

Bally[®]

MAY 1994
16-50031-101

WORLD CUP **SOCCER**



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Operations Manual Includes:

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

Midway Manufacturing Company, 3401 North California Avenue, Chicago, Illinois 60618

DIP SWITCH SETTINGS

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

Country	SW4	SW5	SW6	SW7	SW8
America	On	On	On	On	On
European	On	On	Off	On	On
French	On	On	On	Off	Off
German	On	On	On	On	Off
Spain	On	Off	On	On	On

SOLENOID / FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive xister	Drive Connections			Drive Wire Color	Solenoid Part Number Flashlamp Type		
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox	
01	Goal Popper	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-23-800		
02	TV Popper	High Power	J107-2			Q80	J130-2			Vio-Red	AE-26-1500		
03	Kickback	High Power	J107-2			Q78	J130-4			Vio-Org	AE-23-800		
04	Lock Release	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1500		
05	Upper Eject Hole	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-26-1200		
06	Trough	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-26-1500		
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800	
08	Ramp Diverter	High Power	J107-2			Q70	J130-9			Vio-Gry	FL-11753-1		
09	Left Jet Bumper	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200		
10	Upper Jet Bumper	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200		
11	Lower Jet Bumper	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200		
12	Left Slingshot	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200		
13	Right Slingshot	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200		
14	Right Eject Hole	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1200		
15	Left Eject Hole	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200		
16	Diverter Hold	Low Power	J107-2			Q44	J127-9			Brn-Gry	FL-11753-1		
17	Goal Cage Top	Flasher	J107-6	J106-5		Q42	J126-1	J125-1		Blk-Brn	#906	#906	
18	Goal	Flasher	J107-6	J106-5		Q40	J126-2	J125-2		Blk-Red	#89, #906	#906	
19	Skill Shot	Flasher	J107-6	J106-5		Q38	J126-3	J125-3		Blk-Org	#906	#906	
20	Jet Bumpers	Flasher	J107-6	J106-5		Q36	J126-4	J125-4		Blk-Yel	#89	#906	
21	Goalie Drive	Flasher	J116-2			Q28	J126-5			Blu-Grn	14-7997 *		
22	Spinning Ball	Flasher	J107-6			Q30	J126-6			Blu-Blk	#89 (2)		
23	Ball Clockwise	Flasher	J116-2			Q34	J126-7			Blu-Vio	14-7996 *		
24	Ball Counter-Clockwise	Flasher	J116-2			Q32	J126-8			Blu-Gry	14-7996 *		
25	Left Ramp Entrance	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#89	#906	
26	Lock Area	Gen. Purpose	J107-6	J106-5		Q24	J122-2	J124-2		Blu-Red	#906	#906	
27	Flipper Lanes	Gen. Purpose	J107-6	J106-5		Q22	J122-3	J124-3		Blu-Org	#89 (2)	#906	
28	Ramp Rear	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-4		Blu-Yel	#906 (2)	#906	
33	Magna Goalie	High Power	J907-6,7			Q2	J902-6			Yel-Vio	20-9247		
34	Loop Gate	Low Power	J907-6,7			Q7	J902-4			Org-Vio	A-14406		
35	Lock Magnet	High Power	J907-8,9			Q1	J902-3			Yel-Gry	20-9247		
General Illumination													
01	Playfield Left	G.I.	J121-1			Q18	J121-7			Wht-Brn	#44, #555		
02	Playfield Right	G.I.	J121-2			Q10	J121-8			Wht-Org	#44, #555		
03	Insert Background	G.I.		J120-3		Q14		J120-9		Wht-Yel		#555	
04	Insert Title	G.I.		J120-5		Q16		J120-10		Wht-Grn		#555	
05	Playfield Top	G.I.	J121-6			Q12	J121-11			Wht-Vio	#555		
Flipper Circuits													
	Function	Solenoid Type	Voltage Connections			Drive Transistors		Drive Connections		Drive Wire Colors		Coil Part Number	Coil Color
			Playfield	Backbox	Cabinet	Power	Hold	Playfield	Backbox	Power	Hold		
	Lower Left Flipper	High Power	Lwr. Lt. Power	J907-4 (Red-Blu)		Q3		J902-9		Yel-Blu	FL-11629	BLUE	
			Lwr. Lt. Hold	J907-4 (Red-Blu)		Q9		J902-7		Org-Blu			
	Lower Right Flipper	High Power	Lwr. Rt. Power	J907-1 (Red-Grn)		Q4		J902-13		Yel-Grn	FL-11629	BLUE	
			Lwr. Rt. Hold	J907-1 (Red-Grn)		Q11		J902-11		Org-Grn			
	Upper Left Flipper	High Power	Up Lt. Power	J907-8 (Red-Gry)		Q1		J902-3		Yel-Gry	Not Used		
			Up Lt. Hold	J907-8 (Red-Gry)		Q5		J902-1		Org-Gry			
	Upper Right Flipper	High Power	Up Rt. Power	J907-6 (Red-Vio)		Q2		J902-6		Yel-Vio	Not Used		
			Up Rt. Hold	J907-6 (Red-Vio)		Q7		J902-4		Org-Vio			

* +12VDC J1XX = Power Driver Board; J9XX - Fliptronic II Board; 24-6549 = #44 Bulb; 24-8704 = #89 Bulb; 24-8768 = #555 Bulb; 24-8802 = #906 Bulb

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 World Cup Soccer 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.

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 opened. A new interlock switch assembly (part no. A-18249-1), located at the left of the coin door opening, has been added to this 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 opened, this 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 opened, 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.

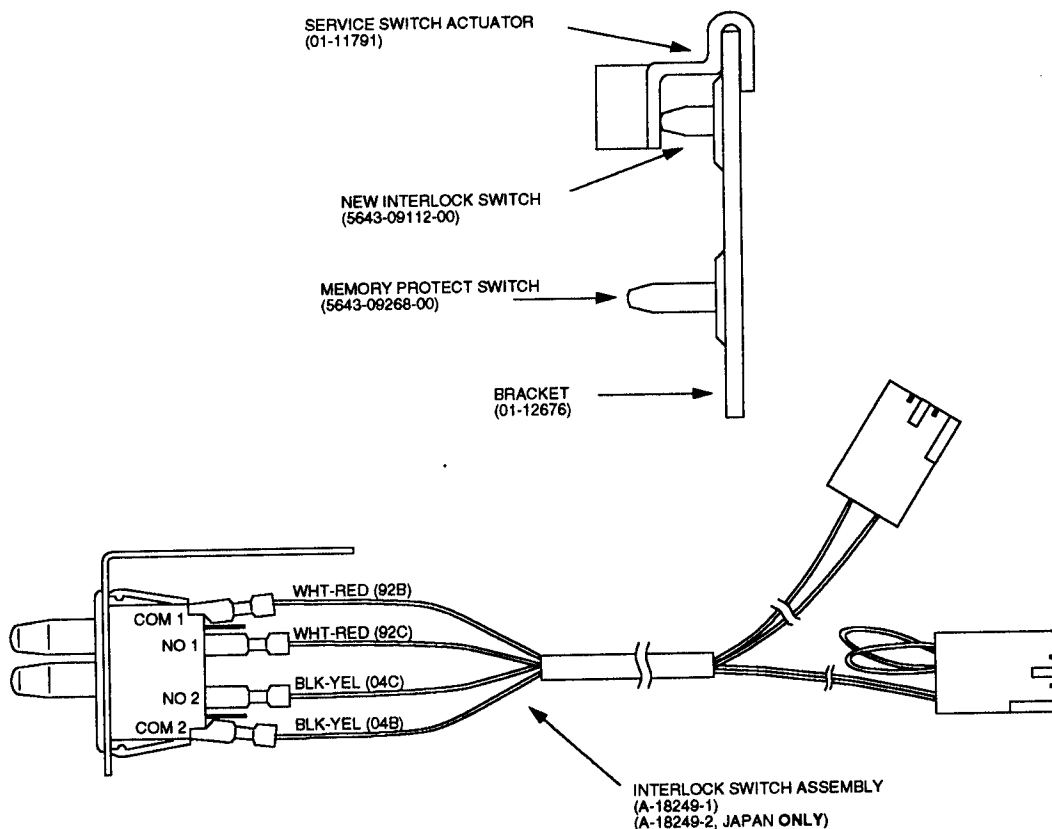


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WORLD CUP SOCCER

Midway Manufacturing Company reserves the rights to make modifications and improvements to its products.

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

Bally's
WORLD CUP Soccer '94 Pinball

Game Rules and Playfield Shot Maps

GAME RULES

Skill Shot

Shoot each of the 3 blinking lanes in the Coin Toss unit. The 1st lane hit is worth 5 Million. The 2nd lane hit is worth 10 Million. Hitting the 3rd lane awards 30 Million points and advances "1 City". See City Award for more information.

Goal / Ultras / TV

Shoot the Goal whenever the Soccer Ball is spinning. Goals score 10 Million points and award one of the four "Ultra" features.

Each "Ultra" feature stays lit until the end of the current ball, or until 30 Million points have been accumulated at which time a 10 Million point bonus is awarded and the feature is turned off.

Ultra Jets:	Each jet bumper hit is worth 2 Million.
Ultra Spinner:	Each rotation of the spinner is worth 1 Million.
Ultra Ramps:	Each ramp shot is worth 5 Million.
Ultra Goalie:	Each goalie hit is worth 5 Million.

The goal must be re-lit by completing the 4 rollover buttons in the center of the playfield. The upper striker stand-up target spots an un-lit rollover.

The goal is lit at the start of each ball.

The "TV" hole is lit at the start of the game. Every 4 goals thereafter re-lights the TV. There are 4 TV awards as follows:

1) Big Goal Round.

Spell B-I-G by scoring 3 goals during this 20 second timed round. Each goal is worth 10 Million. Completing B-I-G (3 goals) awards a 20 Million point bonus.

2) Extra Ball Round.

Shoot Striker's Hideout (hole to the right of the goal) during this 20 second timed round for an Extra Ball. Use remaining time to shoot Striker's Hideout for 50 Million. If Extra Balls are disabled, the 1st shot will score 50 Million.

3) Shoot the Goalie.

During this 20 second timed round, the Goalie value starts at 10 Million. Each ball shot into the goal increases the Goalie value by 10 Million. Each Goalie hit scores the current Goalie value. Each time the Goalie is hit, or the ball is shot in the goal will cause the goalie to move to a new position.

4) Where's Striker.

Shoot any of the 3 Striker stand-up targets during this 20 second timed round to try and find the lost mascot in the crowded stadium. Low and Medium point values are awarded when strangers are sighted. High scores are given for locating Striker.

Multi-ball™

Shoot flashing "BUILD LOCK" arrows to light the following panels on the Soccer Ball in the center of the playfield:

STRENGTH
STAMINA
SKILL
SPIRIT
SPEED

Completing all 5 panels lights BOTH ramps to lock a ball.

Final Draw will light after locking a ball, or on the last ball if Multi-ball has not yet been earned.

Shoot Final Draw hole when lit to begin Multi-ball.

At the start of Multi-ball, the player will be assigned a starting rank. The object in Multi-ball is to ascend the ranking ladder by defeating as many higher ranking teams as possible.

On the 1st Multi-ball, the player will be ranked as follow:

The Lowest rank assigned is #16.

If Multi-ball is awarded by Striker then the player starts at Rank #16.

If Multi-ball is awarded by Final Draw, then the player's rank is advanced 1 position for every 2 goals scored before beginning the 1st Multi-ball.

If the player locked a ball before starting the 1st Multi-ball, the player will advance 4 additional positions.

On subsequent Final Draw Multi-balls, the player will advance 2 positions from their previous rank.

In Multi-ball, shoot the goal to score a Goal Jackpot and advance 1 position. The Goal Jackpots increase in value as you play higher ranked teams as follows:

Rank 15	U.S.A.	20 Million
Rank 14	Russia	20 Million
Rank 13	South Korea	25 Million
Rank 12	Saudi Arabia	30 Million
Rank 11	Morocco	35 Million
Rank 10	Austria	40 Million
Rank 9	Canada	45 Million
Rank 8	Holland	50 Million
Rank 7	Italy	55 Million
Rank 6	England	60 Million
Rank 5	Sweden	65 Million
Rank 4	Spain	70 Million
Rank 3	Australia	75 Million
Rank 2	France	100 Million
Rank 1	Germany	250 Million

After scoring a Goal Jackpot, you must shoot either ramp or the "Assist" hole to challenge the next team and re-light the goal.

Once Germany has been defeated (for a 250 Million point Jackpot) either ramp or the goal may be shot for 50 Million point victory laps. After 5 victory laps, they are alternately available from the left ramp and the goal.

If no Goal Jackpots are scored during Multi-ball, a rematch (re-start of Multi-ball) may be achieved by shooting either ramp, the Final Draw hole, or the Assist hole

Cities / Final Match

Completing both top lanes ("BUY" and "TICKET") or completing both ramps buys a ticket and blinks the next of the 9 City lamps.

Shooting the left spinner lane will award 1 blinking city.

Chicago, Dallas and Boston each award 10 Million each.

New York, Orlando and Washington D.C. award 15 Million each.

San Francisco, Detroit and Los Angeles award 20 Million each.

Traveling to Boston starts "Boston Tea Party". This hurry-up round counts down a value from 30 Million down to 10 Million which is awarded by shooting the ball up the left spinner lane.

Traveling to Washington D.C. lights "Extra Ball" in Striker's hideout. If Extra Balls are disabled, then 50 Million points will be awarded for traveling to Washington D.C.

Traveling to Los Angeles lights the Final Draw Hole for the World Cup Final Match.

Traveling to any City will light the tackle target.

Final Match

The Final Match begins by shooting the Final Draw hole after traveling to Los Angeles. A 2nd ball will be delivered to the shooter lane. The player will be allowed to shoot unlimited balls from the shooter lane during this 45 second round. The object of this round is to score more goals than the Defending World Cup Champion German Team. Each goal scored by the player will be posted on the scoreboard and is worth 75 Million points. German goals are announced by the announcer, appear on the scoreboard and are accompanied by a momentary darkening of the playfield illumination lamps. When the timer reaches zero, the player wins the match if he has scored more goals than the German Team. If the match is tied when the timer reaches zero, then a sudden-death overtime period begins. The match ends when a goal is scored in overtime. If the player wins the match, then 500 Million points are awarded.

After the match, the flippers are turned off to allow the balls to recycle. Once the balls are all in the lower trough, the same player continues his turn.

Tackle

Hitting the tackle target when lit scores 10 Million points.

Striker Award

Striker's Hideout (hole to the right of the goal) is lit at the beginning of the game. Shoot ball into this hole when lit to receive a Striker Award. The 1st Striker award may be collected from the Goal when the Goal is not lit for any other feature.

The following Striker awards are available:

3 Goals: This gives the awards for 3 goals, including:
3 Ultra Features.
3 Goals added to total for Bonus.
TV is lit if the 4 Goal Threshold is reached.

Super Free Kick: This 20 second timed round lights the "Free Kick" target for high scoring. The 1st hit is worth 10 Million points, and each subsequent hit is worth 5 Million more.

Multi-ball™.	This begins a 2-ball or 3-ball Multi-ball round depending on whether the player has previously locked a ball. If the player has previously locked a ball, then his rank will be moved up 2 places. Otherwise his rank will start at its current level.
Three Cities:	This will award the next 3 Cities, along with the points and features associated with those cities.
Extra Ball:	This awards an Extra Ball.
Penalty Kick:	This feeds the ball to the right flipper for 1 shot at the goal. Penalty kick goal is worth 30 Million points.
Unlimited Kickback:	This enables the kickback for the remainder of the current ball.
20 Million:	This awards 20 Million points.

Assist Hole

When the ball lands in the Assist hole (just below the goal to the left), the goal will be lit and the player is able to shoot the ball at the goal with either flipper button.

If the ball lands in the Assist hole during Multi-ball, the game will automatically shoot the ball for the player. This will usually result in a goal.

Free Kick

The 2 lower “Free Kick” holes light the “Free Kick” target for a timed period. Hitting this target awards 10 Million points.

Kickback / Header Save

The Kickback is on at the start of the game. When the kickback is off, the right flipper lane will blink the “Light Corner Kickback” target for a timed interval. Hitting this target while blinking re-lights the kickback.

Entering the left outlane from the upper lane when the kickback is off will result in a “Header Save” by the Kickback.

Magna-Goal-Save

Magna-goal Save is lit at the start of the game. Press the button on the left side of the cabinet (behind the flipper button) to activate the Magna-goal Save magnet.

When the Magna-goal Save is off, the left flipper lane will blink the “Light Magna-goal Save” target for a timed interval. Hitting this target while blinking re-lights the Magna-goal Save.

Jet Bumpers

Jet Bumpers score 100,000 per hit until 25 hits. After 25 hits, the Jet Bumpers score 1,000,000 per hit for the remainder of the ball.

Bonus

The following points are awarded at the end of each ball:

5 Million points for each Goal.

5 Million points for each City Traveled.

Points accumulated in Ultra Jets feature.

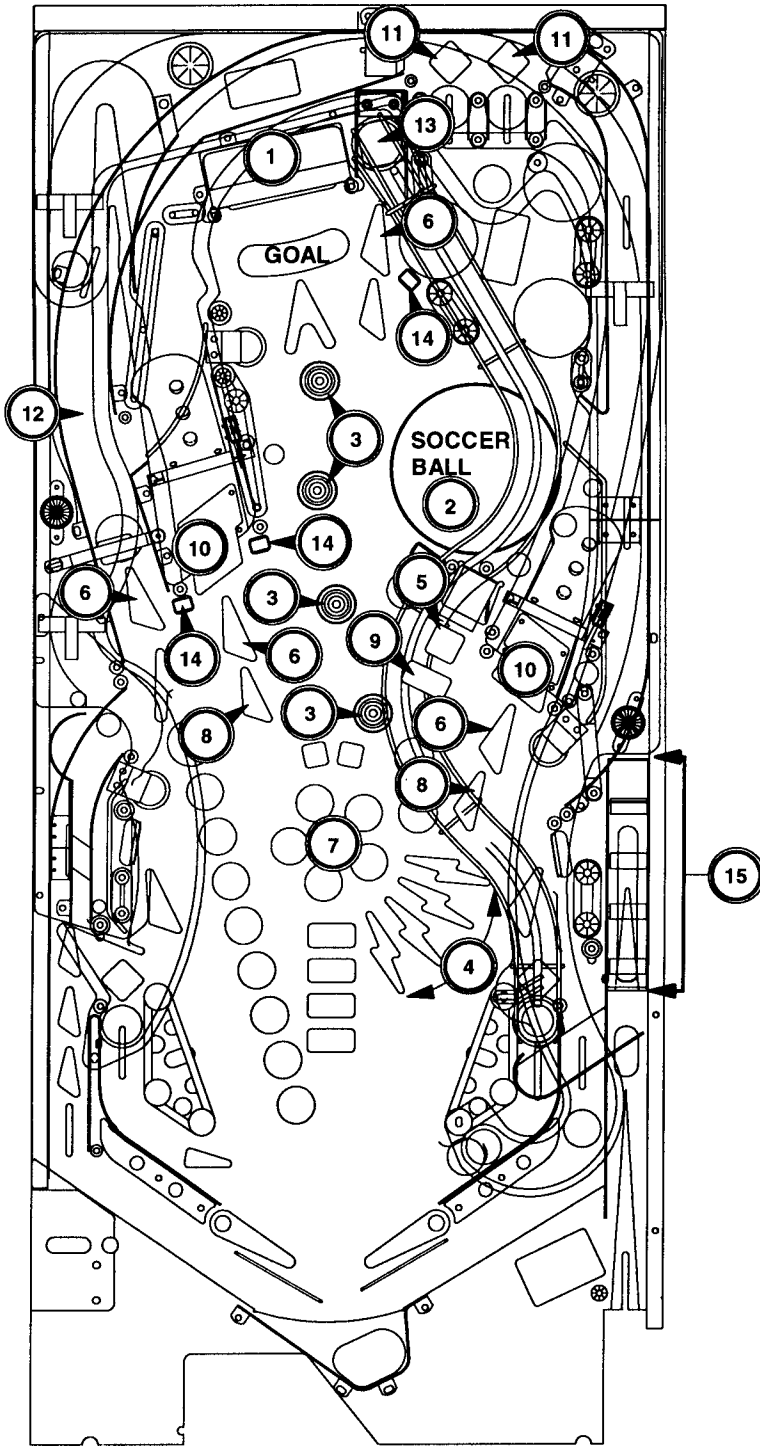
Points accumulated in Ultra Spinner feature.

Points accumulated in Ultra Ramps feature.

Points accumulated in Ultra Goalie feature.

Special

Advancing to Rank #1 (in Multi-ball) lights the Special. Special awards a credit, or 100 Million points when a credit is not available.



Goal: Shoot Goal (1) whenever soccer ball (2) is spinning. Complete rollover buttons (3) to relight Goal.

Ultra: Each goal lights an Ultra feature (4) for high scoring.

T.V.: TV (5) is lit every 4 goals for timed feature.

Lock: Shoot flashing "BUILD" (6) shots to complete Soccer Ball (7) and light Locks (8) on both ramps.

Multi-Ball™: Shoot Final Draw hole (9) to begin Multi-ball™.

Jackpot: Goals in Multi-ball™ score Jackpot and advance Rank. Shoot either ramp (10) to re-light Goal Jackpot.

Cities: Buy tickets by completing top lanes (11) or both ramps (10). Shoot spinner lane (12) to travel to flashing city.

Travel to Boston for Tea Party (Hurry Up).
 Travel to Washington D.C. to light Extra Ball.
 Travel to Los Angeles for World Cup Final Match.

Striker: Shoot top center hole (13) to collect random Striker Award. Spell S-T-R-I-K-E-R by hitting Striker's targets.

Skill Shot: Complete all 3 lanes (15) to collect 30 Million and advance 1 city.

Game Operation and Test Information

(System WPC) ROM Summary

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	U6	A-5343-50031-1A (Domestic)
Game 1	27c040	CPU	U6	A-5343-50031-1X (Foreign)
Music/Speech	27c040	Audio	SU2	A-5343-50031-S2
Music/Speech	27c040	Audio	SU3	A-5343-50031-S3
Music/Speech	27c040	Audio	SU4	A-5343-50031-S4
Music/Speech	27c040	Audio	SU5	A-5343-50031-S5
Music/Speech	27c040	Audio	SU6	A-5343-50031-S6
Music/Speech	27c040	Audio	SU7	A-5343-50031-S7
Music/Speech	27c040	Audio	SU8	A-5343-50031-S8
Music/Speech	27c040	Audio	SU9	A-5343-50031-S9

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

WORLD CUP IS A 5 BALL GAME.

Power: Domestic 120V @ 60 Hz
Foreign 230V @ 50 Hz
Japan 100V @ 50 Hz

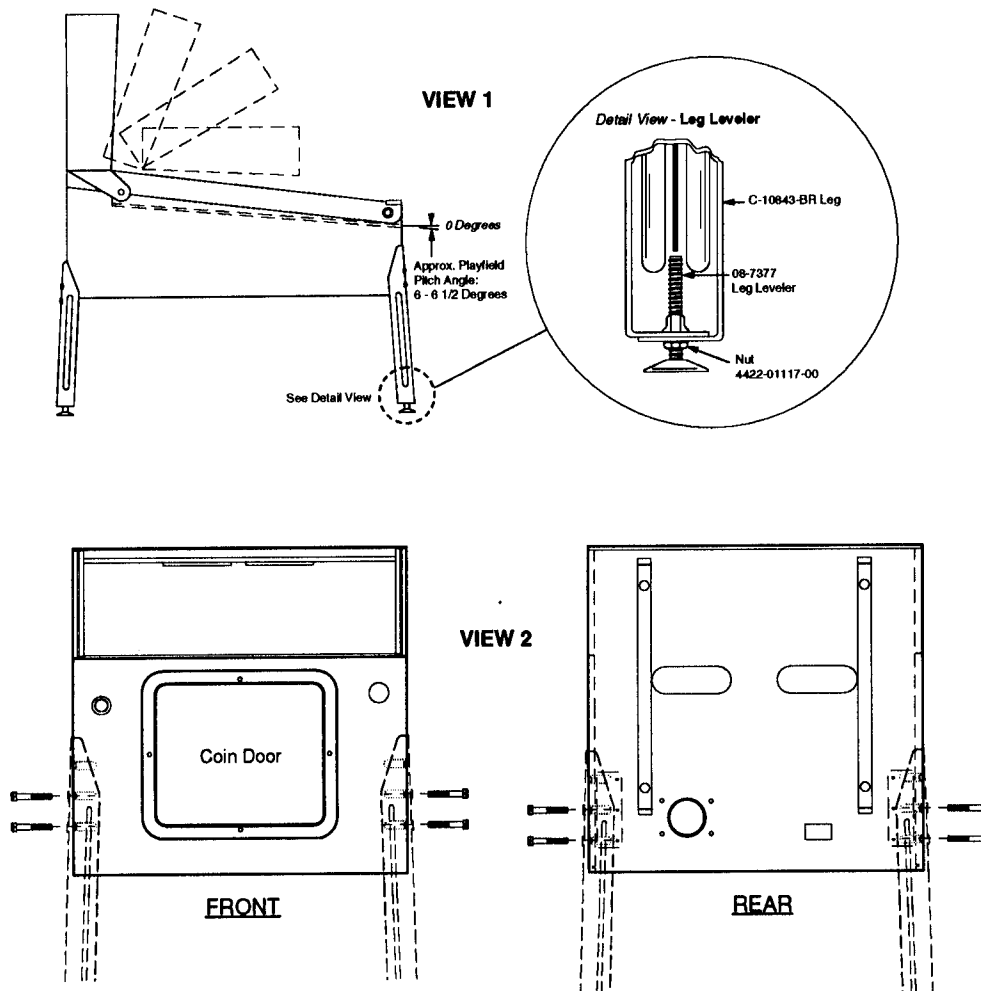
Dimensions: Width: 22" Approx.
Depth: 52" Approx.
Height: 75" Approx.

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).



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. Adjust leg levelers to the desired playfield pitch (front to back). The recommended pitch level is 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.

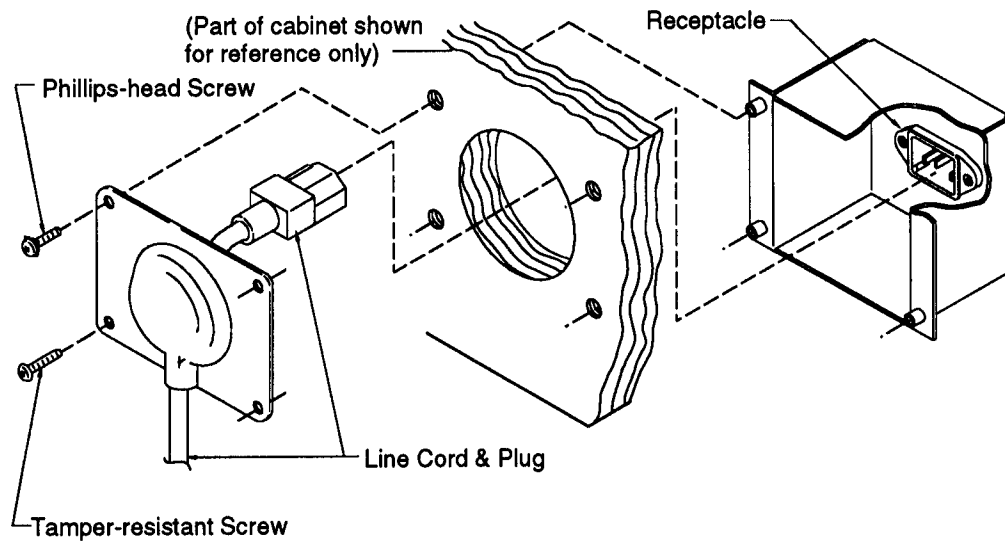
10. Move the game into the desired location; recheck the level and pitch angle of the playfield.
11. Verify that the **required number** of balls are installed in the game. **WORLD CUP** uses 5 balls.

12. Install playfield mylars if desired.

NOTE: The **WORLD CUP** 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 03-9025-2 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.



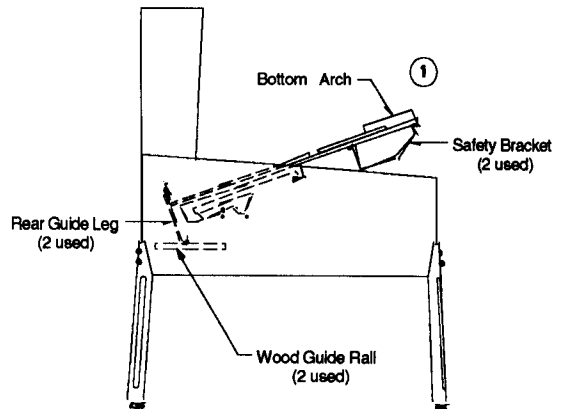
RAISING THE PLAYFIELD

CAUTION

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

To raise the playfield.

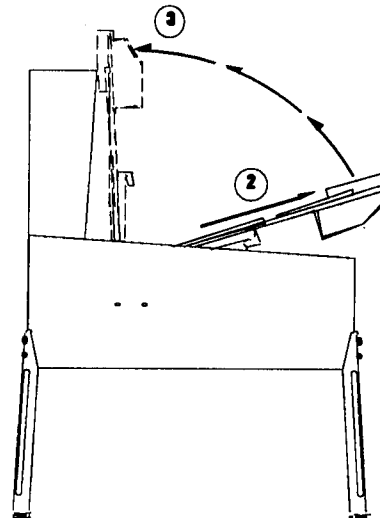
1. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails or be used to slide out playfield.



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

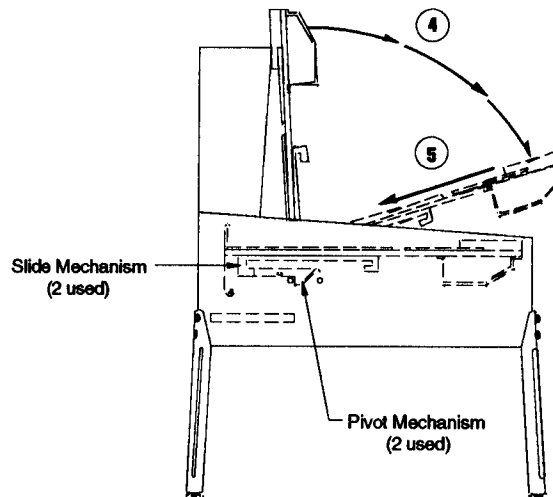
Be sure playfield is in locked position and does not slide back into the cabinet. If it does, repeat Step 2 before proceeding to Step 3.

3. Rotate playfield to upright service position (lean on backbox) by pulling toward you and up. Listen for the sound of a click; this insures locking and pivoting sequence.



To lower the playfield.

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



GAME CONTROL LOCATIONS

Cabinet Switches

The On-Off switch is 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.

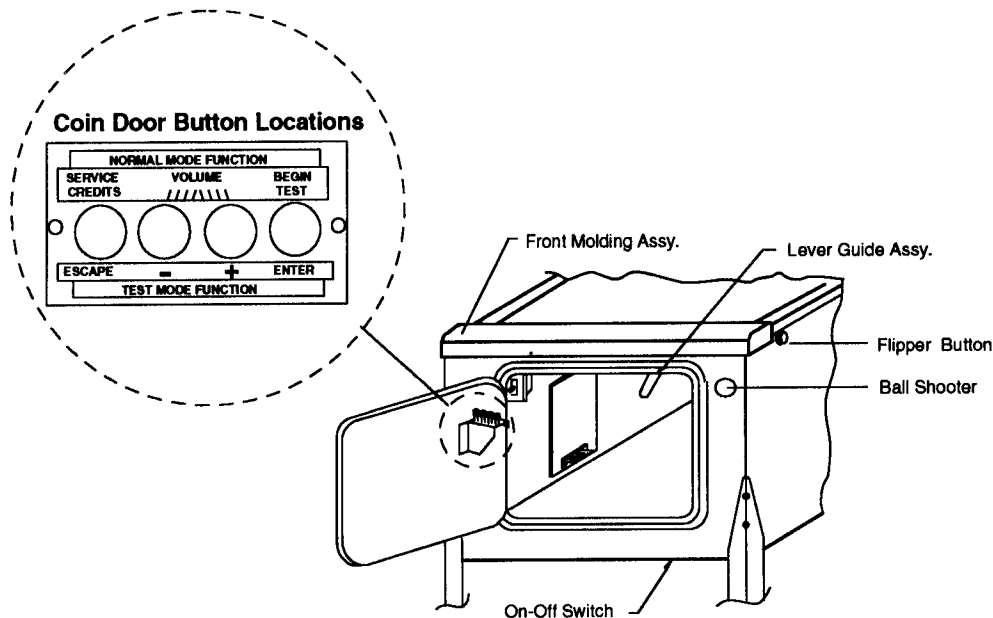
Test Function

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:	WORLD CUP '94	Sound Rev. P-O
	50031 Rev. PX-C	Sy. 3.16 4/05/94

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 Goalie Test
	T.15 Eject Hole 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 Buy-in Extra Balls

This is the number of Extra Balls purchased at the end of the game.

B.4 02 Final Draw Multi-ball™

This is the number of Multi-balls that were earned from the “Final Draw” hole.

B.4 03 Ramp Multi-ball™

This is the number of Multi-balls that were earned from the ramp. Note that adjustment A.2 05 (Last Easy Release) must be set non-zero to allow Multi-ball to begin from a ramp shot.

B.4 04 Striker Multi-ball™

This is the number of Multi-balls awarded from the Striker Feature.

B.4 05 Total Multi-ball™

This is the total number of Multi-balls played.

B.4 06 Jackpots

This is the number of Goal Jackpots scored during Multi-ball.

B.4 07 Victory Laps

This is the number of Victory Laps achieved after reaching #1 ranking.

B.4 08 Rematch

This is the number of times Rematch Multi-ball was achieved.

B.4 09 Striker Lit

This is the number of times that the Striker Award feature was lit by spelling S-T-R-I-K-E-R from the stand-up targets.

B.4 10 Striker Awards

This is the number of Striker Awards given.

B.4 11 Hideout Strikers

This is the number of Striker Awards given as a result of a ball shot into Striker’s Hideout. (If A.2 07 Striker Award Goals is set to “Yes” or “1st Award”, then some of the Striker Awards will be made from shots into the goal. This is the number that was awarded from the hideout to the right of the goal).

B.4 12 TV Awards

This is the number of TV awards given.

B.4 13 Big Goal Round

This is the number of Big Goal Rounds played (TV Round #1).

B.4 14 Extra Ball Round

This is the number of Extra Ball Rounds played (TV Round #2).

B.4 15 Hit The Goalie

This is the number of Hit the Goalie Rounds played (TV Round #3).

B.4 16 Where Is Striker

This is the number of Where is Striker Rounds played (TV Round #4).

B.4 17 Skill Shot Made

This is the number of times a blinking Skill Shot lamp was hit.

B.4 18 Skill Completed

This is the number of times the 3 skill shot lamp sequence was completed.

B.4 19 Cities Traveled

This is the total number of cities traveled.

B.4 20 Boston

This is the number of times that a player reached Boston (Start Tea Party).

B.4 21 Washington D.C.

This is the number of times that a player reached Washington D.C. (Light Extra Ball).

B.4 22 Los Angeles

This is the number of times that a player reached Los Angeles (Light Final Match).

B.4 23 Final Match

This is the number of times the Los Angeles Final Match has been played.

B.4 24 Final Match Goals

This is the total number of goals scored during Final Matches.

B.4 25 Final Match Wins

This is the number of Final Match victories.

B.4 26 Final Match Loss

This is the number of Final Match defeats.

B.4 27 Final Match Overtime

This is the number of Final Matches that went into overtime.

B.4 28 Kickbacks

This is the number of times the kickback was used.

B.4 29 Kickback Lit

This is the number of times the kickback was lit.

B.4 30 Kickback High

This is the number of balls going out the high entrance of the left outlane. The "Header Save" feature will save these balls (using the kickback) if it is not multi-ball and the kickback is not enabled. The Header Save is enabled through adjustment A.2 28

B.4 31 Magna-goal Save Lit

This is the number of times Magna-goal Save was lit.

B.4 32 Magna-goal Used

This is the number of times Magna-goal Save was used by the player.

B.4 33 Extra Ball Round Collected

This is the number of times that the extra ball was collected in the Extra Ball Round.

B.4 34 Striker Extra Ball

This is the number of extra balls given out (or lit if A.2 10 is set to Hard) by the Striker feature.

B.4 35 Washington D.C. Extra Ball

This is the number of extra balls lit by the Washington D.C. feature.

B.4 36 Goal Lit

This is the number of times the goal was lit by completing the rollover buttons.

B.4 37 Goals

This is the number of regular goals scored.

B.4 38 Assist Hole

This is the number of times the ball has landed in the Assist Hole.

B.4 39 Left Ramp Shot

This is the number of shots made around the left ramp.

B.4 40 Right Ramp Shot

This is the number of shots made around the right ramp.

B.4 41 Top Lane Award

This is the number of times the top two lanes have been completed.

B.4 42 Free Kicks

This is the number of times the Free Kick target was hit while lit.

B.4 43 Rank 10

This is the number of players that reached rank 10 or higher (through multi-ball jackpot sequence).

B.4 44 Rank 6

This is the number of players that reached rank 6 or higher (through multi-ball jackpot sequence).

B.4 45 Rank 3

This is the number of players that reached rank 3 or higher (through multi-ball jackpot sequence).

B.4 46 Rank 1

This is the number of players that reached rank 1 (through multi-ball jackpot sequence).

B.4 47 1 Buy-in Games

This is the number of times that 1 or more extra balls were purchased at the end of a game.

B.4 48 2 Buy-in Games

This is the number of times that 2 or more extra balls were purchased at the end of a game.

B.4 49 3 Buy-in Games

This is the number of times that 3 extra balls were purchased at the end of a game.

B.4 50 Header Saves

When Header Saves are enabled through adjustment A.2 28, this is the number of times that a ball exiting play through the upper left outlane was saved by the kickback.

B.4 51 Goal Champ Credits

This is the number of credits that have been awarded to players that became Final Match Goal Champ.

B.4 52 Free Ride Balls

This is the number of balls that were returned to the player because they drained during the "Free Ride" safety period.

B.5 Histograms

B.5	01	0-39 Million Scores	00%	00
B.5	02	40-59 Million Scores	00%	00
B.5	03	60-79 Million Scores	00%	00
B.5	04	80-99 Million Scores	00%	00
B.5	05	100-149 Million Scores	00%	00
B.5	06	150-249 Million Scores	00%	00
B.5	07	250-399 Million Scores	00%	00
B.5	08	400-599 Million Scores	00%	00
B.5	09	600-999 Million Scores	00%	00
B.5	10	1-1.49 Billion Scores	00%	00
B.5	11	1.5-1.9 Billion Scores	00%	00
B.5	12	2-2.9 Billion Scores	00%	00
B.5	13	Over 3 Billion	00%	00
B.5	14	Game Time 0.0-1.0 Mins	00%	00
B.5	15	Game Time 1.0-1.5 Mins	00%	00
B.5	16	Game Time 1.5-2.0 Mins	00%	00
B.5	17	Game Time 2.0-2.5 Mins	00%	00
B.5	18	Game Time 2.5-3.0 Mins	00%	00
B.5	19	Game Time 3.0-3.5 Mins	00%	00
B.5	20	Game Time 3.5-4.0 Mins	00%	00
B.5	21	Game Time 4-5 Mins	00%	00
B.5	22	Game Time 5-6 Mins	00%	00
B.5	23	Game Time 6-8 Mins	00%	00
B.5	24	Game Time 8-10 Mins	00%	00
B.5	25	Game Time 10-15 Mins	00%	00
B.5	26	Game Time Over 15 Mins	00%	00

B.6 Time-Stamps

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

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

Press the 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	Goalie Test
T.15	Eject Hole 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 Goalie Test This test is used to manually operate the goalie motor and check the function of the goalie position optos.

Pressing the enter key will start and stop the goalie motor.

The display will show whether the left, right or both optos are blocked.

The "LEFT" opto is the opto that is blocked when the goalie is in the left position. This opto is on the right side of the mechanism.

The "RIGHT" opto is the opto that is blocked when the goalie is in the right position. This opto is on the left side of the mechanism.

T.15 Eject Hole Test

This test is used to test and adjust the eject holes in the game.

All devices will kick out balls in this test.

The top “assist” eject hole will operate the goalie, and use the same method used in multi-ball play to shoot the ball to the left of the goalie.

Each of the eject hole solenoids may also be energized manually as follows:

Left Eject:	Press Left Flipper Button
Top (assist) Eject:	Press Start Button
Right Eject:	Press Right Flipper Button

When operated manually, the solenoid will fire for an extra-long time to allow you to grab hold of the actuator for manual adjustment. Note that a very slight bend will affect the kick-out as follows:

To kick further right:	Bend actuator slightly left.
To kick further left:	Bend actuator slightly right.

It is recommended that the side eject holes be aligned such that the ball just clears the slingshots and lands on the highest part of the corresponding flipper.

It is recommended that the top eject when firing on its own should shoot the ball when the goalie is in the rightmost position and should pass on the left side of the goalie without touching the target. If it kicks at a different time, then check the Right Goalie Opto using the Goalie Test. If it kicks at the correct time, but does not go into the goal, then a small adjustment to the actuator must be made.

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 03	Starting Rank	12	14	16	16	16
A.2 05	Last Easy Release	2	1	0	0	0
A.2 06	Goals/No Rematch	2	2	1	1	1
A.2 07	Striker Award Goals	YES	1ST AWARD	1ST AWARD	1ST AWARD	1ST AWARD
A.2 09	Striker Difficulty	EASY	EASY	EASY	MEDIUM	HARD
A.2 10	Striker Extra Ball Difficulty	EASY	EASY	EASY	HARD	HARD
A.2 11	Free Cities	2	2	0	0	0
A.2 12	L.A. Match Ticket in Order	1	1	1	1	0
A.2 15	Goal Lit Each Ball	YES	YES	YES	YES	1ST GOAL
A.2 20	Kickback Memory	EASY	EASY	MEDIUM	MEDIUM	MEDIUM
A.2 27	Header Save	YES	YES	YES	YES	NO
A.2 29	Free Ride Time	7	6	5	5	5

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 03	Starting Rank	12	14	16	16	16
A.2 05	Last Easy Release	2	1	0	0	0
A.2 06	Goals/No Rematch	2	2	1	1	1
A.2 07	Striker Award Goals	YES	1ST AWARD	1ST AWARD	1ST AWARD	1ST AWARD
A.2 09	Striker Difficulty	EASY	EASY	EASY	MEDIUM	HARD
A.2 10	Striker Extra Ball Difficulty	EASY	EASY	EASY	HARD	HARD
A.2 11	Free Cities	2	2	0	0	0
A.2 12	L.A. Match Ticket in Order	1	1	1	1	0
A.2 15	Goal Lit Each Ball	YES	YES	YES	YES	1ST GOAL
A.2 20	Kickback Memory	EASY	EASY	MEDIUM	MEDIUM	MEDIUM
A.2 27	Header Save	YES	YES	YES	YES	NO
A.2 29	Free Ride Time	7	6	5	5	5

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	Install 5 Ball U.9 06
A.1 01	Balls Per Game	3	5
A.1 07	Replay Start	900,000,000	1,300,000,000
A.2 03	Starting Rank	16	16
A.2 04	Last Easy Multi-ball	1	0
A.2 05	Last Easy Release	0	0
A.2 06	Goals/No Rematch	1	1
A.2 07	Striker Award Goals	1ST AWARD	1ST AWARD
A.2 09	Striker Difficulty	EASY	MEDIUM
A.2 10	Striker Extra Ball Difficulty	EASY	HARD
A.2 11	Free Cities	0	0
A.2 12	L.A. Match Ticket in Order	1	0
A.2 15	Goal Lit Each Ball	YES	1ST BALL
A.2 20	Kickback Memory	MEDIUM	MEDIUM
A.2 27	Header Save	YES	NO
A.2 29	Free Ride Time	5	5

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:

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

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

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

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

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

U.9 11 Install Buy-in This option automatically sets game pricing to 1 for 50¢/2 for \$1.00, and 1 Coin Buy-in (A.3 19) to YES. **Note that this is not the same feature that allows the player to buy an extra ball at the end of the game. See A.2 01 "Buy Extra Ball".**

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 Not Used

U.9 14 Not Used

U.9 15 Not Used

U.9 16 Not Used

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

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

Preset Game Adjustments Table for German/European Games

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

• The German DIP Switch Settings are:

SW4 **SW5** **SW6** **SW7** **SW8**
On **On** **On** **On** **Off**

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

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

Preset Game Adjustments Table for French Games

Adj. #	Adjustment Description	French 1 U.9 23	French 2 U.9 24	French 3 U.9 25	French 4 U.9 26	French 5 U.9 27	French 6 U.9 28
A.2 01	Extra Ball Percent	20%	15%	25%	25%	20%	20%

* 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, French, or German.

A.1 22 Clock Style

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

A.1 23 Date Style

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

A.1 24 Show Date and Time

The date and time show in the Attract Mode.

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

A.1 25 Allow Dim Illumination

The game program dims the General Illumination for special effects 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

This determines whether the player may buy an Extra Ball for 1 Credit at the end of the game.

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.

A.2 03 Starting Rank

The object of multi-ball play is to score successive jackpots to advance toward number 1 ranking. The player normally begins the game at rank 16. By setting the starting rank to a smaller number (higher rank) the player will receive higher jackpots and attain number 1 ranking more often.

A.2 04 Last Easy Multi-ball

This is set to the last multi-ball sequence that awards 1 free ball panel at the start of each ball.

A.2 05 Last Easy Release

This is the last multi-ball sequence where the Final Draw (Start Multi-ball) is available from the ramps (in addition to the Final Draw Hole).

A.2 06 Goals / No Rematch

This is the number of Goal Jackpots in multi-ball that renders rematch unavailable.

A.2 07 Striker Award Goals

This determines whether the unlit Goal will give Striker Awards (when Goal is unlit and Striker is lit).

No - Don't give Striker Award from the Goal.

Yes - Give Striker Awards from unlit Goal.

1st Award - Give only the 1st Striker Award from unlit Goal.

A.2 08 Free Striker Award

This determines whether the Striker Award is lit at the beginning of the game.

A.2 09 Striker Difficulty

This determines how the Striker letters carry over from ball to ball.

Easy - Letters always carry over ball to ball.

Medium - Letters carry over from ball to ball until the sequence has been completed once.

Hard - Letters never carry over from ball to ball.

A.2 10 Striker Extra Ball Difficulty

This determines how hard it is to earn the Extra Ball from the Striker feature.

- Easy - Extra Ball is given directly to player.
- Hard - Extra Ball lamp is lit.

A.2 11 Free Cities

This determines the number of cities that are lit at the beginning of the game for each player.

A.2 12 L.A. Match Ticket in Order

This is the number of "L.A. Final Matches" that must be played before purchasing ramp tickets must be done in order. Until this number of final matches have been played, the ramps may be hit in either order to purchase tickets.

A.2 13 Final Match Difficulty

This determines how easy it is to win the Final Match.

- Easy - The German team will usually score less goals.
- Normal - The German team will usually score 3-5 goals.
- Hard - The German team will usually score more goals.

Note that when there are only 1 or 2 pinballs in the machine that the German team will score less goals.

A.2 14 Final Match Challenger

This determines the name of the challenging team (the player's team) in the Final Match. The selected country (or "CHALLENGER") will appear on the final match scoreboard.

A.2 15 Goal Lit Each Ball

This will cause the Goal to be lit at the beginning of each ball. Otherwise the rollovers will hold their state and need to be completed on the subsequent ball.

- Yes - Light the goal at the beginning of every ball.
- No - Start game with goal off, and leave in memory.
- 1st Ball - Start game with goal lit, and leave in memory.

A.2 16 Free TV Award

This causes the TV to be lit at the start of the game.

A.2 17 Ramps Spot Rollovers

This causes the ramps to spot the rollover buttons.

- Off - Don't spot rollover buttons from ramps.
- 1 - Spot 1 rollover button from each ramp shot.
- 2 - Spot 2 rollover buttons from each ramp shot.

A.2 18 Maximum Kickbacks

The game is capable of storing up to 3 kicks for the kickback. Each of these kicks is represented by a kickback lamp. This adjustment determines the maximum number of kicks that may be stored.

- Off - This disables the kickback entirely.
- 1 - Only store 1 kick at a time. When set to "1" all 3 kickback lamps turn on and off together.
- 2 - Store up to 2 kicks.
- 3 - Store up to 3 kicks.

A.2 19 Starting Kickbacks

This determines the number of kicks used at ball start when KICKBACK MEMORY (A.2 20) is set to Easy, or the number of kicks used at game start when KICKBACK MEMORY (A.2 20) is set to Normal.

A.2 20 Kickback Memory

This adjustment provides a wide variety of difficulty options for the kickback:

- Extra Easy - Kickback is always on. Balls will not drain down the left side.
- Easy - At the beginning of every ball, the kickback is loaded with the "STARTING KICKBACK" count (A.2 19).
- Normal - At the beginning of the game, the kickback is loaded with the "STARTING KICKBACK" count (A.2 19). The count stays in memory from ball to ball.
- Hard - The kickback is off at the beginning of the game and stays in memory from ball to ball.
- Extra Hard - The kickback starts off at the beginning of every ball.

A.2 21 Free Magna-goal Save

This determines whether the Magna-goal Save feature is lit at the beginning of the game.

A.2 22 Striker Extra Ball Memory

This determines whether extra balls that are lit from the Striker Award feature stay in memory from ball to ball. This adjustment has no effect if the "Striker Extra Ball Difficulty" (A.2 10) is set to Easy.

A.2 23 Washington D.C. Extra Ball Memory

This determines whether extra balls that are lit by traveling to Washington D.C. are retained in memory from ball to ball.

A.2 24 Special Memory

This determines whether the Special Lamp is retained in memory from ball to ball.

A.2 25 Attract Mode Sound

This may be used to disable the sound generated by hitting the Magna-goal Save, Buy-in or Flipper buttons in Attract Mode.

A.2 26 Attract Mode Music

This allows the game to play music in the Attract Mode. It will play a short music sequence every 5-7 minutes after a game has been played, for about 30 minutes.

A.2 27 Header Save

The header save prevents balls from draining down the upper left lane (above the "light corner kick" target). When enabled, the kickback will always kick balls that pass through this upper lane (except during multi-ball).

A.2 28 Endgame Lock Release

This may be used to prevent the balls from being ejected from the lock mechanism between games.

A.2 29 Special Challenge

This adjustment may be used to disable the Special Challenge feature.

A.2 30 Free Ride Time

Any ball that has not been in play for this many seconds will be returned to the player as "OFFSIDES".

A.2 31 Lock Magnet Time

This is the amount of time that the Lock Magnet stays energized (in 1/60th second units) to lock a ball.

A.2 32 Disable Rollovers

This function disables the rollover buttons and causes them to be spotted by ramp shots.

A.3 Pricing Adjustments

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

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

A.3 02 Left Coin Units

A.3 03 Center Coin Units

A.3 04 Right Coin Units

A.3 05 4th Slot Units

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

A.3 06 Units/Credits

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

A.3 07 Units/Bonus

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

A.3 08 Bonus Credits

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

A.3 09 Minimum Units

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

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

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

A.3 11 Collection Text

The coin system used to display the Earning Audits.

A.3 12 Left Slot Value

A.3 13 Center Slot Value

A.3 14 Right Slot Value

A.3 15 4th Slot Value

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

A.3 16 Maximum Credits

The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 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 1 Coin Buy-in

If game pricing is set to 1 for 50¢/2 for \$1.00 the player is allowed to 'buy-in' a subsequent game for 1 coin. The number of games that may be purchased at this cost is determined by the number of players in the previous game; that is, if the previous game had three players, 3 Credits can be purchased at the rate of 1 coin per credit. **Note that this is not the same feature that allows the player to buy an extra ball at the end of the game. See A.2 01 "Buy Extra Ball".**

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

A.3 20 Base Coin Size

The number of ticket per coin calculations.

A.3 21 Coin Meter Units

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

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

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.

Pricing Table

Country	Chutes				Games/Coins	Display	Pricing Adjustments A3 02 03 04 05 06 07 08 09
	Coin 4th Left Chute	Center		Right			
USA	25¢	\$1.00*	25¢	\$1.0	1/50¢. 2/75¢. 3/\$1 ²	50¢, 75¢,	
	25	\$1.00	25¢	\$1.0	1/3X25¢ ²	USA1 1/\$0.75	
	25	\$1.00	25¢	\$1.0	1/50¢. 2/\$1 ²	USA 2/\$1.00	
	25	\$1.00	25¢	\$1.0	1/50¢. 3/\$1.00 ²	USA 3/\$1.00	
	25	\$1.00	25¢	\$1.0	1/2x25¢. 2/4x25¢. 3/\$1.00 ²	3/\$1.00 Coin	
	25	\$1.00	25¢	\$1.0	1/2x25¢. 2/\$1.00. 3/\$1.50. 6/\$2.00	USA 6/\$2.00	
	25	\$1.00	25¢	\$1.0	1/2x25¢. 2/\$1.00. 3/\$1.50. 5/\$2.00	USA 5/\$2.00	
	25	\$1.00	25¢	\$1.0	1/3X25¢. 2/\$1.50. 4/\$2.00 ²	1/75. 4/\$2.00	
	25¢	25¢	25¢	-	1/2x25¢. 2/\$1.00. 4/\$1.50.	6/\$2.00	
	25¢	25¢	25¢	-	1/4x25¢. 6/\$5.00	1/1, 6/5	
Canada	25¢	-	\$1.00	-	1/50¢. 2/75¢. 3/\$1 1/50¢. 2/\$1 ²	CANADA 1 CANADA 2	
Austria	5sch 5sch	10sch -	10sch 10sch	- -	1/2x5sch. 3/2x10sch ² 2/5sch. 5/10sch	AUSTRIA CUSTOM	02 00 05 00 01 00 01
Australia	20¢ 20¢	\$1 \$1	\$1 \$1	\$2 \$2	1/\$1. 3/\$2 ² 1/\$1, 2/\$2	AUSTRALIA 1 AUSTRALIA 2	
U.K.	£1.00	50P	20P	10P	1/3x10P. 2/50P. 4/£1 ²	U. KINGDOM	
Switzerland	1Fr 1Fr	2Fr 2Fr	5Fr 5Fr	- -	1/1Fr. 3/2Fr. 7/5Fr ² 1/2Fr. 2/3Fr. 3/4Fr. 5/5F	SWISS 1 SWISS 2	
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr. 1/20Fr. 3/50Fr ²	BELGIUM	
Germany	1DM	2DM	5DM	-	1/2DM. 2/3DM. 3/4DM. 5/5DM ² 1/1DM. 2/2DM. 5/5DM ² 1/1DM. 2/2DM. 6/5DM ^{1,2}	GER. 1/2DM GER. 1/1DM GER. 6/5DM	
Holland	1G	-	1G	-	1/1G ²	HOLLAND	
Sweden	1Kr 5Kr	5Kr 5kr	10Kr 5Kr	- -	1/5x1Kr. 1/5kr. 2/10Kr ^{1,2} 1/5Kr ²	SWEDEN 1 SWEDEN 2	
France	1Fr 1Fr 1Fr 1Fr 1Fr 1Fr	5Fr 5Fr 5Fr 5Fr 5Fr 5Fr	10Fr 10Fr 10Fr 10Fr 10Fr 10Fr	20Fr 20Fr 20Fr 20Fr 20Fr 20Fr	1/3x1Fr. 2/5Fr. 5/10Fr. 10/20Fr ^{2,3} 1/2x1Fr. 3/5Fr. 7/10Fr. 14/20Fr ^{2,3} 1/5Fr. 3/10Fr. 7/2x10Fr. 7/20Fr ^{1,2,3} 2/5Fr. 4/10Fr. 9/2x10Fr. 9/20Fr ^{2,3} 2/5Fr. 5/10Fr. 11/2x10Fr. 11/20Fr ^{2,3} 1/5Fr. 3/10Fr. 6/20Fr ^{2,3}	TARIF 1 TARIF 2 TARIF 3 TARIF 4 TARIF 5 TARIF 6	
Italy	500L 500L 500L	500L 500L 500L	500L 500L 500L	- - -	1/500L ² 1/2x500L. 3/4x500L ^{1,2} 1/500L. 2/1000L	ITALY 1 ITALY 2 ITALY 3	
Spain	100P 25P 25P 25P 25P	- - - - -	500P 100P 100P 100P 100P	- - - - -	1/100P. 6/500P ² 1/25P. 5/100P 1/25P. 4/100P 1/2x25P. 2/100P 1/2x25P. 3/100P	SPAIN CUSTOM CUSTOM CUSTOM CUSTOM	01 00 04 00 01 04 01 01 00 04 00 01 00 01 01 00 04 00 02 00 01 03 00 12 00 04 00 01
Japan	100¥	-	100¥	-	1/100¥ ²	JAPAN	
Chile	Token	-	Token	-	1/1Token ²	CHILE	
Denmark	1Kr	5Kr	10Kr	-	1/3x1 Kr. 3/5 Kr. 7/10 Kr ²	DENMARK	
Finland	1Mka 1Mka	- -	5Mka 5Mka	- -	1/2x1Mka. 3/5Mka ² 1/3x1Mka. 2/5Mka ²	FINLAND 1 FINLAND 2	
New Zealand	\$1.00 \$2.00	- -	\$2.00 \$1.00	- -	1/\$1, 3/\$2 1/\$1, 3/\$2, (\$2-\$1 door)	NEW ZEALAND 1 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	
Netherland	1Hfl	2.5Hfl	2.5Hfl	-	1/1Hfl. 3/2.5Hfl	NETHERLANDS	
Hungary	10F	10F	20F	-	1/1x20F. 1/2x10F. 3/2x20F ²	HUNGARY	

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

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

A.4 01 Highest Scores

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

OFF - No high scores are recorded, or displayed.

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

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

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

This is the number of goals that the Final Match Goal Champ is set to each time the high scores are reset.

A.4 16 Final Match Goal Champ Credits

This is the number of credits awarded for becoming the Final Match Goal Champ.

A.4 17 Backup Aux H.S.T.D. 1

This is the highest score used in the "2 or more Buy-in" high score table. If you continue your more than 1 time, you are not eligible for the "Grand Champion" Honor Roll table. The number of credits given for reaching this position is the same as the honor roll table, as specified by A.4 05.

A.4 18 Backup Aux H.S.T.D. 2

This is the 2nd highest score used in the "2 or more Buy-in" high score table. If you continue your more than 1 time, you are not eligible for the "Grand Champion" Honor Roll table. The number of credits given for reaching this position is the same as the honor roll table, as specified by A.4 06.

A.4 19 Backup Aux H.S.T.D. 3

This is the 3rd highest score used in the "2 or more Buy-in" high score table. If you continue your more than 1 time, you are not eligible for the "Grand Champion" Honor Roll table. The number of credits given for reaching this position is the same as the honor roll table, as specified by A.4 07.

A.4 20 Backup Aux H.S.T.D. 4

This is the 4th highest score used in the "2 or more Buy-in" high score table. If you continue your more than 1 time, you are not eligible for the "Grand Champion" Honor Roll table. The number of credits given for reaching this position is the same as the honor roll table, as specified by A.4 08.

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.

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 Ramp Diverter

This message is displayed if the game has detected that the diverter is not functioning correctly. After any problem is corrected, the message will be cleared when the game detects 3 correctly diverted balls (during game play) in each direction.

Check Switch ##.

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

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

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 five 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

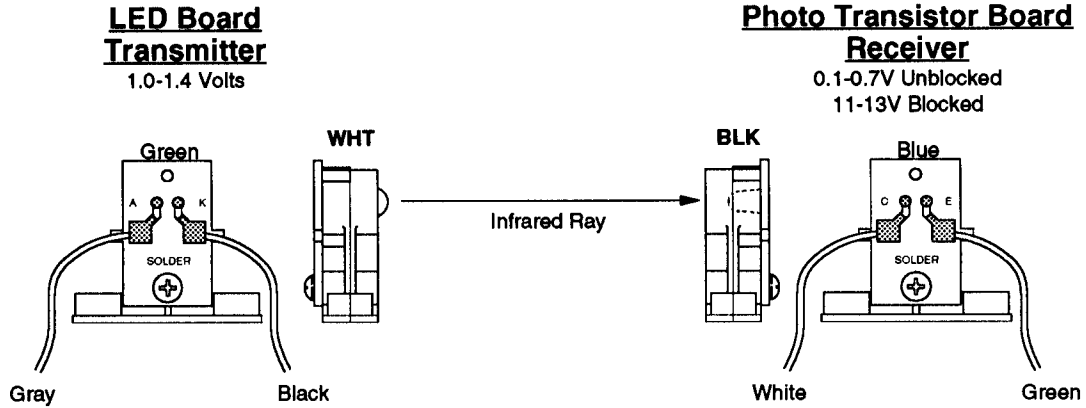
Sound Board Beep Error Codes

Upon Game Turn-On:

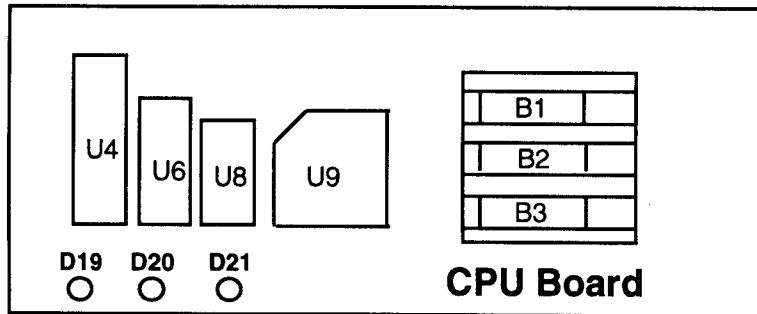
1 Beep	=	Sound Board O.K.
2 Beeps	=	U2 Failure
3 Beeps	=	U3 Failure
4 Beeps	=	U4 Failure
5 Beeps	=	U5 Failure
6 Beeps	=	U6 Failure
7 Beeps	=	U7 Failure
8 Beeps	=	U8 Failure
9 Beeps	=	U9 Failure

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 List



CPU Board

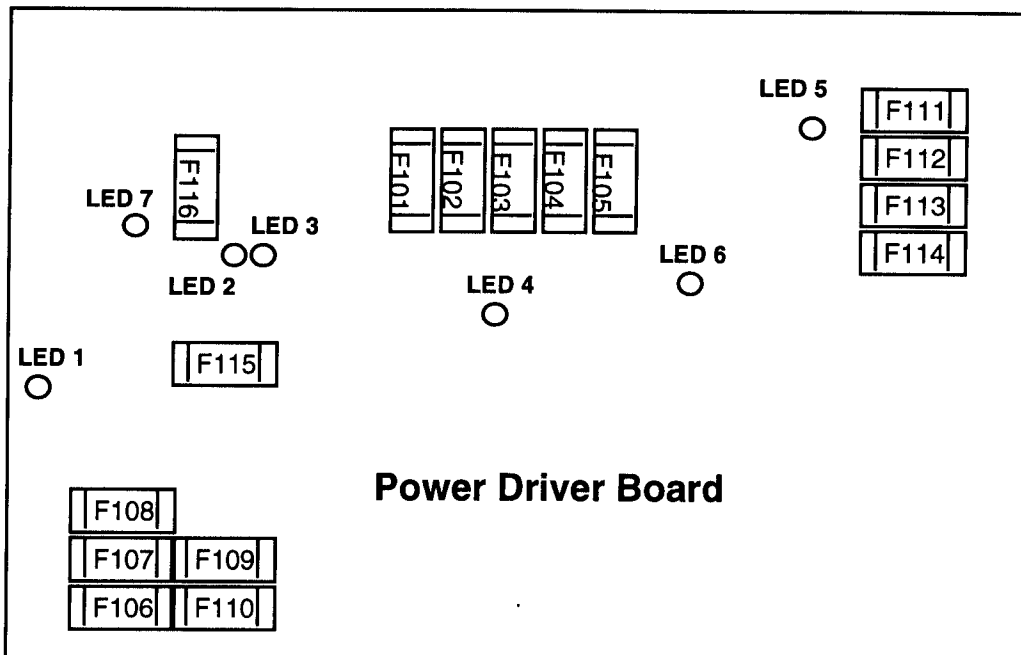
D19, Blanking

D20, Diagnostic

D21, +5vdc

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

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



Power Driver Board

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

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

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

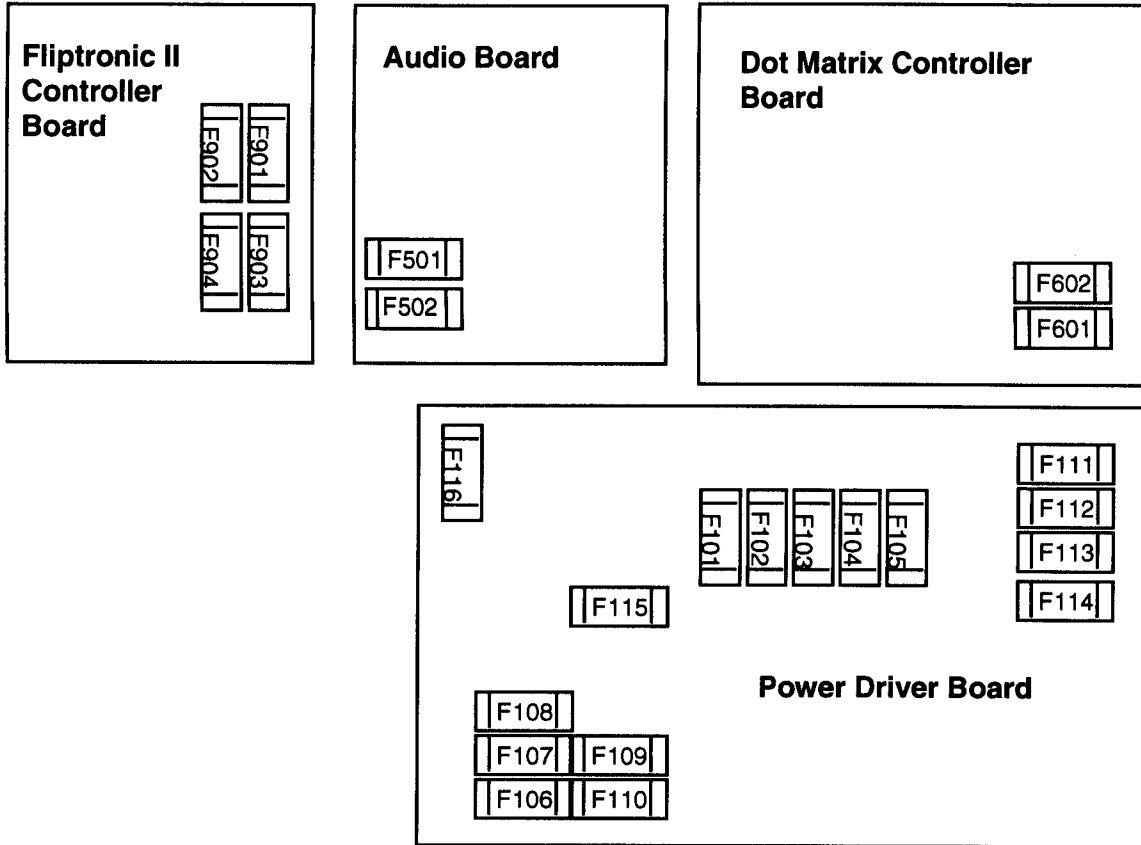
LED 4, +5vdc, Digital Circuit, Normally On

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

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

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

Fuse List



Audio Board

F501 -25V Circuit 3A, 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.

Power Driver Board

F101 +50VDC General (Left Flipper) 3A, 250V, S.B.
 F102 +50VDC General (Right Flipper) 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.

Fliptronic II Controller Board

F901 Upper Right Flipper 3A, 250V, S.B.
 F902 Upper Left Flipper 3A, 250V, S.B.
 F903 Lower Right Flipper 3A, 250V, S.B.
 F904 Lower Left Flipper 3A, 250V, S.B.

Line Filter

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

MAINTENANCE INFORMATION

LUBRICATION

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

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

Lubrication to ensure proper operation also applies to the target blades of Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, (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 NOT REPLACE these switches with the old style tungsten high current type switches, as intermittent operation could occur. Please note that unlike the old style of flipper, an end-of-stroke switch failure will not harm the flipper. The game will notify the operator of a switch being 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.

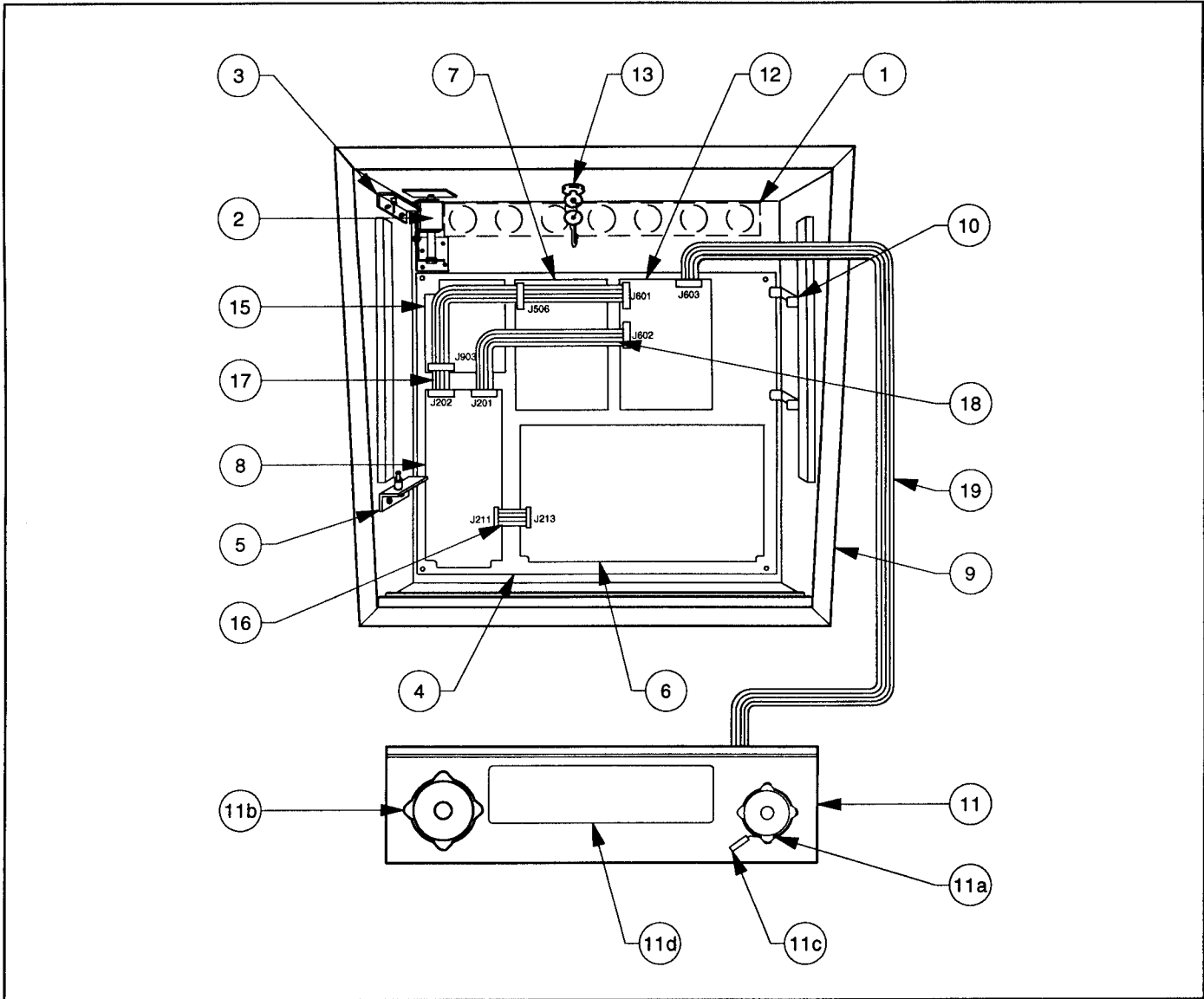
Notes

Notes

SECTION TWO

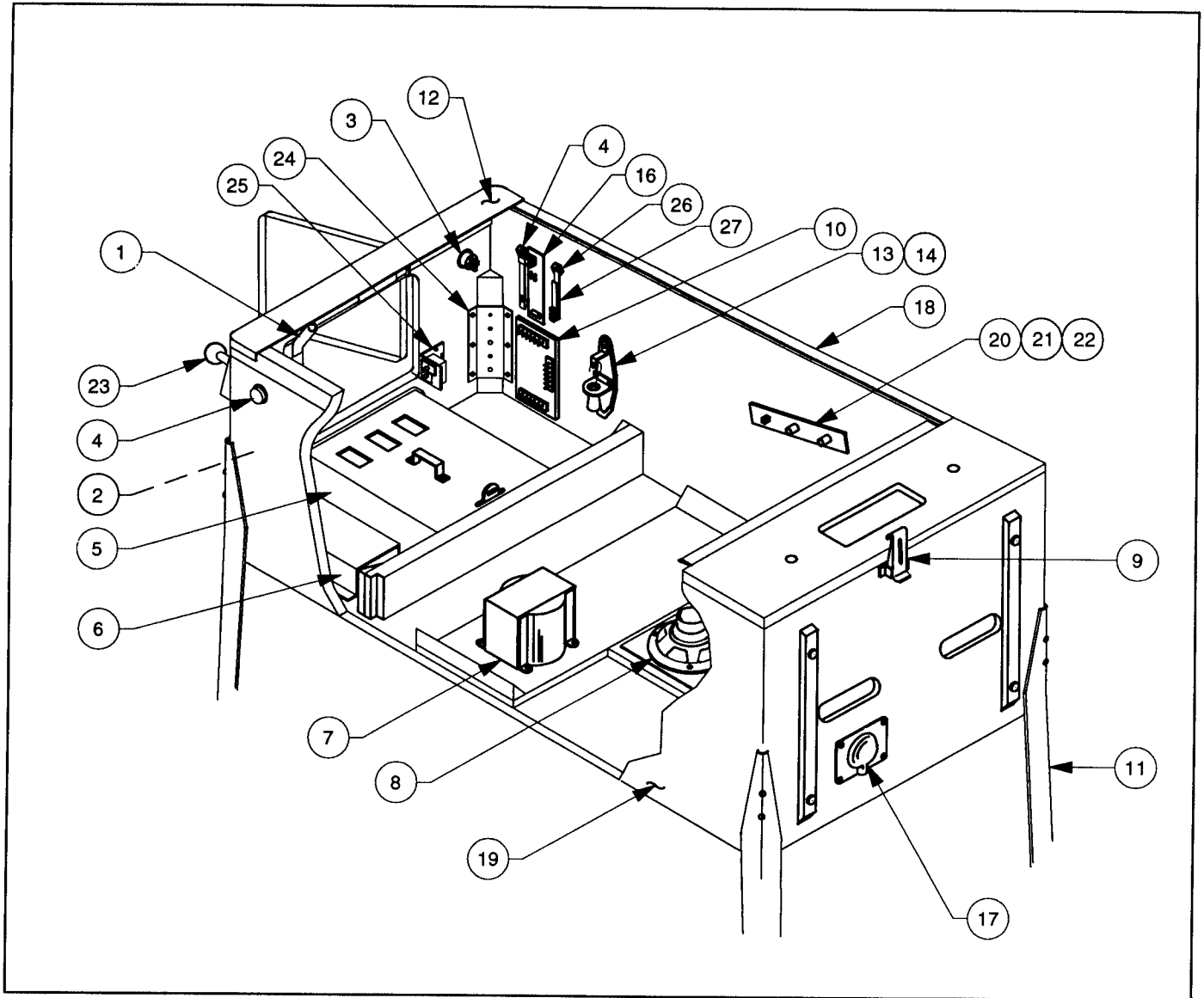
Game Parts Information

50031-BB Backbox Assembly



Item	Part No.	Description	Item	Part No.	Description
1.	01-6645	Venting Screen	14.	50031-IN	Insert Board
2.	B-10686-1	Knocker & Bracket Assembly	15.	A-15472-1	Fliptronic II Board
3.	A-12497	Insert Bd.Hinge Assy., Upper	Ribbon Cables		
4.	A-14092-5	WPC Mounting Plate Assembly	16.	5795-12653-03	Ribbon Cable, 3"
5.	A-12498	Insert Bd. Hinge Assy., Lower	17.	5795-13018-01	Ribbon Cable, 23.5"
6.	A-12697-3	Power Driver Assembly	18.	5795-10938-15	Ribbon Cable, 15"
7.	A-16917-50031	Sound Board Assembly	19.	5795-12838-30	Ribbon Cable, 30"
8.	A-17651-50031	WPC Security CPU Board	Miscellaneous Parts		
9.	A-17814-50031	Backbox Assembly	A-8552-50031	Tempered Backglass Assy.	
10.	01-9047	Insert Stop Bracket	08-7456	Backbox Glass: 27" x 18-7/8"	
11.	A-18039	Speaker/Display Assembly	31-1357-50031	Screened Translight	
a)	5555-12924-00	Speaker Tweeter, 15w, 4Ω	03-8228-2	Glass Channel Top (1)	
	5555-14044-00	Speaker Tweeter, 15w, 4Ω	03-8228-3	Glass Channel Edge (2)	
b)	5555-12856-00	Speaker, 5-1/4", 25w, 4Ω	03-8229-1	Glass Lift Channel (1)	
c)	5045-12914-00	Capacitor, 10μfd., 50v (±20%)			
d)	5901-12784-00	Dot Matrix Display/Driver Bd.			
12.	A-14039	Dot Matrix Controller Board			
13.	A-13379	Lock & Plate Assembly			
a)	20-9637	Lock & Cam Kit			

50031-CAB Cabinet Assembly



Item	Part No.	Description
1.	A-16773	Lever Guide Assembly
2.	20-9663-D-1	Extra Ball Button, Green
3.	20-9663-1	Start Button, Yellow
4.	A-16883-6	Flipper Button, Yellow (2)
5.	A-17900-1	5-Ball Cashbox Assembly
6.	A-17540	Univ. Power Interface Assy.
7.	5610-13953-00	WPC Transformer
8.	5555-12929-00	Speaker, 4Ω, 6", 25w
9.	20-9347	Toggle Latch
10.	A-17051-1	Coin Door Interface Board
11.	C-10843-BR	Leg Assembly, Brass
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.	01-10714	Line Cord Cover
18.	A-12359-3	Side Molding Assembly (2)
19.	11-1147	Wood Cabinet
20.	01-11408	Plate Spacer (2)

Item	Part No.	Description
21.	02-4329-1	Pivot Nut, 7/8" (4)
22.	02-4352	Pivot Bushing (2)
23.	A-17730	Ball Shooter Rod Assembly
24.	01-11400	Leg Plate (4)
25.	A-18249-1	Cable & Interlock Switch Assy.
	a) 01-12676	Switch Bracket
26.	A-16883-4	Button Assembly, Red
27.	A-18602	Switch & Cable Assembly

Miscellaneous Parts:

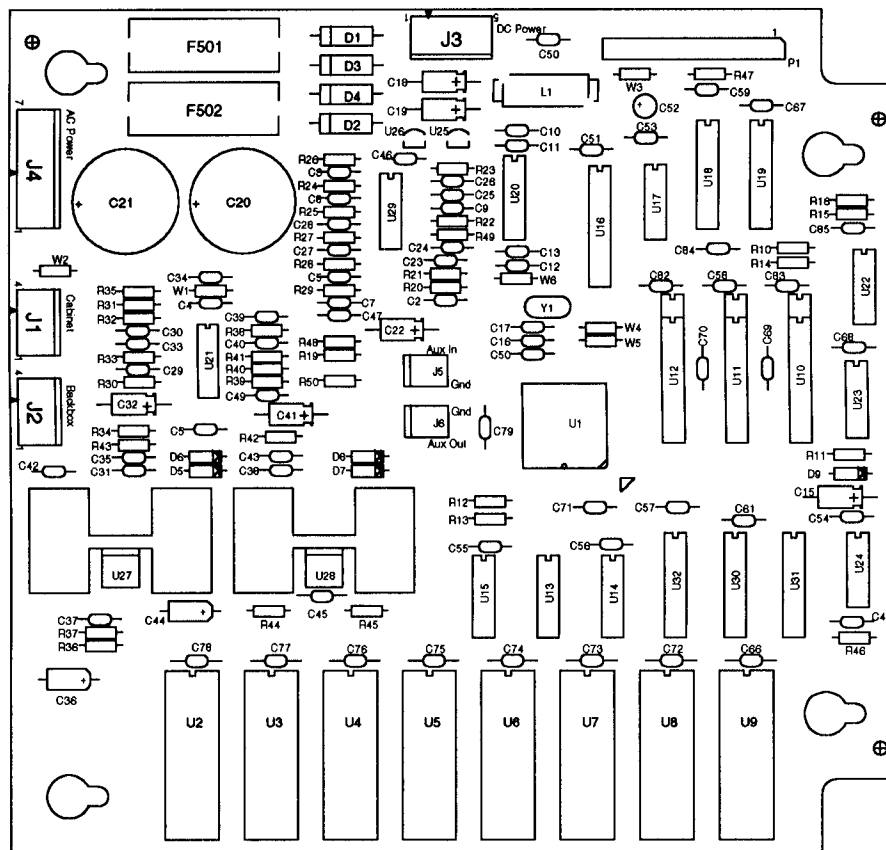
08-7028-T	Tempered Plfd. Glass: 21"x43"
01-10797	Playfield Support Bar, 18"
01-12352	Clip Bracket
08-7377	Leg Leveler Adjuster, 3"
20-6500	Steel Ball, 1-1/16" (5)
A-17195	Tilt Switch Assy. w/Cable
01-9011-L	Backbox Mtg. Bracket, Left
01-9011-R	Backbox Mtg. Bracket, Right
01-3535	Rod Mounting Plate

* See Application Chart (p.2-4)

Universal Power Interface/Cordset Application Chart

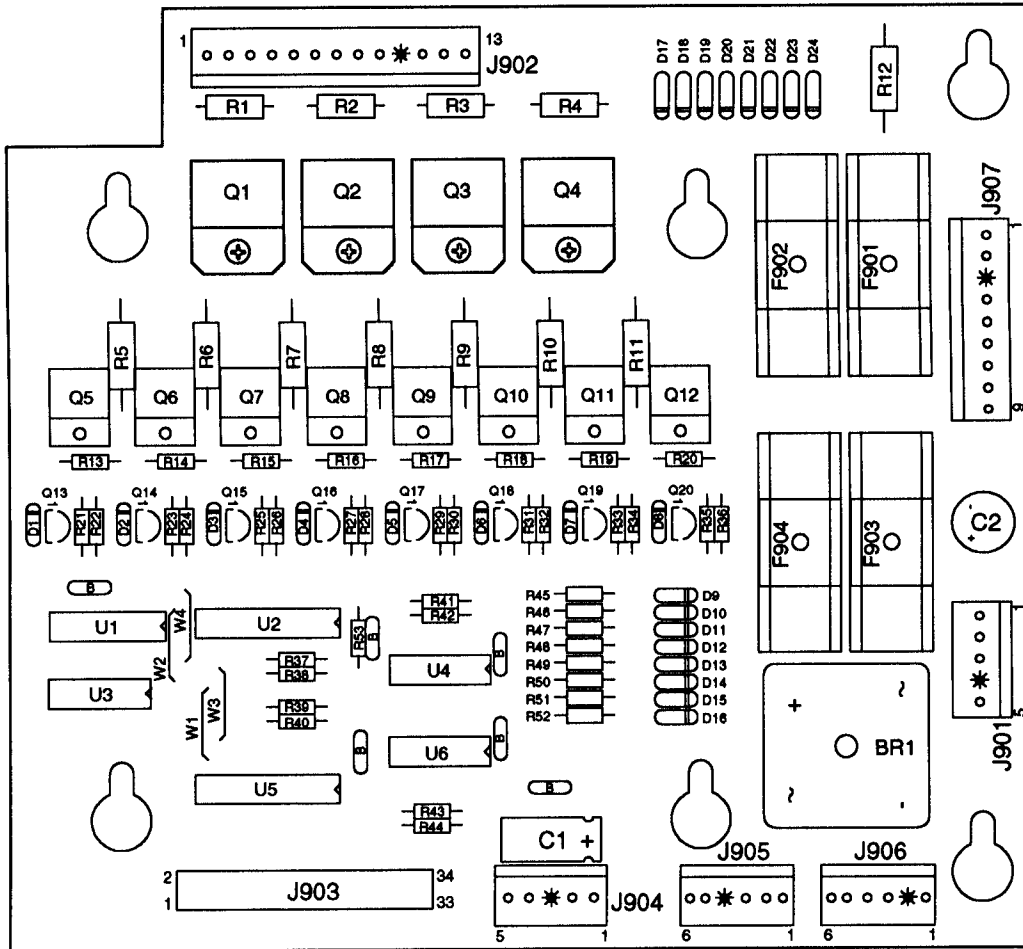
COUNTRY	UNIVERSAL PWR INTERFACE ASSY	VOLTAGE PROGRAMMING JUMP CABLE				5AMP FUSE/ LABEL	8AMP FUSE/ LABEL	LABEL HIGH VOLTAGE CAUTION	POWER ADAPTER CORD	CORDSET								
	A-17540	H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-096651-00 FUSE 16-9668 LABEL	5730-09252-00 FUSE 16-9670 LABEL	16-9669	5850-14052-00	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	X		X				X	X	X	X								
CANADA	X	X					X	X		X								
TAIWAN	X		X				X	X		X								
MEXICO	X		X				X	X		X								
CENTRAL AMERICA	X		X				X	X		X								
SOUTH KOREA	X		X				X	X		X								
PUERTO RICO	X		X				X	X		X								
AUSTRIA	X			X		X	X		X		X							
BELGIUM	X			X		X	X		X		X							
FINLAND	X			X		X	X		X		X							
FRANCE	X			X		X	X		X		X							
GREECE	X			X		X	X		X		X							
HOLLAND	X			X		X	X		X		X							
HUNGARY	X			X		X	X		X		X							
NETHERLANDS	X			X		X	X		X		X							
NETH. ANTILLES	X			X		X	X		X		X							
NORWAY	X			X		X	X		X		X							
POLAND	X			X		X	X		X		X							
PORTUGAL	X			X		X	X		X		X							
SPAIN	X			X		X	X		X		X							
SWEDEN	X			X		X	X		X		X							
TURKEY	X			X		X	X		X		X							
WEST GERMANY	X			X		X	X		X		X							
UNITED KINGDOM	X			X		X	X		X			X						
IRELAND	X			X		X	X		X			X						
HONG KONG	X			X		X	X		X			X						
DENMARK	X			X		X	X		X				X					
ITALY	X			X		X	X		X					X				
CHILE	X			X		X	X		X					X				
PEOPLE'S REP. OF CHINA	X			X		X	X		X					X				
SWITZERLAND	X			X		X	X		X						X			
AUSTRALIA	X			X		X	X		X								X	
NEW ZEALAND	X			X		X	X		X								X	
ARGENTINA	X			X		X	X		X								X	
JAPAN	X				X		X	X									X	X

A-16917-50031 Sound Board Assembly



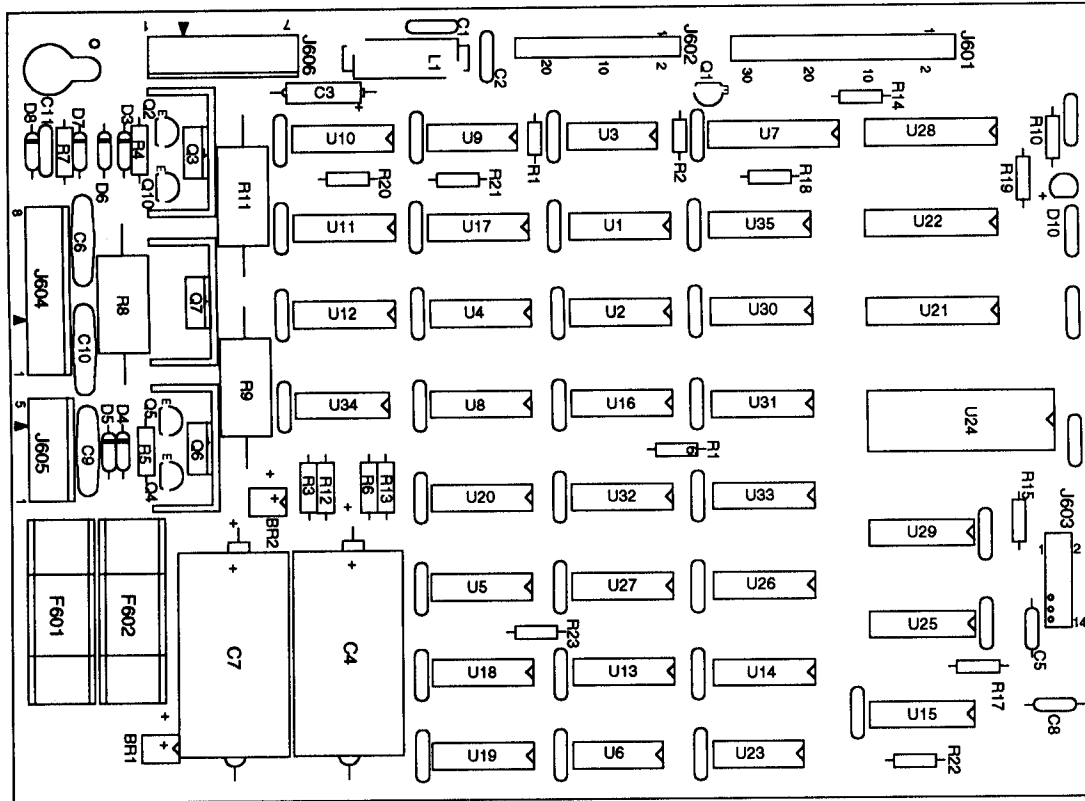
Part Number	Designator	Description	Part Number	Designator	Description
4004-01005-06	U27, U28	Mach. Screw, 4-40 x 3/8"	5070-09054-00	D5 - D9	1N4004 Signal Diode
4404-01119-00	U27, U28	Nut, 4-40	5250-13302-00	U25	78L05 Pos 5 Volt Reg TO-92
5010-08772-00	R39, R41	Resistor, 15KΩ, 1/4W, 5%	5250-13303-00	U26	79L05 Neg 5 Volt Reg TO-92
5010-08774-00	R30, R34, R37, R42, R45	Resistor, 22KΩ, 1/4W, 5%	5283-10551-00	U17	IC74F00 Fast Quad NAND Gate
5010-08991-00	R10, R12 -R16	Resistor, 4.7KΩ, 1/4W, 5%	5311-10946-00	U22	IC74HC74 Dual D Flip Flop
5010-09034-00	R47	Resistor, 10KΩ, 1/4W, 5%	5311-10947-00	U23	IC74HC125 quad Tri-State Buffer
5010-09035-00	R11, R19, R33, R40	Resistor, 47KΩ, 1/4W, 5%	5311-10948-00	U15	IC74HC138 1 of 8 Decoder
5010-09036-00	R46	Resistor, 100Ω, 1/4W, 5%	5315-12009-00	U18, U19	IC74HCT374 Octal D Flip Flop
5010-09219-00	R31, R32, R38	Resistor, 8.2KΩ, 1/4W, 5%	5311-12043-00	U13, U14	IC74HC174 Hex D Flip Flop
5010-09358-00	R50	Resistor, 1KΩ, 1/4W, 5%	5311-12538-00	U24	IC74HC14 Hex Schmitt Inverter
5010-09534-00	W4, W6	Resistor, 0Ω (Jumper)	5311-12287-00	U30 - U32	IC74HC541 Octal Bus Driver
5010-13420-00	R36, R44	Resistor, 680Ω, 1/4W, 5%	5340-13304-00	U10 - U12	ICSRAM 2Kx8 35ns .300DIP
5010-13607-00	R20-R29, R48, R49	Resistor, 6.2KΩ, 1/4W, 5%	5370-12730-00	U21, U29	ICTL084 Quad op Amp
5010-13517-00	R35, R43	Resistor, 15Ω, 1/4W, 5%	5370-13419-00	U27, U28	Audio Power Amp TDA2030AV
5040-09365-00	C15, C18, C19, C32, C41	Capacitor, 1 μF, 63V, Alum Axial	5371-13299-00	U20	ICDAC AD-1851 16 bit
5040-09421-00	C52	Capacitor, 100μF, 25V, Alum Radial	5400-13298-00	U1	Processor ADSP-2105-KP40
5040-13417-00	C20, C21	Capacitor, 10,000μF, 35V, Alum Rad.	5520-13301-00	Y1	Crystal 10MHz Parallel Resonant
5041-09009-00	C36, C44	Capacitor, 22μF, 10V, Tant Axial	5551-09822-00	L1	Inductor, 4.7μH, 3Amp
5041-13187-00	C22	Capacitor, 4.7μF Tant Axial	5700-12047-00	U16	IC socket 24 pin 0.300 DIP
5043-08996-00	C4, C5, C10-C13, C31, C35, C38, C43, C46, C47, C50 -C79	Capacitor, 0.10μF, Cer Axial	5700-12088-00	U2 - U9	IC socket 32 pin 0.600 DIP
5043-10267-00	C37, C45	Capacitor, 150pF, Cer Axial	5705-12638-00	U27, U28	Heatsink 5298-B
5048-11028-00	C16, C17	Capacitor, 22pF, Cer Axial	5733-12060-01	-	Fuse Holder MT3AG(F501, F502)
5048-11029-00	C48	Capacitor, 100pF, Cer Axial	5791-10862-04	J1, J2	Connector, 4-pin Header
5048-11030-00	C49	Capacitor, 470pF, Cer Axial	5791-10862-05	J3	Connector, 5-pin Header
5048-11033-00	C33	Capacitor, 0.022μF, 5%, Cer Axial	5791-10862-07	J4	Connector, 7-pin Header
5048-12036-00	C34, C42	Capacitor, 0.22μF, Cer Axial	5791-12516-00	P1	Connector, 34 Hen 2 x 17 Str .100
5048-13418-00	C30, C39, C40	Capacitor, .047μF, 5%, Cer Axial	A-17002	U16	PAL Sub-Assembly
5048-13608-00	C8	Capacitor, 6800 pF, 50V, Cer Axial	A-5343-50031-S2	U2	ROM Sub-Assembly
5048-13609-00	C7, C24, C26	Capacitor, 3900 pF, 50V, Cer Axial	A-5343-50031-S3	U3	ROM Sub-Assembly
5048-13610-00	C2, C3, C9, C27, C29	Capacitor, 1000 pF, 50V, Cer Axial	A-5343-50031-S4	U4	ROM Sub-Assembly
5048-13611-00	C6, C23, C25, C28	Capacitor, 680 pF, 50V, Cer Axial	A-5343-50031-S5	U5	ROM Sub-Assembly
5070-09045-00	D1 - D4	MR-501 Rectifier Diode	A-5343-50031-S6	U6	ROM Sub-Assembly
			A-5343-50031-S7	U7	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
20-9684	Q5-Q12	Fastener Snap	5162-12635-00	Q5-Q12	Transistor TIP102 NPN
4006-01003-08	Q1-Q4	Mach. Screw, 6-32	5190-09016-00	Q13 - Q20	Transistor 2N4403 PNP
4406-01128-00	Q1-Q4	Nut 6-32 KEPS	5191-12179-00	Q1-Q4	Transistor TIP36C PNP
5010-09034-00	R37 - R44, R53	Resistor, 10K Ω , 1/4w, 5%	5315-12009-00	U2	IC 74HCT374
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45 - R52	Resistor, 1K Ω , 1/4w, 5%	5315-12031-00	U5	IC 74HCT244
5010-09361-00	R1 - R4	Resistor, 220 Ω , 1/2w, 5%	5315-12812-00	U1	IC 74HCT138
5010-09416-00	R21, R23, R25, R27, R29, R31, R33, R35	Resistor, 470 Ω , 1/4w, 5%	5315-12951-00	U3	IC 74HCT00
5010-09534-00	W3, W4	Resistor, 0 Ω	5370-12272-00	U4, U6	IC LM339 QUAD COMP
5010-10171-00	R13 - R20	Resistor, 56 Ω , 1/4w, 5%	5791-10862-09	J907	Connector, 9-pin Header Sq. Pin
5011-12956-00	R5 - R12	Resistor, 2.7K Ω , 1w, 5%	5791-10862-05	J901, J904	Connector, 5-pin Header Sq. Pin
5040-08986-00	C1	Capacitor, 100M, 10v	5791-10862-13	J902	Connector, 13-pin Header Sq. Pin
5040-09537-00	C2	Capacitor, 100 μ F, 100v	5791-13830-06	J905, J906	Connector, Str Sq. Pin Header .100
5043-08980-00	B	Capacitor, .01 μ F, 50v	5791-12516-00	J903	34 HEN 2x17 STR
			5100-09690-00	BR1	Bridge Rectifier
			5731-10356-00	F901 - F904	Fuse S-B, 3A., 250v
			5733-12060-01	-	Fuse Holder (F901-F904)

A-14039 Dot Matrix Controller Assembly

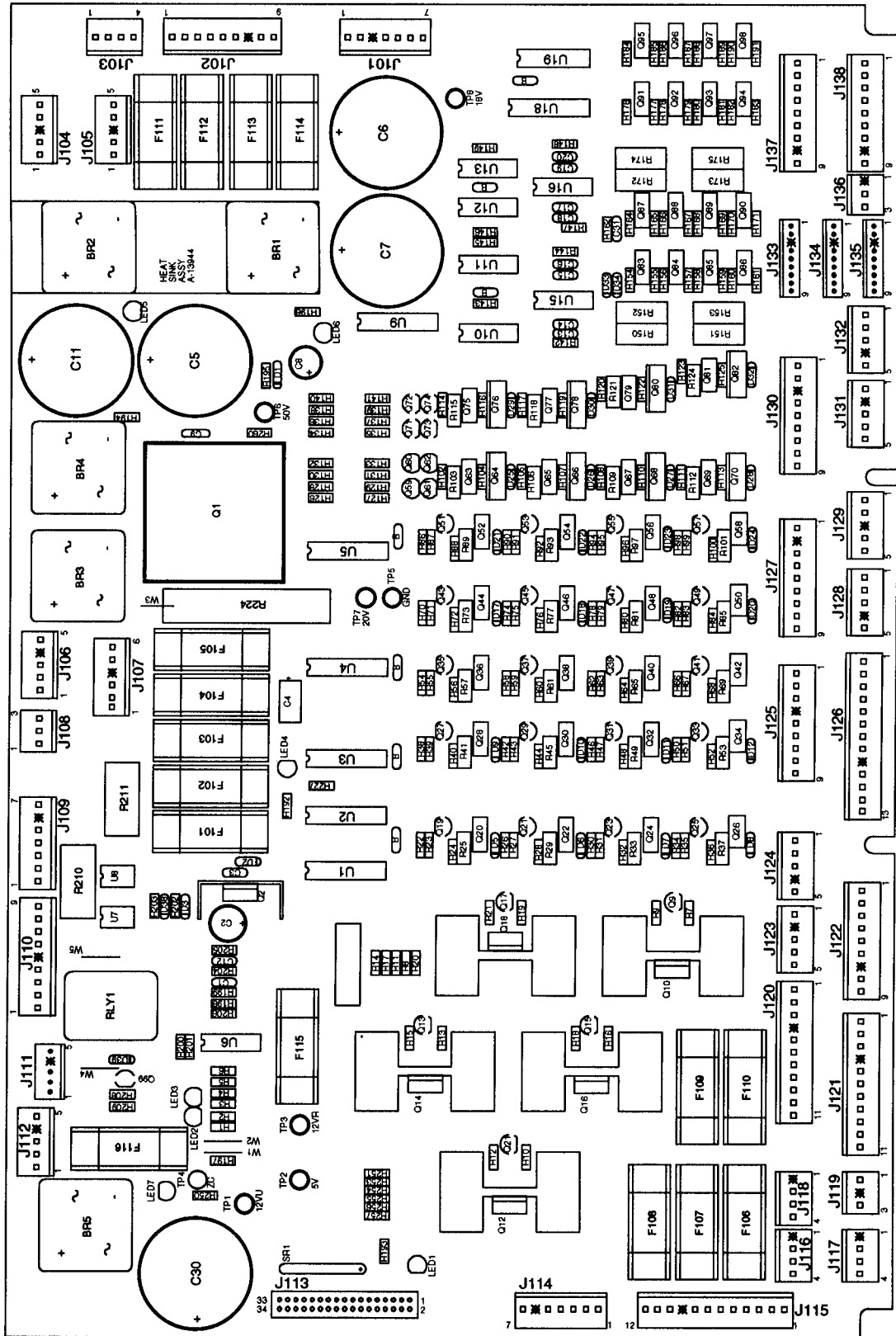


Part Number	Designator	Description	Part Number	Designator	Description
5010-08991-00	R1	Resistor, 4.7KΩ, 1/4w, 5%	5311-10947-00	U9	IC, 74HC125
5010-09224-00	R10	Resistor, 270Ω, 1/4w, 5%	5311-10951-00	U10, U11	IC, 74HC161
5010-12832-00	R3, R6, R12, R13	Resistor, 47KΩ, 1/2w, 5%	5311-10977-00	U6	IC, 74HC04
5010-12841-00	R4, R5	Resistor, 120Ω, 1/2w, 5%	5311-12817-00	U29	IC, 74HC165
5012-12830-00	R9	Resistor, 1.8KΩ, 5w, 5%	5311-12819-00	U21	IC, 74HC688
5012-12842-00	R11	Resistor, 120Ω, 5w, 5%	5311-12820-00	U23	IC, 74HC27
5012-12843-00	R8	Resistor, 4.7K, 5w, 5%	5311-12822-00	U13 - U15	IC, 74HC193
5010-10171-00	R7	Resistor, 56Ω, 1/4w, 5%	5315-12009-00	U22	IC, 74HCT374
5040-08986-00	C3	Capacitor, 100μfd., 10v, (±20%)	5315-12812-00	U1, U2, U30	IC, 74HCT138
5040-12324-00	C4, C7	Capacitor, 150μfd., 160v, (±50%)	5281-09308-00	U28	IC, 74HCT245
5043-08980-00	BYPASS	Capacitor, .01μfd., 50v, (+80, -20%)	5315-12815-00	U8, U34	IC, 74HCT08
5043-09072-00	C6, C9, C10	Capacitor, .1μfd., 500v, (+80, -20%)	5315-12816-00	U19	IC, 74HCT32
5043-09845-00	C1, C2, C11	Capacitor, 1KP, 50v, (±20%)	5315-12821-00	U7	IC, 74HCT240
5043-09492-00	C5, C8	Capacitor, 100P, 50v, (±10%)	5340-12278-00	U24	S/RAM 2064 150NS
5070-09054-00	D7	Diode, 1N4004, 1.0A.	5551-09822-00	L1	IND 4.7μH, 3.0A.
5075-12824-00	D6, D8	Zener, 1N4742A, 12v	5671-13732-00	D10	Display LED Red
5075-12823-00	D4, D5	Zener, 1N4758A, 56v	5705-09199-00	Q3, Q6, Q7	Heatsink 6030B
5075-12826-00	D3	Zener, 1N4759A, 62v	5731-12328-00	F601, F602	Fuse, 3/8A.,SB, 250v
5100-12833-00	BR1, BR2	Bridge, 400v, 1A.	5733-12060-00		Fuse Holder (F601, F602)
5160-10269-00	Q1	Transistor, 2N3904 NPN	5791-10850-00	J602	Connector, 26-pin STR Sq.
5164-09056-00	Q2, Q10	Transistor, MPSD02, NPN	5791-10862-05	J605	Connector, 5-pin Header Sq.
5164-12154-00	Q3, Q7	Transistor, MJE15030 NPN	5791-10862-07	J606	Connector, 7-pin Header Sq.
5194-09055-00	Q4, Q5	Transistor, MPSD52 PNP	5791-10862-08	J604	Connector, 8-pin Header Sq.
5194-12155-00	Q6	Transistor, MJE15031 PNP	5791-12516-00	J601	34 Hen 17x2 STR
5281-09738-00	U16, U25 - U27	IC, 74LS157	5791-12827-00	J603	14 Hen 7x2 STR
5281-10033-00	U3	IC, 74LS30	5010-09036-00	R14-R23	Resistor, 100Ω, 1/4w, 5%
5281-10043-00	U31 - U33, U35	IC, 74LS175	4006-01003-06	Q3, Q6, Q7	Mach. Screw, 6-32 x 3/8
5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74	4406-01128-00	Q3, Q6, Q7	Nut, 6-32 KEPS

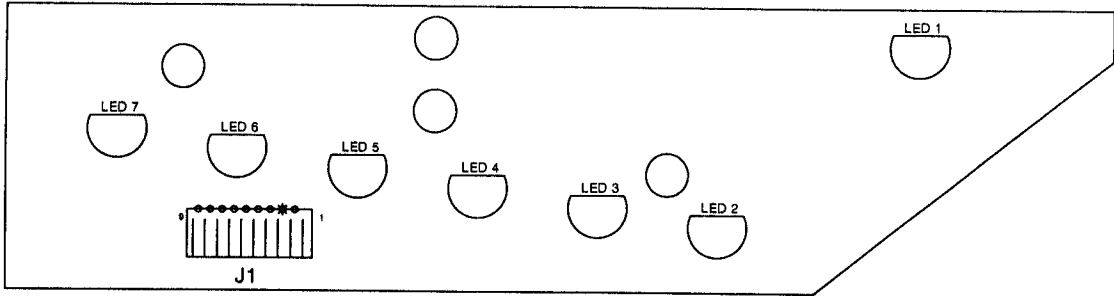
A-12697-3 WPC Power Driver Assembly

Part Number	Ckt Designator	Description	Part Number	Ckt Designator	Description
4006-01005-06	Q1, Q2	Mach. Screw, 6-32 x 3/8	5040-12313-00	C5, C6, C7, C11, C30	Capacitor, 15,000µfd, 25v (±20%)
4406-01128-00	Q1, Q2	Nut, 6-32 KEPS	5043-08980-00	B-BYPASS	Capacitor, .01µfd, 50v (+80, -20%)
4004-01005-06	Q10, Q12, Q14, Q16, Q18	Mach. Screw, 4-40 x 3/8	5043-08998-00	C13-C20, C31	Capacitor, .1µfd, 50v (±20%)
4404-01119-00	Q10, Q12, Q14, Q16, Q18	Nut, 4-40 SNUT	5043-09845-00	C1, C12	Capacitor, 1,000pfd, 50v (±20%)
5010-08981-00	R260	Resistor, 10KΩ, 1/2w, 5%	5048-10994-00	C3	Capacitor, .33µfd, 50v (±20%) Ax.
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	Resistor, 4.7KΩ, 14w, 5%	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 Rectifier, 35A., 200v
			5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac, BT138E
			5162-12422-00	U19	IC, ULN 2803
			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
5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191	Resistor, 560Ω, 1/4w, 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	Resistor, 68Ω, 1/4w, 5%	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
5010-08997-00	R24, R28, R32, R36, R40, R44, R48, R52, R56, R60, R64, R68, R72, R76, R80, R84, R88, R92, R96, R100, R102, R105, R108, R111, R114, R117, R120, R123, R195	Resistor, 2.7KΩ, 1/4w, 5%	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 8 Dual D Flipflop
			5281-09487-00	U10-U13	IC, 74LS74 Dual D Flipflop
			5281-10182-00	U9	IC, 74LS240, L/Dvr
			5370-12272-00	U6, U15, U16	IC, LM339 Quad. Comp
			5460-12423-00	Q2	IC, LM 7812
5010-08998-00	R155, R157, R159, R161, R165, R167, R169, R171	Resistor, 2.2KΩ, 1/4w, 5%	5671-13732-00	LED1 - LED7	Display LED Red
5010-09034-00	R3, R4, R6, R142-R149, R197, R198	Resistor, 10KΩ, 1/4w, 5%	5701-09652-00	Q1	Thermal Pad TO-3
5010-09085-00	R194, R196, R251, R253-R257	Resistor, 1.5KΩ, 1/4w, 5%	5705-09199-00	Q2	Heatsink, #6030B
			5705-12637-00	Q1	Heatsink 5054
5010-09086-00	R252	Resistor, 6.8KΩ, 1/4w, 5%	5705-12638-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
5010-09224-00	R1, R2, R192, R201, R205, R208	Resistor, 270Ω, 1/4w, 5%	5733-12060-01		Fuse Holder, F101-F116
5010-09314-00	R176, R178, R180, R182, R184, R186, R188, R190	Resistor, 1.2KΩ, 1/4w, 5%	5791-10862-03	J108, J119, J136	Connector, 3-pin Header STR Sq.
			5791-10862-04	J103, J116-J118	Connector, 4-pin Header STR Sq.
5010-09324-00	R206	Resistor, 27KΩ, 1/4w, 5%	5791-10862-05	J112, J104-J106, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header STR Sq.
5010-09358-00	R154, R156, R158, R160, R164, R166, R168, R170, R162, R193, R199, R200, R250	Resistor, 1KΩ, 1/4w, 5%			
			5791-10862-06	J107	Connector, 6-pin Header STR Sq.
5010-09361-00	R104, R107, R110, R113, R116, R119, R122, R125	Resistor, 220Ω, 1/4w, 5%	5791-10862-07	J101, J109, J114	Connector, 7-pin Header STR Sq.
5010-09416-00	R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141	Resistor, 470Ω, 1/4w, 5%	5791-10862-09	J102, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header STR Sq.
			5791-10862-11	J120, J121	Connector, 11-pin Header STR Sq.
			5791-10862-12	J115	Connector, 12-pin Header STR Sq.
			5791-10862-13	J126	Connector, 13-pin Header STR Sq.
			5791-13830-05	J111	Connector, 5-pin Header STR Sq.
			5791-13830-09	J133-J135	Connector, 9-pin Header STR Sq.
			5791-12516-00	J113	Connector, 9-pin Header STR Sq.
			5824-09248-00	TP1-TP8	34 HEN 2x17 STR
			5041-09163-00	C9	Test Point #1502-1
5010-09534-00	W1, W2	Resistor, 0Ω	5730-09071-00	F114	Capacitor, 2.2µfd TANT
5010-11079-00	R7, R10, R13, R16, R19	Resistor, 51Ω, 1/4w, 5%	5731-09432-00	F112	Fuse, 8A, 32v
5010-12427-00	R150-R153, R172-R175	Resistor, .22Ω, 1w, 5%	5731-09651-00	F106 - F111, F113	Fuse, S-B, 7A., 250v
5012-12632-00	R224	Resistor, .12Ω, 10w, 5%	5731-10356-00	F101 - F105, F116	Fuse, S-B, 5A., 250v
5019-10143-00	SR1	SIP, 9R, 10 pin, 470Ω, 5%	5730-09797-00	F115	Fuse, S-B, 3A., 250v
5040-08986-00	C4	Capacitor, 100µfd, 10v (±20%)	5705-12698-00		Fuse, S-B, 3/4A., 250v
5040-09421-00	C2	Capacitor, 100µfd, 25v (+50, -10%)	4010-01006-00		Heatsink #62365
5040-09537-00	C8	Capacitor, 100µfd, 100v (±20%)			Mach. Screw, 10-32 x 5/8

A-12697-3 WPC Power Driver Assembly

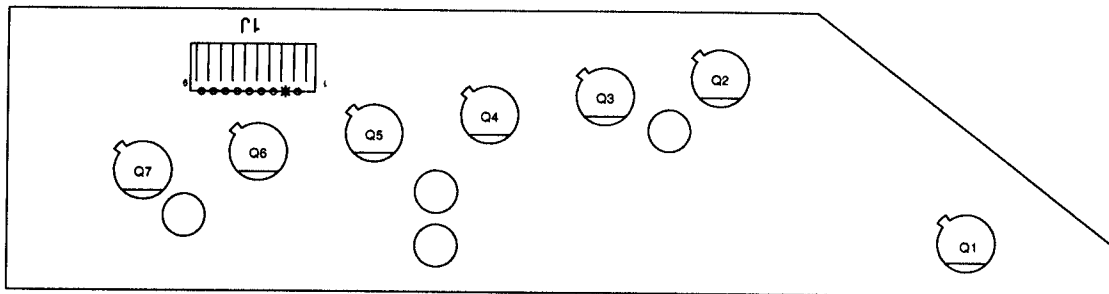


A-18617 Trough 7 IRED PCB Assembly



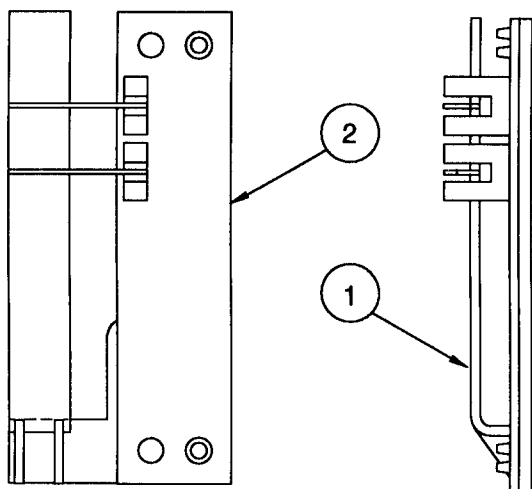
Part No.	Designator	Description
5671-12731-00	LED1 - LED7	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-18618 Trough 7 IR TSTR PCB Assembly



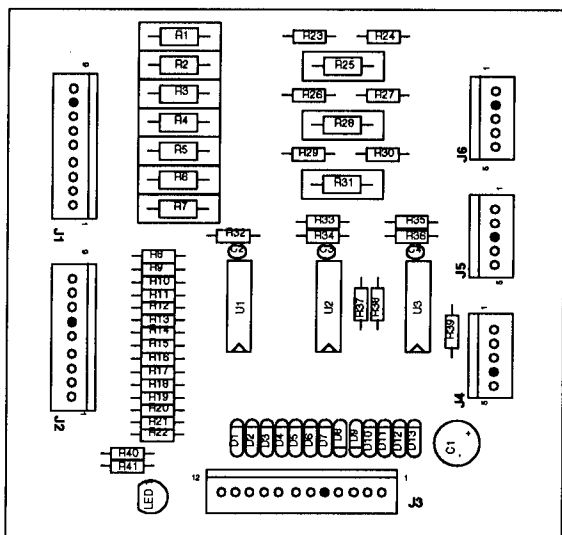
Part No.	Designator	Description
5163-14114-00	Q1 - Q7	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-17316 Flipper Opto PCB Assembly



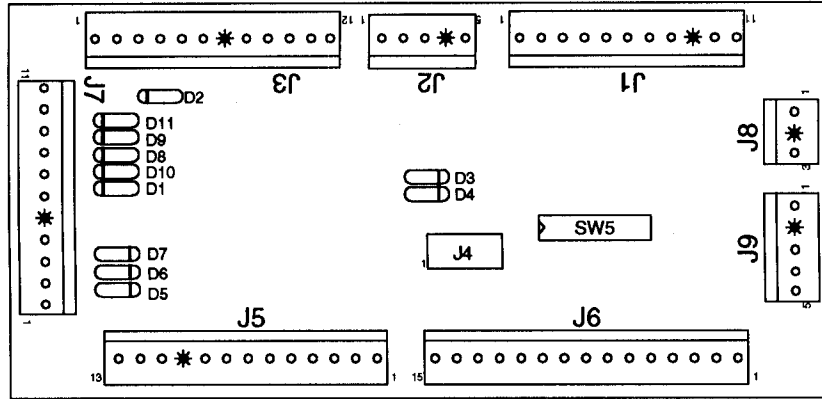
Item	Part Number	Description
1.	03-9001	Interrupter Flip-Opto
2.	A-16384	Flipper Opto Switch Assembly
	5010-08930-00	Resistor, 470Ω, 1/2w, 5%
	5490-12451-00	Opto Inter Lg. 10mA.
	5791-12462-07	Connector, 7-pin Header

A-18159 10-Switch Opto Assembly



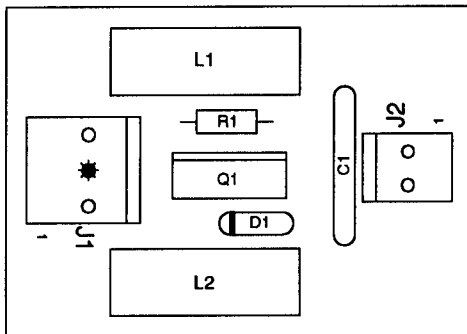
Part Number	Designator	Description
5040-10974-00	C1	Capacitor, 100μfd, 35v (+80, -20%)
5043-08980-00	C2 - C4	Capacitor, 0.01μfd, 50v (+1, -20%)
5671-13732-00	LED1	Display LED 1 Red
5370-12272-00	U1 - U3	IC LM339 Quad
5070-09054-00	D1 - D13	Diode 1N4004 1.0A.
5010-12928-00	R1- R7, R25, R28, R31	Resistor, 270Ω, 2w, 5%
5010-09999-00	R8 - R21, R23, R24, R26, R27, R29, R30	Resistor, 2KΩ, 1/4w, 5%
5010-09314-00	R22	Resistor, 1.2KΩ, 1/4w, 5%
5010-09162-00	R32, R35, R39, R40, R41	Resistor, 100KΩ, 1/4w, 5%
5010-08774-00	R33, R34, R36	Resistor, 22KΩ, 1/4w, 5%
5010-09034-00	R37, R38	Resistor, 10KΩ, 1/4w, 5%
5791-10862-12	J3	Connector, 12-pin Header STR Sq. Pin
5791-10862-09	J1, J2	Connector, 9-pin Header STR Sq. Pin
5791-10862-05	J4 - J6	Connector, 5-pin Header STR Sq. Pin

A-17051-1 Coin Door Interface PCB Assembly



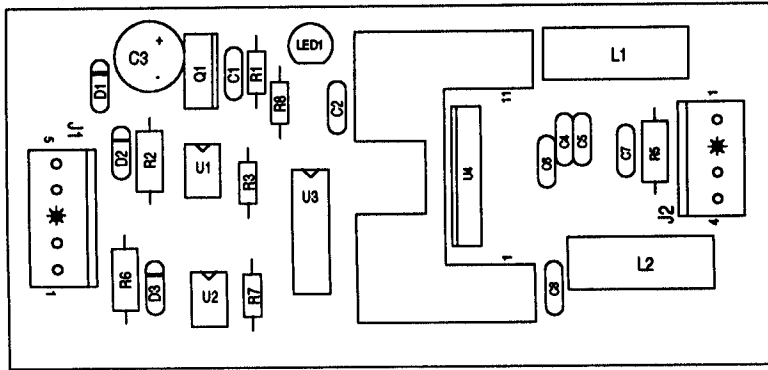
Part Number	Designator	Description
5791-10862-03	J8	Connector, 3-pin Header Str Sq. pin .156
5791-10862-05	J2, J9	Connector, 5-pin Header Str Sq. pin .156
5791-10862-11	J1, J7	Connector, 11-pin Header Str Sq. pin .156
5791-10862-12	J3	Connector, 12-pin Header Str Sq. pin .156
5791-10862-13	J5	Connector, 13-pin Header Str Sq. pin .156
5791-10862-15	J6	Connector, 15-pin Header Str Sq. pin .156
5645-09025-00	SW5	Sw DIP 8 Pos
5070-09054-00	D1 - D11	Diode, 1N4004, 1.0A.
5791-11000-10	J4	Connector, 10-pin Header Str Sq. pin .156

A-15542 Motor EMI PCB Assembly



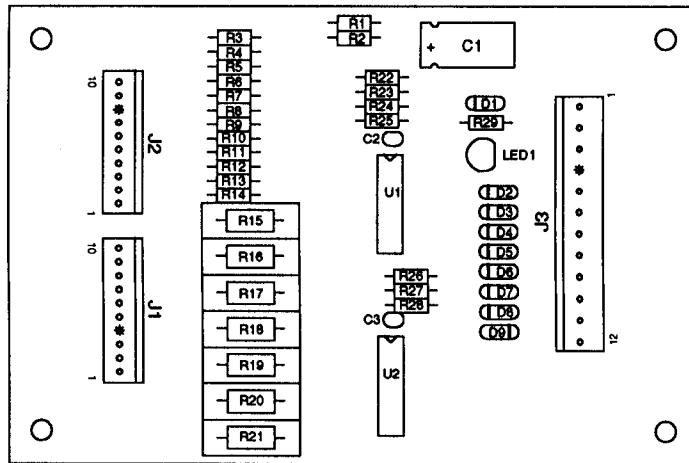
Part Number	Designator	Description
5551-09822-00	L1, L2	Ind. 4.7MH3AMP
5791-12273-03	J1	Connector, 3-pin Header Sq.
5791-12273-02	J2	Connector, 2-pin Header Sq.
5070-09054-00	D1	Diode 1N4004, 1.0A.

A-16120 DC Motor Control Assembly



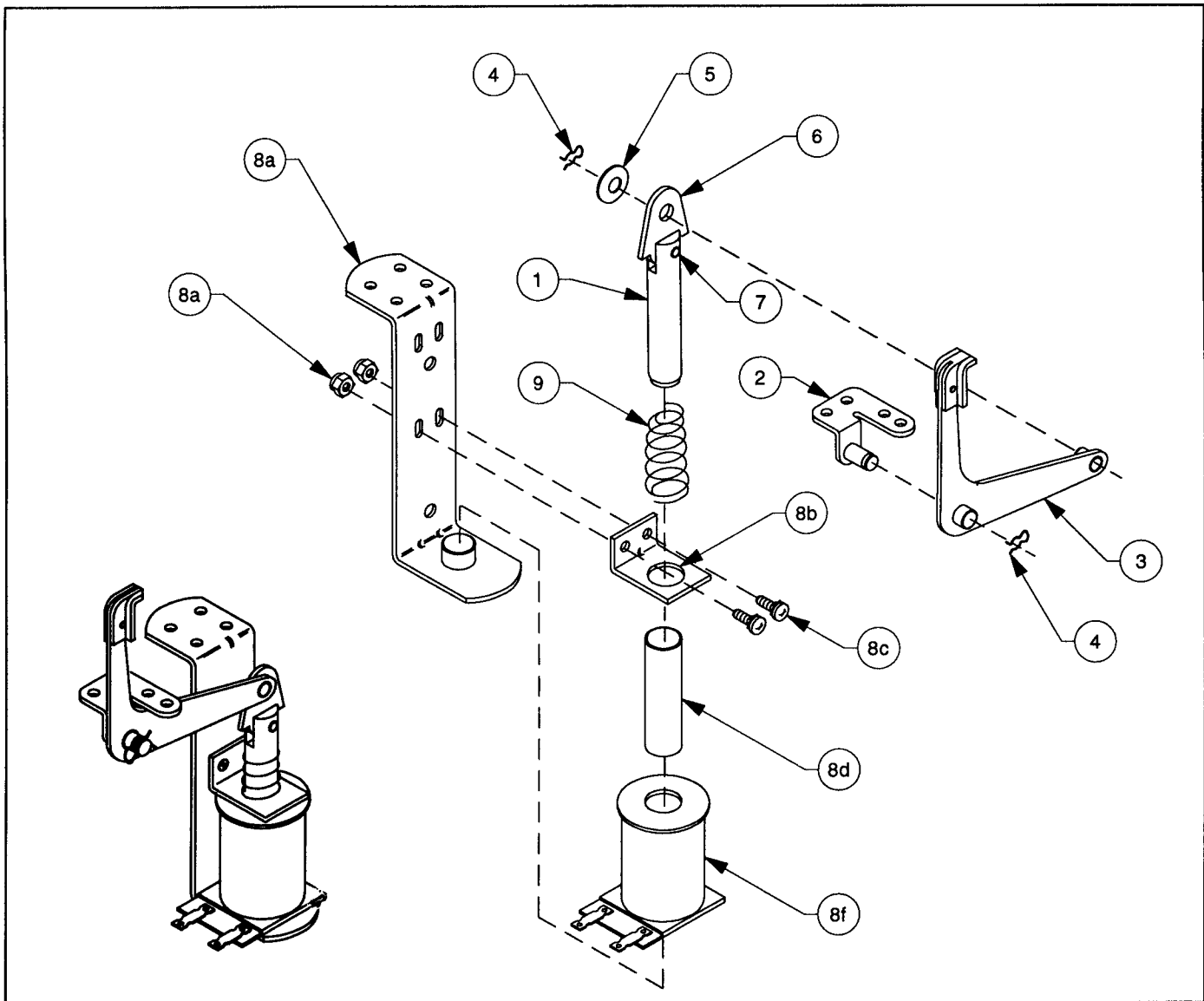
Part Number	Designator	Description
5791-12273-04	J2	Connector, 4-pin Header
5791-12273-05	J1	Connector, 5-pin Header
5671-09019-00	LED1	Display Red LED
5070-09054-00	D1 - D3	Diode 1N4004 1.0A.
5551-09822-00	L1, L2	Ind. 4.7mH, 3.0A.
5010-09061-00	R2, R6	Resistor, 680Ω, 1/2w, 5%
5010-10255-00	R5	Resistor, 10Ω, 1/2w, 5%
5010-08997-00	R3, R7, R8	Resistor, 2.7KΩ, 1/2w, 5%
5010-09085-00	R1	Resistor, 1.5KΩ, 1/2w, 5%
5040-10974-00	C3	Capacitor, 100μFd, 35v Rad
5370-13342-00	U4	IC 3A D.OS Bridge Driver
5490-10892-00	U1, U2	Opto Isolator 4N25
5250-09157-00	Q1	Reg. 7805 1.0A, 5V
5043-08980-00	C2, C4, C6-C8	Cap., .01μFd, 50v (+80, -20%)
5041-09031-00	C1	Cap., 1μFd, 25v (±20%) Axial
5281-09500-00	U3	IC 74LS32 Quad
5043-08996-00	C5	Capacitor, .1M, 50V (±20%)

A-15576 7-Switch Opto PCB Assembly



Part Number	Designator	Description	Part Number	Designator	Description
5040-12298-00	C1	Cap., 100 μ fd, 40v (\pm 50%)	5010-10631-00	R29	Resistor, 1.2K Ω , 2w, 5%
5043-08980-00	C2, C3	Capacitor, .01 M 50v	5010-09162-00	R23, R25, R26	Resistor, 100K Ω , 2w, 5%
5671-09019-00	LED 1	Display LED Red	5010-08774-00	R22, R24	Resistor, 22K Ω , 1/4w, 5%
5370-12272-00	U1, U2	IC LM339 Quad.	5010-09034-00	R28	Resistor, 10K Ω , 1/4w, 5%
5070-09054-00	D1 - D9	Diode 1N4004 1.0A.	5791-10862-12	J3	Connector, 12-pin Header Str Sq.
5010-12928-00	R15 - R21	Resistor, 270K Ω , 2w, 5%	5791-12462-10	J1, J2	Connector, 10-pin Header Str Sq.
5010-09999-00	R1 - R14	Resistor, 2K Ω , 2w, 5%			

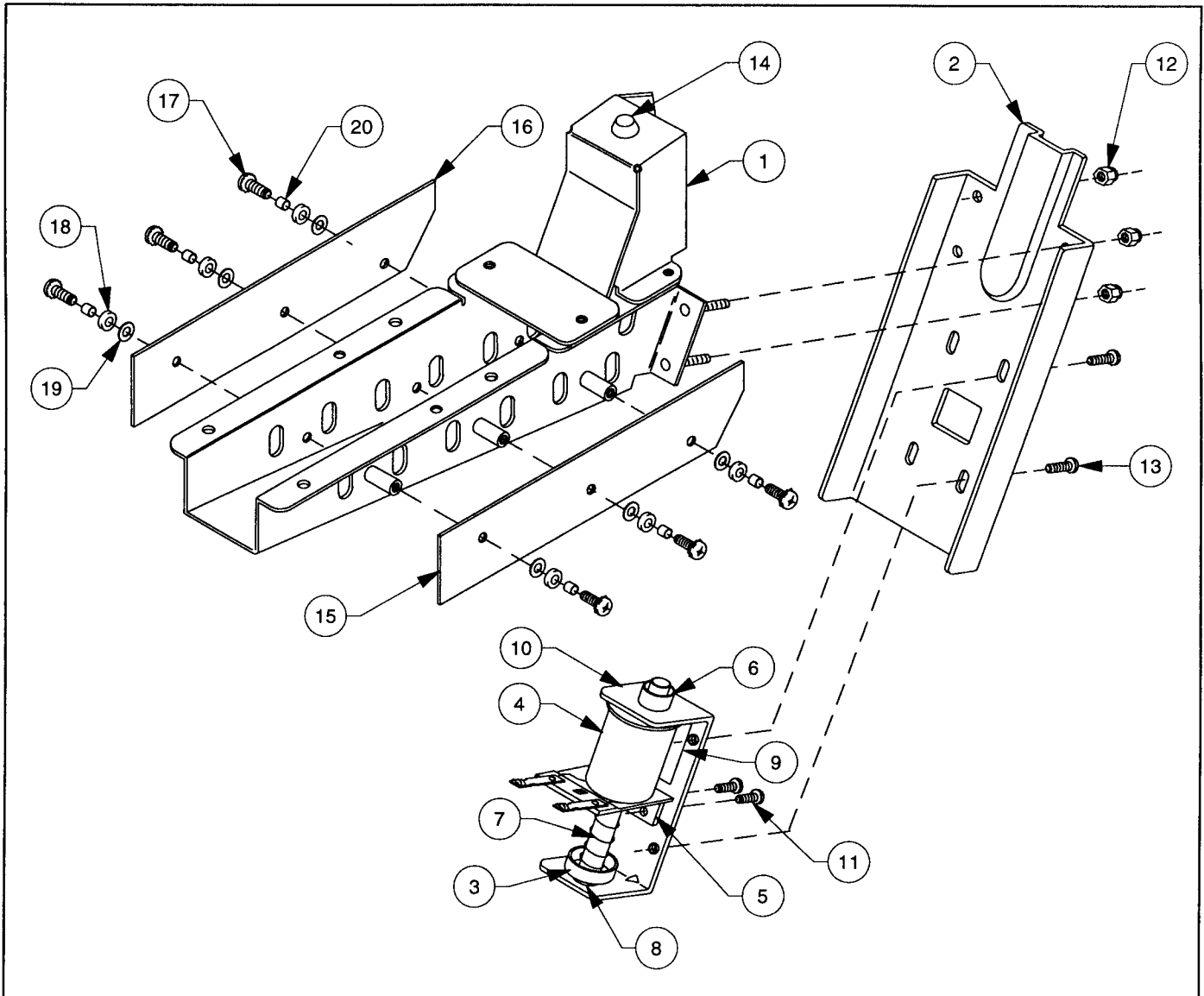
A-17811 Kicker Arm (Slingshot) Assembly



Associated Parts for Right & Left Kickers:

Item	Part No.	Description	Item	Part No.	Description
1.	02-2364	Coil Plunger	8.	B-9362-R-3	Coil & Bracket Assy., Right
2.	A-17810	Mounting Bracket Assembly		B-9362-L-2	Coil & Bracket Assy., Left
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	Flatwasher, 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-18753 Outhole Ball Trough Assembly

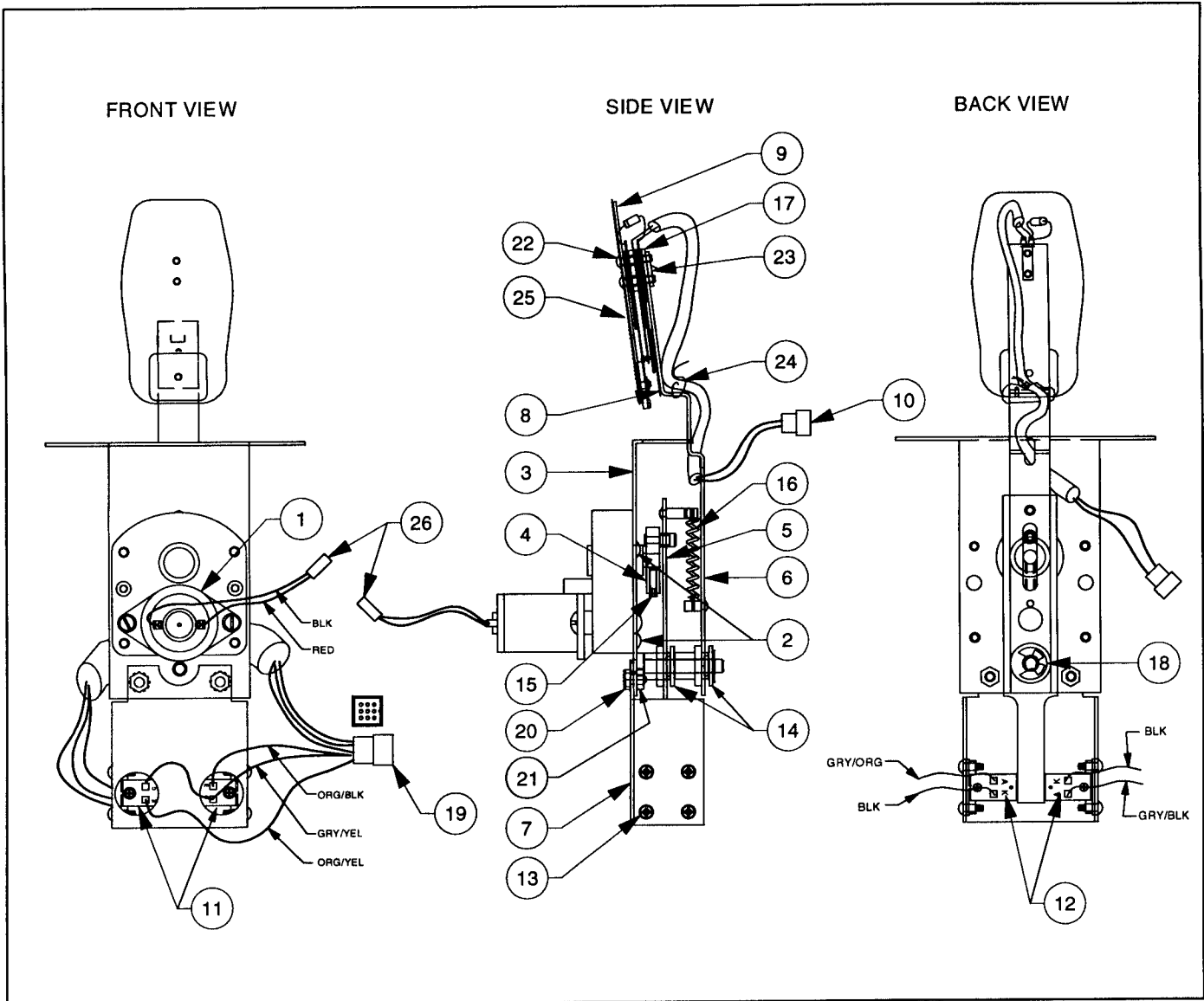


Item	Part No.	Description	Item	Part No.	Description
1.	A-16809	Ball Trough Welded Assy.	11.	4008-01017-05	Mach. Screw, 8-32 x 5/16"
2.	01-11587	Ball Trough Front	12.	4408-01119-00	Nut 8-32 ESN
3.	A-6306-2	Bell Armature Assembly	13.	4008-01017-06	Mach. Screw, 8-32 x 3/8"
4.	AE-26-1500	Coil Assembly	14.	23-6702	Bumper Plug
5.	01-8-508-T	Solenoid Assembly	15.	A-18617	Trough 7 IRED PCB Assembly
6.	03-7067-5	Coil Tubing	16.	A-18618	Trough 7 IR TSTR 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	Grommet
9.	03-8523	Insulator	19.	4700-00004-00	Flatwasher, 9/64 x 7/16 x 21ga.
10.	01-11586	Coil Mounting Brkt. (Bell)	20.	02-4975	Bushing

Associated Assemblies: (Not Shown)

A-15576	7-Switch Opto Board
H-18757	7 Opto Trough Cable, Input
H-18758	7 Opto Trough Cable, Output

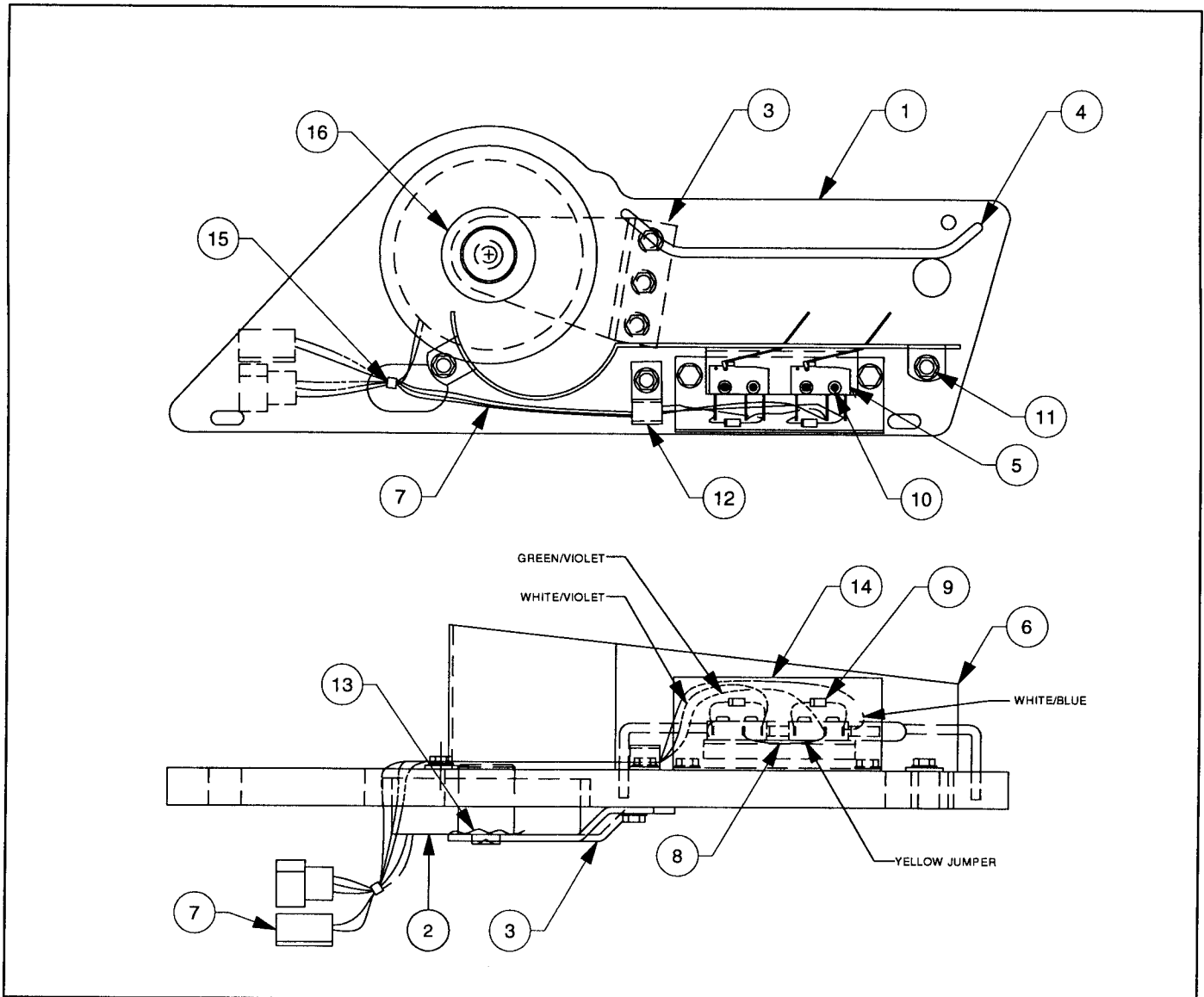
A-17741 Goalie Unit Assembly



Item	Part No.	Description	Item	Part No.	Description
1.	14-7997	Motor	14.	4700-00033-00	Flatwasher, 17/64 x 3/4 x 15ga.
2.	4008-01003-12	Mach. Screw, 8-32 x 3/4"	15.	4008-01083-08	Set Screw, #8-32 x 1/2"
3.	A-17780.1	Mtr. Bracket Assembly	16.	10-362	Spring
4.	A-17744	Crank Assembly	17.	A-17779	Target Switch Assembly
5.	A-17782.1	Drive Assembly	18.	20-8712-25	"E" Ring, 1/4" Shaft
6.	A-17743	Target Assembly	19.	H-18204	Opto Cable Assembly
7.	01-12333.1	Goalie Opto Bracket	20.	4008-01168-06	Mach. Screw, #8-32 x 3/8"
8.	03-8523	Insulator, 3/4 x 1-1/4"	21.	4408-01119-01	Nut #8-32 ESN
9.	03-9134	Goalie Plastic	22.	4005-01003-12	Mach. Screw, #5-40 x 3/4"
10.	H-18214-1	Switch Cable Assembly	23.	01-12823	Nut Plate
11.	A-16909	Photo Transistor Assembly	24.	03-7520-2	Tie Wrap
12.	A-16908	LED Assembly	25.	*31-1924-7	Decal
13.	4106-01013-06	Sh. Metal Screw, #6 x 3/8"	26.	H-18600-4	Cable

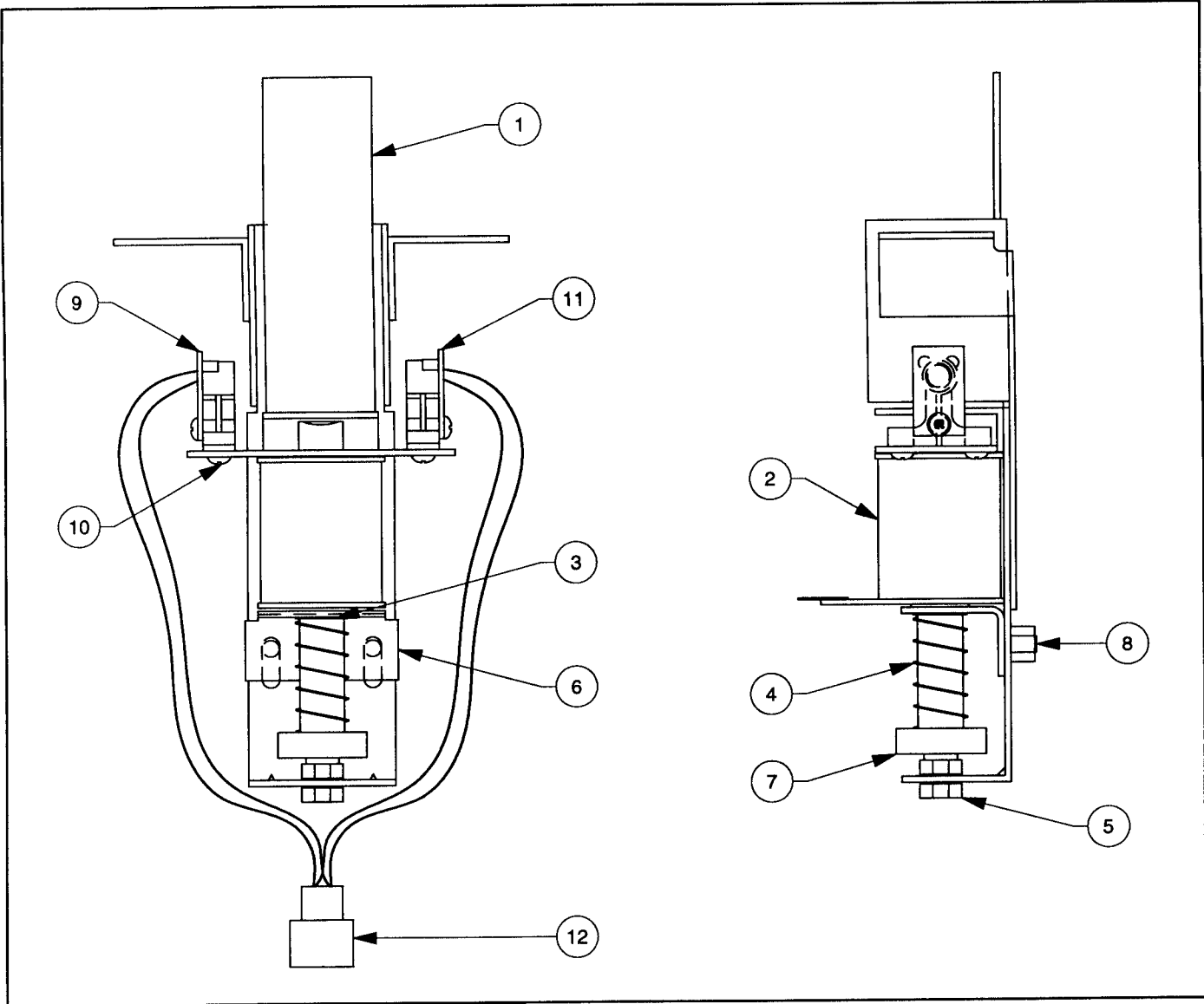
* Not available for individual sale. Order Decal Set 31-1924.

A-18222 Mini-Playfield Assembly



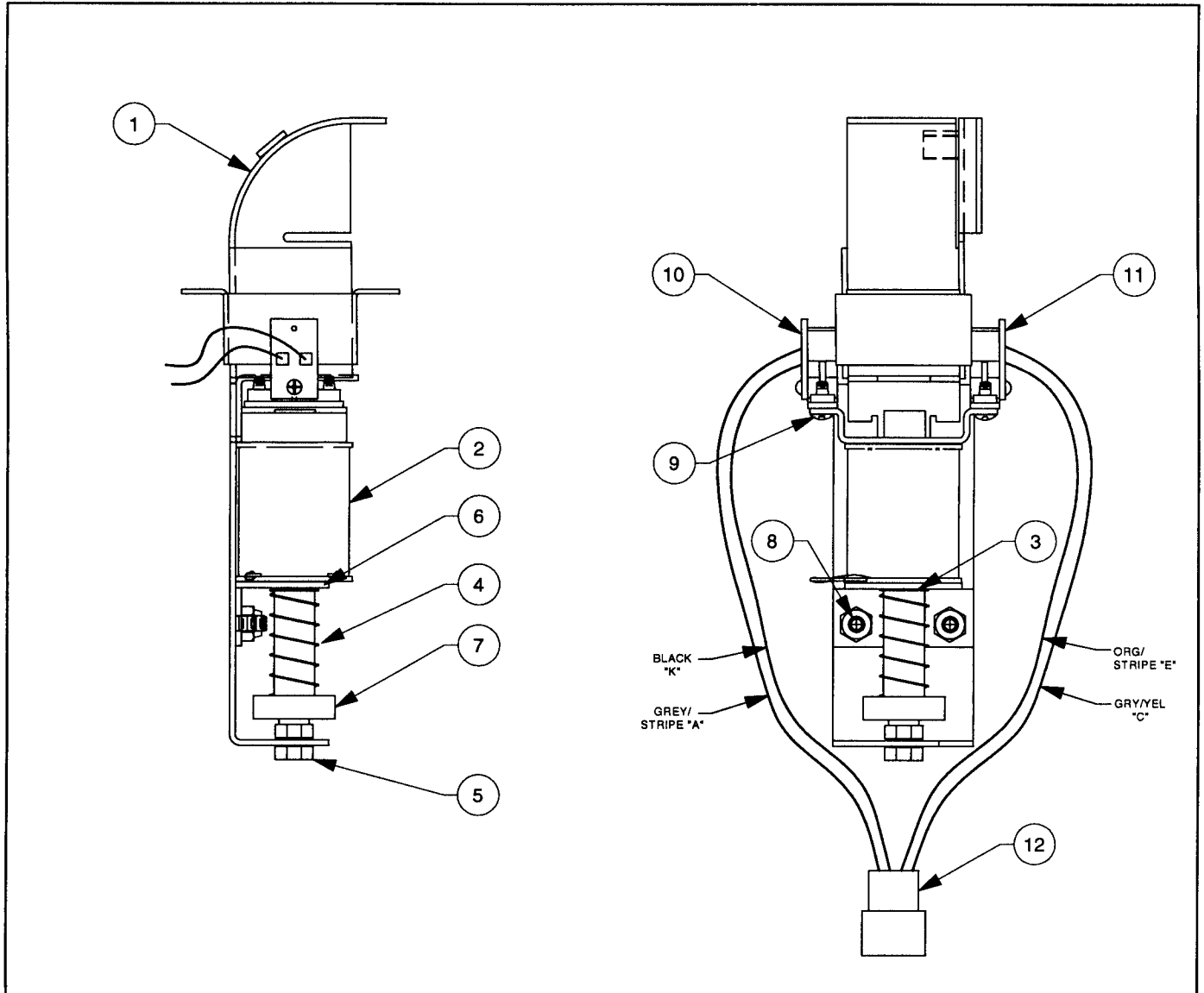
Item	Part Number	Description	Item	Part Number	Description
1.	36-50031-1	Hard Coat Mini-Playfield	9.	5070-09054-00	Diode 1N4004
2.	20-9247	Coil Magnet	10.	4002-01105-06	Mach. Screw, 2-56 x 3/8"
3.	A-18157	Magnet Bracket & Pole Piece	11.	4808-01175-08	E-P #8 x 1/2 IND. PL-HWH
4.	12-7195.1	Wire Ball Guide	12.	03-7655-4	Cable Clamp, 1/4"
5.	5647-12693-59	Switch	13.	20-9672	Wave Spring Washer
6.	A-18226	Switch Ball Guide Assembly	14.	01-13063	Shield, Mini-Playfield Switch
7.	H-18205	Switch Cable	15.	03-7520-2	Tie Wrap, Nylon 3-7/8"
8.	17-1116-2	Jumper Wire Cut, 2"	16.	03-9189-3	Mylar

A-17839 Goalie Ball Popper Unit Assembly



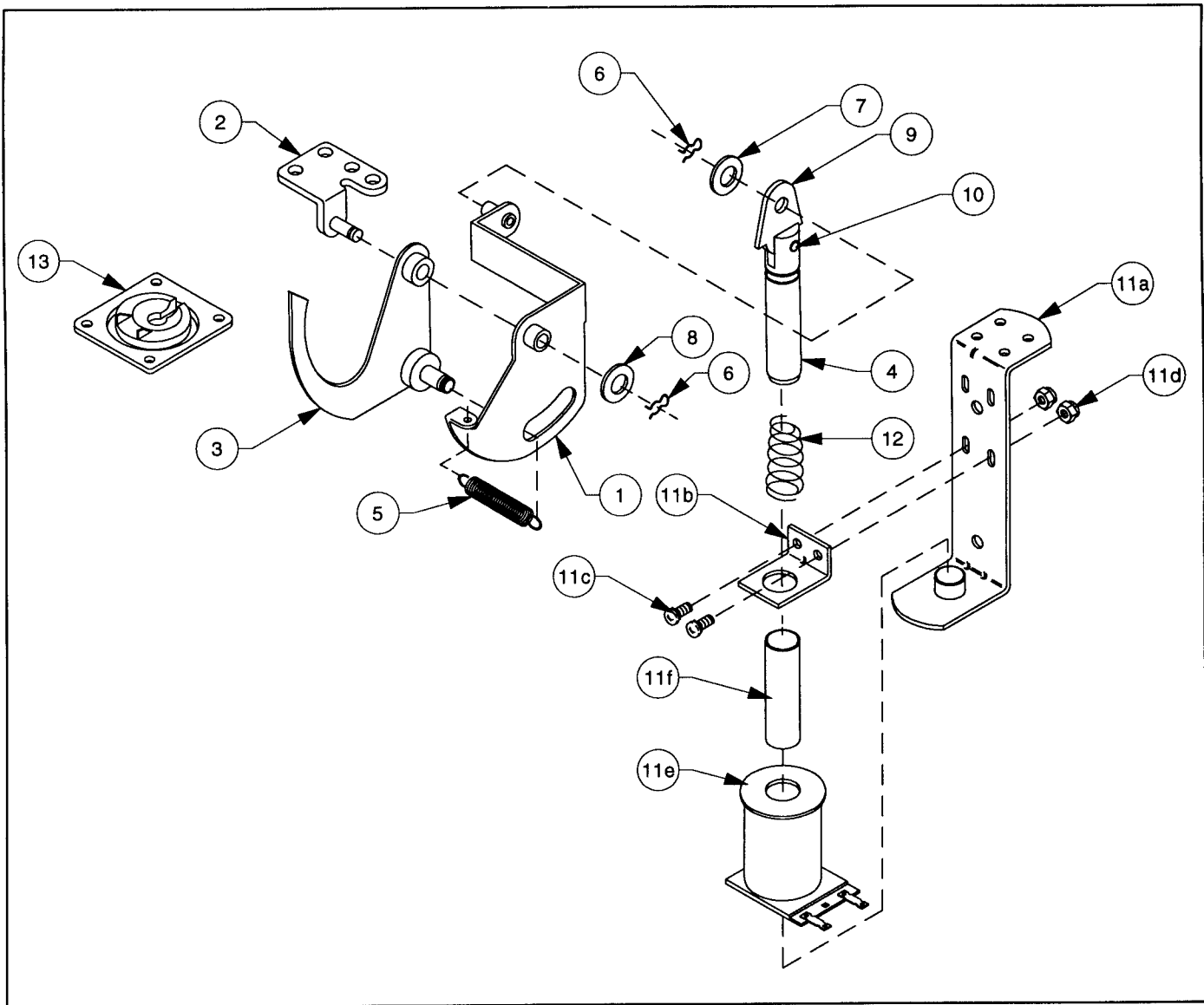
Item	Part No.	Description
1.	A-17840.1	Ball Popper Sub-Assembly
2.	AE-23-800	Coil Assembly
3.	03-7067	Tubing Coil
4.	10-135	Solenoid Spring
5.	23-6340	Rubber Grommet
6.	A-16858	Coil Bracket
7.	A-17767	Bell Armature Assembly
8.	4408-01119-01	Nut 8-32 ESN
9.	A-16909	Photo Transistor Assembly
10.	4106-01013-06	Sh. Metal Screw, #6 x 3/8"
11.	A-16908	LED Assembly
12.	H-17609-5	Cable Assembly

A-18213 Ball Popper Assembly



Item	Part No.	Description
1.	A-18212.1	Ball Popper Sub-Assembly
2.	AE-26-1500	Coil Assembly
3.	03-7067	Tubing Coil
4.	10-135	Solenoid Spring
5.	23-6340	Rubber Grommet
6.	01-10895	Coil Bracket
7.	A-17767	Bell Armature Assembly
8.	4408-01119-01	Nut 8-32 ESN
9.	4106-01013-06	Sh. Metal Screw, #6 x 3/8"
10.	A-16908	LED Assembly
11.	A-16909	Photo Transistor Assy.
12.	H-17609-8	Cable

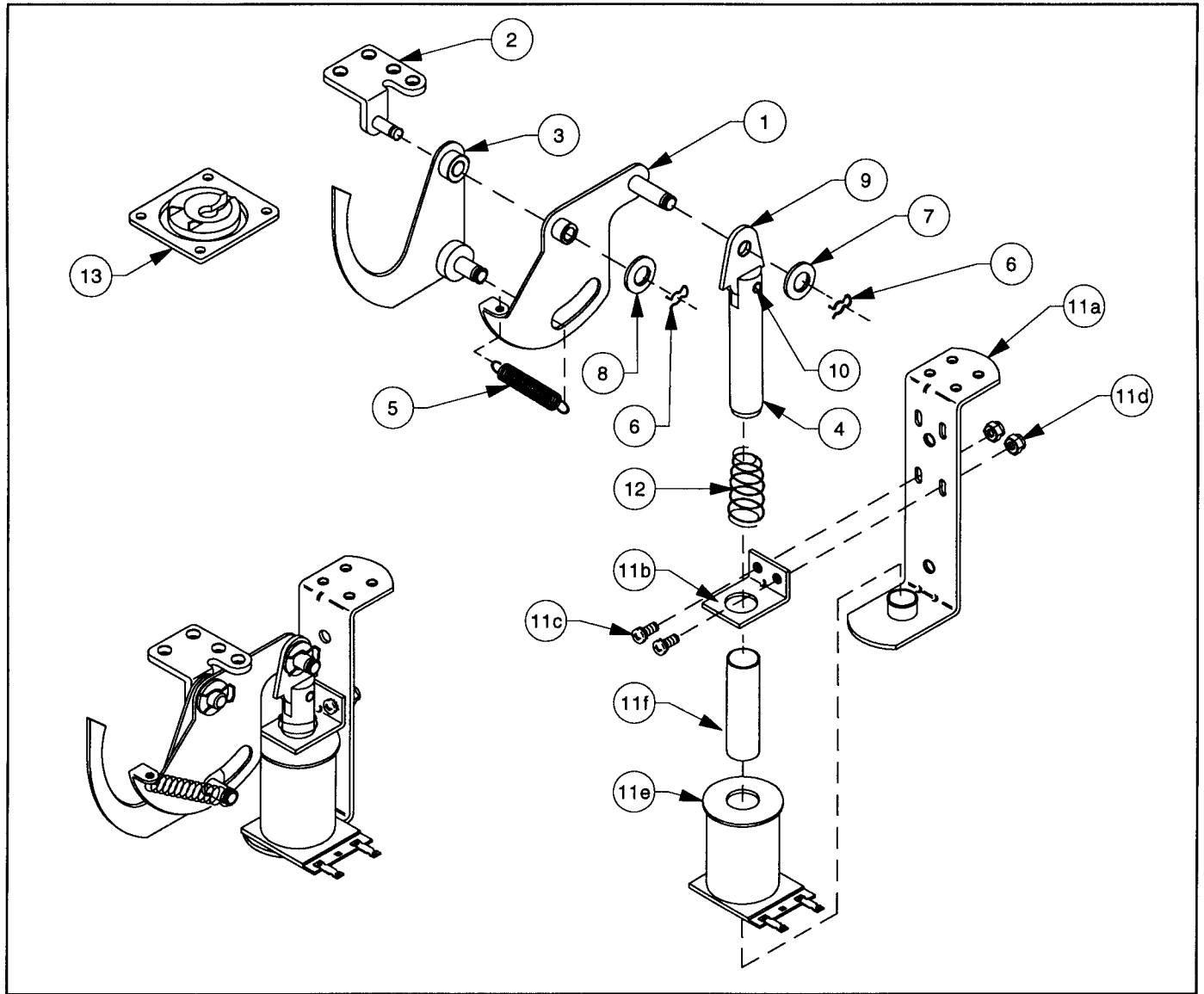
A-17908 Ball Eject Assembly



Associated Parts:

Item	Part No.	Description	Item	Part No.	Description
1.	A-17907	Ball Eject Spring Plate Assy.	11.	B-9362-R-3	Coil & Bracket Assy., Right
2.	A-18146	Mounting Bracket Assy.	a)	A-17808	Bracket & Stop Assembly
3.	A-7471-R	Eject Cam Assembly	b)	01-8-508-S	Coil Retaining Bracket
4.	02-3407-2	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	Flatwasher, 17/64 x 1/2 x 15ga.	f)	03-7066	Coil Tubing
8.	4700-00103-00	Flatwasher, 17/64 x 1/2 x 28ga.	12.	10-128	Spring
9.	03-8085	Armature Link	13.	03-9101-18	Eject Shield, Violet
10.	20-8716-5	Roll Pin, 1/8 x 7/16"			

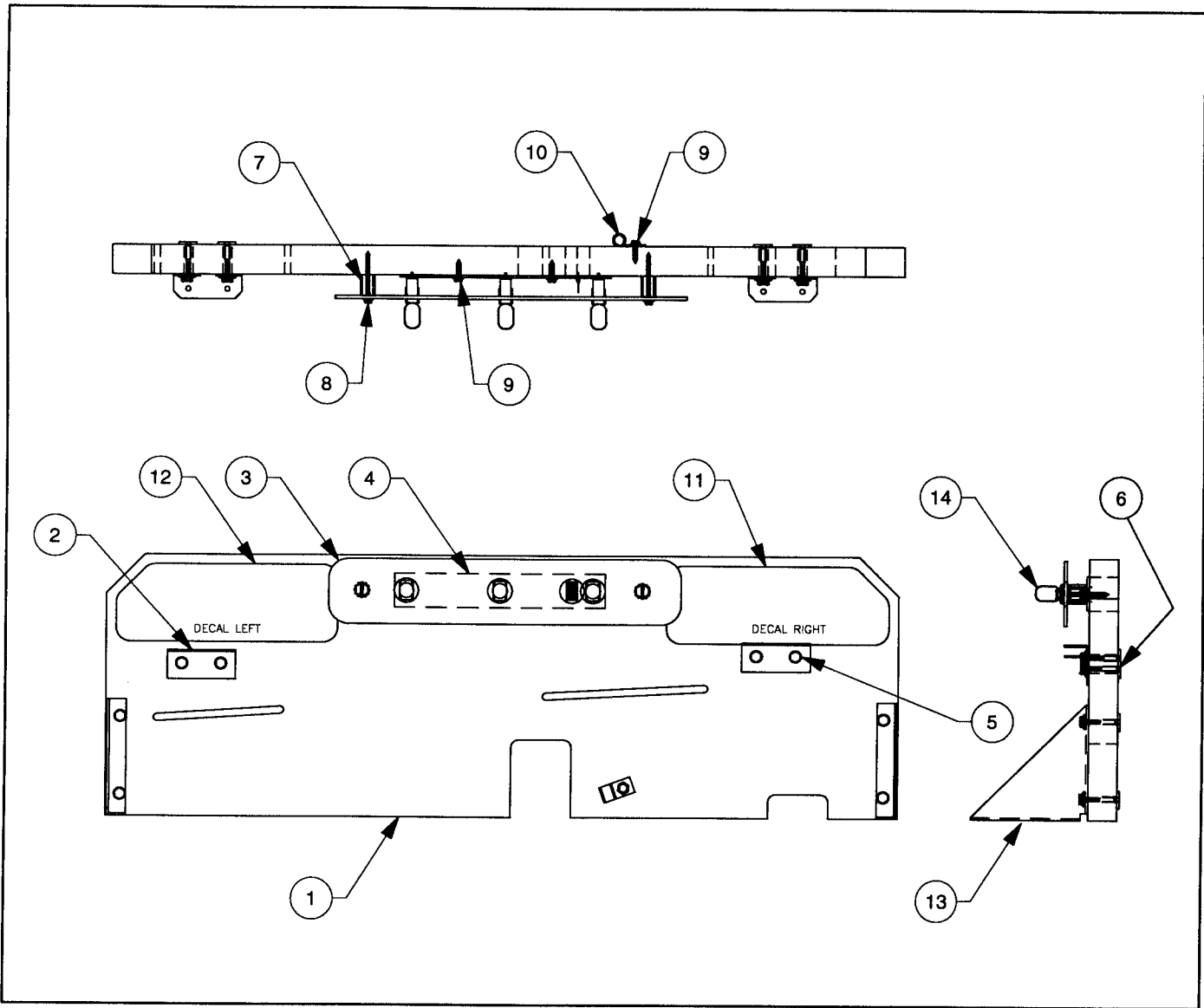
B-9361-R-5 Ball Eject Assembly



Associated Parts:

Item	Part No.	Description	Item	Part No.	Description
1.	A-6949-R	Spring Plate	11.	B-9362-L-2	Coil & Bracket Assy., Left
2.	A-18146	Mtg. Bracket Assembly	a)	A-17808	Bracket & Stop Assembly
3.	A-7471-R	Eject Cam Assembly	b)	01-8-508-S	Coil Retaining Bracket
4.	02-3407-2	Solenoid Plunger	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
5.	10-320	Spring-Eject, Red	d)	4406-01119-00	Nut, 6-32 ESN
6.	12-6227	Hairpin Clip	e)	AE-26-1200	Coil Assembly
7.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.	f)	03-7066	Coil Tubing
8.	4700-00103-00	Flatwasher, 17/64 x 1/2 x 28ga.	12.	10-128	Spring
9.	03-8085	Armature Link	13.	03-9101-18	Eject Shield, Violet
10.	20-8716-5	Roll Pin: 1/8 x 7/16"			

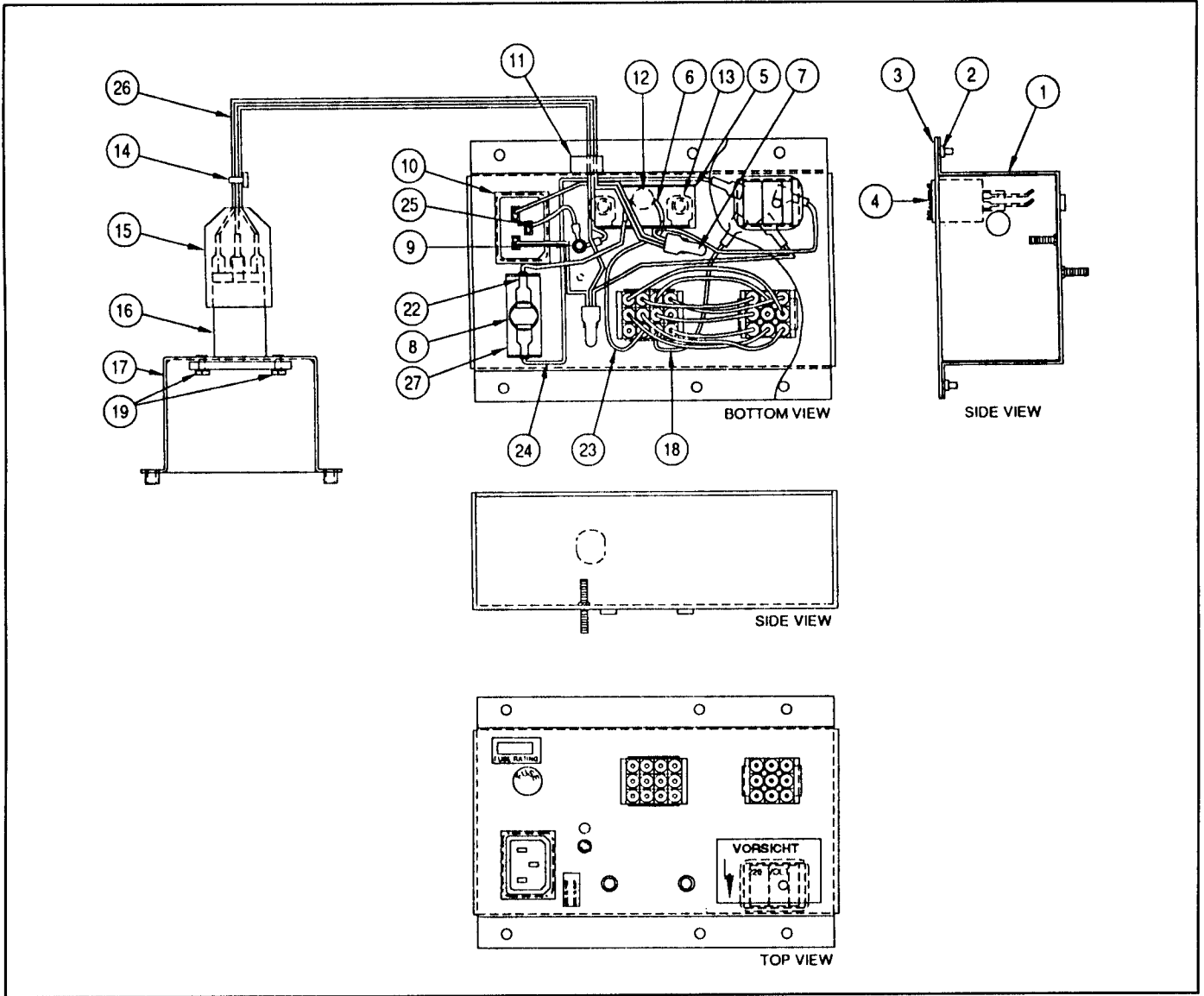
A-18232 Back Panel Assembly



Item	Part Number	Description	Item	Part Number	Description
1.	11-831-50031	Wood Back Panel	8.	4106-01115-20	Sh. Metal Screw, #6 x 1/2"
2.	01-11679	Ramp Mounting Bracket	9.	4106-01114-08	TCS #6 x 1/2"
3.	31-1925-9	Playfield Plastic	10.	03-7655-4	Clip Harness 1/4"
4.	A-17713	Lamp Assembly	* 11.	31-1928-10	Decal, Right
5.	4008-01168-12	Mach. Screw, 8-32 x 3/4"	* 12.	31-1928-9	Decal, Left
6.	4408-01168-12	Nut #8-32	13.	01-12569	Gusset, Back Panel
7.	03-8022-1	Standoff, 9/16"	14.	03-8063-6	Bulb Sleeve, Yellow

* Not available for individual sale. Order Decal Set 31-1928.

A-17540 Universal Power Interface Assembly

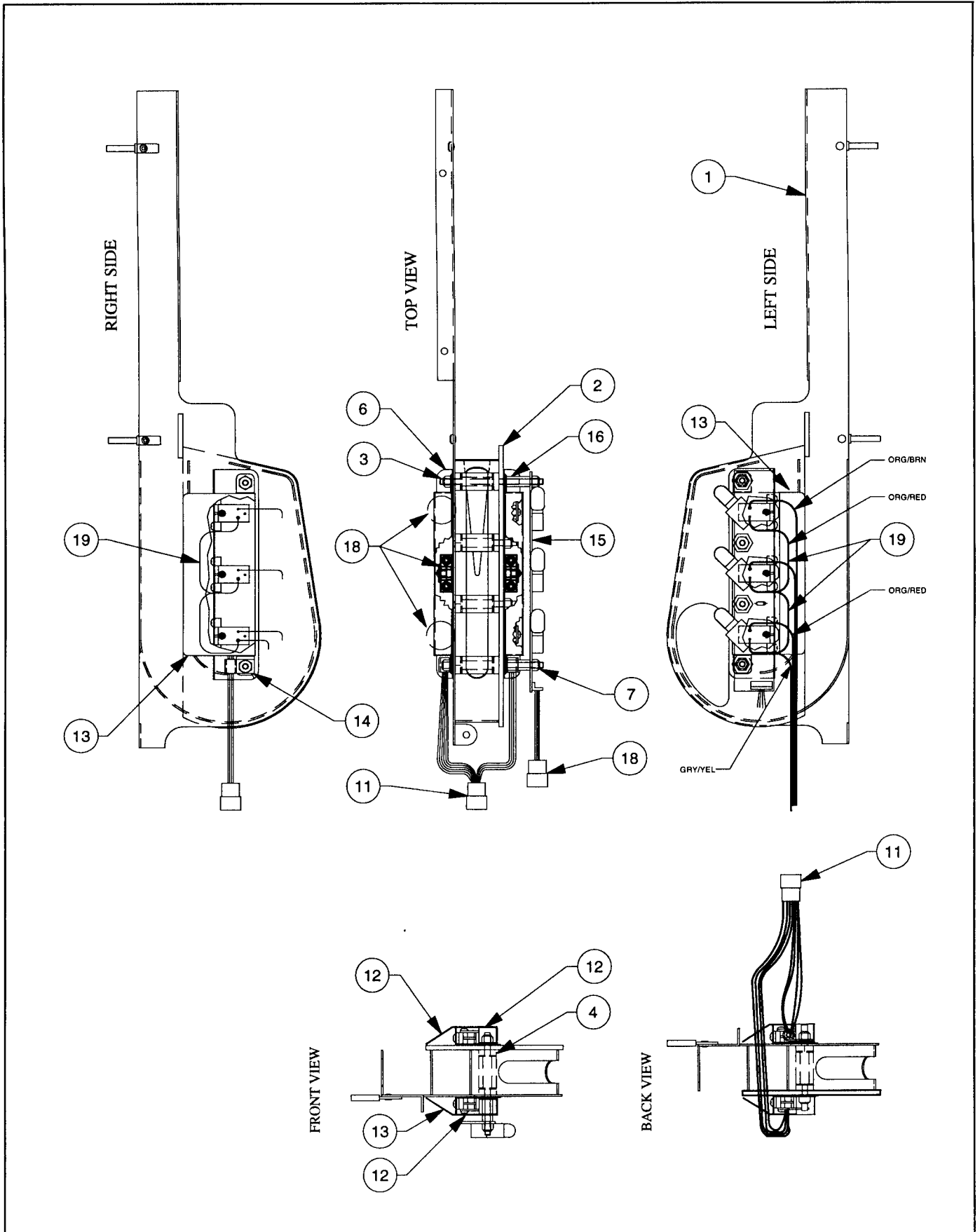


Item	Part No.	Description	Item	Part No.	Description
1.	01-12293	Power Control Chassis Box .	15.	20-9682-1	Boot w/9-32 Dia. Hole
2.	4406-01128-00	Nut, #6-32 KEPS	16.	5102-13864-00	Line Filter w/IEC Connector
3.	01-12294	Switch Mounting Plate Assembly	17.	01-12292	Line Filter Chassis Box
4.	5642-13935-00	Power Switch	18.	H-17992	Jumper Cable Neutral Sw/1FC
5.	01-12299	Insulator, Terminal Strip	19.	4004-01003-05	Mach. Screw, #4-40 x 5/16"
6.	RM-21-06	#18 Vinyl Fgls	20.	H-18050	Jumper Cable, Transformer Prog.
7.	5822-13865-00	Terminal Strip 3-CKT 2-Mtg.	21.	16-9667	Label Convenience Rcpt. Rating
8.	5733-12869-00	Fuse Holder Panel	22.	H-17543	Hot Jumper Black Cable
9.	4408-01128-00	Nut, #8-32 KEPS	23.	H-17546	Jumper Interface Hot Black Cable
10.	5851-13867-00	Outlet-IEC Conn. 237 Socket	24.	H-17545	Jumper Switch/Fuse Black Cable
11.	03-8712	Strain Relief Bushing	25.	H-17542	Ground Jumper
12.	5016-12978-00	Thermistor 8A, 2.5R25	26.	5797-13940-01	Jumper Cable
13.	4008-01017-10	Mach. Screw, 8-32 x 5/8" P-PH-S	27.	01-10623	Insulator, Thermistor
14.	03-7520-3	Ty-Wrap Nylon			

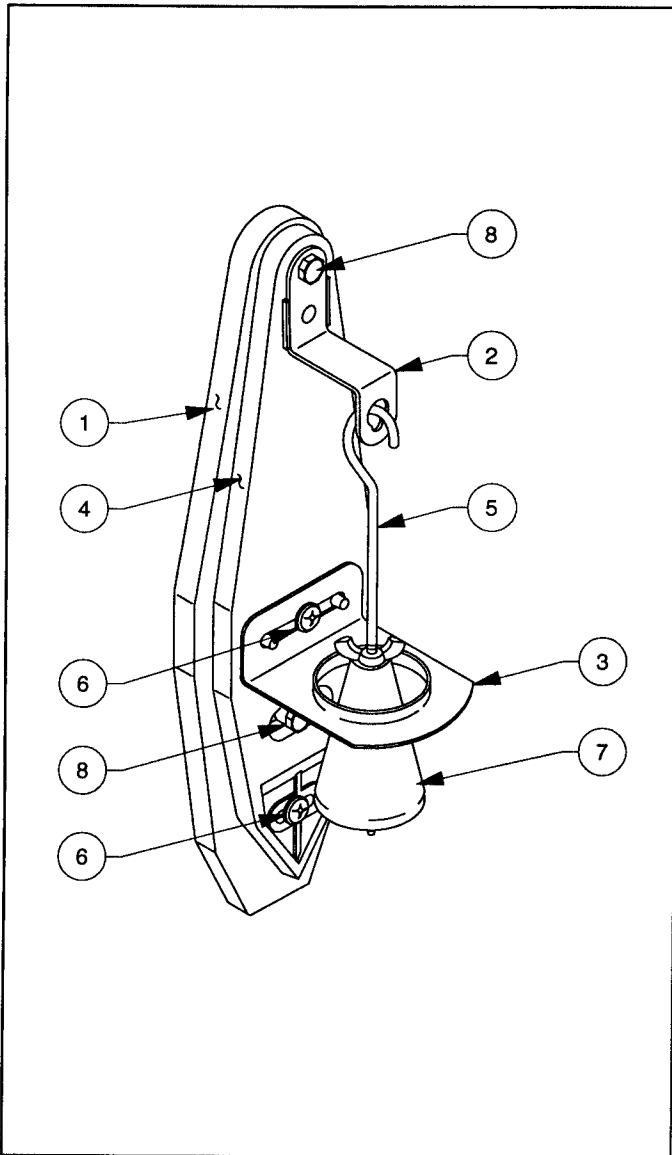
A-17633 Coin Toss Assembly

Item	Part No.	Description
1.	A-17642	Bracket, Coin Toss
2.	03-9024	Post, Coin Toss
3.	02-4932	Cover, Coin Toss
4.	02-4933	Spacer, Coin Toss
5.	23-6552-1	Rubber Bumper Sleeve
6.	01-12220	Opto Mounting Bracket
7.	4408-01119-00	Nut #8-32 ESN
8.	A-16908	LED Assembly
9.	A-16909	Photo Transistor Assembly
10.	4106-01013-06	Sh. Metal Screw, #6 x 3/8"
11.	H-16909	Cable Assembly
12.	03-9100	Insulator Strip
13.	01-12462	Opto Protection Bracket
14.	03-7655-4	Cable Clamp, 1/4"
15.	A-18495	3-Lamp PCB
16.	02-4176-10	Standoff #8-32 Hex.
17.	31-1928-2	Decal
18.	H-18527	Lamp Cable Assembly
19.	17-1116-2	Jumper Wire
20.	03-8063-6	Bulb Sleeve, Yellow

A-17633 Coin Toss Assembly



A-15361 Tilt Mechanism Assembly

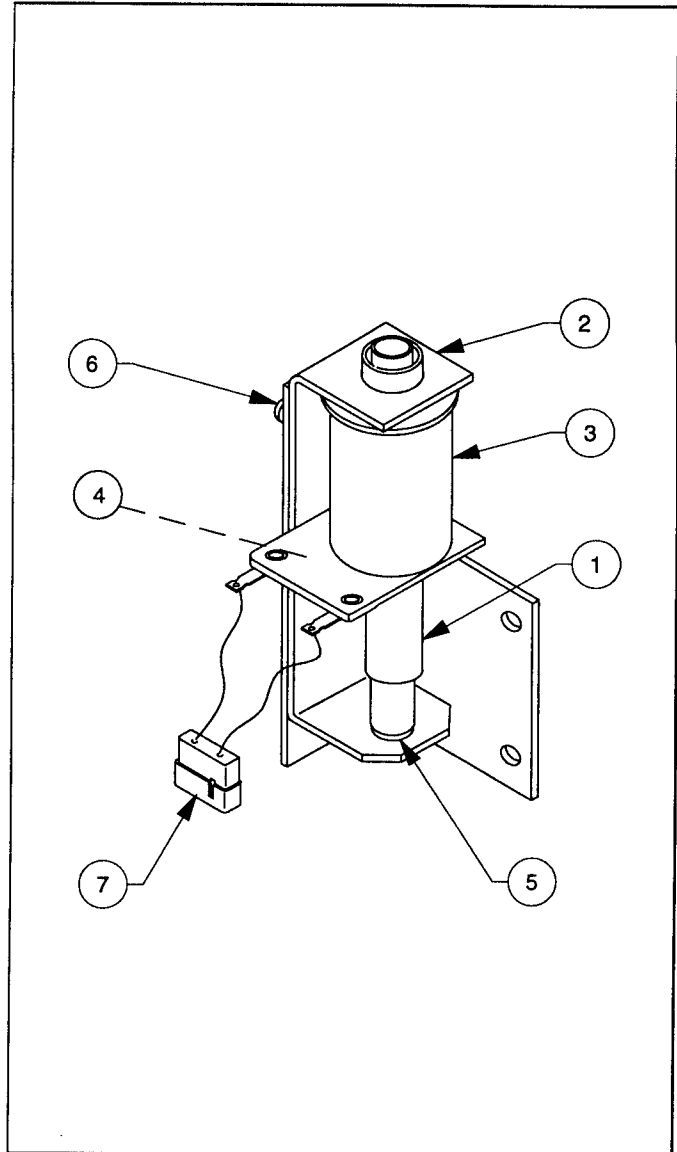


Item	Part No.	Description
1.	A-15360	Mount Plate, Tilt Mech.
2.	01-3444	Bracket, Tilt Upper
3.	01-3445	Bracket, Tilt Lower
4.	03-8668	Pendulum, Tilt Mech.
5.	12-6231	Wire, Plum Bob
6.	4006-01113-06	Mach. Screw, 6-32 x 3/8"

Associated Parts:

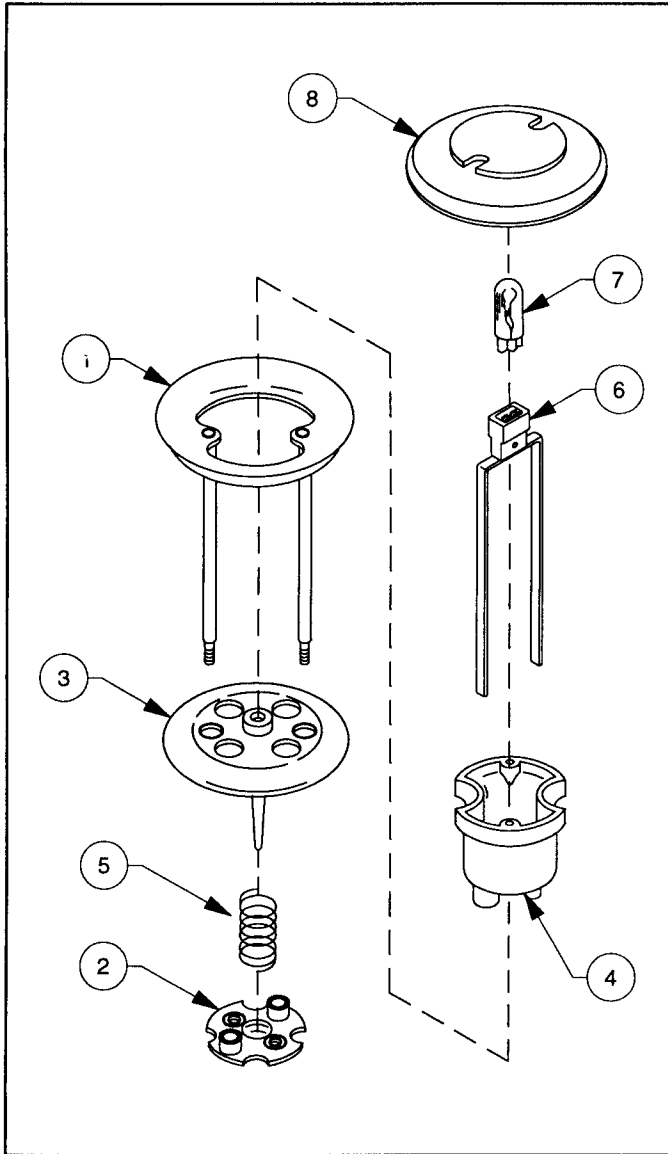
7.	20-6502-A	Plum Bob
8.	4406-01120-00	Wing Nut (2)

B-10686-1 Knocker Assembly



Item	Part No.	Description
1.	A-5387	Coil Plunger Assembly
2.	01-11273	Mounting Bracket Assy.
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

B-9414-4 Jet Bumper Assembly

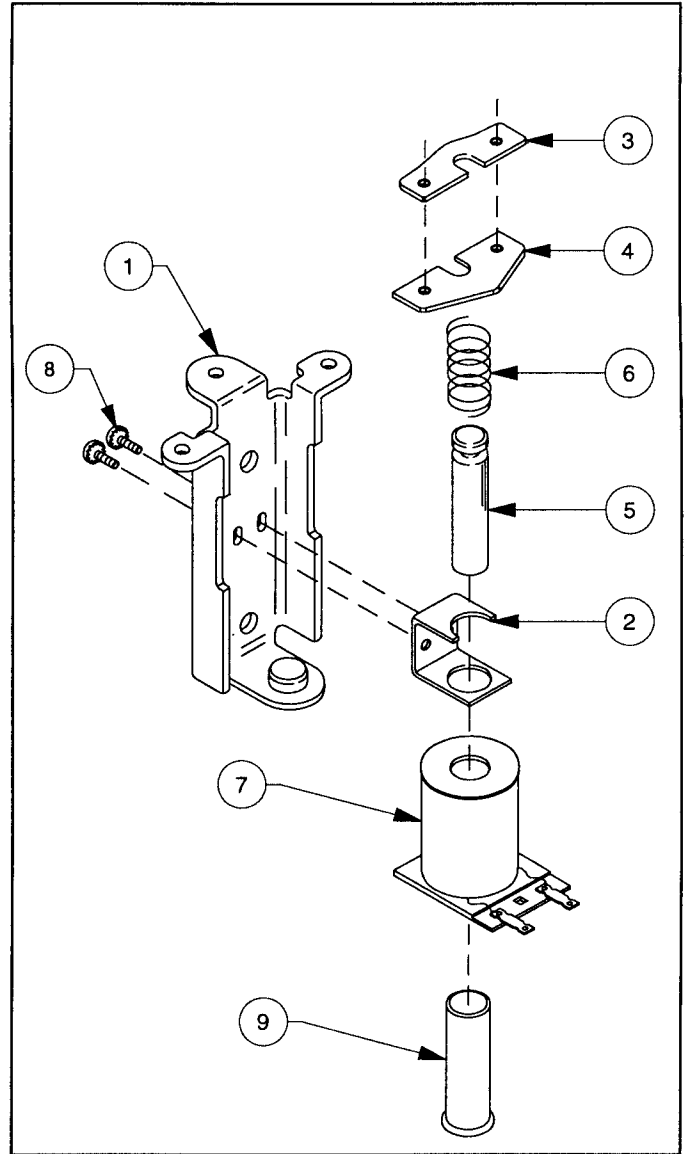


Item	Part No.	Description
1.	A-4754	Bumper Ring Assembly
2.	03-6009-A5	Bumper Base, White
3.	03-6035-27	Bumper Wafer, Op. Teel Green
4.	03-7443-5	Bumper Body, White
5.	10-7	Spring
6.	24-8776	Socket-Wedge Base
7.	24-8768	Bulb #555 (6.3v., 0.25A.)

Associated Parts:

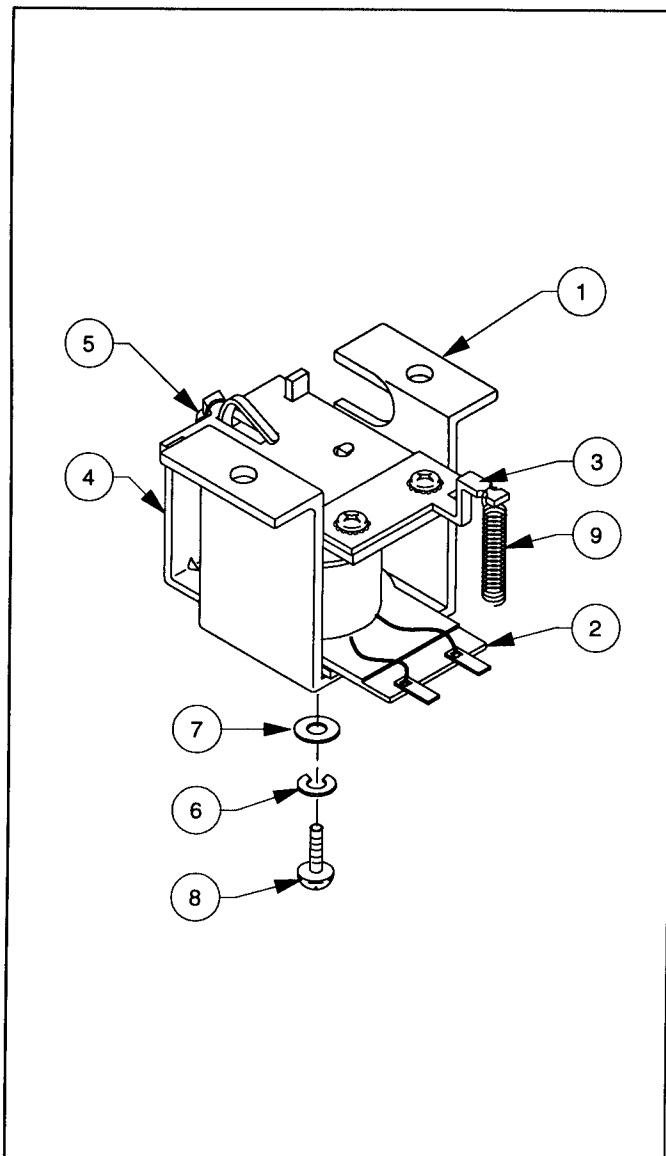
8.	03-9030-25	Jet Bumper Cap (3) (Trans. Teel)
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A-9415-2 Jet Bumper Coil Assembly

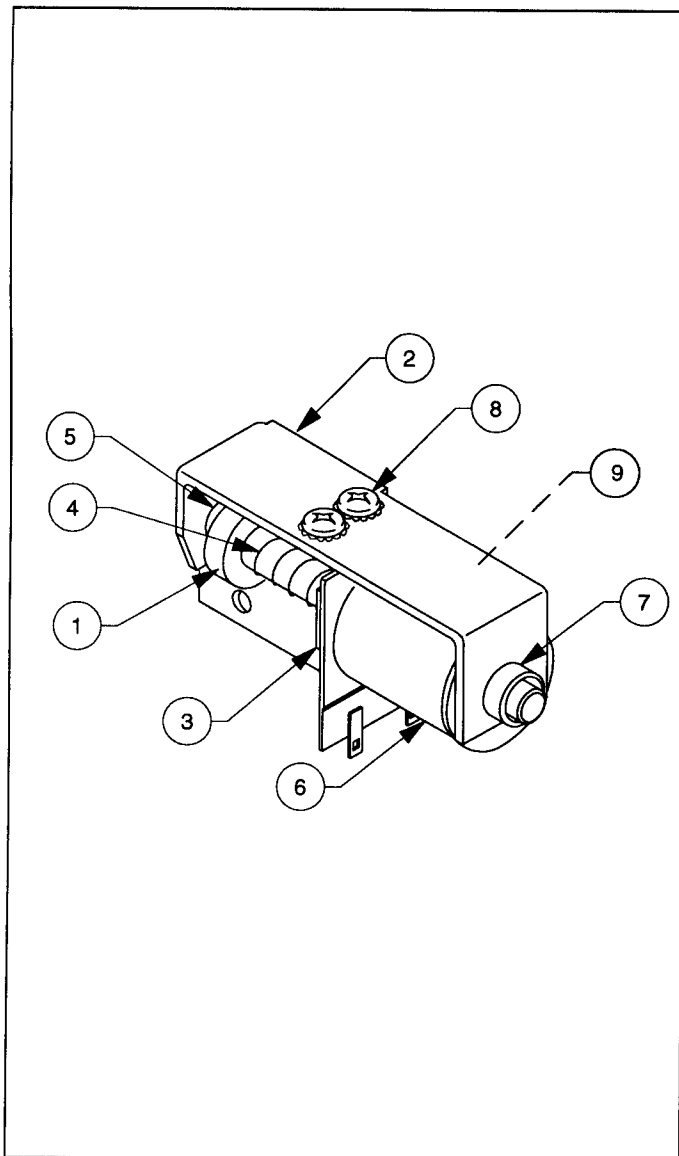


Item	Part No.	Description
1.	B-7417	Bracket & Stop Assembly
2.	01-1747	Coil Retaining Bracket
3.	01-5492	Armature Link, Steel
4.	01-5493	Armature Link, Bakelite
5.	02-3406-1	Coil Plunger
6.	10-326	Armature Spring
7.	AE-26-1200	Coil Assembly
8.	4006-01017-04	Mach. Screw, 6-32 x 1/4"
9.	03-7066	Coil Tubing

A-17796 Ball Gate Actuator Assembly



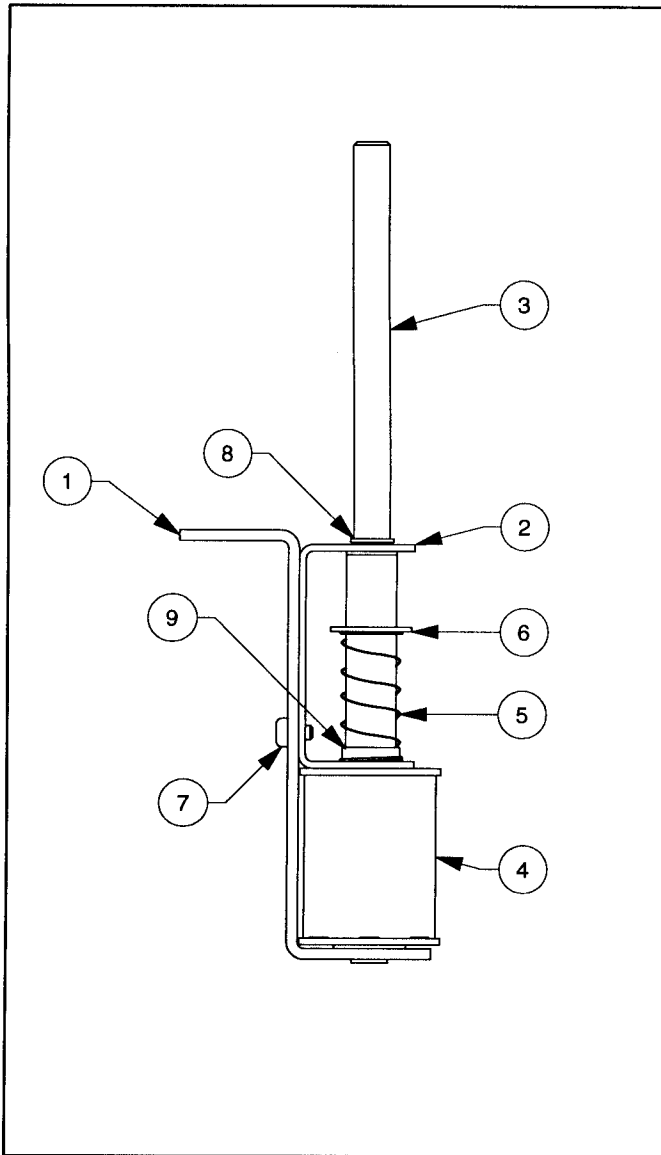
B-11873 Bottom Arch Kicker Assembly



Item	Part No.	Description
1.	01-12348	Ball Gate Coil Bracket
2.	A-14406	Coil Assembly
3.	A-11146	Armature Assembly
4.	A-6892	Frame & Eyelet Assembly
5.	10-120	Spring
6.	4701-00003-00	Lockwasher, #8 Split
7.	4700-00089-00	Flatwasher, 11/64 x 7/16 x 16ga.
8.	4008-01021-07	Mach. Screw, 8-32 x 7/16"
9.	10-194	Extension Spring

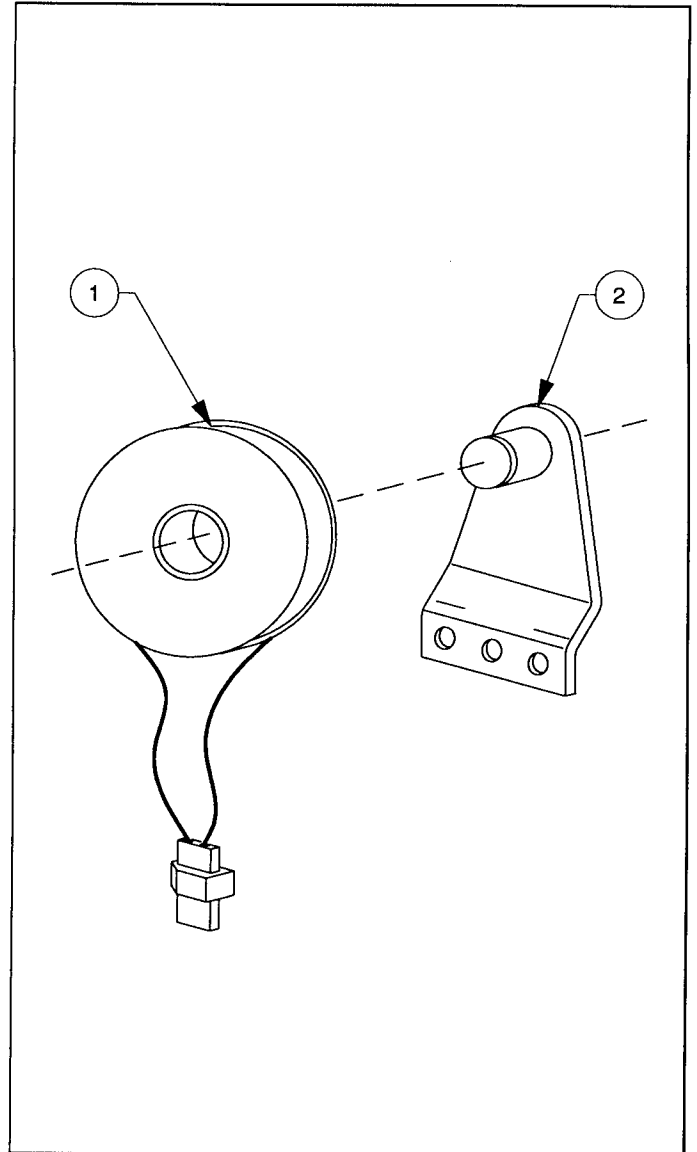
Item	Part No.	Description
1.	A-6306-2	Bell Armature Assembly
2.	01-11273	Mtg. Kicker Bracket Assembly
3.	01-8-508-T	Solenoid Bracket
4.	10-135	Solenoid Spring
5.	23-6420	Rubber Grommet
6.	AE-23-800	Coil Assembly
7.	03-7067-5	Coil Tubing
8.	4008-01017-05	Mach. Screw, #8-32 x 5/16"
9.	03-8523	Insulator

A-18155 Up/Down Post Unit Assembly



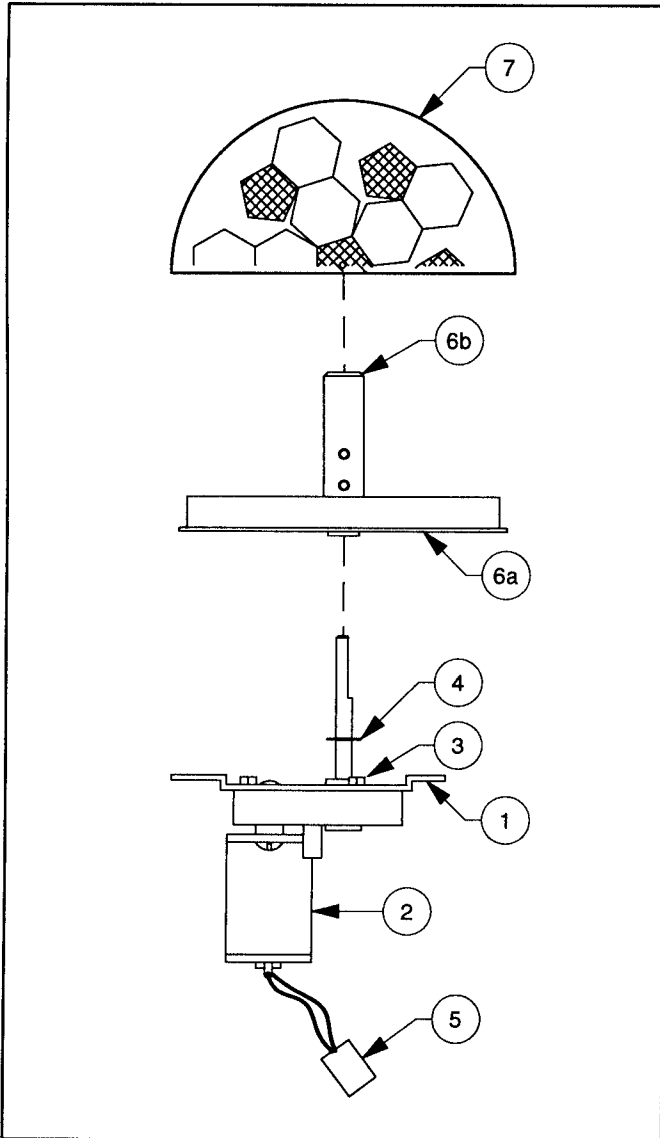
Item	Part No.	Description
1.	A-17808	Bracket & Stop Assembly
2.	01-12594	Coil Stop Bracket
3.	A-18156	Plunger
4.	AE-26-1500	Coil Assembly
5.	10-135	Spring
6.	20-8712-43	"E" Retaining Ring
7.	4006-01003-04	Mach. Screw, #6-32 x 1/4"
8.	20-8790	Nylined Bearing
9.	03-7066	Tubing, 1.745" Long

Coil Magnet Assembly & Bracket Assembly

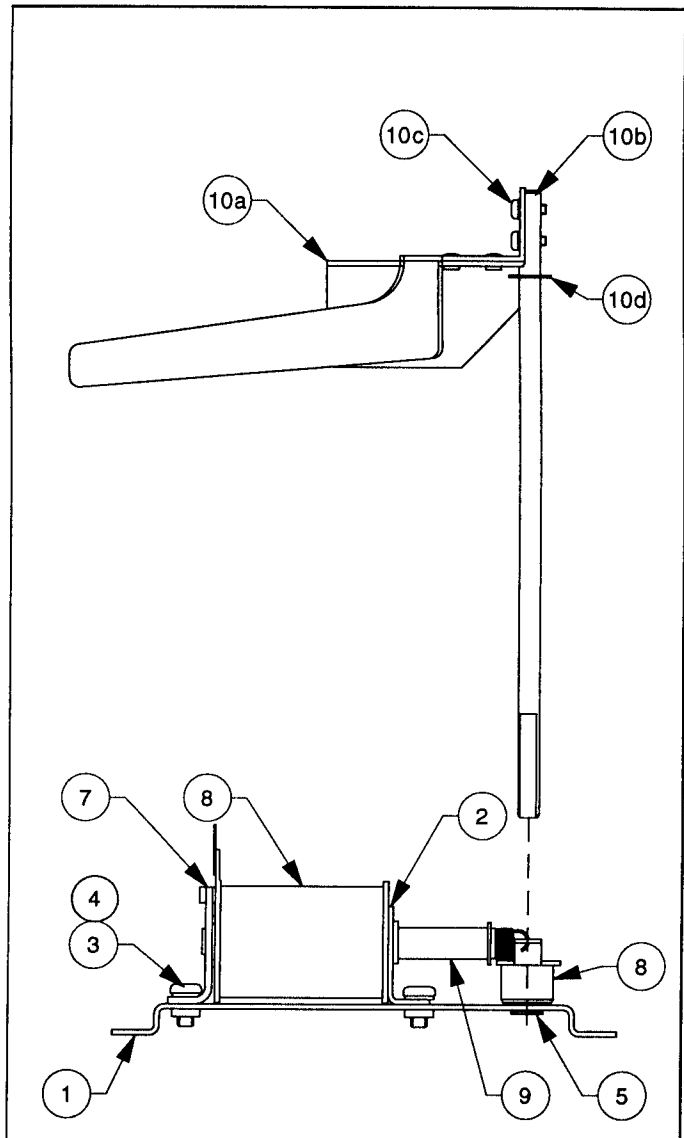


Item	Part No.	Description
1.	20-9247	Coil Magnet & Thermal Breaker
2.	A-15257	Bracket & Pole Piece Assy.
a)	01-10592	Coil Magnet Bracket
b)	02-2755	Pole Piece Magnet

A-17569 Motor Assembly



A-18138 Diverter Assembly



Item	Part No.	Description
1.	01-12175.1	Motor Mount Bracket
2.	14-7996.1	Motor - Soccer Ball
3.	4008-01168-10	Mach. Screw, 8-32 x 3/4"
4.	20-8712-25	"E"-Ring, 1/4" Shaft
5.	H-18601-6	Cable Assembly

Associated Assemblies:

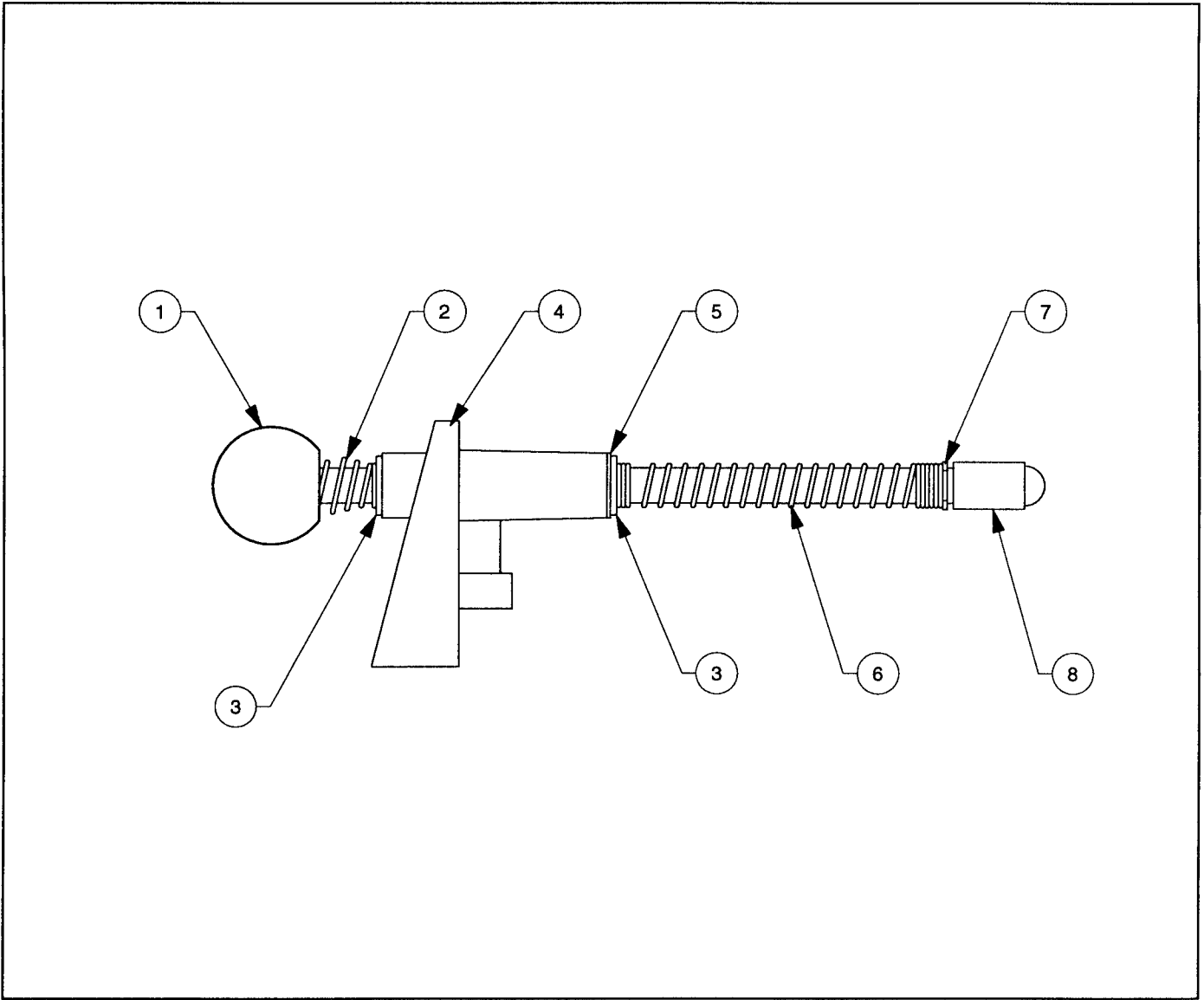
6.	A-17568	Plate Assembly
a)	A-17641	Guide, Plate
b)	02-4904	Post, Plate
7.	23-6709	Soccer Ball

Item	Part No.	Description
1.	A-18152	Diverter Bracket
2.	01-8413-1	Coil Mounting Bracket
3.	4701-00004-00	Lockwasher #10 Split
4.	4010-01008-06	Mach. Screw, #10-32 X 3/8"
5.	20-8790	Nylined Bearing
6.	FL-11753-1	Coil Assembly, Yellow
7.	A-10821	Flipper Stop Bracket Assembly

Associated Assemblies:

8.	A-14185	Drive Arm Assembly
9.	A-16636	Diverter Plunger Assembly
10.	A-18139	Diverter Gate & Shaft Assembly
a)	A-18233.1	Diverter Ball Guide Assembly
b)	02-5011	Shaft
c)	4004-01003-06	Mach. Screw, 4-40 x 3/8"
d)	20-8712-25	"E" Ring, 1/4" Shaft

A-17730 Ball Shooter Assembly



Item	Part No.	Description
1.	20-9927-1	Ball Shooter Rod w/Shaft
2.	10-149	Outer Spring
3.	4700-00051-00	Flatwasher, 25/64 x 5/8 x 16ga.
4.	21-6645-1	Shooter Housing
5.	03-7357	Shooter Sleeve
6.	10-148-4	Power Spring
7.	20-8718-1	"C" Retaining Ring
8.	23-6327	Ball Shooter Tip

Associated Parts:
(Not Shown)

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

Unique Parts

Unique Backbox Parts

Part No.	Description
A-16917-50031	Sound Board Assembly
A-17651-50031	WPC Security CPU Board Assembly
A-17814-50031	Backbox
A-18039	Speaker/Display Panel Assembly
5795-10938-15	Ribbon Cable, 15"

Unique Cabinet Parts

A-17730	Ball Shooter w/Knob Assembly
A-17900-1	5-Ball Cashbox Assembly
A-18602	Switch & Cable Assembly
11-1147	Cabinet, Wood
20-9663-D-1	Push Button

Unique Playfield Parts

A-13204-50031	Bottom Arch Assembly
A-17568	Plate Assembly
A-17569	Motor Assembly
A-17633	Coin Toss Assembly
A-17711-1	2-Lamp G.I. & Spacer Assembly
A-17712-1	2-Lamp G.I. & Spacer Assembly
A-17713-1	3-Lamp G.I. & Spacer Assembly
A-17741	Goalie Unit
A-17742	Trough Assembly
A-17749.1-1	Playfield Slide Assembly, Left
A-17749.1-2	Playfield Slide Assembly, Right
A-17839	Goalie Ball Popper Assembly
A-17908	Ball Eject Assembly
A-17910-1	1-Lamp PCB & Spacer Assembly
A-17985-R	Eject Switch Assembly
A-17995	Spin Target Switch Assembly
A-18008	Rollover Button Switch
A-18009	Bottom Plastic Ramp Assembly
A-18010	Back Plastic Ramp Assembly
A-18011	Front Plastic Ramp Assembly
A-18028.1	Ball Guide Assembly
A-18029	Ball Guide Assembly
A-18030	Ball Guide Assembly
A-18031	Ball Guide Assembly
A-18034-1	Flipper Return Guide Assy., Left
A-18034-2	Flipper Return Guide, Right
A-18059-4	Stationary Target Assembly, Op. Red
A-18067-1	4-Lamp PCB & Spacer Assembly
A-18068-1	21-Lamp PCB & Spacer Assembly
A-18071-1	3-Lamp PCB & Spacer Assembly
A-18072-1	5-Lamp PCB & Spacer Assembly
A-18138	Diverter Assembly
A-18139	Diverter Gate & Shaft Assembly
A-18147	Coin Toss Exit Assembly
A-18155	Up/Down Post Unit Assembly
A-18159-1	10-Opto Board & Bracket Assembly
A-18199	Spin Target Assembly
A-18213	Right Ball Popper Assembly
A-18222	Mini-Playfield Assembly

Unique Parts (Continued)

Unique Playfield Parts

Part No.	Description
A-18232	Back Panel Assembly
A-18384	5-Lamp & 1-Flasher Assembly
A-18504	Stationary Target & Decal Assembly
A-18510	Goal Bracket & Decal Assembly
A-18530-15	Oblong Stationary Target Assembly, Op. Orange
A-18530-4	Oblong Stationary Target Assembly, Op. Red
A-18750	Playfield Plastic Assembly
A-18751	Playfield Plastic Assembly
A-18753	Ball Trough Assembly
A-18775	Striker Board Assembly
B-9414-4	Jet Bumper Assembly
01-12481	Ball Guide
01-12482	Ball Guide
01-12483	Ball Guide
01-12485	Ball Guide
01-12486	Ball Guide
01-12487	Ball Guide
01-12488	Ball Guide
01-12606	Ball Guide Bottom Arch, Right
01-12613	Ball Deflector
01-12624	Lower Arch Mounting Bracket
01-13025	Ramp Support
02-4436-27	F-F Spacer, 8-32 x 9/16"
02-5014-3	Hex. Post, 10-32 x 3.0"
02-5015-1	Round Post, 10-32 x 2.88"
03-8247-25	Post #8 Double Star, Tr. Teal
03-8318-25	Double Hood-Light, Tr. Teal
03-8319-25	Post #8 Starred, Tr. Teal
03-8365-25	Post #8, Tr. Teal Green
03-9030-25	Jet Bumper Cap, Tr. Teal
03-9101-18	Shield- Eject, Tr. Violet
12-7185.1	Ball Popper Wire Ramp
12-7186	Ball Guide, Left
12-7187	Ball Guide, Right
12-7210	Wireform, Rebound
23-6709	Soccer Ball
31-1002-50031	Screened Playfield
31-1002A-50031	Screened Mini-Playfield
36-50031	Playfield Hardcoat
36-50031-1	Mini-Playfield Hardcoat

Cables

Backbox Cables

Part No.	Description
H-14584	Dot Matrix Display Power Cable
H-15736	Secondary Cable
H-15476	Logic Power Cable
H-18202	Cabinet Switch/Lamp Cable
H-18373	Insert Cable

Playfield Cables

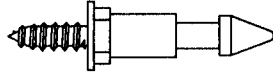
H-18206.2	Playfield Switch Cable
H-18207.1	Playfield Lamp Cable
H-18208	Playfield Solenoid Cable
H-18209	Playfield Opto Cable
H-18219-1	General Flasher 3-Pin Cable 8"
H-18372	Playfield G.I. Cable
H-18757	7-Opto Trough Input Cable
H-18758	7-Opto Trough Output Cable

Cabinet Cables

H-17005-1	Cabinet Cable
H-17019	Dixi-Mars Interconnect Cable
H-17217	Plum Bob Mech. Protect Cable
H-17837-2	Voltage Program Cable
H-18202	Switch/Lamp Cable

Posts

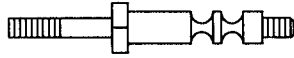
**Part Number/
Description (Qty.)**



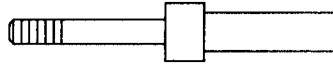
02-3905
Post #8WS (7)



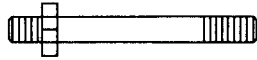
02-4434
Post Spacer (2)



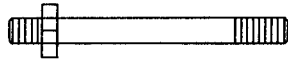
02-4658
Double Bumper Post (1)



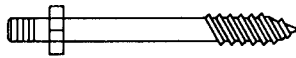
02-4659-1
Post, 6-32 x 3/8" (11)



02-4424-1
Post, 6-32/8-32 2-1/32" (6)
02-4424-2
Post (1)



02-4425-1
Post, 8-32/#8-32 2-3/8" (2)
02-4425-2
Post, 8-32/#8-32 (2)



02-4426-2
Post, #6-32/8 (1)

Upper Playfield Parts

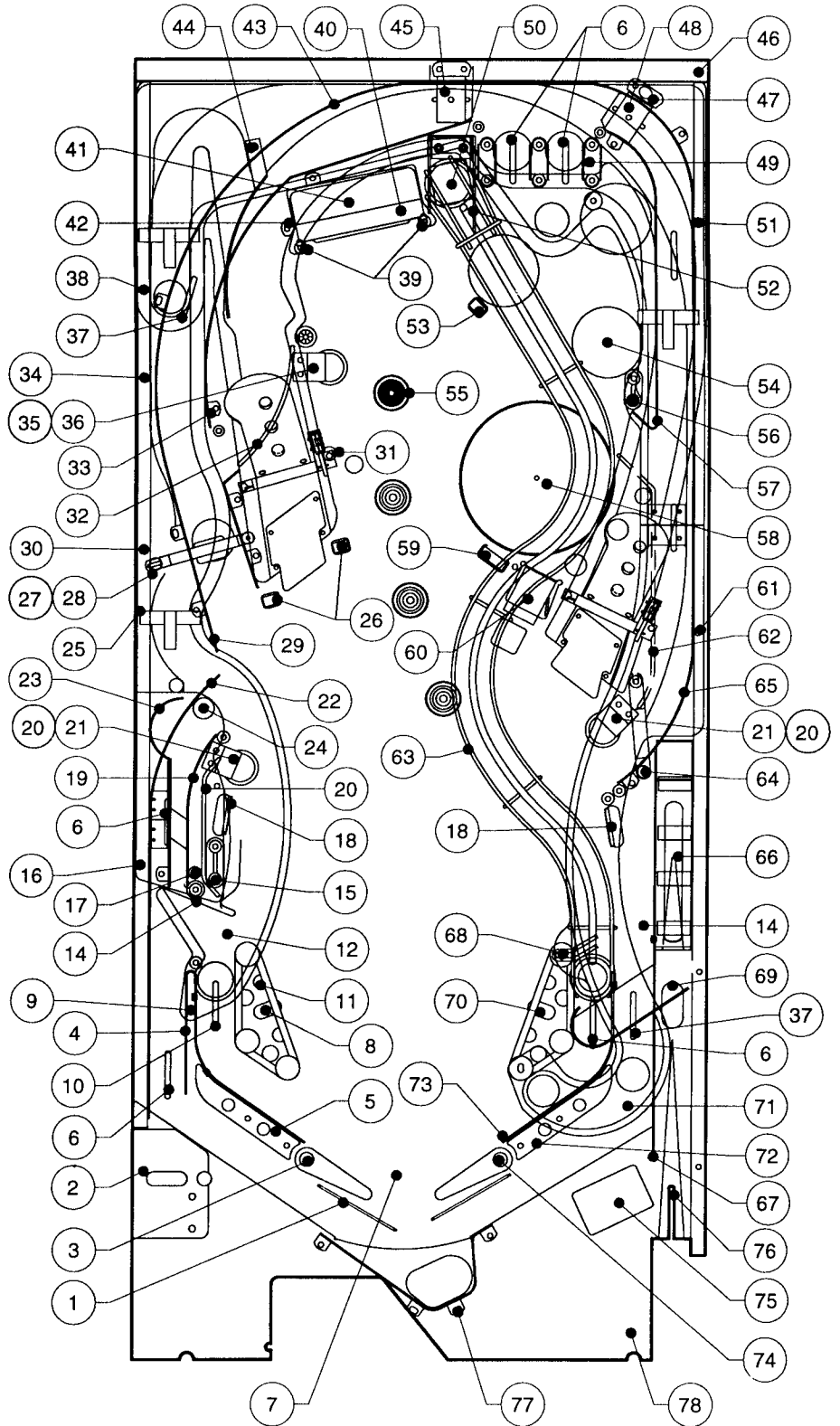
Item No.	Part Number	Description	Item No.	Part Number	Description
1	12-7210	Rebound Wireform (2)	43	01-12483	Ball Guide
2	B-11873	Bottom Arch Kicker Assy.	44	A-18139	Diverter Gate & Shaft Assy.
3	A-15849-L-2	Flipper Assembly		A-14185	Drive Arm Assembly
	20-9250-5	Flipper & Shaft, White		A-16636	Diverter Plunger Assembly
4	A-18031	Ball Guide Assembly		A-18138	Diverter Assembly
5	A-18034-1	Flipper Return Guide, Left		10-128	Spring
6	A-17813	Rollover Switch	45	A-8244-L	Ball Gate Assembly
7	A-15257	Bracket & Pole Piece	46	A-18232	Back Panel Assembly
	20-9247	Coil Magnet	47	A-17796	Ball Gate Actuator Coil Assy.
	20-9612	Wave Spring Washer	48	A-17797-1	Ball Gate Special Assy., Left
8	B-9362-L-2	Coil & Bracket Assy.	49	03-8313-25	Double Light Hood, Teal (3)
	A-17811	Kicker Assembly	50	A-17839	Goalie Ball Popper Assy.
	10-128	Spring	51	A-12258-3	Stud Plate, 8-32x1/2"
9	02-5014-3	Hex Post 10-32 3"		02-4436-11	Spacer, 8-32x2 1/4"
10	01-12625	Ramp Guard Bracket (2)	52	A-18028	Ball Guide Assembly
11	A-17801	Kicker Count Switch (2)	53	A-18530-4	Oblong Target, Red
12	A-18009	Bottom Ramp Assembly	54	A-9415-2	Coil & Bracket Assembly (3)
13	12-7195	Wire Ball Guide		B-9414-4	Jet Bumper Assy., Teal (3)
14	01-9510	#8 Adjustment Plate		B-12030-2	Jet Bumper Switch Assy. (3)
15	02-4436-27	Spacer, 8-32x9/16"		03-9030-25	Jet Bumper Cap, Teal (3)
16	02-4436-20	Spacer, 8-32x3/4"	55	A-18008	Rollover Button Assembly (4)
17	A-18155	Up/Down Post Unit	56	02-4436-17	Spacer, 8-32x3 3/8"
18	A-18059-4	Stationary Target, Red	57	01-12486	Ball Guide
19	01-12487	Ball Guide	58	A-17569	Motor Assembly
20	03-9101-18	Eject Shield, Violet		A-17568	Plate Assembly
	B-9361-R-5	Ball Eject Assy., Right		23-6709	Soccer Ball
	B-9362-L-2	Coil & Bracket Assy.	59	A-18504	Stationary Target Assy.
	A-17985-R	Eject Switch Assy.	60	A-18213	Right Ball Popper Assy.
	10-128	Spring	61	A-12258-3	Stud Plate, 8-32x1/2"
21	01-12613	Ball Deflector		02-4436-17	Spacer, 8-32x3 3/8"
22	01-12481	Ball Guide	62	12-7187	Ball Guide, Right
23	A-18226	Switch Ball Guide Assy.	63	12-7185	Ball Popper Ramp
24	A-18157	Magnet Bracket & Pole Piece	64	A-10744	Ball Gate Assembly
	20-9247	Coil Magnet	65	01-12482	Ball Guide
	20-9612	Wave Spring Washer	66	A-17633	Coin Toss Assembly
25	A-12258-3	Stud Plate, 8-32x1/2"	67	A-18029	Ball Guide Assembly
	02-4436-20	Spacer, 8-32x3/4"	68	02-4436-10	Spacer, 8-32x2 1/2"
26	A-18530-15	Oblong Target, Orange	69	A-18147	Coin Toss Exit Assembly
27	A-17995	Spin Target Switch Assy.	70	A-17811	Kicker Assembly
28	A-18199	Spin Target Assembly		B-9362-R-3	Coil & Bracket Assembly
29	01-12485	Ball Guide		10-128	Spring
30	A-12258-3	Stud Plate, 8-32x1/2"	71	A-18011	Front Ramp Assembly
	02-4436-7	Spacer, 8-32x1 1/2"	72	A-18034-2	Flipper Return Guide, Right
31	A-17794	Kicker Switch Sub-Assy.	73	A-18030	Ball Guide Assembly
32	12-7186	Ball Guide Left	74	A-15849-R-2	Flipper Assembly
33	01-12488	Ball Guide		20-9250-5	Flipper & Shaft, White
34	A-12258-3	Stud Plate, 8-32x1/2"	75	A-18753	Ball Trough Assembly
	02-4436-13	Spacer, 8-32x2 1/8"	76	A-17791	Rollover Switch Assembly
35	B-9362-R-3	Coil & Bracket Assembly	77	01-12606	Ball Guide, Bottom Arch
	A-17908	Ball Eject Assembly	78	01-9211	Playfield Hanger Bracket (2)
	A-17985-R	Eject Switch Assembly			
	10-128	Spring			
36	01-8877	Mounting Bracket			
37	A-17813-1	Rollover Switch Assembly			
38	A-18010	Back Ramp Assembly			
39	02-5015-1	Round Post, 10-32x2.88"			
40	A-17741	Goalie Unit			
41	A-17742	Trough Assembly			
42	A-18510	Goal Bracket & Decal			

Upper Playfield Parts (Continued)

Not Shown:

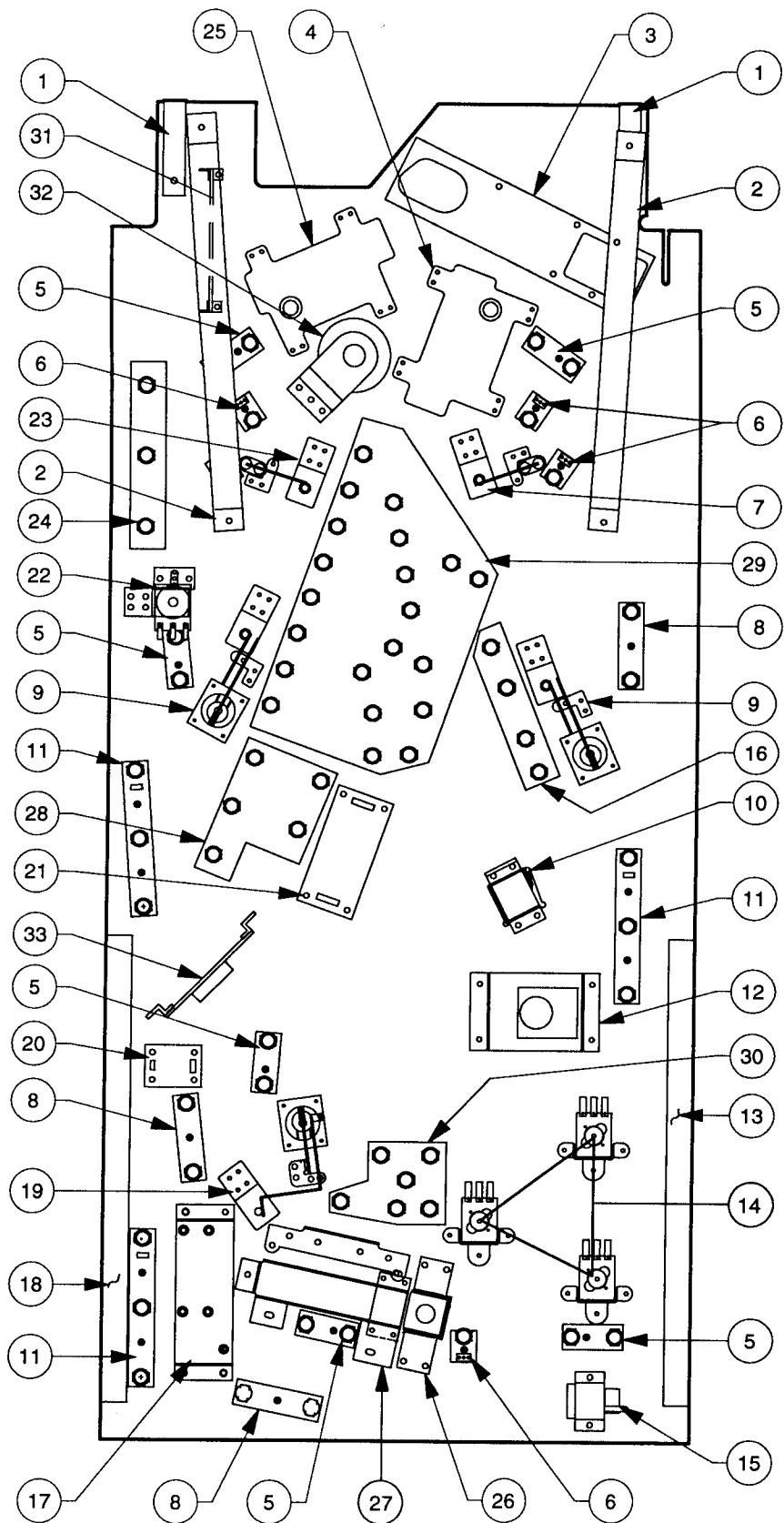
- A-15542 Motor EMI Board
- A-15595 Opto Sw-7 Board
- A-16120 D.C. Motor Control Board
- A-18159 10 Opto Board
- A-13204-50031 Bottom Arch Assembly
- 01-12624 Bottom Arch Mounting Brkt. (2)
- 01-12810 Ramp Guard, #1 Right
- 01-12812 Ramp Guard, #2 Left
- 01-12813 Ramp Guard, #3 Right
- 01-12814 Ramp Guard, #4 Left
- 01-13025 Ramp Support
- 03-9189-2 Jet Bumper Area Mylar
- 03-9189-3 Ramp Drop Area Mylar
- 03-9189-4 Ramp Drop Area Mylar
- 03-9189-5 Mylar
- 03-9189-6 Mylar
- 03-9189-7 *Full Playfield Mylar
- 20-6500 Steel Ball 1 1/16"
- 20-9672 Switch Protect Cover
- 31-1009-50031 Screened Shooter Gage Plate
- 36-50031 Hardcoat Playfield
- 36-50031-1 Hardcoat Mini-playfield

*The World Cup hardcoat playfield does not require a full mylar. However, mylars can be purchased through your local Bally Distributor.



Lower Playfield Parts

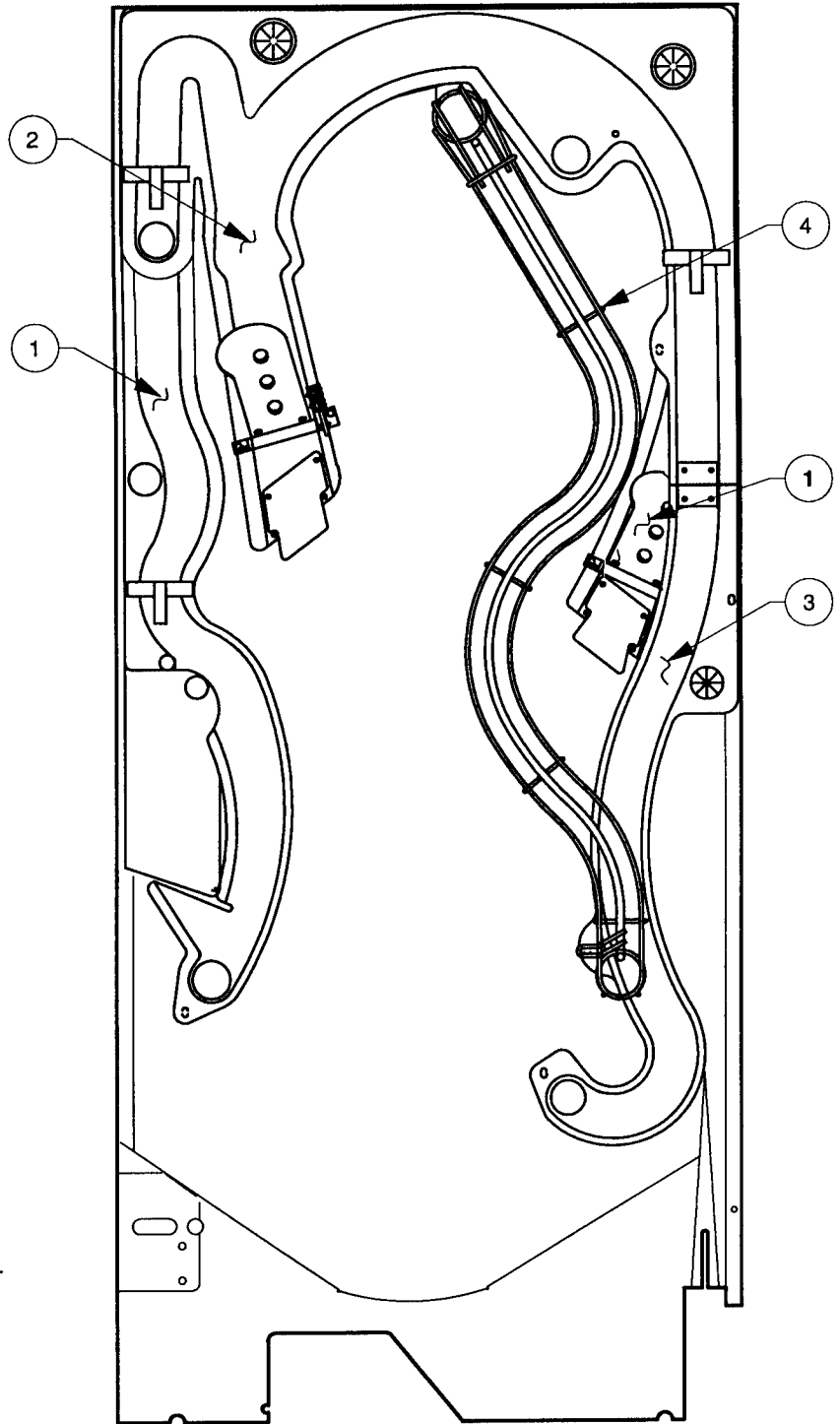
Item	Part No.	Description
1.	01-9211	Plfd. Hanger Bracket (2)
2.	01-11781	Leg Support (2)
3.	A-18753	Outhole Ball Trough Assy.
4.	A-15849-R-2	Flipper Assembly, Right
5.	A-17711	2-Lamp G.I. PCB (6)
6.	A-17910	1-Lamp PCB (6)
7.	A-17811	Kicker Arm Slingshot, Right
8.	B-9362-R-3	Coil & Bracket Assembly
9.	A-17712	2-Lamp G.I. PCB (3)
10.	B-9361-R-5	Ball Eject Assy., Righ (2)t
11.	B-9362-L-2	Coil & Bracket Assembly
12.	A-18213	Ball Popper Assembly
13.	A-17713	3-Lamp G.I. PCB (3)
14.	A-17569	Motor Assembly
15.	A-17749.1-2	Plfd. Slide Mech. Assy., R.
16.	A-9415-2	Jet Bumper Coil Assy. (3)
17.	A-17796	Ball Gate Actuator Assy.
18.	A-18067	4-Lamp PCB
19.	A-18138	Diverter Assembly
20.	A-17749.1-1	Plfd. Slide Mech. Assy., L.
21.	A-17908	Ball Eject Assembly
22.	B-9362-R-3	Coil & Bracket Assembly
23.	A-15542	Motor EMI PCB Assy.
24.	A-16120	D.C. Motor Control Assy.
25.	A-18155	Up/Down Post Unit Assy.
26.	A-17811	Kicker Arm Slingshot, Left
27.	B-9362-L-2	Coil & Bracket Assembly
28.	A-18071	3-Lamp PCB
29.	A-15849-L-2	Flipper Assembly, Left
30.	A-17839	Goalie Ball Popper Assy.
31.	A-17741	Goalie Unit Assembly
32.	A-18072	5-Lamp & 1 Flasher PCB
33.	A-18068	21-Lamp PCB
34.	A-18069	5-Lamp PCB
35.	A-15576	7-Switch Opto PCB
36.	A-15257	Bracket & Pole Piece
37.	A-18159	10-Switch Opto PCB



Underside of playfield , viewed in raised position

Ramps

Item	Part No.	Description
1.	A-18009	Bottom Ramp Assembly
	a) 03-8662-16	Mini Dome, Yellow
	b) A-18385	Jackpot Board Assembly
	c) A-18562	Mini Switch Assembly
2.	A-18010	Back Ramp Assembly
	a) A-18385	Jackpot Board Assembly
	b) A-18562	Mini Switch Assembly
	c) 03-8171-16	Mini Dome, Yellow
3.	A-18011	Front Ramp Assembly
	a) 03-8662-16	Mini Dome, Yellow
4.	12-7185	Ball Popper Wire Ramp



LAMP MATRIX

Yellow (B+)  Red

Column	1 Yellow-Brown J138-1 Q98	2 Yellow-Red J138-2 Q97	3 Yellow-Orange J138-3 Q96	4 Yellow-Black J138-4 Q95	5 Yellow-Green J138-5 Q94	6 Yellow-Blue J138-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J137-9 J138-9 Q91
Row								
1 Red-Brown J135-1 Q90	Chicago "P" 11	1 Goal 21	Free Kick 31	Kickback Lower 41	Goal Jackpot 51	Left Ramp Build Lock 61	Light Jackpot (2) 71	Rollover 1 (High) 81
2 Red-Black J135-2 Q89	Dallas "U" 12	2 Goals 22	TV Award 32	Kickback Center 42	Extra Ball 52	Spinner Build Lock 62	Final Draw 72	Rollover 2 82
3 Red-Orange J135-4 Q88	Boston "C" 13	3 Goals 23	Ultra Goalie 33	Kickback Upper 43	Goal (2) 53	Travel 63	Magna-Goal Save 73	Rollover 3 83
4 Red-Yellow J135-5 Q87	New York "D" 14	4 Goals Light TV 24	Ultra Ramps 34	Right Ramp Build Lock 44	Upper Build Lock 54	Los Angeles 64	Left Flipper Lane 74	Rollover 4 (Low) 84
5 Red-Green J135-6 Q86	Orlando "L" 15	Speed (Ball) 25	Spirit (Ball) 35	Right Ramp Lock 45	Light Magna Goalie 55	Left Ramp Lock 65	Light Kickback 75	Skill Shot Rear 85
6 Red-Blue J134-7 J135-7 Q85	Washington D.C. "R" 16	Strength (Ball) 26	Skill (Ball) 36	Ultra Spinner (2) 46	Right Flipper Lane 56	Upper Left Lane 66	Left Ramp Buy Ticket 76	Skill Shot Center 86
7 Red-Violet J134-8 J135-8 Q84	San Francisco "O" 17	Stamina (Ball) 27	Right Ticket Half 37	Ultra Jets (2) 47	Shoot Again 57	Upper Right Lane 67	Right Ramp Buy Ticket 77	Buy-in Button 87
8 Red-Gray J134-9 J135-9 Q83	Detroit "W" 18	Left Ticket Half 28	Tackle 38	Striker Billboard 48	Right Special 58	Skill Shot Front 68	Ultra Ramps (2) 78	Start Button 88

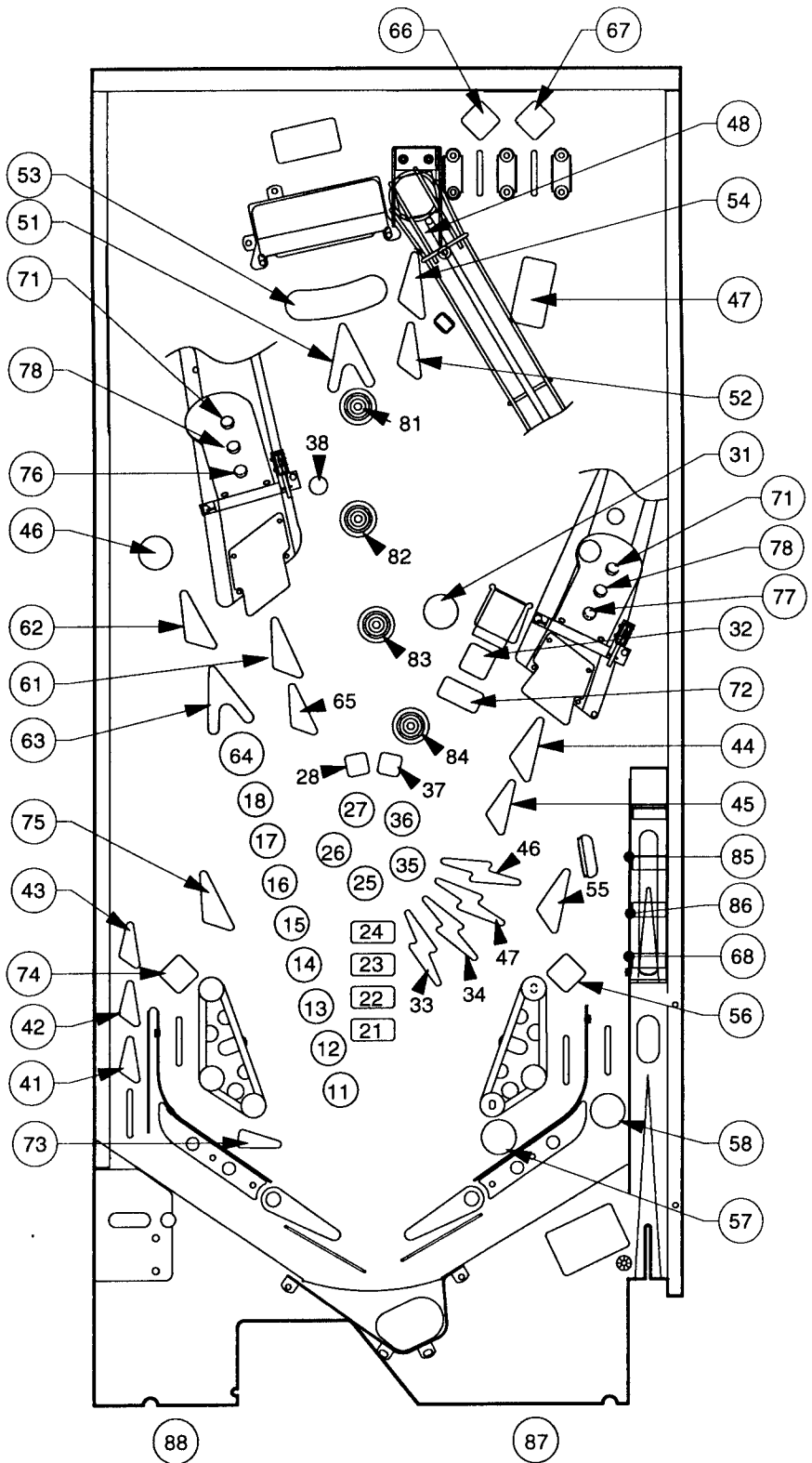
J1XX = Power Driver Board

LAMP LOCATIONS

Item No.	Bulb No.	Lamp Assy. No.	Description	Item No.	Bulb No.	Lamp Assy. No.	Description
11	24-8768	A-18068	Chicago "P"	31	24-6549	A-17835	Free Kick
12	24-8768	A-18068	Dallas "U"	32	24-6549	A-17835	TV Award
13	24-8768	A-18068	Boston "C"	33	24-8768	A-18068	Ultra Ball
14	24-8768	A-18068	New York "D"	34	24-8768	A-18068	Ultra Ramps (Playfield)
15	24-8768	A-18068	Orlando "L"	35	24-8768	A-18068	Strength (Ball)
16	24-8768	A-18068	Washington D.C. "R"	36	24-8768	A-18068	Stamina (Ball)
17	24-8768	A-18068	San Francisco "O"	37	24-8768	A-18068	Right Ticket Half
18	24-8768	A-18068	Detroit "W"	38	24-6549	A-17835	Tackle
21	24-8768	A-18068	1 Goal	41	24-8768	A-18071	Kickback Low
22	24-8768	A-18068	2 Goals	42	24-8768	A-18071	Kickback Center
23	24-8768	A-18068	3 Goals	43	24-8768	A-18071	Kickback High
24	24-8768	A-18068	4 Goals Light TV	44	24-8768	A-18067	Right Ramp Build Lock
25	24-8768	A-18068	Speed (Ball)	45	24-8768	A-18067	Right Ramp Lock
26	24-8768	A-18068	Spirit (Ball)	46	24-6549	A-17835	Ultra Spinner (2)
27	24-8768	A-18068	Skill (Ball)	47	24-6549	A-18067	Ultra Jets (2)
28	24-8768	A-18068	Left Ticket Half	48	24-6549	A-18067	Striker Billboard

Lamp Locations (Continued)

<u>Pin No.</u>	<u>Bulb No.</u>	<u>Lamp Assy. No.</u>	<u>Description</u>
51	24-8768	A-18384	Goal Jackpot
52	24-8768	A-18384	Extra Ball
53	24-8768	A-18384	Goal (2)
54	24-8768	A-18384	Upper Build Lock
55	24-6549	A-17835	Light Magna Goalie
56	24-6549	A-17835	Right Flipper Lane
57	24-6549	A-17835	Shoot Again
58	24-6549	A-17835	Right Special
61	24-8768	A-18072	Left Ramp Build Lock
62	24-8768	A-18072	Spinner Build Lock
63	24-8768	A-18072	Travel
64	24-8768	A-18072	Los Angeles
65	24-8768	A-18072	Left Ramp Lock
66	24-6549	A-17835	Upper Left Lane
67	24-6549	A-17835	Upper Right Lane
68	24-8768	A-18495	Skill Shot Front
71	24-8768	C-12709	Light Jackpot (2)
72	24-6549	A-17835	Final Draw
73	24-6549	A-17835	Magna-Goal Save
74	24-6549	A-17835	Left Flipper Lane
75	24-6549	A-17807	Light Kickback
76	24-8768	C-12709	Left Ramp Buy Ticket
77	24-8768	C-12709	Right Ramp Buy Ticket
78	24-8768	C-12709	Ultra Ramps (2)
81	24-6549	A-17807	Rollover 1 (High)
82	24-6549	A-17807	Rollover 2
83	24-6549	A-17807	Rollover 3
84	24-6549	A-17807	Rollover 4 (Low)
85	24-8768	A-18495	Skill Shot Rear
86	24-8768	A-18495	Skill Shot Center
87	20-9663-D-1	---	Buy-in Button
88	20-9663-1	---	Start Button



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

SWITCH MATRIX

Dedicated Grounded Switches	Column Row	White ——— ——— Green								Flipper Grounded Switches
		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	
Orange-Brown (1) J205-1 Left Coin Chute D1	1 White-Brown J209-1 U18-11	Not Used 11	Slam Tilt 21	Trough 1 (Right) 31	Goal Trough 41	Skill Shot Front 51	Rollover 1 (High) 61	Left Ramp Diverted 71	Left Jet Bumper 81	Black-Green J905-1 Right Flipper End of Stroke F1
Orange-Red (2) J205-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	Magna Goalie Button 12	Coin Door Closed 22	Trough 2 32	Goal Popper Opto 42	Skill Shot Center 52	Rollover 2 62	Left Ramp Entrance 72	Upper Jet Bumper 82	Blue-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 Extra Ball 23	Trough 3 33	Goalie Is Left 43	Skill Shot Rear 53	Rollover 3 63	Not Used 73	Lower Jet Bumper 83	Black-Blue J905-3 Left Flipper End of Stroke F3
Orange-Yellow (4) J205-4 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	Plumb Bob Tilt 14	Always Closed 24	Trough 4 34	Goalie Is Right 44	Right Eject Hole 54	Rollover 4 (Low) 64	Left Ramp Exit 74	Left Slingshot 84	Blue-Gray J905-2 Left Flipper Opto F4
Orange-Green (5) J205-6 Normal Function Service Credits Escape D5 Orange-Blue (6) J205-7 Normal Function Volume Down Down D6 Orange-Violet (7) J205-8 Normal Function Volume Up Up D7 Orange-Gray (8) J205-9 Normal Function Begin Test Enter D8	5 White-Green J209-5 U19-11	Left Flipper Lane 15	Free Kick Target 25	Trough 5 (Left) 35	TV Ball Popper 45	Upper Eject Hole 55	Tackle Switch 65	Right Ramp Entrance 75	Right Slingshot 85	Not Used F5
	6 White-Blue J209-7 U19-9	Striker 3 (High) 16	Kickback Upper 26	Trough Stack 36	Not Used 46	Left Eject Hole 56	Striker 1 (Left) 66	Lock Mech. Low 76	Kickback 86	Not Used F6
	7 White-Violet J209-8 U19-5	Right Return Lane 17	Spinner 27	Light Magna Goalie 37	Travel Lane Rollover 47	Not Used 57	Striker 2 (Center) 67	Lock Mech. High 77	Upper Left Lane 87	Not Used F7
	8 White-Gray J209-9 U19-7	Right Outlane 18	Light Kickback 28	Ball Shooter 38	Goalie Target 48	Not Used 58	Not Used 68	Right Ramp Exit 78	Upper Right Lane 88	Not Used F8

J20X = CPU Board, J90X = Fliptronic II Board Opto, Typically Closed

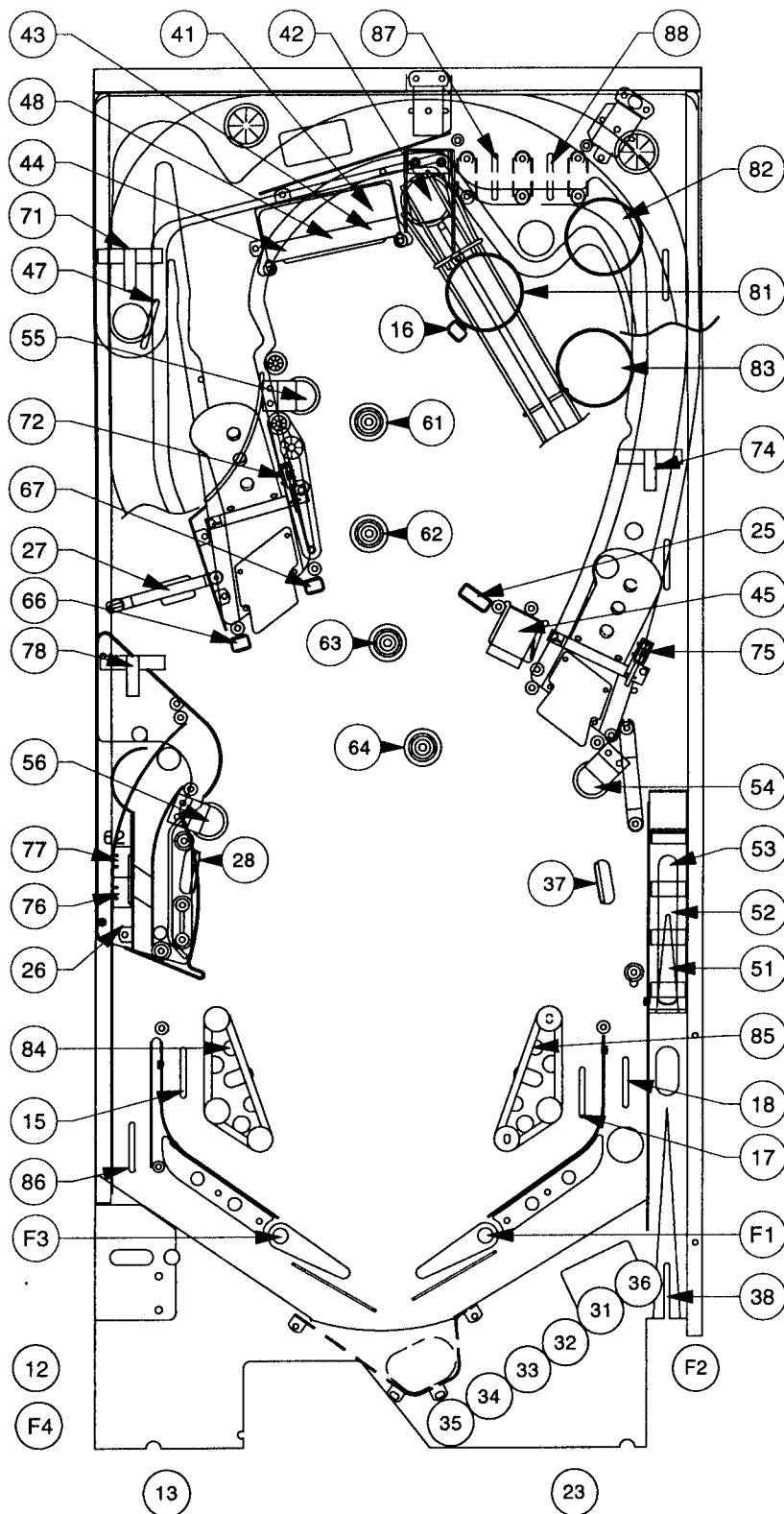
SWITCH LOCATIONS

Item	Switch Part #	Where Used	Item	Switch Part #	Where Used
F1	SW-1A-194	Lower Right Flipper EOS	32	A-18618 Transistor	Trough 2
F2	A-17316	Lower Right Flipper Cabinet		A-18617 LED	
F3	SW-1A-194	Lower Left Flipper EOS	33	A-18618 Transistor	Trough 3
F4	A-17316	Lower Left Flipper Cabinet		A-18617 LED	
11	---	Not Used	34	A-18618 Transistor	Trough 4
12	SW-1A-195	Magna Goalie Button		A-18617 LED	
13	20-9663-1	Start Button	35	A-18618 Transistor	Trough 5 (Left)
14	A-15361	*Plumb Bob Tilt		A-18617 LED	
15	5647-12693-19	Left Flipper Lane	36	A-18618 Transistor	Trough Stack
16	A-18530-4	Striker 3 (High)		A-18617 LED	
17	5647-12693-19	Right Return Lane	37	A-18059-4	Light Magna Goalie
18	5647-12693-19	Right Outlane	38	5647-12693-32	Ball Shooter
21	A-17238	*Slam Tilt	41	A-16908 LED	Goal Trough
22	5643-09288-00	*Coin Door Closed		A-16909 Transistor	
23	20-9663-D-1	Buy Extra Ball	42	A-16908 LED	Goal Popper Opto
24	5643-09112-00	*Always Closed		A-16909 Transistor	
25	A-18504	Free Kick Target	43	A-16908 LED	Goalie Is Left
26	5647-12693-19	Kickback Upper		A-16909 Transistor	
27	5647-12133-08	Spinner	44	A-16908 LED	Goalie Is Right
28	A-18059-4	Light Kickback		A-16909 Transistor	
31	A-18618 Transistor	Trough 1 (Right)	45	A-16908 LED	TV Ball Popper
	A-18617 LED			A-16909 Transistor	
			46	---	Not Used
			47	5647-12693-19	Travel Lane Rollover
			48	A-17779	Goalie Target

*Not Shown

Switch Locations (Continued)

Item	Switch Part #	Where Used
51	A-16908 LED	Skill Shot Front
	A-16909 Transistor	
52	A-16908 LED	Skill Shot Center
	A-16909 Transistor	
53	A-16908 LED	Skill Shot Rear
	A-16909 Transistor	
54	5647-12133-11	Right Eject Hole
55	5647-12133-11	Upper Eject Hole
56	5647-12133-11	Left Eject Hole
57	---	Not Used
58	---	Not Used
61	SW-11A-37	Rollover 1 (High)
62	SW-11A-37	Rollover 2
63	SW-11A-37	Rollover 3
64	SW-11A-37	Rollover 4 (Low)
65	SW-1A-120	Tackle Switch
66	A-18530-15	Striker 1 (Left)
67	A-18530-15	Striker 2 (Center)
68	---	Not Used
71	5647-12693-21	Left Ramp Diverted
72	5647-12693-11	Left Ramp Entrance
73	---	Not Used
74	5647-12693-21	Left Ramp Exit
75	5647-12693-11	Right Ramp Entrance
76	5647-12693-17	Lock Mech. Low
77	5647-12693-17	Lock Mech. High
78	5647-12693-21	Right Ramp Exit
81	SW-11A-37	Left Jet Bumper
82	SW-11A-37	Upper Jet Bumper
83	SW-11A-37	Lower Jet Bumper
84	SW-1A-114	Left Slingshot (kicker)
	SW-1A-120	(score)
85	SW-1A-114	Right Slingshot (kicker)
	SW-1A-120	(score)
86	5647-12693-19	Kickback
87	5647-12693-19	Upper Left Lane
88	5647-12693-19	Upper Right Lane



SOLENOID / FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive xletter	Drive Connections			Drive Wire Color	Solenoid Part Number Flashlamp Type	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox
01	Goal Popper	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-23-800	
02	TV Popper	High Power	J107-2			Q80	J130-2			Vio-Red	AE-26-1500	
03	Kickback	High Power	J107-2			Q78	J130-4			Vio-Org	AE-23-800	
04	Lock Release	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1500	
05	Upper Eject Hole	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-26-1200	
06	Trough	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-26-1500	
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	Ramp Diverter	High Power	J107-2			Q70	J130-9			Vio-Gry	FL-11753-1	
09	Left Jet Bumper	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	Upper Jet Bumper	Low Power	J107-3			Q56	J127-3			Brn-Blk	AE-26-1200	
11	Lower Jet Bumper	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	Left Slingshot	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	Right Slingshot	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	Right Eject Hole	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1200	
15	Left Eject Hole	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200	
16	Diverter Hold	Low Power	J107-2			Q44	J127-9			Brn-Gry	FL-11753-1	
17	Goal Cage Top	Flasher	J107-6	J106-5		Q42	J126-1	J125-1		Blk-Brn	#906	#906
18	Goal	Flasher	J107-6	J106-5		Q40	J126-2	J125-2		Blk-Red	#89, #906	#906
19	Skill Shot	Flasher	J107-6	J106-5		Q38	J126-3	J125-3		Blk-Org	#906	#906
20	Jet Bumpers	Flasher	J107-6	J106-5		Q36	J126-4	J125-5		Blk-Yel	#89	#906
21	Goalie Drive	Flasher	J116-2			Q28	J126-5			Blu-Grn	14-7997 *	
22	Spinning Ball	Flasher	J107-6			Q30	J126-6			Blu-Blk	#89 (2)	
23	Ball Clockwise	Flasher	J116-2			Q34	J126-7			Blu-Vio	14-7996 *	
24	Ball Counter-Clockwise	Flasher	J116-2			Q32	J126-8			Blu-Gry	14-7996 *	
25	Left Ramp Entrance	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#89	#906
26	Lock Area	Gen. Purpose	J107-6	J106-5		Q24	J122-2	J124-2		Blu-Red	#906	#906
27	Flipper Lanes	Gen. Purpose	J107-6	J106-5		Q22	J122-3	J124-3		Blu-Org	#89 (2)	#906
28	Ramp Rear	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-5		Blu-Yel	#906 (2)	#906
33	Magna Goalie	High Power	J907-6,7			Q2	J902-6			Yel-Vio	20-9247	
34	Loop Gate	Low Power	J907-6,7			Q7	J902-4			Org-Vio	A-14406	
35	Lock Magnet	High Power	J907-8,9			Q1	J902-3			Yel-Gry	20-9247	

General Illumination

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

Flipper Circuits		Voltage Connections		Drive Transistors		Drive Connections		Drive Wire Colors		Coll Part Number	Coll Color
		Playfield	Power	Hold	Playfield	Power	Hold				
Lower Left Flipper	Lwr. Lt. Power	J907-4 (Red-Blu)	Q3		J902-9		Yel-Blu			FL-11629	BLUE
	Lwr. Lt. Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu				
Lower Right Flipper	Lwr. Rt. Power	J907-1 (Red-Grn)	Q4		J902-13		Yel-Grn			FL-11629	BLUE
	Lwr. Rt. Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn				
Upper Left Flipper	Up Lt. Power	J907-8 (Red-Gry)	Q1		J902-3		Yel-Gry			Not Used	
	Up Lt. Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry				
Upper Right Flipper	Up Rt. Power	J907-6 (Red-Vio)	Q2		J902-6		Yel-Vio			Not Used	
	Up Rt. Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio				

* +12VDC 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	Coil/Flasher Number	Assembly Number	Description	Item	Coil/Flasher Number	Assembly Number	Description
01	AE-23-800	A-17839	Goal Popper	17	24-8802	A-12336-1	Goal Cage Top (2)
02	AE-26-1500	A-18213	TV Popper	18	24-8802	A-18384	Goal (2)
03	AE-23-800	B-11873	Kickback		24-8704	A-17803	
04	AE-26-1500	A-18155	Lock Release	19	24-8802	A-12336-1	Skill Shot (2)
05	AE-26-1200	B-9362-R-3	Upper Eject Hole		24-8704	A-17803	
06	AE-26-1500	A-16765	Trough	20	24-8704	A-17803	Jet Bumpers
07	AE-23-800	B-10686-1	*Knocker	21	14-7997	A-17741	Goalie Drive
08	FL-11753-1	A-18138	Ramp Diverter	22	24-8704	A-17983	Spinning Ball (2)
09	AE-26-1200	A-9415-2	Left Jet Bumper	23	14-7996	A-17569	Ball Clockwise
10	AE-26-1200	A-9415-2	Upper Jet Bumper	24	14-7996	A-17569	Ball Counter-Clockwise
11	AE-26-1200	A-9415-2	Lower Jet Bumper	25	24-8704	A-17983	Left Ramp Entrance
12	AE-26-1200	B-9362-L-2	Left Slingshot	26	24-8802	A-12336-1	Lock Area
13	AE-26-1200	B-9362-R-3	Right Slingshot	27	24-8704	A-17983	Flipper Lanes (2)
14	AE-26-1200	B-9362-L-2	Right Eject Hole	28	24-8802	A-12336-1	Ramp Rear (2)
15	AE-26-1200	B-9362-L-2	Left Eject Hole	33	20-9247	---	Magna Goalie
16	FL-11753-1	A-18138	Diverter Hold	34	A-14406	A-17796	Lock Gate
				35	20-9247	A-18222	Loop Magnet

*Not Shown

Solenoid/Flasher Locations (Continued)

General Illumination Circuits

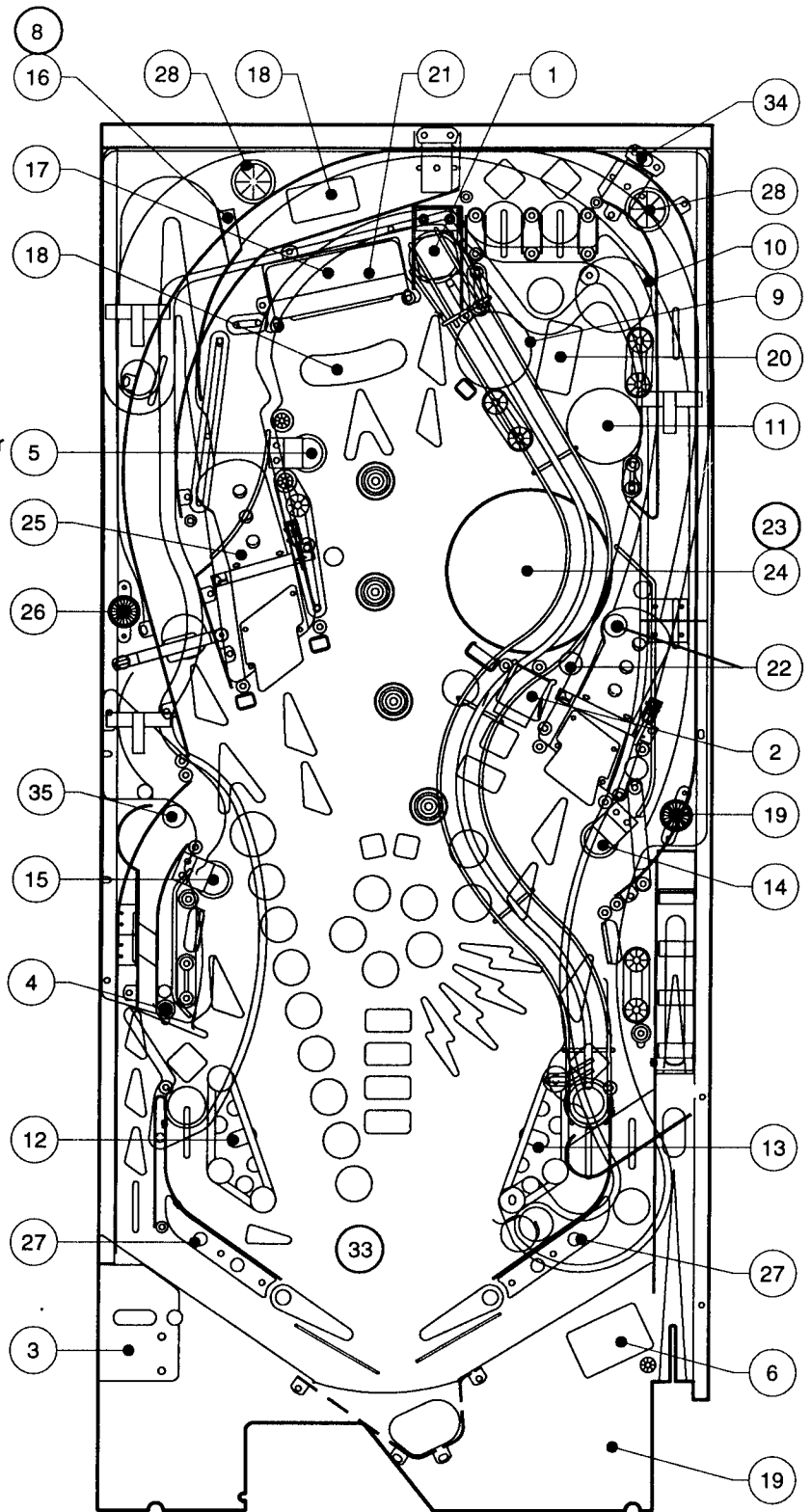
*01	Playfield Left	#44, #555	GI String 1
*02	Playfield Right	#44, #555	GI String 2
*03	Insert Background	#555	GI String 3
*04	Insert Title	#555	GI String 4
*05	Playfield Top	#555	GI String 5

Flipper Coils

*FL-11629 (Blue)	A-15849-L-2	Lwr. Left Flipper
*FL-11629 (Blue)	A-15849-R-2	Lwr. Right Flipper

*Not Shown

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



Notes

Notes

Notes

Game Wiring and Schematics

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack-except the Audio 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 numbers for the WPC circuit boards are listed below.

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

The Audio Board and Dot Matrix Display/Driver Board do not have an identification number.

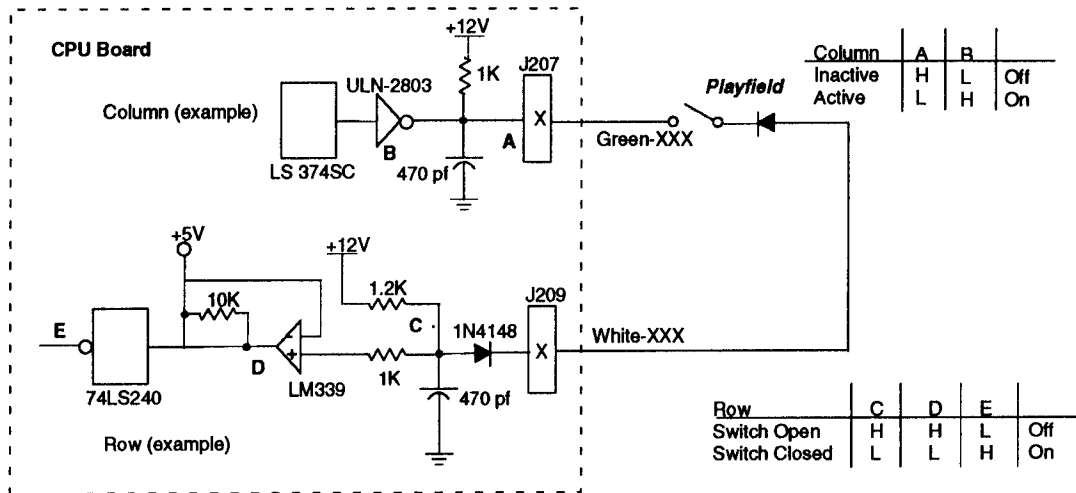
Schematics for standard WPC backbox boards are found in the WPC Schematics Manual. Playfield, cabinet, and all other backbox board schematics are found in this section.

SWITCH MATRIX

Dedicated Grounded Switches	Column Row	White Green								Flipper Grounded Switches
		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	
Orange-Brown (1) J205-1 Left Coin Chute D1	1 White-Brown J209-1 U18-11	Not Used 11	Slam Tilt 21	Trough 1 (Right) 31	Goal Trough 41	Skill Shot Front 51	Rollover 1 (High) 61	Left Ramp Diverted 71	Left Jet Bumper 81	Black-Green J906-1 Right Flipper End of Stroke F1
Orange-Red (2) J205-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	Magna Goalie Button 12	Coin Door Closed 22	Trough 2 32	Goal Popper Opto 42	Skill Shot Center 52	Rollover 2 62	Left Ramp Entrance 72	Upper Jet Bumper 82	Blue-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 Extra Ball 23	Trough 3 33	Goalie Is Left 43	Skill Shot Rear 53	Rollover 3 63	Not Used 73	Lower Jet Bumper 83	Black-Blue J906-3 Left Flipper End of Stroke F3
Orange-Yellow (4) J205-4 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	Plumb Bob Tilt 14	Always Closed 24	Trough 4 34	Goalie Is Right 44	Right Eject Hole 54	Rollover 4 (Low) 64	Left Ramp Exit 74	Left Slingshot 84	Blue-Gray J905-2 Left Flipper Opto F4
Orange-Green (5) J205-6 Normal Function Service Credits Escape D5	5 White-Green J209-5 U19-11	Left Flipper Lane 15	Free Kick Target 25	Trough 5 (Left) 35	TV Ball Popper 45	Upper Eject Hole 55	Tackle Switch 65	Right Ramp Entrance 75	Right Slingshot 85	Not Used F5
Orange-Blue (6) J205-7 Normal Function Volume Down Down D6	6 White-Blue J209-7 U19-9	Striker 3 (High) 16	Kickback Upper 26	Trough Stack 36	Not Used 46	Left Eject Hole 56	Striker 1 (Left) 66	Lock Mech. Low 76	Kickback 86	Not Used F6
Orange-Violet (7) J205-8 Normal Function Volume Up Up D7	7 White-Violet J209-8 U19-5	Right Return Lane 17	Spinner 27	Light Magna Goalie 37	Travel Lane Rollover 47	Far Right Lane High 57	Striker 2 (Center) 67	Lock Mech. High 77	Upper Left Lane 87	Not Used F7
Orange-Gray (9) J205-9 Normal Function Begin Test Enter D8	8 White-Gray J209-9 U19-7	Right Outlane 18	Light Kickback 28	Ball Shooter 38	Goalie Target 48	Far Right Lane Low 58	Not Used 68	Right Ramp Exit 78	Upper Right Lane 88	Not Used F8

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

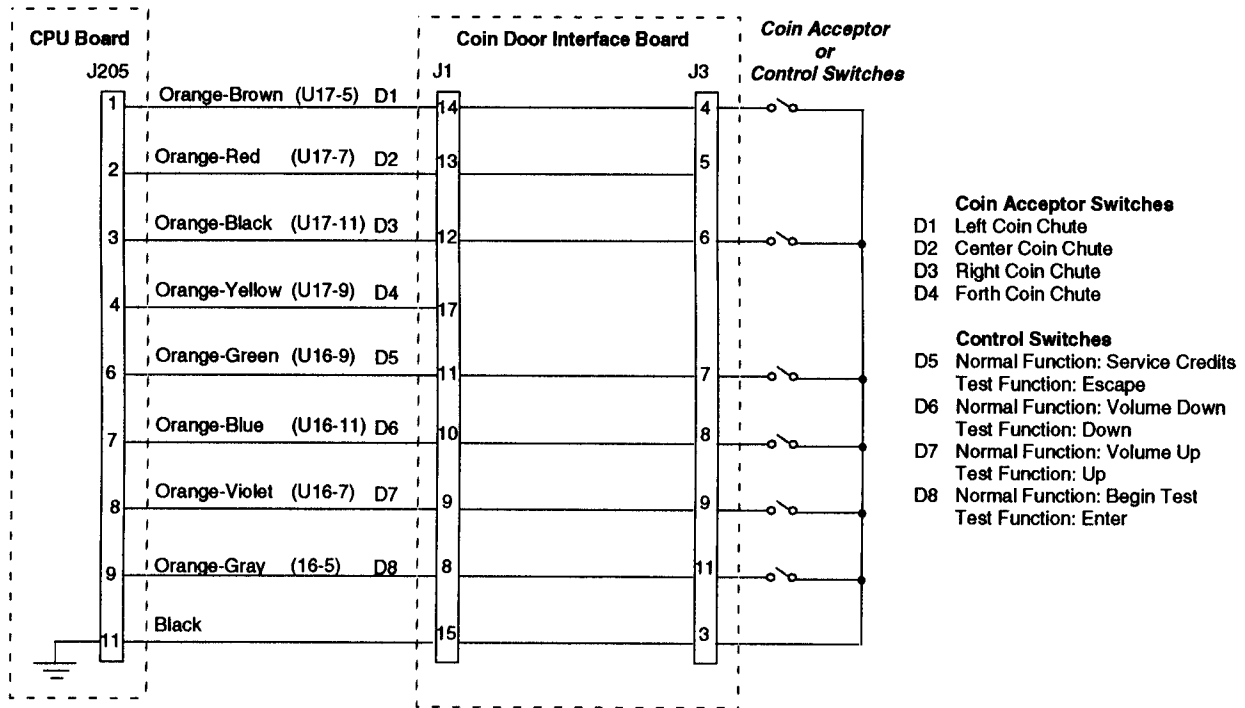
SWITCH MATRIX CIRCUIT



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

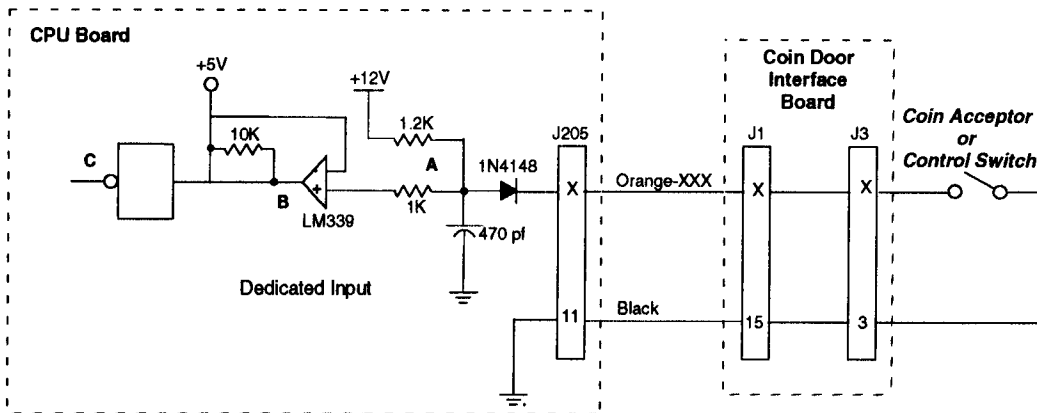
When a switch closes, the row side of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Corresponding row and column switches must be low at the same time, for the switch to be considered closed by the microprocessor. When the switch opens, the "+" input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

DEDICATED SWITCHES



- Coin Acceptor Switches**
- D1 Left Coin Chute
 - D2 Center Coin Chute
 - D3 Right Coin Chute
 - D4 Forth Coin Chute
- Control Switches**
- D5 Normal Function: Service Credits
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 above +5V, its output is high and the row is inactive.

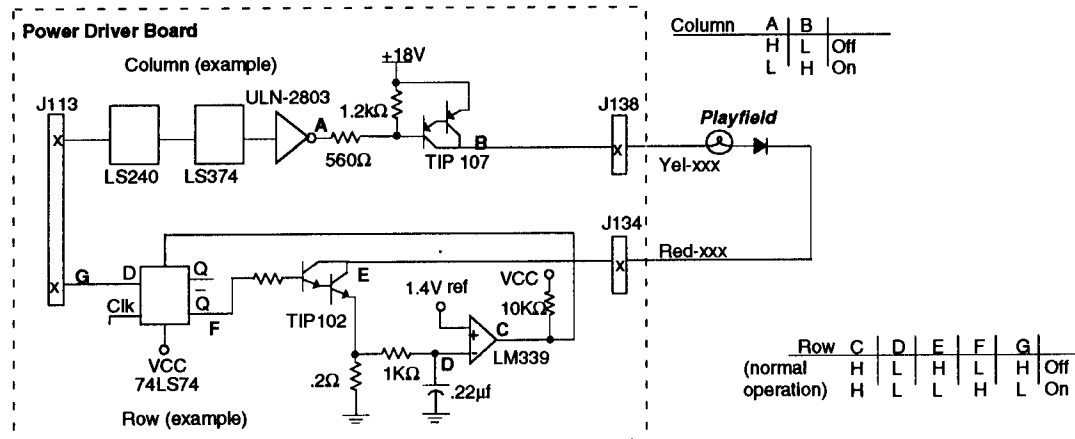
LAMP MATRIX

Yellow (B+) Red

Column \ Row	1 Yellow-Brown J138-1 Q98	2 Yellow-Red J138-2 Q97	3 Yellow-Orange J138-3 Q96	4 Yellow-Black J138-4 Q95	5 Yellow-Green J138-5 Q94	6 Yellow-Blue J138-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J137-9 J138-9 Q91
1 Red-Brown J135-1 Q90	Chicago "P" 11	1 Goal 21	Free Kick 31	Kickback Lower 41	Goal Jackpot 51	Left Ramp Build Lock 61	Light Jackpot (2) 71	Rollover 1 (High) 81
2 Red-Black J135-2 Q89	Dallas "U" 12	2 Goals 22	TV Award 32	Kickback Center 42	Extra Ball 52	Spinner Build Lock 62	Final Draw 72	Rollover 2 82
3 Red-Orange J135-4 Q88	Boston "C" 13	3 Goals 23	Ultra Goalle 33	Kickback Upper 43	Goal (2) 53	Travel 63	Magna-Goal Save 73	Rollover 3 83
4 Red-Yellow J135-5 Q87	New York "D" 14	4 Goals Light TV 24	Ultra Ramps 34	Right Ramp Build Lock 44	Upper Build Lock 54	Los Angeles 64	Left Flipper Lane 74	Rollover 4 (Low) 84
5 Red-Green J135-6 Q86	Orlando "L" 15	Speed (Ball) 25	Spirit (Ball) 35	Right Ramp Lock 45	Light Magna Goalle 55	Left Ramp Lock 65	Light Kickback 75	Skill Shot Rear 85
6 Red-Blue J134-7 J135-7 Q85	Washington D.C. "R" 16	Strength (Ball) 26	Skill (Ball) 36	Ultra Spinner (2) 46	Right Flipper Lane 56	Upper Left Lane 66	Left Ramp Buy Ticket 76	Skill Shot Center 86
7 Red-Violet J134-8 J135-8 Q84	San Francisco "O" 17	Stamina (Ball) 27	Right Ticket Half 37	Ultra Jets (2) 47	Shoot Again 57	Upper Right Lane 67	Right Ramp Buy Ticket 77	Buy-In Button 87
8 Red-Gray J134-9 J135-9 Q83	Detroit "W" 18	Left Ticket Half 28	Tackle 38	Striker Billboard 48	Right Special 58	Skill Shot Front 68	Ultra Ramps (2) 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.

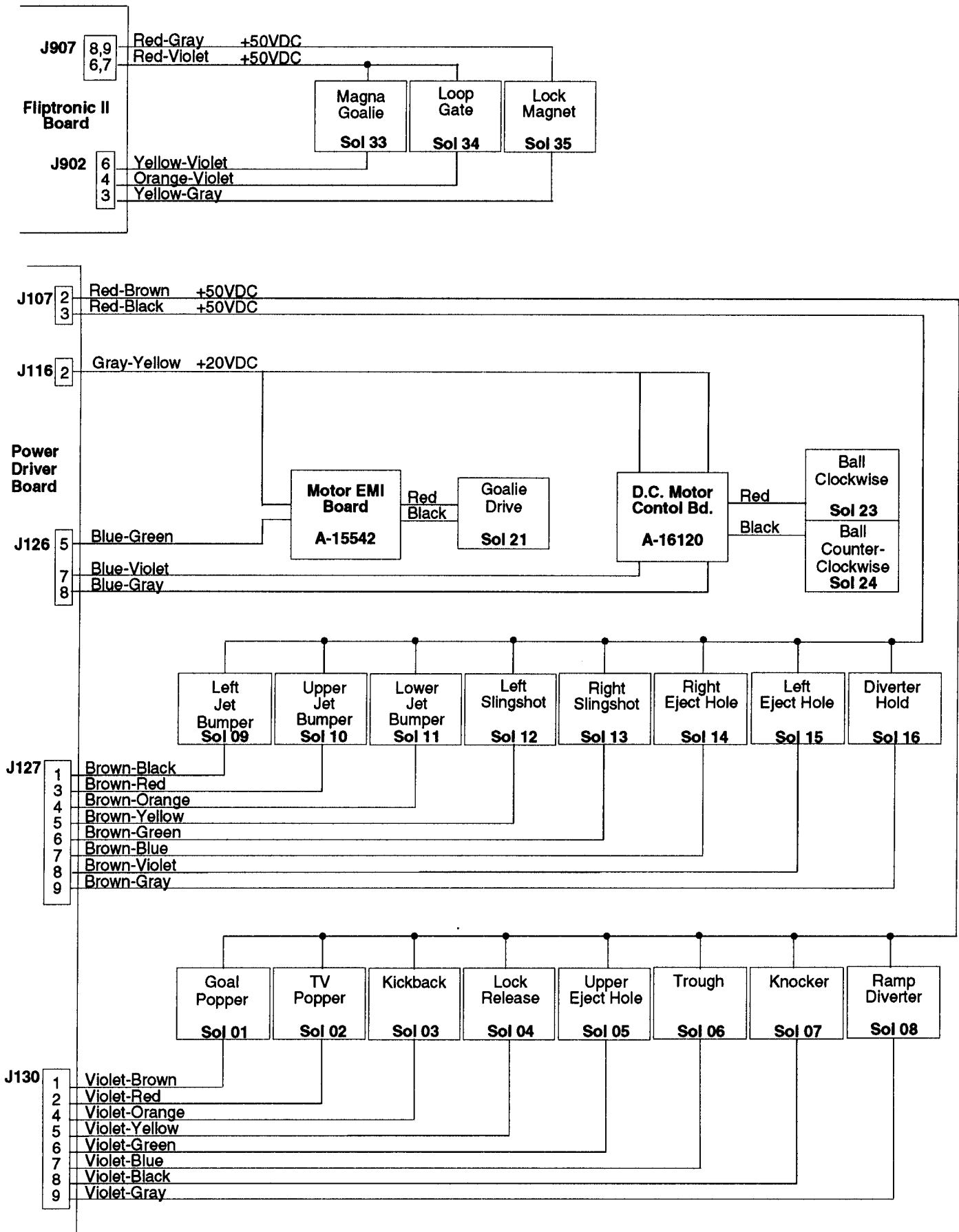
In overcurrent conditions the lamp is shut Off through the comparator. If the voltage at the negative input of the LM339 rises above 1.4V the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit Off.

SOLENOID / FLASHER TABLE

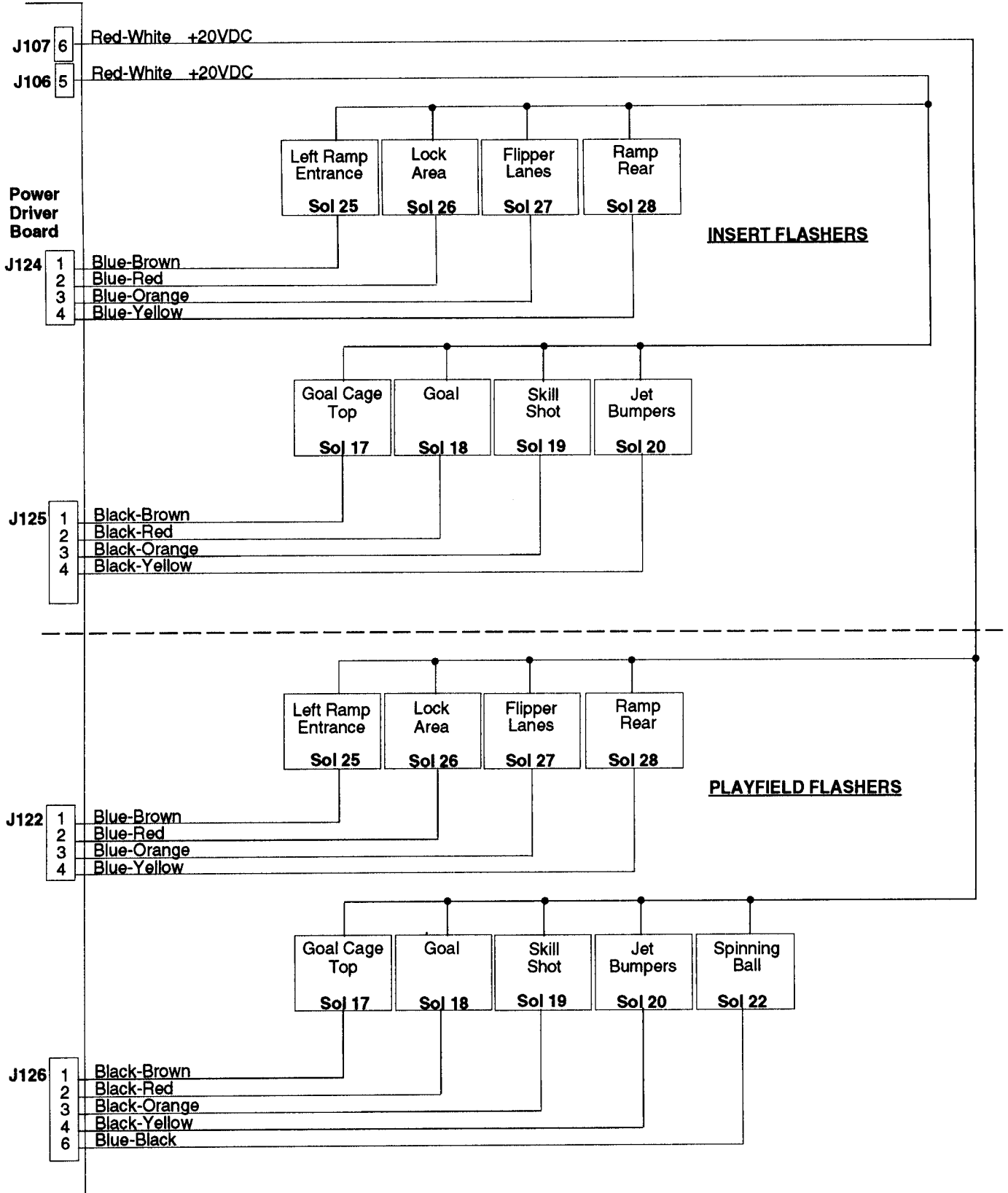
Sol. No.	Function	Solenoid Type	Voltage Connections			Drive xletter	Drive Connections			Drive Wire Color	Solenoid Part Number Flashlamp Type	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox
01	Goal Popper	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-23-800	
02	TV Popper	High Power	J107-2			Q80	J130-2			Vio-Red	AE-26-1500	
03	Kickback	High Power	J107-2			Q78	J130-4			Vio-Org	AE-23-800	
04	Lock Release	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1500	
05	Upper Eject Hole	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-26-1200	
06	Trough	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-26-1500	
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	Ramp Diverter	High Power	J107-2			Q70	J130-9			Vio-Gry	FL-11753-1	
09	Left Jet Bumper	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	Upper Jet Bumper	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	Lower Jet Bumper	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	Left Slingshot	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	Right Slingshot	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	Right Eject Hole	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1200	
15	Left Eject Hole	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200	
16	Diverter Hold	Low Power	J107-2			Q44	J127-9			Brn-Gry	FL-11753-1	
17	Goal Cage Top	Flasher	J107-6	J106-5		Q42	J126-1	J125-1		Blk-Brn	#906	#906
18	Goal	Flasher	J107-6	J106-5		Q40	J126-2	J125-2		Blk-Red	#89, #906	#906
19	Skill Shot	Flasher	J107-6	J106-5		Q38	J126-3	J125-3		Blk-Org	#906	#906
20	Jet Bumpers	Flasher	J107-6	J106-5		Q36	J126-4	J125-5		Blk-Yel	#89	#906
21	Goalle Drive	Flasher	J116-2			Q28	J126-5			Blu-Grn	14-7997 *	
22	Spinning Ball	Flasher	J107-6			Q30	J126-6			Blu-Blk	#89 (2)	
23	Ball Clockwise	Flasher	J116-2			Q34	J126-7			Blu-Vio	14-7996 *	
24	Ball Counter-Clockwise	Flasher	J116-2			Q32	J126-8			Blu-Gry	14-7996 *	
25	Left Ramp Entrance	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#89	#906
26	Lock Area	Gen. Purpose	J107-6	J106-5		Q24	J122-2	J124-2		Blu-Red	#906	#906
27	Flipper Lanes	Gen. Purpose	J107-6	J106-5		Q22	J122-3	J124-3		Blu-Org	#89 (2)	#906
28	Ramp Rear	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-5		Blu-Yel	#906 (2)	#906
33	Magna Goalle	High Power	J907-6,7			Q2	J902-6			Yel-Vio	20-9247	
34	Loop Gate	Low Power	J907-6,7			Q7	J902-4			Org-Vio	A-14406	
35	Lock Magnet	High Power	J907-8,9			Q1	J902-3			Yel-Gry	20-9247	
General Illumination												
01	Playfield Left	G.I.	J121-1			Q18	J121-7			Wht-Brn	#44, #555	
02	Playfield Right	G.I.	J121-2			Q10	J121-8			Wht-Org	#44, #555	
03	Insert Background	G.I.		J120-3		Q14		J120-9		Wht-Yel		#555
04	Insert Title	G.I.		J120-5		Q16		J120-10		Wht-Gm		#555
05	Playfield Top	G.I.	J121-6			Q12	J121-11			Wht-Vio	#555	
Flipper Circuits												
Flipper Circuits		Voltage Connections	Drive Transistors		Drive Connections	Drive Wire Colors		Coil Part Number	Coil Color			
			Playfield	Power Hold		Playfield	Power Hold					
Lower Left Flipper	Lwr. Lt. Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu		FL-11629	BLUE			
	Lwr. Lt. Hold	J907-4 (Red-Blu)	Q9		J902-7	Org-Blu						
Lower Right Flipper	Lwr. Rt. Power	J907-1 (Red-Gm)	Q4		J902-13	Yel-Grn		FL-11629	BLUE			
	Lwr. Rt. Hold	J907-1 (Red-Gm)	Q11		J902-11	Org-Grn						
Upper Left Flipper	Up Lt. Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry		Not Used				
	Up Lt. Hold	J907-8 (Red-Gry)	Q5		J902-1	Org-Gry						
Upper Right Flipper	Up Rt. Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio		Not Used				
	Up Rt. Hold	J907-6 (Red-Vio)	Q7		J902-4	Org-Vio						

*+12VDC J1XX = Power Driver Board; J9XX - Fliptronic II Board; 24-6549 = #44 Bulb; 24-8704 = #89 Bulb; 24-8768 = #555 Bulb; 24-8802 = #906 Bulb

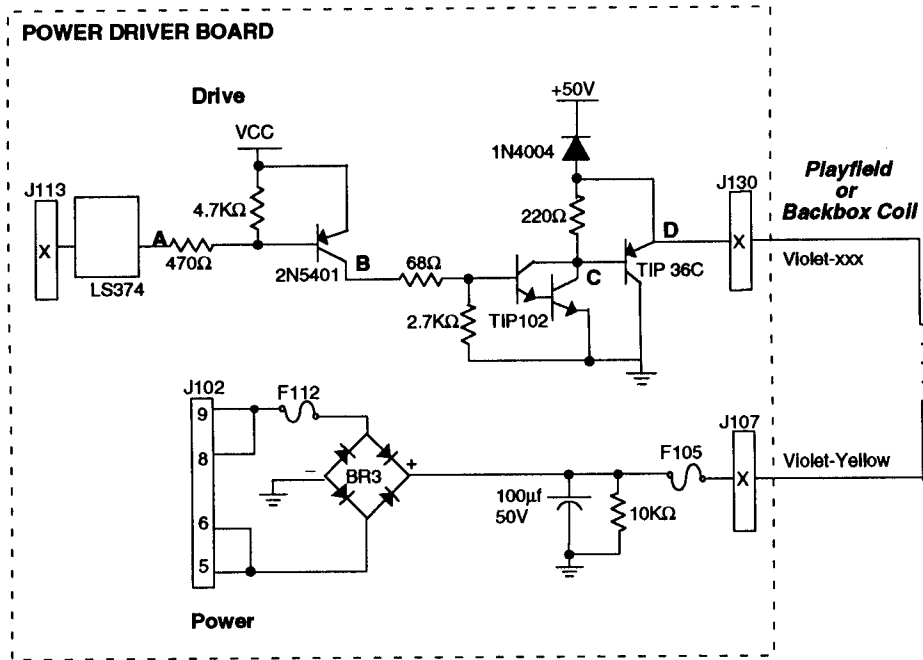
SOLENOID WIRING



FLASHER WIRING

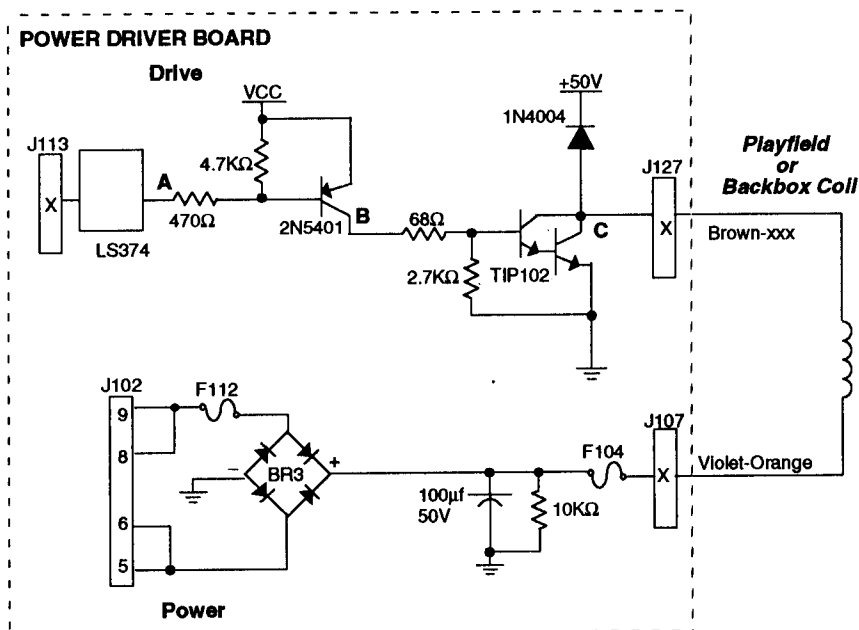


High Power Solenoid Circuit



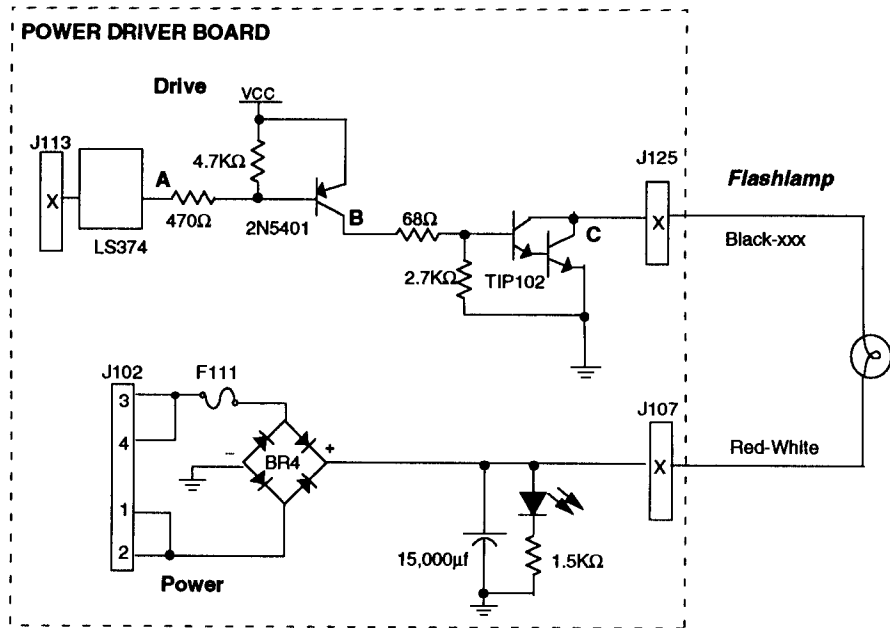
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" the collector of the 2N5401 transistor is high. A high at point "B" causes point "C" the collector of the TIP102 transistor, and point "D" the emitter of the TIP36 transistor to drop low. When point "D" is low the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

Low Power Solenoid Circuit



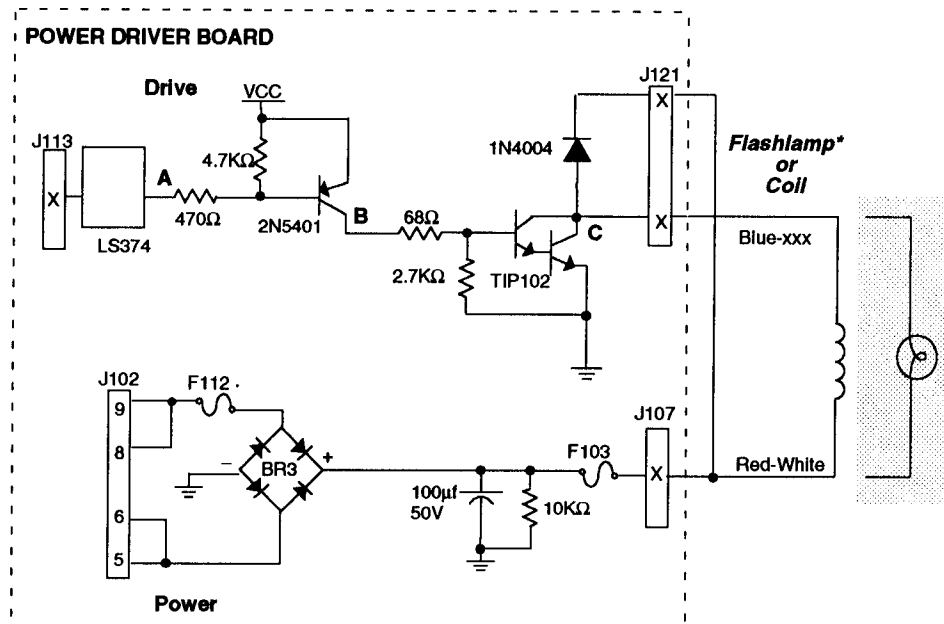
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the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

Flashlamp Circuit



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

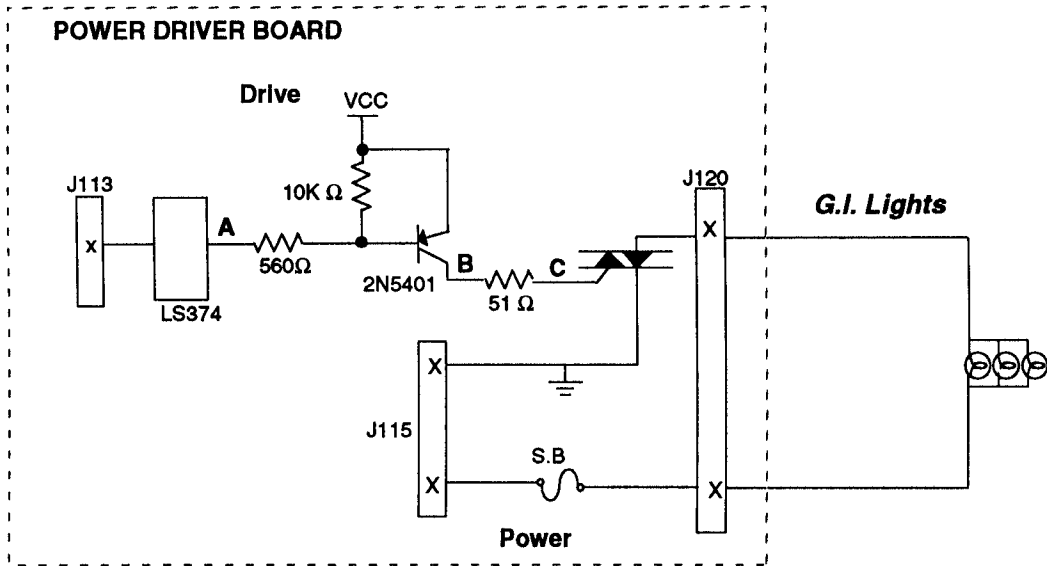
Special (General Purpose) Solenoid Circuit



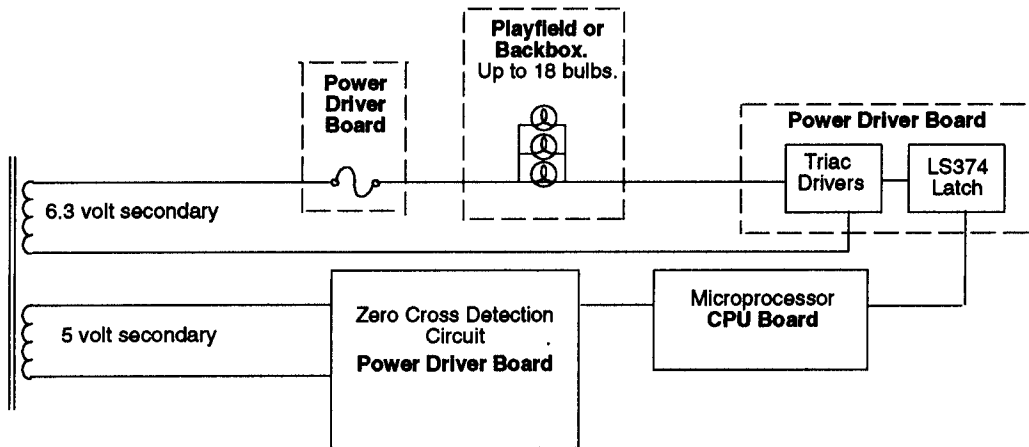
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the transistor and the coil/flashlamp turns On. When point "A" toggles high the coil/flashlamp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

* Tieback Diode is not used for flashlamp circuit.

General Illumination Circuit



Block Diagram of General Illumination Circuit

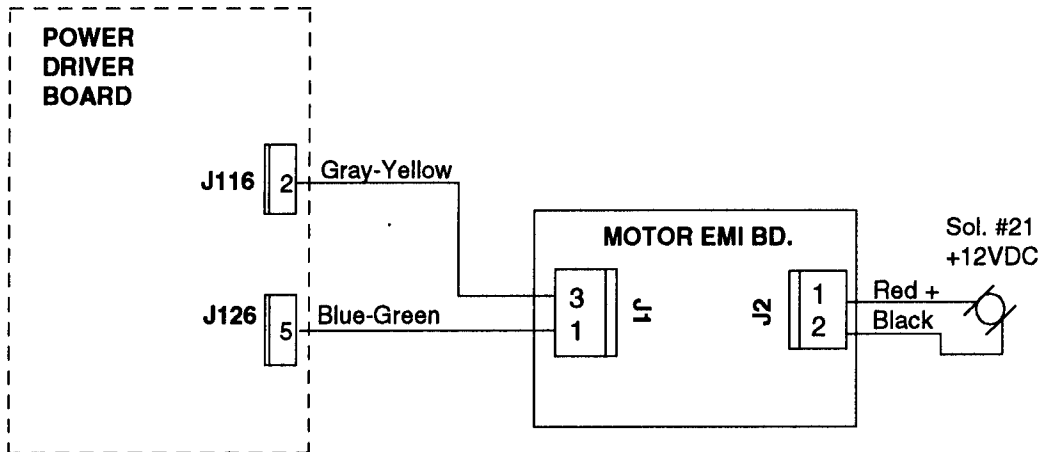
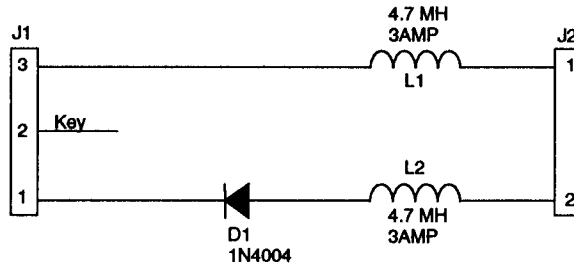
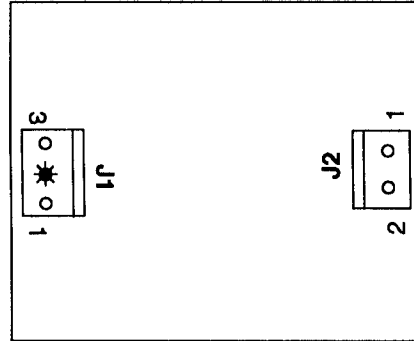


When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired General Illumination string lights.

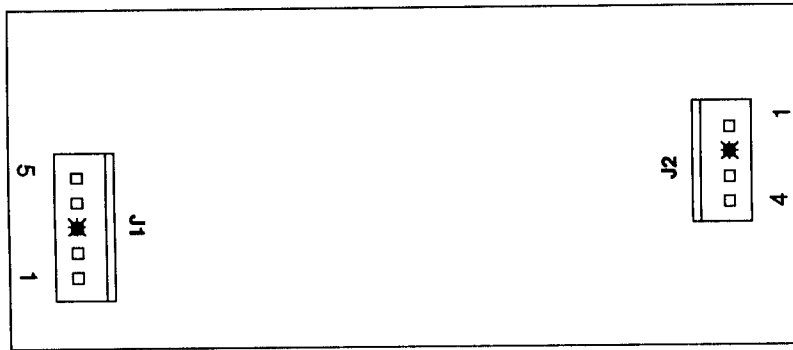
Motor EMI Assembly A-15542

- J1 - 1 Blue-Green, from J126-5
- J1 - 2 Key
- J1 - 3 Gray-Yellow, +20VDC from J116-2

- J2 - 1 Red to Motor, Sol #21
- J2 - 2 Black, Ground to Motor, Sol #21

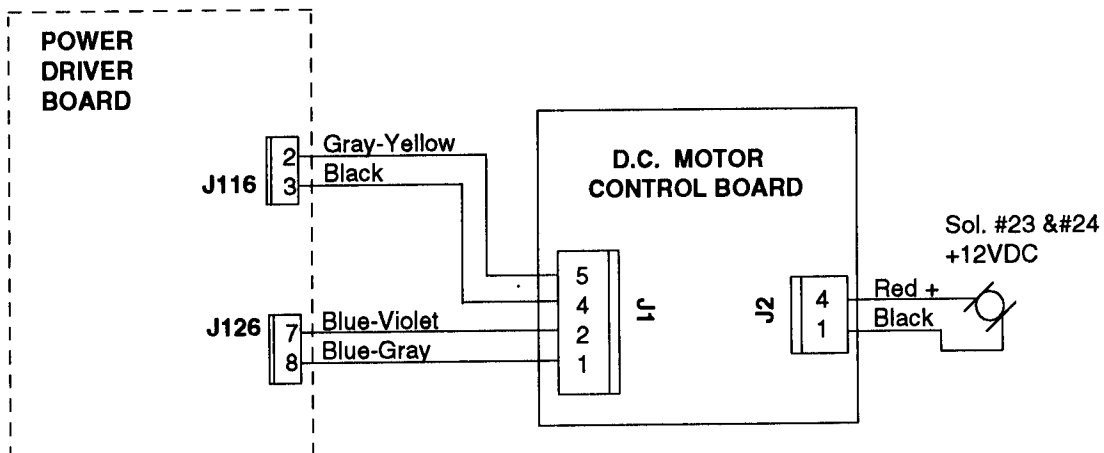


D.C. Motor Control Assembly (4 Way) A-16120

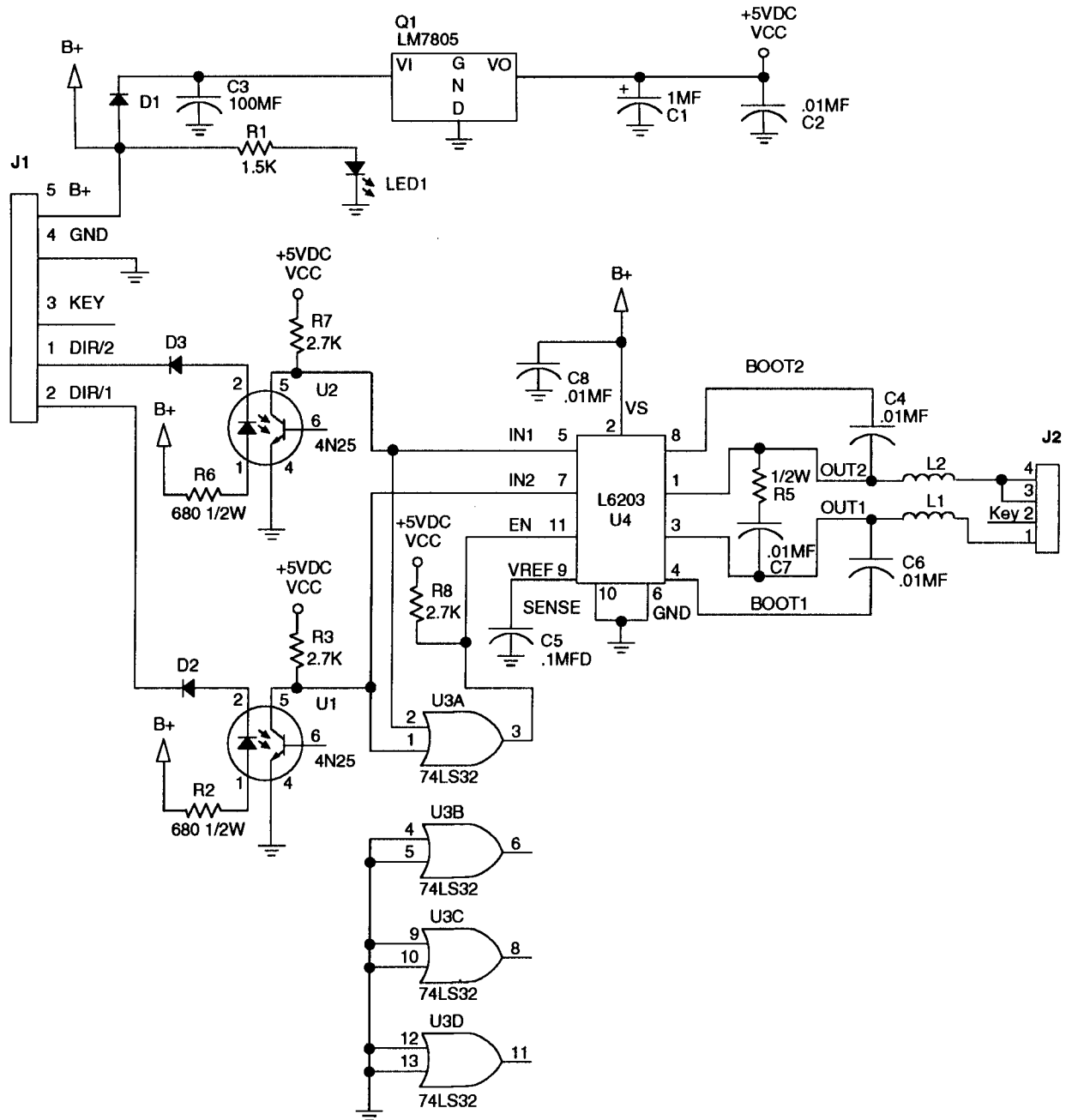


J1-1 Blue-Gray, from J126-8
 J1-2 Blue-Violet, from J126-7
 J1-3 Key
 J1-4 Black, Ground from J116-3
 J1-5 Gray-Yellow, +12VDC from J116-2

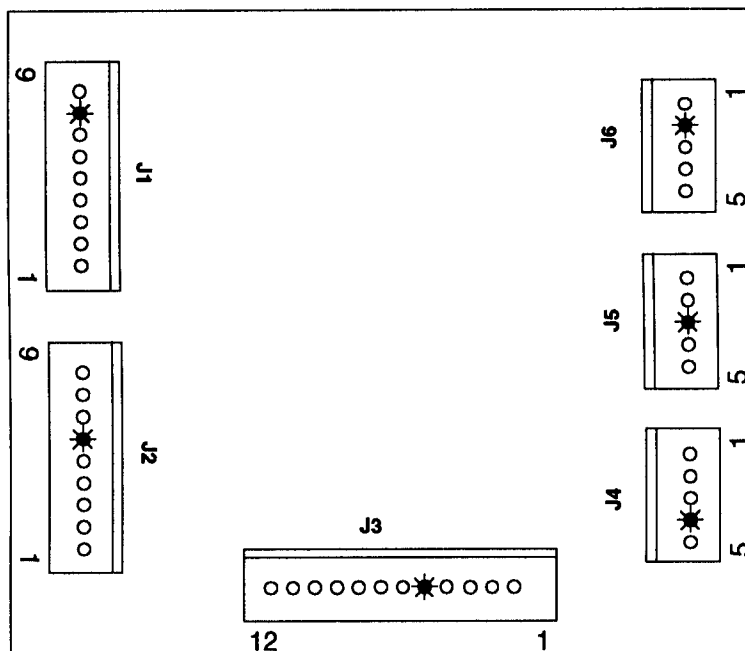
J2-1 Black, Ground to Solenoid #23 & #24
 J2-2 Key
 J2-3 Not Used
 J2-4 Red, +20VDC to Solenoid #23 & #24



D.C. Motor Control Schematic A-16120



Opto Sw 10 PCB Assembly A-18159



J1-1 Not Used
 J1-2 Not Used
 J1-3 Gray-Green, to opto transmitter Sw #45
 J1-4 Gray-Black, to opto transmitter Sw #44
 J1-5 Gray-Orange, to opto transmitter Sw #43
 J1-6 Gray-Red, to opto transmitter Sw #42
 J1-7 Gray-Brown, to opto transmitter Sw #41
 J1-8 Key
 J1-9 Black, Ground

J2-1 Not Used
 J2-2 Not Used
 J2-3 Orange-Green, to opto receiver Sw #45
 J2-4 Orange-Yellow, to opto receiver Sw #44
 J2-5 Orange-Black, to opto receiver Sw #43
 J2-6 Key
 J2-7 Orange-Red, to opto receiver Sw #42
 J2-8 Orange-Brown, to opto receiver Sw #41
 J2-9 Gray-Yellow, +12VDC

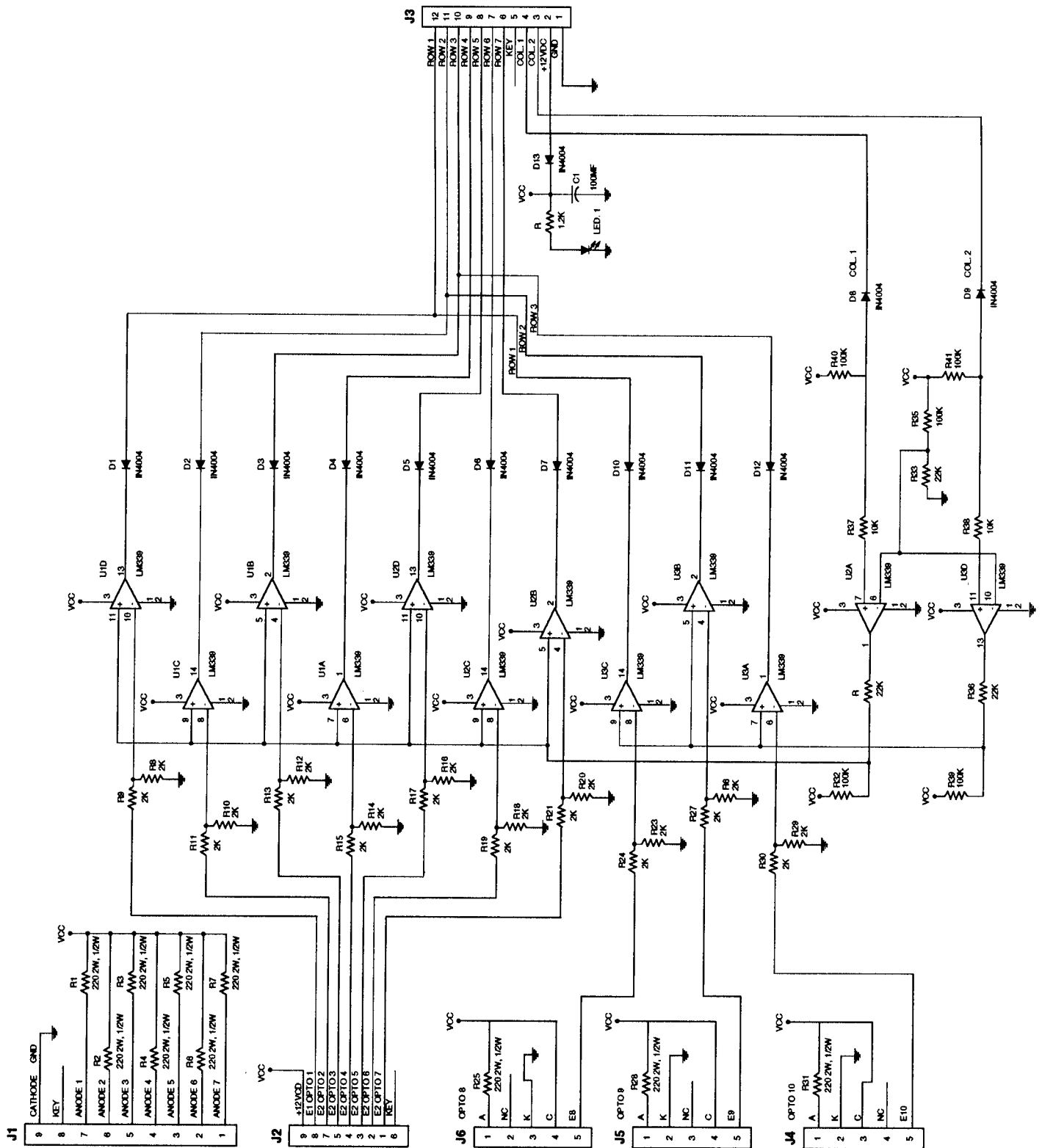
J3-1 Black, Ground from J116-3
 J3-2 Gray-Yellow, +12VDC from J116-2
 J3-3 Green-Black, from J207-5, to playfield switches
 J3-4 Green-Yellow, from J207-4, to playfield switches
 J3-5 Key
 J3-6 Not Used
 J3-7 Not Used
 J3-8 White-Green, from J209-5, to playfield switches
 J3-9 White-Yellow, from J209-4,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

J4-1 Gray-Orange, to opto transmitter Sw #53
 J4-2 Not Used
 J4-3 Not Used
 J4-4 Key
 J4-5 Orange-Black, to opto receiver Sw #53

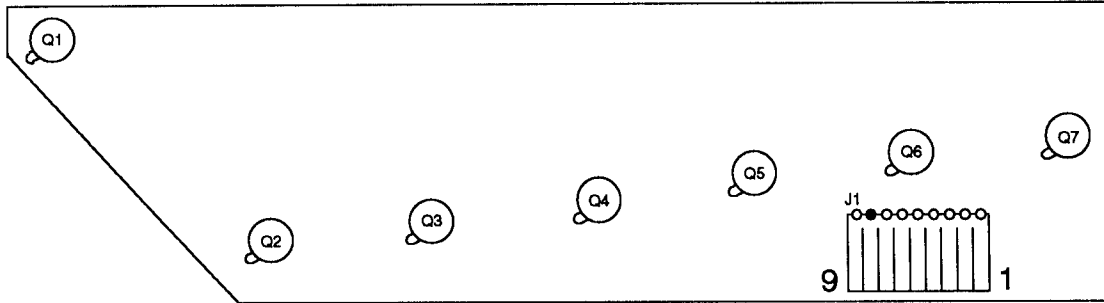
J5-1 Gray-Red, to opto transmitter Sw #522
 J5-2 Not Used
 J5-3 Key
 J5-4 Not Used
 J5-5 Orange-Red, to opto receiver Sw #52

J6-1 Gray-Brown, to opto transmitter Sw #51
 J6-2 Key
 J6-3 Black, Ground
 J6-4 Gray-Yellow, +12VDC
 J6-5 Orange-Brown, to opto receiver Sw #51

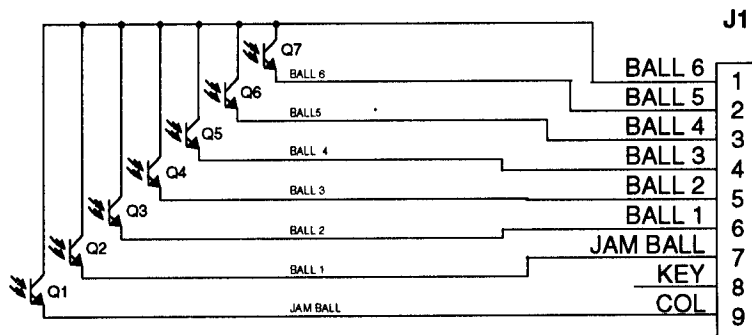
Opto Sw10 PCB Schematic A-18159



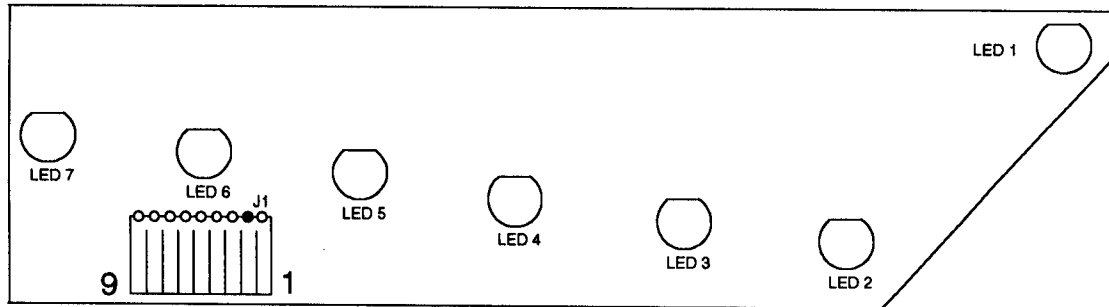
7 Ball Trough Photo Transistor PCB Assembly A-18618



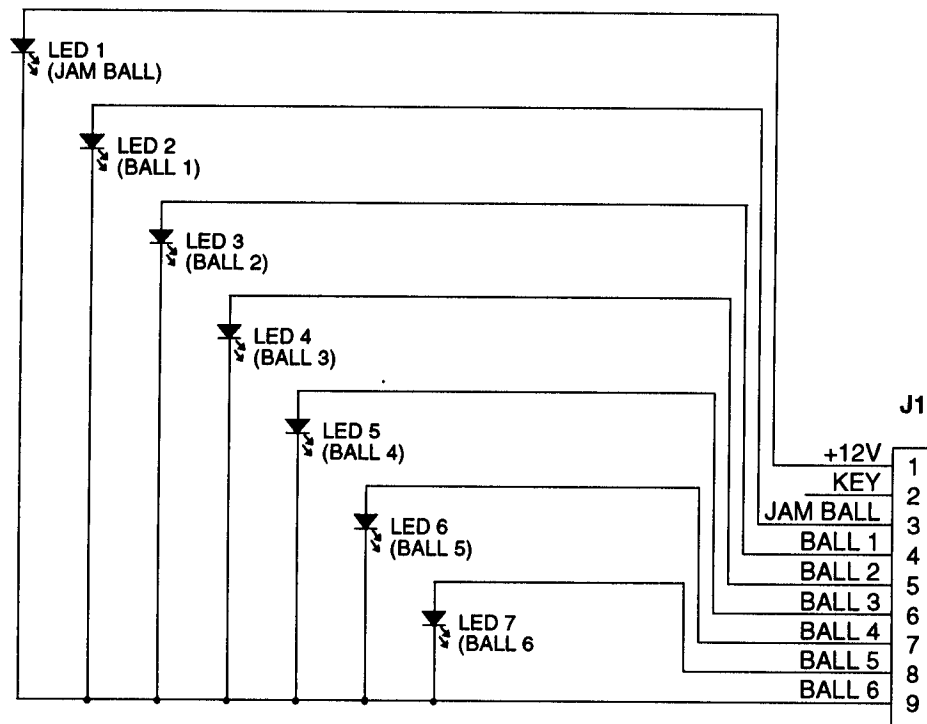
- J1-1 Gray-Violet, from Opto SW-7 Board J1-1
- J1-2 Gray-Blue, from Opto SW-7 Board J1-2
- J1-3 Gray-Green, from Opto SW-7 Board J1-3
- J1-4 Gray-Black, from Opto SW-7 Board J1-5
- J1-5 Gray-Orange, from Opto SW-7 Board J1-6
- J1-6 Gray-Red, from Opto SW-7 Board J1-7
- J1-7 Gray-Brown, from Opto SW-7 Board J1-8
- J1-8 Key
- J1-9 Black, from Opto SW-7 Board J1-10



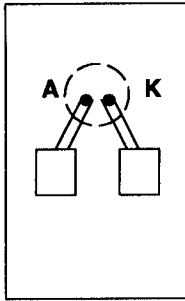
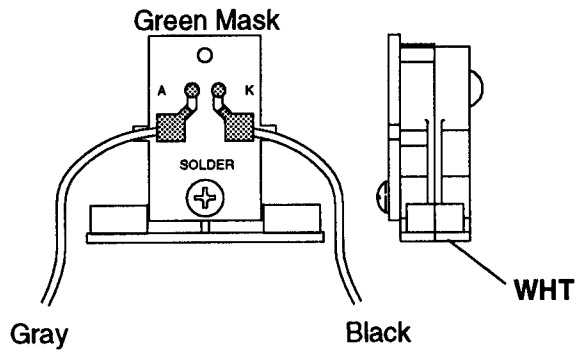
7 Ball Trough LED PCB Assembly A-18617



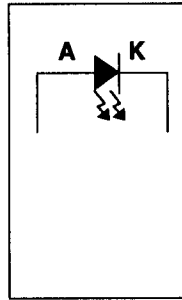
- J1-1 Gray-Yellow, from Opto SW-7 Board J2-10
- J1-2 Key
- J1-3 Orange-Brown, from Opto SW-7 Board J2-7
- J1-4 Orange-Red, from Opto SW-7 Board J2-6
- J1-5 Orange-Black, from Opto SW-7 Board J2-5
- J1-6 Orange-Yellow, from Opto SW-7 Board J2-4
- J1-7 Orange-Green, from Opto SW-7 Board J2-3
- J1-8 Orange-Blue, from Opto SW-7 Board J2-2
- J1-9 Orange-Violet, from Opto SW-7 Board J2-1



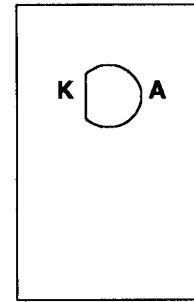
LED PCB Assembly (transmitter) A-16908



solder side

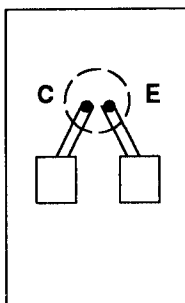
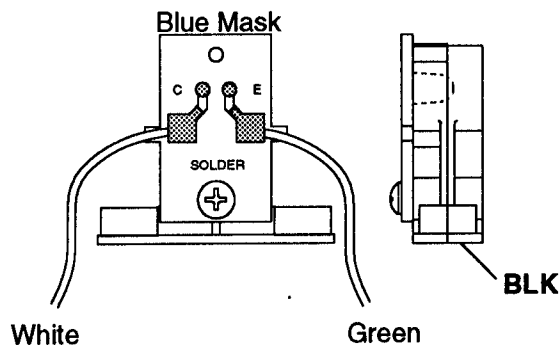


schematic

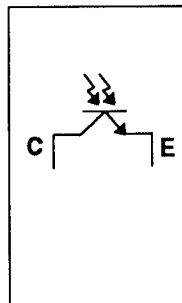


component side

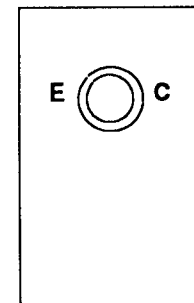
Photo Transistor PCB Assembly (receiver) A-16909



solder side

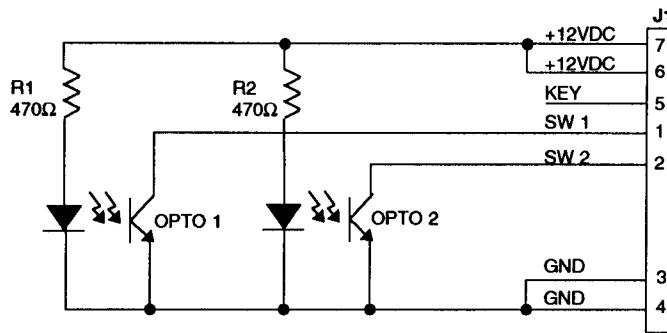
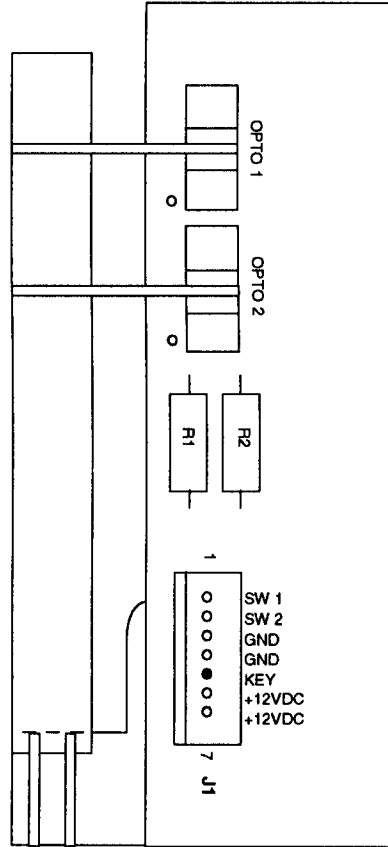


schematic



component side

Flipper Opto PCB Assembly A-17316



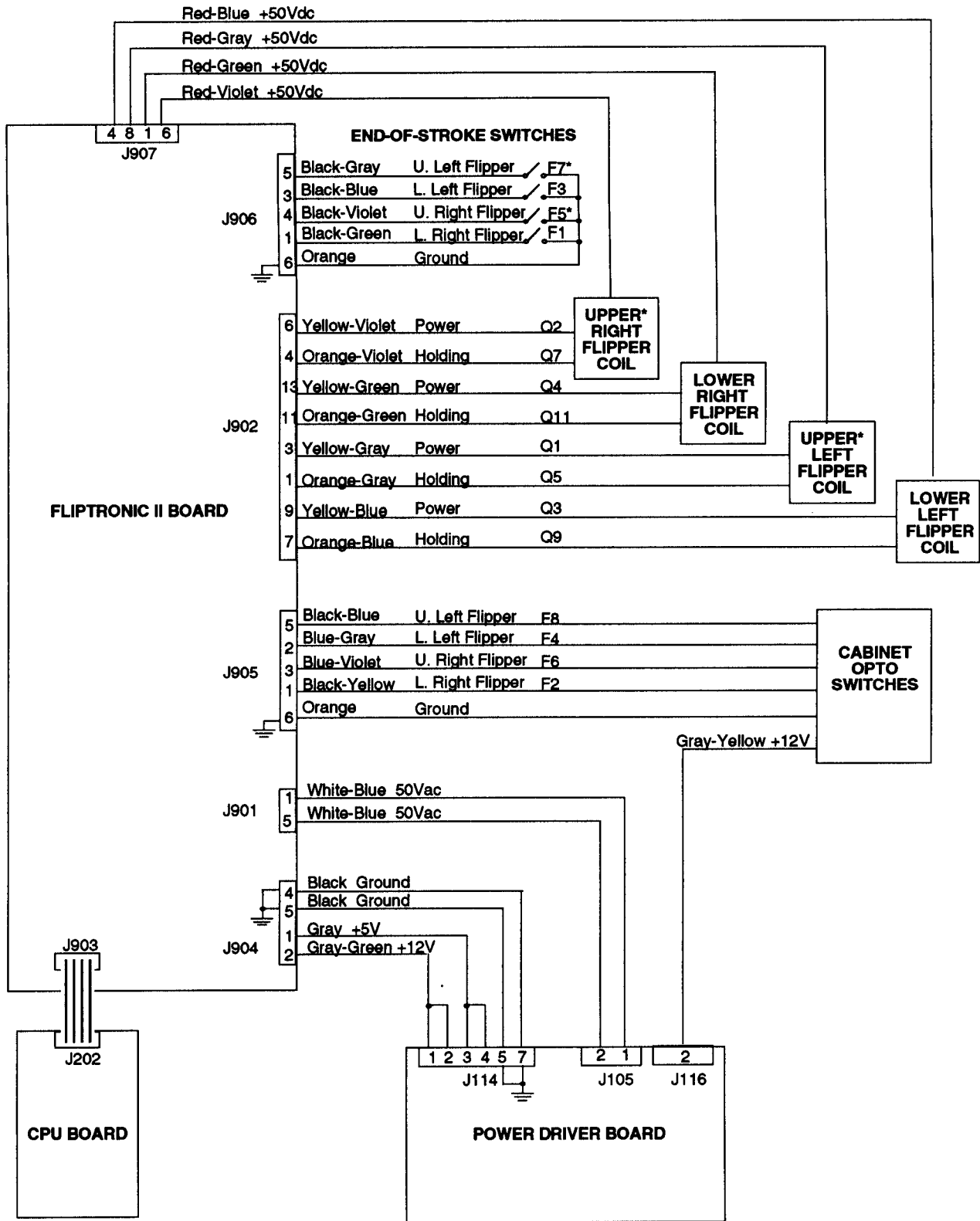
Left Side Flipper Cabinet Opto Switch Board

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

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

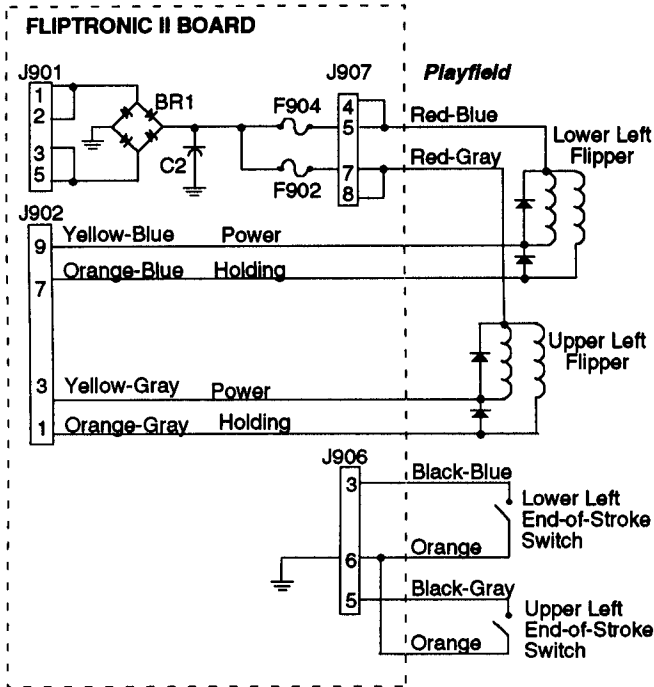
Flipper Circuit Diagram



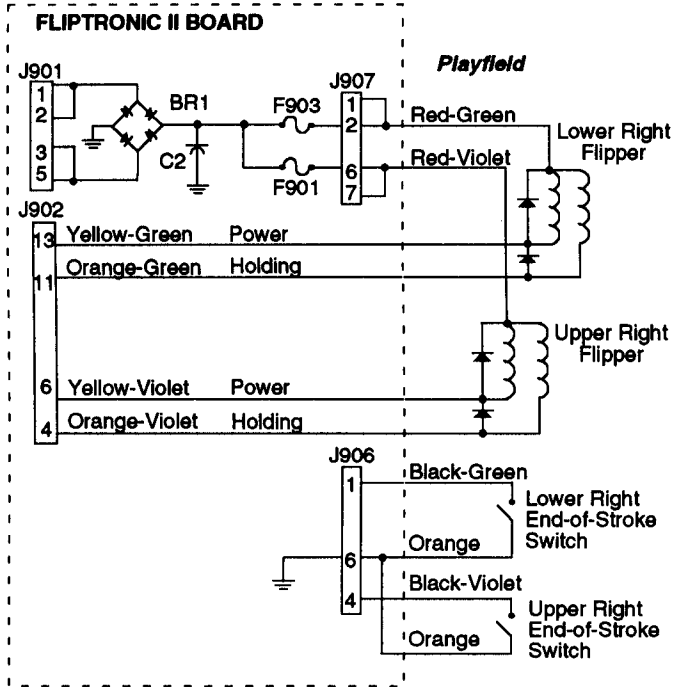
**Note: Used as circuits other than flipper circuits in this game.*

Flipper Coil Circuits

Left Flipper Circuit

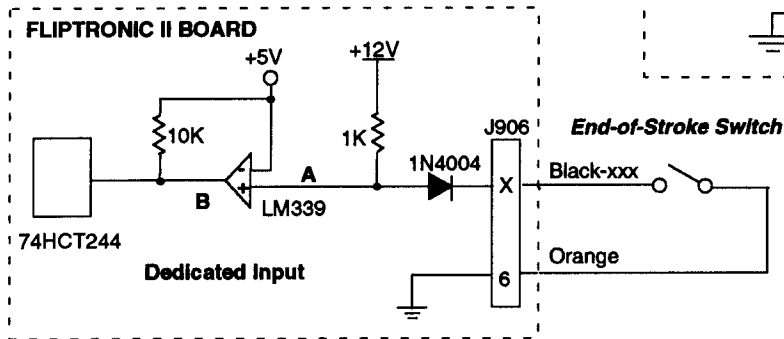
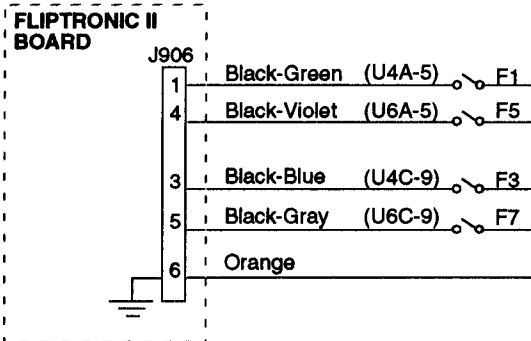


Right Flipper Circuit



Flipper End-of-Stroke Switches

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

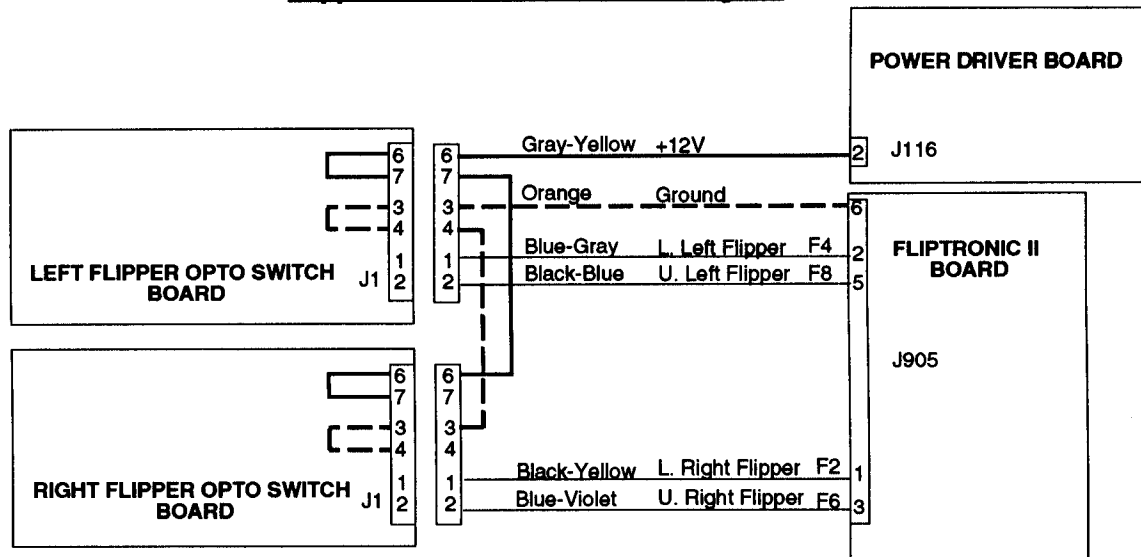


Switch	A	B	
Open	H	H	Off
Closed	L	L	On

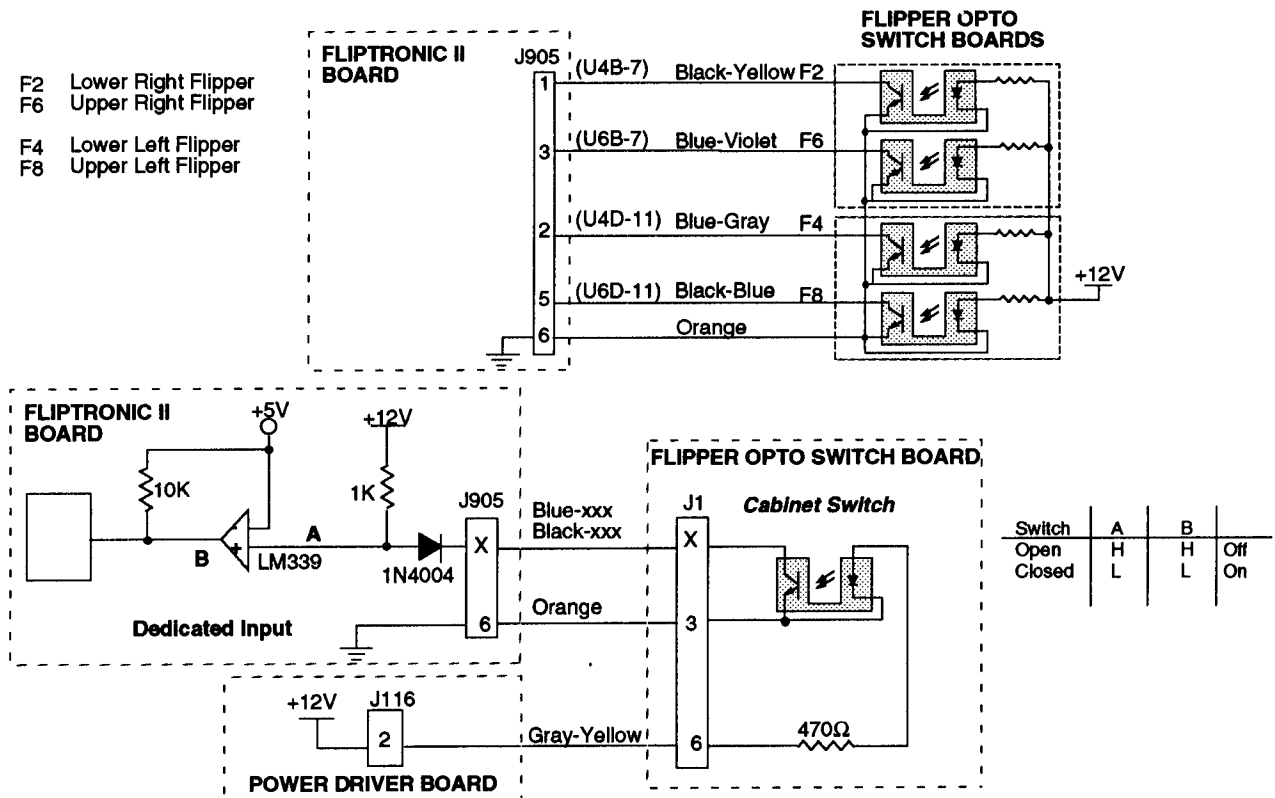
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

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

Flipper Cabinet Switch Circuit Diagram



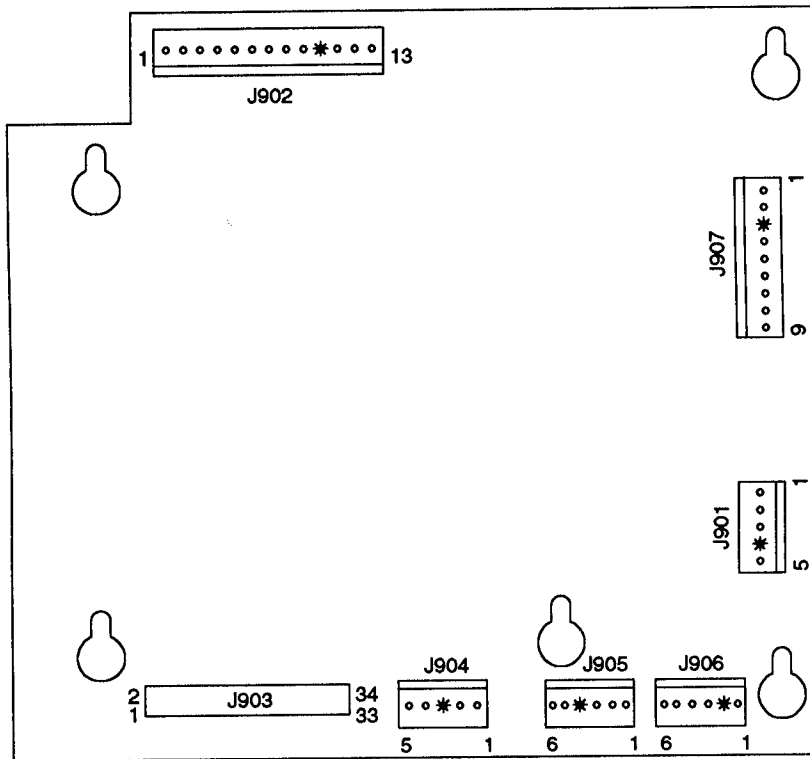
Flipper Cabinet Switches



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

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

Fliptronic II 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 Not Used
- J902-2 Not Used
- J902-3 Yellow-Gray, power to upper left flipper
- J902-4 Orange-Violet, holding to upper right flipper
- J902-5 Not Used
- J902-6 Yellow-Violet, power to upper right flipper
- J902-7 Orange-Blue, holding to lower left flipper
- J902-8 Not Used
- J902-9 Yellow-Blue, power to lower left flipper
- J902-10 Key
- J902-11 Orange-Green, holding to lower right flipper
- J902-12 Not Used
- J902-13 Yellow-Green, power to 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 Blue-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 end-of-stroke switch
- J906-2 Key
- J906-3 Black-Blue, to lower left end-of-stroke switch
- J906-4 Not Used
- 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

P.C. Board Legend

J1xx	Power Driver Board
J2xx	CPU Board
J6xx	Dot Matrix Controller Board
J9xx	Fliptronic II Board

Power Driver Board A-12697-3

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

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

- J103 Not Used

- J104-1 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

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

- 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

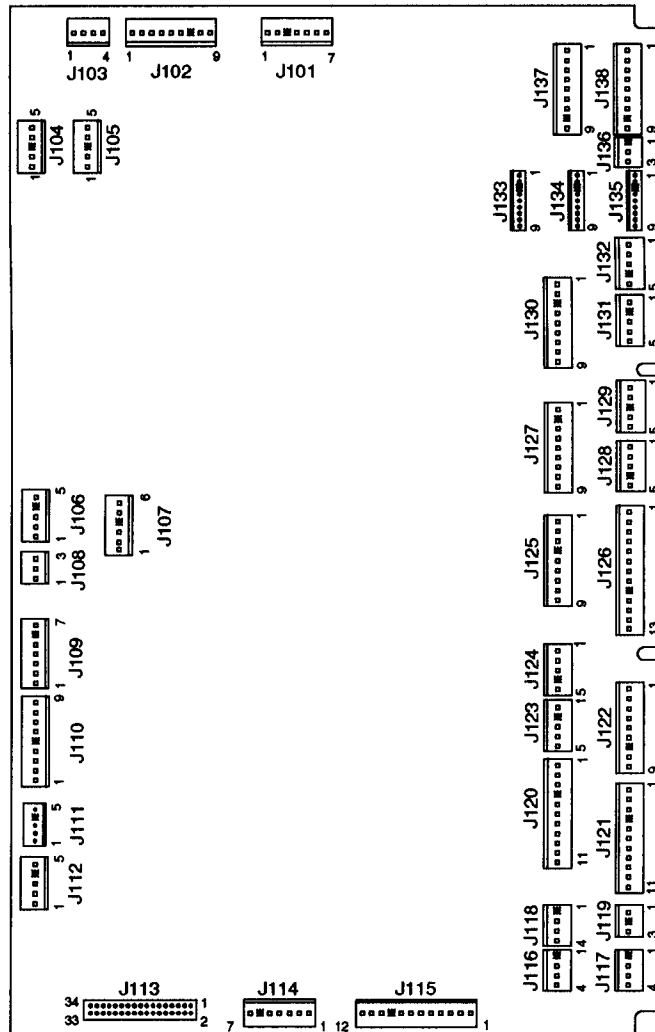
- J108 Not Used

- J109 Not Used

- J110 Not Used

- J111 Not Used

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



J113 Ribbon Cable, Data to/from J211

- J114-1 Gray-Green, +12VDC to J210-7
- J114-2 Gray-Green, +12VDC to 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

P.C. Board Legend	
J1xx	Power Driver Board
J2xx	CPU Board
J6xx	Dot Matrix Controller Board
J9xx	Filiptronic II Board

Power Driver Board Continued...

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

J116-1 Key
 J116-2 Gray-Yellow, +12VDC to to playfield
 J116-3 Black, Ground
 J116-4 Not Used

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 cabinet
 J118-3 Black, Ground
 J118-4 Not Used

J119-1 White-Violet, 6.8VAC G.I. to coin door interface J2-3
 J119-2 Key
 J119-3 Violet, Return G.I. to coin door interface J2-5

J120-1 Not Used
 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 Not Used
 J120-7 Not Used
 J120-8 Not Used
 J120-9 White-Yellow, 6.8VAC to playfield
 J120-10 White-Green, 6.8VAC to playfield
 J120-11 Not Used

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

J122-1 Blue-Brown, Sol 25 to playfield flashlamps
 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

J124-1 Blue-Brown, Sol 25 to insert flashlamps
 J124-2 Blue-Red, Sol 26 to insert flashlamps
 J124-3 Blue-Orange, Sol 27 to insert flashlamps
 J124-4 Key
 J124-5 Blue-Yellow, Sol 28 to insert flashlamps

J125-1 Black-Brown, Sol 17 to insert flashlamps
 J125-2 Black-Red, Sol 18 to insert flashlamps
 J125-3 Black-Orange, Sol 19 to insert flashlamps
 J125-4 Key
 J125-5 Black-Yellow, Sol 20 to insert flashlamps
 J125-6 Not Used
 J125-7 Not Used
 J125-8 Not Used
 J125-9 Not Used

J126-1 Black-Brown, Sol 17 to playfield motor
 J126-2 Black-Red, Sol 18 to playfield flashlamps
 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 motor
 J126-6 Blue-Black, Sol 22 to playfield flashlamps
 J126-7 Blue-Violet, Sol 23 to playfield motor
 J126-8 Blue-Gray, Sol 24 to playfield motor
 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 coil
 J127-8 Brown-Violet, Sol 15 to playfield coil
 J127-9 Brown-Gray, Sol 16 to playfield coil

P.C. Board Legend

J1xx	Power Driver Board
J2xx	CPU Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

Power Driver Board Continued...

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 playfield 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

P.C. Board Legend

J1xx	Power Driver Board
J2xx	CPU Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

Security CPU Board A-17651-50031

J201 Ribbon Cable, Data to J602

J202 Ribbon Cable, Data to J903; J506; J601

J203 Not Used

J204 Ribbon Cable, Data to J1, A-16100

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

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

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

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

J205-5 Key

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

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

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

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

J205-10 Black, Ground to J1-15

J205-11 Not Used

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

J206 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 Green-Gray, Sw Col 8 to Playfield Switches

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

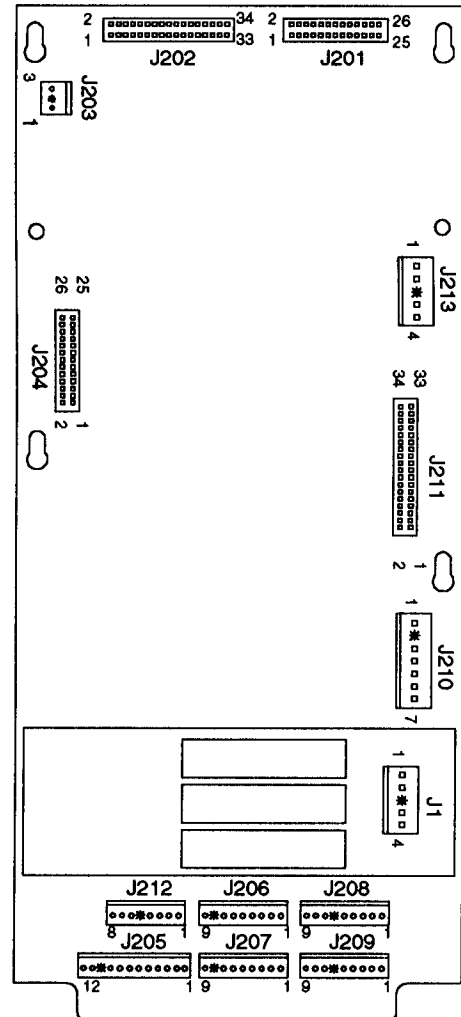
J210-3 Black, Ground from J904-4; J3-5 Sound Bd; J114-5

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 P.C.B. J1-1

J213-2 Black to Battery Holder P.C.B. J1-2

J213-3 Key

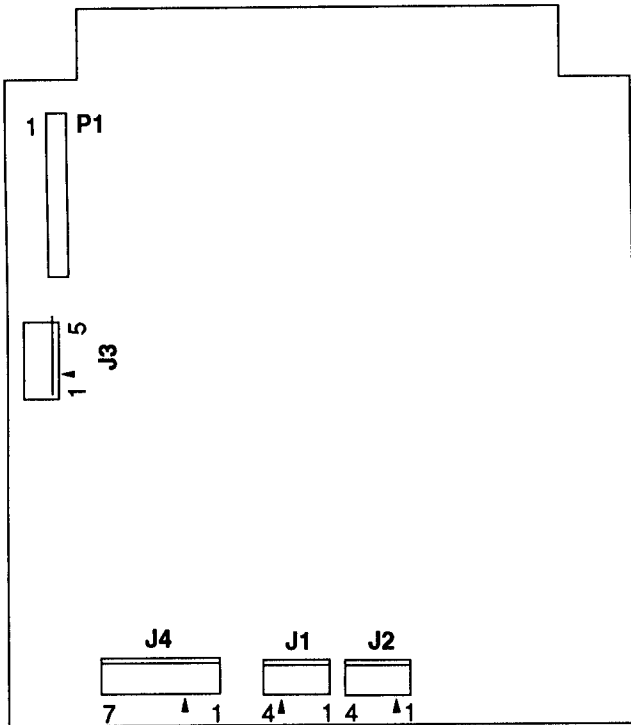
J213-4 Gray to Battery Holder P.C.B. J1-4

J213-5 Gray to Battery Holder P.C.B. J1-5

P.C. Board Legend

J1xx	Power Driver Board
J2xx	CPU Board
J6xx	Dot Matrix Controller Board
J9xx	Filiptronic II Board

Audio Board A-16917-50031



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

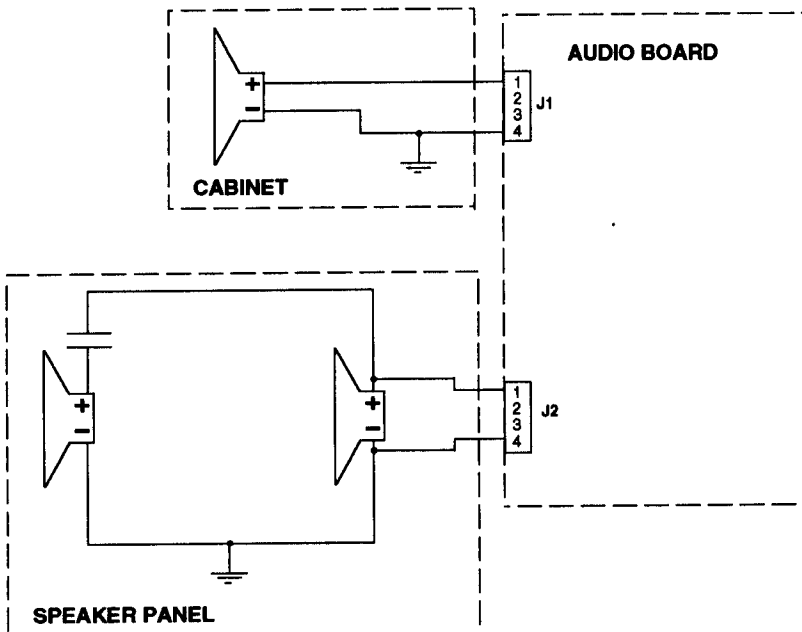
J3-1 Gray, +5V from J114-4; J904-1; J210-4
 J3-2 Key
 J3-3 Gray, +5V from J114-3; J210-5
 J3-4 Black, Ground from J114-7; J904-4; J210-1
 J3-5 Black, Ground from J114-5; J904-5; J210-3

J4-1 Gray-Green, 18VAC from transformer secondary
 J4-2 Gray-Green, 18VAC loop from J4-1
 J4-3 Key
 J4-4 Gray, 18VAC from transformer secondary
 J4-5 Gray, 18VAC loop from J4-4
 J4-6 Gray-White, 18VAC from transformer secondary
 J4-7 Gray-White, 18VAC loop from J4-6

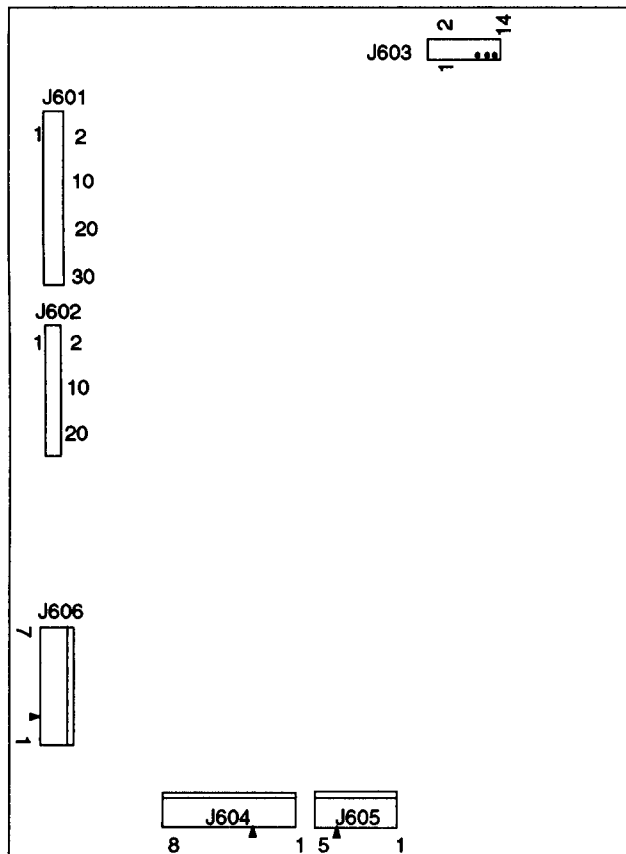
P.C. Board Legend

J1xx	Power Driver Board
J2xx	CPU Board
J6xx	Dot Matrix Controller Board
J9xx	Filptronic II Board

SPEAKER WIRING DIAGRAM



Dot Matrix Controller Board A-14039



J601 Ribbon Cable, Data to/from J202; J903; Dot Matrix P1

J602 Ribbon Cable, Data from J201

J603 Ribbon Cable ,Data to Dot Matrix Display Driver

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

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

J604-3 Key

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

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

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

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

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

J605-1 White, 80VAC from transformer secondary

J605-2 White, 80VAC from transformer secondary

J605-3 Violet, 100VAC from transformer secondary

J605-4 Key

J605-5 Violet, 100VAC from transformer secondary

J606-1 Black, Ground loop from J606-3

J606-2 Key

J606-3 Black, Ground from J117-3

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

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

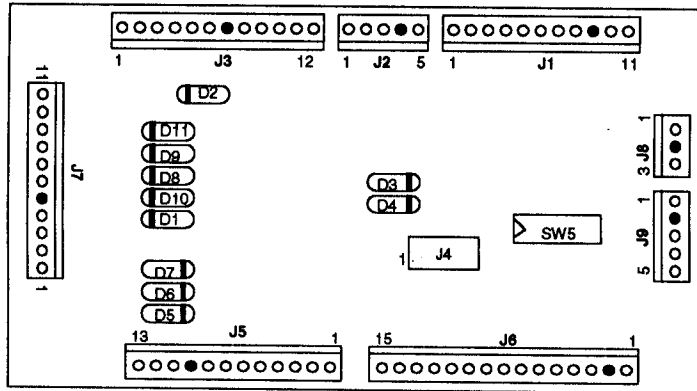
J606-6 Gray-Yellow, +12V loop from J606-7

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

P.C. Board Legend

J1xx	Power Driver Board
J2xx	CPU Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

Coin Door Interface PCB Assembly A-17051-1



J1-1 Orange-Gray, dedicated row 8 from CPU J205-9
 J1-2 Orange-Violet, dedicated row 7 from CPU J205-8
 J1-3 Orange-Blue, dedicated row 6 from CPU J205-7
 J1-4 Orange-Green, dedicated row 5 from CPU J205-6
 J1-5 Orange-Yellow, dedicated row 4 from CPU J205-4
 J1-6 Orange-Black, dedicated row 3 from CPU J205-3
 J1-7 Orange-Red, dedicated row 2 from CPU J205-2
 J1-8 Orange-Brown, dedicated row 1 from CPU J205-1
 J1-9 Key
 J1-10 Black, ground from CPU J205-10
 J1-11 Orange-White, sw. enable from J205-12

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

J3-1 Green-Brown, sw. col. 1 from CPU J212-1
 J3-2 Green-Red, sw. col. 2 from CPU J212-2
 J3-3 White-Brown, sw. row 1 from CPU J212-4
 J3-4 White-Red, sw. row 2 from CPU J212-6
 J3-5 White-Orange, sw. row 3 from CPU J212-7
 J3-6 White-Yellow, sw. row 4 from CPU J212-8
 J3-7 Key
 J3-8 Yellow-Gray, lamp col. 8 from Power Driver Brd J136-3
 J3-9 Red-Blue, lamp row 6 from Power Driver Brd J134-7
 J3-10 Red-Violet, lamp row 7 from Power Driver Brd J134-8
 J3-11 Red-Gray, lamp row 8 from Power Driver Brd J134-9
 J3-12 Not Used

J4- Not Used

P.C. Board Legend

J1xx	Power Driver Board
J2xx	CPU Board
J6xx	Dot Matrix Controller Board
J9xx	Flitronic II Board

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 sw. row 1 to coin door
 J5-5 Orange-Red, dedicated sw. row 2 to coin door
 J5-6 Orange-Black, dedicated sw. row 3 to coin door
 J5-7 Orange-Green, dedicated sw. row 5 to coin door
 J5-8 Orange-Blue, dedicated sw. row 6 to coin door
 J5-9 Orange-Violet, dedicated sw. row 7 to coin door
 J5-10 Key
 J5-11 Orange-Gray, dedicated sw. row 8 to coin door
 J5-12 Green-Red, sw. col. 2 to coin door Slam tilt
 J5-13 White-Brown, sw. row 1 to coin door Slam tilt

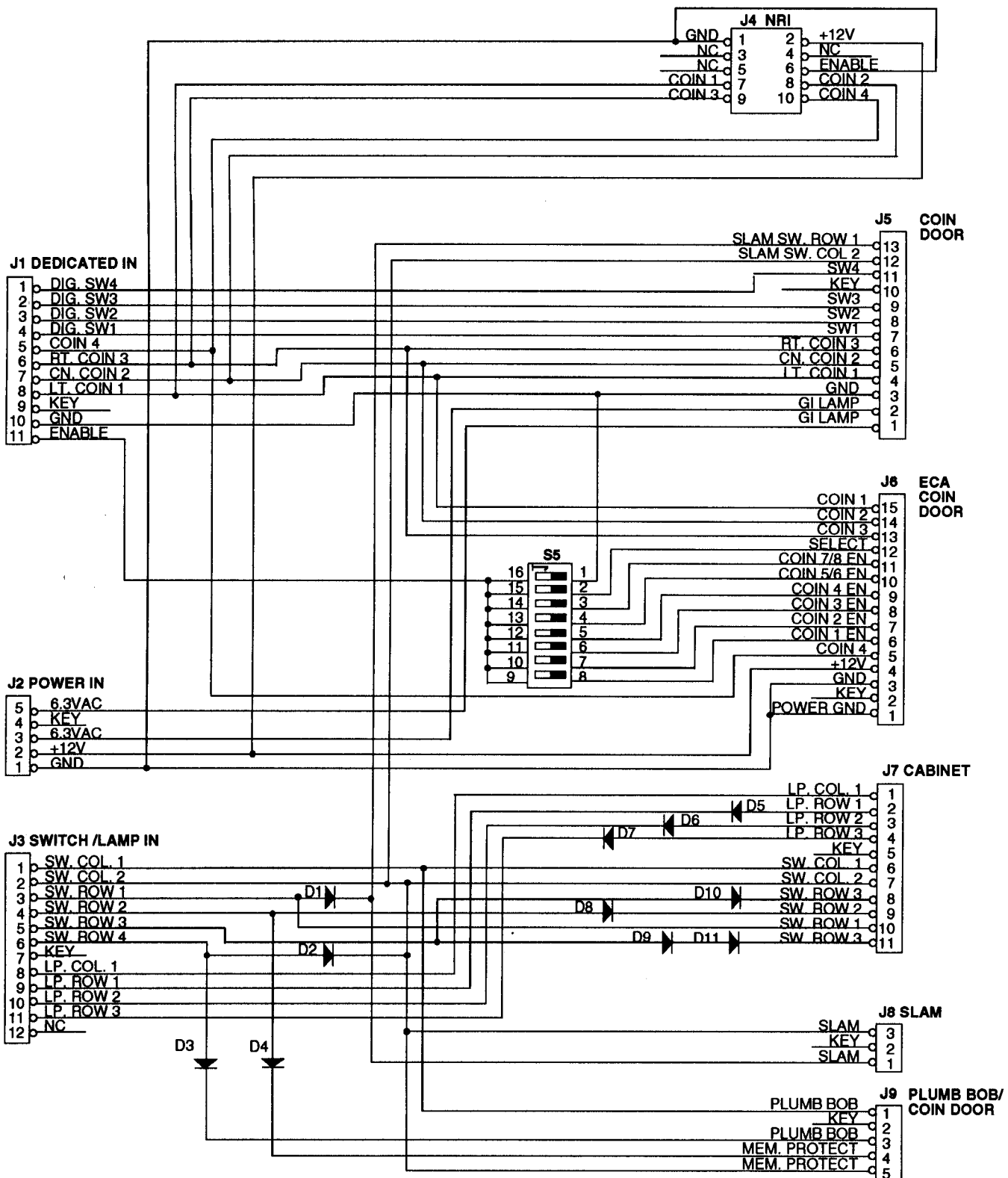
J6- Not Used

J7-1 Yellow-Gray, lamp col. 8 to cabinet
 J7-2 Not Used
 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, sw. col. 1 to cabinet
 J7-7 Green-Red, sw. col. 2 to cabinet
 J7-8 White-Orange, sw. row 3 to cabinet
 J7-9 White-Red, sw. row 2 to cabinet
 J7-10 Not Used
 J7-11 White-Orange, sw. row 3 to cabinet

J8-1 White, sw. row to cabinet Slam tilt
 J8-2 Key
 J8-3 Green, sw. col to cabinet Slam tilt

J9-1 White-Yellow, sw. row 4 to Plumb Bob tilt
 J9-2 Key
 J9-3 Green-Brown, sw. col. 1 to Plumb Bob tilt
 J9-4 White-Red, sw. row 2 to interlock switch
 J9-5 Green-Red, sw. col. 2 to interlock switch

Coin Door Interface PCB Schematic



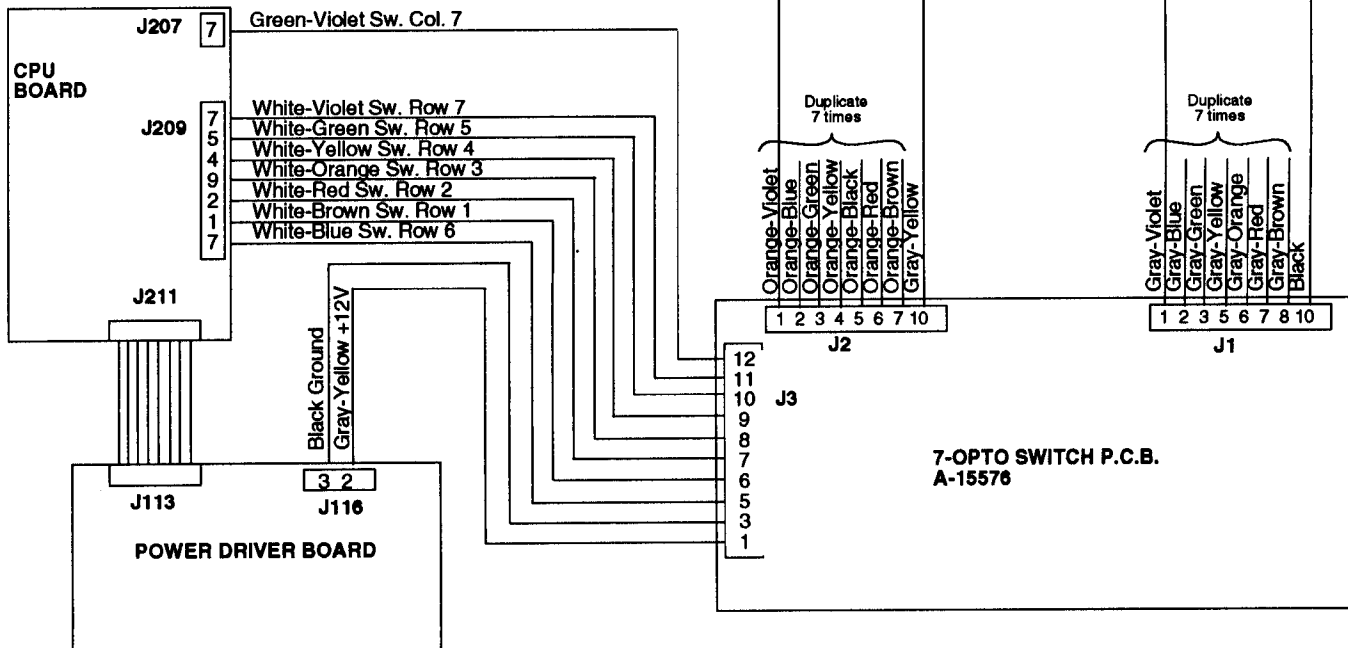
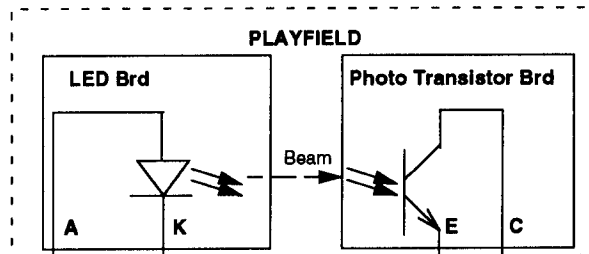
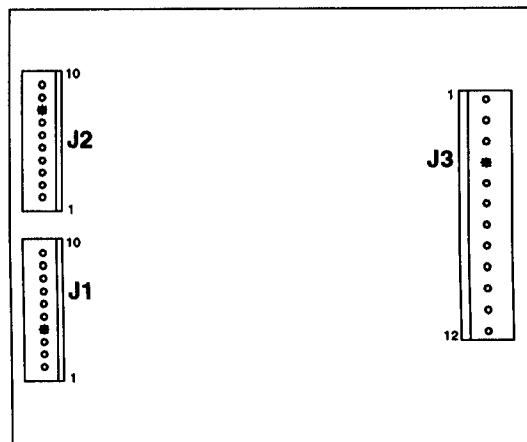
NOTE: ALL DIODES IN4004

Opto SW-7 P.C.B. A-15576

J1-1 Gray-Violet, to Trough 7 Photo Transistor Board J1-1
 J1-2 Gray-Blue, to Trough 7 Photo Transistor Board J1-2
 J1-3 Gray-Green, to Trough 7 Photo Transistor Board J1-3
 J1-4 Key
 J1-5 Gray-Black, to Trough 7 Photo Transistor Board J1-4
 J1-6 Gray-Orange, to Trough 7 Photo Transistor Board J1-5
 J1-7 Gray-Red, to Trough 7 Photo Transistor Board J1-6
 J1-8 Gray-Brown, to Trough 7 Photo Transistor Board J1-7
 J1-9 Not Used
 J1-10 Black, Ground to Trough 7 Photo Transistor Board J1-9

J2-1 Orange-Violet, to Trough 7 LED Board Anode J1-9
 J2-2 Orange-Blue, to Trough 7 LED Board Anode J1-8
 J2-3 Orange-Green, to Trough 7 LED Board Anode J1-7
 J2-4 Orange-Yellow, to Trough 7 LED Board Anode J1-6
 J2-5 Orange-Black, to Trough 7 LED Board Anode J1-5
 J2-6 Orange-Red, to Trough 7 LED Board Anode J1-4
 J2-7 Orange-Brown, to Trough 7 LED Board Anode J1-3
 J2-8 Key
 J2-9 Not Used
 J2-10 Gray-Yellow, to Trough 7 LED Board Anode J1-1

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



LAMP MATRIX

Yellow (B+) Red

Column Row	1 Yellow-Brown J138-1 Q98	2 Yellow-Red J138-2 Q97	3 Yellow-Orange J138-3 Q96	4 Yellow-Black J138-4 Q95	5 Yellow-Green J138-5 Q94	6 Yellow-Blue J138-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-9 Q91
1 Red-Brown J135-1 Q90	Chicago "P" 11	1 Goal 21	Free Kick 31	Kickback Lower 41	Goal Jackpot 51	Left Ramp Build Lock 61	Light Jackpot (2) 71	Rollover 1 (High) 81
2 Red-Black J135-2 Q89	Dallas "U" 12	2 Goals 22	TV Award 32	Kickback Center 42	Extra Ball 52	Spinner Build Lock 62	Final Draw 72	Rollover 2 82
3 Red-Orange J135-4 Q88	Boston "C" 13	3 Goals 23	Ultra Goalie 33	Kickback Upper 43	Goal (2) 53	Travel 63	Magna-Goal Save 73	Rollover 3 83
4 Red-Yellow J135-5 Q87	New York "D" 14	4 Goals Light TV 24	Ultra Ramps 34	Right Ramp Build Lock 44	Upper Build Lock 54	Los Angeles 64	Left Flipper Lane 74	Rollover 4 (Low) 84
5 Red-Green J135-6 Q86	Orlando "L" 15	Speed (Ball) 25	Spirit (Ball) 35	Right Ramp Lock 45	Light Magna Goalie 55	Left Ramp Lock 65	Light Kickback 75	Skill Shot Rear 85
6 Red-Blue J134-7 J135-7 Q85	Washington D.C. "R" 16	Strength (Ball) 26	Skill (Ball) 36	Ultra Spinner (2) 46	Right Flipper Lane 56	Upper Left Lane 66	Left Ramp Buy Ticket 76	Skill Shot Center 86
7 Red-Violet J134-8 J135-8 Q84	San Francisco "O" 17	Stamina (Ball) 27	Right Ticket Half 37	Ultra Jets (2) 47	Shoot Again 57	Upper Right Lane 67	Right Ramp Buy Ticket 77	Buy-in Button 87
8 Red-Gray J134-9 J135-9 Q83	Detroit "W" 18	Left Ticket Half 28	Tackle 38	Striker Billboard 48	Right Special 58	Skill Shot Front 68	Ultra Ramps (2) 78	Start Button 88

J1XX = Power Driver Board

SWITCH MATRIX

White Green

Dedicated Grounded Switches	Column Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-9 U20-11	Flipper Grounded Switches
	Orange-Brown (1) J205-1 Left Coin Chute D1	1 White-Brown J209-1 U18-11	Not Used 11	Slam Tilt 21	Trough 1 (Right) 31	Goal Trough 41	Skill Shot Front 51	Rollover 1 (High) 61	Left Ramp Diverted 71	
Orange-Red (2) J205-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	Magna Goalie Button 12	Coin Door Closed 22	Trough 2 32	Goal Popper Opto 42	Skill Shot Center 52	Rollover 2 62	Left Ramp Entrance 72	Upper Jet Bumper 82	Blue-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 Extra Ball 23	Trough 3 33	Goalie Is Left 43	Skill Shot Rear 53	Rollover 3 63	Not Used 73	Lower Jet Bumper 83	Black-Blue J906-3 Left Flipper End of Stroke F3
Orange-Yellow (4) J205-4 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	Plumb Bob Tilt 14	Always Closed 24	Trough 4 34	Goalie Is Right 44	Right Eject Hole 54	Rollover 4 (Low) 64	Left Ramp Exit 74	Left Slingshot 84	Blue-Gray J905-2 Left Flipper Opto F4
Orange-Green (5) J205-6 Normal Function Service Credits Test Function Escape D5	5 White-Green J209-5 U19-11	Left Flipper Lane 15	Free Kick Target 25	Trough 5 (Left) 35	TV Ball Popper 45	Upper Eject Hole 55	Tackle Switch 65	Right Ramp Entrance 75	Right Slingshot 85	Not Used F5
Orange-Blue (6) J205-7 Normal Function Volume Down Test Function Down D6	6 White-Blue J209-7 U19-9	Striker 3 (High) 16	Kickback Upper 26	Trough Stack 36	Not Used 46	Left Eject Hole 56	Striker 1 (Left) 66	Lock Mech. Low 76	Kickback 86	Not Used F6
Orange-Violet (7) J205-8 Normal Function Volume Up Test Function Up D7	7 White-Violet J209-8 U19-5	Right Return Lane 17	Spinner 27	Light Magna Goalie 37	Travel Lane Rollover 47	Not Used 57	Striker 2 (Center) 67	Lock Mech. High 77	Upper Left Lane 87	Not Used F7
Orange-Gray (8) J205-9 Normal Function Begin Test Test Function Enter D8	8 White-Gray J209-9 U19-7	Right Outlane 18	Light Kickback 28	Ball Shooter 38	Goalie Target 48	Not Used 58	Not Used 68	Right Ramp Exit 78	Upper Right Lane 88	Not Used F8

J2XX = CPU Board, J9XX = Flitronic II Board = Opto, Typically Closed

WARNINGS & NOTICES

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