

WARLOK

INSTRUCTION BOOKLET

This booklet provides game operation, bookkeeping, game adjustment, diagnostic, and self-test procedures for WARLOK. For installation and special maintenance information refer to the blue-covered game manual.

SPECIAL CONSIDERATIONS WHEN REPLACING CIRCUIT BOARDS

CPU Board

1. Revision level 7 CPU Boards (batteries located on lower left corner at board) of later boards must be used.
2. Must be equipped with blue-labeled Flipper ROMs and Warlok Game ROMs.
3. Jumpers W3, W10, W11, W14, W17, W19, W20, and W22 must be connected. Jumpers W4, W9, W12, W15, W16, W18, W21, and W23 must be removed. With the exception of W25, (Factory Setting Jumper) all other jumpers are not changed.

Driver Board

Must be equipped with zero-ohm resistors or wire jumpers (W9-W16) in place of switch matrix drive series resistors R204-R211.

Sound Board

Must be jumpered for ROM operation and be equipped with Sound ROM 14. (Jumpers W2, W5, W7, W9, W10, W12, and W15 connected; W3, W4, W6, W8, W11, and W13 removed).

Power Supply Board

1. Model D 8345 board required (equipped with relay).
2. Fuse F4 (10A SB) for flipper solenoids must be installed.

Display Boards

Model C 8363 Master Display and 7-digit Slave Displays required.

Game Operation

Game Over Mode - Turn game ON; player 1 score shows 00; all player scores alternate the high score to date, Game Over lamp lights. All playfield lamps cycle in attract mode.

Credit Posting - Insert coins; sound produced, number of credits displayed. If maximum credits* exceeded by coin or high score to date, credits posted correctly and coin lockout de-energizes until remaining credits are below maximum. No credits may be won and coins are rejected while the coin lockout is de-energized.

Game Start - Push credit button; start-up tune played, ball served, credit display reduced by one, player 1 up flashes until first scoring switch is made, ball in play shows 1. Pushing credit button before ball 2 is displayed allows additional players.

*Indicates adjustable features.

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Bonus Lamps - The BONUS lamps are lit by hitting drop targets (1, 2, 3) which light the BONUS lamps in sequence from left to right in the corresponding row (1, 2, 3). As the BONUS lamps are lit in sequence in a row, the bonus points are as follows: 1,000, 2,000, 3,000, 4,000, 5,000, 6,000 and 7,000 points.

When three BONUS lamps are lit in a column (note there are seven columns), there is a possibility for an extra ball to be provided when the center target of a drop target bank is hit.

When all of the BONUS lamps are lit, the lamps for DOUBLE SCORE, EXTRA BALL, and drop target SPECIAL are lit.

Double Score Lamp - When the DOUBLE SCORE lamp is lit, 14,000 points are scored each time a drop target is hit.

Extra Ball Lamps - EXTRA BALL lamps are lit when the same number of BONUS lamps are lit in each row. EXTRA BALL lamps light alternately between the center drop targets of the three drop target banks and the top left target. Hitting either of the lower kickers or the left spinner will also rotate the EXTRA BALL lamps. Orbit Shot EXTRA BALL lights after making the ORBIT SHOT 3 times.

Drop Target Special Lamps - Drop target SPECIAL lamps are lit when all the BONUS lamps are lit. When the top right spinner or the lower kicking rubbers are hit, the SPECIAL drop target lamps light alternately at center drop targets 1, 2, and 3.

Orbit Shot - For each ORBIT SHOT (from left spinner to right spinner) successive earnings are 20,000 points, 40,000 points, 70,000 points, extra ball, and special. After SPECIAL is scored, ORBIT SHOT scores 70,000.

Spinner Lamps - When drop target bank #1 is struck down, the top left spinner lamp lights. When drop target bank #2 is struck down, the lower right spinner lamp lights. When drop target bank #3 is struck down, the top right spinner lamp lights.

Spot #3 Target Lamps - SPOT #3 TARGET lamps are lit at the beginning of the game. When the SPOT #3 TARGET switch is lit, 7,000 points are scored and a target in the drop target bank 3 will fall and light BONUS lamp in row 3.

X-Y-Z Lanes - Spotting lane lamps X-Y-Z increases bonus multiplier in 1X steps from 1X to 10X. Operating right flipper (*LANE CHANGE™* feature) alternates lit lane lamps.

Bottom Out Lane Special Lamps - When bonus multiplier reaches 7X*, the bottom out lane SPECIAL lamps light. They alternately light when top right spinner, top left spinner, or bottom kicking rubbers are hit.

Collect Bonus Lane - Each time a drop target bank is struck down, a lamp for 10,000 points is lit in the COLLECT BONUS lane. The green COLLECT BONUS lamp lights when all drop targets are struck down.

Lamps on Memory

- (1) ORBIT SHOT SCORE*
- (2) BONUS MULTIPLIER*
- (3) X-Y-Z LANES

Tilt - Ball in play tilted on first closure of ball roll tilt and third* closure of plumb bob and playfield tilts. Slam tilt returns game to Game Over mode.

End of Game - Match Digits* appear in ball in play display, credit* awarded for match. Exceeding high score to date awards three* credits. Match, High Score to Date, and Game Over sounds made as appropriate. A new game cannot be started with more than one ball in the ball shooter trough; excess balls must be returned to playfield and drain to rest on ball ramp switches.

*Indicates adjustable features.

BOOKKEEPING AND GAME EVALUATION

(Functions 01-17)

1. Set AUTO-UP/MANUAL-DOWN switch to AUTO-UP and depress ADVANCE pushbutton. Test 04 is indicated in the credits display, Function 00 in Match display, and Game Identification in Player 1 display.
2. Operate the ADVANCE pushbutton to display Functions 01 thru 04 on the Match display (See Table 1) and record the corresponding totals (number of coins and total paid credits) from the Player 1 display. (To review a total that has been advanced past, set switch to MANUAL-DOWN and operate the ADVANCE pushbutton).
3. Operate the ADVANCE pushbutton to display Functions 05, 06, and 07 in the Match display and record the corresponding free credit totals from the Player 1 display.
4. Operate the ADVANCE pushbutton to display Function 08 in the Match display. Total credits is indicated in the Player 1 display, total free credits in the Player 2 display, and percentage of free credits in the Player 4 display.
5. Operate the ADVANCE pushbutton to display Function 09 thru 12 in the Match display and record the corresponding totals from the Player 1 display.
6. Operate the ADVANCE pushbutton to display Functions 13 thru 17 in the Match display and record the corresponding totals from the Player 2 display.
7. With switch set to MANUAL-DOWN operate ADVANCE to display Function 50 in the Match Display. From Function 50 you can return to game over or zero audit totals and return to game over. Perform step 8.a. or 8.b. as desired.
8.
 - a. To return to game over, set the switch to AUTO-UP and depress ADVANCE.
 - b. To zero audit totals and return to game over set switch to AUTO-UP, operate the credit button to display 35 in the Player 1 display, and depress ADVANCE.

Table 1. Audit Totals

FUNCTION	DESCRIPTION		
	PLAYER 1	PLAYER 2	PLAYER 4
00	Game Identification (2516 1)	—	—
01	Coins, Left chute	—	—
	(closest to coin door hinge)	—	—
02	Coin, center chute	—	—
03	Coin, right chute	—	—
04	Total Paid Credits	—	—
05	Special Credits	—	—
06	Replay Score Credits	—	—
07	Match Credits	—	—
08	Total Credits	Free Credits	% Free Credits
09	Total Extra Balls	—	—
10	Ball Time in Minutes	—	—
11	Total Balls Played	—	—
12	Current High Score	—	—
	to Date		
13	Backup High Score	High Score to Date	—
	to Date	Credits Awarded	
14	Replay 1 Score	Times exceeded	—
15	Replay 2 Score	Times exceeded	—
16	Replay 3 Score	Times exceeded	—
17	Replay 4 Score	Times exceeded	—

GAME ADJUSTMENT PROCEDURE

(Functions 13-41)

Coin door must be open to change settings.

1. Set AUTO-UP/MANUAL-DOWN switch to AUTO-UP and depress the ADVANCE pushbutton. Test 04 is indicated in the Credits display, Function 00 in Match display, and game identification in Player 1 display.
2. **To raise** Function number in Match display, operate ADVANCE pushbutton with switch set to AUTO-UP. **To lower** Function number, operate ADVANCE with switch set to MANUAL-DOWN.
3. With desired Function indicated in Match display, **raise** value in player 1 display by operating credit button with switch set to AUTO-UP; **lower** value by operating credit button with switch set to MANUAL-DOWN. Value left in Player 1 display is the new setting. For values see Table 2, and for pricing Table 3.
4. Repeat steps 2 and 3 until all required adjustments have been made.
5. Operate ADVANCE until Function 50 is indicated in Match display. From Function 50 you can return to game over or **restore factory settings**. Perform step 6 or 7 as desired.
6. To return to game over, depress ADVANCE with switch set to AUTO-UP.
7. To restore factory settings **and** zero audit totals:
 - a. Operate Credit button with switch set to AUTO-UP until 45 is indicated in Player 1 Display.
 - b. Depress ADVANCE. The game returns to Test 04, Function 00.
 - c. Set switch to MANUAL-DOWN and depress ADVANCE to indicate Function 50.
 - d. Set switch to AUTO-UP and depress ADVANCE.

RESETTING HIGH SCORE TO DATE

1. Using game adjustment procedure, set Function 13 to the desired reset value.
2. Depress HIGH SCORE RESET pushbutton.

FACTORY AUDIT TOTALS

(Functions 42-49)

The factory audit functions are not assigned.

Table 2. Game Adjustments

FUNCTION	DESCRIPTION	NOTES	*FACTORY SETTING
13	Backup High Score to Date (HSTD Credits Awarded)	1	2,500,000
14	Replay 1 Score [Times exceeded]	2	1,000,000
15	Replay 2 Score [Times exceeded]	2	2,000,000
16	Replay 3 Score [Times exceeded]	2	0
17	Replay 4 Score [Times exceeded]	2	0
18	Maximum Credits	3	30
19	Standard and Custom Pricing Control	4	01/02
20	Left Coin Slot Multiplier	4	01/09
21	Center Coin Slot Multiplier	4	04/45
22	Right Coin Slot Multiplier	4	01/18
23	Coin Units Required for Credit	4	02/05
24	Coin Units Bonus Point	4	04/45
25	Minimum Coin Units	4	00
26	Match: 00 = Match ON; 01 = Match OFF	-	00
27	Special: 00 = Awards Credit; 01 = No Special; 02 = Awards Points	-	00
28	Replay Scores: 00 = Awards Credit; 01 = Awards Extra Ball	-	00
29	Maximum Plumb Bob Tilts	-	03
30	Number of Balls (03 or 05)	-	03
31	Background Sound: 00 = OFF; 01 = ON	-	01
32	Memory on Orbit Shot Bonus: 00 = OFF; 01 = ON	-	01
33	Memory on Bonus Multiplier: 00 = OFF; 01 = ON	-	01
34	Upper 3 Bank Remote Drop: 00 = First Time Only; 01 = Remote Drop always	5	01
35	Outlane Specials Lit at: 00 = 7X; 01 = 8X; 02 = 9X; 03 = 10X	-	00
36	Not Used	-	00
37	Not Used	-	00
38	Not Used	-	00
39	Not Used	-	00
40	High Score Credits	1	03
41	Maximum Extra Balls at one time (00 = No Extra Ball)	-	07

* Second Factory Setting value is with jumper W25 on CPU Board connected.

[] Description in brackets shown in Player 2 Display.

- Function 13 may be set to any multiple of 100,000 points. Setting Function 40 to zero with Function 13 set to any score but zero permits the High Score to Date feature to operate but no credits are awarded.
- Functions 14-17 (Replay Scores) may be set to any multiple of 100,000 points. Setting a function to zero disables the replay score point.
- Setting Maximum Credits (Function 18) to zero places the game in a **free play mode**.
- With Function 19 set to 00, Functions 20-25 must be set manually. Refer to Table 2 for eight standard pricing schemes (selected by values of 01-08 for Function 19) and custom pricing values. For straight quarter play, set Function 19 to 00, Function 23 to 01 and Function 24 to 00. All other pricing functions should remain at their factory settings.
- When lit, flipper return lanes and Upper Left Target will drop Upper 3-Bank targets.

Table 3. Standard and Custom Price Settings

COIN DOOR MECHANISM	CREDITS	FUNCTION							
		19	20	21	22	23	24	25	
Twin-Quarter Quarter, Dollar, Quarter	1/25¢, 3/50¢, 7/\$1	00	03	12	03	02	12	00	
	1/25¢, 3/50¢, 7/\$1 coin only	00	03	14	03	02	00	00	
	1/25¢, 7/\$1 coin only	00	01	07	01	01	00	00	
	1/25¢, 3/50¢, 6/\$1	00	01	04	01	01	02	00	
	1/25¢, 6/\$1 coin only	00	01	06	01	01	00	00	
	1/25¢, 5/\$1	00	01	04	01	01	04	00	
	2/50¢, 5/\$1	00	01	04	01	01	04	02	
	1/25¢, 5/\$1 coin only	00	01	05	01	01	00	00	
	•1/25¢, 4/\$1	01	01	04	01	01	00	00	
	2/50¢, 4/\$1	00	01	04	01	01	00	02	
	•1/50¢, 2/75¢, 3/4 x 25¢ 4/\$1 or 5 x 25¢	05	03	15	03	04	15	00	
	1/50¢, 3/\$1, 4/\$1.25	00	03	12	03	04	15	00	
	1/50¢, 3/\$1, 7/\$2	00	12	48	12	14	96	18	
	•1/50¢, 3/\$1, 6/\$2 1/50¢	03	01	04	01	02	04	00	
		00	01	04	01	02	00	00	
1DM, 5DM, 2DM	•1/1DM, 3/2DM, 10/5DM 2/1DM, 5/2DM, 14/5DM	02	09	45	18	05	45	00	
20-Cent, 50-Cent	1/20¢, 3/50¢	00	13	65	26	05	65	00	
1 Franc, 10 Franc, 5 Franc	•1/2¢, 3/5¢ only, 8/10¢ only	04	01	16	06	02	00	00	
25 Cent, 1 Guilder,	•1/25¢, 4/1G 1/25¢, 5/1G	06	01	00	04	01	00	00	
Twin 100 Yen 1 Franc or Twin-1 Franc	2/100Y 1/1¢, 3/2F 1/1¢	00	01	00	04	01	04	00	
5 Franc, 10 Franc	•1/5¢, 2/10¢ •1/10¢	07	01	00	02	01	00	00	
Twin-2 Franc	•1/2¢	08	01	00	02	02	00	00	
10, 20 Franc	•1/10¢, 2/20¢	03	01	04	01	01	00	00	
Twin-1 Sucre	1/3S, 2/5S	07	01	00	02	01	00	00	
		00	02	00	02	05	00	00	
*Indicates standard price settings by adjusting only Function 19. For other price settings, set Function 19 to 00 and set Functions 20 through 25 to the values indicated in the chart.									

DIAGNOSTIC PROCEDURES

Display Digits Test

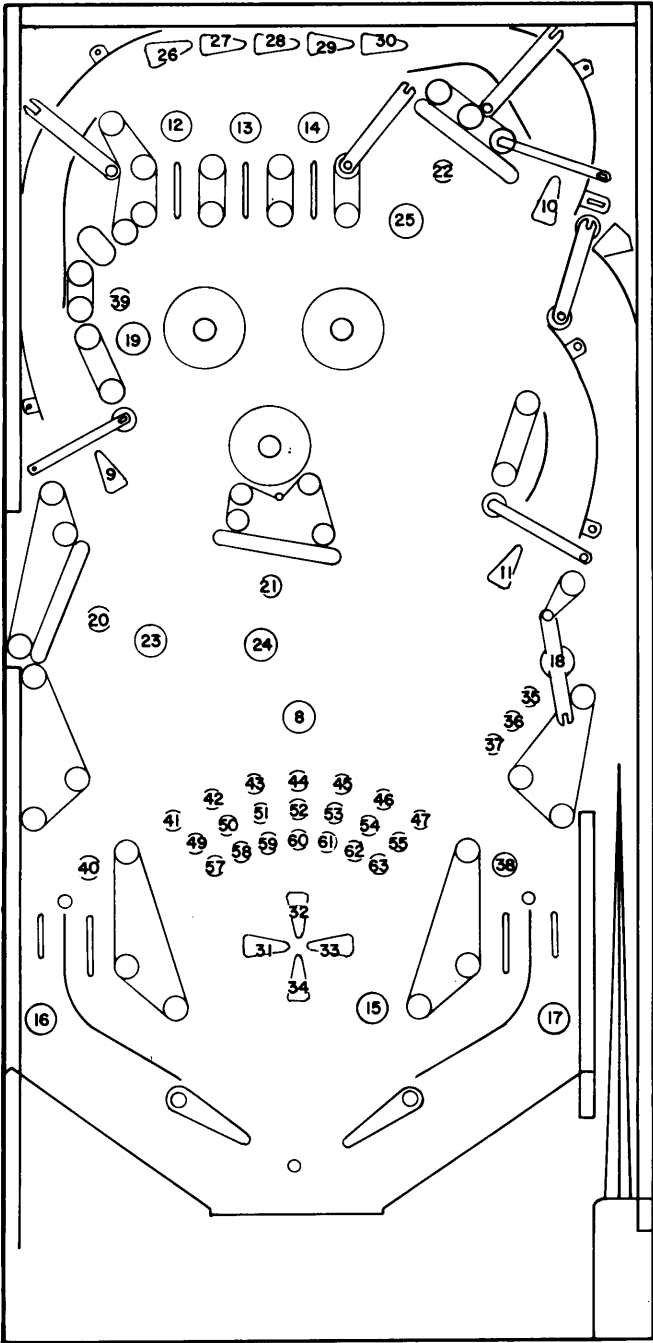
1. Set AUTO-UP/MANUAL-DOWN switch to MANUAL-DOWN and depress ADVANCE. Displays should indicate all 0's.
2. Set the switch to AUTO-UP. Displays should sequence from all 0's thru all 9's. Comma segments should come on when odd digits are displayed.
3. To stop cycling, set switch to MANUAL-DOWN. Operate ADVANCE pushbutton to step through the tests one number at a time. Set switch to AUTO-UP to resume cycling.

Sound Test

1. From Display Digits Test depress ADVANCE with the switch set to AUTO-UP. Test 00 should be indicated in the Credits display and the Match display should sequence from 00 thru 06. Different sounds should be produced for 00, 01, 02, 03, and 04.
2. To continuously pulse a single sound, set the toggle switch to MANUAL-DOWN. Operate ADVANCE pushbutton to sequence through sounds one at a time. Set toggle switch to AUTO-UP to resume sequencing.

Lamp Test

From Sound Test depress ADVANCE with the switch set to AUTO-UP. Test 01 should be indicated in the Credits display and all multiplexed lamps should flash.

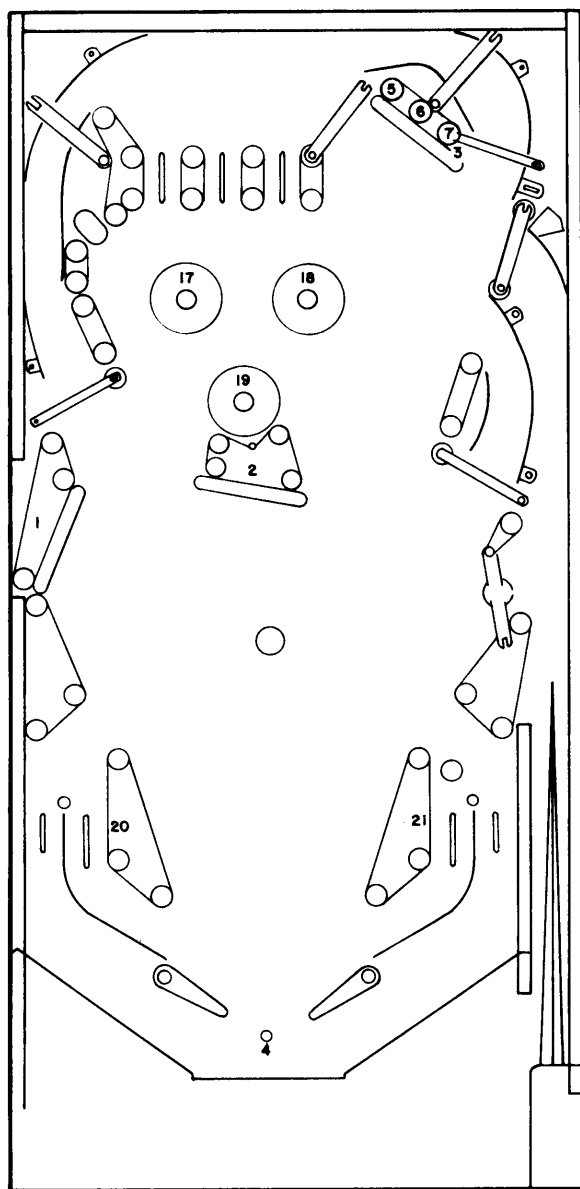


COLUMN ROW	1	2	3	4	5	6	7	8
RED- BRN 2J7-1	YEL-BRN 2J5-8 Extra Ball 1	YEL-RED 2J5-9 Left Spinner Arrow 9	YEL-ORN 2J5-6 Right Special 17	YEL-BLK 2J5-7 Right Drop Target Special 25	YEL-GRN 2J5-3 3X Bonus Multiplier 33	YEL-BLU 2J5-5 1-1,000 Bonus 41	YEL-VIO 2J5-1 2-1,000 Bonus 49	YEL-GRY 2J5-2 3-1,000 Bonus 57
RED- BLK 2J7-2	Ball in Play 2	Upper Spinner Arrow 10	Collect Bonus 18	"25,000" 26	4X Bonus Multiplier 34	1-2,000 Bonus 42	2-2,000 Bonus 50	3-2,000 Bonus 58
RED- ORN 2J7-3	Tilt 3	Right Spinner Arrow 11	Top Left Target Extra Ball 19	"50,000" 27	"1" 10,000 Right ball gate 35	1-3,000 Bonus 43	2-3,000 Bonus 51	3-3,000 Bonus 59
RED- YEL 2J7-4	Game Over 4	"X" Lane 12	Left Drop Target Extra Ball 20	"70,000" 28	"2" 10,000 Right ball gate 36	1-4,000 Bonus 44	2-4,000 Bonus 52	3-4,000 Bonus 60
RED- GRN 2J7-5	Match 5	"Y" Lane 13	Center Drop Target Extra Ball 21	Extra Ball 29	"3" 10,000 Right ball gate 37	1-5,000 Bonus 45	2-5,000 Bonus 53	3-5,000 Bonus 61
RED- BLU 2J7-6	High Score to Date 6	"Z" Lane 14	Right Drop Target Extra Ball 22	Special 30	Right "7,000" 38	1-6,000 Bonus 46	2-6,000 Bonus 54	3-6,000 Bonus 62
RED- VIO 2J7-9	Not Used 7	Same Player Shoots Again 15	Left Drop Target Special 23	1X Bonus Multiplier 31	Top Left Target 39	1-7,000 Bonus 47	2-7,000 Bonus 55	3-7,000 Bonus 63
RED- GRY 2J7-8	Double Score/Bonus Advance 8	Left Special 16	Center Drop Target Special 24	2X Bonus Multiplier 32	Left "7,000" 40	Not Used 48	Not Used 56	Not Used 64

Figure 1. Lamp Matrix

Solenoid Test

1. From Lamp Test depress ADVANCE with the switch set to AUTO-UP. Test 02 should be indicated in the Credits display. The Match display sequences from 01 thru 25. Corresponding solenoids 01 thru 24 are pulsed. Flipper relay is de-energized with subtest 25.
2. To continuously pulse a single solenoid set switch to MANUAL-DOWN. Operate ADVANCE pushbutton sequence through the solenoids one at a time. Set switch to AUTO-UP to resume sequencing.



Sol. No.	Function
01	Left Drop Target Bank Reset
02	Center Drop Target Bank Reset
03	Upper Drop Target Bank Release
04	Outhole
05	Upper Drop Target Left Reset
06	Upper Drop Target Center Reset
07	Upper Drop Target Right Reset
08	General Illumination Relay
09	Not Used
10	Not Used
11	Not Used
12	Not Used
13	Not Used
14	Not Used
15	Knocker
16	Coin Lockout
17	Left Jet Bumper
18	Right Jet Bumper
19	Center Jet Bumper
20	Left Kicker
21	Right Kicker
22	Not Used

Figure 2. Playfield Solenoid Locations and Solenoid Chart

Table 4. Solenoid Connections

SOL. NO.	FUNCTION	WIRE COLOR	CONNECTIONS	DRIVER TRANS.	SOLENOID PART NO.
01	Left Drop Target Bank Reset	GRY-BRN	2P11-4, 8P3-1	Q15	SA3-23-850-DC
02	Center Drop Target Bank Reset	GRY-RED	2P11-5, 8P3-2	Q17	SA3-23-850-DC
03	Upper Drop Target Bank Release	GRY-ORN	2P11-7, 8P3-3	Q19	SA6-24-750-DC
04	Outhole	GRY-YEL	2P11-8, 8P3-4	Q21	SA-23-850-DC
05	Upper Drop Target Left Reset	GRY-GRN	2P11-9, 8P3-5	Q23	SA5-24-750-DC
06	Upper Drop Target Center Reset	GRY-BLU	2P11-3, 8P3-6	Q25	SA5-24-750-DC
07	Upper Drop Target Right Reset	GRY-VIO	2P11-2, 8P3-7	Q27	SA5-24-750-DC
08	General Illumination Relay	GRY-BLK	2P11-1, 3P7-1	Q29	5580-09555
09	Not Used	BRN-BLK	2P9-9, 7P1-17	Q31	SA2-23-850-DC
10	Not Used	BRN-RED	2P9-7, 8P3-10	Q33	—
11	Not Used	BRN-ORN	2P9-1, 8P3-11	Q35	—
12	Not Used	BRN-YEL	2P9-2, 8P3-12	Q37	—
13	Not Used	BRN-GRN	2P9-3, 8P3-13	Q39	—
14	Not Used	BRN-BLU	2P9-4, 7P1-3	Q41	—
15	Knocker	BRN-VIO	2P9-5, 7P1-17	Q43	—
16	Coin Lockout	BRN-GRY	2P9-6, 7P1-18, 7P2-4	Q45	SM-29-1000-DC
*17	Left Jet Bumper	BLU-BRN	2P12-7, 8P3-17	Q2	SG-23-850-DC
*18	Right Jet Bumper	BLU-RED	2P12-4, 8P3-18	Q4	SG-23-850-DC
*19	Center Jet Bumper	BLU-ORN	2P12-3, 8P3-19	Q6	SG-23-850-DC
*20	Left Kicker	BLU-YEL	2P12-6, 8P3-20	Q8	SG1-23-850-DC
*21	Right Kicker	BLU-GRN	2P12-8, 8P3-21	Q10	SG1-23-850-DC
22	Not Used	BLU-BLK	2P12-9, 7P1-22	Q12	—
	Right Flipper	BLU-VIO	2P12-1, 7P1-7	—	SFL-19-400/ 30-750-DC
	Left Flipper	BLU-GRY	2P12-2, 7P1-9	—	SFL-19-400/ 30-750-DC

***NOTES:**

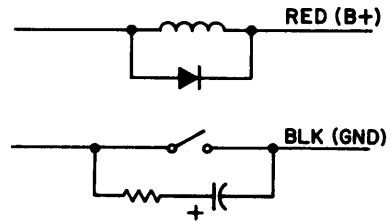
1. Special switch connections for solenoids 17 through 21 are as follows:

17—ORN-BRN—2P13-5, 8P3-24
 18—ORN-RED—2P13-3, 8P3-25
 19—ORN-BLK—2P13-2, 8P3-26
 20—ORN-YEL—2P13-4, 8P3-27
 21—ORN-GRY—2P13-8, 8P3-28

2. Flipper button connections are as follows:

Right—ORN-VIO—2P12-1, 7P1-7
 Left—ORN-GRY—2P12-2, 7P1-9

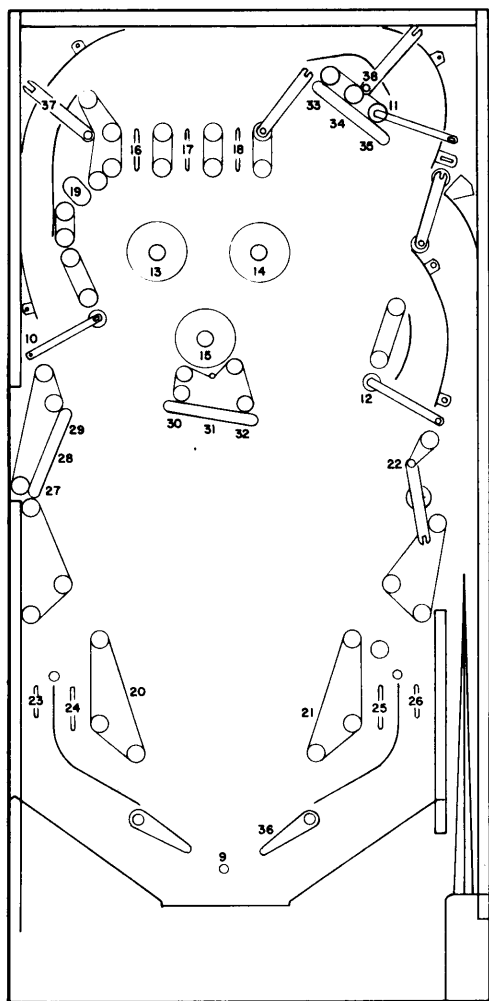
3. Typical wiring for solenoids and special switches follows.



Switch Test

- From Solenoid Test depress ADVANCE with the switch set to AUTO-UP. Test 03 should be indicated in the Credits display and any stuck switches in the Master display. As stuck switch(es) is displayed a sound is produced. The display continuously cycles through the stuck switches and as they are opened, the number is removed from the sequence. When all switches are open, the Match display is blank and the sounds stop.
- If all switches in a row are displayed, first verify that all are open and then check for a short to ground on the row wire.
- Operate switches; a sound is produced and switch number is momentarily indicated in the ball in play display. If two switches in a row are indicated with one switch closed, check for a short between the column wires; for multiple indication check column wire for short to ground. If two switches in a column are indicated with one switch closed, check for short between row wires.

4. If proper indications are obtained in Test 03 but matrix problem is suspected in game play, disconnect lamp connectors 2P5 and 2P7. Recheck in game play. Perform CPU Self-Test if problem remains. If problem is cleared, check for short between lamp matrix and jet bumper mounting brackets.
5. Shorted diodes can cause "rectangle" switch problems. For example, consult the switch matrix chart and visualize a situation where the drop target switches, nos. 30 & 31 are down. If the ball makes the upper right "roll under" switch no. 38, a shorted diode on switch no. 30 would cause a playfield tilt. Note that the faulty switch is diagonally opposite the invalidly indicated switch.



Switch

No.	Function *(Score)
01	Plumb Bob Tilt
02	Ball Roll Tilt
03	Credit Button
04	Right Coin Switch
05	Center Coin Switch
06	Left Coin Switch
07	Slam Tilt
08	High Score Reset
09	Outhole
10	Left Spinner (10/2,000)
11	Upper Right Spinner (10/2,000)
12	Lower Right Spinner (10/2,000)
13	Left Jet Bumper (1,000)
14	Right Jet Bumper (1,000)
15	Center Jet Bumper (1,000)
**16	"X" (1,000)
**17	"Y" (1,000)
**18	"Z" (1,000)
†19	Top Left Target
20	Left Kicker (10)
21	Right Kicker (10)
22	Right Ball Exit (Note 2)
23	Left Outlane (15,000, Special)
24	Left Flipper Return Lane (1,000, Note 1)
25	Right Flipper Return Lane (1,000, Note 1)
26	Right Outlane (15,000, Special)
+27	Left Drop Target Bank - Left
+28	Left Drop Target Bank - Center
+29	Left Drop Target Bank - Right
+30	Center Drop Target Bank - Left
+31	Center Drop Target Bank - Center
+32	Center Drop Target Bank - Right
+33	Upper Drop Target Bank - Left
+34	Upper Drop Target Bank - Center
+35	Upper Drop Target Bank - Right
36	Lane Change™
‡37	Left Upper Rollunder
‡38	Right Upper Rollunder
39	Playfield Tilt
40-64	Not Used

NOTE 1: (7,000 and spots #3 Drop Target.)

NOTE 2: (1,000/10,000 × No. of Drop Target Banks comp., if all three are complete then scores 30,000 and Collect Bonus.)

* Second value is for "when lit".

** Making all three, "X", "Y", and "Z" advances Bonus Multiplier

† Scores (1,000, Note 1, Extra Ball)

‡ Making "Orbit Shot" left to right scores lit value/ value advance.

+ All Drop Targets score (1,000-7,000 or 14,000) Center Targets also light for (Extra Ball, Special)

Figure 3. Playfield Switch Locations and Switch Chart

COLUMN ROW	1 GRN-BRN 2J2-9	2 GRN-RED 2J2-8	3 GRN-ORN 2J2-7	4 GRN-YEL 2J2-6	5 GRN-BLK 2J2-5	6 GRN-BLU 2J2-3	7 GRN-VIO 2J2-2	8 GRN-GRY 2J2-1
1 WHT- BRN 2J3-9	Plumb Bob Tilt 1	Outhole 9	"Y" 17	Right Flipper Return Lane 25	Upper Drop Target Bank - Left 33	Not Used 41	Not Used 49	Not Used 57
2 WHT- RED 2J3-8	Ball Roll Tilt 2	Left Spinner 10	"Z" 18	Right Outlane 26	Upper Drop Target Bank - Center 34	Not Used 42	Not Used 50	Not Used 58
3 WHT- ORN 2J3-7	Credit Bottom 3	Upper Right Spinner 11	Top Left Target 19	Left Drop Target Bank - Left 27	Upper Drop Target Bank - Right 35	Not Used 43	Not Used 51	Not Used 59
4 WHT- YEL 2J3-6	Right Coin Switch 4	Lower Right Spinner 12	Left Kicker 20	Left Drop Target Bank - Center 28	Lane Change™ 36	Not Used 44	Not Used 52	Not Used 60
5 WHT- GRN 2J3-5	Center Coin Switch 5	Left Jet Bumper 13	Right Kicker 21	Left Drop Target Bank - Right 29	Left Upper Rollunder 37	Not Used 45	Not Used 53	Not Used 61
6 WHT- BLU 2J3-4	Left Coin Switch 6	Right Jet Bumper 14	Right Ball Exit 22	Center Drop Target Bank - Left 30	Right Upper Rollunder 38	Not Used 46	Not Used 54	Not Used 62
7 WHT- VIO 2J3-3	Slam Tilt 7	Center Jet Bumper 15	Left Outlane 23	Center Drop Target Bank - Center 31	Playfield Tilt 39	Not Used 47	Not Used 55	Not Used 63
8 WHT- GRY 2J3-1	High Score Reset 8	"X" 16	Left Flipper Return Lane 24	Center Drop Target Bank - Right 32	Not Used 40	Not Used 48	Not Used 56	Not Used 64

Figure 4. Switch Matrix

INITIATING AUTO-CYCLE MODE

1. Set AUTO-UP/MANUAL-DOWN switch to AUTO-UP and depress ADVANCE pushbutton. Test 04 is indicated in Credit display and Function 00 in Match Display.
2. Set switch to MANUAL-DOWN and depress ADVANCE to indicate Function 50 in the Match Display.
3. Set switch to AUTO-UP and operate Credit button to indicate 15 in Player 1 Display.
4. Depress ADVANCE pushbutton to start Auto-Cycle mode. Each cycle of this mode sequences thru the Display Digits Test, Sound Test (00), Lamp Test (01), and Solenoid test (02).
5. To terminate the test and return to game over, turn the game OFF and back ON.

CPU BOARD SELF-TEST

Depress the DIAGNOSTIC pushbutton on the left side of the CPU Board. The following indications are provided. With 0 indication the game returns to the game over mode.

0 - Test Passed

1 - IC13 RAM Faulty

2 - IC16 RAM Faulty

3 - IC17 ROM 2 Faulty

4 - IC17 ROM 2 Faulty

5 - IC20 ROM 1 Faulty

6 - IC14 Game ROM 1 Faulty

7 - IC26 Game ROM 0 Faulty

8 - IC19 CMOS RAM or Memory Protect Circuit Faulty

9 - Coin-door closed, Memory Protect Circuit Faulty, or IC19 CMOS RAM Faulty.

Note that "0" remaining after power turn-on indicates CPU Board lockup.

SOUND BOARD SELF-TEST

Depress DIAGNOSTIC pushbutton on the top of the Sound Board. Several electronic sounds should be produced. This sequence of sounds is repeated until the game is turned OFF and back ON.

“Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.”