Operations and Parts Information Manual

16-2011-101
August 1989

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: CPU Board	Connections: Playfield/ Cabinet	Driver Trnstr	Solenoid Part No. Flashlamp Type (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-26-1500
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 → Lower Right Flipper		Orn-Vio [2] (Blu-Vio)	1P19-1	2J3-1: 2J18-10: 7P1-15 (7P1-16:2J18-6:2J17-4)	-	FL-11630/50VDC
	Left Flipper → Lower Left Flipper		Orn-Gry [2] (Blu-Gry)	1P19-2	2J3-2: 2J18-9: 7P1-18 (7P1-19:2J18-5:2J17-3)	-	FL-11630/50VDC

Notes: [1] Wire colors, except flipper Orn-Vio and Orn-Gry , are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. [2] Flipper connections shown in braces are from flipper switch to flipper coil. [3] "A" 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 Adjusment 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.

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.

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

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

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

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.

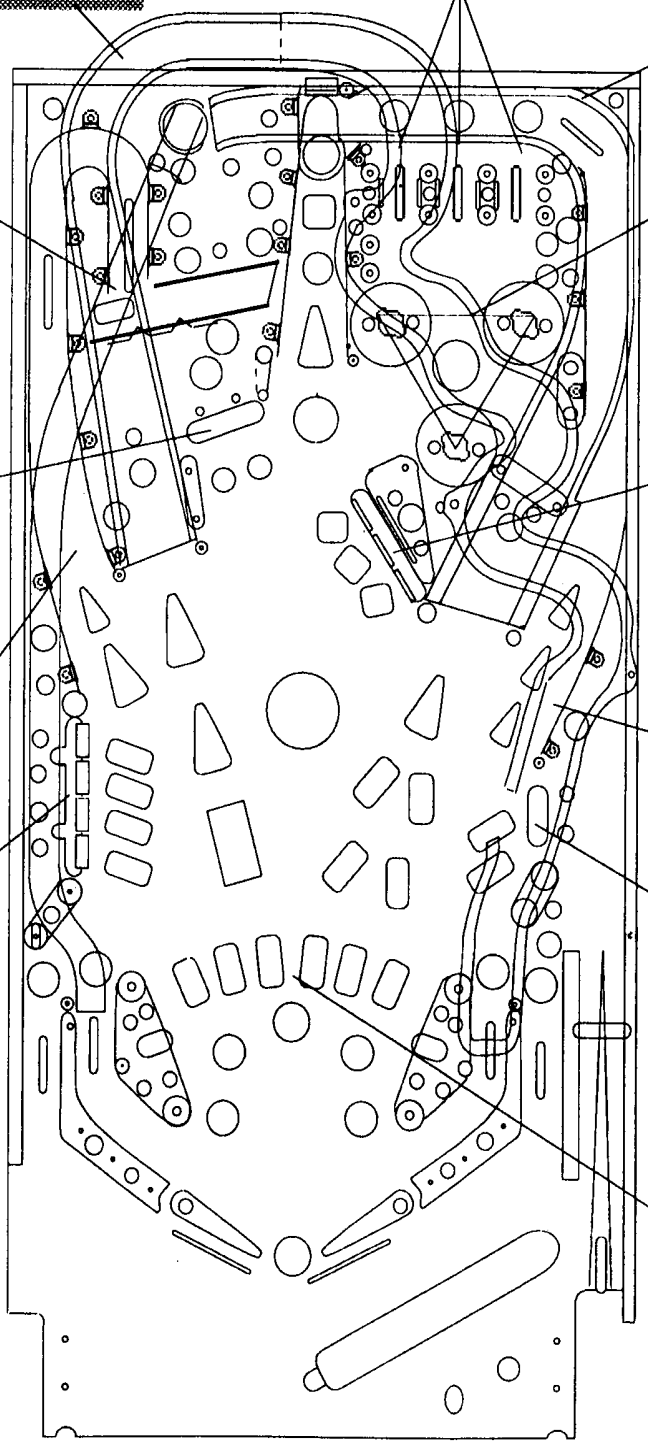


TABLE OF CONTENTS

SECTION 1 — Game Operation & Test Information

SECTION 2 — Game Parts Information

SECTION 3 — Reference Diagram & Schematics

SECTION 1

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 microprocessor.

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.

Power Supply Board

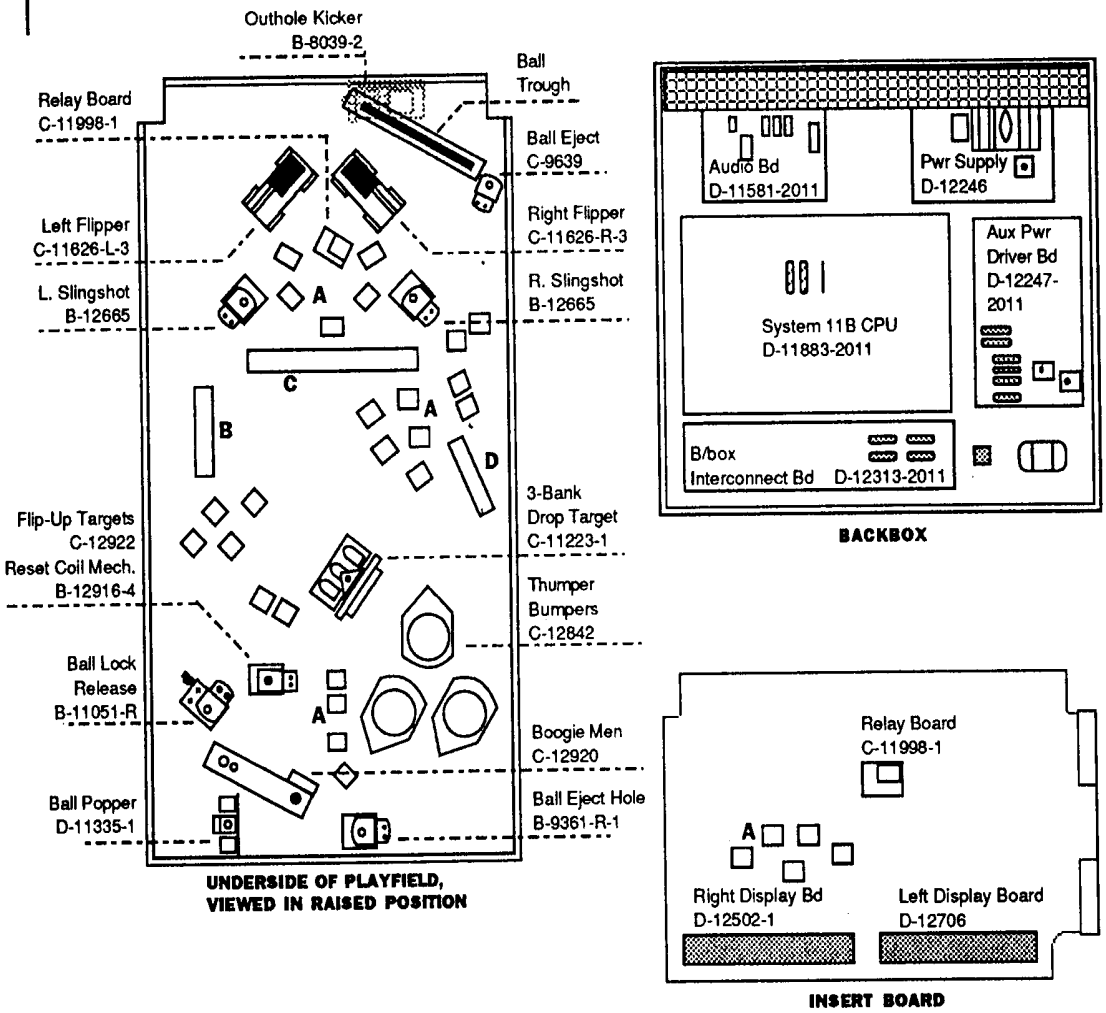
The Power Supply Board is p/n D-12246.

Auxiliary Power Driver Board

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

Master Interconnect Board

The Master Interconnect Board is D-12313-2011.



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

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.

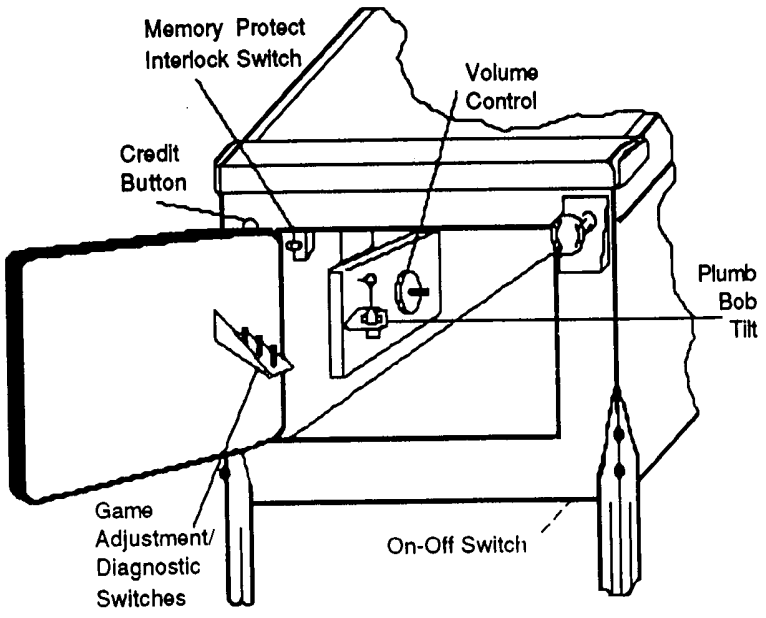


Figure 2. Control Locations

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.

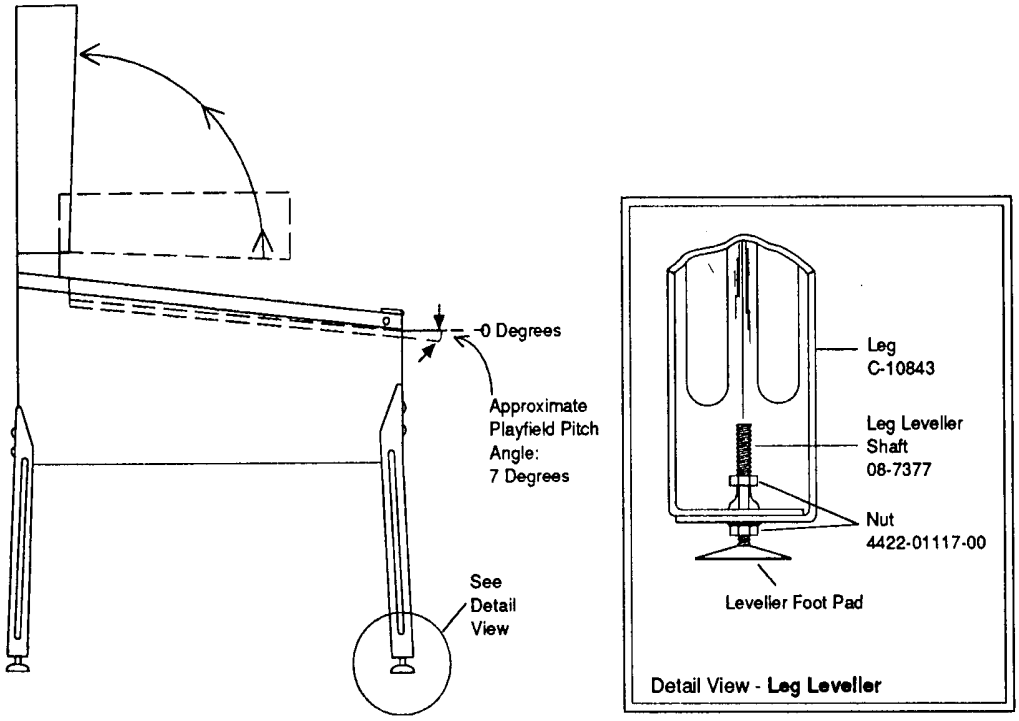


Figure 3. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

C A U T I O N

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 Million 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] *or* FIXED REPLAY [1]		10 (%) SCORES[1]
02	REPLAY START (or REPLAY LEVEL 1) [1]		3,000,000
03	REPLAY LEVELS (or REPLAY LEVEL 2) [1]		01
04	(REPLAY LEVEL 3) [1]		(see text)
05	(REPLAY LEVEL 4) [1]		(see text)
06	REPLAY AWARD		Credit
07	SPECIAL AWARD		Credit
08	MATCH FEATURE	[Off, 1-50%]	8 (%)
09	BALLS/GAME		03
10	TILT WARNING		03
11	B. I. P.		03
12	MAXIMUM CREDITS		10
13	HIGHEST SCORES		On
14	BACKUP HI. SCR.1		8,000,000
15	BACKUP HI. SCR. 2		7,000,000
16	BACKUP HI. SCR. 3		6,000,000
17	BACKUP HI. SCR. 4		5,000,000
18	HI. SCR.1 CREDITS		01
19	HI. SCR.2 CREDITS		01
20	HI. SCR.3 CREDITS		01
21	HI. SCR.4 CREDITS		01
22	H. S. RESET EVERY		3,000
23	FREE PLAY		YES
24	U.S.A. 1 COINAGE (1 COIN 1 PLAY) [2,3,6]		
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	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 Start	4 Ramps
09	Balls/Game	03			
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 NOT USED	AD 54 NOT USED	AD 55 NOT USED	AD 56 Install 1 Coin	AD 57 3 Plays for $1.00	AD 58 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 AD 53	GERMAN 2 AD 54	GERMAN 3 AD 55	GERMAN 4 AD 56	GERMAN 5 AD 57	GERMAN 6 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 Start	7 Ramps
09	Balls/Game	05			
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 Left	Center	Right	Games/Coin	*Ad 24 Display*	Pricing Functions 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	2F	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	20F	-	50 F	1/20 F, 3/50 Franc [2]	BELGIUM	06	00	15	05	00	00

ELVIRA Pricing Table (Continued)

Country	Coin Chute Left	Center	Right	Games/Coin	*Ad 24 Display*	Pricing Functions 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
	1 F	5 F	10 F	1/3x1 F, 2/5 F, 5/10 Franc	CUSTOM	02	10	20	05	20	00
	5 F	10 F	10 F	1/5 F, 3/10 F, 7/2x10 Franc	CUSTOM	03	15	30	10	60	15
	5 F	10 F	10 F	2/5 F, 4/10 F, 9/2x10 Franc	CUSTOM	02	10	20	05	40	10
	5 F	10 F	10 F	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 x 1, or one game for 25¢.

Units Required for Bonus Credit

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

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 LampsTest identifier) and that all feature lamps (playfield and backbox) blink on and off. (Note, however, that the General Illumination lamps remain lighted steadily.) To locate the wiring associated with a particular feature lamp, refer to the Lamp-Matrix Table. CPU Board connections at jacks 1J6 (columns) and 1J7 (rows) are also listed in the table.

2. **Single Lamps**

From the All Lamps test, using AUTO-UP, press ADVANCE to initiate the Single Lamps Test. The Player 1 and 2 displays initially show the message, SINGLE LAMPS, and the Player 3 display shows 04. Then, the Player 3 display shows 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
row								
1 Q80 RED-BRN 1J6-1	E 1	4X 9	Eye 1 17	Left Ramp Sign 25	Right Ramp Potion 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 Elvira 26	Right Ramp Potion 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 Potion 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 Potion 4 36	Boogie 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.

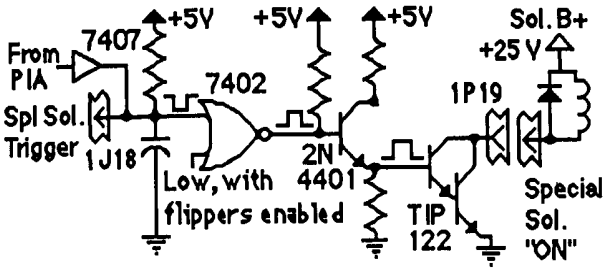
   To continuously pulse a single solenoid/circuit, use MANUAL-DOWN. Press ADVANCE to sequence through the switched, controlled, and special solenoids. Use AUTO-UP to resume test cycling, and to proceed to the next test.

ELVIRA Solenoid Table

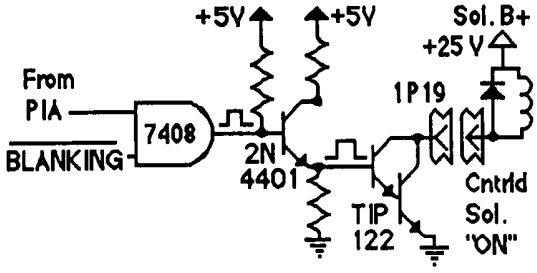
Sol. No.	Function	Solenoid Type	Wire Color	Connections: CPU Board	Connections: Playfield/ Cabinet	Driver Trnstr	Solenoid Part No. Flashlamp Type (i = Insert Bd ; p = Playfield)	
01A[3]	Outhole Kicker	Switched	Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800	
01C[3]	Jets (p)/Bats (i)	Switched	Blk-Brn	(Gry-Brn)	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 → Lower Right Flipper		Orn-Vio[2] (Blu-Vio)	1P19-1	2J3-1: 2J18-10: 7P1-15 (7P1-16:2J18-6:2J17-4)		FL-11630/50VDC	
	Left Flipper → Lower Left Flipper		Orn-Gry[2] (Blu-Gry)	1P19-2	2J3-2: 2J18-9: 7P1-18 (7P1-19:2J18-5:2J17-3)		FL-11630/50VDC	

Notes: [1] Wire colors, except flipper Orn-Vio and Orn-Gry , are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. [2] Flipper connections shown in braces are from flipper switch to flipper coil. [3] "A" 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.

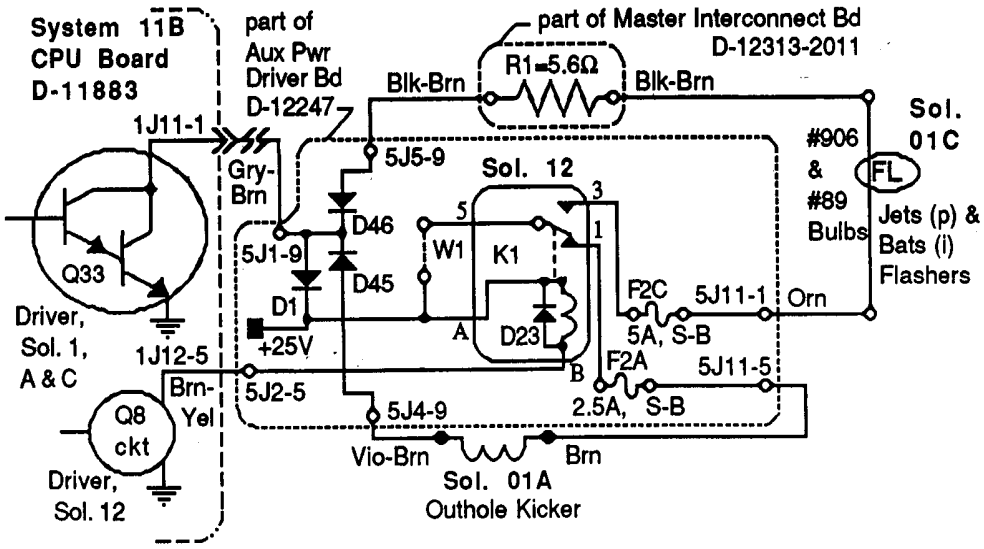


Figure 4. Typical Solenoid A/C Select Relay Circuit, showing the function of Solenoid 12, the Solenoid A/C Select Relay

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	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 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	59
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	60
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	61
6 WHT-BLU 1J10-3	Left Coin 6	14	Top Right Rollover 22	Left Ramp Entry 30	38	A 46	Flip Up Target 2 54	62
7 WHT-VIO 1J10-2	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 1J10-1	High Score Reset 8	Right Standup 2 16	24	Ball Popper 32	40	Eject Hole 48	Flip Up 2 Open 56	64

✔ **Row Problems.** If a display of two (or more) switch numbers of a row occurs, although only one switch is closed, check for a short circuit 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 displays 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 connectingdevices are causing it to appear to have a problem. (The following U26 test is skipped.)
11	U26 ROM FAILURE	U26's internal checksums do not match.

Notes: 1. This test assumes that the Coin Door is OPEN; it is initiated ONLY by pressing the CPU Diagnostic Switch (SW2).

2. Alternatively, its associated connections or connecting devices are causing the IC to appear to have problems.

System 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).

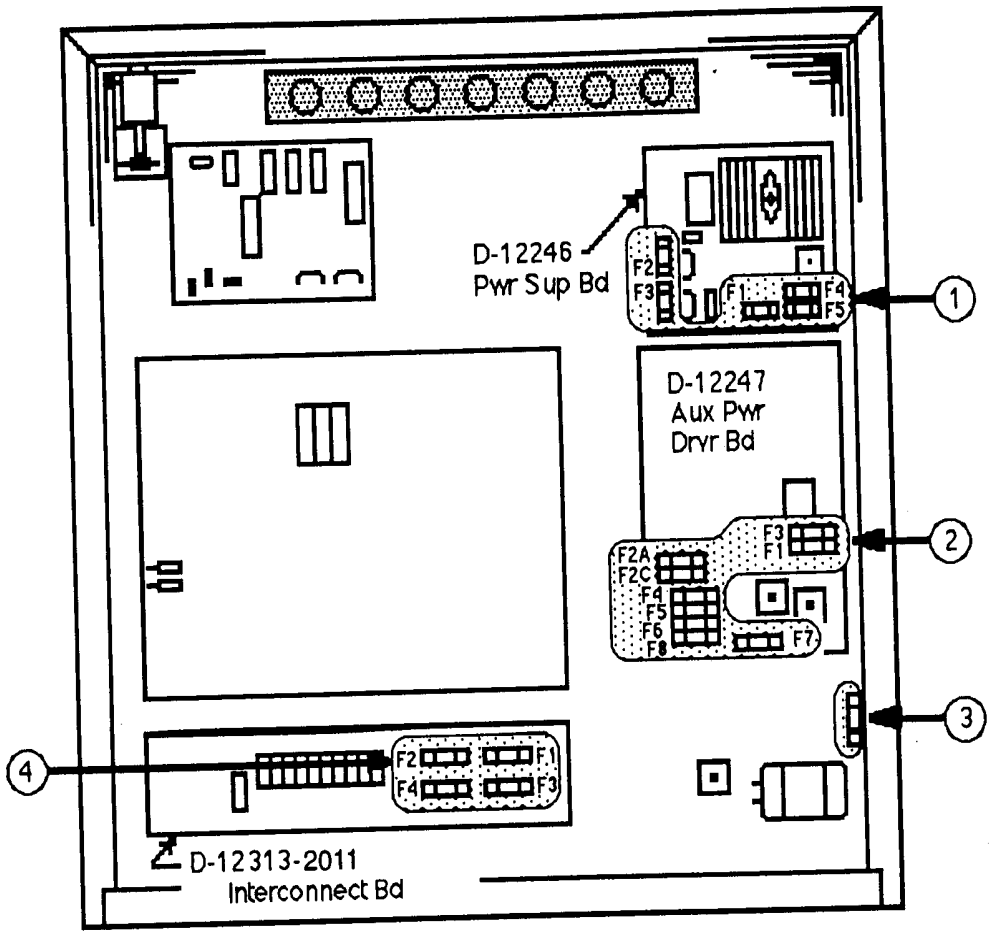
If the previous checks did not isolate the problem, turn the Volume Control for maximum output. Momentarily touch a powered-up AC soldering pencil on the center tap of the Volume Control.

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.

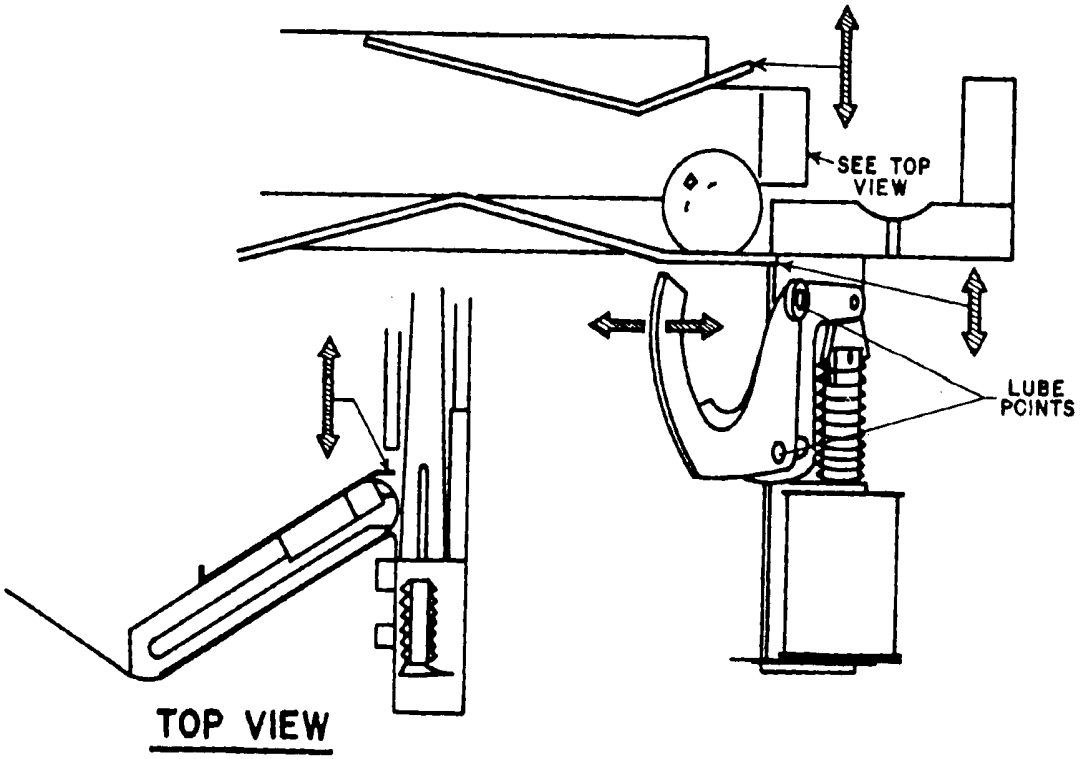


Figure 3. Adjustments and Lubrication Points, Shooter Lane Feeder.

- 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 -MBI Instrument Grease
  -SUNEX #257, WAY OIL -Non-Gumming Lubricant
  -Viscosity: 300-350

- 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.

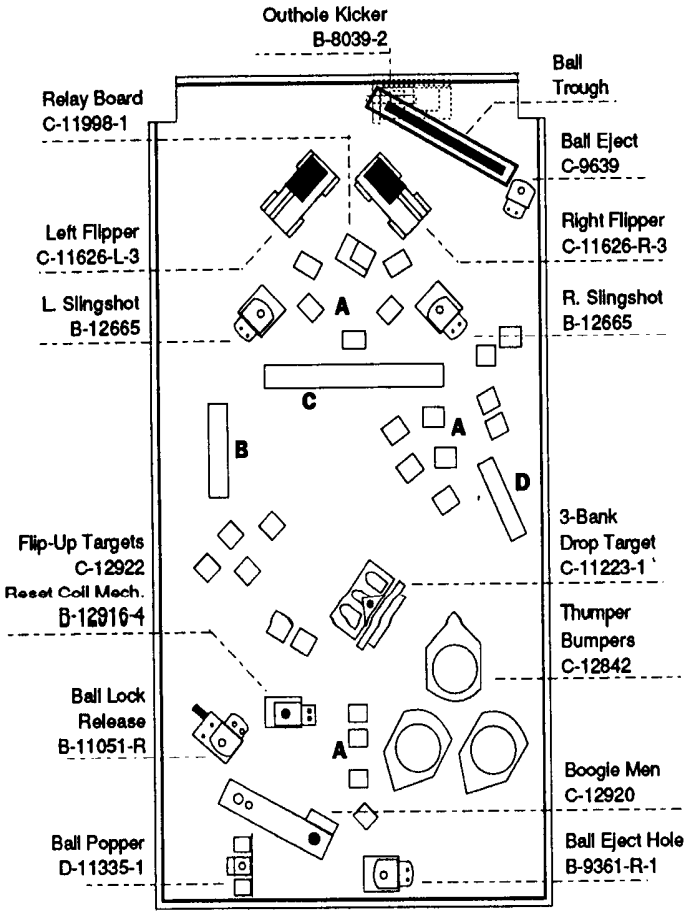
- Switch contacts should be free of dust, dirt , and corrosion. Plating helps switch contacts, (except flipper button switch assemblies) resist corrosion. Filing or burnishing contacts breaks the finish and encourages corrosion. Effective contact cleaning requires gentler treatment. Gently close the 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 swithc 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.

SECTION 2

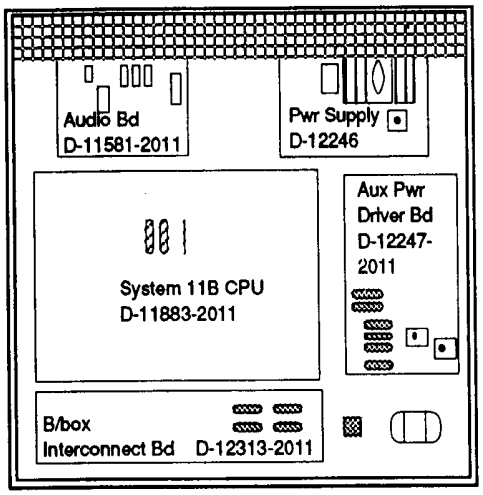
Game Parts Information

ELVIRA

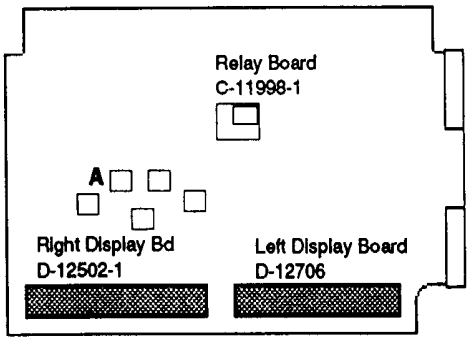
Major Mechanism & Game Circuit Board Locations



UNDERSIDE OF PLAYFIELD, VIEWED IN RAISED POSITION



BACKBOX

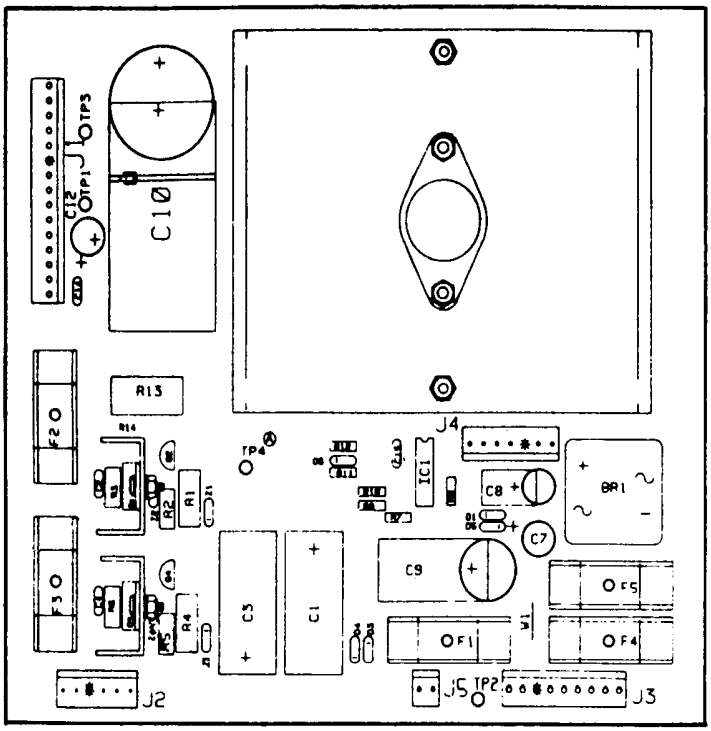


INSERT BOARD

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

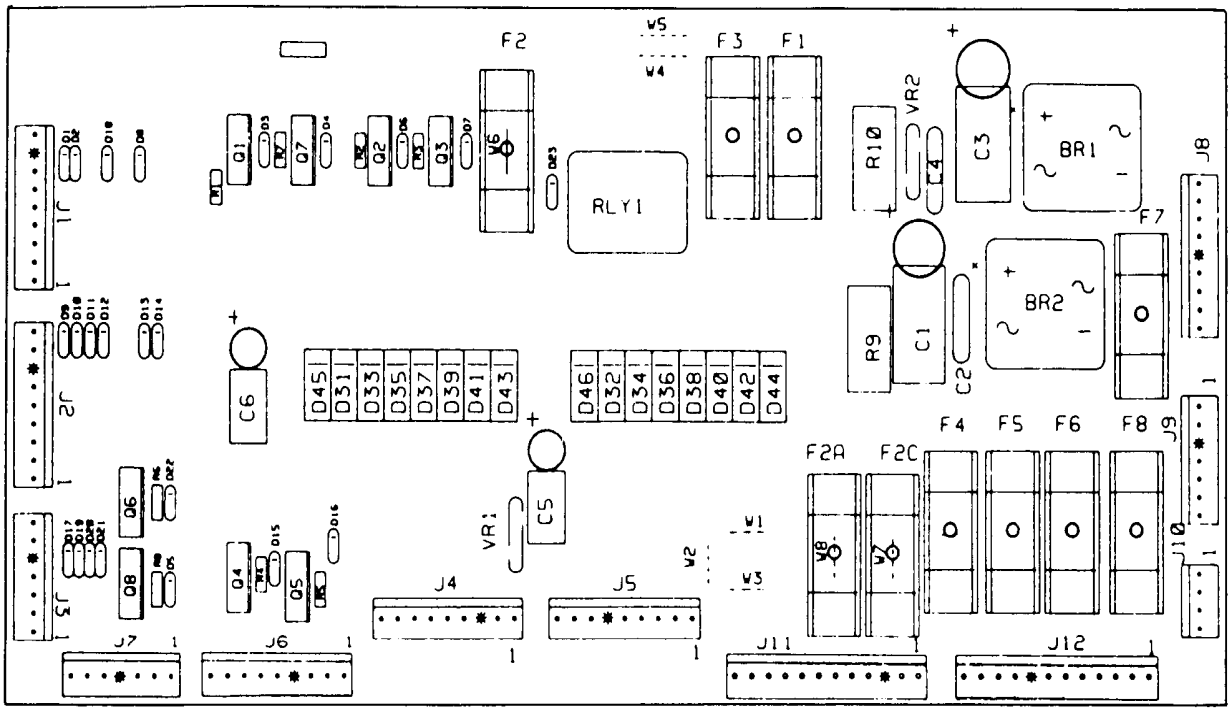


DESCRIPTION	DESIGNATION	PART NUMBER
Power Supply PCB		5765-12317-00
Fuse Holder	F1 - F5	5733-12060-01
Fuse, 7A., S-B, 250v	F4, F5	5731-09432-00
Fuse, 3/8A., S-B, 250v	F1	5731-12328-00
Fuse 1/8 A., 250v	F2, F3	5730-12327-00
Con, 15-pin Hdr, Sq Pin .156	J1	5791-10862-15
Cor, 6-pin Hdr, Sq Pin .156	J2	5791-10862-06
Con, 9-pin Hdr, Sq Pin .156	J3	5791-10862-09
Bridge Rectifier, 35A., 200VB	R1	5100-09690-00
Transistor, MJE15030, NPN	Q1	5164-12154-00
Transistor, MJE15031, PNP	Q3	5194-12155-00
Transistor, MPSD52, PNP	Q2	5194-09055-00
Transistor, MPSD02, NPN	Q4	5164-09056-00
Transistor, 2N6057, NPN	Q5	5162-09425-00
Thermal Pad T0-3		5701-09652-00
Mach. Screw, 6-32 x 3/8		4006-01003-06
Mach. Screw, 6-32 x 1/2		4006-01003-08
Thermal Compound		20-9229
Nut, 6-32 Hex.		4406-01117-00
Resistor,0W	W1	5010-09534-00
Lockwasher, #6 Ext.		4703-00007-00
Heatsink 4"		5705-12330-00
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

DESCRIPTION	DESIGNATION.	PART NUMBER
IC, Volt. Reg., MC1723C5	IC1	5460-09424-00
Resistor, 330K, 5%, 1/2w, C.F.	R3, R6	5010-09069-00
Resistor, 1.2K, 5%, 1/2w	R2, R5	5010-10631-00
Resistor, 39K, 5%,1w	R1, R4	5010-09536-00
Res, 2.15K, 1%, 1/4w, C. F.	R7	5013-09426-00
Res, 4.99K, 1%, 1/4w, C. F.	R8	5013-09427-00
Res, 2.7K, 2%,1/4w, C. F.	R9	5010-09541-00
Resistor, 1.5K, 5%,1/4w, C. F.	R10	5010-09085-00
Resistor, 1.5K, 2%, 1/4w, C. F.	R11	5010-09428-00
Res, 270W, 2%, 1/4w, C. F37	R12	5010-09508-00
Resistor, 0.12W, 5%,5w	R13	5012-09429-00
Cap, 150 mfd, 160v, radial	C1, C3	5040-12324-00
Capacitor, 0.1 mfd, 500v, disc	C2, C4	5043-09072-00
Cap, 100 mfd, 25v, radial	C7	5040-09421-00
Capacitor, 47 mfd, 50v, radial	C8	5040-09422-00
Capacitor, 1000 mfd, electr,	C9	5040-09420-00
25v, axial or radial		5040-08893-00
Capacitor, 18,000 mfd, electr,	1C10	5040-09419-00
20v, axial		
Capacitor, 330 mfd, electr,	C12	5040-09423-00
10v,radial		
Capacitor, 0.1 mfd, 50v, disc	C14	5043-09446-00
Capacitor, 470 pfd	C15	5043-09065-00
Terminal, #1502-1 (Test Post)	TP1-TP4	5824-09248-00
Tie Wrap, 8" Long		03-7947

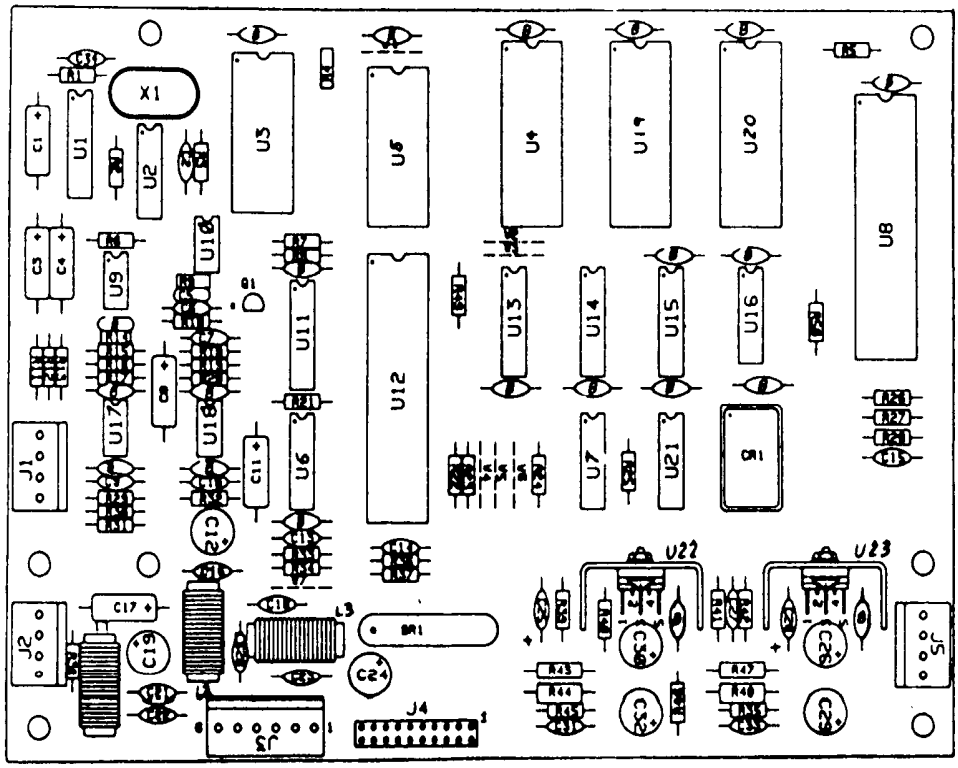
NOTES: 1. Heat sink compound must be applied between transistor and heat sink.
2. Observe index mark on integrated circuit, polarity of capacitors and diodes, and position of transistors.
3. The view of Q5 and its related heat sink and hardware is from the bottom of the heatsink, to clarify installation.

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, 220W, 1/4w, C.F., 5%	8	R1 - R8	5010-09160-00
Resistor, 3.3K, 10%, 5w	1	R9	5012-12238-00
Resistor, 0W, 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.
Bare P. C. Board 1		5766-12130-00
IC, D/A Conv, YM3012		5371-11087-00
Socket, IC, 16-pin (U1)		a) 5700-09006-00
IC, Sound Processor, YM2151	U3	5370-11086-00
Socket, IC, 24-pin (U3)		a) 5700-09004-00
IC, mProcessor, MC68B09E	U8	5400-10320-00
Socket, IC, 40-pin (U8)		a) 5700-08985-00
IC, Audio ROM 1	U4	A-5343-2011-5
IC, Audio ROM 2	U19	A-5343-2011-6
IC, Audio ROM 3	U20	A-5343-2011-7
Socket, IC, 28-pin (U4, U19)		a) 5700-10176-00
IC, D/A Convtr, MC1408	U11	5371-09152-00
IC, PIA, MC68B21	U12	5430-10322-00
IC, RAM/S 5516-2 2Kx8	U5	5340-10139-00
IC, Dual D Flipflop, 74LS74	U16	5281-09487-00
IC, 74LS175	U13	5281-10043-00
IC,Triple NAND, 74LS10	U21	5281-09235-00
IC, Op Amp, MC1458	U9, U10,U17	5370-09321-00
IC, Hex Inv, 74LS04	U2	5281-09215-00
IC, 2-4 Dec, 74LS139	U14	5281-09246-00
IC, Dual Mux, 74LS138	U15	5281-09745-00
IC, Audio Amp, TDA2002	U22, U23	5370-09156-00
Heatsink, #6030B		a) 5705-09199-00
Mach. Screw, 6-32 x 3/8		b) 4006-01003-06
Nut, 6-32 Hex.		c) 4406-01117-00
Lockwasher, #6 Ext.		d) 4703-00007-00
Transistor, 2N3904, NPN	Q1	5160-10269-00
SIP 4.7K & 470pfd, 8R8C	SP1	5060-10396-00
Resistor, 1.0W, 1/2w, 5%	R44, R48	5010-09181-00
Resistor, 2.2W, 1/4w, 5%	R35, R45	5010-09161-00
Resistor, 220W, 1/2w, 5%	R43,R46,R47	5010-09361-00
Resistor, 8.2K, 1/4w, 5%	R38	5010-09219-00
Resistor, 13K, 1/4w, 5%	R16	5010-09331-00

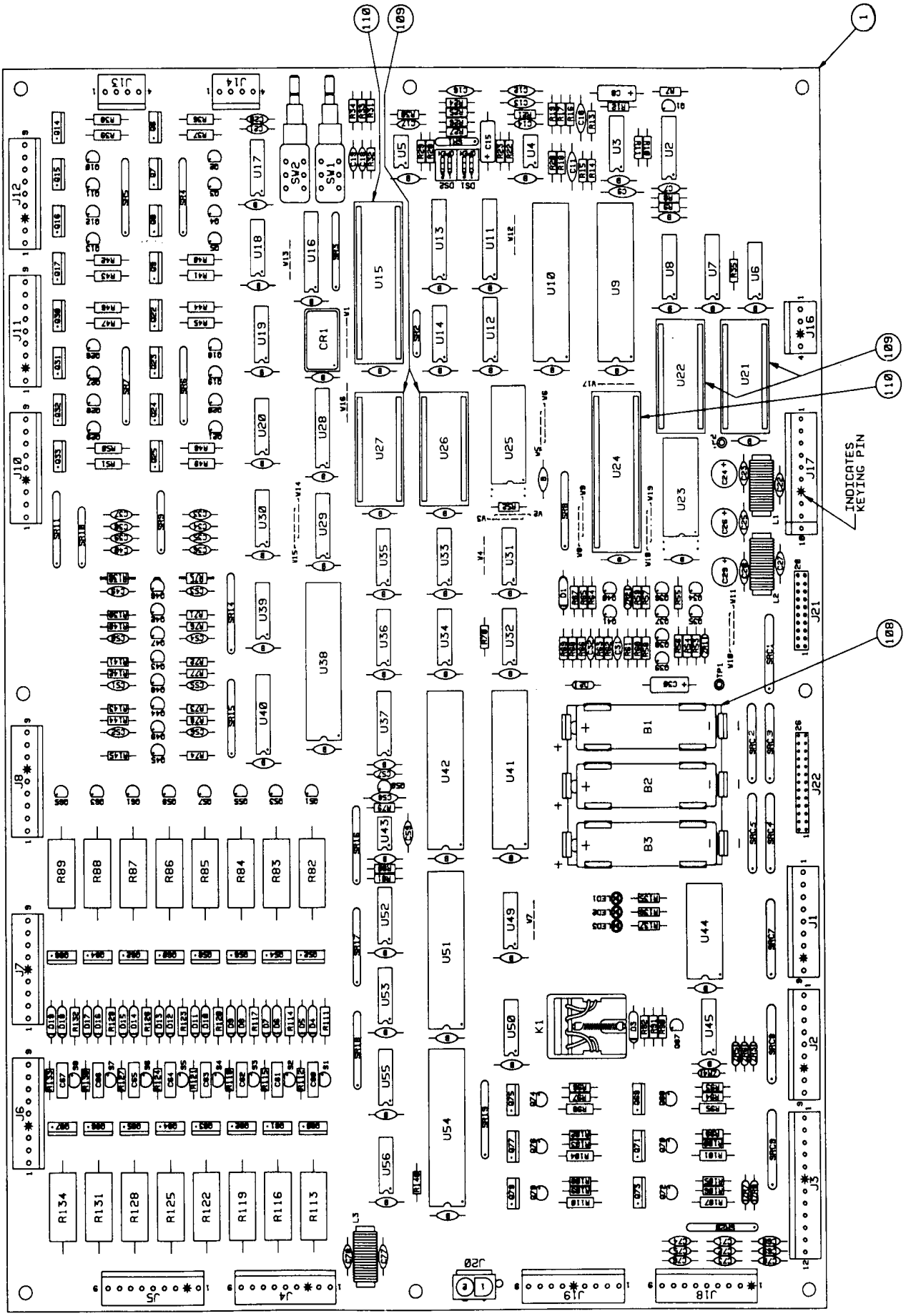
DESCRIPTION	DESIGNATION	PART NO.
Resistor, 20K, 1/4w, 5%	R14-R15	5010-10985-00
Resistor, 4.7K, 1/4w,5%	R12	5010-08991-00
Resistor, 4.99K,1/4w, 1%	R13	5010-09427-00
Resistor, 1K, 1/4w, 5%	R41, R42	5010-09358-00
Resistor, 2.2K, 1/4w, 5%	R2,R3,	5010-08998-00
Resistor, 3.3K, 1/4w, 5%	R7 - R9	5010-08983-00
Resistor, 4.7K, 1/4w, 5%	R1,R4,R5,R11, R26 - R28, R33,R36, R37, R49, R50	5010-08991-00
Resistor, 10K, 1/4w, 5%	R16 - R17	5010-09034-00
Resistor, 27K, 1/4w, 5%	R6,	5010-09324-00
Resistor, 100K, 1/4w, 5%	R39	5010-09162-00
Resistor, 1M, 1/4w, 5%	R40	5010-10258-00
Resistor, 3.3M, 1/4w, 5%	R10	5010-09179-00
Resistor, 0W, 1/4w, 5%	W9	5010-09534-00
Capacitor, 10mfd, 20v, ±20%	C1,C3,C4,C8	5040-09343-00
Capacitor, 100mfd, 35v	C12,C19,C24	5040-10974-00
Cap, 470mfd, 16v; +50, -10%	C26, C30	5040-09776-00
Capacitor, 1000mfd, 16v, 20%	C29, C32	5040-12006-00
Capacitor, 10mfd, 10v,±10%	C25, C28	5041-09243-00
Cap, 0.01mfd, 50v,+80, -20%	C5, B (17)*	5043-08980-00
Capacitor, 0.1mfd, 50v, ±20%	C31, C33	5043-08996-00
Capacitor, 470 pfd, 50v, ±20%	C13 - C15	5043-09065-00
Capacitor, 100 pfd, 50v, ±10%	C2, C34	5043-09492-00
Capacitor, 47 pfd, 50v, ±20%	C6	5043-09844-00
Capacitor, 1000 pfd, 50v, ±20%	C16,C18,C20 - C23, C27	5043-09845-00
Crystal, 3.58 MHz	X1	5520-09020-00
Oscillator, 8 MHz	CR1	5521-10931-00
Inductor, 4.7 mH, 3A	L1 - L3	5551-09822-00
Con, 20 pin, (Hdr), Rib, Cbl	J4	5791-09437-00
Connector, 4 pin (Hdr)	J1, J2 J5	5791-10862-04
Connector, 6 pin (Hdr)	J3	5791-10862-06
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.

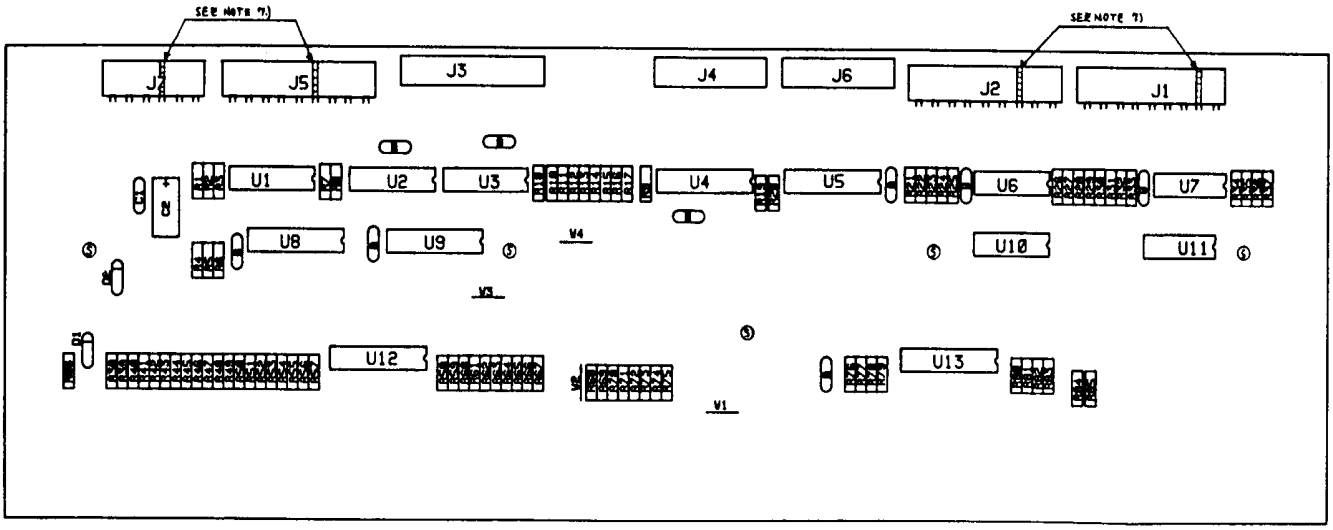
System 11B CPU Board
D-11883-2011

Item	Part Number	Ckt Designator	Description
1	5764-12206-00		Bare P. C. Board
2	5370-09691-00	U3	IC, CVSD Mod., 55536
3	5370-09321-00	U4, U5	IC, Dual Op Amp, 1458
4	5281-09308-00	U16	IC, Octal Bus Xcvr, 74LS245
5	5430-08972-00	U9, U10, U38, U41, U42, U51, U54	IC, PIA, MC6820/6821
6	5340-10139-00	U25	IC, 2K x 8 CMOS Static RAM
7	5280-09010-00	U44	IC, 4-16 Decoder, 74154
8	5281-09246-00	U7, U8, U12	IC, 2-4 Decoder, 74LS139
9	5075-09406-00	ZR3 - ZR8	Diode, Zener, 6.2v, 0.5w
10	5164-10998-00	Q42 - Q49	Transistor, NPN, 2N5550, TO-92
11	5281-09487-00	U6	IC, Dual D Flip-flop,74LS74
12	5431-09449-00	U43	IC, Timer, MC1455
13	5310-09236-00	U29	IC, 14-b Counter, 40200
14	5281-09743-00	U32	IC, Quad 2-Input AND, 74LS08
15	5281-09247-00	U14	IC, Quad 2-Input NOR, 74LS02
16	5281-09235-00	U35	IC, Triple 3-Input NAND, 74LS10
17	5280-09013-00	U36	IC, Hex Inverter, 7404
18	5281-09499-00	U31, U34	IC, Quad 2-Input NAND, 74LS00
19	5281-10014-00	U33	IC, Dual 4-Input NAND, 74LS20
20	5281-09486-00	U28	IC, Octal D Flip-flop, 74LS374
21	5371-09152-00	U2	IC, D/A Converter, MC1408
22	5281-09745-00	U37	IC, 3-8 Decoder, 74LS138
23	5340-09878-00	U23	IC, 2K x 8 Static RAM, 2016
24	Not Used		
25	5281-09867-00	U11, U13, U40	IC, Octal Buffer, 74LS244
26	5280-08973-00	U17-U20, U52, U53	IC, Quad 2-Input AND, 7408
27	5280-08974-00	U55, U56	IC, Hex Inverter, 7406
28	5310-09155-00	U30, U39	IC, Quad 2-Input NAND, MC14011
29	5280-08948-00	U45, U50	IC, Quad 2-Input NOR, 7402
30	5280-09309-00	U49	IC, Hex Buffer, 7407
31	5671-09019-00	LED1-LED3	LED, Red, Display
32	5521-10506-00	CR1	Oscillator, 4 MHz
33	5162-08976-00	Q51, Q53, Q55, Q57, Q59, Q61, Q63, Q65	Transistor, NPN Darl. 2N6427, TO-92
34	5191-08978-00	Q52, Q54, Q56, Q58, Q60, Q62, Q64, Q66	Transistor, PNP, TIP42, TO-220
35	5162-09410-00	Q6-Q9, Q14-Q17, Q22-Q25, Q30-Q33, Q69, Q71, Q73, Q75, Q77, Q79, Q80-Q87	Transistor, NPN, TIP122, TO-220
36	5160-08938-00	Q2-Q5, Q10-Q13, Q18-Q21, Q26-Q29, Q34-Q38, Q41, Q67, Q68, Q70, Q72, Q74, Q76, Q78	Transistor, NPN, 2N4401, TO-92
37	5160-10269-00	Q1, Q40	Transistor, NPN, 2N3904, TO-92
38	5190-09016-00	Q39, Q50	Transistor, PNP, 2N4403, TO-92
39	5130-09014-00	S1-S8	SCR, 30v, 0.8A, 2N5060
40	5070-06258-00	D3-D19	Diode, 1N4001
41	5070-08919-00	D2	Diode, 1N4148, 150mA
42	5070-09266-00	D1	Diode, 1N5817, 1.0A
43	5075-09018-00	ZR1	Diode, Zener, 1N5996A, 6.8v, 0.5w
44	5075-09059-00	ZR2	Diode, Zener, 1N5990, 3.9v, 0.5w
45	5010-08992-00	R94, R97, R100, R103, R106, R109	Resistor, 560Ω, 5%, 1/4w, C. F.
46	5010-09039-00	R56	Resistor, 10Ω, 5%, 1/4w, C. F.
47	5010-09534-00	W1, W2, W4, W5, W7, W8, W11, W14, W16, W17, W19	Resistor, 0Ω, 5%, 1/4w, C. F.
48	5010-08991-00	R31, R32, R35, R52 R55, R68, R92, R146	Resistor, 4.7KΩ, 5%, 1/4w, C. F.
49	5010-09358-00	R54, R57, R58, R64, R66, R138-R145	Resistor, 1.0KΩ, 5%, 1/4w, C. F.
50	5010-09113-00	R79	Resistor, 33KΩ, 5%, 1/4w, C. F.
51	5010-08983-00	R7, R8, R10, R70, R80	Resistor, 3.3KΩ, 5%, 1/4w, C. F.
52	5010-09034-00	R11-R14, R25, R26, R53, R60, R65, R90	Resistor, 10KΩ, 5%, 1/4w, C. F.
53	5010-09086-00	R81	Resistor, 6.8KΩ, 5%, 1/4w, C. F.
54	5010-09363-00	R3	Resistor, 5.6KΩ, 5%, 1/4w, C. F.
55	5010-08997-00	R23, R24, R91, R93, R96, R99, R102, R105, R108, R112, R115, R118, R121, R124, R127, R130, R133	Resistor, 2.7KΩ, 5%, 1/4w, C. F.
562	5012-09037-00	R113, R116, R119, R122, R125, R128, R131, R134	Resistor, 0.4Ω, 5%, 3w, Wire-Wnd.
57	5010-08993-00	R36-R51, R95, R98, R101, R104, R107, R110	Resistor, 68Ω, 5%, 1/2w, C. F.
582	5012-10860-00	R82-R89	Resistor, 27Ω, 5%, 2w, C. F.
59	Not Used		
60	Not Used		
61	5010-10987-00	R19	Resistor, 56KΩ, 5%, 1/4w, C. F.
62	5010-10003-00	R62, R63	Resistor, 390Ω, 5%, 1/4w, C. F.
63	5010-10171-00	R67	Resistor, 56Ω, 5%, 1/4w, C.F.
64	5010-10170-00	R69	Resistor, 47Ω, 5%, 1/4w, C. F.
65	5010-09160-00	R59, R61, W12, W13	Resistor, 220Ω, 5%, 1/4w, C. F.
66	5010-09416-00	R33, R34, R71-R78, R135-R137	Resistor, 470Ω, 5%, 1/4w, C. F.
67	5010-09179-00	R9	Resistor, 3.3MΩ, 5%, 1/4w, C. F.
68	Not Used		
69	5010-10631-00	R111, R114, R117, R120, R123, R126, R129, R13	Resistor, 1.2KΩ, 5%, 1/2w, C. F.
70	Not Used		
71	Not Used		
72	5010-09120-00	R17	Resistor, 270KΩ, 5%, 1/4w, C. F.
73	5010-09333-00	R15, R16, R18	Resistor, 180KΩ, 5%, 1/4w, C. F.
74	5010-09324-00	R29, R30	Resistor, 27KΩ, 5%, 1/4w, C. F.
75	5010-09269-00	R20, R21	Resistor, 12KΩ, 5%, 1/4w, C. F.
76	5010-09356-00	R27, R28	Resistor, 820Ω, 5%, 1/4w, C. F.
77	5019-09783-00	SR18	SIP, 9R, 10-pin, 6.8KΩ, .125w/R,
78	5019-09362-00	SR3, SR15, SR17, SR19, SR20	SIP, 9R, 10-pin, 4.7KΩ, .125w/R,
79	5019-09808-00	SR4, SR6, SR11	SIP, 9R, 10-pin, 560Ω, .125w/R, 5%
80	5019-09785-00	SR16	SIP, 9R, 10-pin, 2.2KΩ, .125w/R, 5%
81	5019-10472-00	SR14	SIP, 9R, 10-pin, 3.3KΩ, .125w/R, 5%
82	5019-09669-00	SR8	SIP, 9R, 10-pin, 1.0KΩ, .125w/R, 5%
83	5019-09780-00	SR9, SR10	SIP, 4R, 8-pin, 1KΩ, 5%
84	5019-09786-00	SR1, SR2	SIP, 5R, 6-pin, 4.7KΩ, .125w/R, 5%
85	5019-09792-00	SR5, SR7	SIP, 9R, 10-pin, 2.7KΩ, .125w/R, 5%
86	5060-10396-00	SRC1 - SRC5, SRC7 - SRC9	SIP, 8R, 8C,10-pin, 4.7KΩ & 470pfd
87	5010-08774-00	R22	Resistor, 22KΩ, 5%, 1/4w, C. F.
88	5043-08980-00	C14, C17-C21, C31, C32, C49-C56, C59, + 54 Bypass, marked B	Capacitor, 0.01 µfd, 50v(+80,-20%),
89	5043-09845-00	C22, C23, C25, C27, C28	Capacitor, 1K pfd, 50v(±20%), Axial
90	5043-08996-00	C9, C70-75, C77, C78	Capacitor, 0.1 µfd, 50v(±20%), Axial
91	5040-09343-00	C8, C15	Capacitor, 10 µfd, Electr., 20v(±20%)
92	5043-09844-00	C7	Capacitor, 47 pfd, 50v(±20%), Axial
93	5040-10974-00	C24, C26, C29	Capacitor, 100 µfd, Electr., 25v(+50, Axial
94	Not Used		
95	5045-09796-00	C60-C67	Capacitor, 0.1 µfd, Polycarbonate Rad 100v(±10%)
96	5043-09065-00	C33-C40, C68, C69, C76, C10, C12	Capacitor, 470 pfd, 50v(±20%), Axial
97	5040-09545-00	C30	Capacitor, 22 µfd, Electr., 10v(+50,- Axial
98	5041-09031-00	C58	Capacitor, 1 µfd, Tant., 25v(±20%), Axia
99	5043-09030-00	C16, C57	Capacitor, 0.047 µfd, 50v(±20%), Axial
100	Not Used		
101	5043-09492-00	C11	Capacitor, 100 pfd, ceramic,100v(±2
102	Not Used		
103	5048-10992-00	C13	Capacitor, 4700 pfd, ceramic,50v(±1
104	5551-09822-00	L1-L3	Inductor, 4.7 µH, 3A
105	5641-09312-00} 5641-09653-00}	SW1, SW2	Switch, Pushbutton, DPDT, 100v, 5A
106	5880-09022-00	B1-B3	Battery, Alkaline, 1.5v, AA
107	20-9491	W18, W19	Bus Wire, Jumper
108	5881-09021-00		Battery Holder, #171
109	5700-10176-00		IC Socket, 28 pin
a)	A-5343-2011-1	U26	IC, Game ROM 2, 27128
b)	A-5343-2011-2	U27	IC, Game ROM 1, 27256
c)	A-5343-2011-3	U22	IC, Sound ROM 2, 27256
d)	A-5343-2011-4	U21	IC, Sound ROM 1, 27256
110	5700-08985-00		IC Socket, 40 pin
a)	5400-09150-00	U15	IC, µProcessor, 6802
b)	5400-09150-00	U24	IC, µProcessor, 6802
111	5824-09248-00	TP1, TP2	Test Point
112 - 115	Not Used		
116	20-9229		Thermal Compound
117	5580-08994-01	K1	Relay, 4-pole, 40Ω, 6v
118	5791-10862-09	1J1, 1J2, 1J4-1J8, 1J10-1J12, 1J17-1J19	Connector, 9 pin (Hdr)
119	5791-10862-04	1J13, 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

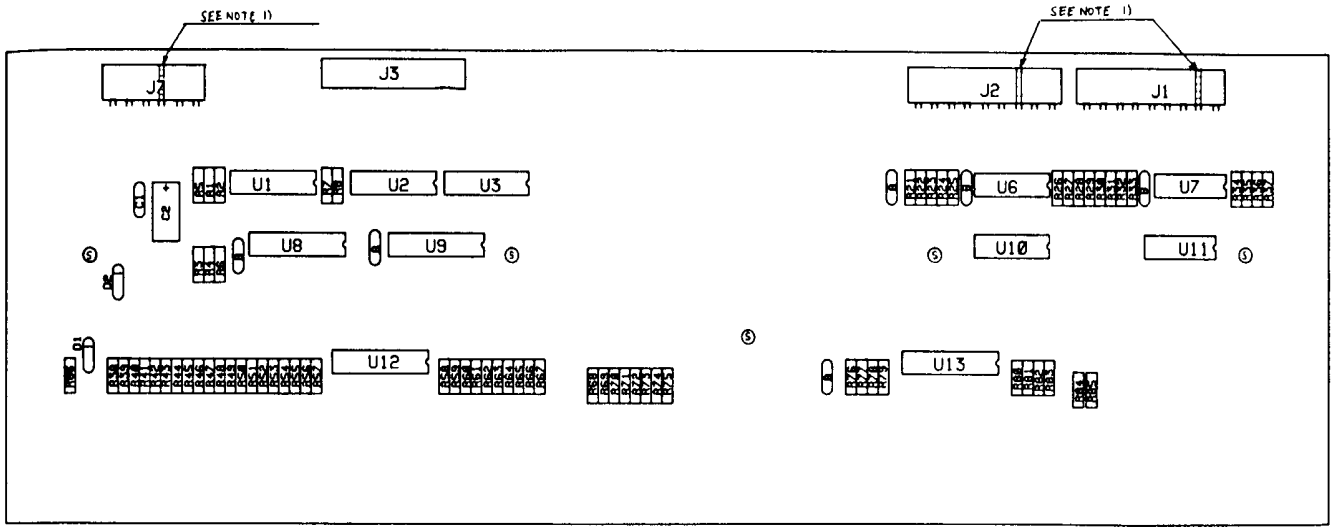


Bally Right Display Board
D-12502-1



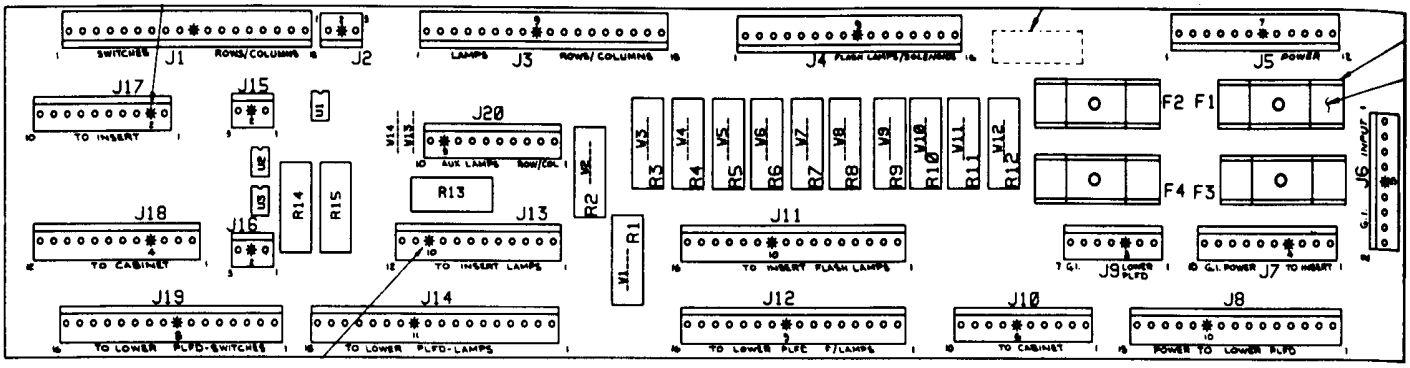
DESCRIPTION	QTY.	DESIGNATION NO.	PART NUMBER
Axial Cap., 0.01mfd, 50v, +80, -20%	9	B (Bypass Cap)	5043-08980-00
Axial Cap., 0.1mfd, 50v, +80, -20%	1	C1	5043-08996-00
Axial Cap., 10mfd, 25v, ±20%	1	C2	5040-09343-00
Zener, 1N4740, 10v	2	D1, D2	5075-09135-00
Display, 16-Character A/N	1	DSPL1	5670-12308-00
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., 0.01mfd, 50v, +80, -20%	6	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	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, Catode Driver	2	U8, U9	5680-08969-00
I.C. 6118, Anode Driver	2	U12, U13	5680-08968-00
Bally-Hi-Display PCB	1		5768-12408-00
Support Display5		S (Support)	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 Pifid 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	B-11051-R
	Coil Assy	B-9362-R-1
2	Red Standup Target	B-11696-4
3	L. Slingshot Kicker	B-12665
	Left Coil Assy	B-11203-L-1
4	R. Slingshot Kicker	B-12665
	Right Coil Assy	B-11203-R-1
5	Round Target	B-12879
6	Flip Up Targets	C-12922
	Reset Coil Mech.	B-12916
	Standup Target	B-11696-4
7	Hexagonal Target	B-13030
8	Rectangular Target	B-13031
9	Ball Eject Hole	B-9361-R-1
	Coil Assy	B-9362-R-1
10	3-Bank Drop Target	C-11223-1
11	Left Flipper Assy	C-11626-L-3
	Flipper, Yellow	20-9592-6
12	Right Flipper Assy	C-11626-R-3
	Flipper, Yellow	20-9592-6
13	Thumper Bumpers	C-12842
14	Boogie Men Mech.	C-12920
	Boogie Man, Rub.	23-6639
15	Ball Popper	D-11335-1
16	Skull & Lights Assy	B-13069
17	Ball Trough Assy	B-8623

Guides, Gates, Ramps, & Wireforms

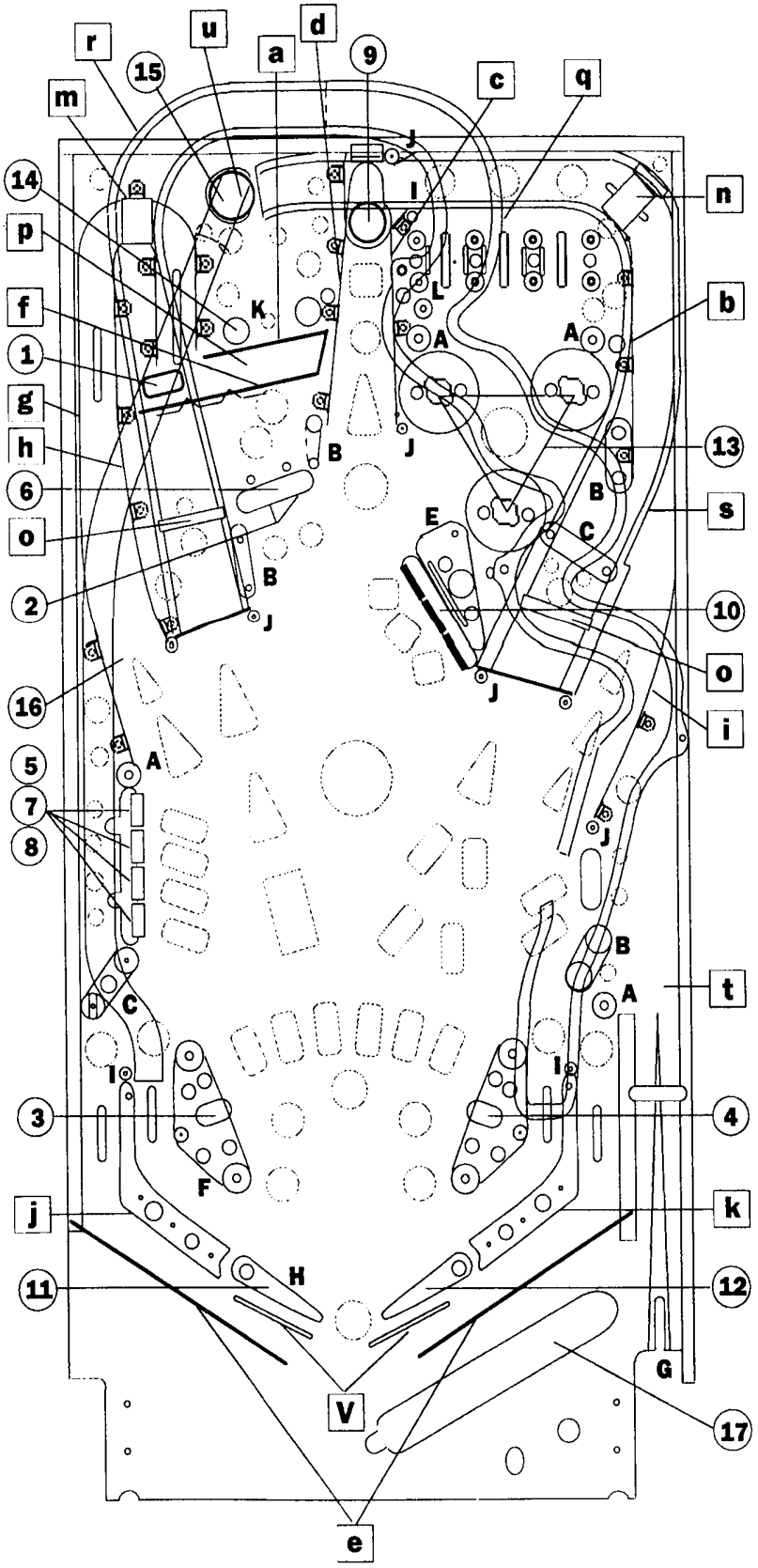
ITEM	DESCRIPTION	PART NUMBER
a	Release Guide, Upper	A-13049
b	Ball Guide Assy	B-13050
c	Eject Guide, Right	B-13051
d	Eject Guide,Left	B-13052
e	Bottom Arch Guides	D-12861-1
f	Release Guide, Lower	B-13010
g	Skull Guide, Right	C-13054
h	Skull Guide, Left	C-13055
i	Pizza Passage Guide	D-13056
j	L. Flipper Ball Guide	B-12919
k	R. Flipper Ball Guide	B-12918
l	Ball Gate Assy	A-13101
m	Ball Gate Assy	A-8112-L
	Hinge Pin	02-2413
n	Ball Gate Assy	A-8244-R
	Hinge Pin	02-2413-1
o	Switch Gate Assy	A-13068
	Wireform	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	Boogie 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

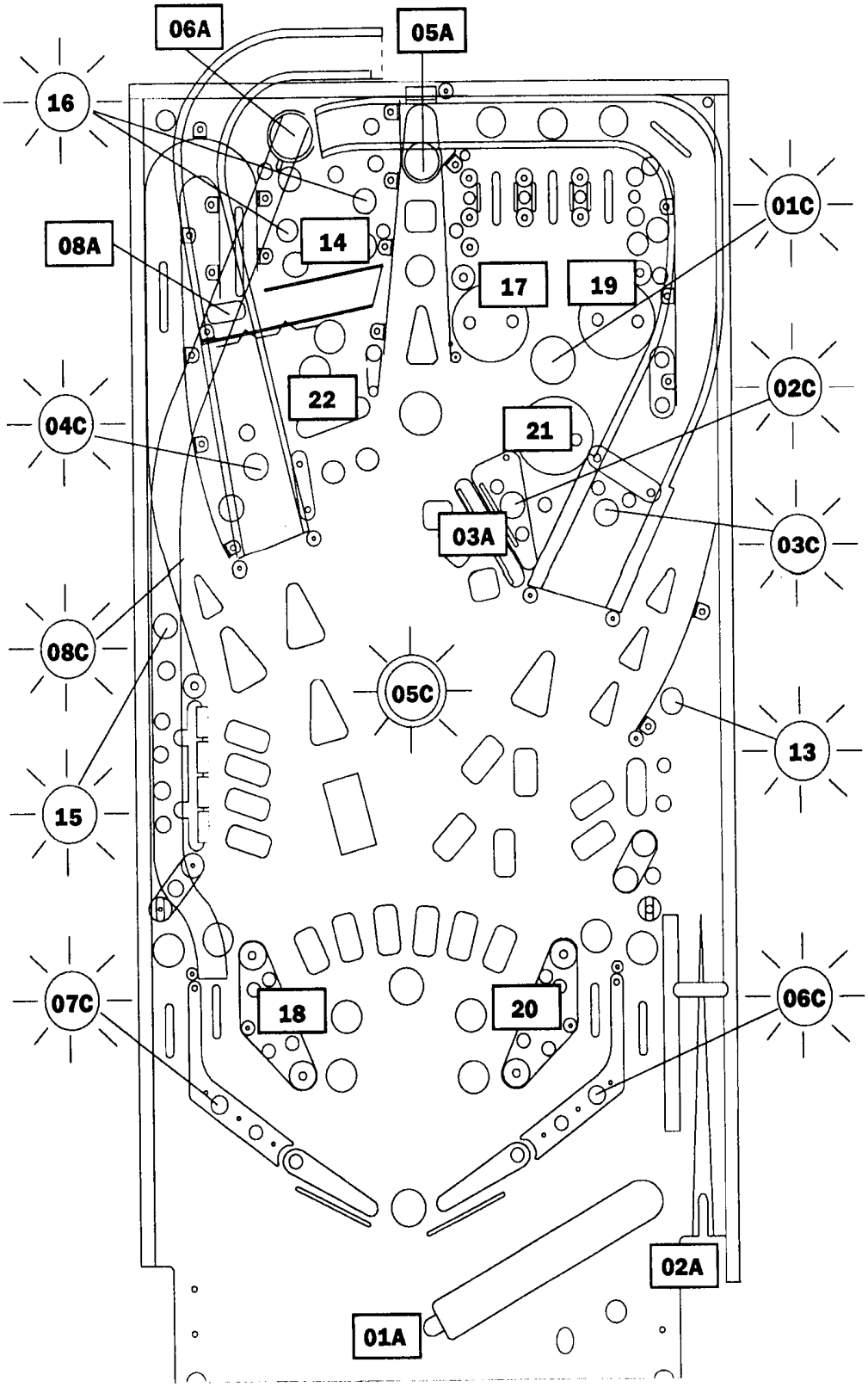


Solenoids & Flashers

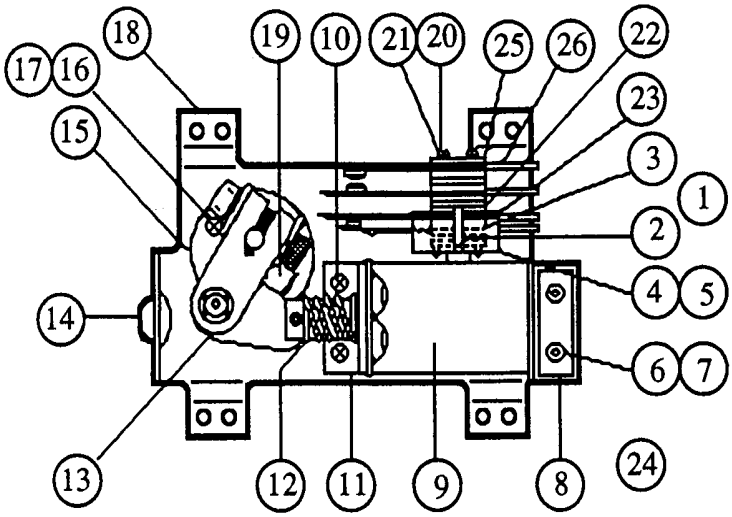
Sol. No.	Function	Solenoid Type	Wire Color	Connections: CPU Board	Connections: Playfield/ Cabinet	Driver Trnstr	Solenoid Part No. Flashlamp Type (I = Insert Bd ; p = Playfield)
01A[3]	Outhole Kicker	Switched	Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800
01C[3]	Jets (p)/Bats (i)	Switched	Blk-Brn	(Gry-Brn)	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 → Lower Right Flipper		Orn-Vio [2] (Blu-Vio)	1P19-1	2J3-1: 2J18-10: 7P1-15 (7P1-16:2J18-6:2J17-4)	-	FL-11630/50VDC
	Left Flipper → Lower Left Flipper		Orn-Gry [2] (Blu-Gry)	1P19-2	2J3-2: 2J18-9: 7P1-18 (7P1-19:2J18-5:2J17-3)	-	FL-11630/50VDC

Notes: [1] Wire colors, except flipper Orn-Vio and Orn-Gry , are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. [2] Flipper connections shown in braces are from flipper switch to flipper coil. [3] "A" 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

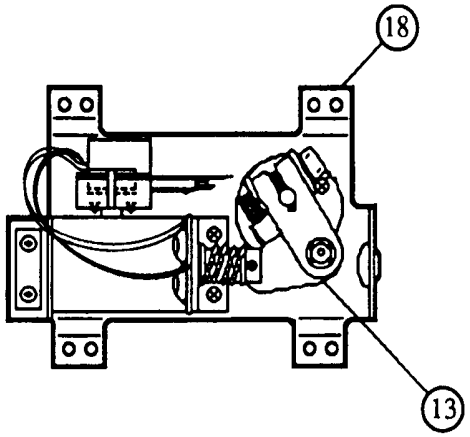


ITEM	PART NO.	DESCRIPTION
1	HW-30018-6	Wire, 18 AWG, Blue
2	03-7520-2	Ty-Wrap, Nylon
3	20-6516	Speednut, Tinnerman
4	5045-12098-00	Cap, 2.2 nFd, 250V, 20%
5	RM-21-06	Sleeve, Vinyl (Cap. leads)
6	4010-01066-06	Cap Screw,10-32 x 3/8,SH
7	4701-00004-00	Lockwasher, #10 Split
8	A-12111	Flipper Stop Assembly
9	FL-11630	Flipper Coil (Red),
10	4006-01017-06	M.S., 6-32x3/8,PRH-S
11	01-7695	Solenoid Bracket
12	10-376	Coil Plunger Spring
13	B-10655-R	Crank Link Assembly, Right
a)	02-4179	Link Spacer Bushing
b)	4010-01086-14	Cap Screw,10-32 x 7/8, SH
c)	4700-00023-00	Washer, 5/8 o.d.x13/64 i.d.x16ga.
d)	4701-00004-00	Lockwasher, #10 Split
e)	4410-01132-00	Nut, 10-32 ESNA
f)	A-10656**	Flipper Link Assembly
1.)	02-4219	Coil Plunger
2.)	20-9370-1	Spring Pin, 5/32 dia.x7/16
3.)	03-8050-1	Flipper Link
g)	B-10657-R	Flipper Crank Assey, Right
1.)	01-8073-R	Flipper Crank, Right
2.)	17-1037	Crank Washer

ITEM	PART NO.	DESCRIPTION
g)	B-10657-R	Flipper Crank Assy, Right
1.)	01-8073-R	Flipper Crank, Right
2.)	17-1037	Crank Washer
3.)	4010-01066-18	Cap Screw,10-32 x1-1/8, HCS
4.)	4410-01127-00	Nut, 10-32 Hex Hd.
5.)	4700-00107-00	Washer, 5/8 o.d.x13/64 i. d.x12ga.
6.)	4701-00004-00	Lockwasher, #10 Split
7.)	RM-23-06	Tubing, H. S. 1/4 DWP
14	23-6577	Bumper Plug
15	03-7568	Flipper Bushing
16	4006-01005-06	M.S., 6-32 x 3/8, P-PH
17	4406-01117-00	Nut, 6-32 Hex
18	C-11627-R	Flipper Base Assy,Right
19	06-14G	Insulating Blade
20	4105-01001-20	Sh. Met Screw, #5x1-1/4
21	4701-00002-00	Lockwasher, #6 Split
22	23-6622	Tape, Double-sided
23	03-7811	End of Stroke (EOS) Sw.
24	HW-30018-64	Wire,18 AWG, BLU-YEL
25	01-3670	Switch Plate-Curve
26	SW-1A-183	Flipper Switch

** - 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 actu- ated 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.

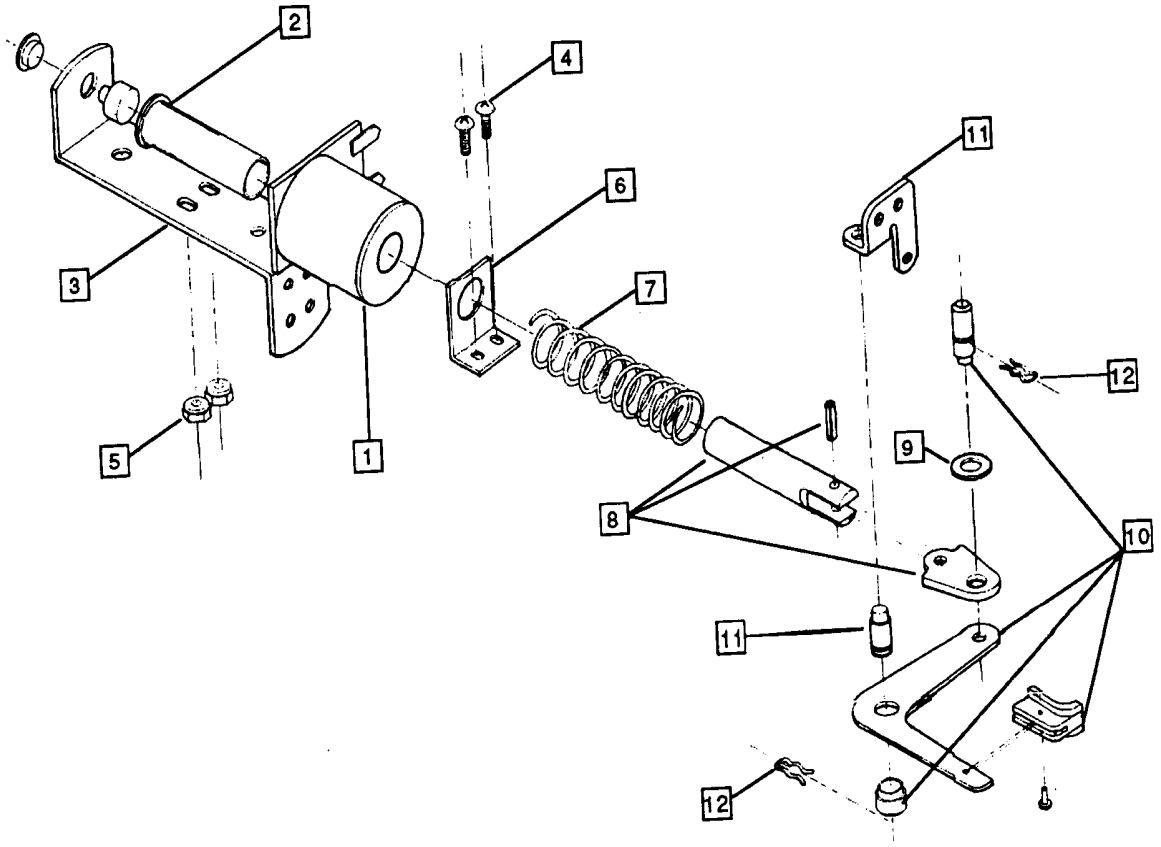
6 For coil replacement, remove the Solenoid Bracket (item 11) to prevent screw damage.

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.

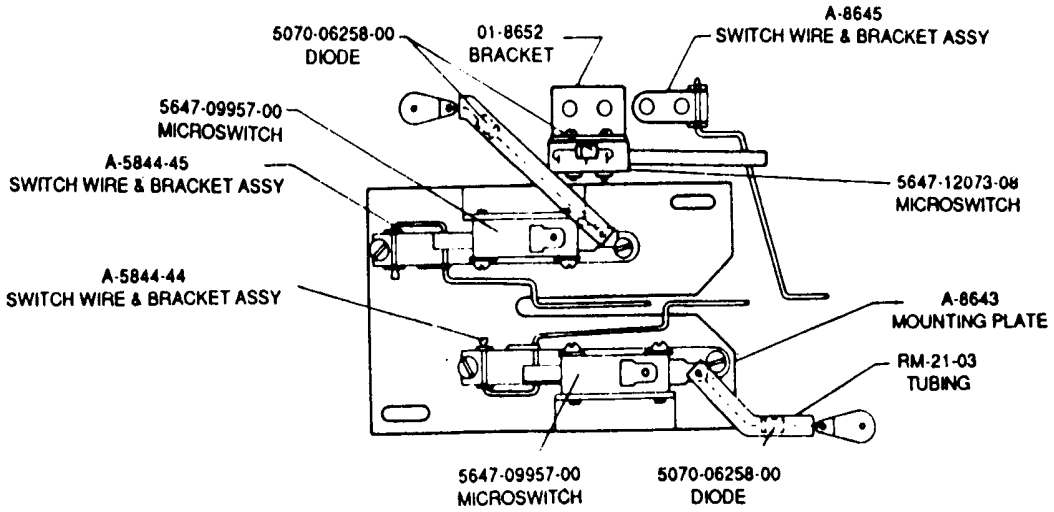
Right and Left Slingshot Kicker Assembly
B-12665



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

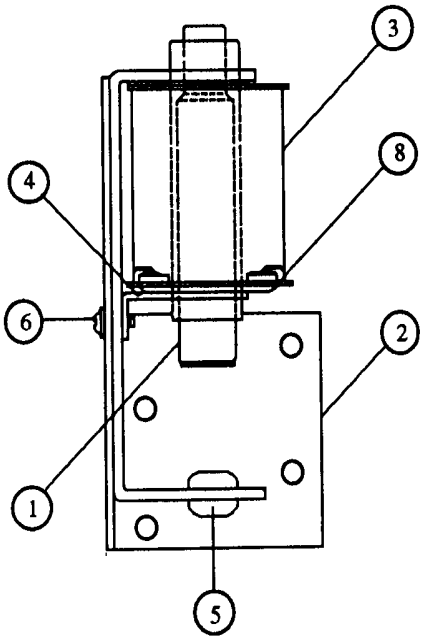
Ball Trough Switches

Ball Trough Switch Plate Assembly B-8925



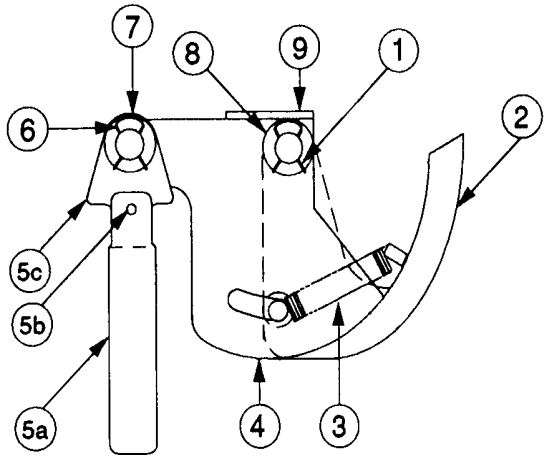
Mach Screw,4-40x5/8 4004-01003-10
Mach Screw,5-40x1/8 4005-01005-02

Knocker Assembly
B-10686-1



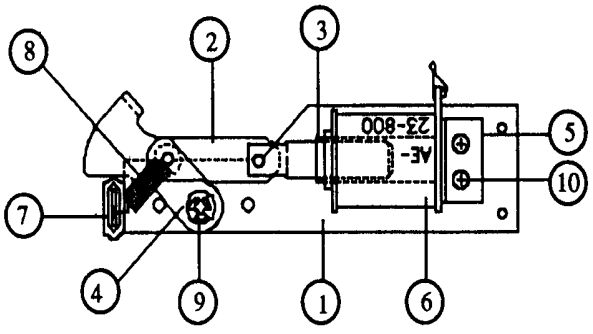
ITEM	DESCRIPTION	PART NUMBER
1	Coil Plunger Assy	A-5387
a)	Coil Plunger	02-2653
b)	Bell Arm Ext.	03-6013
2	Mtg. Brkt Assy	B-7409-2
3	Coil Sub-Assy	AE-23-800
4	Coil Retaining Brkt	01-8-508-T
5	Rubber Grommet	23-6420
6	Mach. Screw, #8-32x3/8	4008-01017-06
7	Knocker Cable	H-11835
8	Coil Tubing	03-7067-5

Ball Eject (Shooter Lane Feeder) Assembly
C-9638



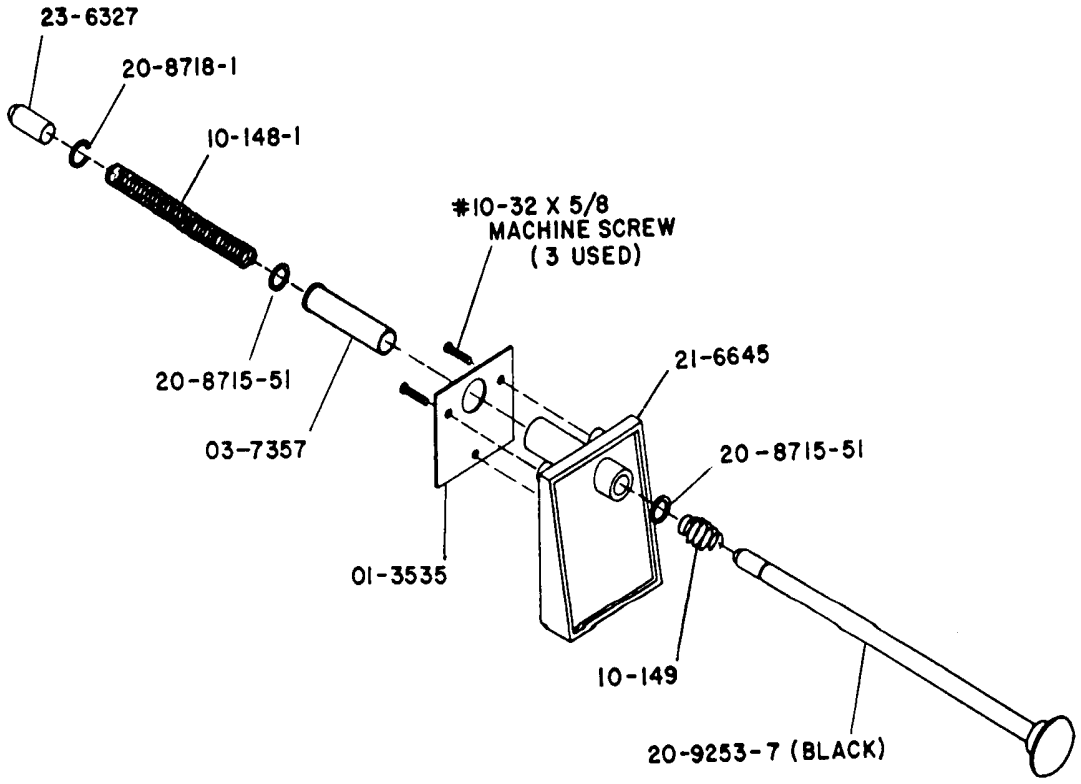
ITEM	DESCRIPTION	PART NUMBER
1	Hair Pin Clip	12-6227
2	Ball Eject Cam Assy	A-8247
3	Spring	10-362
4	Spring Plate Assy	A-6949-L
5	Plunger Assy	A-8050-1
a]	Coil Plunger	02-3407-2
b]	Poll Pin	20-8716-5
c]	Armature Link	03-8085
6	Hair Pin Clip	12-6227
7	Washer,1/2o.d. x 17/64i.d. x 15 ga.	4700-00030-00
8	Washer,1/2o.d. x 17/64i.d. x 28 ga.	4700-00103-00
9	Mounting Brkt Assy	A-8268
	Associated Coil & Bracket Assembly	B-9362-R-1

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

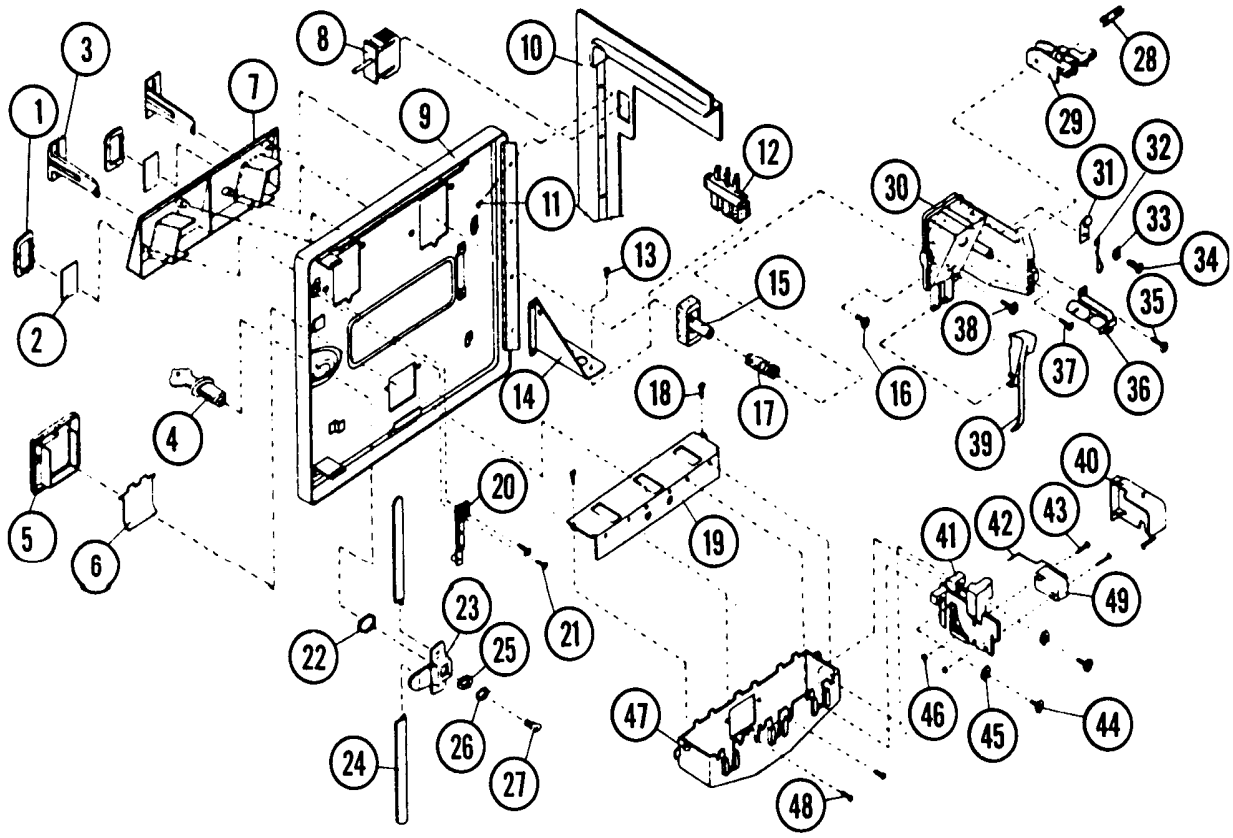
Ball Shooter Assembly



Coin Door Assembly

2-Chute Door 09-17002-x

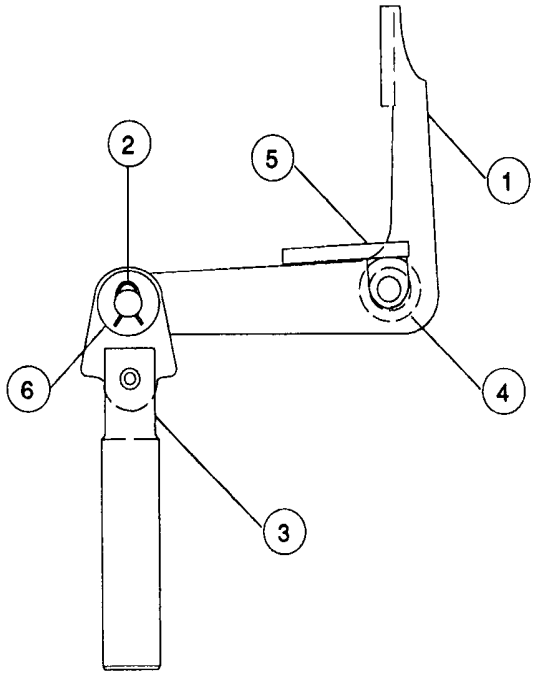
3-Chute Door 09-17003-x



ITEM	PART NO.	DESCRIPTION
1	27-1038	Button Cover
2	27-1041-1--49	Price Panel
3	27-1026-1--15	Coin Entry Plate
4	27-1016	Lock Assembly
5	27-1061	Coin Return Bezel
6	27-1062	Coin Return Flap
7	27-1021	Button Housing - 2-slot
8	27-1111	Interlock Switch
9	27-1006	Coin Door - 2-slot
	27-1007	Coin Door - 3-slot
10	27-1005	Coin Door Frame
11	27-1003	M/C Screw, 6-32 x 3/16
12	27-1008	Diagnostic Switch
13	27-1101	M/C Screw, 4-40 x 1/4
14	27-1102	Bracket, Diagnostic Switch
15	27-1037	Button
16	27-1078	M/C Screw, 6-32 x 3/8
17	27-1039	Conical Spring
18	27-1079	Self-tapping Screw, #6 x 1/4
19	27-1077	Coinbox Cover
20	27-1066	Slam Switch
21	27-1067	M/C Screw 4-40 x 1/2
22	27-1017	Nut (key)
23	27-1012	Locking Cam
24	27-1011	Locking Arm
25	27-1020	Washer
26	27-1018	Star Washer

ITEM	PART NO.	DESCRIPTION
27	27-1019	M/C Screw
28	27-1089	R-Ring
29	27-1083	Retainer
30	27-1081	Coin Inlet Chute
31	27-1088	Wire Clamp
32	27-1025	Key Hook
33	27-1086	Washer, #6
34	27-1078	M/C Screw, 6-32 x 3/8
	27-1078	M/C Screw, 6-32 x 7/8
35	27-1079	Self-tapping Screw, #6 x 1/4
36	27-1084	Lamp Socket
	27-1085	Lamp
37	27-1096	Self-tapping Screw, #5 x 3/8
38	27-1087	M/C Screw, 6-32 x 5/8
39	27-1082	Lever Arm 2 or 3
40	27-1097	Switch Cover
41	27-1091	Coin Accept Chute
42	27-1075	Wire Form
	27-1093	Wire Form
43	27-1094	M/C Screw, 6-40 x 7/8
44	27-1087	M/C Screw, 6-32 x 5/8
45	27-1086	Washer, #6
46	27-1095	Nut, 4-40
47	27-1076	Coin Return Box
48	27-1078	M/C Screw, 6-32 x 3/8
49	27-1092	Microswitch

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 Link03-8085	
c)	Roll Pin, 1/8x7/16	20-8716-5
4	Flat Washer, .265x.500x.067	4700-00030-00
5	Kicker Mouting Assy	B-11052
a)	Mounting Bracket	01-8329-R
6	Hairpin Clip	12-6227

Parts Associated to Ball Lock Release Kickbig:

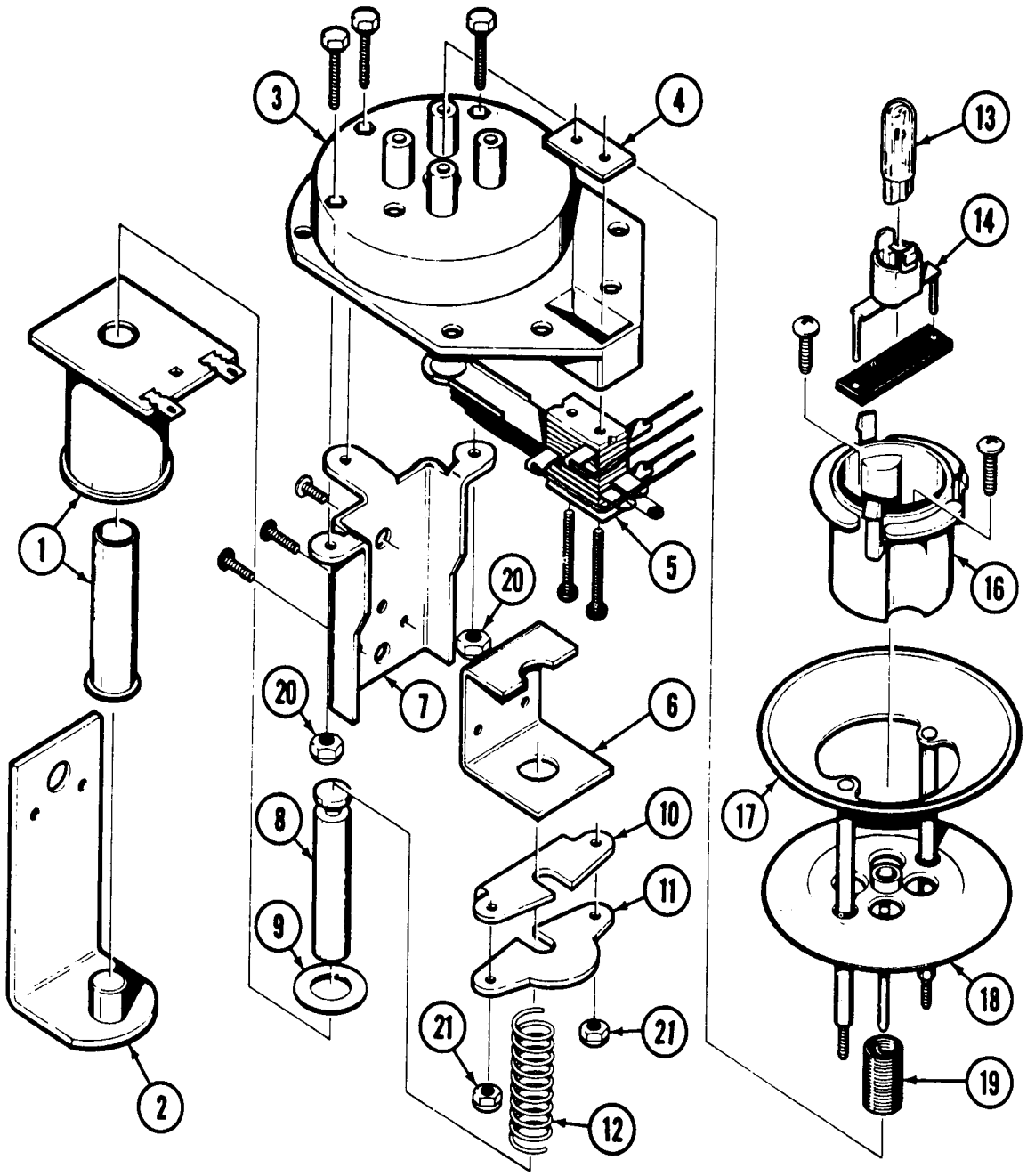
Coil & Bracket Assy **B-9362-R-1**

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

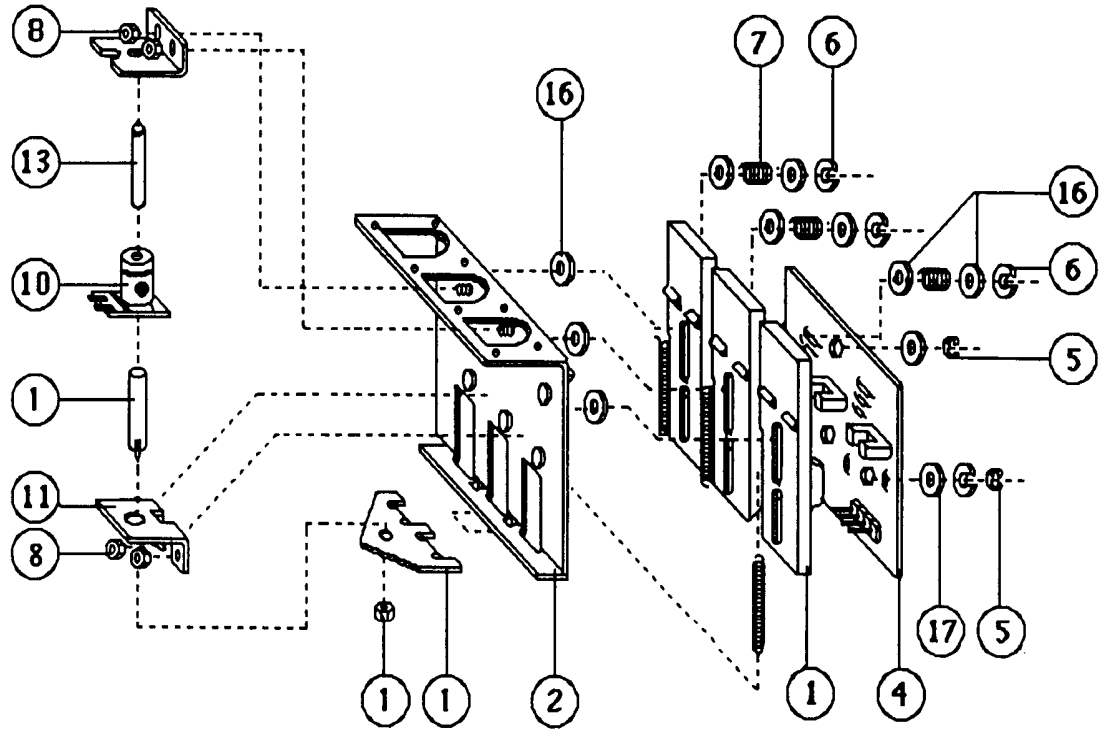
Thumper Bumper Assembly
C-12842



Thumper Bumper Assembly Parts List
C-12842

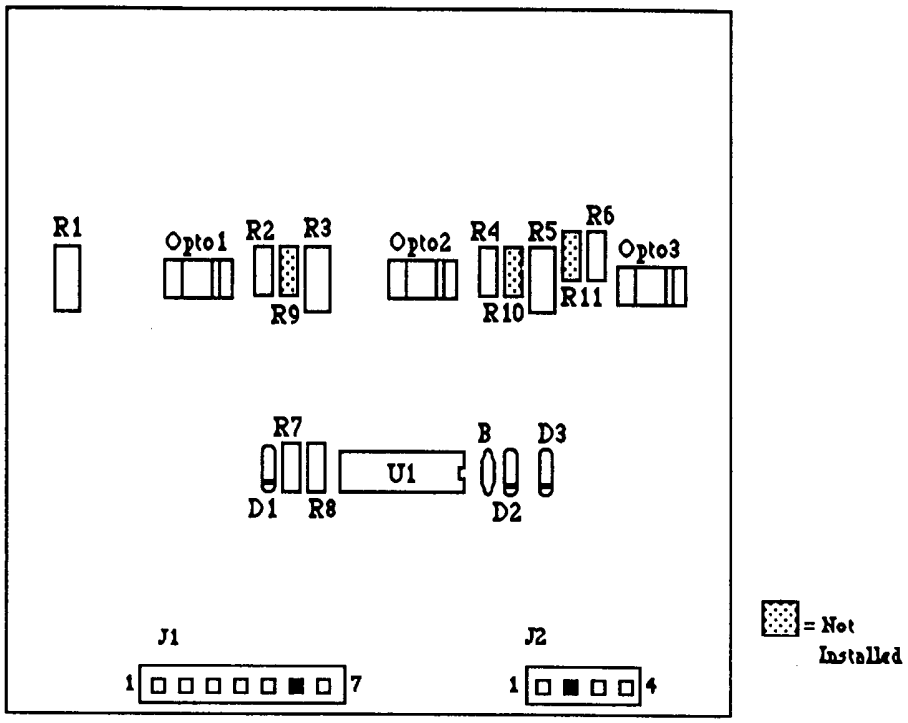
ITEM	DESCRIPTION	PART NUMBER
1	Coil & Tubing Assy	AE-23-800
	Diode: 1N4004GP, 1.0A	5070-06258-00
	Tubing	03-7066
2	Core Plug Assy & Brkt Assy	B-12749
3	Base: Thumper Bumper	03-8324-5
4	Switch Assy	01-9166
5	Make Switch Plate	01-9321
6	Bracket	01-9319
7	Mounting Bracket	01-9117
8	Plunger	02-3406-1
9	Spring 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



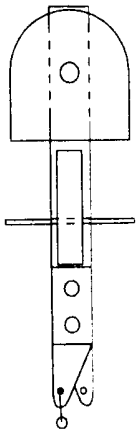
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1	Target, Plain	03-8036	12	Plunger & Reset Plt Assembly	A-11389
2	3-Bank Tgt Sub-Assy	B-11224	A)	Plunger	02-3972-1
3	Spring - Extension	10-364	B)	Reset Plate, 3-Bank	01-8408
4	3-Drop Target Opto Assy	C-12559	C)	Nut, 10-32 ESN	4410-01132-00
5	"E" 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



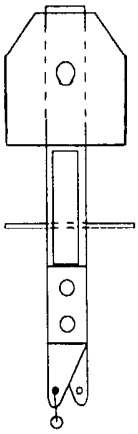
PART NUMBER	CKT DESIGNATION	DESCRIPTION
5768-12368-00		3-Bank Opto Board
5490-10159-00	Opto 1- Opto3	Opto Interruptor, MDL, S/G
5010-08930-00	R1, R3, R5	Resistor, C.F., 470 W, 1/2w, 5%
5010-09162-00	R8	Resistor, C.F., 100KW, 1/4w, 5%
5010-09324-00	R2, R4, R6	Resistor, C.F., 27KW, 1/4w, 5%
5010-08774-00	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



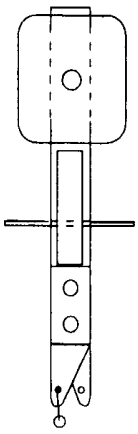
Round Target B-12879

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



Hexagonal Target B-13030

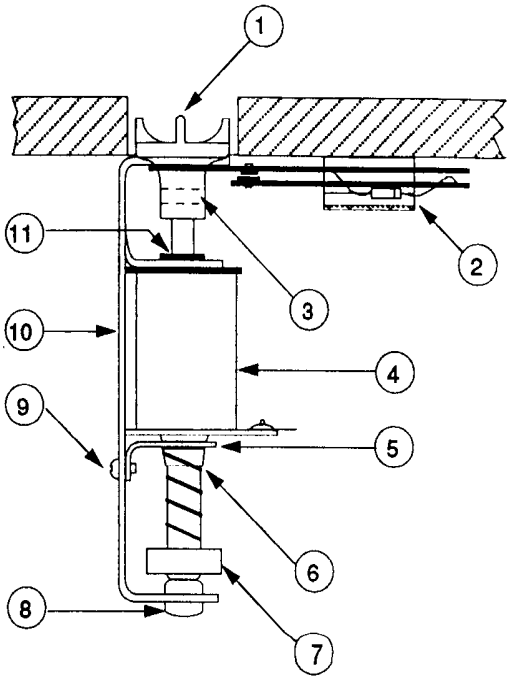
DESCRIPTION	PART NUMBER
Sta. Target Assy HEX- Complete	B-13030
Sta Target Sw	SW-1A-185-17
Target, Hex	03-8307
Diode,1N4001, 1.0A	5070-06258-00



Rectangular Target B-13031

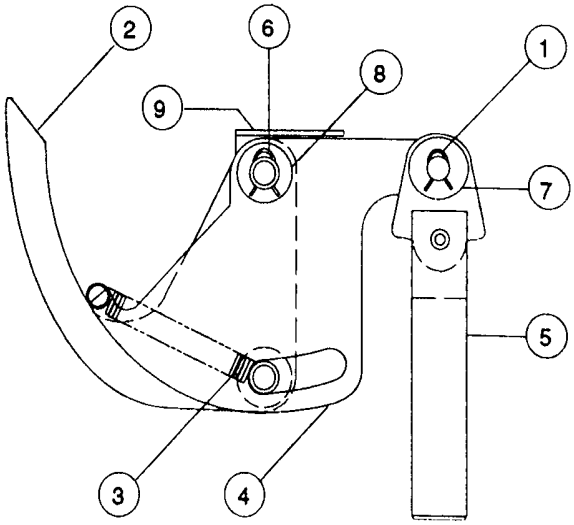
DESCRIPTION	PART NUMBER
Sta. Target Assy RECT. Complete	B-12912-12
Sta Target Sw	SW-1A-186-17
Target, Rectangular	03-8308
Diode,1N4001, 1.0A	5070-06258-00

Ball Popper
D-11335-1



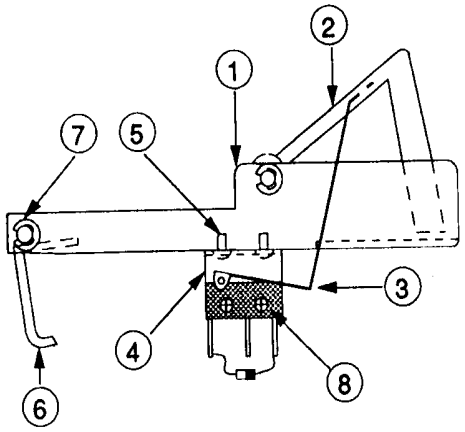
ITEM	DESCRIPTION	PART NUMBER
1	Ball Popper Cap	03-8053
2	Switch Assy	A-11657
	Sw. & Diode Assy	A-11658
	Switch Plate	01-3670-1
	Wood Screw, #5x7/8, P-RH	4205-01016-14
3	Dowel Pin,3/32x1/2	20-9314-7
4	Coil Assembly	AE-24-900
5	Bracket	01-8-508-A
6	Spring	10-135
7	Armature Assy	A-11336
8	Rubber Grommet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



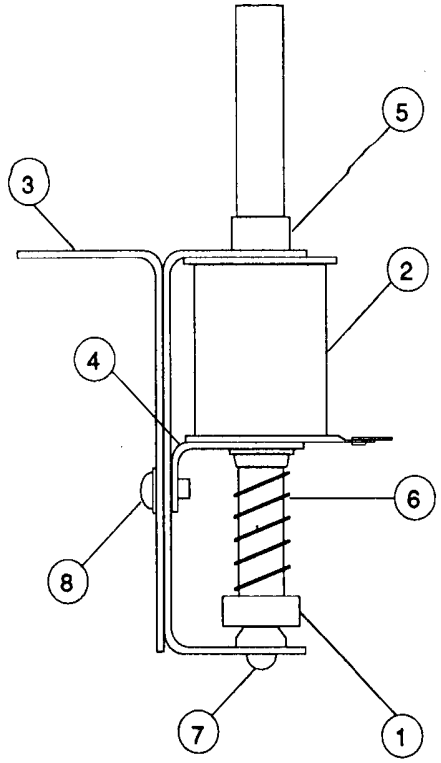
ITEM	DESCRIPTION	PART NUMBER
1	Hair Pin Clip	12-6227
2	Ball Eject Cam Assy	A-7471-R
3	Spring	10-362
4	Spring Plate Assy	A-6949-R
5	Plunger Assy	A-8050-1
a]	Coil Plunger	02-3407-2
b]	Roll Pin	20-8716-5
c]	Armature Link	03-8085
6	Hair Pin Clip	12-6227
7	Washer,1/2o.d. x 17/64i.d. x 15 ga.	4700-00030-00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



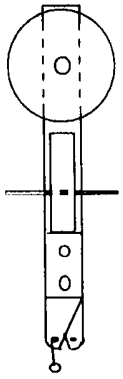
Flip Up Targets Assembly C-12922

ITEM	DESCRIPTION	PART NUMBER
1	Bracket, Flip Up	01-9274
2	Top Flip Up Target	03-8305
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

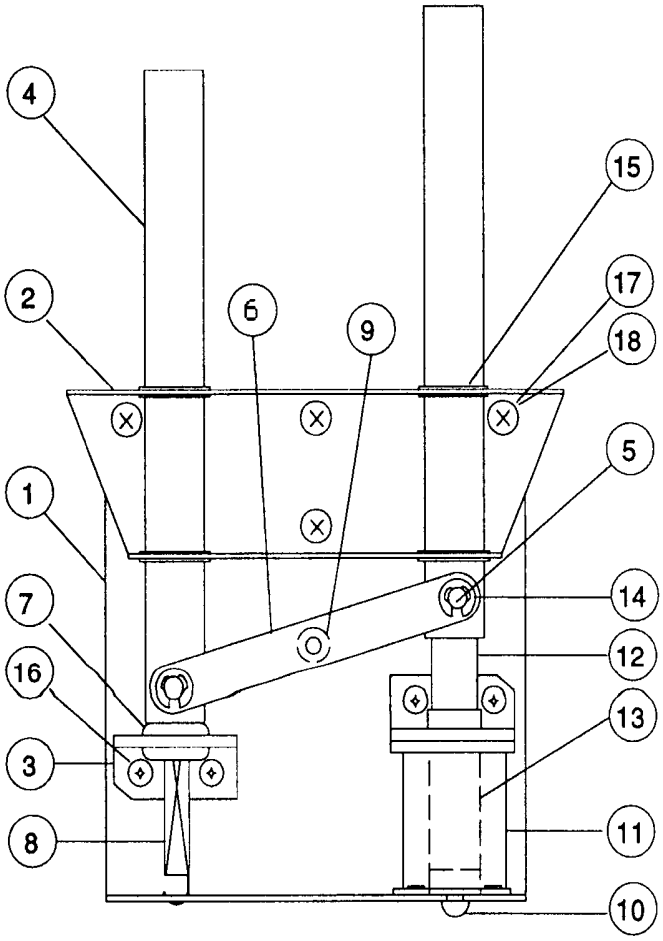
ITEM	DESCRIPTION	PART NUMBER
1	Bell Armature Assy	A-6306-1
2	Coil Assy	AE-26-1200
3	Kicker Mounting Bracket Assy	B-12917
4	Coil Retaining Brkt	01-8-508-T
5	Coil Tubing	03-7067-2
6	Coil Plunger Spring	10-135
7	Rubber Grommet	23-6313-1
8	Mach. Screw, 8-32 x 5/16, P-RH-S	4008-01017-05



Standup Target Assembly B-11696-4

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
			15	5/8 x .078 Nyliner	20-9624
5	Pivot Pin	02-4385	16	Machine Screw, 6-32 x .31 L, P-PH	4006-01003-05
6	Rocker Link	01-9273			
7	Rubber Grommet	23-6640	17	TCS, P-PH 8-32 x 5/16	4108-01010-05
8	Extension Spring	10-408			
9	Post	02-4387	18	Split Lock Washer #8	4701-00003-00
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

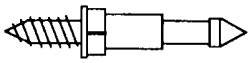
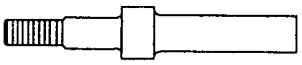
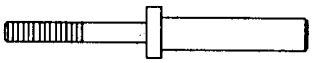
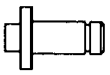
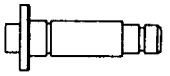
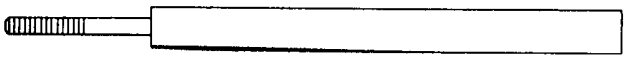
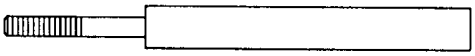
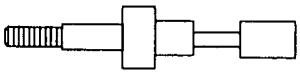
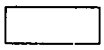
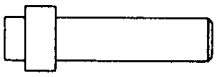
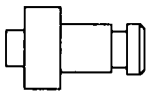
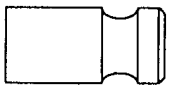
Skull Bracket and Lights Assembly B-13069

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

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

Metal and Plastic Posts

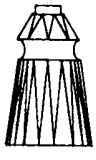
Metal Posts

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

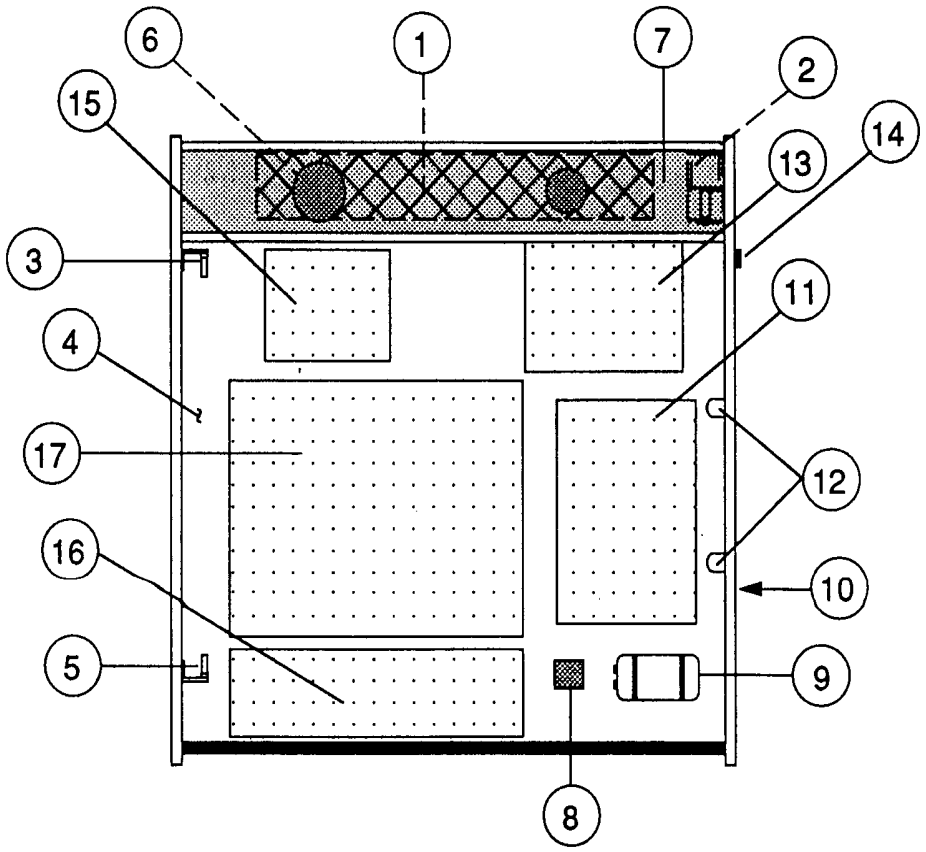
03-8279-9
Plastic Post [23]

03-8269-9
Plastic Post [12]



03-7542-9
Plastic Post [4]

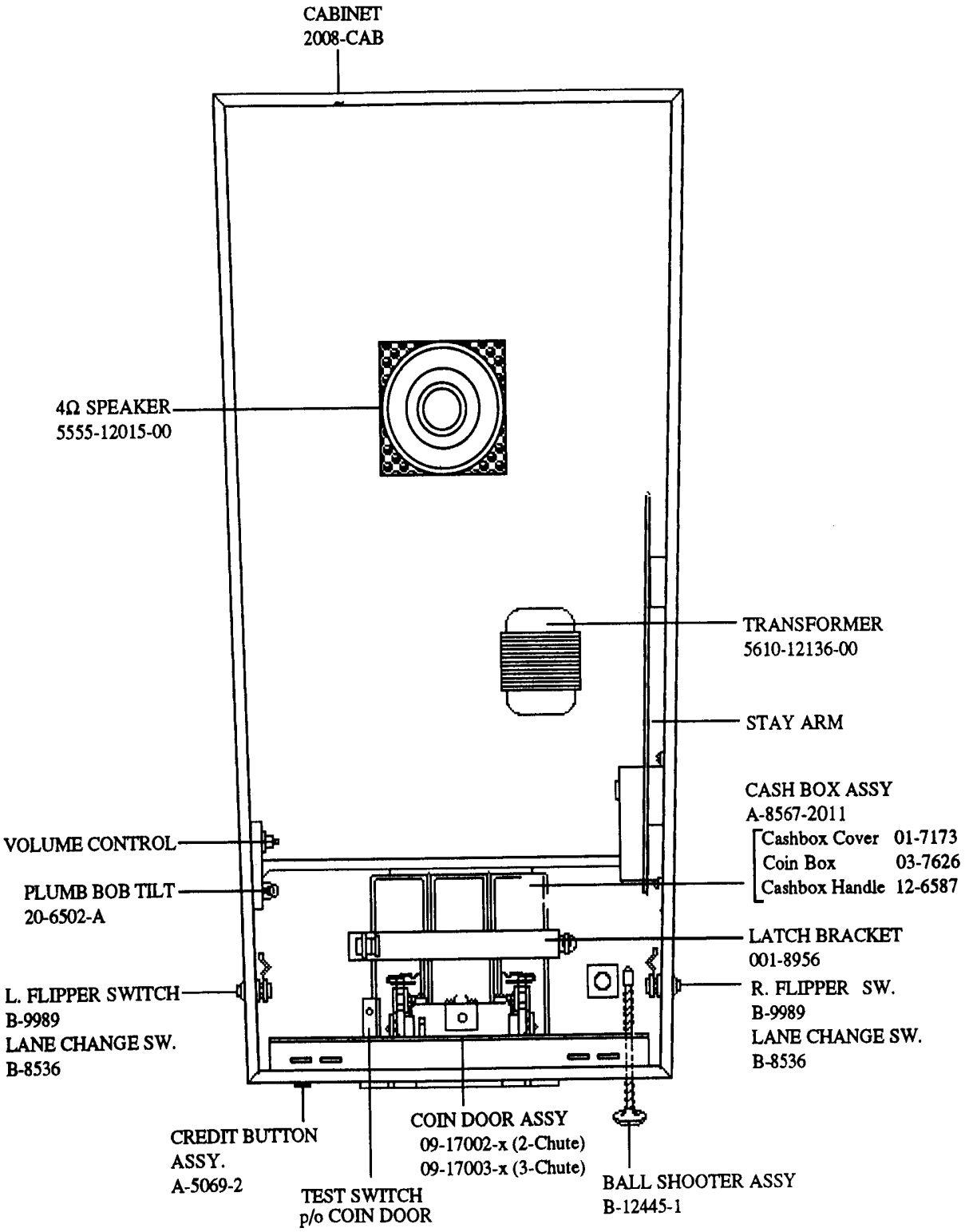
ELVIRA Backbox Parts



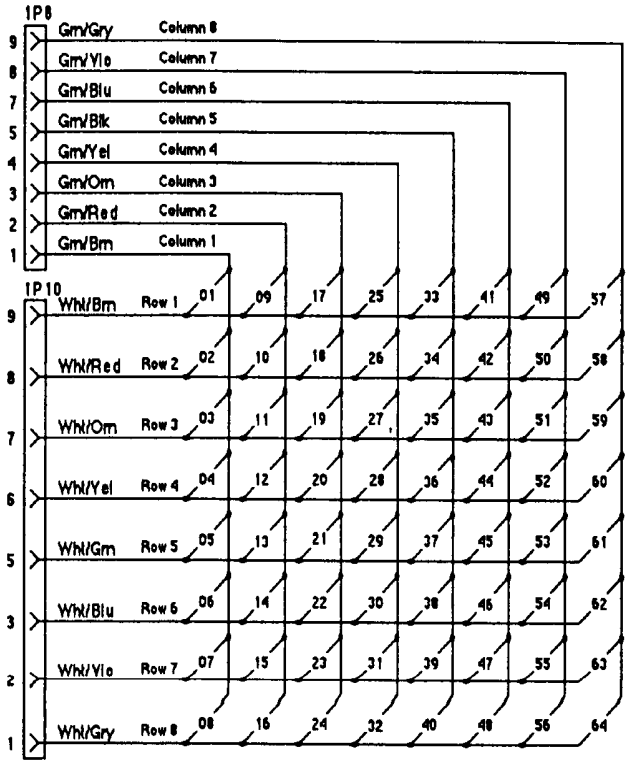
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1	Venting Screen	01-6645-3	10	ELVIRA Backbox	A-11-904-2011
2	Knocker & Bracket Assy	B-10686-1*	11	Aux Power Driver Bd	D-12247-566
3	Upper Insert Bd Hinge	A-12497	12	Insert Stop Bracket	01-9047
4	P.C.B. Plate Assembly	D-12771	13	Power Supply Assembly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

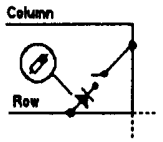
*Bally Insert Assembly not shown in Backbox Parts Location Diagram.

ELVIRA Cabinet Parts



Switch Wiring Diagram & Matrix



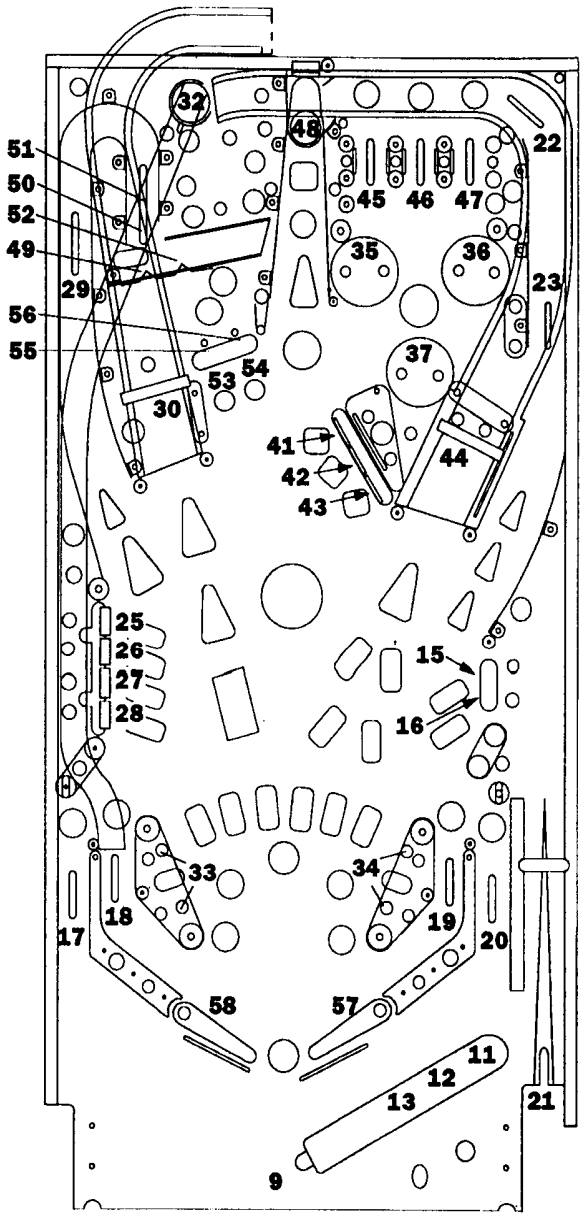


Typical Switch Circuit

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	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 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	59
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	60
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	61
6 WHT-BLU 1J10-3	Left Coin 6	14	Top Right Rollover 22	Left Ramp Entry 30	38	A 46	Flip Up Target 2 54	62
7 WHT-VIO 1J10-2	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 1J10-1	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

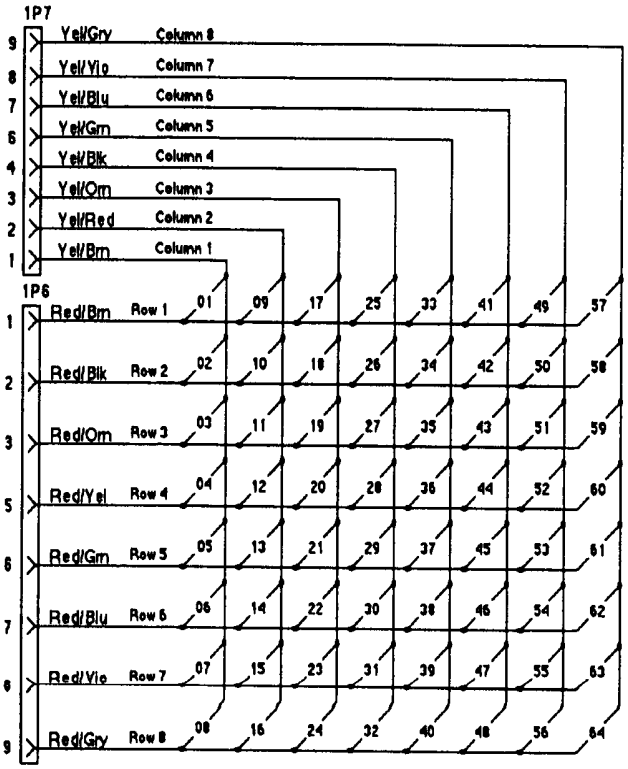
ITEM	DESCRIPTION	PART NUMBER
1	Plumb Bob Tilt	--
2	A/C Relay Select	No part number
3	Credit Button	SW-1A-126
4	Right Coin Sw	27-1092
5	Center Coin Sw	Not Used (USA)
6	Left Coin Sw	27-1092
7	Slam Tilt	27-1066
8	High Score Reset	27-1008*
9	Outhole	5647-12133-12
10	Not Used	--
11	Trough 1, Right	5647-12073-08
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

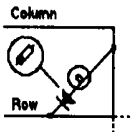


ITEM	DESCRIPTION	PART NUMBER
57	Right Flipper	--
58	Left Flipper	--
59-64	Not Used	

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

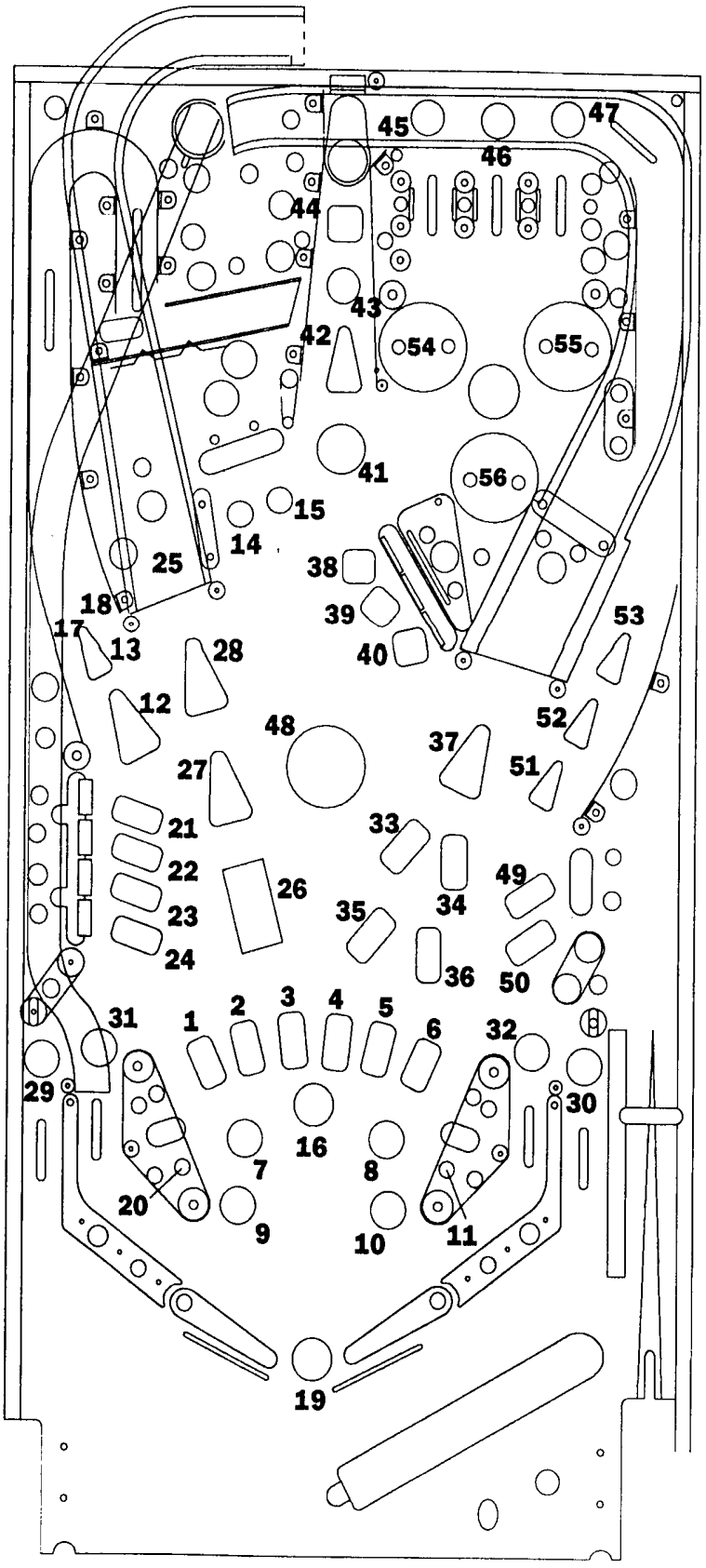




Typical Lamp Circuit

column	1 Q66	2 Q64	3 Q62	4 Q60	5 Q58	6 Q56	7 Q54	8 Q52
row	YEL-BRN 1J7-1	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 Potion 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 Elvira 26	Right Ramp Potion 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 Potion 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 Potion 4 36	Boogie 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

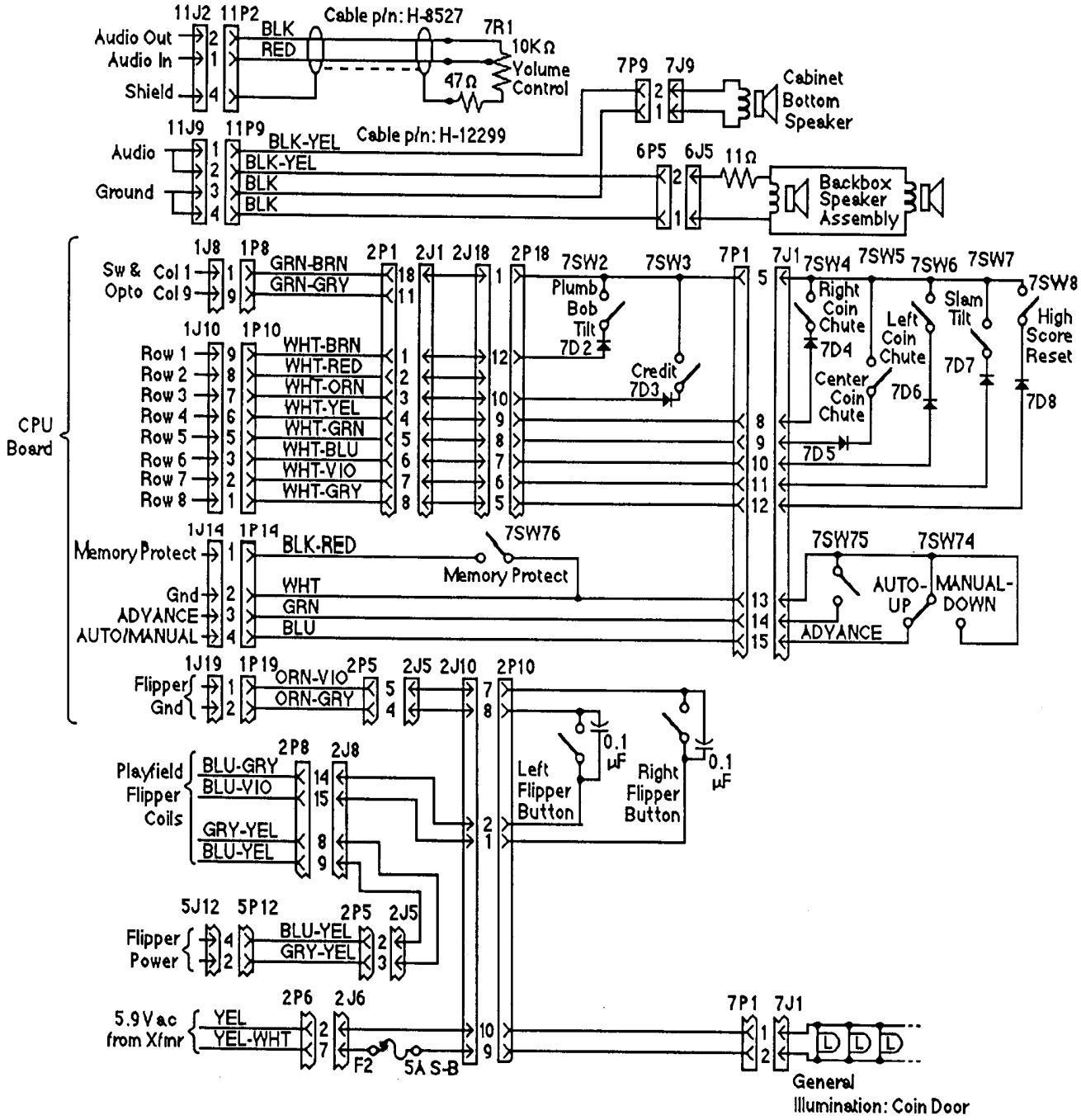
DESCRIPTION	PART NUMBER
Rebound Ring Assembly	A-12841
Ball Guide Assy	A-13049
Switch Gate Assy	A-13068
Ball Gate Assy	A-13100
Back Glass Assy	A-8552-2011
Standup Target Assy	B-12879
Reset Mechanism Assy	B-12916
R. Flipper Ball Guide	B-12918
L. Flipper Ball Guide	B-12919
Bracket & Post Assy	B-12921
Ball Guide & Sw. Assy	B-13009
Ramp Assy	B-13011
Hex Standup Target Assy	B-13030
Rect. Standup Target Assy	B-13031
Ball Guide Assy	B-13050
Ball Guide Assy	B-13051
Ball Guide Assy	B-13052
Ball Guide Assy	B-13053
Skull & Lights Assy	B-13069
Thumper Bumper Assy	C-12842
Boogie Men Assy	C-12920
Flip Up Target Assy	C-12922
Ball Guide Assy	C-13054
Ball Guide Assy	C-13055
Right Ramp Assy	D-13006
Left Ramp Assy	D-13007
Right Ramp Assy-Popper	D-13008
Ball Guide Assy	D-13056
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

DESCRIPTION	PART NUMBER
Rebound Ring	01-9267
"U" Bracket Shaft	01-9272
Rocker Link	01-9272
Impact Target Bottom	01-9275
Bracket, Ramp Support	01-9302
Switch Gate Bracket	01-9345
Backpanel Bracket	01-9346
Skull Light Bracket	01-9347
Playfield Mylar	03-7960-2011
Rubber Boogie Man	23-6639
Screened Playfield	31-1002-2011
Screened Plastic Complete	31-1006-2011
Screened Plastic Sheet	31-1006A-2011
Screened Bottom Arch	31-1008-2011
Screened Shooter Gauge	31-1009-2011
Screened Backglass	31-1357-2011
Tombstone Target Decals	31-1464-2011-1
Tombstone Target Decals	31-1464-2011-2
Tombstone Target Decals	31-1464-2011-3
Tombstone Target Decals	31-1464-2011-4
Tombstone Target Decals	31-1464-2011-5
Tombstone Target Decals	31-1464-2011-6
Backboard Screened	31-1475-2011
Deadhead Illuminated	31-1511-2011
Flip-Up Target Decals	31-1512-2011-1
Flip-Up Target Decals	31-1512-2011-2
Flip-Up Target Decals	31-1512-2011-3
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

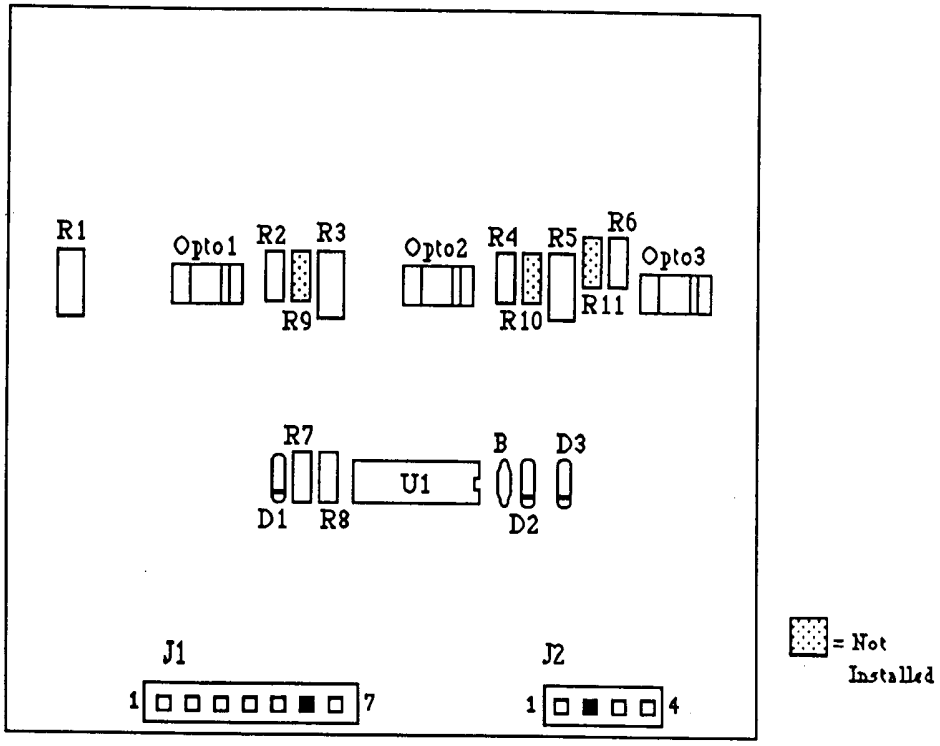
SECTION 3

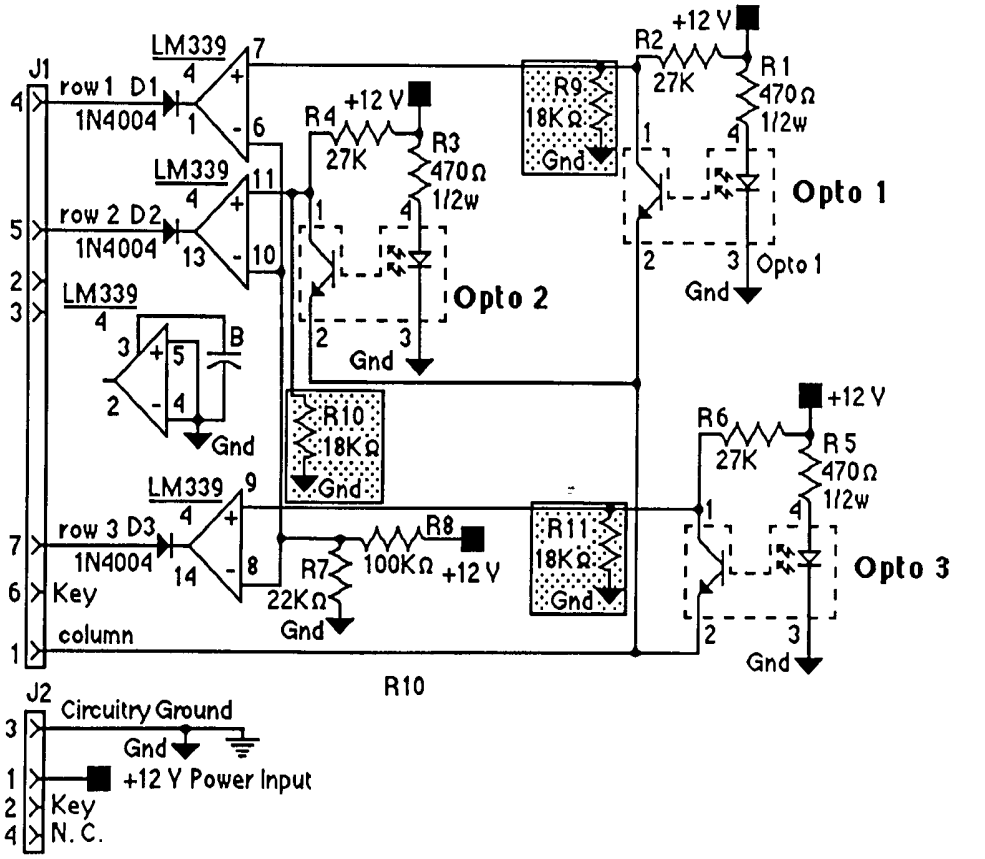
Reference Diagrams and Schematics

ELVIRA Cabinet Wiring

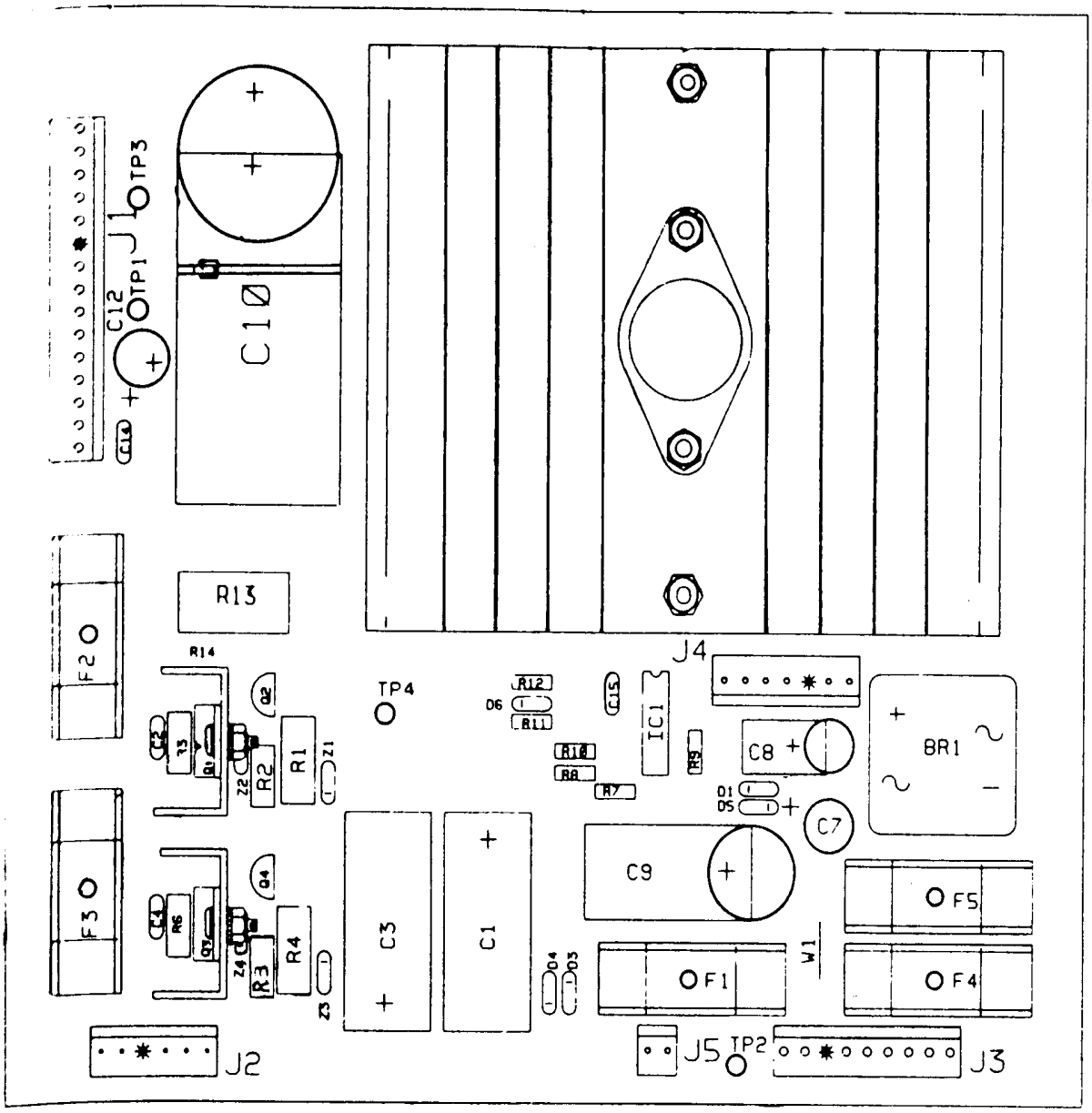


3-Bank Opto Board Assembly & Schematic
C-12559

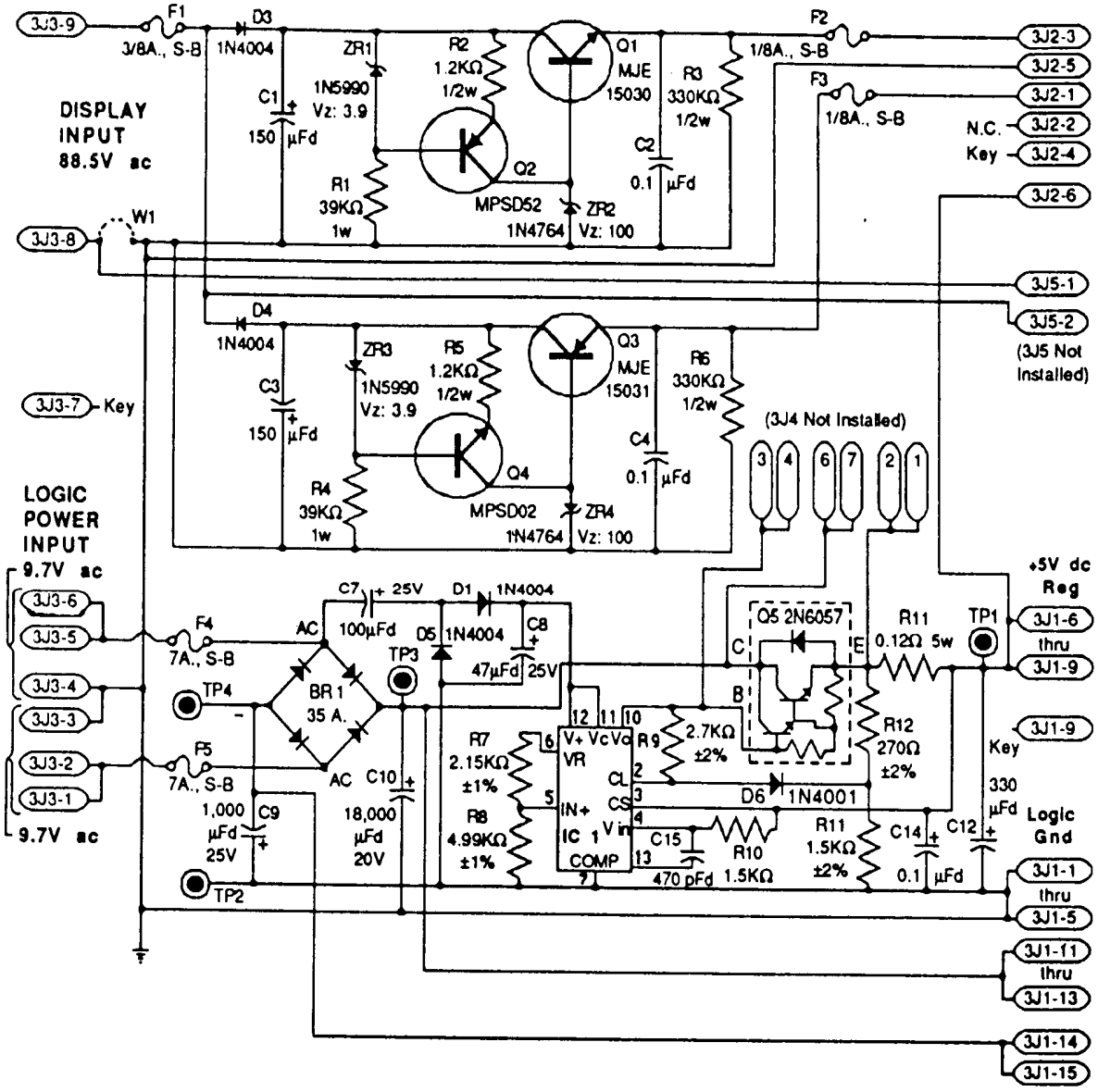




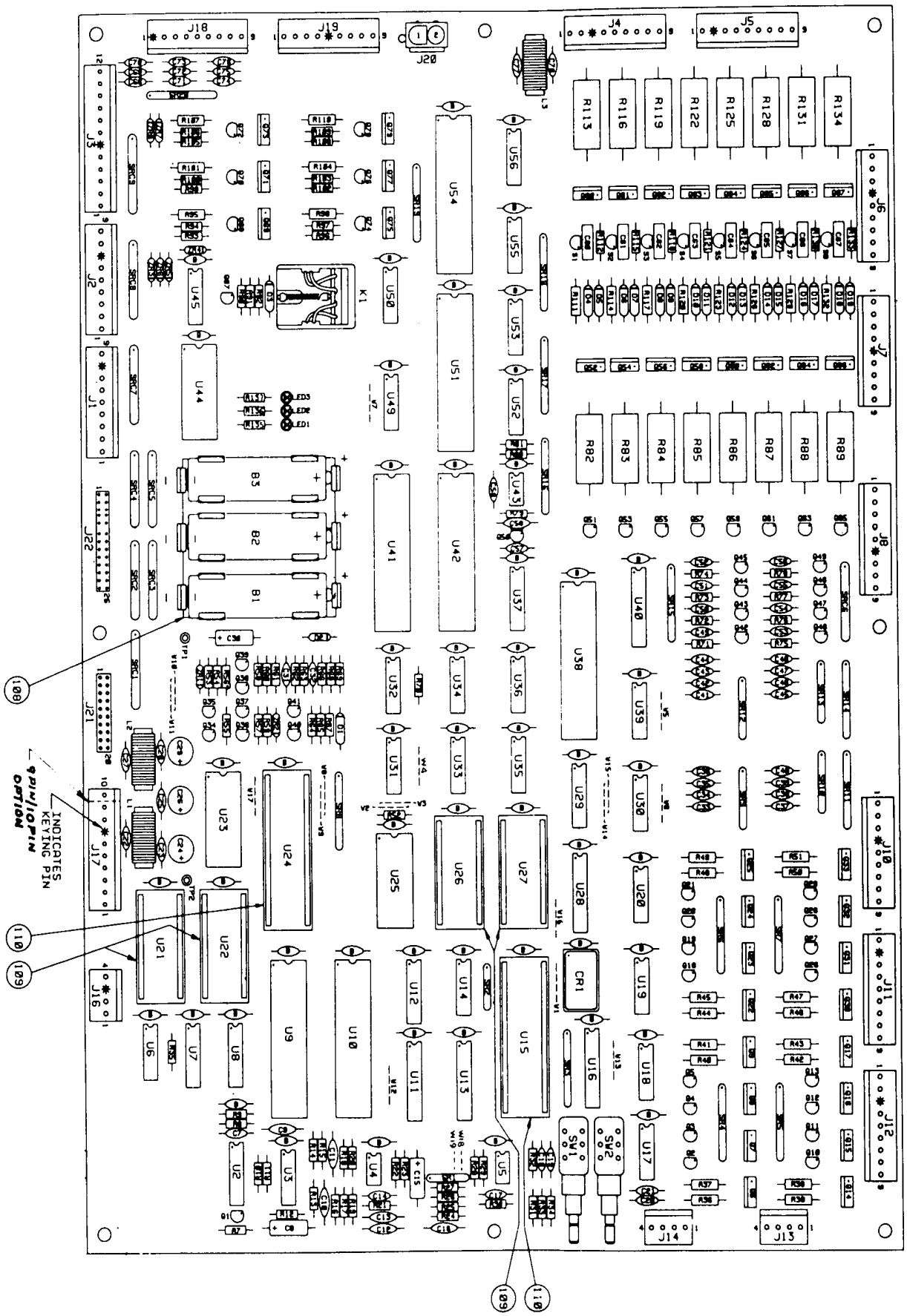
Power Supply Board
D-12246

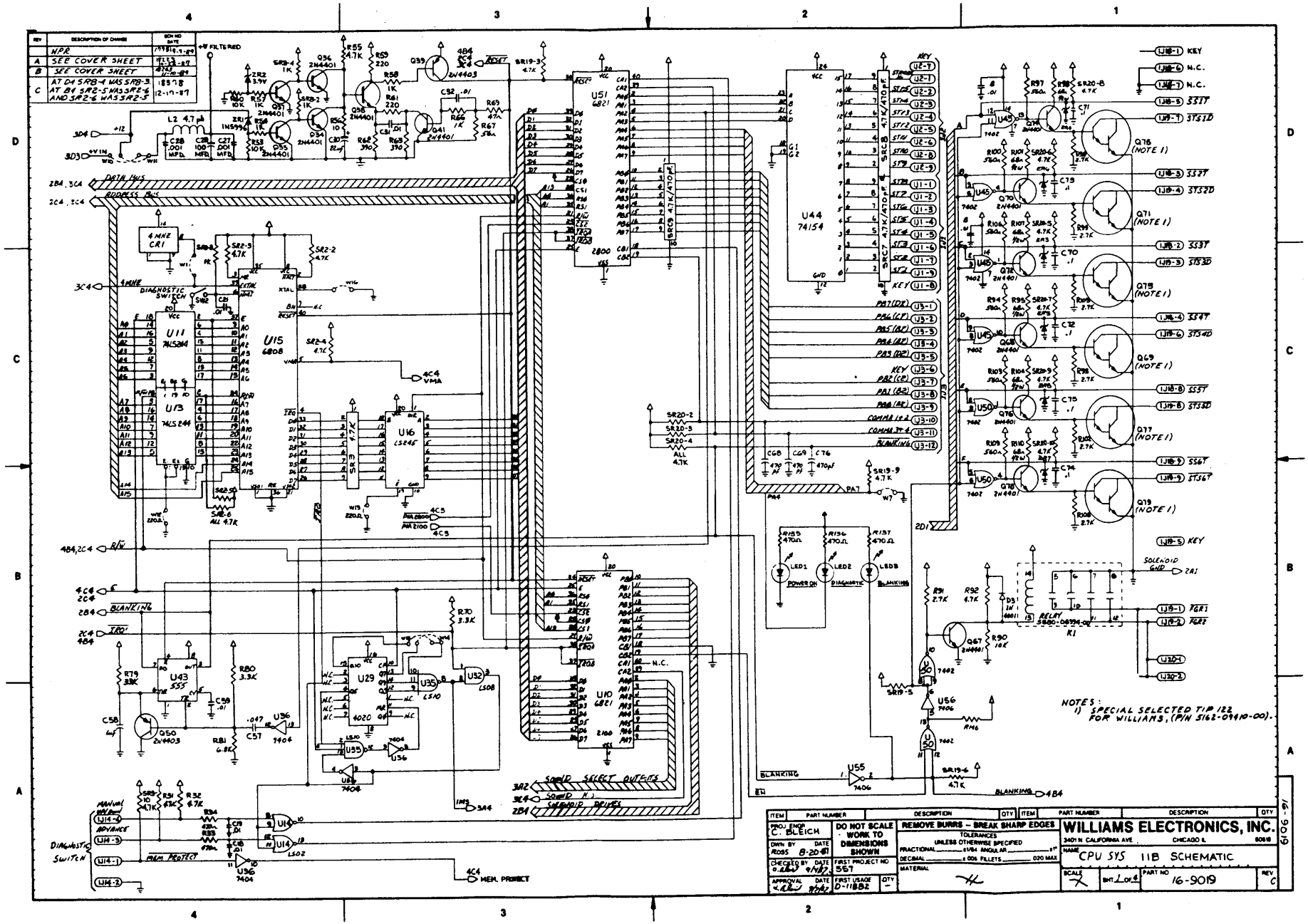


Power Supply Board Schematic

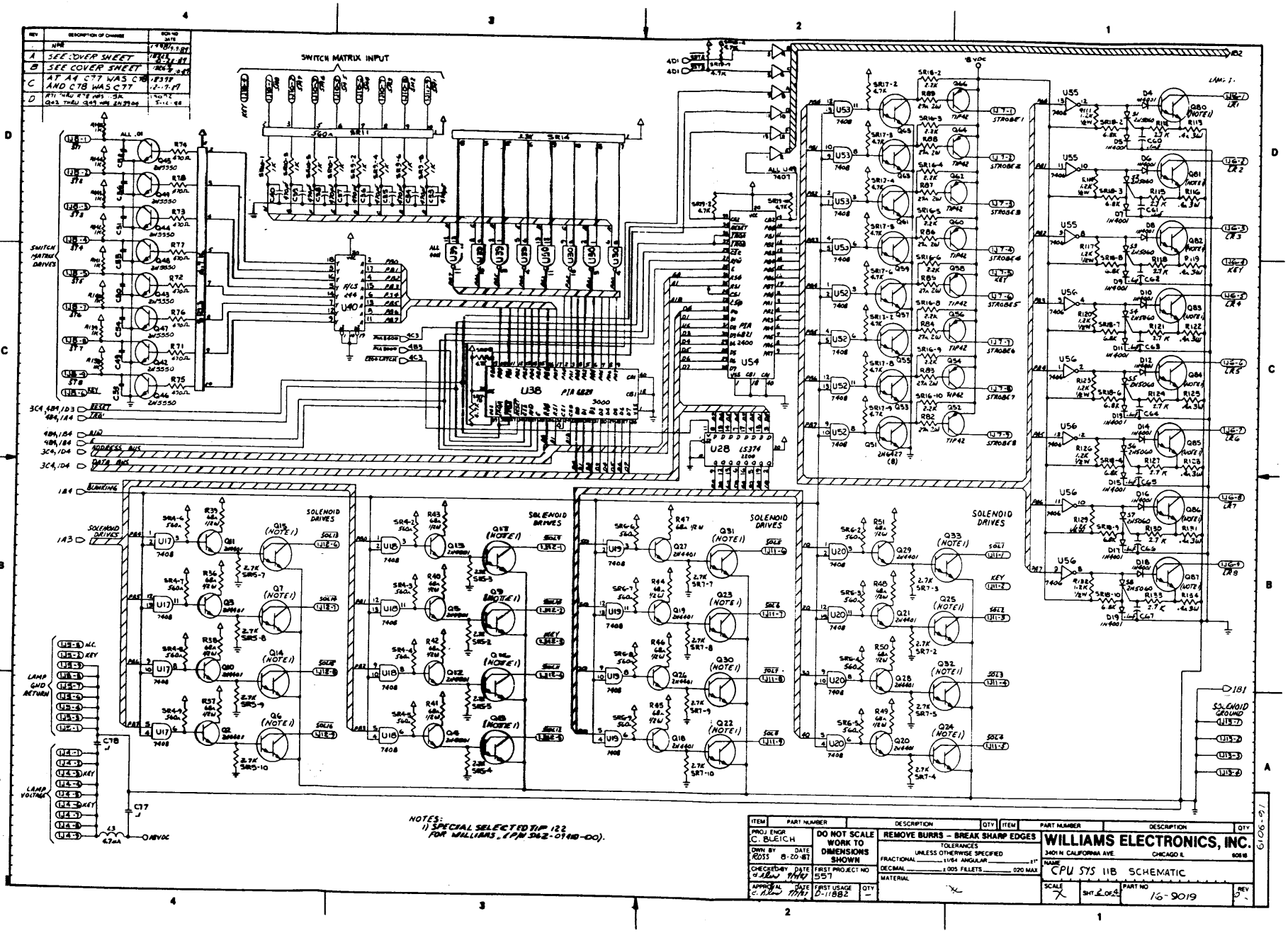


System 11B CPU Board
D-11883

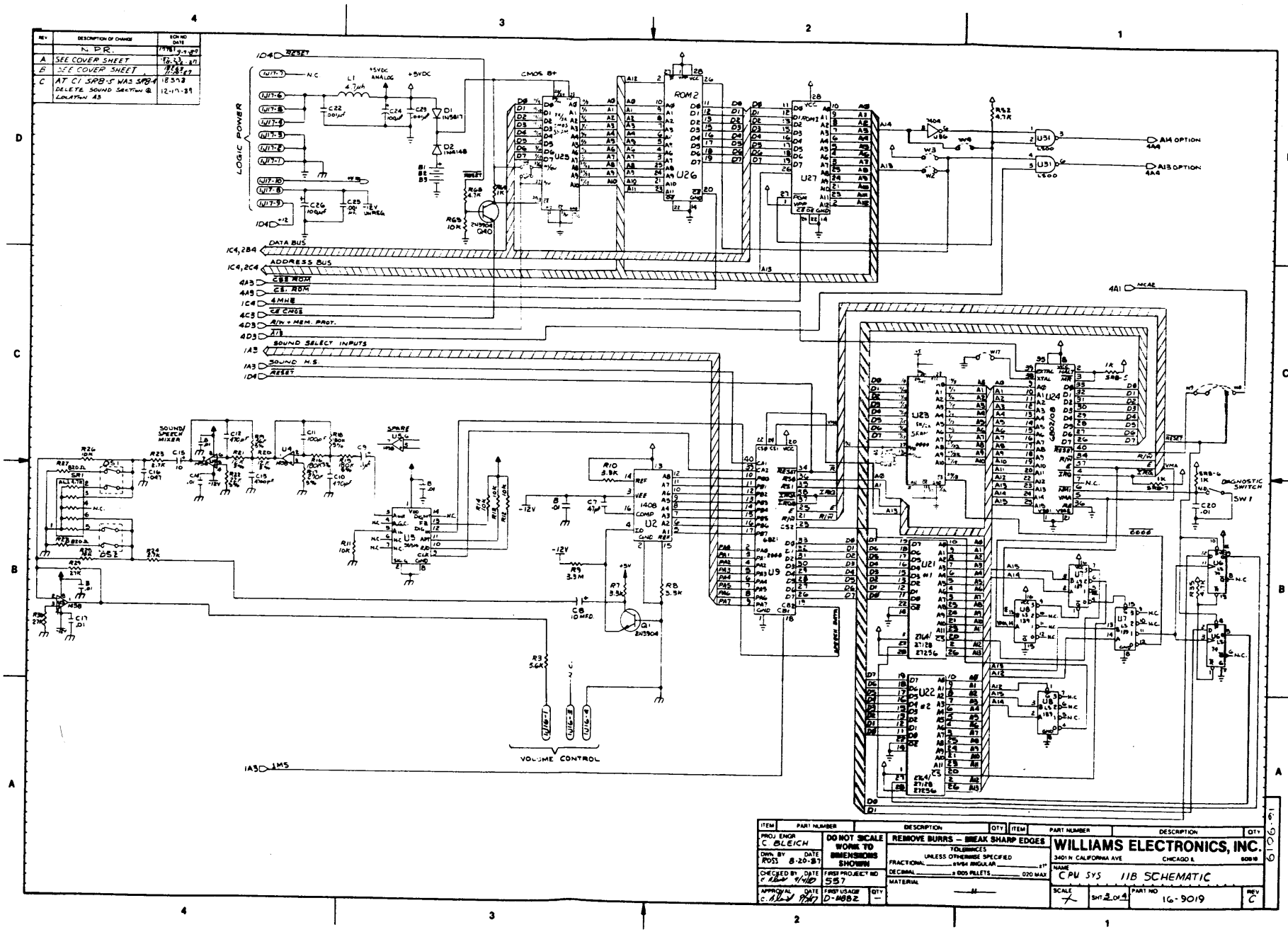




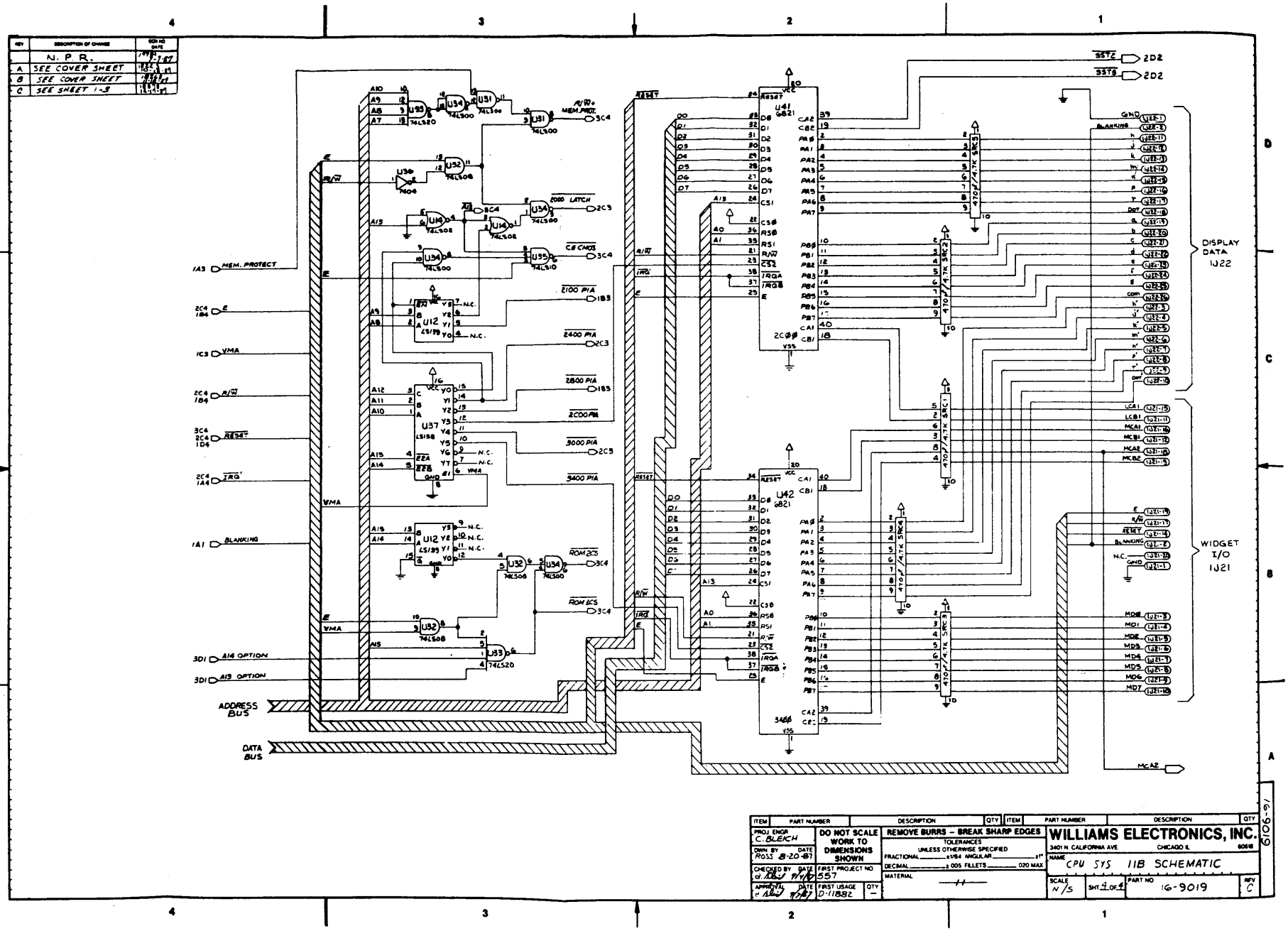
System 11B CPU Schematic (16-9019, Sheet 1 of 4)



System 11B CPU Schematic (16-9019, Sheet 2 of 4)

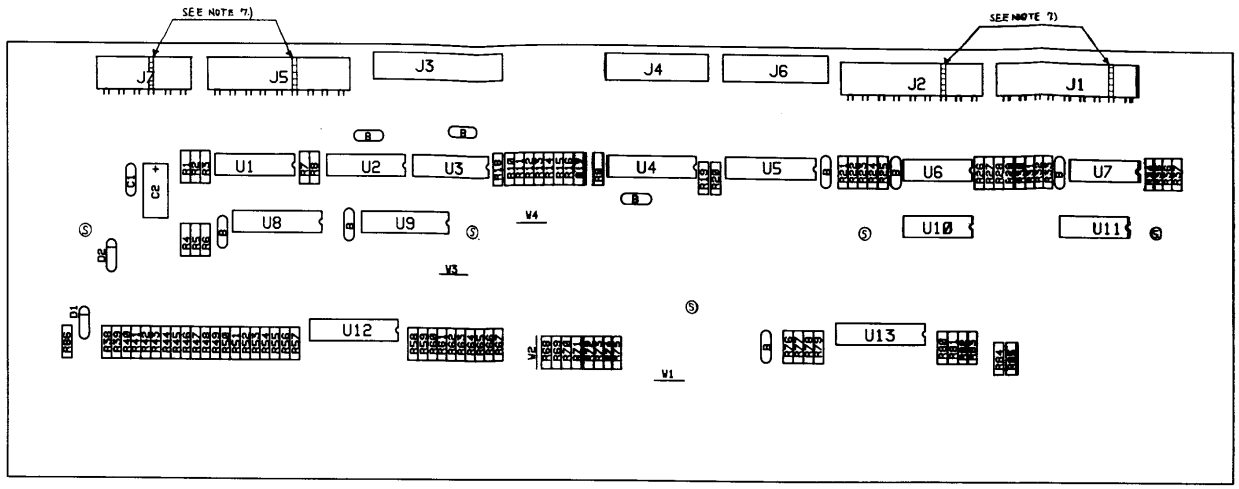


System 11B CPU Schematic (16-9019, Sheet 3 of 4)



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

DESCRIPTION OF CHANGE	ECN NO DATE
N. P. R. 5-1-89	21129



BALLY R-DISPLAY

ITEM	PART NUMBER	PART DESIGNATION	DESCRIPTION	QTY
1	5043-08980-00	B (BYPASS CAP)	CAP. .01MF 50V AX. CR.	9
2	5043-08996-00	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	DSPT1	DISPLAY,16-CHARACTER A/N	1
6	5791-10869-09	J1,J2,J5	9 PIN HEADER, R/A, .156	3
7	5791-10851-00	J3	26 PIN HEADER, R/A .100	1
8	5791-10869-06	J7	6 PIN HEADER, R/A, .156	1
9	5791-09438-00	CHART	20 PIN HEADER, R/A,.100	CHART
10	5010-08773-00	R1-R8,R21-R37	RES. 18K ohm 1/4W	25
11	5010-09162-00	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	5310-08975-00	U1,U2,U3	4049	3
16	5310-09882-00	U8,U7,U10,U11	4001	4
17	5680-08969-00	U8,U9	UDN-7180	2
18	5680-08968-00	CHART	UDN-6118	CHART
19	5010-09534-00	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	ASSEMBLEY I.D. LABEL	CHART

OPTION:	ITEM 9	ITEM 11	ITEM 12	ITEM 13	ITEM 14	ITEM 18	ITEM 19	ITEM 22
NOTE 6	DESIGNATION QTY	DESIGNATION QTY	DESIGNATION QTY	DESIGNATION QTY	DESIGNATION QTY	DESIGNATION QTY	DESIGNATION QTY	PARTNUMBER QTY
-01	NOT USED 0	R42,R44,R46,R50,R52,R63 32	SEE NOTE 2 1	R45,R51 R62 7	R41,R47 R53 9	U12,U13 2	U3,U4 2	16-8850-251 1
-02	J4 1	SEE NOTE 1 26	R9,R19 3	SEE NOTE 3 4	R10-R17 14	U4,U12,U13 3	U1,U2 2	16-8850-245 1
-03	J4,J6 2	SEE NOTE 1 26	R9,R16,R19,R20 5	SEE NOTE 3 4	R10-R17 14	U4,U5,U12,U13 4	U1,U2 2	16-8850-246 1

NOTES:

1) 100K ohm RESISTORS
R38,R40,R48,R54-R61,R65,R67,R69,R71,
R73,R75-R83,R85

SEE CHART ALSO

2) 1M ohm RESISTORS
R66

SEE CHART ALSO

3) 8.2K ohm RESISTORS
R49,R64,R68,R74

SEE CHART ALSO

4) 10K ohm RESISTOR
R39,R43,R66,R70,R72,R84

SEE CHART ALSO

5) THE CHART SPECIFIES RESISTORS, I.C.s,AND CONNECTORS THAT ARE OPTION SPECIFIC

6) THE TWO LAST DIGITS OF THE PART NUMBER SPECIFIES THE SUB-ASSEMBLY OPTION.

-01 MAIN DISPLAY ONLY: ALPHA NUMERIC

-02 MAIN DISPLAY:NUMERIC, ONE EXTENTED 7-SEGMENT NUMERIC

-03 MAIN DISPLAY:NUMERIC, TWO EXTENTED 7-SEGMENT NUMERIC

7) CUT KEYING PINS AS INDICATED

8) ALIGN TOP EDGE OF GLASS DISPLAY WITH TOP EDGE OF DISPLAY SUPPORTS.

9) FOR SCHEMATIC SEE DRAWING #6-9868

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY

PROJ. ENGR. J. BOYDSTON
DWN. BY J. PARRISH DATE
CHECKED BY D. Boyd 5-1-89 DATE
APPROVAL M. Pla 5/1/89 DATE

DO NOT SCALE WORK TO DIMENSIONS SHOWN

FIRST PROJECT NO. 2008
FIRST USAGE 2008-1N QTY 1

REMOVE BURRS - BREAK SHARP CORNERS @ EDGES

TOLERANCES
UNLESS OTHERWISE SPECIFIED
DECIMAL — X ± .030 ANGULAR — ±1/2°
XX ± .015
XXX ± .005 FRACTIONAL ±1/64

MATERIAL

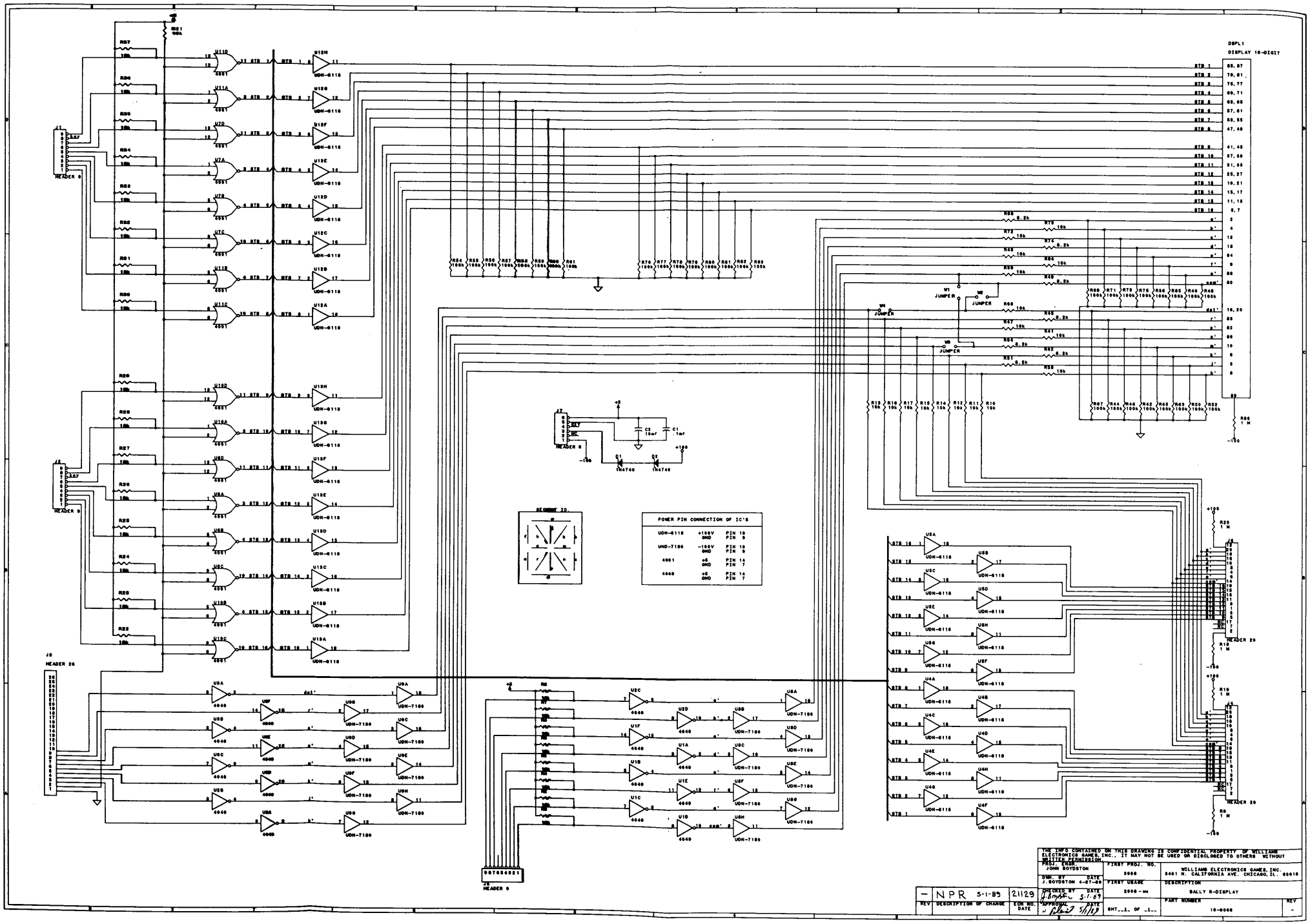
WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE. CHICAGO IL 60618

NAME BALLY R-DISPLAY ASSY

SCALE 2/1 SHT 1 OF 1 PART NO. D-12502- REV —

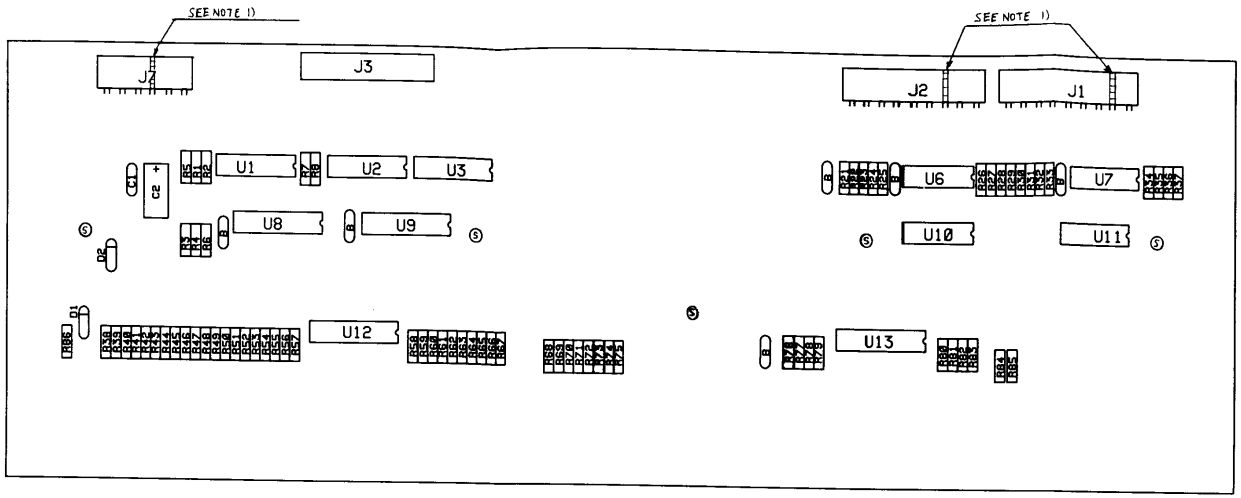
D-12502-

Bally Right Display (D-12502)



Bally Right Display Schematic

DESCRIPTION OF CHANGE	ECN NO DATE
P. R. 5-1-89	21130



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	DSPY1	DISPLAY,16-CHARACTER A/N	1
6	5791-10869-09	J1,J2	9 PIN HEADER, R/A, .156	2
7	5791-10851-00	J3	26 PIN HEADER, R/A .100	1
8	5791-10869-06	J7	6 PIN HEADER, R/A, .156	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

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY

PROJ. ENGR. J. BONDSTON
DRWN. BY J. PARRISH DATE
CHECKED BY DATE 5-1-89
APPROVAL DATE 5/1/89

DO NOT SCALE WORK TO DIMENSIONS SHOWN

FIRST PROJECT NO. 2008
FIRST USAGE 2008-IN QTY 1

REMOVE BURRS-BREAK SHARP CORNERS & EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL — X ±.030 ANGULAR ±1/2°
XX ±.015
XXX ±.005 FRACTIONAL ±1/64

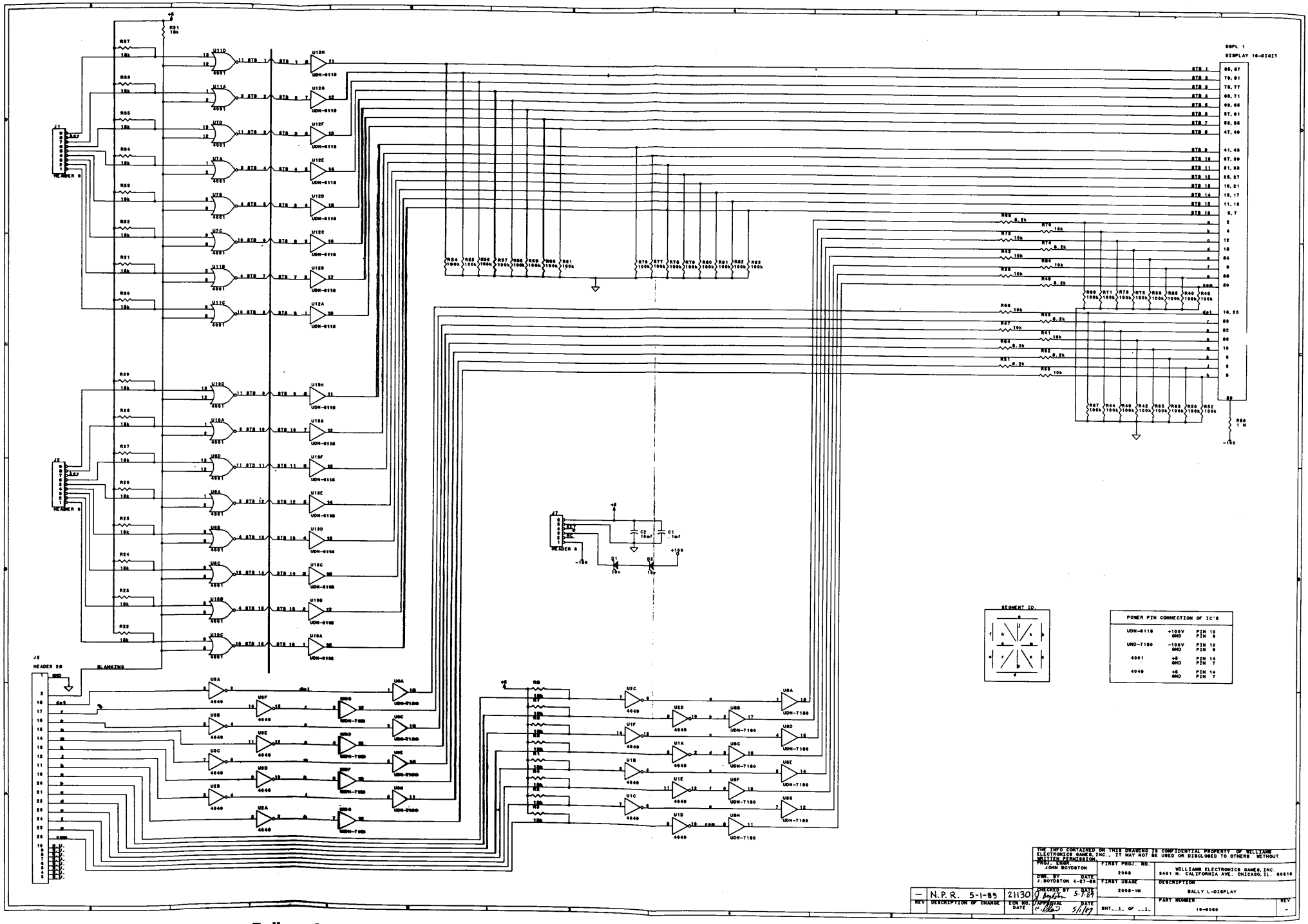
MATERIAL

WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE CHICAGO IL 60618

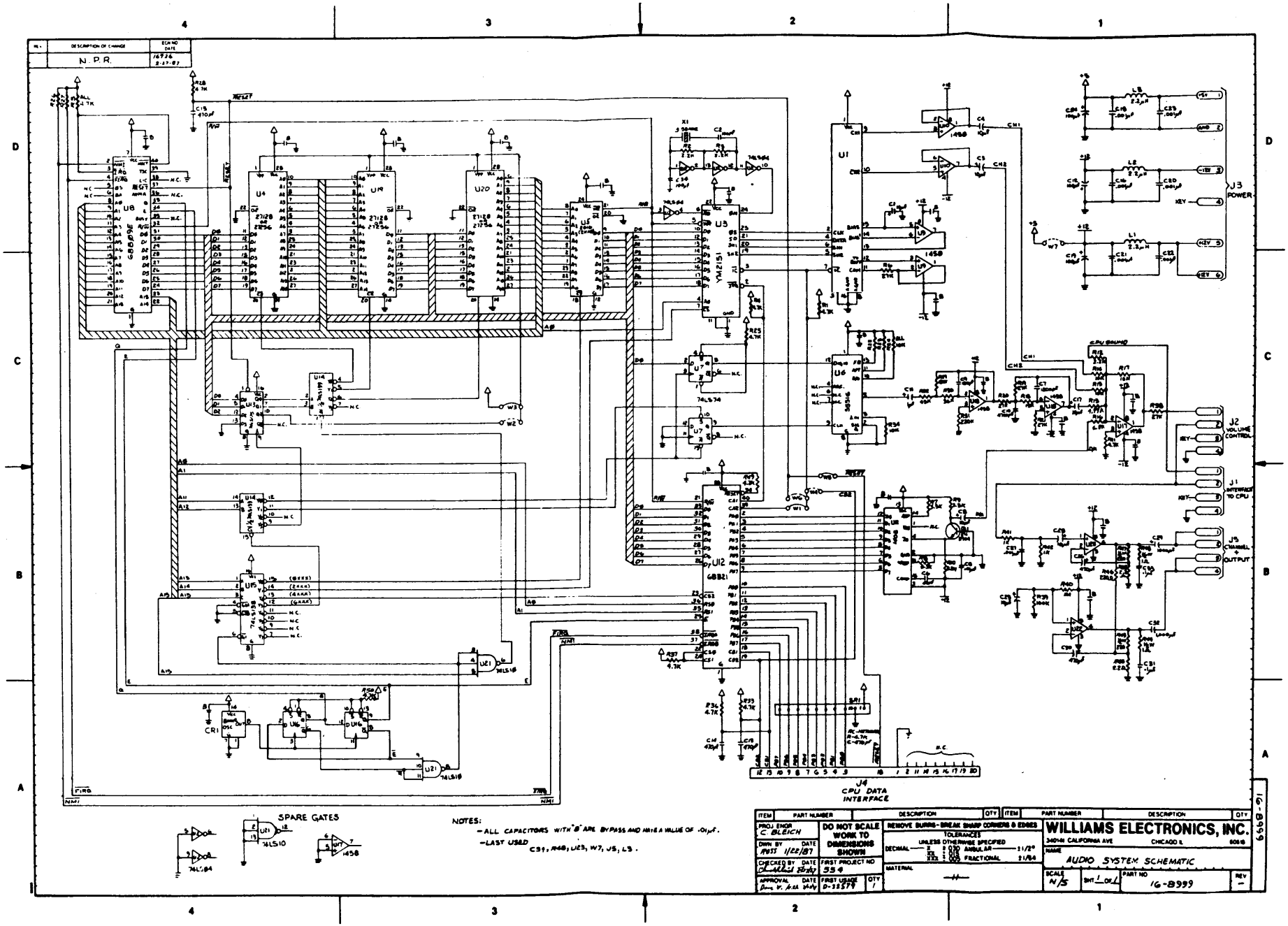
NAME BALLY L-DISPLAY ASSY

SCALE 2/1 SHT 1 OF 1 PART NO. D-12706 REV -

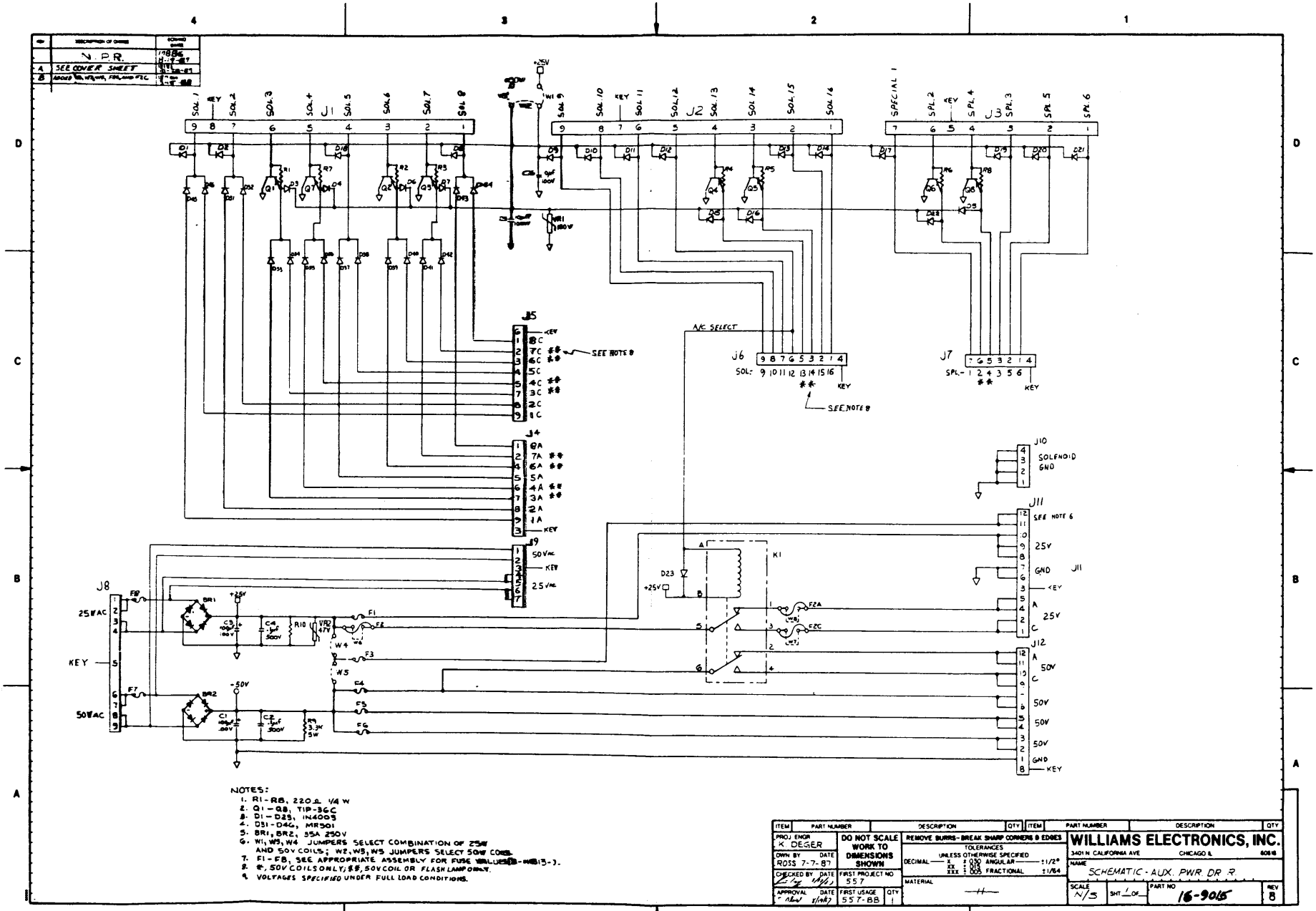
D-12706



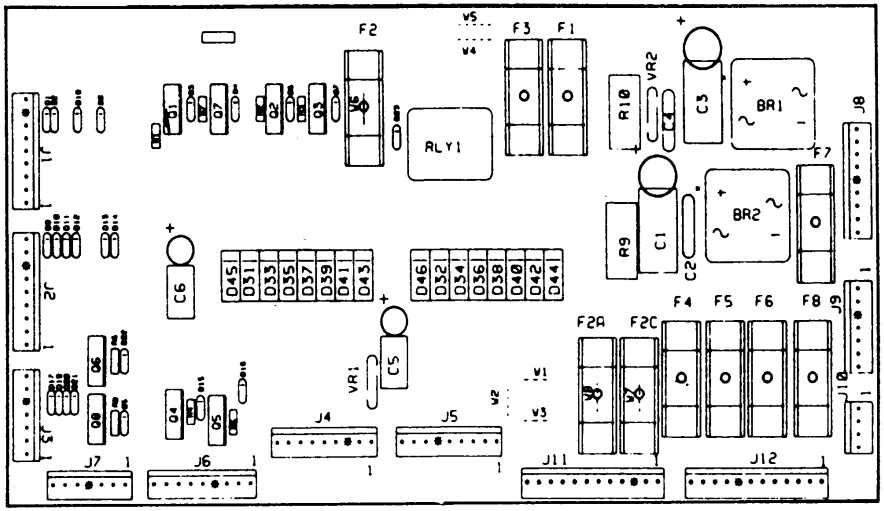
Bally Left Display Schematic



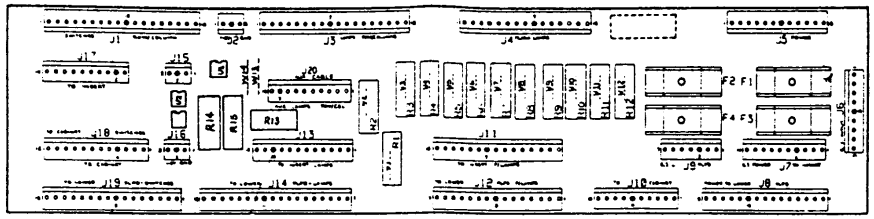
Audio Board (D-11581) Schematic



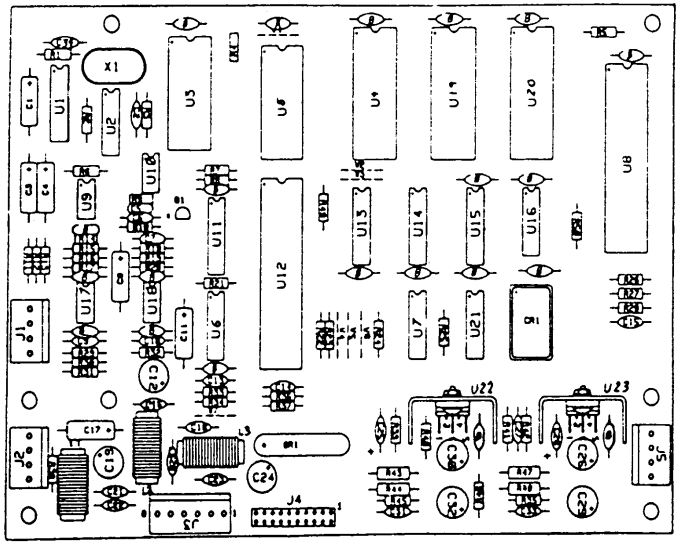
Aux Power Driver Board Schematic



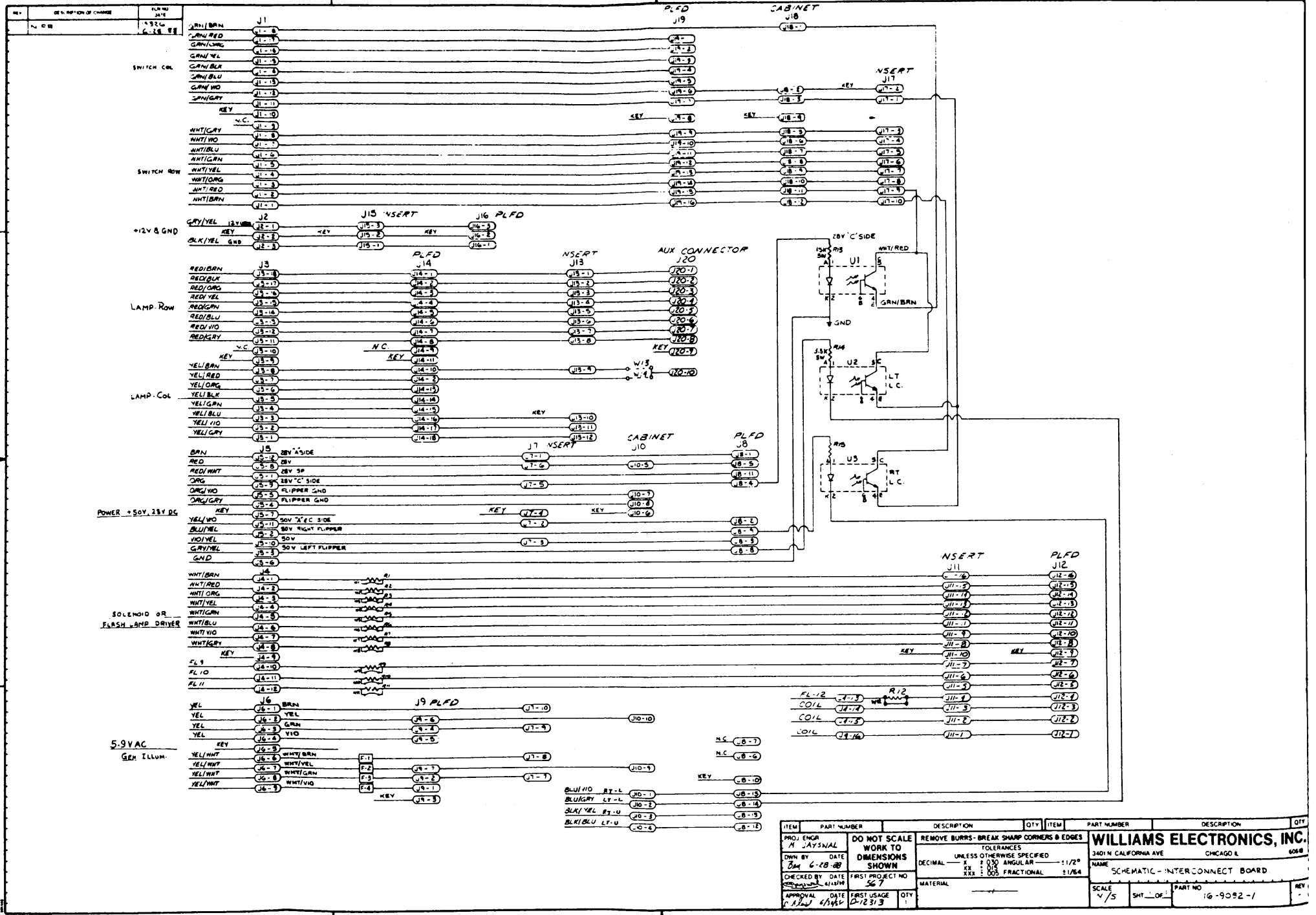
Aux Power Driver Unit Board
p/n D-12247-2011



Backbox Interconnect Board
p/n D-12313-2011



Audio Board Assembly
p/n D-11581-2011



ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	M JAYSNAL	DO NOT SCALE WORK TO DIMENSIONS SHOWN	
DWN BY	DATE 6-18-88		
CHECKED BY	DATE	FIRST PROJECT NO 567	
APPROVAL	DATE 6/19/88	FIRST USAGE D-12313	QTY 1

REMOVE BURRS - BREAK SHARP CORNERS & EDGES

TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL — X ± .030 ANGULAR ± 1/2°
XX ± .005
XXX ± .005 FRACTIONAL ± 1/64

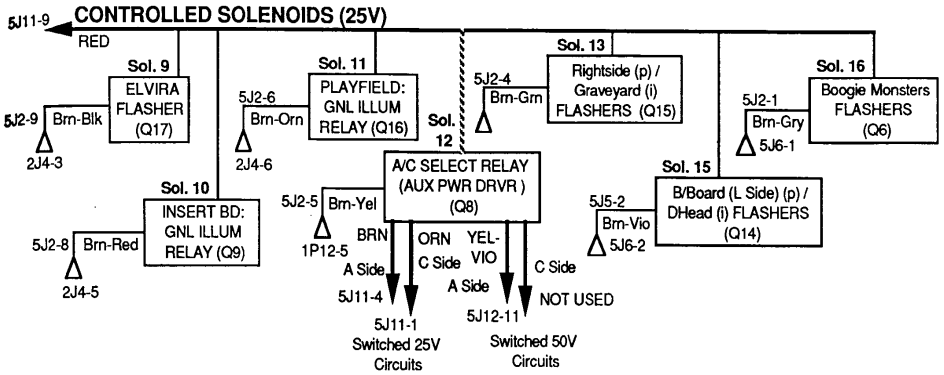
MATERIAL —

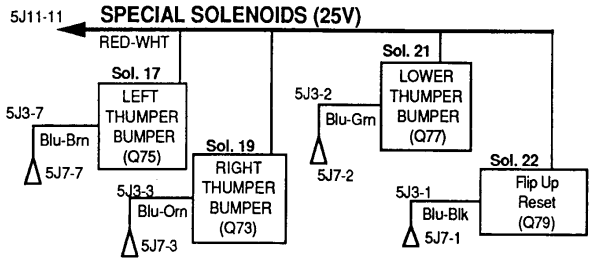
WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE CHICAGO IL 60618

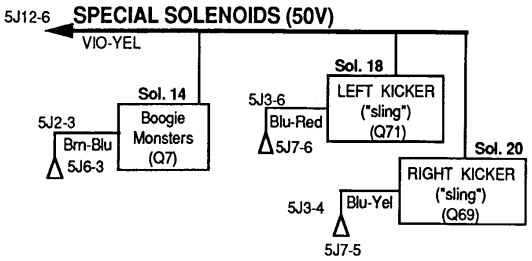
NAME SCHEMATIC - INTERCONNECT BOARD

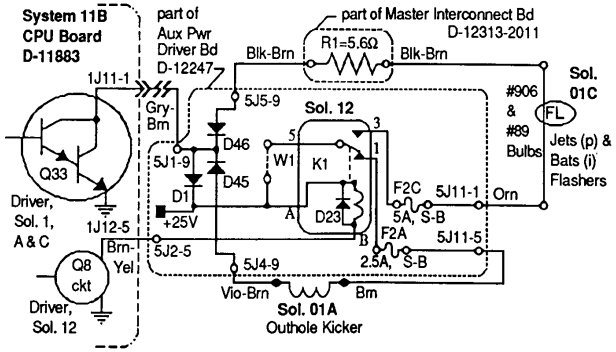
SCALE N/S SHT 1 OF 1 PART NO 16-9092-1 REV -

Backbox Interconnect Board (D-12313-568) Schematic

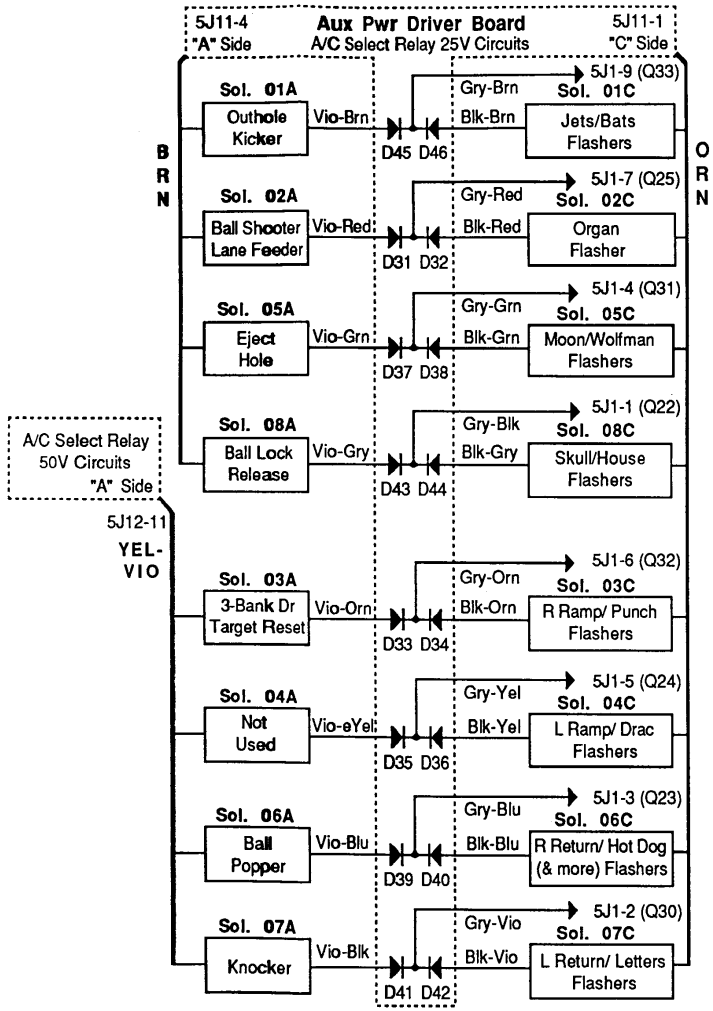




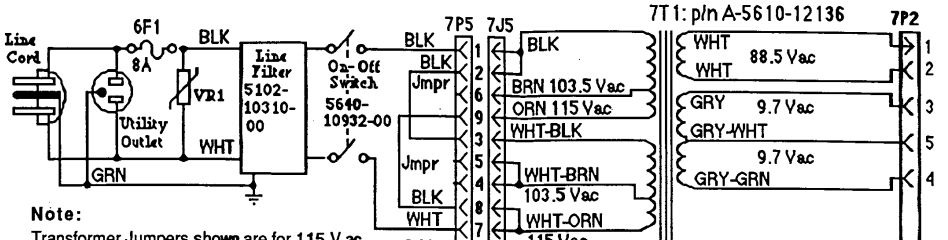




SWITCHED SOLENOIDS

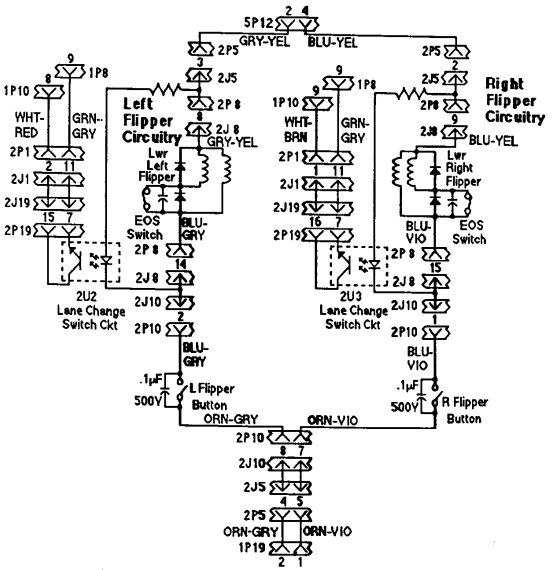


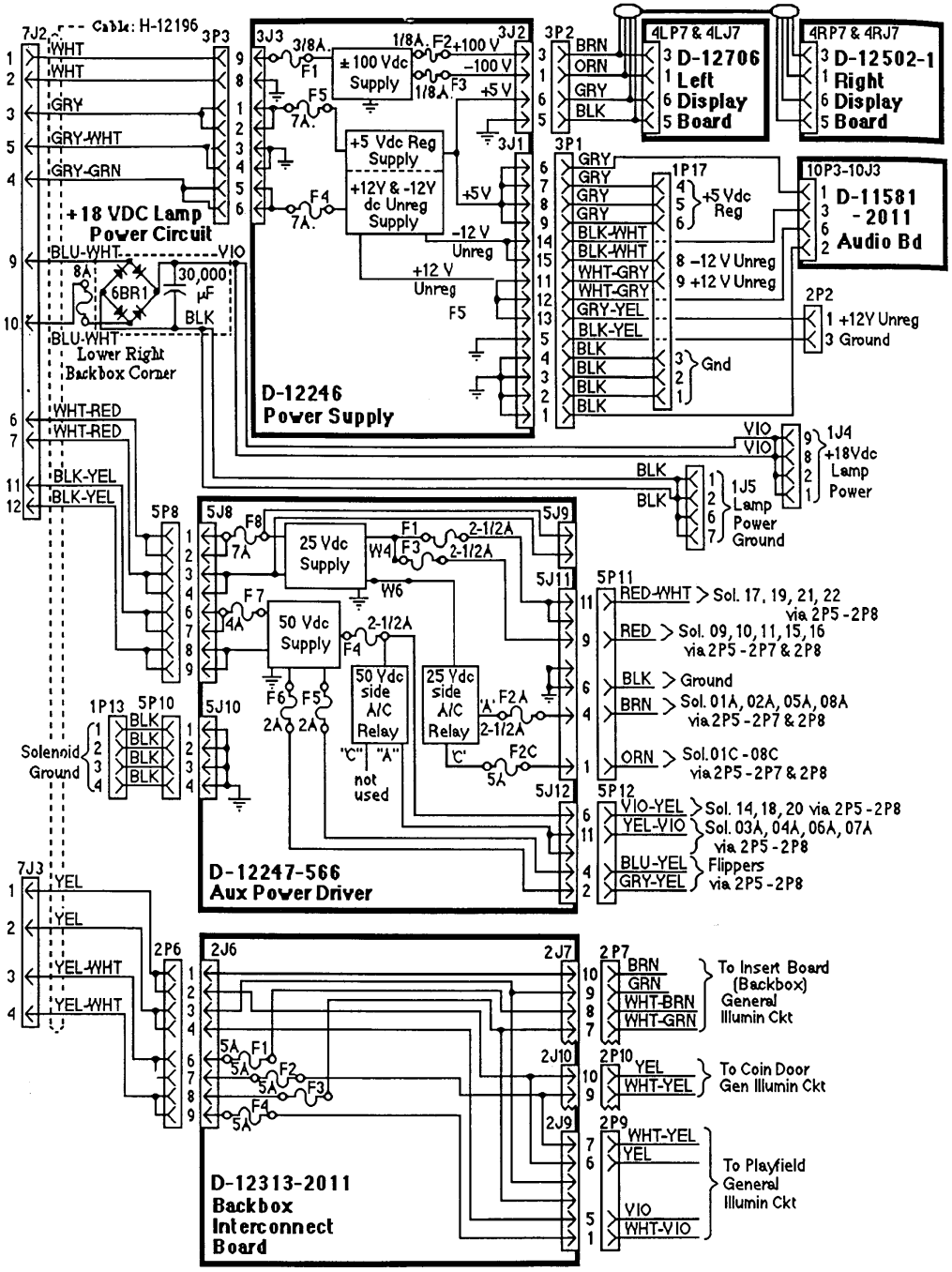
Power Wiring Diagram



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

TRANSFORMER JUMPER CHART		
206/218 VAC	230 VAC	103.5 VAC
7P5: BLK, 206V, 218V, WHT	7P5: BLK, WHT	7P5: BLK, WHT
FUSE (6F1): 4A, S-B	4A, S-B	8A, N-B
VARISTOR: 275V	275V	130V
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)		





BACKBOX INTERCONNECT BOARD INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description
2J1-1	WHT-BRN	Switch Row 1 /1J11-9
2J1-1	WHT-RED	Switch Row 2 /1J11-8
2J1-3	WHT-ORG	Switch Row 3 /1J11-7
2J1-4	WHT-YEL	Switch Row 4 /1J11-6
2J1-5	WHT-GRN	Switch Row 5 /1J11-5
2J1-6	WHT-BLU	Switch Row 6 /1J11-3
2J1-7	WHT-VIO	Switch Row 7 /1J11-2
2J1-8	WHT-GRY	Switch Row 8 /1J11-1
2J1-9	Key Pin	No Connection
2J1-10	---	No Connection
2J1-11	GRN-GRY	Switch Col 8 (Q46) /1J8-9
2J1-12	GRN-VIO	Switch Col 7 (Q42) /1J8-8
2J1-13	GRN-BLU	Switch Col 6 (Q47) /1J8-7
2J1-14	GRN-BLK	Switch Col 5 (Q43) /1J8-5
2J1-15	GRN-YEL	Switch Col 4 (Q48) /1J8-4
2J1-16	GRN-ORG	Switch Col 3 (Q44) /1J8-3
2J1-17	GRN-RED	Switch Col 2 (Q49) /1J8-2
2J1-18	GRN-BRN	Switch Col 1 (Q45) /1J8-1
2J4-1	WHT-BRN	Solenoid 01C In /5J5-9
2J4-2	WHT-RED	Solenoid 02C In /5J5-8
2J4-3	WHT-ORG	Solenoid 03C In /5J5-7
2J4-4	WHT-YEL	Solenoid 04C In /5J5-5
2J4-5	WHT-GRN	Solenoid 05C In /5J5-4
2J4-6	WHT-BLU	Solenoid 06C In /5J5-3
2J4-7	WHT-VIO	Solenoid 07C In /5J5-2
2J4-8	WHT-GRY	Solenoid 08C In /5J5-1
2J4-9	Key Pin	No Connection
2J4-10	BRN-GRN	Solenoid 14 /5J6-5
2J4-11	BRN-VIO	Solenoid 15 /5J6-2
2J4-12	BRN-GRY	Solenoid 16 /5J6-1
2J4-13	BRN-BLK	Solenoid 9/5J6-9
2J4-14	BRN-ORG	Solenoid 11 /5J6-7
2J4-15	BRN-RED	Solenoid 10 /5J6-8
2J4-16	BRN-BLU	Solenoid 14 /5J6-3
2J6-1	YEL	Gen Illum Pwr: 6V ac
2J6-2	YEL	Gen Illum Pwr: 6V ac
2J6-3	YEL	Gen Illum Pwr: 6V ac
2J6-4	YEL	Gen Illum Pwr: 6V ac
2J6-5	Key Pin	No Connection
2J6-6	YEL-WHT	Gen Illum Pwr: 6V ac
2J6-7	YEL-WHT	Gen Iilum Pwr: 6V ac
2J6-8	YEL-WHT	Gen Illum Pwr: 6V ac
2J6-9	YEL-WHT	Gen Illum Pwr: 6V ac
2J8-1	BRN	+25 Vdc ("A" Solenoids)
2J8-2	YEL-VIO	+50 Vdc Solenoid 03A, 04A, 06A
2J8-3	VIO-YEL	+50 Vdc Solenoid 14, 18, 20
2J8-4	ORG	+25 Vdc ("C" Solenoids)
2J8-5	RED	+25 Vdc Solenoid 9-11, 15, 16
2J8-6 - 7	---	No Connection
2J8-8	GRY-YEL	Flipper Power
2J8-9	BLU-YEL	Flipper Power
2J8-10	Key Pin	No Connection
2J8-11	RED-WHT	+25Vdc Solenoid 17, 19, 21
2J8-12	---	No Connection
2J8-13	---	No Connection
2J8-14	BLU-GRY	Lower L Flipper
2J8-15	BLU-VIO	Lwr R Flipper
2J10-1	BLU-VIO	Lwr R Flipper Switch
2J10-2	BLU-GRY	Lwr L Flipper Switch
2J10-3 - 4	---	No Connection
2J10-5	RED	+25 Vdc (Solenoid)
2J10-6	---	No Connection
2J10-7	ORG-VIO	R Flipper Ground Ckt
2J10-8	ORG-GRY	L Flipper Ground Ckt
2J10-9	WHT-YEL	Gen Illum Pwr: 6V ac
2J10-10	YEL	Gen Illum Pwr: 6V ac

Connector	Wire Color	Signal Designation/Description
2J2-1	GRY-YEL	+12Vdc Unreg/3J1-13
2J2-2	---	No Connection
2J2-3	BLK-YEL	Ground/3J1-5
2J3-1	YEL-GRY	Lamp Col 8 (Q51/52)/1J7-9
2J3-2	YEL-VIO	Lamp Col 7 (Q53/54)/1J7-8
2J3-3	YEL-BLU	Lamp Col 6 (Q55/56)/1J7-7
2J3-4	YEL-GRN	Lamp Col 5 (Q57/58)/1J7-6
2J3-5	YEL-BLK	Lamp Col 4 (Q59/60)/1J7-4
2J3-6	YEL-ORG	Lamp Col 3 (Q61/62)/1J7-3
2J3-7	YEL-RED	Lamp Col 2 (Q63/64)/1J7-2
2J3-8	YEL-BRN	Lamp Col 1 (Q65/66)/1J7-1
2J3-9	Key Pin	No Connection
2J3-10		No Connection
2J3-11	RED-GRY	Lamp Row 8 (Q87) /1J6- 9
2J3-12	RED-VIO	Lamp Row 7 (Q86) /1J6- 8
2J3-13	RED-BLU	Lamp Row 6 (Q85) /1J6- 7
2J3-14	RED-GRN	Lamp Row 5 (Q84) /1J6- 6
2J3-15	RED-YEL	Lamp Row 4 (Q83) /1J6- 5
2J3-16	RED-ORG	Lamp Row 3 (Q82) /1J6- 3
2J3-17	RED-BLK	Lamp Row 2 (Q81) /1J6- 2
2J3-18	RED-BRN	Lamp Row 1 (Q80) /1J6- 1
2J5-1	RED-WHT	+25Vdc (Solenoid)/5J11-12
2J5-2	BLU-YEL	Flipper Power/5J12-4
2J5-3	GRY-YEL	Flipper Power/5J12-2
2J5-4	ORG-GRY	Flipper Ground Ckt/1J19-2
2J5-5	ORG-VIO	Flipper Ground Ckt/1J19-1
2J5-6	BLK	Ground/5J11-6
2J5-7	Key Pin	No Connection
2J5-8	RED	+25 Vdc (Solenoid)/ 5J11-9
2J5-9	ORG	+25 Vdc ("C" Solenoids)/ 5J11-1
2J5-10	VIO-YEL	+50 Vdc (Solenoid)/ 5J12-7
2J5-11	YEL-VIO	+50 Vdc (Solenoid)/ 5J12-11
2J5-12	BRN	+25 Vdc ("A" Solenoids)/5J11-5
2J7-1	---	No Connection
2J7-2	---	No Connection
2J7-3	---	No Connection
2J7-4	---	No Connection
2J7-5	ORG	+25 Vdc ("C" Solenoids)
2J7-6	RED	+25 Vdc (Solenoid)/
2J7-7	WHT-GRN	Backbox Gen Illum Pwr/2J6-8
2J7-8	WHT-BRN	Backbox Gen Illum Pwr/2J6-6
2J7-9	GRN	Backbox Gen Illum Pwr/2J6-3
2J7-10	BRN	Backbox Gen Illum Pwr/2J6-1
2J9-1	WHT-VIO	Playfield Gen Illum Pwr/2J6-9
2J9-2	---	No Connection
2J9-3	---	No Connection
2J9-4	---	No Connection
2J9-5	VIO	Playfield Gen Illum Pwr/2J6-4
2J9-6	YEL	Playfield Gen Illum Pwr/2J6-2
2J9-7	WHT-YEL	Playfield Gen Illum Pwr/2J6-7
2J11-1	---	No Connection
2J11-2	BRN-RED	Solenoid 10
2J11-3	---	No Connection
2J11-4	BRN-BLK	Solenoid 9
2J11-5	---	No Connection
2J11-6	BRN-VIO	Solenoid 15
2J11-7	BRN-GRN	Solenoid 13
2J11-8	BLK-GRY	Solenoid 08C
2J11-9	BLK-VIO	Solenoid 07C
2J11-10	---	No Connection
2J11-11	BLK-BLU	Solenoid 06C
2J11-12	BLK-GRN	Solenoid 05C
2J11-13	BLK-YEL	Solenoid 04C
2J11-14	BLK-ORN	Solenoid 03C
2J11-15	---	No Connection
2J11-16	BLK-BRN	Solenoid 01C
2J12-16	BLK-BRN	Solenoid 01C

BACKBOX INTERCONNECT BOARD INTERBOARD SIGNALS (Continued)

Connector	Wire Color	Signal Designation/Description
2J12-1	BRN-BLU	Solenoid 14
2J12-2	---	No Connection
2J12-3	BRN-ORN	Solenoid 11
2J12-4	---	No Connection
2J12-5	BRN-GRY	Solenoid 16
2J12-6	BRN-VIO	Solenoid 15
2J12-7	BRN-GRN	Solenoid 13
2J12-8	BLK-GRY	Solenoid 08C
2J12-9	---	No Connection
2J12-10	BLK-VIO	Solenoid 07C
2J12-11	BLK-BLU	Solenoid 06C
2J12-12	BLK-GRN	Solenoid 05C
2J12-13	BLK-YEL	Solenoid 04C
2J12-14	BLK-ORG	Solenoid 03C
2J12-15	BLK-RED	Solenoid 02C
2J14--1	RED-BRN	Lamp Row 1
2J14-2	RED-BLK	Lamp Row 2
2J14-3	RED-ORG	Lamp Row 3
2J14-4	RED-YEL	Lamp Row 4
2J14-5	RED-GRN	Lamp Row 5
2J14-6	RED-BLU	Lamp Row 6
2J14-7	RED-VIO	Lamp Row 7
2J14-8	RED-GRY	Lamp Row 8
2J14-9	---	No Connection
2J14-10	YEL-BRN	Lamp Col 1
2J14-11	---	No Connection
2J14-12	YEL-RED	Lamp Col 2
2J14-13	YEL-ORG	Lamp Col 3
2J14-14	YEL-BLK	Lamp Col 4
2J14-15	YEL-GRN	Lamp Col 5
2J14-16	YEL-BLU	Lamp Col 6
2J14-17	YEL-VIO	Lamp Col 7
2J14-18	YEL-GRY	Lamp Col 8
2J19-1	GRN-RED	Switch Col 2
2J19-2	GRN-ORN	Switch Col 3
2J19-3	GRN-YEL	Switch Col 4
2J19-4	GRN-BLK	Switch Col 5
2J19-5	GRN-BLU	Switch Col 6
2J19-6	GRN-VIO	Switch Col 7
2J19-7	---	No Connection
2J19-8	---	No Connection

Connector	Wire Color	Signal Designation/Description
2J13-1	---	No Connection
2J13-2	---	No Connection
2J13-3	---	No Connectio
2J13-4	RED-YEL	Lamp Row 4
2J13-5	RED-GRN	Lamp Row 5
2J13-6	RED-BLU	Lamp Row 6
2J13-7	RED-VIO	Lamp Row 7
2J13-8	RED-GRY	Lamp Row 8
2J13-9	---	No Connection
2J13-10	---	No Connection
2J13-11	---	No Connection
2J13-12	YEL-GRY	Lamp Col 8
2J15	Not Applicable	
2J16-1	BLK-YEL	Ground
2J16-2	---	No Connection
2J16-3	GRY-YEL	+12Vdc Unreg/3-b Dr Tgt Opto
2J17	Not Applicable	
2J18-1	GRN-BRN	Switch Col 1
2J18-2 - 4	---	No Connection
2J18-5	WHT-GRY	Switch Row 8
2J18-6	WHT-VIO	Switch Row 7
2J18-7	WHT-BLU	Switch Row 6
2J18-8	WHT-GRN	Switch Row 5
2J18-9	WHT-YEL	Switch Row 4
2J18-10	WHT-ORG	Switch Row 3
2J18-11	---	No Connection
2J18-12	WHT-BRN	Switch Row 1
2J19-9	WHT-GRY	Switch Row 8
2J19-10	WHT-VIO	Switch Row 7
2J19-11	WHT-BLU	Switch Row 6
2J19-12	WHT-GRN	Switch Row 5
2J19-13	WHT-YEL	Switch Row 4
2J19-14	WHT-ORG	Switch Row 3
2J19-15	WHT-RED	Switch Row 2
2J19-16	WHT-BRN	Switch Row 1
2J20	Not Applicable	

AUX POWER DRIVER INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description
5J1-1	GRY-BLK	CPU: Solenoid 8 (Q22) / 1J11-9
5J1-2	GRY-VIO	CPU: Solenoid 7 (Q30) / 1J11-8
5J1-3	GRY-BLU	CPU: Solenoid 6 (Q23) / 1J11-7
5J1-4	GRY-GRN	CPU: Solenoid 5 (Q31) / 1J11-6
5J1-5	GRY-YEL	CPU: Solenoid 4 (Q24) / 1J11-5
5J1-6	GRY-ORG	CPU: Solenoid 3 (Q32) / 1J11-4
5J1-7	GRY-RED	CPU: Solenoid 2 (Q25) / 1J11-3
5J1-8	Key Pin	No Connection
5J1-9	GRY-BRN	CPU: Solenoid 1 (Q33) / 1J11-1
5J3-1	BLU-BLK	CPU: Solenoid 22 (Q79) / 1J19-9
5J3-2	BLU-GRN	CPU: Solenoid 21 (Q77) / 1J19-8
5J3-3	BLU-ORG	CPU: Solenoid 19 (Q73) / 1J19-3
5J3-4	BLU-YEL	CPU: Solenoid 20 (Q69) / 1J19-6
5J3-5	Key Pin	No Connection
5J3-6	BLU-RED	CPU: Solenoid 18 (Q71) / 1J19-4
5J3-7	BLU-BRN	CPU: Solenoid 17 (Q75) / 1J19-7
5J5-1	WHT-GRY	Solenoid 08C /2J4-8
5J5-2	WHT-VIO	Solenoid 07C /2J4-7
5J5-3	WHT-BLU	Solenoid 06C /2J4-6
5J5-4	WHT-GRN	Solenoid 05C /2J4-5
5J5-5	WHT-YEL	Solenoid 04C /2J4-4
5J5-6	Key Pin	No Connection
5J5-7	WHT-ORG	Solenoid 03C /2J4-3
5J5-8	WHT-RED	Solenoid 02C /2J4-2
5J5-9	WHT-BRN	Solenoid 01C /2J4-1
5J7-1	BLU-BLK	Solenoid 22
5J7-2	BLU-GRN	Solenoid 21
5J7-3	BLU-ORG	Solenoid 19
5J7-4	Key Pin	No Connection
5J7-5	BLU-YEL	Solenoid 20
5J7-6	BLU-RED	Solenoid 18
5J7-7	BLU-BRN	Solenoid 17
5J9-1	---	No Connection
5J9-2	---	No Connection
5J9-3	Key Pin	No Connection
5J9-4	---	No Connection
5J9-5	---	No Connection
5J9-6	---	No Connection
5J9-7	---	No Connection
5J12-1	---	No Connection
5J12-2	GRY-YEL	+50 Vdc Flipper Pwr/ 2J5-3
5J12-3	---	No Connection
5J12-4	BLU-YEL	+50 Vdc Flipper Pwr/2J5-2
5J12-5	---	No Connection
5J12-6	VIO-YEL	+50 Vdc Solenoid Pwr/2J5-10
5J12-7	---	No Connection
5J12-8	Key Pin	No Connection
5J12-9	---	No Connection
5J12-10	---	No Connection
5J12-11	YEL-VIO	+50 Vdc Solenoid Pwr/2J5-11
5J12-12	---	No Connection

Connector	Wire Color	Signal Designation/Description
5J2-1	BRN-GRY	CPU: Solenoid 16 (Q6) / 1J12-9
5J2-2	BRN-VIO	CPU: Solenoid 15 (Q14) / 1J12-8
5J2-3	BRN-BLU	CPU: Solenoid 14 (Q7) / 1J12-7
5J2-4	---	No Connection
5J2-5	BRN-YEL	CPU: Solenoid 12 (Q8) / 1J12-5
5J2-6	BRN-ORG	CPU: Solenoid 11 (Q16) / 1J12-4
5J2-7	Key Pin	No Connection
5J2-8	BRN-RED	CPU: Solenoid 10 (Q9) / 1J12-2
5J2-9	BRN-BLK	CPU: Solenoid 9 (Q17) / 1J12-1
5J4-1	VIO-GRY	Solenoid 08A
5J4-2	VIO-BLK	Solenoid 07A
5J4-3	Key Pin	No Connection
5J4-4	VIO-BLU	Solenoid 06A
5J4-5	VIO-GRN	Solenoid 05A
5J4-6	---	No Connection
5J4-7	VIO-ORN	Solenoid 03A
5J4-8	VIO-RED	Solenoid 02A
5J4-9	VIO-BRN	Solenoid 01A
5J6-1	BRN-GRY	Solenoid 16 /2J4-12
5J6-2	BRN-VIO	Solenoid 15 /2J4-11
5J6-3	BRN-BLU	Solenoid 14
5J6-4	Key Pin	No Connection
5J6-5	---	Solenoid 13
5J6-6	---	Solenoid 12
5J6-7	BRN-ORG	Solenoid 11 /2J4-10
5J6-8	BRN-RED	Solenoid 10 /2J4-15
5J6-9	BRN-BLK	Solenoid 9 /2J4-13
5J8-1	WHT-RED	Transformer: 26V ac / 7J2-6
5J8-2	WHT-RED	Transformer: 26V ac / 7J2-6
5J8-3	WHT-RED	Transformer: 26V ac / 7J2-7
5J8-4	WHT-RED	Transformer: 26V ac / 7J2-7
5J8-5	Key Pin	No Connection
5J8-6	BLK-YEL	Transformer: 48V ac / 7J2-11
5J8-7	BLK-YEL	Transformer: 48V ac / 7J2-11
5J8-8	BLK-YEL	Transformer: 48V ac / 7J2-12
5J8-9	BLK-YEL	Transformer: 48V ac / 7J2-12
5J10-1	BLK	Solnd Gnd / 1J13-1
5J10-2	BLK	Solnd Gnd / 1J13-2
5J10-3	BLK	Solnd Gnd / 1J13-3
5J10-4	BLK	Solnd Gnd / 1J13-4
5J11-1	ORG	+25 Vdc "C" Solenoid Pwr/2J5-9
5J11-2	---	No Connection
5J11-3	Key Pin	No Connection
5J11-4	BRN	+25 Vdc "A" Solenoid Pwr/2J5-12
5J11-5	---	No Connection
5J11-6	BLK	Ground/2J5-6
5J11-7	---	No Connection
5J11-8	---	No Connection
5J11-9	RED	+25 Vdc Solenoid Pwr/2J5-8
5J11-10	---	No Connection
5J11-11	RED-WHT	+50 Vdc / Solenoid Pwr/2J5-1
5J11-12	---	No Connection

SYSTEM 11B CPU INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description
1J1-1	BRN-GRY	ST-8: Display Digit Strobe / 4J1-1
1J1-2	BRN-VIO	ST-7: Display Digit Strobe / 4J1-2
1J1-3	BRN-BLU	ST-6: Display Digit Strobe / 4J1-3
1J1-4	BRN-GRN	ST-5: Display Digit Strobe / 4J1-4
1J1-5	BRN-YEL	ST-4: Display Digit Strobe / 4J1-5
1J1-6	BRN-ORG	ST-3: Display Digit Strobe / 4J1-6
1J1-7	BRN-RED	ST-2: Display Digit Strobe / 4J1-7
1J1-8	Key Pin	No Connection
1J1-9	BRN-BLK	ST-1: Display Digit Strobe / 4J1-9
1J3-1	BLU-BRN	D1 / Display BCD / 4J5-1
1J3-2	BLU-RED	C1 / Display BCD / 4J5-2
1J3-3	BLU-ORG	B1 / Display BCD / 4J5-3
1J3-4	BLU-YEL	A1 / Display BCD / 4J5-4
1J3-5	BLU-GRN	D2 / Display BCD / 4J5-5
1J3-6	Key Pin	No Connection
1J3-7	BLU-BLK	C2 / Display BCD / 4J5-7
1J3-8	BLU-VIO	B2 / Display BCD / 4J5-8
1J3-9	BLU-GRY	A2 / Display BCD / 4J5-9
1J3-10	---	No Connection
1J3-11	---	No Connection
1J3-12	---	No Connection
1J5-1	---	No Connection
1J5-2	Key Pin	No Connection
1J5-3	BLK	Ground (Lamp Ckt)
1J5-4	BLK	Ground (Lamp Ckt)
1J5-5	---	No Connection
1J5-6	---	No Connection
1J5-7	---	No Connection
1J5-8	BLK	Ground (Lamp Ckt)
1J5-9	BLK	Ground (Lamp Ckt)
1J7-1	YEL-BRN	Lamp Col 1 (Q65/66) /2J3-8
1J7-2	YEL-RED	Lamp Col 2 (Q63/64) /2J3-7
1J7-3	YEL-ORG	Lamp Col 3 (Q61/62) /2J3-6
1J7-4	YEL-BLK	Lamp Col 4 (Q59/60) /2J3-5
1J7-5	Key Pin	No Connection
1J7-6	YEL-GRN	Lamp Col 5 (Q57/58) /2J3-4
1J7-7	YEL-BLU	Lamp Col 6 (Q55/56) /2J3-3
1J7-8	YEL-VIO	Lamp Col 7 (Q53/54) /2J3-2
1J7-9	YEL-GRY	Lamp Col 8 (Q51/52) /2J3-1
1J10-1	WHT-GRY	Switch Row 8 /2J1-8
1J10-2	WHT-VIO	Switch Row 7 /2J1-7
1J10-3	WHT-BLU	Switch Row 6 /2J1-6
1J10-4	Key Pin	No Connection
1J10-5	WHT-GRN	Switch Row 5 /2J1-5
1J10-6	WHT-YEL	Switch Row 4 /2J1-4
1J10-7	WHT-ORG	Switch Row 3 /2J1-3
1J10-8	WHT-RED	Switch Row 2 /2J1-2
1J11-9	WHT-BRN	Switch Row 1 /2J1-1
1J12-1	BRN-BLK	Solenoid 9 (Q17) / 5J2-9
1J12-2	BRN-RED	Solenoid 10 (Q9) / 5J2-8
1J12-3	Key Pin	No Connection
1J12-4	BRN-ORG	Solenoid 11 (Q16) / 5J2-6
1J12-5	BRN-YEL	Solenoid 12 (Q8) / 5J2-5
1J12-6	BRN-GRN	Solenoid 13 (Q15) /2J4-10
1J12-7	BRN-BLU	Solenoid 14 (Q7) / 5J2-3
1J12-8	BRN-VIO	Solenoid 15 (Q14) / 5J2-2
1J12-9	BRN-GRY	Solenoid 16 (Q6) / 5J2-1
1J16-1	RED	Volume Control Input / 11J1-1
1J16-2	BLK	Volume Control Output / 11J1-2
1J16-3	Key Pin	No Connection
1J16-4	WHT	Signal Ground - CPU / 11J1-4
1J18	Not Applicable	
1J19-1	ORG-VIO	Flipper Ground /2J5-5
1J19-2	ORG-GRY	Flipper Ground /2J5-4
1J19-3	BLU-ORN	Spl Solnd 3 (Q73) / 5J3-3
1J19-4	BLU-RED	Spl Solnd 2 (Q71) / 5J3-6
1J19-5	Key Pin	No Connection
1J19-6	BLU-YEL	Spl Solnd 4 (Q69) / 5J3-4
1J19-7	BLU-BRN	Spl Solnd 1 (Q75) / 5J3-7
1J19-8	BLU-GRN	Spl Solnd 5 (Q77) / 5J3-2
1J19-9	BLU-BLK	Spl Solnd 6 (Q79) / 5J3-1

Connector	Wire Color	Signal Designation/Description
1J2-1	VIO-GRY	ST-16: Display Digit Strobe / 4J2-1
1J2-2	VIO-BLK	ST-15: Display Digit Strobe / 4J2-2
1J2-3	VIO-BLU	ST-14: Display Digit Strobe / 4J2-3
1J2-4	VIO-GRN	ST-13: Display Digit Strobe / 4J2-4
1J2-5	VIO-YEL	ST-12: Display Digit Strobe / 4J2-5
1J2-6	VIO-ORG	ST-11: Display Digit Strobe / 4J2-6
1J2-7	Key Pin	No Connection
1J2-8	VIO-RED	ST-10: Display Digit Strobe / 4J2-8
1J2-9	VIO-BRN	ST-9: Display Digit Strobe / 4J2-9
1J4-1	VIO	Lamp +18V dc Power
1J4-2	VIO	"
1J4-3	Key Pin	No Connection
1J4-4	---	No Connection
1J4-5	---	No Connection
1J4-6	---	No Connection
1J4-7	---	No Connection
1J4-8	VIO	Lamp +18V dc Power
1J4-9	VIO	"
1J6-1	RED-BRN	Lamp Row 1 (Q80) /2J3-18
1J6-2	RED-BLK	Lamp Row 2 (Q81) /2J3-17
1J6-3	RED-ORG	Lamp Row 3 (Q82) /2J3-16
1J6-4	Key Pin	No Connection
1J6-5	RED-YEL	Lamp Row 4 (Q83) /2J3-15
1J6-6	RED-GRN	Lamp Row 5 (Q84) /2J3-14
1J6-7	RED-BLU	Lamp Row 6 (Q85) /2J3-13
1J6-8	RED-VIO	Lamp Row 7 (Q86) /2J3-12
1J6-9	RED-GRY	Lamp Row 8 (Q87) /2J3-11
1J8-1	GRN-BRN	Switch Col 1 (Q45) /2J1-18
1J8-2	GRN-RED	Switch Col 2 (Q49) /2J1-17
1J8-3	GRN-ORG	Switch Col 3 (Q44) /2J1-16
1J8-4	GRN-YEL	Switch Col 4 (Q48) /2J1-15
1J8-5	GRN-BLK	Switch Col 5 (Q43) /2J1-14
1J8-6	Key Pin	No Connection
1J8-7	GRN-BLU	Switch Col 6 (Q47) /2J1-13
1J8-8	GRN-VIO	Switch Col 7 (Q42) /2J1-12
1J8-9	GRN-GRY	Switch Col 8 (Q46) /2J1-11
1J9	Not Applicable	
1J11-1	GRY-BRN	Solenoid 1 (Q33) / 5J1-9
1J11-2	Key Pin	No Connection
1J11-3	GRY-RED	Solenoid 2 (Q25) / 5J1-7
1J11-4	GRY-ORG	Solenoid 3 (Q32) / 5J1-6
1J11-5	GRY-YEL	Solenoid 4 (Q24) / 5J1-5
1J11-6	GRY-GRN	Solenoid 5 (Q31) / 5J1-4
1J11-7	GRY-BLU	Solenoid 6 (Q23) / 5J1-3
1J11-8	GRY-VIO	Solenoid 7 (Q30) / 5J1-2
1J11-9	GRY-BLK	Solenoid 8 (Q22) / 5J1-1
1J13-1	BLK	Solenoid Ground / 5J10-1
1J13-2	BLK	" / 5J10-2
1J13-3	BLK	" / 5J10-3
1J13-4	BLK	" / 5J10-4
1J14-1	BLK-RED	Memory Protect / 7J1-4
1J14-2	WHT	Ground / 7J1-3
1J14-3	GRN	ADVANCE Switch / 7J1-1
1J14-4	BLU	AUTO/MANUAL Switch / 7J1-2
1J15	Not Applicable	
1J17-1	BLK	Ground / 3J1-2
1J17-2	BLK	" / 3J1-3
1J17-3	BLK	" / 3J1-4
1J17-4	GRY	Power: +5V dc / 3J1-8
1J17-5	GRY	" / 3J1-6
1J17-6	GRY	" / 3J1-9
1J17-7	Key Pin	No Connection
1J17-8	BLK-WHT	Power: -12V dc Unreg / 3J1-14
1J17-9	WHT-GRY	Power: +12V dc Unreg / 3J1-12
1J20	Not Applicable	
1J21	Ribbon Cable to Audio Board 11J4	
1J22	Ribbon Cable to Master Display Board 4J3	

POWER SUPPLY INTERBOARD SIGNALS

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

AUDIO BOARD INTERBOARD SIGNALS

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

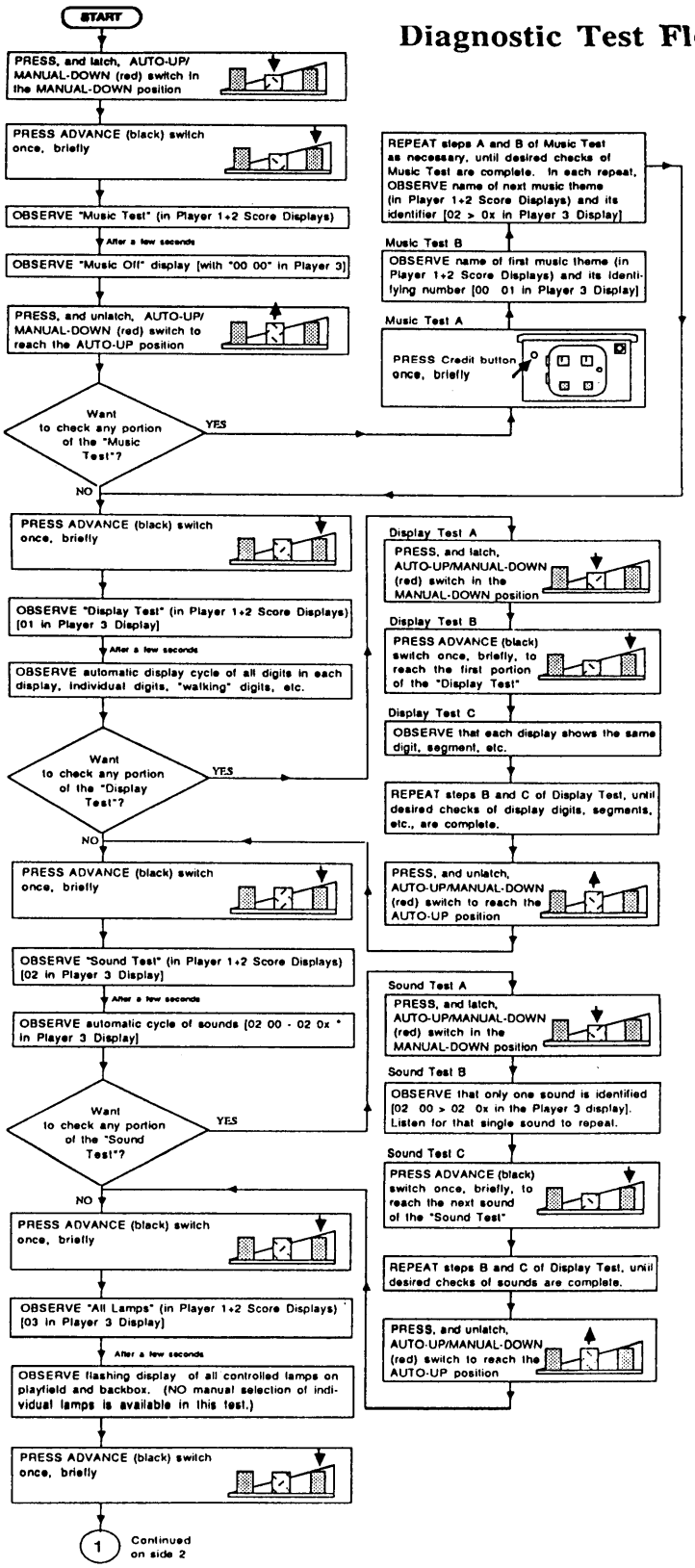
LEFT DISPLAY INTERBOARD SIGNALS

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

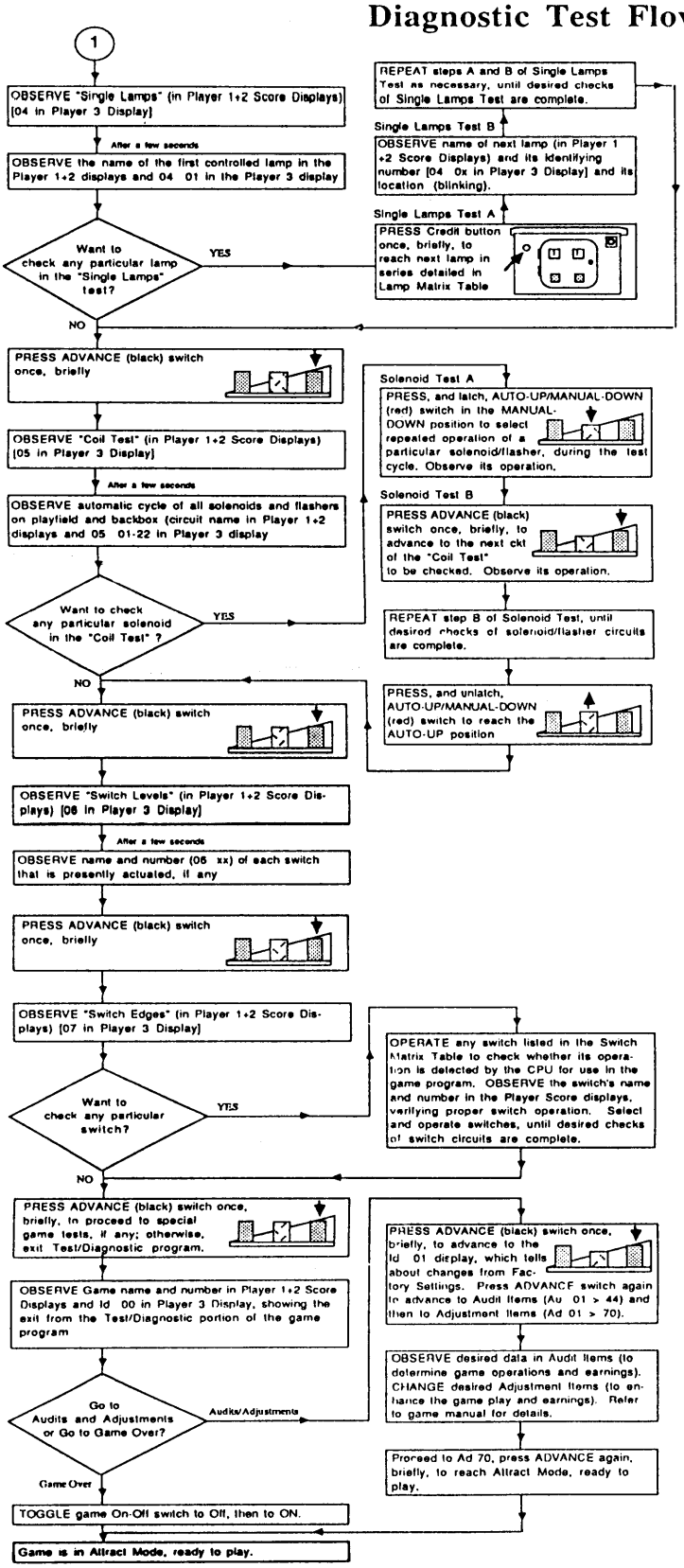
RIGHT DISPLAY INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description
(Same as for Left Display, above, plus 4J5 listed below)		
4J5-1	BLU-BRN	D1 / Display BCD / 1J3-1
4J5-2	BLU-RED	C1 / Display BCD / 1J3-2
4J5-3	BLU-ORG	B1 / Display BCD / 1J3-3
4J5-4	BLU-YEL	A1 / Display BCD / 1J3-4
4J5-5	BLU-GRN	D2 / Display BCD / 1J3-5
4J5-6	Key Pin	No Connection
4J5-7	BLU-BLK	C2 / Display BCD / 1J3-7
4J5-8	BLU-VIO	B2 / Display BCD / 1J3-8
4J5-9	BLU-GRY	A2 / Display BCD / 1J3-9

Diagnostic Test Flowchart



Diagnostic Test Flowchart Side 2



ELVIRA Switch Matrix

column	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
row								
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	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 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	59
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	60
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	61
6 WHT-BLU 1J10-3	Left Coin 6	14	Top Right Rollover 22	Left Ramp Entry 30	38	A 46	Flip Up Target 2 54	62
7 WHT-VIO 1J10-2	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 1J10-1	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 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
row								
1 Q80 RED-BRN 1J6-1	E 1	4X 9	Eye 1 17	Left Ramp Sign 25	Right Ramp Potion 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 Elvira 26	Right Ramp Potion 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 Potion 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 Potion 4 36	Boogie 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

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.

THIS GAME IS PROTECTED by Federal copyright, trademark and patent laws. Unauthorized software or hardware modifications may be illegal under Federal law.

THIS "MODIFICATION" PRINCIPLE ALSO APPLIES to unauthorized facsimiles of BALLY logos, designs, publications, and assemblies. Moreover, facsimiles of *BALLY* equipment (or any feature thereof) may be illegal under Federal law. Whether or not such facsimiles are manufactured with *BALLY* components, this rule applies.

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 FCCsticker. 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.

WARNINC

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-HARNESS 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.

NOTICE

BALLY, MIDWAY, and *ELVIRA* are trademarks or Midway Manufacturing Company. *WILLIAMS, LANE-CHANGE,* and *MULTI-BALL* are trademarks of *WILLIAMS ELECTRONICS GAMES, INC.*

Bally IS MONSTROUS PINBALL