16-555-101
February, 1987

MILLIONAIRE

INSTRUCTION MANUAL

Williams®
ELECTRONICS GAMES, INC.

MILLIONAIRE 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

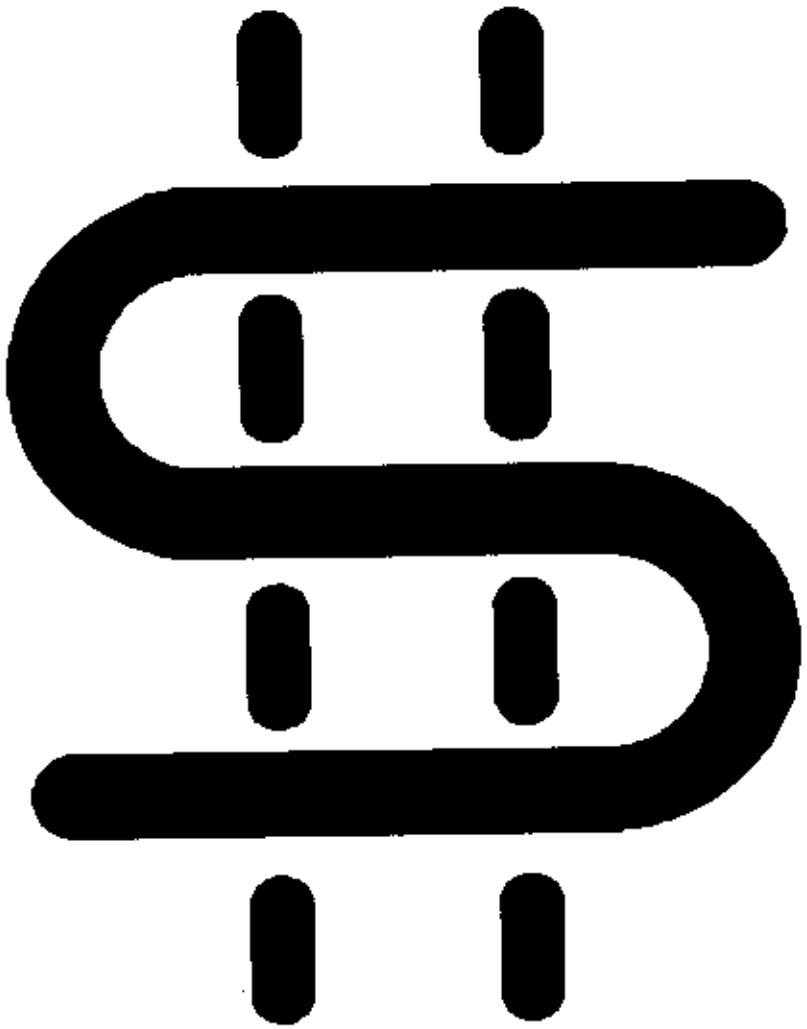
MILLIONAIRE Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color [1]	Connections CPU Bd.	Connections Playfield/ Cabinet	Driver Trans.	Solenoid Part Number / Flashlamp Type (b = Backbox, p = Playfield)
01A [3]	Outhole	Switched	{Vio-Brn	1P11-1	8P3-1 (to B1 on	Q33	AE-23-800-01
01C [3]	Top Kickbig - Right Flashlamp	Switched	Blk-Brn}	(Gry-Brn)	Diode Sw. Bd.)	Q33	#89 flashlamp 1p
02A [3]	Ball Trough Feeder	Switched	{Vio-Red	1P11-3	8P3-2 (to B2 on	Q25	AE-23-800-03
02C [3]	Top Kickbig - Left Flashlamp	Switched	Blk-Red}	(Gry-Red)	Diode Sw. Bd.)	Q25	#89 flashlamp 1p
03A [3]	Left Eject	Switched	{Vio-Orn	1P11-4	8P3-3 (to B3 on	Q32	AE-26-1500-01
03C [3]	Top Kickbig	Switched	Blk-Orn}	(Gry-Orn)	Diode Sw. Bd.)	Q32	AE-24-900-02 [4]
04A [3]	Right Eject	Switched	{Vio- Yel	1P11-5	8P3-4 (to B4 on	Q24	AE-26-1500-01
04C [3]	Mid. Kicker - Top Flashlamps	Switched	Blk-Yel}	(Gry-Yel)	Diode Sw. Bd.)	Q24	#89 flashlamps 2b, 2p
05A [3]	Top Drop Target	Switched	{Vio-Grn	1P11-6	8P3-5 (to B5 on	Q31	AE-23-800-04
05C [3]	Mid. Kicker - Mid. Flashlamps	Switched	Blk-Grn}	(Gry-Grn)	Diode Sw. Bd.)	Q31	#89 flashlamps 2b, 2p
06A [3]	Bottom Drop Target	Switched	{Vio-Blu	1P11-7	8P3-6 (to B6 on	Q23	AE-23-800-04
06C [3]	Mid. Kicker - Bottom Flashlamps	Switched	Blk-Blu}	(Gry-Blu)	Diode Sw. Bd.)	Q23	#89 flashlamps 2b, 2p
07A [3]	Right Kickbig	Switched	{Vio-Wht	1P11-8	8P3-7 (to B7 on	Q30	AE-24-900-02 [4]
07C [3]	Left Eject Flashlamps	Switched	Blk-Gry}	(Gry-Vio)	Diode Sw. Bd.)	Q30	#89 flashlamps 2b, 1p
08A [3]	Knocker	Switched	{Vio-Blk	1P11-9	8P3-8 (to B8 on	Q22	AE-23-800-02
08C [3]	Right Eject Flashlamps	Switched	Blk-Vio}	(Gry-Blk)	Diode Sw. Bd.)	Q22	#89 flashlamps 2b, 1p
09	Middle Kicker	Controlled	Brn-Blk	1P12-1	8P3-9	Q17	AE-23-800-03
10		Controlled	Brn-Red	1P12-2	8P3-10	Q9	
11	General Illumin.	Controlled	Brn-Orn	1P12-4	3P7-1	Q16	5580-09555-01 [5]
12	Solenoid A/C Select Relay	Controlled	Brn-Yel	1P12-5	8P3-12	Q8	5580-09555-01 [4]
13	Right Gate	Controlled	Brn-Grn	1P12-6	8P3-13	Q15	SZ-31-2000-DC
14	Moving Ball Guide	Controlled	Brn-Blu	1P12-7	8P3-14	Q7	5580-09555-01 [4]
15	C. B. Spinner Detent	Controlled	Brn-Vio	1P12-8	8P3-15	Q14	SM-26-600-DC
16	C. B. Spinner Motor	Controlled	Brn-Gry	1P12-9	8P3-16	Q6	14-7945
17	Left Gate	Special #1	Blu-Brn	1P19-7	8P3-17	Q75	SZ-31-2000-DC
18	Left Jet Bumper	Special #2	Blu-Red	1P19-4	8P3-18	Q71	AE-23-800-03
19	Right Jet Bumper	Special #3	Blu-Orn	1P19-3	8P3-19	Q73	AE-23-800-03
20	Bottom Jet Bumper	Special #4	Blu-Yel	1P19-6	8P3-20	Q69	AE-23-800-03
21	Left Kicker	Special #5	Blu-Grn	1P19-8	8P3-21	Q77	AE-23-800-03
22	Right Kicker	Special #6	Blu-Blk	1P19-9	8P3-22	Q79	AE-23-800-03
-	Upper Right Flipper	-	[Blk-Yel]		[7J1-19, 8P3-33]	-	FL23/600-30/2600-50VDC
-	Right Flipper	-	Orn-Vio [Blu-Vio]	1P19-1	7P1-20 [7J1-21,8P3-34] [2]	-	FL23/600-30/2600-50VDC
-	Left Flipper	-	Orn-Gry [Blu-Gry]	1P19-2	7P1-23 [7J1-24,8P3-32] [2]	-	FL23/600-30/2600-50VDC

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; "C" coils are pulsed, with Sol. 12 energized. Wire colors in brackets are those from respective A and C terminals corresponding to the B terminal connection listed for the Diode Switching Board, which controls the device pulsing by Sol. 12. 4. Relay (p/n 5580-09555-01) is mounted on Relay Snubber Bd. p/n C-11232 or C-11232-2, or Relay Bd. p/n C-11232-1. 5. Relay is mounted on Power Supply Bd. D-8345 in the backbox.

16-555-101
February,1987

MILLIONAIRE



INSTRUCTION MANUAL

NOTES

Contents

Section 1 - Game Operation & Test Information

Contents

Section 2 - Game Parts Information

Section 3 - Reference Diagrams & Schematics

Section 1

Game Operation & Test Information

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

MILLIONAIRE (System-11A) ROM Summary

IC	DESCRIPTION	TYPE	IDENTIFIER	BOARD	PART NUMBER
Game ROM 1	32K x 8 ROM	27256	U27	CPU	A-5343-555-2
Game ROM 2	16K x 8 ROM	27128	U26	CPU	A-5343-555-1
Sound ROM 1	32K x 8 ROM	27256	U21	CPU	A-5343-555-4
Sound ROM 2	32K x 8 ROM	27256	U22	CPU	A-5343-555-3
Background (B/G) Sound/Speech ROM 1	32K x 8 ROM	27256	U4	B/G Snd./Sp.	A-5343-555-5
B/G Snd./Spch. ROM 2	32K x 8 ROM	27256	U19	B/G Snd./Sp.	A-5343-555-6

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 circuit board), 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.

MILLIONAIRE CIRCUIT BOARDS

All *MILLIONAIRE* 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 (p/n D-11392-555) must be equipped with the ROMs specified in the *MILLIONAIRE* (System-11A) ROM Summary. For this ROM complement and CPU Board, 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.)

BACKGROUND SOUND/SPEECH BOARD. The Background Sound/Speech Board is p/n D-11298-555, as supplied with ROMs and microprocessor.

DISPLAY BOARD. The Alphanumeric Display Unit Board is p/n D-11415.

POWER SUPPLY BOARD. The Power Supply Board is p/n D-8345 -555.

Prefix numbers for *MILLIONAIRE* 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 - B/G Sound/Speech
2 - (not assigned)	7 - Cabinet	12 - (not assigned)
3 - Backbox Power Supply	8 - Playfield	13 - (not assigned)
4 - Alphanumeric Display	9 - Insert Board	14 - (not assigned)
5 - (not assigned)	10 - (not assigned)	15 - Flipper Power Supply

MILLIONAIRE 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 mechanisms 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. *MILLIONAIRE* 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.

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 Test/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 Test/Diagnostic Procedures.

PINBALL GAME ASSEMBLY INSTRUCTIONS

1. Open the shipping container; remove all cartons, parts, and other items, and set them aside.
2. Place cabinet on a support and attach rear legs (after installing leg levellers), using leg bolts. Leg levellers and leg bolts are both provided among the parts in the cash box.
3. Attach the front legs (after installing leg levellers), using leg bolts.
4. Open the coin door and remove keys from clip on door.
5. 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.

6. 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.

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.

7. Extend each leg leveler *slightly* below the leg bottom, so that all four foot pads are extended about the same distance. Remove the cabinet from its support and place it on the floor.
8. Remove the playfield cover glass to allow release of Ball inside the Captured Ball Spinner on the playfield, as follows: Raise the playfield carefully to just past the vertical position, resting the upper left corner on the Ball Roll Tilt panel. Release the Spinner Ball by removing the sleeving holding the ball within the spinner: To remove sleeving, cut tie wrap at one end and pull sleeving from the opposite end.
9. Adjust the leg levelers for proper playfield level (side-to-side) *and* playfield pitch angle (incline) of approximately 6 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, as shown in Figure 1.

CAUTION

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

10. Move the game into the desired location; recheck the level and pitch angle of the playfield.
11. Verify that the ***required number*** of balls are installed in the game.
12. Clean and re-install the playfield cover glass. Prepare the game for player operation.

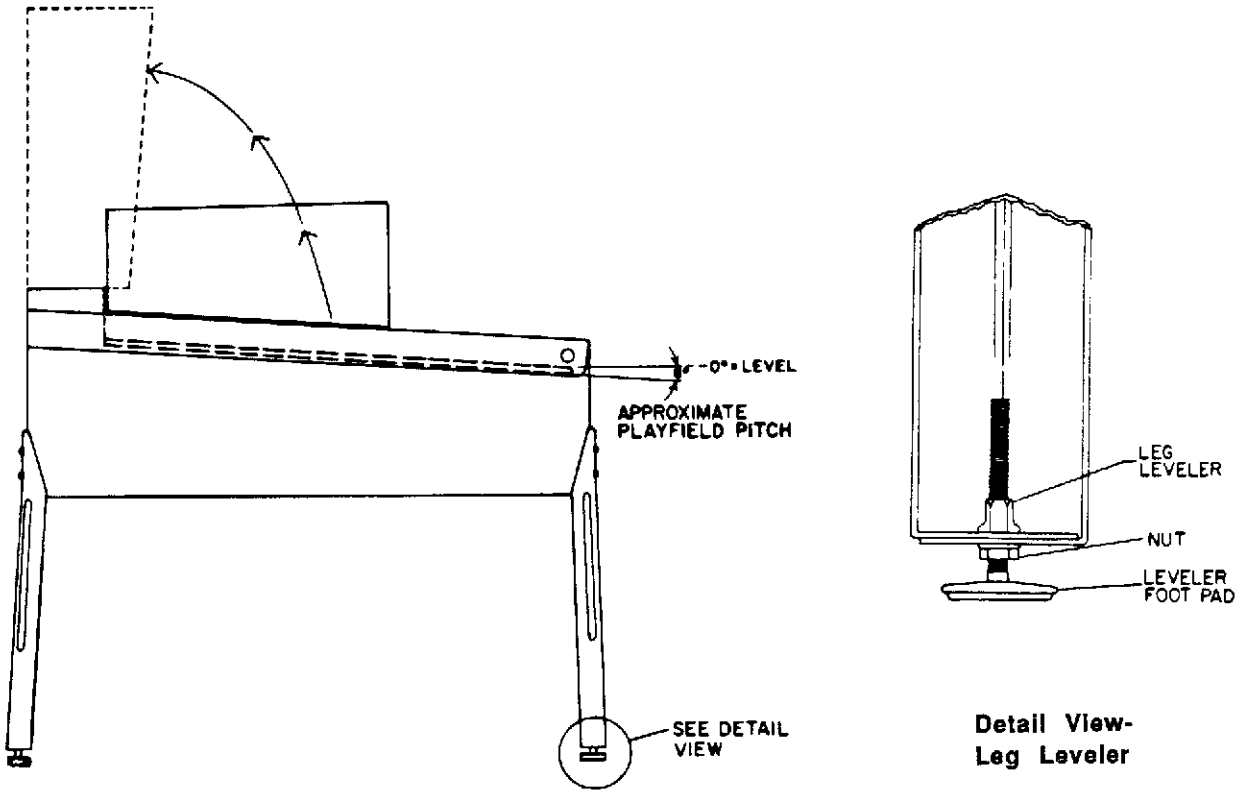


Figure 1. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

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 and the lower two 2-digit displays (Credits and BALL IN PLAY/MATCH) initially all show 00. The GAME OVER indicator blinks. Then, the game goes into the Attract Mode (Playfield and backbox lamps flashing, sounds being heard, etc.).

Open the coindoor and press the AUTO-UP/MANUAL-DOWN switch to MANUAL-DOWN. Press the ADVANCE button to begin the game test routine. Return to AUTO-UP and perform the entire test to verify that the game is operating satisfactorily.

CAUTION

MILLIONAIRE's SYSTEM 11A game program has a great capability to aid the operator and service personnel: At game Turn-On (and also when the operator is beginning the Test/Diagnostic Procedures), a display now signals when a switch has NOT been actuated during ball play for 60 balls (20 games). Up to three switches can be displayed during this Switch Problem reporting activity. Moreover, *MILLIONAIRE* compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep *MILLIONAIRE* earning good profits! More information is available in the Test/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" ("CAN YOU ... EARN A ... MILLION DOLLARS.")*;
C. The score to achieve to obtain a Replay award*;
D. Brief game feature instructions.

These (or similar) displays 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.

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 (until the first playfield switch is actuated), and the BALL IN PLAY display shows 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; *MILLIONAIRE* 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 GAME OVER indicator lights. Then, the high scores flash on the appropriate player score displays. The game proceeds to the Attract Mode.

* - operator-adjustable feature

MILLIONAIRE GAME PLAY

M-O-N-E-Y Targets — Hitting all five targets once opens the Left (drain lane) Gate*. "BIG MONEY!" sounds.

B-A-N-K Targets — Hitting all four targets lights the lamp for each letter, and:

A. Opens the Right (drain Lane) Gate*.

B. Blinks the SILVER Target lamp. Then, hitting the SILVER Target lamp causes the B-A-N-K lamps to begin blinking, and sounds "BREAK THE BANK!" Hitting each B-A-N-K Target again starts blinking the GOLD Target lamp. Hitting the GOLD Target again starts blinking the LIGHTS CASH HELD lamp.

Awarding EXTRA BALL (Earn Again) — Score an EXTRA BALL by:

1. Landing in the EXTRA BALL hole on the "WHEEL OF RICHES"; or
2. Hitting the M-O-N-E-Y and GOLD targets to light the EXTRA BALL arrow. Then, a ball shot up the path of the lit EXTRA BALL arrow gets the EXTRA BALL, and lights the EARN AGAIN lamp.

WHEEL OF RICHES — Landing in the Eject Hole with the lighted SPIN lamp starts the WHEEL OF RICHES. Both SPIN lamps are lit at the beginning of every ball; they go out after a shot lands in the Eject Hole. A flipper return lane shot can light the SPIN lamp again, but a timer controls its 'On' period.

The WHEEL OF RICHES has 12 scoring possibilities: $10,000; $20,000; $30,000; $40,000; $50,000; $100,000; 2 - $5,000 or EXTRA BALL WHEN FLASHING; 2 - $5,000 or SPECIAL WHEN FLASHING; 2 - $5,000 or MULTI-BALL™.

Moving Ball Guide — Success with this skill shot allows the player to score the (Gold Bars) Drop Targets and advance the Bonus Multipliers 2X - 3X - 5X.

MULTI-BALL™ Play — Locking the balls (up the left ramp, or into the wireform ramp) starts the Payoff display (Example: Go for Emerald $100,000). Multi-Ball™ play then begins as both balls speed back onto the playfield.

PAYOFFS — Locking the balls again (up the left ramp, or into the wireform ramp), while in Multi-Ball, scores the Payoff. The 4 Payoff levels are Emerald (100,000 - 500,000); Ruby (250,000 - 1,000,000); Diamond (500,000 - 2,000,000); Hotshot (500,000). The Hotshot level is only revealed, when the player scores a Diamond payoff. Each payoff level goes up $5,000**, until its maximum payoff value is reached. When a player scores a payoff, that payoff resets itself to its minimum value.

***MILLIONAIRE* Status** — The closer a player nears earning a million, the more letters of the word MILLIONAIRE light on the playfield. When a player scores one million, the game announces, "MILLIONAIRE", and awards a spin on the WHEEL OF RICHES.

Flipper Buttons — Holding the left flipper buton displays the first 3 Payoff levels, or the Payoffs left to be scored. Holding the right flipper button shows the Replay level and the latest High Scores.

Bonus — Bonus goes from $1,000 to $79,000 with no lighted bonus multipliers. The Bonus amount shows on the playfield by lighted lamps during play, and in the players' score displays at the end of play for a ball.

* - Timed Feature Adjustable by Operator

** - Value Adjustable by Operator

MILLIONAIRE GAME STATUS DISPLAYS

MILLIONAIRE 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 *MILLIONAIRE* 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. *MILLIONAIRE's* 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 display 3 does not appear in the listing because it remains blank):

Player 1	Player 2	Player 4	Credits	BALL IN PLAY/ MATCH
MILLIONAIRE	**555**	**L-x***	**Id**	**00**

* x - 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 Credits display shows the status display mode in abbreviated form, *Id*. The BALL IN PLAY/MATCH display shows the status display mode item for this particular display.

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 *MILLIONAIRE's* System 11A game program now performs all the mathematical factor 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 ***MILLIONAIRE*** **Audit Table** lists the 44 items of the Audit Information portion of the *MILLIONAIRE* 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 Credits 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.)

MILLIONAIRE GAME STATUS DISPLAYS (Continued)

MILLIONAIRE Audit Table

Audit Item (MATCH)	Descriptive Phrases (Player 1 and 2 Displays)	Audit Factor [1] Value (Player 4)
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	Replay 1 Awards	
21	Replay 2 Awards	
22	Replay 3 Awards	
23	Replay 4 Awards	
24	1 Playr Games	
25	2 Playr Games	
26	3 Playr Games	
27	4 Playr Games	
28	Burn In Cycles	
29	C. B. SPIN Percent (Last Auto. Adj. % for Captured Ball Spinner	
30	Special Percent (Last Auto. Adj.% for C. B. Spinner Special)	
31	Ex. Ball Percent (Last Auto. Adj. % for C. B. Spin Extra Ball)	
32	Emerald Awards (# of Emerald Payoff Awards)	
33	Ruby Awards (# of Ruby Payoff Awards)	
34	Diamond Awards (# of Diamond Payoff Awards)	
35	C. B. Spin Spins (# of times C. B. Spinner was spun)	
36	Minutes "ON" (# of minutes game has been operating)	
37	C. B. Spin Ex. Ball (# of Ex. Balls awarded from C. B. Spinner)	
38	GOLD/$ Ex. Ball (# of Ex. Balls awarded from GOLD & M. O. N. E. Y.)	
39	H. S. Reset Counter	
40	Aut. Pct. Data 1	
41	Aut. Pct. Data 2	
42	Aut. Pct. Data 3	
43	Aut. Pct. Data 4	
44	Aut. Pct. Data 5	

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.

MILLIONAIRE GAME STATUS DISPLAYS (Continued)

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 *MILLIONAIRE* 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.

MILLIONAIRE Game Adjustment Table

Adjustment Item (MATCH)	Descriptive Phrases (Player 1 and 2 Displays)	(Player 3)	Factory Setting (Player 4)
01	AUTO REPLAY [1] or FIXED REPLAY [1]	PERCENT	LEARN10 [1] SCORES
02	REPLAY START (or REPLAY LEVEL 1) [1]		1,900,000
03	REPLAY LEVELS (or REPLAY LEVEL 2) [1]		01 (or OFF)
04	(REPLAY LEVEL 3) [1]		(see text)
05	(REPLAY LEVEL 4) [1]		(see text)
06	REPLAY AWARD		Credit
07	SPECIAL AWARD		Credit
08	MATCH FEATURE	[Off, 1 - 50%]	10(%)
09	BALLS / GAME		03
10	TILT WARNING		03
11	EX. BALL / B. I. P.	{[00 = NO Ex. Ball; 1-9 E. B. /Ball; 1-9 E. B. /B. I. P.; 1-9 E. B. /Game]}	2/BIP
12	MAXIMUM CREDITS		10
13	HIGHEST SCORES		On
14	BACKUP HI. SCR.1		3,000,000
15	BACKUP HI. SCR. 2		2,500,000
16	BACKUP HI. SCR. 3		2,000,000
17	BACKUP HI. SCR. 4		1,500,000
18	HI. SCR.1 CREDITS		04
19	HI. SCR.2 CREDITS		03
20	HI. SCR.3 CREDITS		02
21	HI. SCR.4 CREDITS		01
22	H. S. RESET EVERY (3,000 PLAYS) [2]		
23	FREE PLAY		NO
24	U.S.A. 1 COINAGE (1 COIN 1 PLAY) [2,3]		
25	LEFT UNITS		01
26	CENTER UNITS		04
27	RIGHT UNITS		01
28	UNITS/ CREDIT		01
29	UNITS/ BONUS		00
30	MINIMUM UNITS		00
31	M.O.N.E.Y. MEMORY	[no = not stored in memory; yes = stored]	NO
32	B.A.N.K. MEMORY	[no = not stored in memory; yes = stored]	NO
33	GOLD MEMORY	[no = not stored in memory; yes = stored]	NO
34	LIT. HOLD MEMORY	[no = not stored; yes = stored]	NO
35	GATES MEMORY	[no = not stored; yes = stored]	NO
36	BON. MULT. MEMORY	[no = not stored; yes = stored]	NO
37	GATES TIMED	[0 = NO; 1 - 99 sec]	5 sec
38	PAYOFF ADVANCE	[1,000 - 99,000]	5000
39	C. B. SPIN AUTO AD.	[NO AUTO; 1 - 90%]	50(%)
40	C. B. SPIN TIMER	[Untimed; 1 - 99 sec]	20 sec
41	SPECIAL AUTO AD.	[NO AUTO; 1 - 99%]	10(%)

MILLIONAIRE GAME STATUS DISPLAYS (Continued)

The ***MILLIONAIRE* Game Adjustment Table** lists the 70 items of the Adjustment Information portion of the *MILLIONAIRE* Game Status Displays. Presentation of the displays is similar to that for the Audit Information (that is, the player 1 and 2 displays combine as a descriptive phrase; the light type below the column headings names the respective backbox displays where the information appears, etc.). The Credits display shows *Ad* for all 70 adjustment items, so its entry is omitted from the tabular listing.

MILLIONAIRE Game Adjustment Table (Continued)

Adjustment Item (MATCH)	Descriptive Phrases (Player 1 and 2 Displays)		Factory Setting (Player 4)
42	SPECIAL 1 LITE PER 1 SPIN	[1 - 2 lites, 1 - 8 spins]	1 LITE/1 SPIN
43	EX. BALL AUTO AD.	[1% - 99%; or NO AUTO]	33 (%)
44	EX. BALL 2 LITES PER 1 SPIN	[1 - 2 lites, 1 - 8 spins]	2 LITES/1 SPIN
45	SPIN LAMPS	[On; Off]	On
46	SPECIAL / GAME	[NO Specials; 1 - 9/Ball; 1 - 9/B.I.P.; 1 - 9/game]	1 / GAME
47	CONSOL GATE	[0 = NO; 1 - 99 sec]	30 sec
48	A. MODE SOUNDS	[ALOT; LESS; NONE]	ALOT
49	CUSTOM MESSAGE [4]		ON
50	SW. ALARM KNOCKER		YES
51	ENGLISH TEXT		
52	UNUSED ADJUST		
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 to install their replay level scores. Turn off any replay score 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 BALL IN PLAY/MATCH display initially indicates **Ad 01.** The player 1 and 2 score displays indicate AUTO REPLAY. The player 3 display shows PERCENT. If the factory setting has not been changed, the player 4 display shows LEARN10, indicating the setting of a 10% replay percentage. (The "Learn" feature causes the game program to adjust itself automatically, as discussed in the following text concerning the 'details' about Adjustment Item 01.)

2. To reach a higher item number (in the BALL IN PLAY/MATCH 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 ***MILLIONAIRE* Game Adjustment Table**) showing in the BALL IN PLAY/MATCH 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 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 BALL IN PLAY/MATCH 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. *MILLIONAIRE* 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 BALL IN PLAY/MATCH display. Press the Credit button to display the YES option in the player 4 display. Using AUTO-UP, press ADVANCE once. *MILLIONAIRE* 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 *LEARN 10%* (German games have a Factory Setting of *LERNE 15%*). The *LEARN* mode aids a game's initial installation by causing the game program to compare the value of the Replay Level to the player's score 16 times during 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 *LEARN 5* to *LEARN 50* (%), followed by *5%* to *50%* ,with the value increasing using AUTO-UP (or decreasing using MANUAL-DOWN). The next Credit button change beyond 50%, or below LEARN 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). *MILLIONAIRE* 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 1,400,000 (German games have a Factory Setting of 1,000,000). 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, *MILLIONAIRE* 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. *MILLIONAIRE* 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. *MILLIONAIRE* 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:

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 Knocker coil to activate once per free game won (instead of awarding a credit for each level exceeded).

NOTE

A ticket dispenser or token dispenser can be activated by the Knocker coil driver to provide an alternative award for each free game 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:

11 Extra Ball/Ball In Play (Continued)

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.
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 3,000,000. (The Factory Setting for German games is 5,200,000.) 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 2,500,000. (The Factory Setting for German games is 5,000,000.) 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 2,000,000. (The Factory Setting for German games is 4,800,000.) 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 1,500,000. (The Factory Setting for German games is 4,600,000.) 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 04. 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 03.

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 02.

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 *1,000* to *99,000* games (in increments of 1,000). 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 choices are:

No - A coin is necessary for game play. This is the Factory Setting.
Yes - Game play is free; no coin is required.

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.

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.

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 M. O. N. E. Y. Lamps Memory
The operator can choose (via the Credit button) whether the lighted M. O. N. E. Y. lamps are stored in memory for the 'next ball'. The choices are:

No - These lamps are turned off (not stored in memory) at the start of a ball. The Factory Setting is No.
Yes - Lighted lamps ARE stored in memory and recalled for the player's next ball.

32 B. A. N. K. Lamps Memory
The operator can choose (via the Credit button) whether the lighted B. A. N. K. lamps are stored in memory for the 'next ball'. The choices are:

No - These lamps are turned off (not stored in memory) at the start of a ball. The Factory Setting is No.
Yes - Lighted lamps ARE stored in memory and recalled for the player's next ball.

33 GOLD/SILVER Lamps Memory
The operator can choose (via the Credit button) whether the lighted GOLD and SILVER lamps are stored in memory for the 'next ball'. The choices are:

No - These lamps are turned off (not stored in memory) at the start of a ball. The Factory Setting is No.
Yes - Lighted lamps ARE stored in memory and recalled for the player's next ball.

34 LITES CASH HELD Lamp Memory
The operator can choose (via the Credit button) whether the lighted 'LITES CASH HELD' lamp is stored in memory for 'next ball' play. The choices are:

No - The lamp is turned off (not stored in memory) at the start of a ball. The Factory Setting is No.
Yes - The lighted lamp IS stored in memory and recalled for the player's next ball.

35 Gates Memory
The operator can choose (via the Credit button) whether the gates being open or closed is stored in memory for 'next ball' play. This applies *only* if Ad 37 is set to No. The choices are:

No - The gates are all closed (not stored in memory) at the start of a ball. The Factory Setting is No.
Yes - The gate positions ARE stored in memory and recalled for the player's next ball.

36 Bonus Multiplier Memory
The operator can choose (via the Credit button) whether the lighted Bonus Multiplier lamps are stored in memory for 'next ball' play. The choices are:

No - These lamps are turned off (not stored in memory) at the start of a ball. The Factory Setting is No.
Yes - Lighted lamps ARE stored in memory and recalled for the player's next ball.

37 Gates Timed
The operator can select (via the Credit button) whether the operation of the left and right gates (opened, respectively, by lighting the M. O. N. E. Y. and B. A. N. K. lamps) is to be untimed or timed. These gates control the draining of a ball from the outlanes of the playfield. An untimed gate remains open until a ball passes through it; a timed gate remains open for a specified period, *or* until a ball passes through it. Either type of gate always closes after a ball passes through it. The choices are:

00 - NO: Both gates are UNTIMED.
1 - 99 - The operator can select a period in seconds for the gates to stay open. The Factory Setting is Enabled and 5 seconds.

38 Payoff Advance
The operator can choose (via the Credit button) the number of points by which a payoff increases (advances), after the player actuates the Bonus Collect. The range of this adjustment item is *1,000* (slow advance) to *99,000* (fast advance). The Factory Setting is 5,000.

39 Captured Ball Spinner (C. B. Spin) Auto Adjustment
The operator can choose (via the Credit button) what percentage award is earned from the Captured Ball Spinner. The range of this automatic adjustment setting is *1%* (Hard) through *99%* (Extremely Easy); it can also be turned off (disabled), via a setting of *0*. When the automatic adjustment is turned on (enabled), the game program adjusts the setting, at the end of a game after 50 misses or awards, except when the current value is within 2% of the setting. Then, no auto adjustment occurs. The last percentage award can be viewed by accessing Audit Item Au 29. The Factory Setting is Enabled and 50%.

40 Captured Ball Spinner Timer
The operator can choose (via the Credit button) the degree of difficulty, via a timer setting, for the Captured Ball Spinner. The range of this setting is *1 second* (Hard) through *90 seconds* (Easy); it can also be *Untimed* (via a setting of *0*) for an Extremely Easy condition. Be aware that, if this is auto adjusted, the displayed value of this setting is the current, adjusted setting. The Factory Setting is 20 seconds.

41 Special Auto Adjustment
The operator can choose (via the Credit button) what percentage award is earned from the Special on the Captured Ball Spinner. The range of this automatic adjustment setting is *1%* (Hard) through *99%* (Extremely easy); it can also be turned off (disabled), via a setting of *0*. When the

41 Special Auto Adjustment (Continued)
automatic adjustment is turned on (enabled), the game program adjusts the setting, at the end of a game, after 50 misses or awards, except when the current value is within 2% of the setting. Then, no auto adjustment occurs. The last percentage award can be viewed by accessing Audit Item Au 30. The Factory Setting is Enabled and 10%.

42 Special 1 Lite Per 1 Spin
The operator can choose (via the Credit button) the degree of difficulty of awarding the Special on the Captured Ball Spinner. The difficulty increases as the number of spins for each light awarded increases. The range of this setting is:

# of Lights	# of Spins	Approx. % Award	# of Lights	# of Spins	Approx. % Award
2	1	16.6 (Easiest)	1	5	1.6
1	1	8.3	1	6	1.3
1	2	4.1	1	7	1.1
1	3	2.7	1	8	1.0 (Hardest)
1	4	2.0			

Be aware that, if this is auto adjusted, the setting is merely the initial, or current, setting. The FactorySetting is 2 Lites Per 1 Spin (16.6% approx.).

43 Extra Ball Auto Adjust
The operator can choose (via the Credit button) the desired percentage for awarding the Extra Ball by the Captured Ball Spinner. The range of this automatic adjustment setting is *1%* (Hard) through *99%* (Very easy); it can also be turned off (disabled), via a setting of *0*. When the automatic adjustment is turned on (enabled), the game program adjusts the setting, at the end of a game, after 50 misses or awards. No auto adjustment occurs when the current value is within 2% of the setting. The last percentage award can be viewed by accessing Audit Item Au 31. The Factory Setting is Enabled and 33%.

44 Extra Ball 2 Lites Per 1 Spin
The operator can choose (via the Credit button) the degree of difficulty of awarding the Extra Ball on the Captured Ball Spinner. The difficulty increases as the number of spins for each light awarded increases. The range of this setting is:

# of Lights	# of Spins	Approx. % Award	# of Lights	# of Spins	Approx. % Award
2	1	16.6 (Easiest)	1	5	1.6
1	1	8.3	1	6	1.3
1	2	4.1	1	7	1.1
1	3	2.7	1	8	1.0 (Hardest)
1	4	2.0			

Be aware that, if this is auto adjusted, the setting is merely the initial, or current, setting. The FactorySetting is 2 Lites Per 1 Spin (16.6% approx.).

45 Spin Lamps
The operator can choose (via the Credit button) whether the left and right "SPIN" lamps are turned on or off, at the start of a ball. Being turned on makes spinning the C. B. Spinner easier. The choices are:

On - Turn lamps on at the start of a ball. This is the Factory Setting.
Off - Turn lamps off at the start of a ball.

46 Special / Game

The operator can choose (via the Credit button) how many Specials are awarded to a player. The choices are:

00 - NO Specials are awarded; a score is given in lieu of a Special.
1-9/Ball - From 1 through 9 Specials per ball are allowed.
1-9/B. I. P. - From 1 through 9 Specials per Ball In Play (B. I. P.), all balls except Extra Balls.
1-9/Game - From 1 through 9 Specials per Game.

The Factory Setting is 1 Special per Game.

47 Consolation Gate

The operator can choose (via the Credit button) whether a player gets TWO GATES open for a certain time at the start of all balls except the first ball. This aids players who are not skilled pinball players. The conditions under which the gates are open are: a) This is the second (or higher) Ball In Play; b) The average ball time of the previous balls is less than the time specified by the operator to enable this adjustment. The choices are:

00 - NO Consolation Gate award is allowed.
01-99 - This is the minimum average ball time by which the Consolation Gate is Enabled. The Factory Setting is 30 seconds. (For German games, the Factory Setting is 40 seconds, via the W7 jumper settings.)

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 during the Rules display and the Attract Mode sequence. This is the Factory Setting.
LESS - Sounds occur during only the Attract Mode.
NONE - No sounds occur during the Attract Mode.

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:
CAN YOU ... EARN A ... MILLION DOLLARS.
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:
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789<>?-/*'
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 UNUSED ADJUST

This adjustment is not used for *MILLIONAIRE.*

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 is recommended 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 individual 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 indicate whether the operator has selected it, by identifying the Adjustment in the player 1 and 2 displays by name 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 by using 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	Lerne15 (%)	18	Hi Scr 1 Credits	03
02	Replay Start	1,900,000	19	Hi Scr 2 Credits	00
03	Replay Level 2	03	20	Hi Scr 3 Credits	00
Pu	Maximum Credits	30	21	Hi Scr 4 Credits	00
14	Backup Hi Scr 1	5,200,000	22	Hi Scr Reset	00
15	Backup Hi Scr 2	5,000,000	24	German 1 Coinage	10 Plays/5DM
16	Backup Hi Scr 3	4,800,000	47	Consol. Gate	40 sec
17	Backup Hi Scr 4	4,600,000	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	4,600,000
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	5,200,000	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	5,000,000	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	4,800,000	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	4,600,000
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	5,200,000	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	5,000,000	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	4,800,000	24	German 1 Coinage	10 Plays/5DM

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:

Ad	Name	New Setting	Ad	Name	New Setting
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 6 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	4,600,000
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	5,200,000	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	5,000,000	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	4,800,000	24	German 2 Coinage	6 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 6 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	4,600,000
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	5,200,000	20	Hi Scr 3 Credits	00
15	Backup Hi Scr 2	5,000,000	21	Hi Scr 4 Credits	00
16	Backup Hi Scr 3	4,800,000	24	German 2 Coinage	6 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 6 games for 5 DM. Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
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	6 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:

Ad	Name	New Setting	Ad	Name	New Setting
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			

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:

Ad	Name	New Setting
02	Replay Start	4,000,000
09	Balls / Game	05

61 Install Novelty

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

Ad	Name	New Setting	Ad	Name	New Setting
01	Fixed Replay		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 (sometines called "liberal"). Individual Adjustments are affected, as follows:

Ad	Name	New Setting	Ad	Name	New Setting
31	M. O. N. E. Y. Memory	Yes	39	C. B. Spin Auto Ad.	80 (%)
32	B. A. N. K. Memory	Yes	40	C. B. Spin Timer	20 sec
33	GOLD/SILVER Memory	Yes	41	Special Auto Ad.	10 (%)
34	Lit. Held Memory	Yes	42	Special	1 Lite per 1 Spin
35	Gates Memory	Yes	43	Ex. Ball Auto Ad.	33 (%)
36	Bon. Mult. Memory	Yes	44	Ex. Ball	2 Lites per 1 Spin
37	Gates Timed	No	45	Spin Lamps	On
38	Payoff Advance	10,000	46	Special/Game	1/Game

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:

Ad	Name	New Setting	Ad	Name	New Setting
31	M. O. N. E. Y. Memory	Yes	39	C. B. Spin Auto Ad.	60 (%)
32	B. A. N. K. Memory	Yes	40	C. B. Spin Timer	20 sec
33	GOLD/SILVER Memory	No	41	Special Auto Ad.	10 (%)
34	Lit. Held Memory	Yes	42	Special	1 Lite per 1 Spin
35	Gates Memory	No	43	Ex. Ball Auto Ad.	33 (%)
36	Bon. Mult. Memory	No	44	Ex. Ball	2 Lites per 1 Spin
37	Gates Timed	No	45	Spin Lamps	On
38	Payoff Advance	5,000	46	Special/Game	1/Game

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:

Ad	Name	New Setting	Ad	Name	New Setting
31	M. O. N. E. Y. Memory	No	39	C. B. Spin Auto Ad.	50 (%)
32	B. A. N. K. Memory	No	40	C. B. Spin Timer	20 sec
33	GOLD/SILVER Memory	No	41	Special Auto Ad.	10 (%)
34	Lit. Held Memory	No	42	Special	1 Lite per 1 Spin
35	Gates Memory	No	43	Ex. Ball Auto Ad.	33 (%)
36	Bon. Mult. Memory	No	44	Ex. Ball	2 Lites per 1 Spin
37	Gates Timed	5 sec	45	Spin Lamps	On
38	Payoff Advance	5,000	46	Special/Game	1/Game

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:

Ad	Name	New Setting	Ad	Name	New Setting
31	M. O. N. E. Y. Memory	No	39	C. B. Spin Auto Ad.	40 (%)
32	B. A. N. K. Memory	No	40	C. B. Spin Timer	15 sec
33	GOLD/SILVER Memory	No	41	Special Auto Ad.	8 (%)
34	Lit. Held Memory	No	42	Special	1 Lite per 1 Spin
35	Gates Memory	No	43	Ex. Ball Auto Ad.	30 (%)
36	Bon. Mult. Memory	No	44	Ex. Ball	1 Lite per 1 Spin
37	Gates Timed	5 sec	45	Spin Lamps	Off
38	Payoff Advance	2,000	46	Special/Game	1/Game

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:

Ad	Name	New Setting	Ad	Name	New Setting
31	M. O. N. E. Y. Memory	No	39	C. B. Spin Auto Ad.	40 (%)
32	B. A. N. K. Memory	No	40	C. B. Spin Timer	10 sec
33	GOLD/SILVER Memory	No	41	Special Auto Ad.	5 (%)
34	Lit. Held Memory	No	42	Special	1 Lite per 1 Spin
35	Gates Memory	No	43	Ex. Ball Auto Ad.	20 (%)
36	Bon. Mult. Memory	No	44	Ex. Ball	1 Lite per 1 Spin
37	Gates Timed	5 sec	45	Spin Lamps	Off
38	Payoff Advance	1,000	46	Special/Game	1/Game

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.

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.

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 *MILLIONAIRE*, 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 Credits display shows Ad and the BALL IN PLAY/MATCH display shows item 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 the16 "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 eqivalent 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 x 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.)

MILLIONAIRE Pricing Table

Country	Coin Chute Left	Center	Right	Games/Coin	Pricing Functions 24	25	26	27	28	29	30
USA and Canada	25¢		25¢	1/25¢, 4/$1 [1,2]	01	01	04	01	01	00	00
				1/50¢, 2/$1 [2]	03	01	04	01	02	00	00
				2/25¢, 8/$1	00	02	00	02	01	00	00
				1/25¢, 3/50¢, 6/$1 [2]	04	01	04	01	01	02	00
				1/25¢, 5/$1	00	01	00	01	01	04	00
				1/50¢, 3/$1 [2]	02	01	04	01	02	04	00
West Germany	1 DM	2 DM	5 DM	1/1 DM, 3/2 DM, 10/5 DM [2,3]	09	09	18	45	05	45	00
				1/1 DM, 2/2 DM, 6/5 DMark [2]	10	06	12	30	05	00	00
				1/1 DM, 3/2 DM, 9/5 DM	00	09	18	45	05	00	00
				1/2x1 DM, 1/2 DM, 3/5 DM [2]	11	03	06	15	05	00	00
				2/1 DM, 5/2 DM, 14/5 DM [2]	12	13	26	65	05	65	00
				Ticket/Token Mode [4]							
				Keyset Mode [4]							
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 G	1/25¢, 5/1 Guilder	00	01	00	05	01	00	00
Belgium	5 F	-	20 F	1/2x5 F, 2/20 Franc [2]	08	01	01	04	02	00	00
	5 F	5 F	20 F	1/2X5 F, 1/2X5 F, 2/20 F [2]	08	01	01	04	02	00	00
	5 F	20 F	20 F	1/2x5 F, 2/20 F, 2/20 F [2]	00	01	04	04	02	00	00
Spain	25 P	-	100P	1/25 P, 5/100 Peseta [2]	15	01	00	05	01	00	00
Switzerland	1 F	2 F	5 F	1/1 F, 3/2 F, 7/5 Franc	00	02	06	14	02	00	00
	1 F	-	2 F	1/1 F, 3/2 F [2]	07	03	00	06	02	00	00
Japan	100 ¥	-	100 ¥	2/100 Yen	00	04	00	04	02	00	00
	-	100 ¥	-	2/100 ¥ [2]	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	50 P	20 P	1/10 P, 5/50 P, 2/20 Pence	00	01	05	02	01	00	00
	10 P	50 P	10 P	1/10 P, 5/50 P [2]	06	01	05	01	01	00	00
Argentina	10¢	10¢	10¢	1/1 Token	00	01	01	01	01	00	00
Austria	5 Sch	-	10 Sch	2/5 Sch, 5/10 Schilling	00	02	00	05	01	00	00
	1 Sch	5 Sch	10 Sch	2/5x1 Sch, 2/5 Sch, 5/10 Sch	00	02	10	25	05	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	1/2x1 Krona [2]	03	01	04	01	02	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.

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

MILLIONAIRE'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), a display now signals when 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.

CAPTURED BALL SPINNER (C. B. SPIN) TEST.

1. In the "C. B. Spin" Test, observe that the player 1 and 2 displays show the message, C. B. SPIN TEST, briefly. Then, observe that the message changes to C. B. SPIN OFF, and that the BALL IN PLAY/MATCH display shows 00. The C. B. SPIN OFF test turns off the Spinner motor. The player 3 score display shows the total number of cycles (spins) during both parts of the C. B. Spin Test. (To clear the player 3 display of 'cycle count', perform the procedure to clear audits, or install Factory Settings.)

2. Switching to AUTO-UP, press the Credit button to select the test named C. B. SPIN CYCLE in the player score displays. The C. B. SPIN CYCLE turns on the spinner motor every 5 seconds.

   Both tests light the lamps corresponding to switches being opened by a ball contacting the switches; thus, some lamps may 'flicker' on and off, during the spin. A minimum switch actuation time of 1/2 second is necessary for the program to determine that a ball is resting on a switch.

   Repeated cycling can cause a 'cooling down' mode to begin, shown by the message, C. B. SPIN COOLING. The player 4 score display shows the number of seconds remaining in this 'cooling down' mode, after which the Cycle Test will again operate. To reduce (somewhat) the length of the 'cooling down' mode, the operator can press the Credit button to go to the C. B. SPIN OFF test, and then press the Credit button to reach the C. B. SPIN CYCLE test again.

3. Use the AUTO-UP position.

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 BALL IN PLAY/MATCH display shows 01. Press the Credit button to select the desired music selection: 01 - 'Game Theme' through 07 - '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 Credits display shows 02 (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 display (player 1, 2, 3, 4, BALL IN PLAY/MATCH, Credits).

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 Credit display shows 03 (the Sound Test identifier). The BALL IN PLAY/MATCH display shows a series of test steps from 00 through 07. Verify that a different sound is heard each time the number in the BALL IN PLAY/MATCH 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.

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 Credit display shows 04 (All Lamps Test 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 enable *MILLIONAIRE* to initiate the Single Lamps Test. The player 1 and 2 displays initially show the message, SINGLE LAMPS, and the Credit display shows 05. Then, the BALL IN PLAY/ MATCH display shows 01 and the player 1 and 2 displays show GAME OVER, 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.

MILLIONAIRE Lamp-Matrix Table

[2] Double Lamps

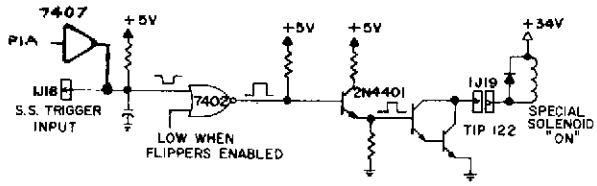
COLUMN / ROW	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
Q80 RED-BRN 1J6-1	GAME OVER (Backbox) [2] 1	ADVANCE MULTIPLIERS [2] 9	B 17	M 25	C. B. Spin 40K 33	C. B. Spin Right Extra Ball 41	1K 49	9K 57
Q81 RED-BLK 1J6-2	MATCH (Backbox) 2	LIGHTS CASH HELD (Bonus Hold) 10	A 18	O 26	C. B. Spin Left Multi-Ball 34	C. B. Spin 20K 42	2K 50	"M" (in Millionaire) 58
Q82 RED-ORN 1J6-3	BALL IN PLAY (Backbox) 3	GATE OPEN (Left) 11	N 19	N 27	C. B. Spin Left Extra Ball 35	C. B. Spin 30K 43	3K 51	"L" (1st) (in Millionaire) 59
Q83 RED-YEL 1J6-5	"R" (in Millionaire) 4	GATE OPEN (Right) 12	K 20	E 28	C. B. Spin 50K 36	C. B. Spin Bottom Special 44	4K 52	"I" (1st) (in Millionaire) 60
Q84 RED-GRN 1J6-6	CASH HELD 5	"I" (2nd) (in Millionaire) 13	Gold 21	Y 29	C. B. Spin 100K 37	Extra Ball 45	5K 53	"L" (2nd) (in Millionaire) 61
Q85 RED-BLU 1J6-7	EARN AGAIN 6	"N" (in Millionaire) 14	Silver 22	Right Lock 30	C. B. Spin Top Special 38	Bonus 10K 46	6K 54	2X 62
Q86 RED-VIO 1J6-8	"I" (3rd) (in Millionaire) 7	"O" (in Millionaire) 15	BALL GUIDE [2] MOVING W/ FLASHING 23	Left Spin W/L 31	C. B. Spin 10K 39	Bonus 20K 47	7K 55	3X 63
Q87 RED-GRY 1J6-9	"E" (in Millionaire) 8	"A" (in Millionaire) 16	Left Lock 24	Right Spin W/L 32	C. B. Spin Right Multi-Ball 40	Bonus 40K 48	8K 56	5X 64

SOLENOID TEST.

1. (From Lamp Test) Using AUTO-UP, press ADVANCE. Observe that the player 1 and 2 displays show the message, COIL TEST, the Credit display shows 06 (Solenoid Test identifier). Next, the BALL IN PLAY/ MATCH 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.

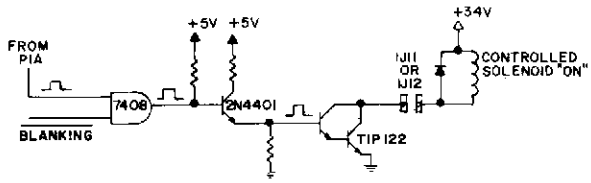
   To continuously pulse a single solenoid/circuit, use MANUAL-DOWN. Press ADVANCE to sequence through the switched, controlled, and special solenoids. Use AUTO-UP to resume test cycling, and to proceed to the next test.

"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.

MILLIONAIRE Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color [1]	Connections: CPU Bd.	Connections: Playfield/ Cabinet	Driver Trans.	Solenoid Part Number / Flashlamp Type (b = Backbox, p = Playfield)
01A [3]	Outhole	Switched	{Vio-Brn}	1P11-1	8P3-1 (to B1 on	Q33	AE-23-800-01
01C [3]	Top Kickbig - Right Flashlamp	Switched	{Blk-Brn}	(Gry-Brn)	Diode Sw. Bd.)	Q33	#89 flashlamp 1p
02A [3]	Ball Trough Feeder	Switched	{Vio-Red}	1P11-3	8P3-2 (to B2 on	Q25	AE-23-800-03
02C [3]	Top Kickbig - Left Flashlamp	Switched	{Blk-Red}	(Gry-Red)	Diode Sw. Bd.)	Q25	#89 flashlamp 1p
03A [3]	Left Eject	Switched	{Vio-Orn}	1P11-4	8P3-3 (to B3 on	Q32	AE-26-1500-01
03C [3]	Top Kickbig	Switched	{Blk-Orn}	(Gry-Orn)	Diode Sw. Bd.)	Q32	AE-24-900-02 [4]
04A [3]	Right Eject	Switched	{Vio- Yel}	1P11-5	8P3-4 (to B4 on	Q24	AE-26-1500-01
04C [3]	Mid. Kicker - Top Flashlamps	Switched	{Blk-Yel}	(Gry-Yel)	Diode Sw. Bd.)	Q24	#89 flashlamps 2b, 2p
05A [3]	Top Drop Target	Switched	{Vio-Grn}	1P11-6	8P3-5 (to B5 on	Q31	AE-23-800-04
05C [3]	Mid. Kicker - Mid. Flashlamps	Switched	{Blk-Grn}	(Gry-Grn)	Diode Sw. Bd.)	Q31	#89 flashlamps 2b, 2p
06A [3]	Bottom Drop Target	Switched	{Vio-Blu}	1P11-7	8P3-6 (to B6 on	Q23	AE-23-800-04
06C [3]	Mid. Kicker - Bottom Flashlamps	Switched	{Blk-Blu}	(Gry-Blu)	Diode Sw. Bd.)	Q23	#89 flashlamps 2b, 2p
07A [3]	Right Kickbig	Switched	{Vio-Wht}	1P11-8	8P3-7 (to B7 on	Q30	AE-24-900-02 [4]
07C [3]	Left Eject Flashlamps	Switched	{Blk-Gry}	(Gry-Vio)	Diode Sw. Bd.)	Q30	#89 flashlamps 2b, 1p
08A [3]	Knocker	Switched	{Vio-Blk}	1P11-9	8P3-8 (to B8 on	Q22	AE-23-800-02
08C [3]	Right Eject Flashlamps	Switched	{Blk-Vio}	(Gry-Blk)	Diode Sw. Bd.)	Q22	#89 flashlamps 2b, 1p
09	Middle Kicker	Controlled	Brn-Blk	1P12-1	8P3-9	Q17	AE-23-800-03
10		Controlled	Brn-Red	1P12-2	8P3-10	Q9	
11	General Illumin.	Controlled	Brn-Orn	1P12-4	3P7-1	Q16	5580-09555-01 [5]
12	Solenoid A/C Select Relay	Controlled	Brn-Yel	1P12-5	8P3-12	Q8	5580-09555-01 [4]
13	Right Gate	Controlled	Brn-Grn	1P12-6	8P3-13	Q15	SZ-31-2000-DC
14	Moving Ball Guide	Controlled	Brn-Blu	1P12-7	8P3-14	Q7	5580-09555-01 [4]
15	C. B. Spinner Detent	Controlled	Brn-Vio	1P12-8	8P3-15	Q14	SM-26-600-DC
16	C. B. Spinner Motor	Controlled	Brn-Gry	1P12-9	8P3-16	Q6	14-7945
17	Left Gate	Special #1	Blu-Brn	1P19-7	8P3-17	Q75	SZ-31-2000-DC
18	Left Jet Bumper	Special #2	Blu-Red	1P19-4	8P3-18	Q71	AE-23-800-03
19	Right Jet Bumper	Special #3	Blu-Orn	1P19-3	8P3-19	Q73	AE-23-800-03
20	Bottom Jet Bumper	Special #4	Blu-Yel	1P19-6	8P3-20	Q69	AE-23-800-03
21	Left Kicker	Special #5	Blu-Grn	1P19-8	8P3-21	Q77	AE-23-800-03
22	Right Kicker	Special #6	Blu-Blk	1P19-9	8P3-22	Q79	AE-23-800-03
-	Upper Right Flipper	-	[Blk-Yel]		[7J1-19, 8P3-33]	-	FL23/600-30/2600-50VDC
-	Right Flipper	-	Orn-Vio [Blu-Vio]	1P19-1	7P1-20 [7J1-21,8P3-34] [2]	-	FL23/600-30/2600-50VDC
-	Left Flipper	-	Orn-Gry [Blu-Gry]	1P19-2	7P1-23 [7J1-24,8P3-32] [2]	-	FL23/600-30/2600-50VDC

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; "C" coils are pulsed, with Sol. 12 energized. Wire colors in brackets are those from respective A and C terminals corresponding to the B terminal connection listed for the Diode Switching Board, which controls the device pulsing by Sol. 12. 4. Relay (p/n 5580-09555-01) is mounted on Relay Snubber Bd. p/n C-11232 or C-11232-2, or Relay Bd. p/n C-11232-1. 5. Relay is mounted on Power Supply Bd. D-8345 in the backbox.

SOLENOID TEST (Continued)

NOTE

As directed by the game program, the Solenoid 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 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 Right Flashlamp near the Top Kickbig (sol. 01C). Using this "multiplexing" technique, the same driver transistor can control actuation of two separate solenoid circuits.

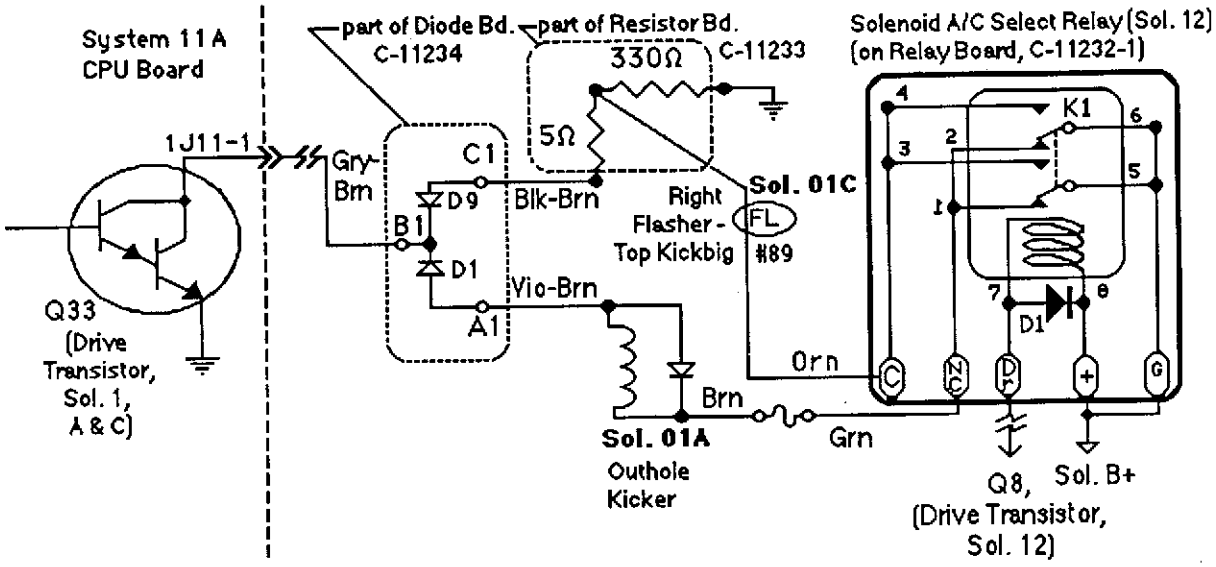


Figure 2. Typical A/C Solenoid Select Circuit

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, the Credit display shows 07 (Switch Levels Test identifier), and the BALL IN PLAY/MATCH display is blank, indicating that no switch is actuated.

   If, however, a switch *is* actuated (possibly stuck closed, OR *for the C. B. Spinner,* stuck open, since its switches are 'normally closed'), the BALL IN PLAY/MATCH display shows that switch's number, while the player 1 and 2 displays indicate the switch's name. A sound also accompanies the display. (This is another facet of the new *MILLIONAIRE System-11A* 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 (or closes an open switch of the C. B. Spinner), its name and number are eliminated from the Switch Levels display series. For *MILLIONAIRE,* switch numbers can range from 01 through 64. 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.

   Row Problems. If a display of two (or more) switch numbers <u>of a row</u> 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 <u>in a column</u> 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.

SWITCH TESTS (Continued).

***MILLIONAIRE* 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	B 17	M 25	Right Trough 33	Enter Top Kickbig 41	Right Lock 49	Left Sling 57
2 WHT-RED 1J10-8	Ball Roll Tilt 2	Lites Cash Held 10	A 18	O 26	Left Trough 34	In Top Kickbig 42	Left Jet Bumper 50	Right Sling 58
3 WHT-ORN 1J10-7	Credit Button 3	Left Outlane 11	N 19	N 27	Not Used 35	In Center Kickbig 43	Right Jet Bumper 51	Ten Point Switches 59
4 WHT-YEL 1J10-6	Right Coin Chute 4	Right Outlane 12	K 20	E 28	Outhole 36	Enter Center Kickbig 44	Bottom Jet Bumper 52	Right Kickbig 60
5 WHT-GRN 1J10-5	Center Coin Chute 5	Not Used 13	Not Used 21	Y 29	Left Flipper Lane Change 37	C. B. Spin 40K 45	C. B. Spin 100K 53	C. B. Spin Extra Ball Right 61
6 WHT-BLU 1J10-3	Left Coin Chute 6	Not Used 14	Silver Gold 22	Advance Multipliers Target 30	Right Flipper Lane Change 38	C. B. Spin Multi-Ball Left 46	C. B. Spin Top Special 54	C. B. Spin 20K 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Left Return Lane 15	Not Used 23	Left Eject 31	Top Drop Target 39	C. B. Spin Extra Ball Left 47	C. B. Spin 10K 55	C. B. Spin 30K 63
8 WHT-GRY 1J10-1	High-Score Reset 8	Right Return Lane 16	Ball Shooter 24	Right Eject 32	Bottom Drop Target 40	C. B. Spin 50K 48	C. B. Spin Multi-Ball Right 56	C. B. Spin Special Bottom 64

2. **Switch Edges.**
From the Switch Levels Test, press ADVANCE. Observe that the player 1 and 2 displays show the message, SWITCH EDGES, the Credit display shows 08 (Switch Edges Test identifier), and the BALL IN PLAY/MATCH 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 and 2, and the BALL IN PLAY/MATCH 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 *MILLIONAIRE* 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.

SWITCH TESTS (Continued).

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 (08 in the Credits display), use AUTO-UP and press ADVANCE. The backbox displays should show the *MILLIONAIRE* 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. *MILLIONAIRE* 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.)

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	**CPU Problem**	**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 connectingdevices 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 Sound/Speech Board are possible, only after successful completion of the System-11A Memory Chip Test.

1. **Sound/Speech Board Test.** A brief check of the Sound/Speech Board (D-11297) 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.

2. **General System-11A Sound Test.** Press the Sound Diagnostic Switch (SW 1) on left edge of the CPU Board. Listen for *two* sounds, showing that both the CVSD (Continuously Variable Slope Delta) Modulator, which provides the voices for *MILLIONAIRE*, and the DAC (Digital-to-Analog Converter) sound circuits are functioning properly. The sound for the CVSD Modulator is the word "MILLIONAIRE"; the sound for the DAC circuit is a "twing" noise.

   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).

SYSTEM-11A SOUND SECTION TEST (Continued).

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 Backbox fuseholder (4)
5731-09128-00	Fuse, 2-1/2A S-B, 250v	Top & Right Kickbig circuit/Backbox fuseholder
5731-09128-00	Fuse, 2-1/2A S-B, 250v	Left & Right Eject Hole ckt/Playfield fuseholder
5731-06569-00	Fuse, 1A S-B, 250v	Moving Ball Guide ckt/Playfield fuseholder
5731-08761-00	Fuse, 1/4A S-B, 250v	F1, D-8345-549 Power Supply
5731-09128-00	Fuse, 2-1/2A S-B, 250v	F2, D-8345-549 Power Supply
5731-09071-00	Fuse, 8A, 32v	F3, D-8345-549 Power Supply
5731-06314-00	Fuse, 4A S-B, 250v	F4, D-8345-549 Power Supply
5731-09432-00	Fuse, 7A S-B, 250v	F5, F6; D-8345-549 Power Supply

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

Figure 2 shows the two main lubrication points of the Ball Trough Feeder (also the Multi-Ball Ejector,which utilizes the same mechanism). The shaded arrows show the directions in which the Ball Trough Feeder and other parts of its related assemblies can be adjusted for proper operation.

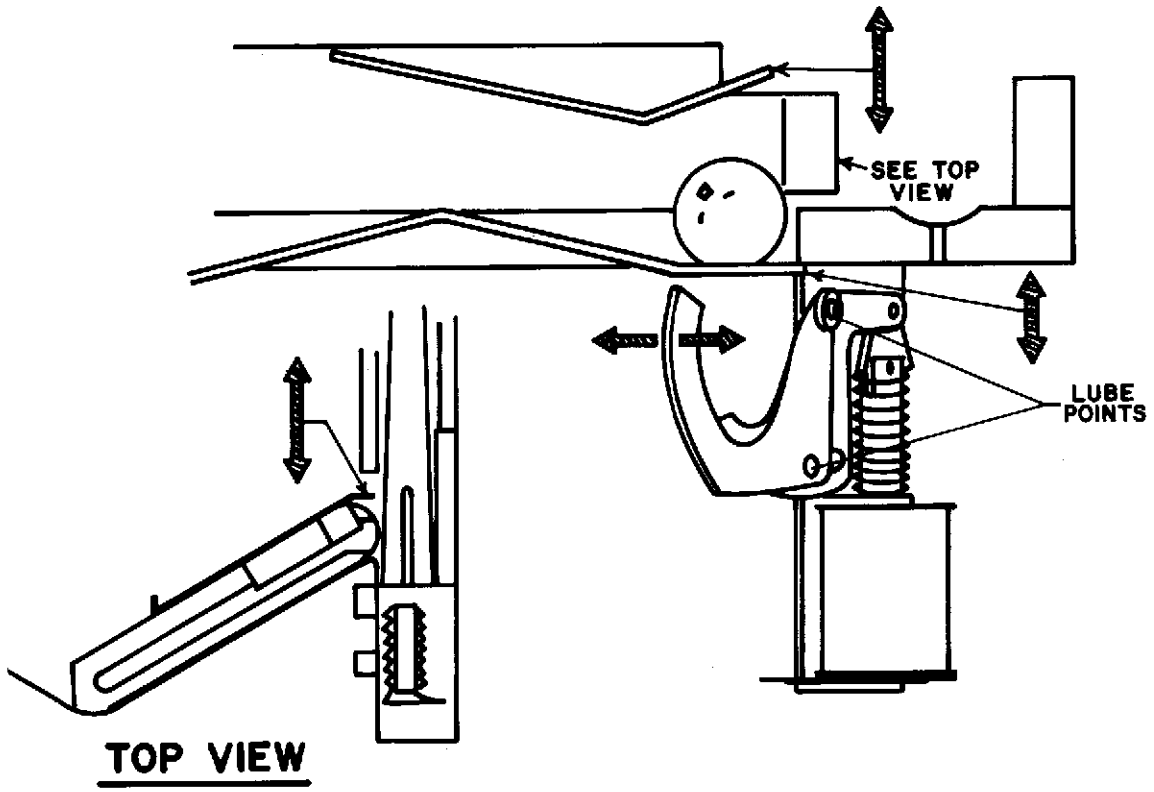


Figure 2. Adjustments and Lubrication Points, Ball Trough Feeder.

Solder Warning

WARNING

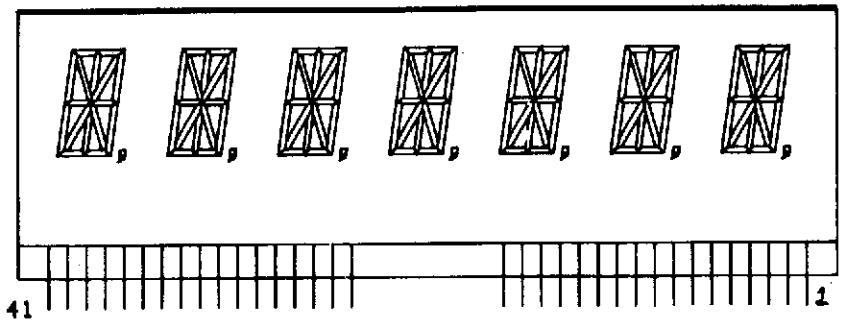
Use ONLY *Rosin-core* solder to repair electrical/electronic problems. Other types of solder can damage or destroy electronic parts, especially Printed Circuit Board wiring and switch contacts.

Section 2

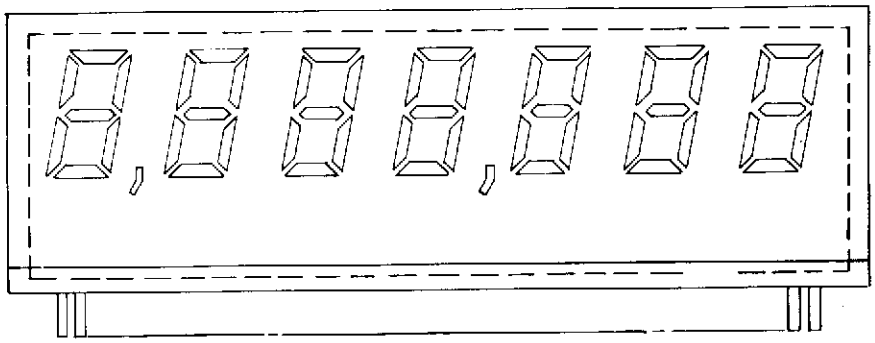
Game Parts Information

- **Parts Lists and Diagrams:**

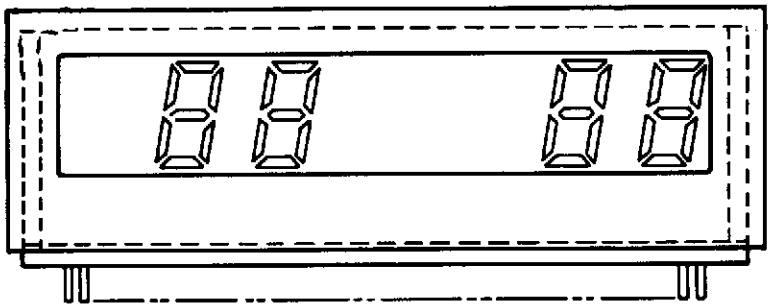
Displays and Display Board
Ball Trough Feeder
Captured Ball Spinner
Eject Hole Assembly
Backbox Parts
Playfield Pivot Parts
Flipper Assemblies
Jet Bumper
Moving Ball Guide Assembly
Post & Gate Assembly
Single-Bank Drop Target
Miscellaneous Game Parts
Power Supply Board (D-8345-549)
CPU Board (D-11392-555)
B/G Sound/Speech Board (D-11298)
Playfield Parts
Solenoids/Flashers & Rubber Parts
Lamps
Switches



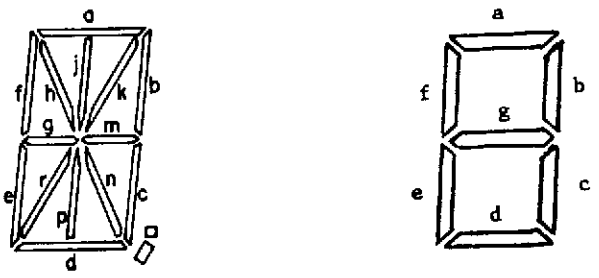
7-digit Alphameric Display Glass, p/n 5670-10873-00



7-digit 7-segment Display Glass, p/n 5670-09439-00



2 x 2: 7-segment Display Glass, p/n 5670-09448-00



Display Characters Segment Designations

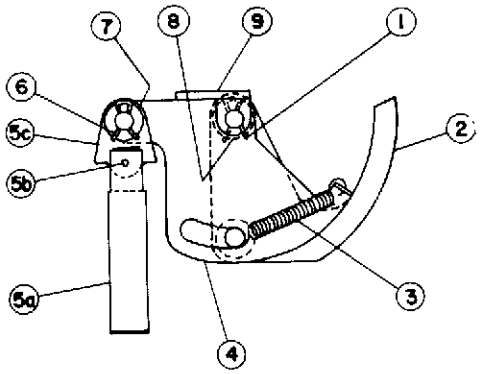
Alphanumeric Display Unit Board

p/n D-11415

Item	Part No.	Ckt Designation	Description
1	5760-12100-00		Bare P. C. Board
2	5680-08968-00	U1, U2, U5, U6	IC, Anode/Digit Driver, UDN6118A or 6184
3	5310-09882-00	U3, U4, U7, U8	IC, Quad NOR, 4001B
4	5680-08969-00	U9, U12 - U14	IC, Cathode Seg. Driver, UDN7180A
5	5310-09153-00	U10, U11, U14 - U16	IC, Hex Buffer, 4050
6	5075-09135-00	D1	Zener diode, 1N4740A, 10V, 1 w
7	5070-06258-00	D2 - D4	Diode, 1N4001 1A.
8	5043-09343-00	C1	Capacitor, 10 µfd., 25v, ±5%, Axial
9	5043-08996-00	C2	Capacitor, 0.1 µfd., 50v, ±20%, Axial
10	5043-08980-00	B	Capacitor, 0.01 µfd, 50v, Axial
11	5019-10387-00	SR1 - SR3	SIP, 18 K, 9R, 10P, 5%
12	5010-08773-00	R1, R2, R6, R34, R35	Resistor, 18 K, 1/4 w, 5%
13	5010-10927-00	R3 - R5, R7- R9, R38, R41	Resistor, 8.2 K, 1/2 w, 5%
14	5010-10258-00	R10 - R17, R25, R26	Resistor, 1 M, 1/4 w, 5%
15	5010-08981-00	R18 - R24, R27 - R33, R36, R37, R39, R40, R42 - R48	Resistor, 10 K, 1/2 w, 5%
16	5010-08772-00	R49	Resistor, 15 K, 1/4 w, 5%
17	5670-10873-00	DSPY1, DSPY2	Display, 7 -character, Alphanumeric
18	5670-09439-00	DSPY3, DSPY4	Display, 7-character, 7-segment
19	5670-09448-00	DSPY5	Display, 2 x 2-character, 7-segment
20	5791-10851-00	J1	Connector, 26 pin (Hdr), Rt. Angle
21	5791-10869-06	J2, J6	Connector, 6 pin (Hdr), Rt. Angle
22	5791-10869-09	J3 - J5	Connector, 9 pin (Hdr), Rt. Angle
23	24-8767	Sckt1 - Sckt4	Socket, Lamp
24	24-8768	Lmp1 - Lmp4	Lamp Bulb, #555, 6.3v, .25A
25	03-8069-1	Shld 1	Light Shield, Single
26	03-8069-2	Shld 2	Light Shield, Double
27	03-7885-4	Standoff	Standoff, Nylon, 3/8"

Ball Trough Feeder

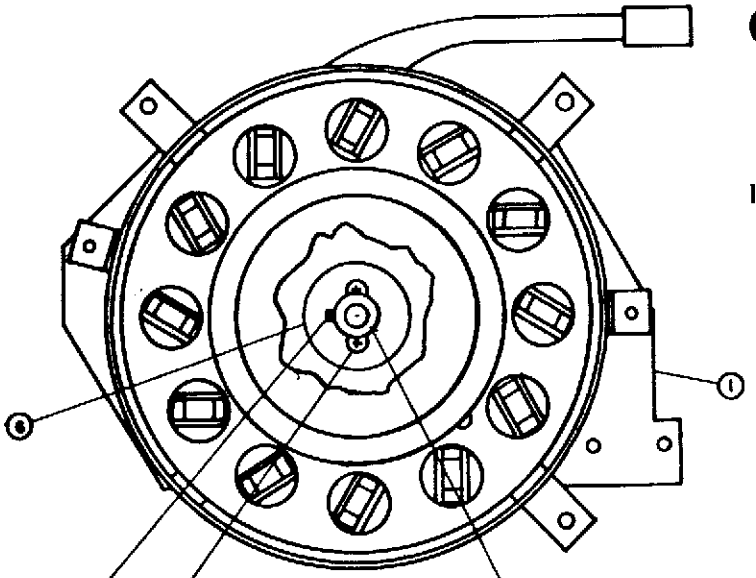
p/n C-9638



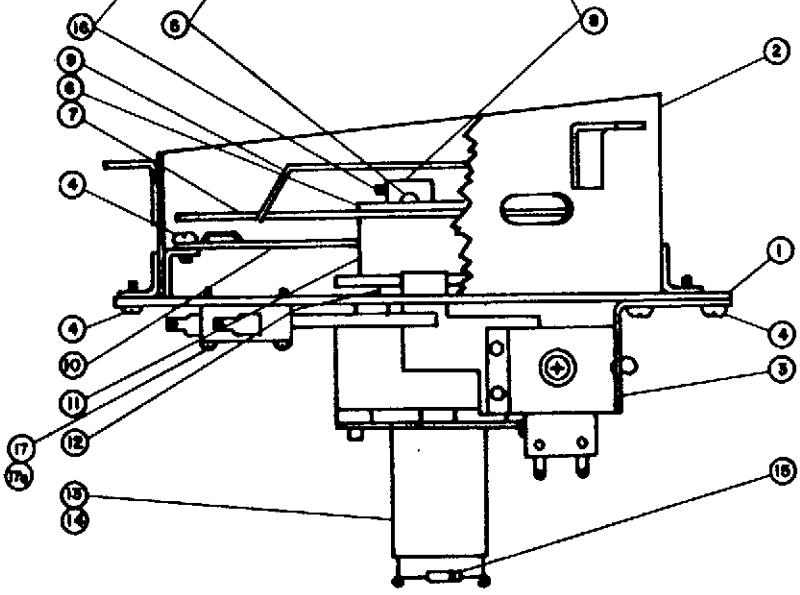
Item	Part No.	Description
1	12-6227	Clip, Hair Pin
2	A-8247	Ball Eject Cam Assembly
3	10-362	Spring
4	A-6949-L	Spring Plate Assembly
5	A-8050-1	Plunger Assembly
a)	02-3407-2	Coil Plunger
b)	20-8716-5	Roll Pin
c)	01-1789	Armature Link
6	12-6227	Clip, Hair Pin
7	4700-00030-00	Washer, 1/2 o.d. x 17/64 i.d. 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 Assembly

Captured Ball Spinner Assembly

p/n C-11525



TOP VIEW

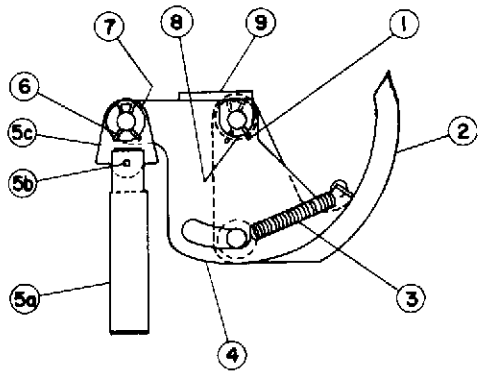


SIDE VIEW

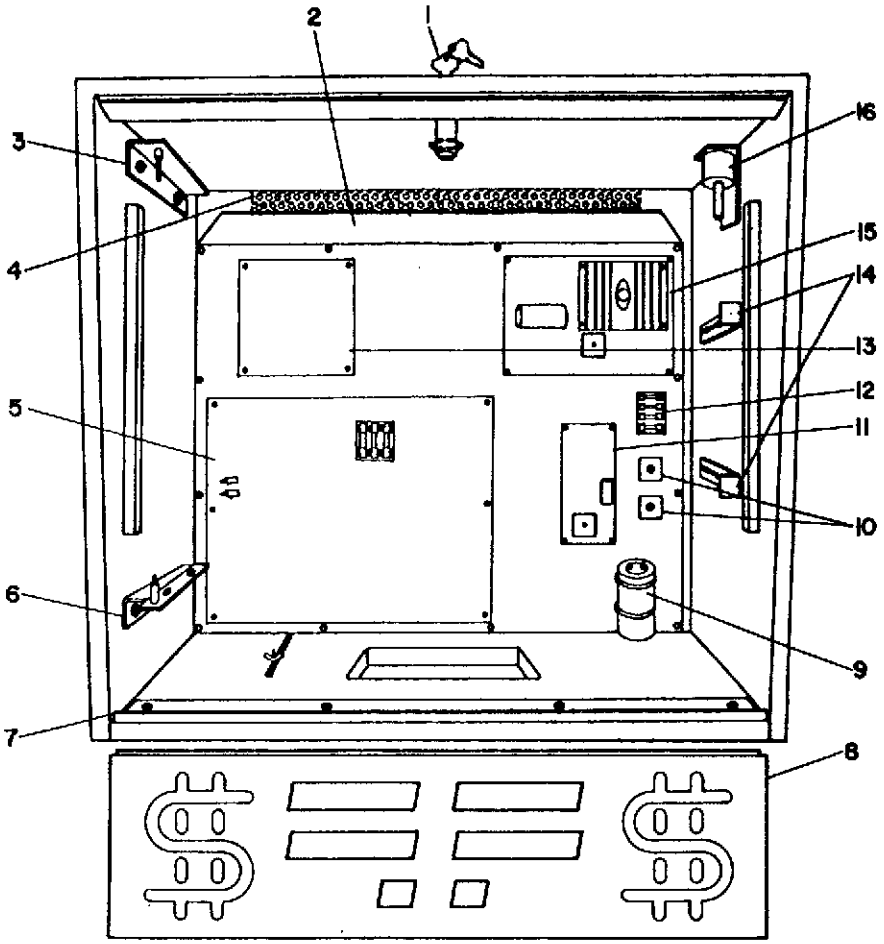
Item	Part No.	Description
1	01-8574	Housing, C. B. Spinner
2	C-11540	Outer Ring Assembly
3	B-11524	Pawl - Coil Assembly
4	4006-01003-03	Mach. Screw , 6-32 x 3/16"
5	4006-01003-05	Mach. Screw , 6-32 x 5/16"
6	03-8071	Washer, plastic
7	01-8576	Ball Wheel
8	02-4290	Shaft Collar
9	A-11523	Cap Assembly
10	C-11461	PCB Assembly, C. B. Spin
11	A-11522	Clutch - Bushing Assembly
12	4700-00033-00	Washer, .265 i.d. x 3/4 o.d. x 3/32 thk
13	14-7945	Motor, C. B. Spin
14	4008-01041-06	Mach. Screw, 8-32 x 3/8, FH
15	5070-06258-00	Diode, 1N4001, 1.0A
16	4008-01076-06	Mach. Screw, 8-32 x 3/8"
17	5647-09728-00	Microswitch, E33-55H
a)	4004-01003-10	Mach. Screw. 4-40 x 5/8"

Eject Hole Assembly

p/n B-9361-R-1

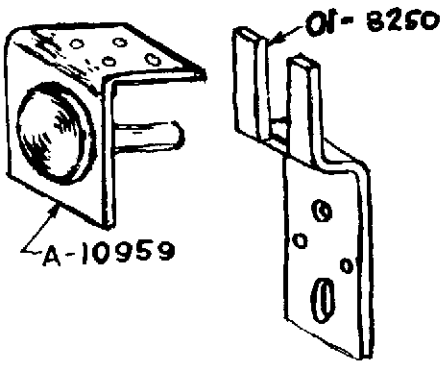


Item	Part No.	Description
1	12-6227	Clip, Hair Pin
2	A-7471-R	Ball Eject Cam Assembly
3	10-362	Spring
4	A-6949-R	Spring Plate
5	A-8050-1	Plunger Assembly
a)	02-3407-2	Coil Plunger
b)	20-8716-5	Roll Pin
c)	01-1789	Armature Link
6	12-6227	Clip, Hair Pin
7	4700-00030-00	Washer, 1/2 o.d. x 17/64 i.d. x 15 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

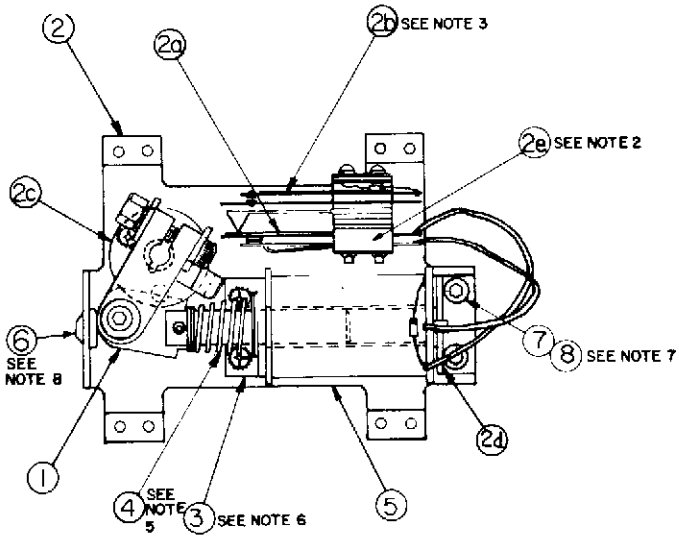


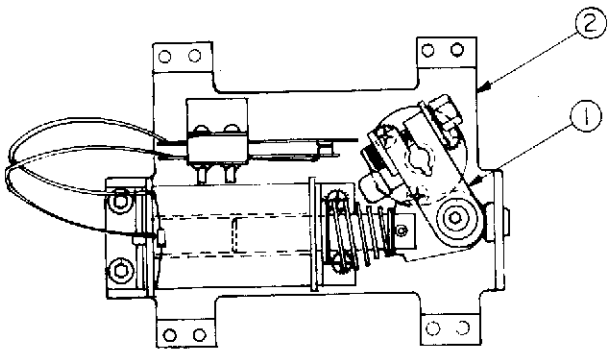
Backbox Parts Listing

Item	Part No.	Description	Item	Part No.	Description
1	20-6542-TB	Cam Lock	9	5040-09051-00	Capacitor, 30,000 µFd., 25V
a)	01-7993-1	Lock Pawl, Backglass	10	5100-09418-00	Bridge Rectifier, 100v, 35A.
2	D-11537	PCB Plate Assembly	11	C-9939	Flipper Power Supply
3	A-7984	Upper Insert Bd. Hinge Assy	12	5733-10702-01	Fuse Holder
4	01-6645	Venting Screen	13	D-11298-555	B/G Speech & Sound Board
5	D-11392-555	CPU Board, MILLIONAIRE	14	01-8084	Insert Stop Bracket
6	A-10815	Lower Insert Board Hinge Assy	15	D-8345-549	Power Supply Assembly
7	01-8569	Lower Speaker Panel Bracket	16	B-10686	Knocker Assembly
8	D-11416	Display/Speaker Panel Assy		20-9518	Backbox Hinge



Playfield Pivot & Hinge Bracket





Flipper Assembly

p/n C-9952-R

Item	Part No.	Description
1	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
9	A-11523	Cap Assembly
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
2	C-9954-R	Flipper Base/Lane Change Assembly, R
a)	06-14G	Insulating Blade
b)	SW-1A-150	Lane Change Switch
c)	03-7568	Flipper Bushing
d)	A-10821	Flipper Stop Assembly
e)	03-7811	End of Stroke (EOS) Switch
3	01-7695	Solenoid Bracket
4	10-376	Coil Plunger Spring
5	FL-23/600-30/2600	Flipper Coil
6	23-6577	Bumper Plug
7	4010-01066-06	Cap Screw, 10-32 x 3/8, AH
8	4710-00004-00	Lockwasher, #10 split

Flipper Assembly

p/n C-9952-L

(Parts listed replace same Items of C-9952-R)

Item	Part No.	Description
1	B-10655-L	Crank Link Assembly
g)	B-10657-L	Flipper Crank Assembly, Left
1.)	01-8073-L	Flipper Crank, Left
2	C-9954-L	Flipper Base/Lane Change Assy, L.

Flipper Assembly

p/n C-9953-R

(Parts listed replace same Items of C-9952-R)

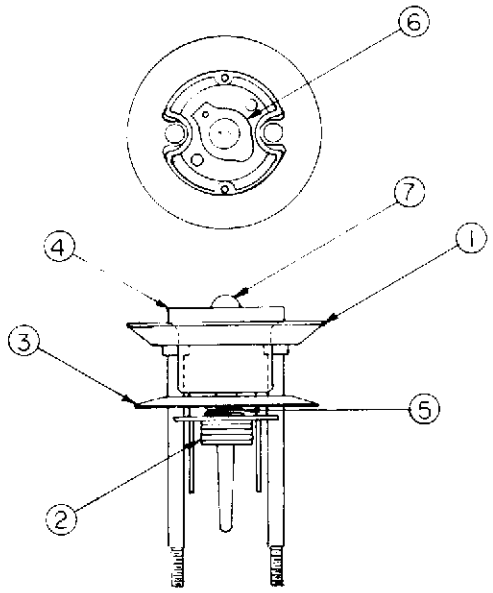
Item	Part No.	Description
2	C-9957-R	Flipper Base Assy

Flipper Assembly Notes

1. 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.
2. 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 (± .015) inch. Adjustment of the EOS Switch must be made at a minimum distance of 0.25 inch from the switch body.
3. The Lane Change Switch must have a gap of 0.046 (±.015) inch, when fully open.
4. All moving elements of the assembly must operate freely, with no evidence of binding.
5. The Coil Plunger Spring must fit within the four lugs of the solenoid bracket.
6. For coil replacement, remove the Solenoid Bracket (item 3) to prevent screw damage.
7. Use Loctite™ when reattaching screws to the Flipper Stop Assembly.
8. When using the Bumper Plug (item 6) on older flipper assemblies, readjust the flipper paddle and shaft position.
9. Solid color grey (or blue) wire connects to the banded end of the diode, mounted on the connector end of the Flipper Coil (item 5). Trace color wire connects to the unbanded end of the diode.

Jet Bumper Assembly

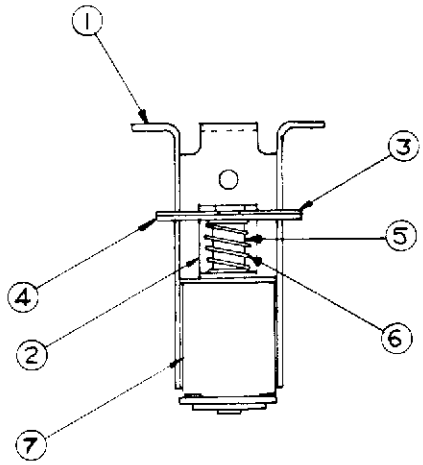
p/n B-9414-2 (Above the playfield)



Item	Part No.	Description
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base, White
3	03-6035-6	Bumper Wafer, Yellow
4	03-7443-5	Bumper Body, White
5	10-7	Spring
6	24-8776	Lamp Socket
7	24-8768	Bulb, #555

Jet Bumper Coil Assembly

p/n B-9415 (Beneath the playfield)



Item	Part No.	Description
1	B-7417	Bracket and Stop Assembly
2	01-1747	Coil Retaining Bracket
3	01-5492	Armature Link, Steel
4	01-5493	Armature Link, Bakelite
5	02-3406-1	Coil Plunger
6	10-326	Armature Spring
7	AE-23-800-03	Coil

Moving Ball Guide Assembly

p/n B-11445

Part No.	Description
A-11449	Rotor Disc Assembly
14-7943	Motor, 24 VAC, 3w, 10 rpm
4006-01076-04	Set Screw, 6-32 x 1/4 SH - CP
5791-09111-00	Connector, 3-pin
5820-09080-00	Pin, Connector

Post & Gate Assembly

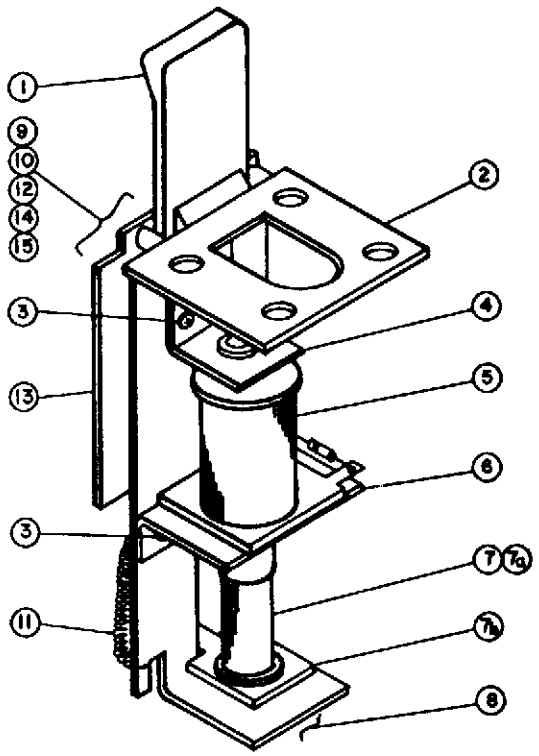
p/n A-9572

Part No.	Description
02-3133	Gate Post
12-6337	Gate Wireform
20-8846	Palnut
20-8713-25	Crescent Ring

Single-Bank Drop Target Assembly

p/n C-11546

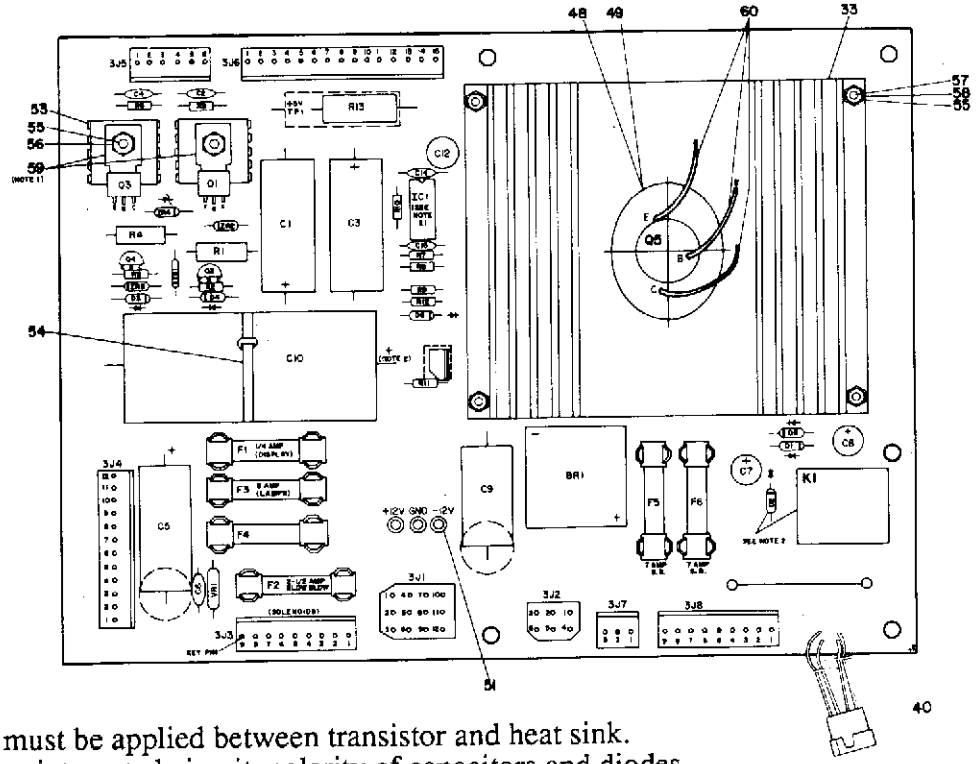
Item	Part No.	Description
1	03-8033	Target
2	B-11213	Drop TargetSubassembly
3	4408-01119-00	Nut, 8-32 ESNA
4	A-11397	Stop Bracket Assembly
a)	01-8177	Flipper Stop Bracket
b)	02-3058-1	Collar
c)	02-3540-4	Armature Stop
5	AE-23-800-04	Coil Assembly
6	01-8413	Bracket, Coil Mounting
7	A-11388	Plunger & Reset Plate Assy
a)	02-3972-1	Plunger
b)	01-8414	Reset Plate
c)	4410-01132-01	Nut 10-32 ESNA, Thin
8	4008-01016-10	Mach. Screw, 8-32 x 5/8, P-RH
9	4700-00027-00	Washer, 1/2 o.d. x 1/4 i.d., 21 ga.
10	20-8712-25	E-Ring, 1/4" shaft
11	10-364	Spring , Extension
12	4700-00023-00	Washer, 5/8 o.d. x 13/64 i.d., 16 ga.
13	C-11319	Opto Switch Assembly
a)	5768-12070-00	PC Board
b)	5490-10159-00	Opto Interruptor, Mdl, S/G
c)	5070-08919-00	Diode, 1N4148, 150 mA
d)	5010-09162-00	Resistor, 100K, 5%, 1/4w
e)	5010-08997-00	Resistor, 2.7K, 5%, 1/4w
f)	5010-09324-00	Resistor, 27K, 5%, 1/4w
g)	5010-08930-00	Resistor, 470Ω, 5%, 1/2w
h)	5190-10270-00	Transistor, 2N3906, PNP, TO-92
i)	16-8850-161	Label, PCB Identification
j)	20-9533	Cement, RTV Silicone
14	10-392	Spring ,
15	20-8712-18	E-Ring, 3/16" shaft



Miscellaneous MILLIONAIRE Parts

Part No.	Description
31-1002-555	Playfield, MILLIONAIRE
31-1357-555	Backglass, MILLIONAIRE
31-1415	Drop Target Decal
31-1006-555	Plastics Set, MILLIONAIRE
20-9269	Standoff, 1/2", P-nut (on PCB)
01-6571	Mounting Bracket, Hinge, Insert Bd.
01-6652	Stop Bracket
01-6655	Latch - Insert Board
11-555-IN	MILLIONAIRE Insert Board (Backbox)
5795-10937-09	Ribbon Cable, 20-conductor, 9"
5795-10938-27	Ribbon Cable, 26-conductor, 27"
03-7960-555-1 thru 03-7960-555-6	Playfield Mylar*
01-8431	Playfield Post Adj Nut Plate
31-1413	Cover Plate Decal*
31-1414	Center Cap Decal*
31-1415	Dropt Target Decal*
31-1416	Standup Target Decal*
31-1417	Rotary Beacon Decal*

* available separately



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

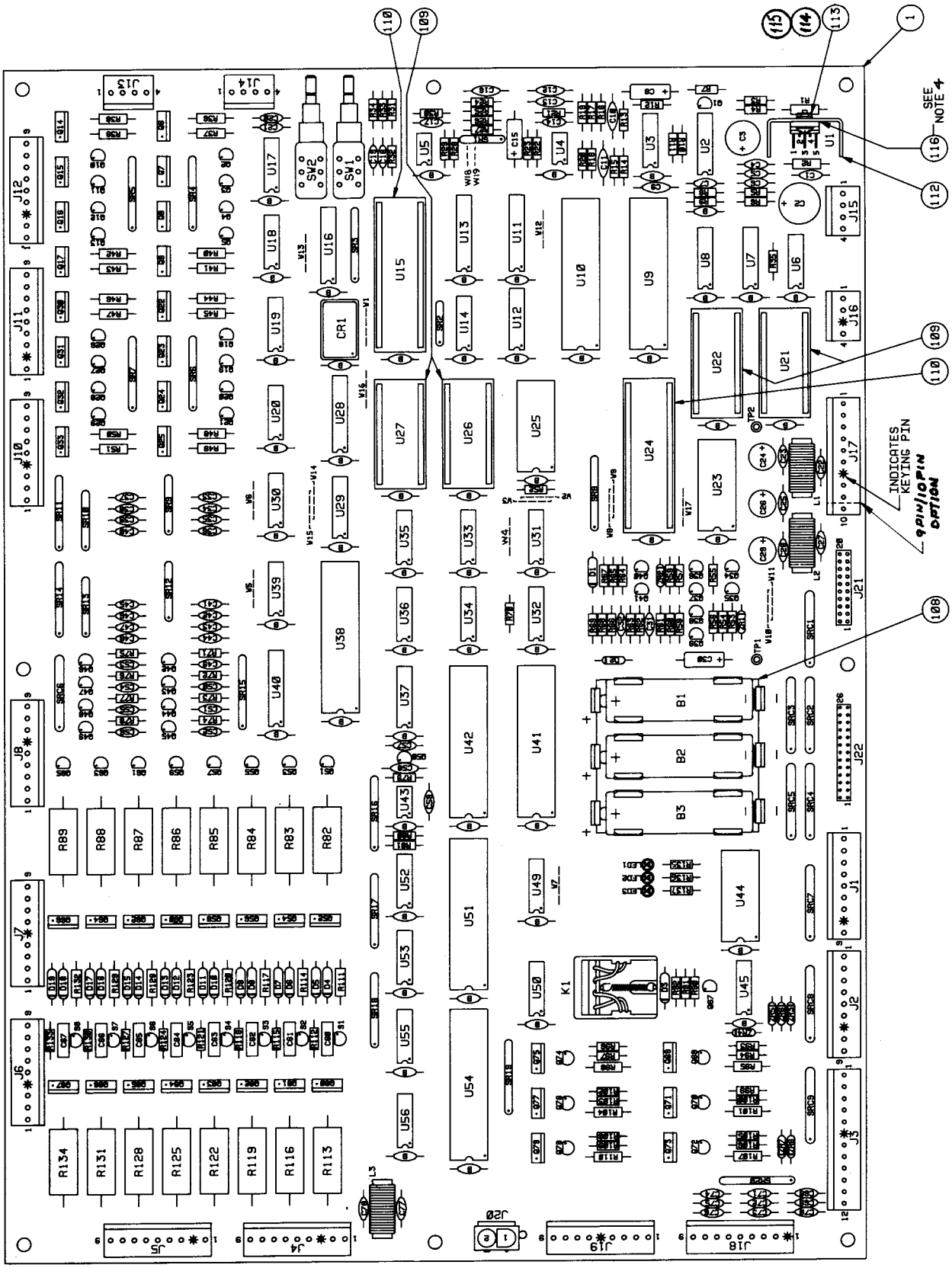
p/n D-8345-549

Item	Part No.	Ckt Designation	Description
1	5765-09466-01		Bare P. C. Board
2	5013-09426-00	R7	Resistor, 2.15K, 1%, 1/4w, Metal Film
3	5013-09427-00	R8	Resistor, 4.99K, 1%, 1/4w, Metal Film
4	5010-09428-00	R11	Resistor, 1.5K, 2%, 1/4w, Carbon Film
5	5010-09085-00	R10	Resistor, 1.5K, 5%,1/4w
6	5010-09541-00	R9	Resistor, 2.7K, 2%,1/4w
7	5010-09508-00	R12	Resistor, 270Ω, 2%, 1/4w, Carbon Film
8	5012-09429-00	R13	Resistor, 0.12Ω, 5%,5w
9	5010-09536-00	R1, R4	Resistor, 39K, 5%,1w
10	5010-09061-00	R2, R5	Resistor, 680Ω, 2w
11	5010-09069-00	R3, R6	Resistor, 330K, 5%,1/2w
12	5040-09419-00	C10	Capacitor, 18,000 mfd, electr., 20V, axial
13	5040-09420-00	C9	Capacitor, 1000 mfd, electr., 25V, axial or radial
14	5040-09423-00	C12	Capacitor, 330 mfd, electr., 10V,radial
15	5043-9065-00	C15	Capacitor, 470 pfd
16	5040-9053-00	C1, C3	Capacitor, 100 mfd, electr., 150V
17	5040-09070-00	C5	Capacitor, 100 mfd, electr., 100V, axial or radial
18	5043-09072-00	C2, C4	Capacitor, 0.1 mfd, 500V, disc
19	5043-09446-00	C14	Capacitor, 0.1 mfd, 50V, disc
20	5070-06258-00	D1, D2, D5, D6	Diode, 1N4001
21	5070-09054-00	D3, D4	Diode, 1N4004
22	5075-09059-00	ZR1, ZR3	Zener, 1N5990, 3.9v, 5%
23	5075-09060-00	ZR2, ZR4	Zener, 1N4764, 100v, 5%
24	5460-09424-00	IC1	IC, Volt. Reg., MC1723C
25	5043-09443-00	C6	Capacitor, 0.1 mfd, 200v, disc
26	5040-09421-00	C7	Capacitor, 100 mfd, 25v, radial
27	5040-09422-00	C8	Capacitor, 47 mfd, 50v, radial
28	5164-09057-00	Q1	Transistor, SDS201, NPN
29	5164-09056-00	Q4	Transistor, MPSD02, NPN
30	5194-09058-00	Q3	Transistor, SDS202, PNP
31	5194-09055-00	Q2	Transistor, MPSD52, PNP
32	5162-09425-00	Q5	Transistor, 2N6057, NPN
33	5705-09431-00		Heak Sink
34	5791-09074-00	3J6	Connector, 15 pin (Hdr)
35	5791-09027-00	3J3, 3J8	Connector, 9 pin (Hdr)
36	5791-09038-00	3J2	Connector, 6 pin (Hdr)
37	5791-09067-00	3J5	Connector, 6 pin (Hdr)
38	5791-09434-00	3J4	Connector, 12 pin (Hdr)
39	5791-09435-00	3J7	Connector, 3 pin (Hdr)
40	H-11065	3J9	Cable/Connector Assembly
a)	5791-09400-00		Connector shell
b)	5820-09080-00		Connector pin
41	5791-09068-00	3J1	Connector, 12 pin (Hdr)
42	5321-09178-00		Fuseholder
43	5731-09128-00	F2	Fuse, 2.5A, 250v, S-B
44	5731-09071-00	F3	Fuse, 8A, 32v
45	5731-09128-00	F4	Fuse, 2.5A, 250v, S-B
46	5731-08761-00	F1	Fuse, 1/4A, 250v, S-B
47	5017-09064-00	VR1	Varistor
48	5700-09445-00		Socket
49	5701-09652-00		Mica Insulator
50	5580-09555-00	K1	Relay, 24VDC, 10A, DPDT
51	5824-09428-00	TP1 - TP4	Terminal, #1502-1 (Test Post)
52	5100-09418-00	BR1	Bridge Rectifier, 35A, 100V
53	5705-09042-00		Heat Sink
54	03-7947		Tie Wrap
55	4005-01016-00		Mach. Screw, 5-40 x 7/16, RH
56	4700-00004-00		Flatwasher, 0.146 x 3/8, 21 Ga.
57	4701-00023-00		Lockwasher, #5, split
58	4405-01117-00		Hex Nut, 5-40
59	20-9229		Heat sink Thermal Compound
60	HW-30118-4		Lead wire, 18 AWG, 3"
61	5731-01003-00	F6, F5	Fuse, 7A, 250V, S-B

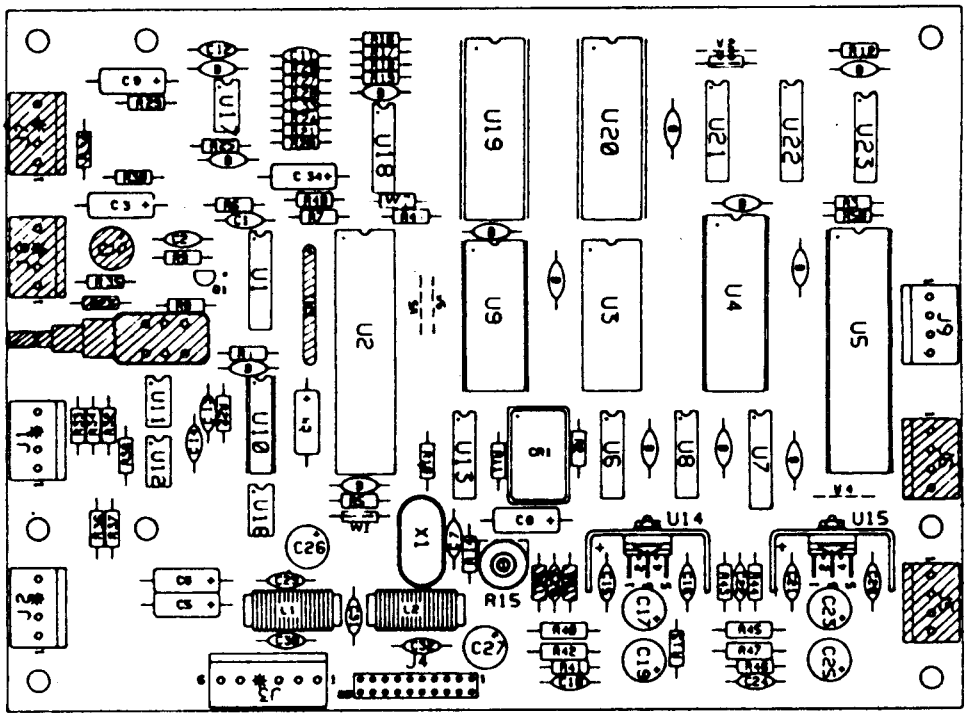
System 11A CPU Board (D-11392) Parts Information

Item	Part No.	Ckt Designator	Description
1	5764-12091-00		Bare P. C. Board
2	5370-09891-00	U3	IC, CVSD Mod., 55536
3	5370-09321-00	U4, U5	IC, Dual Op Amp, 1458
4	5281-09308-00	U16	IC, Octal Bus Xcvr, 74LS245
5	5430-08972-00	U9, U10, U38, U41, U42, U51, U54	IC, PIA, MC6820/6821
6	5340-10139-00	U25	IC, 2K x 8 CMOS Static RAM
7	5280-09010-00	U44	IC, 4-16 Decoder, 74154
8	5281-09246-00	U7, U8, U12	IC, 2-4 Decoder, 74LS139
9	5075-09406-00	ZR3 - ZR8	Diode, Zener, 6.2v, 0.5w
10	Not Used		
11	5281-09487-00	U6	IC, Dual D Flip-flop,74LS74
12	5431-09449-00	U43	IC, Timer, MC1455
13	5310-09236-00	U29	IC, 14-b Counter, 4020
14	5281-09743-00	U32	IC, Quad 2-Input AND, 74LS08
15	5281-09247-00	U14	IC, Quad 2-Input NOR, 74LS02
16	5281-09235-00	U35	IC, Triple 3-Input NAND, 74LS10
17	5280-09013-00	U36	IC, Hex Inverter, 7404
18	5281-09499-00	U31, U34	IC, Quad 2-Input NAND, 74LS00
19	5281-10014-00	U33	IC, Dual 4-Input NAND, 74LS20
20	5281-09486-00	U28	IC, Octal D Flip-flop, 74LS374
21	5371-09152-00	U2	IC, D/A Converter, MC1408
22	5281-09745-00	U37	IC, 3-8 Decoder, 74LS138
23	5340-09878-00	U23	IC, 2K x 8 Static RAM, 2016
24	5370-09156-00	U1	IC, Aud. Amp., TDA2002
25	5281-09867-00	U11, U13, U40	IC, Octal Buffer, 74LS244
26	5280-08973-00	U17-U20, U52, U53	IC, Quad 2-Input AND, 7408
27	5280-08974-00	U55, U56	IC, Hex Inverter, 7406
28	5310-09155-00	U30, U39	IC, Quad 2-Input NAND, MC14011
29	5280-08948-00	U45, U50	IC, Quad 2-Input NOR, 7402
30	5280-09309-00	U49	IC, Hex Buffer, 7407
31	5671-09019-00	LED1-LED3	LED, Red, Display
32	5521-10506-00	CR1	Oscillator, 4 MHz
33	5162-08976-00	Q51, Q53, Q55, Q57, Q59, Q61, Q63, Q65	Transistor, NPN Darl. 2N6427, TO-92
34	5191-08978-00	Q52, Q54, Q56, Q58, Q60, Q62, Q64, Q66	Transistor, PNP, TIP42, TO-220
35	5162-09410-00	Q6-Q9, Q14-Q17, Q22-Q25, Q30-Q33, Q69, Q71, Q73, Q75, Q77, Q79, Q80-Q87	Transistor, NPN, TIP122, TO-220
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
37	5160-10269-00	Q1, Q40, Q42-Q49	Transistor, NPN, 2N3904, TO-92
38	5190-09016-00	Q39, Q50	Transistor, PNP, 2N4403, TO-92
39	5130-09014-00	S1-S8	SCR, 30v, 0.8A, 2N5060
40	5070-06258-00	D3-D19	Diode, 1N4001
41	5070-08919-00	D2	Diode, 1N4148, 150mA
42	5070-09266-00	D1	Diode, 1N5817, 1.0A
43	5075-09018-00	ZR1	Diode, Zener, 1N5996A, 6.8v, 0.5w
44	5075-09059-00	ZR2	Diode, Zener, 1N5990, 3.9v, 0.5w
45	5010-08992-00	R94, R97, R100, R103, R106, R109	Resistor, 560Ω, 5%, 1/4w, C. F.
46	5010-09039-00	R56	Resistor, 10Ω, 5%, 1/4w, C. F.
47	5010-09534-00	W1, W2, W4, W5, W7, W8, W11, W14, W16, W17	Resistor, 0Ω, 5%, 1/4w, C. F.
48	5010-08991-00	R31, R32, R35, R52 R55, R68, R92	Resistor, 4.7KΩ, 5%, 1/4w, C. F.
49	5010-09358-00	R5, R6, R57, R58, R64, R66, R112, R115, R118, R121, R124, R127, R130, R133	Resistor, 1.0KΩ, 5%, 1/4w, C. F.
50	5010-09113-00	R79	Resistor, 33KΩ, 5%, 1/4w, C. F.
51	5010-08983-00	R7, R8, R10, R70, R80	Resistor, 3.3KΩ, 5%, 1/4w, C. F.
52	5010-09034-00	R11-R14, R25, R26, R53, R60, R65, R90	Resistor, 10KΩ, 5%, 1/4w, C. F.
53	5010-09086-00	R81	Resistor, 6.8KΩ, 5%, 1/4w, C. F.
54	5010-09363-00	R3	Resistor, 5.6KΩ, 5%, 1/4w, C. F.
55	5010-08997-00	R23, R24, R91, R93, R96, R99, R102, R105, R108	Resistor, 2.7KΩ, 5%, 1/4w, C. F.
56[2]	5012-09037-00	R113, R116, R119, R122, R125, R128, R131, R134	Resistor, 0.4Ω, 5%, 3w, Wire-Wnd.
57	5010-08993-00	R36-R51, R95, R98, R101, R104, R107, R110	Resistor, 68Ω, 5%, 1/2w, C. F.
58[2]	5012-10860-00	R82-R89	Resistor, 27Ω, 5%, 2w, C. F.
59	5010-09361-00	R1	Resistor, 220Ω, 5%, 1/2w, C. F.
60	5010-09181-00	R2	Resistor, 1.0Ω, 5%, 1/2w, C. F.
61	5010-09161-00	R4	Resistor, 2.2Ω, 5%, 1/4w, C. F.
62	5010-10003-00	R62, R63	Resistor, 390Ω, 5%, 1/4w, C. F.
63	5010-10171-00	R67	Resistor, 56Ω, 5%, 1/4w, C. F.
64	5010-10170-00	R69	Resistor, 47Ω, 5%, 1/4w, C. F.
65	5010-09160-00	R59, R61, W12, W13	Resistor, 220Ω, 5%, 1/4w, C. F.
66	5010-09416-00	R33, R34, R135-137	Resistor, 470Ω, 5%, 1/4w, C. F.
67	5010-09179-00	R9	Resistor, 3.3MΩ, 5%, 1/4w, C. F.
68	5010-09085-00	R71-R78	Resistor, 1.5KΩ, 5%, 1/4w, C. F.
69	5010-10361-00	R111, R114, R117, R120, R123, R126, R129, R132	Resistor, 1.2KΩ, 5%, 1/2w, C. F.
70	5010-08824-00	R15	Resistor, 43KΩ, 5%, 1/4w, C. F.
71	5010-09342-00	R16	Resistor, 36KΩ, 5%, 1/4w, C. F.
72	5010-08846-00	R17	Resistor, 220KΩ, 5%, 1/4w, C. F.
73	5010-09160-00	R18	Resistor, 180KΩ, 5%, 1/4w, C. F.
74	5010-09324-00	R19, R20, R22, R29, R30	Resistor, 27KΩ, 5%, 1/4w, C. F.
75	5010-08772-00	R21	Resistor, 15KΩ, 5%, 1/4w, C. F.
76	5010-09356-00	R27, R28	Resistor, 820Ω, 5%, 1/4w, C. F.
77	5019-09783-00	SR18	SIP, 9R, 10-pin, 6.8KΩ, .125w/R, 5%
78	5019-09362-00	SR3, SR15, SR17, SR19, SR20	SIP, 9R, 10-pin, 4.7KΩ, .125w/R, 5%
79	5019-09808-00	SR4, SR6, SR11	SIP, 9R, 10-pin, 560Ω, .125w/R, 5%
80	5019-09785-00	SR16	SIP, 9R, 10-pin, 2.2KΩ, .125w/R, 5%
81	5019-10472-00	SR14	SIP, 9R, 10-pin, 3.3KΩ, .125w/R, 5%
82	5019-09669-00	SR8, SRC8	SIP, 9R, 10-pin, 1.0KΩ, .125w/R, 5%
83	5019-09780-00	SR9,SR10, SR12, SR13	SIP, 4R, 8-pin, 1KΩ, 5%
84	5019-09786-00	SR1, SR2	SIP, 5R, 6-pin, 4.7KΩ, .125w/R, 5%
85	5019-09792-00	SR5, SR7	SIP, 9R, 10-pin, 2.7KΩ, .125w/R, 5%
86	5060-10396-00	SRC1-SRC5, SRC7-SRC9	SIP, 8R, 8C,10-pin, 4.7KΩ & 470pfd
87	Not Used		
88	5043-08980-00	C14, C17-C21, C31, C32, C49-C56, C59, + 54 Bypass, marked B	Capacitor, 0.01 µfd, 50v(+80,-20%), Axial
89	5043-09845-00	C6, C22, C23, C25, C27, C28	Capacitor, 1K pfd, 50v(±20%), Axial
90	5043-08996-00	C1, C4, C5, C70-75, C77, C78	Capacitor, 0.1 µfd, 50v(±20%), Axial
91	5040-09343-00	C8, C15	Capacitor, 10 µfd, Electr., 20v(±20%), Axial
92	5043-09844-00	C7, C41-C48	Capacitor, 47 pfd, 50v(±20%), Axial
93	5040-10974-00	C3, C24, C26, C29	Capacitor, 100 µfd, Electr., 25v(+50,-10%), Axial
94	5040-09776-00	C2	Capacitor, 470 µfd, Electr., 16v(+50,-10%), Radial
95	5045-09796-00	C60-C67	Capacitor, 0.1 µfd, Polycarbonate Rad., 100v(±10%)
96	5043-09065-00	C33-C40, C68, C69, C76	Capacitor, 470 pfd, 50v(±20%), Axial
97	5040-09545-00	C30	Capacitor, 22 µfd, Electr., 10v(+50,-10%), Axial
98	5041-09031-00	C9, C58	Capacitor, 1 µfd, Tant., 25v(±20%), Axial
99	5043-09030-00	C16, C57	Capacitor, 0.047 µfd, 50v(±20%), Axial
100	5046-09347-00	C10	Capacitor, 1800 pfd, Polystyrene,50v(±5%)
101	5046-09350-00	C11	Capacitor, 180 pfd, Polystyrene,100v(±5%)
102	5046-09346-00	C12	Capacitor, 1200 pfd, Polystyrene,50v(±5%)
103	5046-09348-00	C13	Capacitor, 4700 pfd, Polystyrene,50v(±5%)
104	5551-09822-00	L1-L3	Inductor, 4.7 µH, 3A
105	5641-09312-00	SW1, SW2	Switch, Pushbutton, DPDT, 100v, 5A
106	5880-09022-00	B1-B3	Battery, Alkaline, 1.5v, AA
107	20-9491	W18, W19	Bus Wire, Jumper
108	5881-09021-00		Battery Holder, #171
109	5700-10176-00		IC Socket, 28 pin
a)	A-5343-1919-1	U27	IC, Game ROM 1, 27128
b)	A-5343-1919-2	U21	IC, Sound ROM 1, 27256
c)	A-5343-1919-2	U22	IC, Sound ROM 2, 27256
110	5700-08985-00		IC Socket, 40 pin
a)	5400-09150-00	U15	IC, µProcessor, 6802
b)	5400-09150-00	U24	IC, µProcessor, 6802
111	5824-09248-00	TP1, TP2	Test Point
112	5705-09199-00		Heatsink, #6030
113	4006-01003-06		Mach. Screw, 6-32 x 3/8", P-PH-S
114	4406-01117-00		Nut, Hex, 6-32
115	4703-00007-00		Lockwasher, #6
116	20-9229		Thermal Compound (see Note 4)
117	5580-08994-01	K1	Relay, 4-pole, 40Ω, 6v
118	5791-10862-09	1J1, 1J2, 1J4-1J8, 1J10-1J12, 1J17-1J19	Connector, 9 pin (Hdr)
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:
1. For Schematic, refer to drawing #16-8993.
2. Items 56 and 58 (resistors) must be mounted 1/8" above PCB surface.
3. Standard Jumper: W1, W2, W4, W5, W7, W8, W11, W14, W16, W17.
4. Use thermal compound between item 24 (U1) and item 112 (heatsink).



System 11A CPU Board (D-11392) Parts Information



Background Sound & Speech Board

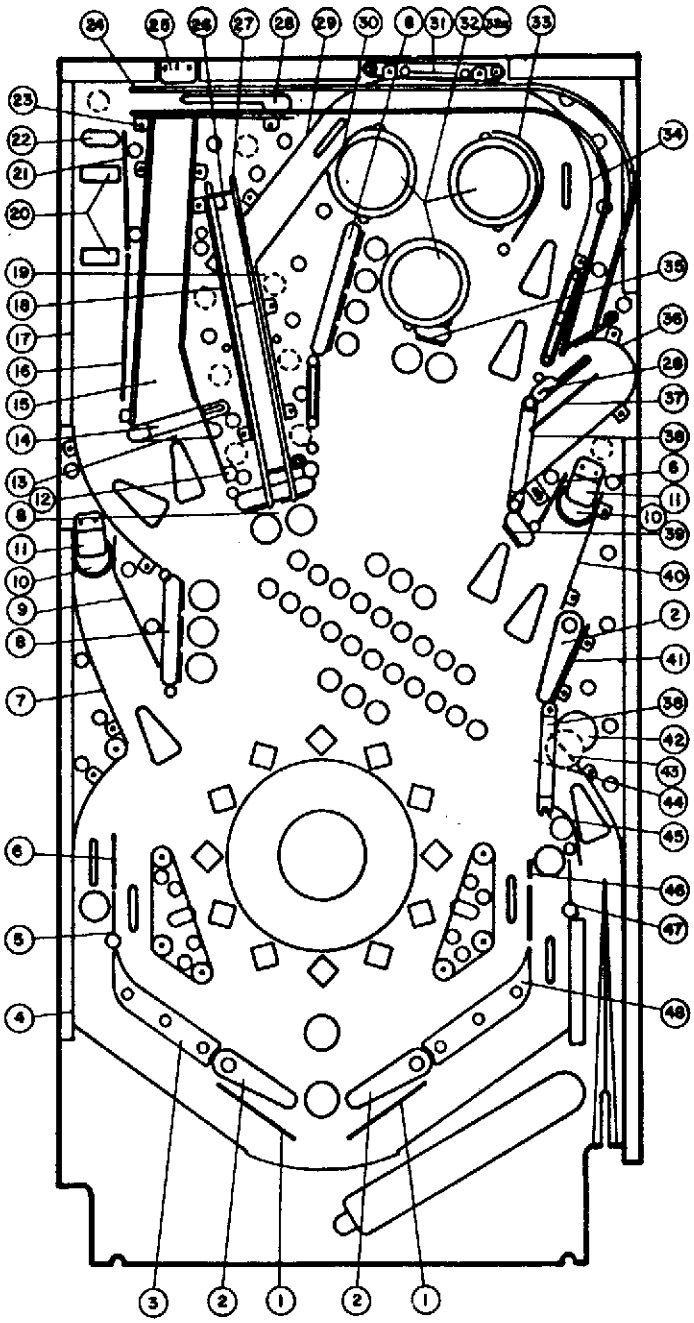
p/n D-11298-555

Item	Part No.	Ckt Designator	Description
1	5766-12057-00		Bare P. C. Board
2	5371-09152-00	U1	IC, D/A Convtr, MC1408
3	5430-10322-00	U2	IC, PIA, MC68B21
4	5340-09878-00	U3	IC, RAM, 2016
5	5281-09487-00	U6, U23	IC, Dual Flipflop, 74LS74
6	5281-09745-00	U7	IC, Dual Mux, 74LS138
7	5281-09235-00	U8	IC,Triple Nand, 74LS10
8	5370-09321-00	U11, U12, U16, U17	IC, Op Amp, MC1458
9	5281-09215-00	U13	IC, Hex Inv, 74LS04
10	5281-10043-00	U21	IC, 74LS175
11	5281-09246-00	U22	IC, 2-4 Dec,74LS139
12	5370-09156-00	U14, U15	IC, Aud. Amp, TDA2002
13	5370-09335-00	U18	IC, CVSD, 55516
14	5160-10269-00	Q1	Transistor, 2N3904, NPN
15	5014-12061-00	R15	Potentiometer, 100K, Horiz.
16	5010-09181-00	R-42, R47	Resistor, 1.0Ω, 1/2w.
17	5010-09161-00	R41, R46	Resistor, 2.2Ω
18	5010-09361-00	R13, R40, R45	Resistor, 220Ω
19	5010-09358-00	R43, R44	Resistor, 1K
20	5010-08998-00	R10, R11	Resistor, 2.2K
21	5010-08983-00	R6 - R8	Resistor, 3.3K
22	5010-08991-00	R1 - R5, R12, R36, R48 - R50	Resistor, 4.7K
23	5010-09034-00	R16 - R19, R30, R32 - R35, R38	Resistor, 10K
24	5010-08772-00	R28	Resistor, 15K
25	5010-09324-00	R22, R26, R27, R29, R37	Resistor, 27K
26	5010-09342-00	R21	Resistor, 36K
27	5010-08824-00	R20	Resistor, 43K
28	5010-09333-00	R24	Resistor, 180K
29	5010-08846-00	R25	Resistor, 220K
30	5010-10258-00	R14	Resistor, 1M
31	5010-09179-00	R9	Resistor, 3.3M
32	5010-09534-00	W1, W3, W6	Resistor, 0Ω

Item	Part No.	Ckt Designator	Description
31	5010-09179-00	R9	Resistor, 3.3M
32	5010-09534-00	W1, W3, W7	Resistor, 0Ω
33	5043-09844-00	C1	Capacitor, 47 pfd
34	5043-09492-00	C7	Capacitor, 100 pfd
35	5046-09350-00	C33	Capacitor, 180 pfd
36	5046-09346-00	11	Capacitor, 1200 pfd
37	5046-09243-00	C12	Capacitor, 4700 pfd
38	5043-09845-00	C20, C29 - C32	Capacitor, .001 µfd
39*	5043-08980-00	C2, C13, C14, C16, C22	Capacitor, .01 µfd
40	5043-08996-00	C18, C24	Capacitor, 0.1 µfd
41	5043-09365-00	C34	Capacitor, 1 µfd, 63V
42	5040-09343-00	C3 - C6, C8, C9	Capacitor, 10 µfd, electr., 20V, axial
43	5040-10974-00	C26, C27	Capacitor, 100 µfd, electr., 35V, radial
44	5040-09776-00	C17, C23	Capacitor, 470 µfd, electr., 16V, radial
45	5040-12006-00	C19, C25	Capacitor, 1000 µfd, electr., 16V, radial
46	5041-09493-00	C21	Capacitor, 10 µfd, tant., axial
47	5551-09822-00	L1,L2	Inductor, 4.7 µH, 3A
48	5791-10862-04	J1, J2, J8, J9	Connector, 4 pin (Hdr)
49	5791-10862-06	J3	Connector, 6 pin (Hdr)
50	5791-09437-00	J4	Connector, 20 pin, (Hdr) Ribbon Cable
51	5700-10176-00		IC Socket, 28 pin
a)	A-5343-555-5	U4	IC, B/G Sp. & Sound ROM 1
b)	A-5343-555-6	U19	IC, B/G Sp. & Sound ROM 2
52	5700-08985-00		IC Socket, 40 pin
a)	5400-10320-00	U5	IC, µProcessor, MC68B09E
53	5700-09004-00		IC Socket, 24 pin
a)	5370-11086-00	U9	IC, Sound Processor, YM2151
54	5700-09006-00		IC Socket, 16 pin
a)	5371-11087-00	U10	IC, D/A Conv, YM3012
55	5521-10931-00	CR1	Oscillator, 8 MHz
56	5520-09020-00	X1	Crystal, 3.58 MHz

Notes: * 14 capacitors (shown on diagram with "B" symbol) also 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.

Playfield Parts

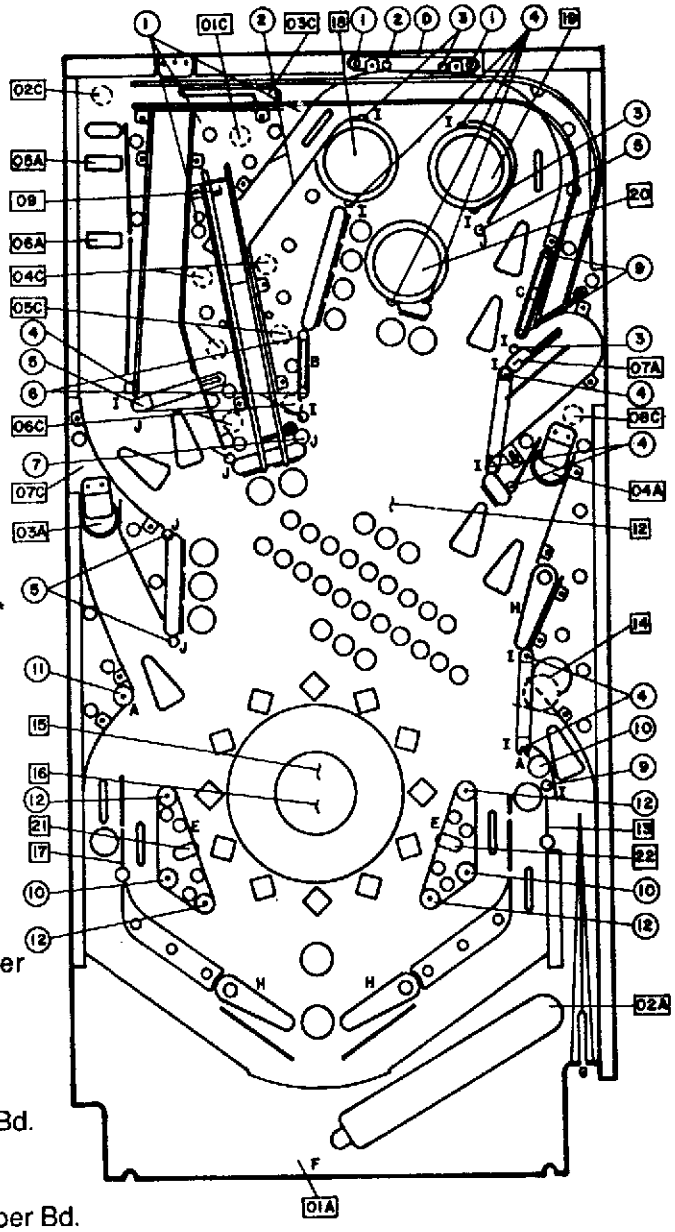


Item	Part No.	Description
1	12-6468	Anti-Rebound Wire
2	20-9250-5	Flipper Arm on Shaft
3	A-8108-L	Left Flipper Return Frame
4	B-11430	Left Lower Ball Guide Assembly
5	A-10607	Left Post & Gate Assembly
6	12-6466-7	Wireform, 1-3/4"
7	B-11428	Ball Guide Assembly (mid left)
8	D-11583-2	Standup Target, green
9	12-6721	Wireform
10	B-9361-R-1	Eject Hole Assembly
11	01-6933	Eject Hole Deflector
12	A-11456	Ball Guide Assembly
13	01-8526	Ramp Entrance Plate
14	A-10751-L	Gate Assy, Top Kickbig Ramp
15	B-11455	Ramp Assembly
16	12-6466-19	Wireform, 4-3/4"
17	C-11454	Ball Guide Assembly
18	B-11426	Ball Guide Assembly
19	A-11433	Ball Guide Assembly
20	C-11456	Drop Target
21	12-6466-16	Wireform, 4"
22	D-11583-1	Standup Target
23	B-11431	Ball Guide Assembly
24	D-12-6716	Upper Ball Chute, Wire
25	01-8520	Ball Deflector, Top Kickbig
26	B-11441	Middle Kickbig
27	C-12-6717	Ball Jump, Wire
28	B-11051-R	Kickbig, Top; Kickbig, Right
29	B-11427	Ball Guide Assembly
30	12-6466-23	Wireform, 5-3/4"
31	12-6466-4	Wireform, 1"
32	B-9414-2	Jet Bumper Assembly, Upper
a)	17-1093	Cap, Jet Bumper
33	12-6723	Wireform
34	B-11429	Ball Guide Assembly
35	D-11584-1	Standup Target, Gold/Silver
36	B-11436	Ball Guide Assembly
37	12-6466-12	Wireform, 3"
38	A-11453	Ball Gate Assembly
39	D-11583-1	Standup Target, Lites Cash Held
40	B-11434	Ball Guide Assembly
41	A-11432	Ball Guide Assembly
42	14-7943	Motor, Moving Ball Guide
43	A-11449	Rotor Disc Assembly
44	B-11447	Moving Ball Guide Assembly
45	12-6720	Wireform
46	12-6466-2	Wireform, 1/2"
47	A-9572	Right Post & Gate Assembly
48	A-8108-R	Right Flipper Return Frame

Solenoids/Flashers

Item	Part No.	Description
01A	AE-23-800-01	Outhole Kicker
01C	#89 Flashlamp	Rt. Flasher - Top Kickbig
02A	AE-23-800-03	Ball Shooter Lane Feeder
02C	#89 Flashlamp	Left Flasher - Top Kickbig
03A	AE-26-1500-01	Left Eject Hole
03C	AE-24-900-02	Top Kickbig*
04A	AE-26-1500-01	Right Eject Hole
04C	#89 Flashlamp	Top Flasher - Mid. Kicker
05A	AE-23-800-04	Top Drop Target
05C	#89 Flashlamp	Ctr. Flasher - Mid. Kicker
06A	AE-23-800-04	Bottom Drop Target
06C	#89 Flashlamp	Lower Flasher - Mid. Kicker
07A	AE-24-900-02	Right Kickbig*
07C	#89 Flashlamp	Left Eject Flasher
08A	AE-23-800-02	Knocker
08C	#89 Flashlamp	Right Eject Flasher
09	AE-23-800-03	Middle Kicker
10		
11	5580-09555-00	Gen. Illumin. Relay **
12	5580-09555-00	Solenoid A/C Select Relay***
13	SZ-31-2000-DC	Right Gate
14	14-7943	Moving Ball Guide Motor****
15	SM-29-1100-DC	C. B. Spinner Detent
16	14-7945	C. B. Spinner Motor
17	SZ-31-2000-DC	Left Gate
18	AE-23-800-03	Left Jet Bumper
19	AE-23-800-03	Right Jet Bumper
20	AE-23-800-03	Bottom Jet Bumper
21	AE-23-800-03	Left Sling
22	AE-23-800-03	Right Sling
-	FL 23/600-30/2600-50VDC	Lower and Upper Right Flipper
-	FL 23/600-30/2600-50VDC	Left Flipper

Note: *Boxes* enclose Solenoid item numbers.
Circles enclose Playfield Posts item numbers.



* - via relay, 55580-09555-00, on C-11232 Snubber Bd.
** - In backbox on Power Supply, D-8345
*** - On Relay Board, C-11232-1
**** - via relay, 5580-09555-00, on C-11232-2 Snubber Bd.

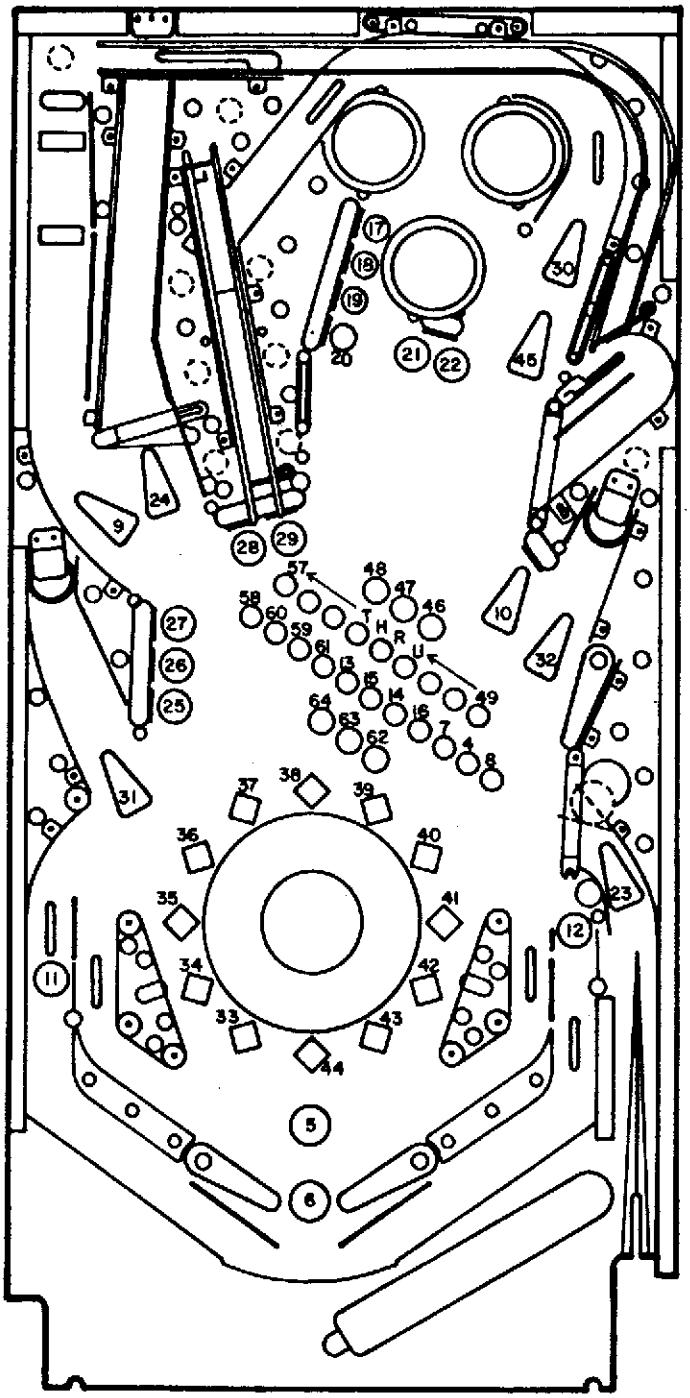
Rubber Parts

Item	Part No.	Description	Qty.
A	23-6300	5/16" Ring	2
B	23-6302	1" Ring	1
C	23-6304	1-1/2" Ring	1
D	23-6305	2" Ring	1
E	23-6306	2-1/2" Ring	2
F	23-6313-1	Grommet	1
G	23-6327	Ball Shooter Tip	1
H	23-6519-4	Red Ring	3
I	23-6535	Bumper	14
J	23-6552	Sleeving	6

Playfield Posts

Item	Post Part No.	Sleeve Part No.
1	02-3648	02-3408
2	4106-01001-24	02-3408
3	02-3905	
4	02-4008	
5	02-4036	
6	02-4195	
7	02-4056	
8	02-3648-1	02-3180
9	02-4003	
10	4106-01001-24	03-7542-13
11	02-3648	03-7542-13
12	02-4002-1	03-7542-13

Lamps



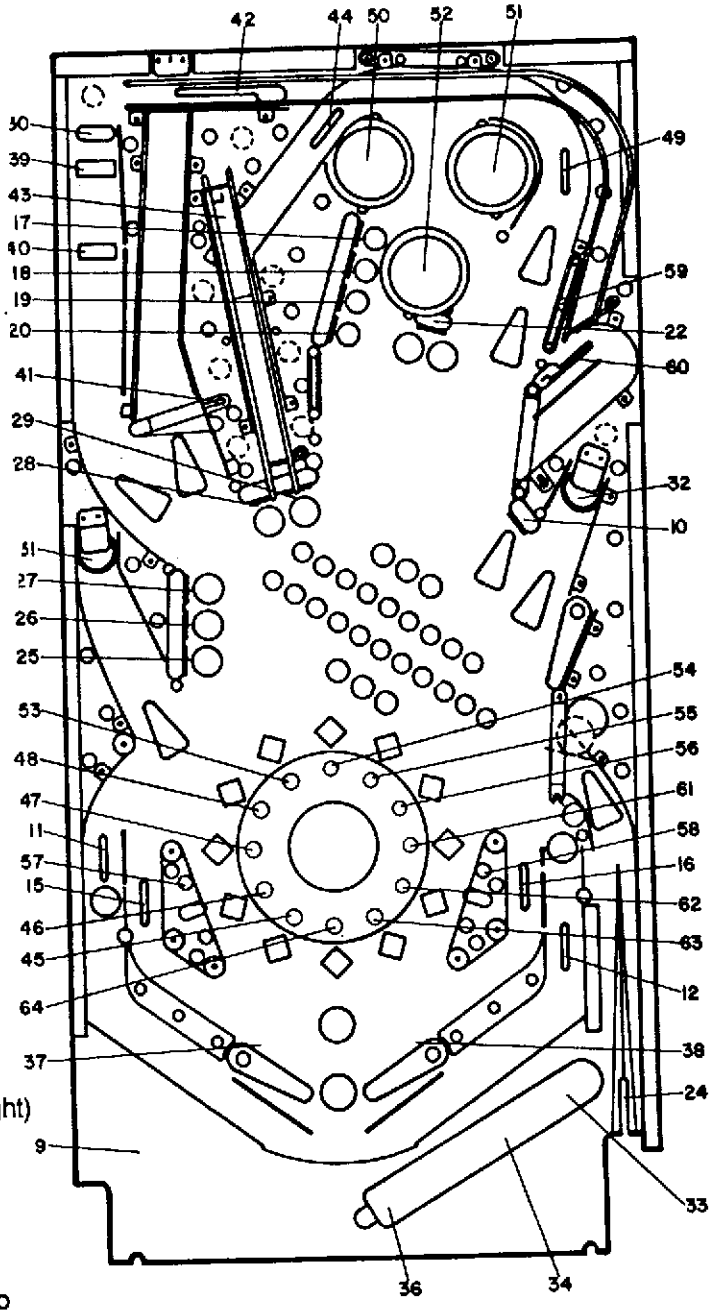
Lamp	Location/Description
1	GAME OVER (Backbox)
2	MATCH (Backbox)
3	BALL IN PLAY (Backbox)
4	R - in MILLIONAIRE
5	CASH HELD
6	EARN AGAIN
7	I (3rd) - in MILLIONAIRE
8	E - in MILLIONAIRE
9	ADVANCE MULTIPLIERS
10	LIGHTS CASH HELD
11	GATE OPEN (Left)
12	GATE OPEN (Right)
13	I (2nd) - in MILLIONAIRE
14	N - in MILLIONAIRE
15	O - in MILLIONAIRE
16	A - in MILLIONAIRE
17	B - in BANK
18	A - in BANK
19	N - in BANK
20	K - in BANK
21	GOLD
22	SILVER
23	Ball Guide Moving W/Flashing
24	LOCK (Left)
25	M - in MONEY
26	O - in MONEY
27	N - in MONEY
28	E - in MONEY
29	Y - in MONEY
30	LOCK (Right)
31	SPIN WHEN LIT (Left)
32	SPIN WHEN LIT (Right)
33	$40,000 (C. B. Spin)
34	Left MULTI-BALL (C. B. Spin)
35	Left EXTRA BALL (C. B. Spin)
36	$50,000 (C. B. Spin)
37	$100,000 (C. B. Spin)
38	Top SPECIAL (C. B. Spin)
39	$10,000 (C. B. Spin)
40	Right MULTI-BALL (C. B. Spin)
41	Right EXTRA BALL (C. B. Spin)
42	$20,000 (C. B. Spin)
43	$30,000 (C. B. Spin)
44	Bottom SPECIAL (C. B. Spin)
45	EXTRA BALL (W/L)
46	Bonus 10 (K)
47	Bonus 20 (K)
48	Bonus 40 (K)
49	1 (K)
50	2 (K)
51	3 (K)
52	4 (K)
53	5 (K)
54	6 (K)

Lamp	Location/Description
55	7 (K)
56	8 (K)
57	9 (K)
58	M - in MILLIONAIRE
59	L (1st) - in MILLIONAIRE
60	I (1st) - in MILLIONAIRE
61	L (2nd) - in MILLIONAIRE
62	2X
63	3X
64	5X

41 - 42 - 60

Switches

Item	Part No.	Description
1	A-8476	Plumb Bob Tilt
2	B-6572	Ball Roll Tilt
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	SW-1A-117	Playfield Tilt
10	SW-1A-140-5	Lights Cash Held
11	SW-1A-138	Left Outlane
12	SW-1A-124	Right Outlane
13	Not Used	
14	Not Used	
15	SW-1A-138	Left Return Lane
16	SW-1A-124	Right Return Lane
17	SW-1A-140-4	B (green)
18	SW-1A-140-4	A (green)
19	SW-1A-140-4	N (green)
20	SW-1A-140-4	K (green)
21	Not Used	
22	SW-1A-161	Silver/Gold
23	Not Used	
24	SW-1A-138	Ball Shooter Lane
25	SW-1A-140-4	M (green)
26	SW-1A-140-4	O (green)
27	SW-1A-140-4	N (green)
28	SW-1A-140-4	E (green)
29	SW-1A-140-4	Y (green)
30	SW-1A-140-5	Advance Target
31	17-1012	Left Eject Hole
32	17-1012	Right Eject Hole
33	5647-09957-00	Ball Trough #1 (lwr right)
34	5647-09633-00	Ball Trough #2
35	Not Used	
36	17-1067	Outhole
37	SW-1A-150	Left Lane Change
38	SW-1A-150	Right Lane Change
39	C-11319	Top Drop Target Opto
40	C-11319	Bottom Drop Target Opto
(41)	SW-1A-118	Enter, Top Kickbig
(42)	5647-09633-00	In, Top Kickbig
43	17-1012	In, Center Kickbig
44	SW-1A-124	Enter, Center Kickbig
45	A-11521***	$40,000, C/B Spin
46	A-11521***	Left MULTI-BALL, C/B Spin
47	A-11521***	Left EXTRA BALL, C/B Spin
48	A-11521***	$50,000, C/B Spin
49	SW-1A-124	Right Lock
50	A-7459-7	Left Jet Bumper
51	A-7459-7	Right Jet Bumper
52	A-7459-7	Bottom Jet Bumper
53	A-11521***	$100,000, C/B Spin



Item	Part No.	Description
54	A-11521***	Top SPECIAL, C/B Spin
55	A-11521***	$10,000, C/B Spin
56	A-11521***	Rt. MULTI-BALL, C/B Spin
57	SW-1A-122	Left Sling (scoring)**
58	SW-1A-122	RightSling (scoring)**
59	SW-1A-120	10 Points
(60)	5647-09633-00	Right Kickbig —
61	A-11521***	Rt. EXTRA BALL, C/B Spin
62	A-11521***	$20,000, C/B Spin
63	A-11521***	$30,000, C/B Spin
64	A-11521***	Bottom SPECIAL, C/B Spin
-	SW-1010A-13	Flipper Button

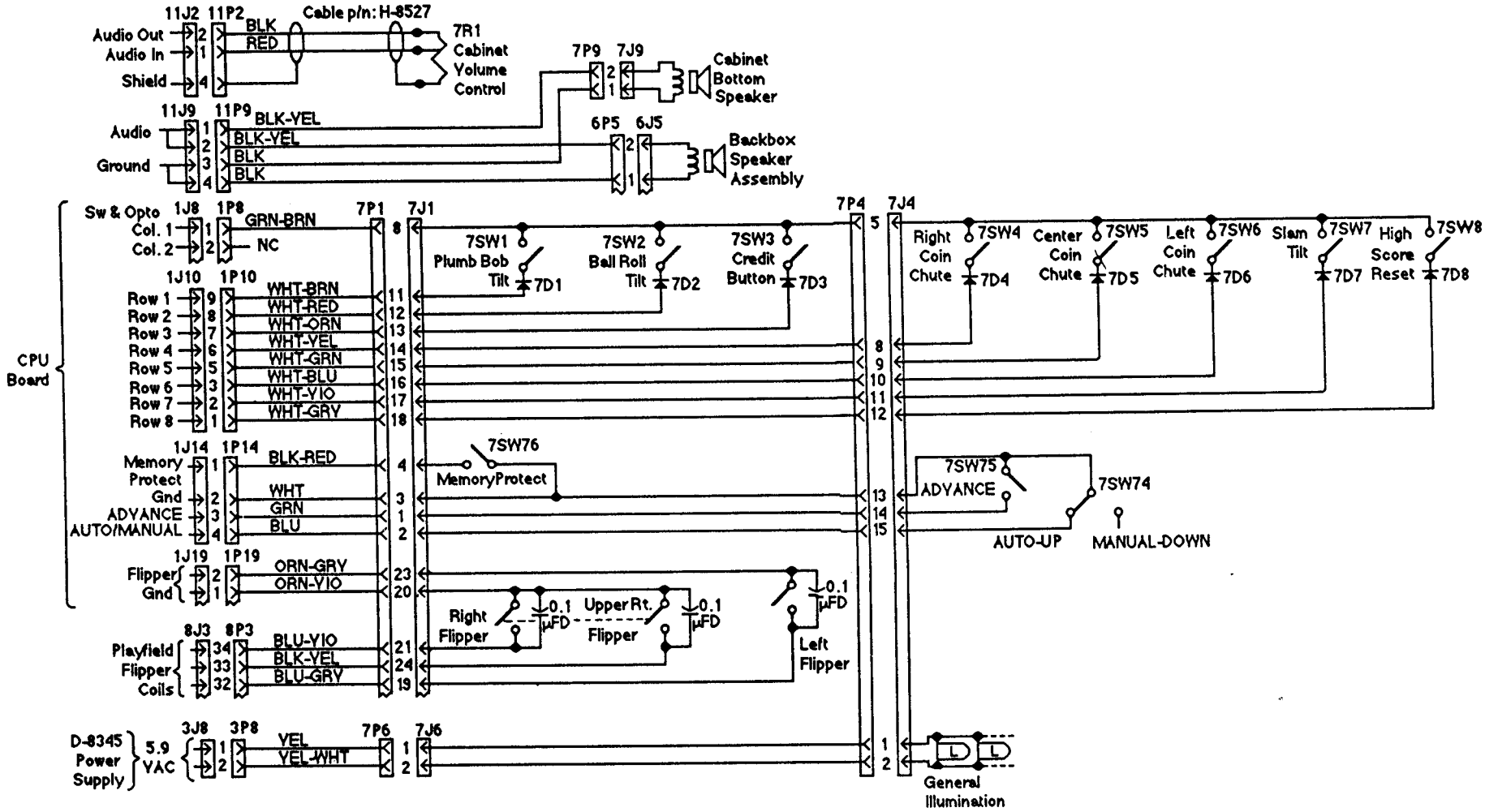
Notes: * (Coinco Part No.) ** [Kicker Actuating Sw: A-4834-H; B-8734 w/RC] *** [part of C-11461]

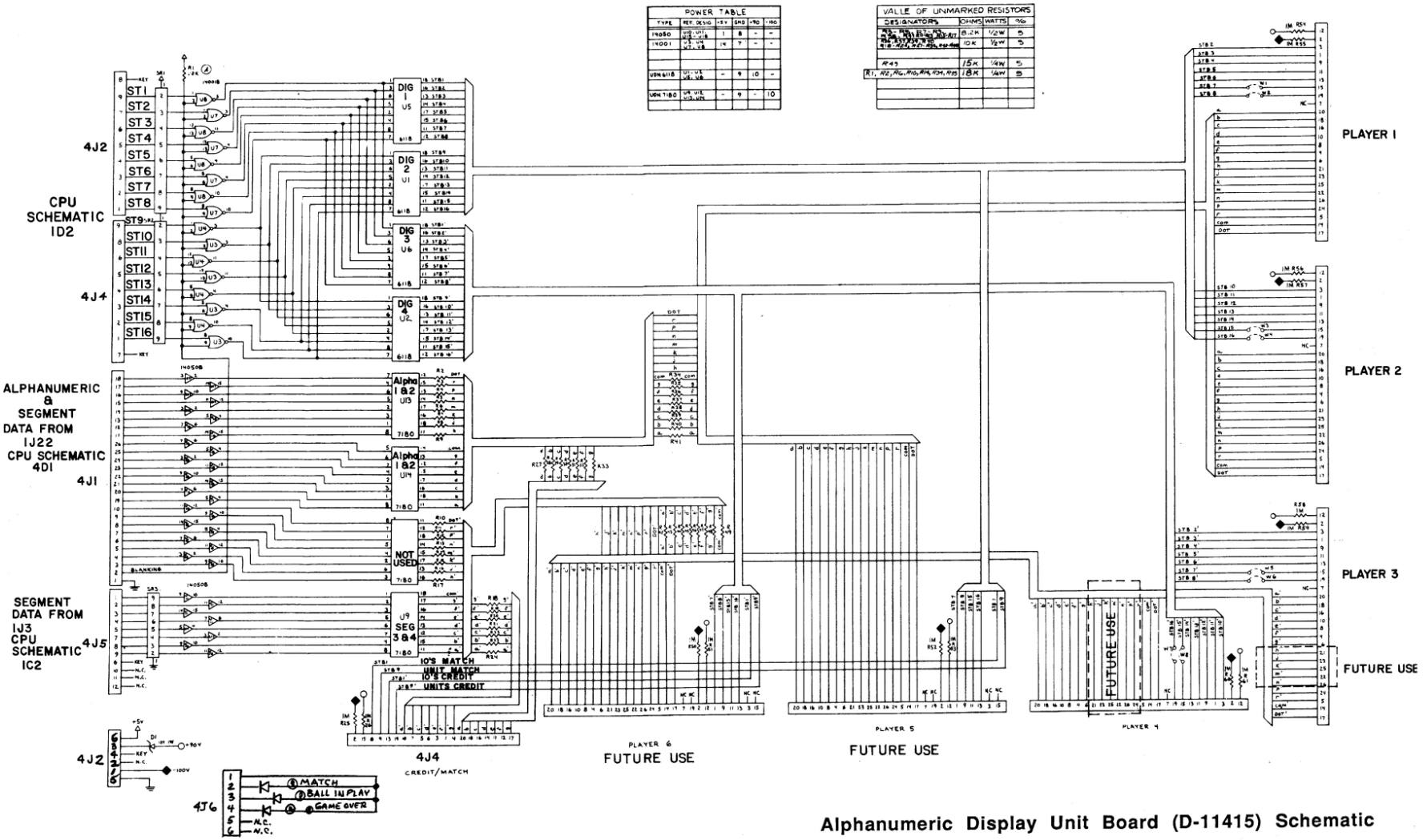
Section 3

Reference Diagrams & Schematics

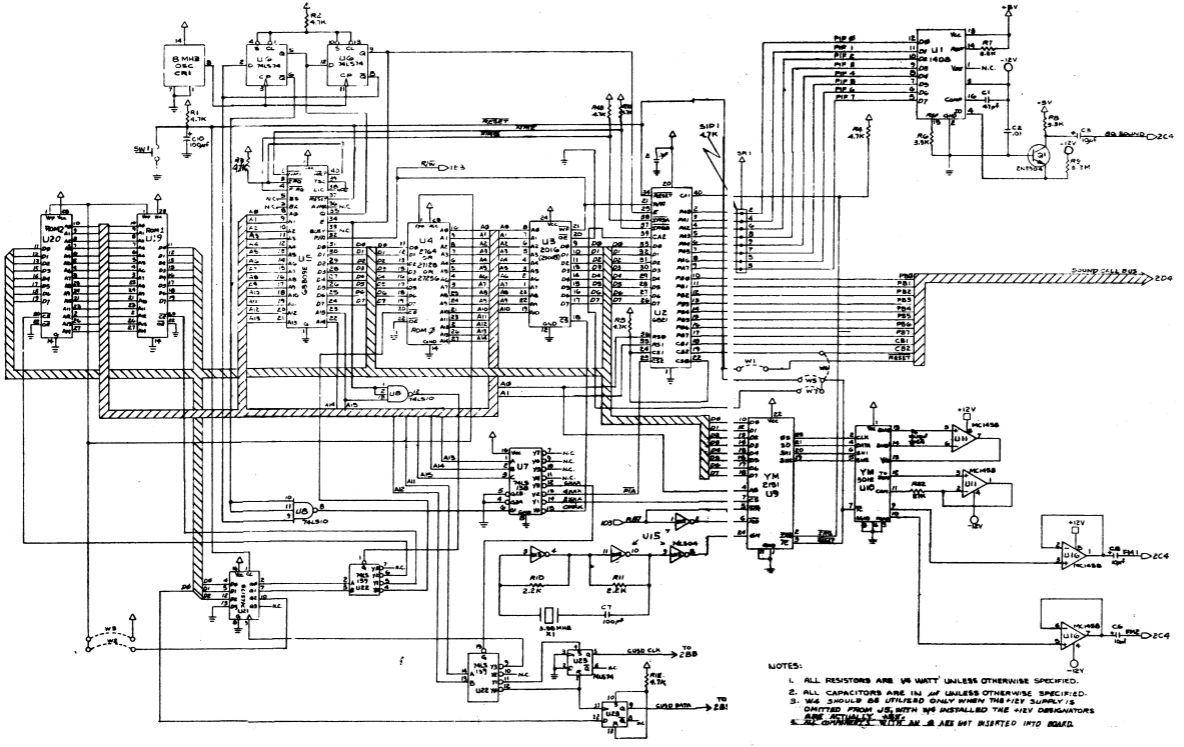
- **Diagrams and Schematics:**

  Cabinet Wiring
  A/N Display Unit Board
  Background Music/Speech Board
  Interboards Signals
  CPU Board
  Power Supply Board
  Displays
  Power Wiring

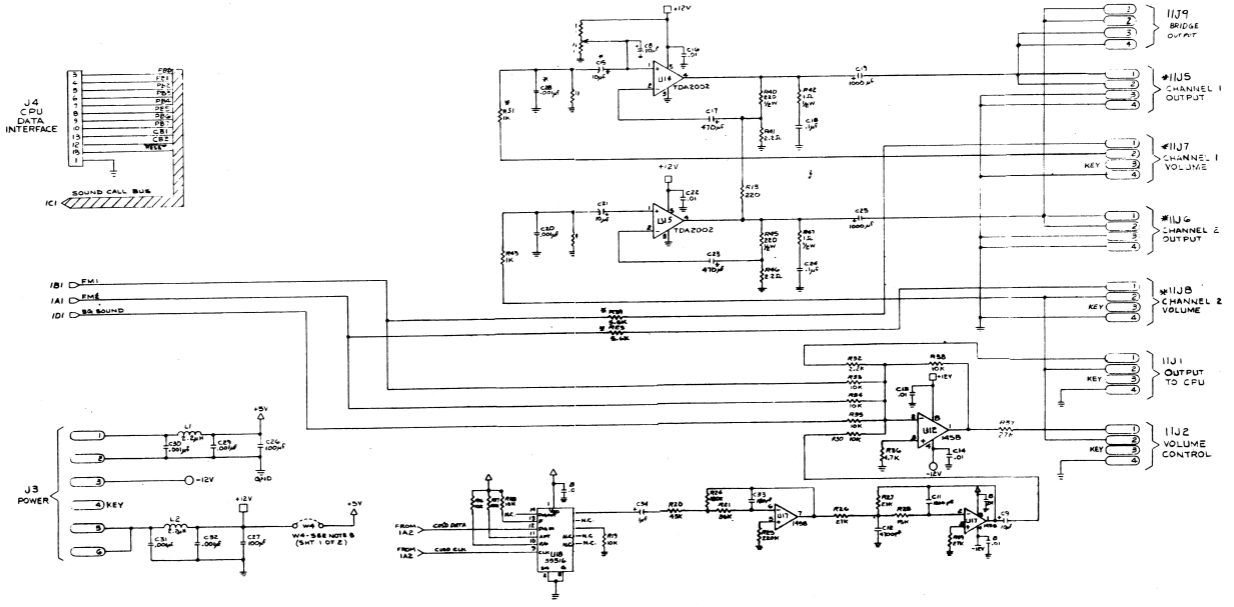

11J2 11P2
Cable p/n: H-8527
Audio Out
Audio In
Shield
BLK
RED
7R1
Cabinet
Volume
Control
7P9 7J9
Cabinet
Bottom
Speaker
11J9 11P9
BLK-YEL
Audio
Ground
BLK-YEL
BLK
BLK
6P5 6J5
Backbox
Speaker
Assembly
Sw & Opto
Col. 1
Col. 2
1J8 1P8
GRN-BRN
NC
7P1 7J1
7P4 7J4
7SW1
Plumb Bob
Tilt
7D1
7SW2
Ball Roll
Tilt
7D2
7SW3
Credit
Button
7D3
Right
Coin
Chute
7SW4
7D4
Center
Coin
Chute
7SW5
7D5
Left
Coin
Chute
7SW6
7D6
Slam
Tilt
7SW7
7D7
High
Score
Reset
7SW8
7D8
CPU
Board
1J10 1P10
Row 1
Row 2
Row 3
Row 4
Row 5
Row 6
Row 7
Row 8
WHT-BRN
WHT-RED
WHT-ORN
WHT-YEL
WHT-GRN
WHT-BLU
WHT-VIO
WHT-GRY
1J14 1P14
Memory
Protect
Gnd
ADVANCE
AUTO/MANUAL
BLK-RED
WHT
GRN
BLU
7SW76
MemoryProtect
7SW75
ADVANCE
7SW74
AUTO-UP
MANUAL-DOWN
1J19 1P19
Flipper
Gnd
ORN-GRY
ORN-VIO
Right
Flipper
0.1
µFD
Upper Rt.
Flipper
0.1
µFD
0.1
µFD
Left
Flipper
8J3 8P3
Playfield
Flipper
Coils
BLU-YIO
BLK-YEL
BLU-GRY
D-8345
Power
Supply
5.9
VAC
3J8 3P8
YEL
YEL-WHT
7P6 7J6
General
Illumination



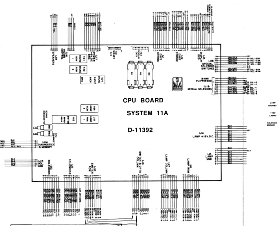
Alphanumeric Display Unit Board (D-11415) Schematic

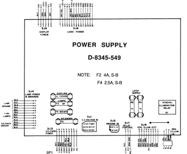


Background Sound & Speech Board (D-11298) Schematic



Background Sound & Speech Board (D-11298) Schematic



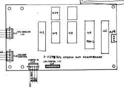


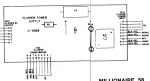
3P1

Pin	Wire Color	Connection
1	VIO	Lamp Rectifier, + 18V DC
2	ORN	Solenoid Rectifier, +34V DC
3	ORN	Solenoid Rectifier, +34V DC
4	WHT	Transformer, 88.5V AC
5	---	
6	---	
7	---	
8	---	
9	WHT	Transformer, 88.5V AC
10	GRY-GRN	Transformer, 19-4V AC, 1Ø, C.T.
11	GRY	Transformer, 19-4V AC, 1Ø, C.T.
12	GRY-WHT	Transformer, 19-4V AC, C.T. Com.

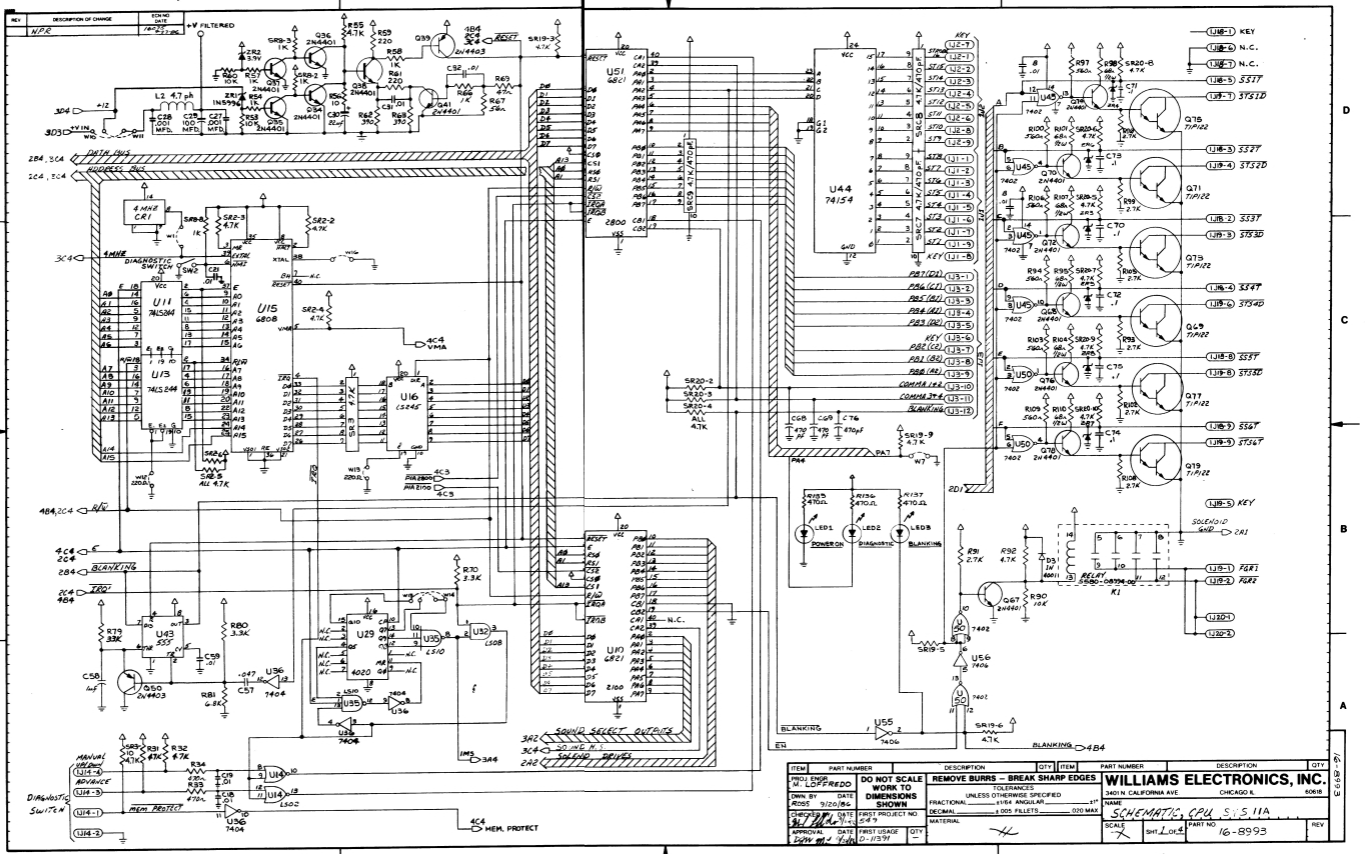
3P2

Pin	Wire Color	Connection
1	---	
2	---	
3	BLK	Lamp Rectifier (Gnd)
4	---	
5	---	
6	BLK	Lamp Rectifier (Gnd)

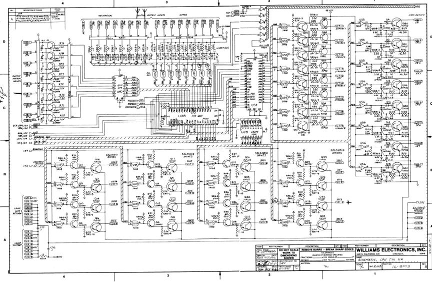




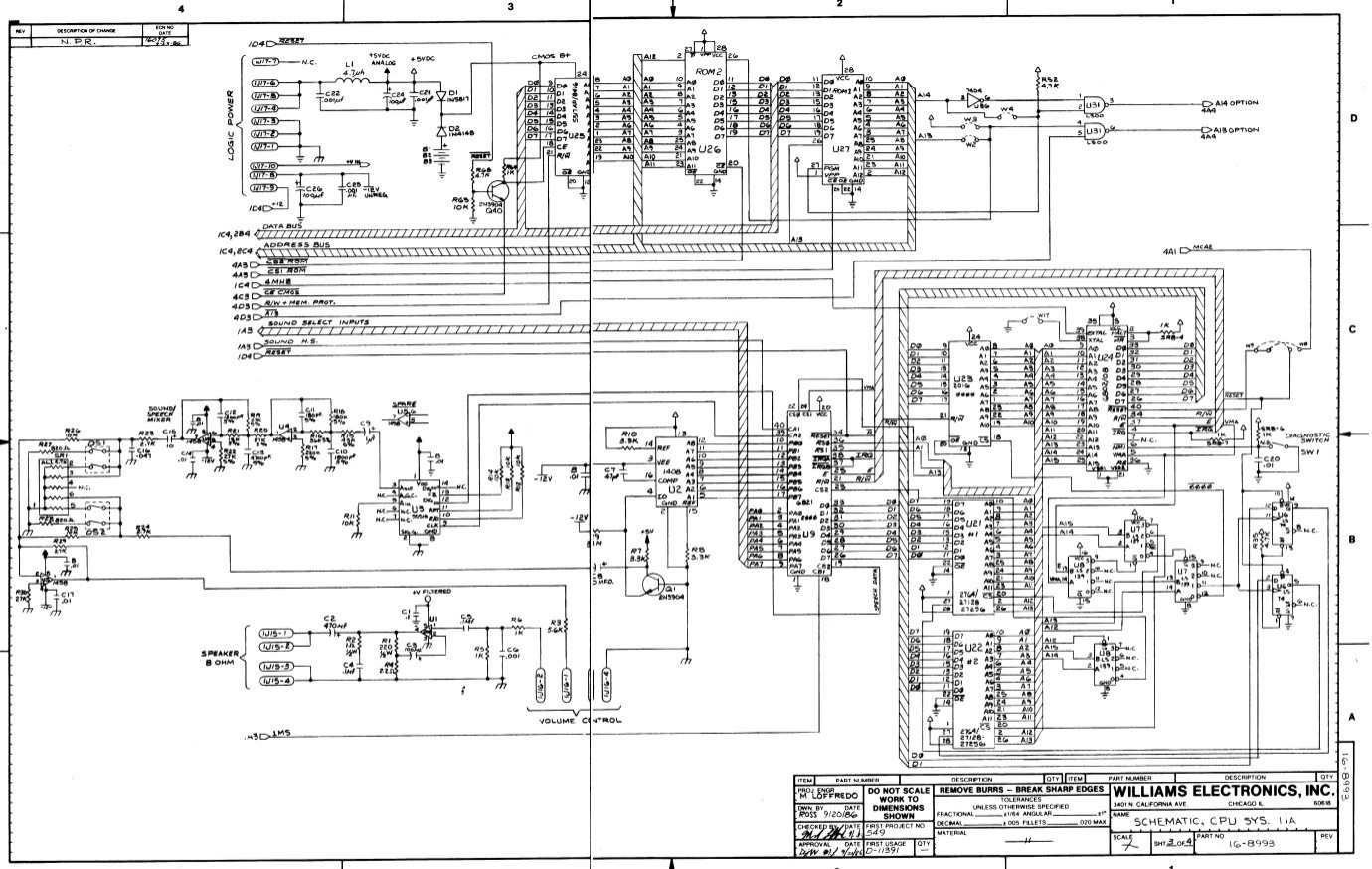
Interboards Signals Diagrams



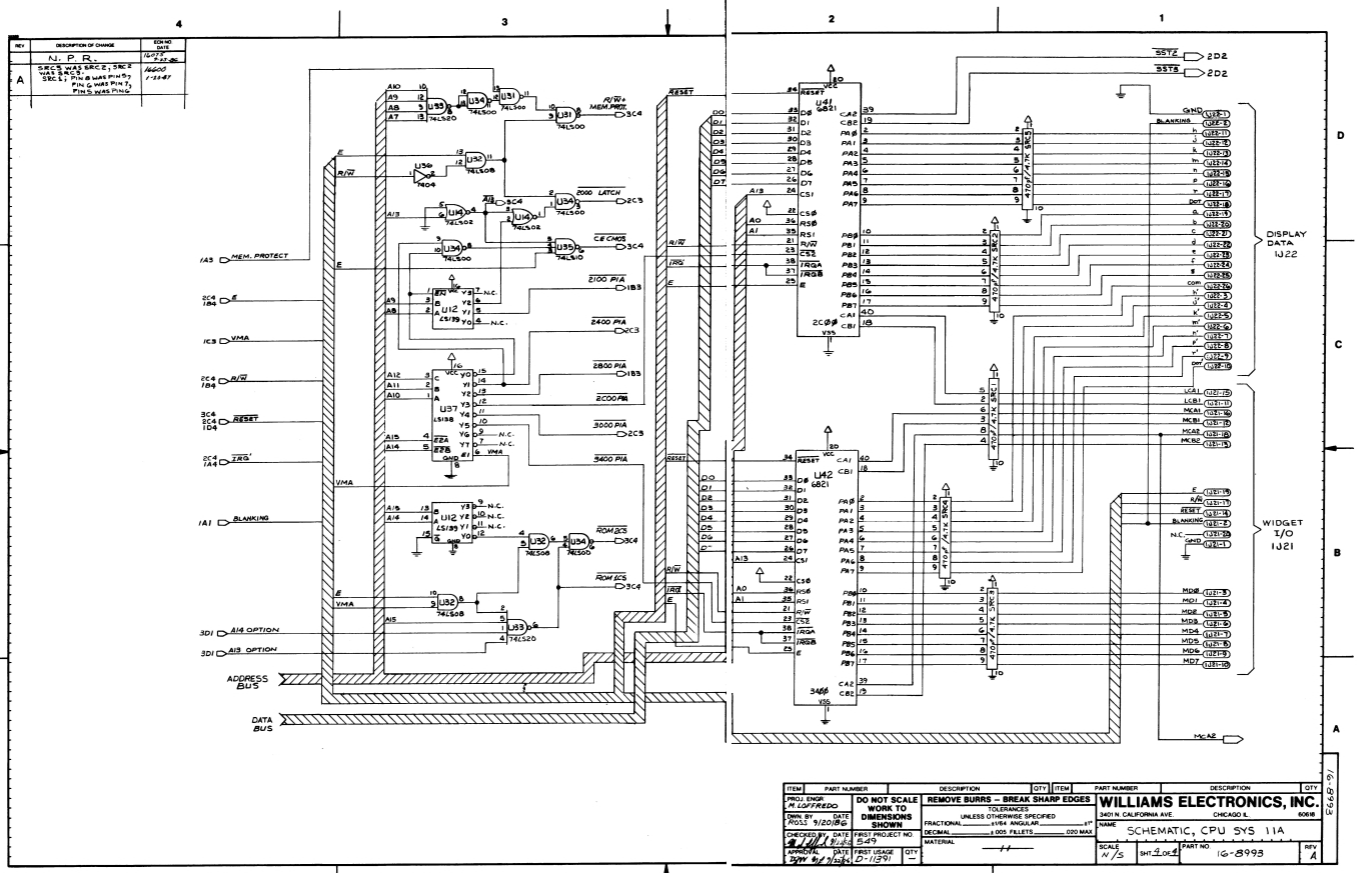
Schematic, System 11A CPU Board (16-8993, Sheet 1 of 4)



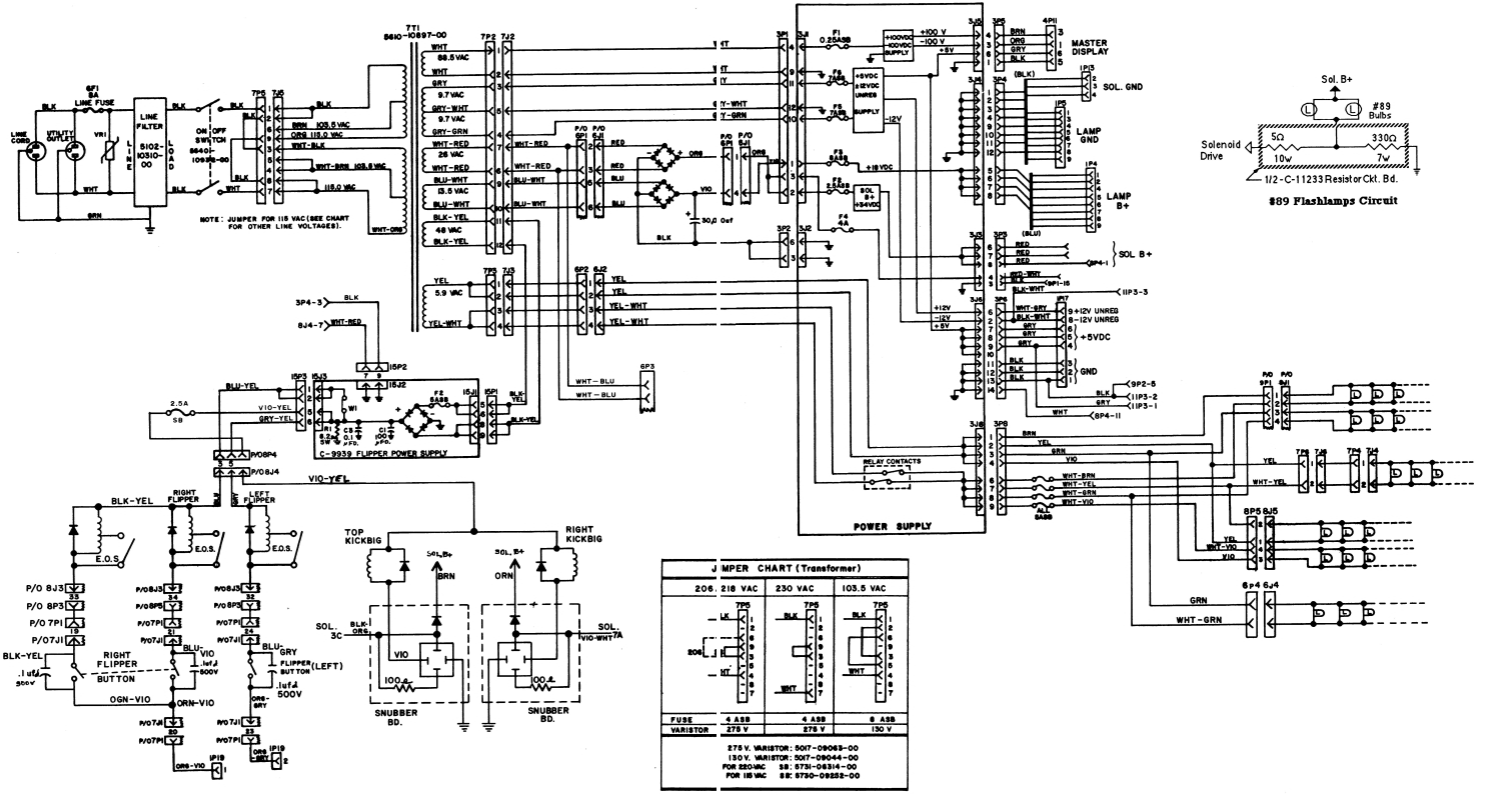
Schematic, System 11A CPU Board (16-8993, Sheet 2 of 4)



Schematic, System 11A CPU Board (16-8993, Sheet 3 of 4)



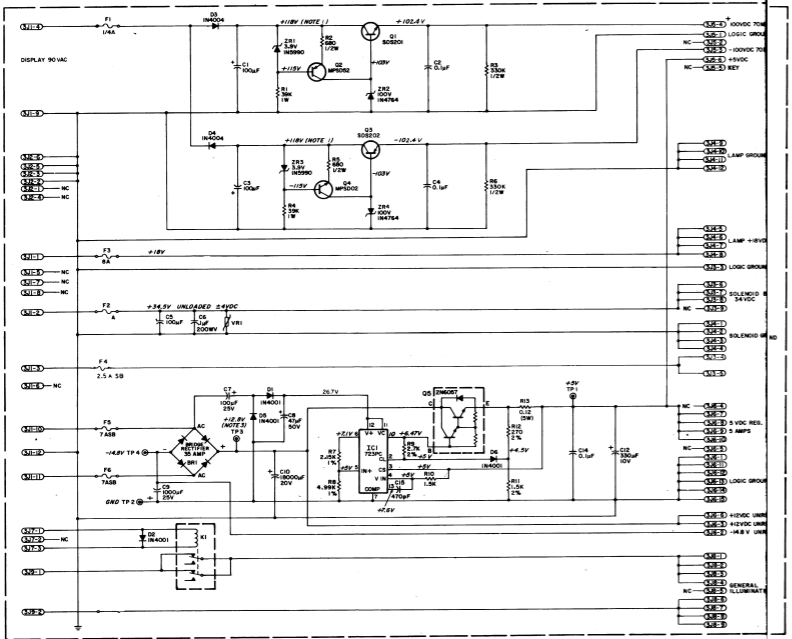
Schematic, System 11A CPU Board (16-8993, Sheet 4 of 4)



JUMPER CHART (Transformer)			
	206, 218 VAC	230 VAC	103.5 VAC
	7P5	7P5	7P5
FUSE	4 AGC	4 AGC	8 AGC
VARISTOR	275 V	275 V	130 V

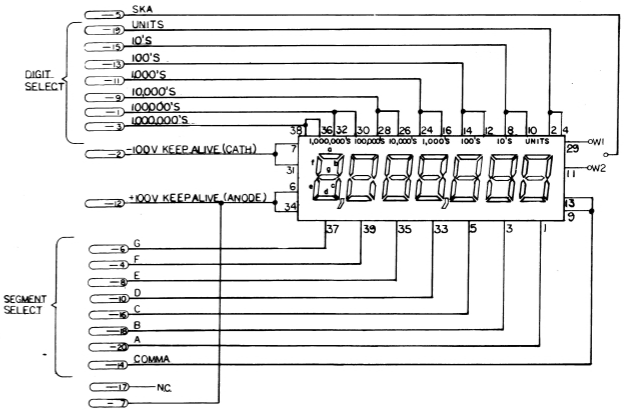
275 V. VARISTOR: 5017-09063-00
130 V. VARISTOR: 5017-09044-00
FOR 220 VAC SE: 5731-06314-00
FOR 115 VAC SE: 5730-09252-00

Power Wiring Diagram



NOTES:
1. Display voltage measured with digits display test ON, and displays at all zeroes.
2. Unless otherwise indicated, all resistors are in ohms (Ω), 1/4 watt.
3. TP3 (unregulated +12 VDC) readout should not go lower than +10.5 V, or intermittent reset will occur.

D-8345 Power Supply Schematic



7-digit 7-segment Display Glass (5670-09439-00) Schematic

[2] Double Lamps

MILLIONAIRE Lamp-Matrix Table

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 1 RED-BRN 1J6-1	GAME OVER (Backbox) [2] 1	ADVANCE MULTIPLIERS [2] 9	B 17	M 25	C. B. Spin 40K 33	C. B. Spin Right Extra Ball 41	1K 49	9K 57
Q81 2 RED-BLK 1J6-2	MATCH (Backbox) 2	LIGHTS CASH HELD (Bonus Hold) 10	A 18	O 26	C. B. Spin Left Multi-Ball 34	C. B. Spin 20K 42	2K 50	"M" (in Millionaire) 58
Q82 3 RED-ORN 1J6-3	BALL IN PLAY (Backbox) 3	GATE OPEN (Left) 11	N 19	N 27	C. B. Spin Left Extra Ball 35	C. B. Spin 30K 43	3K 51	"L" (1st) (in Millionaire) 59
Q83 4 RED-YEL 1J6-5	"R" (in Millionaire) 4	GATE OPEN (Right) 12	K 20	E 28	C. B. Spin 50K 36	C. B. Spin Bottom Special 44	4K 52	"I" (1st) (in Millionaire) 60
Q84 5 RED-GRN 1J6-6	CASH HELD 5	"I" (2nd) (in Millionaire) 13	Gold 21	Y 29	C. B. Spin 100K 37	Extra Ball 45	5K 53	"L" (2nd) (in Millionaire) 61
Q85 6 RED-BLU 1J6-7	EARN AGAIN 6	"N" (in Millionaire) 14	Silver 22	Right Lock 30	C. B. Spin Top Special 38	Bonus 10K 46	6K 54	2X 62
Q86 7 RED-VIO 1J6-8	"I" (3rd) (in Millionaire) 7	"O" (in Millionaire) 15	BALL GUIDE [2] MOVING W/ FLASHING 23	Left Spin W/L 31	C. B. Spin 10K 39	Bonus 20K 47	7K 55	3X 63
Q87 8 RED-GRY 1J6-9	"E" (in Millionaire) 8	"A" (in Millionaire) 16	Left Lock 24	Right Spin W/L 32	C. B. Spin Right Multi-Ball 40	Bonus 40K 48	8K 56	5X 64

MILLIONAIRE 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	B 17	M 25	Right Trough 33	Enter Top Kickbig 41	Right Lock 49	Left Sling (Kicker) 57
2 WHT-RED 1J10-8	Ball Roll Tilt 2	Lites Cash Held 10	A 18	O 26	Left Trough 34	In Top Kickbig 42	Left Jet Bumper 50	Right Sling (Kicker) 58
3 WHT-ORN 1J10-7	Credit Button 3	Left Outlane 11	N 19	N 27	Not Used 35	In Center Kickbig 43	Right Jet Bumper 51	Ten Points Switch 59
4 WHT-YEL 1J10-6	Right Coin Chute 4	Right Outlane 12	K 20	E 28	Outhole 36	Enter Center Kickbig 44	Bottom Jet Bumper 52	Right Kickbig 60
5 WHT-GRN 1J10-5	Center Coin Chute 5	Not Used 13	Not Used 21	Y 29	Left Flipper Lane Change 37	C. B. Spin 40K 45	C. B. Spin 100K 53	C. B. Spin Extra Ball Right 61
6 WHT-BLU 1J10-3	Left Coin Chute 6	Not Used 14	Silver Gold 22	Advance Multipliers Target 30	Right Flipper Lane Change 38	C. B. Spin Multi-Ball Left 46	C. B. Spin Top Special 54	C. B. Spin 20K 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Left Return Lane 15	Not Used 23	Left Eject 31	Top Drop Target 39	C. B. Spin Extra Ball Left 47	C. B. Spin 10K 55	C. B. Spin 30K 63
8 WHT-GRY 1J10-1	High-Score Reset 8	Right Return Lane 16	Ball Shooter 24	Right Eject 32	Bottom Drop Target 40	C. B. Spin 50K 48	C. B. Spin Multi-Ball Right 56	C. B. Spin Special Bottom 64

WARNINGS & NOTICES

WARNING

FOR SAFETY AND RELIABILITY, *WILLIAMS ELECTRONICS GAMES* does not recommmend or authorize any substitute parts or modifications of *WILLIAMS'* equipment. Use of Non-*WILLIAMS'* parts, or modifications of game circuitry, may adversely affect game play, or may cause injuries.

SUBSTITUTE PART OR EQUIPMENT MODIFICATIONS may void FCC Type Acceptance.

BECAUSE THIS GAME IS PROTECTED by Federal copyright, trademark, and patent laws, unauthorized game conversions may be illegal under Federal law.

THIS 'CONVERSION' PRINCIPLE ALSO APPLIES to unauthorized facsimiles of *WILLIAMS'* equipment, logos, designs, publications, assemblies, and games (or game features not deemed to be in the public domain), whether manufactured with *WILLIAMS'* components or not.

WARNING

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

WARNING

FCC STICKER. Check the back of your *MILLIONAIRE* game to verify that an FCC-certification sticker was attached to your game at the factory.

All games that leave *WILLIAMS'* plants have been tested and found to comply with FCC Rules. Because the sticker is proof of this fact, legal repercussions to the owner and distributor of the game may result, if the sticker is missing. If you receive any *WILLIAMS* game, manufactured after December 1982, that has no FCC sticker, call *WILLIAMS'* for advice or write us a note on your Game Registration Card. Be sure that the card bears your game's serial number.

RF Interference Notice

CABLE HARNESS PLACEMENTS and ground strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by the FCC Rules.

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

Notice

MILLIONAIRE, Lane Change, and MULTI-BALL are trademarks of *WILLIAMS ELECTRONICS GAMES, INC.*

FOR SERVICE...

CALL your authorized
WILLIAMS' Distributor.

Williams®
ELECTRONICS GAMES, INC.
3401 N. California Avenue
Chicago, IL 60618

***WARNING:* Transport this game ONLY with hinged backbox down!**