CONGO

THE MOVIE™

OPERATIONS MANUAL INCLUDES

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

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

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
EUROPEAN	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 Xistor	Voltage Connections Playfield	Voltage Connections Backbox	Voltage Connections Cabinet	Drive Wire Color	Solenoid Part Number Flashlamp Type Playfield	Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			Vio-Brn	AE-23-800	
02	KICKBACK	High Power	J133-2			Q68	J116-2			Vio-Red	AE-23-800	
03	2-WAY POPPER UP	High Power	J133-2			Q71	J116-4			Vio-Org	AE-23-800	
04	2-WAY POPPER DOWN	High Power	J133-2			Q67	J116-5			Vio-Yel	AE-23-800	
05	RAMP DIVERTER	High Power	J133-2			Q70	J116-6			Vio-Grn	AE-26-1500	
06	VOLCANO POPPER	High Power	J133-2			Q66	J116-7			Vio-Blu	AE-23-800	
07	KNOCKER	High Power		J133-2		Q69		J116-8		Vio-Blk		AE-23-800
08	TOP LOOP POST	High Power	J133-2			Q65	J116-9			Vio-Gry	AE-26-1500	
09	TROUGH EJECT	Low Power	J133-3			Q44	J113-1			Brn-Blk	AE-26-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			Brn-Red	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			Brn-Org	AE-26-1200	
12	LEFT JET BUMPER	Low Power	J133-3			Q47	J113-5			Brn-Yel	AE-26-1200	
13	RIGHT JET BUMPER	Low Power	J133-3			Q42	J113-6			Brn-Grn	AE-26-1200	
14	BOTTOM JET BUMPER	Low Power	J133-3			Q46	J113-7			Brn-Blu	AE-26-1200	
15	GORILLA LEFT	Low Power	J133-3			Q41	J113-8			Brn-Vio	AE-25-1000	
16	GORILLA RIGHT	Low Power	J133-3			Q45	J113-9			Brn-Gry	AE-25-1000	
17	AMY FLASHER	Flasher	J133-6	J134-5		Q28	J111-1	J112-1		Blk-Brn	#906 (1)	#906 (1)
18	LEFT RAMP FLS	Flasher	J133-6			Q32	J111-2			Blk-Red	#89 (1)	
19	2-WAY POPPER FLS	Flasher	J133-6			Q27	J111-3			Blk-Org	#89 (1)	
20	SKILL SHOT FLS	Flasher	J133-6	J134-5		Q31	J111-4	J112-5		Blk-Yel	#89 (1)	#906 (1)
21	GRAY GORILLA FLS	Flasher	J133-6	J134-5		Q26	J111-5	J112-6		Blu-Grn	#906 (1)	#906 (1)
22	MAP EJECT	Flasher	J133-1			Q30	J111-6			Blu-Blk	AE-26-1200	
23	LEFT GATE	Flasher	J133-1			Q25	J111-7			Blu-Vio	A-14406	
24	RIGHT GATE	Flasher	J133-1			Q29	J111-8			Blu-Gry	A-14406	
25	LOWER RIGHT FLS	Gen. Purpose	J133-6			Q16	J109-1			Blu-Brn	#89 (1)	
26	RIGHT RAMP FLS	Gen. Purpose	J133-6			Q15	J109-2			Blu-Red	#89 (1)	
27	VOLCANO FLS	Gen. Purpose	J133-6	J134-5		Q14	J109-3	J107-4		Blu-Org	#89(2)#906(1)	#906 (1)
28	PRMTR DFNS FLS	Gen. Purpose	J133-6	J134-5		Q13	J109-4	J107-5		Blu-Yel	#89 (1)	#906 (1)

General Illumination

	Function	Type	Playfield	Backbox	Cabinet	Xistor	Playfield	Backbox	Cabinet	Wire Color	Playfield	Backbox
01	PLAYFIELD GORILLA	G.I.	J105-1	J106-1		Q5	J105-7	J106-7		Wht-Brn	#555	
02	PLAYFIELD TOP	G.I.	J105-2			Q4	J105-8			Wht-Org	#44	
03	PLAYFIELD BOTTOM	G.I.	J105-3	J106-3		Q3	J105-9	J106-9		Wht-Yel	#44	
04	BACKBOX STRING 1	G.I.		J106-5		Q2		J106-10		Wht-Grn		#555
05	BACKBOX STRING 2	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	Wht-Vio		#555

Flipper Circuits

|			Voltage Connection Playfield	Drive Transistors Power	Drive Transistors Hold	Drive Connections Playfield	Drive Wire Colors Power	Drive Wire Colors Hold	Coil Part No.	Coil Colors
29		Lwr. Rt. Power	J119-1 (Red-Grn)	Q90		J120-13	Yel-Grn			
30	LWR RIGHT FLIPPER	Lwr. Rt. Hold	J119-1 (Red-Grn)		Q92	J120-11		Org-Grn	FL-11629	BLUE
31		Lwr. Lt. Power	J119-4 (Red-Blu)	Q87		J120-9	Yel-Blu			
32	LWR LEFT FLIPPER	Lwr. Lt. Hold	J119-4 (Red-Blu)		Q89	J120-7		Org-Blu	FL-11629	BLUE
33	UPPER LEFT POST	Upr. Rt. Power	J119-6 (Red-Vio)	Q84		J120-6	Yel-Vio		AE-27-1200	
34	MYSTERY EJECT	Upr. Rt. Hold	J119-6 (Red-Vio)		Q86	J120-4		Org-Vio	AE-26-1200	
35		Upr. Lt. Power	J119-8 (Red-Gry)	Q81		J120-3	Yel-Gry			
36	UPR LEFT FLIPPER	Upr. Lt. Hold	J119-8 (Red-Gry)		Q83	J120-1		Org-Gry	FL-11630	RED

J1XX = POWER DRIVER BOARD
24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

ATTENTION

The 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 **CONGO** 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 the country specific code. An example of the power-up display is shown below, the electronic ID number is bolded.

```
TESTING
50050                    EPROM 1.0 A
550   100006  95749
```
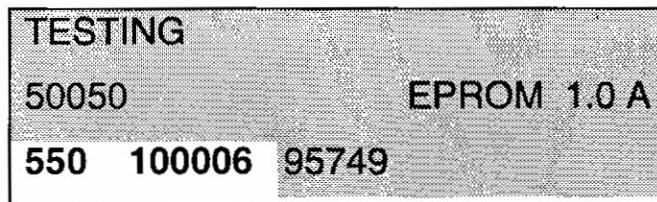
IMPORTANT NOTICE

PLEASE READ

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

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

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

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)
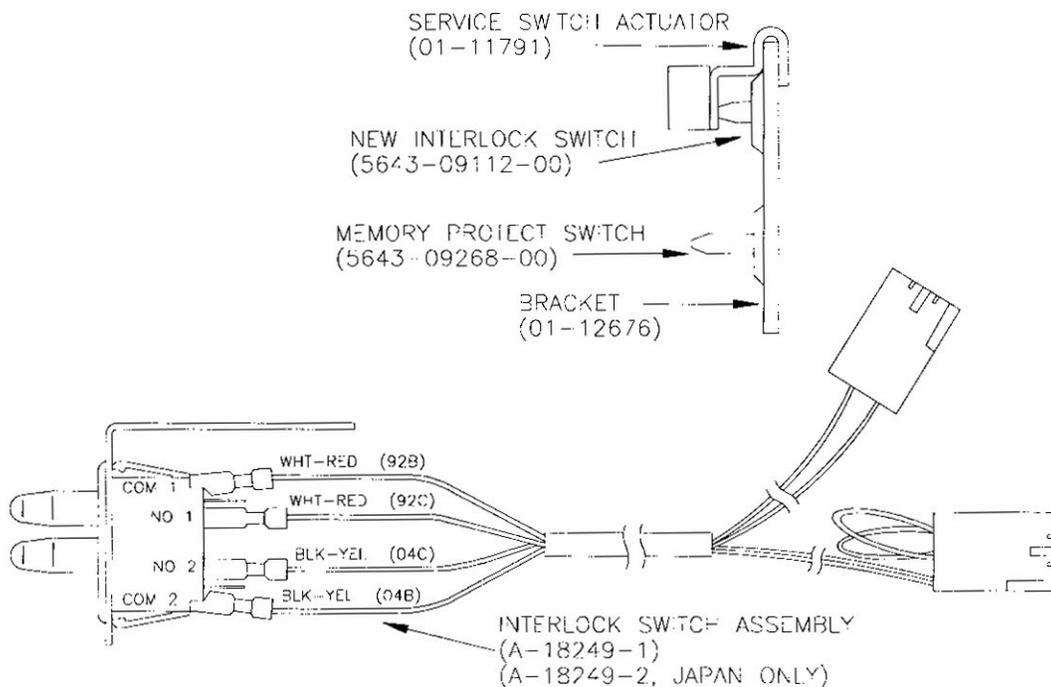
CONGO

Information current at time of release.

Fill out and mail in game Registration card. Be sure to include the game serial number. For your records, write the PIC and game serial numbers in manual.

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Section 3 - Wiring Diagrams & Schematics

CONGO

RULES OF PLAY

AND

SHOTMAPS

MYSTERY FEATURE:
Complete _Z-I-N-J_ rollovers to light.

SKILL SHOT:
Hit lit target when _Skill Shot_ lamp is flashing.

LOWER LEVEL:
Complete _G-R-A-Y_ sequence to capture ball and start feature.

HIPPO BONUS:
Jet bumpers light _H-I-P-P-O_. When _Hippo_ is lit, shoot _Collect_ or _3X Collect_ to score.

VOLCANO MULTI-BALL™ (3-BALL):
Collect four diamonds to light _Lock_ lamps. Capture three balls to start.

SUPER MULTI-BALL™ (2 LEVEL, 5-BALL):
Collect 100 diamonds to start.

MAP FEATURE
Shoot when lit to relight diamonds and collect _Map_ awards.

CONGO

SKILL SHOT

HIT THE LIT TARGET WHEN THE <u>SKILL SHOT</u> LAMP IS FLASHING.

SKILL SHOT
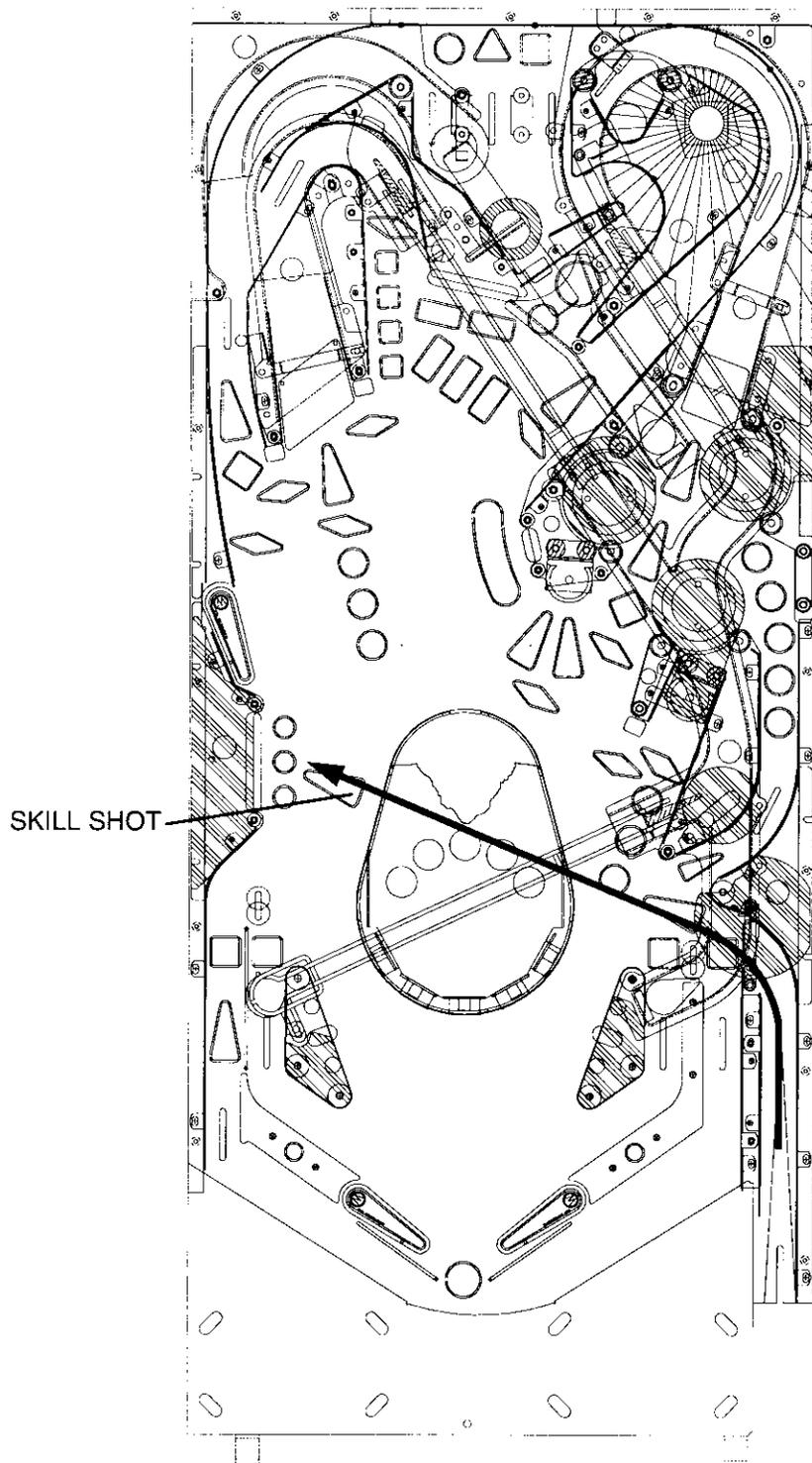
CONGO

LEFT 3-BANK TARGET

COMPLETE THE THREE BANK TARGET TO RE-LIGHT <u>KICKBACK</u>.

KICKBACK
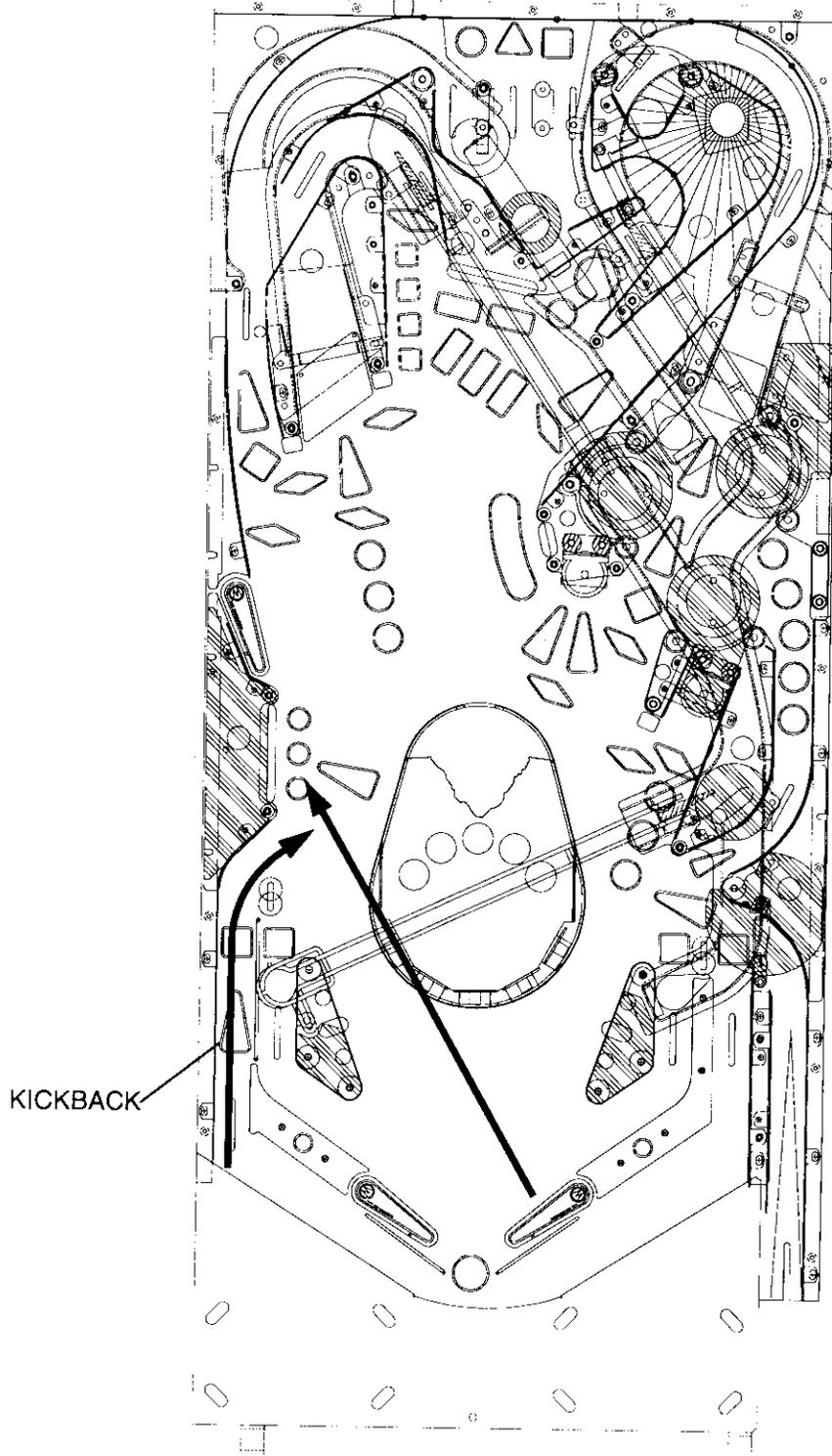
CONGO

LEFT LOOP

COLLECT <u>DIAMOND</u>, WHEN LIT.

COLLECT <u>EXTRA BALL</u>, WHEN LIT.

CAPTURE BALL FOR <u>VOLCANO MULTI-BALL</u>™ WHEN "LOCK" IS LIT.

COMPLETE <u>A-M-Y</u> TOP ROLLOVERS TO START <u>SUPER SCORE</u> LOOP SHOT.

A M Y

SUPER SCORE

LOCK

E.B.

DIAMOND

E
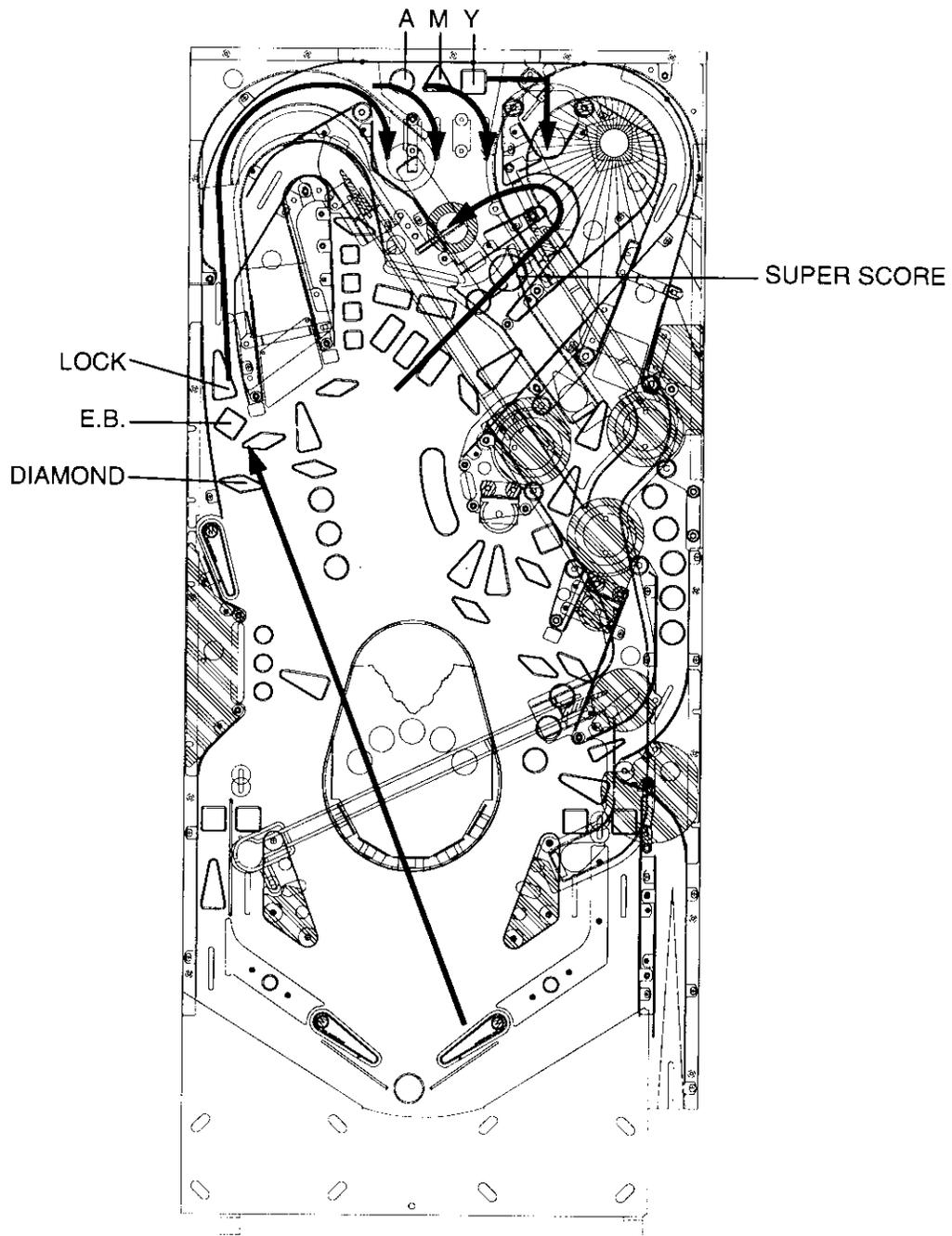
CONGO

THREE SMALL TARGETS

COMPLETE WE ARE WATCHING YOU SEQUENCE TO LIGHT VIDEO EJECT HOLE FEATURE.
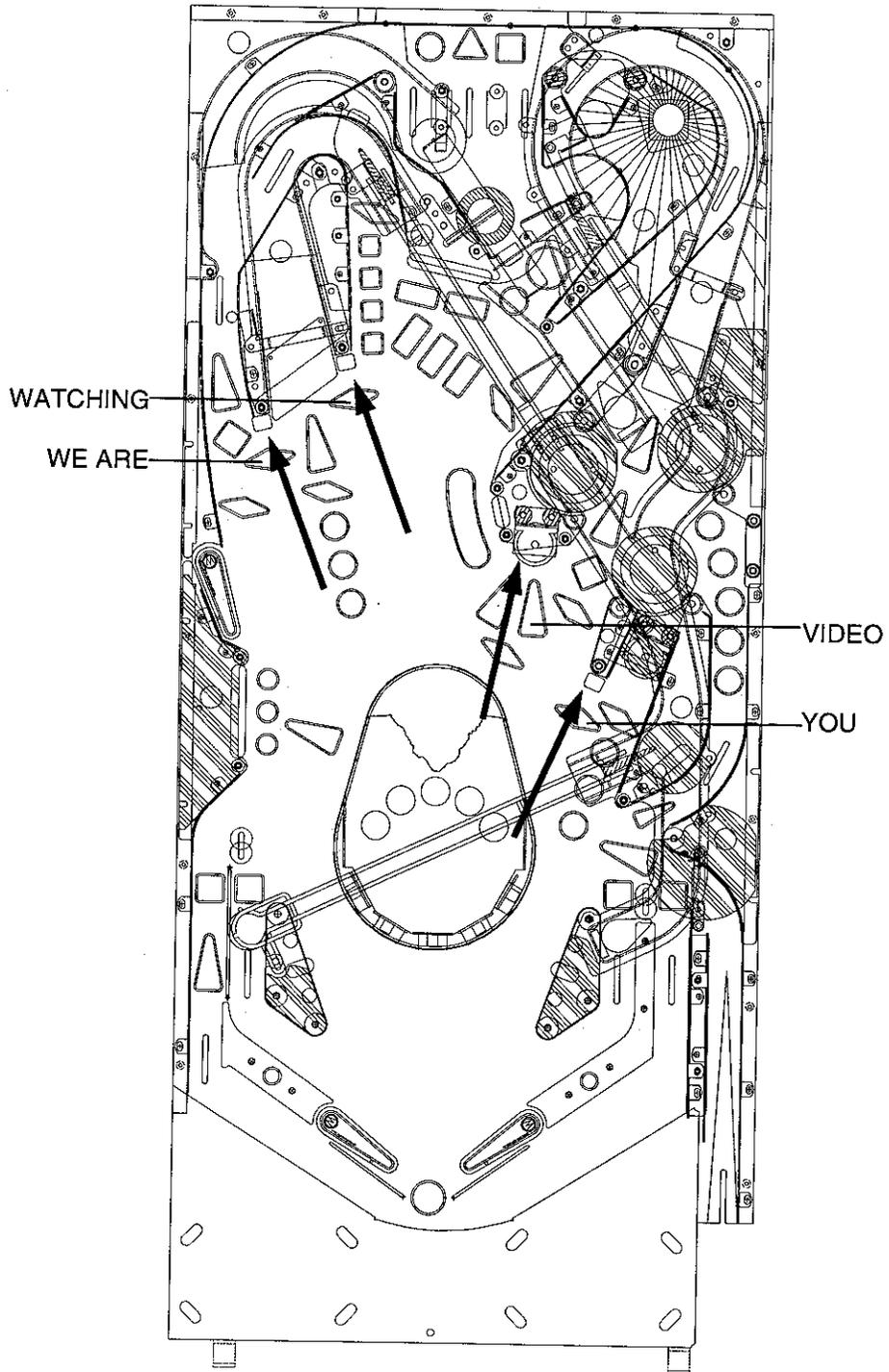
CONGO

LEFT RAMP

COLLECT <u>JACKPOT</u>, WHEN LIT.

COLLECT <u>DIAMOND</u>, WHEN LIT.

COMPLETE <u>M-A-P</u> SEQUENCE TO LIGHT <u>MAP</u> EJECT HOLE FEATURE.

MOVE <u>Z-I-N-J</u> ROLLOVER LETTERS WITH THE FLIPPER BUTTONS, TO COMPLETE SEQUENCE AND LIGHT <u>MYSTERY</u> FEATURE.
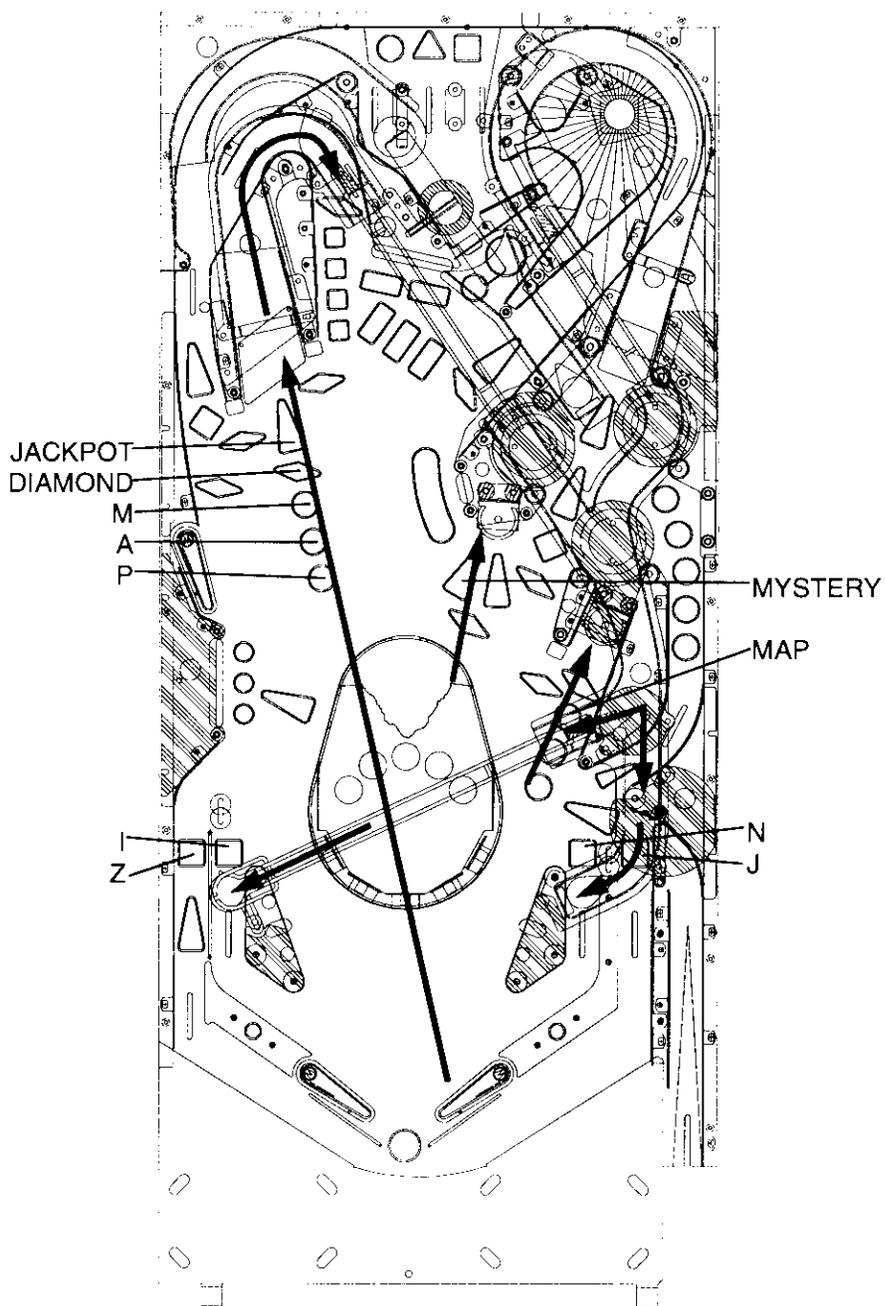
CONGO

G-R-A-Y LOOP

COLLECT DIAMOND, WHEN LIT.

COMPLETE G-R-A-Y SEQUENCE TO ACTIVATE LOWER LEVEL GRAY GORILLA FEATURE.

ACTIVATE PERIMETER DEFENSE TARGET.

DIAMOND

PERIMETER
DEFENSE

GRAY GORILLA

N
O
C

G
O
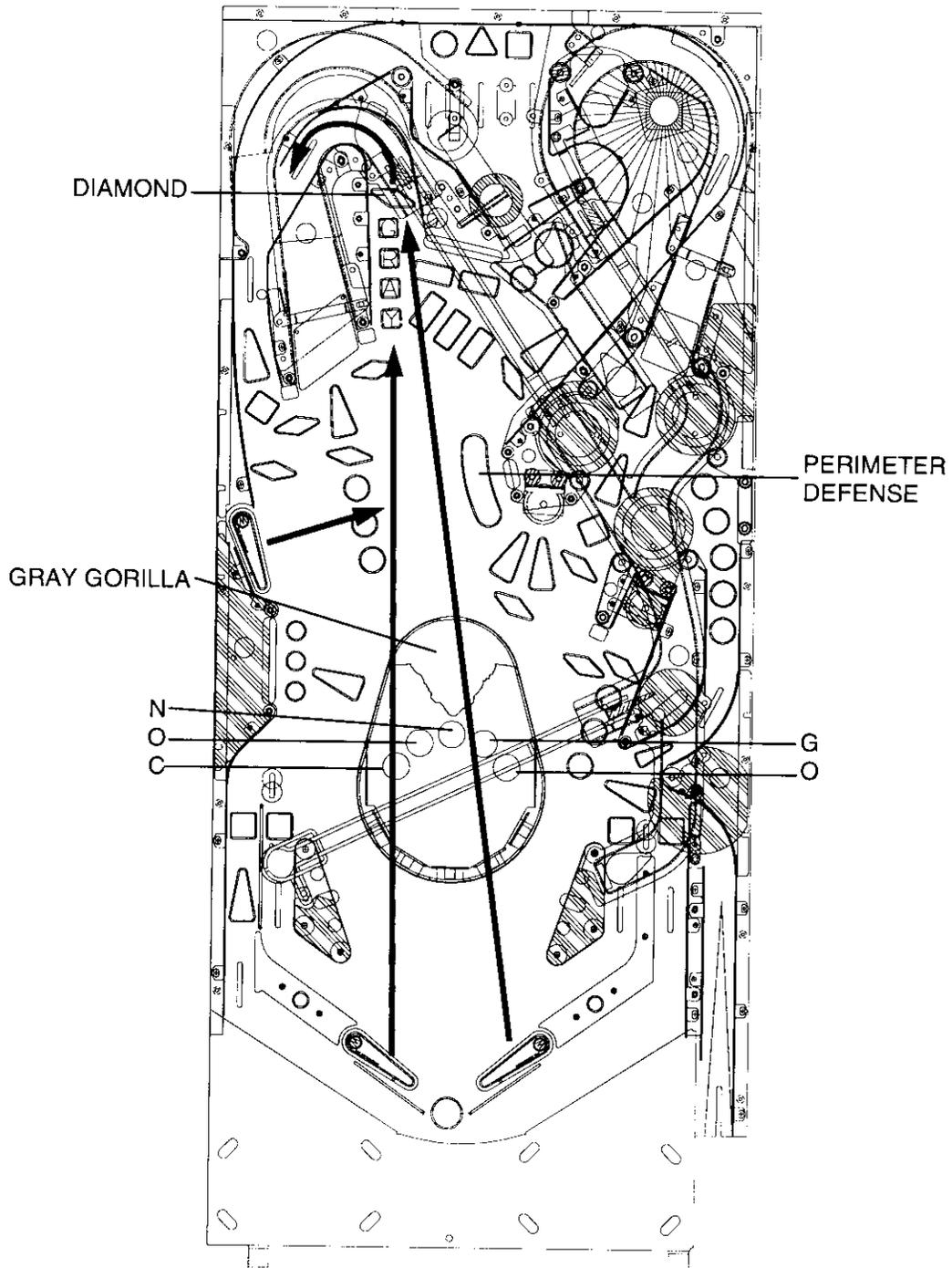
CONGO

CENTER 2-BANK TARGET

COMPLETE <u>TRAVI-COM</u> AND <u>SATELLITE</u> SEQUENCES TO ACTIVATE THE <u>SATELLITE</u> COUNTDOWN FEATURE.
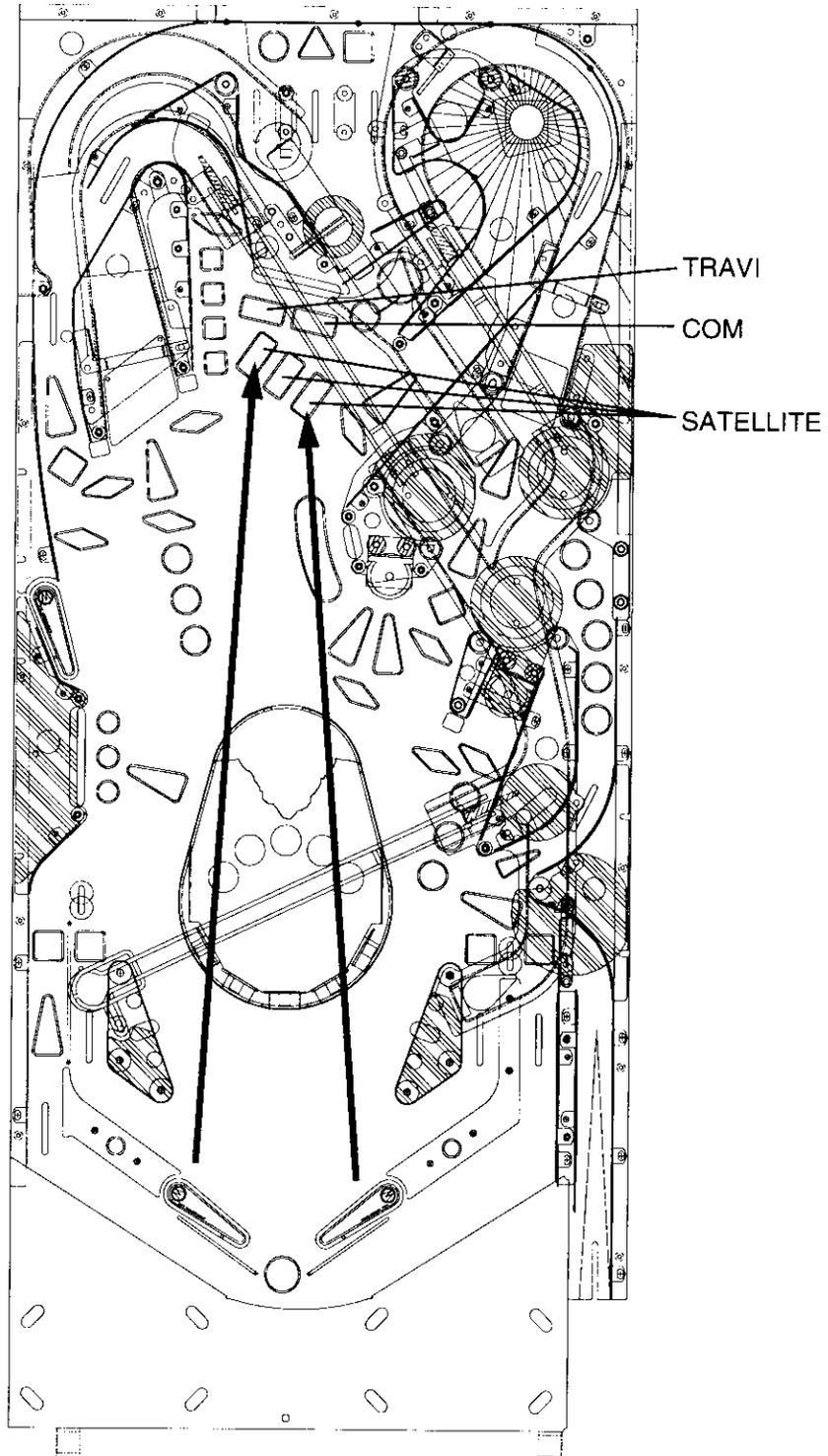
CONGO

MINE SHAFT LOOP

SHOOT LOOP TO ACTIVATE <u>MINE SHAFT</u> VIDEO FEATURE.

MINE
SHAFT

CONGO

UNDER VOLCANO LOOP

COLLECT <u>DIAMOND</u>, WHEN LIT.

SHOOT CONSECUTIVE TIMES TO COLLECT LOOP BONUS.

CAPTURE BALL FOR <u>VOLCANO MULTI-BALL</u>™ WHEN LOCK IS LIT.

ACTIVATE <u>PERIMETER DEFENSE</u> TARGET.

LOCK
DIAMOND

PERIMETER
DEFENSE

K
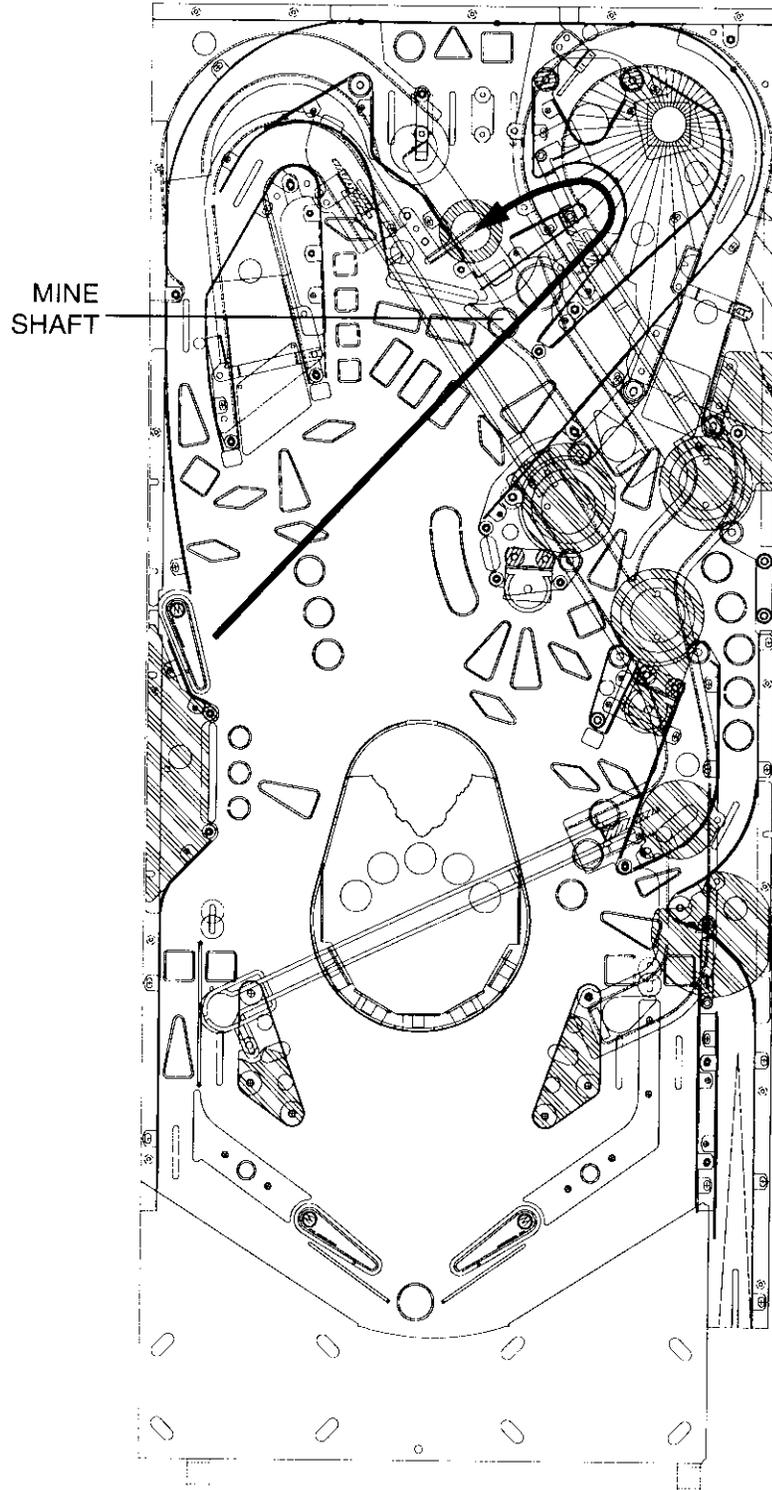
CONGO

PERIMETER DEFENSE TARGET

SHOOT TARGET, WHEN LIT, TO SCORE.

PERIMETER
DEFENSE
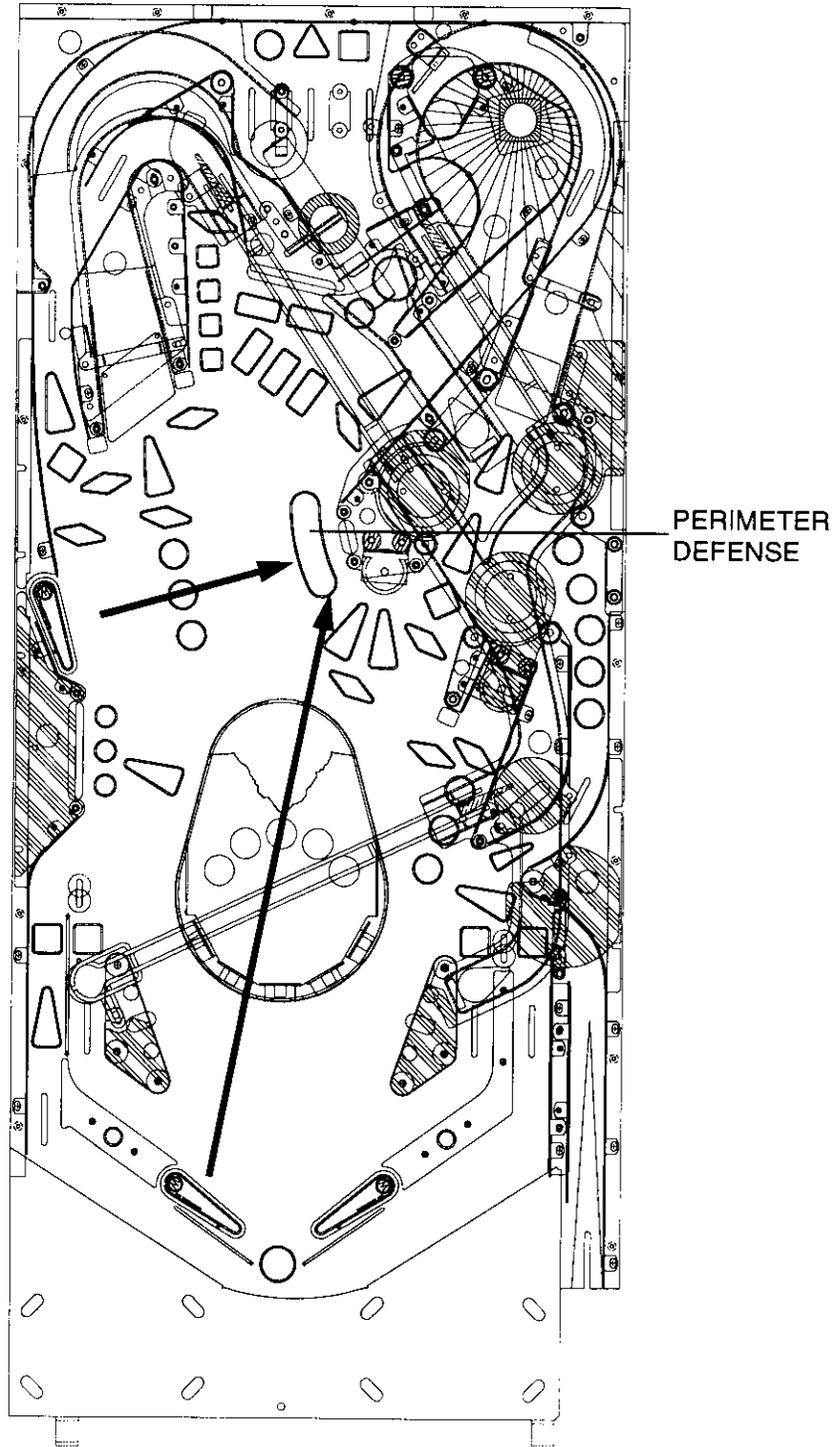
CONGO

LEFT EJECT HOLE

COLLECT <u>DIAMOND</u>, WHEN LIT.

SCORE <u>MYSTERY</u> VALUE SELECTED, WHEN LIT.

ENTER <u>VIDEO</u> MODE, WHEN LIT.

MYSTERY
DIAMOND

VIDEO

M
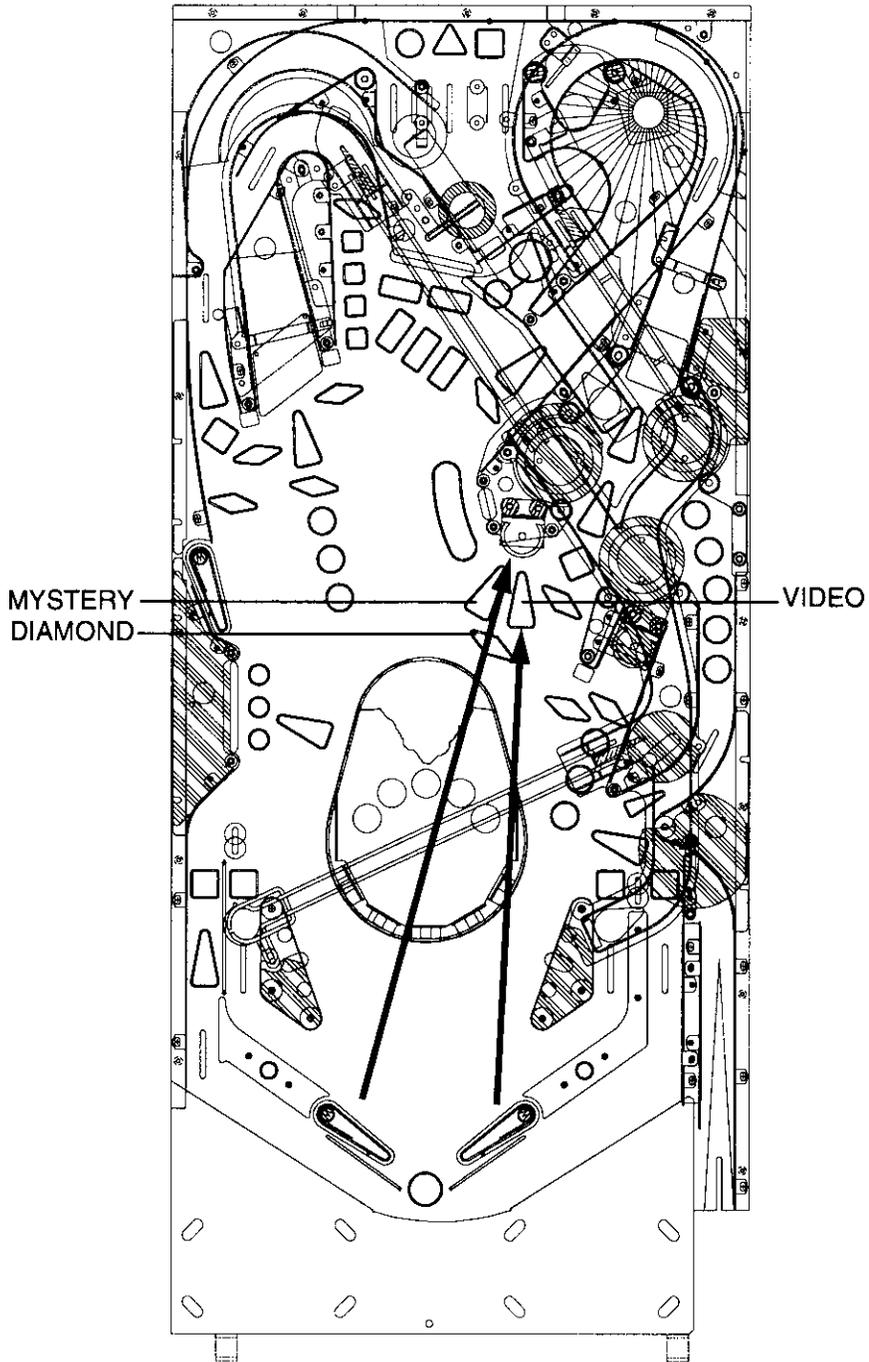
CONGO

VOLCANO RAMP

COLLECT DIAMOND, WHEN LIT.

COLLECT EXTRA BALL, WHEN LIT.

COLLECT 3X HIPPO BONUS, WHEN LIT.

COLLECT JACKPOT, WHEN LIT.

ADD TO EXTRA BALL COUNT-UP FEATURE.

JACKPOT

3X COLLECT

EXTRA BALL
DIAMOND
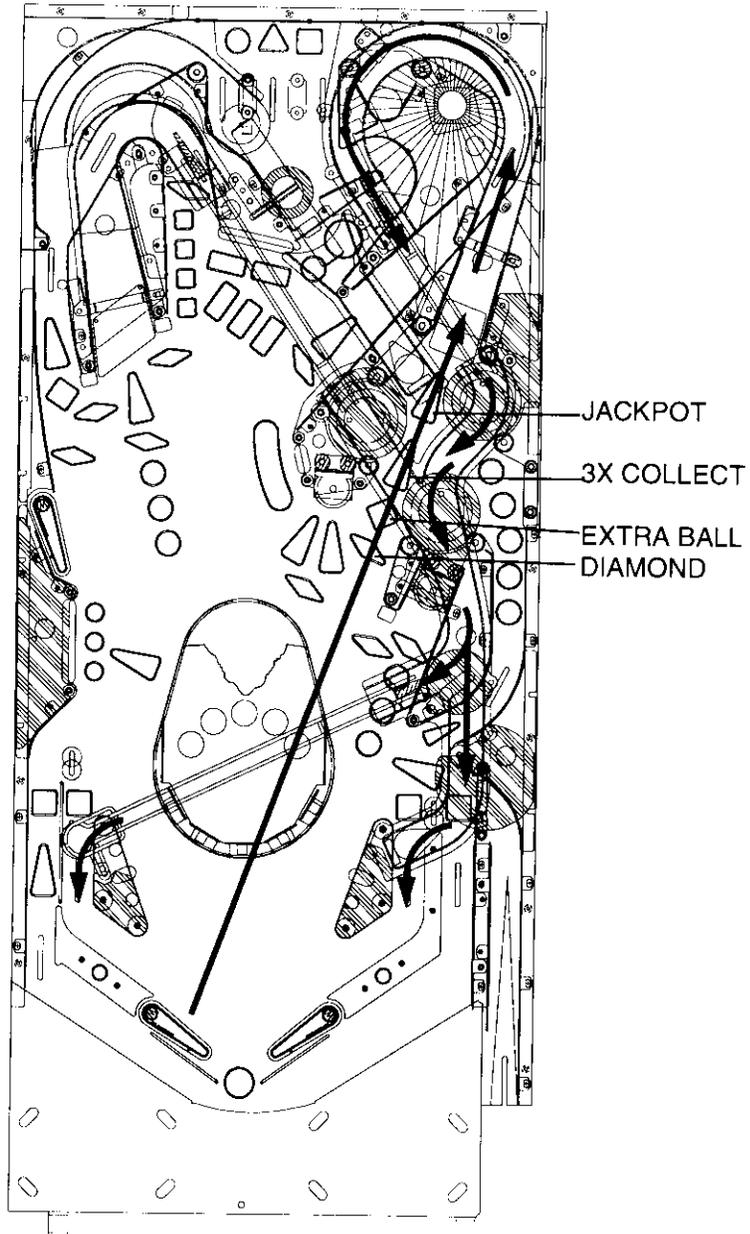
CONGO

RIGHT EJECT HOLE

COLLECT <u>DIAMOND</u>, WHEN LIT.

ACTIVATE <u>MAP</u> FEATURE, WHEN LIT.

ACTIVATE <u>SKILL FIRE</u> FEATURE, WHEN LIT.

COLLECT <u>JUNGLE JACKPOT</u> AND START <u>GHOST TRIBE</u> MULTI-BALL™ (2-BALL), WHEN LIT.

— DIAMOND
— MAP
— SKILL FIRE
— JUNGLE JACKPOT

O
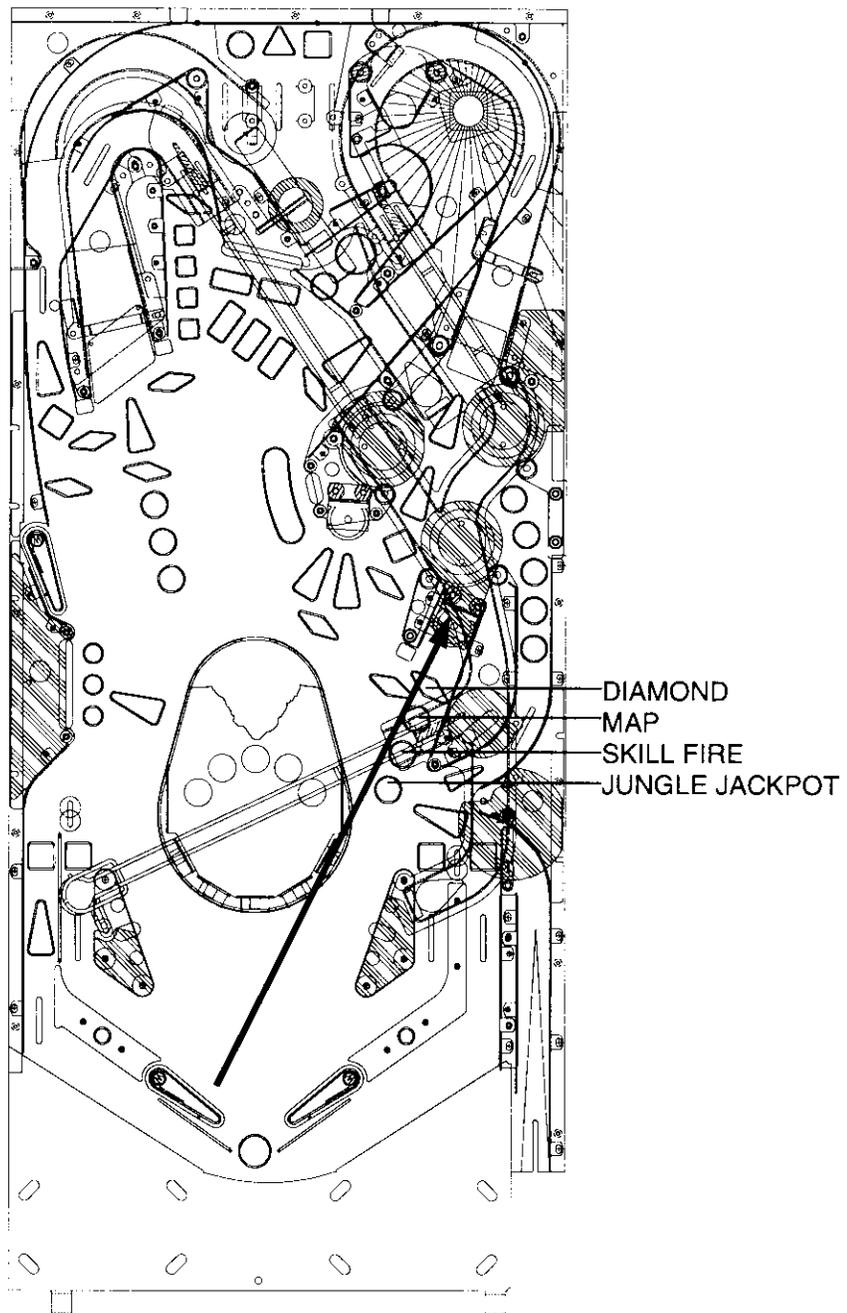
CONGO

JET BUMPERS

ADVANCE H-I-P-P-O BONUS. LIGHT 3X COLLECT AND COLLECT LIGHTS WHEN HIPPO IS COMPLETED.

3X COLLECT

H
I
P
P
O

COLLECT
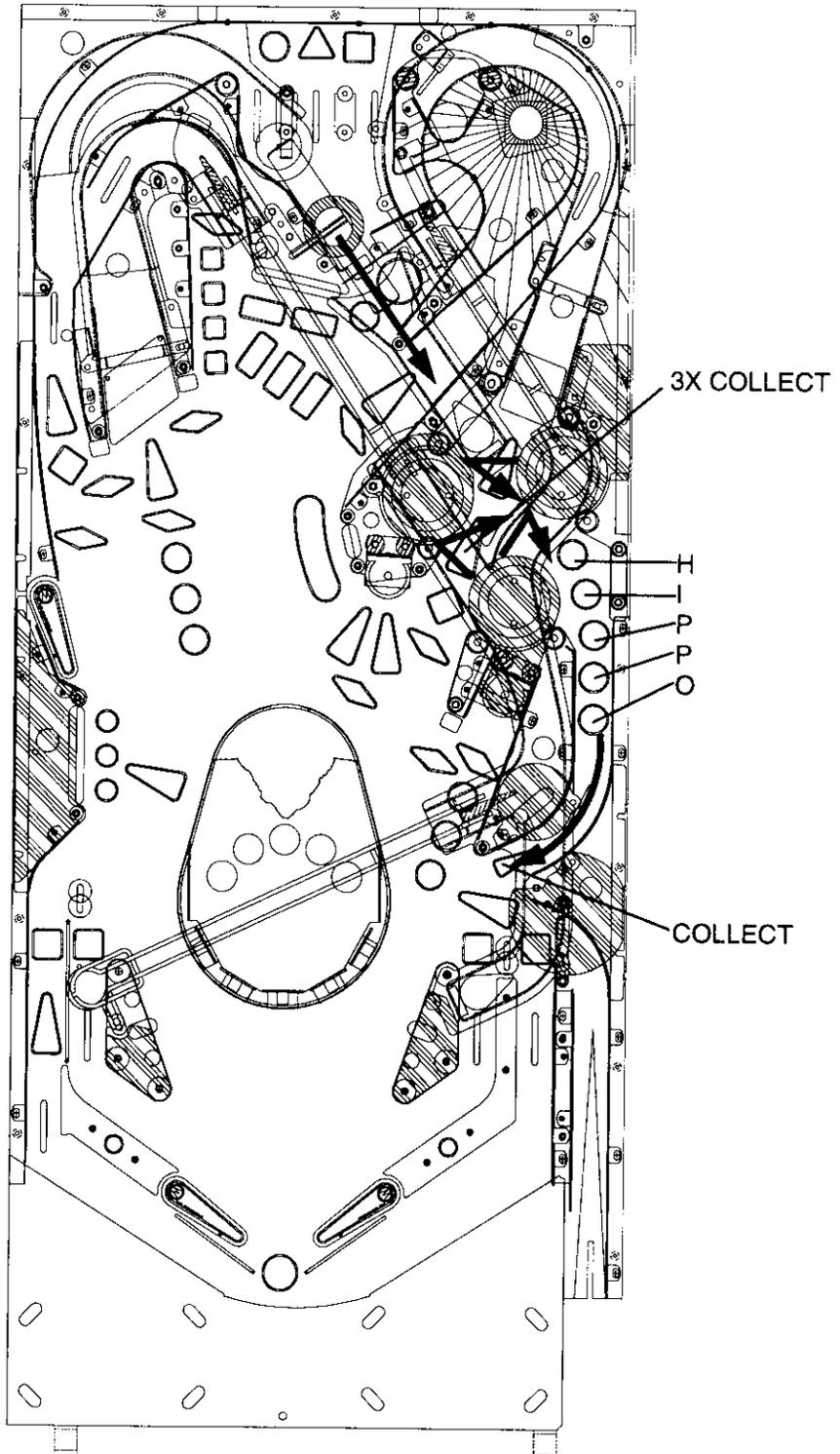
CONGO

GRAY GORILLA

USE FLIPPER BUTTONS TO SWING GORILLA LEFT AND RIGHT AND HIT PINBALL INTO
C-O-N-G-O TARGETS. COMPLETE <u>CONGO</u> TO DEFEAT GRAY GORILLA AND AWARD BONUS.

N

O

C

G

O
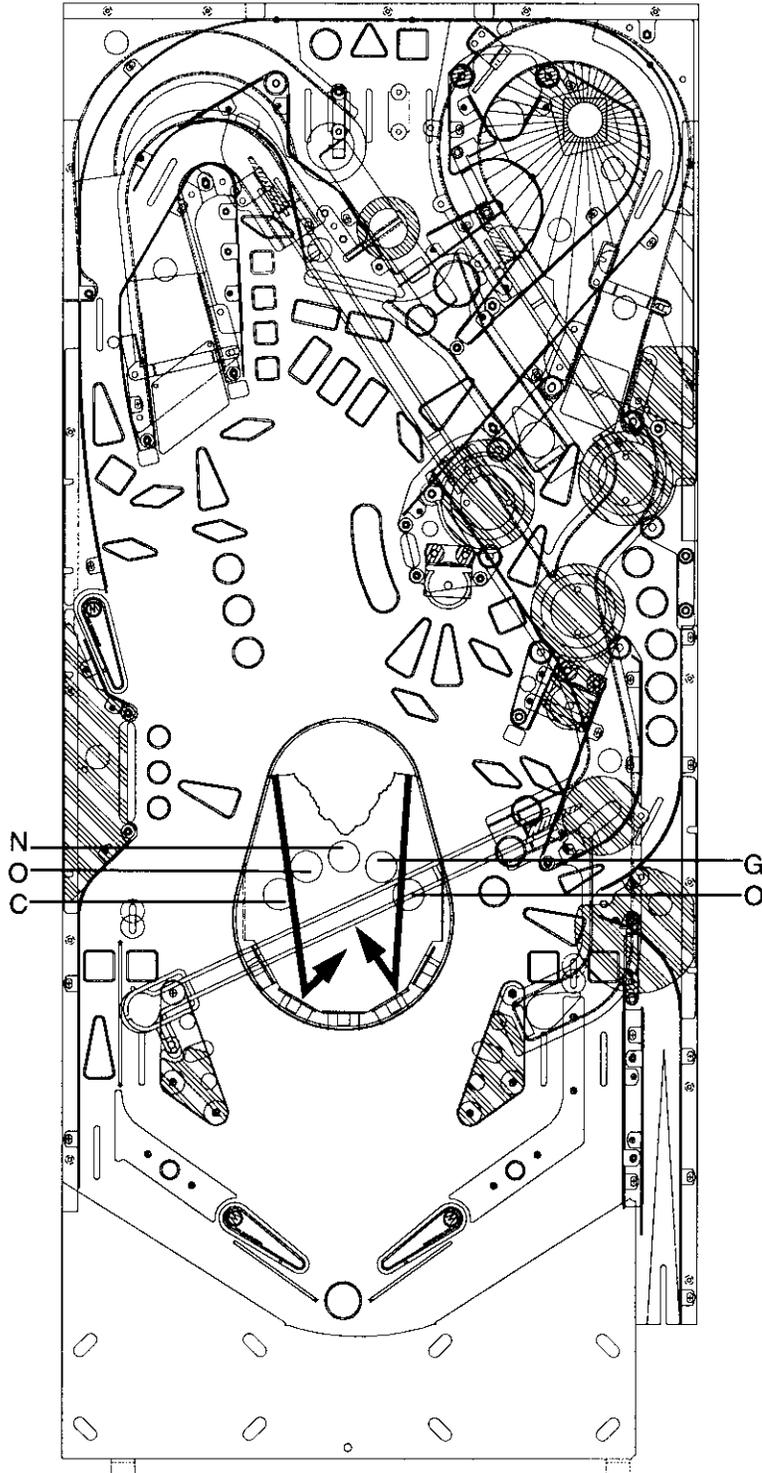
SECTION ONE

GAME OPERATION
AND TEST INFORMATION

(System WPC) ROM SUMMARY

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	G11	A-5343-50050-1R
Security Chip	PIC16C57	CPU	G10	A-5400-50050-1
Music/Speech	27c040	Audio	SU2	A-5343-50050-S2
Music/Speech	27c040	Audio	SU3	A-5343-50050-S3
Music/Speech	27c040	Audio	SU4	A-5343-50050-S4

NOTICE

Order replacement ROMS from your authorized Williams Electronics Games, Inc. distributor. Specify:
(1) part number (if available); (2) ROM level (number) on label; (3) game in which ROM is used.

PINBALL GAME ASSEMBLY INSTRUCTIONS

CONGO IS A FIVE BALL GAME.
FOUR PLAY BALLS AND ONE CAPTIVE BALL.

Power:	Domestic 120V @ 60Hz	**Dimensions:**	Width: 29" approx.
	Foreign 230V @ 50Hz		Depth: 52" approx.
	Japan 100V @ 50HZ		Height: 75" approx.
Temp:	32°F to 100° F, (0°C to 38°C)		
Humidity:	Not to exceed 95% relative.	**Weight:**	325 lb. approx. (crated)

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

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

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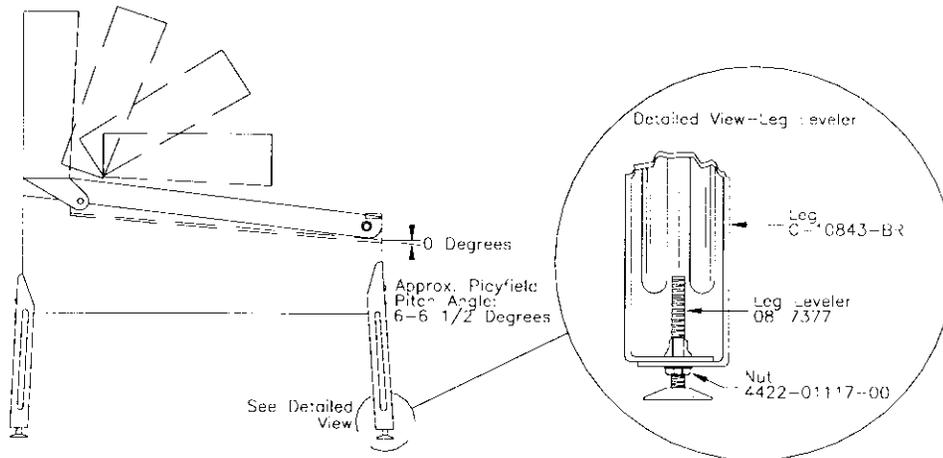
VIEW 1
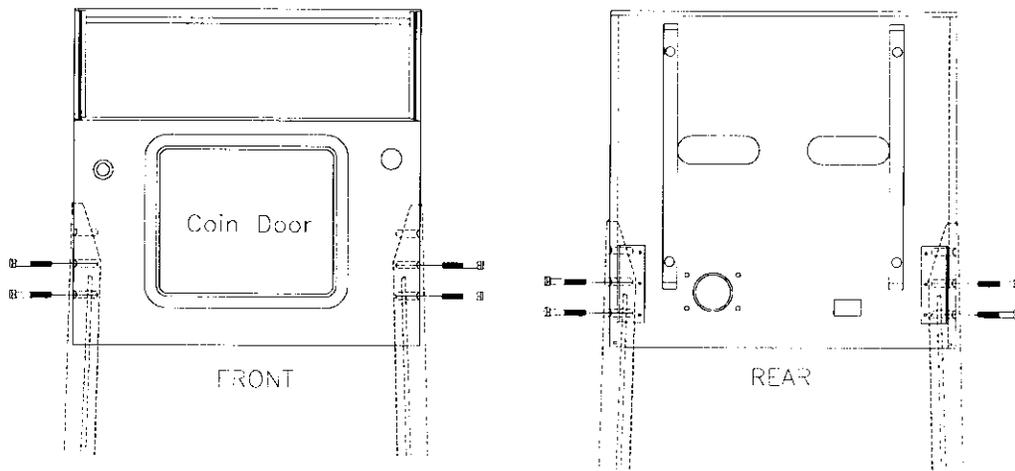
VIEW 2

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

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

⚠ CAUTION

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

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

7. Unlock and open the coin door. Move the molding latch lever toward the left side of the game. Lift the front molding off the playfield cover glass return the latch lever toward the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game, 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:* This measurement 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 properly adjusted WITHOUT REMOVING THE GLASS. The first line (closest to the front of the game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch is 6-1/2 degrees. The NOSE of the bubble should be between the first and second line on the level (see diagram below).

TRU PITCH™ level 6-1/2 degrees.
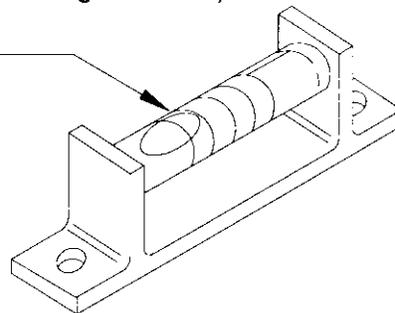
! IMPORTANT !

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

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

11. Be sure the *required number* of balls are installed. **CONGO** game uses five balls, four play balls and one captive ball.

12. Install full playfield mylar, if desired.

    NOTE: The **CONGO** playfield is coated with a special hardcoat surface and does not require a protective mylar. However, mylars can be purchased through your local Williams Distributor. Specify part number 03-9472-1 for full playfield mylar.

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

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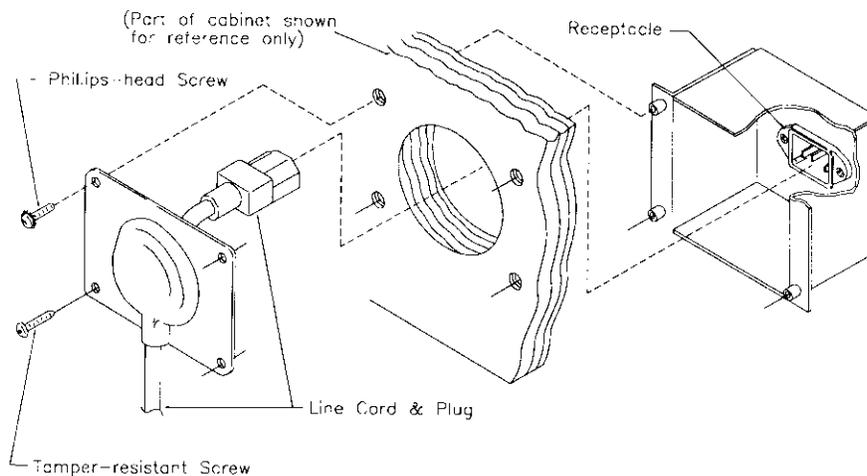
15. IMPORTANT: Fill out and return the registration card.

RAISING THE PLAYFIELD

⚠ CAUTION

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

To raise the playfield.

1. Remove all the balls from the game. 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.

Bottom Arch ①

Safety Bracket (2 used)

Rear Guide Leg (2 used)

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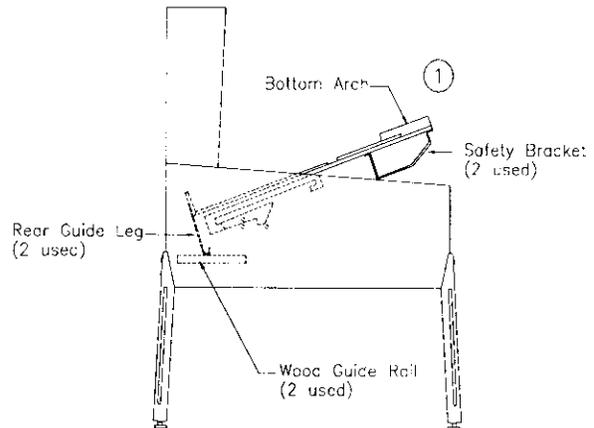
2. Pull the playfield out toward you until it stops (rest position), and raise it approximately 3". Be sure playfield is in locked position and does not slide back into cabinet. If it does, repeat Step 2 before proceeding to Step 3.
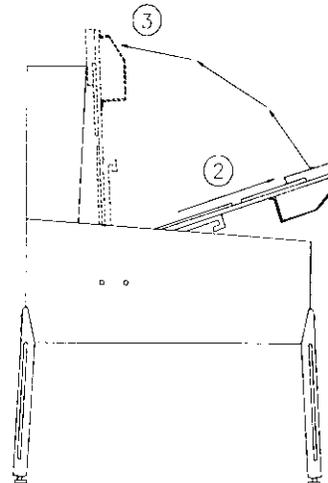
3. Rotate playfield to upright service position (lean on backbox) by pulling toward you and up. Listen for the sound of a click: this ensures locking and pivoting sequence.

③

②

To lower the playfield.

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

5. Push the playfield back into cabinet and into the playing position.

④

⑤

Slice Mechanism (2 used)

Pivot Mechanism (2 used)
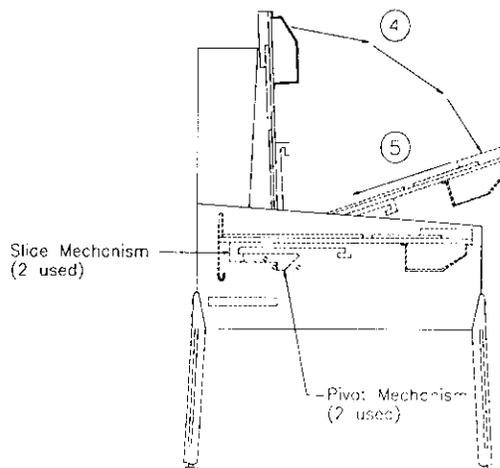
GAME CONTROL LOCATIONS

Cabinet Switches

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

The Start Button is a 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 Buttons

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

Normal Function

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

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

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

The Begin Test button starts the Menu System operation and changes the coin door buttons from Normal Function to Test Function.

Test Function

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

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

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

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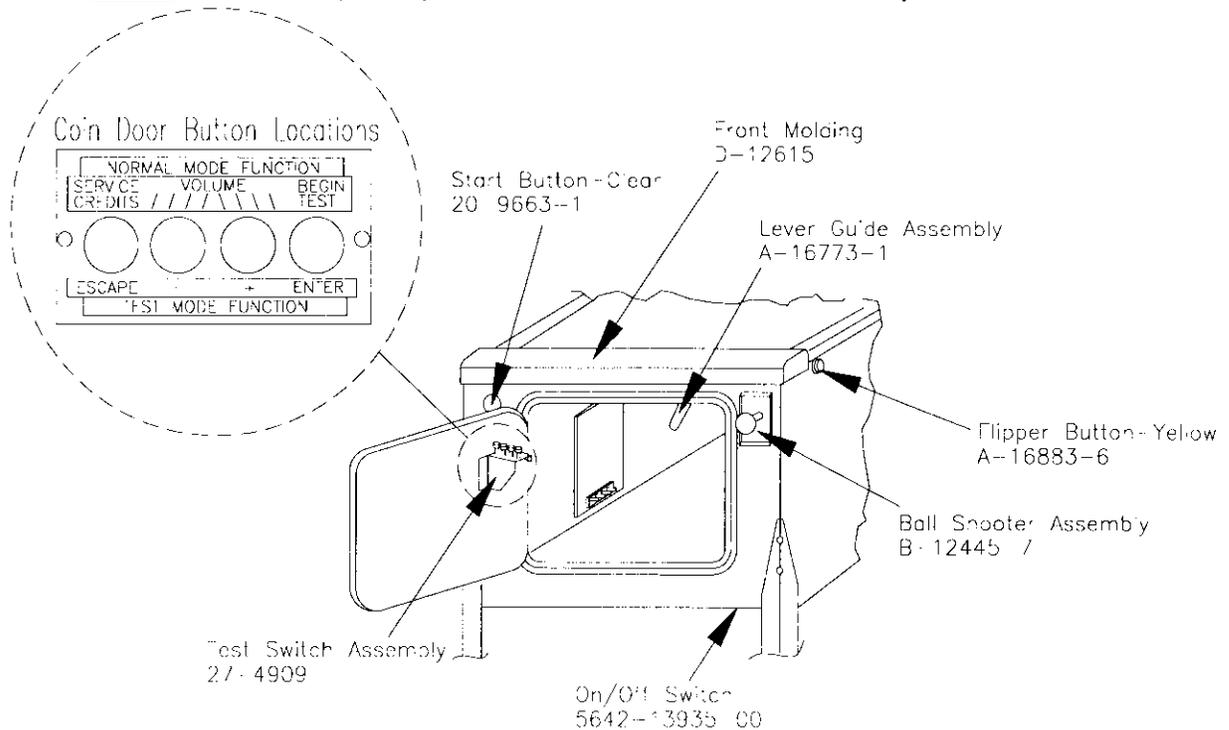
To reset High Score, hold down the Begin Test/Enter switch for five seconds while in the Attract mode.

GAME OPERATION

⚠ CAUTION

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

POWERING UP. With the coin door closed, plug the game in, and switch it On. In normal operation, Testing shows in the displays as the game performs Start-up tests. Once the Start-up tests have been successfully completed the last score is displayed and the game goes into the Attract mode.

Note: After the game has been on location for a time, the Start-up tests may contain messages concerning game problems. 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 and the display shows the sound software revision, the revision level of the system software, and the date the software was revised.

Example:	**CONGO**		**Sound Rev. 1.0A**	
	50050	**Rev. 1.0A**	**SY. 0.X0**	**XX-XX-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 that the game is operating satisfactorily.

ATTRACT MODE*. After completing the Test menu routine, press the Escape button three times to enter the Attract mode. During the Attract mode, the display shows a series of messages informing the player of the recent highest scores*, "custom messages*", and the score 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. 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 A GAME. All earned scores and bonuses are awarded. If a player's final score exceeds the specified value, the player receives a designated award for achieving the current highest score. A random digit set* appears in the display. Credits* 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.

GAME OVER MODE. The **Game Over** display shows the high scores and 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 choose from. 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 Earning Audits
B.3 Standard Audits
B.4 Feature Audits
B.5 Histograms
B.6 Time-Stamps

Press Escape
To move out of a menu selection.

Press Enter
To get into a menu selection.

P. PRINTOUTS MENU

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

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 or Down to cycle through the selections in a menu.

T. TEST MENU

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

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

U. UTILITIES MENU

U.1 Clear Audits
U.2 Clear Coins
U.3 Reset H.S.T.D.
U.4 Set Time and 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. ADJUSTMENT MENU

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

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	00	B.2	13	Total Paid Credits*	00
B.2	07	Recent Service Credits	00	B.2	14	Total Service Credits*	00

*These audits are NOT re-settable. 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	Average Game Time	00
B.3	02	Total Plays**	00	B.3	21	Play Time	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 on completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored. Operation for test and service do not affect audits.
†This Audit is not re-settable.

B.4 Feature Audits

B.4	01	Total Multiball	00	00%
B.4	02	Ball Saves	00	00%
B.4	03	Volcano Multiballs	00	00%
B.4	04	Ghost Tribe Multiballs	00	00%
B.4	05	Diamond Hunt Multiballs	00	00%
B.4	06	Super Multiballs	00	00%
B.4	07	Diamonds Collected	00	00%
B.4	08	Gray Letters Collected	00	00%
B.4	09	Mini Playfield Plays	00	00%
B.4	10	Mini Playfield Wins	00	00%
B.4	11	Volcano Multiball Jackpots	00	00%
B.4	12	Volcano Multiball Super Jackpots	00	00%
B.4	13	Satellite Modes	00	00%
B.4	14	Amy Help Modes	00	00%
B.4	15	Mine Shaft Plays	00	00%
B.4	16	Kickbacks	00	00%
B.4	17	Skill Shots	00	00%
B.4	18	Super Skill Shots	00	00%
B.4	19	Laser Defense	00	00%
B.4	20	Mystery Awards	00	00%
B.4	21	Video Modes	00	00%
B.4	22	Gray Attack Diamond Awards	00	00%
B.4	23	Gray Attack Multiball Awards	00	00%
B.4	24	Gray Attack Extra Ball Awards	00	00%
B.4	25	Gray Attack Point Awards	00	00%
B.4	26	Volcano Extra Balls Lit	00	00%
B.4	27	Mystery Extra Balls Lit	00	00%
B.4	28	Map Extra Balls Lit	00	00%
B.4	29	Bonus X Extra Balls Lit	00	00%
B.4	30	Diamond Extra Balls Lit	00	00%
B.4	31	Diamond Champ Credits	00	00%
B.4	32	Special Mode Starts	00	00%

B.5 Histograms

B.5	01	0 - 99 Million Scores	00	00%
B.5	02	100 - 299 Million Scores	00	00%
B.5	03	300 - 499 Million Scores	00	00%
B.5	04	500 - 749 Million Scores	00	00%
B.5	05	750 - 999 Million Scores	00	00%
B.5	06	1.0 - 1.4 Billion Scores	00	00%
B.5	07	1.5 - 1.9 Billion Scores	00	00%
B.5	08	2.0 - 2.9 Billion Scores	00	00%
B.5	09	3.0 - 3.9 Billion Scores	00	00%
B.5	10	4.0 - 4.9 Billion Scores	00	00%
B.5	11	5.0 - 6.9 Billion Scores	00	00%
B.5	12	7.0 - 8.9 Billion Scores	00	00%
B.5	13	Over 9 Billion Scores	00	00%
B.5	14	Game Time 0.0-1.0 Mins	00	00%
B.5	15	Game Time 1.0-1.5 Mins	00	00%
B.5	16	Game Time 1.5-2.0 Mins	00	00%
B.5	17	Game Time 2.0-2.5 Mins	00	00%
B.5	18	Game Time 2.5-3.0 Mins	00	00%

Histograms Continued.....

B.5	19	Game Time 3.0-3.5 Mins	00	00%
B.5	20	Game Time 3.5-4.0 Mins	00	00%
B.5	21	Game Time 4-5 Mins	00	00%
B.5	22	Game Time 5-6 Mins	00	00%
B.5	23	Game Time 6-8 Mins	00	00%
B.5	24	Game Time 8-10 Mins	00	00%
B.5	25	Game Time 10-15 Mins	00	00%
B.5	26	Game Time Over 15 Mins	00	00%

B.6 Time-Stamps

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

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

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

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

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

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

T.1   Switch Edges Test

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

T.2   Switch Levels Test

This test automatically cycles through all switches that are detected closed. The name and number of each switch that is detected is shown in the display. A filled square indicates the switch's position in the matrix.

T.3   Single Switches Test

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

T.4 Solenoid Test

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

Repeat: The Repeat mode pulses a single solenoid. After entering this test, the name of the first solenoid shows in the display and the corresponding coil pulses. Press the Up or Down button to cycle through the solenoids, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test menu, or press the Enter button to move to the next mode.

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 move 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.

T.5 Flasher Test

This tests the flashlamp part of the solenoid circuit. There are three modes - Repeat, Stop, and Run. During this test the flashlamp circuit named in the display should blink. The system has detected a problem if more then one flashlamp circuit blinks, the lamps stays on, or no lamps blink 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 shows in the display and the corresponding bulb(s) blink. The same lamps blink 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. There should not be any flashlamps lit during this mode. Either press the Escape button to return to the Test menu, or press the Enter button to advance to the next mode.

Run: The Run mode cycles through the flashlamps automatically. The display shows the name and number of the flashlamp circuit currently being pulsed as the corresponding bulb(s) flashes.

T.6 General Illumination Test

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

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

T.7 Sound and Music Test

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

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

Repeat: Press the Enter button at any time during the 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. Nothing should be heard. Any other results indicates the system has detected a problem.

T.8 Single Lamp Test

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

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

T.9 All Lamps Test

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

T.10 Lamp and Flasher Test

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

T.11 Display Test

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

T.12 Flipper Coil Test

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

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

Stop: The Stop mode halts the Flipper Coil test. Press Enter during the Repeat mode and the test stops. No coils should be activated while the test is stopped. Either press the Escape button to return to the Test menu, or the Enter button to move to the next mode.

Run: The Run mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed.

T.13   Ordered Lamps Test

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

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

T.14   Lamp Row-Col

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 and Down buttons to cycles through 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   Gorilla Test

Select T.16 from the Test menu and press Enter to begin the Gorilla Mechanism test.

The Gorilla test allows the operator to enable the underground mini-playfield and test its operation without entering game play. While the test is enabled, the left and right flipper buttons will operate the gorilla mechanism and the display the state of the gorilla stand-up switches.

T.17   Empty Balls

Select T.17 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 may 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 setting is
retained and the new setting is ignored. Press the Escape button to return to the Utility menu.

U. Utilities Menu

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

U.1   Clear Audits

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

U.2   Clear Coins

Press the Enter button to clear the Earnings Audits.

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

Press the Enter button to clear the High Score to Date Table and the Grand Champion.

U.4   Set Time and Date

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

U.5   Custom Message   *Set A.1 20 to ON before trying to write a Custom Message.*

Press the Enter button to begin entry of the custom message. Use the Up or Down
buttons 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 a mistake is made, use Up and
Down to select the "back-arrow" character. The "back-arrow" character is located before the
space character and after the number nine. Press Enter while the back-arrow shows to erase
the previously entered character. Once the message is complete, press and hold the Enter
button until "Message Stored" is displayed.

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

U.6   Set Game I.D.

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

U.7   Factory Adjustment

Press the Enter button to restore the adjustments to factory settings.

1-17

U.8 Factory Reset

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

U.9 Presets

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

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

U.9 01	**Install Extra Easy**	MUCH LESS difficult than factory setting.
U.9 02	**Install Easy**	Somewhat LESS difficult than factory setting.
U.9 03	**Install Medium**	About the SAME as factory setting.
U.9 04	**Install Hard**	Somewhat MORE difficult than factory setting.
U.9 05	**Install Extra Hard**	MUCH MORE difficult than factory setting.

Difficulty Setting Table for U.S., Canadian, French, German, and European Games

Adj. #	Adj. Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03 (factory)	Hard U.9 04	Extra Hard U.9 05
A.2 08	*Kickback Difficulty For*					
	Game Start	-----	On	On	Off	Off
	Ball Start	On	-----	-----	-----	-----
	Memory	-------	Yes	Yes	Yes	No
A.2 09	*Amy Difficulty Memory*	-----	Yes	Yes	Yes	No
A.2 10	*Multiball Difficulty For*					
	Lock lamps at game start	-----	On	Off	Off	Off
	Lock lamps at ball start	On	Memory	Memory	Memory	Off
	Locks enabled for first multiball	All (3)	All (3)	One	One	One
	Locks enables for later multiballs	All (3)	One	One	One	One
A.2 11	*Mystery Difficulty For*					
	Mystery lamps at game start	-----	On	Off	Off	Off
	Mystery lamps at ball start	On	-----	-----	-----	-----
	Mystery lamp memory	-----	Yes	Yes	Yes	No
A.2 12	*Gray Difficulty Memory*	Yes	Yes	Yes	Yes	No
A.2 13	*Bonus X Difficulty Memory*	Yes	Yes	No	No	No

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 changing of certain features to the recommended 3-and 5-ball level.   The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the individual groups.

Preset Adjustments Table for U.S. and Canadian Games

Adj. #	Adj. Description	Install 5-ball U.9 06	Install 3-ball U.9 07
A.1 01	Ball Per Game	5	3
A.1 07	Replay Start	1,000,000,000	900,000,000
A.2 06	Extra Ball Level	8	5

U.9 08 Install Add-A-Ball

This option deletes all Free Play awards and replaces them with Extra Ball awards. Individual adjustments are affected, as follows:

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

U.9 09 Install Ticket

This option deletes Credit awards and replaces them with Ticket awards. Individual adjustments are affected as follows:

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

U.9 10 Install Novelty

This option removes all Free Play and Extra Ball awards. Individual adjustments are affected as follows:

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

U.9 11 NOT USED

U.9 12 Serial Capture

This sets up the printer adjustments for a 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 to U.9 16 NOT USED

U.9 17 Install German 1
U.9 18 Install German 2
U.9 19 Install German 3
U.9 20 Install German 4
U.9 21 Install German 5
U.9 22 Install German 6
Adjustments U.9 17 through U.9 22 are used to modify game pricing and type of play.

U.9 23 Install French 1
U.9 24 Install French 2
U.9 25 Install French 3
U.9 26 Install French 4
U.9 27 Install French 5
U.9 28 Install French 6
Adjustments U.9 23 through U.9 28 are used to modify game pricing and type of play.

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

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

Press the 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 setting choice. If a mistake is made, press the Escape button while "Saving Adjustment Value" is in the display. The original value 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 to 10.

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

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

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

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

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

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

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

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

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. 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 value to be used for the 1st through 4th Fixed Replay.
Range: 00 to 250,000,000.

A.1 13 Replay Boost

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

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

A.1 14 Replay Award

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

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

A.1 15 Special Award

The award automatically provided when the player scores a special.

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

A.1 16 Match Award

The award automatically provided when the players wins a match.

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

A.1 17 Extra Ball Ticket

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

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

A.1 18 Maximum Ticket/Player

The amount of Tickets each player can earn.
Range: 00 to 100.

** For Fixed Replay.

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

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

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

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

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

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

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

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

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

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

YES   -   Dim the General Illumination during the Attract Mode.
NO   -   Do Not dim the General Illumination.

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

YES   -   Keep Multiball and Jackpots equal.
NO   -   Do Not Keep Multiball 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 Override
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 substantially increases the life of the lamps.

Setting: OFF, 2 to 60 minutes.

A.1 30 Power Saver Level

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

Range: 4 to 7. (4 = 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 to "YES" may extend the life of the flipper mechanisms.

A.1 33 Game Restart

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

NEVER-   Do not allow a new game start until the current game is over.
SLOW -   Restart if the Start button is pressed continuously for over 1/2 second. This helps to
          prevent the unintended restart of game in progress.
INSTANTLY-   Restart as soon as the Start button is pressed.

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

A.2   Feature Adjustments

A.2 01 Ball Saves

This determines how many times a ball will be saved when it drains. The ball saver is available each ball until the adjusted number of ball saves is used by the player.

Setting: OFF, 1-5
Factory Default: 1

Example of ball save usage: WITH BALL SAVES - 1 (factory default).

BALL 1:   Ball saves available.
Ball drains after ball saver time-out.

BALL 2:   Ball saves available.
Ball drains during ball save timer, and ball is delivered back onto the playfield.

BALL 3:   Ball save NOT available.

A.2 02 Ball Save Time

This sets the number of seconds that the ball saver is activated.

Setting: 2-15 seconds
Factory Default: 4 seconds

A.2 03 Timed Plunger

This sets a time-out for the ball to be automatically plunged onto the playfield after it has been served.

Setting: OFF, 30-90 seconds
Factory Default: OFF

A.2 04 Flipper Plunger

When this adjustment is set to YES, the right flipper will cause the ball to be launched onto the playfield. This adjustment provides the option of launching the ball with the right flipper button in addition to the manual plunger.

Setting: YES, NO
Factory Default: NO

A.2 05 Ex. Ball Percent

This determines the total percentage of extra balls desired (for all extra balls awarded from all features except replay score levels). The game will adjust the number of Volcano ramps needed to light an extra ball to achieve the requested percentage. Set to FIXED to disable the automatic percentaging of the Volcano Ramp Extra Ball.

Setting: FIXED, 11-40%
Factory Default: 20 %

A.2 06 Ex. Ball Level

This is the number of Volcano Ramps necessary to light the Extra Ball lamp. The machine will start with this value and modify it as necessary to achieve the percentage specified in A.2 05. To use a fixed level for the extra ball, set A.2 05 to FIXED, then set the level.

Setting: 3-55
Factory Default: 5

A.2 07 Ex. Ball Memory

This determines whether a lit Extra Ball stays lit from ball to ball.

Setting: YES, NO
Factory Default: YES

A.2 08 Kickback Difficulty

This determines the difficulty setting for the kickback.

	Game Start	Ball Start	Memory
Extra Easy	-----	On	----
Easy	On	----	Yes
Medium	On	----	Yes
Hard	Off	----	Yes
Extra Hard	Off	----	No

Setting: Extra Easy, Easy, Medium, Hard, Extra Hard
Factory Default: Medium

A.2 09 Amy Difficulty

This determines the Amy rule difficulty. (The memory setting for the AMY lamps).

	Memory
Extra Easy	Yes
Easy	Yes
Medium	Yes
Hard	Yes
Extra Hard	No

Setting: Extra Easy, Easy, Medium, Hard, Extra Hard
Factory Default: Medium

A.2 10 Multiball Difficulty

This adjustment controls the difficulty settings for Volcano multiball:

	Lock Lamps State At		Number Of Locks Enabled		
	Game Start	Ball Start	First Multiball	Later Multiballs	Diamonds Lit At Ball Start
Extra Easy	-----	On	All (3)	All (3)	All
Easy	On	Memory	All (3)	One	All
Medium	Off	Memory	One	One	All
Hard	Off	Memory	One	One	None
Extra Hard	Off	Memory	One	One	None

Setting: Extra Easy, Easy, Medium, Hard, Extra Hard
Factory Default: Medium

A.2 11 Mystery Difficulty
These are the difficulty settings for the Mystery award:

	Mystery Lamps State At		
	Game Start	Ball Start	Memory
Extra Easy	-----	On	-----
Easy	On	-----	Yes
Medium	Off	-----	Yes
Hard	Off	-----	Yes
Extra Hard	Off	-----	No

Setting: Extra Easy, Easy, Medium, Hard, Extra Hard
Factory Default: Medium

A.2 12 Gray Difficulty
This adjustment controls the difficulty settings for the GRAY lamps:

	Memory
Extra Easy	Yes
Easy	Yes
Medium	Yes
Hard	Yes
Extra Hard	No

Setting: Extra Easy, Easy, Medium, Hard, Extra Hard
Factory Default: Medium

A.2 13 Bonus X Difficulty
This is the difficulty adjustment for the players end of ball bonus multiplier.

	Memory
Extra Easy	Yes
Easy	Yes
Medium	No
Hard	No
Extra Hard	No

Setting: Extra Easy, Easy, Medium, Hard, Extra Hard
Factory Default: Medium

A.2 14 Special Mode
This determines whether a special mode is available to players.

Setting: YES, NO
Factory Default: YES

A.2 15 Player Tournament
When this adjustment is set to YES, holding both flipper buttons (during Attract mode) for five seconds prompts the player with "TOURNAMENT MODE READY" and gives them ten seconds to start a game in Tournament mode

Setting: YES, NO
Factory Default: YES

A.2 16 A-Mode Music
This determines whether or not the Attract mode plays music to attract the player.

Setting: YES, NO
Factory Default: NO

A.2 17 Endgame Lock Release
When this adjustment is set to YES, the game will release all locked balls from the Volcano 3-ball lockup at the end of each game.

Setting: YES, NO
Factory Default: YES

A.2 18 Buy Extra Ball
This determines if the players can buy extra balls at the end of the game.

Setting: OFF, ½ Credit, 1 Credit
Factory Default: OFF

A.2 19 Buy In Count
This determines the number of times per game the player is allowed to buy an extra ball.

Setting: 1-3, UNLIMITED
Factory Default: 1

A.2 20 Amy Feed Disabled
When this adjustment is set to YES, The game will not operate the up direction of the Two-way popper mechanism. All balls arriving at the Two-way popper will be ejected in the down direction. This adjustment is provided for use when the Amy ramp or Two-way popper are broken. This will allow the game to continue playing until the mechanism can be repaired.

Setting: YES, NO
Factory Default: NO

A.2 21 Mini Playfield Disabled
When this adjustment is set to YES, The game will not operate the underground mini-playfield device in game play. This adjustment is provided for use when the mini-playfield is broken or removed from the game. This will allow the game to continue playing until the mechanism can be repaired.

Setting: YES, NO
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 USA 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 to A.2 09   NOT USED

A.3 10 Coin Door Type (If set to custom, then 11 to 15, 20 and 25 are available. Custom Pricing Is Not Available For USA And Canadian Games).

This adjustment is used to preset adjustments 11 through 15, 20 and 25, based on standard coin doors.

A.3 11 Collection Text

The coin system is used to display the Earning Audits.

A.3 12 Left Slot Value

A.3 13 Center Slot Value

A.3 14 Right Slot Value

A.3 15 4th Slot Value

These are the values for the coins for these respective coin slots. These values are used for determining collection totals. The corresponding adjustments A.3 28 (Left Slot Credit Value) through A.3 31 (4th Slot Credit Value) typically contain the same values and are used to determine the number of credits awarded for the coin slot. Whenever these values are changed, the new value is copied to the corresponding A.3 28 through A.3 31 adjustment. If a bonus is desired for a particular coin (such as 3 credits for dollar coin) then the corresponding A.3 28 through A.3 31 "Credit Value" adjustment should be modified to award the bonus. See "Bonus for Special Coin" section 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. Factory default is 10.

A.3 17 Free Play

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

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

A.3 18 Hide Coin Audits

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

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

A.3 19 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 cents (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.

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

A.3 23 Minimum Coin Milliseconds
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 24 NOT USED

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 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 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 used a different value for other pricing modes.

Please note that formerly, the coin values specified by custom coin doors 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 in 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 selected.)

Assuming the last mode installed was 1/$0.50 2/$0.75 3/$1.00 the display appears 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):   Make the current field higher.

Enter: Save any changes to the current field and move to the next field. Note that there are 2 columns of fields. Price levels are in the left column and credit levels are in the right column. Pressing "Enter" will move from left column to right column before moving to the next line.

Start: Save the current price mode or start over

By using the above functions, you 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 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 instructions:

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 one 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)         $1.50          4 cred    │
└─────────────────────────────────────┘
             DISPLAY VIEW
```

Note that the line "5) $2.00   6 cred." No longer fits on the display. Whenever there are more than four pricing levels that 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 four 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

DISPLAY VIEW

Now repeatedly press "Enter" to move the right hand column to 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 be specified, you 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 previous 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.

Bonus for Special Coins

For most coin modes, the system allows the mixing of any combination of any size coin and awards credits as each appropriate amount is accumulated. With A.3 10 (Coin Door Type) set to "custom", the value of each coin slot may be entered for adjustments A.3 12 (Left slot value) through A.3 15 (4th slot value). Whenever these values are changed, the new values are copied to A.3 28 (Left Slot Credit Value) through A.3 31 (4th Slot Credit Value) respectively. To give a bonus for a particular coin, you need to modify the "Credit Value" adjustment to specify the value to be given for the bonus coin.

For example, in a game with a Left Coin Slot that takes quarters and a center coin slot that takes dollars, if you wish to charge 50 cents for 1 play and $1.00 for 2 plays, you setup the pricing editor to show:

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

If you set A.3 10 (Coin Door Type) to "custom" you will see the following coin door specifier adjustments:

A.3 12	Left Slot Value	0.25
A.3 13	Center Slot Value	1.00
A.3 28	Left Slot Credit Value	0.25
A.3 29	Center Slot Credit Value	1.00

To change the pricing to 1 play for $0.50, 2 plays for $1.00 and 3 plays for a dollar coin, you change A.3 29 (Center Slot Credit Value) to 1.50. This will result in the following settings:

A.3 12	Left Slot Value	0.25
A.3 13	Center Slot Value	1.00
A.3 28	Left Slot Credit Value	0.25
A.3 29	Center Slot Credit Value	1.50

This will cause $1.50 worth of credits (3) to be awarded for each coin inserted in the center coin slot (dollar coin). This is due to the $1.50 setting of A.3 29 (Center Slot CREDIT VALUE). Note that the 1.00 setting of A.3 13 tells the game that each coin in the center slot adds $1.00 to the total collection.

A.3 28 Left Slot Credit Value
A.3 29 Center Slot Credit Value
A.3 30 Right Slot Credit Value
A.3 31 4th Slot Credit Value

This adjustment specifies the value to be used for awarding credits. It is typically the same value as the corresponding A.3 12 (Left Slot Value) through A.3 15 (4th Slot Value) adjustment.

The A.3 12 through A.3 15 values are used to determine the auditing value of each coin (for collection totals) while the A.3 28 through A.3 31 value determine the coin value for awarding credits. By making this "Credit Value" adjustment higher than the A.3 12 through A.3 15 "Value" adjustment, a bonus may be given for a specific call (see "Bonus for Special Coin" section for more information).

Pricing Table

Country	CoinChutes 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	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]	USA 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	
Canada 3/Dollar Coin	25¢	-	$1.00	-	1/0,50, 2/$1.00, 3/$1.00-Coin	CAN.$ BONUS	
Austria	5sch	10sch	10sch	-	1/2x5sch, 3/2x10sch [2]	AUSTRIA	
	5sch	-	10sch		12/5sch, 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 [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	SWISS 1	
	1Fr	2Fr	5Fr	-	1/2Fr, 2/3Fr, 3/4Fr, 5/5F	SWISS 2	
Swiss 2	1Fr	2Fr	5Fr	-	1/1Fr, 5/5Fr	SWISS 3	
Swiss 3	1Fr	2Fr	5Fr	-	1/1Fr, 2/2Fr, 6/5Fr	SWISS 4	
Swiss 4	1Fr	1Fr	1Fr	-	1/1Fr (all slots = 1Fr)	SWISS 5	
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr, 1/20Fr, 3/50Fr [2]	BELGIUM	
Belgium 2	5Fr	20Fr	50Fr	-	1/20Fr, 3/60Fr, 3/50Fr-Coin	BELG. BONUS	
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 [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 [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]	TARIFF 1	
	1Fr	5Fr	10Fr	20Fr	1/2x1Fr, 3/5Fr, 7/10Fr ,14/20Fr [2,3]	TARIFF 2	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 7/2x10Fr , 7/20Fr [1,2,3]	TARIFF 3	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 4/10Fr, 9/2x10Fr , 9/20Fr [2,3]	TARIFF 4	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 5/10Fr, 11/2x10Fr , 11/20Fr [2,3]	TARIFF 5	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr , 6/20Fr [2,3]	TARIFF 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 [2]	CUSTOM	01 00 04 00 01 04 01 00
	25P	-	100P	-	1/25P, 4/100P [2]	CUSTOM	01 00 04 00 01 00 01 00
	25P	-	100P	-	1/2x25P, 2/100P [2]	CUSTOM	01 00 04 00 02 00 01 00
	25P	-	100P	-	1/2x25P, 3/100P [2]	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	1/2x1 Kr, 3/5 Kr, 7/10 Kr [2]	DENMARK 1	
	1Kr	5Kr	10Kr	20Kr	1/5 Kr, 3/10 Kr, 6/20 Kr [1,2]	DENMARK 2	
Finland	1Mka	-	5Mka	-	1/2x1Mka, 3/5Mka [2]	FINLAND 1	
	1Mka	-	5Mka	-	1/3x1Mka, 2/5Mka [2]	FINLAND 2	
New Zealand	$1.00	-	$2.00	-	1/$1, 3/$2 [2]	NEW ZEALAND 1	
	$2.00	-	$1.00	-	1/$1, 3/$2, ($2-$1 door)	NEW ZEALAND 2	
Norway	5Kr	-	10Kr	-	1/5Kr, 2/10Kr, 5/20Kr [2]	NORWAY	
Argentina	10¢	10¢	10¢	-	1/1 Token [2]	ARGENTINA	
Greece	10D	20D	50D	-	1/2x10D, 1/20D, 3/50D	GREECE	
Antilles	25¢	25¢	1G	-	1/25¢, 4/1G	ANTILLES	
Netherlands	1HFl	2.5HFl	2.5HFl	-	1/1Hfl, 3/2.5hfl	NETHERLANDS	
Netherlands 2	1HFl	2.5HFl	2.5HFl	-	1/1HFl, 3/3HFl, 3/2.5HFl-Coin	NETH. BONUS	
Hungary	20 Old	20 New	50F	-	1/40F, 2/60F, 4/100F	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 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 Attract Mode.

A.4 02 H.S.T.D. Award
The award given for achieving the High Score To Date, or the Champion H.S.T.D.: Credit or a Ticket.

A.4 03 Champion H.S.T.D.
The "Highest" High Score can be displayed in the Attract Mode. This score is not cleared when "High Score Reset Every" occurs.

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

A.4 04 Champion Credits
The number of credits or tickets awarded for a Grand Champion Score.
Range: 00 to 10.

A.4 05 H.S.T.D. 1 Credits
A.4 06 H.S.T.D. 2 Credits
A.4 07 H.S.T.D. 3 Credits
A.4 08 H.S.T.D. 4 Credits
The number of credits or tickets awarded whenever a player exceeds the 1st, 2nd, 3rd, or 4th highest score.
Range: 00 to 10.

A.4 09 High Score Reset Every
The number of games to be played before an automatic reset of the displayed "Highest Score" occurs. The values provided upon reset are those selected by the operator in the Back-up High Scores.
Range: OFF (disabled); 250 to 20,000.

A.4 10 Backup Champion
The Back-up Grand Champion Score.
Range: 00 to 999,000,000.

A.4 11 Backup H.S.T.D. 1
A.4 12 Backup H.S.T.D. 2
A.4 13 Backup H.S.T.D. 3
A.4 14 Backup H.S.T.D. 4
The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached.
Range: 00 - 999,000,000.

A.5   Printer Adjustments (optional board required)
A.5 01 Column Width
The column width to be printed. Range: 22 to 80.

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

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

YES   -   The printer does pause.
NO   -   The printer doesn't pause.

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

A.5 05 Serial Baud Rate
Select which baud rate to use for serial or ADP communications (bit rate): 300, 600, 1200, 2400, 4800, or 9600.

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

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

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 then 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 AUDITS	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 be taken 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 printouts will only take place if the coin door is open.

After an automatic printout has been generated, a 2nd 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 a message, "Press ENTER for Test Report". This indicates the game program has detected a possible problem with the game.

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

Check Switch ##.

This message indicates that at least one switch was stuck 'On' at game turn-on or has NOT been actuated during ball play (for 90 balls or apx. 30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep your game earning, until the service technician can repair the problem. To verify the problem, refer to the Test Menu text describing Switch Testing, and check each reported switch using applicable switch tests. Always check switch operation using a ball, to simulate game conditions. Switch problems may often be resolved by adjusting the wire switch actuators, fixing switch circuitry problems, securing loose connectors, etc. Mechanisms using 'opto switches' (drop targets, etc.) need to be checked for proper power connections (+12V dc and ground).

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 (F109), or at connectors J138, J139, J140 or J141 on the power driver board.

Opto Trough Bad Check Connectors, Wires and 12V Supply.

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

Pinball Missing.

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

xxxxx Sw. is Stuck On.

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

Ground Short Row - N, Wht - xxx.

This message indicates that the switch wires being called out are touching a grounded part on the playfield or coin door. The following should be checked:
1. Slam tilt (or other coin door switch) touching the grounded coin door.
2. A leaf-type, playfield switch touching a grounded part.
3. Players poking metallic objects (wires, coat hangers, etc.) into the game.
4. Switch cable insulation pierced or damaged allowing bare wire contact with a grounded part.
5. All switches in a row closing at the same time. *Note:* This is NOT a switch problem; however, for most games it is a very rare possibility.

G10 Error

The security chip is incorrect or faulty. If this occurs, replace the security chip.

G11 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. Go to U.4 of the Utilities Menu and set the time and date.

Factory Settings Restored.

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

CPU and Audio Visual Board Error Codes

The CPU has three LED's, 201, 202, and 203. At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing. If the system detects and error the following happens:

CPU BOARD	Center LED blinks once	= G11 ROM Failure
LED ERROR CODES	Center LED blinks twice	= U8 RAM Failure
	Center LED blinks three times	= G10 Security Chip Failure

Upon game turn-on you will hear one of the following.

AUDIO VISUAL BOARD	1 Beep	= Audio Visual Board is O.K.
BEEP ERROR CODES	2 Beeps	= S2 Failure
	3 Beeps	= S3 Failure
	4 Beeps	= S4 Failure
	5 Beeps	= S5 Failure
	6 Beeps	= S6 Failure
	7 Beeps	= S7 Failure
	10 Beeps	= Audio Static RAM 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 (LED) should always be approximately 1.4 volts. *Note:* The transmitter (LED) is larger than the receiver (Photo Transistor); it protrudes further from its case.
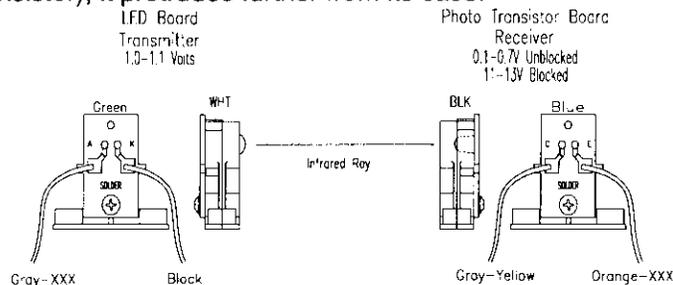
LED LIST
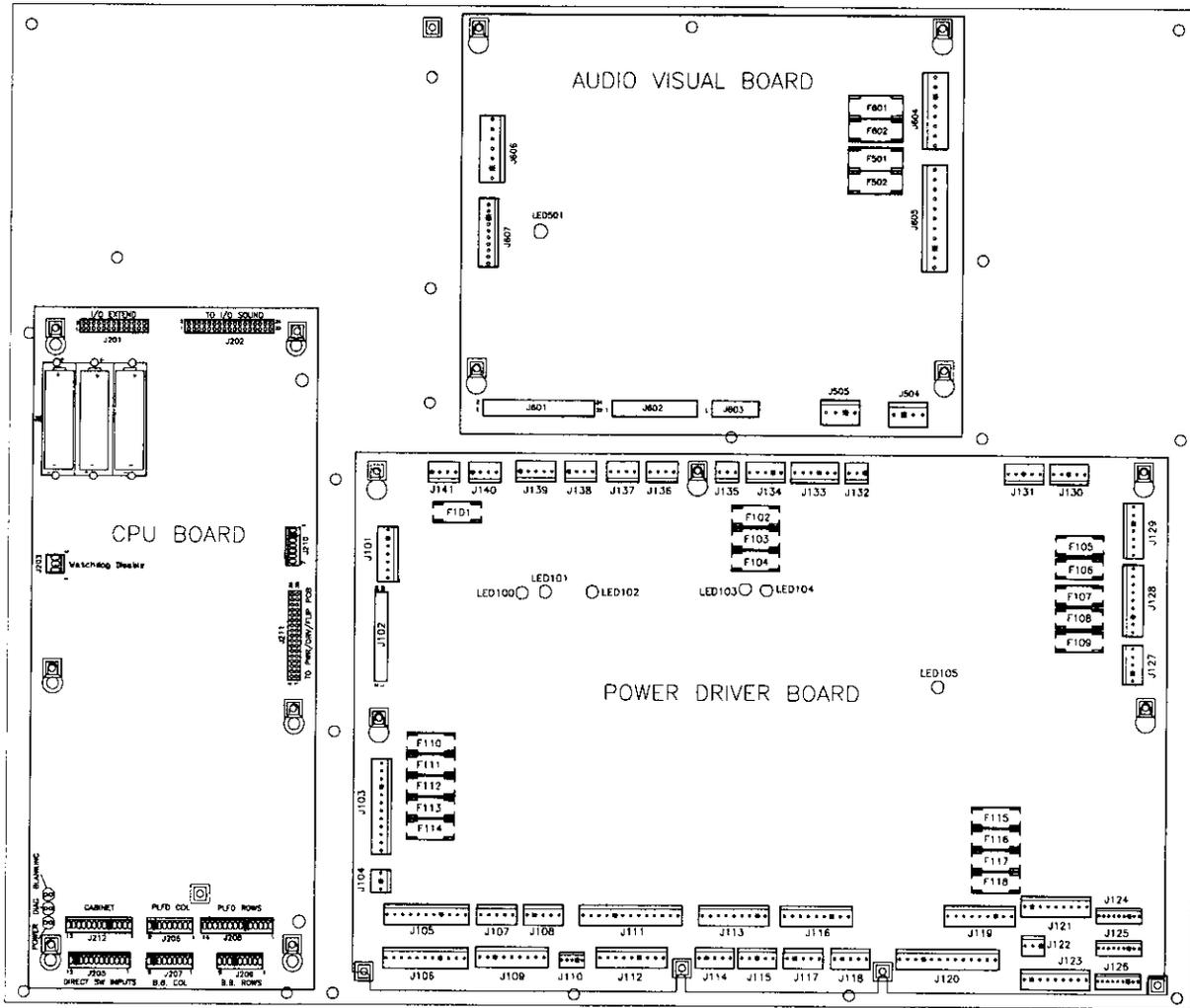
CPU BOARD
LED 201   Blanking
LED 202   Power
LED 203   Diagnostics
At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing.

AUDIO VISUAL BOARD
LED 501   +5VDC, Normally flashing, but at a slower rate than LED 203.

POWER DRIVER BOARD
LED 100   +12VDC Regulated, Normally On
LED 101   +5VDC Digital, Normally On
LED 102   +18VDC Lamps, Normally On
LED 103   +12VDC Unregulated, Normally On
LED 104   +20VDC Flashlamps, Normally On
LED 105   +50VDC Coils, Normally On

FUSE LIST
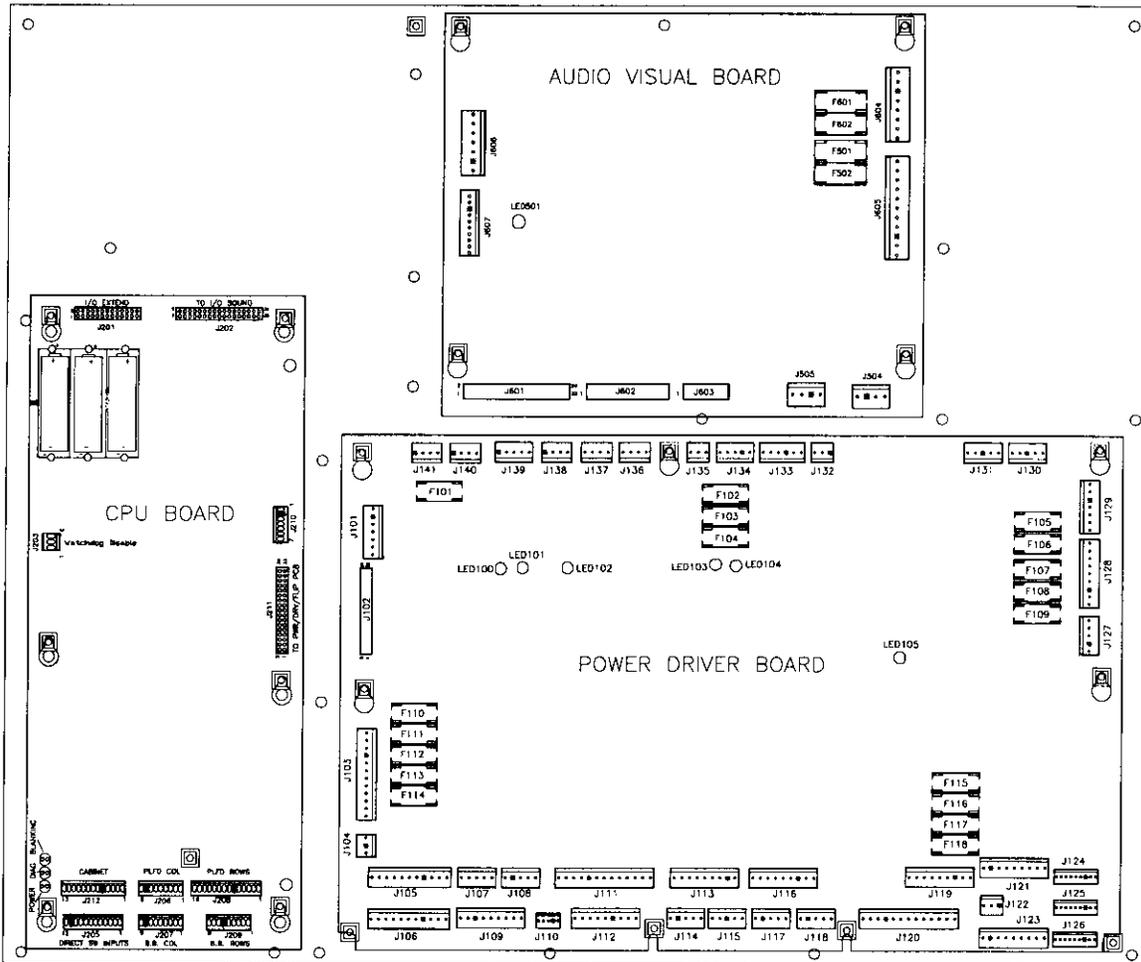
AUDIO VIDEO BOARD

F501	-25V	T2.5A, 250V
F502	+25V	T2.5A, 250V
F601	+62V	T0.25A, 250V
F602	-113V & -125V	T0.25A, 250V

CPU BOARD

There are no fuses on the CPU board.

POWER DRIVER BOARD

F101	Regulated 12V	T0.63A, 250v	F110	G.I. #5 White-Violet	T4.0A, 250V
F102	Solenoids #25 to #28	T4.0A, 250V	F111	G.I. #4 White-Green	T4.0A, 250V
F103	Solenoids #1-#8	T4.0A, 250V	F112	G.I. #3 White-Yellow	T4.0A, 250V
F104	Solenoids #9 to #16	T4.0A, 250V	F113	G.I. #2 White-Orange	T4.0A, 250V
F105	+5V Logic	T4.0A, 250V	F114	G.I. #1 White-Brown	T4.0A, 250V
F106	+18V Lamp Matrix	T5.0A, 250V	F115	+50V Flippers	T4.0A, 250V
F107	Flasher Secondary	T4.0A, 250V	F116	+50V Flippers	T4.0A, 250V
F108	Solenoid Secondary	T6.3A, 250	F117	+50V Flippers	T4.0A, 250V
F109	Unregulated 12V	T4.0A, 250V	F118	+50V Flippers	T4.0A, 250V

LINE FILTER

Foreign	T4.0A, 250V
Domestic	T5.0A, 250V

MAINTENANCE INFORMATION

LUBRICATION

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

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

Lubrication to ensure proper operation also applies to the target blades of the Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, with a Williams' part number of EI165, is a recommended lubricant.

SWITCH CONTACTS

Playfield Switches

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

Flipper Switches

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

CLEANING

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

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

SECTION TWO

PARTS INFORMATION

50050-BB
Backbox Assembly

Item	Part Number	Description
1	01-6645	Venting Screen
2	B-10686-1	Knocker Assembly
3	A14092-7	WPC '95 Mounting Plate Assy.
4	A-20028	WPC '95 Power Driver PCB
5	A-20516-50050	WPC '95 Audio Visual PCB
6	A-20119-50050	WPC '95 CPU PCB
7	04-10276-50050	Backbox, Wood
8	A-20245	Speaker/Display Assembly
a)	555-12924-00	Speaker Tweeter, 15w, 4Ω
b)	5555-12856-00	Speaker, 5-1/4", 25w, 4Ω
c)	5045-12914-00	Capacitor, 10μfd., 50v (±20%)
d)	5901-12784-00	Dot Matrix Display/Driver Board
9	A-13379	Lock & Plate Assembly
10	50050-IN	Insert Assembly

Ribbon Cables

Item	Part Number	Designator
11	5795-12653-03	Ribbon Cable, 34-pin, 3"
12	5795-12653-12	Ribbon Cable, 34-pin, 12"
13	5795-12838-25	Ribbon Cable, 14-pin, 25"
14	5795-10938-15	Ribbon Cable, 26-pin, 15"

Miscellaneous Parts

08-7456	Backbox Glass: 27 x 18-7/8"
20-9718	Wing Screw, 3/8-16 x 2"
31-1357-50050	Screened Translight

Backbox Cables

H-20479	Dot Matrix Display Power Cable
H-20477	Logic Power Cable
H-20478	Secondary Cable
H-20723	Insert Cable

50050-CAB
Cabinet Assembly

Item	Part Number	Description
1	A-16773-1	Lever Guide Assembly
2	B-12445-7	Ball Shooter Assembly
3	02-4352	Pivot Bushing (2)
4	A-16883-6	Flipper Button, Yellow (2)
5	A-20729-1	4-Ball Cashbox Assembly
6	A-17540-1	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-20580	Coin Door Interface Board
11	A-19514	Leg Assembly, Chrome (4)
12	D-12615	Front Molding Assembly
13	20-6502-A	Plum Bob
14	04-10346	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	11-1311	Wood Cabinet
20	20-9663-2	Push Button w/Sw., *Start* (Green)
21	01-11400	Leg Plate (4)
22	A-18249-1	Cable & Interlock Switch Assy.
23	09-61000-1	Coin Door-USA
24	01-13936	Drip Plate, Narrow
25	01-11408	Plate Spacer (2)
26	02-4329-1	Pivot Nut, 7/8" (4)

Miscellaneous Parts (Not Shown)

Part Number	Description
A-17195	Tilt Switch Assy. w/Cable
A-19562.1	Stay Arm Assembly
01-12352	Clip Bracket
01-9011.1-L	Backbox Mtg. Bracket, Left
01-9011.1-R	Backbox Mtg. Bracket, Right
01-6389-1	Cashbox Lock Bracket
08-7028-T	Playfield Glass
08-7377	Leg Leveler Adjuster, 3"
20-6500	Steel Ball, 1-1/16" (4)
01-3535	Rod Mounting Plate

Backbox Cables

Part Number	Description
A-20201	Cable & Jumper Assy., Coin Door
H-17217.1	Plumb/Bob Mech. Protect Cable
H-17837-2	Voltage Program Jumper Cable
H-20599-1	Cabinet Cable
H-19601-1	Power Extension Cable
H-20671.1	Cabinet Switch/Lamp Cable
H-20673	Insert Cable

* See Application Chart p.2-31.

A-20516-50050
WPC '95 Audio Visual PCB Assembly

Part Number	Designator	Description
4004-01005-06	-	Mach. Screw, 4-40 x 3/8"
4404-01119-00	-	Nut 4-40 ESN
5010-08774-00	R2, R17, R22, R23, R35, R36, R40, R42, R87	Resistor, 22KΩ, ¼w, 5%
5010-08991-00	R20, R46-R48, R50, R72, R76, R77, R107	Resistor, 4.7KΩ, ¼w, 5%
5010-09034-00	R21	Resistor, 10KΩ, ¼w, 5%
5010-09036-00	R19	Resistor, 100Ω, ¼w, 5%
5010-09134-00	R32-R34	Resistor, 150KΩ, ¼w, 5%
5010-09219-00	R1, R3	Resistor, 8.2KΩ, ¼w, 5%
5010-09416-00	R73, R74, R80-R82, R88, R105, R106	Resistor, 470Ω, ¼w, 5%
5010-09807-00	R30, R31, R67-R69, R102	Resistor, 120Ω, ¼w, 5%
5010-10171-00	R24	Resistor, 56Ω, ¼w, 5%
5010-10258-00	R86	Resistor, 1MΩ, ¼w, 5%
5010-10983-00	R53, R75, R79, R84, R85, R89, R90	Resistor, 1.8KΩ, ¼w, 5%
5010-12832-00	R25, R26, R27, R29	Resistor, 47KΩ, ¼w, 5%
5010-13215-00	R78, R97-R101	Resistor, 200KΩ, ¼w, 5%
5010-13372-00	R91-R96, R103, R104	Resistor, 220Ω, 1/8w, 5%
5010-13420-00	R37, R41	Resistor, 680Ω, ¼w, 5%
5010-13517-00	R38, R39	Resistor, 15Ω, ¼w, 5%
5010-13607-00	R4, R5, R7-R15	Resistor, 6.19KΩ, 1/8w, 1%
5012-14558-00	R44	Resistor, 1.8KΩ, 5w vertical
5012-14559-00	R43	Resistor, 4.7KΩ, 5w vertical
5012-14560-00	R28	Resistor, 120Ω, 5w vertical
5013-13661-00	R16	Resistor, 9.09KΩ, ¼w, 1%
5013-14456-00	R6, R18	Resistor, 3.32KΩ, ¼w, 1%
5040-14569-00	C35	Cap., 100mf, 25v, Axial
5040-09365-00	C38, C39, C43, C44	Cap., 1m, 63v(+50,-10%)Ax.
5040-12750-00	C48, C52, C73	Cap., 22m, 35v Radial
5040-13098-00	C18, C67, C68	Cap., 4.7μ, 35v (±20%)
5040-13417-00	C36, C37	Cap., 10000μf, 35v Radial
5040-14564-00	C28, C42	Cap., 150μf, 160v, 20%Rad.
5043-08996-00	C2, C3, C19, C22-C24, C26, C32, C34, C45, C46, C49, C50, C53-C66, C69, C72, C74-C76, C79, C80	Cap., 0.1μf, 50v (±20%) Ax.
5043-10267-00	C47, C51	Cap., 150pf, 100v Cer. Ax.
5048-10992-00	C27	Cap., .0047m, 50v, 10% Ax.
5048-11028-00	C77	Cap., 22p, 50v, Axial
5048-11029-00	C25	Cap., 100p, 50v, 5% Axial
5048-11030-00	C7	Cap., 470p, 50v, Axial
5048-11033-00	C1	Cap., .022m, 50v, 10% Ax.
5048-12036-00	C40, C41	Cap., .22m, 50v, Axial
5048-13172-00	C78	Cap., 47pf, 50v, 20% Ax.
5048-13418-00	C4 - C6	Cap., .047m, 50v, 5% Ax.
5048-13609-00	C9, C12, C15	Cap., 3900pf, 50v, 5% Ax.
5048-13610-00	C8, C10, C11, C13, C14	Cap., 1000pf, 50v, 5% Ax.
5048-13611-00	C16, C17, C20, C21	Cap., 680pf, 50v, 5% Ax.
5048-14563-00	C29-C31	Cap., .01μf, 200v, 10% Axial
5070-09045-00	D19-D22	Diode MR501, 3.0A
5070-09054-00	D4, D6-D17, D23	Diode 1N4004, 1.0A
5075-12823-00	D1, D18	Zener, 1N4758A 56v, 1w
5075-12824-00	D3, D5	Zener, 1N4742A 12v, 1w
5075-12826-00	D2	Zener, 1N4759, 62v, 1w
5160-08938-00	Q13-Q15	Transistor, 2N4401 NPN
5164-09056-00	Q2, Q3	Transistor, MPSD02 NPN
5164-12154-00	Q1, Q7	Transistor, MJE15030 NPN
5194-09055-00	Q4, Q5	Transistor, MPSD52 PNP
5194-12155-00	Q6	Transistor, MJE15031 PNP
5250-13302-00	U7	Reg. 78L05T 5v
5250-13303-00	U8	Reg. 79L05T 5v
5311-12538-00	U4	IC 74HC14 Hex. S-T
5315-13081-00	U12-U14	IC Octal Buffer HCT541
5340-12278-00	U25	S/Ram 2064 150NS
5370-12687-00	U27	IC MC 340640Reset Chp
5349-14351-00	U9-U11	SRAm 8Kx8-35ms, 28pdip
5370-12730-00	U1, U2	IC Op Amp TL084
5370-13419-00	U5, U6	IC TDA 2030AV 18w, Audio Amp
5371-13299-00	U3	IC Ad-1851 16bit mono
5520-14561-00	X2	Crystal 20mHz, parallel 20pf
5671-14516-00	LED 501	Led-Display Red T 1-3/4
5700-08985-00	U24	Socket IC 40-pin .6
5700-12047-00	U22	Socket IC 24.3P
5700-12088-00	S2-S7	Socket Dip 32.6P"
5705-12638-00	-	Heatsink 5298B
5705-14562-00	-	Heatsink 10-220 wave sol 287
5733-14528-00	-	Fuse Holder 5x20mm 10A.
5791-10850-00	J602	Connector, 26-pin Header Str.
5791-10862-04	J504, J505	Connector, 4-pin Header Str.
5791-10862-07	J606	Connector, 7-pin Header Str.
5791-10862-08	J604	Connector, 8-pin Header Str.
5791-10862-11	J605	Connector, 11-pin Header Str.
5791-12516-00	J601	Connector, 34 hdr 2 x 17 .100
5791-12827-00	J603	Connector, 14 Hen 7x2 Str.
5791-13830-10	J607	Connector, 10-pin Str. Sq.
5010-09534-00	W0, W1-W7, R49	Resistor, 0Ω, 0w
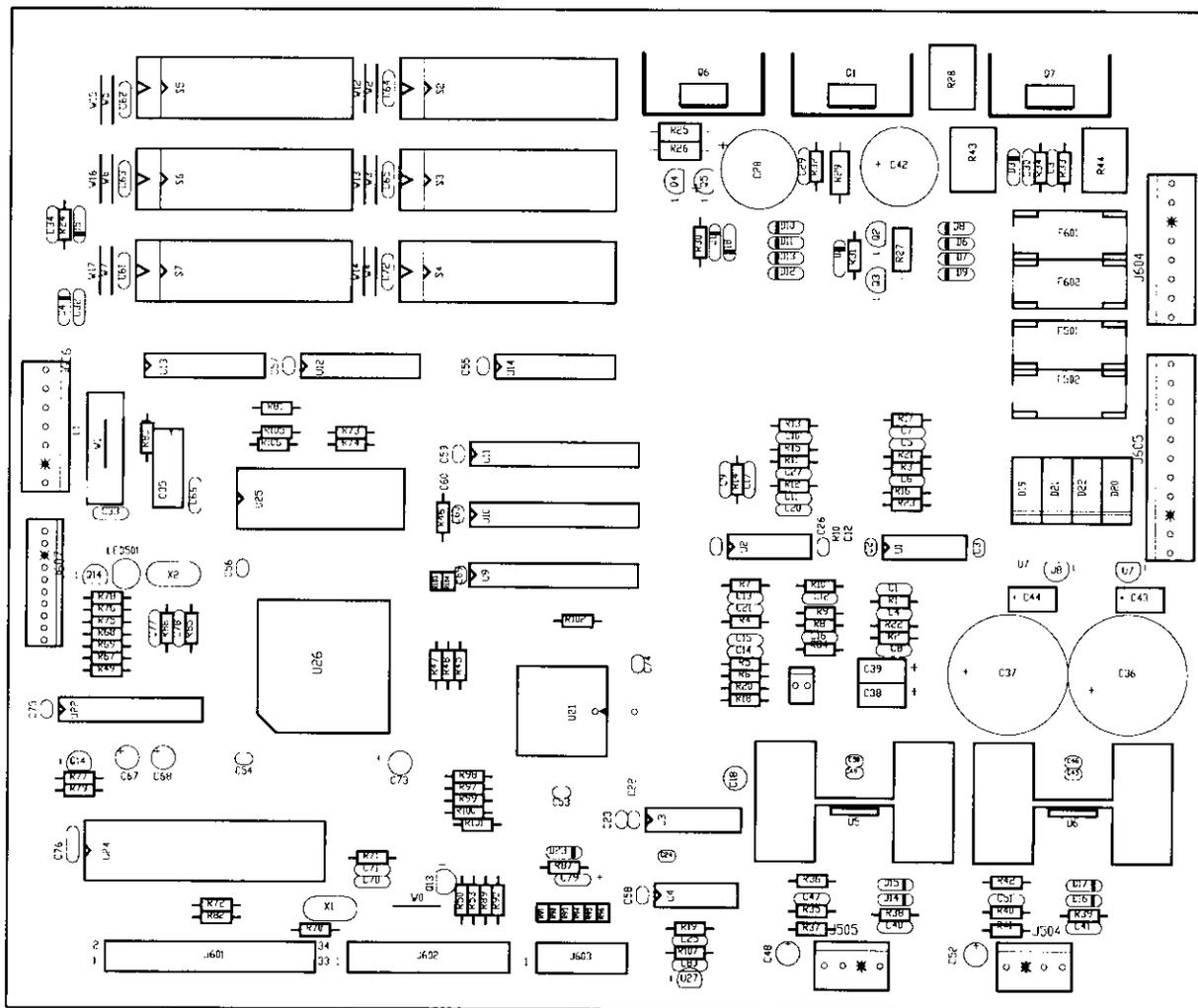
A-20028
WPC '95 Power Driver PCB Assembly

Part Number	Designator	Description
5040-14569-00	C1, C40	Capacitor, 100µF, 25v, Ax.
5043-08996-00	C2, C4, C5, C7, C13, C16, C17, C18, C19, C20, C21, C24-C39, C41-C43	Capacitor, 0.1m, 50v (±20%) Ax.
5040-13417-00	C8 - C12	Capacitor, 10000µf, 35v Radial
5048-11031-00	C14, C15	Capacitor, .001m, 50v, 10% Ax.
5040-09537-00	C22, C23	Capacitor, 100µ, 100v (±20%) Radial
5070-09054-00	D1, D2, D23, D24, D33 - D100, D103	Diode 1N4004
5070-14526-00	D3-D22, D25-D32	Diode P600G 6A 400 PIV
5070-08919-00	D101, D102	Diode, 1N4148 150mA.
5731-14531-00	F101	Fuse 5 x 20mm TO 63A., 250V
5731-14530-00	F102-F105, F107, F109-F118	Fuse 5 x 20mm T 4A, 250V
5731-14046-00	F106	Fuse S-B, 5A, 5x20mm
5731-14529-00	F108	Fuse 5 x 20mm T 6.3A, 250V
5733-14528-00	F101-F118	Fuse Holder 5 x 20mm10A
5705-14724-00	Q1	Heat Sink TO-3 5.1DEG/W
5701-09652-00	Q1	Thermal Pad TO-3
4406-01128-00	Q1	Nut 6-32 KEPS
4006-01005-06	Q1	Mach. Screw, 6-32 x 3/8"
5705-14562-00	Q2	Heat Sink 10-220 Wave Sol 287
4004-01005-06	Q2-Q5	Mach. Screw, 4-40 x 3/8"
4404-01119-00	Q2-Q5	Nut 4-40 ESN
5705-12638-00	Q3-Q5	Heat Sink 5298B
5791-10862-07	J101, J129	Connector, 7-pin Header Str.
5791-12516-00	J102	Connector, 34 Hdr 2x17
5791-10862-12	J103	Connector, 12-pin Header Str.
5791-10862-03	J104, J122, J132, J135	Connector, 3-pin Header Str.
5791-10862-11	J105, J106	Connector, 11-pin Header Str.
5791-10862-05	J107, J108, J114, J115, J117, J118, J127, J130, J131, J134, J139	Connector, 5-pin Header Str.
5791-10862-09	J109, J112, J113, J116, J119, J121, J123, J128	Connector, 9-pin Header Str.
5791-10862-13	J111, J120	Connector, 13-pin Header Str.
5791-13830-09	J124-J126	Connector, 9-pin Header Str.
5791-10862-06	J133	Connector, 6-pin Header Str.
5791-10862-04	J136-J138, J140, J141	Connector, 4-pin Header Str.
5671-14516-00	LED100-LED105	LED Dspl Red T-1
5250-14527-00	Q1	Regulator Voltage LM317K
5460-12423-00	Q2	I.C. LM7812
5131-12725-00	Q3-Q5	Triac BT138E
5194-09055-00	Q6-Q12, Q17-Q24, Q33-Q40, Q49-Q56, Q109	Transistor, MPSD52 PNP
5162-12635-00	Q13-Q16, Q25-Q32, Q41-Q48, Q57-Q64, Q82, Q83, Q85, Q86, Q88, Q89, Q91, Q92, Q101-Q108	Transistor, TIP102
5191-12179-00	Q65-Q72, Q81, Q84, Q87, Q90	Transistor, TIP36C
5190-09016-00	Q73 - Q80	Transistor, 2N4403 PNP
5192-12428-00	Q93 - Q100	Transistor, TIP107
5160-10269-00	Q110	Transistor, 2N3904
5013-14535-00	R1	Resistor, 750Ω, 1/4w, 1%
5010-09036-00	R247	Resistor, 100Ω, 1/4w, 1%

Part Number	Designator	Description
5013-14534-00	R2	Resistor, 243Ω, 1/4w, 1%
5010-09999-00	R3, R4, R6-R8, R43, R44, R81-R83, R190	Resistor, 2KΩ, 1/4w, 5%
5010-09224-00	R5, R14 - R17	Resistor, 270Ω, 1/4w, 5%
5012-12632-00	R9	Resistor, 12Ω, 10w, 5%
5010-09324-00	R10	Resistor, 27KΩ, 1/4w, 5%
5010-09358-00	R11, R157, R159, R161, R163, R165, R167, R169, R171, R216-R224	Resistor, 1KΩ, 1/4w, 5%
5010-09034-00	R12, R13, R189, R208-R215, R248	Resistor, 10KΩ, 1/4w, 5%
5010-08992-00	R18, R21, R24, R192, R194, R196, R198, R200, R202, R204, R206	Resistor, 560Ω, 1/4w, 5%
5010-08991-00	R19, R22, R25, R28, R30, R32, R34, R50, R52, R54, R56, R58, R60, R62, R64, R84, R86, R88, R90, R92, R94, R96, R98, R116, R119, R122, R125,R128, R131, R134, R137,R246	Resistor, 4.7KΩ, 1/4w, 5%
5010-11079-00	R20, R23, R26, R254-R256	Resistor, 51Ω, 1/4w, 5%
5010-09416-00	R27, R29, R31, R33, R45-R49, R51, R53, R55, R57, R59, R61, R63, R85, R87, R89, R91, R93, R95, R97, R99, R117, R120, R123, R126, R129, R132, R135, R138, R156, R158, R160, R162, R164, R166, R168, R170, R245, R250-R253, R257	Resistor, 470Ω, 1/4w, 5%
5010-08993-00	R35, R37, R39, R41, R65-R72, R100-R107, R140-R147	Resistor, 68Ω, 1/4w, 5%
5010-08997-00	R36, R38, R40, R42, R73-R80, R108, R109, R110-R115, R118, R121, R124, R127, R130, R133, R136, R139	Resistor, 2.7kΩ, 1/4w, 5%
5010-09361-00	R148-R155, R184-R187	Resistor, 220Ω, 1/4w, 5%
5011-12956-00	R172, R173, R178-R183	Resistor, 2.7KΩ,1/4w, 5%
5010-11071-00	R174-R177, R241-R244	Resistor, 56Ω, 1/4w, 5%
5010-14711-00	R188	Resistor, 10KΩ, 1/4w, 5%
5010-09314-00	R191, R193, R195, R197, R199, R201, R203, R205	Resistor, 1.2kΩ, 1/4w, 5%
5010-09086-00	R207	Resistor, 6.8kΩ, 1/4w, 5%
5010-12427-00	R225, R228, R231, R234, R237-R240	Resistor, .22kΩ, 1/4w, 5%
5010-08998-00	R226, R227, R229, R230, R232, R233, R235, R236	Resistor, 2.2kΩ, 1/4w, 5%
5010-13517-00	R249	Resistor, 15Ω, 1/4w, 5%
5019-10143-00	SRI	SIP RES 470 x 9R
5824-09248-00	TP100-TP107	Test Point #1502-1
5370-12272-00	U1, U16, U17	I.C. LM339 Quad Comp
5281-09486-00	U2, U4-U8, U10	I.C. 74LS374 8df/f
5162-12422-00	U3, U11	Trans uln 2803 Oc-drl
5281-10182-00	U9	I.C. 74LS240 I/drvr
5281-09487-00	U12 - U15	I.C. 74LS74 Dual d f/f
5791-13830-05	J110	Connector, 5-pin Header

A-20119-50050
WPC '95 CPU PCB Assembly

Part Number	Designator	Description
A-15814	B1	Battery Holder
5048-11033-00	C1, C42	Cap., .022µ. 50v, 10% Ax.
5048-11030-00	C3-C26, C34-C41	Cap., 470p, 50v Axial
5043-09030-00	C27	Cap., .047m, 50v (±20%) Ax.
5048-13375-00	C28	Cap., 100p, 50v, 10% Axial
5048-11028-00	C29, C30, C43, C44	Cap., 22p, 50v Axial
5040-14569-00	C31	Cap., 100µ, 25v, Axial
5048-11031-00	C32	Cap., .001µ, 50v, Axial
5043-08996-00	C45 - C70	Cap., 0.1µ, 50v (±20%) Ax.
5040-13098-00	C73	Cap., 4.7µF, 35v (±20%)
5645-09025-00	DIPSW1	Switch Dip 8-Position
5070-09266-00	D1, D25	Diode 1N5817 1.0A.
5070-08919-00	D2 - D24, D26, D27	Diode 1N4148 150mA.
5700-10176-00	G10	Socket Dip 28.6
5700-12088-00	G11	Socket Dip 32.6p"
5700-08985-00	U4	IC Socket 40-pin
5700-12424-00	U9	Socket 84-pin
5700-10389-00	U20	IC Socket 18-pin 3"
5791-10850-00	J201	Connector, 26-pin Header
5791-12516-00	J202, J211	Connector, 34-pin Hdr. 2x17
5791-13830-12	J205	Connector, 12-pin Header Str.
5791-13830-09	J206, J207, J209	Connector, 9-pin Header
5791-13830-14	J208	Connector, 14-pin Header
5791-10862-07	J210	Connector, 7-pin Header
5791-13830-13	J212	Connector, 13-pin Header
5671-14516-00	LED201 - LED203	LED Dspl. Red T-1-3/4
5160-10269-00	Q1	Transistor, 2N3904 NPN
5019-09669-00	RP1	SIP 4.7K, 9R, 10 (5%)
5010-09358-00	R1-R4, R9-R11, R23-R26, R43-R84, R93, R95-R97, R99-R114, R117	Resistor, 1kΩ, 1/4W, 5%
5010-09416-00	R5-R8, R12, R13, R87-R89	Resistor, 470Ω, 1/4w, 5%
5010-09034-00	R14-R22, R27-R42, R86, R90, R94, R98	Resistor, 10KΩ, 1/4w, 5%
5010-12104-00	R91	Resistor, 22M, 1/4w, 5%
5010-10989-00	R92	Resistor, 470KΩ, 1/4w, 5%
5010-09187-00	R118 - R123, R128	Resistor, 150Ω, 1/4w, 5%
5010-09434-00	R124, R125	Resistor, 22Ω, 1/4w, 5%
5010-09040-00	R127	Resistor, 33Ω, 1/4w, 5%
5010-09534-00	W3, W4, W7, R124, R125	Resistor, 0Ω
5010-10258-00	R126	Resistor, 1M, 5% 1/4w
5281-09867-00	U1, U2, U7	I.C. 74HCT244
5281-09851-00	U5	I.C. 74LS14 SMT/TRG
5281-09308-00	U3	IC 74LS245 Trnc
5340-13062-00	U9	IC RAM 32k x 8 Static
5370-12687-00	U10	I.C. MC 34064 Reset Chp.
5281-10182-00	U11-U13, U15	I.C. 74LS240 I/drvr
5311-14068-00	U14, U24	I.C. 74HC574 Octal d-latch
5370-12272-00	U16-U19, U25, U26	I.C. LM339 Quad Comp.
5284-12651-00	U21	I.C. 4584 Hex Schmitt
5311-14554-00	U23	I.C. 74HC237 3 to 8 non inv
5281-09743-00	U27	I.C. 74LS08 Quad.
5520-12084-00	X1	Crystal 32.768KHz
5520-14761-00	X2	Xtal-8M Anti Res Parallel Cut
A-5400-50050-1	G10	PIC16C57 Assembly
5880-09022-00	B1	Battery 1.5v AA Alkaline
5400-10320-00	U4	I.C. MPU68B09E
5410-12426-00	U9	I.C. WPC-89 ASIC
5162-12422-00	U20	Trans uln 2803 Oc-Drl
A-5343-50050-1A	G11	Game ROM Assembly

A-20119-50050
WPC '95 CPU PCB Assembly
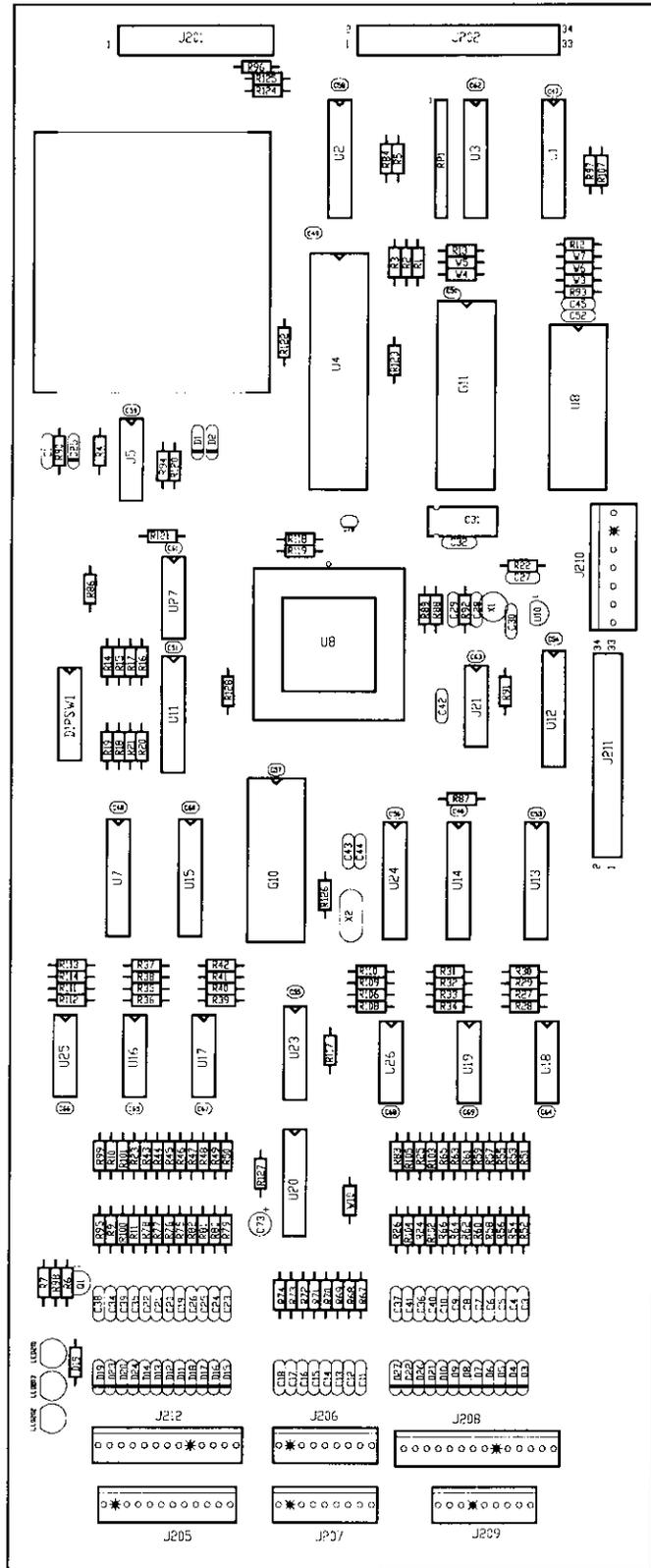
A-20580
Coin Interface PCB Assembly
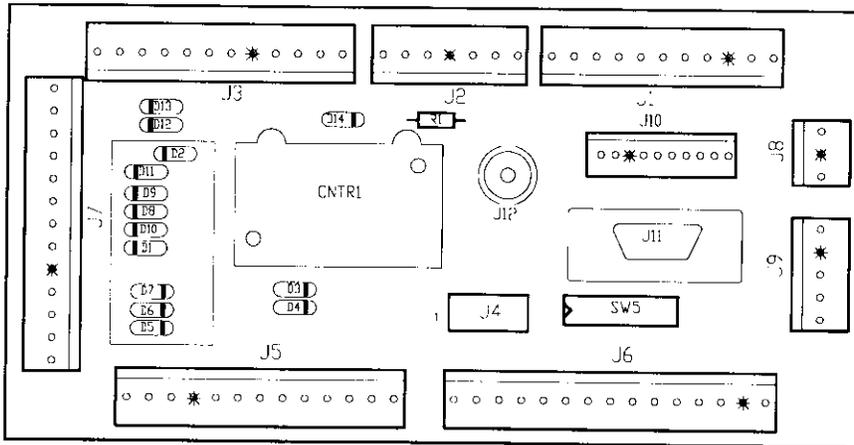
Part Number	Designator	Description
5070-09054-00	D1-D14	Diode 1N4004 1.0A.
5791-10862-11	J1	Connector, 11-pin Header Str. Sq.
5791-10862-07	J2	Connector, 7-pin Header Str. Sq.
5791-10862-12	J3	Connector, 12-pin Header Str. Sq.
5791-11000-10	J4	Connector, 10-pin Header Str. Sq.
5791-10862-13	J5, J7	Connector, 13-pin Header Str. Sq.
5791-10862-15	J6	Connector, 15-pin Header Str. Sq.
5791-10862-03	J8	Connector, 3-pin Header Str. Sq.
5791-10862-05	J9	Connector, 5-pin Header Str. Sq.
5791-12462-10	J10	Connector, 10-pin Header Str. Sq.
5010-09040-00	R1	Resistor, 33, ¼w, 5%
5645-09025-00	SW5	Switch DIP 8 Pos.

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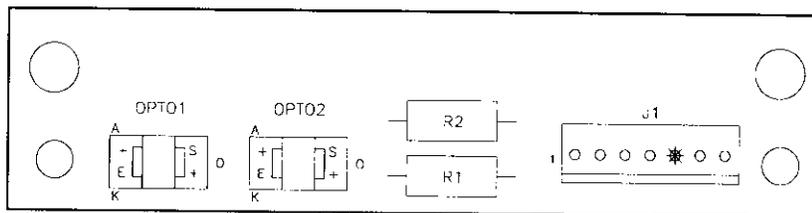
Part Number	Designator	Description
A-20207	-	Flipper Opto Switch PCB
5010-09061-00	R1, R2	Resistor, 680Ω, 1/2w, 5%
5490-14575-00	OPTO1, OPTO2	IC Opto Integ Schmitt 10mA.
5791-13830-07	J1	Connector, 7-pin Header Solid Sq.
03-9001	-	Interrupter Flip-Opto

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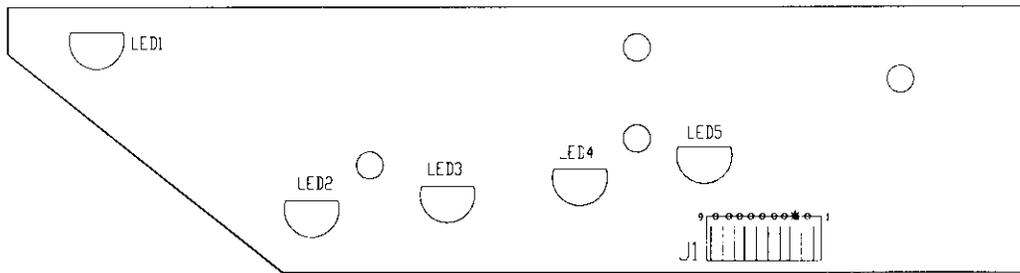
Part Number	Designator	Description
5671-12731-00	LED1 - LED5	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-18618-1
Trough IRED LED PCB Assembly
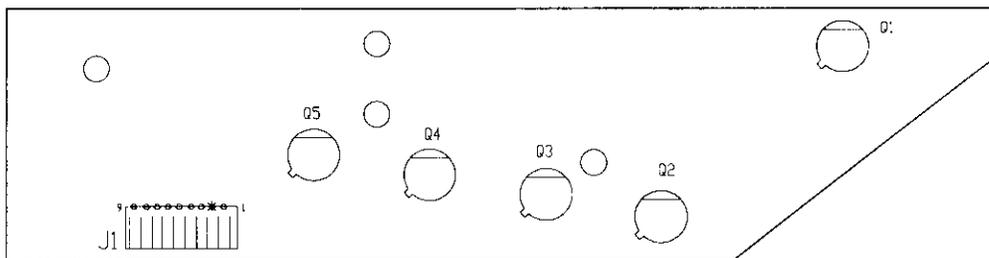
Part Number	Designator	Description
5671-14114-00	Q1 - Q5	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header Sq.

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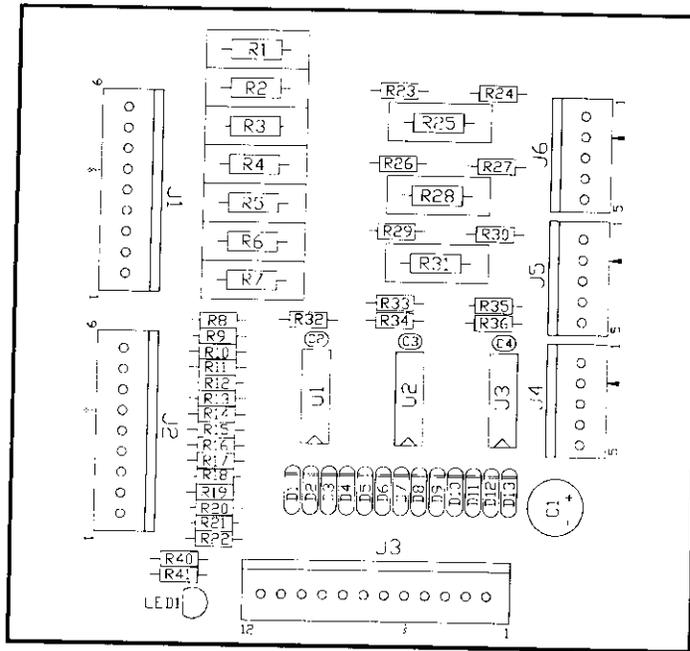
Part Number	Designator	Description
5040-10974-00	C1	Cap., 100µFd, 35v
5043-08980-00	C2-C4	Cap., 0.01µFd, 50v
5671-13732-00	LED1	Display Red LED1
5370-12272-00	U1-U3	I.C. LM339, Quad Compar
5070-09054-00	D1-D13	Diode, 1N4004, 1.0A.
5010-12928-00	R1-R7, R25, R28, R31	Res., 270Ω, 2w, 5%
5010-09999-00	R8-R21,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

A-20738
Flipper Assembly - Left

Item	Part Number	Description
1	04-10355-2	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	01-9375-1	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-11630	Flipper Coil, Red
a)	03-7066-5	Coil Tubing
13	01-7695-1	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	Flat Washer, 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, Black
22	20-10110-6	Flipper Bat w/Shaft

Flipper Notes...
1. *Each Flipper Assembly is mounted beneath the playfield, in conjunction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.*
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 reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.*

A-15849-R-2
Flipper Assembly

Item	Part Number	Description	Item	Part Number	Description
1	B-13104-R	Flipper Base Assembly, Right	18	A-15848-R	Crank Link Assembly, Right
2	SW-1A-194	Switch Assembly	a)	A-17050-R	Flipper Crank Assembly, Right
3	4701-00002-00	Lockwasher #6 Split	b)	A-15847	Flipper Link Assembly
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"	c)	02-4676	Link Spacer Bushing
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"	d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
6	4701-00003-00	Lockwasher #8 Split	e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
7	01-9375-1	Switch Mounting Bracket	f)	4701-00004-00	Lockwasher #10 Split
8	20-6516	Speednut, Tinnerman	g)	4410-01132-00	Nut 10-32 ESN
9	4010-01066-06	Cap Screw, 10-32 x 3/8"	19	23-6577	Bumper Plug, 5/8"
10	4701-00004-00	Lockwasher #10 Split	20	03-7568	Flipper Bushing
11	A-12390	Flipper Stop Assembly			
12	FL-11629	Flipper Coil, Blue			
a)	03-7066-5	Coil Tubing		**Associated Parts:**	
13	01-7695	Solenoid Bracket		(Not Shown)	
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"			
15	10-364	Spring	21	23-6695	Flipper Rubber Ring
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"	22	20-10110-6	Flipper w/Shaft
17	4406-01117-00	Nut 6-32 Hex.			

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	01-9375-1	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	01-7695-1	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	Flat Washer, 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, Black
22	20-10110-6	Flipper Bat w/Shaft

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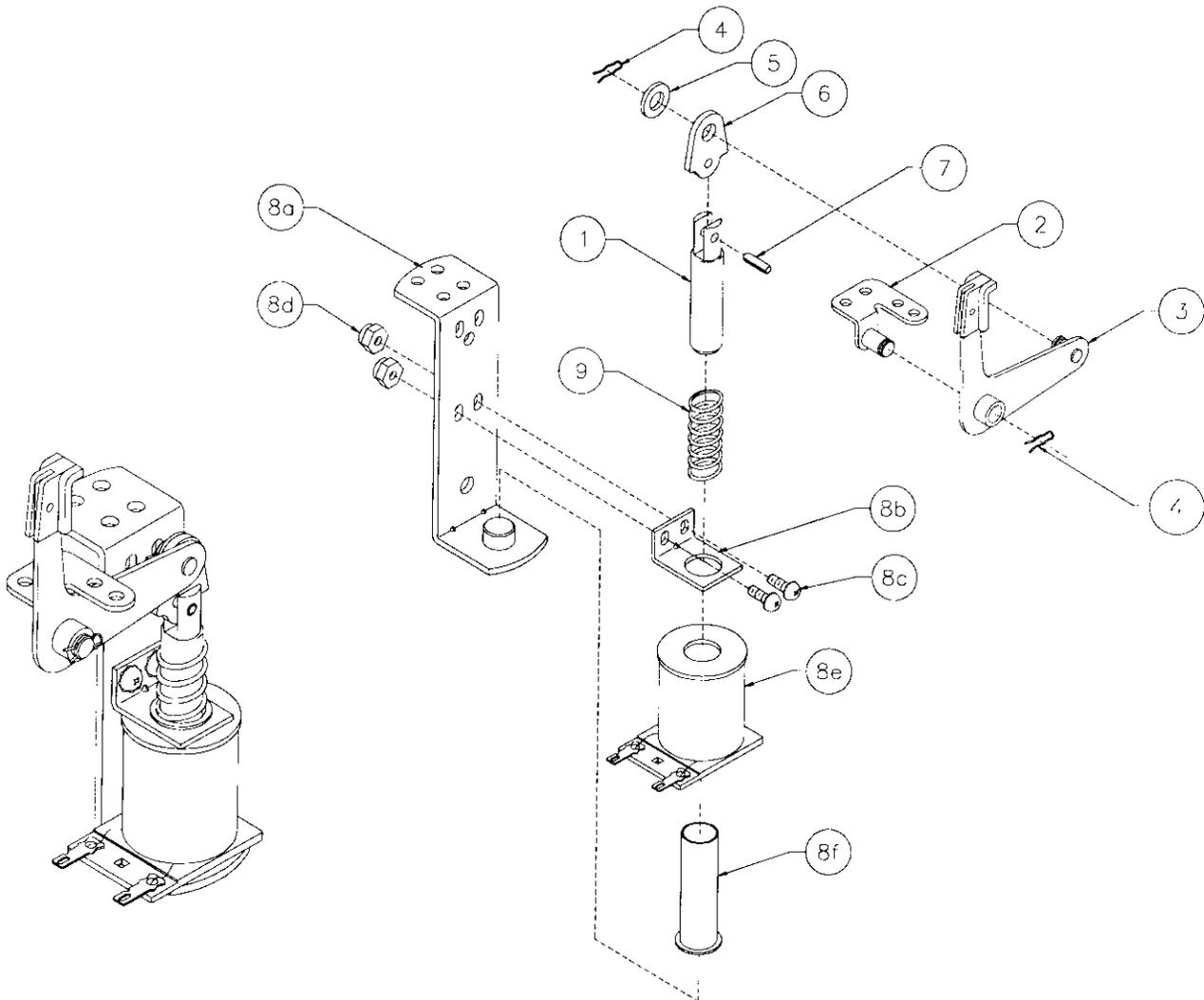
Associated Parts for Right & Left Kickers:

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, 17/64 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-2**	**Coil & Bracket Assembly, Left**
	B-9362-R-3	**Coil & Bracket Assembly, 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-26-1200	Coil Assembly
f)	03-7066	Coil Tubing
9	10-128	Spring

A-19963-1
Ball Trough Assembly Complete
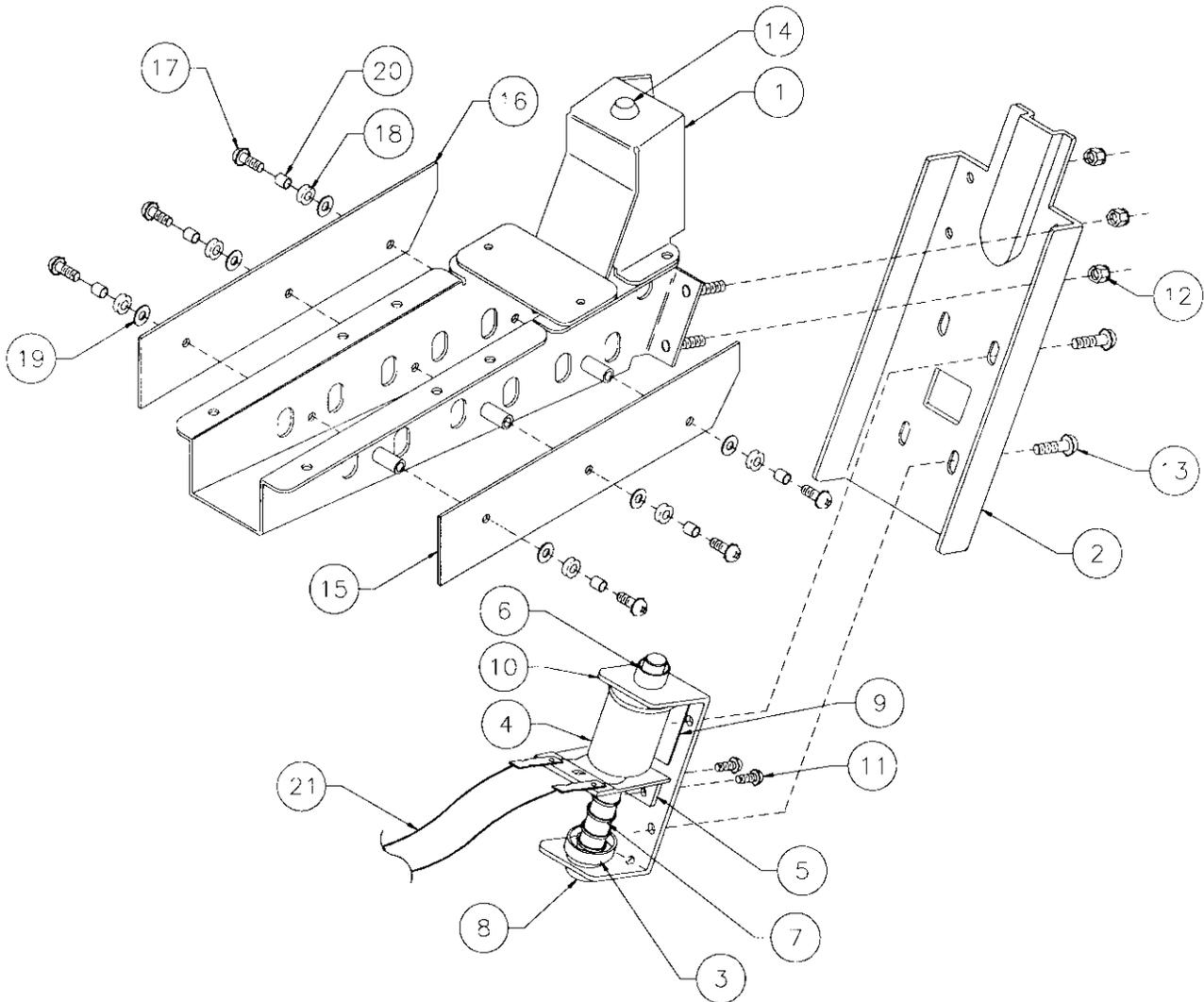
Item	Part Number	Description	Item	Part Number	Description
1	A-16809-2	Ball Trough Welded Assy.	12	4408-01119-00	Nut 8-32 ESN
2	01-11587	Ball Trough Front	13	4008-01017-06	Mach. Screw, 8-32 x 3/8"
3	A-6306-2	Bell Armature Assembly	14	23-6702	Bumper Plug
4	AE-26-1500	Coil Assembly	15	A-18617-1	Trough IRED LED PCB Assembly
5	01-8-508-T	Solenoid Assembly	16	A-18618-1	Trough IRED Transistor PCB Assy.
6	03-7067-5	Coil Tubing	17	4006-01003-10	Mach. Screw, 6-32 x 5/8" SEMS
7	10-135	Spring	18	23-6626	Rubber Grommet
8	23-6420	Rubber Grommet	19	4700-00004-00	Flat Washer, 9/64 x 7/16 x 21ga.
9	03-8523	Insulator	20	02-4975	Bushing
10	01-1158	Coil Mounting Bracket	21	H-19523	Mini Solenoid Cable
11	4008-01017-05	Mach. Screw, 8-32 x 5/16"			

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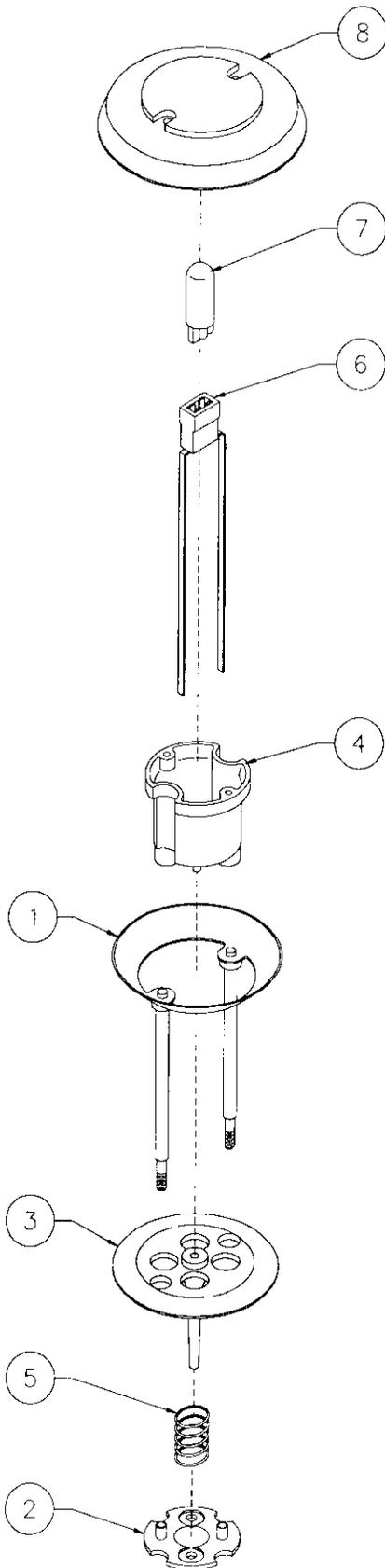
Item	Part Number	Description
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base, White
3	03-6035-6	Bumper Wafer, Yellow
4	03-7443-5	Bumper Body, White
5	10-7	Spring
6	24-8776	Socket-Wedge Base
7	24-8768	Bulb #555(6.3v., 0.25A.)

Associated Parts:

8	03-8254-13	Jet Bumper Cap, Clear (3)

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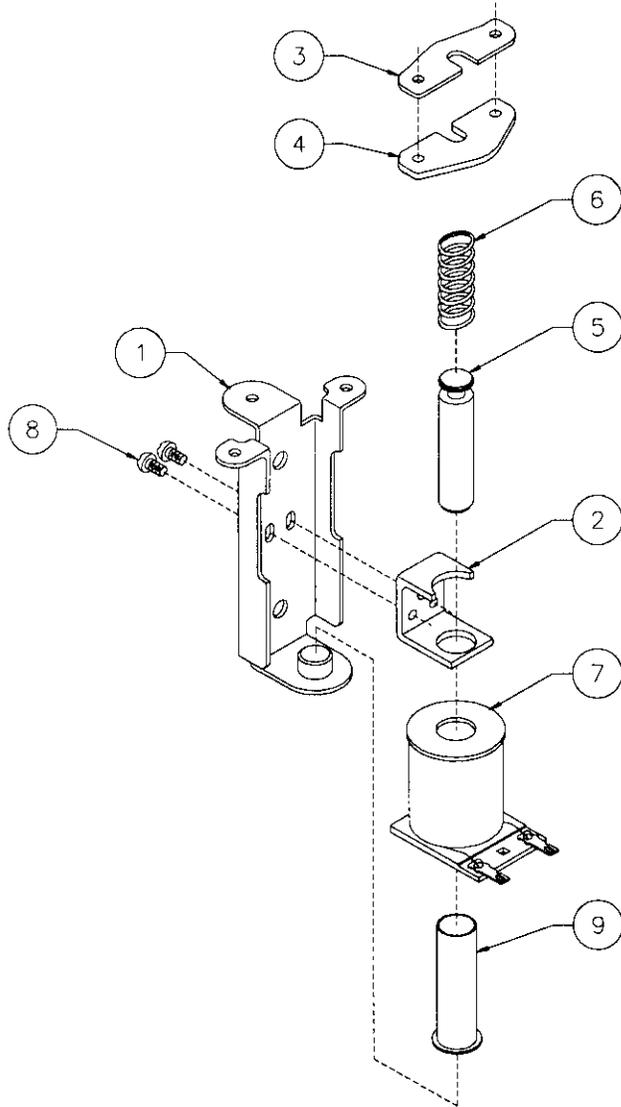
Item	Part Number	Description
1	B-7417	Bracket & Stop Assembly
2	01-1747	Coil Retaining Bracket
3	01-5492	Armature Link, Steel
4	01-5493	Armature Link, Bakeline
5	02-3406-1	Coil Plunger
6	10-326	Armature Spring
7	AE-26-1200	Coil Assembly
8	4006-01017-04	Mach. Screw, 6-32 x 1/4"
9	03-7066	Coil Tubing

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-20439
Shooter Lane Auto Kicker Assembly
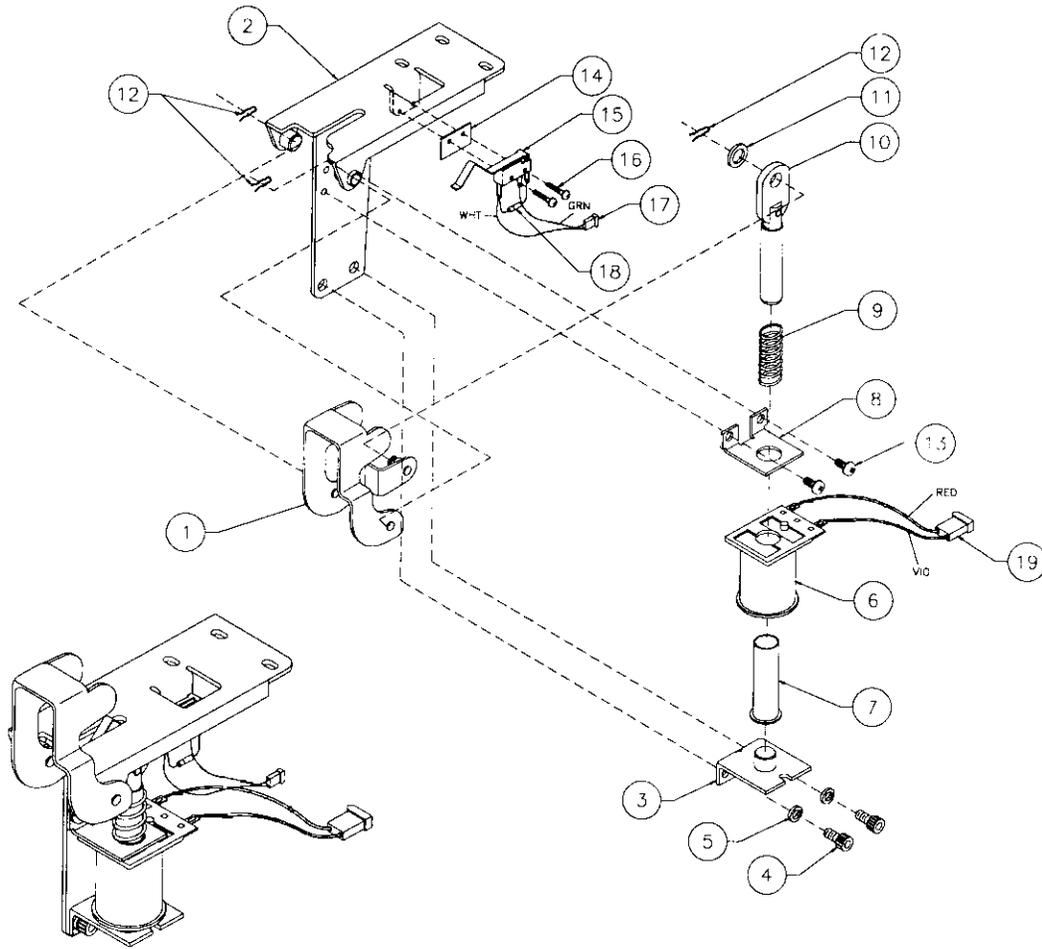
Item	Part Number	Description
1	04-10210.3	Kicker Crank Assembly
2	04-10211.3	Coil Mounting Bracket
3	A-12390	Flipper Stop Bracket Assembly
4	4010-01066-06	Cap Screw, #10 x 3/8"
5	4701-00004-00	Lock Washer #10 Split
6	AE-23-800	Coil Assembly
7	03-7066	Coil Tubing
8	01-8413	Coil Mounting Bracket
9	10-128	Spring
10	A-15847	Flipper Link Assembly
11	4700-00104-00	Flat Washer, 23/64 x 1/2 x 16ga.
12	12-6227	Hairpin Clip
13	4006-01003-05	Mach. Screw, 6-32 x 5/16"
14	01-8600	Insulator
15	5647-12693-62	Mini-Micro Switch
16	4002-01105-08	Mach. Screw, #2-56 x 1/2"
17	H-16437	Cable
18	5070-09054-00	Diode1N4004
19	H-19523	Cable

A-20655
Drop Diverter Assembly
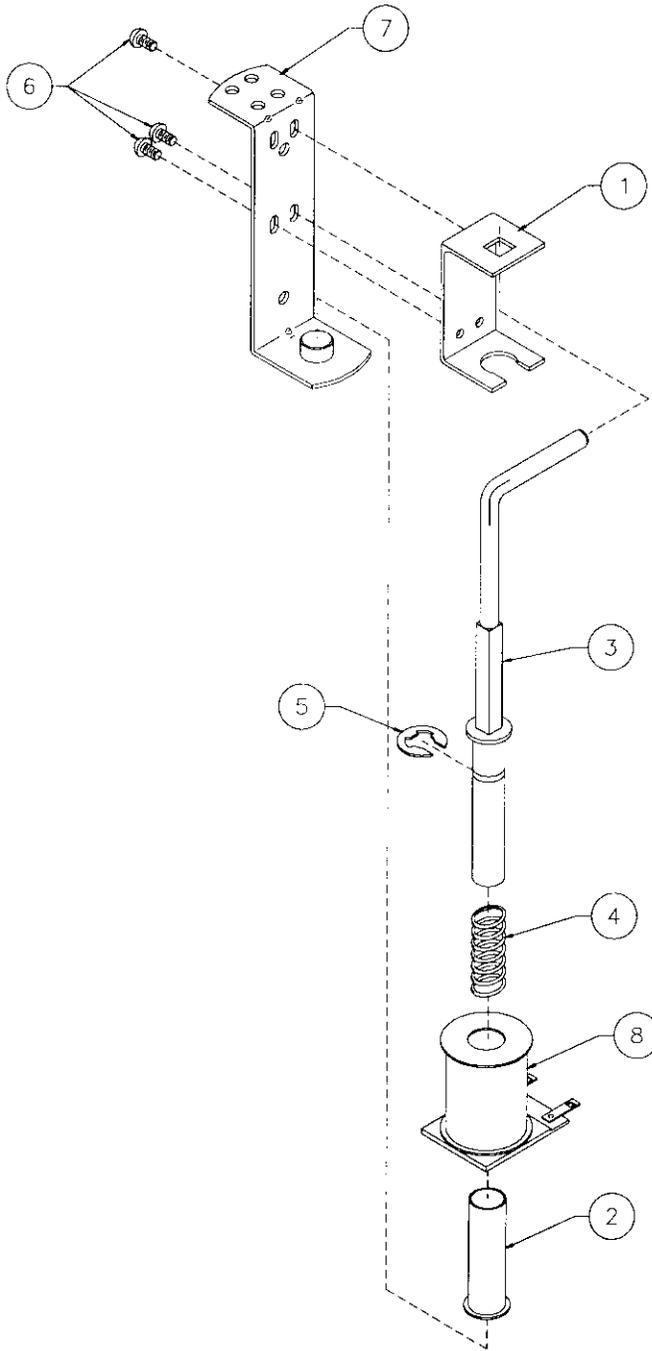
Item	Part Number	Description
1	01-14187	Coil Stop Bracket
2	03-7066	Coil Tubing, 1.745"
3	04-10314	Drop Divertor
4	10-135	Spring
5	20-8712-43	"E" Retaining Ring, 7/16" Shaft
6	4006-01003-04	Mach. Screw, 6-32 x ¼"
7	A-17808	Bracket & Stop Assembly
8	AE-26-1500	Coil Assembly

04-10346
Tilt Mechanism Assembly
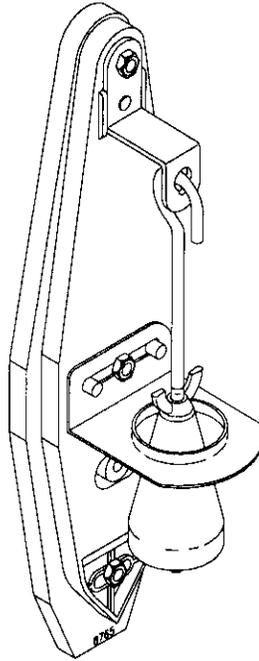
B-10686-1
Knocker Assembly
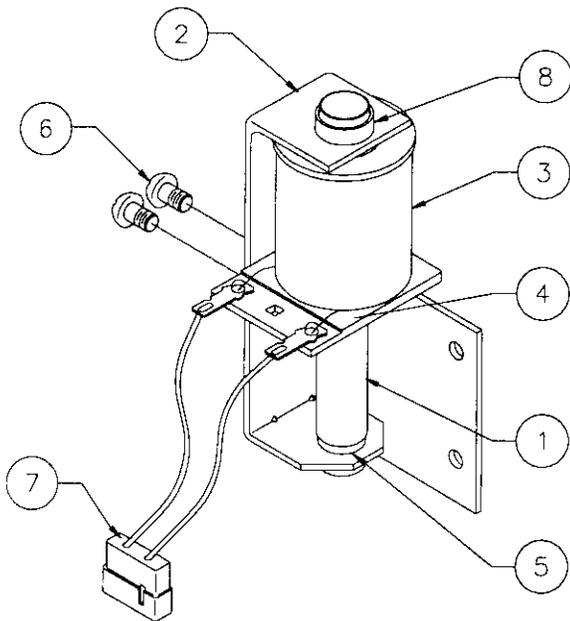
Item	Part Number	Description
1	A-5387	Coil Plunger Assembly
2	01-11273	Mounting Bracket Assembly
3	AE-23-800	Coil Sub-Assembly
4	01-8-508-T	Coil Retaining Bracket
5	23-6420	Rubber Grommet
6	4008-01017-04	Mach. Screw, 8/32 x 1/4"
7	H-11835	Knocker Cable
8	03-7067-5	Coil Tubing

B-11873
Bottom Arch Kicker Assembly

Item	Part Number	Description
1	A-6306-2	Bell Armature Assembly
2	AE-23-800	Coil Sub-Assembly
3	01-11273	Mounting Bracket
4	01-8-508-T	Solenoid Bracket
5	03-7067-5	Coil Tubing
6	10-135	Solenoid Spring
7	23-6420	Rubber Grommet
8	4008-01017-04	Mach. Screw, 8-32 x 1/4"
9	03-8523	Insulator
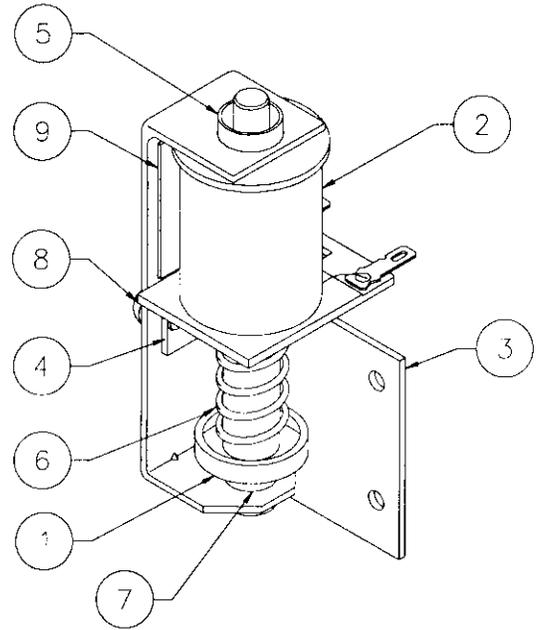
A-17932-1
Disappearing Post Assembly

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"
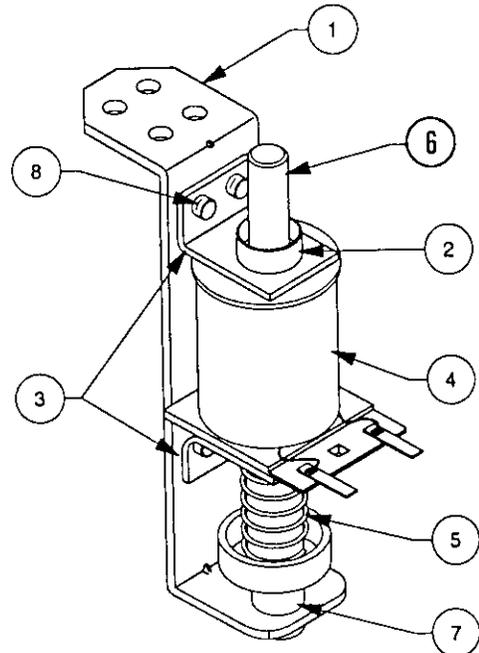
A-20665
Ball Gate Actuator Assembly

Item	Part Number	Description
1	01-14123	Coil Bracket
2	A-14406	Coil Assembly, Small
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
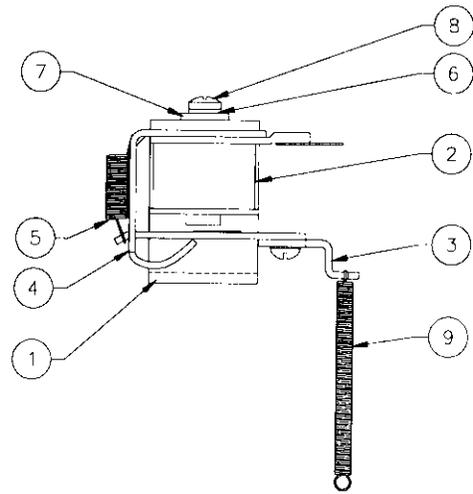
A-20453-1
Eject Assembly

Item	Part Number	Description
1	04-10217.1-1	Bracket Assembly
2	AE-26-1200	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	01-9784	Coil Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut #8-32 ESN
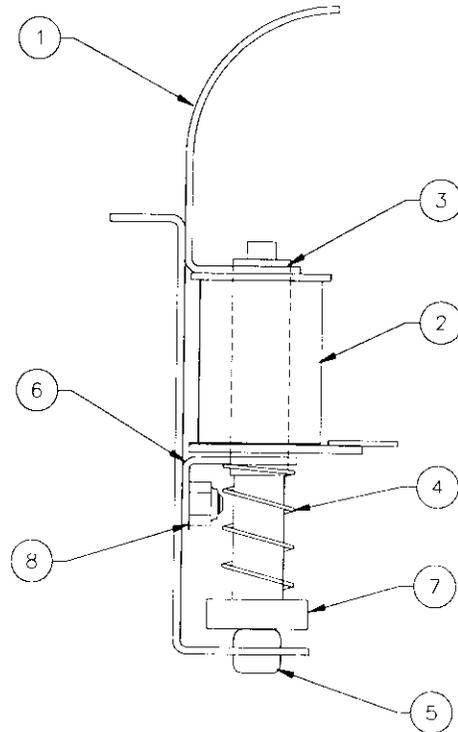
A-20654
Disappearing Post Assembly
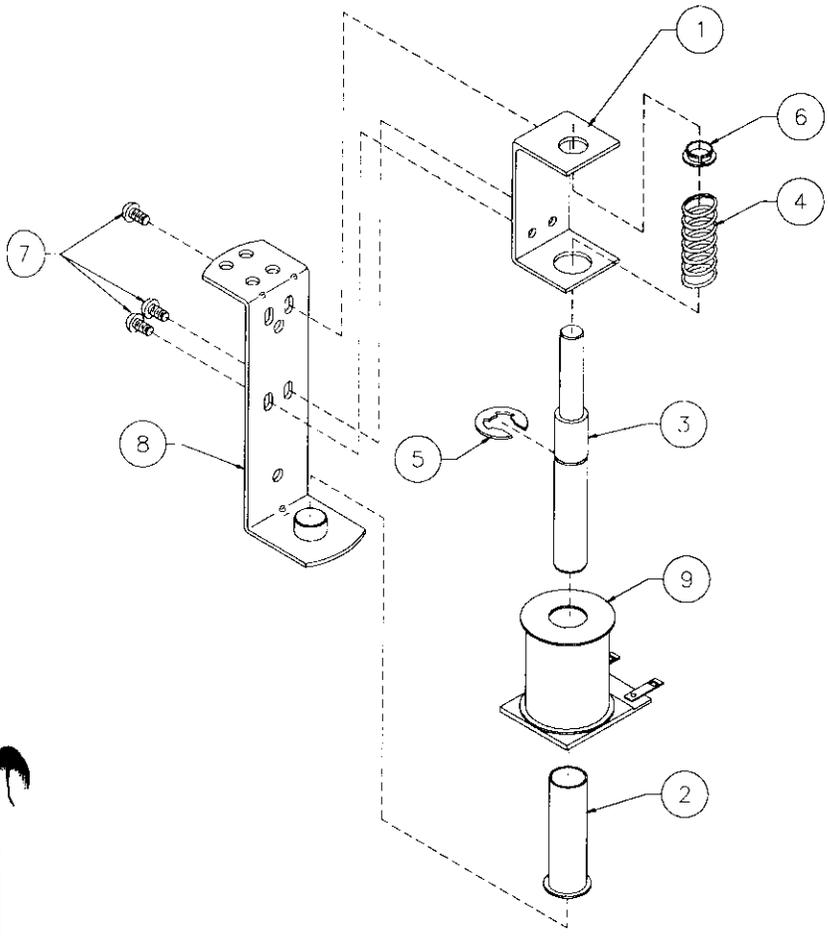
Item	Part Number	Description
1	01-14185	Coil Bracket
2	03-7066	Coil Tubing, 1.745" Long
3	02-5240	Plunger Disappearing Post
4	10-135	Spring
5	20-8712-43	"E"-Ring, 7/16" Shaft
6	20-8790	Nyliner Bearing
7	4006-01003-04	Mach. Screw, 6-32 x ¼"
8	A-17808	Bracket & Stop Assembly
9	AE-26-1500	Coil Assembly

A-20680
3-Ball Popper Assembly
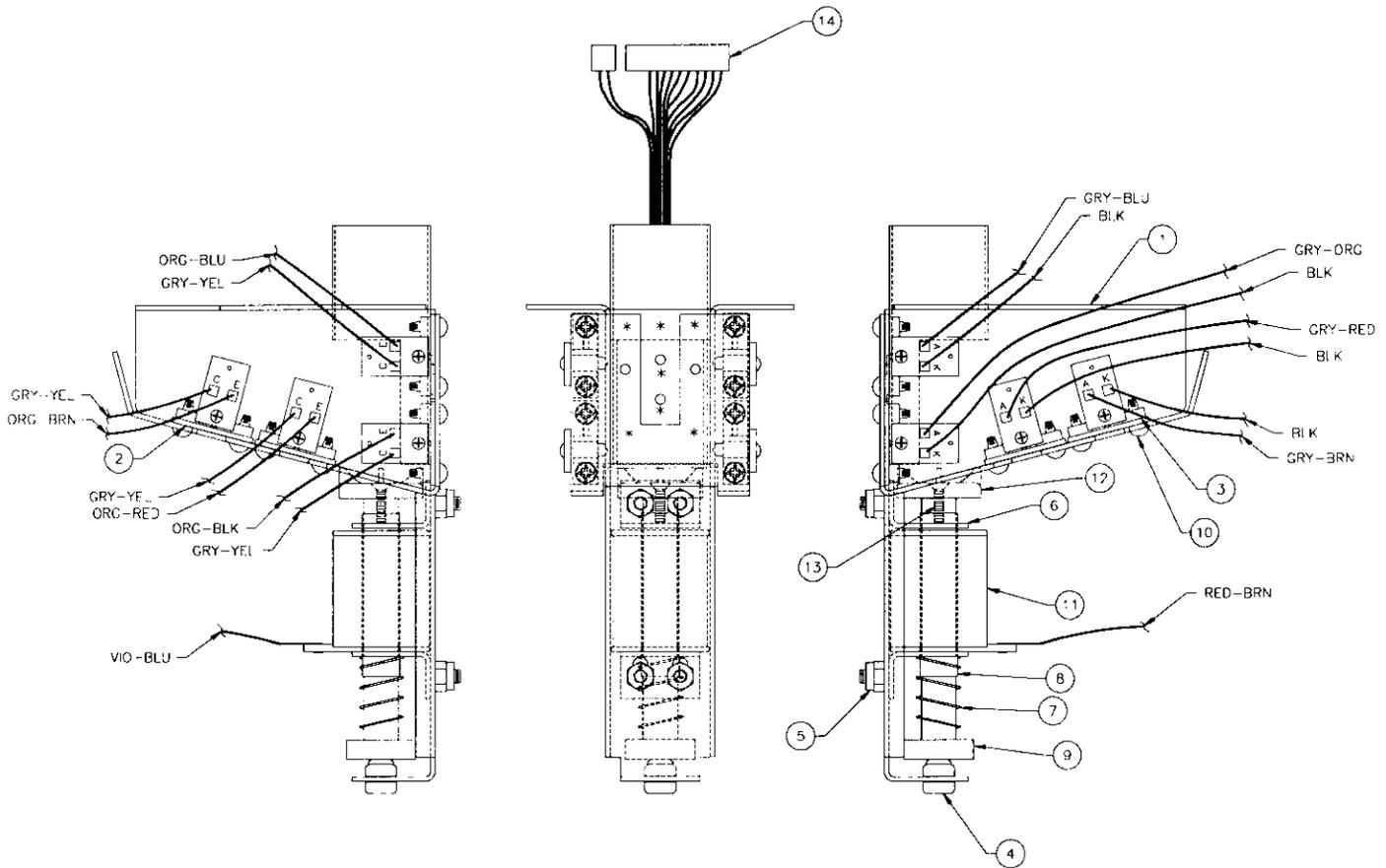
Item	Part Number	Description
1	04-10323	3-Ball Popper Frame
2	A-16909	LED Assembly
3	A-16908	Photo Transistor Assembly
4	23-6420	Rubber Grommet
5	4408-01119-00	Nut 8-32 ESN
6	04-10322-2	Coil Bracket
7	10-135	Spring
8	03-7067	Coil Tubing
9	04-10291	Bell Armature Assembly
10	4106-01013-06	Sh. Metal Screw, 6-32 x 3/8"
11	AE-23-800	Coil Assembly
12	03-8561	Ball Popper Cap
13	4106-01152-08	Sh. Metal Screw, 6-32 x ½"
14	H-20752.1	Wire Harness

A-20625
2-Way Popper Assembly

GRN

WHT

RED—BLK

BRN—GRY

BRN—VIO
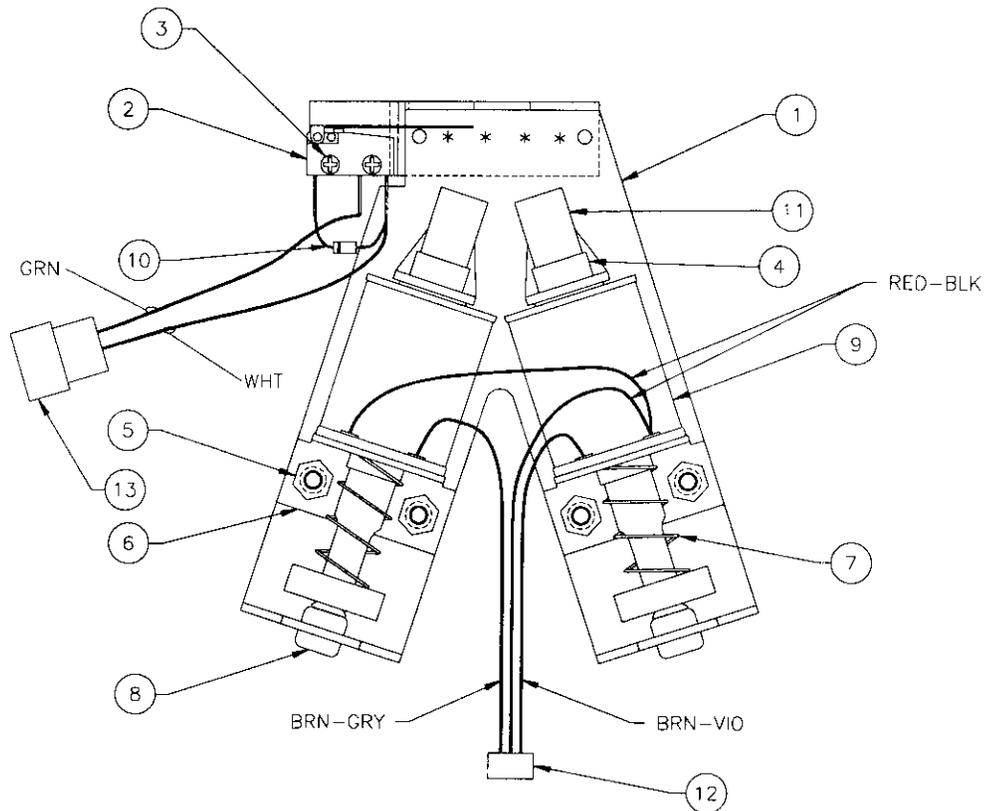
Item	Part Number	Description
1	04-10318	2-Way Popper Bracket
2	5647-12693-11	Sub-Miniature Switch
3	4002-01105-06	Mach. Screw, 2-52 x 3/8" (2)
4	03-7067	Coil Tubing (2)
5	4408-01119-00	Nut 8-32 ESNA (4)
6	01-9784	Coil Mounting Bracket (2)
7	10-135	Spring Plunger (2)
8	23-6420	Rubber Grommet (2)
9	AE-23-800	Coil Assembly (2)
10	5070-09054-00	Diode 1N4004, 1.0A.
11	02-4668	Armature Assembly (2)
12	H-20674	Coil Wire Harness
13	H-18214-12	Cable

A-20664
Back Panel Assembly
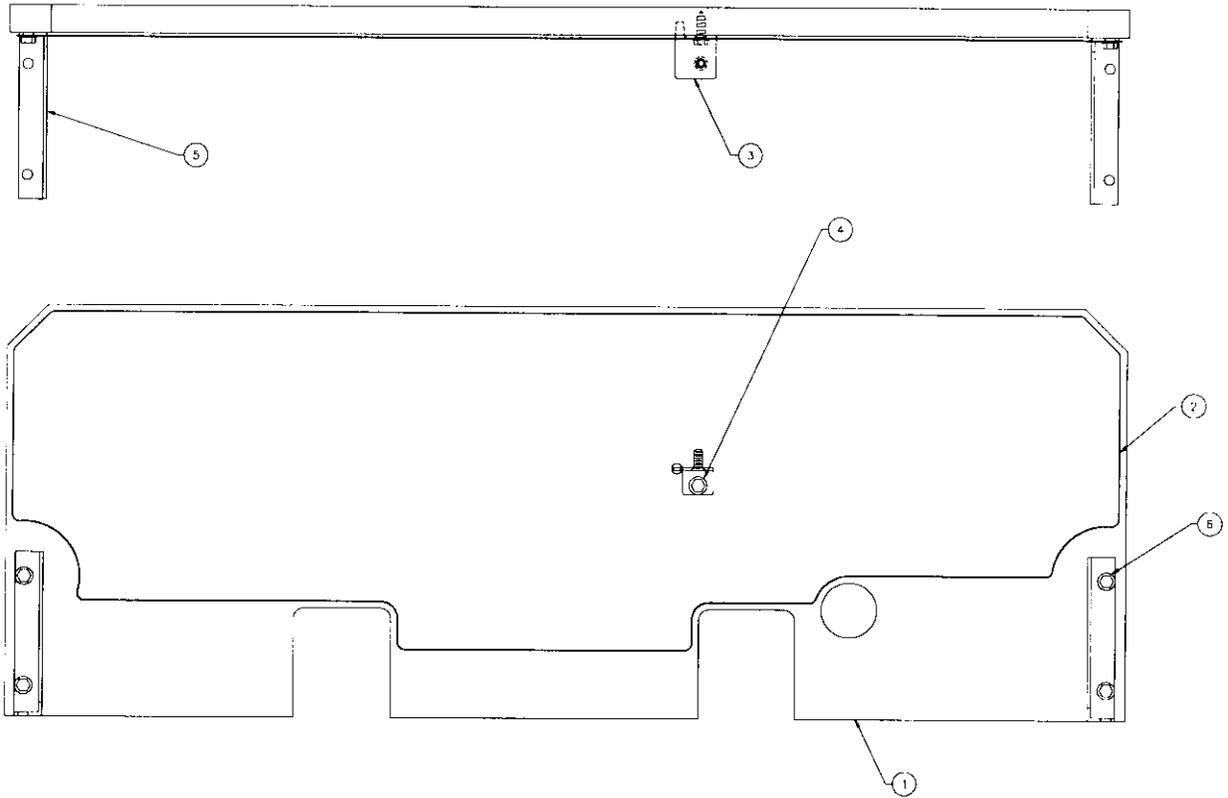
Item	Part Number	Description
1	04-10316	Back Panel Assembly
2	31-2540	Back Panel Decal
3	04-10326	Mounting Bracket
4	4808-01175-08	E-P #8x1/2 IND
5	01-12569	Gusset Bracket
6	4008-01168-10	Mach. Screw, 8-32 x 5/8"

A-20614
Gorilla Assembly
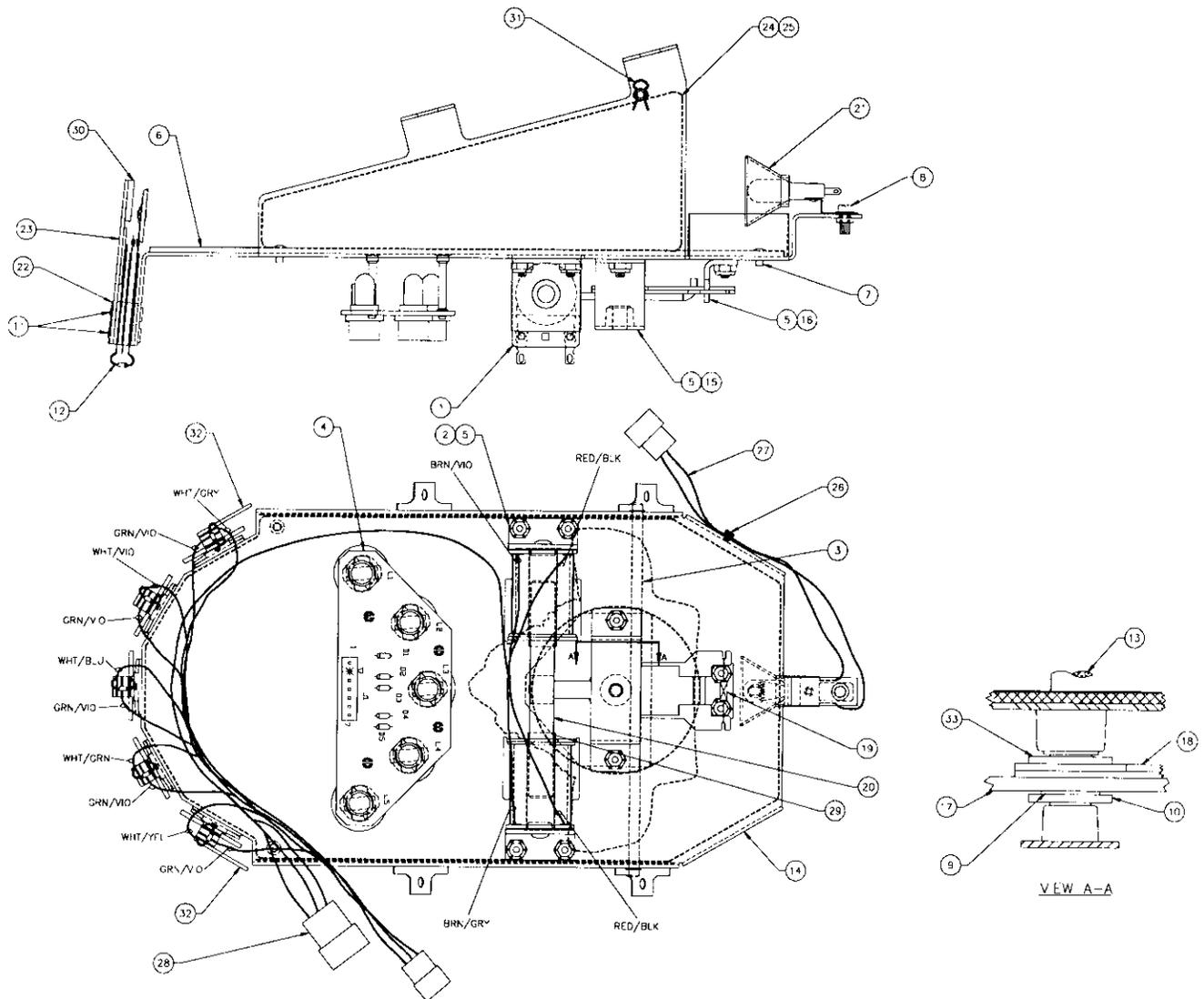
Item	Part Number	Description	Item	Part Number	Description
1	AE-25-1000	Coil Assembly	18	01-14206.1	Gray Gorilla Return Arm
2	A-18957	Stop Bracket Assembly	19	10-362	Spring
3	02-5245.1	Ball Deflector Rod	20	02-5244	Gray Gorilla Plunger
4	A-20603	Lamp Board Assembly	21	04-10094-1	Reflector & Socket Assembly
5	4408-01119-01	Nut 8-32 ESN	22	01-3670	Switch Plate Curved
6	31-2530	Plastic Liner	23	01-8657	Switch Limit Stop
7	07-6704-04	Pop Rivet, 1/8 x ¼"	24	31-2531-1	Decal
8	4008-01168-06	Mach. Screw, 8-32 x 3/8"	25	31-2531-2	Decal
9	20-8712-25	"E" Retaining Ring, ¼" Shaft	26	03-9454	Tie-Wrap, 4" Long
10	4700-00033-00	Flat Washer, 17/64 x ¾ x 15ga.	27	H-18219-1	Cable
11	07-6688-27	Rivet, 1/8 x 9/16"	28	H-20734.1	Cable
12	SW-1A-203-6	Target Switch	29	03-7066	Coil Tubing
13	A-20681	Gray Gorilla Shaft Sub-Assy.	30	23-6684-2	Edge Protector, ¾" Long
14	04-10324.1	Gray Gorilla Pan	31	12-6227	Hairpin Clip
15	04-10330.1	Gray Gorilla Bearing Bracket	32	01-14282	Ball Stop
16	01-14204	Gray Gorilla Return Stop	33	4700-00080-00	Flat Washer, 25/64 x ¾ x 16ga.
17	01-14205.2	Gray Gorilla Actuator Arm			

A-17540-1
Universal Power Interface Assembly
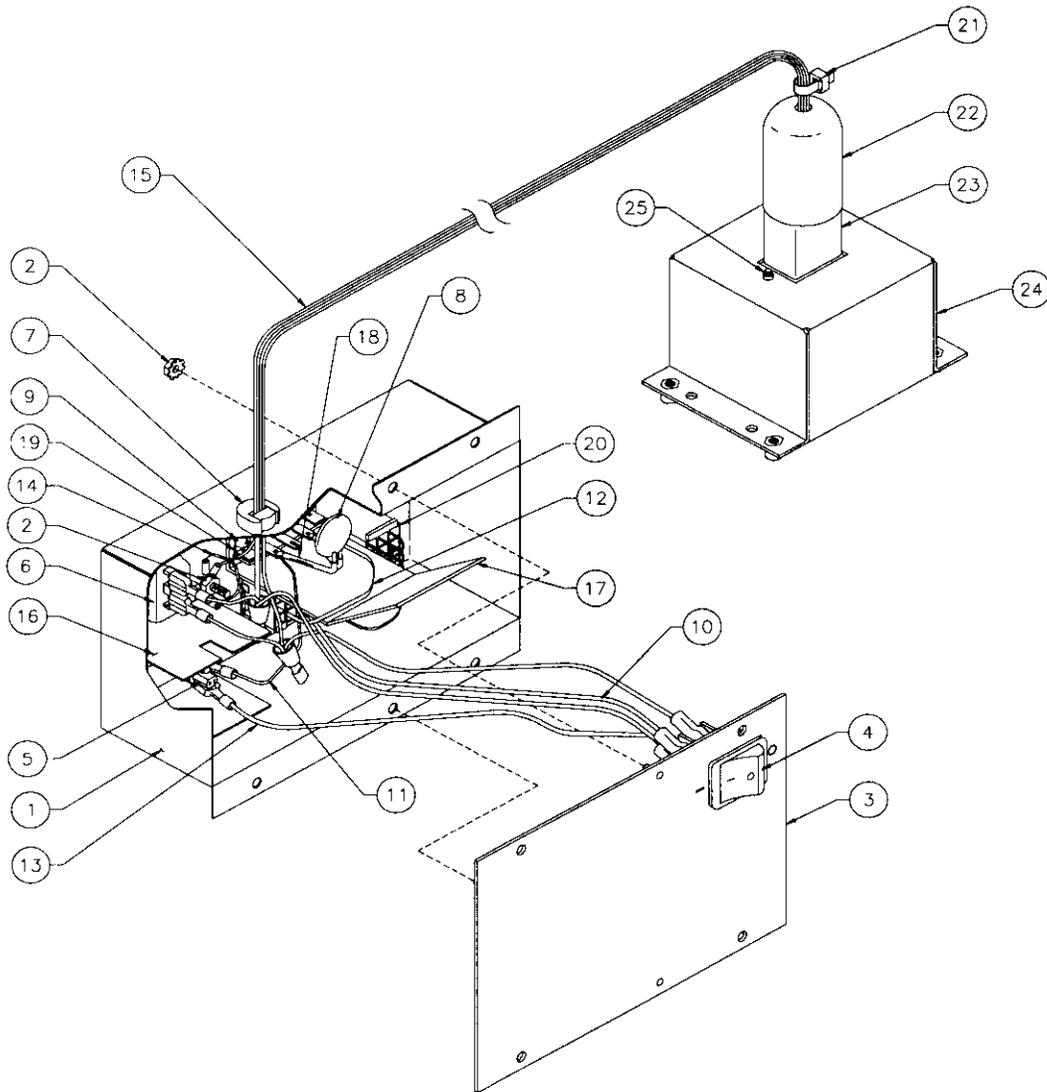
Item	Part Number	Description	Item	Part Number	Description
1	04-10292	Power Control Chassis Box	14	H-17542	Ground Jumper Grn/Yel Cable
2	4406-01128-00	Nut #6-32 KEPS (3)	15	5797-13940-01	Jumper Cable
3	01-12294	Switch Mounting Plate Assembly	16	01-10623	Insulator, Thermistor
4	5642-13935-00	Power Switch	17	01-12299	Insulator, Terminal Strip
5	5733-14734-00	Fuse Holder Panel (5x20mm)	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	04-10293	Line Filter Chassis Box
12	H-17546	Jumper Interface Hot Black Cable	25	4004-01003-05	Mach. Screw, #4-40 x 5/16" (2)
13	H-17545	Jumper Switch/Fuse Black Cable			

Universal Power Interface/Cordset Application Chart

COUNTRY	UNIVERSAL POWER INTERFACE ASSEMBLY	VOLTAGE PROGRAMMING JUMP CABLE				5AMP FUSE/LABEL		8AMP FUSE/LABEL		LABEL HIGH/VOLTAGE CAUTION	POWER ADAPTER CORD	CORDSET								
	A-17540-1	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	√		√					√	√		√	√								
CANADA	√	√						√	√			√								
TAIWAN	√		√					√	√			√								
MEXICO	√		√					√	√			√								
CENTRAL AMERICA	√		√					√	√			√								
SOUTH KOREA	√		√					√	√			√								
PUERTO RICO	√		√					√	√			√								
AUSTRIA	√			√		√	√			√			√							
BELGIUM	√			√		√	√			√			√							
FINLAND	√			√		√	√			√			√							
FRANCE	√			√		√	√			√			√							
GREECE	√			√		√	√			√			√							
HOLLAND	√			√		√	√			√			√							
HUNGARY	√			√		√	√			√			√							
NETHERLANDS	√			√		√	√			√			√							
NETH. ANTILLES	√			√		√	√			√			√							
NORWAY	√			√		√	√			√			√							
POLAND	√			√		√	√			√			√							
PORTUGAL	√			√		√	√			√			√							
SPAIN	√			√		√	√			√			√							
SWEDEN	√			√		√	√			√			√							
TURKEY	√			√		√	√			√			√							
WEST GERMANY	√			√		√	√			√			√							
UNITED KINGDOM	√			√		√	√			√				√						
IRELAND	√			√		√	√			√				√						
HONG KONG	√			√		√	√			√				√						
DENMARK	√			√		√	√			√						√				
ITALY	√			√		√	√			√							√			
CHILE	√			√		√	√			√							√			
PEOPLE'S REP. OF CHINA	√			√		√	√			√							√			
SWITZERLAND	√			√		√	√			√								√		
AUSTRALIA	√			√		√	√			√									√	
NEW ZEALAND	√			√		√	√			√									√	
ARGENTINA	√			√		√	√			√										
JAPAN	√				√			√	√										√	√

Playfield Slide Mechanism Assembly

(Left Assembly Shown)

Underside of Playfield
shown for reference
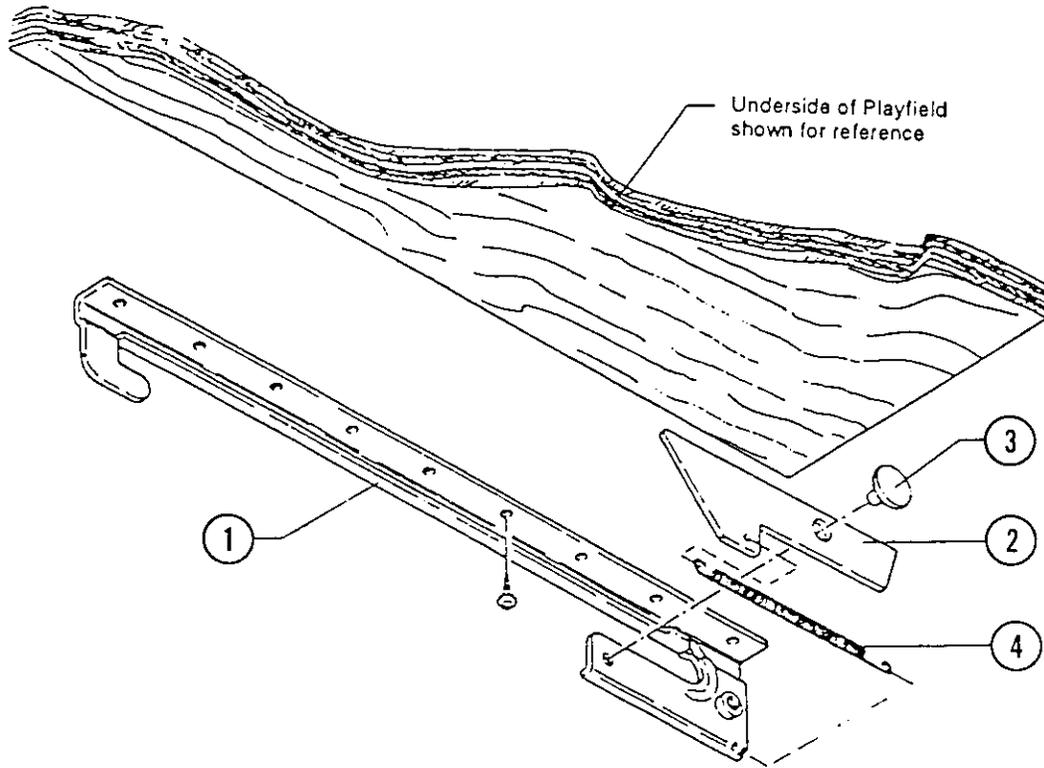
A-17749.1-1
Playfield Slide Mechanism
(Left Assembly)

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
(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

Posts

Part Number	Description
02-4425-1	Post Fastner 8-32/8-32 x 5/8" Top
02-4425-2	Post Fastner 8-32/8-32 x 9/32" Top
02-4425-3	Post Fastner 8-32/8-32 x 5/8" Top
02-4426-2	Post Fastner #8 WS 6-32 Top
02-5222	Post #10 8-32 Top
02-5246-28	M-M Post 8-32 x 1.75"
02-5246-40	M-M Post 8-32 x 2.50"
02-5246-55	M-M Post 8-32 x 3.44"
02-5246-72	M-M Post 8-32 x 4.44"
02-5247-20	M-F Post 8-32 x 1.25"
02-5247-36	M-F Post 8-32 x 2.25"
02-5247-40	M-F Post 8-32 x 2.50"
02-5249	Post Bumper 10-32
02-5250	Double Bumper Post
02-5107	Adjusting Post
03-8319-7	Post #8 Starred, Black
03-8247-7	Post # 8 Double Starred, Black
03-8365-13	Post #8, Clear

B-12445-7
Ball Shooter Assembly

Item	Part Number	Description
1	20-9253-7	Ball Shooter Rod
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	10-148-7	Power Spring, White
7	20-8712-37	Ball Shooter Tip
8	23-6327	

Associated Assemblies:
(Not Shown)

9	01-3535	Mounting Plate
10	4010-01006-08	Mach. Screw, 10-32 x ½"

Upper Playfield Parts

Item No.	Part No.	Description
1	12-6468	Rebound Wire
2	A-13204-50050	Bottom Arch Assembly
3	01-13273.1	Arch Ball Guide
4	A-15849-R-2	Lower Right Flipper
••	20-10110-6	Shaft and Bat Assembly
5	A-20751-1	Right Flipper Ball Guide
6	04-10284	Ball Guide #16
7	A-17811	Slingshot Assembly
••	B-9362-R-3	Coil And Bracket Assy
••	A-20759	Leaf Switch Assembly
8	04-10285	Ball Guide #17
9	01-14139	Ball Guide #13
10	A-20655	Drop Diverter Assembly
••	04-10314	Rod Assembly
11	01-14140	Ball Guide #14
12	A-17778-15	Orange Oblong Standup Tgt
13	01-14138	Ball Guide #12
14	A-17794	Kicker Switch Sub Assembly
15	A-9415-2	Jet Bumper Coil Assembly
••	B-9414-2	Jet Bumper Assembly
••	B-12030-2	Jet Bumper Leaf Switch
16	A-20617	Right Ramp Assembly
17	A-20618	Center Ramp Assembly
18	12-7314	Medium Ramp
19	01-14128	Ball Guide #9
20	A-20708	Switch Gate Assembly
••	12-7323	Wireform Switch
••	01-14213	Switch Gate Bracket
21	01-14131	Ball Guide #11
22	A-20625	2-Way Popper
23	A-20616	Volcano Ramp
••	01-14145	Ramp Flap
24	A-20680	3 Ball Popper Assembly
25	A-20706	Rollunder Switch Assembly
26	A-17797-2	Right Ball Guide
••	12-6657-R	Wire Gate
••	01-6935	Ball Gate Flap
27	01-14130	Ball Guide #10
28	A-17797-1	Left Ball Gate
••	12-6657-L	Wire Gate
••	01-6935	Ball Gate Flap
29	01-14126	Ball Guide #6
30	A-20706	Rollunder Switch Assembly
31	01-14129	Ball Guide #5
32	A-20619	Left Ramp Assembly
••	01-14146	Ramp Flap
33	01-14127	Ball Guide #8
34	A-20654	Disappearing Post
••	02-5240	Post
35	12-7313	Short Ramp
36	A-20707	Switch Gate Assembly
••	12-7322	Wireform Switch
••	01-14212	Switch Gate Bracket
37	04-10287	Ball Guide #4
38	A-20678-6	Rectang Yellow Standup Tgt
39	04-10286	Ball Guide #3
40	A-18605-1	Round Blue Standup Target
41	01-14133	Ball Guide #2
42	A-18605-6	Round Yellow Standup Tgt

Item No.	Part No.	Description
43	A-20614	Gray Gorilla Assembly
••	31-2524	Gorilla
44	01-14141	Ball Guide #15
45	01-14132	Ball Guide #1
46	12-7311	Long Ramp
47	A-17811	Slingshot Assembly
••	B-9362-L-2	Coil and Bracket Assembly
••	A-20759	Leaf Switch Assembly
48	A-20751-2	Left Flipper Ball Guide
49	A-15849-L-2	Lower Left Flipper Assembly
••	20-10110-6	Shaft and Bat Assembly
50	B-11873	Bottom Arch Kicker
51	12-6468	Rebound Wire
52	A-20738	Upper Left Flipper Assembly
••	20-10110-6	Shaft and Bat Assembly
53	31-2522	Plastic Volcano Ramp
54	31-2523	Plastic "AMY" Gorilla
55	A-17778-15	Oblong Orange Standup Tgt

Not Shown:

03-7557		Kicker Protector Mylar
03-9472-1		Full Playfield Mylar*
03-9472-2		"AMY" Drop Area Mylar
03-9472-3		Lower Ball Drop Area Mylar
03-9472-4		Lower Ball Drop Area Mylar
03-9472-5		Jet Bumper Area Mylar
03-8633		Level Mount
04-10094		Reflector and Socket
12-6842		Bottom Arch Fence
20-9691		Level
20-6500		Steel Balls
31-1357-50050		Backglass Translight
31-2529		Screened Bottom Arch
36-50050		Screened Hardcoat Playfield

The CONGO hardcoat playfield does not require a full mylar. However, mylars can be purchased through your local Williams Distributor.
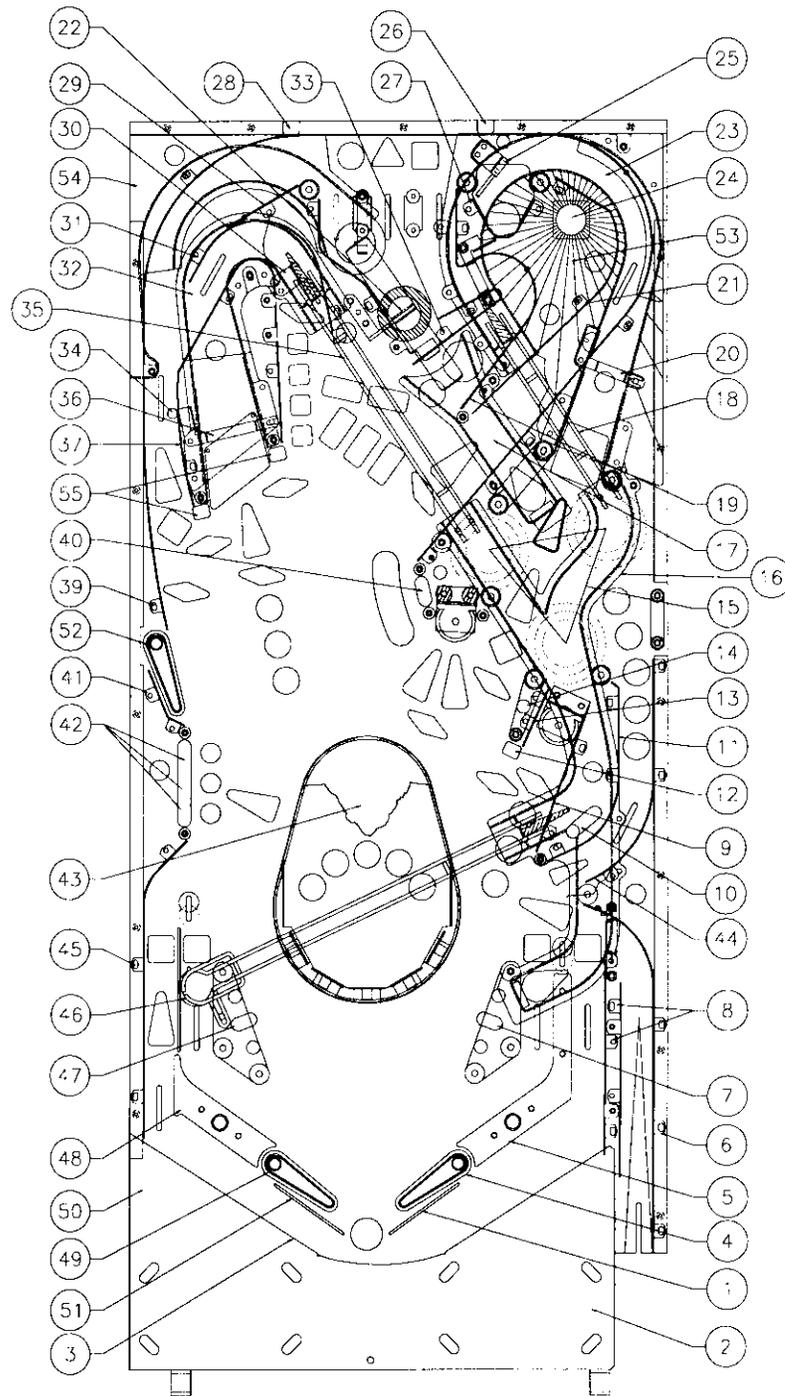
Lower Playfield Parts

Item	Part Number	Description
1	01-9211	Plfd. Hanger Bracket Assy. (2)
2	01-11781	Leg Support (2)
3	A-20439	Shooter Lane Auto Kicker Assy.
4	A-19963-1	Ball Trough Assembly Complete
5	A-15849-R-2	Flipper Assembly, Lwr. Right
6	A-17811	Kicker Arm (Slingshot) Assy.
	B-9362-R-3	Coil & Bracket Assembly
7	A-20605	9-Lamp PCB Assembly
8	A-20655	Drop Diverter Assembly
9	A-20453-1	Eject Assembly (2)
10	A-20600	5-Lamp Board Assembly
11	A-9415-2	Jet Bumper Coil Assembly
12	A-20607	14-Lamp Board Assembly
13	A-20625	2-Way Popper Assembly
14	A-20680	3-Ball Popper Assembly
15	A-17949.1-2	Plfd. Slide Mech. Assy. R.
16	A-20654	Disappearing Post Assy.
17	A-20665	Ball Gate Actuator Assy. (2)
18	A-20601	3-Lamp Board Assembly
19	A-17949.1-1	Plfd. Slide Mech. Assy. L.
20	A-17932-1	Disappearing Post Assy.
21	A-20606	4-Lamp Board Assembly
22	A-20738	Flipper Assembly, Left
23	A-20620	5-Lamp PCB Assembly
24	A-20602	4-Lamp PCB Assembly
25	A-20614	Gorilla Assembly
26	A-17811	Kicker Arm (Slingshot) Assy.
	B-9362-L-2	Coil & Bracket Assembly
27	A-15849-L-2	Flipper Assembly, Lwr. Left
28	A-18159	10-Opto PCB Assembly
29	A-20697	6-Lamp Board Assembly
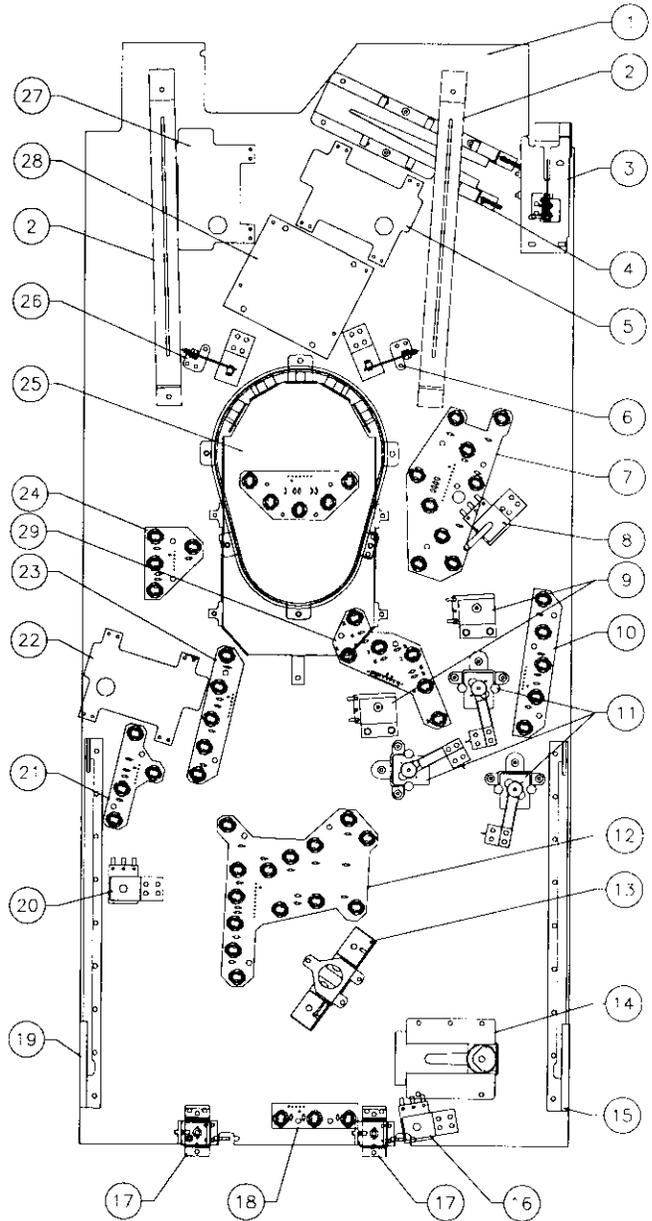
Rubber Rings

Item No.	Part No.	Description	Quantity
A	23-6556	Black Bumper Sleeve	9
B	23-6641	Black Rubber Bumper	4
C	23-6694-3	Black Rubber Ring 5/16"	15
D	23-6694-6	Black Rubber Ring 1"	2
E	23-6694-7	Black Rubber Ring 1-1/4"	1
F	23-6694-8	Black Rubber Ring 1-1/2"	2
G	23-6694-10	Black Rubber Ring 2-1/2"	2
H	23-6695	Black Flipper Ring 1-1/2"	3

LAMP MATRIX

Yellow (B+) ———→— Red

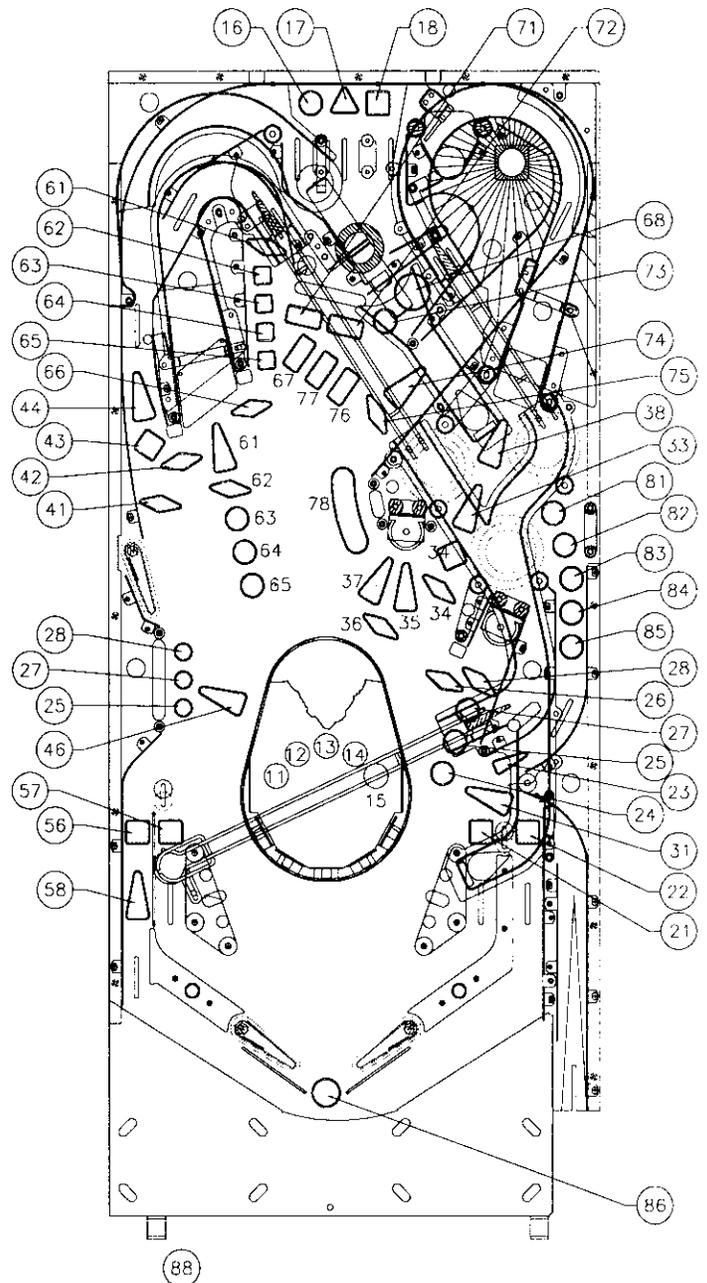| Column \ Row	1 Yellow-Brown J121-1 Q96	2 Yellow-Red J121-2 Q100	3 Yellow-Orange J121-3 Q95	4 Yellow-Black J121-4 Q99	5 Yellow-Green J121-5 Q94	6 Yellow-Blue J121-6 Q98	7 Yellow-Violet J121-7 Q93	8 Yellow-Gray J121-9 Q97
1 Red-Brown J125-1 Q104	(C)ONGO 11	ZI(N)J 21	"AUTOFIRE" 31	DIAMOND LEFT LOOP 41	LEFT RAMP 1 51	DIAMOND INNER LOOP 61	"TRAVI" 71	(H)IPPO 81
2 Red-Black J125-2 Q108	C(O)NGO 12	ZIN(J) 22	RIGHT RAMP EXTRA BALL 32	"WE ARE" 42	LEFT RAMP 2 52	(G)RAY 62	"COM" 72	H(I)PPO 82
3 Red-Orange J125-4 Q103	CO(N)GO 13	JET EXTRA COLLECT 23	RIGHT RAMP "COLLECT" 33	LEFT LOOP EXTRA BALL 43	LEFT RAMP 3 53	G(R)AY 63	"MINE SHAFT" 73	HI(P)P0 83
4 Red-Yellow J125-5 Q107	CON(G)O 14	"JUNGLE JACKPOT" 24	DIAMOND RIGHT RAMP 34	LEFT LOOP "LOCK" 44	DIAMOND LEFT RAMP 54	GR(A)Y 64	UPPER LOOP "LOCK" 74	HIP(P)O 84
5 Red-Green J125-6 Q102	CONG(O) 15	"SKILL FIRE" 25	LEFT EJECT EYE 35	LEFT BANK BOTTOM 45	LEFT RAMP JACKPOT 55	GRA(Y) 65	DIAMOND UPPER LOOP 75	HIPP(O) 85
6 Red-Blue J125-7 Q106	(A)MY 16	"YOU" 26	DIAMOND LEFT EJECT 36	"SKILL SHOT" 46	(Z)INJ 56	"WATCHING" 66	SATELLITE RIGHT 76	"SHOOT AGAIN" 86
7 Red-Violet J125-8 Q101	A(M)Y 17	"MAP" 27	"MYSTERY" 37	LEFT BANK CENTER 47	Z(I)NJ 57	SATELLITE LEFT 67	SATELLITE CENTER 77	NOT USED 87
8 Red-Gray J125-9 Q105	AM(Y) 18	DIAMOND RIGHT EJECT 28	RIGHT RAMP JACKPOT 38	LEFT BANK TOP 48	"KICKBACK" 58	"SUPER SCORE" 68	"PERIMETER DEFENSE" 78	START BUTTON 88

J1XX = Power Driver Board

Lamp Locations

Item No.	Bulb No.	Lamp Assy No.	Description
11	24-8768	A-20603	(C)ongo
12	24-8768	A-20603	C(o)ngo
13	24-8768	A-20603	Co(n)go
14	24-8768	A-20603	Con(g)o
15	24-8768	A-20603	Cong(o)
16	24-8768	A-20601	(A)my
17	24-8768	A-20601	A(m)y
18	24-8768	A-20601	Am(y)
21	24-8768	A-20605	Zi(n)j
22	24-8768	A-20605	Zin(j)
23	24-8768	A-20605	Jet Extra Collect
24	24-8768	A-20605	Jungle Jackpot
25	24-8768	A-20605	Skill Fire
26	24-8768	A-20605	You
27	24-8768	A-20605	Map
28	24-8768	A-20605	Diamond Right Eject
31	24-8768	A-20605	Autofire
32	24-8768	A-20697	Right Ramp Extra Ball
33	24-8768	A-20697	Right Ramp Collect
34	24-8768	A-20697	Diamond Right Ramp
35	24-8768	A-20697	Left Eject Eye
36	24-8768	A-20697	Diamond Left Eject
37	24-8768	A-20697	Mystery
38	24-6549	A-17835	Right Ramp Jackpot
41	24-8768	A-20606	Diamond Left Loop
42	24-8768	A-20606	We Are
43	24-8768	A-20606	Left Loop Extra Ball
44	24-8768	A-20606	Left Loop Lock
45	24-8768	A-20602	Left Bank Bottom
46	24-8768	A-20602	Skill Shot
47	24-8768	A-20602	Left Bank Center
48	24-8768	A-20602	Left Bank Top
51	24-8768	A-20620	Left Ramp 1
52	24-8768	A-20620	Left Ramp 2
53	24-8768	A-20620	Left Ramp 3
54	24-8768	A-20620	Diamond Left Ramp
55	24-8768	A-20620	Left Ramp Jackpot
56	24-6549	A-17835	(Z)inj
57	24-6549	A-17835	Z(i)nj
58	24-6549	A-17835	Kickback
61	24-8768	A-20607	Diamond Inner Loop
62	24-8768	A-20607	(G)ray
63	24-8768	A-20607	G(r)ay
64	24-8768	A-20607	Gr(a)y
65	24-8768	A-20607	Gra(y)
66	24-8768	A-20607	Watching
67	24-8768	A-20607	Satellite Left
68	24-6549	A-17807	Super Score
71	24-8768	A-20607	Travi
72	24-8768	A-20607	Corn
73	24-8768	A-20607	Mine Shaft
74	24-8768	A-20607	Upper Loop Lock
75	24-8768	A-20607	Diamond Upper Loop
76	24-8768	A-20607	Satellite Right
77	24-8768	A-20607	Satellite Center
78	24-6549	A-17835	Perimeter Defense
81	24-8768	A-20600	(H)ippo
82	24-8768	A-20600	H(i)ppo
83	24-8768	A-20600	Hi(p)po
84	24-8768	A-20600	Hip(p)o
85	24-8768	A-20600	Hipp(o)
86	24-6549	A-17807	Shoot Again
87	Not Used		
88	----------	20-9663-1	Start Button

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

2-39

SWITCH MATRIX

White ●——○ ○—— Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J206-1 U20-18	2 Green-Red J206-2 U20-17	3 Green-Orange J206-3 U20-16	4 Green-Yellow J206-4 U20-15	5 Green-Black J206-5 U20-14	6 Green-Blue J206-6 U20-13	7 Green-Violet J206-7 U20-12	8 Green-Gray J206-9 U20-11	Flipper Grounded Switches
Orange-Brown J205-1 Left Coin Chute U17-5 D1	1 White-Brown J208-1 U18-11	INNER LEFT LOOP 11	SLAM TILT 21	TROUGH EJECT 31	LOCK BALL 1 41	"TRAVI" 51	LEFT SLINGSHOT 61	(A)MY 71	NOT USED 81	Black-Green J208-13 Lower Right Flipper E.O.S. F1
Orange-Red J205-2 Center Coin Chute U17-7 D2	2 White-Red J208-2 U18-9	UPPER LOOP 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	LOCK BALL 2 42	"COM" 52	RIGHT SLINGSHOT 62	A(M)Y 72	NOT USED 82	Blue-Violet J212-12 Lower Right Flipper Opto F2
Orange-Black J205-3 Right Coin Chute U17-11 D3	3 White-Orange J208-3 U18-5	START BUTTON 13	NOT USED 23	TROUGH BALL 2 33	LOCK BALL 3 43	2-WAY POPPER 53	LEFT JET BUMPER 63	AM(Y) 73	NOT USED 83	Black-Blue J208-12 Lower Left Flipper E.O.S. F3
Orange-Yellow J205-4 4th Coin Chute U17-9 D4	4 White-Yellow J208-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	"MINE SHAFT" 44	"WE ARE" STANDUP TARGET 54	RIGHT JET BUMPER 64	(C)ONGO 74	NOT USED 84	Blue-Gray J212-11 Lower Left Flipper Opto F4
Orange-Green J205-6 U16-9 Normal: Srv Crdts Test/Function: Escape D5	5 White-Green J208-5 U19-11	JET EXIT 15	RIGHT EJECT RUBBER 25	TROUGH BALL 4 35	LEFT LOOP 45	"WATCHING" STANDUP TARGET 55	BOTTOM JET BUMPER 65	C(O)NGO 75	NOT USED 85	Black-Violet J208-11 Upper Right Flipper E.O.S. F5
Orange-Blue J205-7 U16-11 Normal: Volume Dn Test/Function: Down D6	6 White-Blue U208-7 U19-9	LEFT OUTLANE 16	LEFT RETURN LANE 26	VOLCANO STACK 36	LEFT BANK TOP 46	"PERIMETER DEFENSE" 56	NOT USED 66	CO(N)GO 76	NOT USED 86	Black-Yellow J212-10 Upper Right Flipper Opto F6
Orange-Violet J205-8 U16-7 Normal: Volume Up Test/Function: Up D7	7 White-Violet J208-8 U19-5	RIGHT RETURN LANE 17	RIGHT OUTLANE 27	"MYSTERY" EJECT 37	LEFT BANK CENTER 47	LEFT RAMP ENTER 57	RIGHT RAMP ENTER 67	CON(G)O 77	NOT USED 87	Black-Gray J208-10 Upper Left Flipper E.O.S. F7
Orange-Gray J205-9 U16-5 Normal: Begin Test Test/Function: Enter D8	8 White-Gray J208-9 U19-7	SHOOTER LANE 18	"YOU" STANDUP TARGET 28	RIGHT EJECT 38	LEFT BANK BOTTOM 48	LEFT RAMP EXIT 58	RIGHT RAMP EXIT 68	CONG(O) 78	NOT USED 88	Black-Blue J212-9 Upper Left Flipper Opto F8

J2XX = CPU BOARD [ ] = OPTO, TYPICALLY CLOSED

Switch Locations

Item No.	Switch No.		Description
F1	SW-1A-194		Lower Right Flipper E.O.S.
F2	A-17316		Lower Right Flipper Cabinet.
F3	SW-1A-194		Lower Left Flipper E.O.S.
F4	A-17316		Lower Left Flipper Cabinet
F5	Not Used		Upper Right Flipper E.O.S.
F6	Not Used		Upper Right Flipper Cabinet
F7	SW-1A-194		Upper Left Flipper E.O.S.
F8	A-17316		Upper Left Flipper Cabinet
11	5647-12693-19		Inner Left Loop
12	5647-12693-19		Upper Loop
13	20-9663-1		Start Button
14	A-15361		Plumb Bob Tilt*
15	5647-12693-19		Jet Exit
16	5647-12693-19		Left Outlane
17	5647-12693-19		Right Return Lane
18	5647-12693-62		Shooter Lane
21	A-17238		Slam Tilt*
22	5643-09268-00		Coin Door Closed*
23	Not Used		
24	5643-09112-00		Always Closed*
25	A-17794		Right Eject Rubber
26	5647-12693-19		Left Return Lane
27	5647-12693-19		Right Outlane
28	A-17778-15		"You" Standup Target
31	A-18617-1 (LED)		Trough Eject
	A-18618-1	(Photo Xistor.)	
32	A-18617-1 (LED)		Trough Ball 1
	A-18618-1	(Photo Xistor.)	
33	A-18617-1 (LED)		Trough Ball 2
	A-18618-1	(Photo Xistor.)	
34	A-18617-1 (LED)		Trough Ball 3
	A-18618-1	(Photo Xistor.)	
35	A-18617-1 (LED)		Trough Ball 4
	A-18618-1	(Photo Xistor.)	
36	A-16909 (LED)		Volcano Stack
	A-16909 (Photo Xistor)		
37	5647-12693-43		Mystery Eject
38	5647-12693-43		Right Eject
41	A-16909 (LED)		Lock Ball 1
	A-16909 (Photo Xistor)		
42	A-16909 (LED)		Lock Ball 2
	A-16909 (Photo Xistor)		
43	A-16909 (LED)		Lock Ball 3
	A-16909 (Photo Xistor)		
44	5647-12693-11		Mine Shaft
45	5647-12393-19		Left Loop
46	A-18605-6		Left Bank Top
47	A-18605-6		Left Bank Center
48	A-18605-6		Left Bank Bottom
51	A-20678-6		Travi
52	A-20678-6		Com
53	5647-12693-11		2-Way Popper
54	A-17778-15		"We Are" Standup Target
55	A-17778-15		"Watching" Standup Target
56	A-18605-1		Perimeter Defense
57	5647-12693-11		Left Ramp Enter
58	5647-12693-21		Left Ramp Exit
61	SW-1A-204 (Kick)		Left Slingshot
	SW-1A-205 (Score)**		
62	SW-1A-204 (Kick)		Right Slingshot
	SW-1A-205 (Score)**		
63	SW-11A-37-1		Left Jet Bumper
64	SW-11A-37-1		Right Jet Bumper
65	SW-11A-37-1		Bottom Jet Bumper
66			Not Used
67	5647-12693-11		Right Ramp Enter
68	5647-12693-21		Right Ramp Exit
71	5647-12693-19		(A)my
72	5647-12693-19		A(m)y
73	5647-12693-19		Am(y)
74	SW-1A-203-6		(C)ongo
75	SW-1A-203-6		C(o)ngo
76	SW-1A-203-6		Co(n)go
77	SW-1A-203-6		Con(g)o
78	SW-1A-203-6		Cong(o)

*NOT SHOWN. **Score switches have diodes attached.

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Backbox	Cabinet	Drive Xistor	Voltage Connections Playfield	Backbox	Cabinet	Drive Wire Color	Solenoid Part Number / Flashlamp Type Playfield	Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			Vio-Brn	AE-23-800	
02	KICKBACK	High Power	J133-2			Q68	J116-2			Vio-Red	AE-23-800	
03	2-WAY POPPER UP	High Power	J133-2			Q71	J116-4			Vio-Org	AE-23-800	
04	2-WAY POPPER DOWN	High Power	J133-2			Q67	J116-5			Vio-Yel	AE-23-800	
05	RAMP DIVERTER	High Power	J133-2			Q70	J116-6			Vio-Grn	AE-26-1500	
06	VOLCANO POPPER	High Power	J133-2			Q66	J116-7			Vio-Blu	AE-23-800	
07	KNOCKER	High Power		J133-2		Q69		J116-8		Vio-Blk		AE-23-800
08	TOP LOOP POST	High Power	J133-2			Q65	J116-9			Vio-Gry	AE-26-1500	
09	TROUGH EJECT	Low Power	J133-3			Q44	J113-1			Brn-Blk	AE-26-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			Brn-Red	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			Brn-Org	AE-26-1200	
12	LEFT JET BUMPER	Low Power	J133-3			Q47	J113-5			Brn-Yel	AE-26-1200	
13	RIGHT JET BUMPER	Low Power	J133-3			Q42	J113-6			Brn-Grn	AE-26-1200	
14	BOTTOM JET BUMPER	Low Power	J133-3			Q46	J113-7			Brn-Blu	AE-26-1200	
15	GORILLA RIGHT	Low Power	J133-3			Q41	J113-8			Brn-Vio	AE-25-1000	
16	GORILLA LEFT	Low Power	J133-3			Q45	J113-9			Brn-Gry	AE-25-1000	
17	AMY FLASHER	Flasher	J133-6	J134-5		Q28	J111-1	J112-1		Blk-Brn	#906 (1)	#906 (1)
18	LEFT RAMP FLS	Flasher	J133-6			Q32	J111-2			Blk-Red	#89 (1)	
19	2-WAY POPPER FLS	Flasher	J133-6			Q27	J111-3			Blk-Org	#89 (1)	
20	SKILL SHOT FLS	Flasher	J133-6	J134-5		Q31	J111-4	J112-5		Blk-Yel	#89 (1)	#906 (1)
21	GRAY GORILLA FLS	Flasher	J133-6	J134-5		Q26	J111-5	J112-6		Blu-Grn	#906 (1)	#906 (1)
22	MAP EJECT	Flasher	J133-1			Q30	J111-6			Blu-Blk	AE-26-1200	
23	LEFT GATE	Flasher	J133-1			Q25	J111-7			Blu-Vio	A-14406	
24	RIGHT GATE	Flasher	J133-1			Q29	J111-8			Blu-Gry	A-14406	
25	LOWER RIGHT FLS	Gen. Purpose	J133-6			Q16	J109-1			Blu-Brn	#89 (1)	
26	RIGHT RAMP FLS	Gen. Purpose	J133-6			Q15	J109-2			Blu-Red	#89 (1)	
27	VOLCANO FLS	Gen. Purpose	J133-6	J134-5		Q14	J109-3	J107-4		Blu-Org	#89(2)#906(1)	#906 (1)
28	PRMTR DFNS FLS	Gen. Purpose	J133-6	J134-5		Q13	J109-4	J107-5		Blu-Yel	#89 (1)	#906 (1)

General Illumination

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Backbox	Cabinet	Drive Xistor	Voltage Connections Playfield	Backbox	Cabinet	Drive Wire Color	Solenoid Part Number / Flashlamp Type Playfield	Backbox
01	PLAYFIELD GORILLA	G.I.	J105-1	J106-1		Q5	J105-7	J106-7		Wht-Brn	#555	
02	PLAYFIELD TOP	G.I.	J105-2			Q4	J105-8			Wht-Org	#44	
03	PLAYFIELD BOTTOM	G.I.	J105-3	J106-3		Q3	J105-9	J106-9		Wht-Yel	#44	
04	BACKBOX STRING 1	G.I.		J106-5		Q2		J106-10		Wht-Grn		#555
05	BACKBOX STRING 2	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	Wht-Vio		#555

Flipper Circuits

		Voltage Connection Playfield	Drive Transistors Power	Hold	Drive Connections Playfield	Drive Wire Colors Power	Hold	Coil Part No.	Coil Colors
29		Lwr. Rt. Power J119-1 (Red-Grn)	Q90		J120-13	Yel-Grn			
30	LWR RIGHT FLIPPER	Lwr. Rt. Hold J119-1 (Red-Grn)		Q92	J120-11		Org-Grn	FL-11629	BLUE
31		Lwr. Lt. Power J119-4 (Red-Blu)	Q87		J120-9	Yel-Blu			
32	LWR LEFT FLIPPER	Lwr. Lt. Hold J119-4 (Red-Blu)		Q89	J120-7		Org-Blu	FL-11629	BLUE
33	UPPER LEFT POST	Upr. Rt. Power J119-6 (Red-Vio)	Q84		J120-6	Yel-Vio		AE-27-1200	
34	MYSTERY EJECT	Upr. Rt. Hold J119-6 (Red-Vio)		Q86	J120-4		Org-Vio	AE-26-1200	
35		Upr. Lt. Power J119-8 (Red-Gry)	Q81		J120-3	Yel-Gry			
36	UPR LEFT FLIPPER	Upr. Lt. Hold J119-8 (Red-Gry)		Q83	J120-1		Org-Gry	FL-11630	RED

J1XX = POWER DRIVER BOARD
24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

Solenoid/Flashlamp Locations

Item No.	Coil/Flasher No.	Assembly No.	Description
01	AE-23-800	A-20439	Auto Plunger
02	AE-23-800	B-11873	Kickback
03	AE-23-800	A-20625	2-Way Popper Up
04	AE-23-800	A-20625	2-Way Popper Down
05	AE-26-1500	A-20655	Ramp Diverter
06	AE-23-800	A-20680	Volcano Popper
07	AE-23-800	B-10686-1	*Knocker
08	AE-26-1500	A-20654	Top Loop Post
09	AE-26-1500	A-19963-1	Trough Eject
10	AE-26-1200	B-9362-L-2	Left Slingshot
11	AE-26-1200	B-9362-R-3	Right Slingshot
12	AE-26-1200	A-9415-2	Left Jet Bumper
13	AE-26-1200	A-9415-2	Right Jet Bumper
14	AE-26-1200	A-9415-2	Bottom Jet Bumper
15	AE-25-1000	A-20614	Gorilla Right
16	AE-25-1000	A-20614	Gorilla Left
17	24-8802	04-10321-2	Amy Flasher
	24-8802	---------	*Insert Flasher
18	24-8704	A-17983	Left Ramp Flasher
19	24-8704	A-17983	2-Way Popper Flshr
20	24-8704	A-17983	Skill Shot Flasher
	24-8802	---------	*Insert Flasher
21	24-8802	04-10094-1	Gray Gorilla Flasher
	24-8802	---------	*Insert Flasher
22	AE-26-1200	A-20453-1	Map Eject
23	A-14406	A-20665	Left Gate
24	A-14406	A-20665	Right Gate
25	24-8704	A-17983	Lower Right Flasher
26	24-8704	A-17983	Right Ramp Flasher
27	24-8704/24-8802	A-17983/04-10321-2	Volcano Flasher
	24-8802	---------	*Insert Flasher
28	24-8704	A-17803	Perimtr Defen. Flshr
	24-8802	---------	*Insert Flasher

Flippers

Item No.	Coil/Flasher No.	Assembly No.	Description
29-30	FL-11629	A-15849-R-2	Lower Right Flipper
31-32	FL-11629	A-15849-L-2	Lower Left Flipper
33	AE-27-1200	A-17932-1	Upper Left Post
34	AE-26-1200	A-20453-1	Mystery Eject
35-36	FL-11630	A-20738	Upper Left Flipper

General Illumination

Item No.	Bulb No.	Description
01	24-8768	*Playfield Gorilla
02	24-6549	*Playfield Top
03	24-8549	*Playfield Bottom
04	24-8768	*Backbox String 1
05	24-8768	*Backbox String 2

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

*NOT SHOWN
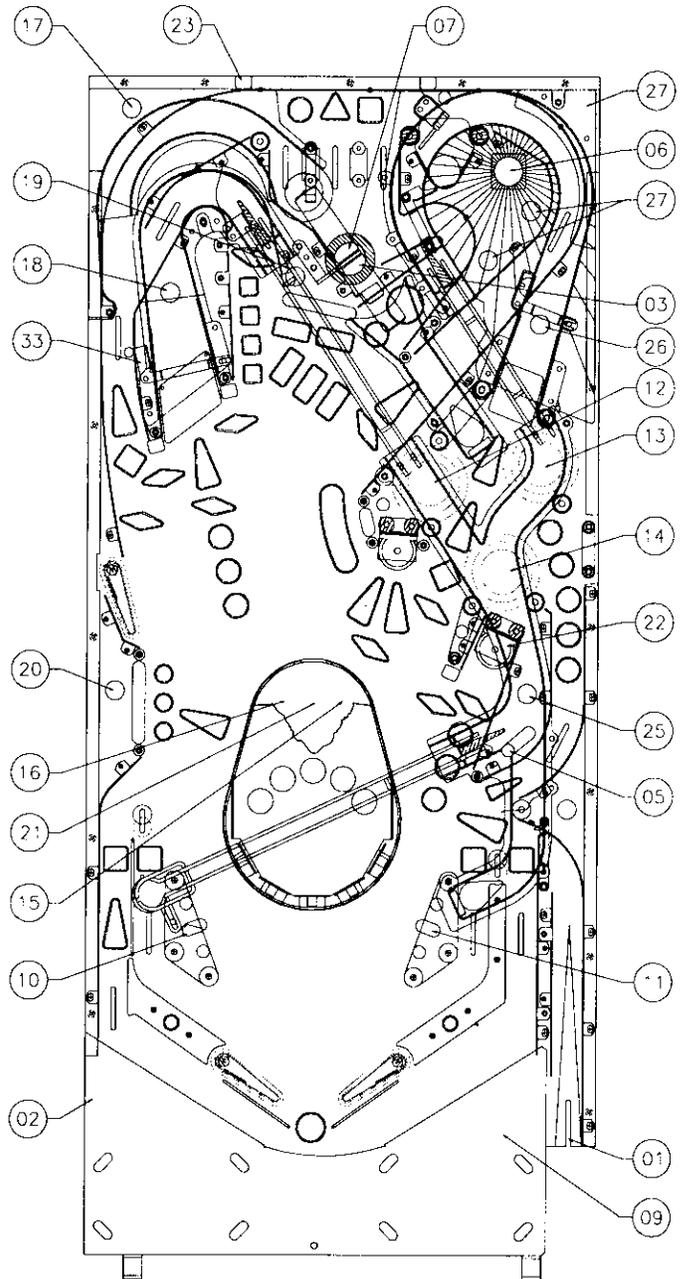
Ramps

Item	Part Number	Description
1	12-7311	Long Ramp
2	A-20619	Left Ramp Assembly
3	A-20616	Volcano Ramp
4	12-7314	Medium Ramp
5	A-20618	Center Ramp Assembly
6	12-7313	Short Ramp
7	A-20617	Right Ramp Assembly
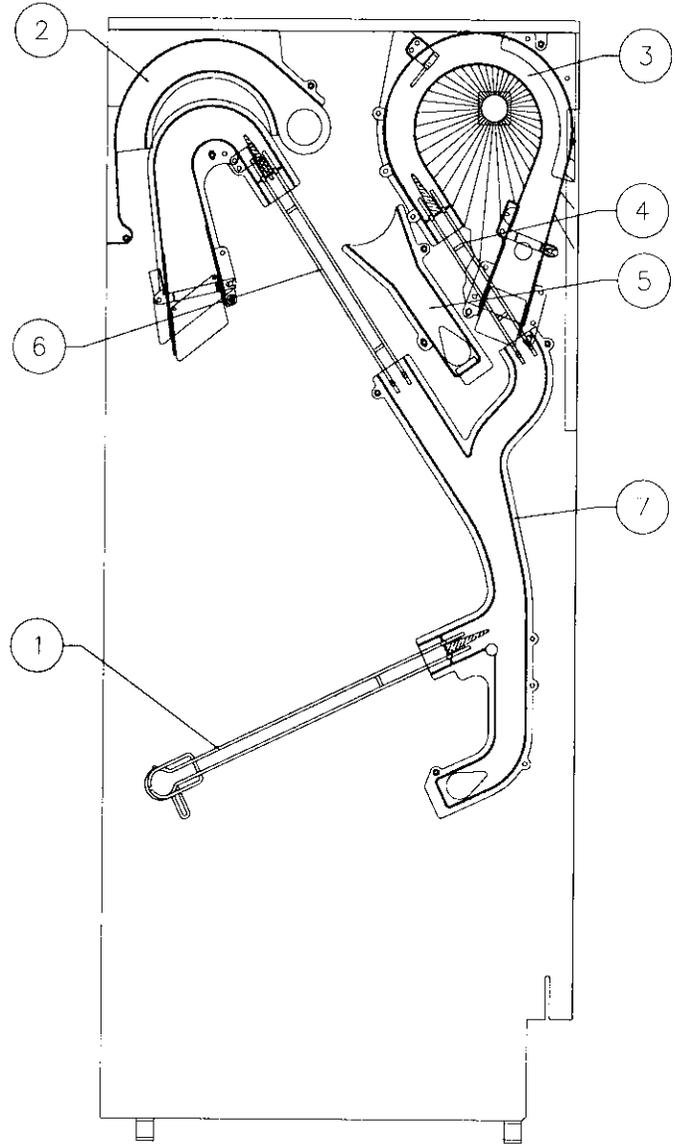
SECTION THREE

GAME WIRING
AND SCHEMATICS

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack receives a number that identifies the circuit board and the position on that board that it connects to. J-designations refer to a male connector. P-designations refer to a female 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 is a fuse on the Audio Video board.

Prefix numbers for WPC circuit boards are listed below.
J1XX - Power Driver board jacks; F1XX - Power Driver board fuses
J2XX - CPU Board (There are no fuses on the CPU board.)
J5XX and J6XX - Audio Video board (AV board) jacks; F5XX and F6XX - Audio Video board fuses

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.
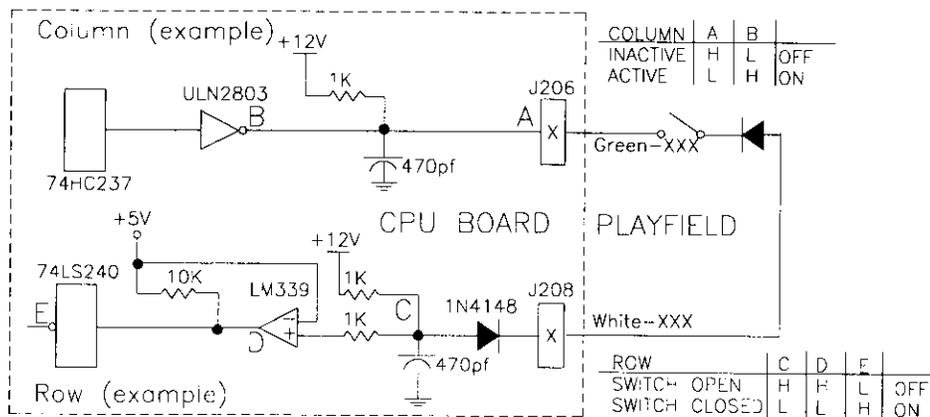
SWITCH MATRIX

White ——————/o— Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J206-1 U20-18	2 Green-Red J206-2 U20-17	3 Green-Orange J206-3 U20-16	4 Green-Yellow J206-4 U20-15	5 Green-Black J206-5 U20-14	6 Green-Blue J206-6 U20-13	7 Green-Violet J206-7 U20-12	8 Green-Gray J206-9 U20-11	Flipper Grounded Switches
Orange-Brown J205-1 Left Coin Chute U17-5 D1	1 White-Brown J208-1 U18-11	INNER LEFT LOOP 11	SLAM TILT 21	TROUGH EJECT 31	LOCK BALL 1 41	"TRAVI" 51	LEFT SLINGSHOT 61	(A)MY 71	NOT USED 81	Black-Green J208-13 Lower Right Flipper E.O.S. F1
Orange-Red J205-2 Center Coin Chute U17-7 D2	2 White-Red J208-2 U18-9	UPPER LOOP 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	LOCK BALL 2 42	"COM" 52	RIGHT SLINGSHOT 62	A(M)Y 72	NOT USED 82	Blue-Violet J212-12 Lower Right Flipper Opto F2
Orange-Black J205-3 Right Coin Chute U17-11 D3	3 White-Orange J208-3 U18-5	START BUTTON 13	NOT USED 23	TROUGH BALL 2 33	LOCK BALL 3 43	2-WAY POPPER 53	LEFT JET BUMPER 63	AM(Y) 73	NOT USED 83	Black-Blue J208-12 Lower Left Flipper E.O.S. F3
Orange-Yellow J205-4 4th Coin Chute U17-9 D4	4 White-Yellow J208-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	"MINE SHAFT" 44	"WE ARE" STANDUP TARGET 54	RIGHT JET BUMPER 64	(C)ONGO 74	NOT USED 84	Blue-Gray J212-11 Lower Left Flipper Opto F4
Orange-Green J205-6 U16-9 Normal/Test Function/Function Srv Crdts/Escape D5	5 White-Green J208-5 U19-11	JET EXIT 15	RIGHT EJECT RUBBER 25	TROUGH BALL 4 35	LEFT LOOP 45	"WATCHING" STANDUP TARGET 55	BOTTOM JET BUMPER 65	C(O)NGO 75	NOT USED 85	Black-Violet J208-11 Upper Right Flipper E.O.S. F5
Orange-Blue J205-7 U16-11 Normal/Test Function/Function Volume Dn/Down D6	6 White-Blue U208-7 U19-9	LEFT OUTLANE 16	LEFT RETURN LANE 26	VOLCANO STACK 36	LEFT BANK TOP 46	"PERIMETER DEFENSE" 56	NOT USED 66	CO(N)GO 76	NOT USED 86	Black-Yellow J212-10 Upper Right Flipper Opto F6
Orange-Violet J205-8 U16-7 Normal/Test Function/Function Volume Up/Up D7	7 White-Violet J208-8 U19-5	RIGHT RETURN LANE 17	RIGHT OUTLANE 27	"MYSTERY" EJECT 37	LEFT BANK CENTER 47	LEFT RAMP ENTER 57	RIGHT RAMP ENTER 67	CON(G)O 77	NOT USED 87	Black-Gray J208-10 Upper Left Flipper E.O.S. F7
Orange-Gray J205-9 U16-5 Normal/Test Function/Function Begin Test/Enter D8	8 White-Gray J208-9 U19-7	SHOOTER LANE 18	"YOU" STANDUP TARGET 28	RIGHT EJECT 38	LEFT BANK BOTTOM 48	LEFT RAMP EXIT 58	RIGHT RAMP EXIT 68	CONG(O) 78	NOT USED 88	Black-Blue J212-9 Upper Left Flipper Opto F8

J2XX = CPU 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, therefore, its output is low. Corresponding row and column switches must be low at the same time for the switch to be considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

3-2

DEDICATED SWITCHES
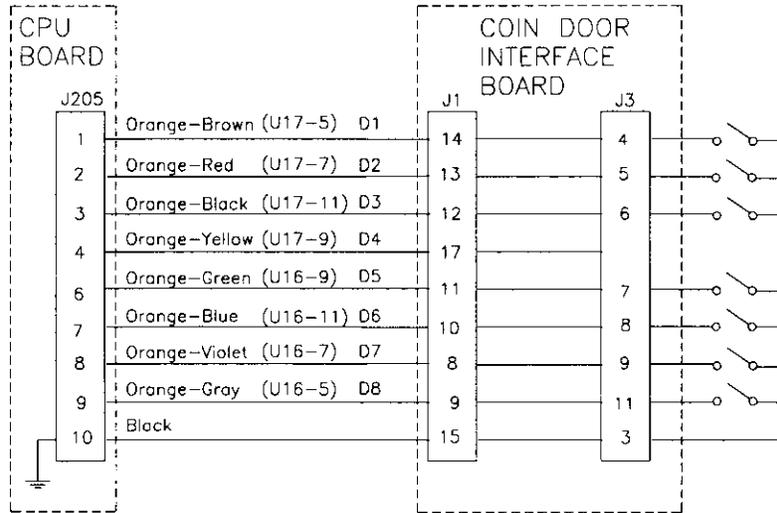
Coin Acceptor Switches
D1 - Left Coin Chute
D2 - Center Coin Chute
D3 - Right Coin Chute
D4 - Fourth Coin Chute

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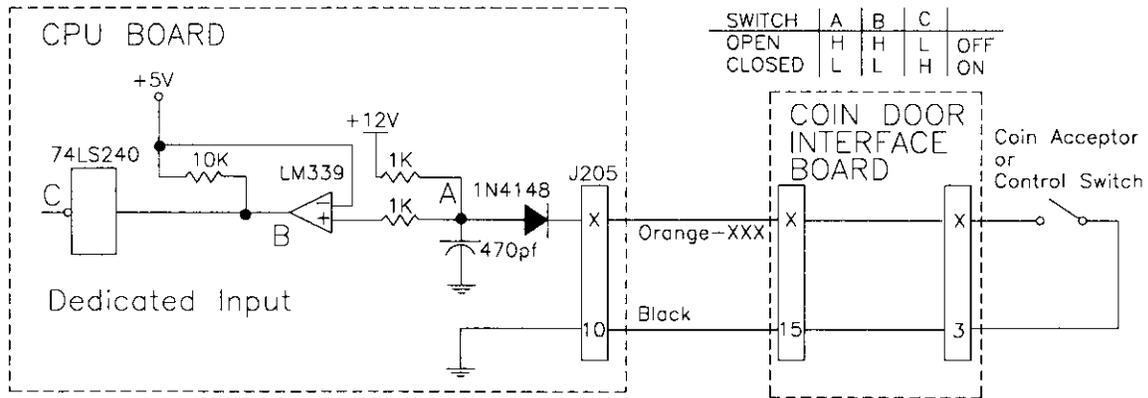
The dedicated switches operate similar in the matrix, except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).

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

3-3

LAMP MATRIX

Yellow (B+) ——▶|— Red

Column / Row	1 Yellow-Brown J121-1 Q96	2 Yellow-Red J121-2 Q100	3 Yellow-Orange J121-3 Q95	4 Yellow-Black J121-4 Q99	5 Yellow-Green J121-5 Q94	6 Yellow-Blue J121-6 Q98	7 Yellow-Violet J121-7 Q93	8 Yellow-Gray J121-9 Q97
1 Red-Brown J125-1 Q104	(C)ONGO 11	ZI(N)J 21	"AUTOFIRE" 31	DIAMOND LEFT LOOP 41	LEFT RAMP "P" 51	DIAMOND INNER LOOP 61	"TRAV!" 71	(H)IPPO 81
2 Red-Black J125-2 Q108	C(O)NGO 12	ZIN(J) 22	RIGHT RAMP EXTRA BALL 32	"WE ARE" 42	LEFT RAMP "A" 52	(G)RAY 62	"COM" 72	H(I)PPO 82
3 Red-Orange J125-4 Q103	CO(N)GO 13	JET EXTRA COLLECT 23	RIGHT RAMP "COLLECT" 33	LEFT LOOP EXTRA BALL 43	LEFT RAMP "M" 53	G(R)AY 63	"MINE SHAFT" 73	HI(P)P0 83
4 Red-Yellow J125-5 Q107	CON(G)O 14	"JUNGLE JACKPOT" 24	DIAMOND RIGHT RAMP 34	LEFT LOOP "LOCK" 44	DIAMOND LEFT RAMP 54	GR(A)Y 64	UPPER LOOP "LOCK" 74	HIP(P)O 84
5 Red-Green J125-6 Q102	CONG(O) 15	"SKILL FIRE" 25	LEFT EJECT EYE 35	LEFT BANK BOTTOM 45	LEFT RAMP JACKPOT 55	GRA(Y) 65	DIAMOND UPPER LOOP 75	HIPP(O) 85
6 Red-Blue J125-7 Q106	(A)MY 16	"YOU" 26	DIAMOND LEFT EJECT 36	"SKILL SHOT" 46	(Z)INJ 56	"WATCHING" 66	SATELLITE RIGHT 76	"SHOOT AGAIN" 86
7 Red-Violet J125-8 Q101	A(M)Y 17	"MAP" 27	"MYSTERY" 37	LEFT BANK CENTER 47	Z(I)NJ 57	SATELLITE LEFT 67	SATELLITE CENTER 77	NOT USED 87
8 Red-Gray J125-9 Q105	AM(Y) 18	DIAMOND RIGHT EJECT 28	RIGHT RAMP JACKPOT 38	LEFT BANK TOP 48	"KICKBACK" 58	"SUPER SCORE" 68	"PERIMETER DEFENSE" 78	START BUTTON 88

J1XX = Power Driver Board

LAMP MATRIX CIRCUIT
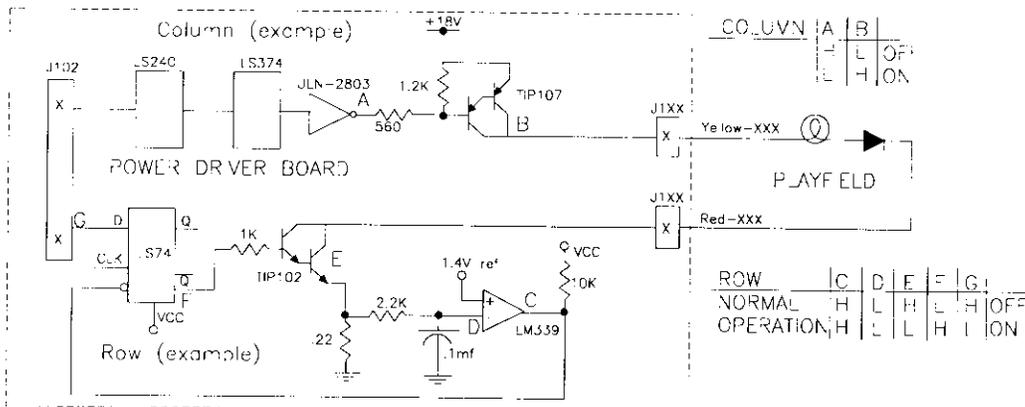
The microprocessor sends a signal to the column circuit causing the output of the UNL-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time, the microprocessor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of the TIP102 causes the transistor to conducts, bringing the row circuit to ground and turning the lamp on. The microprocessor changes the input of the 74LS74 to a high state to turn the lamp off.

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

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Backbox	Cabinet	Drive Xistor	Voltage Connections Playfield	Backbox	Cabinet	Drive Wire Color	Solenoid Part Number Flashlamp Type Playfield	Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			Vio-Brn	AE-23-800	
02	KICKBACK	High Power	J133-2			Q68	J116-2			Vio-Red	AE-23-800	
03	2-WAY POPPER UP	High Power	J133-2			Q71	J116-4			Vio-Org	AE-23-800	
04	2-WAY POPPER DOWN	High Power	J133-2			Q67	J116-5			Vio-Yel	AE-23-800	
05	RAMP DIVERTER	High Power	J133-2			Q70	J116-6			Vio-Grn	AE-26-1500	
06	VOLCANO POPPER	High Power	J133-2			Q66	J116-7			Vio-Blu	AE-23-800	
07	KNOCKER	High Power		J133-2		Q69		J116-8		Vio-Blk		AE-23-800
08	TOP LOOP POST	High Power	J133-2			Q65	J116-9			Vio-Gry	AE-26-1500	
09	TROUGH EJECT	Low Power	J133-3			Q44	J113-1			Brn-Blk	AE-26-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			Brn-Red	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			Brn-Org	AE-26-1200	
12	LEFT JET BUMPER	Low Power	J133-3			Q47	J113-5			Brn-Yel	AE-26-1200	
13	RIGHT JET BUMPER	Low Power	J133-3			Q42	J113-6			Brn-Grn	AE-26-1200	
14	BOTTOM JET BUMPER	Low Power	J133-3			Q46	J113-7			Brn-Blu	AE-26-1200	
15	GORILLA LEFT	Low Power	J133-3			Q41	J113-8			Brn-Vio	AE-25-1000	
16	GORILLA RIGHT	Low Power	J133-3			Q45	J113-9			Brn-Gry	AE-25-1000	
17	AMY FLASHER	Flasher	J133-6	J134-5		Q28	J111-1	J112-1		Blk-Brn	#906 (1)	#906 (1)
18	LEFT RAMP FLS	Flasher	J133-6			Q32	J111-2			Blk-Red	#89 (1)	
19	2-WAY POPPER FLS	Flasher	J133-6			Q27	J111-3			Blk-Org	#89 (1)	
20	SKILL SHOT FLS	Flasher	J133-6	J134-5		Q31	J111-4	J112-5		Blk-Yel	#89 (1)	#906 (1)
21	GRAY GORILLA FLS	Flasher	J133-6	J134-5		Q26	J111-5	J112-6		Blu-Grn	#906 (1)	#906 (1)
22	MAP EJECT	Flasher	J133-1			Q30	J111-6			Blu-Blk	AE-26-1200	
23	LEFT GATE	Flasher	J133-1			Q25	J111-7			Blu-Vio	A-14406	
24	RIGHT GATE	Flasher	J133-1			Q29	J111-8			Blu-Gry	A-14406	
25	LOWER RIGHT FLS	Gen. Purpose	J133-6			Q16	J109-1			Blu-Brn	#89 (1)	
26	RIGHT RAMP FLS	Gen. Purpose	J133-6			Q15	J109-2			Blu-Red	#89 (1)	
27	VOLCANO FLS	Gen. Purpose	J133-6	J134-5		Q14	J109-3	J107-4		Blu-Org	#89(2)#906(1)	#906 (1)
28	PRMTR DFNS FLS	Gen. Purpose	J133-6	J134-5		Q13	J109-4	J107-5		Blu-Yel	#89 (1)	#906 (1)

General Illumination

	Function	G.I.	Voltage Conn. Playfield	Backbox	Cabinet	Drive Xistor	Playfield	Backbox	Cabinet	Drive Wire Color	Playfield	Backbox
01	PLAYFIELD GORILLA	G.I.	J105-1	J106-1		Q5	J105-7	J106-7		Wht-Brn	#555	
02	PLAYFIELD TOP	G.I.	J105-2			Q4	J105-8			Wht-Org	#44	
03	PLAYFIELD BOTTOM	G.I.	J105-3	J106-3		Q3	J105-9	J106-9		Wht-Yel	#44	
04	BACKBOX STRING 1	G.I.		J106-5		Q2		J106-10		Wht-Grn		#555
05	BACKBOX STRING 2	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	Wht-Vio		#555

Flipper Circuits

Sol.	Flipper Circuits	Voltage Connection Playfield	Drive Transistors Power	Hold	Drive Connections Playfield	Drive Wire Colors Power	Hold	Coil Part No.	Coil Colors
29		Lwr. Rt. Power	J119-1 (Red-Grn)	Q90		J120-13	Yel-Grn			
30	LWR RIGHT FLIPPER	Lwr. Rt. Hold	J119-1 (Red-Grn)		Q92	J120-11		Org-Grn	FL-11629	BLUE
31		Lwr. Lt. Power	J119-4 (Red-Blu)	Q87		J120-9	Yel-Blu			
				Q85		J120-7		Org-Blu	FL-11629	BLUE
33	UPPER LEFT POST	Upr. Rt. Power	J119-6 (Red-Vio)	Q84		J120-6	Yel-Vio		AE-27-1200	
34	MYSTERY EJECT	Upr. Rt. Hold	J119-6 (Red-Vio)		Q86	J120-4		Org-Vio	AE-26-1200	
35		Upr. Lt. Power	J119-8 (Red-Gry)	Q81		J120-3	Yel-Gry			
36	UPR LEFT FLIPPER	Upr. Lt. Hold	J119-8 (Red-Gry)		Q83	J120-1		Org-Gry	FL-11630	RED

J1XX = POWER DRIVER BOARD
24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB
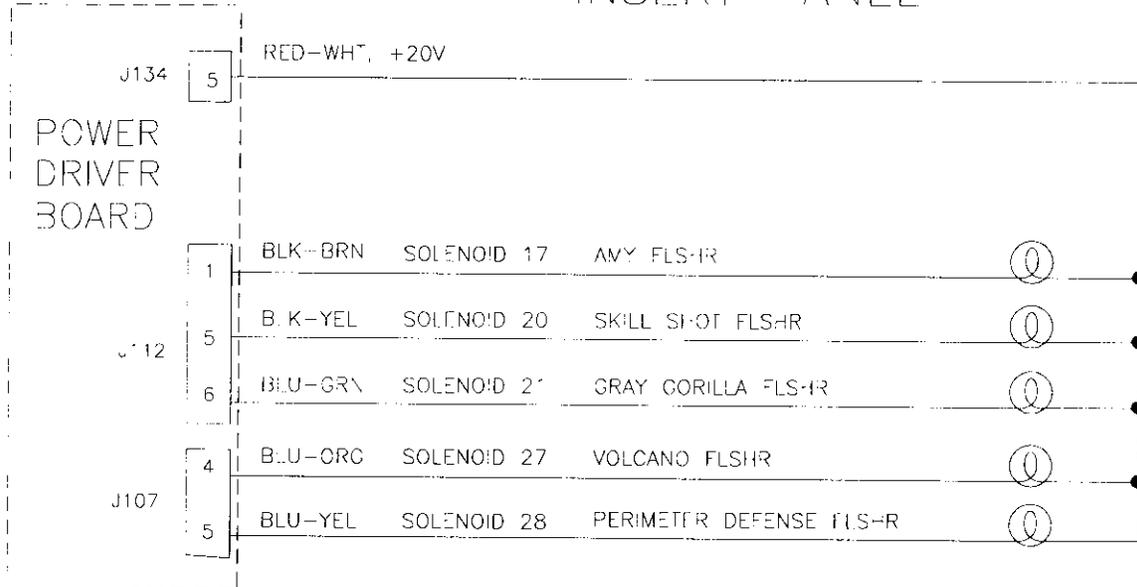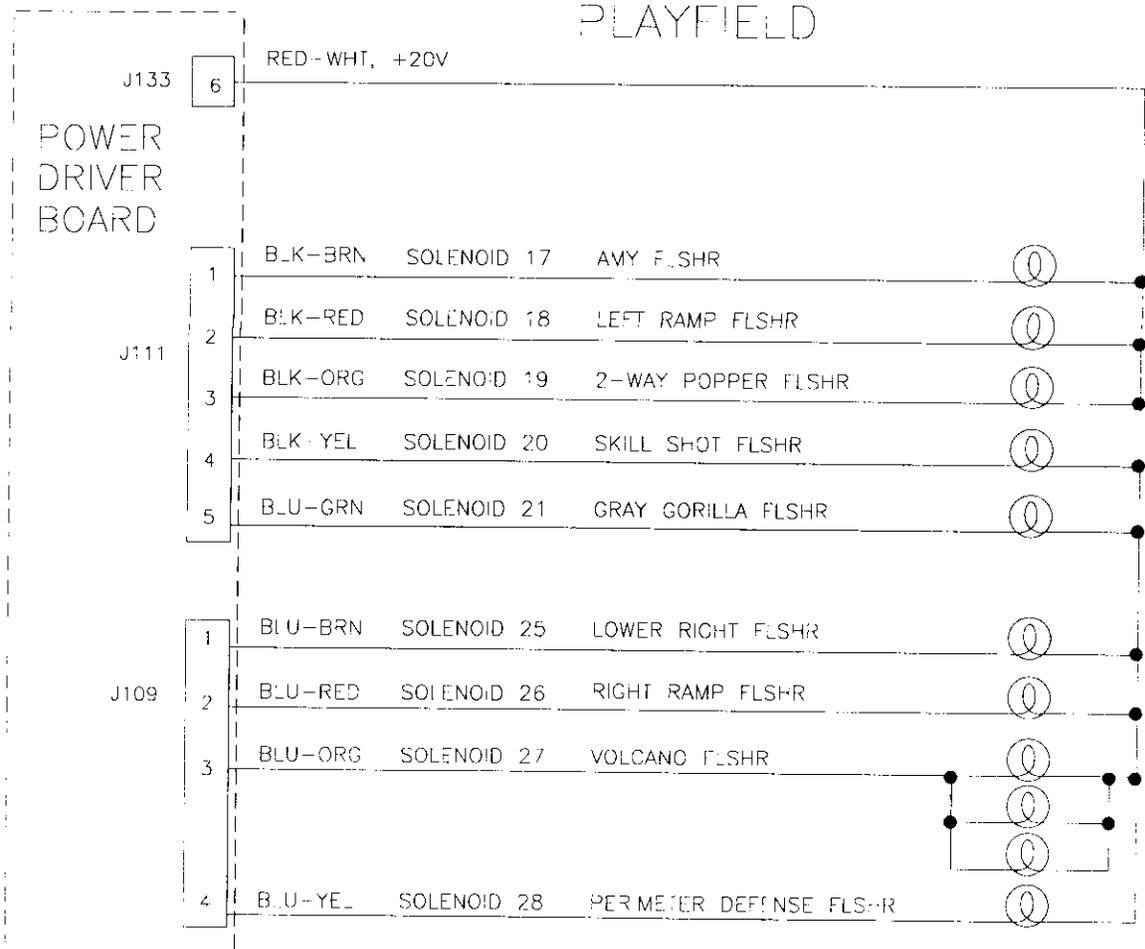
SOLENOID WIRING

COILS

POWER
DRIVER
BOARD

J133
- 2 | RED–BRN, +50V
- 3 | RED–BLK, +50V
- 1 | RED–ORG, +50V

J119
- 6 | RED–VIO, +50V

J120
- 6 | YEL–VIO
- 4 | ORG–VIO

J111
- 6 | BLU–BLK
- 7 | BLU–VIO
- 8 | BLU–GRY

J113
- 1 | BRN–BLK
- 3 | BRN–RED
- 4 | BRN–ORG
- 5 | BRN–YEL
- 6 | BRN–GRN
- 7 | BRN–BLU
- 8 | BRN–VIO
- 9 | BRN–GRY

J116
- 1 | VIO–BRN
- 2 | VIO–RED
- 4 | VIO–ORG
- 5 | VIO–YEL
- 6 | VIO–GRN
- 7 | VIO–BLU
- 9 | VIO–BLK
- 9 | VIO–GRY

| UPPER LEFT POST SOL. 33 | MYSTERY EJECT SOL. 34 |

| MAP EJECT SOL. 22 | LEFT GATE SOL. 23 | RIGHT GATE SOL. 24 |

| TROUGH EJECT SOL. 9 | LEFT SLINGSHOT SOL. 10 | RIGHT SLINGSHOT SOL. 11 | LEFT JET BUMPER SOL. 12 | RIGHT JET BUMPER SOL. 13 | BOTTOM JET BUMPER SOL. 14 | GORILLA LEFT SOL. 15 | GORILLA RIGHT SOL. 16 |

| AUTO PLUNGER SOL. 1 | KICKBACK SOL. 2 | 2–WAY POPPER UP SOL. 3 | 2–WAY POP. DWN SOL. 4 | RAMP DIVERTER SOL. 5 | VOLCANO POPPER SOL. 6 | KNOCKER SOL. 7 | TOP LOOP POST SOL. 8 |

INSERT PANEL

POWER
DRIVER
BOARD

J134 | 5 | RED—WHT, +20V

J112				
1	BLK—BRN	SOLENOID 17	AMY FLSHR
5	BLK—YEL	SOLENOID 20	SKILL SHOT FLSHR
6	BLU—GRN	SOLENOID 21	GRAY GORILLA FLSHR

J107				
4	BLU—ORG	SOLENOID 27	VOLCANO FLSHR
5	BLU—YEL	SOLENOID 28	PERIMETER DEFENSE FLSHR

PLAYFIELD

POWER
DRIVER
BOARD

J133 | 6 | RED—WHT, +20V

J111				
1	BLK—BRN	SOLENOID 17	AMY FLSHR
2	BLK—RED	SOLENOID 18	LEFT RAMP FLSHR
3	BLK—ORG	SOLENOID 19	2—WAY POPPER FLSHR
4	BLK·YEL	SOLENOID 20	SKILL SHOT FLSHR
5	BLU—GRN	SOLENOID 21	GRAY GORILLA FLSHR

J109				
1	BLU—BRN	SOLENOID 25	LOWER RIGHT FLSHR
2	BLU—RED	SOLENOID 26	RIGHT RAMP FLSHR
3	BLU—ORG	SOLENOID 27	VOLCANO FLSHR
4	BLU—YEL	SOLENOID 28	PERIMETER DEFENSE FLSHR

HIGH 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 high. A high at point "B" causes point "C", the collector of the TIP102 transistor and point "D", the emitter of the TIP36C transistor, to drop low. When point "D" is low, the coil is grounded through the transistor and turns on. The coil shuts off when point "A" toggles high.

LOW POWER SOLENOID CIRCUIT

The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is 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 turns on. The coil shuts off when point "A" toggles high.

SPECIAL (GENERAL PURPOSE) SOLENOID CIRCUIT

The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor, 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 turns on. When point "A" toggles high the coil/flashlamp turns off.

* Tieback diode is not used for flashlamp circuit.

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 turns on. When point "A" toggles high, the current shuts off.

GENERAL ILLUMINATION CIRCUIT

Figure #1

Figure #2

There are five general illumination strings; three like figure #1 and two like figure #2. When point "A" toggles low, points, "B" and "C" are high. This turns on the triac and the desired general illumination string of lights.

BLOCK DIAGRAM OF GENERAL ILLUMINATION CIRCUIT
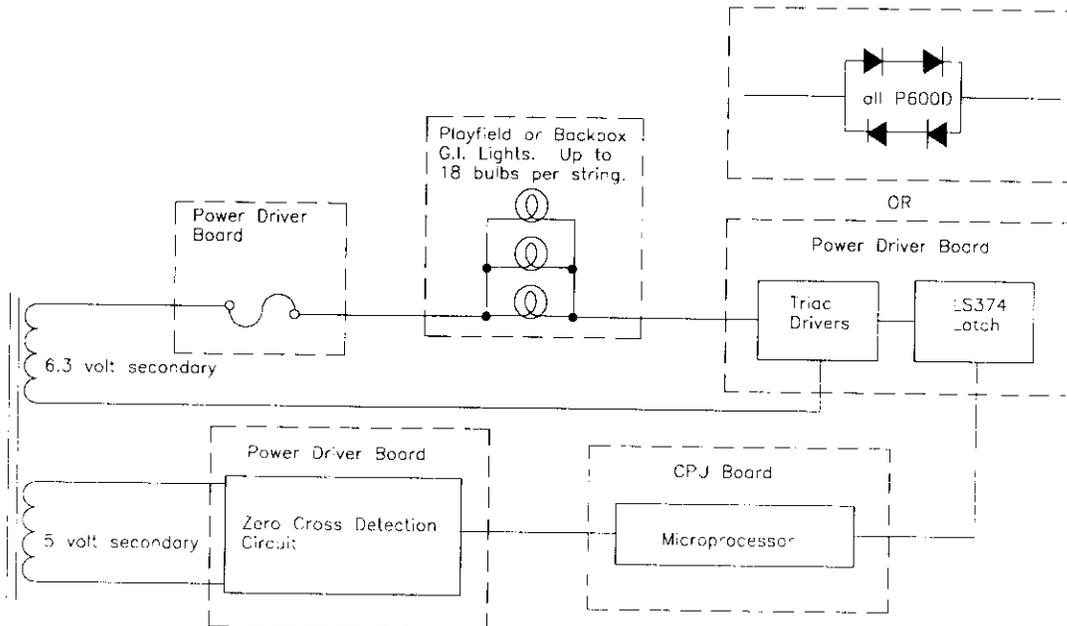
FLIPPER CIRCUIT DIAGRAM

RED–GRAY +50V

RED–VIOLET +50V

RED–BLUE +50V

RED–GREEN +50V

```
8 6 4 1
J119
```

POWER
DRIVER
BOARD

J120

LOWER RIGHT FLIPPER COIL

| 12 | YELLOW–GREEN | POWER | Q90 |
| 11 | ORANGE–GREEN | HOLD | Q92 |

LOWER LEFT FLIPPER COIL

| 9 | YELLOW–BLUE | POWER | Q87 |
| 7 | ORANGE–BLUE | HOLD | Q89 |

UPPER RIGHT FLIPPER COIL

| 6 | YELLOW–VIOLET | POWER | Q84 |
| 4 | ORANGE–VIOLET | HOLD | Q86 |

UPPER LEFT FLIPPER COIL

| 3 | YELLOW–GRAY | POWER | Q81 |
| 1 | ORANGE–GRAY | HOLD | Q83 |

J139

J102

| 2 | GRAY–YELLOW +12V |

J211

CPU
BOARD

J212   **CABINET OPTO SWITCHES**

13	ORANGE	GROUND		
12	BLUE–VIOLET	L. RIGHT FLIPPER	F2	U25A–1
11	BLUE–GRAY	L. LEFT FLIPPER	F4	U25B–2
10	BLACK–YELLOW	U. RIGHT FLIPPER	F6	U25C–14
9	BLACK–BLUE	U. LEFT FLIPPER	F8	U25D–13

FLIPPER
OPTO
BOARDS

J208   **END–OF–STROKE SWITCHES**

14	ORANGE	GROUND		
13	BLACK–GREEN	L. RIGHT FLIPPER	F1	U26A–1
12	BLACK–BLUE	L. LEFT FLIPPER	F3	U26B–2
11	BLACK–VIOLET	U. RIGHT FLIPPER	F5	U26C–14
10	BLACK–GRAY	U. LEFT FLIPPER	F7	U26D–13

The upper right flipper coil power circuit is used for the Upper Left Post, and the upper right flipper coil hold circuit is used for the Mystery Eject.

3-11

FLIPPER COIL CIRCUITS

LEFT FLIPPER CIRCUIT
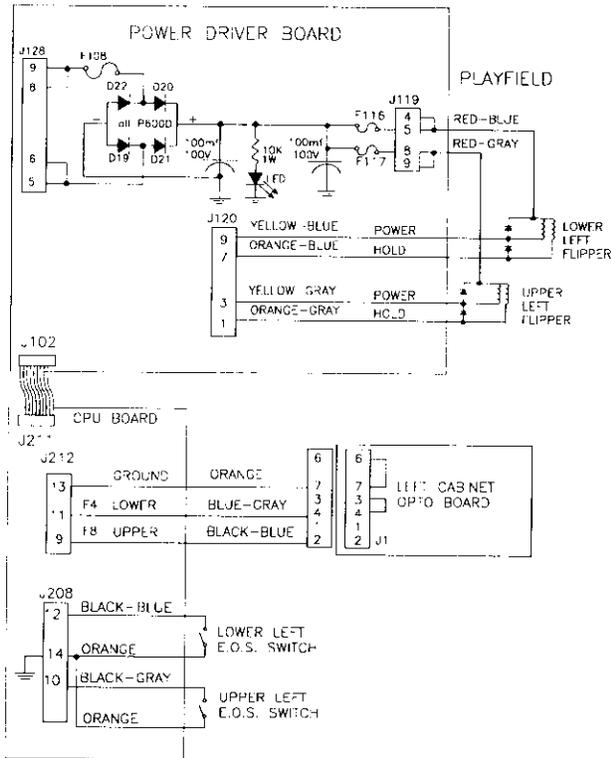
RIGHT FLIPPER CIRCUIT
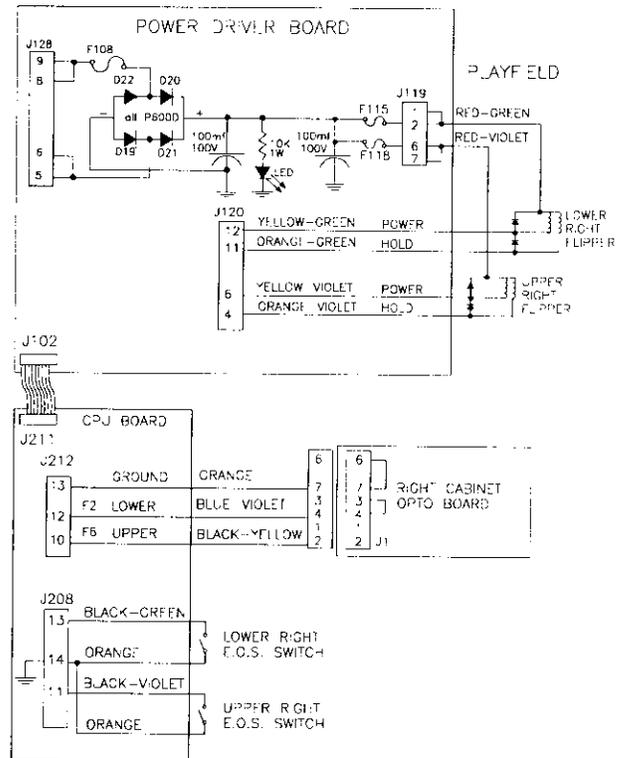
FLIPPER END-OF-STROKE SWITCH CIRCUIT

SWITCH	A	B	
OPEN	H	H	OFF
CLOSED	L	L	ON
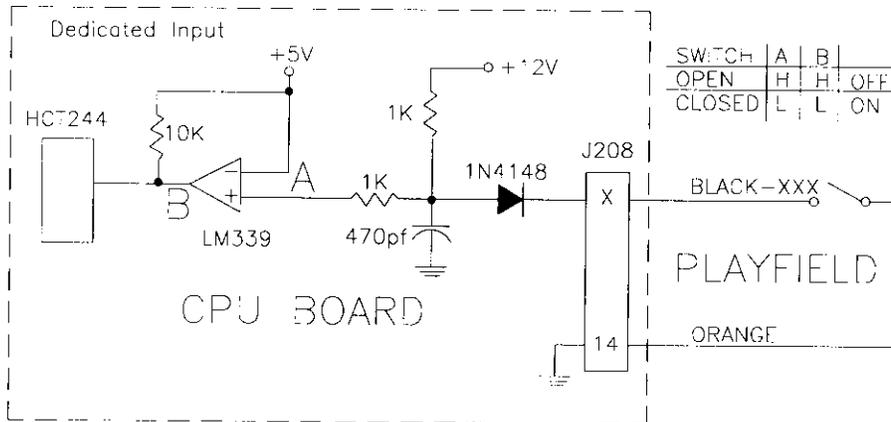
The flipper E.O.S. circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

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

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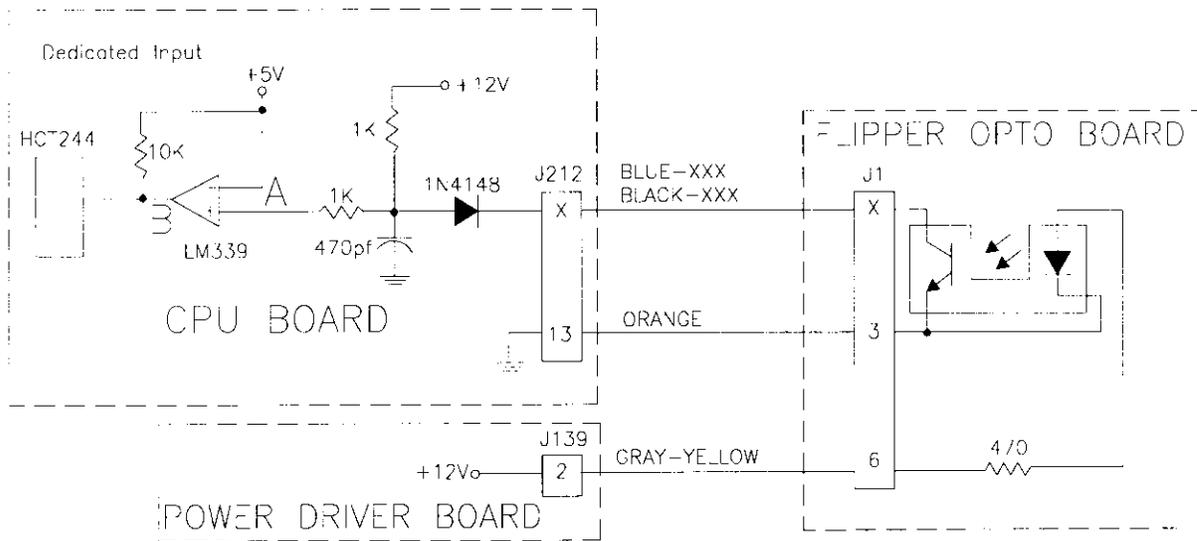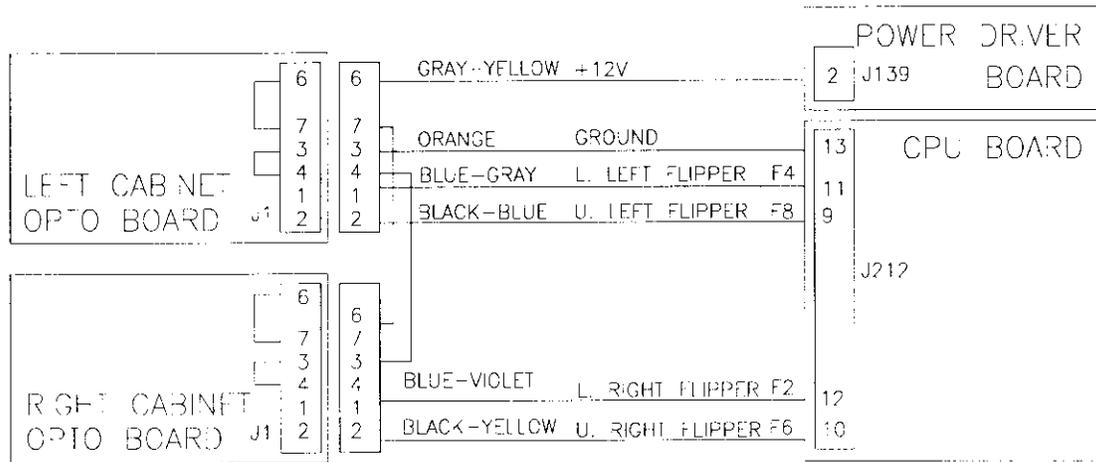
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch circuit.

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

Flipper Opto Board Assembly
A-20207
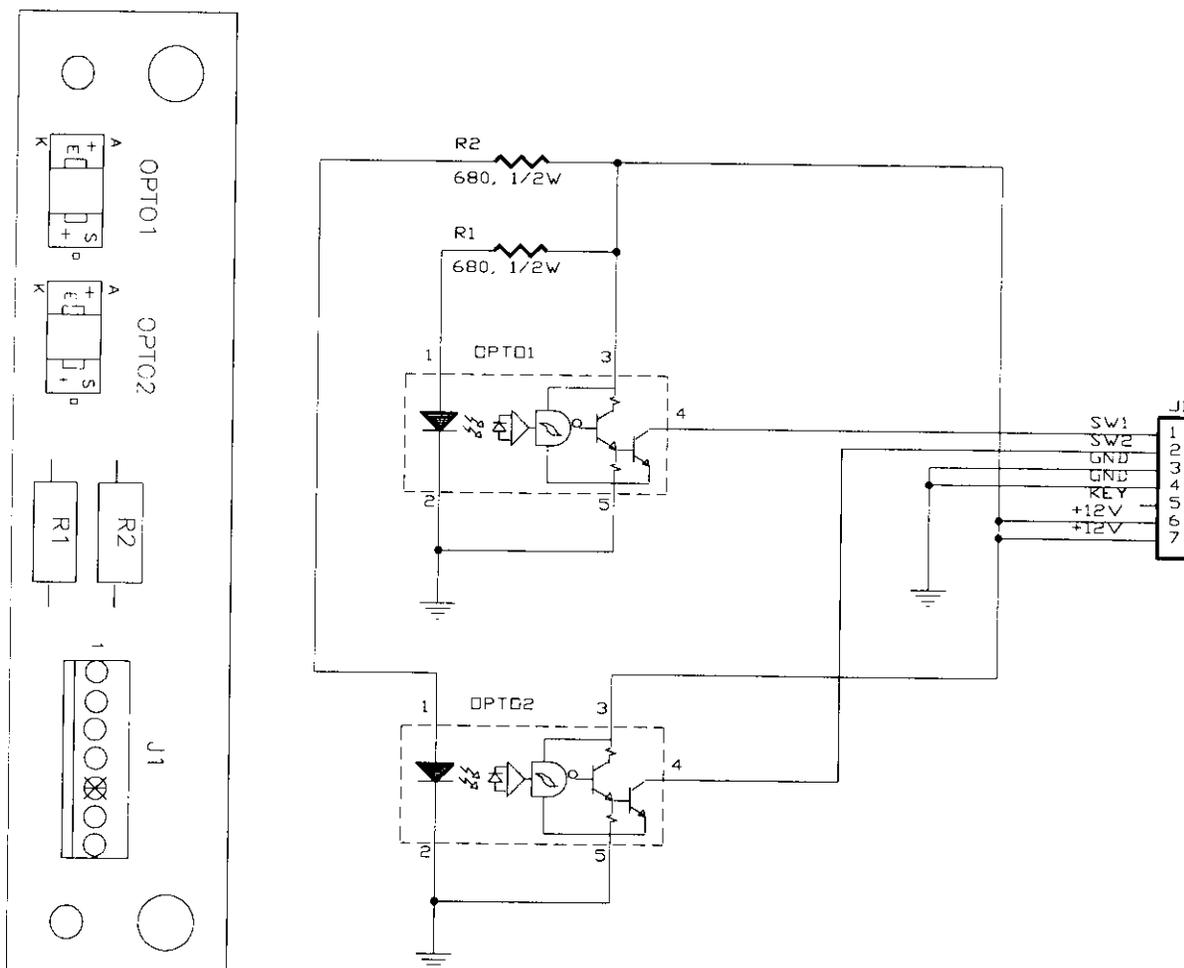
Left Flipper Opto Board Assembly
J1-1 Black-Blue from CPU Board J212-9
J1-2 Blue-Gray from CPU Board J212-11
J1-3 N/C
J1-4 Orange from CPU Board J212-13
J1-5 N/C
J1-6 Gray-Yellow from Power Driver Board J139-2
J1-7 Gray-Yellow from Power Driver Board J139-2

Right Flipper Opto Board Assembly
J1-1 Black-Yellow from CPU Board J212-10
J1-2 Blue-Violet from CPU Board J212-12
J1-3 Orange from CPU Board J212-13
J1-4 Orange from Left Flipper Opto Board Assy. J1-4
J1-5 N/C
J1-6 Gray-Yellow from Left Flipper Opto Board Assy. J1-6
J1-7 N/C

LED BOARD ASSEMBLY
A-16908
(TRANSMITTER-GREEN BOARD)
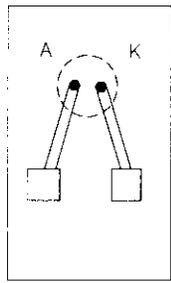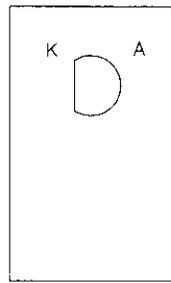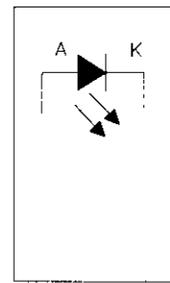
solder side   component side   schematic

PHOTO TRANSISTOR BOARD ASSEMBLY
A-16909
(RECEIVER-BLUE BOARD)
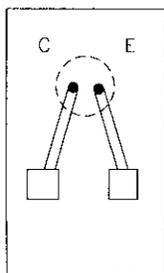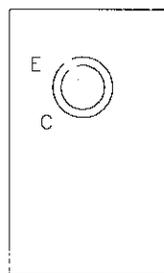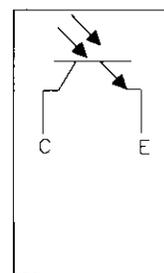
solder side   component side   schematic

TYPICAL CIRCUIT DIAGRAM
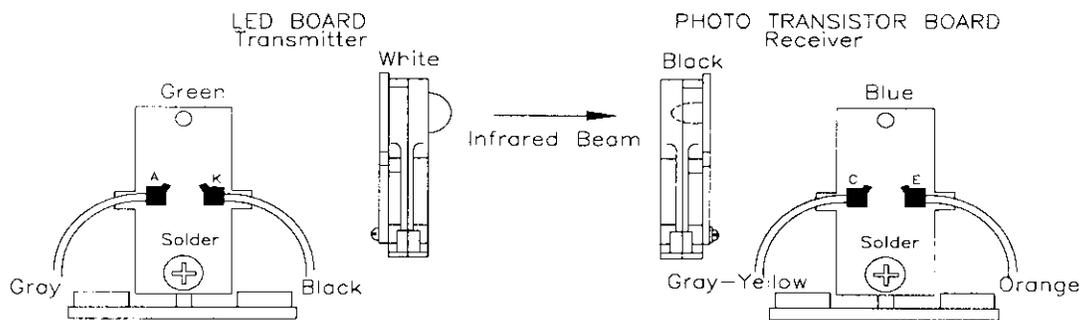
LED BOARD
Transmitter
1.0—1.4 volts
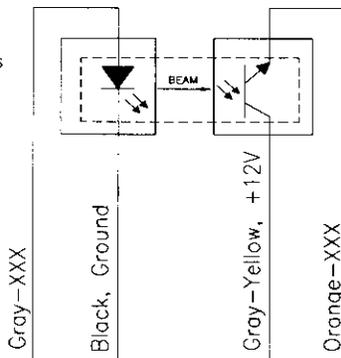
PHOTO TRANSISTOR BOARD
Receiver
0.1—0.7 volts unblocked
11—13 volts blocked

BEAM

Gray-XXX

Black, Ground

Gray-Yellow, +12V

Orange-XXX

LED BOARD
Transmitter

White

Green

A   K

Solder

Gray

Black

Infrared Beam

PHOTO TRANSISTOR BOARD
Receiver

Black

Blue

C   E

Solder

Gray-Yellow

Orange

3-15

Trough IR LED Board Assembly
(transmitter-green board)
A-18617-1
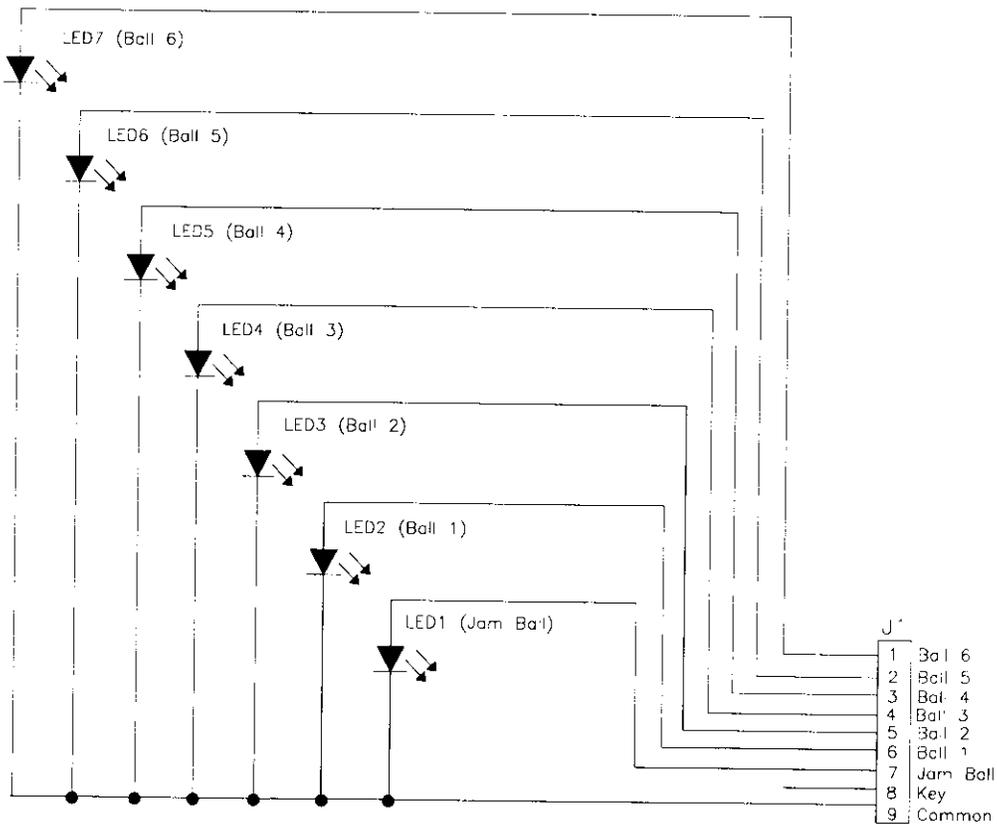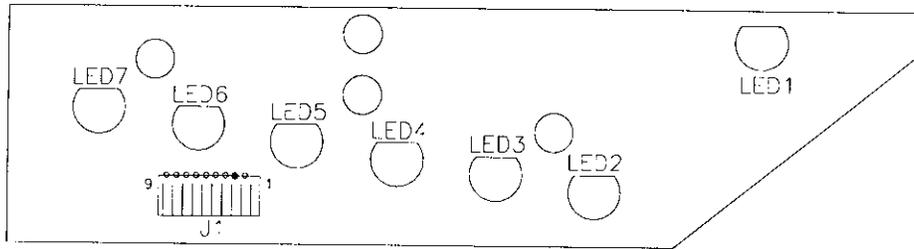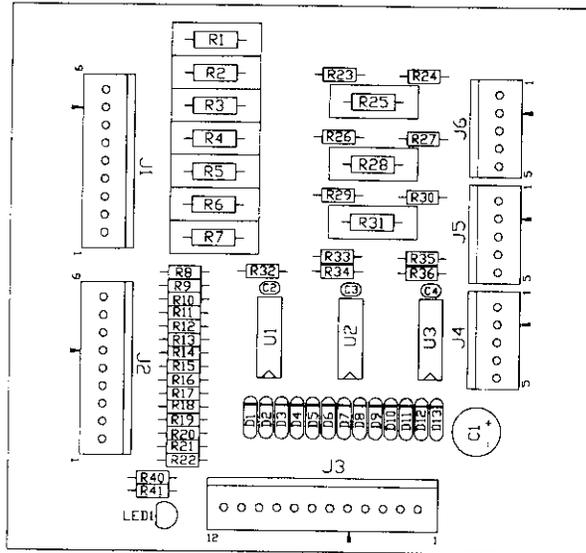

J1-1 N/C
J1-2 N/C
J1-3 GRY-VIO, LED 5, to 10-Opto Switch Board J1-3
J1-4 GRY-BLK, LED 4, to 10-Opto Switch Board J1-4
J1-5 GRY-ORG, LED 3, to 10-Opto Switch Board J1-5
J1-6 GRY-RED, LED 2, to 10-Opto Switch Board J1-6
J1-7 GRY-BRN, LED 1, to 10-Opto Switch Board J1-7
J1-8 Key
J1-9 BLK, ground, to 10-Opto Switch Board J1-9

Trough IR Photo Transistor Board Assembly
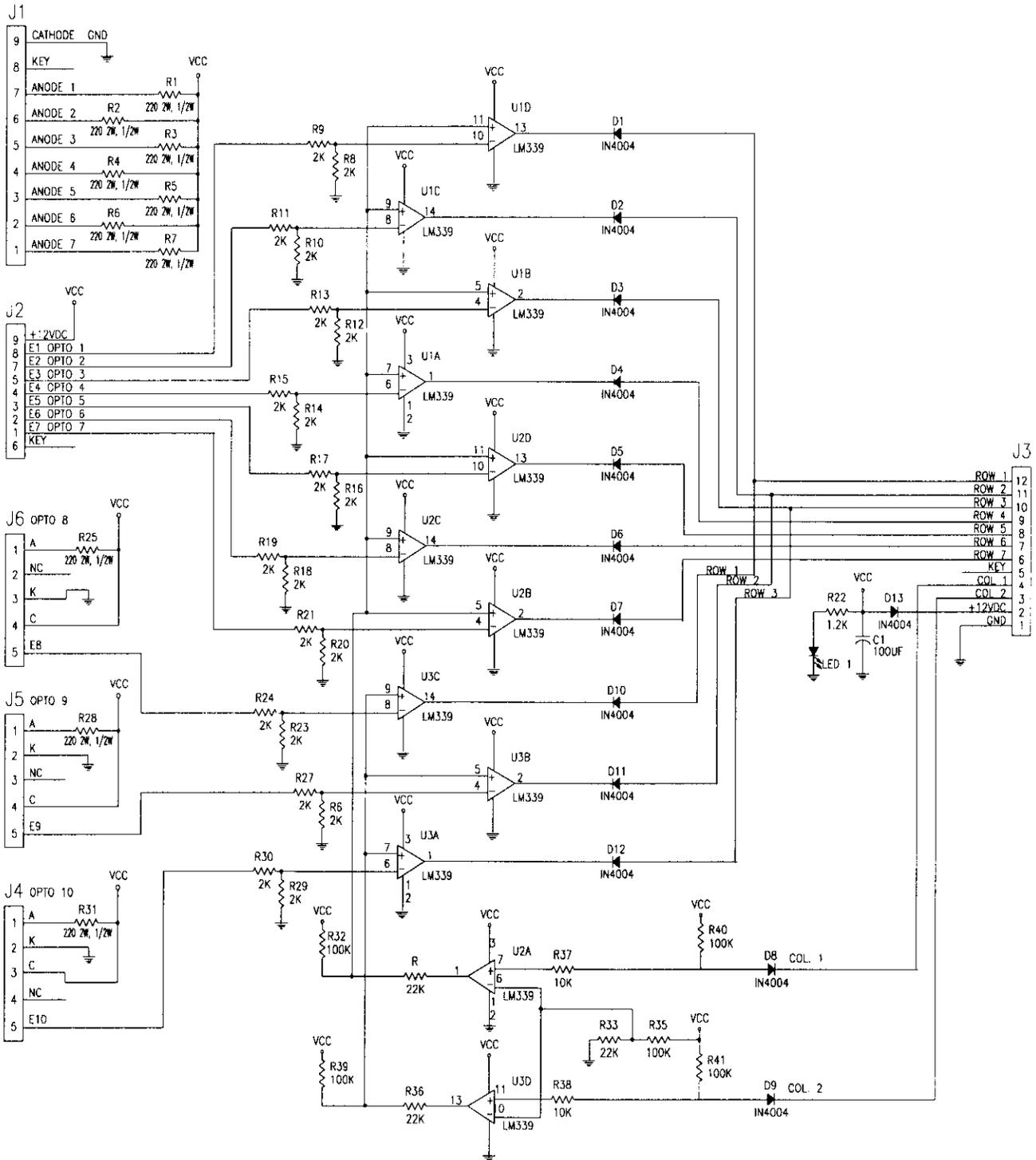## (receiver-blue board)
A-18618-1
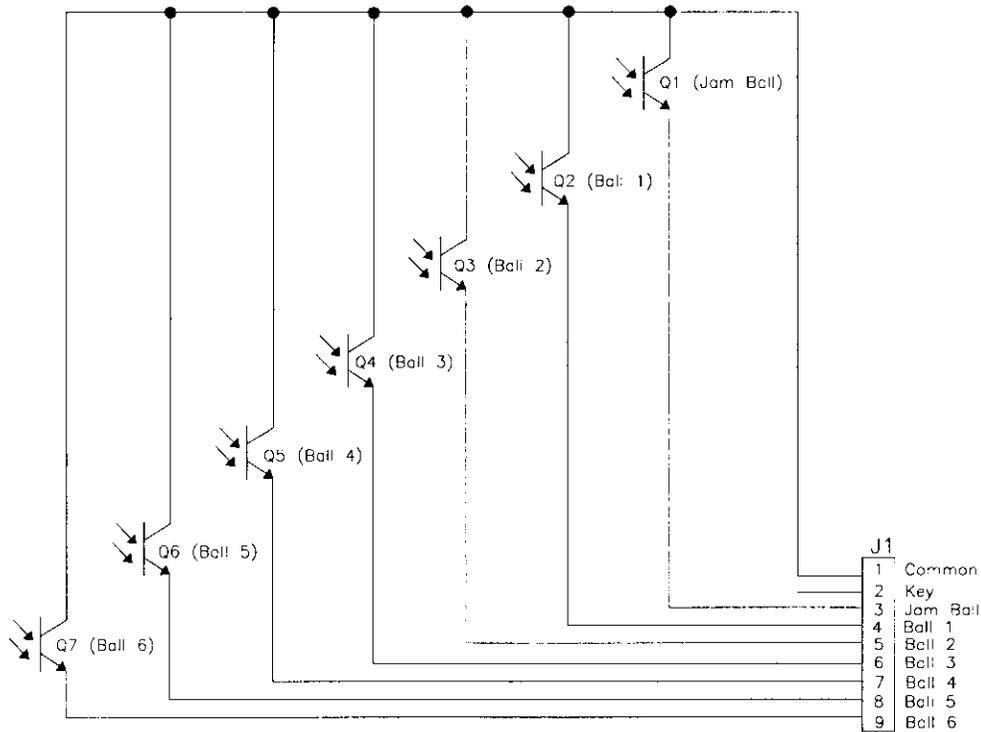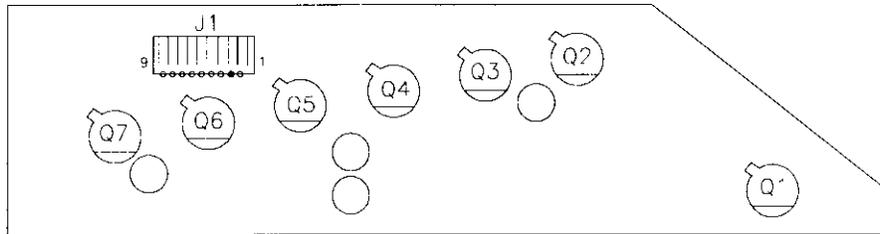
J1-1 GRY-YEL, +12V, to 7-Opto Switch Board J2-9
J1-2 Key
J1-3 ORG-BRN, Photo Transistor 1, to 7-Opto Switch Board J2-8
J1-4 ORG-RED, Photo Transistor 2, to 7-Opto Switch Board J2-7
J1-5 ORG-BLK, Photo Transistor 3, to 7-Opto Switch Board J2-5
J1-6 ORG-YEL, Photo Transistor 4, to 7-Opto Switch Board J2-4
J1-7 ORG-VIO, Photo Transistor 5, to 7-Opto Switch Board J2-3
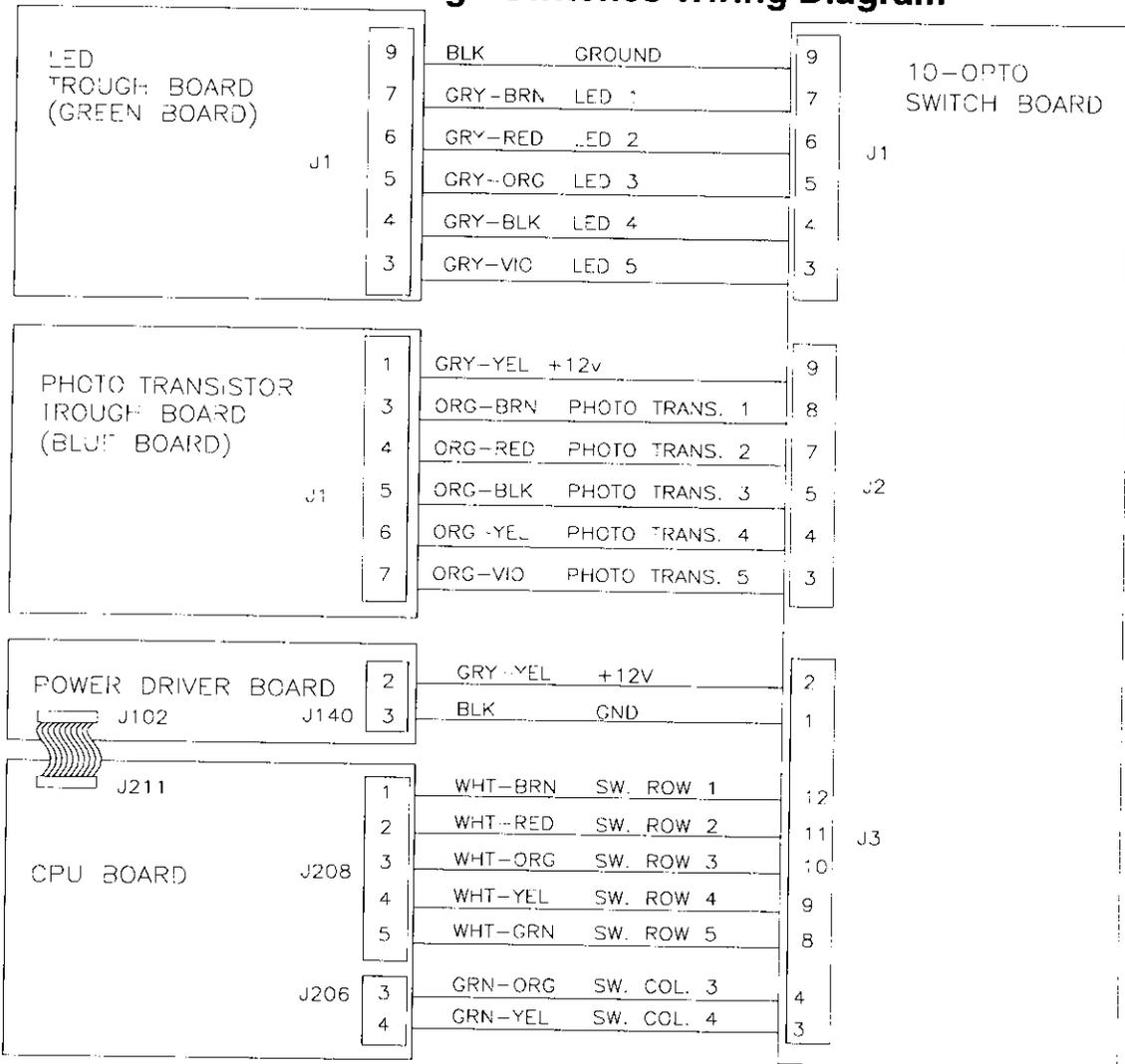J1-8 N/C
J1-9 N/C

10-Opto Switch Board Assembly
A-18159

J1-1	N/C
J1-2	GRY-BLU, to switch 36 (Volcano Stack) LED board
J1-3	GRY-VIO, to Trough LED board J1-3
J1-4	GRY-BLK, to Trough LED board J1-4
J1-5	GRY-ORG, to Trough LED board J1-5
J1-6	GRY-RED, to Trough LED board J1-6
J1-7	GRY-BRN, to Trough LED board J1-7
J1-8	KEY
J1-9	BLK, ground to Trough LED board J1-9
J2-1	N/C
J2-2	ORG-BLU, to switch 36 (Vlcn Stck) Photo Xistor brd
J2-3	ORG-VIO, to Trough Photo Xistor board J1-7
J2-4	ORG-YEL, to Trough Photo Xistor board J1-6
J2-5	ORG-BLK, to Trough Photo Xistor board J1-5
J2-6	KEY
J2-7	ORG-RED, to Trough Photo Xistor board J1-4
J2-8	ORG-BRN, to Trough Photo Xistor board J1-3
J2-9	GRY-YEL, +12V to Trough Photo Xistor board J1-1
J3-1	BLK, ground from Power Driver board J140-3
J3-2	GRY-YEL, +12V from Power Driver board J140-2
J3-3	GRN-YEL, switch column 4 from CPU board J206-4
J3-4	GRN-ORG, switch column 3 from CPU board J206-3
J3-5	KEY
J3-6	N/C
J3-7	WHT-BLU- switch row 6 from CPU board J208-7
J3-8	WHT-GRN, switch row 5 from CPU board J208-5
J3-9	WHT-YEL, switch row 4 from CPU board J208-4
J3-10	WHT-ORG, switch row 3 from CPU board J208-3
J3-11	WHT-RED, switch row 2 from CPU board J208-2
J3-12	WHT-BRN, switch row 1 from CPU board J208-1

J4-1	GRY-ORG, to switch 41 (Lock Ball 1) LED board
J4-2	N/C
J4-3	N/C
J4-4	KEY
J4-5	ORG-BLK, to switch 41 (Lock Ball 1) Photo Xistor board
J5-1	GRY-RED, to switch 42 (Lock Ball 2) LED board
J5-2	N/C
J5-3	KEY
J5-4	N/C
J5-5	ORG-RED, to switch 42 (Lock Ball 2) Photo Xistor board
J6-1	GRY-BRN, to switch 43 (Lock Ball 3) LED board
J6-2	KEY
J6-3	BLK, ground to individual LED boards
J6-4	GRY-YEL, +12V to individual Photo Xistor boards
J6-5	ORG-BRN, to switch 43 (Lock Ball 3) Photo Xistor board

10-Opto Switch Board Schematic
A-18159

Outhole Trough Switches Wiring Diagram

LED TROUGH BOARD (GREEN BOARD)	J1			10-OPTO SWITCH BOARD J1
		9	BLK GROUND	9
		7	GRY-BRN LED 1	7
		6	GRY-RED LED 2	6
		5	GRY-ORG LED 3	5
		4	GRY-BLK LED 4	4
		3	GRY-VIO LED 5	3

PHOTO TRANSISTOR TROUGH BOARD (BLUE BOARD)	J1			
		1	GRY-YEL +12v	9
		3	ORG-BRN PHOTO TRANS. 1	8
		4	ORG-RED PHOTO TRANS. 2	7
		5	ORG-BLK PHOTO TRANS. 3	5
		6	ORG-YEL PHOTO TRANS. 4	4
		7	ORG-VIO PHOTO TRANS. 5	3

J2

POWER DRIVER BOARD J102 J140			
2	GRY-YEL +12V	2
3	BLK GND	1

J211

CPU BOARD J208			
1	WHT-BRN SW. ROW 1	12
2	WHT-RED SW. ROW 2	11
3	WHT-ORG SW. ROW 3	10
4	WHT-YEL SW. ROW 4	9
5	WHT-GRN SW. ROW 5	8

J3

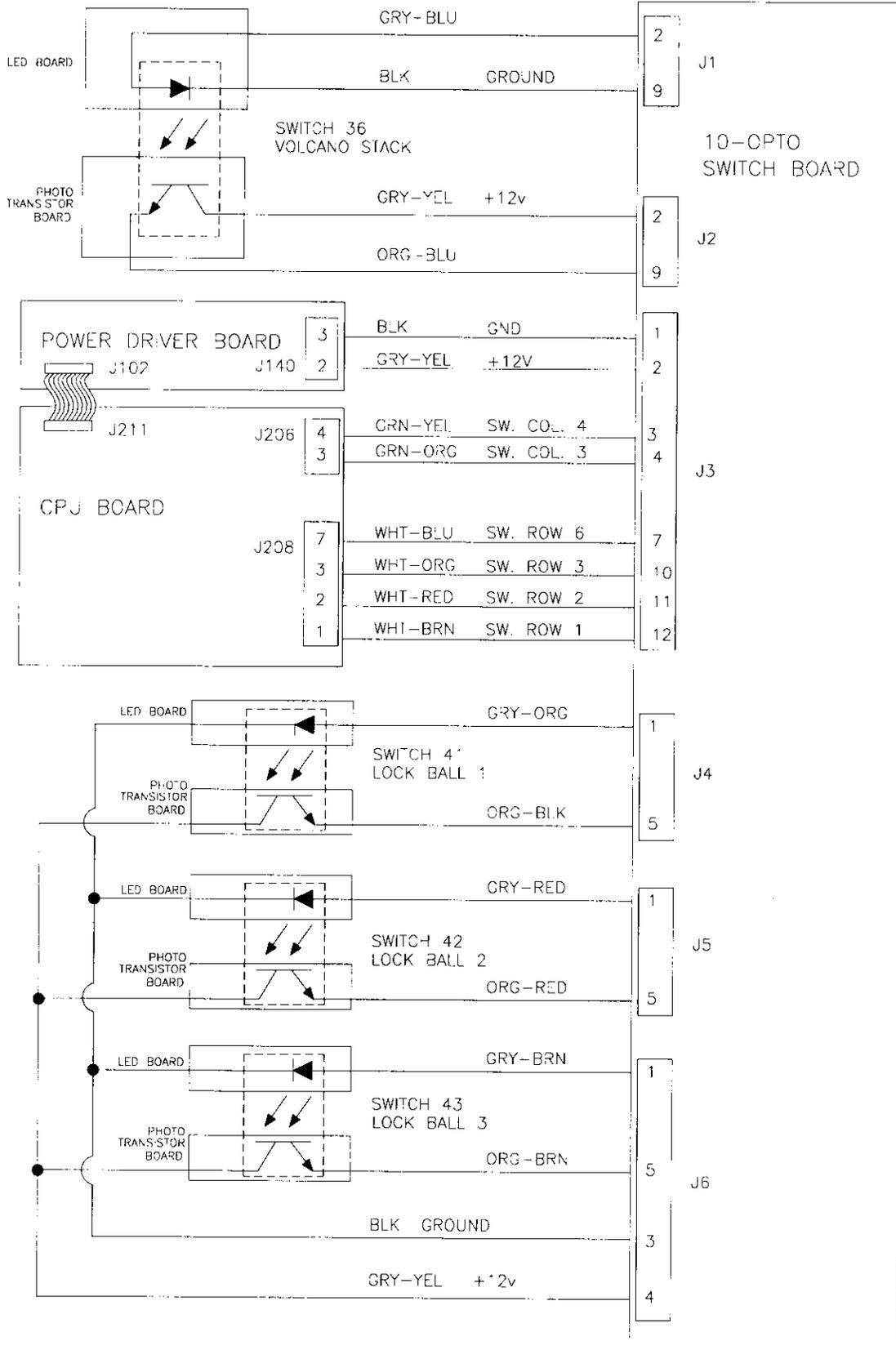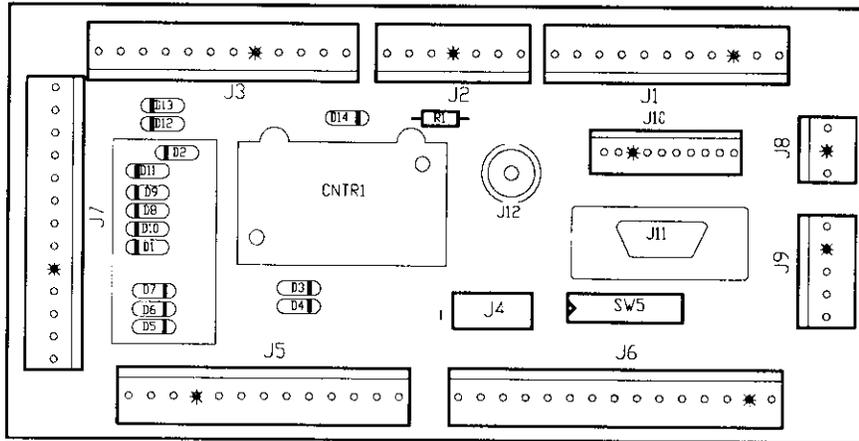| J206			
3	GRN-ORG SW. COL. 3	4
4	GRN-YEL SW. COL. 4	3

THE BALL ROLLS BETWEEN THE LED BOARD AND THE
PHOTO TRANSISTOR BOARD BREAKING THE BEAM.
WHEN THE BEAM IS BROKEN THE SWITCH IS MADE.

LED BOARD

REPEATED FOR ALL FIVE LEDS.
- GRY-VIO
- GRY-BLK
- GRY-ORG
- GRY-RED
- GRY-BRN

BLK, GND

10-OPTO SWITCH BOARD

GRY-YEL, +12V

REPEATED FOR ALL FIVE PHOTO TRANSISTORS.
- ORG-BRN
- ORG-RED
- ORG-BLK
- ORG-YEL
- ORG-VIO

PHOTO TRANSISTOR BOARD
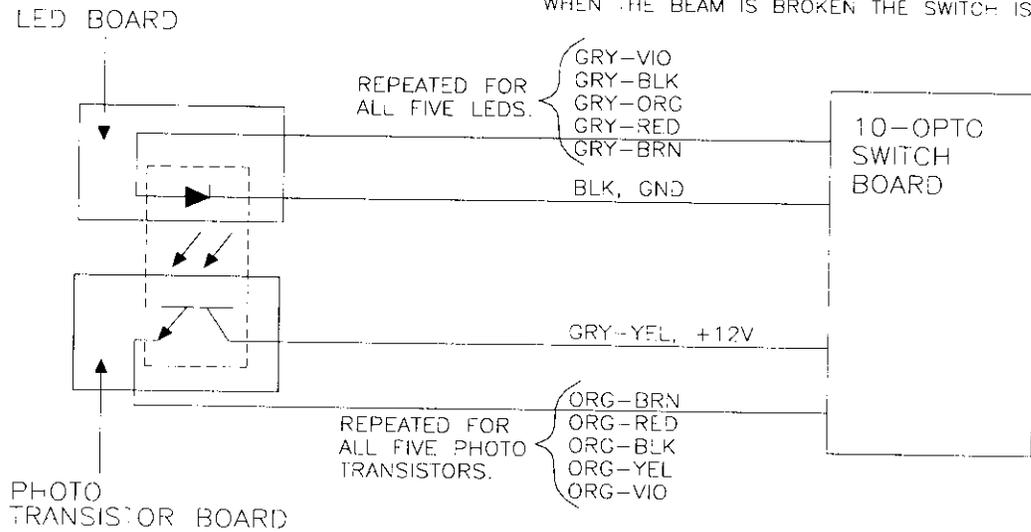
Playfield Opto Switches Wiring Diagram

LED BOARD

GRY-BLU

2 | J1

BLK   GROUND

9

SWITCH 36
VOLCANO STACK

PHOTO
TRANSISTOR
BOARD

GRY-YEL   +12v

2 | J2

ORG-BLU

9

10-OPTO
SWITCH BOARD

POWER DRIVER BOARD   3 | J140   BLK   GND   1
J102   2   GRY-YEL   +12V   2

J211   J206   4   GRN-YEL   SW. COL. 4   3
                         3   GRN-ORG   SW. COL. 3   4

CPU BOARD

J208   7   WHT-BLU   SW. ROW 6   7
             3   WHT-ORG   SW. ROW 3   10
             2   WHT-RED   SW. ROW 2   11
             1   WHT-BRN   SW. ROW 1   12

J3

LED BOARD

GRY-ORG

1 | J4

SWITCH 41
LOCK BALL 1

PHOTO
TRANSISTOR
BOARD

ORG-BLK

5

LED BOARD

GRY-RED

1 | J5

SWITCH 42
LOCK BALL 2

PHOTO
TRANSISTOR
BOARD

ORG-RED

5

LED BOARD

GRY-BRN

1

SWITCH 43
LOCK BALL 3

PHOTO
TRANSISTOR
BOARD

ORG-BRN

5 | J6

BLK   GROUND

3

GRY-YEL   +12v

4

Coin Door Interface Board
A-20580

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

J2-1 Black, ground from Power Driver Board J141-3
J2-2 Gray-Yellow, +12vac for Power Driver Board J141-2
J2-3 Violet, G.I. from Power Driver Board J104-3
J2-4 Key
J2-5 White-Violet, G.I. 6.8vac from Power Driver J104-1

J3-1 Green-Brown, switch column. 1 from CPU J212-1
J3-2 Green-Red, switch column 2 from CPU J212-2
J3-3 White-Brown, switch row 1 from CPU J212-4
J3-4 White-Red, switch row 2 from CPU J212-6
J3-5 White-Orange, switch row 3 from CPU J212-7
J3-6 White-Yellow, switch row 4 from CPU J212-8
J3-7 Key
J3-8 Yellow-Gray, lamp col. 8 from Power Driver J122-3
J3-9 Red-Blue, lamp row 6 from Power Driver J125-7
J3-10 Red-Violet, lamp row 7 from Power Driver J125-8
J3-11 Red-Gray, lamp row 8 from Power Driver J125-9

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, ded. switch row 1 to coin door
J5-5 Orange-Red, ded. switch row 2 to coin door
J5-6 Orange-Black, ded. switch row 3 to coin door
J5-7 Orange-Green, ded. switch row 5 to coin door
J5-8 Orange-Blue, ded. switch row 6 to coin door
J5-9 Orange-Violet, ded. switch row 7 to coin door
J5-10 Key
J5-11 Orange-Gray, ded. 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 N/C
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 N/C
J7-10 N/C
J7-11 White-Orange, switch row 3 to cabinet
J7-12 N/C
J7-13 N/C

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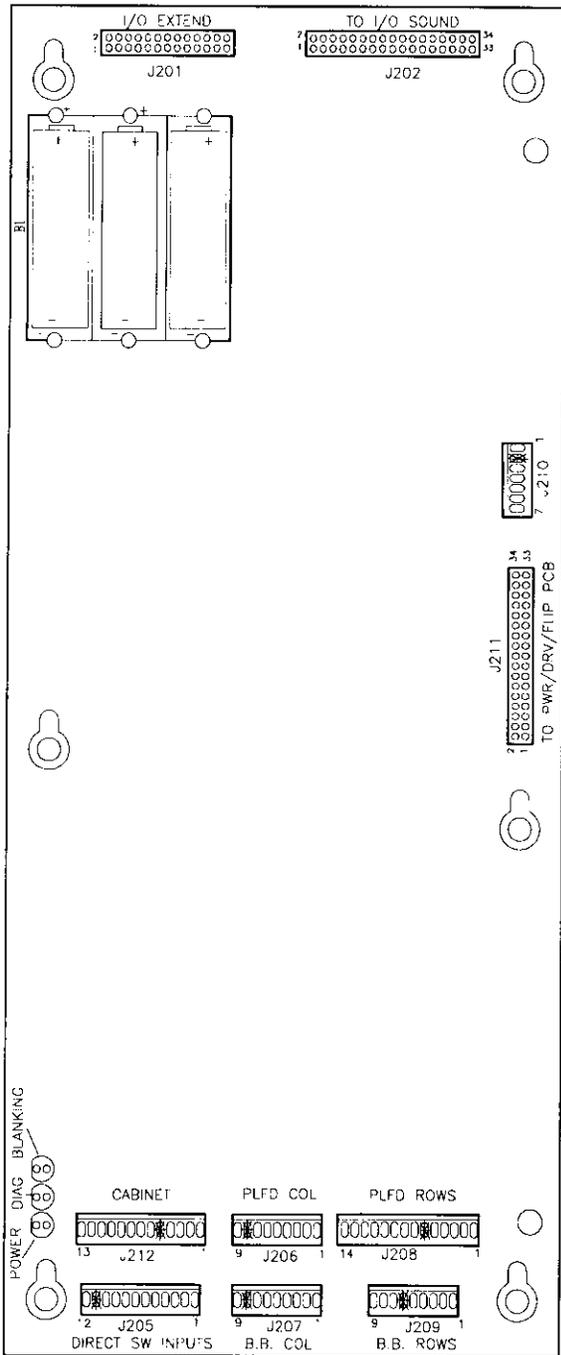J8-2 Key
J8-3 Green, switch column to cabinet Slam Tilt

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 Board Schematic
A-20580
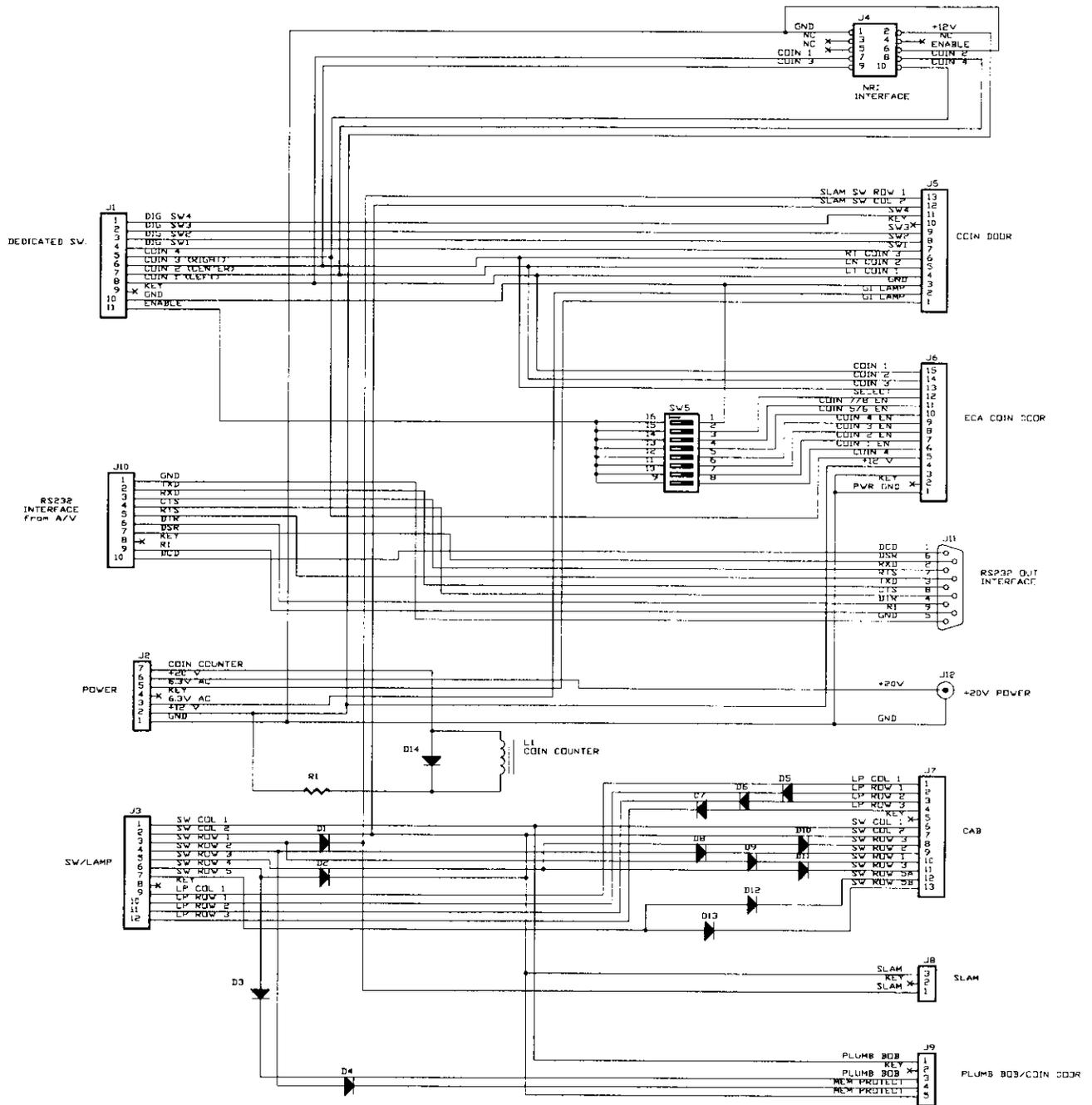
Security CPU Board Assembly
A-20119-50050

J201,   26-pin ribbon cable, data to/from J602

J202,   34-pin ribbon cable, data to/from J601

J203- Not Used

J204- Not Used

J205-1   Orange-Brown, ded. sw. row 1, to Coin Door Brd J1-8
J205-2   Orange-Red, ded. sw. row 2, to Coin Door Brd J1-7
J205-3   Orange-Black, ded. sw. row 3, to Coin Door Brd J1-6
J205-4   Orange-Yellow, ded. sw. row 4, to Coin Door Brd J1-5
J205-5   N/C
J205-6   Orange-Green, ded. sw. row 5, to Coin Door Brd J1-4
J205-7   Orange-Blue, ded. sw. row 6, to Coin Door Brd J1-3
J205-8   Orange-Violet, ded. sw. row 7, to Coin Door Brd J1-2
J205-9   Orange-Gray, ded. sw. row 8, to Coin Door Brd J1-1
J205-10 Black, ground, to Coin Door Brd J1-10
J205-11 KEY
J205-12 Orange-White, switch enable, to Coin Door Brd J1-11

J206-1   Green-Brown, switch column 1, to playfield switches
J206-2   Green-Red, switch column 2, to playfield switches
J206-3   Green-Orange, switch column 3, to playfield switches
J206-4   Green-Yellow, switch column 4, to playfield switches
J206-5   Green-Black, switch column 5, to playfield switches
J206-6   Green-Blue, switch column 6, to playfield switches
J206-7   Green-Violet, switch column 7 to playfield switches
J206-8   Key
J206-9   N/C

J207- Not Used

J208-1   White-Brown, switch row 1, to playfield switches
J208-2   White-Red, switch row 2, to playfield switches
J208-3   White-Orange, switch row 3, to playfield switches
J208-4   White-Yellow, switch row 4, to playfield switches
J208-5   White-Green, switch row 5, to playfield switches
J208-6   Key
J208-7   White-Blue, switch row 6, to playfield switches
J208-8   White-Violet, switch row 7, to playfield switches
J208-9   White-Gray, switch row 8, to playfield switches
J208-10 Black-Gray, F7, to upper left E.O.S. switch
J208-11 Black-Violet, F5, to upper right E.O.S. switch
J208-12 Black-Blue, F3, to lower left E.O.S. switch
J208-13 Black-Green, F1, to lower right E.O.S. switch
J208-14 Orange, ground to E.O.S. switches

J209- Not Used

J210-1   Black, ground, from Power Driver Board J101-5,7
J210-2   Key
J210-3   Black, ground, from Power Driver Board J101-5, 7
J210-4   Gray, +5V, from Power Driver Board J101-3, 4
J210-5   Gray, +5V, from Power Driver Board J101-3, 4
J210-6   Gray-Green, +12V, from Power Driver Board J101-1, 2
J210-7   Gray-Green, +12V, from Power Driver Board J101-1, 2
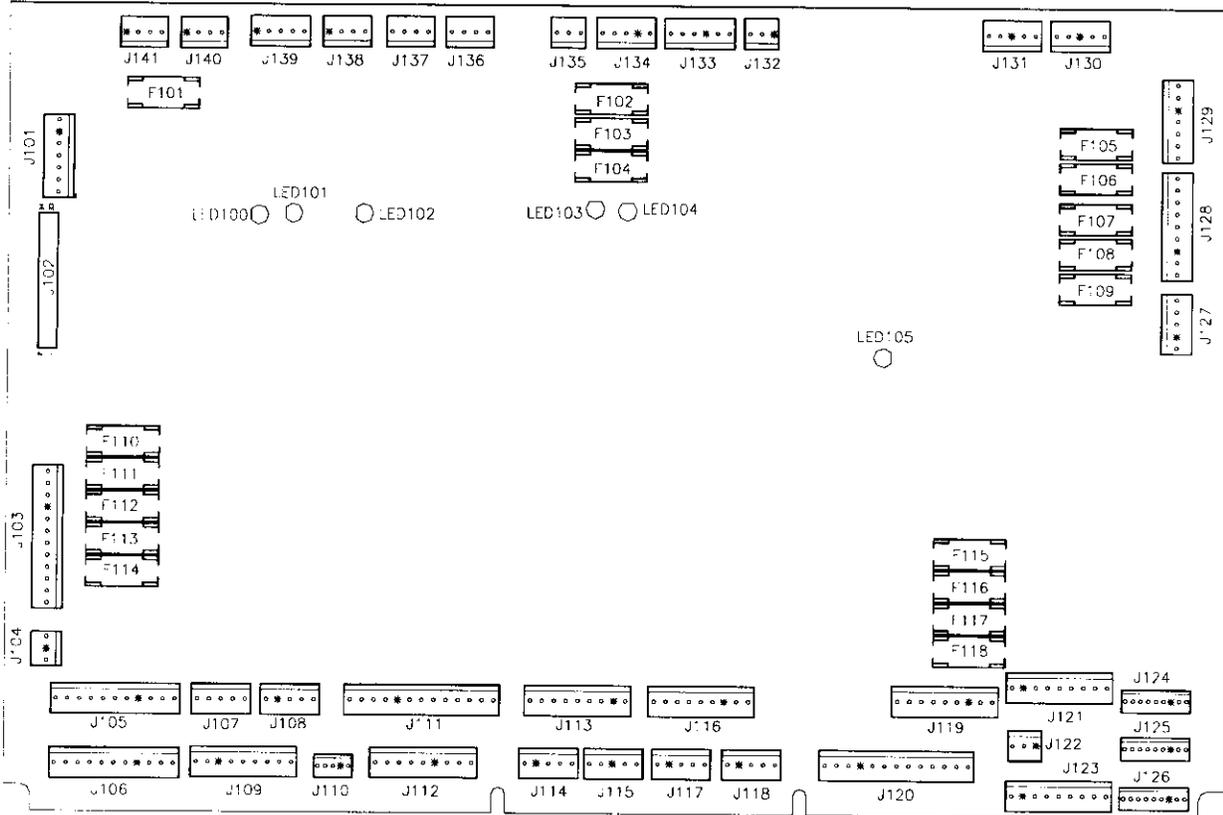
J211,   34-pin ribbon cable, data to/from J102

J212-1   Green-Brown, switch col. 1, to coin door board J3-1
J212-2   Green-Red, switch col. 2, to coin door board J3-2
J212-3   N/C
J212-4   White-Brown, switch row 1, to coin door board J3-3
J212-5   Key
J212-6   White-Red, switch row 2, to coin door board J3-4
J212-7   White-Orange, switch row 3, to coin door board J3-5
J212-8   White-Yellow, switch row 4, to coin door board J3-6
J212-9   Black-Blue, F8, to left flipper opto board J1-1
J212-10 Black-Yellow, F6, to right flipper opto board J1-1
J212-11 Blue-Gray, F4, to left flipper opto board J1-2
J212-12 Blue-Violet, F2, to right flipper opto board J1-2
J212-13 Orange, Ground to left flipper opto board J1-4

Audio Visual Board Assembly
A-20516-50050
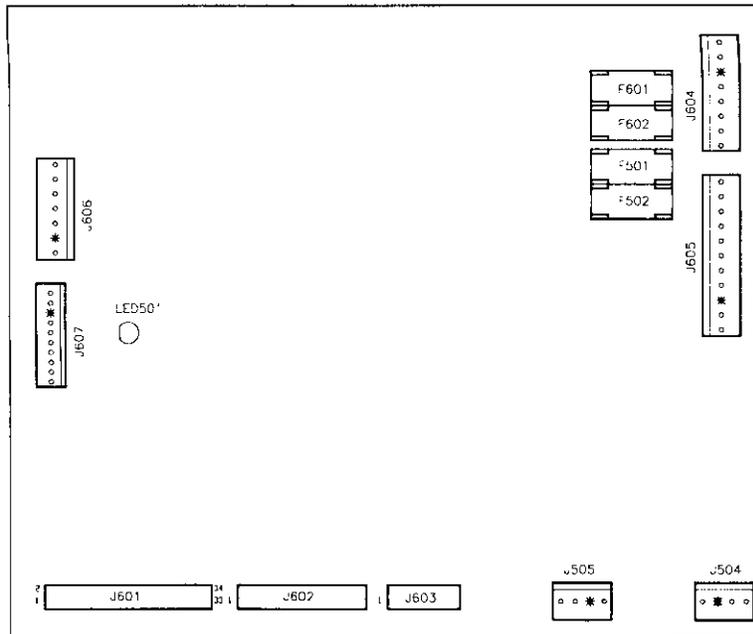
J601	34-pin ribbon cable, data to CPU J202
J602	26-pin ribbon cable, data to CPU J201
J603	14-pin ribbon cable, data to/from dot matrix display driver
J604-1	Orange, -125V to display driver pin1
J604-2	Blue, -113V to display driver pin 2
J604-3	Key
J604-4	Black, ground to display driver pin 4
J604-5	Black, ground to display driver pin 5
J604-6	Gray, +5V to display driver pin 6
J604-7	Gray-Yellow, +12 to display driver pin 7
J604-8	Brown, +62 to display driver pin 8
J605-1	White, 80VAC from transformer secondary
J605-2	White, 80VAC from transformer secondary
J605-3	Violet, 100VAC from transformer secondary
J605-4	Violet, 100VAC from transformer secondary
J605-5	Gray-White, 18VAC from transformer secondary
J605-6	Gray-White, loop from J605-5
J605-7	Gray, 18VAC from transformer secondary
J605-8	Gray, loop from J605-7
J605-9	Key
J605-10	Gray-Green, 18VAC from transformer secondary
J605-11	Gray-Green, 18VAC loop from J605-10
J606-1	Black, ground from power driver board J101-7
J606-2	Key
J606-3	Black, ground from power driver board J101-5
J606-4	Gray, +5V from power driver board J101-4
J606-5	Gray, +5V from power driver board J101-3
J606-6	Gray-Green, +12V from power driver board J101-2
J606-7	Gray-Green, +12V from power driver board J101-1
J607	Not Used

J504-1	Black-Yellow, signal to speaker
J504-2	Key
J504-3	N/C
J504-4	Black, signal to speaker
J505-1	Black-Yellow, signal to speaker
J505-2	N/C
J505-3	Key
J505-4	Black, signal to speaker

Power Driver Board Assembly
A-20028

J101-1   Gray-Green, +12V to J210-6, 7; J606-1
J101-2   Gray-Green, +12V to J210-6, 7; J606-2
J101-3   Gray, +5V to J210-4, 5; J3-1,3; J606-3
J101-4   Gray, +5V to J210-4, 5; J3-1,3; J606-4
J101-5   Black, ground to J210-1, 3; J606-5
J101-6   Key
J101-7   Black, ground to J210-1,3; J606-7

J102,   34-pin ribbon cable, data to/from CPU J211

J103-1   Yellow-White, 6.8Vac from xformer secondary
J103-2   White-Violet, 6.8Vac from xformer secondary
J103-3   White-Brown, 6.8Vac from xformer secondary
J103-4   White-Orange, 6.8Vac from xformer secondary
J103-5   White-Yellow, 6.8Vac from xformer secondary
J103-6   White-Yellow, 6.8Vac from xformer secondary
J103-7   Orange, 6.8Vac from xformer secondary
J103-8   Orange, 6.8Vac from xformer secondary
J103-9   Key
J103-10 Green, 6.8Vac from xformer secondary
J103-11 Brown, 6.8Vac from xformer secondary
J103-12 Brown, 6.8Vac from xformer secondary

J104-1   White-Violet, 6.8Vac, G.I. to Coin Door BrdJ2-5
J104-2   Key
J104-3   Violet, return, G.I. to Coin Door Board J2-3

J105-1   Brown, return, G.I. to playfield
J105-2   Orange, return, G.I. to playfield
J105-3   Yellow, return, G.I. to playfield
J105-4   Key
J105-5   N/C
J105-6   N/C
J105-7   White-Brown, 6.8Vac, G.I. to playfield
J105-8   White-Orange, 6.8Vac, G.I. to playfield
J105-9   White-Yellow, 6.8Vac, G.I. to playfield
J105-10 N/C
J105-11 N/C

J106-1   Brown, return, G.I. to insert panel
J106-2   N/C
J106-3   Yellow, return, G.I. to insert panel
J106-4   Key
J106-5   Green, return, G.I. to insert panel
J106-6   Violet, return, G.I. to insert panel
J106-7   White-Brown, 6.8Vac, G.I. to insert panel
J106-8   N/C
J106-9   White-Yellow, 6.8Vac, G.I. to insert panel
J106-10 White-Green, 6.8Vac, G.I. to insert panel
J106-11 White-Violet, 6.9Vac, G.I. to insert panel

J107-1   N/C
J107-2   N/C
J107-3   N/C
J107-4   Blue-Orange, solenoid 27 drive to insert panel
J107-5   Blue-Yellow, solenoid 28 drive to insert panel

3-26

Power Driver Board Continued...

J108-Not Used

J109-1 Blue-Brown, solenoid 25 drive to flashlamp
J109-2 Blue-Red, solenoid 26 drive to flashlamp
J109-3 Blue-Orange, solenoid 27 drive to flashlamp
J109-4 Blue-Yellow, solenoid 28 drive to flashlamp
J109-5 N/C
J109-6 N/C
J109-7 Key
J109-8 N/C
J109-9 N/C

J110- Not Used

J111-1 Black-Brown, solenoid 17 drive to flashlamp
J111-2 Black-Red, solenoid 18 drive to flashlamp
J111-3 Black-Orange, solenoid 19 drive to flashlamp
J111-4 Black-Yellow, solenoid 20 drive to flashlamp
J111-5 Blue-Green, solenoid 21 drive to flashlamp
J111-6 Blue-Black, solenoid 22 drive to coil
J111-7 Blue-Violet, solenoid 23 drive to coil
J111-8 Blue-Gray, solenoid 24 drive to coil
J111-9 Key
J111-10 Red-Orange, tieback diode
J111-11 Red-Orange, loop from J111-10
J111-12 Red-Orange, loop from J111-11
J111-13 Red-Orange, tieback diode

J112-1 Black-Brown, solenoid 17 drive to insert panel
J112-2 N/C
J112-3 N/C
J112-4   Key
J112-5 Black-Yellow, solenoid 20 drive to insert panel
J112-6 Blue-Green, solenoid 21 drive to insert panel
J112-7 N/C

J113-1 Brown-Black, solenoid 9 drive to coil
J113-2 Key
J113-3 Brown-Red, solenoid 10 drive to coil
J113-4 Brown-Orange, solenoid 11 drive to coil
J113-5 Brown-Yellow, solenoid 12 drive to coil
J113-6 Brown-Green, solenoid 13 drive to coil
J113-7 Brown-Blue, solenoid 14 drive to coil
J113-8 Brown-Violet, solenoid 15 drive to coil
J113-9 Brown-Gray, solenoid 16 drive to coil

J114- Not Used

J115- Not Used

J116-1 Violet-Brown, solenoid 1 drive to coil
J116-2 Violet-Red, solenoid 2 drive to coil
J116-3 Key
J116-4 Violet-Orange, solenoid 3 drive to coil
J116-5 Violet-Yellow, solenoid 4 drive to coil
J116-6 Violet-Green, solenoid 5 drive to coil
J116-7 Violet-Blue, solenoid 6 drive to coil
J116-8 Violet-Black, solenoid 7 drive to coil
J116-9 Violet-Gray, solenoid 8 drive to coil

J117- Not Used

J118- Not Used

J119-1 Red-Green, +50V to lower right flipper coil
J119-2 Red-Green, loop from J119-1
J119-3 Key
J119-4 Red-Blue, loop from J119-5
J119-5 Red-Blue, +50V to lower left flipper coil
J119-6 Red-Violet, +50V to upper right flipper coil
J119-7 Red-Violet, loop from J119-6
J119-8 Red-Gray, +50V to upper left flipper coil
J119-9 Red-Gray, Loop from J119-8

J120-1 Orange-Gray, holding, upper left flipper
J120-2 N/C
J120-3 Yellow-Gray, power, upper left flipper coil
J120-4 Orange-Violet, solenoid 34 drive to coil
J120-5 N/C
J120-6 Yellow-Violet, solenoid 33 drive to coil
J120-7 Orange-Blue, holding, lower left flipper
J120-8 N/C
J120-9 Yellow-Blue, power, lower left flipper coil
J120-10 Key
J120-11 Orange-Green, holding, lower right flipper coil
J120-12 N/C
J120-13 Yellow-Green, power, lower right flipper coil

J121-Not Used

J122-1 Key
J122-2 N/C
J122-3 Yellow-Gray, lamp column 8 to cabinet

J123-1 Yellow-Brown, lamp column 1 to playfield
J123-2 Yellow-Red, lamp column 2 to playfield
J123-3 Yellow-Orange, lamp column 3 to playfield
J123-4 Yellow-Black, lamp column 4 to playfield
J123-5 Yellow-Green, lamp column 5 to playfield
J123-6 Yellow-Blue, lamp column 6 to playfield
J123-7 Yellow-Violet, lamp column 7 to playfield
J123-8 Key
J123-9 Yellow-Gray, lamp column 8 to playfield

J124-Not Used

J125-1 Red-Brown, lamp row 1 to playfield
J125-2 Red-Black, lamp row 2 to playfield
J125-3 Key
J125-4 Red-Orange, lamp row 3 to playfield
J125-5 Red-Yellow, lamp row 4 to playfield
J125-6 Red-Green, lamp row 5 to playfield
J125-7 Red-Blue, lamp row 6 to playfield
J125-8 Red-Violet, lamp row 7 to playfield
J125-9 Red-Gray, lamp row 8 to playfield

J126-1 N/C
J126-2 N/C
J126-3 Key
J126-4 N/C
J126-5 N/C
J126-6 N/C
J126-7 Red-Blue, lamp row 6 to cabinet
J126-8 Red-Violet, lamp row 7 to cabinet
J126-9 Red-Gray, lamp row 8 to cabinet

J127-1 White-Green, 9.8Vac from xformer secondary
J127-2 White-Green, 9.8Vac loop from J112-1
J127-3 White-Green, 9.8Vac from xformer secondary
J127-4 Keys
J127-5 White-Green, 9.8VAC loop from J112-3

J128-1 White-Red, 16Vac loop from J102-2
J128-2 White-Red, 16Vac from xformer secondary
J128-3 White-Red, 16Vac loop from J102-4
J128-4 White-Red, 16Vac from xformer secondary
J128-5 Black-Yellow, 16Vac loop from J102-6
J128-6 Black-Yellow, 16Vac from xformer secondary
J128-7 Key
J128-8 Black-Yellow, 16Vac loop from J102-9
J128-9 Black-Yellow, 16Vac from xformer secondary

J129-1 Red, 9Vac from xformer secondary
J129-2 Red, 9Vac from transformer secondary
J129-3 Key
J129-4 Blue-White, 13Vac from xformer secondary
J129-5 Blue-White, 13Vac loop from J101-4
J129-6 Blue-White, 13Vac from xformer secondary
J129-7 Blue-White, 13Vac loop from J101-6

J130-Not Used

J131-Not Used

J132-Not Used

J133-1 Red-Orange, +50V to coils
J133-2 Red-Brown, +50V to coils
J133-3 Red-Black, +50V to coils
J133-4 Key
J133-5 N/C
J133-6 Red-White, +20V to playfield flashlamps

J134-1 N/C
J134-2 N/C
J134-3 N/C
J135-4 Key
J134-5 Red-White, +20V to insert panel flashlamps

J135- Not Used

J136- Not Used

J137- Not Used

J138- Not Used

J139- Not Used

J140-1 Key
J140-2 Gray-Yellow, +12V to playfield boards
J140-3 Black, ground to playfield boards
J140-4 N/C

J141-1 Key
J141-2 Gray-Yellow, +12V to Coin Door Board J2-2
J141-3 Black, ground to Coin Door Board J2-1
J141-4 N/C

LAMP MATRIX

Yellow (B+) ———⊗——► Red

Column → / Row ↓	1 Yellow-Brown J121-1 Q96	2 Yellow-Red J121-2 Q100	3 Yellow-Orange J121-3 Q95	4 Yellow-Black J121-4 Q99	5 Yellow-Green J121-5 Q94	6 Yellow-Blue J121-6 Q98	7 Yellow-Violet J121-7 Q93	8 Yellow-Gray J121-9 Q97
1 Red-Brown J125-1 Q104	(C)ONGO 11	ZI(N)J 21	"AUTOFIRE" 31	DIAMOND LEFT LOOP 41	LEFT RAMP "P" 51	DIAMOND INNER LOOP 61	"TRAVI" 71	(H)IPPO 81
2 Red-Black J125-2 Q108	C(O)NGO 12	ZIN(J) 22	RIGHT RAMP EXTRA BALL 32	"WE ARE" 42	LEFT RAMP "A" 52	(G)RAY 62	"COM" 72	H(I)PPO 82
3 Red-Orange J125-4 Q103	CO(N)GO 13	JET EXTRA COLLECT 23	RIGHT RAMP "COLLECT" 33	LEFT LOOP EXTRA BALL 43	LEFT RAMP "M" 53	G(R)AY 63	"MINE SHAFT" 73	HI(P)P0 83
4 Red-Yellow J125-5 Q107	CON(G)O 14	"JUNGLE JACKPOT" 24	DIAMOND RIGHT RAMP 34	LEFT LOOP "LOCK" 44	DIAMOND LEFT RAMP 54	GR(A)Y 64	UPPER LOOP "LOCK" 74	HIP(P)O 84
5 Red-Green J125-6 Q102	CONG(O) 15	"SKILL FIRE" 25	LEFT EJECT EYE 35	LEFT BANK BOTTOM 45	LEFT RAMP JACKPOT 55	GRA(Y) 65	DIAMOND UPPER LOOP 75	HIPP(O) 85
6 Red-Blue J125-7 Q106	(A)MY 16	"YOU" 26	DIAMOND LEFT EJECT 36	"SKILL SHOT" 46	(Z)INJ 56	"WATCHING" 66	SATELLITE RIGHT 76	"SHOOT AGAIN" 86
7 Red-Violet J125-8 Q101	A(M)Y 17	"MAP" 27	"MYSTERY" 37	LEFT BANK CENTER 47	Z(I)NJ 57	SATELLITE LEFT 67	SATELLITE CENTER 77	NOT USED 87
8 Red-Gray J125-9 Q105	AM(Y) 18	DIAMOND RIGHT EJECT 28	RIGHT RAMP JACKPOT 38	LEFT BANK TOP 48	"KICKBACK" 58	"SUPER SCORE" 68	"PERIMETER DEFENSE" 78	START BUTTON 88

J1XX = Power Driver Board

SWITCH MATRIX

White ———►o o——— Green

Dedicated Grounded Switches	Column → / Row ↓	1 Green-Brown J206-1 U20-18	2 Green-Red J206-2 U20-17	3 Green-Orange J206-3 U20-16	4 Green-Yellow J206-4 U20-15	5 Green-Black J206-5 U20-14	6 Green-Blue J206-6 U20-13	7 Green-Violet J206-7 U20-12	8 Green-Gray J206-9 U20-11	Flipper Grounded Switches
Orange-Brown J205-1 Left Coin Chute U17-5 D1	1 White-Brown J208-1 U18-11	INNER LEFT LOOP 11	SLAM TILT 21	TROUGH EJECT 31	LOCK BALL 1 41	"TRAVI" 51	LEFT SLINGSHOT 61	(A)MY 71	NOT USED 81	Black-Green J208-13 Lower Right Flipper E.O.S. F1
Orange-Red J205-2 Center Coin Chute U17-7 D2	2 White-Red J208-2 U18-9	UPPER LOOP 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	LOCK BALL 2 42	"COM" 52	RIGHT SLINGSHOT 62	A(M)Y 72	NOT USED 82	Blue-Violet J212-12 Lower Right Flipper Opto F2
Orange-Black J205-3 Right Coin Chute U17-11 D3	3 White-Orange J208-3 U18-5	START BUTTON 13	NOT USED 23	TROUGH BALL 2 33	LOCK BALL 3 43	2-WAY POPPER 53	LEFT JET BUMPER 63	AM(Y) 73	NOT USED 83	Black-Blue J208-12 Lower Left Flipper E.O.S. F3
Orange-Yellow J205-4 4th Coin Chute U17-9 D4	4 White-Yellow J208-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	"MINE SHAFT" 44	"WE ARE" STANDUP TARGET 54	RIGHT JET BUMPER 64	(C)ONGO 74	NOT USED 84	Blue-Gray J212-11 Lower Left Flipper Opto F4
Orange-Green J205-6 U16-9 Normal/Test Function Srv Crdts/Escape D5	5 White-Green J208-5 U19-11	JET EXIT 15	RIGHT EJECT RUBBER 25	TROUGH BALL 4 35	LEFT LOOP 45	"WATCHING" STANDUP TARGET 55	BOTTOM JET BUMPER 65	C(O)NGO 75	NOT USED 85	Black-Violet J208-11 Upper Right Flipper E.O.S. F5
Orange-Blue J205-7 U16-11 Normal/Test Function Volume On/Down D6	6 White-Blue U208-7 U19-9	LEFT OUTLANE 16	LEFT RETURN LANE 26	VOLCANO STACK 36	LEFT BANK TOP 46	"PERIMETER DEFENSE" 56	NOT USED 66	CO(N)GO 76	NOT USED 86	Black-Yellow J212-10 Upper Right Flipper Opto F6
Orange-Violet J205-8 U16-7 Normal/Test Function Volume Up/Up D7	7 White-Violet J208-8 U19-5	RIGHT RETURN LANE 17	RIGHT OUTLANE 27	"MYSTERY" EJECT 37	LEFT BANK CENTER 47	LEFT RAMP ENTER 57	RIGHT RAMP ENTER 67	CON(G)O 77	NOT USED 87	Black-Gray J208-10 Upper Left Flipper E.O.S. F7
Orange-Gray J205-9 U16-5 Normal/Test Function Begin Test/Enter D8	8 White-Gray J208-9 U19-7	SHOOTER LANE 18	"YOU" STANDUP TARGET 28	RIGHT EJECT 38	LEFT BANK BOTTOM 48	LEFT RAMP EXIT 58	RIGHT RAMP EXIT 68	CONG(O) 78	NOT USED 88	Black-Blue J212-9 Upper Left Flipper Opto F8

J2XX = CPU BOARD   ☐ = OPTO, TYPICALLY CLOSED

WARNINGS & NOTICES

WARNING

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

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WARNING

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

RF Interference Notice

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

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

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Call your authorized Williams Distributor	3401 N. California Avenue
	Chicago, IL 60618

CAUTION: Transport this game ONLY with the hinged backbox DOWN!