Williams®
ELECTRONICS GAMES, INC.

NOVEMBER 1997
16-50061-101
FINAL

NO GOOD GOFERS

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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 G11	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	Backbox	Cabinet	Drive Xistor	Drive Connections Playfield	Backbox	Cabinet	Drive Wire Color	Solenoid Part Number Flashlamp Type Playfield	Insert
01	AUTO FIRE	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-23-800	
02	KICKBACK	High Power		J134-3		Q68	J116-2			VIO-RED	AE-23-800	
03	CLUBHOUSE KICKER	High Power	J133-2			Q71	J116-4			VIO-ORG	AE-23-800	
04	LEFT GOFER UP	High Power	J133-2			Q67	J116-5			VIO-YEL	LE-23-1300	
05	RIGHT GOFER UP	High Power	J133-2			Q70	J116-6			VIO-GRN	LE-23-1300	
06	JET POPPER	High Power	J133-2			Q66	J116-7			VIO-BLU	AE-27-1200	
07	LEFT EJECT	High Power	J133-2			Q69	J116-8			VIO-BLK	AE-24-900	
08	UPPER RIGHT EJECT	High Power	J133-2			Q65	J116-9			VIO-GRY	AE-26-1200	
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	TOP JET BUMPER	Low Power	J133-3			Q47	J113-5			BRN-YEL	AE-26-1200	
13	MIDDLE 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	LEFT GOFER DOWN	Low Power	J133-3			Q41	J113-8			BRN-VIO	AE-30-2000	
16	RIGHT GOFER DOWN	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-30-2000	
17	JET FLASHER	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906	
18	LOWER LEFT FLASHER	Flasher	J133-6			Q32	J111-2			BLK-RED	#906	
19	LEFT SPINNER FLASHER	Flasher	J133-6			Q27	J111-3			BLK-ORG	#906	
20	RIGHT SPINNER FLASHER	Flasher	J133-6			Q31	J111-4			BLK-YEL	#906, #89	
21	LOWER RIGHT FLASHER	Flasher	J133-6			Q26	J111-5			BLU-GRN	#89	
22	NOT USED	Flasher	J133-6			Q30				BLU-BLK		
23	NOT USED	Flasher	J133-6			Q25				BLU-VIO		
24	UNDERGROUND PASS	Flasher	J133-1			Q29	J111-8			BLU-GRY	AE-27-1200	
25	SAND TRAP FLASHER	Gen. Purpose	J133-6			Q16	J109-1			BLU-BRN	#906 (2)	
26	WHEEL FLASHER	Gen. Purpose	J133-6			Q15	J109-2			BLU-RED	#906	
27	LEFT RAMP DOWN	Gen. Purpose	J133-1			Q14	J109-3			BLU-ORG	SM1-28-900	
28	RIGHT RAMP DOWN	Gen. Purpose	J133-1			Q13	J109-4			BLU-YEL	SM1-28-900	
	General Illumination											
01	LEFT SIDE STRING	G.I.	J105-1			Q5	J105-7			WHT-BRN		#555, #545
02	RIGHT SIDE STRING	G.I.	J105-2			Q4	J105-8			WHT-ORG		#555, #545
03	GOFER SPOTLIGHT	G.I.	J105-3			Q3	J105-9			WHT-YEL	#44	#555, #545
04	*ILLUMINATION STRING 4	G.I.		J106-5		Q2		J106-10		WHT-GRN	#44	
05	*ILLUMINATION STRING 5	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	WHT-VIO	#44	

	Flipper Circuits	Solenoid Type	Playfield Voltage Connection	Drive Xistors Power	Hold	Playfield Drive Connections	Drive Wire Colors Power	Hold	Coil Part No.	Coil Colors
29		Power	J119-1 (RED-GRN)	Q90		J120-13	YEL-GRN			
30	LOWER RIGHT FLIPPER	Hold	J119-1 (RED-GRN)		Q92	J120-11		ORG-GRN	FL-11629	BLUE
31		Power	J119-4 (RED-BLU)	Q87		J120-9	YEL-BLU			
32	LOWER LEFT FLIPPER	Hold	J119-4 (RED-BLU)		Q89	J120-7		ORG-BLU	FL-11629	BLUE
33		Power	J119-6 (RED-VIO)	Q84		J120-6	YEL-VIO			
34	UPPER RIGHT FLIPPER	Hold	J119-6 (RED-VIO)		Q86	J120-4		ORG-VIO	FL-11630	RED
35	BALL LAUNCH RAMP	Power	J119-8 (RED-GRY)	Q81		J120-3	YEL-GRY		LE-23-1300-T	YELLOW
36	NOT USED	Hold	J119-8 (RED-GRY)		Q83	J120-1		ORG-GRY		

	Motor Circuit	Solenoid Type	Playfield Voltage Connections	Drive Gates	Drive Connections Playfield	Drive Wire Color	Device Part Number Playfield
37	WHEEL SPIN (counter clock-wise)	Low Power	J139-2	U3A, U3B	J110-1	BRN-WHT	SEE BELOW
38	WHEEL SPIN (clock-wise)	Low Power	J139-2	U3C, U3D	J110-3	ORG-WHT	SEE BELOW

	Auxiliary Circuits	Solenoid Type	Voltage Connections Playfield	Drive Transistor	Drive Connections Playfield	Drive Wire Color	Device Part Number Playfield
42	UPPER RIGHT 1 FLASHER	Flasher	J4-1	Q2	J4-2	BLU-BRN	#906
43	UPPER RIGHT 2 FLASHER	Flasher	J4-1	Q4	J4-3	BLU-RED	#906
44	UPPER RIGHT 3 FLASHER	Flasher	J4-1	Q6	J4-4	BLU-ORG	#906
45	UPPER PLAYFIELD RIGHT	Flasher	J4-1	Q8	J4-5	BLU-YEL	#906 (2)
46	UPPER PLAYFIELD LEFT	Flasher	J4-1	Q10	J4-7	BLU-GRN	#906 (2)
47	UPPER LEFT 3 FLASHER	Flasher	J4-1	Q12	J4-8	BLU-BLK	#906
48	UPPER LEFT 2 FLASHER	Flasher	J4-1	Q14	J4-9	BLU-VIO	#906
49	UPPER LEFT 1 FLASHER	Flasher	J4-1	Q16	J4-10	BLU-GRY	#906

***These general illumination strings do not brighten and dim, they are always on.**

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

Tieback Diodes:
J109-8 & J109-9
J111-10 & J111-11

For solenoids #37 and #38:
Motor, 14-7955-1
DC Motor Control Board, A-16120
Motor 2-Opto Board, A-22026

DECLARATION OF CONFORMITY

WILLIAMS ELECTRONICS GAMES, INC.

3401 N. CALIFORNIA AVE.
CHICAGO, IL 60618
U.S.A.

WE, HEREBY DECLARE UNDER SOLE RESPONSIBILITY THAT

THE MODEL: ***"NO GOOD GOFERS" 50261,50361,50461,50761,50961, 51061,51161,51361,51461,51861,52061,52261,52361,57261 PIN***

TO WHICH THIS DECLARATION RELATES IS IN CONFORMITY WITH THE FOLLOWING EUROPEAN PRODUCT SAFETY DIRECTIVES:

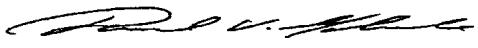
ELECTROMAGNETIC COMPATABILITY DIRECTIVE
(89/336/EEC AND AMENDMENTS 91/C162/08, 92/31/EEC,93/68/EEC

ELECTRICAL EQUIPMENT DESIGNED FOR USE WITHIN CERTAIN VOLTAGE LIMITS DIRECTIVE
(73/23/EEC AND AMENDMENTS 88/C168/02, 92/C210/01, 93/68/EEC, 94/C199/03, 95/C214/02)

EN 55014:1993 EN55104:1995 EN61000-4-2: 1995
IEC 801-3: 1984 (EN61000-4-3) EN61000-4-4: 1995 EN61000-4-5: 1995
ENV50141: 1993 (EN61000-4-6) EN61000-4-11: 1994 EN60335-1: 1995
IEC 335-2-82 (DRAFT)

Date issued: **SEPTEMBER 18, 1997**

MANUFACTURE'S SIGNATURE



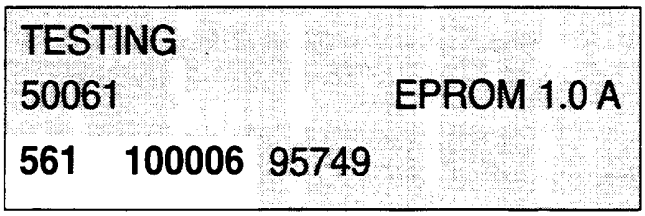
DAN GALARDE

CORPORATE V.P. OF QUALITY

ATTENTION

The Security CPU board has an added security chip that can be interchanged between other **NO GOOD GOFERS** 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.

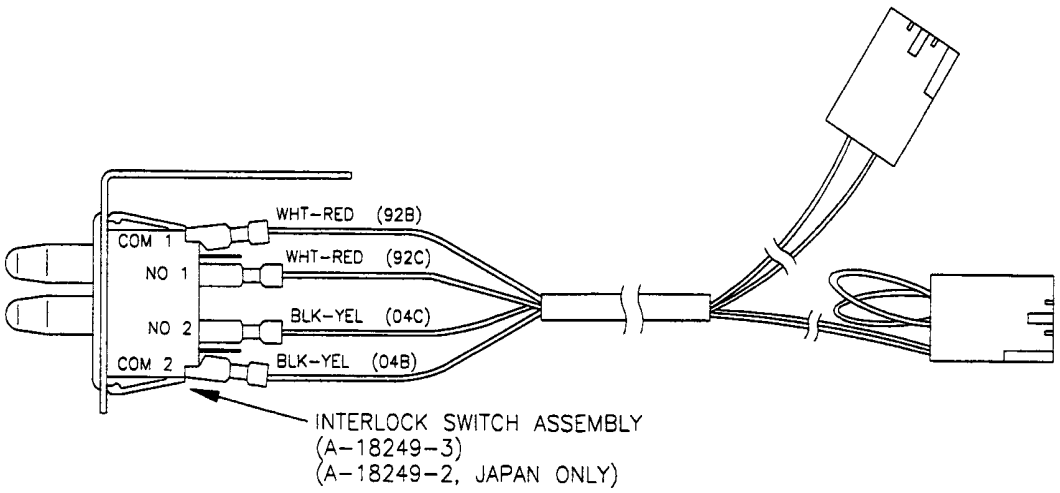
The games' electronic ID number is shown in the display during power-up. The number displayed is the same nine-digit number printed on the security chip label. The first three digits are the project number without the country specific code. An example of the power-up display is shown below, the electronic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



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. An interlock switch assembly (part no. A-18249-3), located at the left of the coin door opening, has been added to the game. This assembly consists of 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.



NO GOOD GOFERS

NO GOOD GOFERS™

- **OBJECT:** Play as many holes of golf as possible and attack **BUZZ and BUD,** the Gofers.
- **GOLF:** To complete a hole of golf complete **LIT DRIVE SHOTS** then **SHOOT for PUTT-OUT.**
- **WHEEL AWARDS:** The wheel award pointed at by the **WHEEL VALUE** lamp is **AWARDED** when you **PUTT-OUT.**
- **MULTIBALL™: SHOOT the CENTER RAMP** when the **RAISE GOFER LAMP** is lit. **HIT RAISED GOFER** to light **LOCK. LOCK TWO BALLS to LIGHT CLUBHOUSE for MULTIBALL™.**
- **JACKPOT: In MULTIBALL™** shoot **SIDE RAMP for JACKPOT.**
- **SUPER JACKPOT:** After making a **JACKPOT** a **HOLE-IN-ONE** awards **SUPER JACKPOT!**
- **EXTRA BALL:** Extra ball is awarded **by Completing Holes of Golf** and from the **WHEEL, BONUS X** and other hidden features!
- **RIPOFF!:** Start Ripoff by **Hitting the CAPTIVE BALL.** While in Ripoff **Shoot for the Two center ramps.** Hit the Captive Ball to **Add another ball!**
- **DRIVING RANGE:** When the **SLAM RAMP™** is lowered shoot the ball onto the **DRIVING RANGE** to **AWARD YARDAGE, HIT THE CART** or get a **HOLE-IN-ONE.**

HINT: Complete nine holes of golf for chance at HOLE-IN-ONE CHALLENGE!

16-10525.2

The information is current as of the time of its 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.

PIC Number _____ **Serial Number** _____

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

TABLE OF CONTENTS

Section 1 Continued...

Section 2 Continued...

Section 3 Continued...

NOTES

SECTION ONE

GAME OPERATION AND TEST INFORMATION

(System WPC) ROM SUMMARY

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	G11	A-5343-50061-1
Security Chip	PIC16C57	CPU	G10	A-5400-50061-1
Music/Speech	27c040	Audio	SU2	A-5343-50061-S2
Music/Speech	M27c801	Audio	SU3	A-5343-50061-S3
Music/Speech	M27c801	Audio	SU4	A-5343-50061-S4
Music/Speech	M27c801	Audio	SU5	A-5343-50061-S5
Music/Speech	M27c801	Audio	SU6	A-5343-50061-S6

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

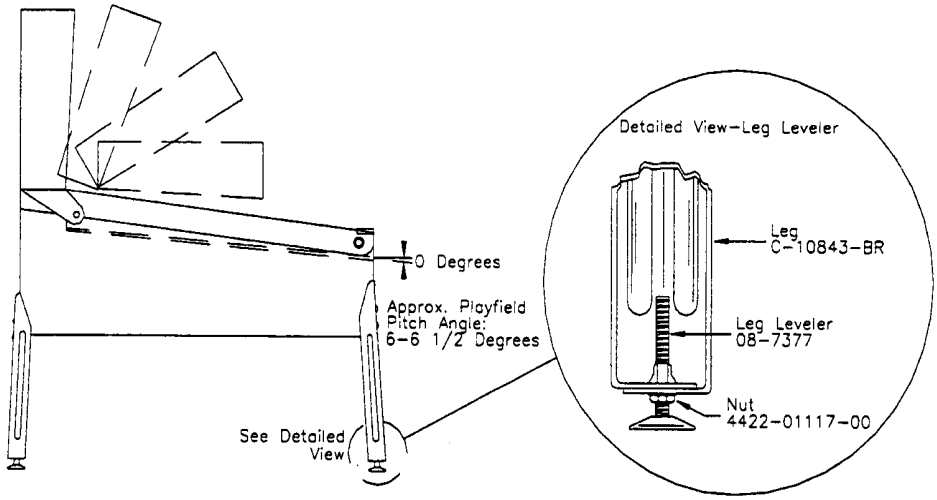
-NO GOOD GOFERS IS A SIX BALL GAME-
-Plus one captive ball-

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

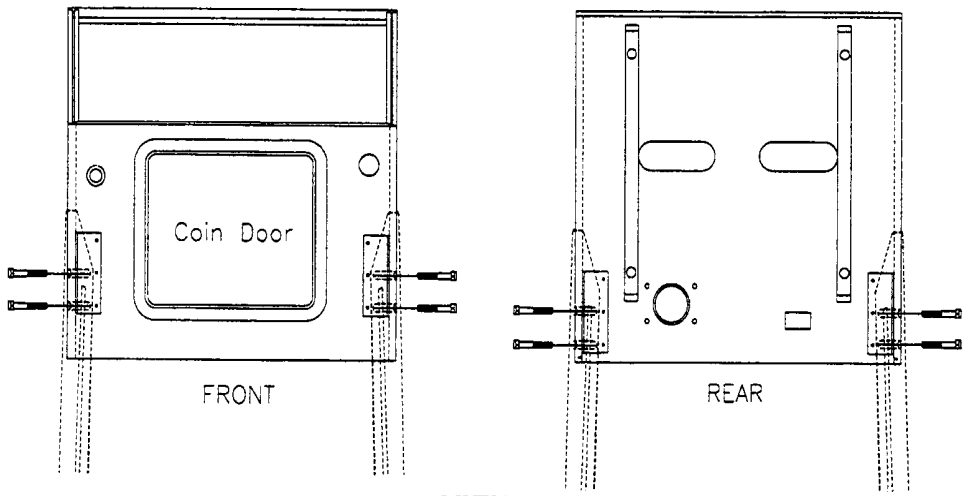
1. Remove all cartons, parts, and other items from the shipping container and set them aside.

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.

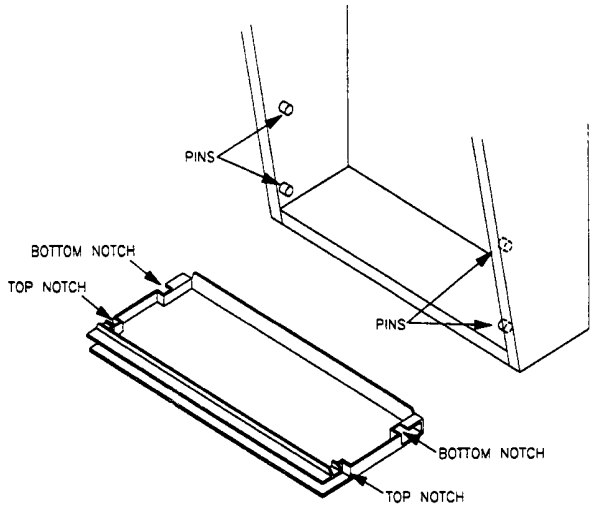
5. Raise the hinged backbox upright and latch it into position.

   Unlock the backbox. Carefully, lift the backglass/insert panel from the bottom. Slide it down and out of the backbox grooves. Rotate it forwards from the top, and lay it facedown on the playfield glass. Unplug the cables extending from the backbox to the backglass/insert panel. Carefully, set the backglass/insert panel aside.

   Lift the speaker panel so that the top notches clear the top set of pins in the sides of the backbox. Rotate it forwards from the top, and lay it facedown on the playfield glass. The bottom of the speaker panel remains attached to the backbox.

   Once the backglass/insert panel is removed and the speaker panel is lowered onto the playfield, the holes needed to secure the backbox upright are accessible. To secure the backbox, install the washer-head mounting bolts through the holes in the bottom of the backbox. Be sure that the bolts extend into the threaded fasteners in the cabinet.

   Note: *You have the option of removing the speaker panel completely. Lay the speaker panel on the playfield glass. Unplug the display cable, speaker cable, and the ground strap. Line up the bottom notches in the speaker panel with the bottom pins in the sides of the backbox. Lower the speaker panel through the notches and slide it under the backbox pins.*



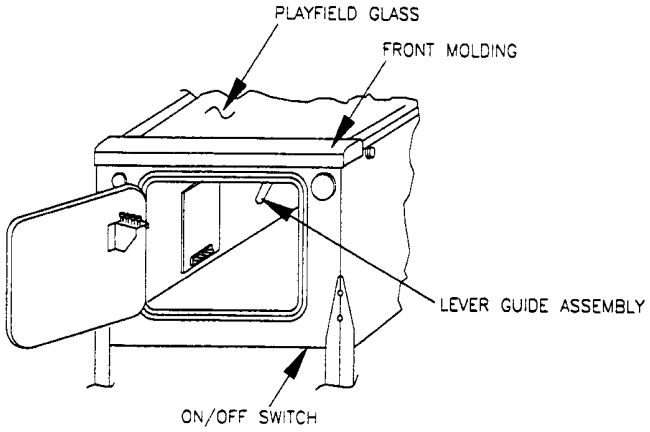
6. After the washer-head mounting bolts are installed, replace the speaker panel and the backglass/insert panel. Take care when plugging in the connectors. Connectors should plug in easily. Do not force the connectors.

⚠ 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.

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

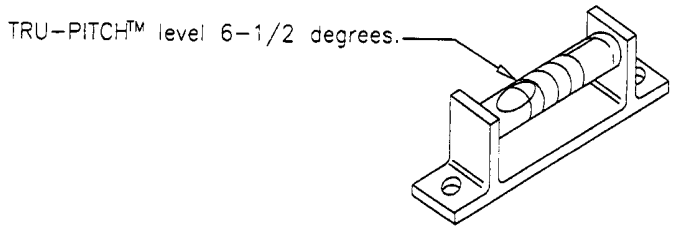
8. Unlock and open the coin door. Move the lever guide toward the left side of the game, and lift the front molding off of the playfield cover glass. Slide the lever guide to the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side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



9. 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 or the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.*

10. 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).



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

11. Be sure the ***required number*** of balls is installed. The ***NO GOOD GOFERS*** game uses SIX balls, plus one captive ball.

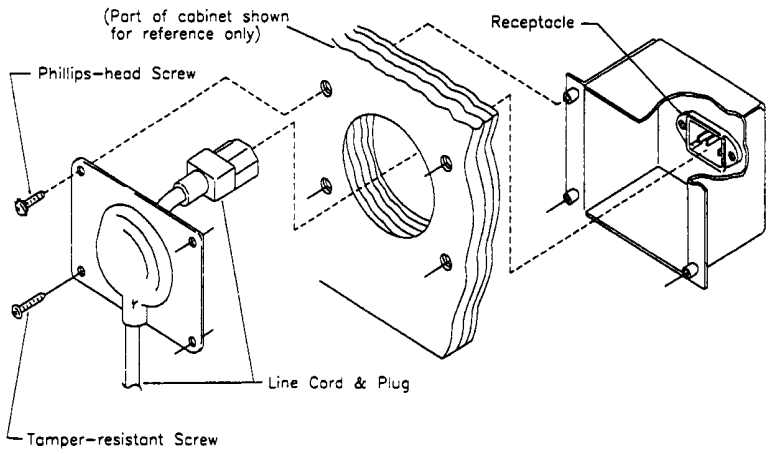
12. Remove the foam from the captive ball feature. The captive ball is located next to the floating ramp.

13. Install full playfield Mylar, if desired.

    Note: The ***NO GOOD GOFERS*** 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.

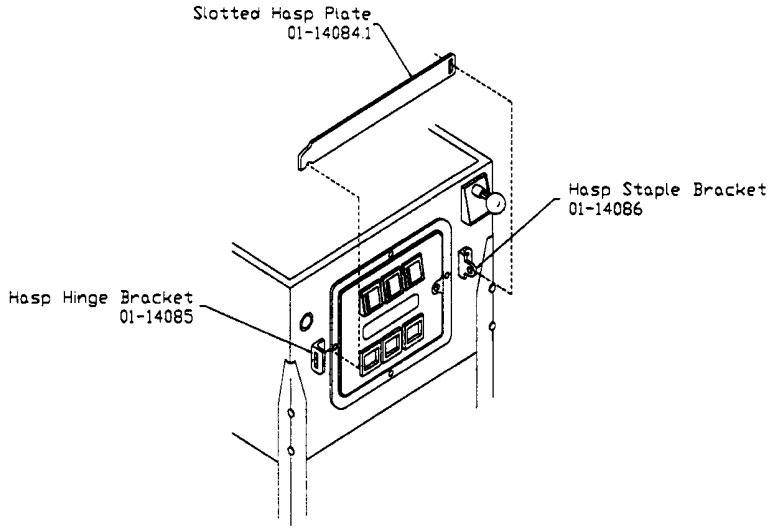
14. Clean and reinstall the playfield cover glass. Replace and lock the front molding.

15. To attach the line cord, 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 the unique parts bag, to remount cover plate.



16. Move the game into the desired location. Adjust the leg levelers so that the playfield pitch is the recommended 6-1/2 degrees. This places the game in a FIXED position.

17. If a padlock is desired, install the security bar as shown below.



18. IMPORTANT: Fill out and return the registration card.

GAME CONTROL LOCATIONS

NO GOOD GOFERS features a new coin door display. When the coin door is open (in Attract mode and game play), the display shows that the high-power has been disabled. It also shows the Test Report (if there is anything to report), and some game specific information. Use the flipper buttons to page through this information.

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

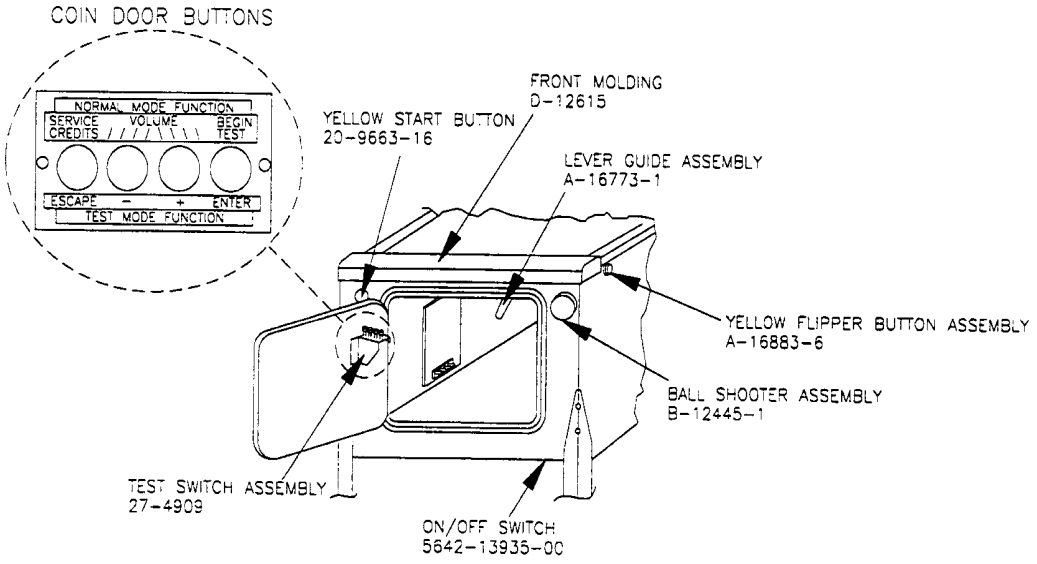
The operator controls all game adjustments, obtains bookkeeping information, and diagnoses problems, using only four push-button switches mounted on the inside of the coin door. The coin door buttons have two modes of operation Normal Function and Test Function.

Normal Function

The Service Credits button puts credits on the games 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 turn 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 will show the sound software revision, the revision level of the system software, and the date the software was revised.

Example:	***NO GOOD GOFERS***		**Sound Rev. 1.0A**	
	50061	**Rev. 1.0A**	**SY. 0.X0**	**XX-XX-97**

Press the Enter button to enter the Menu System (refer to the section entitled "Menu System Operation" for more information). Perform the entire Test menu routine to verify that the game is operating satisfactorily.

In order to operate the tests that use the +50V or +20V circuits, pull the top interlock switch button out. The interlock switches are located on a bracket in the coin door opening.

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, the music plays for one minute, 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 slam 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

RAISING THE PLAYFIELD

⚠ CAUTION

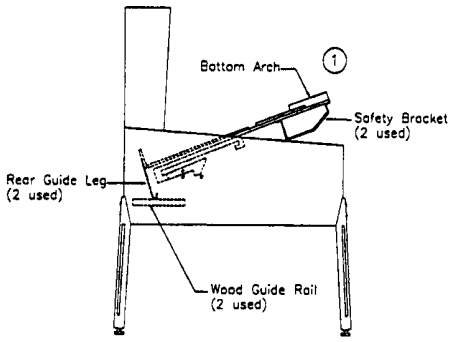
Do not raise the playfield straight up! This game uses a slide assembly to raise and lower the playfield.

Before Raising the Playfield:

Be sure there are no balls present in the ball trough or any of the other ball-holding playfield devices (i.e. poppers). Raising the playfield with balls present in these locations may cause them to come loose and damage the playfield. Use the "Empty Balls Test" to remove all of the balls from these locations.

To Raise the Playfield:

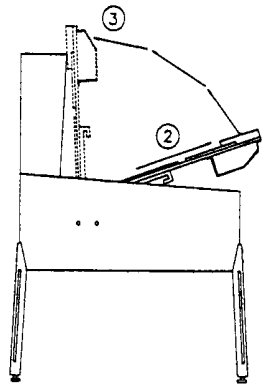
1. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails, or be used to slide out playfield.



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

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

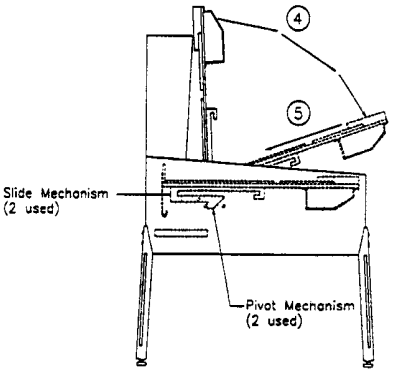
3. Rotate playfield to upright service position (lean on backbox) by pulling toward you and up. Listen for the sound of a click: this ensures locking and pivoting sequence. The latch will engage at the upper position.



To Lower the Playfield

4. Press down on the latch end to disengage (see decal) and rotate the playfield to the rest position. This unlocks the pivoting mechanism.

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



MENU SYSTEM OPERATION

The Main Menu allows you to choose from several options, which in turn lead to other menus to choose from. To access the Main Menu open the coin door, press the Begin Test button, then the Enter button. Press the Up and Down buttons to scroll through the Main Menu. To access a menu, (Bookkeeping, Printouts, etc.), from the Main Menu, press the Enter button. To return to the Main Menu (from Bookkeeping, Printouts, etc.) press the Escape button. Press the Start button for HELP.

MAIN MENU

B. BOOKKEEPING MENU

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

P. PRINTOUTS MENU

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

T. TEST MENU

- T.1 Switch Edges Test
- T.2 Switch Levels Test
- T.3 Single Switches Test
- T.4 Solenoid Test
- T.5 Flasher Test
- T.6 General Illumination Test
- T.7 Sound and Music Test
- T.8 Single 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 Gofer Test
- T.17 Wheel Test
- T.18 Empty Balls Test

U. UTILITIES MENU

- U.1 Clear Audits
- U.2 Clear Coins
- U.3 Reset H.S.T.D.
- U.4 Set Time 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
- U.12 Shipping

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 Escape
To move out of a menu selection.

Press Enter
To get into a menu selection.

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

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

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

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

Press the Up or Down buttons to scroll through the Bookkeeping 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

Using the 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	22	Minutes On	00
B.3	02	Total Plays**	00	B.3	23	Balls Played	00
B.3	03	Total Free Play	00	B.3	24	Tilts	00
B.3	04	Free Play Percent	00	B.3	25	Replay 1 Awards	00
B.3	05	Replay Awards	00	B.3	26	Replay 2 Awards	00
B.3	06	Percent Replays	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				
B.3	20	Average Game Time	00				
B.3	21	Play 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 cannot be reset.*

B.4 FEATURE AUDITS

B.4 01 KICKBACKS 00% 00
Number of times the kickback saved the ball.

B.4 02 BALL SAVES 00% 00
Number of times the game performed a ball save.

B.4 03 RAMP DROPS 00% 00
Number of times the Slam Ramp was dropped in main game play.

B.4 04 SJ RAMP DROPS 00% 00
Number of times the Slam Ramp was dropped in Multiball.

B.4 05 GOLF CART HITS 00% 00
Number of Golf Cart Hits after a Slam Ramp drop.

B.4 06 HOLES-IN-ONE 00% 00
Number of Holes-in-One after a Slam Ramp drop.

B.4 07 AROUND THE WORLD 00% 00
Number of times the ball traveled past the Cart and Hole-in-One Slam Ramp drop.

B.4 08 MB START 00% 00
Number of times Multiball was started by the player.

B.4 09 MB RE-OFFER 00% 00
Number of times Multiball Rematch was offered to the player.

B.4 10 MB REMATCH 00% 00
Number of times Multiball Rematch was made by the player.

B.4 11 MB JACKPOT 00% 00
Number of Multiball Jackpots awarded.

B.4 12 MB SUPER JP 00% 00
Number of Multiball Super Jackpots awarded.

B.4 13 SAND TRAP ARRIVES 00% 00
Number of times the ball landed in the Sand Trap.

B.4 14 SAND TRAP ARRIVES 00% 00
Number of times the player won the Sand Trap award.

B.4 15 BUD CLOBBERS 00% 00
Number of times Bud (the left Gofer) was hit.

B.4 16 BUZZ CLOBBERS 00% 00
Number of times Buzz (the right Gofer) was hit.

B.4 17 KICKBACKS LIT 00% 00
Number of times the kickback was lit from the K-I-C-K targets.

B.4 18 PUTT OUTS 00% 00
Number of times the player completed a golf hole via a Putt-Out.

Feature Audits Continued...

B.4 19 RIP-OFF HURRY-UP 00% 00
Number of times the Rip-off Hurry-up was started.

B.4 20 RIP-OFF STARTED 00% 00
Number of times the player hit the captive ball to start Rip-off Multiball.

B.4 21 CART STARTED 00% 00
Number of times Cart Attack was started by hitting the golf cart.

B.4 22 SKILL SHOTS 00% 00
Number of Skill Shots completed.

B.4 23 9TH HOLE STARTS 00% 00
Number of times the player completed the 9TH hole.

B.4 24 9TH HOLE SPECIALS 00% 00
Number of Specials awarded from the 9TH hole.

B.5 HISTOGRAMS

B.5	**01**	0 - 120,000 Scores	00%	00
B.5	**02**	120,000 to 250,000 Scores	00%	00
B.5	**03**	250,000 to 500,000 Scores	00%	00
B.5	**04**	500,000 to 1 Million Scores	00%	00
B.5	**05**	1 to 2 Million Scores	00%	00
B.5	**06**	2 to 4 Million Scores	00%	00
B.5	**07**	4 to 6 Million Scores	00%	00
B.5	**08**	6 to 12 Million Scores	00%	00
B.5	**09**	12 to 25 Million Scores	00%	00
B.5	**10**	25 to 50 Million Scores	00%	00
B.5	**11**	50 to 75 Million Scores	00%	00
B.5	**12**	75 to 99 Million Scores	00%	00
B.5	**13**	Over 99 Million Scores	00%	00
B.5	**14**	Game Time 0.0-1.0 Minute	00%	00
B.5	**15**	Game Time 1.0-1.5 Minutes	00%	00
B.5	**16**	Game Time 1.5-2.0 Minutes	00%	00
B.5	**17**	Game Time 2.0-2.5 Minutes	00%	00
B.5	**18**	Game Time 2.5-3.0 Minutes	00%	00
B.5	**19**	Game Time 3.0-3.5 Minutes	00%	00
B.5	**20**	Game Time 3.5-4.0 Minutes	00%	00
B.5	**21**	Game Time 4-5 Minutes	00%	00
B.5	**22**	Game Time 5-6 Minutes	00%	00
B.5	**23**	Game Time 6-8 Minutes	00%	00
B.5	**24**	Game Time 8-10 Minutes	00%	00
B.5	**25**	Game Time 10-15 Minutes	00%	00
B.5	**26**	Game Time Over 15 Minutes	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 scroll through the Printouts menu. Press the Enter button to access a menu. Press the Escape button to return to the Printouts Menu.

P. PRINTOUTS MENU

(An optional board is required to use the Printouts feature.)

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.*

Press the Up or Down buttons to scroll through the Test menu. Press the Enter button to access a test. Press the Escape button to return to the Test menu. 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 Gofer Test**
T.8 Single Lamps Test	**T.17 Wheel Test**
T.9 All Lamps Test	**T.18 Empty Balls Test**

In order to operate the tests that use the +50V or +20V circuits, pull the top interlock switch button out. The interlock switches are located on a bracket just inside the coin door opening.

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 of the switches one at a time. The name and number of the switch is shown in the display. If a switch other than the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit. To return the Test menu, press the Escape button.

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. To return the Test menu, press the Escape button.

T.3 SINGLE SWITCHES TEST

This test isolates a single switch and shows its state in the display. A mechanical switch is 'made' when the display reads closed. An opto switch is 'made' (opto beam broken) when the display reads open. Use the Up or Down buttons to select the switch to be tested. To return the Test menu, press the Escape button.

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 than one solenoid pulses, a solenoid comes on and stays on, or no solenoids pulse during the Repeat and Run modes.

Repeat: The Repeat mode pulses an individual solenoid. Press the Enter button to start this test. The name of the first solenoid shows in the display and the corresponding coil pulses. Press the Up or Down buttons to cycle through the solenoids, one at a time. The same solenoid pulses until you press the Up or Down buttons to advance to the next one. To return the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode halts the Solenoid test. No solenoids should be active. To return the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Run: The Run mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed. To return the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

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 than one flashlamp circuit blinks, the lamps stays on, or no lamps blink during the Repeat and Run modes.

Repeat: The Repeat mode pulses an individual flashlamp. Press the Enter button to start this test. The name and number of the first flashlamp is displayed and the corresponding bulb(s) blinks. The same bulb(s) blinks until you press the Up or Down buttons to advance to the next one. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode halts the Flasher test. There should not be any flashlamps lit during this mode. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

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. To return to the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

T.6 GENERAL ILLUMINATION TEST

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

Note: General Illumination strings four & five do not brighten or dim, they are always ON.

Stop: The Stop mode allows you to cycle through the General Illumination test manually. Press the Up or Down buttons to advance through the test. All illumination is tested first, followed by an individual circuit test. The circuit name and number shows in the display while the corresponding bulbs light. If any other results occur the system has detected an error. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Run: The Run mode cycles through the General Illumination test automatically. For each circuit shown in the display the corresponding bulbs should light. If any other results occur, the system has detected a problem. To return to the Test menu, press the Escape button. To return to the Stop mode, press the Enter button.

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 to advance to a particular sound or tune. A sound or tune should be heard for each name and number that appears in the display. Any other results indicate the system has detected a problem. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Repeat: The Repeat mode causes the program to stop and repeat a particular sound/tune. The same sound repeats continuously until you press the Up or Down buttons to advance to the next one. Any other results indicates the system has detected a problem. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode stops this test altogether. Nothing should be heard. Any other results indicate the system has detected a problem. To return to the Test menu, press the Escape button. To return to the Run mode, press the Enter button.

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.

The Single Lamp test checks each lamp circuit individually. Press the Up or Down buttons to scroll through this test. A lamp should light for each name and number that is displayed. Any other results indicate the system has detected a problem. To return to the Test menu, press the Escape button.

T.9 ALL LAMPS TEST

This test causes all the controlled lamps to flash at the same time. Every controlled lamp should flash. Any other results indicate the system has detected a problem. To return to the Test menu, press the Escape button.

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 indicate the system has detected a problem. To return to the Test menu, press the Escape button.

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. To return to the Test menu, press the Escape button.

T.12 FLIPPER COIL TEST

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

Repeat: The Repeat mode pulses an individual flipper. Press the Enter button to begin the test. Press the Up or Down buttons to cycle through the flipper coils one at a time. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode halts the Flipper Coil test. No coils should pulse while the test is stopped. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Run: The Run mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed. To return to the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

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 buttons to cycle through the lamps. Lamps light in a clock-wise or counter clock-wise direction starting from the bottom of the playfield. The direction depends on whether the Up or Down button is pressed. For each name and number that is shown in the display, the corresponding lamp should light. Any other results indicate the system has detected a problem. To return to the Test menu, press the Escape button.

T.14 LAMP ROW - COLUMN

This test allows individual rows and columns in the lamp matrix to be operated. This is useful for troubleshooting wiring and driver problems.

Press the Up and Down buttons to cycles through the different rows and columns.

To return to the Test menu, press the Escape button.

T.15 DIP SWITCH TEST

This test is used to show the positions of the DIP switches on the CPU board (U27).

To return to the Test menu, press the Escape button.

T.16 GOFER TEST

The Gofer test shows the state of the optos switches on the two Gofer mechanisms and shows the state of the two ramp switches. Close the coin door to begin the test, open the door and press Escape to stop the test and return to the Test menu.

The test will cycle the left Gofer and then the right Gofer, raising the head above the playfield, dropping the head, and then lowering the ramp. Any errors detected during the test will be shown on the display, and the suspected bad switch will be blinking on the display.

Possible Error Messages from Gofer Test:

CHECK COIL #xx: A coil used to raise or lower the gofer and/or ramp is believed to be faulty.

T.16 GOFER TEST CONTINUED...

OPTO FAILURE: The software cannot read the Gofer Down opto switch associated with this mechanism.

RAMP SW FAILURE: The software cannot read the Ramp Down microswitch associated with this mechanism.

WARNING GOFER DISABLED: The Gofer may not be operating in game play because it was disabled in the A2.12 or A2.13 adjustment(s).

T.17 WHEEL TEST

Use this test to check the orientation of the Wheel Award decal and check that the wheel motor is operating properly.

Press Enter to begin the test. The test will then spin the wheel and make sure that the wheel opto switches and the motor are functioning correctly. The display will then show what the game believes to be the current wheel position.

You may turn the wheel by hand to check the alignment of the wheel award decal. If you change the direction of the wheel's rotation, make sure to turn the wheel at least ONE FULL REVOLUTION to make sure that the game software can re-track where the pointer is pointing to.

Possible Error Messages from Wheel Test:

MOTOR WIRES REVERSED: The software has determined that the wires to the wheel motor or the wires that transmit the drive signal to the Motor board have been connected incorrectly. Reverse the orientation of the wheel motor's power wires and try this test again.

TRACKING FAILURE: The software cannot read the Wheel Inner Spin and Wheel Outer Spin optos. Check the 12-volt power supply to the Wheel Opto board, and check the individual switches using the T.1 Switch Test.

WARNING MOTOR DISABLED: The wheel may not be operating in game play because the Motor Disabled (A2.08) adjustment has been set to YES.

T.18 EMPTY BALLS TEST

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

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

To scroll through the Utilities menu, press the Up or Down buttons. To access a utility, press the Enter button. To see the setting choices of a utility option, press the Up and Down buttons. Press the Enter button to lock in a choice. If you make a mistake, press Escape while "Saving Adjustment Value" is in the display. The original setting is retained and the new setting is ignored. To return to the Utilities menu, press the Escape button.

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 buttons to change the value, then press the Enter button to lock in that value. If you make a mistake 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 you make a mistake, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once 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.

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 you make a mistake, 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	Nearly 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	Ball Save After Ball 1	YES	YES	YES	YES	NO
A.2 15	Hole-in-One Reset	NO	NO	NO	NO	YES
A.2 22	K-I-C-K (Kickback) Starts	BLINKING	BLINKING	BLINKING	OFF	OFF
A.2 23	Stack Kickbacks	YES	YES	YES	NO	NO
A.2 25	First Cart Award At	2	2	3	3	4
A.2 26	Cart Award Interval	3	4	5	6	7
A.2 30	Cart Path Reset	NO	NO	YES	YES	YES

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	25,000,000	15,000,000
A.2 20	Cart Path Extra Ball Memory	NO	YES
A.2 21	Kickback Difficulty	HARD	MEDIUM
A.2 22	K-I-C-K (Kickback) Starts	OFF	BLINKING
A.2 23	Stack Kickbacks	NO	YES

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:

Adjust.	Name	New Settings
A.1 13	Replay Boost	Off
A.1 14	Replay Award	Extra Ball
A.1 15	Special Award	Extra Ball
A.1 17	Extra Ball Ticket	No
A.1 19	Match Feature	Off
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 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:

Adjust.	Name	New Settings
A.1 14	Replay Award	Ticket
A.1 15	Special Award	Ticket
A.1 16	Match Award	Ticket
A.1 17	Extra Ball Ticket	Yes
A.1 31	Ticket Expansion 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:

Adjust.	Name	New Settings
A.1 04	Maximum Extra Ball	Off
A.1 05	Replay system	Fixed
A.1 09	Replay Level 1	Off
A.1 10	Replay Level 2	Off
A.1 11	Replay Level 3	Off
A.1 12	Replay Level 4	Off
A.1 15	Special Award	Points
A.1 19	Match Feature	Off
A.4 01	Highest Score	On
A.4 04	Champion Credit	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 tests 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 scroll through the Adjustments menu. To access an adjustment menu option, press the Enter button. To see the setting choices for that option press the Up and Down buttons. To lock in a setting choice, press the Enter button. If you make a mistake, 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.

Settings: 1 to 10

Factory Default: 3

A.1 02 TILT WARNINGS
The number of total actuation's of the plumb bob that can occur before the game is "tilted".

Settings: 1 to 10

Factory Default: 3

A.1 03 MAXIMUM EXTRA BALLS COUNT
The number of extra balls that a player may accumulate.

Settings: 0 to 10
NO EXTRA BALL - No extra balls may be accumulated.

Factory Default: 4

A.1 04 MAXIMUM EXTRA BALLS PER BALL IN PLAY
The number of extra balls to be awarded per ball in play.

Settings: OFF - No maximum number of extra balls per ball in play.
1 to 10 - 1 through 10 extra balls per ball in play.

Factory Default: OFF

A.1 05 REPLAY SYSTEM
The type of replay system to be used.

Settings: 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.
OFF - Disable the replay system. No replays are awarded.

Factory Default: AUTO %

A.1 06 REPLAY PERCENT

The percentage of replays the players are able to earn when Auto Replay is used.

Settings: 5% to 50%

Factory Default: 10%

A.1 07 REPLAY START

Replay Start value when Auto % Replay is used.

Settings: 5,000,000 to 105,000,000

Factory Default: 24,000,000

A.1 08 REPLAY LEVELS

The number of replay levels used by the Auto % Replay mode. 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.

Settings: 1 to 4

Factory Default: 1

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.

Settings: 00 to 105,000,000.

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.

Settings: AUTO - The Replay Boost value is half of the current Replay value.
ON - Score is boosted between 2,000,000 and 20,000,000 points.
OFF - Replay score is not boosted.

Factory Default: AUTO

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.

Settings: 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.

Factory Default: CREDIT

A.1 15 NOT USED

A.1 16 MATCH AWARD

The award automatically provided when the players win a match.

Settings: CREDIT - Winning a match awards a credit.
TICKET - Winning a match awards a ticket.

Factory Default: CREDIT

A.1 17 EXTRA BALL TICKET

A ticket is awarded when the player earns an extra ball.

Settings: YES - The player is awarded a ticket in addition to an extra ball.
NO - The player is not awarded a ticket.

Factory Default: NO

A.1 18 MAXIMUM TICKET/PLAYER

The amount of tickets each player can earn.

Settings: 00 to 100.

Factory Default: 25

A.1 19 MATCH FEATURE

This is the desired percentage for the Match Feature occurring at the end of the game.

Settings: OFF - Match Feature is not available.
1 to 50% - 1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects random points score value at the end of the game and compares each player's score for an identical match. A match of an entire score value results in an award of a Credit or a Ticket.

Factory Default: 7%

A.1 20 CUSTOM MESSAGE

The message displayed during the Attract mode.

Settings: ON - A message is displayed
OFF - A message is not displayed.

Factory Default: ON

A.1 21 LANGUAGE

The language the game uses.

Settings: ENGLISH, FRENCH, OR GERMAN

Factory Default: ENGLISH

A.1 22 CLOCK STYLE

The style of clock the game uses.

Settings: A.M./P.M. or 24 hours.

Factory Default: A.M./P.M.

A.1 23 DATE STYLE

The style of dates the game uses.

Settings: MONTH/DATE/YEAR OR DATE/MONTH/YEAR

Factory Default: MONTH/DATE/YEAR

A.1 24 SHOW DATE AND TIME

The date and time show in the Attract mode.

Settings: 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.

Factory Default: NO

A.1 25 ALLOW DIM ILLUMINATION

The game program dims the general illumination for special effects and during the Attract mode.

Settings: YES - Dim the general illumination during the Attract mode.
NO - Do not dim the general illumination.

Factory Default: YES

A.1 26 TOURNAMENT PLAY

Equalize random game features and global score values during multi-player games.

Settings: YES - Equalize random game features and global score values.
NO - Do not equalize random game features and global score values.

Factory Default: NO

A.1 27 EUROPEAN SCORE FORMAT

Use either commas or dots between digits when numbers are displayed.

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

Factory Default: NO

A.1 28 MINIMUM VOLUME OVERRIDE

The volume can be turned off.

Settings: YES - Volume can be turned off.
NO - Volume can be turned down but not off.

Factory Default: NO

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.

Settings: OFF, 2 to 60 minutes.

Factory Default: 15 minutes

A.1 30 POWER SAVER LEVEL

When General Illumination Power Saver (A.1 29) is set for 2 to 60 minutes, the Power Saver Level controls the intensity of the general illumination and controlled lamps after the game has been idle for the specified period of time.

Settings: 4 to 7 (4 = dimmest, 7 = brightest)

Factory Default: 5

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.

Settings: YES - Ticket Expansion board is connected.
NO - Ticket Expansion board is NOT installed in the game.

Factory Default: NO

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.

Settings: YES, NO

Factory Default: YES

A.1 33 GAME RESTART

When you press the Start button during or after the 2nd ball, the game in progress ends and a new game begins. This adjustment has three settings to determine how to handle this.

Settings: 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 the game in progress.
INSTANTLY - Restart as soon as the Start button is pressed.

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

Factory Default: SLOW

A.2 FEATURE ADJUSTMENTS

A2.01 ATTRACT MODE SOUND

The operator can select whether or not the Attract mode has sounds on the flipper buttons to attract players.

Settings: YES, NO
Factory Default: YES

A2.02 ATTRACT MODE MUSIC

The operator can select whether or not the Attract mode plays a short tune to attract players.

Settings: YES, NO
Factory Default: NO

A2.04 PLAYER TOURNAMENT

When this adjustment is set to YES, holding both flipper buttons during Game Over mode for five seconds prompts the player with "TOURNAMENT MODE READY" and gives them ten seconds to start a game in Tournament mode.

Settings: YES, NO
Factory Default: YES

A2.05 BALL SAVES

This setting determines how many ball saves a player is allowed to have within a game.

Settings: OFF, OR 1 THROUGH 5
Factory Default: 1

A2.06 BALL SAVE TIME

This setting determines how long the ball saver is active (in seconds) once the player's ball is in play.

Settings: 3 to 15 seconds
Factory Default: 6 seconds

A2.07 TIMED PLUNGER

This setting allows the game to automatically plunge the ball from the shooter groove after a determined amount of inactivity. This time is shown in seconds after the ball is served.

Settings: ON, OFF
Factory Default: OFF

A2.08 BALL SAVE AFTER BALL 1

This decides if the player is allowed to have a ball save (or saves) after the first ball.

Settings: YES, NO
Factory Default: YES

A2.09 DISABLE MOTOR

Use this setting to disable the Wheel Award motor. If set to YES, the game will not attempt to use the motor and will compensate game rules accordingly.

Settings: YES, NO
Factory Default: NO

A2.10 DISABLE LEFT RAMP

Use this setting to disable the left ramp flap. If set to YES, the game will not attempt to use the left ramp lower coil and will compensate game rules accordingly.

Settings: YES, NO
Factory Default: NO

A2.11 DISABLE RIGHT RAMP

Use this setting to disable the Wheel Award motor. If set to YES, the game will not attempt to use the right ramp lower coil and will compensate game rules accordingly.

Settings: YES, NO
Factory Default: NO

A2.12 DISABLE LEFT GOFER

Use this setting to disable Bud, the left side gofer. If set to YES, the game will not attempt to operate this gofer and will compensate game rules accordingly.

Settings: YES, NO
Factory Default: NO

A2.13 DISABLE RIGHT GOFER

Use this setting to disable Buzz, the right side gofer. If set to YES, the game will not attempt to operate this gofer and will compensate game rules accordingly.

Settings: YES, NO
Factory Default: NO

A2.14 JETS DIFFICULTY

This determines how many jet bumpers are lit and flashing at game start.

Settings:	Jet Lit at Game Start	Jets Added/Lit on Next Ball	Carryover from Ball to Ball
Ex. Easy	3	2	YES
Easy	2	2	YES
Medium	1	1	NO
Hard	1	1	NO
Ex. Hard	0	1	NO

Settings: EXTRA EASY, EASY, MEDIUM, HARD, and EXTRA HARD.
Factory Default: MEDIUM

A2.15 HOLE-IN-ONE RESET

When set to YES, this will reset the Hole-in-One award when won by the player.

Settings YES, NO
Factory Default: NO

A2.16 TRAP EXTRA BALL MEMORY

The operator selects whether or not the extra ball lit from completing Sand Traps remains lit from ball to ball.

Settings: YES, NO
Factory Default: YES

A2.17 GOLF EXTRA BALL COUNT

This determines how many Putt-Out awards will light Extra Ball. Choosing Auto % lets the game decide the count to keep the extra ball percentage around 25%.

Settings: 4, 5, 6, AUTO %
Factory Default: 5

A2.18 GOLF EXTRA BALL MEMORY

The operator selects whether or not the Extra Ball lit from completing Putt-Outs will remain lit from ball to ball.

Settings: YES, NO
Factory Default: YES

A2.19 WHEEL EXTRA BALL MEMORY

This decides if the Extra Ball lit from the Putt-Out Wheel award will remain lit from ball to ball.

Settings: YES, NO
Factory Default: NO

A2.20 CART PATH EXTRA BALL MEMORY

This decides if the Extra Ball lit from completing the Cart Path awards will remain lit from ball to ball.

Settings: YES, NO
Factory Default: YES

A2.21 KICKBACK DIFFICULTY

This decides how the kickback will be lit at the start of a player's ball, and how the light will carry over from ball to ball.

Settings:	Lit at Game Start	Lit at Ball Start
Ex. Easy	YES	YES
Easy	YES	MEMORY
Medium	YES	MEMORY
Hard	NO	MEMORY
Ex. Hard	NO	NO

Settings: EXTRA EASY, EASY, MEDIUM, HARD, and EXTRA HARD.
Factory Default: MEDIUM

A2.22 K-I-C-K (KICKBACK) STARTS

This decides how the K-I-C-K lamps are lit at game start.

Settings OFF, BLINKING
Factory Default: BLINKING

A2.23 STACK KICKBACKS

If extra kickbacks are earned during game play, this setting decides if they are stored in memory or if they are discarded.

Settings YES, NO
Factory Default: YES

A2.24 MAX KICKBACK STACK
If STACK KICKBACKS is set to YES, this decides how many kickbacks can be stored in memory.

Settings: 1 to 8
Factory Default: 1

A2.25 FIRST CART AWARD AT
This determines how many Cart Whacks are needed to start the first Cart Award.

Settings: 3 to 7
Factory Default: 3

A2.26 CART AWARD INTERVAL
This determines how many Cart Whacks are needed to start the next Cart Award (after the first).

Settings: 4 to 15
Factory Default: 5

A2.27 GOFER ATTITUDE
Buzz and Bud may say things that could upset more sensitive players. You can tone down their speech for a family setting by changing their attitude to just plain RUDE.

Settings: RUDE, VERY RUDE
Factory Default: VERY RUDE

A2.28 JET KICKBACK
This allows for a kickback on a very short time after the ball leaves the jet bumpers.

Settings: YES, NO
Factory Default: YES

A2.29 VOLUME INTERLOCK
This setting prevents accidental volume changes when adding service credits or entering the test mode. When set to YES, a flipper button needs to be held in while changing the game volume.

Settings: YES, NO
Factory Default: NO

A2.30 CART PATH RESET
This setting resets the cart path (multiplier) lamps after every ball.

Settings: YES, NO
Factory Default: YES

A2.31 HOLE IN ONE CHAMPION CREDITS
This sets the amount of credits given to a player that has become the new Hole-in-One Champion.

Settings 00-10
Factory Default: 1

A2.32 DAILY HSTD CREDITS
This sets the amount of credits given to a player that has attained the daily High Score to Date.

Settings: 00-10
Factory Default: 00

A. 3 PRICING ADJUSTMENTS

A.3 01 GAME PRICING (If set to custom, then 02 to 09 are available).
The cost of a game is selected 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).
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 three 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 plays 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

The adjustment determines the value of each coin unit on the coin meter. For example, to show the total amount of money collected as total quarters, set the adjustment to 0.25. To show the total 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 the meter installed on the Coin Door Interface board. ***Note:*** *All WPC-95 games are cable ready to operate a coin meter mounted to the Coin Door Interface board. Boards without a meter can use the parts listed below to take advantage of the coin meter feature. The coin meter and spacer may be purchased from your distributor.* coin meter +6V p/n 20-9302-3; spacer p/n 20-9914

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

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, 1/6etc.). 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	*Repeat 3*	*Repeat 9*	*Repeat 15*
Delete	*Repeat 4*	*Repeat 10*	*Repeat 16*
Insert	*Repeat 5*	*Repeat 11*	*Repeat 17*
Clear	*Repeat 6*	*Repeat 12*	*Repeat 18*
Repeat 1	*Repeat 7*	*Repeat 13*	*Repeat 19*
Repeat 2	*Repeat 8*	*Repeat 14*	*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 later in this section).

Delete
This deletes the current level from the pricing mode.

Insert
This inserts 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 Down 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 VI

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 clears out the current entries to allow a new pricing mode to be entered.

Repeat (1-20)
This causes all of the 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 the Up and Enter buttons to specify 1/2 credit for $0.25:

CUSTOM PRICING EDITOR		
1)	$0.25	1/2 cred.

DISPLAY VIEW

Now, use the Up button until the display shows "Repeat 20". The display looks like this:

CUSTOM PRICING EDITOR		
1)	$0.50	1 cred.
2)	REPEAT 20	

DISPLAY VIEW

Press the Enter button 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 the Enter button 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 the Up button 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 Up and Down buttons to select your choice and press the Enter button to activate it. 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 the Enter button 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	COIN CHUTES LEFT	CENTER	RIGHT	4TH CHUTE	GAMES/COINS	DISPLAY	PRICING ADJUSTMENTS A3 02 03 04 05 06 07 08 09
USA	25¢	$1.00*	25¢	$1.00	1/50¢, 2/75¢, 3/$1[2]	50¢, 75¢, $1.00	
	25¢	$1.00*	25¢	$1.00	1/75¢, 2/$1.50, 3/$2.00[2]	1/.75, 3/2.00	
	25¢	$1.00	25¢	$1.00	1/3X25¢[2]	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	AUSTRALIA 2	
U.K.	£1.00	50P	20P	10P	1/3x10P, 2/50P, 4/£1[2]	U. KINGDOM	
Switzerland	1Fr	2Fr	5Fr	-	1/1Fr, 3/2Fr, 7/5Fr[2]	SWISS 1	
Swiss 2	1Fr	2Fr	5Fr	-	1/2Fr, 2/3Fr, 3/4Fr, 5/5Fr	SWISS 2	
Swiss 3	1Fr	2Fr	5Fr	-	1/1Fr, 5/5Fr	SWISS 3	
Swiss 4	1Fr	2Fr	5Fr	-	1/1Fr, 2/2Fr, 3/3Fr, 4/4Fr, 6/5Fr[1]	SWISS 4	
Swiss 5	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	-	1/1DM, 2/2DM, 6/5DM[1,2]	GER. 6/5DM	
					1/2DM, 2/3DM, 3/4DM, 4/5DM[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	
Holland	1G	-	1G	-	1/1G[2]	HOLLAND	
Sweden	1Kr	5Kr	10Kr	1Kr	1/10Kr, 2/15Kr, 3/20Kr[1,2]	SWEDEN 1	
	1Kr	5Kr	10Kr	1Kr	1/5Kr[2]	SWEDEN 2	
France	1Fr	5Fr	10Fr	20Fr	1/3x1Fr, 2/5Fr, 5/10Fr , 10/20Fr[2,3]	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[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	CUSTOM	01 00 04 00 01 04 01 00
	25P	-	100P	-	1/25P, 4/100P	CUSTOM	01 00 04 00 01 00 01 00
	25P	-	100P	-	1/2x25P, 2/100P	CUSTOM	01 00 04 00 02 00 01 00
	25P	-	100P	-	1/2x25P, 3/100P	CUSTOM	03 00 12 00 04 00 01 06
Japan	100¥	-	100¥	-	1/100¥[2]	JAPAN	
Chile	Token	-	Token	-	1/1Token[2]	CHILE	
Denmark	1Kr	5Kr	10Kr	20Kr	1/2x1 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	1HFI	2.5HFI	2.5HFI	-	1/1Hfl, 3/2.5Hfl	NETHERLANDS	
Netherlands 2	1HFI	2.5HFI	2.5HFI	-	1/1HFI, 3/3HFI, 3/2.5HFI-Coin	NETH. BONUS	
Hungary	20 Old	20 New	50F	-	1/40F, 2/60F, 4/100F	HUNGARY	

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 HIGH SCORE TO DATE (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
This is the award given for achieving the High Score to Date or the Champion High Score to Date. Credit or 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 four highest scores.

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 operator selects the values provided at reset 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 120,000,000

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 fourth Back-up High Score values. The game automatically restores this value when the "High Score Reset Every" value is reached.

Range: 00 to 120,000,000

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
This is 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-95 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.

NO GOOD GOFERS features a new coin door display. When the coin door is open (in Attract mode and game play), the display shows that the high-power has been disabled. It also shows the Test Report (if there is anything to report), and some game specific information. Use the flipper buttons to page through this information.

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.

Error Messages for the Gofer mechanisms.

Check Coil #XX
A coil used to raise or lower the gofer and/or ramp is believed to be faulty.

Opto Failure
The software cannot read the Gofer Down opto switch associated with this mechanism.

Ramp Sw Failure
The software cannot read the Ramp Down microswitch associated with this mechanism.

Warning Gofer Disabled
The Gofer may not be operating in game play because it was disabled in the A2.12 or A2.13 adjustment(s).

Error Messages for the Wheel mechanism.

Motor Wires Reversed
The software has determined that the wires to the wheel motor or the wires that transmit the drive signal to the Motor board have been connected incorrectly. Reverse the orientation of the wheel motor's power wires and try this test again.

Tracking Failure
The software cannot read the Wheel Inner Spin and Wheel Outer Spin optos. Check the 12-volt power supply to the Wheel Opto board, and check the individual switches using the T.1 Switch Test.

Warning Motor Disabled
The wheel may not be operating in game play because the Motor Disabled (A2.08) adjustment has been set to YES.

General Error Messages.

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 opto switches 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 four 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.

XXXX 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, and 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 an error the following happens:

CPU board error codes

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

The Audio Visual board produces one beep upon game turn on if the board is operating properly. If the system detects an error the following happens:

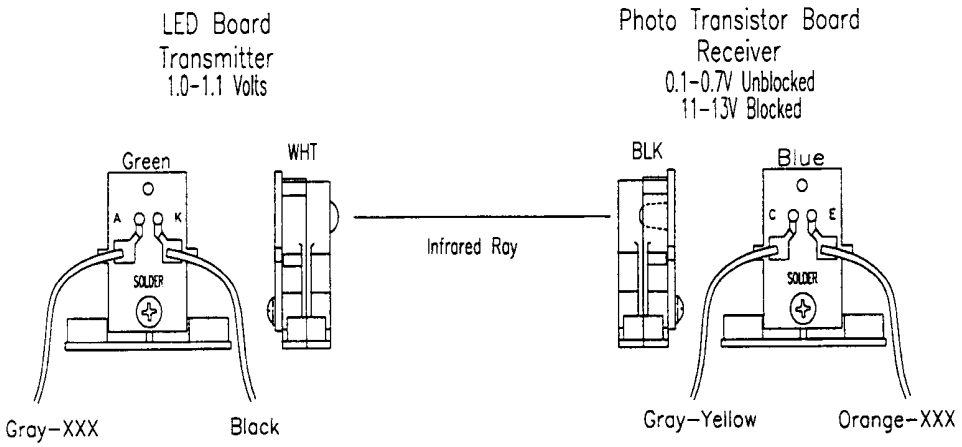
Audio Visual board error codes

1 Beep	= Audio Visual Board is O.K.
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

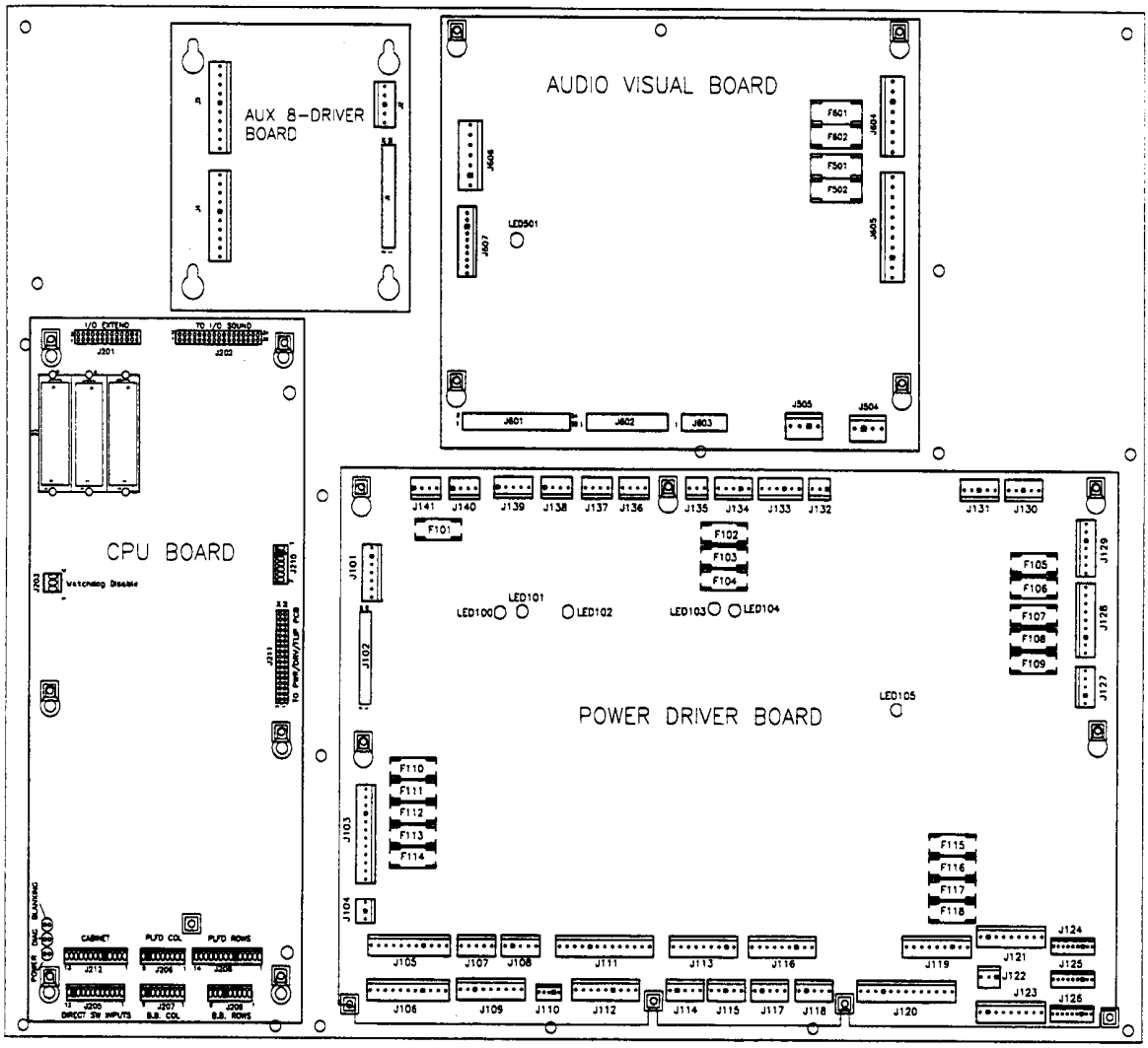
Opto Theory

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

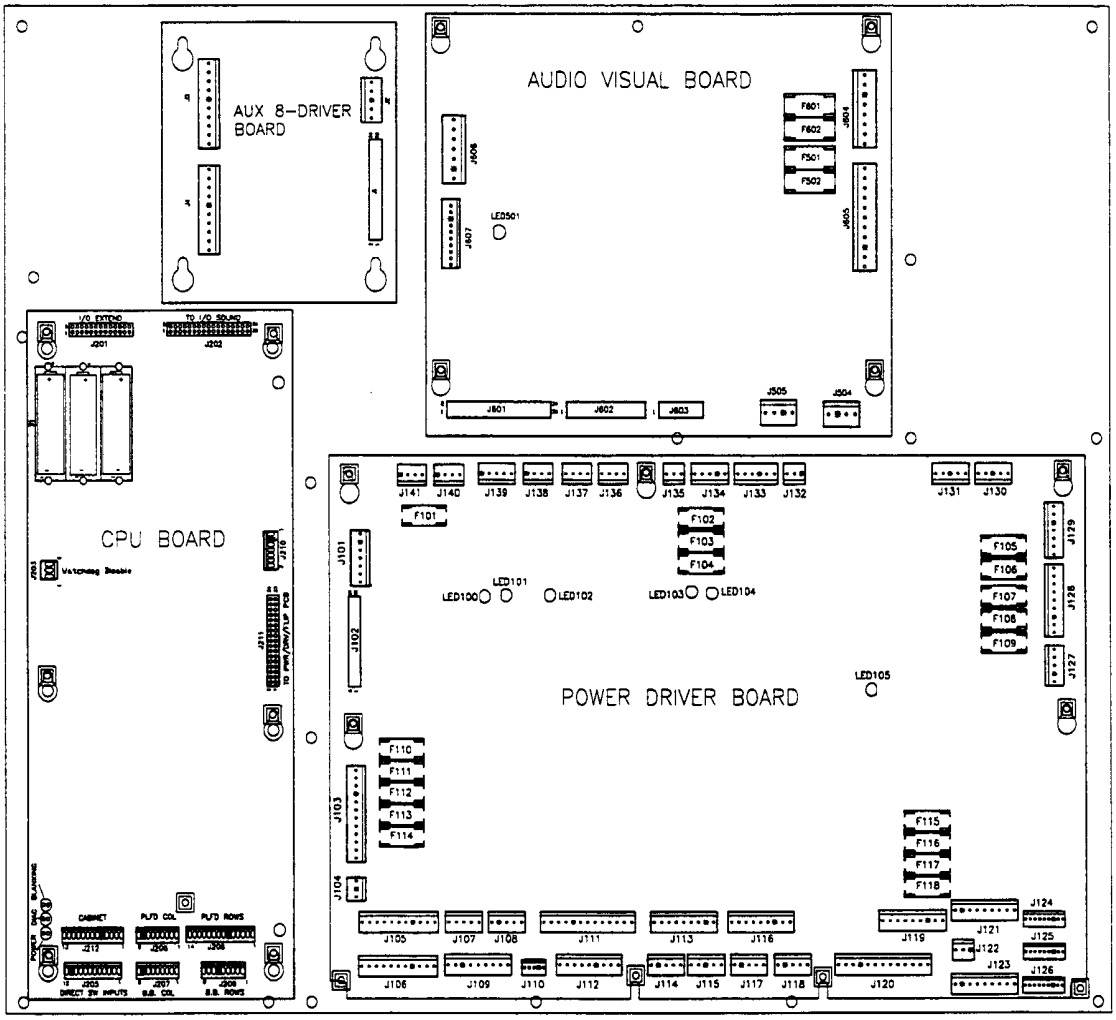


CPU BOARD
LED 201 Blanking
LED 202 Power
LED 203 Diagnostics
At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing.

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

Loc.	Description	Part Number	Value
F501	-25V	5731-14532-00	T2.5A, 250V
F502	+25V	5731-14532-00	T2.5A, 250V
F601	+62V	5731-14840-00	T0.315A, 250V
F602	-113V & -125V	5731-14840-00	T0.315A, 250V

CPU BOARD

There are no fuses on the CPU board.

POWER DRIVER BOARD

Loc.	Description	Part Number	Value	Loc.	Description	Part Number	Value
F101	Regulated 12V	5731-14531-00	T0.63A, 250v	F110	G.I. #5 WHT-VIO	5731-14530-00	T4.0A, 250V
F102	Solenoid. #25 to #28	5731-14530-00	T4.0A, 250V	F111	G.I. #4 WHT-GRN	5731-14530-00	T4.0A, 250V
F103	Solenoid #1-#8	5731-14530-00	T4.0A, 250V	F112	G.I. #3 WHT-YEL	5731-14530-00	T4.0A, 250V
F104	Solenoid #9 to #16	5731-14530-00	T4.0A, 250V	F113	G.I. #2 WHT-ORG	5731-14530-00	T4.0A, 250V
F105	+5V Logic	5731-14530-00	T4.0A, 250V	F114	G.I. #1 WHT-BRN	5731-14530-00	T4.0A, 250V
F106	+18V Lamp Matrix	5731-14046-00	T5.0A, 250V	F115	+50V Flippers	5731-14530-00	T4.0A, 250V
F107	Flasher Secondary	5731-14530-00	T4.0A, 250V	F116	+50V Flippers	5731-14530-00	T4.0A, 250V
F108	Solenoid Secondary	5731-14529-00	T6.3A, 250	F117	+50V Flippers	5731-14530-00	T4.0A, 250V
F109	Unregulated 12V	5731-14530-00	T4.0A, 250V	F118	+50V Flippers	5731-14530-00	T4.0A, 250V

LINE FILTER

Loc.	Part Number	Value
Foreign	5731-14530-00	T4.0A, 250V
Domestic	5731-14046-00	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 tungsten high current 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 that the switch is misadjusted 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

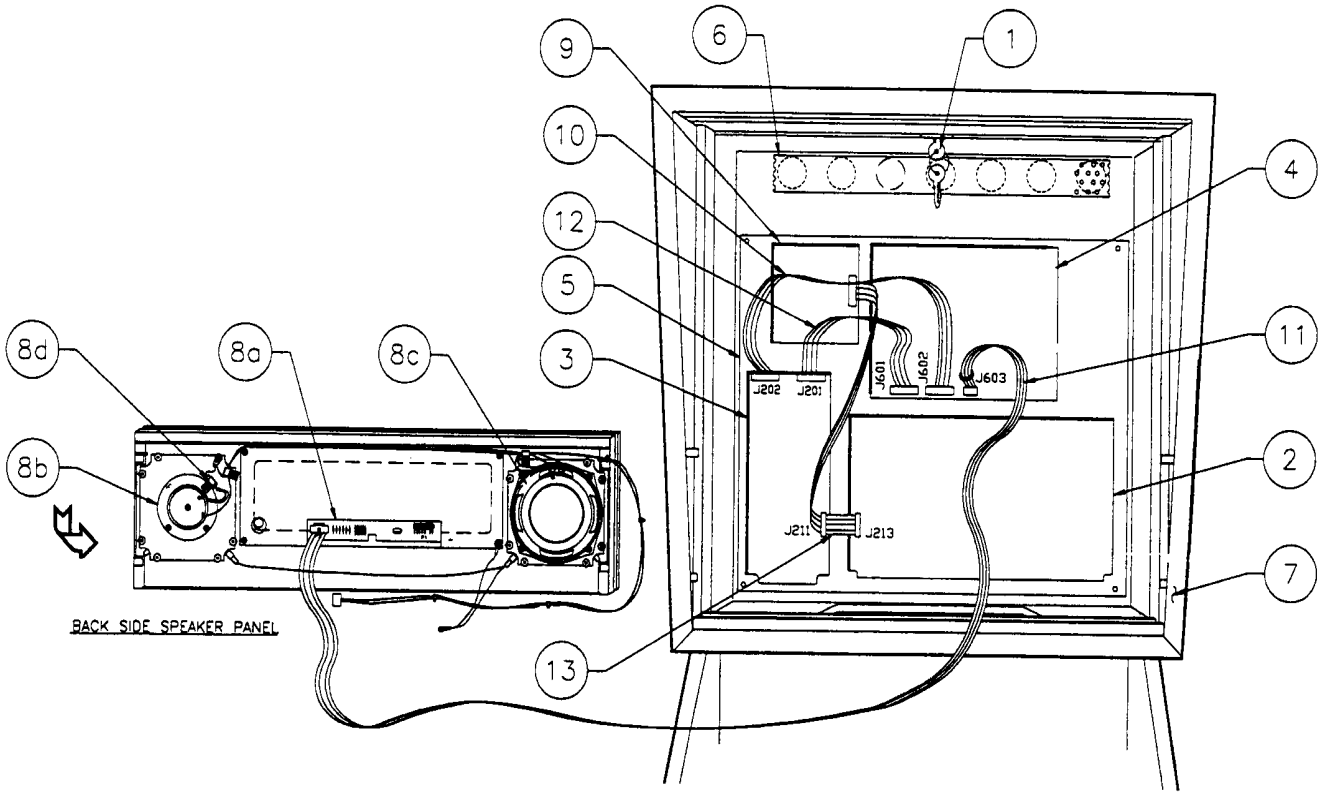
Good game action and extended playfield life are the results of regular playfield cleaning. During each collection stop, the playfield glass should be removed and thoroughly cleaned and the playfield should be wiped off with a clean, lint-free cloth. The game balls should be cleaned and inspected for 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

50061-BB Backbox Assembly



Item	Part Number	Description
1	**A-21998**	Lock & Plate Assembly
a)	**20-9637**	Lock & Cam Kit
2	**A-20028**	WPC '95 Power Driver PCB
3	**A-21377-50061**	WPC '95 CPU PCB Assy.
4	**A-20516-50061**	WPC '95 Audio Visual PCB Assy.
5	**A-14092-7**	Mounting Plate Assembly
6	**01-6645**	Vent Screen
7	**04-10992**	Wood Backbox & Decal Assembly
8	**A-21559**	Speaker/Display Assembly
a)	**5901-12784-00**	Dot Matrix Display Comp.
b)	**5555-12924-00**	Speaker Tweeter, 4Ω, 15w
c)	**5555-12856-00**	Speaker 5-1/4", 4Ω, 25w
d)	**5045-12914-00**	Capacitor, 10mfd, 50v, ±20%
9	**A-21773**	Aux. 8 Drive PCB Assembly

Ribbon Cables:

10	**5795-10938-19**	Ribbon Cable 26-Pin, 19"
11	**5795-13434-25**	Ribbon Cable w/Ferrite
12	**5795-12653-15**	Ribbon Cable 34-Pin, 15"
13	**5795-15420-00**	Ribbon Cable 34-Pin, 3"

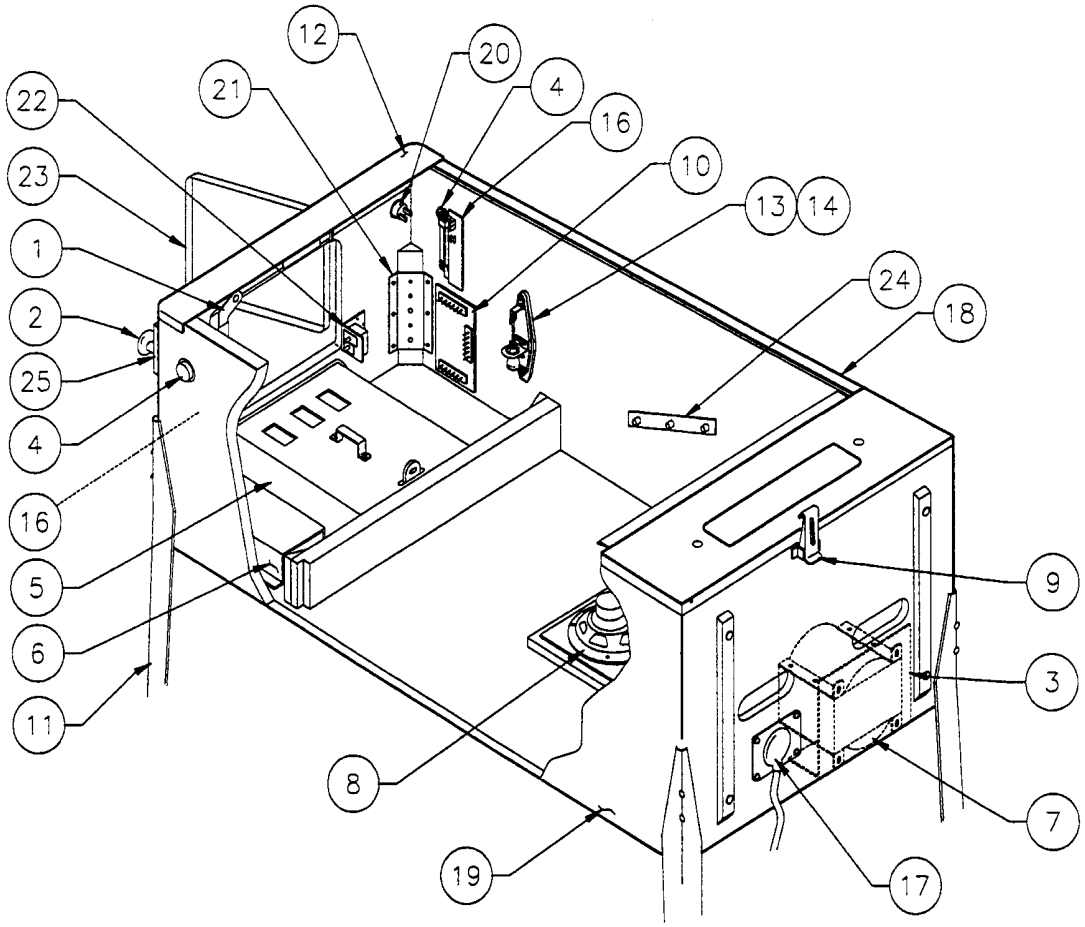
Miscellaneous Parts: (Not Shown)

Part Number	Description
01-8397	Bracket Trunk Latch
02-5223	Button Speaker Panel (4)

Cables:

H-20477	Logic Power Cable
H-20478-1	Secondary Cable
H-20479	Dot Matrix Power Cable
H-22208-2.1	Backbox Insert Cable

50061-CAB Cabinet Assembly



Item	Part Number	Description
1	**A-16773-1**	Lever Guide Assembly
2	**B-12445-1**	Ball Shooter Assy.
3	**01-13936**	Drip Plate – Narrow
4	**A-16883-6**	Flipper Button w/Spring (2)
5	**A-22023-5**	6-Ball Cashbox Assembly
6	**A-20871**	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**	Plumb 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	**11-1353**	Wood Cabinet
20	**20-9663-16**	Push Button w/Sw., *Start* (Yellow)
21	**01-11400**	Leg Plate (4)
22	**A-18249-3**	Cable & Interlock Switch Assy.
23	**09-61000-1**	Coin Door-U.S.A.
24	**01-11408**	Plate Spacer (2)

Item	Part Number	Description
25	**01-3535**	Rod Mounting Plate

Miscellaneous Parts: (Not Shown)

	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" (6)

Cabinet Cables:

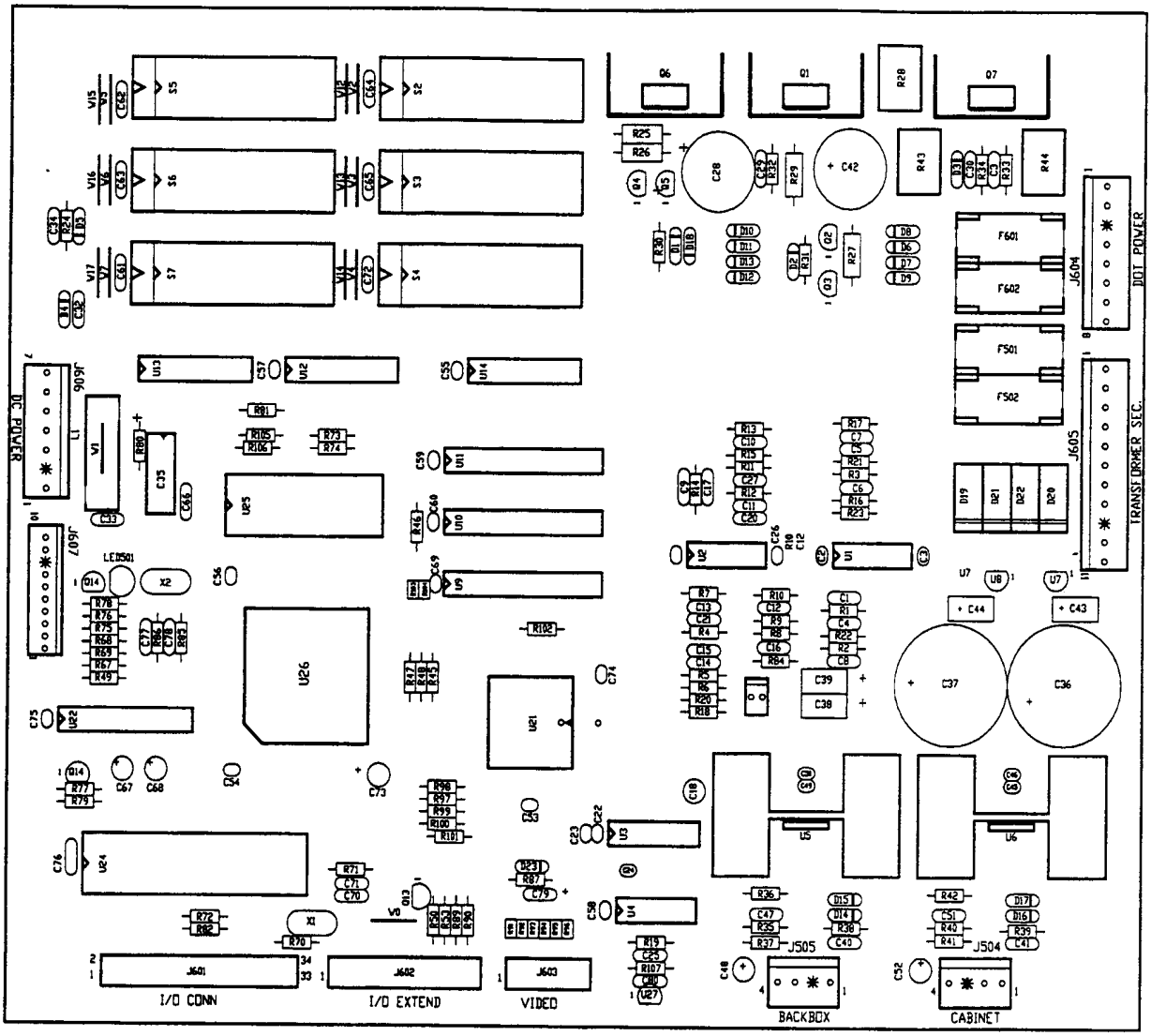
	A-20201	Cable & Jumper Assy., Coin Door
	H-17217.1	Plumb/Bob Mech. Protect Cable
	H-17837-2	Voltage Program Jumper Cable
	H-20599-1.1	WPC '95 Cabinet Cable
	H-19601-1	Power Extension Cable
	H-20856	Cabinet Switch/Lamp Cable

* See Power Interface/Cordset Application Chart on page 2-54.

A-20516-50061 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, R81, 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, 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%)
5040-15413-00	C36, C37	Cap., 10000µf, 35v, 25mm
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.
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, C81, C82	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
5317-12211-00	U12-U14	IC Octal Buffer 74ALS541
5340-12278-00	U25	S/Ram 2064 150NS
5370-12687-00	U27	IC MC 340640Reset Chp
5349-15440-00	U9-U11	SRAm 8Kx8-35ms, 28pdlp
5370-12730-00	U1, U2	IC Op Amp TL084
5370-13419-00	U5, U6	IC TDA 2030AV 18w, Audio Am
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	U5, U6	Heatsink 5298B
5705-14562-00	Q1, Q6, Q7	Heatsink 10-220 wave sol 287
5733-14528-00	F501, F502, F601, F602	Fuse Holder 5x20mm 10A.
5731-14532-00	F501, F502	Fuse 5x20mm T2.5A., 250V
5731-14840-00	F601, F602	Fuse 5x20mm T0.315A., 250V
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, W12-W17, R49	Resistor, 0Ω, 0w
A-5343-50061-S2	S2	ROM Assembly
A-5343-50061-S3	S3	ROM Assembly
A-5343-50061-S4	S4	ROM Assembly
A-5343-50061-S5	S5	ROM Assembly
A-5343-50061-S6	S6	ROM Assembly

A-20516-50061 WPC '95 Audio Visual PCB Assembly

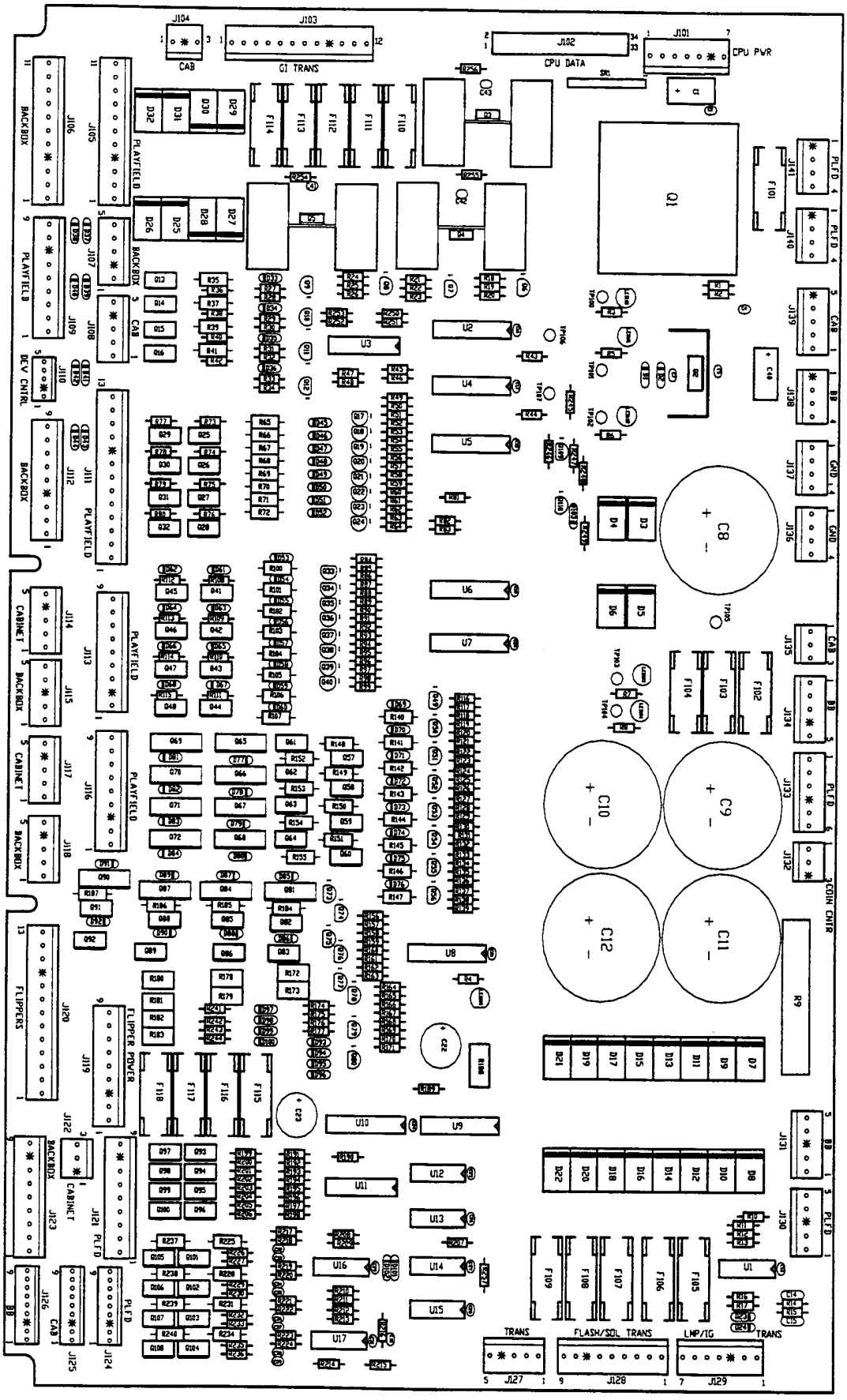


A-20028 WPC '95 Power Driver PCB Assembly

Part Number	Designator	Description
5040-14569-00	C1, C40	Capacitor, 100µF, 25v, Ax.
5043-08996-00	C2, C4, C5, C7, C13, C16-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 1.0A.
5070-14526-00	D3-D22	Diode P600G 6A 400 PIV
5070-08919-00	D101, D102	Diode, 1N4148 150mA.
5731-14531-00	F101	Fuse 5 x 20mm T.63A., 250V
5731-14530-00	F102-F105, F107, F109-F118	Fuse 5 x 20mm T 4A, 250V
5731-14046-00	F106	Fuse, 5x20mm T5.0A, 250V
5731-14529-00	F108	Fuse 5 x 20mm T6.3A, 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 4 Quad Low Gate Current
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%
5013-14534-00	R2	Resistor, 243Ω, 1/4w, 1%
5010-09224-00	R5, R14-R17	Resistor, 270Ω, 1/4w, 1%

Part Number	Designator	Description
5010-09999-00	R3, R4, R6-R8, R43, R44, R81-R83, R190	Resistor, 2KΩ, 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%
5010-09036-00	R247	Resistor, 100Ω, 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%
5010-10171-00	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, 150Ω, 1/4w, 5%
5010-09534-00	D25-D32	Resistor, 0Ω, 0w
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

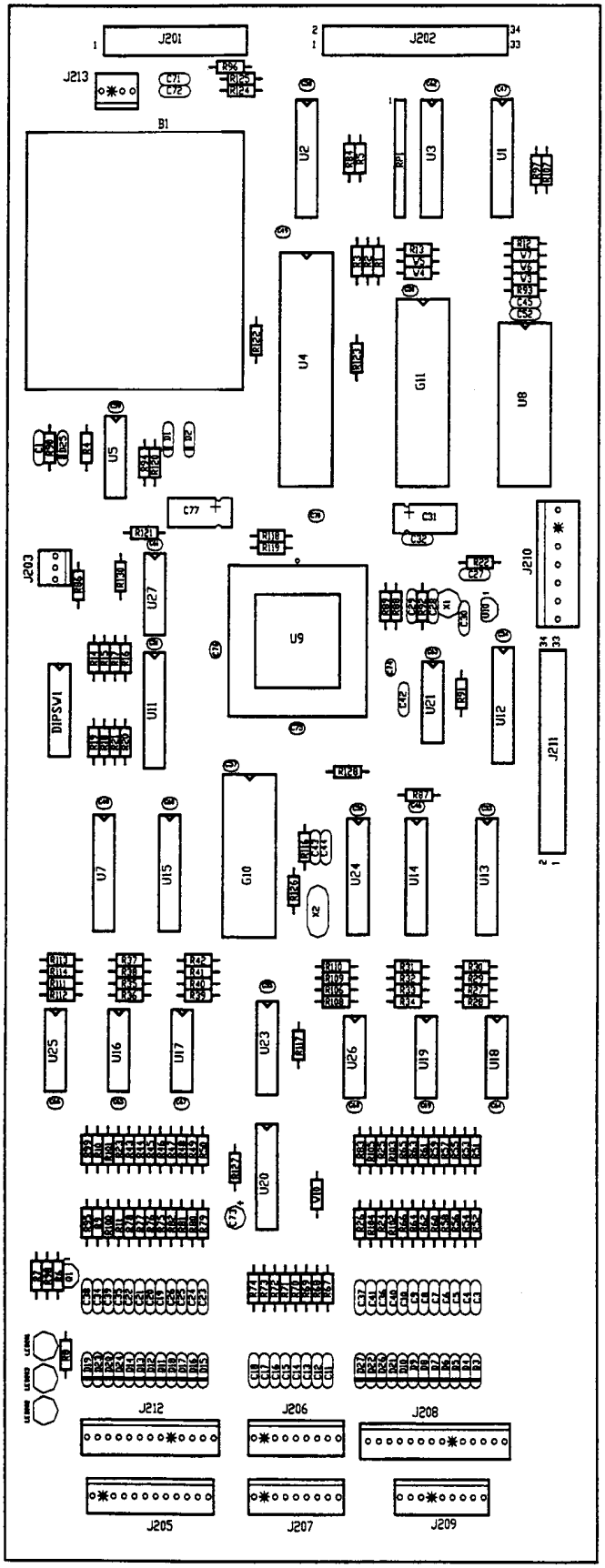
A-20028 WPC '95 Power Driver PCB Assembly



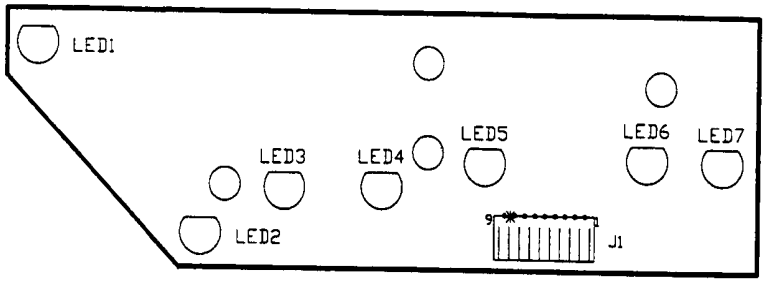
A-21377-50061 WPC '95 CPU PCB Assembly

Part Number	Designator	Description
A-15814	B1	Battery Holder
5048-11033-00	C1, C42	Capacitor, .022m, 50v, 10% Axial
5048-11030-00	C3-C26, C34-C41	Capacitor, 470p, 50v, Axial
5043-09030-00	C27	Capacitor, .047m, 50v (±20%) Axial
5048-13375-00	C28	Capacitor, 100p, 50v (10%) Axial
5048-11028-00	C29, C30, C43, C44	Capacitor, 22p, 50v Axial
5040-14569-00	C31, C77	Capacitor, 100mf, 25v Axial
5048-11031-00	C32	Capacitor, .001m, 50v, 10% Axial
5043-08996-00	C45-C70, C74-C76	Capacitor, 0.1m, 50v (±20%) Axial
5040-13098-00	C73	Capacitor, 4.7µF, @35v (±20%)
5645-09025-00	DIPSW1	Switch Dip 8 Pos
5070-09266-00	D1, D25	Diode 1N5817 1.0A.
5070-08919-00	D2-D24, D26, D27	Diode 1N4148 150ma
5700-10176-00	G10A	Socket Dip 28.6
5700-12088-00	G11	Socket Dip 32.6p"
5700-08985-00	U4	Socket I C 40Pl N .6
5700-12424-00	U9	socket 84 Pl N PL CC
5700-10389-00	U20	Socket I C 18 PIN 3"
5791-10850-00	J201	26H STR Sq. .100
5791-12516-00	J211, J202	34 HDR 2x17 .100
5791-13830-12	J205	12H STR Sq. Pin .100 Solid Tab
5791-13830-09	J206, J207, J209	9H STR Sq. Pin .100 Solid Tab
5791-13830-14	J208	14H STR Sq. Pin .100 Solid Tab
5791-10862-07	J210	7H STR Sq. Pin .156
5791-13830-13	J212	13H STR Sq. Pin .100 Solid Tab
5671-14516-00	LED201, LED202, LED203	LED DSPL RED T-1 3/4
5160-10269-00	Q1	Trans 2N3904 NPN
5019-09669-00	RP1	SIP 1K 9R 10 5%
5010-09358-00	R1, R2, R3, R4, R9, R10, R11, R23, R24, R25, R26, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R93, R95, R96, R97, R99, R100, R101, R102, R103, R104, R105, R106 R107, R108, R109, R110, R111, R112, R113, R114, R117	Resistor, 1KΩ, 1/4w, 5%
5010-09416-00	R5, R6, R7, R8, R12, R13, R87, R88, R89	Resistor, 470Ω, 1/4w, 5%
5010-09034-00	R14, R15, R16, R17, R18, R19, R20, R21, R22, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, 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, R119, R120, R121, R122 R123, R128, R130	Resistor, 150Ω, 1/4w, 5%
5010-09534-00	W3, W4, W7, R124, R125	Resistor, 0Ω, 0w
5010-10258-00	R126	Resistor, 1M, 1/4w, 5%
5010-09040-00	R127	Resistor, 33Ω, 1/4w, 5%
5281-09867-00	U1, U2	I C 74LS244 OCT BUF
5281-09308-00	U3	I C 74LS245 TRNC
5281-09851-00	U5	I C 74LS14 SMT/TRG
5315-12031-00	U7	I C 74HCT244
5340-12558-00	U8	IC RAM 8K x8 Static Cmos 100ns
5370-12687-00	U10	I C MC 34064 Reset CHP
5281-10182-00	U11, U12, U13, U15	I C 74LS240 L/DRVR
5311-14068-00	U14, U24	I C 74HC574 OCTAL D-Latch
5370-12272-00	U16, U17, U18, U19, U25, U26	I C LM339 Quad Comp
5284-12651-00	U21	I C 4584 Hex Schmtt
5311-14554-00	U23	U I C 74HC237 3 to 8 NON I NV DE
5281-09247-00	U27	I C 74LS02 Quad Nor
5520-12084-00	X1	Crystal 32. 768 KHZ
5520-14761-00	X2	XTL 8MHz Anti-Res Parallel Cut
A-5400-50061-1	G10	PIC16C57 Assembly
A-5343-50061-1	G11	Game ROM Assembly
5880-09022-00	B1	Battery 1.5v, AA Alk.
5400-10320-00	U4	IC MPU 68B09E
5410-12426-00	U9	IC WPC-89 ASIC
5162-12422-00	U20	Trans Uln 2803 Oc-Drl

A-21377-50061 WPC '95 CPU PCB Assembly

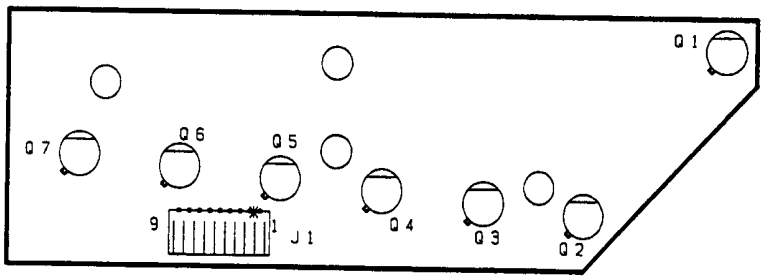


A-18617 Trough IRED LED PCB Assembly



Part Number	Designator	Description
5671-12731-00	LED1 – LED7	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

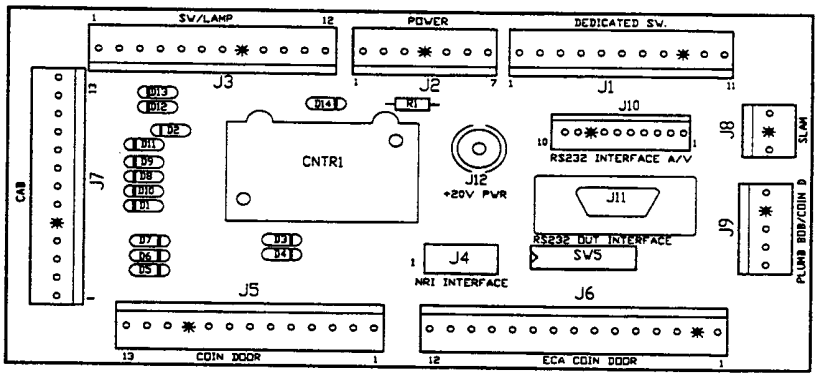
A-18618 Trough IRED Transistor PCB Assembly



Part Number	Designator	Description
5163-14114-00	Q1 – Q7	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header Sq.

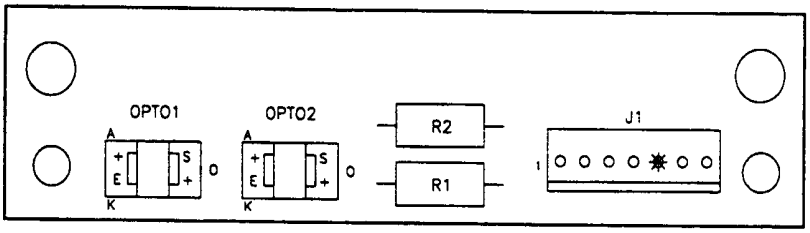
A-20580 Coin Interface PCB Assembly

(This board does not contain optional items such as the coin counter and printer interface.)



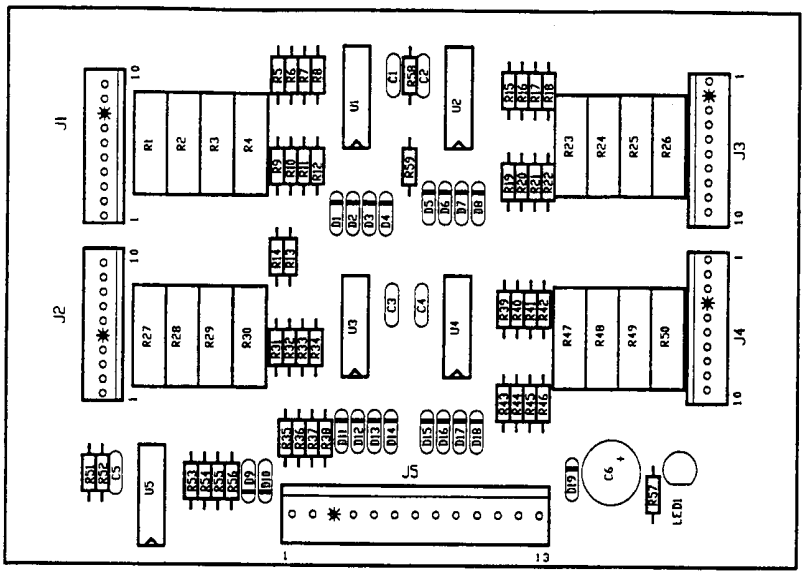
Part Number	Designator	Description
5070-09054-00	D1-D14	Diode 1N4004 1.0A.
5791-10862-11	J1	Connector, 11-pin Header Str. Sq.
5791-10862-07	J2	Connector, 7-pin Header Str. Sq.
5791-10862-12	J3	Connector, 12-pin Header Str. Sq.
5791-11000-10	J4	Connector, 10-pin Header Str. Sq.
5791-10862-13	J5, J7	Connector, 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.
5010-13517-00	R1	Resistor, 15Ω, ¼w, 5%
5645-09025-00	SW5	Switch DIP 8 Pos.

A-17316 Flipper Opto PCB Assembly



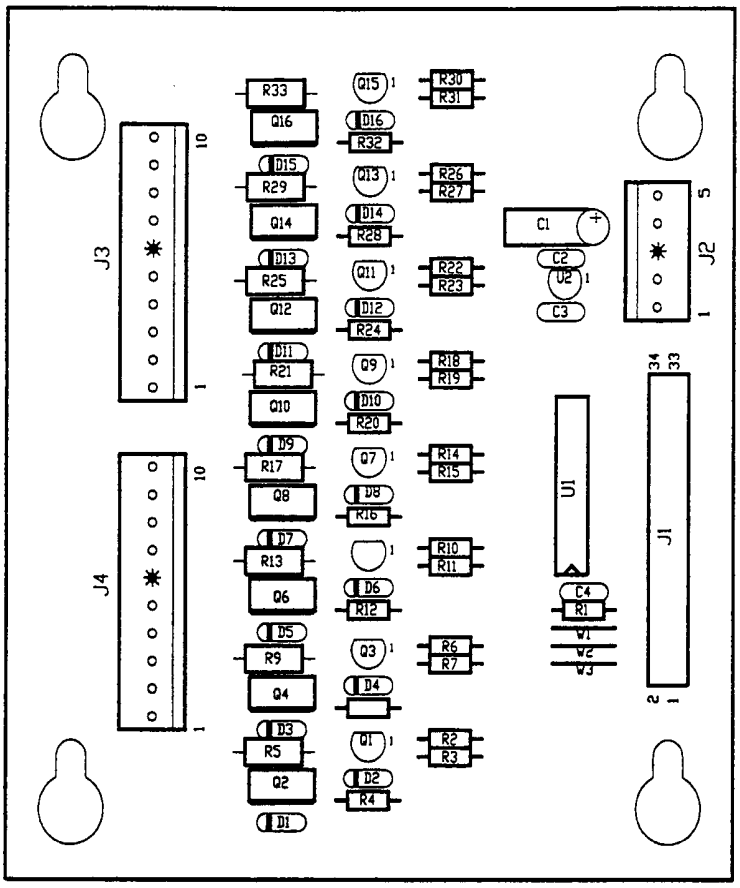
Part Number	Designator	Description
A-20207.1	-	Flipper Opto Switch PCB
5010-09061-00	R1, R2	Resistor, 680Ω, 1/2w, 5%
5490-14575-00	OPTO1, OPTO2	IC Opto Integ Schmitt 10mA.
5791-13830-07	J1	Connector, 7-pin Header Solid Sq.
03-9001.1	-	Interrupter Flip-Opto
01-14348	-	Spring Flipper Switch

A-22019-2 16 Opto Driver PCB w/Brackets



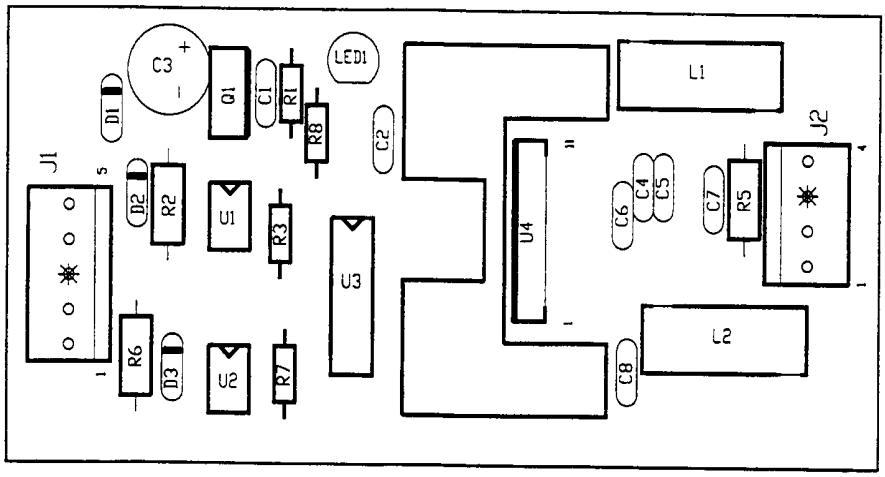
Part Number	Designator	Description
A-22019	-	16 Opto Driver PCB Assembly
5043-08996-00	C1 C5	Capacitor, 0.1m, 50v, ±20 Axial.
5040-13102-00	C6	Capacitor, 470µf, @35v ±20%
5070-09054-00	D1-D19	Diode 1N4004, 1.0A.
5791-13830-00	J1-J4	Connector, 10-pin Header STR SQ.
5791-10862-13	J5	Connector, 13-pin Header STR SQ.
5671-14516-00	LED1	Led Display Red T 1-3/4"
5010-12928-00	R1-R4, R23-R30, R47-R50	Resistor 270Ω, 2w, 5%
5010-09999-00	R5-R12, R15-R22, R31-R46, R57	Resistor 2K Ω, 1/4w, 5%
5010-08776-00	R51	Resistor 68K Ω, 1/4w, 5%
5010-08774-00	R13, R14, R53, R55	Resistor 22K Ω, 1/4w, 5%
5010-09162-00	R52, R54, R56, R58, R59	Resistor 100K Ω, 1/4w, 5%
5370-12272-00	U1-U5	IC LM339 Quad Comp
01-10756	-	PCB Mounting Bracket
07-6688-18N	-	Rivet: 1/8 x 3/16

A-21773 Auxiliary 8 Driver PCB Assembly



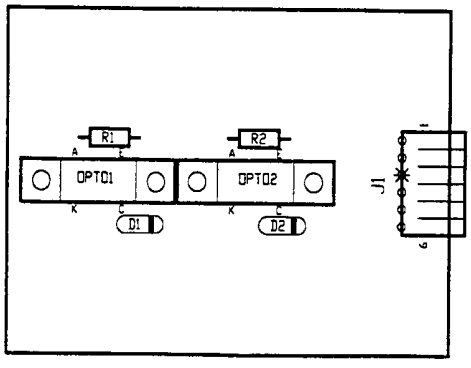
Part Number	Designator	Description
5040-12808-00	C1	Capacitor 10µF, 35v, Axial
5043-08996-00	C2-C4	Capacitor 0.1µF, 50v, ±20%
5070-09054-00	D1-D16	Diode 1N4004, 1.0A.
5791-12516-00	J1	Connector, 34Hdr 2x17 .100
5791-10862-05	J2	Connector, 5H, STR Sq. .156
5791-10862-10	J3, J4	Connector, 10H STR Sq. Pin
5190-09016-00	Q1, Q3, Q5, Q7, Q9, Q11, Q13, Q15	Transistor 2N4403 PNP
5162-12635-00	Q2, Q4, Q6, Q8, Q10, Q12, Q14, Q16	Transistor TIP 102
5010-08991-00	R1, R2, R6, R10, R14, R18, R22, R26, R30	Resistor 4.7KΩ, 1/4w, 5%
5010-09416-00	R3, R7, R11, R15, R19, R23, R27, R31	Resistor, 470Ω, 1/4w, 5%
5010-10171-00	R4, R8, R12, R16, R20, R24, R28, R32	Resistor 56Ω, 1/4w, 5%
5011-12956-00	R5, R9, R13, R17, R21, R25, R29, R33	Resistor 2.7KΩ, 1W
5317-12212-00	U1	I.C. 74LS574 Oct F-F
5250-13302-00	U2	Reg 78L05T
5010-09534-00	W1	Resistor 0Ω, 0w

A-16120 DC Motor Control Assembly (4 Way)



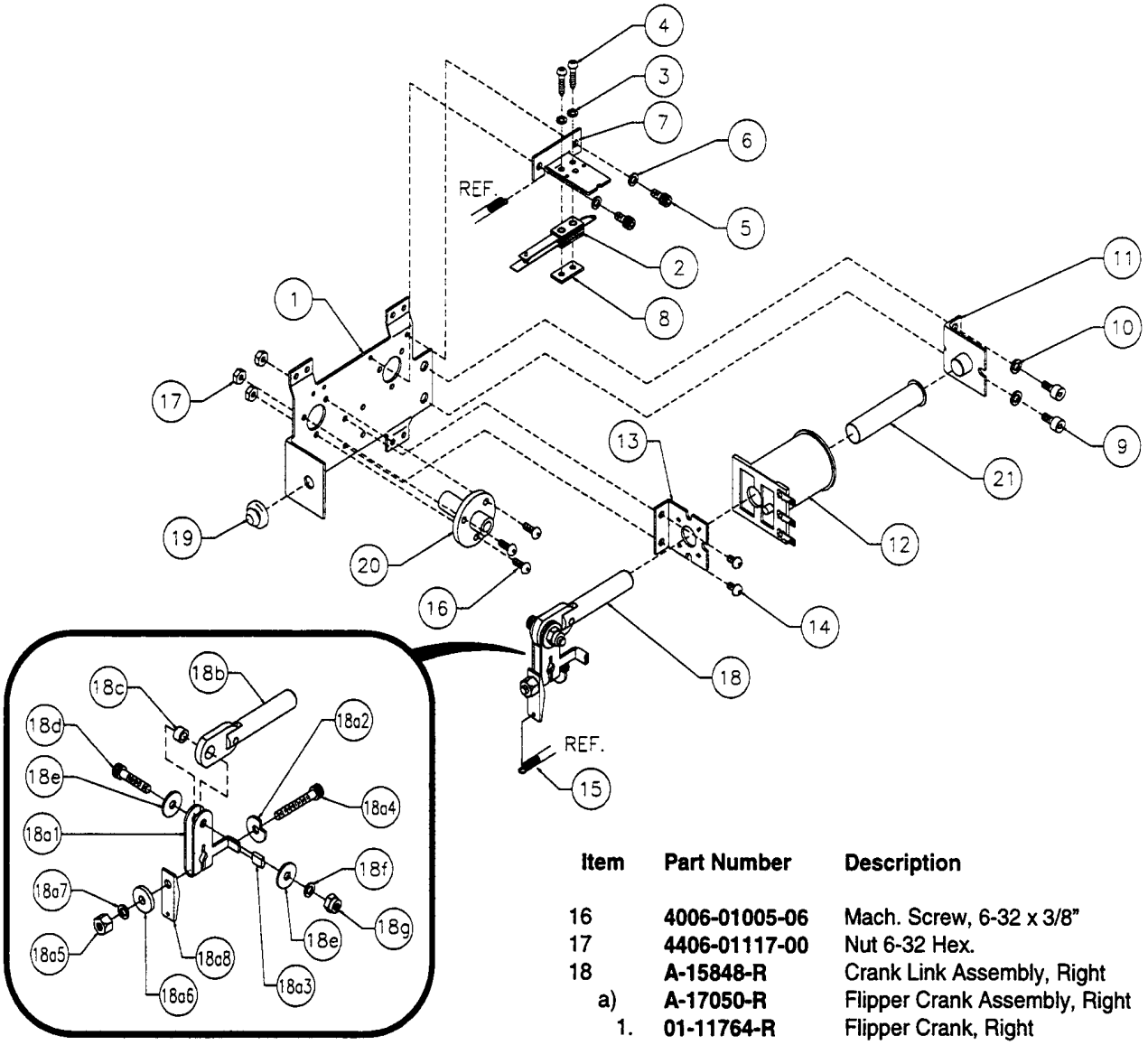
Part Number	Designator	Description
5791-12273-04	J2	Connector 4-H STR Sq. Lck. .156
5791-12273-05	J1	Connector 5H STR Sq. Lck. .156
5671-13732-00	LED1	Display RED LED
5070-09054-00	D1-D3	Diode 1N4004 1A.
5551-09822-00	L1, L2	Ind. 4.7µH, 3A.
5010-09061-00	R2, R6	Resistor, 680µ, 1/2w, 5%
5010-10255-00	R5	Resistor, 10Ω, 1/2w, 5%
5010-08997-00	R3, R7, R8	Resistor, 2.7KΩ, 1/4w, 5%
5010-09085-00	R1	Resistor, 1.5KΩ, 1/4w, 5%
5040-10974-00	C3	Capacitor, 100µF, 35V. Rad.
5281-09500-00	U3	IC 74LS32 Quad OR
5370-13342-00	U4	IC 3A. DMOS Bridge Driver
5490-10892-00	U1, U2	IC Opto Isolator 4N25
5250-09157-00	Q1	Reg. 7805 1A 5V
5043-08980-00	C2, C4, C6-C8	Capacitor, 0.01µF, 50v, +80-20%
5043-12807-00	C1	Capacitor, 1µF, 50v, +80-20%
5043-08996-00	C5	Capacitor, 0.1µF, 50v, +80-20%

A-22026 Motor 2-Opto PCB Assembly



Part Number	Designator	Description
5070-09054-00	D1, D2	Diode 1N4004 1.0A.
5013-14535-00	R1, R2	Resistor 750 1/4w, 1%
5490-13341-00	Opto1, Opto2	I.C. Opto Intr w/Tab
5791-12622-06	Opto1, Opto2	Connector, 6 Header R/A Lck. .100 Solid Tab

A-14876-R-3 Flipper Assembly



Item	Part Number	Description
1	**A-14877-R**	Flipper Base Assembly, Right
2	**SW-1A-194**	Switch Assembly
3	**4701-00002-00**	Lock Washer #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**	Lock Washer #8 Split
7	**01-9375**	Switch Mounting Bracket
8	**20-6516**	Speednut, Tinnerman
9	**4010-01066-06**	Cap Screw, 10-32 x 3/8"
10	**4701-00004-00**	Lock Washer #10 Split
11	**A-12390**	Flipper Stop Assembly
12	**FL-11629**	Flipper Coil, Blue
13	**01-7695-1**	Solenoid Bracket
14	**4006-01017-04**	Mach. Screw, 6-32 x 1/4"
15	**10-364**	Spring

Item	Part Number	Description
16	**4006-01005-06**	Mach. Screw, 6-32 x 3/8"
17	**4406-01117-00**	Nut 6-32 Hex.
18	**A-15848-R**	Crank Link Assembly, Right
a)	**A-17050-R**	Flipper Crank Assembly, Right
1.	**01-11764-R**	Flipper Crank, Right
2.	**4700-00107-01**	Mod-Crank Washer
3.	**RM-23-06**	H.S. Tubing ¼"
4.	**4010-01066-20**	Mach. Screw, 10-32 x 1-1/4"
5.	**4410-01127-00**	Nut, 10-32 Hex.
6.	**4700-00107-00**	FW: 13/64 x 5/8 x 12ga.
7.	**4701-00004-00**	Lockwasher #10 Split
8.	**01-9376**	Spring Retainer Bracket
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**	Lock Washer #10 Split
g)	**4410-01132-00**	Nut 10-32 ESN
19	**23-6577**	Bumper Plug, 5/8"
20	**03-7568**	Flipper Bushing
21	**03-7066-5**	Coil Tubing

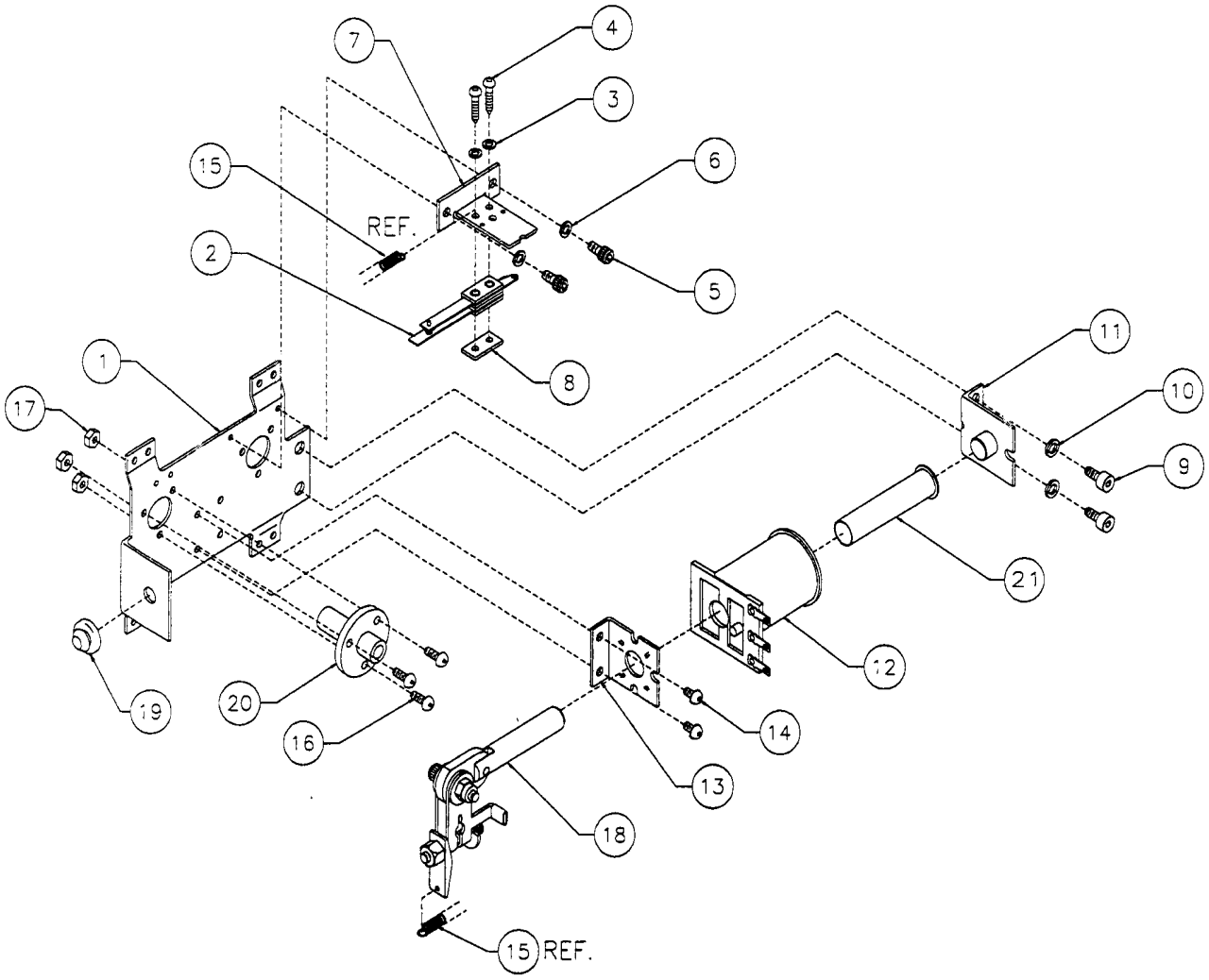
Associated Parts: (Not Shown)

23-6519-4	Flipper Ring
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 Flipper Assembly



Item	Part Number	Description
1	**B-13104-R**	Flipper Base Assembly, Right
2	**SW-1A-194**	Switch Assembly
3	**4701-00002-00**	Lock Washer #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**	Lock Washer #8 Split
7	**01-9375**	Switch Mounting Bracket
8	**20-6516**	Speednut, Tinnerman
9	**4010-01066-06**	Cap Screw, 10-32 x 3/8"
10	**4701-00004-00**	Lock Washer #10 Split
11	**A-12390**	Flipper Stop Assembly
12	**FL-11630**	Flipper Coil
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.

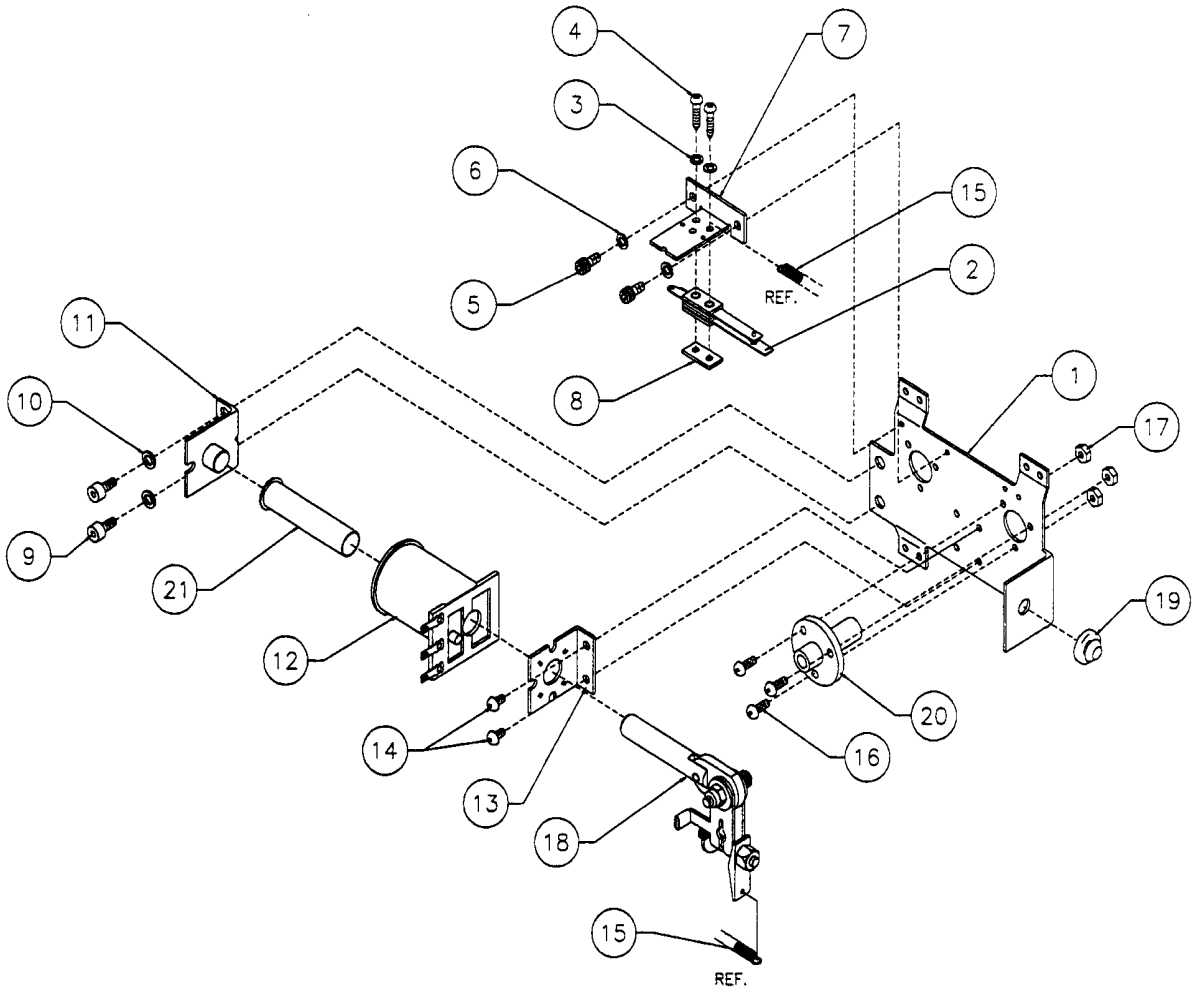
Item	Part Number	Description
*18	**A-15848-R**	Crank Link Assembly, Right
a)	**A-17050-R**	Flipper Crank Assembly, Right
1.	**01-11764-R**	Flipper Crank, Right
2.	**4700-00107-01**	Mod-Crank Washer
3.	**RM-23-06**	H.S. Tubing ¼"
4.	**4010-01066-20**	Mach. Screw, 10-32 x 1-1/4"
5.	**4410-01127-00**	Nut, 10-32 Hex.
6.	**4700-00107-00**	FW: 13/64 x 5/8 x 12ga.
7.	**4701-00004-00**	Lockwasher #10 Split
8.	**01-9376**	Spring Retainer Bracket
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**	Lock Washer #10 Split
g)	**4410-01132-00**	Nut 10-32 ESN
19	**23-6577**	Bumper Plug, 5/8"
20	**03-7568**	Flipper Bushing
21	**03-7066-5**	Coil Tubing

Associated Parts: (Not Shown)

23-6519-4	Flipper Ring
20-10110-6	Flipper Bat w/Shaft

* See page 2-15 for assembly detail drawing.

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**	Lock Washer #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**	Lock Washer #8 Split
7	**01-9375**	Switch Mounting Bracket
8	**20-6516**	Speednut, Tinnerman
9	**4010-01066-06**	Cap Screw, 10-32 x 3/8"
10	**4701-00004-00**	Lock Washer #10 Split
11	**A-12390**	Flipper Stop Assembly
12	**FL-11629**	Flipper Coil, Blue
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.

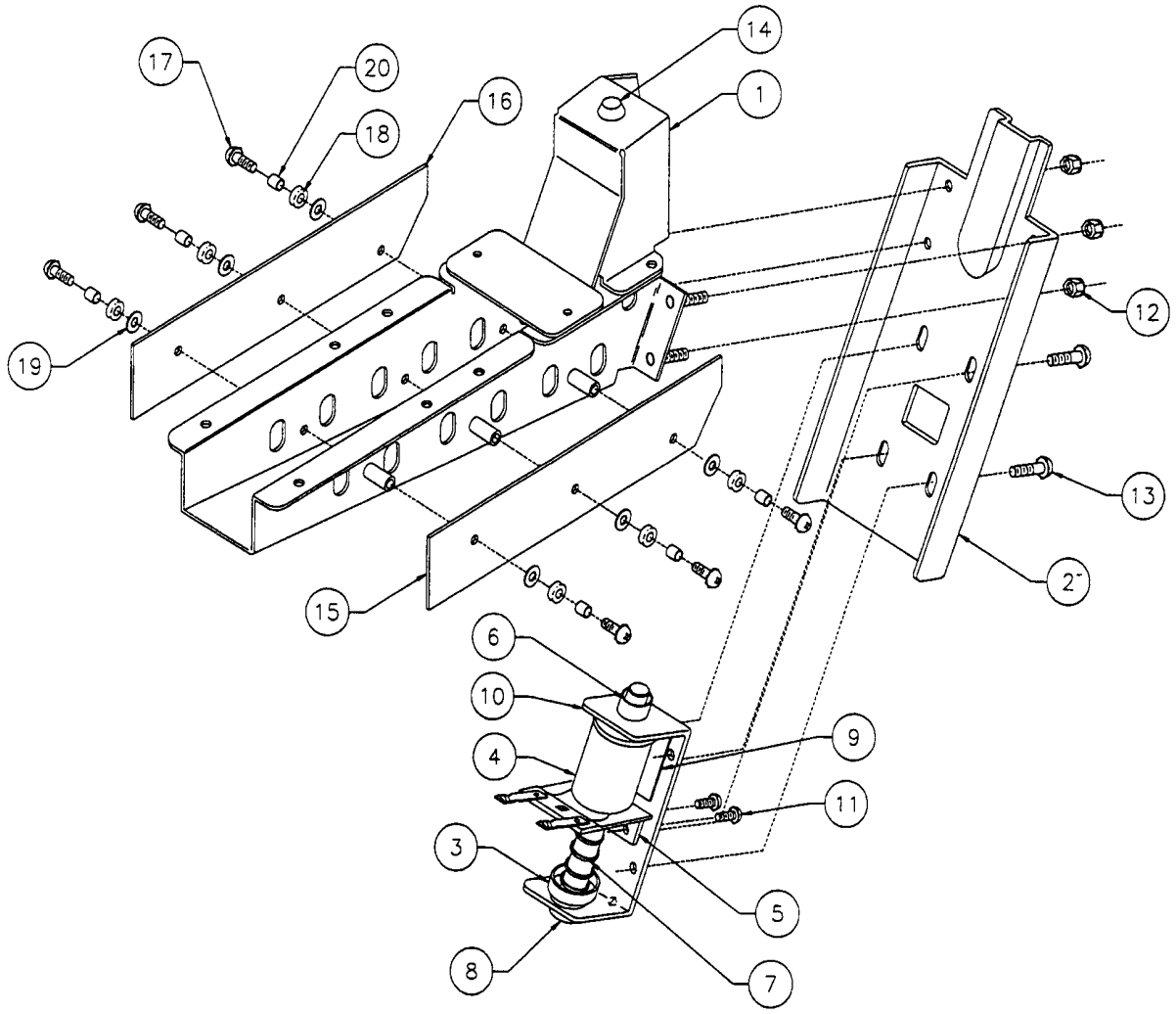
Item	Part Number	Description
*18	**A-15848-L**	Crank Link Assembly, Left
a)	**A-17050-L**	Flipper Crank Assembly, Left
1.	**01-11764-L**	Flipper Crank, Left
2.	**4700-00107-01**	Mod-Crank Washer
3.	**RM-23-06**	H.S. Tubing ¼"
4.	**4010-01066-20**	Mach. Screw, 10-32 x 1-1/4"
5.	**4410-01127-00**	Nut, 10-32 Hex.
6.	**4700-00107-00**	FW: 13/64 x 5/8 x 12ga.
7.	**4701-00004-00**	Lockwasher #10 Split
8.	**01-9376**	Spring Retainer Bracket
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**	Lock Washer #10 Split
g)	**4410-01132-00**	Nut 10-32 ESN
19	**23-6577**	Bumper Plug, 5/8"
20	**03-7568**	Flipper Bushing
21	**03-7066-5**	Coil Tubing

Associated Parts: (Not Shown)

23-6519-4	Flipper Ring
20-10110-6	Flipper Bat w/Shaft

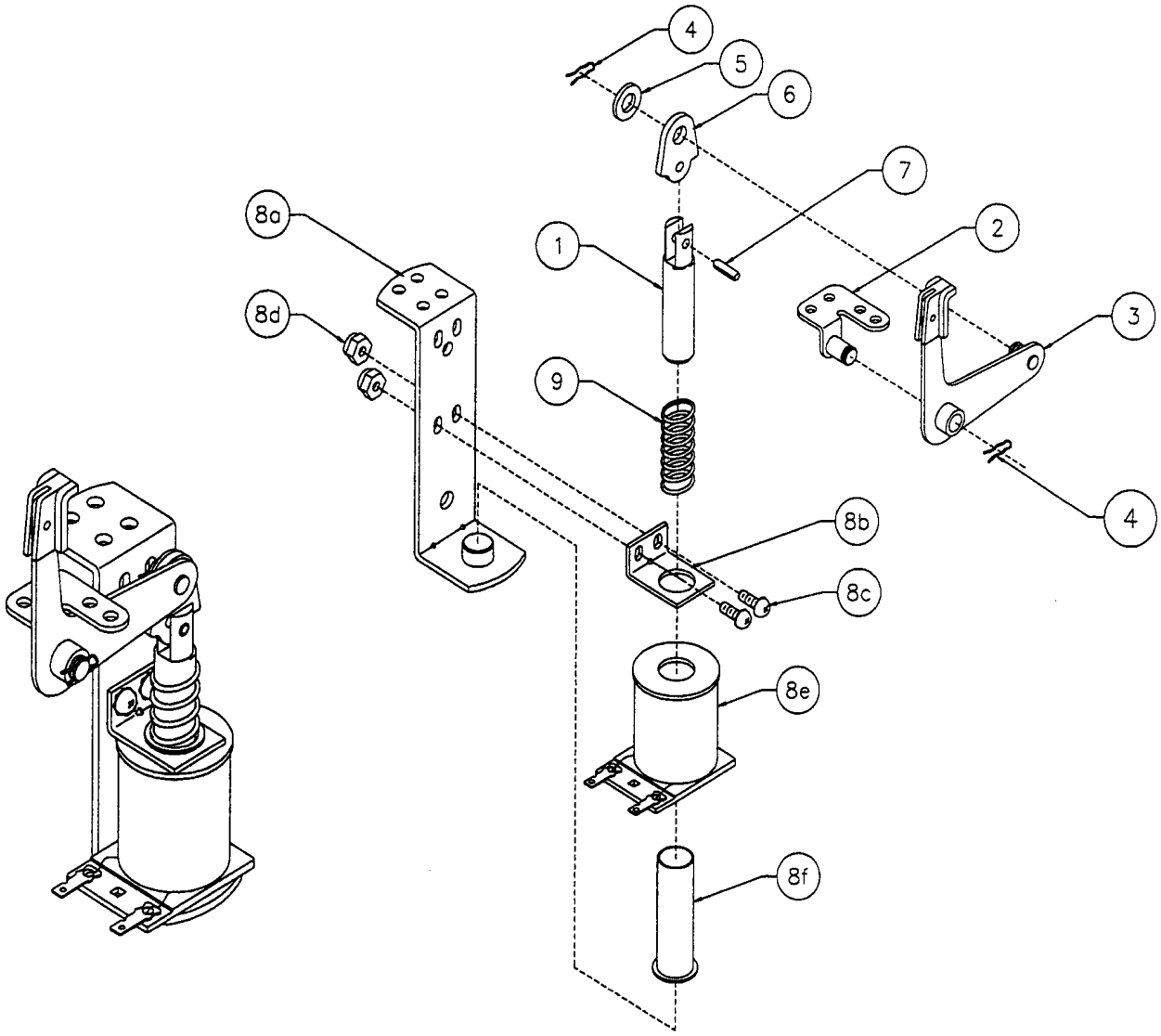
* See page 2-15 for assembly detail drawing.

A-18753 Ball Trough Assembly Complete



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

A-17811 Kicker Arm (Slingshot) Assembly

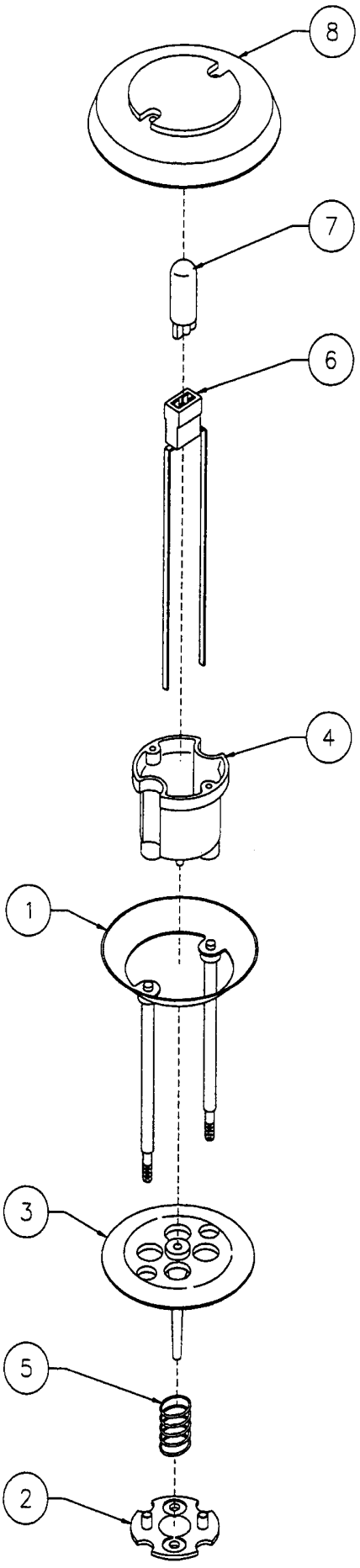


Item	Part Number	Description
1	**02-2364**	Coil Plunger
2	**A-17810**	Mounting Bracket Assy.
3	**A-12664**	Kicker Crank Assembly
4	**12-6227**	Hairpin Clip
5	**4700-00030-00**	FW, 17/64 x 1/2 x 15ga.
6	**03-8085**	Armature Link
7	**20-8716-5**	Roll Pin, 1/8 x 7/16"

Associated Parts for Right & Left Kickers:

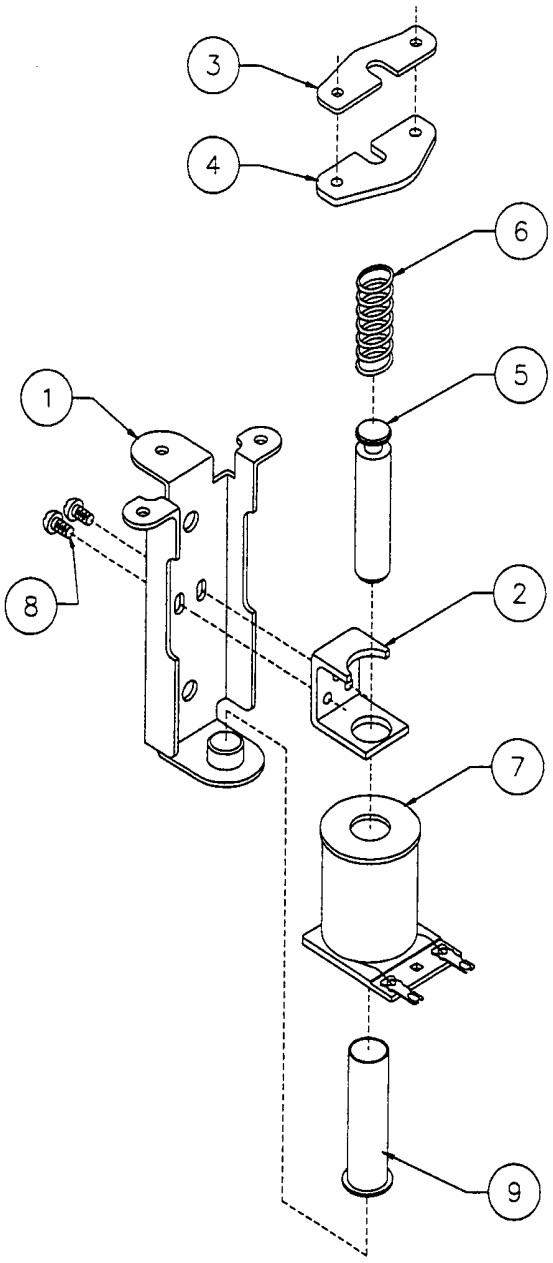
Item	Part Number	Description
8	**A-22206-2**	**Coil & Bracket Assembly, R.**
	A-22207-2	**Coil & Bracket Assembly, L.**
a)	**A-17808**	Bracket & Stop Assembly
b)	**01-8-508-S**	Coil Retaining Bracket
c)	**4006-01017-06**	Mach. Screw, 6-32 x 3/8"
d)	**4406-01119-00**	Nut, 6-32 ESN
e)	**AE-26-1200**	Coil Assembly
f)	**03-7066**	Coil Tubing
9	**10-128**	Spring

B-9414, B-9414-1 & B-9414-3 Jet Bumper Assemblies



Item	Part Number	Description
1	**A-4754**	Bumper Ring Assembly
2	**03-6009-A5**	Bumper Base, White
3	**03-6035-5**	Bumper Wafer, White (use w/B-9414)
	03-6035-1	Bumper Wafer, Blue (use w/B-9414-1)
	03-6035-4	Bumper Wafer, Red (use w/ B-9414-3)
4	**03-7443-5**	Bumper Body, White
5	**10-7**	Spring
6	**24-8776**	Socket-Wedge Base
7	**24-8768**	Bulb #555(6.5v., 0.25A.)
Associated Parts:		
8	**03-8254-9**	Jet Bumper Cap (1)
	03-8254-10	Jet Bumper Cap (1)
	03-9828.1	Jet Bumper Cap, Modified (1)

A-22205-2 Jet Coil & Bracket Assembly

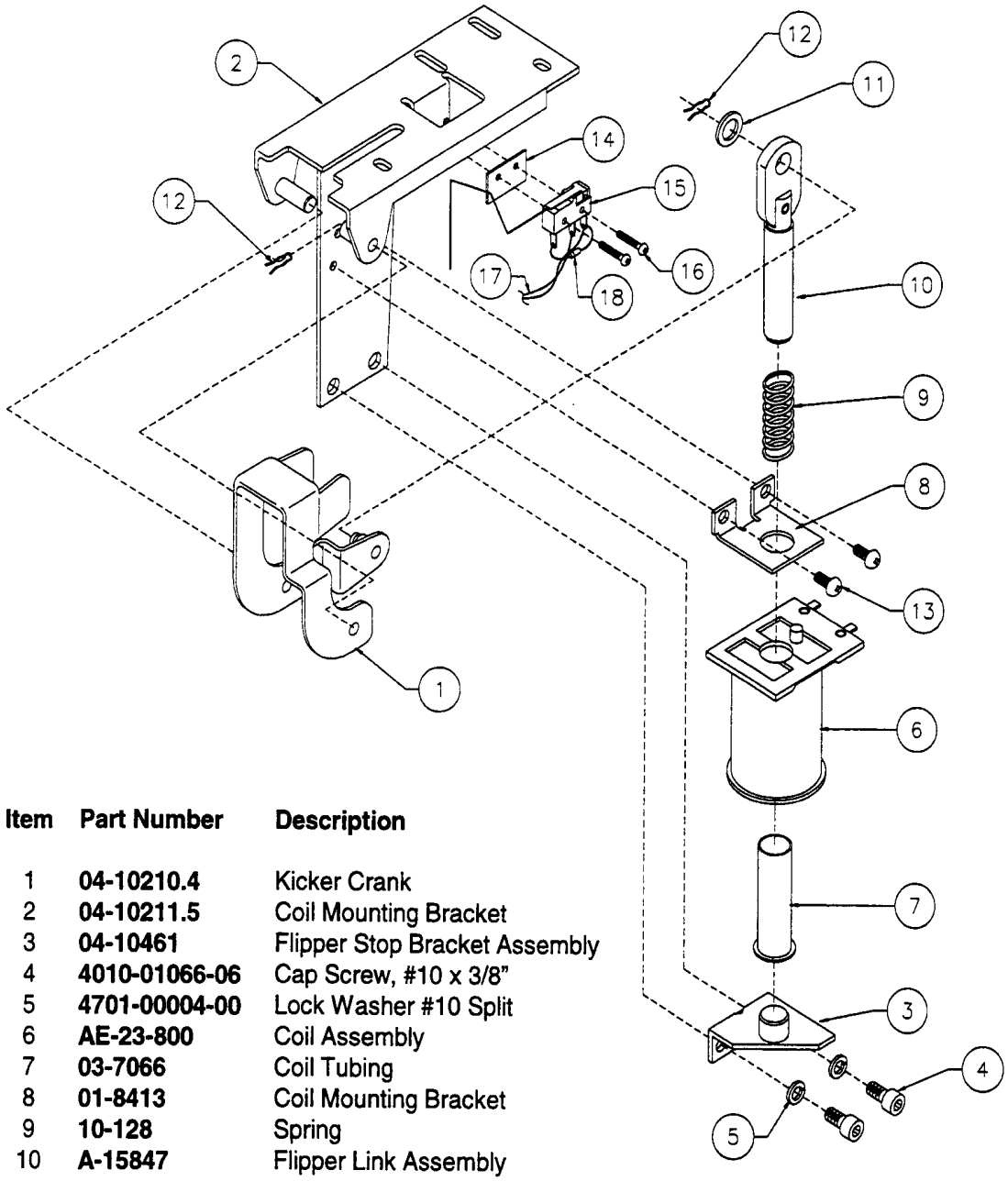


Item	Part Number	Description
1	**04-10888**	Bracket & Stop Assembly
2	**01-1747**	Coil Retaining Bracket
3	**01-5492**	Armature Link, Steel
4	**01-5493**	Armature Link, Bakeline
5	**02-3406-1**	Coil Plunger
6	**10-326**	Armature Spring
7	**AE-26-1200**	Coil Assembly
8	**4006-01017-04**	Mach. Screw, 6-32 x 1/4"
9	**03-7066**	Coil Tubing

Associated Parts: (Not Shown)

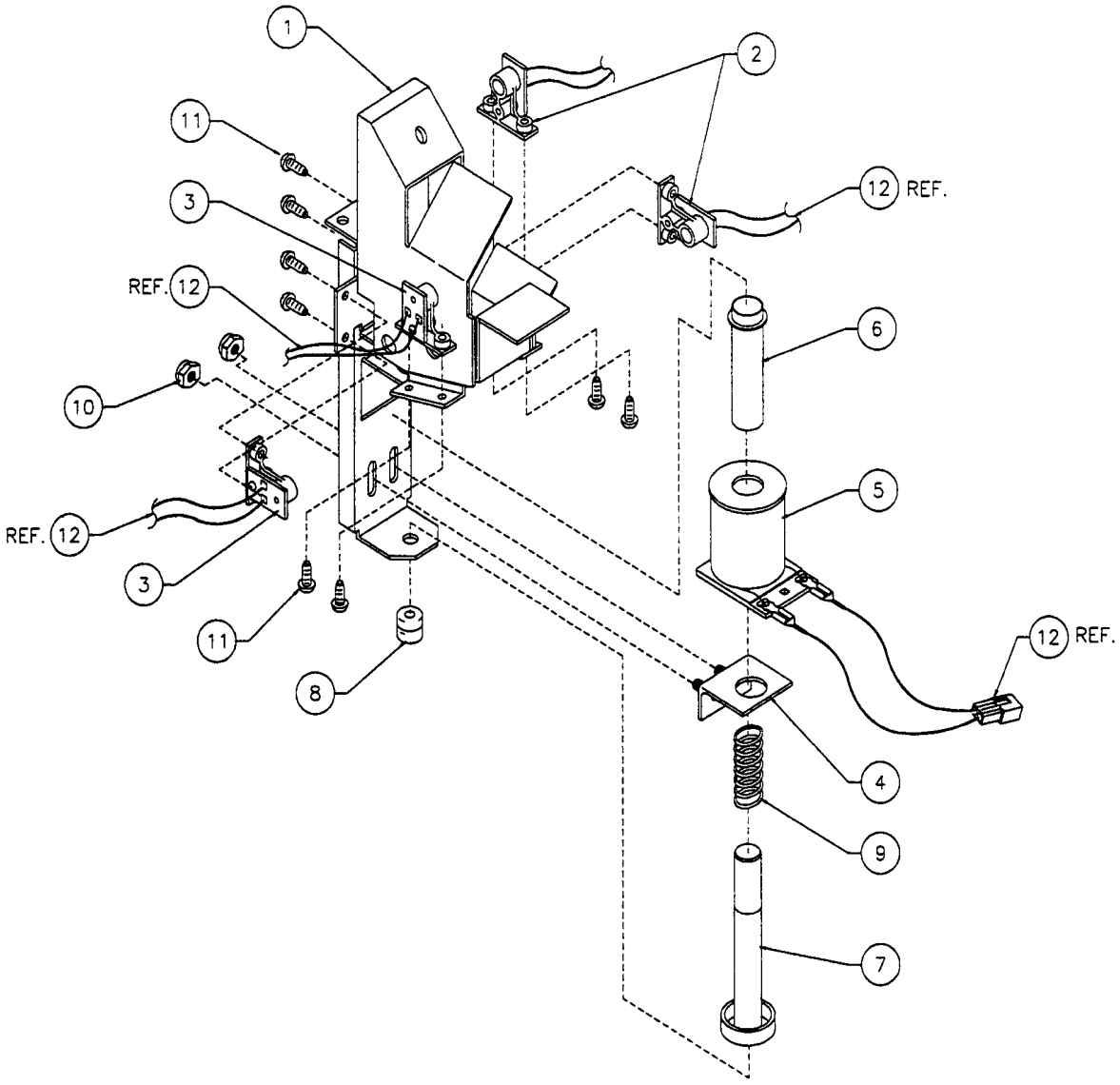
10	**B-12030-2**	Leaf Switch Assembly
a)	**A-16443**	Switch & Diode Assembly
b)	**01-1168**	Switch Mounting Bracket
c)	**01-3670**	Switch Plate
d)	**03-7395**	Switch Actuator
e)	**4005-01003-12**	Mach. Screw, 5-40 x 3/4"
f)	**4405-01117-00**	Nut 5-40 Hex.

A-22204 Shooter Lane Kicker Assembly



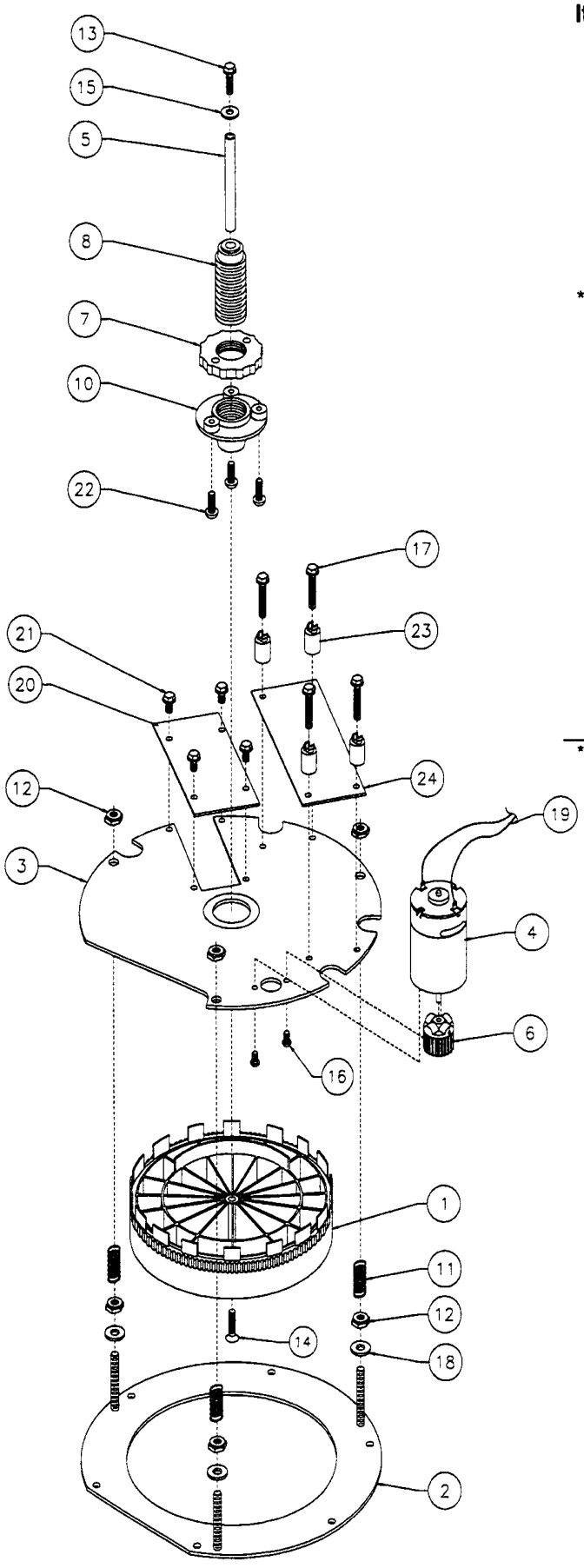
Item	Part Number	Description
1	**04-10210.4**	Kicker Crank
2	**04-10211.5**	Coil Mounting Bracket
3	**04-10461**	Flipper Stop Bracket Assembly
4	**4010-01066-06**	Cap Screw, #10 x 3/8"
5	**4701-00004-00**	Lock Washer #10 Split
6	**AE-23-800**	Coil Assembly
7	**03-7066**	Coil Tubing
8	**01-8413**	Coil Mounting Bracket
9	**10-128**	Spring
10	**A-15847**	Flipper Link Assembly
11	**4700-00104-00**	Flat Washer, 23/64 x ½ x 16ga.
12	**12-6227**	Hair Pin Clip
13	**4006-01003-05**	Mach. Screw, 6-32 x 5/16"
14	**01-8600**	Insulator
15	**5647-12693-68**	Mini-Micro Switch
16	**4002-01105-08**	Mach. Screw, 2-56 x ½"
17	**H-16437**	Cable
18	**5070-09054-00**	Diode

A-22022 Right Popper Assembly



Item	Part Number	Description
1	**04-10978.1**	Right Popper Bracket
2	**A-16908**	Opto LED Assembly
3	**A-16909**	Opto Transistor Assembly
4	**04-10910-1**	Coil Bracket
5	**AE-26-1200**	Coil Assembly
6	**03-7067**	Coil Tubing
7	**A-17767**	Bell Armature Assembly
8	**23-6420**	Rubber Grommet
9	**10-135**	Plunger Spring
10	**4408-01119-01**	Nut 8-32 ESNA NTM
11	**4106-01013-06**	Sh. Metal Screw: #6 x 3/8"
12	**H-22158.1**	Right Popper Cable

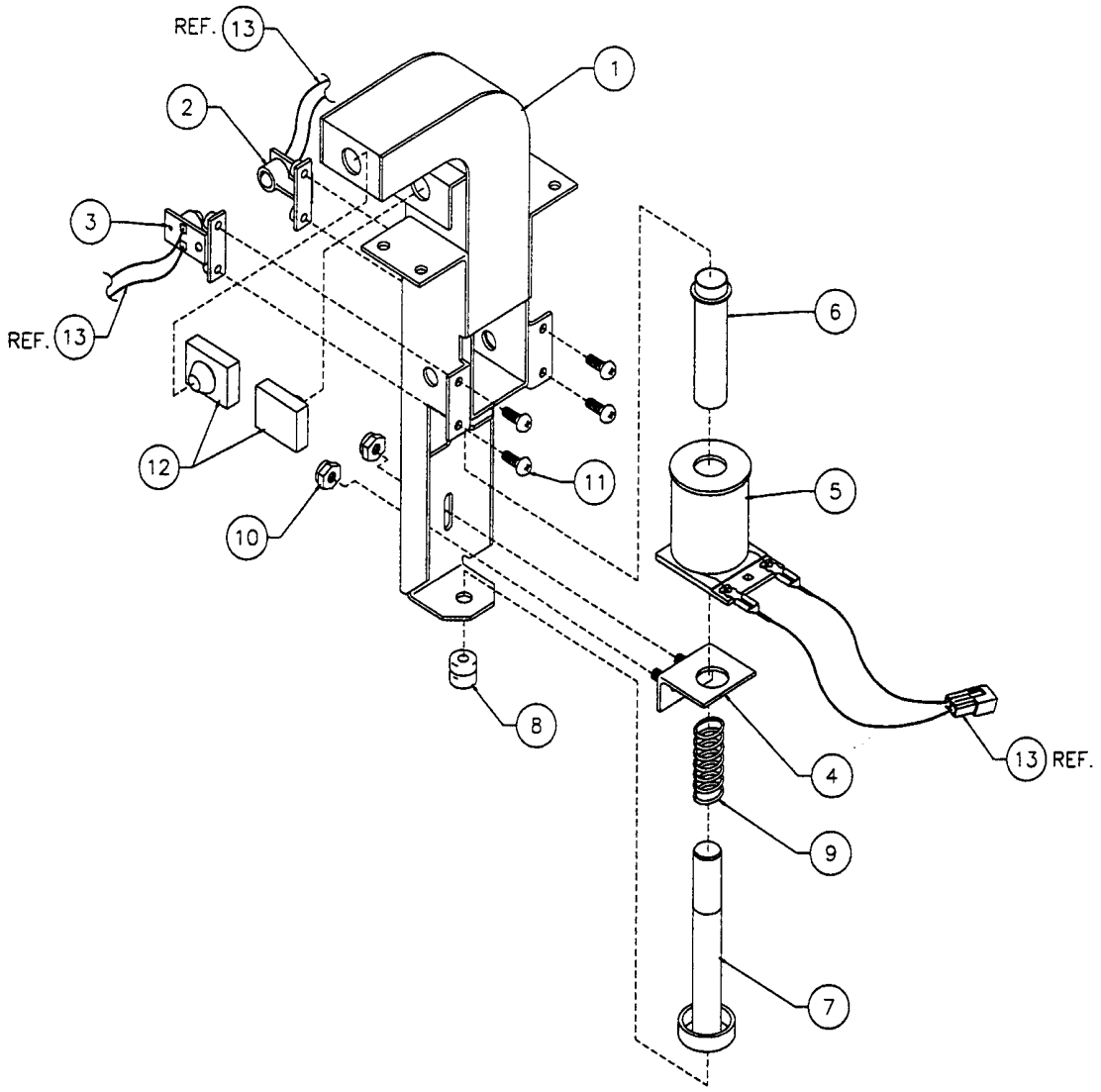
A-21786 Driven Disc Assembly



Item	Part Number	Description
1	**03-9691**	Driven Disc
2	**04-10912**	Base Plate
3	**04-10913.2**	Mounting Plate
4	**14-7955-1**	Motor (Low Speed)
5	**02-4418-1**	Shaft
6	**03-8343**	Pinion-18 Tooth
7	**03-8347**	Gland
8	**04-10412**	Adjusting Screw Assembly
* 9	**31-2957**	Decal - Driven Disc
10	**03-8363-1**	Nut - Locking
11	**10-526**	Leveling Spring
12	**4410-01132-01**	Nut 10-32 ESNA
13	**4008-01168-08**	Mach. Screw 8-32 x ½"
14	**4008-01041-10**	Mach. Screw: 8-32 x 5/8"
15	**4700-00016-00**	Flat Washer: 3/16 x 7/16 x 17ga.
16	**20-9639**	Mach. Screw: M3 x .5 x 6mm
17	**4008-01168-16**	Mach. Screw: 8-32 x 1"
18	**4700-00060-00**	Flat Washer: 7/32 x ½ x 16ga.
19	**H-18601-1**	Cable - Gen. Motor 4-Pin 8"
20	**A-22026**	Motor 2 Opto PCB Assembly
21	**4008-01168-05**	Mach. 8-32 x 5/16"
22	**4108-01013-08**	Sh. Metal Screw: #8 x 3/8"
23	**03-9255-3**	Spacer #8, .541 Long
24	**A-16120**	D.C. Motor Control Assembly

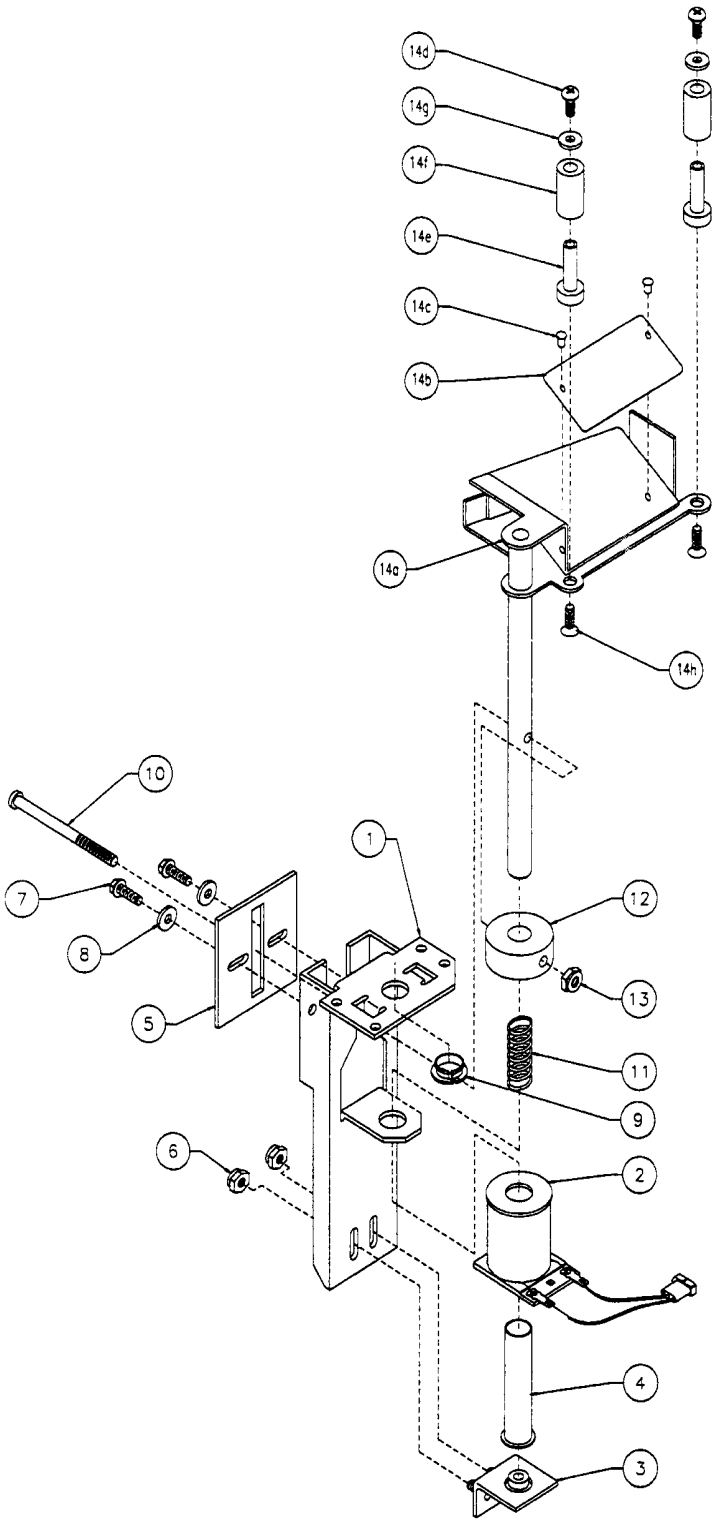
* Not available for individual sale. Order Decal Set 31-2957.

A-21988 Loop Assembly



Item	Part Number	Description
1	**04-10954**	Loop Assembly
2	**A-16908**	Opto LED Assembly
3	**A-16909**	Opto Photo Transistor Assembly
4	**04-10910-1**	Coil Bracket
5	**AE-27-1200**	Coil Assembly
6	**03-7067**	Coil Tubing
7	**A-17767**	Bell Armature Assembly
8	**23-6420**	Rubber Grommet
9	**10-135**	Plunger Spring
10	**4408-01119-01**	Nut 8-32 ESNA/NTM
11	**4106-01013-06**	Sh. Metal Screw: #6 x 3/8"
12	**23-6823**	Rectangular Bumper Pad
13	**H-17607-5**	Inline Opto Cable

A-22010 Floating Ramp Coil & Bracket Assembly

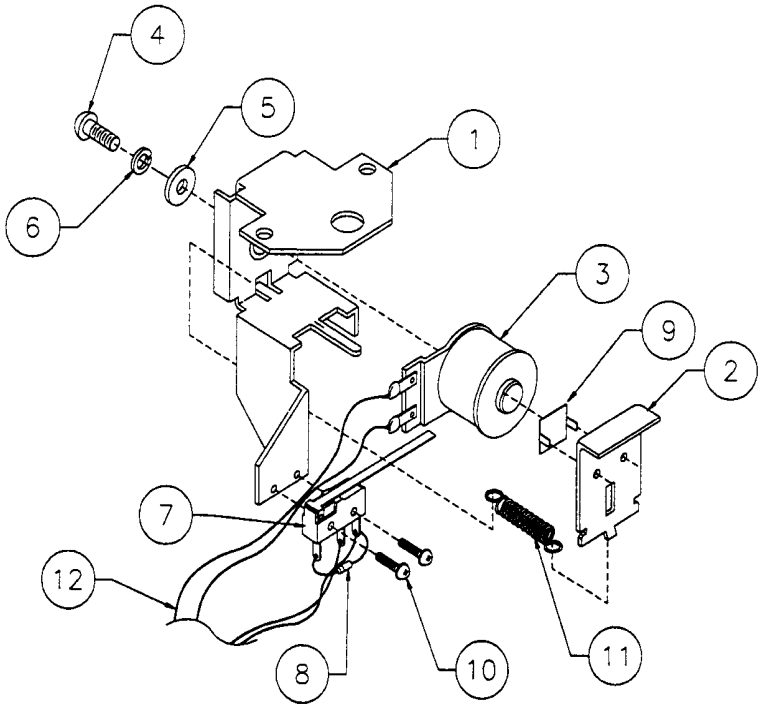


Item	Part Number	Description
1	**04-10965.1**	Floating Ramp Bracket
2	**LE-23-1300**	Coil Sub Assembly Thermal
3	**04-10911-4**	5/8 Coil Centering Bracket
4	**03-7066-5**	Coil Tubing
5	**01-14731**	Adjusting plate
6	**4408-01119-01**	Nut 8-32 ESNA
7	**4008-01168-08**	Mach. Screw: 8-32 x ½"
8	**4700-00011-00**	Flat Washer: 11/64 x 7/16 x 16ga.
9	**20-8790-5**	Nyliner Bearing

Associated Assemblies:

10	**02-5323**	Mod CS 10-32 x 2-1/2"
11	**10-523**	Spring - Floating Ramp
12	**02-5322**	Adjusting Collar
13	**4410-01132-01**	Nut 10-32 ESNA
14	**A-22200**	Floating Ramp Assembly
a)	**04-10964.1**	Floating Ramp
b)	**01-14732**	Floating Ramp Flap
c)	**07-6688-17N**	Rivet: 1/8 x 3/16" Nickel
d)	**4008-01003-06**	Mach. Screw: 8-32 x 3/8"
e)	**02-5321**	Post 8-32
f)	**23-6824**	Bumper Sleeve
g)	**4700-00011-00**	Flat Washer: 11/64 x 7/16 x 16ga.
h)	**4008-01041-06**	Mach. Screw: 8-32 x 3/8"

A-22016 Lift Coil Bracket Assembly

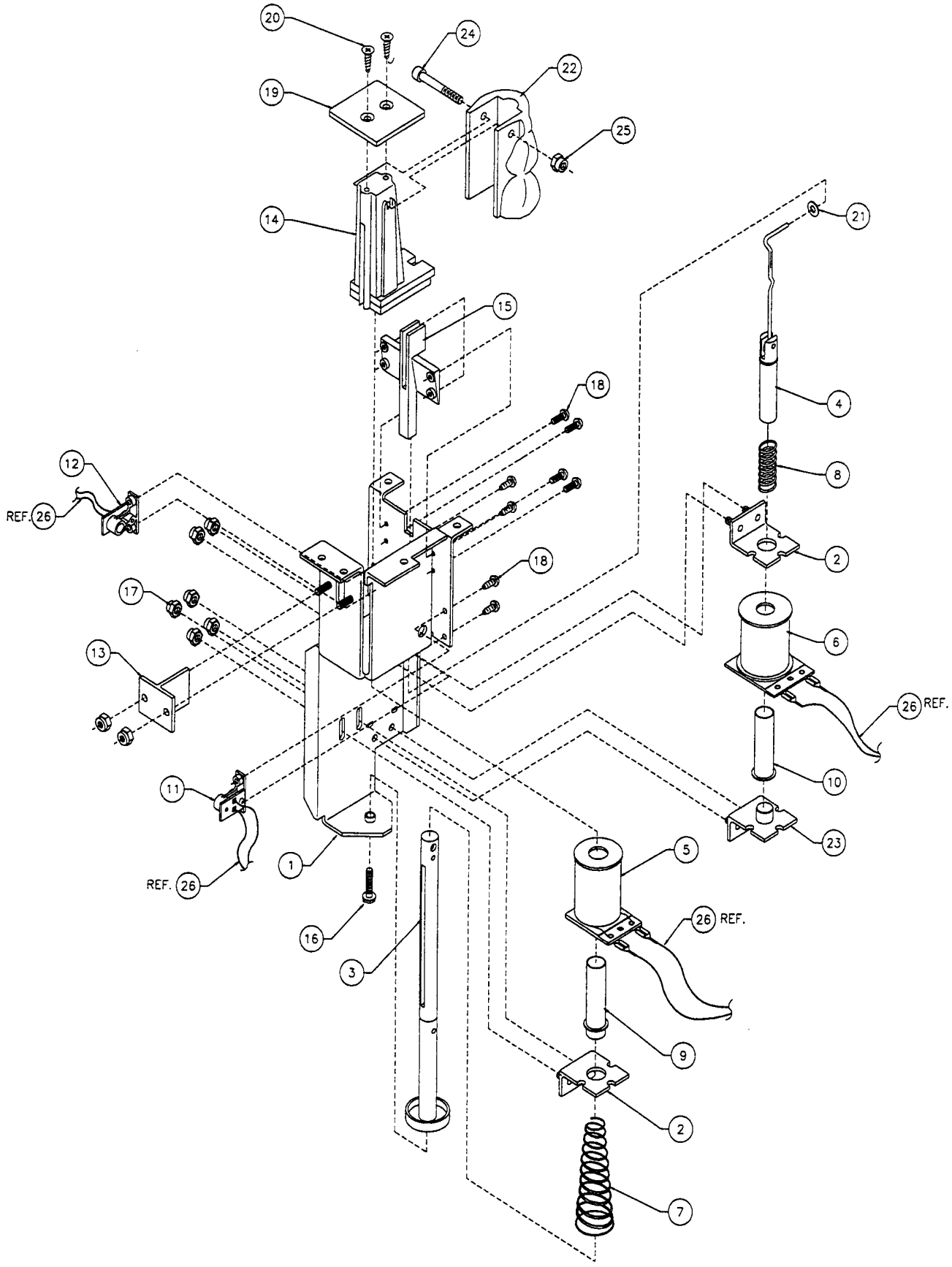


Item	Part Number	Description
1	**04-10974.1**	Lift Ramp Coil Bracket
2	**01-14739**	Lift Ramp Catch
3	**SM1-28-900-DC**	Coil Assembly
4	**4008-01021-07**	Mach. Screw: 8-32 x 7/16"
5	**4700-00089-00**	Flat Washer: 11/64 x 7/16 x 16ga.
6	**4701-00003-00**	Lockwasher # 8 Split
7	**5647-12693-31**	Sub Mini Micro Switch
8	**5070-09054-00**	Diode 1N4004 1.0A.
9	**01-6376**	Residual Plate
10	**4002-01105-06**	Mach. Screw: 2-56 x 3/8"
11	**10-120**	Armature Spring
12	**H-22209**	Cable

A-21815-1 & A-21815-2 Gopher Assembly

Item	Part Number	Description
1	**04-10924.1**	Gopher Bracket
2	**04-10911-1**	Coil Bracket
3	**A-21814**	Gopher Plunger Assembly
4	**A-21816**	Release Assembly
5	**LE-23-1300**	Coil Sub- Assembly
6	**AE-30-2000**	Coil Sub-Assembly
7	**10-518**	Compression Spring
8	**10-135**	Plunger Spring
9	**03-7067-6**	Coil Tubing
10	**03-7066**	Coil Tubing
11	**A-16908**	Opto LED Assembly
12	**A-16909**	Opto Photo Transistor Assembly
13	**03-9805**	Guide-Release
14	**03-9806.1**	Latch
15	**03-9807**	Guide - Latch
16	**4008-01113-12**	Mach. Screw: 8-32 x ¾"
17	**4408-01119-01**	Nut 8-32 ESNA
18	**4106-01013-06**	Sh. Metal Screw: #6 x 3/8"
19	**01-14801.1**	Cap - Gopher
20	**4108-01042-08**	Sh. Metal Screw: #8 x ½"
21	**4700-00013-00**	Flat Washer: 11/64 x 3/8 x 20ga.
22	**31-2955**	Gopher - Buzz *(used w/**A-21815-1**)*
	31-2956	Gopher - Bud *(used w/**A-21815-2**)*
23	**04-10911-4**	Coil Bracket
24	**02-5439**	Mach. Screw: 8-32 Soc. Hd. Cap Modified
25	**4410-01129-00**	Nut 8-32 ESNA
26	**H-22161**	Cable

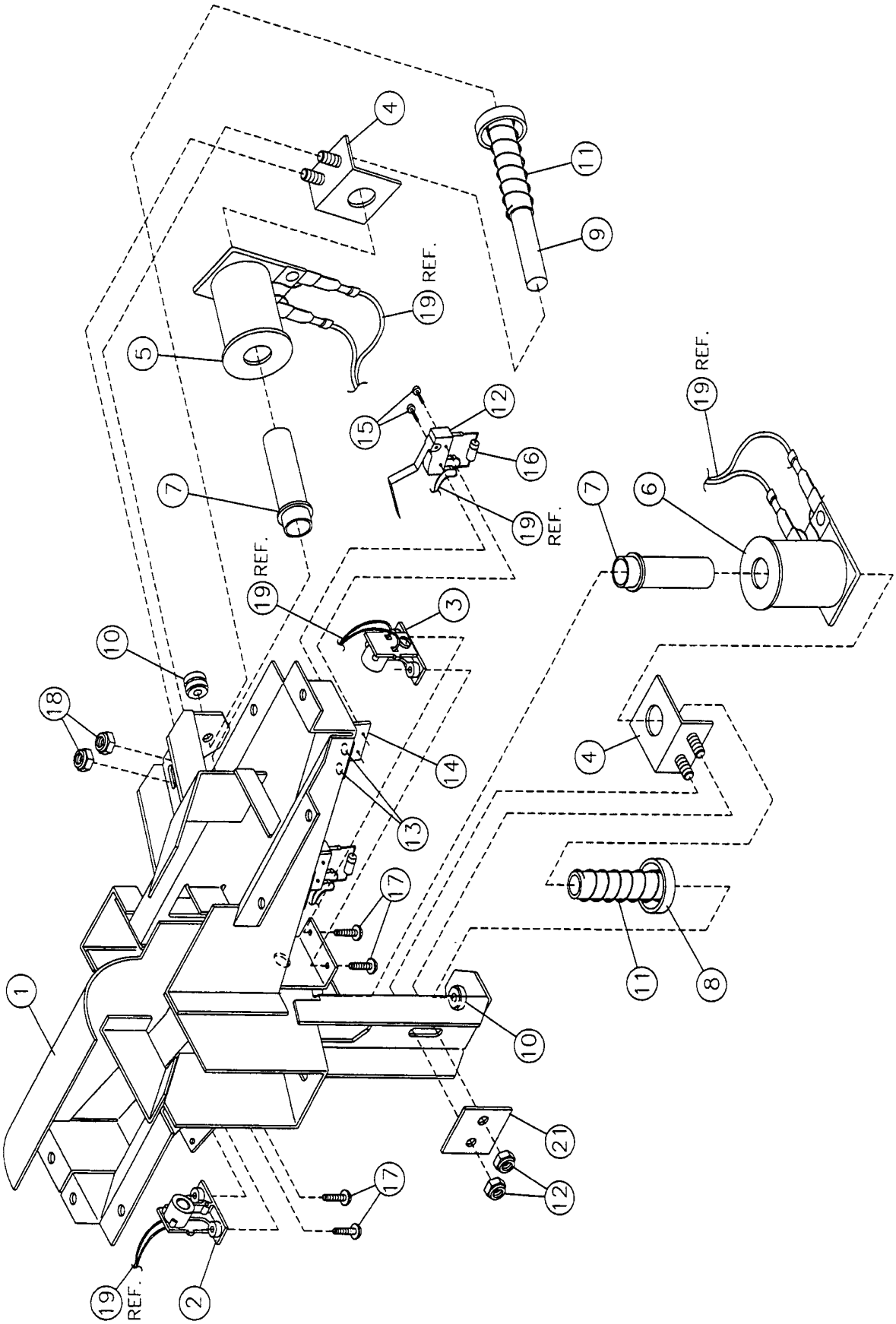
A-21815-1 & A-21815-2 Gopher Assembly



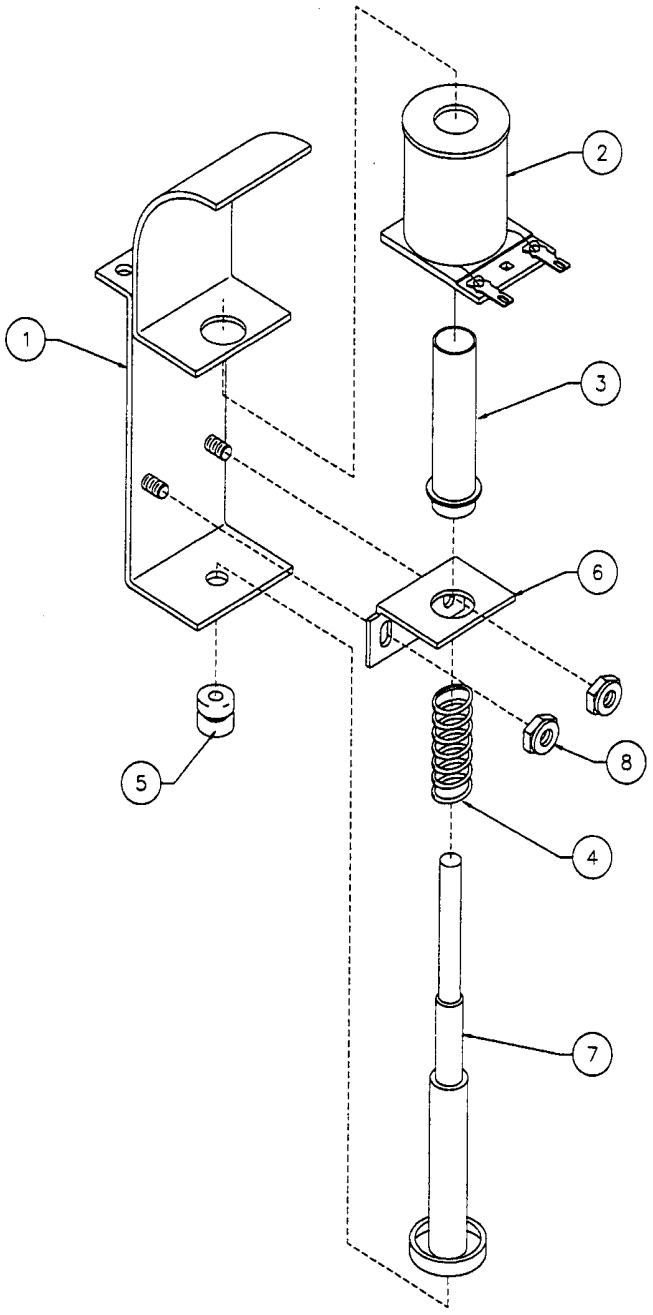
A-21989 Backtrap Assembly

Item	Part Number	Description
1	**04-10955.4**	Backtrap
2	**A-16908**	Opto LED Assembly
3	**A-16909**	Opto Photo Transistor Assy.
4	**04-10910-1**	Coil Bracket
5	**AE-27-1200**	Coil Assembly
6	**AE-23-800**	Coil Assembly
7	**03-7067**	Coil Tubing
8	**A-17767**	Bell Armature Assembly
9	**04-10962**	Bell Armature Assembly
10	**23-6420**	Rubber Grommet
11	**10-135**	Plunger Spring
12	**5647-12693-13**	Sub Mini Micro Switch
13	**07-6688-17N**	Rivet: 1/8 x 5/32 Nickel
14	**01-8774**	Switch Bracket
15	**4002-01105-06**	Mach. Screw: 2-56 x 3/8"
16	**5070-09054-00**	Diode 1N4004 1.0A.
17	**4106-01013-06**	Sh. Metal Screw: #6 x 3/8"
18	**4408-01119-01**	Nut 8-32 ESNA NTM
19	**H-22162.1**	Cable
20	**03-9454**	Cable Tie 4" long
21	**01-14832**	Backup Plate

A-21989 Backtrap Assembly

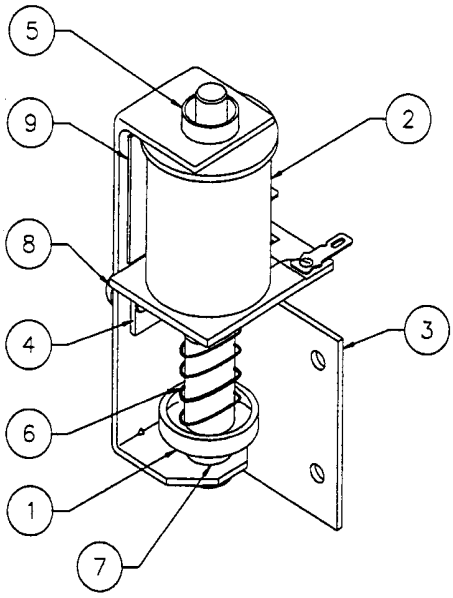


A-20496-1 Eject Assembly



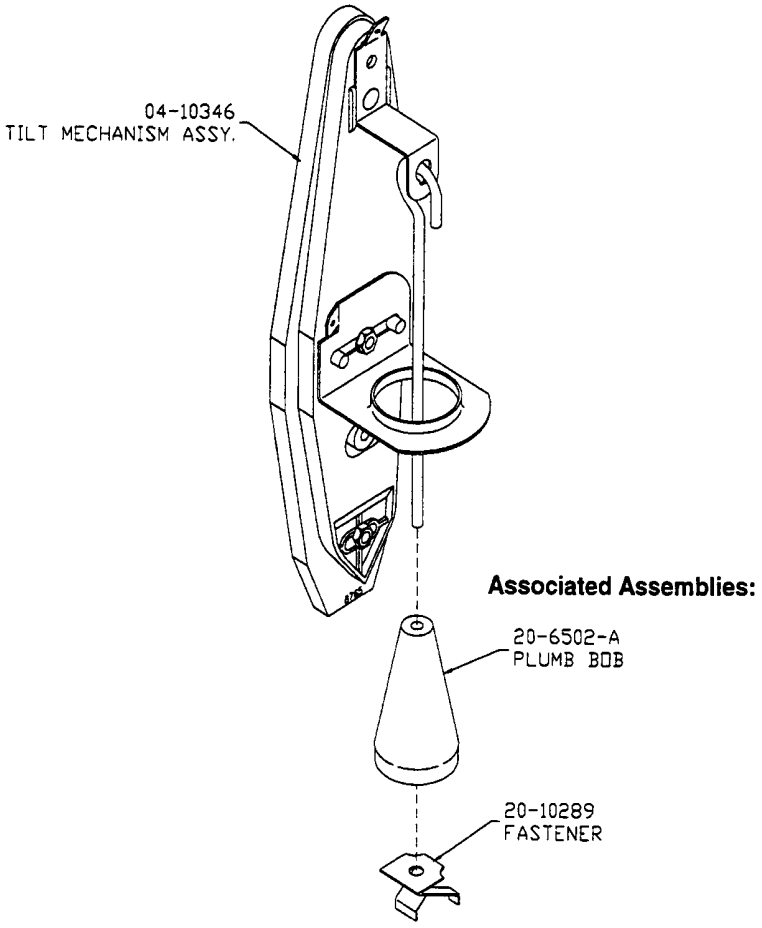
Item	Part Number	Description
1	**04-10217.1**	Eject Bracket Assembly
2	**AE-24-900**	Coil Assembly
3	**03-7067**	Coil Tubing
4	**10-135**	Solenoid Spring
5	**23-6420**	Rubber Grommet
6	**01-9784**	Coil Bracket
7	**A-17767**	Bell Armature Assembly
8	**4408-01119-00**	Nut 8-32 ESN

B-11873 Bottom Arch Kicker Assembly

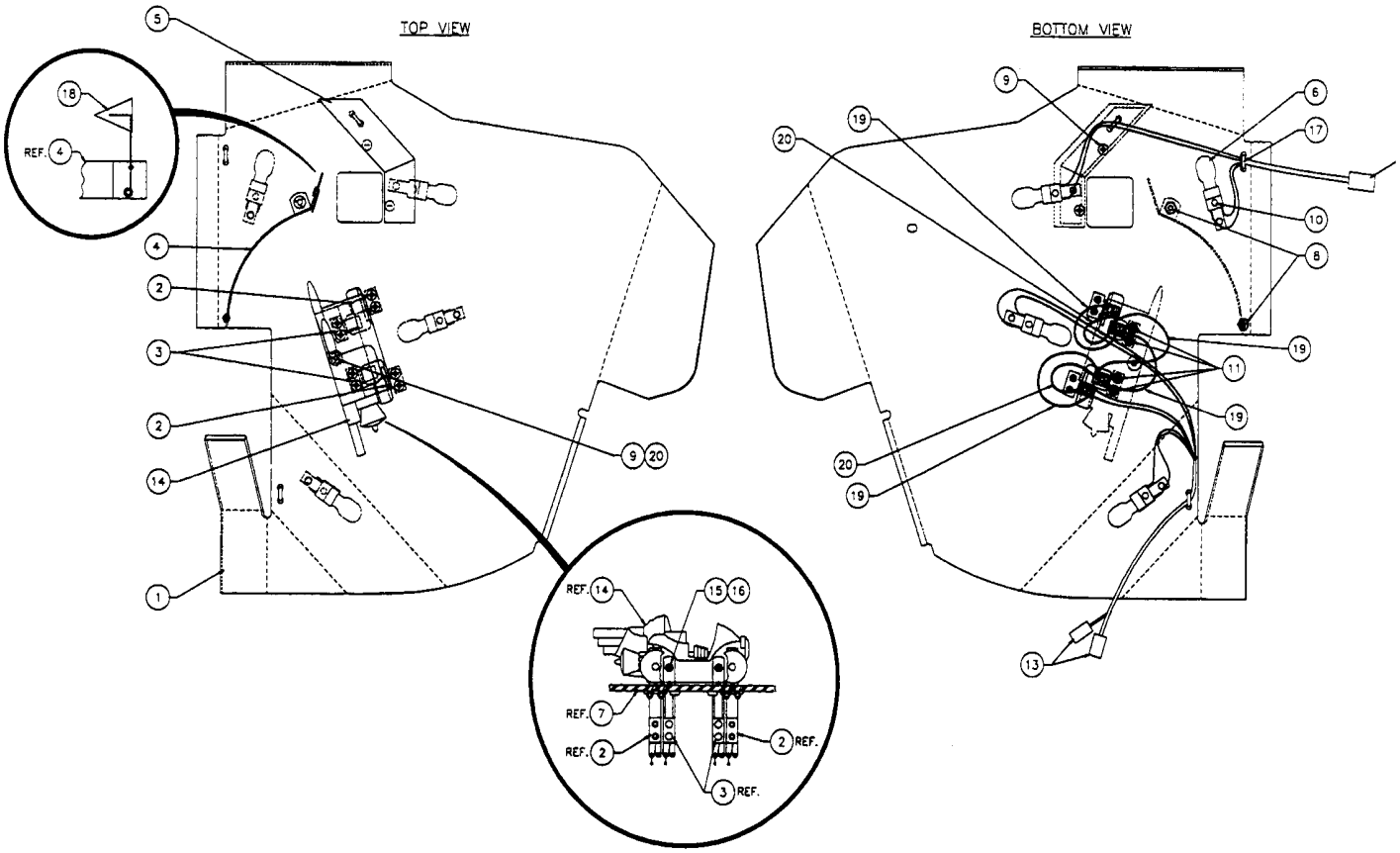


Item	Part Number	Description
1	**A-6306-2**	Bell Armature Assembly
2	**AE-23-800**	Coil Sub-Assembly
3	**01-11273**	Mounting Bracket
4	**01-8-508-T**	Solenoid Bracket
5	**03-7067-5**	Coil Tubing
6	**10-135**	Solenoid Spring
7	**23-6420**	Rubber Grommet
8	**4008-01017-04**	Mach. Screw, 8-32 x 1/4"
9	**03-8523**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

04-10346 Tilt Mechanism Assembly

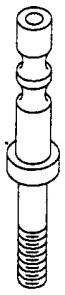


A-22030 Mini Playfield Assembly

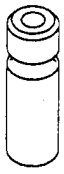


Item	Part Number	Description	Item	Part Number	Description
1	31-3063.4	Mini-Playfield Screened	11	4008-01005-08	Mach. Screw, 8-32 x1/2"
2	A-22224-4	Standup Target Assy. Rd. 3/16"	12	H-22159-1	Mini Playfield Cable-Right
3	A-22222	Golf Cart Switch Assembly	13	H-22159-2	Mini Playfield Cable-Left
4	A-22223	Mini Playfield Ball Guide Assy.	14	31-3070	Golf Cart
5	03-9837	Deflector – Mini Playfield	15	4005-01005-08	Mach. Screw, 5-40 x ½"
6	A-17802	Socket & #906 Bulb Assy.	16	4405-01119-00	Nut 5-40 ESNA
7	4008-01041-00	Mach. Screw, 8-32 x 3/8"	17	03-9454	Cable Tie 4" Long
8	4408-01119-01	Nut 8-32 ESNA/NTM	18	31-3096	Decal Flag
9	4108-01013-08	Sh. Metal Screw, #8 x ½"	19	17-1141-4	18AWG Jumper Wire Cit 4"
10	07-6688-21N	Rivet, 1/8 x 9/32"	20	4700-00011-00	Flat Washer, 11/64 x 7/16 x 16ga.

Posts



02-4678
Double Bumper Post #10
Qty.: 4



02-4434
Post #8
Qty.: 2

03-8044-13
Mini-Post Clear
Qty.: 5

02-5295-12
Post M-F 8-32 x .75"
Qty.: 4

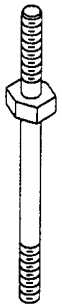
02-5295-16
Post M-F 8-32 x 1"
Qty.: 1

02-5295-20
Post M-F 8-32 x 1.25"
Qty.: 5

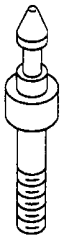
02-5295-24
Post M-F 8-32 x 1.50"
Qty.: 1

02-5295-32
Post M-F 8-32 x 2"
Qty.: 2

02-5295-40
Post M-F 8-32 x 2.50"
Qty.: 1

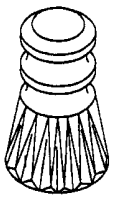


02-4425-2
Post #8-32/#8-32
Qty.: 4

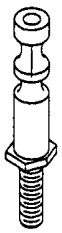


02-4660
Mini-Post Single Bumper
Qty.: 10

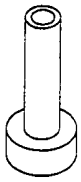
03-8319-13
Post #8 Starred
Qty.: 3



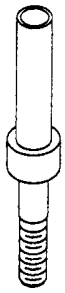
03-8247-8
Bumper Post Double Starred
Qty.: 6



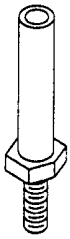
02-4608
DOUBLE BUMPER POST
Qty.: 3



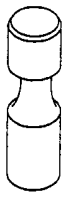
02-5321
Post #8-32 X 8-32
Qty.: 2



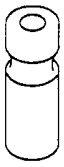
02-5222
Post #10-32 X 3/8"
Qty.: 3



02-5254
Bumper Post 8-32
Qty.: 4

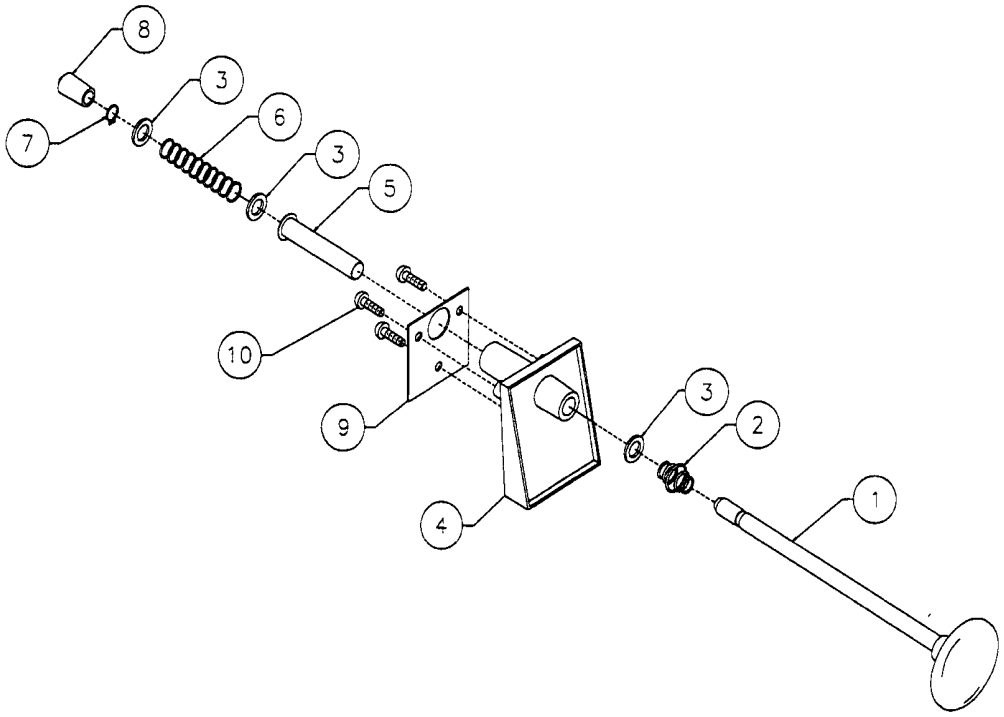


02-4435
Playfield Post
Qty.: 2



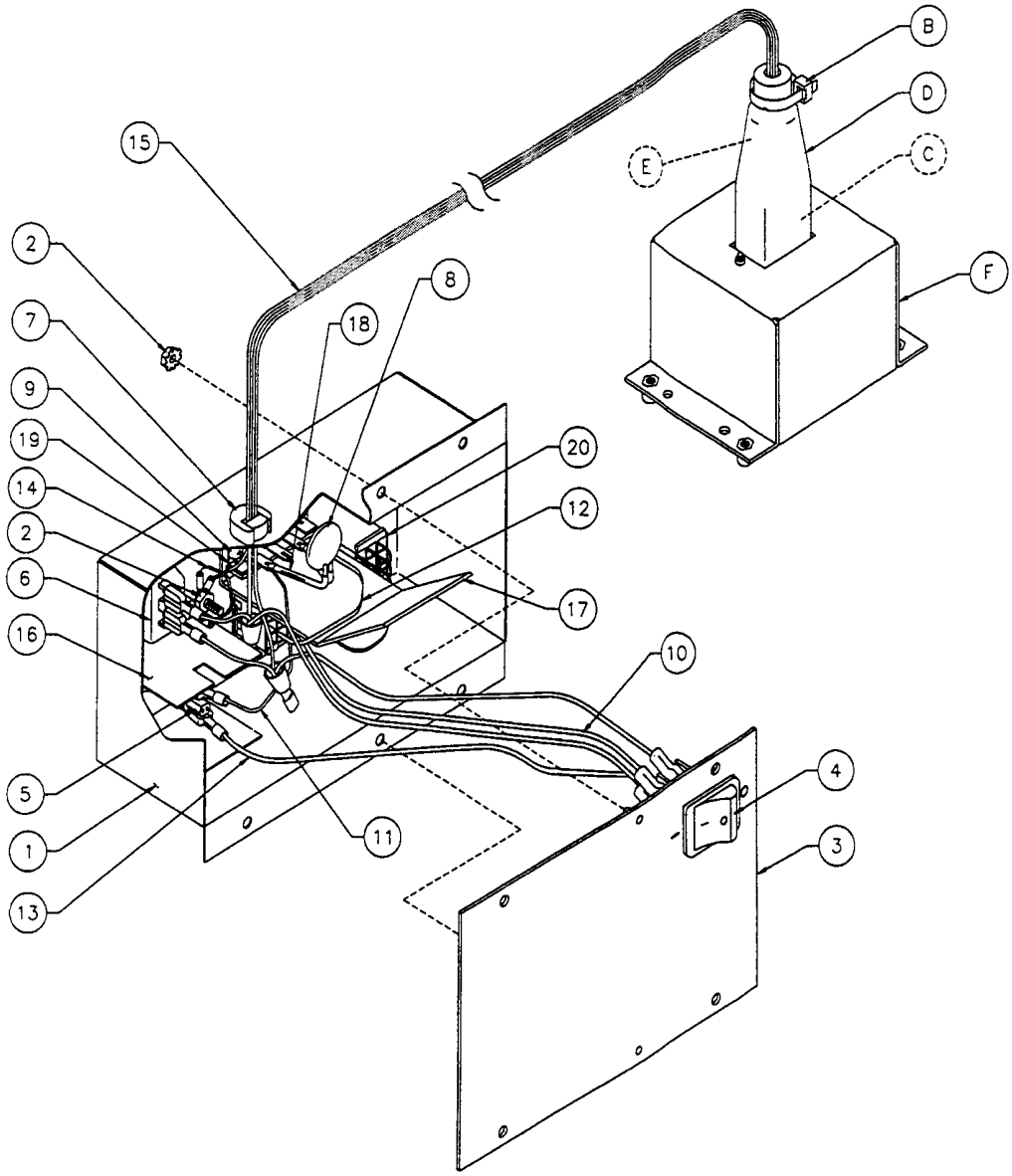
03-8365-13
Post #8 Clear
Qty.: 2

B-12445-1 Ball Shooter Rod Assembly



Item	Part Number	Description
1	**20-9253-7**	Ball Shooter Knob
2	**10-149**	Shooter Rod Spring
3	**4700-00051-00**	FW, 25/64 x 5/8 x 16ga.
4	**21-6645-1**	Shooter Housing
5	**03-7357**	Shooter Sleeve
6	**10-148-1**	Power Spring
7	**20-8712-37**	External Retainer Ring
8	**23-6327**	Ball Shooter Tip
Associated Assemblies:		
9	**01-3535**	Rod Mounting Bracket
10	**4010-01006-10**	Mach. Screw: 10-32 x 5/8"

A-20871 Power Interface Assembly



Item	Part Number	Description	Item	Part Number	Description
A	**A-20872**	Power Control Chassis Assembly	14)	**H-17542**	Ground Jumper Grn/Yel Cable
1)	**04-10292**	Power Control Chassis Box	15)	**5797-13940-01**	Jumper Cable
2)	**4406-01128-00**	Nut #6-32 KEPS (3)	16)	**01-10623**	Insulator, Thermistor
3)	**01-12294**	Switch Mounting Plate Assembly	17)	**01-12299**	Insulator, Terminal Strip
4)	**5642-13935-00**	Power Switch	18)	**RM-21-06**	#18 Vinyl Fgls
5)	**5733-14734-00**	Fuse Holder Panel (5x20mm)	19)	**5822-13865-00**	Terminal Strip 3-CKT 2-Mtg.
6)	**5851-13867-00**	Outlet-IEC Conn. 237 Socket	20)	**H-18050**	Jumper Cable, Transformer Prog
7)	**03-8712**	Strain Relief Bushing	B	**03-7933**	Ty-Wrap Nylon
8)	**5016-12978-00**	Thermistor 8A., 2.5R25	C	**5045-14007-00**	Capacitor, 1µF 275v
9)	**4006-01003-10**	Mach. Screw, #6-32 x 5/8"	D	**23-6776-4**	Heat Shrink
10)	**H-17992**	Jumper Cable Neutral Sw/1FC	E	**RM-21-06**	#18 Vinyl Sleeving
11)	**H-17543**	Hot Jumper Black Cable	F	**A-20873**	Line Filter Entry Chassis
12)	**H-17546**	Jumper Interface Hot Black Cable			
13)	**H-17545**	Jumper Switch/Fuse Black Cable			

See Page 2-54 for Power Interface/Cordset Application Chart.

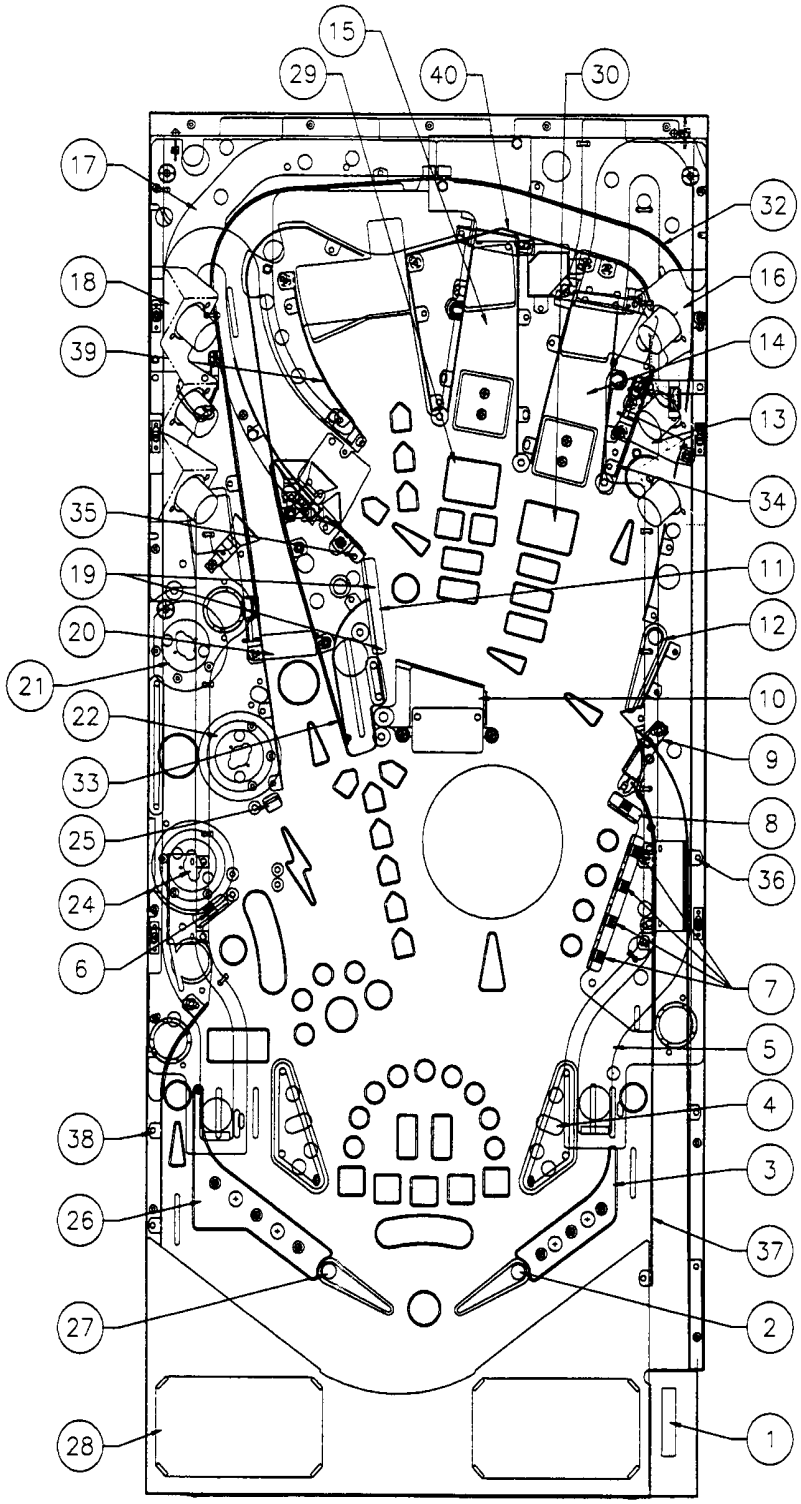
Upper Playfield Parts

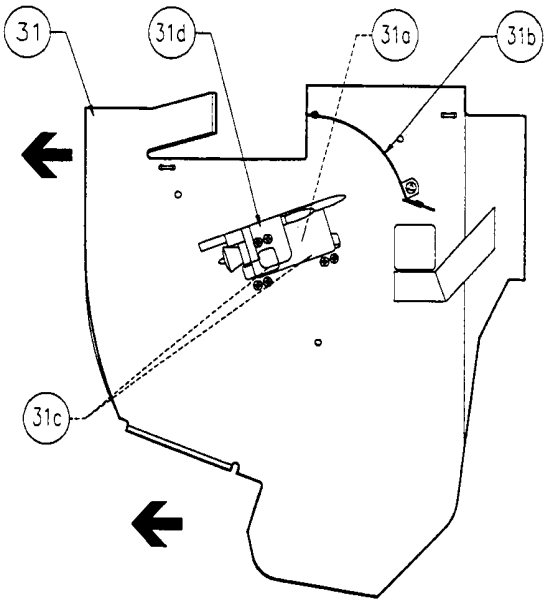
Item Number	Part Number	Description
1	A-22204	Shooter Lane Kicker
2	A-14876-R-3	Lower Right Flipper
	20-10110-6	Flipper Bat w/Shaft-Yellow
3	A-22191-1	Right Flipper Ball Guide
4	A-17811	Slingshot Assembly
5	A-21754	Right Plastic Ramp
6	A-15330-6	Yellow Standup Target
7	B-12039-16	Orange Standup Target
8	A-17799-4	Red Standup Target
9	A-14372	Ball Gate Assembly
10	A-22200	Floating Ramp Assembly
	A-22010	Floating Ramp Brkt & Coil
11	A-17795-6	Yellow Standup Target
12	A-15849-R	Upper Right Flipper
	20-10110-6	Flipper Bat w/Shaft-Yellow
13	A-22037-2	Spinner Target
14	A-22018	Right Lift Ramp
15	A-22017	Left Lift Ramp
16	A-22199-1	Right Step Flashers
17	A-21753	Left Plastic Ramp
18	A-22199-2	Left Step Flashers
19	A-17799-6	Yellow Standup Target
20	A-22037-2	Spinner Target
21	B-9414	White Jet Bumper
	B-12030-2	Jet Bumper Switch
	A-22205-2	Jet Coil Assembly
22	B-9414-3	Red Jet Bumper
	B-12030-2	Jet Bumper Switch
	A-22205-2	Jet Coil Assembly
23	A-17795-1	Blue Standup Target
24	B-9414-1	Blue Jet Bumper
	B-12030-2	Jet Bumper Switch
	A-22205-2	Jet Coil Assembly
25	A-17811	Slingshot Assembly
26	A-22191-2	Left Flipper Ball Guide
27	A-15849-L-2	Lower Left Flipper
	20-10110-6	Flipper Bat w/Shaft-Yellow
28	B-11873	Bottom Arch Kicker
29	A-21815-2	Left Gofer Assembly
30	A-21815-1	Right Gofer Assembly
31	A-22030	Mini Playfield
31a	A-22222	Golf Cart Switches
31b	A-22223	Ball Guide Assembly
31c	A-22224-4	Red Standup Targets
31d	31-3070	Golf Cart
32	04-10966.2	Ball Guide #1
33	04.10967.1	Ball Guide #2
34	04-10968.2	Ball Guide #4
35	04-10969	Ball Guide #6
36	04-10970.1	Ball Guide #8
37	04-10971	Ball Guide #9
38	04-10972	Ball Guide #10
39	04-10997	Ball Guide #5
40	04-10998	Ball Guide #3

Not Shown: Part Number	Description
A-13204-50061	Bottom Arch Assembly
A-20496-1	Eject Assembly
A-21786	Driven Disk Assembly
A-21988	Loop Assembly
A-21989	Backtrap Assembly
A-22022	Right Popper Assembly
B-12445-1	Ball Shooter Assembly
03-8633	Level Mount
04-10005	Newton Ball Assembly
20-9691	Level
24-8825	#545 Bulb
24-8861	Wedge Base Socket
31-1357-50061	Screened Backglass

*The *NO GOOD GOPHERS* hardcoat playfield does not require a full Mylar. However, mylars can be purchased through your local WILLIAMS Distributor.

Upper Playfield Parts Locations



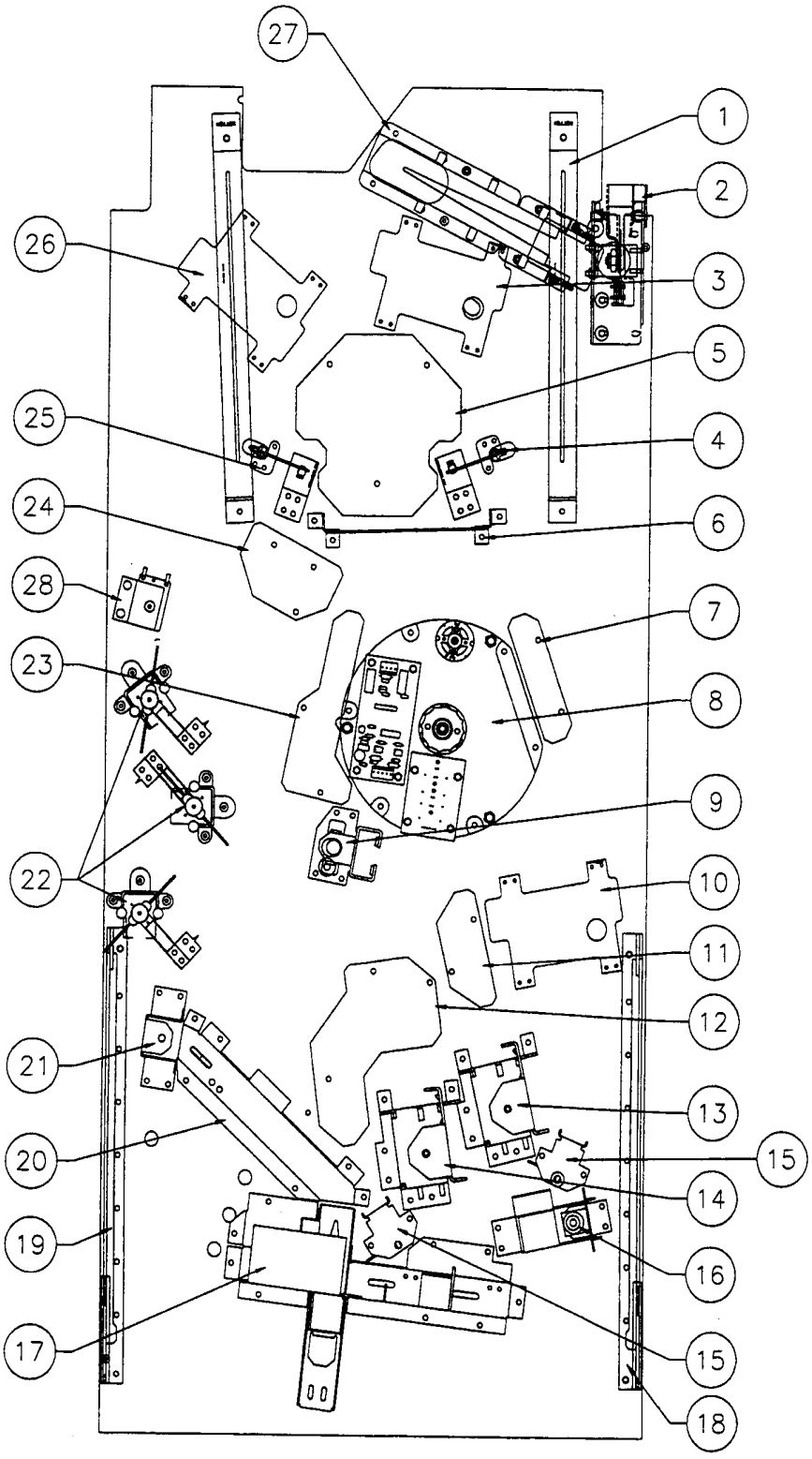


Mini-Playfield

Lower Playfield Parts

Item	Part Number	Description
1	**01-11781**	Support Bracket (2)
2	**A-22204**	Shooter Lane Kicker Assembly
3	**A-14876-R-3**	Flipper Assembly Complete
4	**A-22206-2**	Coil & Bracket Assembly
5	**A-22038**	16-Lamp PCB Assembly
6	**A-22019-2**	16-Opto PCB Assembly
7	**A-22042**	4-Lamp PCB Assembly
8	**A-21786**	Drive Disc Assembly
9	**A-22010**	Floating Ramp Assembly
10	**A-15849-R**	Flipper Assembly Complete
11	**A-22043**	4-Lamp PCB Assembly
12	**A-22041**	10-Lamp PCB Assembly
13	**A-21815-1**	Gopher Assembly, Right
14	**A-21815-2**	Gopher Assembly, Left
15	**A-22016**	Lift Coil Bracket Assembly
16	**A-22022**	Right Popper Assembly
17	**A-21989**	Backtrap Assembly
18	**A-17749.1-2**	Slide Playfield Assembly, Right
19	**A-17749.1-1**	Slide Playfield Assembly, Left
20	**A-21987**	Trough Assembly
21	**A-21988**	Loop Assembly
22	**A-22205-2**	Jet Coil & Bracket Assembly (3)
23	**A-22039**	7-Lamp PCB Assembly
24	**A-22040**	6-Lamp PCB Assembly
25	**A-22207-2**	Coil & Bracket Assembly
26	**A-15849-L-2**	Flipper Assembly Complete
27	**A-18753**	Ball Trough Assembly
28	**A-20496-1**	Sand Trap Eject Assembly

Lower Playfield Parts Locations

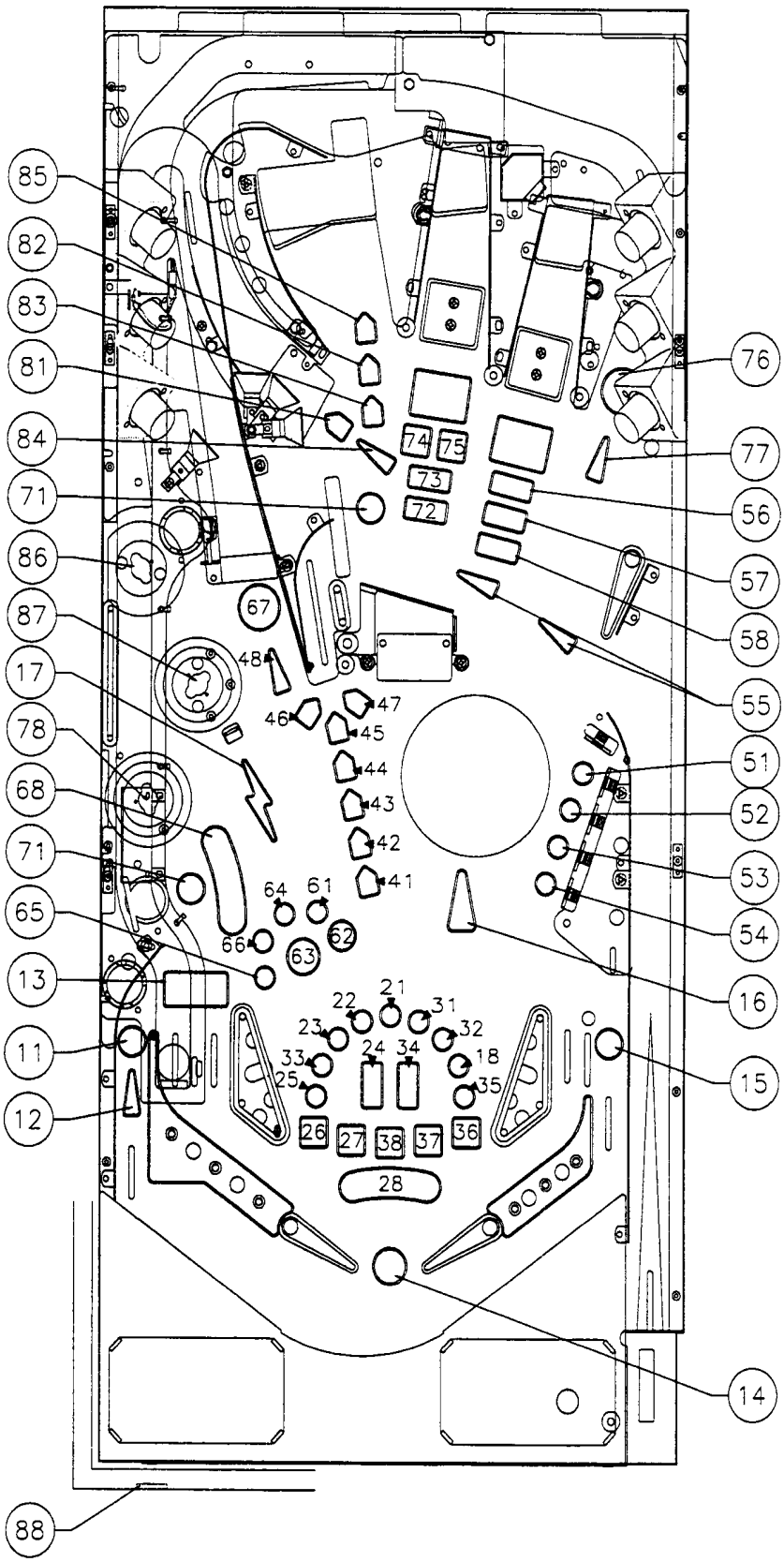


Underside View of Playfield, Viewed in Raised Position

Lamp Locations

Item Number	Lamp Assembly Part Number	Bulb Type	Bulb Part Number	Socket Part Number	Description
11	A-17835	#44	24-6549	Not Sold Separate	OUTLANE EXTRA BALL
12	A-17835	#44	24-6549	Not Sold Separate	KICKBACK
13	A-17835	#44	24-6549	Not Sold Separate	LOWER DRIVING RANGE (2)
14	A-17807	#44	24-6549	Not Sold Separate	SHOOT AGAIN
15	A-17807	#44	24-6549	Not Sold Separate	SPECIAL
16	A-17807	#44	24-6549	Not Sold Separate	WHEEL VALUE
17	A-17835	#44	24-6549	Not Sold Separate	JET LIGHTNING
18	A-17835	#44	24-6549	Not Sold Separate	HOLE 8
21	A-22038	#555	24-8768	24-8767	HOLE 5
22	A-22038	#555	24-8768	24-8767	HOLE 4
23	A-22038	#555	24-8768	24-8767	HOLE 3
24	A-22038	#555	24-8768	24-8767	HIT BUD
25	A-22038	#555	24-8768	24-8767	HOLE 1
26	A-22038	#555	24-8768	24-8767	2X
27	A-22038	#555	24-8768	24-8767	CART PATH 2
28	A-22038	#555	24-8768	24-8767	5X CART PATH (2)
31	A-22038	#555	24-8768	24-8767	HOLE 6
32	A-22038	#555	24-8768	24-8767	HOLE 7
33	A-17835	#44	24-6549	Not Sold Separate	HOLE 2
34	A-22038	#555	24-8768	24-8767	HIT BUZZ
35	A-22038	#555	24-8768	24-8767	HOLE 9
36	A-22038	#555	24-8768	24-8767	4X
37	A-22038	#555	24-8768	24-8767	CART PATH 4
38	A-22038	#555	24-8768	24-8767	3X
41	A-22039	#555	24-8768	24-8767	DRIVING RANGE
42	A-22039	#555	24-8768	24-8767	INCREASE GOLF CART
43	A-22039	#555	24-8768	24-8767	INCREASE BUZZ VALUE
44	A-22039	#555	24-8768	24-8767	INCREASE BUD VALUE
45	A-22039	#555	24-8768	24-8767	NEWTON DRIVE
46	A-22039	#555	24-8768	24-8767	COLLECT
47	A-22039	#555	24-8768	24-8767	RIP OFF
48	A-17835	#44	24-6549	Not Sold Separate	LEFT LOOP DRIVE
51	A-22042	#555	24-8768	24-8767	(K)ICK
52	A-22042	#555	24-8768	24-8767	K(I)CK
53	A-22042	#555	24-8768	24-8767	KI(C)K
54	A-22042	#555	24-8768	24-8767	KIC(K)
55	A-17835 A-22043	#44 #555	24-6549 24-8768	Not Sold Separate 24-8767	SKILL SHOT
56	A-22043	#555	24-8768	24-8767	RELIGHT JACKPOT
57	A-22043	#555	24-8768	24-8767	RIGHT RAMP LOCK
58	A-22043	#555	24-8768	24-8767	RIGHT RAMP DRIVE
61	A-22040	#555	24-8768	24-8767	4 STROKES
62	A-22040	#555	24-8768	24-8767	3 STROKES
63	A-22040	#555	24-8768	24-8767	2 STROKES
64	A-22040	#555	24-8768	24-8767	5 STROKES
65	A-22040	#555	24-8768	24-8767	7 STROKES
66	A-22040	#555	24-8768	24-8767	6 STROKES
67	A-17807	#44	24-6549	Not Sold Separate	LEFT SPINNER
68	A-17807	#44	24-6549	Not Sold Separate	TRAP READY (2)
71	A-17807 A-22041	#44 #555	24-6549 24-8768	Not Sold Separate 24-8767	ADVANCE TRAP
72	A-22041	#555	24-8768	24-8767	CENTER DRIVE
73	A-22041	#555	24-8768	24-8767	CENTER LOCK
74	A-22041	#555	24-8768	24-8767	GET T.N.T.
75	A-22041	#555	24-8768	24-8767	CENTER RAISE GOFER
76	A-17807	#44	24-6549	Not Sold Separate	RIGHT SPINNER
77	A-17835	#44	24-6549	Not Sold Separate	RIGHT LOOP DRIVE
78	-----	#555	24-8768	24-8776	BOTTOM JET BUMPER
81	A-22041	#555	24-8768	24-8767	SIDE RAMP DRIVE
82	A-22041	#555	24-8768	24-8767	EXTRA BALL
83	A-22041	#555	24-8768	24-8767	MULTIBALL
84	A-22041	#555	24-8768	24-8767	JACKPOT
85	A-22041	#555	24-8768	24-8767	PUTT OUT
86	-----	#555	24-8768	24-8776	TOP JET BUMPER
87	-----	#555	24-8768	24-8776	MIDDLE JET BUMPER
88	20-9663-16	-----	-----	-----	START BUTTON

Lamp Locations



Solenoid/Flasher Locations

Item Number	Coil or Flasher Assembly Part Number	Coil or Flasher Part Number	Description
01	A-22204	AE-23-800	AUTO FIRE
02	B-11873	AE-23-800	KICKBACK
03	A-21989	AE-23-800	CLUBHOUSE KICKER
04	A-21815-2	LE-23-1300	LEFT GOFER UP
05	A-21815-1	LE-23-1300	RIGHT GOFER UP
06	A-21988	AE-27-1200	JET POPPER
07	A-20496-1	AE-24-900	LEFT EJECT
08	A-22022	AE-26-1200	UPPER RIGHT EJECT
09	A-18753	AE-26-1500	TROUGH EJECT
10	A-22207-2	AE-26-1200	LEFT SLINGSHOT
11	A-22206-2	AE-26-1200	RIGHT SLINGSHOT
12	A-22205-2	AE-26-1200	TOP JET BUMPER
13	A-22205-2	AE-26-1200	MIDDLE JET BUMPER
14	A-22205-2	AE-26-1200	BOTTOM JET BUMPER
15	A-21815-2	AE-30-2000	LEFT GOFER DOWN
16	A-21815-1	AE-30-2000	RIGHT GOFER DOWN
17	A-17802	24-8802	JET FLASHER (#906)
18	-----	24-8802	LOWER LEFT FLASHER (#906)
19	A-17802	24-8802	LEFT SPINNER FLASHER (#906)
20	A-17802, A-17983	24-8802, 24-8704	RIGHT SPINNER FLASHER (#906, #89)
21	A-17983	24-8704	LOWER RIGHT FLASHER (#89)
22			NOT USED
23			NOT USED
24	A-21989	AE-27-1200	UNDERGROUND PASS
25	A-17802	24-8802	SAND TRAP FLASHER (#906)
26	A-17802	24-8802	WHEEL FLASHER (#906)
27	A-22016	SM1-28-900	LEFT RAMP DOWN
28	A-22016	SM1-28-900	RIGHT RAMP DOWN

Flippers

Item	Coil Assembly Part Number	Coil Part Number	Description
29-30	A-14876-R-3	FL-11629	LOWER RIGHT FLIPPER
31-32	A-15849-L-2	FL-11629	LOWER LEFT FLIPPER
33-34	A-15849-R	FL-11630	UPPER RIGHT FLIPPER
35	A-22010	LE-23-1300-T	BALL LAUNCH RAMP
36			NOT USED

Auxiliary

Item	Flasher Assembly Part Number	Flasher Part Number	Description
42	A-22199-1	24-8802	UPPER RIGHT 1 FLASHER (#906)
43	A-22199-1	24-8802	UPPER RIGHT 2 FLASHER (#906)
44	A-22199-1	24-8802	UPPER RIGHT 3 FLASHER (#906)
45	A-22030	24-8802	UPPER PLAYFIELD RIGHT (#906, 2 BULBS)
46	A-22030	24-8802	UPPER PLAYFIELD LEFT (#906, 2 BULBS)
47	A-22199-2	24-8802	UPPER LEFT 3 FLASHER (#906)
48	A-22199-2	24-8802	UPPER LEFT 2 FLASHER (#906)
49	A-22199-2	24-8802	UPPER LEFT 1 FLASHER (#906)

Motor

Item	Assembly Part Number	PC Board Part Number	Device Part Number	Description
37	-----			WHEEL SPIN (counter clock-wise)
38	-----	SEE BELOW	14-7955-1	WHEEL SPIN (clock-wise)

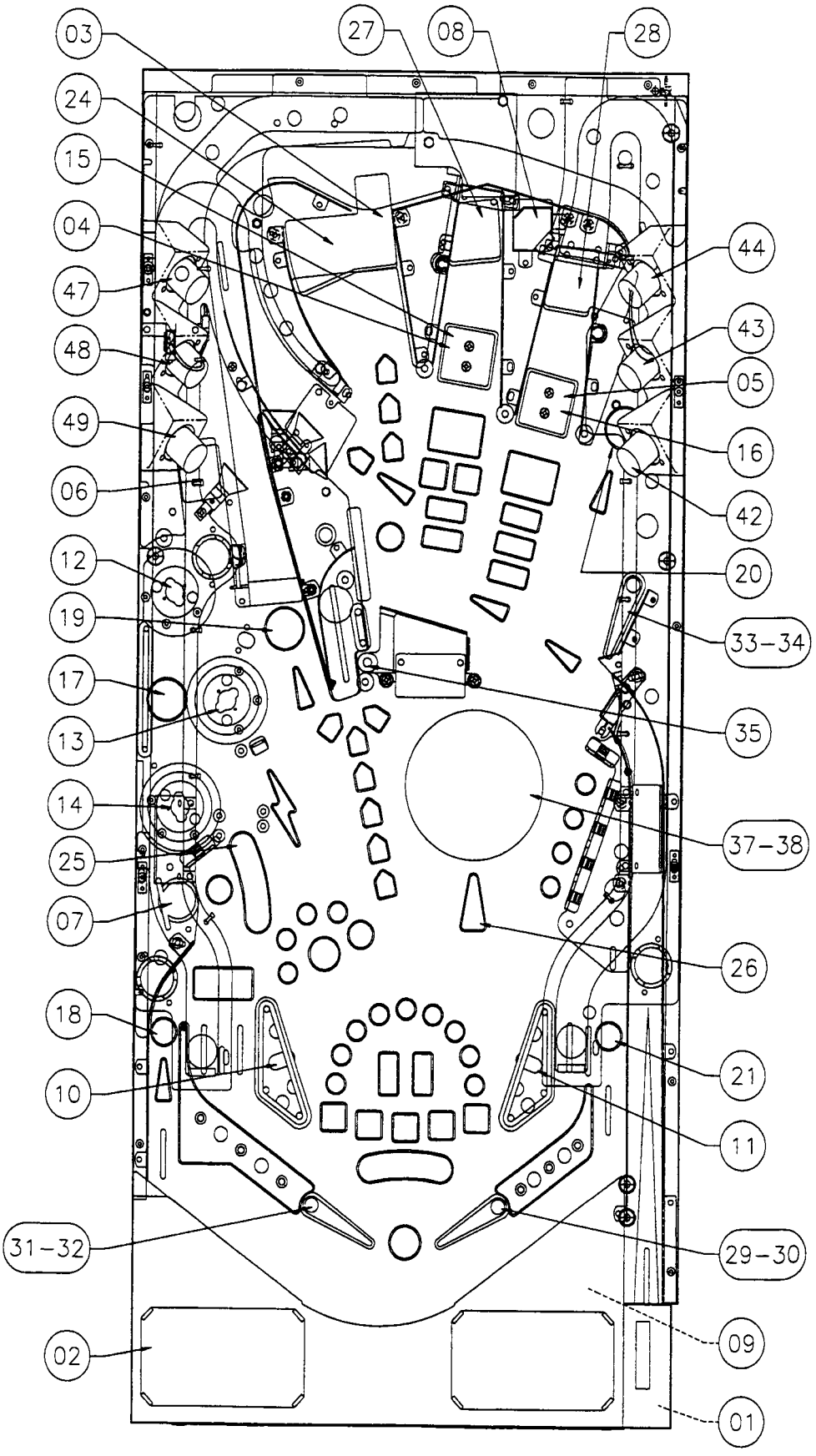
General Illumination

Item	Bulb Number	Bulb Type	Description
01	24-8768, 24-8825	#555, #545	LEFT SIDE STRING
02	24-8768, 24-8825	#555, #545	RIGHT SIDE STRING
03	24-8768, 24-8825	#555, #545	GOFER SPOTLIGHT (Insert)
	24-6549	#44	GOFER SPOTLIGHT (Playfield)
04	24-6549	#44	ILLUMINATION STRING 4
05	24-6549	#44	ILLUMINATION STRING 5

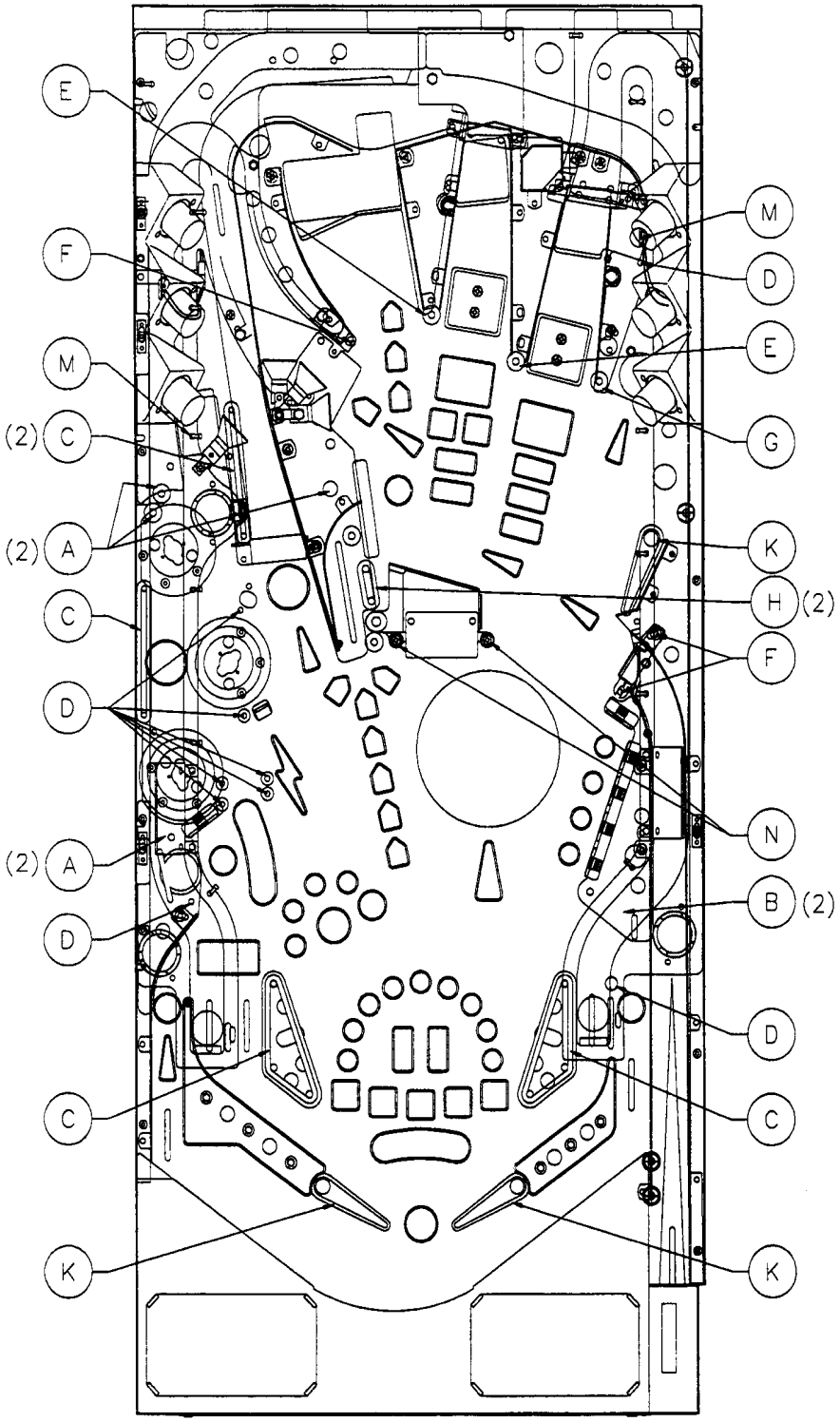
24-6549 = #44 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

The WHEEL SPIN solenoids use two PC boards:
DC Motor Control Board, A-16120
Motor 2-Opto Board, A-22026

Solenoid/Flasher Locations

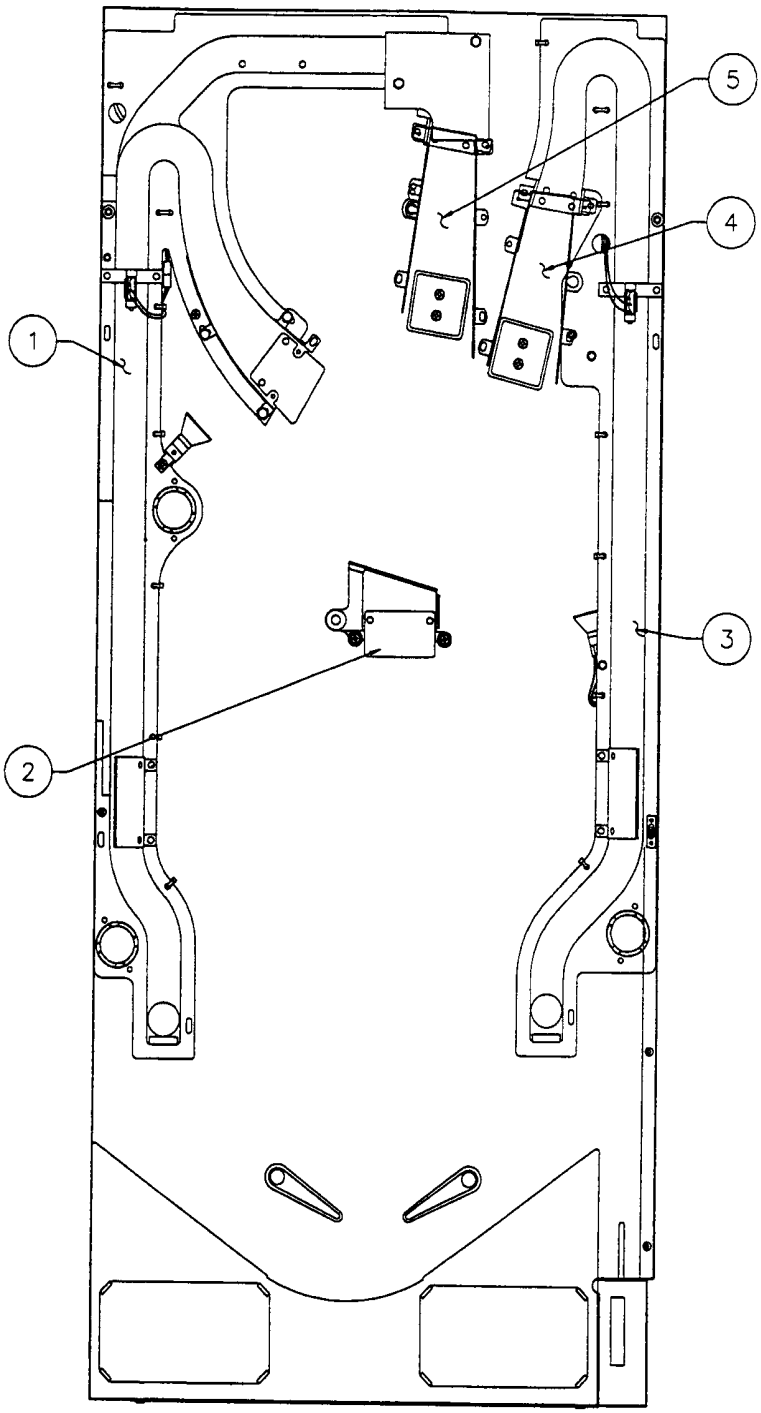


Rubber Rings



Item No.	Part No.	Description	Quantity
A	23-6300	White Rubber Ring 5/16"	8
B	23-6303	White Rubber Ring 1-1/4"	2
C	23-6305	White Rubber Ring 2"	6
D	23-6535	White Rubber Grommet	10
E	23-6552	Yellow Rubber Bumper Sleeve	2
F	23-6556	Black Rubber Bumper Sleeve	4
G	23-6579-1	Tapered Rubber Bumper	1
H	23-6599	White Rubber Ring 7/16"	2
K	23-6519-4	Red Flipper Rubber Ring	3
M	23-6823	Blue Rectangle Bumper Pad	2
N	23-6824	Gray Rubber Bumper Sleeve	2

Ramp Locations



Item	Part Number	Description
1	**A-21753**	Left Plastic Ramp
2	**A-22200**	Floating Ramp Assembly
3	**A-21754**	Right Plastic Assembly
4	**A-22018**	Right Lift Ramp Assembly
5	**A-22017**	Left Lift Ramp Assembly

Switch Locations

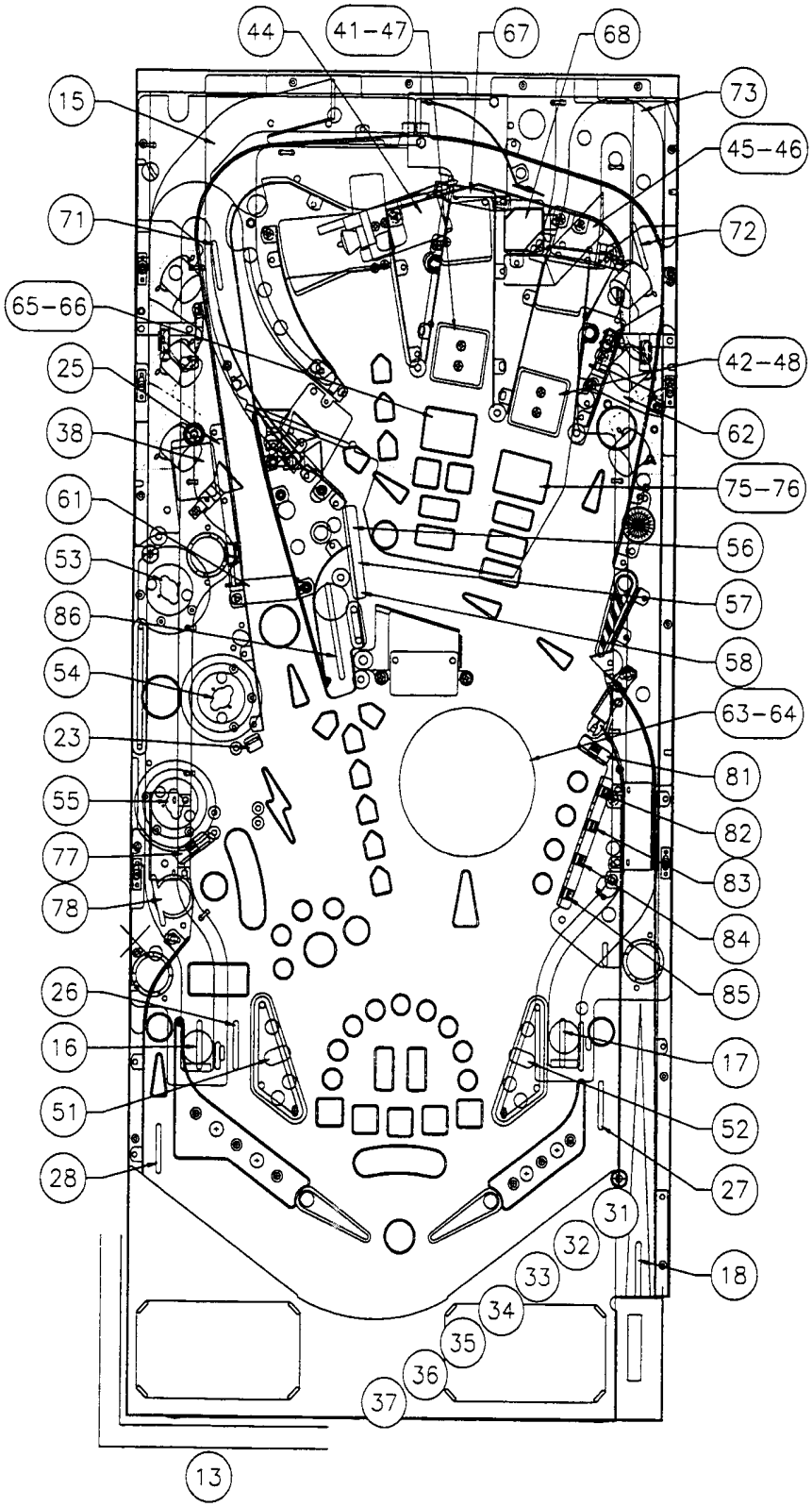
Item Number	Switch Assembly Part Number *OR* Opto Assembly Part Number	Switch Part Number	Description
F1	-----	SW-1A-194	*LOWER RIGHT FLIPPER E.O.S.
F2	A-17316	-----	*LOWER RIGHT FLIPPER CABINET
F3	-----	SW-1A-194	*LOWER LEFT FLIPPER E.O.S.
F4	A-17316	-----	*LOWER LEFT FLIPPER CABINET
F5	-----	SW-1A-194	*UPPER RIGHT FLIPPER E.O.S
F6	A-17316	-----	*UPPER RIGHT FLIPPER CABINET
F7	NOT USED	-----	UPPER LEFT FLIPPER E.O.S.
F8	NOT USED	-----	UPPER LEFT FLIPPER CABINET
11	NOT USED	-----	NOT USED
12	-----	20-10293	LEFT RAMP MAKE
13	20-9663-16	-----	START BUTTON
14	-----	04-10346	*PLUMB BOB TILT
15	-----	20-10293	CENTER RAMP MAKE
16	A-17813	5647-12693-19	LEFT OUTLANE
17	A-17813	5647-12693-19	RIGHT IN-LANE
18	-----	5647-12693-68	SHOOTER GROOVE
21	A-17238	-----	*SLAM TILT
22	-----	5643-09268-00	*COIN DOOR CLOSED
23	A-17795-1	-----	JET ADVANCE STANDUP
24	-----	5643-15190-00	*ALWAYS CLOSED
25	-----	5647-12693-21	UNDERGROUND PASS
26	A-17813-1	5647-12693-19	LEFT IN-LANE
27	A-17813	5647-12693-19	RIGHT OUTLANE
28	A-17813	5647-12693-19	KICKBACK
31	A-18617-1 (LED) A-18618-1 (PHOTO TRANS)	----- -----	TROUGH ELECT
32	A-18617-1 (LED) A-18618-1 (PHOTO TRANS)	----- -----	TROUGH BALL 1
33	A-18617-1 (LED) A-18618-1 (PHOTO TRANS)	----- -----	TROUGH BALL 2
34	A-18617-1 (LED) A-18618-1 (PHOTO TRANS)	----- -----	TROUGH BALL 3
35	A-18617-1 (LED) A-18618-1 (PHOTO TRANS)	----- -----	TROUGH BALL 4
36	A-18617-1 (LED) A-18618-1 (PHOTO TRANS)	----- -----	TROUGH BALL 5
37	A-18617-1 (LED) A-18618-1 (PHOTO TRANS)	----- -----	TROUGH BALL 6
38	A-16908 (LED) A-16909 (PHOTO TRANS)	----- -----	JET POPPER
41	A-16908 (LED) A-16909 (PHOTO TRANS)	----- -----	LEFT GOFER DOWN
42	A-16908 (LED) A-16909 (PHOTO TRANS)	----- -----	RIGHT GOFER DOWN
43	NOT USED	-----	NOT USED
44	A-16908 (LED) A-16909 (PHOTO TRANS)	----- -----	PUTT OUT POPPER
45	A-16908 (LED) A-16909 (PHOTO TRANS)	----- -----	RIGHT POPPER JAM
46	A-16908 (LED) A-16909 (PHOTO TRANS)	----- -----	RIGHT POPPER
47	-----	5647-12693-31	LEFT RAMP DOWN
48	-----	5647-12693-31	RIGHT RAMP DOWN
51	A-17801	A-17800 (KICK) A-17794 (SCORE)*	LEFT SLINGSHOT
52	A-17801	A-17800 (KICK) A-17794 (SCORE)*	RIGHT SLINGSHOT
53	B-12030-2	A-16443	TOP JET BUMPER
54	B-12030-2	A-16443	MIDDLE JET BUMPER
55	B-12030-2	A-16443	BOTTOM JET BUMPER
56	A-17799-6	-----	TOP SKILL SHOT
57	A-17795-6	-----	MIDDLE SKILL SHOT
58	A-17799-6	-----	LOWER SKILL SHOT
61	A-22037-2	5647-12693-24	LEFT SPINNER
62	A-22037-2	5647-12693-24	RIGHT SPINNER
63	A-22026	-----	INNER WHEEL OPTO
64	A-22026	-----	OUTER WHEEL OPTO

Switch Locations

Item Number	Switch Assembly Part Number *OR* Opto Assembly Part Number	Switch Part Number	Description
65	-----	20-10293	LEFT GOFER 1
66	-----	20-10293	LEFT GOFER 2
67	-----	5647-12693-13	BEHIND LEFT GOFER
68	-----	5647-12693-13	HOLE-IN-ONE MADE
71	A-17813	5647-12693-19	LEFT CART PATH
72	A-17813	5647-12693-19	RIGHT CART PATH
73	-----	20-10293	RIGHT RAMP MADE
74	A-22222 (Qty. 2) A-22224-4 (Qty. 2)	----- -----	GOLF CART
75	-----	20-10293	RIGHT GOFER 1
76	-----	20-10293	RIGHT GOFER 2
77	A-15330-6	-----	ADVANCE TRAP VALUE
78	A-19693	5647-12693-43	SAND TRAP EJECT
81	A-17799-4	-----	K-I-C-K ADVANCE
82	B-12039-15	-----	(K)ICK
83	B-12039-15	-----	K(I)CK
84	B-12039-15	-----	KI(C) K
85	B-12039-15	-----	KIC(K)
86	A-17813-1	5647-12693-19	CAPTIVE BALL
87	NOT USED	-----	NOT USED
88	NOT USED	-----	NOT USED

***NOT SHOWN. **SCORE SWITCHES HAVE DIODES ATTACHED.**

Switch Locations



SWITCH MATRIX

White ─▶├─○⁄ ○─ Green

DEDICATED GROUNDED SWITCHES	Column / Row	1 Green-Brown J206-1 U20-18	2 Green-Red J206-2 U20-17		4 Green-White 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	NOT USED 11	SLAM TILT 21	TROUGH EJECT 31	LEFT GOFER DOWN 41	LEFT SLINGSHOT 51	LEFT SPINNER 61	LEFT CART PATH 71	K-I-C-K ADVANCE 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	LEFT RAMP MAKE 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	RIGHT GOFER DOWN 42	RIGHT SLINGSHOT 52	RIGHT SPINNER 62	RIGHT CART PATH 72	(K)ICK 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	JET ADVANCE STANDUP 23	TROUGH BALL 2 33	NOT USED 43	TOP JET BUMPER 53	INNER WHEEL OPTO 63	RIGHT RAMP MAKE 73	K(I)CK 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	PUTT OUT POPPER 44	MIDDLE JET BUMPER 54	OUTER WHEEL OPTO 64	GOLF CART 74	KI(C)K 84	**BLUE-GRAY** **J212-11** LOWER LEFT FLIPPER OPTO F4
Orange-Green **J205-6** U16-9 Normal Function Srv Crdts | Test Function Escape D5	**5** **White-Green** J208-5 U19-11	CENTER RAMP MAKE 15	UNDER-GROUND PASS 25	TROUGH BALL 4 35	RIGHT POPPER JAM 45	BOTTOM JET BUMPER 55	LEFT GOFER 1 65	RIGHT GOFER 1 75	KIC(K) 85	**BLACK-VIOLET** **J208-11** UPPER RIGHT FLIPPER E.O.S. F5
Orange-Blue **J205-7** U16-11 Normal Function Volume Dn | Test Function Down D6	**6** **White-Blue** J208-7 U19-9	LEFT OUTLANE 16	LEFT IN-LANE 26	TROUGH BALL 5 36	RIGHT POPPER 46	TOP SKILL SHOT 56	LEFT GOFER 2 66	RIGHT GOFER 2 76	CAPTIVE BALL 86	**BLACK-YELLOW** **J212-10** UPPER RIGHT FLIPPER OPTO F6
Orange-Violet **J205-8** U16-7 Normal Function Volume Up | Test Function Up D7	**7** **White-Violet** J208-8 U19-5	RIGHT IN-LANE 17	RIGHT OUTLANE 27	TROUGH BALL 6 37	LEFT RAMP DOWN 47	MIDDLE SKILL SHOT 57	BEHIND LEFT GOFER 67	ADVANCE TRAP VALUE 77	NOT USED 87	**BLACK-GRAY** **J208-10** UPPER LEFT FLIPPER E.O.S. F7
Orange-Gray **J205-9** U16-5 Normal Function Begin Test | Test Function Enter D8	**8** **White-Gray** J208-9 U19-7	SHOOTER GROOVE 18	KICKBACK 28	JET POPPER 38	RIGHT RAMP DOWN 48	LOWER SKILL SHOT 58	HOLE-IN-ONE MADE 68	SAND TRAP EJECT 78	NOT USED 88	**BLACK-BLUE** **J212-9** UPPER LEFT FLIPPER OPTO F8

J2XX = CPU BOARD

(shaded) = OPTO, TYPICALLY CLOSED

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	OUTLANE EXTRA BALL 11	HOLE 5 21	HOLE 6 31	DRIVING RANGE 41	(K)ICK 51	4 STROKES 61	ADVANCE TRAP 71	SIDE RAMP DRIVE 81
2 Red-Black J125-2 Q108	KICKBACK 12	HOLE 4 22	HOLE 7 32	INCREASE GOLF CART 42	K(I)CK 52	3 STROKES 62	CENTER DRIVE 72	EXTRA BALL 82
3 Red-Orange J125-4 Q103	LOWER DRIVING RANGE 13	HOLE 3 23	HOLE 2 33	INCREASE BUZZ VALUE 43	KI(C)K 53	2 STROKES 63	CENTER LOCK 73	MULTIBALL 83
4 Red-Yellow J125-5 Q107	SHOOT AGAIN 14	HIT BUD 24	HIT BUZZ 34	INCREASE BUD VALUE 44	KIC(K) 54	5 STROKES 64	GET T.N.T 74	JACKPOT 84
5 Red-Green J125-6 Q102	SPECIAL 15	HOLE 1 25	HOLE 9 35	NEWTON DRIVE 45	SKILL SHOT 55	7 STROKES 65	CENTER RAISE GOFER 75	PUTT OUT 85
6 Red-Blue J125-7 Q106	WHEEL VALUE 16	2X 26	4X 36	COLLECT 46	RELIGHT JACKPOT 56	6 STROKES 66	RIGHT SPINNER 76	TOP JET BUMPER 86
7 Red-Violet J125-8 Q101	JET LIGHTNING 17	CART PATH 2 27	CART PATH 4 37	RIP OFF 47	RIGHT RAMP LOCK 57	LEFT SPINNER 67	RIGHT LOOP DRIVE 77	MIDDLE JET BUMPER 87
8 Red-Gray J125-9 Q105	HOLE 8 18	5X CART PATH 28	3X 38	LEFT LOOP DRIVE 48	RIGHT RAMP DRIVE 58	TRAP READY 68	BOTTOM JET BUMPER 78	START BUTTON 88

J1XX = Power Driver Board

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Backbox	Cabinet	Drive Xistor	Drive Connections Playfield	Backbox	Cabinet	Drive Wire Color	Solenoid Part Number Flashlamp Type Playfield	Insert
01	AUTO FIRE	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-23-800	
02	KICKBACK	High Power		J134-3		Q68	J116-2			VIO-RED	AE-23-800	
03	CLUBHOUSE KICKER	High Power	J133-2			Q71	J116-4			VIO-ORG	AE-23-800	
04	LEFT GOFER UP	High Power	J133-2			Q67	J116-5			VIO-YEL	LE-23-1300	
05	RIGHT GOFER UP	High Power	J133-2			Q70	J116-6			VIO-GRN	LE-23-1300	
06	JET POPPER	High Power	J133-2			Q66	J116-7			VIO-BLU	AE-27-1200	
07	LEFT EJECT	High Power	J133-2			Q69	J116-8			VIO-BLK	AE-24-900	
08	UPPER RIGHT EJECT	High Power	J133-2			Q65	J116-9			VIO-GRY	AE-26-1200	
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	TOP JET BUMPER	Low Power	J133-3			Q47	J113-5			BRN-YEL	AE-26-1200	
13	MIDDLE 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	LEFT GOFER DOWN	Low Power	J133-3			Q41	J113-8			BRN-VIO	AE-30-2000	
16	RIGHT GOFER DOWN	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-30-2000	
17	JET FLASHER	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906	
18	LOWER LEFT FLASHER	Flasher	J133-6			Q32	J111-2			BLK-RED	#906	
19	LEFT SPINNER FLASHER	Flasher	J133-6			Q27	J111-3			BLK-ORG	#906	
20	RIGHT SPINNER FLASHER	Flasher	J133-6			Q31	J111-4			BLK-YEL	#906, #89	
21	LOWER RIGHT FLASHER	Flasher	J133-6			Q26	J111-5			BLU-GRN	#89	
22	NOT USED	Flasher	J133-6			Q30				BLU-BLK		
23	NOT USED	Flasher	J133-6			Q25				BLU-VIO		
24	UNDERGROUND PASS	Flasher	J133-1			Q29	J111-8			BLU-GRY	AE-27-1200	
25	SAND TRAP FLASHER	Gen. Purpose	J133-6			Q16	J109-1			BLU-BRN	#906 (2)	
26	WHEEL FLASHER	Gen. Purpose	J133-6			Q15	J109-2			BLU-RED	#906	
27	LEFT RAMP DOWN	Gen. Purpose	J133-1			Q14	J109-3			BLU-ORG	SM1-28-900	
28	RIGHT RAMP DOWN	Gen. Purpose	J133-1			Q13	J109-4			BLU-YEL	SM1-28-900	
	General Illumination											
01	LEFT SIDE STRING	G.I.	J105-1			Q5	J105-7			WHT-BRN		#555, #545
02	RIGHT SIDE STRING	G.I.	J105-2			Q4	J105-8			WHT-ORG		#555, #545
03	GOFER SPOTLIGHT	G.I.	J105-3			Q3	J105-9			WHT-YEL	#44	#555, #545
04	*ILLUMINATION STRING 4	G.I.		J106-5		Q2		J106-10		WHT-GRN	#44	
05	*ILLUMINATION STRING 5	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	WHT-VIO	#44	

	Flipper Circuits	Solenoid Type	Voltage Connection Playfield	Drive Xistors Power	Hold	Drive Connections Playfield	Drive Wire Colors Power	Hold	Coil Part No.	Coil Colors
29		Power	J119-1 (RED-GRN)	Q90		J120-13	YEL-GRN			
30	LOWER RIGHT FLIPPER	Hold	J119-1 (RED-GRN)		Q92	J120-11		ORG-GRN	FL-11629	BLUE
31		Power	J119-4 (RED-BLU)	Q87		J120-9	YEL-BLU			
32	LOWER LEFT FLIPPER	Hold	J119-4 (RED-BLU)		Q89	J120-7		ORG-BLU	FL-11629	BLUE
33		Power	J119-6 (RED-VIO)	Q84		J120-6	YEL-VIO			
34	UPPER RIGHT FLIPPER	Hold	J119-6 (RED-VIO)		Q86	J120-4		ORG-VIO	FL-11630	RED
35	BALL LAUNCH RAMP	Power	J119-8 (RED-GRY)	Q81		J120-3	YEL-GRY		LE-23-1300-T	YELLOW
36	NOT USED	Hold	J119-8 (RED-GRY)		Q83	J120-1		ORG-GRY		

	Motor Circuit	Solenoid Type	Voltage Connections Playfield	Drive Gates	Drive Connections Playfield	Drive Wire Color	Device Part Number Playfield
37	WHEEL SPIN (counter clock-wise)	Low Power	J139-2	U3A, U3B	J110-1	BRN-WHT	SEE BELOW
38	WHEEL SPIN (clock-wise)	Low Power	J139-2	U3C, U3D	J110-3	ORG-WHT	SEE BELOW

	Auxiliary Circuits	Solenoid Type	Voltage Connections Playfield	Drive Transistor	Drive Connections Playfield	Drive Wire Color	Device Part Number Playfield
42	UPPER RIGHT 1 FLASHER	Flasher	J4-1	Q2	J4-2	BLU-BRN	#906
43	UPPER RIGHT 2 FLASHER	Flasher	J4-1	Q4	J4-3	BLU-RED	#906
44	UPPER RIGHT 3 FLASHER	Flasher	J4-1	Q6	J4-4	BLU-ORG	#906
45	UPPER PLAYFIELD RIGHT	Flasher	J4-1	Q8	J4-5	BLU-YEL	#906 (2)
46	UPPER PLAYFIELD LEFT	Flasher	J4-1	Q10	J4-7	BLU-GRN	#906 (2)
47	UPPER LEFT 3 FLASHER	Flasher	J4-1	Q12	J4-8	BLU-BLK	#906
48	UPPER LEFT 2 FLASHER	Flasher	J4-1	Q14	J4-9	BLU-VIO	#906
49	UPPER LEFT 1 FLASHER	Flasher	J4-1	Q16	J4-10	BLU-GRY	#906

***These general illumination strings do not brighten and dim, they are always on.**

J1XX = Power Driver Board

J4-X = Auxiliary 8-Driver Board

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

Tieback Diodes:
J109-8 & J109-9
J111-10 & J111-11

For solenoids #37 and #38:
Motor, 14-7955-1
DC Motor Control Board, A-16120
Motor 2-Opto Board, A-22026

POWER INTERFACE/CORDSET APPLICATION CHART

COUNTRY	UNIVERSAL PWR. INTERFACE ASSEMBLY	VOLTAGE PROGRAMMING JUMP CABLE				4AMP FUSE/ LABEL		5AMP FUSE/ LABEL		LABEL HIGH/ VOLTAGE CAUTION	POWER ADAPTER CORD	CORDSET								
	A-20871	H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-14530-00 FUSE	16-10145 LABEL	5731-14046-00 FUSE	16-9698 LABEL	16-9669	5850-14052-00	5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00	A-17175-2
UNITED STATES	X		X					X	X		X	X								
CANADA	X	X						X	X			X								
TAIWAN	X		X					X	X			X								
MEXICO	X		X					X	X			X								
CENTRAL AMERICA	X		X					X	X			X								
SOUTH KOREA	X		X					X	X			X								
PUERTO RICO	X		X					X	X			X								
AUSTRIA	X			X		X	X			X			X							
BELGIUM	X			X		X	X			X			X							
FINLAND	X			X		X	X			X			X							
FRANCE	X			X		X	X			X			X							
GREECE	X			X		X	X			X			X							
HOLLAND	X			X		X	X			X			X							
HUNGARY	X			X		X	X			X			X							
NETHERLANDS	X			X		X	X			X			X							
NETH. ANTILLES	X			X		X	X			X			X							
NORWAY	X			X		X	X			X			X							
POLAND	X			X		X	X			X			X							
PORTUGAL	X			X		X	X			X			X							
SPAIN	X			X		X	X			X			X							
SWEDEN	X			X		X	X			X			X							
TURKEY	X			X		X	X			X			X							
WEST GERMANY	X			X		X	X			X			X							
UNITED KINGDOM	X			X		X	X			X				X						
IRELAND	X			X		X	X			X				X						
HONG KONG	X			X		X	X			X				X						
DENMARK	X			X		X	X			X					X					
ITALY	X			X		X	X			X						X				
CHILE	X			X		X	X			X						X				
PEOPLE'S REP. OF CHINA	X			X		X	X			X						X				
SWITZERLAND	X			X		X	X			X							X			
AUSTRALIA	X			X		X	X			X								X		
NEW ZEALAND	X			X		X	X			X								X		
ARGENTINA	X			X		X	X			X								X		
JAPAN	X				X			X	X										X	X
CROATIA	X			X		X	X			X			X							

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.

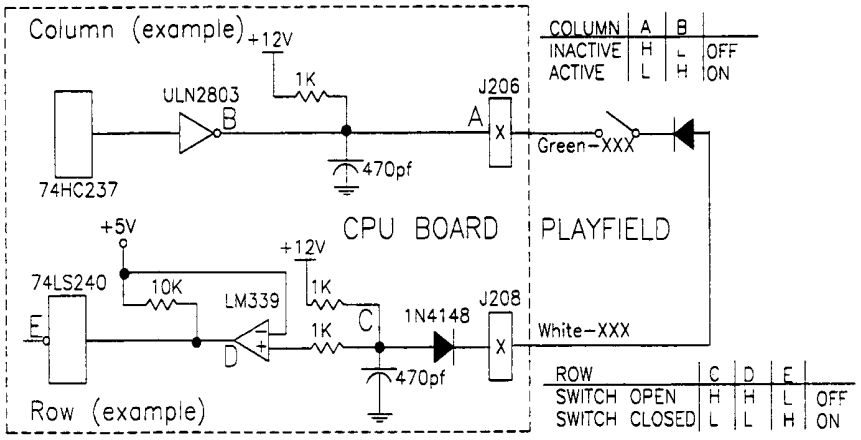
SWITCH MATRIX

White ——▶|—o 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-White 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	NOT USED 11	SLAM TILT 21	TROUGH EJECT 31	LEFT GOFER DOWN 41	LEFT SLINGSHOT 51	LEFT SPINNER 61	LEFT CART PATH 71	K-I-C-K ADVANCE 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	LEFT RAMP MAKE 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	RIGHT GOFER DOWN 42	RIGHT SLINGSHOT 52	RIGHT SPINNER 62	RIGHT CART PATH 72	(K)ICK 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	JET ADVANCE STANDUP 23	TROUGH BALL 2 33	NOT USED 43	TOP JET BUMPER 53	INNER WHEEL OPTO 63	RIGHT RAMP MAKE 73	K(I)CK 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	PUTT OUT POPPER 44	MIDDLE JET BUMPER 54	OUTER WHEEL OPTO 64	GOLF CART 74	KI(C)K 84	BLUE-GRAY J212-11 LOWER LEFT FLIPPER OPTO F4
Orange-Green J205-6 U16-9 Normal Function / Test Function Srv Crdts / Escape D5	5 White-Green J208-5 U19-11	CENTER RAMP MAKE 15	UNDER-GROUND PASS 25	TROUGH BALL 4 35	RIGHT POPPER JAM 45	BOTTOM JET BUMPER 55	LEFT GOFER 1 65	RIGHT GOFER 1 75	KIC(K) 85	BLACK-VIOLET J208-11 UPPER RIGHT FLIPPER E.O.S. F5
Orange-Blue J205-7 U16-11 Normal Function / Test Function Volume Dn / Down D6	6 White-Blue J208-7 U19-9	LEFT OUTLANE 16	LEFT IN-LANE 26	TROUGH BALL 5 36	RIGHT POPPER 46	TOP SKILL SHOT 56	LEFT GOFER 2 66	RIGHT GOFER 2 76	CAPTIVE BALL 86	BLACK-YELLOW J212-10 UPPER RIGHT FLIPPER OPTO F6
Orange-Violet J205-8 U16-7 Normal Function / Test Function Volume Up / Up D7	7 White-Violet J208-8 U19-5	RIGHT IN-LANE 17	RIGHT OUTLANE 27	TROUGH BALL 6 37	LEFT RAMP DOWN 47	MIDDLE SKILL SHOT 57	BEHIND LEFT GOFER 67	ADVANCE TRAP VALUE 77	NOT USED 87	BLACK-GRAY J208-10 UPPER LEFT FLIPPER E.O.S. F7
Orange-Gray J205-9 U16-5 Normal Function / Test Function Begin Test / Enter D8	8 White-Gray J208-9 U19-7	SHOOTER GROOVE 18	KICKBACK 28	JET POPPER 38	RIGHT RAMP DOWN 48	LOWER SKILL SHOT 58	HOLE-IN-ONE MADE 68	SAND TRAP EJECT 78	NOT USED 88	BLACK-BLUE J212-9 UPPER LEFT FLIPPER OPTO F8

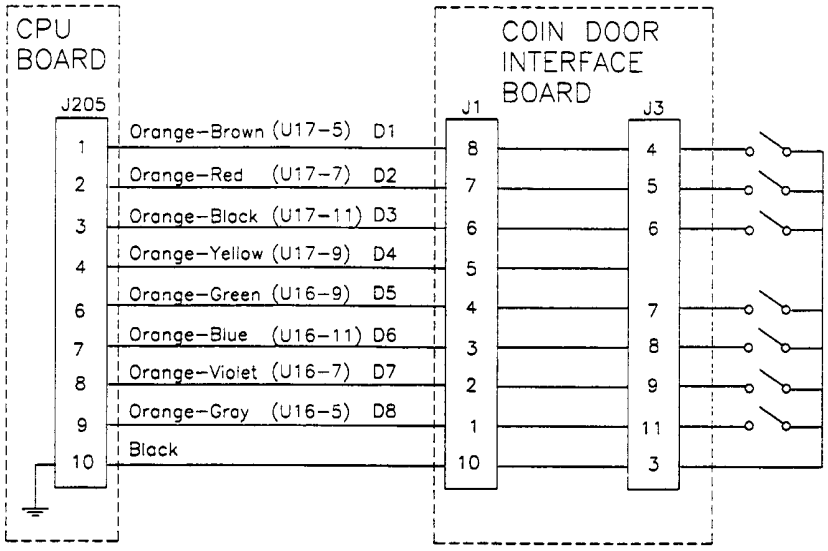
J2XX = CPU BOARD = OPTO, TYPICALLY CLOSED

SWITCH MATRIX CIRCUIT



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

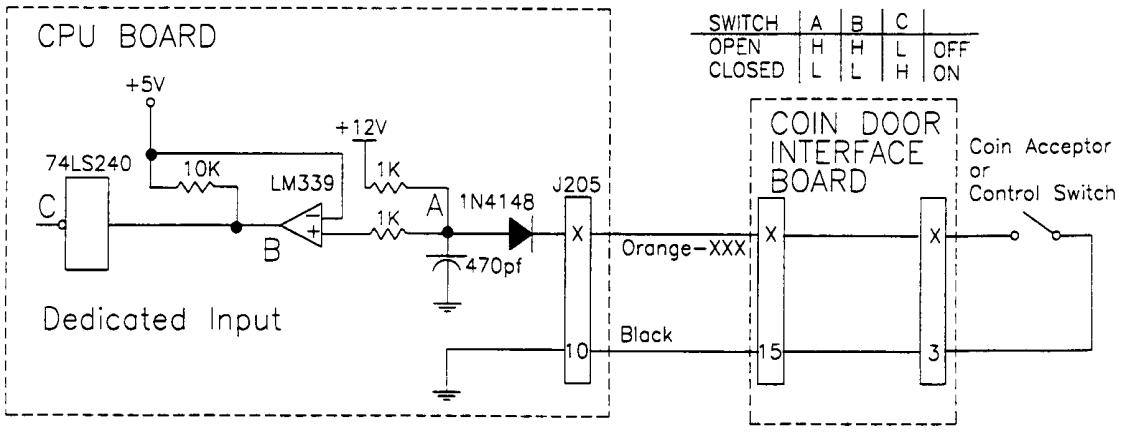
DEDICATED SWITCHES



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



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

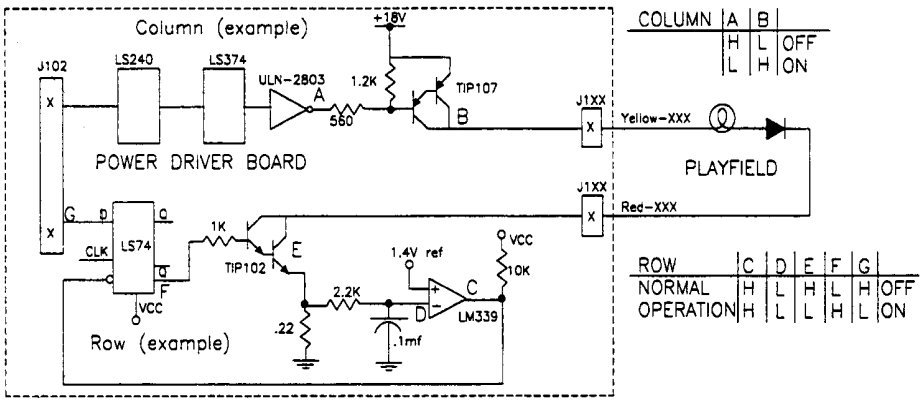
LAMP MATRIX

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	OUTLANE EXTRA BALL 11	HOLE 5 21	HOLE 6 31	DRIVING RANGE 41	(K)ICK 51	4 STROKES 61	ADVANCE TRAP 71	SIDE RAMP DRIVE 81
2 Red-Black J125-2 Q108	KICKBACK 12	HOLE 4 22	HOLE 7 32	INCREASE GOLF CART 42	K(I)CK 52	3 STROKES 62	CENTER DRIVE 72	EXTRA BALL 82
3 Red-Orange J125-4 Q103	LOWER DRIVING RANGE 13	HOLE 3 23	HOLE 2 33	INCREASE BUZZ VALUE 43	KI(C)K 53	2 STROKES 63	CENTER LOCK 73	MULTIBALL 83
4 Red-Yellow J125-5 Q107	SHOOT AGAIN 14	HIT BUD 24	HIT BUZZ 34	INCREASE BUD VALUE 44	KIC(K) 54	5 STROKES 64	GET T.N.T 74	JACKPOT 84
5 Red-Green J125-6 Q102	SPECIAL 15	HOLE 1 25	HOLE 9 35	NEWTON DRIVE 45	SKILL SHOT 55	7 STROKES 65	CENTER RAISE GOFER 75	PUTT OUT 85
6 Red-Blue J125-7 Q106	WHEEL VALUE 16	2X 26	4X 36	COLLECT 46	RELIGHT JACKPOT 56	6 STROKES 66	RIGHT SPINNER 76	TOP JET BUMPER 86
7 Red-Violet J125-8 Q101	JET LIGHTNING 17	CART PATH 2 27	CART PATH 4 37	RIP OFF 47	RIGHT RAMP LOCK 57	LEFT SPINNER 67	RIGHT LOOP DRIVE 77	MIDDLE JET BUMPER 87
8 Red-Gray J125-9 Q105	HOLE 8 18	5X CART PATH 28	3X 38	LEFT LOOP DRIVE 48	RIGHT RAMP DRIVE 58	TRAP READY 68	BOTTOM JET BUMPER 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	Drive Connections Playfield	Backbox	Cabinet	Drive Wire Color	Solenoid Part Number Flashlamp Type Playfield	Insert
01	AUTO FIRE	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-23-800	
02	KICKBACK	High Power		J134-3		Q68	J116-2			VIO-RED	AE-23-800	
03	CLUBHOUSE KICKER	High Power	J133-2			Q71	J116-4			VIO-ORG	AE-23-800	
04	LEFT GOFER UP	High Power	J133-2			Q67	J116-5			VIO-YEL	LE-23-1300	
05	RIGHT GOFER UP	High Power	J133-2			Q70	J116-6			VIO-GRN	LE-23-1300	
06	JET POPPER	High Power	J133-2			Q66	J116-7			VIO-BLU	AE-27-1200	
07	LEFT EJECT	High Power	J133-2			Q69	J116-8			VIO-BLK	AE-24-900	
08	UPPER RIGHT EJECT	High Power	J133-2			Q65	J116-9			VIO-GRY	AE-26-1200	
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	TOP JET BUMPER	Low Power	J133-3			Q47	J113-5			BRN-YEL	AE-26-1200	
13	MIDDLE 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	LEFT GOFER DOWN	Low Power	J133-3			Q41	J113-8			BRN-VIO	AE-30-2000	
16	RIGHT GOFER DOWN	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-30-2000	
17	JET FLASHER	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906	
18	LOWER LEFT FLASHER	Flasher	J133-6			Q32	J111-2			BLK-RED	#906	
19	LEFT SPINNER FLASHER	Flasher	J133-6			Q27	J111-3			BLK-ORG	#906	
20	RIGHT SPINNER FLASHER	Flasher	J133-6			Q31	J111-4			BLK-YEL	#906, #89	
21	LOWER RIGHT FLASHER	Flasher	J133-6			Q26	J111-5			BLU-GRN	#89	
22	NOT USED	Flasher	J133-6			Q30				BLU-BLK		
23	NOT USED	Flasher	J133-6			Q25				BLU-VIO		
24	UNDERGROUND PASS	Flasher	J133-1			Q29	J111-8			BLU-GRY	AE-27-1200	
25	SAND TRAP FLASHER	Gen. Purpose	J133-6			Q16	J109-1			BLU-BRN	#906 (2)	
26	WHEEL FLASHER	Gen. Purpose	J133-6			Q15	J109-2			BLU-RED	#906	
27	LEFT RAMP DOWN	Gen. Purpose	J133-1			Q14	J109-3			BLU-ORG	SM1-28-900	
28	RIGHT RAMP DOWN	Gen. Purpose	J133-1			Q13	J109-4			BLU-YEL	SM1-28-900	
	General Illumination											
01	LEFT SIDE STRING	G.I.	J105-1			Q5	J105-7			WHT-BRN		#555, #545
02	RIGHT SIDE STRING	G.I.	J105-2			Q4	J105-8			WHT-ORG		#555, #545
03	GOFER SPOTLIGHT	G.I.	J105-3			Q3	J105-9			WHT-YEL	#44	#555, #545
04	*ILLUMINATION STRING 4	G.I.		J106-5		Q2		J106-10		WHT-GRN	#44	
05	*ILLUMINATION STRING 5	G.I.		J106-6	J104-3	Q1		J106-11	J104-1	WHT-VIO	#44	

Flipper Circuits		Solenoid Type	Playfield Voltage Connection	Drive Xistors Power	Hold	Playfield Drive Connections	Drive Wire Colors Power	Hold	Coil Part No.	Coil Colors
29		Power	J119-1 (RED-GRN)	Q90		J120-13	YEL-GRN			
30	LOWER RIGHT FLIPPER	Hold	J119-1 (RED-GRN)		Q92	J120-11		ORG-GRN	FL-11629	BLUE
31		Power	J119-4 (RED-BLU)	Q87		J120-9	YEL-BLU			
32	LOWER LEFT FLIPPER	Hold	J119-4 (RED-BLU)		Q89	J120-7		ORG-BLU	FL-11629	BLUE
33		Power	J119-6 (RED-VIO)	Q84		J120-6	YEL-VIO			
34	UPPER RIGHT FLIPPER	Hold	J119-6 (RED-VIO)		Q86	J120-4		ORG-VIO	FL-11630	RED
35	BALL LAUNCH RAMP	Power	J119-8 (RED-GRY)	Q81		J120-3	YEL-GRY		LE-23-1300-T	YELLOW
36	NOT USED	Hold	J119-8 (RED-GRY)		Q83	J120-1		ORG-GRY		

Motor Circuit		Solenoid Type	Playfield Voltage Connections	Drive Gates	Drive Connection Playfield	Drive Wire Color	Device Part Number Playfield
37	WHEEL SPIN (counter clock-wise)	Low Power	J139-2	U3A, U3B	J110-1	BRN-WHT	SEE BELOW
38	WHEEL SPIN (clock-wise)	Low Power	J139-2	U3C, U3D	J110-3	ORG-WHT	SEE BELOW

Auxiliary Circuits		Solenoid Type	Voltage Connections Playfield	Drive Transistor	Drive Connections Playfield	Drive Wire Color	Device Part Number Playfield
42	UPPER RIGHT 1 FLASHER	Flasher	J4-1	Q2	J4-2	BLU-BRN	#906
43	UPPER RIGHT 2 FLASHER	Flasher	J4-1	Q4	J4-3	BLU-RED	#906
44	UPPER RIGHT 3 FLASHER	Flasher	J4-1	Q6	J4-4	BLU-ORG	#906
45	UPPER PLAYFIELD RIGHT	Flasher	J4-1	Q8	J4-5	BLU-YEL	#906 (2)
46	UPPER PLAYFIELD LEFT	Flasher	J4-1	Q10	J4-7	BLU-GRN	#906 (2)
47	UPPER LEFT 3 FLASHER	Flasher	J4-1	Q12	J4-8	BLU-BLK	#906
48	UPPER LEFT 2 FLASHER	Flasher	J4-1	Q14	J4-9	BLU-VIO	#906
49	UPPER LEFT 1 FLASHER	Flasher	J4-1	Q16	J4-10	BLU-GRY	#906

***These general illumination strings do not brighten and dim, they are always on.**

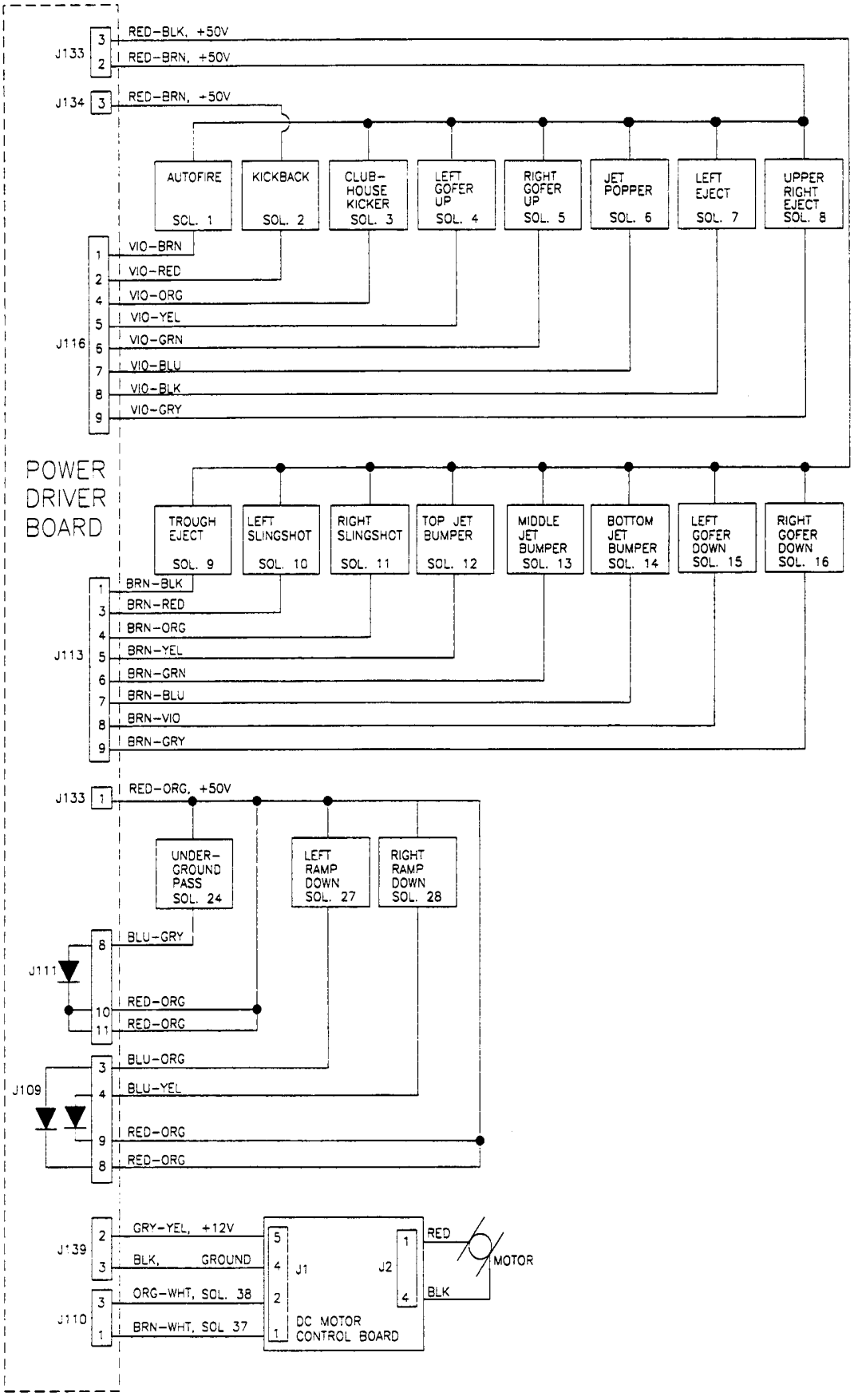
24-6549 =	#44 bulb	24-8768 =	#555 bulb
24-8704 =	#89 bulb	24-8802 =	#906 bulb

Tieback Diodes:
J109-8 & J109-9
J111-10 & J111-11

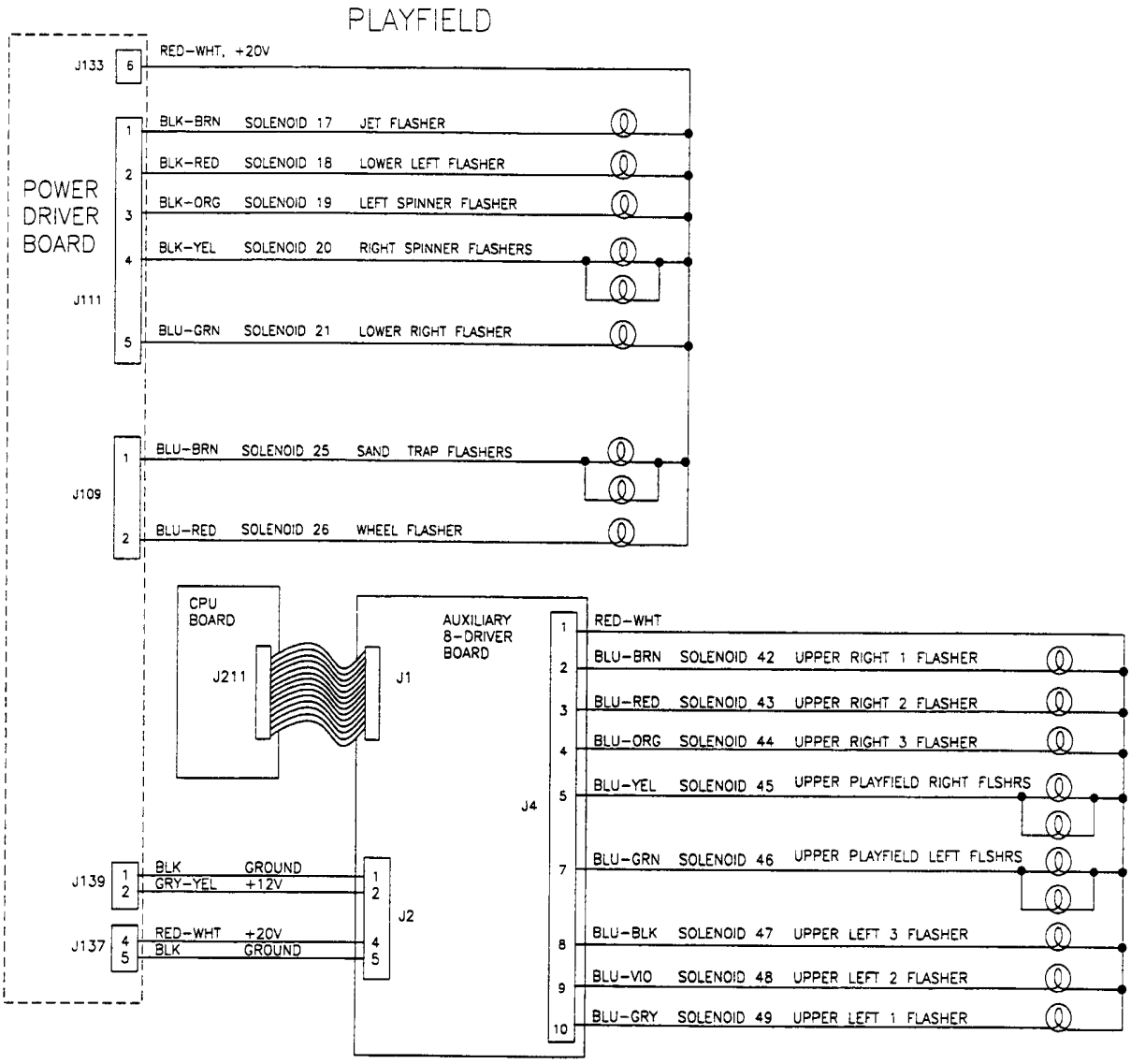
For solenoids #37 and #38:
Motor, 14-7955-1
DC Motor Control Board, A-16120
Motor 2-Opto Board, A-22026

SOLENOID WIRING

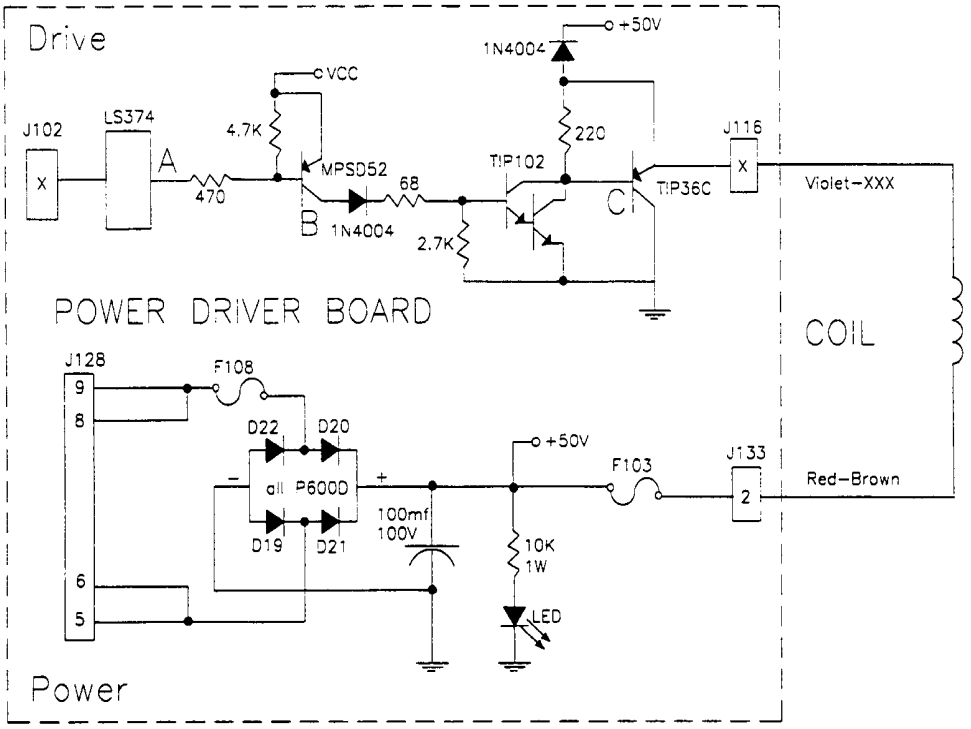
COILS



FLASHLAMPS

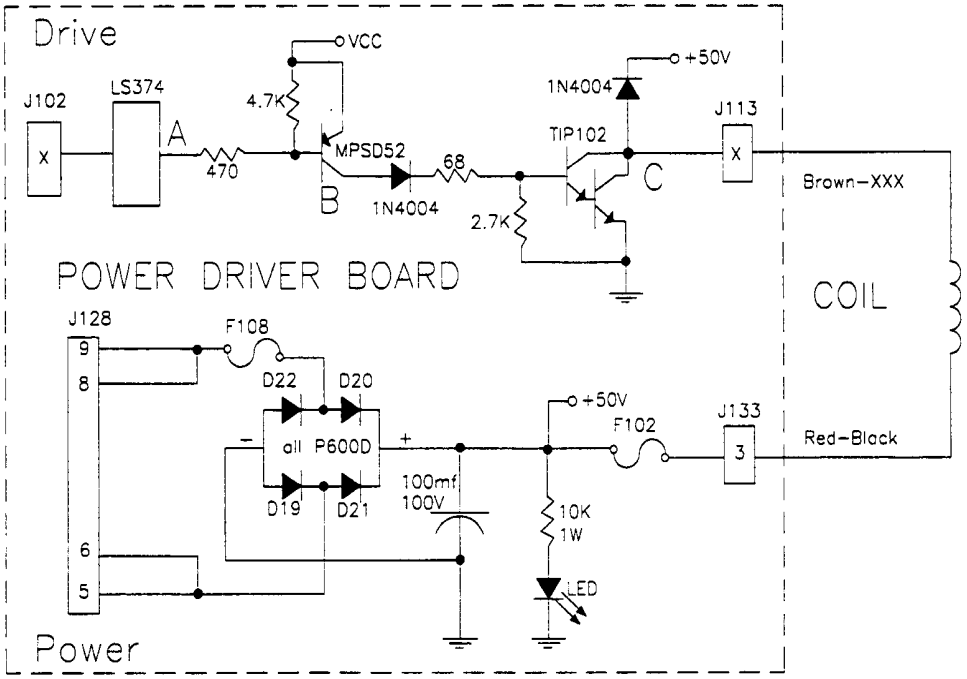

PLAYFIELD
POWER DRIVER BOARD
J133
6
RED-WHT, +20V
J111
1
2
3
4
5
BLK-BRN SOLENOID 17 JET FLASHER
BLK-RED SOLENOID 18 LOWER LEFT FLASHER
BLK-ORG SOLENOID 19 LEFT SPINNER FLASHER
BLK-YEL SOLENOID 20 RIGHT SPINNER FLASHERS
BLU-GRN SOLENOID 21 LOWER RIGHT FLASHER
J109
1
2
BLU-BRN SOLENOID 25 SAND TRAP FLASHERS
BLU-RED SOLENOID 26 WHEEL FLASHER
CPU BOARD
J211
J1
AUXILIARY 8-DRIVER BOARD
J4
1
2
3
4
5
7
8
9
10
RED-WHT
BLU-BRN SOLENOID 42 UPPER RIGHT 1 FLASHER
BLU-RED SOLENOID 43 UPPER RIGHT 2 FLASHER
BLU-ORG SOLENOID 44 UPPER RIGHT 3 FLASHER
BLU-YEL SOLENOID 45 UPPER PLAYFIELD RIGHT FLSHRS
BLU-GRN SOLENOID 46 UPPER PLAYFIELD LEFT FLSHRS
BLU-BLK SOLENOID 47 UPPER LEFT 3 FLASHER
BLU-VIO SOLENOID 48 UPPER LEFT 2 FLASHER
BLU-GRY SOLENOID 49 UPPER LEFT 1 FLASHER
J139
1
2
BLK GROUND
GRY-YEL +12V
J137
4
5
RED-WHT +20V
BLK GROUND
J2
1
2
4
5

HIGH POWER SOLENOID CIRCUIT



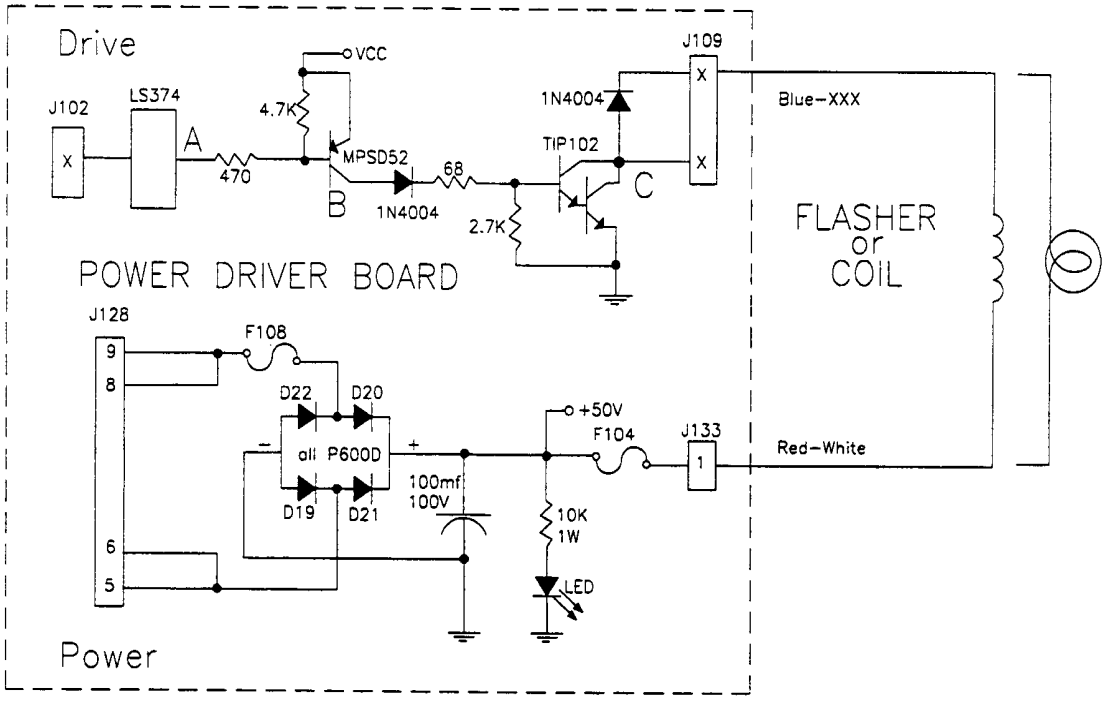
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is high. A high at point "B" causes point "C", the collector of the TIP102 transistor and point "D", the emitter of the TIP36C transistor, to drop low. When point "D" is low, 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.

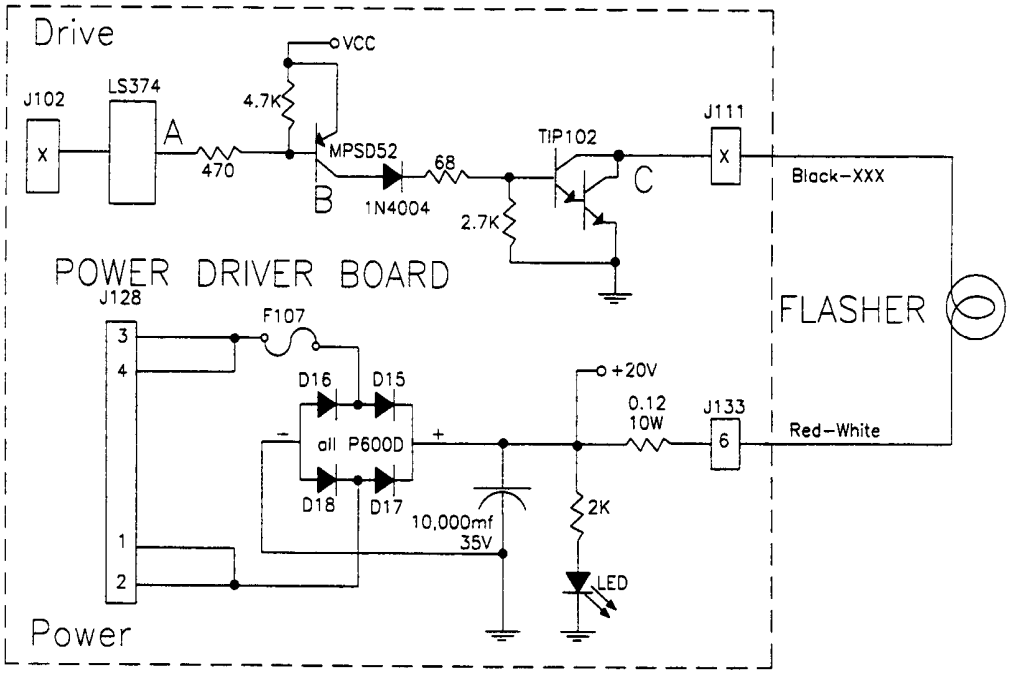
SPECIAL (GENERAL PURPOSE) SOLENOID CIRCUIT



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

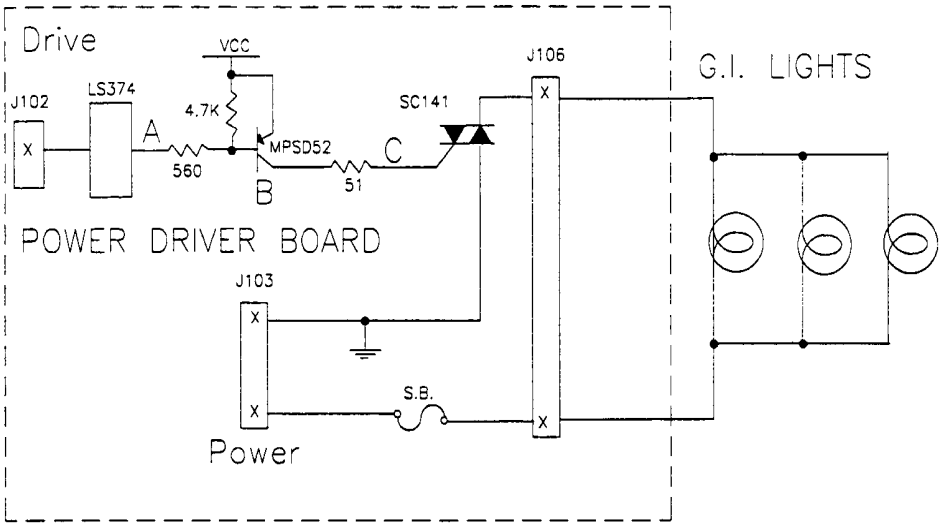


Figure #1

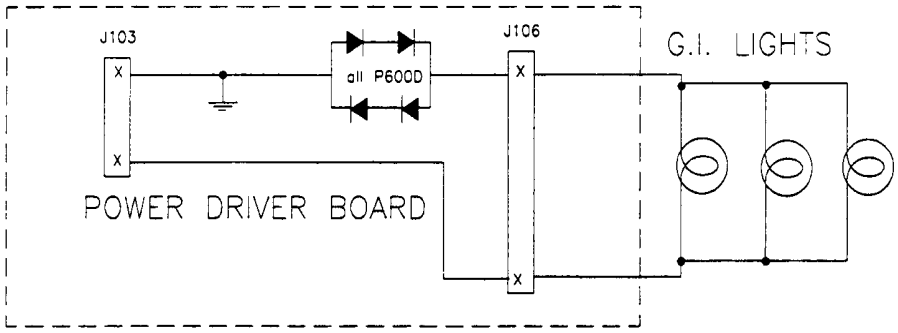
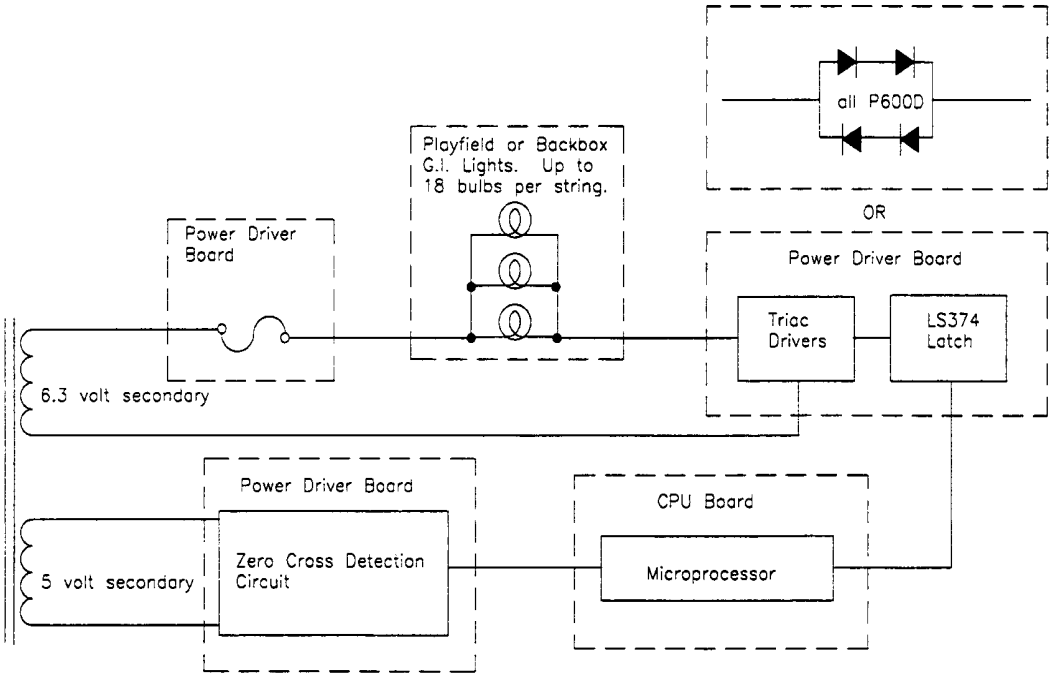


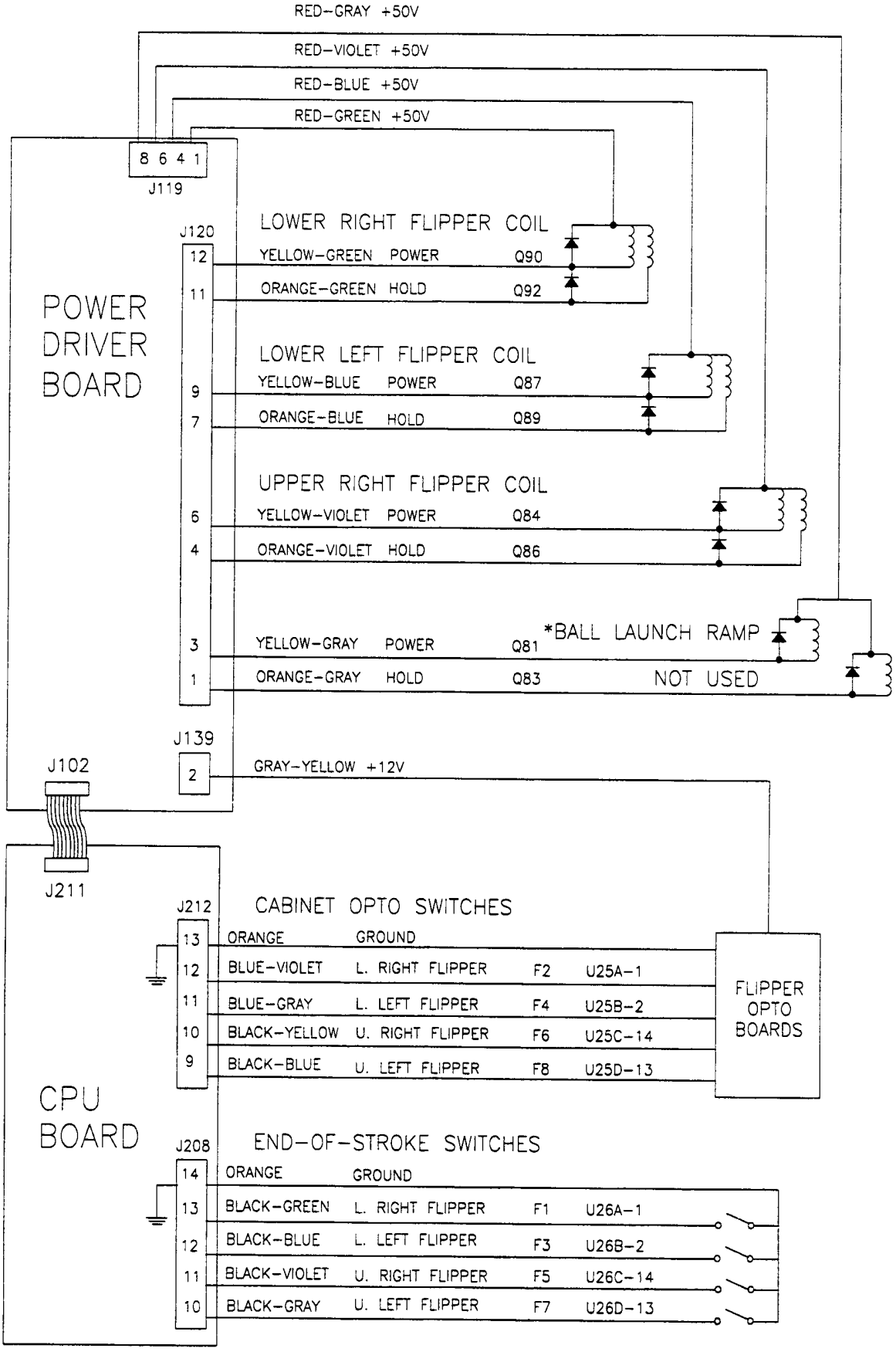
Figure #2

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



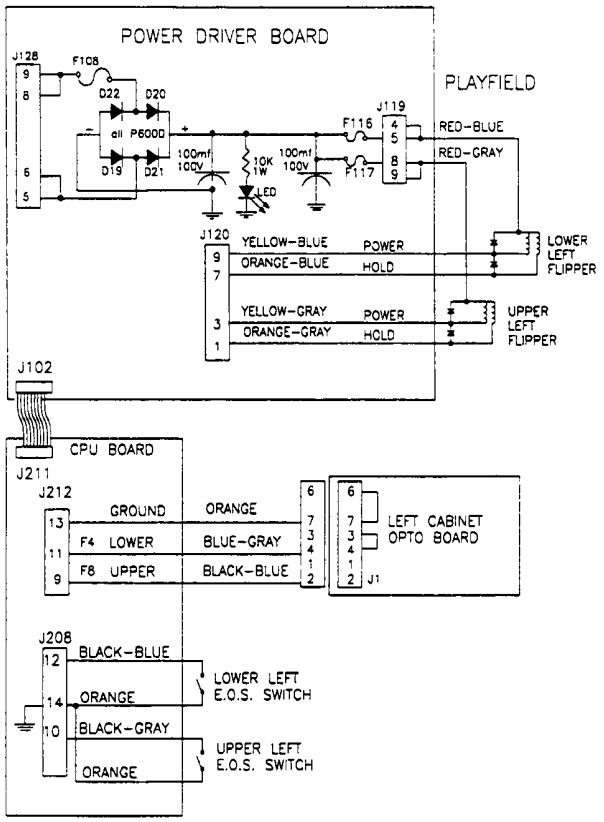
FLIPPER CIRCUIT DIAGRAM



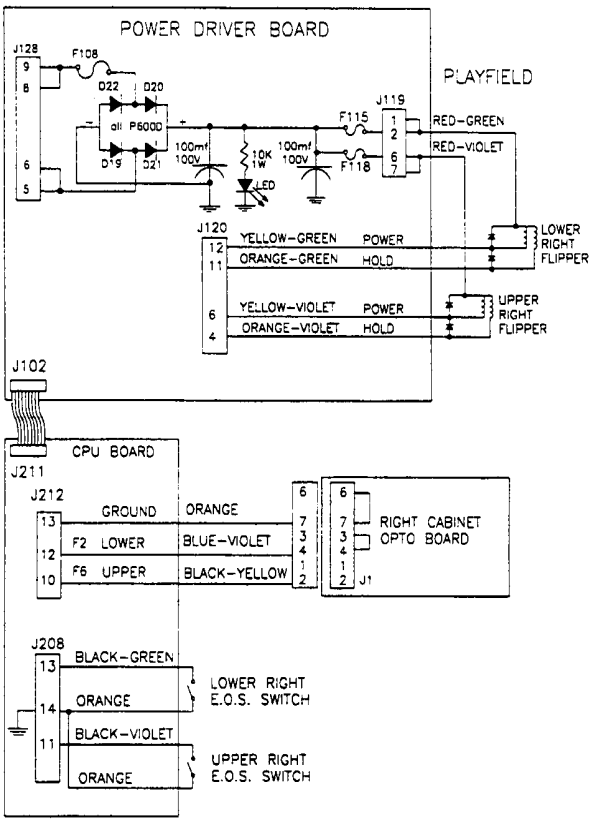
*** The UPPER LEFT FLIPPER circuit is used for the BALL LAUNCH RAMP**

FLIPPER COIL CIRCUITS

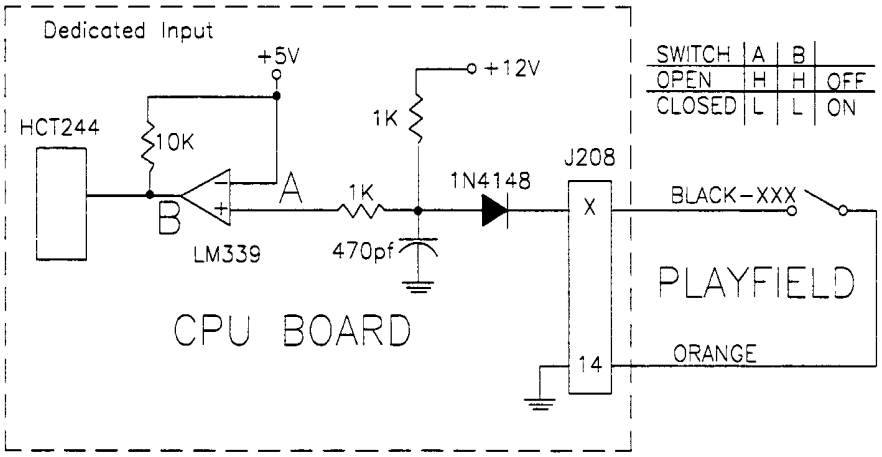
LEFT FLIPPER CIRCUIT



RIGHT FLIPPER CIRCUIT



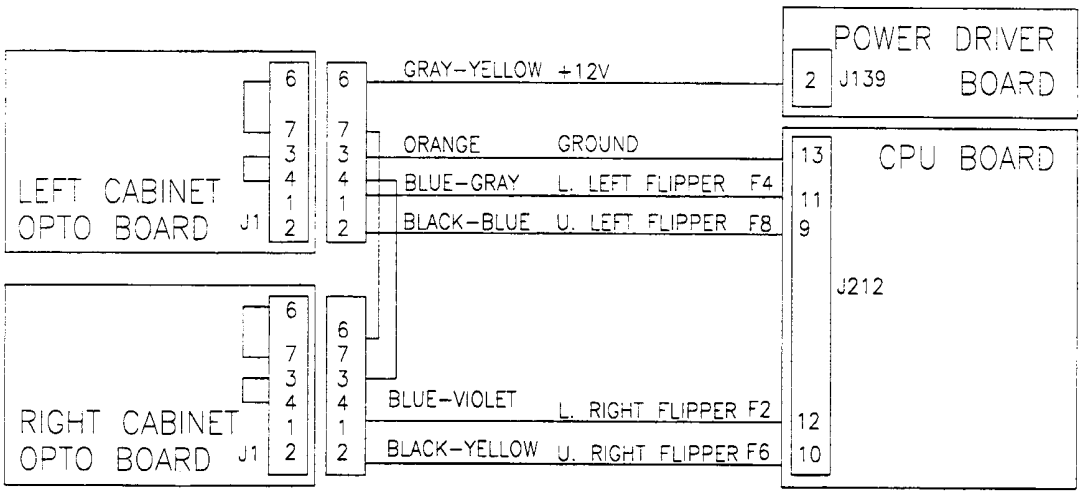
FLIPPER END-OF-STROKE SWITCH CIRCUIT

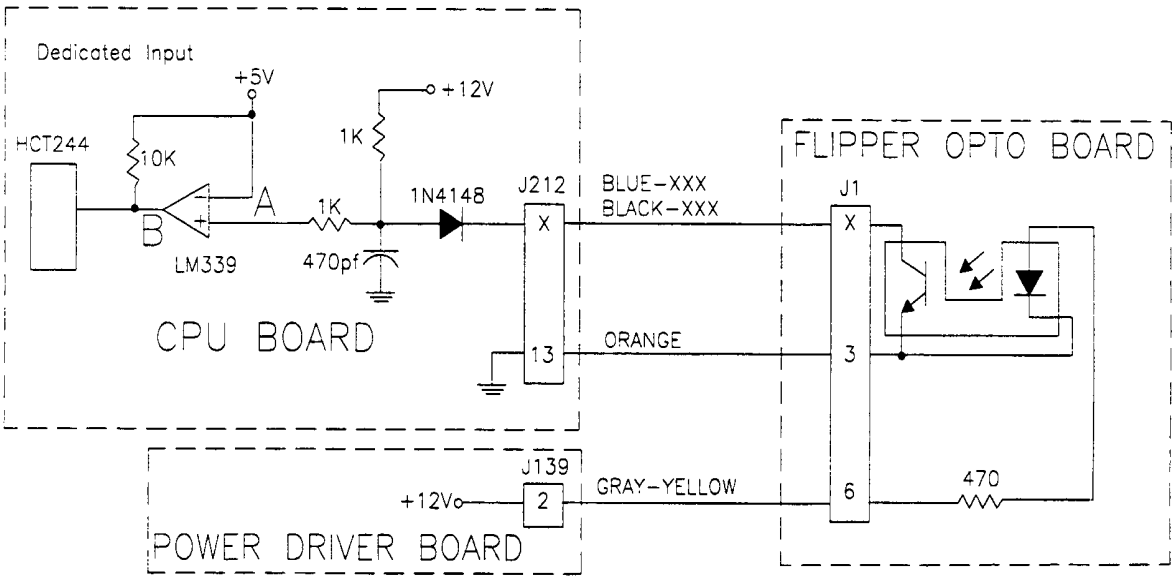


The flipper E.O.S. circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

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

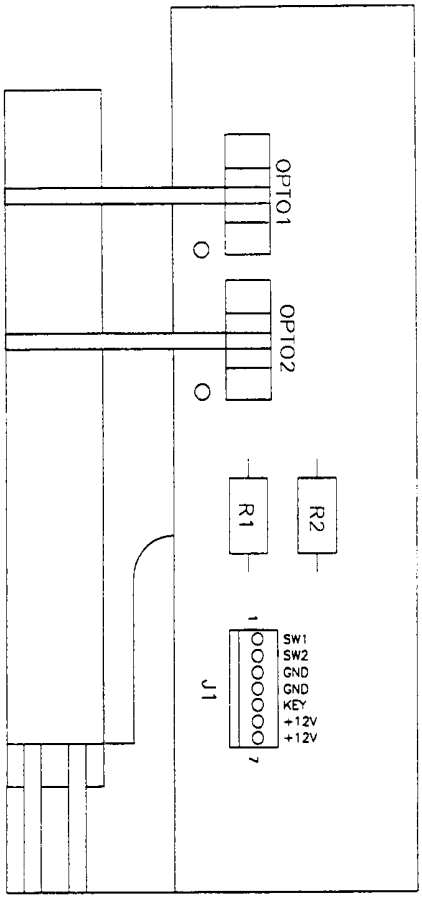


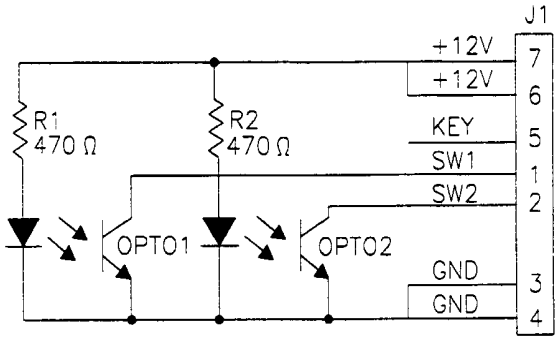


The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch circuit.

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-17316





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)

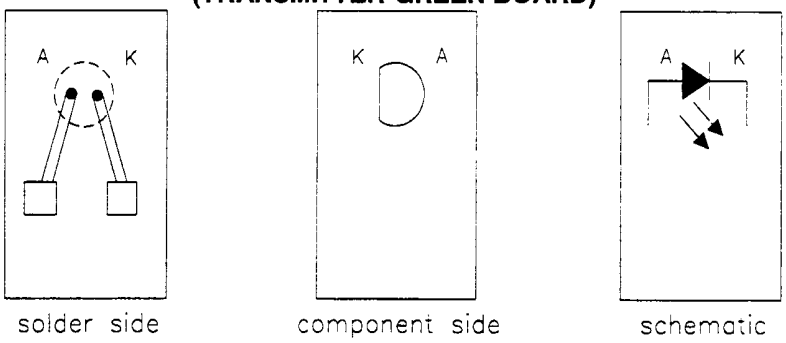
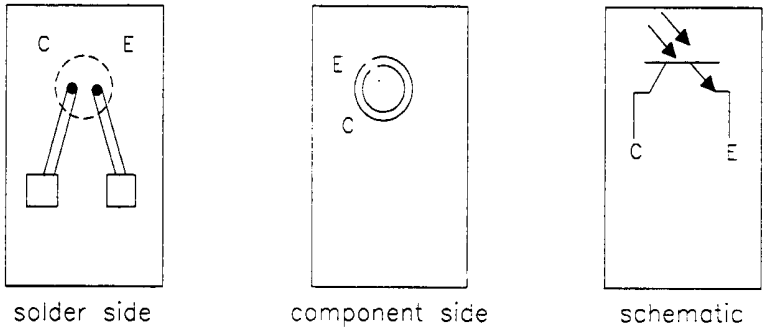
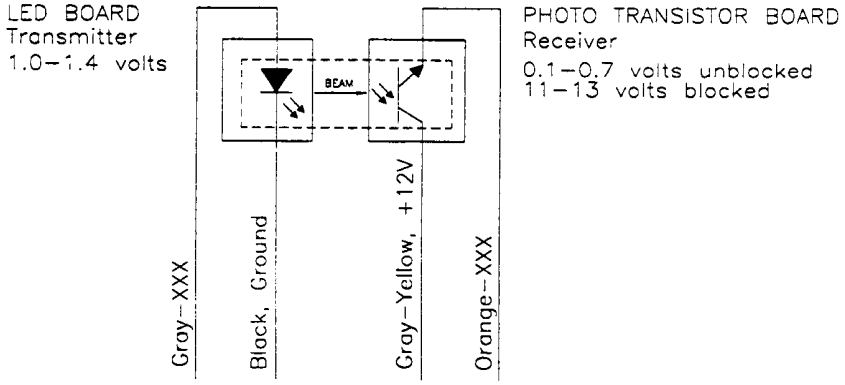
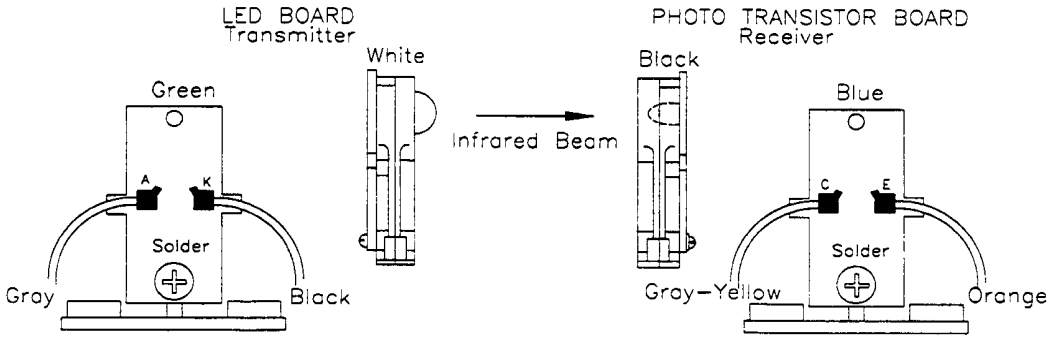


PHOTO TRANSISTOR BOARD ASSEMBLY
A-16909
(RECEIVER-BLUE BOARD)

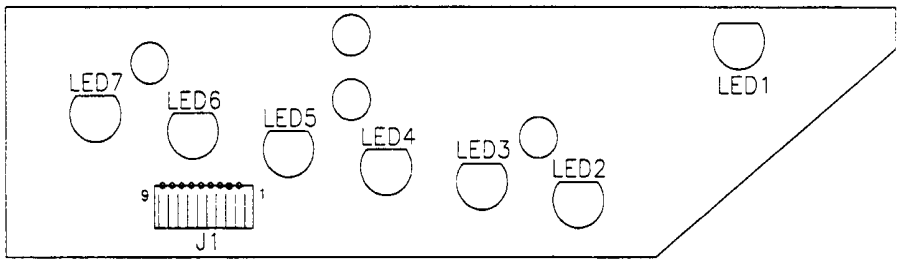


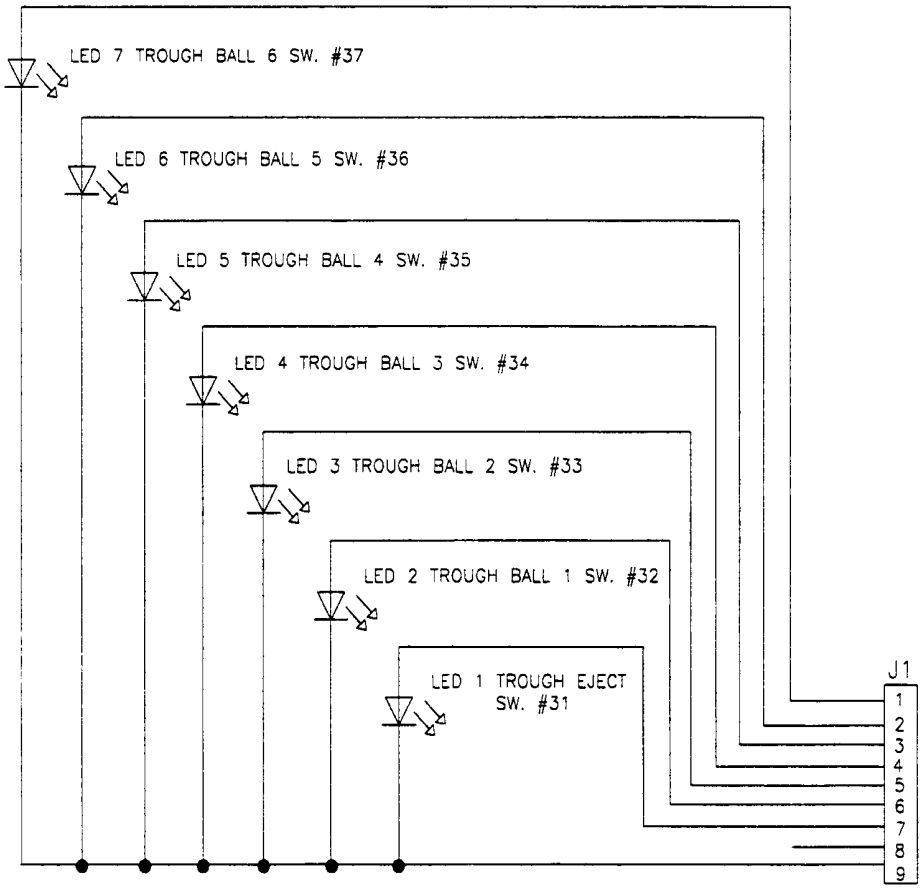
TYPICAL CIRCUIT DIAGRAM





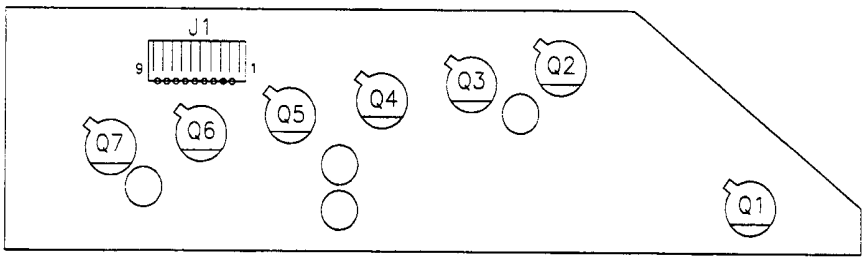
Trough IR LED Board Assembly
(transmitter - green board)
A-18617-1

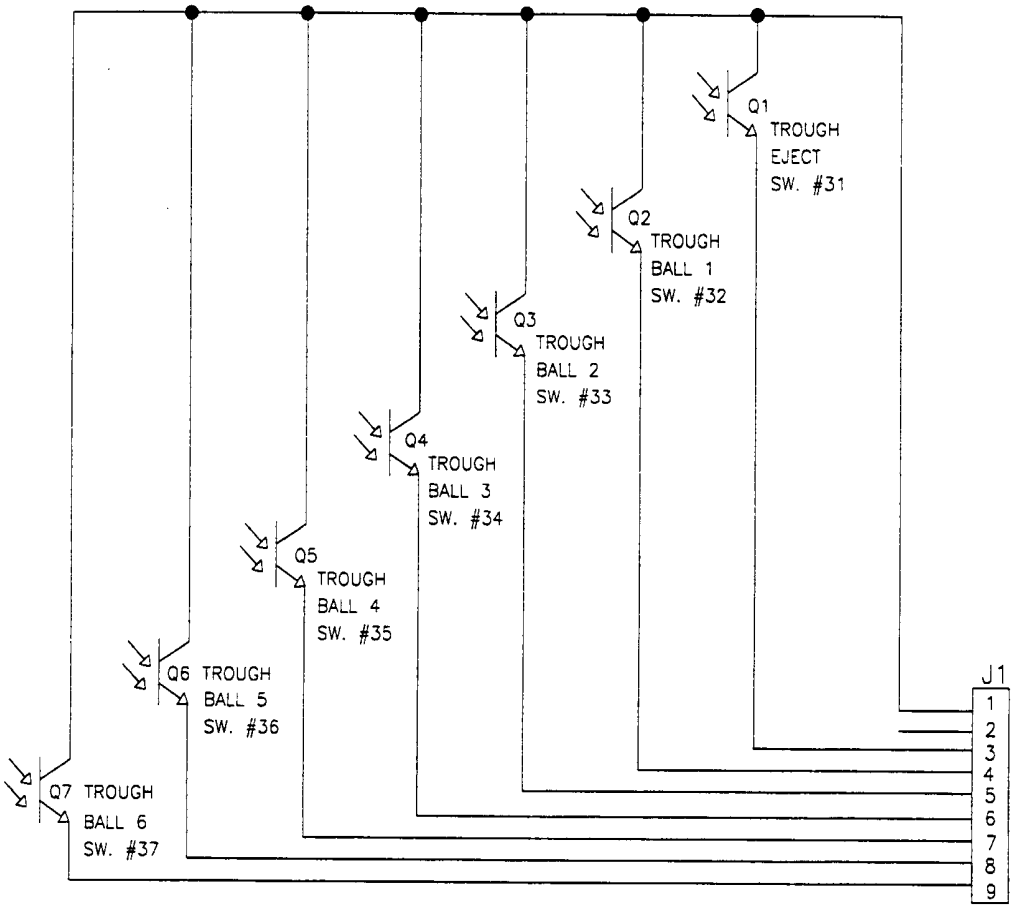




J1-1	GRY-VIO	For TROUGH BALL 6 switch #37 from 16-Opto Switch Board J1-2
J1-2	GRY-BLU	For TROUGH BALL 5 switch #36 from 16-Opto Switch Board J1-3
J1-3	GRY-GRN,	For TROUGH BALL 4 switch #35 from 16-Opto Switch Board J1-4
J1-4	GRY-BLK,	For TROUGH BALL 3 switch #34 from 16-Opto Switch Board J1-5
J1-5	GRY-ORG,	For TROUGH BALL 2 switch #33 from 16-Opto Switch Board J1-6
J1-6	GRY-RED,	For TROUGH BALL 1 switch #32 from 16-Opto Switch Board J1-7
J1-7	GRY-BRN,	For TROUGH EJECT switch #31 from 16-Opto Switch Board J1-9
J1-8	KEY	
J1-9	BLK,	Ground from 16-Opto Switch Board J1-10

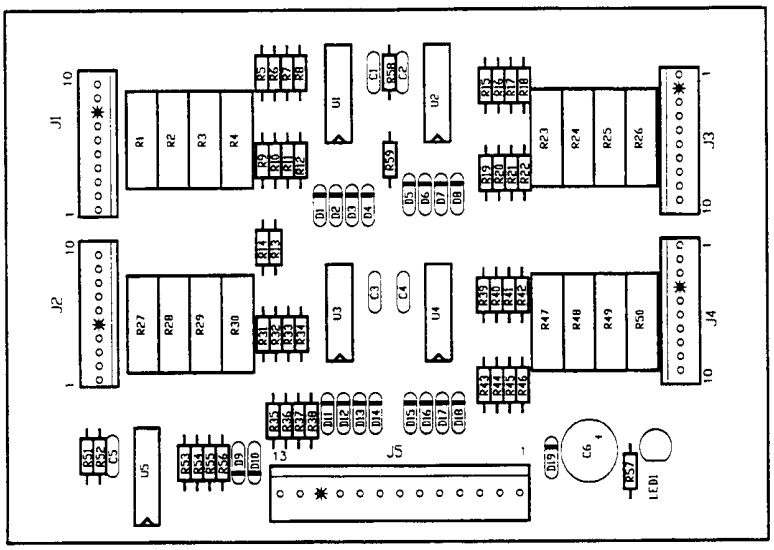
Trough IR Photo Transistor Board Assembly
(receiver - blue board)
A-18618-1





J1-1	GRY-YEL,	+12V from 16-Opto Switch Board J2-1
J1-2	KEY	
J1-3	ORG-BRN,	For TROUGH EJECT switch #31 from 16-Opto Switch Board J2-10
J1-4	ORG-RED,	For TROUGH BALL 1 switch #32 from 16-Opto Switch Board J2-9
J1-5	ORG-BLK,	For TROUGH BALL 2 switch #33 from 16-Opto Switch Board J2-8
J1-6	ORG-YEL,	For TROUGH BALL 3 switch #34 from 16-Opto Switch Board J2-7
J1-7	ORG-GRN,	For TROUGH BALL 4 switch #35 from 16-Opto Switch Board J2-6
J1-8	ORG-BLU	For TROUGH BALL 5 switch #36 from 16-Opto Switch Board J2-4
J1-9	ORG-VIO	For TROUGH BALL 6 switch #37 from 16-Opto Switch Board J2-3

16-Opto Switch Board Assembly
A-22019-2



J1-1	GRY-WHT	To switch #38 LED board
J1-2	GRY-VIO	To switch #37 LED board
J1-3	GRY-BLU	To switch #36 LED board
J1-4	GRY-GRN	To switch #35 LED board
J1-5	GRY-BLK	To switch #34 LED board
J1-6	GRY-ORG	To switch #33 LED board
J1-7	GRY-RED	To switch #32 LED board
J1-8	KEY	
J1-9	GRY-BRN	To switch #31 LED board
J1-10	BLK	Ground to LED boards

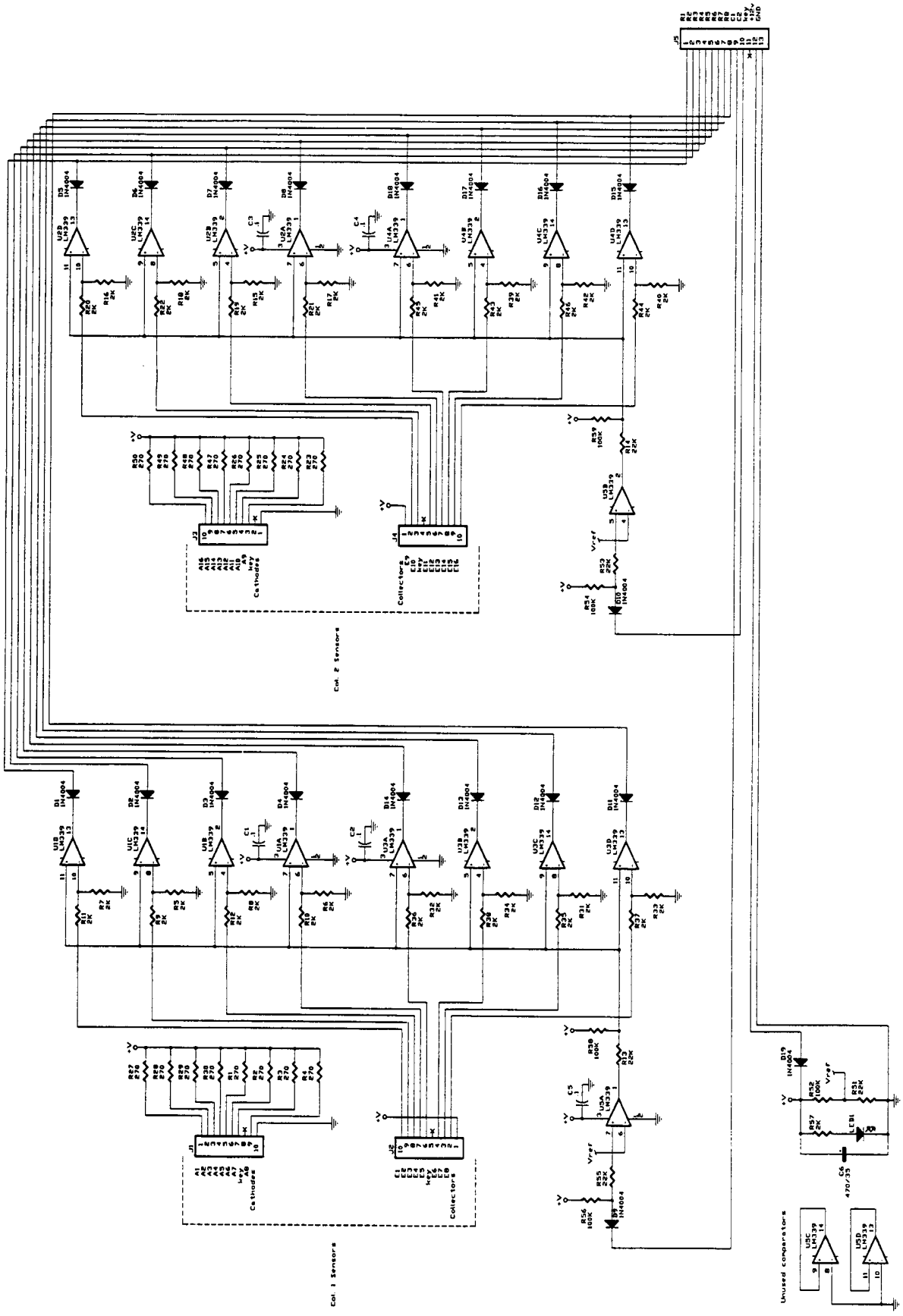
J2-1	GRY-YEL	+12V to Photo Trans. boards
J2-2	ORG-GRY	To switch #38 Photo Trans. board
J2-3	ORG-VIO	To switch #37 Photo Trans. board
J2-4	ORG-BLU	To switch #36 Photo Trans. board
J2-5	KEY	
J2-6	ORG-GRN	To switch #35 Photo Trans. board
J2-7	ORG-YEL	To switch #34 Photo Trans. board
J2-8	ORG-BLK	To switch #33 Photo Trans. board
J2-9	ORG-RED	To switch #32 Photo Trans. board
J2-10	ORG-BRN	To switch #31 Photo Trans. board

J3-1	BLK	Ground to LED boards
J3-2	KEY	
J3-3	GRN-BRN	To switch #41 LED board
J3-4	GRN-RED	To switch #42 LED board
J3-5	N/C	
J3-6	GRN-WHT	To switch #44 LED board
J3-7	GRN-BLK	To switch #45 LED board
J3-8	GRN-BLU	To switch #46 LED board
J3-9	N/C	
J3-10	N/C	

J4-1	GRY-YEL	+12V to Photo Trans. boards
J4-2	WHT-BRN	To switch #41 Photo Trans. board
J4-3	WHT-RED	To switch #42 Photo Trans. board
J4-4	KEY	
J4-5	N/C	
J4-6	WHT-YEL	To switch #44 Photo Trans. board
J4-7	WHT-GRN	To switch #45 Photo Trans. board
J4-8	WHT-BLU	To switch #46 Photo Trans. board
J4-9	N/C	
J4-10	N/C	

J5-1	WHT-BRN	Switch Col. #1 from CPU J208-1
J5-2	WHT-RED	Switch Col. #2 from CPU J208-2
J5-3	WHT-ORG	Switch Col. #3 from CPU J208-3
J5-4	WHT-YEL	Switch Col. #4 from CPU J208-4
J5-5	WHT-GRN	Switch Col. #5 from CPU J208-5
J5-6	WHT-BLU	Switch Col. #6 from CPU J208-7
J5-7	WHT-VIO	Switch Col. #7 from CPU J208-8
J5-8	WHT-GRY	Switch Col. #8 from CPU J208-9
J5-9	GRN-ORG	Switch Row #3 from CPU J206-3
J5-10	GRN-WHT	Switch Row #4 from CPU J206-4
J5-11	KEY	
J5-12	GRY-YEL	+12V from Power Driver J139-2
J5-13	BLK	Ground from Power Driver J139-3

16-Opto Switch Board Schematic
A-22019-2



Individual Playfield Opto Switch Wiring Diagram

This diagram shows the wiring for individual playfield opto switches only. See the next page for the wiring diagram for the ball trough opto switches.

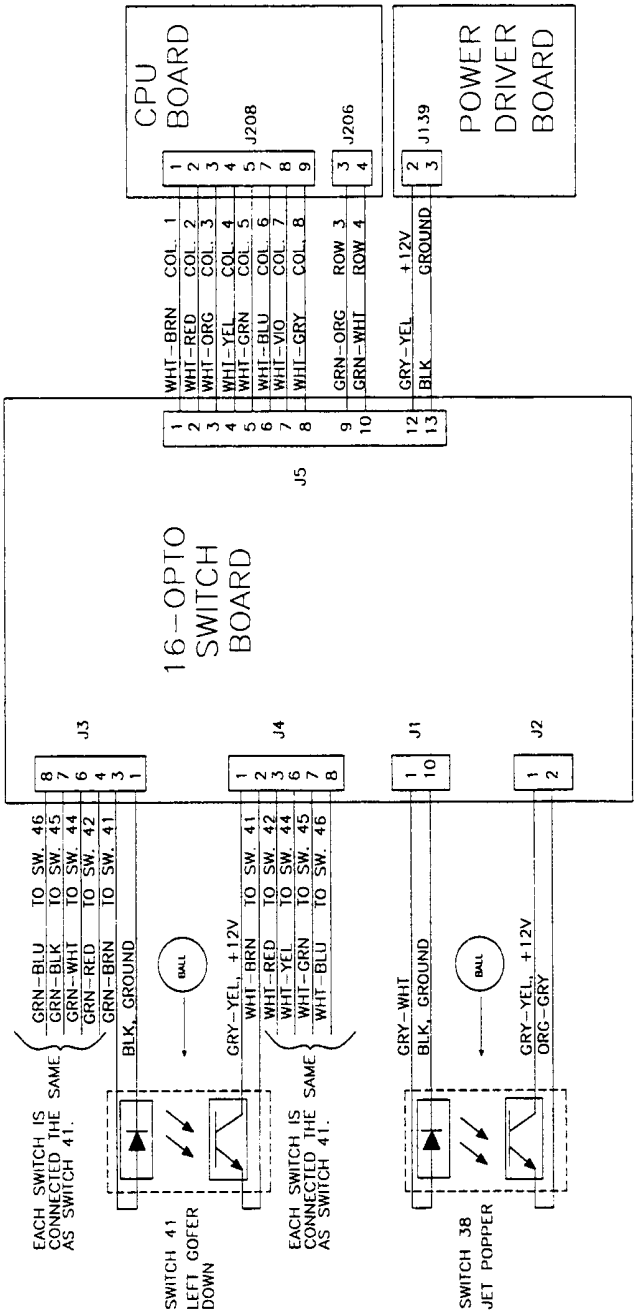
The individual playfield opto switches are:

Switch 38 Jet Popper
Switch 41 Left Gofer Down
Switch 42 Right Gofer Down
Switch 44 Putt Out Popper
Switch 45 Right Popper Jam
Switch 46 Right Popper

Each of these switches uses a green LED board (p/n A-16908), and a blue Photo Transistor board (p/n A-16909).

OPTO SWITCH OPERTION:

The ball rolls between the LED board and the Photo Transistor board and breaks the beam. The broken beam 'makes' the switch.



Ball Trough Opto Switches Wiring Diagram

This diagram shows the opto switches for the ball trough assembly only. See the previous page for the individual playfield opto switches.

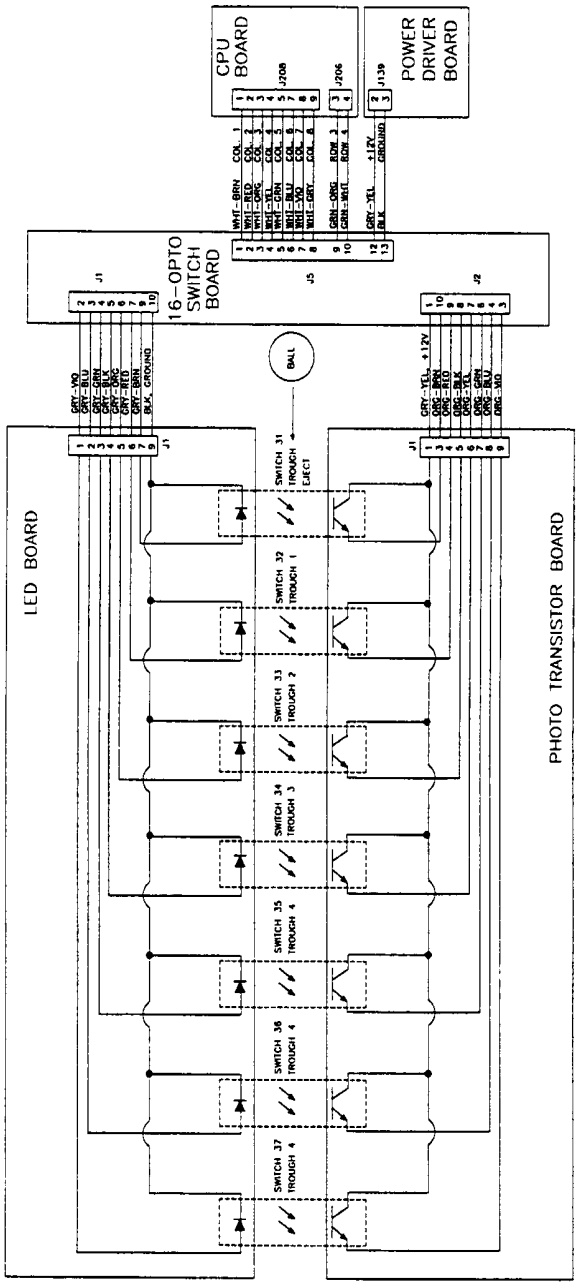
The ball trough opto switches are:

Switch 31 Trough Eject
Switch 32 Trough Ball 1
Switch 33 Trough Ball 2
Switch 34 Trough Ball 3
Switch 35 Trough Ball 4
Switch 36 Trough Ball 5
Switch 37 Trough Ball 6

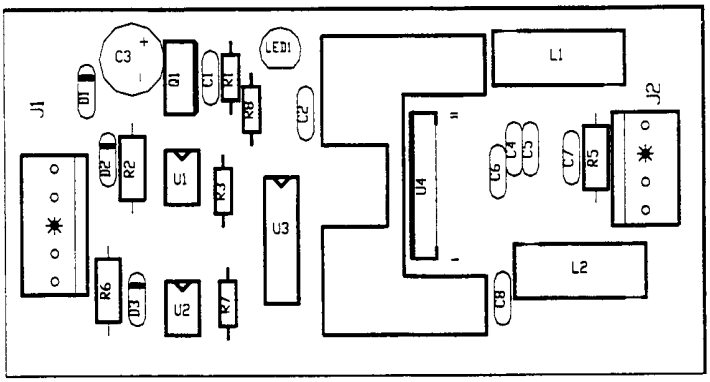
The ball trough switches use a green LED board (p/n A-18617-1), and a blue Photo Transistor board (p/n A-18618-1).

OPTO SWITCH OPERTION:

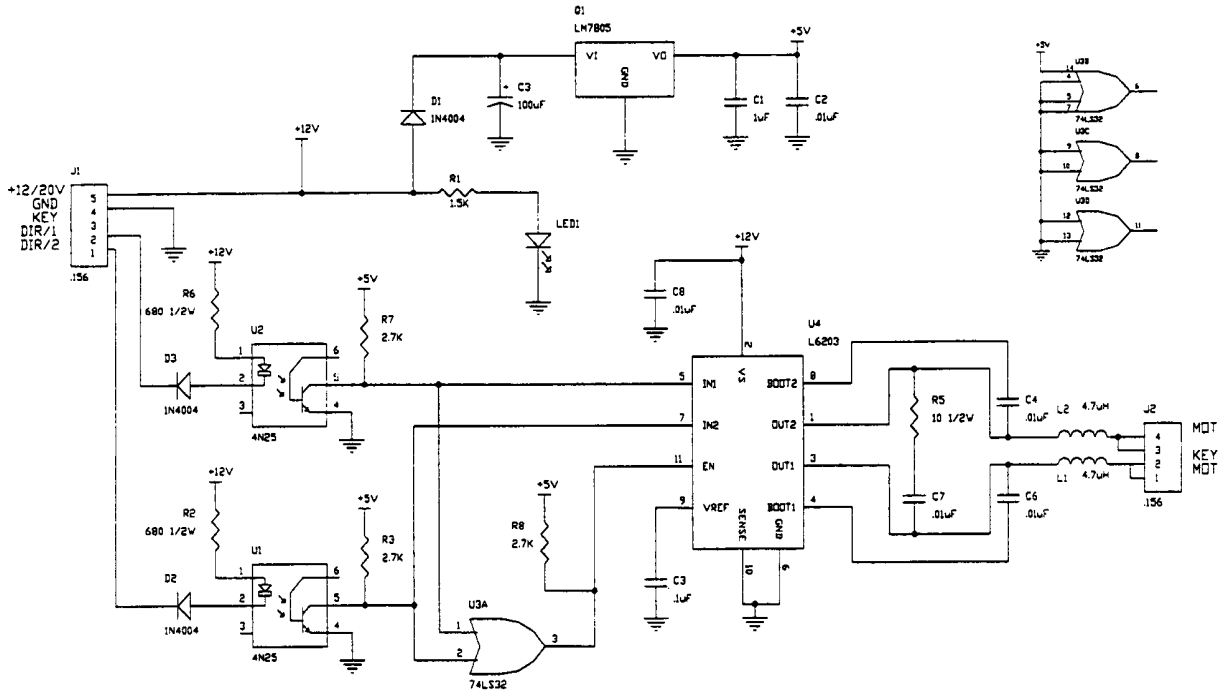
The ball rolls between the LED board and the Photo Transistor board and breaks the beam. The broken beam 'makes' the switch.



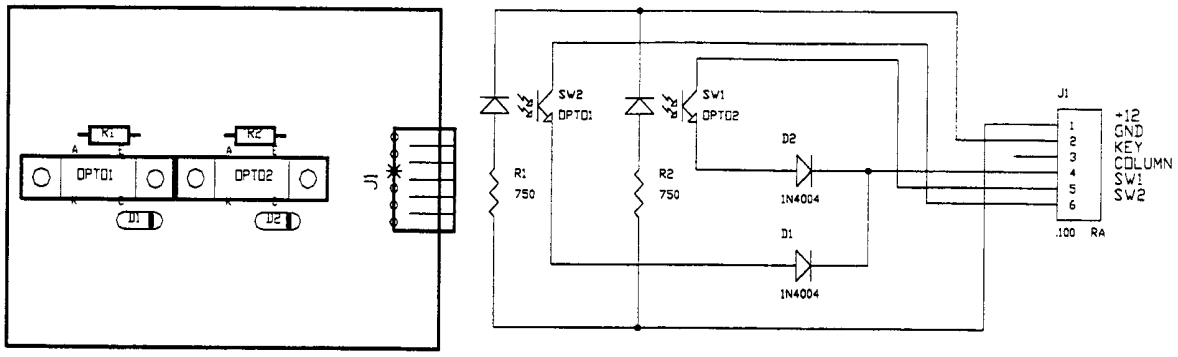
DC Motor Control Board
A-16120



J1-1	BRN-WHT	To Power Driver board J110-1 for solenoid #37 drive	**J2-1**	RED	Motor "+"
J1-2	ORG-WHT	To Power Driver board J110-3 for solenoid #38 drive	**J2-2**	KEY	
J1-3	KEY		**J2-3**	N/C	
J1-4	BLK	Ground from Power Driver board J139-3	**J2-4**	BLK	Motor "-"
J1-5	GRY-YEL	+12V from Power Driver board J139-2			

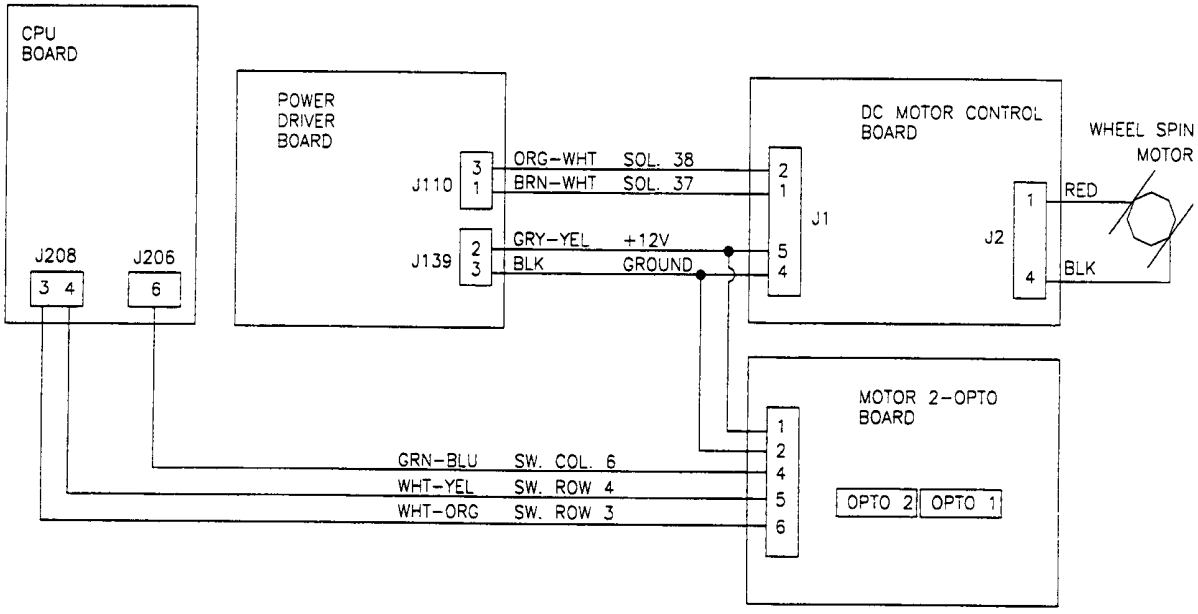


Motor 2-Opto Board
A-22026



J1-1	GRY-YEL	+12V from Power Driver board J139-2
J1-2	BLK	Ground from Power Driver board J139-3
J1-3	KEY	
J1-4	GRN-BLU	Switch Column #6 from CPU board J206-6
J1-5	WHT-YEL	Switch Row #4 from CPU board J208-4
J1-6	WHT-ORG	Switch Row #3 from CPU board J208-3

Wheel Spin Motor Wiring Diagram

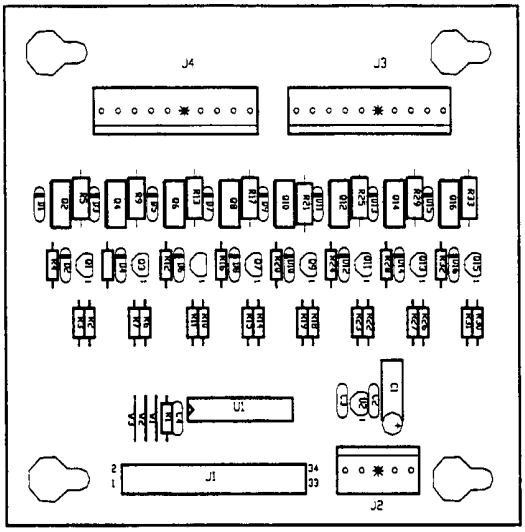


The switch and solenoid circuits that control the motor are:

Solenoid 37 Wheel Spin (counter clock-wise)
Solenoid 38 Wheel Spin (clock-wise)

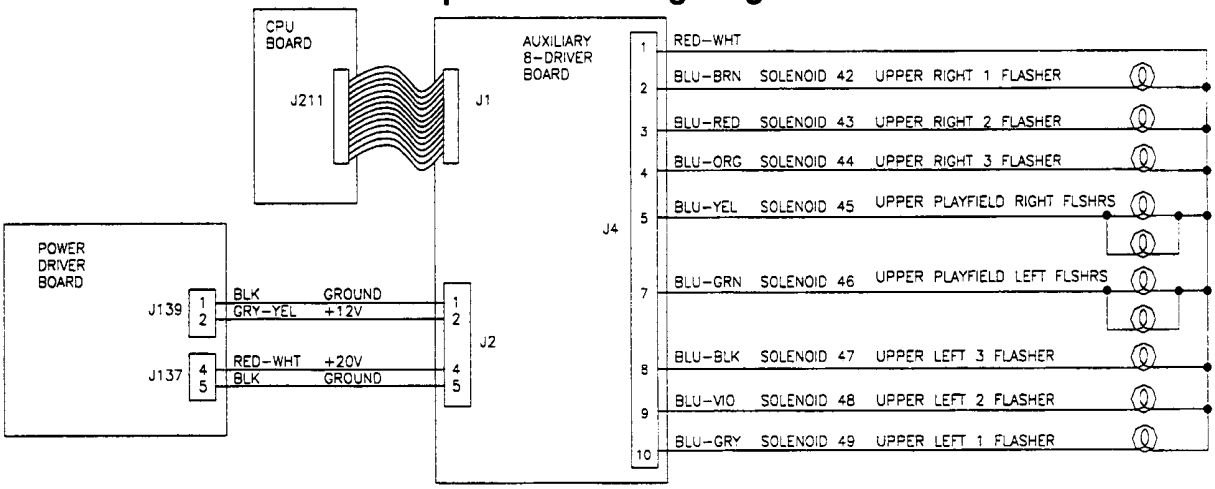
Switch 63 Inner Wheel (opto 1)
Switch 64 Outer Wheel (opto 2)

Auxiliary 8-driver Board
A-21773

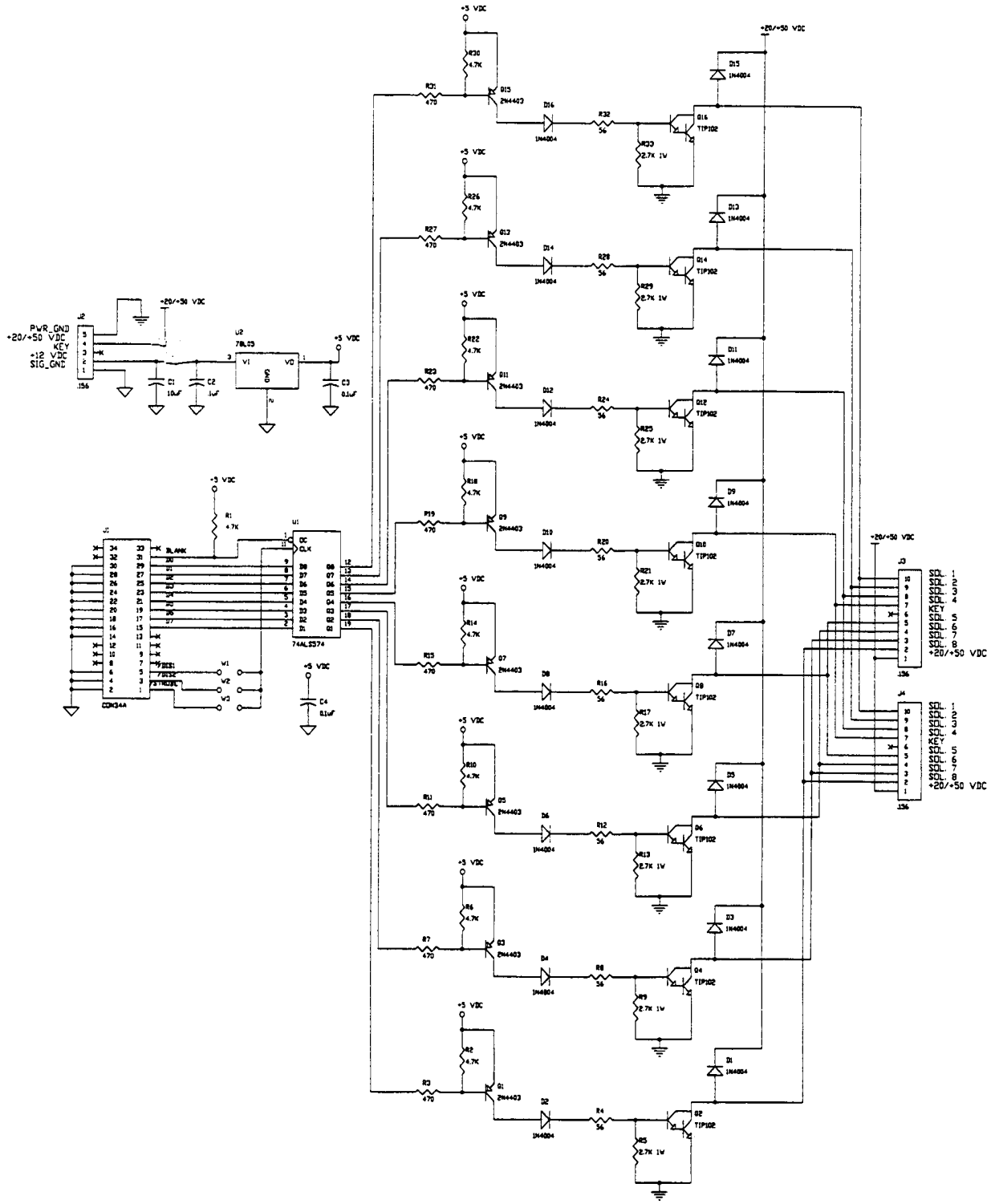


J1	Ribbon Cable, Data to/from CPU J211	
J2-1	BLK	Ground from Power Driver Board J139-3
J2-2	GRY-YEL	+12V from Power Driver Board J139-2
J2-3	KEY	
J2-4	RED-WHT	+20V from Power Driver Board J134-5
J2-5	BLK	Ground from Power Driver Board J137-4
J3	NOT USED	
J4-1	RED-WHT	+20V to Step Flashers
J4-2	BLU-BRN	Solenoid #42 drive to Upper Right 1 Flasher
J4-3	BLU-RED	Solenoid #43 drive to Upper Right 2 Flasher
J4-4	BLU-ORG	Solenoid #44 drive to Upper Right 3 Flasher
J4-5	BLU-YEL	Solenoid #45 drive to Upper Right Playfield Flasher
J4-6	KEY	
J4-7	BLU-GRN	Solenoid #46 drive to Upper Left Playfield Flasher
J4-8	BLU-BLK	Solenoid #47 drive to Upper Left 3 Flasher
J4-9	BLU-VIO	Solenoid #48 drive to Upper Left 2 Flasher
J4-10	BLU-GRY	Solenoid #49 drive to Upper Left 1 Flasher

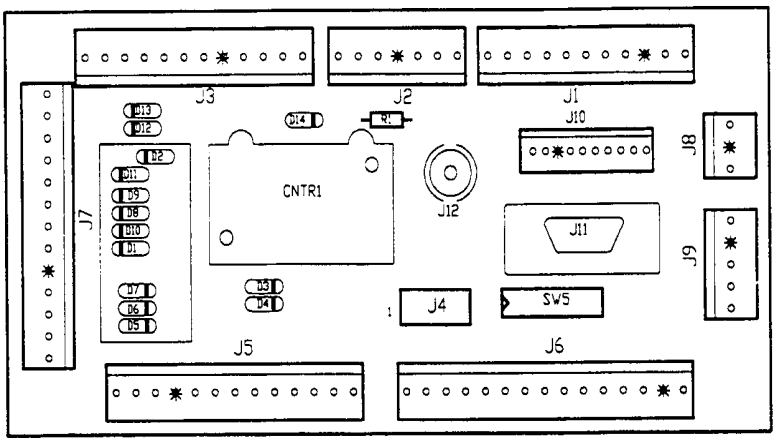
Step Flasher Wiring Diagram



Auxiliary 8-driver Board Schematic
A-21773



Coin Door Interface Board
A-20580



J1-1	ORG-GRY	Dedicated sw row #8 from CPU J205-9.
J1-2	ORG-VIO	Dedicated sw row #7 from CPU J205-8.
J1-3	ORG-BLU	Dedicated sw row #6 from CPU J205-7.
J1-4	ORG-GRN	Dedicated sw row #5 from CPU J205-6.
J1-5	ORG-YEL	Dedicated sw row #4 from CPU J205-4.
J1-6	ORG-BLK	Dedicated sw row #3 from CPU J205-3.
J1-7	ORG-RED	Dedicated sw row #2 from CPU J205-2.
J1-8	ORG-BRN	Dedicated sw row #1 from CPU J205-1.
J1-9	KEY	
J1-10	BLK	Ground from CPU J205-10
J1-11	ORG-WHT	Switch enable from CPU J205-12.

J2-1	BLK	Ground from Power Driver board J141-3.
J2-2	GRY-YEL	+12VAC from Power Driver board J141-2.
J2-3	WHT-VIO	6.8VAC from Power Driver board J104-1.
J2-4	KEY	
J2-5	VIO	For G.I. from Power Driver board J104-3.
J2-6	N/C	
J2-7	BLK-WHT	Signal for coin meter from Power Driver board J139-5.

J3-1	GRN-BRN	Switch column #1 from CPU J212-1.
J3-2	GRN-RED	Switch column #2 from CPU J212-2.
J3-3	WHT-BRN	Switch row #1 from CPU J212-4.
J3-4	WHT-RED	Switch row #2 from CPU J212-5.
J3-5	WHT-ORG	Switch row #3 from CPU J212-6.
J3-6	WHT-YEL	Switch row #4 from CPU J212-7.
J3-7	KEY	
J3-8	YEL-GRY	Lamp col #8 from Pwr Drvr brd J122-3.
J3-9	RED-BLU	Lamp row #6 from Pwr Drvr brd J125-7.
J3-10	RED-VIO	Lamp row #7 from Pwr Drvr brd J125-8.
J3-11	RED-GRY	Lamp row #8 from Pwr Drvr brd J125-9.

J4 NOT USED

J5-1	VIO	Return to coin door.
J5-2	WHT-VIO	6.8VAC for G.I. to coin door.
J5-3	BLK	Ground to coin door.
J5-4	ORG-BRN	Dedicated switch row #1 to coin door.
J5-5	ORG-RED	Dedicated switch row #2 to coin door.
J5-6	ORG-BLK	Dedicated switch row #3 to coin door.
J5-7	ORG-GRN	Dedicated switch row #5 to coin door.
J5-8	ORG-BLU	Dedicated switch row #6 to coin door.
J5-9	ORG-VIO	Dedicated switch row #7 to coin door.
J5-10	KEY	
J5-11	ORG-GRY	Dedicated switch row #8 to coin door.
J5-12	GRN-RED	Switch column #2 to coin door Slam Tilt.
J5-13	WHT-BRN	Switch row #1 to coin door Slam Tilt.

J6 NOT USED

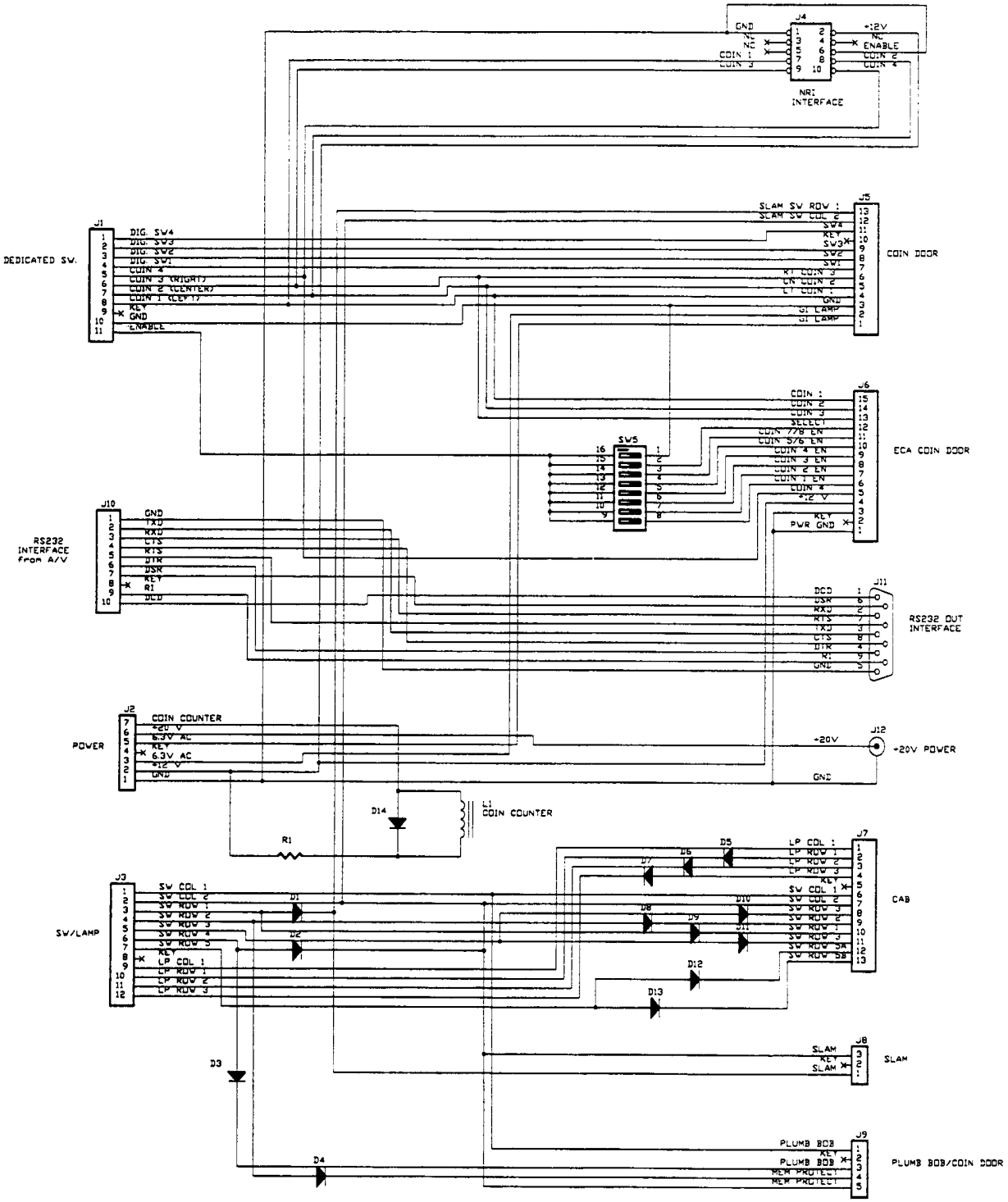
J7-1	YEL-GRY	Lamp column #8 to cabinet.
J7-2	N/C	
J7-3	RED-BLU	Lamp row #6 to cabinet.
J7-4	RED-GRY	Lamp row #8 to cabinet.
J7-5	KEY	
J7-6	GRN-BRN	Switch column #1 to cabinet.
J7-7	N/C	
J7-8	N/C	
J7-9	N/C	
J7-10	WHT-BRN	Switch row #1 to cabinet.
J7-11	WHT-ORG	Switch row #3 to cabinet.
J7-12	N/C	
J7-13	N/C	

J8-1	WHT	Switch row to cabinet for Slam tilt.
J8-2	KEY	
J8-3	GRN	Switch column to cabinet for Slam Tilt.

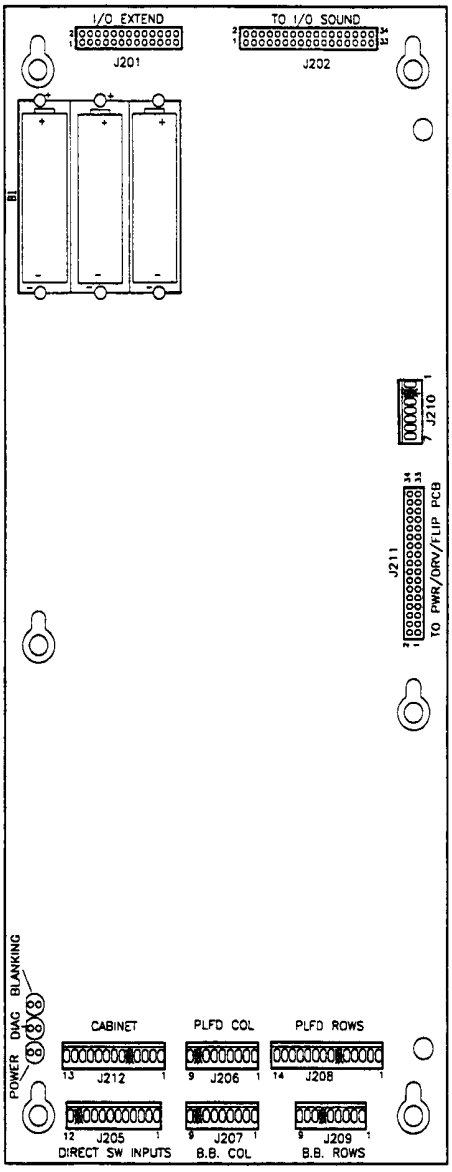
J9-1	WHT-YEL	Switch row #4 to Plumb Bob Tilt.
J9-2	KEY	
J9-3	GRN-BRN	Switch column #1 to Plumb Bob Tilt.
J9-4	WHT-RED	Switch row #2 to Interlock Switch.
J7-5	GRN-RED	Switch column #2 to Interlock Switch.

J10 Ribbon cable To cash flow mechanism (if used).

Coin Door Interface Board Schematic
A-20580



Security CPU Board Assembly
A-21377-50061



J201 26-pin ribbon cable Data to/from J602.

J202 34-pin ribbon cable Data to/from J601.

J203 & J204 NOT USED

J205-1	ORG-BRN	Dedicate sw row #1 to Coin Door brd J1-8.
J205-2	ORG-RED	Dedicate sw row #2 to Coin Door brd J1-7.
J205-3	ORG-BLK	Dedicate sw row #3 to Coin Door brd J1-6.
J205-4	ORG-YEL	Dedicate sw row #4 to Coin Door brd J1-5.
J205-5	N/C	
J205-6	ORG-GRN	Dedicate sw row #5 to Coin Door brd J1-4.
J205-7	ORG-BLU	Dedicate sw row #6 to Coin Door brd J1-3.
J205-8	ORG-VIO	Dedicate sw row #7 to Coin Door brd J1-2.
J205-9	ORG-GRY	Dedicate sw row #8 to Coin Door brd J1-1.
J205-10	BLK	Ground to Coin Door board J1-10.
J205-11	KEY	
J205-12	ORG-WHT	Switch enable to Coin Door brd J1-11.

J206-1	GRN-BRN	Switch column #1 to playfield switches.
J206-2	GRN-RED	Switch column #2 to playfield switches.
J206-3	GRN-ORG	Switch column #3 to playfield switches.
J206-4	GRN-WHT	Switch column #4 to playfield switches.
J206-5	GRN-BLK	Switch column #5 to playfield switches.
J206-6	GRN-BLU	Switch column #6 to playfield switches.
J206-7	GRN-VIO	Switch column #7 to playfield switches.
J206-8	KEY	
J206-9	GRN-GRY	Switch Column #8 to playfield switches

J207 NOT USED

J208-1	WHT-BRN	Switch row #1 to playfield switches.
J208-2	WHT-RED	Switch row #2 to playfield switches.
J208-3	WHT-ORG	Switch row #3 to playfield switches.
J208-4	WHT-YEL	Switch row #4 to playfield switches.
J208-5	WHT-GRN	Switch row #5 to playfield switches.
J208-6	KEY	
J208-7	WHT-BLU	Switch row #6 to playfield switches.
J208-8	WHT-VIO	Switch row #7 to playfield switches.
J208-9	WHT-GRY	Switch row #8 to playfield switches.
J208-10	N/C	
J208-11	BLK-VIO	To upper right E.O.S. switch #F5
J208-12	BLK-BLU	To lower left E.O.S. switch #F3.
J208-13	BLK-GRN	To lower right E.O.S. switch #F1.
J208-14	ORG	E.O.S. switch ground.

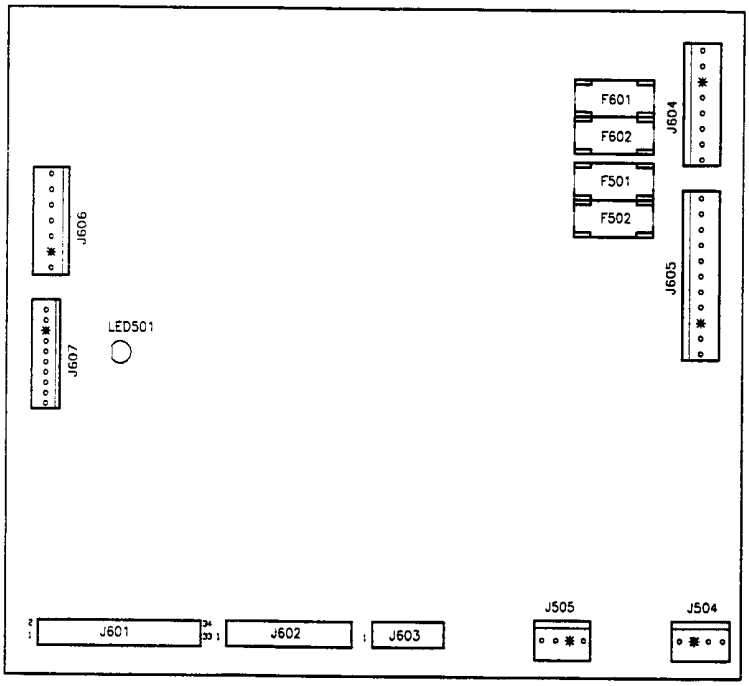
J209 NOT USED

J210-1	BLK	Ground from Power Driver brd J101-5, 7.
J210-2	KEY	
J210-3	BLK	Ground from Power Driver brd J101-5, 7.
J210-4	GRY	+5V from Power Driver board J101-3, 4.
J210-5	GRY	+5V from Power Driver board J101-3, 4.
J210-6	GRY-GRN	+12V from Power Driver board J101-1, 2.
J210-7	GRY-GRN	+12V from Power Driver board J101-1, 2.

J211 34-pin ribbon cable Data to/from J102 & J1 Aux 8-driver board.

J212-1	GRN-BRN	Switch col. #1 to Coin Door board J3-1.
J212-2	GRN-RED	Switch col. #2 to Coin Door board J3-2.
J212-3	N/C	
J212-4	WHT-BRN	Switch row #1 to Coin Door board J3-3.
J212-5	KEY	
J212-6	WHT-RED	Switch row #2 to Coin Door board J3-4.
J212-7	WHT-ORG	Switch row #3 to Coin Door board J3-5
J212-8	WHT-YEL	Switch row #4 to Coin Door board J3-6
J212-9	BLK-BLU	To switch #F8 left flipper opto brd J1-1.
J212-10	BLK-YEL	To switch #F6 right flipper opto brd J1-1.
J212-11	BLU-GRY	To switch #F4 left flipper opto brd J1-2.
J212-12	BLU-VIO	To switch #F2 right flipper opto brd J1-2.
J212-13	ORG	Ground to left flipper opto board J1-4.

Audio Visual Board Assembly
A-20516-50061



J601	34-pin ribbon cable	Data to/from CPU J202.
J602	26-pin ribbon cable	Data to/from CPU J201.
J603	14-pin ribbon cable	Data to/from Dot Matrix Display Driver board.

J604-1	ORG	+125V to Dot Matrix Display
J604-2	BLU	+113V to Dot Matrix Display
J604-3	KEY	
J604-4	BLK	Ground to Dot Matrix Display
J604-5	BLK	Ground to Dot Matrix Display
J604-6	GRY	+5V to Dot Matrix Display
J604-7	GRY-YEL	+12V to Dot Matrix Display
J604-8	BRN	+62V to Dot Matrix Display

J605-1	WHT	80VAC from transformer secondary.
J605-2	WHT	80VAC from transformer secondary.
J605-3	VIO	100VAC from transformer secondary.
J605-4	VIO	100VAC from transformer secondary.
J605-5	GRY-WHT	18VAC from transformer secondary.
J605-6	GRY-WHT	Loop from J605-7.
J605-7	GRY	18VAC from transformer secondary.
J605-8	GRY	Loop from J605-7.
J605-9	KEY	
J605-10	GRY-GRN	18VAC from transformer secondary.
J605-11	GRY-GRN	Loop from J605-10.

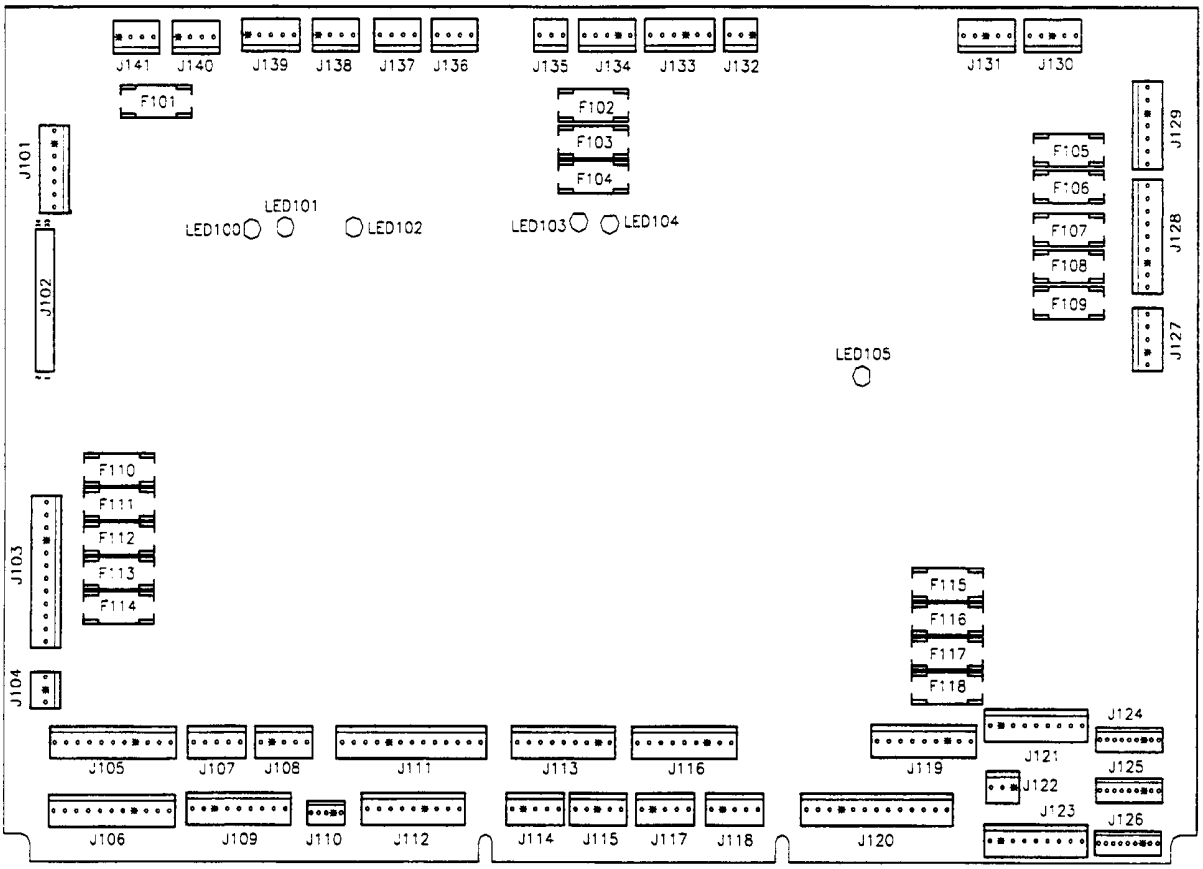
J606-1	BLK	Ground form Power Driver brd J101-7.
J606-2	KEY	
J606-3	BLK	Ground from Power Driver brd J101-5.
J606-4	GRY	+5V from Power Driver board J101-4.
J606-5	GRY	+5V from Power Driver board J101-3.
J606-6	GRY-GRN	+12V from Power Driver board J101-2.
J606-7	GRY-GRN	+12V from Power Driver board J101-1.

J607 NOT USED

J504-1	BLK-YEL	Signal to speaker.
J504-2	KEY	
J504-3	N/C	
J504-4	BLK	Signal to speaker.

J505-1	BLK-YEL	Signal to speaker.
J505-2	KEY	
J505-3	N/C	
J505-4	BLK	Signal to speaker.

Power Driver Board Assembly
A-20028



J101-1	GRY-GRN	+12V to J210-6, 7; J606-1.
J101-2	GRY-GRN	+12V to J210-6, 7; J606-2.
J101-3	GRY	+5V to J210-4, 5; J3-1, 3; J606-3.
J101-4	GRY	+5V to J210-4, 5; J3-1, 3; J606-4.
J101-5	BLK	Ground to J210-1, 3; J606-5.
J101-6	KEY	
J101-7	BLK	Ground to J210-1,3; J606-7.

J102	34-pin ribbon cable	Data to/from CPU J211.

J103-1	YEL-WHT	6.8Vac from transformer secondary.
J103-2	WHT-BRN	6.8Vac from transformer secondary.
J103-3	WHT-BRN	6.8Vac from transformer secondary.
J103-4	WHT-ORG	6.8Vac from transformer secondary.
J103-5	WHT-YEL	6.8Vac from transformer secondary.
J103-6	WHT-YEL	6.8Vac from transformer secondary.
J103-7	ORG	6.8Vac from transformer secondary.
J103-8	ORG	6.8Vac from transformer secondary.
J103-9	KEY	
J103-10	GRN	6.8Vac from transformer secondary.
J103-11	BRN	6.8Vac from transformer secondary.
J103-12	BRN	6.8Vac from transformer secondary.

J104-1	WHT-VIO	6.8VAC for G.I. to Coin Door brd J2-5.
J104-2	KEY	
J104-3	VIO	Return for G.I. to Coin Door board J2-3.

J105-1	N/C	
J105-2	N/C	
J105-3	YEL	Return for G.I. to insert panel.
J105-4	KEY	
J105-5	GRN	Return for G.I. to insert panel.
J105-6	VIO	Return for G.I. to insert panel.
J105-7	N/C	
J105-8	N/C	
J105-9	WHT-YEL	6.8VAC for G.I. to insert panel.
J105-10	WHT-GRN	6.8VAC for G.I. to insert panel.
J105-11	WHT-VIO	6.8VAC for G.I. to insert panel.

J106-1	BRN	Return for G.I. to playfield.
J106-2	ORG	Return for G.I. to playfield.
J106-3	YEL	Return for G.I. to playfield.
J106-4	KEY	
J106-5	N/C	
J106-6	N/C	
J106-7	WHT-BRN	6.8VAC for G.I. to playfield.
J106-8	WHT-ORG	6.8VAC for G.I. to playfield.
J106-9	WHT-YEL	6.8VAC for G.I. to playfield.
J106-10	N/C	
J106-11	N/C	

J107	NOT USED

J108	NOT USED

Power Driver Board Continued...

J109-1	BLU-BRN	For solenoid #25 drive to plyfld flasher
J109-2	BLU-RED	For solenoid #26 drive to plyfld flasher
J109-3	BLU-ORG	For solenoid #27 drive to playfield coil
J109-4	BLU-YEL	For solenoid #28 drive to playfield coil
J109-5	N/C	
J109-6	N/C	
J109-7	KEY	
J109-8	RED-ORG	For solenoid #27 tieback diode
J109-9	RED-ORG	For solenoid #28 tieback diode
J110-1	BRN-WHT	For solenoid #37 drive to DC Motor Control board.
J110-2	KEY	
J110-3	ORG-WHT	For solenoid #38 drive to DC Motor Control board.
J110-4		
J110-5		
J111-1	BLK-BR[illegible]	For solenoid #17 drive to playfield flasher.
J111-2	BLK-RED	For solenoid #18 drive to playfield flasher.
J111-3	BLK-ORG	For solenoid #19 drive to playfield flasher.
J111-4	BLK-YEL	For solenoid #20 drive to playfield flasher.
J111-5	BLU-GRN	For solenoid #21 drive to playfield flasher.
J111-6	N/C	
J111-7	BLU-VIO	NOT USED
J111-8	BLU-GRY	For solenoid #24 drive to playfield coil
J111-9	KEY	
J111-10	RED-ORG	For solenoid #24 tieback diode
J111-11	RED-ORG	For solenoid #24 tieback diode
J111-12	N/C	
J111-13	N/C	
J112	NOT USED	
J113-1	BRN-BLK	For solenoid #9 drive to playfield coil.
J113-2	KEY	
J113-3	BRN-RED	For solenoid #10 drive to playfield coil.
J113-4	BRN-ORG	For solenoid #11 drive to playfield coil.
J113-5	BRN-YEL	For solenoid #12 drive to playfield coil.
J113-6	BRN-GRN	For solenoid #13 drive to playfield coil.
J113-7	BRN-BLU	For solenoid #14 drive to playfield coil.
J113-8	BRN-VIO	For solenoid #15 drive to playfield coil.
J113-9	BRN-GRY	For solenoid #16 drive to playfield coil.
J114	NOT USED	
J115	NOT USED	
J116-1	VIO-BRN	For solenoid #1 drive to playfield coil.
J116-2	VIO-RED	For solenoid #2 drive to playfield coil
J116-3	KEY	
J116-4	VIO-ORG	For solenoid #3 drive to playfield coil.
J116-5	VIO-YEL	For solenoid #4 drive to playfield coil.
J116-6	VIO-GRN	For solenoid #5 drive to playfield coil.
J116-7	VIO-BLU	For solenoid #6 drive to playfield coil.
J116-8	VIO-BLK	For solenoid #7 drive to playfield coil.
J116-9	VIO-GRY	For solenoid #8 drive to playfield coil.
J117	NOT USED	
J118	NOT USED	

J119-1	RED-GRN	+50V to lower right flipper coil.
J119-2	RED-GRN	Loop from J119-1.
J119-3	KEY	
J119-4	RED-BLU	+50V to lower left flipper coil
J119-5	RED-BLU	Loop from J119-4
J119-6	RED-VIO	+50V to upper right flipper coil
J119-7	RED-VIO	Loop from J119-6.
J119-8	RED-GRY	+50V for solenoid #35 Ball Launch Ramp
J119-9	RED-GRY	Loop from J119-8
J120-1	ORG-GRY	For sol. #36 not used
J120-2	N/C	
J120-3	YEL-GRY	For sol. #35 drive to Ball Launch Ramp
J120-4	N/C	
J120-5	ORG-VIO	For sol. #34 hold drive to upper right flipper
J120-6	YEL-VIO	For sol. #33 power drive to uppr right flipper
J120-7	ORG-BLU	For sol. #32 hold drive to low left flipper.
J120-8	N/C	
J120-9	YEL-BLU	For sol. #31 power drive to low left flipper.
J120-10	KEY	
J120-11	ORG-GRN	For sol. #30 hold drive to low right flipper.
J120-12	N/C	
J120-13	YEL-GRN	For sol. #29 power drive to low right flipper.
J121-1	YEL-BRN	For lamp column #1 to playfield.
J121-2	YEL-RED	For lamp column #2 to playfield.
J121-3	YEL-ORG	For lamp column #3 to playfield.
J121-4	YEL-BLK	For lamp column #4 to playfield.
J121-5	YEL-GRN	For lamp column #5 to playfield.
J121-6	YEL-BLU	For lamp column #6 to playfield.
J121-7	YEL-VIO	For lamp column #7 to playfield.
J121-8	KEY	
J121-9	YEL-GRY	For lamp column #8 to playfield.
J122-1	KEY	
J122-2	N/C	
J122-3	YEL-GRY	For lamp column #8 to cabinet.
J123	NOT USED	
J124-1	RED-BRN	For lamp row #1 to playfield.
J124-2	RED-BLK	For lamp row #2 to playfield.
J124-3	KEY	
J124-4	RED-ORG	For lamp row #3 to playfield.
J124-5	RED-YEL	For lamp row #4 to playfield.
J124-6	RED-GRN	For lamp row #5 to playfield.
J124-7	RED-BLU	For lamp row #6 to playfield.
J124-8	RED-VIO	For lamp row #7 to playfield.
J124-9	RED-GRY	For lamp row #8 to playfield.
J125-1	N/C	
J125-2	N/C	
J125-3	KEY	
J125-4	N/C	
J125-5	N/C	
J125-6	N/C	
J125-7	RED-BLU	For lamp row #6 to coin door board J3-9.
J125-8	RED-VIO	For lamp row #7 to coin door brd J3-10.
J125-9	RED-GRY	For lamp row #8 to coin door brd J3-11.
J126	NOT USED	
J127-1	WHT-GRN	9.8VAC from transformer secondary.
J127-2	WHT-GRN	9.8VAC loop from J127-1.
J127-3	WHT-GRN	9.8VAC from transformer secondary.
J127-4	KEY	
J127-5	WHT-GRN	9.8VAC loop from J127-3.

Power Driver Board Continued...

J128-1	WHT-RED	16VAC loop from J128-2.
J128-2	WHT-RED	16VAC from transformer secondary.
J128-3	WHT-RED	16VAC loop from J128-4.
J128-4	WHT-RED	16VAC from transformer secondary.
J128-5	BLK-YEL	16VAC loop from J128-6
J128-6	BLK-YEL	16VAC from transformer secondary.
J128-7	KEY	
J128-8	BLK-YEL	16VAC loop from J128-9.
J128-9	BLK-YEL	16VAC from transformer secondary.
J129-1	RED	9VAC from transformer secondary.
J129-2	RED	9VAC from transformer secondary.
J129-3	KEY	
J129-4	BLU-WHT	13VAC from transformer secondary.
J129-5	BLU-WHT	13VAC loop from J129-4.
J129-6	BLU-WHT	13VAC from transformer secondary.
J129-7	BLU-WHT	13VAC loop from J129-6.
J130	NOT USED	
J131	NOT USED	
J132	NOT USED	
J133-1	RED-ORG	+50V to coils
J133-2	RED-BRN	+50V to coils.
J133-3	RED-BLK	+50V to coils.
J133-4	KEY	
J133-5	N/C	
J133-6	RED-WHT	+20V to playfield flashers.
J134-1	N/C	
J134-2	N/C	
J134-3	N/C	
J134-4	KEY	
J134-5	RED-WHT	+20V to Aux 8-driver Board J2-4
J135	NOT USED	
J136	NOT USED	
J137-1	N/C	
J137-2	N/C	
J137-3	N/C	
J137-4	BLK	Ground to Aux 8-driver Board J2-5
J138-1	KEY	
J138-2	GRY-YEL	+12v
J138-3	BLK	Ground
J138-4	N/C	
J139-1	KEY	
J139-2	GRY-YEL	+12V to playfield PC boards.
J139-3	BLK	Ground to playfield PC boards.
J139-4	N/C	
J139-5	BLK-WHT	Signal for coin meter to coin door brd J2-7.
J140-1	KEY	
J140-2	GRY-YEL	+12V
J140-3	BLK	Ground
J140-4	N/C	
J141-1	KEY	
J141-2	GRY-YEL	+12V to Coin Door board J2-2.
J141-3	BLK	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	OUTLANE EXTRA BALL 11	HOLE 5 21	HOLE 6 31	DRIVING RANGE 41	(K)ICK 51	4 STROKES 61	ADVANCE TRAP 71	SIDE RAMP DRIVE 81
2 Red-Black J125-2 Q108	KICKBACK 12	HOLE 4 22	HOLE 7 32	INCREASE GOLF CART 42	K(I)CK 52	3 STROKES 62	CENTER DRIVE 72	EXTRA BALL 82
3 Red-Orange J125-4 Q103	LOWER DRIVING RANGE 13	HOLE 3 23	HOLE 2 33	INCREASE BUZZ VALUE 43	KI(C)K 53	2 STROKES 63	CENTER LOCK 73	MULTIBALL 83
4 Red-Yellow J125-5 Q107	SHOOT AGAIN 14	HIT BUD 24	HIT BUZZ 34	INCREASE BUD VALUE 44	KIC(K) 54	5 STROKES 64	GET T.N.T 74	JACKPOT 84
5 Red-Green J125-6 Q102	SPECIAL 15	HOLE 1 25	HOLE 9 35	NEWTON DRIVE 45	SKILL SHOT 55	7 STROKES 65	CENTER RAISE GOFER 75	PUTT OUT 85
6 Red-Blue J125-7 Q106	WHEEL VALUE 16	2X 26	4X 36	COLLECT 46	RELIGHT JACKPOT 56	6 STROKES 66	RIGHT SPINNER 76	TOP JET BUMPER 86
7 Red-Violet J125-8 Q101	JET LIGHTNING 17	CART PATH 2 27	CART PATH 4 37	RIP OFF 47	RIGHT RAMP LOCK 57	LEFT SPINNER 67	RIGHT LOOP DRIVE 77	MIDDLE JET BUMPER 87
8 Red-Gray J125-9 Q105	HOLE 8 18	5X CART PATH 28	3X 38	LEFT LOOP DRIVE 48	RIGHT RAMP DRIVE 58	TRAP READY 68	BOTTOM JET BUMPER 78	START BUTTON 88

J1XX = Power Driver Board

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-White 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	NOT USED 11	SLAM TILT 21	TROUGH EJECT 31	LEFT GOFER DOWN 41	LEFT SLINGSHOT 51	LEFT SPINNER 61	LEFT CART PATH 71	K-I-C-K ADVANCE 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	LEFT RAMP MAKE 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	RIGHT GOFER DOWN 42	RIGHT SLINGSHOT 52	RIGHT SPINNER 62	RIGHT CART PATH 72	(K)ICK 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	JET ADVANCE STANDUP 23	TROUGH BALL 2 33	NOT USED 43	TOP JET BUMPER 53	INNER WHEEL OPTO 63	RIGHT RAMP MAKE 73	K(I)CK 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	PUTT OUT POPPER 44	MIDDLE JET BUMPER 54	OUTER WHEEL OPTO 64	GOLF CART 74	KI(C)K 84	BLUE-GRAY J212-11 LOWER LEFT FLIPPER OPTO F4
Orange-Green J205-6 U16-9 Normal Function / Srv Crdts | Test Function / Escape D5	5 White-Green J208-5 U19-11	CENTER RAMP MAKE 15	UNDER-GROUND PASS 25	TROUGH BALL 4 35	RIGHT POPPER JAM 45	BOTTOM JET BUMPER 55	LEFT GOFER 1 65	RIGHT GOFER 1 75	KIC(K) 85	BLACK-VIOLET J208-11 UPPER RIGHT FLIPPER E.O.S. F5
Orange-Blue J205-7 U16-11 Normal Function / Volume Dn | Test Function / Down D6	6 White-Blue J208-7 U19-9	LEFT OUTLANE 16	LEFT IN-LANE 26	TROUGH BALL 5 36	RIGHT POPPER 46	TOP SKILL SHOT 56	LEFT GOFER 2 66	RIGHT GOFER 2 76	CAPTIVE BALL 86	BLACK-YELLOW J212-10 UPPER RIGHT FLIPPER OPTO F6
Orange-Violet J205-8 U16-7 Normal Function / Volume Up | Test Function / Up D7	7 White-Violet J208-8 U19-5	RIGHT IN-LANE 17	RIGHT OUTLANE 27	TROUGH BALL 6 37	LEFT RAMP DOWN 47	MIDDLE SKILL SHOT 57	BEHIND LEFT GOFER 67	ADVANCE TRAP VALUE 77	NOT USED 87	BLACK-GRAY J208-10 UPPER LEFT FLIPPER E.O.S. F7
Orange-Gray J205-9 U16-5 Normal Function / Begin Test | Test Function / Enter D8	8 White-Gray J208-9 U19-7	SHOOTER GROOVE 18	KICKBACK 28	JET POPPER 38	RIGHT RAMP DOWN 48	LOWER SKILL SHOT 58	HOLE-IN-ONE MADE 68	SAND TRAP EJECT 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.

SUBSTITUTE PART OR EQUIPMENT MODIFICATIONS may void FCC/CANADA Type Acceptance.

BECAUSE THIS GAME IS PROTECTED by Federal copyright, trademark, and patent laws, unauthorized game conversions may be illegal under Federal law.

THIS 'CONVERSION' PRINCIPLE ALSO APPLIES to unauthorized facsimiles of WILLIAMS equipment, logos, designs, publications, assemblies, and games (or game features not deemed to be public domain), whether manufactured with WILLIAMS components or not.

NOTICE

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.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

RF Interference Notice

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

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

FCC/CANADA STICKER. Check the back of your game to verify that an FCC/CANADA certification sticker was attached to your game at the factory. All games that leave the WILLIAMS plant have been tested and found to comply with FCC/CANADA Rules. Because the sticker is proof of this fact, legal repercussions to the owner and distributor may result, if the sticker is missing. If you receive a game that has no FCC/CANADA sticker, call WILLIAMS for advice or write us a note on your Game Registration Card. Be sure that the card bears your game's serial number.

For Service...
Call your authorized Williams Distributor

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

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