Williams®
ELECTRONICS GAMES, INC.

OCTOBER 1994
16-50024-101

OPERATIONS MANUAL INCLUDES

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

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

DIP SWITCH SETTINGS AND JUMPERS

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

DIP Switch Chart

COUNTRY	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
AMERICA	Off	Off	On	On	On	On	On	On
EUROPEAN	Off	Off	On	On	On	Off	On	On
FRENCH	Off	Off	On	On	On	On	Off	Off
GERMAN	Off	Off	On	On	On	On	On	Off
SPAIN	Off	Off	On	On	Off	On	On	On

SOLENOID/FLASHER TABLE

SOL. NO.	FUNCTION	SOLENOID TYPE	VOLTAGE CONNECTIONS			DRIVE XISTOR	DRIVE CONNECTIONS			DRIVE WIRE	SOLENOID PART NUMBER FLASHLAMP TYPE	
			PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX
01	Trough	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	Lower Left Diverter	High Power	J107-2			Q80	J130-2			Vio-Red	AE-26-1500	
03	Lock up Pin	High Power	J107-2			Q78	J130-4			Vio-Org	AL-26-1500	
04	Upper Left Diverter	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1200	
05	Upper Right Diverter	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-26-1200	
06	Start City	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-24-900	
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	Lock Kickout	High Power	J017-2			Q70	J130-9			Vio-Gry	AE-24-900	
09	Ted Eyes Left	Low Power	J107-3			Q58	J127-1			Brn-Blk	SM-30-1100	
10	Ted Lids Down	Low Power	J017-3			Q56	J127-3			Brn-Red	SM-30-1100	
11	Ted Lids Up	Low Power	J107-3			Q54	J127-4			Brn-Org	SM-31-900	
12	Ted Eyes Right	Low Power	J107-3			Q52	J127-5			Brn-Yel	SM-30-1100	
13	Red Lids Down	Low Power	J107-3			Q50	J127-6			Brn-Grn	SM-30-1100	
14	Red Eyes Left	Low Power	J107-3			Q48	J127-7			Brn-Blu	SM-30-1100	
15	Red Lids Up	Low Power	J107-3			Q46	J127-8			Brn-Vio	SM-31-900	
16	Red Eyes Right	Low Power	J107-3			Q44	J127-9			Brn-Gry	SM-30-1100	
17	Red Motor On	Low Power	J118-2			Q42	J126-1			Blk-Brn		
18	Red Motor Direction	Low Power	J118-2			Q40	J126-2			Blk-Red	A-13997	
19	Ted Motor Direction	Low Power	J118-2			Q38	J126-3			Blk-Org		
20	Ted Motor On	Low Power	J118-2			Q36	J126-4			Blk-Yel	A-13997	
21	Left Sling	Low Power	J107-1			Q28	J126-5			Blu-Grn	AE-26-1200	
22	Right Sling	Low Power	J107-1			Q30	J126-6			Blu-Blk	AE-26-1200	
23	Bulldozer Motor	Low Power	J118-2			Q34	J126-7			Blu-Vio	14-8016	
24	Red Eject	Low Power	J107-1			Q32	J126-8			Blu-Gry	AE-26-1500	
25	Top Jet	Gen. Purpose	J107-1			Q26	J122-1			Blu-Brn	AE-26-1200	
26	Left Jet	Gen. Purpose	J107-1			Q24	J122-2			Blu-Red	AE-26-1200	
27	Right Jet	Gen. Purpose	J107-1			Q22	J122-3			Blu-Org	AE-26-1200	
28	Shaker Motor	Gen. Purpose	J107-5			Q20	J122-4			Blu-Yel	14-7951	
29-36	See Flipper Circuit											
37	Little Flipper	Low Power	J107-5			Q16	J4-2			Brn-Wht	#902 (1)	
38	Left Ramp	Low Power	J107-5			Q15	J4-4			Blk-Wht	#906 (1)	
39	Back White	Low Power	J107-6			Q14	J4-5			Org-Wht	#906 (2)	
40	Back Yellow	Low Power	J107-6			Q13	J4-6			Yel-Wht	#906 (2)	
41	Back Red	Low Power	J107-6			Q9	J3-2			Grn-Wht	#906 (2)	
42	Blasting Zone	Low Power	J107-6			Q10	J3-3			Blu-Wht	#89 (2)	
43	Right Ramp	Low Power	J107-6			Q11	J3-4			Vio-Wht	#906 (1)	
44	Jets	Low Power	J107-6			Q12	J3-5			Gry-Wht	#89 (1)	
	GENERAL ILLUMINATION											
01	Playfield/Insert 1	G.I.	J120-1	J121-1		Q18	J120-7	J121-7		Wht-Brn	#44	#555
02	Playfield/Insert 2	G.I.	J120-2	J121-2		Q10	J120-8	J121-8		Wht-Org	#44	#555
03	Playfield/Insert 3	G.I.	J120-3	J121-3		Q14	J120-9	J121-9		Wht-Yel	#44	#555
04	Right Playfield	G.I.	J120-5			Q16	J120-10			Wht-Grn	#44	
05	Left Playfield	G.I.	J120-6		J119-3	Q12	J120-11		J119-1	Wht-Vio	#44	

	FLIPPER CIRCUITS		VOLTAGE CONNECTION	DRIVE XISTOR POWER	DRIVE XISTOR HOLD	DRIVE CONNECTION PLAYFIELD	DRIVE WIRE POWER	DRIVE WIRE HOLD	COIL PART NUMBER	COIL COLOR
29	Lower Right Flipper	Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn		FL-15411	ORANGE
30		Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn		
31	Lower Left Flipper	Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu		FL-15411	ORANGE
32		Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu		
33	Upper Left Flipper	Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio		FL-11753	YELLOW
34		Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio		
35	Middle Left Flipper	Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry		FL-11722	GREEN
36		Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry		

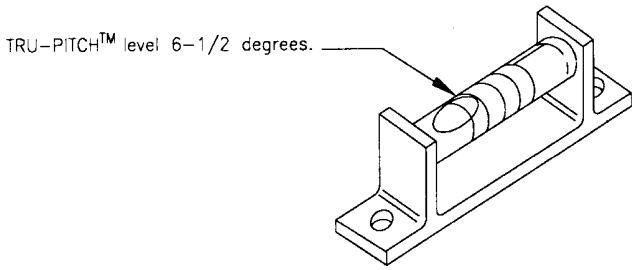
J1XX-X=POWER DRIVER BOARD, JX-X=AUX. DRIVER BOARD. J9XX-X=FLIPTRONIC II BOARD

THANK YOU FOR BUYING ANOTHER FINE WILLIAMS PINBALL!

PLEASE READ THIS SHEET AND KEEP IT WITH THE GAME. IT CONTAINS IMPORTANT INFORMATION ON THE SET-UP OF, AND NEW TECHNICAL FEATURES CONTAINED IN, ROADSHOW.

YOUR LONG TERM COLLECTIONS ARE OUR CONCERN!

1. Please note the TRU-PITCH level located on the right shooter rail. This allows you to accurately pitch the game WITHOUT REMOVING THE GLASS when it is first set in a new location. The first line on the level is approximately 6 degrees. Every line after that is approximately another 1/2 degrees of pitch. We recommend that you pitch ROADSHOW with the NOSE of the bubble on the SECOND line of the level, (6-1/2 degrees). We DO NOT RECOMMEND less than 6 degrees of pitch as this could lead to long ball time and adverse earnings.



2. For the first time ever in a Williams pinball, we have implemented 1/2 credit BUY-IN. This allows your players to purchase an extra ball for 1/2 credit. Even the best players should have buy-in to see all of the features contained in ROADSHOW. We feel that 1/2 credit BUY-IN will be valuable earnings asset for ROADSHOW.

3. ROADSHOW contains Williams' new outlane adjustment posts. Should you feel the need to adjust the outlanes, (further open if you operate 5 ball play) simply raise the playfield, loosen the attaching nut and slide the post, then re-tighten the attaching nut. These posts can be completely adjusted from the back side of the playfield with no removal of plastic parts being necessary.

4. Since settling occurs in shipping, please check the following playfield items before placing ROADSHOW in operation.

   A. Check RED'S hair to be sure it is not tangled into the upper ramp, or is not hanging into the lane to her right (your left).

   B. Check the large wire chute/ramp all the way on the left side of the game. Pay particular attention to the first skill drop area marked "Lite 5x Blast". Make sure that a ball will drop cleanly onto the playfield from the wire chute and will not hang up on the playfield plastic. If necessary gently bend the chute so that the ball falls cleanly.

   C. Check to be sure that all packing materials have been removed from the playfield.

5. Players are PAYING to hear RED and TED speak. Make every effort to place the game on location at a reasonable volume. Setting the volume so that players cannot hear WILL ADVERSELY EFFECT EARNINGS!

6. Never clean RED or TED's face with strong cleaners. Use only a damp cloth and water.

If you have any comments on ROADSHOW (good or bad), please send them to :

WMS GAMES
3401 N. California Ave.
Chicago, Illinois U.S.A.
60618-5899
Attn: Pinball Engineering Group

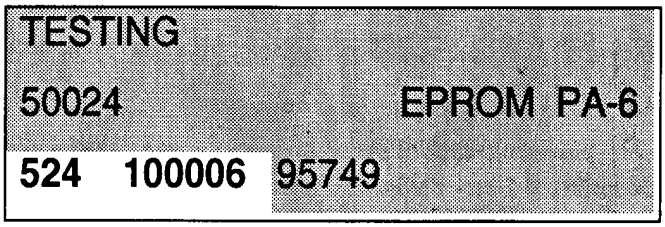
THANKS FOR YOUR PURCHASE!

AT WILLIAMS WE'RE WORKING FOR YOUR BOTTOM LINE.

ATTENTION

The game uses a new Security CPU Board that is not downward compatible to the CPU boards used in previous games. The new board has an added security chip that can be interchanged between other ROAD SHOW 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.



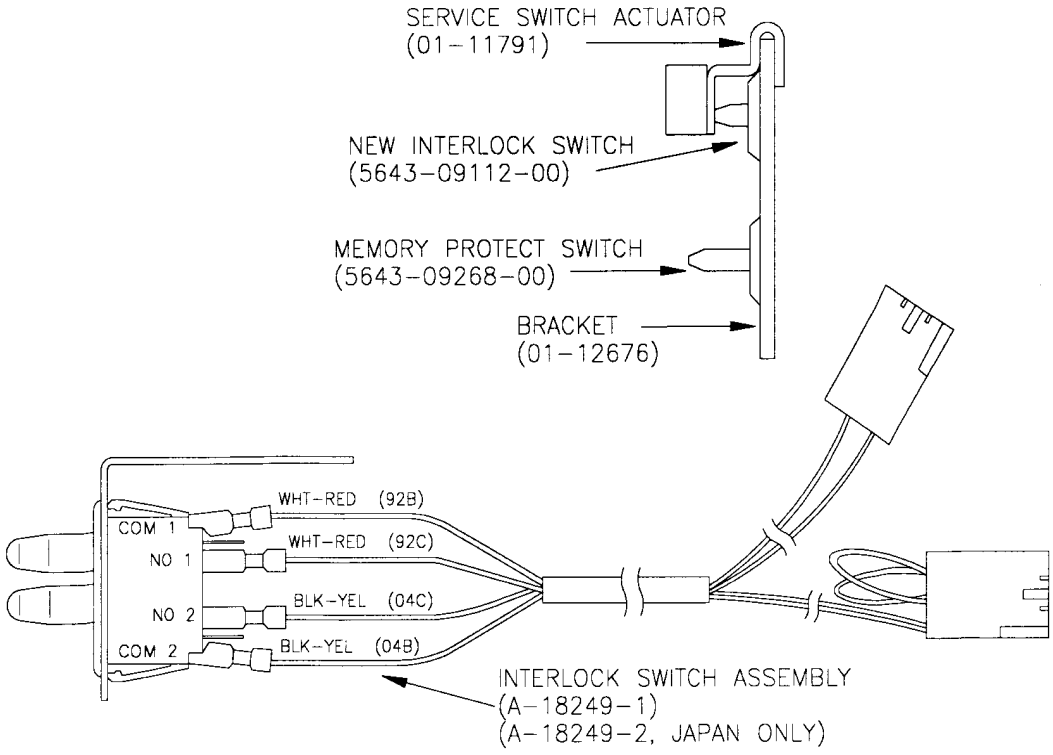
IMPORTANT NOTICE

PLEASE READ

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

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

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



ROAD SHOW

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.

ROAD SHOW

!!!RULES OF THE ROAD!!!

OBJECT: Wreck roads across the U.S.A. from east to west with RED & TED. Make it to the west coast and visit as many cities as possible.

MULTI-BALL: Each hit on the front of TED'S Bulldozer advances the day of the week. On Friday collect a PAYCHECK and LOCK a ball. After 2 BALLS are LOCKED start MULTI-BALL by shooting the third ball into TED'S OPEN MOUTH.

JACKPOT: While TED is sleeping shoot a ball into his OPEN MOUTH. Jackpot can be RE-LIT by hitting RED in the JAW.

EXTRA-BALL: There is an extra ball available on the Blast Wheel, the Flying Rock Ramp, and by repeatedly hitting the Blast Zone.

BLAST WHEEL VALUES: The WHEEL is LIT by making BRIDGE OUT SHOTS when the danger signs are flashing. The WHEEL is COLLECTED by making the SPINNER SHOT or the BLAST HOLE SHOT. The SPINNER MOVES the CURRENT WHEEL VALUE. The BLAST HOLE COLLECTS the CURRENT WHEEL VALUE.

BRIDE-OUT: The 2 flipper lanes light the bridge-out signs on the ramps. BONUS-X is advanced and the blast wheel is lit by bridge-out shots.

VISIT CITIES: The different SHOTS all AWARD MILES. Once the CORRECT MILES BETWEEN CITIES have been traveled, a CITY EVENT can be started by shooting into the lit START CITY HOLE.

HINT: VISIT THE WEST COAST FOR A SUPER PAYDAY!

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SECTION ONE

GAME OPERATION AND TEST INFORMATION

ROM SUMMARY

IC	Type	Location	Board	Part Number
Game ROM 1 (Domestic)	27c040	U6	CPU	A-5343-50024-1A
Game ROM 1 (Foreign)	27c040	U6	CPU	A-5343-50024-1X
Security Chip	PIC16C57	U22	CPU	A-5400-50024-1
Music/Speech ROM	27c040	SU2	Audio	A-5343-50024-S2
Music/Speech ROM	27c040	SU3	Audio	A-5343-50024-S3
Music/Speech ROM	27c040	SU4	Audio	A-5343-50024-S4
Music/Speech ROM	27c040	SU5	Audio	A-5343-50024-S5
Music/Speech ROM	27c040	SU6	Audio	A-5343-50024-S6
Music/Speech ROM	27c040	SU7	Audio	A-5343-50024-S7

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

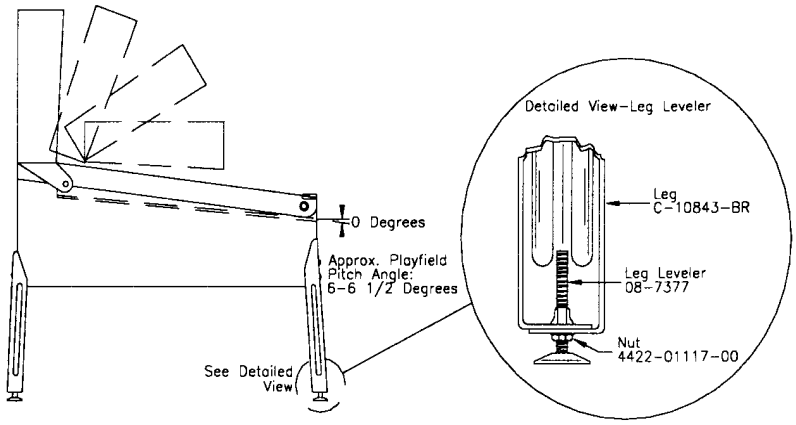
ROAD SHOW IS A FOUR BALL GAME

Power:	Domestic 120V @ 60Hz Foreign 230V @ 50Hz Japan 100V @ 50HZ	***Dimensions:***	Width: 22" approx. Depth: 52" approx. Height: 75" approx.
Temp:	32°F to 100° F, (0°C to 38°C)	***Weight:***	325 lbs approx. (crated)
Humidity:	Not to exceed 95% relative.		

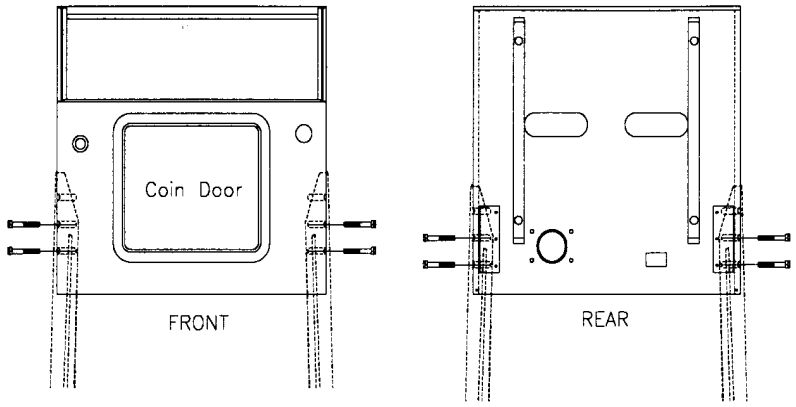
1. Remove all cartons, parts, and other items from the shipping container and set them aside.

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

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



VIEW 1



VIEW 2

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

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

⚠ CAUTION

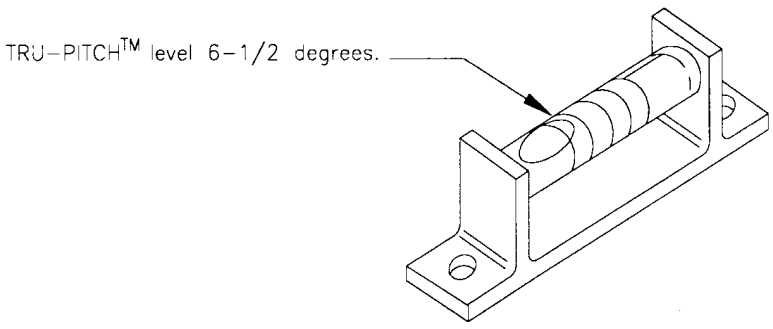
FAILURE TO INSTALL the backbox mounting hardware properly can cause personal injury. ***NEVER TRANSPORT*** a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

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

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

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

9. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be accurately adjusted WITHOUT REMOVING THE GLASS. The first line (closest to the front of the game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch for Road Show 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.

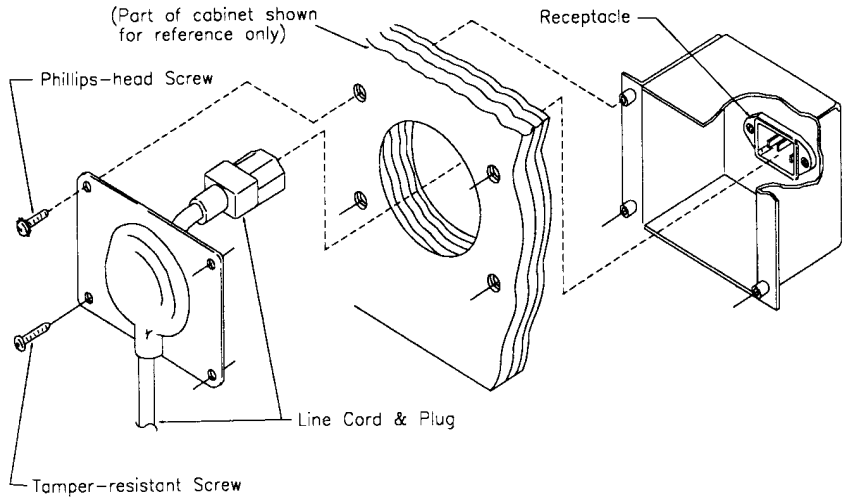
10. Move the game into the desired location; recheck the level and pitch angle of the playfield.

11. Be sure the ***required number*** of balls are installed. This game uses four balls.

12. Install full playfield mylar, if desired. ***NOTE:*** The playfield is coated with a special hardcoat surface and does not require a protective mylar. However, mylars can be purchased through your local Williams Distributor. Specify part number 03-9310-1 for full playfield mylar.

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

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



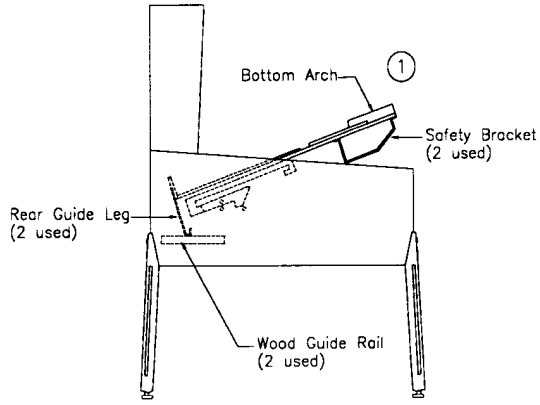
RAISING THE PLAYFIELD

⚠ CAUTION

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

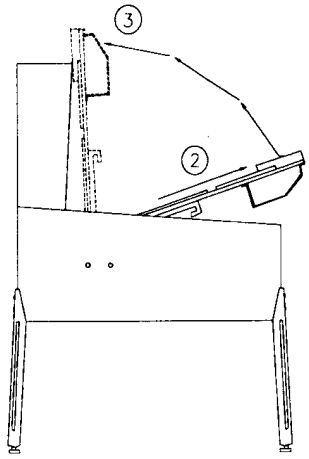
To raise the playfield.

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



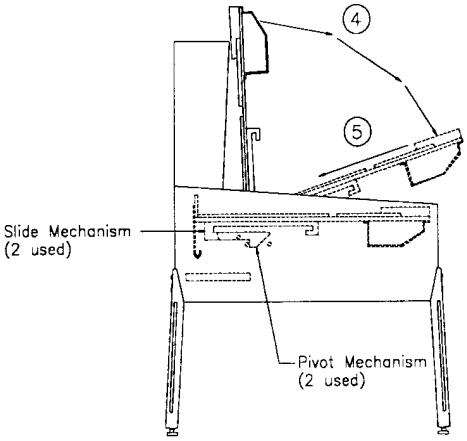
2. Pull the playfield out toward you until it stops (rest position) and raise it approximately 3". **Be sure playfield is in locked position and does not slide back into the cabinet. If it does, repeat Step 2 before proceeding to Step 3.**

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



To lower the playfield.

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



GAME CONTROL LOCATIONS

Cabinet Switches

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

Coin Door Buttons

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

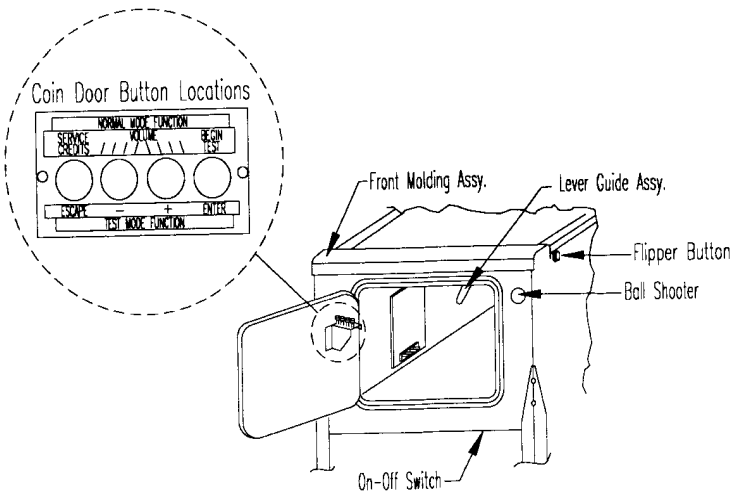
Normal Function

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

Test Function

The Escape button allows you to get out of a menu selection or return to the Attract Mode.
The Up (+) button allows you to cycle forward through the menu selections or adjustment choices.
The Down (-) button allows you to cycle backward through the menu selections or adjustment choices.
The Enter button allows you to get into a menu selection or lock in an adjustment choice.
Holding the Enter button for five seconds, during the Attract Mode, resets the High Scores.

CONTROL SWITCH LOCATIONS



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. The section entitled 'Error Messages' contains more details concerning messages displayed at each game turn-on.

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

Example:	**Game Name**		**Sound Rev. L-1**	
	500XX	**Rev. L-X**	**SY. 0.X0**	**X-X-94**

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

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

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

STARTING A GAME. Press the Start button. 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 either Start button once for each player, before the end of play on the first ball. Pull one of the ball shooter handles to launch a ball. Press the flipper buttons to operate the flippers.

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

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

GAME OVER MODE. The **Game Over** display shows the high scores and the game proceeds to the Attract Mode.

* - Operator-adjustable feature

MENU SYSTEM OPERATION

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

MAIN MENU

B. BOOKKEEPING MENU

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

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 Dozer Test
- T.17 "TED" Test
- T.18 "RED" Test
- T.19 Motor/Switch
- T.20 Empty Balls

U. UTILITIES MENU

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

A. ADJUSTMENT MENU

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

Press Escape
To move out of a menu selection.

Press Enter
To get into a menu selection.

Press Up
Increases sequence;
(ex. A.1, A.2, A.3, A.4).

Press Down
Decreases sequence;
(ex. A.4, A.3, A.2, A.1).

Use Up or Down to cycle through the menu selections.

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

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

B. BOOKKEEPING MENU

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

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

B.1 Main Audits

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

B.2 Earning Audits

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

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

B.3 Standard Audits

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

** "Total Plays" only counts on completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored. Operation for test and service do not affect audits.*

† This audit is not resettable.

B.4 Feature Audits

B.4	01	Buy-In Extra Balls	00
B.4	02	Multiballs	00
B.4	03	Cities Saved	00
B.4	04	Flying Rocks Started	00
B.4	05	Collected Wheel	00
B.4	06	Made Skill	00
B.4	07	Lock 1	00
B.4	08	Lock 2	00
B.4	09	1st Multiballs	00
B.4	10	2nd Multiballs	00
B.4	11	Jackpots	00
B.4	12	Jackpot Relit	00
B.4	13	Rematch	00
B.4	14	Multiball Restart	00
B.4	15	Bob's Visits	00
B.4	16	Bob's Bought	00
B.4	17	Bridge Outs	00
B.4	18	2X Plus Blast	00
B.4	19	Cities Lit	00
B.4	20	Frocks Lit	00
B.4	21	Today's High Score	00
B.4	22	Balls Saved	00
B.4	23	West Coast City	00
B.4	24	Super Payday	00
B.4	25	Blast Extra Ball Lit	00
B.4	26	Bridge Extra Ball Lit	00
B.4	27	Wheel Extra Ball Lit	00
B.4	28	Rocks Extra Ball Lit	00
B.4	29	Blast For Extra Ball	00
B.4	30	Time Per Credit	00
B.4	31	1 Buy-In Games	00
B.4	32	2 Buy-In Games	00
B.4	33	3 Buy-In Games	00
B.4	34	>=4 Buy-In Games	00

B.5 Histograms

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

B.6 Time-Stamps

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

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

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

P. PRINTOUTS MENU

(optional board required)

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

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

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

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

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a test. Press the Escape button to return to the Test Menu. **NOTE:** During any test, press the Start button to obtain the wire color, driver number, connector number and fuse location.

T. TEST MENU

T.1	**Switch Edges Test**	**T.11**	**Display Test**
T.2	**Switch Levels Test**	**T.12**	**Flipper Coil Test**
T.3	**Single Switch Test**	**T.13**	**Ordered Lamps Test**
T.4	**Solenoid Test**	**T.14**	**Lamp Row-Col**
T.5	**Flasher Test**	**T.15**	**DIP Switch Test**
T.6	**General Illumination Test**	**T.16**	**Dozer Test**
T.7	**Sound & Music Test**	**T.17**	**"TED" Test**
T.8	**Single Lamps Test**	**T.18**	**"RED" Test**
T.9	**All Lamps Test**	**T.19**	**Motor/Switch**
T.10	**Lamp & Flasher Test**	**T.20**	**Empty Balls**

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

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

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

T.1 Switch Edges Test

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

T.2 Switch Levels Test

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

T.3 Single Switches Test

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

T.4 Solenoid Test

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

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

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

Run: The Run mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed.

T.5 Flasher Test

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

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

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

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

T.6 General Illumination Test

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

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

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

T.7 Sound and Music Test

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

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

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

Stop: Press the Enter button at any time during the Repeat mode to stop this test altogether. Nothing should be heard. Any other results indicates the system has detected a problem.

T.8 Single Lamp Test

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

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

T.9 All Lamps Test

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

T.10 Lamp and Flasher Test

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

T.11 Display Test

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

T.12 Flipper Coil Test

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

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

T.12 Flipper Coil Test Continued...

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

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

T.13 Ordered Lamps Test

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

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

T.14 Lamp Row-Col

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

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

T.15 DIP Switch Test

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

T.16 Dozer Test

This allows the operator to run the bulldozer motor and shows the status of two switches.

T.17 "TED" Test

This test activates each of Ted's coils. The status of the coils is shown in the displays.

T.18 "RED" Test

This test activates each of Red's coils. The status of the coils is shown in the displays.

T.19 Motor/Switch

This test runs all motors in the game, one at a time. At the same time, the switch matrix is displayed. The operator can see if erroneous switch closures occur while the motors are on.

T.20 Empty Balls

This test kicks out all balls from all devices.

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

U. Utilities Menu

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

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

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

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

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

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

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

U.6 Set Game I.D.
This utility allows for the installation of a message, such as game location, that only appears on 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 the desired letter and punctuation.

U.7 Factory Adjustment

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

U.8 Factory Reset

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

U.9 Presets

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

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

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

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

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

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

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

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

Adj #	Adj Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03 (factory)	Hard U.9 04	Extra Hard U.9 05
A.2 02	Special Percent	10%	9%	8%	7%	6%
A.2 03	Extra Ball Percent	30%	23%	20%	15%	10%
A.2 04	Extra Ball Memory	On	On	On	On	Off
A.2 08	Starting Day	Fri	Thr	Mon	Mon	Mon
A.2 09	Weeks To Lock 2	0 Weeks	0 Weeks	0 Weeks	1 Week	1Week
A.2 10	Cnt Between Wheels	0 Brdg Out	0 Brdg Out	0 Brdg Out	0 Brdg Out	1Brdg Out
A.2 15	Miles Between Cities	200 miles	300 Miles	400 Miles	500 Miles	600 Miles
A.2 16	Longer Path	Off	Off	On	On	On
A.2 17	Ball Saves Timer	On	On	Off	Off	Off
A.2 19	Default Extra Ball Blast	5 B. Zones	6 B. Zones	7 B. Zones	8 B. Zones	9 B. Zones

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	Balls Per Game	5	3
A.1 07	Replay Start	700 Million	500 Million
A.2 02	Special Percent	7%	8%
A.2 03	Extra Ball Percent	15%	20%
A.2 04	Extra Ball Memory	On	On
A.2 08	Starting Day	Mon	Mon
A.2 09	Weeks To Lock 2	1 Week	0 Weeks
A.2 10	Cnt Between Wheels	0 Brdg Out	0 Brdg Out
A.2 15	Miles Between Cities	500 Miles	400 Miles
A.2 16	Longer Path	On	On
A.2 17	Ball Saves Timer	Off	Off
A.2 19	Default Extra Ball Blast	8 B. Zones	7 B. Zones

U.9 08 Install Add-A-Ball

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

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

U.9 09 Install Ticket

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

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

U.9 10 Install Novelty

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

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

U.9 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 game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups. ***NOTE:*** German replay starts at 500,000,000.

Preset Adjustments Table for German Games

Adj #	Adj Description	German 1 U.9 17	German 2 U.9 18	German 3 U.9 19	German 4 U.9 20	German 5 U.9 21	German 6 U.9 22
A.1 14	Replay Award	Credit	Ticket	Audit	Credit	Ticket	Audit
A.1 15	Special Award	Credit	Ex. Ball	Points	Credit	Ex. Ball	Points
A.1 16	Match Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.1 19	Match Feature	7%	7%	Off	7%	7%	Off
A.3 01	Game Pricing	6spiele/5DM	6spiele/5DM	6spiele/5DM	7spiele/5DM	7spiele/5DM	7spiele/5DM
A.4 02	H.S.T.D. Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.4 04	Champion Credits	03	03	00	03	03	00
A.4 05	H.S.T.D. 1 Credits	01	01	00	01	01	00
A.4 06	H.S.T.D. 2 Credits	00	00	00	00	00	00
A.4 07	H.S.T.D. 3 Credits	00	00	00	00	00	00
A.4 08	H.S.T.D. 4 Credits	00	00	00	00	00	00

• German DIP Switch settings are:

Sw4	Sw5	Sw6	Sw7	Sw8
On	On	On	On	Off

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

Preset Adjustments Table for French Games

Adj #	Adj Description	French 1 U.9 23	French 2 U.9 24	French 3 U.9 25	French 4 U.9 26	French 5 U.9 27	French 6 U.9 28
A.2 02	Special Percent	8%	6%	9%	8%	8%	7%
A.2 03	Extra Ball Percent	20%	10%	23%	20%	20%	15%
A.2 04	Extra Ball Memory	On	Off	On	On	On	On
A.2 08	Starting Day	Mon	Mon	Thr	Mon	Mon	Mon
A.2 09	Weeks To Lock 2	0 Weeks	1Week	0 Weeks	0 Weeks	0 Weeks	1 Week
A.2 10	Cnt Btween Wheels	0 Brdg Out	1Brdg Out	0 Brdg Out	0 Brdg Out	0 Brdg Out	0 Brdg Out
A.2 15	Miles Btween Cities	400 Miles	600 Miles	300 Miles	400 Miles	400 Miles	500 Miles
A.2 16	Longer Path	On	On	Off	On	On	On
A.2 17	Ball Saves Timer	Off	Off	On	Off	Off	Off
A.2 19	Default Ex Ball Blast	7 B. Zones	9 B. Zones	6 B. Zones	7 B. Zones	7 B. Zones	8 B. Zones

*** French DIP Switch settings are:**

Sw4	Sw5	Sw6	Sw7	Sw8
On	On	On	Off	Off

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

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

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

A. ADJUSTMENTS MENU

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

A.1 Standard Adjustments

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

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

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

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

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

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

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

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

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

*For Auto% Replay.

A.1 08 Replay Levels*

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

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

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

A.1 13 Replay Boost

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

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

A.1 14 Replay Award

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

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

A.1 15 Special Award

The award automatically provided when the player scores a special.

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

A.1 16 Match Award

The award automatically provided when the players wins a match.

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

A.1 17 Extra Ball Ticket

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

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

*For Auto% Replay; ** For Fixed Replay.

A.1 18 Maximum Ticket/Player

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

A.1 19 Match Feature

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

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

A.1 20 Custom Message

The message displayed during the Attract Mode.

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

A.1 21 Language

The language the game uses: English, French, or German.

A.1 22 Clock Style

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

A.1 23 Date Style

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

A.1 24 Show Date and Time

The date and time show in the Attract Mode.

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

A.1 25 Allow Dim Illumination

The game program dims the General Illumination for special effects and during the Attract Mode.

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

A.1 26 Tournament Play

Equalize Multiball and Jackpots during multi-player games, (do not carry over to next player).

YES - Keep Multiball and Jackpots equal.
NO - Do Not Keep Multiball and Jackpots equal.

A.1 27 Euro. Scr. Format

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

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

A.1 28 Minimum Volume Override

The volume can be turned Off.

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

A.1 29 General Illumination Power Saver

This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played. Power Saver Level (A.1 30) determines dimness of the lamps. Using this feature substantially increases the life of the lamps.
Setting: OFF, 2 to 60 minutes.

A.1 30 Power Saver Level

When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.
Range: 4 to 7. (4 = dimmest, 7 = brightest)

A.1 31 Ticket Expansion Board

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

YES - Ticket Expansion Board is connected.
NO - Ticket Expansion Board is NOT installed in the game.

A.1 32 No Bonus Flips

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

A.1 33 Game Restart

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

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

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

A.2 Feature Adjustments

A.2 01 Blink Eyes
This adjustment allows the operator to disable random eye blinking from RED and TED.

Settings: ON = Eyes blink.
OFF = Eyes do not blink.

A.2 02 Special Percent
The percent of Specials that a game awards.

Settings: 5% to 15% = Percentage of Specials

A.2 03 Extra Ball Percent
The percent of Extra Balls that a game awards.

Settings: 5% to 35% = Percentage of Extra Balls

A.2 04 Extra Ball Memory
The Extra Ball light is either carried over from ball to ball, or reset at ball start.

Settings: ON = The Extra Ball light is carried over from ball to ball.
OFF = The Extra Ball light is reset at ball start.

A.2 05 Buy Extra Ball
This determines whether or not each player may buy one extra ball at the end of a game

Settings: OFF
CREDIT
HALF CREDIT
COIN

A.2 06 Buy In Count
This determines the number of times per game the player is allowed to buy an Extra Ball.
Note: Buy-In is canceled when player reaches the west coast.

Settings: UNLIMITED
1 to 6 BUY-INS

A.2 07 Attract Sounds
This determines whether or not the attract mode plays music and speech to attract players.

Settings: ON = The attract mode does have music and speech.
OFF = The attract mode does not have music or speech.

A.2 08 Starting Day
This determines the day the game starts on. If it starts on a Friday, the lock will be lit.

Settings: MONDAY-FRIDAY

A.2 09 Weeks To Lock 2

The number of weeks the player has to complete before the game lights lock 2.

Settings: 0 or 1 Week

A.2 10 Cnt Between Wheels

This is the number of Bridge Outs that don't activate the wheel. If 0, then the wheel is activated on every complete Bridge Out. If 1, then the wheel is activated on every other Bridge Out.

Settings: 0 or 1

A.2 11 Skill Shot Award

This is the award given with a skill shot.

Settings: START CITY
SOUVENIR
FLYING ROCKS

A.2 12 Game Over Effect

If this is set to ON a very good game over lamp effect takes place.

Settings: ON = Lamp effect takes place.
OFF = Lamp effect does not take place.

A.2 13 Wheel Lamps Memory

This controls which wheel lamps are turned off at the start of each ball.

Settings: ON = Wheel Lamps are ON.
OFF = All wheel lamps are turned off at the start of each ball. Except, Light Extra Ball and Light Special, which are never turned off once they are achieved.

A.2 14 Wheel In Memory

This controls whether or not the wheel is disabled at ball start.

Settings: ON = The wheel is not disabled.
OFF = The wheel is disabled at ball start regardless if it was enabled last ball or not.

A.2 15 Miles Between Cities

This lets the operator set the distance between cities.

Settings: 100 to 1000 Miles

A.2 16 Longer Path

This controls whether or not the player can go across the country in a straight line.

Settings: ON = The player must zigzag across the country.
OFF = The player can go straight across the country

A.2 17 Ball Save Timer

This determines whether or not ball save is available.

Settings: ON = There is a short ball save timer that saves the ball up to once per ball-in-play.
OFF = Ball Save Timer is not available.

A.2 18 Outlane Serving

A saved ball will be served as soon as it hits the outlane instead of when it drains.

Settings: ON
OFF

A.2 19 Default Extra Ball Blast

This lets the operator set the default blast count that lights extra balls.

Settings: 5 BLASTS - 10 BLASTS

A.2 20 Disable Ted

This controls whether or not Ted is enabled.

Settings: ON = Ted is disabled. The bulldozer and Ted's jaw will not move.
OFF = Ted is enabled.

A.2 21 Disable Red

This controls whether or not Red is enabled.

Settings: ON = Red is disabled. Red's jaw will not move.
OFF = Red is enabled.

A.2 22 Disable Left Ramp Diverter

This determines whether or not the left ramp diverter will activate.

Settings: ON = The diverter will not activate.
OFF = The diverter will activate.

A.2 23 Disable Right Ramp Diverter

This determines whether or not the right ramp diverter will activate.

Settings: ON = The diverter will not activate.
OFF = The diverter will activate.

A.2 24 Disable Lower Left Diverter

This determines whether or not the lower left diverter will activate.

Settings: ON = The diverter will not activate.
OFF = The diverter will activate.

A. 3 Pricing Adjustments

A.3 01 Game Pricing (if set to custom, then 02 to 09 are available)
The cost of a game is selected from the Standard Pricing Table or by installing Custom pricing.

A.3 02 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 (USA, German, etc.).

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

A.3 16 Maximum Credits
The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 99. Reaching the specified setting prevents the award of any credits. 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 20 Base Coin Size
This is the smallest unit of coin that may be used in a custom pricing mode. For example, in the USA this is typically $0.25. All pricing levels are then specified in 25 cents (or greater) increments.

A.3 21 Coin Meter Units

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

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

A.3 22 Dollar Bill Slot

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

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

A.3 23 Minimum Coin Microseconds

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

A.3 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.2 27 Custom Pricing

This function is now used to enter information for the custom pricing mode. Before using this function, you Must first set function A.3 01 (Game Pricing) to "CUSTOM". The adjustment A.3 26 (Credit Fraction) may need to be set before entering the custom pricing function. This specifies the smallest fraction available for partial credits.

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

Please note that formerly, the coin values specified by custom coin doors adjustments A.3 12-15 only affected audit totals that showed collection totals. In the 10/94 pricing system, these coin values are added up for each coin received and credits are awarded based on pricing levels being reached. The pricing editor described here allows you to set these levels, however it may

be necessary for you to set A.3 10 (Coin Door Type) to "CUSTOM" and then change A.3 11-15, 20 and 25 to reflect the value of the coins being used. This is usually NOT NECESSARY, but must be done BEFORE using the custom pricing editor when it is necessary.

You begin the custom pricing function by pressing the "Enter" button while A.3 27 "EDIT PRICE" 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 since A.3 01 was set to "CUSTOM" then this will show the last built-in pricing that was selected. Otherwise it will be the last custom mode created by this function.

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.

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:

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

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

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

Example: Inserting a new pricing level.

CUSTOM PRICING EDITOR		
1)	$0.50	1 cred.
2)	$1.00	2 cred.
3)	$1.50	4 cred.
4)	$2.00	6 cred

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

CUSTOM PRICING EDITOR		
1)	$0.50	1 cred.
2)	$1.00	2 cred.
3)	INSERT	4 cred.
4)	$2.00	6 cred

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

CUSTOM PRICING EDITOR		
1)	$0.50	1 cred.
2)	$1.00	2 cred.
3)	$1.20	2 1/2 cred.
4)	$1.50	4 cred

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

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

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

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

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

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

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

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

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

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

CUSTOM PRICING EDITOR		
1)	$0.25	1/2 cred.
2)	$0.50	1 cred.
3)	$0.75	1 1/2 cred.
4)	$1.00	2 cred

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)	$3.20	6 1/2 cred.
14)	$3.50	7 cred.
15)	$3.75	7 1/2 cred.
16)	$4.00	8 cred.
17)	$4.25	8 1/2 cred
18)	$4.50	9 cred.
19)	$4.75	9 1/2 cred.
20)	$5.00	10 cred

Now repeatedly press "Enter" to move 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

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

Start Button Once the pricing mode has bee specified, you exit the custom pricing editor by pressing the 'Start" button. This will bring up a menu with the following choices:
Save Pricing Mode
Restore Last Pricing Mode
Edit NEW Pricing Mode
Use the "+" and "-" button to select your choice and press the "Enter" button to activate. The selections cause the following actions:

Save Pricing Mode — Press "Enter" to save your custom edited pricing mode and install it as the pricing for the game. Note that this choice will not be displayed if there is not at least one pricing level specified in the pricing editor.

Restore Last Pricing Mode — This option will discard the work done in the previous pricing editor and leave the previously installed pricing mode in the game.

Edit NEW Pricing Mode — This option will clear out all pricing levels and bring you back to the pricing editor to create a pricing mode from scratch.

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	
Austria	5sch	10sch	10sch	-	1/2x5sch, 3/2x10sch [2]	AUSTRIA	
	5sch	-	10sch	-	2/5sch, 5/10sch	CUSTOM	02 00 05 00 01 00 01 00
Australia	20¢	$1	$1	$2	1/$1, 3/$2 [2]	AUSTRALIA 1	
	20¢	$1	$1	$2	1/$1, 2/$2	AUSTRALIA 2	
U.K.	£1.00	50P	20P	10P	1/3x10P, 2/50P, 4/£1 [2]	U. KINGDOM	
Switzerland	1Fr	2Fr	5Fr	-	1/1Fr, 3/2Fr, 7/5Fr [2]	SWISS 1	
	1Fr	2Fr	5Fr	-	1/2Fr, 2/3Fr, 3/4Fr, 5/5F	SWISS 2	
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr, 1/20Fr , 3/50Fr [2]	BELGIUM	
Germany	1DM	2DM	5DM	-	1/2DM, 2/3DM, 3/4DM, 4/5DM[1,2]	GER. 4/5DM	
					1/2DM, 2/3DM, 3/4DM, 5/5DM [2]	GER. 1/2DM	
					1/1DM, 2/2DM, 5/5DM [2]	GER. 1/1DM	
					1/1DM, 2/2DM, 6/5DM [2]	GER. 6/5DM	
Holland	1G	-	1G	-	1/1G [2]	HOLLAND	
Sweden	1Kr	5Kr	10Kr	1Kr	1/10Kr, 2/15Kr, 3/20Kr[1,2]	SWEDEN 1	
	1Kr	5Kr	10Kr	1Kr	1/5Kr [2]	SWEDEN 2	
France	1Fr	5Fr	10Fr	20Fr	1/3x1Fr, 2/5Fr, 5/10Fr , 10/20Fr[2, 3]	TARIF 1	
	1Fr	5Fr	10Fr	20Fr	1/2x1Fr, 3/5Fr, 7/10Fr ,14/20Fr[2, 3]	TARIF 2	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 7/2x10Fr , 7/20Fr [1,2, 3]	TARIF 3	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 4/10Fr, 9/2x10Fr , 9/20Fr[2,3]	TARIF 4	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 5/10Fr, 11/2x10Fr , 11/20Fr[2,3]	TARIF 5	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr , 6/20Fr[2, 3]	TARIF 6	
Italy	500L	500L	500L	-	1/500L [2]	ITALY 1	
	500L	500L	500L	-	1/2x500L, 3/4x500L [1,2]	ITALY 2	
	500L	500L	500L	-	1/2x500L, 2/4x500L[2]	ITALY 3	
Spain	100P	-	500P	-	1/100P, 6/500P [2]	SPAIN	
	25P	-	100P	-	1/25P, 5/100P	CUSTOM	01 00 04 00 01 04 01 00
	25P	-	100P	-	1/25P, 4/100P	CUSTOM	01 00 04 00 01 00 01 00
	25P	-	100P	-	1/2x25P, 2/100P	CUSTOM	01 00 04 00 02 00 01 00
	25P	-	100P	-	1/2x25P, 3/100P	CUSTOM	03 00 12 00 04 00 01 06
Japan	100¥	-	100¥	-	1/100¥ [2]	JAPAN	
Chile	Token	-	Token	-	1/1Token [2]	CHILE	
Denmark	1Kr	5Kr	10Kr	20Kr	1/2x1 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	NEW ZEALAND 1	
	$2.00	-	$1.00	-	1/$1, 3/$2, ($2-$1 door)	NEW ZEALAND 2	
Norway	5Kr	-	10Kr	-	1/5Kr, 2/10Kr, 5/20Kr [2]	NORWAY	
Argentina	10¢	10¢	10¢	-	1/1 Token [2]	ARGENTINA	
Greece	10D	20D	50D	-	1/2x10D, 1/20D, 3/50D	GREECE	
Antilles	25¢	25¢	1G	-	1/25¢, 4/1G	ANTILLES	
Netherlands	1Hfl	2.5Hfl	2.5Hfl	-	1/1Hfl, 3/2.5Hfl	NETHERLANDS	
Hungary	10F	10F	20F	-	1/1x20F, 1/2x10F, 3/2x20F [2]	HUNGARY	

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

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

A.4 01 Highest Scores

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

OFF - No high scores are recorded, or displayed.
ON - The four highest scores are stored in memory and displayed in Attract Mode.

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

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

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

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

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

A.4 04 Champion Credits

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

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

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

A.4 09 High Score Reset Every

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

A.4 10 Backup Champion

The Back-up Grand Champion Score.
Range: 00 to 999,000,000.

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

The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached.
Range: 00 - 999,000,000.

A.5 Printer Adjustments (optional board required)

A.5 01 Column Width

The column width to be printed.
Range: 22 to 80.

A.5 02 Lines Per Page

The amount of lines per page.
Range: 20 to 80.

A.5 03 Pause Every Page

Choose whether the printer pauses at the end of a page.

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

A.5 04 Printer Type

Select the type of printer: Parallel, Serial, ADP, Mini-Drucker, or NSM.

A.5 05 Serial Baud Rate

Select which baud rate to use for serial or ADP communications (bit rate): 300, 600, 1200, 2400, 4800, or 9600.

A.5 06 Serial D.T.R. (Data Terminal Ready)

When a serial printer is used, this line may be connected to a printer output line signaling that the printer is busy.

NORMAL - Normal D.T.R. signal goes low to indicate the printer is not ready.

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

IGNORE - D.T.R. signal is ignored.

A.5 08 Auto Printout

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

This adjustment has the following settings:

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

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

If the printer is detected during game over or test mode, the printout will be taken right away. If the printer is connected while a game is being played, it will take up to 10 seconds to be detected, after which the printout will occur. The game will resume after the printout is complete.

Automatic printouts will only take place if the coin door is open. After an automatic printout has been generated, a 2nd automatic printout will not be possible until a new game has started, or test mode begins.

ERROR MESSAGES

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

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

Check Switch ##.

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

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

Check Fuses F115 and F116 and Opto 12V Supply

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

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

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

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

Pinball Missing.

This game normally uses 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.

xxxxx Sw. is Stuck On.

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

Ground Short Row-N, Wht-xxx.

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

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

U6 Checksum Error.

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

Time and Date Not Set.

The real time clock is not set. 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 L.E.D.'s

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

CPU Board L.E.D. Error Codes

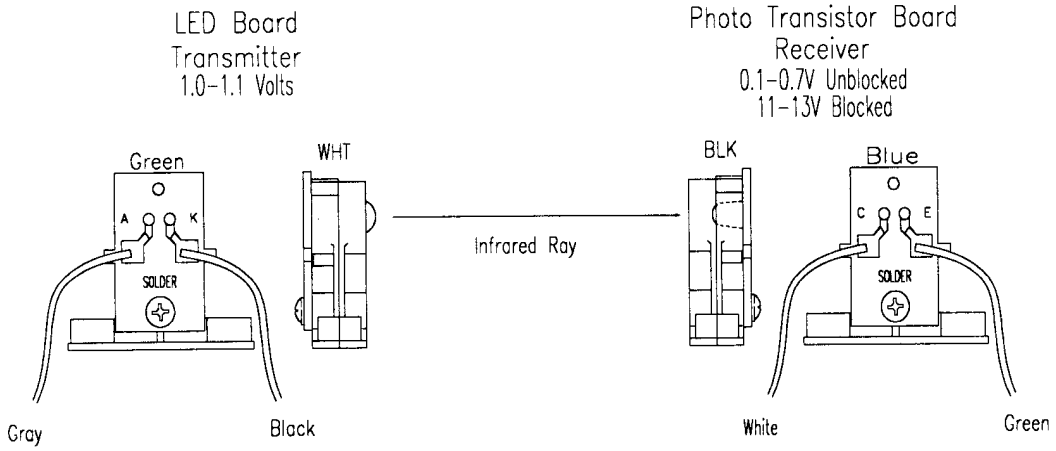
Center L.E.D. blinks one time	-	U6 ROM Failure
Center L.E.D. blinks two times	-	U8 RAM Failure
Center L.E.D. blinks three times	-	U9 Custom Chip Failure

Sound Board Beep Error Codes
Upon Game Turn-On:

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

Opto Theory

The opto receiver (Photo Transistor) should be approximately 0.1 - 0.7 volts when the opto beam is unblocked and approximately 11 - 13 volts when the opto beam is blocked. The opto transmitter (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.



Adjustment A.2 20 is set to ON.

This is a reminder to the operator that the adjustment DISABLE TED is set to ON. This adjustment must be set to OFF once the problem is fixed.

Adjustment A.2 21 Is set to ON.

This is a reminder to the operator that the adjustment DISABLE RED is set to ON. This adjustment must be set to OFF once the problem is fixed.

Adjustment A.2 22 is set to ON.

This is a reminder to the operator that the adjustment DISABLE LEFT RAMP DIVERTER is set to ON. This adjustment must be set to OFF once the problem is fixed.

Adjustment A.2 23 is set to ON.

This is a reminder to the operator that the adjustment DISABLE RIGHT RAMP DIVERTER is set to ON. This adjustment must be set to OFF once the problem is fixed.

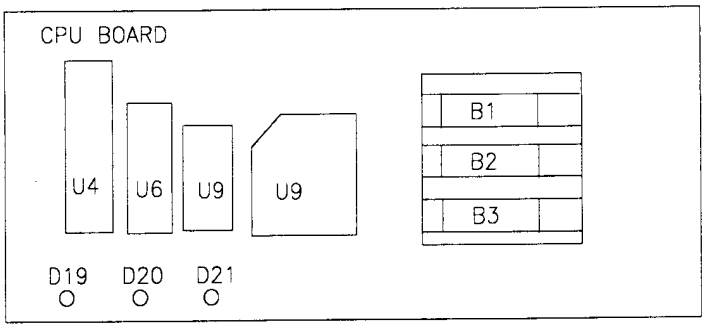
Adjustment A.2 24 is set to ON.

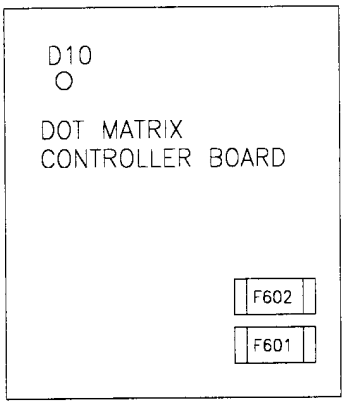
This is a reminder to the operator that the adjustment DISABLE LOWER LEFT DIVERTER is set to ON. This adjustment must be set to OFF once the problem is fixed.

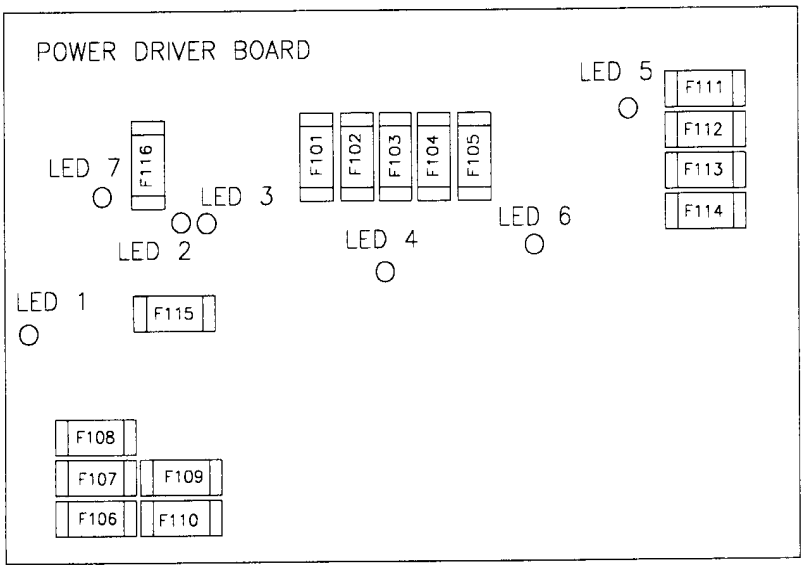
Dozer Timed Out Error

This message indicates that one or the two bulldozer switches is not working, or the bulldozer is obstructed, or the bulldozer motor is physically disabled.

LED List





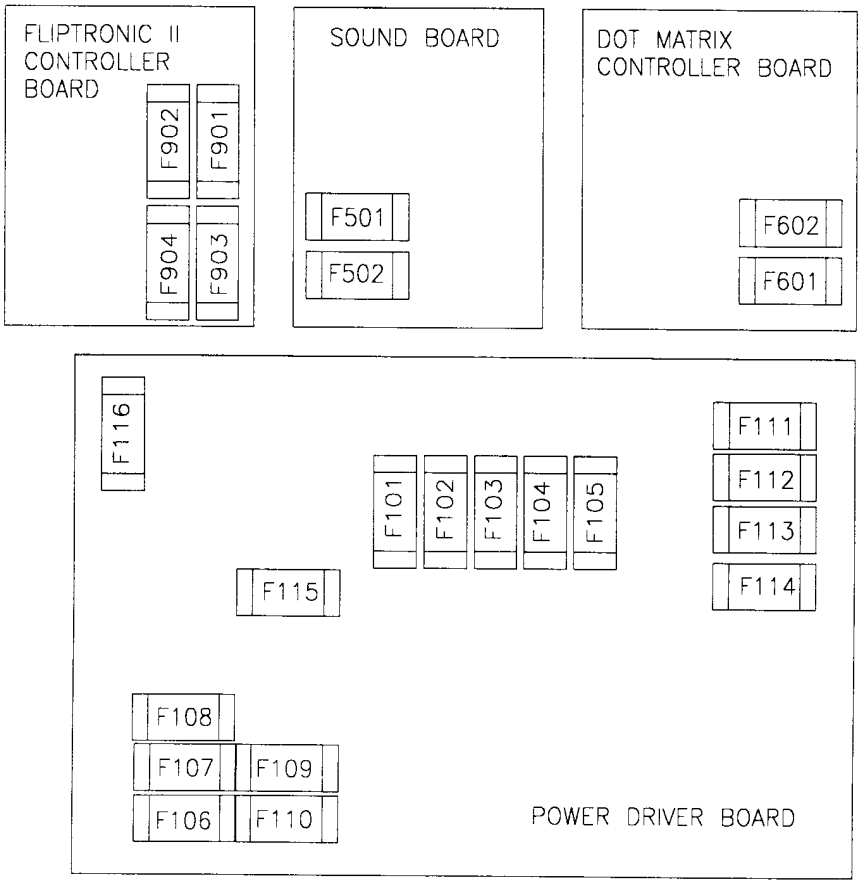


CPU Board
D19, Blanking
D20, Diagnostic
D21, +5VDC
At game turn-on, D19 and D21 are on, D20 is off.
During normal operation, D19 is off, D20 is flashing and D21 is on.

Dot Matrix Controller
D10, +5VDC, Normally On

Power Driver Board
LED 1, +12VDC Switch Circuit, Normally On
LED 2, High/Low Line Voltage Sensor, Normally On
LED 3, High/Low Voltage Sensor, Normally Off
LED 4, +5VDC, Digital Circuit, Normally On
LED 5, +20VDC, Flashlamp Circuit, Normally On
LED 6, +18VDC Lamp Circuit, Normally On
LED 7, +12VDC, Power Circuit, (motors, relays, etc.), Normally On

Fuse List



Sound Board

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

Dot Matrix Controller Board

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

Power Driver Board

F101	+50V general (l. flipper)	3A, S.B.
F102	+50V general (r. flipper)	3A, S.B.
F103	Solenoid #25-#28	3A, S.B.
F104	Solenoid #9-#16	3A, S.B.
F105	Solenoid #1-#8	3A, S.B.
F106	G.I. #5 Wht-Vio	5A, S.B.
F107	G.I. #4 Wht-Grn	5A, S.B.
F108	G.I. #3 Wht-Yel	5A, S.B.
F109	G.I. #2 Wht-Org	5A, S.B.
F110	G.I. #1 Wht-Brn	5A, S.B.
F111	Flasher Secondary	5A, S.B.
F112	Solenoid Secondary	7A, S.B.
F113	+5V Logic	5A, S.B.
F114	+18V Lamp Matrix	8A, N.B.
F115	+12V Switch Matrix	3/4A, S.B.
F116	+12V Secondary	3A, S.B.

Fliptronic II Controller Board

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

Line Filter

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

MAINTENANCE INFORMATION

LUBRICATION

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

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

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

SWITCH CONTACTS

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

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

CLEANING

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

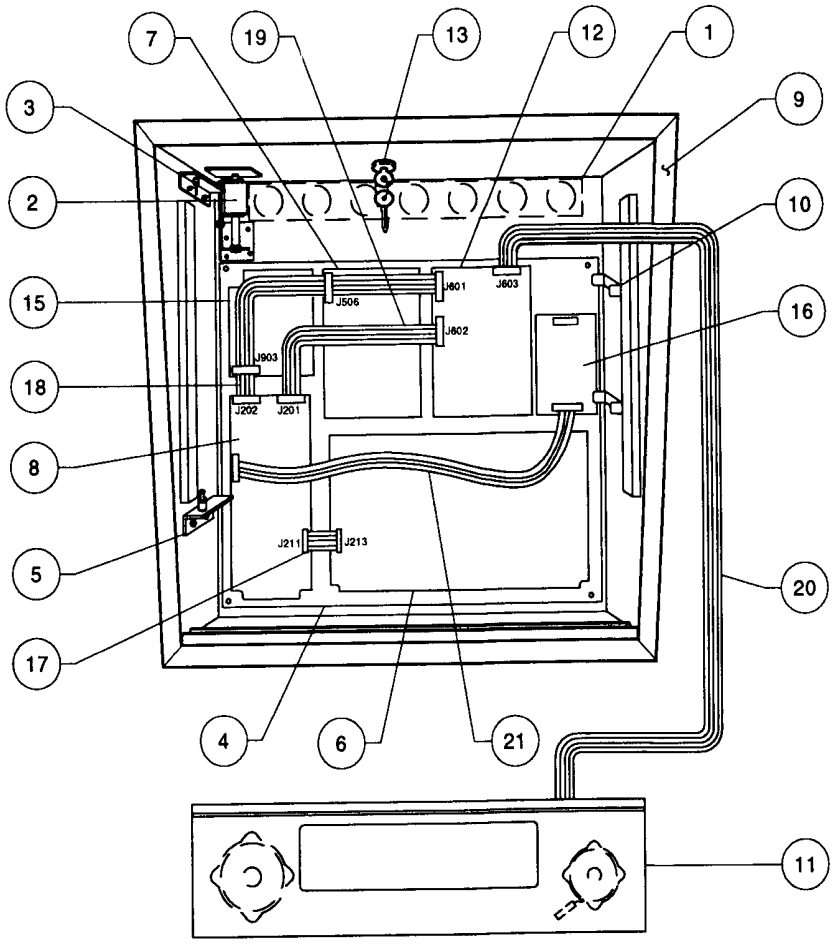
Regular, more extensive, playfield cleaning is recommended. However, avoid excessive use of water and caustic or abrasive cleaners because they tend to damage the playfield surface. Playfield wax (or any carnauba based wax), or polish may be used sparingly, to prevent a buildup on the playfield surface.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

NOTES

SECTION TWO

GAME PARTS INFORMATION

50024-BB
Backbox Assembly



Item	Part Number	Description
1	01-6645	Venting Screen
2	B-10686-1	Knocker Assembly
3	A-12497	Insert Bd.Hinge Assy., Upr.
4	A-14092-5	WPC Mounting Plate Assy.
5	A-12498	Insert Bd. Hinge Assy., Lwr.
6	A-12697-3	Power Driver Assembly
7	A-16917-50024	Sound Board Assembly
8	A-17651-50024	WPC Security CPU Board
9	A-17814-50024	Backbox, Screened
10	01-9047	Insert Stop Bracket
11	A-19056	Speaker/Display Assembly
12	A-14039.1	Dot Matrix Controller Board
13	A-13379	Lock & Plate Assembly
14	50024-IN	Insert Board
15	A-15472-1	Fliptronic II Board
16	A-16100-2	Aux. PCB Assembly

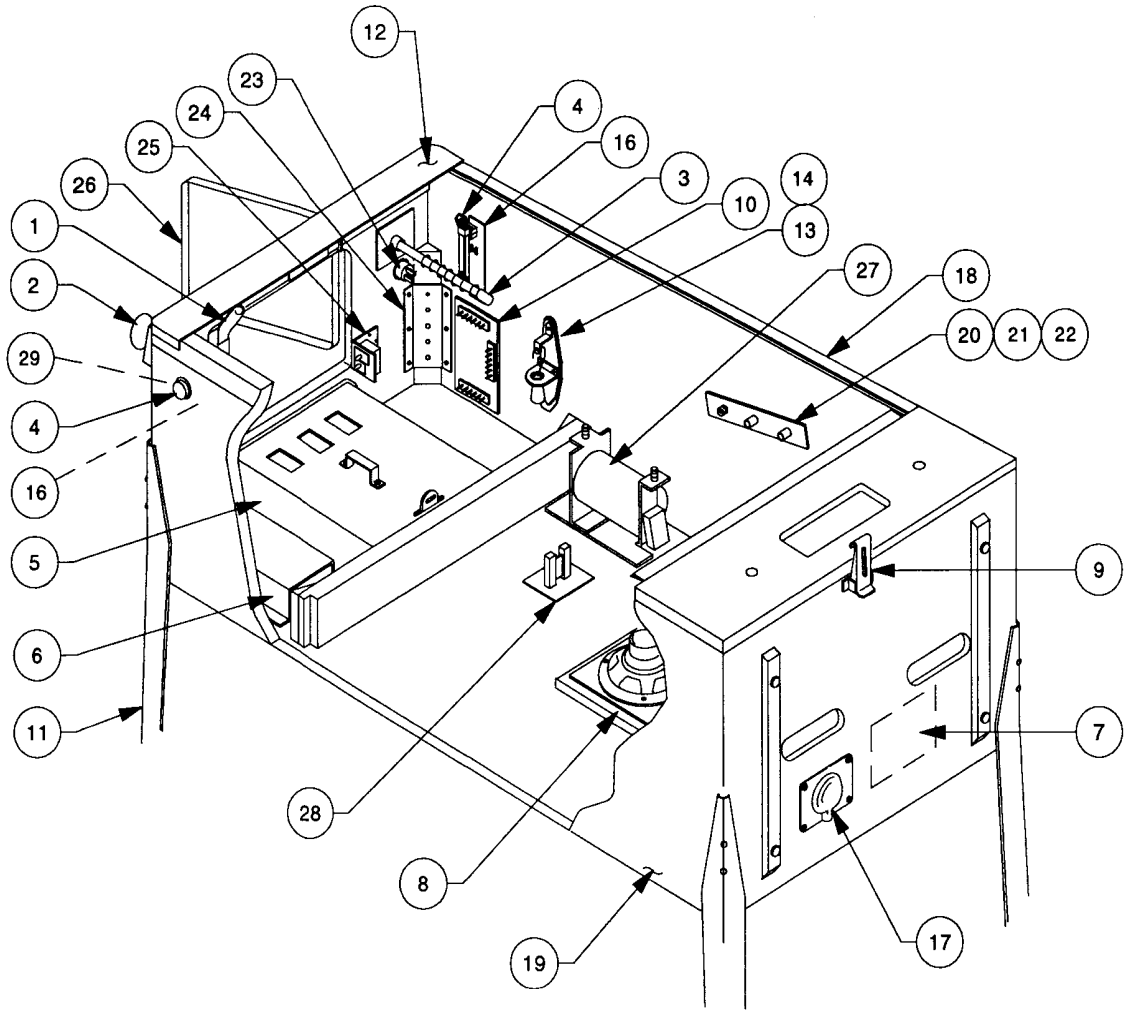
♦ Ribbon Cables

Item	Part Number	Description
17	5795-12653-03	Ribbon Cable, 3"
18	5795-13018-01	Ribbon Cable, 23.5"
19	5795-10938-15	Ribbon Cable, 15"
20	5795-12838-30	Ribbon Cable, 30"
21	5795-10938-32	Ribbon Cable, 32"

♦ Miscellaneous Parts

A-8552-50024	Tempered Backglass Assy.
03-8228-2	Glass Channel Top (1)
03-8228-3	Glass Channel Edge (2)
03-8229-1	Glass Lift Channel (1)
08-7456	Backbox Glass:27x18-7/8"
31-1357-50024	Screened Translight

50024-CAB
Cabinet Assembly



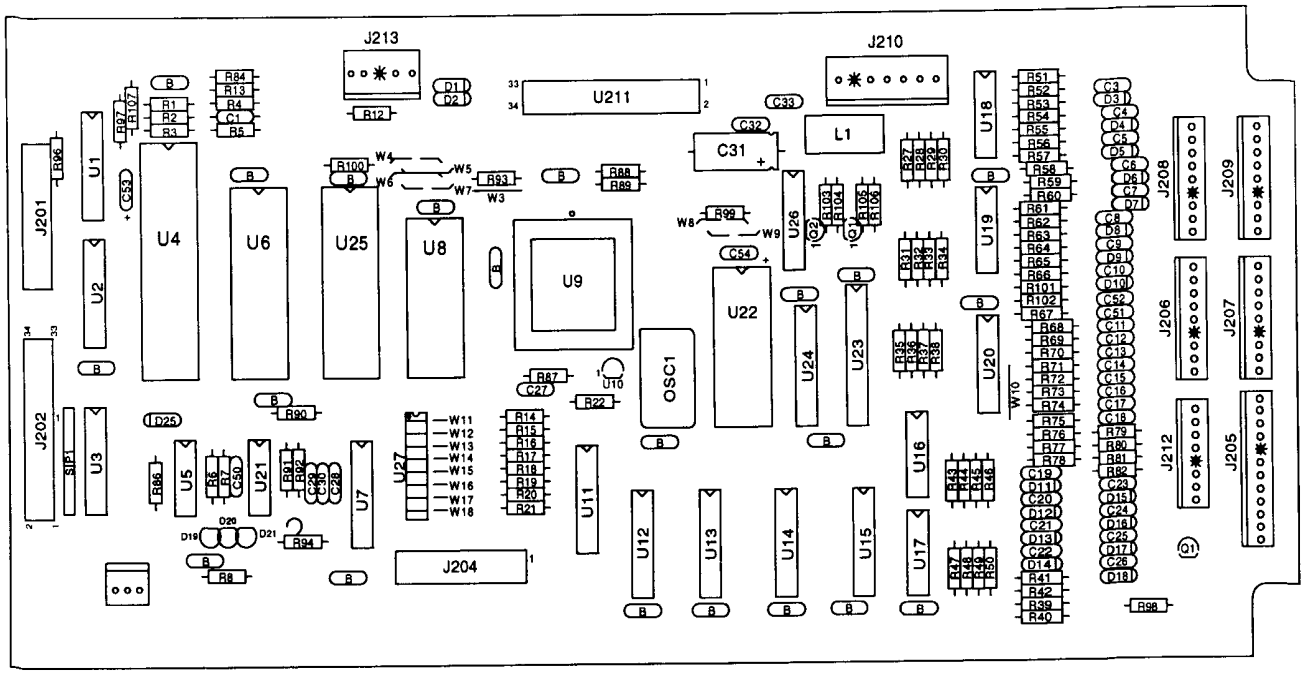
Item	Part Number	Description
1	A-16773-1	Lever Guide Assembly
2	B-12445-7	Ball Shooter Assy., White Spring
3	B-12445-4	Ball Shooter Assy., Green Spring
4	A-16883-6	Flipper Button, Yellow (2)
5	A-18531-1	4-Ball Cashbox Assembly
6	A-17540	Univ. Power Interface Assy.
7	5610-13953-00	WPC Transformer
8	5555-12929-00	Speaker, 4Ω, 6", 25w
9	20-9347	Toggle Latch
10	A-17051-1	Coin Door Interface Board
11	A-19514-5	Leg Assembly, Blue
12	A-16055	Front Molding Assembly
13	20-6502-A	Plum Bob
14	A-15361	Tilt Mechanism Assembly
15	*	Cordset
16	A-17316	Opto Flipper Assembly (2)
17	01-10714	Line Cord Cover
18	A-12359-3	Side Molding Assembly (2)
19	11-1212	Wood Cabinet
20	01-11408	Plate Spacer (2)
21	02-4329-2	Pivot Nut, 11/16" (4)
22	02-4352	Pivot Bushing (2)
23	20-9663-1	Push Button w/Sw., Start
24	01-11400	Leg Plate (4)
25	A-18249-1	Cable & Interlock Switch Assy.
26	09-61000-1	Coin Door-USA
27	A-19169	Shaker Motor Assembly
28	A-19720	High Current Driver Board
29	20-9663-9	Push Button w/Sw., Extra Ball

♦ Miscellaneous

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

* See Application Chart p.2-41.

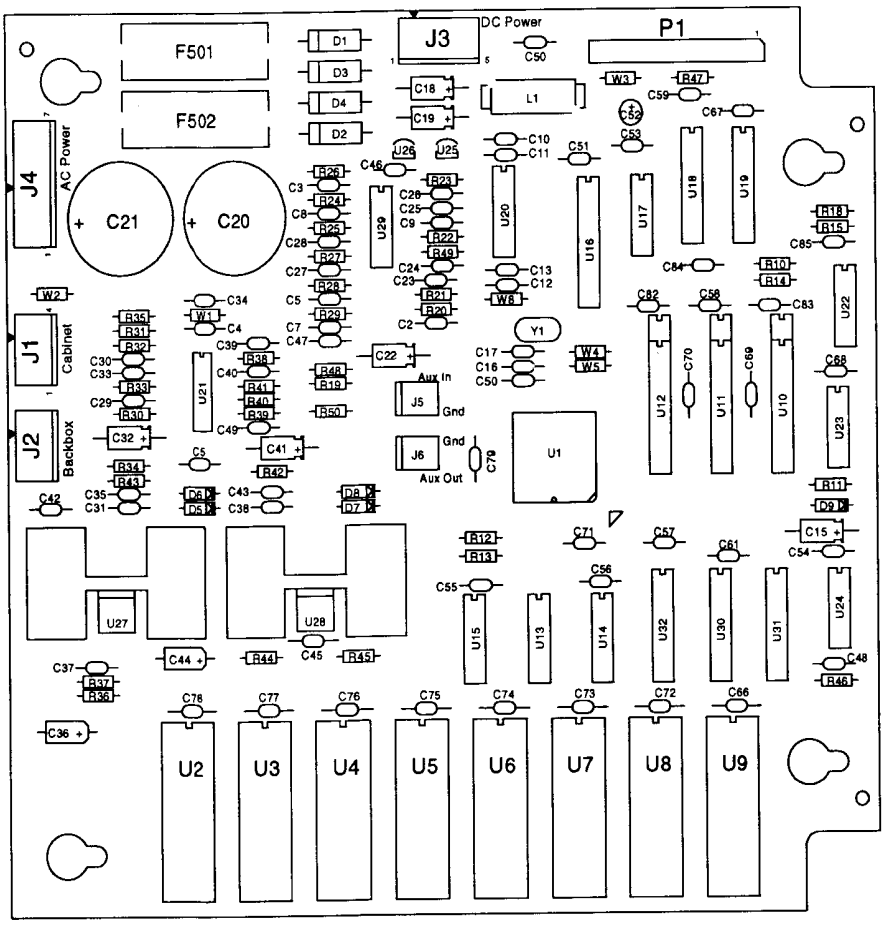
A-17651-50024
WPC CPU Security Board Assembly



Part Number	Designator	Description
5010-09034-00	R14-R22, R27-R42, R86, R94, R90, R98	Res., 10KΩ, ¼w, 5%
5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Res., 1.2KΩ, ¼w, 5%
5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84, R101, R102, R105, R106	Res., 1KΩ, ¼w, 5%
5010-09416-00	R5-R8, R12, R13, R87-R89, R99, R100	Res., 470Ω, ¼w, 5%
5010-09085-00	R1, R2, R4, R96, R97, R107	Res., 1.5KΩ, ¼w, 5%
5010-09534-00	W4, W7, W9	Res., 0Ω
5010-10989-00	R92	Res., 470KΩ, ¼w, 5%
5010-12104-00	R91	Res., 22MΩ, ¼w, 5%
5010-08991-00	R103, R104	Res., 4.7KΩ, ¼w, 5%
5019-09362-00	SIP1	SIP 4.7K, 9R, 10P, 5%
5040-08986-00	C31	Cap., 100M, 10v (±20%)
5043-08980-00	B	Cap., .01M, 50v (+80, -20%)
5043-09030-00	C27	Cap., .047M, 50v, (±20%)
5043-09065-00	C3,-C26, C51, C52	Cap., 470P, 50v, (±20%)
5043-09491-00	C29, C30	Cap., 22P, 1KV (±10%)
5043-09492-00	C28	Cap., 100P, 50v (±10%)
5041-09163-00	C53, C54	Cap., 2.2µF, 15v (20%) Ax.
5070-08919-00	D2-D18	Diode, 1N4148 150MA
5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.
5160-10269-00	Q1-Q3	Trans., 2N3904 NPN
5700-10389-00	U20	IC Socket 18-pin
5281-09308-00	U3	IC, 74LS245 TRNCV
5281-09486-00	U14, U24	IC, 74LS374 8 D F/F
5281-09851-00	U5	IC, 74LS14 SMT TRG
5281-09867-00	U1, U2, U7	IC, 74LS244 OCT BUF

Part Number	Designator	Description
5281-10182-00	U11-U13, U15	IC, 74LS240 / DRVR
5284-12651-00	U21	IC, 4548
5315-13924-00	U23	IC, 74HC4514 LTCH 1to16 Dec.
5281-09246-00	U26	IC, 74LS139 2 T 4 Decoder
5340-12558-00	U8	S/RAM 8Kx8 Low Power
5370-12558-00	U16-U19	IC, LM339 Quad Comp
5370-12687-00	U10	MC 34064
5521-10931-00	0SC1	8.00MHZ OSC 14PIN DIP
5520-12084-00	X1	Crystal 32.768 KHz
5551-09822-00	L1	Inductor, 4.7µH, 3.0A.
5671-13732-00	D19-D21	Display LED Red
5700-08985-00	U4	Socket IC 40P .6"
5700-12088-00	U6	Socket IC 32P .6"
5700-12424-00	U9	Socket 84 Pin PLCC
5700-10176-00	U22	Socket IC 28 P .6"
5791-10850-00	J201, J204	Connector, 26-pin Header Str
5791-14090-05	J213	Connector, 5-pin Header Str
5791-10862-07	J210	Connector, 7-pin Header Str
5791-13830-08	J212	Connector, 8-pin Header Str
5791-13830-09	J208, J209	Connector, 9-pin Header Str
5791-13830-11	J206, J207	Connector, 11-pin Header Str
5791-12516-00	J202, J211	34 Hen 2x17 Str
5048-11033-00	C50	Cap., .022 µF
5791-13830-12	J205	Cap., 12-pin Header Str
5043-09845-00	C32, C33	Cap., 1KP, 50v (±10%)
5645-09025-00	U27	Switch DIP 8 POS
5162-12422-00	U20	IC, ULN 2803A
A-5400-50024-1	U22	WPC PIC 16C57 Micro-C
A-5343-50024-1	U6	Game ROM Assembly
A-17643	-	Battery Holder PCB Assy.
5400-10320-00	U4	MC68B09E 2Mhz µP
5410-12426-00	U9	WPC ASIC-89
20-9665-1	-	PCB Standoffs
H-18258	-	WPC CPU Security Cable

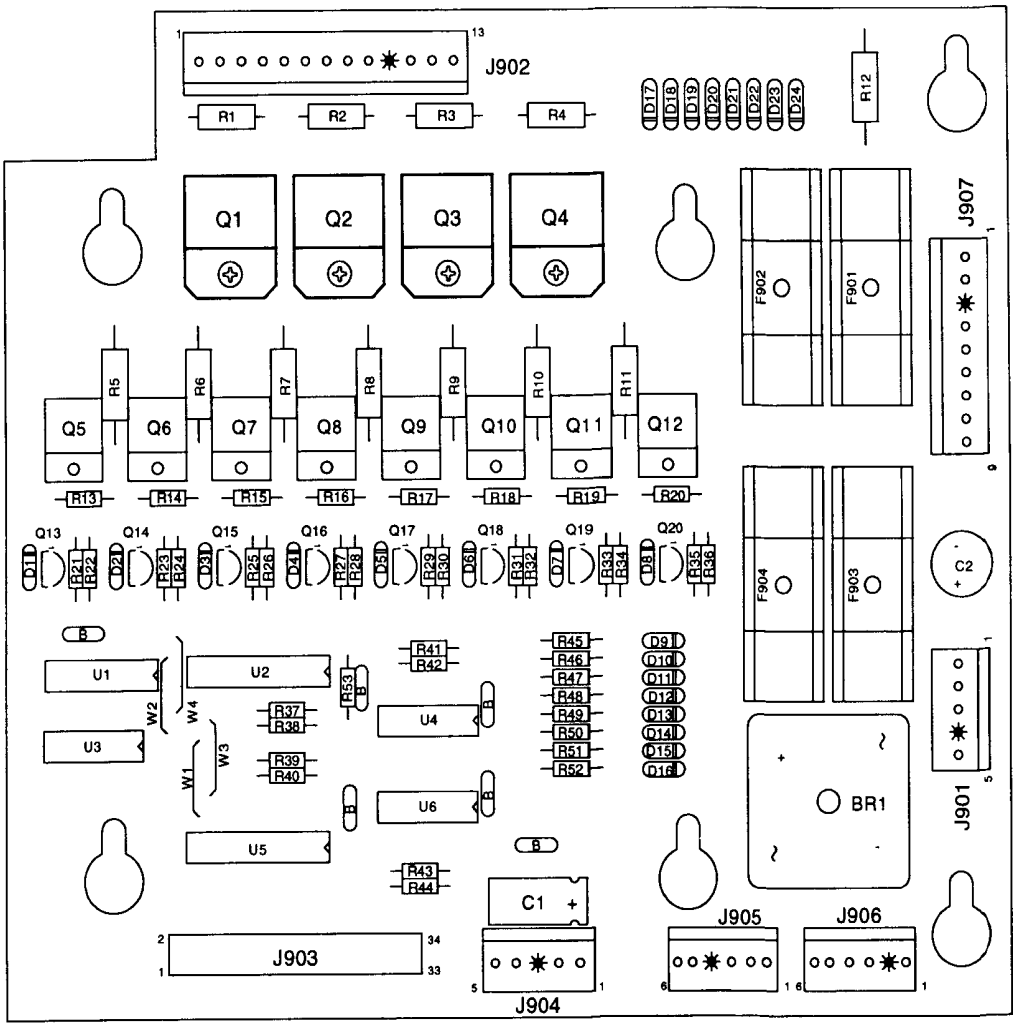
A-16917-50024
Sound Board Assembly



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

Part Number	Designator	Description
5070-09054-00	D5-D9	Diode Signal 1N4004
5250-13302-00	U25	78L05 Pos 5V reg TO-92
5250-13303-00	U26	79L05 Neg 5V Reg TO-92
5283-10551-00	U17	IC74F00 Fast Quad NAND
5311-10946-00	U22	IC74HC74 Dual D Flip Flop
5311-10947-00	U23	IC74HC125 Quad Tri-State Buffer
5311-10948-00	U15	IC74HC138 1 of 8 Decoder
5315-12009-00	U18, U19	IC74HCT374 Octal D Flip Flop
5311-12043-00	U13, U14	IC74HC174 Hex D Flip Flop
5311-12538-00	U24	IC74HC14 Hex Schmitt Inverter
5311-12287-00	U30-U32	IC74HC541 Octal Bus Driver
5340-13304-00	U10-U12	ICSRAM 2Kx8 35ns .300 DIP
5370-12730-00	U21, U29	ICTL084 Quad Op AMP
5370-13419-00	U27, U28	Audio Power Amp TDA2030AV
5371-13299-00	U20	IC DAC AD-1851 16Bit
5520-13301-00	Y1	Crystal 10MHz Parallel resonant
5551-09822-00	L1	Inductor, 4.7µH, 3Amp.
5700-12047-00	U16	IC, Socket 24-Pin .300 DIP
5700-12088-00	U2-U9	IC, Socket 32-Pin .600 DIP
5705-12638-00	U27, U28	Heatsink 5298-B
5733-12060-01	F501, F502	MT3AG PCMounted Fuse Holder
5791-10862-04	J1, J2	Connector, 4-pin Header STR .156
5791-10862-05	J3	Connector, 5-pin Header STR .156
5791-10862-07	J4	Connector, 7-pin Header STR .156
5791-12516-00	P1	Connector, 34 Hen 2x17 STR .100
A-17002	U16	PAL Sub-Assembly
A-5343-50024-S2	U2	ROM Sub-Assembly
A-5343-50024-S3	U3	ROM Sub-Assembly
A-5343-50024-S4	U4	ROM Sub-Assembly
A-5343-50024-S5	U5	ROM Sub-Assembly
A-5343-50024-S6	U6	ROM Sub-Assembly
A-5343-50024-S7	U7	ROM Sub-Assembly
A-5343-50024-S8	U8	ROM Sub-Assembly
A-5343-50024-S9	U9	ROM Sub-Assembly
5731-10356-00	F501, F502	Fuse, 3Amp, 250v, Slow Blow

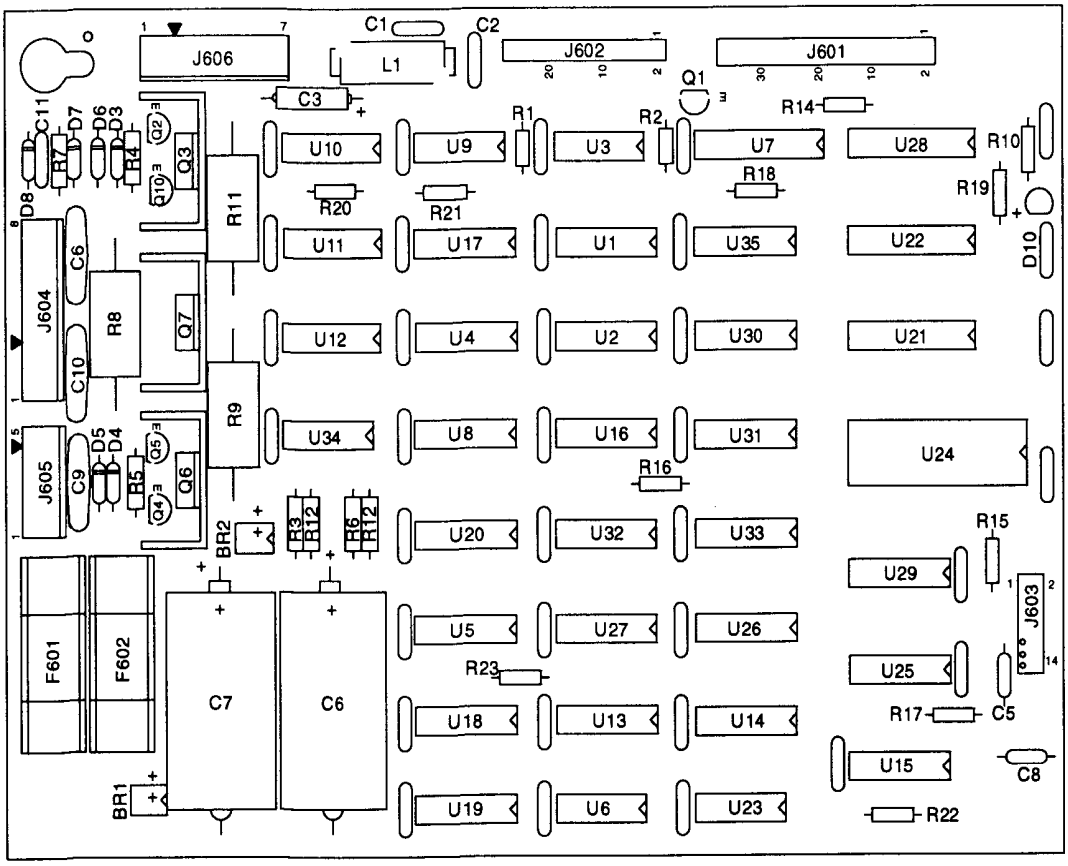
A-15472-1
Fliptronic II Board Assembly



Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink
20-9684	Q5-Q12	Fastener Snap In
4006-10003-08	Q1-Q4	Mach. screw, 6-32
4406-01128-00	Q1-Q4	Nut 6-32 KEPS
5010-09034-00	R37-R44, R53	Res., 10KΩ, ¼w, 5%
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45-R52	Res., 1KΩ, ¼w, 5%
5010-09361-00	R1-R4	Res., 220Ω, ½w, 5%
5010-09416-00	R21, R23, R25, R27, R29, R31, R33, R35	Res., 470Ω, ¼w, 5%
5010-09534-00	W3, W4	Res., 0Ω
5010-10171-00	R13, R20	Res., 56Ω, ¼w, 5%
5011-12956-00	R5, R12	Res., 2.7KΩ, 1w, 5%
5040-08986-00	C1	Cap., 100M, 10v
5040-09537-00	C2	Cap., 100µF, 100v
5043-08980-00	B	Cap., .01µF, 50v

Part Number	Designator	Description
5070-09054-00	D1-D24	Diode, 1N4004
5100-09690-00	BR1	Bridge Rectifier
5162-12635-00	Q5-Q12	Trans., TIP102 NPN
5190-09016-00	Q13, Q20	Trans., 2N4403 PNP
5191-12179-00	Q1-Q4	Trans., TIP36C PNP
5315-12009-00	U2	IC, 74HCT374
5315-12031-00	U5	IC, 74HCT244
5315-12812-00	U1	IC, 74HCT138
5315-12951-00	U3	IC, 74HCT00
5370-12272-00	U4, U6	IC, LM339 Quad Comp
5731-10356-00	F901-F904	Fuse S-B, 3A., 250v
5733-12060-01		Fuse Holder (F901-F904)
5791-10862-05	J901, J904	Connector, 5-pin Header
5791-10862-09	J907	Connector, 9-pin Header
5791-10862-13	J902	Connector, 13-pin Header
5791-13830-06	J905, J906	Connector, Str Sq. Pin Hdr.
5791-12516-00	J903	34 Hen 2 x 17 STR

A-14039.1
Dot Matrix Assembly



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

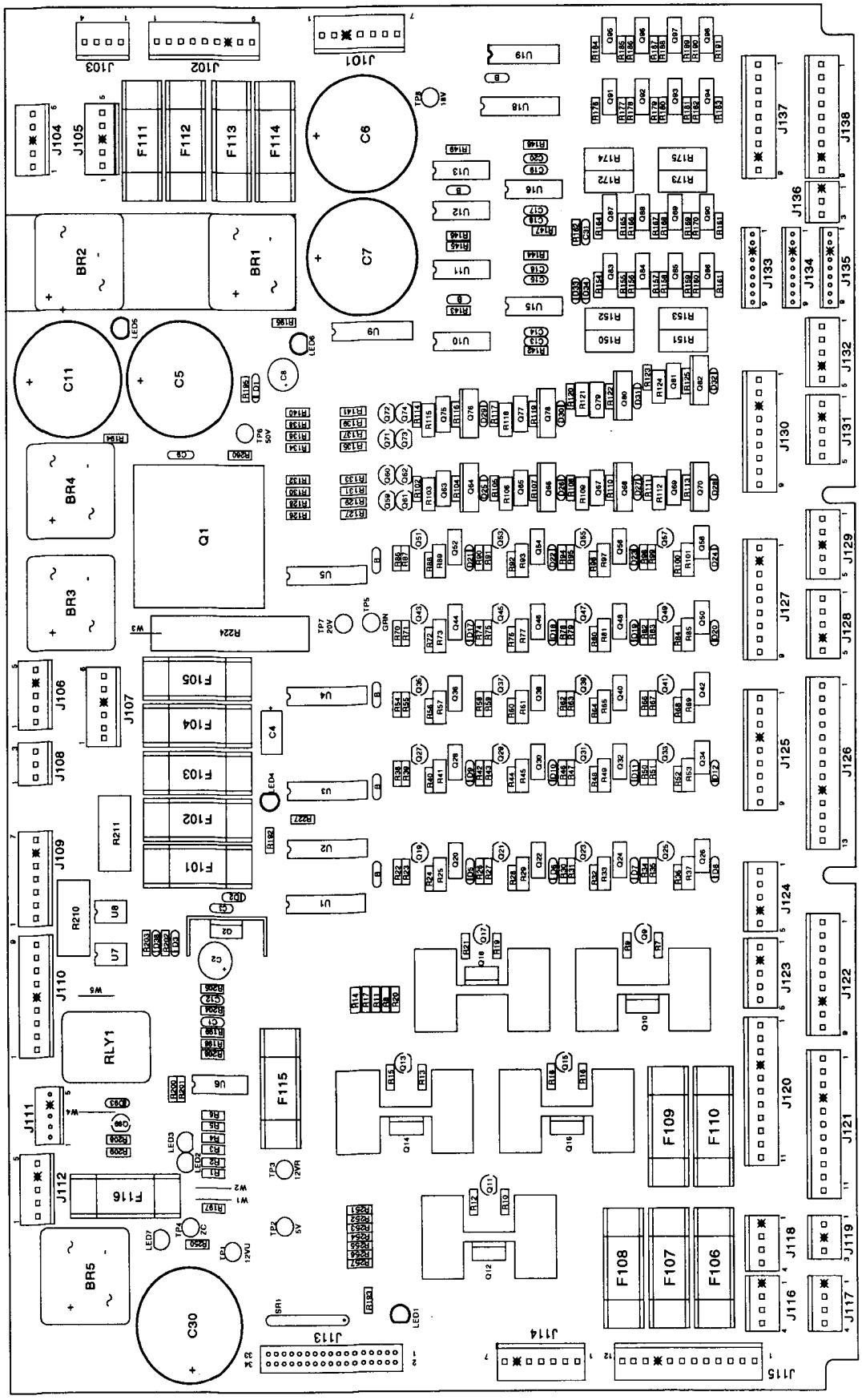
Part Number	Designator	Description
5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
5311-10947-00	U9	IC, 74HC125
5311-10951-00	U10, U11	IC, 74HC161
5311-10977-00	U6	IC, 74HC04
5311-12817-00	U29	IC, 74HC165
5311-12819-00	U21	IC, 74HC688
5311-12820-00	U23	IC, 74HC27
5311-12822-00	U13-U15	IC, 74HC193
5315-12009-00	U22	IC, 74HCT374
5315-12812-00	U1, U2, U30, U12	IC, 74HCT138
5281-09308-00	U28	IC, 74HCT245
5315-12815-00	U8, U34	IC, 74HCT08
5315-12816-00	U19	IC, 74HCT32
5315-12821-00	U7	IC 74HCT240
5340-12278-00	U24	S/RAM 2064 150NS
5551-09822-00	L1	Ind. 4.7µH, 3A.
5671-13732-00	D10	Display LED Red
5705-09199-00	Q3, Q6, Q7	Heatsink, 6030B
5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
5733-12060-01		Fuse Holder (F601, F602)
5791-10850-00	J602	Connector, 26-pin Header
5791-10862-05	J605	Connector, 5-pin Header
5791-10862-07	J606	Connector, 7-pin Header
5791-10862-08	J604	Connector, 8-pin Header
5791-12516-00	J601	34 Hen 17x2 STR
5791-12827-00	J603	14 Hen 7x2 STR

A-12697-3
WPC Power Driver Assembly

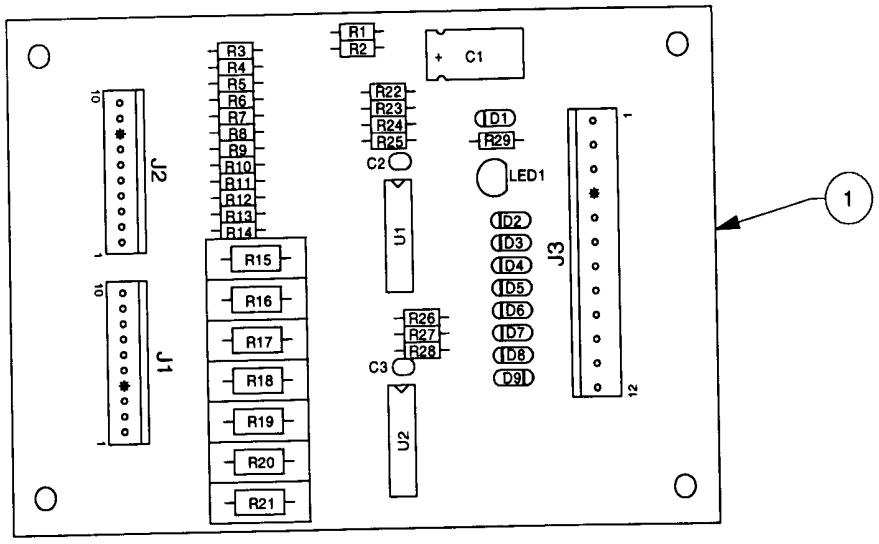
Part Number	Designator	Description
5010-08981-00	R260	Res., 10KΩ, ½w, 5%
5010-08991-00	R9, R12, R15, R18, R21, R23, R27, R31, R35, R39, R43, R47, R51, R55, R59, R63, R67, R71, R75, R79, R83, R87, R91, R95, R99, R126, R128, R130, R132, R134, R136, R138, R140, R227	Res., 4.7KΩ, ¼w, 5%
5010-08992-00	R8,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

Part Number	Designator	Description
5040-12313-00	C5-C7, C11, C30	Cap., 15KM, 25v (±20%)
5043-08980-00	B-BYPASS	Cap., .01M, 50v (+80, -20%)
5043-08996-00	C13-C20, C31	Cap., .1M, 50v (±20%)
5043-09845-00	C1, C12	Cap., 1KP, 50v (±20%) Axial
5048-10994-00	C3	Cap., .33M, 50v (±20%) Axial
5070-08919-00	D33, D34	Diode 1N4148, 150MA.
5070-09054-00	D1-D3, D5-D12, D17-D32, D38	Diode 1N4004, 1.0A.
5100-09690-00	BR1-BR5	Bridge, 35A., Rect, 200v
5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac BT138E
5162-12422-00	U19	IC ULN 2803 OC-DRL
5162-12635-00	Q20, Q22, Q24, Q26, Q28, Q30, Q32, Q34, Q36, Q38, Q40, Q42, Q44, Q46, Q48, Q50, Q52, Q54, Q56, Q58, Q63, Q65, Q67, Q69, Q75, Q77, Q79, Q81, Q83-Q90	Transistor, TIP 102
5194-09055-00	Q9, Q11, Q13, Q15, Q17, Q19, Q21, Q23, Q25, Q27, Q29, Q31, Q33, Q35, Q37, Q39, Q41, Q43, Q45, Q47, Q49, Q51, Q53, Q55, Q57, Q59-Q62, Q71-Q74	Transistor, 2N5401 PNP
5191-12179-00	Q64, Q66, Q68, Q70, Q76, Q78, Q80, Q82	Transistor, TIP36C PNP
5192-12428-00	Q91-Q98	Transistor, TIP 107
5250-12634-00	Q1	Reg LM 323 5v
5281-09486-00	U1-U5, U18	IC, 74LS374 8D F/F
5281-09487-00	U10-U13	IC, 74LS74 Dual D F/F
5281-10182-00	U9	IC, 74LS240 L/Drvr.
5370-12272-00	U6, U15, U16	IC, LM339 Quad Comp.
5460-12423-00	Q2	IC, LM7812
5671-13732-00	LED1, LED4-LED7	Display LED Red
5701-09652-00	Q1	Thermal Pad
5705-09199-00	Q2	Heatsink 6030B
5705-12637-00	Q1	Heatsink 5054
5705-12638-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
5733-10450-00	F101-F116	Fuse Holder PC MT3AG
5791-10862-03	J108, J119, J136	Connector, 3-pin Header .156
5791-10862-04	J103, J116-J118	Connector, 4-pin Header .156
5791-10862-05	J104-J106, J112, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header .156
5791-10862-06	J107	Connector, 6-pin Header .156
5791-10862-07	J101, J109, J114	Connector, 7-pin Header .156
5791-10862-09	J102, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header .156
5791-10862-11	J120, J121	Connector, 11-pin Header .156
5791-10862-12	J115	Connector, 12-pin Header .156
5791-10862-13	J126	Connector, 13-pin Header .156
5791-13830-05	J111	Connector, 5-pin Header
5791-13830-09	J133-J135	Connector, 9-pin Header
5791-12516-00	J113	34 Hen 2x17 STR
5824-09248-00	TP1-TP8	Test Point #1502-1
5041-09163-00	C9	Cap., 2.2MF Tant
5730-09071-00	F114	Fuse, 8A, 32v
5731-09432-00	F112	Fuse, S-B, 7A., 250v
5731-09651-00	F106-F111, F113	Fuse, S-B, 5A., 250v
5731-10356-00	F101-F105, F116	Fuse, S-B, 3A., 250v
5730-09797-00	F115	Fuse, S-B, 3/4A., 250v
5705-12698-00		Heatsink #62365

A-12697-3
WPC Power Driver Assembly

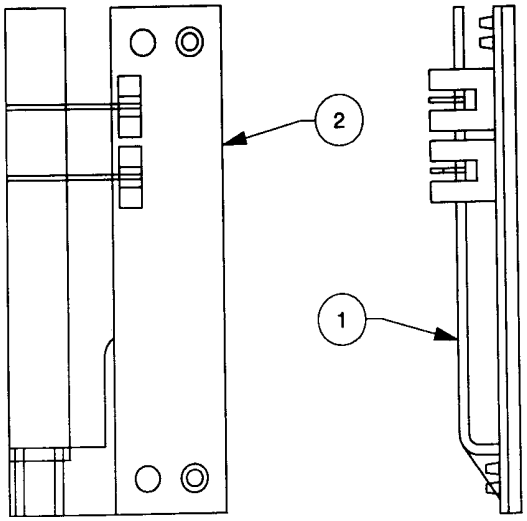


A-15595
7-Switch Opto PCB w/Bracket Assembly



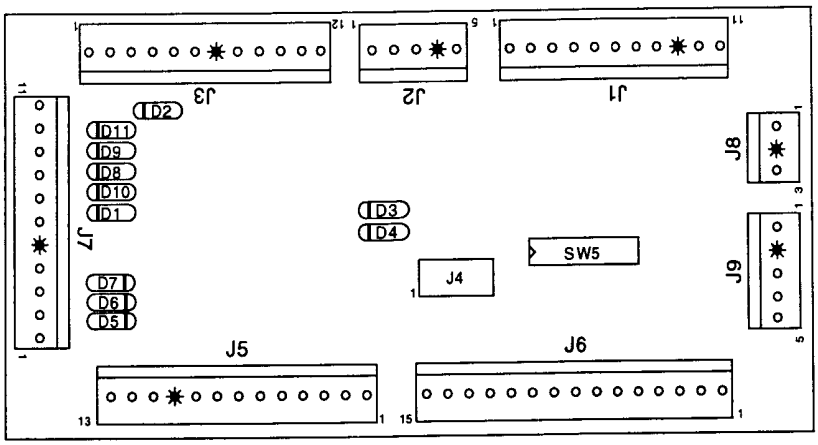
Item	Part Number	Designator	Description
1	A-15576	-	7-Switch Opto PCB Assy.
	5040-12298-00	C1	Cap., 100µfd, 40v, (±50%)
	5043-08980-00	C2, C3	Cap., .01M, 50v
	5671-09019-00	LED1	Display LED Red
	5370-12272-00	U1, U2	IC, LM339 Quad.
	5070-09054-00	D1 - D9	Diode, 1N4004, 1.0A.
	5010-12928-00	R15-R21	Res., 270Ω, 2w, 5%
	5010-09999-00	R1-R14	Res., 2KΩ, 1/4w, 5%
	5010-10631-00	R29	Res., 1.2KΩ, 1/4w, 5%
	5010-09162-00	R23, R25, R26	Res., 100KΩ, 1/4w, 5%
	5010-08774-00	R22, R24	Res., 22KΩ, 1/4w, 5%
	5010-09034-00	R28	Res., 10KΩ, 1/4w, 5%
	5791-10862-12	J3	Connector, 12-pin Header
	5791-12462-10	J1, J2	Connector, 10-pin Header
2	01-10756	-	PCB Mounting Bracket
3	07-6688-18N	-	Rivet, 1/8 x3/16"

A-17316
Flipper Opto PCB Assembly



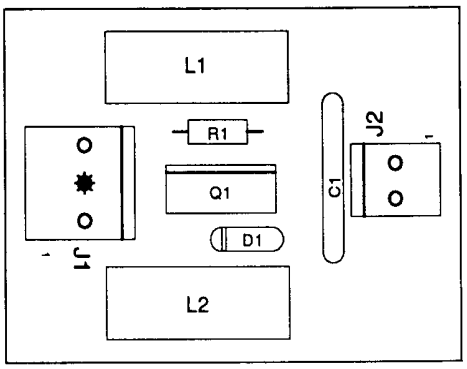
Item	Part Number	Description
1	03-9001	Interrupter Flip-Opto
2	A-16384	Flipper Opto Sw. Assy.
	5010-08930-00	Res., 470Ω, ½w, 5%
	5490-12451-00	Opto Inter Lg. 10mA.
	5791-12462-07	Connector, 7-pin Header

A-17051-1
Coin Door Interface PCB Assembly



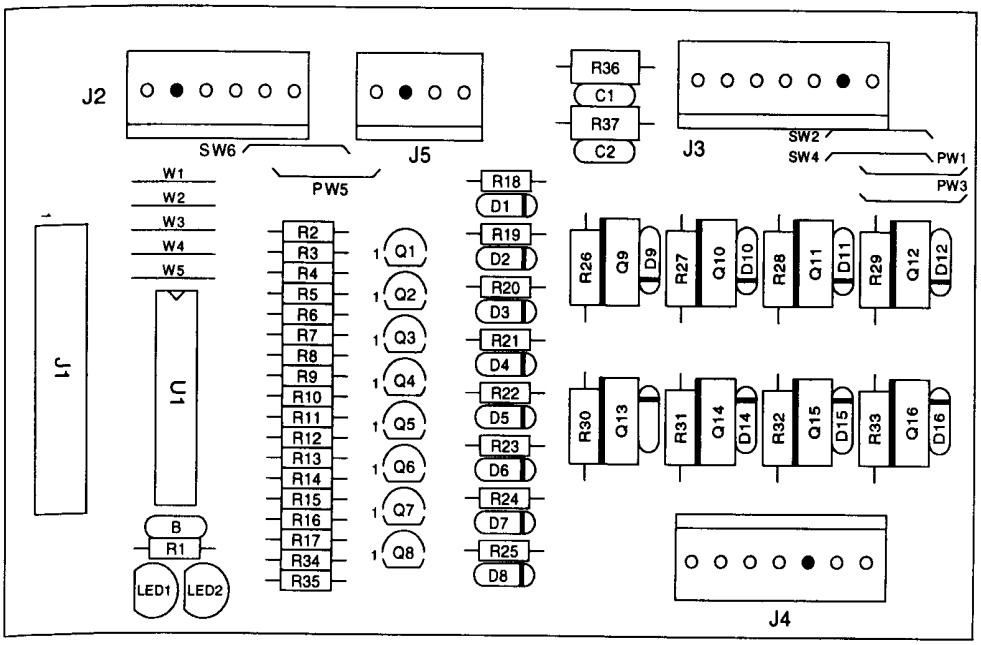
Part Number	Designator	Description
5791-10862-03	J8	Connector, 3-pin Header Str Sq.
5791-10862-05	J2, J9	Connector, 5-pin Header Str Sq.
5791-10862-11	J1, J7	Connector, 11-pin Header Str Sq.
5791-10862-12	J3	Connector, 12-pin Header Str Sq.
5791-10862-13	J5	Connector, 13-pin Header Str Sq.
5791-10862-15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

A-15340
Motor EMI w/Brake Assembly



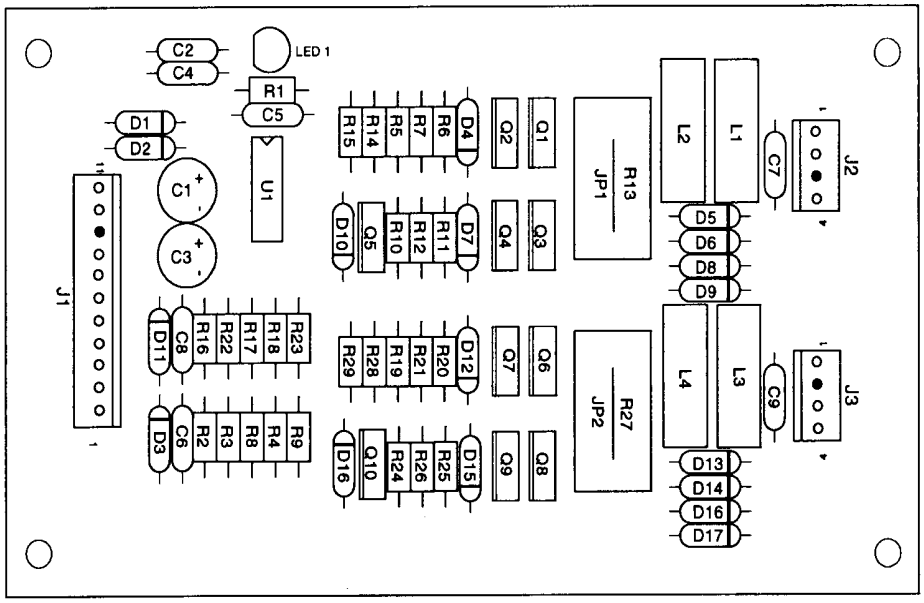
Part Number	Designator	Description
5551-09822-00	L1, L2	Inductor, 4.7MH3AMP
5791-12273-03	J1	Connector, 3-pin Header Str Sq.
5791-12273-02	J2	Connector, 2-pin Header Str Sq.
5070-09054-00	D1	Diode, 1N4004 1.0A.
5010-08998-00	R1	Resistor, 2.2KΩ, 1/4w, 5%
5162-12635-00	Q1	Trans., TIP 102

A-16100-2
Auxiliary Driver PCB Assembly



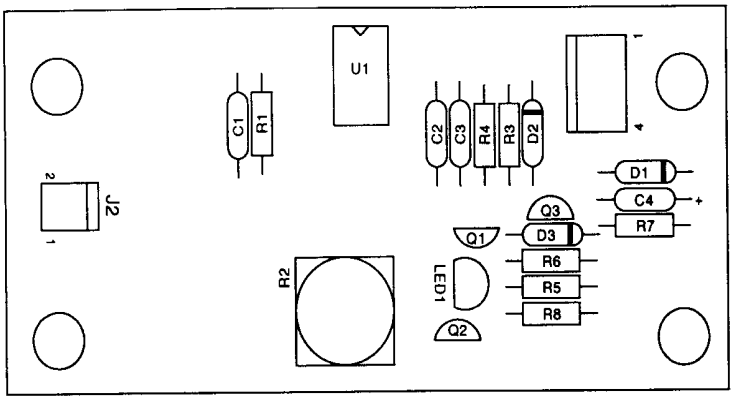
Part Number	Designator	Description
5317-13400-00	U1	I.C. 74ALS576
5190-09016-00	Q1-Q8	Trans. 2N4403 PNP
5162-12635-00	Q9-Q16	Trans. TIP102 NPN
5070-09054-00	D1-D16	Diode 1N4004
5010-08991-00	R1, R2, R4, R6, R8, R10, R12, R14, R16	Resistor, 4.7KΩ, 1/4w, 5%
5010-09416-00	R3, R5, R7, R9, R11, R13, R15, R17	Resistor, 470Ω, 1/4w, 5%
5043-08980-00	B	Capacitor, .01μFd, 50v (+80,-20%)
5010-10171-00	R18-R25	Resistor, 56Ω, 1/4w, 5%
5011-12956-00	R26-R33	Resistor, 2.7KΩ, 1w, 5%
5010-09314-00	R35	Resistor, 1.2KΩ, 1/4w, 5%
5010-09224-00	R34	Resistor, 270Ω, 1/4w, 5%
5671-13732-00	LED1, LED2	Display Red LED
5010-08930-00	R37	Resistor, 470Ω, 1/2w, 5%
5043-09065-00	C2	Capacitor, 470PF, 50v (±20%)
5010-09534-00	W4, PW1, PW3, PW5	Resistor, 0Ω
5791-10850-00	J1	Connector, 26-pin Header
5791-10862-06	J2	Connector, 6-pin Header
5791-10862-07	J3, J4	Connector, 7-pin Header
5791-10862-04	J5	Connector, 4-pin Header

A-19242-1
Dual H-Drive Motor Controller w/Bracket



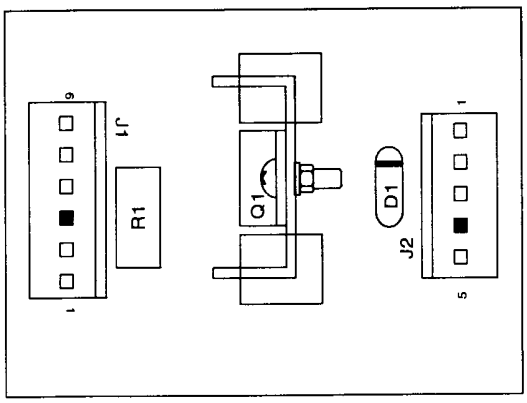
Item	Part Number	Designator	Description
1	01-10756	-	Bracket
2	07-6688-18N	-	Rivet, 3/16 X 1/8"
3	A-19159-1	-	Dual H-Driver PCB Assy.
	5040-10974-00	C1, C3	Cap., 100µFd, 35v, Rad.
	5043-08980-00	C2, C4-C9	Cap., 0.01µFd, 50v, Ax.
	5010-09999-00	R1	Res., 2KΩ, ¼w, 5%
	5010-08991-00	R2, R3, R5, R8, R10, R16, R17, R19, R22, R24	Res., 4.7KΩ, ¼w, 5%
	5010-09034-00	R4, R6, R7, R9, R11, R12, R18, R20, R21, R23, R25, R26	Res., 10KΩ, ¼w, 5%
	5012-10024-00	R13, R27	Res., 5.6Ω, 5w, 10% PWR
	5070-09054-00	D1-D18	Diode, 1N4004, 1.0A.
	5162-12635-00	Q1, Q3, Q6, Q8	Trans., TIP102, NPN
	5192-12428-00	Q2, Q4, Q7, Q9	Trans., TIP107, PNP
	5370-12272-00	U1	IC, LM339, Quad
	5671-13732-00	LED1	LED Display RED
	5551-09822-00	L1-L4	Inductor, 4.7µH, 3A
	5791-12273-11	J1	Connector, 11-pin Header
	5791-12273-04	J2, J3	Connector, 4-pin Header

A-18543-2
Generic Eddy Sensor PCBAssembly



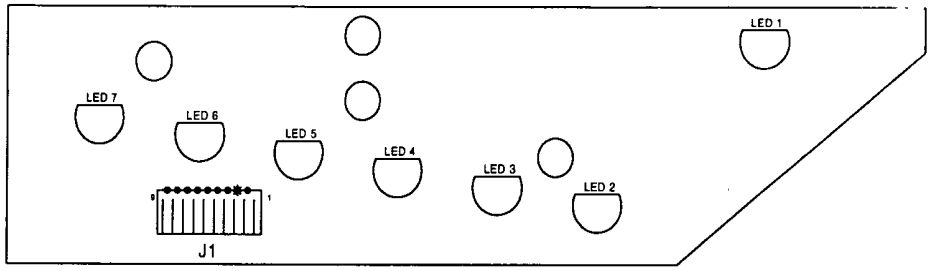
Part Number	Designator	Description
5370-13452-00	U1	I.C. Proximity Sensor
5190-10270-00	Q2	Trans. 2N3906 PNP
5160-10269-00	Q1, Q3	Trans. 2N3904 NPN
5010-08992-00	R4	Resistor, 560Ω, 1/4w, 5%
5010-09807-00	R3	Resistor, 120Ω, 1/4w, 5%
5010-09034-00	R7	Resistor, 10KΩ, 1/4w, 5%
5010-09999-00	R1, R5, R6, R8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

A-19720
High Current Driver PCB Assembly



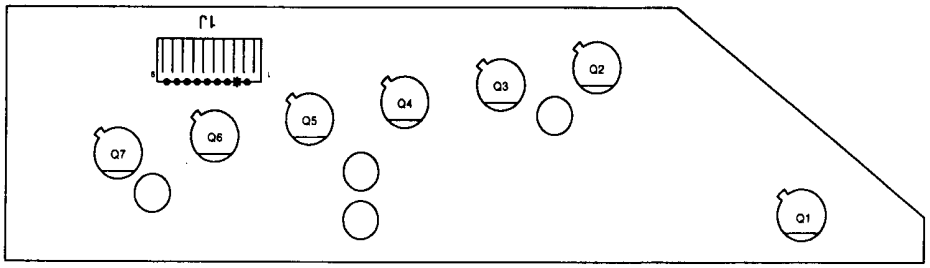
Part Number	Designator	Description
4404-01119-00	-	Nut 4-40 KEPS
4004-01005-06	-	Mach. Screw, 4-40 x 3/8"
5705-09199-00	-	Heatsink
5010-09361-00	R1	Resistor, 220Ω, 1/2w, 5%
5070-09054-00	D1	Diode 1N4004
5191-12179-00	Q1	Trans. TIP36C PNP
5791-10862-05	J2	Connector, 5-pin Header
5791-10862-06	J1	Connector, 6-pin Header

A-18617
Trough 7 IRED PCB Assembly



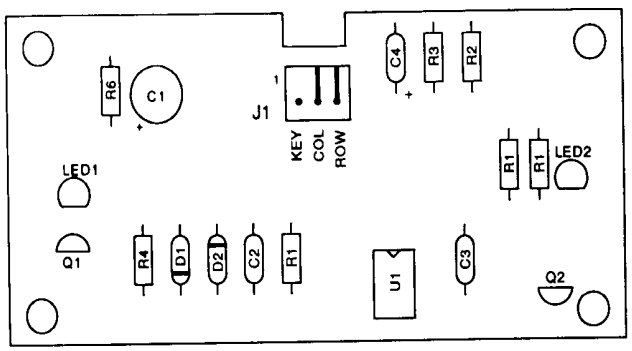
Part Number	Designator	Description
5671-12731-00	LED1 - LED7	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-18618
Trough 7 IR TSTR PCB Assembly



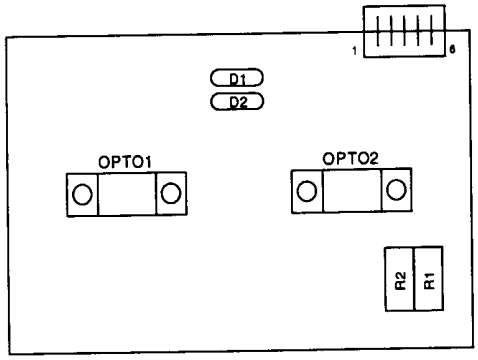
Part Number	Designator	Description
5163-14114-00	Q1 - Q7	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-19064
Wig-Wag Board Assembly



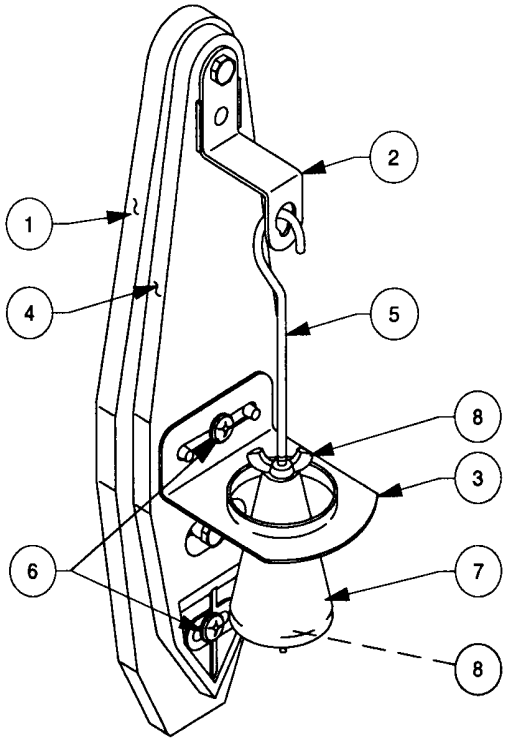
Part Number	Designator	Description
5010-08991-00	R4, R5	Res., 4.7KΩ, 5%, 1/4w
5010-09034-00	R3	Res., 10KΩ, 5%, 1/4w
5010-08846-00	R2	Res., 220KΩ, 5%, 1/4w
5010-09999-00	R1	Res., 2KΩ, 5%, 1/4w
5010-09358-00	R6, R7	Res., 1KΩ, 1/4w, 5%
5040-12294-00	C4	Cap., 2.2µF, 50v(±20%) Axial
5040-09421-00	C1	Cap., 100µF, 50v(+50, -20%)Rad.
5043-08980-00	C3	Cap., 0.01m, 50v(+80, -20%) Ax.
5043-08996-00	C2	Cap., 0.1m, 50v(±20%)Axial
5070-09054-00	D1, D2	Diode 1N4004, 1.0A.
5160-10269-00	Q1	Trans., 2N3904 NPN
5190-10270-00	Q2	Trans., 2N3906 PNP
5431-13064-00	U1	I.C. Timer 1m555
5791-12622-03	J1	Connector, 3-pin Header
03-9290	LED1-LED2	Spacers
5671-13732-00	LED1-LED2	Display LED Red

A-19359
Opto Blade Interrupter Board Assembly



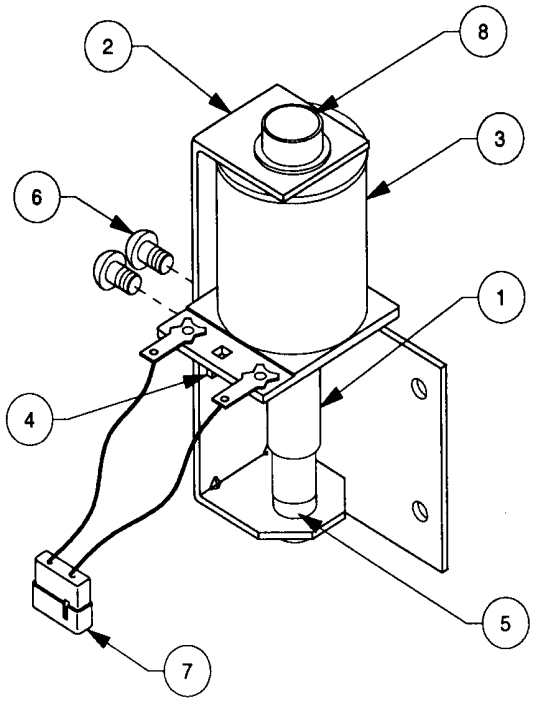
Part Number	Designator	Description
5791-12622-06	J1	Connector, 6-pin Header
5010-08930-00	R1, R2	Res., 470Ω, 5%, 1/2w
5070-09054-00	D1, D2	Diode 1N4004, 1A
5490-13341-00	OPTO1, OPTO2	Opto Integrated w/Tab, 10mA

A-15361
Tilt Mechanism Assembly



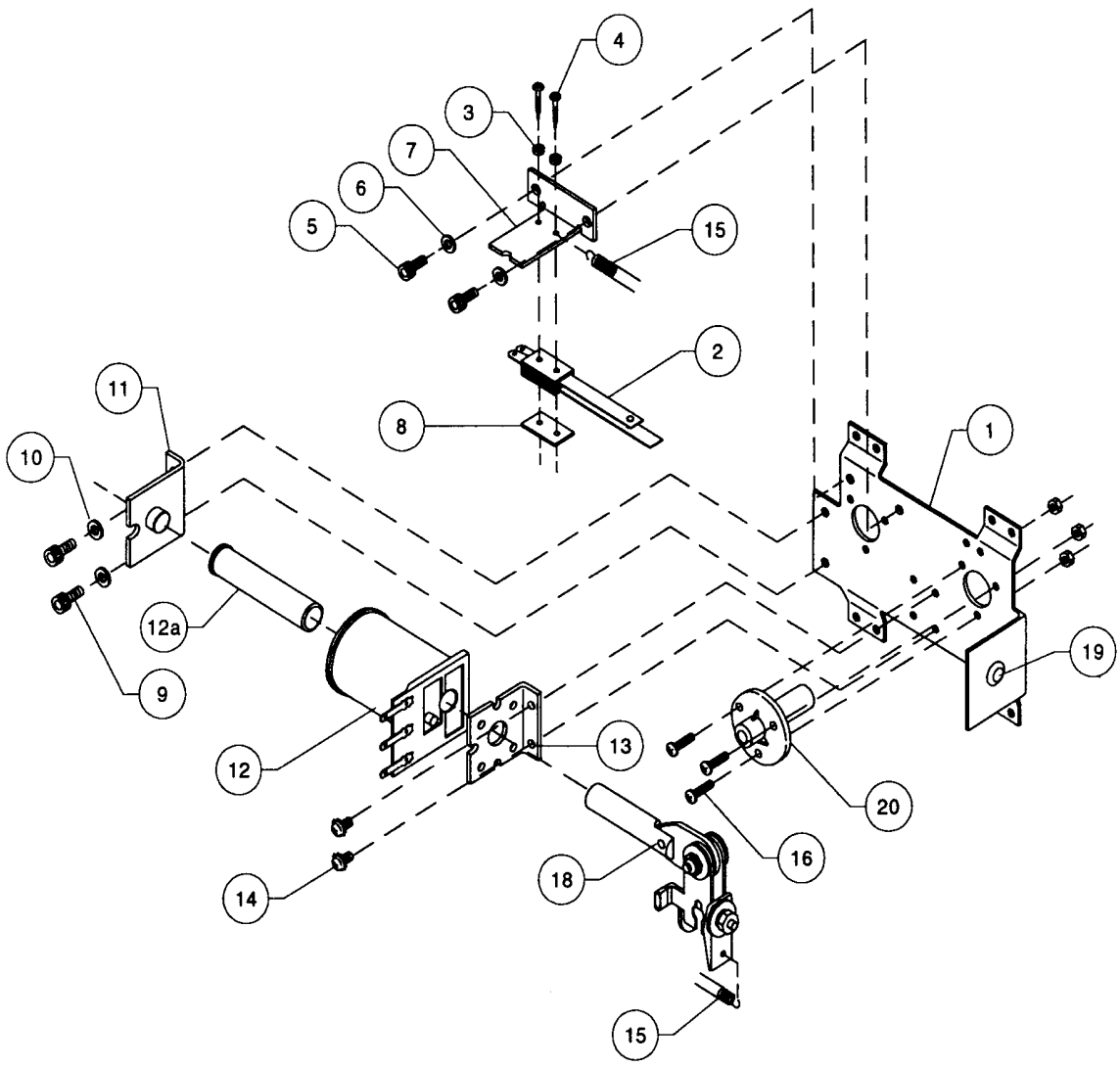
Item	Part Number	Description
1	A-15360	Mount Plate, Tilt Mech.
2	01-3444	Bracket, Tilt Upper
3	01-3445	Bracket, Tilt Lower
4	03-8668	Pendulum, Tilt Mech.
5	12-6231	Wire, Plum Bob
6	4006-01113-06	Mach. Screw, 6-32 x 3/8"
Associated Parts:		
7	20-6502-A	Plumb Bob
8	4406-01120-00	Wing Nut (2)

B-10686-1
Knocker Assembly



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

A-15849-L-1
Flipper Assembly



Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, Left
2	SW-1A-194	Switch Assembly
3	4701-00002-00	Lockwasher, #6 Split
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"
6	4701-00003-00	Lockwasher #8 Split
7	01-9375	Switch Mounting Bracket
8	20-6516	Speednut, Tinnerman
9	4010-01066-06	Cap Screw, 10-32 x 3/8"
10	4701-00004-00	Lockwasher #10 Split
11	A-12390	Flipper Stop Assembly
12	FL-11753	Flipper Coil, Yellow
a)	03-7066-5	Coil Tubing
13	01-7695	Solenoid Bracket
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"
15	10-364	Spring
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"
17	4406-01117-00	Nut, 6-32 Hex

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

Associated Parts:
(Not Shown)

21	23-6519-4	Flipper Rubber Ring, Red
22	20-9250-6	Flipper & Shaft

A-15849-L-3
Flipper Assembly

(Parts listed replace same items of **A-15849-L-1**)

Item	Part Number	Description
12	FL-11722	Flipper Coil, Green
Associated Parts:		
21	23-6553-4	Small Flipper Rubber Ring, Red
22	20-9264-6	Small Flipper & Shaft

A-15849-L-4
Flipper Assembly

(Parts listed replace same items of **A-15849-L-1**)

Item	Part Number	Description
12	FL-15411	Flipper Coil, Orange

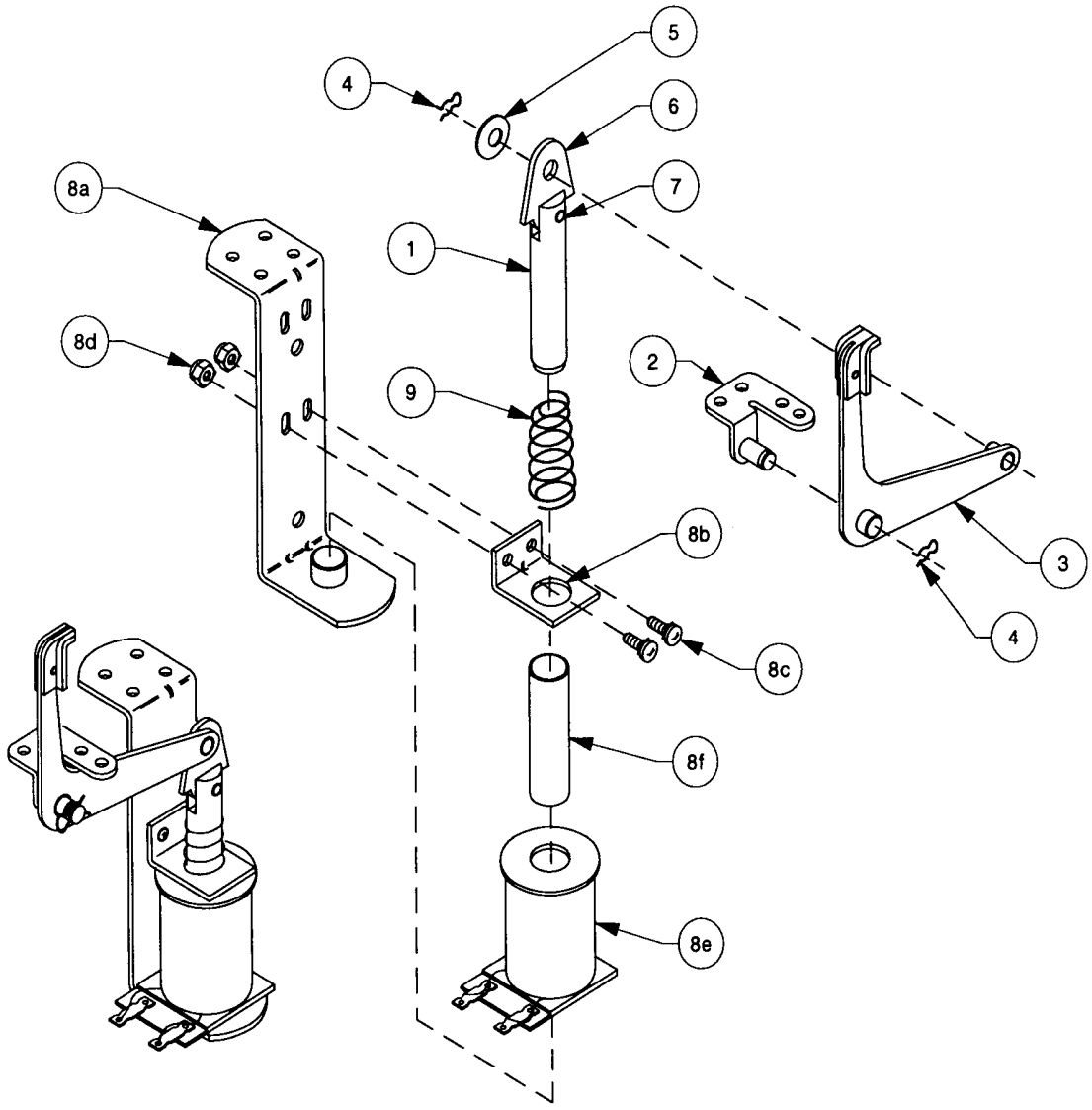
A-15849-R-4
Flipper Assembly

Item	Part Number	Description
1	A-13104-R	Flipper Bracket Sub-Assy.
2	SW-1A-194	Switch Assembly
3	4701-00002-00	Lockwasher, #6 Split
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"
6	4701-00003-00	Lockwasher #8 Split
7	01-9375	Switch Mounting Bracket
8	20-6516	Speednut, Tinnerman
9	4010-01066-06	Cap Screw, 10-32 x 3/8"
10	4701-00004-00	Lockwasher #10 Split
11	A-12390	Flipper Stop Assembly
12	FL-15411	Flipper Coil, Orange
a)	03-7066-5	Coil Tubing
13	01-7695	Solenoid Bracket
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"
15	10-364	Spring
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"
17	4406-01117-00	Nut, 6-32 Hex
18	A-15848-R	Crank Link Assembly, Right
a)	A-17050-R	Flipper Crank Assembly, Right
b)	A-15847	Flipper Link Assembly
c)	02-4676	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
e)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut, 10-32 ESN
19	23-6577	Bumper Plug, 5/8"
20	03-7568	Flipper Bushing
Associated Parts: (Not Shown)		
21	23-6519-4	Flipper Rubber Ring, Red
22	20-9250-6	Flipper & Shaft

Flipper Notes...

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

A-17811
Kicker Arm (Slingshot) Assembly

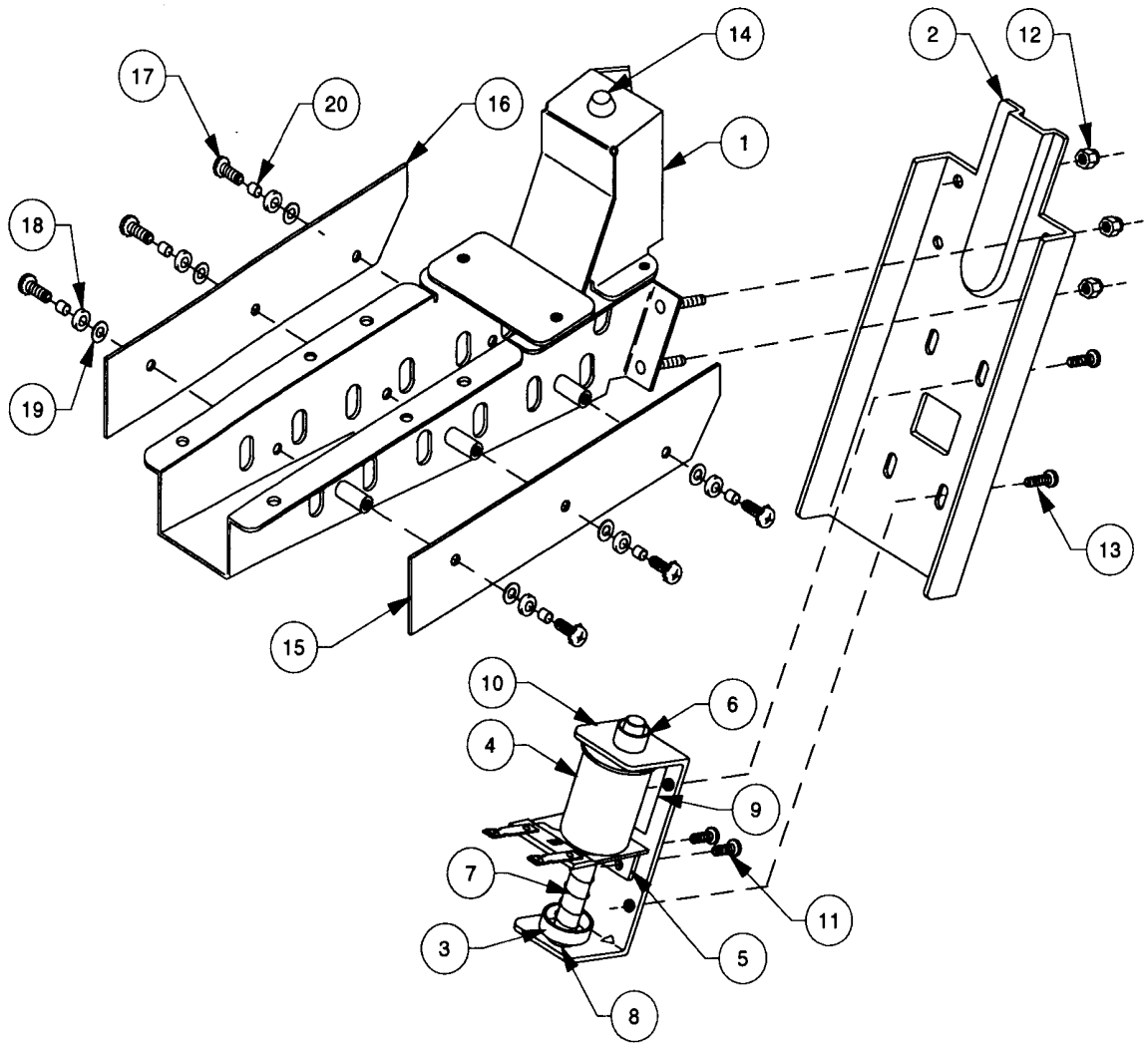


Item	Part Number	Description
1.	02-2364	Coil Plunger
2.	A-17810	Mounting Bracket Assembly
3.	A-12664	Kicker Crank Assembly
4.	12-6227	Hairpin Clip
5.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.
6.	03-8085	Armature Link
7.	20-8716-5	Roll Pin, 1/8 x 7/16"

Associated Parts for Right & Left Kickers:

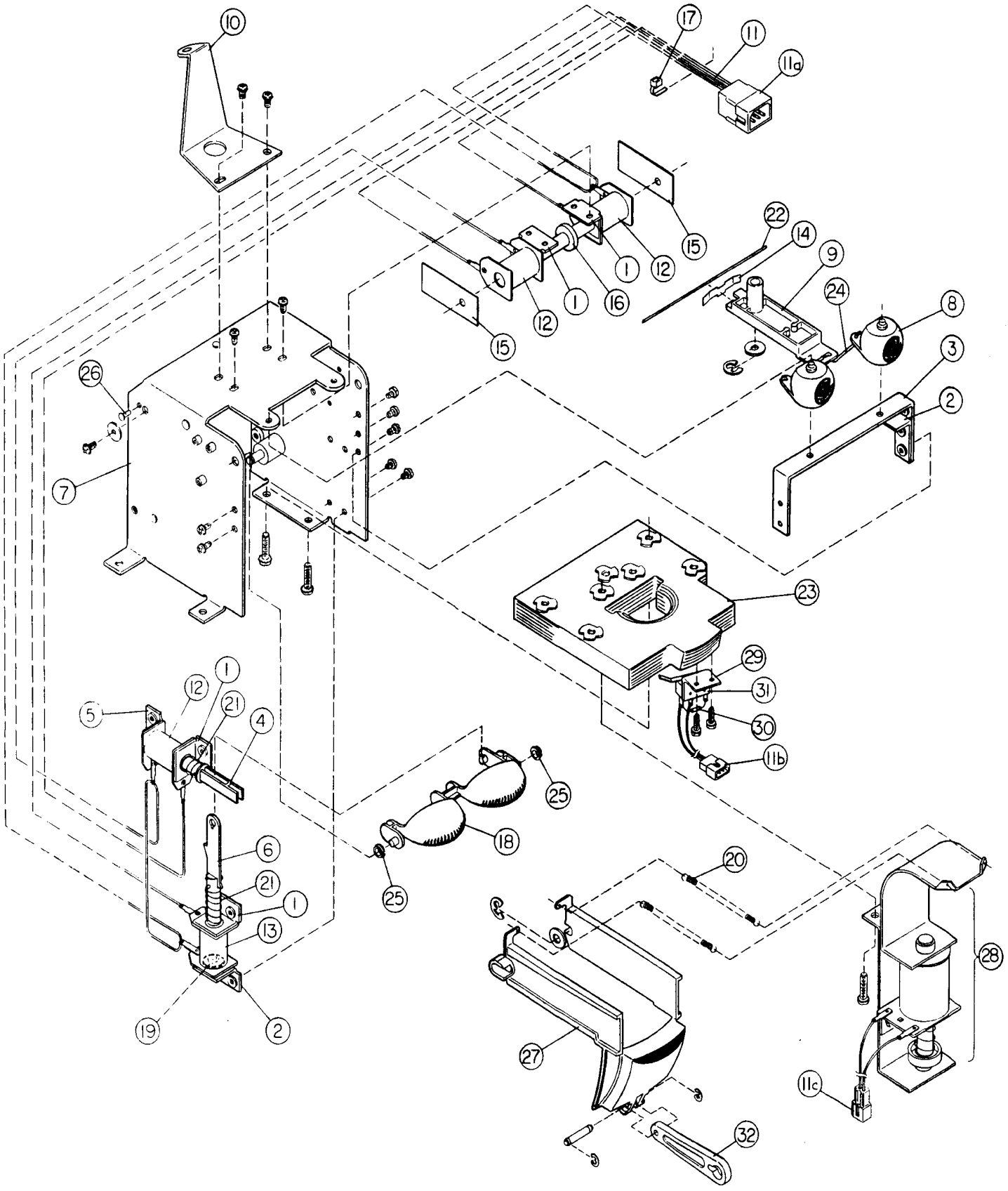
Item	Part Number	Description
8.	**B-9362-R-3**	**Coil & Bracket Assy., Left**
	B-9362-L-2	**Coil & Bracket Assy., Right**
a)	A-17808	Bracket & Stop Assembly
b)	01-8-508-S	Coil Retaining Bracket
c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
d)	4406-01119-00	Nut, 6-32 ESN
e)	AE-26-1200	Coil Assembly
f)	03-7066	Coil Tubing
9.	10-128	Spring

A-18753
Outhole Ball Trough Assembly



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

A-19127 "Red" Head Assembly



A-19127 "Red" Head Assembly

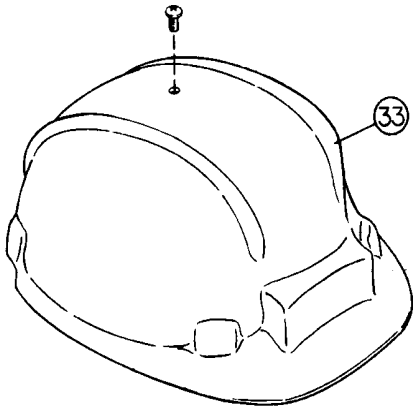
Item	Part No.	Description
1	A-13735	Coil Bracket Assembly (5)
2	A-14026	Centering Bracket Ass'y
3	A-14027	Eye Bracket Assembly
4	A-14028	Plunger Assembly
5	A-14029	Plunger Stop Bracket Ass'y
6	A-14030	Main Lid Plunger Ass'y
7	A-19126.2	Head Bracket Assembly
8	A-19257-2	Eye Assembly (2)
9	A-19258	Crank Assembly
10	A-17918	Hat Bracket
11	H-19531	Head Cable Assembly
(a)	5791-13202-00	6-Pin Connector
(b)	5791-10772-00	2-Pin Connector
(c)	5791-12570-00	2-Pin Connector
12	SM-30-1100-DC	Coil Assembly (3)
13	SM-31-900-DC	Coil Assembly
14	01-13416	Crank Liner
15	01-9959-1	Insulator (2)
16	02-5103	Double Plunger
17	03-7520-2	Nylon Tie Wrap (5)
18	03-8469-1	Eyelids
19	03-8486	Centering Flange
20	10-423	Extension Spring (2)
21	10-424	Compression Spring (2)
22	10-425	Spring Bar
23	11-1220	Wood Base
24	12-7239	Eye Link Wire (2)
25	20-8790-1	Nyliner (2)
26	20-9668	Eyelet 1/8 x 1/4 (2)
27	31-2016	Decorated Lip/Mandible
28	A-13941	Eject Assembly
29	01-9785	Switch Mounting Bracket
30	5070-06258-00	Diode 1N4001 1.0A
31	5647-12693-32	Mini-Micro Switch

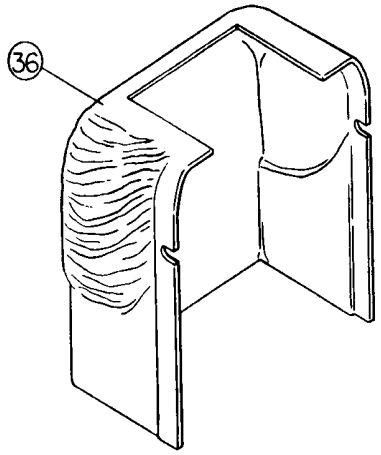
Related Parts:

32	03-8472	Jaw Link
33	03-9289	Hard Hat
34	20-10142	Hair Assembly
35	31-2018-1	Decorated Head - Front
36	31-2018-2	Decorated Head - Back

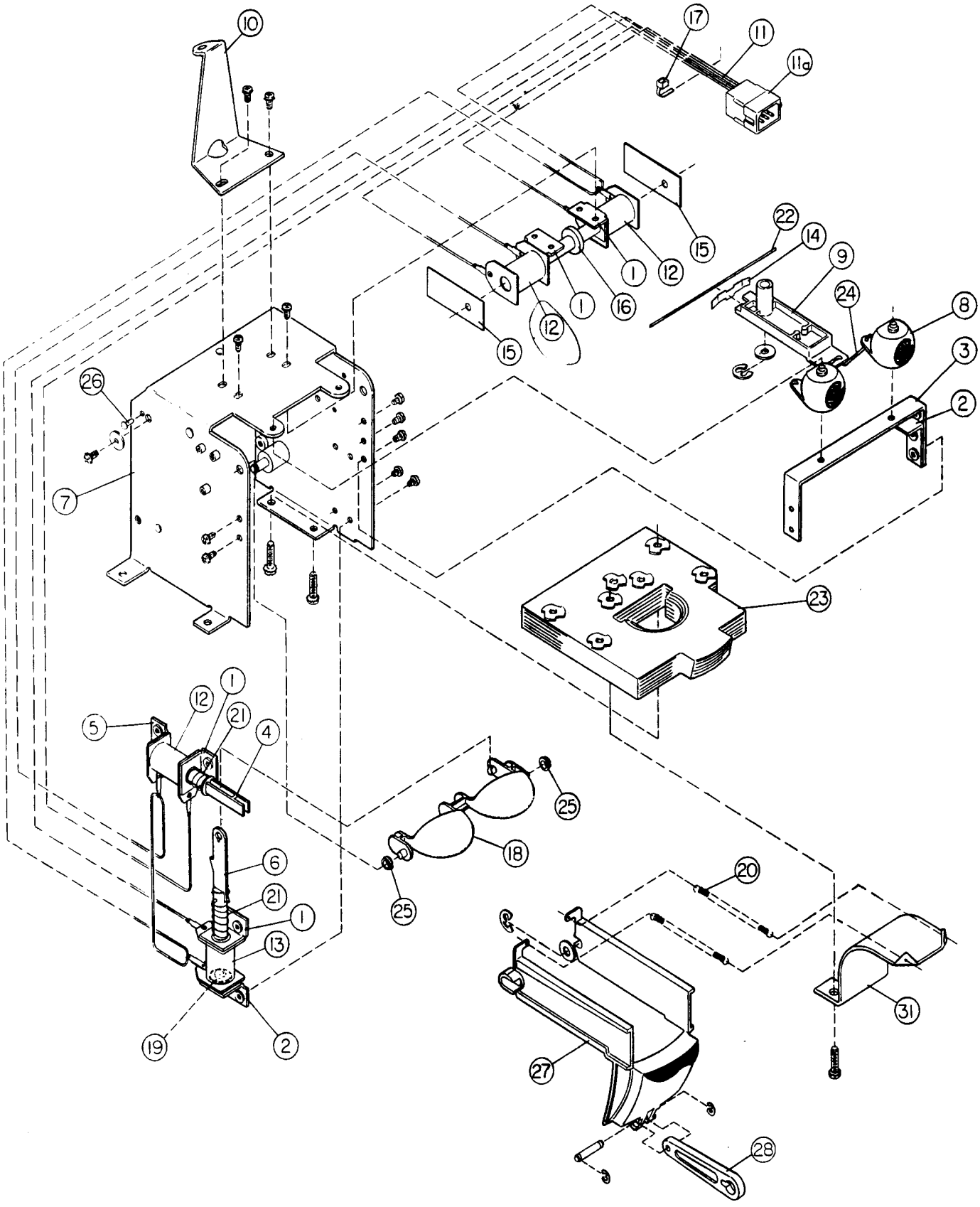
Miscellaneous Hardware:

02-4499	Pivot Pin
20-8712-18	"E" Ring 3/16" Shaft (2)
20-8712-25	"E" Ring 1/4" Shaft (3)
4006-01003-05	MS 6-32 x 5/16 P-PHS (14)
4006-01035-03	MS 6-32 x 3/16 P-Tr Hd
4006-01035-05	MS 6-32 x 5/16 P-Tr Hd (4)
4008-01003-12	MS 8-32 x 3/4 P-PHS (6)
4106-01114-08	TCS #6 x 1/2 PL-H (2)
4408-01119-00	Nut 8-32 ESN
4700-00005-00	FW .141 x .437 x .032 (2)
4700-00072-00	FW .265 x .500 x .032 (3)





A-19128 "Ted" Head Assembly



A-19128 "Ted" Head Assembly

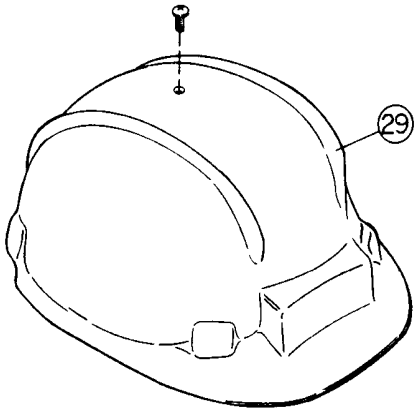
Item	Part No.	Description
1	A-13735	Coil Bracket Assembly (5)
2	A-14026	Centering Bracket Ass'y
3	A-14027	Eye Bracket Assembly
4	A-14028	Plunger Assembly
5	A-14029	Plunger Stop Bracket Ass'y
6	A-14030	Main Lid Plunger Ass'y
7	A-19126.2	Head Bracket Assembly
8	A-19257-1	Eye Assembly (2)
9	A-19258	Crank Assembly
10	A-17918	Hat Bracket
11	H-19530	Head Cable Assembly
12	SM-30-1100-DC	Coil Assembly (3)
13	SM-31-900-DC	Coil Assembly
14	01-13416	Crank Liner
15	01-9959-1	Insulator (2)
16	02-5103	Double Plunger
17	03-7520-2	Nylon Tie Wrap (5)
18	03-8469-2	Eyelids
19	03-8486	Centering Flange
20	10-423	Extension Spring (2)
21	10-424	Compression Spring (2)
22	10-425	Spring Bar
23	11-1220	Wood Base
24	12-7239	Eye Link Wire (2)
25	20-8790-1	Nyliner (2)
26	20-9668	Eyelet 1/8 x 1/4 (2)
27	31-1611-1	Lip/Mandible

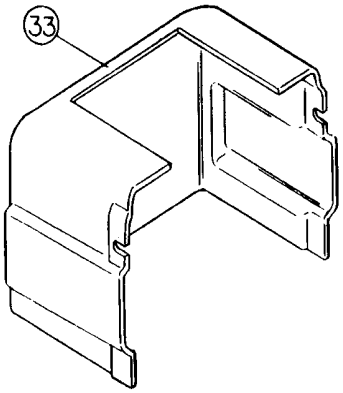
Related Parts:

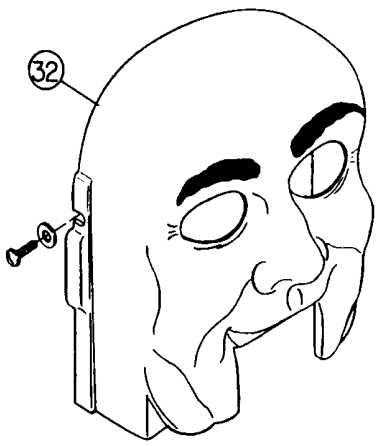
28	03-8472	Jaw Link
29	03-9280	Hard Hat
30	A-18615	Dozer Blade Assembly
31	01-13158	Deflector
32	31-2017-1	Decorated Head - Front
33	31-2017-2	Decorated Head - Back

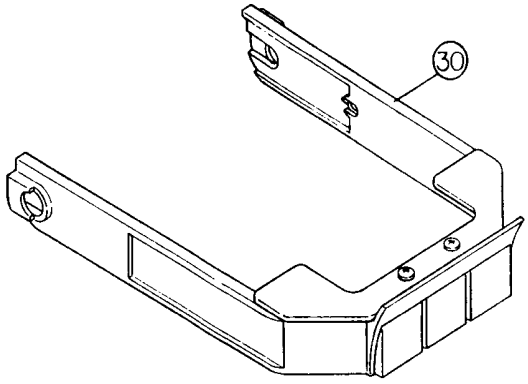
Miscellaneous Hardware:

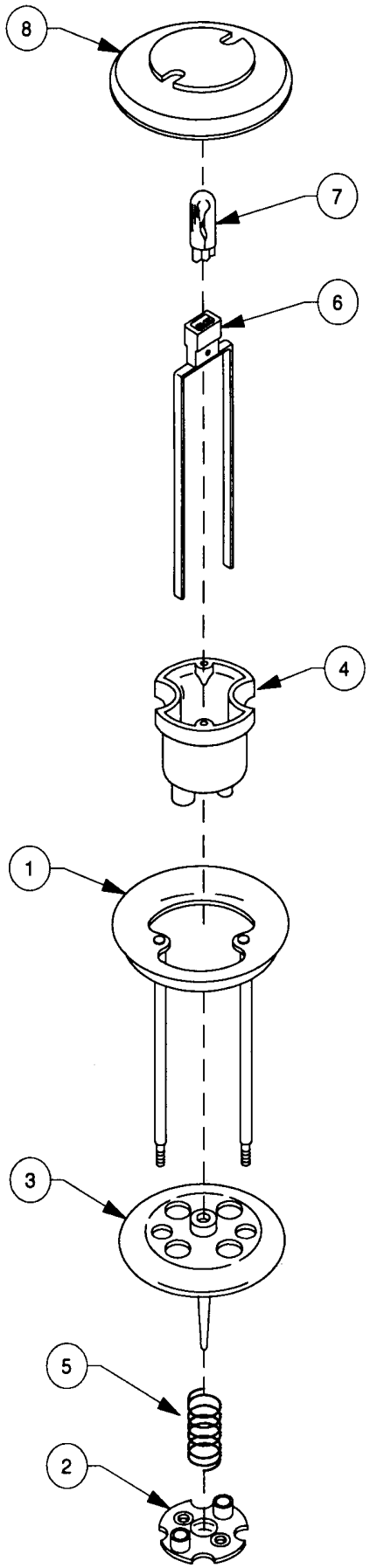
02-4499	Pivot Pin
20-8712-18	"E" Ring 3/16" Shaft (2)
20-8712-25	"E" Ring 1/4" Shaft (3)
4006-01003-05	MS 6-32 x 5/16 P-PHS (14)
4006-01035-03	MS 6-32 x 3/16 P-Tr Hd
4006-01035-05	MS 6-32 x 5/16 P-Tr Hd (4)
4008-01003-12	MS 8-32 x 3/4 P-PHS (6)
4700-00005-00	FW .141 x .437 x .032 (2)
4700-00072-00	FW .265 x .500 x .032 (3)











B-9414
Jet Bumper Assembly

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

Associated Part:

8	03-8254-13	Jet Bumper Cap, Clear

B-9414-2
Jet Bumper Assembly

(Parts listed replace same items of **B-9414**)

Item	Part Number	Description
3	03-6035-6	Bumper Wafer, Yellow

Associated Part:

8	03-8254-16	Jet Bumper Cap, Tr. Yellow

B-9414-5
Jet Bumper Assembly

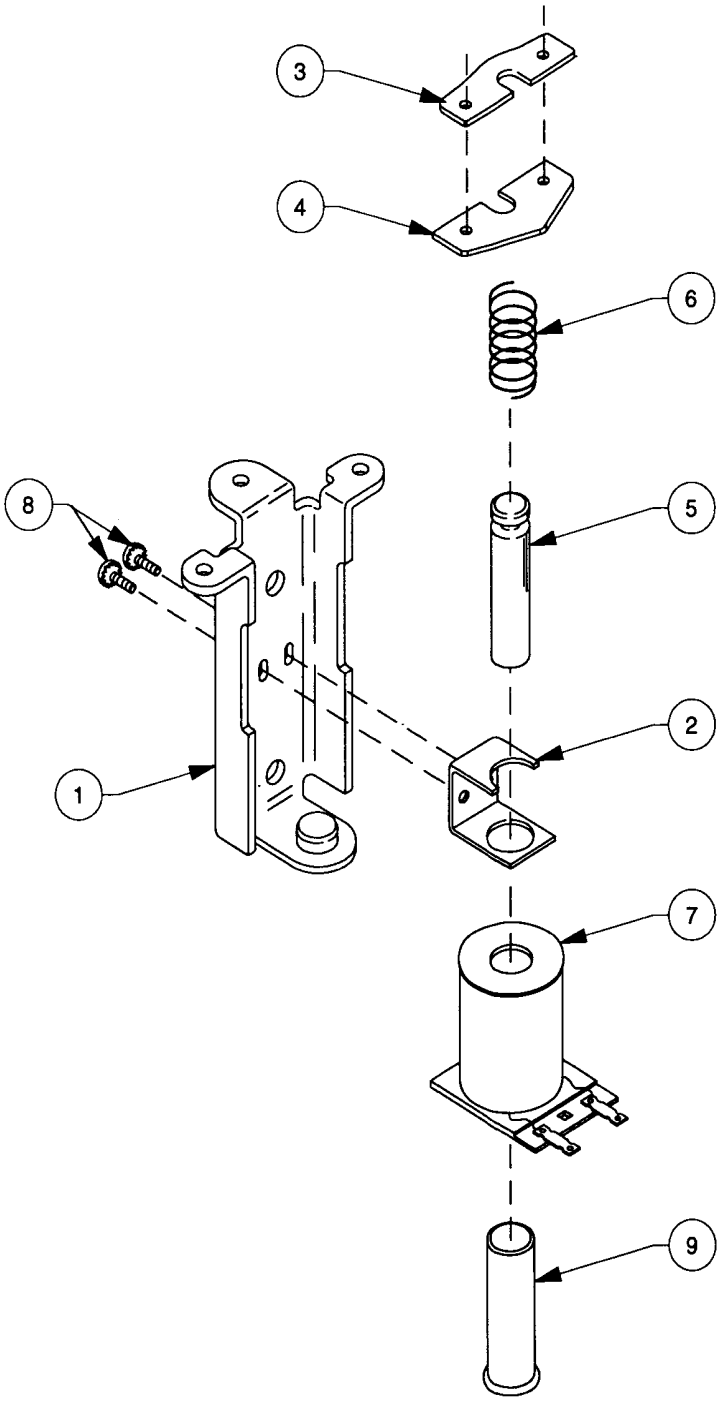
(Parts listed replace same items of **B-9414**)

Item	Part Number	Description
3	03-6035-15	Bumper Wafer, Orange

Associated Part:

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

A-9415-2
Jet Bumper Coil Assembly

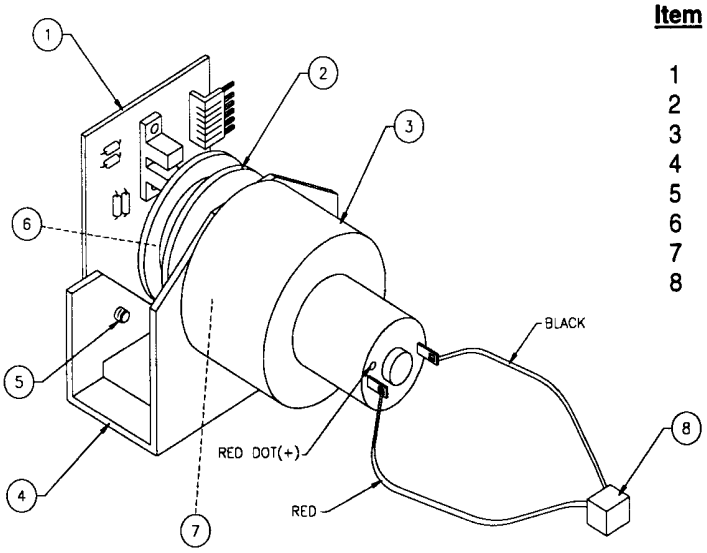


Item	Part Number	Description
1	B-7417	Bracket & Stop Assembly
2	01-1747	Coil Retaining Bracket
3	01-5492	Armature Link, Steel
4	01-5493	Armature Link, Bakelite
5	02-3406-1	Coil Plunger
6	10-326	Armature Spring
7	AE-26-1200	Coil Assembly
8	4006-01017-04	Mach. Screw, 6-32 x 1/4"
9	03-7066	Coil Tubing

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

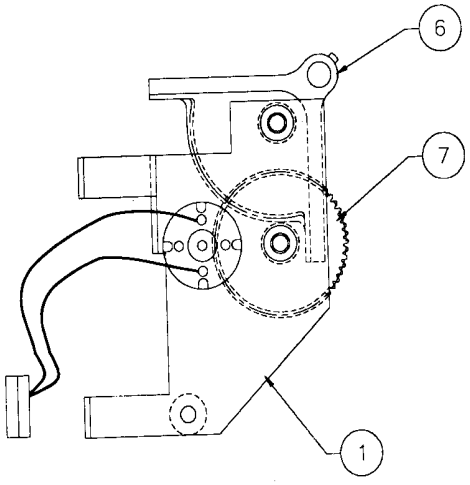
A-18832
Blade Drive Assembly



Item	Part Number	Description
1	A-19359	Opto Board Assembly
2	03-9239	Cam
3	14-8016	Motor
4	01-13097	Bracket
5	4006-01003-04	Mach. Screw, 6-32 x 1/4"
6	4006-01003-06	Mach. Screw, 6-32 x 3/8"
7	4010-01008-06	Mach. Screw, 10-32 x 3/8"
8	H-18600-2	Cble, 2-Pin Gen. Motor

A-19129
Jaw Drive Assembly "Ted"

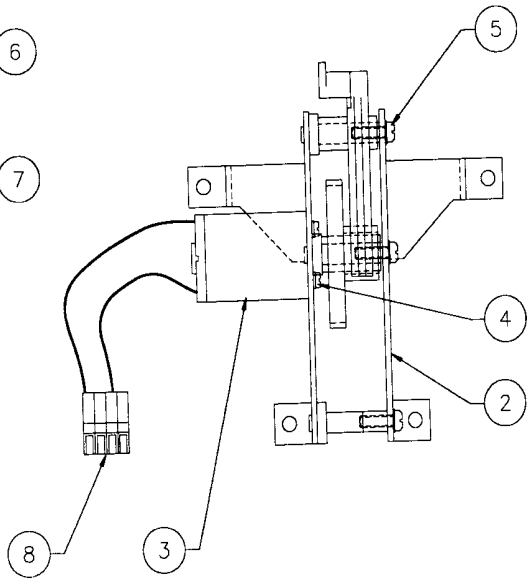
Item	Part Number	Description
1	A-19125	Jaw Drive & Bracket Assy.
2	01-13260-R	Jaw Drive Bracket, Right
3	A-13997	Jaw Motor Assembly
4	4004-01003-03	Mach. Screw, 4-40 x 3/16"
5	4008-01003-06	Mach. Screw, 8-32 x 3/8"
6	03-8470	Sector
7	03-8471	Gear
8	H-19616	Cable Assembly



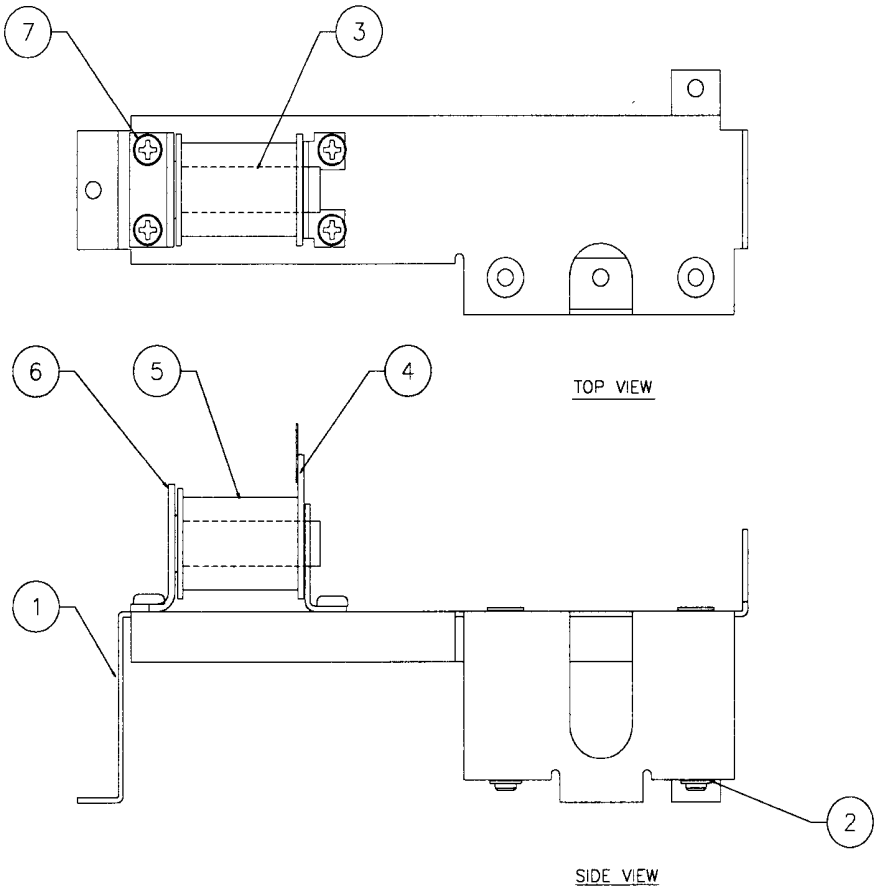
A-19129-1
Jaw Drive Assembly "Red"

(Parts listed replace same items of A-19129)

Item	Part Number	Description
8	H-18601-10	General Motor 4-pin 26"



A-19049
Dual Diverter Bracket & Coil Assembly

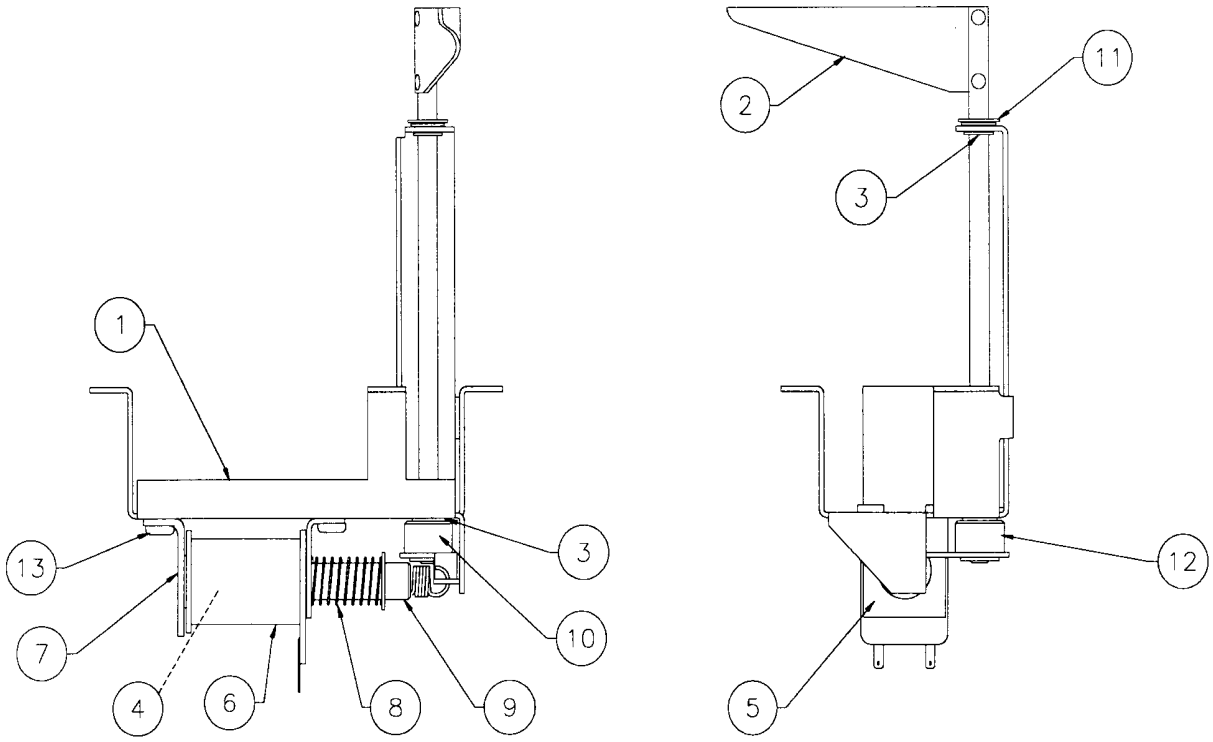


Item	Part Number	Description
1	A-19328	Dual Diverter Bracket
2	20-8790	Nyliner Bearing
3	03-7066	Coil Tubing
4	01-8413	Coil Mounting Bracket
5	AE-26-1500	Coil Sub-Assembly
6	A-12390	Flipper Stop Bracket
7	4010-01008-06	Mach. Screw, 10-32 x 3/8"

Associated Parts

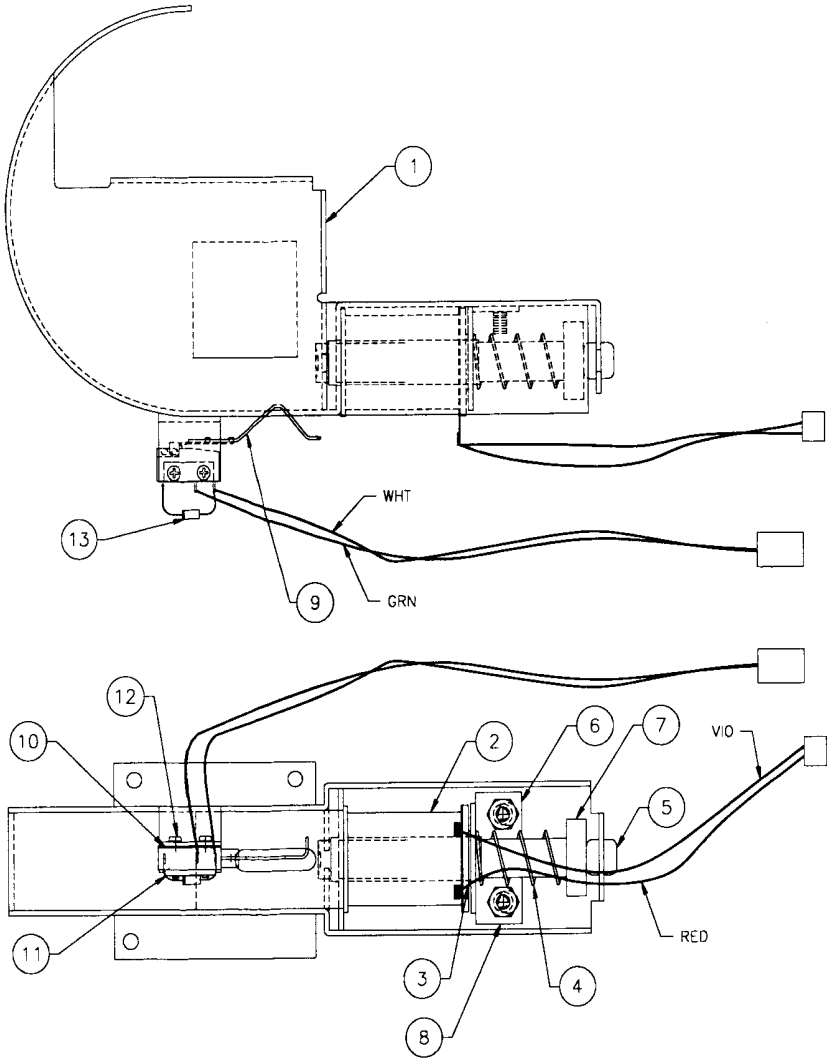
8	A-19694	Link & Plunger Assembly
a)	01-13211	Link
b)	A-14185-1	Drive Arm Assembly
c)	02-5077	Link Pin
d)	20-8712-12	"E"-Ring 1/8" Shaft
e)	A-13278	Plunger Assembly
f)	4010-01082-04	Set Screw, 10-32 x 1/4"
9	A-19050	Dual Diverter Assembly (2)

A-19041
Diverter Assembly - Left



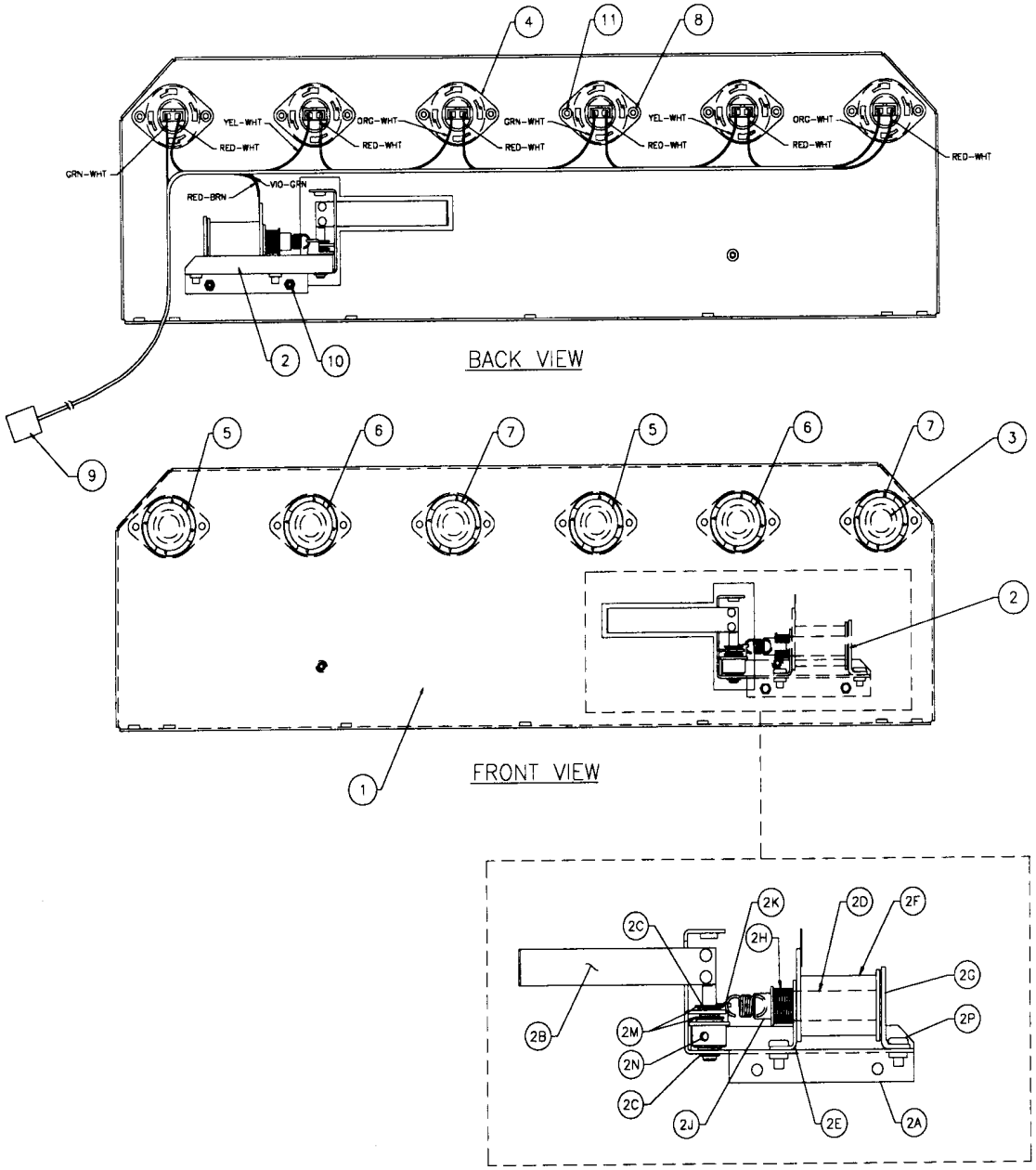
Item	Part Number	Description
1	A-19329	Bracket - Left Diverter
2	A-19042	Diverter Blade Assembly
3	20-8790	Nyliner Bearing
4	03-7066	Coil Tubing
5	01-18413	Coil Mounting Bracket
6	AE-26-1200	Coil Assembly
7	A-12390	Flipper Stop Bracket
8	10-128	Spring
9	A-13278	Plunger Assembly
10	A-14185	Drive Arm Assembly
11	20-8712-25	"E"-Ring, 1/4" Shaft
12	4010-01082-04	Mach. Screw, 10-32 x 1/4"
13	4010-01008-06	Mach. Screw, 10-32 x 3/8"

A-19046
Loop Assembly



Item	Part Number	Description
1	A-19327	Loop Sub-Assembly
2	AE-23-800	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Spring Plunger
5	23-6420	Grommet
6	01-9784	Coil Mounting Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut 8-32 ESN
9	5647-12693-20	Mini-Micro Switch
10	01-8600	Insulator
11	01-8240	Nut Plate, #2-56
12	4002-01105-07	Mach. Screw, 2-56 x 7/16"
13	5070-09054-00	Diode 1N4004
14	H-19523	Mini Switch Cable
15	H-16437	Radio Cable

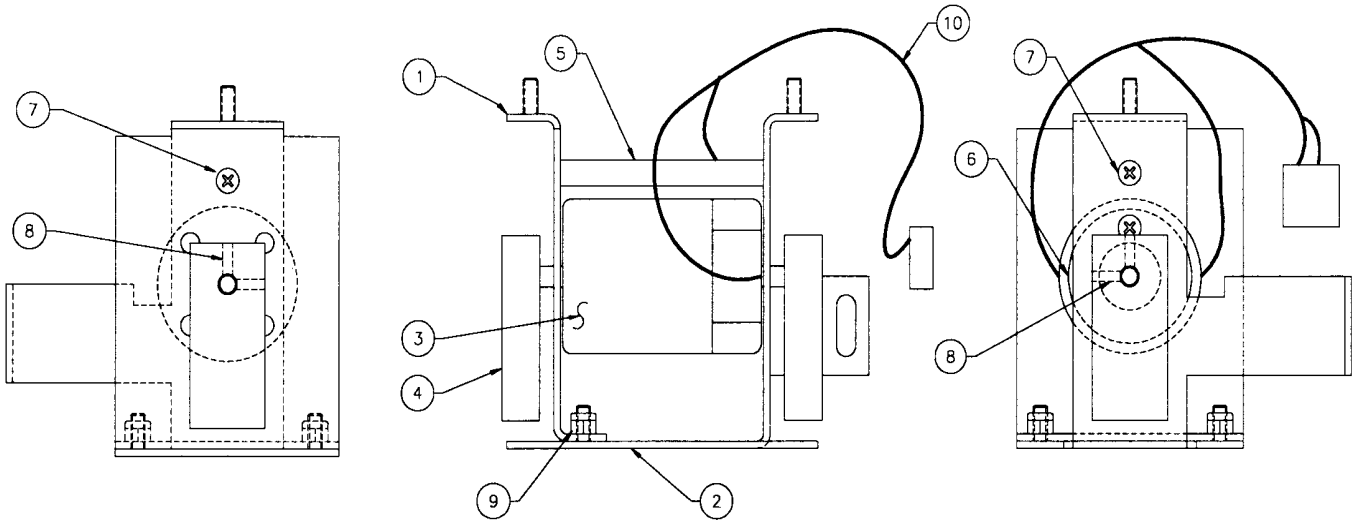
A-19334
Back Panel Assembly



Item	Part Number	Description
1	A-19298.2	Back Panel
2	A-18948	Rear Diverter Assembly
A)	A-19333	Rear Diverter Bracket
B)	A-18949	Diverter Blade Assembly
C)	20-8790	Nyliner Bearing
D)	03-7066	Coil Tubing
E)	01-8413	Coil Mounting Bracket
F)	AE-26-1200	Coil Assembly
G)	A-12390	Flipper Stop Assembly
H)	10-437	Spring
J)	A-13278	Plunger Assembly
K)	A-19293	Drive Arm Assembly
M)	20-8712-25	"E"-R ing 1/4" Shaft
N)	4010-01082-04	Mach. Screw, 10-32 x 1/4"
P)	4010-01008-06	Mach. Screw, 10-32 x 3/8"

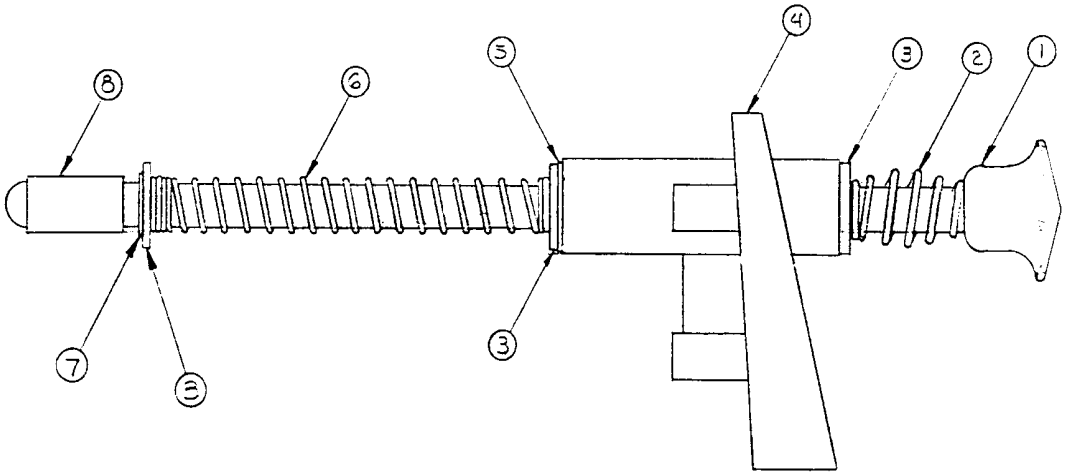
Item	Part Number	Description
3	24-8802	Bulb #906 13v, 0.69A
4	A-14265-13	Receptacle & Socket (Clear)
5	03-8171-13	Mini Dome Twist/Lock (Clear)
6	03-8171-16	Mini Dome Twist/Lock (Yellow)
7	03-8171-9	Mini Dome Twist /Lock (Red)
8	4700-00003-00	Flatwasher, .125 x .281 x .032
9	H-19602	Back Panel Cable
10	4408-01119-00	Nut 8-32 ESN
11	07-6688-19	Rivet, 1/8 x 7/32" Nickel

A-19169
Shaker Motor Assembly



Item	Part Number	Description
1	A-12565	Front Mounting Bracket
2	A-19217.1	Motor Mounting Bracket
3	14-7951	Motor
4	20-9588	Eccentric Weight
5	02-4353	Spacer
6	01-10659	Insulator-Washer
7	4008-01017-06	Mach. Screw, 8-32 x 3/8"
8	4008-01076-06	Set Screw, 8-32 x 3/8"
9	4408-01119-00	Nut 8-32 ESN
10	H-12541	Motor Cable

Ball Shooter Assembly



B-12445-4
Ball Shooter Assembly

Item	Part Number	Description
1	20-9253-7	Ball Shooter Rod
2	10-149	Outer Spring
3	4700-00051-00	FW, 25/64x5/8x16ga.
4	21-6645-1	Shooter Housing
5	03-7357	Shooter Sleeve
6	10-148-4	Power Spring, Green
7	20-8712-37	Retainer Ring, External
8	23-6327	Ball Shooter Tip

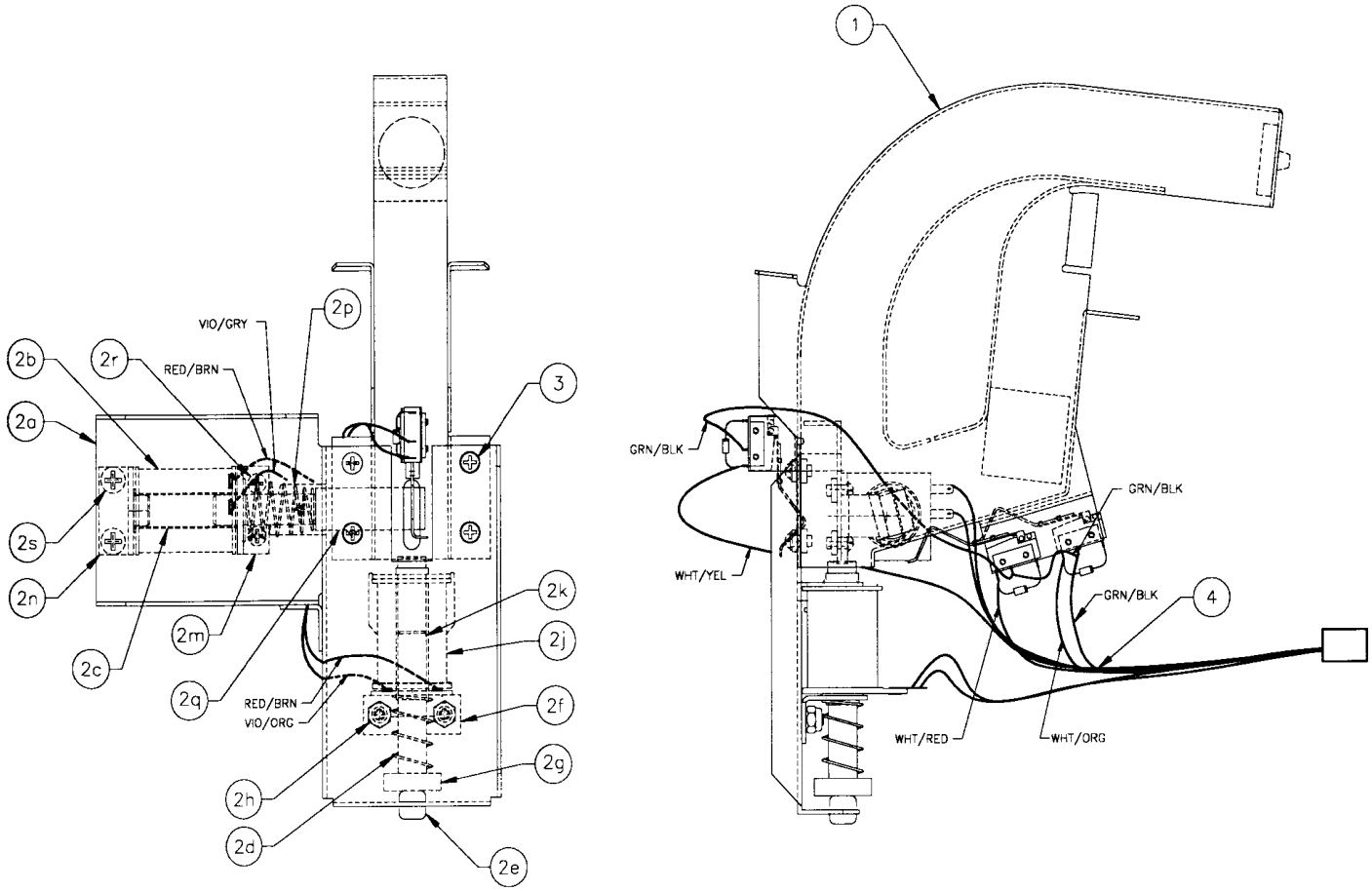
Associated Parts
(Not Shown)

9	01-3535	Mounting Plate
10	4010-01006-08	MS, 10-32 x 1/2"

B-12445-7
Ball Shooter Assembly
(Parts listed replace same items of B-12445-4)

Item	Part Number	Description
7	10-148-7	Power Spring, White

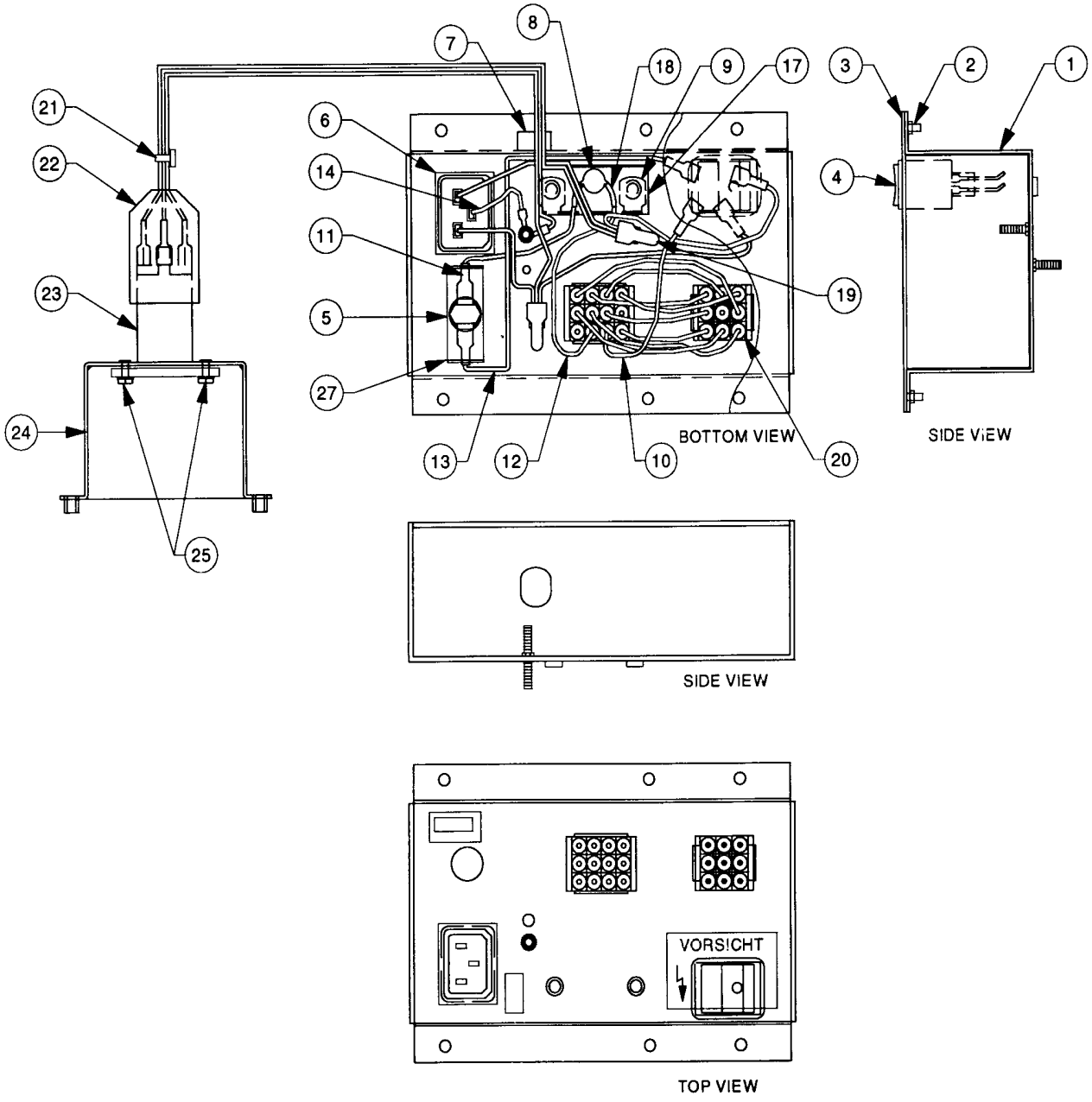
A-18794
Pop Up Assembly



Item	Part Number	Description
1	A-19225	Pop Up Bracket & Switch Assy.
a)	A-19324.1	Weldment - Pop Up
b)	5647-12693-20	Mini Micro Switch
c)	01-8600	Switch Insulator
d)	01-8240	Nut Plate #2-56
e)	4002-01105-07	MS, #2-56 x 7/16"
f)	5070-09054-00	Diode 1N4004 1.0A
g)	5647-12693-61	Mini Micro Switch
h)	23-6686	Round Pad
2	A-19226	Pop Up Bracket & Coil Assy.
a)	A-19325	Pop Up Coil Bracket
b)	AL-26-1500	Coil Assembly
c)	03-7067	Coil Tubing
d)	10-135	Plunger Spring
e)	23-6420	Rubber Grommet
f)	01-9784	Coil Mounting Bracket
g)	A-17797	Bell Armature Assembly
h)	4408-01119-00	Nut, 8-32 ESN
j)	AE-24-900	Coil Assembly

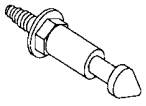
Item	Part Number	Description
2 k)	03-7066	Coil Tubing
m)	01-7695	Solenoid Bracket
n)	A-12390	Flipper Stop Bracket
p)	10-422	Spring
q)	A-18818	Separator Assembly
r)	4008-01003-05	MS, 8-32x 5/16"
s)	4010-01008-06	MS, 10-32 x 3/8"
3	4008-01003-05	MS, 8-32 x 5/16"
4	H-19526	Cable

A-17540
Universal Power Interface Assembly



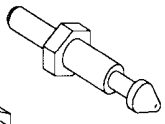
Item	Part Number	Description
1	01-12293.1	Power Control Chassis Box
2	4406-01128-00	Nut #6-32 KEPS
3	01-12294	Switch Mounting Plate Assembly
4	5642-13935-00	Power Switch
5	5733-12869-00	Fuse Holder Panel
6	5851-13867-00	Outlet-IEC Conn. 237 Socket
7	03-8712	Strain Relief Bushing
8	5016-12978-00	Thermistor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

Posts

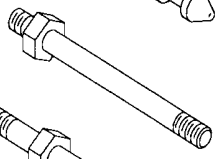


02-3905
POST #8WS (1)

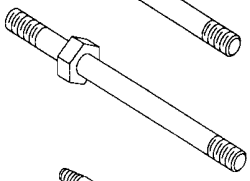
02-4020



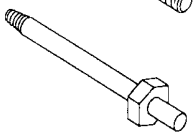
02-4177
POST-SPACER, 1/2" (1)



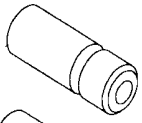
02-4424-1
POST #8-32 X 15/32" (1)



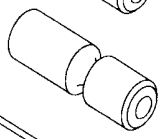
02-4425-1
FASTENER POST, 6-32/8-32 (3)



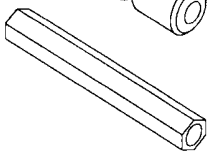
02-4426-1
FASTENER POST, 8-32/8-32 (2)



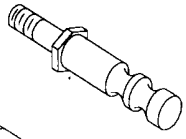
02-4434
FASTENER POST, 6-32/8-32 (5)



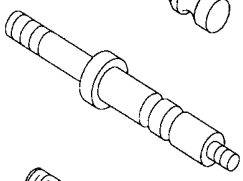
02-4435
POST #8 X 1" (2)



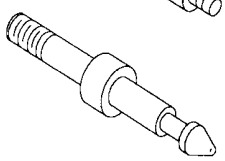
02-4436-8
POST #8 X 1-3/16" (2)
02-4436-15
POST #8 X 1-7/16" (6)
02-4436-28
POST #8 X 1-13/16" (2)



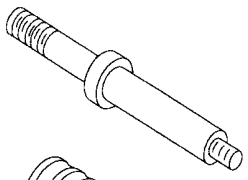
02-4608
SPACER, 8-32 X 1-7/8" (1)



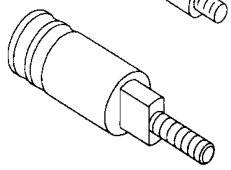
02-4658
DOUBLE BUMPER POST (1)



02-4660
SINGLE BUMPER POST (13)

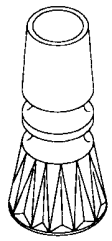


02-4679
BUMPER POST #10 (2)

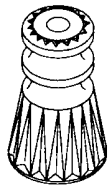


02-5107
ADJUSTING POST (2)

03-8044-13
MINI-POST, CLEAR (2)

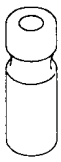


03-8130-13
DOUBLE POST (1)



03-8247-13
DOUBLE POST #8 (6)

03-8319-13
POST #8 STARRED (2)



03-8365-13
POST #8, CLEAR (2)

Unique Parts

Unique Backbox, Cabinet & Playfield Parts

A-13204-50024	Bottom Arch Assembly
A-13769-50024	Playfield Insert
A-16773-1	Lever Guide Assembly
A-16816-15	Standup Oblong Target Assembly, Opaque Orange
A-16917-50024	WPC Sound Board Assembly
A-17651-50024	WPC Security CPU Board Assembly
A-17795-4	Standup Oblong Target, Opaque Red
A-17795-5	Standup Oblong Target, Opaque White
A-17814	Backbox Assembly
A-17838-1	Stud Plate 8-32
A-18060-15	Standup Target-Square, Opaque Orange
A-18060-6	Standup Target-Square, Opaque Yellow
A-18235	Right Plastic Ramp Assembly
A-18262	Left Plastic Ramp Assembly
A-18506	Left Wire Shooter Ramp Assembly
A-18507	Left Wire Ramp Assembly
A-18508	X-Over Wire Ramp Assembly
A-18509	Right Wire Ramp Assembly
A-18535-2	Eddy Sensor PCB & Spacers
A-18575-1	Flipper Ball Guide Assembly, Left
A-18575-2	Flipper Ball Guide Assembly, Right
A-18615	Dozer Blade Assembly
A-18794	Pop Up Assembly
A-18832	Blade Drive Assembly
A-19041	Left Diverter Assembly
A-19046	Loop Assembly
A-19047	Front Trough Assembly
A-19049	Dual Diverter Assembly
A-19050	Dual Diverter Blade Assembly
A-19056	Speaker/Display Assembly
A-19127	Head Assembly "Red"
A-19128	Head Assembly "Ted"
A-19129	Jaw Drive Assembly "Ted"
A-19129-1	Jaw Drive Assembly "Red"
A-19169	Shaker Motor Assembly
A-19206-1	6-Lamp Board Assembly
A-19207-1	28-Lamp Board Assembly
A-19231	Rear Trough Assembly
A-19235	Dozer Eddy Coil Assembly, Large
A-19237	Dozer Eddy Coil Assembly, Small
A-19242-1	Dual H-Drive Motor Controller w/Bracket
A-19266	Boom Box Bracket & Socket Assembly
A-19272-1	20-Lamp PCB Assembly & Spacers
A-19276	Arch Ball Guide, Left
A-19277	Arch Ball Guide, Right
A-19309	Spin Target Assembly
A-19313	Loop Sign Assembly
A-19318	Ball Guide #2
A-19319	Ball Guide #4
A-19320	Ball Guide #5
A-19321	Ball Guide #6
A-19322.1	Ball Guide #10
A-19323.1	Ball Guide #13
A-19334	Back Panel Assembly

Unique Parts
(continued)

Unique Backbox, Cabinet & Playfield Parts

A-19356	Ball Guide #15
A-19514-5	Leg Assembly, Blue
A-19562.1	Stay Arm Assembly
A-19680	Kicker Leaf Switch Assembly
A-19694	Dual Link & Plunger Assembly
A-19695	Shaker Motor Assembly
A-19731-1	Playfiel Plastic Assembly
A-19731-2	Playfield Plastic Assembly
A-19731-3	Playfield Plastic Assembly
A-19731-4	Playfield Plastic Assembly
A-8552-50024	Backglass Assembly
B-12445-7	Ball Shooter Assembly (White Spring)
B-9414-5	Jet Bumper Assembly (Orange)
01-12911.2	Ball Guide #1
01-12947	Ball Guide #7
01-12948	Ball Guide #8
01-12955	Ball Guide #9
01-12958.1	Ball Guide #12
01-12963	Ball Guide #14
01-12965.1	Ball Guide #16
01-12984	Ball Guide #17
01-13158	Rear Deflector
02-4436-28	F-F Spacer, 8-32 x 2 13/16
02-5083.1	Pivot, Jaw
02-5107	Adjusting Post
03-8254-12	Jet Bumper Cap, Trans. Orange
03-8256-1	Shaker Assembly
03-9238	Blade Drive Rod
03-9288	Boom Box
03-9289	Hard Hat
11-1206-1	Rail Wood, Left
11-1206-2	Rail Wood, Right
11-1212	Wood Cabinet
11-50024-IN	Insert Panel
12-7247-1	Ball Guide, 2 x 1/2"
12-7247-2	Ball Guide, 2 x 1"
20-10142	Hair Assembly "Red"
23-6740	Hose-Eddy PCB Assembly
31-1357-50024	Backglass Translight
31-1420-50024	Screened Speaker Panel Cover
31-2011-1, -2, -3, -4	Under Ramp Decal
31-2012	Insert Matrix
31-2013-1, -2, -3, -4	Decal, Top
31-2014-	Playfield Plastic Set
31-2032	Williams Decal
36-50024	Screened Hardcoat Playfield

Cables

Backbox Cables

H-14584	Dot Matrix Display Power Cable
H-15476	Logic Power Cable
H-15736-1	Secondary Cable
H-16505	Extended Driver Cable

Cabinet Cables

H-17217	Plumb Bob/Mech. Protect Cable
H-17837-2	Voltage Program Jumper Cable
H-19130	Dixie-Vend Interconnect Cable
H-19369	Cabinet Switch/Lamp Cable
H-19524	Cabinet Cable
H-19600	Shaker Motor Cable
H-19601	Power Extension Cable

Playfield Cables

H-19366	Playfield Switch Cable
H-19367	Playfiled Lamp Cable
H-19368	Playfield Solenoid Cable
H-19371	Trough Opto Cable
H-19615	3-Bank Switch Cable
H-19664	Switch 26,27 Cable

Targets

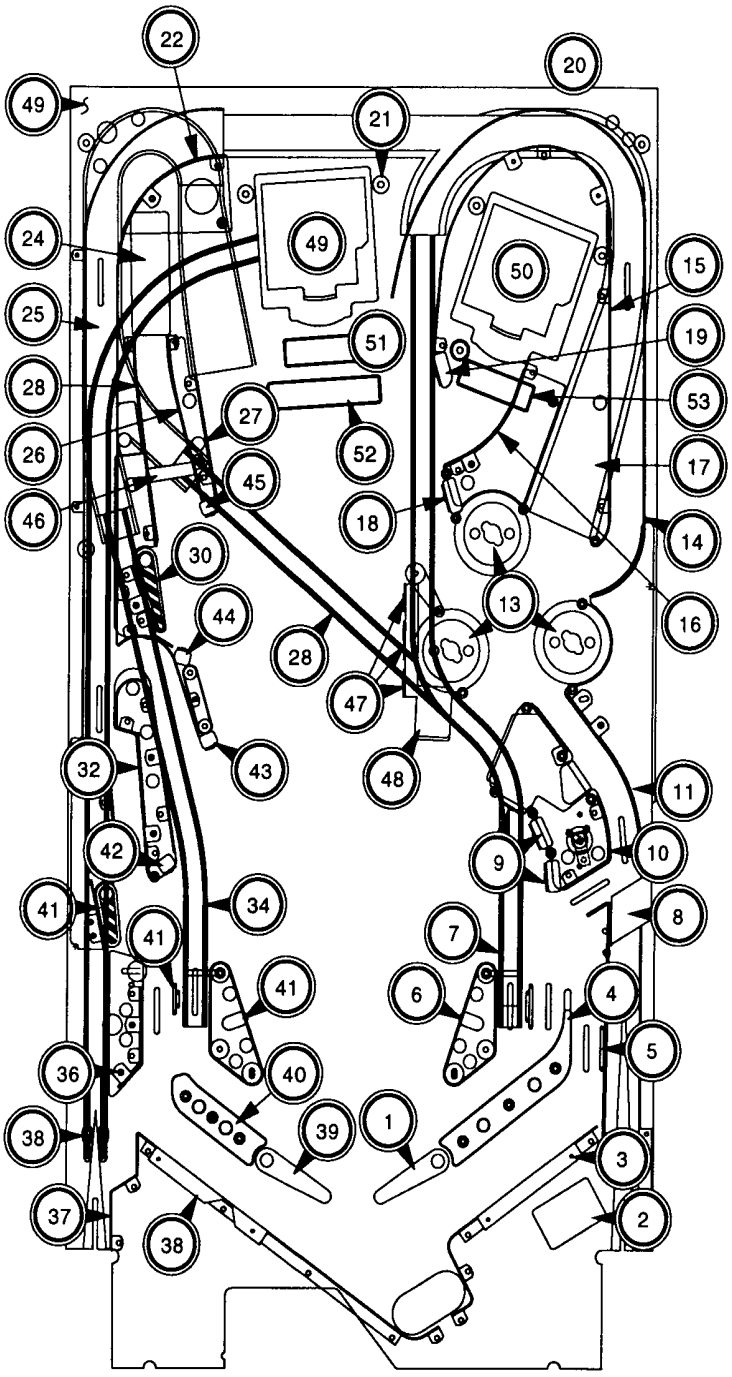
A-16816-4	Standup Target, Red Oblong (1)
A-16816-5	Standup Target, White Oblong (1)
A-16816-6	Standup Target, Yellow Oblong (1)
A-16816-15	Standup Target, Orange Oblong (1)
A-18060-15	Standup Target, Orange Square (2)
A-19753	3-Bank Target Assembly, Yellow
A-19754	3-Bank Target Assembly, Red

Universal Power Interface/Cordset Application Chart

COUNTRY	UNIVERSAL PWR. INTERFACE ASSEMBLY	VOLTAGE PROGRAMMING JUMP CABLE				5AMP FUSE/ LABEL		8AMP FUSE/ LABEL		LABEL HIGH/ VOLTAGE CAUTION	POWER ADAPTER CORD	CORDSET								
	A-17540	H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-09651-00 FUSE	16-9668 LABEL	5730-09252-00 FUSE	16-9670 LABEL	16-9669	5850-14052-00	5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00	A-17175-2
UNITED STATES	X		X					X	X		X	X								
CANADA	X	X						X	X			X								
TAIWAN	X		X					X	X			X								
MEXICO	X		X					X	X			X								
CENTRAL AMERICA	X		X					X	X			X								
SOUTH KOREA	X		X					X	X			X								
PUERTO RICO	X		X					X	X			X								
AUSTRIA	X			X		X	X			X			X							
BELGIUM	X			X		X	X			X			X							
FINLAND	X			X		X	X			X			X							
FRANCE	X			X		X	X			X			X							
GREECE	X			X		X	X			X			X							
HOLLAND	X			X		X	X			X			X							
HUNGARY	X			X		X	X			X			X							
NETHERLANDS	X			X		X	X			X			X							
NETH. ANTILLES	X			X		X	X			X			X							
NORWAY	X			X		X	X			X			X							
POLAND	X			X		X	X			X			X							
PORTUGAL	X			X		X	X			X			X							
SPAIN	X			X		X	X			X			X							
SWEDEN	X			X		X	X			X			X							
TURKEY	X			X		X	X			X			X							
WEST GERMANY	X			X		X	X			X			X							
UNITED KINGDOM	X			X		X	X			X				X						
IRELAND	X			X		X	X			X				X						
HONG KONG	X			X		X	X			X				X						
DENMARK	X			X		X	X			X					X					
ITALY	X			X		X	X			X						X				
CHILE	X			X		X	X			X						X				
PEOPLE'S REP. OF CHINA	X			X		X	X			X						X				
SWITZERLAND	X			X		X	X			X							X			
AUSTRALIA	X			X		X	X			X								X		
NEW ZEALAND	X			X		X	X			X								X		
ARGENTINA	X			X		X	X			X								X		
JAPAN	X				X			X	X										X	X

Upper Playfield Parts

Item	Part Number	Description
1	A-15849-R-4	Lower Right Flipper
	FL-14511	Flipper Coil
	20-9250-6	Shaft & Paddle
2	A-18753	Ball Trough Assembly
3	A-19277	Bottom Arch Ball Guide
4	A-18575-2	Right Flipper Ball Guide
5	12-6466-2	Ball Guide
6	B-9362-R-3	Kicker (slingshot) Coil & Brkt Assy
	A-17811	Kicker (slingshot) Assembly
7	A-18509	Right WireRamp
8	A-14196	Shooter Gate Assembly
9	A-19753	3-Bank Target Assy-Red
10	01-12963	Ball Guide
11	A-19323.1	Ball Guide
12	A-19266	Boom Box & Bracket Assembly
13	A-9415-2	Jet Bumper & Coil Assembly
14	01-12911.3	Ball Guide
15	A-19318	Ball Guide
16	01-12958.1	Ball Guide
17	A-18235	Right Plastic Ramp
	A-19311	Right Bridge Out Sign
18	A-18060-15	Square Orange Standup Target
19	A-18060-15	Square Orange Standup Target
20	A-18948	Rear Diverter
21	A-18832	Blade Driver Assembly
	03-9207	Dozer Blade
	14-8016	Dozer Motor
22	A-19319	Ball Guide
23	A-18262	Left Plastic Ramp
	A-19644	Bob's Plastic Sign
	A-19310	Right Bridge Out Sign
24	A-18794	Pop-up Assembly
25	A-19041	Left Diverter
26	A-19321	Ball Guide
27	01-12947	Ball Guide
28	A-19320	Ball Guide
29	A-18508	Cross-Over Wire Ramp
30	A-15849-L-1	Upper Left Flipper
	FL-11753	Flipper Coil
	20-9250-6	Shaft & Paddle
31	01-12955	Ball Guide
32	A-19322.1	Ball Guide
33	A-15849-L-3	Middle Left Flipper
	FL-11722	Flipper Coil
	20-9264-6	Shaft & Paddle
34	A-18507	Left Wire Ramp
35	12-7247-1	Ball Guide
36	01-12984	Ball Guide
37	A-19049	Dual Diverter Assembly
	A-19050	Dual Diverter Balde Assembly
38	A-19276	Bottom Arch Ball Guide
39	A-15849-L-4	Lower Left Flipper Assembly
	FL-15411	Flipper Coil
	20-9250-6	Shaft & Paddle
40	A-18575-1	Left Flipper Ball Guide
41	B-9362-L-2	Kicker (slingshot) Coil & Brkt Assy
	A-17811	Kicker Assembly
42	A-16816-15	Oblong Orange Standup Target Assy
43	A-16816-6	Oblong Yellow Standup Target Assy
44	A-16816-4	Oblong Red Standup Target Assy
45	A-16816-5	Oblong White Standup Target Assy
46	A-19309	Spinner Target
47	A-19754	Yellow 3-Bank Target Assy
48	A-19046	Loop Assembly
49	A-19128	Ted's Head Assembly
	A-19129	Jaw Drive Assembly
50	A-19127	Red's Head Assembly
	A-19129-1	Jaw Drive Assembly
51	A-19237	Small Coil Assembly
52	A-19235	Large Coil Assembly
53	A-19237	Small Coil Assembly

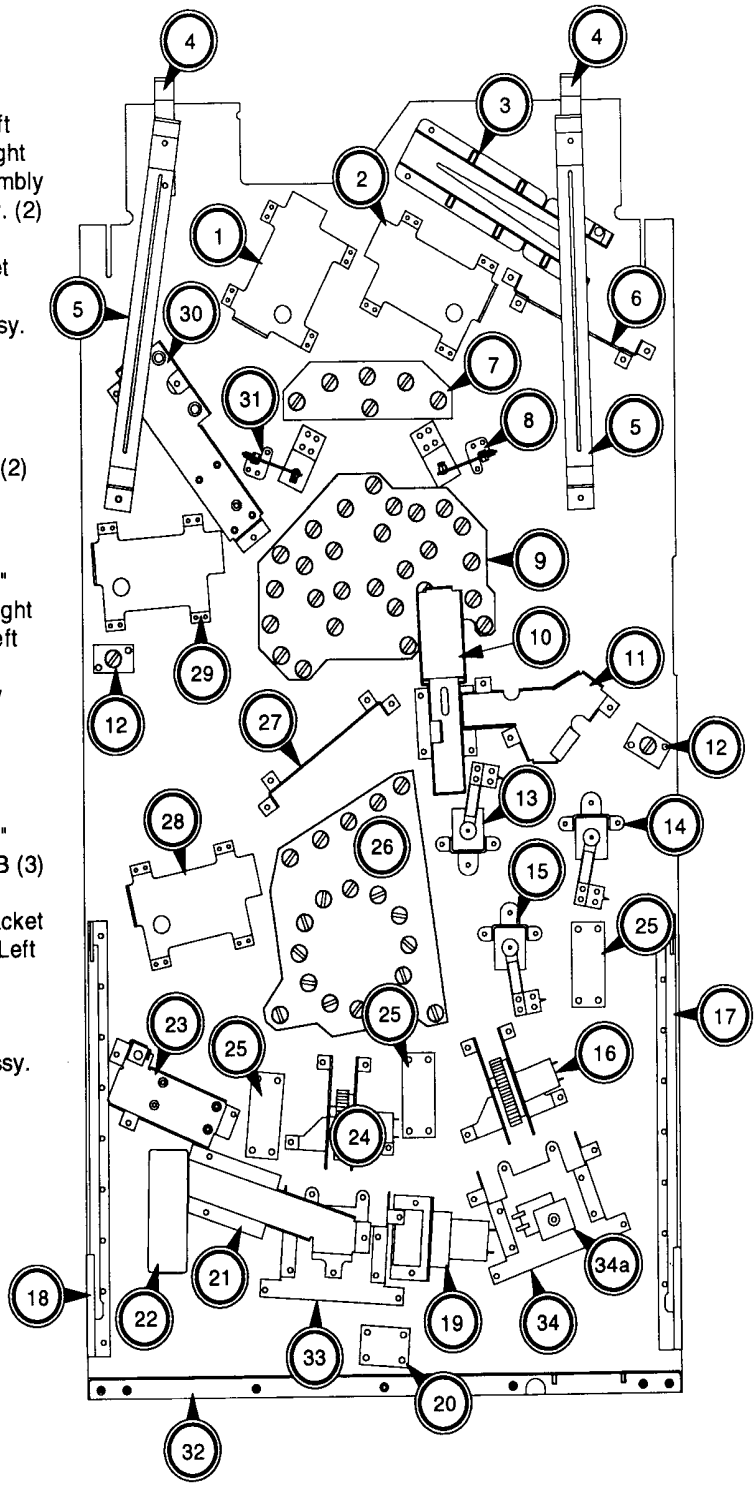


Not Shown:

A-13769-50024	Playfield & Insert Assembly
03-9310-1	Full Playfield Mylar
20-6500	Steel Ball
31-2006.1	Screened Bottom Arch

Lower Playfield Parts

Item	Part Number	Description
1	A-15849-L-1	Flipper Assembly, Lwr. Left
2	A-15849-R-4	Flipper Assembly, Lwr. Right
3	A-18753	Outhole Ball Trough Assembly
4	01-9211	Plfd. Hanger Bracket Assy. (2)
5	01-11781	Leg Support (2)
6	A-15595	7-Sw. Opto PCB w/Bracket
7	A-19206	6-Lamp Board Assembly
8	A-17811	Kicker Arm (Slingshot) Assy.
a)	B-9362-L-2	Coil & Bracket Assembly
9	A-19207	28-Lamp Board Assembly
10	A-19046	Loop Assembly
11	A-19047	Front Trough Assembly
12	A-15280	Single Flash Lamp Board (2)
13	B-9414	Jet Bumper Assembly
14	B-9414-5	Jet Bumper Assembly
15	B-9414-2	Jet Bumper Assembly
16	A-19129-1	Jaw Drive Assembly "Red"
17	A-17749.1-2	Plfd. Slide Mechanism, Right
18	A-17749.1-1	Plfd. Slide Mechanism, Left
19	A-18832	Blade Drive Assembly
20	A-15340	Motor EMI PCB Assembly
21	A-19231	Rear Trough Assembly
22	A-18794	Pop-Up Assembly
a)	A-19325	Bracket Pop-Up Coils
23	A-19041	Diverter Assembly, Left
24	A-19129	Jaw Drive Assembly "Ted"
25	A-18543-2	Generic Eddy Sensor PCB (3)
26	A-19272	20-Lamp PCB Assembly
27	A-19242-1	Dual H-Drive Motor w/Bracket
28	A-15849-L4	Flipper Assembly, Upper Left
29	A-15849-L-3	Flipper Assembly, Small
30	A-19049	Dual Diverter Assembly
a)	A-19694	Link Plunger Assembly
31	A-17811	Kicker Arm (Slingshot) Assy.
a)	B-9362-R-3	Coil & Bracket Assembly
32	A-19334	Back Panel Assembly
a)	A-13941	Eject Assembly
33	A-19128	Head Assembly "Ted"
34	A-19127	Head Assembly "Red"

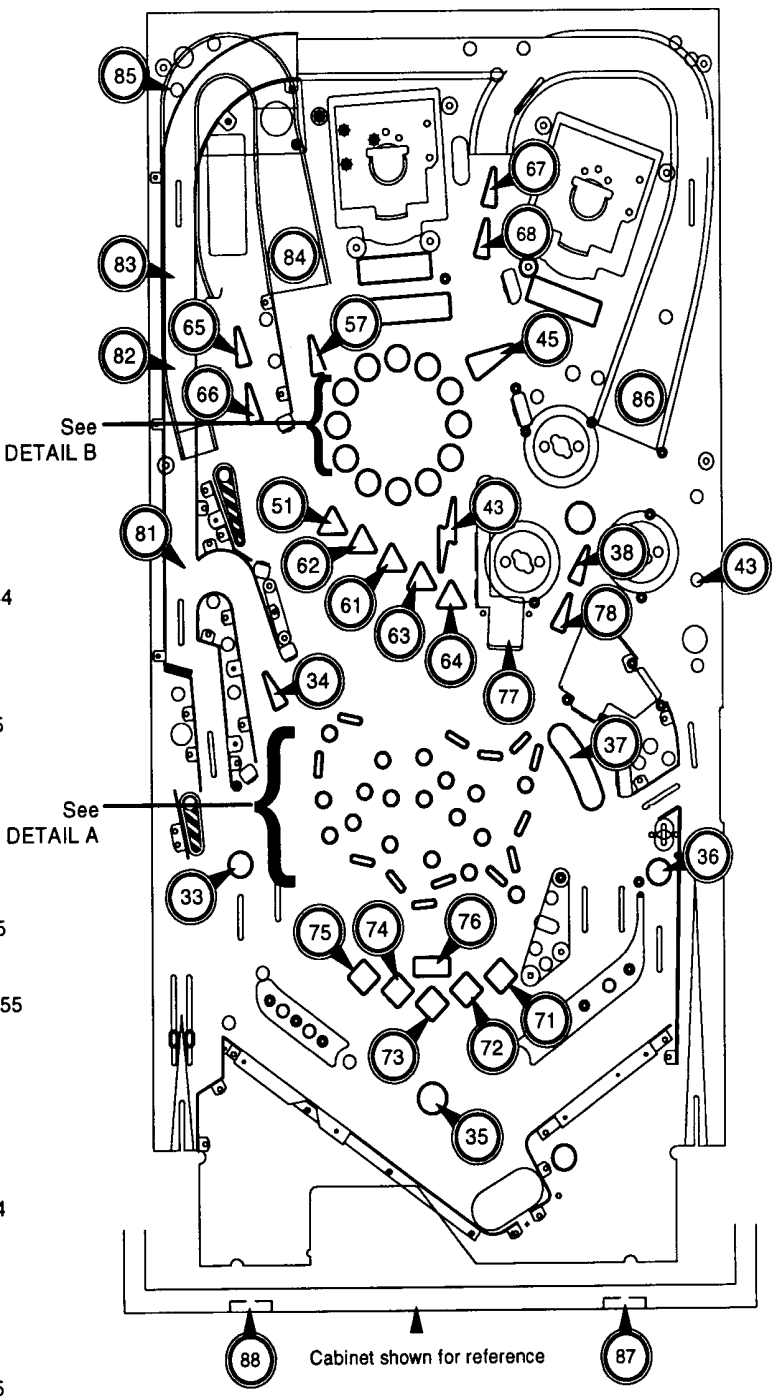


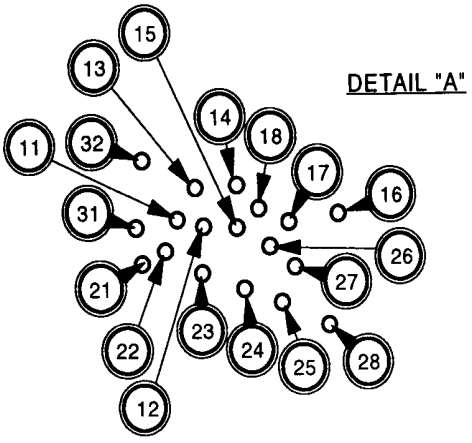
Lamp Matrix

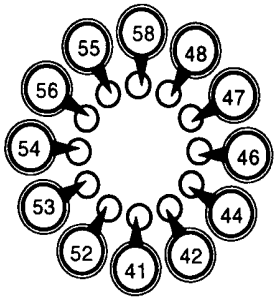
COLUMN / ROW	1 Yellow–Brown J137–1 Q98	2 Yellow–Red J137–2 Q97	3 Yellow–Orange J137–3 Q96	4 Yellow–Black J137–4 Q95	5 Yellow–Green J137–5 Q94	6 Yellow–Blue J137–6 Q93	7 Yellow–Violet J137–7 Q92	8 Yellow–Gray J137–9 Q91
Red–Brown J134–1 Q90 1	Salt Lake 11	Los Angeles 21	San Francisco 31	Bad Weather 41	Monday 51	Wednesday 61	Bonus 6X 71	Flying Rocks 5X Blast 81
Red–Black J134–2 Q89 2	Denver 12	Las Vegas 22	Seattle 32	Jets At Max 42	Spinner At Max 52	Tuesday 62	Bonus 5X 72	Flying Rocks Radio Riot 82
Red–Orange J134–4 Q88 3	Butte 13	Albuquerque 23	Left Special 33	Radio 43	Hold Bonus 53	Thursday 63	Bonus 4X 73	Flying Rocks Extra Ball 83
Red–Yellow J134–5 Q87 4	Minnesota 14	Dallas 24	Shoot Here Left Loop 34	Million Plus Wheel 44	Light Extra Ball Wheel 54	Friday 64	Bonus 3X 74	Left Bridge Out 84
Red–Green J134–6 Q87 5	Kansas City 15	New Orleans 25	Shoot Again 35	Big Millions 45	Lunch Time 55	Lock 65	Bonus 2X 75	Bob's Bunker 85
Red–Blue J134–7 Q86 6	New York City 16	Nashville 26	Right Special 36	Light Special 46	Bob's Freebie 56	Extra Ball 66	Light Extra Ball Lower 76	Right Bridge Out 86
Red–Violet J134–8 Q84 7	Ohio 17	Atlanta 27	Blasting Zone 37	Light Big Blast 47	Shoot Here Left Ramp 57	Shoot Here Right Loop 67	Start City 77	Buy In Button 87
Red–Gray J134–9 Q83 8	Chicago 18	Miami 28	Shoot Here Right Ramp 38	Flying Rocks 48	You're There 58	Light Bob's 68	Million Plus Right Ramp 78	Start Button 88

Lamp Locations

Item	Bulb Number	Lamp Assy Number	Description
11	24-8768	A-19207	Salt Lake #555
12	24-8768	A-19207	Denver #555
13	24-8768	A-19207	Butte #555
14	24-8768	A-19207	Minnesota #555
15	24-8768	A-19207	Kansas City #555
16	24-8768	A-19207	New York City #555
17	24-8768	A-19207	Ohio #555
18	24-8768	A-19207	Chicago #555
21	24-8768	A-19207	Los Angeles #555
22	24-8768	A-19207	Las Vegas #555
23	24-8768	A-19207	Albuquerque #555
24	24-8768	A-19207	Dallas #555
25	24-8768	A-19207	New Orleans #555
26	24-8768	A-19207	Nashville #555
27	24-8768	A-19207	Atlanta #555
28	24-6549	A-17807	Miami #44
31	24-8768	A-19207	San Francisco #555
32	24-8768	A-19207	Seattle #555
33	24-6549	A-17835	Left Special #44
34	24-6549	A-17835	Shoot Here L. Loop #44
35	24-6549	A-17807	Shoot Again #44
36	24-6549	A-17835	Right Special #44
37	24-6549	A-17807	Blasting Zone #44
38	24-6549	A-17835	Shoot Here R. Ramp #44
41	24-8768	A-19272	Bad Weather #555
42	24-8768	A-19272	Jets At Max #555
43	24-8768	A-19272	Radio #555
	24-6549	A-17836	Radio #44
44	24-8768	A-19272	Million Plus Wheel #555
45	24-8768	A-19272	Big Millions #555
46	24-8768	A-19272	Light Special #555
47	24-8768	A-19272	Light Big Blast #555
48	24-8768	A-19272	Flying Rocks #555
51	24-8768	A-19272	Monday #555
52	24-8768	A-19272	Spinner At Max #555
53	24-8768	A-19272	Hold Bonus #555
54	24-8768	A-19272	Light Ex. B. Wheel #555
55	24-8768	A-19272	Lunch Time #555
56	24-8768	A-19272	Bob's Freebie #555
57	24-8768	A-19272	Shoot Here L. Ramp #555
58	24-8768	A-19272	You're There #555
61	24-8768	A-19272	Wednesday #555
62	24-8768	A-19272	Tuesday #555
63	24-8768	A-19272	Thursday #555
64	24-8768	A-19272	Friday #555
65	24-6549	A-17835	Lock #44
66	24-6549	A-17835	Extra Ball #44
67	24-6549	A-17836	Shoot Here R. Loop #44
68	24-6549	A-17836	Light Bob's #44
71	24-8768	A-19206	Bonus 6X #555
72	24-8768	A-19206	Bonus 5X #555
73	24-8768	A-19206	Bonus 4X #555
74	24-8768	A-19206	Bonus 3X #555
75	24-8768	A-19206	Bonus 2X #555
76	24-8768	A-19206	Light Ex. B. Lower #555
77	24-6549	A-17836	Start City #44
78	24-6549	A-17807	Million Plus R. Ramp #44
81	24-6549	A-17836	Flying Rocks 5X Blast #44
82	24-6549	A-17836	Flying Rocks Radio Riot #44
83	24-6549	A-17836	Flying Rocks Ex. Ball #44
84	-----	A-19064	Left Bridge Out
85	24-6549	A-16041	Bob's Bunker #44
86	-----	A-19064	Right Bridge Out
87	-----	20-9663-9	Buy-in Button
88	-----	20-9663-1	Start Button





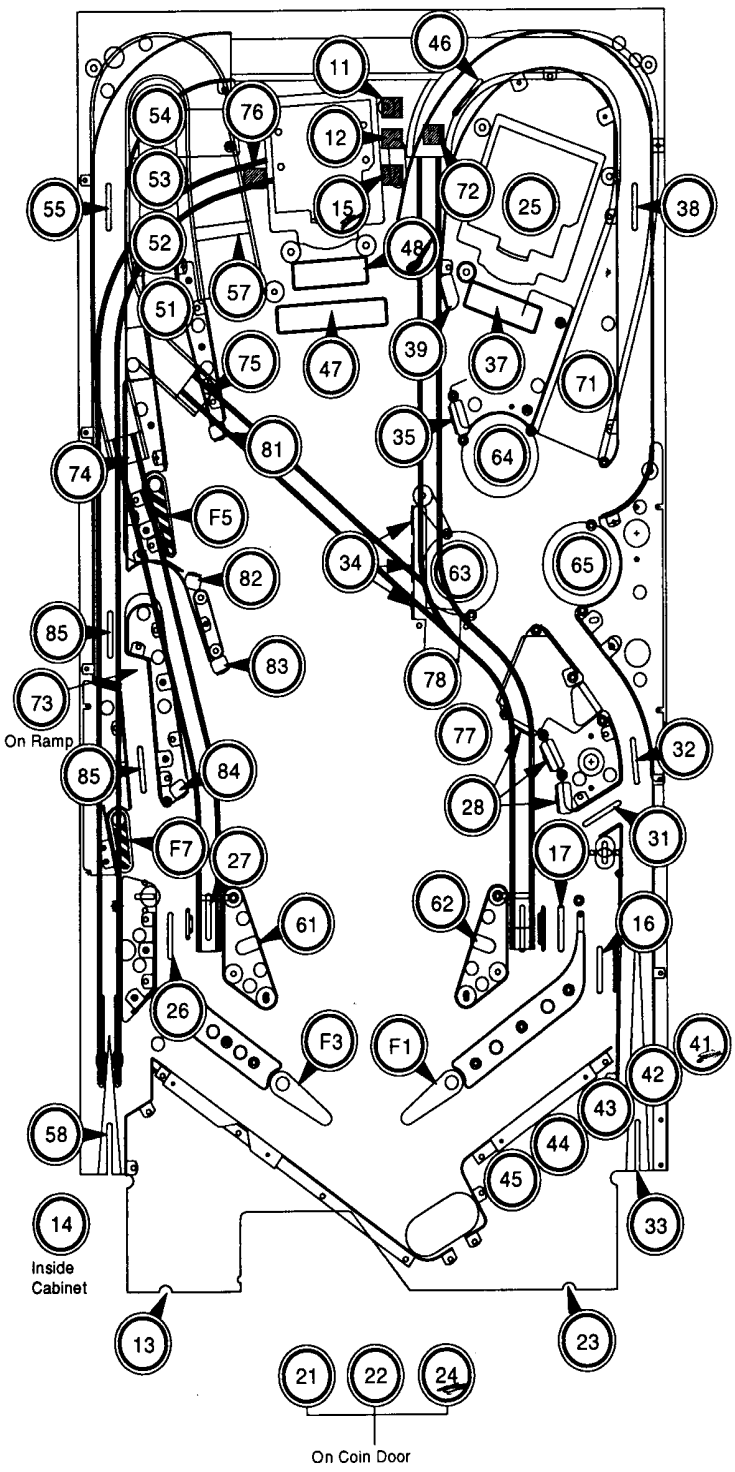


Switch Matrix

Dedicated Grounded Switches	COLUMN / ROW	1 Green–Brown J207–1 U20–18	2 Green–Red J207–2 U20–17	3 Green–Orange J207–3 U20–16	4 Green–Yellow J207–4 U20–15	5 Green–Black J207–5 U20–14	6 Green–Blue J207–6 U20–13	7 Green–Violet J207–7 U20–12	8 Green–Gray J207–9 U20–11	Flipper Grounded Switches
Org–Brn J205–1 Left Coin Chute D1	White–Brown J209–1 U18–11 1	Ted's Mouth 11	Slam Tilt 21	Skill Shot Lower 31	Trough Jam 41	Spinner 51	Left Sling 61	Right Ramp Enter 71	White Standup 81	Black–Green J906–1 Lower Right E.O.S. F1
Org–Red J205–2 Center Coin Chute D2	White–Red J209–2 U18–9 2	Dozer Down 12	Coin Door Closed 22	Skill Shot Upper 32	Trough 1 42	Lockup 1 52	Right Sling 62	Right Ramp Exit Center 72	Red Standup 82	Blue–Violet J905–1 Lower Right Opto F2
Org–Blk J205–3 Right Coin Chute D3	White–Orange J209–3 U18–5 3	Start Button 13	Buy In Button 23	Right Shooter 33	Trough 2 43	Lockup 2 53	Left Jet 63	Flying Rocks 5X Blast 73	Yellow Standup 83	Black–Blue J906–3 Lower Left E.O.S. F3
Org–Yel J205–4 4th Coin Chute D4	White–Yellow J209–4 U18–7 4	Plumb Bob Tilt 14	Always Closed 24	Radio 3–Bank 34	Trough 3 44	Lock Kickout 54	Top Jet 64	Flying Rocks Radio Riot 74	Orange Standup 84	Blue–Gray J905–2 Lower Left Opto F4
Org–Grn J205–6 Normal Service Credit; Test Escape D5	White–Green J209–5 U19–11 5	Dozer Up 15	Red's Mouth 25	Red Standup Upper 35	Trough 4 45	Right Ramp Exit Left 55	Right Jet 65	Flying Rocks Extra Ball 75	Middle Left Flipper Top 85	Black–Violet J906–4 Middle Left E.O.S. F5
Org–Blu J205–7 Normal Volume Down; Test Down D6	White–Blue J209–7 U19–9 6	Right Outlane 16	Left Outlane 26	Red Standup Lower 36	Right Loop Enter 46	Left Ramp Exit 56	Not Used 66	Flying Rocks Top 76	Middle Left Flipper Bottom 86	Black–Yellow J905–3 Upper Right Opto F6
Org–Vio J205–8 Normal Volume Up; Test Up D7	White–Violet J209–8 U19–5 7	Right Inlane 2 17	Left Inlane 27	Hit Red 37	Hit Bulldozer 47	Left Ramp Enter 57	Not Used 67	Under Blast Zone 77	Not Used 87	Black–Gray J906–5 Upper Left E.O.S. F7
Org–Gry J205–9 Normal Begin Test; Test Enter D8	White–Gray J209–9 U19–7 8	Right Inlane 1 18	Blast Zone 3–Bank 28	Right Loop Exit 38	Hit Ted 48	Left Shooter 58	Not Used 68	Start City 78	Not Used 88	Black–Blue J905–5 Upper Left Opto F8

Switch Locations

Item	Switch Number	Description
F1	SW-1A-194	Low Rt. Flipper EOS
F2	A-17316	Low Rt. Flipper Cab.
F3	SW-1A-194	Low Lt. Flipper EOS
F4	A-17316	Low Lt. Flipper Cab.
F5	SW-1A-194	Up. Lt. Flipper EOS
F6	A-17316	Up. Lt. Flipper Cab.
F7	SW-1A-194	Mid. Lt. Flipper EOS
F8	A-17316	Mid Lt. Flipper Cab.
11	5647-12693-23	Ted's Mouth
12	A-19359	Dozer Down
13	20-9663-1	Start Button
14	A-15361	Plumb Bob Tilt
15	A-19359	Dozer Up
16	5647-12693-19	Right Outlane
17	5647-12693-19	Right Inlane 2
18	5647-12693-19	Right Inlane 1
21	A-17238	Slam Tilt
22	5643-09268-00	Coin Door Closed
23	20-9663-9	Buy-In Button
24	5643-09112-00	Always Closed
25	5647-12693-43	Red's Mouth
26	5647-12693-19	Left Outlane
27	5647-12693-19	Left Inlane
28	A-19753	Blast Zone 3-Bank
31	5647-12693-19	Skill Shot Lower
32	5647-12693-19	Skill Shot Upper
33	5647-12693-32	Right Shooter
34	A-19754	Radio 3-Bank
35	A-18060-15	Red Stand Upper Tgt.
36	A-18060-15	Red Stand Low Tgt.
37	A-19237	Hit Red
38	5647-12693-19	Right Loop Exit
41	A-18617 (LED) A-18618 (Trans)	Trough Jam
42	A-18617 (LED) A-18618 (Trans)	Trough 1
43	A-18617 (LED) A-18618 (Trans)	Trough 2
44	A-18617 (LED) A-18618 (Trans)	Trough 3
45	A-18617 (LED) A-18618 (Trans)	Trough 4
46	5647-12693-19	Right Loop Enter
47	A-19235	Hit Bulldozer
48	A-19237	Hit Ted
51	5647-12693-24	Spinner
52	5647-12693-61	Lockup 1
53	5647-12693-61	Lockup 2
54	5647-12693-23	Lock Kickout
55	5647-12693-19	Rt. Ramp Exit Left
56	5647-12693-21	Left Ramp Exit
57	5647-12693-24	Left Ramp Enter
58	5647-12693-32	Left Shooter
61	A-19680	Left Slingshot
62	A-19680	Right Slingshot
63	B-12030-2	Left Jet Bumper
64	B-12030-2	Top Jet Bumper
65	B-12030-2	Right Jet Bumper
66		Not Used
67		Not Used
68		Not Used
71	5647-12693-24	Rt. Ramp Enter
72	5647-12693-21	Rt. Ramp Exit Center
73	5647-12693-59	Flying Rocks 5X Blast
74	5647-12693-59	Flying Rocks Radio Riot
75	5647-12693-59	Flying Rocks Ex. Ball
76	5647-12693-24	Flying Rocks Top
77	5647-12693-19	Under Blast Zone
78	5647-12693-19	Start City



Item	Switch Number	Description
81	A-16816-5	White Standup Tgt.
82	A-16816-4	Red Standup Tgt.
83	A-16816-6	Yellow Standup Tgt.
84	A-16816-15	Orange Standup Tgt.
85	5647-12693-19	Mid. Lt. Flipper Top
86	5647-12693-19	Mid. Lt. Flipper Bottom
87		Not Used
88		Not Used

Solenoid/Flasher Table

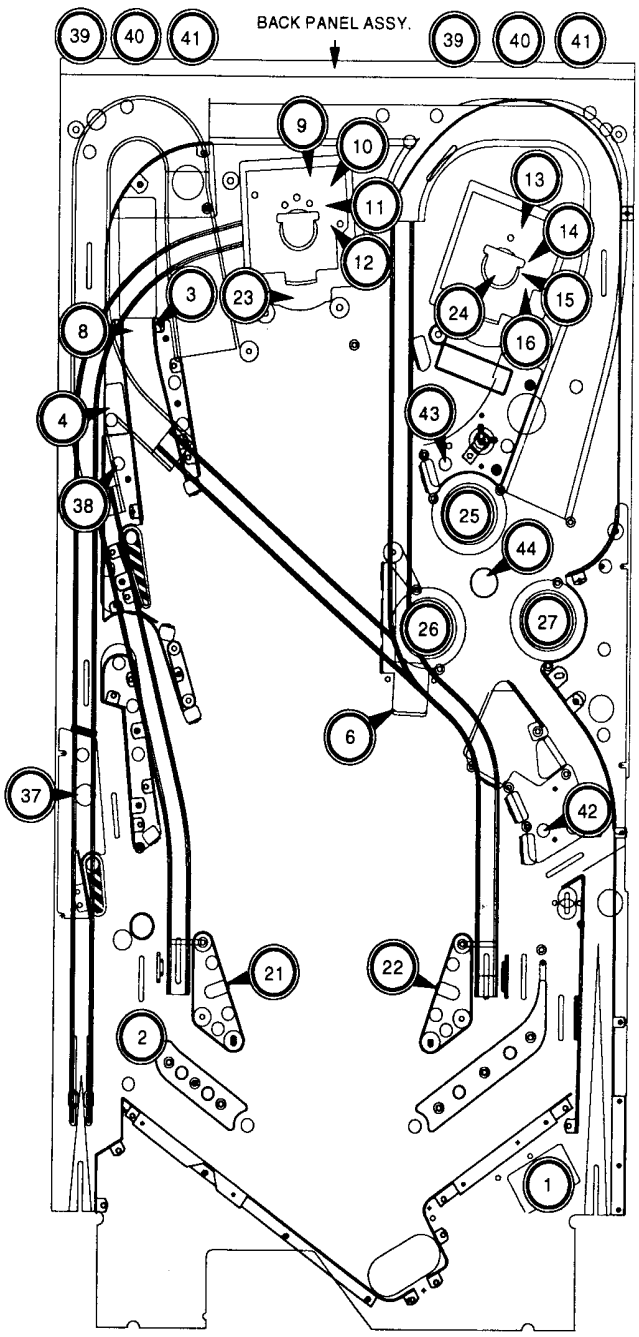
SOL. NO.	FUNCTION	SOLENOID TYPE	VOLTAGE CONNECTIONS			DRIVE XISTOR	DRIVE CONNECTIONS			DRIVE WIRE	SOLENOID PART NUMBER FLASHLAMP TYPE	
			PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX
01	Trough	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	Lower Left Diverter	High Power	J107-2			Q80	J130-2			Vio-Red	AL-26-1500	
03	Lock-up Pin	High Power	J107-2			Q78	J130-4			Vio-Org	AE-26-1500	
04	Upper Left Diverter	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1200	
05	Upper Right Diverter	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-26-1200	
06	Start City	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-26-1200	
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk	AE-23-800	
08	Lock Kickout	High Power	J017-2			Q70	J130-9			Vio-Gry	AE-24-900	
09	Ted Eyes Left	Low Power	J107-3			Q58	J127-1			Brn-Blk	SM-30-1100	
10	Ted Lids Down	Low Power	J017-3			Q56	J127-3			Brn-Red	SM-30-1100	
11	Ted Lids Up	Low Power	J107-3			Q54	J127-4			Brn-Org	SM-31-900	
12	Ted Eyes Right	Low Power	J107-3			Q52	J127-5			Brn-Yel	SM-30-1100	
13	Red Lids Down	Low Power	J107-3			Q50	J127-6			Brn-Grn	SM-30-1100	
14	Red Eyes Left	Low Power	J107-3			Q48	J127-7			Brn-Blu	SM-30-1100	
15	Red Lids Up	Low Power	J107-3			Q46	J127-8			Brn-Vio	SM-31-900	
16	Red Eyes Right	Low Power	J107-3			Q44	J127-9			Brn-Gry	SM-30-1100	
17	Red Motor On	Low Power	J117-2			Q42	J126-1			Blk-Brn		
18	Red Motor Direction	Low Power	J117-2			Q40	J126-2			Blk-Red	A-13997	
19	Ted Motor Direction	Low Power	J117-2			Q38	J126-3			Blk-Org		
20	Ted Motor On	Low Power	J117-2			Q36	J126-4			Blk-Yel	A-13997	
21	Left Sling	Low Power	J107-1			Q28	J126-5			Blu-Grn	AE-26-1200	
22	Right Sling	Low Power	J107-1			Q30	J126-6			Blu-Blk	AE-26-1200	
23	Bulldozer Motor	Low Power	J117-2			Q34	J126-7			Blu-Vio	14-8016	
24	Red Eject	Low Power	J107-1			Q32	J126-8			Blu-Gry	AE-26-1500	
25	Top Jet	Gen. Purpose	J107-1			Q26	J122-1			Blu-Brn	AE-26-1200	
26	Left Jet	Gen. Purpose	J107-1			Q24	J122-2			Blu-Red	AE-26-1200	
27	Right Jet	Gen. Purpose	J107-1			Q22	J122-3			Blu-Org	AE-26-1200	
28	Shaker Motor	Gen. Purpose	J107-4			Q20	J122-4			Blu-Yel	14-7951	
29-36	See Flipper Circuit											
37	Little Flipper	Low Power	J107-4			Q16	J4-2			Brn-Wht	#902 (1)	
38	Left Ramp	Low Power	J107-4			Q15	J4-4			Blk-Wht	#906 (1)	
39	Back White	Low Power	J107-4			Q14	J4-5			Org-Wht	#906 (2)	
40	Back Yellow	Low Power	J107-4			Q13	J4-6			Yel-Wht	#906 (2)	
41	Back Red	Low Power	J107-4			Q9	J3-2			Grn-Wht	#906 (2)	
42	Blasting Zone	Low Power	J107-4			Q10	J3-3			Blu-Wht	#89 (1)	
43	Right Ramp	Low Power	J107-4			Q11	J3-4			Vio-Wht	#906 (1)	
44	Jets	Low Power	J107-4			Q12	J3-5			Gry-Wht	#89 (1)	
	GENERAL ILLUMINATION											
01	Playfield/Insert 1	G.I.	J120-1	J121-1		Q18	J120-7	J121-7		Wht-Brn	#44	#555
02	Playfield/Insert 2	G.I.	J120-2	J121-2		Q10	J120-8	J121-8		Wht-Org	#44	#555
03	Playfield/Insert 3	G.I.	J120-3	J121-3		Q14	J120-9	J121-9		Wht-Yel	#44	#555
04	Right Playfield	G.I.	J120-5			Q16	J120-10			Wht-Grn	#44	
05	Left Playfield	G.I.	J120-6		J119-3	Q12	J120-11		J119-1	Wht-Vio	#44	

	FLIPPER CIRCUITS		VOLTAGE CONNECTION	DRIVE XISTOR POWER	DRIVE XISTOR HOLD	DRIVE CONNECTION PLAYFIELD	DRIVE WIRE POWER	DRIVE WIRE HOLD	COIL PART NUMBER	COIL COLOR
29 30	Lower Right Flipper	Power Hold	J907-1 (Red-Grn) J907-1 (Red-Grn)	Q4	Q11	J902-13 J902-11	Yel-Grn	Org-Grn	FL-15411	ORANGE
31 32	Lower Left Flipper	Power Hold	J907-4 (Red-Blu) J907-4 (Red-Blu)	Q3	Q9	J902-9 J902-7	Yel-Blu	Org-Blu	FL-15411	ORANGE
33 34	Upper Left Flipper	Power Hold	J907-6 (Red-Vio) J907-6 (Red-Vio)	Q2	Q7	J902-6 J902-4	Yel-Vio	Org-Vio	FL-11753	YELLOW
35 36	Middle Left Flipper	Power Hold	J907-8 (Red-Gry) J907-8 (Red-Gry)	Q1	Q5	J902-3 J902-1	Yel-Gry	Org-Gry	FL-11722	GREEN

J1XX-X = POWER DRIVER BOARD, JX-X = 8-DRIVER BOARD, J9XX-X = FLIPTRONIC II BOARD

Solenoid/Flashlamp Locations

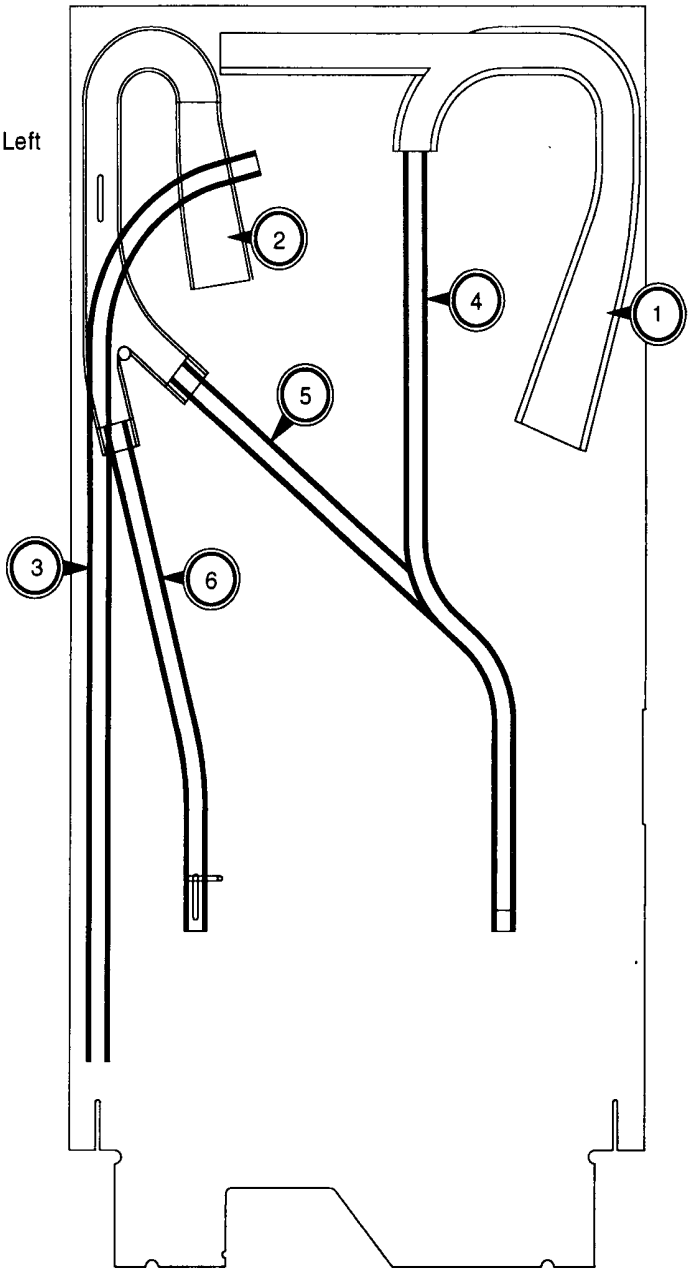
Item	Coil/Flasher Number	Assembly Number	Description
01	AE-26-1500	A-18753	Trough
02	AE-26-1500	A-19049	Lower Lt. Diverter
03	AL-26-1500	A-18794	Lock-Up Pin
04	AE-26-1200	A-19041	Upper Lt. Diverter
05	AE-26-1200	A-18948	Upper Rt. Diverter
06	AE-24-900	A-19046	Start City
07	AE-23-800	B-10686-1	Knocker
08	AE-24-900	A-18794	Lock Kickout
09	SM-30-1100	A-19128	Ted Eyes Left
10	SM-30-1100	A-19128	Ted Lids Down
11	SM-31-900	A-19128	Ted Lids Up
12	SM-30-1100	A-19128	Ted Eyes Right
13	SM-30-1100	A-19127	Red Lids Down
14	SM-30-1100	A-19127	Red Eyes Left
15	SM-31-900	A-19127	Red Lids Up
16	SM-30-1100	A-19127	Red Eyes Right
17	A-13997	A-19129-1	Red Motor On
18	A-13997	A-19129-1	Red Motor Direction
19	A-13997	A-19129	Ted Motor On
20	A-13997	A-19129	Ted Motor Direction
21	AE-26-1200	B-9362-L-2	Left Slingshot
22	AE-26-1200	B-9362-R-3	Right Slingshot
23	14-8016	A-18832	Bulldozer Motor
24	AE-26-1500	A-13941	Red Eject
25	AE-26-1200	A-9415-2	Top Jet Bumper
26	AE-26-1200	A-9415-2	Left Jet Bumper
27	AE-26-1200	A-9415-2	Right Jet Bumper
28	14-7951	A-19169	Shaker Motor
FLIPPER			
29-30	FL-15411	A-15849-R-4	Lower Right Flipper
31-32	FL-15411	A-15849-L-4	Lower Left Flipper
33-34	FL-11753	A-15849-L-1	Upper Left Flipper
35-36	FL-11722	A-15849-L-3	Middle Left Flipper
FLASHLAMPS			
37	24-8802	A-15280	Little Flipper Flshr #906
38	24-8802	*A-14265-13	Left Ramp Flshr #906
39	24-8802	*A-14265-13	Back White Flshr #906
40	24-8802	*A-14265-13	Back Yellow Flshr #906
41	24-8802	*A-14265-13	Back Red Flshr #906
42	24-8802	*A-14265-13	Blasting Zone Flshr #906
	24-8704	A-17803	Blasting Zone Flshr #89
43	24-8802	*A-14265-13	Right Ramp Flshr#906
44	24-8704	A-17984	Jets Flshr #89
GENERAL ILLUMINATION			
01	24-6549/24-8768	-----	Plfd/Insert G.I. 1 #44/#555
02	24-6549/24-8768	-----	Plfd/Insert G.I. 2 #44/#555
03	24-6549/24-8768	-----	Plfd/Insert G.I. 3 #44/#555
04	24-6549	-----	Right Plfd G.I. 4 #44
05	24-6549	-----	Left Plfd G.I. 5 #44



*** A-14265-13 is a receptacle and skirt assembly. This assembly is riveted to a playfield plastic or ramp. The #906 bulb the assembly uses is sold separate.**

Ramps

Item	Part Number	Description
1	A-18235	Plastic Ramp Assembly, Right
2	A-18262	Plastic RAmp Assembly, Left
a)	5647-12693-21	Mini Micro Switch
3	A-18506	Wire Shooter Ramp Assembly, Left
4	A-18509	Wire Ramp Assembly, Right
5	A-18508	Cross Over Wire Ramp Assy.
6	A-18507	Wire Ramp Assembly, Left



SECTION THREE

GAME WIRING AND SCHEMATICS

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack (except the Audio Board and the Dot matrix Display/Driver Board) 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 refers to a fuse located on the Audio Board.

Prefix numbers for WPC circuit boards are listed below.
1 - Power Driver Board
2 - CPU Board
6 - Dot Matrix Controller Board
9 - Fliptronic II Controller Board

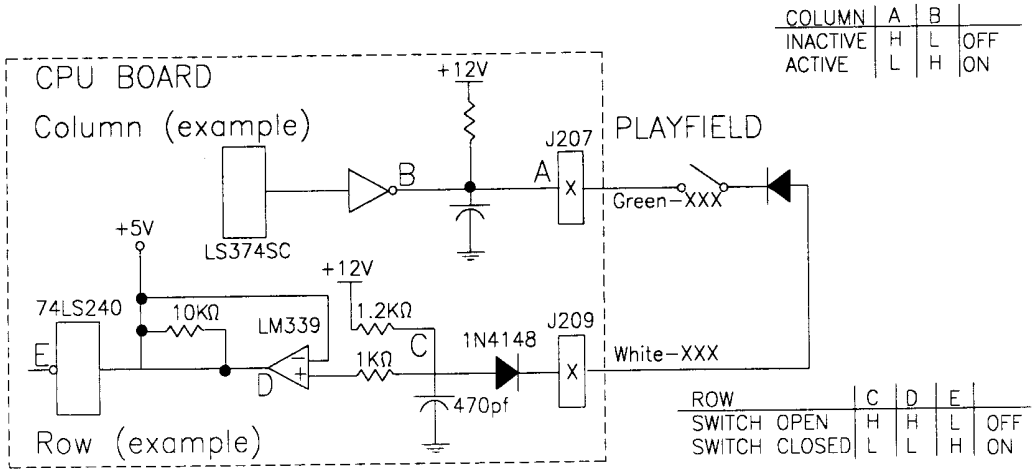
The Audio Board and the Dot Matrix Display/Driver Board do not have identification numbers.

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

SWITCH MATRIX

Dedicated Grounded Switches	COLUMN / ROW	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-9 U20-11	Flipper Grounded Switches
Org-Brn J205-1 Left Coin Chute D1	White-Brown J209-1 U18-11 1	Ted's Mouth 11	Slam Tilt 21	Skill Shot Lower 31	Trough Jam 41	Spinner 51	Left Sling 61	Right Ramp Enter 71	White Standup 81	Black-Green J906-1 Lower Right E.O.S. F1
Org-Red J205-2 Center Coin Chute D2	White-Red J209-2 U18-9 2	Dozer Down 12	Coin Door Closed 22	Skill Shot Upper 32	Trough 1 42	Lockup 1 52	Right Sling 62	Right Ramp Exit Center 72	Red Standup 82	Blue-Violet J905-1 Lower Right Opto F2
Org-Blk J205-3 Right Coin Chute D3	White-Orange J209-3 U18-5 3	Start Button 13	Buy In Button 23	Right Shooter 33	Trough 2 43	Lockup 2 53	Left Jet 63	Flying Rocks 5X Blast 73	Yellow Standup 83	Black-Blue J906-3 Lower Left E.O.S. F3
Org-Yel J205-4 4th Coin Chute D4	White-Yellow J209-4 U18-7 4	Plumb Bob Tilt 14	Always Closed 24	Radio 3-Bank 34	Trough 3 44	Lock Kickout 54	Top Jet 64	Flying Rocks Radio Riot 74	Orange Standup 84	Blue-Gray J905-2 Lower Left Opto F4
Org-Grn J205-6 Normal Service Credit Test Escape D5	White-Green J209-5 U19-11 5	Dozer Up 15	Red's Mouth 25	Red Standup Upper 35	Trough 4 45	Right Ramp Exit Left 55	Right Jet 65	Flying Rocks Extra Ball 75	Middle Left Flipper Top 85	Black-Violet J906-4 Upper Left E.O.S. F5
Org-Blu J205-7 Normal Volume Down Test Down D6	White-Blue J209-7 U19-9 6	Right Outlane 16	Left Outlane 26	Red Standup Lower 36	Right Loop Enter 46	Left Ramp Exit 56	Not Used 66	Flying Rocks Top 76	Middle Left Flipper Bottom 86	Black-Yellow J905-3 Upper Left Opto F6
Org-Vio J205-8 Normal Volume Up Test Up D7	White-Violet J209-8 U19-5 7	Right Inlane 2 17	Left Inlane 27	Hit Red 37	Hit Bulldozer 47	Left Ramp Enter 57	Not Used 67	Under Blast Zone 77	Not Used 87	Black-Gray J906-5 Middle Left E.O.S. F7
Org-Gry J205-9 Normal Begin Test Test Enter D8	White-Gray J209-9 U19-7 8	Right Inlane 1 18	Blast Zone 3-Bank 28	Right Loop Exit 38	Hit Ted 48	Left Shooter 58	Not Used 68	Start City 78	Not Used 88	Black-Blue J905-5 Middle Left Opto F8

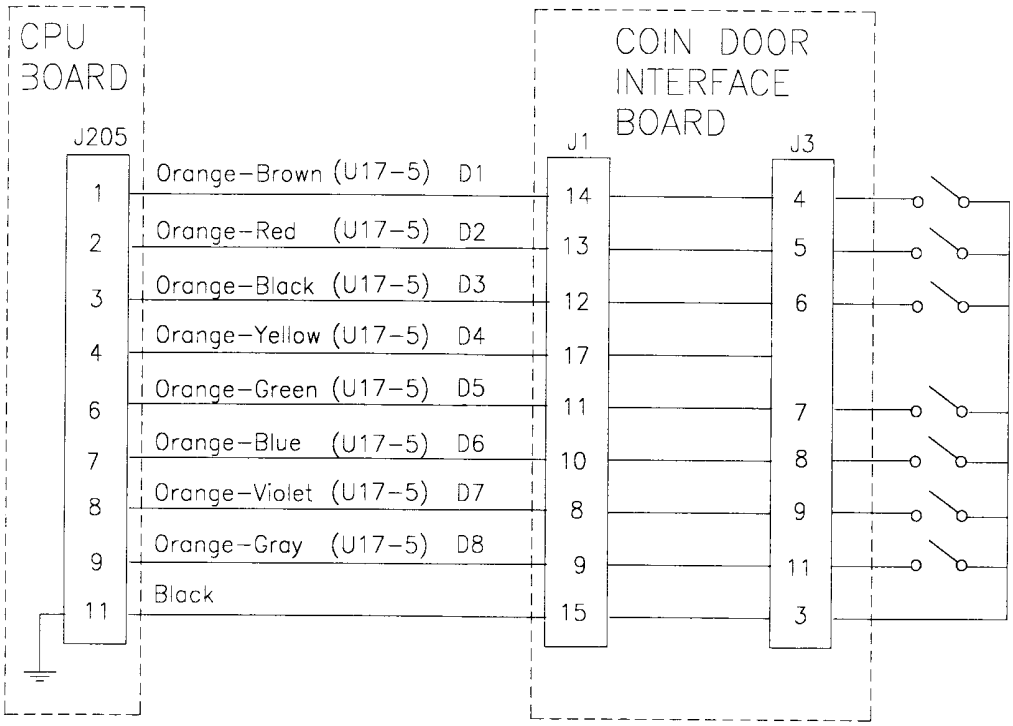
SWITCH MATRIX CIRCUIT



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.

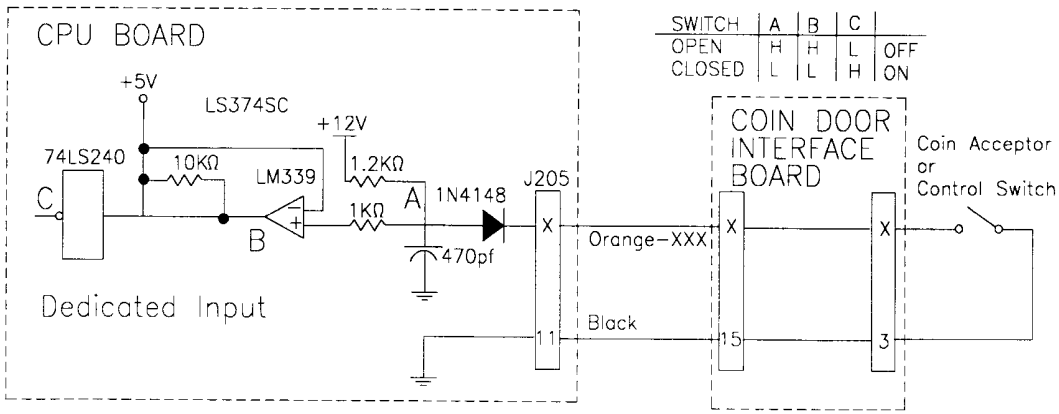
DEDICATED SWITCHES



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



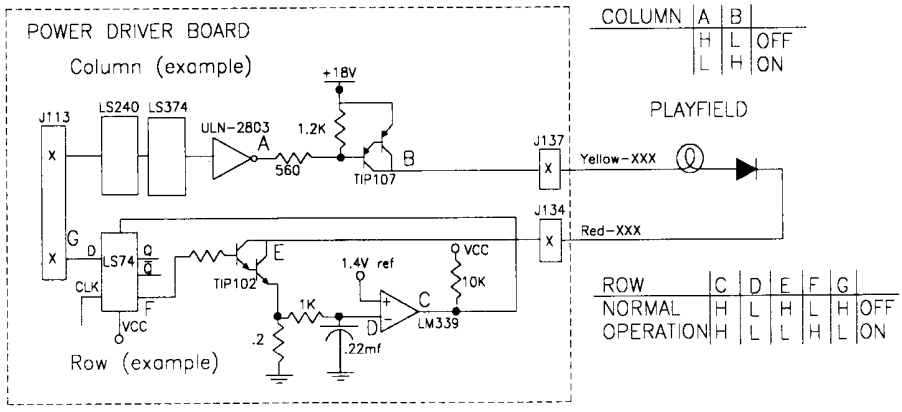
The dedicated switches operate similar in the matrix, except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).

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

COLUMN / ROW	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J137-7 Q92	8 Yellow-Gray J137-9 Q91
Red-Brown J134-1 Q90 1	Salt Lake 11	Los Angeles 21	San Francisco 31	Bad Weather 41	Monday 51	Wednesday 61	Bonus 6X 71	Flying Rocks 5X Blast 81
Red-Black J134-2 Q89 2	Denver 12	Las Vegas 22	Seattle 32	Jets At Max 42	Spinner At Max 52	Tuesday 62	Bonus 5X 72	Flying Rocks Radio Riot 82
Red-Orange J134-4 Q88 3	Butte 13	Albuquerque 23	Left Special 33	Radio 43	Hold Bonus 53	Thursday 63	Bonus 4X 73	Flying Rocks Extra Ball 83
Red-Yellow J134-5 Q87 4	Minnesota 14	Dallas 24	Shoot Here Left Loop 34	Million Plus Wheel 44	Light Extra Ball Wheel 54	Friday 64	Bonus 3X 74	Left Bridge Out 84
Red-Green J134-6 Q87 5	Kansas City 15	New Orleans 25	Shoot Again 35	Big Millions 45	Lunch Time 55	Lock 65	Bonus 2X 75	Bob's Bunker 85
Red-Blue J134-7 Q86 6	New York City 16	Nashville 26	Right Special 36	Light Special 46	Bob's Freebie 56	Extra Ball 66	Light Extra Ball Lower 76	Right Bridge Out 86
Red-Violet J134-8 Q84 7	Ohio 17	Atlanta 27	Blasting Zone 37	Light Big Blast 47	Shoot Here Left Ramp 57	Shoot Here Right Loop 67	Start City 77	Buy In Button 87
Red-Gray J134-9 Q83 8	Chicago 18	Miami 28	Shoot Here Right Ramp 38	Flying Rocks 48	You're There 58	Light Bob's 68	Million Plus Right Ramp 78	Start Button 88

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 row circuit off.

SOLENOID/FLASHLAMP TABLE

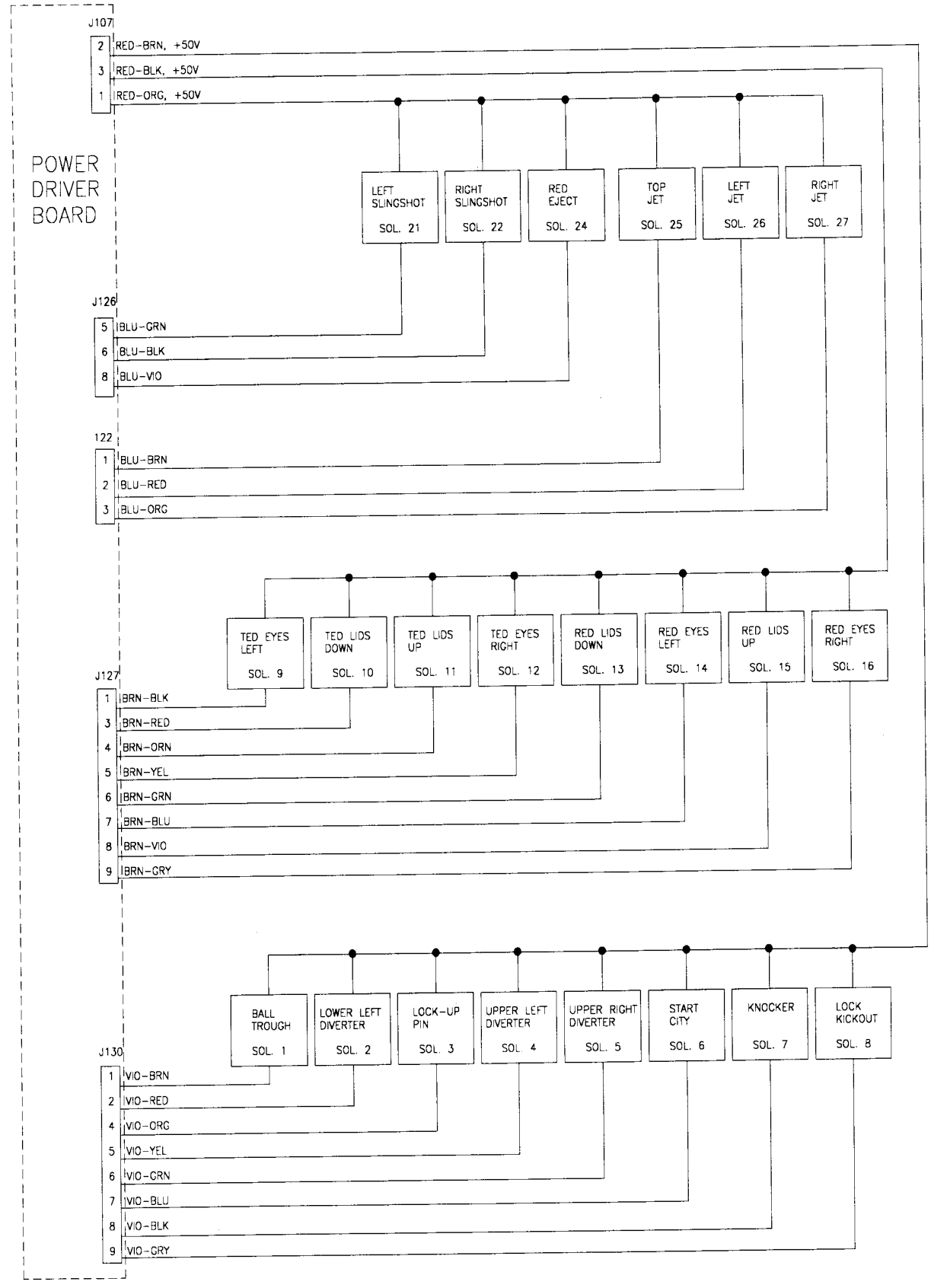
SOL. NO.	FUNCTION	SOLENOID TYPE	VOLTAGE CONNECTIONS			DRIVE XISTOR	DRIVE CONNECTIONS			DRIVE WIRE	SOLENOID PART NUMBER FLASHLAMP TYPE	
			PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX
01	Trough	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	Lower Left Diverter	High Power	J107-2			Q80	J130-2			Vio-Red	AE-26-1500	
03	Lock-up Pin	High Power	J107-2			Q78	J130-4			Vio-Org	AL-26-1500	
04	Upper Left Diverter	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-26-1200	
05	Upper Right Diverter	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-26-1200	
06	Start City	High Power	J107-2			Q66	J130-7			Vio-Blu	AE-24-900	
07	Knocker	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	Lock Kickout	High Power	J017-2			Q70	J130-9			Vio-Gry	AE-24-900	
09	Ted Eyes Left	Low Power	J107-3			Q58	J127-1			Brn-Blk	SM-30-1100	
10	Ted Lids Down	Low Power	J017-3			Q56	J127-3			Brn-Red	SM-30-1100	
11	Ted Lids Up	Low Power	J107-3			Q54	J127-4			Brn-Org	SM-31-900	
12	Ted Eyes Right	Low Power	J107-3			Q52	J127-5			Brn-Yel	SM-30-1100	
13	Red Lids Down	Low Power	J107-3			Q50	J127-6			Brn-Grn	SM-30-1100	
14	Red Eyes Left	Low Power	J107-3			Q48	J127-7			Brn-Blu	SM-30-1100	
15	Red Lids Up	Low Power	J107-3			Q46	J127-8			Brn-Vio	SM-31-900	
16	Red Eyes Right	Low Power	J107-3			Q44	J127-9			Brn-Gry	SM-30-1100	
17	Red Motor On	Low Power	J118-2			Q42	J126-1			Blk-Brn		
18	Red Motor Direction	Low Power	J118-2			Q40	J126-2			Blk-Red	A-13997	
19	Ted Motor Direction	Low Power	J118-2			Q38	J126-3			Blk-Org		
20	Ted Motor On	Low Power	J118-2			Q36	J126-4			Blk-Yel	A-13997	
21	Left Sling	Low Power	J107-1			Q28	J126-5			Blu-Grn	AE-26-1200	
22	Right Sling	Low Power	J107-1			Q30	J126-6			Blu-Blk	AE-26-1200	
23	Bulldozer Motor	Low Power	J118-2			Q34	J126-7			Blu-Vio	14-8016	
24	Red Eject	Low Power	J107-1			Q32	J126-8			Blu-Gry	AE-26-1500	
25	Top Jet	Gen. Purpose	J107-1			Q26	J122-1			Blu-Brn	AE-26-1200	
26	Left Jet	Gen. Purpose	J107-1			Q24	J122-2			Blu-Red	AE-26-1200	
27	Right Jet	Gen. Purpose	J107-1			Q22	J122-3			Blu-Org	AE-26-1200	
28	Shaker Motor	Gen. Purpose	J107-6			Q20	J122-4			Blu-Yel	14-7951	
29-36	See Flipper Circuit											
37	Little Flipper	Low Power	J107-6			Q16	J4-2			Brn-Wht	#902 (1)	
38	Left Ramp	Low Power	J107-6			Q15	J4-4			Blk-Wht	#906 (1)	
39	Back White	Low Power	J107-6			Q14	J4-5			Org-Wht	#906 (2)	
40	Back Yellow	Low Power	J107-6			Q13	J4-6			Yel-Wht	#906 (2)	
41	Back Red	Low Power	J107-6			Q9	J3-2			Grn-Wht	#906 (2)	
42	Blasting Zone	Low Power	J107-6			Q10	J3-3			Blu-Wht	#89 (2)	
43	Right Ramp	Low Power	J107-6			Q11	J3-4			Vio-Wht	#906 (1)	
44	Jets	Low Power	J107-6			Q12	J3-5			Gry-Wht	#89 (1)	
	GENERAL ILLUMINATION											
01	Playfield/Insert 1	G.I.	J120-1	J121-1		Q18	J120-7	J121-7		Wht-Brn	#44	#555
02	Playfield/Insert 2	G.I.	J120-2	J121-2		Q10	J120-8	J121-8		Wht-Org	#44	#555
03	Playfield/Insert 3	G.I.	J120-3	J121-3		Q14	J120-9	J121-9		Wht-Yel	#44	#555
04	Right Playfield	G.I.	J120-5			Q16	J120-10			Wht-Grn	#44	
05	Left Playfield	G.I.	J120-6		J119-3	Q12	J120-11		J119-1	Wht-Vio	#44	

	FLIPPER CIRCUITS		VOLTAGE CONNECTION	DRIVE XISTOR POWER	DRIVE XISTOR HOLD	DRIVE CONNECTION PLAYFIELD	DRIVE WIRE POWER	DRIVE WIRE HOLD	COIL PART NUMBER	COIL COLOR
29	Lower Right Flipper	Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn		FL-15411	ORANGE
30		Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn		
31	Lower Left Flipper	Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu		FL-15411	ORANGE
32		Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu		
33	Upper Left Flipper	Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio		FL-11753	YELLOW
34		Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio		
35	Middle Left Flipper	Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry		FL-11722	GREEN
36		Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry		

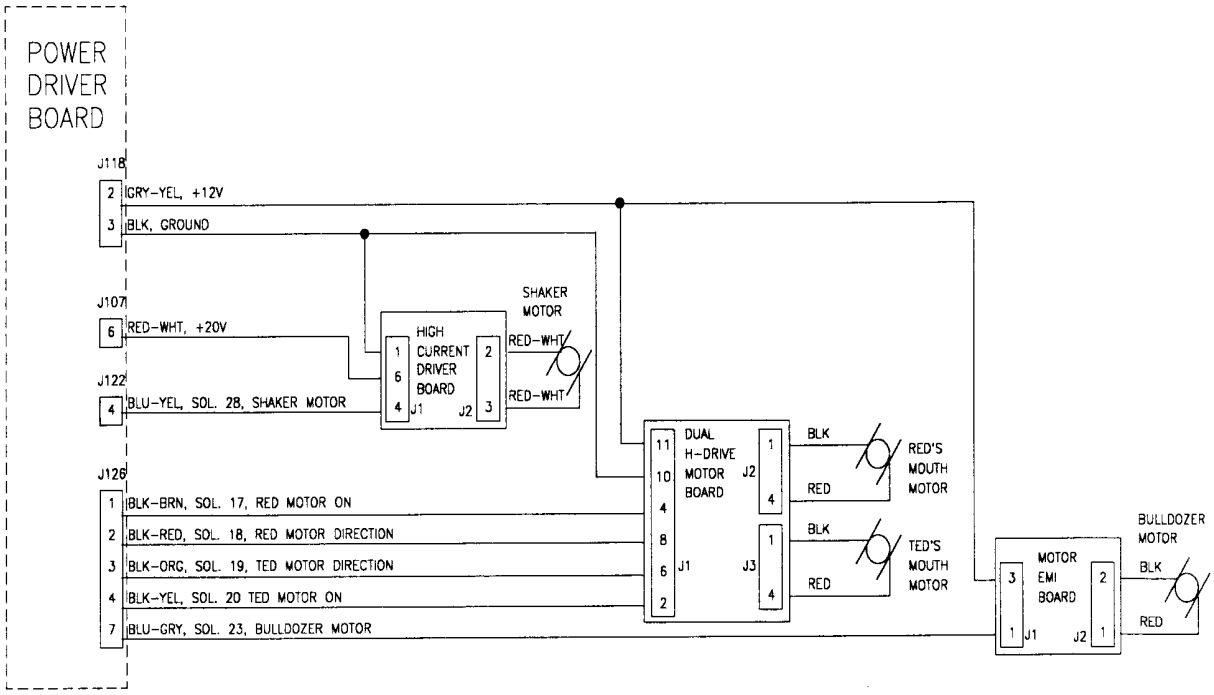
J1XX-X=POWER DRIVER BOARD, JX-X=AUX. DRIVER BOARD, J9XX-X=FLIPTRONIC II BOARD

SOLENOID WIRING

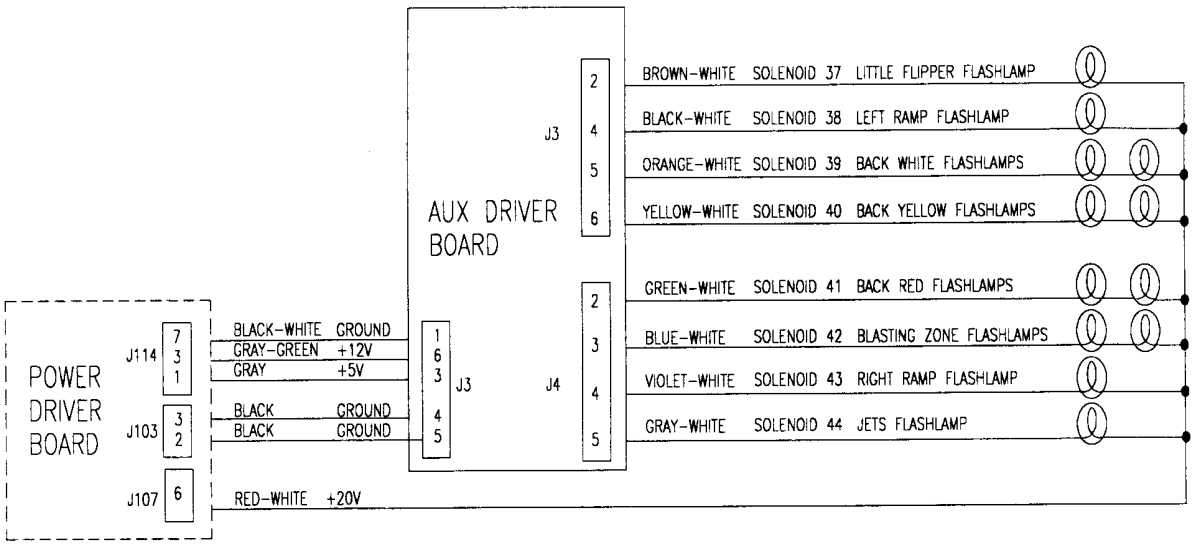
COILS



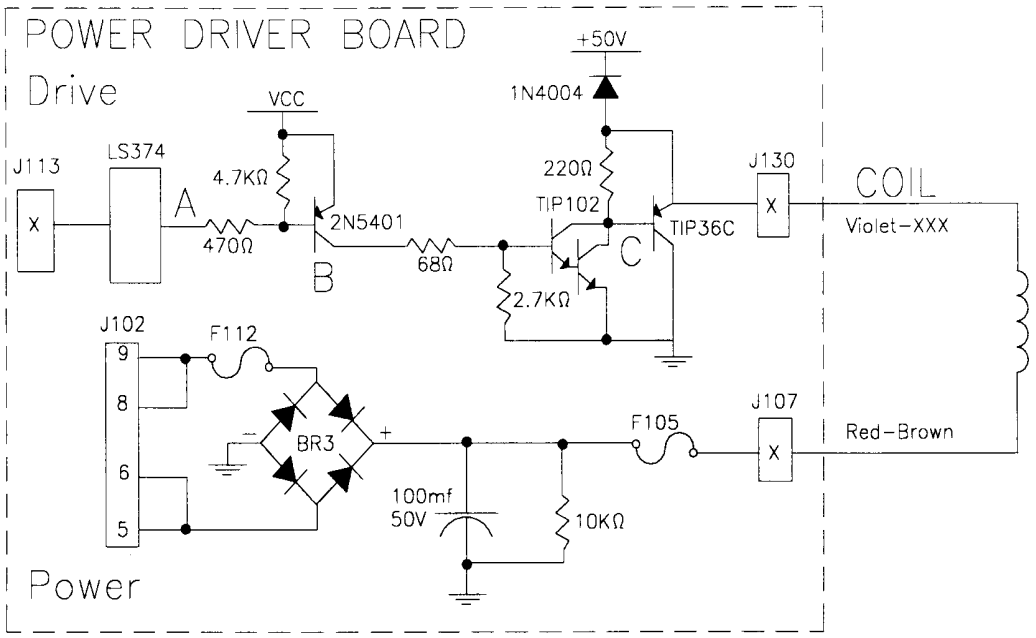
MOTORS



FLASHLAMPS

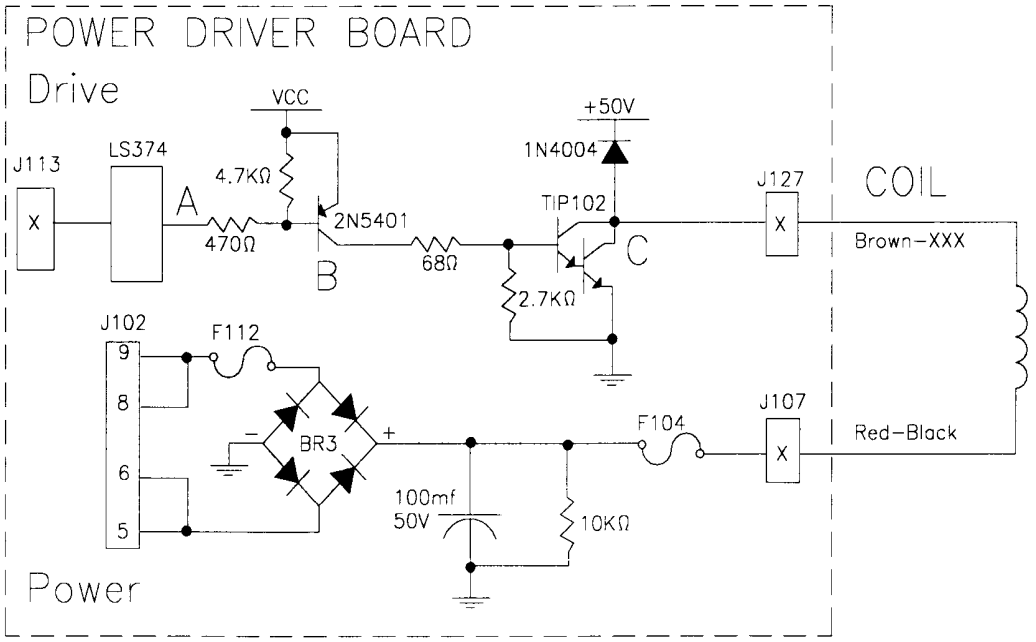


HIGH POWER SOLENOID CIRCUIT



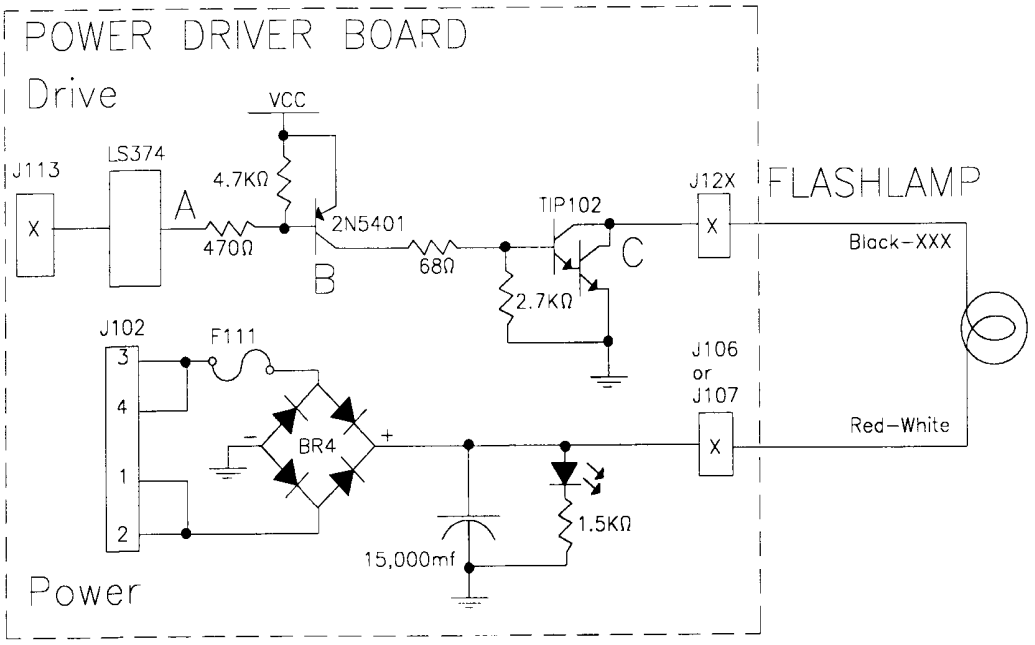
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is high. A high at point "B" causes point "C", the collector of the TIP102 transistor and point "D", the emitter of the TIP36C transistor, to drop low. When point "D" is low,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

LOW POWER SOLENOID CIRCUIT



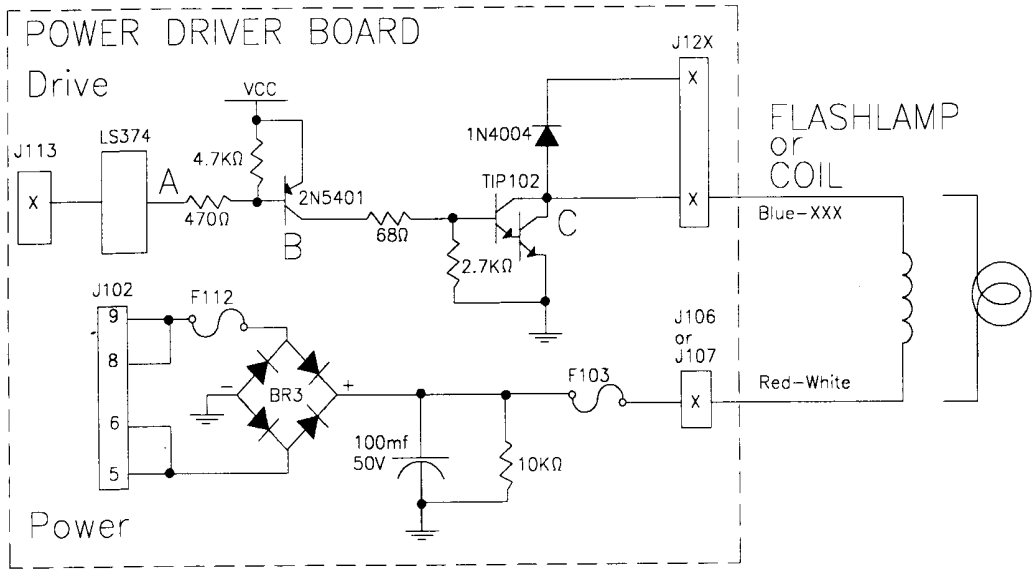
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is high. A high at point "B" turns on the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and turns on.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

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.

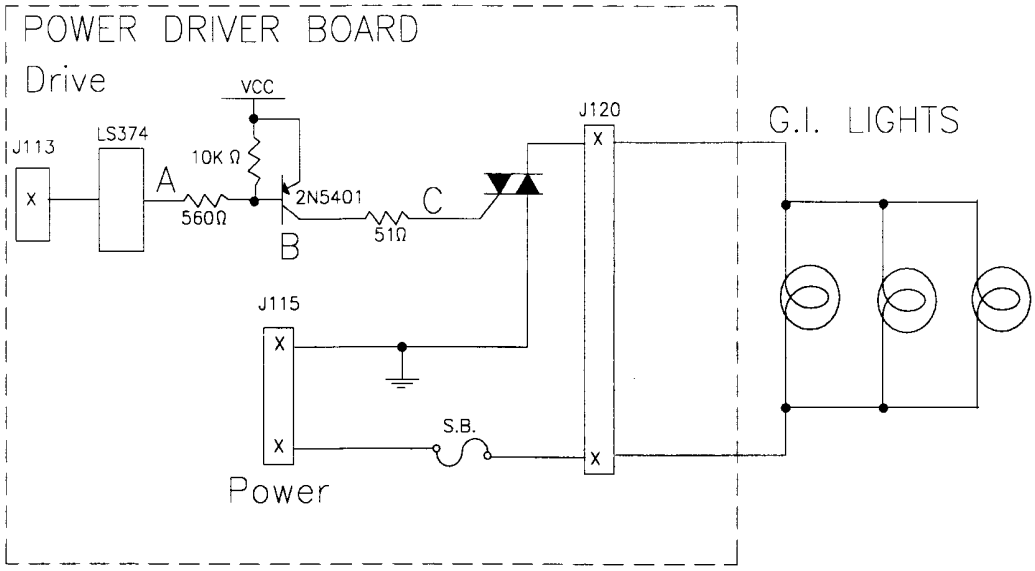
SPECIAL (GENERAL PURPOSE) SOLENOID CIRCUIT



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.

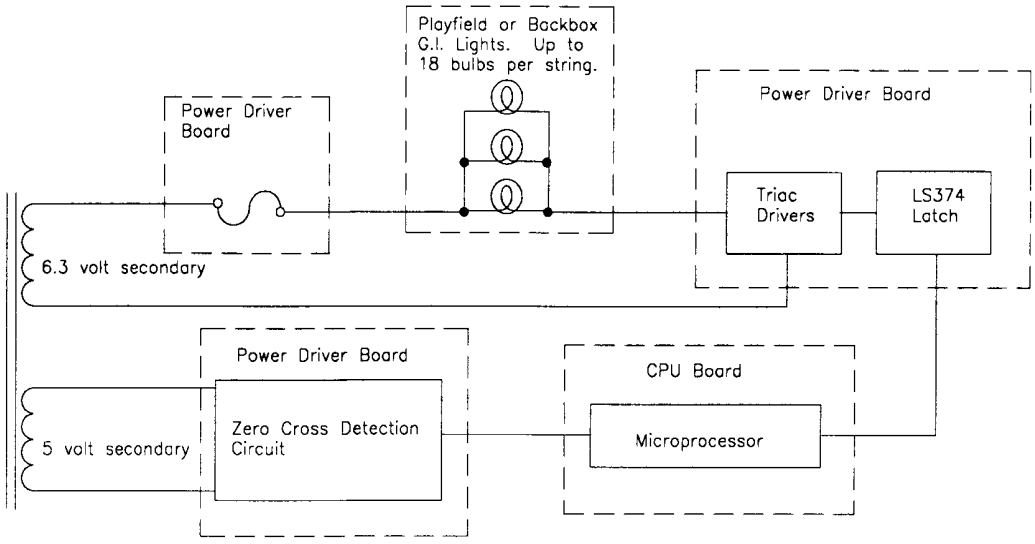
* Tieback diode is not used for flashlamp circuit.

GENERAL ILLUMINATION CIRCUIT

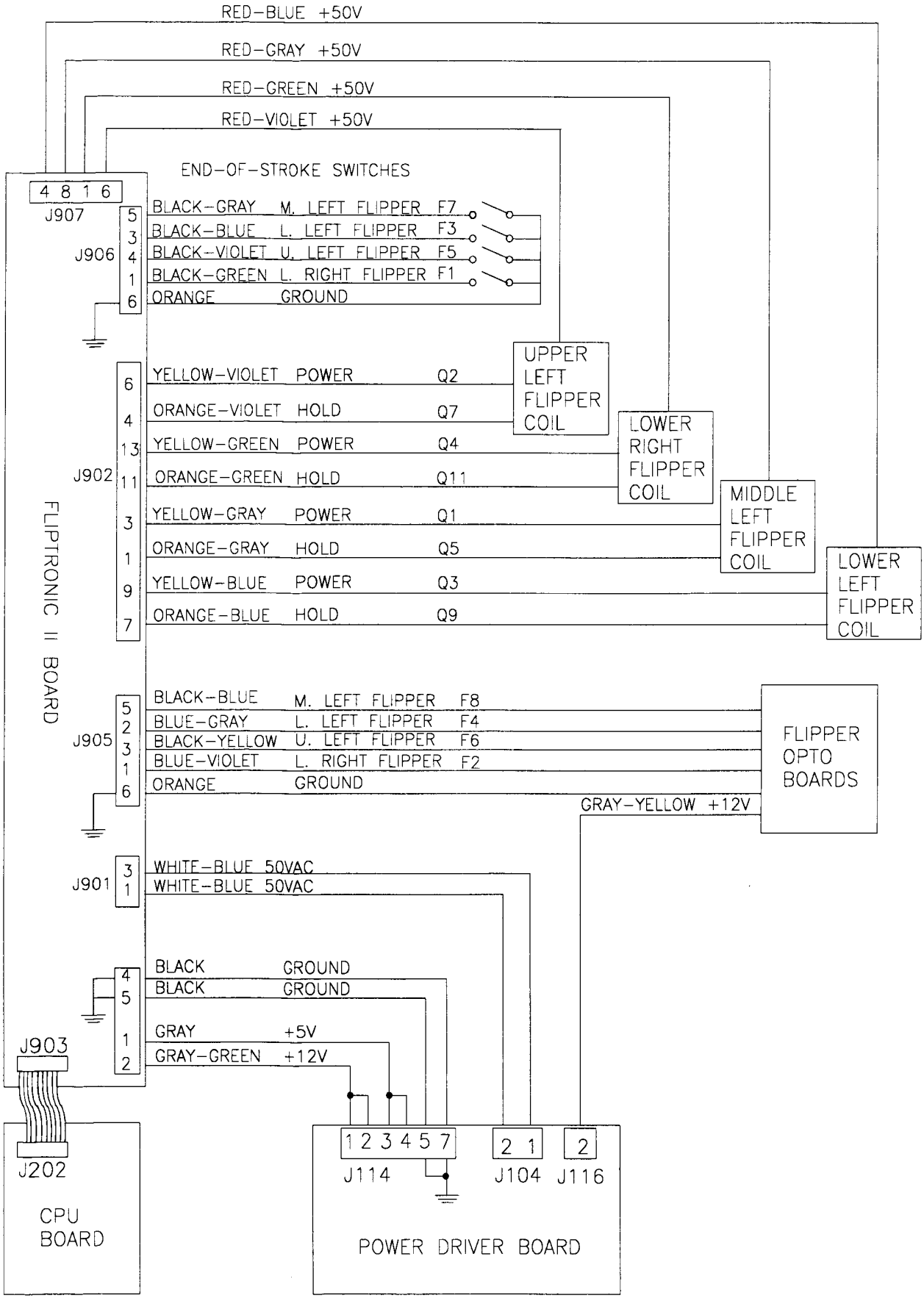


When point "A" toggles low, points, "B" and "C" are high. This turns on the triac and the desired general illumination string of lights.

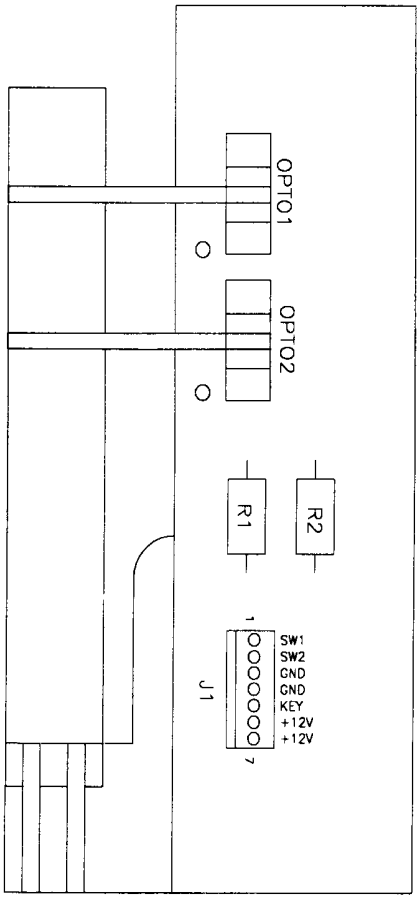
BLOCK DIAGRAM OF GENERAL ILLUMINATION CIRCUIT

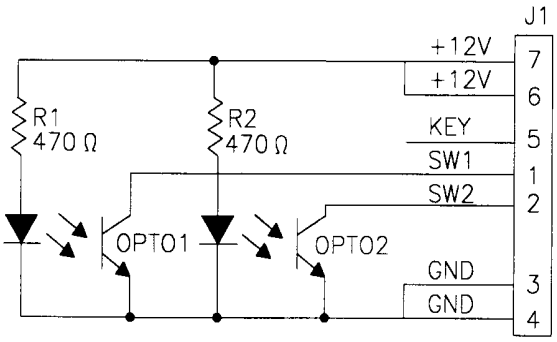


FLIPPER CIRCUIT DIAGRAM



Flipper Opto Board Assembly
A-17316

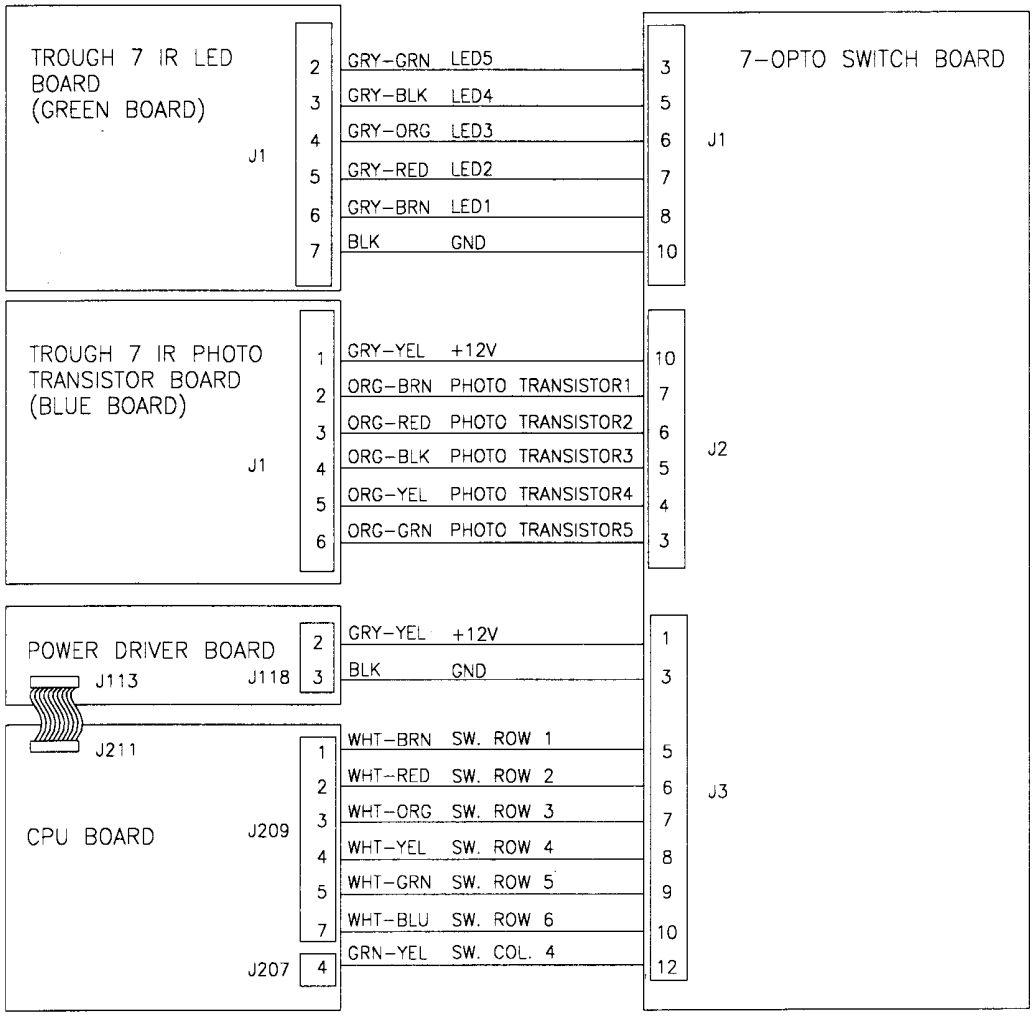




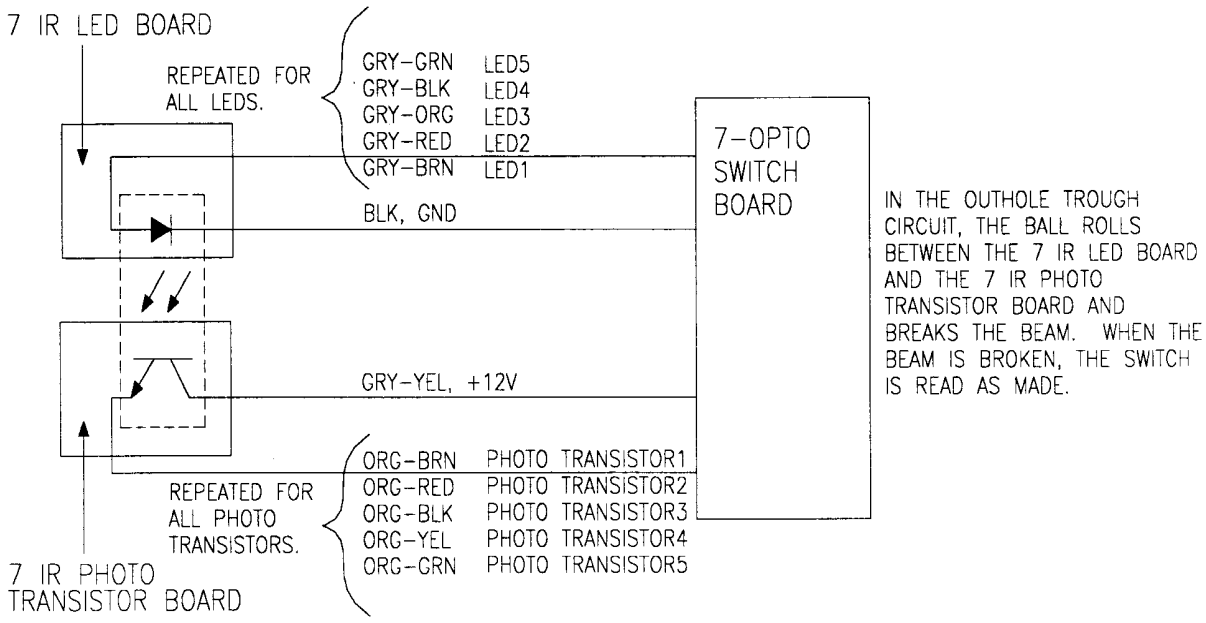
Left Flipper Opto Board Assembly
J1-1 Black-Blue from Fliptronic II Board J905-5
J1-2 Blue-Gray from Fliptronic II Board J905-2
J1-3 N/C
J1-4 Orange from Fliptronic II Board J905-6
J1-5 N/C
J1-6 Gray-Yellow from Power Driver Board J116-2
J1-7 Gray-Yellow from Power Driver Board J116-2

Right Flipper Opto Board Assembly
J1-1 Black-Yellow from Fliptronic II Board J905-1
J1-2 Blue-Violet from Fliptronic II Board J905-3
J1-3 Orange from Fliptronic II Board J905-6
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

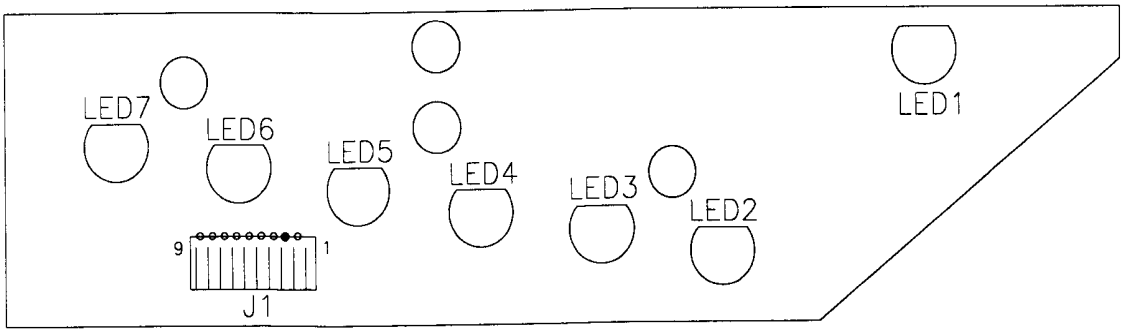
Outhole Trough Circuit Block Diagram

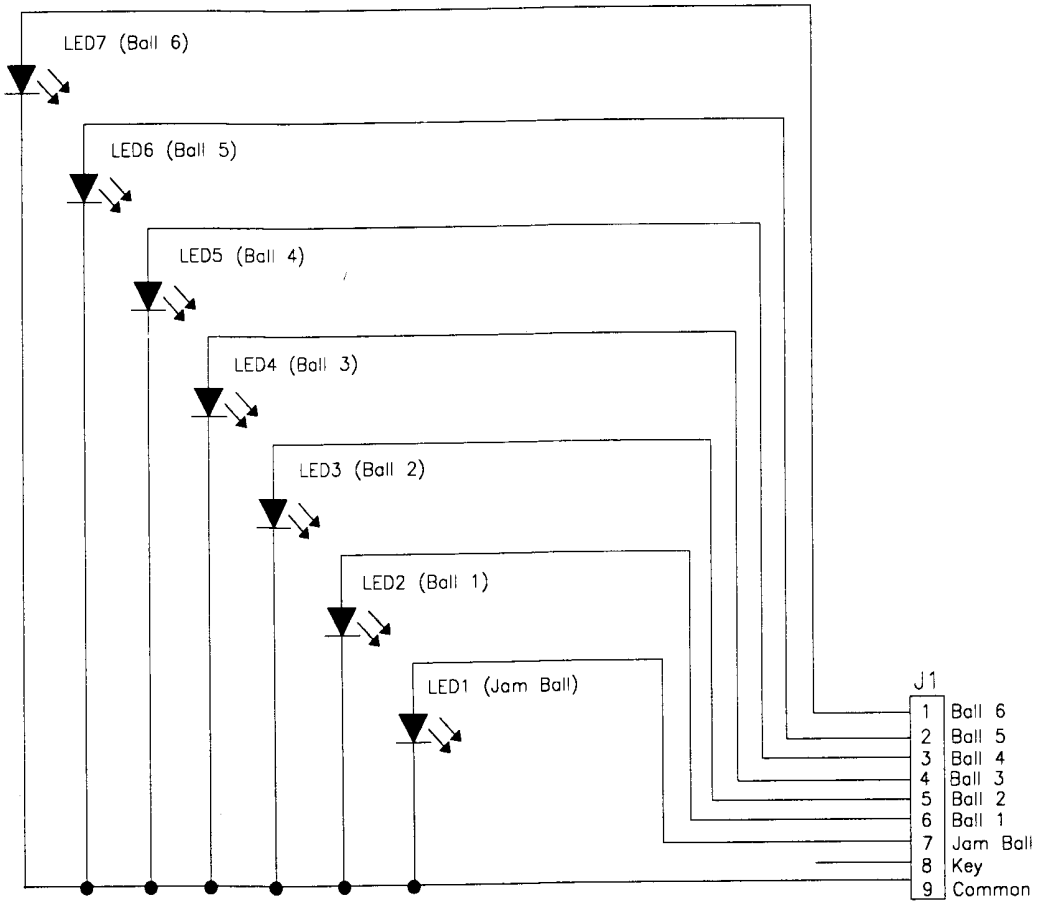


Outhole Trough Circuit Detail



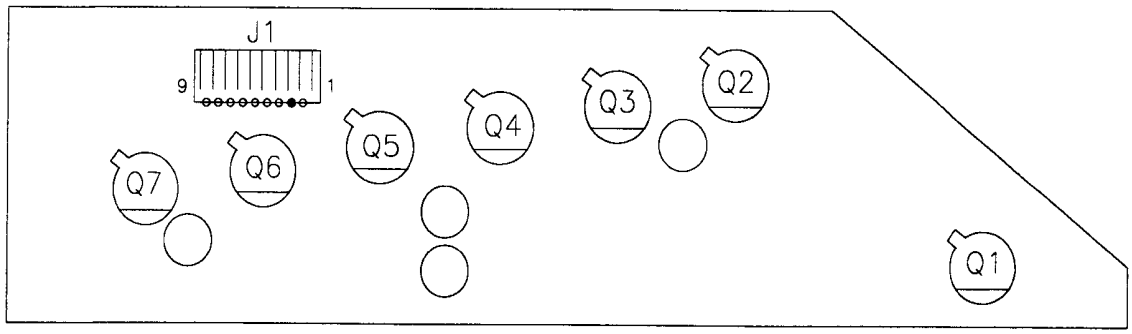
Trough 7 IR LED Board Assembly
(transmitter-green board)
A-18617

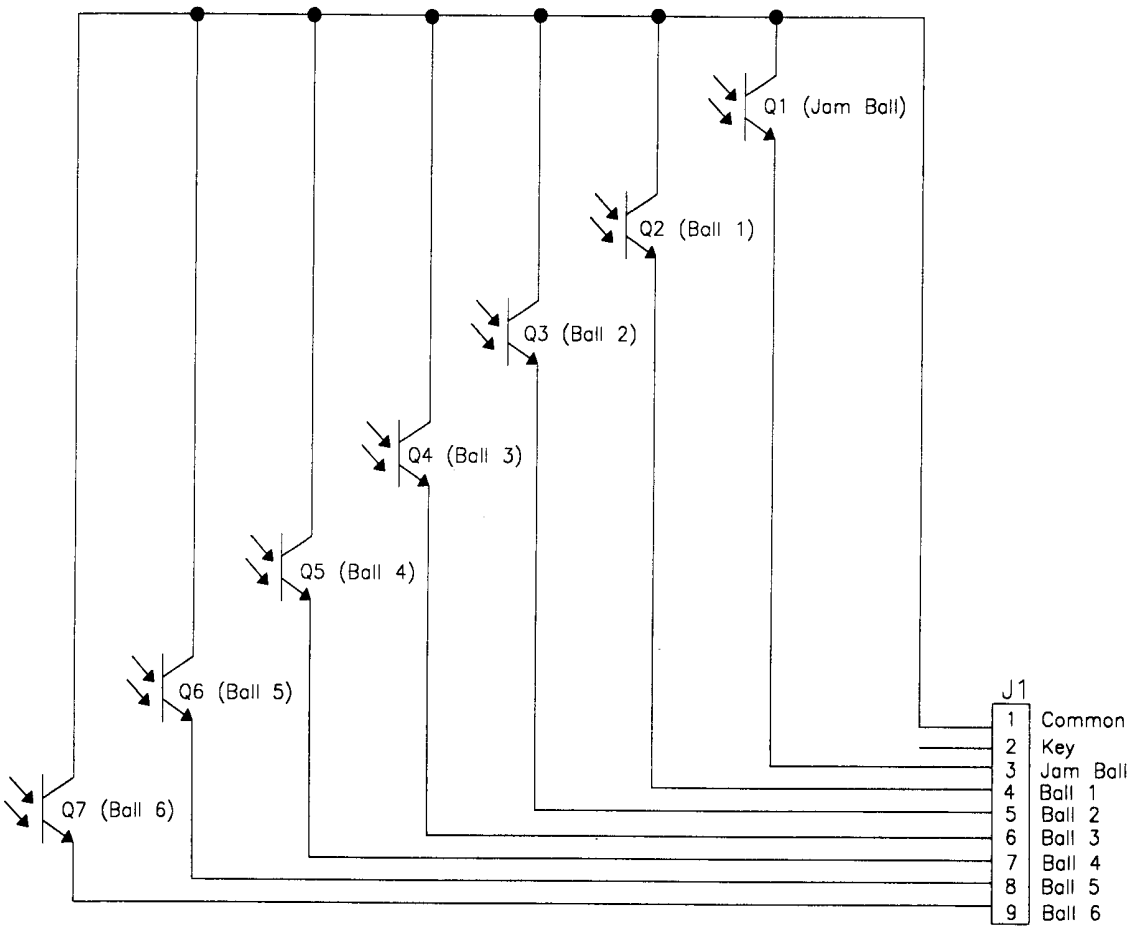




J1-1 N/C
J1-2 N/C
J1-3 Gray-Green, LED5, to 7-Opto Switch Board J1-3
J1-4 Gray-Black, LED4, to 7-Opto Switch Board J1-5
J1-5 Gray-Orange, LED3, to 7-Opto Switch Board J1-6
J1-6 Gray-Red, LED2, to 7-Opto Switch Board J1-7
J1-7 Gray-Brown, LED1, to 7-Opto Switch Board J1-8
J1-8 Key
J1-9 Black, ground, to 7-Opto Switch Board J1-10

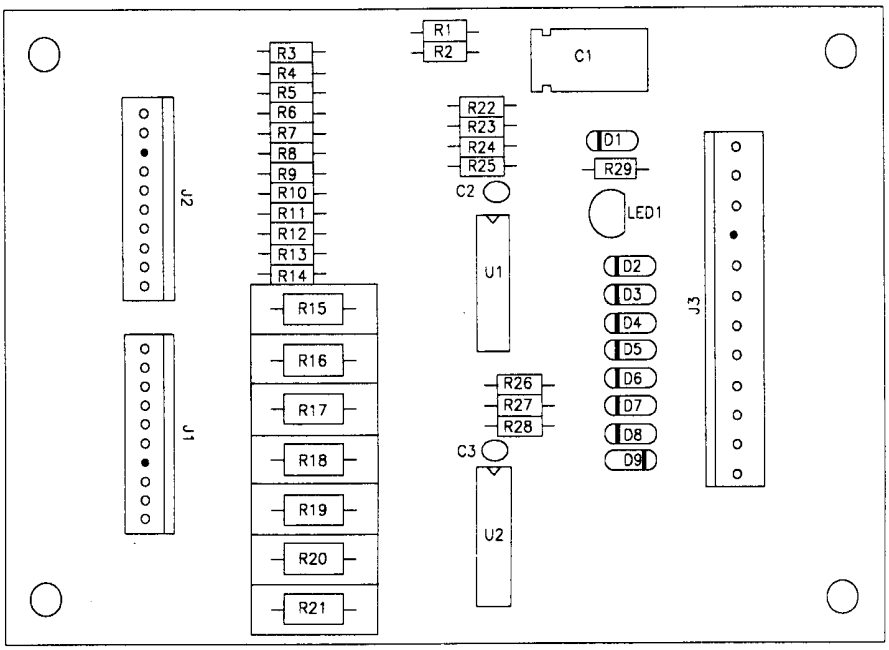
Trough 7 IR Photo Transistor Board Assembly
(receiver-blue board)
A-18618





J1-1 Gray-Yellow, +12V, to 7-Opto Switch Board J2-10
J1-2 Key
J1-3 Orange-Brown, Photo Transistor 1, to 7-Opto Switch Board J2-7
J1-4 Orange-Red, Photo Transistor 2, to 7-Opto Switch Board J2-6
J1-5 Orange-Black, Photo Transistor 3, to 7-Opto Switch Board J2-5
J1-6 Orange-Yellow, Photo Transistor 4, to 7-Opto Switch Board J2-4
J1-7 Orange-Green, Photo Transistor 5, to 7-Opto Switch Board J2-3
J1-8 N/C
J1-9 N/C

7-Opto Switch Board Assembly
A-15595

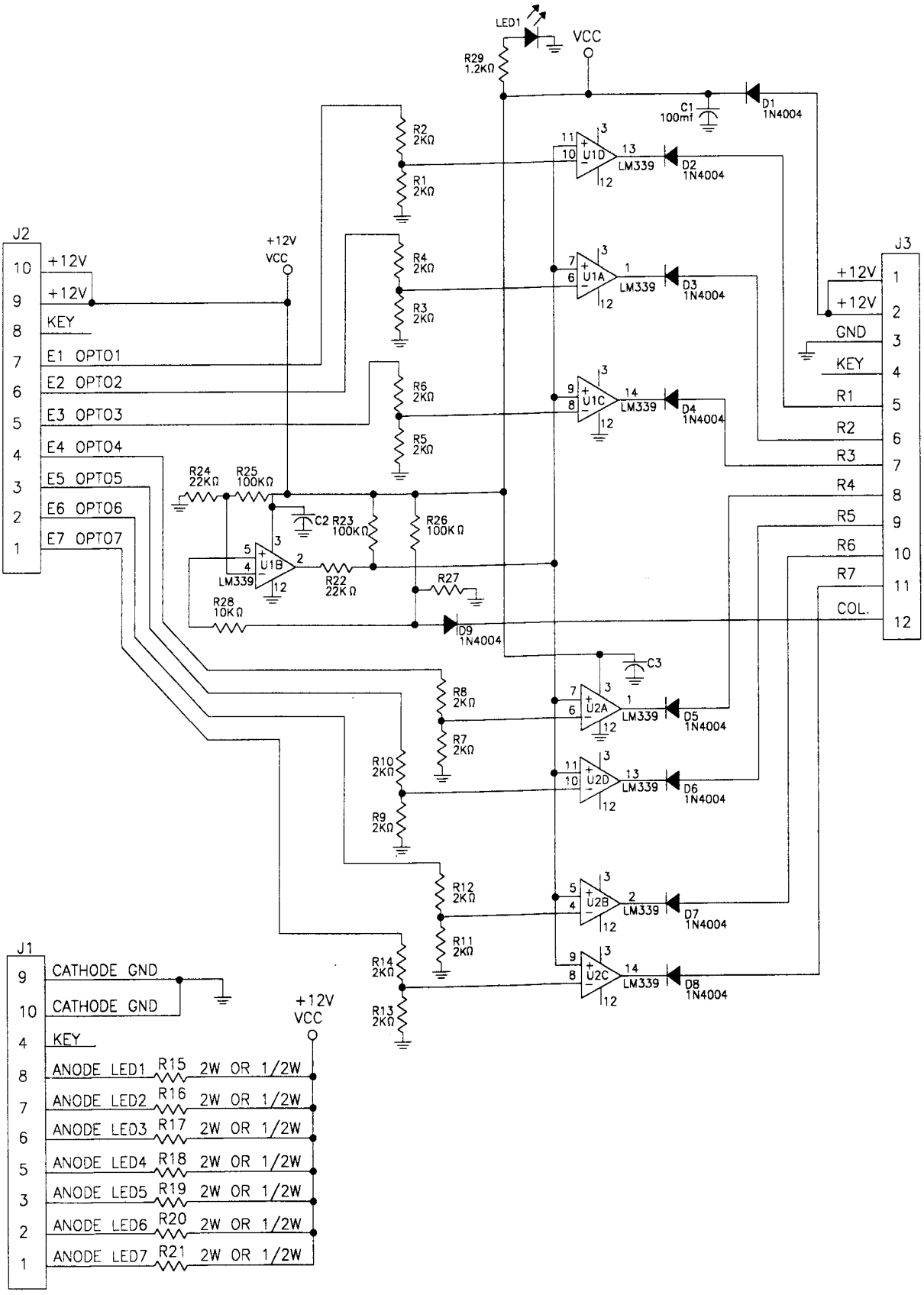


J1-1 N/C
J1-2 N/C
J1-3 Gray-Green, LED5, to Trough 7 IR LED Board J1-3
J1-4 Key
J1-5 Gray-Black, LED4, to Trough 7 IR LED Board J1-4
J1-6 Gray-Orange, LED3 to Trough 7 IR LED BoardJ1-5
J1-7 Gray-Red, LED2 to Trough 7 IR LED Board J1-6
J1-8 Gray-Brown, LED1, to Trough 7 IR LED Board J1-7
J1-9 N/C
J1-10 Black, ground to Trough 7 IR LED Board J1-9

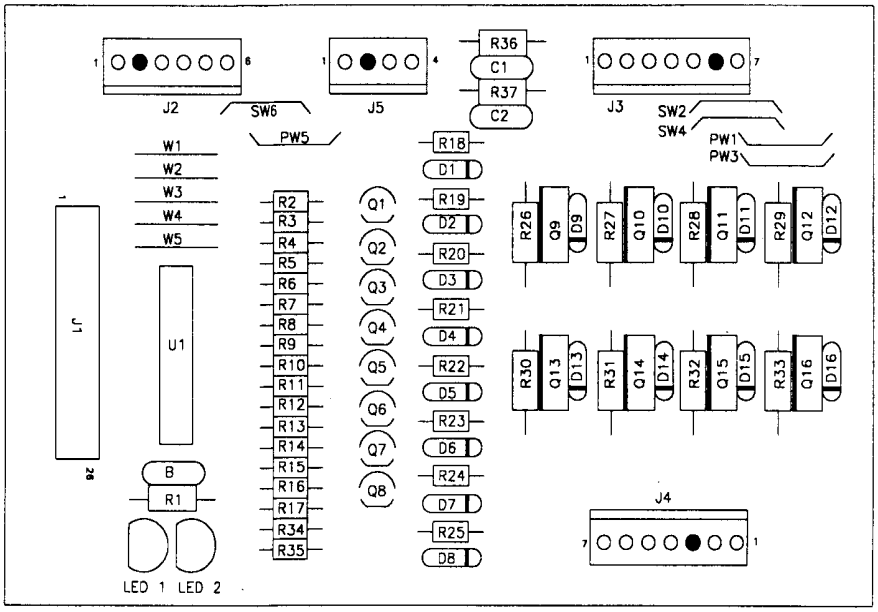
J2-1 N/C
J2-2 N/C
J2-3 Orange-Green, Photo Transistor 5, to Trough 7 IR Photo Transistor Board J1-7
J2-4 Orange-Yellow, Photo Transistor 4, to Trough 7 IR Photo Transistor Board J1-6
J2-5 Orange-Black, Photo Transistor 3, to Trough 7 IR Photo Transistor Board J1-5
J2-6 Orange-Red, Photo Transistor 2, to Trough 7 IR Photo Transistor Board J1-4
J2-7 Orange-Brown, Photo Transistor 1, to Trough 7 IR Photo Transistor Board J1-3
J2-8 Key
J2-9 N/C
J2-10 Gray-Yellow, +12V, to Trough 7 IR Photo Transistor Board J1-1

J3-1 Gray-Yellow, +12V from Power Driver Board J118-2
J3-2 N/C
J3-3 Black, ground, from Power Driver Board J118-3
J3-4 Key
J3-5 White-Brown, Switch Row 1, from CPU Board J209-1
J3-6 White-Red, Switch Row 2, from CPU Board J209-2
J3-7 White-Orange, Switch Row 3, from CPU Board J209-3
J3-8 White-Yellow, Switch Row 4, from CPU Board J209-4
J3-9 White-Green, Switch Row 5, from CPU Board J209-5
J3-10 White-Blue, Switch Row 6,from CPU Board J209-7
J3-11 Key
J3-12 Green-Yellow, Switch Column 4, from CPU Board J207-4

7-Opto Switch Board Schematic
A-15595



Aux Driver Board Assembly
A-16100-2



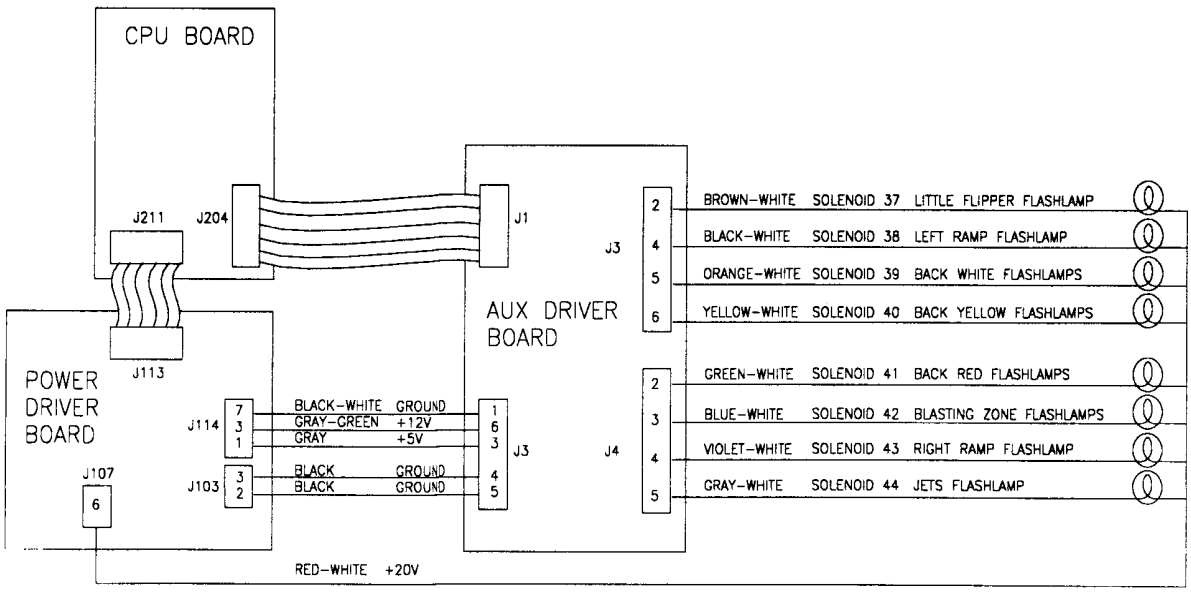
J1 26-pin ribbon cable, data to/from CPU J204

J2-1 Black-White, ground from Power Driver Broad J114-7
J2-2 Key
J2-3 Gray, +5V from Power Driver Board J114-1
J2-4 Black, ground from Power Driver Board J103-3
J2-5 Black, ground from Power Driver Board J103-2
J2-6 Gray-Green, +12V from Power Driver Board J114-3

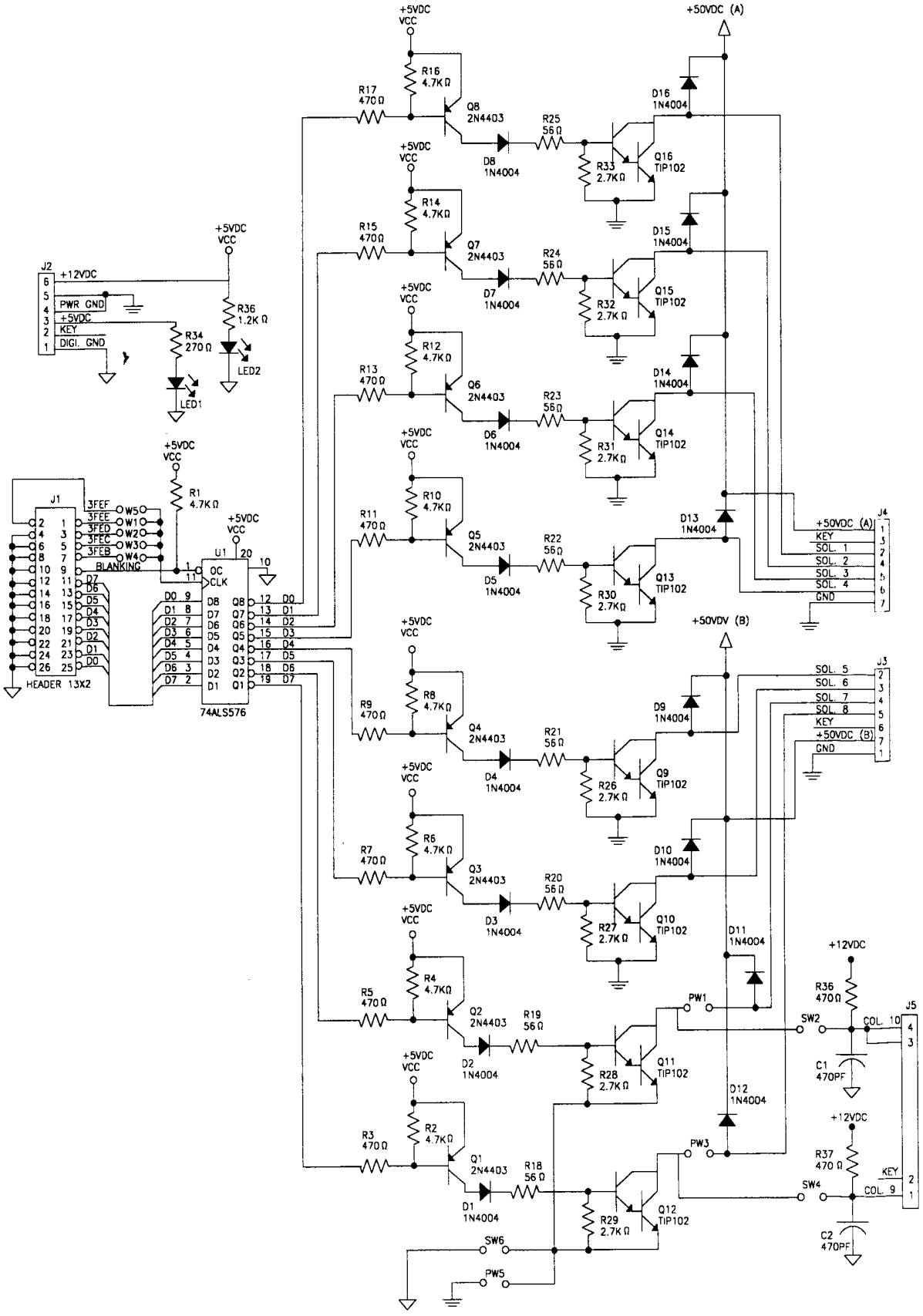
J3-1 N/C
J3-2 Green-White, solenoid 41 drive to flashlamp
J3-3 Blue-White, solenoid 42 drive to flashlamp
J3-4 Violet-White, solenoid 43 drive to flashlamps
J3-5 Gray-White, solenoid 44 drive to flashlamp
J3-6 Key
J3-7 N/C

J4-1 N/C
J4-2 Brown-White, solenoid 37 drive to flashlamp
J4-3 Key
J4-4 Black-White, solenoid 38 drive to flashlamp
J4-5 Orange-White, solenoid 39 drive to flashlamp
J4-6 Yellow-White, solenoid 40 drive to flashlamp
J4-7 N/C

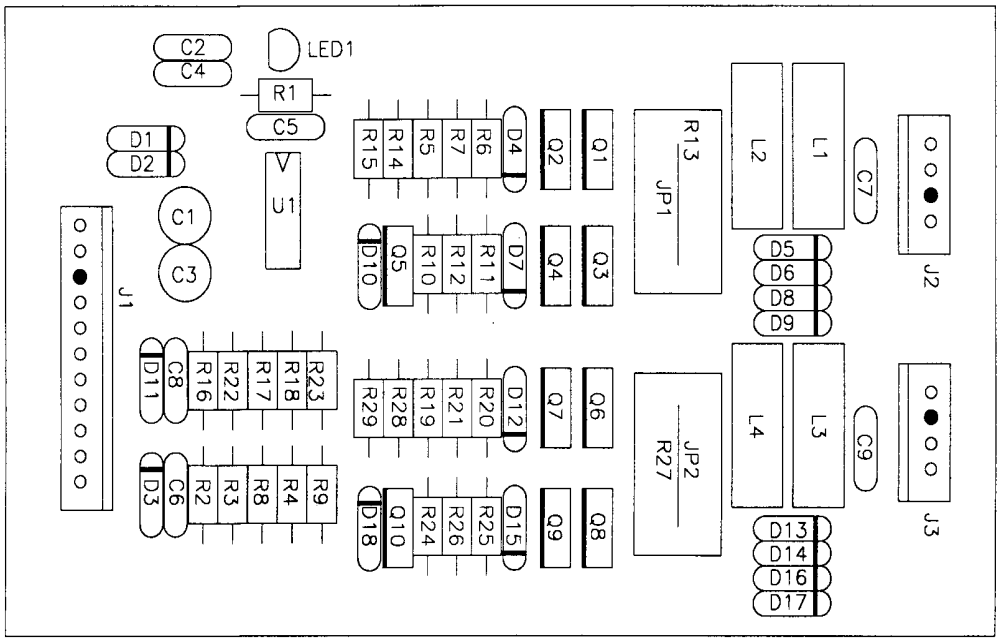
J5- Not Used



Aux Driver Board Schematic
A-16100-2



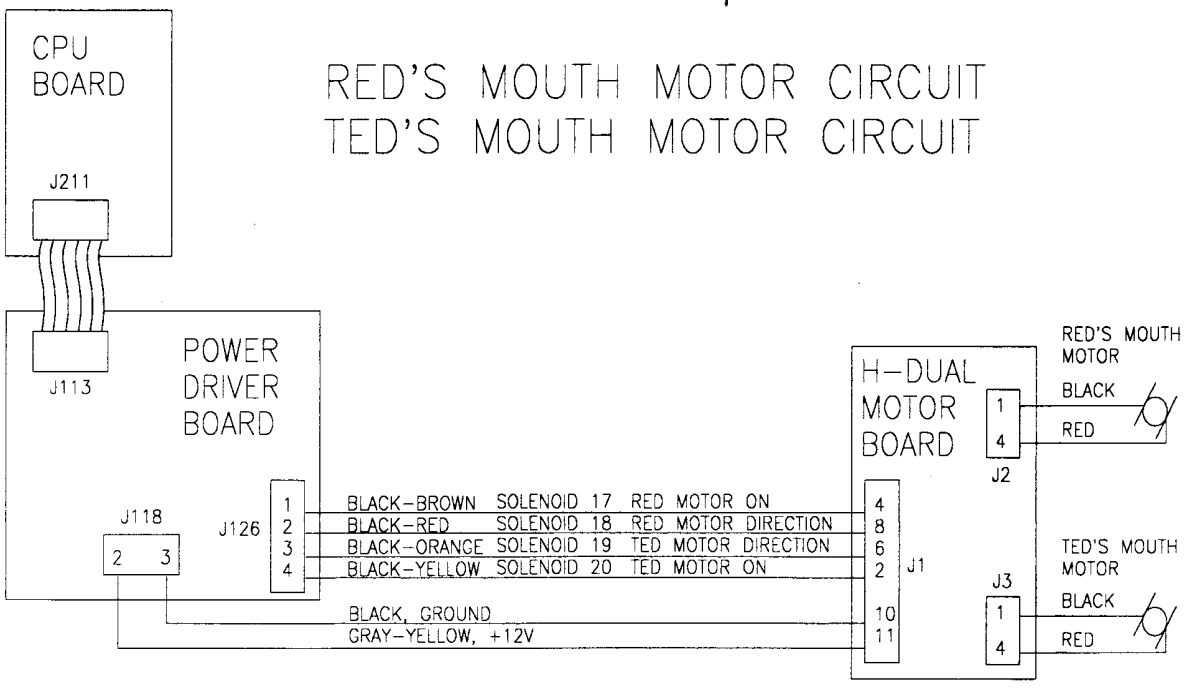
Dual H-Drive Motor Controller Board Assembly
A-19242-1



J1-1 Black-Yellow, loop from J1-2
J1-2 Black Yellow, solenoid 20 drive from Power Driver Brd J126-4
J1-3 Black-Brown, loop from J1-4
J1-4 Black-Brown, solenoid 17 drive from Power Driver Board J126-1
J1-5 Black-Orange, loop from J1-6
J1-6 Black-Orange, solenoid 19 drive from Power Driver Brd J126-3
J1-7 Black-Red, loop from J1-8
J1-8 Black-Red, solenoid 18 drive from Power Driver Board J126-2
J1-9 Key
J1-10 Black, ground from Power Driver Board J118-3
J1-11 Gray-Yellow, +12V from Power Driver Board J118-2

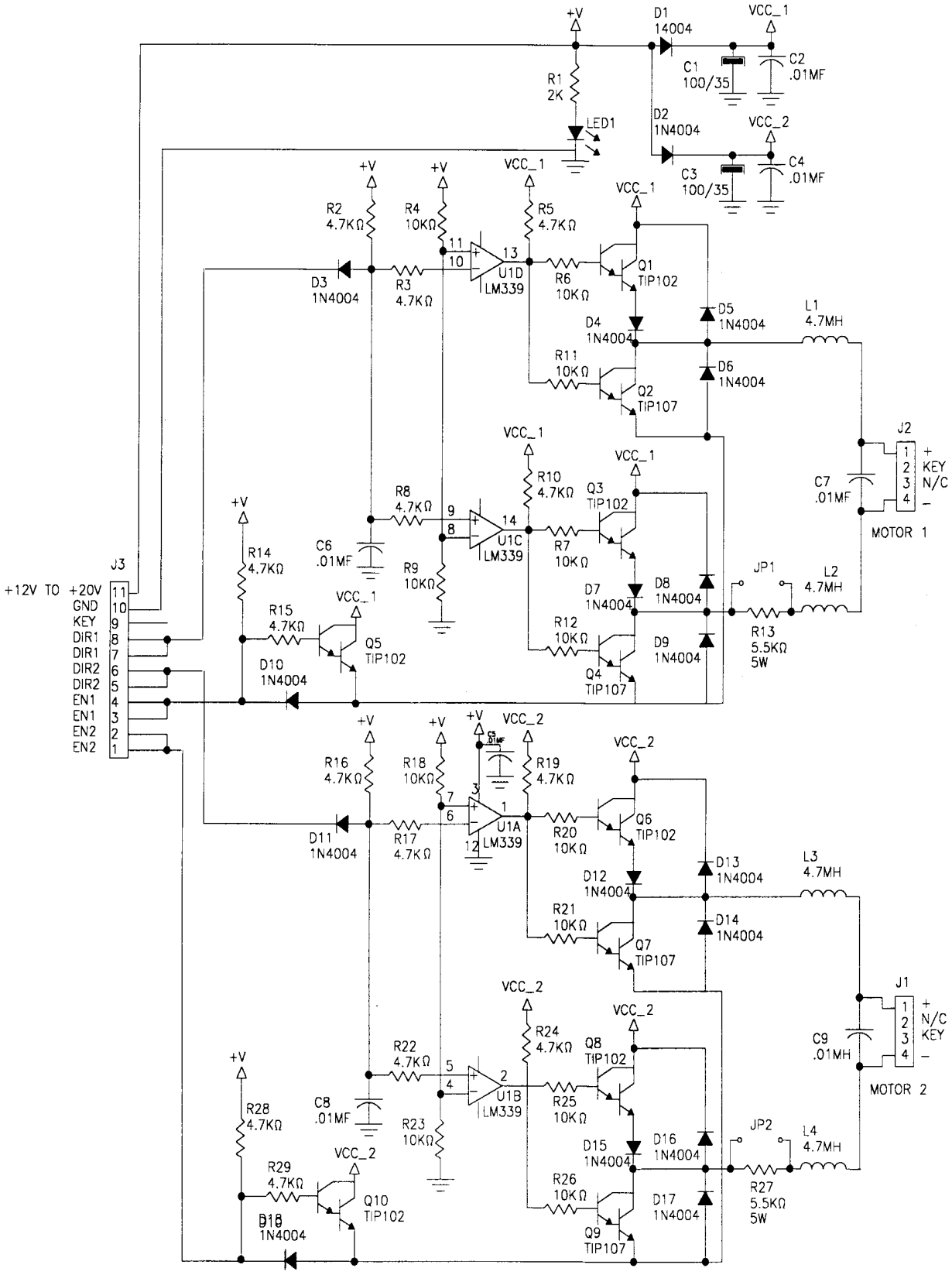
J2-1 Black, to Red's mouth motor
J2-2 Key
J2-3 N/C
J2-4 Red, to Red's mouth motor

J3-1 Black, to Ted's mouth motor
J3-2 N/C
J3-3 Key
J3-4 Red, to Ted's mouth motor

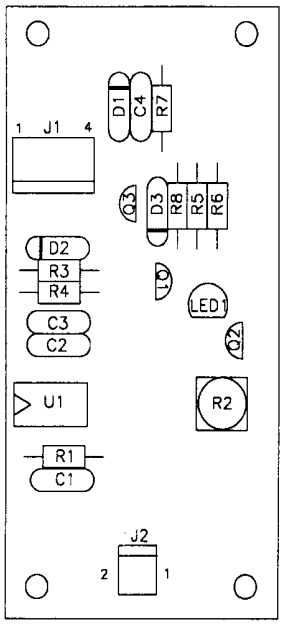


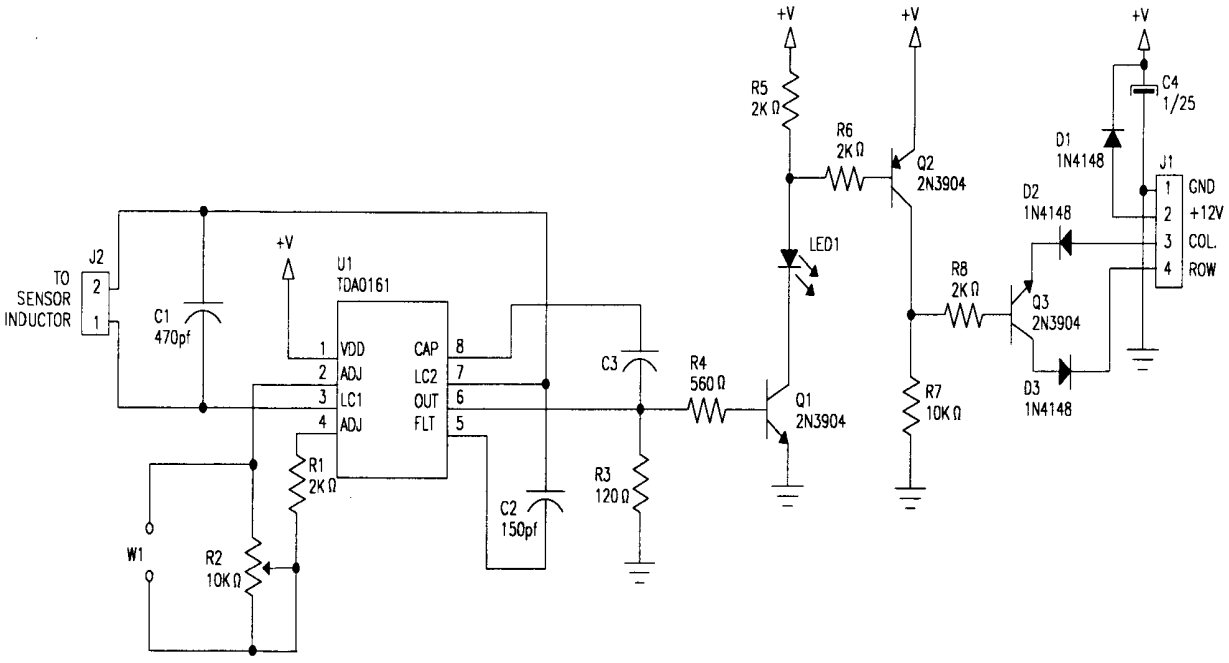
RED'S MOUTH MOTOR CIRCUIT
TED'S MOUTH MOTOR CIRCUIT

Dual H-Motor Controller Board Schematic
A-19242-1



Eddy Sensor Board Assembly
A-18543-2

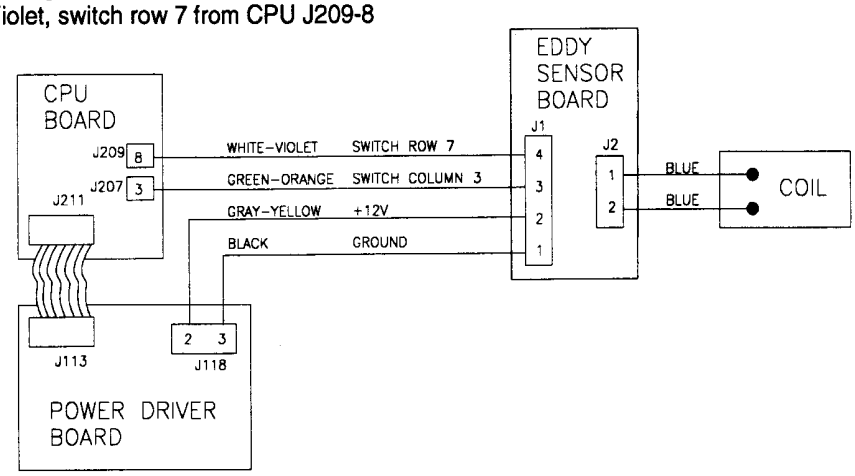




HIT RED, SWITCH 37

J1-1 Black, ground from Power Driver Board J118-3
J1-2 Gray-Yellow, +12V from Power Driver Board J118-2
J1-3 Green-Orange, switch column 3 from CPU J207-3
J1-4 White-Violet, switch row 7 from CPU J209-8

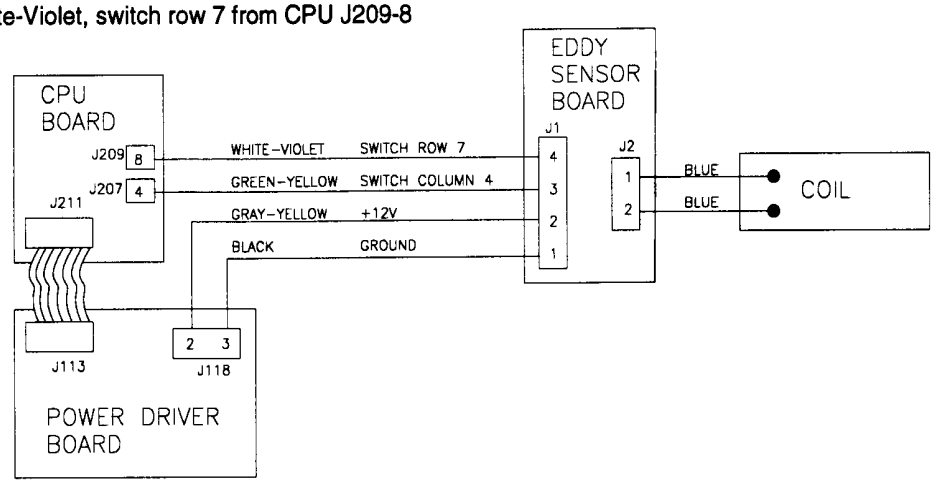
J2-1 Blue, to coil
J2-2 Blue, to coil



HIT BULLDOZER, SWITCH 47

J1-1 Black, ground from Power Driver Board J118-3
J1-2 Gray-Yellow, +12V from Power Driver Board J118-2
J1-3 Green-Yellow, switch column 4 from CPU J207-4
J1-4 White-Violet, switch row 7 from CPU J209-8

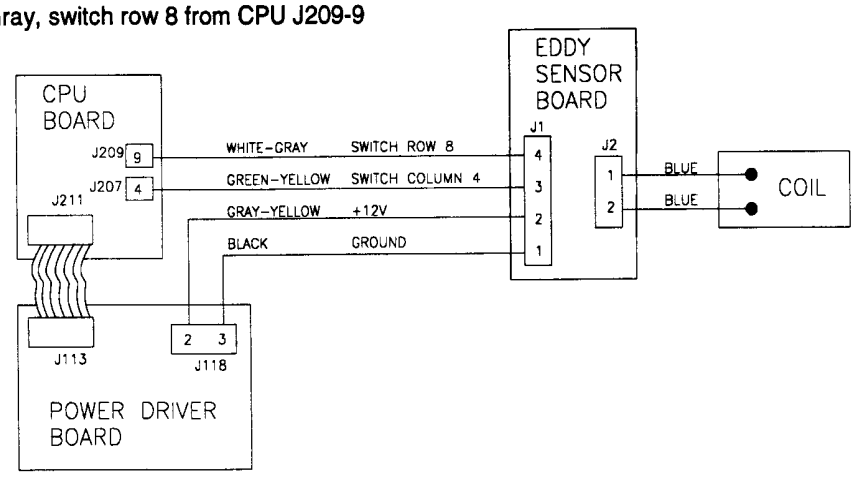
J2-1 Blue, to coil
J2-2 Blue, to coil



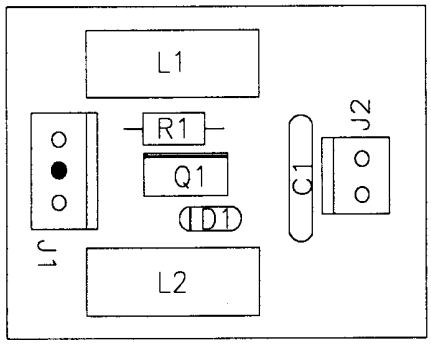
HIT TED, SWITCH 48

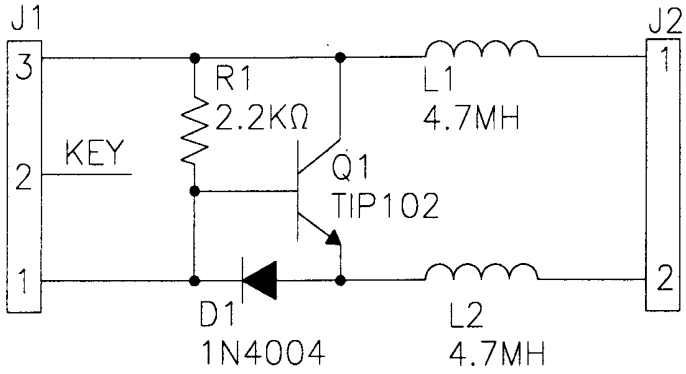
J1-1 Black, ground from Power Driver Board J118-3
J1-2 Gray-Yellow, +12V from Power Driver Board J118-2
J1-3 Green-Yellow, switch column 4 from CPU J207-4
J1-4 White-Gray, switch row 8 from CPU J209-9

J2-1 Blue, to coil
J2-2 Blue, to coil



Motor EMI Board Assembly
A-15340

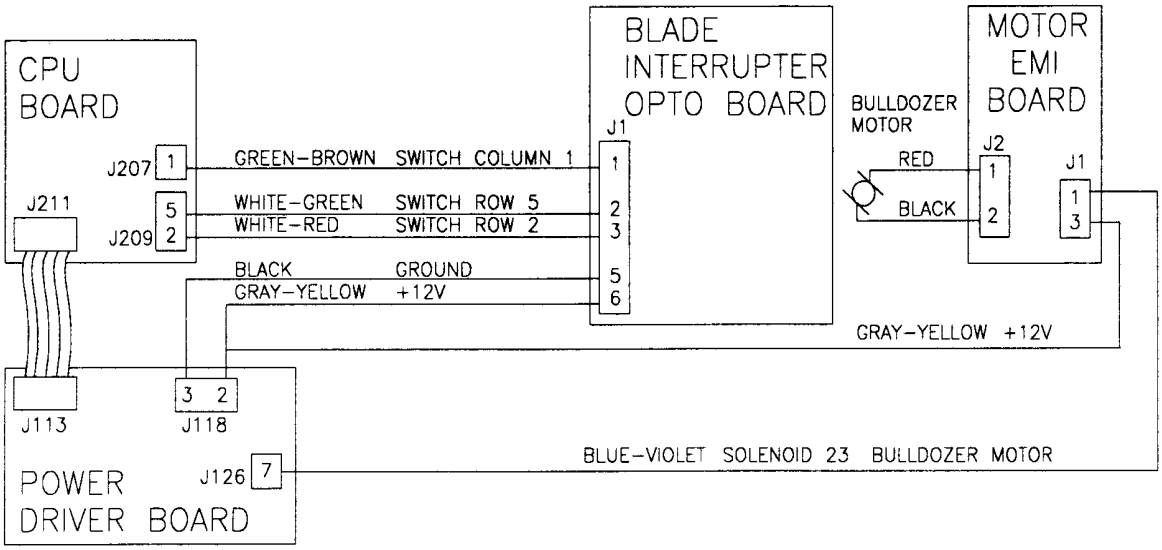




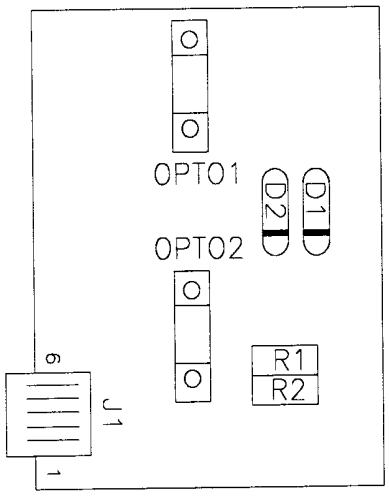
J1-1 Blue-Violet, solenoid 23 drive from Power Driver Board J126-7
J1-2 Key
J1-3 Gray-Yellow, +12V from Power Driver Board J118-2

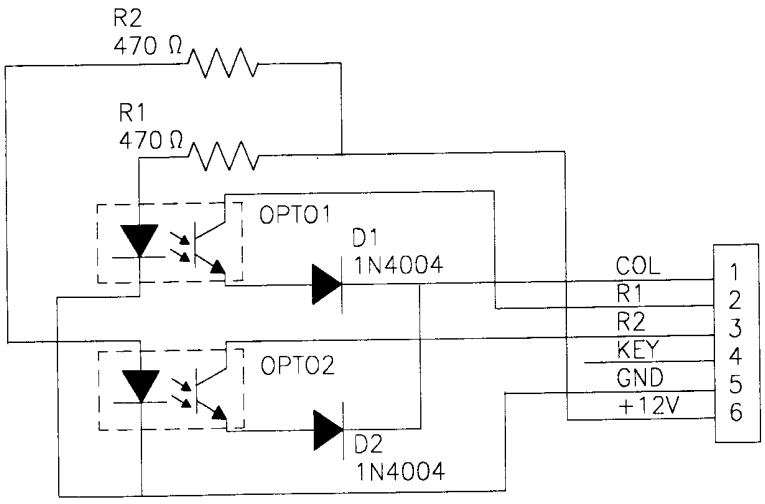
J2-1 Red, to Bulldozer Motor
J2-2 Black, to Bulldozer Motor

BULLDOZER MOTOR CIRCUIT



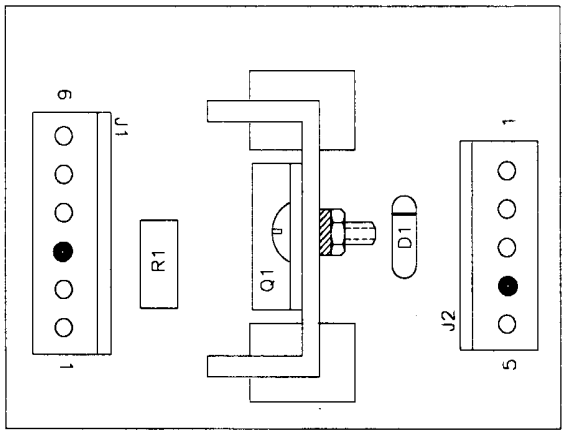
Blade Interrupter Opto Board Assembly
A-19359

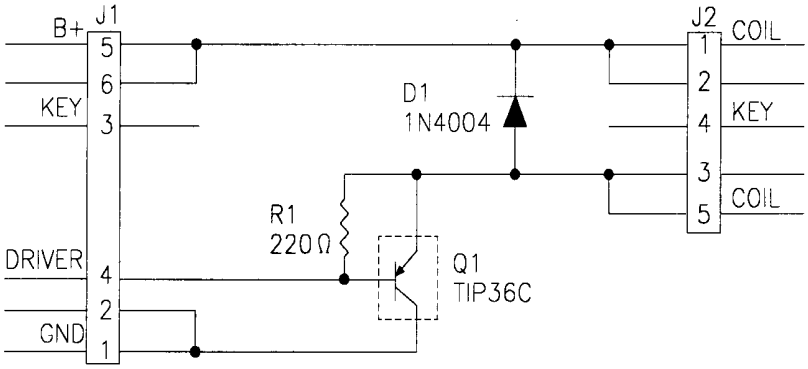




J1-1 Green-Brown, switch column 1 from CPU Board J207-1
J1-2 White-Green, switch row 5 from CPU Board J209-5
J1-3 White-Red, switch row 2 from CPU Board J209-2
J1-4 Key
J1-5 Black, gound from Power Driver Board J118-3
J1-6 Gray-Yellow, +12V from Power Driver Board J118-2

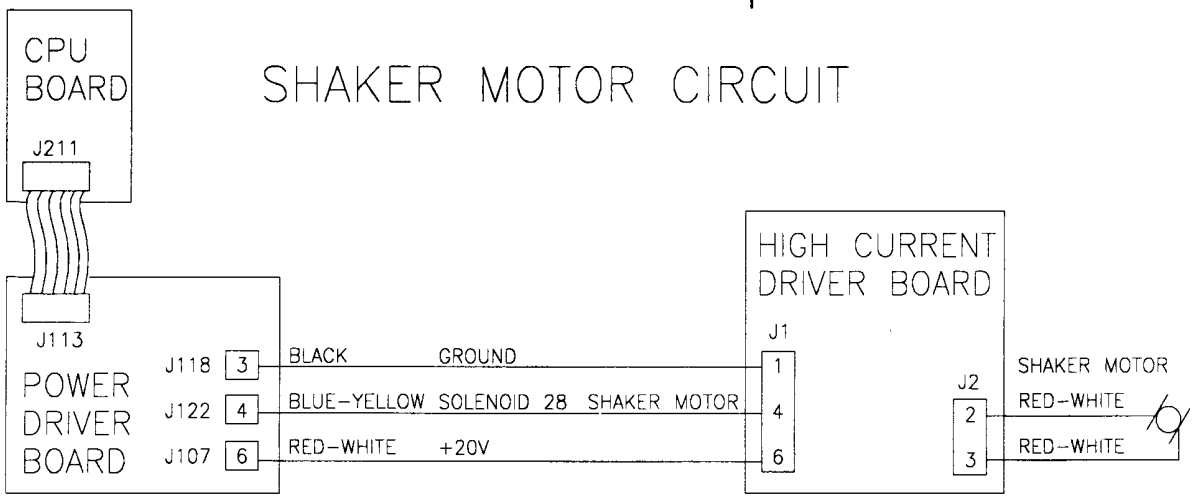
High Current Driver Board Assembly
A-19720



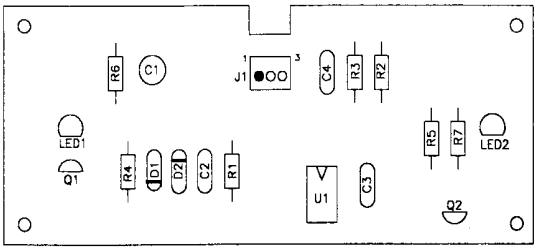


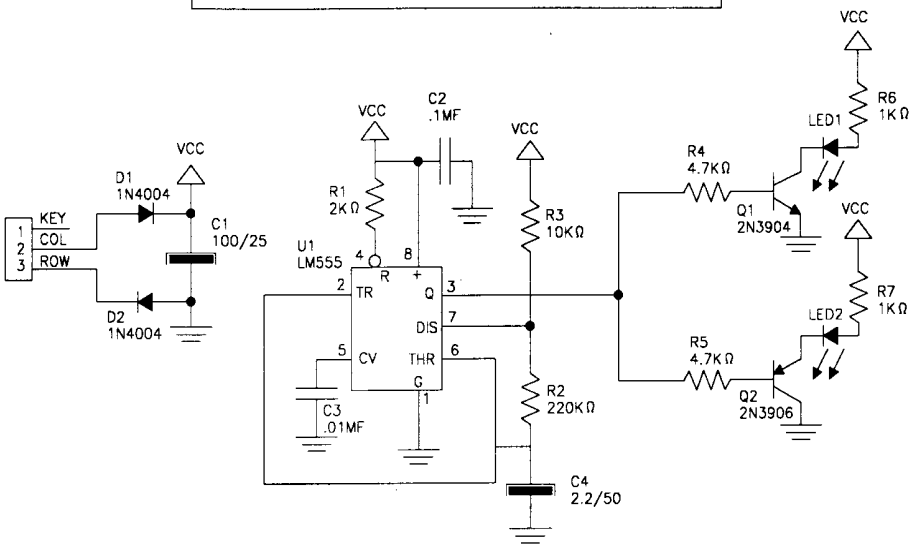
J1-1 Black, ground from Power Driver Board J118-3
J1-2 Black, loop from J1-1
J1-3 Key
J1-4 Blue-Yellow, solenoid 28 drive from Power Driver Board J122-4
J1-5 Blue-Yellow, loop from J1-4
J1-6 Red-White, +20V from Power Driver Board J107-6

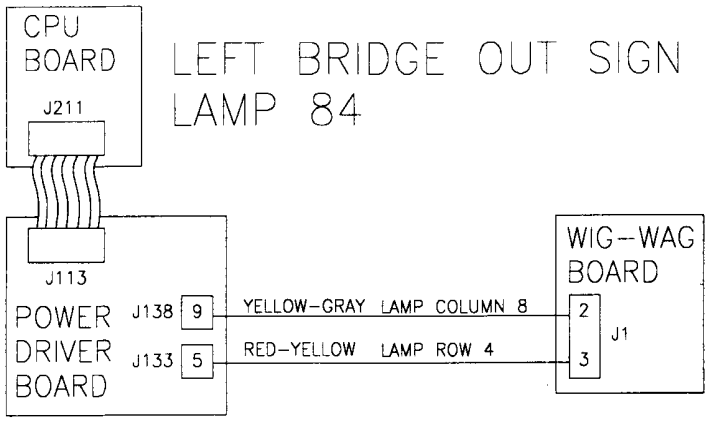
J2-1 Red-White, loop from J2-2
J2-2 Red-White, to Shaker Motor
J2-3 Red-White, to Shaker Motor
J2-4 Key
J2-5 Red-White, loop from J2-3



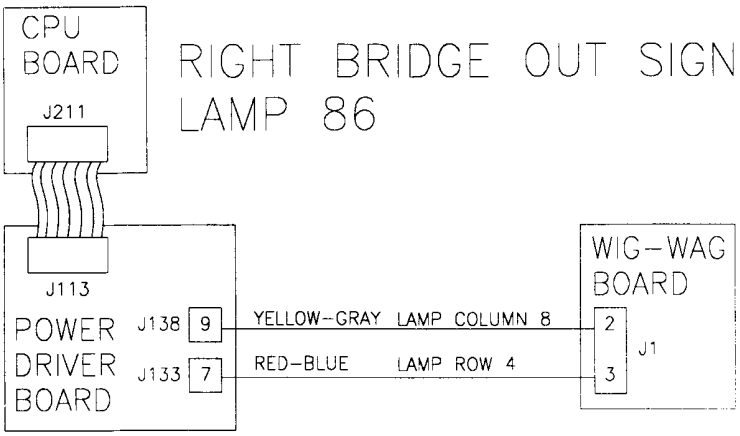
Wig-Wag Board Assembly
A-19064





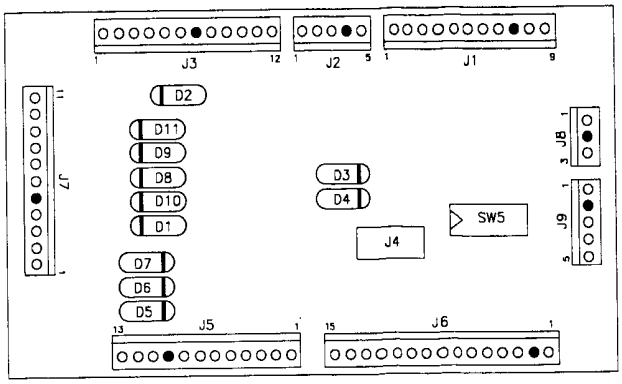


J1-1 Key
J1-2 Yellow-Gray, lamp column 8 from Power Driver Board J138-9
J1-3 Red-Yellow, lamp row 4 from Power Driver Board J133-5



J1-1 Key
J1-2 Yellow-Gray, lamp column 8 from Power Driver Board J138-9
J1-3 Red-Blue lamp row 6 from Power Driver Board J133-7

Coin Door Interface Board
A-17051-1



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

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

J3-1 Green-Brown, switch column. 1 from CPU J212-1
J3-2 Green-Red, switch column 2 from CPU J212-2
J3-3 White-Brown, switch row 1 from CPU J212-4
J3-4 White-Red, switch row 2 from CPU J212-6
J3-5 White-Orange, switch row 3 from CPU J212-7
J3-6 White-Yellow, switch row 4 from CPU J212-8
J3-7 Key
J3-8 Yellow-Gray, lamp col. 8 from Power Driver J136-3
J3-9 Red-Blue, lamp row 6 from Power Driver J135-7
J3-10 Red-Violet, lamp row 7 from Power Driver J135-8
J3-11 Red-Gray, lamp row 8 from Power Driver J135-9

J4- Not Used

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

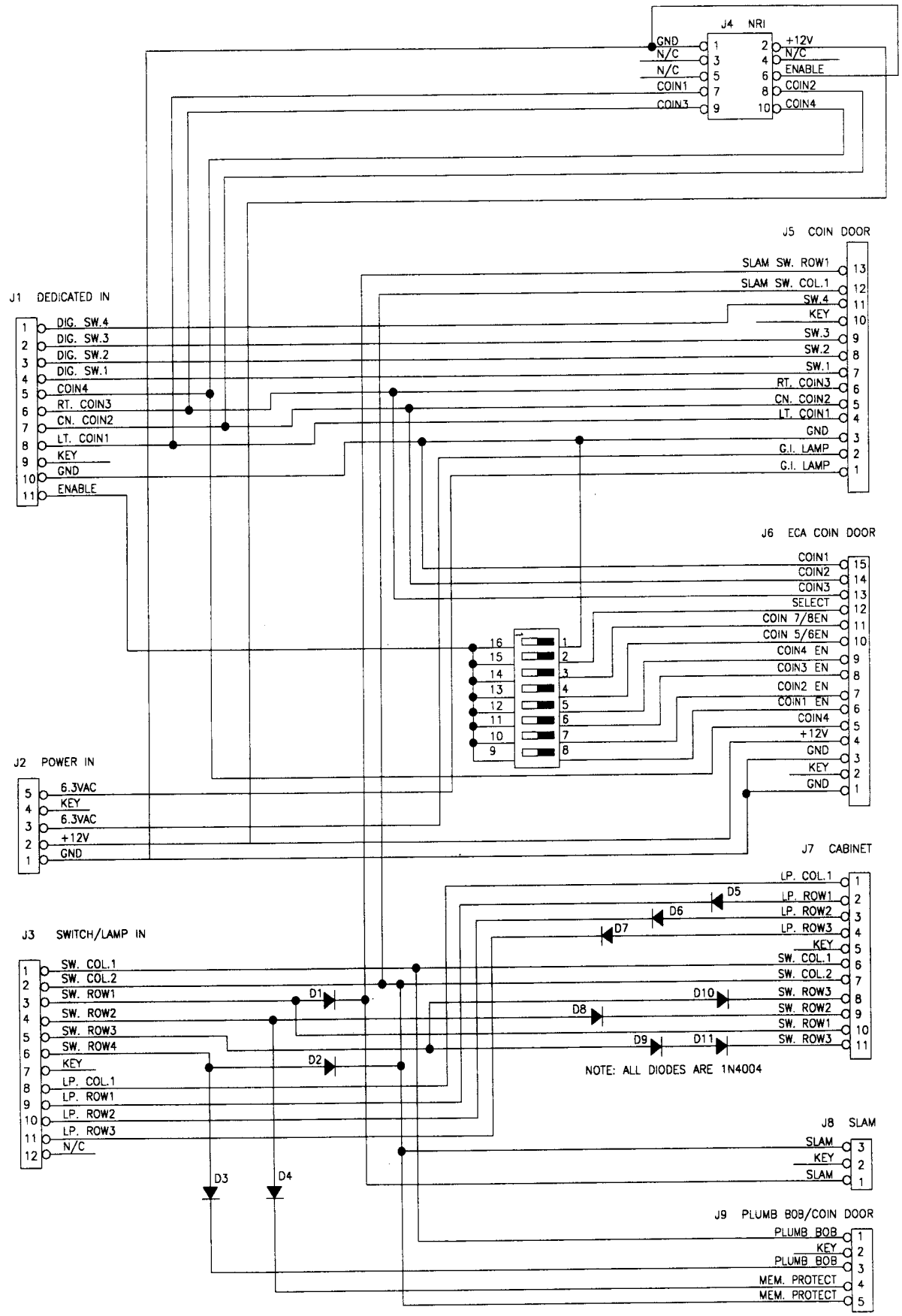
J6- Not Used

J7-1 Yellow-Gray, lamp column 8 to cabinet
J7-2 N/C
J7-3 Red-Violet, lamp row 7 to cabinet
J7-4 Red-Gray, lamp row 8 to cabinet
J7-5 Key
J7-6 Green-Brown, switch column 1 to cabinet
J7-7 Green-Red, switch column 2 to cabinet
J7-8 White-Orange, switch row 3 to cabinet
J7-9 N/C
J7-10 N/C
J7-11 White-Orange, switch row 3 to cabinet

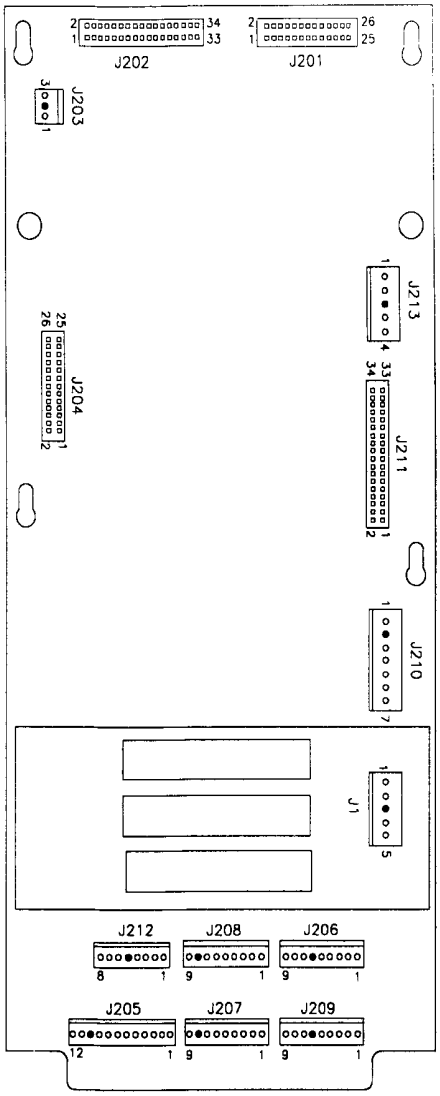
J8-1 White, switch row to cabinet Slam Tilt
J8-2 Key
J8-3 Green, switch column to cabinet Slam Tilt

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

Coin Door Interface Board Schematic
A-17051-1



Security CPU Board Assembly
A-17651-50024



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

J202, 34-pin ribbon cable, data to/from J903; P1; J601

J203- Not Used

J204 26-pin ribbon cable, data to/from J1 Aux. Driver Board

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

J206- Not Used

J207-1 Green-Brown, switch column 1, to playfield switches
J207-2 Green-Red, switch column 2, to playfield switches
J207-3 Green-Orange, switch column 3, to playfield switches
J207-4 Green-Yellow, switch column 4, to playfield switches
J207-5 Green-Black, switch column 5, to playfield switches
J207-6 Green-Blue, switch column 6, to playfield switches
J207-7 Green-Violet, switch column 7, to playfield switches
J207-8 Key
J207-9 Green-Gray, switch column 8, to playfield switches
J207-10 N/C
J207-11 N/C

J208- Not Used

J209-1 White-Brown, switch row 1, to playfield switches
J209-2 White-Red, switch row 2, to playfield switches
J209-3 White-Orange, switch row 3, to playfield switches
J209-4 White-Yellow, switch row 4, to playfield switches
J209-5 White-Green, switch row 5, to playfield switches
J209-6 Key
J209-7 White-Blue, switch row 6, to playfield switches
J209-8 White-Violet, switch row 7, to playfield switches
J209-9 White-Gray, switch row 8, to playfield switches

J210-1 Black, ground, from Power Driver Board J114-5,7
J210-2 Key
J210-3 Black, ground, from Power Driver Board J114-5, 7
J210-4 Gray, +5V, from Power Driver Board J114-3, 4
J210-5 Gray, +5V, from Power Driver Board J114-3, 4
J210-6 Gray-Green, +12V, from Power Driver Board J114-1, 2
J210-7 Gray-Green, +12V, from Power Driver Board J114-1, 2

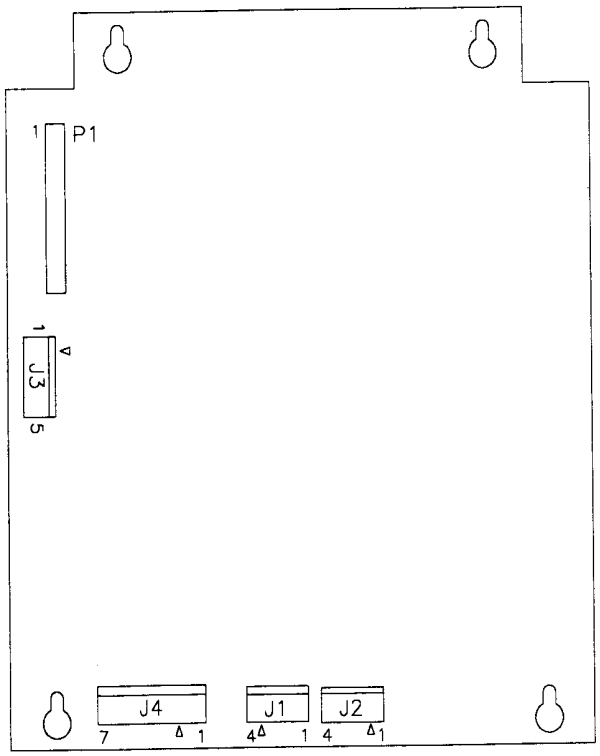
J211, 34-pin ribbon cable, data to/from J113

J212-1 Green-Brown, switch col. 1, to Coin Door Board J3-1
J212-2 Green-Red, switch col. 2, to Coin Door Board J3-2
J212-3 N/C
J212-4 White-Brown, switch row 1, to Coin Door Board J3-3
J212-5 Key
J212-6 White-Red, switch row 2, to Coin Door Board J3-4
J212-7 White-Orange, switch row 3, to Coin Door Board J3-5
J212-8 White-Yellow, switch row 4, to Coin Door Board J3-6

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

J1-1 Black, from CPU J213-1
J1-2 Black, from CPU J213-2
J1-3 Key
J1-4 Gray, from CPU J213-4
J1-5 Gray, from CPU J213-5

Sound Board Assembly
A-16917-50024



P1, 34-pin ribbon cable, data to/from J601; J903; J202

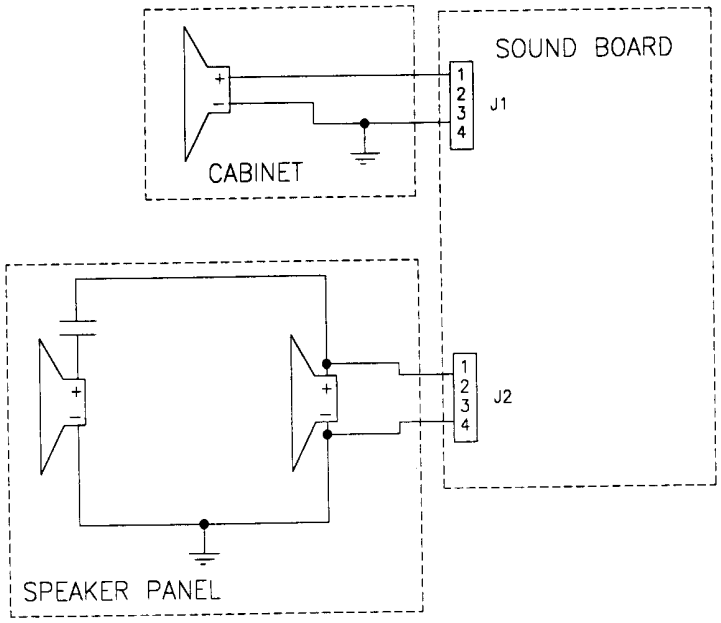
J1-1 Black-Yellow, signal to speaker
J1-2 N/C
J1-3 Key
J1-4 Black, signal to speaker

J2-1 Black-Yellow, signal to speaker
J2-2 Key
J2-3 N/C
J2-4 Black, signal to speaker

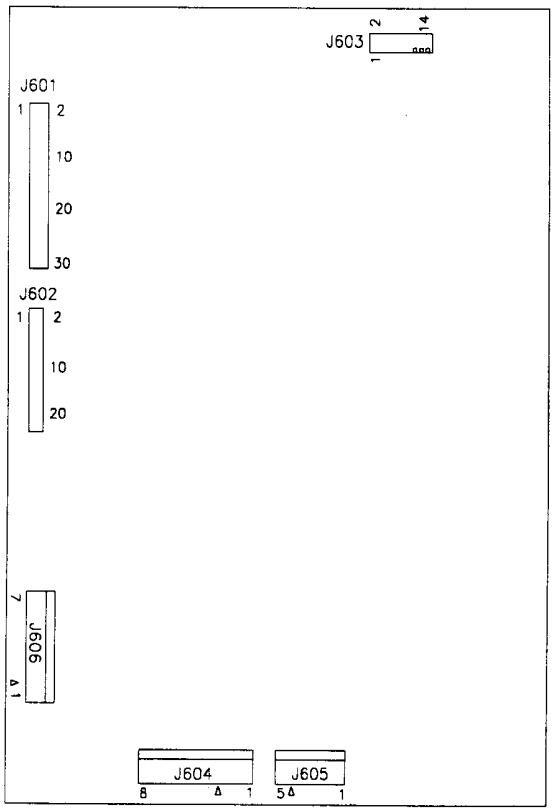
J3-1 Gray, +5V from Power Driver Board J114-3, 4
J3-2 Key
J3-3 Gray, +5V from Power Driver Board J114-3, 4
J3-4 Black, ground from Power Driver Board J114-5, 7
J3-5 Black, ground from Power Driver Board J114-5, 7

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

Speaker Wiring Diagram



Dot Matrix Controller Board Assembly
A-14039.1



J601, 34-pin ribbon cable, data to/from J202; J903; P1

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

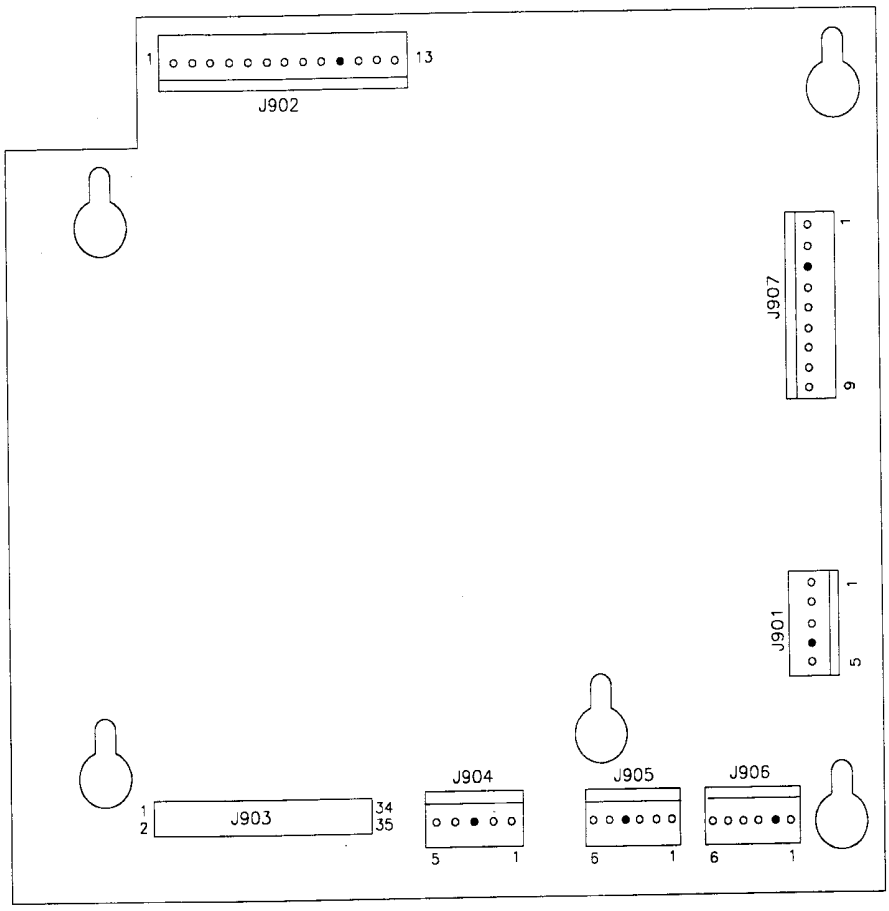
J603, 14-pin ribbon cable, data to/from Dot Matrix Display/Driver

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

J605-1 White, 80Vac from transformer secondary
J605-2 White, 80Vac from transformer secondary
J605-3 Violet, 100Vac from transformer secondary
J605-4 Key
J605-5 Violet, 100Vac from transformer secondary

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

Fliptronic II Board Assembly
A-15472-1



J901-1 White-Blue, 50Vac from Power Drvr Brd J104-2
J901-2 White-Blue, 50Vac loop from J901-1
J901-3 White-Blue, 50Vac from Power Drvr Brd J104-1
J901-4 Key
J901-5 White-Blue, 50Vac loop from J901-3

J902-1 Orange-Gray, holding, middle left flipper coil
J902-2 N/C
J902-3 Yellow-Gray, power, middle left flipper coil
J902-4 Orange-Violet, holding, upper left flipper coil
J902-5 N/C
J902-6 Yellow-Violet, power, upper left flipper coil
J902-7 Orange-Blue, holding, lower left flipper coil
J902-8 N/C
J902-9 Yellow-Blue, power, lower left flipper coil
J902-10 Key
J902-11 Orange-Green, holding, lower right flipper coil
J902-12 N/C
J902-13 Yellow-Green, power, lower right flipper coil

J903, 34-pin ribbon cable, data to/from J202; J601; P1

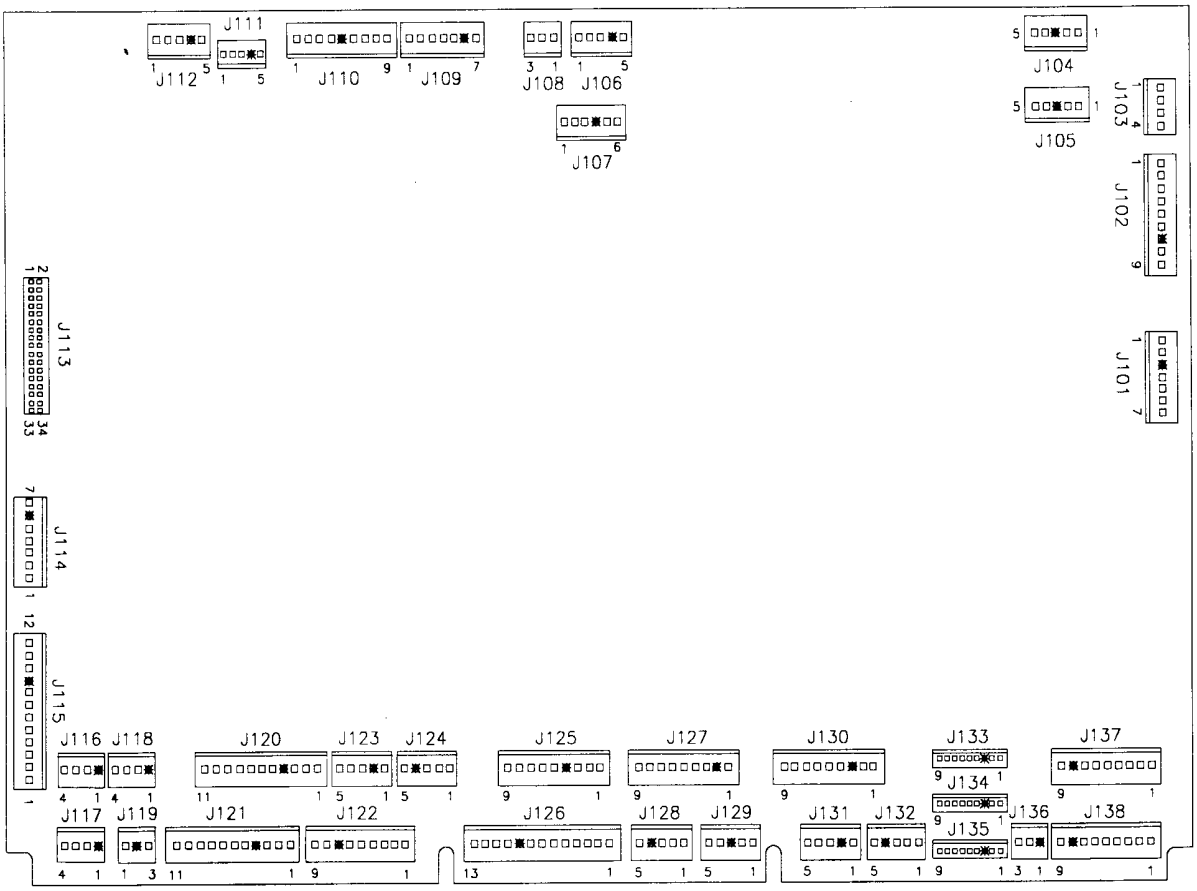
J904-1 Gray, +5V from Power Driver Board J114-3, 4
J904-2 Gray-Green, +12V from Pwr Drvr Brd J114-1, 2
J904-3 Key
J904-4 Black, ground from Power Driver Brd J114-5, 7
J904-5 Black ,ground from Power Driver Brd J114-5, 7

J905-1 Blue-Violet, F2 to right flipper opto J1-2
J905-2 Blue-Gray, F4 to left flipper opto J1-2
J905-3 Black-Yellow, F6 to right flipper opto J1-1
J905-4 Key
J905-5 Black-Blue, F8 to left flipper opto J1-1
J905-6 Orange, ground to left flipper opto J1-4

J906-1 Black-Green, F1 to lower right E.O.S. switch
J906-2 Key
J906-3 Black-Blue, F3 to lower left E.O.S. switch
J906-4 Black-Violet, F5 to upper left E.O.S. switch
J906-5 Black-Gray, F7 to middle left E.O.S. switch
J906-6 Orange, ground to E.O.S. switches

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

Power Driver Board Assembly
A-12697-3



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

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

J103- 1 Black, ground to High Current Driver Brd J1-1
J103-2 Black, ground to Aux Driver Board J2-5
J103-3 Black, ground to Aux Driver Board J2-4
J103-4 N/C

J104-1 White-Blue, 50Vac to Fliptronic II Board J901-3
J104-2 White-Blue, 50Vac to Fliptronic II Board J901-1
J104-3 Key
J104-4 N/C
J104-5 N/C

J105- Not Used

J106- Not Used

J107-1 Red-Orange, +50V to coils
J107-2 Red-Brown, +50V to coils
J107-3 Red-Black, +50V to coils
J107-4 Key
J107-5 N/C
J107-6 Red-White, +20V to flashlamps; High Current Driver Board J1-6

J108- Not Used

J109- Not Used

J110- Not Used

J111- Not Used

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

J113, 34-pin ribbon cable, data to/from CPU J211

Power Driver Board Continued...

J114-1 Gray-Green, +12V to J210-6, 7; J904-2
J114-2 Gray-Green, +12V to J210-6, 7; J904-2
J114-3 Gray, +5V to J210-4, 5; J3-1,3; J904-1
J114-4 Gray, +5V to J210-4, 5; J3-1,3; J904-1
J114-5 Black, ground to J210-1, 3; J3-4, 5; J904-4, 5
J114-6 Key
J114-7 Black-White, ground to J210-1,3; J3-4, 5;. J904-4, 5

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

J116-1 Key
J116-2 Gray-Yellow, +12V to Coin Door Board J2-2
J116-3 Black, ground to Coin Door Board J2-1
J116-4 N/C

J117-1 Key
J117-2 Gray-Yellow, +12V to Dot Matrix Cntrllr J606-7
J117-3 Black, ground to Dot Matrix Cntrllr J606-3
J117-4 Gray, +5V to Dot Matrix Cntrllr J606-5

J118-1 Key
J118-2 Gray-Yellow, +12V to playfield boards
J118-3 Black, ground to playfield boards
J118-4 N/C

J119-1 White-Violet, 6.8Vac, G.I. to Coin Door BrdJ2-5
J119-2 Key
J119-3 Violet, return, G.I. to Coin Door Board J2-3

J120-1 Brown, return, G.I. to playfield
J120-2 Orange, return, G.I. to playfield
J120-3 Yellow, return, G.I. to playfield
J120-4 Key
J120-5 Green, return, G.I. to playfield
J120-6 Violet, return, G.I. to playfield
J120-7 White-Brown, 6.8Vac, G.I. to playfield
J120-8 White-Orange, 6.8Vac, G.I. to playfield
J120-9 White-Yellow, 6.8Vac, G.I. to playfield
J120-10 White-Green, 6.8Vac, G.I. to playfield
J120-11 White-Violet, 6.8Vac, G.I. to playfield

J121-1 Brown, return, G.I. to insert panel
J121-2 Orange, return, G.I. to insert panel
J121-3 Yellow, return, G.I. to insert panel
J121-4 Key
J121-5 N/C
J121-6 N/C
J121-7 White-Brown, 6.8Vac, G.I. to insert panel
J121-8 White-Orange, 6.8Vac, G.I. to insert panel
J121-9 White-Yellow, 6.8Vac, G.I. to insert panel
J121-10 N/C
J121-11 N/C

J122-1 Blue-Brown, solenoid 25 drive to coil
J122-2 Blue-Red, solenoid 26 drive to coil
J122-3 Blue-Orange, solenoid 27 drive to coil
J122-4 Blue-Yellow, solenoid 28 drive to coil
J122-5 Red-Orange, tieback for solenoid 25
J122-6 Red-Orange, tieback for solenoid 26
J122-7 Key
J122-8 Red-Orange, tieback for solenoid 27
J122-9 N/C

J123- Not Used

J124- Not Used

J125- Not Used

J126-1 Black-Brown, solenoid 17 drive to coil
J126-2 Black-Red, solenoid 18 drive to coil
J126-3 Black-Orange, solenoid 19 drive to coil
J126-4 Black-Yellow, solenoid 20 drive to coil
J126-5 Blue-Green, solenoid 21 drive to coil
J126-6 Blue-Black, solenoid 22 drive to coil
J126-7 Blue-Violet, solenoid 23 drive to coil
J126-8 Blue-Gray, solenoid 24 drive to coil
J126-9 Key
J126-10 N/C
J126-11 Red-Orange, tieback for solenoid 24
J126-12 Red-Orange, tieback for solenoid 22
J126-13 Red-Orange, tieback for solenoid 21

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

J128-Not Used

J129-Not Used

J130-1 Violet-Brown, solenoid 1 drive to coil
J130-2 Violet-Red, solenoid 2 drive to coil
J130-3 Key
J130-4 Violet-Orange, solenoid 3 drive to coil
J130-5 Violet-Yellow, solenoid 4 drive to coil
J130-6 Violet-Green, solenoid 5 drive to coil
J130-7 Violet-Blue, solenoid 6 drive to coil
J130-8 Violet-Black, solenoid 7 drive to coil
J130-9 Violet-Gray, solenoid 8 drive to coil

J131- Not Used

J132- Not Used

Power Driver Board Continued...

J133-1 Red-Brown, lamp row 1 to playfield
J133-2 Red-Black, lamp row 2 to playfield
J133-3 Key
J133-4 Red-Orange, lamp row 3 to playfield
J133-5 Red-Yellow, lamp row 4 to playfield
J133-6 Red-Green, lamp row 5 to playfield
J133-7 Red-Blue, lamp row 6 to playfield
J133-8 Red-Violet, lamp row 7 to playfield
J133-9 Red-Gray, lamp row 8 to playfield

J134-Not Used

J135-1 N/C
J135-2 N/C
J135-3 Key
J135-4 N/C
J135-5 N/C
J135-6 N/C
J135-7 Red-Blue, lamp row 6 to cabinet
J135-8 Red-Violet, lamp row 7 to cabinet
J135-9 Red-Gray, lamp row 8 to cabinet

J136-1 Key
J136-2 N/C
J136-3 Yellow-Gray, lamp column 8 to cabinet

J137- Not Used

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

LAMP MATRIX

COLUMN / ROW	1 Yellow–Brown J137–1 Q98	2 Yellow–Red J137–2 Q97	3 Yellow–Orange J137–3 Q96	4 Yellow–Black J137–4 Q95	5 Yellow–Green J137–5 Q94	6 Yellow–Blue J137–6 Q93	7 Yellow–Violet J137–7 Q92	8 Yellow–Gray J137–9 Q91
Red–Brown J134–1 Q90 1	Salt Lake 11	Los Angeles 21	San Francisco 31	Bad Weather 41	Monday 51	Wednesday 61	Bonus 6X 71	Flying Rocks 5X Blast 81
Red–Black J134–2 Q89 2	Denver 12	Las Vegas 22	Seattle 32	Jets At Max 42	Spinner At Max 52	Tuesday 62	Bonus 5X 72	Flying Rocks Radio Riot 82
Red–Orange J134–4 Q88 3	Butte 13	Albuquerque 23	Left Special 33	Radio 43	Hold Bonus 53	Thursday 63	Bonus 4X 73	Flying Rocks Extra Ball 83
Red–Yellow J134–5 Q87 4	Minnesota 14	Dallas 24	Shoot Here Left Loop 34	Million Plus Wheel 44	Light Extra Ball Wheel 54	Friday 64	Bonus 3X 74	Left Bridge Out 84
Red–Green J134–6 Q87 5	Kansas City 15	New Orleans 25	Shoot Again 35	Big Millions 45	Lunch Time 55	Lock 65	Bonus 2X 75	Bob's Bunker 85
Red–Blue J134–7 Q86 6	New York City 16	Nashville 26	Right Special 36	Light Special 46	Bob's Freebie 56	Extra Ball 66	Light Extra Ball Lower 76	Right Bridge Out 86
Red–Violet J134–8 Q84 7	Ohio 17	Atlanta 27	Blasting Zone 37	Light Big Blast 47	Shoot Here Left Ramp 57	Shoot Here Right Loop 67	Start City 77	Buy In Button 87
Red–Gray J134–9 Q83 8	Chicago 18	Miami 28	Shoot Here Right Ramp 38	Flying Rocks 48	You're There 58	Light Bob's 68	Million Plus Right Ramp 78	Start Button 88

SWITCH MATRIX

Dedicated Grounded Switches	COLUMN / ROW	1 Green–Brown J207–1 U20–18	2 Green–Red J207–2 U20–17	3 Green–Orange J207–3 U20–16	4 Green–Yellow J207–4 U20–15	5 Green–Black J207–5 U20–14	6 Green–Blue J207–6 U20–13	7 Green–Violet J207–7 U20–12	8 Green–Gray J207–9 U20–11
Org–Brn J205–1 Left Coin Chute D1	White–Brown J209–1 U18–11 1	Ted's Mouth 11	Slam Tilt 21	Skill Shot Lower 31	Trough Jam 41	Spinner 51	Left Sling 61	Right Ramp Enter 71	White Standup 81
Org–Red J205–2 Center Coin Chute D2	White–Red J209–2 U18–9 2	Dozer Down 12	Coin Door Closed 22	Skill Shot Upper 32	Trough 1 42	Lockup 1 52	Right Sling 62	Right Ramp Exit Center 72	Red Standup 82
Org–Blk J205–3 Right Coin Chute D3	White–Orange J209–3 U18–5 3	Start Button 13	Buy In Button 23	Right Shooter 33	Trough 2 43	Lockup 2 53	Left Jet 63	Flying Rocks 5X Blast 73	Yellow Standup 83
Org–Yel J205–4 4th Coin Chute D4	White–Yellow J209–4 U18–7 4	Plumb Bob Tilt 14	Always Closed 24	Radio 3–Bank 34	Trough 3 44	Lock Kickout 54	Top Jet 64	Flying Rocks Radio Riot 74	Orange Standup 84
Org–Grn J205–6 Normal Service Credit / Test Escape D5	White–Green J209–5 U19–11 5	Dozer Up 15	Red's Mouth 25	Red Standup Upper 35	Trough 4 45	Right Ramp Exit Left 55	Right Jet 65	Flying Rocks Extra Ball 75	Middle Left Flipper Top 85
Org–Blu J205–7 Normal Volume Down / Test Down D6	White–Blue J209–7 U19–9 6	Right Outlane 16	Left Outlane 26	Red Standup Lower 36	Right Loop Enter 46	Left Ramp Exit 56	Not Used 66	Flying Rocks Top 76	Middle Left Flipper Bottom 86
Org–Vio J205–8 Normal Volume Up / Test Up D7	White–Violet J209–8 U19–5 7	Right Inlane 2 17	Left Inlane 27	Hit Red 37	Hit Bulldozer 47	Left Ramp Enter 57	Not Used 67	Under Blast Zone 77	Not Used 87
Org–Gry J205–9 Normal Begin Test / Test Enter D8	White–Gray J209–9 U19–7 8	Right Inlane 1 18	Blast Zone 3–Bank 28	Right Loop Exit 38	Hit Ted 48	Left Shooter 58	Not Used 68	Start City 78	Not Used 88

Flipper Grounded Switches	
Black–Green J906–1 Lower Right E.O.S.	F1
Blue–Violet J905–1 Lower Right Opto	F2
Black–Blue J906–3 Lower Left E.O.S.	F3
Blue–Gray J905–2 Lower Left Opto	F4
Black–Violet J906–4 Upper Left E.O.S.	F5
Black–Yellow J905–3 Upper Left Opto	F6
Black–Gray J906–5 Middle Left E.O.S.	F7
Black–Blue J905–5 Middle Left Opto	F8

WARNINGS & NOTICES

WARNING

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

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