

Bally

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FINAL

The Shadow™



Operations Manual Includes:

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

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

THE SHADOW™

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

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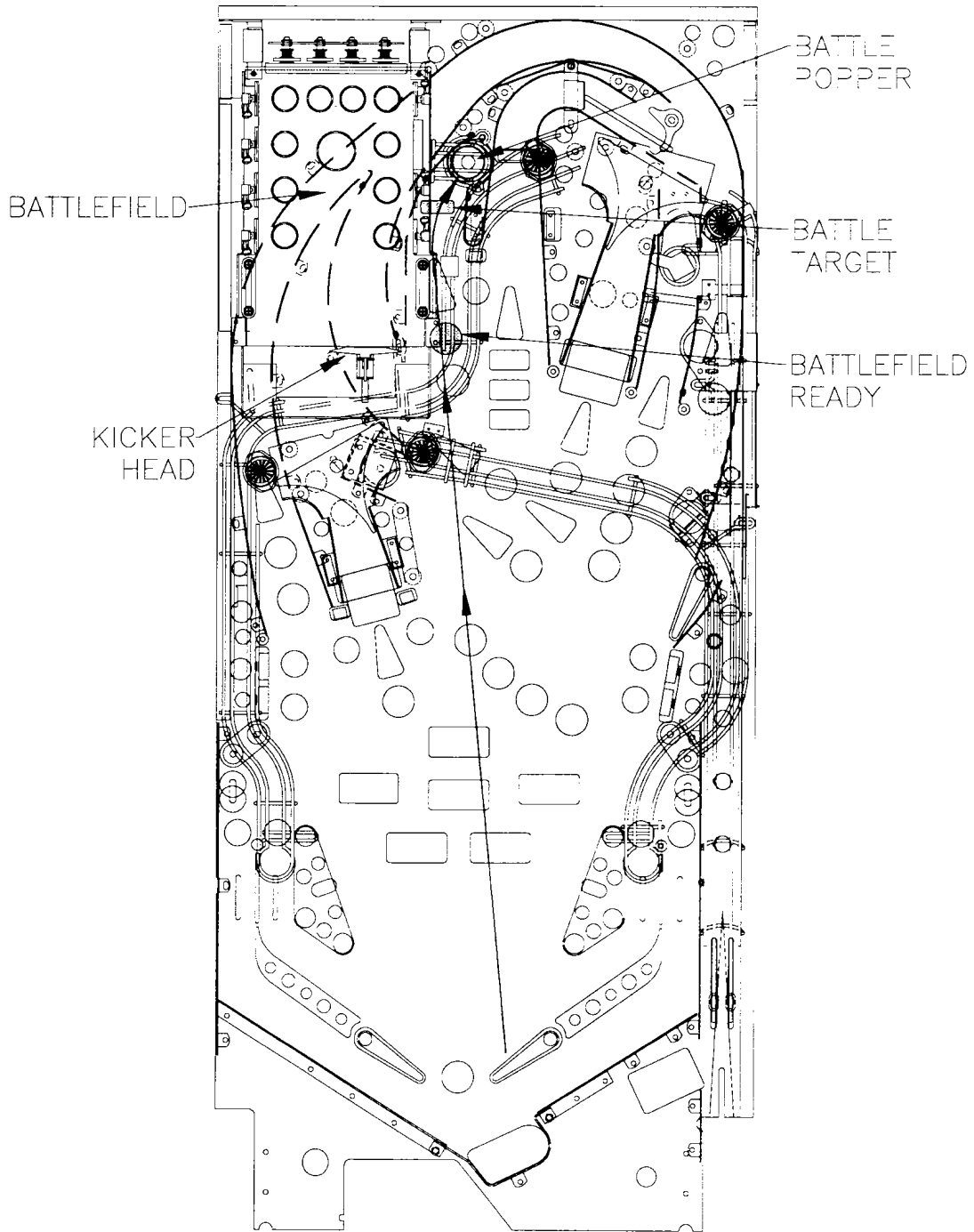
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Bally's
THE SHADOW Pinball

Game Rules & Shot Maps

THE BATTLEFIELD

Hit Battle Drop Target to gain access to the Battlefield Mini-playfield. Shoot into the Battle Popper to enter the Battlefield. When on the Battlefield, use the flippers to move the kicker head to the right and left. Kicker head will fire automatically. Hit the amount of targets shown in the display and then break through the back drop targets to collect the Battlefield Jackpot and light Extra Ball. Completing all the lights on the Battlefield will increase the Jackpot value.



SECTION ONE

GAME OPERATION AND TEST INFORMATION

(System WPC) ROM Summary

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	U6	A-5343-50032-1A (Domestic)
Game 1	27c040	CPU	U6	A-5343-50032-1X (Foreign)
Music/Speech	27c040	Audio	SU2	A-5343-50032-S2
Music/Speech	27c040	Audio	SU3	A-5343-50032-S3
Music/Speech	27c040	Audio	SU4	A-5343-50032-S4
Music/Speech	27c040	Audio	SU5	A-5343-50032-S5
Music/Speech	27c040	Audio	SU6	A-5343-50032-S6
Music/Speech	27c040	Audio	SU7	A-5343-50032-S7

NOTICE

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

GAME CONTROL LOCATIONS

Cabinet Switches

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

The Start Button is the push-button to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

Coin Door Switches

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

Normal Function

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

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

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

The *Begin Test button starts the Menu System Operation and changes the Coin Door Switches from Normal Function to Test Function.

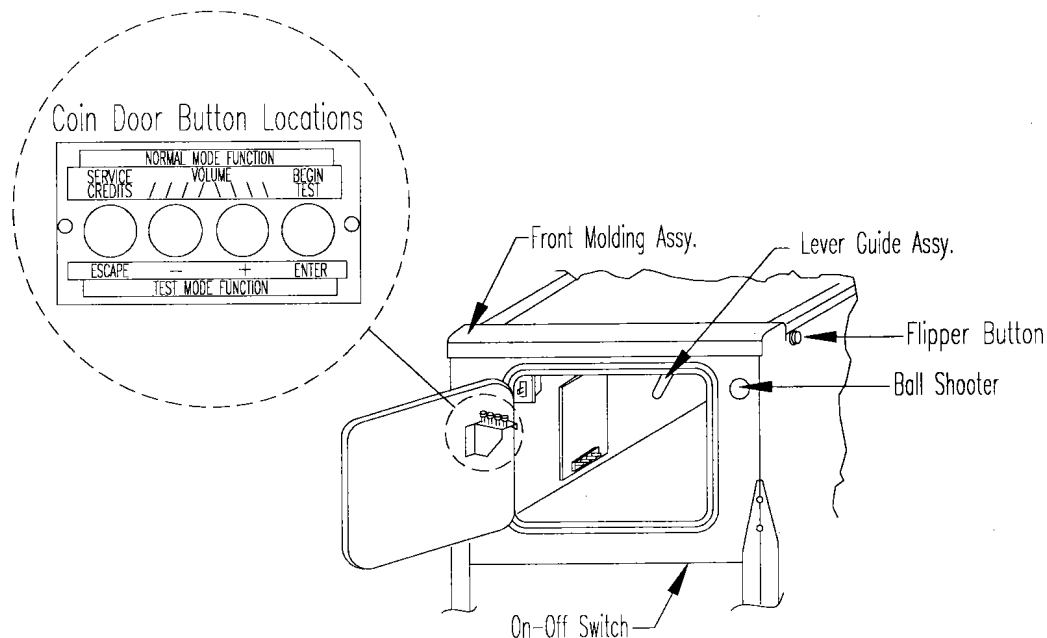
Test Function

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

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

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

The *Enter button allows you to get into a menu selection or lock in an adjustment choice.



****To reset High Score, hold down the Begin Test/Enter switch for 5 seconds while in the Attract Mode.***

GAME OPERATION

CAUTION

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

POWERING UP. With the coin door closed, plug the game in and switch it On. In normal operation, testing will show in the display as the game performs Start-Up Tests. Once the Start-Up Tests have been successfully completed the last score is displayed. After which, the game goes into the Attract Mode.

Note: After the game has been on location for a period of time, the Start-Up Tests may contain messages concerning game problems. See 'Error Messages' for more detailed information regarding messages.

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

Example:	SHADOW	Sound Rev. P-O
50032	Rev. PA-O	Sy. 3.24 12/9/93

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

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

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

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

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

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

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

*Operator-adjustable feature.

MENU SYSTEM OPERATION

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

Main Menu

B. Bookkeeping Menu	
	B.1 Main Audits
	B.2 Earnings Audits
	B.3 Standard Audits
	B.4 Feature Audits
	B.5 Histograms
	B.6 Time-Stamps
P. Printouts Menu	
	P.1 Earnings Data
	P.2 Main Audits
	P.3 Standard Audits
	P.4 Feature Audits
	P.5 Score Histograms
	P.6 Game Time Histograms
	P.7 Time-Stamps
	P.8 All Data
T. Test Menu	
	T.1 Switch Edges
	T.2 Switch Levels
	T.3 Single Switches
	T.4 Solenoid Test
	T.5 Flasher Test
	T.6 General Illumination
	T.7 Sound & Music Test
	T.8 Single Lamps
	T.9 All Lamps
	T.10 Lamp & Flasher Test
	T.11 Display Test
	T.12 Flipper Test
	T.13 Ordered Lamp Test
	T.14 Lamp Row-Col Test
	T.15 Dip Switch Test
	T.16 Mini-playfield Test
	T.17 Magnet Test
	T.18 Empty Balls Test
U. Utilities Menu	
	U.1 Clear Audits
	U.2 Clear Coins
	U.3 Reset H.S.T.D.
	U.4 Set Time & Date
	U.5 Custom Message
	U.6 Set Game I.D.
	U.7 Factory Adjustments
	U.8 Factory Resets
	U.9 Presets
	U.10 Clear Credits
	U.11 Auto Burn-In
A. Adjustments Menu	
	A.1 Standard Adjustments
	A.2 Feature Adjustments
	A.3 Pricing Adjustments
	A.4 H.S.T.D. Adjustments
	A.5 Printer Adjustments

Press Escape

To move out of a menu selection.

Press Enter

To get into a menu selection.

Press Up

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

Press Down

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

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

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

ERROR MESSAGES

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

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

ER. MINI PFD. BAD CHK. SWITCHES/MTR

This is saying the mini-playfield is not working correctly. Check the mini-playfield motor (20 - mini motor left, 19 - mini motor right), Bridge driver board, Power Driver board, CPU board, and the two mini-playfield limit switches (38 - mini-playfield right and 37 - mini-playfield left). Also check for blown fuses.

ER. MAGNET OPTO IS NOT WORKING

This is saying that opto switch #33 (inner sanctum) is not working. This switch must be working for the magnet to be able to capture and throw the ball. Check the opto driver board, 12v power supply, CPU board and proper alignment of the opto pair. Also check for blown fuses.

ER. BATTLE KICKER OPTO NOT WORKING

This is saying that opto switch #36 (inner sanctum) is not working. This switch must be working for the magnet to be able to capture and throw the ball. Check the 24 inch opto driver board, 12v power supply, CPU board and proper alignment of the opto pair. Also check for blown fuses.

ER. LOCKUP IS BAD CHK. SWITCH/COIL

This is saying that the 3 ball lockup at the top of the playfield is not working correctly. Check to see that the three lockup switches (lockup right #63, lockup middle #64, lockup left #65) are working properly (check with balls sitting on switches) and that the lockup kickout coil (#02) is working correctly. Also check for blown fuses.

ER. WALL TGT. BAD CHK. SWITCH/COIL

This is saying that the sanctum wall controlled target is not working correctly. Check to see that the wall drop down switch (#51) is functioning correctly (it should trigger closed when the wall is down) and coils #08 (wall target up) & #16 (wall target down) are functioning. Also check for blown fuses.

ER. DROP BANK BAD CHK. SWITCH/COIL

This is saying the mini-playfield 4 bank drop targets are not functioning properly. Check the mini drop bank coil (#24) and the four drop target switches (#85-#88), 12v power supply and the CPU board. Also check for blown fuses.

ER. BAT. DROP BAD CHK. SWITCH/COIL

This is saying that the single drop target at the entrance to the popper (battlefield) is not functioning correctly. Check to see that the battle drop down switch (#55) is functioning correctly (it should trigger closed when the drop target is down) and coils #25 (single drop up) & #36 (single drop down) are functioning. Also check for blown fuses.

The Shadow

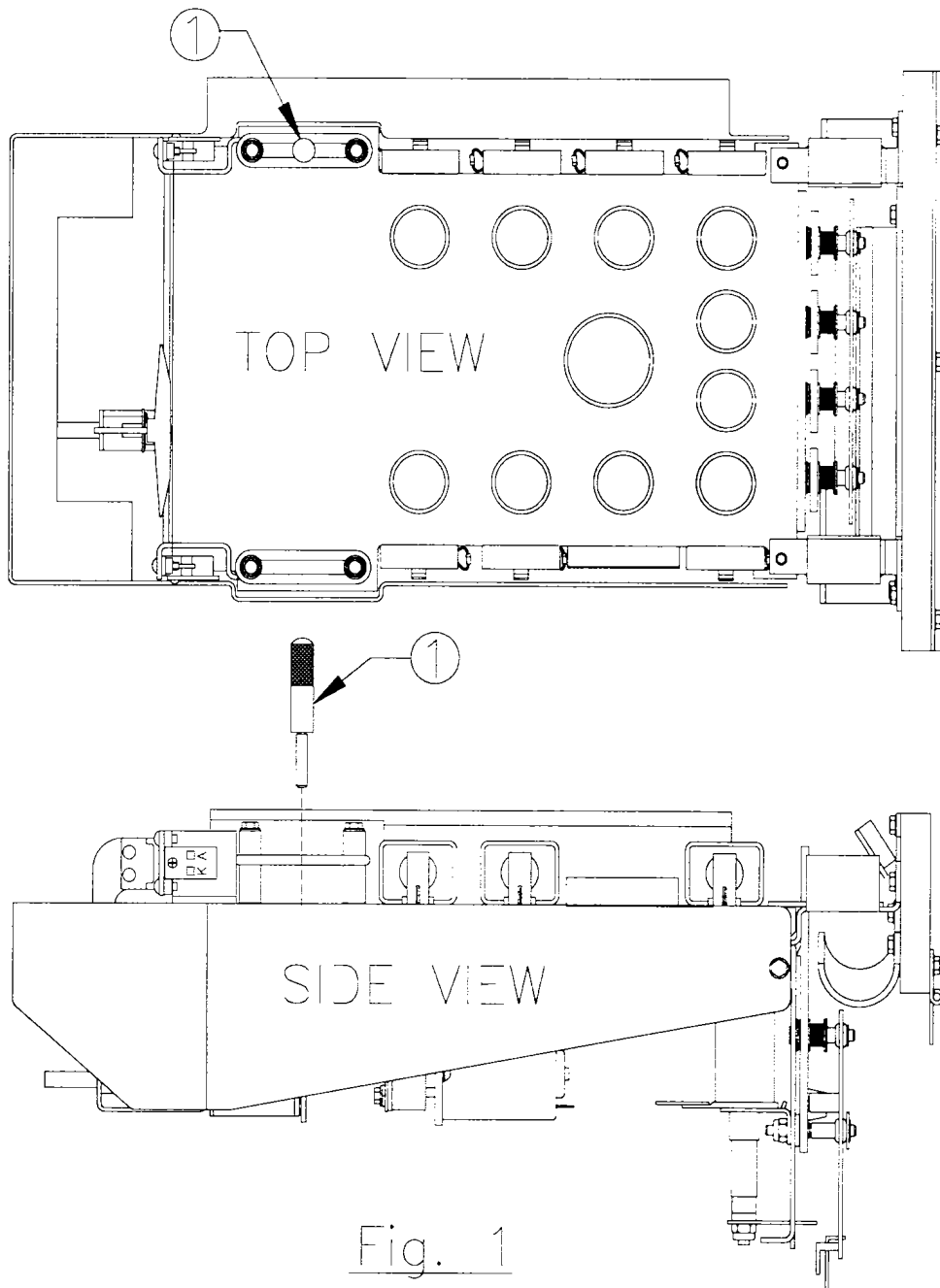
Unit Disassembly for Repair

Major Component Service Instructions

Mini-playfield

A. To access mini-playfield.

1. Unscrew thumb screw (Item 1) from the mini-playfield. (See Fig.1) This may be tight the first time it is removed. A straight blade screwdriver may be necessary to remove the thumb screw. Subsequent removals and insertions may be done with just your fingers.



2. To service motor

- a. De-solder motor wire leads, noting which color wire belongs to which terminal.
- b. Remove four (4) motor mounting screws. Motor can now be removed. (See Fig. 6)

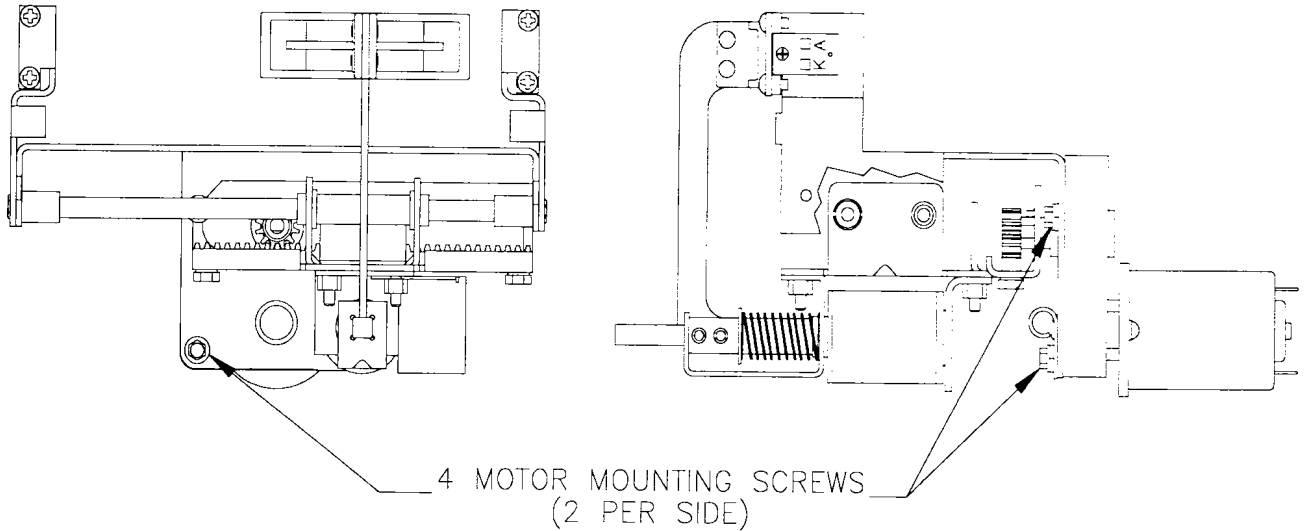


Fig. 6

- c. If replacing motor, be sure to remove pinion gear from the motor shaft and install it on the new motor shaft. (See Fig. 7) Apply Loctite to set-screw and use a .050 Hex Allen wrench to re-install. Do not over tighten, screw may strip.

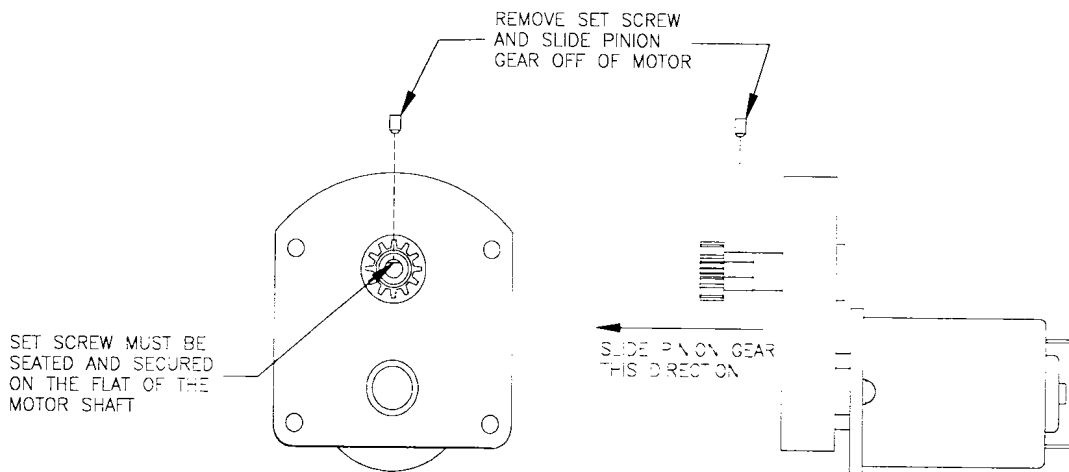


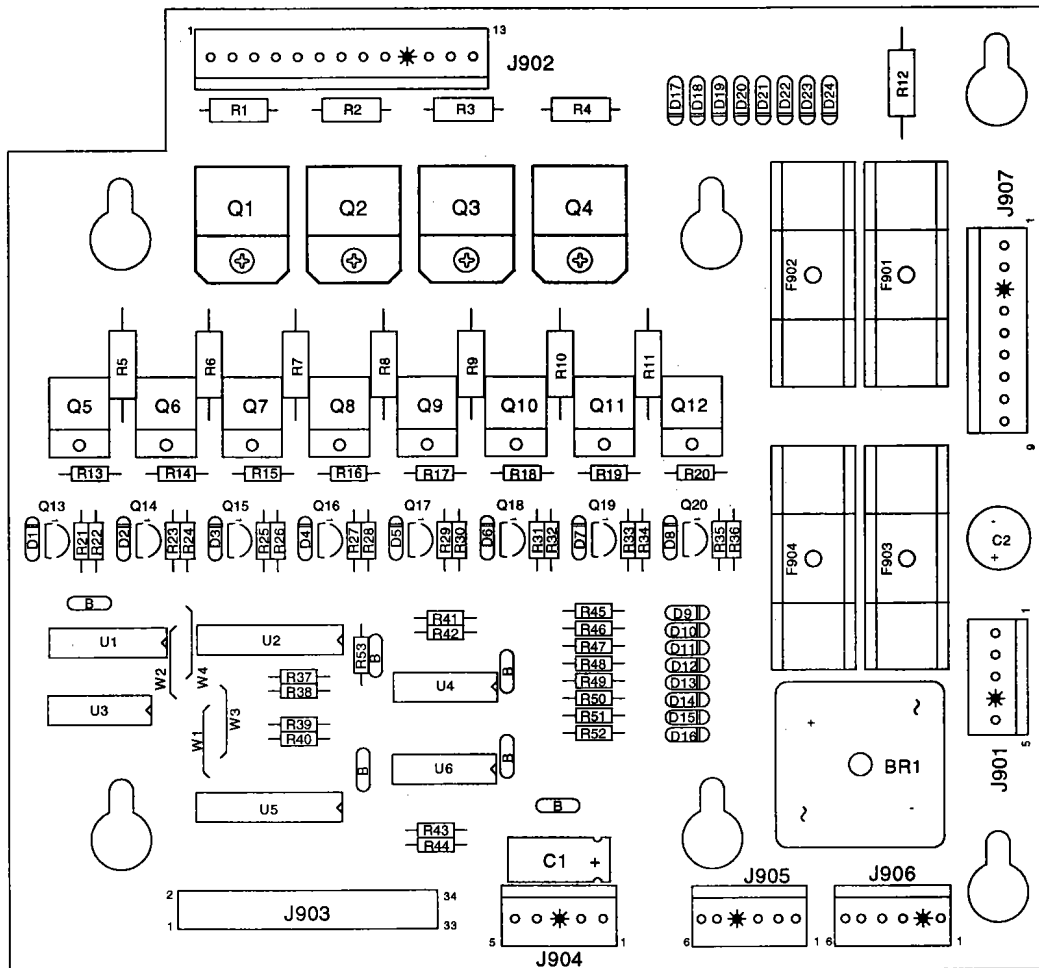
Fig. 7

- d. Re-install new motor, making sure that there is proper engagement between the rack and pinion.
- e. Solder wire leads back onto terminals.

SECTION TWO

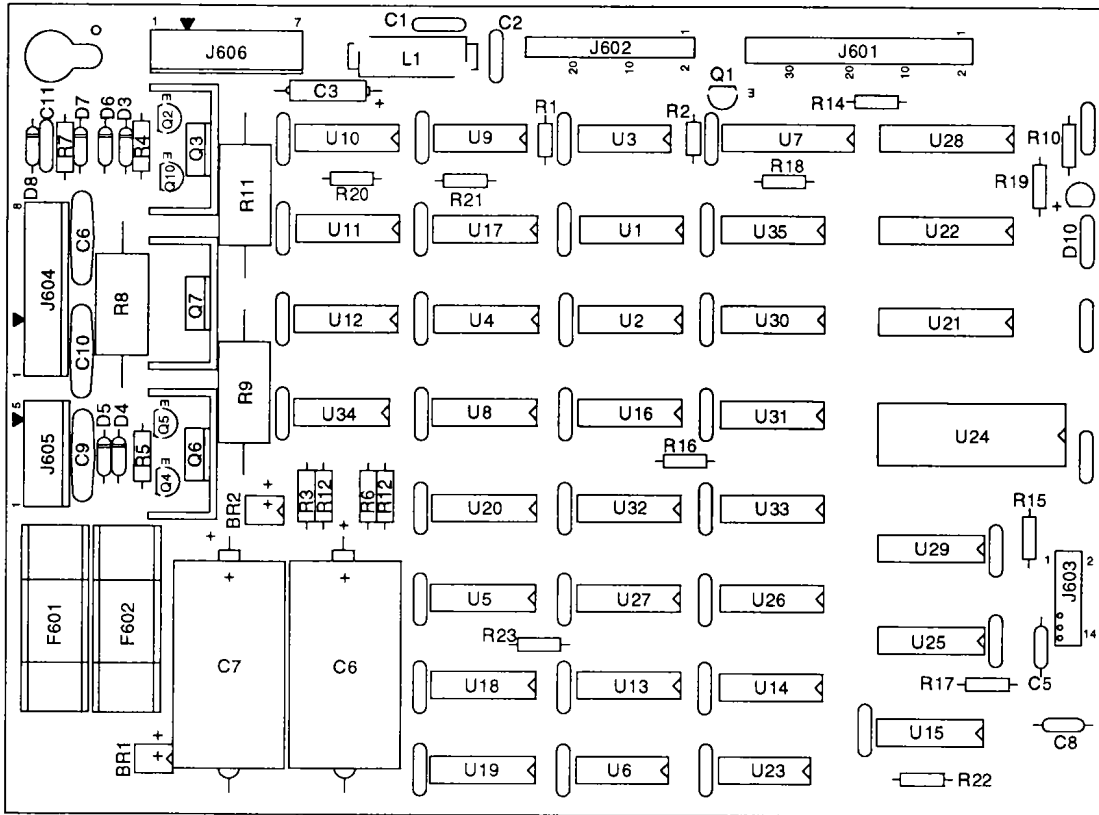
GAME PARTS INFORMATION

A-15472-1 Fliptronic II Board Assembly



Part Number	Designator	Description	Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink	5070-09054-00	D1-D24	Diode, 1N4004
20-9684	Q5-Q12	Fastener Snap In	5100-09690-00	BR1	Bridge Rectifier
4006-10003-08	Q1-Q4	Mach. screw, 6-32	5162-12635-00	Q5-Q12	Trans., TIP102 NPN
4406-01128-00	Q1-Q4	Nut 6-32 KEPS	5190-09016-00	Q13, Q20	Trans., 2N4403 PNP
5010-09034-00	R37-R44, R53	Res., 10K Ω , 1/4w, 5%	5191-12179-00	Q1-Q4	Trans., TIP36C PNP
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45-R52	Res., 1K Ω , 1/4w, 5%	5315-12009-00	U2	IC, 74HCT374
5010-09361-00	R1-R4	Res., 220 Ω , 1/2w, 5%	5315-12031-00	U5	IC, 74HCT244
5010-09416-00	R21, R23, R25, R27, R29, R31, R33, R35	Res., 470 Ω , 1/4w, 5%	5315-12812-00	U1	IC, 74HCT138
5010-09534-00	W3, W4	Res., 0 Ω	5315-12951-00	U3	IC, 74HCT00
5010-10171-00	R13, R20	Res., 56 Ω , 1/4w, 5%	5370-12272-00	U4, U6	IC, LM339 Quad Comp
5011-12956-00	R5, R12	Res., 2.7K Ω , 1w, 5%	5731-10356-00	F901-F904	Fuse Holder (F901-F904)
5040-08986-00	C1	Cap., 100M, 10v	5733-12060-01	J901, J904	Connector, 5-pin Header
5040-09537-00	C2	Cap., 100 μ F, 100v	5791-10862-05	J907	Connector, 9-pin Header
5043-08980-00	B	Cap., .01 μ F, 50v	5791-10862-09	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	Part Number	Designator	Description
5010-08991-00	R1	Res., 4.7K Ω , 1/4w, 5%	5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
5010-09036-00	R14-R23	Res., 100 Ω , 1/4w, 5%	5311-10947-00	U9	IC, 74HC125
5010-09224-00	R10	Res., 270 Ω , 1/4w, 5%	5311-10951-00	U10, U11	IC, 74HC161
5010-12832-00	R3, R6, R12, R13	Res., 4.7K Ω , 1/2w, 5%	5311-10977-00	U6	IC, 74HC04
5010-12841-00	R4, R5	Res., 120 Ω , 1/2w, 5%	5311-12817-00	U29	IC, 74HC165
5012-12830-00	R9	Res., 1.8K Ω , 5w, 5%	5311-12819-00	U21	IC, 74HC688
5012-12842-00	R11	Res., 120 Ω , 5w, 5%	5311-12820-00	U23	IC, 74HC27
5012-12843-00	R8	Res., 4.7K Ω , 5w, 5%	5311-12822-00	U13-U15	IC, 74HC193
5010-10171-00	R7	Res., 56 Ω , 1/4w, 5%	5315-12009-00	U22	IC, 74HCT374
5043-09492-00	C5, C8	Cap., 100P, 50v, (\pm 10%)	5315-12812-00	U1, U2, U30, U12	IC, 74HCT138
5040-08986-00	C3	Cap., 100M, 10v (\pm 20%)	5281-09308-00	U28	IC, 74HCT245
5040-12324-00	C4, C7	Cap., 150M, 160v (\pm 50%)	5315-12815-00	U8, U34	IC, 74HCT08
5043-08980-00	BYPASS	Cap., .01M, 50v (+80,-20%)	5315-12816-00	U19	IC, 74HCT32
5043-09072-00	C6, C9, C10	Cap., .1M, 500v (+80,-20%)	5315-12821-00	U7	IC 74HCT240
5043-09845-00	C1, C2, C11	Cap., 1KP, 50v (\pm 20%)	5340-12278-00	U24	S/RAM 2064 150NS
5070-09054-00	D7	Diode, 1N4004, 1.0A.	5551-09822-00	L1	Ind. 4.7 μ H, 3A.
5075-12824-00	D6, D8	Zener, 1N4742A, 12v	5671-13732-00	D10	Display LED Red
5075-12823-00	D4, D5	Zener, 1N4758, 56v	5705-09199-00	Q3, Q6, Q7	Heatsink, 6030B
5075-12826-00	D3	Zener, !N4759A, 62v	5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
5100-12833-00	BR1, BR2	Bridge, 400v, 1A	5733-12060-01		Fuse Holder (F601, F602)
5150-10269-00	Q1	Trans., 2N3904 NPN	5791-10850-00	J602	Connector, 26-pin Header
5164-09056-00	Q2, Q10	Trans., MPSD02 NPN	5791-10862-05	J605	Connector, 5-pin Header
5164-12154-00	Q3, Q7	Trans., MJE15030 NPN	5791-10862-07	J606	Connector, 7-pin Header
5194-09055-00	Q4, Q5	Trans., MPSD52 PNP	5791-10862-08	J604	Connector, 8-pin Header
5194-12155-00	Q6	Trans., MJE15031 PNP	5791-12516-00	J601	34 Hen 17x2 STR
5281-09738-00	U16, U25-U27	IC, 74LS157	5791-12827-00	J603	14 Hen 7x2 STR
5281-10033-00	U3	IC, 74LS30			
5281-10043-00	U31-U33, U35	IC, 74LS175			

SECTION THREE

GAME WIRING AND SCHEMATICS

CONNECTOR & COMPONENT IDENTIFICATION

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

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

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

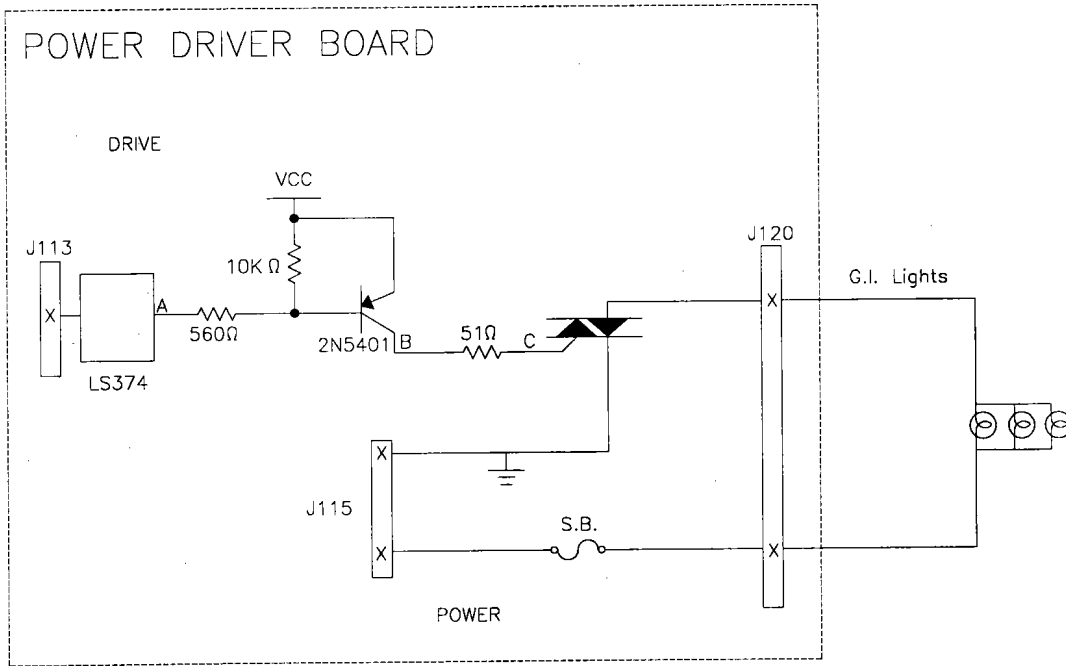
- 1-Power Driver Board
- 2-CPU Board
- 6-Dot Matrix Controller
- 9-Fliptronic II Controller Board

P.C. BOARD LEGEND	
J1XX	= Power Driver Board
J2XX	= CPU Board
J3XX	= Dot Matrix Controller Board
J4XX	= Fliptronic II Board

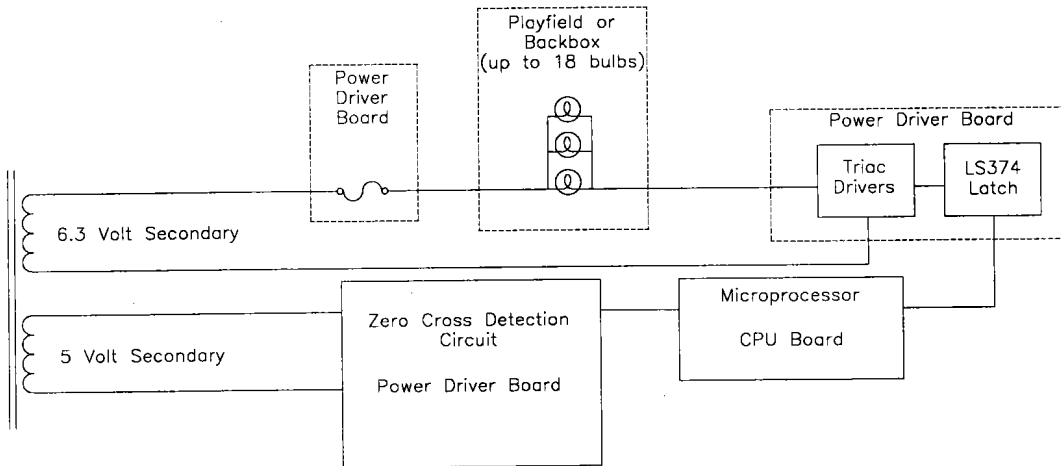
The Audio Board and the Dot Matrix Display/Driver Board do not have an identification number.

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

General Illumination Circuit

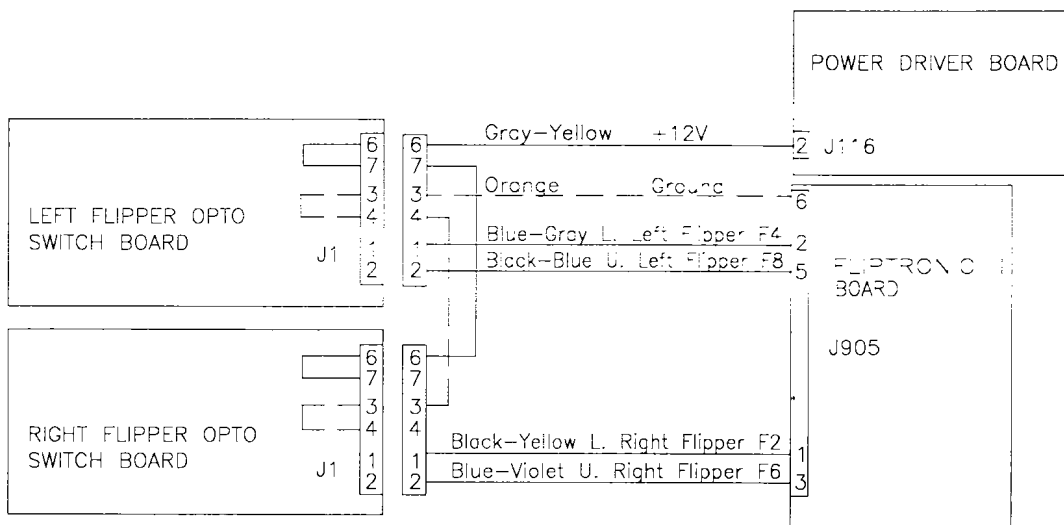


Block Diagram of General Illumination Circuit

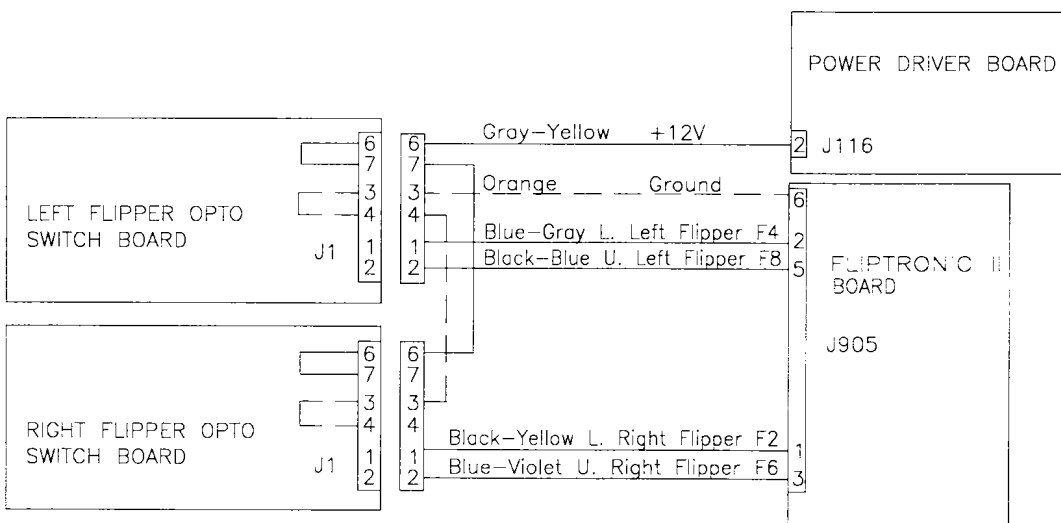


When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired general illumination string lights.

Flipper Cabinet Switch Circuit Diagram



Flipper Cabinet Switches



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

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

WARNINGS & NOTICES

WARNING

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

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