAME ASSEMBLY INSTRUCTIONS

INDIANAPOLIS 500 IS A 4 BALL GAME.

Power:	Domestic 120V @ 60 Hz	*Dimensions:*	Width: 29" Approx.
	Foreign 230V @ 50 Hz		Depth: 56" Approx.
	Japan 100V @ 50 Hz		Height: 76" Approx.
Temp:	32° F to 100° F		
	(0° C to 38° C)		
Humidity:	Not to exceed 95% relative.	*Weight:*	Approx. 325 Lbs. (crated)

1. Remove all cartons, parts, and miscellaneous items from the shipping container and set them aside.

2. Leg levelers and leg bolts are provided among the parts in the cash box. Install leg levelers on front and back legs (View 1). Place the cabinet on a support and attach rear legs using leg bolts (View 2).

3. Attach the front legs using leg bolts (View 2).
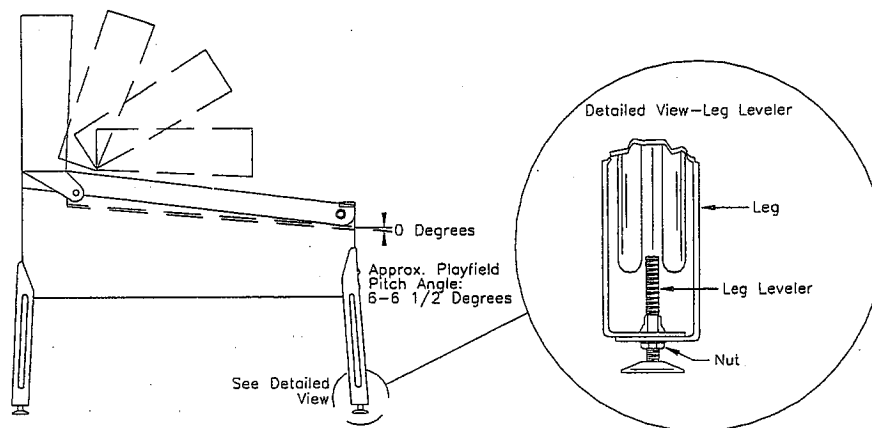
VIEW 1
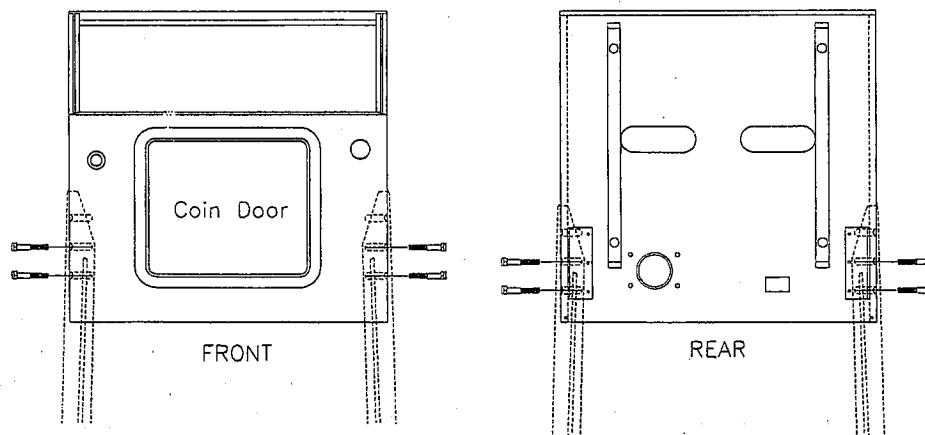
VIEW 2

4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.

5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass, storing it carefully to avoid damage. Remove the shipping screws holding the Insert Panel. Unlatch and open the Insert Panel. Carefully lift the Speaker Panel and lay it down on the playfield glass. Be careful not to damage the Dot Matrix Display/Driver Board. This allows access to the bolt holes used for securing the backbox upright. Install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox. Close the Insert Panel and latch into position. Replace the Speaker Panel. Reinstall the backglass, and lock the backbox.

⚠ **CAUTION**

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

6. Extend each leg leveler slightly below the leg bottom, so that all four foot pads protrude approximately the same distance. Remove the cabinet from its support and place it on the floor.

7. Unlock and open the coin door. Move the molding latch lever toward the left side of the game, to release the front molding. Lift the front molding off the playfield cover glass, return the latch lever to the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game, storing it carefully to avoid breakage.

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

9. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be accurately adjusted WITHOUT REMOVING THE GLASS. The first line (closest to the front of the game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch is 6 1/2 degrees. The nose of the bubble should be between the first and second line on the level (see diagram below).

10.

TRU-PITCH™ level 6 1/2 degrees.
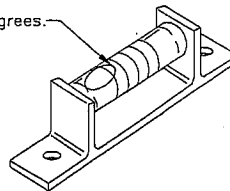
CAUTION

Playfield pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting. The unit is factory installed for a 6 1/2 degree angle. If an adjustment is necessary, loosen screw at the bottom of the unit. Move the pointer, one groove at a time to the left or right, depending on the degree desired. Hold pointer in place and tighten screw.

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

11. Verify that the **required number** of balls are installed in the game. This game uses 4 balls.

12 Install playfield mylars if desired.

> **NOTE:** This playfield has a special hardcoat surface and does not require a full protective mylar. However, mylars can be purchased through your local Bally Distributor. Specify part number 03-9418-1 for full playfield mylar.

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

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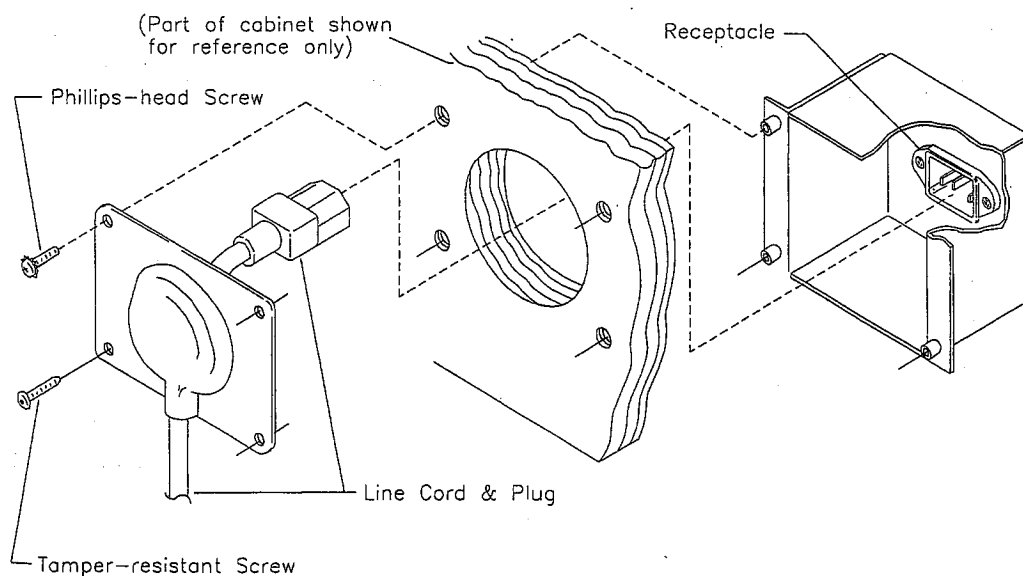
RAISING THE PLAYFIELD

⚠ CAUTION

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

To Raise 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.
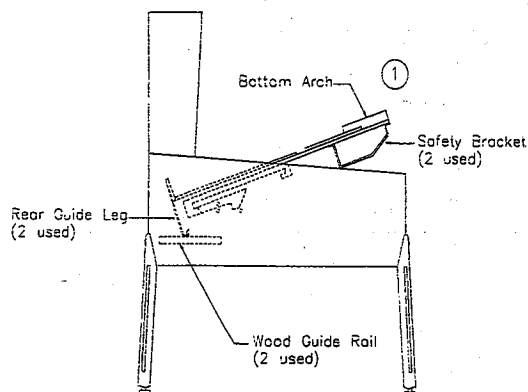
2. Pull the playfield out toward you until it stops (rest position) and raise it approximately 3".

   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.
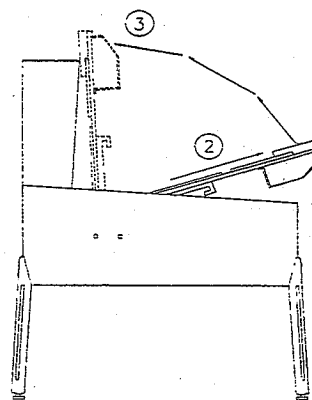
To Lower Playfield:

4. Rotate the playfield to the rest position. This unlocks the pivoting sequence.

5. Push back playfield into cabinet and into playing position.
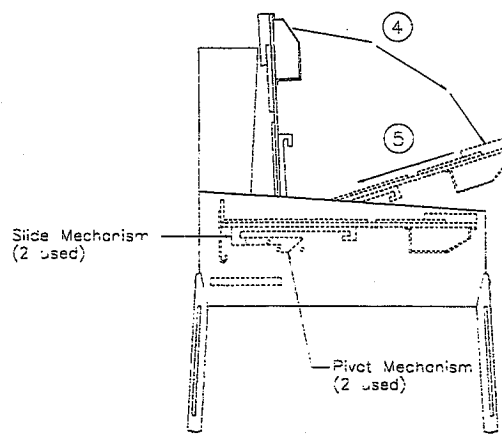
GAME CONTROL LOCATIONS

Cabinet Switches

The On-Off switch is located on the bottom of the cabinet near the right front leg.
The Start Button is the push-button to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

Coin Door Switches

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

Normal Function

The Service Credits button puts credits on the game that are not included in any of the game audits.
The Volume Up (+) button raises the sound level of the game. Press and hold the button until the desired level is reached.
The Volume Down (-) button lowers the sound level of the game. Press and hold the button until the desired level is reached. See Adjustment A.1 28 to shut sound OFF completely.
The *Begin Test button starts the Menu System Operation and changes the Coin Door Switches from Normal Function to Test Function.

Test Function

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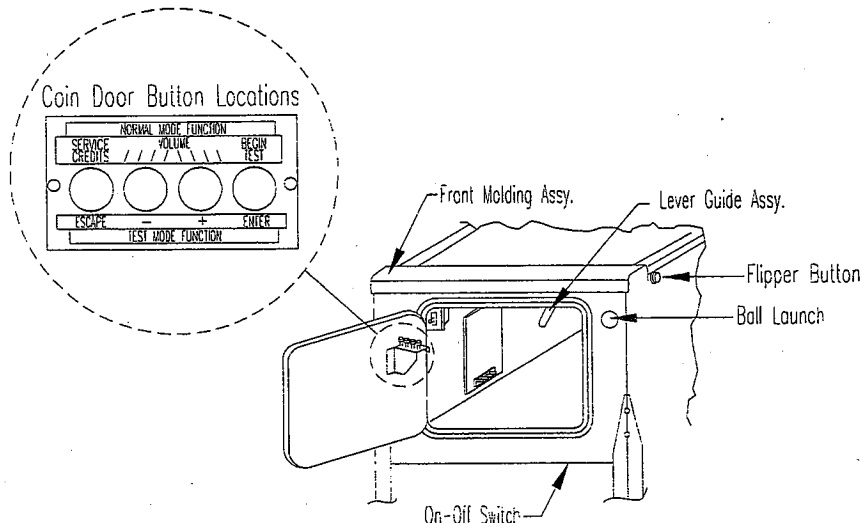
To reset High Score, hold down the Begin Test/Enter switch for 5 seconds while in the Attract Mode.

GAME OPERATION

⚠ CAUTION

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

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

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

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

Example:	INDY500		Sound Rev. P-0
50026	Rev. D.0 A	Sy. 3.39	11/9/94

Press the Enter button to enter the WPC Menu System (refer to the section entitled 'Menu System Operation' for more information). Slide the Service Switch Actuator over the top interlock switch located in the bottom left corner of the coin door opening. Perform the entire Test Menu routine to verify the game is operating satisfactorily.

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

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

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

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

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

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

*Operator-adjustable feature.

MENU SYSTEM OPERATION

The Main Menu allows you to choose from several categories, which in turn lead to other menus. To access the Main Menu, open the coin door and press the Begin Test button, then press the Enter button. Press the Up or Down buttons to cycle through the Main Menu. Press the Enter button to access a menu. Press the Escape button to return to the Main Menu. Press the Start button for HELP at any time.

Main Menu

B. Bookkeeping Menu

B.1 Main Audits
B.2 Earnings 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 Game Time Histograms
P.7 Time-Stamps
P.8 All Data

T. Test Menu

T.1 Switch Edges
T.2 Switch Levels
T.3 Single Switches
T.4 Solenoid Test
T.5 Flasher Test
T.6 General Illumination
T.7 Sound & Music Test
T.8 Single Lamps
T.9 All Lamps
T.10 Lamp & Flasher Test
T.11 Display Test
T.12 Flipper Test
T.13 Ordered Lamp Test
T.14 Lamp Row-Col Test
T.15 Dip Switch Test
T.16 Turbo Test
T.17 Empty Balls 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; Example A.1, A.2, A.3, A.4.

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

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

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

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access an audit menu. Press the Escape button to return to the Bookkeeping 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	06	Total Plays	00
B.1	02	Recent Earnings	00	B.1	07	Replay Awards	00
B.1	03	Free Play Percent	00	B.1	08	Percent Replays	00
B.1	04	Average Ball Time	00	B.1	09	Extra Balls	00
B.1	05	Time Per Credit	00	B.1	10	Percent Extra Ball	00

B.2   Earning Audits*

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

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

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

B.4 Feature Audits

B.4	01	Number Of Games That Used Buy-In	00
B.4	02	Total Multi-Balls	00
B.4	03	Number Of Speedway Awards	00
B.4	04	Percent Pit Stop Multi-Balls	00
B.4	05	Right Ramp Extra Ball Lit	00
B.4	06	Average Time Per Credit	00
B.4	07	Change Set-up Feature Awards	00
B.4	08	Light-up Wave Completed	00
B.4	09	Number Of Games With 1 Buy-In	00
B.4	10	Number Of Games With 2 Buy-In's	00
B.4	11	Number Of Games With 3 Buy-In's	00
B.4	12	Number Of Games With 4 Or More Buy-In's	00
B.4	13	Number Of Turbo Multiballs Played	00
B.4	14	Number Of Turbo Boost Multiballs Played	00
B.4	15	Number Of Ball Saves	00
B.4	16	Speedway "Go For The Pole" Awards	00
B.4	17	Speedway "Quick Pit" Awards	00
B.4	18	Speedway "3x Playfield" Awards	00
B.4	19	Speedway "Gasoline Alley" Awards	00
B.4	20	Speedway "Wrong Turn" Awards	00
B.4	21	Speedway "Extra Ball" Awards	00
B.4	22	Speedway "Caution" Awards (Video Mode)	00
B.4	23	Speedway "Super Liteups" Awards	00
B.4	24	Speedway "Dueling Drivers" Awards	00
B.4	25	Speedway "Super Jets" Awards	00
B.4	26	Speedway Feature Completed Count	00
B.4	27	Turbo Multiball Jackpots	00
B.4	28	Turbo Multiball Super Jackpots	00
B.4	29	Turbo Boost Multiball Jackpots	00
B.4	30	Pit Stop Multiball Jackpots	00
B.4	31	Pit Stop Lanes Completed	00
B.4	32	Pit Stop Feature Lit	00
B.4	33	Hit The Wall Feature Lit	00
B.4	34	Hit The Wall Feature Awarded	00
B.4	35	Change Set-up Feature Lit	00
B.4	36	Change Set-up Feature Played	00
B.4	37	Left Loop Pass Shots	00
B.4	38	"Go For The Pole" Features Where Player Made 1st Shot	00
B.4	39	"Go For The Pole" Features Where Player Made 2nd Shot	00
B.4	40	"Go For The Pole" Features Where Player Made All 4 Shots	00
B.4	41	Dueling Drivers Mode Number Of Shots Made	00
B.4	42	Dueling Drivers Mode Completed	00
B.4	43	Number Of Shots To The Upper Ball Popper	00
B.4	44	Number Of Shots To The Turbo Ball Popper	00
B.4	45	Number Of Shots To The Sponsor Kicker	00
B.4	46	Number Of Shots To The Top Eject Hole	00
B.4	47	Number Of Race Start Shots (Green Flag) Made	00
B.4	48	Number Of Left Loop Shots Made	00
B.4	49	Number Of Right Loop Shots Made	00
B.4	50	Number Of Left Ramp Shots Made	00
B.4	51	Number Of Right Ramp Shots Made	00

B.4   Feature Audits Continued

B.4	53	Number Of Times Super Jets Mode Was Completed	00
B.4	54	Number Of Times Super Light-ups Mode Was Completed	00
B.4	55	Number Of Times The 4 Wrench Standups Were Completed	00
B.4	56	Number Of Times Gasoline Alley Mode Was Completed	00
B.4	57	Number Of Times The INDY Lanes Were Completed	00
B.4	58	Number Of Souvenir's Collected	00
B.4	59	Number Of Times Change Set-up Awards Were Given Out	00
B.4	60	Number Of Times A Light-up Wave Was Completed	00

B.5   Histograms

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

B.6   Time-Stamps

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

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

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a menu.
Press the Escape button to return to the Printouts Menu.

P. PRINTOUTS MENU
(optional board required)

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

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

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

Use the Service Switch Actuator to hold in the top interlock switch located in the bottom left corner of the coin door opening. The actuator must be in place in order to activate the solenoids and flashlamps.

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a test. Press the Escape button to return to the Test Menu.

Note: During any test, press the Start button to obtain the wire color, driver number, connector number and fuse location.

T. TEST MENU

T.1	Switch Edges
T.2	Switch Levels
T.3	Single Switch
T.4	Solenoid Test
T.5	Flasher Test
T.6	General Illumination
T.7	Sound & Music Test
T.8	Single Lamps
T.9	All Lamps
T.10	Lamp & Flasher Tests
T.11	Display Test
T.12	Flipper Test
T.13	Ordered Lamps Test
T.14	Lamp Row-Col Test
T.15	Dip Switch Test
T.16	Turbo Test
T.17	Empty Balls Test

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

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

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

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

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

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

T.4 Solenoid Test
The Solenoid Test has three modes: Repeat, Stop, and Run. Only one solenoid should pulse at a time. The system has detected a problem if; more then one solenoid pulses, a solenoid comes On and stays On, or no solenoids pulse during the Repeat or Run modes.

Repeat   -   The Repeat Mode pulses a single solenoid. After entering this test, Solenoid 1 shows in the display. and the corresponding solenoid activates. Press the Up or Down button to cycle through the solenoids, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.

Stop   -   The Stop Mode halts the Solenoid Test. Press Enter during the Repeat mode and the Solenoid Test Stops. No solenoids should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

Run   -   The Run Mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

T.5 Flasher Test
This tests the flashlamp part of the solenoid circuit exclusively. This, like the Solenoid Test has three test modes: Repeat, Stop, and Run. During this test, only one flashlamp circuit should pulse at a time. The system has detected a problem if more than one circuit pulses, a circuit stays On, or no circuits pulse during the Repeat or Run modes.

Repeat   -   The Repeat mode pulses a single flashlamp. After entering this test, the name and number of the first flashlamp circuit will show in the display and the corresponding bulb(s) flash. Press the Up or Down button to cycle through all of the flashlamp circuits one at a time. The same circuit pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.

Stop   -   The Stop Mode halts the Flasher Test. No flashlamp circuit should be active during this mode. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

Run   -   The Run Mode cycles through the flashlamps automatically. The display shows the name and number of the flashlamp circuit currently being pulsed and the corresponding bulb(s) flash. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

T.6 General Illumination
This test checks all of the General Illumination circuits. There are two modes of operation: Stop and Run.

Stop   -   Press the Up or Down buttons to cycle through the General Illumination Test manually. All illumination is tested first, followed by an individual circuit test. The circuit name and number will show in the display while the corresponding lamps light. If any other results occur the system has detected an error.

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

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

Run   –   The Run Mode steps through a sequence of sounds and music. Pressing the Up or Down button during this portion of the Sound and Music test advances to a particular sound/tune without having to wait for the program to play all the sounds available in the test. A sound/tune should be heard for each name and number that appears in the display. Any other results indicate the system has detected a problem.

Repeat   –   Press the Enter button at any time during the Run Mode to cause the program to stop and repeat a particular sound/tune. The same sound should repeat continuously until the Up or Down button is pressed. Any other results indicates the system has detected a problem.

Stop   –   Press the Enter button at any time during the Repeat Mode to stop this test altogether. No sound/tune should be heard. Any other results indicates the system has detected a problem.

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

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

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

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

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

T.12 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 than one flipper pulses, a flipper comes On and stays On, or no flippers pulse during the Repeat or Run modes.

Repeat   -   The Repeat Mode pulses a single flipper. After entering this test, coil 01 shows in the display and the corresponding flipper activates. Press the Up or Down button to cycle through the flipper coils, one at a time. The same flipper coil pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.

Stop   -   The Stop Mode halts the Flipper Coil Test. Press Enter during the Repeat mode and the Flipper Coil Test stops. No flipper coil should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

Run   -   The Run Mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

T.13 Ordered 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 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 Lamp Row-Col Test   This test allows individual rows and columns in the lamp matrix to be operated. This is useful for trouble-shooting wiring and driver problems.

Press the UP or DOWN buttons to cycle trough the different rows and columns.

T.15 Dip Switch Test   This test is used to show the positions of the dip switches on the CPU board (U27).

T.16 Turbo Test   Advance to test T.16 and press the Enter Button. The turbo test begins by running the turbo motor at full speed to clear any balls that might be in the turbo. The display indicates "Emptying Turbo" while this takes place. Then, the index opto mounted to the circuit board below the turbo is tested, and the results are printed, followed by the "Ball Sensor" opto which "Looks" through the turbo blade. If the turbo blade fails to spin, check the motor for proper operation.

T.17 Empty Balls Test   This test kicks out all balls loaded in troughs, lockups, poppers, and kickouts until no balls remain in those locations.

Note: As the trough kicks out balls, they will stack up in the shooter groove, which may require manual clearing in order to allow further balls to be kicked out.

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a utility. Press the Up or Down buttons to see the setting choices. Press the Enter button to lock in a choice. If a mistake is made, press Escape while "Saving Adjustment Value" is in the display. The original settings is retained and the new settings is ignored. Press the Escape button to return to the Utility 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 writing a Custom Message. Press the Enter button to begin entry of the custom message. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation. If you make a mistake, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once your message is complete, press and hold the Enter button until "Message Stored" is displayed.

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

U.6 Set Game I.D.   This utility allows the operator to install a message, such as game location, that only appears on printouts . Press the Enter button to activate Set Game I.D.. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation.

U.7 Factory Adjustment   Press the Enter button to restore the adjustments to factory settings.

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

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

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 groups.

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 Somewhat MORE difficult than factory setting.

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

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

Adj. No.	Adjustment Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03	Hard U.0 04	Extra Hard U.9 05
A.2 02	Buy-in Count	UNLIMITED	3	3	2	1
A.2 07	Ball Save Time	12	10	6	4	3
A.2 08	Ball Saves	5	3	1	1	1
A.2 09	Turbo Ball Save	15	12	9	5	0
A.2 10	Boost Ball Save	15	12	9	5	0
A.2 11	Pit Ball Save	15	10	7	4	0
A.2 12	Extra Ball Percentage	35	25	20	10	5
A.2 13	Ramp Extra Ball Start	4	6	8	10	15
A.2 14	Ramp Extra Ball 2	ON	ON	ON	OFF	OFF
A.2 15	Auto-fire Locks	NO	NO	NO	YES	YES
A.2 16	Race Difficulty	EX. EASY	EASY	MEDIUM	HARD	EX. HARD
A.2 17	Speedway Extra Ball Memory	YES	YES	YES	NO	NO
A.2 18	Ramp Extra Ball Memory	YES	YES	YES	NO	NO
A.2 19	Set-up Extra Ball Memory	YES	YES	YES	NO	NO
A.2 20	Light-up Extra Ball Memory	YES	YES	YES	NO	NO
A.2 21	Pit Stop Time	35	30	25	15	10
A.2 22	Duel Mode Time	45	40	30	25	20
A.2 23	3X Mode Time	45	40	30	25	20
A.2 24	Wrong Turn Mode Time	45	40	30	25	20
A.2 25	Pole Mode Time	45	40	30	25	20
A.2 26	Gas Alley Time	45	40	30	25	20
A.2 27	Change Set-up Time	8	7	5	3	3

Game Difficulty Setting Table for German/European Games

Adj. No.	Adjustment Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03	Hard U.0 04	Extra Hard U.9 05
A.2 02	Buy-in Count	UNLIMITED	3	3	2	1
A.2 07	Ball Save Time	12	10	6	4	3
A.2 08	Ball Saves	5	3	1	1	1
A.2 09	Turbo Ball Save	15	12	9	5	0
A.2 10	Boost Ball Save	15	12	9	5	0
A.2 11	Pit Ball Save	15	10	7	4	0
A.2 12	Extra Ball Percentage	35	25	20	10	5
A.2 13	Ramp Extra Ball Start	4	6	8	10	15
A.2 14	Ramp Extra Ball 2	ON	ON	ON	OFF	OFF
A.2 15	Auto-fire Locks	NO	NO	NO	YES	YES
A.2 16	Race Difficulty	EX. EASY	EASY	MEDIUM	HARD	EX. HARD
A.2 17	Speedway Extra Ball Memory	YES	YES	YES	NO	NO
A.2 18	Ramp Extra Ball Memory	YES	YES	YES	NO	NO
A.2 19	Set-up Extra Ball Memory	YES	YES	YES	NO	NO
A.2 20	Light-up Extra Ball Memory	YES	YES	YES	NO	NO
A.2 21	Pit Stop Time	35	30	25	15	10
A.2 22	Duel Mode Time	45	40	30	25	20
A.2 23	3X Mode Time	45	40	30	25	20
A.2 24	Wrong Turn Mode Time	45	40	30	25	20
A.2 25	Pole Mode Time	45	40	30	25	20
A.2 26	Gas Alley Time	45	40	30	25	20
A.2 27	Change Set-up Time	8	7	5	3	3

U.9 06 Install 5 Ball

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

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

Adjustment Number	Adjustment Description	Install 3-Ball U.9 07 (factory)	Install 5 Ball U.9 06
A.2 02	Buy-in Count	3	2
A.2 07	Ball Save Time	6	4
A.2 08	Ball Saves	1	1
A.2 09	Turbo Ball Save	9	5
A.2 10	Boost Ball Save	9	5
A.2 11	Pit Ball Save	7	4
A.2 12	Extra Ball Percentage	20	10
A.2 13	Ramp Extra Ball Start	8	10
A.2 14	Ramp Extra Ball 2	ON	OFF
A.2 15	Auto-fire Locks	NO	YES
A.2 16	Race Difficulty	MEDIUM	HARD
A.2 17	Speedway Extra Ball Memory	YES	NO
A.2 18	Ramp Extra Ball Memory	YES	NO
A.2 19	Set-up Extra Ball Memory	YES	NO
A.2 20	Light-up Extra Ball Memory	YES	NO
A.2 21	Pit Stop Time	25	15
A.2 22	Duel Mode Time	30	25
A.2 23	3X Mode Time	30	25
A.2 24	Wrong Turn Mode Time	30	25
A.2 25	Pole Mode Time	30	25
A.2 26	Gas Alley Time	30	25
A.2 27	Change Set-up Time	5	3

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:

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

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

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

U.9 10 Install Novelty   This option removes all Free Play and Extra Ball awards.   Individual adjustments are affected, as follows:

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

U.9 11 Not Used

U.9 12 Serial Capture   This sets up the printer adjustments for serial transmission to a laptop computer (9600 baud, 40 column, no page breaks, serial printer).   This option requires the installation of the optional printer kit, part number 63110.

U.9 13 thru 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 U9 22 are used to modify game pricing and type of game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups. **NOTE:** German Replay starts at 50,000,000.

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 28 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.

* The French DIP Switch Settings are:

SW4	SW5	SW6	SW7	SW8
On	On	On	Off	Off

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 will help in find intermittent problems. The tests that Auto Burn-in cycle through are: the Display Test, Sound and Music Test, All Lamps Test, Solenoid Test, Flashers Test, General Illumination Test, and the Flipper Coil Test. All of the tests are run concurrently. The time spent on the current burn-in cycle, and the total time the game has spent in burn-in are displayed.

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access an adjustment. Press the Up or Down buttons to see the setting choices. Press the Enter button to lock in a choice. If a mistake is made, press Escape while "Saving Adjustment Value" is in the display. The original settings is retained and the new value is ignored. Press the Escape button to return to the Adjustment Menu.

A. ADJUSTMENTS MENU

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

A.1 Standard Adjustments

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

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

A.1 03 Maximum Extra Balls
The number of extra balls that a player may accumulate.
Range: 1-10

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

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

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

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

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

A.1 07 Replay Start*
The replay start value when Auto % Replay is used. The range of this setting is 100,000,000 to 700,000,000.

A.1 08 Replay Levels*

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

*For Auto % Replay.

A.1 09 Replay Level 1
A.1 10 Replay Level 2
A.1 11 Replay Level 3
A.1 12 Replay Level 4

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

A.1 13 Replay Boost

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

ON   -   Score is boosted between 1,000,000 and 75,000,000 points.
OFF   -   Replay score is not boosted.

A.1 14 Replay Award

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

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

A.1 15 Special Award

The award automatically provided when the player scores a special.

Credit   -   Scoring a Special awards a Credit.
Ticket   -   Scoring a Special awards a Ticket.
Ball   -   Scoring a Special awards an Extra Ball.
Points   -   Scoring a Special awards 30 Million points.

A.1 16 Match Award

The award automatically provided when the players wins a match.

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

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

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

A.1 18 Maximum Ticket/Player
The amount of Tickets each player can earn.
Range 00 - 100

A.1 19 Match Feature
The desired percentage for the Match Feature occurring at the end of the game.

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

A.1 20 Custom Message
The message displayed during the Attract Mode.

YES - A message is displayed
NO - A message is not displayed.

A.1 21 Language
The language the game uses: English, German, French or Spanish.

A.1 22 Clock Style
The style of clock the game uses: A.M./P.M., or 24 Hours.

A.1 23 Date Style
The style of date the game uses: Month/Date/Year, or Date/Month/Year.

A.1 24 Show Date and Time
The date and time show in the Attract Mode.

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

A.1 25 Allow Dim Illumination
The game program dims the General Illumination for special effects and during the Attract Mode.

YES - Dim General Illumination for spiral effects and Attract Mode.
NO - Do Not dim 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 dimness of the lamps. Using this feature will substantially increase the life of the lamps.

Setting: -   Off, 2-60 Minutes

A.1 30 Power Saver Level

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

Range: 4-7 (4 = dimmest, 7 = brightest)

A.1 31 Ticket Expansion Board

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

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

A.1 32 No Bonus Flips

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

A.1 33 Game Restart

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

Never: -   Do not allow a new game to start until the current game is over.

Slow: -   Restart if the start button is pressed continuously for over 1/2 second. This helps to prevent the unintended restart of game in progress.

Instantly: -   Restart as soon as the start button is pressed.

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

A.2 Feature Adjustments

A.2 01 Buy Extra Ball - Buy-In Feature
This determines whether each player may buy 1 extra ball for 1 credit at the end of the game.
Settings: 1 Credit
              Off

Factory Default: 1 Credit

A.2 02 Buy-In Count
If A.2 01 (BUY EXTRA BALL) is set to "1 CREDIT", this determines the number of Extra Balls that may be purchased at the end of the game. The choices are 1-3 or Unlimited.

A.2 03 Attract Mode Sounds
The operator can select whether or not the game will play music and speech during the attract mode to attract players. The choices are:

ON = The attract mode does have Sound and Music.
OFF = The attract mode does not have Sound OR Music.

Factory Default: OFF

A.2 04 Flipper Sounds
The operator can select whether or not the attract mode has sound on the flipper and launch buttons to attract players. The choices are:

ON = The attract mode does have sound on buttons.
OFF = The attract mode does not have sound on buttons.

Factory Default: ON

A.2 05 Timed Plunger
The ball launch plunger automatically shoots for the player after specified amount of time.

Setting: ON = After 30 - 90 Seconds, the plunger will kick automatically.

OFF = The plunger will NOT kick automatically.

Factory Default: OFF

A.2 06 Flipper Plunger
Pressing The flipper button will fire the launch plunger. (Turn this adjustment on ONLY if the Launch button does not function properly.) The choices are:

NO = Pressing the right flipper does not launch the ball.
YES = Pressing the right flipper will launch the ball.

Factory Default: NO

A.2 07 Ball Save Time
Sets the amount of time a player has Ball Save active at the start of each ball.

Setting: 3-15 seconds
      OFF

Factory Default: 6 Seconds

A.2 08 Ball Saves
Maximum number of ball saves a player is allowed.

Setting: 1-5 Balls

Factory Default: 1 Ball

A.2 09 Turbo Ball Save
Sets the amount of time a player has Ball Save active at the start of Turbo Multi-ball. (This is the Main Multi-ball.)

Setting: 1-15 seconds
      OFF

Factory Default: 9 Seconds

A.2 10 Boost Ball Save
Sets the amount of time a player has Ball Save active at the start of Turbo Boost Multi-ball. (This is a 2-ball Multi-ball.)

Setting: 1-15 seconds
      OFF

Factory Default: 9 Seconds

A.2 11 Pit Ball Save
Sets the amount of time a player has Ball Save active at the start of Pit Stop Multi-ball. (This is a 2-ball Multi-ball)

Setting: 1-15 seconds
      OFF

Factory Default: 7 Seconds

A.2 12 Extra Ball Percentage

The operator selects the percentage of Extra Balls desired. The game will try to match this percentage by:

1) Increasing or decreasing the number of right ramp shots needed to light extra ball.
2) Increasing or decreasing the number of times the Light-up targets need to be completed to award extra ball.
3) Increasing or decreasing the number of times extra ball is available in the Change Set-up feature.

The setting range is OFF-35 percent.

Factory Default: 20 percent

A.2 13 Ramp Extra Ball Start

This is the number of Right Ramp shots (High Speed Laps) needed to light extra ball. The machine will start at this value, and modify it as needed to achieve the percentage specified in A.2 12.

Setting: 2 - 15

Factory Default: 8 Ramp shots

A.2. 14 Ramp Extra Ball 2

Determines if a second extra ball will be awarded from the right ramp at 60 ramp shots. The choices are:

ON = Making 60 ramp shots will light extra ball.
OFF = There is NOT a second ramp extra ball.

A.2 15 Auto-Fire Locks

The operator selects whether or not the ball will auto-fire onto the playfield when a turbo multi-ball lock is made. Note: This also turns off the right ramp skill shot on locked balls. The choices are:

YES = Balls will be auto-fired when a lock is made.
NO = Balls will not be autofied when a lock is made, the player must press launch button to launch ball.

Factory Default: NO

A.2 16 Race Difficulty

This adjustment helps controls the overall difficulty of the game by making features such as speedway awards, passing and locks more difficult to get. The choices are:

Extra Easy, Easy, Medium, Hard, Extra Hard

Each choice makes the game progressively more difficult to complete.

Factory Default: Medium

A.2 17 Speedway Extra Ball Memory

The operator selects whether or not Extra Balls awarded from the Speedway will remain lit from ball to ball. The choices are:

YES = An extra ball lit from the Speedway Award will remain lit from ball to ball.

NO = An extra ball lit from the Speedway Award will be turned off at the end of each ball.

Factory Default: YES

A.2 18 Ramp Extra Ball Memory

The operator selects whether or not Extra Balls awarded from the Right Ramp will remain lit from ball to ball. Choices are:

YES = An extra ball lit from the Right Ramp will remain lit from ball to ball.

NO = An extra ball lit from the Right Ramp will be turned off at the end of each ball.

Factory Default: YES

A.2 19 Set-up Extra Ball Memory

The operator selects whether or not Extra Balls awarded from the Change Set-up feature will remain lit from ball to ball. The choices are:

YES = An extra ball lit from "Change Set-up" award will remain lit from ball to ball.

NO = An extra ball lit from "Change Set-up" award will be turned off at the end of each ball.

Factory Default: YES

A.2 20 Light-Up Extra Ball Memory

The operator selects whether or not Extra Balls awarded from the Light-up Targets will remain lit from ball to ball. The choices are:

YES = An extra ball lit from the "Light-up Targets" will remain lit from ball to ball.

NO = An extra ball lit from the "Light-up Targets" will be turned off at the end of each ball.

Factory Default: YES

A.2 21 Pit Stop Time

Determines the maximum amount of time a player has to complete a pit stop.

Setting: 15 - 45 seconds

Factory Default: 25 seconds

A.2 22   Duel Mode Time

The operator selects the amount of time that the DUELING DRIVERS mode is active once started (setting range 15-45 seconds).

Factory Default: 30 seconds

A.2 23   3X Mode Time

The operator selects the amount of time that the 3X playfield mode is active once started (setting range 15-45 seconds).

Factory Default: 30 seconds

A.2 24   Wrong Turn Mode Time

The operator selects the amount of time that the WRONG TURN mode is active once started (setting range 15-45 seconds).

Factory Default: 30 seconds

A.2 25   Pole Mode Time

The operator selects the amount of time that the "GO FOR THE POLE" mode is active once started (setting range 15-45 seconds).

Factory Default: 30 seconds

A.2 26   Gas Alley Time

The operator selects the amount of time that the GASOLINE ALLEY mode is active once started (setting range 15-45 seconds).

Factory Default: 30 seconds

A.2 27   Change Set-up Time

The operator selects the amount of time that the player is given to choose an award during the Change Set-up feature mode, once started (setting range 15-45 seconds).

Setting: 3-8

Factory Default: 5 seconds

A.3   Pricing Adjustments

A.3 01 Game Pricing (if set to custom, then 02 to 09 are available). Custom pricing is not available for U.S.A. and Canadian games.

The cost of a game is selected here, from the Standard Pricing Table or by using the Custom Pricing Editor (A.3 27).

A.3 02 thru A.3 09 Not Used

A.3 10 Coin Door Type (if set to custom, then 11 to 15, 20 and 25 are available)

This adjustment is used to preset adjustments 11 through 15, 20 and 25, based on standard coin doors (U.S.A., German, Etc.).

A.3 11 Collection Text

The coin system used to display the Earning Audits.

A.3 12 Left Slot Value
A.3 13 Center Slot Value
A.3 14 Right Slot Value
A.3 15 4th Slot Value

The monetary value of the left, center, right, and 4th coin chutes. Formerly, these values only affected the way in which the coins were totaled for auditing displays. In the new 10/94 pricing system, these values are added for each coin inserted and credits are awarded based on the amount of money accumulated. See Pricing Editor (A.3 27) for more information.

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. The factory default is 10.

A.3 17 Free Play

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

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

A.3 18 Hide Coin Audits

The coin audits may, or may not be displayed.

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

A.3 19 Not Used

A.3 20 Base Coin Size

This is the smallest unit of coin that may be used when creating a custom pricing mode using the Pricing Editor (A.3 27). For example, in the USA this is typically $0.25. All pricing levels are then specified in 25 cent (or greater) increments.

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 microseconds 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. The options are:

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 slot.

A.3 23 Minimum Coin Microseconds

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.

A.3 25 Allow Hundredths

This is used for a custom door specifier. If set to "YES", then the values for A.3 12-15 are specified in units and hundredths (such as dollars and quarters). If set to "NO", then all values are in units (such as Francs and Lire).

A.3 26 Credit Fraction

This determines the smallest fraction used for credits. It must always be even to accommodate the extra ball buy-in option of 1/2 credit, and is typically 1/2 but may need to be a different value for modes requiring more coins per credit.

A.3 27 Pricing Editor

Custom pricing is not available for U.S.A. and Canadian games.
This function is now used to enter information for a custom pricing mode. The adjustment A.3 26 (Credit Fraction) may need to be set before entering the Custom Pricing Editor. This specifies the smallest fraction available for partial credits.

Because of the availability of an extra ball (buy-in) for 1/2 credit, this value is always even (1/2, 1/4, 1/6 etc.). The typical setting for A.3 26 is 1/2 (such that there are only full credits and half credits) but you may need to use a different value for other pricing modes.

Please note that formerly, the coin values specified by custom coin door adjustments A.3 12-15 only affected audit totals that showed collection totals. In the 10/94 pricing system, these coin values are added up for each coin received and credits are awarded based on pricing levels being reached. The pricing editor described here allows you to set these levels, however, it may be necessary for you to set A.3 10 (Coin Door Type) to "CUSTOM" and then change A.3 11-15, 20 and 25 to reflect the value of the coins being used. This is usually NOT NECESSARY, but must be done BEFORE using the custom pricing editor when it is necessary.

Begin the custom pricing function by pressing the "Enter" button while A.3 27 "PRICING EDITOR" is showing on the display.

The pricing editor will now show the data for the currently selected pricing mode. If this is the 1st use of the pricing editor then this will show the last built-in pricing that was selected. Otherwise it will be the last custom mode created by this function. (Note that A.3 01 will display "Custom" any time a non-standard pricing has been used.)

Assuming that last mode installed was 1/$0.50 2/$0.75 3/$1.00 the display will appear as follows:

Custom Pricing Editor	
1) $0.25	1/2 cred.
2) $0.50	1 cred.
3) $0.75	2 cred.
4) $1.00	3 cred.

Display View

The "$0.25" field will be flashing. You may now use the test mode buttons to perform the following functions:

Escape: Undo any changes to the current field and move to the previous field.

"-" (Down): Make the current field lower.

"+" (Up): Made the current field higher.

Enter: Save any change to the current field and move to the next field. Note that there are two columns of fields. Price levels are in the left column and credit levels are in the right column. Pressing "Enter" will move from the left column to the right column before moving to the next line.

Start: Save the current custom price mode or start over.

By using the above functions, simply enumerate each pricing level and the number of credits that should be awarded at that level. Please note that you must specify each fractional level in the sequence.

Example: 1/$0.50 2/$1.00 4/$1.50 6/$2.00

1)	$0.25	1/2 cred.
2)	$0.50	1 cred.
3)	$0.75	1 1/2 cred.
4)	$1.00	2 cred.
5)	$1.25	2 1/2 cred.
6)	$1.50	4 cred.
7)	$1.75	4 1/2 cred.
8)	$2.00	6 cred.

1-36

Also note that once the value of the coins repeat that no further specification is necessary.

Example: 1/$0.50   2/$1.00

                    1) $0.25   1/2 cred.

In the above example, only one line needs to be specified, indicating that 1/2 credit is awarded for each $0.25 received.

Special Features:
There are some special features available by pressing the "-" (Down) button while in the left column. The following words will be displayed instead of a pricing level:

> *End*
> *Delete*
> *Insert*
> *Clear*
> *Repeat 1*
> *Repeat 2*
> *Repeat 3*
> *Repeat 4*
> *Repeat 5*
> *Repeat 6*
> *Repeat 7*
> *Repeat 8*
> *Repeat 9*
> *Repeat 10*
> *Repeat 11*
> *Repeat 12*
> *Repeat 13*
> *Repeat 14*
> *Repeat 15*
> *Repeat 16*
> *Repeat 17*
> *Repeat 18*
> *Repeat 19*
> *Repeat 20*

Pressing "Enter" with the above words selected will activate the following functions:

End   This is the same as pressing the start button. A menu of choices will be provided (see "Start Button" below).

Delete   This will delete the current level from the pricing mode.

Insert   This will insert a new pricing level ABOVE the current level. The current level will be unaffected. There must be room for at least 1 coin between the current level and the previous level, and at least one fractional credit unit between the current level and the previous level.

Example: Inserting a new pricing level.

```
┌────────────────────────────────┐
│      Custom Pricing Editor      │
│  1)      $0.50        1 cred.   │
│  2)      $1.00        2 cred.   │
│  3)      $1.50        4 cred.   │
│  4)      $2.00        6 cred.   │
└────────────────────────────────┘
            Display View
```

Use the "Enter" button to move to the $1.50 field. Now press the "-" button once to create the following display:

```
┌────────────────────────────────┐
│      Custom Pricing Editor      │
│  1)      $0.50        1 cred.   │
│  2)      $1.00        2 cred.   │
│  3)      INSERT       4 cred.   │
│  4)      $2.00        6 cred.   │
└────────────────────────────────┘
            Display View
```

Now press the "Enter" button. The display will now show:

```
┌────────────────────────────────┐
│      Custom Pricing Editor      │
│  1)      $0.50        1 cred.   │
│  2)      $1.00        2 cred.   │
│  3)      $1.25        2 1/2 cred.│
│  4)      $2.00        6 cred.   │
└────────────────────────────────┘
            Display View
```

Note that the line "5) $2.00 6 cred." no longer fits on the display. Whenever there are more that 4 pricing levels the display will scroll up and down as "Enter" and "Escape" are used to move from field to field. If you repeatedly press "Enter" the display will then show:

```
┌────────────────────────────────┐
│      Custom Pricing Editor      │
│  2)      $1.00        2 cred.   │
│  3)      $1.25        2 1/2 cred.│
│  4)      $1.50        4 cred.   │
│  5)      $2.00        6 cred.   │
└────────────────────────────────┘
            Display View
```

Clear This will clear out the current entries to allow a new price mode to be entered.

Repeat (1-20)   This will cause all entries above the current line to be repeated the number of times specified. This is only available when there are no pricing levels below the current line.

Example: 1/$0.50   2/$1.00   15/$5.00

Use the "Edit New Pricing Mode" feature described below to clear out the current levels.

Use "+" and "Enter" to specify 1/2 credit for $0.25:

```
┌─────────────────────────────────┐
│      Custom Pricing Editor      │
│ 1)      $0.25        1/2 cred.  │
└─────────────────────────────────┘
```
Display View

Now, use "-" until the display shows "Repeat 20". The display will show the following:

```
┌─────────────────────────────────┐
│      Custom Pricing Editor      │
│ 1)      $0.50        1 cred.    │
│ 2)      REPEAT 20               │
└─────────────────────────────────┘
```
Display View

Press "Enter" and the display will show the following:

```
┌─────────────────────────────────┐
│      Custom Pricing Editor      │
│ 1)      $0.25        1/2 cred.  │
│ 2)      $0.50        1 cred.    │
│ 3)      $0.75        1 1/2 cred.│
│ 4)      $1.00        2 cred.    │
└─────────────────────────────────┘
```
Display View

Actually, by repeating the 1st line 20 times the pricing mode is currently set up as follows, but only the 1st 4 lines are displayed.

```
┌─────────────────────────────────┐
│      Custom Pricing Editor      │
│ 1)      $0.25        1/2 cred.  │
│ 2)      $0.50        1 cred.    │
│ 3)      $0.75        1 1/2 cred.│
│ 4)      $1.00        2 cred.    │
│ 5)      $1.25        2 1/2 cred.│
│ 6)      $1.50        3 cred.    │
│ 7)      $1.75        3 1/2 cred.│
│ 8)      $2.00        4 cred.    │
│ 9)      $2.25        4 1/2 cred.│
│ 10)     $2.50        5 cred.    │
│ 11)     $2.75        5 1/2 cred.│
│ 12)     $3.00        6 cred.    │
│ 13)     $3.25        6 1/2 cred.│
│ 14)     $3.50        7 cred.    │
│ 15)     $3.75        7 1/2 cred.│
│ 16)     $4.00        8 cred.    │
│ 17)     $4.25        8 1/2 cred.│
│ 18)     $4.50        9 cred.    │
│ 19)     $4.75        9 1/2 cred.│
│ 20)     $5.00        10 cred.   │
└─────────────────────────────────┘
```

Now, repeatedly press "Enter" to move to the right hand column of the 20th level. The display will show (with "10 cred." blinking):

```
┌─────────────────────────────────┐
│         Custom Pricing Editor   │
│   17)    $4.25        8 1/2 cred.│
│   18)    $4.50        9 cred.    │
│   19)    $4.75        9 1/2 cred.│
│   20)    $5.00        10 cred.   │
└─────────────────────────────────┘
```
Display View

Now, press "+" repeatedly until the right hand column of line 20) reads "15 cred.".

Start Button: Once the pricing mode has been specified, exit the custom pricing editor by pressing the "Start" button. This will bring up a menu with (some or all of) the following choices:

```
┌─────────────────────────────────┐
│ Choose an Option:               │
│    Return to Editor             │
│    Clear Pricing                │
│    Ignore Changes               │
│    Save Changes                 │
└─────────────────────────────────┘
```
Display View

Use the "+" and "-" button to select your choice and press the "Enter" button to activate. The selections cause the following actions:

Return to Editor: This option will allow you to continue to edit the pricing information.

Clear Pricing: This option will clear out all pricing levels and bring you back to the pricing editor to create a pricing mode from scratch.

Ignore Changes: This option will discard the work done in the pricing editor and leave the previously installed pricing mode in the game.

Save Changes: Press "Enter" to save your custom edited pricing mode and install it as the pricing for the game. Note that this choice will not be displayed if there is not at least one pricing level specified in the pricing editor, or if no changes have been made.

Exit Pricing Editor: This option will appear if no changes have been made. It will exit the Pricing Editor leaving the pricing as is.

Pricing Table

Country	Coin Chutes Left	Center	Right	4th Chute	Games/Coins	Display	Pricing Adjustments A3 02 03 04 05 06 07 08 09
USA	25¢	$1.00*	25¢	$1.00	1/50¢, 2/75¢, 3/$1 [2]	50¢, 75¢, $1.00	
	25¢	$1.00*	25¢	$1.00	1/75¢, 2/$1.50, 3/$2.00 [2]	1/.75, 3/2.00	
	25	$1.00	25¢	$1.00	1/3X25¢ [2]	USA1 1/$0.75	
	25	$1.00	25¢	$1.00	1/50¢, 2/$1 [2]	USA 2/$1.00	
	25	$1.00	25¢	$1.00	1/50¢, 3/$1.00 [2]	USA 3/$1.00	
	25	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 3/$1.50, 6/$2.00 [2]	USA 6/$2.00	
	25	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 3/$1.50, 5/$2.00 [1,2]	USA 5/$2.00	
	25	$1.00	25¢	$1.00	1/3X25¢, 2/$1.50, 4/$2.00 [2]	1/.75, 4/$2.00	
	25	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 4/$1.50, 6/$2.00 [2]	6/$2.00 4/$1.50	
	25¢	25¢	25¢	-	1/4x25¢, 6/$5.00 [2]	1/1, 6/5	
	25¢	25¢	25¢	-	1/4x25¢ [2]	1/$1.00	
Canada	25¢	-	$1.00*	-	1/50¢, 2/75¢, 3/$1 [2]	CAN. 50-75-1	
	25	-	$1.00	-	1/50¢, 2/$1 [2]	CAN. 2/$1.00	
	25	-	$1.00	-	1/50¢, 3/$1.00 [2]	CAN. 3/$1.00	
	25	-	$1.00	-	1/2x25¢, 2/4x25¢, 3/$1.00 [2]	3/$1.00 Coin	
	25	-	$1.00	-	1/2x25¢, 2/$1.00, 3/$1.50, 6/$2.00 [2]	CAN. 6/$2.00	
	25	-	$1.00	-	1/2x25¢, 2/$1.00, 3/$1.50, 5/$2.00 [1,2]	CAN. 5/$2.00	
	25	-	$1.00	-	1/2x25¢, 2/$1.00, 4/$1.50, 6/$2.00 [2]	6/$2 4/1.50	
	25	-	$1.00	-	1/3X25¢, 2/$1.50, 4/$2.00 [2]	1/.75, 4/2.00	
	25¢	-	$1.00*	-	1/75¢, 2/$1.50, 3/$2.00 [2]	1/.75, 3/2.00	
	25	-	$1.00	-	1/3X25¢ [2]	CAN. 1/$0.75	
Austria	5sch	10sch	10sch	-	1/2x5sch, 3/2x10sch [2]	AUSTRIA	
	5sch	-	10sch		2/5sch, 5/10sch	CUSTOM	02 00 05 00 01 00 01 00
Australia	20¢	$1	$1	$2	1/$1, 3/$2 [2]	AUSTRALIA 1	
	20¢	$1	$1	$2	1/$1, 2/$2	AUSTRALIA 2	
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 1	
	1Fr	2Fr	5Fr	-	1/2Fr, 2/3Fr, 3/4Fr, 5/5F	SWISS 2	
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr, 1/20Fr, 3/50Fr [2]	BELGIUM	
Germany	1DM	2DM	5DM	-	1/2DM, 2/3DM, 3/4DM, 4/5DM [1,2]	GER. 4/5DM	
					1/2DM, 2/3DM, 3/4DM, 5/5DM [1,2]	GER. 1/2DM	
					1/1DM, 2/2DM, 5/5DM [2]	GER. 1/1DM	
					1/1DM, 2/2DM, 6/5DM [2]	GER. 6/5DM	
Holland	1G	-	1G	-	1/1G [2]	HOLLAND	
Sweden	1Kr	5Kr	10Kr	1Kr	1/10Kr, 2/15Kr, 3/20Kr [1,2]	SWEDEN 1	
	1Kr	5Kr	10Kr	1Kr	1/5Kr [2]	SWEDEN 2	
France	1Fr	5Fr	10Fr	20Fr	1/3x1Fr, 2/5Fr, 5/10Fr, 10/20Fr [2,3]	TARIF 1	
	1Fr	5Fr	10Fr	20Fr	1/2x1Fr, 3/5Fr, 7/10Fr, 14/20Fr [2,3]	TARIF 2	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 7/2x10Fr, 7/20Fr [1,2,3]	TARIF 3	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 4/10Fr, 9/2x10Fr, 9/20Fr [2,3]	TARIF 4	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 5/10Fr, 11/2x10Fr, 11/20Fr [2,3]	TARIF 5	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 6/20Fr [2,3]	TARIF 6	
Italy	500L	500L	500L	-	1/500L [2]	ITALY 1	
	500L	500L	500L	-	1/2x500L, 3/4x500L [1,2]	ITALY 2	
	500L	500L	500L	-	1/2x500L, 2/4x500L [2]	ITALY 3	
Spain	100P	-	500P	-	1/100P, 6/500P [2]	SPAIN	
	25P	-	100P	-	1/25P, 5/100P	CUSTOM	01 00 04 00 01 04 01 00
	25P	-	100P	-	1/25P, 4/100P	CUSTOM	01 00 04 00 01 00 01 00
	25P	-	100P	-	1/2x25P, 2/100P	CUSTOM	01 00 04 00 02 00 01 00
	25P	-	100P	-	1/2x25P, 3/100P	CUSTOM	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	20Kr	1/2x1kr, 3/5kr, 7/10kr [2]	DENMARK 1	
	1Kr	5Kr	10Kr	20Kr	1/5kr, 3/10kr, 6/20kr [1,2]	DENMARK 2	
Finland	1Mka	-	5Mka	-	1/2x1Mka, 3/5Mka [2]	FINLAND 1	
	1Mka	-	5Mka	-	1/3x1Mka, 2/5Mka [2]	FINLAND 2	
New Zealand	$1.00	-	$2.00	-	1/$1, 3/$2 [2]	NEW ZEALAND 1	
	$2.00	-	$1.00	-	1/$1, 3/$2, ($2-$1 door)	NEW ZEALAND 2	
Norway	5Kr	-	10Kr	-	1/5Kr, 2/10Kr, 5/20Kr [2]	NORWAY	
Argentina	10¢	10¢	10¢	-	1/1 Token [2]	ARGENTINA	
Greece	10D	20D	50D	-	1/2x10D, 1/20D, 3/50D	GREECE	
Antilles	25¢	25¢	1G	-	1/25¢, 4/1G	ANTILLES	
Netherlands	1Hfl	2.5Hfl	2.5Hfl	-	1/1Hfl, 3/2.5Hfl	NETHERLANDS	
Hungary	20 Old	20 New	50F	-	1/40F, 2/60F, 4/100F [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 Ticket.

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

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

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

A.4 04 Champion Credits

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

A.4 05 H.S.T.D. 1 Credits
A.4 06 H.S.T.D. 2 Credits
A.4 07 H.S.T.D. 3 Credits
A.4 08 H.S.T.D. 4 Credits

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

A.4 09 High Score Reset Every

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

A.4 10 Backup Champion

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

A.4 11 Backup H.S.T.D. 1
A.4 12 Backup H.S.T.D. 2
A.4 13 Backup H.S.T.D. 3
A.4 14 Backup H.S.T.D. 4

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

A.4.15 Pit Stop Record Default
The operator selects the default number of seconds for the Pit Stop Record.

Setting Range is 5-25 seconds.

Factory Default: 12 Seconds

A.4.16 Backup Aux Grand Champion H.S.T.D.
This is the backup BUY-IN grand champion score. Players are placed on this HSTD table IF they have bought in at least once.

Range: 0 - 99,900,000

A.4 17 Backup Aux H.S.T.D 1
A.4 18 Backup Aux H.S.T.D 2
A.4 19 Backup Aux H.S.T.D 3
A.4 20 Backup Aux H.S.T.D 4
The first throught the forth BUY-IN high score values. The game automatically restores this value when the High Score Reset value is reached. Players are placed on this H.S.T.D. table IF they have bought in at least once. Range: 0 - 99,900,000

A.5   Printer Adjustments (optional board required)

A.5 01 Column Width
The column width to be printed. Range: 22 - 80.

A.5 02 Lines Per Page
The amount of lines per page. Range: 20 - 80.

A.5 03 Pause Every Page
Choose whether the printer pauses at the end of a page.
YES   -   The printer does pause.
NO   -   The printer does not pause.

A.5 04 Printer Type
Select the type of printer . Choices: Parallel, Serial, ADP., Mini-Drucker, or NSM.

A.5 05 Serial Baud Rate
The baud rate used for Serial or ADP communications (bit rate). Choices: 300, 600, 1200, 2400, 4800, or 9600.

A.5 06 Serial D.T.R. (Data Terminal Ready)
When a Serial Printer is used, this line may be connected to a printer output line signaling that the printer is busy.
Normal   -   Normal D.T.R. signal goes low to indicate the printer is not ready.
Inverted   -   Inverted D.T.R. (busy) signal goes high to indicate printer is not ready.
Ignore   -   D.T.R. signal is ignored.

A.5 07 Auto Printout
With the optional printer board installed, this adjustment allows the initiation of printouts whenever the game detects a printer connected to the game. Parallel printers are detected automatically by plugging them in and putting them on-line. Serial printers (or computers) are detected by sending a carriage return (ASCII 0x0D) or XON (ASCII 0x11).
This adjustment has the following settings:

> OFF   Disable automatic printouts
> MAIN AUDS   Main Audit table (B.1)
> EARNINGS   Earning Audits (B.2)
> STD. AUDITS   Standard Audits (B.3)
> FEATURES   Feature Audits (B.4)
> HISTOGRAMS   Histograms (B.5)
> TIMESTAMPS   Time Stamps (B.6)
> ALL DATA   All of the above data

The table specified above will automatically be printed when a printer (or computer) is detected.

If the printer is detected during game over or test mode, the printout will take place right away.

If the printer is connected while a game is being played, it will take up to 10 seconds to be detected, after which the printout will occur. The game will resume after the printout is complete.

Automatic printout will only take place if the coin door is open.

After an automatic printout has been generated, a second automatic printout will not be possible until a new game has started, or test mode begins.

ERROR MESSAGES

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

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

Check Switch ##.

This message indicates that at least one switch was stuck 'On' at game turn-on or has NOT been actuated during ball play (for 90 balls or Å30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep the game earning, until the service technician can repair the problem.

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

Check Fuses F115 and F116 and Opto 12V Supply.

This message will be displayed if the game senses that all optical switches are not functioning. This usually occurs when there is no 12V supply to the playfield optics.

The problem is likely to be a blown fuse (F115 or F116) or at connectors J112, J116, J117 or J118 on the power driver board.

Opto Trough Bad Check Connectors, Wires and 12V Supply

This message will be displayed if all of the optics in the playfield ball trough are not functioning. This is usually caused by a problem with a ball trough connector supplying 12V and Ground for the optical circuits.

Pinball Missing.

This game normally uses 4 balls; however, it will operate with as few as 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 optos or the Ball Shooter switch.

xxxxx Sw. is Stuck On.

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

Ground Short Row-N, Wht-xxx.

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

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

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 set. If this occurs go to U.4 of the Utilities Menu and set the time and date.

Factory Settings Restored.

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

CPU L.E.D.'s

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

CPU Board L.E.D. Error Codes

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

Sound Board Beep Error Codes
Upon Game Turn-On:

1 Beep	=	Sound Board O.K.
2 Beeps	=	U2 Failure
3 Beeps	=	U3 Failure
4 Beeps	=	U4 Failure
5 Beeps	=	U5 Failure
6 Beeps	=	U6 Failure
7 Beeps	=	U7 Failure
8 Beeps	=	U8 Failure
9 Beeps	=	U9 Failure

OPTO THEORY

The opto receiver (Photo Transistor) 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 (L.E.D.) should always be approximately 1.4 volts. Note, the transmitter (L.E.D.) is larger than the receiver (Photo Transistor); it protrudes further from its case.

LED Board (A—16908)　　　　　　　　　Photo Transistor Board (A—16909)
Transmitter　　　　　　　　　　　　　　　Receiver
1.0—1.1 Volts　　　　　　　　　　　0.1—0.7V Unblocked
　　　　　　　　　　　　　　　　　　　11—13V Blocked

Green　　　　WHT　　　　　　　　　　　BLK　　　Blue

Infrared Ray

SOLDER　　　　　　　　　　　　　　　　　　　　SOLDER

Gray—XXX　　　　　Black　　　　　　　Gray—Yellow　　　Orange—XXX

1-47
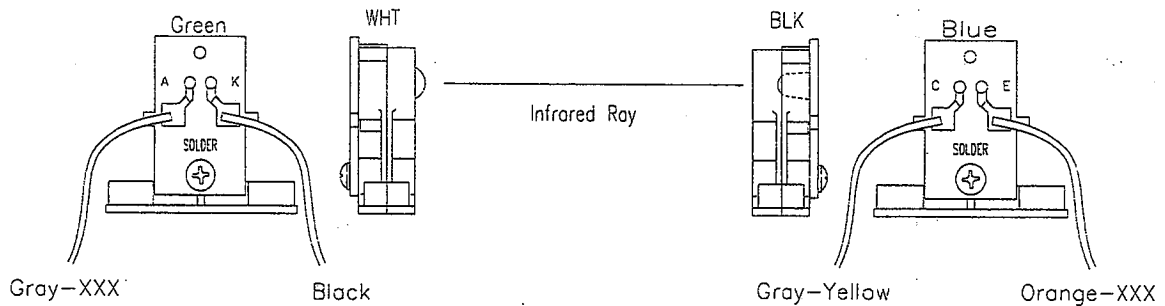
LED List
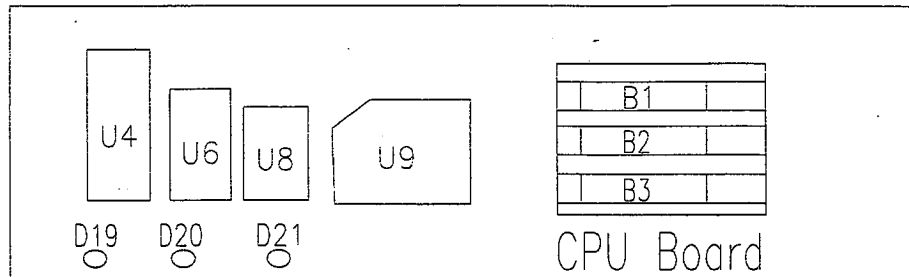
CPU Board
D19, Blanking
D20, Diagnostic
D21, +5vdc
At Game Turn-On = D19 & D21 On, D20 Off
During Normal Operation = D19 Off, D20 flashing, D21 On

Power Driver Board
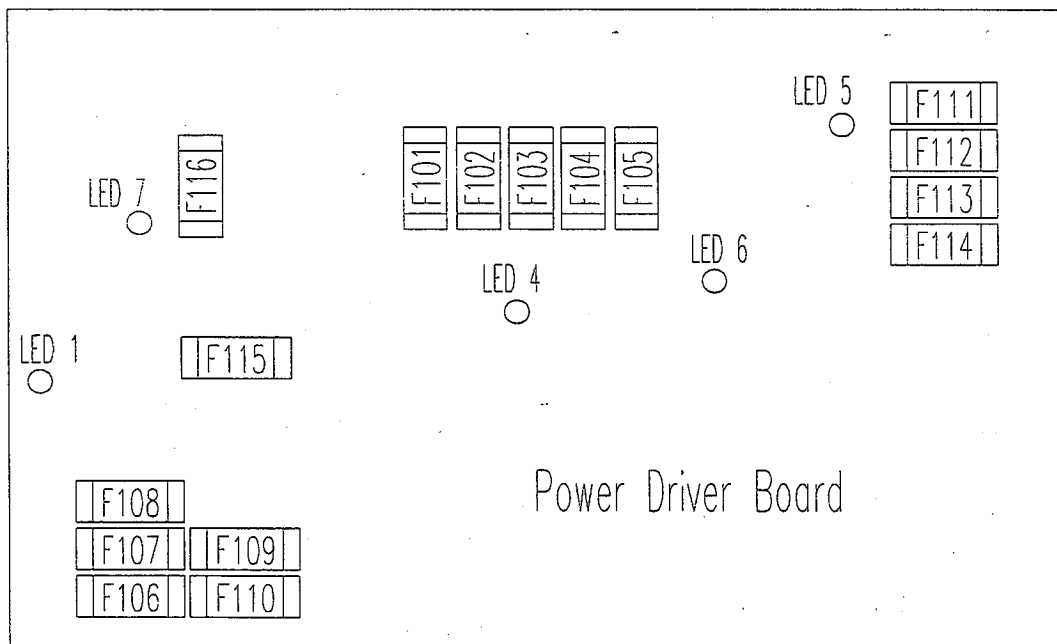LED 1, +12vdc, Switch Circuit, Normally On
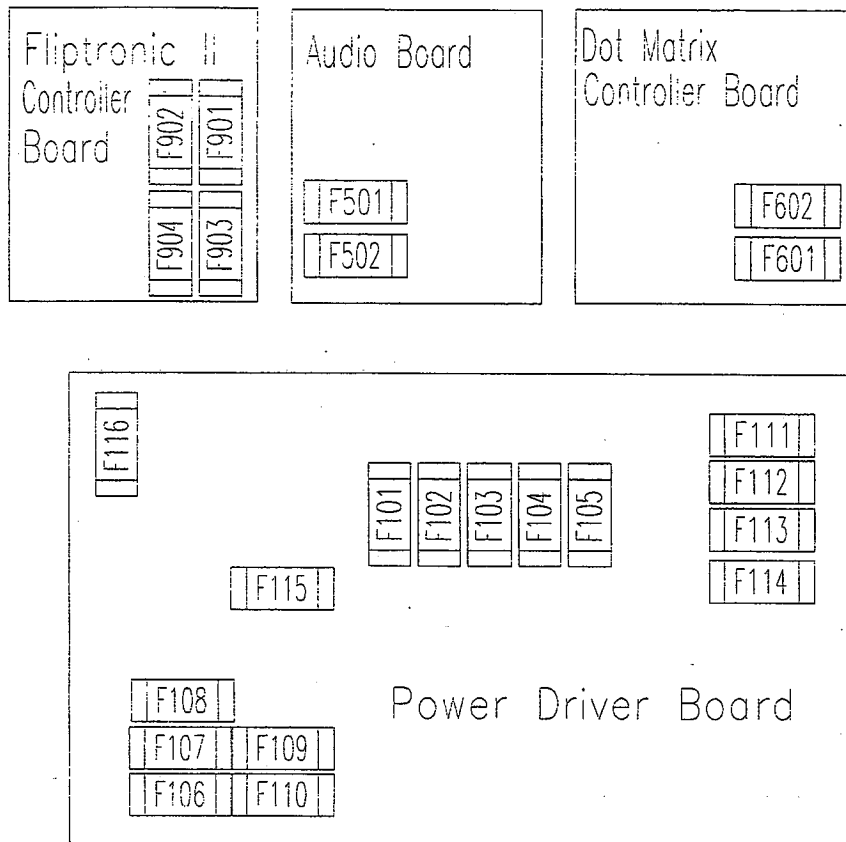LED 2, Not Used
LED 3, Not Used
LED 4, +5vdc, Digital Circuit, Normally On
LED 5, +20vdc, Flashlamp Circuit, Normally On
LED 6, +18vdc, Lamps Circuit, Normally On
LED 7, +12vdc, Power Circuit (Motors, Relays, Etc.), Normally On

Fuse List

```
┌─────────────────────┐   ┌─────────────────────┐   ┌─────────────────────┐
│ Fliptronic II       │   │ Audio Board         │   │ Dot Matrix          │
│ Controller          │   │                     │   │ Controller Board    │
│ Board   [F902][F901]│   │                     │   │                     │
│                     │   │      [F501]         │   │         [F602]      │
│         [F904][F903]│   │      [F502]         │   │         [F601]      │
└─────────────────────┘   └─────────────────────┘   └─────────────────────┘
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┌─────────────────────────────────────────────────────────────┐
│ [F116]                                          [F111]        │
│                                                 [F112]        │
│           [F101][F102][F103][F104][F105]        [F113]        │
│    [F115]                                       [F114]        │
│                                                               │
│   [F108]        Power  Driver  Board                          │
│   [F107][F109]                                                │
│   [F106][F110]                                                │
└─────────────────────────────────────────────────────────────┘
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Audio Board
F501	-25V Circuit	3A, 250V, S.B.
F502	+25V Circuit	3A, 250V, S.B.

Dot Matrix Controller Board
F601	+62V Circuit	3/8A, 250V, F.B.
F602	-113V and -125V Circuits	3/8A, 250V, F.B.

Fliptronic II Controller Board
F901	Lower Right Flipper	3A, 250V, S.B.
F902	Lower Left Flipper	3A, 250V, S.B.
*F903	Upper Right Flipper	3A, 250V, S.B.
*F904	Upper Left Flipper	3A, 250V, S.B.

Power Driver Board
F101	+50VDC General (Not Used)	3A, 250V, S.B.
F102	+50VDC General (Not Used)	3A, 250V, S.B.
F103	Solenoid #25-#28	3A, 250V, S.B.
F104	Solenoid #9-#16	3A, 250V, S.B.
F105	Solenoid #1-#8	3A, 250V, S.B.
F106	G.I. #5 Wht-Vio	5A, 250V, S.B.
F107	G.I. #4 Wht-Grn	5A, 250V, S.B.
F108	G.I. #3 Wht-Yel	5A, 250V, S.B.
F109	G.I. #2 Wht-Org	5A, 250V, S.B.
F110	G.I. #1 Wht-Brn	5A, 250V, S.B.
F111	Flasher Secondary	5A, 250V, S.B.
F112	Solenoid Secondary	7A, 250V, S.B.
F113	+5V Logic	5A, 250V, S.B.
F114	+18V Lamp Matrix	8A, 32V, N.B.
F115	+12V Switch Matrix	3/4A, 250V, F.B.
F116	+12V Secondary	3A, 250V, S.B.

Line Filter
Domestic Game	8A
Foreign Game	5A, S.B.

*May be used for circuits other than flipper circuits.

MAINTENANCE INFORMATION

LUBRICATION

The two main lubrication points of the Ball Eject mechanism* are the pivots for the arm.. The mechanisms of other playfield devices are somewhat similar and have the same lubrication requirements. A medium viscosity oil (switch target grease) is satisfactory for these devices. Also, regularly lubricate the slide-mechanism rails and the leg levers.

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

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

SWITCH CONTACTS

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

Flipper Switches
This game uses the new Fliptronic II Electronic Flipper System. The end-of-stroke switches are NORMALLY OPEN and should close when the flipper is energized. All end-of-stroke switches 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 NO REPLACE these switches with the old style tungsten high current type switches, as intermittent operation could occur. Please note that unlike the old style of flipper, an end-of-stroke switch failure will not harm the flipper. The game will notify the operator of a switch being misadjusted in the test report, but will continue to play. The end-of-stroke switches are a means by which the new electronic flippers feel and play with all of the subtleties of the old flippers.

CLEANING

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

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

*May not be used on all games.

INDIANAPOLIS **500**®

Unit Disassembly for Repair

## Major Component Service Instructions

RACE TRACK ASSEMBLY

1. Grasp bottom arch and carefully lift playfield up enough to clear the safety brackets. Pull the playfield out until it stops. Leave the playfield in this position for easier access to the race track assembly.

2. Remove two 1/4" hex-head bolts from behind the back panel.

3. Reach behind the back panel, under the playfield and disconnect two connectors; one from the Motor EMI P.C.B., and one in-line connector.

4. The race track assembly can now be removed from the playfield and serviced as needed.

5. Reassemble in reverse order.
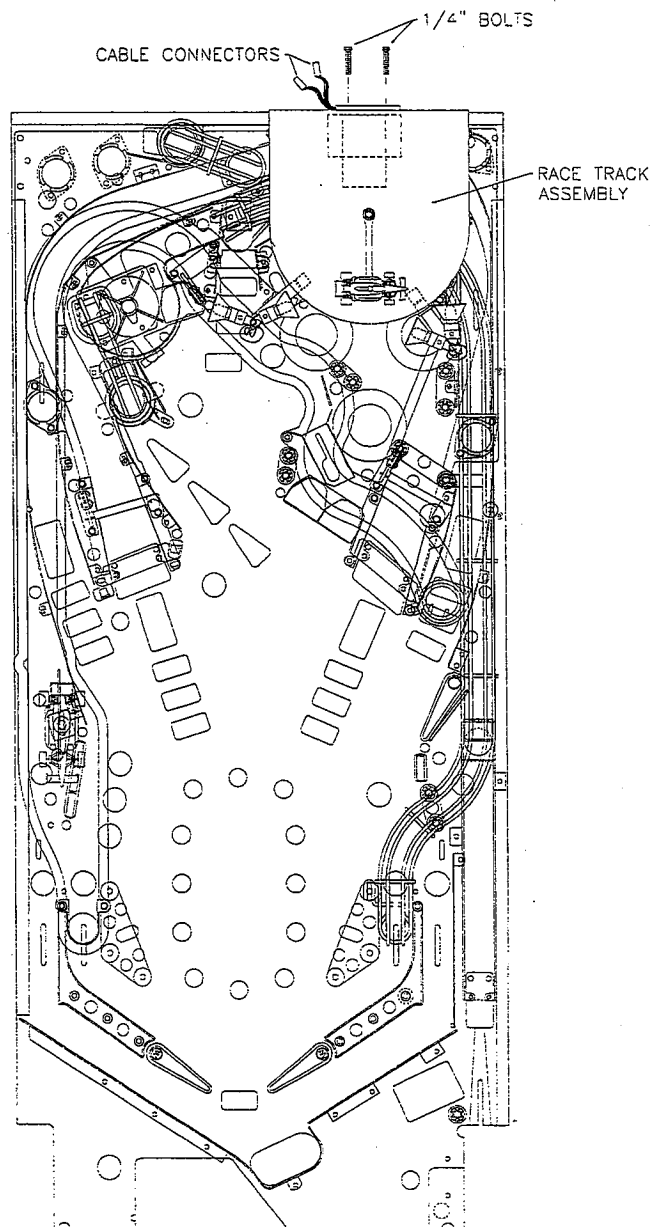
TURBO MOTOR ASSEMBLY

1. Grasp bottom arch and carefully lift playfield up enough to clear the safety brackets. Pull the playfield out until it stops. Leave the playfield in this position for easier access to the turbo motor assembly.

2. Remove one 1/4" hex-head screw (A) and one Philips head screw (B) from the turbo wire form. Remove wire form and set aside.

3. Remove: (C) Two small Philips screws from the ramp flap.
              (D) Two 1/4" hex-head screws on ramp entrance.
              (E) Two 1/4" hex-head screws along ramp edge.
              (F) One 1/4" hex-head screw and washer from wire form attached to ramp.

4. Carefully lay the ramp to the side.

5. Remove one 1/4" Philips screw (G) from the center of the turbo impeller. Remove impeller and set aside.

6. Disconnect cable connector from the turbo opto P.C.B.
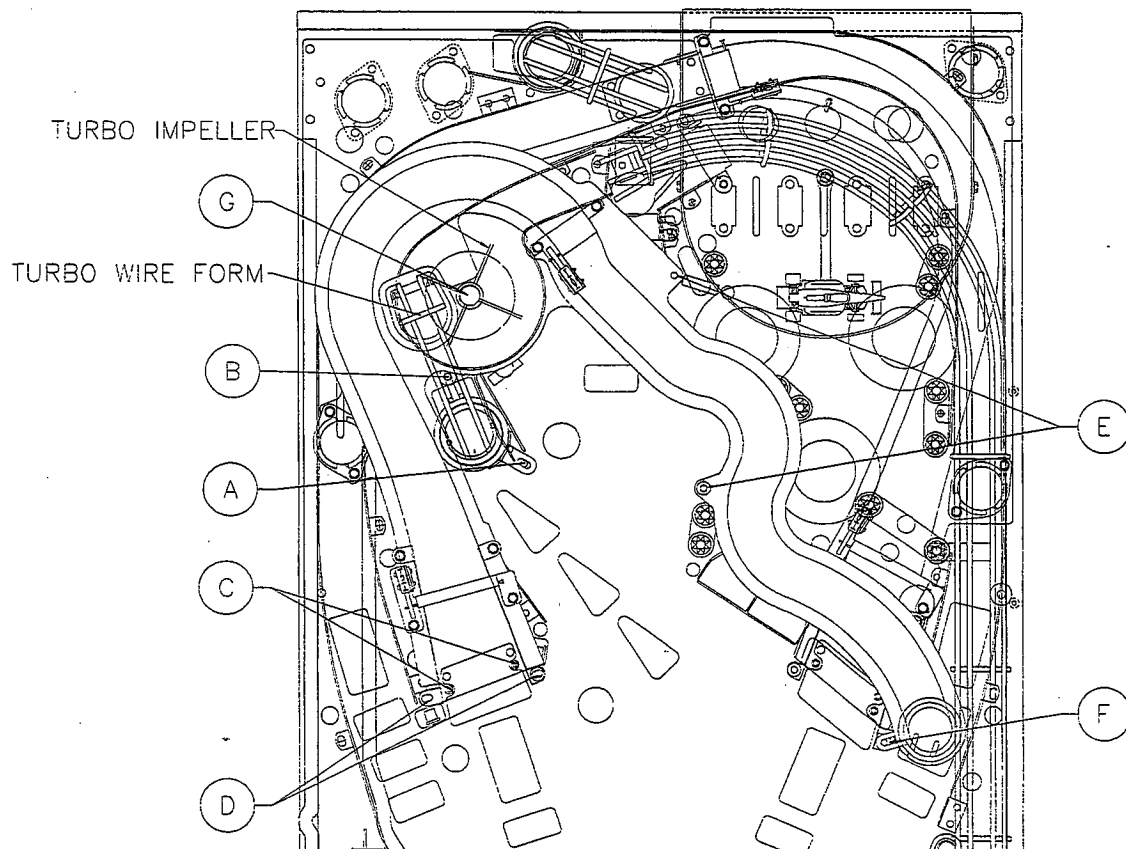
7. Lift the playfield to the upright service position (leaning on the backbox).

8. Disconnect cable connector from the Motor EMI P.C.B.

9. Remove three elastic stop nuts (H) from the motor mounting bracket. Remove motor assembly and repair as needed.
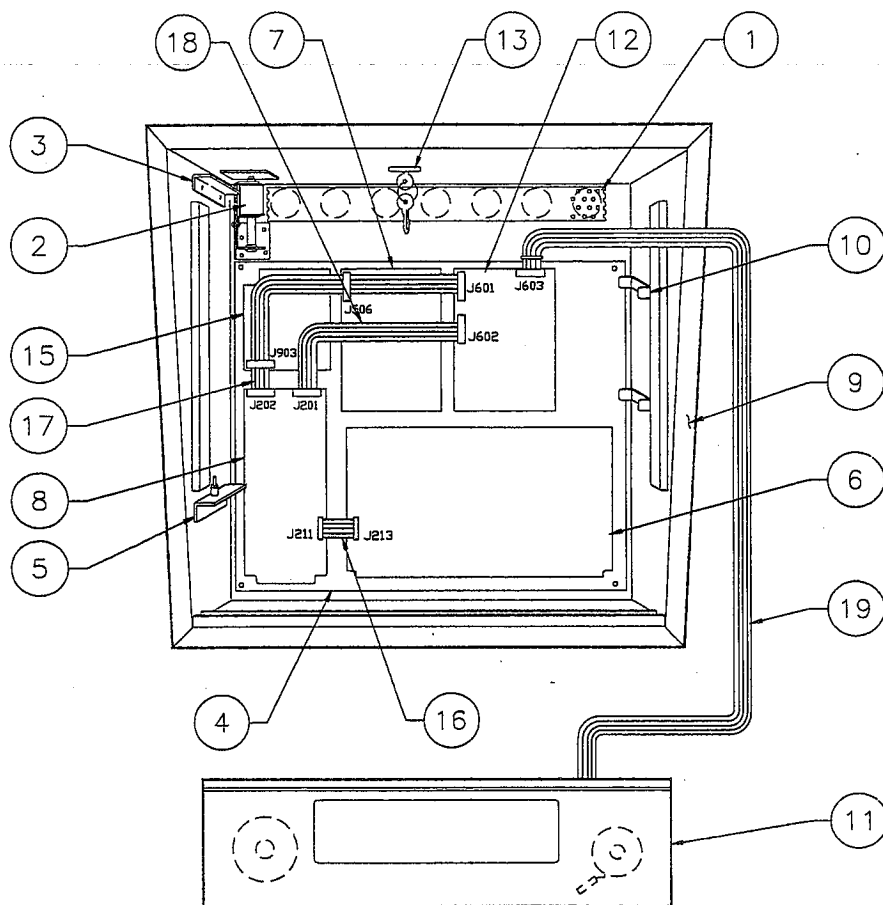
10. Reassemble in reverse order.
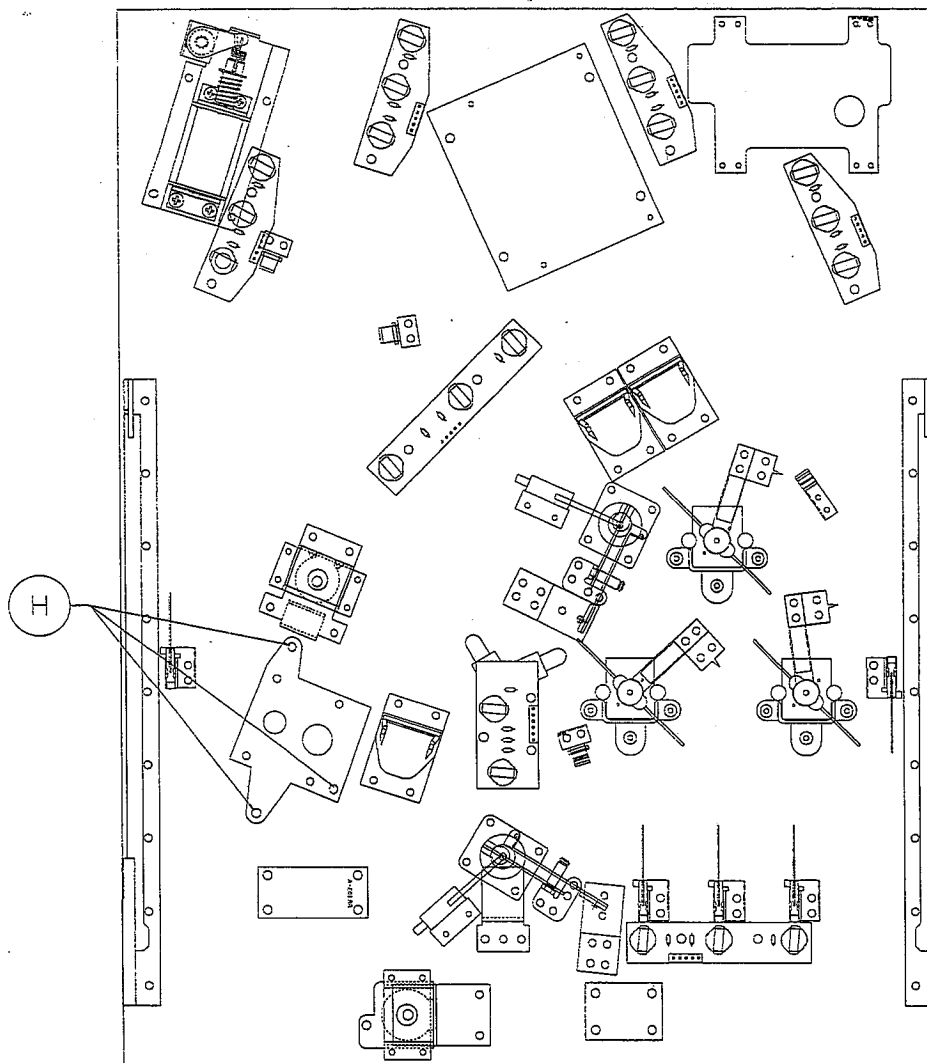
Underside of Playfield, Viewed in Raised Position

SECTION TWO

GAME PARTS
INFORMATION

50026-BB
Backbox Assembly

Ribbon Cables

Item	Part Number	Description
1	01-6645	Venting Screen
2	B-10686-1	Knocker Assembly
3	A-12497	Insert Bd. Hinge Assy., Upper
4	A-14092-6	WPC Mounting Plate Assy.
5	A-12498	Insert Bd. Hinge Assy., Lower
6	A-12697-3	Power Driver Assembly
7	A-16917-50026	Sound Board Assembly
8	A-17651-50026	WPC Security CPU Board
9	04-10012-50026	Backbox, Wood
10	01-9047	Insert Stop Bracket
11	A-19986	Speaker/Display Assembly
a)	5555-12924-00	Speaker Tweeter, 15w, 4Ω
b)	5555-14044-00	Speaker, 5-1/4", 25w, 4Ω
c)	5045-12914-00	Capacitor, 10fd., 50v(±20%)
d)	5901-12784-00	Dot Matrix Display/Driver Bd.
12	A-14039.1	Dot Matrix Controller Board
13	A-13379	Lock & Plate Assembly
14	50026-IN	Insert Board
15	A-15472-1	Fliptronic II Board

Item	Part Number	Description
16	5795-12653-03	Ribbon Cable, 3"
17	5795-13018-01	Ribbon Cable, 23.5"
18	5795-10938-15	Ribbon Cable, 15"
19	5795-13434-32	Ribbon Cable w/Ferrite 32"

Miscellaneous Parts

	Part Number	Description
	A-8552-50026	Tempered Backglass Assy.
	03-8228-2	Glass Channel Top (1)
	03-8228-3	Glass Channel Edge (2)
	03-8229-1	Glass Lift Channel (1)
	08-7456	Backbox Glass: 27 x 18-7/8"
	20-9718	Wing Screw, 3/8-16 x 2"
	31-1357-50026	Screened Translight

Backbox Cables

	Part Number	Description
	H-14584	Dot Matrix Display Power Cable
	H-15476	Logic Power Cable
	H-15736-1	Secondary Cable
	H-20193	Insert Cable

50026-CAB
Cabinet Assembly
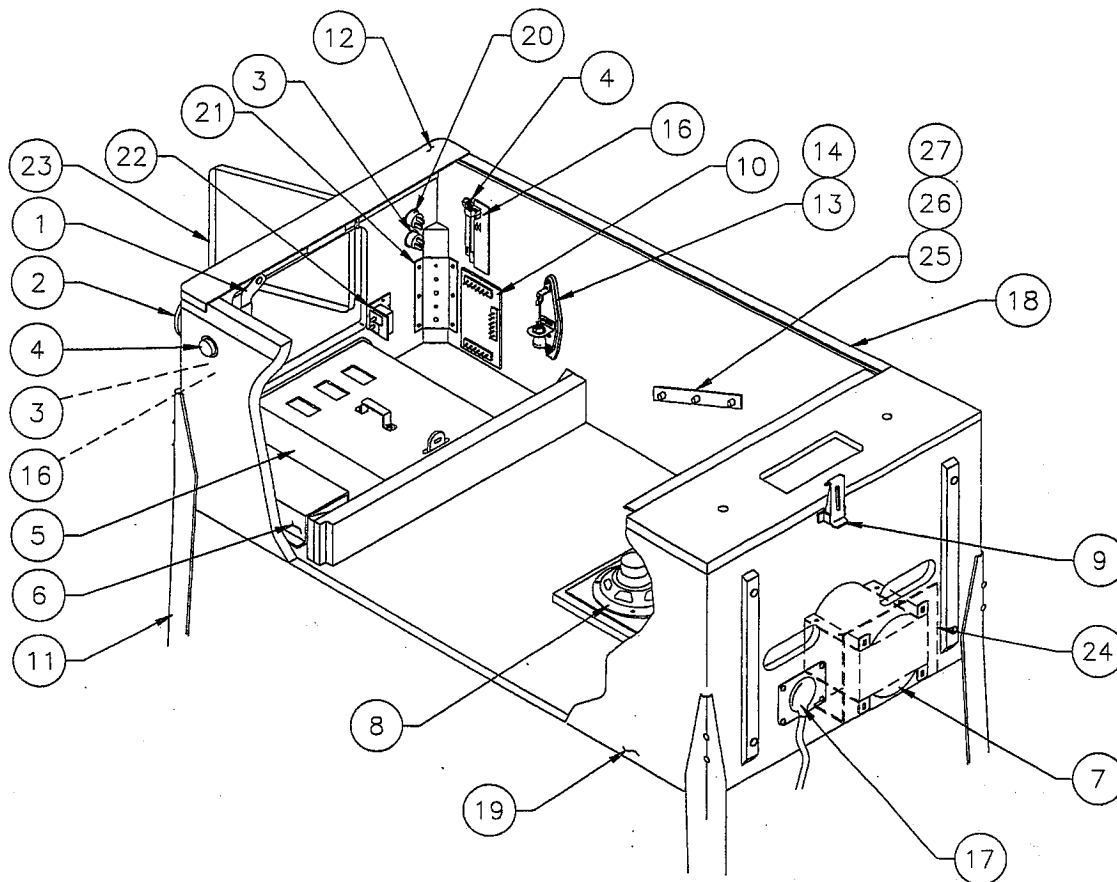
Miscellaneous Parts

Item	Part Number	Description
1	A-16773-1	Lever Guide Assembly
2	20-9663-B-3	Push Button, Large Round
3	20-9663-21	Push Button w/Sw., *Extra Ball*
4	A-16883-4	Flipper Button, Red (2)
5	A-18531-1	4-Ball Cashbox Assembly
6	A-17540	Univ. Power Interface Assy.
7	5610-14515-00	WPC Transformer
8	5555-12929-00	Speaker, 4Ω, 6", 25w
9	20-9347	Toggle Latch
10	A-17051-1	Coin Door Interface Board
11	A-19514	Leg Assembly, Chrome (4)
12	D-12615	Front Molding Assembly
13	20-6502-A	Plum Bob
14	A-15361	Tilt Mechanism Assembly
15	*	Cordset
16	A-17316	Opto Flipper Assembly (2)
17	03-9414	Line Cord Cover
18	A-12359-3	Side Molding Assembly (2)
19	11-1229.1	Wood Cabinet
20	20-9663-1	Push Button w/Sw., *Start*
21	01-11400	Leg Plate (4)
22	A-18249-1	Cable & Interlock Switch Assy.
23	09-61000-1	Coin Door-USA
24	01-13936	Drip Plate, Narrow
25	01-11408	Plate Spacer (2)
26	02-4329-1	Pivot Nut, 7/8" (4)
27	02-4352	Pivot Bushing (2)

Miscellaneous Parts

Part Number	Description
A-17195	Tilt Switch Assy. w/Cable
A-19562.1	Stay Arm Assembly
01-12352	Clip Bracket
01-9011-L	Backbox Mtg. Bracket, Left
01-9011-R	Backbox Mtg. Bracket, Right
01-6389-1	Cashbox Lock Bracket
08-7028-T	Playfield Glass
08-7377	Leg Leveler Adjuster, 3"
20-6500	Steel Ball, 1-1/16" (4)

Cabinet Cables

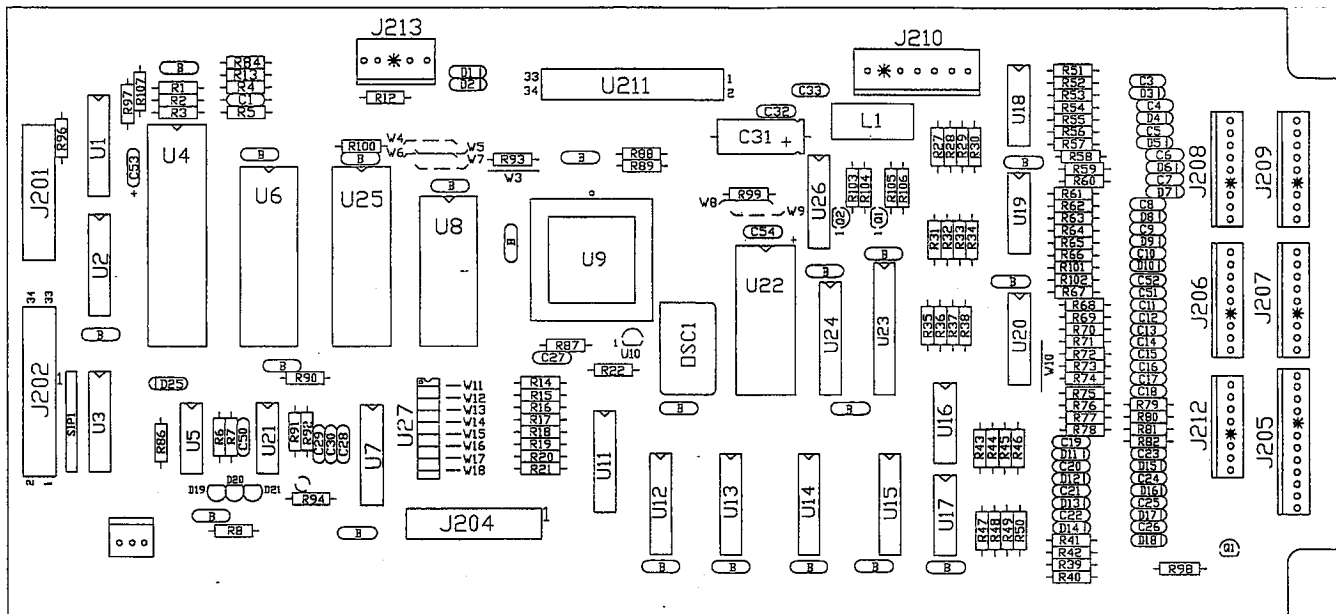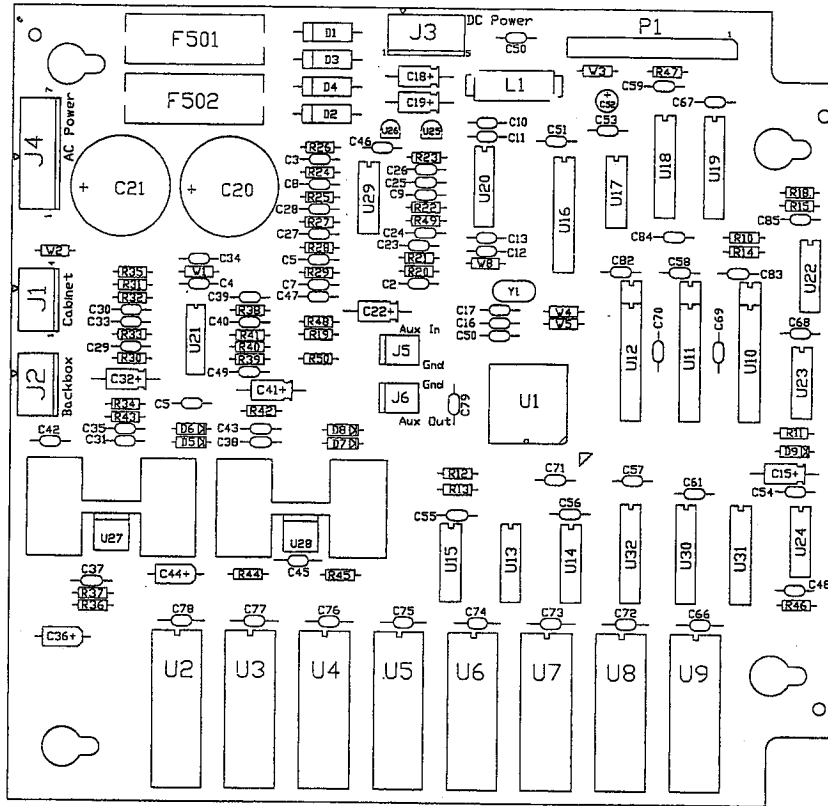| Part Number	Description
H-16810	50V Disconnect Cable
H-17217	Plumb/Bob Mech. Protect Cable
H-17837-2	Voltage Program Jumper Cable
H-19524	Cabinet Cable
H-19601-1	Power Extension Cable
A-20201	Cable & Jumper Assy., Coin Door
H-20205	Cabinet Switch/Lamp Cable

* See Application Chart p.2-31.

2-3

A-17651-50026
WPC CPU Security Board Assembly

Part Number	Designator	Description	Part Number	Designator	Description
5010-09034-00	R14-R22, R27-R42, R86, R94, R90, R98	Res., 10KΩ, ¼w, 5%	5281-10182-00	U11-U13, U15	IC, 74LS240 / DRVR
			5284-12651-00	U21	IC, 4548
5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Res., 1.2KΩ, ¼w, 5%	5315-13924-00	U23	IC, 74HC4514 LTCH 1to16 Dec.
			5281-09246-00	U26	IC, 74LS139 2 T 4 Decoder
			5340-12558-00	U8	S/RAM 8Kx8 Low Power
5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84, R101, R102, R105, R106	Res., 1KΩ, ¼w, 5%	5370-12272-00	U16-U19	IC, LM339 Quad Comp
			5370-12687-00	U10	MC 34064
			5521-10931-00	OSC1	8.00MHZ OSC 14PIN DIP
			5520-12084-00	X1	Crystal 32.768 KHz
			5551-09822-00	L1	Inductor, 4.7µH, 3.0A.
5010-09416-00	R5-R8, R12, R13, R87-R89, R99, R100	Res., 470Ω, ¼w, 5%	5671-14516-00	D19-D21	Display LED Red
5010-09085-00	R1, R2, R4, R93, R96, R97, R107	Res., 1.5KΩ, ¼w, 5%	5700-08985-00	U4	Socket IC 40P .6"
			5700-12088-00	U6	Socket IC 32P .6"
5010-09534-00	W4, W7, W9	Res., 0Ω	5700-12424-00	U9	Socket 84 Pin PLCC
5010-10989-00	R92	Res., 470KΩ, ¼w, 5%	5700-10176-00	U22	Socket IC 28 P :6"
5010-12104-00	R91	Res., 22MΩ, ¼w, 5%	5791-10850-00	J201, J204	Connector, 26-pin Header Str
5010-08991-00	R103, R104	Res., 4.7KΩ, ¼w, 5%	5791-14090-05	J213	Connector, 5-pin Header Str
5019-09362-00	SIP1	SIP 4.7K, 9R, 10P, 5%	5791-10862-07	J210	Connector, 7-pin Header Str
5040-08986-00	C31	Cap., 100M, 10v (±20%)	5791-13830-08	J212	Connector, 8-pin Header Str
5043-08980-00	B	Cap., .01M, 50v (+80, -20%)	5791-13830-09	J208, J209	Connector, 9-pin Header Str
5043-09030-00	C27	Cap., .047M, 50v, (±20%)	5791-13830-11	J206, J207	Connector, 11-pin Header Str
5043-09065-00	C3,-C26, C51, C52	Cap., 470P, 50v, (±20%)	5791-12516-00	J202, J211	34 Hen 2x17 Str
5043-09491-00	C29, C30	Cap., 22P, 1KV (±10%)	5048-11033-00	C50	Cap., .022 µF
5043-09492-00	C28	Cap., 100P, 50v (±10%)	5791-13830-12	J205	Cap., 12-pin Header Str
5041-09163-00	C53, C54	Cap., 2.2µF, 15v (20%) Ax.	5043-09845-00	C32, C33	Cap., 1KP, 50v (±10%)
5070-08919-00	D2-D18	Diode, 1N4148 150MA	5645-09025-00	U27	Switch DIP 8 POS
5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.	5162-12422-00	U20	IC, ULN 2803A
5160-10269-00	Q1-Q3	Trans., 2N3904 NPN	A-5400-50026-1	U22	WPC PIC 16C57 Micro-C
5700-10389-00	U20	IC Socket 18-pin	A-5343-50026-1	U6	Game ROM Assembly
5281-09308-00	U3	IC, 74LS245 TRNCV	A-17643	-	Battery Holder PCB Assy.
5281-09486-00	U14, U24	IC, 74LS374 8 D F/F	5400-10320-00	U4	MC68B09E 2Mhz µP
5281-09851-00	U5	IC, 74LS14 SMT TRG	5410-12426-00	U9	WPC ASIC-89
5281-09867-00	U1, U2, U7	IC, 74LS244 OCT BUF	20-9665-1	-	PCB Standoffs
			H-18258	-	WPC CPU Security Cable

A-16917-50026
Sound Board Assembly

Part Number	Designator	Description
4004-01005-06	U27, U28	MS, 4-40 x 3/8"
4404-01119-00	U27, U28	Nut 4-40
5010-08772-00	R39, R41	Resistor, 15KΩ, ¼w, 5%
5010-08774-00	R30, R34, R37, R42, R45	Resistor, 22KΩ, ¼w, 5%
5010-08991-00	R10, R12-R16	Resistor, 4.7Ω,¼ w, 5%
5010-09034-00	R47	Resistor, 10KΩ, ¼w, 5%
5010-09035-00	R11, R19, R33, R40	Resistor, 47KΩ, ¼w, 5%
5010-09036-00	R46	Resistor, 100Ω, ¼w, 5%
5010-09219-00	R31, R32, R38	Resistor, 8.2KΩ, ¼w, 5%
5010-09358-00	R50	Resistor, 1KΩ,¼ w, 5%
5010-09534-00	W4, W6	Resistor, 0Ω (Jumper)
5010-13420-00	R36, R44	Resistor, 680Ω, ¼w, 5%
5010-13607-00	R20-R29, R48, R49	Resistor, 6.2KΩ, 1/8w, 1%
5010-13517-00	R35, R43	Resistor, 15Ω, ¼w, 5%
5040-09365-00	C15, C18, C19, C32, C41	Cap., 1µF, 63v, Alum Ax.
5040-09421-00	C52	Cap., 100µF,25v,Alum Ax.
5040-13417-00	C20, C21	Cap., 10,000µF, 35v,Alum.
5041-09009-00	C36, C44	Cap., 22µF,10v, Tant Alum
5041-13187-00	C22	Cap., 4.7µF, Tant Axial.
5043-08996-00	C4, C5, C10-C13 C31, C35, C38, C43, C46, C47, C50-C79	Cap., .10µF, 50v, Cer Ax.
5043-10267-00	C37, C45	Cap., 150pF,50v, Cer Ax.
5048-11028-00	C16, C17	Cap., 22pF, 50v, Cer Ax.
5048-11029-00	C48	Cap., 100pF,50v, Cer Ax.
5048-11030-00	C49	Cap., 470pF,50v, Cer Ax.
5048-11033-00	C33	Cap., .022µF, 50v, CerAx.
5048-12036-00	C34, C42	Cap., .22µF, 50v, Cer Ax.
5048-13418-00	C30, C39, C40	Cap., .047µF,50v, Cer Ax.
5048-13608-00	C8	Cap., 6800pF, 50v, Cer Ax.
5048-13609-00	C7, C24, C26	Cap., 3900pF, 50v, Cer Ax.
5048-13610-00	C2, C3, C9, C27, C29	Cap., 1000pF, 50v, Cer Ax.
5048-13611-00	C6, C23, C25, C28	Cap., 680pF, 50v, Cer Ax.
5070-09045-00	D1-D4	MR-501 Rectifier Diode

Part Number	Designator	Description
5070-09054-00	D5-D9	Diode Signal 1N4004
5250-13302-00	U25	78L05 Pos 5V reg TO-92
5250-13303-00	U26	79L05 Neg 5V Reg TO-92
5283-10551-00	U17	IC74F00 Fast Quad NAND
5311-10946-00	U22	IC74HC74 Dual D Flip Flop
5311-10947-00	U23	IC74HC125 Quad Tri-State Buffer
5311-10948-00	U15	IC74HC138 1 of 8 Decoder
5315-12009-00	U18, U19	IC74HCT374 Octal D Flip Flop
5311-12043-00	U13, U14	IC74HC174 Hex D Flip Flop
5311-12538-00	U24	IC74HC14 Hex Schmitt Inverter
5311-12287-00	U30-U32	IC74HC541 Octal Bus Driver
5340-13304-00	U10-U12	ICSRAM 2Kx8 35ns .300 DIP
5370-12730-00	U21, U29	ICTL084 Quad Op AMP
5370-13419-00	U27, U28	Audio Power Amp TDA2030AV
5371-13299-00	U20	IC DAC AD-1851 16Bit
5520-13301-00	Y1	Crystal 10MHz Parallel resonant
5551-09822-00	L1	Inductor, 4.7µH, 3Amp.
5700-12047-00	U16	IC, Socket 24-Pin .300 DIP
5700-12088-00	U2-U9	IC, Socket 32-Pin .600 DIP
5705-12638-00	U27, U28	Heatsink 5298-B
5733-12060-01	F501, F502	MT3AG PCMounted Fuse Holder
5791-10862-04	J1, J2	Connector, 4-pin Header STR .156
5791-10862-05	J3	Connector, 5-pin Header STR .156
5791-10862-07	J4	Connector, 7-pin Header STR .156
5791-12516-00	P1	Connector, 34 Hen 2x17 STR .100
A-17002	U16	PAL Sub-Assembly
A-5343-50026-S2	U2	ROM Sub-Assembly
A-5343-50026-S3	U3	ROM Sub-Assembly
A-5343-50026-S4	U4	ROM Sub-Assembly
A-5343-50026-S5	U5	ROM Sub-Assembly
A-5343-50026-S6	U6	ROM Sub-Assembly
A-5343-50026-S7	U7	ROM Sub-Assembly
Not Used	U8	ROM Sub-Assembly
Not Used	U9	ROM Sub-Assembly
5731-10356-00	F501, F502	Fuse, 3Amp, 250v, Slow Blow

A-15472-1
Fliptronic II Board Assembly
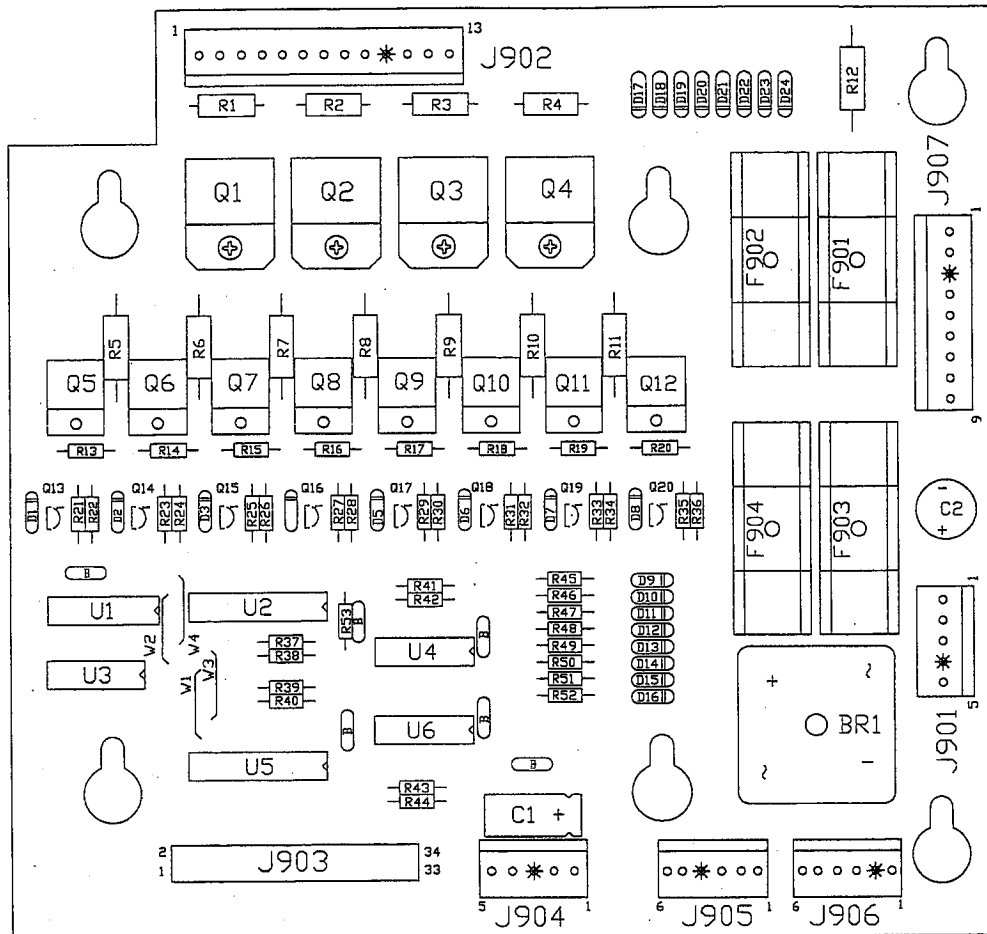
Part Number	Designator	Description	Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink	5070-09054-00	D1-D24	Diode, 1N4004
4006-01003-08	Q1-Q4	Mach. Screw, 6-32	5100-09690-00	BR1	Bridge Rectifier
4406-01128-00	Q1-Q4	Nut 6-32 KEPS	5162-12635-00	Q5-Q12	Trans., TIP102 NPN
5010-09034-00	R37-R44, R53	Res., 10KΩ, ¼w, 5%	5190-09016-00	Q13, Q20	Trans., 2N4403 PNP
5010-09358-00	R22, R24, R26,	Res., 1KΩ, ¼w, 5%	5191-12179-00	Q1-Q4	Trans., TIP36C PNP
	R28, R30, R32, R34,	Res., 220Ω, ½w, 5%	5315-12009-00	U2	IC, 74HCT374
	R36, R45-R52		5315-12031-00	U5	IC, 74HCT244
5010-09361-00	R1-R4	Res., 470Ω, ¼w, 5%	5315-12812-00	U1	IC, 74HCT138
5010-09416-00	R21, R23, R25,		5315-12951-00	U3	IC, 74HCT00
	R27, R29, R31, R33,		5370-12272-00	U4, U6	IC, LM339 Quad Comp
	R35		5731-10356-00	F901-F904	Fuse S-B, 3A., 250v
5010-09534-00	W3, W4	Res., 0Ω	5733-12060-01		Fuse Holder (F901-F904)
5010-10171-00	R13, R20	Res., 56Ω, ¼w, 5%	5791-10862-05	J901, J904	Connector, 5-pin Header
5011-12956-00	R5, R12	Res., 2.7KΩ, 1w, 5%	5791-10862-09	J907	Connector, 9-pin Header
5040-08986-00	C1	Cap., 100µF, 10v	5791-10862-13	J902	Connector, 13-pin Header
5040-09537-00	C2	Cap., 100µF, 100v	5791-13830-06	J905, J906	Connector, Str Sq. Pin Hdr.
5043-08980-00	B	Cap., .01µF, 50v	5791-12516-00	J903	34 Hen 2 x 17 STR

A-14039.1
Dot Matrix Assembly
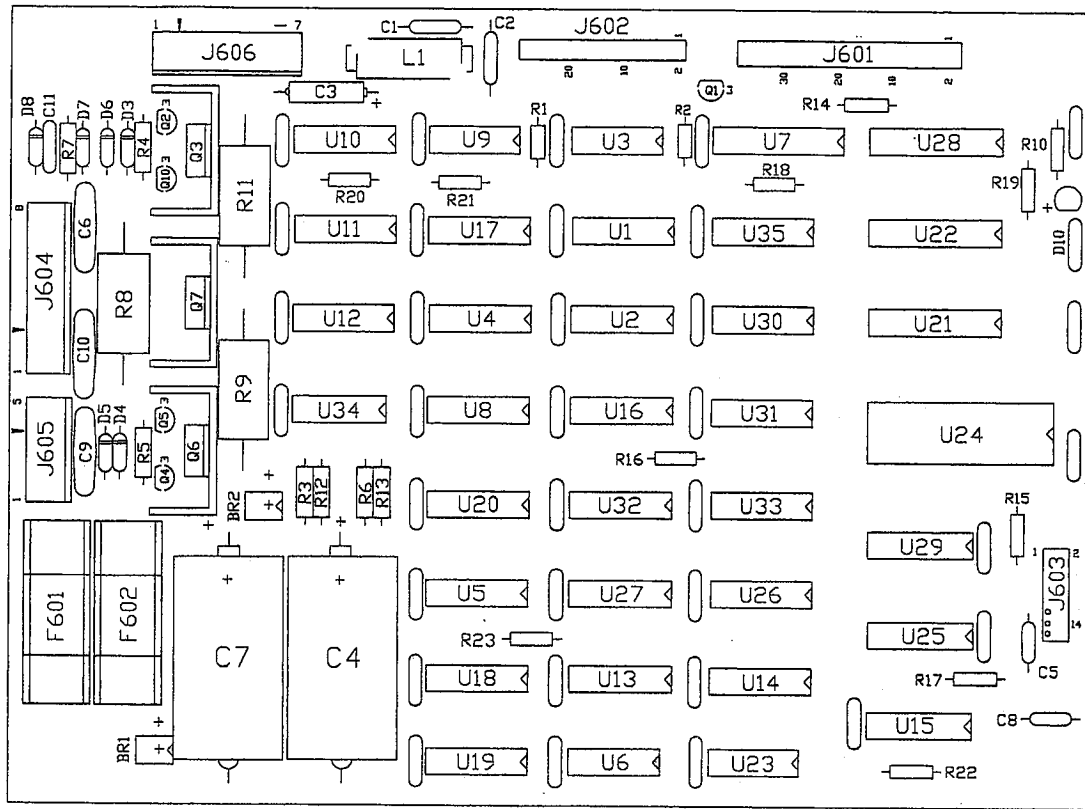
Part Number	Designator	Description
5010-08991-00	R1	Res., 4.7KΩ, ¼w, 5%
5010-09036-00	R14-R23	Res., 100Ω, ¼w, 5%
5010-09224-00	R10	Res., 270Ω, ¼w, 5%
5010-12832-00	R3, R6, R12, R13	Res., 4.7KΩ, ½w, 5%
5010-12841-00	R4, R5	Res., 120Ω, ½w, 5%
5012-12830-00	R9	Res., 1.8KΩ, 5w, 5%
5012-12842-00	R11	Res., 120Ω, 5w, 5%
5012-12843-00	R8	Res., 4.7KΩ, 5w, 5%
5010-10171-00	R7	Res., 56Ω, ¼w, 5%
5043-09492-00	C5, C8	Cap., 100P, 50v, (±10%)
5040-08986-00	C3	Cap., 100M, 10v (±20%)
5040-12324-00	C4, C7	Cap., 150M, 160v (±50%)
5043-08980-00	BYPASS	Cap., .01M, 50v (+80,-20%)
5043-09072-00	C6, C9, C10	Cap., .1M, 500v (+80,-20%)
5043-09845-00	C1, C2, C11	Cap., 1KP, 50v (±20%)
5070-09054-00	D7	Diode, 1N4004, 1.0A.
5075-12824-00	D6, D8	Zener, 1N4742A, 12v
5075-12823-00	D4, D5	Zener, 1N4758, 56v
5075-12826-00	D3	Zener, !N4759A, 62v
5100-12833-00	BR1, BR2	Bridge, 400v, 1A
5150-10269-00	Q1	Trans., 2N3904 NPN
5164-09056-00	Q2, Q10	Trans., MPSD02 NPN
5164-12154-00	Q3, Q7	Trans., MJE15030 NPN
5194-09055-00	Q4, Q5	Trans., MPSD52 PNP
5194-12155-00	Q6	Trans., MJE15031 PNP
5281-09738-00	U16, U25-U27	IC, 74LS157
5281-10033-00	U3	IC, 74LS30
5281-10043-00	U31-U33, U35	IC, 74LS175

Part Number	Designator	Description
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, U12	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. 4.7µH, 3A.
5671-14516-00	D10	Display LED Red
5705-09199-00	Q3, Q6, Q7	Heatsink, 6030B
5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
5733-12060-01		Fuse Holder (F601, F602)
5791-10850-00	J602	Connector, 26-pin Header
5791-10862-05	J605	Connector, 5-pin Header
5791-10862-07	J606	Connector, 7-pin Header
5791-10862-08	J604	Connector, 8-pin Header
5791-12516-00	J601	34 Hen 17x2 STR
5791-12827-00	J603	14 Hen 7x2 STR

A-12697-3
WPC Power Driver Assembly

Part Number	Designator	Description
5010-08981-00	R260	Res., 10KΩ, ½w, 5%
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, R227	Res., 4.7KΩ, ¼w, 5%
5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191	Res., 560Ω, ¼w, 5%
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	Res., 68KΩ, ½w, 5%
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	Res., 2.7KΩ, ¼w, 5%
5010-08998-00	R155, R157, R159, R161, R163, R165, R167, R169, R171	Res., 2.2KΩ, ¼w, 5%
5010-09034-00	R142-R149, R197-R198	Res., 10KΩ, ¼w, 5%
5010-09085-00	R194, R196, R251, R253-R257	Res., 1.5KΩ, ¼w, 5%
5010-09086-00	R252	Res., 6.8KΩ, ¼w, 5%
5010-09224-00	R192, R202-R205	Res., 270Ω, ¼w, 5%
5010-09314-00	R176, R178, R180, R182, R184, R186, R188, R190	Res., 1.2K, ¼w, 5%
5010-09324-00	R206	
5010-09358-00	R154, R156, R158, R160, R162, R164, R166, R168, R170, R193, R199, R250	Res., 27KΩ, ¼w, 5% Res., 1KΩ, ¼w, 5%
5010-09361-00	R104, R107, R110, R113, R116, R119, R122, R125	Res., 220Ω, ½w, 5%
5010-09416-00	R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141	Res., 470Ω, ¼w, 5%
5010-11079-00	R7, R10, R13, R16, R19	Res., 51Ω, ¼w, 5%
5010-12427-00	R150-R153, R172-R175	Res., .22Ω, 1w, 5%
5012-12632-00	R224	
5019-10143-00	SR1	Res., .12Ω, 10w, 5%
5040-08986-00	C4	SIP 470Ω, 9R, 10-pin, 5%
5040-09421-00	C2	Cap., 100M, 10v (±20%)
5040-09537-00	C8	Cap., 100M, 25v (+50, -10%) Cap., 100M, 100v (±20%)

Part Number	Designator	Description
5040-12313-00	C5-C7, C11, C30	Cap., 15KM, 25v (±20%)
5043-08980-00	B-BYPASS	Cap., .01M, 50v (+80, -20%)
5043-08996-00	C13-C20, C31	Cap., .1M, 50v (±20%)
5043-09845-00	C1, C12	Cap., 1KP, 50v (±20%) Axial
5048-10994-00	C3	Cap., .33M, 50v (±20%) Axial
5070-08919-00	D33, D34	Diode 1N4148, 150MA.
5070-09054-00	D1-D3, D5-D12, D17-D32, D38	Diode 1N4004, 1.0A.
5100-09690-00	BR1-BR5	Bridge, 35A., Rect, 200v
5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac BT138E
5162-12422-00	U19	IC ULN 2803 OC-DRL
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
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	Transistor, 2N5401 PNP
5191-12179-00	Q64, Q66, Q68, Q70, Q76, Q78, Q80, Q82	Transistor, TIP36C PNP
5192-12428-00	Q91-Q98	Transistor, TIP 107
5250-12634-00	Q1	Reg LM 323 5v
5281-09486-00	U1-U5, U18	IC, 74LS374 8D F/F
5281-09487-00	U10-U13	IC, 74LS74 Dual D F/F
5281-10182-00	U9	IC, 74LS240 L/Drvr.
5370-12272-00	U6, U15, U16	IC, LM339 Quad Comp.
5460-12423-00	Q2	IC, LM7812
5671-14516-00	LED1, LED4-LED7	Display LED Red
5701-09652-00	Q1	Thermal Pad
5705-09199-00	Q2	Heatsink 6030B
5705-12637-00	Q1	Heatsink 5054
5705-12638-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
5733-12060-01	F101-F116	Fuse Holder PC MT3AG
5791-10862-03	J108, J119, J136	Connector, 3-pin Header .156
5791-10862-04	J103, J116-J118	Connector, 4-pin Header .156
5791-10862-05	J104-J106, J112, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header .156
5791-10862-06	J107	Connector, 6-pin Header .156
5791-10862-07	J101, J109, J114	Connector, 7-pin Header .156
5791-10862-09	J102, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header .156
5791-10862-11	J120, J121	Connector, 11-pin Header .156
5791-10862-12	J115	Connector, 12-pin Header .156
5791-10862-13	J126	Connector, 13-pin Header .156
5791-13830-05	J111	Connector, 5-pin Header
5791-13830-09	J133-J135	Connector, 9-pin Header
5791-12516-00	J113	34 Hen 2x17 STR
5824-09248-00	TP1-TP8	Test Point #1502-1
5041-09163-00	C9	Cap., 2.2MF Tant
5730-09071-00	F114	Fuse, 8A, 32v
5731-09432-00	F112	Fuse, S-B, 7A., 250v
5731-09651-00	F106-F111, F113	Fuse, S-B, 5A., 250v
5731-10356-00	F101-F105, F116	Fuse, S-B, 3A., 250v
5730-09797-00	F115	Fuse, S-B, 3/4A., 250v
5705-12698-00		Heatsink #62365

A-12697-3
WPC Power Driver Assembly
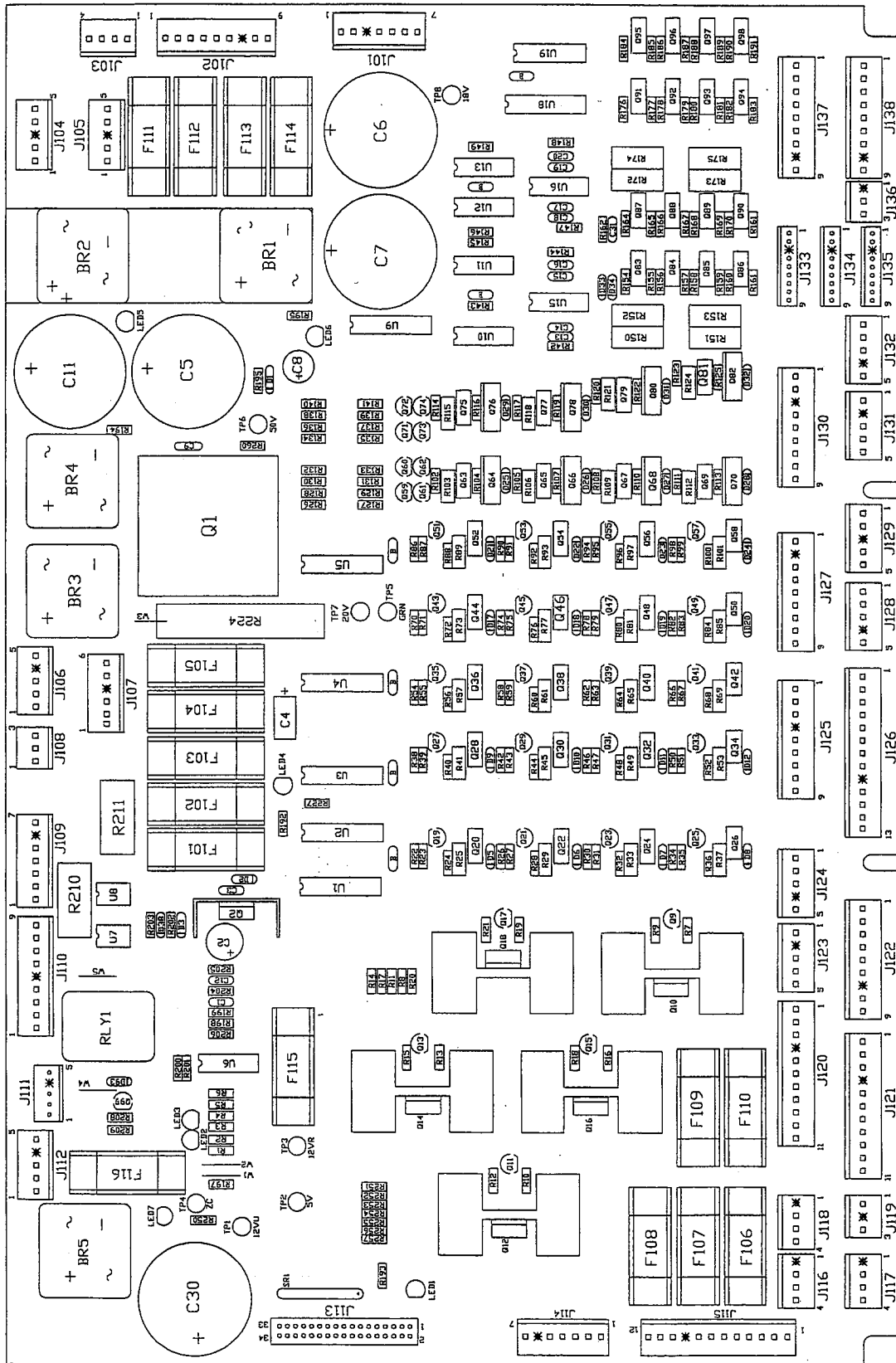
A-17051-1
# Coin Door Interface PCB Assembly
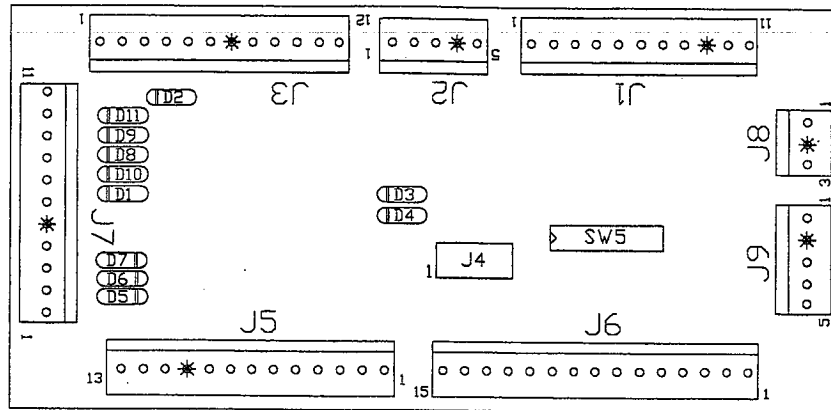
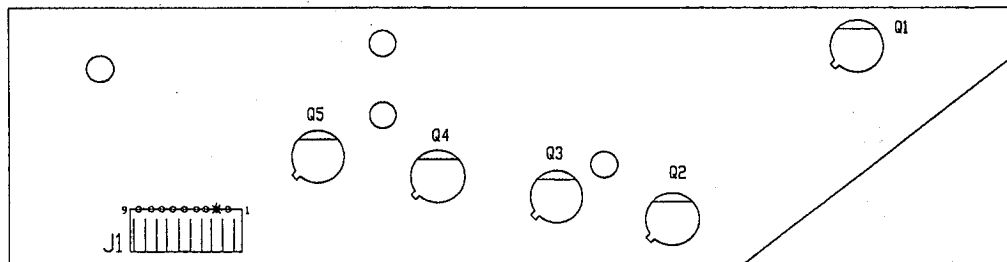| Part Number	Designator	Description
5791-10862-03	J8	Connector, 3-pin Header Str. Sq.
5791-10862-05	J2, J9	Connector, 5-pin Header Str. Sq.
5791-10862-11	J1, J7	Connector, 11-pin Header Str. Sq.
5791-10862-12	J3	Connector, 12-pin Header Str. Sq.
5791-10862-13	J5	Connector, 13-pin Header Str. Sq.
5791-10862-15	J6	Connector, 15-pin Header Str. Sq.
5791-11000-10	J4	Connector, 10-pin Header Str. Sq.
5645-09025-00	SW5	Switch DIP 8 Pos.
5070-09054-00	D1 - D11	Diode, 1N4004, 1.0A.

A-17316
Flipper Opto PCB Assembly
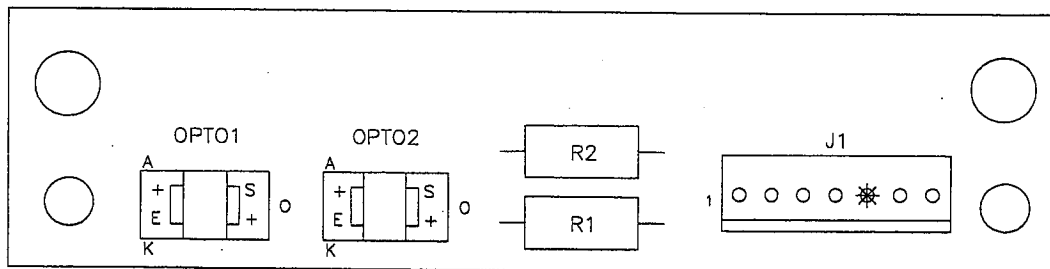
Part Number	Designator	Description
A-20207	-	Flipper Opto Switch PCB
5010-09061-00	R1, R2	Resistor, 680Ω, 1/2w, 5%
5490-14575-00	OPTO1, OPTO2	IC Opto Integ Schmitt 10mA.
5791-13830-07	J1	Connector, 7-pin Header Solid Sq.
03-9001	-	Interrupter Flip-Opto

A-18617-1
Trough IRED LED PCB Assembly
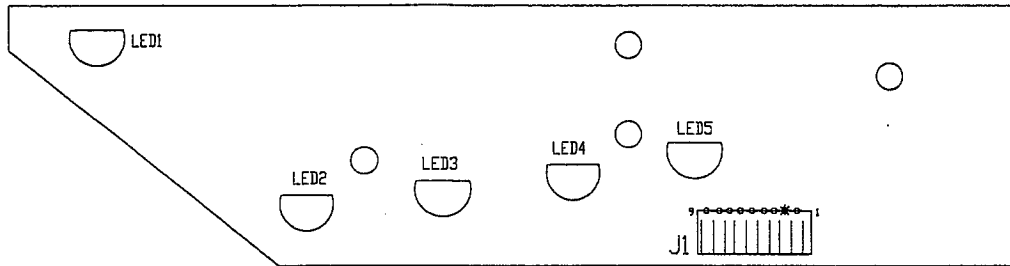
Part Number	Designator	Description
5671-12731-00	LED1 - LED5	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-18618-1
Trough IRED Transistor PCB Assembly

Part Number	Designator	Description
5163-14114-00	Q1 - Q5	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-18159
10-Opto PCB Assembly
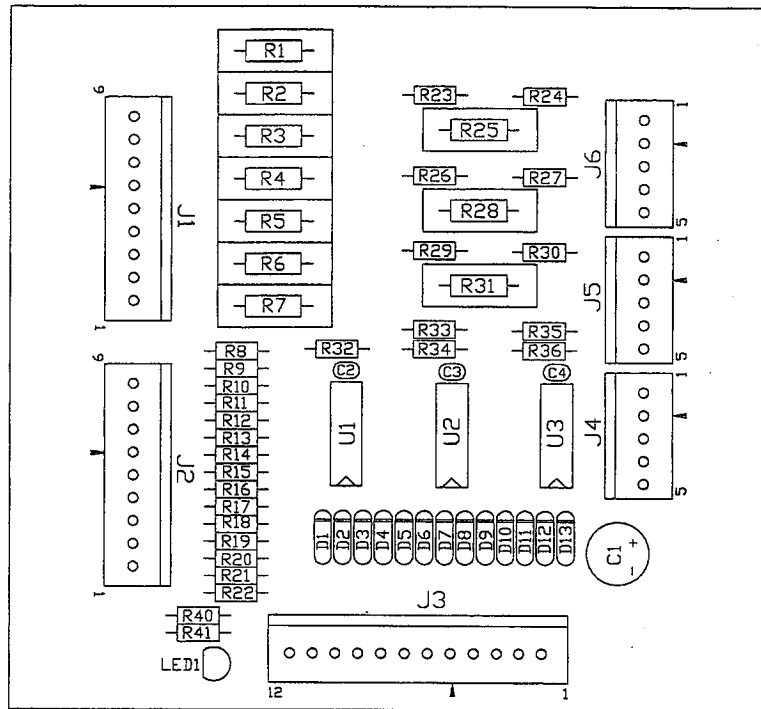
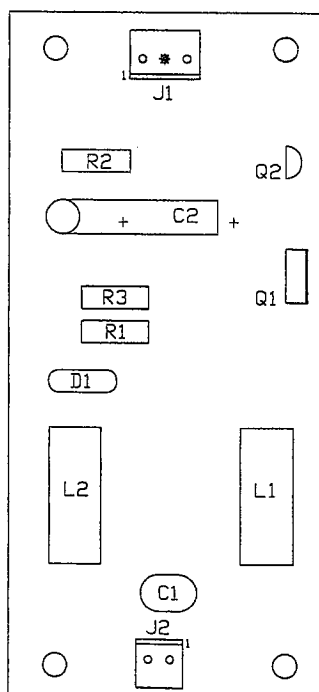| Part Number	Designator	Description
5040-10974-00	C1	Cap., 100µFd, 35v
5043-08980-00	C2-C4	Cap., 0.01µFd, 50v
5671-13732-00	LED1	Display Red LED1
5370-12272-00	U1-U3	I.C. LM339, Quad Compar
5070-09054-00	D1-D13	Diode, 1N4004, 1.0A.
5010-12928-00	R1-R7, R25, R28, R31	Res., 270Ω, 2w, 5%
5010-09999-00	R8-R21, R23, R24, R26, R27, R29, R30	Res., 2KΩ, ¼w, 5%
5010-09314-00	R22	Res., 1.2KΩ, ¼, 5%
5010-09162-00	R32, R35, R39-R41	Res., 100KΩ, ¼w, 5%
5010-08774-00	R33, R34, R36	Res., 22KΩ, ¼w, 5%
5010-09034-00	R37, R38	Res., 10KΩ, ¼w, 5%
5791-10862-12	J3	Connector, 12-pin Header
5791-10862-09	J1, J2	Connector, 9-pin Header
5791-10862-05	J4-J6	Connector, 5-pin Header

A-19823
4-LED Illuminated Target PCB Assembly
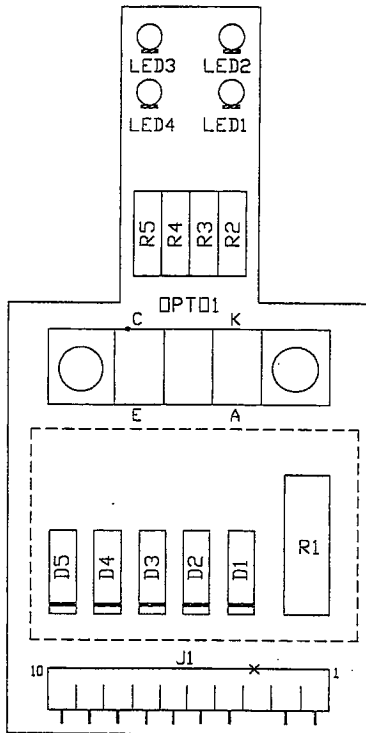
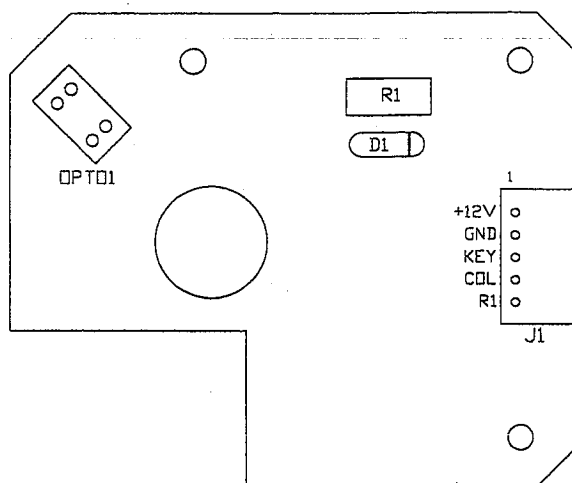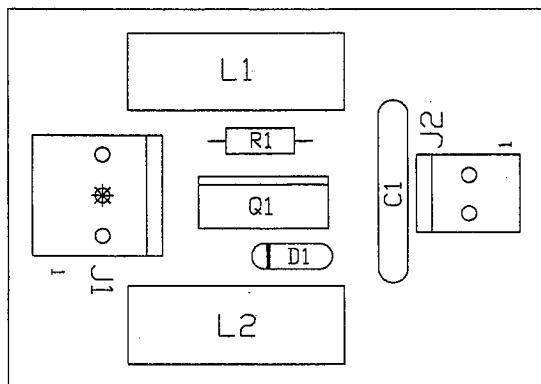| Part Number	Designator	Description
5010-09036-00	R2 - R5	Resistor, 100Ω, 1/4w, 5%
5010-08930-00	R1	Resistor, 470Ω, 1/2w, 5%
5490-13341-00	OPTO1	IC Opto Inter w/Tab 10MA.
5671-14509-00	LED1 - LED4	LED Red Clear
5791-12622-10	J1	Connector, 10-pin Header R/A Lck.
5070-09054-00	D1 - D5	Diode 1N4004, 1.0A.
03-9402	LED1 - LED4	Spacer .38"

A-20189
EMI Motor w/Delay Brake PCB Assembly

Part Number	Designator	Description
5010-08998-00	R1 - R3	Resistor, 2.2KΩ, 1/4w, 5%
5190-10270-00	Q2	Transistor 2N3905 PNP
5162-12635-00	Q1	Transistor Tip 102
5551-09822-00	L2, L1	Inductor 4.7µH 3A
5791-12273-02	J2	Connector, 2-pin Header STR Sq.
5791-12273-03	J1	Connector, 3-pin Header STR Sq.
5070-09054-00	D1	Diode 1N4004 1.0A
5040-12294-00	C2	Capacitor, 2.2µFd, 50v (±20%) Ax.

A-20047
Turbo Opto PCB Assembly

Part Number	Designator	Description
5791-12622-05	J1	Connector, 5-pin Header .100R/A
5010-08930-00	R1	Resistor, 470Ω, 1/2w, 5%
5070-09054-00	D1	Diode 1N4004, 1A
5490-12451-00	OPTO1	Opto Integrated 10mA

A-15242
Motor EMI PCB Assembly

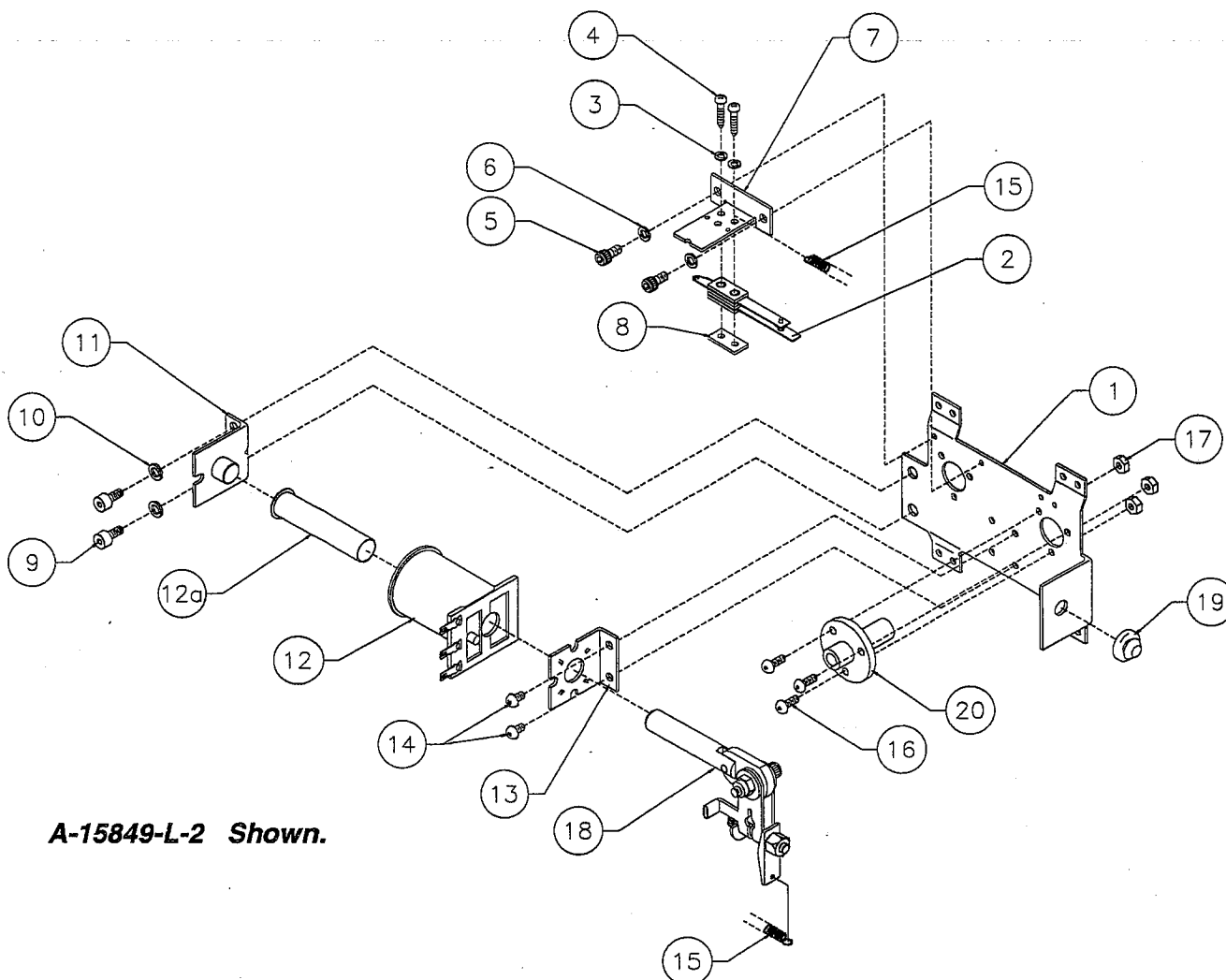| Part Number	Designator	Description
5551-09822-00	L1, L2	Inductor, 4.7MH3AMP
5791-12273-03	J1	Connector, 3-pin Header Str Sq.
5791-12273-02	J2	Connector, 2-pin Header Str Sq.
5070-09054-00	D1	Diode, 1N4004 1.0A.

B-9361-R-1
Ball Eject Assembly
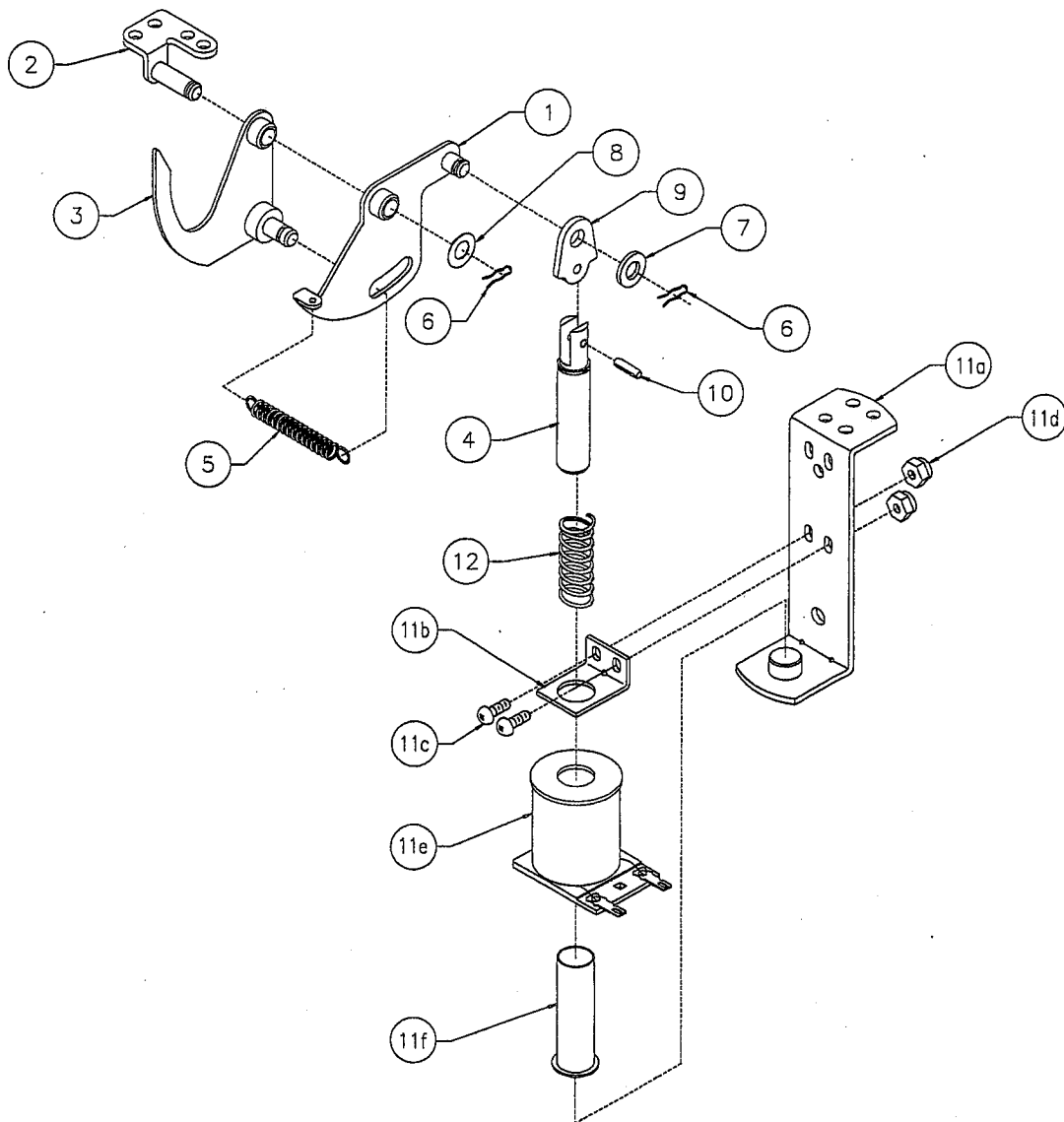
Associated Assemblies:

Item	Part Number	Description	Item	Part Number	Description
1	A-6949-R	Spring Plate	11	**B-9362-R-3**	Coil & Bracket Assembly
2	A-18146	Mounting Bracket Assembly	a)	B-7572-1	Bracket & Stop Assembly
3	A-7471-R	Eject Cam Assembly	b)	01-8-508-S	Coil Retaining Bracket
4	02-3407-02	Coil Plunger	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
5	10-362	Spring Eject	d)	4406-01119-00	Nut, 6-32 ESN
6	12-6227	Hairpin Clip	e)	AE-26-1200	Coil Assembly
7	4700-00030-00	Flat Washer, 17/64 x 1/2 x 15ga.	f)	03-7066	Coil Tubing
8	4700-00103-00	Flat Washer, 17/64 x 1/2 x 28ga.	12	10-128	Spring
9	03-8085	Armature Link	* 13	03-9101-13	Eject Shield
10	20-8716-5	Roll Pin, 1/8 x 7/16"			

*Not shown.

A-15849-L-2   Flipper Assembly (Lower Left)
A-15849-R-2   Flipper Assembly (Lower Right)
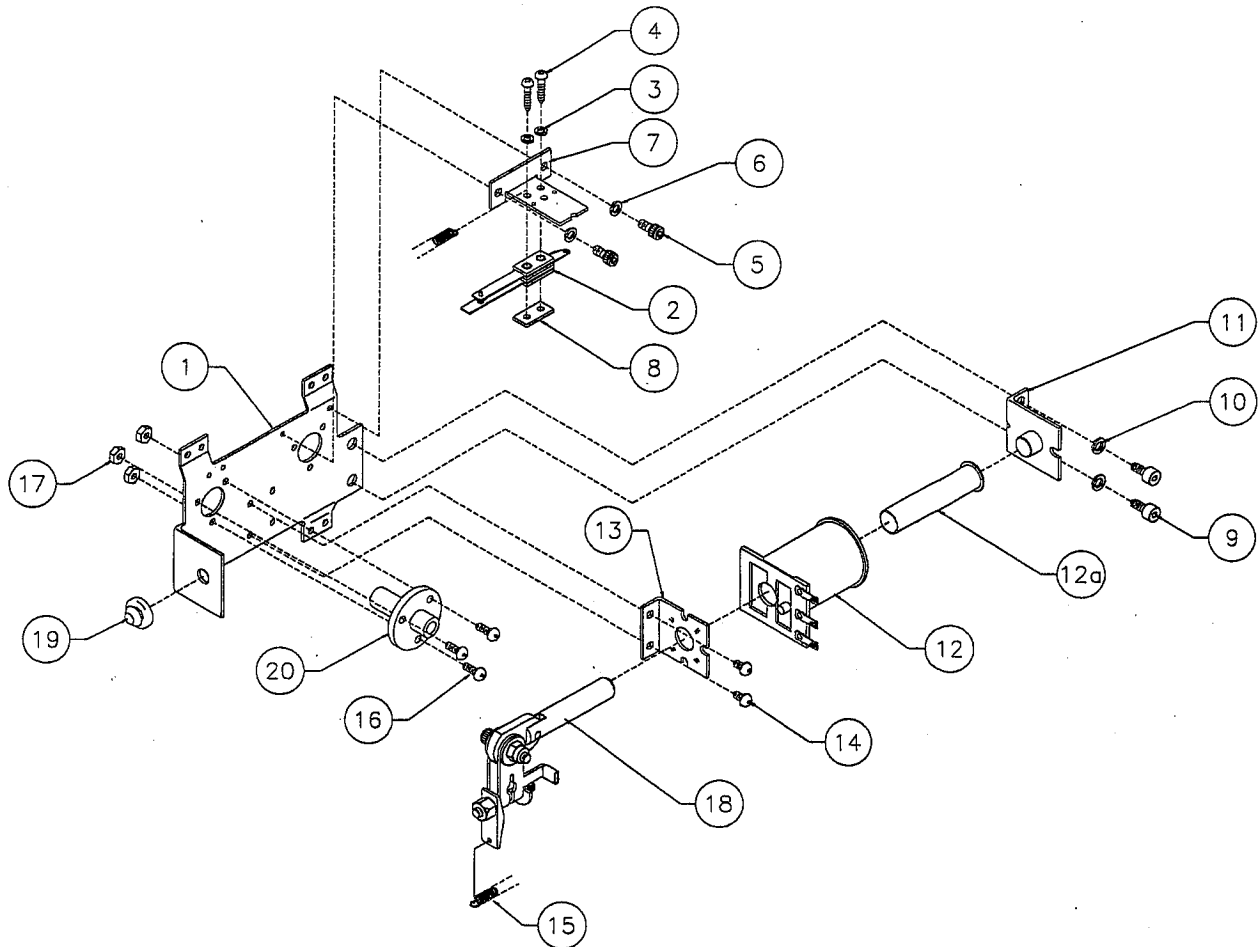

A-15849-L-2 Shown.

Item	Part Number	Description	Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, Left	18	A-15848-L	Crank Link Assembly, Left
	B-13104-R	Flipper Base Assembly, Right		A-15848-R	Crank Link Assembly, Right
2	SW-1A-194	Switch Assembly	a)	A-17050-L	Flipper Crank Assembly, Left
3	4701-00002-00	Lockwasher #6 Split		A-17050-R	Flipper Crank Assembly, Right
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"	b)	A-15847	Flipper Link Assembly
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"	c)	02-4676	Link Spacer Bushing
6	4701-00003-00	Lockwasher #8 Split	d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
7	01-9375	Switch Mounting Bracket	e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
8	20-6516	Speednut, Tinnerman	f)	4701-00004-00	Lockwasher #10 Split
9	4010-01066-06	Cap Screw, 10-32 x 3/8"	g)	4410-01132-00	Nut 10-32 ESN
10	4701-00004-00	Lockwasher #10 Split	19	23-6577	Bumper Plug, 5/8"
11	A-12360	Flipper Stop Assembly	20	03-7568	Flipper Bushing
12	FL-11629	Flipper Coil, Blue			
a)	03-7066-5	Coil Tubing			
13	01-7695-1	Solenoid Bracket		**Associated Parts:**	
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"		(Not Shown)	
15	10-364	Spring			
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"	21	23-6695	Flipper Rubber Ring, Red
17	4406-01117-00	Nut 6-32 Hex.	22	20-10110-5	Flipper w/Shaft, White

A-14876-R-3
Flipper Assembly (Upper Right)

Item	Part Number	Description	Item	Part Number	Description
1	A-14877-R	Flipper Base Assembly, Right	18	A-15848-R	Crank Link Assembly, Right
2	SW-1A-194	Switch Assembly	a)	A-17050-R	Flipper Crank Assembly, Right
3	4701-00002-00	Lockwasher #6 Split	b)	A-15847	Flipper Link Assembly
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"	c)	02-4676	Link Spacer Bushing
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"	d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
6	4701-00003-00	Lockwasher #8 Split	e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
7	01-9375	Switch Mounting Bracket	f)	4701-00004-00	Lockwasher #10 Split
8	20-6516	Speednut, Tinnerman	g)	4410-01132-00	Nut 10-32 ESN
9	4010-01066-06	Cap Screw, 10-32 x 3/8"	19	23-6577	Bumper Plug, 5/8"
10	4701-00004-00	Lockwasher #10 Split	20	03-7568	Flipper Bushing
11	A-12390	Flipper Stop Assembly			
12	FL-11629	Flipper Coil, Blue			
a)	03-7066-5	Coil Tubing			
13	01-7695-1	Solenoid Bracket	**Associated Parts:**		
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"	(Not Shown)		
15	10-364	Spring			
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"	21	23-6695	Flipper Rubber Ring, Red
17	4406-01117-00	Nut 6-32 Hex.	22	20-10110-5	Flipper w/Shaft White

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Flipper Notes...

1. *Each Flipper Assembly is mounted beneath the playfield, in conjuction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.*
2. *With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 (±.015) inch. When flipper is activated switch must close.*
3. *Any adjustment of the E.O.S. switch must be made at a minimum distance of 0.25 inch from the switch body.*
4. *Longer blade of E.O.S. switch must be made straight. Gap adjustment is done by adjusting shorter blade.*
5. *All moving elements of the assembly must operate freely without any evidence of binding.*
6. *Apply Loctite™ 245 when reataching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.*
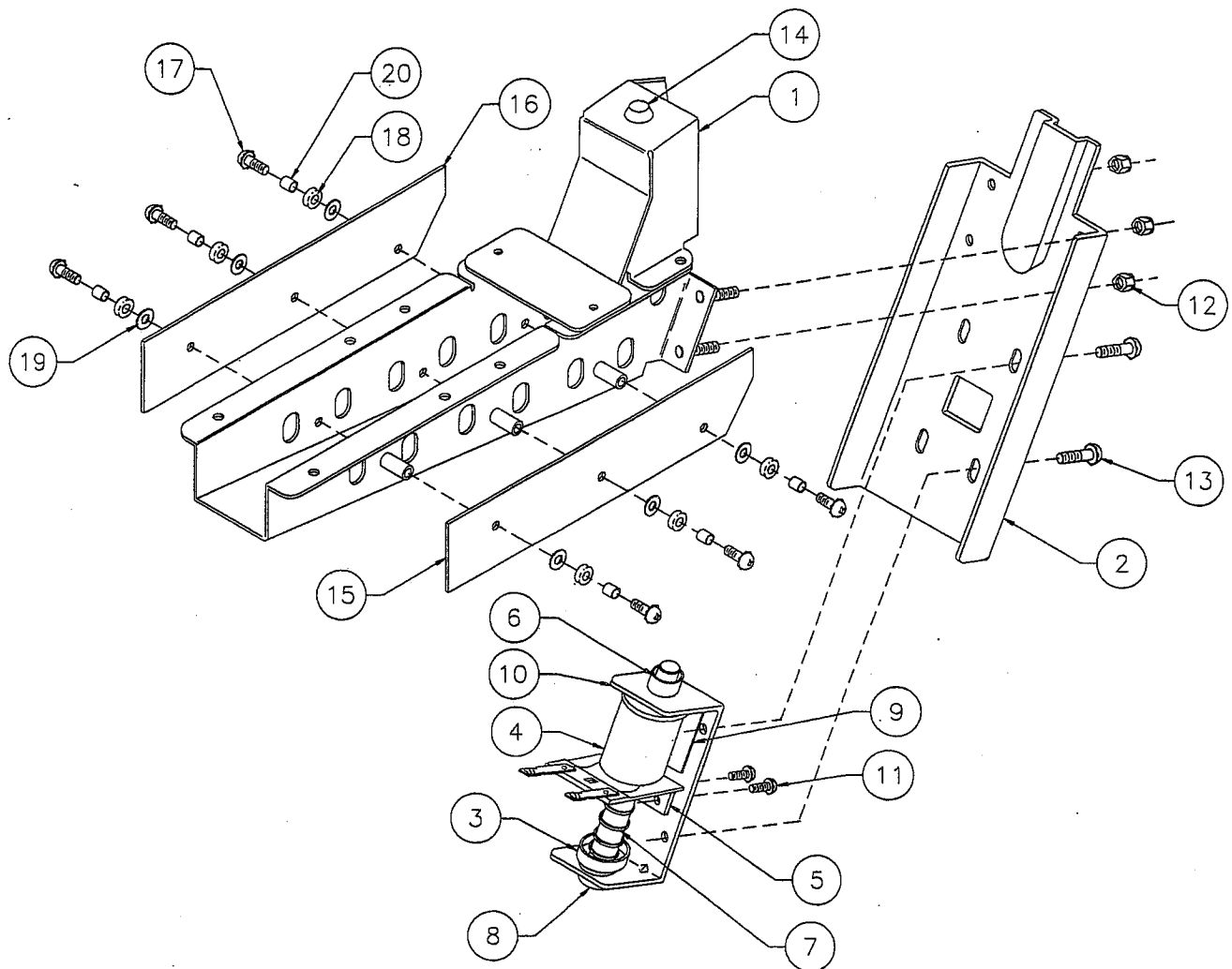
A-17811
Kicker Arm (Slingshot) **Assembly**
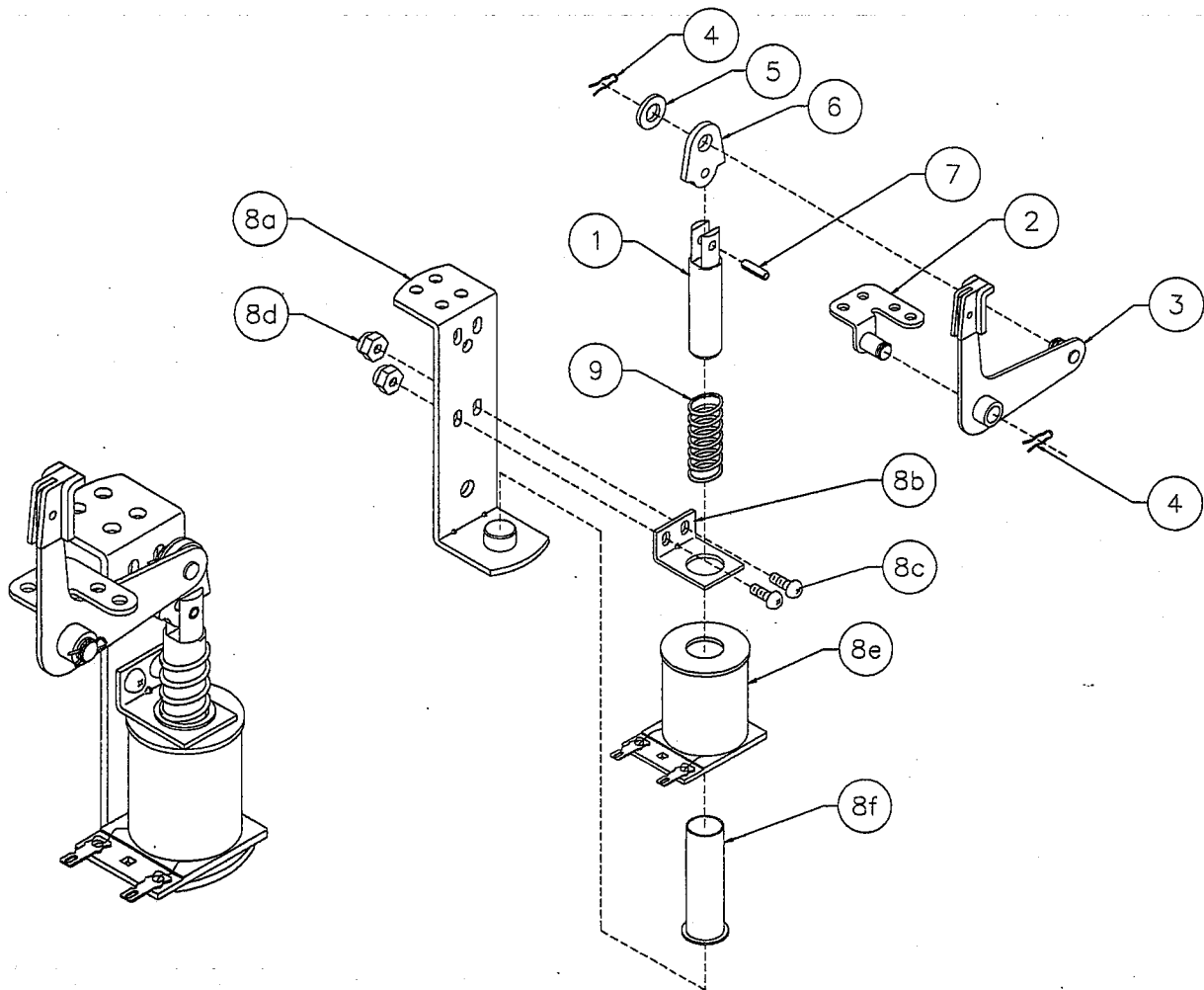
Associated Parts for Right & Left Kickers:

Item	Part Number	Description		Item	Part Number	Description
1	02-2364	Coil Plunger		8	**B-9362-L-2**	**Coil & Bracket Assy., Left**
2	A-17810	Mounting Bracket Assembly			**B-9362-R-3**	**Coil & Bracket Assy., Right**
3	A-12664	Kicker Crank Assembly		a)	A-17808	Bracket & Stop Assembly
4	12-6227	Hairpin Clip		b)	01-8-508-S	Coil Retaining Bracket
5	4700-00030-00	FW, 17/64 x 1/2 x 15ga.		c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
6	03-8085	Armature Link		d)	4406-01119-00	Nut, 6-32 ESN
7	20-8716-5	Roll Pin, 1/8 x 7/16"		e)	AE-26-1200	Coil Assembly
				f)	03-7066	Coil Tubing
				9	10-128	Spring

A-19963
Outhole Ball Trough Assembly

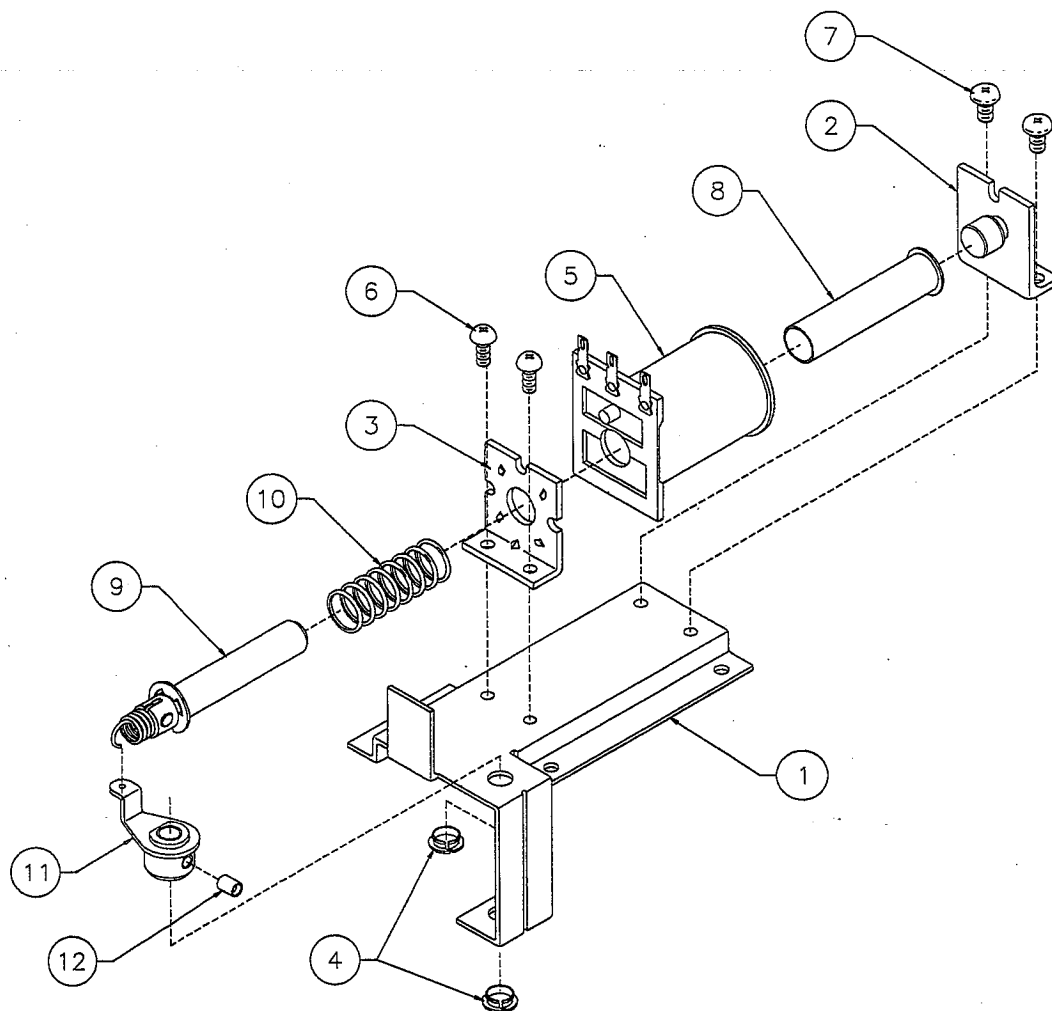| Item	Part Number	Description	Item	Part Number	Description
1	A-16809-2	Ball Trough Welded Assy.	11	4008-01017-05	Mach. Screw, 8-32 x 5/16"
2	01-11587	Ball Trough Front	12	4408-01119-00	Nut 8-32 ESN
3	A-6306-2	Bell Armature Assembly	13	4008-01017-06	Mach. Screw, 8-32 x 3/8"
4	AE-26-1500	Coil Assembly	14	23-6702	Bumper Plug
5	01-8-508-T	Solenoid Assembly	15	A-18617-1	Trough IRED LED PCB Assembly
6	03-7067-5	Coil Tubing	16	A-18618-1	Trough IRED Transistor PCB Assy.
7	10-135	Spring	17	4006-01003-10	Mach. Screw, 6-32 x 5/8" SEMS
8	23-6420	Rubber Grommet	18	23-6626	Rubber Grommet
9	03-8523	Insulator	19	4700-00004-00	Flat Washer, 9/64 x 7/16 x 21ga.
10	01-11586	Coil Mounting Bracket	20	02-4975	Bushing

A-20235
Ball Popper Assembly

BLK

GRY

ORG

GRY/YEL

RED

VIOLET
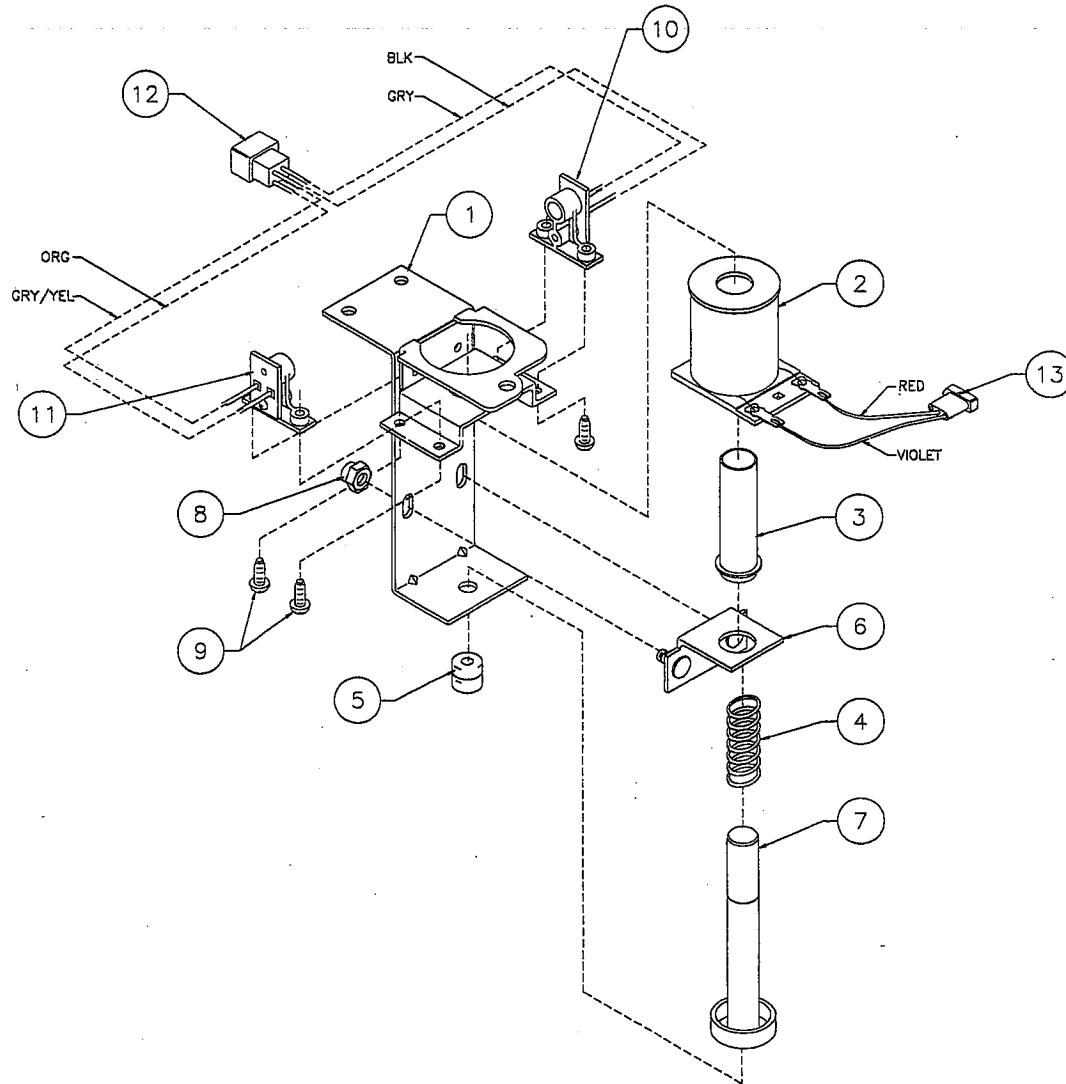
Item	Part Number	Description
1	04-10096	Ball Popper Mounting Bracket
2	AE-24-900	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	04-10086.1	Coil Mounting Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut, 8-32 ESN
9	4106-01013-06	Sh. Metal Screw, #6 x 3/8"
10	A-16908	LED Assembly - RTV
11	A-16909	Photo Transistor Assembly - RTV
12	H-17609-5	Opto Cable - Square
13	H-19523	Mini Coil Cable

A-20159
Ball Popper Assembly
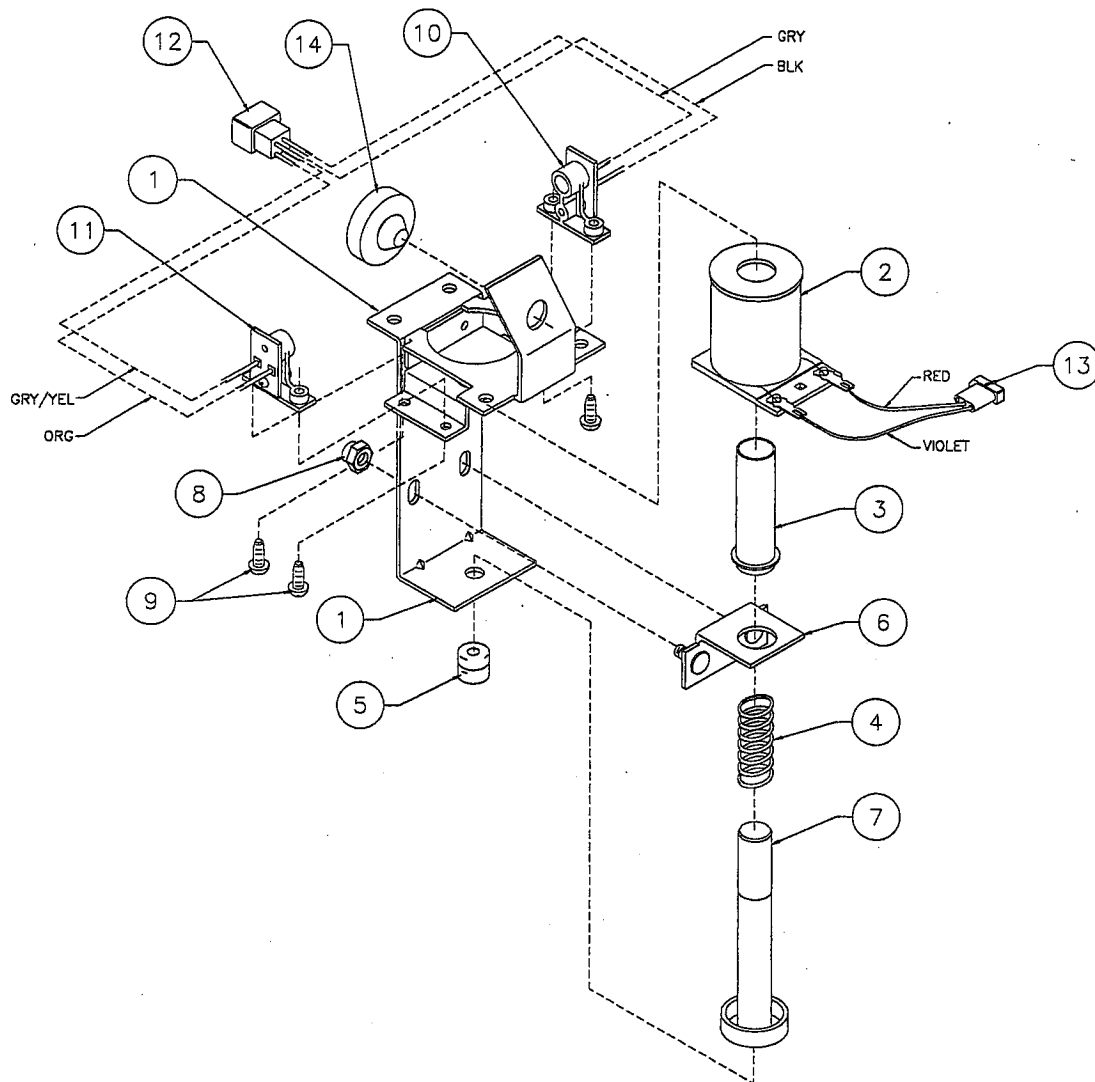
Item	Part Number	Description
1	04-10072	Ball Popper Mounting Bracket
2	AE-24-900	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	04-10086.1	Coil Mounting Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut, 8-32 ESN
9	4106-01013-06	Sh. Metal Screw, #6 x 3/8"
10	A-16908	LED Assembly - RTV
11	A-16909	Photo Transistor Assembly - RTV
12	H-17609-5	Opto Cable - Square
13	H-19523	Mini Coil Cable
14	23-6702	Rubber Bumper Pad, Round

A-19978
Pit Ramp Diverter Assembly

Associated Assembly:
(Shown Below)

Item	Part Number	Description
1	04-10042.1	Diverter Bracket Assembly
2	A-12390	Flipper Stop Bracket Assy.
3	01-7695-1	Solenoid Bracket
4	20-8790	Nyliner Bearing
5	A-20099	Coil Assembly
6	4008-01003-06	Mach. Screw, 8-32 x 3/8"
7	4010-01006-05	Mach. Screw, 10-32 x 5/16"
8	03-7066-5	Coil Tubing
9	A-16636	Diverter Plunger Assembly
10	10-303	Spring, Master
11	A-14185	Drive Arm Assembly
12	4010-01169-04	Set Screw, 10-32 x 1/4"

Item	Part Number	Description
13	**A-20413**	Divertor Blade & Car Assy.
a)	04-10041.2	Divertor Blade Welded Assy.
b)	04-10209	Car & Driver Assy., Large
c)	4004-01003-06	Mach. Screw, 4-40 x 3/8"
d)	01-14009.1	Bracket
e)	20-8712-25	"E"-Ring 1/4" Shaft
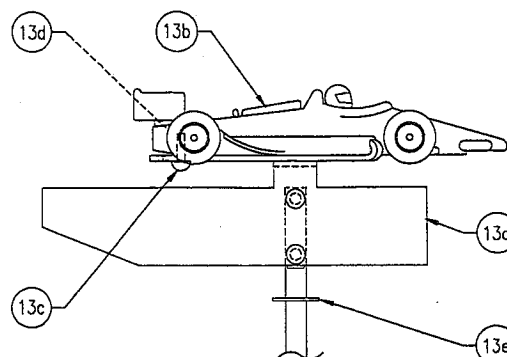
A-20038
Turbo Motor Assembly
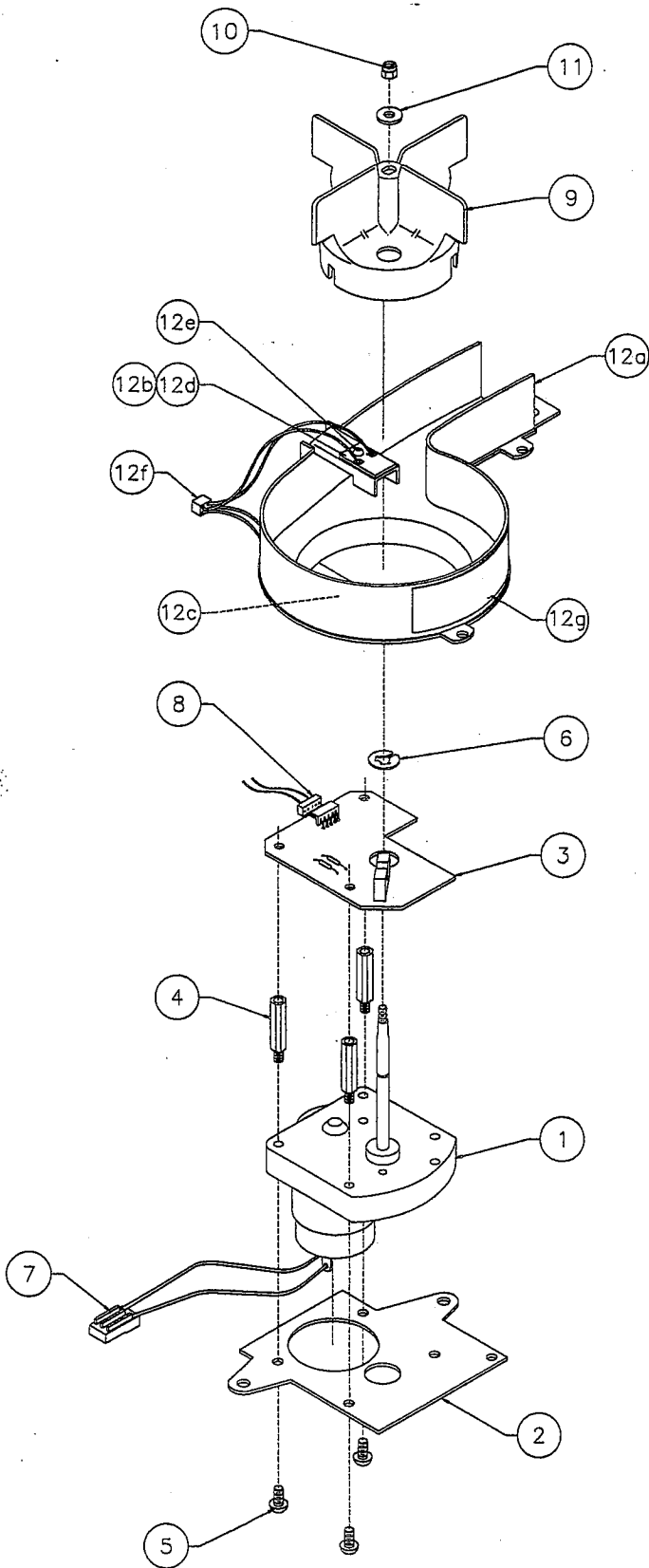
Item	Part Number	Description
1	14-8021.1	Turbo Gearmotor,12VDC
2	01-13870	Turbo Mtr. Mounting Bracket
3	A-20047	Turbo Opto PCB Assembly
4	02-5185-1	M-F Spacer, 8-32 x 1.0" Lg.
5	4008-01003-05	Mach. Screw, 8-32 x .31"
6	20-8712-25	"E"- Ring, 1/4" Shaft
7	H-18600-1	Cable, 8"
8	H-20206	Turbo Index Cable

Associated Assemblies:

Item	Part Number	Description
9	03-9343	Turbo Impeller
10	4406-01119-00	Nut 6-32 ESN
11	4700-00011-00	FW, 11/64 x 7/16 x 16ga.
12	A-20065	Turbo Housing Assembly
a)	04-10047.1	Welde Housing -Turbo
b)	01-13878.1	Opto Insulator
c)	A-14231	LED Assembly
d)	A-14232	Photo Transistor Assembly
e)	4004-01003-05	Mach. Screw, 4-40 x 5/16"
f)	H-20196	Cable
g)	*31-2505-2	Decal

* Not for individual sale. Order Decal Set 31-2505.

A-20432-5
Jet Bumper Assembly
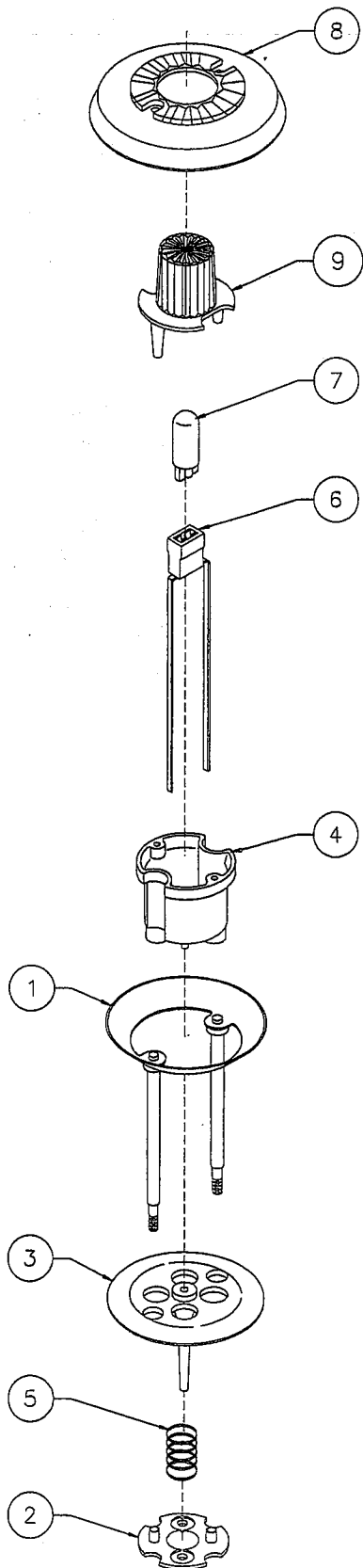
Item	Part Number	Description
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base, White
3	03-6035-15	Bumper Wafer, Orange
4	03-7443-5	Bumper Body, White
5	10-7	Spring
6	24-8776	Socket-Wedge Base
7	24-8802	Bulb #906(13v., 0.69A.)

Associated Parts:

8	03-9266-12	Jet Bumper Cap, Tr. Orange
9	03-9267-9	Jet Bumper Dome, Tr. Red

A-9415-2
Jet Bumper Coil Assembly
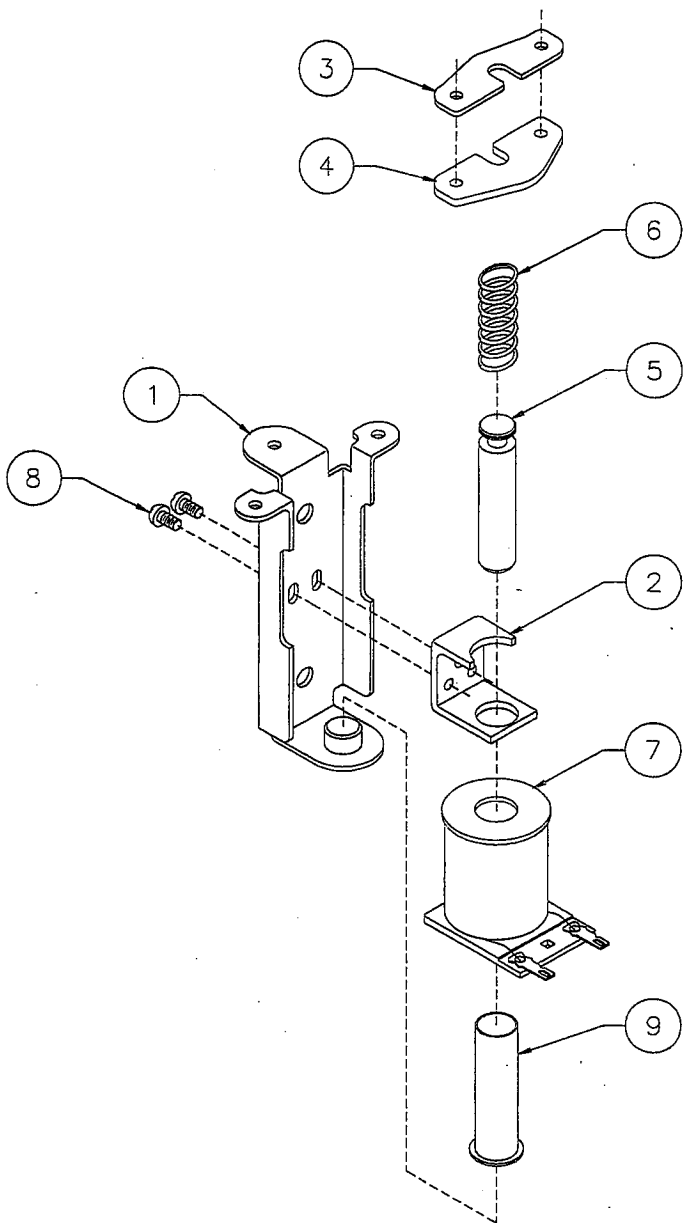
Item	Part Number	Description
1	B-7417	Bracket & Stop Assembly
2	01-1747	Coil Retaining Bracket
3	01-5492	Armature Link, Steel
4	01-5493	Armature Link, Bakeline
5	02-3406-1	Coil Plunger
6	10-326	Armature Spring
7	AE-26-1200	Coil Assembly
8	4006-01017-04	Mach. Screw, 6-32 x 1/4"
9	03-7066	Coil Tubing

Associated Parts:
(Not Shown)

10	B-12030-2	Leaf Switch Assembly
a)	A-16443	Switch & Diode Assembly
b)	01-1168	Switch Mounting Bracket
c)	01-3670	Switch Plate
d)	03-7395	Switch Actuator
e)	4005-01003-12	Mach. Screw, 5-40 x 3/4"
f)	4405-01117-00	Nut 5-40 Hex.

A-15361
Tilt Mechanism Assembly
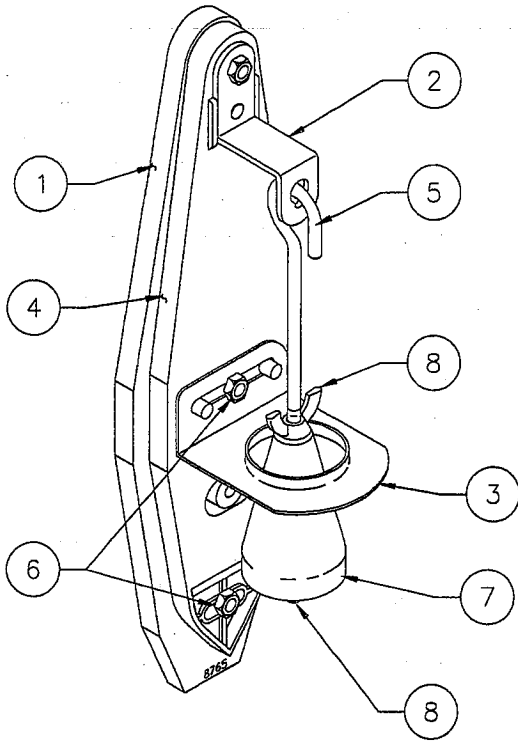
Item	Part Number	Description
1	A-15360	Mount Plate
2	01-3444	Bracket, Tilt Upper
3	01-3445	Bracket, Tilt Lower
4	03-8668	Pendulum
5	12-6231	Plumb Bob Wire
6	4006-01113-06	Mach. Screw, 6-32 x 3/8"

Associated Parts:

Item	Part Number	Description
7	20-6502-A	Plumb Bob
8	4406-01120-00	Wing Nut (2)

B-10686-1
Knocker Assembly
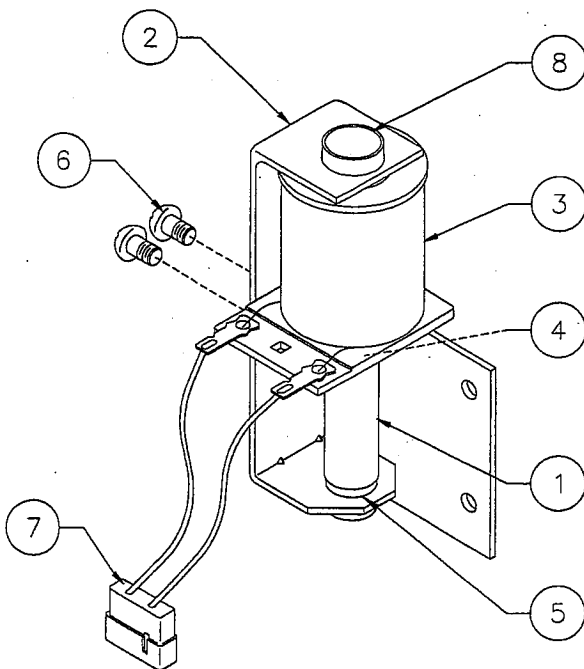
Item	Part Number	Description
1	A-5387	Coil Plunger Assembly
2	01-11273	Mounting Bracket Assembly
3	AE-23-800	Coil Sub-Assembly
4	01-8-508-T	Coil Retaining Bracket
5	23-6420	Rubber Grommet
6	4008-01017-04	Mach. Screw, 8/32 x 1/4"
7	H-11835	Knocker Cable
8	03-7067-5	Coil Tubing

A-14525
Kicker Bracket Assembly
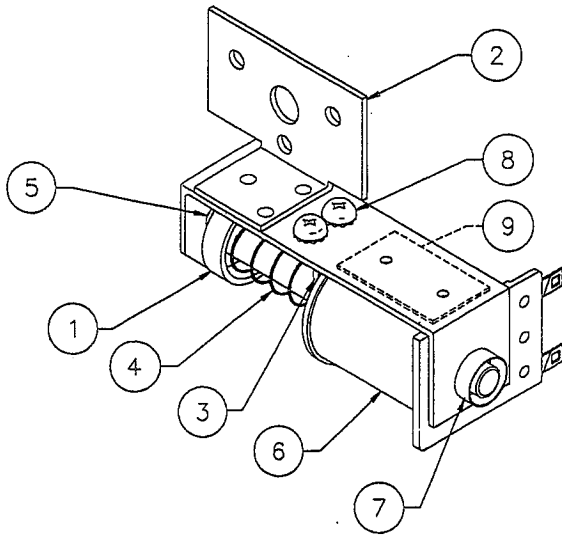
Item	Part Number	Description
1	A-6306-2	Bell Armature Assembly
2	A-14526	Kicker Mounting Bracket Assy.
3	01-8-508-T	Solenoid Bracket
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	AE-23-800	Coil Assembly
7	03-7067-5	Coil Tubing
8	4008-01017-04	Mach. Screw, #8-32 x 1/4"
9	03-8523	Insulator

A-20450
Kicker Assembly
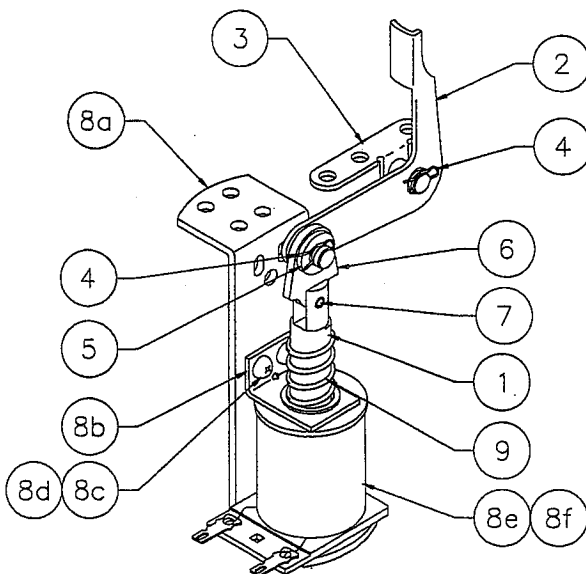
Item	Part Number	Description
1	02-3407	Solenoid Plunger
2	A-5652-1	Kicker Crank Assembly
3	A-11396	Kicker Mounting Bracket
4	12-6227	Hairpin Clip
5	4700-00030-00	Flat Washer, 9/32x1/2x22ga.
6	03-8085	Armature Link
7	20-8716-5	Roll Pin, 1/8 x 7/16"

Associated Assembly:

Item	Part Number	Description
8	**A-20451**	Coil & Bracket Assembly
a)	A-17808	Bracket & Stop Assembly
b)	01-8-508-S	Coil Retaining Bracket
c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
d)	4406-01119-00	Nut, 6-32 ESN
e)	AE-28-1500	Coil Assembly
f)	03-7066	Coil Tubing
9	10-128	Spring

A-20170
Back Panel Assembly
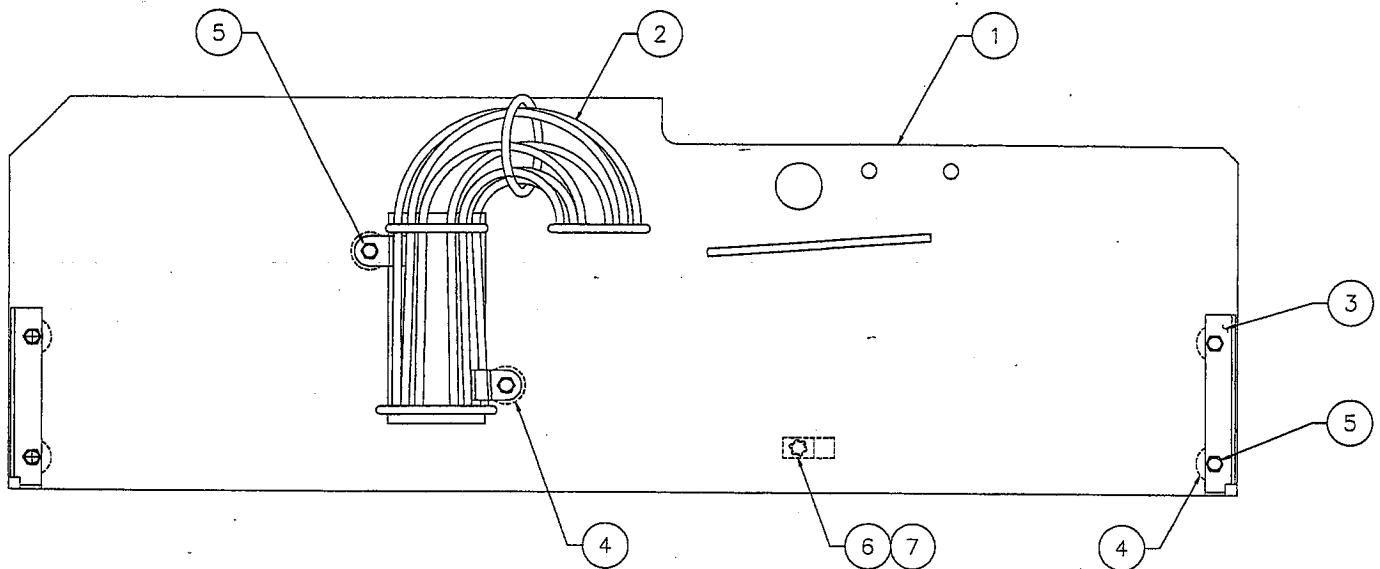
Item	Part Number	Description
1	11-1237.1	Back Panel
2	12-7282	Rear Wire Popper
3	01-12569	Back Panel Gusset
4	4408-01118-02	Nut 8-32 Tee .281 Lg.
5	4008-01168-10	Mach. Screw, 8-32 x 5/8"
6	03-7655-4	Cable Clamp, 1/4"
7	4106-01114-08	TCS #6 x 1/2"

A-20169
Race Track Assembly

Item	Part Number	Description	Item	Part Number	Description
1	04-10079.1	Race Track Weldment	11	4004-01003-03	Mach. Screw, 4-40 x 3/16"
2	04-10082	Car Bracket & Hub Weldment	12	H-20185	Cable
3	04-10094	Reflector Socket Assembly	13	03-7655-4	Cable Clamp, 1/4"
4	14-8022	Race Track Gear Motor	14	03-7520-2	Tie Wrap, Nylon 3-7/8"
5	01-13640	Car Mounting Bracket	15	4006-01113-06	Mach. Screw, 6-32 x 3/8"
6	04-10208	Car & Driver Assembly, Small	16	17-1116-2	Wire, Yellow Jumper Cut 2"
7	4010-01186-04	Set Screw, 10-32 x 1/4"	17	03-9408	Cover - Racetrack
8	4008-01113-08	Mach. Screw, 8-32 x 1/2"	18	31-2505-1	Decal - Racetrack
9	4006-01113-18	Mach. Screw, 6-32 x 1-1/8"	19	20-9682-1	Protective Sleeve
10	4406-01119-00	Nut 6-32 ESNA			

A-17540
Universal Power Interface Assembly
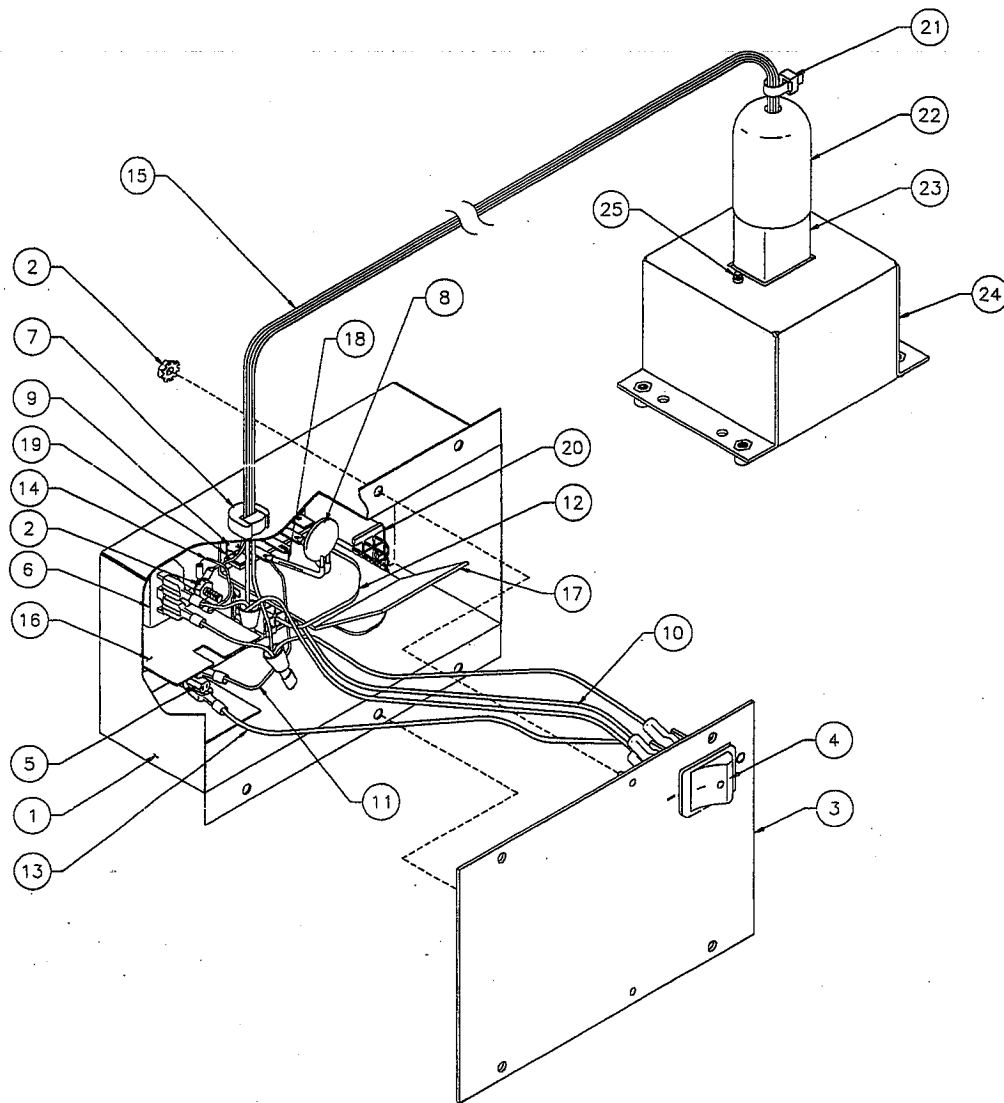
Item	Part Number	Description	Item	Part Number	Description
1	01-12293.1	Power Control Chassis Box	14	H-17542	Ground Jumper Grn/Yel Cable
2	4406-01128-00	Nut #6-32 KEPS (3)	15	5797-13940-01	Jumper Cable
3	01-12294	Switch Mounting Plate Assembly	16	01-10623	Insulator, Thermistor
4	5642-13935-00	Power Switch	17	01-12299	Insulator, Terminal Strip
5	5733-12869-00	Fuse Holder Panel	18	RM-21-06	#18 Vinyl Fgls
6	5851-13867-00	Outlet-IEC Conn. 237 Socket	19	5822-13865-00	Terminal Strip 3-CKT 2-Mtg.
7	03-8712	Strain Relief Bushing	20	H-18050	Jumper Cable, Transformer Prog.
8	5016-12978-00	Thermistor 8A., 2.5R25	21	03-7933	Ty-Wrap Nylon
9	4006-01003-10	Mach. Screw, #6-32 x 5/8"	22	20-9682-1	Boot w/9-32 Dia. Hole
10	H-17992	Jumper Cable Neutral Sw/1FC	23	5102-13864-00	Line Filter w/IEC Connector
11	H-17543	Hot Jumper Black Cable	24	01-12292	Line Filter Chassis Box
12	H-17546	Jumper Interface Hot Black Cable	25	4004-01003-05	Mach. Screw, #4-40 x 5/16" (2)
13	H-17545	Jumper Switch/Fuse Black Cable			

Universal Power Interface/Cordset Application Chart

COUNTRY	UNIVERSAL POWER INTERFACE ASSEMBLY	VOLTAGE PROGRAMMING JUMP CABLE				5AMP FUSE/LABEL		8AMP FUSE/LABEL		LABEL HIGH/VOLTAGE CAUTION	POWER ADAPTER CORD	CORDSET								
	A-17540	H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-09851-00 FUSE	16-9668 LABEL	5730-09252-00 FUSE	16-9670 LABEL	16-9669	5850-14052-00	5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00	A-17175-2
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	√				√			√	√										√	√

Posts

02-4424-1
Post #6-32/#8-32 x 1-5/8"
02-4424-2
Post #6-32/#8-32 x 1-3/4"

02-4425-1
Post #8-32/#8-32 x 1-5/8"

02-4426-1
Post, #6-32/#8 x 1-1/2"

02-4434
Post #8

02-4659-1
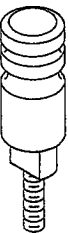Mini-Post

02-4660
Mini-Post Single Bumper

02-4250-42
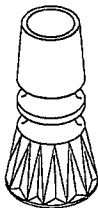M-F Spacer, #6-32 x 2-5/8"
02-4250-48
M-F Spacer, #6-32 x 3"

02-4765-6
Mounting Post, 3.13"
02-4765-17
Mounting Post, 2.25"
02-4765-18
Mounting Post, 2.41"

02-4842
Bumper Post

02-5107
Post-Adjusting

03-8130-13
Double Post

02-5180
Mounting POst #8-32

03-8044-13
Mini-Post, Clear

03-8319-9
Post #8 Starred

03-8365-9
Post #8, Red

Unique Assemblies

Backbox	A-16917-50026	Sound Board Assembly
	A-17651-50026	WPC CPU Board Assembly
	A-19986	Speaker/Display Assembly
Playfield	A-13204-50026	Bottom Arch Assembly
	A-18019-20	Standup Target Assembly, Orange
	A-18530-1	Standup Target Assembly-Oblong, Blue
	A-19820-1	Illuminated Target Assembly
	A-19978	Pit Ramp Diverter Assembly
	A-19979	Serpentine Ramp Assembly
	A-19980	Pit Ramp Assembly
	A-20038	Turbo Motor Assembly
	A-20065	Turbo Housing Assembly
	A-20103-1	6-Lamp PCB & Spacer Assembly
	A-20104-1	4-Lamp PCB & Spacer Assembly
	A-20105-1	3-Lamp PCB Assembly
	A-20106-1	3-Lamp PCB & Spacer Assembly
	A-20107-1	3-Lamp PCB & Spacer Assembly
	A-20108-1	3-Lamp PCB & Spacer Assembly
	A-20159	Ball Popper Assembly
	A-20169	Race Track Assembly
	A-20170	Back Panel Assembly
	A-20180	Ball Stop Assembly
	A-20188	Motor/EMI w/Delay & Spacers
	A-20235	Ball Popper Assembly
	A-20246-1	10-Opto PCB Assembly w/Spacers
	A-20401	Illum. Target PCB & Bracket Assembly
	A-20406	Switch & Bracket Assembly
	A-20407	Turbo Feed Wire Ramp Assembly
	A-20410	Shooter Ramp Assembly
	A-20413	Diverter Blade & Car Assembly
	A-20432-5	Jet Bumper Assembly
	A-20433	One Way Gate Assembly
	A-20450	Kicker Assembly
	A-20451	Coil & Bracket Assembly
	A-20459 - A-20462	Playfield Plastic Assembly
	A-20524	One Way Gate Assembly
	H-20182	Playfield Switch Cable
	H-20183	Playfield Lamp Cable
	H-20184	Playfield Solenoid Cable
	H-20192	Playfield Opto Cable
	H-20195	4-Lamp Target Cable
	01-13840	Ball Guide
	01-13841	Ball Guide
	01-13842	Ball Guide
	01-13912.1	Ball Guide
	01-13931.1	Left Ramp Guard
	01-13932.1	Right Ramp Guard
	01-14002	Ball Guide
	01-14083	Angle Bracket
	02-4250-48	M-F Spacer, 6-32 x 3" (1/4" Hex.)
	02-4765-17	Mounting Post, 2.25"
	02-4765-18	Mounting Post, 2.41"
	02-5180	Mounting Post 8-32
	03-9267-9	Jet Bumper Dome, Transparent Red
	03-9343	Turbo Impeller
	04-10044	Ball Guide Assembly
	04-10058	Ball Guide
	04-10203	Ball Guide Assembly
	31-2346.1-1, -2	Ramp Decal
	31-2503-	Playfield Plastic Set
	31-2504-	Playfield Plastic Set (Sheet 2)
	31-2505-	Decal
Cabinet	11-1229.1	Cabinet, Wood
	20-9663-21	Push Button w/Switch, *Buy Extra*

Upper Playfield Parts

Item No.	Part Number	Description	Item No.	Part Number	Description
1	01-9211	*Playfield Hanger Bracket	42	02-4250-36	Spacer 6-32 x 2 1/4"
2	01-13593	Bottom Arch Ball Guide	44	A-17794	Kicker Switch Sub-Assembly
3	A-15849-L-2	Flipper Assembly Complete	45	A-20406	Switch & Bracket Assembly
	20-10110-5	Flipper & Shaft Assy., White		A-20451	Coil & Bracket Assembly
4	03-9216-13	Flipper Return Guide, Clear		A-20450	Kicker Assembly, Left
5	A-17813	Rollover Switch Assembly		10-128	Spring
6	A-17811	Sling Shot Kicker Assembly	46	04-10044	Ball Guide Assembly
	B-9362-L-2	Coil & Bracket Assembly	47	01-13840	Ball Guide
	10-128	Spring	48	12-7293.1	Wire Ramp Support Bracket
7	A-17801	Kicker Count Switch	49	A-14876-R-3	Flipper Assembly Complete
8	02-5107	Adjusting Post		20-10110-5	Flipper & Shaft Assy., White
9	A-19980	Pit Ramp Assembly	50	02-4765-6	Mounting Post 3.13"
10	A-18019-20	Stationary Target, Orange	51	12-7273.2	Turbo Exhaust Ramp
11	A-19978	*Pit Ramp Diverter Assembly	52	04-10058	Ball Guide
	A-20413	Diverter Blade & Car Assembly	53	A-20410	Shooter Ramp Assembly
12	A-18159	*10 Opto P.C.B. Assembly	54	A-17811	Sling Shot Kicker Assembly
13	01-13842	Ball Guide		B-9362-R-3	Coil & Bracket Assembly
14	A-18530-1	Stationary Target, Blue		10-128	Spring
15	A-18017-6	Stationary Target, Yellow	55	A-15802-P	Level & Holder Assembly
16	A-19979	Serpentine Ramp Assembly	56	A-15849-R-2	Flipper Assembly Complete
17	01-13843	Ball Guide		20-10110-5	Flipper & Shaft Assy., White
18	A-20407	Turbo Feed Wire Ramp Assy.	57	01-10621	Strike Plate
19	12-6466-10	Ball Guide Wire 2 1/2"	58	A-19963	Ball Trough Assembly, Complete
20	A-20159	Ball Popper Assembly	59	A-18973	Shooter Lane Switch Assembly
21	02-4765-18	Mounting Post 2.41"	60	A-14525	Kicker Bracket Assembly
22	A-18019-6	Stationary Target, Yellow	61	01-13931.1	Left Guard
23	01-14002	Ball Guide	62	01-13932.1	Right Guard
24	01-13912.1	Ball Guide	63	01-13933.1	Left Guard
25	A-20038	Turbo Motor Assembly	64	01-13934.1	Right Guard
	A-20065	Turbo Housing Assembly	65	01-14088	Kicker Ball Guide, Left
	03-9343	Turbo Impeller	66	01-10489	Kicker Ball Guide, Right
26	A-19820-1	Illuminated Target Assembly	67	A-20524	One-way Gate Assembly
	A-20401	Illuminated Target P.C.B. & Brkt.			
27	02-4765-17	Mounting Post 2.25"	**NOT SHOWN:**		
28	04-10203	Ball Guide Assembly		01-12569	Gusset Brackets
29	12-6466-6A	Ball Guide Wire 1 5/8"		03-9418-1A	**Full Playfield Mylar
30	A-20180	Ball Stop Assembly		03-9418-2	Drop Area Mylar (2)
31	A-20235	Ball Popper Assembly		03-9418-3	Upper Left Area Mylar
32	12-7282	Rear Wire Ramp		03-9418-4	Jet Bumper Area Mylar
33	A-20433	One-way Gate Assembly		03-9418-5	Upper Mylar
34	03-8318-9	Double Sided Light Hood, Red		A-15542	Motor EMI P.C.B.
35	A-20170	Back Panel Assembly		A-17812-2	Cable Mounting Bracket 1/2"
36	A-17985-R	Eject Switch Assembly		A-17812-4	Cable Mounting Bracket 1"
	B-9361-R-1	Ball Eject Assembly, Left		A-20189	Motor EMI w/Delay Brake P.C.B.
	B-9362-R-3	Coil & Bracket Assembly		A-20501	Playfield Plastic Assy.
	10-128	Spring		36-50026	Screened Playfield
37	04-10201	Metal Shooter Ramp			
38	A-20169	Race Track Assembly	**MISCELLANEOUS:**		
39	02-4250-48	Spacer 6-32 x 3"		01-11791	Service Switch Actuator
40	12-6466-5	Ball Guide Wire 1 1/4"		23-6767	Bulb Extractor
41	A-9415-2	Jet Bumper Coil Assembly			
	A-12030-3	Jet Bumper Switch Assembly			
	A-20432-5	Jet Bumper Wafer Assy., Orange			
	03-9266-12	Jet Bumper Cap, Orange			
	03-9267-9	Jet Bumper Dome, Red			
	23-6710-1	Clear Tubing #10, 1"			

*Located under playfield.
**The Indianapolis 500 hardcoat playfield does not
require a full mylar. However, mylars can be purchased
through your local Bally Distributor.
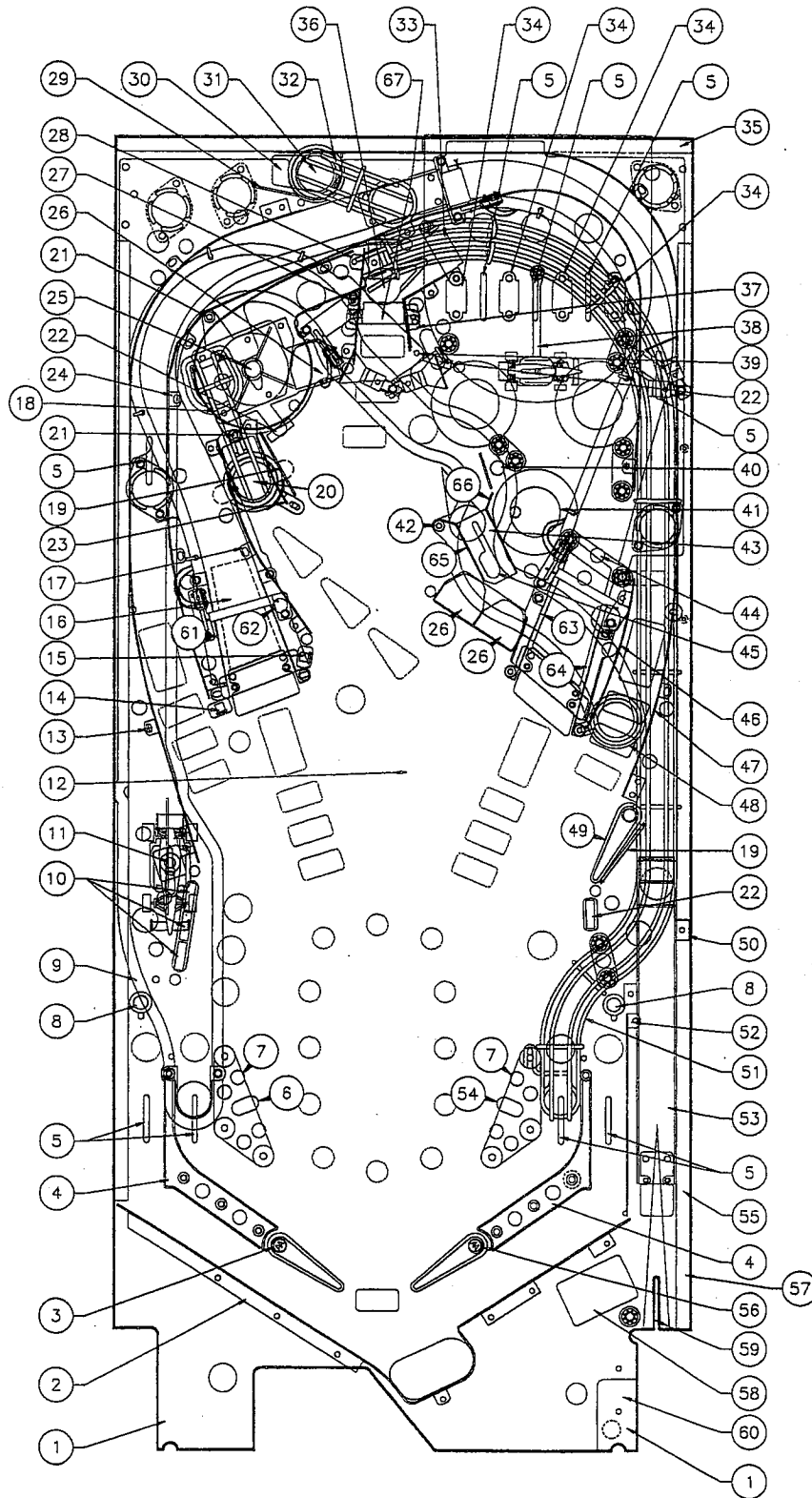
Lower Playfield Parts

Item	Part Number	Description
1	01-9211	Plfd. Hanger Bracket Assy. (2)
2	01-11781	Leg Support (2)
3	A-19963	Outhole Ball Trough Assembly
4	A-15849-R-2	Flipper Assembly, Lwr. Right
5	A-17811	Kicker Arm (Slingshot) Assy.
	B-9362-R-3	Coil & Bracket Assembly
6	A-20103	6-Lamp PCB Assembly (2)
7	A-14876-R-3	Flipper Assembly, Upr. Right
8	A-20105	3-Lamp PCB Assembly (4)
9	A-15849-L-2	Flipper Assembly, Lwr. Left
10	A-18159	10-Opto PCB Assembly
11	A-18120-1	Illuminated Target Assy. (3)
	A-20401	Illum. Target PCB & Bracket(3)
12	A-9415-2	Jet Bumper Coil Assembly (3)
13	A-17949.1-2	Plfd. Slide Mech. Assembly, R.
14	A-20108	3-Lamp PCB Assembly
15	A-15542	Motor EMI PCB Assembly
16	B-9361-R-1	Ball Eject Assembly, Left
	B-9362-R-3	Coil & Bracket Assembly
17	A-20235	Ball Popper Assembly
18	A-20189	EMI Motor w/Delay Brake PCB
19	A-20038	Turbo Motor Assembly
20	A-20159	Ball Popper Assembly
21	A-20104	4-Lamp PCB Assembly
22	A-20450	Kicker Assembly
	A-20451	Coil & Bracket Assembly
23	A-20107	3-Lamp PCB Assembly
24	A-19978	Pit Ramp Diverter Assembly
25	A-20106	3-Lamp PCB Assembly
26	A-17811	Kicker Arm (Slingshot) Assy.
	B-9362-L-2	Coil & Bracket Assembly
27	A-17949.1-1	Plfd. Slide Mech. Assembly, L.
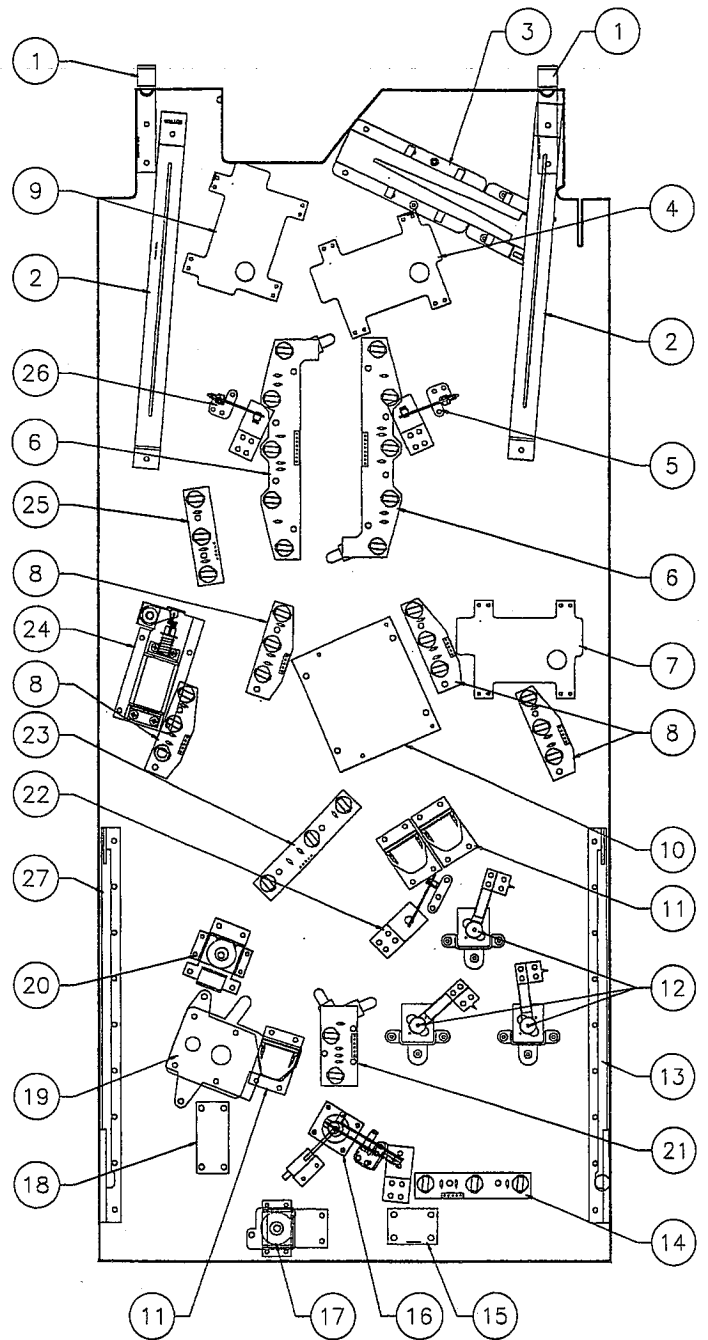
Rubber Rings
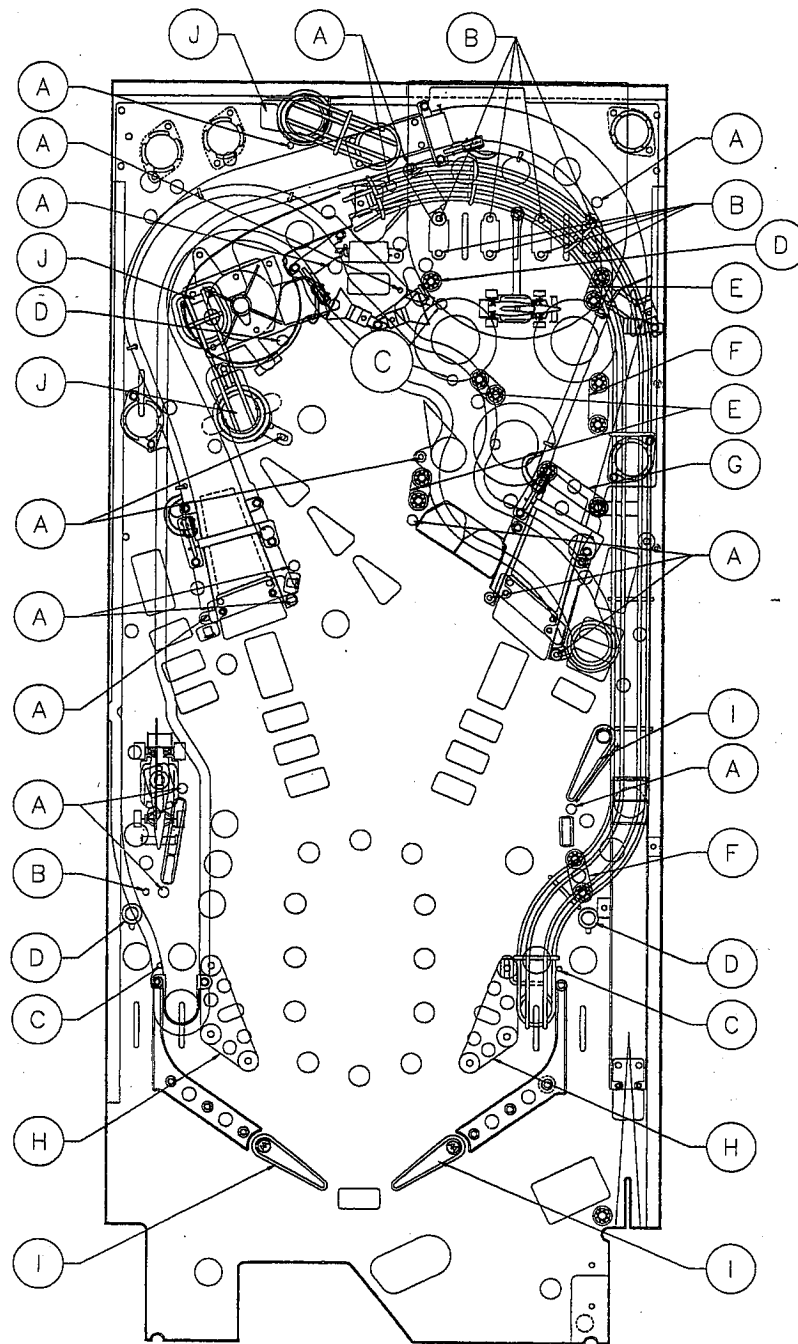
Item No.	Part Number	Description.	Qty	Item No.	Part Number	Description.	Qty
A	23-6556	Black Sleeve	17	F	23-6694-6	Rubber Ring 1"	2
B	23-6641	Rubber Bumper .64 od	9	G	23-6694-8	Rubber Ring 1 1/2"	1
C	23-6694-1	Rubber Grommet 3/32"	4	H	23-6694-10	Rubber Ring 2 1/2"	2
D	23-6694-3	Rubber Ring 5/16"	6	I	23-6695	Flipper Ring 1 1/2"	3
E	23-6694-5	Rubber Ring 3/4"	3	J	23-6686	Round Pad, Blue	3

LAMP MATRIX

Yellow (B+) ——⊗——►Red

Column / Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-9 Q91
1 Red-Brown J133-1 Q90	LEFT LANE 11	TURBO LOCK 1 21	HIT THE "WALL" 31	SUPER JETS 41	DUELING DRIVERS 51	RIGHT LOOP UPPER 61	LIGHTUP 1 LOWER RIGHT 71	LIGHTUP 3 LOWER RIGHT 81
2 Red-Black J133-2 Q89	CENTER LANE 12	TURBO LOCK 2 22	HIT "THE" WALL 32	TURBO BOOST 42	SUPER LIGHTUPS 52	AWARD SPEEDWAY 2	LIGHTUP 1 UPPER RIGHT 72	LIGHTUP 3 UPPER RIGHT 82
3 Red-Orange J133-4 Q88	RIGHT LANE 13	TURBO LOCK 3 23	"HIT" THE WALL 33	CHECKERED FLAG 43	CAUTION FLAG 53	HIT THE WALL 63	LIGHTUP 1 UPPER LEFT 73	LIGHTUP 3 UPPER LEFT 83
4 Red-Yellow J133-5 Q87	UPPER EJECT TOP 14	LIGHT LOCK LAMP 24	LEFT RAMP JACKPOT 34	GO FOR THE POLE 44	EXTRA BALL FLAG 54	RIGHT RAMP JACKPOT 64	LIGHTUP 1 LOWER LEFT 74	LIGHTUP 3 LOWER LEFT 84
5 Red-Green J133-6 Q86	JET WRENCH 15	LIGHT SPEEDWAY 25	INCREASE BOOST 35	QUICK PIT 45	PARTY PIT FLAG 55	PIT STOP 65	LIGHTUP 2 LOWER RIGHT 75	NOT USED 85
6 Red-Blue J133-7 Q85	EXTRA BALL 16	"PASS" 26	SOUVENIR LAMP 36	3X PLAYFIELD 46	SUPER HIT WALL 56	FAST LAPS 66	LIGHTUP 2 UPPER RIGHT 76	LAUNCH BUTTON 86
7 Red-Violet J133-8 Q84	VICTORY LAP 17	LEFT RAMP WRENCH 27	LEFT FLIPPER LANE 37	UPPER RIGHT FLIPPER WRENCH 47	RIGHT OUTLANE 57	NOT USED 67	LIGHTUP 2 UPPER LEFT 77	BUY-IN BUTTON 87
8 Red-Gray J133-9 Q83	TURBO WRENCH 18	LEFT RAMP STANDUP 28	LEFT OUTLANE 38	RIGHT FLIPPER LANE 48	SHOOT AGAIN 58	NOT USED 68	LIGHTUP 2 LOWER LEFT 78	START BUTTON 88

J1XX = Power Driver Board

Lamp Locations

Item No.	Bulb No.	Lamp Assy. No.	Description	Item No.	Bulb No.	Lamp Assy. No.	Description
11	24-8768	A-20108	Left Lane	35	24-8768	A-20105	Increase Boost
12	24-8768	A-20108	Center Lane	36	24-8768	A-20105	Souvenir Lamp
13	24-8768	A-20108	Right Lane	37	24-6549	A-17835	Left Flipper Lane
14	24-8768	A-20104	Upper Eject Top	38	24-6549	A-17835	Left Outlane
15	24-8768	A-20104	Jet Wrench	41	24-8768	A-20103	Super Jets
16	24-8768	A-20104	Extra Ball	42	24-8768	A-20103	Turbo Boost
17	24-8768	A-20104	Victory Lap	43	24-8768	A-20103	Checkered Flag
18	24-6549	A-17835	Left Ramp Wrench	44	24-8768	A-20103	Go For The Pole
21	24-8768	A-20107	Turbo Lock 1	45	24-8768	A-20103	Quick Pit
22	24-8768	A-20107	Turbo Lock 2	46	24-8768	A-20103	3X Playfield
23	24-8768	A-20107	Turbo Lock 3	47	24-6549	A-17835	Upper Right Flipper Wrench
24	24-8768	A-20105	Light Lock Lamp	48	24-6549	A-17835	Right Flipper Lane
25	24-8768	A-20105	Light Speedway	51	24-8768	A-20103	Dueling Drivers
26	24-8768	A-20105	"Pass"	52	24-8768	A-20103	Super Lightups
27	24-6549	A-17835	Turbo Wrench	53	24-8768	A-20103	Caution Flag
28	24-6549	A-17835	Left Ramp Standup	54	24-8768	A-20103	Extra Ball Flag
31	24-8768	A-20106	Hit The "Wall"	55	24-8768	A-20103	Party Pit Flag
32	24-8768	A-20106	Hit "The" Wall	56	24-8768	A-20103	Super Hit Wall
33	24-8768	A-20106	"Hit" The Wall	57	24-6549	A-17835	Right Outlane
34	24-8768	A-20105	Left Ramp Jackpot	58	24-6549	A-17835	Shoot Again

Lamp Locations (continued)
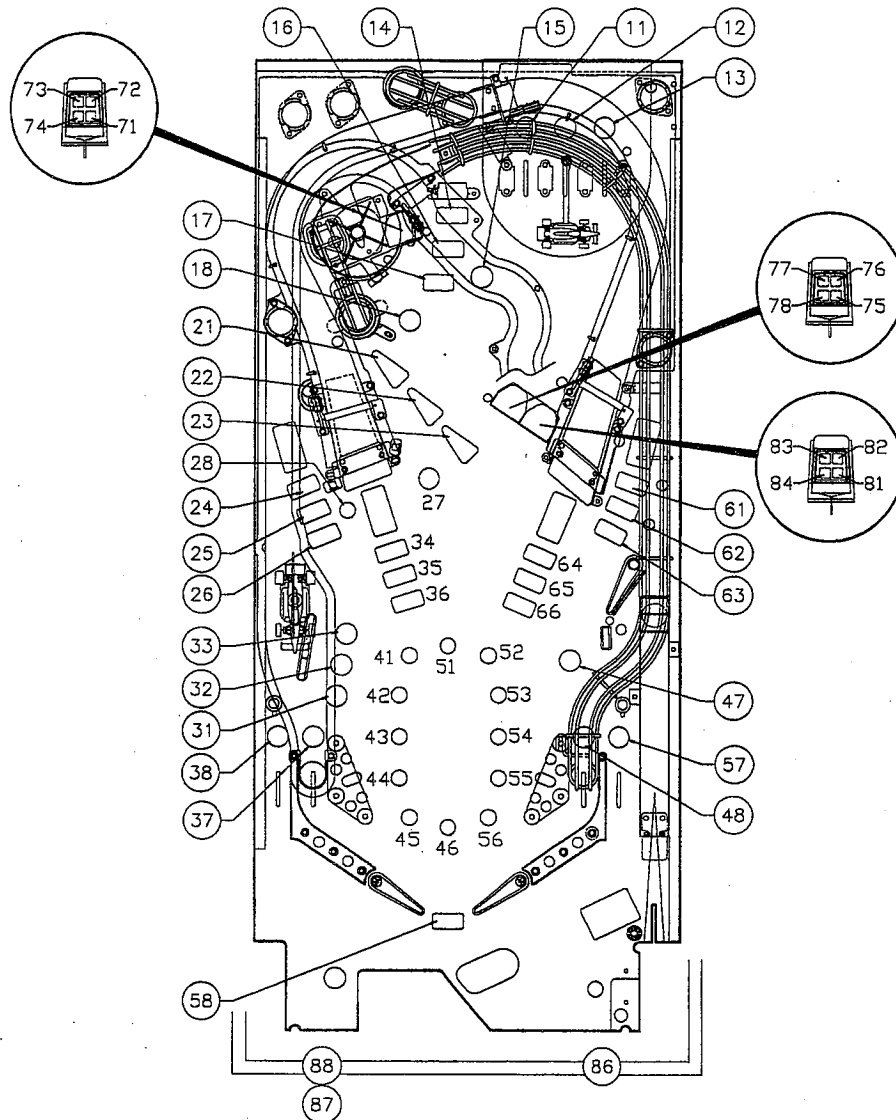
Item No.	Bulb No.	Lamp Assy. No.	Description	Item No.	Bulb No.	Lamp Assy. No.	Description
61	24-8768	A-20105	Right Loop Upper	75	---	A-19823	Lightup 2 Lower Right
62	24-8768	A-20105	Award Speedway	76	---	A-19823	Lightup 2 Upper Right
63	24-8768	A-20105	Hit The Wall	77	---	A-19823	Lightup 2 Upper Left
64	24-8768	A-20105	Right Ramp Jackpot	78	---	A-19823	Lightup 2 Lower Left
65	24-8768	A-20105	Pit Stop	81	---	A-19823	Lightup 3 Lower Right
66	24-8768	A-20105	Fast Laps	82	---	A-19823	Lightup 3 Upper Right
67	---	---	Not Used	83	---	A-19823	Lightup 3 Upper Left
68	---	---	Not Used	84	---	A-19823	Lightup 3 Lower Left
71	---	A-19823	Lightup 1 Lower Right	85	---	---	Not Used
72	---	A-19823	Lightup 1 Upper Right	86	---	20-9663-B-3	Launch Button
73	---	A-19823	Lightup 1 Upper Left	87	---	20-9663-21	Buy-In Button
74	---	A-19823	Lightup 1 Lower Left	88	---	20-9663-1	Start Button

24-8768 = #555 Bulb
24-6549 = #44 Bulb

SWITCH MATRIX

White ——▶——o⁄o—— Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-9 U20-11	Flipper Grounded Switches
Orange-Brown (1) J205-1 Left Coin Chute D1	1 White-Brown J209-1 U18-11	BALL LAUNCH 11	SLAM TILT 21	THREE BANK CENTER 31	TOP TROUGH 41	LEFT LANE 51	UPPER POPPER 61	NOT USED 71	NOT USED 81	Black-Green J906-1 Right Flipper EOS F1
Orange-Red (2) J205-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	NOT USED 12	COIN DOOR CLOSED 22	THREE BANK LOWER 32	TROUGH 1 (RIGHT) 42	CENTER LANE 52	TURBO POPPER 62	LEFT JET 72	NOT USED 82	Black-Violet J905-1 Right Flipper Opto F2
Orange-Black (3) J205-3 Right Coin Chute D3	3 White-Orange J209-3 U18-5	START BUTTON 13	BUY-IN BUTTON 23	NOT USED 33	TROUGH 2 43	RIGHT LANE 53	TURBO BALL SENSE 63	RIGHT JET 73	NOT USED 83	Black-Blue J906-3 Left Flipper EOS F3
Orange-Yellow (4) J205-4 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	RIGHT FLIPPER WRENCH 34	TROUGH 3 44	TEN POINT 54	UPPER EJECT 64	CENTER JET 74	NOT USED 84	Black-Gray J905-2 Left Flipper Opto F4
Orange-Green (5) J205-6 Normal Function: Ser Credits | Test Function: Esc D5	5 White-Green J209-5 U19-11	LEFT OUTLANE 15	SHOOTER LANE 25	LEFT RAMP ENTER 35	TROUGH 4 (LEFT) 45	LEFT RAMP WRENCH 55	LOWER KICKER 65	RIGHT RAMP ENTER 75	NOT USED 85	Black-Violet J906-4 Upper Right Flipper EOS F5
Orange-Blue (6) J205-7 Normal Function: Vol Down | Test Function: Down D6	6 White-Blue J209-7 U19-9	LEFT FLIPPER LANE 16	LEFT SLING-SHOT 26	LEFT RAMP MADE 36	LEFT RAMP STANDUP 46	LEFT LIGHTUP 56	TURBO INDEX 66	RIGHT RAMP MADE 76	NOT USED 86	Black-Yellow J905-3 Upper Right Flipper Opto F6
Orange-Violet (7) J205-8 Normal Function: Vol Up | Test Function: Up D7	7 White-Violet J209-8 U19-5	RIGHT FLIPPER LANE 17	RIGHT SLING-SHOT 27	LEFT LOOP 37	TURBO WRENCH 47	CENTER LIGHTUP 57	NOT USED 67	NOT USED 77	NOT USED 87	Black-Gray J906-5 Upper Left Flipper EOS F7 (NOT USED)
Orange-Gray (8) J205-9 Normal Function: Begin Test | Test Function: Enter D8	8 White-Gray J209-9 U19-7	RIGHT OUTLANE 18	THREE BANK UPPER 28	RIGHT LOOP 38	JET BUMPER WRENCH 48	RIGHT LIGHTUP 58	NOT USED 68	NOT USED 78	NOT USED 88	Black-Blue J905-5 Upper Left Flipper Opto F8 (NOT USED)

J2XX = CPU Board; J9XX = Fliptronic II Board; ▓ = Opto, Typically Closed

Switch Locations

Item No.	Switch Part No.	Description
F1	SW-1A-194	Lower Right Flipper EOS
F2	A-17316	*Lower Right Flipper Cabinet
F3	SW-1A-194	Lower Left Flipper EOS
F4	A-17316	*Lower Left Flipper Cabinet
F5	SW-1A-194	Upper Right Flipper EOS
F6	A-17316	* Upper Right Flipper Cabinet
F7	---	Not Used
F8	---	Not Used
11	20-9663-B-3	Ball Launch
12	---	Not Used
13	20-9663-1	Start Button
14	A-15361	*Plumb Bob Tilt
15	5647-12693-19	Left Outlane
16	5647-12693-19	Left Flipper Lane
17	5647-12693-19	Right Flipper Lane
18	5647-12693-19	Right Outlane
21	A-17238	*Slam Tilt
22	5643-09288-00	*Coin Door Closed
23	20-9663-21	Buy-In Button
24	5643-09112-00	*Always Closed
25	5647-12693-32	Shooter Lane
26	SW-1A-114 SW-1A-120	Left Slingshot (Kicker) (Score)

Item No.	Switch Part No.	Description
27	SW-1A-114 SW-1A-120	Right Slingshot (Kicker) (Score)
28	A-18019-20	Three Bank Upper
31	A-18019-20	Three Bank Center
32	A-18019-20	Three Bank Lower
33	---	Not Used
34	A-18019-6	Right Flipper Wrench
35	5647-12693-11	Left Ramp Enter
36	5647-12693-11	Left Ramp Made
37	5647-12693-19	Left Loop
38	5647-12693-19	Right Loop
41	A-18617-1 A-18618-1	Top Trough (LED) (Transistor)
42	A-18617-1 A-18618-1	Trough 1 (Right) (LED) (Transistor)
43	A-18617-1 A-18618-1	Trough 2 (LED) (Transistor)
44	A-18617-1 A-18618-1	Trough 3 (LED) (Transistor)
45	A-18617-1 A-18618-1	Trough 4 (Left) (LED) (Transistor)
46	A-18530-1	Left Ramp Standup
47	A-18019-6	Turbo Wrench
48	A-18019-6	Jet Bumper Wrench

*Not Shown
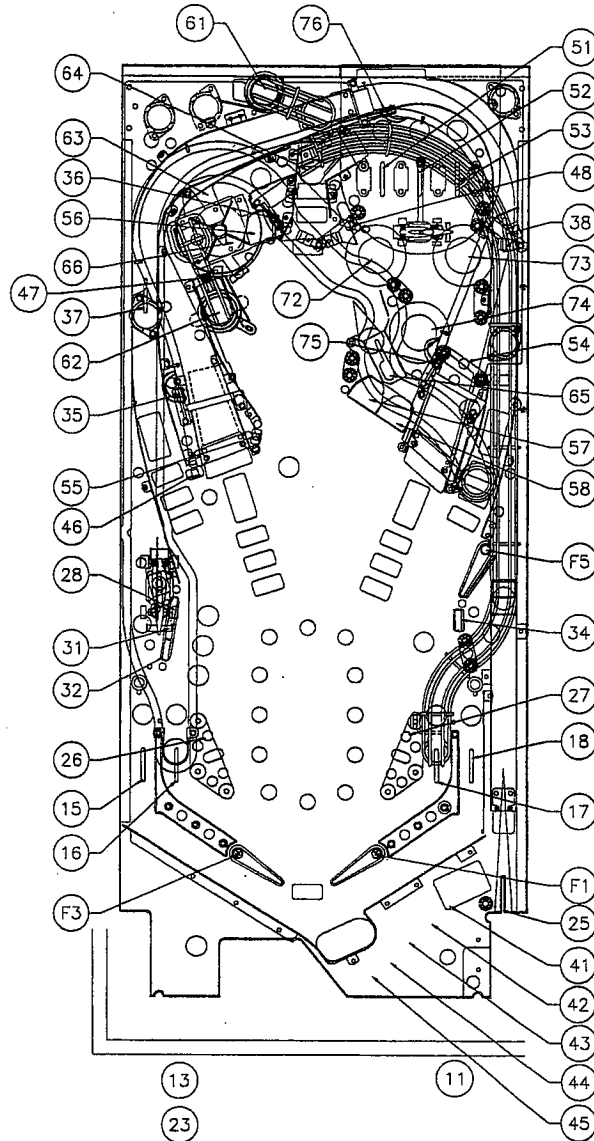
Item No.	Switch Part No.	Description		Item No.	Switch Part No.	Description
51	5647-12693-19	Left Lane		71	---	Not Used
52	5647-12693-19	Center Lane		72	SW-11A-37-1	Left Jet
53	5647-12693-19	Right Lane		73	SW-11A-37-1	Right Jet
54	SW-1A-120	Ten Point		74	SW-11A-37-1	Center Jet
55	A-18017-6	Left Ramp Wrench		75	5647-12693-11	Right Ramp Enter
56	A-19823	Left Lightup		76	5647-12693-11	Right Ramp Made
57	A-19823	Center Lightup		77	---	Not Used
58	A-19823	Right Lightup		78	---	Not Used
61	A-16908	Upper Popper		81	---	Not Used
	A-16909			82	---	Not Used
62	A-16908	Turbo Popper		83	---	Not Used
	A-16909			84	---	Not Used
63	A-14231	Turbo Ball Sense		85	---	Not Used
	A-14232			86	---	Not Used
64	5647-12133-11	Upper Eject		87	---	Not Used
65	5647-12693-53	Lower Kicker		88	---	Not Used
66	A-20047	Turbo Index				
67	---	Not Used				
68	---	Not Used				

*Not Shown

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Voltage Connections Backbox	Voltage Connections Cabinet	Drive Xister	Drive Connections Playfield	Drive Connections Backbox	Drive Connections Cabinet	Drive Wire Color	Solenoid Part number / Flashlamp Type Playfield	Solenoid Part number / Flashlamp Type Backbox
01	Auto Plunger	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-23-800	
02	Upper Popper	High Power	J107-2			Q80	J130-2			Vio-Red	AE-24-900	
03	Upper Eject	High Power	J107-2			Q78	J130-4			Vio-Org	AE-26-1200	
04	Lower Eject	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-28-1500	
05	Turbo Popper	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-24-900	
06	Not Used	High Power				Q66					---	
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	Left Jet	High Power	J107-2			Q70	J130-9			Vio-Gry	AE-26-1200	
09	Right Jet	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	Center Jet	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	Left Sling	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	Right Sling	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	Trough	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1500	
14	Upper Popper Flasher	Low Power	J107-6			Q48	J127-7			Brn-Blu	#906	
15	Top Left Corner Flasher	Low Power	J107-6			Q46	J127-8			Brn-Vio	#906	
16	Top Right Corner Flasher	Low Power	J107-6			Q44	J127-9			Brn-Gry	#906	
17	Turbo Motor	Flasher	J116-2			Q42	J126-1			Blk-Brn	14-8021.1	
18	Race Track Motor	Flasher	J116-2			Q40	J126-2			Blk-Red	14-8022	
19	Orange Car Flasher	Flasher	J107-6			Q38	J126-3			Blk-Org	#906	
20	Yellow Car Flasher	Flasher	J107-6			Q36	J126-4			Blk-Yel	#906	
21	Blue Car Flasher	Flasher	J107-6			Q28	J126-5			Blu-Grn	#906	
22	Green Car Flasher	Flasher	J107-6			Q30	J126-6			Blu-Blk	#906	
23	Left Jet Flasher	Flasher	J107-6			Q34	J126-7			Blu-Vio	#906	
24	Right Jet Flasher	Flasher	J107-6			Q32	J126-8			Blu-Gry	#906	
25	Center Jet Flasher	Gen. Purpose	J107-6			Q26	J122-1			Blu-Brn	#906	
26	Right Side Flasher	Gen. Purpose	J107-6			Q24	J122-2			Blu-Red	#906	
27	Left Side Flasher (2)	Gen. Purpose	J107-6			Q22	J122-3			Blu-Org	#906 (2)	
28	Right Ramp Enter Flasher	Gen. Purpose	J107-6			Q20	J122-4			Blu-Yel	#906	
35	Diverter Power	High Power	J907-8,9			Q1	J902-3			Yel-Gry	A-20099	
36	Diverter Hold	Low Power	J907-8,9			Q5	J902-1			Org-Gry	A-20099	
	General Illumination											
01	Upper Left Playfield	G.I.	J121-1	J120-1		Q18	J121-7	J120-7		Wht-Brn	#44	#555
02	Upper Right Playfield	G.I.	J121-2			Q10	J121-8			Wht-Org	#44, #555	
03	Lower Playfield	G.I.	J121-3	J120-3		Q14	J121-9	J120-9		Wht-Yel	#44	#555
04	Backbox-Coindoor	G.I.		J120-5		Q16		J120-10		Wht-Grn		#555
05	Backbox Title	G.I.		J120-6		Q12		J120-11		Wht-Vio		#555

Flipper Circuits		Voltage Connections Playfield	Drive Transistors Power	Drive Transistors Hold	Drive Connectors Playfield	Drive Wire Colors Power	Drive Wire Colors Hold	Coil Part No.	Coil Color
29		Lwr. Rt. Power J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn			
30	Lower Right Flipper	Lwr. Rt. Hold J907-1 (Red-Grn)		Q11	J902-11		Org-Grn	FL-11629	BLUE
31		Lwr. Lt. Power J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu			
32	Lower Left Flipper	Lwr. Lt. Hold J907-4 (Red-Blu)		Q9	J902-7		Org-Blu	FL-11629	BLUE
33		Upr. Rt. Power J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio			
34	Upper Right Flipper	Upr. Rt. Hold J907-6 (Red-Vio)		Q7	J902-4		Org-Vio	FL-11629	BLUE
35		Upr. Lt. Power J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry			
36	Upper Left Flipper	Upr. Lt. Hold J907-8 (Red-Gry)		Q5	J902-1		Org-Gry	SEE	ABOVE

J1xx=Power Driver Board; J9xx=Fliptronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb

Solenoid/Flasher Locations

Item No.	Coil/Flasher No.	Assy. Number.	Description	Item No.	Coil/Flasher No.	Assy. Number.	Description
01	AE-23-800	A-14525	Auto Plunger	11	AE-26-1200	B-9362-L-2	Left Sling
02	AE-24-900	A-20235	Upper Popper	12	AE-26-1200	A-9362-R-3	Right Sling
03	AE-26-1200	B-9361-R-1	Upper Eject	13	AE-26-1500	A-19963	Trough
04	AE-28-1500	A-20451	Lower Eject	14	24-8802	A-19980	Upper Popper Flasher
05	AE-24-900	A-20159	Turbo Popper	15	24-8802	A-19980	Top Left Corner Flasher
06	---		Not Used	16	24-8802	A-19980	Top Right Corner Flasher
07	AE-23-800	B-10686-1	*Knocker	17	14-8021	A-20038	Turbo Motor
08	AE-26-1200	A-9415-2	Left Jet	18	14-8022	A-20169	Race Track Motor
09	AE-26-1200	A-9415-2	Right Jet	19	24-8802	A-17802	Orange Car
10	AE-26-1200	A-9415-2	Center Jet	20	24-8802	A-17802	Yellow Car

*NOT SHOWN

Solenoid/Flasher Locations (continued)
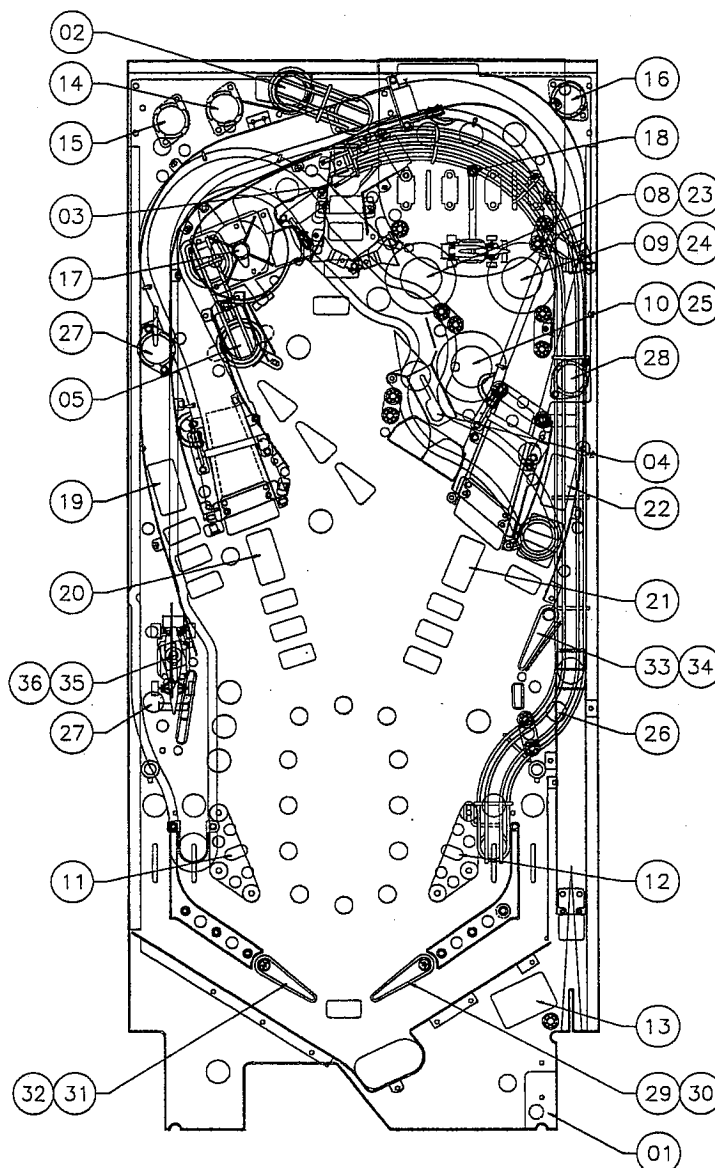
Item No.	Coil/ Flasher No.	Assy. Number.	Description
21	24-8802	A-17802	Blue Car
22	24-8802	A-17802	Green Car
23	24-8802	A-20432-5	Left Jet Flasher
24	24-8802	A-20432-5	Right Jet Flasher
25	24-8802	A-20432-5	Center Jet Flasher
26	24-8802	C-13337	Right Side Flasher
27	24-8802	C-13337	Left Side Flasher (2)
	24-8802	A-19979	
28	24-8802	A-19980	Right Ramp Enter Fls.
35	A-20099	A-19978	Diverter Power
36	A-20099	A-19978	Diverter Hold

General Illumination Circuits

Item No.	Description	Bulb No.
01	Upper Left Playfield	G.I. String 1
02	Upper Right Playfield	G.I. String 2
03	Lower Playfield	G.I. String 3
04	Backbox-Coindoor	G.I. String 4
05	Backbox Title	G.I. String 5

Flipper Coils

Item No.	Coil No.	Color	Assy. No.	Description
29 & 30	FL-11629	Blue	A-15849-R-2	Lower Right Flipper
31 & 32	FL-11629	Blue	A-15849-L-2	Lower Left Flipper
33 & 34	FL-11629	Blue	A-14876-R-3	Upper Right Flipper

24-6549 = #44 bulb
24-8704 = #89 bulb
24-8768 = #555 bulb
24-8802 = #906 bulb

Ramps

Item	Part Number	Description
1	A-19980	Pit Ramp Assembly
2	A-19979	Serpentine Ramp Assembly
3	A-20407	Turbo Feed Wire Ramp
4	12-7282	Popper Wire Ramp - Rear
5	12-7273.2	Turbo Exhaust Wire Ramp Assy
6	A-20410	Shooter Ramp Assembly
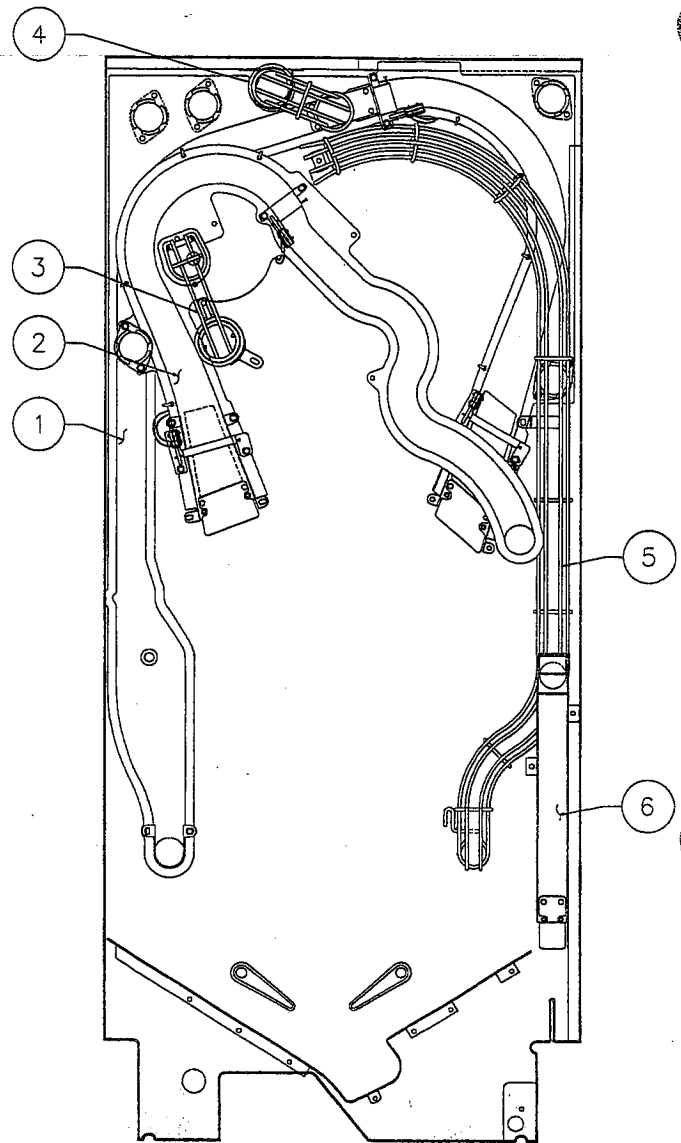
SECTION THREE

GAME WIRING
AND SCHEMATICS

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack (except the Sound Board and Dot Matrix Display/Driver Board) 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 number for the WPC circuit boards are as listed below.

1-Power Driver Board
2-CPU Board
6-Dot Matrix Controller
9-Fliptronic II Controller Board

```
P.C. BOARD LEGEND
J1XX  =  Power Driver Board
J2XX  =  CPU Board
J3XX  =  Dot Matrix Controller
J4XX  =  Fliptronic II Board
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The Sound Board and the Dot Matrix Display/Driver Board do not have an identification number.

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.

SWITCH MATRIX

White —▸|—o͞ o— Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-9 U20-11	Flipper Grounded Switches
Orange-Brown (1) J205-1 Left Coin Chute D1	1 White-Brown J209-1 U18-11	BALL LAUNCH 11	SLAM TILT 21	THREE BANK CENTER 31	TOP TROUGH 41	LEFT LANE 51	UPPER POPPER 61	NOT USED 71	NOT USED 81	Black-Green J906-1 Right Flipper EOS F1
Orange-Red (2) J205-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	NOT USED 12	COIN DOOR CLOSED 22	THREE BANK LOWER 32	TROUGH 1 (RIGHT) 42	CENTER LANE 52	TURBO POPPER 62	LEFT JET 72	NOT USED 82	Black-Violet J905-1 Right Flipper Opto F2
Orange-Black (3) J205-3 Right Coin Chute D3	3 White-Orange J209-3 U18-5	START BUTTON 13	BUY-IN BUTTON 23	NOT USED 33	TROUGH 2 43	RIGHT LANE 53	TURBO BALL SENSE 63	RIGHT JET 73	NOT USED 83	Black-Blue J906-3 Left Flipper EOS F3
Orange-Yellow (4) J205-4 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	RIGHT FLIPPER WRENCH 34	TROUGH 3 44	TEN POINT 54	UPPER EJECT 64	CENTER JET 74	NOT USED 84	Black-Gray J905-3 Left Flipper Opto F4
Orange-Green (5) J205-6 Normal Function Ser Credits / Test Function Esc D5	5 White-Green J209-5 U19-11	LEFT OUTLANE 15	SHOOTER LANE 25	LEFT RAMP ENTER 35	TROUGH 4 (LEFT) 45	LEFT RAMP WRENCH 55	LOWER KICKER 65	RIGHT RAMP ENTER 75	NOT USED 85	Black-Violet J906-4 Upper Right Flipper EOS F5
Orange-Blue (6) J205-7 Normal Function Vol Down / Test Function Down D6	6 White-Blue J209-7 U19-9	LEFT FLIPPER LANE 16	LEFT SLING-SHOT 26	LEFT RAMP MADE 36	LEFT RAMP STANDUP 46	LEFT LIGHTUP 56	TURBO INDEX 66	RIGHT RAMP MADE 76	NOT USED 86	Black-Yellow J905-4 Upper Right Flipper Opto F6
Orange-Violet (7) J205-8 Normal Function Vol Up / Test Function Up D7	7 White-Violet J209-8 U19-5	RIGHT FLIPPER LANE 17	RIGHT SLING-SHOT 27	LEFT LOOP 37	TURBO WRENCH 47	CENTER LIGHTUP 57	NOT USED 67	NOT USED 77	NOT USED 87	Black-Gray J906-5 Upper Left Flipper EOS F7 (NOT USED)
Orange-Gray (8) J205-9 Normal Function Begin Test / Test Function Enter D8	8 White-Gray J209-9 U19-7	RIGHT OUTLANE 18	THREE BANK UPPER 28	RIGHT LOOP 38	JET BUMPER WRENCH 48	RIGHT LIGHTUP 58	NOT USED 68	NOT USED 78	NOT USED 88	Black-Blue J905-5 Upper Left Flipper Opto F8 (NOT USED)

J2XX = CPU Board; J9XX = Fliptronic II Board; ▨ = Opto, Typically Closed

SWITCH MATRIX CIRCUIT

Column	A	B	
Inactive	H	L	Off
Active	L	H	On

Row	C	D	E	
Switch Open	H	H	L	Off
Switch Closed	L	L	H	On
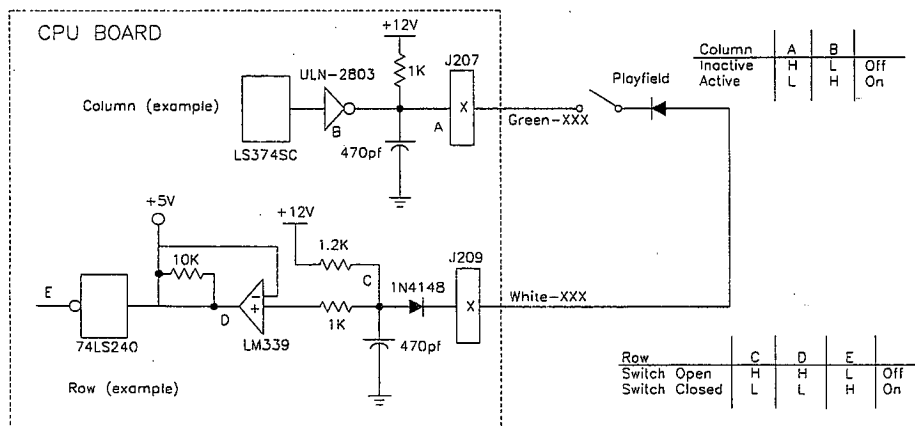
The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low, the column side is active.

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

3-2

DEDICATED SWITCHES

					Coin Acceptor or Control Switches

CPU Board — J205

Pin	Color	(IC)	D
1	Orange-Brown	(U17-5)	D1
2	Orange-Red	(U17-7)	D2
3	Orange-Black	(U17-11)	D3
4	Orange-Yellow	(U17-9)	D4
6	Orange-Green	(U16-9)	D5
7	Orange-Blue	(U16-11)	D6
8	Orange-Violet	(U16-7)	D7
9	Orange-Gray	(U16-5)	D8
11	Black		

Coin Acceptor Switches

D1 Left Coin Chute
D2 Center Coin Chute
D3 Right Coin Chute
D4 Fourth Coin Chute

Control Switches

D5 Normal Function: Service Credits
Test Function: Escape

D6 Normal Function: Volume Down
Test Function: Down

D7 Normal Function: Volume Up
Test Function: Up

D8 Normal Function: Begin Test
Test Function: Enter

DEDICATED SWITCH CIRCUIT

Switch	A	B	C	
Open	H	H	L	Off
Closed	L	L	H	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 causing its output to go 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 about +5V, its output is high and the row is inactive.

LAMP MATRIX

Column / Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-9 Q91
1 Red-Brown J133-1 Q90	LEFT LANE 11	TURBO LOCK 1 21	HIT THE "WALL" 31	SUPER JETS 41	DUELING DRIVERS 51	CHANGE SETUP 61	LIGHTUP 1 LOWER RIGHT 71	LIGHTUP 3 LOWER RIGHT 81
2 Red-Black J133-2 Q89	CENTER LANE 12	TURBO LOCK 2 22	HIT "THE" WALL 32	TURBO BOOST 42	SUPER LIGHTUPS 52	AWARD SPEEDWAY 2	LIGHTUP 1 UPPER RIGHT 72	LIGHTUP 3 UPPER RIGHT 82
3 Red-Orange J133-4 Q88	RIGHT LANE 13	TURBO LOCK 3 23	"HIT" THE WALL 33	CHECKERED FLAG 43	CAUTION FLAG 53	HIT THE WALL 63	LIGHTUP 1 UPPER LEFT 73	LIGHTUP 3 UPPER LEFT 83
4 Red-Yellow J133-5 Q87	UPPER EJECT TOP 14	LIGHT LOCK LAMP 24	LEFT RAMP JACKPOT 34	GO FOR THE POLE 44	EXTRA BALL FLAG 54	RIGHT RAMP JACKPOT 64	LIGHTUP 1 LOWER LEFT 74	LIGHTUP 3 LOWER LEFT 84
5 Red-Green J133-6 Q86	JET WRENCH 15	LIGHT SPEEDWAY 25	INCREASE BOOST 35	QUICK PIT 45	WRONG TURN 55	PIT STOP 65	LIGHTUP 2 LOWER RIGHT 75	NOT USED 85
6 Red-Blue J133-7 Q85	EXTRA BALL 16	"PASS" 26	SOUVENIR LAMP 36	3X PLAYFIELD 46	GASOLINE ALLEY 56	FAST LAPS 66	LIGHTUP 2 UPPER RIGHT 76	LAUNCH BUTTON 86
7 Red-Violet J133-8 Q84	VICTORY LAP 17	LEFT RAMP WRENCH 27	LEFT FLIPPER LANE 37	UPPER RIGHT FLIPPER WRENCH 47	RIGHT OUTLANE 57	NOT USED 67	LIGHTUP 2 UPPER LEFT 77	BUY-IN BUTTON 87
8 Red-Gray J133-9 Q83	TURBO WRENCH 18	LEFT RAMP STANDUP 28	LEFT OUTLANE 38	RIGHT FLIPPER LANE 48	SHOOT AGAIN 58	NOT USED 68	LIGHTUP 2 LOWER LEFT 78	START BUTTON 88

J1XX = Power Driver Board

LAMP MATRIX CIRCUIT
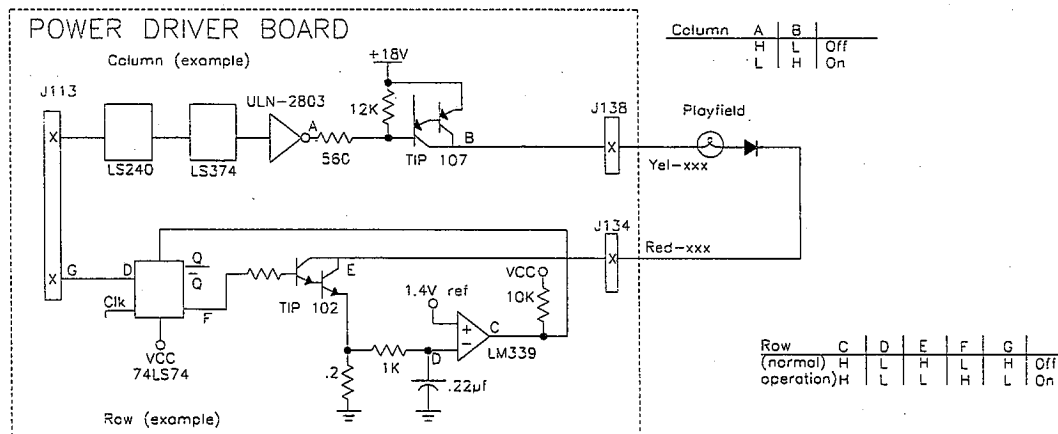
The processor sends a signal to the column circuit, causing the output of the ULN-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time the processor drives the input of the 74LS74 low, causing a high at output "F". A high state 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 over current conditions the lamps are shut Off through the comparator. If the voltage at the negative input of the LM330 rises above 1.4V the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit Off.

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Voltage Connections Backbox	Voltage Connections Cabinet	Drive Xister	Drive Connections Playfield	Drive Connections Backbox	Drive Connections Cabinet	Drive Wire Color	Solenoid Part number / Flashlamp Type Playfield	Solenoid Part number / Flashlamp Type Backbox
01	Auto Plunger	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-23-800	
02	Upper Popper	High Power	J107-2			Q80	J130-2			Vio-Red	AE-24-900	
03	Upper Eject	High Power	J107-2			Q78	J130-4			Vio-Org	AE-26-1200	
04	Lower Eject	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-28-1500	
05	Turbo Popper	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-24-900	
06	Not Used	High Power				Q66					—	
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	Left Jet	High Power	J107-2			Q70	J130-9			Vio-Gry	AE-26-1200	
09	Right Jet	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	Center Jet	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	Left Sling	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	Right Sling	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	Trough	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1500	
14	Upper Popper Flasher	Low Power	J107-6			Q48	J127-7			Brn-Blu	#906	
15	Top Left Corner Flasher	Low Power	J107-6			Q46	J127-8			Brn-Vio	#906	
16	Top Right Corner Flasher	Low Power	J107-6			Q44	J127-9			Brn-Gry	#906	
17	Turbo Motor	Flasher	J116-2			Q42	J126-1			Blk-Brn	14-8021.1	
18	Race Track Motor	Flasher	J116-2			Q40	J126-2			Blk-Red	14-8022	
19	Orange Car Flasher	Flasher	J107-6			Q38	J126-3			Blk-Org	#906	
20	Yellow Car Flasher	Flasher	J107-6			Q36	J126-4			Blk-Yel	#906	
21	Blue Car Flasher	Flasher	J107-6			Q28	J126-5			Blu-Grn	#906	
22	Green Car Flasher	Flasher	J107-6			Q30	J126-6			Blu-Blk	#906	
23	Left Jet Flasher	Flasher	J107-6			Q34	J126-7			Blu-Vio	#906	
24	Right Jet Flasher	Flasher	J107-6			Q32	J126-8			Blu-Gry	#906	
25	Center Jet Flasher	Gen. Purpose	J107-6			Q26	J122-1			Blu-Brn	#906	
26	Right Side Flasher	Gen. Purpose	J107-6			Q24	J122-2			Blu-Red	#906	
27	Left Side Flasher (2)	Gen. Purpose	J107-6			Q22	J122-3			Blu-Org	#906 (2)	
28	Right Ramp Enter Flasher	Gen. Purpose	J107-6			Q20	J122-4			Blu-Yel	#906	
35	Diverter Power	High Power	J907-8,9			Q1	J902-3			Yel-Gry	A-20099	
36	Diverter Hold	Low Power	J907-8,9			Q5	J902-1			Org-Gry	A-20099	

	General Illumination											
01	Upper Left Playfield	G.I.	J121-1	J120-1		Q18	J121-7	J120-7		Wht-Brn	#44	#555
02	Upper Right Playfield	G.I.	J121-2			Q10	J121-8			Wht-Org	#44, #555	
03	Lower Playfield	G.I.	J121-3	J120-3		Q14	J121-9	J120-9		Wht-Yel	#44	#555
04	Backbox-Coindoor	G.I.		J120-5		Q16		J120-10		Wht-Grn		#555
05	Backbox Title	G.I.		J120-6		Q12		J120-11		Wht-Vio		#555

	Flipper Circuits		Voltage Connections Playfield	Drive Transistors Power	Drive Transistors Hold	Drive Connectors Playfield	Drive Wire Colors Power	Drive Wire Colors Hold	Coil Part No.	Coil Color
29			Lwr. Rt. Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn			
30	Lower Right Flipper		Lwr. Rt. Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn	FL-11629	BLUE
31			Lwr. Lt. Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu			
32	Lower Left Flipper		Lwr. Lt. Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu	FL-11629	BLUE
33			Upr. Rt. Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio			
34	Upper Right Flipper		Upr. Rt. Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio	FL-11629	BLUE
35			Upr. Lt. Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry			
36	Upper Left Flipper		Upr. Lt. Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry	SEE	ABOVE

J1xx=Power Driver Board; J9xx=Fliptronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb

SOLENOID WIRING

Fliptronic II Board

J907 | 8,9 — Red-Gray   +50VDC

DIVERTER POWER Sol 35 | DIVERTER HOLD Sol 36

J902 | 3 — Yellow-Gray
      | 1 — Orange-Gray

J107 | 2 — Red-Brown   +50VDC
     | 3 — Red-Black   +50VDC

J116 | 2 — Gray-Yellow +12VDC

A-20189 MOTOR EMI W/DELAY P.C.B.

TURBO MOTOR Sol 17 | RACE TRACK MOTOR Sol 18

J126 | 1 — Black-Brown
     | 2 — Black-Red

A-15542 MOTOR EMI P.C.B.

Power Driver Board

RIGHT JET Sol 09	CENTER JET Sol 10	LEFT SLING Sol 11	RIGHT SLING Sol 12	TROUGH Sol 13

J127 | 1 — Brown-Black
     | 3 — Brown-Red
     | 4 — Brown-Orange
     | 5 — Brown-Yellow
     | 6 — Brown-Green

AUTO PLUNGER Sol 01	UPPER POPPER Sol 02	UPPER EJECT Sol 03	LOWER EJECT Sol 04	TURBO POPPER Sol 05	NOT USED Sol 06	KNOCKER Sol 07	LEFT JET Sol 08

J130 | 1 — Violet-Brown
     | 2 — Violet-Red
     | 4 — Violet-Orange
     | 5 — Violet-Yellow
     | 6 — Violet-Green
     | 7 — Not Used
     | 8 — Violet-Black
     | 9 — Violet-Gray

FLASHER WIRING

J107 [6] Red–White   +20VDC

CENTER JET Sol 25	RIGHT SIDE Sol 26	LEFT SIDE Sol 27	RIGHT RAMP ENTER Sol 28

J122 [1] Blue–Brown
     [2] Blue–Red
     [3] Blue–Orange
     [4] Blue–Yellow

POWER
DRIVER
BOARD

PLAYFIELD FLASHERS

ORANGE CAR Sol 19	YELLOW CAR Sol 20	BLUE CAR Sol 21	GREEN CAR Sol 22	LEFT JET Sol 23	RIGHT JET Sol 24

J126 [3] Black–Orange
     [4] Black–Yellow
     [5] Blue–Green
     [6] Blue–Black
     [7] Blue–Violet
     [8] Blue–Gray

UPPER POPPER Sol 14	TOP LEFT CORNER Sol 15	TOP RIGHT CORNER Sol 16

J127 [7] Black–Yellow
     [8] Blue–Gray
     [9] Blue–Gray

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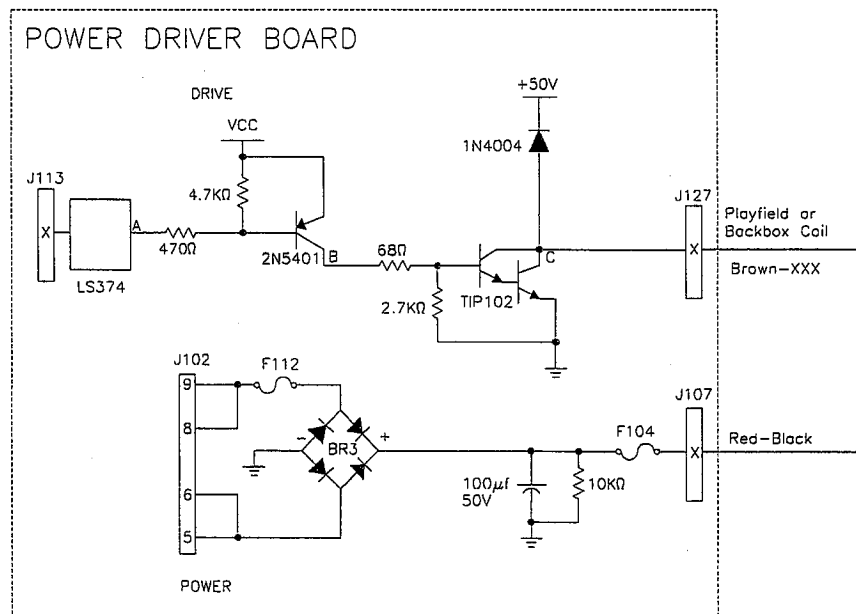
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor, and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the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

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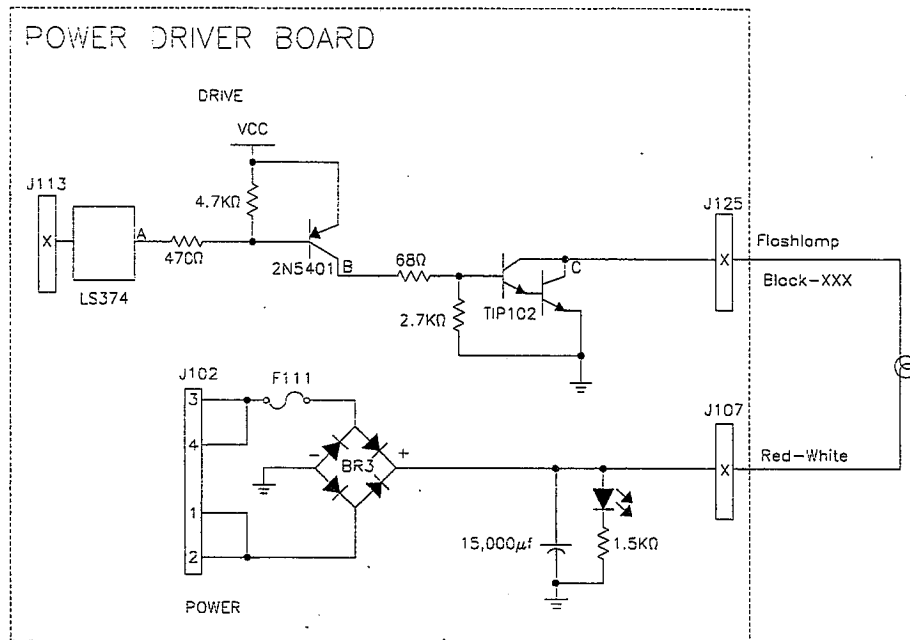
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When point "C" is low the flashlamp is grounded through the transistor and the flashlamp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

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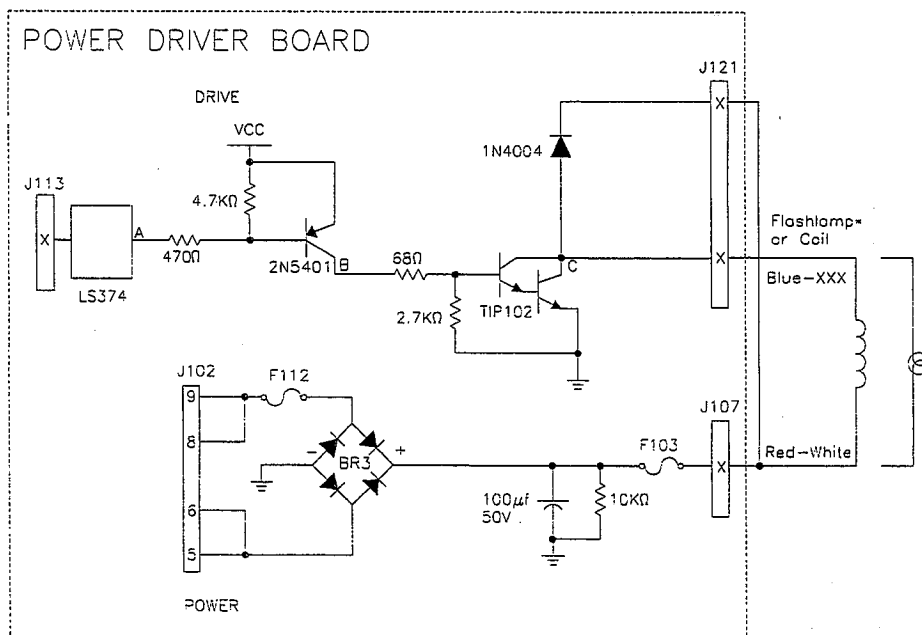
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the transistor and the coil/flashlamp turns On. When point "A" toggles high the coil/flashlamp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

*Tieback Diode is not used for flashlamp circuit.

General Illumination Circuit

POWER DRIVER BOARD

DRIVE

VCC

J113

10K Ω

J120

G.I. Lights

LS374

560Ω

2N5401

51Ω

J115

S.B.

POWER
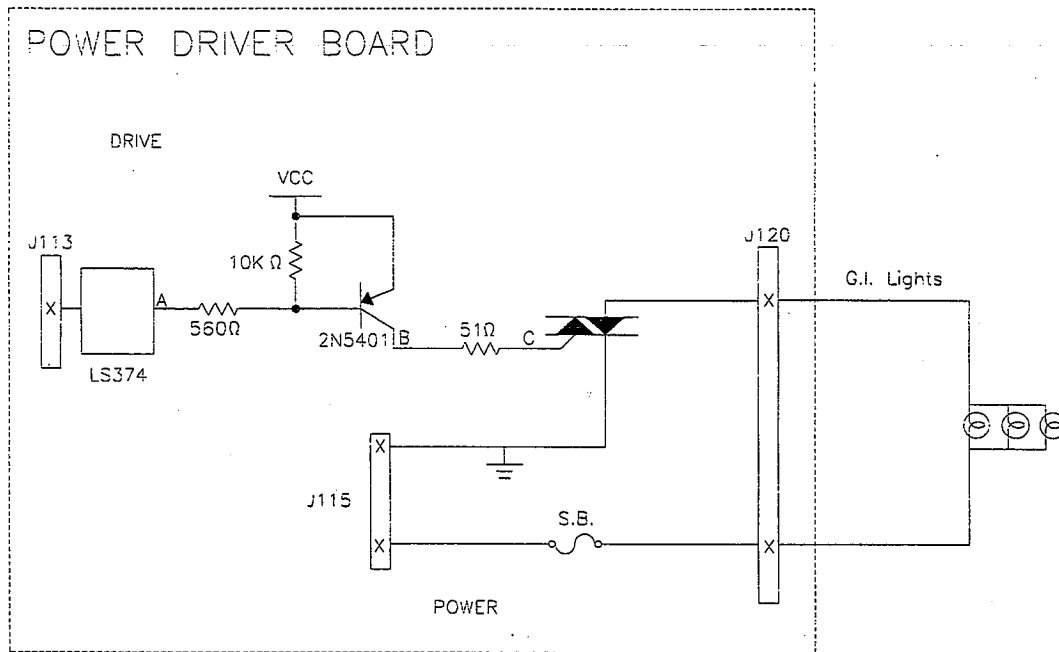
Block Diagram of General Illumination Circuit

Power
Driver
Board

Playfield or
Backbox
(up to 18 bulbs)

Power Driver Board

Triac
Drivers

LS374
Latch

6.3 Volt Secondary

Zero Cross Detection
Circuit

Power Driver Board

Microprocessor

CPU Board

5 Volt Secondary
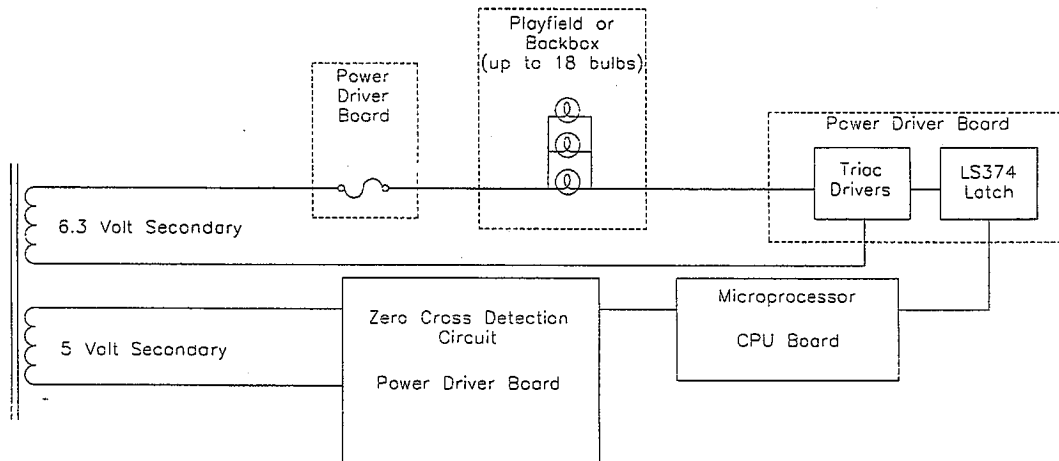
When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired general illumination string lights.

LED P.C.B. Assembly (transmitter)
A-16908

Green

WHT

A   K

SOLDER

Gray   Black

A   K

A   K

K   A
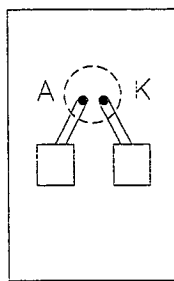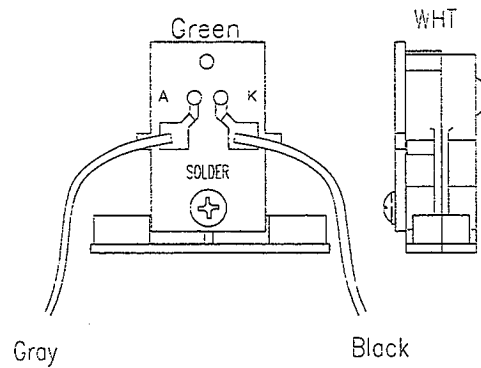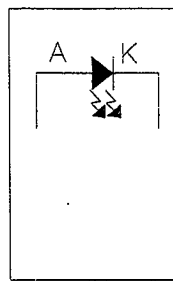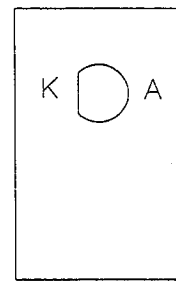
solder side   schematic   component side

Photo Transistor P.C.B. Assembly (receiver)
A-16909

BLK   Blue

C   E

SOLDER

Gray—Yellow   Orange—XXX

C   E

C   E

E   C
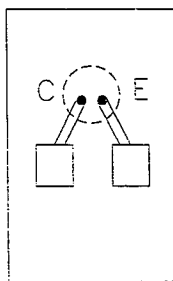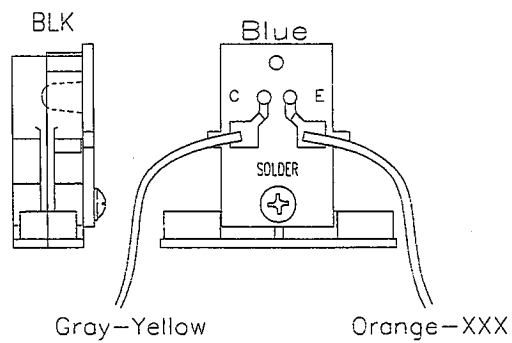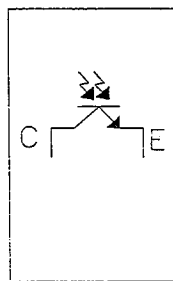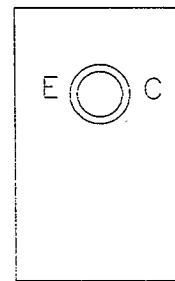
solder side   schematic   component side

Flipper Opto P.C.B. Assembly
A-17316
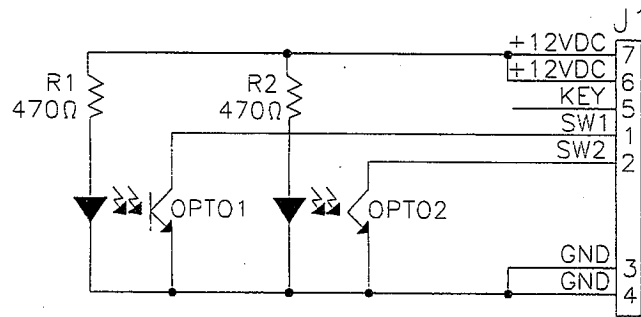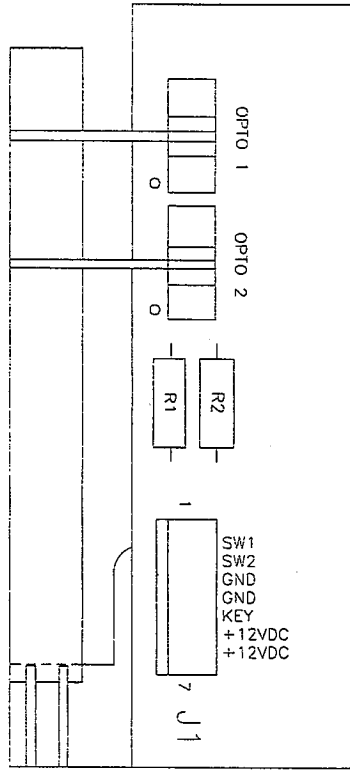
Left Side Flipper Cabinet Opto Switch Board
J1-1 Black-Blue from Fliptronic II Board J905-5
J1-2 Blue-Gray from Fliptronic II Board J905-2
J1-3 Not Used
J1-4 Orange from Fliptronic II Board J905-6
J1-5 Not Used
J1-6 Gray-Yellow to Right Flipper Opto Board J1-6
J1-7 Gray-Yellow from Fliptronic II Board J118-2

Right Side Flipper Cabinet Opto Switch Board
J2-1 Black-Yellow from Fliptronic II Board J905-3
J2-2 Blue-Violet from Fliptronic II Board J905-1
J2-3 Orange from Fliptronic II Board J905-6
J2-4 Orange from Left Flipper Opto Board J1-4
J2-5 Not Used
J2-6 Gray-Yellow to Left Flipper Opto Board J1-6
J2-7 Not Used

Flipper Circuit Diagram

Red–Blue	+50VDC	
Red–Gray	+50VDC	
Red–Green	+50VDC	
Red–Violet	+50VDC	

J907 [4 8 1 6]

END-OF-STROKE SWITCHES

J906

5	Black–Gray	U. Left Flipper	F7*
3	Black–Blue	L. Left Flipper	F3
4	Black–Violet	U. Right Flipper	F5*
1	Black–Green	L. Right Flipper	F1
6	Orange	Ground	

J902

6	Yellow–Violet	Power	Q2
4	Orange–Violet	Holding	Q7
3	Yellow–Green	Power	Q4
11	Orange–Green	Holding	Q11
3	Yellow–Gray	Power	Q1
1	Orange–Gray	Holding	Q5
9	Yellow–Blue	Power	Q3
7	Orange–Blue	Holding	Q9

UPPER* RIGHT FLIPPER COIL

LOWER RIGHT FLIPPER COIL

UPPER* LEFT FLIPPER COIL

LOWER LEFT FLIPPER COIL

FLIPTRONIC II BOARD

J905

5	Black–Blue	U. Left Flipper	F8
2	Blue–Gray	L. Left Flipper	F4
3	Black–Yellow	U. Right Flipper	F6
1	Blue–Violet	L. Right Flipper	F2
6	Orange	Ground	

CABINET OPTO SWITCHES

Gray–Yellow +12V

J901

1	White–Blue	50VAC
5	White–Blue	50VAC

J904

4	Black	Ground
5	Black	Ground
1	Gray	+5V
2	Gray–Green	+12V

J903

J202

CPU BOARD

J114 [1 2 3 4 5 7]   J105 [2 1]   J118 [2]

POWER DRIVER BOARD

*NOTE: May be used as circuits other than flipper circuits.

Flipper Coil Circuits

Left Flipper Circuit

```
FLIPTRONIC II BOARD
J901                    J907   Playfield
 1                      4
 2      BR1    F902      5       Red-Blue
 3                               Red-Gray      Lower Left
 5      C2    F904      8                      Flipper
J902
 9   Yellow-Blue    Power
 7   Orange-Blue    Holding

 3   Yellow-Gray    Power                      Upper Left
 1   Orange-Gray    Holding                    Flipper

          J906
 3            Black-Blue      Lower Left
                              End-of-Stroke
 6            Orange          Switch
 5            Black-Gray      Upper Left
                              End-of-Stroke
              Orange          Switch
```

Right Flipper Circuit

```
FLIPTRONIC II BOARD
J901                    J907   Playfield
 1                      1
 2      BR1    F901      2       Red-Green
 3                      6        Red-Violet    Lower Right
 5      C2    F903      7                      Flipper
J902
13   Yellow-Green    Power
11   Orange-Green    Holding

 6   Yellow-Violet   Power                     Upper Right
 4   Orange-Violet   Holding                   Flipper

          J906
 1            Black-Green     Lower Right
                              End-of-Stroke
 6            Orange          Switch
 4            Black-Violet    Upper Right
                              End-of-Stroke
              Orange          Switch
```

Flipper End-of-Stroke Switches

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

```
FLIPTONIC II BOARD
J906
 1   Black-Green  (U4A-5)    F1
 4   Black-Violet (U6A-5)    F5
 3   Black-Blue   (U4C-9)    F3
 5   Black-Gray   (U6C-9)    F7
 6   Orange
```

```
FLIPTRONIC II BOARD
          +5V      +12v
          10K   1K    1N4004  J906   End-of-Stroke Switch
                          A          X    Black-xxx
          B    LM339
 74HCT244
     Dedicated Input         6        Orange
```
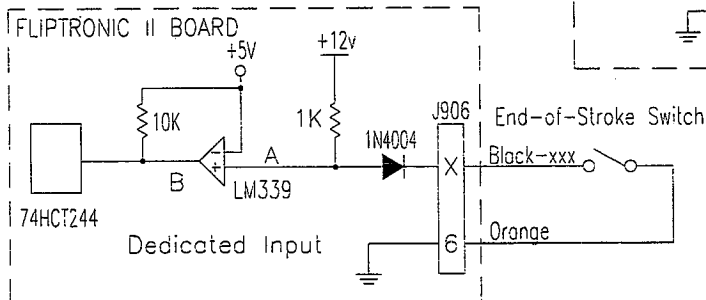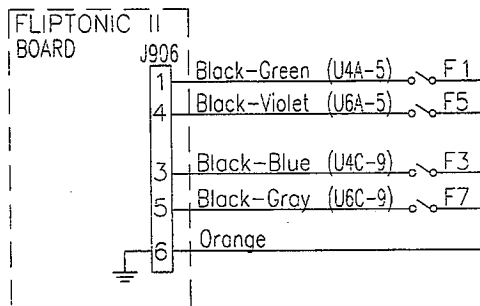
Switch	A	B	
Open	H	H	Off
Closed	L	L	On

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 about +5V, its output is high and the row (dedicated input) is inactive.

Flipper Cabinet Switch Circuit Diagram
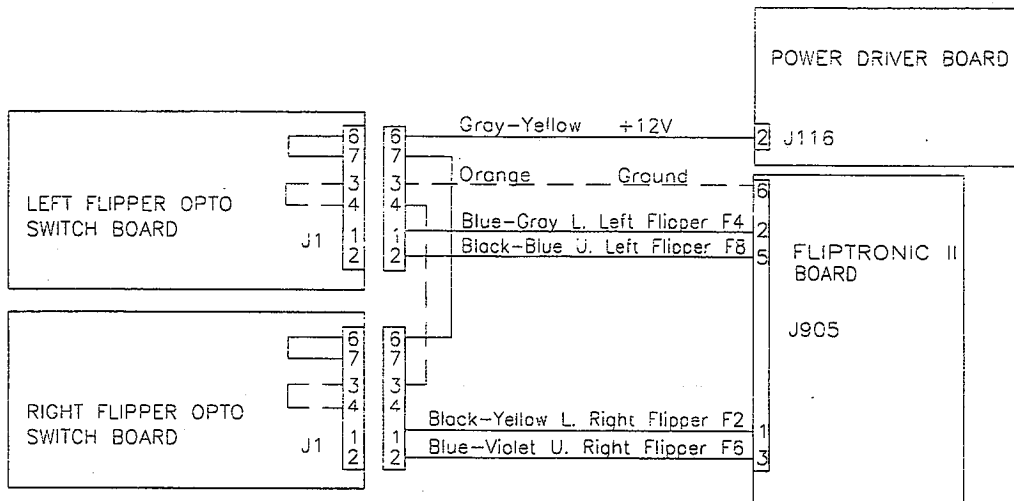
Flipper Cabinet Switches
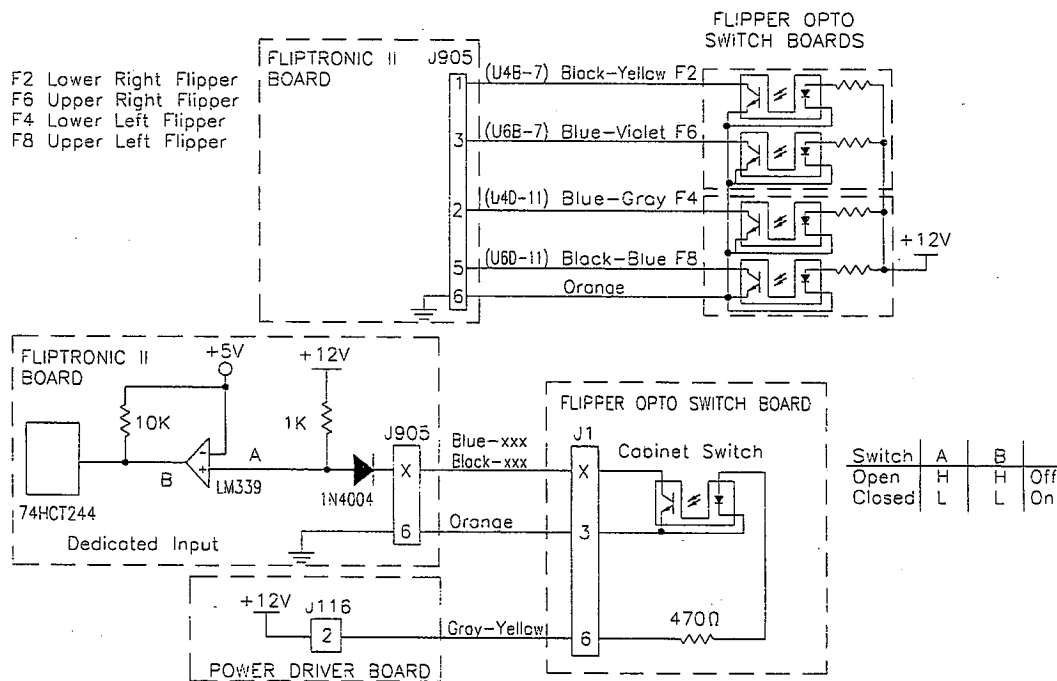
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

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TROUGH IRED LED P.C.B. ASSEMBLY
A-18617-1

J1-1 Not Used
J1-2 Not Used
J1-3 Gray-Green, from Opto SW10 Board J1-3
J1-4 Gray-Black, from Opto SW10 Board J1-4
J1-5 Gray-Orange, from Opto SW10 Board J1-5
J1-6 Gray-Red, from Opto SW10 Board J1-6
J1-7 Gray-Brown, from Opto SW10 Board J1-7
J1-8 Key
J1-9 Black, from Opto SW10 Board J1-10
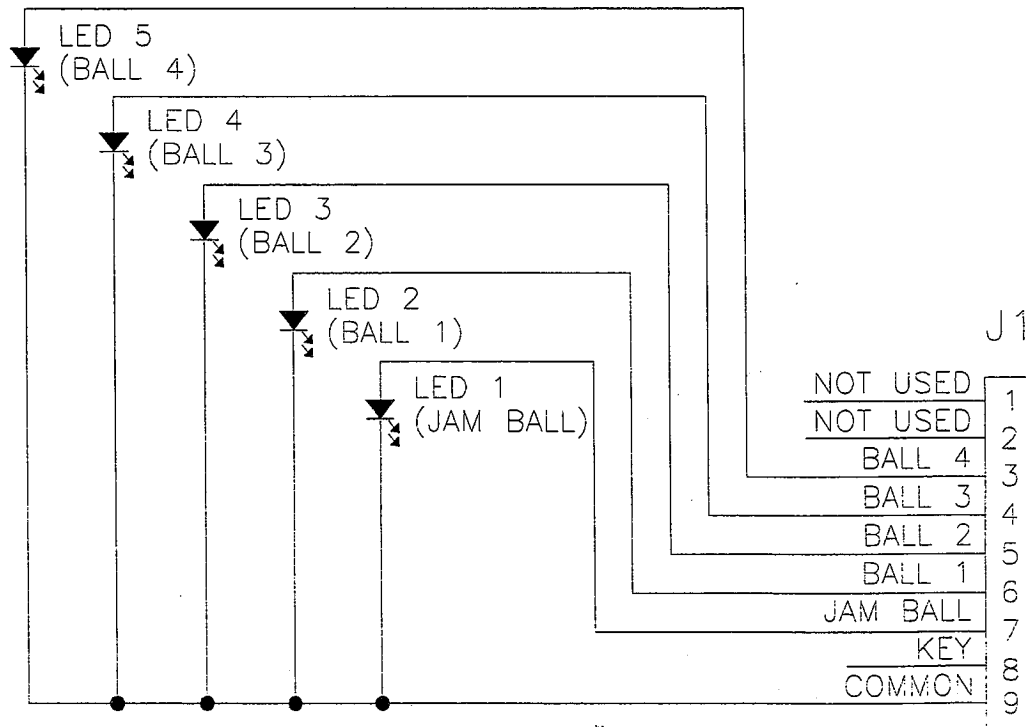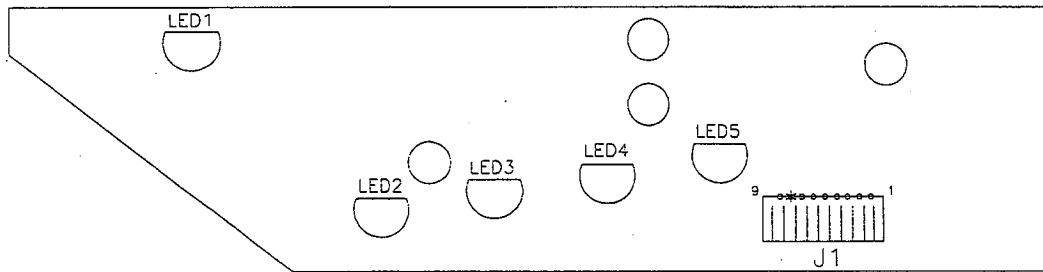
Trough 7 IRED Circuit

TROUGH IRED TRANSISTOR P.C.B. ASSEMBLY
A-18618-1

J1-1 Gray-Yellow, from Opto SW10 Board J2-9
J1-2 Key
J1-3 Orange-Brown, from Opto SW10 Board J2-8
J1-4 Orange-Red, from Opto SW10 Board J2-7
J1-5 Orange-Black, from Opto SW10 Board J2-5
J1-6 Orange-Yellow, from Opto SW10 Board J2-4
J1-7 Orange-Green, from Opto SW10 Board J2-3
J1-8 Not Used
J1-9 Not Used
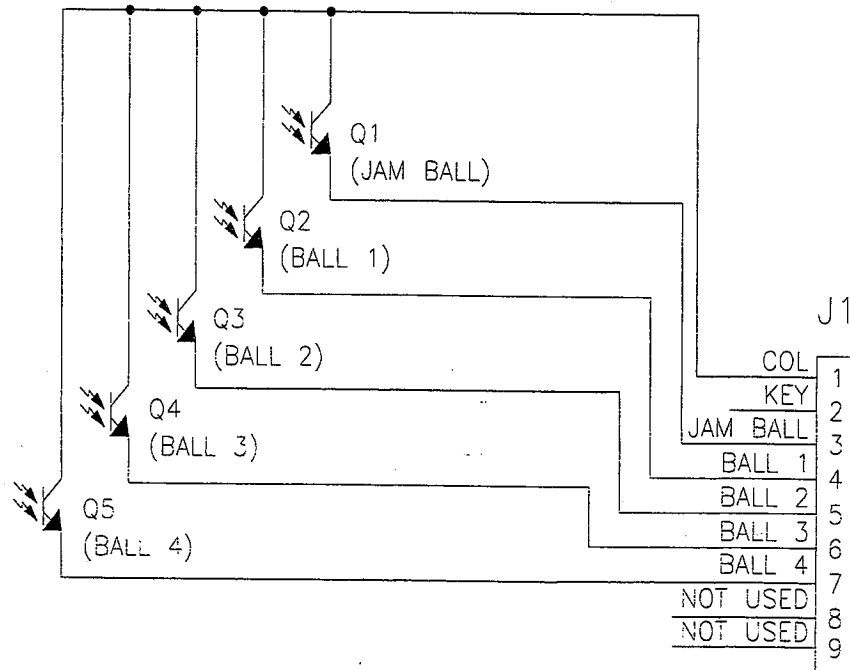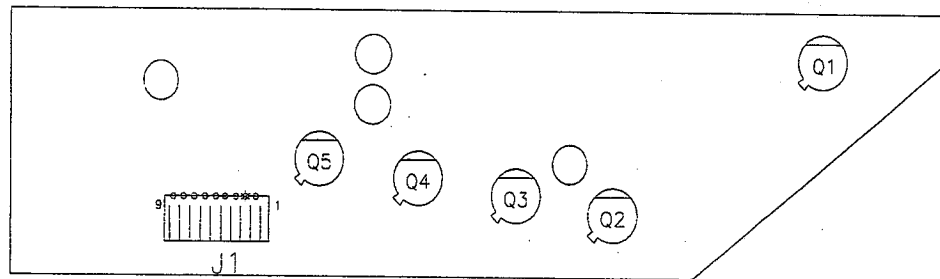
Trough 7 IR TSTR Circuit

MOTOR EMI P.C.B.
A-15542
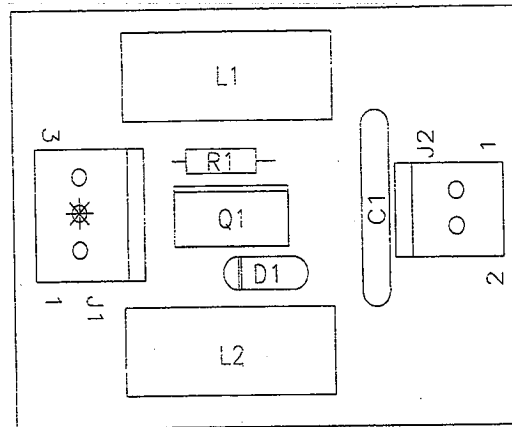
J1-1 Black-Red from J126-2
J1-2 Key
J1-3 Gray-Yellow +12VDC from J116-2

J2-1 Red +20VDC to motor (Sol 18)
J2-2 Black Ground to motor (Sol 18)
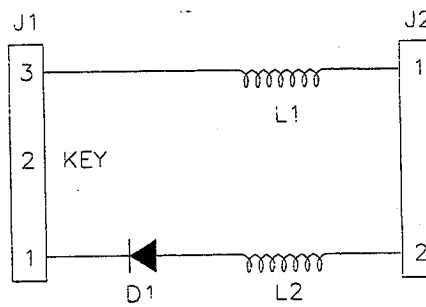
Schematic
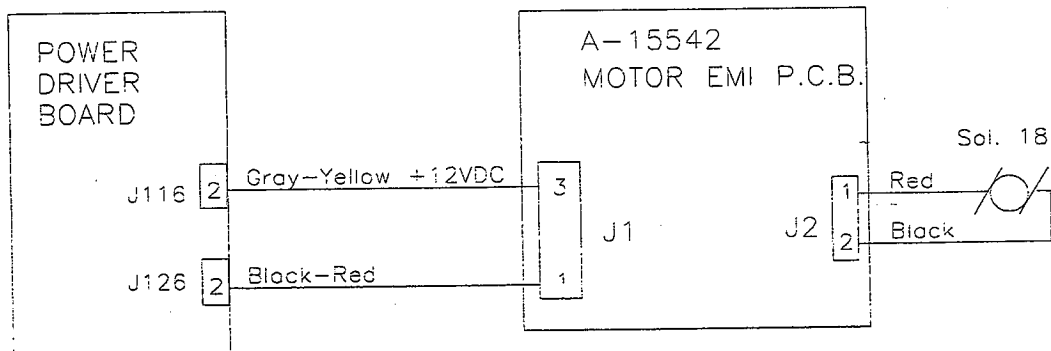
Circuit

MOTOR EMI W/DELAY P.C.B.
A-20189
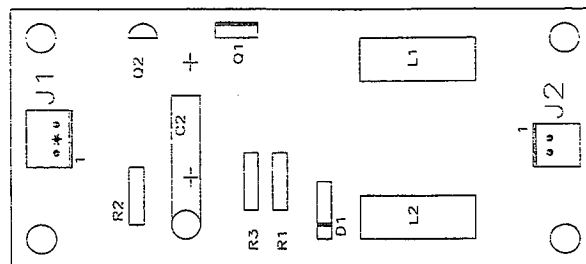
J1-1 Black-Brown from J126-1
J1-2 Key
J1-3 Gray-Yellow +12VDC from J116-2

J2-1 Red +20VDC to motor (Sol 17)
J2-2 Black Ground to motor (Sol 17)
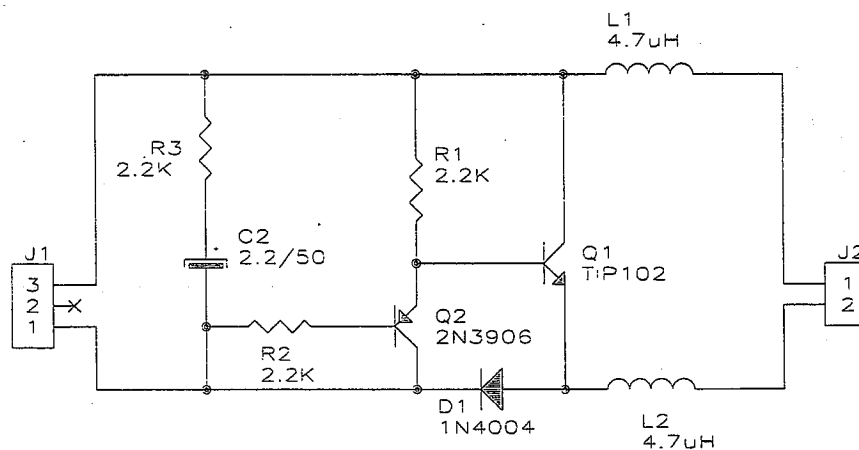
Schematic
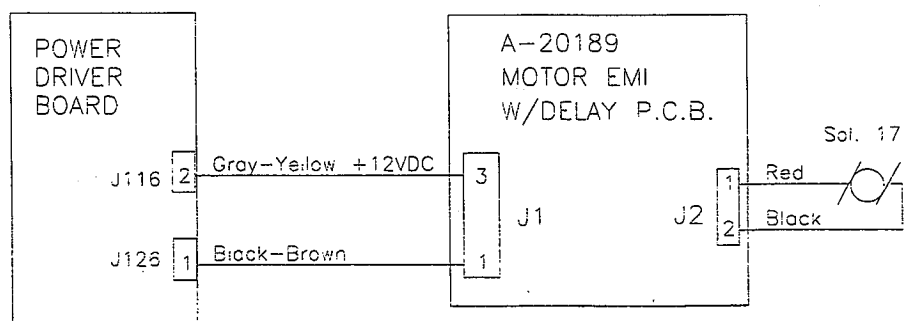
Circuit

10 OPTO P.C.B.
A-18159
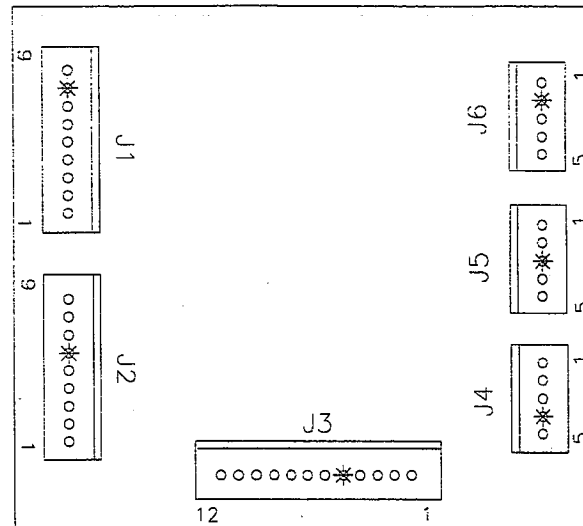
J1-1 Not Used
J1-2 Not Used
J1-3 Gray-Green to A-18617-1 (LED) J1-3 Sw #45
J1-4 Gray-Black to A-18617-1 (LED) J1-4 Sw #44
J1-5 Gray-Orange to A-18617-1 (LED) J1-5 Sw #43
J1-6 Gray-Red to A-18617-1 (LED) J1-6 Sw #42
J1-7 Gray-Brown to A-18617-1 (LED) J1-7 Sw #41
J1-8 Key
J1-9 Black Ground to A-18617-1 J1-9

J2-1 Not Used
J2-2 Not Used
J2-3 Orange-Green to A-18618-1 (Photo) J1-7 Sw #45
J2-4 Orange-Yellow to A-18618-1 (Photo) J1-6 Sw #44
J2-5 Orange-Black to A-18618-1 (Photo) J1-5 Sw #43
J2-6 Key
J2-7 Orange-Red to A-18618-1 (Photo) J1-4 Sw #42
J2-8 Orange-Brown to A-18618-1 (Photo) J1-3 Sw #41
J2-9 Gray-Yellow +12VDC to A-18618-1 (Photo) J1-1

J3-1 Black Ground from J116-3
J3-2 Gray-Yellow +12VDC from J116-2
J3-3 Green-Blue from J207-6
J3-4 Green-Yellow from J207-4
J3-5 Key
J3-6 Not Used
J3-7 Not Used
J3-8 White-Green from J209-5
J3-9 White-Yellow from J209-4
J3-10 White-Orange from J209-3
J3-11 White-Red from J209-2
J3-12 White-Brown from J209-1

J4-1 Gray-Orange to A-16908 (LED) Sw #63
J4-2 Not Used
J4-3 Not Used
J4-4 Key
J4-5 Orange-Black to A-16909 (Photo) Sw #63

J5-1 Gray-Red to A-16908 (LED) Sw #62
J5-2 Not Used
J5-3 Key
J5-4 Not Used
J5-5 Orange-Red to A-16909 (Photo) Sw #62

J6-1 Gray-Brown to A-16908 (LED) Sw #61
J6-2 Key
J6-3 Black Ground
J6-4 Gray-Yellow +12VDC
J6-5 Orange-Brown to A-16909 (Photo) Sw #61

10 OPTO P.C.B.
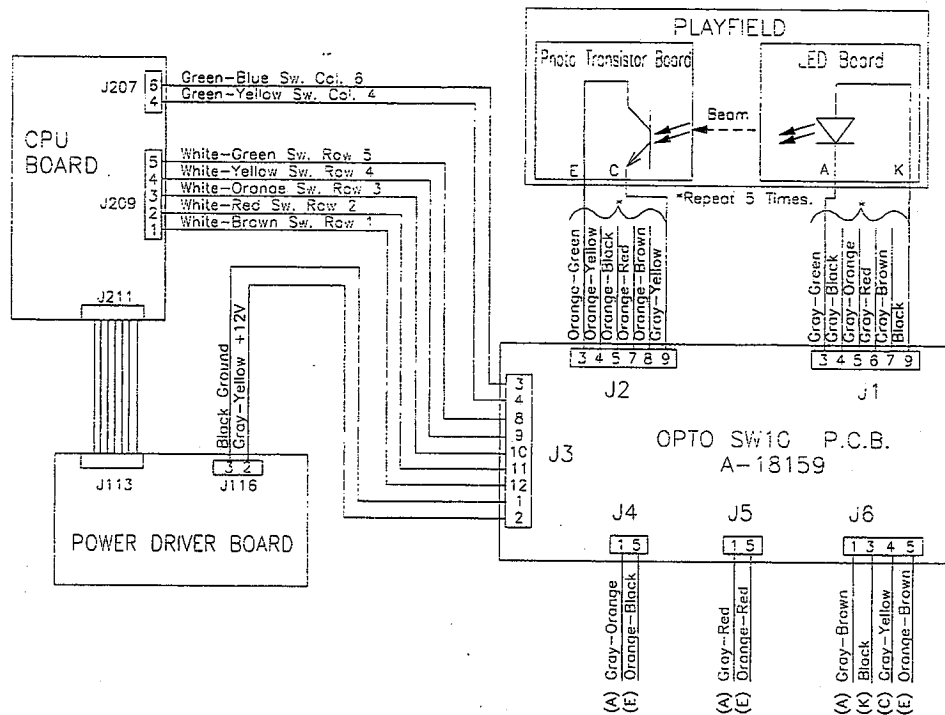
Circuit Diagram
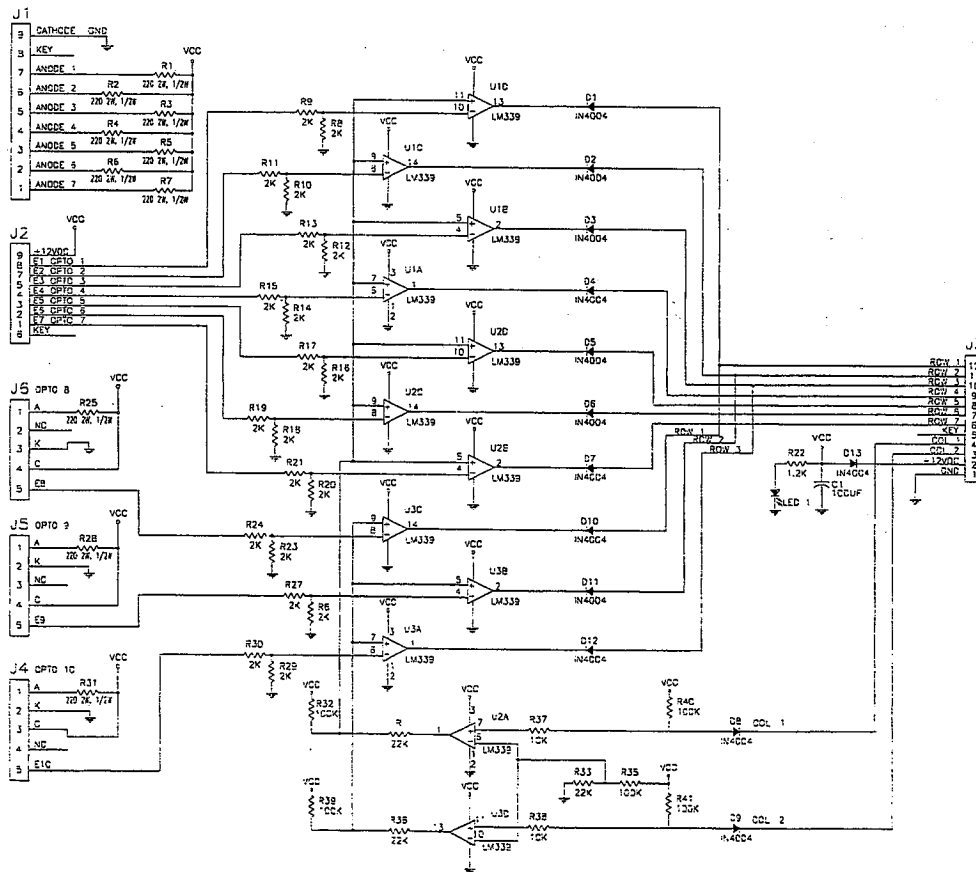
Schematic

4 LED ILLUMINATED TARGET P.C.B.
A-19823

Switch #56
J1-1 Gray-Yellow +12VDC from J116-2
J1-2 Black Ground from J116-3
J1-3 Key
J1-4 Green-Black from J207-5
J1-5 White-Blue from J209-7
J1-6 Yellow-Violet from J138-7
J1-7 Red-Brown from J135-1
J1-8 Red-Black from J135-2
J1-9 Red-Orange from J135-4
J1-10 Red-Yellow from J-135-5

Switch #57
J1-1 Gray-Yellow +12VDC from J116-2
J1-2 Black Ground from J116-3
J1-3 Key
J1-4 Green-Black from J207-5
J1-5 White-Violet from J209-8
J1-6 Yellow-Violet from J138-7
J1-7 Red-Green from J135-6
J1-8 Red-Blue from J135-7
J1-9 Red-Violet from J135-8
J1-10 Red-Gray from J-135-9

Switch #58
J1-1 Gray-Yellow +12VDC from J116-2
J1-2 Black Ground from J116-3
J1-3 Key
J1-4 Green-Black from J207-5
J1-5 White-Gray from J209-9
J1-6 Yellow-Gray from J138-9
J1-7 Red-Brown from J135-1
J1-8 Red-Black from J135-2
J1-9 Red-Orange from J135-4
J1-10 Red-Yellow from J-135-5
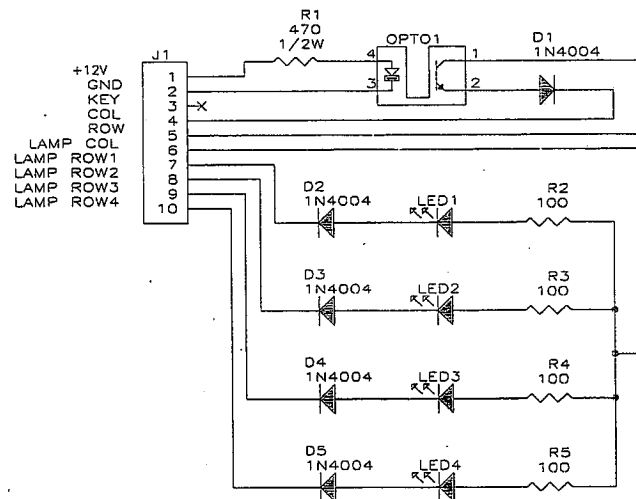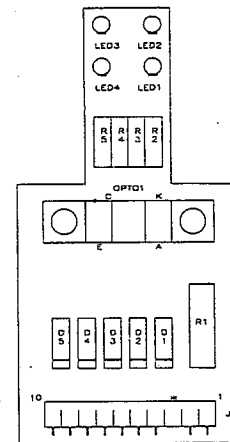
Schematic
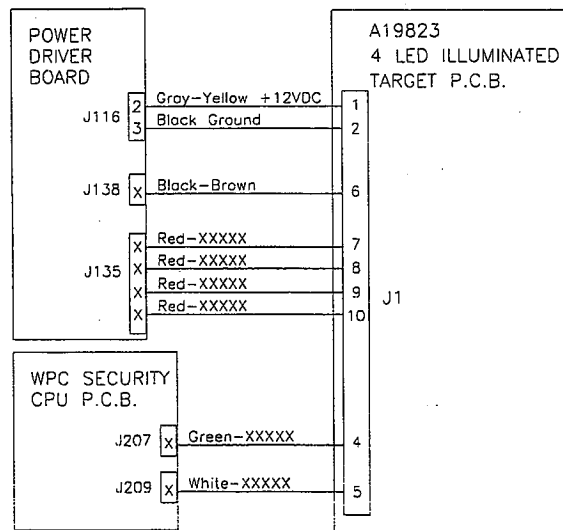
Circuit

Fliptronic II Board
A-15472-1
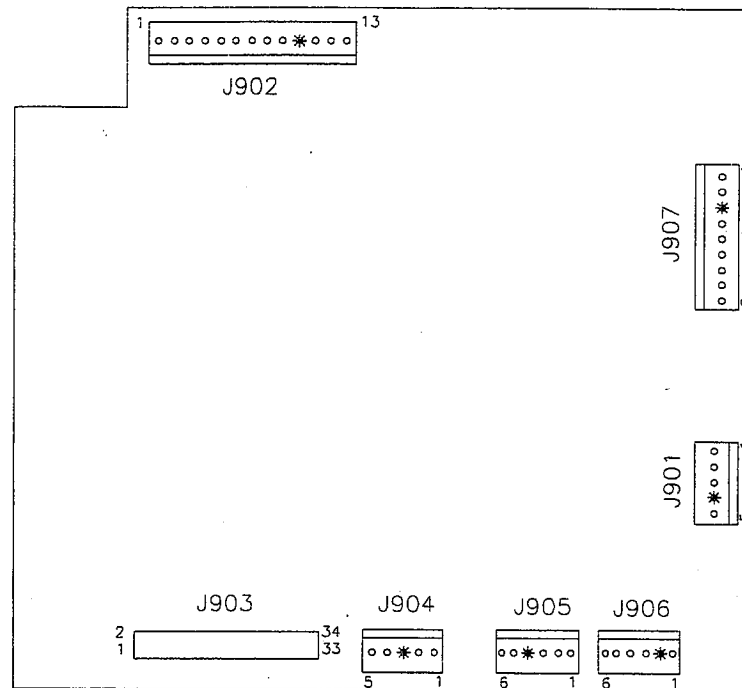
J901-1 White-Blue, 50VAC from J104-1
J901-2 White-Blue, loop from J901-1
J901-3 White-Blue, 50VAC from J104-2
J901-4 Key
J901-5 White-Blue, loop from J901-3

J902-1 Orange-Gray, Sol 36 to playfield coil
J902-2 Not Used
J902-3 Yellow-Gray, Sol 35 to playfield coil
J902-4 Orange-Violet, holding upper right flipper
J902-5 Not Used
J902-6 Yellow-Violet, power upper right flipper
J902-7 Orange-Blue, holding lower left flipper
J902-8 Not Used
J902-9 Yellow-Blue, power lower left flipper
J902-10 Key
J902-11 Orange-Green, holding lower right flipper
J902-12 Not Used
J902-13 Yellow-Green, power lower right flipper

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

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

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

J906-1 Black-Green, to lower right E.O.S. switch
J906-2 Key
J906-3 Black-Blue, to lower left E.O.S. switch
J906-4 Black-Violet, to upper right E.O.S. switch
J906-5 Not Used
J906-6 Orange, Switch Ground

J907-1 Red-Green, +50V to lower right flipper
J907-2 Red-Green, loop from J907-1
J907-3 Key
J907-4 Red-Blue, +50V to lower left flipper
J907-5 Red-Blue, loop from J907-4
J907-6 Red-Violet, +50V to upper right flipper
J907-7 Red-Violet, loop from J907-6
J907-8 Red-Gray, +50V to upper left flipper
J907-9 Red-Gray, loop from J907-8

Power Driver Board
A-12697-3
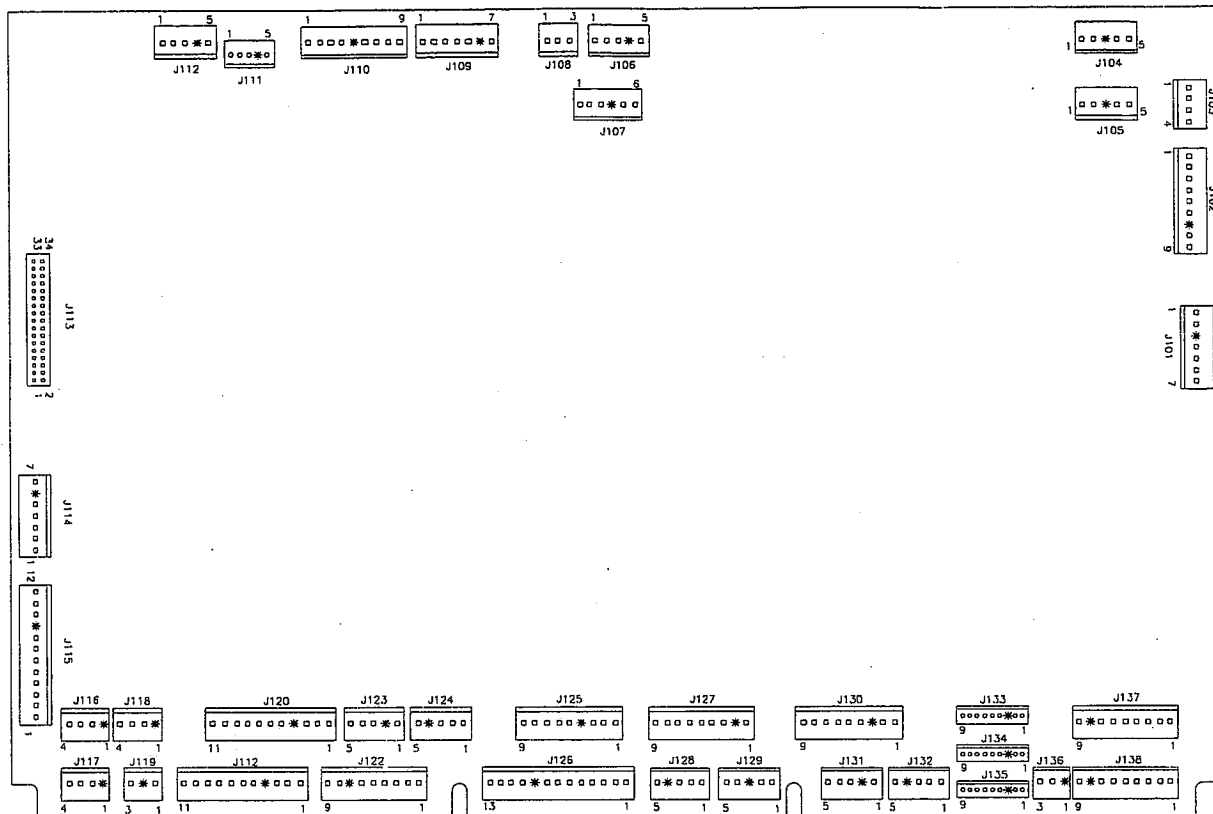
J101-1 Red 9VAC from xfrmr secondary
J101-2 Red 9VAC from xfrmr secondary
J101-3 Key
J101-4 Blue-White 13VAC from xfrmr secondary
J101-5 Blue-White loop from J101-4
J101-6 Blue-White 13VAC from xfrmr secondary
J101-7 Blue-White loop from J101-6

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

J103 Not Used

J104-1 White-Blue 50VAC to J901-1,2
J104-2 White-Blue 50VAC to J901-3,5
J104-3 Key
J104-4 Not Used
J104-5 Not Used

J105 Not Used

J106 Not Used

J107-1 Not Used
J107-2 Red-Brown 50V to playfield coils
J107-3 Red-Black 50V to playfield coils
J107-4 Key
J107-5 Not Used
J107-6 Red-White +20V to playfield flashlamps

J108 Not Used

J109 Not Used

J110 Not Used

J111 Not Used

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

J113 Ribbon Cable data to/from J211

J114-1 Gray-Green +12VDC to J210-7
J114-2 Gray-Green +12VDC to J904-2; J210-6
J114-3 Gray +5VDC to J3-3 Sound Bd; J210-5
J114-4 Gray +5VDC to J3-1 Sound Bd; J904-1; J210-4
J114-5 Black Ground to J3-5 Sound Bd; J904-5; J210-3
J114-6 Key
J114-7 Black Ground to J3-4 Sound Bd; J904-4; J210-1

J115-1 Yellow-White 6.8VAC from xfrmr secondary
J115-2 White-Brown 6.8VAC from xfrmr secondary
J115-3 White-Brown loop from J115-2
J115-4 White-Orange 6.8VAC from xfrmr secondary
J115-5 White-Yellow loop from J115-6
J115-6 White-Yellow 6.8VAC from xfrmr secondary
J115-7 Orange 6.8VAC from xfrmr secondary
J115-8 Orange 6.8VAC loop from J115-7
J115-9 Key
J115-10 Green 6.8VAC from xfrmr secondary
J115-11 Brown 6.8VAC from xfrmr secondary
J115-12 Brown 6.8VAC loop from J115-11

J116-1 Key
J116-2 Gray-Yellow +12VDC to playfield
J116-3 Black Ground
J116-4 Gray +5VDC to playfield

J117-1 Key
J117-2 Gray-Yellow +12VDC to J606-6,7
J117-3 Black Ground to J606-1,3
J117-4 Gray +5VDC to J606-4,5

J118-1 Key
J118-2 Gray-Yellow +12VDC to cabinet
J118-3 Black Ground
J118-4 Not Used

J119-1 White-Violet 6.8VAC G.I. to A-17051-1 J2-3
J119-2 Key
J119-3 Violet Return G.I. to A-17051-1 J2-5

J120-1 Brown Return G.I. to playfield
J120-2 Not Used
J120-3 Yellow Return G.I. to playfield
J120-4 Key
J120-5 Green Return G.I. to playfield
J120-6 Violet Return G.I. to playfield
J120-7 White-Brown 6.8VAC to playfield
J120-8 Not Used
J120-9 White-Yellow 6.8VAC to playfield
J120-10 White-Green 6.8VAC to playfield
J120-11 White-Violet 6.8VAC to playfield

J121-1 Brown Return G.I. to insert
J121-2 Orange Return G.I. to insert
J121-3 Yellow Return G.I. to insert
J121-4 Key
J121-5 Not Used
J121-6 Not Used
J121-7 White-Brown 6.8VAC to insert
J121-8 White-Orange 6.8VAC to insert
J121-9 White-Yellow 6.8VAC to insert
J121-10 Not Used
J121-11 Not Used

J122-1 Blue-Brown Sol 25 to playfield flashlamp
J122-2 Blue-Red Sol 26 to playfield flashlamps
J122-3 Blue-Orange Sol 27 to playfield flashlamps
J122-4 Blue-Yellow Sol 28 to playfield flashlamps
J122-5 Not Used
J122-6 Not Used
J122-7 Key
J122-8 Not Used
J122-9 Not Used

J123 Not Used

J124 Not Used

J125 Not Used

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

J127-1 Brown-Black Sol 9 to playfield coil
J127-2 Key
J127-3 Brown-Red Sol 10 to playfield coil
J127-4 Brown-Orange Sol 11 to playfield coil
J127-5 Brown-Yellow Sol 12 to playfield coil
J127-6 Brown-Green Sol 13 to playfield coil
J127-7 Brown-Blue Sol 14 to playfield flashlamps
J127-8 Brown-Violet Sol 15 to playfield flashlamps
J127-9 Brown-Gray Sol 16 to playfield flashlamps

J128 Not Used

J129 Not Used

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

J131 Not Used

J132 Not Used

J133 Not Used

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

J135-1 Red-Brown Row 1 to playfield lamps
J135-2 Red-Black Row 2 to playfield lamps
J135-3 Key
J135-4 Red-Orange Row 3 to playfield lamps
J135-5 Red-Yellow Row 4 to playfield lamps
J135-6 Red-Green Row 5 to playfield lamps
J135-7 Red-Blue Row 6 to playfield lamps
J135-8 Red-Violet Row 7 to playfield lamps
J135-9 Red-Gray Row 8 to playfield lamps

J136-1 Key
J136-2 Not Used
J136-3 Yellow-Gray Col 8 to insert lamps

J137 Not Used

J138-1 Yellow-Brown Col 1 to playfield lamps
J138-2 Yellow-Red Col 2 to playfield lamps
J138-3 Yellow-Orange Col 3 to playfield lamps
J138-4 Yellow-Black Col 4 to playfield lamps
J138-5 Yellow-Green Col 5 to playfield lamps
J138-6 Yellow-Blue Col 6 to playfield lamps
J138-7 Yellow-Violet Col 7 to playfield lamps
J138-8 Key
J138-9 Yellow-Gray Col 8 to playfield lamps

WPC Security CPU Board
A-17651-50026
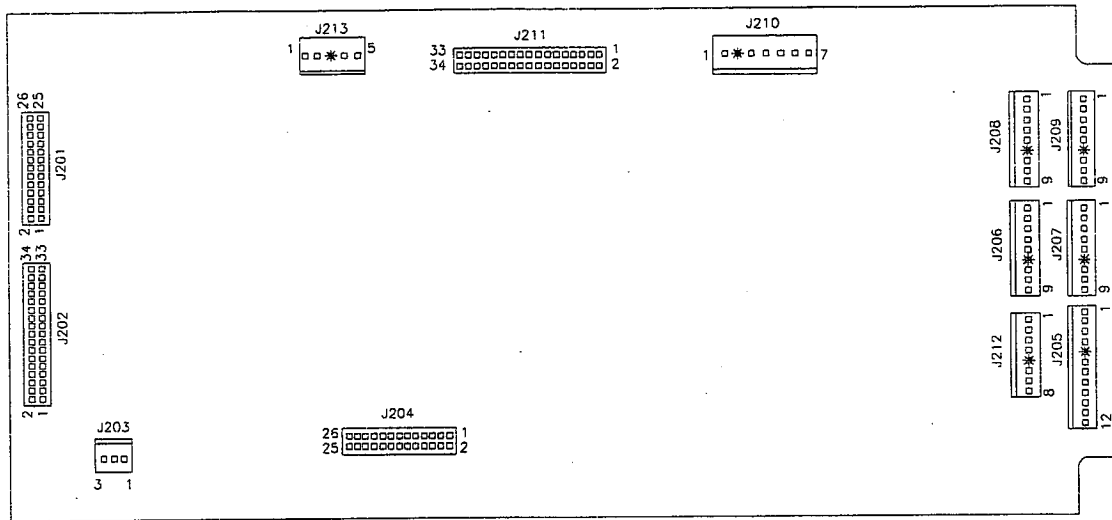
J201 Ribbon Cable data to J602

J202 Ribbon Cable data to J903; J506; J601

J203 Not Used

J204 Ribbon Cable data to A-16100 J1

J205-1 Orange-Brown Dir Sw 1, Left Coin to J1-14
J205-2 Orange-Red Dir Sw 2, Center Coin to J1-13
J205-3 Orange-Black Dir Sw 3, Right Coin to J1-12
J205-4 Orange-Yellow Dir Sw 4, 4th Coin to J1-17
J205-5 Key
J205-6 Orange-Green Dir Sw 5, Escape/Service to J1-11
J205-7 Orange-Blue Dir Sw 6, Down/Vol Down to J1-10
J205-8 Orange-Violet Dir Sw 7, Up/Vol Up to J1-9
J205-9 Orange-Gray Dir Sw 8, Enter/Test to J1-8
J205-10 Black ground to J1-15
J205-11 Not Used
J205-12 Orange-White Enable to J1-18

J206 Not Used

J207-1 Green-Brown Sw Col 1 to playfield switches
J207-2 Green-Red Sw Col 2 to playfield 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 Key
J207-9 Not Used
J207-10 Not Used
J207-11 Not Used

J208 Not Used

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 Key
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 ground from J904-4;J3-4 Sound Bd; J114-7
J210-2 Key
J210-3 Black ground from J904-4; J3-5 Sound Bd; J114-5
J210-4 Gray +5VDC from J901-1; J3-1 Sound Bd; J114-4
J210-5 Gray +5VDC from J3-3 Sound Bd; J114-3
J210-6 Gray-Green +12VDC from J904-2; J114-2
J210-7 Gray-Green +12VDC from J114-1

J211 Ribbon Cable data from J113

J212-1 Green-Brown Sw Col 1 to J1-1
J212-2 Green-Red Sw Col 2 to J1-7
J212-3 Not Used
J212-4 White-Brown Sw Row 1 to J1-6
J212-5 Key
J212-6 White-Red Sw Row 2 to J1-5
J212-7 White-Orange Sw Row 3 to J1-4
J212-8 White-Yellow Sw Row 4 to J1-3

J213-1 Black to battery holder J1-1
J213-2 Black to battery holder J1-2
J213-3 Key
J213-4 Gray to battery holder J1-4
J213-5 Gray to battery holder J1-5

Sound Board
A-16917-50026
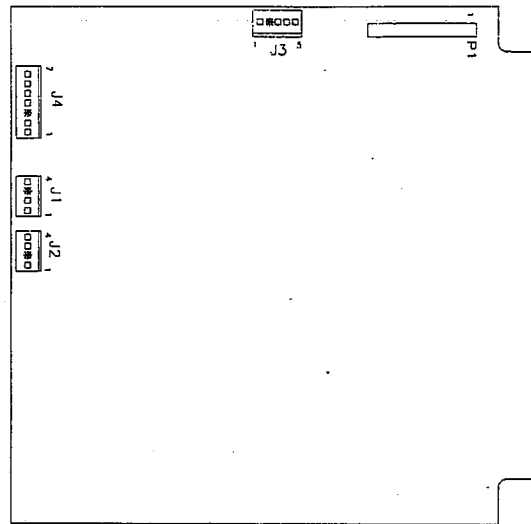
P1 34-pin Ribbon Cable data to/from J601; J903; J202

J1-1 Black-Yellow signal to cabinet speaker
J1-2 Not Used
J1-3 Key
J1-4 Black ground

J2-1 Black-Yellow signal to display panel speakers
J2-2 Key
J2-3 Not Used
J2-4 Black ground

J3-1 Gray +5V from J114-4; J904-1; J210-4
J3-2 Key
J3-3 Gray +5V from J114-3; J210-5
J3-4 Black ground from J114-7; J904-4; J210-1
J3-5 Black ground from J114-5; J904-5; J210-3

J4-1 Gray-Green 18VAC from xfrmr secondary
J4-2 Gray-Green 18VAC loop from J4-1
J4-3 Key
J4-4 Gray 18VAC from xfrmr secondary
J4-5 Gray 18VAC loop from J4-4
J4-6 Gray-White 18VAC from xfrmr secondary
J4-7 Gray-White loop from J4-6
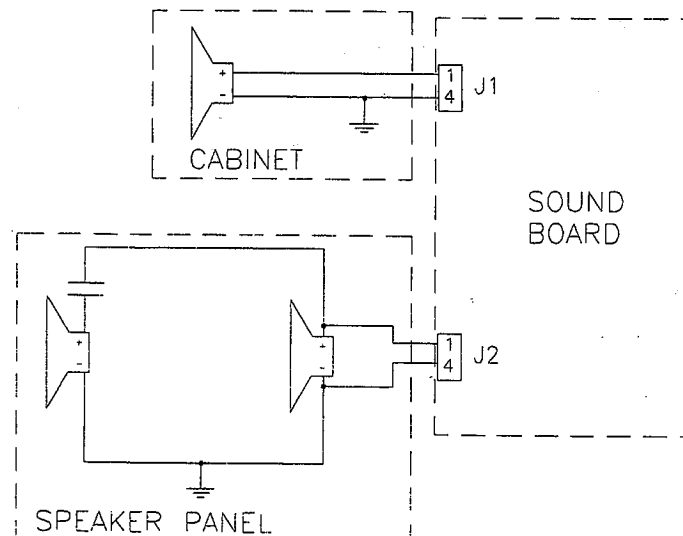
Speaker Wiring Diagram

Dot Matrix Controller Board
A-14039.1
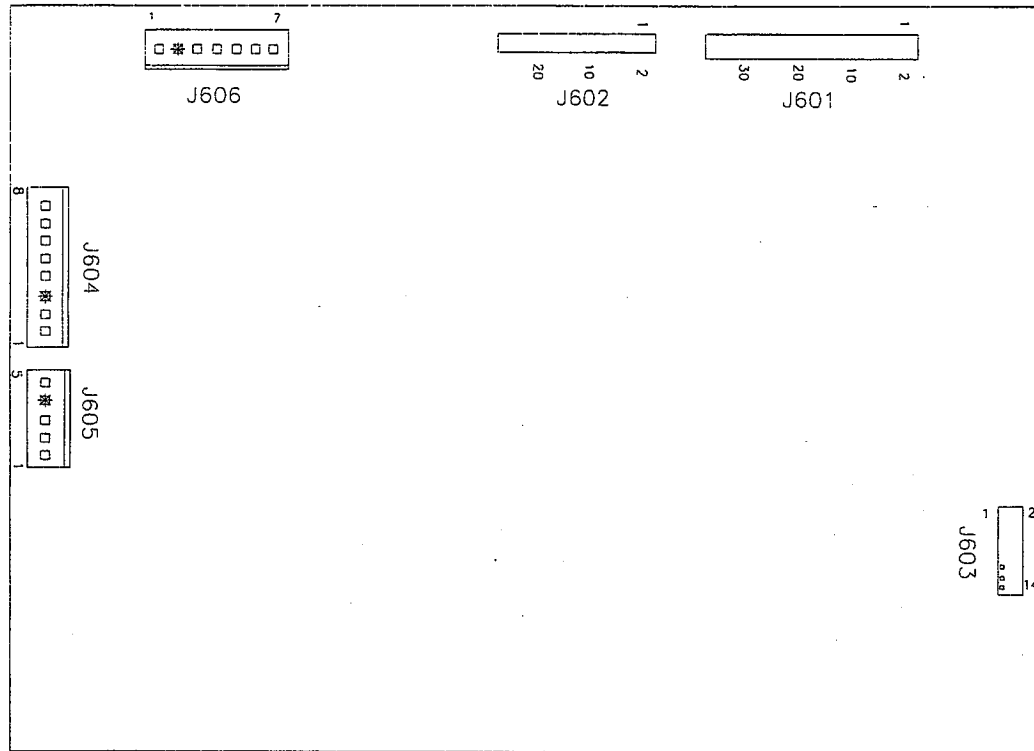
J601 Ribbon Cable data to/from J202; J903; Dot Matrix Display/Driver P1

J601 Ribbon Cable data from J201

J603 Ribbon Cable data to Dot Matrix Display/Driver

J604-1 Orange -125V to Dot Matrix Display/Driver Pin 1
J604-2 Blue -113V to Dot Matrix Display/Driver Pin 2
J604-3 Key
J604-4 Black ground to Dot Matrix Display/Driver Pin 4
J604-5 Black ground to Dot Matrix Display/Driver Pin 5
J604-6 Gray +5V to Dot Matrix Display/Driver Pin 6
J604-7 Gray-Yellow +12V Dot Matrix Display/Driver Pin 7
J604-8 Brown +62 to Dot Matrix Display/Driver Pin 8

J605-1 White 80VAC from xfrmr secondary
J605-2 White 80VAC from xfrmr secondary
J605-3 Violet 100VAC from xfrmr secondary
J605-4 Key
J605-5 Violet 100VAC from xfrmr secondary

J606-1 Black ground loop from J606-3
J606-2 Key
J606-3 Black ground from J117-3
J606-4 Gray +5V loop from J606-5
J606-5 +5V from J117-4
J606-6 Gray-Yellow +12V loop from J606-7
J606-7 Gray-Yellow +12V from J117-2

Coin Door Interface P.C.B. Assembly
A-17051-1
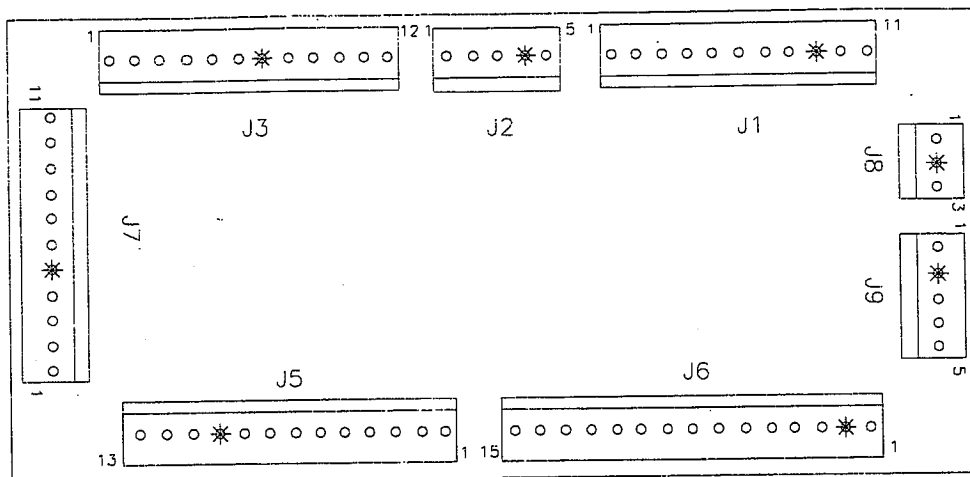
J1-1 Orange-Gray dedicated row 8 from J205-9
J1-2 Orange-Violet dedicated row 7 from J205-8
J1-3 Orange-Blue dedicated row 6 from J205-7
J1-4 Orange-Green dedicated row 5 from J205-6
J1-5 Orange-Yellow dedicated row 4 from J205-4
J1-6 Orange-Black dedicated row 3 from J205-3
J1-7 Orange-Red dedicated row 2 from J205-2
J1-8 Orange-Brown dedicated row 1 from J205-1
J1-9 Key
J1-10 Black ground from J205-10
J1-11 Orange-White switch enable from J205-12

J2-1 Black ground from J116-3
J2-2 Gray-Yellow +12VAC from J116-2
J2-3 White-Violet G.I. 6.8VAC from J119-1
J2-4 Key
J2-5 Violet G.I. from J119-3

J3-1 Green-Brown switch column 1 from J212-1
J3-2 Green-Red switch column 2 from J212-2
J3-3 White-Brown switch row 1 from J212-4
J3-4 White-Red switch row 2 from J212-6
J3-5 White-Orange switch row 3 from J212-7
J3-6 White-Yellow switch row 4 from J212-8
J3-7 Key
J3-8 Yellow-Gray lamp column 8 from J136-3
J3-9 Red-Blue lamp row 6 from J134-7
J3-10 Red-Violet lamp row 7 from J134-8
J3-11 Red-Gray lamp row 8 from J134-9
J3-12 Not Used

J4 Not Used

J5-1 Violet G.I. return to coin door
J5-2 White-Violet G.I. 6.8VAC to coin door
J5-3 Black ground to coin door
J5-4 Orange-Brown dedicated switch row 1 to coin door
J5-5 Orange-Red dedicated switch row 2 to coin door
J5-6 Orange-Black dedicated switch row 3 to coin door
J5-7 Orange-Green dedicated switch row 5 to coin door
J5-8 Orange-Blue dedicated switch row 6 to coin door
J5-9 Orange-Violet dedicated switch row 7 to coin door
J5-10 Key
J5-11 Orange-Gray dedicated switch row 8 to coin door
J5-12 Green-Red switch column 2 to coin door Slam Tilt
J5-13 White-Brown switch row 1 to coin door Slam Tilt

J6 Not Used

J7-1 Yellow-Gray lamp column 8 to cabinet
J7-2 Red-Blue lamp row 6 to cabinet
J7-3 Red-Violet lamp row 7 to cabinet
J7-4 Red-Gray lamp row 8 to cabinet
J7-5 Key
J7-6 Green-Brown switch column 1 to cabinet
J7-7 Green-Red switch column 2 to cabinet
J7-8 White-Orange switch row 3 to cabinet
J7-9 Not Used
J7-10 White-Brown switch row 1 to cabinet
J7-11 White-Orange switch row 3 to cabinet

J8-1 White switch row to cabinet Slam Tilt
J8-2 Key
J8-3 Green switch column to cabinet Slam Tilt

J9-1 White-Yellow switch row 4 to Plumb Bob Tilt
J9-2 Key
J9-3 Green-Brown switch column 1 to Plumb Bob Tilt
J9-4 White-Red switch row 2 to Interlock Switch
J9-5 Green-Red switch column 2 to Interlock Switch

Coin Door Interface P.C.B. Schematic

NOTES

LAMP MATRIX

Yellow (B+) —— Red

Column / Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-9 Q91
1 Red-Brown J133-1 Q90	LEFT LANE 11	TURBO LOCK 1 21	HIT THE "WALL" 31	SUPER JETS 41	DUELING DRIVERS 51	CHANGE SETUP 61	LIGHTUP 1 LOWER RIGHT 71	LIGHTUP 3 LOWER RIGHT 81
2 Red-Black J133-2 Q89	CENTER LANE 12	TURBO LOCK 2 22	HIT "THE" WALL 32	TURBO BOOST 42	SUPER LIGHTUPS 52	AWARD SPEEDWAY 2	LIGHTUP 1 UPPER RIGHT 72	LIGHTUP 3 UPPER RIGHT 82
3 Red-Orange J133-4 Q88	RIGHT LANE 13	TURBO LOCK 3 23	"HIT" THE WALL 33	CHECKERED FLAG 43	CAUTION FLAG 53	HIT THE WALL 63	LIGHTUP 1 UPPER LEFT 73	LIGHTUP 3 UPPER LEFT 83
4 Red-Yellow J133-5 Q87	UPPER EJECT TOP 14	LIGHT LOCK LAMP 24	LEFT RAMP JACKPOT 34	GO FOR THE POLE 44	EXTRA BALL FLAG 54	RIGHT RAMP JACKPOT 64	LIGHTUP 1 LOWER LEFT 74	LIGHTUP 3 LOWER LEFT 84
5 Red-Green J133-6 Q86	JET WRENCH 15	LIGHT SPEEDWAY 25	INCREASE BOOST 35	QUICK PIT 45	WRONG TURN 55	PIT STOP 65	LIGHTUP 2 LOWER RIGHT 75	NOT USED 85
6 Red-Blue J133-7 Q85	EXTRA BALL 16	"PASS" 26	SOUVENIR LAMP 36	3X PLAYFIELD 46	GASOLINE ALLEY 56	FAST LAPS 66	LIGHTUP 2 UPPER RIGHT 76	LAUNCH BUTTON 86
7 Red-Violet J133-8 Q84	VICTORY LAP 17	LEFT RAMP WRENCH 27	LEFT FLIPPER LANE 37	UPPER RIGHT FLIPPER WRENCH 47	RIGHT OUTLANE 57	NOT USED 67	LIGHTUP 2 UPPER LEFT 77	BUY-IN BUTTON 87
8 Red-Gray J133-9 Q83	TURBO WRENCH 18	LEFT RAMP STANDUP 28	LEFT OUTLANE 38	RIGHT FLIPPER LANE 48	SHOOT AGAIN 58	NOT USED 68	LIGHTUP 2 LOWER LEFT 78	START BUTTON 88

J1XX = Power Driver Board

SWITCH MATRIX

White ——/ o—— Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-9 U20-11	Flipper Grounded Switches
Orange-Brown (1) J205-1 — Left Coin Chute D1	1 White-Brown J209-1 U18-11	BALL LAUNCH 11	SLAM TILT 21	THREE BANK CENTER 31	TOP TROUGH 41	LEFT LANE 51	UPPER POPPER 61	NOT USED 71	NOT USED 81	Black-Green J906-1 Right Flipper EOS F1
Orange-Red (2) J205-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	NOT USED 12	COIN DOOR CLOSED 22	THREE BANK LOWER 32	TROUGH 1 (RIGHT) 42	CENTER LANE 52	TURBO POPPER 62	LEFT JET 72	NOT USED 82	Black-Violet J905-1 Right Flipper Opto F2
Orange-Black (3) J205-3 — Right Coin Chute D3	3 White-Orange J209-3 U18-5	START BUTTON 13	BUY-IN BUTTON 23	NOT USED 33	TROUGH 2 43	RIGHT LANE 53	TURBO BALL SENSE 63	RIGHT JET 73	NOT USED 83	Black-Blue J906-3 Left Flipper EOS F3
Orange-Yellow (4) J205-4 — 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	RIGHT FLIPPER WRENCH 34	TROUGH 3 44	TEN POINT 54	UPPER EJECT 64	CENTER JET 74	NOT USED 84	Black-Gray J905-2 Left Flipper Opto F4
Orange-Green (5) J205-6 Normal Function Ser Credits | Test Function Esc D5	5 White-Green J209-5 U19-11	LEFT OUTLANE 15	SHOOTER LANE 25	LEFT RAMP ENTER 35	TROUGH 4 (LEFT) 45	LEFT RAMP WRENCH 55	LOWER KICKER 65	RIGHT RAMP ENTER 75	NOT USED 85	Black-Violet J906-4 Upper Right Flipper EOS F5
Orange-Blue (6) J205-7 Normal Function Vol Down | Test Function Down D6	6 White-Blue J209-7 U19-9	LEFT FLIPPER LANE 16	LEFT SLING-SHOT 26	LEFT RAMP MADE 36	LEFT RAMP STANDUP 46	LEFT LIGHTUP 56	TURBO INDEX 66	RIGHT RAMP MADE 76	NOT USED 86	Black-Yellow J905-3 Upper Right Flipper Opto F6
Orange-Violet (7) J205-8 Normal Function Vol Up | Test Function Up D7	7 White-Violet J209-8 U19-5	RIGHT FLIPPER LANE 17	RIGHT SLING-SHOT 27	LEFT LOOP 37	TURBO WRENCH 47	CENTER LIGHTUP 57	NOT USED 67	NOT USED 77	NOT USED 87	Black-Gray J906-5 Upper Left Flipper EOS F7 (NOT USED)
Orange-Gray (8) J205-9 Normal Function Begin Test | Test Function Enter D8	8 White-Gray J209-9 U19-7	RIGHT OUTLANE 18	THREE BANK UPPER 28	RIGHT LOOP 38	JET BUMPER WRENCH 48	RIGHT LIGHTUP 58	NOT USED 68	NOT USED 78	NOT USED 88	Black-Blue J905-5 Upper Left Flipper Opto F8 (NOT USED)

J2XX = CPU Board; J9XX = Fliptronic II Board; ☐ = Opto, Typically Closed

CAUTION: Transport this game ONLY with hinged backbox DOWN!