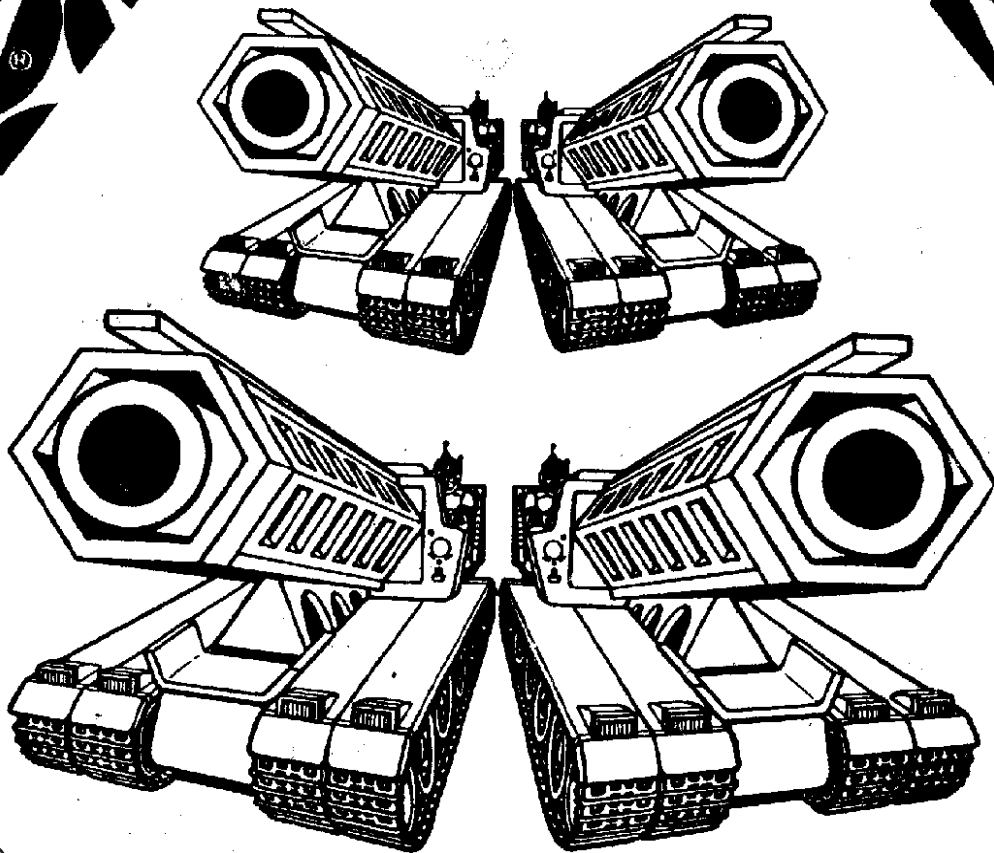


BIG GUNS



FLIPPERSPILL.COM

FLIPPERSPILL.COM

BIG GUNS ROM and Jumper Table

Game	System 11A CPU Rev.	P/N - U15 Game µP	P/N - U27 G. ROM 1	P/N - U26 G. ROM 2	P/N - U21 S. ROM 1	P/N - U22 S. ROM 2	P/N - U24 Sound µP	Jumpers
PIN-BOT	- , A	5400-09150-00	A-5343- 549-2	A-5343- 549-1	A-5343- 549-4	A-5343- 549-3	5400-09150-00	W1, 2, 4, 5, 7, 8, 11, 12, 13, 14, 16, 17, and 18
TIC TAC STRIKE	- , A		Not Used	A-5343- 1919-1	A-5343- 1919-3	A-5343- 1919-2		W1, 2, 4, 5, 7, 8, 11, 12, 13, 14, 16, 17, and 18
MILLIONAIRE	- , A		A-5343- 555-2	A-5343- 555-1	A-5343- 555-4	A-5343- 555-3		W1, 2, 4, 5, 7, 8, 11, 12, 13, 14, 16, 17, and 18
F-14 TOMCAT	- , A		A-5343- 554-2	A-5343- 554-1	A-5343- 555-4	A-5343- 554-3		W1, 2, 4, 5, 7, 8, 11, 12, 13, 14, 16, 17, and 18
FIRE!	- , A		A-5343- 556-2	A-5343- 556-1	A-5343- 556-4	A-5343- 556-3		W1, 2, 4, 5, 7, 8, 11, 12, 13, 14, 16, 17, and 18
BIG GUNS	- , A	↓	A-5343- 557-2	A-5343- 557-1	A-5343- 557-4	A-5343- 557-3	↓	W1, 2, 4, 5, 7, 8, 11, 12, 13, 14, 16, 17, and 18

BIG GUNS Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trans.	Solenoid Part Number Flashlamp Type	
				CPU Bd.	Playfield/ Cabinet		b = Backbox p = Playfield	
01A ³	Outhole Kicker	Switched	{ Vio-Brn }	1P11-1	8P3-1 (to J1-9 on { Gry-Brn } Aux Pwr Drvr Bd.)	Q33	AE-23-800	
01C ³	Ball Popper Flasher	Switched	{ Blk-Brn }	{ Gry-Brn }		Q33	#89 flashlamps	2p
02A ³	Ball Shooter Lane Feeder	Switched	{ Vio-Red }	1P11-3	8P3-2 (to J1-7 on { Gry-Red } Aux Pwr Drvr Bd.)	Q25	AE-23-800	
02C ³	Lwr L (pf) & Queen (bb) Flashers	Switched	{ Blk-Red }	{ Gry-Red }		Q25	#89 flashlamps	2p
03A ³	Ball Popper	Switched	{ Vio-Orn }	1P11-4	8P3-3 (to J1-6 on { Gry-Orn } Aux Pwr Drvr Bd.)	Q32	AE-24-900	
03C ³	Lwr R (pf) & Man (bb) Flashers	Switched	{ Blk-Orn }	{ Gry-Orn }		Q32	#89 flashlamps	2p
04A ³	Left Eject	Switched	{ Vio-Yel }	1P11-5	8P3-4 (to J1-5 on { Gry-Yel } Aux Pwr Drvr Bd.)	Q24	AE-26-1500	
04C ³	Center B'box Flashers	Switched	{ Blk-Yel }	{ Gry-Yel }		Q24	#89 flashlamps	2p
05A ³	Right Eject	Switched	{ Vio-Grn }	1P11-6	8P3-5 (to J1-4 on { Gry-Grn } Aux Pwr Drvr Bd.)	Q31	AE-23-800	
05C ³	L Cannon (pf) & L (bb) Flashers	Switched	{ Blk-Grn }	{ Gry-Grn }		Q31	#89 flashlamps	2p
06A ³	Left Cannon	Switched	{ Vio-Blu }	1P11-7	8P3-6 (to J1-3 on { Gry-Blu } Aux Pwr Drvr Bd.)	Q23	AL-23-800	
06C ³	R Cannon (pf) & R (bb) Flashers	Switched	{ Blk-Blu }	{ Gry-Blu }		Q23	#89 flashlamps	2p
07A ³	Right Cannon	Switched	{ Vio-Blk }	1P11-8	8P3-7 (to J1-2 on { Gry-Vio } Aux Pwr Drvr Bd.)	Q30	AL-23-800	
07C ³	L Troll (pf) & BIG (bb) Flashers	Switched	{ Blk-Vio }	{ Gry-Vio }		Q30	#89 flashlamps	2p
08A ³	Knocker (Ticket Dispenser)	Switched	{ Vio-Gry }	1P11-9	8P3-8 (to J1-1 on { Gry-Blk } Aux Pwr Drvr Bd.)	Q22	AE-23-800-02	
08C ³	R Troll (pf) & GUNS (bb) Flashers	Switched	{ Blk-Gry }	{ Gry-Blk }		Q22	#89 flashlamps	2p
09	L Gen Illum (pf) Relay	Contrld	Brn-Blk	1P12-1	8P3-9	Q17	5580-12145-01 ⁴	
10	R Gen Illum (pf) Relay	Contrld	Brn-Red	1P12-2	8P3-10	Q9	5580-12145-01 ⁴	
11	B'box Gen Illum Relay	Contrld	Brn-Orn	1P12-4	3P7-1	Q16	5580-12145-01 ⁴	
12	Solenoid A/C Select Relay	Contrld	Brn-Yel	1P12-5	8P3-12	Q8	5580-09555-01 ⁵	
13	Right Drop Target	Contrld	Brn-Grn	1P12-6	8P3-13	Q15	AE-26-1000	
14	"Forcefield" Flipper Post	Contrld	Brn-Blu	1P12-7	8P3-14	Q7	AE-26-1200	
15	Invincible	Contrld	Brn-Vio	1P12-8	8P3-15	Q14	#1251 lamp	1b
16	B'box Top Cntr Flashers	Contrld	Brn-Gry	1P12-9	8P3-16	Q6	#89 flashlamps	2b
17	King's Chamber Kicker (B'box P'field)	Spec# 1	Blu-Brn	1P19-7	8P3-17	Q75	AE-24-900	
18	Left Outlane Kicker	Spec# 2	Blu-Red	1P19-4	8P3-18	Q71	AE-23-800	
19	Right Gate	Spec# 3	Blu-Orn	1P19-3	8P3-19	Q73	SZ-35-4000-DC	
20	Left Drop Target	Spec# 4	Blu-Yel	1P19-6	8P3-20	Q69	AE-25-1000	
21	Left Kicker	Spec# 5	Blu-Grn	1P19-8	8P3-21	Q77	AE-23-800-03	
22	Right Kicker	Spec# 6	Blu-Blk	1P19-9	8P3-22	Q79	AE-23-800-03	
-	Right Flipper	-	Orn-Vio { Blu-Vio }	1P19-1	7P1-15 [7P1-16, 8P3-34] ²	-	FL11630-50VDC	
-	Upper R Flipper	-	{ Blk-Yel }		[7P1-14, 8P3-33]		FL11753-50VDC	
-	Upper L Flipper	-	{ Blk-Blu }		[7P1-17, 8P3-31]		FL11753-50VDC	
-	Left Flipper	-	Orn-Gry { Blu-Gry }	1P19-2	7P1-18 [7P1-19, 8P3-32] ²	-	FL11630-50VDC	

Notes: 1. Wire colors, except flipper Orn-Vio and Orn-Gry, are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. 2. Flipper connections shown in braces are from flipper switch to flipper coil. 3. "A" coils are pulsed, when Sol. 12 is de-energized; "B" coils are pulsed, with Sol. 12 energized. Wire colors in brackets are those from respective A and B terminals corresponding to the J1- terminal connection listed for the Aux Power Driver Bd., which controls the device pulsing by Sol. 12. 4. Relay (p/n 5580-12145-01) is mounted on Relay Bd. p/n C-11677-3. 5. Relay is mounted on Aux Pwr Driver Bd. D-11813 in the backbox.

Contents

Section 1 - Game Operation & Test Information

<i>BIG GUNS</i> (System-11A) ROM Summary	1
Connector Identification	2
<i>BIG GUNS</i> Circuit Boards	2
<i>BIG GUNS</i> Game Control Locations	2
Pinball Game Assembly Instructions	3
Figure 1. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details	3
Game Operation	4
<i>BIG GUNS</i> Game Status Displays	5
<i>BIG GUNS</i> Audit Table	7
<i>BIG GUNS</i> Game Adjustment Table	8-9
Game Adjustment Procedure	10
Details of Adjustment Items 01 through 7	10
Item 01	10
Items 02 - 06	11
07 - 11	12
12 - 19	13
20 - 27	14
28 - 36	15
37 - 42	16
43 - 47	17
48 - 52	18
Special Preset Adjustments Caution	19
53 - 54	19
55 - 59	20
60 - 64	21
65 - 68	22
69 - 70	23
<i>BIG GUNS</i> Game Adjustment Setting Comparison Table	23
Resetting the High Scores	24
Game Pricing	24
<i>BIG GUNS</i> Pricing Table	25
Test/Diagnostic Procedures	26
Music Test	26
Display Test	26
Sound Test	26
Lamp Tests	27
<i>BIG GUNS</i> Lamp-Matrix Table	27
Solenoid Test	28
<i>BIG GUNS</i> Solenoid Table	28
Special and Controlled Solenoids - Diagrams and Details	29
Figure 2. Typical Solenoid A/C Select Relay Circuit	29
Switch Tests	30
<i>BIG GUNS</i> Switch-Matrix Table	30
Ending the Diagnostic Tests	31
Auto Burn-in Mode	31
System-11A Memory Chip Test	32
CPU LED Indicator Codes Table	32
System-11A Sound Circuitry Tests	32
Fuse Listing	33

Contents

Section 2 - Game Parts Information

Alphanumeric Display Unit Board (D-11609) Parts List	36
Power Supply Board (D-8345-557)	37
System 11A CPU Board Parts Layout and Parts Listing	38 - 39
Audio Board Assembly (D-11581-557)	40
Aux Power Driver Board (D-11813-557)	41
Center Lamp PCB Assembly (C-11815), 3-Lamp PCB Assembly (C-11823), King's Chamber 5-Lamp PCB Assembly (C-11847), Flashlamp Resistor Board Assembly (D-11814)	42
King's Chamber Parts	43
Backbox Parts Listing	43
Flipper Assemblies (C-11626-R-4, C-11626-L-4, and C-11626-R-8 and -L-8)	44
Ball Shooter Lane Feeder, C-9638	45
Right & Left Eject Hole Assemblies (B-9361-R-1) & Associated Parts	45
"Forcefield" Post Assembly (C-11819)	46
Ball Trough Switches	46
3-Bank Drop Target (C-11223-2)	47
Left Outlane Kickback (B-11873)	47
Standup Target Assemblies	47
Kicker Arm Assembly (B-9463)	48
Ball Popper & Switch Assembly	48
Cannon Assembly (C-11461)	49
Miscellaneous <i>BIG GUNS</i> Parts	49
Switches	50 - 51
Lamps	52 - 53
Solenoids/Flashers, Rubber Parts, & Playfield Posts	54
Playfield Parts	55
Playfield Circuit Boards Locations & Associated Part Numbers	56

Section 3 - Reference Diagrams & Schematics

Cabinet Wiring Diagram	58
Power Supply Schematic D-8345-557	59
Aux Power Driver Board D-11813	60
Aux Power Driver Board Schematic	61
Audio Board (D-11581) Schematic	62
Alphanumeric Display Unit Board Schematic	63
Interboard Signals Diagrams	64
Schematic, System 11A CPU (16-8993, Sheet 1 of 4)	65
Schematic, System 11A CPU (16-8993, Sheet 2 of 4)	66
Schematic, System 11A CPU (16-8993, Sheet 3 of 4)	67
Schematic, System 11A CPU (16-8993, Sheet 4 of 4)	68
Solenoids and Special Switches Control Diagram	69
Power Wiring Diagram	70

Section 1

Game Operation & Test Information

- ***BIG GUNS* (System-11A) ROM Summary**
- **Pinball Game Assembly Instructions**
- **Game Play**
- **Game Status Displays**
- **Game Adjustment Procedure**
- **Game Pricing**
- **Test/Diagnostic Procedures**

***BIG GUNS* (System-11A) ROM Summary**

IC	DESCRIPTION	TYPE	IDENTIFIER	BOARD	PART NUMBER
Game ROM 1	32K x 8 ROM	27256	U27	CPU	A-5343-557-2
Game ROM 2	16K x 8 ROM	27128	U26	CPU	A-5343-557-1
Sound ROM 1	32K x 8 ROM	27256	U21	CPU	A-5343-557-4
Sound ROM 2	32K x 8 ROM	27256	U22	CPU	A-5343-557-3
Audio ROM 1	32K x 8 ROM	27256	U4	Audio	A-5343-557-5
Audio ROM 2	32K x 8 ROM	27256	U19	Audio	A-5343-557-6

NOTICE

To order a replacement ROM from your authorized WILLIAMS ELECTRONICS GAMES distributor, specify: (1) part number (if available); (2) ROM label color; (3) ROM level (number) on the label; (4) which game the ROM is used in.

CONNECTOR IDENTIFICATION

WILLIAMS ELECTRONICS GAMES uses a special technique to identify connectors. Each plug or jack receives a prefix number (which identifies the related circuit board or location within the game), a letter, and a number. J-designations refer to the male part of a connector. P-designations refer to the female part of a connector. For example, 1J1 designates jack 1 of board 1 (a CPU Board jack); 3P6 designates plug 6 of board 3 (a Power Supply 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, 1J1-3 refers to pin 3 of jack 1 on board 1.

BIG GUNS CIRCUIT BOARDS

Major *BIG GUNS* Circuit Boards are in the backbox. They are accessible by removing the backbox glass, unlatching the insert board, and swinging it open.

CPU BOARD. The System-11A CPU Board must be equipped with the ROMs specified in the *BIG GUNS* (System-11A) ROM Summary. For this ROM complement and CPU Board (p/n D-11392-557), jumpers W1, W2, W4, W5, W7, W8, W11, W12, W13, W14, W16, W17, and W18 must be connected. (Jumper W7 is cut/removed for West German games.)

AUDIO BOARD. The Audio Board is p/n D-11581-557, as supplied with ROMs and microprocessor.

DISPLAY BOARD. The Alphanumeric Display Unit Board (p/n D-11609) is on the Speaker/Display Assembly, D-11610, which is a part of the Speaker/Display Panel, D-11611.

POWER SUPPLY BOARD. The Power Supply Board is p/n D-8345-557.

Prefix numbers for *BIG GUNS* System-11A circuit boards and major assemblies are listed below. A prefix number may precede a component designator to identify the unit (e.g., connector 1J1).

1 - CPU	6 - Backbox	11 - Audio
2 - (not assigned)	7 - Cabinet	12 - (not assigned)
3 - Backbox Power Supply	8 - Playfield	13 - (not assigned)
4 - Alphanumeric Display Unit	9 - Insert Board	14 - (not assigned)
5 - Aux Power Driver Board	10 - (not assigned)	15 - (not assigned)

BIG GUNS GAME CONTROL LOCATIONS

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

The Volume Control is on the left inner wall of the cabinet on the tilt mechanism board. It is accessible by opening the coin box door.

The Credit switch is a pushbutton to the left of the coin door on the cabinet exterior.

GAME ADJUSTMENT/DIAGNOSTIC SWITCHES. *BIG GUNS* allows the operator to program virtually all game adjustments, obtain bookkeeping information, and diagnose problems, using only three switches mounted on the inside of the coin door and the Credit button beside the coin door.

ADVANCE, AUTO-UP/MANUAL-DOWN, and HIGH-SCORE RESET are the switches located on the inside of the coin door. Refer to the Game Status Displays text and the Text/Diagnostic Procedures for details concerning their operation.

The Memory Protect switch is on the inside frame of the coin door. This interlock switch must be open to clear bookkeeping totals and to make game adjustments. It automatically opens, when the coin door opens.

BIG GUNS GAME CONTROL LOCATIONS (Continued)

The CPU Diagnostic switch (SW 2) is the lower switch (of the two switches mounted on the left edge of the CPU Board) near a large, socketed microprocessor chip. This switch initiates the Memory Chip Test explained in the Diagnostic Procedures.

The Sound Diagnostic switch (SW 1) is the upper switch of the two mounted on the left edge of the CPU Board. This switch initiates the Sound Section Test. Refer to the Diagnostic Procedures.

PINBALL GAME ASSEMBLY INSTRUCTIONS

1. Open the shipping container; remove all cartons, parts, and other items, and set them aside.
2. After finding the legs, install a leg leveller in the base of each leg. (See Figure 1, detailed view.) Leg levellers and leg bolts are provided among the parts in the cash box.
3. Place the game cabinet on a support and attach the legs, using leg bolts.
4. Open the coin door and remove keys from clip on the door.

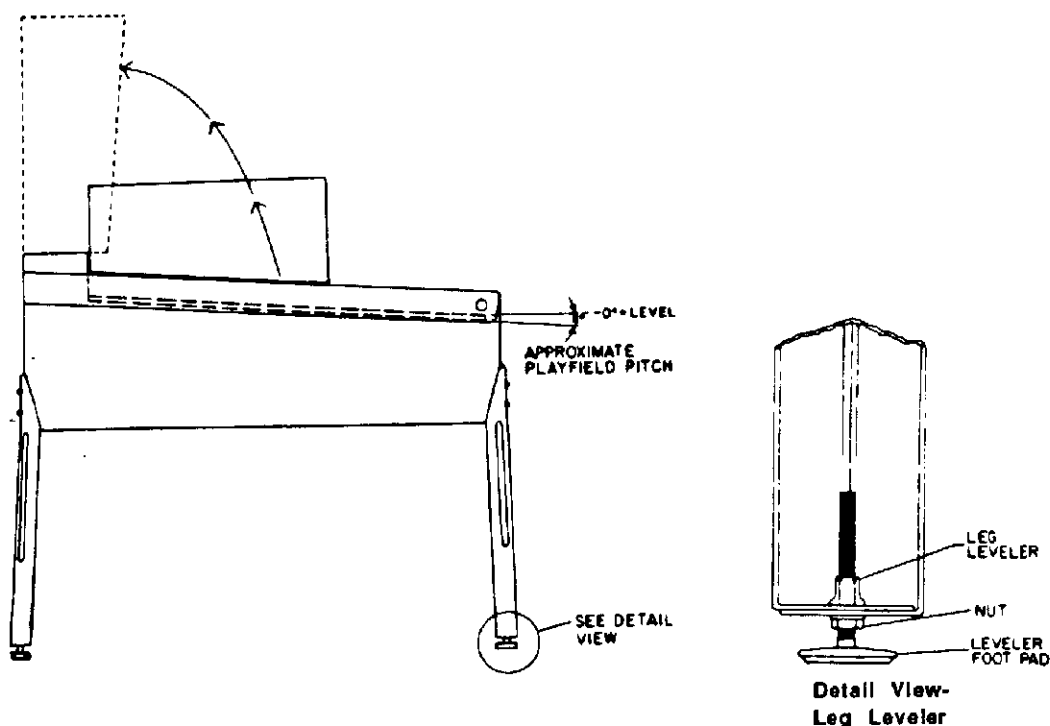


Figure 1. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

5. Raise the hinged backbox upright and stabilize it into position, using the clamp on the back of the cabinet and backbox. Unlock the backbox, and remove the backbox glass, storing it carefully to avoid scratches. Remove the shipping block holding the Insert Board. Unlatch the Insert Board and open it, then lay the Speaker/Display Panel forward on the playfield cabinet. This allows access to the bolt holes used for securing the backbox upright. Install the mounting bolts and flat washers through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox.
6. Reach into the cabinet and backbox and check the mating of the interconnecting cables, matching several wire colors at each connector. Ensure that all connections are properly secure.

CAUTION

Ensure that the interconnecting cables are free to move (not kinked or pinched). Be careful not to damage wires at any stage of the assembly process.

PINBALL GAME ASSEMBLY INSTRUCTIONS (Continued)

7. Remove the cabinet from its support and place it on the floor. Remove the playfield cover glass to permit accurate measurement of the playfield level and pitch. Level (side-to-side) the playfield (preferably measured ON the playfield surface), and firmly tighten the nut on each leg leveler shaft to maintain this level setting, as shown in Figure 1.
8. Adjust the front leg levelers for proper playfield level (side-to-side) and playfield pitch angle (incline) of approximately 6-1/2 degrees. (Again, it is recommended that these measurements 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.

CAUTION

Playfield pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The operator should adjust the tilt mechanisms for proper operation, after completion of the desired playfield pitch angle setting.

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

WARNING

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.

10. Verify that **required number** of balls are installed in the game (*BIG GUNS* requires 3).
11. Clean and re-install the playfield cover glass. Prepare the game for player operation.

GAME OPERATION

WARNING

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, using the On-Off switch. In normal operation, the player 1 score display initially shows 00. Then, the game goes into the Attract Mode (Playfield and backbox lamps flashing, sounds being heard, etc.).

CAUTION

BIG GUNS' System-11A game program has the capability to aid the operator and service personnel: At game Turn-On (and also when the operator is beginning the Test/Diagnostic Procedures), the Player 1 display now signals, with a decimal point by the rightmost character, when a switch has **NOT** been actuated during play for 60 balls (20 games). Up to three switches can be displayed during this Switch Problem reporting activity. Moreover, *BIG GUNS* compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep *BIG GUNS* earning good profits! More information is available in the Diagnostic Procedures text describing the Switch Testing.

ATTRACT MODE*. Playfield and backbox lamps blink. All player score displays exhibit a series of messages informing the player concerning:

- A. Recent highest scores*;
- B. A "custom message" ("DEFEAT KING ... TYRANT WITH ... BIG GUNS.")*;
- C. The score to achieve to obtain a Replay award*;

GAME OPERATION (Continued)

These displays (or variations of them) reappear occasionally, accompanied by sounds and music, until a player initiates game play by inserting a coin or, when credits are available, pressing the Credit button.

* - operator-adjustable feature

CREDIT POSTING. Insert coin(s). A sound is heard for each coin, and the Credits 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. However, after this maximum credits value is reached, posting of additional credits won (not purchased) by the player does *not* occur. ONLY posting of purchased credits occurs beyond the maximum credits value.

STARTING A GAME. Press the Credit button once. A startup sound plays, and the amount shown in the Credit display decreases by one. Player display 1 flashes 00 (until the first playfield switch is actuated), and the Player 4 display shows **ball 1**. Additional players may enter the game by pressing the Credit button once for each player, before the end of play on the first ball.

TILT. Actuating the Slam Tilt switch on the coin door inside the cabinet ends the current game; *BIG GUNS* then proceeds to the Game Over Mode. With the actuation of the ball-roll or playfield tilt switches, or 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 Match display. Credit* may be awarded, when the last two digits of any player's score display (1 through 4) match the random digits of the Match display. Match, high score, and game over sounds are made, as appropriate.

GAME OVER MODE. The player 1 and 2 score displays show **GAME OVER**. Then, the high scores flash on the appropriate player score displays. The game proceeds to the Attract Mode.

* - operator-adjustable feature

BIG GUNS GAME STATUS DISPLAYS

BIG GUNS utilizes a new format for the display of information concerning the game's bookkeeping and game play feature adjustment. Basically, three classes of information now become available to the game owner/ operator: Id (Identification); Au (Audit); Ad (Adjustment). Each of the underscored two-letter abbreviations for these classes appears in the Credits display, while the system microprocessor for the *BIG GUNS* game is displaying the items within each class in the status display mode.

Identification Information--Id

With the game turned on, the coin door open, and the AUTO-UP/MANUAL-DOWN switch in the AUTO-UP position, the operator can press the ADVANCE switch once, briefly. *BIG GUNS* displays immediately change from the Attract Mode to the Game Status Display Mode. This is evident by the following display, shown in columnar form. The column headings refer to the various backbox displays.

Player 1	Player 2	Player 3	Player 4
BIG	GUNS	Id 00	557 L-#*

* # - indicates ROM revision level; e.g., 1 is initial issue; 2, 3, etc. for later revisions.

The game is named in the player score 1 and 2 displays. The game's identification number and the ROM revision level appears in the player 4 display. The Player 3 display shows the status display mode in abbreviated form, **Id**, as well as the status display mode item (**00**) for this particular display.

BIG GUNS GAME STATUS DISPLAYS (Continued)

Identification Information--Id (Continued)

Pressing ADVANCE once more causes the **Id 01** display to appear. This display describes which of the "Install" options is currently in effect. For example, if the YES option of the INSTALL FACTORY Adjustment Item (Ad 70) was last selected, *FACTORY SETTING* appears on the Player Score displays.

Changing the setting of any other game adjustment item, after selecting the YES option for Ad 70 causes the display to change to *FACTORY ALTERED*. Similarly, if the operator selects the YES option for INSTALL HARD (Ad 65), the display indicates *HARD SETTING*. Changing a game adjustment item later then causes the display to show *HARD ALTERED*.

Audit Information--Au

While the AUTO-UP switch remains in the Up position, the operator can press the ADVANCE switch once, briefly, to begin the backbox displays of Audit (sometimes called "bookkeeping") Information. Forty-four audit entries are now available. Calculation of the various factors is no longer necessary because the *BIG GUNS*' System-11A game program now performs all the computations. This information is intended to aid the owner/operator in evaluating how the game is performing in each location, by providing knowledge about which game features are receiving the most play. With this information, the owner/operator can determine whether adjusting the game features to other settings will contribute to increased game earnings.

The operator can press the ADVANCE button once to view each Audit Information display item. To proceed more rapidly through this information, the operator only has to press *and hold* the ADVANCE button. If a desired item is passed, the operator can use the MANUAL-DOWN switch position with the ADVANCE button to back up to the desired item.

The **BIG GUNS Audit Table** lists the 44 items of the Audit Information portion of the *BIG GUNS* Game Status Displays. Presentation of this Audit Information again utilizes the player score displays; however, the player 1 and 2 displays are combined as a descriptive phrase. The light type below the table's column headings names the respective backbox displays where the information appears. Because the player 4 display contains information which depends on game play, only a few example entries are shown in the table. The Player 3 display shows **Au** for all 44 audit items, so its entry is omitted from the tabular listing. Detection of erroneous data affecting any of the counters used in these audit items causes the message, **ERROR**, to be displayed in the player 3 display, during display of any audit item associated with that particular counter. (The program does not analyze the cause of the error; it merely alerts the operator of the error's existence by the message.)

BIG GUNS GAME STATUS DISPLAYS (Continued)

BIG GUNS Audit Table

Audit Item (Player 3)	Descriptive Phrases (Player 1 and 2 Displays)	Audit Factor ¹ Value (Player 4)
AU 01	LEFT COINS [chute next to coin door hinge]	432
02	CENTER COINS	0
03	RIGHT COINS	398
04	PAID CREDITS	830
05	TOTAL PLAYS	
06	TOTAL FREE (Total Free Plays)	
07	PERCENT FREE (% Free Plays)	
08	REPLAY AWARDS	
09	PERCENT REPLAY (% Replay Awards)	
10	SPECIAL AWARDS	
11	PERCENT SPECIAL (% Special Awards)	
12	MATCH AWARDS	
13	HSTD (High Score to Date) CREDITS	
14	PERCENT HSTD (% HSTD Credits)	
15	EXTRA BALLS	
16	PERCENT EX. BALL (% Extra Balls)	
17	AV. BALL TIME (Average Time in Seconds)	
18	MIN. OF PLAY (Minutes of Play)	
19	BALLS PLAYED	
20	REPLAY1 AWARDS	
21	REPLAY2 AWARDS	
22	REPLAY3 AWARDS	
23	REPLAY4 AWARDS	
24	1 PLAYR. GAMES	
25	2 PLAYR. GAMES	
26	3 PLAYR. GAMES	
27	4 PLAYR. GAMES	
28	BURN IN CYCLES	
29	QUEEN RESCUED (# of times Jackpot awarded)	
30	INVIN. TOTAL (# of times Invincible status achieved)	
31	ADV. 'X' TOTAL (# of times Bonus Mult. advanced)	
32	TROLLS AWARDED (# of Trolls awarded)	
33	RET. LANE EX. BALL (# of Ex. Balls via Return Lanes)	
34	E. O. G. EX.BALL (# of Ex. Balls via B'box kicker at Game end)	
35	E. O. G. KICKS (# of kicks by B'box kicker at Game end)	
36	GUARDS SPECIAL (# of Specials earned via center Guards)	
37	MULTI- BALLS (# of times Multi-Ball Play started)	
38	TOWERS AWARDED (# of Tower Bonuses awarded)	
39	H.S.RESET COUNTER	
40	0.0-0.4 M. SCORE (# of games <500K)	
41	0.5-0.9 M. SCORE (# of games ≥500K, <1M)	
42	1.0-1.4 M. SCORE (# of games ≥1M, <1.5M)	
43	1.5-1.9 M. SCORE (# of games ≥1.5M, <2.0M)	
44	2.0-2.4 M. SCORE (# of games ≥2.0M, <2.5M)	

NOTE:

1. The numbers shown in this column for Items 1 through 4 are examples. Entries for all items depend on the amount of play; thus, they will vary from location to location.

Adjustment Information--Ad

At end of the Audit Information presentation, with the AUTO-UP switch in the Up position, the operator can press the ADVANCE button to proceed to the Adjustment Information portion of the *BIG GUNS* Game Status Displays.

The operator can press the ADVANCE button once to view each Adjustment Information display item. To proceed more rapidly through this information, the operator only has to press and hold the ADVANCE button. If a desired item is passed, the operator can use the MANUAL-DOWN switch position with the ADVANCE button to back up to the desired item.

BIG GUNS GAME STATUS DISPLAYS (Continued)
BIG GUNS Game Adjustment Table (Continued)

Adjustment Item (Player 3)	Descriptive Phrases (Player 1 and 2 Displays)	Factory Setting (Player 4)
42	EX. BALL AUTO AD. [NO AUTO; 1 - 90 % for all Extra Balls]	25 (%)
43	TROLLS/ EX. BALL [0=no Ex. Ball; 1-50 Trolls to light Ex. Ball]	3
44	SPECIAL AUTO AD. [NO AUTO; 1-90 % for all Specials]	5 (%)
45	SPECIAL AT 6X [OFF= no Special; flashing 2X-9X for Special]	4X
46	CONSOL BALL (0 - 99 sec)	45 sec
47	L. KICK MEMORY (YES= lit kickback lamp stored; NO=not stored)	03
48	A. MODE SOUNDS [ALOT; LESS; NONE]	ALOT
49	CUSTOM MESSAGE 4	ON
50	SW. ALARM KNOCKER [yes=knock for inop switch; no=no knock]	NO
51	ENGLISH TEXT	
52	GUARDS/ E. O. G. KICK [5= 1 more kick at E.O.G./L or R 5 Guards; 10= 1 more kick at E.O. G/L & R 10 Guards]	10
53 ⁵	INSTALL GERMAN 1 6	
54 ⁵	INSTALL GERMAN 2 6	
55 ⁵	INSTALL GERMAN 3 6	
56 ⁵	INSTALL GERMAN 4 6	
57 ⁵	INSTALL GERMAN 5 6	
58 ⁵	INSTALL GERMAN 6 6	
59 ⁵	INSTALL ADDABALL	NO
60 ⁵	INSTALL 5-BALL	NO
61 ⁵	INSTALL NOVELTY	NO
62 ⁵	INSTALL EX. EASY	NO
63 ⁵	INSTALL EASY	NO
64 ⁵	INSTALL MEDIUM	NO
65 ⁵	INSTALL HARD	NO
66 ⁵	INSTALL EX. HARD	NO
67	AUTO BURN-IN	NO
68	CLEAR COINS	NO
69	CLEAR AUDITS	NO
70	INSTALL FACTORY	NO

NOTES:

1. Automatic Replay percentage value range is adjustable from 5 to 50%, via the Credit button. Item 02 permits changing the factory setting value for Replay Start Level (valid for next 500 games played). Item 03 permits setting up to four replay levels, with values as detailed in text describing item 03. For Fixed Replay Scores set Auto Replay value to 1 less than 5(%) via the Credit button. Go to items 02, 03, 04, and 05; install their replay level scores. Turn off any replay level by setting 00 as its value.
2. Phrase in parentheses is Factory Setting. Phrase appears in player 3 and 4 displays. Press Credit button to change setting of item 22, or the game pricing of item 24.
3. To change country OR coinage setting, press Credit button to obtain 16 Standard settings, followed by a Custom Setting. The Custom Setting activates items 25 through 30. When a Standard Setting is used, items 25 through 30 are set automatically, and cannot be changed.
4. To install Custom Message, press flipper button for alphabet and special characters. Press Credit button for next message letter or character.
5. Special Preset Adjustment, whose effects are noted in the Game Adjustment text.
6. Refer to Pricing Table and text describing these items.
7. Approximates Ad 64, yet includes all factors listed in Factory Setting column, not just Ad 31 through 47 provided by Ad 64.

GAME ADJUSTMENT PROCEDURE

Adjustment Items 01 through 70

The coin door must be open to access the Game Adjustment/Diagnostic switches. All readings and adjustments require operation of these coin door switches. Some adjustments utilize the Credit button; some also use the flipper button(s). Additional text describing the game adjustment items follows this procedure.

1. Use AUTO-UP and press ADVANCE. The Id 00 display initially appears. Press ADVANCE until the player 3 display indicates **Ad 01**. (The player 1 and 2 score displays indicate AUTO REPLAY.) If the factory setting has not been changed, the player 4 display shows 10%, indicating a 10% replay percentage. (The game program adjusts itself automatically, as discussed in the following text concerning the 'details' about Adjustment Item 01.)
2. To reach a higher item number (in the player 3 display), use AUTO-UP and press ADVANCE. To return to a previous item number, use MANUAL-DOWN and press ADVANCE.
3. With the desired item number (refer to the **BIG GUNS Game Adjustment Table**) showing in the player 3 display, increase the value (or select another option) shown in the player 4 display by using AUTO-UP and pressing the Credit button. Repeat this step for each item, until all changes to the factory settings for Game Adjustments have been made.

(The same procedure can be used for Audit Items. To zero **Au 01 - 04** (concerning the coin chutes and the total coins), the operator can proceed to item 68, Clear Coins, and press the Credit button to obtain the YES option. The operator then presses the ADVANCE button and notes the "COINS CLEARED" display, which verifies that the entry values for items 01 through 04 of the Audit Items are now reset to zero.)

For example, the operator may desire to change the degree of game play difficulty from the Factory Setting (equivalent to the Install Medium [Ad 64] difficulty, along with a number of other automatically installed settings, as shown in the right column of the **Game Adjustment Table**) to another difficulty more suitable for the players at a particular game site. Four other 'automatic' play difficulty settings (Ad 62 - Ad 66) are available, each of which, if selected, installs all the adjustments listed for that item in the following 'details' text.

4. To proceed rapidly through the entire adjustments series, press *and hold* ADVANCE, until **Ad 70** shows in the player 3 display. From item 70, you can: (A) return to the Game-Over Mode; or (B) restore factory settings and zero audit (bookkeeping) totals. Perform either of the following, as desired:
 - A. To reach Game-Over Mode, use AUTO-UP and press ADVANCE once. **BIG GUNS** now goes to the Game-Over Mode.
 - B. To restore factory settings, zero all audit (bookkeeping) totals, *and* return to Game-Over Mode, use AUTO-UP or MANUAL-DOWN to display item 70 in the player 3 display. Press the Credit button to display the YES option in the player 4 display. Using AUTO-UP, press ADVANCE once. **BIG GUNS** now zeroes ALL audit totals and changes ALL game adjustments back to those originally selected as Factory Settings. It then shows the operator a message ("FACTORY SETTING") that this has occurred. (A problem in the Memory Protection circuit or closing the coin door will cause the message "ADJUST FAILURE" to appear.) Press ADVANCE once more to return to the Game-Over Mode.

Details of Adjustment Items 01 through 70

01 Auto Replay (or Fixed Replay)

Of the two options, AUTO REPLAY is the Factory Setting. The percentage of replays automatically awarded has a Factory Setting of 10% (German games have a Factory Setting of 15%).

GAME ADJUSTMENT PROCEDURE (Continued)

01 Auto Replay (or Fixed Replay) (Continued)

The game program aids a game's initial installation by performing a comparison of the value of the Replay Level to the player's score every 50 games for the first 800 games. At each comparison, the program increases (or decreases) the Replay Level by 100,000 to achieve the replay percentage specified either via the factory setting or later operator adjustment. (After the first 800 games, the comparison occurs after every 500 games.) Use the Credit button to change the percentage within the range of 5 to 50 (%), with the value increasing using AUTO-UP (or decreasing using MANUAL-DOWN). The next Credit button change below 5% selects the FIXED REPLAY option.

For AUTO REPLAY, Ad 02 provides the Starting Replay Level (player 1 and 2 displays show REPLAY START). Ad 03 provides the number of replay levels (01, 02, 03, or 04). *BIG GUNS* then proceeds to Ad 06 automatically.

For FIXED REPLAY, Ad 02 is the first replay level (REPLAY LEVEL 1). Ad 03, 04, and 05 are the other replay levels.

02 Starting Replay Level (or Replay Level 1)

For AUTO REPLAY (refer to Ad 01), the Factory Setting is 2,500,000 (German games have a Factory Setting of 2,300,000). The range of settings is 800,000 through 4,000,000 (by increments of 100,000 with AUTO-UP or decrements of 100,000 with MANUAL-DOWN).

For FIXED REPLAY, the operator can enter the value to be used for the first fixed replay score level via the Credit button. The range of settings is: OFF; 100,000 through 9,900,000 (by increments of 100,000 with AUTO-UP, or decrements of 100,000 with MANUAL-DOWN).

03 Replay Levels (or Replay Level 2)

For AUTO REPLAY (refer to Ad 01), the Factory Setting is 01 (one replay level). The option range is one, two, three, or four replay level(s). When the operator chooses two replay levels, *BIG GUNS* automatically adjusts the second replay level to be twice the value selected for Ad 02, the starting replay level. Choosing three or four replay levels automatically adjusts their replay levels to three times or four times the Ad 02 value.

For FIXED REPLAY, the technique of value entry and the range of settings are identical to those of Ad 02.

04 (Replay Level 3)

For AUTO REPLAY, this Adjustment Item is not applicable. *BIG GUNS* automatically bypasses this adjustment.

For FIXED REPLAY, the technique of value entry and the range of settings are identical to those of Ad 02.

05 (Replay Level 4)

For AUTO REPLAY, this Adjustment Item is not applicable. *BIG GUNS* automatically bypasses this adjustment.

For FIXED REPLAY, the technique of value entry and the range of settings are identical to those of Ad 02.

06 Replay Award

For either AUTO REPLAY or FIXED REPLAY (Ad 01), the operator can select the form of the award automatically provided when the player exceeds any Replay Level (Automatic or Fixed). The choices are:

GAME ADJUSTMENT PROCEDURE (Continued)

06 Replay Award (Continued)

- Credit* - Reaching each replay level obtains a credit (free game). This is the Factory Setting.
- Ball* - Reaching each replay level obtains an extra ball.
- Audit* - Reaching each replay level obtains nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards (Au 08, and Au 20 through 23, as applicable).
- Coil* - Reaching each replay level causes the Kicker coil to activate once per free play won (instead of awarding a credit for each level exceeded).

NOTE

A ticket dispenser or token dispenser can be activated by the Kicker coil driver to provide an alternative award for each free play achieved by the player.

07 Special Award

The operator can select the form of the award automatically provided when the player scores a Special. The choices are:

- Credit* - Scoring each Special, when lit, obtains a credit (free game). This is the Factory Setting. A variation to this award occurs, when the setting of Ad 06 is Coil. (This permits a ticket or token dispenser to provide the award, when applicable.)
- Ball* - Scoring each Special, when lit, obtains an extra ball.
- Score* - Scoring each Special, when lit, obtains a score advance of 100,000 points to the player.

08 Match Award

The operator can select (via the Credit button) the desired percentage for the Match action occurring at the completion of each game. The choices are:

- 1%-50%* - 1% is 'hard'; 50% is 'extremely easy'. 10% is the Factory Setting. During Match action, the game selects a random two-digit number at end of game and compares each player's score for an identical two digits in the rightmost two positions. A matching of the two digits results in the award of a credit (or a ticket/token, if a dispenser is attached, and the setting of Ad 06 is Coil).
- Off* - The MATCH display does not operate at completion of the game; no award is given.

09 Balls / Game

The operator can define a "game" by specifying the number of balls to be played. The Factory Setting is 3. The range of settings is 1 through 9.

10 Tilt Warning

The operator can specify the allowable number of total actuations of the plumb bob and playfield tilt mechanisms that can occur before the game is "tilted". The range of this setting is 1 through 5. The Factory Setting is 3.

11 Extra Ball/Ball In Play

The operator can choose (via the Credit button) the number of Extra Balls to be awarded to a player. The range of this setting is:

- 00* - NO extra ball play; displays a message, -NO EX. BALL. A score is awarded in lieu of the Extra Ball.
- 1-9 E. B./Ball* - 1 through 9 Extra Balls per ball (i.e., all balls including Extra Balls) are awarded.
- 1-9 E. B./B.I. P.* - 1 through 9 Extra Balls per Ball In Play (B. I. P.) (i.e., all balls NOT including Extra Balls) are awarded.

GAME ADJUSTMENT PROCEDURE (Continued)

11 Extra Ball/Ball In Play (Continued)

1-9 E. B./Game - 1 through 9 Extra Balls per game.

The Factory Setting is 2 Extra Balls per B. I. P.

12 Maximum Credits

The operator can specify the maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of settings is 5 through 99. The Factory Setting is 10 (Factory Setting for German games is 30). Reaching the specified setting prevents the award of additional credits by game play. Coin purchases do continue to accumulate and are displayed.

NOTE

Whenever the number of credits is less than the specified maximum credits, any credits obtained by coin purchase or game awards (High Score, Match, Replay Levels, etc.) will be accumulated, even though they exceed the maximum value. Thereafter, no additional credits can be accumulated, until the credit total is reduced below the specified maximum setting.

13 Highest Scores

The operator can allow the game to maintain a record of the four highest scores achieved to date. The Factory Setting is On. The optional alternative is Off, which deactivates this adjustment item.

14 Backup High Score 1

The operator can set the Backup High Score value in the player 1 score display, using the Credit button. The Factory Setting is 4,500,000. The game automatically restores the value set, when the operator presses, and holds, the HIGH SCORE RESET switch, or when an automatic High Score Reset event (Ad 22) occurs.

15 Backup High Score 2

This adjustment is similar to Ad 14, except that this applies to the player 2 score display. The adjustment technique is identical to Ad 14. The Factory Setting is 4,000,000. It is also restored as described for Ad 14.

16 Backup High Score 3

This adjustment is similar to Ad 14, except that this applies to the player 3 score display. The adjustment technique is identical to Ad 14. The Factory Setting is 3,500,000. It is also restored as described for Ad 14.

17 Backup High Score 4

This adjustment is similar to Ad 14, except that this applies to the player 4 score display. The adjustment technique is identical to Ad 14. The Factory Setting is 3,000,000. It is also restored as described for Ad 14.

18 Credits for Highest Score 1

The operator can select the number of credits to be awarded, by using the Credit button, whenever a player exceeds the previous Highest Score. The range of this setting is 00 through 10. The Factory Setting is 03. A variation to this award occurs, when the setting of Ad 06 is Coil. (This permits a ticket or token dispenser to provide the award, when applicable.)

19 Credits for Highest Score 2

This adjustment is similar to Ad 18, except that this applies to the player's exceeding the second highest score. The Credit button adjustment technique is the same as for Ad 18. The range of this setting is 00 through 03. The Factory Setting is 01.

GAME ADJUSTMENT PROCEDURE (Continued)

20 Credits for Highest Score 3

This adjustment is similar to Ad 18, except that this applies to the player's exceeding the third highest score. The Credit button adjustment technique is the same as for Ad 18. The range of this setting is 00 through 03. The Factory Setting is 01.

21 Credits for Highest Score 4

This adjustment is similar to Ad 18, except that this applies to the player's exceeding the fourth highest score. The Credit button adjustment technique is the same as for Ad 18. The range of this setting is 00 through 03. The Factory Setting is 01.

22 Automatic High Score Reset

The operator can specify (via Credit button) that the game will provide an automatic reset of the displayed "Highest Scores", and the number of games to be played before the reset occurs. The values provided upon reset are those selected by the operator in Ad 14 through 17, the Backup High Scores. The range of this setting is *Off* (to disable this adjustment), and 250 to 24,750 games (in increments of 250). The Factory Setting is 3,000. (Audit item 39 displays the number of games remaining before the reset.)

23 Free Play

The operator can select (via the Credit button) whether a player can operate the game without a coin (free play) or with a coin. The optional alternatives are *No* (a coin is necessary) or *Yes* (game play is free; no coin is required). The Factory Setting is *No*.

24 Coinage Selections

The operator can specify (via the Credit button) any of the 16 Standard Settings for game pricing, each of which exhibits a message identifying the country and the number of coins required and the number of games that the coin requirement purchases. Choosing a Standard Setting permits the game to omit items Ad 25 through 30, which are adjustments allowing for a special custom coinage setting. The Factory Setting is U.S.A. 1 : 1 COIN 1 PLAY, as shown by the backbox display. (For German games, the Factory Setting is GERMAN2 : 7 PLAY 5 dm.)

Following the last Standard Setting is a Custom Coinage Setting, which allows the operator to utilize Ad 25 through 30 in establishing a special coinage setting. A message, CUSTOM COINAGE, indicates that the operator can enter the appropriate values into the Ad 25 through 30 adjustment items.

The values for Ad 25 through 30 of each Standard Setting, as well as other possible values for the Custom Coinage Setting are shown in the **Pricing Table**.

25 Left Chute Coin Units

The operator can specify (via the Credit button) the number of coin units purchased by a coin passing through the left coin chute.

26 Center Chute Coin Units

The operator can specify (via the Credit button) the number of coin units purchased by a coin passing through the center coin chute.

27 Right Chute Coin Units

The operator can specify (via the Credit button) the number of coin units purchased by a coin passing through the right coin chute.

GAME ADJUSTMENT PROCEDURE (Continued)

28 Units Required for Credit

The operator can define (via the Credit button) the number of coin units required to obtain 1 Credit. A coin unit counter in the game program totals the number of coin units purchased through all coin chutes prior to each game. If the total number of coin units purchased exceeds the 1 Credit factor by a multiple (or more, coin units) of the specified Units per Credit value, the Credits display shows the proper number of Credits. The coin unit counter retains any remaining coin units, until the start of a game; then, the coin unit counter is cleared (its contents are zeroed). The Factory Setting is 01.

29 Units Required for Bonus

The operator can specify (via the Credit button) that 1 additional Credit is to be indicated in the Credits display, when a certain number of coin units are accumulated. The Factory Setting is 00.

30 Minimum Units Required for any Credits Posted

The operator can specify that NO Credits are to be posted (indicated in the Credits display), until the credit units counter reaches a particular value. The Factory Setting is 00.

31 Invincible Timer

The operator can choose (via the Credit button) how long a player can be invincible. This also controls the difficulty level of awarding the Queen's Rescue Bonus. The range of this setting is 05 seconds (Hardest) through 99(Easiest). The Factory Setting is 12 seconds.

32 E. O. G. Kick Award

The operator can choose (via the Credit button) the award given for hitting the flashing lane in the King's Chamber (Backbox) at the End of Game. The choices are *Ball* (giving an Extra Ball) or *Score* (100,000-point award). The Factory Setting is Ball.

33 Guards Score Memory

The operator can choose (via the Credit button) whether the lower Guards (50K through Special) lamps are stored in memory for 'next ball' play. The choices are *No* (Lighted lamps are NOT stored in memory for 'next ball' play and are turned off at the start of each ball) or *Yes* (Lighted lamps are stored and recalled for the player's next ball). The Factory Setting is No.

34 Guards Score Award Advance

The operator can choose (via the Credit button) how many times a player must light all 10 left and right Guards lamps to advance the Guards Score each value from 50K upward through Special. The range of this setting is 00 (progressive advance like setting of 01, but never to Special), 01 (light all 10 Guards lamps to advance to next score) through 99. The Factory Setting is 01.

35 Backbox Kicks Award Advance for Extra Ball

The operator can choose (via the Credit button) how many times a player must light all 5 lanes of the King's Chamber (Backbox playfield) to light the Backbox Extra Ball lamp. The range of this setting is 00 (Extra Ball lamp NEVER lit), 01 (light all 5 lanes once to light Extra Ball W/L lamp) through 99. The Factory Setting is 01.

36 Advance 'X' Auto Adjustment

The operator can select (via the Credit button) the percentage value of the award for the Advance 'X' shot. The range of this adjustment is *Enabled* 1% (hard) - 99% (extremely easy), or *NO AUTO* (adjustment is disabled). *The automatic adjustment occurs after either 50 misses or awards; when the current value is within 2% of the selected setting, NO adjustment occurs.* The Factory Setting is Auto Adj enabled, 40%.

GAME ADJUSTMENT PROCEDURE (Continued)

37 Advance 'X' Timer

The operator can choose (via the Credit button) the difficulty of awarding the Adv. 'X' shot, via a timer setting. The range of this setting is *Timed 1 second* (hard) - *90 seconds* (easy), or *00 (Untimed)* (extremely easy). When Advance 'X' is auto adjusted, the operator's setting is merely the initial starting value; during later setting observance, the current value is displayed. When timed, the automatic adjustment range is from 4 seconds to 40 seconds. The Factory Setting is 15 seconds.

38 Drop Targets Auto Adjustment

The operator can choose (via the Credit button) the percentage value of the award for the left and right Drop Targets. The range of this adjustment is *Enabled 1%* (hard) - *99%* (extremely easy), or *NO AUTO* (adjustment is disabled). *The automatic adjustment occurs after either 50 misses or awards; when the current value is within 2% of the selected setting, NO adjustment occurs.* The Factory Setting is Auto Adj enabled, 25%.

39 Drop Targets Timer

The operator can choose (via the Credit button) the difficulty of awarding the left and right Drop Targets, via a timer setting. The range of this setting is *Timed 1 second* (hard) - *90 seconds* (easy), or *00 (Untimed)* (extremely easy). When the Drop Targets are auto adjusted, the operator's setting is merely the initial starting value; during later setting observance, the current value is displayed. When timed, the automatic adjustment range is from 4 seconds to 40 seconds. The Factory Setting is 7 seconds.

40 Invincibility Auto Adjustment

The operator can choose (via the Credit button) the percentage value of the award for the Queen's Rescue Bonus (Invincibility). The range of this adjustment is *Enabled 1%* (hard) - *99%* (extremely easy), or *Off* (auto adjustment is disabled). *The automatic adjustment occurs after either 50 'Invincibles'; when the current value is within 2% of the selected setting, NO adjustment occurs.* The Factory Setting is OFF (auto adjust is disabled).

41 Invincibility Guards

The operator can choose (via the Credit button) the difficulty of awarding the Queen's Rescue Bonus, by selecting the number of Guard targets to be hit, while Invincible. The range of this setting is *2 Guards* (easy - any target on left and right Guard 3-Banks); *4 Guards* (top and bottom or left and right Guard 3-Banks); *6 Guards* (all targets on left and right Guard 3-Banks); *8 Guards* (all target on left and right Guard 3-Banks, plus any target on left and right 2-Banks); or *10 Guards* (hard - all 10 Guards targets). When Invincibility is auto adjusted, the operator's setting is merely the initial starting value; during later setting observance, the current value is displayed. The automatic adjustment range is from 4 Guards targets to 10 Guards targets. The Factory Setting is 6 Guards.

42 Extra Ball Auto Adjustment

The operator can choose (via the Credit button) the percentage value desired for all Extra Balls. The range of this adjustment is *Enabled 1%* (hard) - *99%* (extremely easy), or *NO AUTO* (adjustment is disabled). *The automatic adjustment occurs at the end of a game after 50 games; when the current value is within 2% of the selected setting, NO adjustment occurs.* The Factory Setting is Auto Adj enabled, 25%.

43 Trolls to obtain Extra Ball

The operator can select (via the Credit button) the number of Trolls to be lighted for the Extra Ball lamp. The range of this setting is *00* (Off - NO Extra Ball lamp lighted); *01 - 50* (the number of Trolls). Note that, if this is auto adjusted, the operator's setting is merely the initial starting value; during later setting observance, the current setting is displayed. When auto adjusted, the range is 2 Trolls to 30 Trolls. The Factory Setting is 03.

GAME ADJUSTMENT PROCEDURE (Continued)

44 Special Auto Adjustment

The operator can choose (via the Credit button) the percentage value desired for all Specials. The range of this adjustment is *Enabled 1% (hard)- 99% (extremely easy)*, or *NO AUTO* (adjustment is disabled). *The automatic adjustment occurs at the end of a game after 50 games; when the current value is within 2% of the selected setting, NO adjustment occurs.* The Factory Setting is Auto Adj enabled, 5%.

45 Special (Selected Bonus Multiplier: i.e., 5X)

The operator can select (via the Credit button) the degree of difficulty for awarding the Special from the flashing Bonus Multiplier. The range of this setting is *00 (Off - NO Special); 2X- 9X (the selected Bonus Multiplier)*. Note that, if this is auto adjusted, the operator's setting is merely the initial starting value; during later setting observance, the current setting is displayed. The auto adjustment range is 5X to 9X. The Factory Setting is 5X.

46 Consolation Ball

The operator can choose (via the Credit button) the desired minimum game time. If, on the last ball, this desired minimum game time has not been achieved, the "Forcefield" Post will raise for the remainder of the selected game time setting. The range of this adjustment is *0 second (conservative)- 99 seconds (extremely liberal)*. The Factory Setting is 45 seconds.

47 Left Kickback Memory

The operator can select (via the Credit button) whether the lit (indicating kickback operational readiness) Left Outlane Kickback Lamp is stored in memory for 'next ball' play. The choices are *No* (Lighted lamp is NOT stored in memory for 'next ball' play and is turned off at the start of each ball) or *Yes* (Lighted lamp is stored and recalled for the player's next ball). The Factory Setting is Yes.

48 Attract Mode Sounds

The operator can select (via the Credit button) the amount of sounds occurring during the Attract Mode. The choices are:

- Alot* - Sounds occur for about 7 minutes during the Attract Mode sequence.
- Less* - Sounds occur for about 2 minutes during the Attract Mode sequence.
- Off* - No sounds occur during the Attract Mode.

The Factory Setting is ALOT.

GAME ADJUSTMENT PROCEDURE (Continued)

49 Custom Message

The operator can choose (via the Credit button) whether to display a message during the Attract Mode. (When display of a message is selected, the operator can either utilize the message provided or change the message.) Three choices are available:

- 1 - Display a message during the Attract Mode. The player 4 display shows this choice as ON. This is the Factory Setting. The 3-line message provided is:
DEFEAT KING ... TYRANT WITH ... BIG GUNS.
- 2 - Do NOT display a message during the Attract Mode. (Player 4 shows OFF.)
- 3 - The player 4 display shows this choice as CHANGE. The operator can enter a special ("custom") message, as follows:
 - A. Press ADVANCE once. The operator can now enter as many as three 14-character lines for display during the Attract Mode.
 - B. Use the flipper button(s) to select each message character (alphabet, numbers, and special symbols are available). In case of error, enter a "back arrow" (just before "space") to correct, followed by correct character. For a period after any letter, use letters with periods (following the special symbols). The entire character set is the following:
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 0 1 2 3 4 5 6 7 8 9 < > ? - / ' '
A . B . C . D . E . F . G . H . I . J . K . L . M . N . O . P . Q . R . S . T . U . V . W . X . Y . Z . _
 - C. Move to the next character via the Credit button. No entirely blank lines will be displayed.

50 SW. ALARM KNOCKER

The operator can choose (via the Credit button) whether the knocker operates, sounding an alarm to signal a switch problem, at the time of game Turn-On and at the beginning of the Test/Diagnostic Procedures. Two choices are available:

- YES - The knocker sounds, signalling a switch problem, at game Turn-On and at the beginning of the Test/Diagnostic Procedures. This is the Factory Setting, and is shown in the player 4 display.
- NO - The knocker does NOT sound. (Player 4 shows NO.)

51 ENGLISH TEXT

The operator can choose to display the message, audit, adjustment, and Test/Diagnostic information in English or German (Deutsch) via the Credit button.

52 Guard Targets for End of Game (E. O. G.) Kick

The operator can choose (via the Credit button) the number of Guard targets that must be hit to obtain an additional 'kick' of the King's Chamber (Backbox) at the End of the Game. Two choices are available:

- 05 - One additional 'kick' for hitting any 5 Guard targets (either left or right).
- 10 - One additional 'kick' for hitting all 10 Guard targets. The Factory Setting is 10.

GAME ADJUSTMENT PROCEDURE (Continued)

SPECIAL PRESET ADJUSTMENTS CAUTION

Adjustments 53 through 66 are Special Preset Adjustments to enable the operator to perform the setting of multiple adjustments at once. They permit the operator to: (1) modify a game for a specific area (special German coinage settings, for example, Ad 53 through 58); (2) change a group of adjustments to conform with laws of certain localities (Ad 59 through 61); and (3) to change the degree of difficulty of game play (Ad 62 through 66). A list of the preceding individual Adjustments affected accompanies each of these Special Preset Adjustments. Whenever the operator chooses to use any Special Preset Adjustment, the operator can later access any or all of the individual Adjustments affected by that Special Adjustment for subsequent changes.

A similar technique can be used in the event of error or uncertainty concerning any Special Preset Adjustment, after the operator selects it: The operator can restore the factory setting of each Adjustment, then select the desired Special Preset Adjustment, and then return to any of the preceding individual adjustments to determine whether use of the Special Adjustment has had the desired effect.

The Backbox displays for each Special Preset Adjustment show whether the operator has selected it, by identifying the Adjustment in the player 1 and 2 displays, and the selection choice of NO, meaning Not Selected (this is the Factory Setting), or YES, meaning Selected, in the player 4 display. Selection occurs via the Credit button to choose YES and then pressing ADVANCE.

NOTE

Games in which the CPU jumper W7 is cut ("German games") automatically have certain Adjustment Items preset:

Ad	Name	New Setting	Ad	Name	New Setting
01	Auto Replay	15 %	18	Hi Scr 1 Credits	03
02	Replay Start	2,300,000	19	Hi Scr 2 Credits	00
03	Replay Levels	3	20	Hi Scr 3 Credits	00
12	Maximum Credits	30	21	Hi Scr 4 Credits	00
14	Backup Hi Scr 1	7,000,000	22	Hi Scr Reset	750
15	Backup Hi Scr 2	6,500,000	24	German 2 Coinage	7Plays/5DM
16	Backup Hi Scr 3	6,000,000	46	Ball Time Auto Adj.	60 sec
17	Backup Hi Scr 4	5,500,000	51	Deutsch Text	Deutsch

53 Install German 1

The operator can modify the game pricing selection of Standard Setting 09 in the **Pricing Table** to permit Credit Award play with 10 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
06	Replay Award	Credit	17	Backup Hi Scr 4	5,500,000
07	Special Award	Credit	18	Hi Scr 1 Credits	03
08	Match Feature	10%	19	Hi Scr 2 Credits	00
14	Backup Hi Scr 1	7,000,000	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	6,500,000	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	6,000,000	24	German 1 Coinage	10 Plays/5DM

54 Install German 2

The operator can modify the game pricing selection of Standard Setting 09 in the **Pricing Table** to permit Ticket/Token operation with 10 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
06	Replay Award	Coil	17	Backup Hi Scr 4	5,500,000
07	Special Award	Ball	18	Hi Scr 1 Credits	03
08	Match Feature	10%	19	Hi Scr 2 Credits	00
14	Backup Hi Scr 1	7,000,000	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	6,500,000	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	6,000,000	24	German 1 Coinage	10 Plays/5DM

GAME ADJUSTMENT PROCEDURE (Continued)

55 Install German 3

The operator can modify the game pricing selection of Standard Setting 09 in the **Pricing Table** to permit Keyset Mode operation with 10 games for 5 DM. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
06	Replay Award	Audit	17	Backup Hi Scr 4	00
07	Special Award	Score	18	Hi Scr 1 Credits	00
08	Match Feature	Off	19	Hi Scr 2 Credits	00
14	Backup Hi Scr 1	00	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	00	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	00	24	German 1 Coinage	10 Plays/5DM

56 Install German 4

The operator can modify the game pricing selection of Standard Setting 09 in the **Pricing Table** to permit Credit Award play with 7 games for 5 DM. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
06	Replay Award	Credit	17	Backup Hi Scr 4	5,500,000
07	Special Award	Credit	18	Hi Scr 1 Credits	03
08	Match Feature	10%	19	Hi Scr 2 Credits	00
14	Backup Hi Scr 1	7,000,000	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	6,500,000	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	6,000,000	24	German 2 Coinage	7 Plays/5DM

57 Install German 5

The operator can modify the game pricing selection of Standard Setting 09 in the **Pricing Table** to permit Ticket/Token operation with 7 games for 5 DM. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
06	Replay Award	Coil	17	Backup Hi Scr 4	5,500,000
07	Special Award	Ball	18	Hi Scr 1 Credits	03
08	Match Feature	10%	19	Hi Scr 2 Credits	00
14	Backup Hi Scr 1	7,000,000	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	6,500,000	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	6,000,000	24	German 2 Coinage	7 Plays/5DM

58 Install German 6

The operator can modify the game pricing selection of Standard Setting 09 in the **Pricing Table** to permit Keyset Mode operation with 7 games for 5 DM. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
06	Replay Award	Audit	17	Backup Hi Scr 4	00
07	Special Award	Score	18	Hi Scr 1 Credits	00
08	Match Feature	Off	19	Hi Scr 2 Credits	00
14	Backup Hi Scr 1	00	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	00	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	00	24	German 2 Coinage	7 Plays/5DM

59 Install Add-A-Ball

The operator can utilize this option to delete all Free Play awards and replace them with Extra Ball awards. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
06	Replay Award	Ball	19	Hi Scr 2 Credits	00
07	Special Award	Ball	20	Hi Scr 3 Credits	00
08	Match Feature	Off	21	Hi Scr 4 Credits	00
18	Hi Scr 1 Credits	00			

GAME ADJUSTMENT PROCEDURE (Continued)

60 Install 5 Ball

The operator can change the game to 5-Ball play, including the changing of certain features to the recommended 5-Ball play difficulty level. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
02	Replay Start	3,000,000
09	Balls / Game	05

61 Install Novelty

The operator can remove all Free Play and Extra Ball awards. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
01	Fixed Replay	Scores	08	Match Feature	Off
02	Replay Level 1	Off	11	No Extra Ball	00
03	Replay Level 2	Off	18	Hi Scr 1 Credits	00
04	Replay Level 3	Off	19	Hi Scr 2 Credits	00
05	Replay Level 4	Off	20	Hi Scr 3 Credits	00
06	Replay Award	Audit	21	Hi Scr 4 Credits	00
07	Special Award	Score			

62 Install Extra Easy

The operator can change the game play difficulty adjustments to a combination that is extremely easy (sometimes called "liberal"). Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
31	Invin. Timer	20 sec	39	Drop T. Timer	12 sec
32	E.O.G. Kick Award	Ball	40	Invin. Auto Adj	Off
33	G. Score Memory	Yes	41	Invin. Guards	04
34	G. Score Awd/Adv	01	42	Ex. Ball Auto Adj	25%
35	B. B. Kick Awd/Ex. B	01	43	Trolls/Ex. Ball	03
36	Adv 'X' Auto Adj	50%	44	Special Auto Adj	5%
37	Adv 'X' Timer	20 sec	45	Special at 4X	4X
38	Drop T. Auto Adj	50%	52	Guards/EOG Kick	5

63 Install Easy

The operator can change the game play difficulty adjustments to a combination that is slightly easier than the Factory Settings. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
31	Invin. Timer	15 sec	39	Drop T. Timer	9 sec
32	E.O.G. Kick Award	Ball	40	Invin. Auto Adj	Off
33	G. Score Memory	Yes	41	Invin. Guards	04
34	G. Score Awd/Adv	01	42	Ex. Ball Auto Adj	25%
35	B. B. Kick Awd/Ex. B	01	43	Trolls/Ex. Ball	03
36	Adv 'X' Auto Adj	45%	44	Special Auto Adj	5%
37	Adv 'X' Timer	15 sec	45	Special at 4X	4X
38	Drop T. Auto Adj	33%	52	Guards/EOG Kick	5

64 Install Medium

The operator can change the game play difficulty adjustments to a combination that matches the Factory Settings. Individual Adjustments are affected, as follows:

GAME ADJUSTMENT PROCEDURE (Continued)

64 Install Medium (Continued)

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
31	Invin. Timer	12 sec	39	Drop T. Timer	7 sec
32	E.O.G. Kick Award	Ball	40	Invin. Auto Adj	Off
33	G. Score Memory	No	41	Invin. Guards	06
34	G. Score Awd/Adv	01	42	Ex. Ball Auto Adj	25%
35	B. B. Kick Awd/Ex. B	01	43	Trolls/Ex. Ball	03
36	Adv 'X' Auto Adj	40%	44	Special Auto Adj	5%
37	Adv 'X' Timer	15 sec	45	Special at 4X	4X
38	Drop T. Auto Adj	25%	52	Guards/EOG Kick	10

65 Install Hard

The operator can change the game play difficulty adjustments to a combination that is more difficult than the Factory Settings. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
31	Invin. Timer	10 sec	39	Drop T. Timer	7 sec
32	E.O.G. Kick Award	Ball	40	Invin. Auto Adj	Off
33	G. Score Memory	No	41	Invin. Guards	08
34	G. Score Awd/Adv	02	42	Ex. Ball Auto Adj	25%
35	B. B. Kick Awd/Ex. B	01	43	Trolls/Ex. Ball	03
36	Adv 'X' Auto Adj	30%	44	Special Auto Adj	4%
37	Adv 'X' Timer	10 sec	45	Special at 6X	6X
38	Drop T. Auto Adj	20%	52	Guards/EOG Kick	10

66 Install Extra Hard

The operator can change the game play difficulty adjustments to a combination that is much more difficult than the Factory Settings. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
31	Invin. Timer	10 sec	39	Drop T. Timer	7 sec
32	E.O.G. Kick Award	Score	40	Invin. Auto Adj	Off
33	G. Score Memory	No	41	Invin. Guards	10
34	G. Score Awd/Adv	03	42	Ex. Ball Auto Adj	20%
35	B. B. Kick Awd/Ex. B	02	43	Trolls/Ex. Ball	04
36	Adv 'X' Auto Adj	30%	44	Special Auto Adj	3%
37	Adv 'X' Timer	10 sec	45	Special at 8X	8X
38	Drop T. Auto Adj	16%	52	Guards/EOG Kick	10

67 Auto Burn-In

The operator can choose the YES option for this Special Preset Adjustment to perform certain automatic testing of the game, as used in the factory. It does not affect the game operation, but merely provides for a cyclic testing of most of the game's mechanisms.

68 Clear Coins

The operator can request the clearing of the coinage audits (Au 01 through 04) by selecting (via the Credit button) the YES option, as shown in the player 4 display. This adjustment zeroes the counters tallying the number of coins through each slot, the Paid Credits counter, and the Credits display.

After the YES option is displayed, the operator must press the ADVANCE button. The game then displays COINS CLEARED.

GAME ADJUSTMENT PROCEDURE (Continued)

69 Clear Audits

The operator can request the clearing of the non-coinage audits (Au 05 through 38) by selecting (via the Credit button) the YES option, as shown in the player 4 display. This Adjustment zeroes the counters tallying the remaining Audit factors. Please note that this does NOT affect the Automatic Replay Percentaging data nor the automatic High Score Reset counter.

After the YES option is displayed, the operator must press the ADVANCE button. The game then displays AUDITS CLEARED.

70 Install Factory

The operator can request the game to provide the normal Factory Settings to restore the game to its 'factory condition'. This Adjustment clears all Audits, resets all Game Adjustments to the respective Factory Settings, and provides a restart of the Auto Replay (Ad 01).

After the YES option is displayed, the operator must press the ADVANCE button. The game then displays FACTORY SETTING.

Closing of the coin door before appearance of the FACTORY SETTING message or a problem in the Memory Protect circuit will cause the game to display ADJUST FAILURE.

A loss of battery power or improper treatment of the Game Adjustments will cause the game to attempt to restore Factory Settings. The game announces the results of this reset process with the appropriate message, FACTORY SETTING or ADJUST FAILURE.

BIG GUNS Game Adjustment Setting Comparison Table

Adj #	Adj Description	Extra Ad Easy 62	Easy Ad 63	Medium Ad (Factory) 64	Hard Ad 65	Extra Ad Hard 66
31	Invin. Timer	20 sec	15 sec	12 sec	10 sec	10 sec
32	E.O.G. Kick Award	Ball	Ball	Ball	Ball	Score
33	G. Score Memory	Yes	Yes	No	No	No
34	G. Score Awd/Adv	01	01	01	02	03
35	B. B. Kick Awd/Ex. B	01	01	01	01	02
36	Adv 'X' Auto Ad	50%	45%	40%	30%	30%
37	Adv 'X' Timer	20 sec	15 sec	15 sec	10 sec	10 sec
38	Drop T. Auto Ad	50%	33%	25%	20%	16%
39	Drop T. Timer	12 sec	9 sec	7 sec	7 sec	7 sec
40	Invin. Auto Ad	Off	Off	Off	Off	Off
41	Invin. Guards	4	4	6	8	10
42	Ex. Ball Auto Ad	25 %	25 %	25 %	25 %	20 %
43	Trolls/Ex. Ball	3	3	3	3	4
44	Special Auto Ad	5 %	5 %	5 %	4 %	3 %
45	Special at ____	5X	5X	5X	6X	8X
52	Guards/E.O.G. Kick	5	5	10	10	10

RESETTING THE HIGH SCORES

The challenge of exceeding the High Score (either the factory setting or a higher score by another player) is the goal of many pinball game players. To keep a pinball game challenging requires a method of resetting the High Score value for those occasions when a skilled player registers a truly excellent score. Other players note this score and may decide not to play simply because their skill is not adequate to exceed an extremely high score.

For *BIG GUNS*, in fact, three methods of resetting the High Score values are available. The simplest method involves allowing Game Adjustment Item Ad 22 to reset the High Score values automatically after the specified number of plays designated by the operator. The second method requires pressing the High Score Reset switch on the inside of the coin door in the Attract Mode. This action simply erases the previous high score values and replaces them with the Backup High Score values. The third method establishes new values replacing the factory setting values or previous operator setting values; it requires performing the following steps:

1. Using AUTO-UP or MANUAL-DOWN, reach item Ad 14 (and items Ad 15, 16, and 17, if desired). The High Score value of the factory setting (or previous operator-adjusted setting) appears in the player 1 display. If this value is satisfactory, go to step 4 below.
2. If you wish to increase the High Score value from that displayed in the player 1 display, use AUTO-UP, and press the Credit button, until the desired value shows in the player 1 display.
3. If you wish to decrease the High Score value, use MANUAL-DOWN, and press the Credit button, until the desired value shows in the player 1 display.
4. Using AUTO-UP, press and hold down ADVANCE, until the Player 3 display shows **Ad 70**. Press ADVANCE once, to return to Game-Over Mode.
5. Press the High Score Reset switch (on coin door), and listen for the sound signifying that the score reset action is complete. Observe player score displays (player 1, player 2, etc.) to verify that the new High Score values are displayed.

GAME PRICING

PRICING MADE EASY. Game Adjustment Item Ad 24 allows the operator an easy method of setting the pricing functions. Pressing the Credit button allows the operator a choice of one of the 16 "Standard" Settings, with associated automatic pricing (Player 1 and 2 displays show the Country identifier; player 3 and 4 displays show the games per coin(s) information for a country having more than one "Standard" Setting). In the *Pricing Table*, each "Standard" Setting is denoted by a 2-digit number (other than 00) in column 24. Automatic Pricing causes each of the other pricing items (columns 25 through 30) to change to the value shown in the table for that selected "Standard" Setting.

CUSTOM PRICING. Adjustment Item 24 must be set to the Custom Coinage Setting (player 1 and 2 displaying CUSTOM COINAGE) to enable the operator to enter desired custom pricing selections for Items 25 through 30, based on the *Pricing Table*. Item 25 is the left coin chute multiplier. Item 26 is the center coin chute multiplier. Item 27 is the right coin chute multiplier. Item 28 is the number of coin units equal to one Credit. (A Credit is usually equal to one game.)

The calculation of the ratio of Games : Price uses the ratio equation of $X : VC$, where:

X = Coin Chute Multiplier (Item 25, 26, or 27 in *Pricing Table*);

V = Value of coin;

C = Coin units equivalent to one Credit (Item 28).

For example, for 25¢ chutes at the factory setting, substituting values in the Games : Price ratio calculation gives $1 : 25 \times 1$, or one game for 25¢.

UNITS REQUIRED FOR BONUS CREDIT. Item 29 is the number of coin units that must pass through the coin chute(s) before an additional Credit (game) is posted (displayed). At the factory setting, the number in this item is 00. (This 00 means that NO bonus credit (free game) is awarded, although purchase of more than one game at a time occurs.)

GAME PRICING (Continued)

MINIMUM COIN UNITS. Item 30 determines the number of coin units that must pass through the coin chute(s) before play may begin. The factory setting for this item is 00. (This 00 means that the Minimum Coin Units feature (Item 30) is disabled, by the factory setting.)

BIG GUNS Pricing Table

Country	Coin Chute			Games/Coin	Pricing Functions						
	Left	Center	Right		24	25	26	27	28	29	30
USA and Canada	25¢	-	25¢	1/25¢, 4/\$1 1,2 1/50¢, 2/75¢, 3/\$1 2 1/50¢, 2/\$1 2 1/25¢, 3/50¢, 6/\$1 1/25¢, 5/\$1	01 01 04 01 01 00 00 02 03 12 03 04 00 00 03 01 04 01 02 00 00 00 01 04 01 01 02 00 00 01 00 01 01 04 00						
West Germany	1 DM	2 DM	5 DM	1/1 DM, 2/2 DM, 7/5 DMark 2,3 1/1 DM, 3/2 DM, 10/5 DM 2 1/1 DM, 3/2 DM, 9/5 DM 1/2x1 DM, 1/2 DM, 3/5 DM 2/1 DM, 5/2 DM, 14/5 DM Ticket/Token Mode 4 Keyset Mode 4	10 06 12 30 05 30 00 09 09 18 45 05 45 00 00 09 18 45 05 00 00 00 03 06 15 05 00 00 00 13 26 65 05 65 00						
France	1 F	5 F	10 F	1/3x1 F, 2/5 F, 5/10 Franc 2	13 02 10 20 05 20 00						
Antilles (Netherlands)	25¢	-	1 G	1/25¢, 4/1 Guilder	00 01 01 04 01 00 00						
Netherlands	25¢ 1 HFI	- 2.5 HFI	1 G 2.5 HFI	1/25¢, 5/1 Guilder 1/1 HFI, 3/2.5 HFI 2	00 01 00 05 01 00 00 11 06 15 15 05 00 00						
Belgium	5 F 5 F 5 F 5 F	- 5 F 20 F 5 F	20 F 20 F 20 F 20 F	1/2x5 F, 2/20 Franc 1/2X5 F, 1/2X5 F, 3/20 F 2 1/2x5 F, 2/20 F, 2/20 F 1/2X5 F, 1/2X5 F, 2/20 F	00 01 01 04 02 00 00 08 03 03 12 04 00 00 00 01 04 04 02 00 00 00 01 01 04 02 00 00						
Spain	25 P	-	100 P	1/25 P, 5/100 Peseta 2	15 01 00 05 01 00 00						
Switzerland	1 F 1 F	2 F -	5 F 2 F	1/1 F, 3/2 F, 7/5 Franc 1/1 F, 3/2 F 2	00 02 06 14 02 00 00 07 03 00 06 02 00 00						
Japan	100 ¥ -	- 100 ¥	100 ¥ -	2/100 Yen 2/100 ¥ 2	00 04 00 04 02 00 00 16 01 04 01 02 00 00						
Italy	500 L	-	500 L	1/500 Lire 2	14 01 04 01 01 00 00						
Australia	20¢	-	\$1	1/2x20 ¢, 3/\$1 2	05 01 00 06 02 00 00						
United Kingdom	10 P 10 P	50 P 50 P	20 P 10 P	1/10 P, 5/50 P, 2/20 Pence 1/10 P, 5/50 P 2	00 01 05 02 01 00 00 06 01 05 01 01 00 00						
Argentina	10¢	10¢	10¢	1/1 Token	00 01 01 01 01 00 00						
Austria	5 Sch 1 Sch 5 Sch	- 5 Sch 10 Sch	10 Sch 10 Sch 10 Sch	2/5 Sch, 5/10 Schilling 2/5x1 Sch, 2/5 Sch, 5/10 Sch 1/2x5 Sch, 3/2x10 Sch 2	00 02 00 05 01 00 00 00 02 10 25 05 00 00 04 03 06 06 04 00 00						
Chile	Token	-	Token	1/1 Token 1,2	01 01 04 01 01 00 00						
Denmark	1 Kr	5 Kr	10 Kr	1/2x1 Kr, 3/5 Kr, 7/10 Krone	00 01 06 14 02 00 00						
Finland	1 Mka	-	1 Mka	1/1 Markka 1,2	01 01 04 01 01 00 00						
New Zealand	20¢	-	20¢	1/2x20¢ 2	03 01 04 01 02 00 00						
Norway	1 Kr	-	1 Kr	1/2x1 Kr, 3/5x1 Krone	00 01 00 01 02 05 00						
Sweden	1 Kr 1 Kr	- 5 Kr	1 Kr 5 Kr	1/2x1 Krona 2 1/3x1 Kr, 2/5 Krona 2	03 01 04 01 02 00 00 12 02 10 10 05 00 00						

Notes: 1. Factory Default. 2. Standard Setting - Change by pressing Credit button. 3. Default with jumper W7 cut/removed. 4. Other functions are also affected; see the explanations for Adjustment Items 53 through 58.

AUST. 60¢/10¢ 02 00 10 05 00 00.
BIG GUNS 25

TEST/DIAGNOSTIC PROCEDURES

WILLIAMS ELECTRONICS GAMES provides a series of diagnostic tests to aid the operator in determining game condition (that is, whether the game's features and highlights are operating satisfactorily). These tests activate virtually all the electronic and electromechanical devices comprising the game, so that the operator can readily locate a malfunctioning device or simply verify that all devices are working properly. In order, these tests deal with the music, the displays, the game sounds, the lamps, the solenoids, and the switches.

In addition to the diagnostic testing, a feature called the Auto Burn-in Mode is available. Activating this mode enables the operator to observe the game while all of the diagnostic tests, *except the switch test*, occur. This can be very helpful in locating 'intermittent' problems.

Activating either the entire test series or one of the individual tests requires use of the Game Adjustment/ Diagnostic switches. Open the coin door for access to these switches. To proceed to the Diagnostic Tests, the operator must simply switch the game On, set the AUTO-UP/MANUAL-DOWN switch to MANUAL-DOWN, and press the ADVANCE button.

CAUTION

BIG GUN's System-11A game program greatly aids the operator and service personnel: When the operator is beginning the Test/Diagnostic Procedures (and also at game Turn-On), the Player 1 display now signals, with a decimal point by the rightmost character, that a switch has *NOT* been actuated during ball play for a lengthy period of time (60 balls, or 20 games). However, for the Switch Problem Reporting activity at the beginning of the Test/ Diagnostic Procedures, the display of problem switches is *not* limited to just three switches; it now includes *ALL* switches exhibiting problems. Refer to the text on Switch Tests for additional information. To proceed with the Test/Diagnostic Procedures, use AUTO-UP, and press ADVANCE.

MUSIC TEST.

1. In the Music Test, observe that the player 1 and 2 displays show the message, MUSIC TEST. Switching to AUTO-UP, observe that the message now reads MUSIC OFF, and that the player 3 score display shows 00 00. Press the Credit button to select the desired music selection: 01 - 'Shooter Theme' through 06 - 'Hi. Score Theme' (the selections repeat). Adjust the volume control for proper sound level for the game location.
2. Use the AUTO-UP position.

DISPLAY TEST.

1. To initiate the Display Test, press ADVANCE. Observe that player 1 and 2 displays briefly show the message, DISPLAY TEST, and that the player 3 score display shows 01 (the Display Test identifier).
2. Use AUTO-UP. Observe that all displays begin a display cycle of all 0s through all 9s, one digit at a time. Verify that the proper comma segments light during display of the odd-numbered digits. Next, a special "all segments" character 'walks' from left to right across each player score display.
3. To halt the display cycle, use MANUAL-DOWN. Then, press ADVANCE to step through the sequential digit display, digit by digit, and the subsequent "all segments" characters display test. Use AUTO-UP to resume cycling, and to proceed to the next test.

SOUND TEST.

1. (From Display Test) To initiate the Sound Test, press ADVANCE. Observe that the player 1 and 2 displays show the message, SOUND TEST, and that the player 3 display shows 02 (the Sound Test identifier). The player 3 display shows a series of test steps from 00 through 07. Verify that a different sound is heard each time the number in the display changes.
2. To repeatedly pulse a single sound, use MANUAL-DOWN. Verify that one particular sound repeats. Press ADVANCE to step to the next sound, which repeats until ADVANCE is pressed again. Use AUTO-UP to resume cycling the sounds, and to proceed to the next test.

TEST/DIAGNOSTIC PROCEDURES

LAMP TESTS.

1. All Lamps.

(From Sound Test) To initiate the first Lamps Test, press ADVANCE. Observe that the player 1 and 2 displays show the message, ALL LAMPS, and that the Player 3 display shows 03 (All LampsTest identifier) and that all feature lamps (playfield and backbox) blink on and off. (Note, however, that the General Illumination lamps remain lighted steadily.) To locate the wiring associated with a particular feature lamp, refer to the **Lamp-Matrix Table**. CPU Board connections at jacks 1J6 (columns) and 1J7 (rows) are also listed in the table.

2. Single Lamps.

From the All Lamps test, using AUTO-UP, press ADVANCE to initiate the Single Lamps Test. The player 1 and 2 displays initially show the message, SINGLE LAMPS, and the Player 3 display shows 04. Then, the Player 3 display shows 03 01, and the player 1 and 2 displays change to show B'BOX PF LEFT 1, the name of the lamp currently blinking. Press the Credit button to proceed through an ascending series of designator numbers (01 through 64), with the player 1 and 2 displays showing the individual lamp's name. Press and hold the Credit button to proceed rapidly to the desired lamp.

2 Two Lamps

BIG GUNS Lamp-Matrix Table

Lamps = #44 Bulb, p/n 24-6549
555 Bulb, p/n 24-8768

COLUMN ROW	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
Q80 RED- 1 BRN 1J6-1	Backbox Playfield Left 1 1	Backbox Ex. Ball 9	Left Drop Target Top 17	Left Guard Bottom 1 25	Right Guard Bottom 2 33	Bonus Mult. 2X 41	Left Backbox Seq. 1 (bottom) 49	Right Backbox Seq. 1 (bottom) 57
Q81 RED- 2 BLK 1J6-2	Backbox Playfield Left 2 2	Center Guards 50K 10	Left Drop Target Middle 18	Left Guard Bottom 2 26	Right Guard Bottom 1 34	Bonus Mult. 3X 42	2 50	2 58
Q82 RED- 3 ORN 1J6-3	Backbox Playfield Center 3	Center Guards 100K 11	Left Drop Target Bottom 19	Left Guard Middle 27	Left Top Lock 35	Bonus Mult. 4X 43	3 51	3 59
Q83 RED- 4 YEL 1J6-5	Backbox Playfield Right 2 4	Center Guards 150K 12	Right Drop Target Top 20	Left Guard Top 2 28	Right Top Lock 36	Bonus Mult. 5X 44	4 52	4 60
Q84 RED- 5 GRN 1J6-6	Backbox Playfield Right 1 5	Center Guards 200K 13	Right Drop Target Middle 21	Left Guard Top 1 29	Left Bottom Lock 37	Bonus Mult. 6X 45	5 (top) 53	5 (top) 61
Q85 RED- 6 BLU 1J6-7	Flipper Post 2 6	Center Guards Special 14	Right Drop Target Bottom 22	Right Guard Top 1 30	Right Bottom Lock 38	Bonus Mult. 7X 46	Playfield Double Score 54	Force Field W/L 62
Q86 RED- 7 VIO 1J6-8	Shoot Again 7	Left Outlane Kicker 15	Left Return (Ex. Ball) 23	Right Guard Top 2 31	Left Outlane Special 39	Bonus Mult. 8X 47	Left Advance 'X' 55	Left Troll 2 63
Q87 RED- 8 GRY 1J6-9	Ball Popper Lock 8	Right Outlane Gate 16	Right Return (Ex. Ball) 24	Right Guard Middle 32	Right Outlane Special 40	Bonus Mult. 9X 48	Right Advance 'X' 56	Right Troll 2 64

TEST/DIAGNOSTIC PROCEDURES (Continued)

SOLENOID TEST.

- (From Lamp Test) Using AUTO-UP, press ADVANCE. Observe that the player 1 and 2 displays show the message, COIL TEST, the Player 3 display shows 05 (Solenoid Test identifier). Next, the Player 3 display shows a series of test steps from 01 through 22, while the player 1 and 2 displays show the solenoid/circuit name. During each of these steps, pulsing of the respective solenoid/circuit occurs. The test cycles repeatedly, unless halted via the MANUAL-DOWN switch. Refer to the **Solenoid Table** for solenoid numbers and wiring information. CPU Board connections at 1P11, 1P12, and 1P19 are also listed in the table.

To continuously pulse a single solenoid/circuit, use MANUAL-DOWN. Press ADVANCE to sequence through the switched, controlled, and special solenoids. Use AUTO-UP to resume test cycling, and to proceed to the next test.

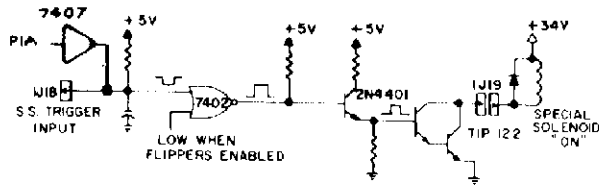
BIG GUNS Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trans.	Solenoid Part Number	
				CPU Bd.	Playfield/Cabinet		Flashlamp Type	
01A ³	Outhole Kicker	Switched	{Vio-Brn}	1P11-1	8P3-1 (to J1-9 on	Q33	AE-23-800	
01C ³	Ball Popper Flasher	Switched	{Blk-Brn}	(Gry-Brn)	Aux Pwr Dvr Bd.)	Q33	#89 flashlamps	2p
02A ³	Ball Shooter Lane Feeder	Switched	{Vio-Red}	1P11-3	8P3-2 (to J1-7 on	Q25	AE-23-800	
02C ³	Lwr L (pf) & Queen (bb) Flashers	Switched	{Blk-Red}	(Gry-Red)	Aux Pwr Dvr Bd.)	Q25	#89 flashlamps	2p
03A ³	Ball Popper	Switched	{Vio-Orn}	1P11-4	8P3-3 (to J1-6 on	Q32	AE-24-900	
03C ³	Lwr R (pf) & Man (bb) Flashers	Switched	{Blk-Orn}	(Gry-Orn)	Aux Pwr Dvr Bd.)	Q32	#89 flashlamps	2p
04A ³	Left Eject	Switched	{Vio-Yel}	1P11-5	8P3-4 (to J1-5 on	Q24	AE-26-1500	
04C ³	Center B'box Flashers	Switched	{Blk-Yel}	(Gry-Yel)	Aux Pwr Dvr Bd.)	Q24	#89 flashlamps	2p
05A ³	Right Eject	Switched	{Vio-Grn}	1P11-6	8P3-5 (to J1-4 on	Q31	AE-23-800	
05C ³	L Cannon (pf) & L (bb) Flashers	Switched	{Blk-Grn}	(Gry-Grn)	Aux Pwr Dvr Bd.)	Q31	#89 flashlamps	2p
06A ³	Left Cannon	Switched	{Vio-Blu}	1P11-7	8P3-6 (to J1-3 on	Q23	AL-23-800	
06C ³	R Cannon (pf) & R (bb) Flashers	Switched	{Blk-Blu}	(Gry-Blu)	Aux Pwr Dvr Bd.)	Q23	#89 flashlamps	2p
07A ³	Right Cannon	Switched	{Vio-Blk}	1P11-8	8P3-7 (to J1-2 on	Q30	AL-23-800	
07C ³	L Troll (pf) & BIG (bb) Flashers	Switched	{Blk-Vio}	(Gry-Vio)	Aux Pwr Dvr Bd.)	Q30	#89 flashlamps	2p
08A ³	Knocker (Ticket Dispenser)	Switched	{Vio-Gry}	1P11-9	8P3-8 (to J1-1 on	Q22	AE-23-800	
08C ³	R Troll (pf) & GUNS (bb) Flashers	Switched	{Blk-Gry}	(Gry-Blk)	Aux Pwr Dvr Bd.)	Q22	#89 flashlamps	2p
09	L Gen Illum (pf) Relay	Contrld	Brn-Blk	1P12-1	8P3-9	Q17	5580-12145-01 ⁴	
10	R Gen Illum (pf) Relay	Contrld	Brn-Red	1P12-2	8P3-10	Q9	5580-12145-01 ⁴	
11	B'box Gen Illum Relay	Contrld	Brn-Orn	1P12-4	8P7-1	Q16	5580-12145-01 ⁴	
12	Solenoid A/C Select Relay	Contrld	Brn-Yel	1P12-5	8P3-12	Q8	5580-09555-01 ⁵	
13	Right Drop Target	Contrld	Brn-Grn	1P12-6	8P3-13	Q15	AE-26-1000	
14	"Forcefield" Flipper Post	Contrld	Brn-Blu	1P12-7	8P3-14	Q7	AE-26-1200	
15	Invincible	Contrld	Brn-Vio	1P12-8	8P3-15	Q14	#1251 lamp	1b
16	B'box Top Cntr Flashers	Contrld	Brn-Gry	1P12-9	8P3-16	Q6	#89 flashlamps	2b
17	King's Chamber Kicker (B'box	Spec# 1	Blu-Brn	1P19-7	8P3-17	Q75	AE-24-900	
18	Left Outlane Kickback (P'field)	Spec# 2	Blu-Red	1P19-4	8P3-18	Q71	AE-23-800	
19	Right Gate	Spec# 3	Blu-Orn	1P19-3	8P3-19	Q73	SZ-35-4000-DC	
20	Left Drop Target	Spec# 4	Blu-Yel	1P19-6	8P3-20	Q69	AE-25-1000	
21	Left Kicker	Spec# 5	Blu-Grn	1P19-8	8P3-21	Q77	AE-23-800	
22	Right Kicker	Spec# 6	Blu-Blk	1P19-9	8P3-22	Q79	AE-23-800	
-	Right Flipper	-	Orn-Vio	1P19-1	7P1-15	-	FL11630-50VDC	
-	Upper R Flipper	-	[Blu-Vio]		[7P1-16,8P3-34] ²			
-	Upper L Flipper	-	[Blk-Yel]		[7P1-14,8P3-33]		FL11753-50VDC	
-	Left Flipper	-	[Blk-Blu]		[7P1-17,8P3-31]		FL11753-50VDC	
-		-	Orn-Gry	1P19-2	7P1-18	-	FL11630-50VDC	
-		-	[Blu-Gry]		[7P1-19,8P3-32] ²			

Notes: 1. Wire colors, except flipper Orn-Vio and Orn-Gry, are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. 2. Flipper connections shown in braces are from flipper switch to flipper coil. 3. "A" coils are pulsed, when Sol. 12 is de-energized; "B" coils are pulsed, with Sol. 12 energized. Wire colors in brackets are those from respective A and B terminals corresponding to the J1- terminal connection listed for the Aux Power Driver Bd., which controls the device pulsing by Sol. 12. 4. Relay (p/n 5580-12145-01) is mounted on Relay Bd. p/n C-11677-3. 5. Relay is mounted on Aux Pwr Driver Bd. D-11813 in the backbox.

TEST/DIAGNOSTIC PROCEDURES (Continued)

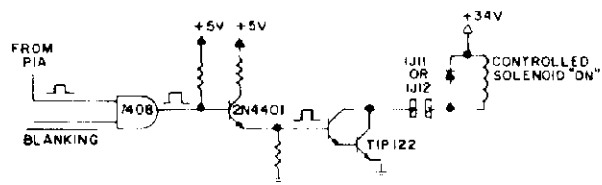
"On" State Logic - Special Solenoid



"Off" State - Special Solenoid:

The Special Switch Trigger Input goes low. Meanwhile, the PIA line remains high. The remaining signals reverse their states.

"On" State Logic - Controlled Solenoid



"Off" State - Controlled Solenoid:

The Enable Input (from the PIA) goes low. Meanwhile, the BLANKING signal remains high. The rest of the signals reverse their states.

NOTE

As directed by the game program, the Solenoid A/C Select Relay (solenoid 12) switches the solenoid B+ power between two power busses to permit actuating two groups of solenoids at the proper times. In its de-energized state, the Relay connects the 'circuit A power' to 16 "controlled" and "switched" solenoids (identified in the table with no suffix letter or the letter A, after the solenoid number). Individual solenoid operation then depends on the game program enabling the ground path for solenoid actuation via the driver transistor associated with each solenoid circuit. For example, the game program can actuate the Outhole Kicker solenoid (sol. 01A), via the driver transistor Q33.

When the game program determines that the Solenoid A/C Select Relay (sol. 12) must be energized, the relay connects 'circuit C power' to eight group C solenoids (01C through 08C). Now, driver transistor Q33 can actuate the Ball Popper Flasher circuit (sol. 01C). Using this "multiplexing" technique, the same driver transistor can control actuation of two separate solenoid circuits.

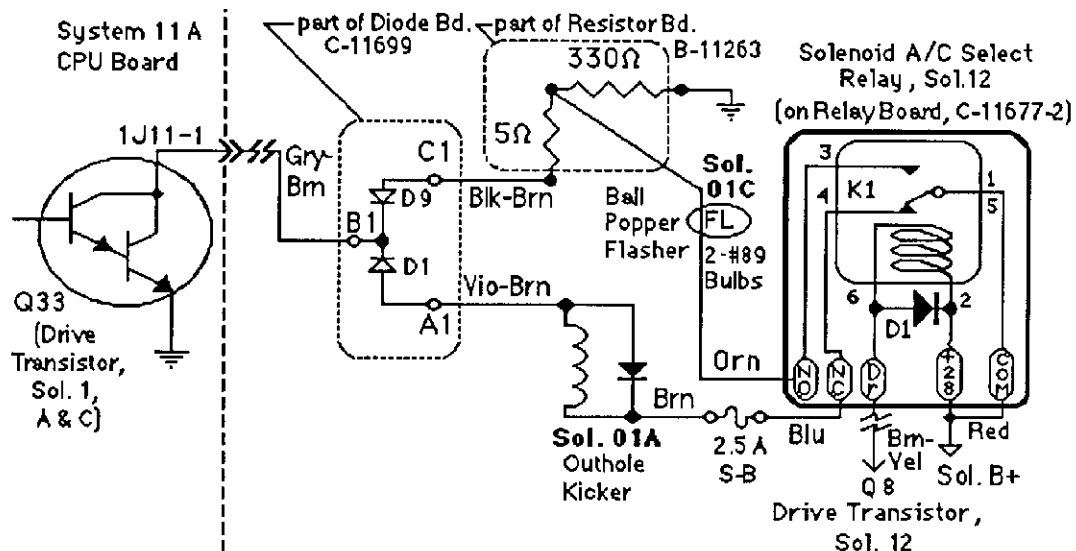


Figure 2. Typical Solenoid A/C Select Relay Circuit

TEST/DIAGNOSTIC PROCEDURES (Continued)

SWITCH TESTS.

1. Switch Levels.

(From Solenoid Test) To initiate the Switch Levels Test, press ADVANCE. Observe that the player 1 and 2 displays show the message, SWITCH LEVELS, and the Player 3 display shows 06 (Switch Levels Test identifier). Normally, the right portion of the Player 3 display remains blank, indicating that no switch is actuated.

If, however, a switch is actuated (possibly stuck closed), the Player 3 display shows that switch's number, while the player 1 and 2 displays indicate the switch's name. A sound also accompanies the displays. (This is another facet of the *BIG GUNS* System-11A's switch testing capability.) If more than one switch is closed, a series of displays show each actuated switch's name and number.

(In addition, either of these problems could result in the reporting of a switch problem (or problems) at game Turn-On or at the beginning of Diagnostic Tests.)

As soon as the operator opens a closed switch, its name and number are eliminated from the Switch Levels display series. For *BIG GUNS*, switch numbers can range from 01 through 63. Refer to the **Switch-Matrix Table** for switch numbers and wiring information. CPU Board connections at jacks 1J8 (columns) and 1J10 (rows) are also listed in the table.

BIG GUNS Switch-Matrix Table

COLUMN ROW	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Bob Tilt 1	Playfield Tilt 9	Left Drop Target Top 17	Left Guard Bottom 1 25	Right Guard Bottom 2 33	Backbox Playfield Left 1 41	Not Used 49	Ball Popper 57
2 WHT-RED 1J10-8	Not Used 2	Outhole 10	Left Drop Target Middle 18	Left Guard Bottom 2 26	Right Guard Bottom 1 34	Backbox Playfield Left 2 42	Not Used 50	Force Field 58
3 WHT-ORN 1J10-7	Credit Button 3	Right Ball Trough (1st ball) 11	Left Drop Target Bottom 19	Left Guard Middle 27	Left Eject 35	Backbox Playfield Center 43	Not Used 51	Tower 59
4 WHT-YEL 1J10-6	Right Coin Chute 4	Center Ball Trough (2nd ball) 12	Right Drop Target Top 20	Left Guard Top 2 28	Right Eject 36	Backbox Playfield Right 2 44	Left Flipper Lane Change 52	Left Outlane 60
5 WHT-GRN 1J10-5	Center Coin Chute 5	Left Ball Trough (3rd ball) 13	Right Drop Target Middle 21	Left Guard Top 1 29	Left Cannon 37	Backbox Playfield Right 1 45	Right Flipper Lane Change 53	Right Outlane 61
6 WHT-BLU 1J10-3	Left Coin Chute 6	Not Used 14	Right Drop Target Bottom 22	Right Guard Top 1 30	Right Cannon 38	Not Used 46	Ball Shooter Lane 54	Not Used (German Score Board) 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Flipper Post Down 15	Left Return 23	Right Guard Top 2 31	Left Troll 39	Not Used 47	Left Advance 'X' 55	Left Kicker 63
8 WHT-GRY 1J10-1	High-Score Reset 8	Not Used 16	Right Return 24	Right Guard Middle 32	Right Troll 40	Not Used 48	Right Advance 'X' 56	Right Kicker 64

Row Problems. If a display of two (or more) switch numbers of a row occurs, although only one switch is closed, check for a short circuit between the column wires.

Multiple Switch Number Indications. Check the associated column wire for a short circuit to ground.

Column Problems. If display of two (or more) switch numbers in a column occurs (while only one switch is actuated), check for a short circuit between the row wires.

Use AUTO-UP to proceed to the next test.

TEST/DIAGNOSTIC PROCEDURES (Continued)

SWITCH TESTS (Continued).

2. Switch Edges.

From the Switch Levels Test, press ADVANCE. Observe that the player 1 and 2 displays show the message, SWITCH EDGES; the Player 3 display shows 06 (Switch Edges Test identifier). The right portion of the Player 3 display is blank, indicating that no switch is actuated.

This test permits the operator to test whether actuating a switch provides the proper signal to the System-11A switch testing program. When actuating a switch, the operator should see the switch's name and number (in the player 1, 2, and 3 displays, respectively). If no indication appears at the time the switch is actuated, the operator then knows that there is a malfunction associated with that switch.

Using this technique, the operator can test each switch appearing in the *BIG GUNS* switch problem reporting displays (either at game Turn-On or at the beginning of the Diagnostic Tests) to determine whether the switch can be actuated. If the switch's name and number are displayed while the operator checks its operation, the operator then knows that the reported problem with that switch is NOT currently caused by a switch malfunction. The operator can then seek other causes for the reported problem, being almost certain now that the switch did not fail. *This test is also useful when the operator is adjusting the sensitivity of a particular switch's actuation mechanism.*

Among the possibilities is the fact that the players have not actuated that switch because of some other problem; the operator should try to analyze what could cause the switch to be missed, and remedy that problem cause. With these new tests, switch problems are, therefore, more easily isolated.

3. *Playfield or CPU Board?* To determine whether a switch problem is in the playfield or the CPU Board, remove connectors 1P8 and 1P10 from the CPU Board. Begin the Switch Test. Use a jumper wire to simulate switch actuation. For example, placing a jumper between 1J10-9 and 1J8-2 should (based on the **Switch-Matrix Table**) should produce an indication of switch 09 being actuated.

ENDING THE DIAGNOSTIC TESTS.

To end the Diagnostic Tests, reach the Switch Edges Test (06 in the Player 3 display), use AUTO-UP and press ADVANCE. The backbox displays should show the *BIG GUNS* game's Identification Information. Use MANUAL-DOWN, and press ADVANCE to reach Adjustment Item 70 (INSTALL FACTORY). Use AUTO-UP and press ADVANCE to obtain the Attract Mode.

AUTO BURN-IN MODE.

The Auto Burn-in Mode permits the operator to check intermittent (or nonrecurring) problems associated with most portions of the game's circuitry. Repeatedly cycling through a group of tests can sometimes bring a problem, which occurs only randomly or occasionally, to exhibit itself more frequently, thereby aiding in the isolation of the problem. To activate the Auto Burn-in Mode:

1. While in the Game Adjustments, reach Ad 67 and change the Factory Setting of NO to YES, via the Credit button. Set the AUTO-UP/MANUAL-DOWN switch to AUTO-UP.
2. Press ADVANCE to start the Auto Burn-in Mode. This mode repeatedly sequences through the Music Test, the Display Test, the Sound Test, the All Lamps portion of the Lamp Test, and the Solenoid Test.
3. To halt the Auto Burn-in Mode, switch the game Off and then On. *BIG GUNS* now starts in the Attract Mode. (If a switch problem is now reported by the displays, perform the Switch Tests again to determine the nature of the problem; then, perform necessary repairs.)

TEST/DIAGNOSTIC PROCEDURES (Continued)

SYSTEM-11A MEMORY CHIP TEST.

A new feature is now included in the Memory Chip Test for System 11A. During power-up, the CPU performs a self-testing routine. When all tests are satisfactory, the game proceeds to the **Attract Mode**, allowing players to use the game. Whenever a portion of the testing does not produce satisfactory results, the game displays a message, before proceeding to the next portion of the testing. ONLY after all tests are satisfactory does the game allow play.

In addition to the displayed message, when a test fails, the lower LED mounted on the CPU Board can be observed to determine the probable cause of the problem. The LED blinks, or flashes, a certain number of times to identify the probable cause, as described in the **CPU LED Indicator Codes Table**. The operator can also start the self-testing routine by pressing the CPU Diagnostic Switch (SW 2) on the edge of the CPU Board.

CPU LED Indicator Codes Table

Diagnostic LED		
Blinks/ Flashes	Display Message	Explanation
1	U25 RAM FAILURE	U25 RAM could not be used properly (NO other tests are performed; the game is locked here, until the game is turned off).
2	MEM. PROT. FAILURE	This message means that (A) the Coin Door may be shut; (B) the Memory Protect Switch may be stuck in the ON position; (C) the memory protect logic is protecting the memory; or (D) a U25 RAM failure is occurring. (See Note 1)
3	U51 PIA FAILURE	U51 has a malfunction. (See Note 2)
4	U38 PIA FAILURE	U38 has a malfunction. (See Note 2)
5	U41 PIA FAILURE	U41 has a malfunction. (See Note 2)
6	U42 PIA FAILURE	U42 has a malfunction. (See Note 2)
7	U54 PIA FAILURE	U54 has a malfunction. (See Note 2)
8	U10 PIA FAILURE	U10 has a malfunction. (See Note 2)
9	IRQ FAILURE	IRQ has a malfunction. It may be missing or too fast or too slow.
10	U27 ROM FAILURE	U27's internal checksums do not match. It may be a ROM failure, or its associated connections and connecting devices are causing it to appear to have a problem. (The following U26 test is skipped.)
11	U26 ROM FAILURE	U26's internal checksums do not match.
Notes: 1. This test assumes that the Coin Door is OPEN; it is initiated ONLY by pressing the CPU Diagnostic Switch (SW2). 2. Alternatively, its associated connections or connecting devices are causing the IC to appear to have problems.		

SYSTEM-11A SOUND CIRCUITRY TESTS.

Tests of the System-11A Sound circuitry, including the Audio Board are possible, only after successful completion of the System-11A Memory Chip Test.

- Sound/Speech Board Test.** A brief check of the Audio Board (D-11581) circuitry occurs at game Turn-on; the game reports the test results by brief sounds, as follows: No sound = Sound/ Speech Board is not operating, or a failure is affecting the sound circuitry (broken cable; dead amplifier; etc.); 1 sound = system OK; 2 sounds = RAM problem; 3 sounds = U4 problem; 4 sounds = U19 problem.
- General System-11A Sound Test.** Press the Sound Diagnostic Switch (SW 1) on left edge of the CPU Board. Listen for the two test sounds, showing that both the CVSD (Continuously Variable Slope Delta) Modulator, which provides the voices for *BIG GUNS*, and the DAC (Digital-to-Analog Converter) sound circuits are functioning properly.

TEST/DIAGNOSTIC PROCEDURES (Continued)

SYSTEM-11A SOUND CIRCUITRY TESTS (Continued)

If no sound is heard, refer to the text entitled "NO SOUND ...". If one "ring" is heard, this indicates a malfunction of the U23 RAM Chip. If either two or four "rings" is heard, this indicates a problem associated with the U21 ROM Chip. If either three or five "rings" is heard, this indicates a problem with the U22 ROM Chip.

NO SOUND DURING THIS TEST (but sound can be heard during the Diagnostic Tests).

Check the sound-select inputs (pins 2 through 9 of U9) to see if they pulse during Sound Test 01. Also, check the -12 V supply voltage on the CPU Board. If this voltage is low (or AC ripple seems too high), perform the following checks:

1. The gray and gray-green transformer secondary wires for 19.4 VAC.
2. The CPU Board filter capacitor C26 for -12 VDC.
3. The filter capacitor C26 for excessive AC ripple (over 0.75VAC).

If the previous checks did not isolate the problem, turn the Volume Control for maximum output. Momentarily touch a powered-up AC soldering pencil on the center tap of the Volume Control.

CAUTION

DO NOT use a soldering iron over 40 watts. Note also that cordless soldering irons will NOT work for this test.

Hearing a low hum indicates that the power amplifier (U1, TDA2002), the Volume Control, and the speaker are operating satisfactorily, as is the sound circuit cabling. Not hearing a hum requires repeating the test with the Volume Control turned part way down, to determine whether the Volume Control is faulty. Also, check the cable connectors for proper mating, and that no broken wires affect this circuit.

FUSE LISTING.

The following fuses are used:

Part Number	Description	Circuit/Location
5730-09252-00	Fuse, 8A Slow-Blow (S-B), 125v	Input Power ("high voltage") Line/Cabinet Box*
5731-09651-00	Fuse, 5A S-B, 250v	Gen. Illumination/Upper Rt Backbox fuseholder (4)
5730-09071-00	Fuse, 8A S-B, 32v	+18 VDC Lamp Ckt/ Lwr Rt Backbox fuseholder (1)
5730-12203-00	Fuse, 1/10A S-B, 250v	+ & - 100V Display Pwr/Upr Cntr B'box fuseholder (2)
5731-08665-00	Fuse, 2A S-B, 250v	F1 - F6; D-11813 Aux Pwr Driver Board
5731-06314-00	Fuse, 4A S-B, 250v	F7, F8; D-11813 Aux Pwr Driver Board
5731-08761-00	Fuse, 1/4A S-B, 250v	F1, D-8345-557 Power Supply
5731-09432-00	Fuse, 7A S-B, 250v	F5, F6; D-8345-557 Power Supply

* One 4A S-B, 250v fuse (5731-06314-00) is provided for an overseas (220v) game installation.

MAINTENANCE INFORMATION

Figure 3 shows the two main lubrication points of the Ball Shooter Lane Feeder (also the Right Eject Hole device, which utilizes the same mechanism). The shaded arrows show the directions in which the Ball Shooter Lane Feeder and other parts of its related assemblies can be adjusted for proper operation.

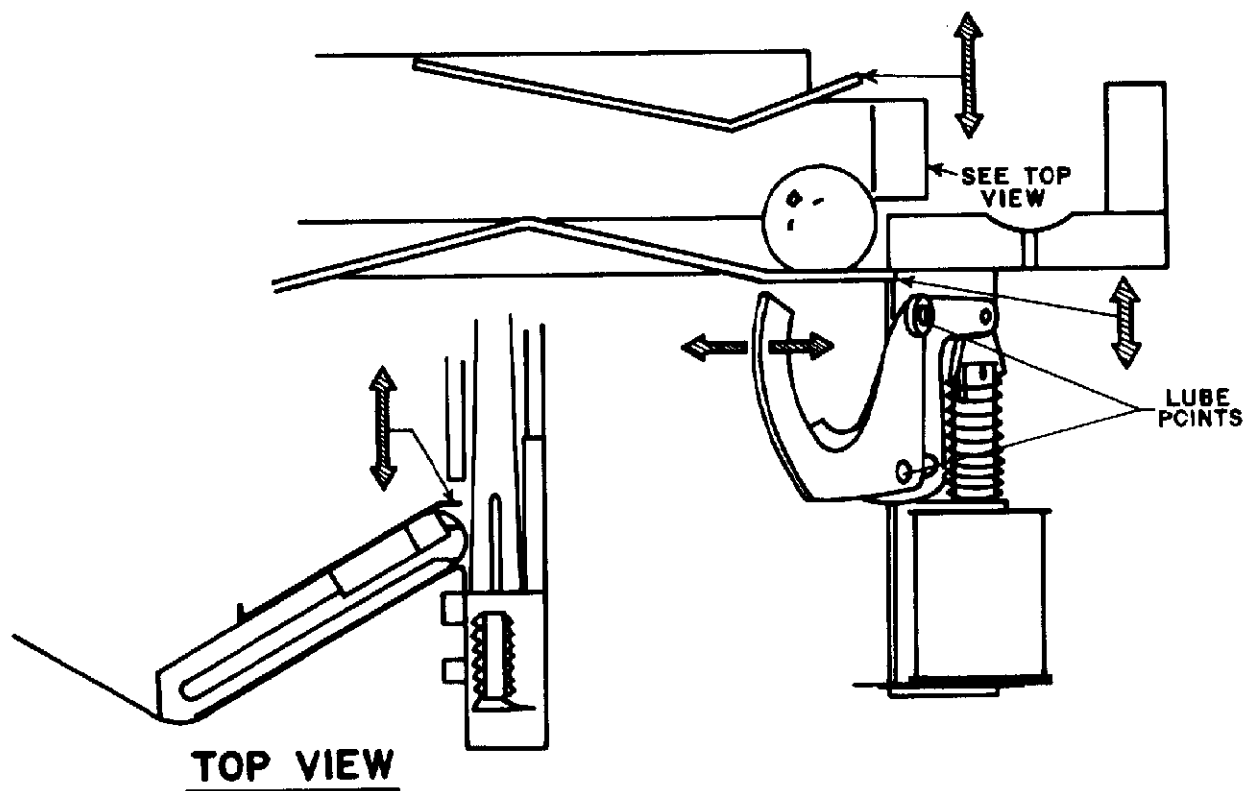


Figure 3. Adjustments and Lubrication Points, Ball Shooter Lane Feeder.

Lubrication to ensure proper operation also applies to other devices on *FIRE!*, such as the shaft of the Fireplug, and the axle portions of the Left and Right Ramp Lifters. Regular maintenance is essential to a game's continuing contribution to the operator's earnings.

Solder Warning

WARNING

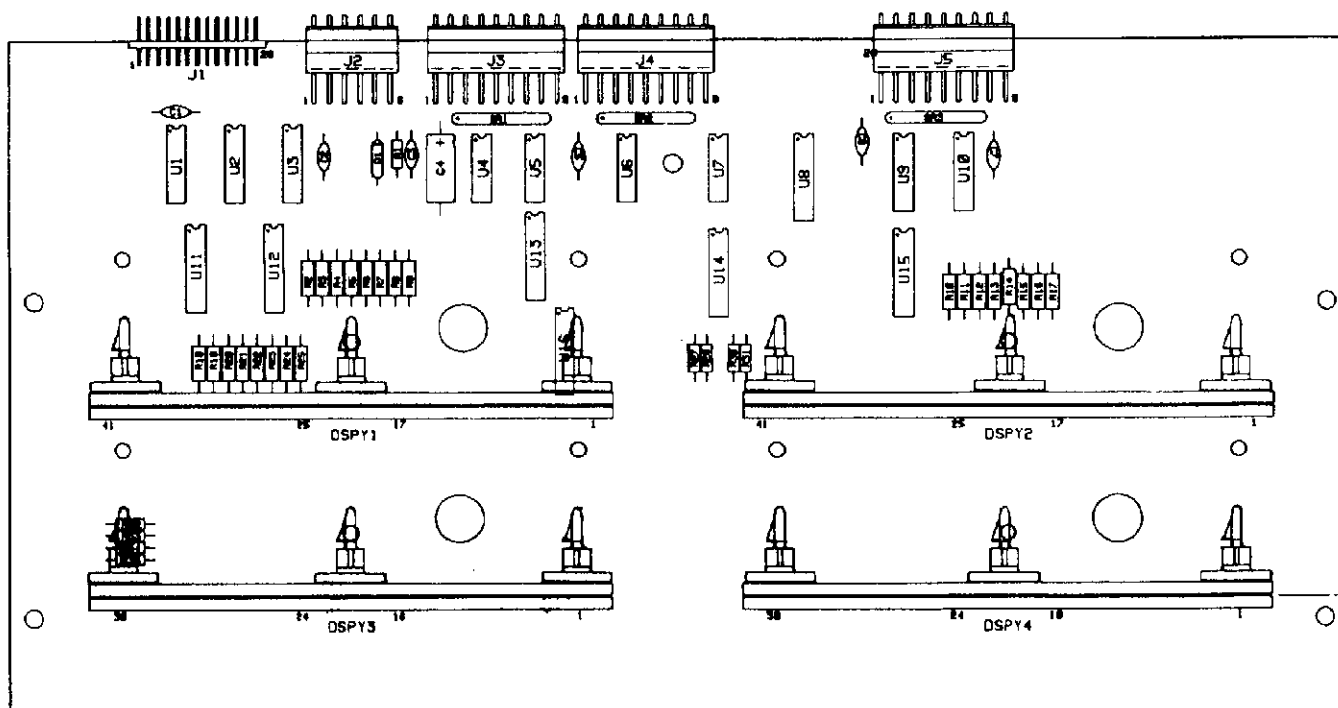
Use ONLY Rosin-core solder to repair electrical/electronic problems. Other types of solder can damage or destroy electronic parts, especially Printed Circuit Board wiring and switch contacts.

Section 2

Game Parts Information

- **Parts Lists and Diagrams:**

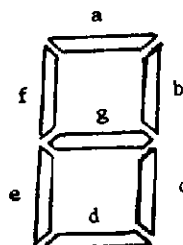
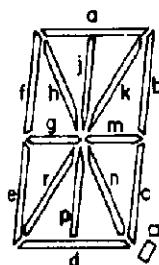
Alphanumeric Display Unit Parts
Power Supply Board (D-8345-557)
CPU Board (D-11392-557)
Audio Board (D-11581-557)
Aux Power Driver Board
Relay & Lamp PCBs Parts
King's Chamber Parts
Backbox Parts
Flipper Assemblies
Ball Shooter Lane Feeder
Right & Left Eject Holes
"Forcefield" Post Assembly
Ball Trough Switches
3-Bank Drop Target Assembly
Standup Targets
Left Outlane Kicker
Kicker Arm Assembly
Ball Popper & Switch Assembly
Cannon Assembly
Miscellaneous BIG GUNS Parts
Switches
Lamps
Solenoids/Flashers & Rubber Parts
Playfield Parts



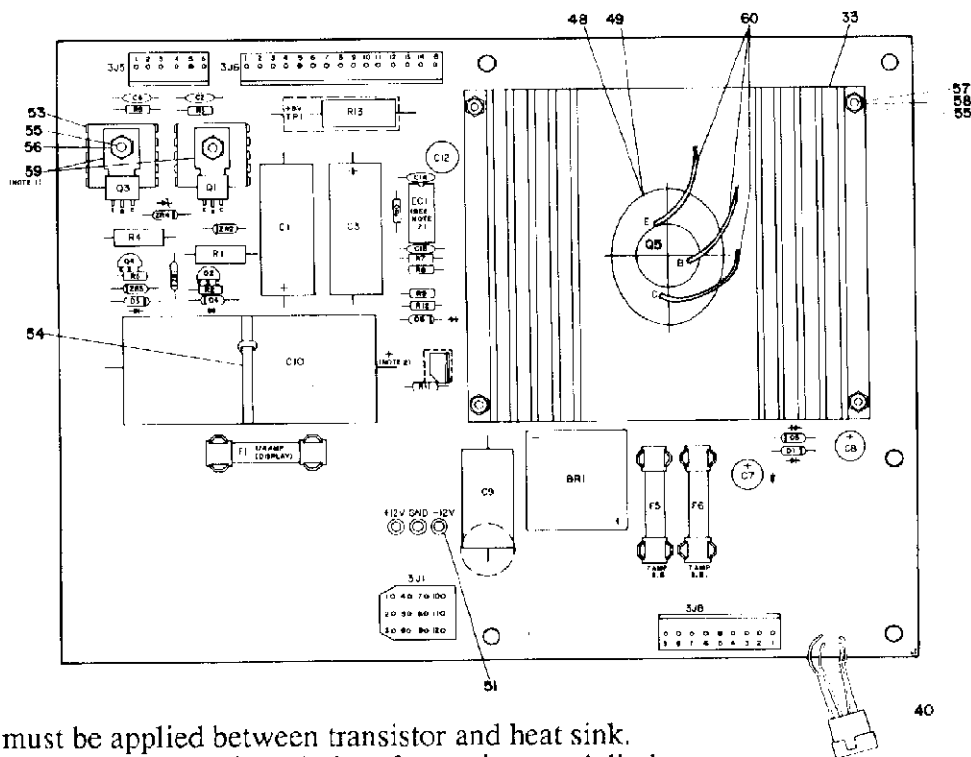
Alphanumeric Display Unit Board

including p/n D-11609 & associated parts

Part No.	Ckt Designator	Description	Part No.	Ckt Designator	Description
5760-12134-00		Bare P. C. Board	5010-08773-00	R1, R2, R8, R20, R23	Resistor, 18 K, 1/4 w, 5%
5680-08968-00	U8, U13, U14, U16	IC, Anode/Digit Driver, UDN6118A or 6184	5010-10927-00	R4, R6, R18, R19, R21, R22, R24, R25	Resistor, 8.2 K, 1/2 w, 5%
5310-09882-00	U4 - U7	IC, Quad NOR, 4001B	5010-10258-00	R27, R28, R30 - R35	Resistor, 1 M, 1/4 w, 5%
5680-08969-00	U11, U12, U15	IC, Cathode Seg. Driver, UDN7180A	5010-08981-00	R3, R5, R7, R9, R10, R12 - R17	Resistor, 10 K, 1/2 w, 5%
5310-09153-00	U1 - U3, U9, U10	IC, Hex Buffer, 4050	5010-08772-00	R11	Resistor, 15 K, 1/4 w, 5%
5075-09135-00	D1	Zener diode, 1N4740A, 10V, 1 w	5670-10873-00	DSPY1, DSPY2	Display, 7-character, A/N
5040-09343-00	C4	Capacitor, 10 μ d., 25v, $\pm$ 5%, Axial	5670-09439-00	DSPY3, DSPY4	Display, 7-character, 7-segment
5043-08996-00	C3	Capacitor, 0.1 μ d., 50v, $\pm$ 20%, Axial	5791-10851-00	J1	Connector, 26 pin (Hdr), Rt. Angle
5043-08980-00	C1, C2, C5 - C7	Capacitor, 0.01 μ d, 50v, Axial	5791-10869-06	J2	Connector, 6 pin (Hdr), Rt. Angle
5019-10387-00	SR1 - SR3	SIP, 18 K, 9R, 10P, 5%	5791-10869-09	J3 - J5	Connector, 9 pin (Hdr), Rt. Angle
			03-8088-1	Support	Support, Display



Display Characters Segment Designations



NOTES:

1. Heat sink compound must be applied between transistor and heat sink.
2. Observe index mark on integrated circuit, polarity of capacitors and diodes, and position of transistors.
3. The view of Q5 and its related heat sink and hardware is from the bottom of the heat sink, to clarify installation

Power Supply p/n D-8345-557

Item	Part No.	Ckt Designator	Description	Item	Part No.	Ckt Designator	Description
1	5765-09466-01		Bare P. C. Board	28	5164-12154-00	Q1	Transistor, MJE15030, NPN
2	5013-09426-00	R7	Resistor, 2.15K, 1%, 1/4w, Metal Film	29	5164-09056-00	Q4	Transistor, MPSD02, NPN
3	5013-09427-00	R8	Resistor, 4.99K, 1%, 1/4w, Metal Film	30	5194-12155-00	Q3	Transistor, MJE15031, PNP
4	5010-09428-00	R11	Resistor, 1.5K, 2%, 1/4w, C. Film	31	5194-09055-00	Q2	Transistor, MPSD52, PNP
5	5010-09085-00	R10	Resistor, 1.5K, 5%, 1/4w	32	5162-09425-00	Q5	Transistor, 2N6057, NPN
6	5010-09541-00	R9	Resistor, 2.7K, 2%, 1/4w	33	Not Used		
7	5010-09508-00	R12	Resistor, 270Ω, 2%, 1/4w, C. Film	34	5791-09074-00	3J6	Connector, 15 pin (Hdr)
8	5012-09429-00	R13	Resistor, 0.12Ω, 5%, 5w	35	5791-09027-00	3J8	Connector, 9 pin (Hdr)
9	5010-09536-00	R1, R4	Resistor, 39K, 5%, 1w	36	Not Used		
10	5010-09061-00	R2, R5	Resistor, 680Ω, 2w	37	5791-09067-00	3J5	Connector, 6 pin (Hdr)
11	5010-09069-00	R3, R6	Resistor, 330K, 5%, 1/2w	38	Not Used		
12	5040-09419-00	C10	Capacitor, 18,000 mfd, electr, 20v, axial	39	Not Used		
13	5040-09420-00	C9	Capacitor, 1000 mfd, electr, 25v, axial or radial	40	H-11065	3J9	Cable/Connector Assembly
14	5040-09423-00	C12	Capacitor, 330 mfd, electr, 10v, radial	a)	5791-09400-00		Connector shell
15	5043-9065-00	C15	Capacitor, 470 pfd	b)	5820-09080-00		Connector pin
16	5040-9053-00	C1, C3	Capacitor, 100 mfd, electr, 150v	41	5791-09068-00	3J1	Connector, 12 pin (Hdr)
17	Not Used			42	5321-09178-00		Fuseholder
18	5043-09072-00	C2, C4	Capacitor, 0.1 mfd, 500v, disc	43	5731-06314-00	F2	Fuse, 4A, 250v, S-B
19	5043-09446-00	C14	Capacitor, 0.1 mfd, 50v, disc	44	Not Used		
20	5070-06258-00	D1, D5, D6	Diode, 1N4001	45	Not Used		
21	5070-09054-00	D3, D4	Diode, 1N4004	46	Not Used		
22	5075-09059-00	ZR1, ZR3	Zener, 1N5990, 3.9v, 5%	47	Not Used		
23	5075-09060-00	ZR2, ZR4	Zener, 1N4764, 100v, 5%	48	5700-09445-00		Socket
24	5460-09424-00	IC1	IC, Volt. Reg., MC1723C	49	5701-09652-00		Mica Insulator
25	Not Used			50	Not Used		
26	5040-09421-00	C7	Capacitor, 100 mfd, 25v, radial	51	5824-09428-00	TP2 - TP4	Terminal, #1502-1 (Test Post)
27	5040-09422-00	C8	Capacitor, 47 mfd, 50v, radial	52	5100-09418-00	BR1	Bridge Rectifier, 35A, 100V
				53	5705-09042-00		Heat Sink
				54	03-7947		Tie Wrap
				55	4005-01016-07		Mach. Screw, 5-40 x 7/16, RH
				56	Not Used		
				57	4701-00023-00		Lockwasher, #5, split
				58	4405-01117-00		Hex Nut, 5-40
				59	20-9229		Heat sink Thermal Compound
				60	Not Used		
				61	5731-09342-00	F6, F5	Fuse, 7A, 250V, S-B

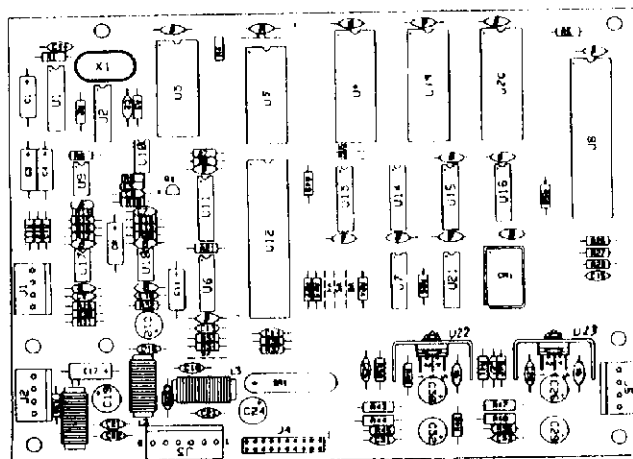
System 11A CPU Board

p/n D-11392-557

Item	Part No.	Ckt Designator	Description	Item	Part No.	Ckt Designator	Description
1	5764-12091-00		Bare P. C. Board	64	5010-10170-00	R69	Resistor, 47 Ω , 5%, 1/4w, C. F.
2	5370-09691-00	U3	IC, CVSD Mod., 55536	65	5010-09180-00	R59, R61, W12, W13	Resistor, 220 Ω , 5%, 1/4w, C. F.
3	5370-09321-00	U4, U5	IC, Dual Op Amp, 1458	66	5010-09416-00	R33, R34, R135-137	Resistor, 470 Ω , 5%, 1/4w, C. F.
4	5281-09308-00	U16	IC, Octal Bus Xcvr, 74LS245	67	5010-09179-00	R9	Resistor, 3.3K Ω , 5%, 1/4w, C. F.
5	5430-08972-00	U9, U10, U38, U41, U42, U51, U54	IC, PIA, MC6820/6821	68	5010-09085-00	R71-R78	Resistor, 1.5K Ω , 5%, 1/4w, C. F.
6	5340-10139-00	U25	IC, 2K x 8 CMOS Static RAM	69	5010-10361-00	R111, R114, R117, R120, R123, R126, R129, R132	Resistor, 1.2K Ω , 5%, 1/2w, C. F.
7	5280-09010-00	U44	IC, 4-16 Decoder, 74154	70	5010-08824-00	R15	Resistor, 43K Ω , 5%, 1/4w, C. F.
8	5281-09248-00	U7, U8, U12	IC, 2-4 Decoder, 74LS139	71	5010-09342-00	R16	Resistor, 36K Ω , 5%, 1/4w, C. F.
9	5075-09408-00	ZR3 - ZR8	Diode, Zener, 6.2v, 0.5w	72	5010-08846-00	R17	Resistor, 220K Ω , 5%, 1/4w, C. F.
10	Not Used			73	5010-09333-00	R18	Resistor, 180K Ω , 5%, 1/4w, C. F.
11	5281-09487-00	U8	IC, Dual D Flip-flop, 74LS74	74	5010-09324-00	R19, R20, R22, R29, R30	Resistor, 27K Ω , 5%, 1/4w, C. F.
12	5431-09449-00	U43	IC, Timer, MC1455	75	5010-08772-00	R21	Resistor, 15K Ω , 5%, 1/4w, C. F.
13	5310-09236-00	U29	IC, 14-b Counter, 4020	76	5010-09356-00	R27, R28	Resistor, 820 Ω , 5%, 1/4w, C. F.
14	5281-09743-00	U32	IC, Quad 2-Input AND, 74LS08	77	5019-09783-00	SR18	SIP, 9R, 10-pin, 6.8K Ω , 125w/R, 5%
15	5281-09247-00	U14	IC, Quad 2-Input NOR, 74LS02	78	5019-09362-00	SR3, SR15, SR17, SR19, SR20	SIP, 9R, 10-pin, 4.7K Ω , 125w/R, 5%
16	5281-09235-00	U35	IC, Triple 3-Input NAND, 74LS10	79	5019-09808-00	SR4, SR6, SR11	SIP, 9R, 10-pin, 560 Ω , 125w/R, 5%
17	5280-09013-00	U36	IC, Hex Inverter, 7404	80	5019-09785-00	SR16	SIP, 9R, 10-pin, 2.2K Ω , 125w/R, 5%
18	5281-09499-00	U31, U34	IC, Quad 2-Input NAND, 74LS00	81	5019-10472-00	SR14	SIP, 9R, 10-pin, 3.3K Ω , 125w/R, 5%
19	5281-10014-00	U33	IC, Dual 4-Input NAND, 74LS20	82	5019-09669-00	SR8, SRC8	SIP, 9R, 10-pin, 1.0K Ω , 125w/R, 5%
20	5281-09488-00	U28	IC, Octal D Flip-flop, 74LS374	B2A	5700-12178-00		Socket, SIP, 10-pin (for SRC8)
21	5371-09152-00	J2	IC, D/A Converter, MC1408	83	5019-09780-00	SR9, SR10, SR12, SR13	SIP, 4R, 8-pin, 1K Ω , 5%
22	5281-09745-00	U37	IC, 3-8 Decoder, 74LS138	84	5019-09786-00	SR1, SR2	SIP, 5R, 6-pin, 4.7K Ω , 125w/R, 5%
23	5340-09878-00	U23	IC, 2K x 8 Static RAM, 2018	85	5019-09792-00	SR5, SR7	SIP, 9R, 10-pin, 2.7K Ω , 125w/R, 5%
24	5370-09156-00	U1	IC, Aud. Amp., TDA2002	86	5060-10396-00	SRC1 - SRC5, SRC7 - SRC9	SIP, 8R, 8C, 10-pin, 4.7K Ω & 470pfd
25	5281-09867-00	U11, U13, U40	IC, Octal Buffer, 74LS244	87	Not Used		
26	5280-08973-00	U17-U20, U52, U53	IC, Quad 2-Input AND, 7408	88	5043-08980-00	C14, C17-C21, C31, C32, C49-C56, C59, + 54 Bypass, marked B	Capacitor, 0.01 μ fd, 50v(+80,-20%), Axial
27	5280-08974-00	U55, U56	IC, Hex Inverter, 7406	89	5043-09845-00	C6, C22, C23, C25, C27, C28	Capacitor, 1K pfd, 50v(+20%), Axial
28	5310-09155-00	U30, U39	IC, Quad 2-Input NAND, MC14011	90	5043-08996-00	C1, C4, C5, C70-75, C77, C78	Capacitor, 0.1 μ fd, 50v(+20%), Axial
29	5280-08948-00	U45, U50	IC, Quad 2-Input NOR, 7402	91	5040-09343-00	C8, C15	Capacitor, 10 μ fd, Electr., 20v(+20%), Axial
30	5280-09309-00	U49	IC, Hex Buffer, 7407	92	5043-09844-00	C7, C41-C48	Capacitor, 47 pfd, 50v(+20%), Axial
31	5671-09019-00	LED1-LED3	LED, Red, Display	93	5040-10974-00	C3, C24, C26, C29	Capacitor, 100 μ fd, Electr., 25v(+50,-10%), Axial
32	5521-10506-00	CR1	Oscillator, 4 MHz	94	5040-09776-00	C2	Capacitor, 470 μ fd, Electr., 16v(+50,-10%), Radial
33	5162-08976-00	Q51, Q53, Q55, Q57, Q59, Q61, Q63, Q65, Q52, Q54, Q56, Q58, Q60, Q62, Q64, Q66, Q68, Q69, Q71, Q73, Q75, Q77, Q79, Q80-Q87	Transistor, NPN Darl. 2N5427, TO-92	95	5045-09796-00	C60-C67	Capacitor, 0.1 μ fd, Polycarbonate Rad., 100v(+10%)
34	5191-08978-00	Q52, Q54, Q56, Q58, Q60, Q62, Q64, Q66, Q68, Q69, Q71, Q73, Q75, Q77, Q79, Q80-Q87	Transistor, PNP, TIP42, TO-220	96	5043-09065-00	C33-C40, C68, C69, C76	Capacitor, 470 pfd, 50v(+20%), Axial
35	5162-09410-00	Q8-Q9, Q14-Q17, Q22-Q25, Q30-Q33, Q69, Q71, Q73, Q75, Q77, Q79, Q80-Q87	Transistor, NPN, TIP122, TO-220	97	5040-09545-00	C30	Capacitor, 22 μ fd, Electr., 10v(+50,-10%), Axial
36	5160-08938-00	Q2-Q5, Q10-Q13, Q18-Q21, Q26-Q29, Q34-Q38, Q41, Q67, Q68, Q70, Q72, Q74, Q76, Q78	Transistor, NPN, 2N4401, TO-92	98	5041-09031-00	C9, C58	Capacitor, 1 μ fd, Tant., 25v(+20%), Axial
37	5160-10269-00	Q1, Q40, Q42-Q49	Transistor, NPN, 2N3904, TO-92	99	5043-09030-00	C18, C57	Capacitor, 0.047 μ fd, 50v(+20%), Axial
38	5190-09016-00	Q39, Q50	Transistor, PNP, 2N4403, TO-92	100	5046-09347-00	C10	Capacitor, 1800 pfd, Polystyrene, 50v(+5%)
39	5130-09014-00	S1-S8	SCR, 30v, 0.8A, 2N5060	101	5046-09350-00	C11	Capacitor, 180 pfd, Polystyrene, 100v(+5%)
40	5070-06258-00	D3-D19	Diode, 1N4001	102	5046-09346-00	C12	Capacitor, 1200 pfd, Polystyrene, 50v(+5%)
41	5070-08919-00	D2	Diode, 1N4148, 150mA	103	5046-09348-00	C13	Capacitor, 4700 pfd, Polystyrene, 50v(+5%)
42	5070-09266-00	D1	Diode, 1N5817, 1.0A	104	5551-09822-00	L1-L3	Inductor, 4.7 μ H, 3A
43	5075-09018-00	ZR1	Diode, Zener, 1N5996A, 6.8v, 0.5w	105	5841-09312-00	SW1, SW2	Switch, Pushbutton, DPDT, 100v, 5A
44	5075-09059-00	ZR2	Diode, Zener, 1N5990, 3.9v, 0.5w	106	5880-09022-00	B1-B3	Battery, Alkaline, 1.5v, AA
45	5010-08992-00	R94, R97, R100, R103, R106, R109	Resistor, 560 Ω , 5%, 1/4w, C. F.	107	20-9491	W18, W19	Bus Wire, Jumper
46	5010-09039-00	R56	Resistor, 10 Ω , 5%, 1/4w, C. F.	108	5881-09021-00		Battery Holder, #171
47	5010-09534-00	W1, W2, W4, W5, W7, W8, W11, W14, W16, W17	Resistor, 0 Ω , 5%, 1/4w, C. F.	109	5700-10176-00		IC Socket, 28 pin
48	5010-08991-00	R31, R32, R35, R52, R55, R58, R82	Resistor, 4.7K Ω , 5%, 1/4w, C. F.	a)	A-5343-557-1	U26	IC, Game ROM 2, 27128
49	5010-09358-00	R5, R6, R57, R58, R64, R66, R112, R115, R118, R121, R124, R127, R130, R133	Resistor, 1.0K Ω , 5%, 1/4w, C. F.	b)	A-5343-557-2	U27	IC, Game ROM 1, 27256
50	5010-09113-00	R79	Resistor, 33K Ω , 5%, 1/4w, C. F.	c)	A-5343-557-4	U21	IC, Sound ROM 1, 27256
51	5010-08983-00	R7, R8, R10, R70, R80	Resistor, 3.3K Ω , 5%, 1/4w, C. F.	d)	A-5343-557-3	U22	IC, Sound ROM 2, 27256
52	5010-09034-00	R11-R14, R25, R26, R53, R60, R65, R90	Resistor, 10K Ω , 5%, 1/4w, C. F.	110	5700-08985-00		IC Socket, 40 pin
53	5010-09086-00	R81	Resistor, 6.8K Ω , 5%, 1/4w, C. F.	a)	5400-09150-00	U15	IC, μ Processor, 6802
54	5010-09363-00	R3	Resistor, 5.6K Ω , 5%, 1/4w, C. F.	b)	5400-09150-00	U24	IC, μ Processor, 6802
55	5010-08997-00	R23, R24, R91, R93, R96, R99, R102, R105, R108	Resistor, 2.7K Ω , 5%, 1/4w, C. F.	111	5824-09248-00	TP1, TP2	Test Point
56	5012-09037-00	R113, R116, R119, R122, R125, R128, R131, R134	Resistor, 0.4 Ω , 5%, 3w, Wire-Wnd.	112	5705-09199-00		Heatsink, #6C30
57	5010-08993-00	R35-R51, R95, R96, R101, R104, R107, R110	Resistor, 68 Ω , 5%, 1/2w, C. F.	113	4006-01003-06		Mach. Screw, 6-32 x 3/8", P-PH-S
58	5012-10860-00	R82-R89	Resistor, 27 Ω , 5%, 2w, C. F.	114	4406-01117-00		Nut, Hex, 6-32
59	5010-09361-00	R1	Resistor, 220 Ω , 5%, 1/2w, C. F.	115	4703-00007-00		Lockwasher, #6
60	5010-09181-00	R2	Resistor, 1.0 Ω , 5%, 1/2w, C. F.	116	20-9229		Thermal Compound (see Note 4)
61	5010-09161-00	R4	Resistor, 2.2 Ω , 5%, 1/4w, C. F.	117	5580-08994-01	K1	Relay, 4-pole, 40 Ω , 6v
62	5010-10003-00	R62, R63	Resistor, 390 Ω , 5%, 1/4w, C. F.	118	5791-10862-09	1J1, 1J2, 1J4-1J8, 1J10-1J12, 1J17-1J19	Connector, 9 pin (Hdr)
63	5010-10171-00	R67	Resistor, 56 Ω , 5%, 1/4w, C. F.	119	5791-10862-04	1J13-1J16	Connector, 4 pin (Hdr)
				120	5791-10862-12	1J3	Connector, 12 pin (Hdr)
				121	Not Used		
				122	5791-10850-00	1J22	Connector, 26 pin Ribbon (Hdr)
				123	5791-09437-00	1J21	Connector, 20 pin Ribbon (Hdr)

NOTES:

- For Schematic, refer to drawing #16-8993.
- Items 56 and 58 (resistors) must be mounted 1/8" above PCB surface.
- Standard Jumper: W1, W2, W4, W5, W7, W8, W11, W14, W16, W17.
- Use thermal compound between item 24 (U1) and item 112 (heatsink).



Audio Board Assembly

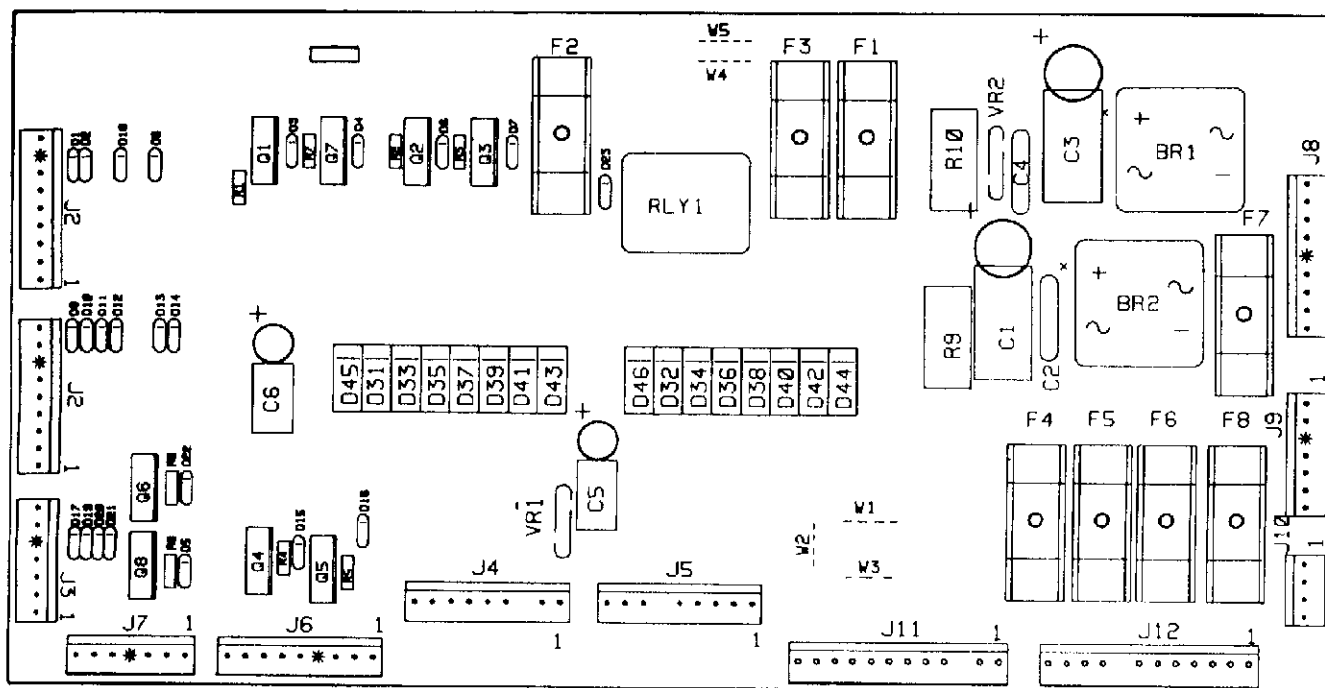
p/n D-11581-557

Part No.	Ckt Designator	Description	Part No.	Ckt Designator	Description
5766-12130-00		Bare P. C. Board	5010-09358-00	R41, R42	Resistor, 1K
5731-11087-00	U1	IC, D/A Conv, YM3012	5010-08998-00	R2, R3, R12	Resistor, 2.2K
a) 5700-09006-00		Socket, IC, 16-pin (U1)	5010-08983-00	R7 - R9	Resistor, 3.3K
5730-11086-00	U3	IC, Sound Processor, YM2151	5010-08991-00	R1, R4, R5, R11, R26 - R28, R33, R36, R37, R49, R50	Resistor, 4.7K
a) 5700-09004-00		Socket, IC, 24-pin (U3)	5010-09034-00	R14 - R17,	Resistor, 10K
5400-10320-00	U8	IC, μ Processor, MC68B09E	5010-09324-00	R6, R38	Resistor, 27K
a) 5700-08985-00		Socket, IC, 40-pin (U8)	5010-09162-00	R39	Resistor, 100K
A-5343-557-5	U4	IC, Audio ROM 1	5010-10258-00	R40	Resistor, 1M
a) 5700-10176-00		Socket, IC, 28-pin (U4)	5010-09179-00	R10	Resistor, 3.3M
A-5343-557-6	U19	IC, Audio ROM 2	5040-09343-00	C1, C3, C4, C8	Capacitor, 10 μ fd, 20v, $\pm$ 20%
a) 5700-10176-00		Socket, IC, 28-pin (U19)	5040-10974-00	C12, C19, C24	Capacitor, 100 μ fd, 35v
5371-09152-00	U11	IC, D/A Convtr, MC1408	5040-09776-00	C26, C30	Capacitor, 470 μ fd, 16v, +50, -10%
5430-10322-00	U12	IC, PIA, MC68B21	5040-12006-00	C29, C32	Capacitor, 1000 μ fd, 16v, 20%
5340-09878-00	U5	IC, RAM, 2016	5041-09243-00	C25, C28	Capacitor, 10 μ fd, 10v, $\pm$ 10%
5281-09487-00	U16	IC, Dual D Flipflop, 74LS74	5043-08980-00	C5, B (18)*	Capacitor, 0.01 μ fd, 50v, +80, -20%
5281-10043-00	U13	IC, 74LS175	5043-08996-00	C31, C33	Capacitor, 0.1 μ fd, 50v, $\pm$ 20%
5281-09235-00	U21	IC, Triple NAND, 74LS10	5043-09065-00	C13 - C15	Capacitor, 470 pfd, 50v, $\pm$ 20%
5370-09321-00	U9, U10, U17	IC, Op Amp, MC1458	5043-09492-00	C2, C34	Capacitor, 100 pfd, 50v, $\pm$ 10%
5281-09215-00	U2	IC, Hex Inv, 74LS04	5043-09844-00	C6	Capacitor, 47 pfd, 50v, $\pm$ 20%
5281-09246-00	U14	IC, 2-4 Dec, 74LS139	5043-09845-00	C16, C18, C20 - C23, C27	Capacitor, 1000 pfd, 50v, $\pm$ 20%
5281-09745-00	U15	IC, Dual Mux, 74LS138	5520-09020-00	X1	Crystal, 3.58 MHz
5370-09156-00	U22, U23	IC, Audio Amp, TDA2002	5521-10931-00	CR1	Oscillator, 8 MHz
a) 5705-09199-00		Heatsink, #6030B	5551-09822-00	L1 - L3	Inductor, 4.7 μ H, 3A
b) 4006-01003-06		6-32 x 3/8 P-PH-S	5791-09437-00	J4	Connector, 20 pin, (Hdr), Ribbon Cable
c) 4406-01117-00		6-32 Hexnut			
d) 4703-00007-00		#6 Ext. Lockwasher			
5160-10269-00	Q1	Transistor, 2N3904, NPN	5791-10862-04	J1, J2, J5	Connector, 4 pin (Hdr)
5060-10396-00	SP1	SIP 4.7K & 470pfd, 8R8C	5791-10862-06	J3	Connector, 6 pin (Hdr)
5010-09181-00	R44, R48	Resistor, 1.0 Ω , 1/2w, 5%			
5010-09161-00	R35, R45	Resistor, 2.2 Ω			
5010-09361-00	R43, R46, R47	Resistor, 220 Ω , 1/2w, 5%			

Notes: * 18 capacitors (shown on diagram with "B" symbol) provide +5VDC filtering for ICs.

All capacitors are ceramic, 50v, axial, unless otherwise noted.

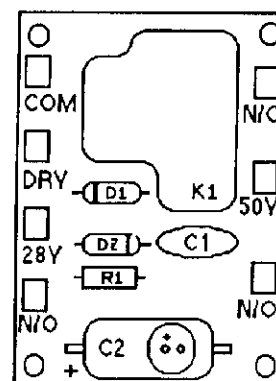
All resistors are 5%, 1/4w, Carbon Film, unless otherwise noted.



Aux Power Driver Unit Board

p/n D-11813-557

Part No.	Kct Designator	Description
5760-12184-00		Bare P. C. Board
5040-09537-00	C1, C3	Capacitor, 100 μ d., 100v, Radial
5040-12181-00	C5, C6	Capacitor, 10 μ d., 100v, Radial
5043-08996-00	C2, C4	Capacitor, 0.1 μ d., 500v
5010-09160-00	R1 - R8	Resistor, 220 Ω , 1/4w C.F., 5%
5012-09874-00	R9	Resistor, 8.2K, 5w, 5%
5010-09534-00	W1, W3, W4	Resistor, 0 Ω , 1/4w
5017-12180-00	VR1	Varistor, 100v
5017-09064-00	VR2	Varistor, 47v
5100-09690-00	BR1, BR2	Bridge Rectifier, 35A, 200v
5070-08785-00	D1 - D23	Diode, 1N4003
5070-09045-00	D31 - D46	Diode, MR501
5191-12179-00	Q1 - Q8	Transistor, TIP36C
5580-09555-01	K1	Relay, DPDT, 13A
5733-12060-01		Fuseholder
5733-08665-00	F1 - F6	Fuse, 2A, S-B, 250v
5733-06314-00	F7, F8	Fuse, 4A, S-B, 250v
5791-10862-09	J1, J2, J4 - J6, J8	Connector, 9-pin Hdr, Sq Pin
5791-10862-07	J3, J7, J9	Connector, 7-pin Hdr, Sq Pin
5791-10862-12	J11, J12	Connector, 12-pin Hdr, Sq Pin
5791-10862-04	J10	Connector, 4-pin Hdr, Sq Pin



Relay PCB Assembly

p/n C-11677-3

Item	Part No.	Description
1	5768-12144-00	PC Board
2	5070-09054-00	Diode, 1N4004, 1.0A
3	5580-12145-00	Relay, 24vdc, 30A
4	5043-09072-00	Capacitor, 0.1 μ d, 500v (+80, -20)
5	16-8850-176	Label

Center Lamp PCB Assembly p/n C-11815

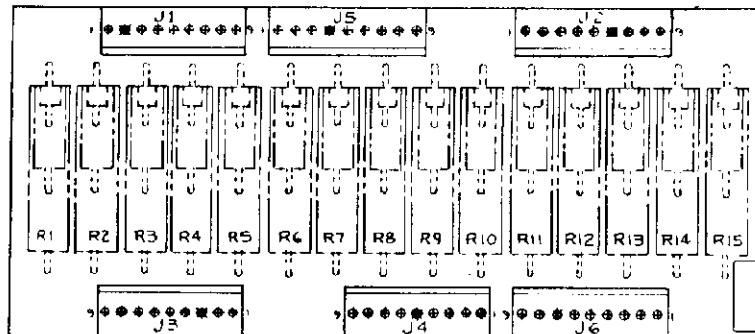
Item	Part No.	Description
1	5768-12185-00	PC Board
2	24-8767	Twist Lamp Socket
3	24-8768	Bulb, #555 (6.3v, .25A)
4	5070-09054-00	Diode, 1N4004
5	5791-10871-07	Header, 7-pin

3-Lamp PCB Assembly p/n C-11823

Item	Part No.	Description
1	5768-12186-00	PC Board
2	24-8767	Twist Lamp Socket
3	24-8768	Bulb, #555 (6.3v, .25A)
4	5070-09054-00	Diode, 1N4004
5	5791-10871-05	Header, 5-pin

King's Chamber 5-Lamp PCB Assembly p/n C-11847

Item	Part No.	Description
1	5768-12191-00	PC Board
2	24-8767	Twist Lamp Socket
3	24-8768	Bulb, #555 (6.3v, .25A)
4	5070-09054-00	Diode, 1N4004
5	5791-10871-07	Header, 7-pin

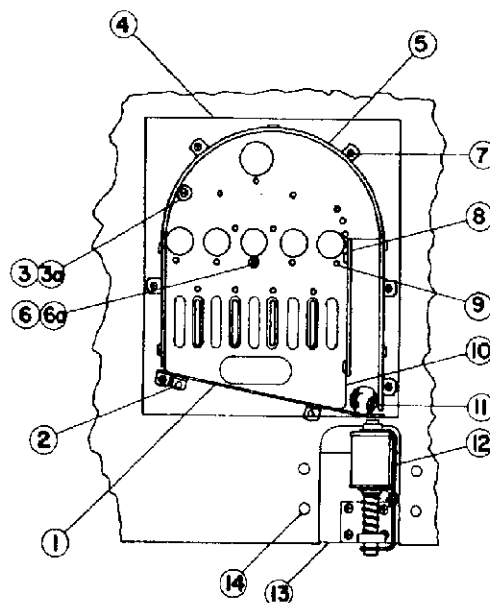


Flashlamp Resistor Board Assy p/n D-11814

Part No.	Ckt Designation	Description
5768-12183-00		Bare PC Board
5010-09534-00	R10 - R15	Resistor, 0Ω
5012-10024-00	R1 - R9	Resistor, 5Ω, 10w, 10%
5791-10862-09	J1 - J6	Header, 9-pin

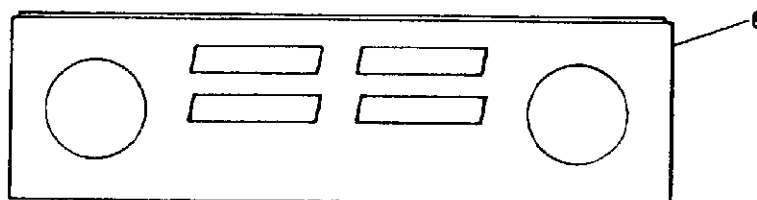
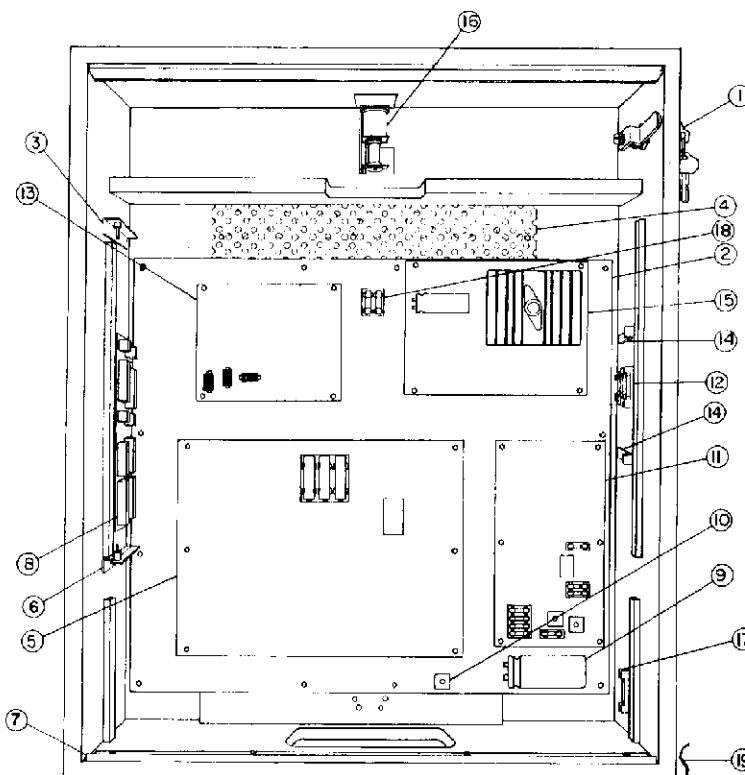
King's Chamber Parts

Item	Part No.	Description
1	B-11799	Ball Guide Assembly
2	4106-01019-06	Screw, #6 x 1/2
3	02-4195	Post
a)	23-6535	Rubber
4	31-1006A-557-1	Plastic Cover, Screened
5	C-11801	Ball Guide Assembly
6	4105-01001-20	Sh Met. Screw, #5 x 1-1/4
a)	03-7007-11	Sleeve
7	4006-01005-04	Mach Screw, 6-32 x 1/4
8	A-11800	Ball Guide Assembly
9	20-6531-D	Metal Playfield Pin
10	31-1357-557-1	King's Chmbr P'fld Plastic
11	03-8111-4	Plastic Ball
12	AE-24-900	Coil Assembly
13	01-8692	Mounting Bracket, Kicker
14	4308-01123-18	Bolt, 8-32 x 1-1/8



Backbox Parts Listing

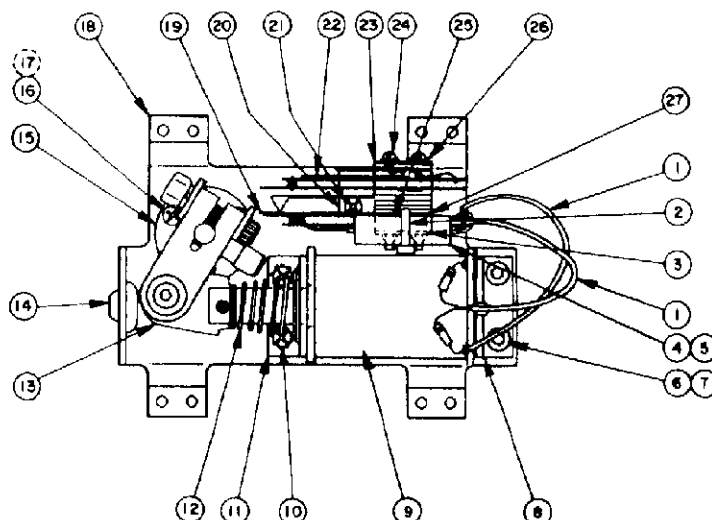
Item	Part No.	Description
1	20-9549	Cam Lock
2	D-11825	PCB Plate Assembly
3	A-7984	Upr Insert Bd Hinge Assy
4	01-6645	Venting Screen
5	D-11392-557	CPU Board, BIG GUNS
6	A-10815	Lwr Insert Bd Hinge Assy
7	01-8569	Lwr Spkr Panel Bracket
8	C-11762	B'box Interconnect Board
9	5040-09051-00	Capacitor, 30,000 μ Fd, 25V
10	5100-09418-00	Bridge Rectifier, 100v, 35A
11	D-11813-557	Aux. Pwr Driver Board
12	5733-10702-04	Fuse Holder, 4-Pos
13	D-11581-557	Audio Board Assembly
14	01-8084	Insert Stop Bracket
15	D-8345-557	Power Supply Assembly
16	B-10686-1	Knocker Assembly
17	5733-10702-01	Fuse Holder, 1-Pos
18	5733-10702-02	Fuse Holder, 2-Pos
19	20-9518	Backbox Hinge



BIG GUNS 43

Flipper Assembly p/n C-11626-R-4

Item	Part No.	Description
1	HW-30018-6	Wire, 18 AWG, Blue
2	03-7520-2	Ty-Wrap, Nylon
3	20-6516	Speednut, Tinnerman
4	5045-12098-00	Capacitor, 2.2 μ Fd, 250V, 20%
5	RM-21-06	Sleeve, Vinyl (Cap. leads)
6	4010-01066-06	Cap Screw, 10-32 x 3/8, SH
7	4701-00004-00	Lockwasher, #10 split
8	A-10821	Flipper Stop Assembly
9	FL-11630/50V	Flipper Coil
10	4006-01017-04	Mach. Screw, 6-32 x 1/4, P-RH-S
11	01-7695	Solenoid Bracket
12	10-376	Coil Plunger Spring
13	B-10655-R	Crank Link Assembly
a)	02-4179	Link Spacer Bushing
b)	4010-01086-14	Cap Screw, 10-32 x 7/8, SH
c)	4700-00023-00	Washer, 5/8 o.d. x 13/64 i. d. x 16 ga.
d)	4701-00004-00	Lockwasher, #10 split
e)	4410-01132-00	Nut, 10-32 ESNA
f)	A-10656	Flipper Link Assembly
1.)	02-4219	Coil Plunger
2.)	20-9370-1	Spring Pin, 5/32 dia. x 7/16
3.)	03-8050	Flipper Link
g)	B-10657-R	Flipper Crank Assembly, Right
1.)	01-8073-R	Flipper Crank, Right
2.)	17-1037	Crank Washer
3.)	4010-01066-18	Cap Screw, 10-32 x 1-1/8, HCS
4.)	4410-01127-00	Nut, 10-32 Hex Hd.
5.)	4700-00107-00	Washer, 5/8 o.d. x 13/64 i. d. x 12 ga.
6.)	4701-00004-00	Lockwasher, #10 split
7.)	RM-23-06	Tubing, H. S. 1/4 DWP
14	23-6577	Bumper Plug
15	03-7568	Flipper Bushing
16	4006-01005-06	Mach. Screw, 6-32 x 3/8, P-PH
17	4406-01117-00	Nut, 6-32 Hex
18	C-11627-R	Flipper Base Assembly, R.
19	06-14G	Insulating Blade
20	No part number	(Now part of item 18)
21	Not Used	(Former attaching part for item 20)
22	B-9951	Switch & Diode Assembly
a)	SW-1A-150	Switch, Lane Change
b)	5070-06258-00	Diode, 1N4001
23	01-3670-1	Plate, Switch
24	4105-01001-20	Sh. Metal Screw, #5 x 1-1/4, P-PH-AB
25	03-7811	End of Stroke (EOS) Switch
26	4701-00002-00	Lockwasher, #6 split
27	23-6622	Tape, Double-sided



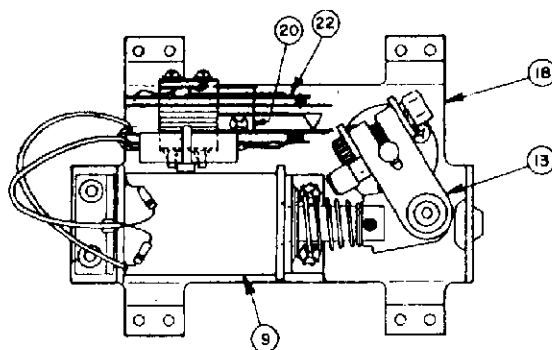
Flipper Assembly Notes

- Each Flipper Assembly is mounted beneath the playfield, in conjunction with the plastic Flipper Paddle and Shaft (20-9250) and flipper Rubber (23-6519) on the upper side of the playfield.
- The tip of the EOS Switch must travel 0.0150 (+ .010, - .000) inch, before the contacts fully open, with the flipper in the actuated position. The EOS Switch contacts must have a gap of 0.062 ($\pm$.015) inch. Adjustment of the EOS Switch must be made at a minimum distance of 0.25 inch from the switch body.
- The Lane Change Switch must have a gap of 0.046 ($\pm$.015) inch, when fully open.
- All moving elements of the assembly must operate freely, with no evidence of binding.
- The large end of the Coil Plunger Spring must fit within the four lugs of the Solenoid Bracket.
- For coil replacement, remove the Solenoid Bracket (item 3) to prevent screw damage.
- Use Loctite™ 242 when reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.
- When using the Bumper Plug (item 13) on older flipper assemblies, readjust the flipper paddle and shaft position.
- Solid color blue wire connects to the banded end of the diode, mounted on the connector end of the Flipper Coil (item 8). Trace color wire connects to the unbanded end of the diode.

Flipper Assembly p/n C-11626-R-8 & -L-8

(Parts listed replace same items of C-11626-R-4 & -L-4)

Item	Part No.	Description
9	FL-11753/50V	Flipper Coil
22	Omitted	
23	Omitted	
24	4105-01019-10	Sh. Metal Screw, #5 x 5/8, P-PH-AB



Flipper Assembly p/n C-11626-L-4

(Parts listed replace same items of C-11626-R-4)

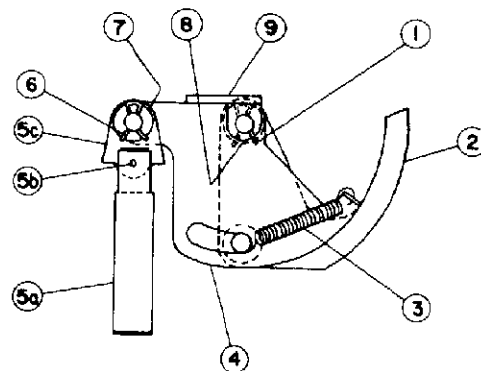
Item	Part No.	Description
13	B-10655-L	Crank Link Assembly
g)	B-10657-L	Flipper Crank Assembly, Left
1.)	01-8073-L	Flipper Crank, Left
18	C-11627-L	Flipper Base Assy, L.
20	No p/n	(Now part of item 18)
22	B-9951-1	Switch & Diode Assembly
a)	SW-1A-150-1	Switch, Lane Change

Ball Shooter Lane Feeder p/n C-9638 & Associated Parts

Item	Part No.	Description
1	12-6227	Clip, Hair Pin
2	A-8247	Ball Eject Cam Assembly
3	10-362	Spring
4	A-6949-L	Spring Plate Assembly
5	A-8050-1	Plunger Assembly
a)	02-3407-2	Coil Plunger
b)	20-8716-5	Roll Pin
c)	03-8085	Armature Link
6	12-6227	Clip, Hair Pin
7	4700-00030-00	Washer, 1/2 o.d. x 17/64 i.d. x 15 ga.
8	4700-00103-00	Washer, 1/2 o.d. x 17/64 i.d. x 28 ga.
9	A-8268	Mounting Bracket Assy

Associated Parts

B-9362-R-1	Coil & Bracket Assembly
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
4006-01017-06	Mach. Screw, 6-32 x 3/8
4406-01119-00	Nut, 6-32 ESN
AE-23-800	Coil Assembly
03-7066	Coil Tubing

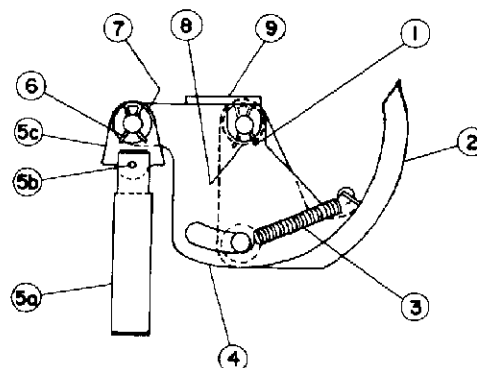


Right Eject Hole Assembly p/n B-9361-R-1 & Associated Parts

Item	Part No.	Description
1	12-6227	Clip, Hair Pin
2	A-7471-R	Ball Eject Cam Assembly
3	10-362	Spring
4	A-6949-R	Spring Plate Assembly
5	A-8050-1	Plunger Assembly
a)	02-3407-2	Coil Plunger
b)	20-8716-5	Roll Pin
c)	03-8085	Armature Link
6	12-6227	Clip, Hair Pin
7	4700-00030-00	Washer, 1/2 o.d. x 17/64 i.d. x 15 ga.
8	4700-00103-00	Washer, 1/2 o.d. x 17/64 i.d. x 28 ga.
9	A-6950-R	Mounting Bracket Assy

Associated Parts

B-9362-R-1	Coil & Bracket Assembly
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
4006-01017-06	Mach. Screw, 6-32 x 3/8
4406-01119-00	Nut, 6-32 ESN
AE-23-800	Coil Assembly
03-7066	Coil Tubing



Left Eject Hole Assembly p/n B-9361-R-1 & Associated Parts

Note: Except for the below-listed Associated Parts, the Left Eject Hole Assembly is identical to the Right Eject Hole, listed previously.

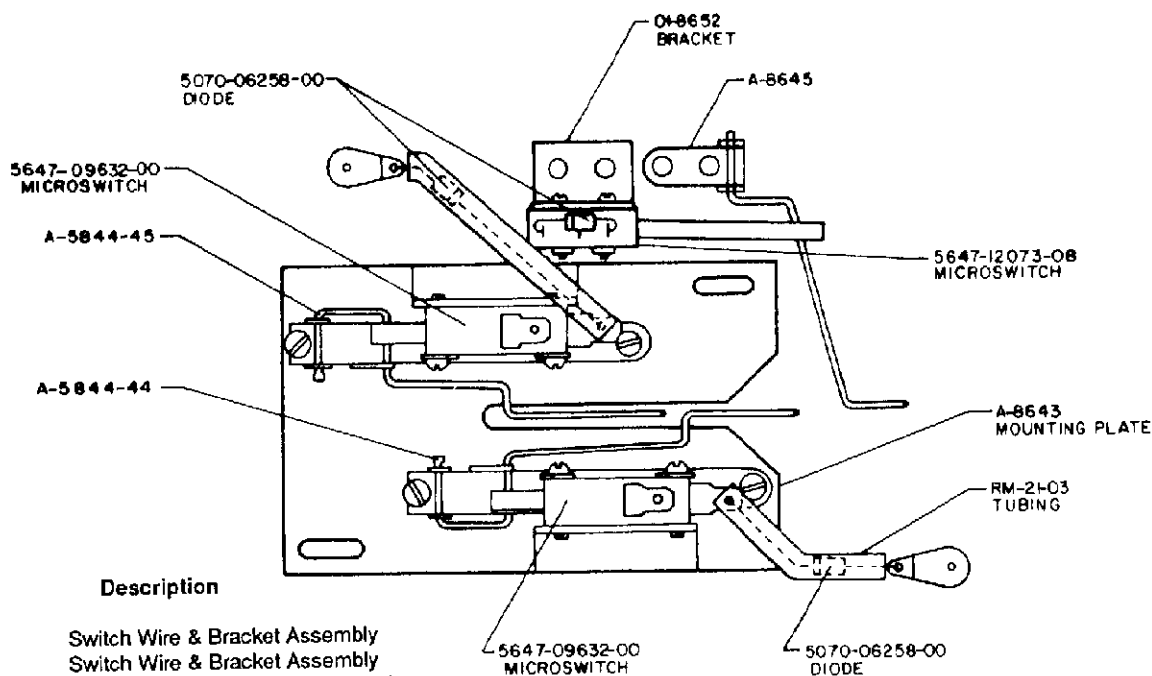
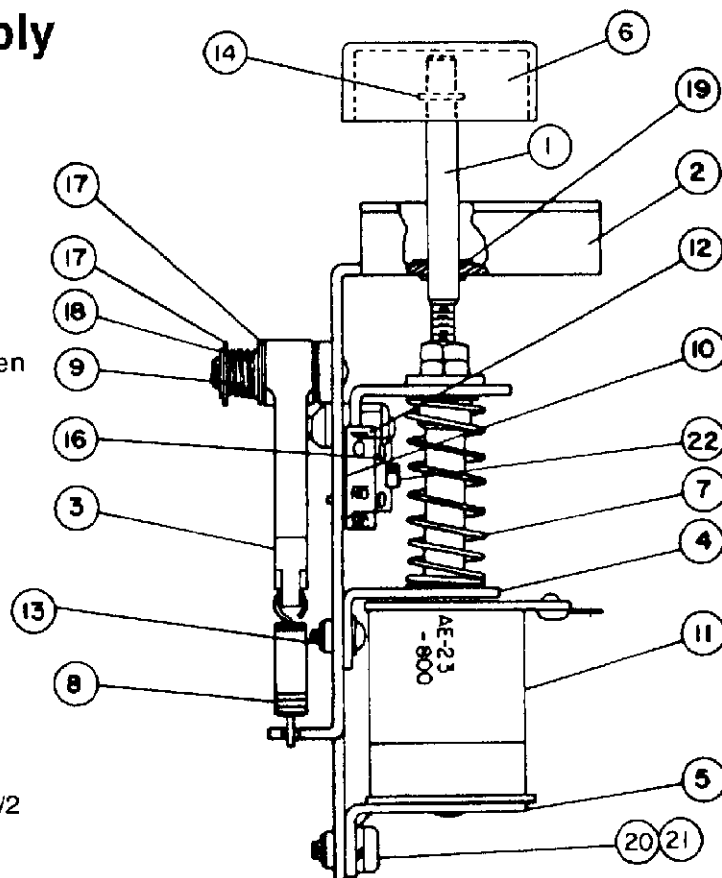
Associated Parts

Part No.	Description
B-11203-L-1	Coil & Bracket Assembly
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
4006-01017-06	Mach. Screw, 6-32 x 3/8
4406-01119-00	Nut, 6-32 ESN
AE-26-1500	Coil Assembly
03-7066	Coil Tubing

"Forcefield" Post Assembly

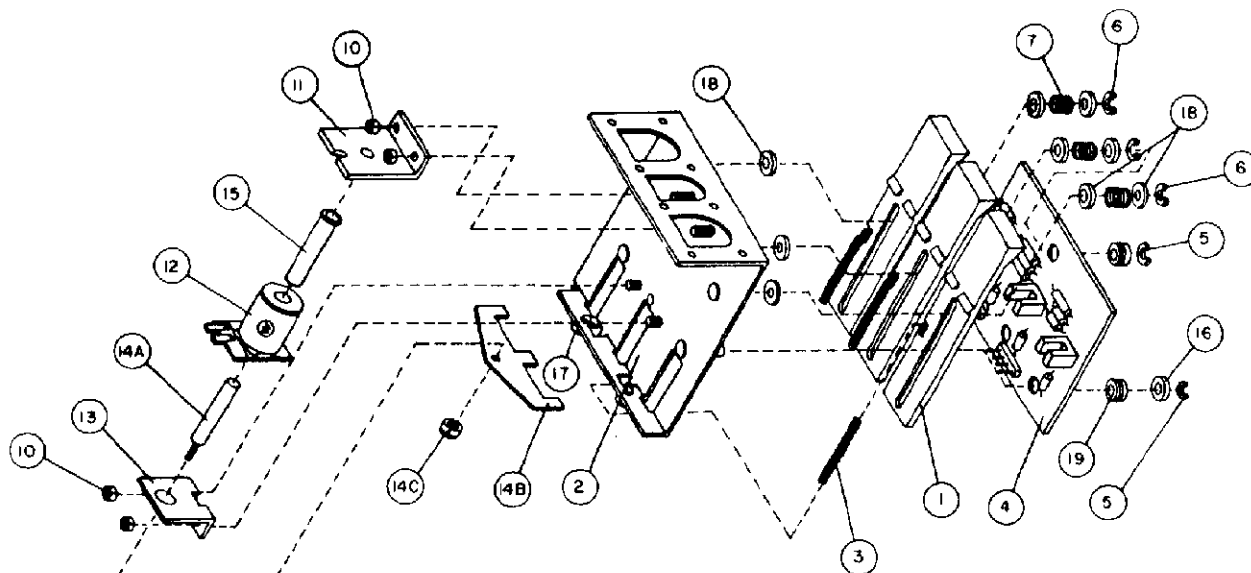
p/n C-11819

Item	Part No.	Description
1	B-11662	Plunger Assembly
2	B-11660	Main Frame Subassy
3	03-8090	Flat Cam
4	01-8639	Coil Support Bracket
5	A-10821	Flipper Stop Brkt Assy
6	03-7257-11	Post Bumper, Trans. Green
7	10-399	Spring, Compression
8	10-401	Spring, Extension
9	10-392	Spring, Compression
10	01-8600	Insulator
11	AE-23-800-06	Coil Assembly
12	5647-12073-06	μSwitch w/roller
13	4006-01027-06	Mach. Screw, 6-32 x 3/8
14	20-8716-18	Roll Pin
15	4701-00024-00	Lockwasher, #2
16	4002-01005-06	Mach. Screw, 2-56 x 3/8
17	4700-00103-00	Flat washer, #12
18	20-8712-25	E-Ring Retainer Clip
19	20-8790	Bearing, Ny-lined
20	4010-01006-08	Mach. Screw, #10-32 x 1/2
21	4701-00004-00	Lockwasher, #10
22	5070-06258-00	Diode, 1N4001, 1.0A



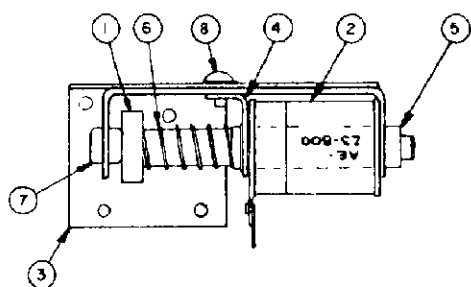
Part No.	Description
A-5844-44	Switch Wire & Bracket Assembly
A-5844-45	Switch Wire & Bracket Assembly
B-8644	Ball Trough Switch Plate Assembly
A-8643	Bracket & Mounting Plate Assembly
5647-09957-00	Ball Trough Switch; Center & Left
4004-01060-08	Mach. Screw, 4-40 x 1/2, SL-PH-S
4005-01005-02	Mach. Screw, 5-40 x 1/8, P-PH
5070-06258-00	Diode, 1N4001
5825-09372-00	Solder Lug
RM-21-03	Insulating Tubing, #10 x 1.75"
A-11680	Ball Trough Switch, Right
5647-12073-08	Submin. Switch
5070-06258-00	Diode, 1N4001
A-8645	Switch Wire & Bracket Assembly

Ball Trough Switches
(viewed from underside of playfield to show parts locations)



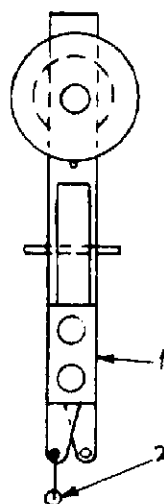
3-Bank Drop Target p/n C-11223-2

Item	Part No.	Description	Item	Part No.	Description
1	03-8033	Target Blade, Flush	12	AE-25-1000	Coil Assembly
2	B-11224	Bracket, 3-Bank Mounting	13	01-8413	Bracket, Coil Mounting
3	10-364	Spring, Extension	14A	02-3972-1	Plunger
4	C-11318	Opto Switch Assembly	14B	01-8408	Reset Plate, 3-Bank
5	20-8712-18	Retaining Clip	14C	4410-01132-00	Nut, 10-32 ESNA
6	20-8712-25	Retaining Clip	15	03-7066-4	Coil Tubing
7	10-392	Spring, Compression	16	4700-00016-00	Flatwasher, 3/16 i. dia
8	Not Used		17	4008-01016-10	Mach. Screw, 8-32 x 5/8
9	Not Used		18	4700-00072-00	Flat Washer, 1/4 i. dia
10	4408-01119-00	Nut, 8-32 ESNA	19	23-6626	Grommet, PCB Mtg
11	A-11397	Stop Bracket			



Left Outlane Kickback p/n B-11873

Item	Part No.	Description
1	A-6306-2	Bell Armature Assembly
2	AE-23-800	Coil Assembly
3	B-7409-2	Mounting Bracket Assembly
4	01-8-508-T	Solenoid Bracket
5	03-7067-5	Coil Tubing
6	10-135	Spring, Solenoid
7	23-6420	Grommet, Rubber
8	4008-01017-05	Mach. Screw, 8-32 x 5/16

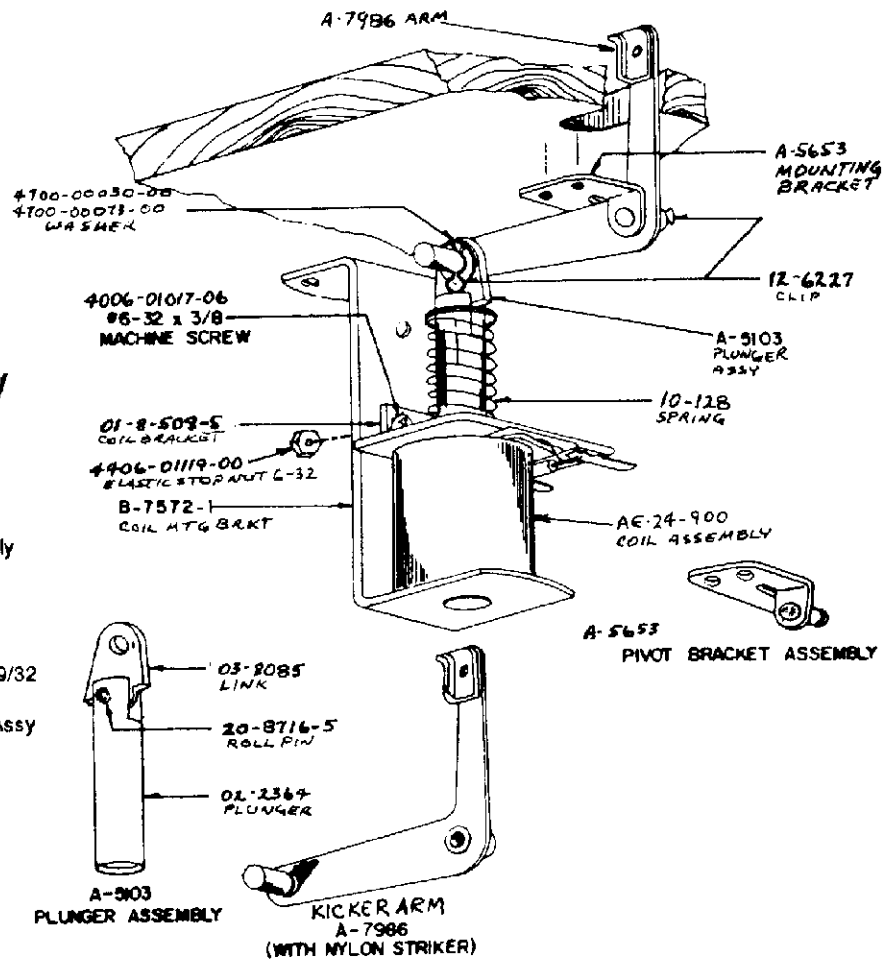


Standup Target Assemblies

1	p/n B-11696-2	Green Lower Guards & Forcefield
1	p/n B-11696-4	Red Lower Guards
1	p/n B-11854-6	Yellow Trolls
2	p/n 5070-06258-00	1N4001 Diode

Kicker Arm Assembly p/n B-9463

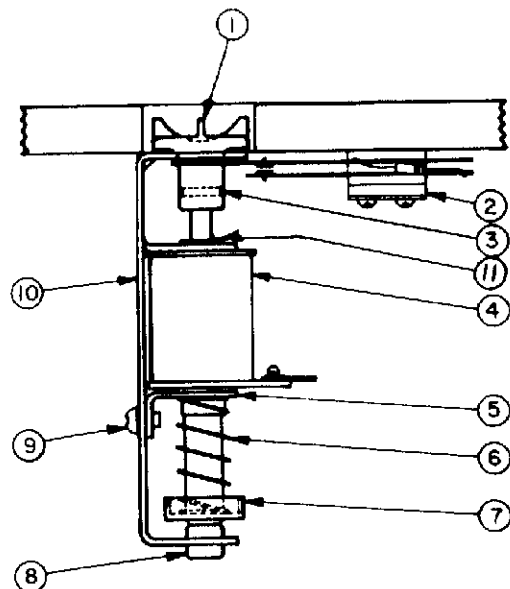
Part No.	Description
12-6227	Clip, Hair Pin
A-7986	Kicker Arm Assembly
A-5103	Plunger Assembly
02-2364	Coil Plunger
20-8716-5	Roll Pin
03-8085	Armature Link
4700-00073-00	Washer, 1/2 o.d. x 9/32 i.d. x 15 ga.
A-5653	Mounting Bracket Assy

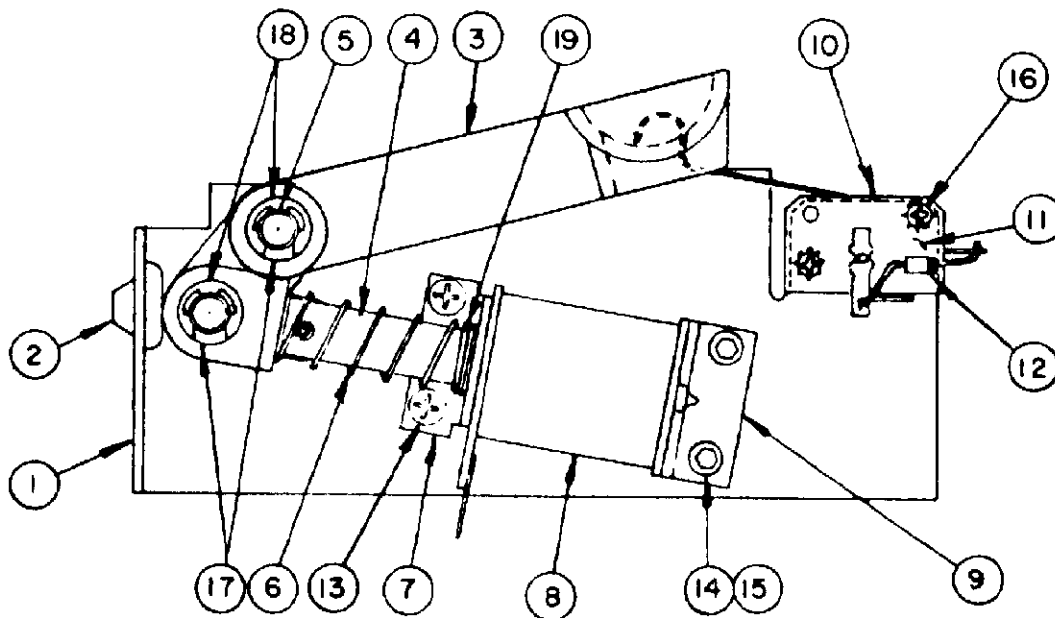


Ball Popper & Switch Assembly

including p/n D-11335-1, and associated parts

Item	Part No.	Description
1	03-8053	Cap, Ball Popper
2	A-11657	Switch Assembly
a)	A-11658	Switch & Diode Assembly
b)	01-3670-1	Switch Plate
c)	4205-01016-14	Wood Screw, #5 x 7/8, P-RH
3	20-9314-7	Dowel Pin, 3/32 dia x 1/2
4	AE-24-900	Coil Assembly
5	A-11721	Bracket Assembly
6	10-135	Spring
7	A-11336	Armature Assembly
8	23-6420	Grommet, Rubber
9	4008-01017-05	Mach. Screw, 8-32 x 5/16, P-RH
10	B-11631	Bracket Assembly, Ball Popper
11	03-7067	Tubing, Coil





Cannon Assembly

p/n C-11641

Item	Part No.	Description	Item	Part No.	Description
1	B-11640	Bracket Assembly	11	A-7438-1	Terminal Strip Assembly
2	23-6577	Plug Bumper	12	5070-06258-00	Diode, 1N4001, 1 A.
3	03-8089	Cannon Arm	13	4008-01017-04	Mach. Screw, 8-32 x 1/4
4	A-11769	Armature Link Assembly	14	4010-01066-06	Cap Screw, 10-32 x 3/8
5	02-4301	Cannon Arm Pin	15	4701-00004-00	Lockwasher, #10 split
6	10-395	Spring	16	4004-01003-10	Mach. Screw, 4-40 x 5/8
7	01-4813	Bracket, Coil Mounting	17	4700-00104-00	Flatwasher, .316 x .5 x .0598
8	AL-23-800	Coil Assembly	18	26-8712-31	Retaining Ring
9	A-10821	Coil Stop Bracket Assembly	19	03-7066	Coil Tubing
10	17-1067	Switch, Reworked			

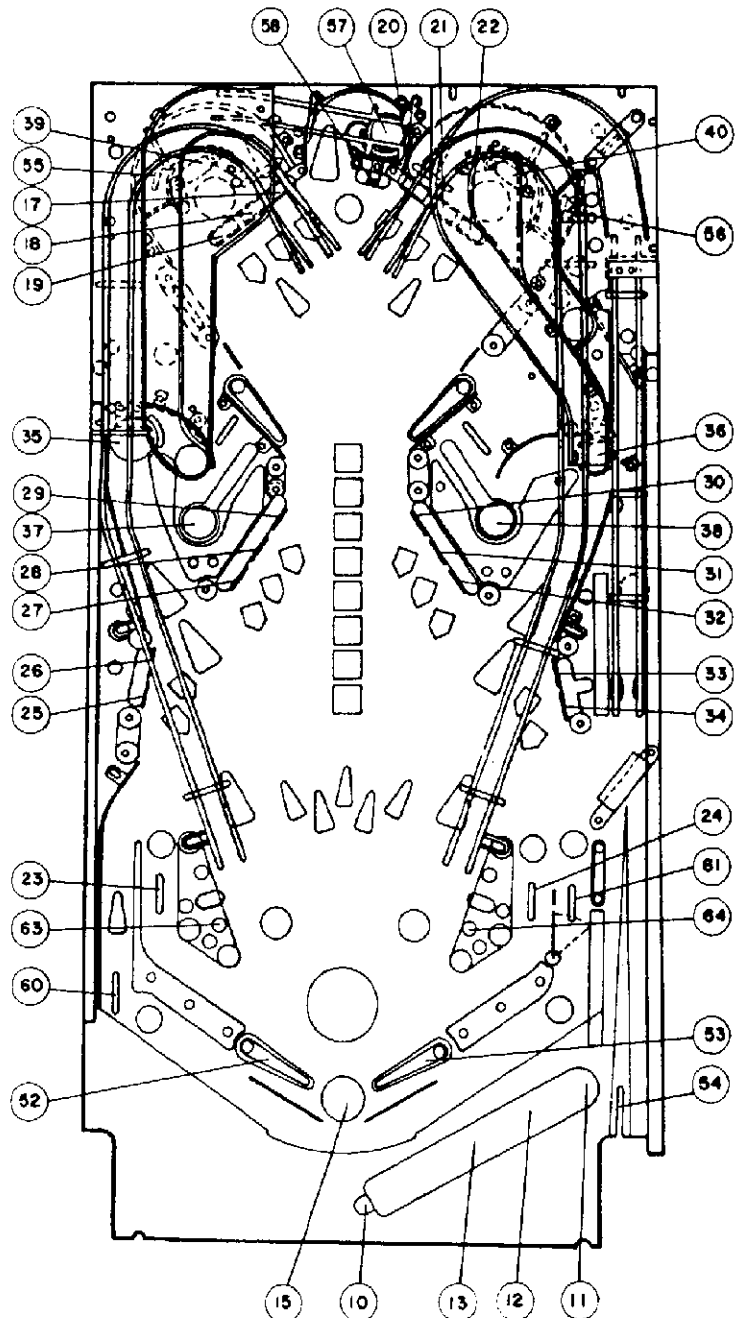
Miscellaneous *BIG GUNS* Parts

Part No.	Description	Part No.	Description
31-1002-557	Playfield, BIG GUNS	01-6652	Stop Bracket
A-8552-557	Backglass Assembly, BIG GUNS	01-6655	Latch - Insert Board
31-1357-557	Backglass, BIG GUNS	11-557-IN	Insert Board (Backbox)
31-1006-557	Plastics Set, BIG GUNS	5795-10937-09	Ribbon Cable, 20-conductor, 9"
31-1006A-557	Plastics Set, BIG GUNS	5795-10938-27	Ribbon Cable, 26-conductor, 27"
01-6571	Hinge Mtg Bracket, Insert Bd.	03-7960-557	Playfield Mylar*
C-11762	Backbox Interconnect Bd		

* available separately

Switches

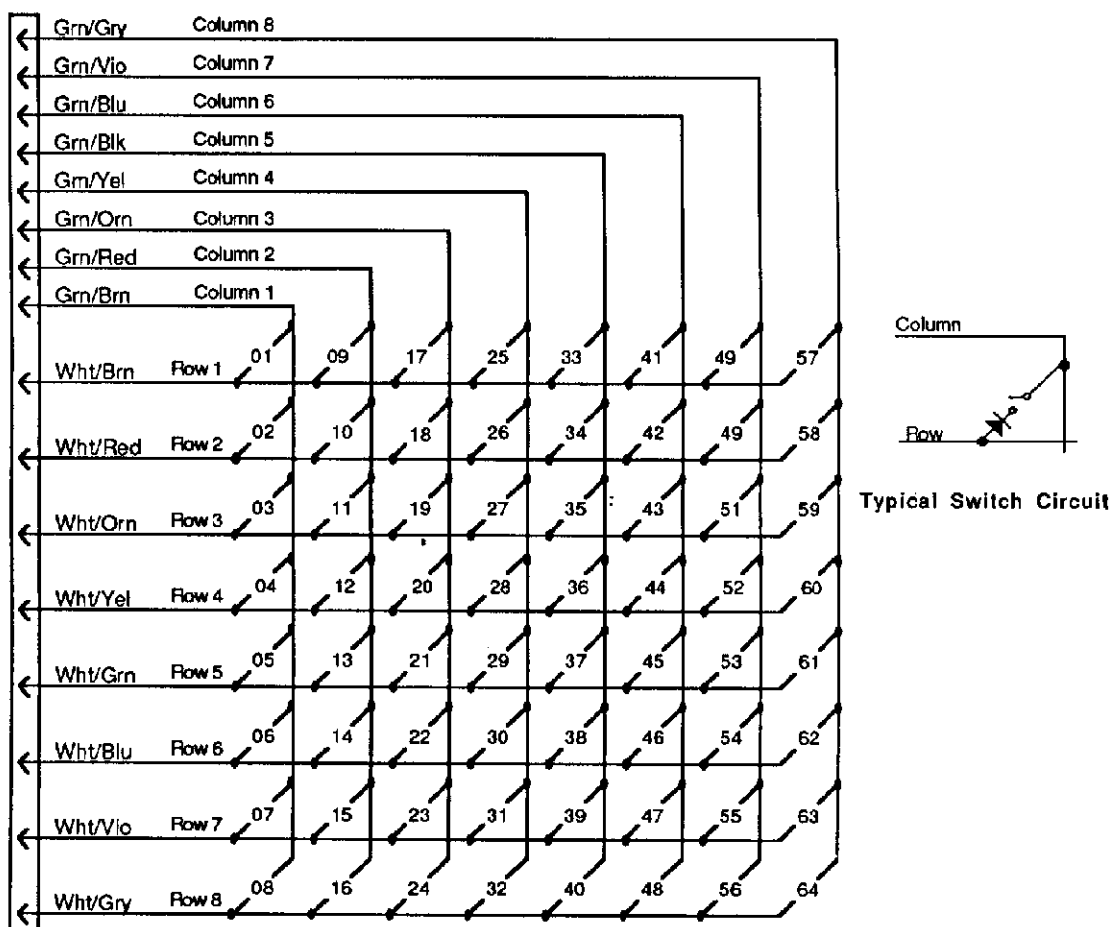
Item	Part No.	Description
1	A-8630	Plumb Bob Tilt
2	Not Used	
3	SW-1A-126	Credit Button
4	904845*	Right Coin Chute
5	904845*	Center Coin Chute
6	904845*	Left Coin Chute
7	904704*	Slam Tilt
8	5641-09369-00	High Score Reset
9	B-8306-1	Playfield Tilt
10	17-1067	Outhole
11	5647-12073-08	Right Ball Trough
12	5647-09957-00	Rt. Center Trough
13	5647-09957-00	Left Center Trough
14	Not Used	
15	5647-12073-09	"Forcefield" Down
16	Not Used	
17	p/o C-11318	Upr L Drop Target
18	p/o C-11318	Mid L Drop Target
19	p/o C-11318	Lwr L Drop Target
20	p/o C-11318	Upr R Drop Target
21	p/o C-11318	Mid R Drop Target
22	p/o C-11318	Lwr R Drop Target
23	5647-12073-10	Left Return Lane
24	5647-12073-10	Right Return Lane
25	B-11696-4	L Guard Bot 1
26	B-11696-4	L Guard Bot 2
27	B-11696-4	L Guard Middle
28	B-11696-4	L Guard Top 2
29	B-11696-4	L Guard Top 1
30	B-11696-2	R Guard Top 1
31	B-11696-2	R Guard Top 2
32	B-11696-2	R Guard Middle
33	B-11696-2	R Guard Bot 2
34	B-11696-2	R Guard Bot 1
35	17-1012	Left Eject Hole
36	17-1012	Right Eject Hole
37	17-1067	Left Cannon
38	17-1067	Right Cannon
39	B-11854-6	Left Troll
40	B-11854-6	Right Troll
41	5647-12133-05	King Chmbr Left 1
42	5647-12133-05	King Chmbr Left 2
43	5647-12133-05	King Chmbr Middle
44	5647-12133-05	King Chmbr Right 2
45	5647-12133-05	King Chmbr Right 1
46	Not Used	
47	Not Used	
48	Not Used	
49	Not Used	
50	Not Used	
51	Not Used	
52	B-9951-1	L Flipper Lane Change
53	B-9951	R Flipper Lane Change



Item	Part No.	Description
54	5647-12073-04	Ball Shooter Lane
55	5647-12073-10	Left Adv. "X"
56	5647-12073-10	Right Adv. "X"
57	A-11658	Ball Popper
58	B-11696-2	Forcefield (top of P'ld)
59	5647-12073-04	Tower
60	5647-12073-10	Left Drain Lane
61	5647-12073-10	Right Drain Lane
62	Not Used (German	Score Board)
63	B-8309-1	Left Kicker**
64	B-8309-1	Right Kicker**
-	SW-1010A-13	Flipper Button (Cabinet sides)

Notes: * (Coinco Part No.)

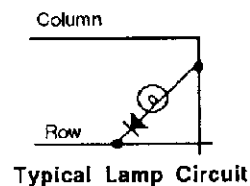
** [Kicker Actuating Sw: A-4834-H; B-8734 w/RC]



BIG GUNS Switch-Matrix Table

ROW \ COLUMN	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Bob Tilt 1	Playfield Tilt 9	Left Drop Target Top 17	Left Guard Bottom 1 25	Right Guard Bottom 2 33	Backbox Playfield Left 1 41	Not Used 49	Ball Popper 57
2 WHT-RED 1J10-8	Not Used 2	Outhole 10	Left Drop Target Middle 18	Left Guard Bottom 2 26	Right Guard Bottom 1 34	Backbox Playfield Left 2 42	Not Used 50	Force Field 58
3 WHT-ORN 1J10-7	Credit Button 3	Right Ball Trough (1st ball) 11	Left Drop Target Bottom 19	Left Guard Middle 27	Left Eject 35	Backbox Playfield Center 43	Not Used 51	Tower 59
4 WHT-YEL 1J10-6	Right Coin Chute 4	Center Ball Trough (2nd ball) 12	Right Drop Target Top 20	Left Guard Top 2 28	Right Eject 36	Backbox Playfield Right 2 44	Left Flipper Lane Change 52	Left Outlane 60
5 WHT-GRN 1J10-5	Center Coin Chute 5	Left Ball Trough (3rd ball) 13	Right Drop Target Middle 21	Left Guard Top 1 29	Left Cannon 37	Backbox Playfield Right 1 45	Right Flipper Lane Change 53	Right Outlane 61
6 WHT-BLU 1J10-3	Left Coin Chute 6	Not Used 14	Right Drop Target Bottom 22	Right Guard Top 1 30	Right Cannon 38	Not Used 46	Ball Shooter Lane 54	Not Used (German Score Board) 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Flipper Post Down 15	Left Return 23	Right Guard Top 2 31	Left Troll 39	Not Used 47	Left Advance 'X' 55	Left Kicker 63
8 WHT-GRY 1J10-1	High-Score Reset 8	Not Used 16	Right Return 24	Right Guard Middle 32	Right Troll 40	Not Used 48	Right Advance 'X' 56	Right Kicker 64

Yel/Gry	Column 8
Yel/Vio	Column 7
Yel/Blu	Column 6
Yel/Grn	Column 5
Yel/Blk	Column 4
Yel/Orn	Column 3
Yel/Red	Column 2
Yel/Brn	Column 1
Red/Brn	Row 1
Red/Blk	Row 2
Red/Orn	Row 3
Red/Yel	Row 4
Red/Grn	Row 5
Red/Blu	Row 6
Red/Vio	Row 7
Red/Gry	Row 8



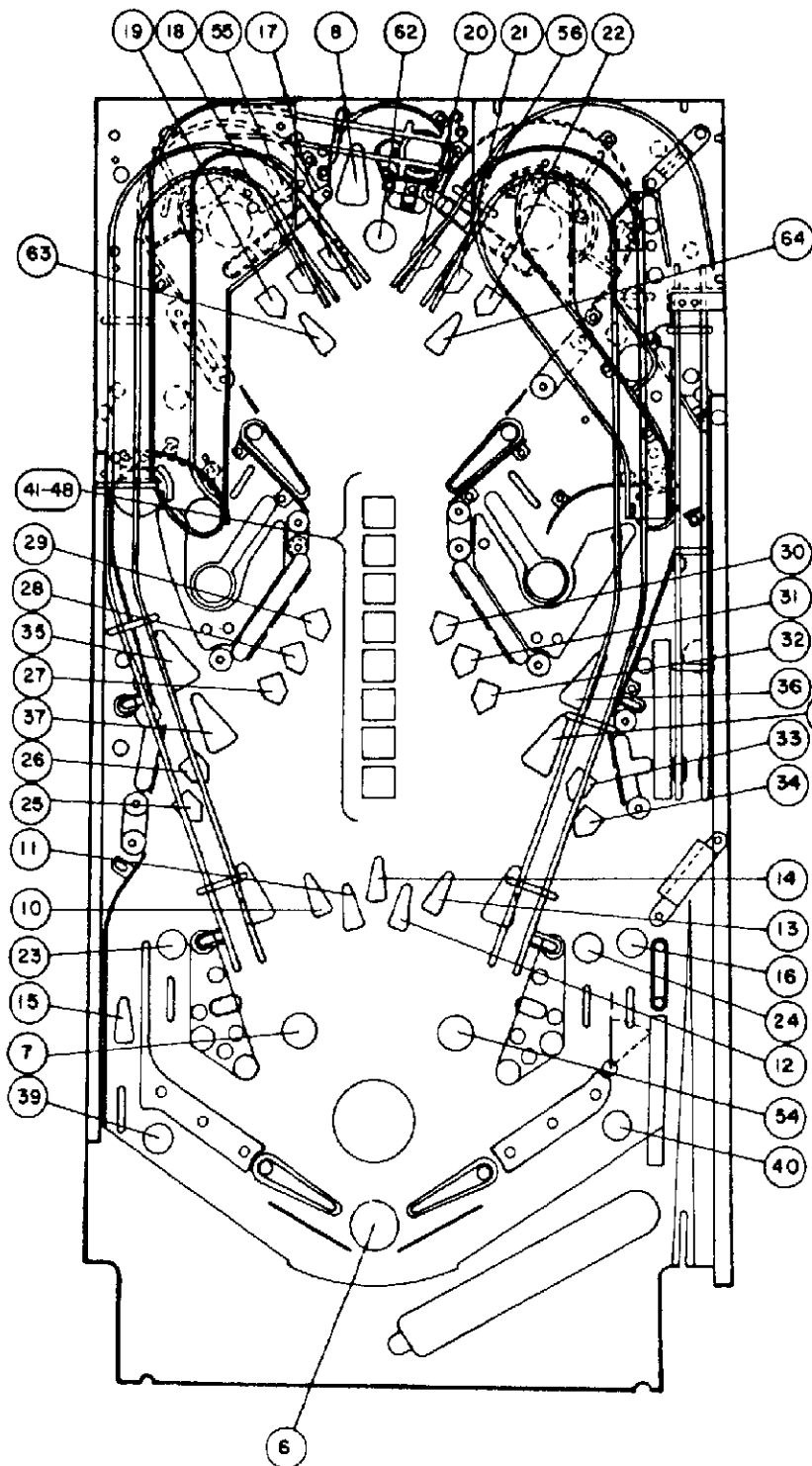
2 Two Lamps

BIG GUNS Lamp-Matrix Table

Lamps = #44 Bulb, p/n 24-6549
555 Bulb, p/n 24-8768

COLUMN		1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
ROW									
Q80 1	RED-BRN 1J6-1	Backbox Playfield Left 1 1	Backbox Ex. Ball 9	Left Drop Target Top 17	Left Guard Bottom 1 25	Right Guard Bottom 2 33	Bonus Mult. 2X 41	Left Backbox Seq. 1 (bottom) 49	Right Backbox Seq. 1 (bottom) 57
Q81 2	RED-BLK 1J6-2	Backbox Playfield Left 2 2	Center Guards 50K 10	Left Drop Target Middle 18	Left Guard Bottom 2 26	Right Guard Bottom 1 34	Bonus Mult. 3X 42	2 50	2 58
Q82 3	RED-ORN 1J6-3	Backbox Playfield Center 3	Center Guards 100K 11	Left Drop Target Bottom 19	Left Guard Middle 27	Left Top Lock 35	Bonus Mult. 4X 43	3 51	3 59
Q83 4	RED-YEL 1J6-5	Backbox Playfield Right 2 4	Center Guards 150K 12	Right Drop Target Top 20	Left Guard Top 2 28	Right Top Lock 36	Bonus Mult. 5X 44	4 52	4 60
Q84 5	RED-GRN 1J6-6	Backbox Playfield Right 1 5	Center Guards 200K 13	Right Drop Target Middle 21	Left Guard Top 1 29	Left Bottom Lock 37	Bonus Mult. 6X 45	5 (top) 53	5 (top) 61
Q85 6	RED-BLU 1J6-7	Flipper Post 2 6	Center Guards Special 14	Right Drop Target Bottom 22	Right Guard Top 1 30	Right Bottom Lock 38	Bonus Mult. 7X 46	Playfield Double Score 54	Force Field W/L 62
Q86 7	RED-VIO 1J6-8	Shoot Again 7	Left Outlane Kicker 15	Left Return (Ex. Ball) 23	Right Guard Top 2 31	Left Outlane Special 39	Bonus Mult. 8X 47	Left Advance 'X' 55	Left Troll 2 63
Q87 8	RED-GRY 1J6-9	Ball Popper Lock 8	Right Outlane Gate 16	Right Return (Ex. Ball) 24	Right Guard Middle 32	Right Outlane Special 40	Bonus Mult. 9X 48	Right Advance 'X' 56	Right Troll 2 64

Lamps



Lamp Location/Description

Lamp Location/Description

- 57 Right B/box Seq. 1 (bottom)
- 58 Right B/box Seq. 2
- 59 Right B/box Seq. 3
- 60 Right B/box Seq. 4
- 61 Right B/box Seq. 5 (top)
- 62 "Force Field" W/L
- 63 Left Troll
- 64 Right Troll

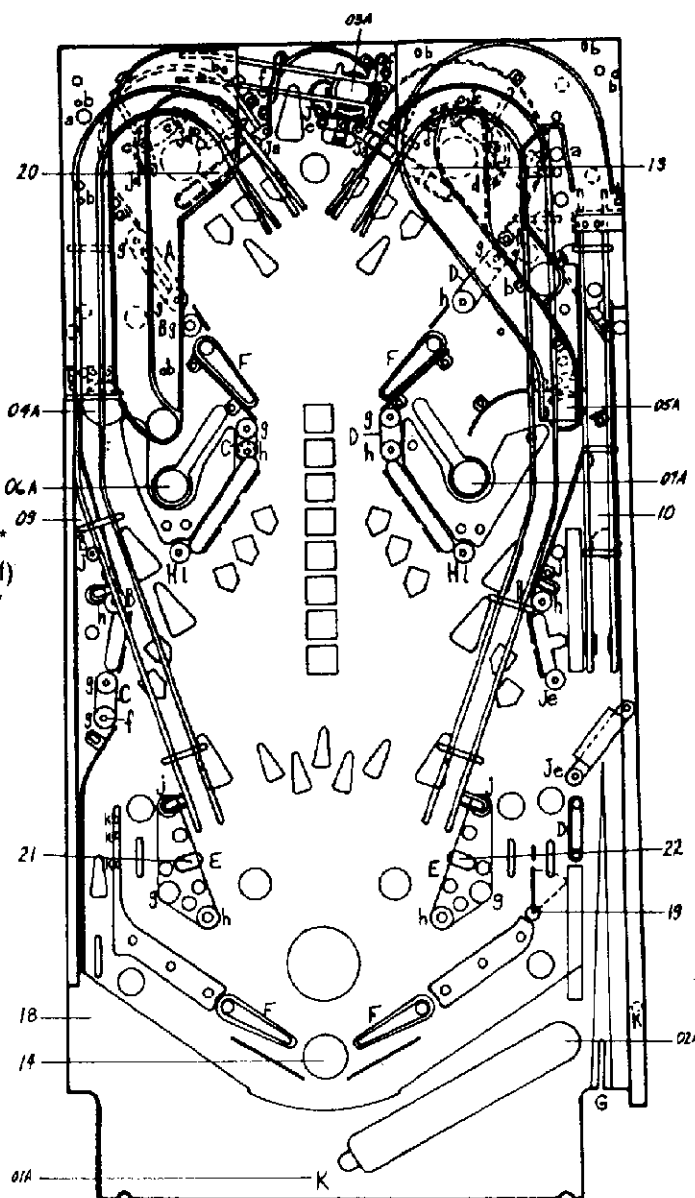
- 1 King's Chamber (b/box) left 1
- 2 King's Chamber (b/box) left 2
- 3 King's Chamber (b/box) center
- 4 King's Chamber (b/box) right 2
- 5 King's Chamber (b/box) right 1
- 6 "Force Field" (Pop-up Post)
- 7 Shoot Again
- 8 Ball Popper Lock Hole
- 9 Backbox EXTRA BALL
- 10 Center Guards - 50K
- 11 Center Guards - 100K
- 12 Center Guards - 150K
- 13 Center Guards - 200K
- 14 Center Guards - SPECIAL
- 15 Left Outlane Kicker
- 16 Right Outlane Gate
- 17 Left Drop Target - top
- 18 Left Drop Target - mid
- 19 Left Drop Target - bottom
- 20 Right Drop Target - top
- 21 Right Drop Target - mid
- 22 Right Drop Target - bottom
- 23 EXTRA BALL - L Return Lane
- 24 EXTRA BALL - R Return Lane
- 25 Left Guard (bottom 1)
- 26 Left Guard (lower 2)
- 27 Left Guard (middle)
- 28 Left Guard (upper 2)
- 29 Left Guard (top 1)
- 30 Right Guard (top 1)
- 31 Right Guard (upper 2)
- 32 Right Guard (middle)
- 33 Right Guard (lower 2)
- 34 Right Guard (bottom 1)
- 35 Left Top Lock
- 36 Right Top Lock
- 37 Left Bottom Lock
- 38 Right Bottom Lock
- 39 Left Outlane SPECIAL
- 40 Right Outlane SPECIAL
- 41 BONUS Mult. - 2X
- 42 BONUS Mult. - 3X
- 43 BONUS Mult. - 4X
- 44 BONUS Mult. - 5X
- 45 BONUS Mult. - 6X
- 46 BONUS Mult. - 7X
- 47 BONUS Mult. - 8X
- 48 BONUS Mult. - 9X
- 49 Left B/box Seq. 1 (bottom)
- 50 Left B/box Seq. 2
- 51 Left B/box Seq. 3
- 52 Left B/box Seq. 4
- 53 Left B/box Seq. 5 (top)
- 54 P/f Double Score
- 55 Left ADVANCE X
- 56 Right ADVANCE X

Solenoids/Flashers

Item	Part No.	Description
01A	AE-23-800	Outhole Kicker
01C	#89 Flashlamp	Playfield Back Panel
02A	AE-23-800	Ball Shooter Lane Feeder
02C	#89 Flashlamp	Lwr L (p/f) & Queen (b/b)
03A	AE-24-900	Ball Popper
03C	#89 Flashlamp	Lwr R (p/f) & Man (b/b)
04A	AE-23-800	Left Eject
04C	#89 Flashlamp	Center B/box
05A	AE-23-800	Right Eject
05C	#89 Flashlamp	L Cannon (p/f) & L B/box
06A	AE-23-800	Left Cannon
06C	#89 Flashlamp	R Cannon (p/f) & R B/box
07A	AE-24-900	Right Cannon
07C	#89 Flashlamp	L Troll (p/f) & "BIG" (b/b)
08A	AE-23-800	Knocker (Ticket Dispenser)
08C	#89 Flashlamp	R Troll (p/f) & "GUNS" (b/b)
09	5580-12145-01	Left General Illumination (p/f)*
10	5580-12145-01	Right General Illumination (p/f)
11	5580-12145-01	Backbox Gen. Illumin. Relay *
12	5580-09555-01	Solenoid A/C Select Relay**
13	AE-26-1000	Right Drop Target
14	AE-26-1200	Flipper "Force Field" Post
15	#1251 Flashlamp	INVINCIBLE
16	#89 Flashlamp	B/box Top Center
17	AE-24-900	King's Chamber (b/b) Kicker
18	AE-23-800	Left Outlane Kickback
19	SZ-35-4000-DC	Right Gate
20	AE-25-1000	Left Drop Target
21	AE-23-800	Left Kicker ("Sling")
22	AE-23-800	Right Kicker ("Sling")
-	FL 11630-50VDC	Lower Left and Right Flipper
-	FL 11753-50VDC	Upper Left and Right Flipper

* - On Relay Board, C-11677-3

** - In backbox on Aux Power Driver Bd, D-11813



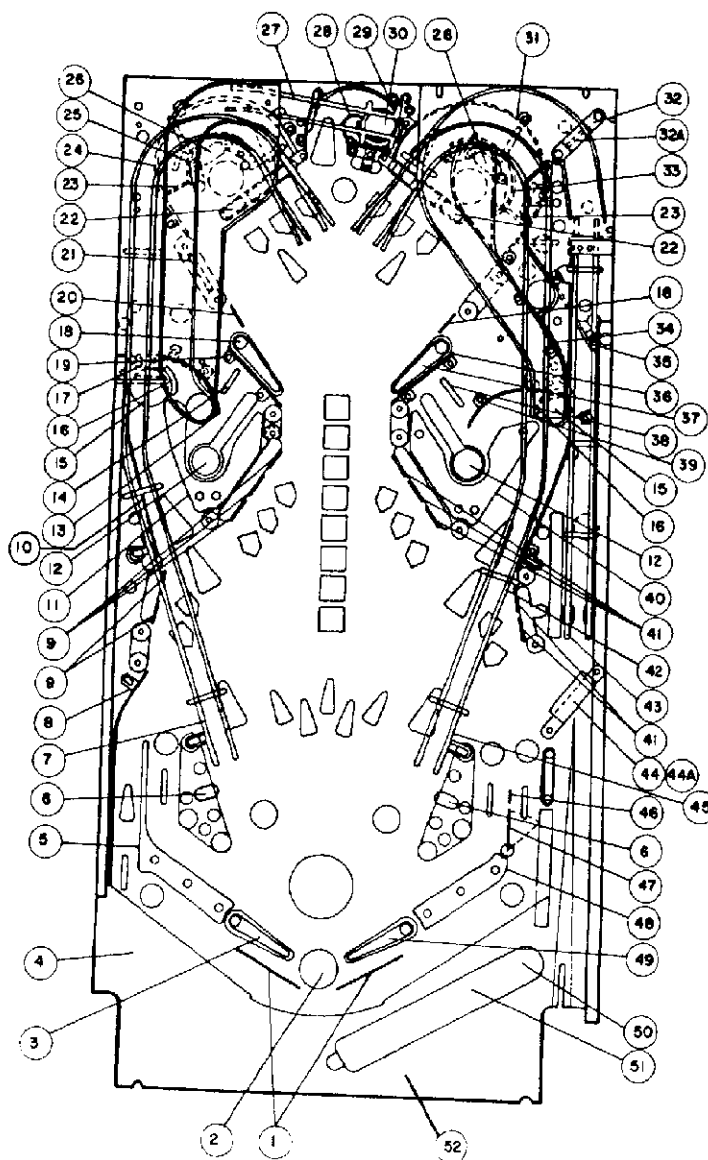
Rubber Parts

Item	Part No.	Description	Qty.
A	23-6304	1-1/2" Ring	1
B	23-6300	5/16" Ring	6
C	23-6301	3/4" Ring	3
D	23-6303	1-1/4" Ring	3
E	23-6306	2-1/2" Ring	2
F	23-6519-4	Red Flipper Ring	4
G	23-6327	Ball Shooter Tip	1
H	23-6551	Bumper, Yellow	2
J	23-6556	Sleeving, Black	9
K	23-6313-1	Grommet	1

Playfield Posts

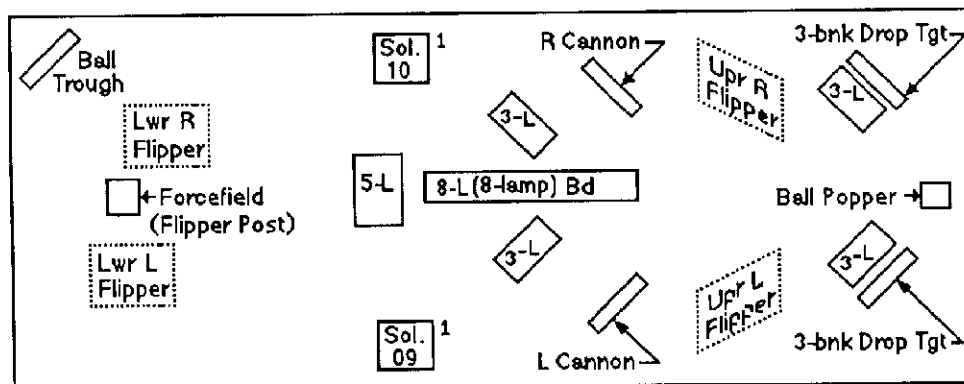
Item	Post Part #	Sleeve Part #
a	02-4315	23-6556
b	02-3648-1	03-6047-11
c	02-3905	23-6535
d	02-4167	23-6556
e	02-4168	
f	02-3648	02-3408
g	4106-01001-24	03-7542-8
h	02-4002-1	03-7542-8
j	02-4254	02-4014
k	4205-01016-16	02-4020
l	02-3702	23-6551

Playfield Parts



Item	Part No.	Description
1	12-6468-2	Anti-Rebound Wireform
2	C-11819	"Forcefield" Pop-up Post
3	C-11626-L-4	Flipper Assembly
a)	20-9250-5	Flipper Arm on Shaft
4	B-11873	L Outlane Kickback
5	B-8239-1	Left Flipper Return Frame
6	B-9463	Kicker (Slingshot) Assy
7	12-6718	Left Wire Return Ramp
8	B-11668	Ball Guide Assembly
9	B-11696-4	L Standup Target, Red
10	B-11669	Ball Guide Assembly
11	01-8670	L Cannon Ball Guide
12	C-11641	Cannon
13	A-11796	Ball Guide Assembly
14	12-6466-5	Wireform 1-1/4"
15	B-9361-R-1	L Eject Hole Assembly
16	12-6468-3	Anti-Rebound Wireform
17	01-8646	Ball Deflector
18	C-11626-L-8	Flipper Assembly
19	B-11795	Ball Guide Assembly
20	12-6466-4	Wireform, 1"
21	12-6466-7	Wireform, 1-3/4"
22	C-11223-2	3-Bnk Drop Target Assy
23	12-6746	Gate Wire
24	C-11656	Ball Guide Assembly
25	A-11653	Ball Guide Assembly
26	B-11854-6	Troll Standup Tgt, Yellow
27	12-6744	Wire Ramp, Ball Popper
28	12-6756	Wireform
29	B-11790	Ball Guide Assembly
30	D-11335	Ball Popper Assembly
31	C-11655	Ball Guide Assembly
32	A-11803	Ball Gate Assembly
a)	12-6754	Ball Gate Wire
33	A-11654	Ball Guide Assembly
34	A-11794	Ball Guide Assembly
35	B-11791	Ball Guide Assembly
36	A-11793	Ball Guide Assembly
37	C-11626-R-8	Upper R Flipper Assembly
38	12-6466-6A	Wireform, 1-5/8"
39	B-11792	Ball Guide Assembly
40	B-11775	Ball Guide Assembly
41	B-11696-2	R Standup Target, Green
42	B-11667	Ball Guide Assembly
43	12-6743	Wire Ramp, Shooter Lane
44	A-11126	Ball Gate Assembly
a)	12-6690	Gate Wire
45	12-6719	R Wire Return Ramp
46	12-6466-2	Wireform, 1/2"
47	A-10607	Post & Gate Assembly
48	A-11889	Right Return Lane Frame
49	C-11626-R-4	Lower R Flipper Assembly
50	C-9638	Ball Shooter Lane Feeder

Item	Part No.	Description
51	B-8644	Ball Tr. Switch Plate Assy
52	B-8039-2	Outhole Kicker Assembly

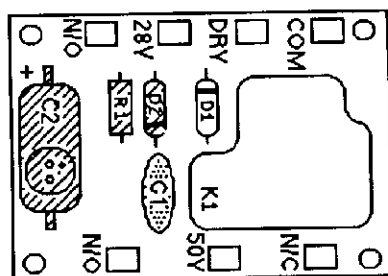


Playfield Circuit Boards Locations
(under side of playfield)

Associated Parts Numbers

(Clockwise from ball trough area)

C-11626-R-4	Lower Right Flipper Assembly	C-11823	3-Lamp PC Bd ("3-L")
C-11677-3	Relay PC Bd (Sol. 10)	C-11626-L-8	Upper Left Flipper Assembly
C-11823	3-Lamp PC Bd ("3-L")	C-11641	Left Cannon Assembly
C-11641	Right Cannon Assembly	C-11823	3-Lamp PC Bd ("3-L")
C-11626-R-8	Upper Right Flipper Assembly	C-11677-3	Relay PC Bd (Sol. 09)
C-11823	3-Lamp PC Bd ("3-L")	C-11626-L-4	Lower Left Flipper Assembly
C-11223-2	3-Bank Drop Target Assembly	C-11819	"Forcefield" Post Assembly
D-11335-1	Ball Popper Assembly	C-11815	Guards' Scores Lamp PC Bd ("5-L")
C-11223-2	3-Bank Drop Target Assembly	D-11806	Bonus Mult. Lamp Assy ("8-L")



C-11677-1 Relay Snubber Board*

C-11677-2 Relay Board**

C-11677-3 Relay Snubber Board***

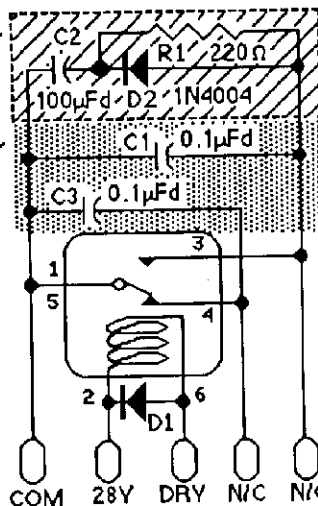
* Parts in dashed line box are for -1 boards only.

** Parts in dashed and dotted boxes are omitted for -2 boards.

*** Only C1 and C3 are for -3 boards.

This circuit is for C-11677-1 only.

This circuit is for C-11677-3 only.



C-11677-Series Board Schematic