THEATRE OF MAGIC™

Operations Manual Includes:

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

DIP SWITCH SETTINGS
AND JUMPERS

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

Dip Switch Chart

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

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Voltage Connections Backbox	Voltage Connections Cabinet	Drive Xister	Drive Connections Playfield	Drive Connections Backbox	Drive Connections Cabinet	Drive Wire Color	Solenoid Part number / Flashlamp Type Playfield	Backbox
01	BALL TROUGH	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	MAGNET DIVERTER	High Power	J107-2			Q80	J130-2			Vio-Red	20-10179	
03	TRAP DOOR UP	High Power	J107-2			Q78	J130-4			Vio-Org	A-20099	
04	SUBWAY POPPER	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1200	
05	RIGHT DRAIN MAGNET	High Power	J107-2			Q64	J130-6			Vio-Grn	20-10197	
06	CENTER LOOP POST	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-27-1200	
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	TOP DIVERTER POST	High Power	J107-2			Q70	J130-9			Vio-Gry	AE-27-1200	
09	LEFT SLING	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-27-1200	
10	RIGHT SLING	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-27-1200	
11	BOTTOM JET	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	MIDDLE JET	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	TOP JET	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	TRAP DOOR HOLD	Low Power	J107-2			Q48	J127-7			Brn-Blu	A-20099	
15	LEFT UP/DOWN GATE	Low Power	J107-3			Q46	J127-8			Brn-Vio	A-14406	
16	RIGHT UP/DOWN GATE	Low Power	J107-3			Q44	J127-9			Brn-Gry	A-14406	
17	BOX CLOCKWISE	Flasher	J116-2			Q42	J126-1			Blk-Brn	14-8018	
18	BOX COUNTER CLOCKWISE	Flasher	J116-2			Q40	J126-2			Blk-Red	14-8018	
19	NOT USED	Flasher	J116-2			Q38	J126-3			Blk-Org	---	
20	RETURN LANE FLASHER	Flasher	J107-6			Q36	J126-4			Blk-Yel	#89 (2)	
21	TOP KICKOUT	Flasher	J107-1			Q28	*J126-5			Blu-Grn	AE-27-1200	
22	NOT USED	Flasher	J107-6			Q30	J126-6			Blu-Blk	---	
23	NOT USED	Flasher	J107-6			Q34	J126-7			Blu-Vio	---	
24	TRAP DOOR FLASHER	Flasher	J107-6			Q32	J126-8			Blu-Gry	#89 (2)	
25	SPIRIT RING FLASHER	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#906, #89	#906
26	SAW FLASHER	Gen. Purpose	J107-6	J106-5		Q24	J122-2	J124-2		Blu-Red	#906, #89 (2)	#906
27	JET FLASHER	Gen. Purpose	J107-6	J106-5		Q22	J122-3	J124-3		Blu-Org	#906, #89 (2)	#906
28	BOX FLASHER	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-5		Blu-Yel	#906, #89 (2)	#906
33	CUBE MAGNET	High Power	J907-6,7			Q2	J902-6			Yel-Vio	20-10197	
34	SUB BALL RELEASE	Low Power	J907-6,7			Q7	J902-4			Org-Vio	AE-27-1200	
35	LEFT DRAIN MAGNET	High Power	J907-8,9			Q1	J902-3			Yel-Gry	20-10197	
	General Illumination											
01	STRING 1	G.I.		J120-1		Q18		J120-7		Wht-Brn		#555
02	STRING 2	G.I.		J120-2		Q10		J120-8		Wht-Org		#555
03	STRING 3	G.I.	J121-3			Q14	J121-9			Wht-Yel	#44	
04	STRING 4	G.I.	J121-5			Q16	J121-10			Wht-Grn	#44	
05	STRING 5	G.I.	J121-6			Q12	J121-11			Wht-Vio	#44	

Flipper Circuits		Voltage Connections Playfield	Drive Transistors Power	Drive Transistors Hold	Drive Connectors Playfield	Drive Wire Colors Power	Drive Wire Colors Hold	Coil Part No.	Coil Color
29		Lwr. Rt. Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn			
30	Lower Right Flipper	Lwr. Rt. Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn	FL-11629	BLUE
31		Lwr. Lt. Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu			
32	Lower Left Flipper	Lwr. Lt. Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu	FL-11629	BLUE
33		Upr. Rt. Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio			
34	Upper Right Flipper	Upr. Rt. Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio	NOT	USED
35		Upr. Lt. Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry			
36	Upper Left Flipper	Upr. Lt. Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry	NOT	USED

J1xx=Power Driver Board; J9xx=Fliptronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb
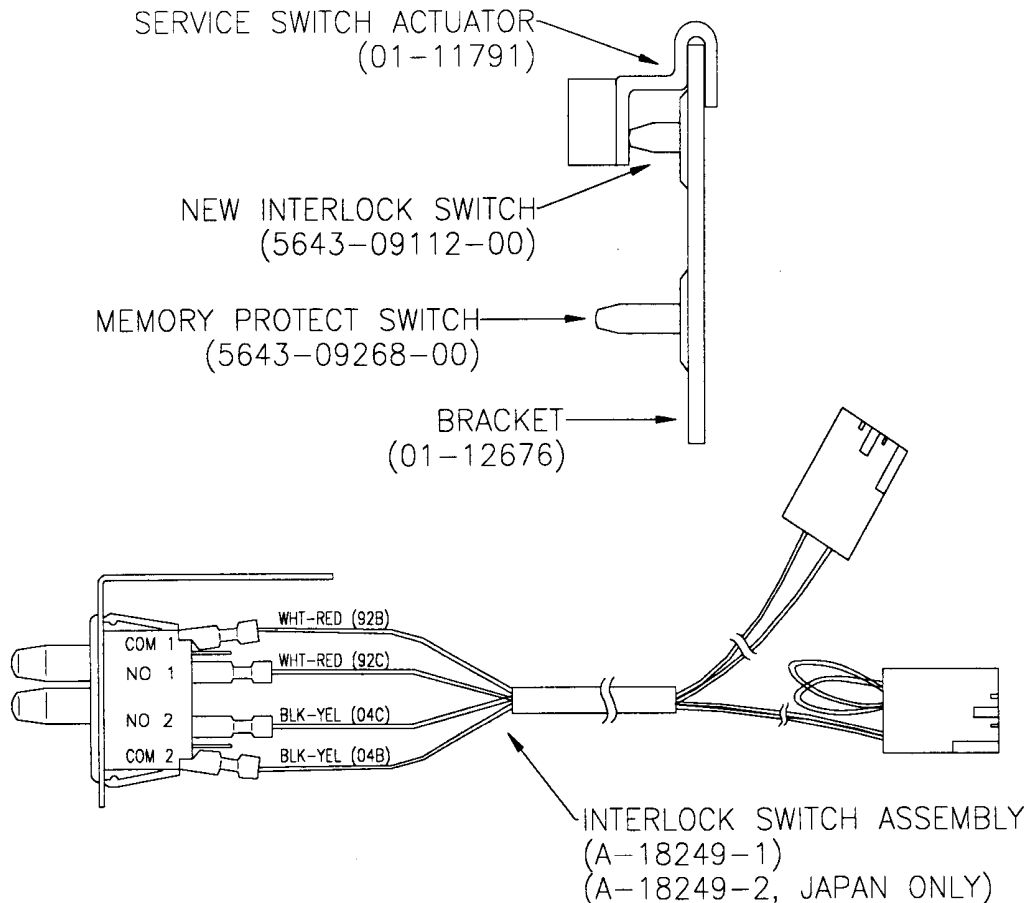*Tieback Diode J126-13

IMPORTANT NOTICE

PLEASE READ

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

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

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

SERVICE SWITCH ACTUATOR
(01-11791)

NEW INTERLOCK SWITCH
(5643-09112-00)

MEMORY PROTECT SWITCH
(5643-09268-00)

BRACKET
(01-12676)

WHT-RED (92B)
COM 1
NO 1   WHT-RED (92C)

NO 2   BLK-YEL (04C)
COM 2   BLK-YEL (04B)

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

ATTENTION

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

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

```
TESTING
50039                    EPROM PA-0
539    300008  30449
```

THEATRE OF MAGIC™

TABLE OF CONTENTS

Section 3 - Wiring Diagrams and Schematics.............................3-1

Bally's

THEATRE OF MAGIC™

Game Rules & Shot Maps

RULES AND THEORY

Object
The object is to journey into the Theatre of Magic and bring to life some of the greatest Illusions and Magic of all time. The player must apprentice to complete all 4 MAGICIANSHIP levels, become a MASTER and then perform the GRAND FINALE.

Theatre Skill Shot
The opening plunger shot has the player entering the Theatre. Shooting the ball selects a THEATRE ENTRANCE value (10 million, 2x Combo, Start Illusion, 20 Million, Advance Clock, Bonus X) and then quickly hitting the lit MAGIC TRUNK, awards that value to the player.

MAGICIANSHIP Levels (complete to light Grand Finale)

Theatre Letters
Shooting into the left lane when lit, will add a letter in THEATRE on the main scarf. Completing all letters will start the THEATRE hurry-up, starting at 50 Million points. The player collects this value by shooting into the trunk hole. The value increases each time a Magic jet bumper is hit. The THEATRE Magicianship lamp on the lower scarf will now be awarded.

Magic Multi-Ball
Complete all letters in MAGIC to light the inner Lightning Loop for LOCK. By shooting either ramp the player will add a letter to MAGIC. After the second ball is locked the Magicians Trunk spins to the Hypnotic side and MULTI-BALL will be lit in front of the trunk. Hitting this side will cause the trunk to grab, LEVITATE and spin the ball for the third LOCK, and then start Multi-Ball. The MULTI-BALL Magicianship lamp on the lower scarf will now be awarded.

All balls will be released out of the TRAP DOOR and into play for a **JACKPOT** shot back into the magicians trunk. After scoring the player must hit the trunk again to relight **JACKPOT.**

Theatre Clock Midnight
Shooting the right lane advances the THEATRE CLOCK towards midnight. Each shot advances the time 1-Hour. When the clock reaches 12:00 the game enters MIDNIGHT MADNESS for a timed amount. The player must shoot at the MAGIC TRUNK and score in millions, 2x the TIME, as the clock moves backwards. The MIDNIGHT Magicianship lamp on the lower scarf will now be awarded.

Illusion Awards
There are 8 illusions on the BOOK of MAGIC located in the center of the game. Hitting the magic case will light all 3 GEMS and then light START ILLUSION in front of the trunk. The player can now start the flashing illusion by going into the trunk hole. The ILLUSIONS Magicianship lamp on the scarf will be awarded when all ILLUSIONS have been completed.

1) **The Tiger Saw** - The player must shoot at the lit TIGER SAW AWARD lamp and hit the captive Lightning Ball on the left side. Each successful hit will cause the Tiger Saw to magically cut thru the box on the display and award 15 million.

2) **Levitating Women** - During this illusion the player must go up the lit center staircase to LEVITATE the women higher and higher. Each attempt scores a value different value. There is no limit to the height you can go for this timed event.

3) **Chained Trunk Escape** - As a new apprentice you must help to unchain and release the magician from the trunk. Each shot at the lit MAGIC TRUNK will break away one of the three locks or chains. Each hit scores millions and escaping scores 20 million.

B

4) **The Spirit Cards** - A spirited deck of 52 cards can be magically shuffled by the player going thru the SPINNER loop on the playfield. The player can spirit the cards from one hand to the other with each spinner shot. The SPIRIT CARD VALUE increases each time the deck is shuffled.

5) **Safe Escape** - You get trapped in a SAFE on stage and must ESCAPE before your time expires. As the inner LIGHTNING LOOP is now lit, you must shoot it (either way) to spin the tumblers and unlock the safe. The safe escape requires three numbers at 10 million per number hit and 25 million for escaping.

6) **The Metamorphosis** - One of the greatest ILLUSIONS is the METAMORPHOSIS. The lady magician awaits as you must go up the lit right staircase and assist her. Each shot will make her change from a person into a Tiger, Dove or other items of MAGIC.

7) **Strait Jacket** - During the Strait Jacket Escape, the left and right lane shots will take you into the Magic Jets. Each hit in the jets will help the lady magician to wiggle and escape from the unforgiving Strait Jacket.

8) **Hat Magic** - This is the oldest ILLUSION of all. When started the magic trunk spins to the hole side and you must shoot balls continuously in. As you are successful, rabbits and other marvels are pulled out of the magic hat in the dot display.

Haunted Basement / Trap Door Feature Awards

The TRAPDOOR leading into the THEATRE BASEMENT can be opened and entered from the playfield. Hitting the center targets will light the RAISE TRAPDOOR lamp in front of the center staircase. Making the center stairs will open the TRAPDOOR and the player can shoot into the basement. 15 Million is then scored and a random feature is awarded that includes.

Start Illusion - This player award will start the current flashing ILLUSION.
Light Extra Ball - This feature lights the left loop lane for Extra Ball.
Trunk Magic - A mystery TRUNK MAGIC round will begin after the ball is released from the basement. You must shoot for the HYPNOTIC side of the Magic Trunk.
Spell MAGIC Letters - This award will spell all the MAGIC letters for the player, and then light LOCKS in the LIGHTNING LOOP.
Bonus X - Your playfield BONUS X value is increased from 2x thru 10x.
Midnight - The THEATRE CLOCK is magically moved ahead to MIDNIGHT. When the ball is put back into play you will be in the MIDNIGHT MADNESS round.
Mystery Points Award - The player is randomly awarded a huge point amount.
Light Special - The outlane SPECIAL lamps are lit for the remaining ball in play.
Digital Pinball - This special award feature will move the player into the display where he will play a game of DIGITAL PINBALL. The player must knock down all 6 targets to light EXTRA BALL or other award.

Also all balls VANISHED and held for MULTIBALL in the basement are kicked out into play thru the trap door.

Vanish Lock

Hitting the captive LIGHTNING BALL on the left side of the playfield will light the VANISH lamp in the left loop lane. Shooting the left lane will now make the ball VANISH from the playfield. The player will receive a new ball and the TIGER SAW MULTI-BALL lamp will be on in the right lane.

Tiger Saw Multi-ball

When the right lane is lit for TIGER SAW MULTI-BALL, a right loop shot will saw the pinball into two for 2 BALL MULTI-BALL play. While in multi-ball, the tiger saw award light will be on and score TIGER SAW JACKPOTS upon each hit

C

The Grand Finale
After completing all your MAGICIANSHIP levels (Theatre, Multi-Ball, Midnight, Illusions) on the lower scarf, the START FINALE lamp will light. A shot into the LIGHTNING LOOP will take the player into the GRAND FINALE timed round for super scoring and enchantment. All letters in MAGIC THEATRE must be lit by making any shot on the playfield. Completing this will make you the highest level of Magician possible.

Theatre Combinations
Every time the player repeats a previous shot in a lane or on a ramp the COMBO award value will be given. Each completed COMBO awards a higher point value starting from 2 Million.

Theatre Jet Bumpers
Shooting into the Magic Jet Bumpers will increase the THEATRE VALUE from 50 Million points on upwards. A random amount is added with each JET bumper hit.

Bonus Awards
At the end of each ball the player may be awarded one or more of the following BONUS AWARDS, multiplied by the BONUS MULTIPLIER.

> Magicianship Level - The player receives a bonus for his LEVEL of MAGICIANSHIP.
> Illusions Completed - Bonus is given for each ILLUSION completed.
> MAGIC letters completed - A Bonus amount is awarded for each MAGIC letter lit.
> THEATRE letters completed - The player receives a bonus for each THEATRE letter lit.
> Theatre CLOCK - Also a bonus amount is awarded for advancing the Theatre CLOCK.

Bonus Multiplier
The BONUS MULTIPLIER is increased by completing the two top THEATRE MASKS viewed in the THEATRE MIRROR. Flipper buttons cause LANE CHANGE to occur, assisting the player in advancing his BONUS X VALUE.

Special
The SPECIAL can be lit during the GRAND FINALE as well as being lit as a BASEMENT random award.

Extra Ball
The player can score an EXTRA BALL by shooting the left lane when lit. Completing all targets in the Digital Pinball game will light the left lane for EXTRA BALL. Also the BASEMENT feature, lights Extra Ball when awarded.

We Now Welcome You To The Theatre of Magic!

PLAYFIELD SHOTS

VANISH LOCK

THEATRE MIRROR

TIGER SAW

TOP LANES

LIGHTNING
LOOP

THEATRE JETS

MAGIC TRUNK

CENTER STAIRS
(RAMP)

SPINNER

SPIRIT RING

RIGHT STAIRCASE
(RAMP)

CAPTIVE
BAL

LEFT OUTER
LOOP

TRAP DOOR

RIGHT OUTER
LOOP

CATWALK

SKILL THEATRE
ENTRANCE

Bally

PLAYFIELD SHOTS

BONUS X MASKS

THEATRE FLASH

MAGIC GEMS

START FINALE

EXTRA BALL

VANISH

SPELL THEATRE

MAGIC LETTERS

THEATRE LETTERS

SPECIAL

SHOOT AGAIN

SPELL MAGIC TO LIGHT LOCK

LOCK

LOCK

TIGER SAW MULTIBALL

CLOCK ADVANCE

GRAND FINALE

ILLUSIONS

SPECIAL

COMPLETE ALL MAGICIANSHIP LEVELS TO LIGHT START FINALE

SKILL SHOT

① Shoot ball into play to select value.

② Hitting Magic Trunk awards that value.
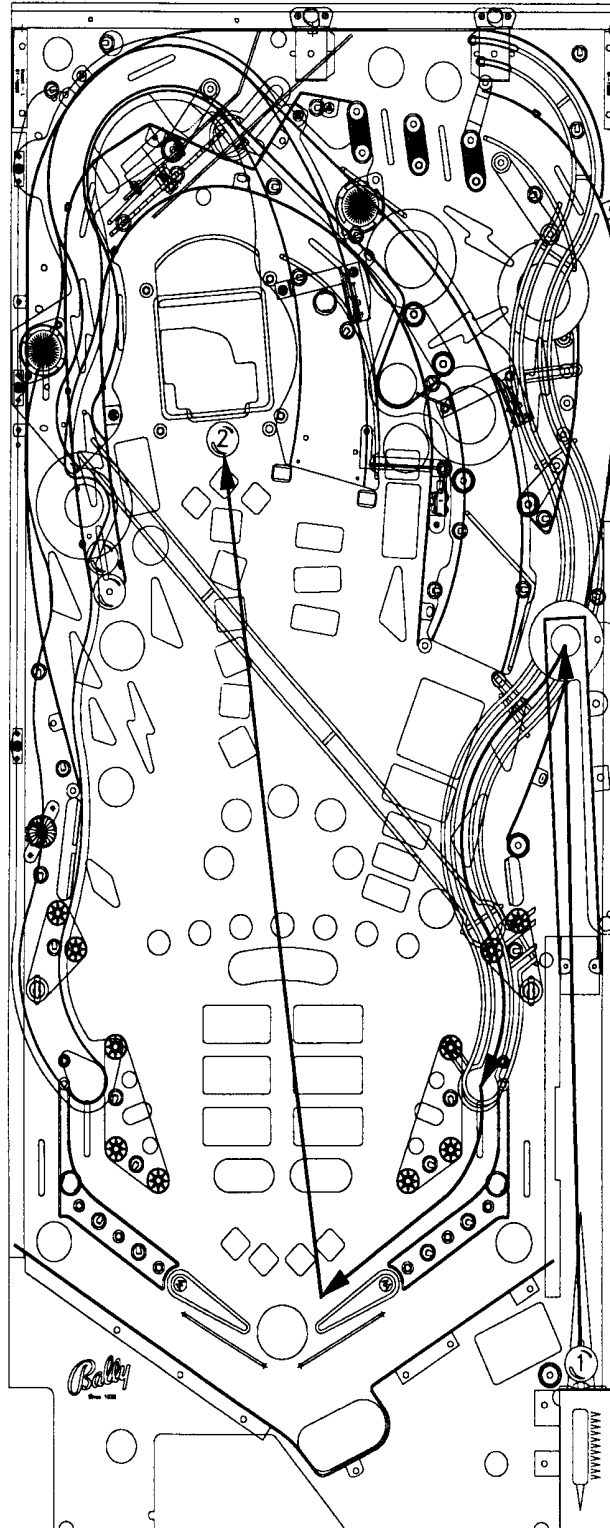
MAGICIANSHIP LEVELS

① Shooting the left lane will light a THEATRE letter and award the Magicianship Level, when completed.

② Hitting the Trunk will light up the Magic Gems and then Start ILLUSION. Shooting into the Trunk hole will begin the next ILLUSION.
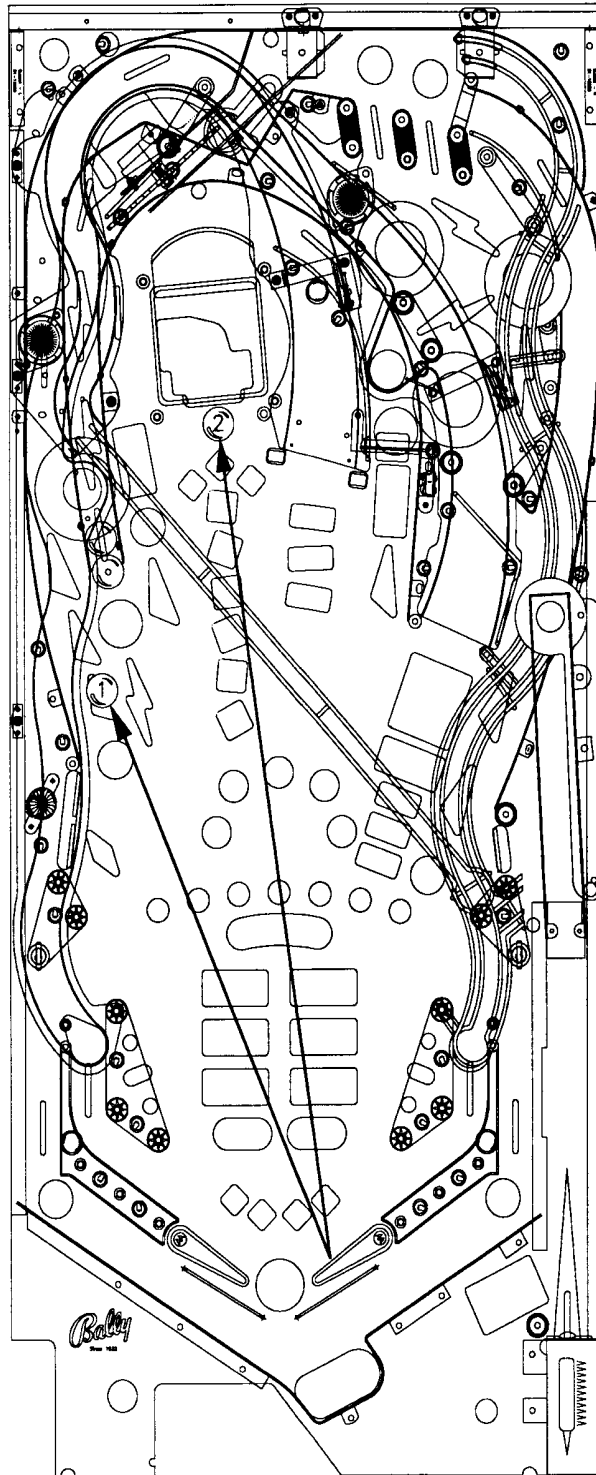
MAGICIANSHIP LEVELS (CONTINUED)

① Spelling MAGIC will light the Lightning Loop for Lock. Shooting into the Lock will hold the ball.

② The third ball must be shot at the Magic Trunk to start Multi-ball. The MULTI-BALL Magicianship Level will now be awarded.

③ Making the right loop lane will advance the Theatre Clock to Midnight Madness. Midnight, the last Magicianship Level will be lit now.
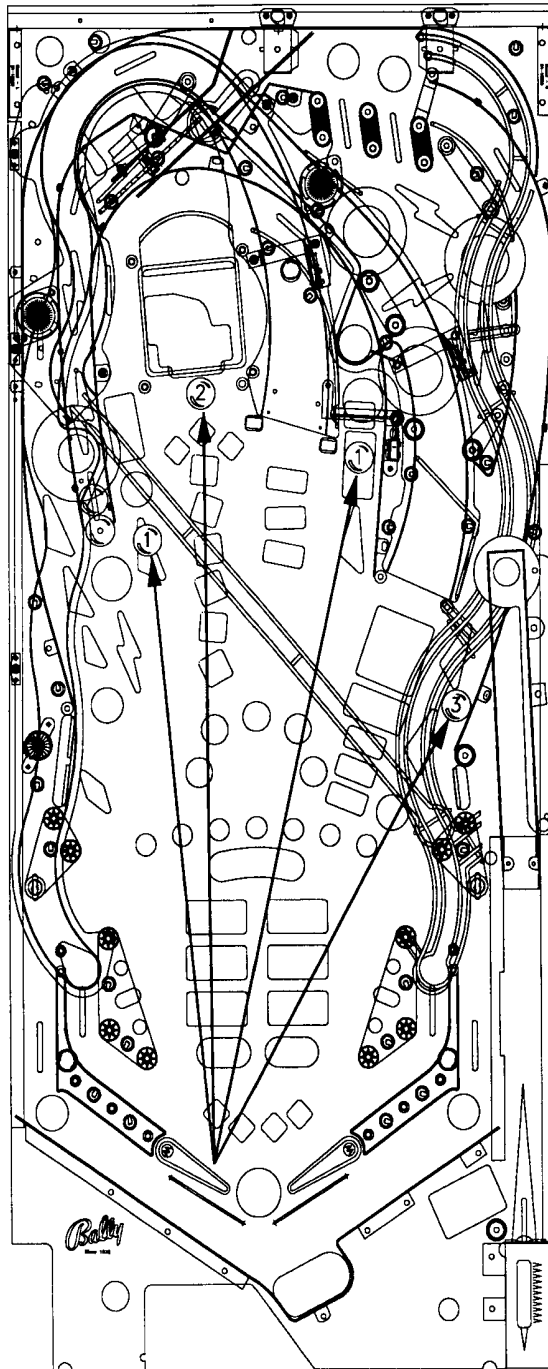
ILLUSIONS

Hit the Magic Trunk to light Start Illusion. Then shoot into it to begin. All Illusions can be completed by making the correct shots on the playfield.

① Strait Jacket
② Metamorphosis
③ Spirit Cards

④ Levitating Woman
⑤ Hat Magic
⑥ Chained Trunk Escape

⑦ Tiger Saw
⑧ Safe Escape
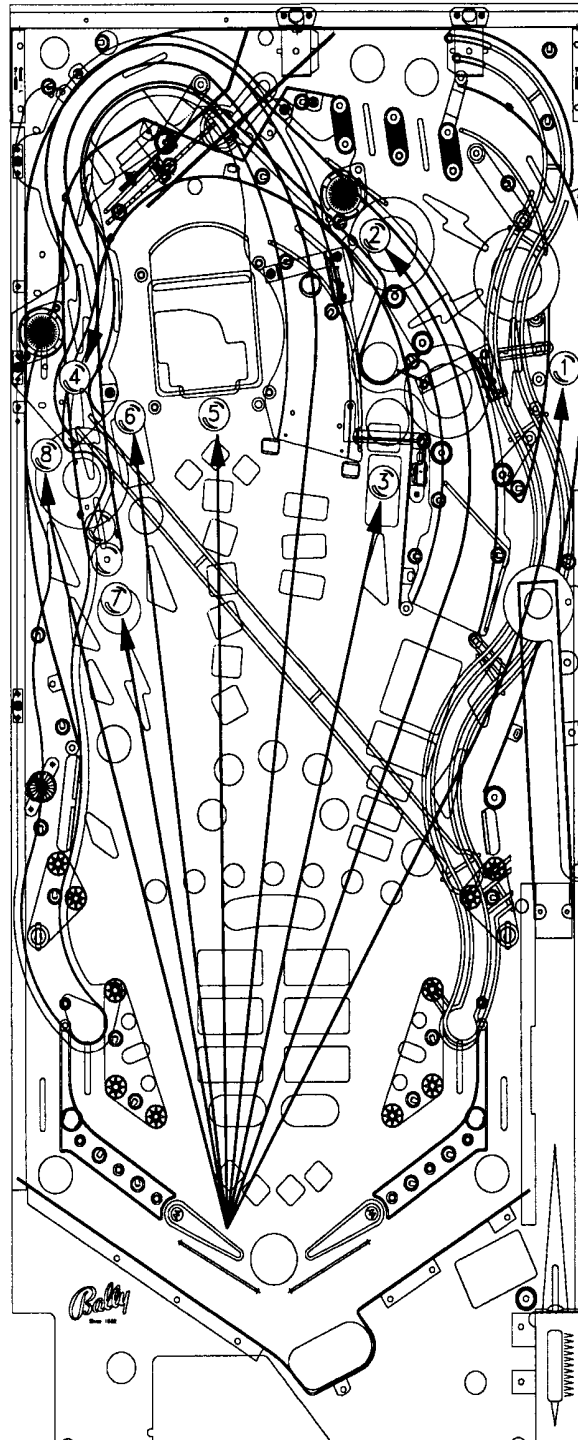
HAUNTED BASEMENT

By hitting the center targets, the player can light the RAISE TRAPDOOR insert.
Shooting up the center stairs will open the Trapdoor to shoot into for feature awards.

① Hit to light
Raise Trapdoor

① Hit to light
Raise Trapdoor

② Shoot Center Stairs
to raise Trapdoor

③ Shoot into Basement

K
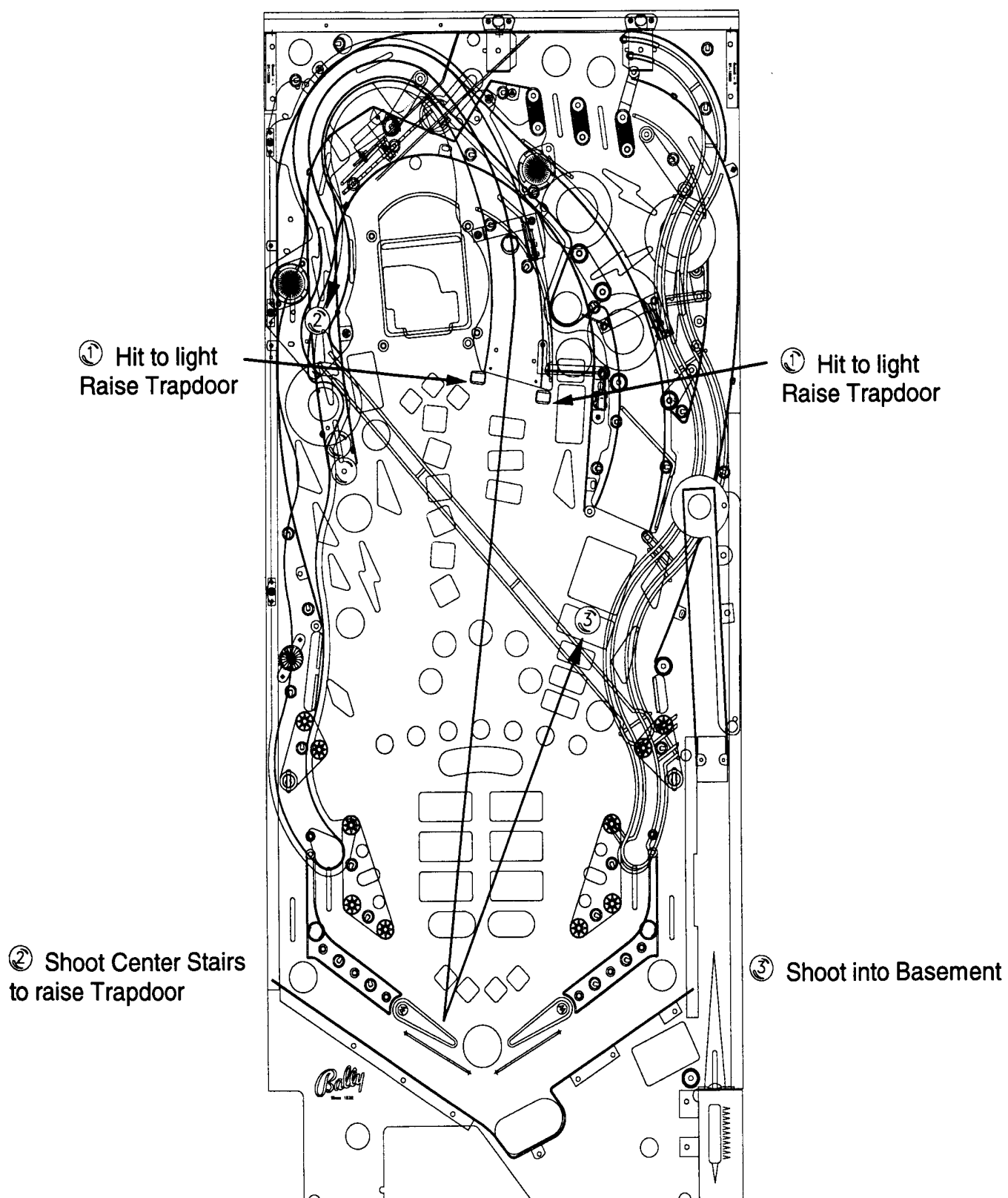
VANISH LOCK / TIGER SAW MULTI-BALL

① Hitting the captive ball will light Vanish Lock in the left lane.

② Shooting into the left lane will Vanish the ball.

③ Then making the right lane will saw the ball into 2 balls for Tiger Saw Multi-ball. The Tiger Saw Jackpot can be scored by hitting the captive ball.

L
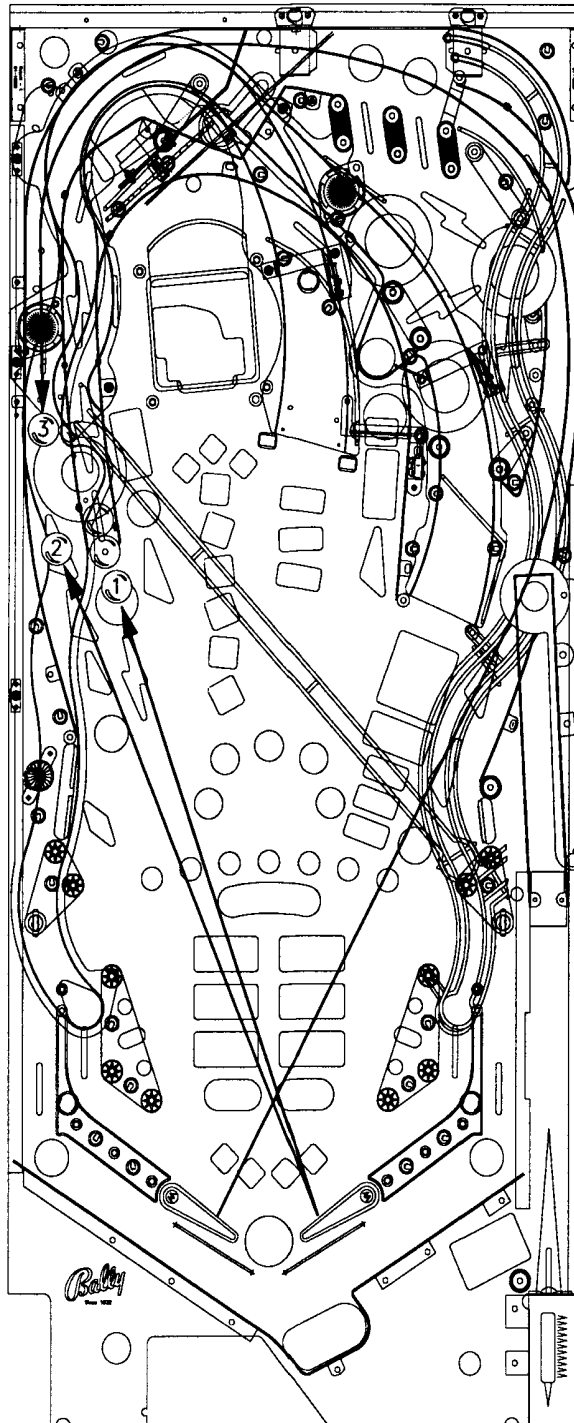
THE GRAND FINALE

When all Magicianship Levels have been completed the START FINALE light will be lit. The player must shoot the lightning loop to begin the Grand Finale.

Make any playfield shot to light MAGIC THEATRE and complete the Grand Finale-Illusion for one Billion.
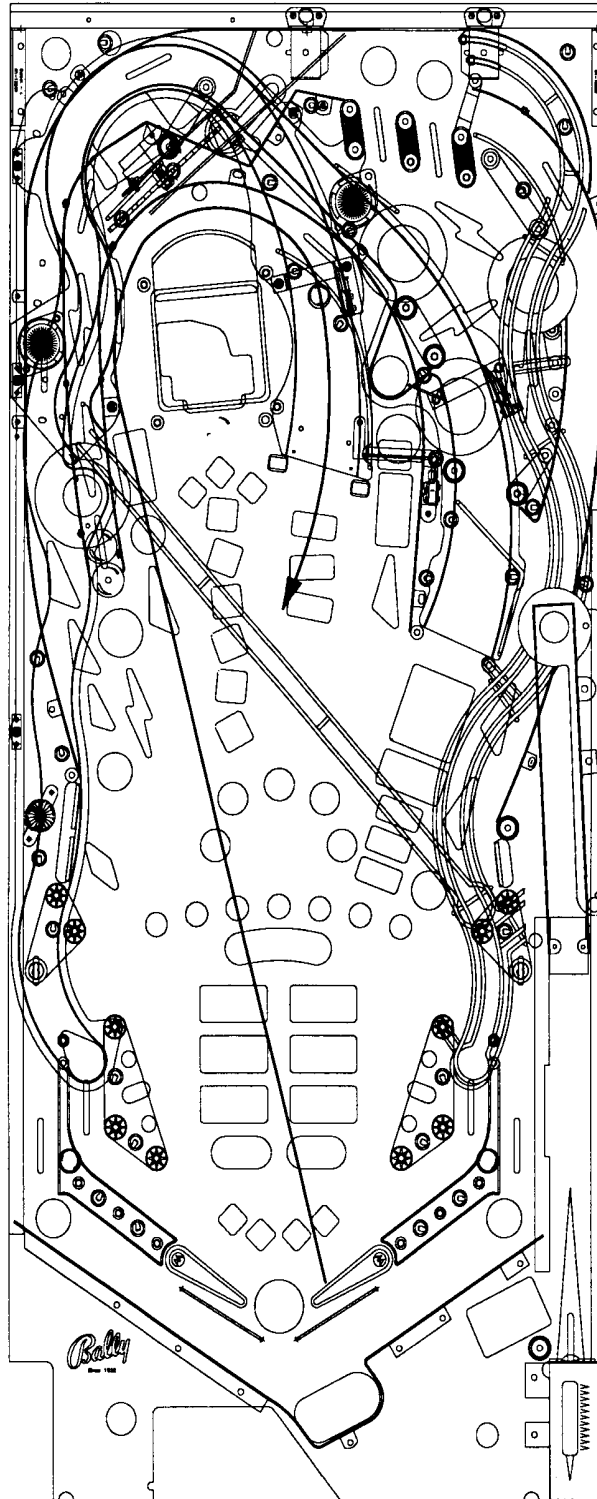
NOTES

SECTION ONE

GAME OPERATION
AND TEST INFORMATION

(System WPC) ROM Summary

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	U6	A-5343-50039-1A (Domestic)
Game 1	27c040	CPU	U6	A-5343-50039-1F (French)
Game 1	27c040	CPU	U6	A-5343-50039-1X (Foreign)
Music/Speech	27c040	Audio	SU2	A-5343-50039-S2
Music/Speech	27c040	Audio	SU3	A-5343-50039-S3
Music/Speech	27c040	Audio	SU4	A-5343-50039-S4
Music/Speech	27c040	Audio	SU5	A-5343-50039-S5
Music/Speech	27c040	Audio	SU6	A-5343-50039-S6
Music/Speech	27c040	Audio	SU7	A-5343-50039-S7

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

PINBALL GAME ASSEMBLY INSTRUCTIONS

THEATRE OF MAGIC IS A 5 BALL GAME.

(Four located in the trough, one captive.)

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

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

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

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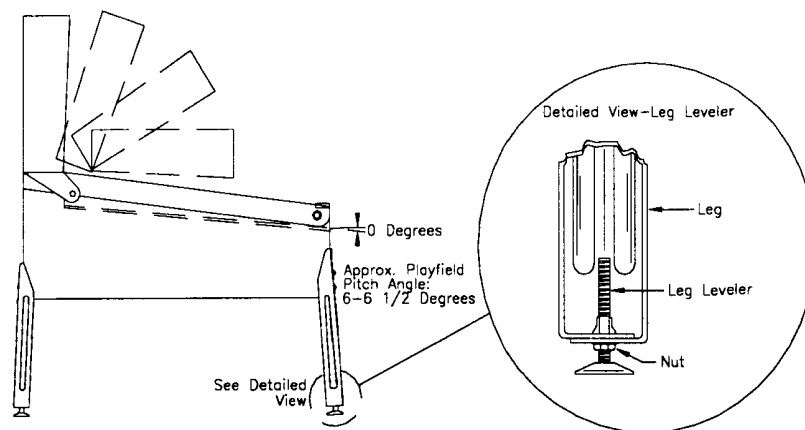
VIEW 1
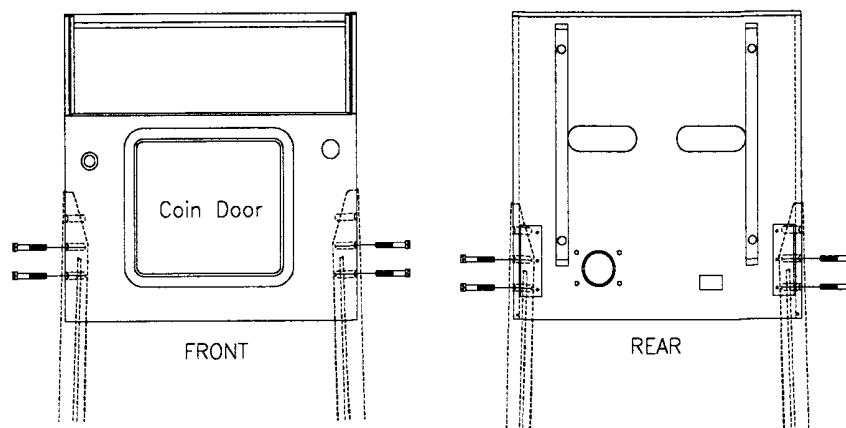
VIEW 2

1-2

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

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

⚠ **CAUTION**

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

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

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

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

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

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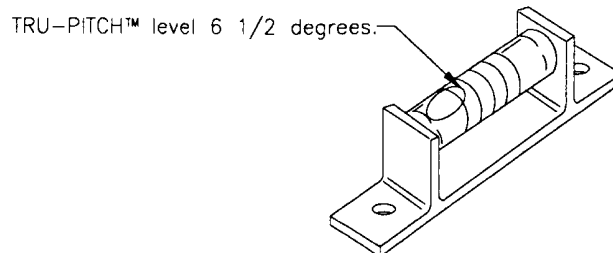
CAUTION

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

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

11. Verify that the **required number** of balls are installed in the game. This game uses 5 balls - four are located in the trough and 1 is a captive ball.

12 Install playfield mylars if desired.

> **NOTE:** This playfield has a special hardcoat surface and does not require a full protective mylar. However, mylars can be purchased through your local Bally Distributor. Specify part number 03-9351-1 for full playfield mylar.

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

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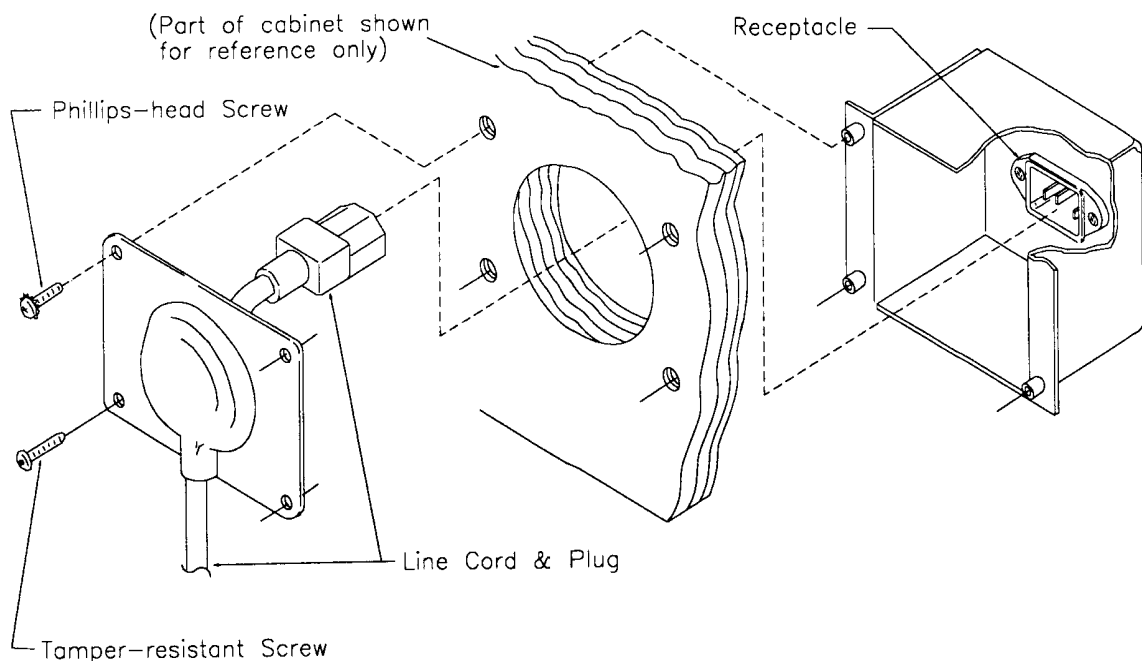
RAISING THE PLAYFIELD

⚠ CAUTION

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

To Raise Playfield:

1. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails or be used to slide out playfield.
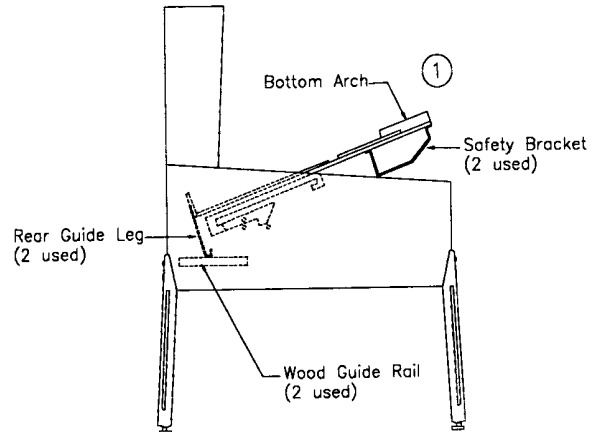
2. Pull the playfield out toward you until it stops (rest position) and raise it approximately 3".

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

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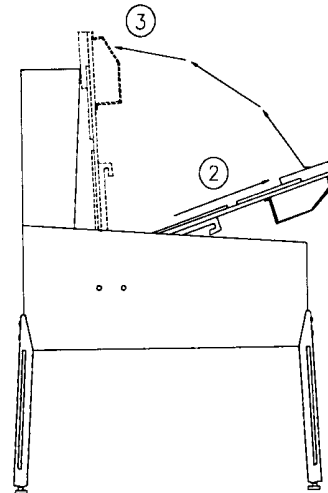
To Lower Playfield:

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

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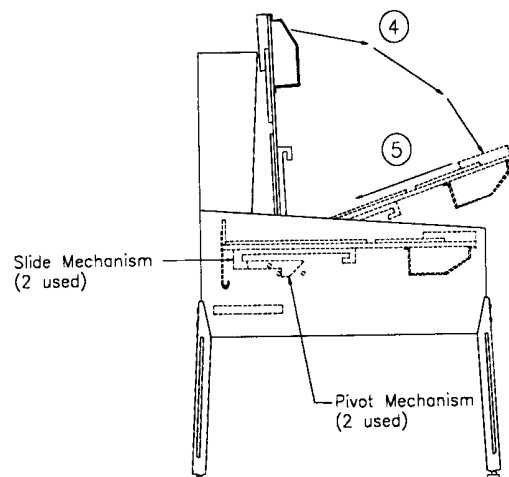
GAME CONTROL LOCATIONS

Cabinet Switches

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

The <u>Start Button</u> 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 <u>Service Credits</u> button puts credits on the game that are not included in any of the game audits.

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

The <u>Volume Down</u> (-) 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 *<u>Begin Test</u> button starts the Menu System Operation and changes the Coin Door Switches from Normal Function to Test Function.

Test Function

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

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

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

The *<u>Enter</u> button allows you to get into a menu selection or lock in an adjustment choice.
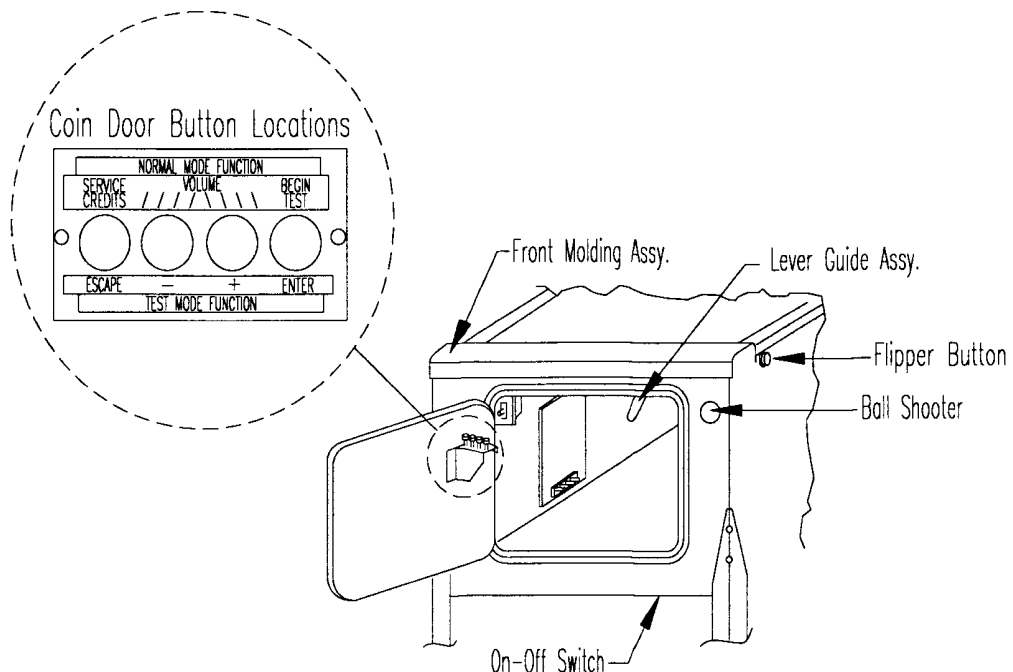
To reset High Score, hold down the Begin Test/Enter switch for 5 seconds while in the Attract Mode.

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 <u>Attract Mode</u>.

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:	**MAGIC**	**Sound Rev. L-1**
	50039 Rev. PA-O	Sy. 3.32 1/10/95

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

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

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

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

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

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

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

*Operator-adjustable feature.

MENU SYSTEM OPERATION

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

Main Menu

B. Bookkeeping Menu

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

P. Printouts Menu

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

T. Test Menu

T.1 Switch Edges
T.2 Switch Levels
T.3 Single Switches
T.4 Solenoid Test
T.5 Flasher Test
T.6 General Illumination
T.7 Sound & Music Test
T.8 Single Lamps
T.9 All Lamps
T.10 Lamp & Flasher Test
T.11 Display Test
T.12 Flipper Test
T.13 Ordered Lamp Test
T.14 Lamp Row-Col Test
T.15 Dip Switch Test
T.16 Trunk Test
T.17 Trapdoor Test
T.18 Empty Balls Test

U. Utilities Menu

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

A. Adjustments Menu

A.1 Standard Adjustments
A.2 Feature Adjustments
A.3 Pricing Adjustments
A.4 H.S.T.D. Adjustments
A.5 Printer Adjustments

Press Escape
To move out of a menu selection.

Press Enter
To get into a menu selection.

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

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

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

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

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access an audit menu. Press the Escape button to return to the Bookkeeping Menu.

B. BOOKKEEPING MENU
B.1 Main Audits
B.2 Earning Audits
B.3 Standard Audits
B.4 Feature Audits
B.5 Histograms

B.6 Time-Stamps
One Button Audit System. The Bookkeeping Menu is obtainable directly from the Attract Mode. Repeatedly pressing the Enter button, while in the Attract Mode, will cycle through all of the game audits.

B.1 Main Audits

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

B.2 Earning Audits*

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

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

B.3 Standard Audits

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

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

B.4 Feature Audits

B.4	01	Number of Buy-ins	00
B.4	02	Number of times Multi-ball was started	00
B.4	03	Number of Illusions started	00
B.4	04	Number of times the Basement Random Feature awards something	00
B.4	05	Number of times Theatre was spelled	00
B.4	06	Number of times a ball was saved	00
B.4	07	Average Time per Credit	00
B.4	08	Number of a ball was VANISHED	00
B.4	09	Number of times Tiger Saw Multi -ball was started	00
B.4	10	Number of Locks lit	00
B.4	11	Number of times Grand Finale was played	00
B.4	12	Number of times Midnight Madness was started	00
B.4	13	Number of greater than 1 consecutive Buy-ins	00
B.4	14	Number of greater than 2 consecutive Buy-ins	00
B.4	15	Number of greater than 3 consecutive Buy-ins	00
B.4	16	Number of greater than 4 consecutive Buy-ins	00
B.4	17	Number of Trunk Failures	00
B.4	18	Number of times the left drain magnet grabbed the ball	00
B.4	19	Number of times the left drain magnet missed the ball	00
B.4	20	Number of times the right drain magnet grabbed the ball	00
B.4	21	Number of times the right drain magnet missed the ball	00
B.4	22	Number of times the magnet diverter was fired	00
B.4	23	Number of times the ball was saved when drain down the center after hitting Trunk (adjustment must be ON)	00
B.4	24	Number of times Side 1 of trunk was hit	00
B.4	25	Number of times Side 4 (MAGNET) of trunk was hit	00
B.4	26	Number of times Side 3 (LAMP) of trunk was hit	00
B.4	27	Number of times Side 2 (SCOOP-SIDE) of trunk was hit	00
B.4	28	Number of times player got to 6:00 pm (on Theatre Clock)	00

B.5   Histograms

B.5	01	1-1.9 Million Scores	00%
B.5	02	2-4.9 Million Scores	00%
B.5	03	5-9.9 Million Scores	00%
B.5	04	10-19 Million Scores	00%
B.5	05	20-29 Million Scores	00%
B.5	06	30-39 Million Scores	00%
B.5	07	40-49 Million Scores	00%
B.5	08	50-69 Million Scores	00%
B.5	09	70-99 Million Scores	00%
B.5	10	100-149 Million Scores	00%
B.5	11	150-199 Million Scores	00%
B.5	12	200-299 Million Scores	00%
B.5	13	Over 3 Million	00%
B.5	14	Game Time 0.0-1.0 Mins	00%
B.5	15	Game Time 1.0-1.5 Mins	00%
B.5	16	Game Time 1.5-2.0 Mins	00%
B.5	17	Game Time 2.0-2.5 Mins	00%
B.5	18	Game Time 2.5-3.0 Mins	00%
B.5	19	Game Time 3.0-3.5 Mins	00%
B.5	20	Game Time 3.5-4.0 Mins	00%
B.5	21	Game Time 4-5 Mins	00%
B.5	22	Game Time 5-6 Mins	00%
B.5	23	Game Time 6-8 Mins	00%
B.5	24	Game Time 8-10 Mins	00%
B.5	25	Game Time 10-15 Mins	00%
B.5	26	Game Time Over 15 Mins	00%

B.6   Time-Stamps

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

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

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

P. PRINTOUTS MENU
(optional board required)

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

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

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

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

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

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

T. TEST MENU

T.1	Switch Edges
T.2	Switch Levels
T.3	Single Switch
T.4	Solenoid Test
T.5	Flasher Test
T.6	General Illumination
T.7	Sound & Music Test
T.8	Single Lamps
T.9	All Lamps
T.10	Lamp & Flasher Tests
T.11	Display Test
T.12	Flipper Test
T.13	Ordered Lamps Test
T.14	Lamp Row-Col Test
T.15	Dip Switch Test
T.16	Trunk Test
T.17	Trapdoor Test
T.18	Empty Balls Test

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

T.12 Flipper Coil Test
The Flipper Coil Test has three modes: Repeat, Stop, and Run. Only one flipper should pulse at a time. The system has detected a problem if more than one flipper pulses, a flipper comes On and stays On, or no flippers pulse during the Repeat or Run modes.

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

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

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

T.13 Ordered Lamp Test
The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example - Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through the lamps. Lamps light in a clock-wise or counter clock-wise direction starting from the bottom of the playfield. Direction depends on which button, Up or Down, is pressed. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicates the system has detected a problem.

T.14 Lamp Row-Col Test
This test allows individual rows and columns in the lamp matrix to be operated. This is useful for trouble-shooting wiring and driver problems.

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

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

T.16 Trunk Test
This will test the trunk clockwise and counter-clockwise motors and the four optos which represent each side of the trunk. When first entering this test the trunk will attempt to return to the HOME side. Then the operator can turn the cube clockwise with the (+) button and counter-clockwise with the (-) button. On the display the trunk opto switch status are shown, if one of them don't change (i.e. closed-open) then one of the switches is bad. Also, There is a picture of what trunk side SHOULD be showing, if the picture and the actual trunk side don't match...there is a PROBLEM.

The diagnostic test switches act as follows:
ESC - Returns to the previous menu
FWD - turn trunk clockwise (or limit switch hit)
REV - turn trunk counter-clockwise (or limit switch hit)

T.17 Trap Door Test   This will test the multi-ball lockup device switches and all coils related to it: The multi-ball device release coil, the trap door popper coil and the trap door itself. The operator must drop ball(s) behind the trunk and wait to see if the state of any of the switches change. If they don't, one of the switches of the lockup is bad. After roughly 2 seconds the test will attempt to kick out the ball(s). If balls fail to come out, switches and/or coils must be checked...

The diagnostic test switches act as follows:

    ESC - Returns to the previous menu
    FWD - Does nothing
    REV - Does nothing
    ENTER - Does nothing

T.18 Empty Balls Test   Select T.18 from the Test Menu and press 'ENTER" to begin the Empty Balls Test.

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

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

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

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

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

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

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

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

U.5 Custom Message   Set A.1 20 to ON before writing a Custom Message. Press the Enter button to begin entry of the custom message. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation. If you make a mistake, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once your message is complete, press and hold the Enter button until "Message Stored" is displayed.

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

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

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

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

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

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

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

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

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

U.9 04 Install Hard Somewhat MORE difficult than factory setting.

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

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

Adj. No.	Adjustment Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03	Hard U.0 04	Extra Hard U.9 05
A.2 05	Lite Magic Percent	15%	123%	12%	8%	8%
A.2 06	Lite Extra Ball Percent	18%	16%	12%	10%	10%
A.2 07	Lite Special Percent	2%	1%	1%	1%	1%

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 05	Lite Magic Percent	15%	123%	12%	8%	8%
A.2 06	Lite Extra Ball Percent	18%	16%	12%	10%	10%
A.2 07	Lite Special Percent	2%	1%	1%	1%	1%

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

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

Adjustment Number	Adjustment Description	Install 3-Ball U.9 07 (factory)	Install 5 Ball U.9 06
A.1 01	Balls Per Game	3	5
A.1 07	Replay Start	600,000,000	600,000,000

U.9 08 Install Add-A-Ball   This option deletes all Free Play awards and replaces them with Extra Ball awards. Individual adjustments are affected, as follows:

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

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

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

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

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

U.9 11 Not Used

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

U.9 13 thru U.9 16 Not Used

U.9 17 Install German 1•
U.9 18 Install German 2•
U.9 19 Install German 3•
U.9 20 Install German 4•
U.9 21 Install German 5•
U.9 22 Install German 6•   Adjustments U.9 17 through U9 22 are used to modify game pricing and type of game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups. **NOTE:** German Replay starts at 50,000,000.

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.

* The French DIP Switch Settings are:

SW4	SW5	SW6	SW7	SW8
On	On	On	Off	Off

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

U.11 Auto Burn-in Press the Enter button to activate Auto Burn-in. This utility automatically cycles through several tests. This will help in find intermittent problems. The tests that Auto Burn-in cycle through are: the Display Test, Sound and Music Test, All Lamps Test, Solenoid Test, Flashers Test, General Illumination Test, and the Flipper Coil Test. All of the tests are run concurrently. The time spent on the current burn-in cycle, and the total time the game has spent in burn-in are displayed.

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

A. ADJUSTMENTS MENU

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

A.1 Standard Adjustments

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

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

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

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

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

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

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

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

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

A.1 08 Replay Levels*

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

*For Auto % Replay.

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

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

A.1 13 Replay Boost

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

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

A.1 14 Replay Award

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

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

A.1 15 Special Award

The award automatically provided when the player scores a special.

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

A.1 16 Match Award

The award automatically provided when the players wins a match.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

YES - Dim General Illumination for spiral effects and Attract Mode.
NO - Do Not dim General Illumination.

A.1 26 Tournament Play
Equalize Multi-ball and Jackpots during multi-player games, (do not carry over to next player).

YES -   Keep Multi-ball and Jackpots equal.
NO   -   Do Not Keep Multi-ball and Jackpots equal.

A.1 27 Euro. Scr. Format
Use either commas or dots between digits when numbers are displayed.

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

A.1 28 Minimum Volume Control
The volume can be turned Off.

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

A.1 29 General Illumination Power Saver
This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played. Power Saver Level (A.1 30) determines dimness of the lamps. Using this feature will substantially increase the life of the lamps.

Setting: -   Off, 2-60 Minutes

A.1 30 Power Saver Level
When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.

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

A.1 31 Ticket Expansion Board
When a Ticket Expansion Board is connected, full control of the ticket dispenser is available. This includes a ticket low/error lamp, resume on ticket jam switch, and manual ticket dispense switch.

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

A.1 32 No Bonus Flips
The activation of flippers during the end of ball "bonus" sequence. Setting this to "YES" may extend the life of the flipper mechanisms.

A.1 33 Game Restart

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

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

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

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

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

A.2 Feature Adjustments

A.2 01   Buy Extra Ball - Buy-in Feature

This determines whether each player may buy 1 extra ball for 1 credit at the end of the game.

Factory Default: 1 Credit

A.2 02   Maximum Buy-in Balls

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.

Factory Default: 1

A.2 03   Attract Mode Sounds

The operator can select whether or not the attract mode has sound on the flipper and gun buttons to attract players. The choices are:

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

Factory Default: OFF

A.2 04   Ball Save Timer

After ball start, this is the amount of time that the "SHOOT AGAIN" ball saver lamp is lit. It allows players who drain within this time to be served another ball. This adjustment is for when player is not in a multiball.

Choices are:

OFF = No ball save is enabled
ON = Ball save is enabled

Factory Default: ON

A.2 09   Spell Magic Percentage

This is a measure of whether or not the BASEMENT random award will spell MAGIC for the player.

The setting range is 2-25%
Factory Default: 10%

A.2 10   Light Extra Ball Percentage

This is a measure of whether or not the BASEMENT random award will light EXTRA BALL for the player.

The setting range is 5-30%
Factory Default: 10%

A.2 11 Light Special Percentage

This is a measure of whether or not the BASEMENT random award will light SPECIAL for the player.

The setting range is 1-3%
Factory Default: 2%

A.2 12 Trunk Hit Ball Saver

The operator selects whether or not during game play a ball will be saved when a ball hits the spinning trunk and the ball drains immediately down the center (with about 2 sec.)

YES - allow special ball save
NO - do not allow special ball save

Factory Default: NO

A.2. 13 Hocus Pocus

The operator can choose to increase or decrease the chance of the DRAIN magnets saving the ball.

The setting range is OFF-25 Seconds
Factory Default: 15 seconds

A.2 14 Trunk Motor

The operator can choose to disable the TRUNK MOTORS. This is allowed in case of a severe problem with TRUNK.

YES - Allow trunk motors to work
NO - Do not allow trunk motors to work

A.2 15 German Speech

The operator can choose to enable the German Speech.

YES - Enable German Speech
NO - No German Speech

Factory Default: NO

A.3 Pricing Adjustments

A.3 01 Game Pricing (if set to custom, then 02 to 09 are available). Custom pricing is not available for U.S.A. and Canadian games.
The cost of a game is selected here, from the Standard Pricing Table or by using the Custom Pricing Editor (A.3 27).

A.3 02 thru A.3 09 Not Used

A.3 10 Coin Door Type (if set to custom, then 11 to 15, 20 and 25 are available)
This adjustment is used to preset adjustments 11 through 15, 20 and 25, based on standard coin doors (U.S.A., German, Etc.).

A.3 11 Collection Text
The coin system used to display the Earning Audits.

A.3 12 Left Slot Value
A.3 13 Center Slot Value
A.3 14 Right Slot Value
A.3 15 4th Slot Value
The monetary value of the left, center, right, and 4th coin chutes. Formerly, these values only affected the way in which the coins were totaled for auditing displays. In the new 10/94 pricing system, these values are added for each coin inserted and credits are awarded based on the amount of money accumulated. See Pricing Editor (A.3 27) for more information.

A.3 16 Maximum Credits
The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 99. Reaching the specified setting prevents the award of any credits. The factory default is 10.

A.3 17 Free Play
The player can operate the game without a coin (free play) or with a coin.

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

A.3 18 Hide Coin Audits
The coin audits may, or may not be displayed.

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

A.3 19 Not Used

A.3 20 Base Coin Size
This is the smallest unit of coin that may be used when creating a custom pricing mode using the Pricing Editor (A.3 27). For example, in the USA this is typically $0.25. All pricing levels are then specified in 25 cent (or greater) increments.

A.3 21 Coin Meter Units

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

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

A.3 22 Dollar Bill Slot

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

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

A.3 23 Minimum Coin Microseconds

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

A.3 25 Allow Hundredths

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

A.3 26 Credit Fraction

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

A.3 27 Pricing Editor

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

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

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

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

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

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

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

Display View

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

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

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

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

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

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

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

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

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

Example: 1/$0.50   2/$1.00

                    1) $0.25   1/2 cred.

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

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

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

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

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

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

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

Example: Inserting a new pricing level.

```
╔══════════════════════════════╗
║       Custom Pricing Editor   ║
║ 1)      $0.50          1 cred.║
║ 2)      $1.00          2 cred.║
║ 3)      $1.50          4 cred.║
║ 4)      $2.00          6 cred.║
╚══════════════════════════════╝
```
Display View

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

```
╔══════════════════════════════╗
║       Custom Pricing Editor   ║
║ 1)      $0.50          1 cred.║
║ 2)      $1.00          2 cred.║
║ 3)      INSERT         4 cred.║
║ 4)      $2.00          6 cred.║
╚══════════════════════════════╝
```
Display View

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

```
╔══════════════════════════════╗
║       Custom Pricing Editor   ║
║ 1)      $0.50          1 cred.    ║
║ 2)      $1.00          2 cred.    ║
║ 3)      $1.25          2 1/2 cred.║
║ 4)      $2.00          6 cred.    ║
╚══════════════════════════════╝
```
Display View

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

```
╔══════════════════════════════╗
║       Custom Pricing Editor   ║
║ 2)      $1.00          2 cred.    ║
║ 3)      $1.25          2 1/2 cred.║
║ 4)      $1.50          4 cred.    ║
║ 5)      $2.00          6 cred.    ║
╚══════════════════════════════╝
```
Display View

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

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

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

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

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

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

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

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

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

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

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

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

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

```
+----------------------------------+
|      Custom Pricing Editor       |
| 17)    $4.25         8 1/2 cred. |
| 18)    $4.50         9 cred.     |
| 19)    $4.75         9 1/2 cred. |
| 20)    $5.00         10 cred.    |
+----------------------------------+
```
Display View

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

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

```
+----------------------------------+
| Choose an Option:                |
|     Return to Editor             |
|     Clear Pricing                |
|     Ignore Changes               |
|     Save Changes                 |
+----------------------------------+
```
Display View

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

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

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

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

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

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

Pricing Table

Country	Coin Chutes Left	Center	Right	4th Chute	Games/Coins	Display	Pricing Adjustments A3 02 03 04 05 06 07 08 09
USA	25¢	$1.00*	25¢	$1.00	1/50¢, 2/75¢, 3/$1 [2]	50¢, 75¢, $1.00	
	25¢	$1.00*	25¢	$1.00	1/75¢, 2/$1.50, 3/$2.00 [2]	1/.75, 3/2.00	
	25	$1.00	25¢	$1.00	1/3X25¢ [2]	USA1 1/$0.75	
	25	$1.00	25¢	$1.00	1/50¢, 2/$1 [2]	USA 2/$1.00	
	25	$1.00	25¢	$1.00	1/50¢, 3/$1.00 [2]	USA 3/$1.00	
	25	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 3/$1.50, 6/$2.00 [2]	USA 6/$2.00	
	25	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 3/$1.50, 5/$2.00 [1,2]	USA 5/$2.00	
	25	$1.00	25¢	$1.00	1/3X25¢, 2/$1.50, 4/$2.00 [2]	1/.75, 4/$2.00	
	25	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 4/$1.50, 6/$2.00 [2]	6/$2.00 4/$1.50	
	25¢	25¢	25¢	-	1/4x25¢, 6/$5.00 [2]	1/1, 6/5	
	25¢	25¢	25¢	-	1/4x25¢ [2]	1/$1.00	
Canada	25¢	-	$1.00*	-	1/50¢, 2/75¢, 3/$1 [2]	CAN. 50-75-1	
	25	-	$1.00	-	1/50¢, 2/$1 [2]	CAN. 2/$1.00	
	25	-	$1.00	-	1/50¢, 3/$1.00 [2]	CAN. 3/$1.00	
	25	-	$1.00	-	1/2x25¢, 2/4x25¢, 3/$1.00 [2]	3/$1.00 Coin	
	25	-	$1.00	-	1/2x25¢, 2/$1.00, 3/$1.50, 6/$2.00 [2]	CAN. 6/$2.00	
	25	-	$1.00	-	1/2x25¢, 2/$1.00, 3/$1.50, 5/$2.00 [1,2]	CAN. 5/$2.00	
	25	-	$1.00	-	1/2x25¢, 2/$1.00, 4/$1.50, 6/$2.00 [2]	6/$2 4/1.50	
	25	-	$1.00	-	1/3X25¢, 2/$1.50, 4/$2.00 [2]	1/.75, 4/2.00	
	25¢	-	$1.00*	-	1/75¢, 2/$1.50, 3/$2.00 [2]	1/.75, 3/2.00	
	25	-	$1.00	-	1/3X25¢ [2]	CAN. 1/$0.75	
Austria	5sch	10sch	10sch	-	1/2x5sch, 3/2x10sch [2]	AUSTRIA	
	5sch	-	10sch	-	2/5sch, 5/10sch	CUSTOM	02 00 05 00 01 00 01 00
Australia	20¢	$1	$1	$2	1/$1, 3/$2 [2]	AUSTRALIA 1	
	20¢	$1	$1	$2	1/$1, 2/$2	AUSTRALIA 2	
U.K.	£1.00	50P	20P	10P	1/3x10P, 2/50P, 4/£1 [2]	U. KINGDOM	
Switzerland	1Fr	2Fr	5Fr	-	1/1Fr, 3/2Fr, 7/5Fr [2]	SWISS 1	
	1Fr	2Fr	5Fr	-	1/2Fr, 2/3Fr, 3/4Fr, 5/5F	SWISS 2	
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr, 1/20Fr, 3/50Fr [2]	BELGIUM	
Germany	1DM	2DM	5DM	-	1/2DM, 2/3DM, 3/4DM, 4/5DM [1,2]	GER. 4/5DM	
					1/2DM, 2/3DM, 3/4DM, 5/5DM [1,2]	GER. 1/2DM	
					1/1DM, 2/2DM, 5/5DM [2]	GER. 1/1DM	
					1/1DM, 2/2DM, 6/5DM [2]	GER. 6/5DM	
Holland	1G	-	1G	-	1/1G [2]	HOLLAND	
Sweden	1Kr	5Kr	10Kr	1Kr	1/10Kr, 2/15Kr, 3/20Kr [1,2]	SWEDEN 1	
	1Kr	5Kr	10Kr	1Kr	1/5Kr [2]	SWEDEN 2	
France	1Fr	5Fr	10Fr	20Fr	1/3x1Fr, 2/5Fr, 5/10Fr, 10/20Fr [2,3]	TARIF 1	
	1Fr	5Fr	10Fr	20Fr	1/2x1Fr, 3/5Fr, 7/10Fr, 14/20Fr [2,3]	TARIF 2	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 7/2x10Fr, 7/20Fr [1,2,3]	TARIF 3	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 4/10Fr, 9/2x10Fr, 9/20Fr [2,3]	TARIF 4	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 5/10Fr, 11/2x10Fr, 11/20Fr [2,3]	TARIF 5	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 6/20Fr [2,3]	TARIF 6	
Italy	500L	500L	500L	-	1/500L [2]	ITALY 1	
	500L	500L	500L	-	1/2x500L, 3/4x500L [1,2]	ITALY 2	
	500L	500L	500L	-	1/2x500L, 2/4x500L [2]	ITALY 3	
Spain	100P	-	500P	-	1/100P, 6/500P [2]	SPAIN	
	25P	-	100P	-	1/25P, 5/100P	CUSTOM	01 00 04 00 01 04 01 00
	25P	-	100P	-	1/25P, 4/100P	CUSTOM	01 00 04 00 01 00 01 00
	25P	-	100P	-	1/2x25P, 2/100P	CUSTOM	01 00 04 00 02 00 01 00
	25P	-	100P	-	1/2x25P, 3/100P	CUSTOM	03 00 12 00 04 00 01 06
Japan	100¥	-	100¥	-	1/100¥ [2]	JAPAN	
Chile	Token	-	Token	-	1/1Token [2]	CHILE	
Denmark	1Kr	5Kr	10Kr	20Kr	1/2x1kr, 3/5kr, 7/10kr [2]	DENMARK 1	
	1Kr	5Kr	10Kr	20Kr	1/5kr, 3/10kr, 6/20kr [1,2]	DENMARK 2	
Finland	1Mka	-	5Mka	-	1/2x1Mka, 3/5Mka [2]	FINLAND 1	
	1Mka	-	5Mka	-	1/3x1Mka, 2/5Mka [2]	FINLAND 2	
New Zealand	$1.00	-	$2.00	-	1/$1, 3/$2	NEW ZEALAND 1	
	$2.00	-	$1.00	-	1/$1, 3/$2, ($2-$1 door)	NEW ZEALAND 2	
Norway	5Kr	-	10Kr	-	1/5Kr, 2/10Kr, 5/20Kr [2]	NORWAY	
Argentina	10¢	10¢	10¢	-	1/1 Token [2]	ARGENTINA	
Greece	10D	20D	50D	-	1/2x10D, 1/20D, 3/50D	GREECE	
Antilles	25¢	25¢	1G	-	1/25¢, 4/1G	ANTILLES	
Netherlands	1Hfl	2.5Hfl	2.5Hfl	-	1/1Hfl, 3/2.5Hfl	NETHERLANDS	
Hungary	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.5 Printer Adjustments (optional board required)

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

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

A.5 03 Pause Every Page
Choose whether the printer pauses at the end of a page.

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

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

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

A.5 06 Serial D.T.R. (Data Terminal Ready)
When a Serial Printer is used, this line may be connected to a printer output line signaling that the printer is busy.

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

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

This adjustment has the following settings:

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

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

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

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

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

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

ERROR MESSAGES

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

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

Trunk Motor Error
This message is displayed when the CPU is unable to detect movement of the TRUNK. This can be caused by a non-functional TRUNK MOTOR, or either of the 4 position optos. being broken.

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

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

Check Fuses F115 and F116 and Opto 12V Supply.
This message will be displayed if the game senses that all optical switches are not functioning. This usually occurs when there is no 12V supply to the playfield optics.

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

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

Pinball Missing.
This game normally uses 5 balls (4 in the trough, 1 captive); however, it will operate with as few as one ball. This message announces that a ball is missing or stuck. When the ball is located, return it to the game via the Outhole. Other possibilities for this problem could be malfunctions of the Ball Trough optos or the Ball Shooter switch.

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

Ground Short Row-N, Wht-xxx.

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

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

U6 Checksum Error.

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

Time and Date Not Set.

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

Factory Settings Restored.

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

CPU L.E.D.'s

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

CPU Board L.E.D. Error Codes

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

Sound Board Beep Error Codes
Upon Game Turn-On:

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

OPTO THEORY

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

LED Board (A-16908)
Transmitter
1.0-1.1 Volts

Photo Transistor Board (A-16909)
Receiver
0.1-0.7V Unblocked
11-13V Blocked

Green

WHT

BLK

Blue

A   K

Infrared Ray

C   E

SOLDER

SOLDER

Gray-XXX

Black

Gray-Yellow

Orange-XXX
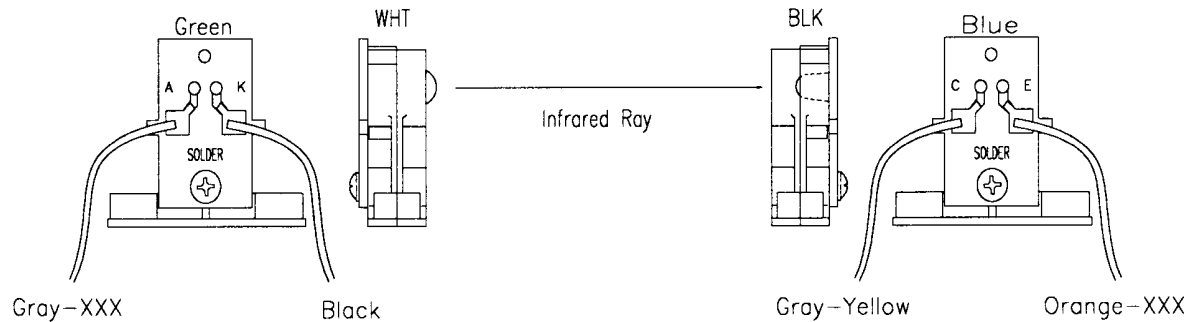
LED List
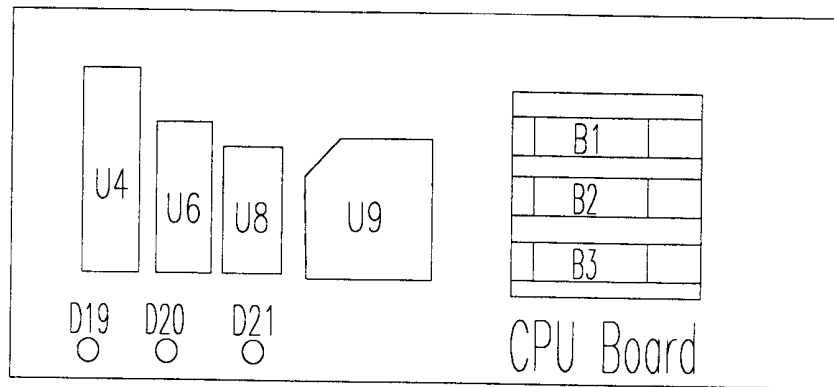
CPU Board
D19, Blanking
D20, Diagnostic
D21, +5vdc
At Game Turn-On = D19 & D21 On, D20 Off
During Normal Operation = D19 Off, D20 flashing, D21 On
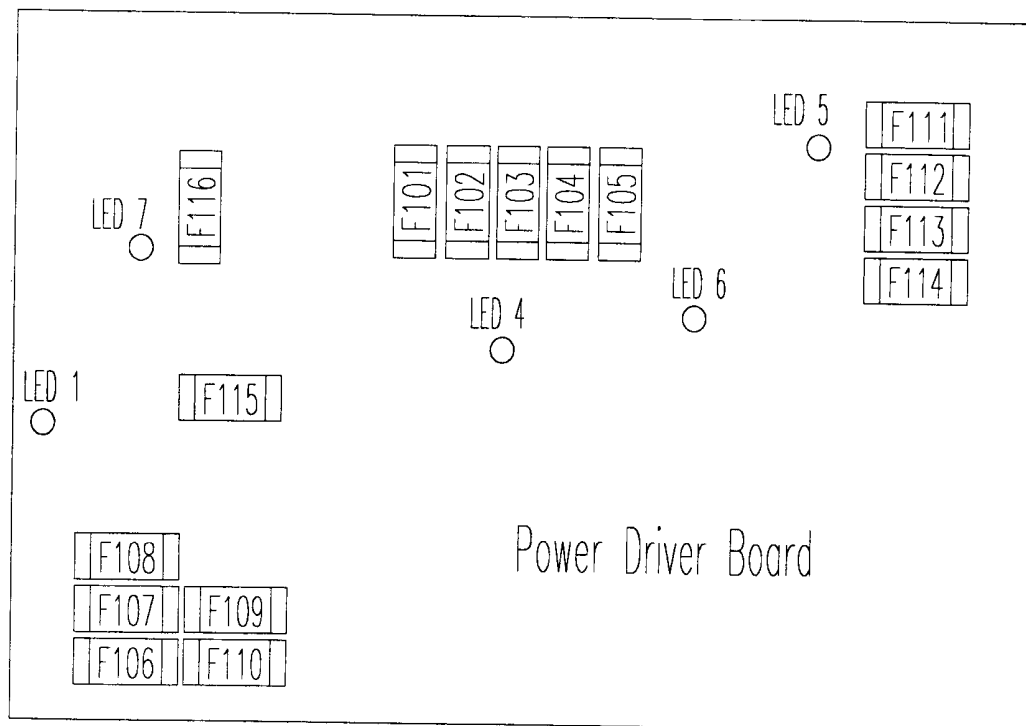
Power Driver Board
LED 1, +12vdc, Switch Circuit, Normally On
LED 2, Not Used
LED 3, Not Used
LED 4, +5vdc, Digital Circuit, Normally On
LED 5, +20vdc, Flashlamp Circuit, Normally On
LED 6, +18vdc, Lamps Circuit, Normally On
LED 7, +12vdc, Power Circuit (Motors, Relays, Etc.), Normally On

Fuse List

```
┌─────────────────┐   ┌─────────────────┐   ┌─────────────────┐
│ Fliptronic II   │   │ Audio Board     │   │ Dot Matrix      │
│ Controller ┌──┐┌──┐│                 │   │ Controller Board│
│ Board     │F902││F901│                │   │                 │
│           └──┘└──┘│  ┌─────┐          │   │        ┌─────┐  │
│           ┌──┐┌──┐│  │F501 │          │   │        │F602 │  │
│           │F904││F903│  └─────┘          │   │        └─────┘  │
│           └──┘└──┘│  ┌─────┐          │   │        ┌─────┐  │
│                 │  │F502 │          │   │        │F601 │  │
└─────────────────┘  └─────┘          │   │        └─────┘  │
                     └─────────────────┘   └─────────────────┘
```
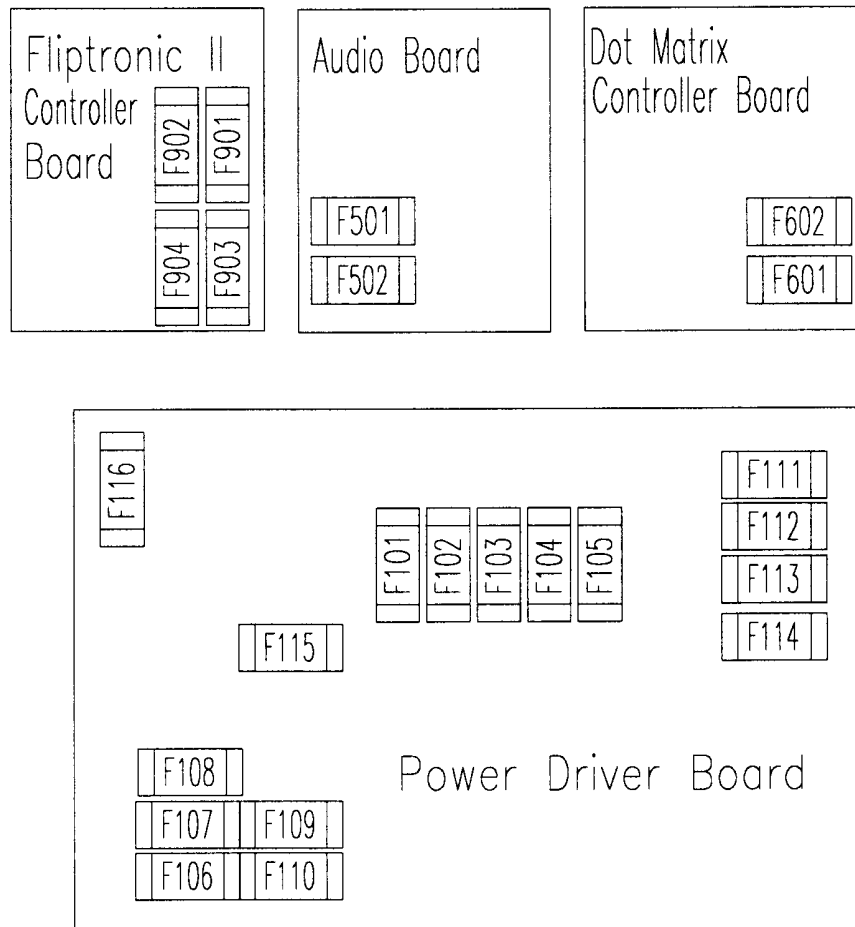
```
┌───────────────────────────────────────────────────────┐
│ ┌───┐                                      ┌─────┐     │
│ │F116│                                      │F111 │     │
│ └───┘                                      └─────┘     │
│                                            ┌─────┐     │
│          ┌──┐┌──┐┌──┐┌──┐┌──┐              │F112 │     │
│          │F101││F102││F103││F104││F105│      └─────┘     │
│          └──┘└──┘└──┘└──┘└──┘              ┌─────┐     │
│   ┌─────┐                                  │F113 │     │
│   │F115 │                                  └─────┘     │
│   └─────┘                                  ┌─────┐     │
│                                            │F114 │     │
│                                            └─────┘     │
│   ┌─────┐      Power  Driver  Board                    │
│   │F108 │                                              │
│   └─────┘                                              │
│  ┌─────┐┌─────┐                                        │
│  │F107 ││F109 │                                        │
│  └─────┘└─────┘                                        │
│  ┌─────┐┌─────┐                                        │
│  │F106 ││F110 │                                        │
│  └─────┘└─────┘                                        │
└───────────────────────────────────────────────────────┘
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Audio Board

F501	-25V Circuit	3A, 250V, S.B.
F502	+25V Circuit	3A, 250V, S.B.

Dot Matrix Controller Board

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

Fliptronic II Controller Board

F901	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.

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.

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

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

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

SWITCH CONTACTS

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

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

CLEANING

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

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

*May not be used on all games.

EDDY SENSOR CALIBRATION

Theatre of Magic uses Eddy Current Sensors to detect the pinball without the use of a mechanical switch. One eddy device can be found in the front of the trunk. The other two are located in the outlane areas. Proper adjustment will ensure top game play and dynamic pinball action.
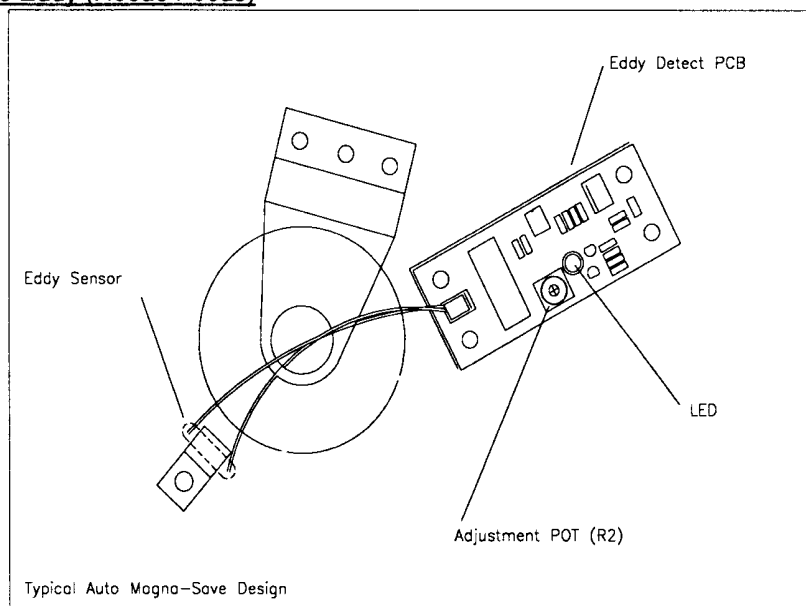
Calibration Procedure:

1) Adjust Pot (R2) counter-clockwise until LED illuminates.
2) Then adjust R2 clockwise until LED just turns off.
3) Place a pinball over the sensor on the playfield side. The LED should turn ON as you move the pinball across the sensor.
4) Secure R2 with a drop of "Glip-Tol".

Magic Trunk Eddy

Adjustment POT (R2)

LED

Eddy Sensor

Eddy Detect PCB

Magic Trunk Eddy Design
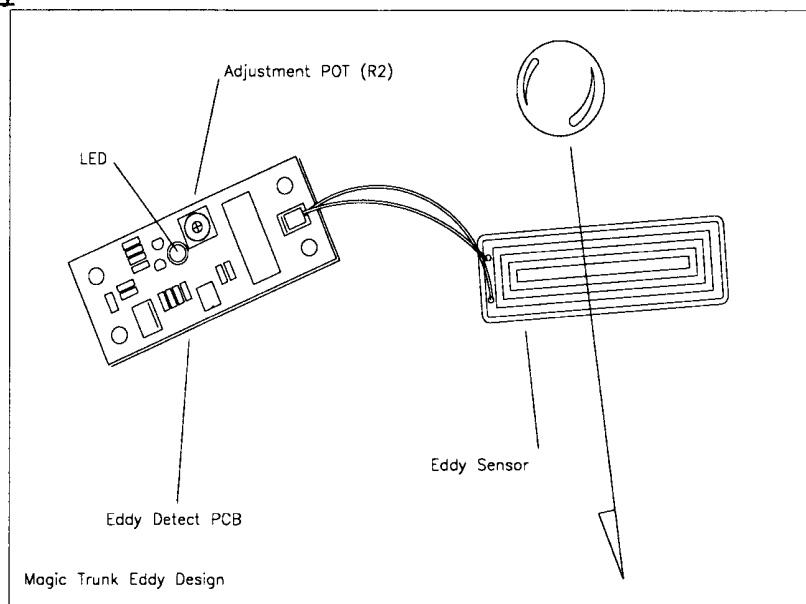
Auto Magna-Save Eddy (Hocus Pocus)

Eddy Detect PCB

Eddy Sensor

LED

Adjustment POT (R2)

Typical Auto Magna-Save Design

Theatre of Magic

Unit Disassembly for Repair

Major Component Service Instructions

BASEMENT / TRAPDOOR ASSEMBLY

The Basement and Trapdoor mechanism is located under the playfield. Balls are carried from the Magic Trunk into the locking trough area thru a plastic chute. Players can also shoot into the trapdoor from above, when the door is up.

The assembly uses 3 coils to function. A release coil (1) shuttles balls into the popper. The trap door is then raised by the lift coil (2) and the ball is kicked out into play by the popper (3).
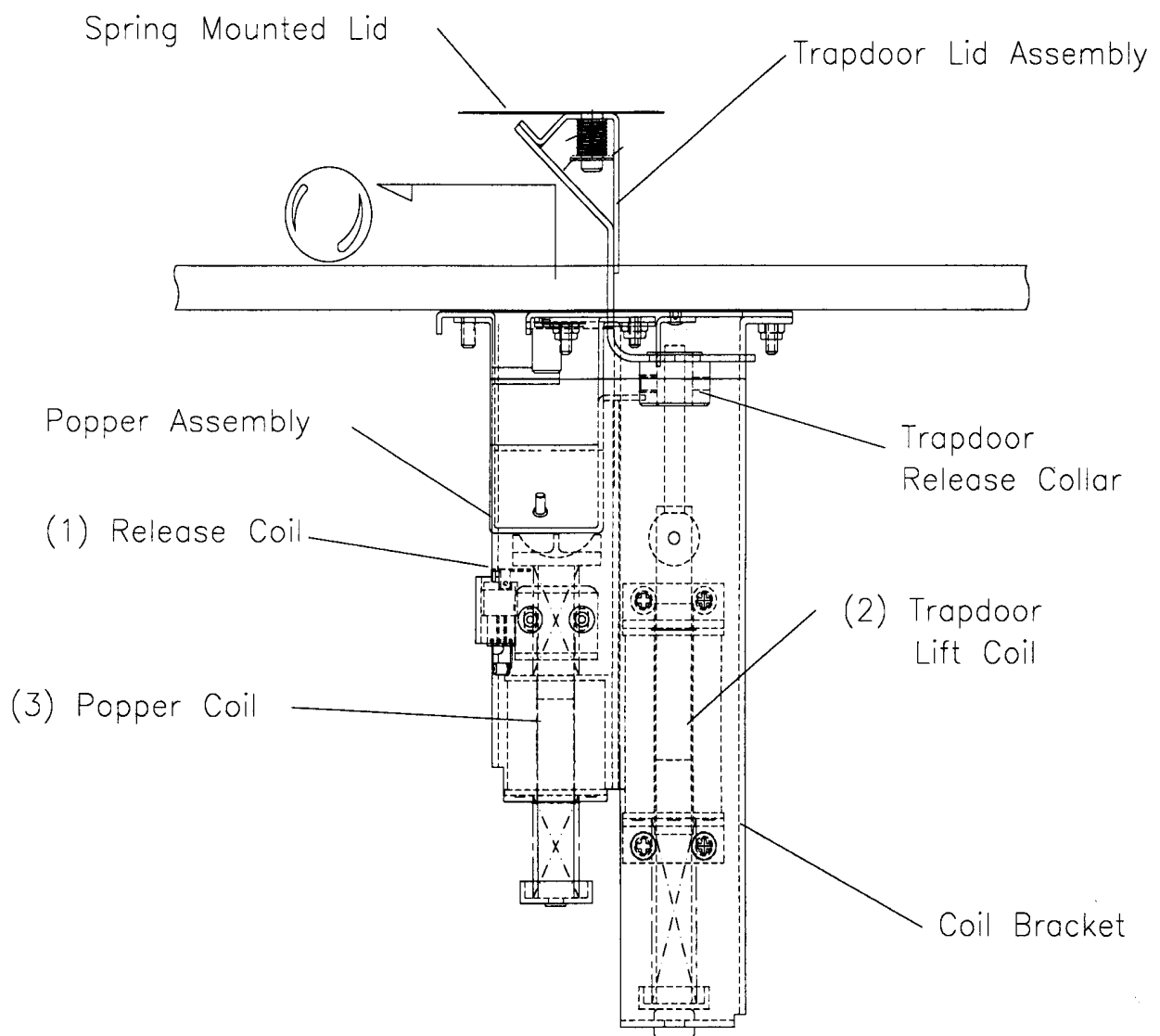
Spring Mounted Lid

Trapdoor Lid Assembly

Popper Assembly

Trapdoor Release Collar

(1) Release Coil

(2) Trapdoor Lift Coil

(3) Popper Coil

Coil Bracket

FIG. 1   Side View

Remove the Trapdoor Lid

1) To remove the Trapdoor lid, raise the trapdoor shaft and thru the access hole loosen and take out the screw fastener on the Release Collar.

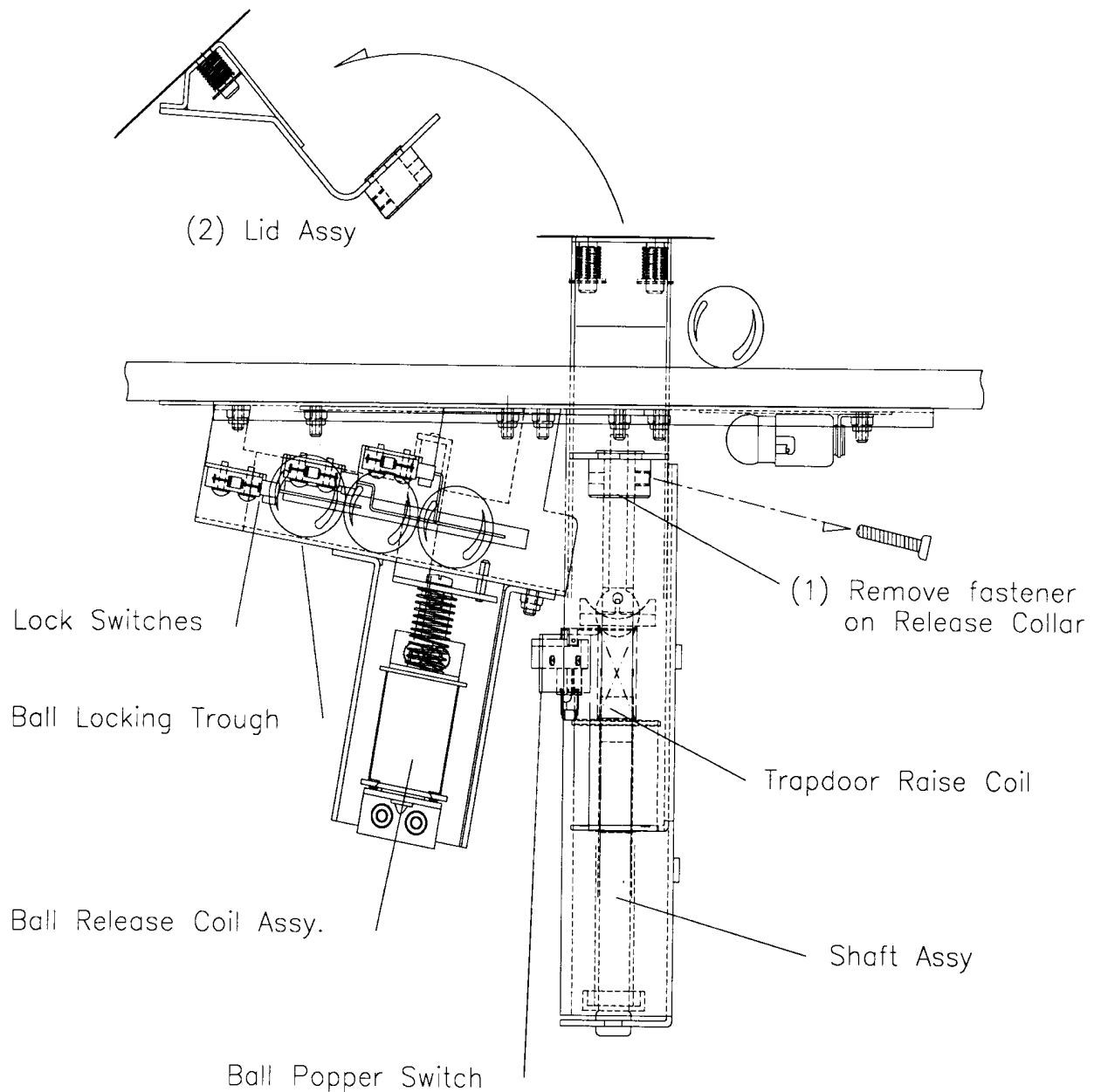2) Gently lift the lid assembly up and out of the playfield.

(2) Lid Assy

(1) Remove fastener on Release Collar

Lock Switches

Ball Locking Trough

Trapdoor Raise Coil

Ball Release Coil Assy.

Shaft Assy

Ball Popper Switch

FIG. 2   Front View

Complete Disassembly

Once the Lid Assembly (1) has been removed, the complete Basement Mechanism can be quickly released from the playfield.

The main bracket has several elastic stop nuts (2) holding it onto the bottom of the playfield.

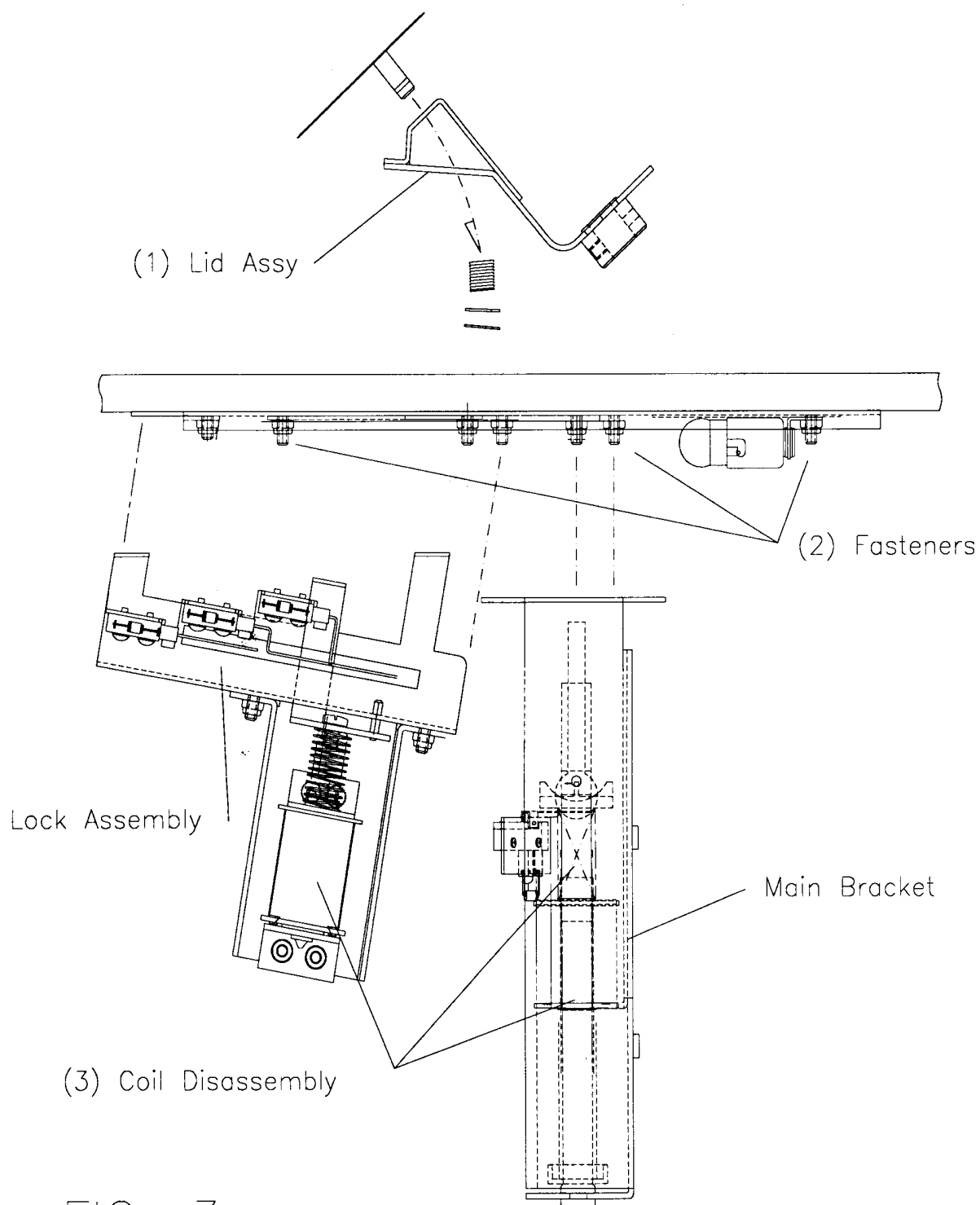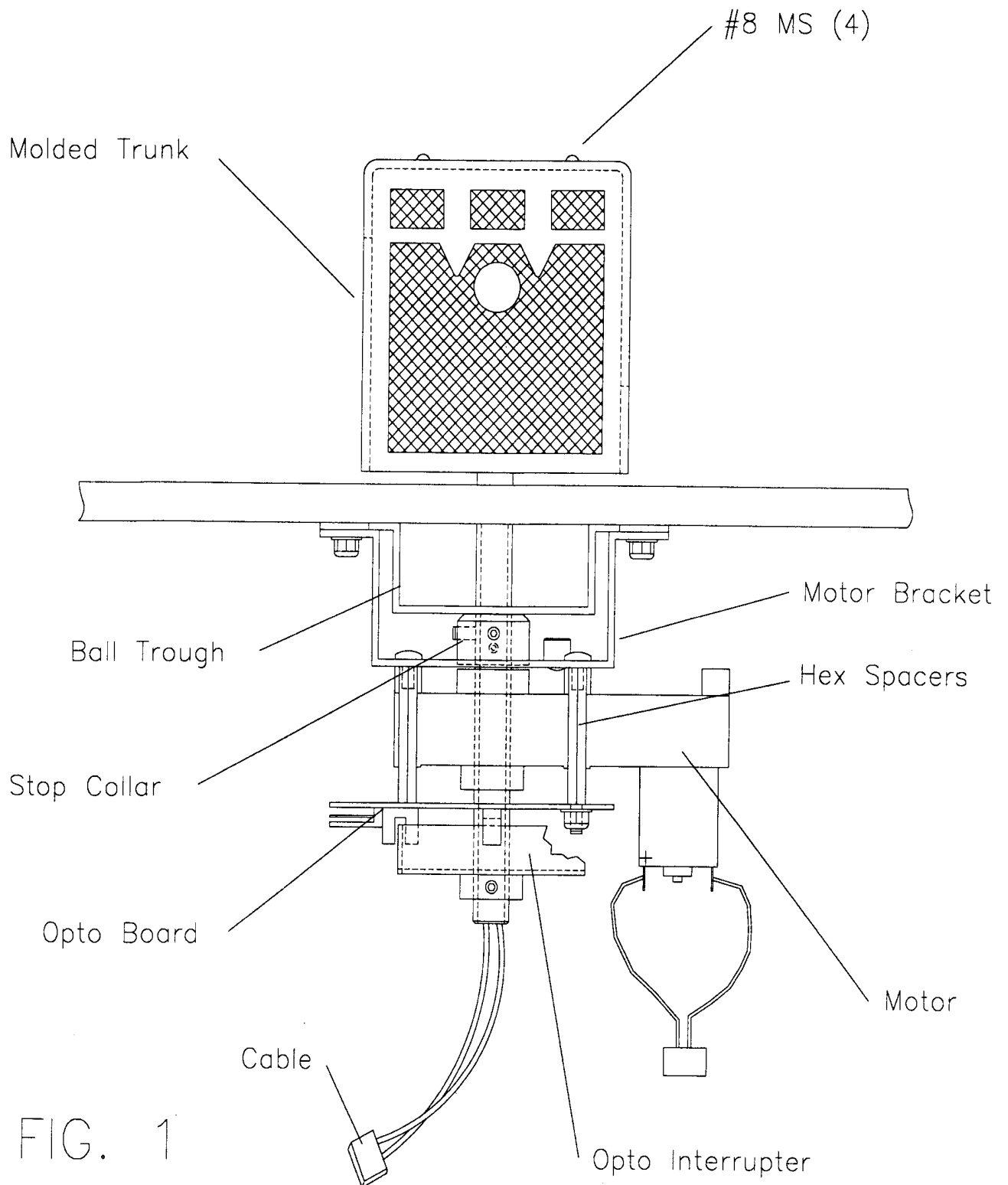*NOTE: All coils (3) can be changed without removing the entire assembly.*

(1) Lid Assy

(2) Fasteners

Lock Assembly

Main Bracket

(3) Coil Disassembly

FIG. 3

MAGIC TRUNK

The Magic Trunk Assembly can be easily disassembled to replace parts if required. The upper box must be removed first and lifted off. Parts are listed below.

#8 MS (4)

Molded Trunk

Motor Bracket

Ball Trough

Hex Spacers

Stop Collar

Opto Board

Motor

Cable

Opto Interrupter

FIG. 1

1) Remove the four #8 machine screws and lift molded trunk off base. Pull apart tape adhesive.

2) Trunk magnet and lamp are mounted to the base. Remove connector (2A) from cable end. Unplug connectors in base (2B) and pull cable up thru motor shaft.

(2B)

Use pin-pusher tool
to remove connecter

Detail (2A)

FIG. 2
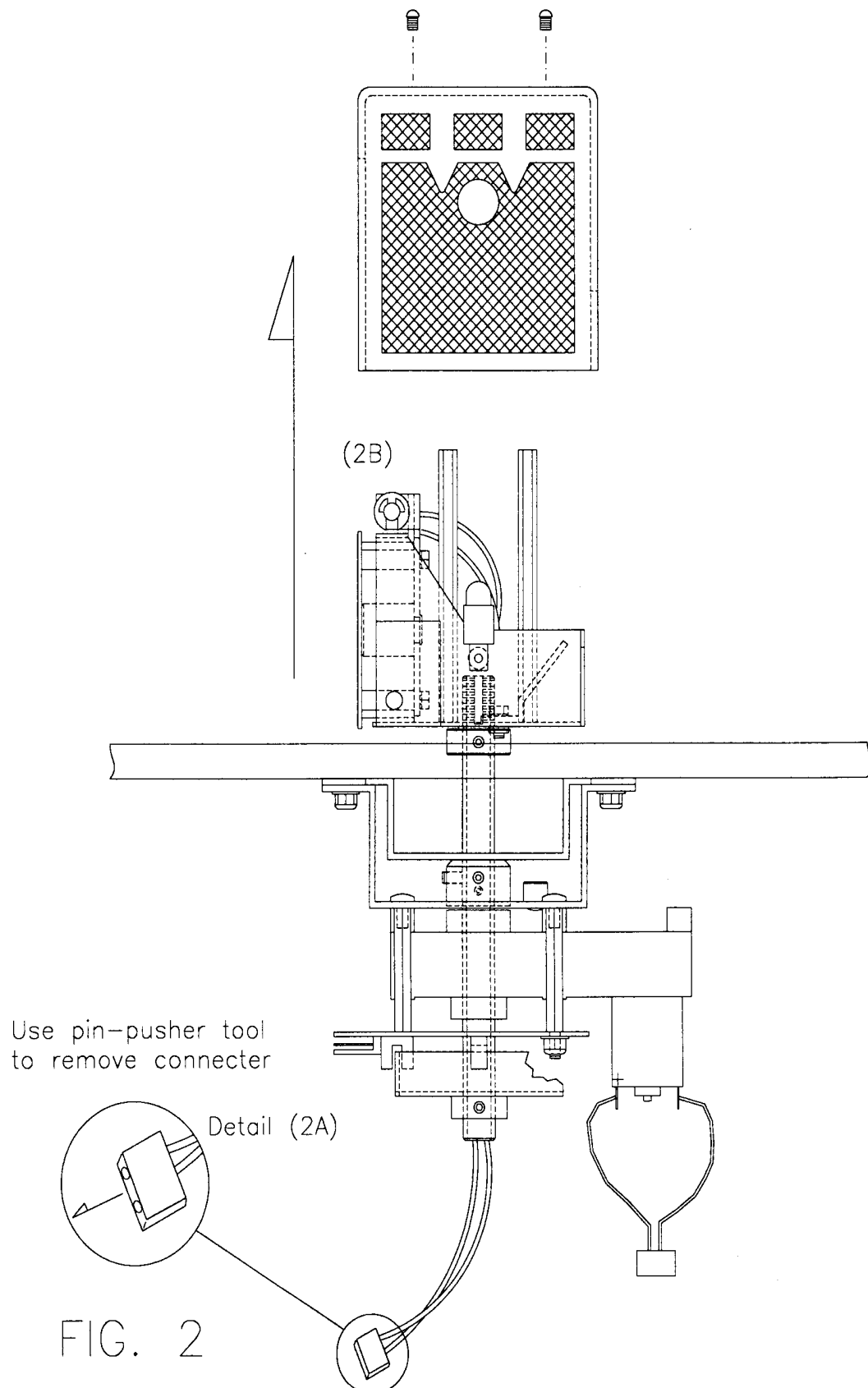
3) Use a socket to remove flat nuts holding base on motor shaft.

4) Lift off trunk base from shaft.

5) Loosen set screw and pull off opto interrupter. Remove lock nuts (4) holding opto board.

6) Remove hex posts (4).

7) Remove motor base from playfield. The motor can be unfastened and replaced.

8) **Remember** to reattach the shaft collars to the new motors.

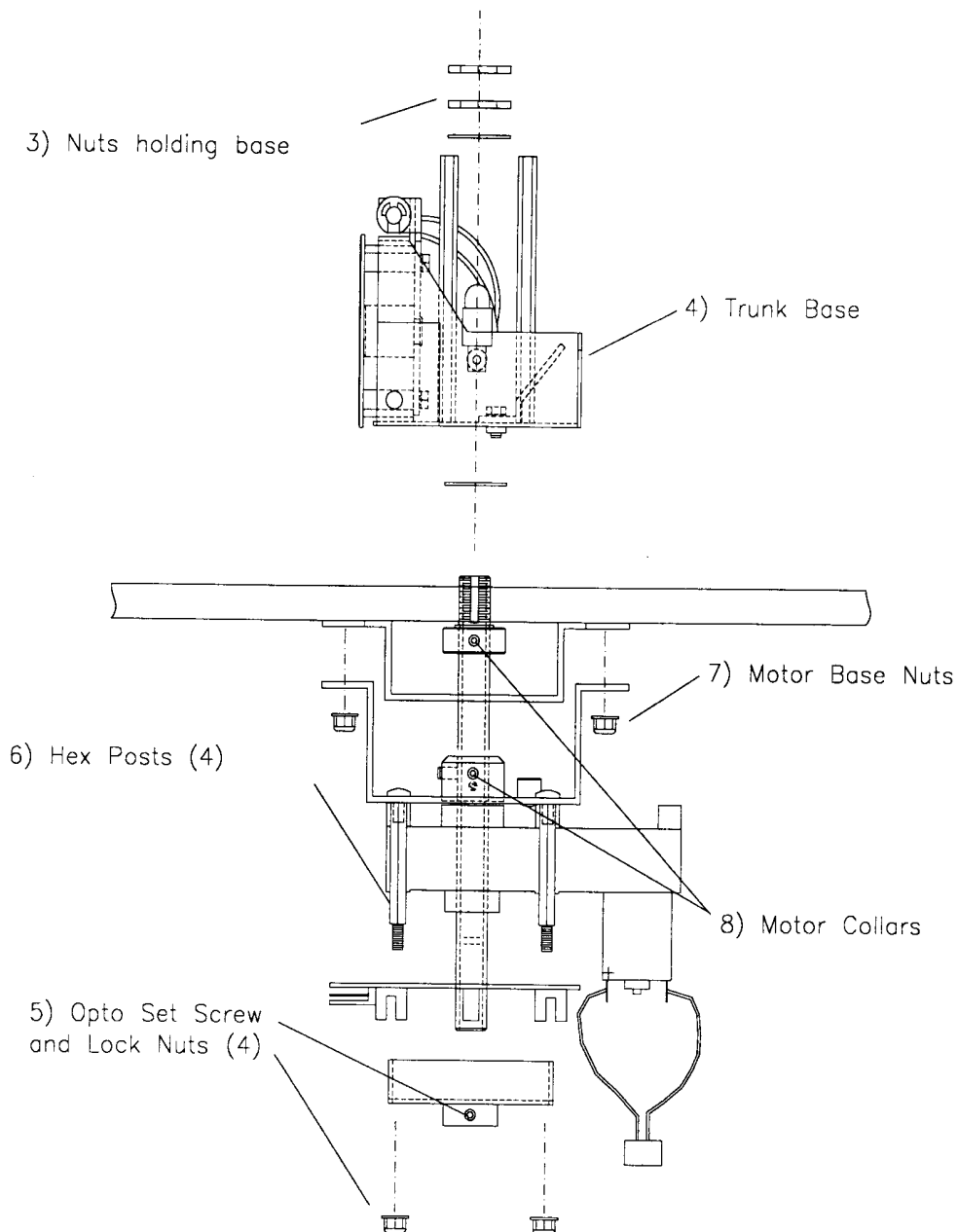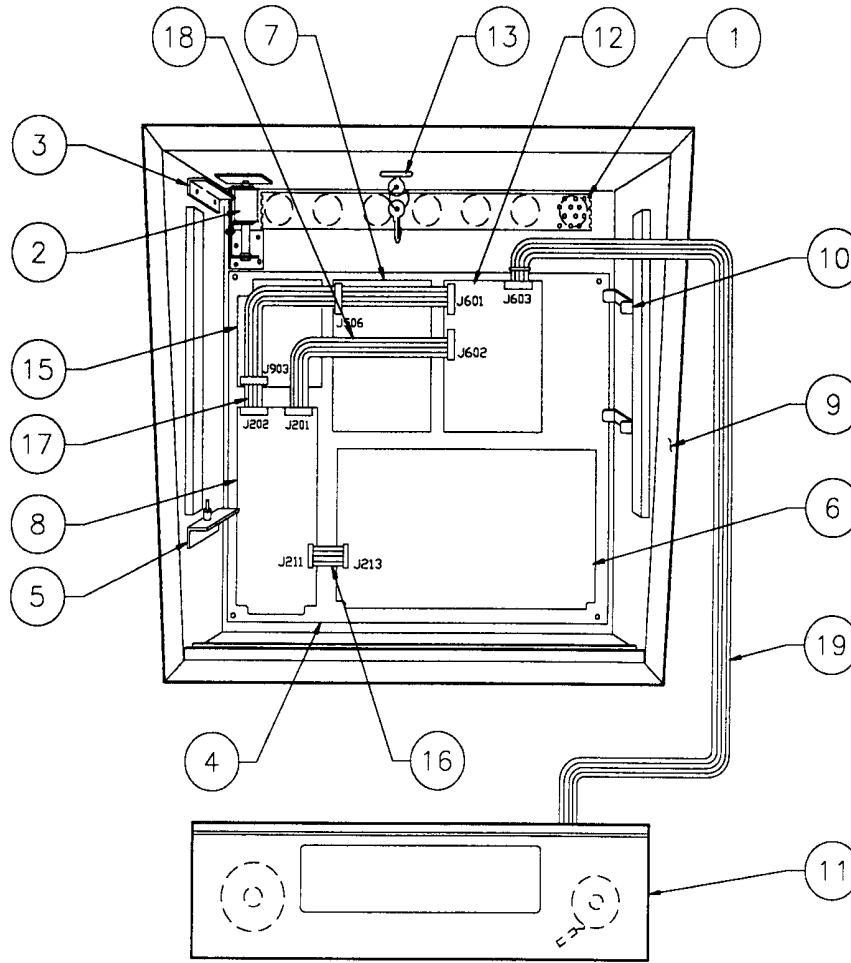9) Perform the steps in reverse to reassemble the trunk mechanism.

3) Nuts holding base

4) Trunk Base

7) Motor Base Nuts

6) Hex Posts (4)

8) Motor Collars

5) Opto Set Screw and Lock Nuts (4)

FIG. 3

SECTION TWO

GAME PARTS
INFORMATION

50039-BB
Backbox Assembly

Miscellaneous Parts

Item	Part Number	Description
1	01-6645	Venting Screen
2	B-10686-1	Knocker Assembly
3	A-12497	Insert Bd. Hinge Assy., Upper
4	A-14092-5	WPC Mounting Plate Assy.
5	A-12498	Insert Bd. Hinge Assy., Lower
6	A-12697-3	Power Driver Assembly
7	A-16917-50039	Sound Board Assembly
8	A-17651-50039	WPC Security CPU Board
9	04-10012-50039	Backbox, Wood
10	01-9047	Insert Stop Bracket
11	A-19748	Speaker/Display Assembly
12	A-14039.1	Dot Matrix Controller Board
13	A-13379	Lock & Plate Assembly
14	50039-IN	Insert Board
15	A-15472-1	Fliptronic II Board

Part Number	Description
A-8552-50039	Tempered Backglass Assy.
03-8228-2	Glass Channel Top (1)
03-8228-3	Glass Channel Edge (2)
03-8229-1	Glass Lift Channel (1)
08-7456	Backbox Glass: 27 x 18-7/8"
20-9718	Wing Screw, 3/8-16 x 2"
31-1357-50039	Screened Translight

Backbox Cables

Part Number	Description
H-14584	Dot Matrix Display Power Cable
H-15476	Logic Power Cable
H-15736-1	Secondary Cable
H-19997	Insert Cable

Ribbon Cables

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

50039-CAB
Cabinet Assembly
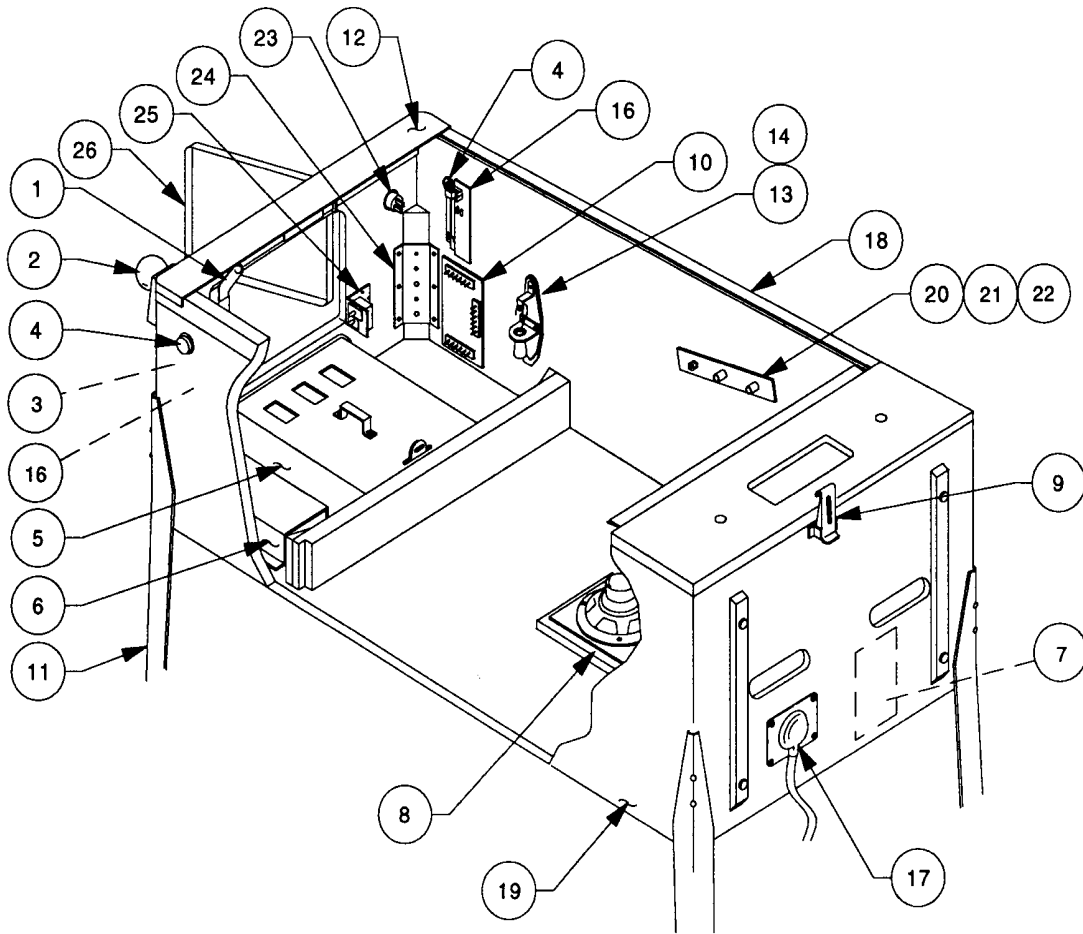
Miscellaneous Parts

Item	Part Number	Description
1	A-16773-1	Lever Guide Assembly
2	A-20084	Ball Shooter w/Knob , Silver
3	20-9663-18	Push Button w/Sw., Extra Ball
4	A-16883-4	Flipper Button, Red (2)
5	A-18531-1	4-Ball Cashbox Assembly
6	A-17540	Univ. Power Interface Assy.
7	5610-14515-00	WPC Transformer
8	5555-12929-00	Speaker, 4Ω, 6", 25w
9	20-9347	Toggle Latch
10	A-17051-1	Coin Door Interface Board
11	A-19514	Leg Assembly, Chrome
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	11-1225	Wood Cabinet
20	01-11408	Plate Spacer (2)
21	02-4329-1	Pivot Nut, 7/8" (4)
22	02-4352	Pivot Bushing (2)
23	20-9663-1	Push Button w/Sw., Start
24	01-11400	Leg Plate (4)
25	A-18249-1	Cable & Interlock Switch Assy.
26	09-61000-1	Coin Door-USA

Part Number	Description
A-17195	Tilt Switch Assy. w/Cable
A-19562.1	Stay Arm Assembly
01-12352	Clip Bracket
01-9011-L	Backbox Mtg. Bracket, Left
01-9011-R	Backbox Mtg. Bracket, Right
01-6389-1	Cashbox Lock Bracket
08-7028-T	Playfield Glass
08-7377	Leg Leveler Adjuster, 3"
20-6500	Steel Ball, 1-1/16" (5)

Cabinet Cables

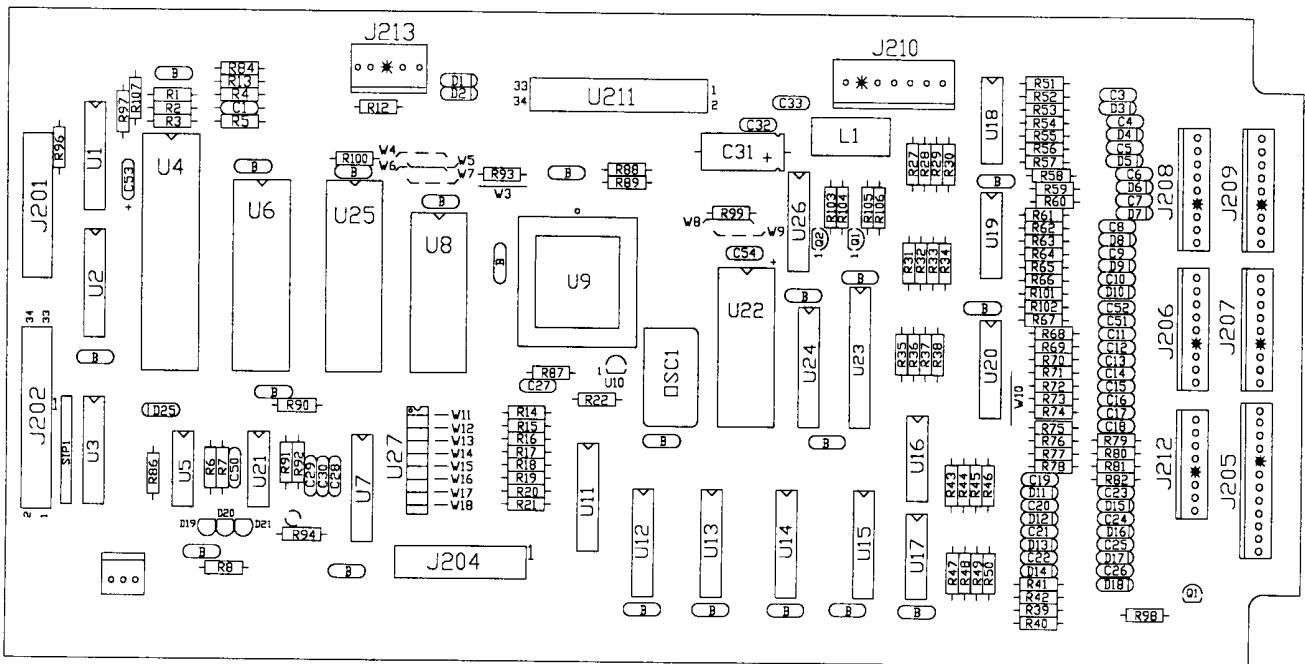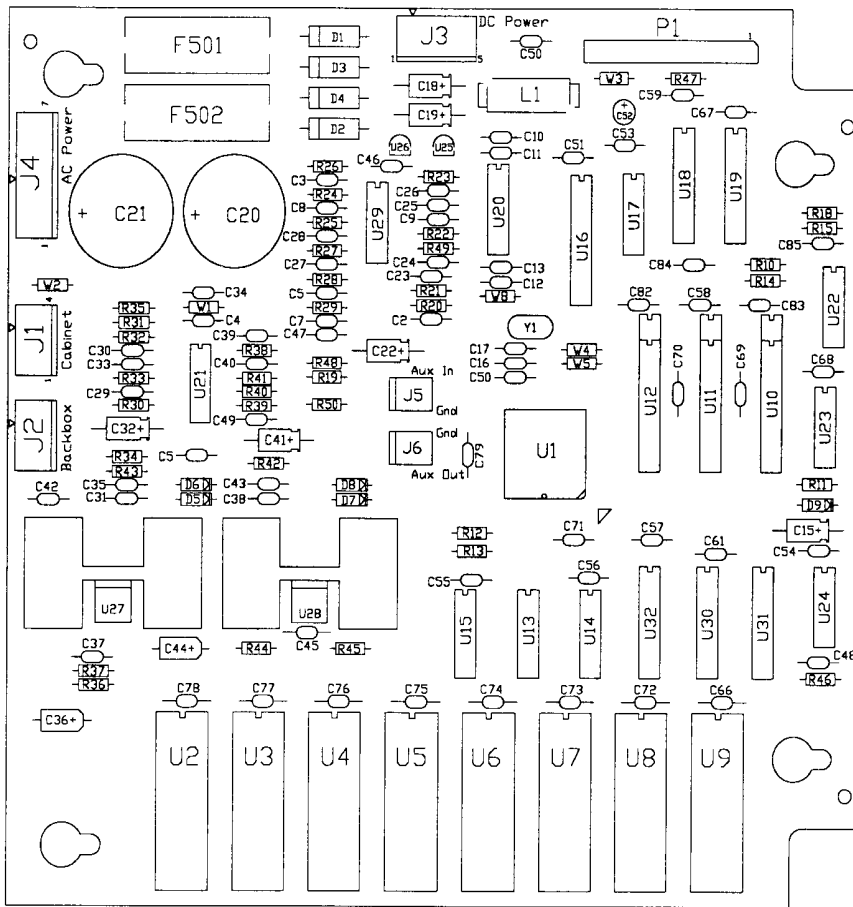| Part Number	Description
H-17217	Plumb/Bob Mech. Protect Cable
H-19524	Cabinet Cable
H-19601-1	Power Extension Cable
H-20005	Cabinet Switch Lamp Cable
A-20201	Cable & Jumper Assy., Coin Door

* See Application Chart p.2-35.

A-17651-50039
WPC CPU Security Board Assembly

Part Number	Designator	Description	Part Number	Designator	Description
5010-09034-00	R14-R22, R27-R42, R86, R94, R90, R98	Res., 10KΩ, ¼w, 5%	5281-10182-00	U11-U13, U15	IC, 74LS240 / DRVR
			5284-12651-00	U21	IC, 4548
5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Res., 1.2KΩ, ¼w, 5%	5315-13924-00	U23	IC, 74HC4514 LTCH 1to16 Dec.
			5281-09246-00	U26	IC, 74LS139 2 T 4 Decoder
			5340-12558-00	U8	S/RAM 8Kx8 Low Power
5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84, R101, R102, R105, R106	Res., 1KΩ, ¼w, 5%	5370-12272-00	U16-U19	IC, LM339 Quad Comp
			5370-12687-00	U10	MC 34064
			5521-10931-00	OSC1	8.00MHZ OSC 14PIN DIP
			5520-12084-00	X1	Crystal 32.768 KHz
			5551-09822-00	L1	Inductor, 4.7µH, 3.0A.
5010-09416-00	R5-R8, R12, R13, R87-R89, R99, R100	Res., 470Ω, ¼w, 5%	5671-14516-00	D19-D21	Display LED Red
			5700-08985-00	U4	Socket IC 40P .6"
5010-09085-00	R1, R2, R4, R93, R96, R97, R107	Res., 1.5KΩ, ¼w, 5%	5700-12088-00	U6	Socket IC 32P .6"
			5700-12424-00	U9	Socket 84 Pin PLCC
5010-09534-00	W4, W7, W9	Res., 0Ω	5700-10176-00	U22	Socket IC 28 P .6"
5010-10989-00	R92	Res., 470KΩ, ¼w, 5%	5791-10850-00	J201, J204	Connector, 26-pin Header Str
5010-12104-00	R91	Res., 22MΩ, ¼w, 5%	5791-14090-05	J213	Connector, 5-pin Header Str
5010-08991-00	R103, R104	Res., 4.7KΩ, ¼w, 5%	5791-10862-07	J210	Connector, 7-pin Header Str
5019-09362-00	SIP1	SIP 4.7K, 9R, 10P, 5%	5791-13830-08	J212	Connector, 8-pin Header Str
5040-08986-00	C31	Cap., 100M, 10v (±20%)	5791-13830-09	J208, J209	Connector, 9-pin Header Str
5043-08980-00	B	Cap., .01M, 50v (+80, -20%)	5791-13830-11	J206, J207	Connector, 11-pin Header Str
5043-09030-00	C27	Cap., .047M, 50v, (±20%)	5791-12516-00	J202, J211	34 Hen 2x17 Str
5043-09065-00	C3,-C26, C51, C52	Cap., 470P, 50v, (±20%)	5048-11033-00	C50	Cap., .022 µF
5043-09491-00	C29, C30	Cap., 22P, 1KV (±10%)	5791-13830-12	J205	Cap., 12-pin Header Str
5043-09492-00	C28	Cap., 100P, 50v (±10%)	5043-09845-00	C32, C33	Cap., 1KP, 50v (±10%)
5041-09163-00	C53, C54	Cap., 2.2µF, 15v (20%) Ax.	5645-09025-00	U27	Switch DIP 8 POS
5070-08919-00	D2-D18	Diode, 1N4148 150MA	5162-12422-00	U20	IC, ULN 2803A
5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.	A-5400-50039-1	U22	WPC PIC 16C57 Micro-C
5160-10269-00	Q1-Q3	Trans., 2N3904 NPN	A-5343-50039-1	U6	Game ROM Assembly
5700-10389-00	U20	IC Socket 18-pin	A-17643	-	Battery Holder PCB Assy.
5281-09308-00	U3	IC, 74LS245 TRNCV	5400-10320-00	U4	MC68B09E 2Mhz µP
5281-09486-00	U14, U24	IC, 74LS374 8 D F/F	5410-12426-00	U9	WPC ASIC-89
5281-09851-00	U5	IC, 74LS14 SMT TRG	20-9665-1	-	PCB Standoffs
5281-09867-00	U1, U2, U7	IC, 74LS244 OCT BUF	H-18258	-	WPC CPU Security Cable

A-16917-50039
Sound Board Assembly

Part Number	Designator	Description	Part Number	Designator	Description
4004-01005-06	U27, U28	MS, 4-40 x 3/8"	5070-09054-00	D5-D9	Diode Signal 1N4004
4404-01119-00	U27, U28	Nut 4-40	5250-13302-00	U25	78L05 Pos 5V reg TO-92
5010-08772-00	R39, R41	Resistor, 15KΩ, ¼w, 5%	5250-13303-00	U26	79L05 Neg 5V Reg TO-92
5010-08774-00	R30, R34, R37, R42, R45	Resistor, 22KΩ, ¼w, 5%	5283-10551-00	U17	IC74F00 Fast Quad NAND
5010-08991-00	R10, R12-R16	Resistor, 4.7Ω, ¼ w, 5%	5311-10946-00	U22	IC74HC74 Dual D Flip Flop
5010-09034-00	R47	Resistor, 10KΩ, ¼w, 5%	5311-10947-00	U23	IC74HC125 Quad Tri-State Buffer
5010-09035-00	R11, R19, R33, R40	Resistor, 47KΩ, ¼w, 5%	5311-10948-00	U15	IC74HC138 1 of 8 Decoder
5010-09036-00	R46	Resistor, 100Ω, ¼w, 5%	5315-12009-00	U18, U19	IC74HCT374 Octal D Flip Flop
5010-09219-00	R31, R32, R38	Resistor, 8.2KΩ, ¼w, 5%	5311-12043-00	U13, U14	IC74HC174 Hex D Flip Flop
5010-09358-00	R50	Resistor, 1KΩ, ¼ w, 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, ¼w, 5%	5340-13304-00	U10-U12	ICSRAM 2Kx8 35ns .300 DIP
5010-13607-00	R20-R29, R48, R49	Resistor, 6.2KΩ, 1/8w, 1%	5370-12730-00	U21, U29	ICTL084 Quad Op AMP
5010-13517-00	R35, R43	Resistor, 15Ω, ¼w, 5%	5370-13419-00	U27, U28	Audio Power Amp TDA2030AV
5040-09365-00	C15, C18, C19, C32, C41	Cap., 1µF, 63v, Alum Ax.	5371-13299-00	U20	IC DAC AD-1851 16Bit
5040-09421-00	C52	Cap., 100µF,25v,Alum Ax.	5520-13301-00	Y1	Crystal 10MHz Parallel resonant
5040-13417-00	C20, C21	Cap., 10,000µF, 35v,Alum.	5551-09822-00	L1	Inductor, 4.7µH, 3Amp.
5041-09009-00	C36, C44	Cap., 22µF,10v, Tant Alum	5700-12047-00	U16	IC, Socket 24-Pin .300 DIP
5041-13187-00	C22	Cap., 4.7µF, Tant Axial.	5700-12088-00	U2-U9	IC, Socket 32-Pin .600 DIP
5043-08996-00	C4, C5, C10-C13 C31, C35, C38, C43, C46, C4, C50-C79	Cap., .10µF, 50v, Cer Ax.	5705-12638-00	U27, U28	Heatsink 5298-B
			5733-12060-01	F501, F502	MT3AG PCMounted Fuse Holder
			5791-10862-04	J1, J2	Connector, 4-pin Header STR .156
			5791-10862-05	J3	Connector, 5-pin Header STR .156
5043-10267-00	C37, C45	Cap., 150pF,50v, Cer Ax.	5791-10862-07	J4	Connector, 7-pin Header STR .156
5048-11028-00	C16, C17	Cap., 22pF, 50v, Cer Ax.	5791-12516-00	P1	Connector, 34 Hen 2x17 STR .100
5048-11029-00	C48	Cap., 100pF,50v, Cer Ax.	A-17002	U16	PAL Sub-Assembly
5048-11030-00	C49	Cap., 470pF,50v, Cer Ax.	A-5343-50039-S2	U2	ROM Sub-Assembly
5048-11033-00	C33	Cap., .022µF,50v, CerAx.	A-5343-50039-S3	U3	ROM Sub-Assembly
5048-12036-00	C34, C4	Cap., .22µF, 50v, Cer Ax.	A-5343-50039-S4	U4	ROM Sub-Assembly
5048-13418-00	C30, C39, C40	Cap., .047µF,50v, Cer Ax.	A-5343-50039-S5	U5	ROM Sub-Assembly
5048-13608-00	C8	Cap., 6800pF, 50v, Cer Ax.	A-5343-50039-S6	U6	ROM Sub-Assembly
5048-13609-00	C7, C24, C26	Cap., 3900pF, 50v, Cer Ax.	A-5343-50039-S7	U7	ROM Sub-Assembly
5048-13610-00	C2, C3, C9, C27, C29	Cap., 1000pF, 50v, Cer Ax.	Not Used	U8	ROM Sub-Assembly
5048-13611-00	C6, C23, C25, C28	Cap., 680pF, 50v, Cer Ax.	Not Used	U9	ROM Sub-Assembly
5070-09045-00	D1-D4	MR-501 Rectifier Diode	5731-10356-00	F501, F502	Fuse, 3Amp, 250v, Slow Blow

A-15472-1
Fliptronic II Board Assembly
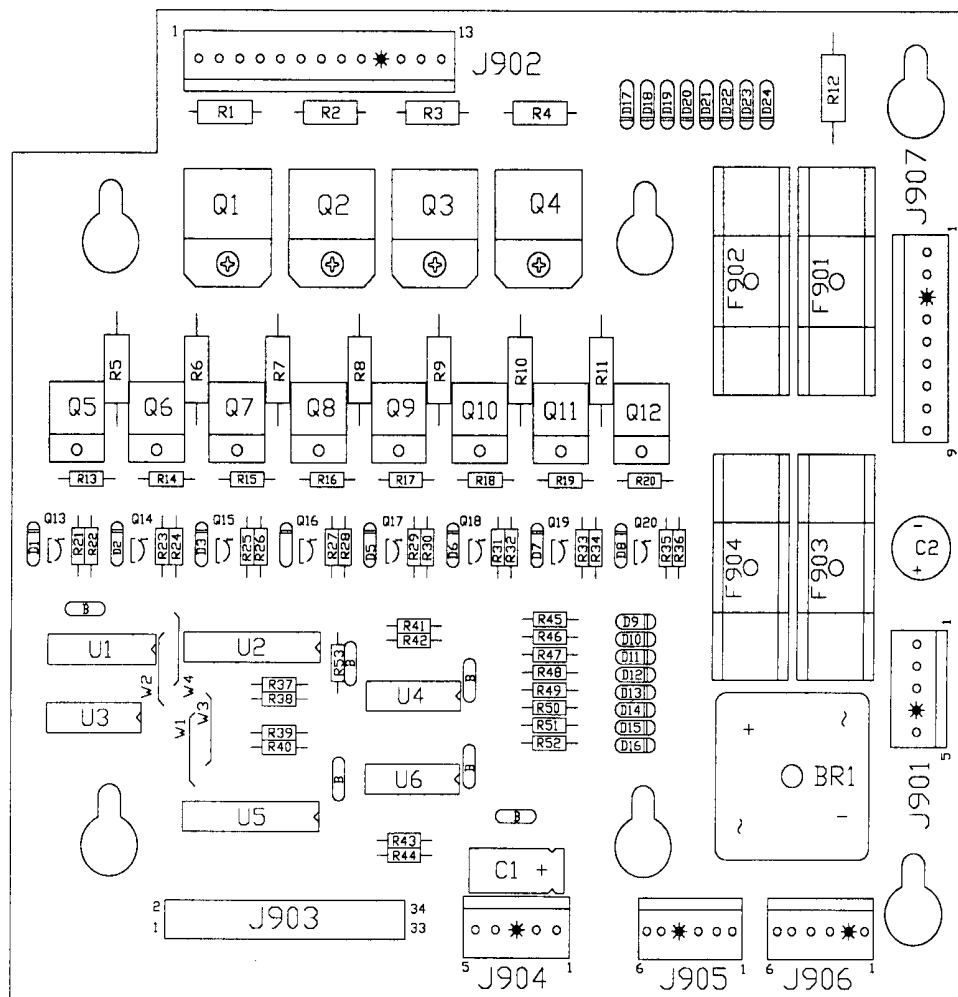
Part Number	Designator	Description	Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink	5070-09054-00	D1-D24	Diode, 1N4004
20-9684	Q5-Q12	Fastener Snap In	5100-09690-00	BR1	Bridge Rectifier
4006-10003-08	Q1-Q4	Mach. screw, 6-32	5162-12635-00	Q5-Q12	Trans., TIP102 NPN
4406-01128-00	Q1-Q4	Nut 6-32 KEPS	5190-09016-00	Q13, Q20	Trans., 2N4403 PNP
5010-09034-00	R37-R44, R53	Res., 10KΩ, ¼w, 5%	5191-12179-00	Q1-Q4	Trans., TIP36C PNP
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45-R52	Res., 1KΩ, ¼w, 5%	5315-12009-00	U2	IC, 74HCT374
			5315-12031-00	U5	IC, 74HCT244
			5315-12812-00	U1	IC, 74HCT138
5010-09361-00	R1-R4	Res., 220Ω, ½w, 5%	5315-12951-00	U3	IC, 74HCT00
5010-09416-00	R21, R23, R25, R27, R29, R31, R33, R35	Res., 470Ω, ¼w, 5%	5370-12272-00	U4, U6	IC, LM339 Quad Comp
			5731-10356-00	F901-F904	Fuse S-B, 3A., 250v
			5733-12060-01		Fuse Holder (F901-F904)
5010-09534-00	W3, W4	Res., 0Ω	5791-10862-05	J901, J904	Connector, 5-pin Header
5010-10171-00	R13, R20	Res., 56Ω, ¼w, 5%	5791-10862-09	J907	Connector, 9-pin Header
5011-12956-00	R5, R12	Res., 2.7KΩ, 1w, 5%	5791-10862-13	J902	Connector, 13-pin Header
5040-08986-00	C1	Cap., 100M, 10v	5791-13830-06	J905, J906	Connector, Str Sq. Pin Hdr.
5040-09537-00	C2	Cap., 100µF, 100v	5791-12516-00	J903	34 Hen 2 x 17 STR
5043-08980-00	B	Cap., .01µF, 50v			

A-14039.1
Dot Matrix Assembly
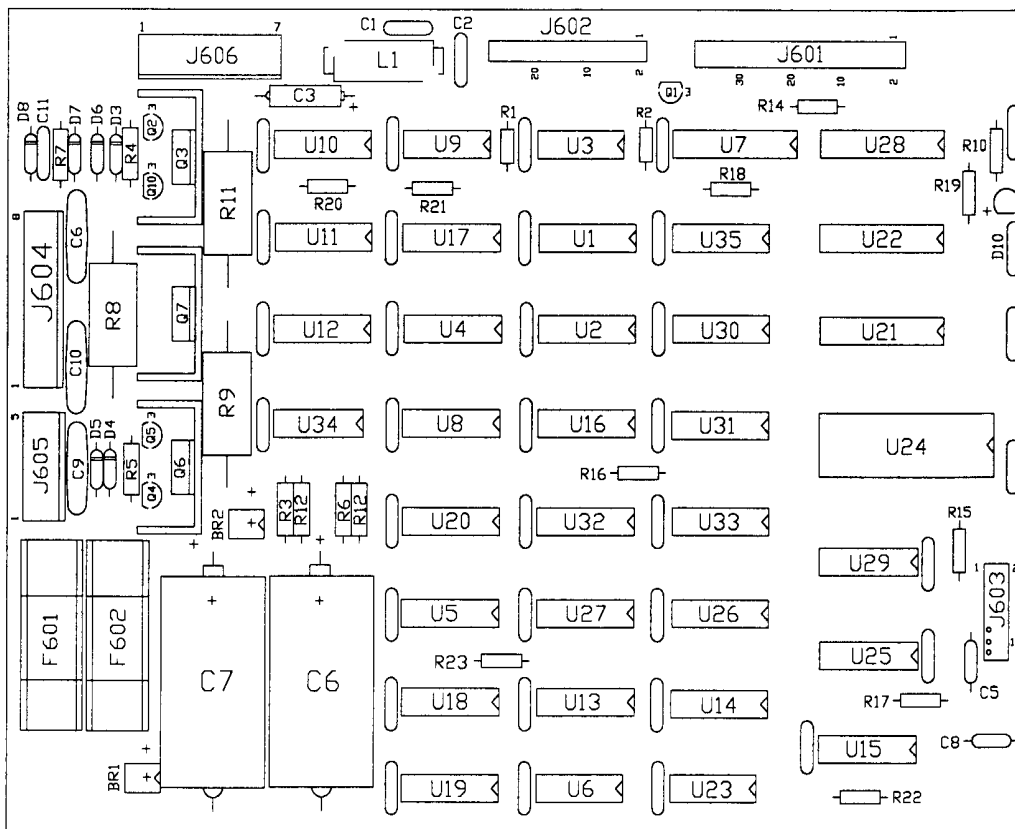
Part Number	Designator	Description	Part Number	Designator	Description
5010-08991-00	R1	Res., 4.7KΩ, ¼w, 5%	5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
5010-09036-00	R14-R23	Res., 100Ω, ¼w, 5%			
5010-09224-00	R10	Res., 270Ω, ¼w, 5%	5311-10947-00	U9	IC, 74HC125
5010-12832-00	R3, R6, R12, R13	Res., 4.7KΩ, ½w, 5%	5311-10951-00	U10, U11	IC, 74HC161
5010-12841-00	R4, R5	Res., 120Ω, ½w, 5%	5311-10977-00	U6	IC, 74HC04
5012-12830-00	R9	Res., 1.8KΩ, 5w, 5%	5311-12817-00	U29	IC, 74HC165
5012-12842-00	R11	Res., 120Ω, 5w, 5%	5311-12819-00	U21	IC, 74HC688
5012-12843-00	R8	Res., 4.7KΩ, 5w, 5%	5311-12820-00	U23	IC, 74HC27
5010-10171-00	R7	Res., 56Ω, ¼w, 5%	5311-12822-00	U13-U15	IC, 74HC193
5043-09492-00	C5, C8	Cap., 100P, 50v, (±10%)	5315-12009-00	U22	IC, 74HCT374
5040-08986-00	C3	Cap., 100M, 10v (±20%)	5315-12812-00	U1, U2, U30, U12	IC, 74HCT138
5040-12324-00	C4, C7	Cap., 150M, 160v (±50%)	5281-09308-00	U28	IC, 74HCT245
5043-08980-00	BYPASS	Cap., .01M, 50v (+80,-20%)	5315-12815-00	U8, U34	IC, 74HCT08
5043-09072-00	C6, C9, C10	Cap., .1M, 500v (+80,-20%)	5315-12816-00	U19	IC, 74HCT32
5043-09845-00	C1, C2, C11	Cap., 1KP, 50v (±20%)	5315-12821-00	U7	IC 74HCT240
5070-09054-00	D7	Diode, 1N4004, 1.0A.	5340-12278-00	U24	S/RAM 2064 150NS
5075-12824-00	D6, D8	Zener, 1N4742A, 12v	5551-09822-00	L1	Ind. 4.7µH, 3A.
5075-12823-00	D4, D5	Zener, 1N4758, 56v	5671-14516-00	D10	Display LED Red
5075-12826-00	D3	Zener, 1N4759A, 62v	5705-09199-00	Q3, Q6, Q7	Heatsink, 6030B
5100-12833-00	BR1, BR2	Bridge, 400v, 1A	5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
5150-10269-00	Q1	Trans., 2N3904 NPN	5733-12060-01		Fuse Holder (F601, F602)
5164-09056-00	Q2, Q10	Trans., MPSD02 NPN	5791-10850-00	J602	Connector, 26-pin Header
5164-12154-00	Q3, Q7	Trans., MJE15030 NPN	5791-10862-05	J605	Connector, 5-pin Header
5194-09055-00	Q4, Q5	Trans., MPSD52 PNP	5791-10862-07	J606	Connector, 7-pin Header
5194-12155-00	Q6	Trans., MJE15031 PNP	5791-10862-08	J604	Connector, 8-pin Header
5281-09738-00	U16, U25-U27	IC, 74LS157	5791-12516-00	J601	34 Hen 17x2 STR
5281-10033-00	U3	IC, 74LS30	5791-12827-00	J603	14 Hen 7x2 STR
5281-10043-00	U31-U33, U35	IC, 74LS175			

A-12697-3
WPC Power Driver Assembly

Part Number	Designator	Description
5010-08981-00	R260	Res., 10KΩ, ½w, 5%
5010-08991-00	R9, R12, R15, R18, R21, R23, R27, R31, R35, R39, R43, R47, R51, R55, R59, R63, R67, R71, R75, R79, R83, R87, R91, R95, R99, R126, R128, R130, R132, R134, R136, R138, R140, R227	Res., 4.7KΩ, ¼w, 5%
5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191	Res., 560Ω, ¼w, 5%
5010-08993-00	R25, R29, R33, R37, R41, R45, R49, R53, R57, R61, R65, R69, R73, R77, R81, R85, R89, R93, R97, R101, R103, R106, R109, R112, R115, R118, R121, R124	Res., 68KΩ, ½w, 5%
5010-08997-00	R24, R28, R32, R36, R40, R44, R48, R52, R56, R60, R64, R68, R72, R76, R80, R84, R88, R92, R96, R100, R102, R105, R108, R111, R114, R117, R120, R123	Res., 2.7KΩ, ¼w, 5%
5010-08998-00	R155, R157, R159, R161, R165, R167, R169, R171	Res., 2.2KΩ, ¼w, 5%
5010-09034-00	R142-R149, R197-R198	Res., 10KΩ, ¼w, 5%
5010-09085-00	R194, R196, R251, R253-R257	Res., 1.5KΩ, ¼w, 5%
5010-09086-00	R252	Res., 6.8KΩ, ¼w, 5%
5010-09224-00	R192, R202-R205	Res., 270Ω, ¼w, 5%
5010-09314-00	R176, R178, R180, R182, R184, R186, R188, R190	Res., 1.2K, ¼w, 5%
5010-09324-00	R206	
5010-09358-00	R154, R156, R158, R160, R162, R164, R166, R168, R170, R193, R199, R250	Res., 27KΩ, ¼w, 5% Res., 1KΩ, ¼w, 5%
5010-09361-00	R104, R107, R110, R113, R116, R119, R122, R125	Res., 220Ω, ½w, 5%
5010-09416-00	R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141	Res., 470Ω, ¼w, 5%
5010-11079-00	R7, R10, R13, R16, R19	Res., 51Ω, ¼w, 5%
5010-12427-00	R150-R153, R172-R175	Res., .22Ω, 1w, 5%
5012-12632-00	R224	
5019-10143-00	SR1	Res., .12Ω, 10w, 5% SIP 470Ω, 9R, 10-pin, 5%
5040-08986-00	C4	Cap., 100M, 10v (±20%)
5040-09421-00	C2	Cap., 100M, 25v (+50, -10%)
5040-09537-00	C8	Cap., 100M, 100v (±20%)

Part Number	Designator	Description
5040-12313-00	C5-C7, C11, C30	Cap., 15KM, 25v (±20%)
5043-08980-00	B-BYPASS	Cap., .01M, 50v (+80, -20%)
5043-08996-00	C13-C20, C31	Cap., .1M, 50v (±20%)
5043-09845-00	C1, C12	Cap., 1KP, 50v (±20%) Axial
5048-10994-00	C3	Cap., .33M, 50v (±20%) Axial
5070-08919-00	D33, D34	Diode 1N4148, 150MA.
5070-09054-00	D1-D3, D5-D12, D17-D32, D38	Diode 1N4004, 1.0A.
5100-09690-00	BR1-BR5	Bridge, 35A., Rect, 200v
5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac BT138E
5162-12422-00	U19	IC ULN 2803 OC-DRL
5162-12635-00	Q20, Q22, Q24, Q26, Q28, Q30, Q32, Q34, Q36, Q38, Q40, Q42, Q44, Q46, Q48, Q50, Q52, Q54, Q56, Q58, Q63, Q65, Q67, Q69, Q75, Q77, Q79, Q81, Q83-Q90	Transistor, TIP 102
5194-09055-00	Q9, Q11, Q13, Q15, Q17, Q19, Q21, Q23, Q25, Q27, Q29, Q31, Q33, Q35, Q37, Q39, Q41, Q43, Q45, Q47, Q49, Q51, Q53, Q55, Q57, Q59-Q62, Q71-Q74	Transistor, 2N5401 PNP
5191-12179-00	Q64, Q66, Q68, Q70, Q76, Q78, Q80, Q82	Transistor, TIP36C PNP
5192-12428-00	Q91-Q98	Transistor, TIP 107
5250-12634-00	Q1	Reg LM 323 5v
5281-09486-00	U1-U5, U18	IC, 74LS374 8D F/F
5281-09487-00	U10-U13	IC, 74LS74 Dual D F/F
5281-10182-00	U9	IC, 74LS240 L/Drvr.
5370-12272-00	U6, U15, U16	IC, LM339 Quad Comp.
5460-12423-00	Q2	IC, LM7812
5671-14516-00	LED1, LED4-LED7	Display LED Red
5701-09652-00	Q1	Thermal Pad
5705-09199-00	Q2	Heatsink 6030B
5705-12637-00	Q1	Heatsink 5054
5705-12638-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
5733-12060-01	F101-F116	Fuse Holder PC MT3AG
5791-10862-03	J108, J119, J136	Connector, 3-pin Header .156
5791-10862-04	J103, J116-J118	Connector, 4-pin Header .156
5791-10862-05	J104-J106, J112, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header .156
5791-10862-06	J107	Connector, 6-pin Header .156
5791-10862-07	J101, J109, J114	Connector, 7-pin Header .156
5791-10862-09	J102, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header .156
5791-10862-11	J120, J121	Connector, 11-pin Header .156
5791-10862-12	J115	Connector, 12-pin Header .156
5791-10862-13	J126	Connector, 13-pin Header .156
5791-13830-05	J111	Connector, 5-pin Header
5791-13830-09	J133-J135	Connector, 9-pin Header
5791-12516-00	J113	34 Hen 2x17 STR
5824-09248-00	TP1-TP8	Test Point #1502-1
5041-09163-00	C9	Cap., 2.2MF Tant
5730-09071-00	F114	Fuse, 8A, 32v
5731-09432-00	F112	Fuse, S-B, 7A., 250v
5731-09651-00	F106-F111, F113	Fuse, S-B, 5A., 250v
5731-10356-00	F101-F105, F116	Fuse, S-B, 3A., 250v
5730-09797-00	F115	Fuse, S-B, 3/4A., 250v
5705-12698-00		Heatsink #62365

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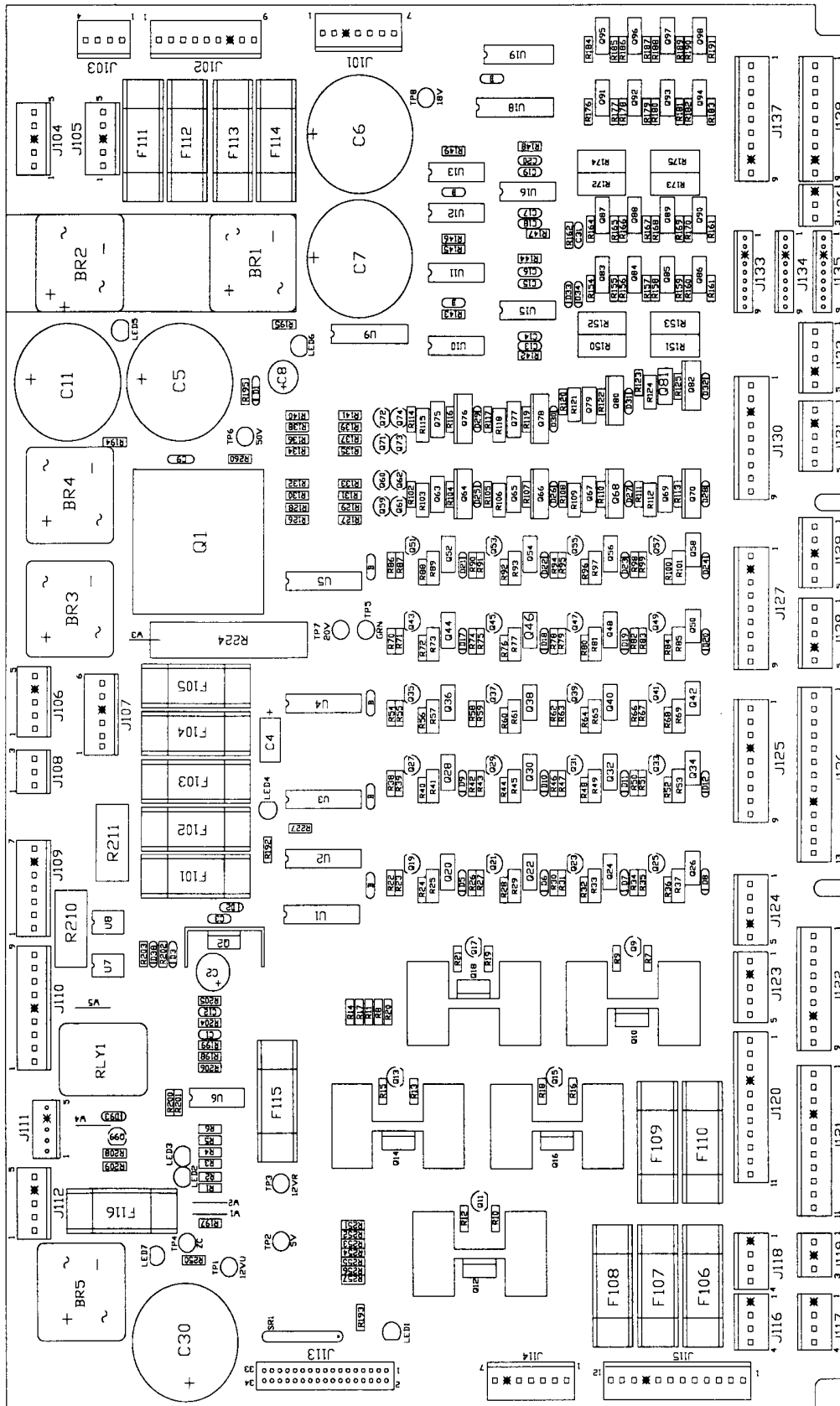
A-17051-1
Coin Door Interface PCB Assembly
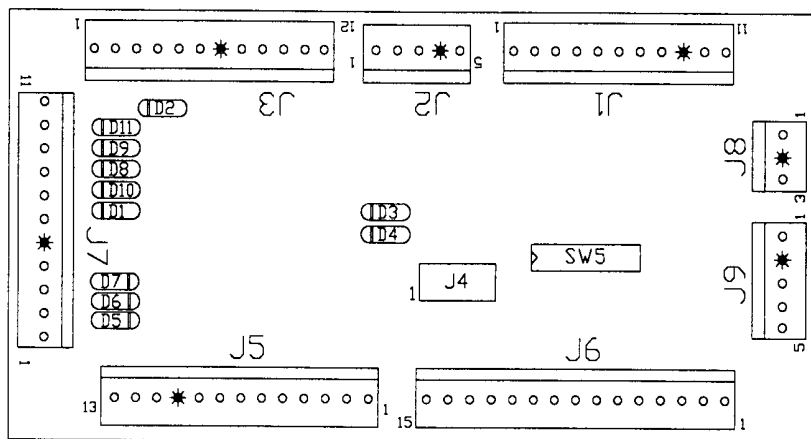
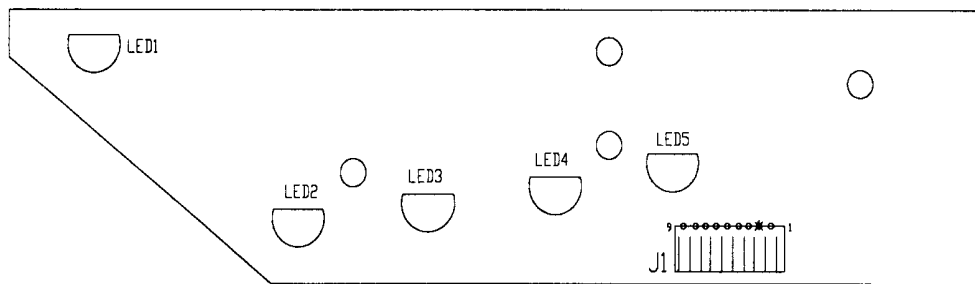| Part Number	Designator	Description
5791-10862-03	J8	Connector, 3-pin Header Str. Sq.
5791-10862-05	J2, J9	Connector, 5-pin Header Str. Sq.
5791-10862-11	J1, J7	Connector, 11-pin Header Str. Sq.
5791-10862-12	J3	Connector, 12-pin Header Str. Sq.
5791-10862-13	J5	Connector, 13-pin Header Str. Sq.
5791-10862-15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

A-17316
Flipper Opto PCB Assembly
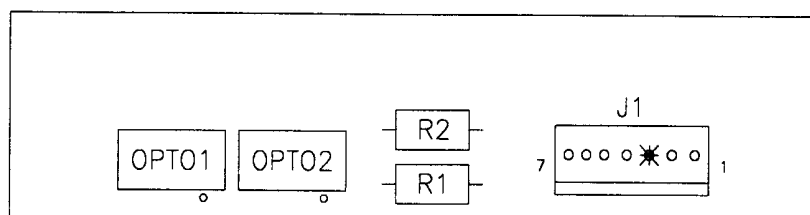
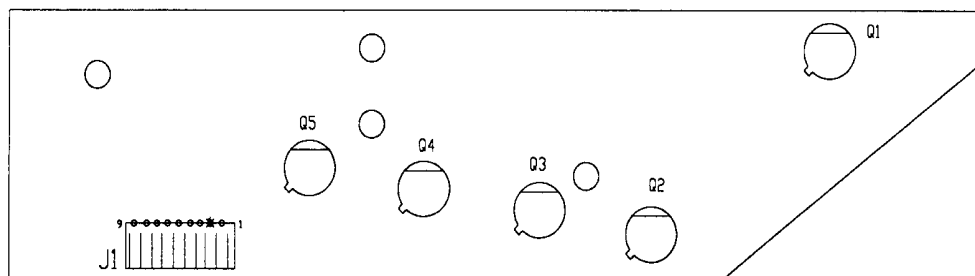| Part Number	Designator	Description
A-16384	-	Flipper Opto Switch PCB
5010-08930-00	R1, R2	Resistor, 470Ω, 1/2w, 5%
5490-12451-00	OPTO1, OPTO2	Opto Interrupter Lg. 10mA.
5791-13830-07	J1	Connector, 7-pin Header Solid Sq.
03-9001	-	Interrupter Flip-Opto

A-18617-1
Trough IRED LED PCB Assembly

Part Number	Designator	Description
5671-12731-00	LED1 - LED5	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-18618-1
Trough IRED Transistor PCB Assembly

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

A-19749
Magic Trunk Opto PCB Assembly
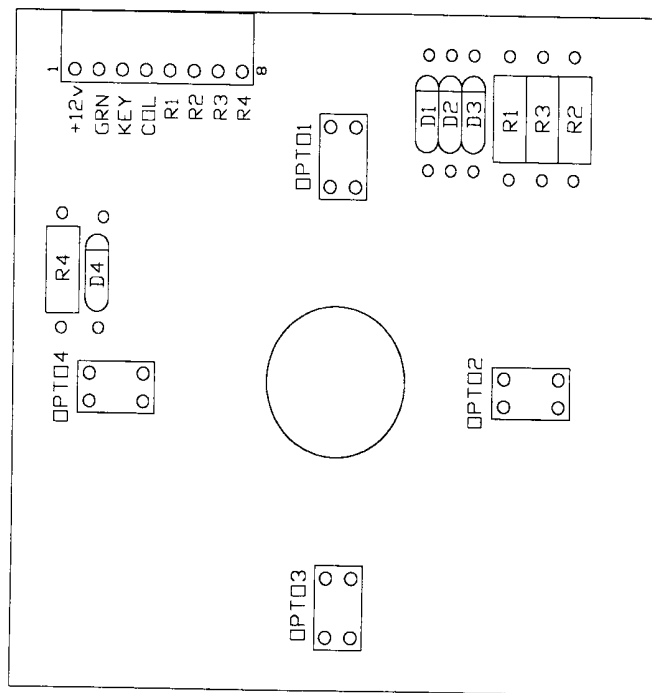
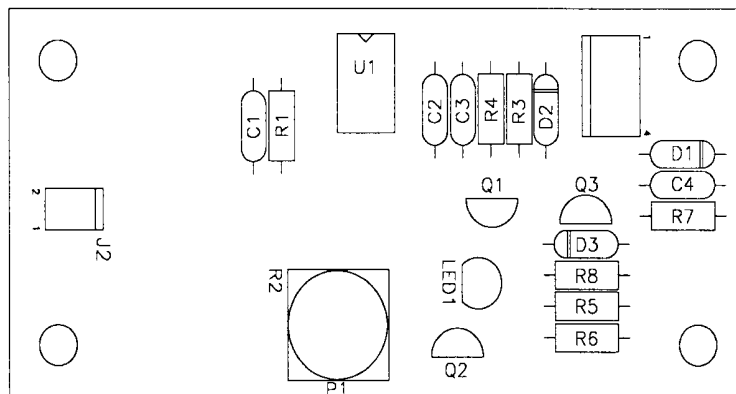| Part Number	Designator	Description
5791-12622-08	J1	Connector, 8-pin Header R/A Lck.
5010-08930-00	R1 - R4	Resistor, 470Ω, 1/2w, 5%
5070-09054-00	D1 - D4	Diode, 1N4004, 1.0A
5490-12451-00	OPTO1 - OPTO4	Opto Integrated 10mA

A-18543-1
Generic Eddy Sensor PCB Assembly

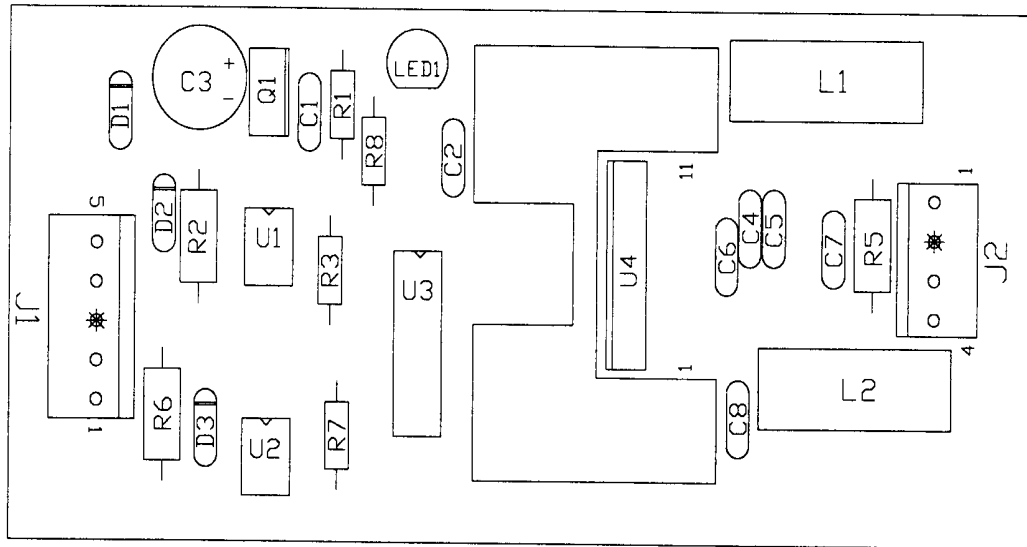| Part Number	Designator	Description
5370-13452-00	U1	IC Proximity Sensor
5190-10270-00	Q2	Transistor 2N3906 PNP
5160-10269-00	Q1, Q3	Transistor 2N3904 NPN
5010-08992-00	R4	Resistor, 560Ω, 1/4w, 5%
5010-09807-00	R3	Resistor, 120Ω, 1/4w, 5%
5010-09034-00	R7	Resistor, 10KΩ, 5%, 1/4w
5010-09999-00	R5, R6, R8	Resistor, 2KΩ, 1/4w, 5%
5671-13732-00	LED1	Display LED Red
5070-08919-00	D1, D2, D3	Diode 1N4148 150mA
5791-13830-04	J1	Connector, 4-pin Header .100 Solid Tab
5791-13830-02	J2	Connector, 2-pin Header .100 Solid Tab
5041-09031-00	C4	Capacitor, 1M, 25v(±20%)Axial
5010-08991-00	R1	Resistor, 4.7K, 1/4w, 5%
5048-13658-00	C1, C2	Capacitor, 3300PF, 100v (±5%) Cog.
5014-10261-00	R2	Pot 10K, 1/4w (±20%)

A-18543-2
Generic Eddy Sensor PCB Assembly

Part Number	Designator	Description
5370-13452-00	U1	IC Proximity Sensor
5190-10270-00	Q2	Transistor 2N3906 PNP
5160-10269-00	Q1, Q3	Transistor 2N3904 NPN
5010-08992-00	R4	Resistor, 560Ω, 1/4w, 5%
5010-09807-00	R3	Resistor, 120Ω, 1/4w, 5%
5010-09034-00	R7	Resistor, 10KΩ, 5%, 1/4w
5010-09999-00	R1, R5, R6, R8	Resistor, 2KΩ, 1/4w, 5%
5671-13732-00	LED1	Display LED Red
5070-08919-00	D1, D2, D3	Diode 1N4148 150mA
5791-13830-04	J1	Connector, 4-pin Header .100 Solid Tab
5791-13830-02	J2	Connector, 2-pin Header .100 Solid Tab
5041-09031-00	C4	Capacitor, 1M, 25v(±20%)Axial
5014-10261-00	R2	Pot 10K, 1/4w (±20%)
5043-10267-00	C2	Capacitor, 150PF, 100v Ceramic Axial
5043-09065-00	C1	Capacitor, 470P, 50v (±20%)

A-18543-1 and A-18543-2 Generic Eddy Sensor PCB

A-16120
D.C. Motor Control PCB Assembly

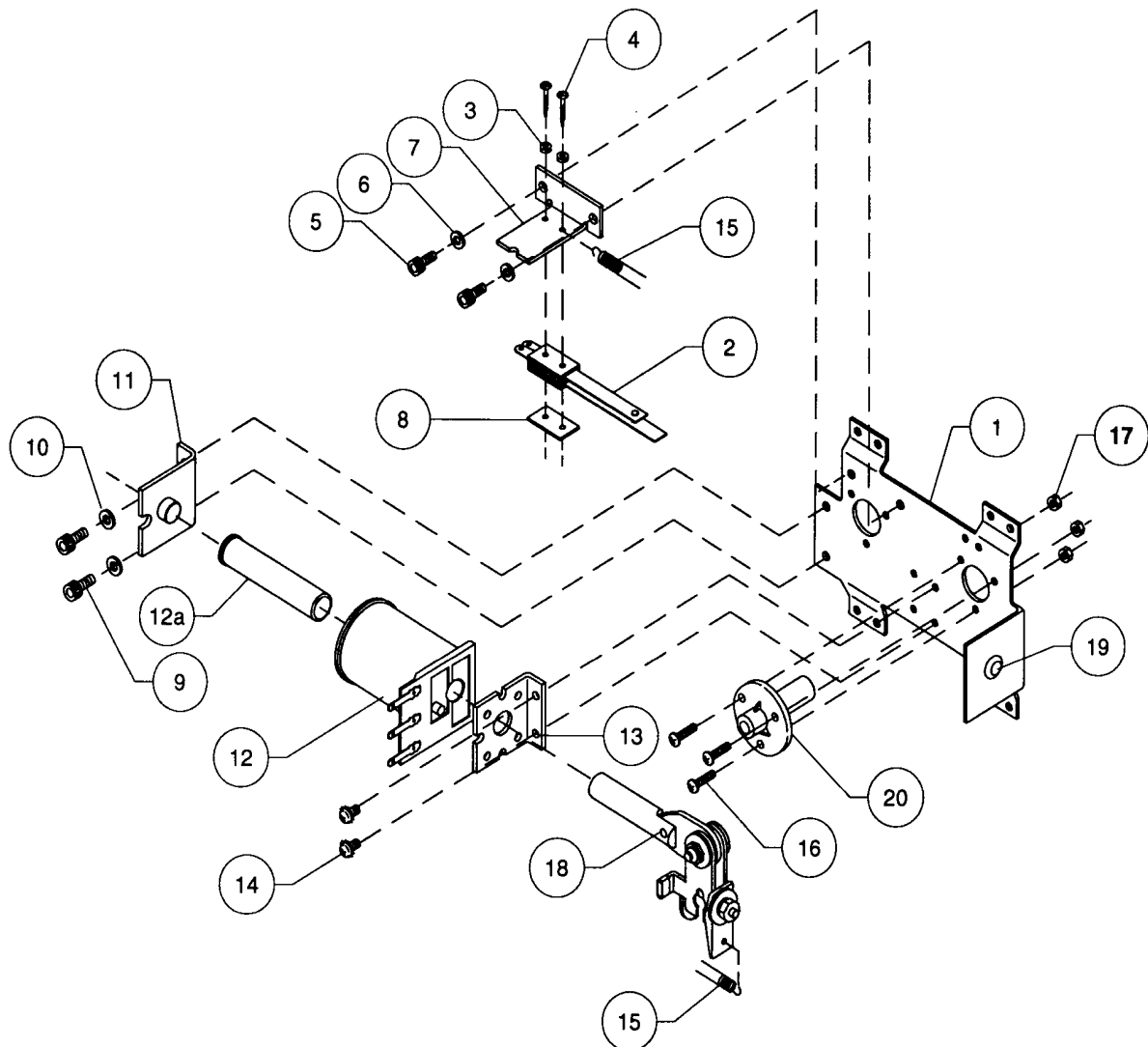| Part Number	Designator	Description
5791-12273-04	J2	Connector, 4-pin Header Str. Sq.
5791-12273-05	J1	Connector, 5-pin Header Str. Sq.
5671-13732-00	LED1	Display Red LED
5070-09054-00	D1 - D3	Diode 1N4004 1.0A
5551-09822-00	L1, L2	Indicator, 4.7mH, 3A
5010-09061-00	R2, R6	Resistor, 680Ω, 1/2w, 5%
5010-10255-00	R5	Resistor, 10Ω, 1/2, 5w
5010-08997-00	R3, R7, R8	Resistor, 2.7KΩ, 1/2w, 5%
5010-09085-00	R1	Resistor, 1.5KΩ, 1/4w, 5%
5370-13342-00	U4	IC 3A DMOS Bridge Drive
5490-10892-00	U1, U2	Opto Isolator 4N25
5250-09157-00	Q1	Regulator 7805 1A 5V
5043-08980-00	C5	Capacitor, 0.1μf, 50v(±20%)
5043-08996-00	C2, C4, C6-C8	Capacitor, .01mfd, 50v(+80,-20%)
5041-09031-00	C1	Capacitor, 1μfd, 25v(±20%) Axial
5040-10974-00	C3	Capacitor, 100μfd, 35v, Rad
5281-09500-00	U3	IC74LS32 Quad OR

A-15595
7-Switch Opto PCB & Bracket Assembly
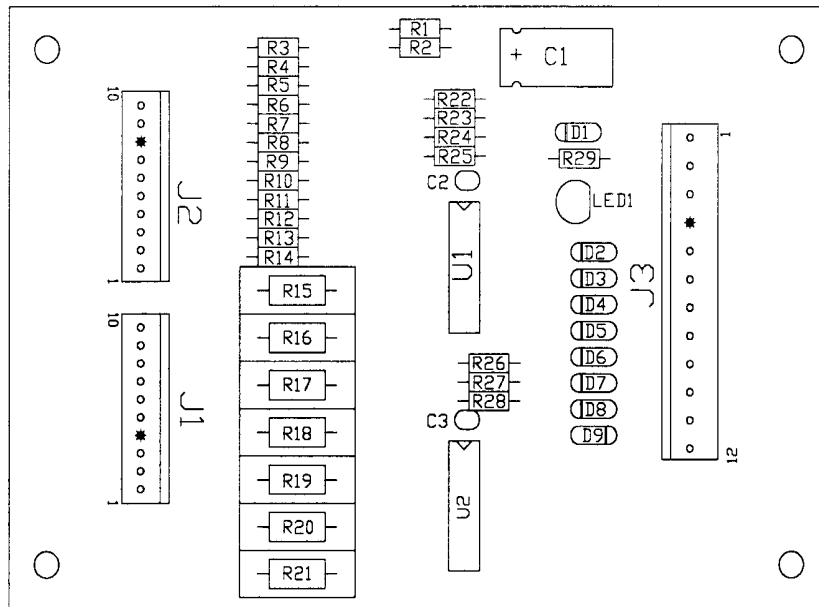
Part Number	Designator	Description
A-15576	-	7-Opto Switch PCB
5040-12298-00	C1	Capacitor, 100µFd, 40v (±50%)
5043-08980-00	C2, C3	Capacitor, 0.01µ, 50v
5671-13732-00	LED1	Display LED Red
5370-12272-00	U1, U2	ICLM339 Quad
5070-09054-00	D1 - D9	Diode 1N4004 1.0A.
5010-12928-00	R15 - R21	Resistor, 270Ω, 2w, 5%
5010-09999-00	R1 - R14	Resistor, 2KΩ, 1/4w, 5%
5010-10631-00	R29	Resistor, 1.2KΩ, 1/4w, 5%
5010-09162-00	R23, R25, R26	Resistor, 100KΩ, 1/4w, 5%
5010-08774-00	R22, R24	Resistor, 22KΩ, 1/4w, 5%
5010-09034-00	R28	Resistor, 10KΩ, 1/4w, 5%
5791-10862-12	J3	Connector, 12-pin Header Sq.
5791-13830-10	J1, J2	Connector, 10-pin Header Sq.
01-10756	-	PCB Mounting Bracket
07-6688-18N	-	Rivet, 3/16 x 18" Nickel

A-15849-L-2
Flipper Assembly

Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, Left
2	SW-1A-194	Switch Assembly
3	4701-00002-00	Lockwasher, #6 Split
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"
6	4701-00003-00	Lockwasher #8 Split
7	01-9375	Switch Mounting Bracket
8	20-6516	Speednut, Tinnerman
9	4010-01066-06	Cap Screw, 10-32 x 3/8"
10	4701-00004-00	Lockwasher #10 Split
11	A-12390	Flipper Stop Assembly
12	FL-11629	Flipper Coil, Blue
a)	03-7066-5	Coil Tubing
13	01-7695	Solenoid Bracket
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"
15	10-364	Spring
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"
17	4406-01117-00	Nut, 6-32 Hex

Item	Part Number	Description
18	A-15848-L	Crank Link Assembly, Left
a)	A-17050-L	Flipper Crank Assembly, Left
b)	A-15847	Flipper Link Assembly
c)	02-4676	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
e)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut, 10-32 ESN
19	23-6577	Bumper Plug, 5/8"
20	03-7568	Flipper Bushing

Associated Parts:
(Not Shown)

21	23-6695	Flipper Rubber Ring, Red
22	20-9250-5	Flipper & Shaft

A-15849-R-2
Flipper Assembly

Item	Part Number	Description
1	B-13104-R	Flipper Base Assembly, Right
2	SW-1A-194	Switch Assembly
3	4701-00002-00	Lockwasher, #6 Split
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"
6	4701-00003-00	Lockwasher #8 Split
7	01-9375	Switch Mounting Bracket
8	20-6516	Speednut, Tinnerman
9	4010-01066-06	Cap Screw, 10-32 x 3/8"
10	4701-00004-00	Lockwasher #10 Split
11	A-12390	Flipper Stop Assembly
12	FL-11629	Flipper Coil, Blue
a)	03-7066-5	Coil Tubing
13	01-7695	Solenoid Bracket
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"
15	10-364	Spring
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"
17	4406-01117-00	Nut, 6-32 Hex

Item	Part Number	Description
18	A-15848-R	Crank Link Assembly, Left
a)	A-17050-R	Flipper Crank Assembly, Left
b)	A-15847	Flipper Link Assembly
c)	02-4676	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
e)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut, 10-32 ESN
19	23-6577	Bumper Plug, 5/8"
20	03-7568	Flipper Bushing

Associated Parts:
(Not Shown)

Item	Part Number	Description
21	23-6695	Flipper Rubber Ring, Red
22	20-9250-5	Flipper & Shaft

Flipper Notes...

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

A-17811
Kicker Arm (Slingshot) Assembly
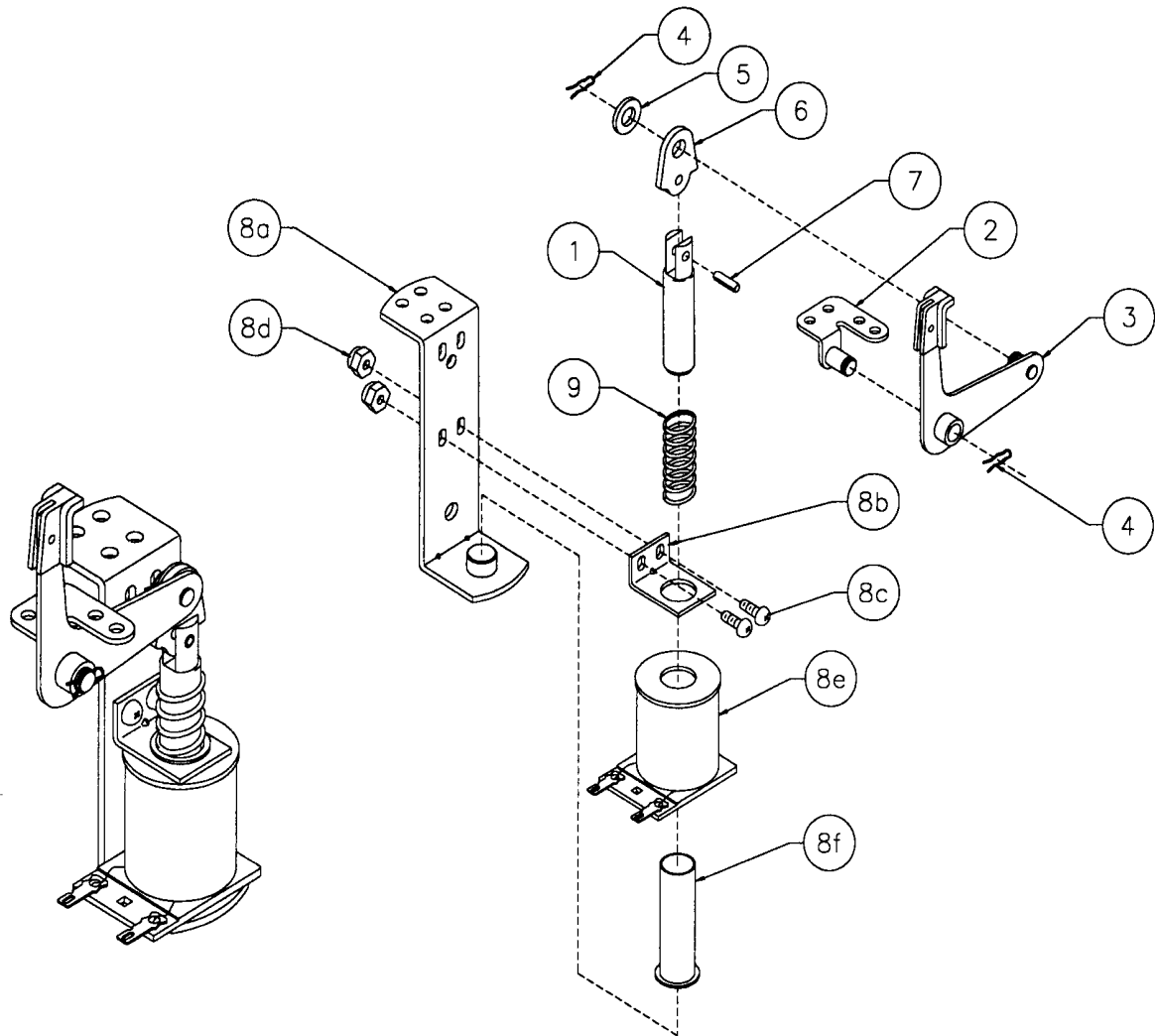
Associated Parts for Right & Left Kickers:

Item	Part Number	Description
1	02-2364	Coil Plunger
2	A-17810	Mounting Bracket Assembly
3	A-12664	Kicker Crank Assembly
4	12-6227	Hairpin Clip
5	4700-00030-00	FW, 17/464 x 1/2 x 15ga.
6	03-8085	Armature Link
7	20-8716-5	Roll Pin, 1/8 x 7/16"

Item	Part Number	Description
8	B-9362-L-3	**Coil & Bracket Assy., Left**
	B-9362-R-4	**Coil & Bracket Assy., Right**
a)	A-17808	Bracket & Stop Assembly
b)	01-8-508-S	Coil Retaining Bracket
c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
d)	4406-01119-00	Nut, 6-32 ESN
e)	AE-27-1200	Coil Assembly
f)	03-7066	Coil Tubing
9	10-128	Spring

A-19963
Outhole Ball Trough Assembly
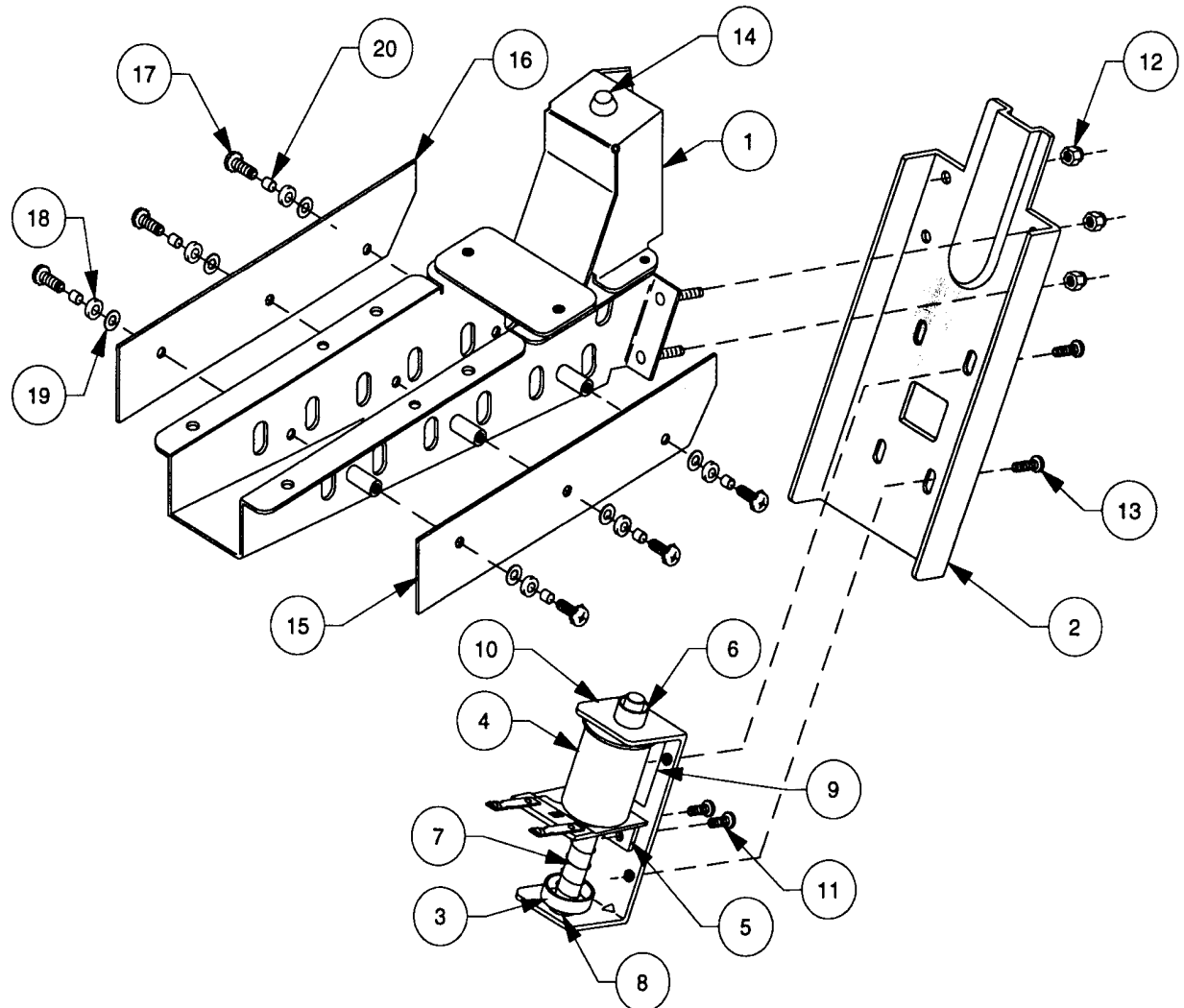
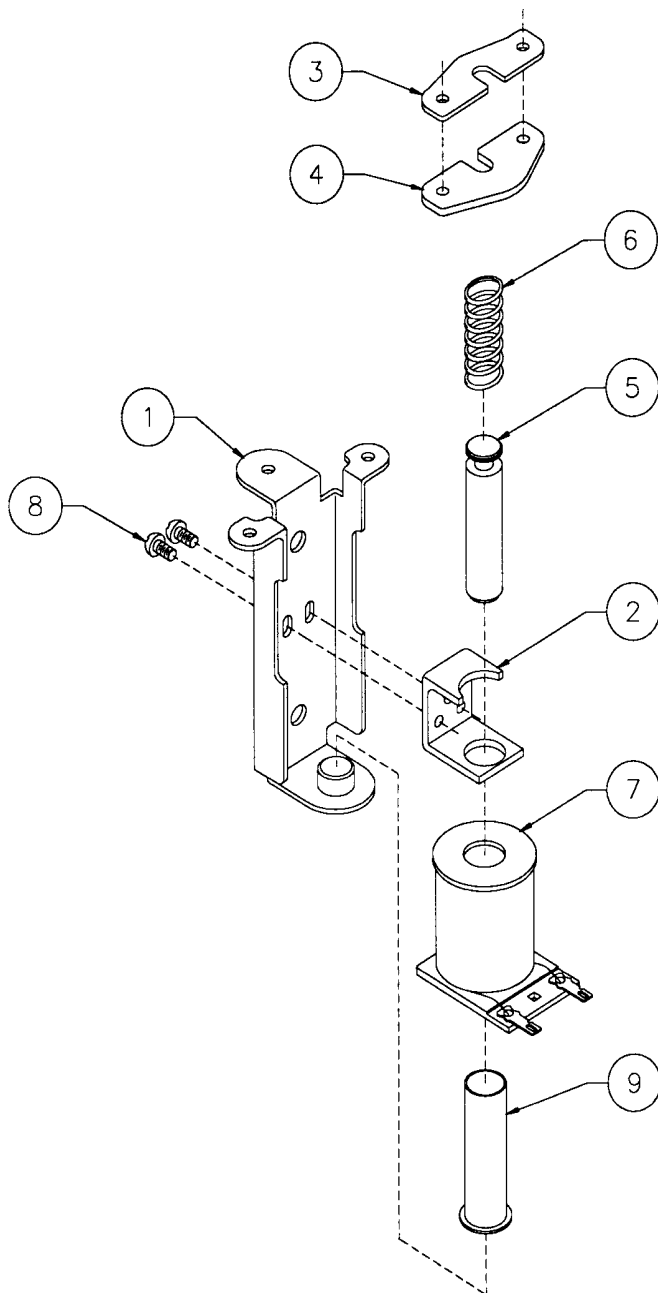| Item	Part Number	Description	Item	Part Number	Description
1	A-16809-2	Ball Trough Welded Assy.	11	4008-01017-05	Mach. Screw, 8-32 x 5/16"
2	01-11587	Ball Trough Front	12	4408-01119-00	Nut 8-32 ESN
3	A-6306-2	Bell Armature Assembly	13	4008-01017-06	Mach. Screw, 8-32 x 3/8"
4	AE-26-1500	Coil Assembly	14	23-6702	Bumper Plug
5	01-8-508-T	Solenoid Assembly	15	A-18617-1	Trough IRED LED PCB Assembly
6	03-7067-5	Coil Tubing	16	A-18618-1	Trough IRED Transistor PCB Assy.
7	10-135	Spring	17	4006-01003-10	Mach. Screw, 6-32 x 5/8" SEMS
8	23-6420	Rubber Grommet	18	23-6626	Rubber Grommet
9	03-8523	Insulator	19	4700-00004-00	Flat Washer, 9/64 x 7/16 x 21ga.
10	01-11586	Coil Mounting Brkt. (Bell)	20	02-4975	Bushing

B-9414-3
Jet Bumper Assembly
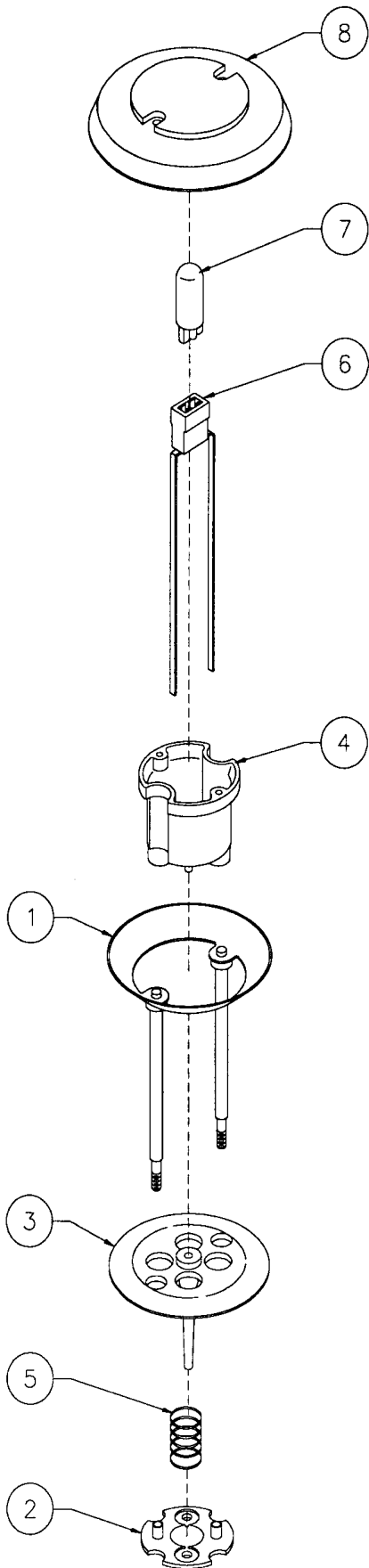
Item	Part Number	Description
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base, White
3	03-6035-4	Bumper Wafer, Red
4	03-7443-5	Bumper Body, White
5	10-7	Spring
6	24-8776	Socket-Wedge Base
7	24-8768	Bulb #555(6.3v., 0.25A.)

Associated Parts:

8	03-8254-12	Jet Bumper Cap, Tr. Orange

A-9415-2
Jet Bumper Coil Assembly

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

Associated Parts:
(Not Shown)

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

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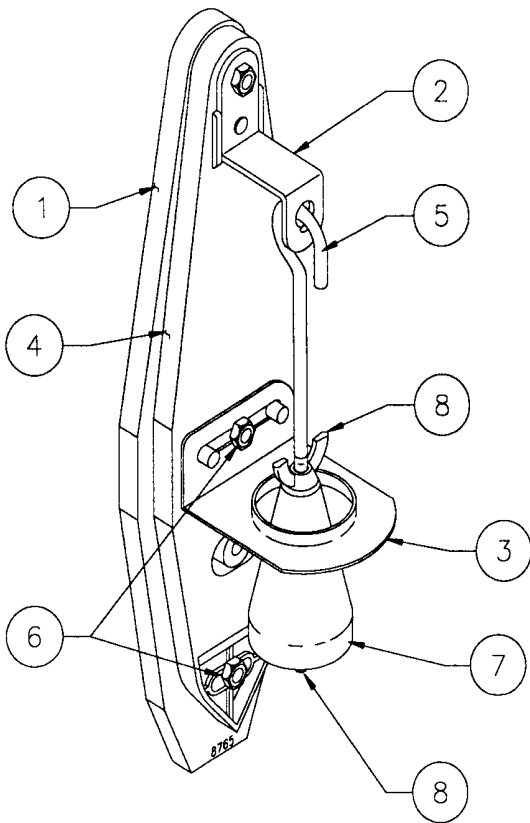
Item	Part Number	Description
1	A-15360	Mount Plate
2	01-3444	Bracket, Tilt Upper
3	01-3445	Bracket, Tilt Lower
4	03-8668	Pendulum
5	12-6231	Plumb Bob Wire
6	4006-01113-06	Mach. Screw, 6-32 x 3/8"

Associated Parts:

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

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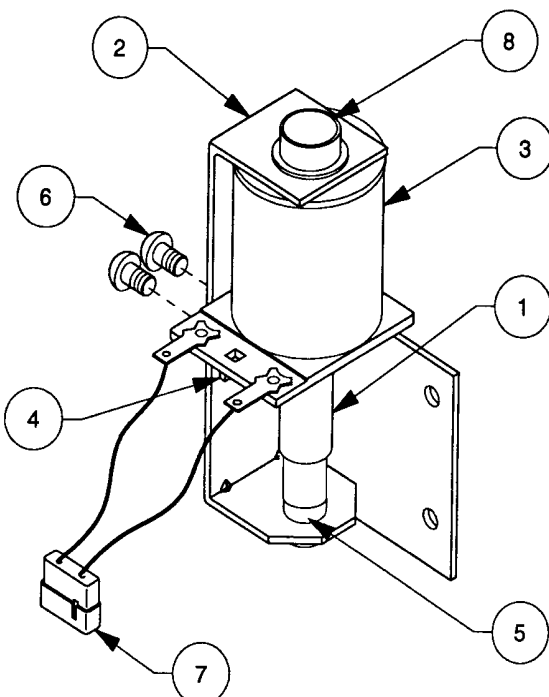
Item	Part Number	Description
1	A-5387	Coil Plunger Assembly
2	01-11273	Mounting Bracket Assembly
3	AE-23-800	Coil Sub-Assembly
4	01-8-508-T	Coil Retaining Bracket
5	23-6420	Rubber Grommet
6	4008-01017-04	Mach. Screw, 8/32 x 1/4"
7	H-11835	Knocker Cable
8	03-7067-5	Coil Tubing

A-17932
Disappearing Post Assembly
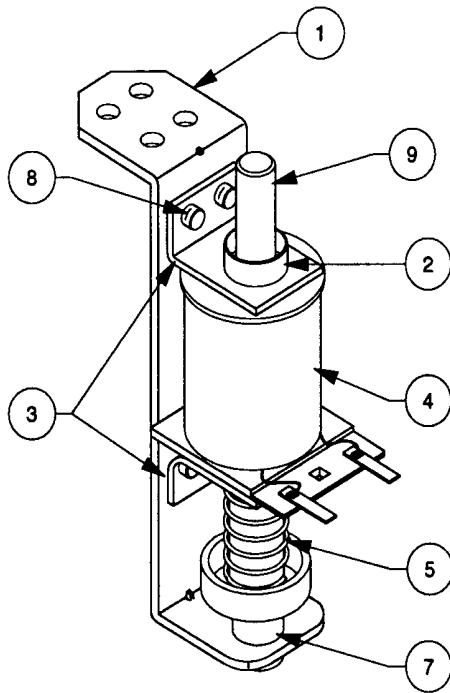
Item	Part Number	Description
1	01-12441	Diverter Post Bracket
2	03-7067-5	Coil Tubing
3	01-8-508-T	Coil Retainer Bracket
4	AE-27-1200	Coil Sub-Assembly
5	10-135	Spring
6	A-17986	Bell Armature Assembly
7	23-6420	Rubber Grommet
8	4008-01017-04	Mach. Screw, #8-32 x 1/4"

A-17796
Ball Gate Actuator Assembly
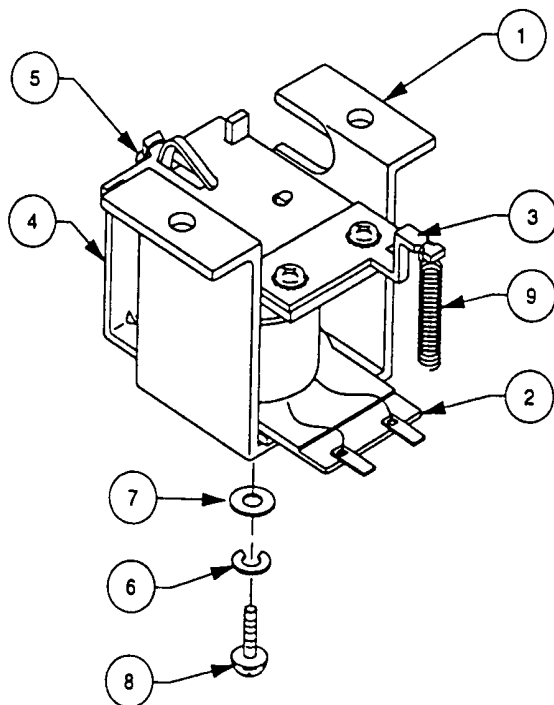
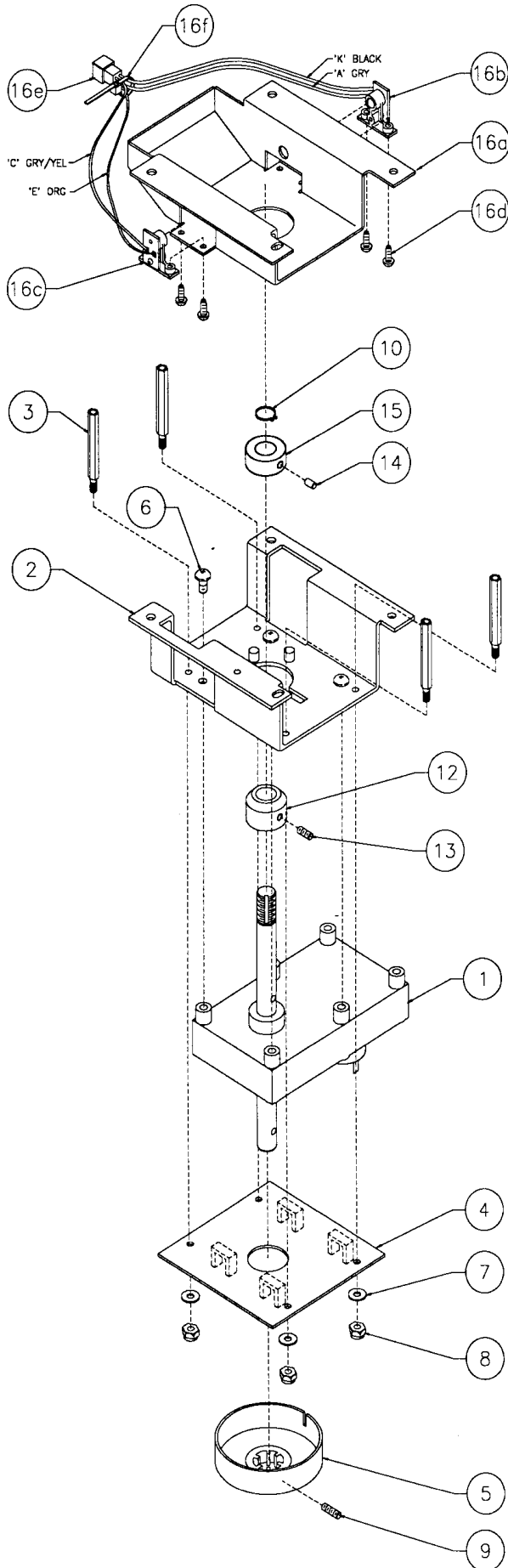| Item	Part Number	Description
1	01-12348	Ball Gate Coil Bracket
2	A-14406	Coil Assembly
3	A-11146	Armature Assembly
4	A-6892	Frame & Eyelet Assembly
5	10-120	Spring
6	4701-00003-00	Lockwasher #8 Split
7	4700-00089-00	Flat Washer, 11/64 x 7/16 x 16ga.
8	4008-01021-07	Mach. Screw, 8-32 x 7/16
9	10-194	Extension Spring

A-19778
Magic Trunk Assembly

Item	Part Number	Description
1	04-10001	Trunk Base Bracket
2	01-13627	Bracket , Trunk Ball Deflector
3	04-10003	Bracket/Pole Assembly
4	20-10197	Coil Magnet
5	04-10002	Trunk Magnet Cover Plate
6	02-4436-29	F-F Spacer #8-32 x 3.88" Long
7	4008-01168-06	Mach. Screw, #8-32 x 3/8"
8	02-5153	Trunk Magnet Shaft
9	20-8712-25	"E" Ring, 1/4" Shaft
10	03-8042	Nylon Washer
* 11	31-2255-3	Decal
**12	RM-22-30	Tape - Double Sided

Associated Assemblies:

13	03-9317	Magic Trunk
14	A-20029	Trunk and Light w/Cable
15	4008-01021-07	Mach. Screw, 8-32 x 7/16" (4)

* Not available for individual sale. Order Decal Set 31-2255.
** Not shown.

A-19782
Magic Trunk Motor Assembly

Item	Part Number	Description
1	14-8018	Motor, 12VDC
2	04-10008	Trunk Motor Bracket
3	02-4176-28	M-F Spacer #8-32 x 1-3/4"
4	A-19749	Magic Trunk Opto Assembly
5	03-9318	Opto Interrupter
6	4010-01008-06	Mach. Screw, #10-32 x 3/8"
7	4700-00009-00	Flat Washer, 11/64 x 7/16 x 21ga.
8	4408-01119-00	Nut #8-32 ESN
9	4008-01083-08	Set Screw #8-32 x 1/2"
10	20-8714-50	External Retaining Ring
11	H-18601-2	Cable Assembly
12	A-19933	Motor Stop Assembly
13	4008-01083-04	Set Screw, #8-32 x 1/4"
14	4010-01169-04	Set Screw, #10-32 1/4
15	02-5175.1	Motor Shaft Collar

Associated Assembly:

16	A-19791	Front Trough Assembly
a)	01-13629	Front Trough Bracket
b)	A-16908	LED Assembly
c)	A-16909	Photo Transistor Assembly
d)	4106-01013-06	Sh. Metal Screw, #6 x 3/8"
e)	H-17609-11	Cable Assembly
f)	03-7520-2	Tie Wrap-Nylon, 3-7/8"

A-19939
Plate Assembly - Complete
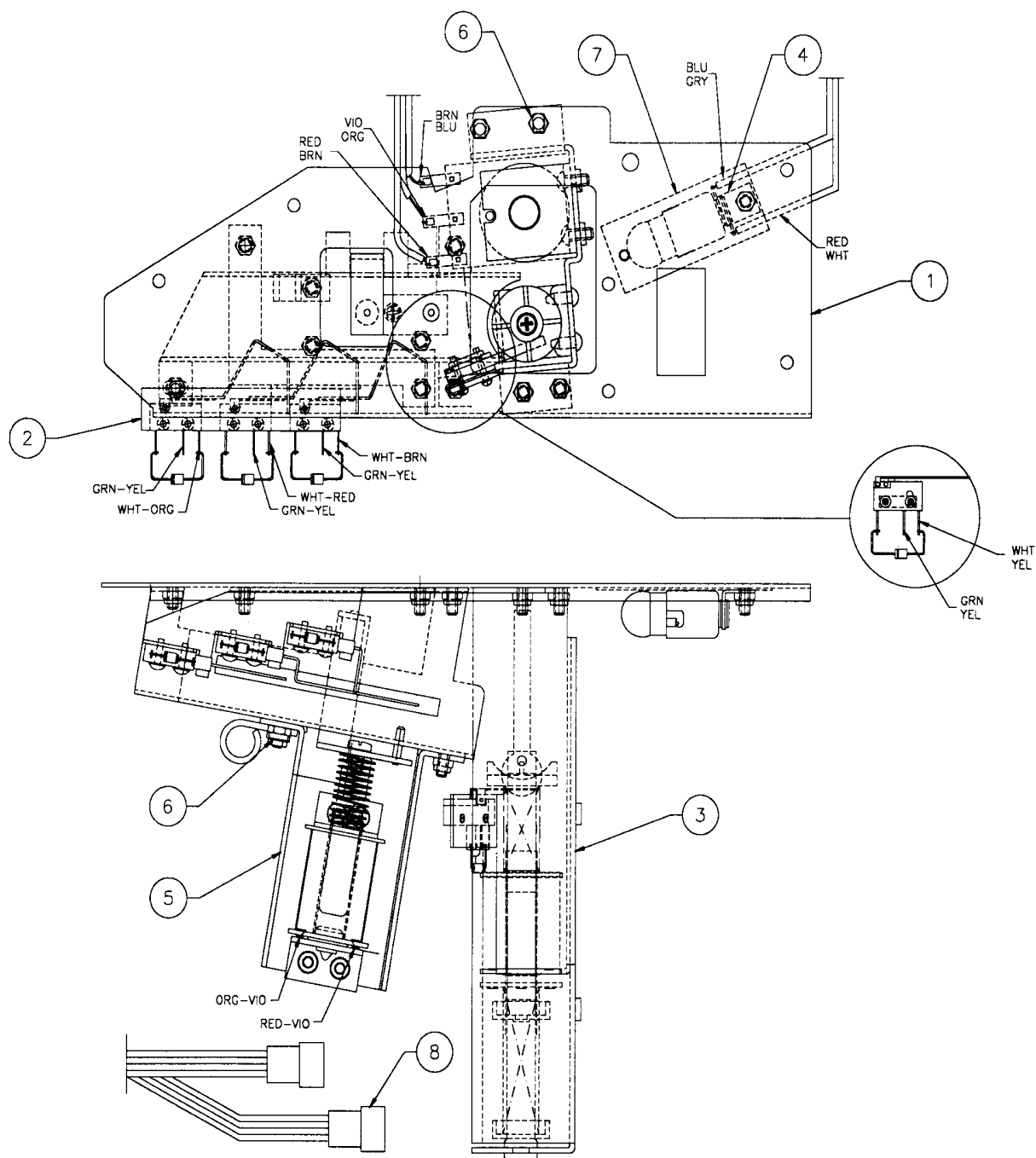
Item	Part Number	Description	Item	Part Number	Description
1	04-10017	Plate Assembly	4	A-17803	Bulb Assembly
2	A-20088	Switch & Bracket Assembly	5	A-19934	Ball Feeder Assy. (See p.2-27)
a)	5647-12693-32	Sub-Mini Micro Switch	6	4406-01119-00	Nut #6-32 ESN
b)	5647-12693-33	Sub-Mini Micro Switch	7	01-13851	Bulb Insulator
c)	5647-12693-34	Sub-Mini Micro Switch	8	H-20006	Cable
3	A-19940	Bracket Assembly (See p.2-27)			

A-19940
Bracket Assembly
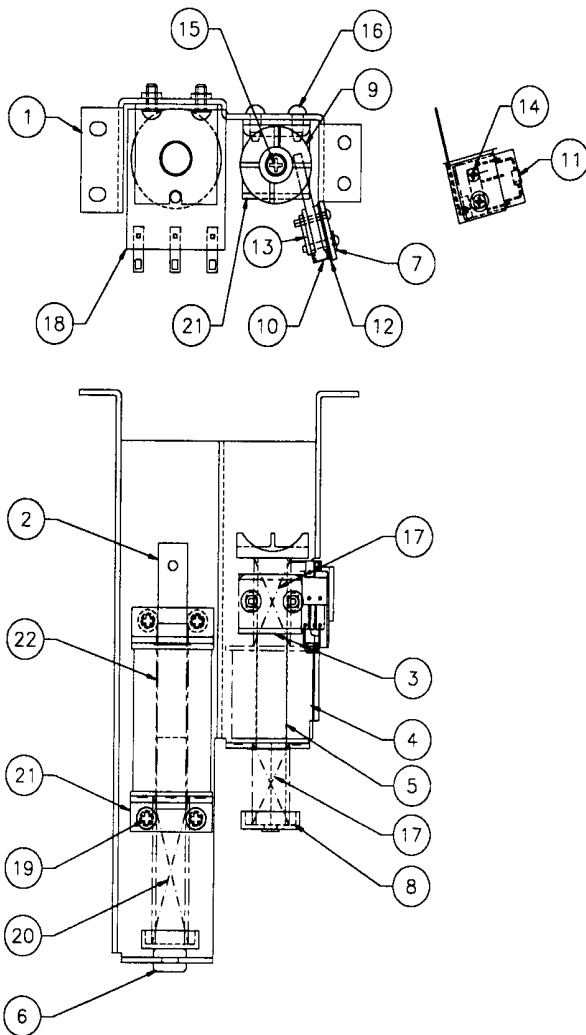
Item	Part Number	Description
1	04-10015.1	Bracket
2	04-10019	Armature Extension
3	01-10167	Solenoid Bracket
4	AE-26-1200	Coil Assembly
5	03-7067-3	Coil Tubing
6	23-6420	Rubber Grommet
7	4700-00003-00	Flat Washer, 1/8 x 9/32 x 21ga.
8	02-4668	Armature Extension Assembly
9	03-8561	Ball Popper Cup
10	5647-12693-11	Mini Micro Switch
11	5070-09054-00	Diode 1N4004 1.0A
12	01-13752	Extension Paper, Switch
13	01-8240	Nut Plate
14	4002-01105-08	Mach. Screw, #2-56 x 1/2"
15	4106-01152-06	Sh. Metal Screw, #6 x 3/8"
16	4008-01015-06	TT #8-32 x 3/8"
17	10-428	Spring
18	A-20099	Coil Assembly
19	4008-01017-04	Mach. Screw, #8-32 x 1/4"
20	10-128	Spring
21	01-7695	Solenoid Bracket
22	03-7067-6	Coil Tubing

A-19934
Ball Feeder Assembly
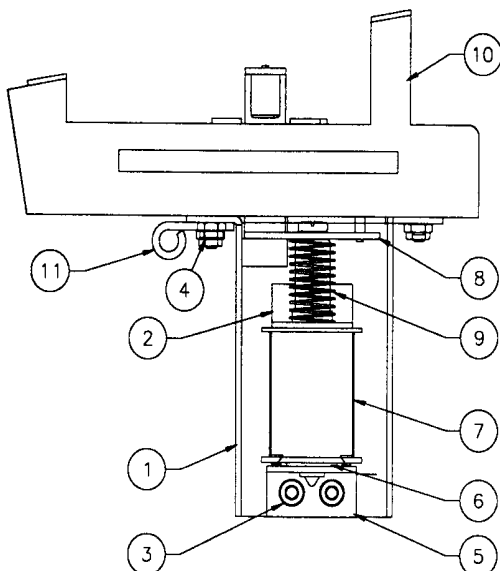
Item	Part Number	Description
1	01-13821	Ball Feeder Bracket
2	01-9794	Flipper Stop Bracket
3	4008-01168-06	Mach. Screw, 8-32 x 3/8"
4	4406-01119-00	Nut 6-32 ESN
5	B-10932	Solenoid Bracket Assembly
6	03-7066-3	Coil Tubing
7	AE-27-1200	Coil Sub-assembly
8	A-19936	Stop Ball Feeder Assembly
9	10-437	Kicker Spring, Comp.
10	04-10021.2	Trough Assembly
11	03-7655-4	Harness Clip

A-20003
Eject Assembly
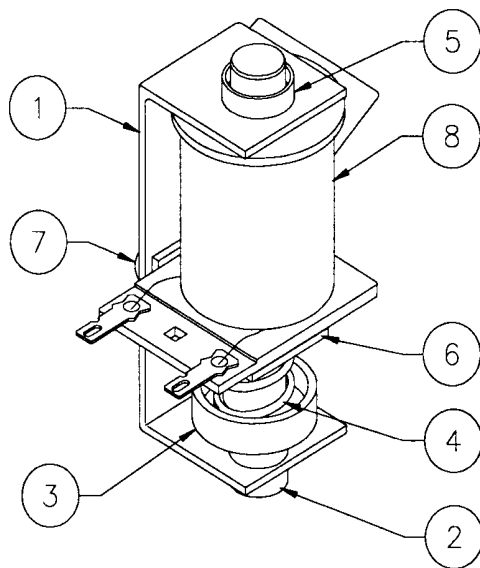
Item	Part Number	Description
1	01-13852	Eject Bracket
2	23-6420	Rubber Grommet
3	A-15371	Plunger Assembly
4	10-135	Spring
5	03-7067-5	Coil Tubing
6	01-8-508-T	Solenoid Bracket
7	4008-01017-04	Mach. Screw, 8-32 x 1/4"
8	AE-27-1200	Coil Assembly

A-19938
Scoop Assembly - Complete
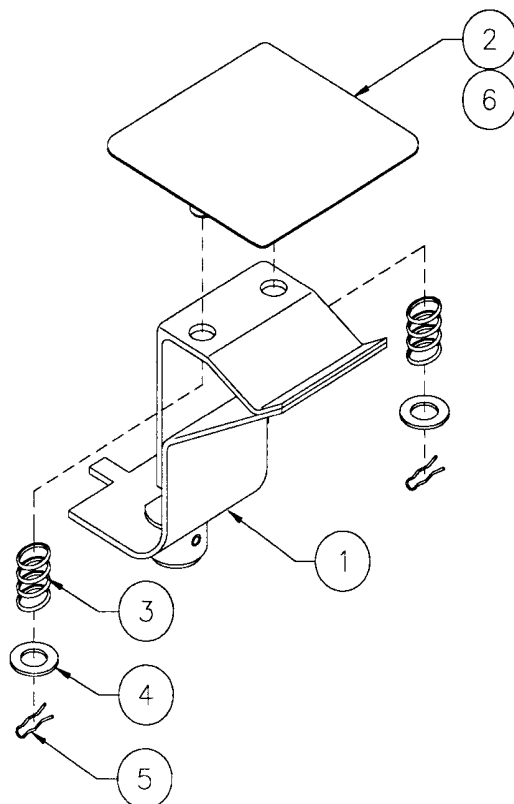
Item	Part Number	Description
1	04-10022	Scoop Assembly
2	04-10020.1	Flap Assembly
3	10-392	Spring
4	4700-00073-00	Flat Washer, 9/32 x 1/2 x 21ga.
5	12-6227	Hairpin Clip
*6	31-2255-4	Decal

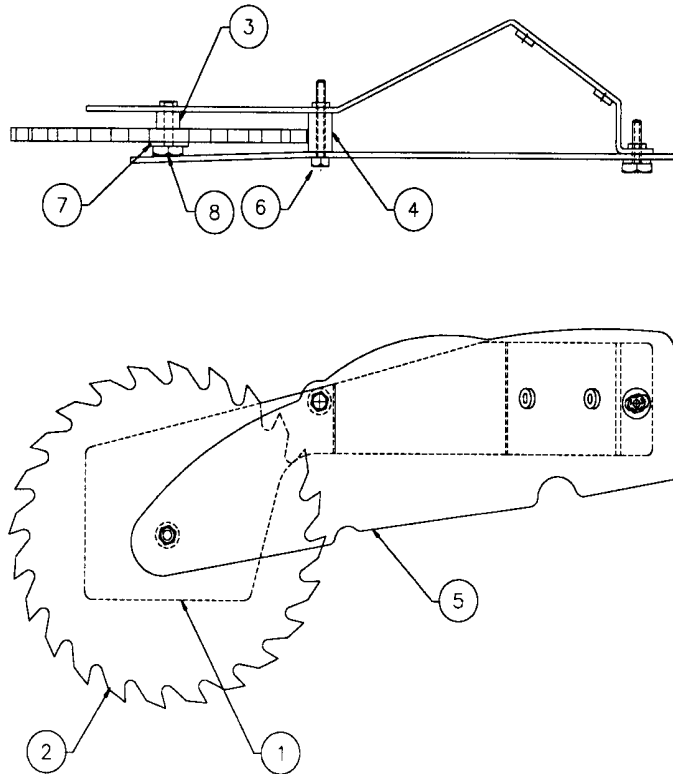* Not available for individual sale. Order Decal Set 31-2255.

A-20084
Ball Shooter Assembly
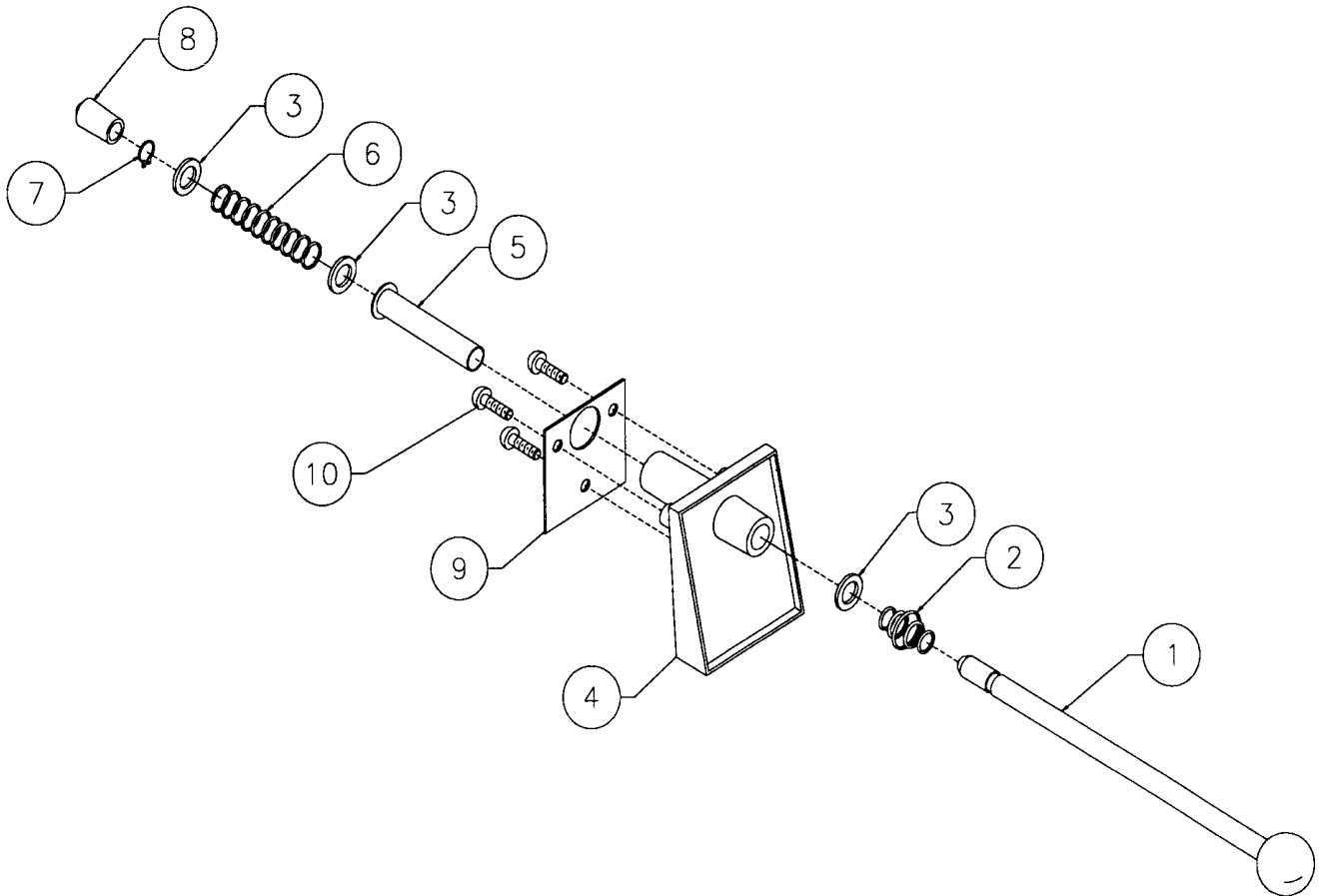
Item	Part Number	Description
1	20-9927-1	Ball Shooter Rod w/Shaft
2	10-149	Outer Spring
3	4700-00051-00	Flat Washer, 25/64 x 5/8 x 16ga.
4	21-6645-1	Shooter Housing
5	03-7357	Shooter Sleeve
6	10-148	Power Spring
7	20-8714-37	External Retainer Ring
8	23-6327	Ball Shooter Tip

Associated Parts:

Item	Part Number	Description
9	01-3535	Rod Mounting Bracket
10	4010-01006-10	Mach. Screw, 10-32 x 5/8"

A-19942
Saw Assembly

Item	Part Number	Description
1	04-10016	Frame Assembly
2	03-9333	Saw
3	03-6047-1	Spacer, 1/4"
4	03-6047	Spacer, 9/16"
5	31-2257-17	Plastic-Playfield
6	4008-01168-16	Mach. Screw, 8-32 x 1"
7	4700-00011-00	Flat Washer, 11/64 x 7/16 x 16ga.
8	4008-01168-10	Mach. Screw, 8-32 x 5/8"

A-19968
Mirror Assembly

Item	Part Number	Description
1	20-10194	Mirror
2	04-10037	Mirror Bracket
3	31-2257-18	Playfield Plastic
4	4008-01021-07	Mach. Screw, #8-32 x 7/16"

Playfield Slide Mechanism Assembly

(Left Assembly Shown)

Underside of Playfield
shown for reference
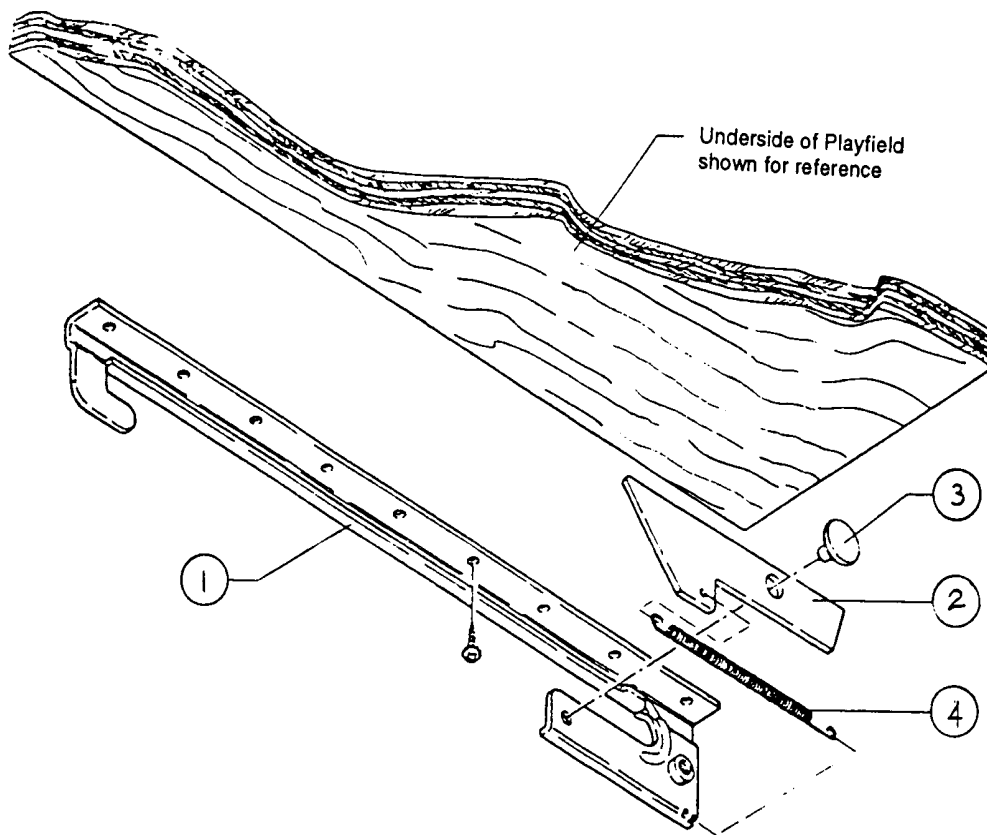
A-17749.1-1
Playfield Slide Mechanism Assy.
Left Assembly

Item	Part Number	Description
1	01-12304-1	Slide, Left
2	01-10664.1	Lever Retainer
3	02-4615	Shoulder Rivet

Associated Part:

4	10-439	Spring

A-17749.1-2
Playfield Slide Mechanism Assy.
Right Assembly

Item	Part Number	Description
1	01-12304-1	Slide, Right
2	01-10664.1	Lever Retainer
3	02-4615	Shoulder Rivet

Associated Part:

4	10-439	Spring

A-17540
Universal Power Interface Assembly

BOTTOM VIEW

SIDE VIEW

SIDE VIEW

VORSICHT

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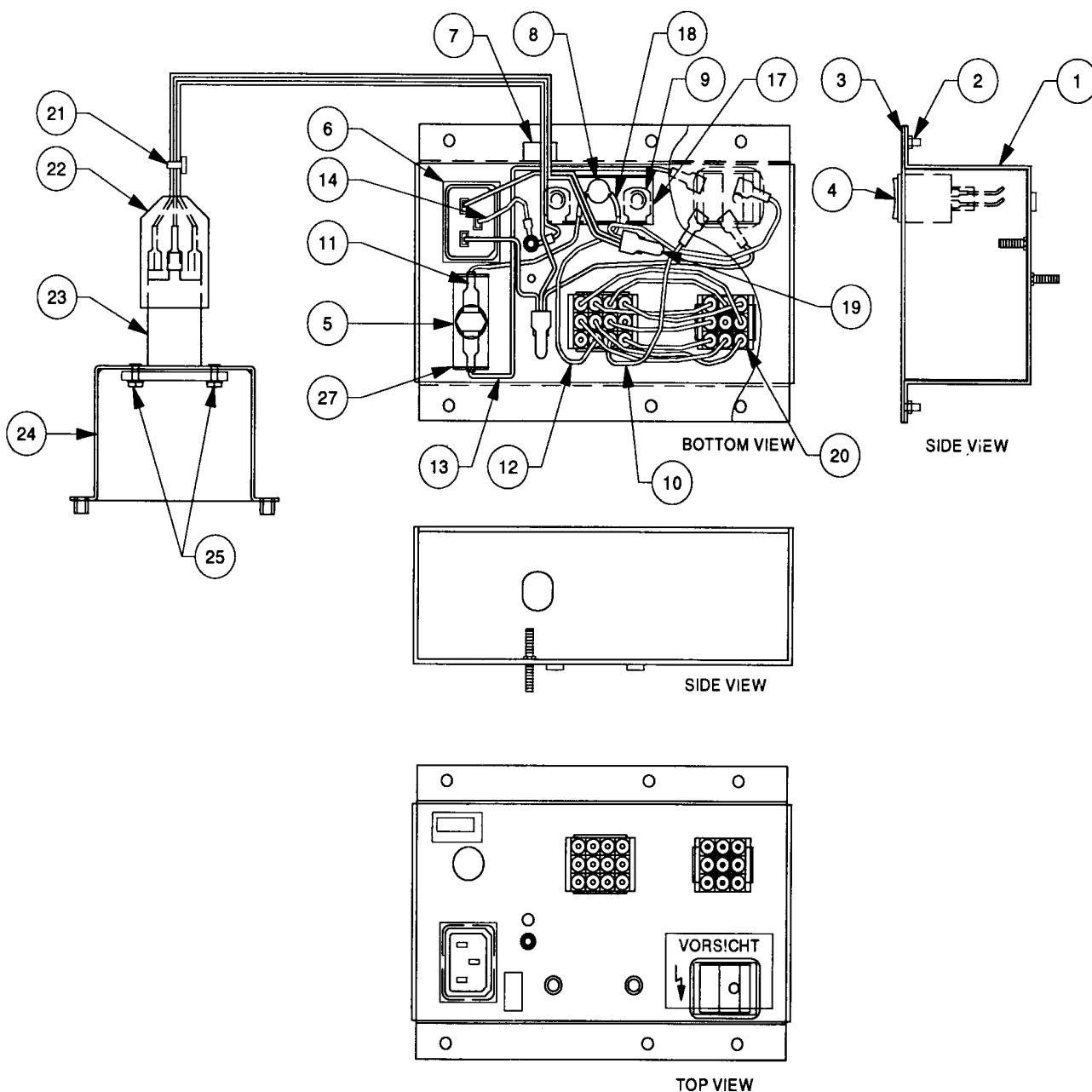
Item	Part Number	Description	Item	Part Number	Description
1	01-12293.1	Power Control Chassis Box	14	H-17542	Ground Jumper Grn/Yel Cable
2	4406-01128-00	Nut #6-32 KEPS	15	5797-13940-01	Jumper Cable
3	01-12294	Switch Mounting Plate Assembly	16	01-10623	Insulator, Thermistor
4	5642-13935-00	Power Switch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

Posts
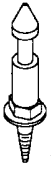
02-3905
Bumper Post #8 WS

02-4176-28
M-F Spacer 8-32

02-4250-20
M-F Spacer #6-32x1-1/4"
02-4250-24
M-F Spacer #6-32x1-1/2"
02-4250-40
M-F Spacer #6-32x2-1/2"
02-4250-42
M-F Spacer #6-32x2-5/8"
02-4250-44
M-F Spacer #6-32x2-3/4"

02-4424-2
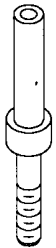Post #6-32/#8-32

02-4425-1
Post #8-32/#8-32

02-4426-1
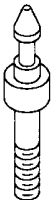Post, #6-32/#8 SMS

02-4436-29
F-F Spacer #8-32

02-4568-6
M-F Standoff 8-32
1/4" Hex.

02-4659-1
Mini-Post

02-4659-1
Mini-Post

02-4660
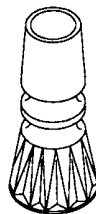Mini-Post
Single Bumper

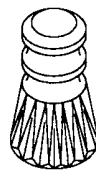02-4677
Mini-Post

02-4678
Double Bumper
Post #10

02-5107
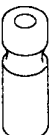Adjusting Post

03-8044-13
Mini-Post, Clear

03-8130-13
Double Post

03-8247-8
Bumper Post,
Double Starred

03-8319-13
Post #8 Starred

03-8365-13
Post #8, Clear

Unique Parts

Part Number	Description	Part Number	Description
A-13204-50039	Bottom Arch Assembly	A-20102	Ball Gate & Wire Assembly
A-16917-50039	Sound Board Assembly	A-20123	Ball Gate Assembly
A-17651-50039	WPC Security CPU Assembly	A-8552-50039	Magic Backglass Assembly
A-19748	Speaker/Display Assembly	B-9362-L-3	Coil & Bracket Assembly
A-19778	Magic Trunk Assembly	B-9362-R-4	Coil & Bracket Assembly
A-19779	Diverter Magnet Assembly	01-13819	Ball Guide #10
A-19782	Magic Trunk Motor Assembly	01-13892.1	Ramp Ball Guard
A-19791	Front Trough Assembly	02-4250-20	M-F Spacer, 6-32 x 1-1/4"
A-19811	Back Panel Assembly	02-4250-24	M-F Spacer, 6-32 x 1-1/2"
A-19825	Trough Assembly	02-4250-40	M-F Spacer, 6-32 x 2-1/2"
A-19934	Ball Feeder Assembly	02-4250-42	M-F Spacer, 6-32 x 2-5/8"
A-19936	Stop Ball Feeder Assembly	02-4250-44	M-F Spacer, 6-32 x 2-3/4"
A-19938	Scoop Assembly- Complete	02-4436-29	M-F Spacer, 8-32 x x 3.88"
A-19939	Plate Assembly Complete	02-4568-6	M-F Post, 8-32 x 3-3/4"
A-19942	Saw Assembly - Complete	02-5161	Screw pin - Scoop
A-19954	Plastic Ramp Assembly, Right	03-8247-8	Double Star Post #8, Tr. Amber
A-19955	Plastic Ramp Assembly, Left	03-8319-8	Starred Post #8, Tr. Amber
A-19956	Spin Target Assembly	03-9317	Magic Trunk
A-19958	Wire Ramp Assembly, Right	04-10005	Newton Ball Assembly
A-19959	Crossover Wire Ramp Assembly	04-10031.1	Ball Guide #1
A-19968	Mirror Assembly	04-10032	Ball Guide #2
A-19981-1	14-Lamp PCB & Spacer Assembly	04-10033	Ball Guide #6
A-19982-1	18-Lamp PCB & Spacer Assembly	04-10034	Ball Guide #8
A-19983-1	17-Lamp PCB & Spacer Assembly	04-10035	Ball Guide #9
A-19984-1	6-Lamp PCB & Spacer Assembly	11-1225	Wood Cabinet
A-20003	Eject Assembly	12-7265	Wireform Ball Guide #3
A-20014-5	Standup Target, Oblong (White)	12-7266	Wireform Ball Guide #4
A-20029	Magic Trunk & Light w/Cable	12-7267	Wireform Ball Guide #5
A-20036	Magic Eddy Coil PCB Assembly	12-7268	Wireform Ball Guide #7
A-20048	Shooter Ramp Assembly	20-10197	Coil Magnet w/Breaker
A-20063-	Playfield Plastics Set	31-2255-	Decal Set
A-20064-1	Flipper Ball Guide Assembly, Right	31-2256-	Playfield Plastic Decal
A-20064-2	Flipper Ball Guide Assembly, Left	31-2257-	Playfield Plastic
A-20084	Ball Shooter w/Knob (Silver)	31-2261-	Playfield Decal
A-20086	Ball Gate Assembly-Coil Actuated	5610-14515-00	WPC Transformer

Universal Power Interface/Cordset Application Chart

Column groups: **UNIVERSAL PWR. INTERFACE ASSEMBLY** (A-17540) · **VOLTAGE PROGRAMMING JUMP CABLE** (H-17837-1 … H-17837-4) · **5AMP FUSE/LABEL** (5731-09651-00 FUSE, 16-9668 LABEL) · **8AMP FUSE/LABEL** (5730-09252-00 FUSE, 16-9670 LABEL) · **LABEL HIGH/VOLTAGE CAUTION** (16-9669) · **POWER ADAPTER CORD** (5850-14052-00) · **CORDSET** (5850-13271-00 … 5850-13278-00, A-17175-2)

COUNTRY	A-17540	H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-09651-00 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

UPPER PLAYFIELD PARTS

Item No.	Part Number	Description
1	01-9211	Playfield Hanger Bracket
2	01-13638	Bottom Arch Ball Guide
3	12-7210	Rebound Wireform (2)
4	A-15849-L-2	Flipper Assembly Complete
	20-9250-5	Flipper & Shaft, White
5	A-20064-2	Flipper Ball Guide Assy., Left
6	A-17813	Rollover Switch Assembly
7	A-17811	Sling Shot Kicker Assembly
	B-9362-L-3	Coil & Bracket Assembly
	10-128	Kicker Spring
8	01-13892.1	Ramp Guard
9	A-17801	Kicker Count Switch Assembly
10	02-4250-20	Spacer, 6-32 x 1 1/4"
11	A-17064	*Inductor & Eddy Sensor Cable
	A-18543-1	*Generic Eddy Sensor P.C.B.
12	A-15257	*Bracket & Pole Piece Assembly
	20-9612	*Wave Spring Washer
	20-10197	*Coil Magnet with Bracket
13	02-5107	Adjusting Post (2)
14	A-18059-15	Rect. Stationary Target, Orange
15	A-20063-1	Playfield Plastic Assembly
16	02-4250-20	Spacer, 6-32 x 1 1/4"
	A-12258-1	6-32 Nut Plate
17	04-10033	Ball Guide #6
18	A-19825	*Trough Assembly
19	04-10005	Newton Ball Assembly
20	20-6500	Steel Ball 1 1/16"
21	A-17813-1	Rollover Switch Assembly
22	A-20014-5	Oblong Stationary Target, White
23	A-19237	*Eddy Coil P.C.B. Assembly
24	02-4250-40	Spacer, 6-32 x 2 1/2"
25	02-4250-44	Spacer, 6-32 x 2 3/4"
	A-12258-1	6-32 Nut Plate
26	A-19778	Magic Trunk Assembly
	A-19782	Magic Trunk Motor Assembly
	A-19791	Front Trough Assembly
	A-20029	Trunk and Light w/Cable
	03-9317	Magic Trunk
27	A-18543-2	*Generic Eddy Sensor P.C.B.
28	12-7268	Wireform Ball Guide #7
29	A-17932	Disappearing Post Assembly
30	02-4250-20	Spacer, 6-32 x 1 1/4"
	02-4250-24	Spacer, 6-32 x 1 1/2"
	A-12258-1	6-32 Nut Plate
31	A-19942	Complete Saw Assembly
32	A-10417	Micro Switch Assembly
	A-17985-R	Eject Switch Assembly
	A-20003	Eject Assembly
33	02-4250-24	Spacer, 6-32 x 1 1/2"
34	02-4250-42	Spacer, 6-32 x 2 5/8"
35	A-17796	Ball Gate Actuator Coil Assy.
36	A-19811	Back Panel Assembly
37	A-20086	Coil Actuated Ball Gate Assy.
38	A-17797-1	Special Ball Gate Assy., Left
39	A-20102	Ball Gate & Wire Assembly
40	03-8318-12	Double Sided Hood, Orange

Item No.	Part Number	Description
41	04-10035	Ball Guide #9
42	12-7265	Wireform Ball Guide #3
43	A-20063-2	Playfield Plastic Assembly
44	A-9415-2	Jet Bumper Coil Assembly
	B-9414-3	Jet Bumper Assy., Red Wafer
	B-12030-2	Jet Bumper Leaf Switch Assy.
	23-6710-1	Clear Tubing
	03-8254-12	Jet Bumper Cap, Orange
45	A-19955	Left Plastic Ramp Assembly
46	12-7267	Wireform Ball Guide #7
47	A-20063-3	Playfield Plastic Assembly
48	01-13819	Ball Guide #10
49	12-7266	Wireform Ball Guide #4
50	A-20063-4	Playfield Plastic Assembly
51	A-19954	Right Plastic Ramp Assembly
52	04-10034	Ball Guide #8
53	A-16120	*D.C. Motor Control Assembly
54	A-19959	Crossover Wire Ramp Assy.
55	A-19938	Scoop Assembly Complete
	A-19939	Plate Assembly Complete
56	02-4568-6	Post 8-32 x 3 3/4"
57	04-10032	Ball Guide #2
58	A-20048	Shooter Ramp Assembly
59	A-17799-6	Round Stationary Target, Yellow
60	A-19958	Right Wire Ramp Assembly
61	A-17811	Sling Shot Kicker Assembly
	B-9362-R-4	Coil & Bracket Assembly
	10-128	Kicker Spring
62	A-20064-1	Flipper Ball Guide Assy., Right
63	A-15849-R-2	Flipper Assembly Complete
	20-9250-5	Flipper & Shaft, White
64	A-15802-P	Level & Holder Assembly
65	01-10621	Strike Plate
66	A-19963	Ball Trough Assembly Complete
67	A-18973	Shooter Lane Switch Assembly
68	31-1009-50039	Screened Ball Shooter
69	A-19002	Ball Gate Assembly
70	A-19968	Mirror Assembly
71	A-20063-5	Playfield Plastic Assembly
72	04-10031.1	Ball Guide #1

NOT SHOWN:

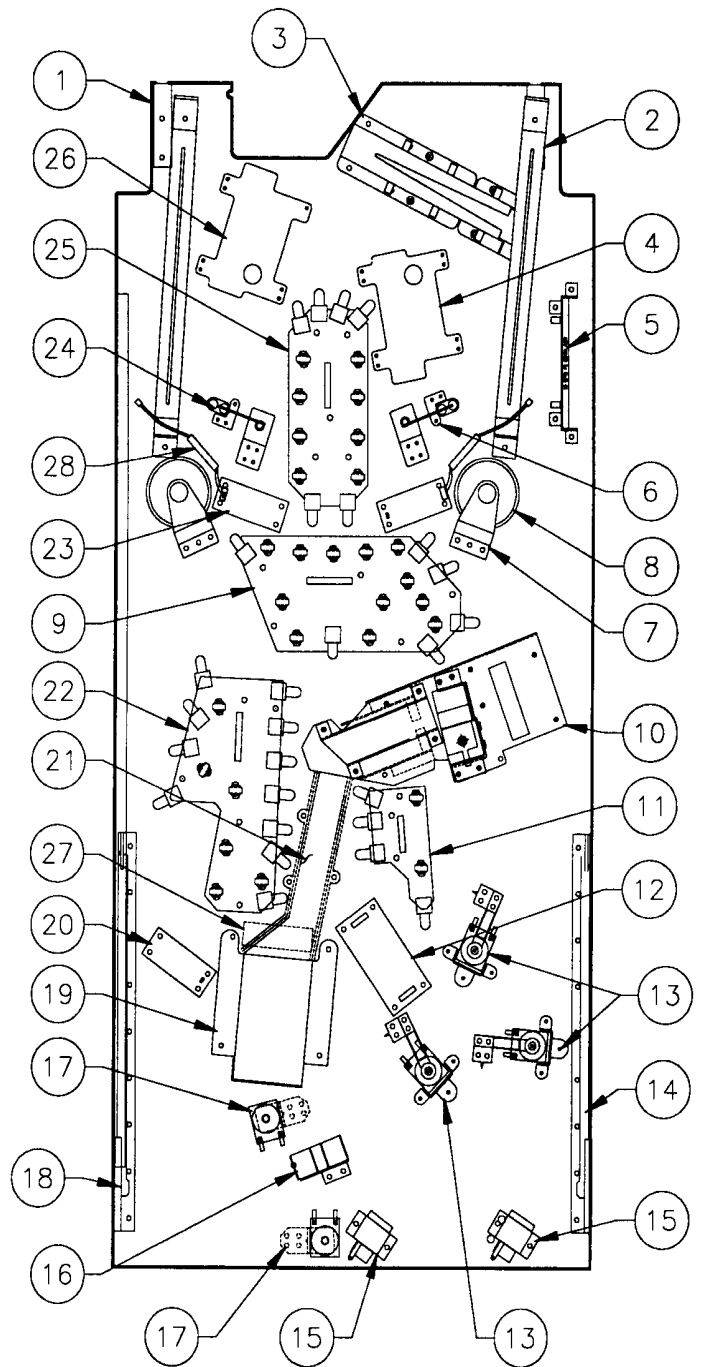|	Part Number	Description
	A-15576	*Opto SW7 P.C.B.
	A-17812-2	*Cable Mounting Bracket, 1/2"
	A-17812-4	*Cable Mounting Bracket, 1"
	A-13204-50039	Bottom Arch Assembly
	03-9351-1	**Full Playfield Mylar
	03-9351-2	Playfield Mylar
	03-9351-3	Playfield Mylar
	36-50039	Screened Hardcoat Playfield

*Located under playfield.
**The Theatre of Magic hardcoat playfield does not require a full mylar. However, mylars can be purchased through your local Bally Distributor.
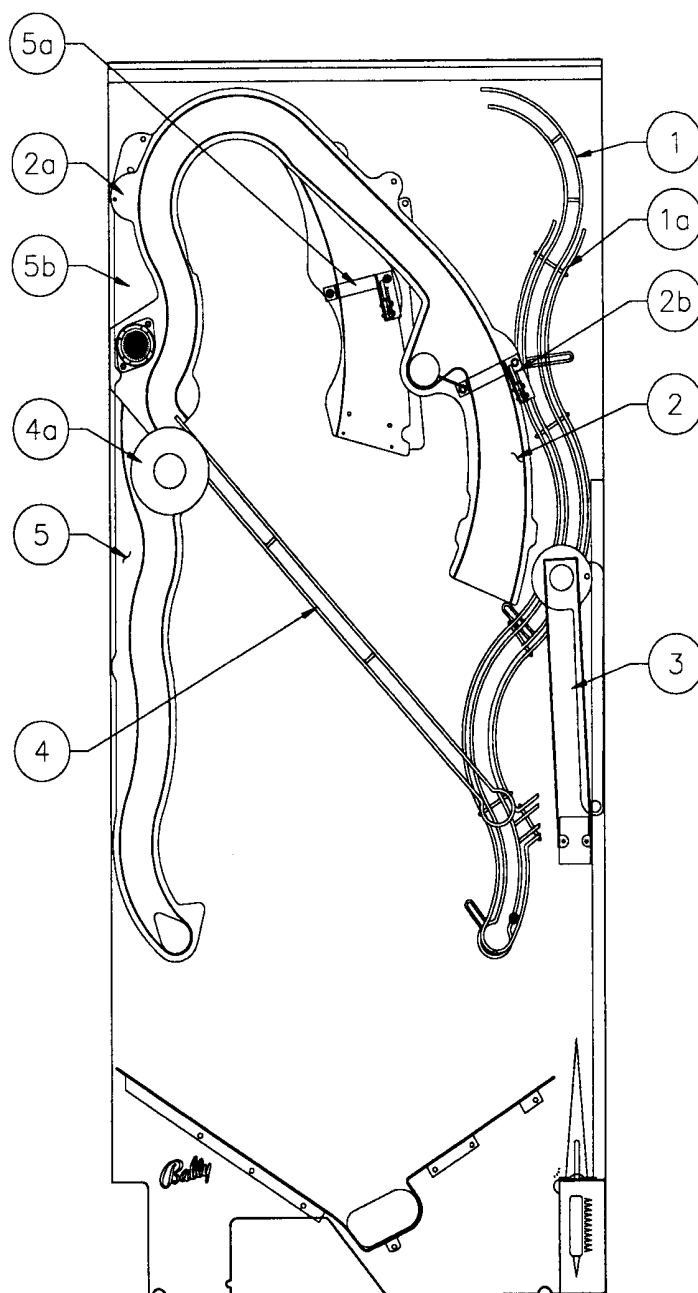
Upper Playfield Parts Locations
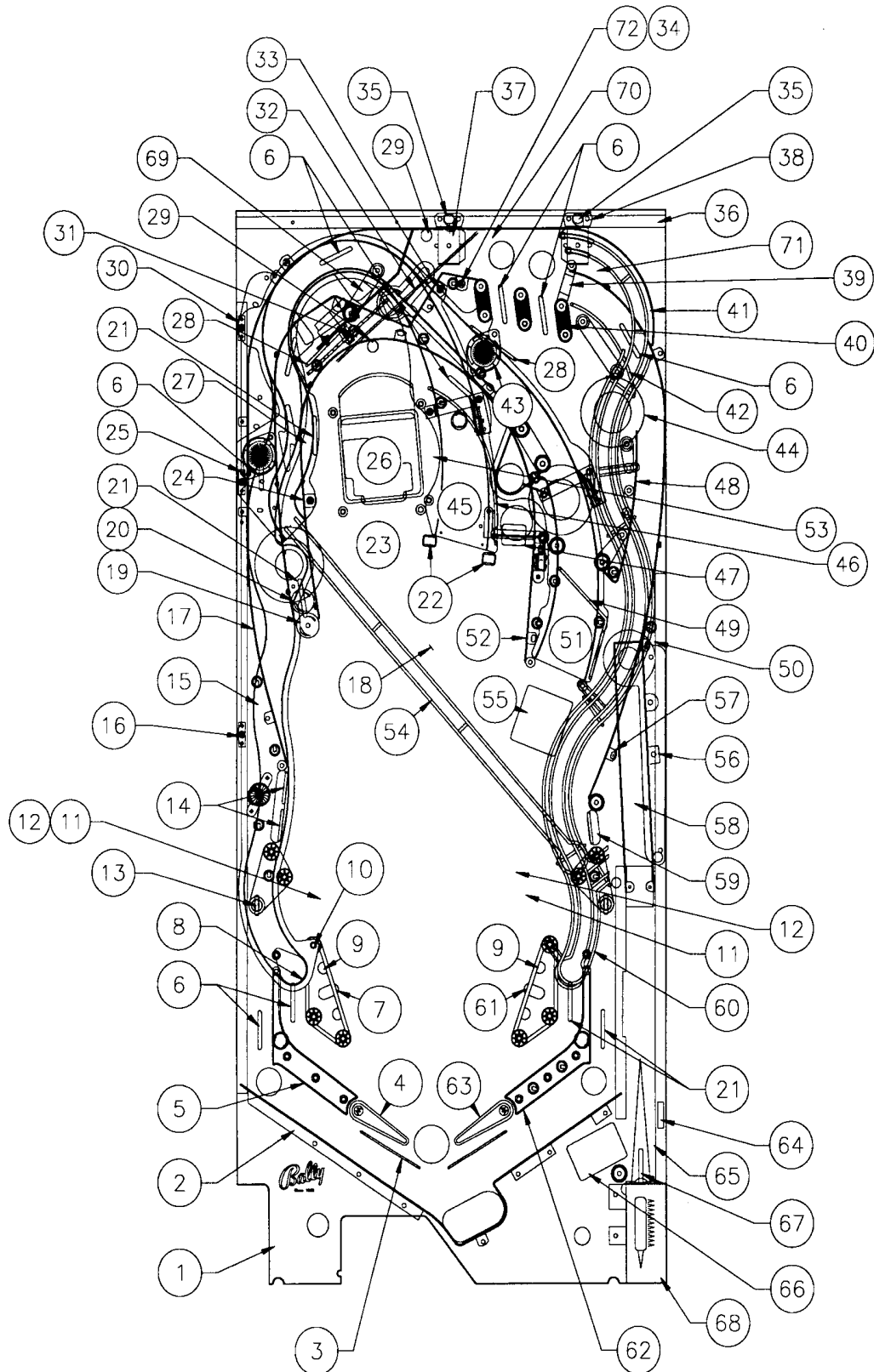
Lower Playfield Parts

Item	Part Number	Description
1	01-9211	Plfd. Hanger Bracket Assy. (2)
2	01-13645	Leg Support (2)
3	A-19963	Outhole Ball Trough Assembly
4	A-15849-R-2	Flipper Assembly, Lwr. Right
5	A-15595	7-Switch Opto PCB & Bracket
6	A-17811	Kicker Arm (Slingshot) Assembly
	B-9362-R-4	Coil & Bracket Assembly
7	A-15257	Bracket & Pole Piece Assy. (2)
8	20-10197	Coil Magnet & Coil Breaker (2)
9	A-19982	18-Lamp Board Assembly
10	A-19939	Plate Assembly - Complete
11	A-19984	6-Lamp Board Assembly
12	A-16120	D.C. Motor Control PCB Assy.
13	A-9415-2	Jet Bumper Coil Assembly
14	A-17749.1-2	Slide Playfield Assembly, Right
15	A-17796	Ball Gate Actuator Assy. (2)
16	A-20003	Eject Assembly
17	A-17932	Disappearing Post Assembly (2)
18	A-17749.1-1	Slide Playfield Assembly, Left
19	A-19782	Magic Trunk Motor Assembly
20	A-18543-2	Generic Eddy Sensor PCB
21	A-19825	Trough Assembly
22	A-19983	17-Lamp Board Assembly
23	A-18543-1	Generic Eddy Sensor PCB (2)
24	A-17811	Kicker Arm (Slingshot) Assembly
	B-9362-L-3	Coil & Bracket Assembly
25	A-19981	14-Lamp Board Assembly
26	A-15849-L-2	Flipper Assembly, Lwr. Left
27	A-20036	Eddy Coil PCB Assembly
28	A-17064	Inductor & Eddy Sensor Cable (2)

Ramps

Item	Part Number	Description
1	A-19958	Right Wire Ramp Assy.
a)	5647-12693-13	Mini Micro Switch
2	A-19954	Ramp Assembly, Left
a)	5647-12693-13	Mini Micro Switch
b)	A-20037	Bracket & Switch Gate
3	A-20048	Shooter Ramp Assembly
4	A-19959	Crossover Wire Ramp
a)	A-19779	Diverter Magnet Assy.
5	A-19955	Ramp Assembly, Left
a)	A-20046	Brkt. & Switch Gate Assy.
b)	5647-12693-13	Mini Micro Switch

LAMP MATRIX

Yellow (B+) ——▷|— Red

Column \ Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-9 Q91
1 Red-Brown J133-1 Q90	(T)HEATRE 11	HAUNTED BASEMENT 21	MA(G)IC 31	EXTRA BALL 41	TRUNK HIT 2 51	TIGER SAW 61	HAT MAGIC 71	SPECIAL 81
2 Red-Black J133-2 Q89	T(H)EATRE 12	META-MORPHISIS AWARD 22	MAGI(C) 32	VANISH 42	HURRY UP 52	LEVITATE WOMAN 2	SPIRIT AWARD 72	NOT USED 82
3 Red-Orange J133-4 Q88	TH(E)ATRE 13	RIGHT SPELL MAGIC 23	LIFT TRAPDOOR 33	SPELL THEATRE 43	TRUNK ESCAPE 53	GRAND FINALE 63	THEATRE 73	NOT USED 83
4 Red-Yellow J133-5 Q87	THE(A)TRE 14	SPIRIT RING 24	CENTER SPELL MAGIC 34	JACKPOT 44	LOCK BALL 54	TRUNK ESCAPE 64	MULTI-BALL 74	NOT USED 84
5 Red-Green J133-6 Q86	THEA(T)RE 15	ADVANCE CLOCK 25	LEVITATE AWARD 35	SAFE AWARD 45	HAT TRICK AWARD 55	SPIRIT CARDS 65	MIDNIGHT 75	LAMP IN CUBE 85
6 Red-Blue J133-7 Q85	THEAT(R)E 16	JACKET AWARD 26	MAG(I)C 36	TIGER SAW AWARD 46	START ILLUSION 56	SAFE ESCAPE 66	ILLUSIONS 76	SHOOT AGAIN 86
7 Red-Violet J133-8 Q84	THEATR(E) 17	M(A)GIC 27	TOP ROLLOVER 1 37	START FINALE 47	START MULTI-BALL 57	META-MORPHISIS 67	SAW MULTI-BALL 77	BUY-IN 87
8 Red-Gray J133-9 Q83	(M)AGIC 18	TRUNK HIT 3 28	TOP ROLLOVER 2 38	TRUNK HIT 1 48	LITE VANISH 58	STRAIT JACKET 68	HOCUS POCUS 78	START BUTTON 88

J1XX = Power Driver Board

Lamp Locations

Item No.	Bulb No.	Lamp Assy. No.	Description
11	24-8768	A-19982	(T)HEATRE
12	24-8768	A-19982	T(H)EATRE
13	24-8768	A-19982	TH(E)ATRE
14	24-8768	A-19982	THE(A)TRE
15	24-8768	A-19982	THEA(T)RE
16	24-8768	A-19982	THEAT(R)E
17	24-8768	A-19982	THEATR(E)
18	24-8768	A-19982	(M)AGIC
21	24-8768	A-19982	Haunted Basement
22	24-8768	A-19982	Metamorphosis Award
23	24-8768	A-19982	Right Spell Magic
24	24-8768	A-19982	Spirit Ring
25	24-8768	A-19982	Advance Clock
26	24-8768	A-19983	Jacket Award (2)
	24-8768	A-19982	
27	24-8768	A-19982	M(A)GIC
28	24-6549	A-17836	Trunk Hit 3
31	24-8768	A-19982	MA(G)IC
32	24-8768	A-19982	MAGI(C)
33	24-8768	A-19984	Lift Trapdoor
34	24-8768	A-19984	Center Spell Magic
35	24-8768	A-19984	Levitate Award
36	24-8768	A-19982	MAG(I)C
37	24-6549	A-17835	Top Rollover 1
38	24-6549	A-17835	Top Rollover 2
41	24-8768	A-19983	Extra Ball
42	24-8768	A-19983	Vanish
43	24-8768	A-19983	Spell Theatre
44	24-8768	A-19983	Jackpot
45	24-8768	A-19983	Safe Award (2)
	24-8768	A-19984	
46	24-8768	A-19983	Tiger Saw Award
47	24-8768	A-19983	Start Finale
48	24-8768	A-19983	Trunk Hit 1
51	24-8768	A-19983	Trunk Hit 2
52	24-8768	A-19983	Hurry Up
53	24-8768	A-19983	Trunk Escape
54	24-8768	A-19983	Lock Ball (2)
	24-8768	A-19984	
55	24-8768	A-19983	Hat Trick Award
56	24-8768	A-19983	Start Illusion
57	24-8768	A-19983	Start Multi-Ball
58	24-8768	A-19983	Lite Vanish
61	24-8768	A-19981	Tiger Saw
62	24-8768	A-19981	Levitate Woman
63	24-8768	A-19981	Grand Finale (2)
64	24-8768	A-19981	Trunk Escape
65	24-8768	A-19981	Spirit Cards
66	24-8768	A-19981	Safe Escape
67	24-8768	A-19981	Metamorphosis
68	24-8768	A-19981	Strait Jacket
71	24-8768	A-19981	Hat Magic
72	24-8768	A-19984	Spirit Award
73	24-8768	A-19981	Theatre
74	24-8768	A-19981	Multi-Ball
75	24-8768	A-19981	Midnight
76	24-8768	A-19981	Illusions
77	24-6549	A-17807	Saw Multi-Ball
78	24-6549	A-17835	Hocus Pocus
81	24-6549	A-17835	Special (2)
82	---	---	Not Used
83	---	---	Not Used
84	---	---	Not Used
85	24-8768	A-17826	Lamp in Cube
86	24-6549	A-17807	Shoot Again
87	20-9663-18	---	Buy-In
88	20-9663-1	---	Start Button

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

Cabinet shown for reference only

2-41

SWITCH MATRIX

White ———▶——o⁄ o— Green

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

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

2-42

Switch Locations

Item No.	Switch Part No.	Description
F1	SW-1A-194	Lower Right Flipper EOS
F2	A-17316	*Lower Right Flipper Cabinet
F3	SW-1A-194	Lower Left Flipper EOS
F4	A-17316	*Lower Left Flipper Cabinet
F5	---	Not Used
F6	---	Not Used
F7	---	Not Used
F8	---	Not Used
11	---	Not Used
12	---	Not Used
13	20-9663-1	Start Button
14	A-15361	*Plumb Bob Tilt
15	5647-12693-32	Shooter Lane
16	---	Not Used
17	---	Not Used
18	---	Not Used
21	A-17238	*Slam Tilt
22	5643-09288-00	*Coin Door Closed
23	20-9663-18	Buy-In
24	5643-09112-00	*Always Closed
25	5647-12693-19	Left Outlane
26	5647-12693-19	Left Return Lane
27	5647-12693-19	Right Return Lane
28	5647-12693-19	Right Outlane
31	A-18617-1 A-18618-1	Trough JAM (LED) (Trans)
32	A-18617-1 A-18618-1	Trough 1 (LED) (Trans)
33	A-18617-1 A-18618-1	Trough 2 (LED) (Trans)
34	A-18617-1 A-18618-1	Trough 3 (LED) (Trans)
35	A-18617-1 A-18618-1	Trough 4 (LED) (Trans)
36	A-16908 A-16909	Subway Opto (LED) (Trans)
37	5647-12693-24	Spinner
38	A-17799-6	Right Lower Target
41	5647-12693-34	Lock 1
42	5647-12693-33	Lock 2
43	5647-12693-32	Lock 3
44	5647-12693-11	Popper
45	A-18543-1	Left Drain Eddy
46	---	Not Used
47	5647-12693-13	Subway Micro
48	A-18543-1	Right Drain Eddy
51	A-18059-15	Left Bank Target (2)
52	5647-12693-19	Captive Ball Rest
53	5647-12693-19	Right Lane Enter
54	5647-12693-19	Left Lane Enter
55	A-19749	Cube Position 4
56	A-19749	Cube Position 1
57	A-19749	Cube Position 2
58	A-19749	Cube Position 3
61	SW-1A-114 SW-1A-120	Left Sling (kicker) (score)
75	5647-12693-11	Center Ramp Enter
62	SW-1A-114 SW-1A-120	Right Sling(kicker) (score)
63	SW-11A-37	Bottom Jet
64	SW-11A-37	Middle Jet
65	SW-11A-37	Top Jet
66	5647-12693-19	Top Lane 1
67	5647-12693-19	Top Lane 2
68	---	Not Used
71	5647-12693-13	Center Ramp Exit
72	---	Not Used
73	5647-12693-13	Right Ramp Exit
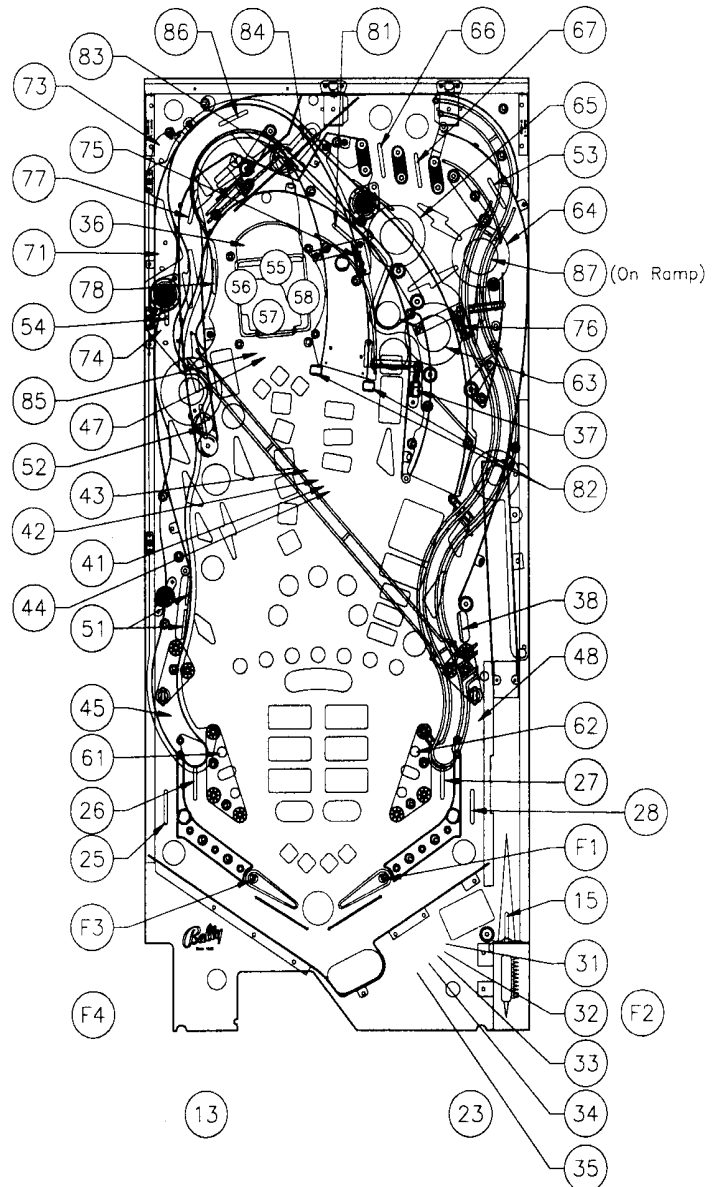
74	5647-12693-13	Right Ramp Exit 2
75	5647-12693-11	Center Ramp Enter
76	5647-12693-11	Right Ramp Enter
77	5647-12693-19	Captive Ball Top
78	5647-12693-19	Loop Left
81	5647-12693-19	Loop Right
82	A-20014-5	Center Ramp Targets (2)
83	5647-12133-11	Vanish Lock 1
84	5647-12133-12	Vanish Lock 2
85	A-18543-2	Trunk Hit
86	5647-12693-19	Right Lane Exit
87	5647-12693-13	Left Lane Exit
88		Not Used

*Not Shown

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Voltage Connections Backbox	Voltage Connections Cabinet	Drive Xister	Drive Connections Playfield	Drive Connections Backbox	Drive Connections Cabinet	Drive Wire Color	Solenoid Part number Flashlamp Type Playfield	Solenoid Part number Flashlamp Type Backbox
01	BALL TROUGH	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	MAGNET DIVERTER	High Power	J107-2			Q80	J130-2			Vio-Red	20-10179	
03	TRAP DOOR UP	High Power	J107-2			Q78	J130-4			Vio-Org	A-20099	
04	SUBWAY POPPER	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1200	
05	RIGHT DRAIN MAGNET	High Power	J107-2			Q64	J130-6			Vio-Grn	20-10197	
06	CENTER LOOP POST	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-27-1200	
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	TOP DIVERTER POST	High Power	J107-2			Q70	J130-9			Vio-Gry	AE-27-1200	
09	LEFT SLING	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-27-1200	
10	RIGHT SLING	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-27-1200	
11	BOTTOM JET	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	MIDDLE JET	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	TOP JET	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	TRAP DOOR HOLD	Low Power	J107-2			Q48	J127-7			Brn-Blu	A-20099	
15	LEFT UP/DOWN GATE	Low Power	J107-3			Q46	J127-8			Brn-Vio	A-14406	
16	RIGHT UP/DOWN GATE	Low Power	J107-3			Q44	J127-9			Brn-Gry	A-14406	
17	BOX CLOCKWISE	Flasher	J116-2			Q42	J126-1			Blk-Brn	14-8018	
18	BOX COUNTER CLOCKWISE	Flasher	J116-2			Q40	J126-2			Blk-Red	14-8018	
19	NOT USED	Flasher	J116-2			Q38	J126-3			Blk-Org	---	
20	RETURN LANE FLASHER	Flasher	J107-6			Q36	J126-4			Blk-Yel	#89 (2)	
21	TOP KICKOUT	Flasher	J107-1			Q28	*J126-5			Blu-Grn	AE-27-1200	
22	NOT USED	Flasher	J107-6			Q30	J126-6			Blu-Blk	---	
23	NOT USED	Flasher	J107-6			Q34	J126-7			Blu-Vio	---	
24	TRAP DOOR FLASHER	Flasher	J107-6			Q32	J126-8			Blu-Gry	#89 (2)	
25	SPIRIT RING FLASHER	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#906, #89	#906
26	SAW FLASHER	Gen. Purpose	J107-6	J106-5		Q24	J122-2	J124-2		Blu-Red	#906, #89 (2)	#906
27	JET FLASHER	Gen. Purpose	J107-6	J106-5		Q22	J122-3	J124-3		Blu-Org	#906, #89 (2)	#906
28	BOX FLASHER	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-5		Blu-Yel	#906, #89 (2)	#906
33	CUBE MAGNET	High Power	J907-6,7			Q2	J902-6			Yel-Vio	20-10197	
34	SUB BALL RELEASE	Low Power	J907-6,7			Q7	J902-4			Org-Vio	AE-27-1200	
35	LEFT DRAIN MAGNET	High Power	J907-8,9			Q1	J902-3			Yel-Gry	20-10197	

	General Illumination		Voltage Connections Playfield	Backbox	Cabinet	Drive Xister	Drive Connections Playfield	Backbox	Cabinet	Drive Wire Color	Flashlamp Playfield	Backbox
01	STRING 1	G.I.		J120-1		Q18		J120-7		Wht-Brn		#555
02	STRING 2	G.I.		J120-2		Q10		J120-8		Wht-Org		#555
03	STRING 3	G.I.	J121-3			Q14	J121-9			Wht-Yel	#44	
04	STRING 4	G.I.	J121-5			Q16	J121-10			Wht-Grn	#44	
05	STRING 5	G.I.	J121-6			Q12	J121-11			Wht-Vio	#44	

	Flipper Circuits		Voltage Connections Playfield	Drive Transistors Power	Drive Transistors Hold	Drive Connectors Playfield	Drive Wire Colors Power	Drive Wire Colors Hold	Coil Part No.	Coil Color
29		Lwr. Rt. Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn			
30	Lower Right Flipper	Lwr. Rt. Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn	FL-11629	BLUE
31		Lwr. Lt. Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu			
32	Lower Left Flipper	Lwr. Lt. Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu	FL-11629	BLUE
33		Upr. Rt. Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio			
34	Upper Right Flipper	Upr. Rt. Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio	NOT	USED
35		Upr. Lt. Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry			
36	Upper Left Flipper	Upr. Lt. Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry	NOT	USED

J1xx=Power Driver Board; J9xx=Fliptronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb
*Tieback Diode J126-13

Solenoid/Flashlamp Locations

Item No.	Coil/ Flasher No.	Assy. Number.	Description
01	AE-26-1500	A-19963	Ball Trough
02	20-10179	A-19778	Magnet Diverter
03	A-20099	A-19939	Trap Door Up
04	AE-26-1200	A-19939	Subway Popper
05	20-10197	---	Right Drain Magnet
06	AE-27-1200	A-17932	Center Loop Post
07	AE-23-800	B-10686-1	*Knocker
08	AE-27-1200	A-17932	Top Diverter Post
09	AE-27-1200	B-9362-L-3	Left Sling
10	AE-27-1200	B-9362-R-4	Right Sling
11	AE-26-1200	A-9415-2	Bottom Jet
12	AE-26-1200	A-9415-2	Middle Jet
13	AE-26-1200	A-9415-2	Top Jet
14	A-20099	A-19939	Trap Door Hold
15	A-14406	A-17796	Left Up/Down Gate
16	A-14406	A-17796	Right Up/Down Gate
17	14-8018	A-19782	Box Clockwise
18	14-8018	A-19782	Box Counter Clockwise
19	---	---	Not Used
20	24-8704	A-17983	Return Lane Flasher (2)
21	AE-27-1200	A-20003	Top Kickout
22	---	---	Not Used
23	24-8704	A-17803	Save Post Flasher
24	24-8704	A-17983	Trap Door Flasher
25	24-8704 24-8802	A-17803 ---	Spirit Ring Flasher
26	24-8704 24-8802	A-17983 ---	Saw Flasher
27	24-8704 (2) 24-8802	A-17903 ---	Jet Flasher
28	24-8704 (2) 24-8802 (2)	A-17803 ---	Box Flasher
33	24-8704 20-10197	A-17983 A-19778	Cube Magnet
34	AE-27-1200	A-19934	Sub Ball Release
35	20-10197	---	Left Drain Magnet

*Not Shown

General Illumination Circuits

Item No.	Description	Bulb No.	
01	String 1	#555	G.I. String 1
02	String 2	#555	G.I. String 2
03	String 3	#44	G.I. String 3
04	String 4	#44	G.I. String 4
05	String 5	#44	G.I. String 5

Flipper Coils

Coil No.	Color	Assy. No.	Description
FL-11629	(blue)	A-15849-R-2	Lower Right Flipper
FL-11629	(blue)	A-15849-L-2	Lower Left Flipper

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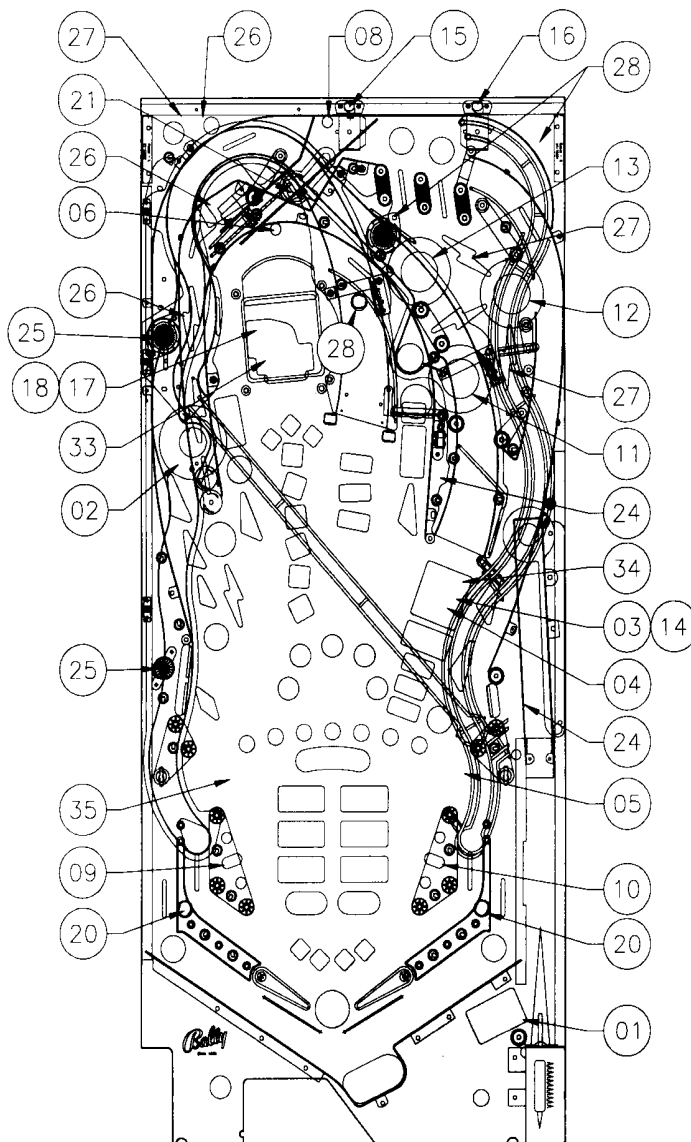
Rubber Rings

Item No.	Part Number	Description.	Qty
A	23-6327	Ball Shooter Tip	1
B	23-6556	Black Sleeve	8
C	23-6641	Rubber Bumper .64 od	7
D	23-6694-1	Rubber Grommet 3/32"	3
E	23-6694-3	Rubber Ring 5/16"	6
F	23-6694-5	Rubber Ring 3/4"	1
G	23-6694-6	Rubber Ring 1"	4
H	23-6694-8	Rubber Ring 1 1/2"	1
I	23-6694-10	Rubber Ring 2 1/2"	2
J	23-6695	Flipper Ring 1 1/2"	2
K	23-6694-9	Rubber Ring 2"	2
L	23-6553-4	Flipper Rubber, Red	1
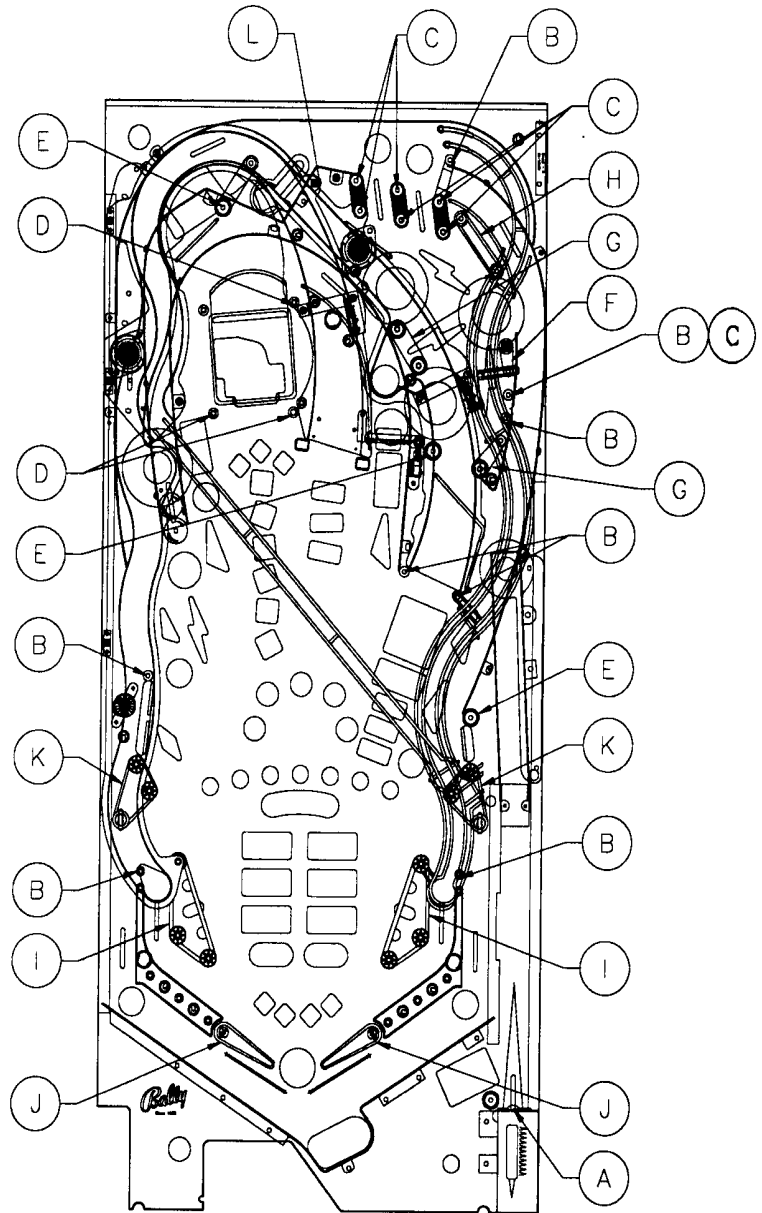
SECTION THREE

GAME WIRING
AND SCHEMATICS

CONNECTOR & COMPONENT IDENTIFICATION

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

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

Prefix number for the WPC circuit boards are as listed below.

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

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

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

SWITCH MATRIX

White ──▶│──○╱ ○── 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 JAM 31	LOCK 1 41	LEFT BANK TARGET 51	LEFT SLING 61	CENTER RAMP EXIT 71	LOOP RIGHT 81	Black-Green J906-1 Right Flipper EOS F1
Orange-Red (2) J205-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	NOT USED 12	COIN DOOR CLOSED 22	TROUGH 1 32	LOCK 2 42	CAPTIVE BALL REST 52	RIGHT SLING 62	NOT USED 72	CENTER RAMP TARGETS 82	Black-Violet J905-1 Right Flipper Opto F2
Orange-Black (3) J205-3 Right Coin Chute D3	3 White-Orange J209-3 U18-5	START BUTTON 13	BUY-IN 23	TROUGH 2 33	LOCK 3 43	RIGHT LANE ENTER 53	BOTTOM JET 63	RIGHT RAMP EXIT 73	VANISH LOCK 1 83	Black-Blue J906-3 Left Flipper EOS F3
Orange-Yellow (4) J205-4 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH 3 34	POPPER 44	LEFT LANE ENTER 54	MIDDLE JET 64	RIGHT RAMP EXIT 2 74	VANISH LOCK 2 84	Black-Gray J905-2 Left Flipper Opto F4
Orange-Green (5) J205-6 Normal Ser Credits / Test Function Esc D5	5 White-Green J209-5 U19-11	SHOOTER LANE 15	LEFT OUTLANE 25	TROUGH 4 35	LEFT DRAIN EDDY 45	CUBE POSITION 4 55	TOP JET 65	CENTER RAMP ENTER 75	TRUNK HIT 85	Black-Violet J906-4 Upper Right Flipper EOS F5
Orange-Blue (6) J205-7 Normal Vol Down / Test Function Down D6	6 White-Blue J209-7 U19-9	NOT USED 16	LEFT RETURN LANE 26	SUBWAY OPTO 36	NOT USED 46	CUBE POSITION 1 56	TOP LANE 1 66	RIGHT RAMP ENTER 76	RIGHT LANE EXIT 86	Black-Yellow J905-3 Upper Right Flipper Opto F6
Orange-Violet (7) J205-8 Normal Vol Up / Test Function Up D7	7 White-Violet J209-8 U19-5	NOT USED 17	RIGHT RETURN LANE 27	SPINNER 37	SUBWAY MICRO 47	CUBE POSITION 2 57	TOP LANE 2 67	CAPTIVE BALL TOP 77	LEFT LANE EXIT 87	Black-Gray J906-5 Upper Left Flipper EOS F7
Orange-Gray (8) J205-9 Normal Begin Test / Test Function Enter D8	8 White-Gray J209-9 U19-7	NOT USED 18	RIGHT OUTLANE 28	RIGHT LOWER TARGET 38	RIGHT DRAIN EDDY 48	CUBE POSITION 3 58	NOT USED 68	LOOP LEFT 78	NOT USED 88	Black-Blue J905-5 Upper Left Flipper Opto F8

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

SWITCH MATRIX CIRCUIT

Column	A	B	
Inactive	H	L	Off
Active	L	H	On

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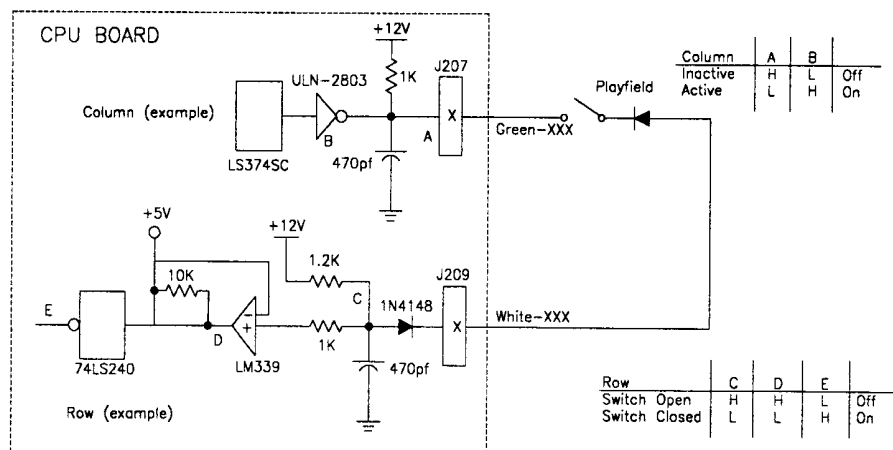
The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low, the column side is active.

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

DEDICATED SWITCHES

CPU Board	Coin Door Interface Board	Coin Acceptor or Control Switches
J205	J1 J3	

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

Coin Acceptor Switches

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

Control Switches

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

DEDICATED SWITCH CIRCUIT

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

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

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

LAMP MATRIX

Yellow (B+) ⎯⎯⎯ ▶ Red

Column / Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-9 Q91
1 Red-Brown J133-1 Q90	(T)HEATRE 11	HAUNTED BASEMENT 21	MA(G)IC 31	EXTRA BALL 41	TRUNK HIT 2 51	TIGER SAW 61	HAT MAGIC 71	SPECIAL 81
2 Red-Black J133-2 Q89	T(H)EATRE 12	META-MORPHISIS AWARD 22	MAGI(C) 32	VANISH 42	HURRY UP 52	LEVITATE WOMAN 2	SPIRIT AWARD 72	NOT USED 82
3 Red-Orange J133-4 Q88	TH(E)ATRE 13	RIGHT SPELL MAGIC 23	LIFT TRAPDOOR 33	SPELL THEATRE 43	TRUNK ESCAPE 53	GRAND FINALE 63	THEATRE 73	NOT USED 83
4 Red-Yellow J133-5 Q87	THE(A)TRE 14	SPIRIT RING 24	CENTER SPELL MAGIC 34	JACKPOT 44	LOCK BALL 54	TRUNK ESCAPE 64	MULTI-BALL 74	NOT USED 84
5 Red-Green J133-6 Q86	THEA(T)RE 15	ADVANCE CLOCK 25	LEVITATE AWARD 35	SAFE AWARD 45	HAT TRICK AWARD 55	SPIRIT CARDS 65	MIDNIGHT 75	LAMP IN CUBE 85
6 Red-Blue J133-7 Q85	THEAT(R)E 16	JACKET AWARD 26	MAG(I)C 36	TIGER SAW AWARD 46	START ILLUSION 56	SAFE ESCAPE 66	ILLUSIONS 76	SHOOT AGAIN 86
7 Red-Violet J133-8 Q84	THEATR(E) 17	M(A)GIC 27	TOP ROLLOVER 1 37	START FINALE 47	START MULTI-BALL 57	META-MORPHISIS 67	SAW MULTI-BALL 77	BUY-IN 87
8 Red-Gray J133-9 Q83	(M)AGIC 18	TRUNK HIT 3 28	TOP ROLLOVER 2 38	TRUNK HIT 1 48	LITE VANISH 58	STRAIT JACKET 68	HOCUS POCUS 78	START BUTTON 88

J1XX = Power Driver Board

LAMP MATRIX CIRCUIT

Column	A	B	
	H	L	Off
	L	H	On

Row	C	D	E	F	G	
(normal)	H	L	H	L	H	Off
operation)	H	L	L	H	L	On
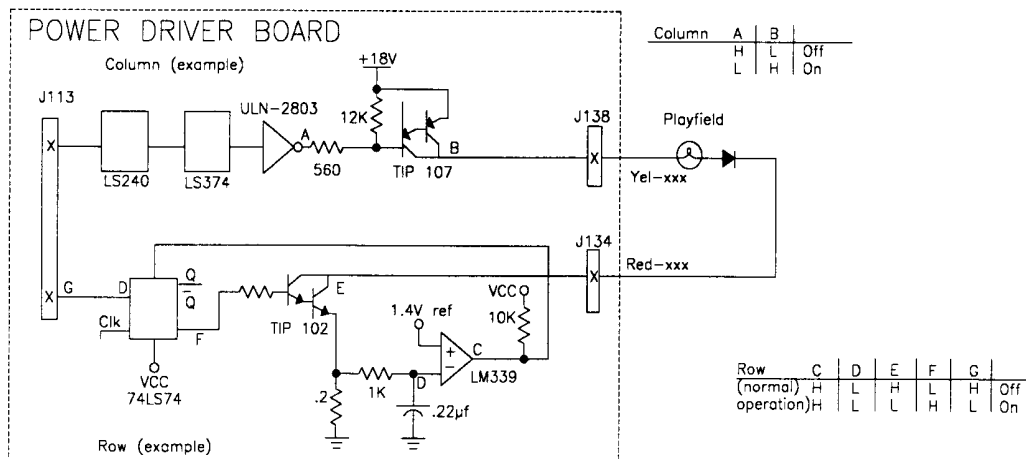
The processor sends a signal to the column circuit, causing the output of the ULN-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time the processor drives the input of the 74LS74 low, causing a high at output "F". A high state 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 lamps is shut Off through the comparator. If the voltage at the negative input of the LM330 rises above 1.4V the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit Off.

3-4

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Backbox	Cabinet	Drive Xister	Drive Connections Playfield	Backbox	Cabinet	Drive Wire Color	Solenoid Part number Flashlamp Type Playfield	Backbox
01	BALL TROUGH	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	MAGNET DIVERTER	High Power	J107-2			Q80	J130-2			Vio-Red	20-10179	
03	TRAP DOOR UP	High Power	J107-2			Q78	J130-4			Vio-Org	A-20099	
04	SUBWAY POPPER	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1200	
05	RIGHT DRAIN MAGNET	High Power	J107-2			Q64	J130-6			Vio-Grn	20-10197	
06	CENTER LOOP POST	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-27-1200	
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	TOP DIVERTER POST	High Power	J107-2			Q70	J130-9			Vio-Gry	AE-27-1200	
09	LEFT SLING	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-27-1200	
10	RIGHT SLING	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-27-1200	
11	BOTTOM JET	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	MIDDLE JET	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	TOP JET	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	TRAP DOOR HOLD	Low Power	J107-2			Q48	J127-7			Brn-Blu	A-20099	
15	LEFT UP/DOWN GATE	Low Power	J107-3			Q46	J127-8			Brn-Vio	A-14406	
16	RIGHT UP/DOWN GATE	Low Power	J107-3			Q44	J127-9			Brn-Gry	A-14406	
17	BOX CLOCKWISE	Flasher	J116-2			Q42	J126-1			Blk-Brn	14-8018	
18	BOX COUNTER CLOCKWISE	Flasher	J116-2			Q40	J126-2			Blk-Red	14-8018	
19	NOT USED	Flasher	J116-2			Q38	J126-3			Blk-Org	---	
20	RETURN LANE FLASHER	Flasher	J107-6			Q36	J126-4			Blk-Yel	#89 (2)	
21	TOP KICKOUT	Flasher	J107-1			Q28	*J126-5			Blu-Grn	AE-27-1200	
22	NOT USED	Flasher	J107-6			Q30	J126-6			Blu-Blk	---	
23	NOT USED	Flasher	J107-6			Q34	J126-7			Blu-Vio	---	
24	TRAP DOOR FLASHER	Flasher	J107-6			Q32	J126-8			Blu-Gry	#89 (2)	
25	SPIRIT RING FLASHER	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#906, #89	#906
26	SAW FLASHER	Gen. Purpose	J107-6	J106-5		Q24	J122-2	J124-2		Blu-Red	#906, #89 (2)	#906
27	JET FLASHER	Gen. Purpose	J107-6	J106-5		Q22	J122-3	J124-3		Blu-Org	#906, #89 (2)	#906
28	BOX FLASHER	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-5		Blu-Yel	#906, #89 (2)	#906
33	CUBE MAGNET	High Power	J907-6,7			Q2	J902-6			Yel-Vio	20-10197	
34	SUB BALL RELEASE	Low Power	J907-6,7			Q7	J902-4			Org-Vio	AE-27-1200	
35	LEFT DRAIN MAGNET	High Power	J907-8,9			Q1	J902-3			Yel-Gry	20-10197	

	General Illumination											
01	STRING 1	G.I.		J120-1		Q18		J120-7		Wht-Brn		#555
02	STRING 2	G.I.		J120-2		Q10		J120-8		Wht-Org		#555
03	STRING 3	G.I.	J121-3			Q14	J121-9			Wht-Yel	#44	
04	STRING 4	G.I.	J121-5			Q16	J121-10			Wht-Grn	#44	
05	STRING 5	G.I.	J121-6			Q12	J121-11			Wht-Vio	#44	

	Flipper Circuits		Voltage Connections Playfield	Drive Transistors Power	Hold	Drive Connectors Playfield	Drive Wire Colors Power	Hold	Coil Part No.	Coil Color
29		Lwr. Rt. Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn			
30	Lower Right Flipper	Lwr. Rt. Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn	FL-11629	BLUE
31		Lwr. Lt. Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu			
32	Lower Left Flipper	Lwr. Lt. Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu	FL-11629	BLUE
33		Upr. Rt. Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio			
34	Upper Right Flipper	Upr. Rt. Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio	NOT	USED
35		Upr. Lt. Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry			
36	Upper Left Flipper	Upr. Lt. Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry	NOT	USED

J1xx=Power Driver Board; J9xx=Fliptronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb
*Tieback Diode J126-13

SOLENOID WIRING

Fliptronic II Board

J907 8,9 | Red-Gray | +50VDC
J907 6,7 | Red-Violet | +50VDC

| Cube Magnet Sol 33 | Sub Ball Release Sol 34 | Left Drain Magnet Sol 35 |

J902 6 | Yellow-Violet
J902 4 | Orange-Violet
J902 3 | Yellow-Gray

Power Driver Board

J107 2 | Red-Brown | +50VDC
J107 3 | Red-Black | +50VDC
J107 1 | Red-Orange | +50VDC

J116 2 | Gray-Yellow | +12VDC

| D.C. Motor Control Board A-16120 |

| Box Clockwise Sol 17 | Box Counter-Clockwise Sol 18 | Top Kickout Sol 21 |

J126 1 | Black-Brown
J126 2 | Black-Red
J126 5 | Blue-Green
J126 13 | Red-Orange (Tieback Diode)

| Left Slingshot Sol 09 | Right Slingshot Sol 10 | Bottom Jet Sol 11 | Middle Jet Sol 12 | Top Jet Sol 13 | Trapdoor Hold Sol 14 | Left Up/Down Gate Sol 15 | Right Up/Down Gate Sol 16 |

J127 1 | Brown-Black
J127 3 | Brown-Red
J127 4 | Brown-Orange
J127 5 | Brown-Yellow
J127 6 | Brown-Green
J127 7 | Brown-Blue
J127 8 | Brown-Violet
J127 9 | Brown-Gray

| Ball Trough Sol 01 | Magnet Diverter Sol 02 | Trapdoor Up Sol 03 | Subway Popper Sol 04 | Right Drain Magnet Sol 05 | Center Loop Post Sol 06 | Knocker Sol 07 | Top Diverter Right Sol 08 |

J130 1 | Violet-Brown
J130 2 | Violet-Red
J130 4 | Violet-Orange
J130 5 | Violet-Yellow
J130 6 | Violet-Green
J130 7 | Violet-Blue
J130 8 | Violet-Black
J130 9 | Violet-Gray

FLASHER WIRING

J107 6 Red—White   +20VDC

J106 5 Red—White   +20VDC

Spirit Ring	Saw	Jet	Box
Sol 25	Sol 26	Sol 27	Sol 28

J124
1 Blue—Brown
2 Blue—Red
3 Blue—Orange
5 Blue—Yellow

POWER
DRIVER
BOARD

INSERT FLASHERS

Spirit Ring	Saw	Jet	Box
Sol 25	Sol 26	Sol 27	Sol 28

J122
1 Blue—Brown
2 Blue—Red
3 Blue—Orange
4 Blue—Yellow

PLAYFIELD FLASHERS

Right Return Lane	Trapdoor
Sol 20	Sol 24

J126
4 Black—Yellow
8 Blue—Gray

3-7

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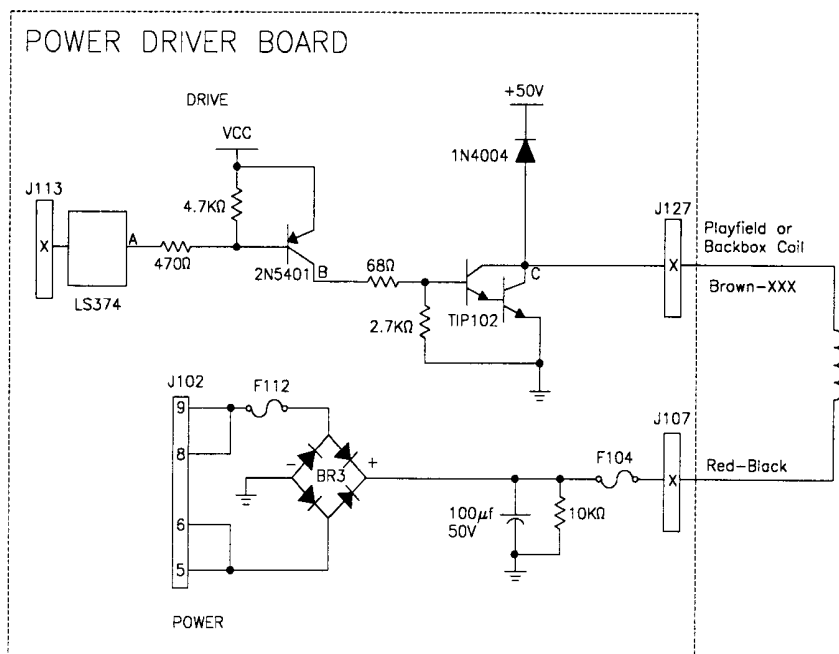
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor, and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the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

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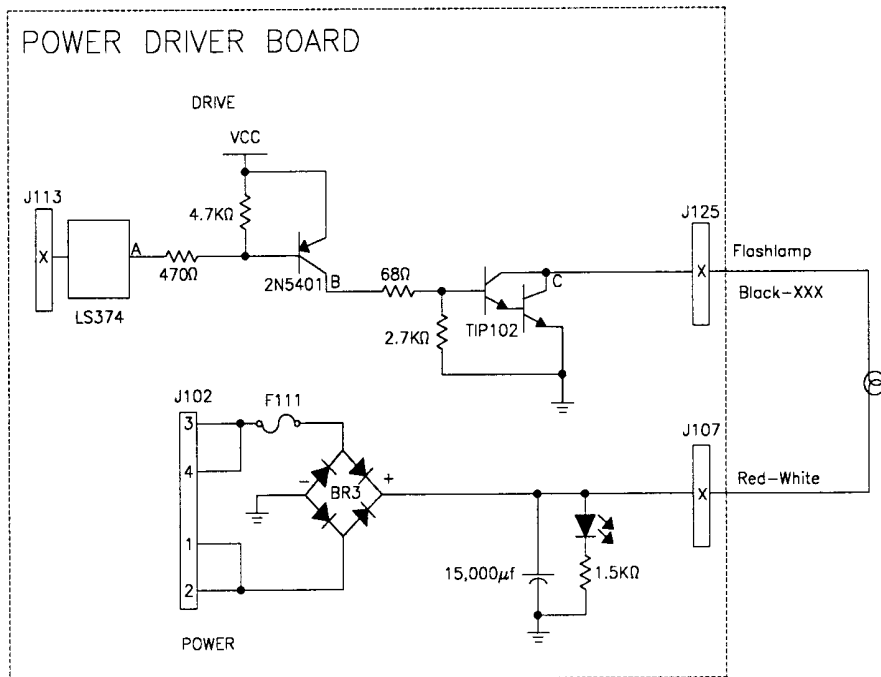
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When point "C" is low the flashlamp is grounded through the transistor and the flashlamp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

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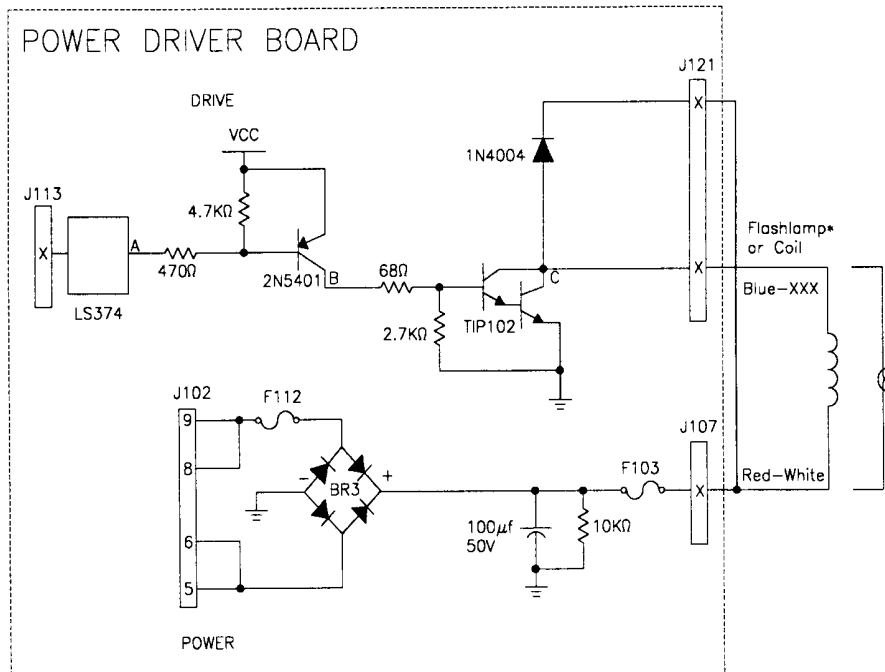
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" is high. A high at point "B" causes a low at point "C". When point "C" is low the coil/flashlamp is grounded through the transistor and the coil/flashlamp turns On. When point "A" toggles high the coil/flashlamp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

*Tieback Diode is not used for flashlamp circuit.

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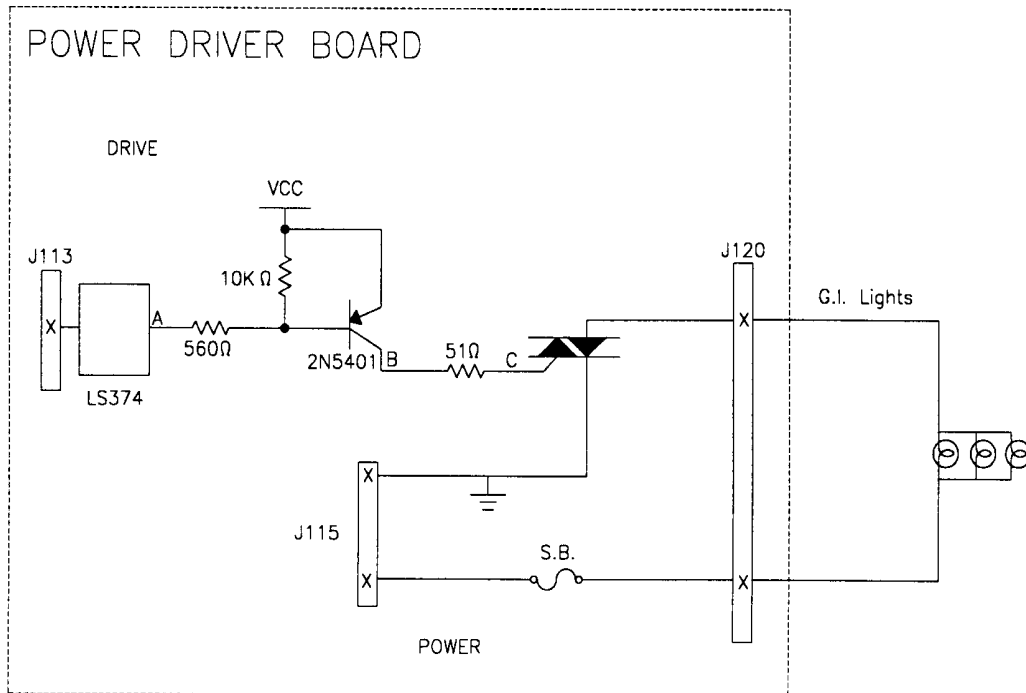
Block Diagram of General Illumination Circuit
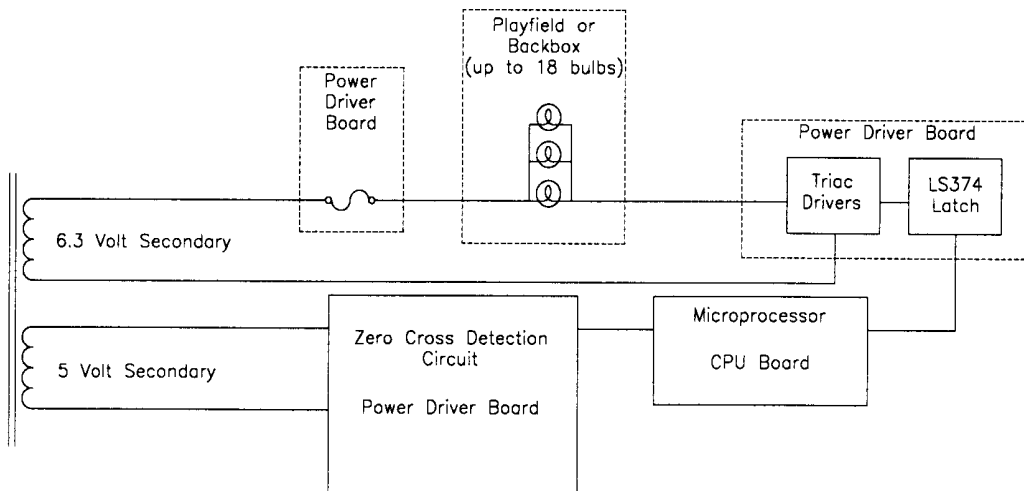
When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired general illumination string lights.

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

Green

WHT

A   K

SOLDER

Gray   Black

A   K

solder side

A   K

schematic

K   A

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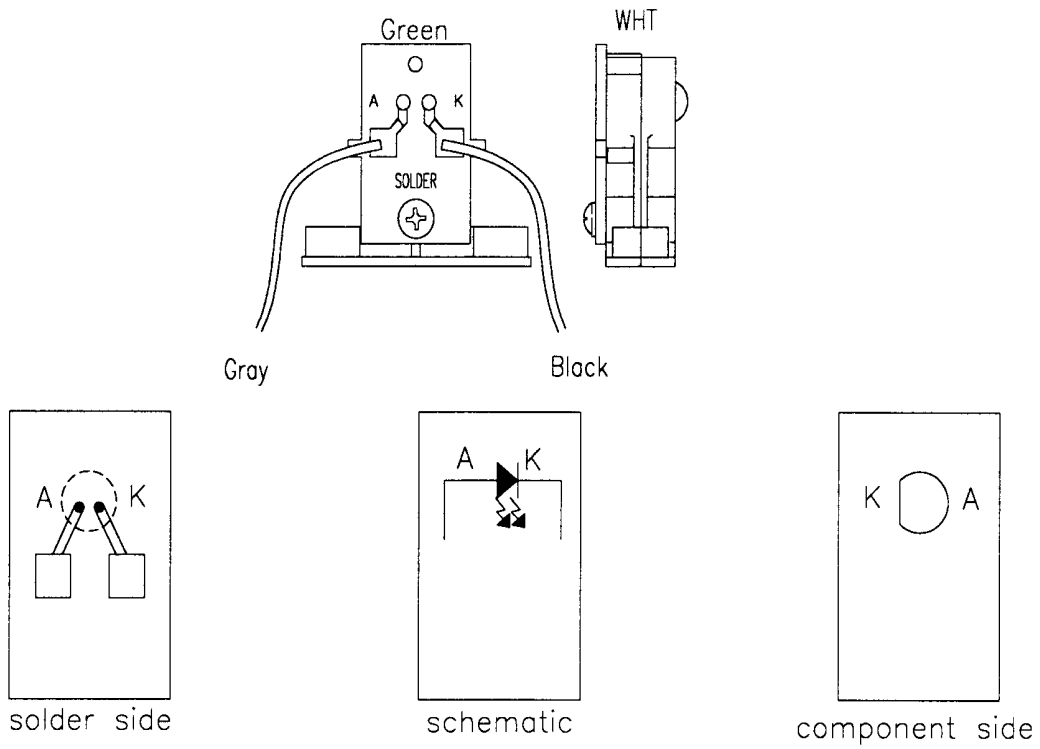
Photo Transistor P.C.B. Assembly (receiver)
A-16909

BLK   Blue

C   E

SOLDER

Gray—Yellow   Orange—XXX

C   E

solder side

C   E

schematic

E   C

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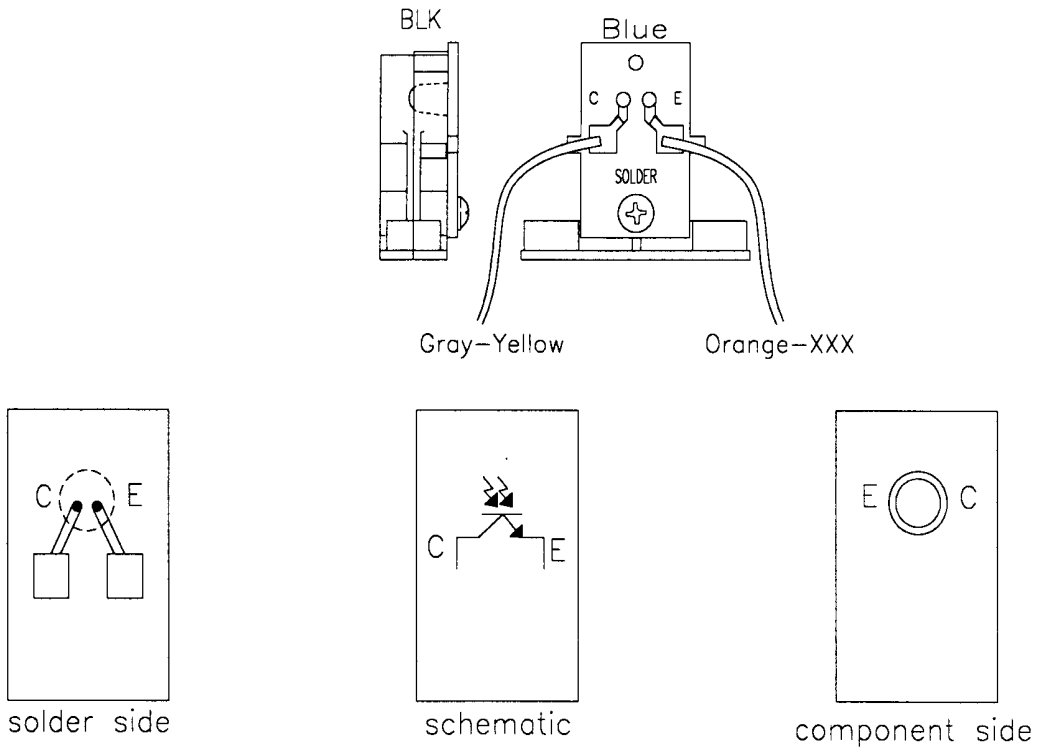
Flipper Opto P.C.B. Assembly
A-17316
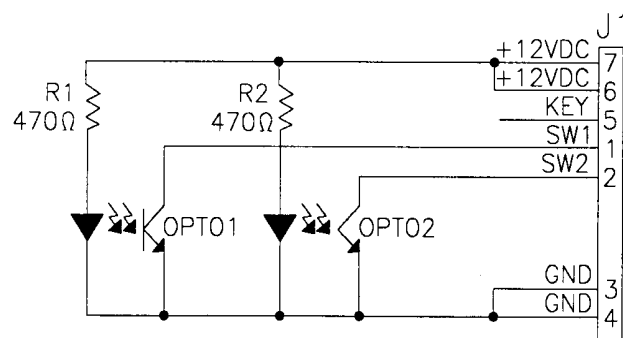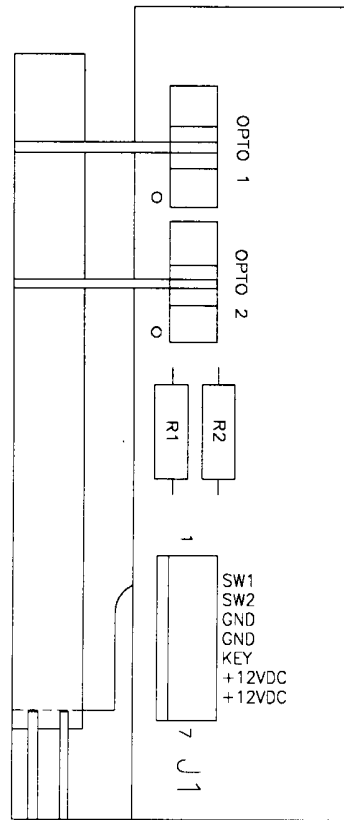
Left Side Flipper Cabinet Opto Switch Board
J1-1 Black-Blue from Fliptronic II Board J905-5
J1-2 Blue-Gray from Fliptronic II Board J905-2
J1-3 Not Used
J1-4 Orange from Fliptronic II Board J905-6
J1-5 Not Used
J1-6 Gray-Yellow to Right Flipper Opto Board J1-6
J1-7 Gray-Yellow from Fliptronic II Board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

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

Flipper Circuit Diagram

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

FLIPTRONIC II BOARD

J907 `4 8 1 6`

END-OF-STROKE SWITCHES

J906

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

J902

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

UPPER* RIGHT FLIPPER COIL

LOWER RIGHT FLIPPER COIL

UPPER* LEFT FLIPPER COIL

LOWER LEFT FLIPPER COIL

J905

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

CABINET OPTO SWITCHES

Gray-Yellow +12V

J901

1	White-Blue	50VAC
5	White-Blue	50VAC

J904

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

J903

J202

CPU BOARD

J114 `1 2 3 4 5 7`   **J105** `2 1`   **J118** `2`

POWER DRIVER BOARD

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

Flipper Coil Circuits

Left Flipper Circuit

Right Flipper Circuit
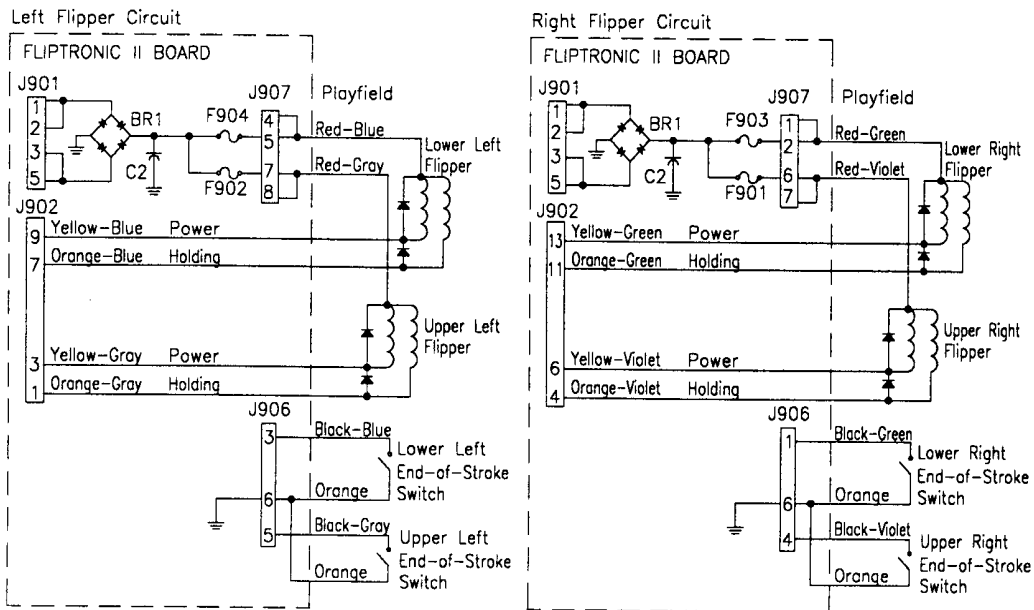
Flipper End-of-Stroke Switches
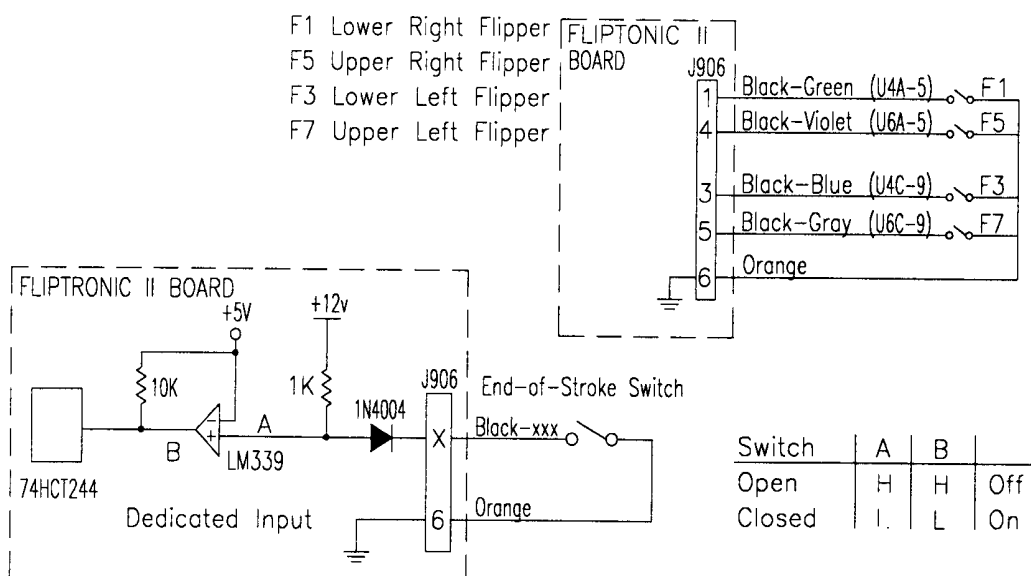
F1 Lower Right Flipper
F5 Upper Right Flipper
F3 Lower Left Flipper
F7 Upper Left Flipper

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

Flipper Cabinet Switch Circuit Diagram
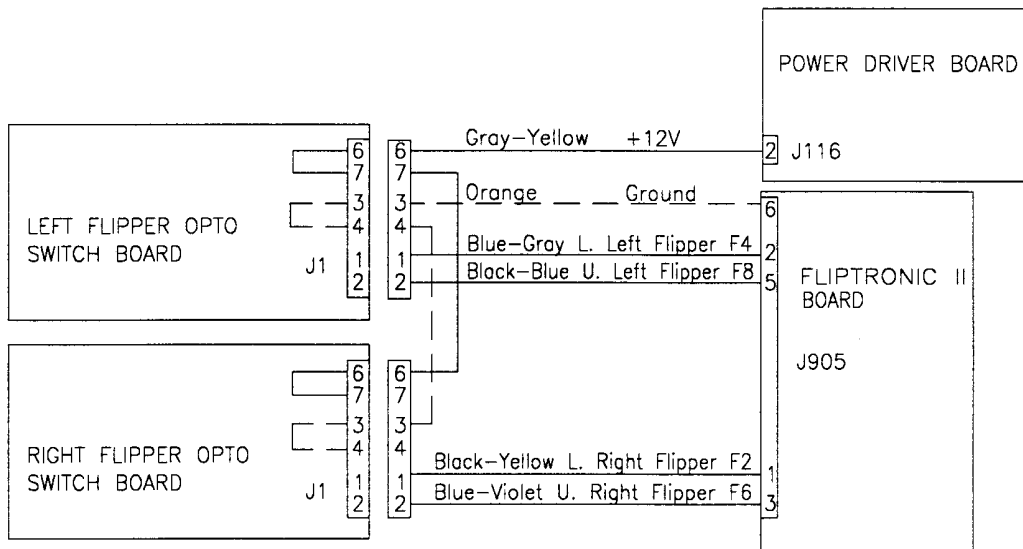
Flipper Cabinet Switches
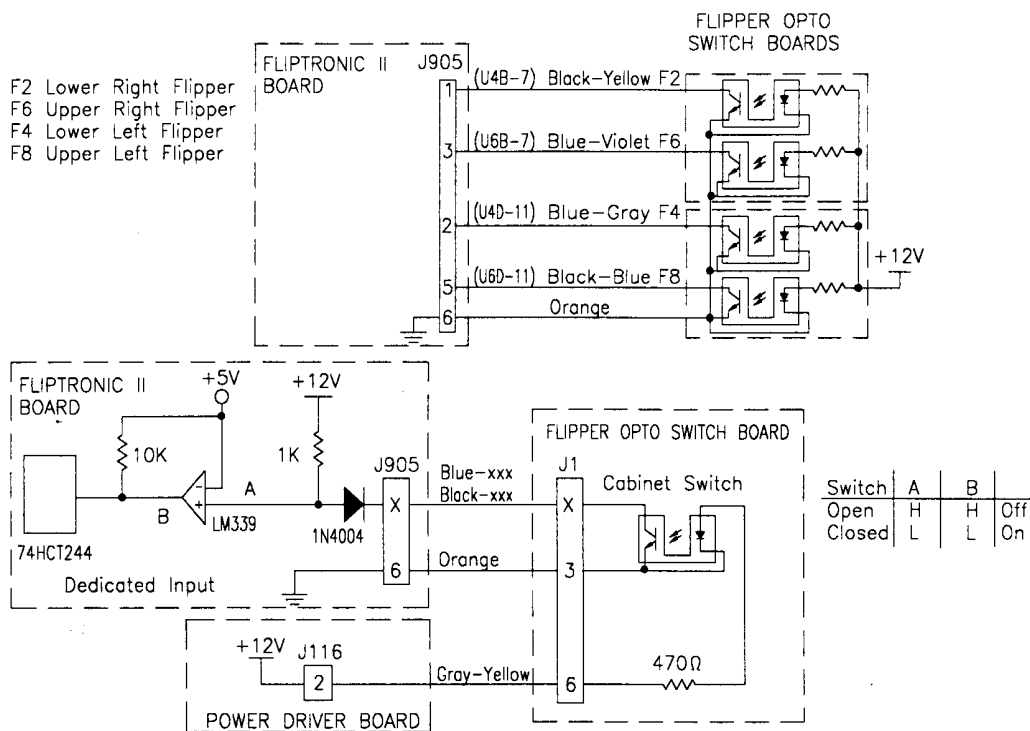
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TROUGH IRED LED P.C.B. ASSEMBLY
A-18617-1

J1-1 Not Used
J1-2 Not Used
J1-3 Gray-Green, from Opto SW7 Board J1-3
J1-4 Gray-Black, from Opto SW7 Board J1-5
J1-5 Gray-Orange, from Opto SW7 Board J1-6
J1-6 Gray-Red, from Opto SW7 Board J1-7
J1-7 Gray-Brown, from Opto SW7 Board J1-8
J1-8 Key
J1-9 Black, from Opto SW7 Board J1-10
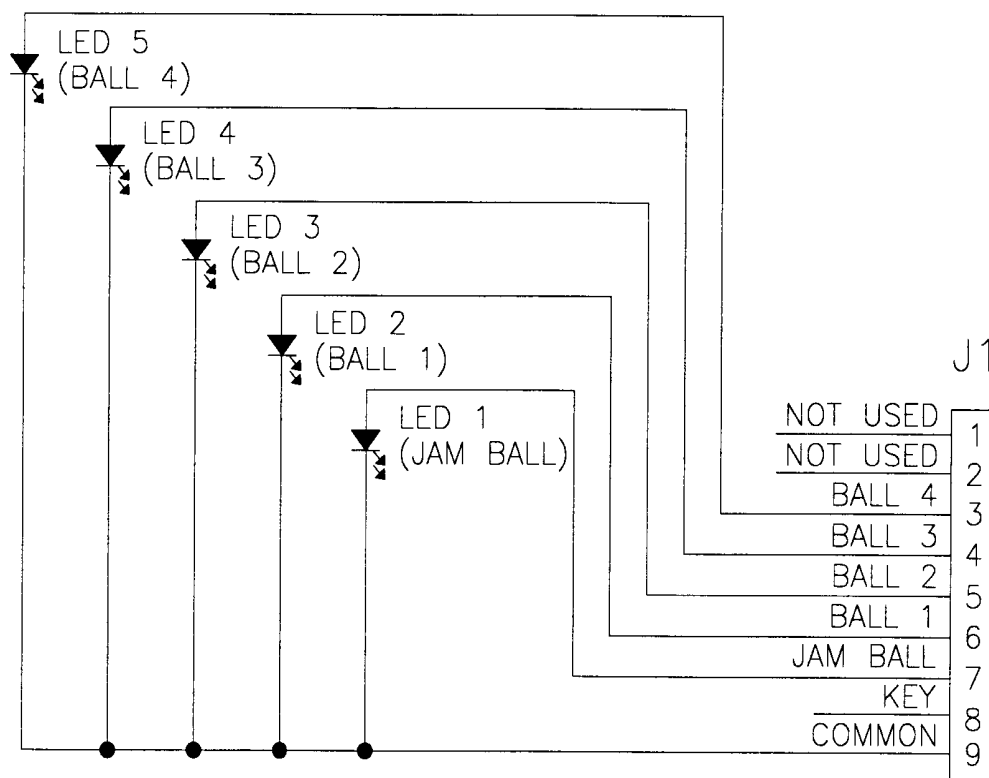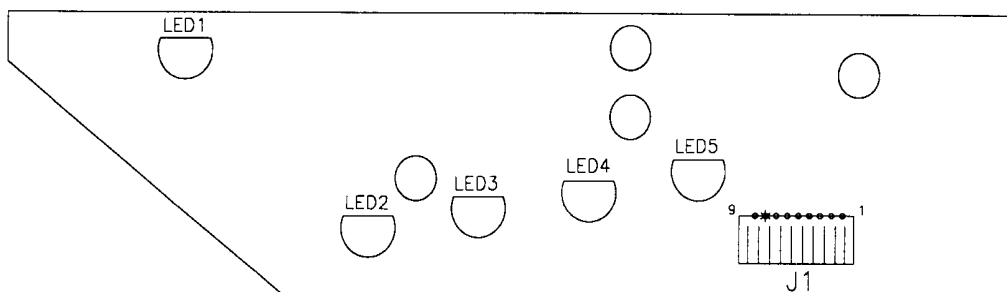
Trough 7 IRED Circuit

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

J1-1 Gray-Yellow, from Opto SW7 Board J2-10
J1-2 Key
J1-3 Orange-Brown, from Opto SW7 Board J2-7
J1-4 Orange-Red, from Opto SW7 Board J2-6
J1-5 Orange-Black, from Opto SW7 Board J2-5
J1-6 Orange-Yellow, from Opto SW7 Board J2-4
J1-7 Orange-Green, from Opto SW7 Board J2-3
J1-8 Not Used
J1-9 Not Used
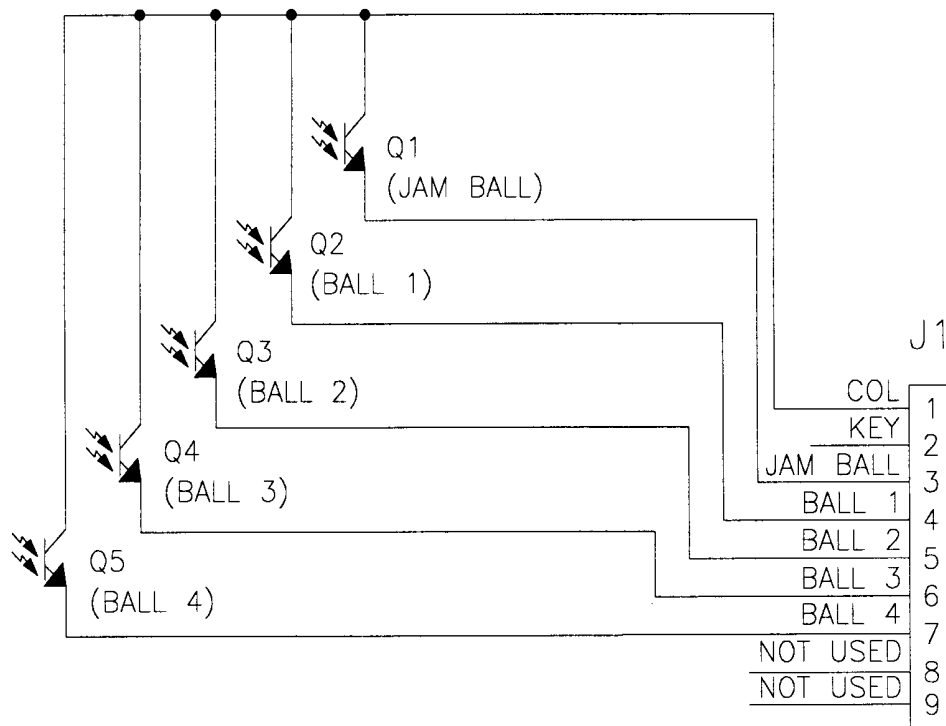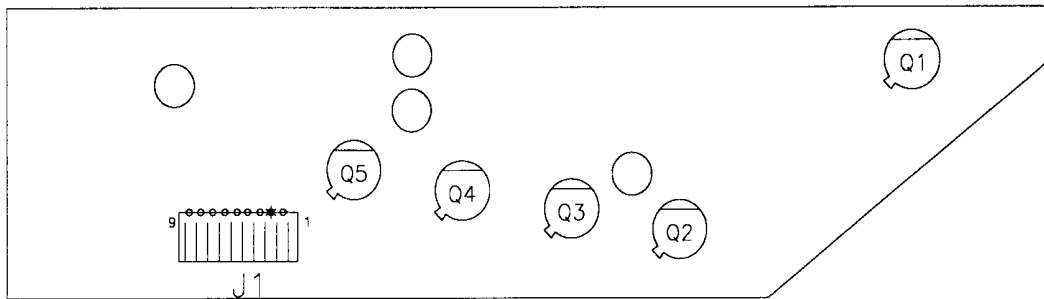
Trough 7 IR TSTR Circuit

OPTO SW7 P.C.B.
A-15576
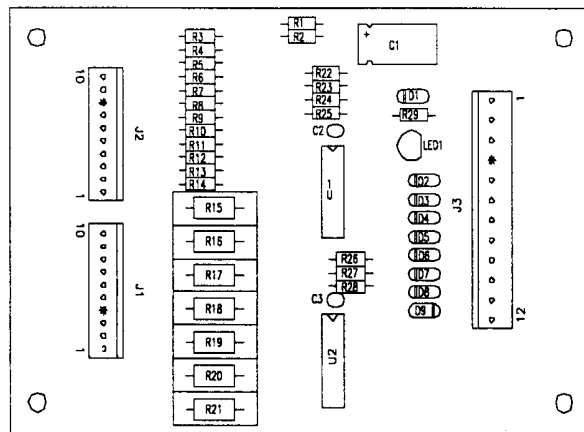
J1-1 Not Used
J1-2 Gray-Blue to A-14231 (LED) J1-7 Sw #36
J1-3 Gray-Green to A-18617-1 (LED) J1-3 Sw #34
J1-4 Key
J1-5 Gray-Black to A-18617-1 (LED) J1-4 Sw #33
J1-6 Gray-Orange to A-18617-1 (LED) J1-5 Sw #32
J1-7 Gray-Red to A-18617-1 (LED) J1-6 Sw #31
J1-8 Gray-Brown to A-18617-1 (LED) J1-7 Sw #35
J1-9 Not Used
J1-10 Black Ground to A-18617-1 J1-10

J2-1 Not Used
J2-2 Orange-Blue to A-14232 (Photo) J1-3 Sw #36
J2-3 Orange-Green to A-18618-1 (Photo) J1-7 Sw #34
J2-4 Orange-Yellow to A-18618-1 (Photo) J1-6 Sw #33
J2-5 Orange-Black to A-18618-1 (Photo) J1-5 Sw #32
J2-6 Orange-Red to A-18618-1 (Photo) J1-4 Sw #31
J2-7 Orange-Brown to A-18618-1 (Photo) J1-3 Sw #35
J2-8 Key
J2-9 Not Used
J2-10 Gray-Yellow +12VDC to A-18618 (Photo) J1-1
J3-1 Not Used

J3-2 Gray-Yellow +12VDC from J116-2
J3-3 Black Ground from J116-3
J3-4 Key
J3-5 White-Brown from J209-1
J3-6 White-Red from J209-2
J3-7 White-Orange from J209-3
J3-8 White-Yellow from J209-4
J3-9 White-Green from J209-5
J3-10 White-Blue from J209-7
J3-11 Not Used
J3-12 Green-Orange from J207-3
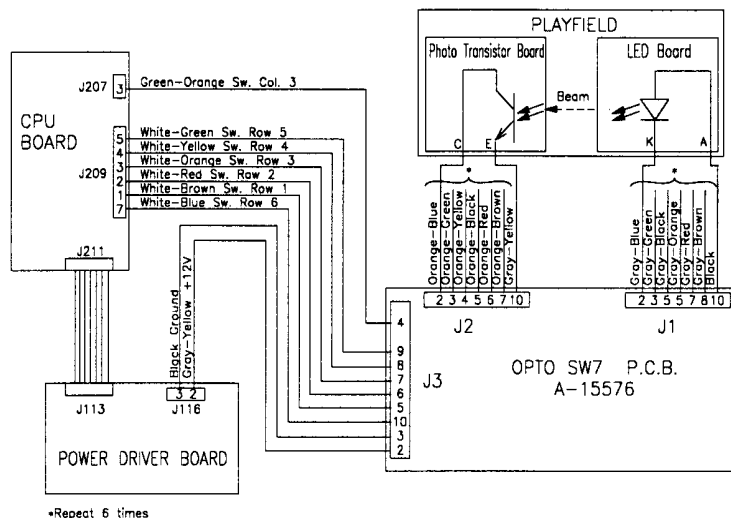
Opto SW7 Circuit

OPTO SW7 P.C.B. SCHEMATIC
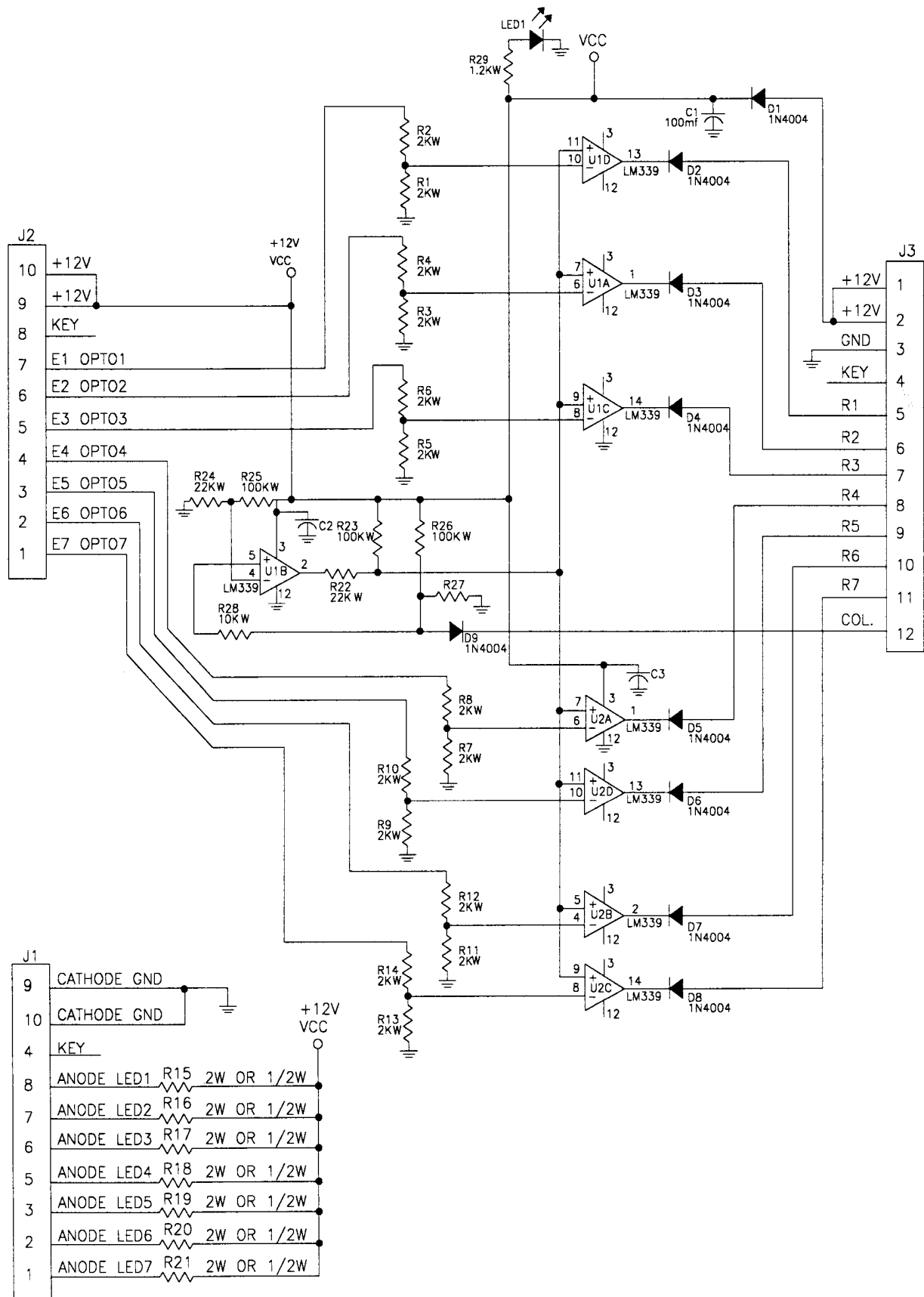
GENERIC EDDY SENSOR P.C.B. ASSEMBLY
A-18543-1 & A-18543-2
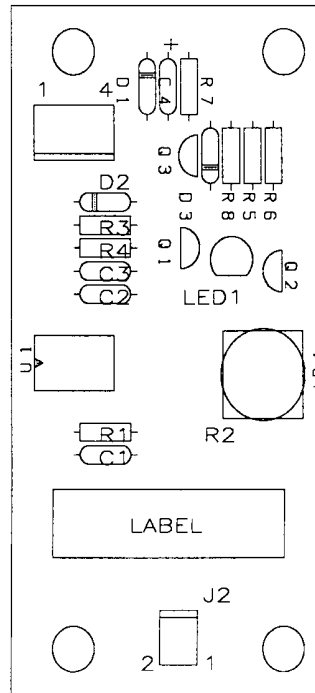
A-18543-1
Left Drain Eddy Sw #45
J1-1 Black from J116-3
J1-2 Gray-Yellow from J116-2
J1-3 Green-Yellow from 207-4
J1-4 White-Green from J209-5

J1-1 Red to Inductor
J1-2 Black to Inductor

A-18543-1
Right Drain Eddy Sw #48
J1-1 Black from J116-3
J1-2 Gray-Yellow from J116-2
J1-3 Green-Yellow from 207-4
J1-4 White-Gray from J209-9

J1-1 Red to Inductor
J1-2 Black to Inductor

A-18543-2
Box Hit Eddy Sw #85
J1-1 Black from J116-3
J1-2 Gray-Yellow from J116-2
J1-3 Green-Gray from 207-9
J1-4 White-Green from J209-

J1-1 Blue to Sensor
J1-2 Blue to Sensor
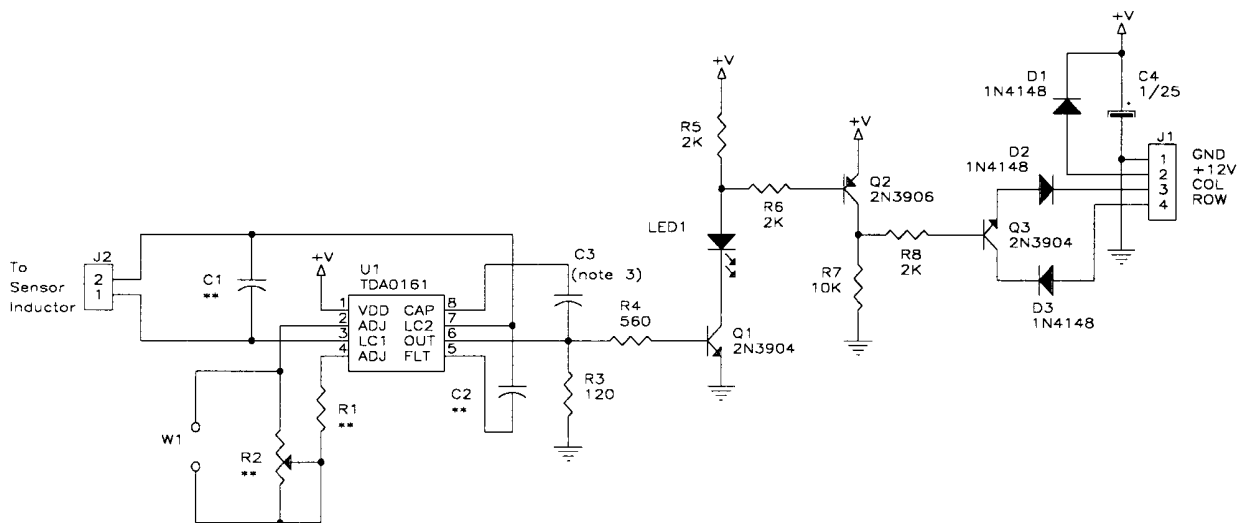
D.C. MOTOR CONTROL P.C.B.
A-16120
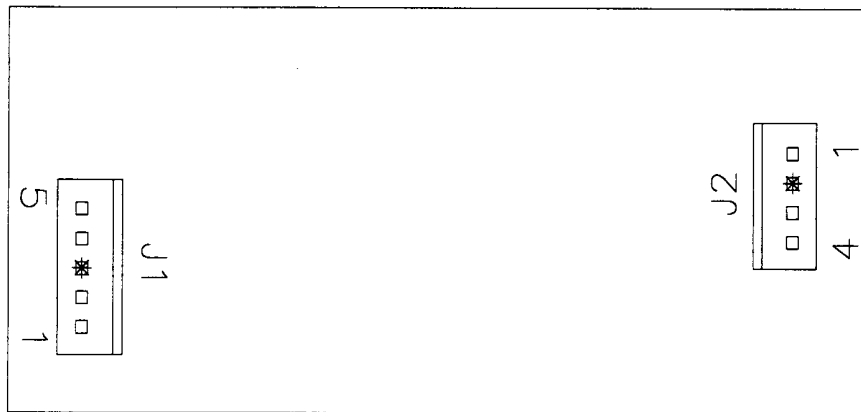
J1-1 Black-Red from J126-2
J1-2 Black-Brown from J126-1
J1-3 Key
J1-4 Black Ground from J116-3
J1-5 Gray-Yellow +12VDC from J116-2

J2-1 Red to Solenoids 17 & 18
J2-2 Key
J2-3 Not Used
J2-4 Black Ground to Solenoids 17 & 18
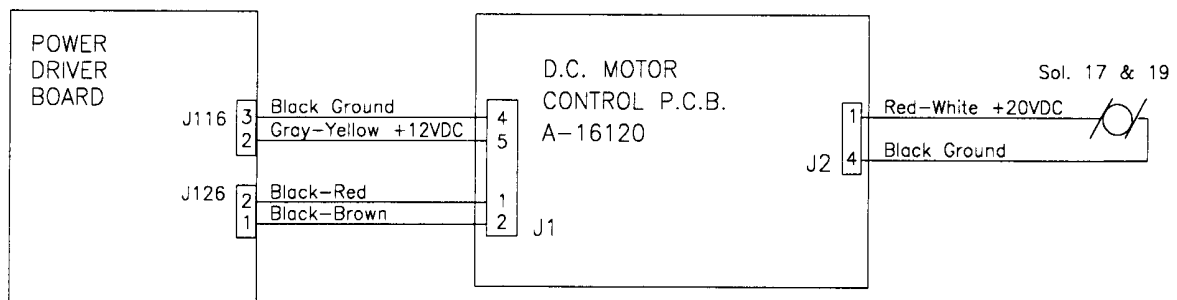
D.C. Motor Control Circuit

D.C. MOTOR CONTROL P.C.B. SCHEMATIC
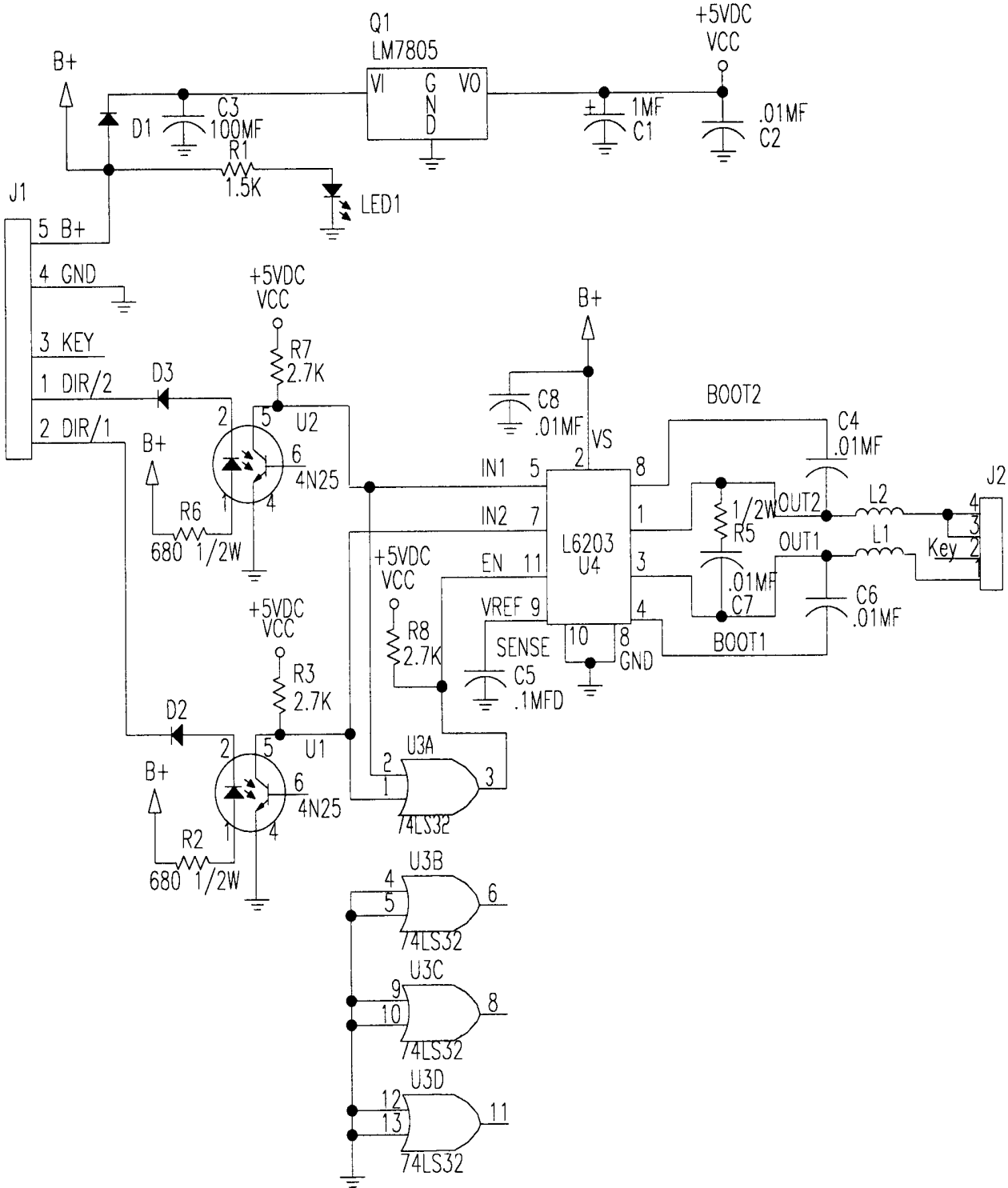
MAGIC TRUNK OPTO P.C.B.
A-19749

(COMPONENT SIDE)
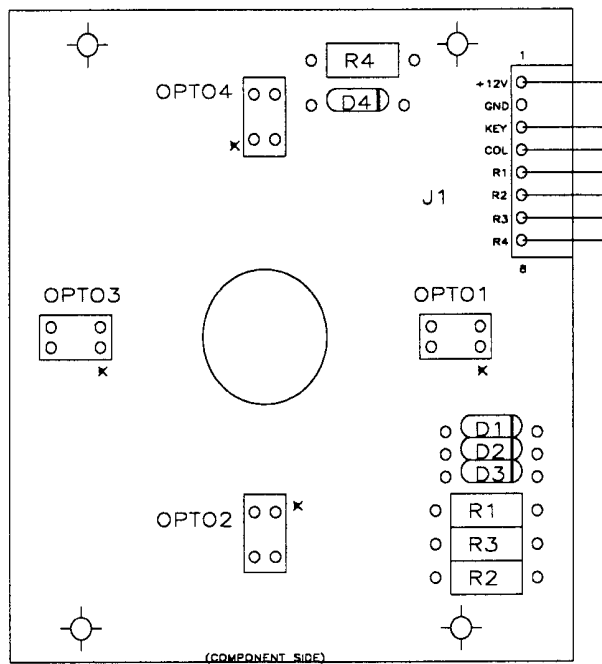
J1-1 Gray-Yellow from J116-2
J1-2 Black Ground from J116-3
J1-3 Key
J1-4 Green-Black from J207-5

J1-5 White-Green from J209-5
J1-6 White-Blue from J209-7
J1-7 White-Violet from J209-8
J1-8 White-Gray from J209-9
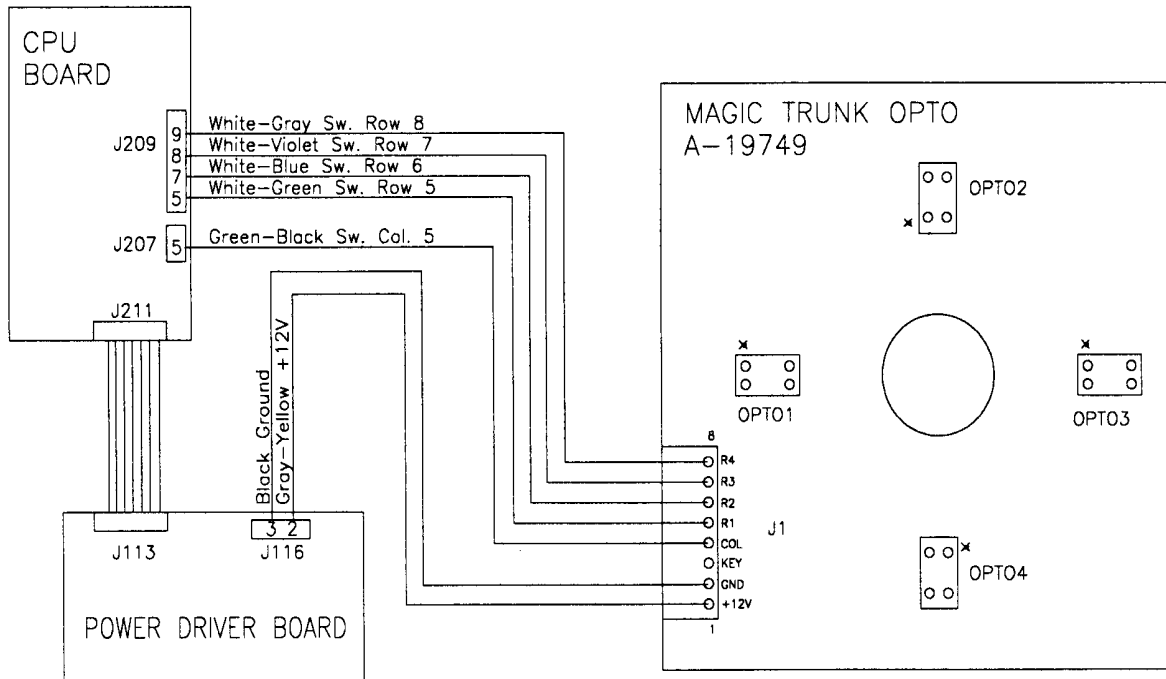
Magic Trunk Opto Circuit

MAGIC TRUNK OPTO P.C.B. SCHEMATIC

470, 1/2W R4

470, 1/2W R3

470, 1/2W R2

470, 1/2W R1

OPTO1

1N4004 D1

OPTO2

1N4004 D2

OPTO3

1N4004 D3

OPTO4

1N4004 D4

J1

+12V   1
GND   2
KEY   3
COL   4
R1   5
R2   6
R3   7
R4   8

8PIN .100
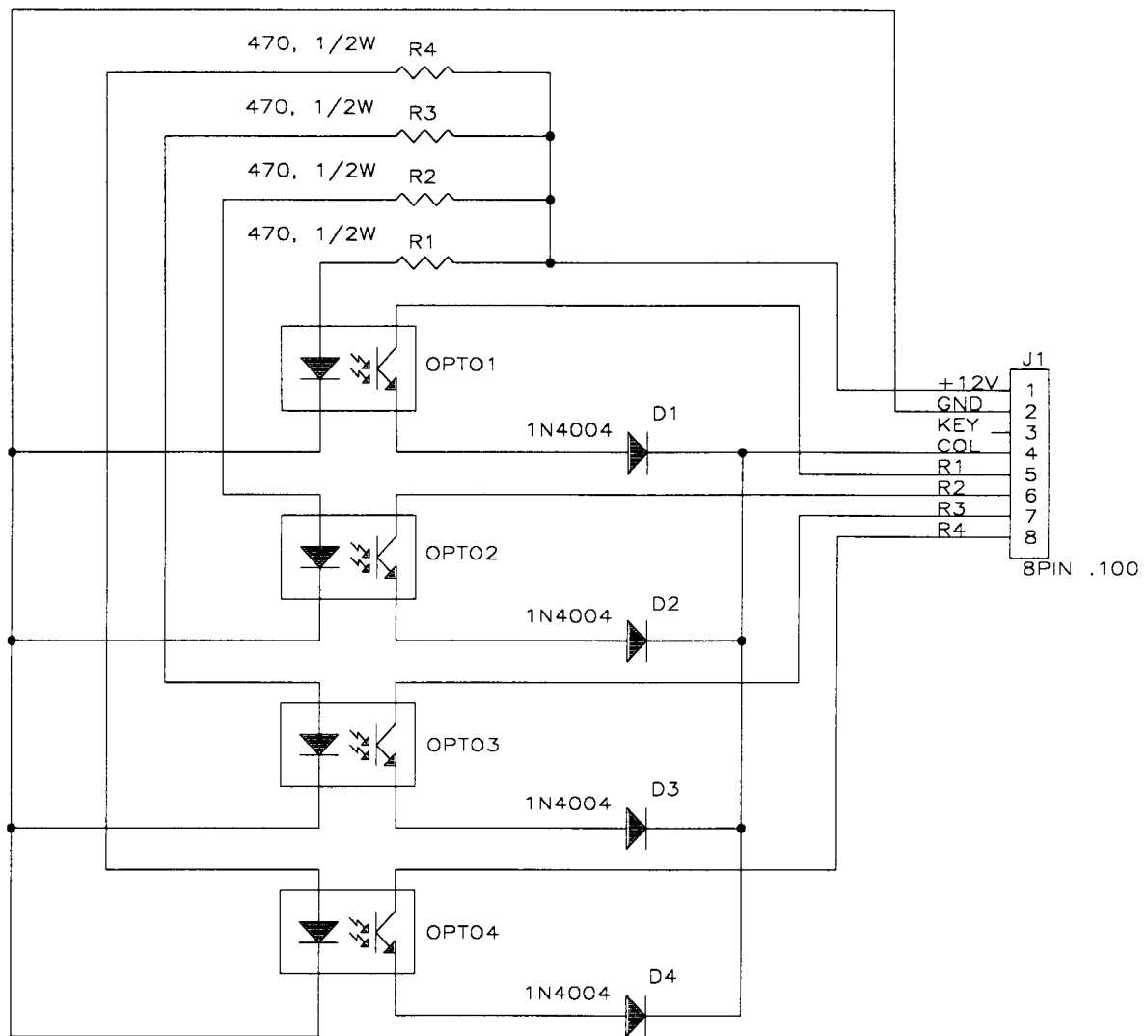
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A-15472-1
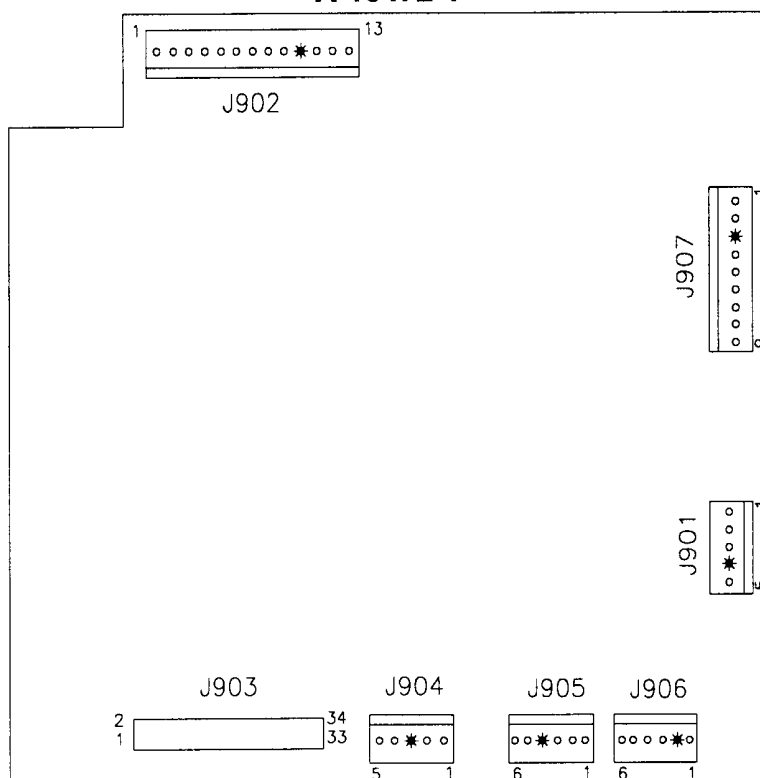
J901-1 White-Blue, 50VAC from J104-1
J901-2 White-Blue, loop from J901-1
J901-3 White-Blue, 50VAC from J104-2
J901-4 Key
J901-5 White-Blue, loop from J901-3

J902-1 Not Used
J902-2 Not Used
J902-3 Yellow-Gray, Sol 35 to playfield magnet
J902-4 Orange-Violet, Sol 34 to playfield coil
J902-5 Not Used
J902-6 Yellow-Violet, Sol 33 to playfield magnet
J902-7 Orange-Blue, holding lower left flipper
J902-8 Not Used
J902-9 Yellow-Blue, power lower left flipper
J902-10 Key
J902-11 Orange-Green, holding lower right flipper
J902-12 Not Used
J902-13 Yellow-Green, power lower right flipper

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

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

J904-5 Black, Ground to/from J114-5; J210-3

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

J906-1 Black-Green, to lower right E.O.S. switch
J906-2 Key
J906-3 Black-Blue, to lower left E.O.S. switch
J906-4 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

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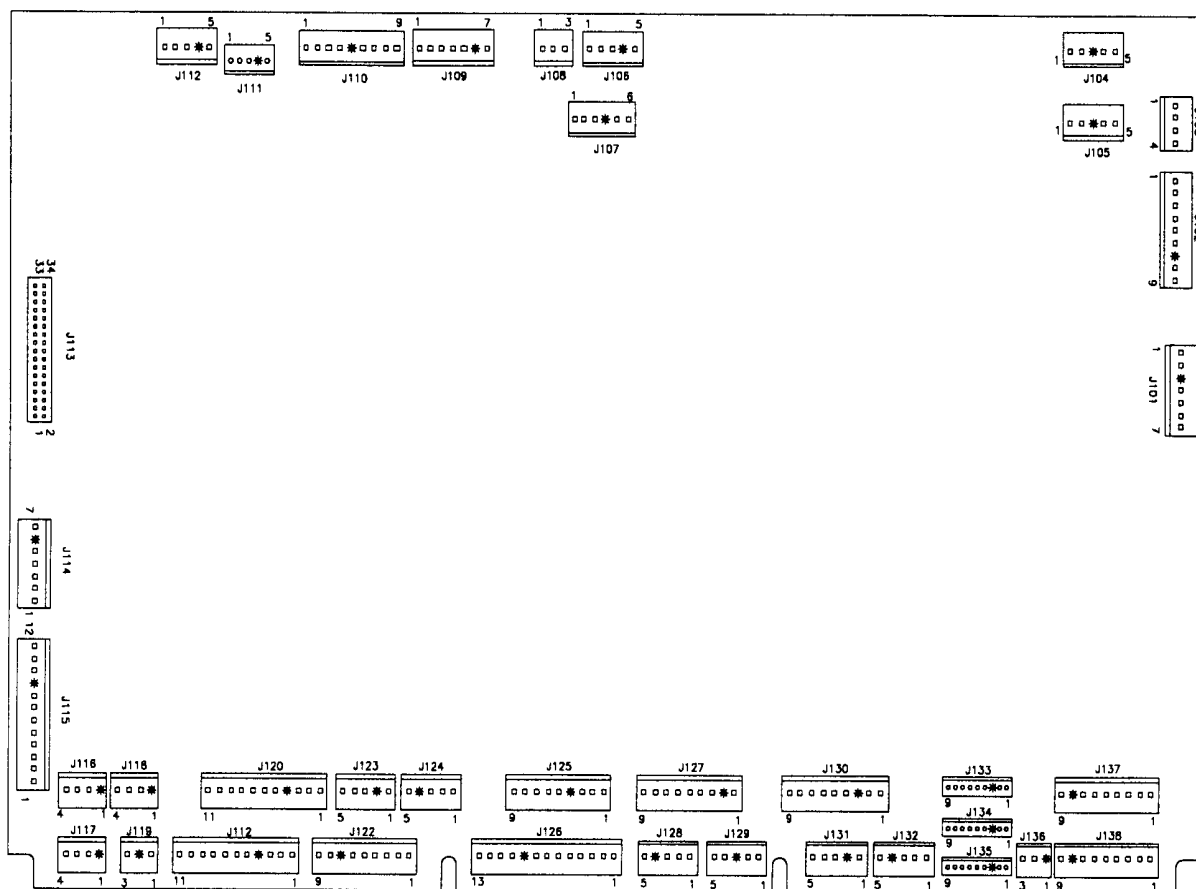
J101-1 Red 9VAC from xfrmr secondary
J101-2 Red 9VAC from xfrmr secondary
J101-3 Key
J101-4 Blue-White 13VAC from xfrmr secondary
J101-5 Blue-White loop from J101-4
J101-6 Blue-White 13VAC from xfrmr secondary
J101-7 Blue-White loop from J101-6

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

J103 Not Used

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

J105 Not Used

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

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

J108 Not Used

J109 Not Used

J110 Not Used

J111 Not Used

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

3-26

J113 Ribbon Cable data to/from J211

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

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

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

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

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

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

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

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

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

J123 Not Used

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

J125 Not Used

J126-1 Black-Brown Sol 17 to playfield motor
J126-2 Black-Red Sol 18 to playfield motor
J126-3 Not Used
J126-4 Black-Yellow Sol 20 to playfield flashlamps
J126-5 Blue-Green Sol 21 to playfield coil
J126-6 Not Used
J126-7 Not Used
J126-8 Blue-Gray Sol 24 to playfield flashlamps
J126-9 Key
J126-10 Not Used
J126-11 Not Used
J126-12 Not Used
J126-13 Red-Orange Tieback Diode from J107-1, to
        Sol 21

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

J128 Not Used

J129 Not Used

J130-1 Violet-Brown Sol 1 to playfield coil
J130-2 Violet-Red Sol 2 to playfield magnet
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 magnet
J130-7 Violet-Blue Sol 6 to playfield coil
J130-8 Violet-Black Sol 7 to backbox coil
J130-9 Violet-Gray Sol 8 to playfield coil

J131 Not Used

J132 Not Used

J133 Not Used

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

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

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

J137 Not Used

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

WPC Security CPU Board
A-17651-50039
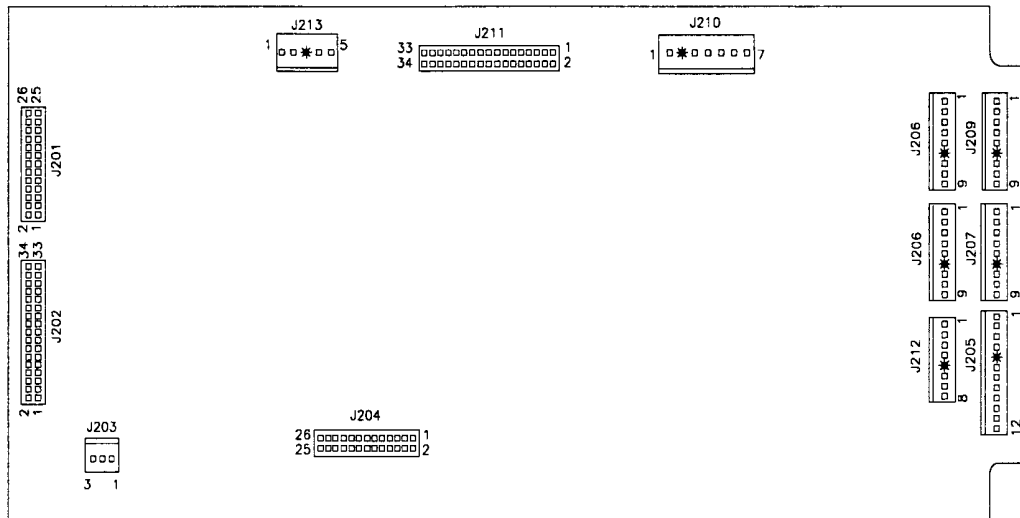
J201 Ribbon Cable data to J602

J202 Ribbon Cable data to J903; J506; J601

J203 Not Used

J204 Ribbon Cable data to A-16100 J1

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

J206 Not Used

J207-1 Green-Brown Sw Col 1 to playfield switches
J207-2 Green-Red Sw Col 2 to playfield switches
J207-3 Green-Orange Sw Col 3 to playfield switches
J207-4 Green-Yellow Sw Col 4 to playfield switches
J207-5 Green-Black Sw Col 5 to playfield switches
J207-6 Green-Blue Sw Col 6 to playfield switches
J207-7 Green-Violet Sw Col 7 to playfield switches
J207-8 Key
J207-9 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 J1-1
J213-2 Black to battery holder J1-2
J213-3 Key
J213-4 Gray to battery holder J1-4
J213-5 Gray to battery holder J1-5

Sound Board
A-16917-50039

P1 34-pin Ribbon Cable data to/from J601; J903; J202

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

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

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

J4-1 Gray-Green 18VAC from xfrmr secondary
J4-2 Gray-Green 18VAC loop from J4-1
J4-3 Key
J4-4 Gray 18VAC from xfrmr secondary
J4-5 Gray 18VAC loop from J4-4
J4-6 Gray-White 18VAC from xfrmr secondary
J4-7 Gray-White loop from J4-6
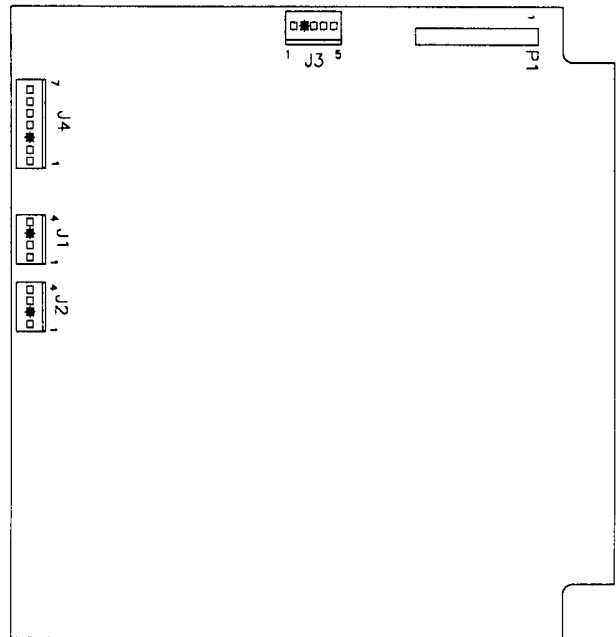
Speaker Wiring Diagram
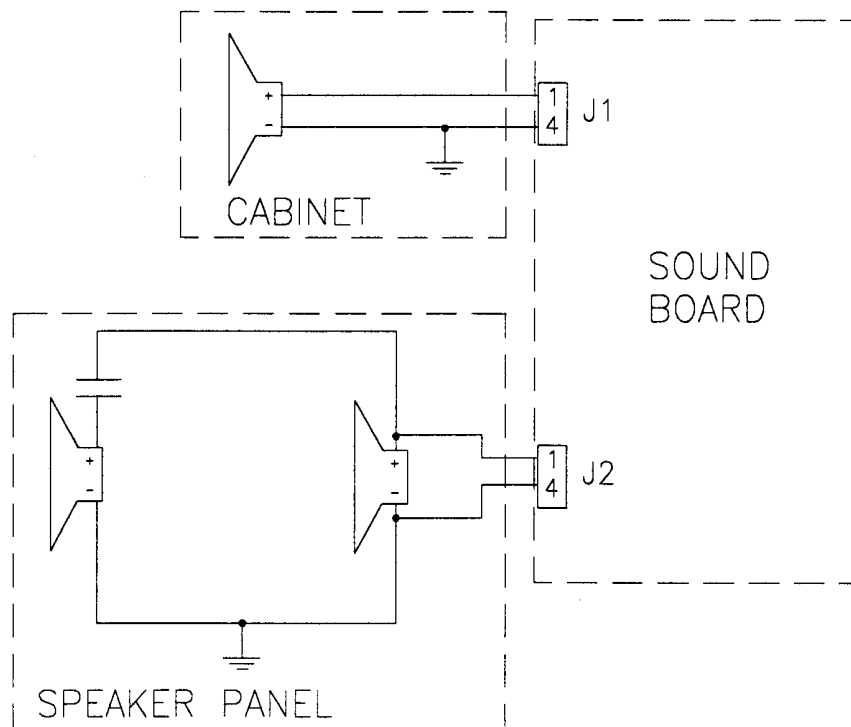
Dot Matrix Controller Board
A-14039.1
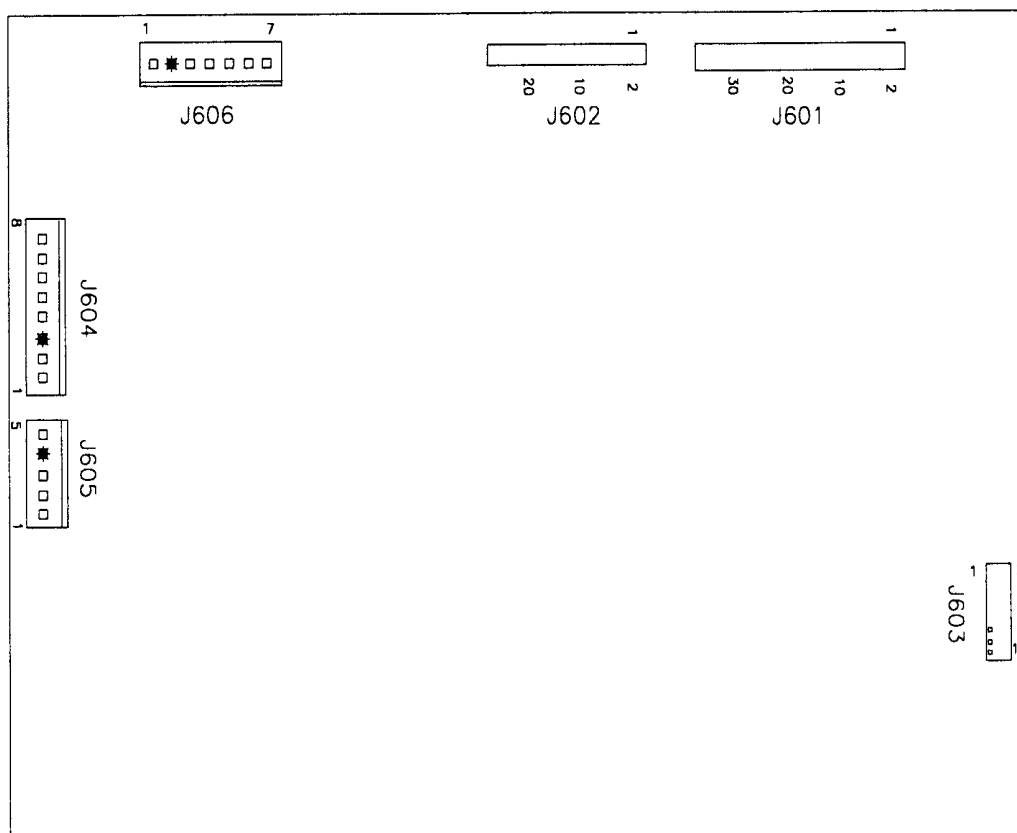
J601 Ribbon Cable data to/from J202; J903; Dot Matrix
Display/Driver P1

J601 Ribbon Cable data from J201

J603 Ribbon Cable data to Dot Matrix Display/Driver

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

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

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

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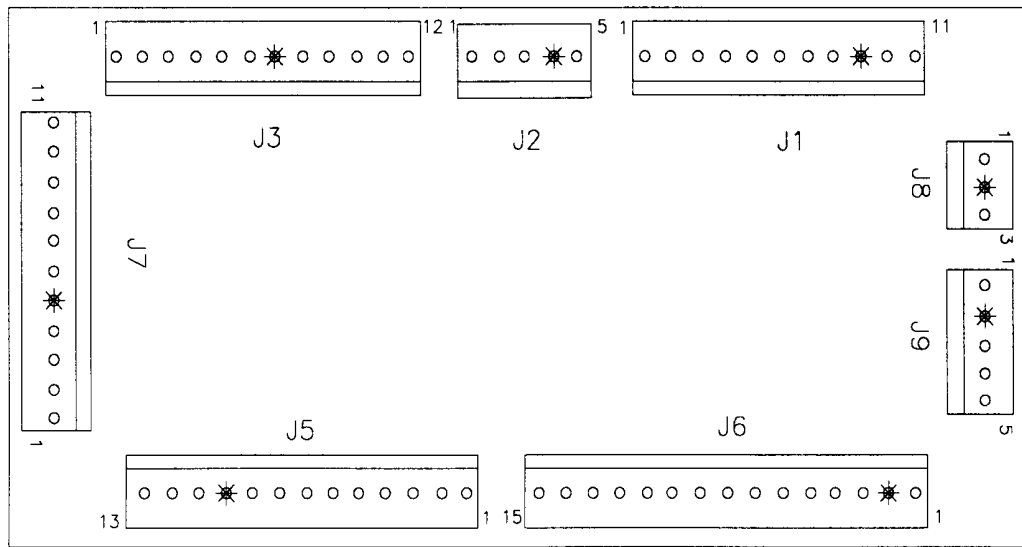
J1-1 Orange-Gray dedicated row 8 from J205-9
J1-2 Orange-Violet dedicated row 7 from J205-8
J1-3 Orange-Blue dedicated row 6 from J205-7
J1-4 Orange-Green dedicated row 5 from J205-6
J1-5 Orange-Yellow dedicated row 4 from J205-4
J1-6 Orange-Black dedicated row 3 from J205-3
J1-7 Orange-Red dedicated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

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

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

J4 Not Used

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

J6 Not Used

J7-1 Yellow-Gray lamp column 8 to cabinet
J7-2 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 switch column 1 to cabinet
J7-7 Green-Red switch column 2 to cabinet
J7-8 White-Orange switch row 3 to cabinet
J7-9 Not Used
J7-10 Not Used
J7-11 White-Orange switch row 3 to cabinet

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

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

Coin Door Interface P.C.B. Schematic

NOTES

LAMP MATRIX

Yellow (B+) ——⊗——▶┤ Red

Column / Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J138-7 Q92	8 Yellow-Gray J138-9 Q91
1 Red-Brown J133-1 Q90	(T)HEATRE 11	HAUNTED BASEMENT 21	MA(G)IC 31	EXTRA BALL 41	TRUNK HIT 2 51	TIGER SAW 61	HAT MAGIC 71	SPECIAL 81
2 Red-Black J133-2 Q89	T(H)EATRE 12	METAMORPHISIS AWARD 22	MAGI(C) 32	VANISH 42	HURRY UP 52	LEVITATE WOMAN 2	SPIRIT AWARD 72	NOT USED 82
3 Red-Orange J133-4 Q88	TH(E)ATRE 13	RIGHT SPELL MAGIC 23	LIFT TRAPDOOR 33	SPELL THEATRE 43	TRUNK ESCAPE 53	GRAND FINALE 63	THEATRE 73	NOT USED 83
4 Red-Yellow J133-5 Q87	THE(A)TRE 14	SPIRIT RING 24	CENTER SPELL MAGIC 34	JACKPOT 44	LOCK BALL 54	TRUNK ESCAPE 64	MULTI-BALL 74	NOT USED 84
5 Red-Green J133-6 Q86	THEA(T)RE 15	ADVANCE CLOCK 25	LEVITATE AWARD 35	SAFE AWARD 45	HAT TRICK AWARD 55	SPIRIT CARDS 65	MIDNIGHT 75	LAMP IN CUBE 85
6 Red-Blue J133-7 Q85	THEAT(R)E 16	JACKET AWARD 26	MAG(I)C 36	TIGER SAW AWARD 46	START ILLUSION 56	SAFE ESCAPE 66	ILLUSIONS 76	SHOOT AGAIN 86
7 Red-Violet J133-8 Q84	THEATR(E) 17	M(A)GIC 27	TOP ROLLOVER 1 37	START FINALE 47	START MULTI-BALL 57	METAMORPHISIS 67	SAW MULTI-BALL 77	BUY-IN 87
8 Red-Gray J133-9 Q83	(M)AGIC 18	TRUNK HIT 3 28	TOP ROLLOVER 2 38	TRUNK HIT 1 48	LITE VANISH 58	STRAIT JACKET 68	HOCUS POCUS 78	START BUTTON 88

J1XX = Power Driver Board

SWITCH MATRIX

White ——▶┤ o╱ o—— Green

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

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

CAUTION: Transport this game ONLY with hinged backbox DOWN!