

Operations and Parts Information Manual

16-2011-101
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Bally
MIDWAY



ELVIRA ROM and Jumper Table

GAME	P/N - U15 Game uP	P/N - U27 G. ROM1	P/N - U26 G. ROM1	P/N - U21 S. ROM1	P/N - U22 S. ROM1	P/N - U24 Sound uP	JUMPERS
Transporter	5400-09150-00	A-5343-2008-2	A-5343-2008-1	A-5343-2008-4	A-5343-2008-3	5400-09150-00	W1,2,4,5,7,8,11,14,16,17, and 18
Elvira	5400-09150-00	A-5343-2011-2	A-5343-2011-1	A-5343-2011-4	A-5343-2011-3	5400-09150-00	W1,2,4,5,7,8,11,14,16,17, and 18

ELVIRA Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trnstr	Solenoid Part No. Flashlamp Type I = Insert Bd ; p = Playfield
				CPU Board	Playfield/ Cabinet		
01A ³	Outhole Kicker	Switched	Vio-Brn }	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800
01C ³	Jets (p)/Bats (I)	Switched	Blk-Brn }	(Gry-Brn)	5J5-9 (C)	Q33	#906/#89 flashlamps 1p,li
02A ³	Ball Eject (Shtr Lane Feeder)	Switched	Vio-Red }	1P11-3	5J1-7: 5J4-8 (A)	Q25	AE-23-800
02C ³	Organ Flasher	Switched	Blk-Red }	(Gry-Red)	5J5-8 (C)	Q25	#906 flashlamp 1p
03A ³	Drop Target Bank	Switched	Vio-Orn }	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200
03C ³	Right Ramp (p)/Punch (I)	Switched	Blk-Orn }	(Gry-Orn)	5J5-7 (C)	Q32	#906/#89 flashlamps 1p,li
04A ³		Switched	Vio-Yel }	1P11-5	5J1-5: 5J4-6 (A)	Q24	
04C ³	Left Ramp (p)/Drac (I)	Switched	Blk-Yel }	(Gry-Yel)	5J5-6 (C)	Q24	#906/#89 flashlamps 1p,li
05A ³	Eject Hole	Switched	Vio-Grn }	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800
05C ³	Moon (p)/Wolfman (I)	Switched	Blk-Grn }	(Gry-Grn)	5J4-5 (C)	Q31	#906/#89 flashlamps 2p,li
06A ³	Ball Popper	Switched	Vio-Blu }	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800
06C ³	Right Return (p)/ Hot Dog,BBQ,Bun (I)	Switched	Blk-Blu }	(Gry-Blu)	5J5-4 (C)	Q23	#906/#89 flashlamps 1p,3i
07A ³	Knocker	Switched	Vio-Blk }	1P11-8	5J1-2: 5J4-3 (A)	Q30	AE-23-800
07C ³	Left Return (p)/Letters (I)	Switched	Blk-Vio }	(Gry-Vio)	5J5-3 (C)	Q30	#906/#89 flashlamps 1p,3i
08A ³	Ball Lock Release	Switched	Vio-Gry }	1P11-9	5J1-1: 5J4-2 (A)	Q22	AE-23-800
08C ³	Skull (p)/ House (I)	Switched	Blk-Gry }	(Gry-Blk)	5J5-2 (C)	Q22	#906/#89 flashlamps 1p,li
09	ELVIRA	Controlled	Bm-Blk	1P12-1	5J2-9: 5J6-9:2J4-3	Q17	#89 flashlamp 3i
10	INSERT GI	Controlled	Bm-Red	1P12-2	5J2-8: 5J6-8:2J4-5	Q9	5580-09555-01 ^{4b}
11	PLAYFIELD GI	Controlled	Bm-Orn	1P12-4	5J2-6: 5J6-7:2J4-6	Q16	5580-09555-01 ^{4a}
12	A/C Select Relay	Controlled	Bm-Yel	1P12-5	5J2-5	Q8	5580-09555-01 ⁵
13	Rightside (p)/Graveyard (I)	Controlled	Bm-Grn	1P12-6	5J2-4: 5J6-5	Q15	#906/#89 flashlamps 1p,li
14	Boogie Monsters	Controlled	Bm-Blu	1P12-7	5J2-3: 5J6-3	Q7	AE-26-1500
15	B/board L. Side (p)/DHead (I)	Controlled	Bm-Vio	1P12-8	5J5-2: 5J6-2	Q14	#906/#89 flashlamps 2p,li
16	Boogie Monsters	Controlled	Bm-Gry	1P12-9	5J2-1: 5J6-1	Q6	#906 flashlamp 2p
17	Left Thumper Bumper	Special #1	Blu-Brn	1P10-7	5J3-7: 5J7-7	Q75	AE-23-800
18	Left Slingshot Kicker	Special #2	Blu-Red	1P19-4	5J3-6: 5J7-6	Q71	AE-26-1500
19	Right Thumper Bumper	Special #3	Blu-Orn	1P19-3	5J3-3: 5J7-3	Q73	AE-23-800
20	Right Slingshot Kicker	Special #4	Blu-Yel	1P19-6	5J3-4: 5J7-5	Q69	AE-26-1500
21	Bottom Thumper Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800
22	Flip Up Reset	Special #6	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79	AE-26-1200
	Right Flipper		Orn-Vio ²	1P19-1	2J3-1: 2J18-10: 7P1-15 (7P1-16:2J18-6:2J17-4)	-	FL-11630/50VDC
	Lower Right Flipper		(Blu-Vio)				
	Left Flipper		Orn-Gry ²	1P19-2	2J3-2: 2J18-9: 7P1-18 (7P1-19:2J18-5:2J17-3)	-	FL-11630/50VDC
	Lower Left Flipper		(Blu-Gry)				

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" circuits are pulsed, when Sol. 12 is de-energized; "C" circuits are pulsed, with Sol. 12 energized. Wire colors in brackets are those from respective "A" and "C" terminals corresponding to the J1-terminal connection listed for the Aux Power Driver Bd, which controls the device pulsing by Sol. 12. [4a] Relay is mounted on the playfield, p/n C-11998-1. [4b] Relay is mounted on the Insert Bd, p/n C-11998-1. [5] Relay is mounted on Aux Power Driver Board, p/n D-12247 in the backbox.

ELVIRA

and the

PARTY MONSTERS

Operations and Parts Information Manual

ATTENTION OPERATORS

A decal is included inside the envelope in the Cashbox Assembly to be used for your family oriented locations. Attach the decal to the screened translite on the bodice of Elvira's dress. Do not attach the decal to the glass. To disassemble the Backglass assembly:

1. Gently remove glass from Backbox.
2. Remove channels from edges of glass. The screened translite can now be separated from the glass.
3. To reassemble, align translite together with glass. Place side and top channels back onto glass first. Slide these assembled parts into the groove of the bottom channel to complete the assembly.

Also available with your game is a special operator-adjustable feature allowing you to modify game speech. Open the coin door to access the Game Adjustment and Diagnostic switches. Use AUTO-UP and press ADVANCE until Adjustment 46 is called up. Adjustment 46 will read:

SPEECH USAGE NORMAL AD 46

Use the Credit button ("START THE PARTY" button) to change this setting to *Family*. The Factory setting is *Normal*.

ELVIRA Rules and Features

MONSTER SLIDE RAMP FEATURE

The Left Ramp spots an ELVIRA letter if enabled. Consecutive shots build in point value till 1 Million. Each shot then scores 250,000 points and spots an ELVIRA letter. The Ramp shot also awards SPECIAL when lit and two (operator adjustable) consecutive shots light HOLD BONUS on Eject Hole.

BAT LANES

Completion of the B-A-T lanes increases the Bonus Multipliers (2X,3X,4X,5X), lights the Monster Slide to spot an ELVIRA letter, and enables a Ball Lock if needed.

PARTY PUNCH RAMP FEATURE

The Right Ramp awards and advances the current Potion value. The Party Punch Ramp also awards an EXTRA BALL after a ramp score of 250,000 points are earned.

BALL LOCK FEATURE

Completion of the B-A-T lanes or the JAM drop targets enables the Skull to lock a ball. Completing both Party Punch and Monster Slide Ramp shots during Multi-Ball awards JACKPOT.

"JUMPER" BUMPERS

Actuating the Bumpers increases BOOGIE BONUS when BOOGIE BONUS is lit.

FLIP UP TARGETS

Completion of the two Flip Up targets lights BARBEQUE on Eject Hole.

JAM DROP TARGETS

Completion of the JAM Drop Targets enables a Ball Lock if needed, lights and builds the BOOGIE BONUS on the Eject Hole, and lights the Monster Slide to spot an ELVIRA letter.

SKULL PASSAGE

Going through the Skull locks balls if enabled and scores 3 Million when lit.

PIZZA PASSAGE

Going through the Pizza Passage awards and advances the current Pizza Passage value.

PIZZA STANDUP TARGETS

Completion of the right standup targets lights one more Pizza Passage light and the Return Lanes.

DEAD HEADS STANDUP TARGETS

Completing all four Dead Head standup targets lights one Dead Head on Backboard, lights the left Return Lane, and lights the Monster Slide to spot an ELVIRA letter. Completing all three Backboard Dead Heads lights MILLION on Eject Hole. Completing Backboard Dead Heads a second time on same ball lights SPECIAL.

ELVIRA FEATURE

Completing the letters E-L-V-I-R-A lights the Skull on a timer for three million points.

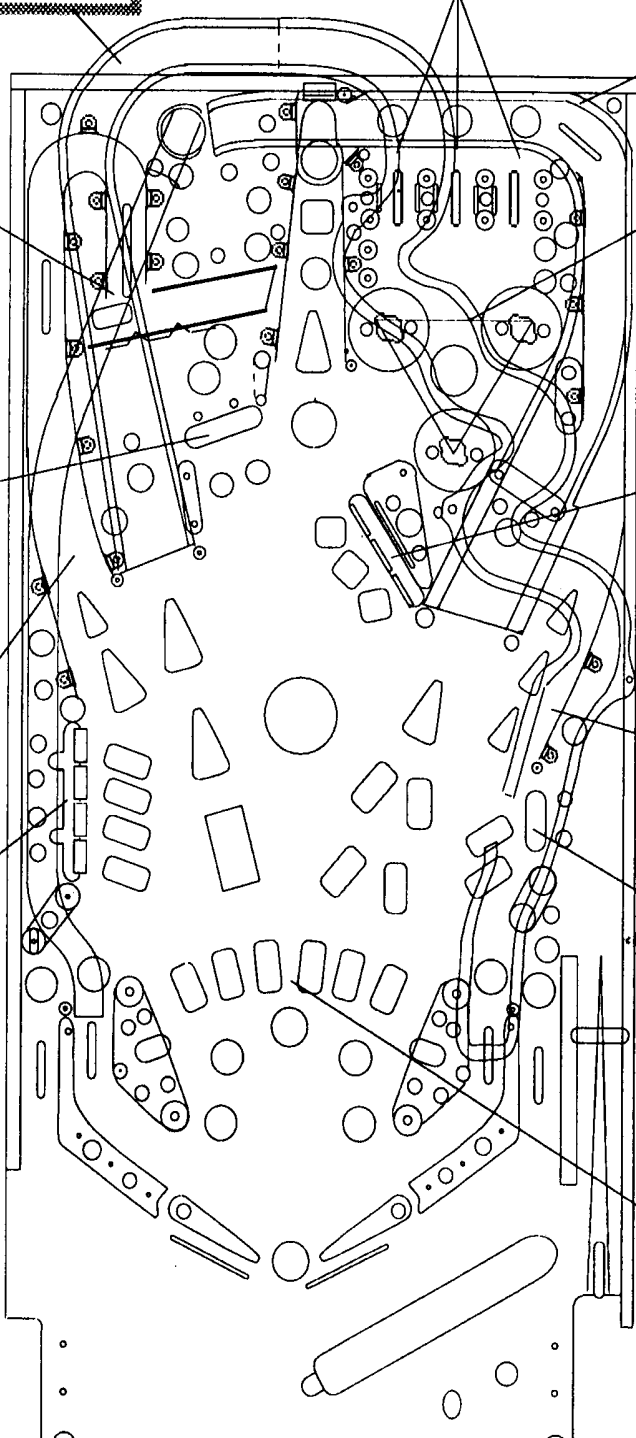


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*Game Operation
and
Test Information*

ELVIRA ROM SUMMARY

IC	DESCRIPTION	TYPE	IDENTIFIER	BOARD	PART NUMBER
Game ROM 1	32K x 8 ROM	27256	U27	CPU	A-5343-2011-2
Game ROM 2	32K x 8 ROM	27256	U26	CPU	A-5343-2011-1
Sound ROM 1	32K x 8 ROM	27256	U21	CPU	A-5343-2011-4
Sound ROM 2	32K x 8 ROM	27256	U22	CPU	A-5343-2011-3
Music/Speech ROM	64K x 8 ROM	27256	U4	AUDIO	A-5343-2011-5
Music/Speech ROM	64K x 8 ROM	27256	U19	AUDIO	A-5343-2011-6
Music/Speech ROM	64K x 8 ROM	27256	U20	AUDIO	A-5343-2011-7

Connector Identification

Since *ELVIRA* is using WILLIAMS ELECTRONICS GAMES System 11B, a new connector identification technique must be introduced. Each plug or jack receives a prefix number (which identifies the circuit board), followed by a letter ("J" or "P"), 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 3 (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.

Other game components may also have similar prefixes preceding their designator to clarify their locations or related circuit.

Prefix numbers for the System 11B circuit boards and other major assemblies are listed below. A prefix number may precede a component designator to identify its associated unit (e.g., connector1J1).

1 - CPU	6 - Backbox
2 - Master Interconnect	7 - Cabinet
3 - Backbox Power Supply	8 - Playfield
4 - Alphanumeric Display	9 - Insert Board
5 - Aux Power Driver	10 - Sound Board

Circuitboards

System 11B Circuit Boards for *ELVIRA* are in the backbox. They are accessible by unlocking the Backbox lock, removing the Backbox glass, unlatching the Insert Board (with lamps and the Digital Display Boards), and swinging it open.

Lamp circuit boards are mounted on the Playfield and the Insert Board.

Control Board

The System 11B CPU Board (p/n D-11883-2011) must be equipped with the ROMs specified in the *Elvira* ROM Summary. CPU Board jumpers W1, W2, W4, W5, W7, W8, W11, W14, W16, W17, and W19 must be connected.

Sound Board

The Sound Board is p/n D-11581-2011, including ROMs and micro-processor.

Display Board

ELVIRA has two Display Boards. The BALLY Lo-Display Board is p/n D-12502-1, and the BALLY Hi-Display Board is p/n D-12706.

1-2 Control Locations

Power Supply Board

The Power Supply Board is p/n D-12246.

Auxiliary Power Driver Board

The Aux Power Driver Board is D-12247-2011.

Master Interconnect Board

The Master Interconnect Board is D-12313-2011.

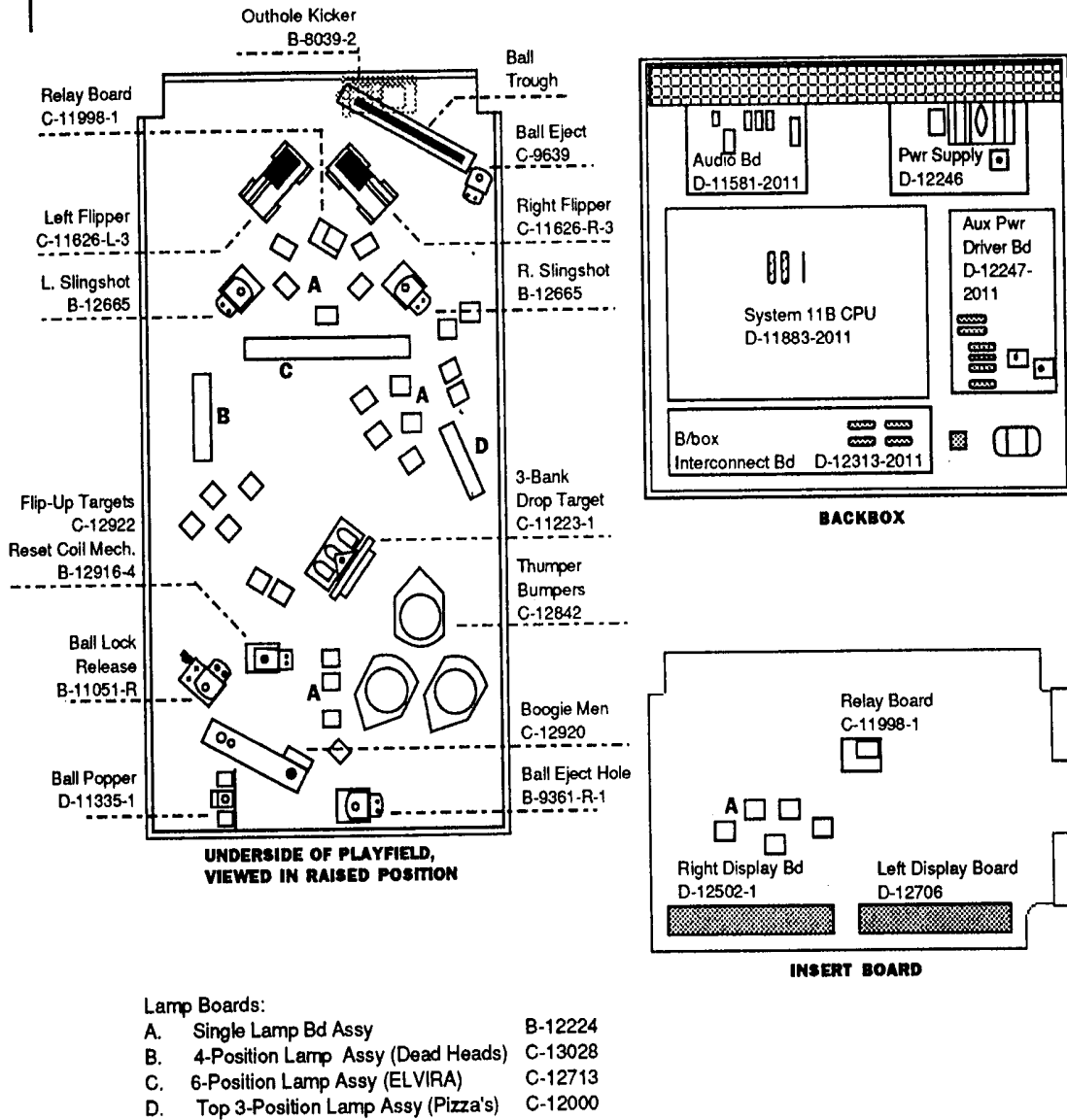


Figure 1. Locations Diagram - Game Circuit Boards and Major Mechanisms.

Control Locations

Figure 2 shows the locations of the following switches, except for the last two (CPU and Sound Diagnostic switches, which are shown in the Circuit Board Locations Diagram, Figure 1).

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 ("START THE PARTY") SWITCH is a pushbutton to the left of the coin door on the cabinet exterior.

GAME ADJUSTMENT/DIAGNOSTIC SWITCHES. *ELVIRA* allows the operator to control all game adjustments, obtain bookkeeping information, and diagnose problems, using only three switches mounted on the inside of the coin door, along with 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 text discussing Game Status Displays and the Test/Diagnostic Procedures for details concerning button 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.

On the previous page, the Circuit Board Locations Diagram shows the locations of the two CPU Board switches (left edge of CPU Board, Backbox View).

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.

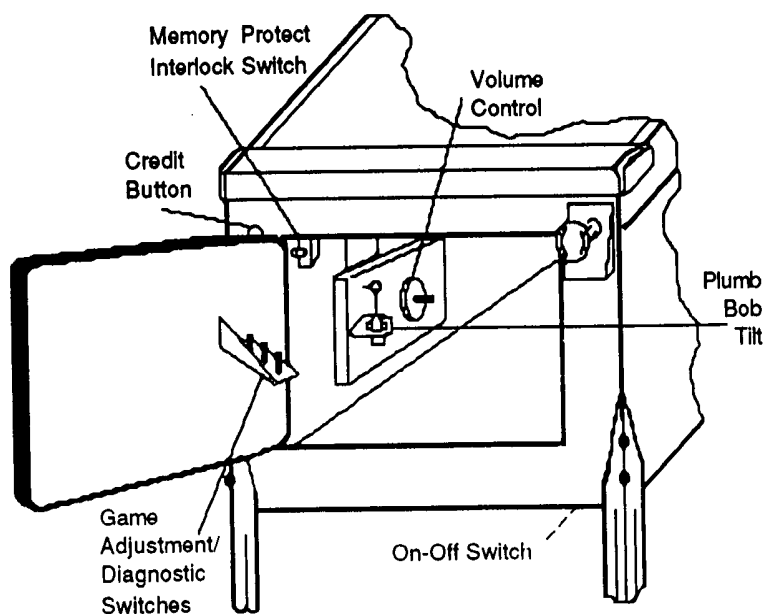


Figure 2. Control Locations

Pinball Game Assembly Instructions

Installation Procedure

1. Open the shipping container; remove all cartons, parts, and other items, and set them aside.
2. Leg levelers and bolts are provided in the cashbox. Place cabinet on a support and attach rear legs (after installing leg levellers), using leg bolts.
3. Attach the front legs (after installing leg levellers), using leg bolts. See Figure 3 for details.

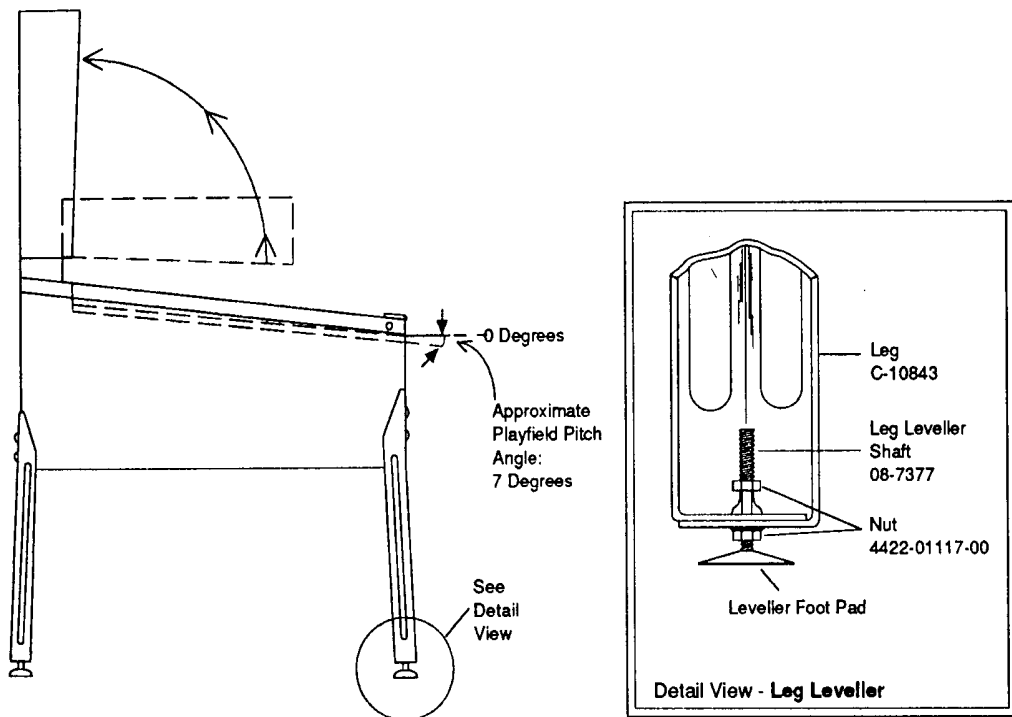


Figure 3. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

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.

4. Raise the hinged backbox upright and stabilize it into position. Unlock the backbox, and remove the backbox glass, storing it carefully to avoid scratches. Remove the shipping block holding the Insert Board. This allows access to the bolt holes used for securing the backbox upright. Install the mounting bolts, split lockwashers, and flat washers through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox. Close and latch the Insert Board, and install the backbox glass, and lock the backbox.

WARNING

NEVER transport a pinball game with 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.

5. Extend each leg leveller 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.
6. Adjust the leg levellers for proper playfield level (side-to-side) and playfield pitch angle (incline) of approximately 7 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 leveller shaft to maintain this setting, as shown in Figure 3.

CAUTION

Playing pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting.

7. Move the game into the desired location: recheck the level and pitch angle of the playfield.
 8. Verify that the required number of balls are inside the game.
 9. Clean and re-install the playfield cover glass. Prepare the game for player operation.
-
-

Game Operation

WARNING

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

Powering Up

With the coin door closed, plug the game in, and switch it ON, using the On-Off switch. In normal operation, the player 1 score display initially shows 00. Then, the game goes into the Attract Mode (playfield and backbox lamps flashing, sounds being heard, etc., if the operator does not change the Factory Setting).

Open the coin door 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.

NOTE

The SYSTEM 11B game program has a great capability to aid the operator and service personnel: At game Turn-On (and also at the beginning of the Test/ Diagnostic Procedures), the player score displays may now signal with a message, "Press ADVANCE for Report", that the game program has detected a possible problem with the game. Usually, this report indicates that at least one switch has NOT been actuated during ball play for 90 balls (~ 30 games). However, the game program compensates the game player requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep *ELVIRA* earning good profits! More information is available in the Test/Diagnostic Procedures text describing the Switch Testing.

Attract Mode*

Playfield and backbox lamps blink. The player score displays exhibit a series of messages informing the player concerning:

- A. Recent highest scores*;
- B. A "custom message";
("PARTY WITH... ELVIRA AND THE... PARTY MONSTERS")*;
- C. The score to achieve to obtain a
Replay award*;

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 player score displays show the number of credits purchased. So long as the number of maximum allowable credits* are NOT exceeded by coin purchase or high score, credits are posted correctly.

Starting a Game

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

Slam Tilt

Actuating the Slam Tilt switch on the coin door inside the cabinet ends the current game; *ELVIRA* then proceeds to the Game Over Mode. With the actuation of the slam tilt switch, 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 display shows in the player score displays. The game proceeds to the Attract Mode.

* - operator-adjustable feature

Game Status Displays

Introduction

ELVIRA provides the game owner/operator with a display of information concerning the game's bookkeeping and game play feature adjustments. Basically, three classes of information now become available in this status display mode:

- Id (Identification);
- Au (Audit);
- Ad (Adjustment).

Each of the above two-letter abbreviations for these classes appears in the Player 4 score display, while the system microprocessor for the ELVIRA game is displaying the items within each class.

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. Player displays immediately change from the Attract Mode to the Game Status Display Mode. This is evident by the following display, shown in columnar form. The column headings refer to the various backbox displays.

Player 1	Player 2	Player 3	Player 4
ELVIRA		2011 PA-x*	ID00

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

The game is named in the Player 1 and 2 score display. The ROM revision level appears in the Player 3 score display. The Player 4 score display shows the status display mode in abbreviated form, Id. The Player 4 score display also shows the status display mode item (00) for this particular display. Pressing advance (to Id 01) once more shows the Game Version information.

Player 1	Player 2	Player 3	Player 4
DOMESTIC	LEVEL 1	05-10-89	ID01

The country is named in the Player 1 score display. The Production Level appears in the Player 2 score display. The game's release date appears in the Player 3 score display and the status display mode information is shown in the Player 4 display.

Pressing ADVANCE once more causes the Id 02 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. (A subsequent change in the setting of a Game Adjustment Item 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. Fifty-three audit entries are now available. Calculation of the various factors is no longer necessary because the System 11B 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 *ELVIRA* Audit Table lists the 53 items of the Audit Information portion of the *ELVIRA* 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 53 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.)

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 *ELVIRA* Game Status Displays, as listed in the *ELVIRA* Game Adjustment Table.

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.

The *ELVIRA* Game Adjustment Table lists the 70 items of the Adjustment Information portion of the *ELVIRA* 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 Player 3 display shows Ad for all 70 adjustment items, so its entry is omitted from the tabular listing.

ELVIRA Audit Table

Audit Item (Player 3)	Descriptive Phrases (Player 1 and 2 Displays)	Audit Factor 1 Value (Player 4)
AU 01	LEFT COINS (chute next to coin door hinge)	432
02	CENTER COINS	0
03	RIGHT COINS	398
04	PAID CREDITS	830
05	TOTAL PLAYS	
06	TOTAL FREE (Total Free Plays)	
07	PERCENT FREE (% Free Plays)	
08	REPLAY AWARDS	
09	PERCENT REPLAY (% Replay Awards)	
10	SPECIAL AWARDS	
11	PERCENT SPECIAL (% Special Awards)	
12	MATCH AWARDS	
13	HSTD (High Score to Date) CREDITS	
14	PERCENT HSTD (% HSTD Credits)	
15	EXTRA BALLS	
16	PERCENT EX. BALL (% Extra Balls)	
17	AV. BALL TIME (Average Time In Seconds)	
18	MINUTES OF PLAY (Minutes of Play)	
19	BALLS PLAYED	
20	REPLAY1 AWARDS	
21	REPLAY2 AWARDS	
22	REPLAY3 AWARDS	
23	REPLAY4 AWARDS	
24	1 PLAYER GAMES	
25	2 PLAYER GAMES	
26	3 PLAYER GAMES	
27	4 PLAYR. GAMES	
28	BURN IN CYCLES	
29	LEFT OUTLANE S(# of times Left Outlane was made)	
30	RIGHT OUTLANES (# of times Right Outlane was made)	
31	LEFT RAMP (# of Left Ramp shots made)	
32	RIGHT RAMP (# of Right Ramp shots made)	
33	ELVIRA SPELLED (# of times ELVIRA was spelled)	
34	ELVIRA AWARDS(# of times 3 Million was collected)	
35	MULTI-BALLS (# of times Multi-Ball was made)	
36	JACKPOTS (# of times Jackpot was awarded)	
37	RAMP MILLION (# of times Ramp Millon was awarded)	
38	EJECT MILLION (# of times Eject Million was awarded)	
39	H.S.RESET COUNTER	
40	0.0-0.4 MIL. SCORE (# of games <400K)	
41	0.5-0.9 MIL. SCORE (# of games ≥500K, <1M)	
42	1.0-1.9 MIL. SCORE (# of games ≥1M, <1.9M)	
43	2.0-2.9 MIL. SCORE (# of games ≥2.0M, <2.9M)	
44	3.0-3.9 MIL. SCORE (# of games ≥3.0M, <3.9M)	
45	4.0-5.9 MIL. SCORE (# of games ≥4.0M, <5.9M)	
46	6.0-7.9 MIL. SCORE (# of games ≥6.0M, <7.9M)	
47	8.0-99.9 MIL SCORE (# of games ≥8.0M, <99.9M)	
48	FIRST REPLAY IS	
49	AV. MIN. GAME TIME (Avg Game Time in minutes)	
50	PIZZA COMPLETE (# of times PIZZA targets were completed)	
51	JAM COMPLETE (# of times JAM targets were completed)	
52	FLIP UP COMPLETE (# of times Flip Up targets were completed)	
53	DEAD HEADS (# of times Dead Heads were made)	
54	NOT USED	
55	NOT USED	

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.

ELVIRA Game Adjustment Table

Adjustment Item (Player 3)	Descriptive Phrases (Player 1 and 2 Displays)	Factory Setting (Player 4)
Ad 01	AUTO REPLAY ¹ <i>or</i> FIXED REPLAY ¹	10 (%)
02	REPLAY START (or REPLAY LEVEL 1) ¹	SCORES ¹
03	REPLAY LEVELS (or REPLAY LEVEL 2) ¹	3,000,000
04	(REPLAY LEVEL 3) ¹	01
05	(REPLAY LEVEL 4) ¹	(see text)
06	REPLAY AWARD	(see text)
07	SPECIAL AWARD	Credit
08	MATCH FEATURE	Credit
09	BALLS/GAME	8 (%)
10	TILT WARNING	[Off, 1-50%]
11	B. I. P.	03
12	MAXIMUM CREDITS	03
13	HIGHEST SCORES	10
14	BACKUP HI. SCR.1	On
15	BACKUP HI. SCR. 2	8,000,000
16	BACKUP HI. SCR. 3	7,000,000
17	BACKUP HI. SCR. 4	6,000,000
18	HI. SCR.1 CREDITS	5,000,000
19	HI. SCR.2 CREDITS	01
20	HI. SCR.3 CREDITS	01
21	HI. SCR.4 CREDITS	01
22	H. S. RESET EVERY	01
23	FREE PLAY	3,000
24	U.S.A. 1 COINAGE (1 COIN 1 PLAY) ^{2,3,6}	YES
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 - 48	Game-specific Adjustments (detailed in text and the Game Adjustment Setting Comparison Table)	
49 ⁴	CUSTOM MESSAGE	ON
50	DISPLAY AU (01 - 04)	YES
51 - 52	Game-specific Adjustments (detailed in text and the Game Adjustment Setting Comparison Table)	
53 -58 ^{5,6}	Special Adjustments- See text for 53-58 details.	
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 ⁷	CLEAR AUDITS	NO
70 ⁷	INSTALL FACTORY	NO

NOTES:

1. Automatic Replay percentage value range is adjustable from 5 to 50%, via the Credit button. Item 02 permits changing the factory setting value for Replay Start Level (valid for next 500 games played). Item 03 permits setting up to four replay levels, with values as detailed in text describing item 03. For Fixed Replay Scores set Auto Replay value to 1 less than 5(%) via the Credit button. Go to items 02, 03, 04, and 05; install their replay level scores. Turn off any replay level by setting 00 as its value.
2. Phrase in parentheses is Factory Setting. Phrase appears in player 2 and 4 displays. Press Credit button to change setting of 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.

The *ELVIRA* Game has the five game 'difficulty' Adjustment Items (ranging from Ad 62 - Extra Easy through Ad 66 - Extra Hard). Installing any one of these 'difficulty' Adjustments causes the values shown for each of the included game play Adjustment Items to be installed as a group, changing the level of play from one difficulty level to another. The owner/operator can use the information provided by the Audit Table Items to determine whether the 'difficulty level' for this game in this location needs to change to obtain a higher level of earnings from the game or to provide a greater challenge to the location's players.

Once the 'difficulty level' is changed, a careful review of the Audit Items will reveal whether the change has achieved this higher-earnings goal. Sometimes, one (or more) of the Adjustment Items needs further change to keep the number of plays high, while still keeping the earnings level high.

Game Difficulty Settings Table for US/Canadian/French Games

Adj. #	Adjustment Description	Extra Easy	Easy	Medium (Factory)	Hard	Extra Hard
31	Left Ramp Timer	20	17	15 SEC.	12	9
32	Ramp Mil. Start	4	4	5 RAMPS	6	8
34	R. Ramp E.B. Start	3	4	4 RAMPS	6	7
35	Extra BALL Auto	35	30	25%	23	20
37	Elvira Start	ELVIR	ELVI	ELVI	ELV	EL
38	Light Elvira	25	20	17 SEC.	12	10
39	3 Mil. Timer	SLOW	SLOW	SLOW	FAST	FAST
40	ELVIRA Memory	ALWAYS	ALWAYS	ALWAYS	ALWAYS	GAME
41	Dead Heads	EASY	EASY	EASY	MEDIUM	HARD
42	Special Memory	YES	YES	YES	YES	NO
43	Multi-Ball Difficulty	EX. EASY	EASY	MEDIUM	HARD	HARD
44	Save Locks	YES	YES	NO	NO	NO
45	Hold Bonus	1	2	2 RAMPS	3 RAMPS	4 RAMPS

Game Difficulty Settings Table for German/European Games

Adj. #	Adjustment Description	Extra Easy	Easy	Medium (Factory)	Hard	Extra Hard
31	Left Ramp Timer	20	17	15 SEC.	12	9
32	Ramp Mil. Start	4	4	5 RAMPS	6	8
34	R. Ramp E.B. Start	4	5	6 RAMPS	7	8
35	Extra BALL Auto	30	27	25%	20	18
37	Elvira Start	ELVI	ELV	ELV	EL	E
38	Light Elvira	25	20	17 SEC.	12	10
39	3 Mil. Timer	SLOW	SLOW	FAST	FAST	FAST
40	ELVIRA Memory	ALWAYS	ALWAYS	ALWAYS	ALWAYS	GAME
41	Dead Heads	EASY	EASY	EASY	MEDIUM	HARD
42	Special Memory	YES	YES	YES	YES	NO
43	Multi-Ball Difficulty	EASY	MEDIUM	HARD	HARD	EX. HARD
44	Save Locks	YES	NO	NO	NO	NO
45	Hold Bonus	1	2	2 RAMPS	3 RAMPS	4 RAMPS

Game Adjustment Procedure

Adjustment Items 01 through 70

The coin door must be open to access the Game Adjustment/Diagnostic switches. All readings and setting changes require operation of these coin door switches. Some setting changes utilize the Credit button; some also use the flipper button(s). Additional text describing the game adjustment items follows this procedure; the value of the Factory Setting for each Game Adjustment item is in the preceding ELVIRA Game Adjustment Table.

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

(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 "DONE" 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 difficulty in the Game Adjustment Setting Comparison Table, which precedes the 'details' text.

4. To proceed rapidly through the entire adjustments series, press and hold ADVANCE, until Ad 70 shows in the Player 3 display. From item 70, you can: (A) return to the Game-Over Mode; or (B) restore factory settings and zero audit (bookkeeping) totals. Perform either of the following, as desired:

- A. To reach Game-Over Mode, use AUTO-UP and press ADVANCE once. *ELVIRA* now goes to the Game-Over Mode.
- B. To restore the Factory Settings for Game Adjustment Items (as listed in the Game Adjustments Table), zero all audit (bookkeeping) totals, and return to Game-Over Mode, use AUTO-UP or MANUAL-DOWN to display Ad 70 in the Player 3 display. Press the Credit button to display the YES option in the Player 4 display. Using AUTO-UP, press ADVANCE once. *ELVIRA* now zeroes ALL Audit Item totals and changes ALL Game Adjustment Items 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 percentage of replays automatically awarded per game. The game program aids a pinball's initial installation by causing a comparison of the value of the Replay Level to the value of all players' scores every 50 games. At each comparison, the program increases (or decreases) the Replay Level by an amount necessary to achieve the replay percentage specified either via the factory setting or later operator selection. Use the Credit button to change the percentage within the range of 5 to 25 (%), with the value increasing using AUTO-UP (or decreasing using MANUAL-DOWN). The next Credit button change below 5%, selects the FIXED REPLAY option.

For AUTO REPLAY, Ad 02 provides the Starting Replay Level (Player 1 and 2 displays show REPLAY START). Ad 03 provides the number of replay levels (01, 02, 03, or 04). *ELVIRA* 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 initial Factory Setting is listed in the Game Adjustment Table. The range of settings is 800,000 through 7,000,000 (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), this is the number of replay levels in a game. The option range is one, two, three, or four replay level(s). When the operator chooses two replay levels, *ELVIRA* 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. *ELVIRA* 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. *ELVIRA* 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).
- 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).

▲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).
- 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:

- 5%-50% - 5% is 'hard'; 50% is 'extremely easy'. 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.
- 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 range of this setting is 1 through 9.

▲10 Tilt Warning

The operator can specify the number of total actuations of the plumb bob mechanism that can occur before the game is "tilted". The range of this setting is 1 through 5.

▲11 Maximum Extra Ball

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

- 00 - NO extra ball play; displays a message, NO EX. BALL
A score is awarded in lieu of the Extra Ball.
- 1-9 Ex Balls - 1 through 9 Extra Balls are awarded.

▲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 10. Reaching the specified setting prevents the award of additional credits by game play. Coin purchases do continue to accumulate and are displayed.

▲13 Highest Scores

The operator can specify (via the Credit button) whether the game is to maintain a record of the four highest scores achieved to date. The choices are:

- Off - NO high scores are recorded.
- On - The four highest scores are stored in memory for use by Game Adjustment 22.

▲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 game automatically restores this value, 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. 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. 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. 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.

▲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.

▲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.

▲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.

▲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. (Audit item 39 displays the games remaining before the reset.) The values provided upon reset are those selected by the operator in Ad 14 through 17, the Backup High Scores. The range of this setting is Off (to disable this adjustment), and 250 to 24,750 games (in increments of 250).

▲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.
- Yes - Game play is free; no coin is required.

▲24 Coinage Selections

The operator can specify (via the Credit button) any of the 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.

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 of these coin units matches, or exceeds, the Units per Credit value 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).

▲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.

▲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, by setting this value to 02 (or more).

The System 11B game program defines the following 26 Adjustment Items as "game-specific"; that is, they are unique for each game. The Game Designer/Engineer/Programmer team members work together to use these as controlling factors for game play. By varying the setting of these Adjustment Items, it is possible to "fine-tune" a game to suit a particular location, enabling the owner/operator to reap maximum earnings, while still providing the players with sufficient challenge to keep them playing.

▲31 Left Ramp Timer

The operator can choose (via the Credit button) the Time Limit for flashing Left Ramp shot. The range for this setting is 3 seconds (Conservative) to 20 seconds (Liberal).

▲32 Ramp Million Start

The operator can choose (via the Credit button) the number of Left Ramp shots the player must make to score 1 million. After each million scored, the number of shots to be made will automatically increase by one.

Example: For a setting of 5, after the player makes 5 shots and scores 1,000,000 points, the setting automatically becomes 6, etc. The range of this setting is 5 (Conservative) to 11 (Liberal).

▲33 Unused

▲34 Right Ramp E.B. Start

The operator can choose (via the Credit button) the number of Right Ramp completions the player must make to light EXTRA BALL. The range for this setting is 3 (Liberal) to 12 (Conservative).

▲35 Extra Ball Auto

The operator can choose (via the Credit button) the AVERAGE AMOUNT OF ALL Extra Balls awarded per game. The range of this setting is Enabled 5% (Conservative) through 50% (Extremely Liberal). This adjustment can also be turned off, via a setting of Fixed (Off).

▲36 Jackpot

The operator can choose (via the Credit button) whether the Jackpot will build from game to game or always stay at 4,000,000. The choices are:

- 4,000,000 - Jackpot stays at 4,000,000.
- Normal - Jackpot builds from game to game. The Factory Setting is Normal.

▲37 ELVIRA Start

The operator can choose (via the Credit button) how much of the E-L-V-I-R-A letter sequence will be lit after the player has spelled Elvira and missed the 3 Million shot. The range for this setting is ALL OFF; E; EL; ELV; ELVI; ELVIR.

▲38 Light Elvira

The operator can choose (via the Credit button) the Time Limit for flashing SPOT ELVIRA. The range for this setting is 5 (Conservative) to 20 (Liberal).

▲39 3 Million Timer

The operator can choose (via the Credit button) the Time Limit for flashing the 3 MILLION lamp, which occurs after the player spells out ELVIRA. The choices for this setting are Fast (Conservative) and Slow (Liberal).

▲40 ELVIRA Memory

The operator can choose (via the Credit button) whether the ELVIRA letters that have been earned carry over from game to game, start over with every game, or every player must earn their own letters. The choices are:

Always - (Liberal) ELVIRA letters carry over from game to game.

Game - (Conservative) ELVIRA letters start over with every game.

Player - Each player must earn their own letters.

▲41 Dead Heads: Easy, Medium, Hard

The operator can choose (via the Credit button) the degree of difficulty for the Dead Heads standup target scoring. The range for this Easy; Medium; Hard.

▲42 Special Memory

The operator can choose (via the Credit button) whether SPECIAL is stored in memory for 'next ball' play. The choices are:

Yes - (Liberal) The SPECIAL is turned ON at ball start (stored in memory) for each ball during the game. The Factory Setting is Yes.

No - (Conservative) SPECIAL lamp is turned Off at ball start.

▲43 Multi-Ball™

The operator can choose (via the Credit button) the option setting for Multi-Ball. The range for this setting is Extra Easy (Liberal); Easy; Medium (Moderate); Hard; Extra Hard (Conservative). The Factory setting is Hard.

▲44 Save Locks

The operator can choose (via the Credit button) whether the game saves any 'locked' balls at game end (to make Multi-Ball™ play easier during the next game). The choices are:

Yes - (Conservative) Do NOT save locked balls at game end.

No - (Liberal) Save all locked balls at game end for 'next-game' play.

▲45 Hold Bonus

The operator can choose (via the Credit Button) how many consecutive Left or Right Ramp shots the player must make before lighting HOLD BONUS. The range for this setting is 1 (Liberal) to 6 (Conservative).

▲46 Speech Usage

The operator can choose (via the Credit Button) whether to censor the speech feature (to insure that the game is not offensive to some people) of *ELVIRA* or not. The phrases that will be omitted AFTER censorship will be "Nice organ", "Don't touch me there", and "How 'bout another ball?". The choices are:

- Normal - Do NOT censor speech. The Factory Setting is Normal.
- Family - Censor speech.

▲47 Attract Mode Snd

The operator can select (via the Credit button) whether sounds occurring during the Attract Mode will be On or OFF. The choices are:

- Yes - (Factory Setting) The Attract Mode sounds are turned On.
- No - The Attract Mode sounds are turned OFF.

▲48 Contest Mode

The operator can specify (via the Credit button) whether the progressive features of *ELVIRA* are allowed to carry over to the next game. When the game is set for 'contest' (tournament) play, single-player games are identical from game to game (no features carry over). This disables all automatic percentaging, except replay scores, and fixes the JACKPOT value at its maximum. The choices are:

- Yes - The game is set for 'contest' play.
- No - The game is not set for 'contest' play. The Factory Setting is No.

▲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 3 display shows this choice as ON. The 3-line message provided is:
PARTY WITH...ELVIRA AND THE...PARTY MONSTERS
- 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 16-character lines for display during the Attract Mode.
 - B. Use the flipper button(s) to select each message character (alphabet, numbers, and special symbols are available). In case of error, enter a "back arrow" (just before "space") to correct, followed by correct character. For a period after any letter, use letters with periods (following the special symbols). The entire character set is the following:
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 0 1 2 3 4 5 6 7 8 9 < > ? - / * '
A . B . C . D . E . F . G . H . I . J . K . L . M . N . O . P . Q . R . S . T . U . V . W . X . Y . Z . _
 - C. Move to the next character via the Credit button. No entirely blank lines will be displayed.

▲50 Display AU 01 - 04

The operator can choose (via the Credit button) how to display the coinage audit information, Au 01 - 04. No information is lost; it remains stored in the CPU memory. The information is now available for readout via the player score displays. Three choices are available:

- Yes - Both the audit text (slot identification) and the value is displayed.
- Value - Only the value is displayed.
- No - NO display occurs.

▲51 1 Coin/Buy-in

The operator can choose (via the Credit button) whether to allow "1 Coin Buy-in" when Game Adjustment Ad24 is set for USA 3 (2 coins- 1 play, 50 cents per game player) pricing. This option enables each player, during a timed period at the end of each game, to buy another game for only one coin (25 cents), after having purchased the first game for 50 cents. That is, after purchasing the first game for 50 cents, subsequent games cost 25 cents, if purchased within the time limit.

▲52 Not Used

▲53 Not Used

▲54 Not Used

▲55 Install 3 Ball

The operator can change the game to 3-Ball play, including the changing of certain features to the recommended 3-Ball play difficulty level.

AD	NAME	NEW SETTING	AD	NAME	NEW SETTING
02	Replay Start	3,000,000	34	R. Ramp E.B	4 Ramps
09	Balls/Game	03		Start	
14	Backup H.S. 1	8,000,000	37	ELVIRA Start	ELVI
15	Backup H.S. 2	7,000,000	38	Light ELVIRA	17 Seconds
16	Backup H.S. 3	6,000,000	39	3 Million Timer	Slow
17	Backup H.S. 4	5,000,000	41	Dead Heads	Easy
31	L. Ramp Timer	15 Seconds	43	Multi-Ball Diffic.	Medium
32	Ramp Mil. Start	5 Ramps	45	Hold Bonus	2 Ramps

▲56 Install 1 Coin

The operator can use this Adjustment Item to modify the current game pricing selection to enable game play to begin when the specified number of coins are deposited. In this instance, the player now receives a 3-ball game when 1 coin of proper denomination (USA: 25 cents) passes through the coin chute.

▲57 Install 3/\$1.00

The operator can use this Adjustment Item to modify the current game pricing selection to enable game play to begin when the specified number of coins are deposited. In this instance, the player now receives a 3-ball game when 4 coins of proper denomination (USA: \$1.00) pass through the coin chute.

▲58 Install 2 Coins

The operator can use this Adjustment Item to modify the current game pricing selection to enable game play to begin when the specified number of coins are deposited. In this instance, the player now receives a 3-ball game when 2 coins of proper denomination (USA: 50 cents) pass through the coin chute.

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) either modify a game for a specific area (for example, USA coinage settings, Ad 56 through 58, or special German coinage settings, 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. Operator installation of the 'selected' Preset Adjustment occurs by using the Credit button to choose YES and then pressing the ADVANCE switch. The displays then show the name of the Adjustment again, with DONE to show that the installation is now in effect.

Note that, when an operator installs any of the Special Preset Adjustments, Adjustment Items using the automatic adjust feature of the game program reset to the auto adjust value listed for that Adjustment Item.

NOTE

Games in which the CPU has ROMs installed for German (Deutsch) language and play adjustments automatically have certain Adjustment Items preset. The following table shows these Preset Adjustment Items for each of the special German Coinage Adjustments.

Preset Game Adjustments for Domestic Games

AD	ADJ DESCRIPTION	AD 53	AD 54	AD 55	AD 56	AD 57	AD 58
		NOT USED	NOT USED	NOT USED	Install 1 Coin	3 Plays for \$1.00	Install 2 Coins
02	Replay Start				3,000,000	3,000,000	3,000,000
09	Balls/Game				03	03	03
14	Backup High Score 1				8,000,000	8,000,000	8,000,000
15	Backup High Score 2				7,000,000	7,000,000	7,000,000
16	Backup High Score 3				6,000,000	6,000,000	6,000,000
17	Backup High Score 4				5,000,000	5,000,000	5,000,000
24	Coinage				USA 1	USA 2	USA 3
64	Install Medium				YES	YES	YES
65	Install Hard				YES	YES	YES

Preset Game Adjustments for German/European Games

AD	ADJ DESCRIPTION	GERMAN 1	GERMAN 2	GERMAN 3	GERMAN 4	GERMAN 5	GERMAN 6
		AD 53	AD 54	AD 55	AD 56	AD 57	AD 58
01	Auto Replay	ON	ON	ON	ON	ON	ON
02	Replay Start	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
03	Replay Level 2	02	02	02	02	02	02
06	Replay Award	CREDIT	COIL	AUDIT	CREDIT	COIL	AUDIT
07	Special Award	CREDIT	BALL	SCORE	CREDIT	BALL	SCORE
08	Match Feature	10%	10%	OFF	10%	10%	OFF
12	Max. Credits	30	30	30	30	30	30
14	Backup High Score 1	8,500,000	8,500,000	00	8,500,000	8,500,000	00
15	Backup High Score 2	7,500,000	7,500,000	00	7,500,000	7,500,000	00
16	Backup High Score 3	6,500,000	6,500,000	00	6,500,000	6,500,000	00
17	Backup High Score 4	5,500,000	5,500,000	00	5,500,000	5,500,000	00
18	High Score 1 Credits	03	03	03	03	03	03
19	High Score 2 Credits	00	00	00	00	00	00
20	High Score 3 Credits	00	00	00	00	00	00
21	High Score 4 Credits	00	00	00	00	00	00
22	High Score Reset	1000 SPIELE	1000 SPIELE	1000 SPIELE	1000 SPIELE	1000 SPIELE	1000 SPIELE
24	Coinage Setting	6 SPIELE/5 DM	6 SPIELE/5 DM	6 SPIELE/5 DM	7 SPIELE/5 DM	7 SPIELE/5 DM	7 SPIELE/5 DM

▲53 through 58 FOR GERMAN GAMES ONLY:

Install German 1, 2, 3, 4, 5 or 6

The operator can use these Adjustment Items to modify the game pricing selection of Standard Setting named "German 2 or German 1" in the Pricing Table to permit the style of play for the particular price shown in the ELVIRA Preset Game Adjustments Table for German Games.

▲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.

AD	NAME	NEW SETTING	AD	NAME	NEW SETTING
02	Replay Start	5,000,000	34	R. Ramp E.B	7 Ramps
09	Balls/Game	05		Start	
14	Backup H.S. 1	9,000,000	37	ELVIRA Start	ELV
15	Backup H.S. 2	8,000,000	38	Light ELVIRA	12 Seconds
16	Backup H.S. 3	7,000,000	39	3 Million Timer	Fast
17	Backup H.S. 4	6,500,000	41	Dead Heads	Medium
31	L. Ramp Timer	12 Seconds	43	Multi-Ball Diffic.	Hard
32	Ramp Mil. Start	6 Ramps	45	Hold Bonus	3 Ramps

▲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	Scores	07	Special Award	Score
02	Replay Level 1	Off	08	Match Feature	Off
03	Replay Level 2	Off	11	No Extra Ball	00
04	Replay Level 3	Off	18	Hi Scr 1 Credits	00
05	Replay Level 4	Off	19	Hi Scr 2 Credits	00
06	Replay Award	Audit	20	Hi Scr 3 Credits	00
			21	Hi Scr 4 Credits	00

▲62 Install Extra Easy

The operator can change the game play difficulty adjustments to a combination that is extremely easy (sometimes called "liberal"). The Game Adjustment Setting Comparison Table, which precedes these 70 individual Adjustments descriptions, lists the Adjustments and the settings that comprise the 'Extra Easy' group.

▲63 Install Easy

The operator can change the game play difficulty adjustments to a combination that is slightly easier than the Factory Settings. The Game Adjustment Setting Comparison Table, which precedes these 70 individual Adjustments descriptions, lists the Adjustments and the settings that comprise the 'Easy' group.

▲64 Install Medium

The operator can change the game play difficulty adjustments to a combination that matches the Factory Settings. The Game Adjustment Setting Comparison Table, which precedes these 70 individual Adjustments descriptions, lists the Adjustments and the settings that comprise the 'Medium' group.

▲65 Install Hard

The operator can change the game play difficulty adjustments to a combination that is more difficult than the Factory Settings. The Game Adjustment Setting Comparison Table, which precedes these 70 individual Adjustments descriptions, lists the Adjustments and the settings that comprise the 'Hard' group.

▲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. The Game Adjustment Setting Comparison Table, which precedes these 70 individual Adjustments descriptions, lists the Adjustments and the settings that comprise the 'Extra Hard' group.

▲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 DONE to show that the coinage audits have been reset to zero.

▲69 Clear Audits

The operator can request the clearing of the non-coinage audits (Au 05 through 55) 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 DONE to show that the non-coinage audits have been reset to zero.

▲70 Install Factory

The operator can request the game (via the Credit button) to provide the normal Factory Settings, essentially restoring the game to its 'factory condition'. The operator must select the 'YES' option for this adjustment. 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 selecting the YES option, 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.

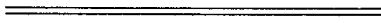
A loss of battery power or improper treatment of the Game Adjustments will cause the game to attempt to restore Factory Settings. The game announces the results of this reset process with the appropriate message, FACTORY SETTING or ADJUST FAILURE.

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

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



Game Pricing

Pricing Made Easy

Game Adjustment Item Ad 24 allows the operator an easy method of setting the pricing functions. Pressing the Credit button allows the operator a choice of one of the "Standard" Settings, with associated automatic pricing (Player 1 and 2 displays show the Country identifier, with a number for a country having more than one "Standard" Setting; player 3 and 4 displays show the games per coin(s) information). In the Pricing Table, each "Standard" Setting is denoted by a Country Identifier. 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. In the table where the word "CUSTOM" appears, the owner/operator must enter the values shown (columns 25 through 30) to obtain the games per coin factor shown in the Games/Coin column of the table. To make these setting adjustments, the owner/operator must press the Credit button until the words "CUSTOM COINAGE" appear in the player score displays.

ELVIRA Pricing Table

Country	Coin Chute			Games/Coin	Ad 24 Display	Pricing Functions					
	Left	Center	Right			25	26	27	28	29	30
USA and Canada	25¢	-	25¢	1/25¢, 4/\$1 ²	U.S.A. 1	01	04	01	01	00	00
				1/50¢, 2/75¢, 3/\$1 ^{1,2}	U.S.A. 2	03	12	03	04	00	00
				1/50¢, 2/\$1 ²	U.S.A. 3	01	04	01	02	00	01
				1/50¢, 3/\$1	U.S.A. 4	01	00	01	02	04	01
				1/50¢ ; Add'l game: 25¢	CUSTOM	98	00	98	99	00	00
Austria	5 Sch	10 Sch	10 Sch	1/2x5 Sch, 3/2x10 Sch ²	AUSTRIA	01	02	02	02	04	01
	5 Sch	-	10 Sch	2/5 Sch, 5/10 Schilling	CUSTOM	02	00	05	01	00	00
	1 Sch	5 Sch	10 Sch	2/5x1 Sch, 2/5 Sch, 5/10 Sch	CUSTOM	02	10	25	05	00	00
Australia	20¢	-	\$1	1/3x20¢, 2/\$1 ²	AUSTRAL.	02	00	10	05	00	00
United Kingdom	10 P	50 P	1£	1/3x10 P, 2/50 P, 5/1£ ²	U.K.	02	10	20	05	20	00
Switzerland	1 F	2 F	5 F	1/1 F, 3/2 F, 7/5 Franc ²	SWISS	01	03	07	01	00	00
	1 F	-	2 F	1/1 F, 3/2 F	CUSTOM	03	00	06	02	00	00
Belgium	20 F	-	50 F	1/20 F, 3/50 Franc ²	BELGIUM	06	00	15	05	00	00

ELVIRA Pricing Table (Continued)

Country	Coin Chute			Games/Coin	Ad 24 Display	Pricing Functions					
	Left	Center	Right			25	26	27	28	29	30
West Germany	1 DM	2 DM	5 DM	1/1 DM, 2/2 DM, 7/5 DMark ^{2,3}	GERMAN1	06	12	30	05	30	00
				1/1 DM, 2/2 DM, 6/5 DM ^{1,2}	GERMAN2	06	12	30	05	00	00
				1/1 DM, 3/2 DM, 9/5 DM	CUSTOM	09	18	45	05	00	00
				1/2x1 DM, 1/2 DM, 3/5 DM	CUSTOM	03	06	15	05	00	00
				2/1 DM, 5/2 DM, 14/5 DM	CUSTOM	13	26	65	05	65	00
Netherlands	1 Hfl	2.5 Hfl	2.5 Hfl	1/1 Hfl, 3/2.5 Holland Florin ²	NETHERL.	06	15	15	05	00	00
	25¢	-	1 G	1/25¢, 5/1 Guilder	CUSTOM	01	00	05	01	00	00
	1G	-	1 G	1/1 Guilder ²	HOLLAND	01	00	01	01	00	00
Sweden	5 Kr	5 Kr	5 Kr	1/5 Krona ²	SWEDEN	01	01	01	01	00	00
	1 Kr	-	1 Kr	1/2x1 Krona	CUSTOM	01	04	01	02	00	01
France	1F	5F	10F	1/2x1F, 3/5F, 7/10 Franc ^{1,2}	FRANCE	03	15	30	05	30	00
	1F	5F	10F	1/3x1 F, 2/5 F, 5/10 Franc	CUSTOM	02	10	20	05	20	00
	5F	10F	10F	1/5 F, 3/10 F, 7/2x10 Franc	CUSTOM	03	15	30	10	60	15
	5F	10F	10F	2/5 F, 4/10 F, 9/2x10 Franc	CUSTOM	02	10	20	05	40	10
	5F	10F	10F	2/5 F, 5/10 F, 11/2x10 Franc	CUSTOM	01	05	10	02	20	05
Italy	200 L	-	500 L	1/2X200 L, 3/2X500 L Lire ²	ITALY	06	00	15	10	00	00
Spain	25 P	-	100P	1/25 P, 5/100 Peseta ²	SPAIN	05	00	20	04	00	00
	25 P	-	100P	1/25 P, 4/100 Peseta	CUSTOM	01	00	04	01	00	00
	25 P	-	100P	1/2x25 P, 2/100 Peseta	CUSTOM	01	00	04	02	00	00
	25 P	-	100P	1/2x25 P, 3/100 Peseta	CUSTOM	03	00	12	04	00	06
Japan	100 ¥	-	100 ¥	1/100 Yen ²	JAPAN	01	00	01	01	00	00
Antilles, Netherl.	25¢	-	1 G	1/25¢, 4/1 Guilder ²	ANTILLES	01	01	04	01	00	00
Chile	Token	-	Token	1/1 Token ²	CHILE	01	04	01	01	00	00
Denmark	1 Kr	5 Kr	10 Kr	1/2x1 Kr, 3/5 Kr, 7/10 Krone ²	DENMARK	03	15	30	05	30	00
Finland	1 Mka	-	5 Mka	1/2x1 Mka, 3/5 Markka ²	FINLAND	03	00	15	05	00	00
New Zealand	20¢	-	20¢	1/3x20¢ ²	N. Z.	01	00	01	03	00	01
Norway	1 Kr	-	1 Kr	1/2x1 Kr, 3/5x1 Krone ²	NORWAY	01	00	01	02	05	00
Argentina	10¢	10¢	10¢	1/1 Token ²	ARG.	01	01	01	01	00	00
Greece	10D	20D	50D	1/2x10D, 1/20D, 3/50Drachma ²	GREECE	03	06	15	05	00	00

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

Custom Pricing

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

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

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

V = Value of coin;

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

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

Units Required for Bonus Credit

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

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.)

Test/Diagnostic Procedures

ELVIRA 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.

C A U T I O N

The System-11B game program greatly aids the operator and service personnel: At the beginning of the Test/Diagnostic Procedures (and also at game Turn-On), the player score displays now signal, with a message ("Press ADVANCE for Report") that at least one switch has NOT been actuated during ball play for a lengthy period of time (90 balls, or ~30 games). Moreover, the Problem Reporting activity at the beginning of the Test/Diagnostic Procedures, the display of problem switches now includes ALL switches exhibiting problems. Refer to the text on Switch Tests for additional information. To proceed with the Test/Diagnostic Procedures, use AUTO-UP, and press ADVANCE.

Music Test

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

Display Test

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

Sound Test

1. (From Display Test) To initiate the Sound Test, press ADVANCE. Observe that the player 1 and 2 displays show the message, SOUND TEST, and that the player 3 display shows 02 (the Sound Test identifier). The player 3 display shows a series of test steps from 00 through 07. The player 4 display shows which IC (DAC or CVSD) the sound is associated with. Verify that a different sound is heard each time the number in the display changes.
2. To repeatedly pulse a single sound, use MANUAL-DOWN. Verify that one particular sound repeats. Press ADVANCE to step to the next sound, which repeats until ADVANCE is pressed again. Use AUTO-UP to resume cycling the sounds, and to proceed to the next test.

Lamp Tests

1. All Lamps

(From Sound Test) To initiate the first Lamps Test, press ADVANCE. Observe that the Player 1 and 2 displays show the message, ALL LAMPS, and that the Player 3 display shows 03 (All 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 initiate the Single Lamps Test. The Player 1 and 2 displays initially show the message, SINGLE LAMPS, and the Player 3 display shows 04. Then, the Player 3 display shows 04 01, and the Player 1 and 2 displays change to show "BONUS 1K", 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. (To proceed through a descending series of lamp identifiers, use MANUAL-DOWN.) Press and hold the Credit button to proceed rapidly to the desired lamp.

ELVIRA Lamp Matrix

column	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
1 Q80 RED-BRN 1J6-1	E 1	4X 9	Eye 1 17	Left Ramp Sign 25	Right Ramp Potton 1 33	Hold Bonus 41	Pizza Standup 1 49	Dead Head 1 57
2 Q81 RED-BLK 1J6-2	L 2	5X 10	Eye 2 18	Left Ramp Spots Elvrg 26	Right Ramp Potton 2 34	Million 42	Pizza Standup 2 50	Dead Head 2 58
3 Q82 RED-ORN 1J6-3	V 3	Left Slingshot 11	Shoot Again 19	Left Ramp Million 27	Right Ramp Potton 3 35	Barbeque 43	Pizza Passage 1 51	Dead Head 3 59
4 Q83 RED-YEL 1J6-5	I 4	3 Million 12	Right Slingshot 20	Left Ramp Special 28	Right Ramp Potton 4 36	Boogle 44	Pizza Passage 2 52	Barbeque 1 60
5 Q84 RED-GRN 1J6-6	R 5	Lock 13	Dead Head 1T 21	Left Outlane 29	Right Ramp Extra Ball 37	B 45	Pizza Passage 3 53	Barbeque 2 61
6 Q85 RED-BLU 1J6-7	A 6	Left Flip Up 14	Dead Head 2T 22	Right Outlane 30	J 38	A 46	Left Thumper Bumper 54	Barbeque 3 62
7 Q86 RED-VIO 1J6-8	2X 7	Right Flip Up 15	Dead Head 3T 23	Left Return Lane 31	A 39	T 47	Right Thumper Bumper 55	Barbeque 4 63
8 Q87 RED-GRY 1J6-9	3X 8	Bonus Held 16	Dead Head 4T 24	Right Return Lane 32	M 40	Center Jackpot 48	Bottom Thumper 56	Barbeque 5 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 Player 3 display shows 05 (Solenoid Test identifier). Next, the Player 3 display shows a series of test steps from 01 through 22, while the Player 1 and 2 displays show the solenoid/circuit name. During each of these steps, pulsing of the respective solenoid/circuit occurs. The test cycles repeatedly, unless halted via the MANUAL-DOWN switch. Refer to the Solenoid Table for solenoid numbers and wiring information. CPU Board connections at 1P11, 1P12, and 1P19 are also listed in the table.

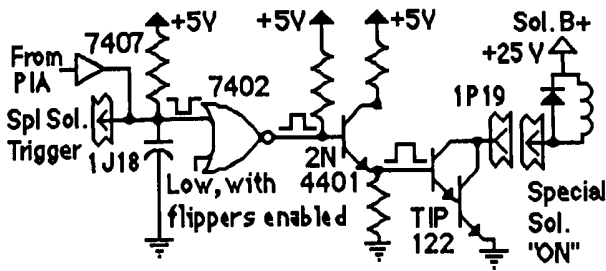
To continuously pulse a single solenoid/circuit, use MANUAL-DOWN. Press ADVANCE to sequence through the switched, controlled, and special solenoids. Use AUTO-UP to resume test cycling, and to proceed to the next test.

ELVIRA Solenoid Table

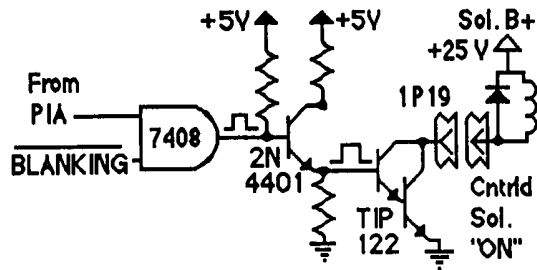
Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trnstr	Solenoid Part No. Flashlamp Type i = Insert Bd ; p = Playfield
				CPU Board	Playfield/ Cabinet		
01A ³	Outhole Kicker	Switched	Vio-Brn }	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800
01C ³	Jets (p)/Bats (i)	Switched	Blk-Brn }	(Gry-Brn)	5J5-9(C)	Q33	#906/#89 flashlamps 1p,li
02A ³	Ball Eject (Shtr Lane Feeder)	Switched	Vio-Red }	1P11-3	5J1-7: 5J4-8 (A)	Q25	AE-23-800
02C ³	Organ Flasher	Switched	Blk-Red }	(Gry-Red)	5J5-8(C)	Q25	#906 flashlamp 1p
03A ³	Drop Target Bank	Switched	Vio-Orn }	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200
03C ³	Right Ramp (p)/Punch (i)	Switched	Blk-Orn }	(Gry-Orn)	5J5-7(C)	Q32	#906/#89 flashlamps 1p,li
04A ³	Left Ramp (p)/Drac (i)	Switched	Vio-Yel }	1P11-5	5J1-5: 5J4-6 (A)	Q24	
04C ³	Eject Hole	Switched	Blk-Yel }	(Gry-Yel)	5J5-6(C)	Q24	#906/#89 flashlamps 1p,li
05A ³	Moon (p)/ Wolfman (i)	Switched	Vio-Grn }	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800
05C ³	Ball Popper	Switched	Blk-Grn }	(Gry-Grn)	5J4-5(C)	Q31	#906/#89 flashlamps 2p,li
06A ³	Right Return (p)/	Switched	Vio-Blu }	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800
06C ³	Hot Dog,BBQ,Bun (i)	Switched	Blk-Blu }	(Gry-Blu)	5J5-4(C)	Q23	#906/#89 flashlamps 1p,3i
07A ³	Knocker	Switched	Vio-Blk }	1P11-8	5J1-2: 5J4-3 (A)	Q30	AE-23-800
07C ³	Left Return (p)/Letters (i)	Switched	Blk-Vio }	(Gry-Vio)	5J5-3(C)	Q30	#906/#89 flashlamps 1p,3i
08A ³	Ball Lock Release	Switched	Vio-Gry }	1P11-9	5J1-1: 5J4-2 (A)	Q22	AE-23-800
08C ³	Skull (p) House (i)	Switched	Blk-Gry }	(Gry-Blk)	5J5-2(C)	Q22	#906/#89 flashlamps 1p,li
09	ELVIRA	Controlled	Brn-Blk	1P12-1	5J2-9: 5J6-9:2J4-3	Q17	#89 flashlamp 3i
10	INSERT GI	Controlled	Brn-Red	1P12-2	5J2-8: 5J6-8:2J4-5	Q9	5580-09555-01 ^{4b}
11	PLAYFIELD GI	Controlled	Brn-Orn	1P12-4	5J2-6: 5J6-7:2J4-6	Q16	5580-09555-01 ^{4a}
12	A/C Select Relay	Controlled	Brn-Yel	1P12-5	5J2-5	Q8	5580-09555-01 ⁵
13	Rightside (p)/Graveyard (i)	Controlled	Brn-Grn	1P12-6	5J2-4: 5J6-5	Q15	#906/#89 flashlamps 1p,li
14	Boogie Monsters	Controlled	Brn-Blu	1P12-7	5J2-3: 5J6-3	Q7	AE-26-1200
15	B/board L. Side (p)/DHead (i)	Controlled	Brn-Vio	1P12-8	5J5-2: 5J6-2	Q14	#906/#89 flashlamps 2p,li
16	Boogie Monsters	Controlled	Brn-Gry	1P12-9	5J2-1: 5J6-1	Q6	#906 flashlamp 2p
17	Left Thumper Bumper	Special #1	Blu-Brn	1P10-7	5J3-7: 5J7-7	Q75	AE-23-800
18	Left Slingshot Kicker	Special #2	Blu-Red	1P19-4	5J3-6: 5J7-6	Q71	AE-26-1500
19	Right Thumper Bumper	Special #3	Blu-Orn	1P19-3	5J3-3: 5J7-3	Q73	AE-23-800
20	Right Slingshot Kicker	Special #4	Blu-Yel	1P19-6	5J3-4: 5J7-5	Q69	AE-26-1500
21	Bottom Thumper Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800
22	Flip Up Reset	Special #6	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79	AE-26-1200
	Right Flipper		Orn-Vio	1P19-1	2J3-1: 2J18-10: 7P1-15 (7P1-16:2J18-6:2J17-4)		FL-11630/50VDC
	Lower Right Flipper		(Blu-Vio)				
	Left Flipper		Orn-Gry ²	1P19-2	2J3-2: 2J18-9: 7P1-18 (7P1-19:2J18-5:2J17-3)		FL-11630/50VDC
	Lower Left Flipper		(Blu-Gry)				

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" circuits are pulsed, when Sol. 12 is de-energized; "C" circuits are pulsed, with Sol. 12 energized. Wire colors in brackets are those from respective "A" and "C" terminals corresponding to the J1-terminal connection listed for the Aux Power Driver Bd, which controls the device pulsing by Sol. 12. [4a] Relay is mounted on the playfield, p/n C-11998-1. [4b] Relay is mounted on the Insert Bd, p/n C-11998-1. [5] Relay is mounted on Aux Power Driver Board, p/n D-12247 in the backbox.

'On' State Logic - Special Solenoid



'On' State Logic - Controlled



"Off" State - Special Solenoid:

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

"Off" State - Controlled Solenoid:

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

NOTE

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

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

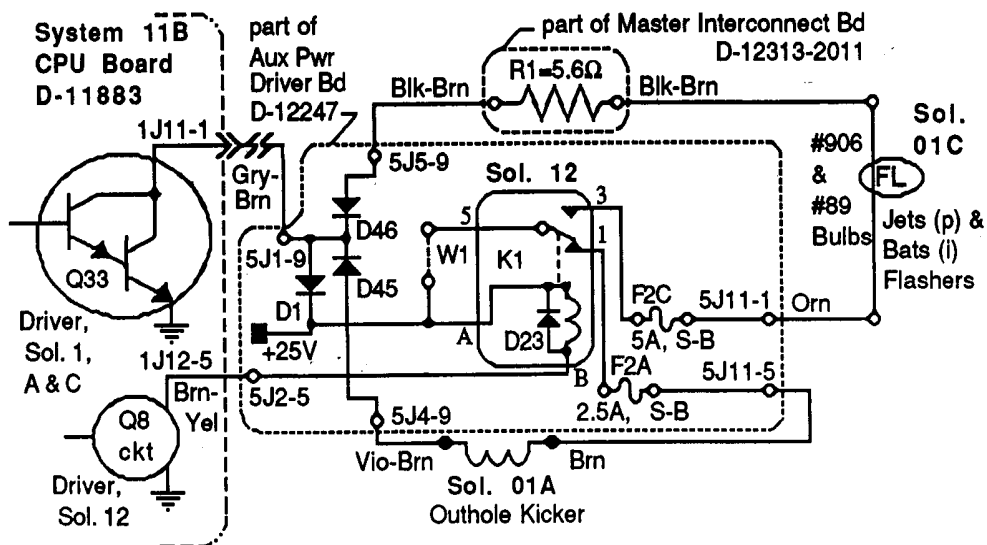


Figure 4. Typical Solenoid A/C Select Relay Circuit, showing the function of Solenoid 12, the Solenoid A/C Select Relay

Switch Tests

1. Switch Levels

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

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

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

As soon as the operator opens a closed switch, its name and number are eliminated from the Switch Levels display series. For *ELVIRA*, 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.

ELVIRA Switch Matrix

column	1 Q45	2 Q49	3 Q44	4 Q48	5 Q43	6 Q47	7 Q42	8 Q46
row	GRN-BRN 1J8-1	GRN-RED 1J8-2	GRN-ORN 1J8-3	GRN-YEL 1J8-4	GRN-BLK 1J8-5	GRN-BLU 1J8-7	GRN-VIO 1J8-8	GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Bob Tilt 1	Outhole 9	Left Outlane 17	Left Standup Target 1 25	Left Slingshot 33	Left Drop Target 41	Lock 1 49	Right Flipper 57
2 WHT-RED 1J10-8	A/C Relay Position 2		Left Return Lane 18	Left Standup Target 2 26	Right Slingshot 34	Center Drop Target 42	Lock 2 50	Left Flipper 58
3 WHT-ORN 1J10-7	Credit Button 3	Trough Sw. 1 Right 11	Right Return Lane 19	Left Standup Target 3 27	Left Thumper Bumper 35	Right Drop Target 43	Lock 3 51	
4 WHT-YEL 1J10-6	Right Coin 4	Trough Sw. 2 Center 12	Right Outlane 20	Left Standup Target 4 28	Right Thumper Bumper 36	Right Ramp Entry 44	Lock Safety 52	
5 WHT-GRN 1J10-5	Center Coin 5	Trough Sw. 3 Left 13	Ball Shooter 21	Lock Entry 29	Bottom Bumper 37	B 45	Flip Up Target 1 53	
6 WHT-BLU 1J10-3	Left Coin 6		Top Right Rollover 22	Left Ramp Entry 30		A 46	Flip Up Target 2 54	
7 WHT-VIO 1J10-2	Slam Tilt 7	Right Standup 1 15	Right Side Rollunder 23	Left Ramp End 31		T 47	Flip Up 1 Open 55	
8 WHT-GRY 1J10-1	High Score Reset 8	Right Standup 2 16		Ball Popper 32		Eject Hole 48	Flip Up 2 Open 56	

- ✓ **Row Problems.** If a display of two (or more) switch numbers of a row occurs, although only one switch is closed, check for a short circuit to ground.
- ✓ **Multiple Switch Number Indications.** Check for a bad diode on any of the switches.
- ✓ **Column Problems.** If display of two (or more) switch numbers in a column occurs (while only one switch is actuated), check for a short circuit to ground or a bad transistor (Q42-Q49) on the CPU Board.

Use AUTO-UP to proceed to the next test.

2. Switch Edges

From the Switch Levels Test, press ADVANCE. Observe that the Player 1 and 2 displays show the message, SWITCH EDGES; the Player 3 display shows 07 (Switch Edges Test identifier). The right portion of the Player 3 display is blank, indicating that no switch is actuated.

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

Using this technique, the operator can test each switch appearing in the *ELVIRA* 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 during game play, and remedy that problem cause. With these new tests, switch problems are, therefore, more easily isolated.

3. Playfield or CPU Board?

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

Ending the Diagnostic Tests

To end the Diagnostic Tests, reach the Switch Test (06 in the Player 3 display), use AUTO-UP and press ADVANCE. The backbox display should show the *ELVIRA* game's Identification Information. Use MANUAL-DOWN, and press ADVANCE to reach Adjustment Item 70 (INSTALL FACTORY). Use AUTO-UP, and press ADVANCE to go to 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. *ELVIRA* 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-11B Memory Chip Test

A new feature is now included in the Memory Chip Test for System 11B. 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 to begin.

In addition to the displayed message, when a test fails, LED2 ('DIAGNOSTIC') mounted on the CPU Board can be observed to determine the probable cause of the problem. This 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 connecting devices are causing it to appear to have a problem. (The following U26 test is skipped.)
11	U26 ROM FAILURE	U26's internal checksums do not match.
<p>Notes: 1. This test assumes that the Coin Door is OPEN; it is initiated ONLY by pressing the CPU Diagnostic Switch (SW2).</p> <p>2. Alternatively, its associated connections or connecting devices are causing the IC to appear to have problems.</p>		

System 11-B Sound Circuitry Tests

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

1. **Audio Board Test.** A brief check of the Audio Board (D-11581) circuitry occurs at game Turn-on; the game reports the test results by brief sounds, as follows: No sound = Audio 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-11B Sound Test.** Press the Sound Diagnostic Switch (SW 1) on left edge of the CPU Board. Listen for the two test sounds, showing that both the CVSD (Continuously Variable Slope Delta) Modulator, which provides the voices for *ELVIRA*, and the DAC (Digital-to-Analog Converter) sound circuits are functioning properly.

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

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

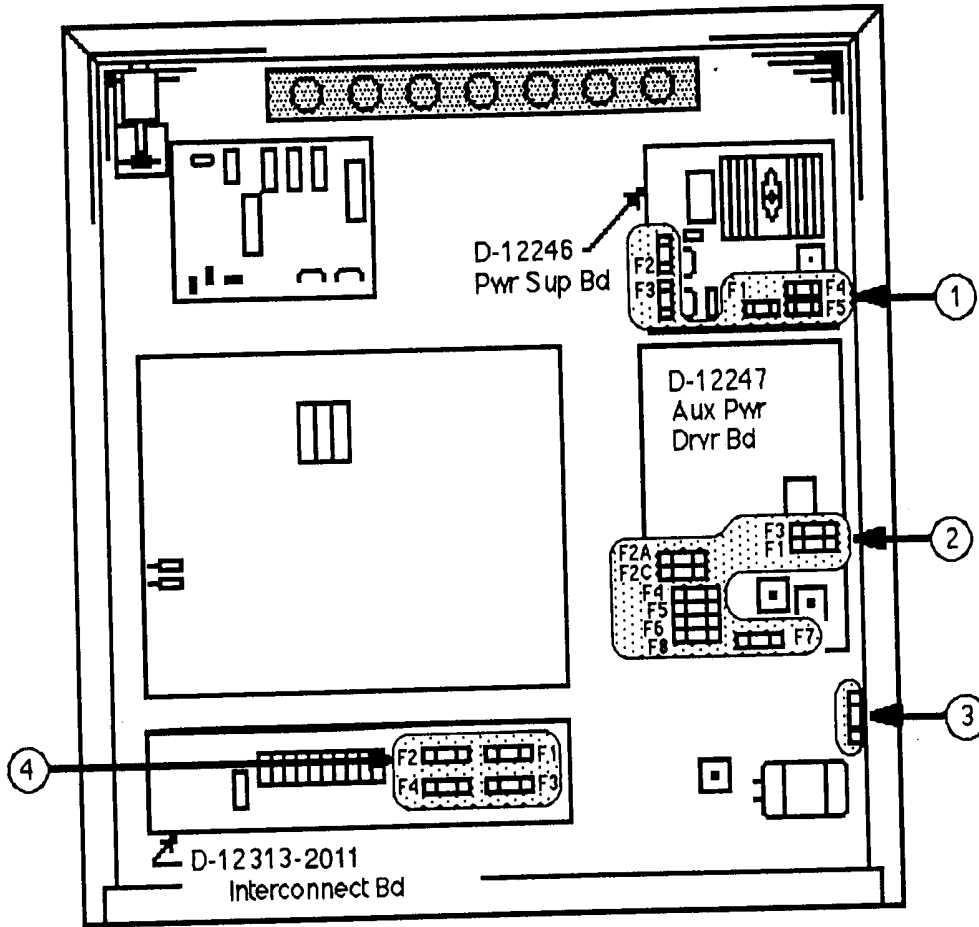
If the previous checks did not isolate the problem, turn the Volume Control for maximum output. Momentarily touch a powered-up AC soldering pencil on the center tap of the Volume Control.

C A U T I O N

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 or a 'click' 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 sound 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 Locations Diagram & Listing



Fuse Listing

ITEM	PART NUMBER	DESCRIPTION	CIRCUIT/LOCATION
1	5731-12328-00	Fuse, 3/8A., S-B, 250V	F1; D-12246 Power Supply Board
1	5731-12327-00	Fuse, 1/8A., S-B, 250V	F2, F3; D-12246 Power Supply Board
1	5731-09432-00	Fuse, 7A S-B, 250v	F4, F5; D-12246 Power Supply Board
2	5731-09128-00	Fuse, 2-1/2A., S-B, 250v	F1, F2A, F3, F4; D-12247 Aux Pwr Driver Board
2	5731-09651-00	Fuse, 5A., S-B, 250v	F2C; D-12247 Aux Pwr Driver Board
2	5731-08665-00	Fuse, 2A., S-B, 250v	F5, F6; D-12247 Aux Pwr Driver Board
2	5731-06314-00	Fuse, 4A., S-B, 250v	F7; D-12247 Aux Pwr Driver Board
2	5731-09432-00	Fuse, 7A., S-B, 250v	F8; D-12247 Aux Pwr Driver Board
3	5730-09071-00	Fuse, 8A., S-B, 32v	+18 Vdc Lamp Ckt/ Lwr Rt B/box fuseholder (1)
4	5731-09651-00	Fuse, 5A., S-B, 250v	F1 - F4; Gen. Illum./B'box Interconnect Board
-	5730-09252-00	Fuse, 8A, Slow-Blow(S-B), 125v	Input ("high voltage") Power Line/Cabinet Box*

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

Maintenance Information

- Figure 3 shows the two main lubrication points of the Ball Eject (Shooter Lane Feeder). The shaded arrows show the directions in which the Ball Eject and other parts of its related assemblies can be adjusted for proper operation. Note that the mechanisms of the Top Right Eject Hole Arm Assembly and the Right Lock (Eject Hole) are quite similar to the Ball Eject Assembly; they have the same lubrication requirements and adjustment capabilities as the Ball Eject.

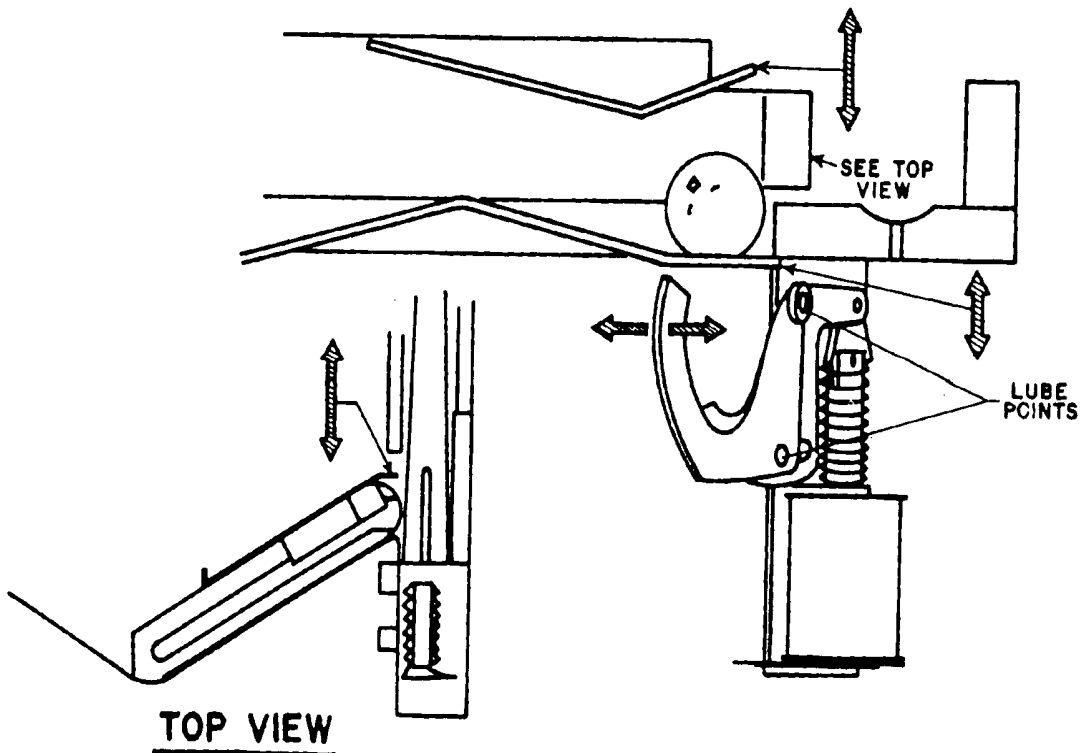


Figure 3. Adjustments and Lubrication Points, Shooter Lane Feeder.

- Because of the functional design (arm-actuated via solenoid plunger operation), the pivot points of the Left and Right Kickers ("Slingshots") and the Spinout Kickbig all require lubrication as a regular servicing procedure. Mechanical adjustments are simple and somewhat similar to the Shooter Lane Feeder. These mechanisms should also be checked for proper fit (snugly tight) where they attach to the playfield.
- Lubrication to ensure proper operation also applies to the target blades of the two 3-Bank Drop Targets. Lubrication reduces friction and wear. BALLY recommends the following lubricants...
 - Medium viscosity oil
 - SUNEX #257, WAY OIL
 - Viscosity: 300-350
 - MBI Instrument Grease
 - Non-Gumming Lubricant

- Playfield life expectancy and play can be extended by periodic cleaning. Inspect and hand polish the balls in a clean cloth. Replace chipped balls. Otherwise these balls will ruin playfield finish in a short time. Don't use quantities of water, caustic or abrasive cleaners or cleaning pads on the playfield. Don't allow a wax or polish build-up. Waxes yellow with age and spoil the playfield. When cleaning plastic parts, don't use cleaners normally used on other parts of the playfield; harsh cleaners can melt playfield plastics.
 - Switch contacts should be free of dust, dirt, and corrosion. Plating helps switch contacts, (except flipper button switch assemblies) resist corrosion. Filing or burnishing contacts breaks the finish and encourages corrosion. Effective contact cleaning requires gentler treatment. Gently close the contacts on a clean business card or piece of paper. Wipe the contacts until they're clean. If necessary, regap the contacts to 1/16 inch. With flipper button switch contacts, severely pitted contacts may cause game malfunctions. Remove the tarnish from the switch contacts with a contact file. Then smooth your work with a burnishing tool.
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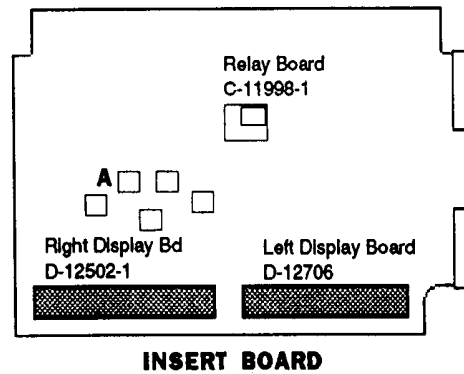
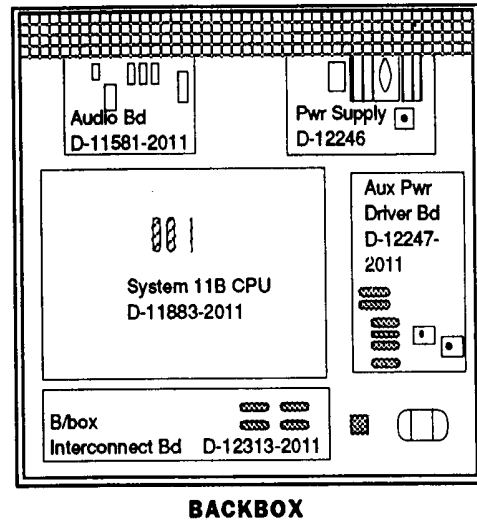
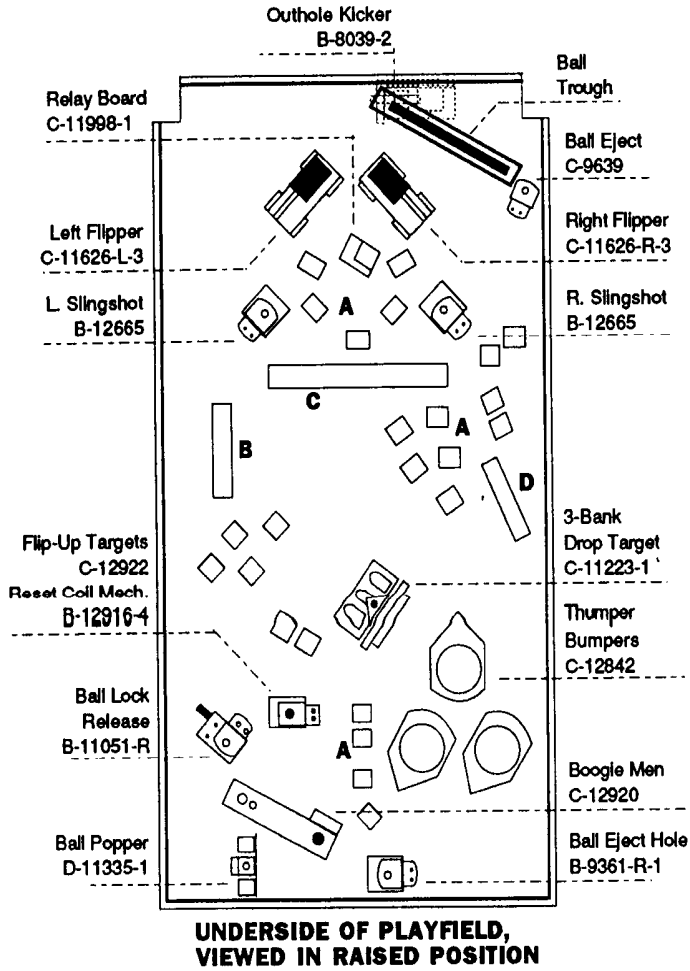
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Game Parts Information

ELVIRA

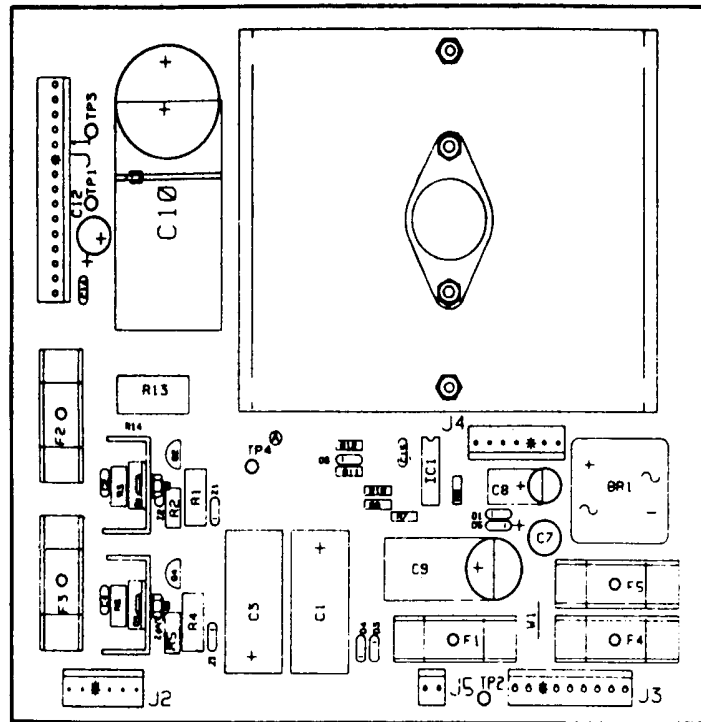
Major Mechanism & Game Circuit Board Locations



Lamp Boards:

- | | |
|---------------------------------------|---------|
| A. Single Lamp Bd Assy | B-12224 |
| B. 4-Position Lamp Assy (Dead Heads) | C-13028 |
| C. 6-Position Lamp Assy (ELVIRA) | C-12713 |
| D. Top 3-Position Lamp Assy (Pizza's) | C-12000 |

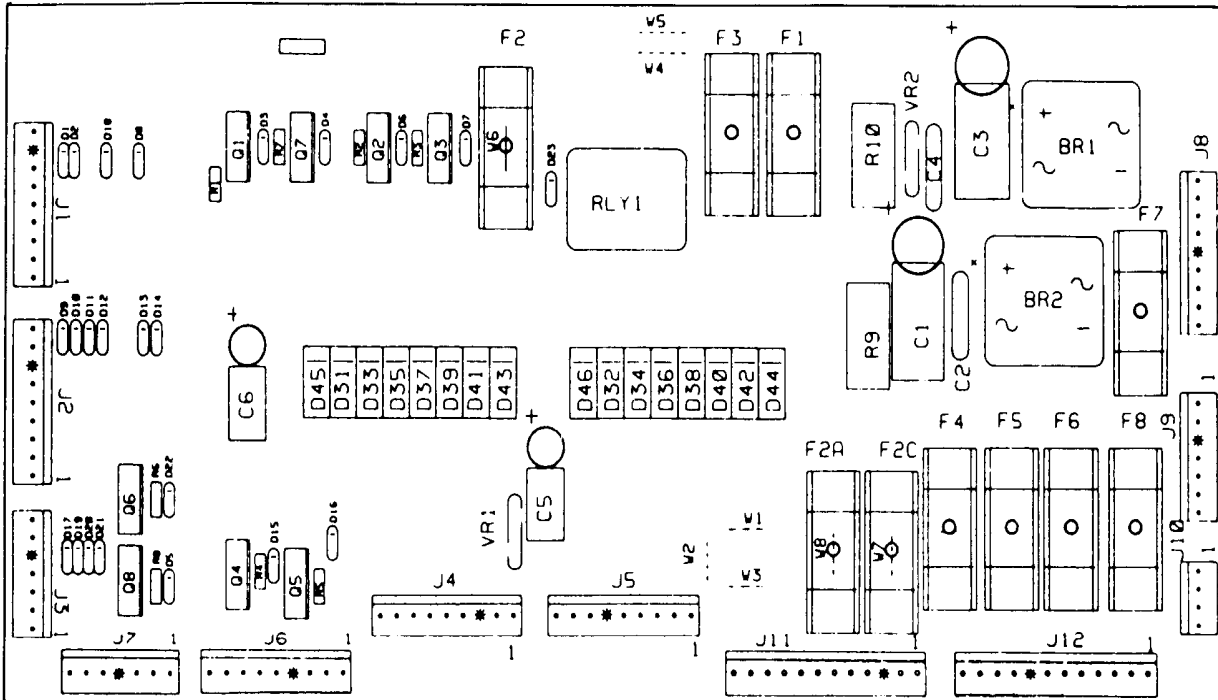
Power Supply D-12246



DESCRIPTION	DESIGNATION	PART NUMBER	DESCRIPTION	DESIGNATION	PART NUMBER
Power Supply PCB		5765-12317-00	IC, Volt. Reg., MC1723C5	IC1	5460-09424-00
Fuse Holder	F1 - F5	5733-12060-01	Resistor, 330K, 5%, 1/2w, C.F.	R3, R6	5010-09069-00
Fuse, 7A., S-B, 250v	F4, F5	5731-09432-00	Resistor, 1.2K, 5%, 1/2w	R2, R5	5010-10631-00
Fuse, 3/8A., S-B, 250v	F1	5731-12328-00	Resistor, 39K, 5%, 1w	R1, R4	5010-09536-00
Fuse 1/8 A., 250v	F2, F3	5730-12327-00	Res, 2.15K, 1%, 1/4w, C. F.	R7	5013-09426-00
Con, 15-pin Hdr, Sq Pin .156	J1	5791-10862-15	Res, 4.99K, 1%, 1/4w, C. F.	R8	5013-09427-00
Cor, 6-pin Hdr, Sq Pin .156	J2	5791-10862-06	Res, 2.7K, 2%, 1/4w, C. F.	R9	5010-09541-00
Con, 9-pin Hdr, Sq Pin .156	J3	5791-10862-09	Resistor, 1.5K, 5%, 1/4w, C. F.	R10	5010-09085-00
Bridge Rectifier, 35A., 200VB	R1	5100-09690-00	Resistor, 1.5K, 2%, 1/4w, C. F.	R11	5010-09428-00
Transistor, MJE15030, NPN	Q1	5164-12154-00	Res, 270W, 2%, 1/4w, C. F37	R12	5010-09508-00
Transistor, MJE15031, PNP	Q3	5194-12155-00	Resistor, 0.12W, 5%, 5w	R13	5012-09429-00
Transistor, MP5D52, PNP	Q2	5194-09055-00	Cap, 150 mfd, 160v, radial	C1, C3	5040-12324-00
Transistor, MP5D02, NPN	Q4	5164-09056-00	Capacitor, 0.1 mfd, 500v, disc	C2, C4	5043-09072-00
Transistor, 2N6057, NPN	Q5	5162-09425-00	Cap, 100 mfd, 25v, radial	C7	5040-09421-00
Thermal Pad T0-3		5701-09652-00	Capacitor, 47 mfd, 50v, radial	C8	5040-09422-00
Mach. Screw, 6-32 x 3/8		4006-01003-06	Capacitor, 1000 mfd, electr, 25v, axial or radial	C9	5040-09420-00
Mach. Screw, 6-32 x 1/2		4006-01003-08	Capacitor, 18,000 mfd, electr, 20v, axial	IC10	5040-09419-00
Thermal Compound		20-9229	Capacitor, 330 mfd, electr, 10v, radial	C12	5040-09423-00
Nut, 6-32 Hex.		4406-01117-00	Capacitor, 0.1 mfd, 50v, disc	C14	5043-09446-00
Resistor, 0W	W1	5010-09534-00	Capacitor, 470 pfd	C15	5043-09065-00
Lockwasher, #6 Ext.		4703-00007-00	Terminal, #1502-1 (Test Post)	TP1-TP4	5824-09248-00
Heatsink 4"		5705-12330-00	Tie Wrap, 8" Long		03-7947
Heatsink 6030B		5705-09199-00			
Diode, 1N4004	D1, D3-D6	5070-09054-00			
Zener, 1N5990, 3.9v, 1/2w	ZR1, ZR3	5075-09059-00			
Zener, 1N4764, 100v, 1w	ZR2, ZR4	5075-09060-00			

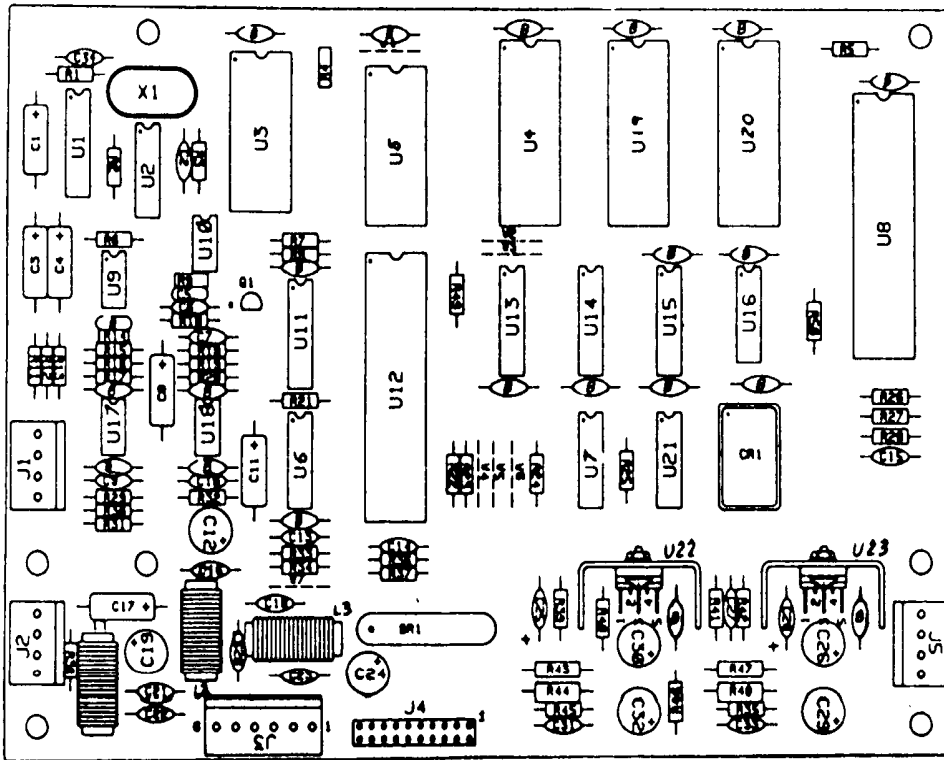
- NOTES: 1. Heat sink compound must be applied between transistor and heat sink.
 2. Observe index mark on integrated circuit, polarity of capacitors and diodes, and position of transistors.
 3. The view of Q5 and its related heat sink and hardware is from the bottom of the heatsink, to clarify installation.

Aux Power Driver Board D-12247-566



DESCRIPTION	QTY.	DESIGNATION NO.	PART NO.
Bare P.C. Board	1		5763-12184-00
Label-PCB Assembly	1		16-8850-215
Capacitor, 100 mfd., 100v, Radial	2	C1, C3	5040-09537-00
Capacitor, 10 mfd., 100v, Radial	2	C5, C6	5040-12181-00
Capacitor, 0.1 mfd., 500v	2	C2, C4	5043-09072-00
Resistor, 220 Ω , 1/4w, C.F., 5%	8	R1 - R8	5010-09160-00
Resistor, 3.3K, 10%, 5w	1	R9	5012-12238-00
Resistor, 0 Ω , 1/4w	4	W1, W3, W4, W6	5010-09534-00
Varistor, 100v	2	VR1, VR2	5017-12180-00
Bridge Rectifier, 35A., 200v	2	BR1, BR2	5100-09690-00
Diode, 1N4003, 1.0A.	23	D1 - D23	5070-08785-00
Diode, MR501, 3.0A.	16	D31 - D46	5070-09045-00
Transistor, TIP36C	8	Q1 - Q8	5191-12179-00
Relay, DPDT, 13A.	1	K1	5580-09555-01
Fuseholder	9		5733-12060-01
Fuse, 2, S-B, 250v	2	F5, F6	5731-08665-00
Fuse, 2-1/2A, S-B, 250v	4	F1, F2A, F3, F4	5731-09128-00
Fuse, 5A, S-B, 250v	1	F2C	5731-09651-00
Fuse, 4A, S-B, 250v	1	F7	5731-06314-00
Fuse, 7A, S-B, 250v	1	F8	5731-09432-00
Connector, 9-pin Hdr, Sq Pin	6	J1, J2, J4-J6, J8	5791-10862-09
Connector, 7-pin Hdr, Sq Pin	3	J3, J7, J9	5791-10862-07
Connector, 12-pin Hdr, Sq Pin	2	J11, J12	5791-10862-12
Connector, 4-pin Hdr, Sq Pin	1	J10	5791-10862-04

Audio Board D-11581-2011



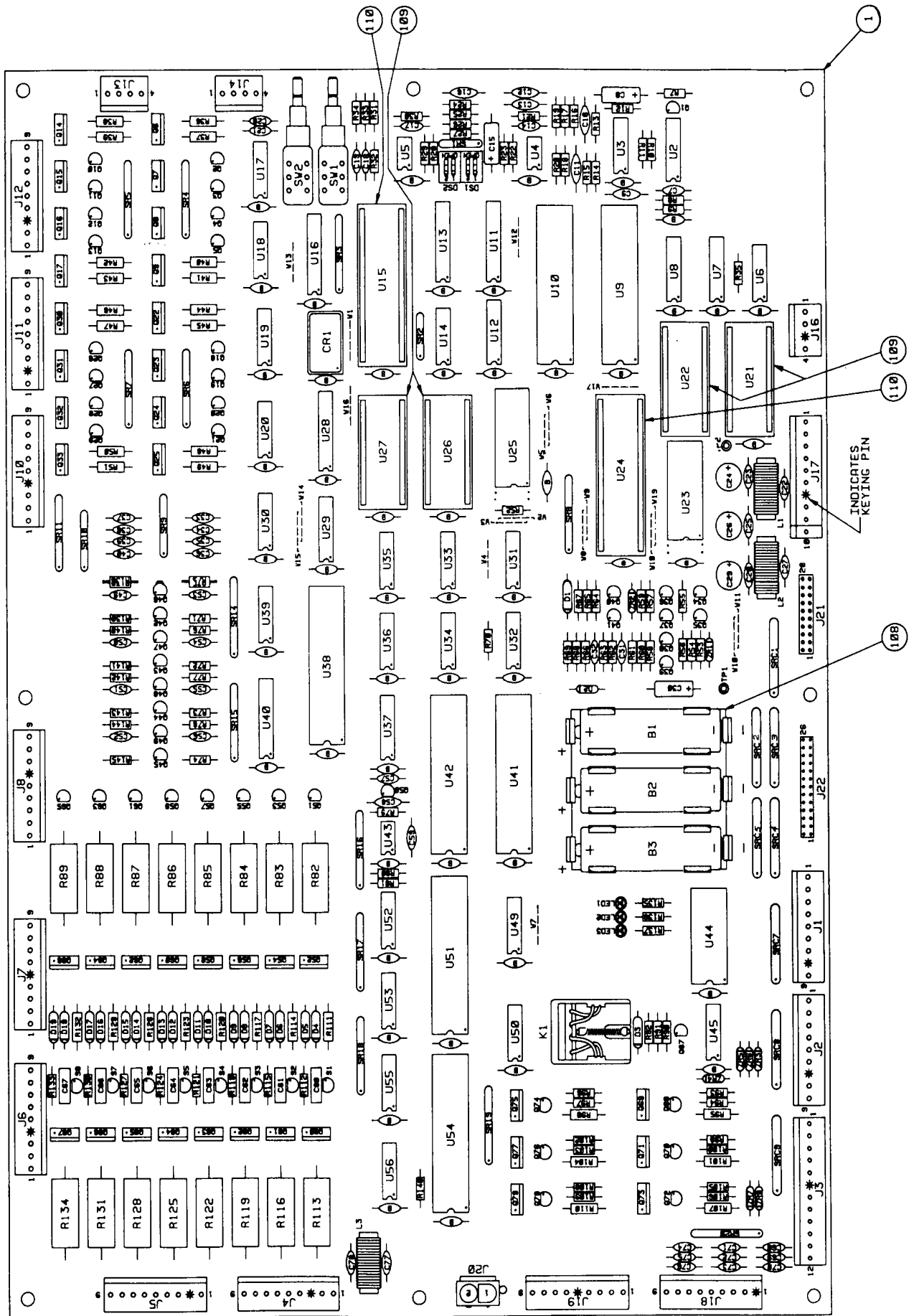
DESCRIPTION	DESIGNATION	PART NO.	DESCRIPTION	DESIGNATION	PART NO.
Bare P. C. Board	1	5766-12130-00	Resistor, 20K, 1/4w, 5%	R14-R15	5010-10985-00
IC, D/A Conv, YM3012		5371-11087-00	Resistor, 4.7K, 1/4w, 5%	R12	5010-08991-00
Socket, IC, 16-pin (U1)		a) 5700-09006-00	Resistor, 4.99K, 1/4w, 1%	R13	5010-09427-00
IC, Sound Processor, YM2151	U3	5370-11086-00	Resistor, 1K, 1/4w, 5%	R41, R42	5010-09358-00
Socket, IC, 24-pin (U3)		a) 5700-09004-00	Resistor, 2.2K, 1/4w, 5%	R2, R3,	5010-08998-00
IC, μ Processor, MC68B09E	U8	5400-10320-00	Resistor, 3.3K, 1/4w, 5%	R7 - R9	5010-08983-00
Socket, IC, 40-pin (U8)		a) 5700-08985-00	Resistor, 4.7K, 1/4w, 5%	R1, R4, R5, R11,	5010-08991-00
IC, Audio ROM 1	U4	A-5343-2011-5	Resistor, 10K, 1/4w, 5%	R26 - R28, R33, R36, R37, R49, R50	
IC, Audio ROM 2	U19	A-5343-2011-6	Resistor, 10K, 1/4w, 5%	R16 - R17	5010-09034-00
IC, Audio ROM 3	U20	A-5343-2011-7	Resistor, 27K, 1/4w, 5%	R6,	5010-09324-00
Socket, IC, 28-pin (U4, U19)		a) 5700-10176-00	Resistor, 100K, 1/4w, 5%	R39	5010-09162-00
IC, D/A Convtr, MC1408	U11	5371-09152-00	Resistor, 1M, 1/4w, 5%	R40	5010-10258-00
IC, PIA, MC68B21	U12	5430-10322-00	Resistor, 3.3M, 1/4w, 5%	R10	5010-09179-00
IC, RAM/S 5516-2 2Kx8	U5	5340-10139-00	Resistor, 0w, 1/4w, 5%	W9	5010-09534-00
IC, Dual D Flipflop, 74LS74	U16	5281-09487-00	Capacitor, 10nfd, 20v, $\pm 20\%$	C1, C3, C4, C8	5040-09343-00
IC, 74LS175	U13	5281-10043-00	Capacitor, 100nfd, 35v	C12, C19, C24	5040-10974-00
IC, Triple NAND, 74LS10	U21	5281-09235-00	Cap, 470nfd, 16v, +50, -10%	C26, C30	5040-09776-00
IC, Op Amp, MC1458	U9, U10, U17	5370-09321-00	Capacitor, 1000nfd, 16v, 20%	C29, C32	5040-12006-00
IC, Hex Inv, 74LS04	U2	5281-09215-00	Capacitor, 10nfd, 10v, $\pm 10\%$	C25, C28	5041-09243-00
IC, 2-4 Dec, 74LS139	U14	5281-09246-00	Cap, 0.01nfd, 50v, +80, -20%	C5, B (17)*	5043-08980-00
IC, Dual Mux, 74LS138	U15	5281-09745-00	Capacitor, 0.1nfd, 50v, $\pm 20\%$	C31, C33	5043-08996-00
IC, Audio Amp, TDA2002	U22, U23	5370-09156-00	Capacitor, 470 pfd, 50v, $\pm 20\%$	C13 - C15	5043-09065-00
Heatsink, #6030B		a) 5705-09199-00	Capacitor, 100 pfd, 50v, $\pm 10\%$	C2, C34	5043-09492-00
Mach. Screw, 6-32 x 3/8		b) 4006-01003-06	Capacitor, 47 pfd, 50v, $\pm 20\%$	C6	5043-08944-00
Nut, 6-32 Hex.		c) 4406-01117-00	Capacitor, 1000 pfd,	C16, C18, C20 -	5043-09845-00
Lockwasher, #6 Ext.		d) 4703-00007-00	50v, $\pm 20\%$	C23, C27	
Transistor, 2N3904, NPN	Q1	5160-10269-00	Crystal, 3.58 MHz	X1	5520-09020-00
SIP 4.7K & 470pfd, 8R8C SPI		5060-10396-00	Oscillator, 8 MHz	CR1	5521-10931-00
Resistor, 1.0W, 1/2w, 5%	R44, R48	5010-09181-00	Inductor, 4.7 nH, 3A	L1 - L3	5551-09822-00
Resistor, 2.2W, 1/4w, 5%	R35, R45	5010-09161-00	Con, 20 pin, (Hdr), Rib, Cbl	J4	5791-09437-00
Resistor, 220W, 1/2w, 5%	R43, R46, R47	5010-09361-00	Connector, 4 pin (Hdr)	J1, J2, J5	5791-10862-04
Resistor, 8.2K, 1/4w, 5%	R38	5010-09219-00	Connector, 6 pin (Hdr)	J3	5791-10862-06
Resistor, 13K, 1/4w, 5%	R16	5010-09331-00	P.C.B. I.D. Label		16-8850-250

NOTES: *17 capacitors (shown on diagram with "B" symbol) provide +5VDC filtering for ICs.
All capacitors are ceramic, 50v, axial, unless otherwise noted. All resistors are 5%, 1/4w, Carbon Film, unless otherwise noted.

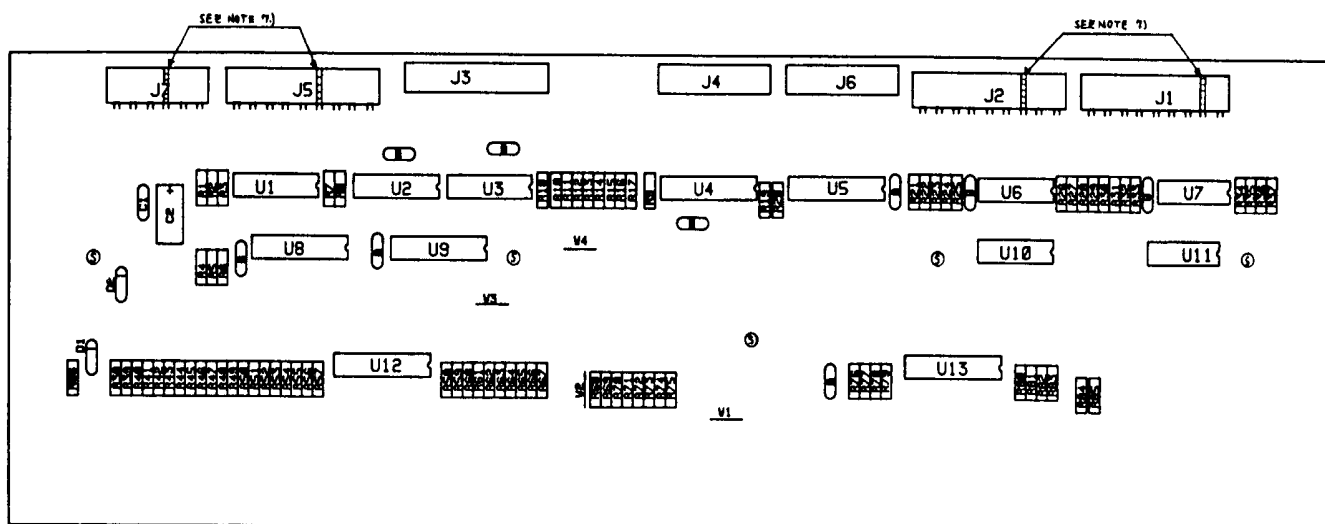
System 11B CPU Board D-11883-2011

Item	Part Number	Ckt Designator	Description	Item	Part Number	Ckt Designator	Description
1	5764-12206-00		Bare P. C. Board	62	5010-10003-00	R62, R63	Resistor, 390Ω, 5%, 1/4w, C, F.
2	5370-09691-00	U3	IC, CVSD Mod., 55536	63	5010-10171-00	R67	Resistor, 56Ω, 5%, 1/4w, C, F.
3	5370-09321-00	U4, U5	IC, Dual Op Amp, 1458	64	5010-10170-00	R69	Resistor, 47Ω, 5%, 1/4w, C, F.
4	5281-09308-00	U16	IC, Octal Bus Xcvr, 74LS245	65	5010-09160-00	R59, R61, W12, W13	Resistor, 220Ω, 5%, 1/4w, C, F.
5	5430-08972-00	U9, U10, U38, U41, U42, U51, U54	IC, PIA, MC6820/6821	66	5010-09416-00	R33, R34, R71-R78, R135-R137	Resistor, 470Ω, 5%, 1/4w, C, F.
6	5340-10139-00	U25	IC, 2K x 8 CMOS Static RAM	67	5010-09179-00	R9	Resistor, 3.3MΩ, 5%, 1/4w, C, F.
7	5280-09010-00	U44	IC, 4-16 Decoder, 74154	68	Not Used		
8	5281-09246-00	U7, U8, U12	IC, 2-4 Decoder, 74LS139	69	5010-10631-00	R111, R114, R117, R120, R123, R126, R129, R13	Resistor, 1.2KΩ, 5%, 1/2w, C, F.
9	5075-09406-00	ZR3 - ZR8	Diode, Zener, 6.2v, 0.5w	70	Not Used		
10	5164-10998-00	Q42 - Q49	Transistor, NPN, 2N5550, TO-92	71	Not Used		
11	5281-09487-00	U6	IC, Dual D Flip-flop, 74LS74	72	5010-09120-00	R17	Resistor, 270KΩ, 5%, 1/4w, C, F.
12	5431-09449-00	U43	IC, Timer, MC1455	73	5010-09333-00	R15, R16, R18	Resistor, 180KΩ, 5%, 1/4w, C, F.
13	5310-09236-00	U29	IC, 14-b Counter, 40200	74	5010-09324-00	R29, R30	Resistor, 27KΩ, 5%, 1/4w, C, F.
14	5281-09743-00	U32	IC, Quad 2-Input AND, 74LS08	75	5010-09269-00	R20, R21	Resistor, 12KΩ, 5%, 1/4w, C, F.
15	5281-09247-00	U14	IC, Quad 2-Input NOR, 74LS02	76	5010-09356-00	R27, R28	Resistor, 820Ω, 5%, 1/4w, C, F.
16	5281-09235-00	U35	IC, Triple 3-Input NAND, 74LS10	77	5019-09783-00	SR18	SIP, 9R, 10-pin, 6.8KΩ, .125w/R
17	5280-09013-00	U36	IC, Hex Inverter, 7404	78	5019-09362-00	SR3, SR15, SR17, SR19, SR20	SIP, 9R, 10-pin, 4.7KΩ, .125w/R
18	5281-09499-00	U31, U34	IC, Quad 2-Input NAND, 74LS00	79	5019-09808-00	SR4, SR6, SR11	SIP, 9R, 10-pin, 560Ω, .125w/R
19	5281-10014-00	U33	IC, Dual 4-Input NAND, 74LS20	80	5019-09785-00	SR16	SIP, 9R, 10-pin, 2.2KΩ, .125w/R
20	5281-09486-00	U28	IC, Octal D Flip-flop, 74LS374	81	5019-10472-00	SR14	SIP, 9R, 10-pin, 3.3KΩ, .125w/R
21	5371-09152-00	U2	IC, D/A Converter, MC1408	82	5019-09669-00	SR8	SIP, 9R, 10-pin, 1.0KΩ, .125w/R
22	5281-09745-00	U37	IC, 3-8 Decoder, 74LS138	83	5019-09780-00	SR9, SR10	SIP, 4R, 8-pin, 1KΩ, 5%
23	5340-09878-00	U23	IC, 2K x 8 Static RAM, 2016	84	5019-09786-00	SR1, SR2	SIP, 5R, 6-pin, 4.7KΩ, .125w/R
24	Not Used			85	5019-09792-00	SR5, SR7	SIP, 9R, 10-pin, 2.7KΩ, .125w/R
25	5281-09867-00	U11, U13, U40	IC, Octal Buffer, 74LS244	86	5060-10396-00	SRC1 - SRC5, SRC7 - SRC9	SIP, 8R, 8C, 10-pin, 4.7KΩ & 470pfd
26	5280-08973-00	U17-U20, U52, U53	IC, Quad 2-Input AND, 7408	87	5010-08774-00	R22	Resistor, 22KΩ, 5%, 1/4w, C, F.
27	5280-08974-00	U55, U56	IC, Hex Inverter, 7406	88	5043-08980-00	C14, C17-C21, C31, C32, C49-C56, C59, + 54 Bypass, marked B	Capacitor, 0.01 μfd, 50v(±80, -20%),
28	5310-09155-00	U30, U39	IC, Quad 2-Input NAND, MC14011	89	5043-09845-00	C22, C23, C25, C27, C28	Capacitor, 1K pfd, 50v(±20%), Axial
29	5280-08948-00	U45, U50	IC, Quad 2-Input NOR, 7402	90	5043-08996-00	C9, C70-75, C77, C78	Capacitor, 0.1 μfd, 50v(±20%), Axial
30	5280-09309-00	U49	IC, Hex Buffer, 7407	91	5040-09343-00	C8, C15	Capacitor, 10 μfd, Electr., 20v(±20%)
31	5671-09019-00	LED1-LED3	LED, Red, Display	92	5043-09844-00	C7	Capacitor, 47 pfd, 50v(±20%), Axial
32	5521-10506-00	CR1	Oscillator, 4 MHz	93	5040-10974-00	C24, C26, C29	Capacitor, 100 μfd, Electr., 25v(+50, -20%), Axial
33	5162-08976-00	Q51, Q53, Q55, Q57, Q59, Q61, Q63, Q65	Transistor, NPN Darl. 2N6427, TO-92	94	Not Used		
34	5191-08978-00	Q52, Q54, Q56, Q58, Q60, Q62, Q64, Q66	Transistor, PNP, TIP42, TO-220	95	5045-09796-00	C60-C67	Capacitor, 0.1 μfd, Polycarbonate Resin 100v(±10%)
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	96	5043-09065-00	C33-C40, C68, C69, C76, C10, C12	Capacitor, 470 pfd, 50v(±20%), Axial
36	5160-08938-00	Q2-Q5, Q10-Q13, Q18-Q21, Q26-Q29, Q34-Q38, Q41, Q67, Q68, Q70, Q72, Q74, Q76, Q78	Transistor, NPN, 2N4401, TO-92	97	5040-09545-00	C30	Capacitor, 22 μfd, Electr., 10v(+50, -20%), Axial
37	5160-10269-00	Q1, Q40	Transistor, NPN, 2N3904, TO-92	98	5041-09031-00	C58	Capacitor, 1 μfd, Tant., 25v(±20%), Axial
38	5190-09016-00	Q39, Q50	Transistor, PNP, 2N4403, TO-92	99	5043-09030-00	C16, C57	Capacitor, 0.047 μfd, 50v(±20%), Axial
39	5130-09014-00	S1-S8	SCR, 30v, 0.8A, 2N5060	100	Not Used		
40	5070-06258-00	D3-D19	Diode, 1N4001	101	5043-09492-00	C11	Capacitor, 100 pfd, ceramic, 100v(±20%)
41	5070-08919-00	D2	Diode, 1N4148, 150mA	102	Not Used		
42	5070-09266-00	D1	Diode, 1N5817, 1.0A	103	5048-10992-00	C13	Capacitor, 4700 pfd, ceramic, 50v(±10%)
43	5075-09018-00	ZR1	Diode, Zener, 1N5996A, 6.8v, 0.5w	104	5551-09822-00	L1-L3	Inductor, 4.7 μH, 3A
44	5075-09059-00	ZR2	Diode, Zener, 1N5990, 3.9v, 0.5w	105	5641-09312-00]	SW1, SW2	Switch, Pushbutton, DPDT, 100v, 6A
45	5010-08992-00	R94, R97, R100, R103, R106, R109	Resistor, 560Ω, 5%, 1/4w, C, F.	106	5880-09022-00	B1-B3	Battery, Alkaline, 1.5v, AA
46	5010-09039-00	R56	Resistor, 10Ω, 5%, 1/4w, C, F.	107	20-9491	W18, W19	Bus Wire, Jumper
47	5010-09534-00	W1, W2, W4, W5, W7, W8, W11, W14, W16, W17, W19	Resistor, 0Ω, 5%, 1/4w, C, F.	108	5881-09021-00		Battery Holder, #171
48	5010-08991-00	R31, R32, R35, R52, R55, R68, R92, R146	Resistor, 4.7KΩ, 5%, 1/4w, C, F.	109	5700-10176-00		IC Socket, 28 pin
49	5010-09358-00	R54, R57, R58, R64, R66, R138-R145	Resistor, 1.0KΩ, 5%, 1/4w, C, F.	a)	A-5343-2011-1	U26	IC, Game ROM 2, 27128
50	5010-09113-00	R79	Resistor, 33KΩ, 5%, 1/4w, C, F.	b)	A-5343-2011-2	U27	IC, Game ROM 1, 27256
51	5010-08983-00	R7, R8, R10, R70, R80	Resistor, 3.3KΩ, 5%, 1/4w, C, F.	c)	A-5343-2011-3	U22	IC, Sound ROM 2, 27256
52	5010-09034-00	R11-R14, R25, R26, R53, R60, R65, R90	Resistor, 10KΩ, 5%, 1/4w, C, F.	d)	A-5343-2011-4	U21	IC, Sound ROM 1, 27256
53	5010-09086-00	R81	Resistor, 6.8KΩ, 5%, 1/4w, C, F.	110	5700-08985-00		IC Socket, 40 pin
54	5010-09363-00	R3	Resistor, 5.6KΩ, 5%, 1/4w, C, F.	a)	5400-09150-00	U15	IC, μProcessor, 6802
55	5010-08997-00	R23, R24, R91, R93, R96, R99, R102, R105, R108, R112, R115, R118, R121, R124, R127, R130, R133	Resistor, 2.7KΩ, 5%, 1/4w, C, F.	b)	5400-09150-00	U24	IC, μProcessor, 6802
56	5012-09037-00	R113, R116, R119, R122, R125, R128, R131, R134	Resistor, 0.4Ω, 5%, 3w, Wire-Wnd.	111	5824-09248-00	TP1, TP2	Test Point
57	5010-08993-00	R36-R51, R95, R98, R101, R104, R107, R110	Resistor, 68Ω, 5%, 1/2w, C, F.	112	-115 Not Used		
58	5012-10860-00	R82-R89	Resistor, 27Ω, 5%, 2w, C, F.	116	20-9229		Thermal Compound
59	Not Used			117	5580-08994-01	K1	Relay, 4-pole, 40Ω, 6v
60	Not Used			118	5791-10862-09	1J1, 1J2, 1J4-1J8, 1J10-1J12, 1J17-1J19	Connector, 9 pin (Hdr)
61	5010-10987-00	R19	Resistor, 56KΩ, 5%, 1/4w, C, F.	119	5791-10862-04	1J13, 1J14, 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)

System 11B CPU Board Schematic

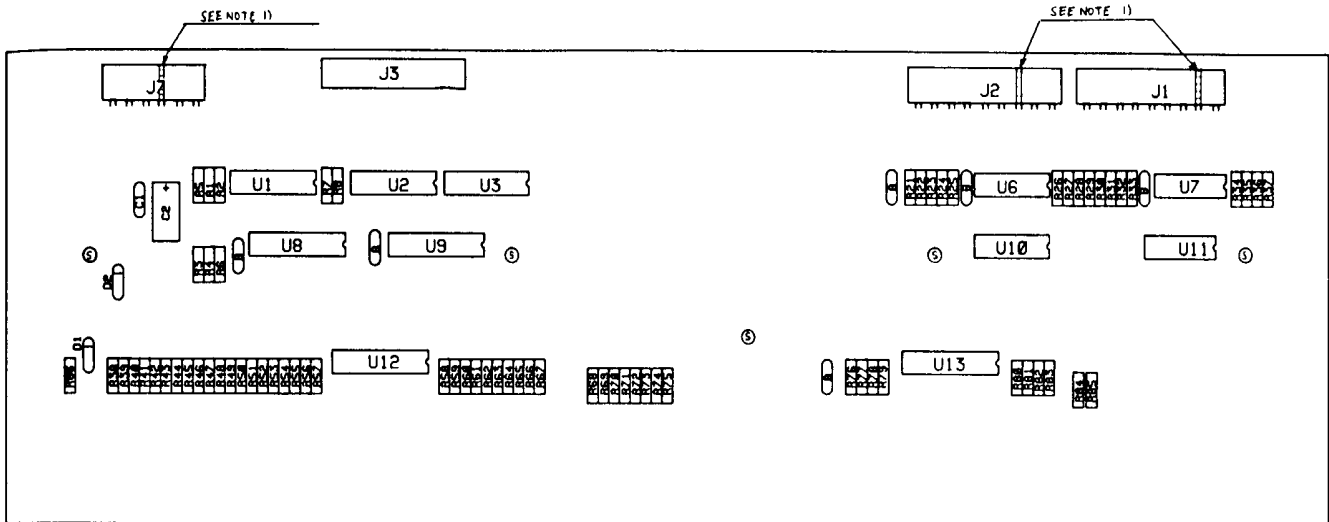


Bally Right Display Board D-12502-1



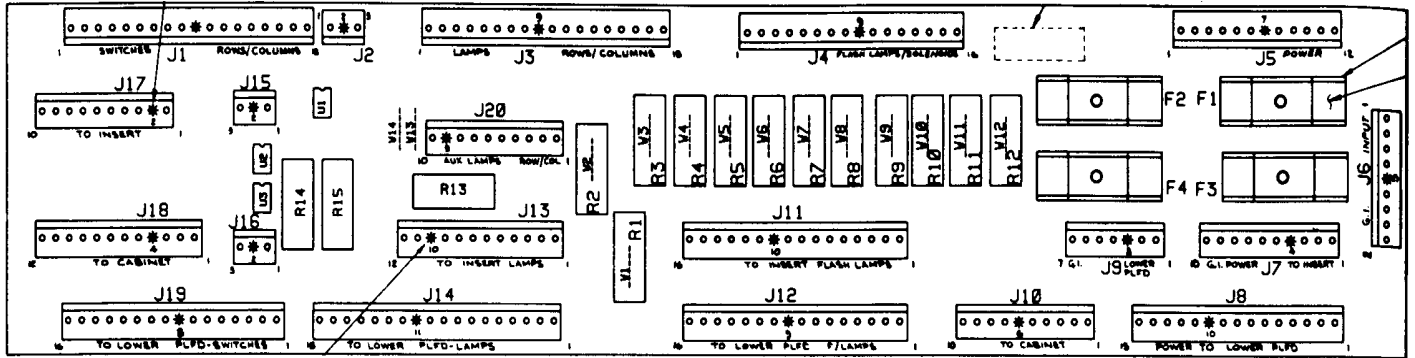
DESCRIPTION	QTY.	DESIGNATION NO.	PART NUMBER
Axial Cap., 0.01mfd, 50v, +80, -20%	9	B (Bypass Cap)	5043-08980-00
Axial Cap., 0.1mfd, 50v, +80, -20%	1	C1	5043-08996-00
Axial Cap., 10mfd, 25v, ±20%	1	C2	5040-09343-00
Zener, 1N4740, 10v	2	D1, D2	5075-09135-00
Display, 16-Character A/N	1	DSPL1	5670-12308-00
9-Pin Header, Right Angle, .156	3	J1, J2, J5	5791-10869-09
26-Pin Header, Right Angle, .100	1	J3	5791-10851-00
6-Pin Header, Right Angle, .156	1	J7	5791-10869-06
Resistor, 18KW, 1/4w, 5%	25	R1-R8, R21-R37	5010-08773-00
Resistor, 100KW, 1/4w, 5%	32	R38, R40, R42, R44, R46, R48, R50, R52, R54, R61, R63, R65, R67, R69, R71, R73, R75-R83, R85	5010-09162-00
Resistor, 1MW, 1/4w, 5%	1	R86	5010-10258-00
Resistor, 8.2KW, 1/2w, 5%	7	R45, R49, R51, R62, R64, R68, R74	5010-10927-00
Resistor, 0W	2	W3, W4	5010-09534-00
I.C. 4049	3	U1-U3	5310-08975-00
I.C. 4001	4	U6, U7, U10, U11	5310-09882-00
I.C. 7180, Catode Driver	2	U8, U9	5680-08969-00
I.C. 6118, Anode Driver	2	U12, U13	5680, 08968-00
Bally-Lo-Display PCB	1		5768-12378-00
Support Display	5	S (Support)	03-8088-1
Assembly, I.D. Label	1		16-8850-251

Bally Left Display Board D-12706



DESCRIPTION	QTY.	DESIGNATION NO.	PART NUMBER
Axial Cap., 0.01nfd, 50v, +80, -20%	6	B (Bypass Cap)	5043-08980-00
Axial Cap., 0.1nfd, 50v, +80, -20%	1	C1	5043-08996-00
Axial Cap., 10nfd, 25v, ±20%	1	C2	5040-09343-00
Zener, 1N4740, 10v	2	D1, D2	5075-09135-00
Display, 16-Character A/N	1	DSPL1	5670-12308-00
9-Pin Header, Right Angle, .156	2	J1, J2	5791-10869-09
26-Pin Header, Right Angle, .100	1	J3	5791-10851-00
6-Pin Header, Right Angle, .156	1	J7	5791-10869-06
Resistor, 18KW, 1/4w, 5%	25	R1-R8, R21-R37	5010-08773-00
Resistor, 100KW, 1/4w, 5%	32	R38, R40, R42, R44, R46, R48, R50, R52, R54, R55, R61, R63, R65, R67, R69, R71, R73, R75-R83, R85	5010-09162-00
Resistor, 10KW, 1/2w, 5%	9	R39, R41, R43, R47, R53, R66, R70, R72, R84	5010-08981-00
Resistor, 1MW, 1/4w, 5%	1	R86	5010-10258-00
Resistor, 8.2KW, 1/2w, 5%	7	R45, R49, R51, R62, R64, R68, R74	5010-10927-00
I.C. 4049	3	U1-U3	5310-08975-00
I.C. 4001		U6, U7, U10, U11	5310-09882-00
I.C. 7180, Cathode Driver	2	U8, U9	5680-08969-00
I.C. 6118, Anode Driver	2	U12, U13	5680-08968-00
Bally-Hi-Display PCB Support Display5	1	S (Support)	5768-12408-00 03-8088-1

Backbox Interconnect Board



DESCRIPTION	QTY.	DESIGNATION NO.	PART NUMBER
Master Interconnect Board	1		5768-12332-00
Resistor, 0W	1	W12	5010-09534-00
Resistor, 3.3KW, 5w, 10%	2	R14, R15	5012-12238-00
Resistor, 1.5KW, 5w, 10%	1	R13	5012-12337-00
Resistor, 5.6W, 5w, 10%	7	R3-R5, R7, R9-R11	5012-10024-00
Resistor, 11W, 5w, 10%	4	R1, R2, R6, R8	5012-12163-00
Opto Isolator 4N25	3	U1 - U3	5490-10892-00
Fuse, 5A.S.B., 250v	4	F1-F4	5731-09651-00
Fuse Holder, F1-F4	4		5733-12060-01
Connector, 3-pin Hdr Sq Pin .156	2	J2, J16	5791-10862-03
Connector, 7-pin Hdr Sq Pin .156	1	J9	5791-10862-07
Connector, 9-pin Hdr Sq Pin .156	1	J6	5791-10862-09
Connector, 10-pin Hdr Sq Pin .156	2	J7, J10	5791-10862-10
Connector, 12-pin Hdr Sq Pin .156	3	J5, J13, J18	5791-10862-12
Connector, 15-pin Hdr Sq Pin .156	1	J8	5791-10862-15
Connector, 16-pin Hdr Sq Pin .156	4	J4, J11, J12, J19	5791-10862-16
Connector, 18-pin Hdr Sq Pin .156	3	J1, J3, J14	5791-10862-18
P.C.B. I.D. Label	1		16-8850-264

Lamp Boards

Top 3-Position Lamp Assy **C-12000**

DESCRIPTION	PART NUMBER
Lamp Skirt PCB Twist	24-8767
Bulb #555, 6.3V, 0.25A	24-8768
Diode, 1N4004, 1.0A	5070-09054-00
Lamp PCB	5768-12245-00

6-Position Lamp Assy **C-12713**

DESCRIPTION	PART NUMBER
Lamp Skirt PCB Twist	24-8767
Bulb #555, 6.3V, 0.25A	24-8768
Diode, 1N4004, 1.0A	5070-09054-00
Lamp PCB	5768-12413-00

Single Lamp Assy **B-12224**

DESCRIPTION	PART NUMBER
Lamp Skirt PCB Twist	24-8767
Bulb #555, 6.3V, 0.25A	24-8768
Diode, 1N4004, 1.0A	5070-09054-00
Single Lamp PCB	5768-12312-00

3-Lamp Back Stop **C-13066**

DESCRIPTION	PART NUMBER
Lamp Skirt PCB Twist	24-8767
Bulb #555, 6.3V, 0.25A	24-8768
Diode, 1N4004, 1.0A	5070-09054-00
Lamp PCB	5768-12518-00

4-Position Plfld Lamp Assy **C-13028**

DESCRIPTION	PART NUMBER
Lamp Skirt PCB Twist	24-8767
Bulb #555, 6.3V, 0.25A	24-8768
Diode, 1N4004, 1.0A	5070-09054-00
Single Lamp PCB	5768-12479-00

Relay Board **C-11998-1**

DESCRIPTION	PART NUMBER
Resistor 0 Ohm	5010-09534-00
Diode, 1N4004, 1.0 A	5070-09054-00
Relay 24D13A VS	5580-09555-01
PCB	5768-12243-00
Header, 2-pin sq post	5791-12273-02
Header, 7-pin sq post	5791-12273-07

Playfield Parts

Major Assemblies

ITEM	DESCRIPTION	PART NUMBER
1	Ball Lock Kicker <i>Coil Assy</i>	B-11051-R B-9362-R-1
2	Red Standup Target	B-11696-4
3	L. Slingshot Kicker <i>Left Coil Assy</i>	B-12665 B-11203-L-1
4	R. Slingshot Kicker <i>Right Coil Assy</i>	B-12665 B-11203-R-1
5	Round Target	B-12879
6	Flip Up Targets <i>Reset Coil Mech.</i> <i>Standup Target</i>	C-12922 B-12916 B-11696-4
7	Hexagonal Target	B-13030
8	Rectangular Target	B-13031
9	Ball Eject Hole <i>Coil Assy</i>	B-9361-R-1 B-9362-R-1
10	3-Bank Drop Target	C-11223-1
11	Left Flipper Assy <i>Flipper, Yellow</i>	C-11626-L-3 20-9592-6
12	Right Flipper Assy <i>Flipper, Yellow</i>	C-11626-R-3 20-9592-6
13	Thumper Bumpers	C-12842
14	Boogle Men Mech. Boogle Man, Rub.	C-12920 23-6639
15	Ball Popper	D-11335-1
16	Skull & Lights Assy	B-13069
17	Ball Trough Assy	B-8623

Guides, Gates, Ramps, & Wireforms

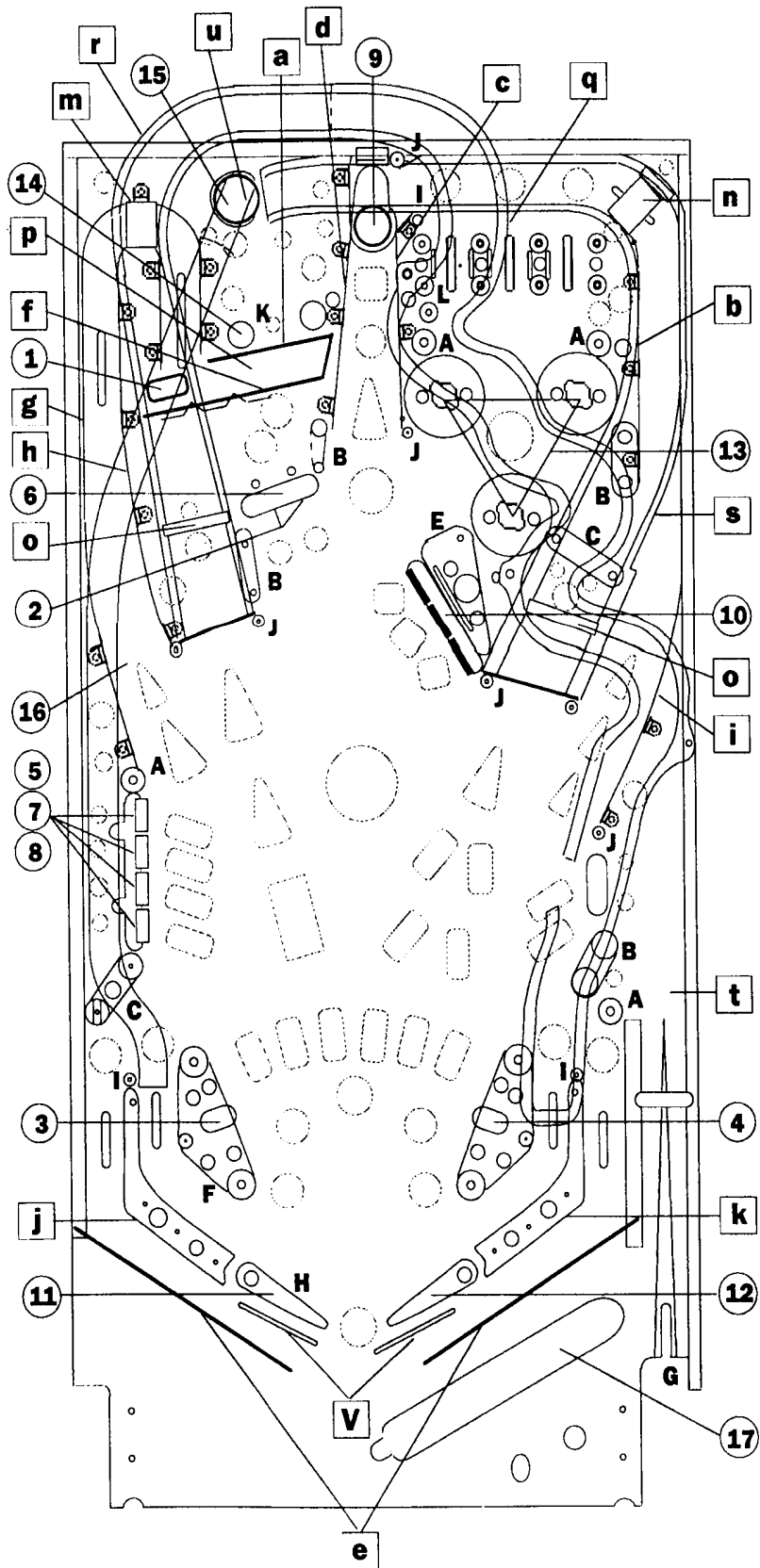
ITEM	DESCRIPTION	PART NUMBER
a	Release Guide, Upper	A-13049
b	Ball Guide Assy	B-13050
c	Eject Guide, Right	B-13051
d	Eject Guide, Left	B-13052
e	Bottom Arch Guides	D-12861-1
f	Release Guide, Lower	B-13010
g	Skull Guide, Right	C-13054
h	Skull Guide, Left	C-13055
i	Pizza Passage Guide	D-13056
j	L. Flipper Ball Guide	B-12919
k	R. Flipper Ball Guide	B-12918
l	Ball Gate Assy	A-13101
m	Ball Gate Assy <i>Hinge Ptn</i>	A-8112-L 02-2413
n	Ball Gate Assy <i>Hinge Ptn</i>	A-8244-R 02-2413-1
o	Switch Gate Assy <i>Wireform</i>	A-13068 12-6796
p	Release (Metal) Ramp	B-13011
q	R. (Slide Return) Ramp	D-13006
r	L. (Monster Slide) Ramp	D-13007
s	R. (Party Punch) Ramp	D-13008
t	Ball Runway Ramp	12-6867
u	Popper Wire Ramp	12-6860
v	Anti-Rebound Wire	12-6871

Rubber Parts

ITEM	DESCRIPTION	PART NO.	QTY
A	5/16" Rubber Ring	23-6300	4
B	1" Rubber Ring	23-6302	4
C	1-1/4" Rubber Ring	23-6303	2
D	1-1/2" Rubber Ring	23-6304	5
E	2" Rubber Ring	23-6305	1
F	Rubber Ring	23-6306	2
G	Ball Shooter Tip	23-6327	1
H	Flipper Rubbers	23-6519-4	2
I	Rubber Bumper	23-6535	3
J	Bumper Sleeve(Black)	23-6556	8
K	Boogle Man	23-6639	2
L	Rubber Bumper	23-6641	11

NOTE: Refer to Page 2-33 for information on playfield posts.

Playfield Parts Location Diagram

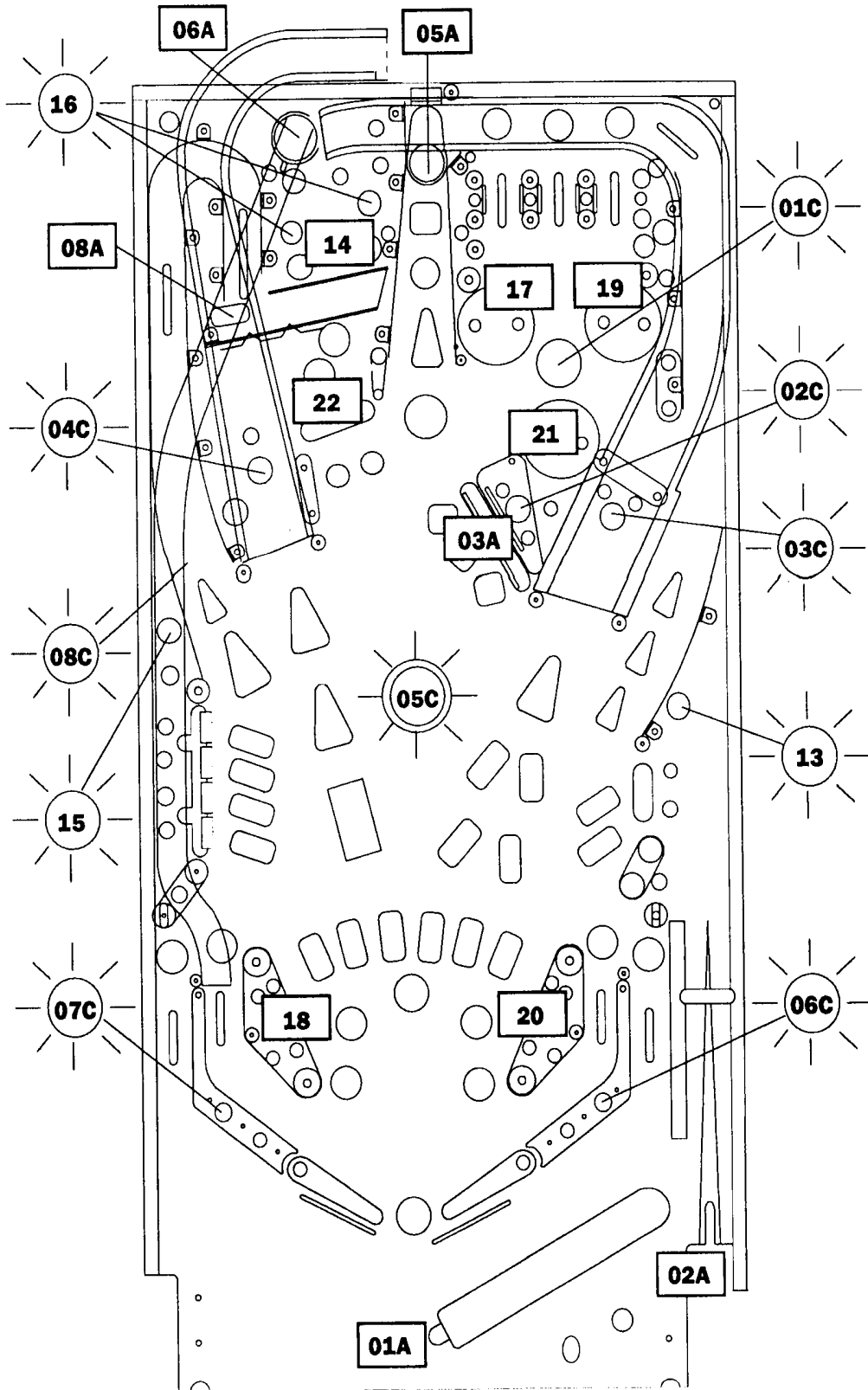


Solenoids & Flashers

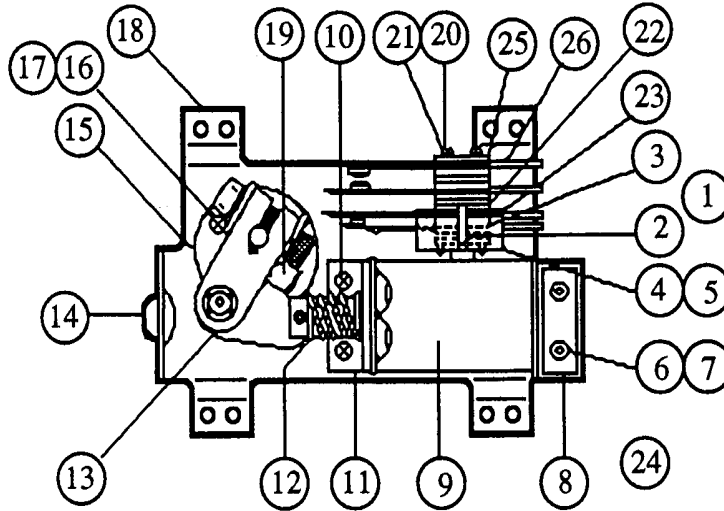
Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trnstr	Solenoid Part No. Flashlamp Type	
				CPU Board	Playfield/Cabinet		I = Insert Bd ; p = Playfield	
01A ³	Outhole Kicker	Switched	Vio-Brn }	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800	
01C ³	Jets (p)/Bats (i)	Switched	Blk-Brn }	(Gry-Brn)	5J5-9 (C)	Q33	#906/#89 flashlamps	1p,1i
02A ³	Ball Eject (Shtr Lane Feeder)	Switched	Vio-Red }	1P11-3	5J1-7: 5J4-8 (A)	Q25	AE-23-800	
02C ³	Organ Flasher	Switched	Blk-Red }	(Gry-Red)	5J5-8 (C)	Q25	#906 flashlamp	1p
03A ³	Drop Target Bank	Switched	Vio-Orn }	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200	
03C ³	Right Ramp (p)/Punch (i)	Switched	Blk-Orn }	(Gry-Orn)	5J5-7 (C)	Q32	#906/#89 flashlamps	1p,1i
04A ³		Switched	Vio-Yel }	1P11-5	5J1-5: 5J4-6 (A)	Q24		
04C ³	Left Ramp (p)/Drac (i)	Switched	Blk-Yel }	(Gry-Yel)	5J5-6 (C)	Q24	#906/#89 flashlamps	1p,1i
05A ³	Eject Hole	Switched	Vio-Grn }	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800	
05C ³	Moon (p)/ Wolfman (i)	Switched	Blk-Grn }	(Gry-Grn)	5J4-5 (C)	Q31	#906/#89 flashlamps	2p,1i
06A ³	Ball Popper	Switched	Vio-Blu }	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800	
06C ³	Right Return (p)/ Hot Dog, BBQ, Bun (i)	Switched	Blk-Blu }	(Gry-Blu)	5J5-4 (C)	Q23	#906/#89 flashlamps	1p,3i
07A ³	Knocker	Switched	Vio-Blk }	1P11-8	5J1-2: 5J4-3 (A)	Q30	AE-23-800	
07C ³	Left Return (p)/Letters (i)	Switched	Blk-Vio }	(Gry-Vio)	5J5-3 (C)	Q30	#906/#89 flashlamps	1p,3i
08A ³	Ball Lock Release	Switched	Vio-Gry }	1P11-9	5J1-1: 5J4-2 (A)	Q22	AE-23-800	
08C ³	Skull (p)/ House (i)	Switched	Blk-Gry }	(Gry-Blk)	5J5-2 (C)	Q22	#906/#89 flashlamps	1p,1i
09	ELVIRA	Controlled	Brn-Blk	1P12-1	5J2-9: 5J6-9:2J4-3	Q17	#89 flashlamp	3i
10	INSERT GI	Controlled	Brn-Red	1P12-2	5J2-8: 5J6-8:2J4-5	Q9	5580-09555-01 ^{4b}	
11	PLAYFIELD GI	Controlled	Brn-Orn	1P12-4	5J2-6: 5J6-7:2J4-6	Q16	5580-09555-01 ^{4a}	
12	A/C Select Relay	Controlled	Brn-Yel	1P12-5	5J2-5	Q8	5580-09555-01 ⁵	
13	Rightside (p)/Graveyard (i)	Controlled	Brn-Grn	1P12-6	5J2-4: 5J6-5	Q15	#906/#89 flashlamps	1p,1i
14	Boogie Monsters	Controlled	Brn-Blu	1P12-7	5J2-3: 5J6-3	Q7	AE-26-1200	
15	B/board L. Side (p)/DHead (i)	Controlled	Brn-Vio	1P12-8	5J5-2: 5J6-2	Q14	#906/#89 flashlamps	2p,1i
16	Boogie Monsters	Controlled	Brn-Gry	1P12-9	5J2-1: 5J6-1	Q6	#906 flashlamp	2p
17	Left Thumper Bumper	Special #1	Blu-Brn	1P10-7	5J3-7: 5J7-7	Q75	AE-23-800	
18	Left Slingshot Kicker	Special #2	Blu-Red	1P19-4	5J3-6: 5J7-6	Q71	AE-26-1500	
19	Right Thumper Bumper	Special #3	Blu-Orn	1P19-3	5J3-3: 5J7-3	Q73	AE-23-800	
20	Right Slingshot Kicker	Special #4	Blu-Yel	1P19-6	5J3-4: 5J7-5	Q69	AE-26-1500	
21	Bottom Thumper Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800	
22	Flip Up Reset	Special #6	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79	AE-26-1200	
	Right Flipper		Orn-Vio	1P19-1	2J3-1: 2J18-10: 7P1-15 (7P1-16:2J18-6:2J17-4)	-	FL-11630/50VDC	
	Lower Right Flipper		(Blu-Vio)					
	Left Flipper		Orn-Gry ²	1P19-2	2J3-2: 2J18-9: 7P1-18 (7P1-19:2J18-5:2J17-3)	-	FL-11630/50VDC	
	Lower Left Flipper		(Blu-Gry)					

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" circuits are pulsed, when Sol. 12 is de-energized; "C" circuits are pulsed, with Sol. 12 energized. Wire colors in brackets are those from respective "A" and "C" terminals corresponding to the J1-terminal connection listed for the Aux Power Driver Bd, which controls the device pulsing by Sol. 12. [4a] Relay is mounted on the playfield, p/n C-11998-1. [4b] Relay is mounted on the Insert Bd, p/n C-11998-1. [5] Relay is mounted on Aux Power Driver Board, p/n D-12247 in the backbox.

Solenoids & Flashers Location Diagram



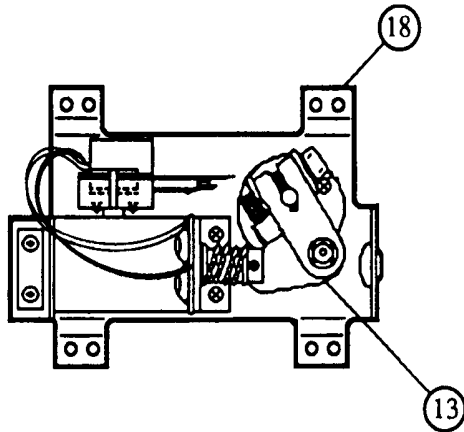
Lower Right Flipper Assembly C-12626-R-3



ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	HW-30018-6	Wire, 18 AWG, Blue	g)	B-10657-R	Flipper Crank Assy, Right
2	03-7520-2	Ty-Wrap, Nylon	1.)	01-8073-R	Flipper Crank, Right
3	20-6516	Speednut, Tinnerman	2.)	17-1037	Crank Washer
4	5045-12098-00	Cap, 2.2 nFd, 250V, 20%	3.)	4010-01066-18	Cap Screw, 10-32 x 1-1/8, HCS
5	RM-21-06	Sleeve, Vinyl (Cap. leads)	4.)	4410-01127-00	Nut, 10-32 Hex Hd.
6	4010-01066-06	Cap Screw, 10-32 x 3/8, SH	5.)	4700-00107-00	Washer, 5/8 o.d. x 13/64 i. d. x 12ga.
7	4701-00004-00	Lockwasher, #10 Split	6.)	4701-00004-00	Lockwasher, #10 Split
8	A-12111	Flipper Stop Assembly	7.)	RM-23-06	Tubing, H. S. 1/4 DWP
9	FL-11630	Flipper Coil (Red).	14	23-6577	Bumper Plug
10	4006-01017-06	M.S., 6-32 x 3/8, PRH-S	15	03-7568	Flipper Bushing
11	01-7695	Solenoid Bracket	16	4006-01005-06	M.S., 6-32 x 3/8, P-PH
12	10-376	Coil Plunger Spring	17	4406-01117-00	Nut, 6-32 Hex
13	B-10655-R	Crank Link Assembly, Right	18	C-11627-R	Flipper Base Assy, Right
a)	02-4179	Link Spacer Bushing	19	06-14G	Insulating Blade
b)	4010-01086-14	Cap Screw, 10-32 x 7/8, SH	20	4105-01001-20	Sh. Met Screw, #5 x 1-1/4
c)	4700-00023-00	Washer, 5/8 o.d. x 13/64 i. d. x 16ga.	21	4701-00002-00	Lockwasher, #6 Split
d)	4701-00004-00	Lockwasher, #10 Split	22	23-6622	Tape, Double-sided
e)	4410-01132-00	Nut, 10-32 ESNA	23	03-7811	End of Stroke (EOS) Sw.
f)	A-10656**	Flipper Link Assembly	24	HW-30018-64	Wire, 18 AWG, BLU-YEL
1.)	02-4219	Coil Plunger	25	01-3670	Switch Plate-Curve
2.)	20-9370-1	Spring Pin, 5/32 dia. x 7/16	26	SW-1A-183	Flipper Switch
3.)	03-8050-1	Flipper Link			
g)	B-10657-R	Flipper Crank Assy, Right			
1.)	01-8073-R	Flipper Crank, Right			
2.)	17-1037	Crank Washer			

** - Also See Separate Diagram

Lower Left Flipper C-11626-L-3



(Parts listed replace same Items of C-12898)

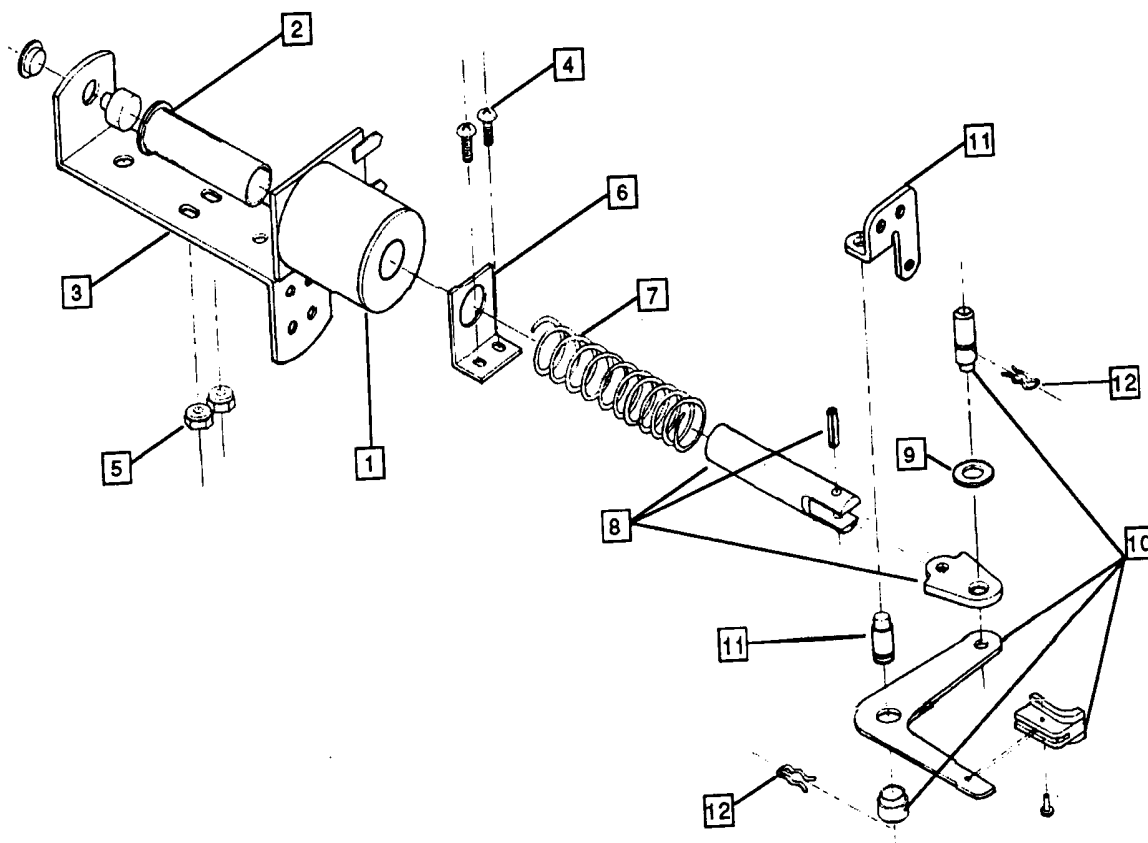
ITEM	PART NO.	DESCRIPTION
13	B-10655-L	Crank Link Assy, Left
g)	B-10657-L	Flipper Crank Assy, Left
1.)	01-8073-L	Flipper Crank, Left
18	C-11627-L	Flipper Base Assy, Left
20	4105-01019-10	Sh. Metal Screw, #5 x 5/8
24-26	Not Used	

Flipper Paddle & Shaft, Yellow	20-9592-6
Flipper Rubber	23-6519-4

Flipper Assembly Notes:

- 1 Each Flipper Assembly on the Lower Playfield (and the two Lower Flipper Assemblies on the Upper Playfield) is mounted beneath the playfield, in conjunction with the plastic Flipper Paddle and Shaft (20-9592-6) and flipper Rubber (23-6519-4) 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 Not Used.
- 4 All moving elements of the assembly must operate freely, with no evidence of binding.
- 5 The large end of the Coil Plunger Spring (item 12) must fit within the four lugs of the Solenoid Bracket.
- 6 For coil replacement, remove the Solenoid Bracket (item 11) to prevent screw damage.
- 7 Use Loctite[®] 242 when reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.
- 8 When replacing the Bumper Plug (item 14) to restore proper flipper operation, readjust the flipper paddle and shaft position.
- 9 Solid color blue wire connects to the banded end of each diode, mounted on the connector end of the Flipper Coil (item 9). Trace color wire connects to the unbanded end of the diode.

Right and Left Slingshot Kicker Assembly B-12665

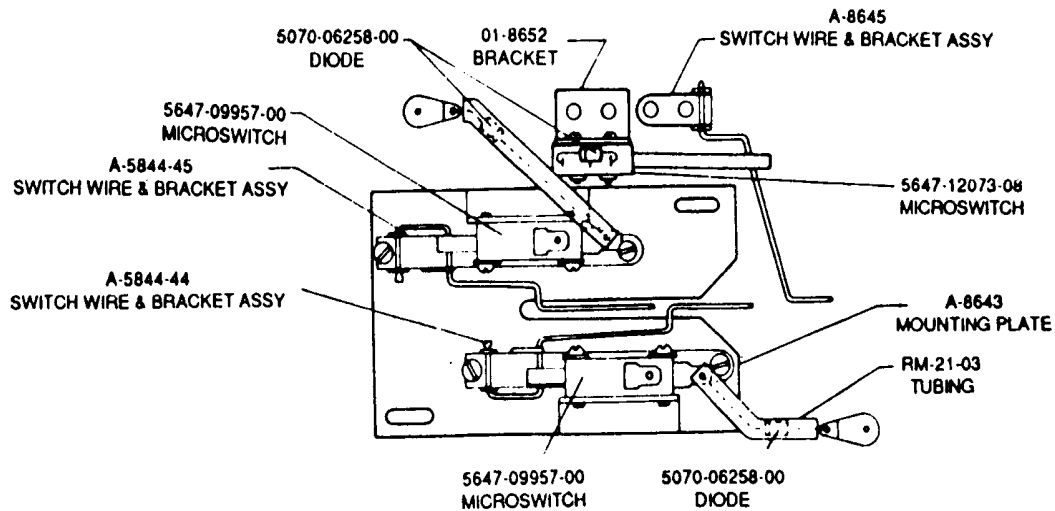


ITEM	DESCRIPTION	PART NUMBER
1	Coil Assembly	AE-26-1500
2	Coil Tubing	03-7066
3	Coil & Bracket Assy : Left	B-11203-L-1
	Right	B-11203-R-1
4	Nut, 6-32 (Elastic Stop Nut)	4406-01119-00
5	Machine Screw, 6-32x3/8	4006-01017-06
6	Coil Retaining Bracket	01-8-508-S
7	Spring	10-128
8	Coil Plunger Assembly	A-5103
9	Flatwasher	4700-00030-00
10	Kicker Arm Assembly	A-12664
11	Kicker Arm Mounting Bracket	A-5653
12	Hairpin Clip	12-6227

Ball Trough Switches

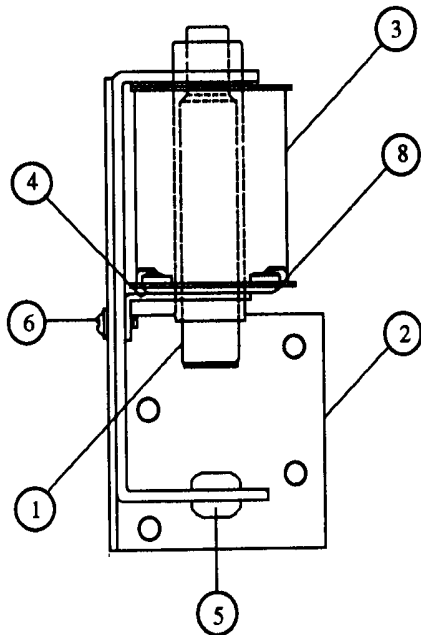
Ball Trough Switch Plate Assembly

B-8925



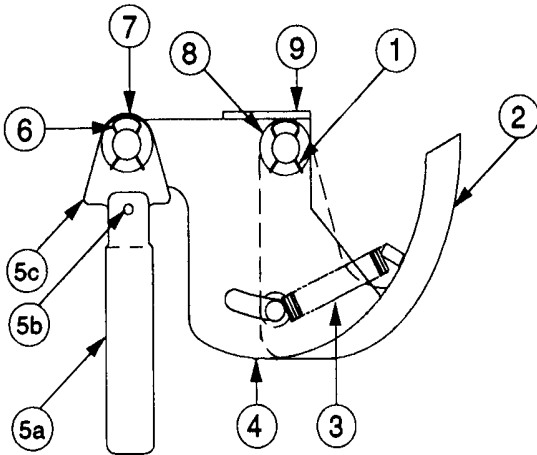
Mach Screw, 4-40x5/8 4004-01003-10
 Mach Screw, 5-40x1/8 4005-01005-02

Knocker Assembly B-10686-1



ITEM	DESCRIPTION	PART NUMBER
1	Coil Plunger Assy	A-5387
a)	Coil Plunger	02-2653
b)	Bell Arm Ext.	03-6013
2	Mtg. Brkt Assy	B-7409-2
3	Coil Sub-Assy	AE-23-800
4	Coil Retaining Brkt	01-8-508-T
5	Rubber Grommet	23-6420
6	Mach. Screw, #8-32x3/8	4008-01017-06
7	Knocker Cable	H-11835
8	Coil Tubing	03-7067-5

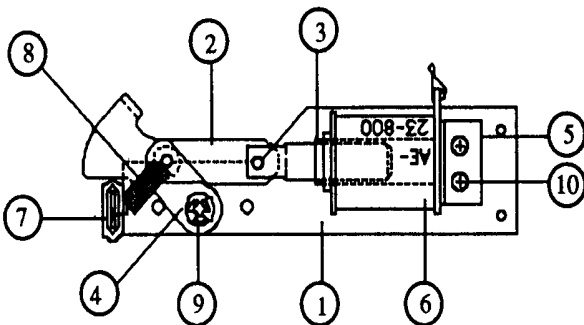
Ball Eject (Shooter Lane Feeder) Assembly C-9638



ITEM	DESCRIPTION	PART NUMBER
1	Hair Pin Clip	12-6227
2	Ball Eject Cam Assy	A-8247
3	Spring	10-362
4	Spring Plate Assy	A-6949-L
5	Plunger Assy	A-8050-1
a)	Coil Plunger	02-3407-2
b)	Poll Pin	20-8716-5
c)	Armature Link	03-8085
6	Hair Pin Clip	12-6227
7	Washer, 1/2o.d. x 17/64i.d. x 15 ga.	4700-00030-00
8	Washer, 1/2o.d. x 17/64i.d. x 28 ga.	4700-00103-00
9	Mounting Brkt Assy	A-8268

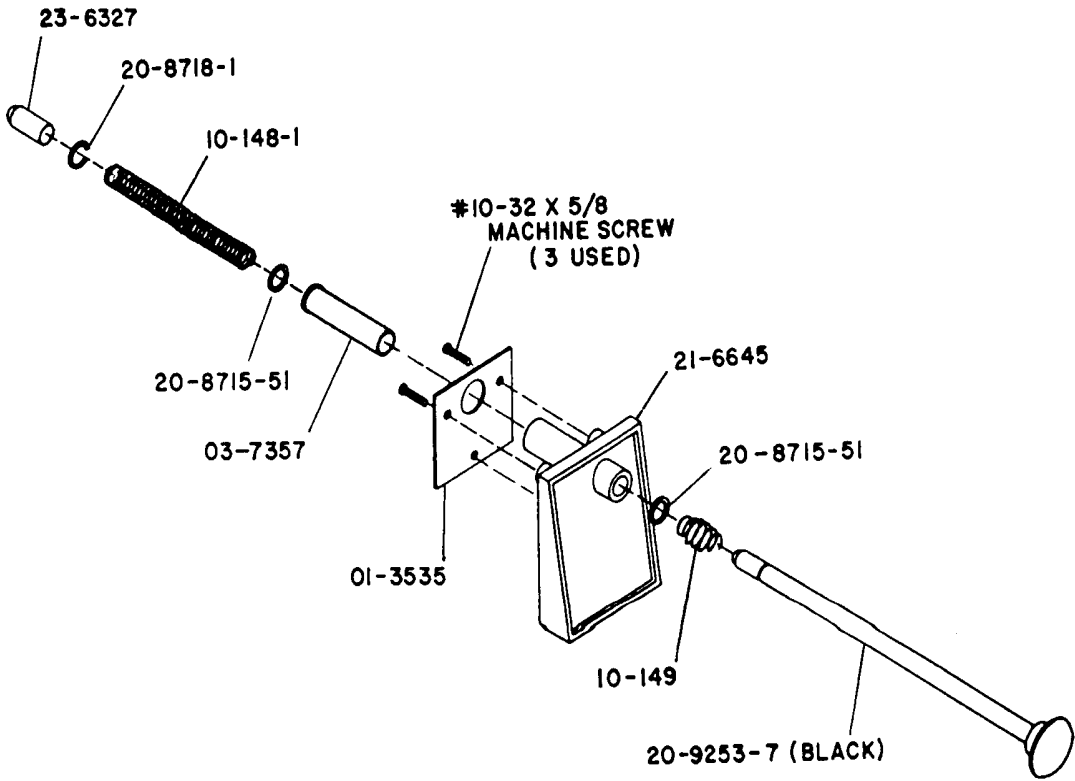
Associated Coil & B-9362-R-1
Bracket Assembly

Outhole Kicker Assembly B-8039-2



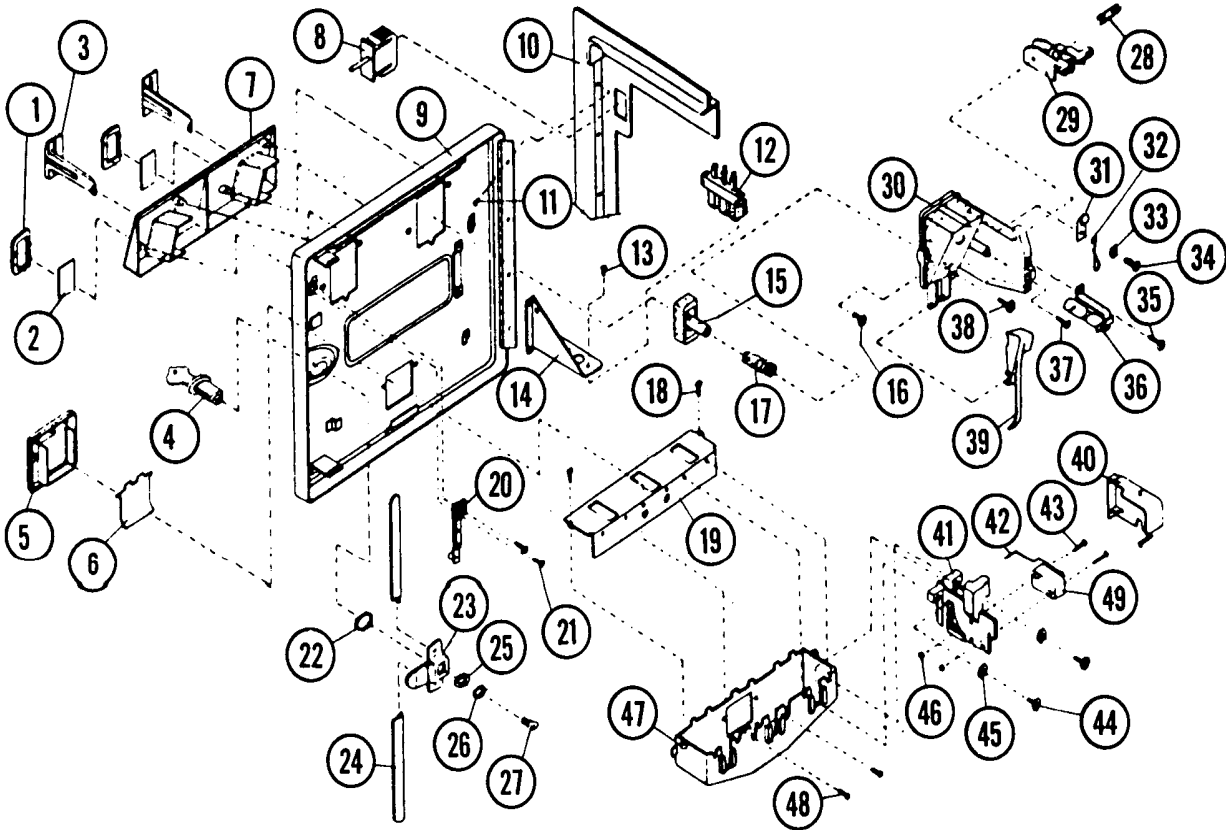
ITEM	DESCRIPTION	PART NUMBER
1	Mounting Plate Assy	A-6378
2	Coil Plunger Assy	A-8335
a)	Coil Plunger	02-2364
b)	Roll Pin, 1/8x7/16	20-8716-5
c)	Ball Return Link	01-4251
3	Coil Tubing	03-7066
4	Kicker Lever Assy	A-6889
5	Coil Stop Assy	A-8038
6	Coil Assy	AE-23-800
7	Striker Ring	03-7176-1
8	Reset Spring	10-010-4
9	E-Ring, 1/4" Shaft	20-8712-25
10	Mach. Screw, 6-32x3/16 P-PHS	4006-01003-03

Ball Shooter Assembly



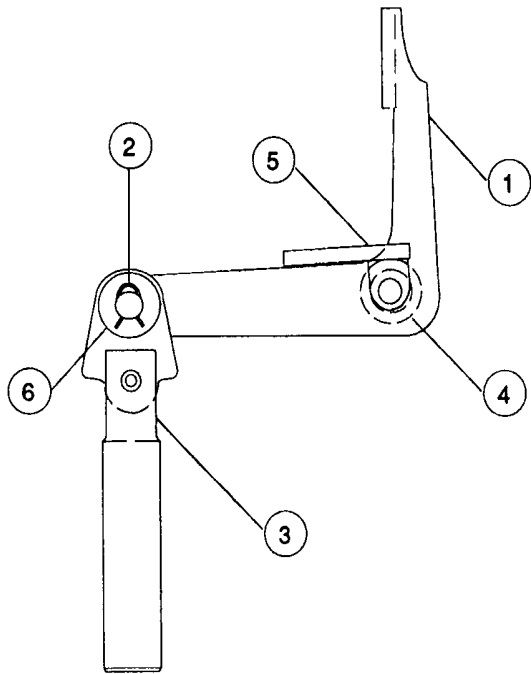
Coin Door Assembly

2-Chute Door 09-17002-x
3-Chute Door 09-17003-x



ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	27-1038	Button Cover	27	27-1019	M/C Screw
2	27-1041-1-49	Price Panel	28	27-1089	R-Ring
3	27-1026-1-15	Coin Entry Plate	29	27-1083	Retainer
4	27-1016	Lock Assembly	30	27-1081	Coin Inlet Chute
5	27-1061	Coin Return Bezel	31	27-1088	Wire Clamp
6	27-1062	Coin Return Flap	32	27-1025	Key Hook
7	27-1021	Button Housing - 2-slot	33	27-1086	Washer, #6
8	27-1111	Interlock Switch	34	27-1078	M/C Screw, 6-32 x 3/8
9	27-1006	Coin Door - 2-slot		27-1078	M/C Screw, 6-32 x 7/8
10	27-1005	Coin Door - 3-slot	35	27-1079	Self-tapping Screw, #6 x 1/4
11	27-1003	Coin Door Frame	36	27-1084	Lamp Socket
12	27-1008	M/C Screw, 6-32 x 3/16		27-1085	Lamp
13	27-1101	Diagnostic Switch	37	27-1096	Self-tapping Screw, #5 x 3/8
14	27-1102	M/C Screw, 4-40 x 1/4	38	27-1087	M/C Screw, 6-32 x 5/8
15	27-1037	Bracket, Diagnostic Switch	39	27-1082	Lever Arm 2 or 3
16	27-1078	Button	40	27-1097	Switch Cover
17	27-1039	M/C Screw, 6-32 x 3/8	41	27-1091	Coin Accept Chute
18	27-1079	Conical Spring	42	27-1075	Wire Form
19	27-1077	Self-tapping Screw, #6 x 1/4		27-1093	Wire Form
20	27-1066	Coinbox Cover	43	27-1094	M/C Screw, 6-40 x 7/8
21	27-1067	Slam Switch	44	27-1087	M/C Screw, 6-32 x 5/8
22	27-1017	M/C Screw 4-40 x 1/2	45	27-1086	Washer, #6
23	27-1012	Nut (key)	46	27-1095	Nut, 4-40
24	27-1011	Locking Cam	47	27-1076	Coin Return Box
25	27-1020	Locking Arm	48	27-1078	M/C Screw, 6-32 x 3/8
26	27-1018	Washer	49	27-1092	Microswitch
		Star Washer			

Ball Lock Release Assembly B-11051-R



ITEM	DESCRIPTION	PART NUMBER
1	Kicker Crank Assy	A-5652-1
2	Hairpin Clip	12-6227
3	Coil Plunger Assy	A-5103
a)	Coil Plunger	02-2364
b)	Armature Link	03-8085
c)	Roll Pin, 1/8x7/16	20-8716-5
4	Flat Washer, .265x.500x.067	4700-00030-00
5	Kicker Mounting Assy	B-11052
a)	Mounting Bracket	01-8329-R
6	Hairpin Clip	12-6227

Parts Associated to Ball Lock Release Kickbig:

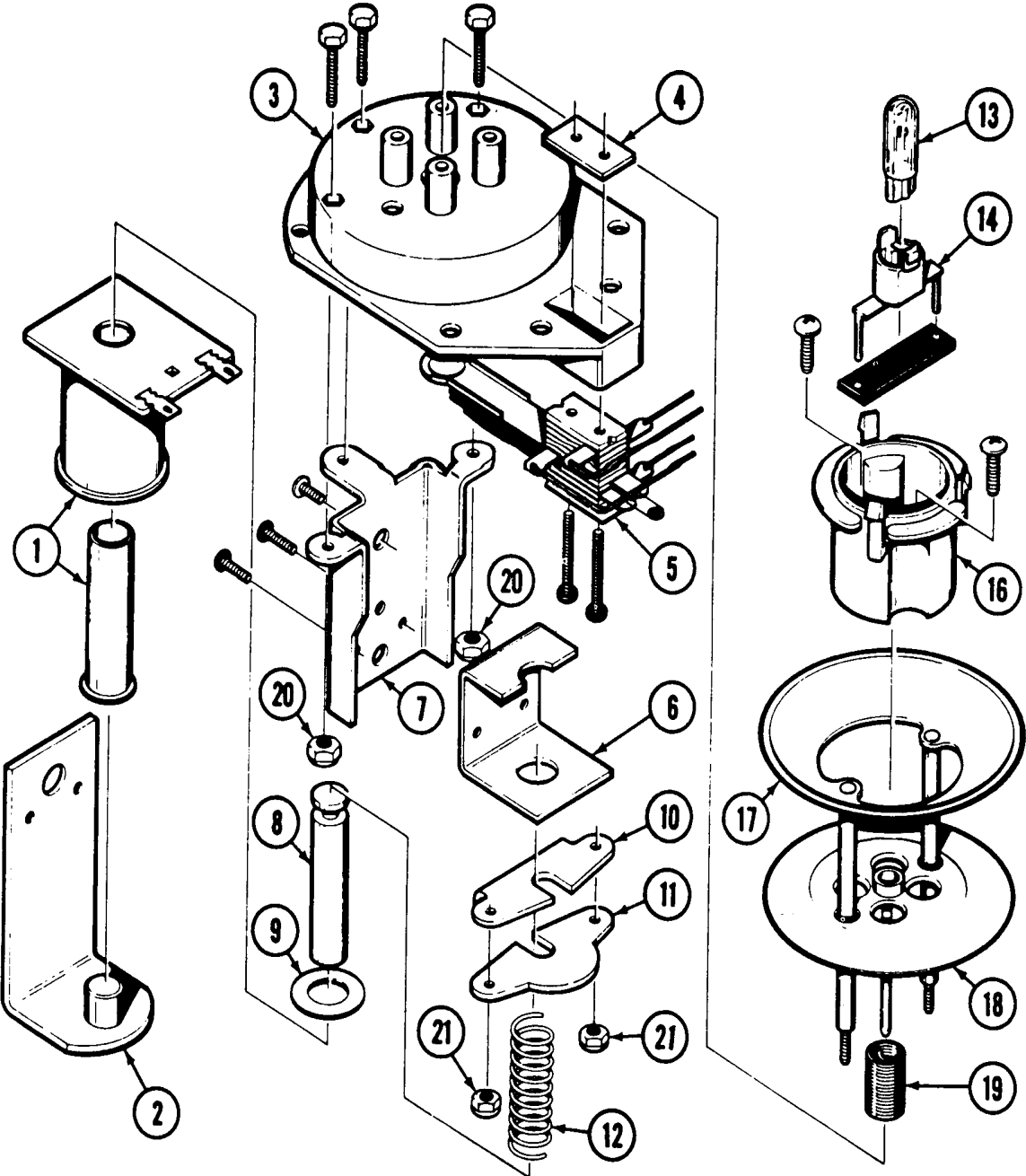
Coil & Bracket Assy **B-9362-R-1**

DESCRIPTION	PART NUMBER
Coil Assembly	AE-23-800
Bracket & Stop Assembly	B-7572-1
Coil Retaining Bracket	01-8-508-S
Machine Screw, 6-32 x 3/8	4006-01017-00
Nut, 6-32 ESN	4406-01119-00
Coil Tubing	03-7066

Ramps & Guides

DESCRIPTION	PART NUMBER
(Sloped) Eject Ramp	B-13011
Upper Guide	A-13049
Lower Guide	B-13010

Thumper Bumper Assembly C-12842

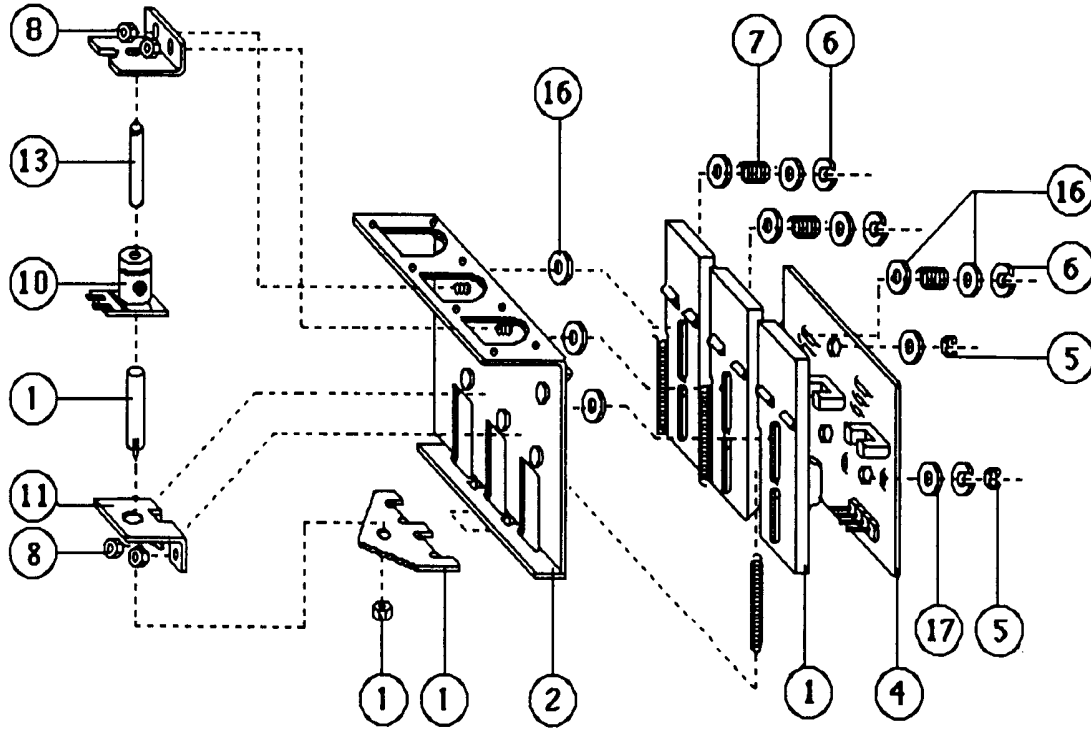


Thumper Bumper Assembly Parts List C-12842

ITEM	DESCRIPTION	PART NUMBER
1	Coil & Tubing Assy	AE-23-800
	Diode: 1N4004GP, 1.0A	5070-06258-00
	Tubing	03-7066
2	Core Plug Assy & Brkt Assy	B-12749
3	Base: Thumper Bumper	03-8324-5
4	Switch Assy	01-9166
5	Make Switch Plate	01-9321
6	Bracket	01-9319
7	Mounting Bracket	01-9117
8	Plunger	02-3406-1
9	Spring Washer: .515i.d.,.875o.d.,.013th.	0017-00104-0073
10	Bracket Plate	01-9116
11	Plate, Bakelite	01-9320
12	Compression Spring	10-411
13	Lamp, #555: Wedge Base	24-8768
14	Socket: Lamp	24-8813
15	Not Used	
16	Body: White	03-8325-5
17	Flange & Stud Assy	A-4754
18	Wafer: White	03-8517-5
19	Compression Spring	10-326
20	Nut: #8-32 Locking	0017-00103-0041
21	Nut: #6-32 Locking	0017-00103-0052

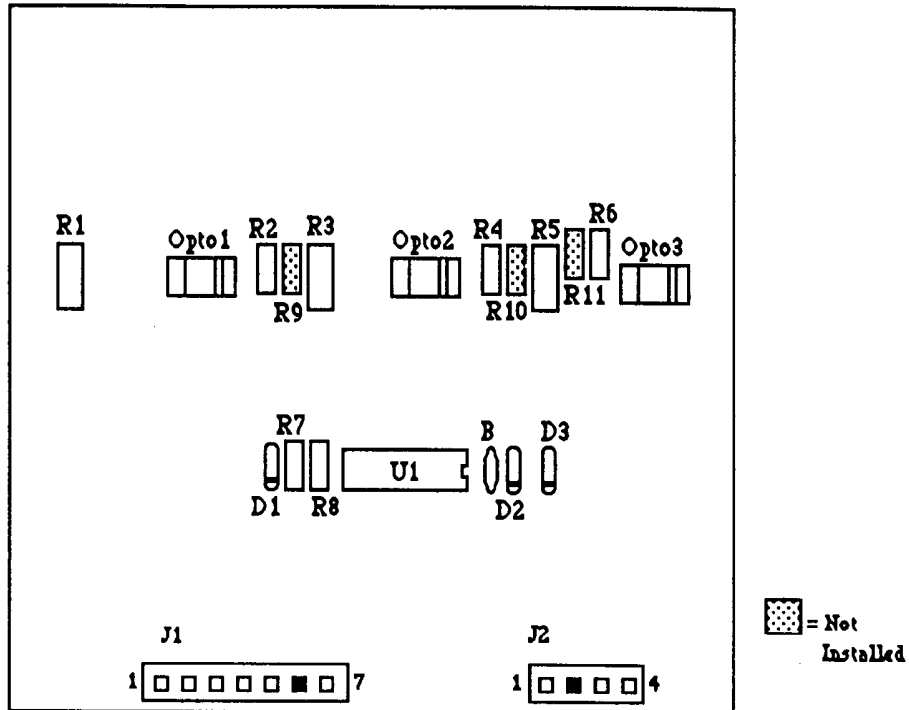
	Thumper Cap	03-8291-9

3-Bank Drop Target Assembly C-11223-1



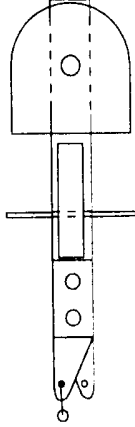
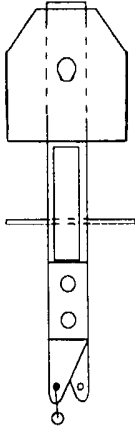
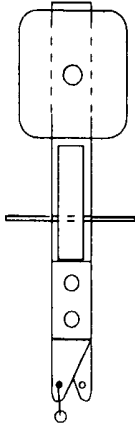
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1	Target, Plain	03-8036	12	Plunger & Reset Plt Assembly	A-11389
2	3-Bank Tgt Sub-Assy	B-11224	A)	Plunger	02-3972-1
3	Spring - Extension	10-364	B)	Reset Plate, 3-Bank	01-8408
4	3-Drop Target Opto Assy	C-12559	C)	Nut, 10-32 ESN	4410-01132-00
5	"E" Ring, 3/16" Shaft	20-8712-18	13	Coil Tubing	03-7066-4
6	"E" Ring, 1/4" Shaft	20-8712-25	14	Flat Washer, 3/16 x 7/16 x 17 ga.	4700-00016-00
7	Spring-Compression	10-392	15	Mach. Screw, 8-32 x 5/8	4008-01016-10
8	Nut, 8-32 ESN 8-32 x 5/8	4408-01119-00	16	Flat Washer, 17/64 x 1/2 x 21 ga.	4700-00072-00
9	Stop Bracket Assy	A-11397	17	Rubber Grommet	23-6626
10	Coil Assembly	AE-26-1200			
11	Bracket Coil	01-8413			

3-Bank Drop Target Opto Board C-12559

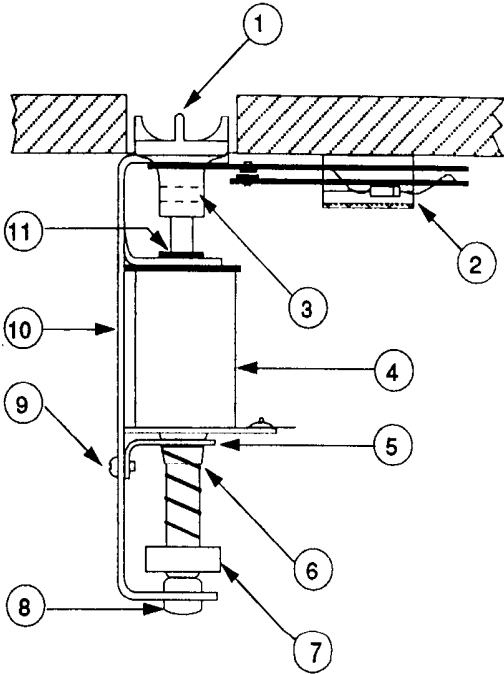


PART NUMBER	CKT DESIGNATION	DESCRIPTION
5768-12368-00		3-Bank Opto Board
5490-10159-00	Opto 1- Opto3	Opto Interruptor, MDL, S/G
5010-08930-00	R1, R3, R5	Resistor, C.F., 470 w, 1/2w, 5%
5010-09162-00	R8	Resistor, C.F., 100Kw, 1/4w, 5%
5010-09324-00	R2, R4, R6	Resistor, C.F., 27Kw, 1/4w, 5%
5010-08774-00	R7	Resistor, C.F., 22Kw, 1/4w, 5%
5043-08980-00	B	Capacitor, .01mfd., +80 -20%
5370-12272-00	U1	I.C., Quad. Comp., LM339
5791-10871-04	J2	Connector, 4-pin Hdr, Sq Pin .156
5791-10871-07	J1	Connector, 7-pin Hdr, Sq Pin .156

Standup Target Assemblies

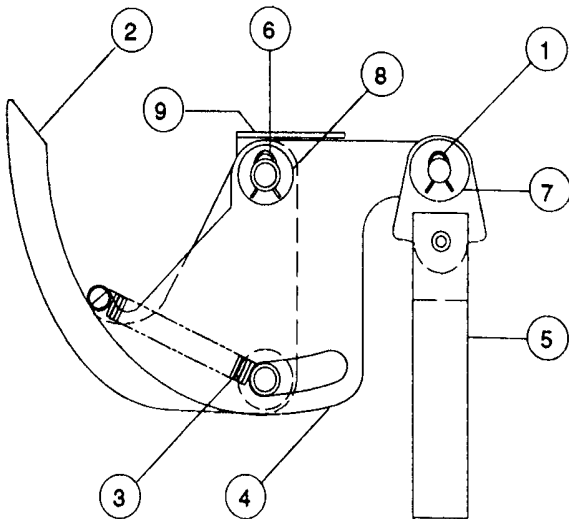
	<p>Round Target B-12879</p> <hr/> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">DESCRIPTION</th> <th style="text-align: left;">PART NUMBER</th> </tr> </thead> <tbody> <tr> <td>Sta. Target Assy ROUND- Complete</td> <td>B-12879</td> </tr> <tr> <td>Sta Target Sw</td> <td>SW-1A-182-17</td> </tr> <tr> <td>Target, Round</td> <td>03-8299</td> </tr> <tr> <td>Diode, 1N4001, 1.0A</td> <td>5070-06258-00</td> </tr> </tbody> </table>	DESCRIPTION	PART NUMBER	Sta. Target Assy ROUND- Complete	B-12879	Sta Target Sw	SW-1A-182-17	Target, Round	03-8299	Diode, 1N4001, 1.0A	5070-06258-00
DESCRIPTION	PART NUMBER										
Sta. Target Assy ROUND- Complete	B-12879										
Sta Target Sw	SW-1A-182-17										
Target, Round	03-8299										
Diode, 1N4001, 1.0A	5070-06258-00										
	<p>Hexagonal Target B-13030</p> <hr/> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">DESCRIPTION</th> <th style="text-align: left;">PART NUMBER</th> </tr> </thead> <tbody> <tr> <td>Sta. Target Assy HEX- Complete</td> <td>B-13030</td> </tr> <tr> <td>Sta Target Sw</td> <td>SW-1A-185-17</td> </tr> <tr> <td>Target, Hex</td> <td>03-8307</td> </tr> <tr> <td>Diode, 1N4001, 1.0A</td> <td>5070-06258-00</td> </tr> </tbody> </table>	DESCRIPTION	PART NUMBER	Sta. Target Assy HEX- Complete	B-13030	Sta Target Sw	SW-1A-185-17	Target, Hex	03-8307	Diode, 1N4001, 1.0A	5070-06258-00
DESCRIPTION	PART NUMBER										
Sta. Target Assy HEX- Complete	B-13030										
Sta Target Sw	SW-1A-185-17										
Target, Hex	03-8307										
Diode, 1N4001, 1.0A	5070-06258-00										
	<p>Rectangular Target B-13031</p> <hr/> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">DESCRIPTION</th> <th style="text-align: left;">PART NUMBER</th> </tr> </thead> <tbody> <tr> <td>Sta. Target Assy RECT. Complete</td> <td>B-12912-12</td> </tr> <tr> <td>Sta Target Sw</td> <td>SW-1A-186-17</td> </tr> <tr> <td>Target, Rectangular</td> <td>03-8308</td> </tr> <tr> <td>Diode, 1N4001, 1.0A</td> <td>5070-06258-00</td> </tr> </tbody> </table>	DESCRIPTION	PART NUMBER	Sta. Target Assy RECT. Complete	B-12912-12	Sta Target Sw	SW-1A-186-17	Target, Rectangular	03-8308	Diode, 1N4001, 1.0A	5070-06258-00
DESCRIPTION	PART NUMBER										
Sta. Target Assy RECT. Complete	B-12912-12										
Sta Target Sw	SW-1A-186-17										
Target, Rectangular	03-8308										
Diode, 1N4001, 1.0A	5070-06258-00										

Ball Popper D-11335-1



ITEM	DESCRIPTION	PART NUMBER
1	Ball Popper Cap	03-8053
2	Switch Assy	A-11657
	Sw. & Diode Assy	A-11658
	Switch Plate	01-3670-1
	Wood Screw, #5x7/8, P-RH	4205-01016-14
3	Dowel Pin, 3/32x1/2	20-9314-7
4	Coil Assembly	AE-24-900
5	Bracket	01-8-508-A
6	Spring	10-135
7	Armature Assy	A-11336
8	Rubber Grommet	23-6420
9	Mach Screw, 8-32x5/16, P-RH	4008-01017-05
10	Popper Brkt Assy	A-11721

Eject Hole Assembly B-9361-R-1



ITEM	DESCRIPTION	PART NUMBER
1	Hair Pin Clip	12-6227
2	Ball Eject Cam Assy	A-7471-R
3	Spring	10-362
4	Spring Plate Assy	A-6949-R
5	Plunger Assy	A-8050-1
a)	Coil Plunger	02-3407-2
b)	Roll Pin	20-8716-5
c)	Armature Link	03-8085
6	Hair Pin Clip	12-6227
7	Washer, 1/2o.d. x 17/64i.d. x 15 ga.	4700-00030-00
8	Washer, 1/2o.d. x 17/64i.d. x 28 ga.	4700-00103-00
9	Mounting Brkt Assy	A-8268

Associated Coil & Bracket Assembly B-9362-R-1

Flip Up Targets

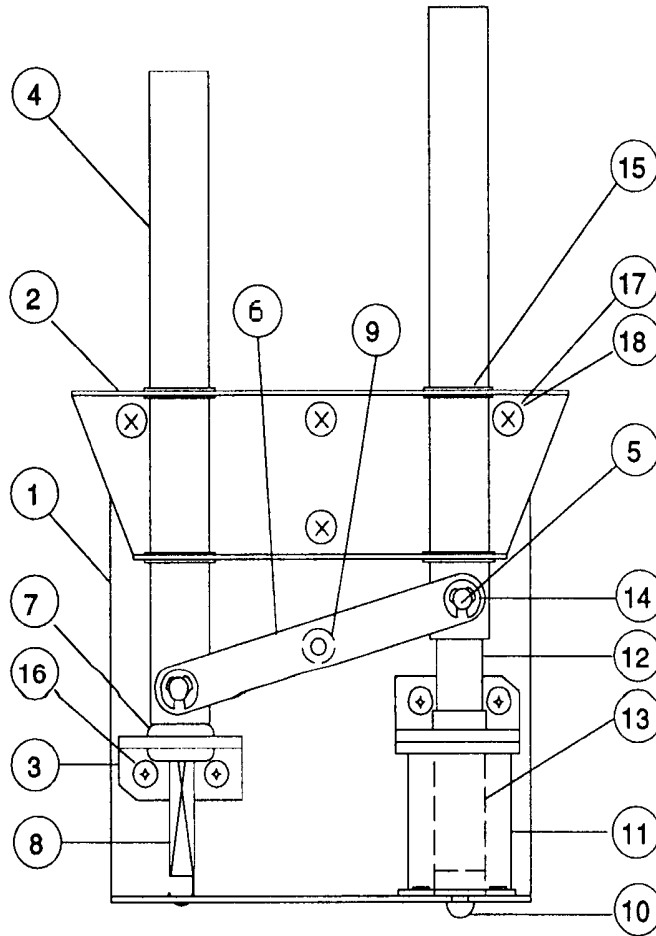
	Flip Up Targets Assembly	C-12922																														
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3	Switch	5674-12073-30																														
4	Switch Bracket	01-8774																														
5	Mach. Screw, 6-32 x 3/16	4006-01003-03																														
6	Bottom Target	01-9275																														
7	Retaining "E" Ring	20A-8712-14																														

	Plastic Cover	03-8322																														

	Flip Up Reset Coil Assembly	B-12916																											
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">ITEM</th> <th style="text-align: left;">DESCRIPTION</th> <th style="text-align: left;">PART NUMBER</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Bell Armature Assy</td> <td>A-6306-1</td> </tr> <tr> <td>2</td> <td>Coil Assy</td> <td>AE-26-1200</td> </tr> <tr> <td>3</td> <td>Kicker Mounting Bracket Assy</td> <td>B-12917</td> </tr> <tr> <td>4</td> <td>Coil Retaining Brkt</td> <td>01-8-508-T</td> </tr> <tr> <td>5</td> <td>Coil Tubing</td> <td>03-7067-2</td> </tr> <tr> <td>6</td> <td>Coil Plunger Spring</td> <td>10-135</td> </tr> <tr> <td>7</td> <td>Rubber Grommet</td> <td>23-6313-1</td> </tr> <tr> <td>8</td> <td>Mach. Screw, 8-32 x 5/16, P-RH-S</td> <td>4008-01017-05</td> </tr> </tbody> </table>	ITEM	DESCRIPTION	PART NUMBER	1	Bell Armature Assy	A-6306-1	2	Coil Assy	AE-26-1200	3	Kicker Mounting Bracket Assy	B-12917	4	Coil Retaining Brkt	01-8-508-T	5	Coil Tubing	03-7067-2	6	Coil Plunger Spring	10-135	7	Rubber Grommet	23-6313-1	8	Mach. Screw, 8-32 x 5/16, P-RH-S	4008-01017-05	
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7	Rubber Grommet	23-6313-1																											
8	Mach. Screw, 8-32 x 5/16, P-RH-S	4008-01017-05																											

	Standup Target Assembly	B-11696-4															
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">ITEM</th> <th style="text-align: left;">DESCRIPTION</th> <th style="text-align: left;">PART NUMBER</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Standup Target Assy Complete</td> <td>B-11696-4</td> </tr> <tr> <td>2</td> <td>Standup Target Sw</td> <td>SW-1A-170-4</td> </tr> <tr> <td>3</td> <td>Standup Target, Red</td> <td>03-8093-4</td> </tr> <tr> <td>4</td> <td>Diode, 1N4001 1.0A</td> <td>5070-06258-00</td> </tr> </tbody> </table>	ITEM	DESCRIPTION	PART NUMBER	1	Standup Target Assy Complete	B-11696-4	2	Standup Target Sw	SW-1A-170-4	3	Standup Target, Red	03-8093-4	4	Diode, 1N4001 1.0A	5070-06258-00	
ITEM	DESCRIPTION	PART NUMBER															
1	Standup Target Assy Complete	B-11696-4															
2	Standup Target Sw	SW-1A-170-4															
3	Standup Target, Red	03-8093-4															
4	Diode, 1N4001 1.0A	5070-06258-00															

Boogie Monsters Assembly C-12920



ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1	Coil Bracket Assy	B-12921	11	Coil Assembly	AE-26-1200
2	U-Bracket, Shaft	01-9272	12	Plunger	02-4386
3	Coil Support Brkt	01-8531-2	13	Coil Tubing	03-7067-2
4	Shaft, 5/8 o.d.x5-5/16L	02-4396	14	Retaining "E" Ring	20-8712-1
5	Pivot Pin	02-4385	15	5/8 x .078 Nyliner	20-9624
6	Rocker Link	01-9273	16	Machine Screw, 6-32 x .31 L, P-PH	4006-01003-05
7	Rubber Grommet	23-6640	17	TCS, P-PH 8-32 x 5/16	4108-01010-05
8	Extension Spring	10-408	18	Split Lock Washer #8	4701-00003-00
9	Post	02-4387			
10	Not Used	----			

ASSOCIATED PARTS:

Rubber Boogie Man Attachment.....Part no. 23-6639

NOTE:

Please note that, if you order additional rubber Boogie Men, you may not receive exact replicas of the ones that came with your game.

Playfield Ramp Assemblies

Right Ramp Assy (Monster Slide Return)

D-13006

DESCRIPTION	PART NUMBER
Switch & Diode Assy	A-12556
Switch Bracket	01-8774
Microswitch	5647-12073-21
Ramp Support Brckt	01-9369
R-Return Ramp	03-8293
Rivet	07-6688-19N
Ramp Decal	31-1515-2011-2
Ramp Decal	31-1515-2011-3
Ramp Decal	31-1515-2011-6
Ramp Decal	31-1515-2011-8
Mach. Screw, #2-56x3/8 P-PH	4002-01005-06
LW #2 Split	4701-00024-00

Left Ramp Assy (Monster Slide Entrance)

D-13007

DESCRIPTION	PART NUMBER
Switch Gate Assy	A-13068
Switch Gate Bracket	01-9345
Switch Wireform	12-6796
Sub-mini Switch Assy	A-12239
Sub-mini Microswitch	5647-12073-11
Left Ramp End Cable	H-13074
Switch Bracket	01-8774
Ramp Flap	01-9380
Left Ramp	03-8296
Rivet-Nickel Plate	07-6688-17N
Rivet	07-6688-19N
Mach. Screw, #2-56x3/8 P-PH	4002-01005-06
Mach. Screw, #6-32x3/8 P-RWH	4006-01027-06
Flat Washer, .125x.281x.032	4700-00003-00

Right Ramp Assy (Party Punch Entrance)

D-13008

DESCRIPTION	PART NUMBER
Switch Gate Assy	A-13068
Switch Gate Bracket	01-9345
Switch Wireform	12-6796

Release Ramp Assy

B-13011

DESCRIPTION	PART NUMBER
Metal Ramp	01-9306
Rivet, 1/8" x 3/16"	07-6697-4
Spade Bolt	20-9284

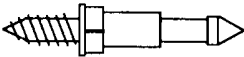
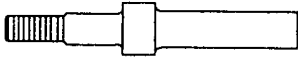
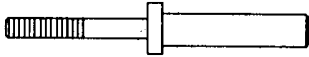
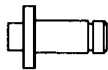




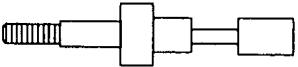
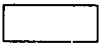
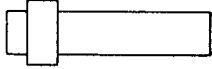
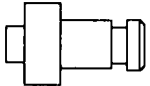
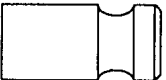
Skull Bracket and Lights Assembly B-13069

DESCRIPTION	PART NUMBER	DESCRIPTION	PART NUMBER
Light Socket Assy	A-8449	Skull Light Bracket	01-9347
Diode, 1N4001, 1.0A	5070-06258-00	Light Bulb Sleeve, Green	03-8063-2
Socket & Lamp Assy	A-9302	Nut, 6-32 ESN	4406-01119-00
Skull Lamps Cable	H-13077		
Skull Light Bracket	01-9347	Skull, Painted*	31-1517-2011




*Vacuum Formed Skull is not included as part of the B-13069 assembly.

Metal and Plastic Posts

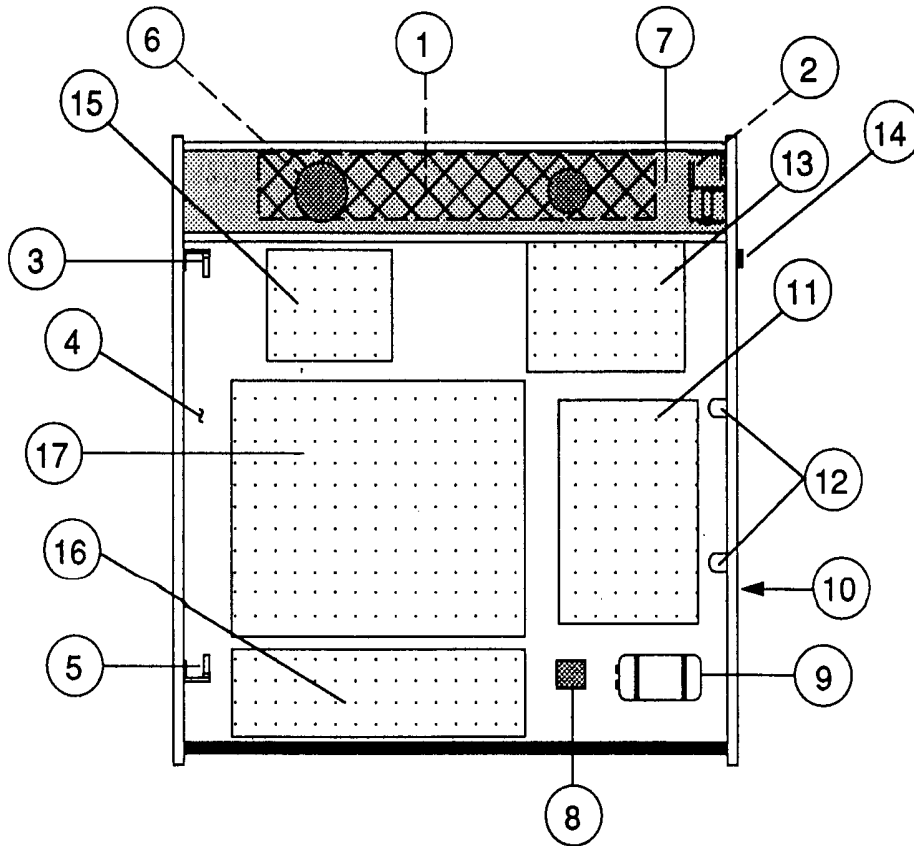
Metal Posts

DESCRIPITON	PART NUMBER	NAME [QUANTITY]
	02-3905	Bumper Post [5]
	02-4036	Rubber Bumper Post [7]
	02-4057	Post [1]
	02-4271-1	Post [2]
	02-4271-2	Post [3]
	02-4271-3	Post [1]
	02-4275-1	Mtg Post, 3-1/2" [1]
	02-4275-2	Mtg Post, 3-3/8" [1]
	02-4008	Rubber Bumper Post [1]
	02-4020	Support Post [3]
	02-3409	Spring Post [2]
	02-4408	Playfield Post, 7/8" [2]
	02-4387	Post, L=1-1/8" [2]

Plastic Posts

		
03-8279-9	03-8269-9	03-7542-9
Plastic Post [23]	Plastic Post [12]	Plastic Post [4]

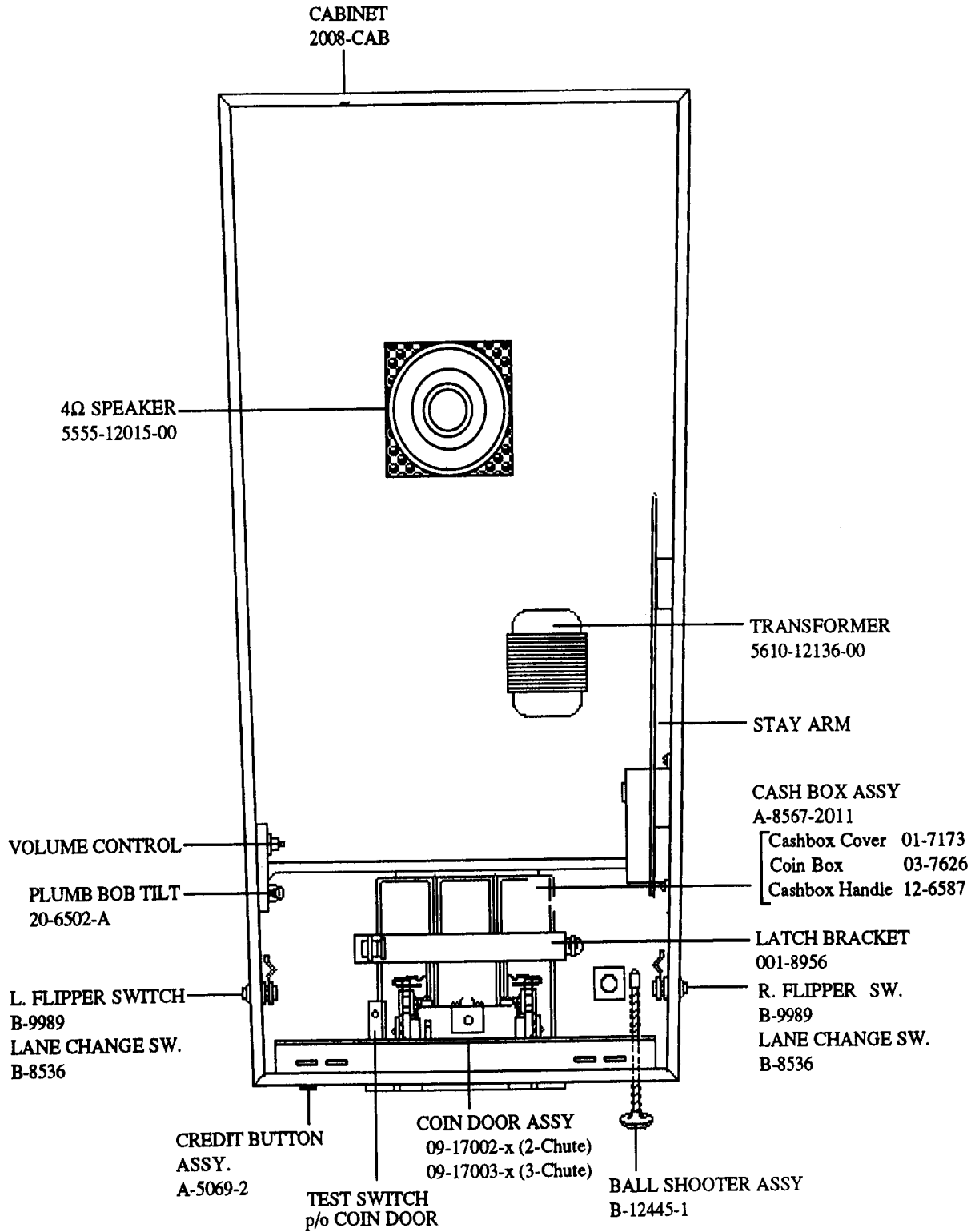
ELVIRA Backbox Parts



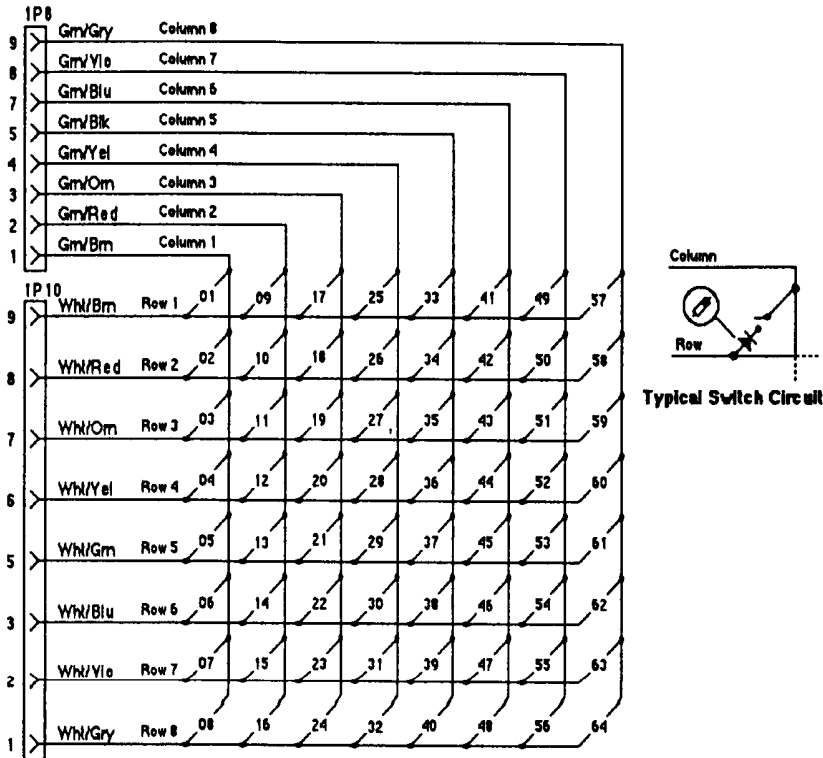
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1	Venting Screen	01-6645-3	10	ELVIRA Backbox	A-11-904-2011
2	Knocker & Bracket Assy	B-10686-1*	11	Aux Power Driver Bd	D-12247-566
3	Upper Insert Bd Hinge	A-12497	12	Insert Stop Bracket	01-9047
4	P.C.B. Plate Assembly	D-12771	13	Power Supply Assembly	D-12246*
5	Lower Insert Bd Hinge	A-12498	14	Cam Lock, 3/4"D x 27/32"L	01-9358
6	Speaker Panel Assy	B-12437-2	15	Audio Board Assembly	D-11581-2011*
a)	4" Piezo Spkr, 50W	5555-12068-00	16	B/box Interconnect Bd	D-12313-2011
7	Spkr Grille/Logo Assy	B-12074	17	System 11B CPU Bd	D-11883-2011
a)	Grille, Speaker	01-8996	18*	Bally Insert Assembly	2011-IN
b)	Bally Logo	31-1493	a)	Bally Right Display Bd	D-12502-1
8	Bridge Rectifier, 100v, 35A	5100-09418-00	b)	Bally Left Display Bd	D-12706
9	Capacitor, 30K uFd, 25v	5040-09051-00	c)	Drop Mount Relay	C-11998-1

*Bally Insert Assembly not shown in Backbox Parts Location Diagram.

ELVIRA Cabinet Parts



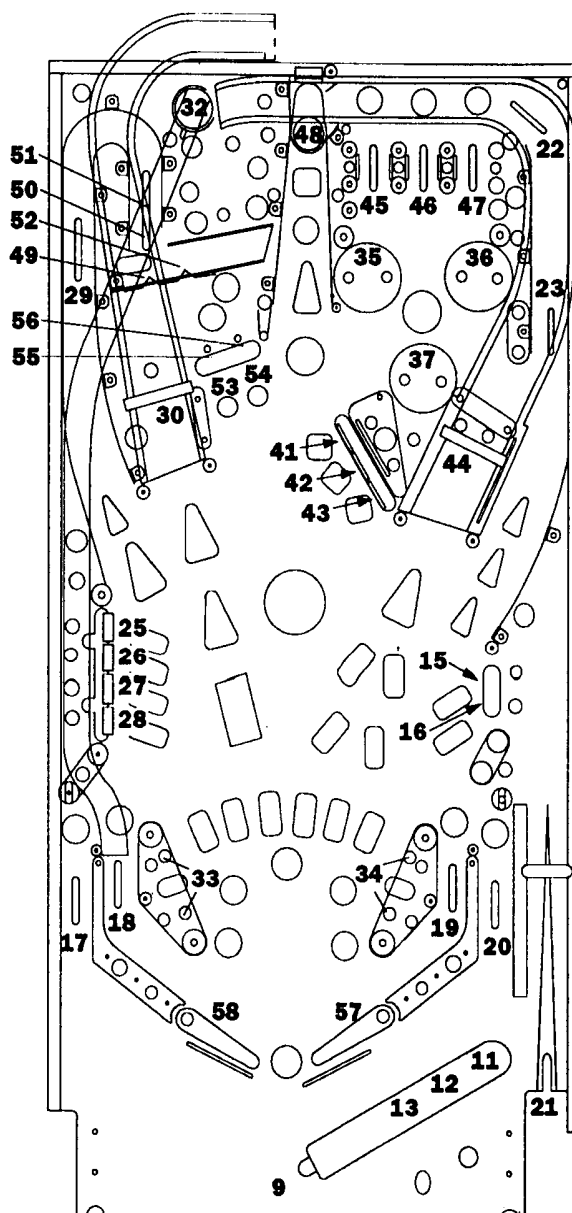
Switch Wiring Diagram & Matrix



column	1 Q45	2 Q49	3 Q44	4 Q48	5 Q43	6 Q47	7 Q42	8 Q46
row	GRN-BRN IJS-1	GRN-RED IJS-2	GRN-ORN IJS-3	GRN-YEL IJS-4	GRN-BLK IJS-5	GRN-BLU IJS-7	GRN-VIO IJS-8	GRN-GRY IJS-9
1 WHT-BRN IJS-9	Plumb Bob Tilt 1	Outhole 9	Left Outlane 17	Left Standup Target 1 25	Left Slingshot 33	Left Drop Target 41	Lock 1 49	Right Flipper 57
2 WHT-RED IJS-8	A/C Relay Position 2	10	Left Return Lane 18	Left Standup Target 2 26	Right Slingshot 34	Center Drop Target 42	Lock 2 50	Left Flipper 58
3 WHT-ORN IJS-7	Credit Button 3	Trough Sw. 1 Right 11	Right Return Lane 19	Left Standup Target 3 27	Left Thumper Bumper 35	Right Drop Target 43	Lock 3 51	59
4 WHT-YEL IJS-6	Right Coin 4	Trough Sw. 2 Center 12	Right Outlane 20	Left Standup Target 4 28	Right Thumper Bumper 36	Right Ramp Entry 44	Lock Safety 52	60
5 WHT-GRN IJS-5	Center Coin 5	Trough Sw. 3 Left 13	Ball Shooter 21	Lock Entry 29	Bottom Bumper 37	B 45	Flip Up Target 1 53	61
6 WHT-BLU IJS-3	Left Coin 6	14	Top Right Rollover 22	Left Ramp Entry 30	38	A 46	Flip Up Target 2 54	62
7 WHT-VIO IJS-2	Slam Tilt 7	Right Standup 1 15	Right Side Rollunder 23	Left Ramp End 31	39	T 47	Flip Up 1 Open 55	63
8 WHT-GRY IJS-1	High Score Reset 8	Right Standup 2 16	24	Ball Popper 32	40	Eject Hole 48	Flip Up 2 Open 56	64

Switch Location Diagram

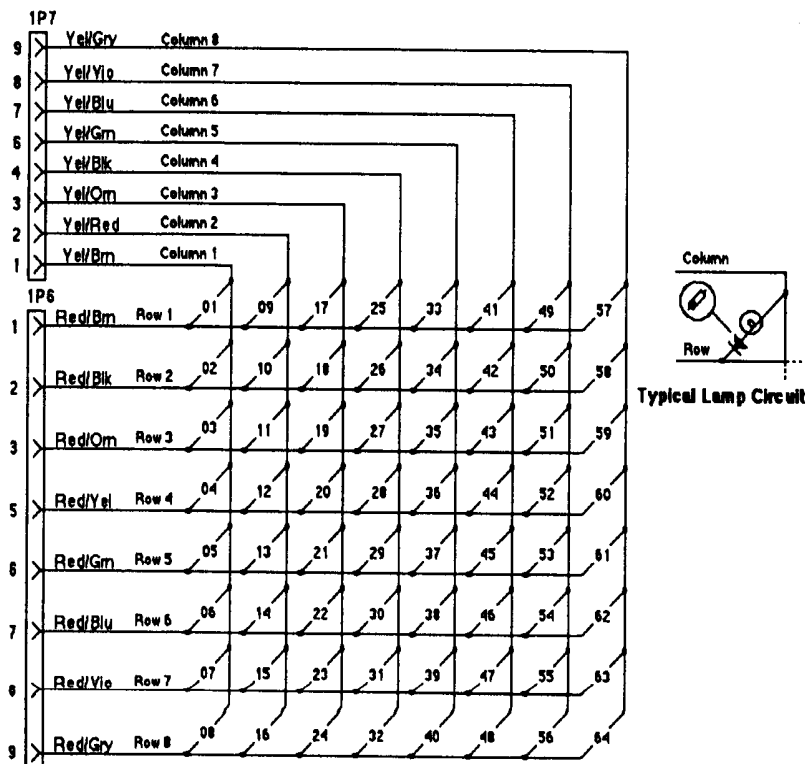
ITEM	DESCRIPTION	PART NUMBER
1	Plumb Bob Tilt	--
2	A/C Relay Select	No part number
3	Credit Button	SW-1A-126
4	Right Coin Sw	27-1092
5	Center Coin Sw	Not Used (USA)
6	Left Coin Sw	27-1092
7	Slam Tilt	27-1066
8	High Score Reset	27-1008*
9	Outhole	5647-12133-12
10	Not Used	--
11	Trough 1, Right	5647-12073-08
12	Trough 2, Middle	5647-09957-00
13	Trough 3, Left	5647-09957-00
14	Not Used	--
15	Right Standup #1	SW-1A-185-17
16	Right Standup #2	SW-1A-185-17
17	Left Outlane	5647-12073-19
18	Left Return	5647-12073-19
19	Right Return	5647-12073-19
20	Right Outlane	5647-12073-19
21	Shooter Lane	5647-12073-04
22	Top Right Rollover	5647-12073-19
23	Right Side Rollunder	5647-12073-19
24	Not Used	--
25	Left Standup #1	SW-1A-186-17
26	Left Standup #2	SW-1A-182-17
27	Left Standup #3	SW-1A-186-17
28	Left Standup #4	SW-1A-182-17
29	Lock Entry	5647-12073-19
30	Left Ramp Entry	A-13068
31	Left Ramp End	5647-12073-11
32	Ball Popper	A-11657
33	Left Slingshot***	--
34	Right Slingshot***	--
35	Left Bumper	p/o C-12872
36	Right Bumper	p/o C-12872
37	Bottom Bumper	p/o C-12872
38-40	Not Used	--
41	Left Drop Target "J"	p/o C-12559
42	Center Drop Target "A"	p/o C-12559
43	Right Drop Target "M"	p/o C-12559
44	Right Ramp Entry	A-13068
45	"B" Lane	5647-12073-19
46	"A" Lane	5647-12073-19
47	"T" Lane	5647-12073-19
48	Eject Hole	5647-12133-11
49	Lock 1	5647-12073-27
50	Lock 2	5647-12073-28
51	Lock 3	5647-12073-26
52	Lock Safety	5647-12073-25
53	Flip Up Target #1	SW-1A-170-4
54	Flip Up Target #2	SW-1A-170-4
55	Flip Up #1 Open	5647-12073-30
56	Flip Up #2 Open	5647-12073-30



ITEM	DESCRIPTION	PART NUMBER
57	Right Flipper	--
58	Left Flipper	--
59-64	Not Used	--

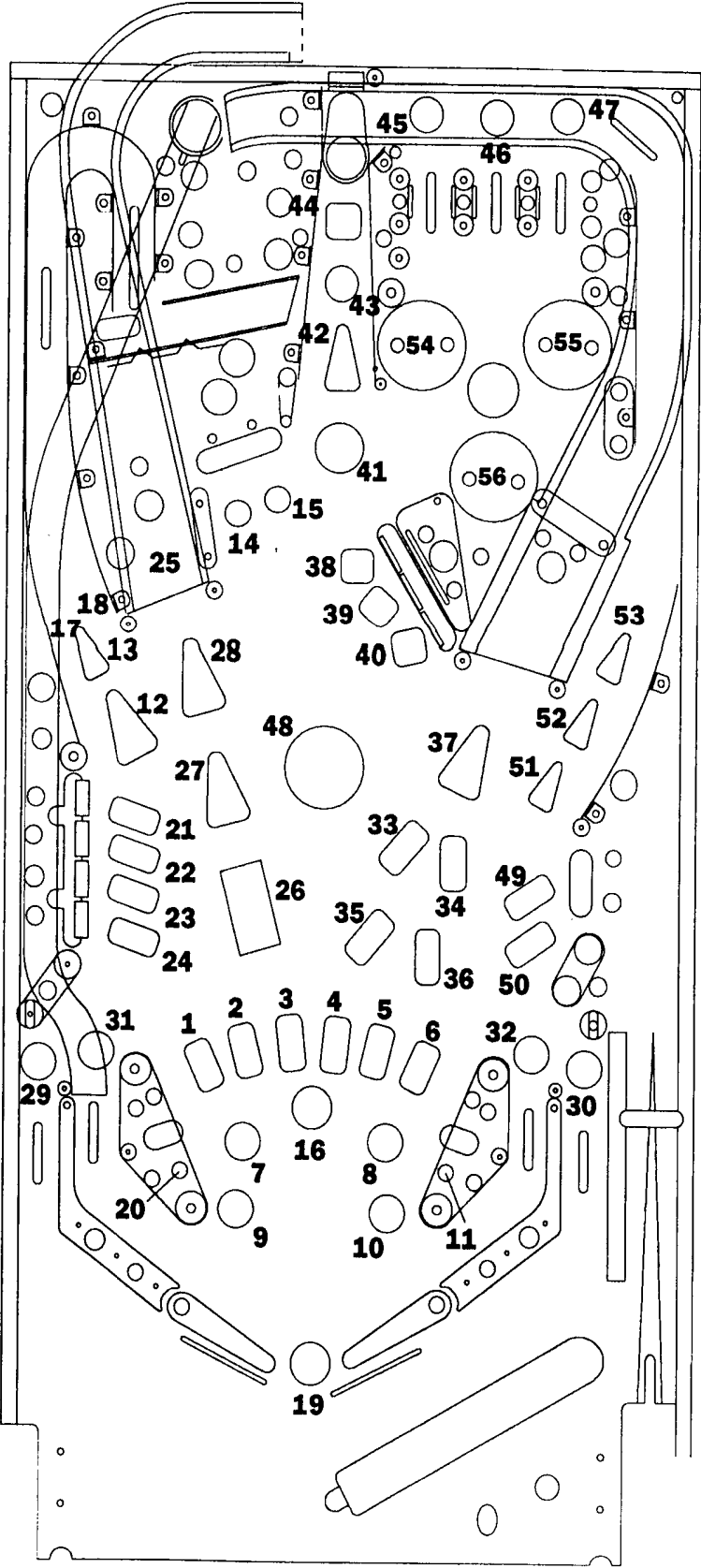
Notes:
 *P/N for entire Diagnostic Switch Assembly, including High Score Reset Switch.
 **Optotransistor on Backbox Interconnect Board.
 ***Paired Kicker Actuating Sw: B-12459; B-12715

Lamp Wiring Diagram & Matrix



column	1 Q86	2 Q84	3 Q82	4 Q80	5 Q58	6 Q56	7 Q54	8 Q52
row	YEL-BRN 1J6-1	YEL-RED 1J7-2	YEL-ORN 1J7-3	YEL-BLK 1J7-4	YEL-GRN 1J7-6	YEL-BLU 1J7-7	YEL-VIO 1J7-8	YEL-GRY 1J7-9
1 Q80 RED-BRN 1J6-1	E 1	4X 9	Eye 1 17	Left Ramp Sign 25	Right Ramp Potton 1 33	Hold Bonus 41	Pizza Standup 1 49	Dead Head 1 57
2 Q81 RED-BLK 1J6-2	L 2	5X 10	Eye 2 18	Left Ramp Spots Elev 26	Right Ramp Potton 2 34	Million 42	Pizza Standup 2 50	Dead Head 2 58
3 Q82 RED-ORN 1J6-3	V 3	Left Slingshot 11	Shoot Again 19	Left Ramp Million 27	Right Ramp Potton 3 35	Barbeque 43	Pizza Passage 1 51	Dead Head 3 59
4 Q83 RED-YEL 1J6-5	I 4	3 Million 12	Right Slingshot 20	Left Ramp Special 28	Right Ramp Potton 4 36	Boogle 44	Pizza Passage 2 52	Barbeque 1 60
5 Q84 RED-GRN 1J6-6	R 5	Lock 13	Dead Head 1T 21	Left Outlane 29	Right Ramp Extra Ball 37	B 45	Pizza Passage 3 53	Barbeque 2 61
6 Q85 RED-BLU 1J6-7	A 6	Left Flip Up 14	Dead Head 2T 22	Right Outlane 30	J 38	A 46	Left Thumper Bumper 54	Barbeque 3 62
7 Q86 RED-VIO 1J6-8	2X 7	Right Flip Up 15	Dead Head 3T 23	Left Return Lane 31	A 39	T 47	Right Thumper Bumper 55	Barbeque 4 63
8 Q87 RED-GRY 1J6-9	3X 8	Bonus Held 16	Dead Head 4T 24	Right Return Lane 32	M 40	Center Jackpot 48	Bottom Thumper 56	Barbeque 5 64

Lamp Location Diagram



Unique Parts List

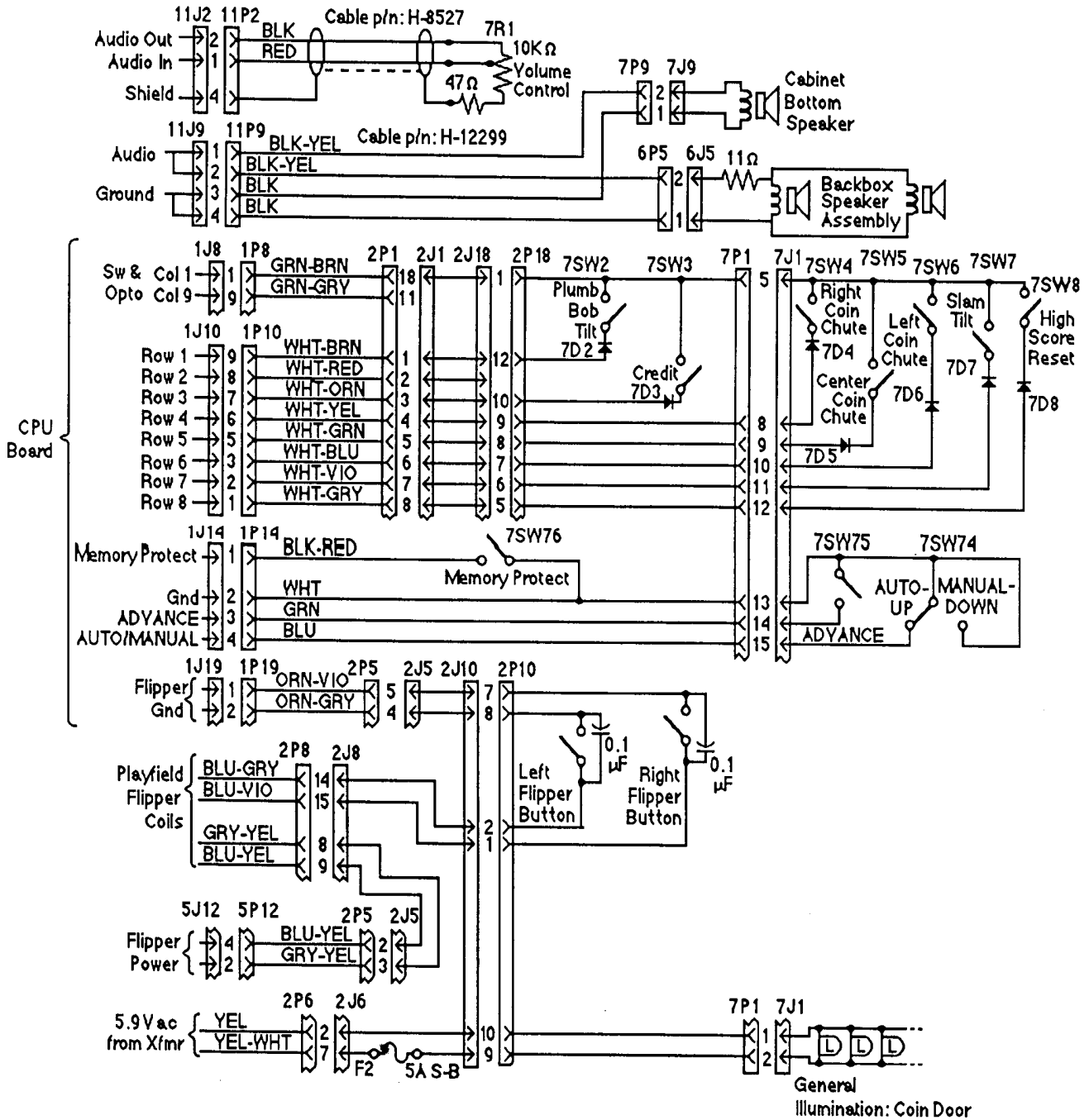
DESCRIPTION	PART NUMBER	DESCRIPTION	PART NUMBER
Rebound Ring Assembly	A-12841	Rebound Ring	01-9267
Ball Guide Assy	A-13049	"U" Bracket Shaft	01-9272
Switch Gate Assy	A-13068	Rocker Link	01-9272
Ball Gate Assy	A-13100	Impact Target Bottom	01-9275
Back Glass Assy	A-8552-2011	Bracket, Ramp Support	01-9302
		Switch Gate Bracket	01-9345
		Backpanel Bracket	01-9346
		Skull Light Bracket	01-9347
Standup Target Assy	B-12879		
Reset Mechanism Assy	B-12916		
R. Flipper Ball Guide	B-12918		
L. Flipper Ball Guide	B-12919	Playfield Mylar	03-7960-2011
Bracket & Post Assy	B-12921		
Ball Guide & Sw. Assy	B-13009		
Ramp Assy	B-13011	Rubber Boogle Man	23-6639
Hex Standup Target Assy	B-13030		
Rect. Standup Target Assy	B-13031		
Ball Guide Assy	B-13050	Screened Playfield	31-1002-2011
Ball Guide Assy	B-13051	Screened Plastic Complete	31-1006-2011
Ball Guide Assy	B-13052	Screened Plastic Sheet	31-1006A-2011
Ball Guide Assy	B-13053	Screened Bottom Arch	31-1008-2011
Skull & Lights Assy	B-13069	Screened Shooter Gauge	31-1009-2011
		Screened Backglass	31-1357-2011
		Tombstone Target Decals	31-1464-2011-1
Thumper Bumper Assy	C-12842	Tombstone Target Decals	31-1464-2011-2
Boogle Men Assy	C-12920	Tombstone Target Decals	31-1464-2011-3
Flip Up Target Assy	C-12922	Tombstone Target Decals	31-1464-2011-4
Ball Guide Assy	C-13054	Tombstone Target Decals	31-1464-2011-5
Ball Guide Assy	C-13055	Tombstone Target Decals	31-1464-2011-6
		Backboard Screened	31-1475-2011
		Deadhead Illuminated	31-1511-2011
Right Ramp Assy	D-13006	Flip-Up Target Decals	31-1512-2011-1
Left Ramp Assy	D-13007	Flip-Up Target Decals	31-1512-2011-2
Right Ramp Assy-Popper	D-13008	Flip-Up Target Decals	31-1512-2011-3
Ball Guide Assy	D-13056	Flip-Up Target Decals	31-1512-2011-4
		Flip-Up Target Decals	31-1512-2011-5
		Flip-Up Target Decals	31-1512-2011-6
		Flip-Up Target Decals	31-1512-2011-7
Main Backbox Cable	H-12190-2011		
Playfield Sw Cable	H-13062		
Playfield Lamp Cable	H-13064		
Playfield Solenoid Cable	H-13063		
Flip Up Mechanism Cable	H-13070		
Insert Cable	H-13071		
Left Ramp Entrance Cable	H-13072		
Lock Mechanism Cable	H-13073		
Left Ramp End Cable	H-13074		
Right Ramp Entrance Cable	H-13075		
Skull Lamps Cable	H-13077		

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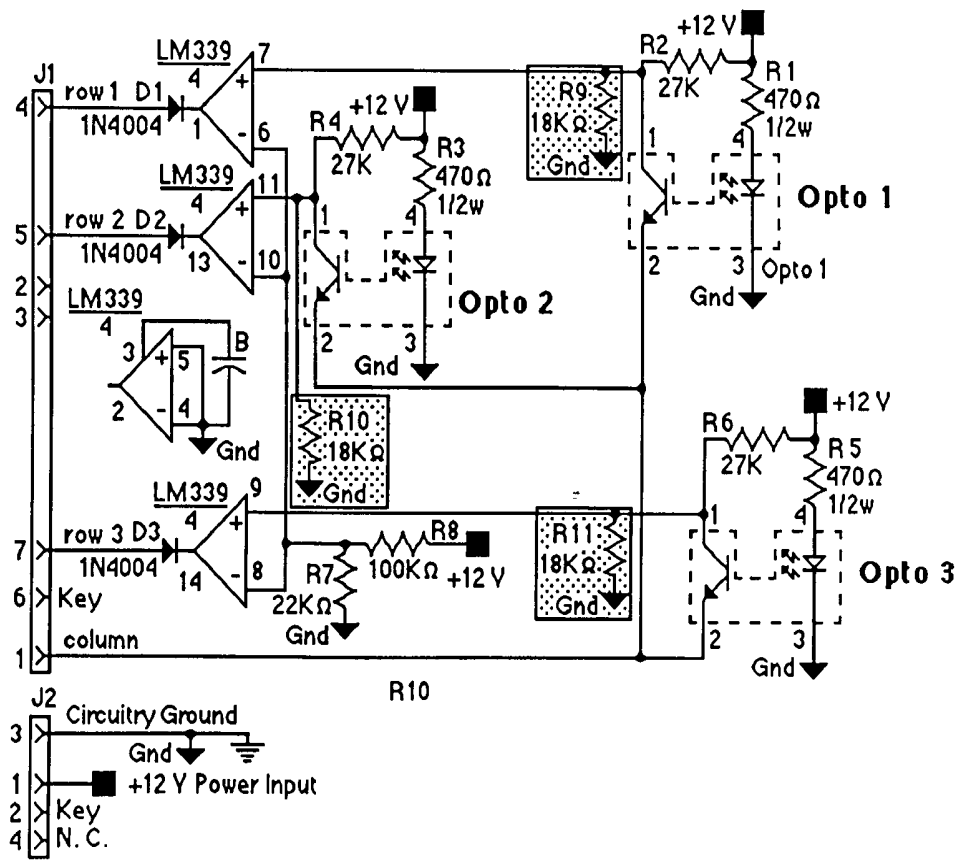
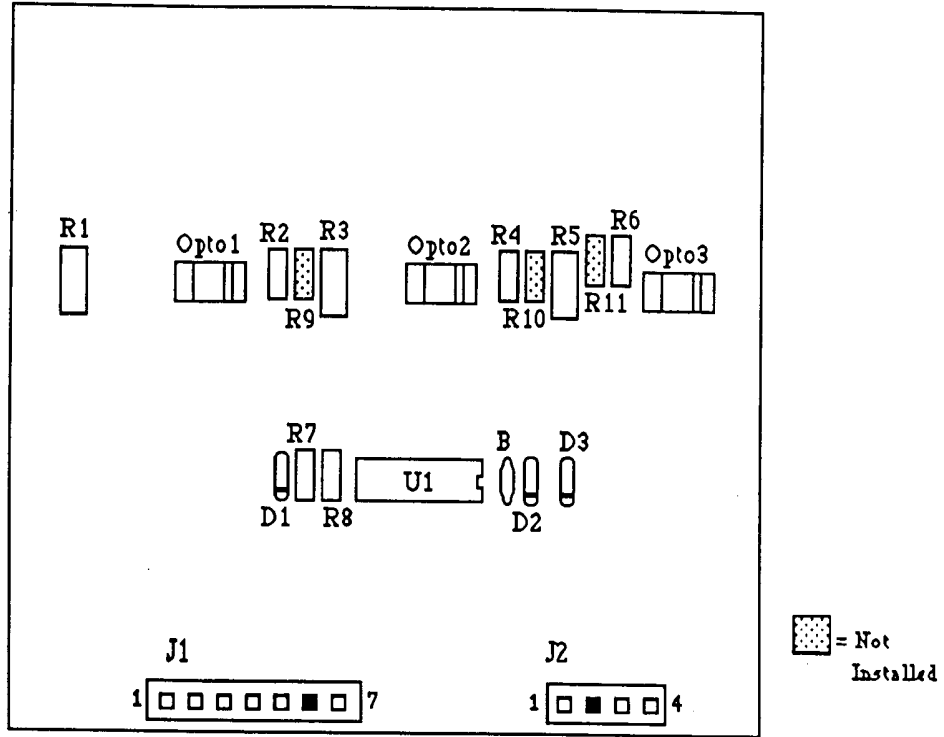
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*Reference Diagrams
and
Schematics*

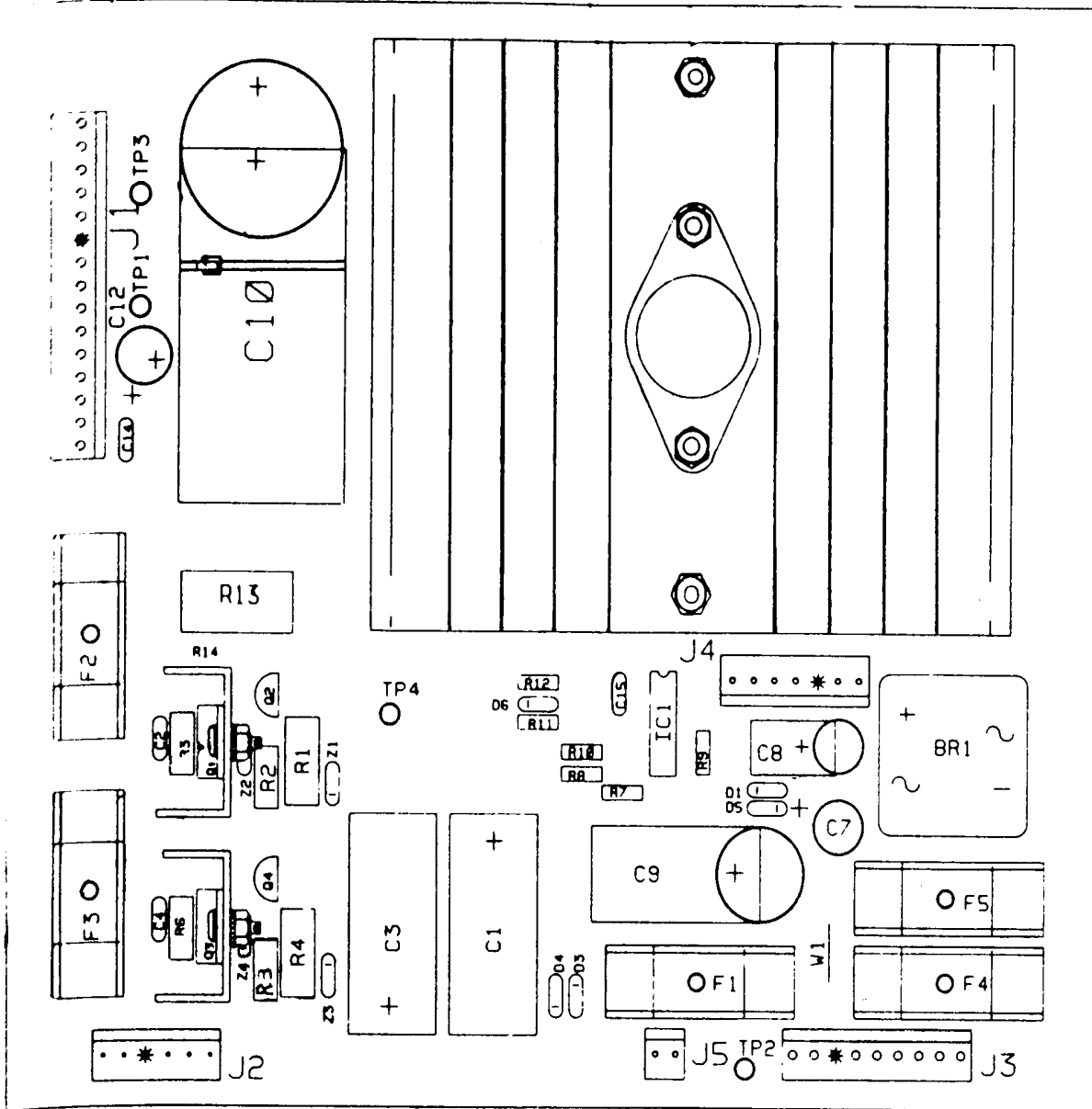
ELVIRA Cabinet Wiring



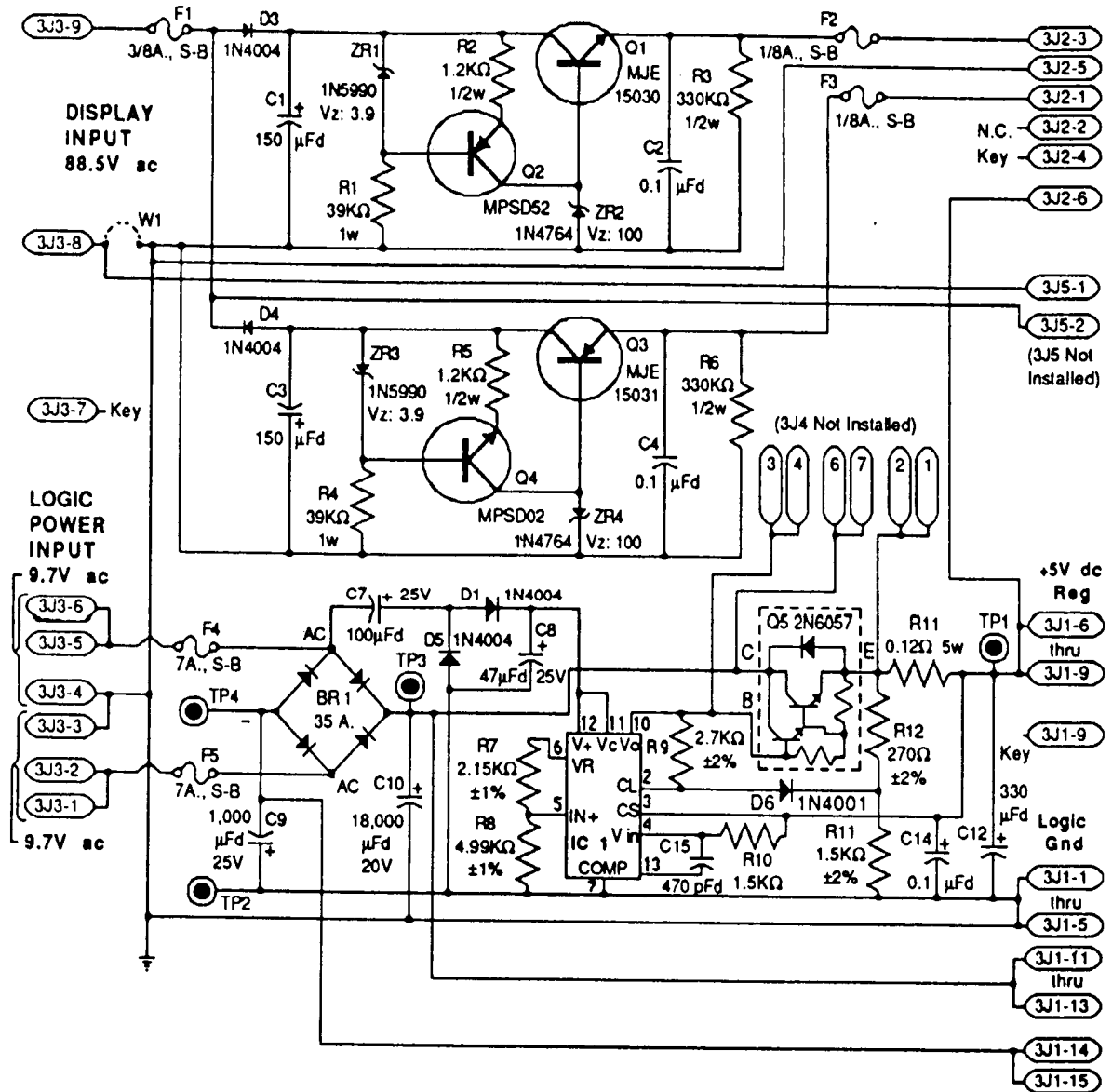
3-Bank Opto Board Assembly & Schematic C-12559



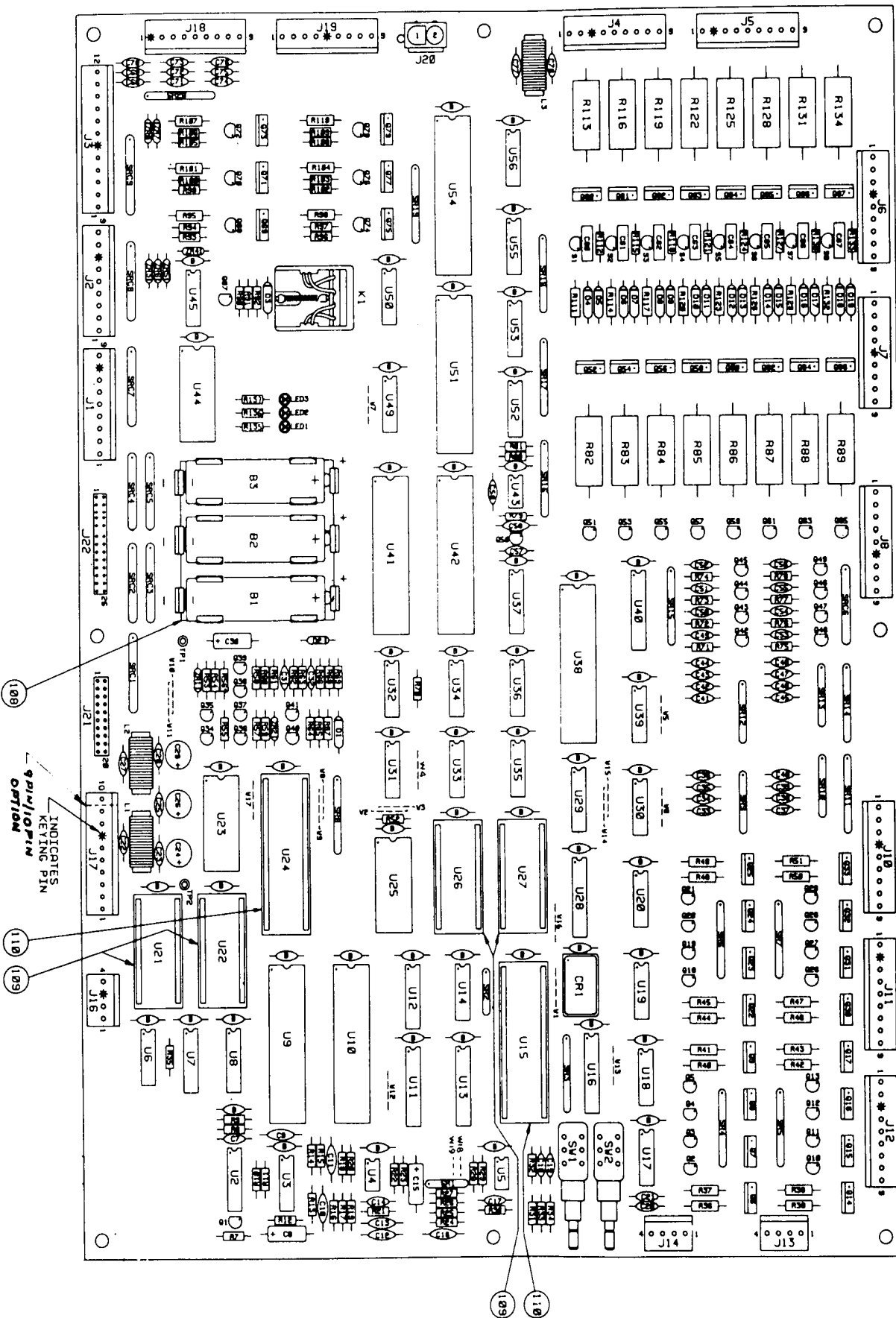
Power Supply Board D-12246

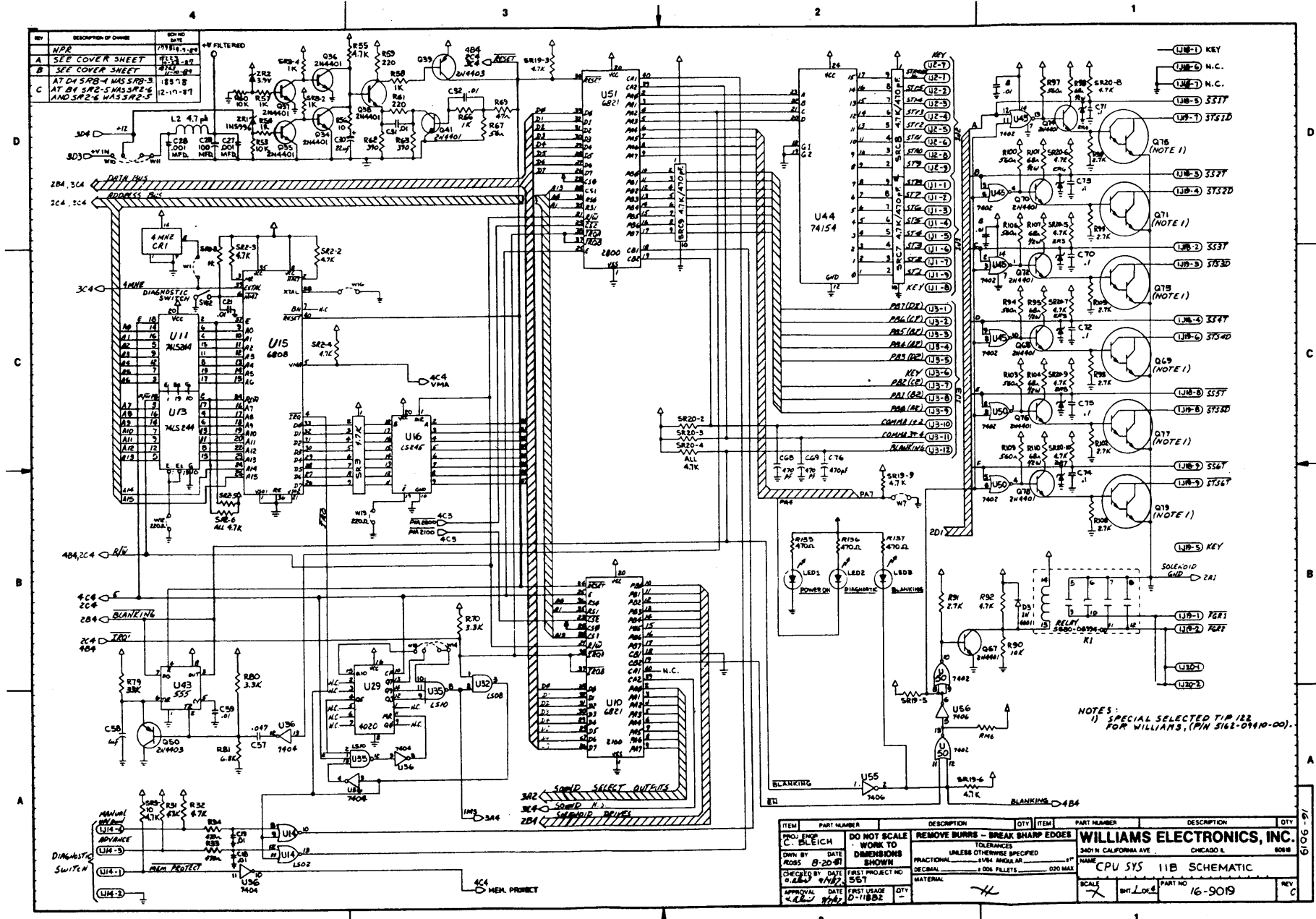


Power Supply Board Schematic



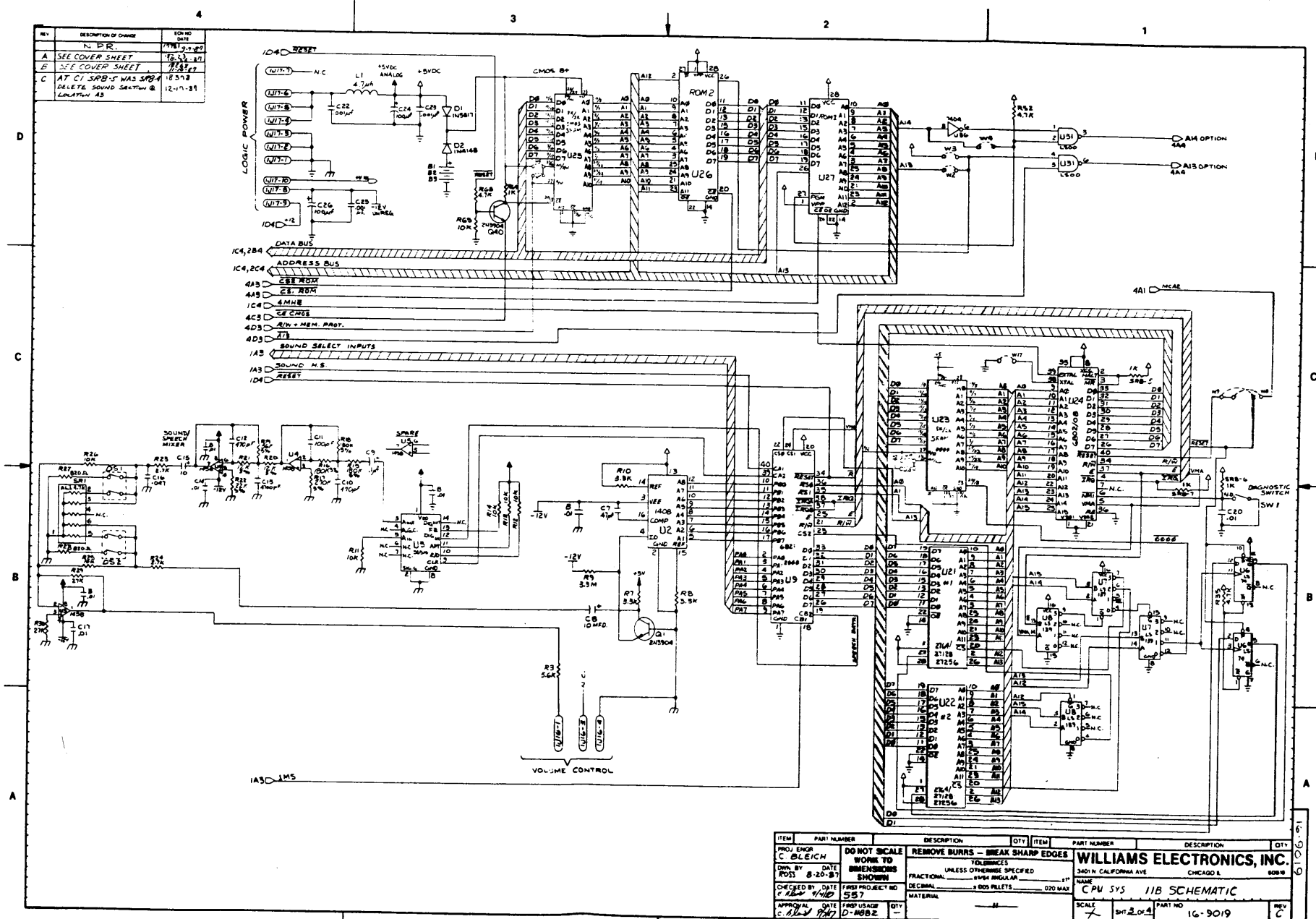
System 11B CPU Board D-11883





ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ. ENG. C. BLEICH		DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS - BREAK SHARP EDGES		UNLESS OTHERWISE SPECIFIED	
DRW. BY DATE ROSS 8-20-81		FRACTIONAL 1/64 ANGULAR DECIMAL 1/64 FLETS 020 MAX					
CHECKED BY DATE 0.2.81 9/1/81		FIRST PROJECT NO 557					
APPROVAL DATE 4-2-81 8/1/81		FIRST ISSUE D-1188Z					
WILLIAMS ELECTRONICS, INC.				2401 N. CALIFORNIA AVE. CHICAGO I. 60618			
NAME CPU SYS 11B SCHEMATIC				SCALE 1/8" = 1"			
PART NO 16-9019				REV. C			

System 11B CPU Schematic (16-9019, Sheet 1 of 4)

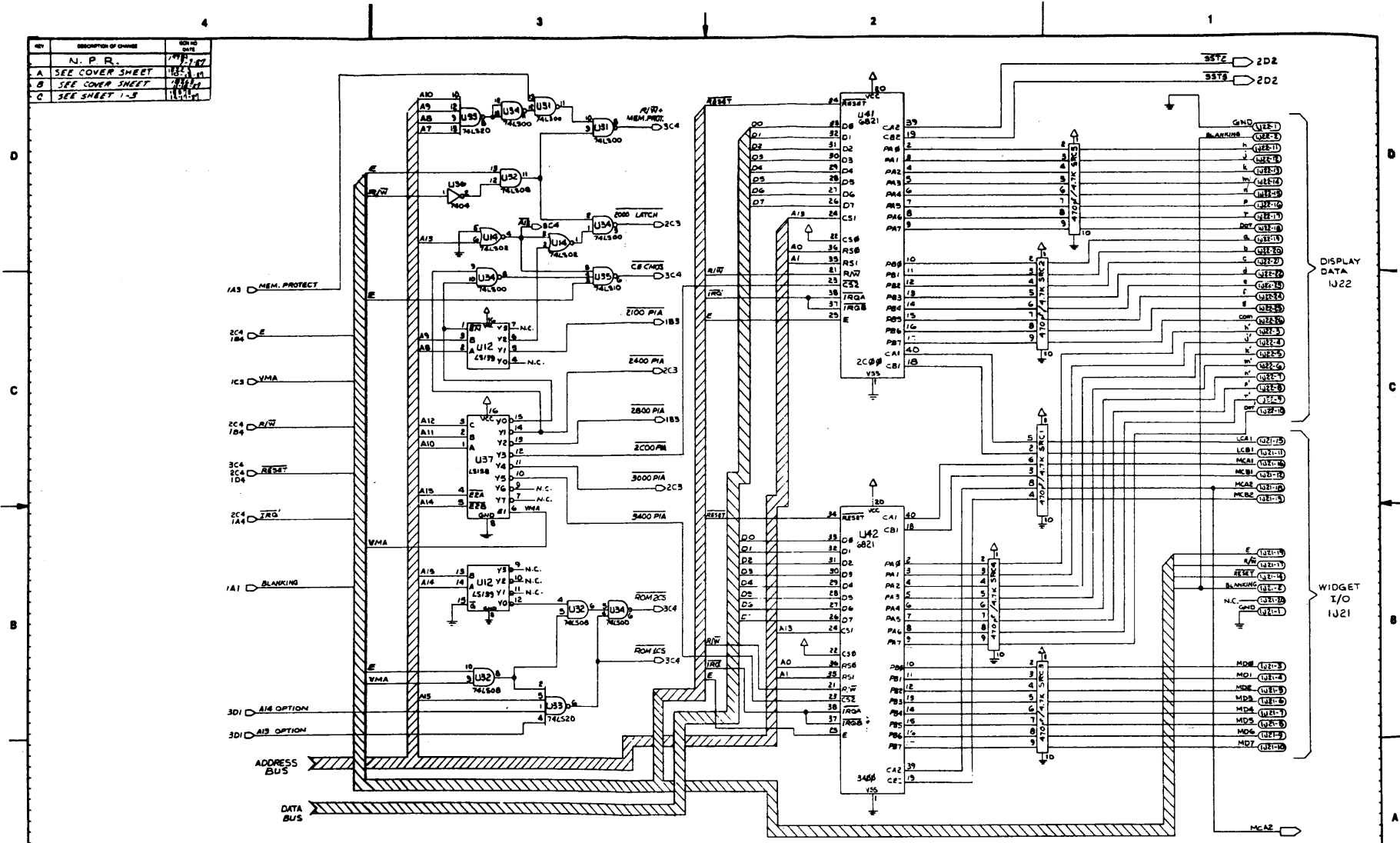


REV	DESCRIPTION OF CHANGE	FORM NO
N	ERR	16-9019-3-92
A	SEE COVER SHEET	16-9019-3-92
B	SEE COVER SHEET	16-9019-3-92
C	AT CI SRB-F WAS SRB-A DELETE SOUND SECTION & LOCATIONS AS	16-9019-3-92 12-11-81

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
<p>PROJ ENGR C BLEICH</p> <p>DO NOT SCALE WORK TO DIMENSIONS SHOWN</p> <p>REMOVE BURRS - BREAK SHARP EDGES</p> <p>UNLESS OTHERWISE SPECIFIED</p> <p>FRACTIONAL: 1/16" ANGULAR</p> <p>DECIMAL: 2 DIGIT PILETS</p> <p>CHECKED BY DATE C. BLEICH 8-20-81</p> <p>APPROVAL DATE C. BLEICH 8-20-81</p> <p>FRST PROJECT NO 16-9019</p> <p>1ST USAGE 16-9019</p> <p>WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO, ILL. 60642</p> <p>CPU SYS 11B SCHEMATIC</p> <p>SCALE: 1/4" = 1"</p> <p>PART NO: 16-9019</p> <p>REV: C</p>							

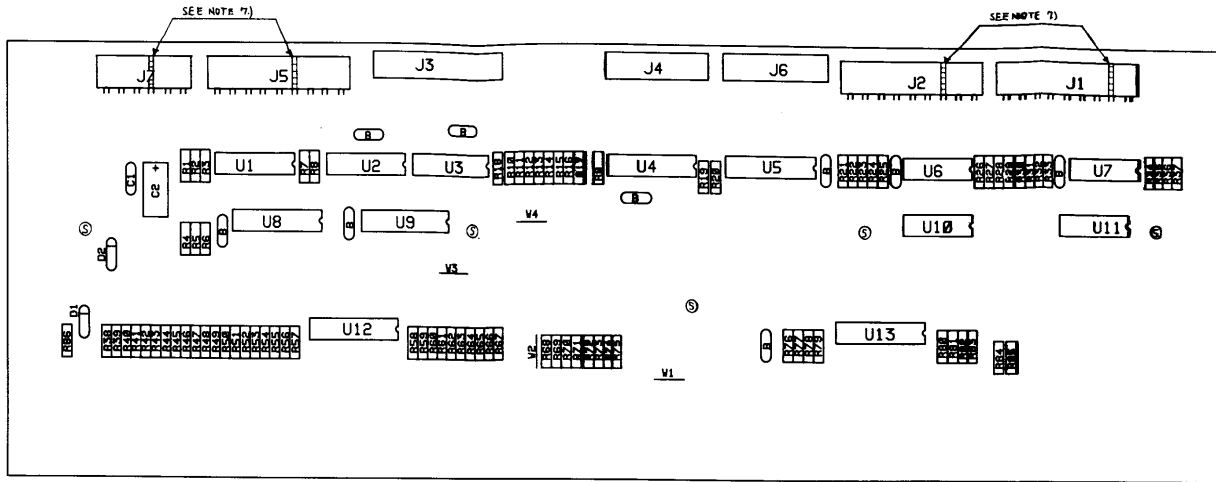
System 11B CPU Schematic (16-9019, Sheet 3 of 4)

REV	DESCRIPTION OF CHANGE	DATE
	N. P. R.	7/17/87
A	SEE COVER SHEET	10/11/87
B	SEE COVER SHEET	11/11/87
C	SEE SHEET 1-3	11/11/87



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
<p>PROJ ENGR C. BLEICH DO NOT SCALE WORK TO DIMENSIONS SHOWN REMOVE BURRS - BREAK SHARP EDGES TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONAL 1/16" ANGULAR .11" DECIMAL .005 FLETS .020 MAX MATERIAL 11</p>							
<p>WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE. CHICAGO, IL 60618</p>				<p>CPU SYS 11B SCHEMATIC SCALE N/S PART NO 16-9019 REV C</p>			

System 11B CPU Schematic (16-9019, Sheet 4 of 4)



BALLY R-DISPLAY

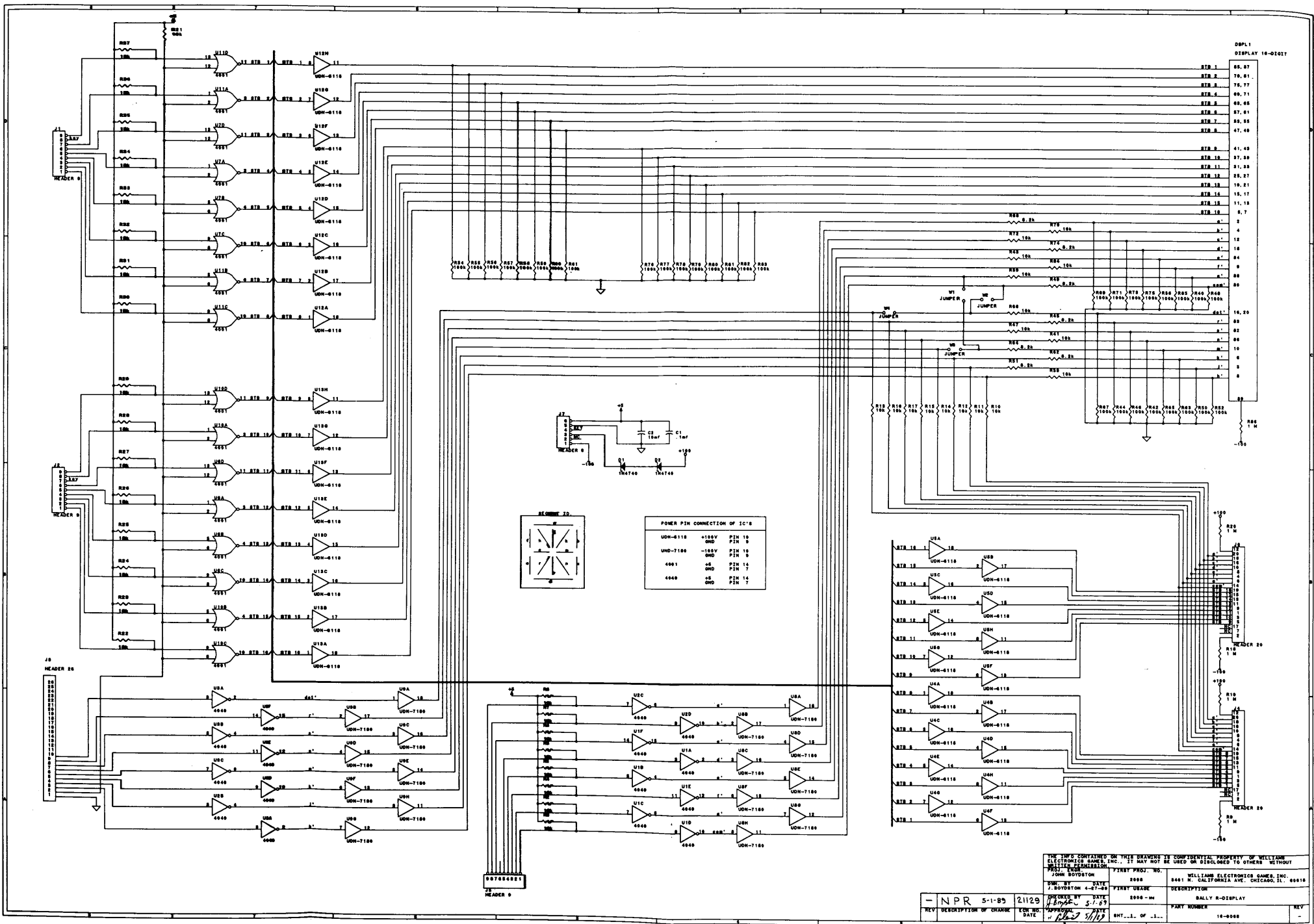
ITEM	PART NUMBER	PART DESIGNATION	DESCRIPTION	QTY
1	5043-08980-00	B (BYPASS CAP)	CAP. .01MF 50V AX. CR.	9
2	5043-08990-00	C1	CAP. 1MF 50V AX. CR.	1
3	5040-09343-00	C2	CAP. 10MF 25V AX. ELECT.	1
4	5075-09135-00	D1, D2	ZENER 1W4740 10V	2
5	5670-12308-00	DSPT1	DISPLAY, 16-CHARACTER A/M	1
6	5791-10869-00	J1, J2, J5	9 PIN HEADER, R/A.	156
7	5791-10851-00	J3	26 PIN HEADER, R/A.	100
8	5791-10869-00	J7	6 PIN HEADER, R/A.	156
9	5791-09438-00	CHART	20 PIN HEADER, R/A.	100
10	5010-08773-00	R1-R6, R21-R37	RES. 18K ohm 1/4W	25
11	5010-09182-00	NOTE 1	RES. 100K ohm 1/4W	CHART
12	5010-10258-00	NOTE 2	RES. 1M ohm 1/4W	CHART
13	5010-10927-00	NOTE 3	RES. 8.2K ohm 1/2W	CHART
14	5010-08981-00	NOTE 4	RES. 10K ohm 1/2W	CHART
15	5310-08876-00	U1, U2, U3	4049	3
16	5310-08882-00	U6, U7, U10, U11	4001	4
17	5680-08969-00	U8, U9	UDM-7180	2
18	5680-08968-00	CHART	UDM-6118	CHART
19	5010-08534-00	CHART	RES. ZERO OHM	CHART
20	5768-12378-00	PCB	BALLY-LO-DISPLAY PCB	1
21	03-8088-1	(SUPPORT) S	SUPPORT DISPLAY	5
22	SEE CHART	LABEL	ASSEMBLY I.D. LABEL	CHART

OPTION	ITEM 9	ITEM 11	ITEM 12	ITEM 13	ITEM 14	ITEM 16	ITEM 19	ITEM 22
NOTE 6	DESIGNATION	QTY	DESIGNATION	QTY	DESIGNATION	QTY	DESIGNATION	QTY
-01	NOT USED	0	R42, R44, R46, R50, R52, R63	32	SEE NOTE 2	1	R45, R51, R62	7
-02	J4	1	SEE NOTE 1	1	R9, R19	3	R10, R17	14
-03	J4, J6	2	SEE NOTE 1	26	R9, R18, R19, R20	5	SEE NOTE 3	4

NOTES:

- 100K ohm RESISTORS
R38, R40, R48, R54, R61, R65, R67, R69, R71, R73, R75, R83, R85
SEE CHART ALSO
- 1M ohm RESISTORS
R68
SEE CHART ALSO
- 8.2K ohm RESISTORS
R49, R64, R68, R74
SEE CHART ALSO
- 10K ohm RESISTOR
R39, R43, R66, R70, R72, R84
SEE CHART ALSO
- THE CHART SPECIFIES RESISTORS, I.C.s., AND CONNECTORS THAT ARE OPTION SPECIFIC
- THE TWO LAST DIGITS OF THE PART NUMBER SPECIFIES THE SUB-ASSEMBLY OPTION.
-01 MAIN DISPLAY ONLY: ALPHA NUMERIC
-02 MAIN DISPLAY: NUMERIC, ONE EXTENDED 7-SEGMENT NUMERIC
-03 MAIN DISPLAY: NUMERIC, TWO EXTENDED 7-SEGMENT NUMERIC
- CUT KEYING PINS AS INDICATED
- ALIGN TOP EDGE OF GLASS DISPLAY WITH TOP EDGE OF DISPLAY SUPPORTS.
- FOR SCHEMATIC SEE DRAWING 16-7648

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
THE INFO CONTAINED ON THIS DRAWING IS CONFIDENTIAL PROPERTY OF WILLIAMS ELECTRONICS GAMES, INC. IT MAY NOT BE USED OR DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION.							
PROJ. ENGR J. BOYDSTON	DATE	DO NOT SCALE WORK TO DIMENSIONS SHOWN	REMOVE BURRS - BREAK SHARP CORNERS & EDGES	WILLIAMS ELECTRONICS, INC. 3400 N. CALIFORNIA AVE CHICAGO IL 60618 BALLY R-DISPLAY ASSY			
DWN BY J. PARKRISH	DATE	FIRST PROJECT NO. 200 B	TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .015 ANGLE 1/2° XX ± .015 XXX ± .005 FRACTIONAL 21/64	SCALE 2/1			
CHECKED BY J. BYRNE 5-1-89	DATE	FIRST USAGE 2008-1N	MATERIAL	PART NO. D-12502-			
APPROVAL H. BLAKE 5/1/89	DATE	QTY 1	REV 1				



POWER PIN CONNECTION OF IC'S

UNH-0110	+100V	PIN 10
	GND	PIN 8
UNH-1100	-100V	PIN 16
	GND	PIN 5
4001	+5V	PIN 14
	GND	PIN 7

THE INFO CONTAINED ON THIS DRAWING IS CONFIDENTIAL PROPERTY OF WILLIAMS ELECTRONIC GAMES, INC. IT MAY NOT BE USED OR DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION.

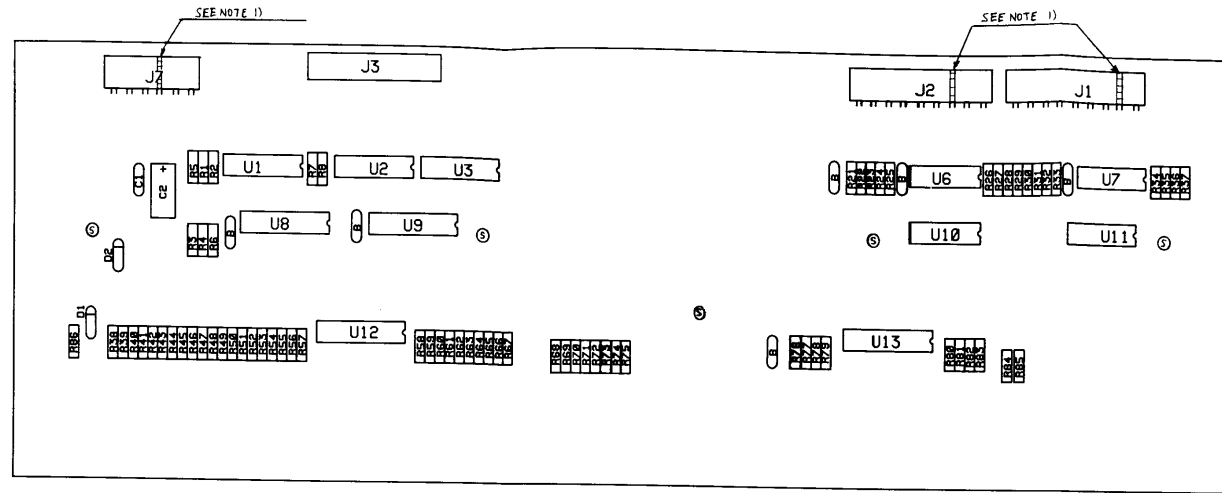
DESIGNED BY: JOHN BOYDSTON
 CHECKED BY: DATE: 5-1-85
 APPROVED BY: DATE: 5/1/85

PAPER PROJ. NO.: 8000
 PART NUMBER: 8000-M
 PART NUMBER: BALLY A-DISPLAY

8401 N. CALIFORNIA AVE., CHICAGO, IL, 60618
 REV DESCRIPTION OF CHANGE: 1-12-85 5/1/85
 REV: 14-0000

Bally Right Display Schematic

3-12 Right Display Schem



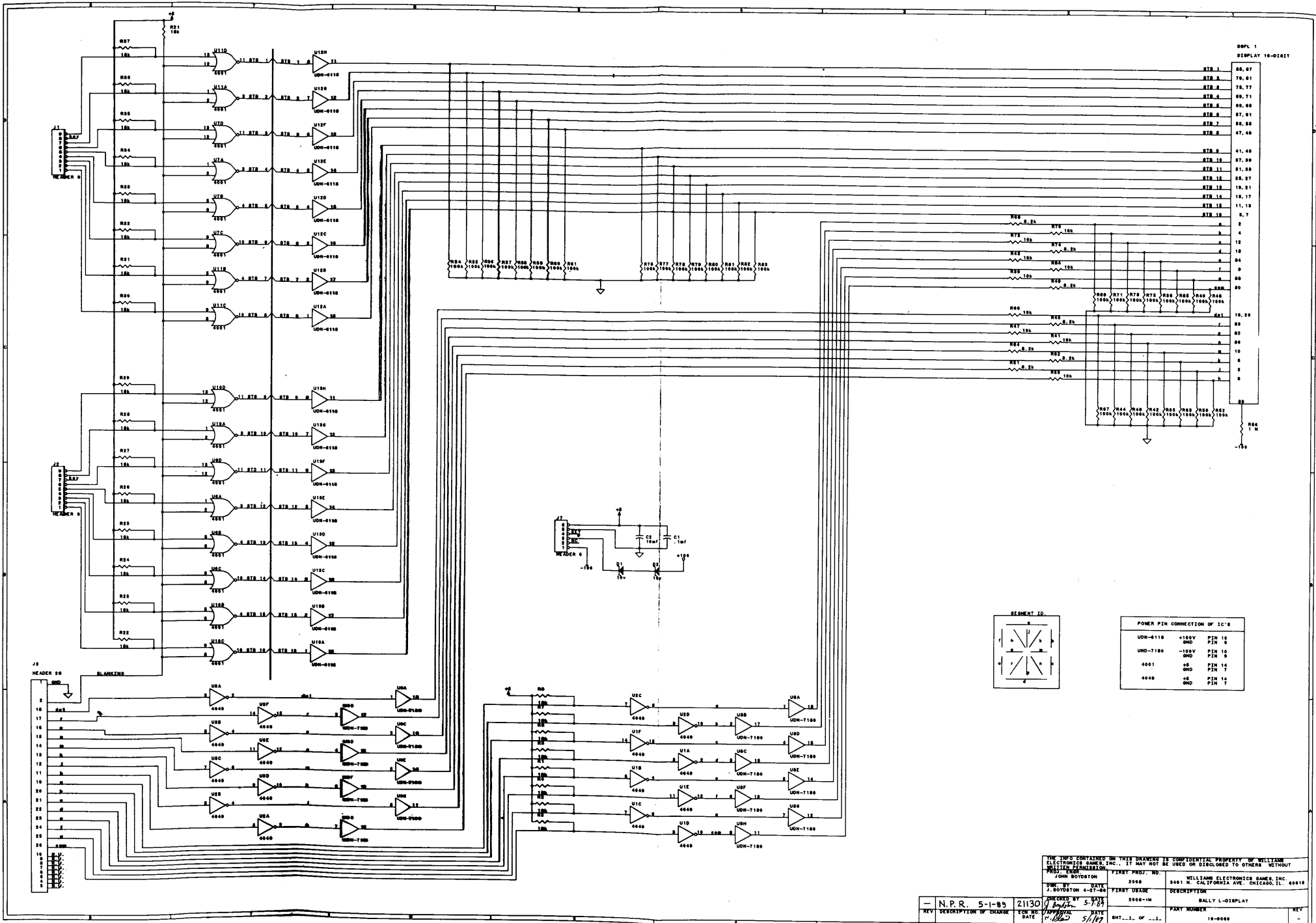
BALLY L-DISPLAY
BILL OF MATERIALS

ITEM	PART NUMBER	PART DESIGNATION	DESCRIPTION	QTY
1	5043-08980-00	B (BYPASS CAP)	CAP. .01MF 50V AX. CR	6
2	5043-08996-00	C1	CAP. .1MF 50V AX. CR.	1
3	5040-09343-00	C2	CAP. 10MF 25V AX. ELECT.	1
4	5075-09135-00	D1, D2	ZENER 1N4740 10V	2
5	5670-12308-00	DSF1	DISPLAY, 16-CHARACTER A/N	1
6	5791-10869-09	J1, J2	9 PIN HEADER, R/A	2
7	5791-10851-00	J3	26 PIN HEADER, R/A	1
8	5791-10869-06	J7	6 PIN HEADER, R/A	1
9	5010-08773-00	R1-R8, R21-R37	RES. 18K ohm 1/4W	25
10	5010-09162-00	R38, R40, R42, R44, R46, R48, R50, R52, R54, R55-R61, R63, R65, R67, R69, R71, R73, R75-R83, R85	RES. 100K ohm 1/4W	32
11	5010-08981-00	R39, R41, R43, R47, R53, R66, R70, R72, R84	RES. 10K ohm 1/2W	9
12	5010-10927-00	R45, R49, R51, R62, R64, R68, R74	RES. 8.2K ohm 1/2W	7
13	5010-10258-00	R86	RES. 1M ohm 1/4W	1
14	5310-08975-00	U1, U2, U3	4049	3
15	5310-09882-00	U6, U7, U10, U11	4001	4
16	5680-08969-00	U8, U9	UDN-7180	2
17	5680-08968-00	U12, U13	UDN-6118	2
18	5768-12408-00	PCB	BALLY HI-DISPLAY PCB	1
19	03-8088-1	(SUPPORT) S	SUPPORT DISPLAY	5

NOTES:

- 1) CUT KEYING PINS AS INDICATED.
- 2) ALIGN TOP EDGE OF GLASS DISPLAY WITH TOP EDGE OF DISPLAY SUPPORTS.
- 3) FOR SCHEMATIC SEE DRAWING 16-9069

REV	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
THE INFO CONTAINED ON THIS DRAWING IS CONFIDENTIAL PROPERTY OF WILLIAMS ELECTRONICS GAMES, INC. IT MAY NOT BE USED OR DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION.							
PROJ ENGR J. BOYDSTON		DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS-BREAK SHARP CORNERS & EDGES		TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .005 ANGULAR ±1/2° XXX 3.005 FRACTIONAL ±1/64	
CHKD BY J. PARRICH		DATE 5-1-89		FIRST PROJECT NO. 2008		WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618	
CHECKED BY J. PARRICH		DATE 5-1-89		FIRST USAGE 2006-1N		NAME BALLY L-DISPLAY ASSY	
APPROVAL [Signature]		DATE 5/1/89		QTY 1		SCALE 2/1	
						SHT Loc 1 PART NO D-12706	
						REV -	

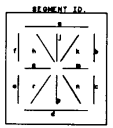


DBPL 1
DISPLAY 10-0101

STR 1	66.67
STR 2	76.61
STR 3	76.77
STR 4	69.71
STR 5	69.66
STR 6	67.61
STR 7	69.66
STR 8	47.69
STR 9	41.66
STR 10	67.69
STR 11	61.66
STR 12	26.67
STR 13	19.61
STR 14	19.67
STR 15	11.69
STR 16	4.7
STR 17	4
STR 18	4
STR 19	4
STR 20	4
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STR 92	4
STR 93	4
STR 94	4
STR 95	4
STR 96	4
STR 97	4
STR 98	4
STR 99	4
STR 100	4

POWER PIN CONNECTION OF IC'S

U0N-6116	+150V	PIN 10
	GND	PIN 5
U0N-7100	-100V	PIN 10
	GND	PIN 5
4001	+5	PIN 14
	GND	PIN 7
4049	+5	PIN 14
	GND	PIN 7



REV. N.P.R. 5-1-83 21130

REV. DESCRIPTION OF CHANGE	DATE	BY	DATE	BY	DATE	BY	DATE	BY	DATE

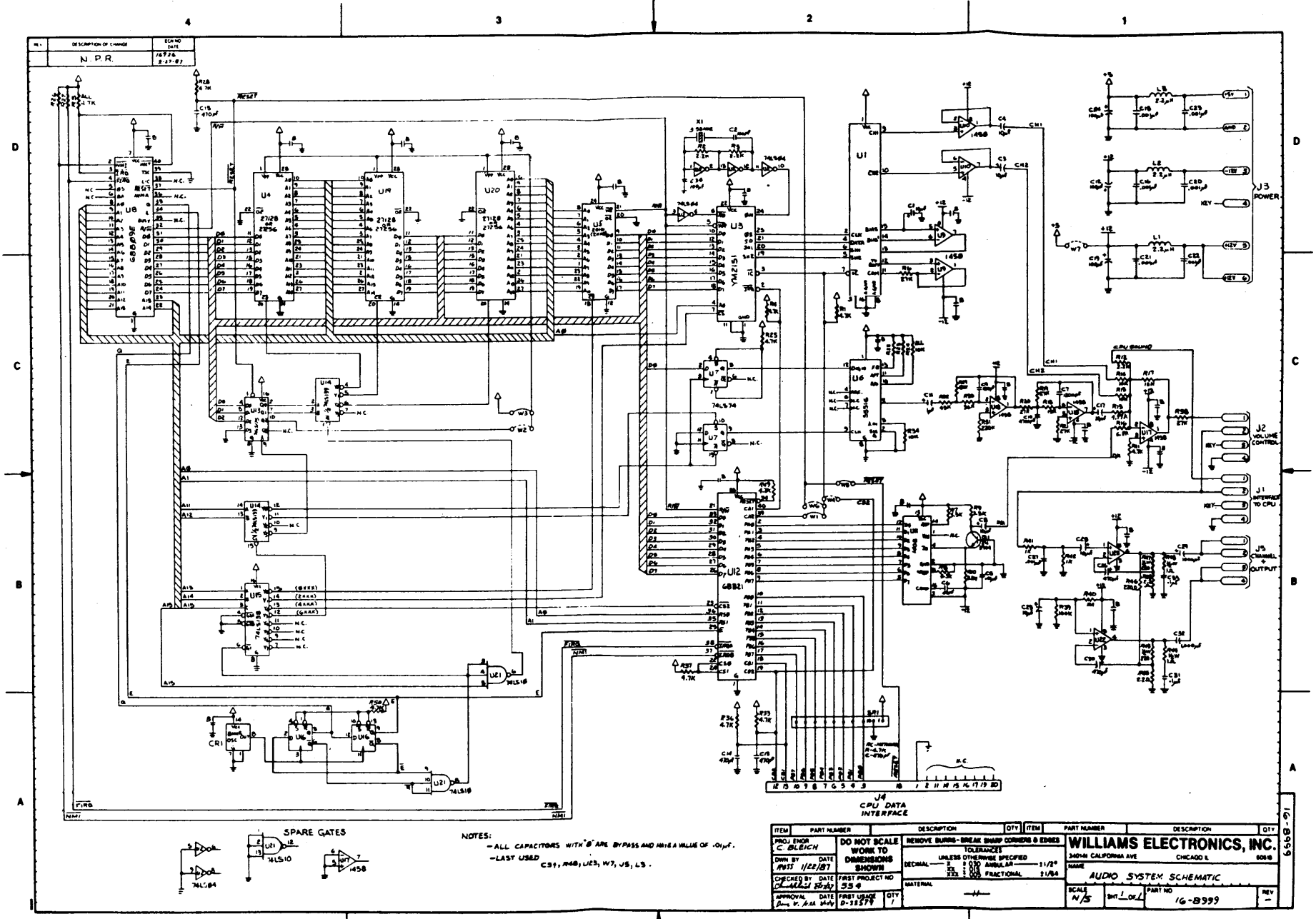
WILLIAM ELECTRONICS NAME, INC. 3401 N. CALIFORNIA AVE. CHICAGO, IL 60618

2000-1M BALLY L-DISPLAY

10-0000

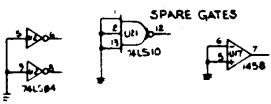
Bally Left Display Schematic

3-14 Left Display Schem



REV.	DESCRIPTION OF CHANGE	ISSUE NO.	DATE
	N.P.R.	16776	8-17-67

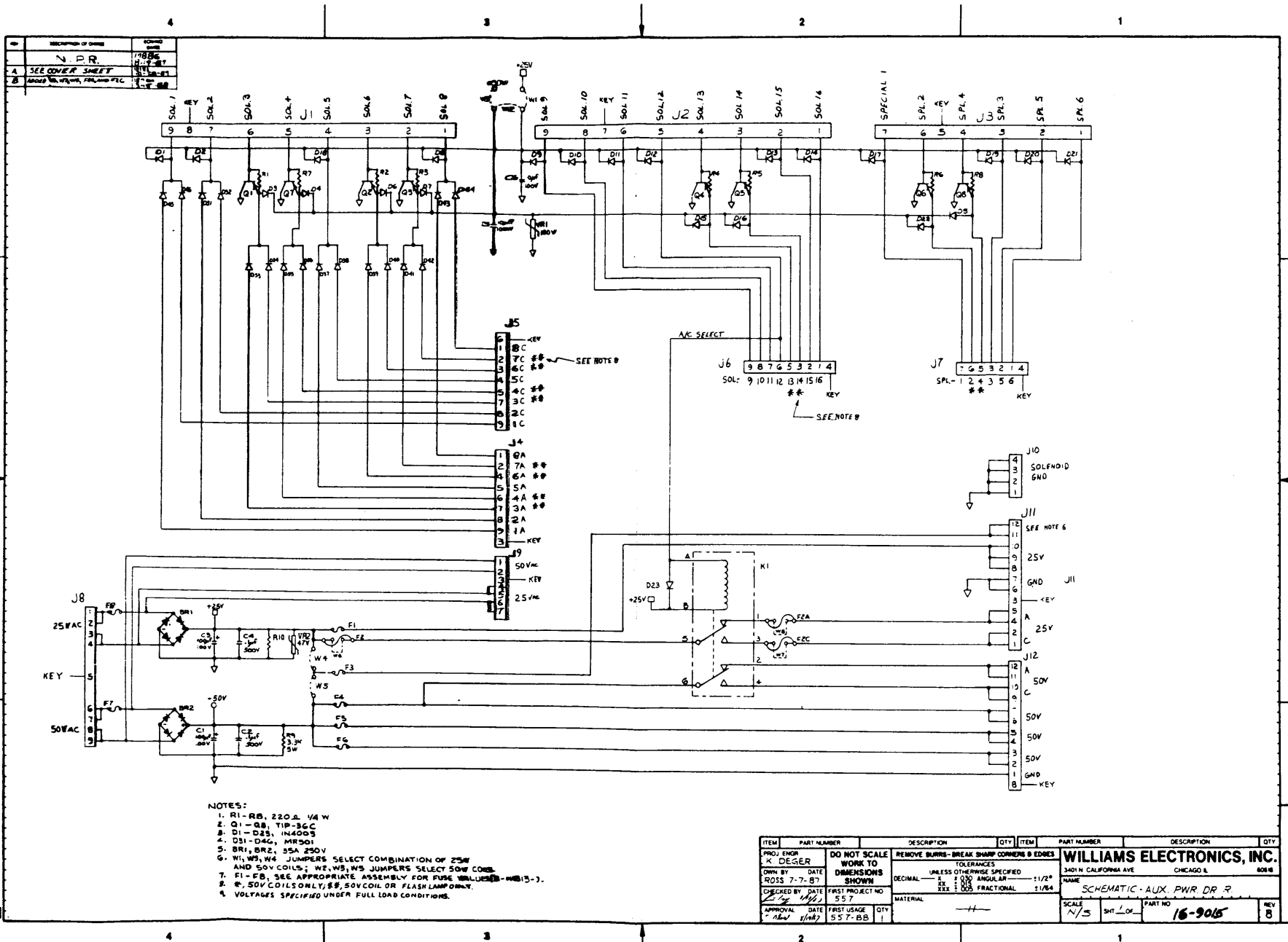
NOTES:
 - ALL CAPACITORS WITH 'B' ARE BYPASS AND HAVE A VALUE OF .01 μ F.
 - LAST USED C31, R48, U23, W7, J5, L3.



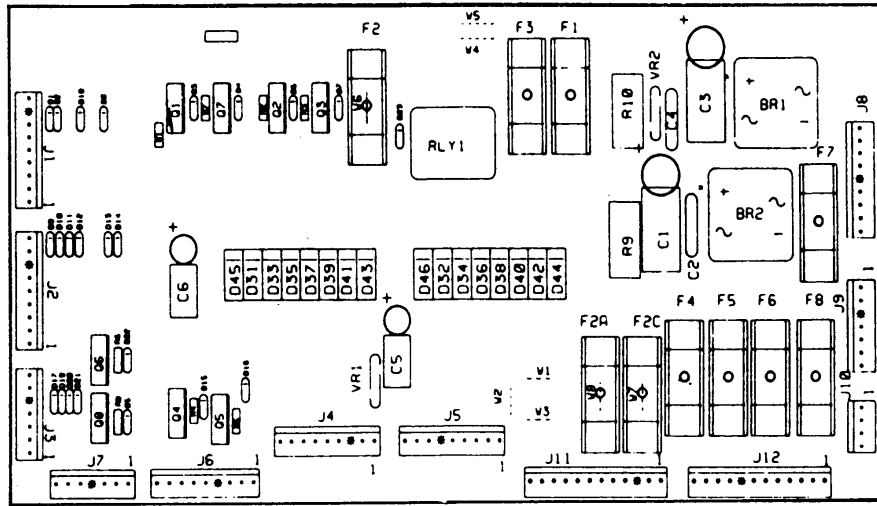
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	C. BLECH	DO NOT SCALE		REMOVE BURRS - BREAK SHARP CORNERS & EDGES			
DOWN BY	DATE	WORK TO DIMENSIONS		TOLERANCES			
CHKD BY	DATE	SHOWN		UNLESS OTHERWISE SPECIFIED			
CHECKED BY	DATE	FIRST PROJECT NO.		DECIMAL	1/16"		
APPROVAL	DATE	FIRST ISSUE		FRACTIONAL	1/64		
				MATERIAL			

WILLIAMS ELECTRONICS, INC.	
3424N CALIFORNIA AVE	CHICAGO IL 60616
AUDIO SYSTEM SCHEMATIC	
SCALE	1/5
REV	1
PART NO	16-8999

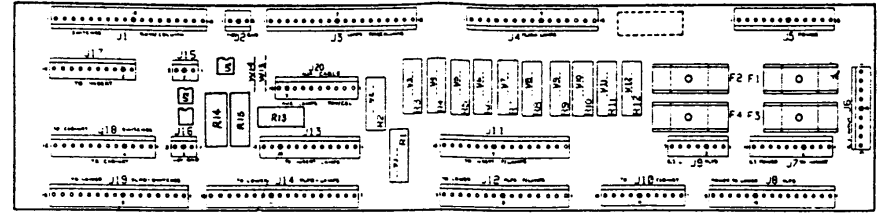
Audio Board (D-11581) Schematic



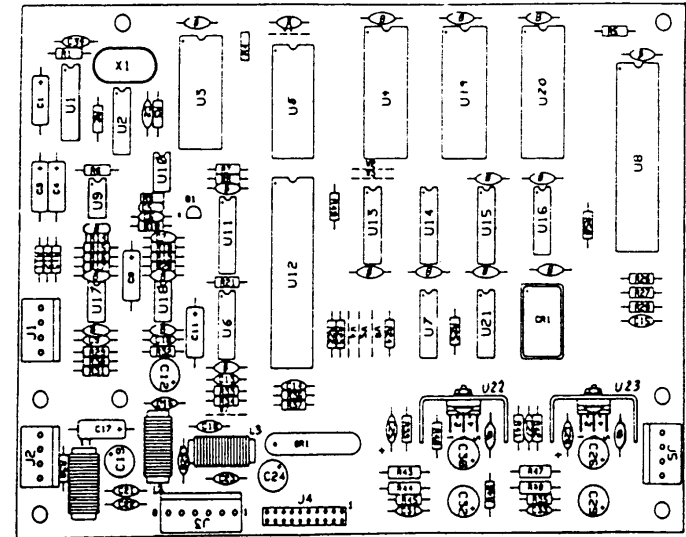
Aux Power Driver Board Schematic



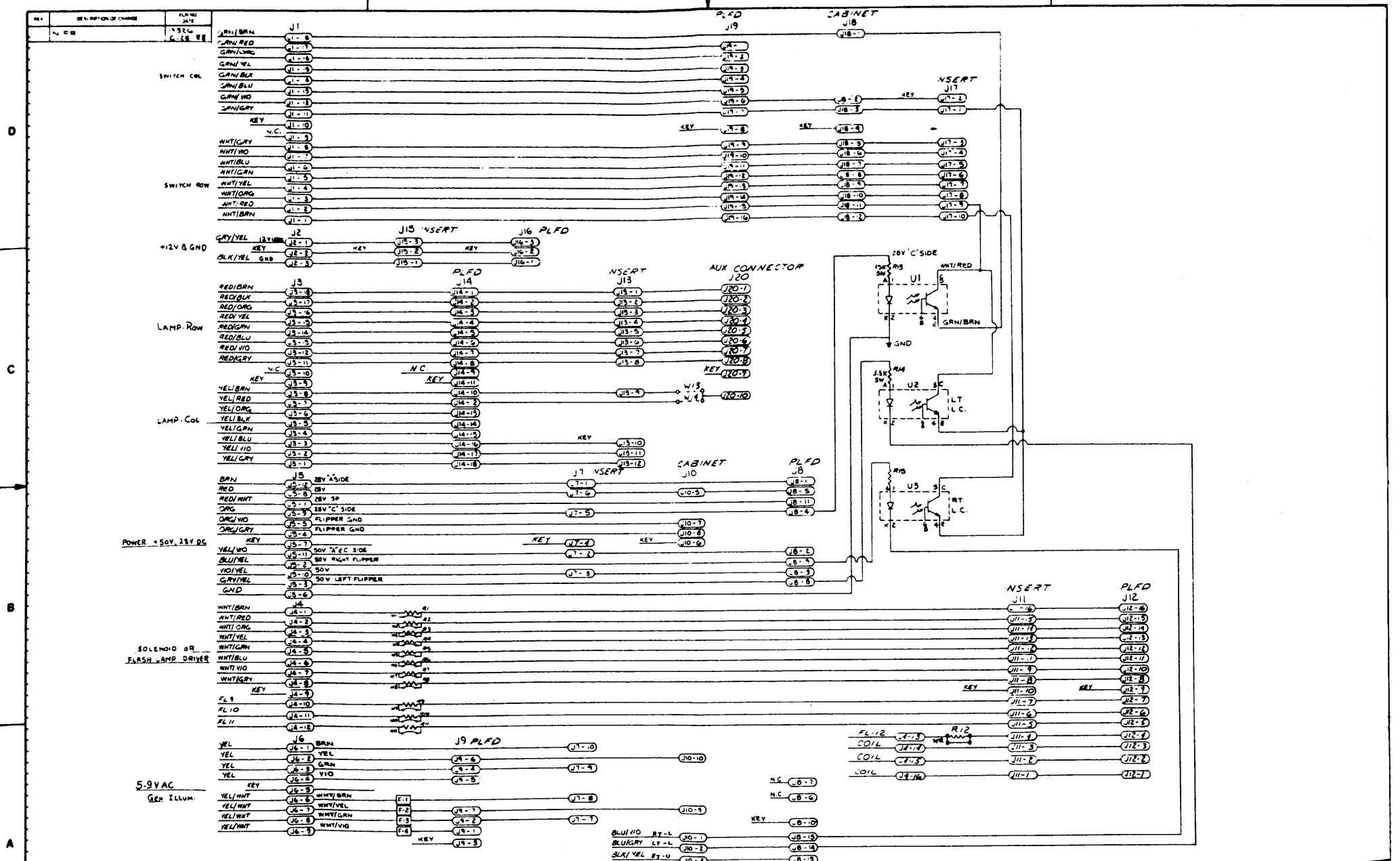
Aux Power Driver Unit Board
p/n D-12247-2011



Backbox Interconnect Board
p/n D-12313-2011



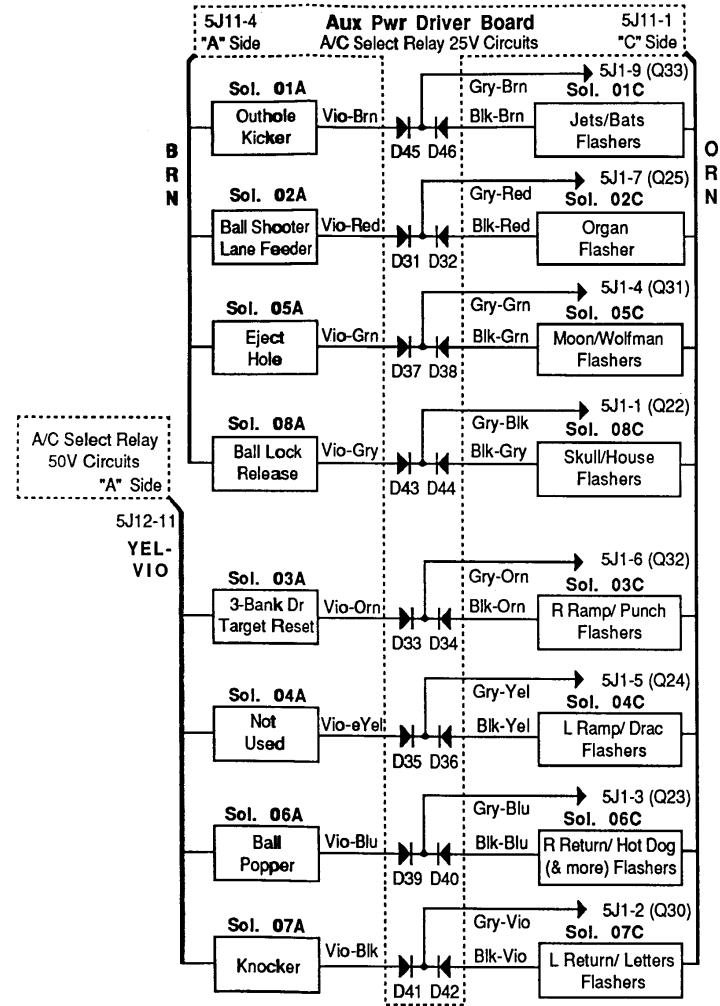
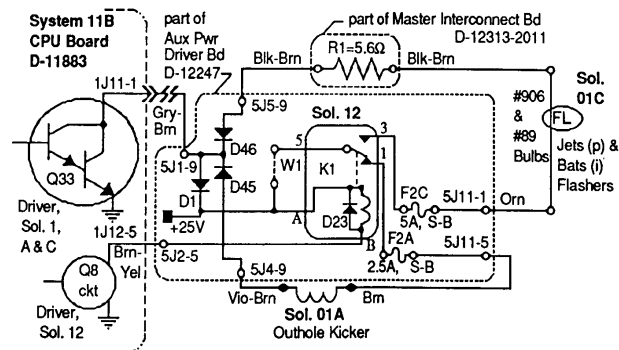
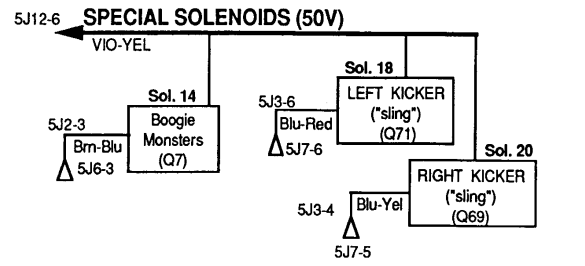
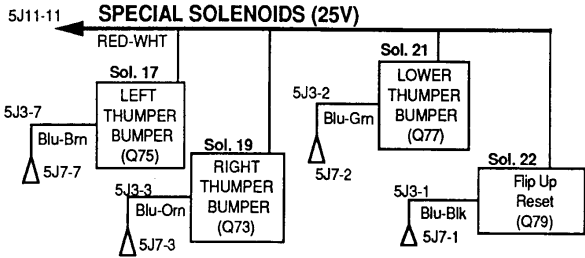
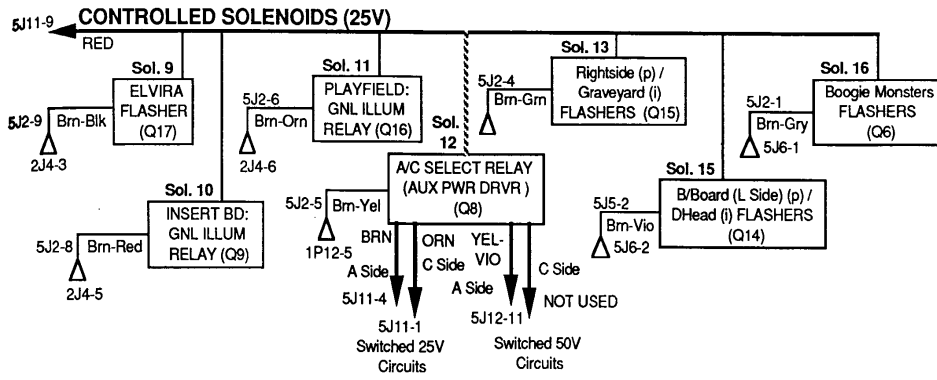
Audio Board Assembly
p/n D-11581-2011



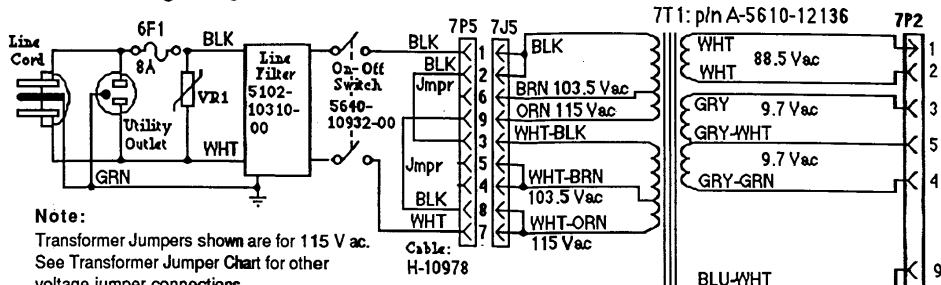
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	M JAYSAL	DO NOT SCALE WORK TO DIMENSIONS SHOWN		WILLIAMS ELECTRONICS, INC. 3401 N CALIFORNIA AVE CHICAGO IL 60618 NAME SCHEMATIC - INTERCONNECT BOARD SCALE 1/5 SHY OK PART NO 16-9022-1 REV 1			
DWN BY	DATE	FIRST PROJECT NO					
CHECKED BY	DATE	FIRST USAGE					
APPROVAL	DATE	FIRST USAGE					
REMOVE BURRS - BREAK SHARP CORNERS & EDGES	TOLERANCES UNLESS OTHERWISE SPECIFIED						
DECIMAL	1/100 ANGULAR		1/128				
	XX 1/16		1/64				
	XXX 1/32		1/32				
MATERIAL							

Backbox Interconnect Board (D-12313-568) Schematic

SWITCHED SOLENOIDS

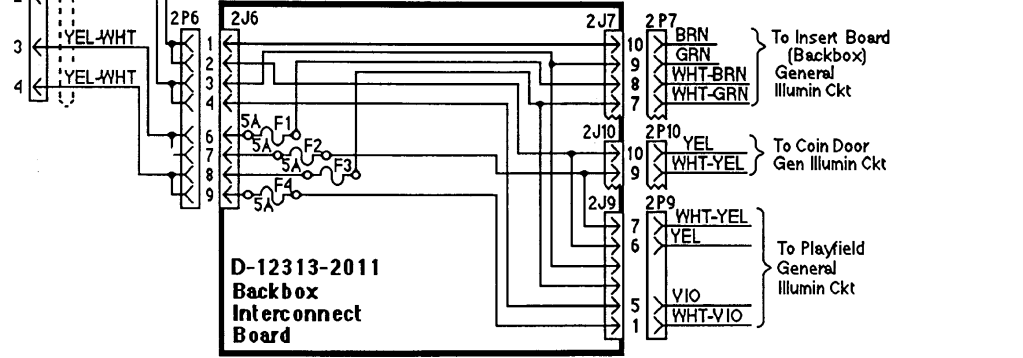
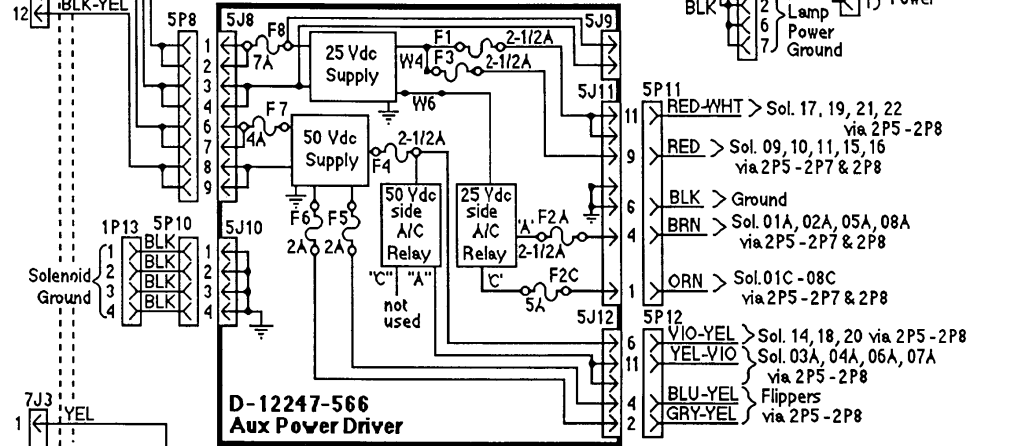
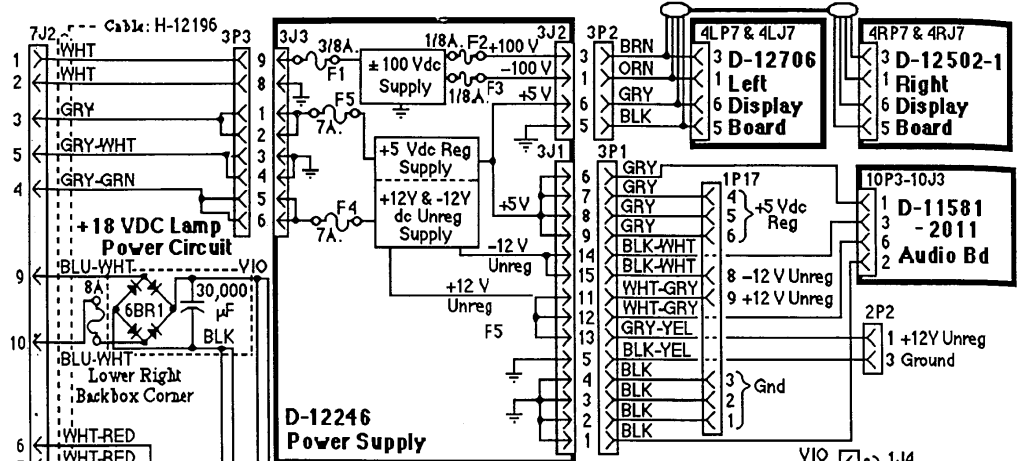
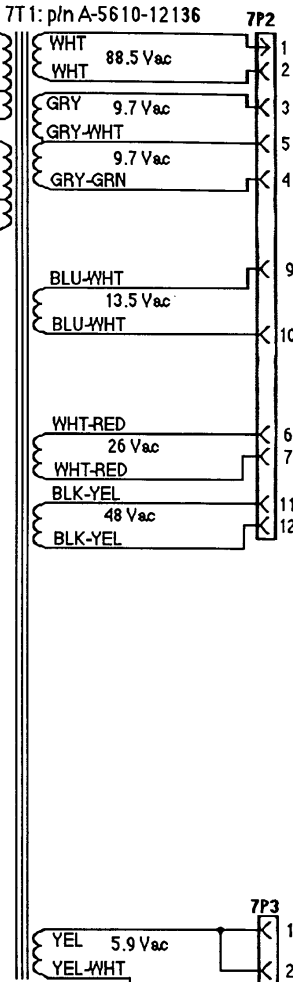
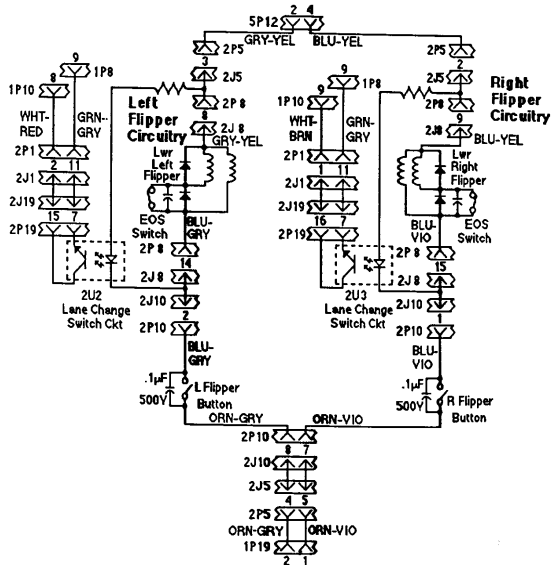


Power Wiring Diagram



Note:
Transformer Jumpers shown are for 115 V ac. See Transformer Jumper Chart for other voltage jumper connections.
Cable: H-10978

TRANSFORMER JUMPER CHART		
206/218 VAC	230 VAC	103.5 VAC
<p>7P5</p>	<p>7P5</p>	<p>7P5</p>
FUSE (6F1): 4A, S-B	4A, S-B	8A, N-B
VARISTOR: 275V		
275V Varistor: 5017-09063-00		
130V Varistor: 5017-09044-00		
4A, S-B Fuse: 5731-06314-00 (for 220V)		
8A, N-B Fuse: 5730-09252-00 (for 115V)		



SYSTEM 11B CPU INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
J1J-1	BRN-GRY	ST-8: Display Digit Strobe / 4J1-1	J2J-1	VIO-GRY	ST-16: Display Digit Strobe / 4J2-1
J1J-2	BRN-VIO	ST-7: Display Digit Strobe / 4J1-2	J2J-2	VIO-BLK	ST-15: Display Digit Strobe / 4J2-2
J1J-3	BRN-BLU	ST-6: Display Digit Strobe / 4J1-3	J2J-3	VIO-BLU	ST-14: Display Digit Strobe / 4J2-3
J1J-4	BRN-GRN	ST-5: Display Digit Strobe / 4J1-4	J2J-4	VIO-GRN	ST-13: Display Digit Strobe / 4J2-4
J1J-5	BRN-YEL	ST-4: Display Digit Strobe / 4J1-5	J2J-5	VIO-YEL	ST-12: Display Digit Strobe / 4J2-5
J1J-6	BRN-ORG	ST-3: Display Digit Strobe / 4J1-6	J2J-6	VIO-ORG	ST-11: Display Digit Strobe / 4J2-6
J1J-7	BRN-RED	ST-2: Display Digit Strobe / 4J1-7	J2J-7	Key Pin	No Connection
J1J-8	Key Pin	No Connection	J2J-8	VIO-RED	ST-10: Display Digit Strobe / 4J2-8
J1J-9	BRN-BLK	ST-1: Display Digit Strobe / 4J1-9	J2J-9	VIO-BRN	ST-9: Display Digit Strobe / 4J2-9
J3J-1	BLU-BRN	D1 / Display BCD / 4J5-1	J4J-1	VIO	Lamp +18V dc Power
J3J-2	BLU-RED	C1 / Display BCD / 4J5-2	J4J-2	VIO	"
J3J-3	BLU-ORG	B1 / Display BCD / 4J5-3	J4J-3	Key Pin	No Connection
J3J-4	BLU-YEL	A1 / Display BCD / 4J5-4	J4J-4	---	No Connection
J3J-5	BLU-GRN	D2 / Display BCD / 4J5-5	J4J-5	---	No Connection
J3J-6	Key Pin	No Connection	J4J-6	---	No Connection
J3J-7	BLU-BLK	C2 / Display BCD / 4J5-7	J4J-7	---	No Connection
J3J-8	BLU-VIO	B2 / Display BCD / 4J5-8	J4J-8	VIO	Lamp +18V dc Power
J3J-9	BLU-GRY	A2 / Display BCD / 4J5-9	J4J-9	VIO	"
J3J-10	---	No Connection	J6J-1	RED-BRN	Lamp Row 1 (Q80) / 2J3-18
J3J-11	---	No Connection	J6J-2	RED-BLK	Lamp Row 2 (Q81) / 2J3-17
J3J-12	---	No Connection	J6J-3	RED-ORG	Lamp Row 3 (Q82) / 2J3-16
J3J-1	---	No Connection	J6J-4	Key Pin	No Connection
J3J-2	Key Pin	No Connection	J6J-5	RED-YEL	Lamp Row 4 (Q83) / 2J3-15
J3J-3	BLK	Ground (Lamp Ckt)	J6J-6	RED-GRN	Lamp Row 5 (Q84) / 2J3-14
J3J-4	BLK	Ground (Lamp Ckt)	J6J-7	RED-BLU	Lamp Row 6 (Q85) / 2J3-13
J3J-5	---	No Connection	J6J-8	RED-VIO	Lamp Row 7 (Q86) / 2J3-12
J3J-6	---	No Connection	J6J-9	RED-GRY	Lamp Row 8 (Q87) / 2J3-11
J3J-7	---	No Connection	J8J-1	GRN-BRN	Switch Col 1 (Q45) / 2J1-18
J3J-8	BLK	Ground (Lamp Ckt)	J8J-2	GRN-RED	Switch Col 2 (Q49) / 2J1-17
J3J-9	BLK	Ground (Lamp Ckt)	J8J-3	GRN-ORG	Switch Col 3 (Q44) / 2J1-16
J7J-1	YEL-BRN	Lamp Col 1 (Q65/66) / 2J3-8	J8J-4	GRN-YEL	Switch Col 4 (Q48) / 2J1-15
J7J-2	YEL-RED	Lamp Col 2 (Q63/64) / 2J3-7	J8J-5	GRN-BLK	Switch Col 5 (Q43) / 2J1-14
J7J-3	YEL-ORG	Lamp Col 3 (Q61/62) / 2J3-6	J8J-6	Key Pin	No Connection
J7J-4	YEL-BLK	Lamp Col 4 (Q59/60) / 2J3-5	J8J-7	GRN-BLU	Switch Col 6 (Q47) / 2J1-13
J7J-5	Key Pin	No Connection	J8J-8	GRN-VIO	Switch Col 7 (Q42) / 2J1-12
J7J-6	YEL-GRN	Lamp Col 5 (Q57/58) / 2J3-4	J8J-9	GRN-GRY	Switch Col 8 (Q46) / 2J1-11
J7J-7	YEL-BLU	Lamp Col 6 (Q55/56) / 2J3-3	J9J	Not Applicable	
J7J-8	YEL-VIO	Lamp Col 7 (Q53/54) / 2J3-2	J11J-1	GRY-BRN	Solenoid 1 (Q33) / 5J1-9
J7J-9	YEL-GRY	Lamp Col 8 (Q51/52) / 2J3-1	J11J-2	Key Pin	No Connection
J10J-1	WHT-GRY	Switch Row 8 / 2J1-8	J11J-3	GRY-RED	Solenoid 2 (Q25) / 5J1-7
J10J-2	WHT-VIO	Switch Row 7 / 2J1-7	J11J-4	GRY-ORG	Solenoid 3 (Q22) / 5J1-6
J10J-3	WHT-BLU	Switch Row 6 / 2J1-6	J11J-5	GRY-YEL	Solenoid 4 (Q24) / 5J1-5
J10J-4	Key Pin	No Connection	J11J-6	GRY-GRN	Solenoid 5 (Q31) / 5J1-4
J10J-5	WHT-GRN	Switch Row 5 / 2J1-5	J11J-7	GRY-BLU	Solenoid 6 (Q23) / 5J1-3
J10J-6	WHT-YEL	Switch Row 4 / 2J1-4	J11J-8	GRY-VIO	Solenoid 7 (Q30) / 5J1-2
J10J-7	WHT-ORG	Switch Row 3 / 2J1-3	J11J-9	GRY-BLK	Solenoid 8 (Q22) / 5J1-1
J10J-8	WHT-RED	Switch Row 2 / 2J1-2	J13J-1	BLK	Solenoid Ground / 5J10-1
J11J-9	WHT-BRN	Switch Row 1 / 2J1-1	J13J-2	BLK	" / 5J10-2
J12J-1	BRN-BLK	Solenoid 9 (Q17) / 5J2-9	J13J-3	BLK	" / 5J10-3
J12J-2	BRN-RED	Solenoid 10 (Q9) / 5J2-8	J13J-4	BLK	" / 5J10-4
J12J-3	Key Pin	No Connection	J14J-1	BLK-RED	Memory Protect / 7J1-4
J12J-4	BRN-ORG	Solenoid 11 (Q16) / 5J2-6	J14J-2	WHT	Ground / 7J1-3
J12J-5	BRN-YEL	Solenoid 12 (Q8) / 5J2-5	J14J-3	GRN	ADVANCE Switch / 7J1-1
J12J-6	BRN-GRN	Solenoid 13 (Q15) / 2J4-10	J14J-4	BLU	AUTOMANUAL Switch / 7J1-2
J12J-7	BRN-BLU	Solenoid 14 (Q7) / 5J2-3	J15J	Not Applicable	
J12J-8	BRN-VIO	Solenoid 15 (Q14) / 5J2-2	J17J-1	BLK	Ground / 3J1-2
J12J-9	BRN-GRY	Solenoid 16 (Q6) / 5J2-1	J17J-2	BLK	" / 3J1-3
J16J-1	RED	Volume Control Input / 11J1-1	J17J-3	BLK	" / 3J1-4
J16J-2	BLK	Volume Control Output / 11J1-2	J17J-4	GRY	Power: +5V dc / 3J1-8
J16J-3	Key Pin	No Connection	J17J-5	GRY	" / 3J1-6
J16J-4	WHT	Signal Ground - CPU / 11J1-4	J17J-6	GRY	" / 3J1-8
J18J	Not Applicable		J17J-7	Key Pin	No Connection
J19J-1	ORG-VIO	Flipper Ground / 2J5-5	J17J-8	BLK-WHT	Power: -12V dc Unreg / 3J1-14
J19J-2	ORG-GRY	Flipper Ground / 2J5-4	J17J-9	WHT-GRY	Power: +12V dc Unreg / 3J1-12
J19J-3	BLU-ORN	Spl Solnd 3 (Q73) / 5J3-3	J20J	Not Applicable	
J19J-4	BLU-RED	Spl Solnd 2 (Q71) / 5J3-6	J21J	Ribbon Cable to Audio Board 11J4	
J19J-5	Key Pin	No Connection	J22J	Ribbon Cable to Master Display Board 4J3	
J19J-6	BLU-YEL	Spl Solnd 4 (Q69) / 5J3-4			
J19J-7	BLU-BRN	Spl Solnd 1 (Q75) / 5J3-7			
J19J-8	BLU-GRN	Spl Solnd 5 (Q77) / 5J3-2			
J19J-9	BLU-BLK	Spl Solnd 6 (Q79) / 5J3-1			

POWER SUPPLY INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
3J1-1	BLK	Ground / 11J3-2	3J2-1	ORG	Display Power: -100V dc / 4J7-1
3J1-2	BLK	Ground / 1J17-1	3J2-2	---	No Connection
3J1-3	BLK	Ground / 1J17-2	3J2-3	BRN	Display Power: +100V dc / 4J7-3
3J1-4	BLK	Ground / 1J17-3	3J2-4	---	No Connection
3J1-5	BLK-YEL	Logic Ground / 2J2-3	3J2-5	BLK	Ground (Display ckt) / 4J7-5
3J1-6	GRY	CPU Pwr: +5V dc Reg / 1J17-5	3J2-6	GRY	Display Power: +5V dc / 4J7-6
3J1-7	GRY	" / 11J3-1	3J3-1	GRY	Transformer: 19.4V ac, 1Ø, C. T.
3J1-8	GRY	" / 1J17-4	3J3-2	GRY	Transformer: 19.4V ac, 1Ø, C. T.
3J1-9	---	" / 1J17-6	3J3-3	GRY-WHT	Transformer: 19.4V ac, C. T. com
3J1-10	Key Pin	No Connection	3J3-4	GRY-WHT	Transformer: 19.4V ac, C. T. com
3J1-11	WHT-GRY	CPU Pwr: +12V dc Unreg / 11J3-6	3J3-5	GRY-GRN	Transformer: 19.4V ac, 1Ø, C. T.
3J1-12	WHT-GRY	CPU Pwr: +12V dc Unreg / 1J17-9	3J3-6	GRY-GRN	Transformer: 19.4V ac, 1Ø, C. T.
3J1-13	GRY-YEL	CPU Power: +12V dc Unreg / 2J2-1	3J3-7	Key Pin	No Connection
3J1-14	BLK-WHT	CPU Pwr: -12V dc Unreg / 1J17-8	3J3-8	WHT	Transformer: 88.5V ac
3J1-15	BLK-WHT	CPU Pwr: -12V dc Unreg / 11J3-3	3J3-9	WHT	Transformer: 88.5V ac

AUDIO BOARD INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
11J1-1	RED	Sound Input (from CPU) / 1J16-1	11J2-1	RED	Signal Level (to Vol Cntrl)
11J1-2	BLK	Sound Input (from CPU) / 1J16-2	11J2-2	BLK	Signal Level (from Vol Cntrl)
11J1-3	---	No Connection	11J2-3	---	No Connection
11J1-4	WHT	Ground / 1J16-4	11J2-4	shield	Ground
11J3-1	GRY	Power: +5 Vdc / 3J1-7	11J4	Ribbon Cable from CPU 1J21	
11J3-2	BLK	Ground / 3J1-1	11J5-1	BLK-YEL / Speaker	
11J3-3	BLK-WHT	Power: -12 Vdc Unreg / 3J1-15	11J5-2	BLK-YEL / Speaker	
11J3-4	---	No Connection	11J5-3	BLK / Speaker	
11J3-5	---	No Connection	11J5-4	BLK / Speaker	
11J3-6	WHT-GRY	Power: +12 Vdc Unreg / 3J1-11			

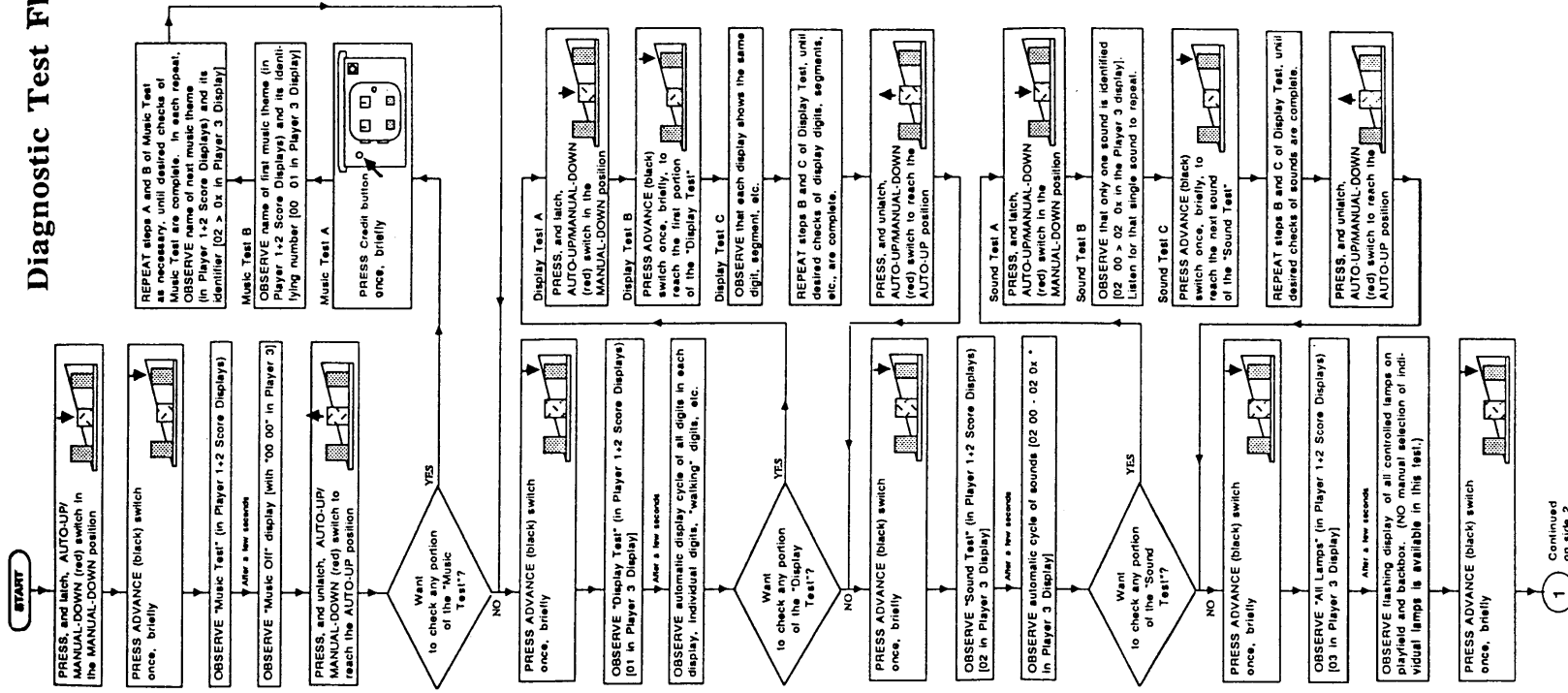
LEFT DISPLAY INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
4J1-1	BRN-GRY	ST-8: Digit Display Strobe / 1J1-1	4J2-1	VIO-GRY	ST-16: Digit Display Strobe / 1J2-1
4J1-2	BRN-VIO	ST-7: Display Digit Strobe / 1J1-2	4J2-2	VIO-BLK	ST-15: Display Digit Strobe / 1J2-2
4J1-3	BRN-BLU	ST-6: Display Digit Strobe / 1J1-3	4J2-3	VIO-BLU	ST-14: Display Digit Strobe / 1J2-3
4J1-4	BRN-GRN	ST-5: Display Digit Strobe / 1J1-4	4J2-4	VIO-GRN	ST-13: Display Digit Strobe / 1J2-4
4J1-5	BRN-YEL	ST-4: Display Digit Strobe / 1J1-5	4J2-5	VIO-YEL	ST-12: Display Digit Strobe / 1J2-5
4J1-6	BRN-ORG	ST-3: Display Digit Strobe / 1J1-6	4J2-6	VIO-ORG	ST-11: Display Digit Strobe / 1J2-6
4J1-7	BRN-RED	ST-2: Display Digit Strobe / 1J1-7	4J2-7	Key Pin	No Connection
4J1-8	Key Pin	No Connection	4J2-8	VIO-RED	ST-8: Display Digit Strobe / 1J2-8
4J1-9	BRN-BLK	ST-1: Display Digit Strobe / 1J1-9	4J2-9	VIO-BRN	ST-9: Display Digit Strobe / 1J2-9
4J3	Ribbon Cable from CPU 1J22				
4J7-1	ORG	Display Power: -100V dc / 3J5-3	4J7-4	Key Pin	No Connection
4J7-2	---	No Connection	4J7-5	BLK	Ground / 3J5-1
4J7-3	BRN	Display Power: +100V dc / 3J5-4	4J7-6	GRY	Power: +5V dc / 3J5-6

RIGHT DISPLAY INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
4J5-1	BLU-BRN	D1 / Display BCD / 1J3-1	4J5-6	Key Pin	No Connection
4J5-2	BLU-RED	C1 / Display BCD / 1J3-2	4J5-7	BLU-BLK	C2 / Display BCD / 1J3-7
4J5-3	BLU-ORG	B1 / Display BCD / 1J3-3	4J5-8	BLU-VIO	B2 / Display BCD / 1J3-8
4J5-4	BLU-YEL	A1 / Display BCD / 1J3-4	4J5-9	BLU-GRY	A2 / Display BCD / 1J3-9
4J5-5	BLU-GRN	D2 / Display BCD / 1J3-5			

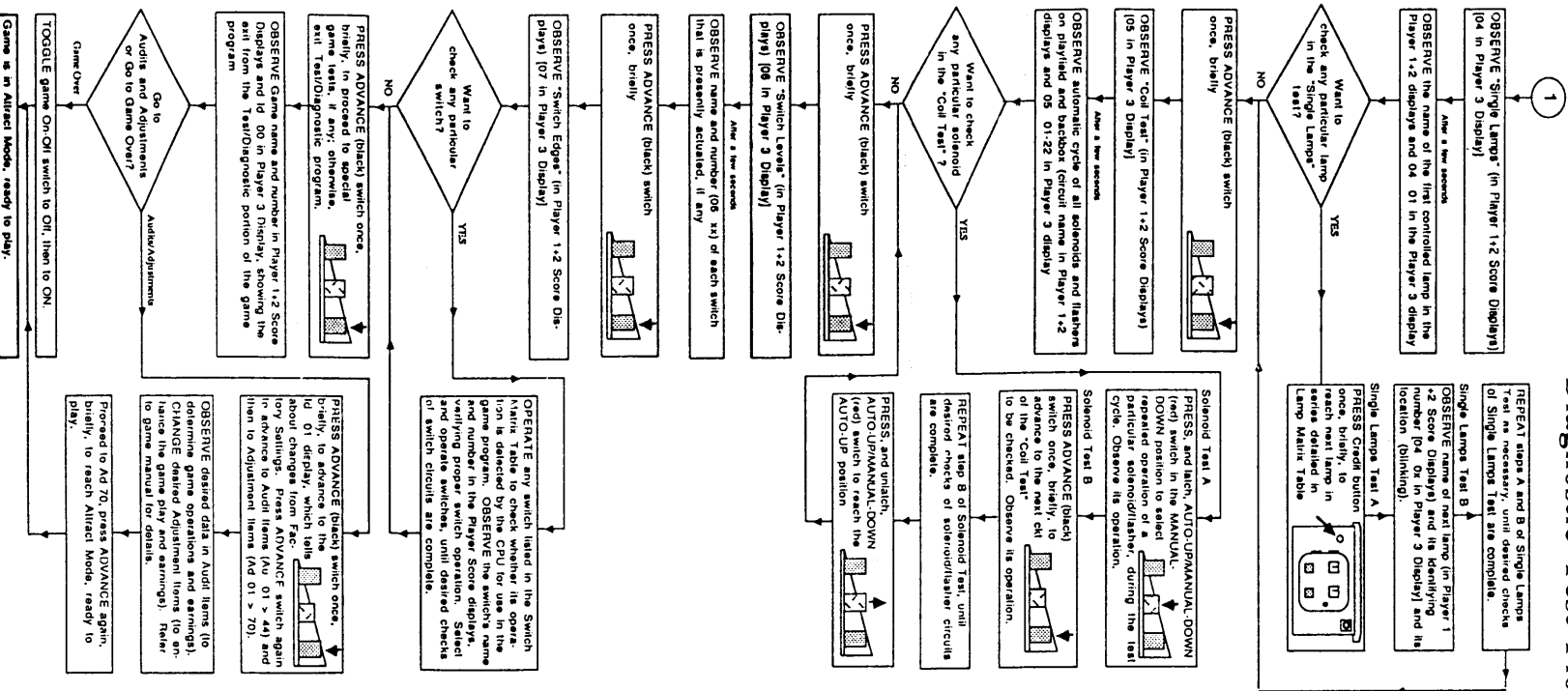
Diagnostic Test Flowchart



Diagnostic Test Flowchart

Diagnostic Test Flowchart

Side 2



Diagnostic Test Flowchart (Continued)

ELVIRA Switch Matrix

column	1 Q45	2 Q49	3 Q44	4 Q48	5 Q43	6 Q47	7 Q42	8 Q46
row	GRN-BRN IJ8-1	GRN-RED IJ8-2	GRN-ORN IJ8-3	GRN-YEL IJ8-4	GRN-BLK IJ8-5	GRN-BLU IJ8-7	GRN-VIO IJ8-8	GRN-GRY IJ8-9
1 WHT-BRN IJ10-9	Plumb Bob Tilt 1	Outhole 9	Left Outlane 17	Left Standup Target 1 25	Left Slingshot 33	Left Drop Target 41	Lock 1 49	Right Flipper 57
2 WHT-RED IJ10-8	A/C Relay Position 2	10	Left Return Lane 18	Left Standup Target 2 26	Right Slingshot 34	Center Drop Target 42	Lock 2 50	Left Flipper 58
3 WHT-ORN IJ10-7	Credit Button 3	Trough Sw. 1 Right 11	Right Return Lane 19	Left Standup Target 3 27	Left Thumper Bumper 35	Right Drop Target 43	Lock 3 51	59
4 WHT-YEL IJ10-6	Right Coin 4	Trough Sw. 2 Center 12	Right Outlane 20	Left Standup Target 4 28	Right Thumper Bumper 36	Right Ramp Entry 44	Lock Safety 52	60
5 WHT-GRN IJ10-5	Center Coin 5	Trough Sw. 3 Left 13	Ball Shooter 21	Lock Entry 29	Bottom Bumper 37	B 45	Flip Up Target 1 53	61
6 WHT-BLU IJ10-3	Left Coin 6	14	Top Right Rollover 22	Left Ramp Entry 30	38	A 46	Flip Up Target 2 54	62
7 WHT-VIO IJ10-2	Slam Tilt 7	Right Standup 1 15	Right Side Rollunder 23	Left Ramp End 31	39	T 47	Flip Up 1 Open 55	63
8 WHT-GRY IJ10-1	High Score Reset 8	Right Standup 2 16	24	Ball Popper 32	40	Eject Hole 48	Flip Up 2 Open 56	64

ELVIRA Lamp Matrix

column	1 Q66	2 Q64	3 Q62	4 Q60	5 Q58	6 Q56	7 Q54	8 Q52
row	YEL-BRN IJ7-1	YEL-RED IJ7-2	YEL-ORN IJ7-3	YEL-BLK IJ7-4	YEL-GRN IJ7-6	YEL-BLU IJ7-7	YEL-VIO IJ7-8	YEL-GRY IJ7-9
1 RED-BRN IJ6-1	E 1	4X 9	Eye 1 17	Left Ramp Sign 25	Right Ramp Potton 1 33	Hold Bonus 41	Pizza Standup 1 49	Dead Head 1 57
2 RED-BLK IJ6-2	L 2	5X 10	Eye 2 18	Left Ramp Spots Elmtr 26	Right Ramp Potton 2 34	Million 42	Pizza Standup 2 50	Dead Head 2 58
3 RED-ORN IJ6-3	V 3	Left Slingshot 11	Shoot Again 19	Left Ramp Million 27	Right Ramp Potton 3 35	Barbeque 43	Pizza Passage 1 51	Dead Head 3 59
4 RED-YEL IJ6-5	I 4	3 Million 12	Right Slingshot 20	Left Ramp Special 28	Right Ramp Potton 4 36	Boogle 44	Pizza Passage 2 52	Barbeque 1 60
5 RED-GRN IJ6-6	R 5	Lock 13	Dead Head 1T 21	Left Outlane 29	Right Ramp Extra Ball 37	B 45	Pizza Passage 3 53	Barbeque 2 61
6 RED-BLU IJ6-7	A 6	Left Flip Up 14	Dead Head 2T 22	Right Outlane 30	J 38	A 46	Left Thumper Bumper 54	Barbeque 3 62
7 RED-VIO IJ6-8	2X 7	Right Flip Up 15	Dead Head 3T 23	Left Return Lane 31	A 39	T 47	Right Thumper Bumper 55	Barbeque 4 63
8 RED-GRY IJ6-9	3X 8	Bonus Held 16	Dead Head 4T 24	Right Return Lane 32	M 40	Center Jackpot 48	Bottom Thumper 56	Barbeque 5 64

WARNINGS & NOTICES

WARNING

FOR SAFETY AND RELIABILITY, substitute parts and equipment modifications are not recommended.

USE OF NON-BALLY PARTS or circuit modifications may cause injuries or equipment damage.

SUBSTITUTE PARTS OR MODIFICATIONS may void FCC Type Acceptance.

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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

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

WARNING

FCC STICKER. Check the back of your game for an FCC sticker. When BALLY ships a game, the game has been found to comply with FCC Rules. The sticker is proof. If the sticker is missing, legal repercussions to the owner and distributor of the game may result. If your game (manufactured after December 1982) has no FCC sticker, call BALLY for advice. Or write us a note on your game-registration card. Be sure the card bears your game's serial number.

WARNING

THREE-WIRE PLUG. Prevent shock hazard and assure proper game operation! Only plug this game into a properly grounded outlet. **DO NOT** use a "cheater" plug to defeat the power cord's ground pin. **DO NOT** cut off the ground pin.

RF-INTERFERENCE NOTICE

YOUR GAME'S CABLE-HARNESSES PLACEMENT and ground-strap routing are very important. They are designed to keep RF radiation and conduction within levels accepted by FCC Regulations.

MAINTAIN THESE LEVELS. Servicing may require that you disconnect harnesses or ground straps. When you're finished, reposition and reconnect them as they were.

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