

Williams[®]

16P-496-101
Game No. 496
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GORGAR



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FOREWORD

This is a basic instruction manual that provides information unique to GORGAR. For detailed troubleshooting and interconnection information refer to the Williams Solid State Flipper Maintenance Manual.

SPECIAL CONSIDERATIONS WHEN REPLACING CIRCUIT BOARDS

CPU BOARD

1. For memory protection feature, revision level 6 CPU Boards (batteries located on lower right corner of board) must be used. Revision level 4 CPU BOARDS equipped with three PROM sockets may be used but the memory protection feature is lost:
2. Must be equipped with green-labeled GORGAR PROMs and green-labeled flipper ROMs.

Sound Board

1. **Must** be equipped with two fuse clips.
2. Must be jumpered for ROM operation and be equipped with Sound ROM 2.

Power Supply Board

1. Fuse F4 (15A SB) for flipper solenoids must be installed.

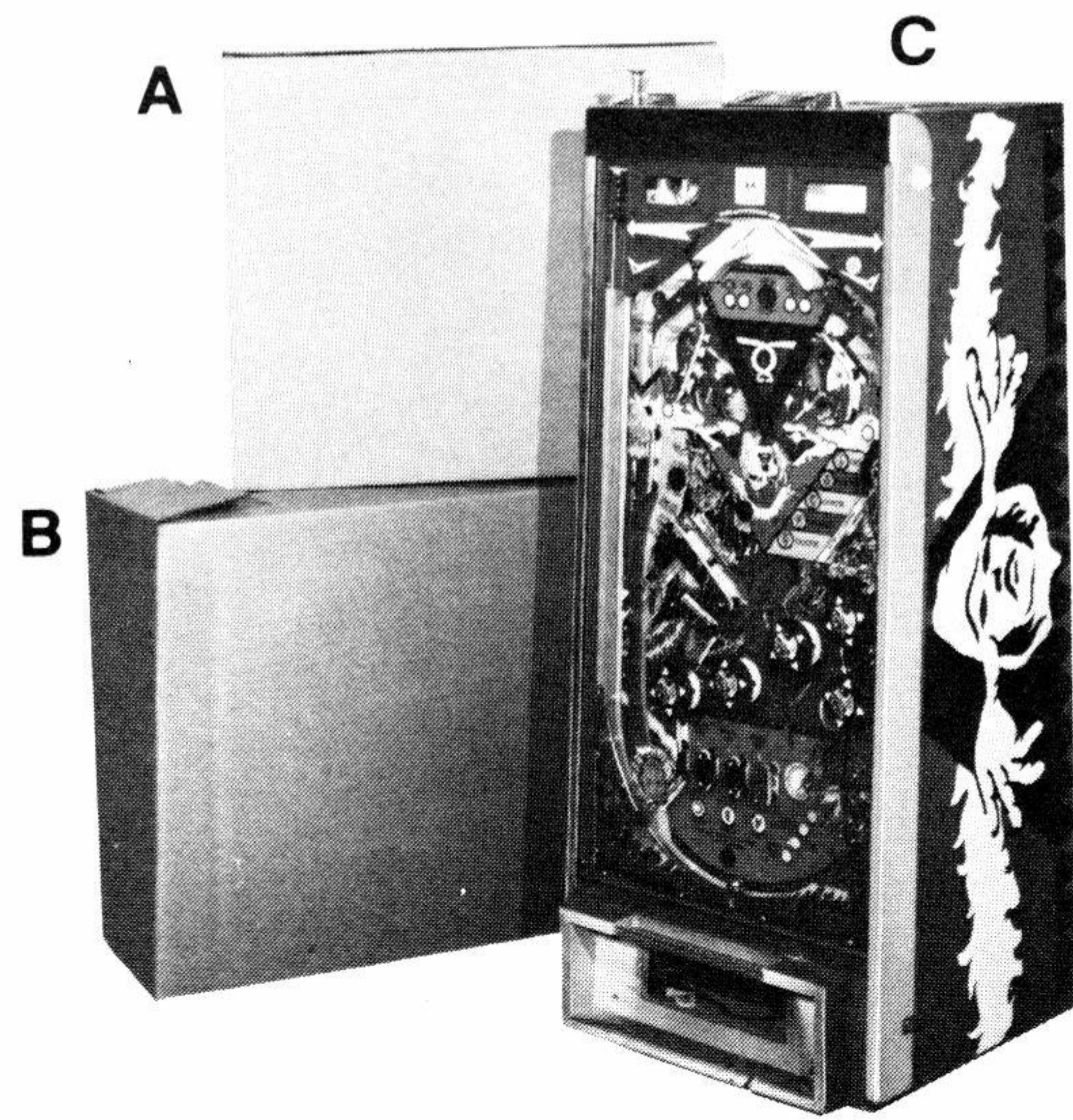
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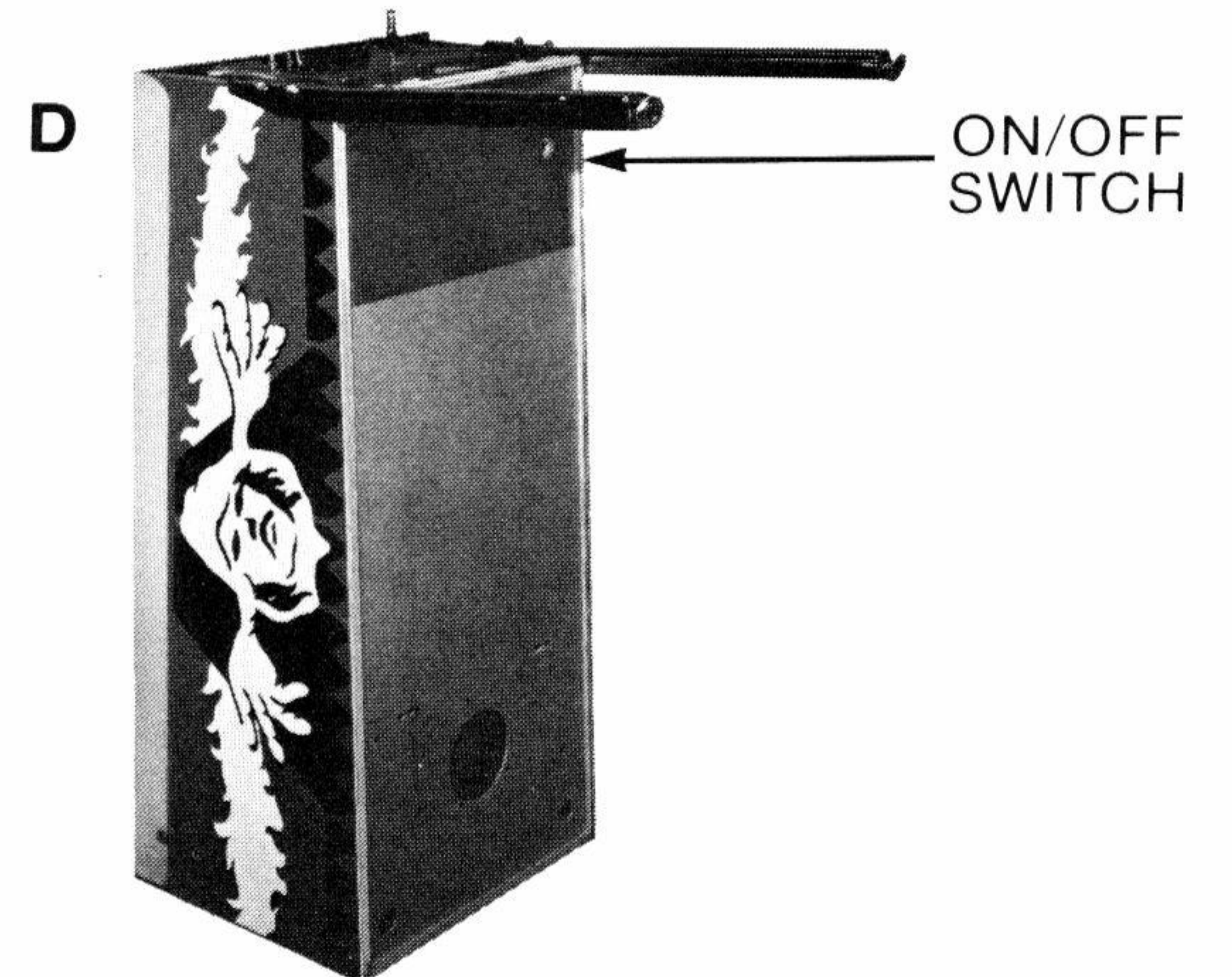
SECTION 1 INSTALLATION

Assembly and Interconnection

- A** Carton with backglass, coin box, legs, and mounting hardware.
- B** Backbox
- C** Cabinet



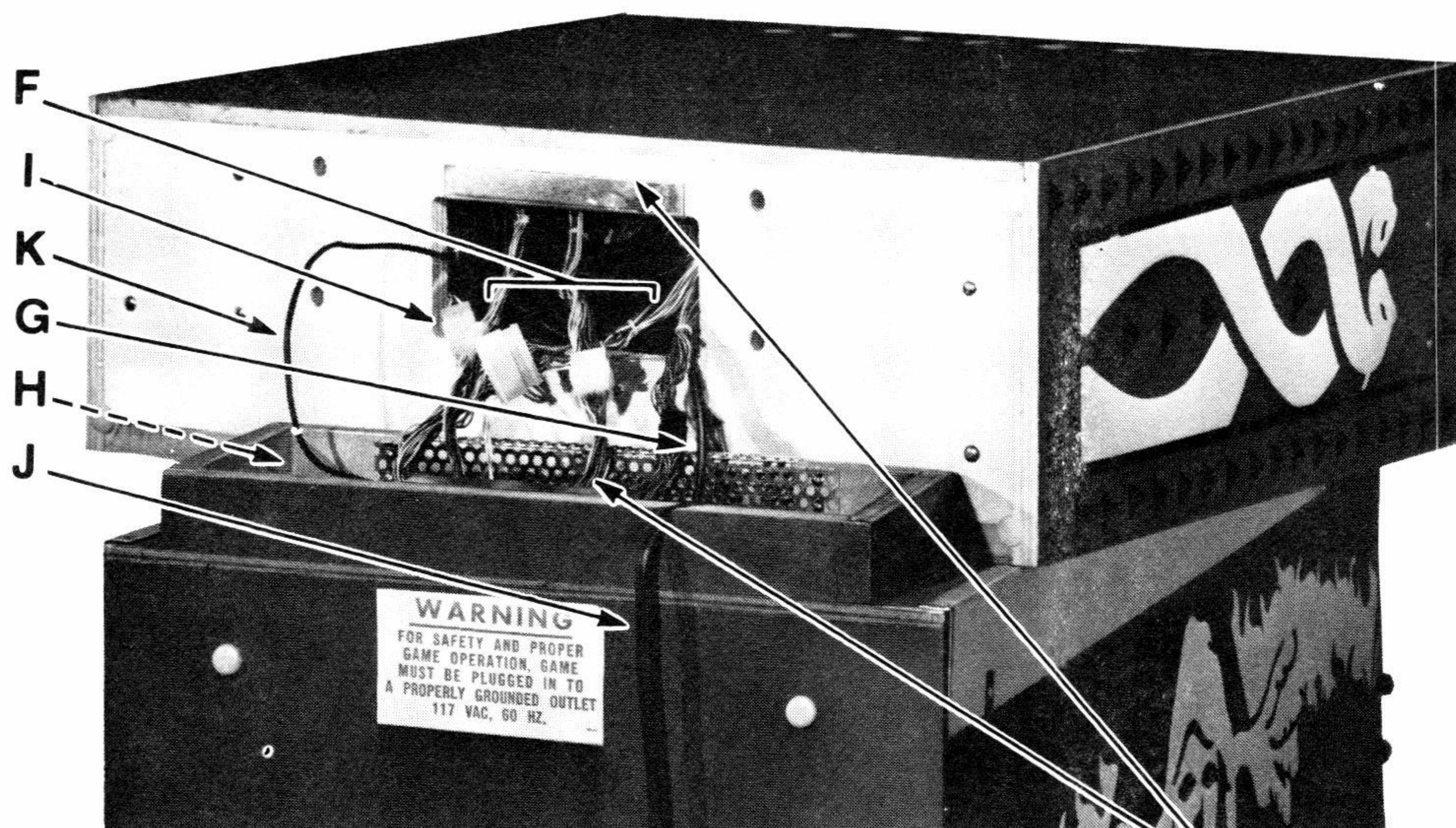
- D** Attach front legs using four acorn bolts.



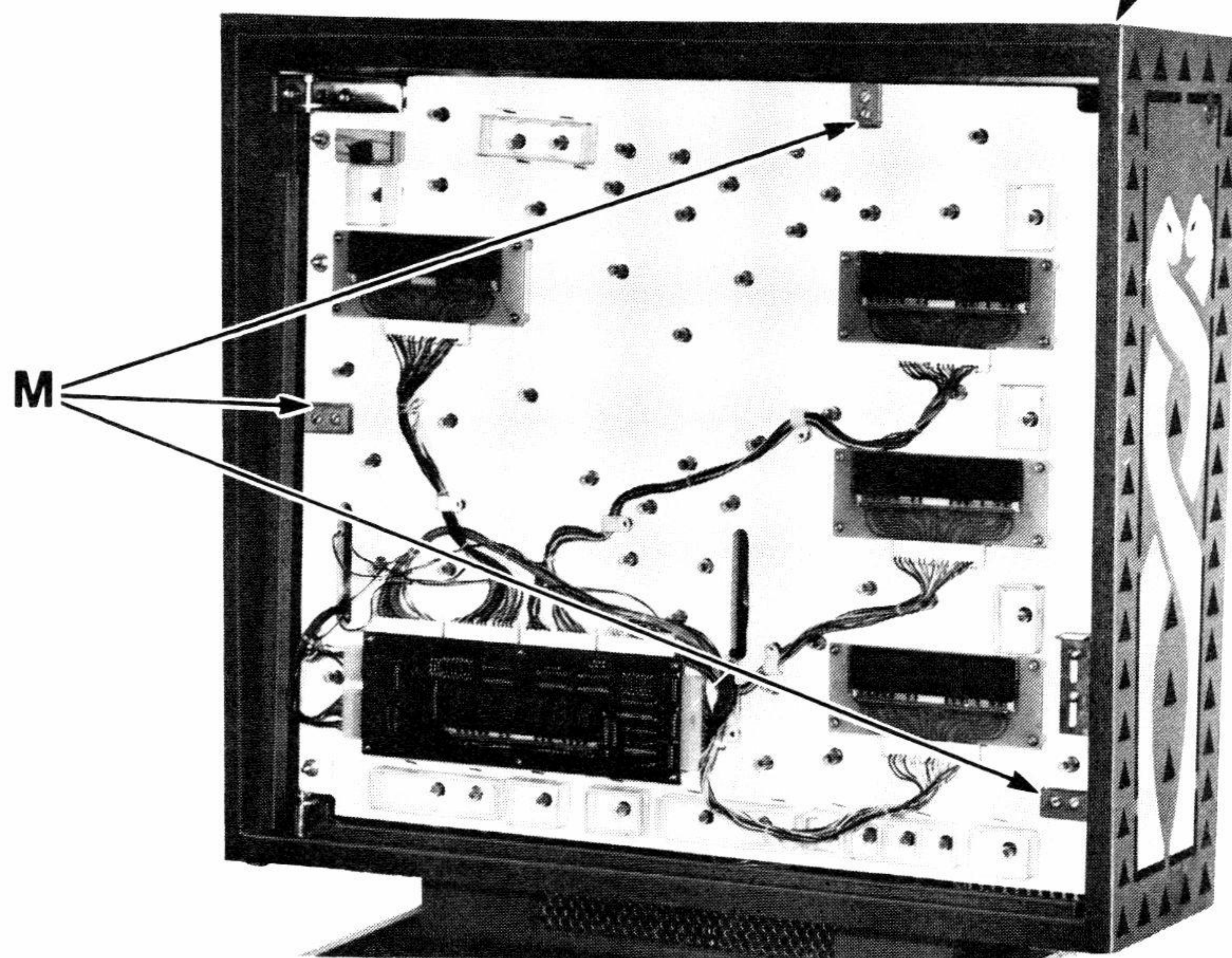
- E** Lay backbox on side to support rear of cabinet. Attach rear legs using four acorn bolts.



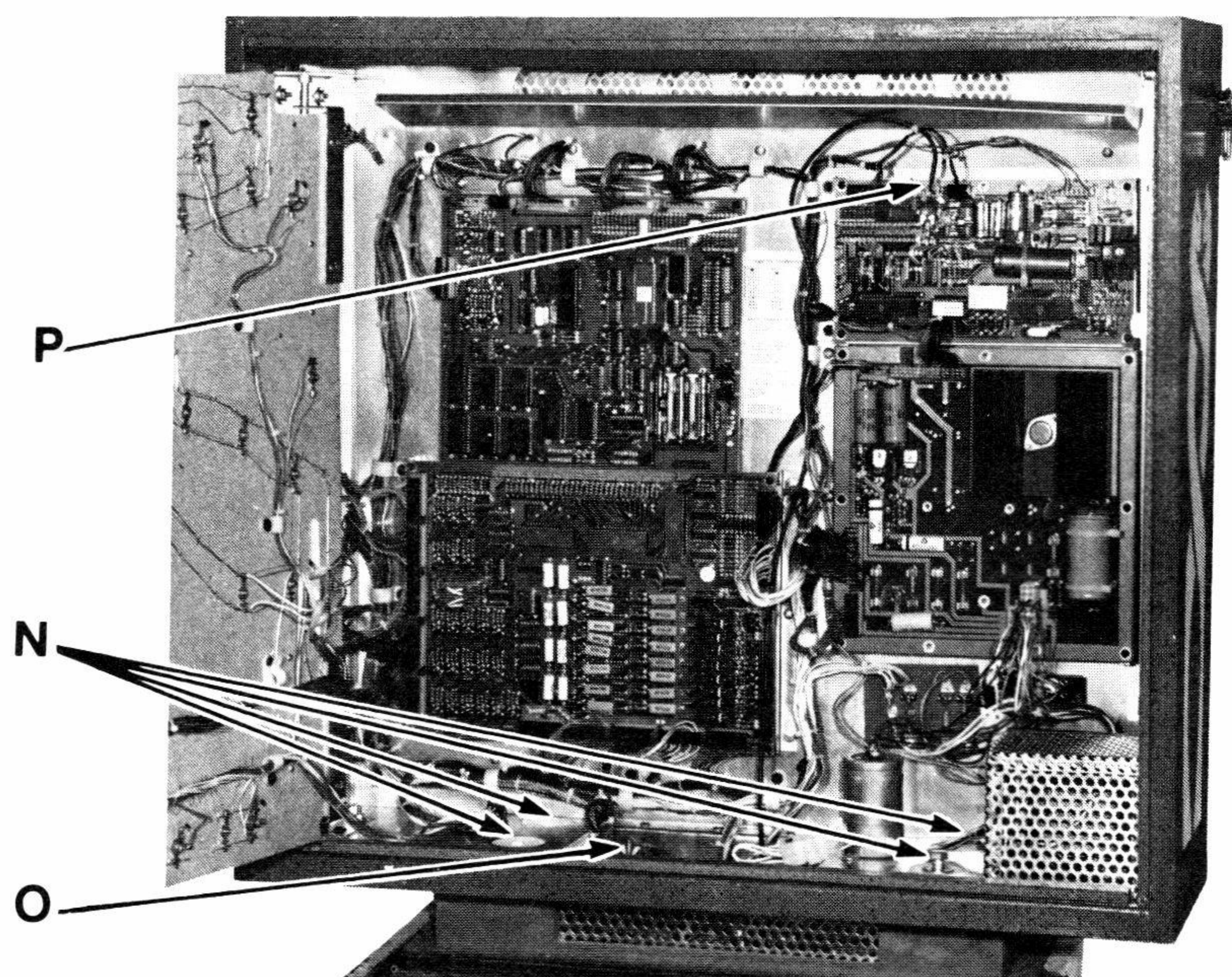
- F** Pull five cables from backbox.
- G** Reach into right side of pedestal hole, pull up ground strap, and push it into backbox.
- H** Remove the tie securing cabinet and playfield cables to cabinet and pull up these cables.
- I** Interconnect five cables. They are size and color coded except for power connector where wire colors do not match.
- J** Insert line cord into notch in cabinet. **DO NOT PLUG IN AT THIS TIME.**
- K** Push remote volume control cable into backbox.
- L** Lift up backbox and position on cabinet pedestal, engaging brackets for support.



- M** Remove shipping blocks.



- N** Secure backbox to cabinet using four bolts and washers.
- O** Connect ground braid under wing nut and washer.
- P** Loosely position remote volume control cable in harness and plug connector into 10J4 on Sound Board.



Inspection

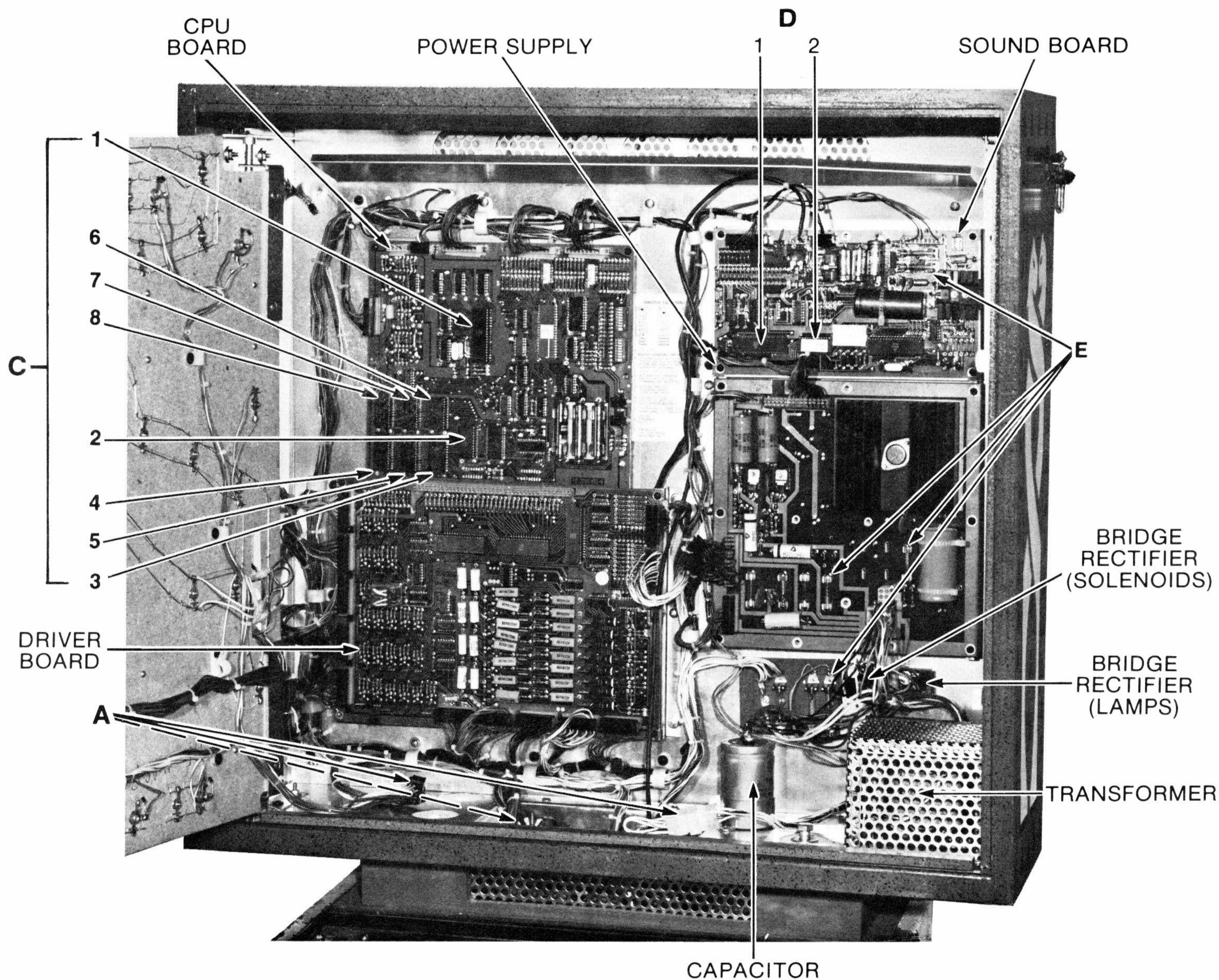
A Check all connectors in backbox for loose wire terminations. Reseat any loose wires by pushing in on the termination.

B (Not called out) Push on all connectors attached to the CPU, Driver, Sound, and Power Supply Boards and check terminations on capacitor and bridge rectifiers.

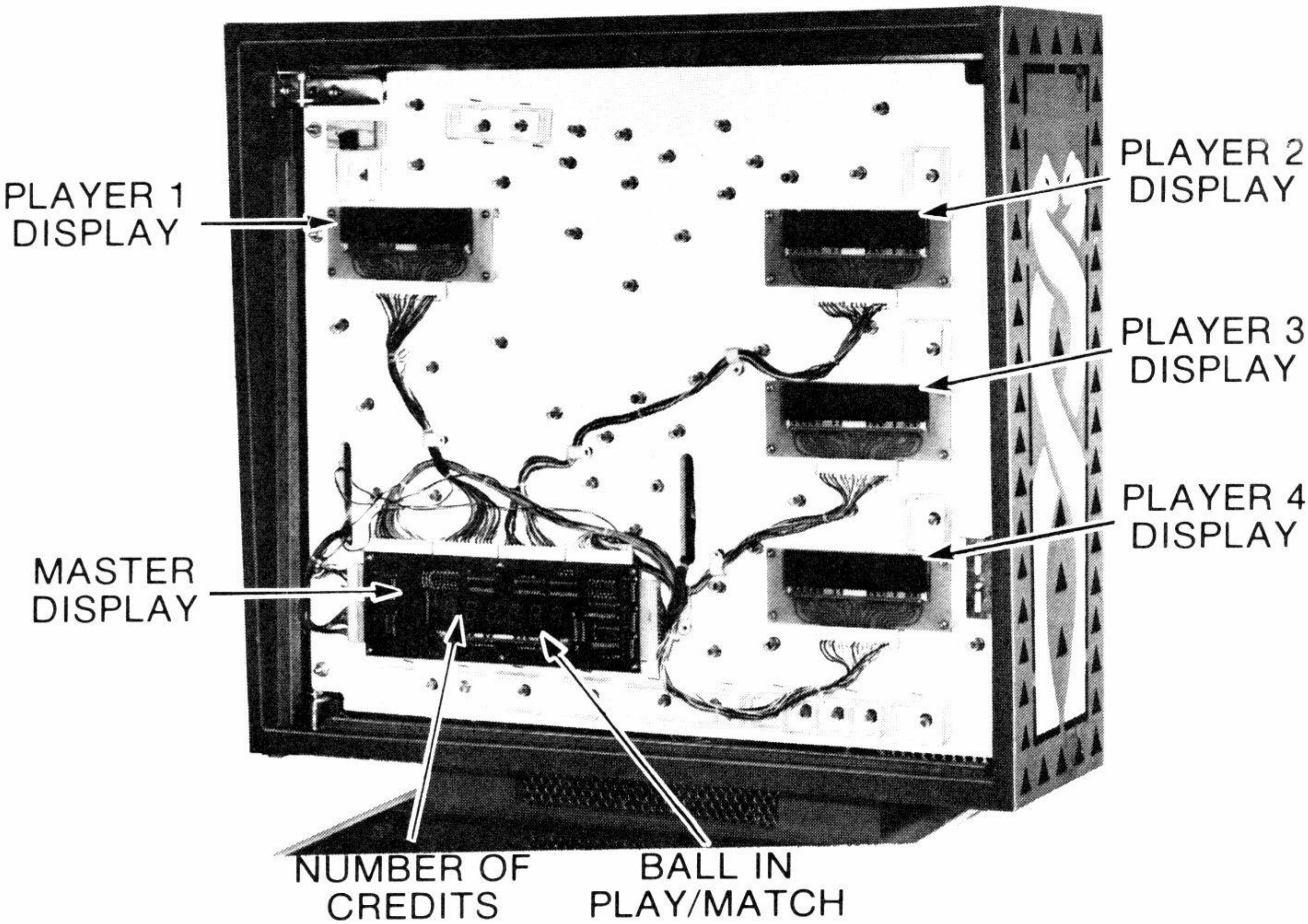
C Gently press on the socketed IC packages on CPU Board: 1 MPU, 2 RAM, 4 and 5 ROMS, and 6, 7 and 8 PROMS.

D Gently press on the socketed IC packages on Sound Board: 1 MPU, 2 Sound ROM.

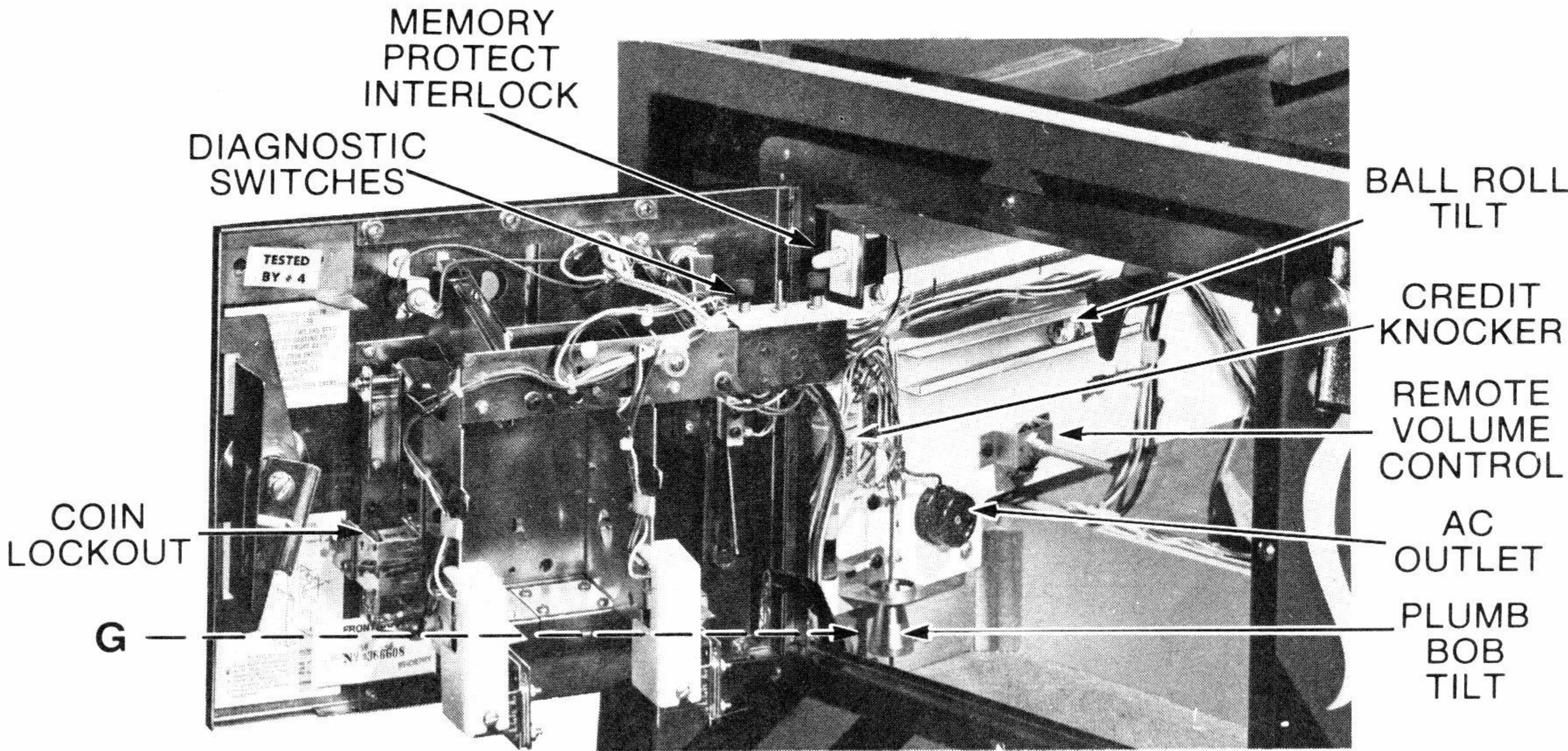
E Check that two fuses on Sound Board, five fuses on Power Supply, and three fuses on fuse card are secure.



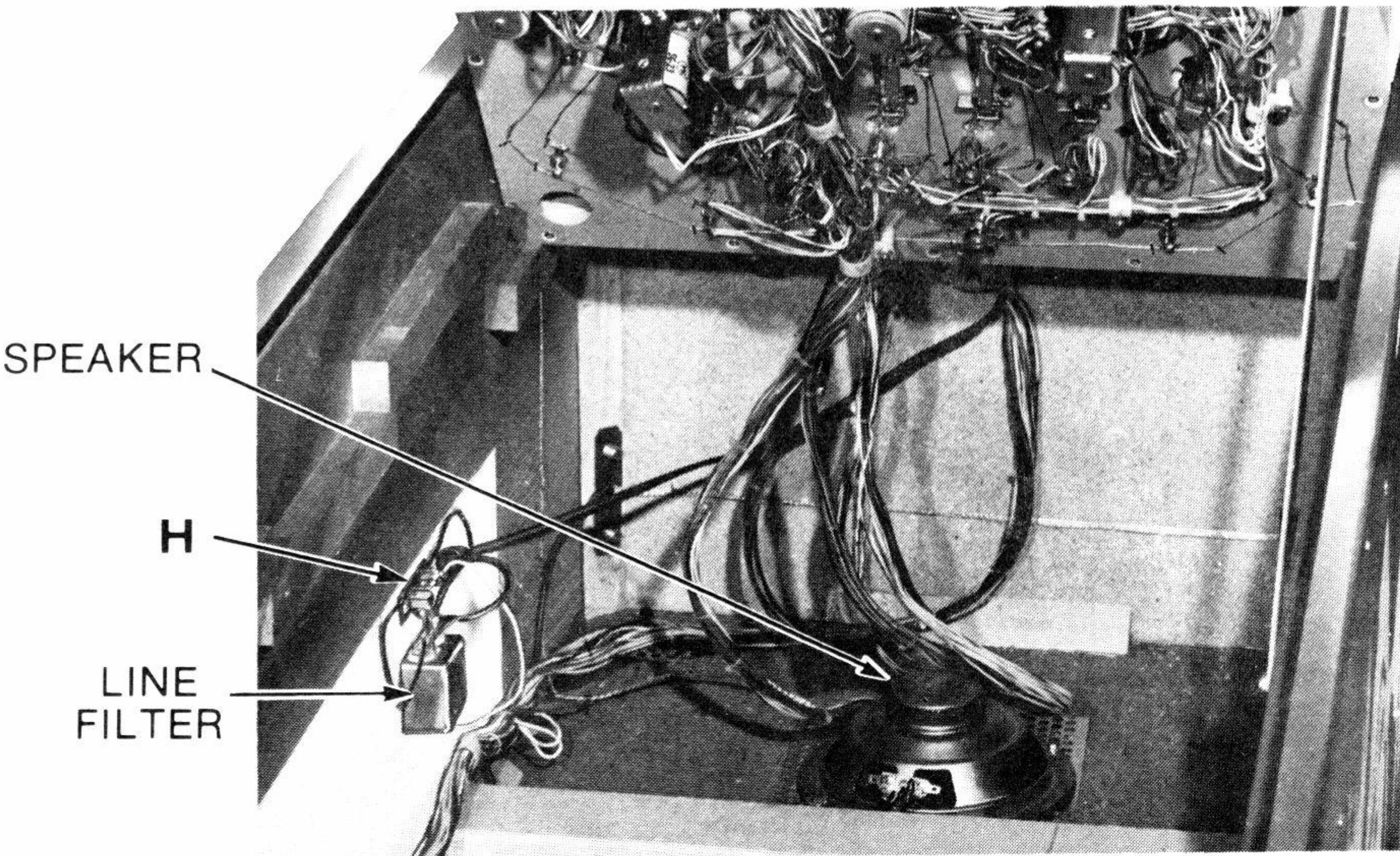
F (Not called out) Push on all connectors attached to Master and Player Display Boards.



G Check the cabinet to coin door connectors for loose wire terminations. Reseat any loose wires by pushing in on the termination.



H Check that the line fuse is secure.



Power Turn-On

This machine **MUST BE PLUGGED INTO A PROPERLY GROUNDED OUTLET** to **PREVENT SHOCK HAZARD** and to ensure **PROPER GAME OPERATION**. **DO NOT** use a “cheater” plug to defeat the ground pin on the line cord, and **DO NOT** cut off the ground pin. The line voltage **MUST** agree with that specified on the back of the cabinet or serious damage to the machine could occur. For low-line applications (105 or 210V ac), refer to the power wiring diagram in the drawing set.

1. **With the coin door closed**, plug the game in and turn it **ON**. The game should come on in the game over mode as indicated by the player scores reading zero, player 1 up light flashing, game over lights lit, and the high score to date alternating with the player 1 score.
2. If the game comes on in the diagnostic mode (number of credits display showing 04, ball in play display showing 00, and player 1 display showing game identification) turn the game **OFF** and **ON** again.
 - a. If the game now comes on in the game over mode the bookkeeping and game evaluation totals have been reset to zero.
 - b. If the game still comes on in the diagnostic mode, open the coin door and turn the game **OFF** and **ON twice**. This is an indication of the batteries being removed with the power **OFF** or coming loose during shipment. This has also resulted in features reverting to factory settings. Any changes from factory settings must be reentered using procedures provided in Section 3 of this manual.
3. If the game still comes on in the diagnostic mode, refer to troubleshooting procedures in the maintenance manual.
4. Perform diagnostic tests (Section 5) and make any desired changes to features (Section 3).

SECTION 2 GAME OPERATION

This Section provides an explanation of game operation.

Place the ball onto the playfield by the outhole. When the game is turned on it will come up in the game over mode. All player scores will be zero, high score to date* will alternate with the player 1 score, the player 1 up light will flash, and the game over lights will light. All playfield lights except for the credit lamp cycle in an attract mode.

When coins are inserted, credits will be posted. The knocker will sound for each credit. When the credit button on the front of the cabinet is pressed, the ball release solenoid serves the ball, the credit display will be reduced by one, the ball in play will show 1, the startup tune will be played, and the player 1 up light will flash until the first switch is made. Pressing the credit button at any time before the ball in play display indicates 2 will allow additional players, change the number of player lights, and reduce the number of credits by one for each additional player.

The bonus is advanced by making each “A” through “E” rollover (three advances for “B” rollover), each “1” through “4” target, and the eject hole. Advancing the bonus to 10,000

lights the spinner and advancing it to 20,000 turns the spinner lamp off. The bonus multiplier is advanced by spotting “A”, “B” and “C”. Spotting “1” through “4” flashes the magnet lamps for 50,000 and advances lighting of Stars 1 and 2 and the “1-4” target Special arrows. Spotting “D” and “E” spots one of the “1-4” lamps.

Making the “G-O-R” bank of drop targets scores 5,000, lights “G O R”, and advances the magnet lamps. Making the “G-A-R” bank of drop targets scores 5,000, lights “G A R”, and advances lighting of the jet bumpers, “G-A-R” drop target 5,000 lamp, and the bottom outside Special rollovers. Making the magnet switch energizes the magnet and scores 1,000 or the highest flashing value. If the value is 20,000 or greater, the magnet value is reset to 1,000.

Spotting “GOR” and “GAR” advances lighting of the eject hole lamps. Making the eject hole scores 5,000 or the highest flashing value. The eject hole lamps are reset whenever it is made to collect an Extra Ball and are always reset for the subsequent ball whenever the “Same Player Shoots” lamp is lit. The eject hole scores 20,000 when made for an Extra Ball.

The kickers, middle and upper left standups, and “G-O-R” and “G-A-R” drop target standups each score 10. The middle upper and lower standups at the top of the playfield each score 50. The jet bumpers and the spinner each score 100 or 1000 when lit. The lower left standup and the “G-O-R” drop targets each score 1000. The “1-4” targets each score 1000 and 2000 when lit and the “G-A-R” drop targets each score 1000 and 5000 when lit. All other scoring is as previously described or as indicated on the playfield.

The magnet lamps and partial spotting of “A-B-C”, “D-E”, “1-4”, and *eject hole lamps are restored for subsequent balls. Also the features lit from the “1-4” targets are *restored for subsequent balls until a “1-4” target special is collected.

Extra balls* (maximum of one extra ball per ball) won during the course of the game are played immediately after the player’s regular ball enters the outhole. After the last ball is played, the match digits* appear where the ball in play digits were. If match occurs an extra credit will be awarded,* the match and game over tunes will play and the game over lights will light. The high score to date will alternate with the winning player’s score.

If a player’s score exceeds the current high score to date, three* credits will be awarded, the game will play a high score to date tune, and the highest score to date lights will remain lit.

The Plumb Bob Tilt tilts the ball in play on the third* closure. The Playfield Shake and Ball Roll tilt switches tilt the ball in play immediately. The slam tilt switch on the coin door sets all player scores to zero and returns the game to game over.

If coins are inserted or credits won and the maximum* number of credits is exceeded, the credits will be posted correctly but the coin lockout coil will be de-energized until the number of remaining credits is below the maximum. While the coil is de-energized, no credits may be won and any coins inserted will be rejected.

*These features are adjustable and the procedure is outlined in Section 3.

SECTION 3 GAME ADJUSTMENTS

This section provides information for making game adjustments and reviewing game status. There are four switches, all accessible from the coin door (Figure 1) or the front of the cabinet, which are used to display and change game features:

1. AUTO-UP/MANUAL-DOWN toggle switch (inside coin door)
2. ADVANCE pushbutton (inside coin door)
3. HIGH SCORE RESET pushbutton (inside coin door)
4. Credit button (front of cabinet)

Procedure (Refer to Table 1 and [for pricing] Table 2 for Function 13-35 adjustment values).

Coin door must remain open to change settings

1. In game over mode, set toggle switch to AUTO-UP and depress ADVANCE pushbutton. Test 04 is indicated in number of credits display, Function 00 in ball in play display, and game identification in player 1 display.
2. **To raise** Function number in ball in play display, operate ADVANCE pushbutton with switch set to AUTO-UP; **to lower** Function number operate ADVANCE with it set to MANUAL-DOWN.
3. With desired Function number indicated in ball in play display, **raise** value in player 1 display by operating credit button with switch set to AUTO-UP; **lower** value by operating credit button with it set to MANUAL-DOWN. Value left on player 1 display is new setting.
4. Repeat steps 2 and 3 until all desired adjustments have been made.

5. Turn game OFF and back ON to return to game over mode.

Restoring Factory Settings (Functions 01-35)

Coin door must remain open to restore factory settings

Factory settings are restored using the coin door switches and two switches on the CPU Board. On the right side of the CPU Board (Figure 2) there are two 8-position miniature slide switches and two pushbutton switches. The lower 8-position switch is not used and the lower (DIAGNOSTIC) pushbutton switch is used only for trouble-shooting. The game is first placed in a blanking mode from the coin door and then switch number 7 on the MASTER COMMAND (upper) slide switch is set to ON (moved to left) and all other switches are set to OFF (moved to the right). Finally, the MASTER COMMAND ENTER pushbutton is depressed. To reset Functions 12 through 35 to factory settings and to **zero audit totals** (Functions 01-11), proceed as follows:

1. With the game in the game over mode, set the AUTO-UP/MANUAL-DOWN switch to MANUAL-DOWN AND momentarily depress the ADVANCE pushbutton. All displays should go blank.
2. Remove the backglass and unlatch and open the insert door.
3. Set all switches on the MASTER COMMAND switch to OFF (move to the right).
4. Set switch 7 on the MASTER COMMAND switch to ON (move to the left).
5. Momentarily depress MASTER COMMAND ENTER pushbutton. The LEDs should blink once.
6. Turn the game OFF and ON **twice** to return to the game over mode.

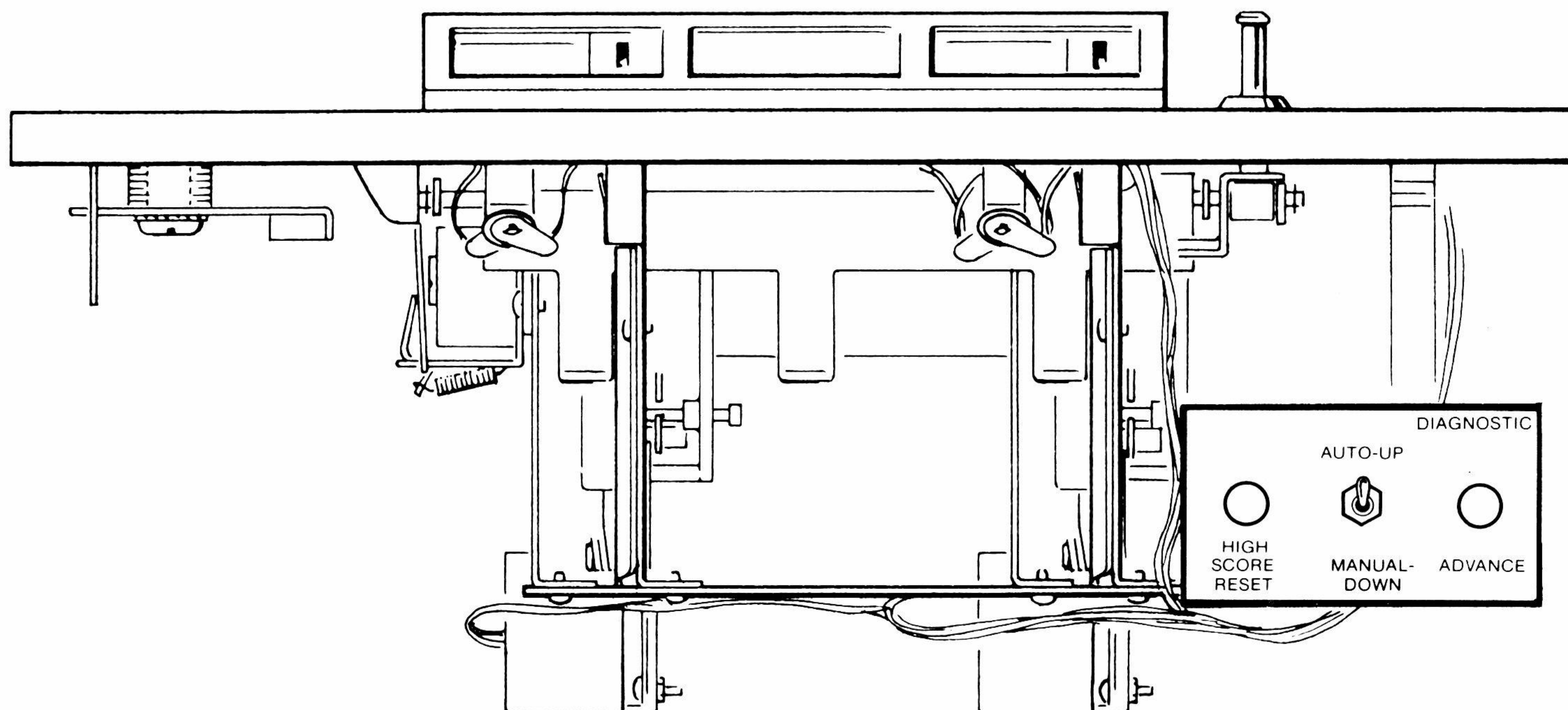


Figure 1. Coin Door Switches

Table 1. Game Adjustments

FUNCTION	DESCRIPTION	NOTES	FACTORY SETTING	Notes:
00	Game Identification	1	1496 1	1. Functions 00-11 cannot be changed from the coin door; however, Functions 01-11 can be set to zero as described in Section 4.
01	Coins, Left Chute (Closest to coin door hinge)	1	—	
02	Coins, Center Chute	1	—	
03	Coins, Right Chute	1	—	
04	Total Paid Credits	1	—	2. Total Credits (Function 08) is the sum of Function 04 and as applicable, Functions 05, 06, and 07.
05	Total Specials	1	—	
06	Total Replay (Extra Ball) Scores	1	—	
07	Match and High Score to Date Credits	1	—	3. Total Extra Balls (Function 09) is the sum of the game extra ball feature and Functions 15 and 06, as applicable.
08	Total Credits	1,2	—	
09	Total Extra Balls	1,3	—	
10	Total Ball Time in Minutes	1	—	
11	Total Number of Balls Played	1	—	4. Current High Score to Date (Function 12) can be changed to the value of the Backup High Score to Date (Function 13) by operating the HIGH SCORE RESET switch while in the game over mode.
12	Current High Score to Date	4	500,000	
13	Backup High Score to Date	5	500,000	
14	Replay 1 Score	6	300,000	
15	Replay 2 Score	6	430,000	
16	Replay 3 Score	6	550,000	
17	Replay 4 Score	6	0	5. Function 13 may be set to any multiple of 10,000 points. Setting Function 25 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.
18	Maximum Credits	7	20	
19	Standard and Custom Pricing Control (00-07)	8	05	
20	Left Coin Slot Multiplier	8	01	
21	Center Coin Slot Multiplier	8	04	
22	Right Coin Slot Multiplier	8	01	6. Functions 14-17 (Replay Scores) may be set to any multiple of 10,000 points. Setting a function to zero disables the replay score point. Always disable the Replay 4 level first, the Replay 3 level second, etc. The replay levels must be set with ascending values.
23	Coin Units Required for Credit	8	01	
24	Coin Units Bonus Point	8	04	
25	High Score Credits	5	03	
26	Match (00=ON, 01=OFF)	—	00	
27	Special	—	00	
	00 = Awards Credit			
	01 = Awards Extra Ball			
	02 = Awards Points			
28	Scoring Awards	—	00	7. Setting Maximum Credits (Function 18) to zero places the game in a free play mode.
	00 = Credits at Replay Score			
	01 = Extra Ball at Replay Score			
	02 = Awards Points			
29	Maximum Plumb Bob Tilts (1-9)	—	03	
30	Number of Balls (03 or 05)	9	03	8. With Function 19 set to 00, Functions 20-24 must be set manually. Refer to Table 2 for seven standard pricing schemes (selected by values of 01-07 for Function 19) and custom pricing values.
31	Outlane Special Control	—	01	
	00 = Top and Bottom Jet Bumpers and "G-A-R" 5000 Lit Together			
	01 = Top and Bottom Jet Bumpers Lit Together			
	02 = All Features Lit Separately			
32	Eject Hole Control	—	00	9. For 5-Ball play it is recommended that Function 33 be set to 02 and Function 34 be set to 01.
	00 = Lamps Restore, 10,000 Not Lit Initially			
	01 = Lamps Restore, 10,000 Lit Initially			
	02 = Lamps do not Restore, 10,000 Not Lit Initially			
	03 = Lamps do not Restore, 10,000 Lit Initially			
33	Extra Ball and "1-4" Lamps	9	00	
	00 = Extra Ball Allowed, Lamps Spotted Randomly			
	01 = No Extra Ball, Lamps Spotted Randomly			
	02 = Extra Ball Allowed, Lamps Spotted in Sequence			
	03 = No Extra Ball, Lamps Spotted in Sequence			
34	"1-4" Target Special Control	9	00	
	00 = Star Lamps Restore, Star 1 Not Lit Initially			
	01 = Star Lamps Restore, Star 1 Lit Initially			
	02 = Star Lamps do not Restore, Star 1 not Lit Initially			
	03 = Star Lamps do not Restore, Star 1 Lit Initially			
35	Heartbeat Background Sound	—	01	
	00 = Sound OFF			
	01 = Sound ON			

Table 2. Standard and Custom Price Settings

COIN DOOR MECHANISM	CREDITS	FUNCTION					
		19	20	21	22	23	24
Quarter, Twin-Quarter,	•1/25¢, 3/50¢	01	01	04	01	01	02
	•1/25¢	02	01	04	01	01	00
	2/25¢, 5/50¢	00	02	02	02	01	04
	2/25¢	00	02	02	02	01	00
	1/25¢, 5/\$1	00	01	01	01	04	00
	1/50¢	00	01	01	01	02	00
	1/50¢, 3/\$1	00	01	01	01	02	04
*Quarter, Dollar, Quarter	•1/25¢, 5/\$1	05	01	04	01	01	04
	•1/25¢, 4/\$1	02	01	04	01	01	00
1DM, 5DM, 2 DM	•2/1DM, 5/2DM, 14/5DM	03	13	65	26	05	65
20-Cent, 50-Cent	1/20¢, 3/50¢	00	06	00	15	05	00
1 Franc, 5 Frank	•1/1F, 6/5F	04	01	00	05	01	05
	1/1F, 7/5F	00	06	00	30	05	30
25 Cent, 1 Guilder,	•1/25¢, 4/1G	06	01	00	04	01	00
	1/25¢, 5/1G	00	01	00	04	01	04
50 Yen, 100 Yen	•1/50Y, 2/100Y	07	01	00	02	01	00
1 Franc or Twin-1 Franc	•1/1F, 3/2F	01	01	01	01	01	02
	•1/1F	02	01	01	01	01	00
5 Franc, 10 Franc	•1/5F, 2/10F	07	01	00	02	01	00
	1/10F	00	01	00	02	02	00
Twin-2 Franc	•1/2F	02	01	01	01	01	00
10, 20 Franc	•1/10F, 2/20F	07	01	00	02	01	00
Twin-1 Sucre	1/3S, 2/5S	00	02	00	02	05	00
•Indicates standard price settings by adjusting only Function 19. For other price settings, set Function 19 to 00 and set Functions 20 through 24 to the values indicated in the chart.							
*or Quarter, Dollar, — .							

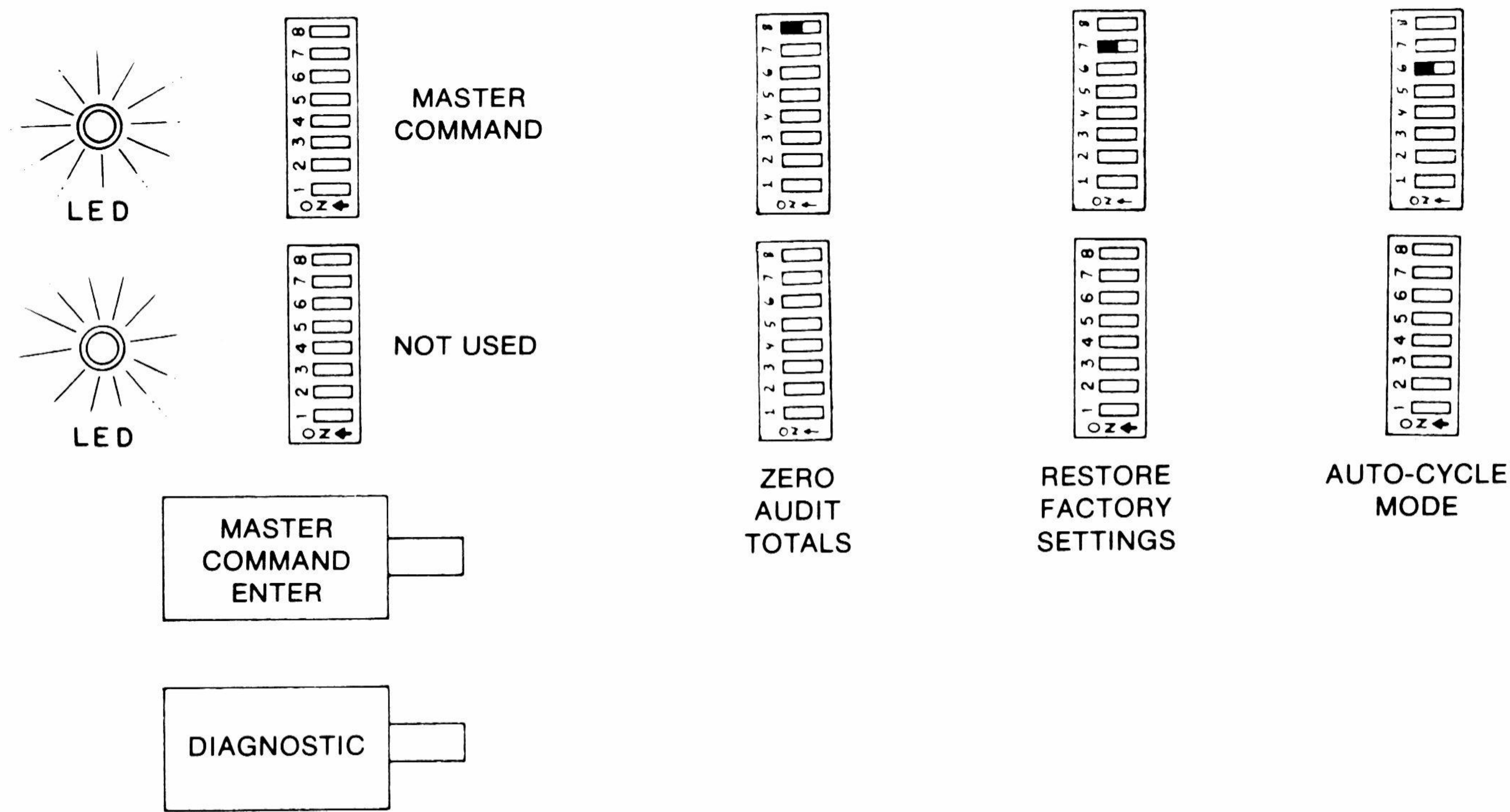


Figure 2. Master Command Switch Settings

SECTION 4 BOOKKEEPING AND GAME EVALUATION

Procedure (Functions 01-12, see Table 1)

1. In game over mode, set toggle switch to AUTO-UP and depress ADVANCE pushbutton. Test 04 is indicated in number of credits display, Function 00 in ball in play display, and game identification in player 1 display.
2. Operate the ADVANCE pushbutton to display each Function on the ball in play display and record each total from the player 1 display. (To review a total that has been advanced past, set toggle switch to MANUAL-DOWN and operate ADVANCE pushbutton).
3. Calculate percentage of paid credits as follows:
 $\% \text{ Paid Credits} = \text{Function 04} \div \text{Function 08}$
4. Turn game OFF and back ON to return to game over mode.

High Score Reset

The current High Score to Date (Function 12) may be reset to the backup High Score to Date (Function 13) from the coin door. To adjust the backup High Score to Date, see Section 3. With the game in the game over mode, momentarily depress the HIGH SCORE RESET pushbutton.

Resetting Audit Totals (Functions 01-11)

Audit totals may be reset to zero using the coin door switches and two switches on the CPU Board described in Section 3. To reset Functions 01 through 11 to zero, refer to Figure 2 and proceed as follows:

1. With the game in the game over mode, set the AUTO-UP/MANUAL-DOWN switch to MANUAL-DOWN and momentarily depress the ADVANCE pushbutton. All displays should go blank.
2. Remove the backglass and unlatch and open the insert door.
3. Set all switches on the MASTER COMMAND slide switch to OFF (move to the right).
4. Set switch 8 on the MASTER COMMAND switch to ON (move to the left).
5. Momentarily depress MASTER COMMAND ENTER pushbutton. The LEDs should blink once.
6. Turn the game OFF and ON to the game over mode.

SECTION 5 BUILT-IN DIAGNOSTICS

Procedure (Display Digits, Lamp, Solenoid, and Switch Tests; see Table 3 and Figure 3)

1. In game over mode, set toggle switch to MANUAL-DOWN and depress ADVANCE. All displays should go blank.
2. Momentarily depress ADVANCE and set toggle switch to AUTO-UP. Display Digits test is performed.
3. Momentarily depress ADVANCE. Test 01 is indicated on number of credits display and lamp test is performed. (All multiplexed lamps blink).
4. Set toggle switch to MANUAL-DOWN and momentarily depress ADVANCE. Test 02 is indicated on number of credits display and solenoid 01 on ball in play display; solenoid 01 is pulsed by Driver Board.
5. Operate ADVANCE to pulse each solenoid.

6. Set toggle switch to AUTO-UP and momentarily depress ADVANCE. Test 03 is indicated on number of credits display and stuck switches on ball in play display.
7. Operate switches; switch number is indicated on ball in play display.
8. Turn game OFF and ON to return to game over mode.

Table 3. Solenoids

Sol. No.	Description
01	Ball Release
02	Eject Hole
03	"G-A-R" Drop Targets Reset
04	"G-O-R" Drop Targets Reset
05	Magnet Relay
06	Magnet Lamps
07	Not Used
08	Not Used
09	Sound
10	Sound
11	Sound
12	Sound
13	Sound
14	Credit Knocker
15	Not Used
16	Coin Lockout
17	Top Jet Bumper
18	Left Jet Bumper
19	Bottom Jet Bumper
20	Left Kicker
21	Right Kicker
22	Not Used

Auto-Cycle Mode

This mode is provided to help diagnose intermittent problems by continuously performing the Display Digits, Lamp, and Solenoid Tests. Each cycle of this mode sequences through the display tests, flashes the lamps 64 times, and pulses each solenoid. This mode is initiated using the coin door switches and two switches on the CPU Board described in Section 3. To initiate the Auto-Cycle mode refer to Figure 2 and proceed as follows:

1. With the game in the game over mode, set the AUTO-UP/MANUAL-DOWN switch to MANUAL-DOWN and momentarily depress the ADVANCE pushbutton. All displays should go blank.
2. Remove the backglass and unlatch and open the insert door.
3. Set all switches on the MASTER COMMAND slide switch to OFF (move to the right).
4. Set switch 6 to ON (move to the left).
5. Momentarily depress the MASTER COMMAND ENTER pushbutton. The LEDs should blink once.
6. Set the toggle switch to AUTO-UP and momentarily depress the ADVANCE pushbutton.
7. To terminate the Auto-Cycle mode and go to game over, turn the game OFF and ON.

SECTION 6 MATRIX CHARTS AND PLAYFIELD SPARE PARTS

This section provides matrix charts for lamps and switches (Figures 4 and 5), solenoid identification and connections (Table 4), and playfield spare parts identification (Figure 6).

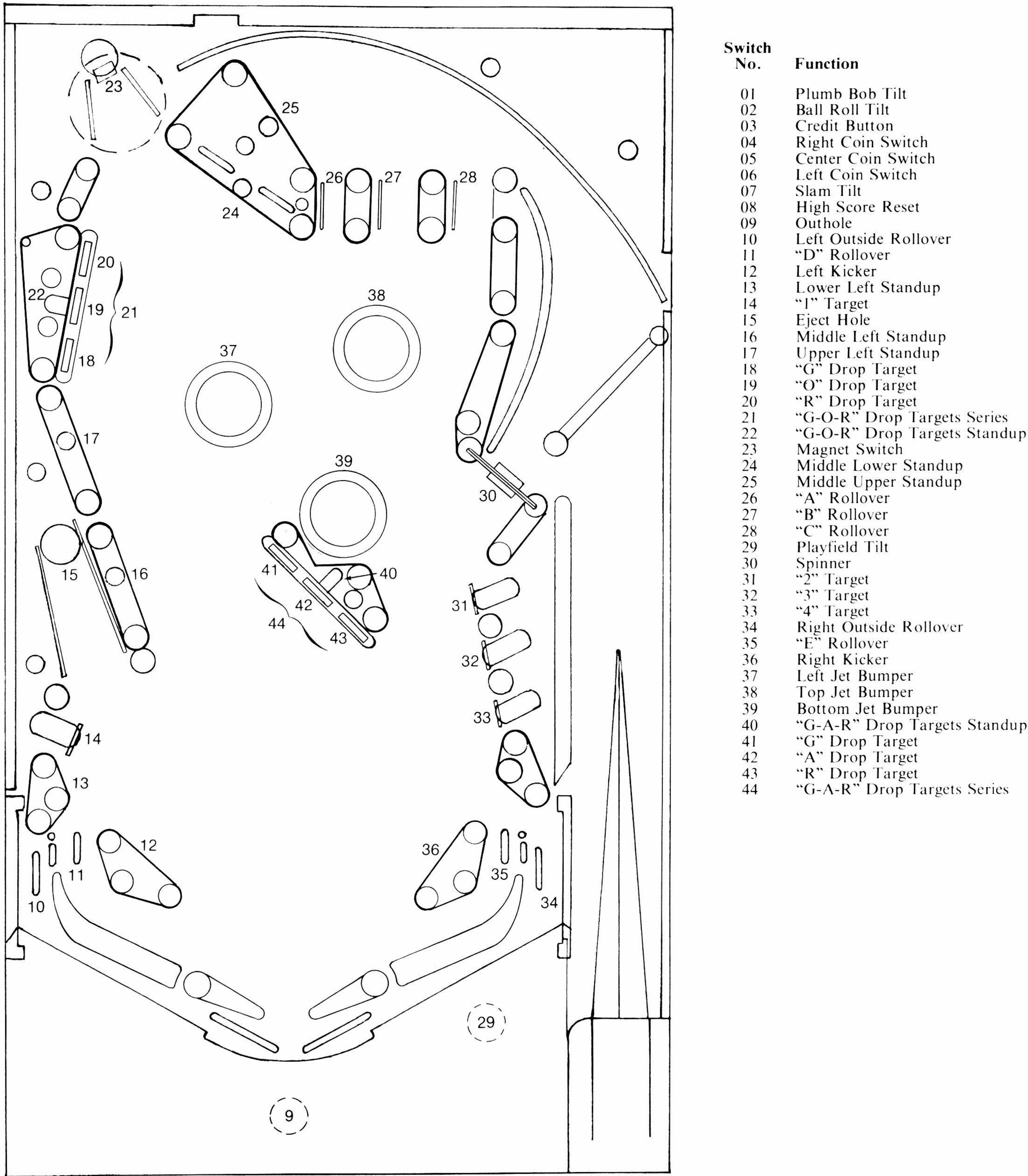


Figure 3. Playfield Switch Locations and Switch Chart

ROW	COLUMN							
	1 YEL-BRN	2 YEL-RED	3 YEL-ORN	4 YEL-BLK	5 YEL-GRN	6 YEL-BLU	7 YEL-VIO	8 YEL-GRY
1 RED-BRN	SAME PLAYER SHOOT AGAIN (PLAYFIELD)	2,000 BONUS	NOT USED	1 TARGET	MAGNET 5,000	"GAR" 5,000 WHEN LIT	NOT USED	#1 PLAYER UP
2 RED-BLK	LEFT SPECIAL	3,000 BONUS	10,000 BONUS	2 TARGET	MAGNET 10,000	GOR	1 CAN PLAY	#2 PLAYER UP
3 RED-ORN	RIGHT SPECIAL	4,000 BONUS	20,000 BONUS	3 TARGET	MAGNET 20,000	GAR	2 CAN PLAY	#3 PLAYER UP
4 RED-YEL	2X	5,000 BONUS	"A"	4 TARGET	MAGNET 30,000	EJECT HOLE 10,000	3 CAN PLAY	#4 PLAYER UP
5 RED-GRN	3X	6,000 BONUS	"B"	1 TARGET ARROW	MAGNET 50,000	EJECT HOLE 15,000	4 CAN PLAY	TILT
6 RED-BLU	STAR 1	7,000 BONUS	"C"	2 TARGET ARROW	TOP JET BUMPER	EJECT HOLE EXTRA BALL	MATCH	GAME OVER
7 RED-VIO	STAR 2	8,000 BONUS	"D"	3 TARGET ARROW	LEFT JET BUMPER	NOT USED	BALL IN PLAY	SAME PLAYER SHOOT AGAIN (BACKBOX)
8 RED-GRY	1,000 BONUS	9,000 BONUS	"E"	4 TARGET ARROW	BOTTOM JET BUMPER	SPINNER 1,000	CREDITS (PLAYFIELD)	HIGH SCORE TO DATE

Figure 4. Lamp Matrix

COLUMN ROW								
	1 GRN-BRN	2 GRN-RED	3 GRN-ORN	4 GRN-YEL	5 GRN-BLK	6 GRN-BLU	7 GRN-VIO	8 GRN-GRY
1 WHT-BRN	PLUMB BOB TILT 1	OUTHOLE 9	UPPER LEFT STANDUP 17	MIDDLE UPPER STANDUP 25	"4" TARGET 33	"G" DROP TARGET 41	NOT USED 49	NOT USED 57
2 WHT-RED	BALL ROLL TILT 2	LEFT OUTSIDE ROLLOVER 10	"G" DROP TARGET 18	"A" ROLLOVER 26	RIGHT OUTSIDE ROLLOVER 34	"A" DROP TARGET 42	NOT USED 50	NOT USED 58
3 WHT-ORN	CREDIT BUTTON 3	"D" ROLLOVER 11	"O" DROP TARGET 19	"B" ROLLOVER 27	"E" ROLLOVER 35	"R" DROP TARGET 43	NOT USED 51	NOT USED 59
4 WHT-YEL	RIGHT COIN SWITCH 4	LEFT KICKER 12	"R" DROP TARGET 20	"C" ROLLOVER 28	RIGHT KICKER 36	"G-A-R" DROP TARGETS SERIES 44	NOT USED 52	NOT USED 60
5 WHT-GRN	CENTER COIN SWITCH 5	LOWER LEFT STANDUP 13	"G-O-R" DROP TARGETS SERIES 21	PLAYFIELD TILT 29	LEFT JET BUMPER 37	NOT USED 45	NOT USED 53	NOT USED 61
6 WHT-BLU	LEFT COIN SWITCH 6	"1" TARGET 14	"G-O-R" DROP TARGETS STANDUP 22	SPINNER 1,000 WHEN LIT 30	TOP JET BUMPER 38	NOT USED 46	NOT USED 54	NOT USED 62
7 WHT-VIO	SLAM TILT 7	EJECT HOLE 15	MAGNET SWITCH 23	"2" TARGET 31	BOTTOM JET BUMPER 39	NOT USED 47	NOT USED 55	NOT USED 63
8 WHT-GRY	HIGH SCORE RESET 8	MIDDLE LEFT STANDUP 16	MIDDLE LOWER STANDUP 24	"3" TARGET 32	"G-A-R" DROP TARGETS STANDUP 40	NOT USED 48	NOT USED 56	NOT USED 64

Figure 5. Switch Matrix

Table 4. Solenoid Connections

SOL. NO.	FUNCTION	WIRE COLOR	CONNECTIONS	DRIVER TRANS.	SOLENOID PART NO.
01	Ball Release	GRY-BRN	2P11-4, 8P3-17	Q15	SA-23-850-DC
02	Eject Hole	GRY-RED	2P11-5, 8P3-18	Q17	SG-23-850-DC
03	"G-A-R" Drop Targets Reset	GRY-ORN	2P11-7, 8P3-19	Q19	SA3-23-850-DC
04	"G-O-R" Drop Targets Reset	GRY-YEL	2P11-8, 8P3-20	Q21	SA3-23-850-DC
*05	Magnet Relay	GRY-GRN	2P11-9, 8P3-21	Q23	SM-35-4000-DC
06	Magnet Lamps	GRY-BLU	2P11-3, 8P3-22	Q25	Type 89 Bulbs
07	Not Used	GRY-VIO	2P11-2, 8P3-23	Q27	--
08	Not Used	GRY-BLK	2P11-1, 8P3-24	Q29	--
09	Sound	BRN-BLK	2P9-9, 10P3-3	Q31	--
10	Sound	BRN-RED	2P9-7, 10P3-2	Q33	--
11	Sound	BRN-ORN	2P9-1, 10P3-5	Q35	--
12	Sound	BRN-YEL	2P9-2, 10P3-4	Q37	--
13	Sound	BRN-GRN	2P9-3, 10P3-7	Q39	--
14	Credit Knocker	BRN-BLU	2P9-4, 7P1-16	Q41	SA2-23-850-DC
15	Not Used	BRN-VIO	2P9-5, 7P1-17	Q43	--
16	Coin Lockout	BRN-GRY	2P9-6, 7P1-18, 7P2-4	Q45	SM-35-4000-DC
*17	Top Jet Bumper	BLU-BRN	2P12-7, 8P3-11	Q2	SG-23-850-DC
*18	Left Jet Bumper	BLU-RED	2P12-4, 8P3-12	Q4	SG-23-850-DC
*19	Bottom Jet Bumper	BLU-ORN	2P12-3, 8P3-13	Q6	SG-23-850-DC
*20	Left Kicker	BLU-YEL	2P12-6, 8P3-14	Q8	SG-23-850-DC
*21	Right Kicker	BLU-GRN	2P12-8, 8P3-15	Q10	SG-23-850-DC
*22	Not Used	BLU-BLK	2P12-9, 8P3-16	Q12	--
*	Right Flipper	BLU-VIO	7P1-8, 8P3-3	--	SFL-20-300/ 30-800-DC
*	Left Flipper	BLU-GRY	7P1-10, 8P3-4	--	SFL-20-300/ 30-800-DC

***NOTES:**

1. Contacts of solenoid 05 switch ground to magnet (Part No. 20-8991).

2. Special switch connections for solenoids

17 through 22 are as follows:

17 -- ORN-BRN -- 2P13-5, 8P3-5

18 -- ORN-RED -- 2P13-3, 8P3-6

19 -- ORN-BLK -- 2P13-2, 8P3-7

20 -- ORN-YEL -- 2P13-4, 8P3-8

21 -- ORN-GRN -- 2P13-8, 8P3-9

22 -- ORN-BLU -- 2P13-9, 8P3-10

3. Flipper button connections are as follows:

Right -- ORN-VIO -- 2P12-1, 7P1-7

Left -- ORN-GRY -- 2P12-2, 7P1-9

4. Typical wiring for solenoids and special switches:

