

Bally

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POOL SHARKSTM



OPERATIONS MANUAL

including
Essential Information Concerning
Game Operation & Adjustments,
Game Testing & Problem Diagnostics,
Parts Information, &
Reference Diagrams

MIDWAY MANUFACTURING COMPANY

POOL SHARKS Jumper Chart

GAME	P/N-U15 Game uP	P/N-U27 G. ROM 1	P/N-U26 G. ROM 2	P/N-U21 S. ROM 1	P/N-U22 S.ROM 2	P/N-U24 Sound 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, 19
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, 19
Mousin' Around	5400-09150-00	A-5343-2009-2	A-5343-2009-1	A-5343-2009-4	A-5343-2009-3	5400-09150-00	W1, 2, 4, 5, 7, 8, 11, 14, 16, 17, 19
Game Show	5400-09150-00	A-5343-2003-2	A-5343-2003-1	Not Used	Not Used	Not Used	W1, 2, 4, 5, 7, 11, 14, 16,
Pool Sharks	5400-09150-00	A-5343-2014-2	A-5343-2014-1	Not Used	Not Used	Not Used	W1, 2, 4, 5, 7, 11, 14, 16,

POOL SHARKS Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trnsfr	Solenoid Part Number Flashlamp Type d= Display Bd; p=Playfield	
				CPU Bd	Playfield/ Cabinet			
01A 3	Outhole	Switched	{ Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800	
01C 3	Captive Ball Flasher	Switched	{ Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#906 flashlamp	1p
02A 3	Ball Shooter Lane Feeder	Switched	{ Vio-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	AE-23-800	
02C 3	Shark Flasher	Switched	{ Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89 flashlamp	1p
03A 3	Left Drop Target	Switched	{ Vio-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200	
03C 3	Right Drop Target Flasher	Switched	{ Blk-Orn	(Gry-Orn)	5J5-7 (C)	Q32	#89 flashlamp	1p
04A 3	Right Drop Target	Switched	{ Vio-Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800	
04C 3	Left Drop Target Flasher	Switched	{ Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89 flashlamp	1p
05A 3	Eject Hole	Switched	{ Vio-Grn	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800	
05C 3	Standups Flasher	Switched	{ Blk-Grn	(Gry-Grn)	5J5-4 (C)	Q31	#89 flashlamp	1p
06A 3	Diverter	Switched	{ Vio-Blu	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800	
06C 3	Right Flipper Flasher	Switched	{ Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89 flashlamp	1p
07A 3	Knocker	Switched	{ Vio-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800	
07C 3	Left Flipper Flasher	Switched	{ Blk-Vio	(Gry-Vio)	5J5-2 (C)	Q30	#89 flashlamp	1p
08A 3	Shark Eject Hole	Switched	{ Vio-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22	AE-23-800	
08C 3	Marquee Flasher	Switched	{ Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89 flashlamps	1b
09	Back Left Flasher	Controlled	Brn-Blk	1P12-1	5J2-9: 5J6-9: 2J4-3	Q17	#89 flashlamp	1p
10	Playfield Gnl Illum Relay	Controlled	Brn-Red	1P12-2	5J2-8: 5J6-8: 2J4-5	Q9	5580-09555-01 4a	
11	Insert Illum Relay	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	Right Shark	Controlled	Brn-Grn	1P12-6	5J2-4: 5J6-5	Q15	SM2-35-4000	
14	Not Used	Controlled	Brn-Blu	1P12-7	5J2-4: 5J6-3	Q7		
15	Back Right Flasher	Controlled	Brn-Vio	1P12-8	5J2-2: 5J6-2	Q14	#89 flashlamp	
16	Backglass Tiger	Controlled	Brn-Gry	1P12-9	5J2-1: 5J6-1	Q6	#89 flashlamp	
17	Left Jet Bumper	Special #1	Blu-Brn	1P19-7	5J3-7: 5J7-7	Q75	AE-23-800	
18	Left Kicker (sling)	Special #2	Blu-Red	1P19-4	5J3-6: 5J7-6	Q71	AE-26-1500	
19	Right Jet Bumper	Special #3	Blu-Orn	1P19-3	5J3-3: 5J7-3	Q73	AE-23-800	
20	Right Kicker (sling)	Special #4	Blu-Yel	1P19-6	5J3-4: 5J7-5	Q69	AE-26-1500	
21	Center Jet Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800	
22	Not Used	Special #6	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79		
-	<u>Right Flipper</u>	-	Orn-Vio (Blu-Vio) 2	1P19-1	2J5-5: 2J10-7 (2J10-1: 2J8-15)	-	FL11630/50VDC	
-	<u>Left Flipper</u>	-	Orn-Gry (Blu-Gry) 2	1P19-2	2J5-4: 2J10-8 (2J10-2: 2J8-4)	-	FL11630/50VDC	

Notes 1. Wire colors, except flipper Orn-Vio and Orn-Gry, are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. 2. Flipper connections shown in braces are from flipper switch to flipper coil. 3. "A" 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. 4. Relay is mounted on Relay Bd, (4a) p/n C-11998-1; (4b) C-11902-1. 5. Relay is mounted on Aux Power Driver Bd, D-12247 in the backbox.

CHANGING A GAME

1. DROP IN COINS.
2. PRESS START BUTTON.
3. USE FLIPPERS TO MOVE BETWEEN 8 BALL AND 9 BALL PLAY.
4. WHEN THE DESIRED GAME HAS BEEN CHOSEN, SHOOT THE BALL TO LOCK IN THAT GAME AND BEGIN PLAY.

POOL SHARKS HOUSE RULES

8 BALL PLAY

MAKING 1-7 THEN 9-15 THEN 8 BALL SHOT BRINGS ON THE TRICK SHOT FOR POSSIBLE 3 MILLION SHOT! THIS ALSO SPOTS A RACK.

MAKING C-U-E TOP LANES ADVANCES BONUS VALUE AND LIGHTS TOP EJECT FOR EXTRA BALL LANES. EXTRA BALL IS MADE BY ALTERNATING BOTTOM LANES.

MAKING C-U-E, THREE CHALK TARGETS AND COMPLETING A RACK BRING ON HOT SHOT ALLEY FOR THE JACKPOT!

DROP TARGET BANKS ADVANCE CUE STICK VALUE; 30K-1 MILLION.

9 BALL PLAY

MAKING 1-7 IN ORDER, THEN 8 BALL, THEN 9 BALL, BRINGS ON THE TRICK SHOT FOR A POSSIBLE 3 MILLION SHOT! THIS ALSO SPOTS A RACK.

MAKING C-U-E- TOP LANES ADVANCES BONUS VALUE AND LIGHTS TOP EJECT FOR POSSIBLE EXTRA BALL LANES. EXTRA BALL IS MADE BY ALTERNATING BOTTOM LANES.

MAKING C-U-E LANES, THREE CHALK TARGETS AND, A RACK, BRINGS ON HOT SHOT ALLEY FOR JACKPOT!

DROP TARGET BANKS ADVANCE CUE STICK VALUE; 30K-1 MILLION.

RESETTING THE HIGH SCORES

POOL SHARKS KEEPS A SEPERATE RECORD FOR HIGH SCORE FOR 8 BALL AND 9 BALL PLAY. HOWEVER, WHEN YOU RESET THE HIGH SCORES, YOU RESET 8 BALL AND 9 BALL SCORES AT THE SAME TIME.

TABLE OF CONTENTS

SECTION 1

Game Operation & Test Information

POOL SHARKS ROM Summary.....	1-1
Connector Identification.....	1-2
Circuit Boards.....	1-2
Fig. 1 Locations Diagram - Game Circuit Boards and Major Mechanisms..	1-3
Game Control Locations, Fig. 2.....	1-4
Pinball Game Assembly Instructions Fig. 3.....	1-5
Game Operation.....	1-7
Game Status Displays.....	1-9
Audit Table.....	1-11
Game Adjustment Table.....	1-12
Game Adjustment Comparison Table.....	1-13
Game Adjustment Procedure.....	1-14
Preset Game Adjustments Table for German/European Games.....	1-26
Preset Game Adjustments Table for U.S./Canadian Games.....	1-27
Resetting the High Scores.....	1-30
Game Pricing	1-31
Pricing Table.....	1-31
Test/Diagnostic Information.....	1-34
Music Test.....	1-34
Display Test.....	1-35
Lamp Tests.....	1-35
Lamp Matrix Table.....	1-36
Solenoid Test.....	1-36
Solenoid Table.....	1-37
Special & Controlled Solenoids - Diagrams & Details.....	1-38
Typical Solenoid A/C Select Relay Circuit, Fig. 4.....	1-38
Switch Tests.....	1-39
Switch Matrix Table.....	1-39
C-Side Test.....	1-41
Ending the Diagnostic Tests.....	1-41
Auto Burn-In Mode.....	1-41
System 11-C Memory Chip Test.....	1-42
CPU LED Indicator Table.....	1-42
System 11-C Sound Circuitry Tests.....	1-43
Problem Analysis Messages.....	1-44
Maintenance Information, Fig. 5.....	1-45
Fuse Locations Diagram & Listings.....	1-47

SECTION 2**Game Parts Information**

Cabinet Parts.....	2-2
Major Mechs. & Circuit Boards.....	2-3
System 11C CPU Board Parts Layout & Listing.....	2-4
Power Supply Parts Layout & Listing.....	2-6
Audio Board Parts Layout & Listing.....	2-7
Aux Power Driver Board Parts Layout & Listing.....	2-8
Backbox Interconnect Board Parts Layout & Listing.....	2-9
Left Display Board Parts Layout & Listing.....	2-10
Right Display Board Parts Layout & Listing.....	2-11
Flipper Assemblies.....	2-12
Jet Bumper & Kicker.....	2-13
Kicker (Slingshot) Assemblies.....	2-14
Ball Trough Switches & Stand-up Target.....	2-15
Outhole Kicker & Ball Shooter Lane Feeder.....	2-16
Eject Hole, Ball Shooter & Pool Lamp.....	2-17
Diverter & Shark Assembly.....	2-18
Playfield Posts.....	2-19
Coin Door.....	2-20
Coin Door Parts.....	2-21
3-Bank Drop Target.....	2-22
3-Bank Drop Target Opto Board.....	2-23
4-Bank Drop Target.....	2-24
4-Bank Drop Target Opto Board.....	2-25
Lamp Matrix & Locations.....	2-26
Switch Matrix & Locations.....	2-28
Solenoid Table & Locations.....	2-30
Playfield Parts Locations.....	2-32
Relay Board & Ramps.....	2-34
Lamp Boards.....	2-35
Backbox, Miscellaneous &, Cable Lists.....	2-36
Unique Parts Lists.....	2-37
Display Glass Pinout.....	2-38

SECTION 3**Reference Diagram & Schematics**

Cabinet Wiring Diagram.....	3-2
4-Bank Drop Target Opto Board & Schematic.....	3-3
3-Bank Drop Target Opto Board & Schematic.....	3-4
Power Supply Board & Schematic.....	3-5
System 11C CPU Layout.....	3-6
System 11C CPU Schematic.....	3-7
Bally Right Display Board Layout	3-11
Bally Right Display Board Schematic.....	3-12
Bally Left Display Board Layout.....	3-13
Bally Left Display Board Schematic.....	3-14
Backbox Interconnect, Audio & Aux Power Driver Boards Layout	3-15
Backbox Interconnect Board Schematic.....	3-16
Audio Board Schematic.....	3-17
Aux. Power Driver Board Schematic.....	3-18
Controlled, Switched, & Special Solenoids.....	3-19
Power Wiring Diagram.....	3-20
Interboards Signals.....	3-21
Diagnostic Test Flowchart.....	3-23

Game Operation
and
Test Information

POOL SHARKS ROM SUMMARY

IC	DESCRIPTION	TYPE	IDENTIFIER	BOARD	PART NUMBER
Game ROM 1	32K x 8 ROM	27256	U27	CPU	A-5343-2014-2
Game ROM 2	32K x 8 ROM	27256	U26	CPU	A-5343-2014-1
Music/Speech ROM	64K x 8 ROM	27512	U4	AUDIO	A-5343-2014-3
Music/Speech ROM	64K x 8 ROM	27512	U19	AUDIO	A-5343-2014-4
Music/Speech ROM	64K x 8 ROM	27512	U20	AUDIO	A-5343-2014-5

Connector Identification

Since *POOL SHARKS* is using WILLIAMS ELECTRONICS GAMES System 11C, 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 11C 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

Circuit Boards

System 11C Circuit Boards for *POOL SHARKS* 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.

CPU BOARD

The System 11C CPU Board (p/n D-11883-2014) must be equipped with the ROMs specified in the *POOL SHARKS* ROM Summary. CPU Board jumpers W1, W2, W4, W5, W7, W11, W14, W16, and must be connected.

SOUND BOARD

The Sound Board is p/n D-11581-2014, including ROMs and micro-processor.

DISPLAY BOARD

POOL SHARKS has two Display Boards. The BALLY Right Display Board is p/n D-12502-1, and the BALLY Left Display Board is p/n D-12706.

POWER SUPPLY BOARD

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

AUX POWER DRIVER BOARD

The Aux Power Driver Board is D-12247.

MASTER INTERCONNECT BOARD

The Master Interconnect Board is D-12313-2014.

CIRCUIT BOARD & MAJOR MECHANISMS LOCATION DIAGRAM

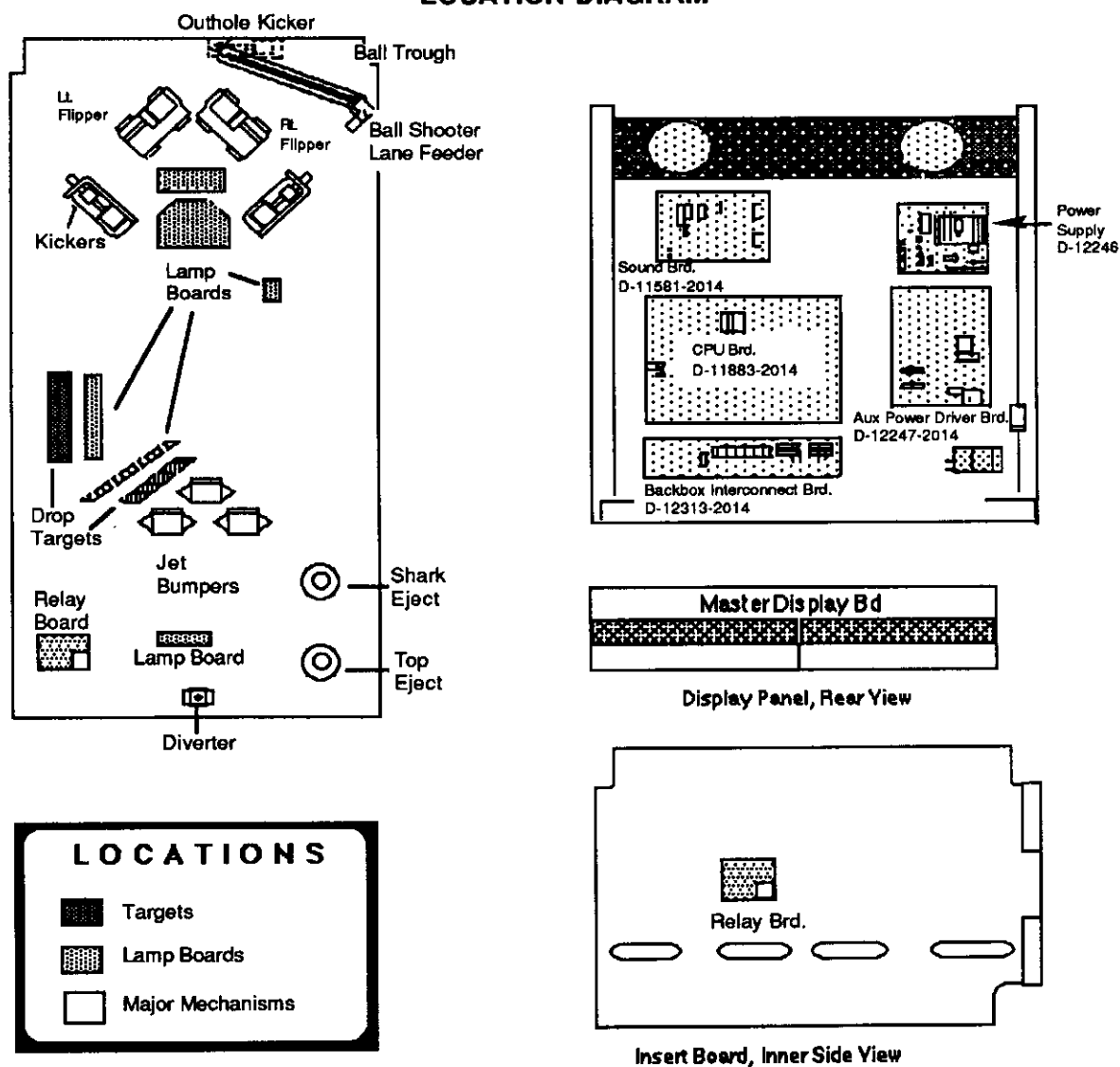


Figure 1. Locations Diagram - Game Circuit Boards and Major Mechanisms.

Game Control Locations

Figure 2 shows the locations of the following switches, except for the CPU Diagnostic switch, which is shown in the Circuit Board Locations Diagram.

THE ON-OFF SWITCH is on the bottom of the cabinet near the right front leg.

THE VOLUME CONTROL is on the left inner wall of the cabinet on the tilt mechanism board. It is accessible by opening the coin box door.

THE START BUTTON is a pushbutton to the left of the coin door on the cabinet exterior.

GAME ADJUSTMENT/DIAGNOSTIC SWITCHES. *POOL SHARKS* 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 Start 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 CPU Board switch (left edge of CPU Board, Backbox View).

THE CPU DIAGNOSTIC SWITCH (SW 2) is 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.

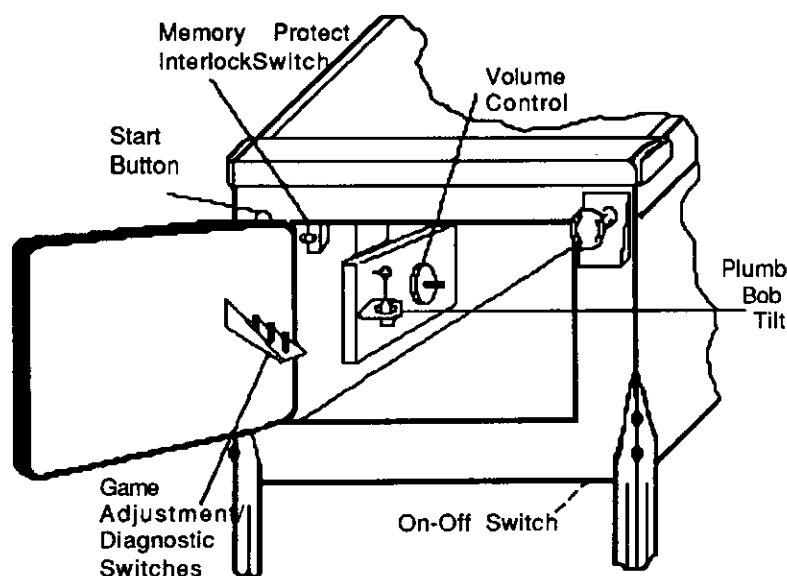


Figure 2. Control Locations

Pinball Game Assembly Instructions

INSTALLATION PROCEDURE

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

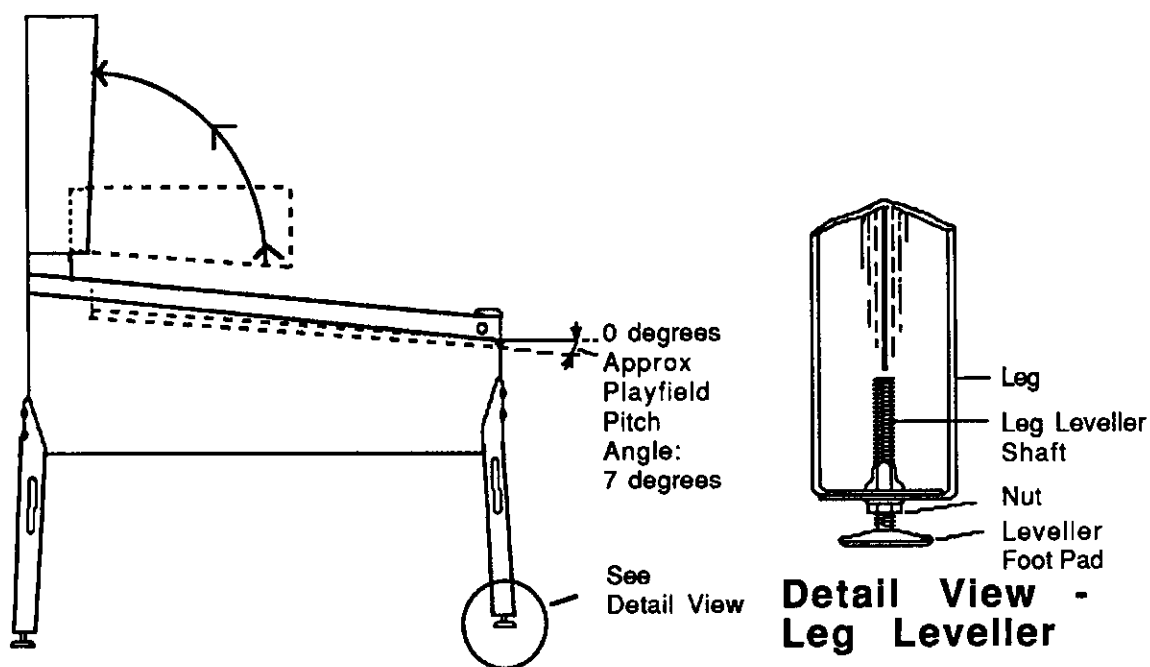


Figure 3. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

CAUTION

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

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

WARNING

NEVER transport a pinball game with hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

5. Extend each leg leveller slightly below the leg bottom, so that all four foot pads are extended about the same distance. Remove the cabinet from its support and place it on the floor.
6. Adjust the leg levellers for proper playfield level (side-to-side) and playfield pitch angle (incline) of approximately 7 degrees. (Again, it is recommended that these measurements be made ON the playfield, not the cabinet nor the playfield cover glass.) Tighten the nut on each leg leveller shaft to maintain this setting, as shown in Figure 3.

CAUTION

Playing pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust the 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. *POOL SHARKS* uses one ball. The second ball is a spare.
9. Remove the foam packing from the captive ball target.
10. 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 11C 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 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 (apx. 30 games). However, the game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep *POOL SHARKS* 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";
("BE A SHARP SHOOTER, PLAY POOL SHARKS.")*;
- 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 Start button.

Game Status Displays

INTRODUCTION

POOL SHARKS 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 two-letter abbreviations for these classes appears in the score display, while the system microprocessor for the *POOL SHARKS* 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
POOL	SHARKS	2014 LA-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 Revision information.

Player 1	Player 2	Player 3	Player 4
DOMESTIC	LEVEL 1	2-9-90	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. Changing a game adjustment item later then causes the display to show HARD ALTERED.

AUDIT INFORMATION - Au

While the AUTO-UP switch remains in the Up position, the operator can press the ADVANCE switch once, briefly, to begin the backbox displays of Audit (sometimes called "bookkeeping") Information. Fifty-three audit entries are now available. Calculation of the various factors is no longer necessary because the System 11C 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 *POOL SHARKS* Audit Table lists the 53 items of the Audit Information portion of the *POOL SHARKS* 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 *POOL SHARKS* Game Status Displays, as listed in the *POOL SHARKS* 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 *POOL SHARKS* Game Adjustment Table lists the 70 items of the Adjustment Information portion of the *POOL SHARKS* 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

POOL SHARKS AUDIT TABLE

Audit Item (Right)	Descriptive Phrases (Left Display)	Audit Factor 1 Value (Right)
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	NOT USED	
11	NOT USED	
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 PLAYER GAMES	
28	BURN-IN CYCLES	
29	JACKPOT MADE (# of times Jackpot made)	
30	TRICK SHOT 8 BALL (# of times Trick Shot made in 8 Ball play)	
31	TRICK SHOT 9 BALL (# of times Trick Shot made in 9 Ball play)	
32	POOL CUE < MILLION (# of times Pool Cue made at Less Than 1 Million)	
33	POOL CUE >= MILLION (# of times Pool Cue made at Greater or Equal 1 Mill)	
34	RACKS 8 BALL (# of Racks made in 8 Ball)	
35	RACKS 9 BALL(# of Racks made in 9 Ball)	
36	CONSOLATION EXTRA BALL TIME (amount of Consolation Extra Ball Time)	
37	MULTIPLIERS (# of Multipliers gotten {2X, 3X, 4X, 5X})	
38	POWER SHOT AWARD (# of Power Shots)	
39	H.S.RESET COUNTER	
40	0.0-0.4 MIL. SCORE (# of games <500K)	
41	0.5-0.9 MIL. SCORE (# of games ≥500K, <1M)	
42	1.0-1.4 MIL. SCORE (# of games ≥1M, <1.5M)	
43	1.5-1.9 MIL. SCORE (# of games ≥1.5M, <2.0M)	
44	2.0-2.9 MIL. SCORE (# of games ≥2.0M, <2.9M)	
45	3.0-3.9 MIL. SCORE (# of games ≥3.0M, <3.9M)	
46	4.0-4.9 MIL. SCORE (# of games ≥4.0M, <4.9M)	
47	5.0-5.9 MIL. SCORE (# of games ≥5.0M, <5.9M)	
48	6.0-7.9 MIL SCORE (# of games ≥6.0M, <7.9M)	
49	8.0-9.9 MIL SCORE (# of games ≥8.0M, <9.9M)	
50	10-99 MIL. SCORE (# of games ≥10.0M, <99 M)	
51	AV. MIN. GAME TIME (Avg Game Time in minutes)	
52	LEFT OUTLANE (Total # of times ball hit Left Outlane)	
53	RIGHT OUTLANE (Total # of times ball hit Right Outlane)	
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.		

POOL SHARKS Game Adjustment Table

Adjustment Item (Player 3)	Descriptive Phrases (Player 1 and 2 Displays)	Factory Setting		
		Domestic (US/Can.)	W.Ger./ European	French
Ad 01	AUTO REPLAY ¹ or FIXED REPLAY ¹	10 (%)	00	
02	REPLAY START (or REPLAY LEVEL 1)	SCORES ¹	6,500,000	6,500,000
03	REPLAY LEVELS (or REPLAY LEVEL 2) ¹	01	02	
04	(REPLAY LEVEL 3) ¹	(see text)		
05	(REPLAY LEVEL 4) ¹	(see text)		
06	REPLAY AWARD	Credit		
07	NOT USED			
08	MATCH FEATURE	[Off, 1-50%]	08(%)	07(%)
09	BALLS/GAMES	03		
10	TILT WARNING	03		01
11	MAXIMUM EXTRA BALL	03		01
12	MAXIMUM CREDITS	10	30	20
13	HIGHEST SCORES	On		
14	BACKUP HI. SCR. 1	8,000,000	8,500,000	8,500,000
15	BACKUP HI. SCR. 2	7,500,000	8,000,000	8,500,000
16	BACKUP HI. SCR. 3	7,000,000	7,500,000	7,500,000
17	BACKUP HI. SCR. 4	6,500,000	7,000,000	7,000,000
18	HI. SCR.1 CREDITS	01	03	03
19	HI. SCR.2 CREDITS	01	00	00
20	HI. SCR.3 CREDITS	01	00	00
21	HI. SCR.4 CREDITS	01	00	00
22	H. S. RESET EVERY	3,000	1,000	
23	FREE PLAY	NO		
24	U.S.A. 1 COINAGE (1 COIN 1 PLAY) ^{2,3,6}	USA 2	GERMAN 2	FRANCE
25	LEFT UNITS	01	06	02
26	CENTER UNITS	04	12	10
27	RIGHT UNITS	01	30	20
28	UNITS/ CREDIT	01	05	05
29	UNITS/ BONUS	00	00	20
30	MINIMUM UNITS	00	00	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	NOT USED			
53 - 58 ^{5,6}	Special Adjustments- See text for 53-58 details.			
59 ⁵	INSTALL ADDABALL	NO		
60 ⁵	INSTALL 5-BALL	NO		
61 ⁵	INSTALL NOVELTY	NO		
62 ⁵	INSTALL EX. EASY	NO		
63 ⁵	INSTALL EASY	NO		
64 ⁵	INSTALL MEDIUM	NO		
65 ⁵	INSTALL HARD	NO		
66 ⁵	INSTALL EX. HARD	NO		
67	AUTO BURN-IN	NO		
68	CLEAR COINS	NO		
69 ⁷	CLEAR AUDITS	NO		
70	INSTALL FACTORY	NO		

NOTES:

- Automatic Replay percentage value range is adjustable from 5 to 50%, via the Start Button. Item 02 permits changing the factory setting value for Replay Start Level valid for the next 500 games played. Item 03 permits setting up four replay levels, values as detailed in text describing Item 03. For Fixed Replay Scores set Auto Replay value to 1 less than 5% via the Start 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.
- Phrase in parentheses is Factory Setting. Phrase appears in player 2 and 4 displays. Press Start button to change setting of the game pricing of item 24.
- To change country OR coinage setting, press Start button to obtain 24 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.
- To install Custom Message, press flipper button for alphabet and special characters. Press Start Button for next message letter or character.
- Special Preset Adjustment, whose effects are noted in the Game Adjustment text.
- Refer to **Pricing Table** and text describing these items.
- Approximates Ad 64, yet includes all factors listed in Factory Setting column, not just Ad 31 through 47 provided by Ad 64.

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.

The *POOL SHARKS* Game Adjustment Setting Comparison Table shows 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.

POOL SHARKS Game Adjustment Comparison Table

Adj #	Adj Description	Extra Easy Ad 62	Easy Ad 63	Medium (Factory) Ad 64	Hard Ad 65	Extra Hard Ad 66
32	Captive 2X Timer	45	30	15	10	5
33	Extra Ball Lit Timer	40	30	20	15	10
34	Jackpot/Shark Timers	40	30	20	15	10
35	Racks Memory	Yes	Yes	Yes	No	No
36	Multipliers Memory	Yes	Yes	No	No	No
37	Extra Ball Lit Memory	Yes	Yes	Yes	Yes	No
38	Captive Ball Start	100K	50K	10K	10K	10K
39	Captive Ball Fall Back	200K	100K	100K	50K	10K
40	Captive Memory	Yes	Yes	Yes	No	No
41	Trick Shot Timer	Slowest	Slow	Normal	Fast	Fastest
42	Lane Change	Yes	Yes	Yes	No	No
43	Lane Memory	Yes	Yes	Yes	No	No
44	8/9 Ball Shots	Easy	Easy	Medium	Hard	Hard
45	% of Extra Ball per Game	50%	40%	33%	25%	20%
46	Not Used					

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 Start button; Adjustment #49 also uses the flipper buttons. 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 *POOL SHARKS* 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 Start 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 Start 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. *POOL SHARKS* 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 Start button to display the YES option in the Player 4 display. Using AUTO-UP, press ADVANCE once. *POOL SHARKS* 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 Protect 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 Start 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 Start 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). *POOL SHARKS* 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 9,800,000 (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 Start 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, *POOL SHARKS* 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. *POOL SHARKS* 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. *POOL SHARKS* 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 Not Used

▲ 08 Match Award

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

- 1%-50% - 1% is 'hard'; 50% is 'extremely easy'. 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 and playfield tilt mechanisms 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 Start button) the number of Extra Balls to be awarded to a player. The range of this setting is:

- 00 - NO extra ball play: displays a message, NO EX. BALL
A score is awarded in lieu of the extra ball.
- 1-9 E.B./Ball - 1 through 9 Extra Balls per ball (i.e., all balls including Extra Balls) are awarded.

▲ 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 Start 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 (for 8 Ball and 9 Ball play)

The operator can set the Backup High Score value in the Player 1 Score display, using the Start 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 (for 8 Ball and 9 Ball play)

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 (for 8 Ball and 9 Ball play)

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 (for 8 Ball and 9 Ball play)

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 Start 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 Start button adjustment technique is the same as for Ad 18. The range of this setting is 00 to 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 Start 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 Start 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 Start 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 Start 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 Start 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 Start 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 Start 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 Start 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 Start 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 Start 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). A setting of 01 allows the Credits display to show fractional coin units.

The System 11C game program defines the following 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 1/2 Price Buy-in

The operator can choose (via the Start button) whether the player is allowed to 'buy-in' subsequent games at 1/2 price. The number of games offered at 1/2 price is determined by the number of players in the previous game; that is, if the previous game had three players, three credits can be purchased for 1/2 price. NOTE: This requires that the left coin slot is always the smallest denomination of coins. The choices are:

- On - The player has 10 seconds to 'buy-in' the next game(s) at 1/2 the original cost.
- Off - The 'buy-in' is not available.

▲ 32 2X Captive Timer

The operator can choose (via the Start button) the amount of time the player has to earn 2X the Captive Ball. The range of this setting is 99 seconds (Liberal) to 1 second (Conservative).

▲ 33 Extra Ball Lit Timer

The operator can choose (via the Start button) the amount of time the playern has to light the Extra Ball. The range of this setting is 99 seconds (Liberal) to 1 second (Conservative).

▲ 34 Jackpot Timer

The operator can choose (via the Start button) the amount of time the player has to earn the Jackpot and/or Sharks. The range of this setting is 99 seconds (Liberal) to 1 second (Conservative).

▲ 35 Racks Memory

The operator can choose (via the Start button) whether the Racks are stored in memory for "next ball" play (continues from ball to ball) or are reset for each ball. The choices are:

- Yes - (Liberal) The Racks are remembered from ball to ball.
- No - (Conservative) The Racks are reset at ball start.

▲ 36 Multiplier Memory

The operator can choose (via the Start button) whether the Bonus Multipliers are stored in memory for "next ball" play (continues from ball to ball) or are reset for each ball. The choices are:

- Yes - (Liberal) The Multipliers are remembered from ball to ball.
- No - (Conservative) The Multipliers are reset at ball start.

▲ 37 Extra Ball Lit Memory

The operator can choose (via the Start button) whether the Extra Ball is stored in memory for "next ball" play (continues from ball to ball) or is reset for each ball. The choices are:

- Yes - (Liberal) The Extra Ball Lit is remembered from ball to ball.
- No - (Conservative) The Extra Ball Lit is reset at ball start.

▲ 38 Captive Start

The operator can choose (via the Start button) what value the Captive Ball will start at. The range of this setting is 30K (Conservative) to 1 Million (Liberal) .

▲ 39 Captive Fallback

The operator can choose (via the Start button) what value the Captive Ball will return to after it has been collected. The range of this setting is 30K (Conservative) to 1 Million (Liberal).

▲ 40 Captive Ball Memory

The operator can choose (via the Start button) whether the Captive Ball value is stored in memory for "next ball" play (continues from ball to ball) or is reset at ball start. The choices are:

- Yes - (Liberal) The Captive Ball value is remembered from ball to ball.
- No - (Conservative) The Captive Ball value is reset at ball start.

▲ 41 Trick Shot Timer

The operator can choose (via the Start button) the time allowed for the Trick Shot. The choices are:

- Slowest - (Liberal) 40 seconds
- Slow - 35 seconds
- Normal - 27 seconds
- Fast - 20 seconds
- Fastest - (Conservative) 15 seconds

▲ 42 Top Lane Change

The operator can choose (via the Start button) whether the player is able, via the flippers, to rotate the Top Lane Lights. The choices are:

- Yes - (Liberal) The player can use the flippers to rotate the Top Lanes lights.
- No - (Conservative) The player cannot rotate the Top Lanes Lights.

▲ 43 Lane Memory

The operator can choose (via the Start button) whether the Top Lanes are stored in memory for "next ball" play (continue from ball to ball) or are reset at ball start. The choices are:

- Yes - (Liberal) The Top Lanes are remembered from ball to ball
- No - (Conservative) The Top Lanes are reset at ball start.

▲ 44 8/9 Ball Shots

The operator can choose (via the Start button) level of difficulty for the 8 and 9 Ball shots. The choices are:

- | | | |
|--------|------------------|---|
| Easy | - (Liberal) | Both ramps always. |
| Medium | | Both ramps the first time, one ramp after that. |
| Hard | - (Conservative) | One ramp always. |

▲ 45 Extra Balls per Game

The operator can choose (via the Start button) the Maximum Amount of Extra Balls awarded. The range of this setting is Enabled 1% (Conservative) through 99% (Extremely Liberal).

▲ 46 Not Used

▲ 47 Consolation Extra Ball Time

The operator can choose (via the Start button) whether a less-skilled player can obtain an Extra Ball. If, on the last ball, the players' score is less than 1 Million and, the game time is less than or equal to the consolation time the Extra Ball light turns on. The range of this setting is 99 seconds (Liberal) to 1 second (Conservative). This Adjustment can be Disabled, via a setting of 0 (OFF).

▲ 48 Attract Mode Sounds

The operator can select (via the Start button) whether the Attract Mode has sound. The choices are:

- Yes - (Liberal) The Attract Mode does have sound.
- No - (Conservative) The Attract Mode does not have sound.

▲ 49 Custom Message

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

- 1 - Display a message during the Attract Mode. The Player 4 display shows this choice as ON. The message provided is:
"BE A SHARP SHOOTER, PLAY POOL SHARKS"
- 2 - Do NOT display a message during the Attract Mode. (Player 4 shows OFF.)
- 3 - The Player 4 display shows this choice as CHANGE. The operator can enter a special ("custom") message, as follows:
 - A. Press ADVANCE once. The operator can now enter as many as three 14-character lines for display during the Attract Mode.
 - B. Use the flipper button(s) to select each message character (alphabet, numbers, and special symbols are available). In case of error, enter a "back arrow" (just before "space") to correct, followed by correct character. For a period after any letter, use letters with periods (following the special symbols). The entire character set is the following:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 0 1 2 3 4 5 6 7 8 9 < > ? - / * ' ,

A. B. C. D. E. F. G. H. I. J. K. L. M. N. O. P. Q. R. S. T. U. V. W. X. Y. Z. _

- C. Move to the next character via the Start button. No entirely blank lines will be displayed.

▲ 50 Display AU 01 - 04

The operator can choose (via the Start 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.

▲ 51-52 Not Used

▲ 53-55 Not used in USA games (see Adjustments for German games).

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 Start 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.

▲ 53 through 58 for German/European 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 the Standard Setting named "German1 or German 2" in the Pricing Table to permit the style of play for the particular price shown in the POOL SHARKS Preset game Adjustment Table for German/European Games.

Preset Game Adjustments Table 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
06	Replay Award	Credit	Credit	Credit	Credit	Credit	Credit
07	Special Award	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
08	Match Feature	7%	7%	Off	7%	7%	Off
09	Balls/Game	03	03	03	03	03	03
14	Backup High Score 1	8,500,000	8,500,000	00	8,500,000	8,500,000	00
15	Backup High Score 2	8,000,000	8,000,000	00	8,000,000	8,000,000	00
16	Backup High Score 3	7,500,000	7,500,000	00	7,500,000	7,500,000	00
17	Backup High Score 4	7,000,000	7,000,000	00	7,000,000	7,000,000	00
18	High Score 1 Credits	03	03	00	03	03	00
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
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

▲ 56 Install 3 Balls/2 Coins

The operator can use this adjustment 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) passes through the coin chute.

▲ 57 Install 3 Ball/ 1 Coin

The operator can use this adjustment 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 the proper denomination (USA: 25 cents) passes through the coin chute.

▲ 58 Install 5 Balls/2 Coins

The operator can use this adjustment 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 5 ball game when 2 Coins of the proper denomination (USA: 50 cents) passes through the coin chute.

Preset Game Adjustments Table For **US/CANADIAN GAMES**

AD	ADJ DESCRIPTION	AD 54 Not Used	AD 55 Not Used	AD 56 3-ball/ 2 Coins	AD 57 3-balls/ 1 Coin	AD 58 5-balls/ 2 Coins
02	Replay Start	-	-	6,000,000	6,000,000	5,000,000
09	Balls/Game	-	-	3	3	5
14	Backup High Score 1	-	-	8,000,000	8,000,000	9,000,000
15	Backup High Score 2	-	-	7,500,000	7,500,000	8,500,000
16	Backup High Score 3	-	-	7,000,000	7,000,000	8,000,000
17	Backup High Score 4	-	-	6,500,000	6,500,000	7,500,000
24	Coinage	-	-	USA 3	USA 1	USA 3
64	Install Medium	-	-	Yes	Yes	No
65	Install Hard	-	-	No	No	Yes

▲ 59 Install Add-A-Ball

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

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
06	Replay Award	Ball	18	Hi Scr 1 Credits	00
07	Special Award	Ball	19	Hi Scr 2 Credits	00
08	Match Feature	Off	20	Hi Scr 3 Credits	00
11	Ex. Ball	4/BIP	21	Hi Scr 4 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 difficulty level. NOTE Ad 65 (Install Hard) settings are also set when the game is changed to '5-ball play'. Individual Adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
02	Replay Start	7,000,000	09	Balls/Game	05

▲ 61 Install Novelty

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

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>	<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
01	Fixed Replay	Scores	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 Adjustment 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 Adjustment 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 Adjustment 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 Adjustment 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 Adjustment 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 cycle 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 Start 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 Start 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 Start 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 any 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 *POOL SHARKS*, 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 Start 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 Start 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.

NOTE:

When you reset the High Scores for *POOL SHARKS*, 8 Ball and 9 Ball play high scores are reset at the same time.

Game Pricing

PRICING MADE EASY

Game Adjustment Item Ad 24 allows the operator an easy method of setting the pricing functions. Pressing the Start button allows the operator a choice of one of the 16 "Standard" Settings, with associated automatic pricing (Player 1 and 2 displays show the Country identifier, 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 Start button until the words "CUSTOM COINAGE" appear in the player score displays.

POOL SHARKS Pricing Table

Country	Coin Chute			Games/Coin	Ad 24 Display	Pricing Functions					
	Left	Center	Right			25	26	27	28	29	30
USA and Canada	25¢	-	25¢	1/25¢, 4/\$1 ²	U.S.A. 1	01	04	01	01	00	00
				1/50¢, 2/75¢, 3/\$1 ^{1,2}	U.S.A. 2	03	12	03	04	00	00
				1/50¢, 2/\$1 ²	U.S.A. 3	01	04	01	02	00	01
				1/25¢, 3/\$1 ²	U.S.A. 4	01	00	01	02	04	01
				1/25¢, 3/50¢, 6/\$1	CUSTOM	01	04	01	01	02	00
				1/25¢, 5/\$1	CUSTOM	01	00	01	01	04	00
				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£	1/2x10 P, 3/50 P, 7/1£ ²	U.K.	03	15	30	05	30	00
	10 P	50 P	20 P	1/10 P, 5/50 P, 2/20 Pence	CUSTOM	03	15	30	05	30	00
Switzerland	1 F	2 F	5 F	1/1 F, 3/2 F, 7/5 Franc ²	SWISS	01	03	07	01	00	00
	1 F	-	2 F	1/1 F, 3/2 F	CUSTOM	03	00	06	02	00	00

POOL SHARKS Pricing Table (continued)

Country	Coin Chute			Games/Coin	Ad 24 Display	Pricing Functions					
	Left	Center	Right			25	26	27	28	29	30
Belgium	20 F	20 F	20 F	1/4 x 5F, 1/1 x 20F, 3/1 x 50F	BELGIUM	03	12	30	10	00	00
	5 F	-	20 F	1/2x5 F, 2/20 Franc	CUSTOM	01	00	04	02	00	01
	5 F	20 F	20 F	1/2x5 F, 2/20 F, 2/20 F	CUSTOM	01	04	04	02	00	01
	5 F	5 F	20 F	1/2X5 F, 1/2X5 F, 2/20 F	CUSTOM	01	01	04	02	00	01
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
	25c	-	1 G	1/25c, 5/1 Guilder	CUSTOM	01	00	05	01	00	00
	1 G	-	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	1 F	5 F	10 F	1/3x1 F, 2/5 F, 5/10 Franc ^{1,2}	FRANCE	02	10	20	05	20	00
	1 F	5 F	10 F	1/2x1 F, 3/5 F, 7/10 Franc	CUSTOM	03	15	30	05	30	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	500 L	500L	500 L	1/500 L, 1/2 ² x 200L, 3/2 x 500L	ITALY	06	00	15	01	10	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
	-	100 ¥	-	2/100 ¥	CUSTOM	01	04	01	02	00	01
Antilles, Netherl.	25c	-	1 G	1/25c, 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	20c	-	20c	1/3x20c 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	10c	10c	10c	1/1 Token ²	ARG.	01	01	01	01	00	00
Greece	10D	20D	50D	1/2x10D, 1/20D, 3/50 Drachma ²	GREECE	03	06	15	05	00	00

Notes:

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

___CUSTOM PRICING

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

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

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

V = Value of coin;

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

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

___UNITS REQUIRED FOR BONUS CREDIT

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

___MINIMUM COIN UNITS

Item 30 determines the number of coin units that must pass through the coin chute(s) before play may begin. The Factory Setting for this item is 00. (This 00 means that the Minimum Coin Units feature (Item 30) is disabled; a 01 setting also means that this feature is still disabled, yet the Credits message display should display fractional coin units.)

Test/Diagnostic Procedures

POOL SHARKS 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 lamps, the solenoids, the switches and the A/C select relay (C-side test).

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

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

Caution

The System-11C 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 07 - CVSD Speech (the selections repeat). Adjust the volume control for proper sound level for the game location.
2. Use the AUTO-UP position to proceed to the next test.

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.

LAMP TESTS

1. **All Lamps**
(From Display 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 02 (All Lamps Test identifier) and that all feature lamps (playfield and backbox) blink on and off. (Note, however, that the General Illumination lamps remain lighted steadily.) To locate the wiring associated with a particular feature lamp, refer to the Lamp-Matrix Table. CPU Board connections at jacks 1J6 (columns) and 1J7 (rows) are also listed in the table.
2. **Single Lamps**
From the All Lamps test, using AUTO-UP, press ADVANCE to initiate the Single Lamps Test. The Player 1 and 2 displays initially show the message, SINGLE LAMPS, and the Player 3 display shows 03. Then, the Player 3 display shows 04 01, and the Player 1 and 2 displays change to show "CAPTIVE CHALK", the name of the lamp currently blinking. Press the Start 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 Start button to proceed rapidly to the desired lamp.

POOL SHARKS Lamp Matrix

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	Captive Chalk 1	Captive Million 9	Drop Target H 17	Top Stand-up Target 25	Right 9 Ball Shot 33	Bonus 2X 41	Ball 1 49	Ball 9 57
2 Q81 RED-BLK 1J6-2	Captive 30K 2	Rack 1 10	Drop Target O 18	Middle Stand-up Target 26	Left 8 Ball 34	Bonus 3X 42	Ball 2 50	Ball 10 58
3 Q82 RED-ORN 1J6-3	Captive 50K 3	Rack 2 11	Drop Target T 19	Bottom Stand-up Target 27	Right 8 Ball 35	Bonus 4X 43	Ball 3 51	Ball 11 59
4 Q83 RED-YEL 1J6-5	Captive 80K 4	Rack 3 12	Drop Target S 20	Left Lane 28	Extra Ball Lit 36	Bonus 5X 44	Ball 4 52	Ball 12 60
5 Q84 RED-GRN 1J6-6	Captive 100K 5	Left Drain 13	Drop Target H 21	Middle Lane 29	Trick Shot 37	Jackpot 45	Ball 5 53	Ball 13 61
6 Q85 RED-BLU 1J6-7	Captive 200K 6	Left Return 14	Drop Target O 22	Right Lane 30	Select 8 Ball 38	Shark 1 46	Ball 6 54	Ball 14 62
7 Q86 RED-VIO 1J6-8	Captive 300K 7	Right Return 15	Drop Target T 23	Right Bank Shot 31	Select 9 Ball 39	Shark 2 47	Ball 7 55	Ball 15 63
8 Q87 RED-GRY 1J6-9	Captive 500K 8	Right Drain 16	Left Bank Shot 24	Left 9 Ball Shot 32	Pool Table Lamp 40	Shark 3 48	Ball 8 56	Shoot Again 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 04 (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.

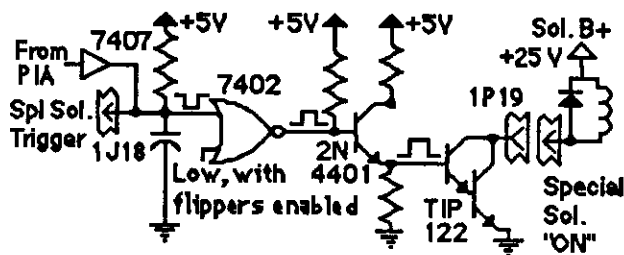
To continuously pulse a single solenoid/circuit, use MANUAL-DOWN. Press ADVANCE to sequence through the switched, controlled, and special solenoids. Use AUTO-UP to resume test cycling, and to proceed to the next test.

POOL SHARKS Solenoid Table

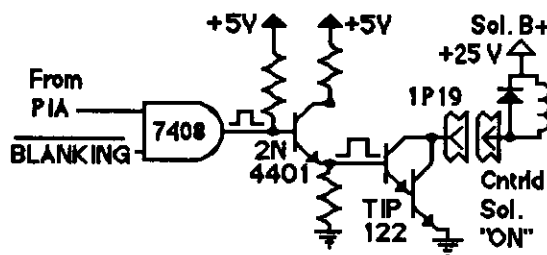
Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trnsr	Solenoid Part Number Flashlamp Type	
				CPU Bd	Playfield/ Cabinet		d= Display Bd; p=Playfield	
01A 3	Outhole	Switched	Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800	
01C 3	Captive Ball Flasher	Switched	Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#906 flashlamp	1p
02A 3	Ball Shooter Lane Feeder	Switched	Vio-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	AE-23-800	
02C 3	Shark Flasher	Switched	Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89 flashlamp	1p
03A 3	Left Drop Target	Switched	Vio-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200	
03C 3	Right Drop Target Flasher	Switched	Blk-Orn	(Gry-Orn)	5J5-7(C)	Q32	#89 flashlamp	1p
04A 3	Right Drop Target	Switched	Vio-Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800	
04C 3	Left Drop Target Flasher	Switched	Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89 flashlamp	1p
05A 3	Eject Hole	Switched	Vio-Grn	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800	
05C 3	Standups Flasher	Switched	Blk-Grn	(Gry-Grn)	5J5-4 (C)	Q31	#89 flashlamp	1p
06A 3	Diverter	Switched	Vio-Blu	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800	
06C 3	Right Flipper Flasher	Switched	Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89 flashlamp	1p
07A 3	Knocker	Switched	Vio-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800	
07C 3	Left Flipper Flasher	Switched	Blk-Vio	(Gry-Vio)	5J5-2 (C)	Q30	#89 flashlamp	1p
08A 3	Shark Eject Hole	Switched	Vio-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22	AE-23-800	
08C 3	Marquee Flasher	Switched	Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89 flashlamps	1b
09	Back Left Flasher	Controlled	Brn-Blk	1P12-1	5J2-9: 5J6-9: 2J4-3	Q17	#89 flashlamp	1p
10	Playfield Gnl Illum Relay	Controlled	Brn-Red	1P12-2	5J2-8: 5J6-8: 2J4-5	Q9	5580-09555-01	4a
11	Insert Illum Relay	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	Right Shark	Controlled	Brn-Grn	1P12-6	5J2-4: 5J6-5	Q15	SM2-35-4000	
14	Not Used	Controlled	Brn-Blu	1P12-7	5J2-4: 5J6-3	Q7		
15	Back Right Flasher	Controlled	Brn-Vio	1P12-8	5J2-2: 5J6-2	Q14	# 89 flashlamp	
16	Backglass Tiger	Controlled	Brn-Gry	1P12-9	5J2-1: 5J6-1	Q6	#89 flashlamp	
17	Left Jet Bumper	Special #1	Blu-Brn	1P19-7	5J3-7: 5J7-7	Q75	AE-23-800	
18	Left Kicker (sling)	Special #2	Blu-Red	1P19-4	5J3-6: 5J7-6	Q71	AE-26-1500	
19	Right Jet Bumper	Special #3	Blu-Orn	1P19-3	5J3-3: 5J7-3	Q73	AE-23-800	
20	Right Kicker (sling)	Special #4	Blu-Yel	1P19-6	5J3-4: 5J7-5	Q69	AE-26-1500	
21	Center Jet Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800	
22	Not Used	Special #6	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79		
-	<u>Right Flipper</u>	-	Orn-Vio (Blu-Vio) ²	1P19-1	2J5-5: 2J10-7 (2J10-1: 2J8-15)	-	FL11630/50VDC	
-	<u>Left Flipper</u>	-	Orn-Gry (Blu-Gry) ²	1P19-2	2J5-4: 2J10-8 (2J10-2: 2J8-4)	-	FL11630/50VDC	

Notes 1. Wire colors, except flipper Orn-Vio and Orn-Gry, are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. 2. Flipper connections shown in braces are from flipper switch to flipper coil. 3. "A" 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. 4. Relay is mounted on Relay Bd, (4a) p/n C-11998-1; (4b) C-11902-1. 5. Relay is mounted on Aux Power Driver Bd, 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 Flasher circuit (sol. 01C), which has two lamp circuits. Using this "multiplexing" technique, the same driver transistor can control actuation of two separate solenoid circuits.

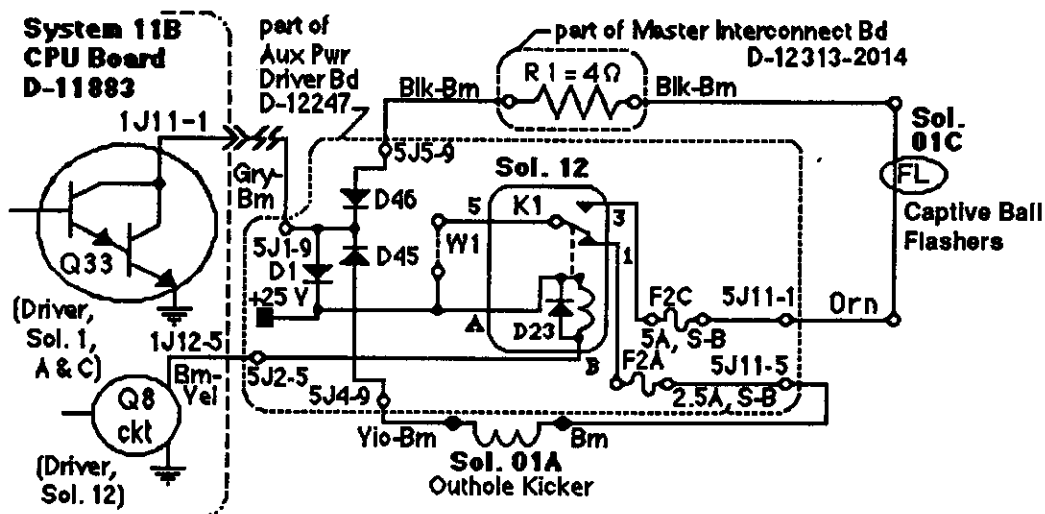


Figure 4. Typical Solenoid A/C Select Relay Circuit, showing the function of Solenoid 12, the Solenoid A/C Select Relay

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 05 (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 *POOL SHARKS* system-11C'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 *POOL SHARKS*, switch numbers can range from 01 through 64. Refer to the Switch-Matrix Table for switch numbers and wiring information. CPU Board

POOL SHARKS 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	Not Used 9	Drop Target H 17	Top Stand-up Target 25	Diverter 33	Ball Shooter 41	Not Used 49	Right Flipper 57
2	WHT-RED 1J10-8 A/C Relay Position 2	Outhole 10	Drop Target O 18	Middle Stand-up Target 26	Top Eject Hole 34	Right Return Ramp 42	Not Used 50	Left Flipper 58
3	WHT-ORN 1J10-7 Credit Button 3	Trough 1 Right 11	Drop Target T 19	Bottom Stand-up Target 27	Right Bumper 35	Left Return Ramp 43	Not Used 51	Not Used 59
4	WHT-YEL 1J10-6 Right Coin Slot 4	Trough 2 Left 12	Drop Target S 20	Left Shoot Lane 28	Left Bumper 36	Lock In Game 44	Not Used 52	Not Used 60
5	WHT-GRN 1J10-5 Center Coin Slot 5	Left Drain 13	Drop Target H 21	Middle Shoot Lane 29	Center Bumper 37	Not Used 45	Not Used 53	Not Used 61
6	WHT-BLU 1J10-3 Left Coin Slot 6	Left Return 14	Drop Target O 22	Right Shoot Lane 30	Captive Stand-up Target 38	Not Used 46	Not Used 54	Not Used 62
7	WHT-VIO 1J10-2 Slam Tilt 7	Right Return 15	Drop Target T 23	Shark Eject Hole 31	Left Sling 39	Not Used 47	Not Used 55	Not Used 63
8	WHT-GRY 1J10-1 High Score Reset 8	Right Drain 16	Enter Right Ramp 24	Enter Left Ramp 32	Right Sling 40	Not Used 48	Not Used 56	Not Used 64

connections at jacks 1J8 (columns) and 1J10 (rows) are also listed in the table.

- ▼ **Row Problems.** If a display of two (or more) switch numbers 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 06 (Switch Edges Test identifier). The right portion of the Player 3 display is blank, indicating that no switch is actuated.

This test permits the operator to test whether actuating a switch provides the proper signal to the System-11C 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 *POOL SHARKS* 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. If only one number is produced for every simulated switch actuation that occurred then the CPU is good and the problem is elsewhere.

C-SIDE TEST

From the Switch Test, press ADVANCE. Observe that the Player 1 and 2 displays show the message, C-SIDE TEST, and that the Player 3 displays shows 07 (C-Side Test Identifier). This test confirms that the Solenoid A/C Select Relay (Sol. 12) is actually in the 'C' position (ready to power flashlamp circuits).

The Player 1 and 2 displays then change to show the 'side' of the circuit being tested, alternating the A/C Relay between "SELECTED A-SIDE" and "SELECTED C-SIDE", while the Player 4 display shows the state of the C-Side Switch. When the switch is closed, the Player 4 display shows "C-SIDE".

The message "Err" appears whenever the C-Side Switch is not operating properly. Causes of improper operation can be blown fuses (F8 or F2C) or a faulty relay on the Aux Power Driver Board; failure of the 12 or 24 volt power circuits; a switch matrix failure; or faulty connections between the circuit boards in the game's backbox (CPU Board, Aux Power Driver Board, Backbox Interconnect Board). To halt the A/C Relay's operation, press MANUAL-DOWN and press ADVANCE to activate the A/C Relay manually.

ENDING THE DIAGNOSTIC TESTS

To end the Diagnostic Tests, reach the C-Side Test use AUTO-UP and press ADVANCE. The backbox displays should 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 Start 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 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. *POOL SHARKS* 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.)

CPU LED Indicator Codes Table

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.
1 0	U27 ROM FAILURE	U27's internal checksums do not match. It may be a ROM failure, or its associated connections and connecting devices are causing it to appear to have a problem. (The following U26 test is skipped.)
1 1	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-11C MEMORY CHIP TEST

A new feature is now included in the Memory Chip Test for System 11C. 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, LED 2 ('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 reset the program by pressing the CPU Switch (SW 2) on the edge of the CPU Board.

SYSTEM-11C SOUND CIRCUITRY TESTS

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

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; 5 sounds=U20.

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

Be sure the Audio Board has +12V, -12V, +5V and Ground.

CAUTION

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

Hearing a low hum or a 'click' indicates that the power amplifier, 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.

Problem Analysis Messages

The SYSTEM 11C game program has a great capability to aid the operator and service personnel: At game Turn-on (and also at the beginning of Test/Diagnostic Procedures) after the game has been operating for an extended period, the player score displays now may signal with a message, "Press ADVANCE for Report", that the game program has detected a possible problem with the game.

To obtain details of the problem, open the coin door and press the AUTO-UP/MANUAL-DOWN switch to MANUAL-DOWN. Press the ADVANCE button to begin displaying the message(s). The following messages apply to *POOL SHARKS*.

Malfunction Check Switch ## (name). This message indicates that at least one switch has not been actuated during ball play (for 90 balls or apx. 30 games) by displaying the message "Check Switch ## (name)", listing each problem switch by number and name. (The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep *POOL SHARKS* earning good profits).

To verify the problem, refer to the Test/Diagnostic Procedures text describing Switch Testing, and check each reported switch using applicable Switch Levels and Switch Edges tests. Always check switch operation using a ball to simulate game conditions. (Switch problems may often be resolved by adjusting the wire switch actuators, fixing electric problems, securing loose connectors, etc).

Malfunction Pinball Missing. *POOL SHARKS* normally uses one ball. The second ball is a spare. When the game is turned on this message announces that a ball is missing or stuck somewhere. When the ball is located, return it to the playfield via the Outhole. Other possibilities for this problem could be malfunctions of the Ball Trough Switches (#11, or #12) or, the Ball Shooter Switch (#14).

Music Error. This message means that no signals are coming from the Audio Board. Check the Audio Board for presence of *POOL SHARKS* ROMs. Also, check that the cable connecting the Audio and CPU Boards is firmly seated, and that the red line on the cable is going to the same pin on both boards. Turn the game Off, then On, to be sure only 1 'Bing' sounds. More than one 'Bing' or *no* 'Bing' indicates an Audio Board problem. Refer to text about System 11C Sound Circuitry tests for more information.

Factory Settings. This message indicates that the CMOS RAM has lost custom setting and has reverted to factory default settings. Pin 24 of U25 should have +5V when the game is turned on and, at least 3.8V when the game is turned off. If the voltage drops below 3.8V memory reset occurs. Check the batteries and battery holder. Be sure the batteries are good and there is no contamination on the battery holder terminals. Check D1 and D2. Turn the game OFF and, use an Ohmmeter. D1 should read 0 ohms when forward biased and infinite ohms when reversed biased. D2 should read 15 ohms when forward biased and infinite ohms when reverse biased. Check Q40. Turn the game ON, use an oscilloscope. Q40 Should have square waves on all three legs.

Maintenance Information

• Ball Shooter Lane Feeder

Figure 5 shows the two main lubrication points of the Ball Shooter Lane Feeder. The shaded arrows show the directions in which the Ball Shooter Lane Feeder and other parts of its related assemblies can be adjusted for proper operation. Note that there are mechanisms quite similar to this Assembly; they have the same lubrication requirements and adjustment capabilities as the Ball Shooter Lane Feeder.

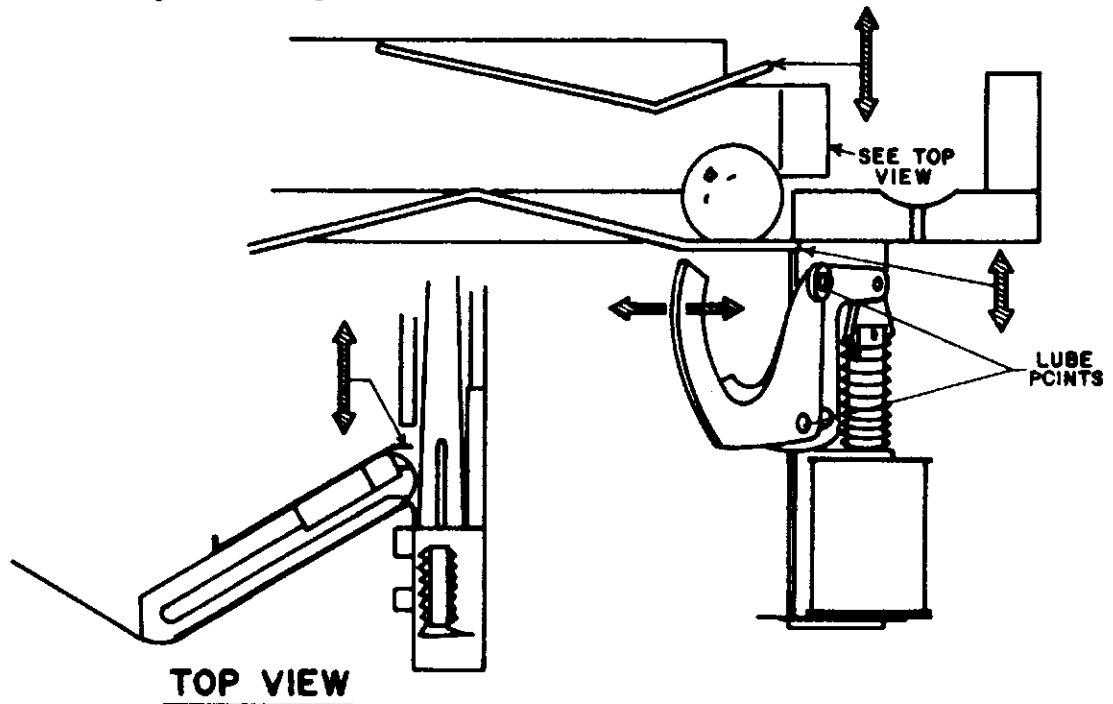


Figure 5. Adjustments and Lubrication Points, Shooter Lane Feeder

• Left & Right Kickers

Because of the functional design (arm-actuated via solenoid plunger operation), the pivot points of the Left and Right Kickers ("Slingshots") all require lubrication as a regular servicing procedure. Mechanical adjustments are simple and somewhat similar to the Ball Shooter Lane Feeder. These mechanisms should also be checked for proper fit (snugly tight) where they attach to the playfield.

- **Playfield**

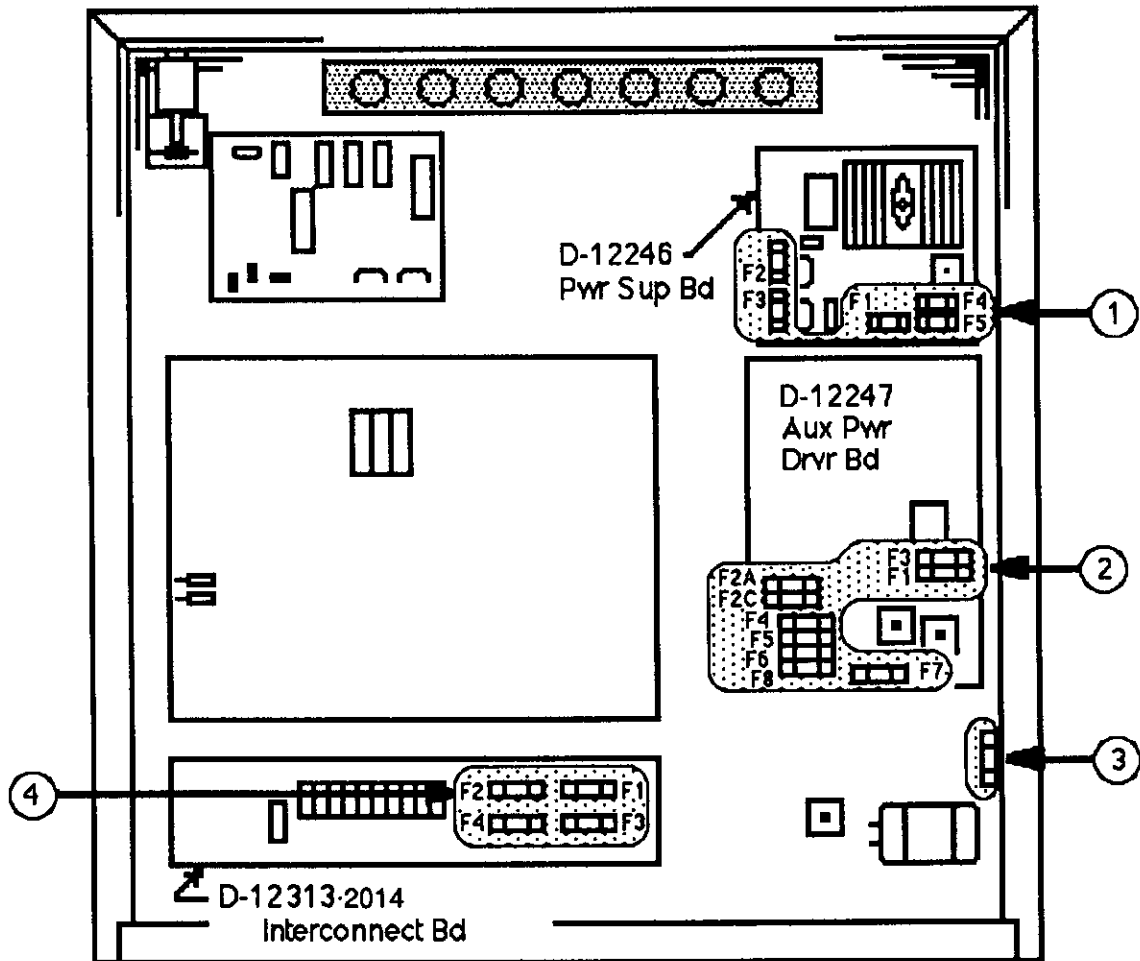
Playfield life expectancy and play can be extended by periodic cleaning. Inspect and hand polish the balls in a clean cloth. Replace chipped balls; otherwise, these balls will ruin the playfield finish in a short time. Don't use quantities of water, caustic or abrasive cleaners or cleaning pads on the playfield. Don't allow polish or wax to build-up, (waxes yellow with age and spoil the appearance of the playfield).

- **Switches**

Switch contacts should be free of dust, dirt, and corrosion. Filing or burnishing most switch 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.

Flipper End-of-Stroke switch contacts must be treated differently from other switch blade contacts; they provide heavier current carrying capability than other pinball game switch contacts. Severely pitted contacts cause flippers to be weak. Smooth the pitted contact surface of the E.O.S. switch contacts with a contact file. Then, polish your work with a burnishing tool. regap the contacts if necessary, to 1/16 inch.

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*

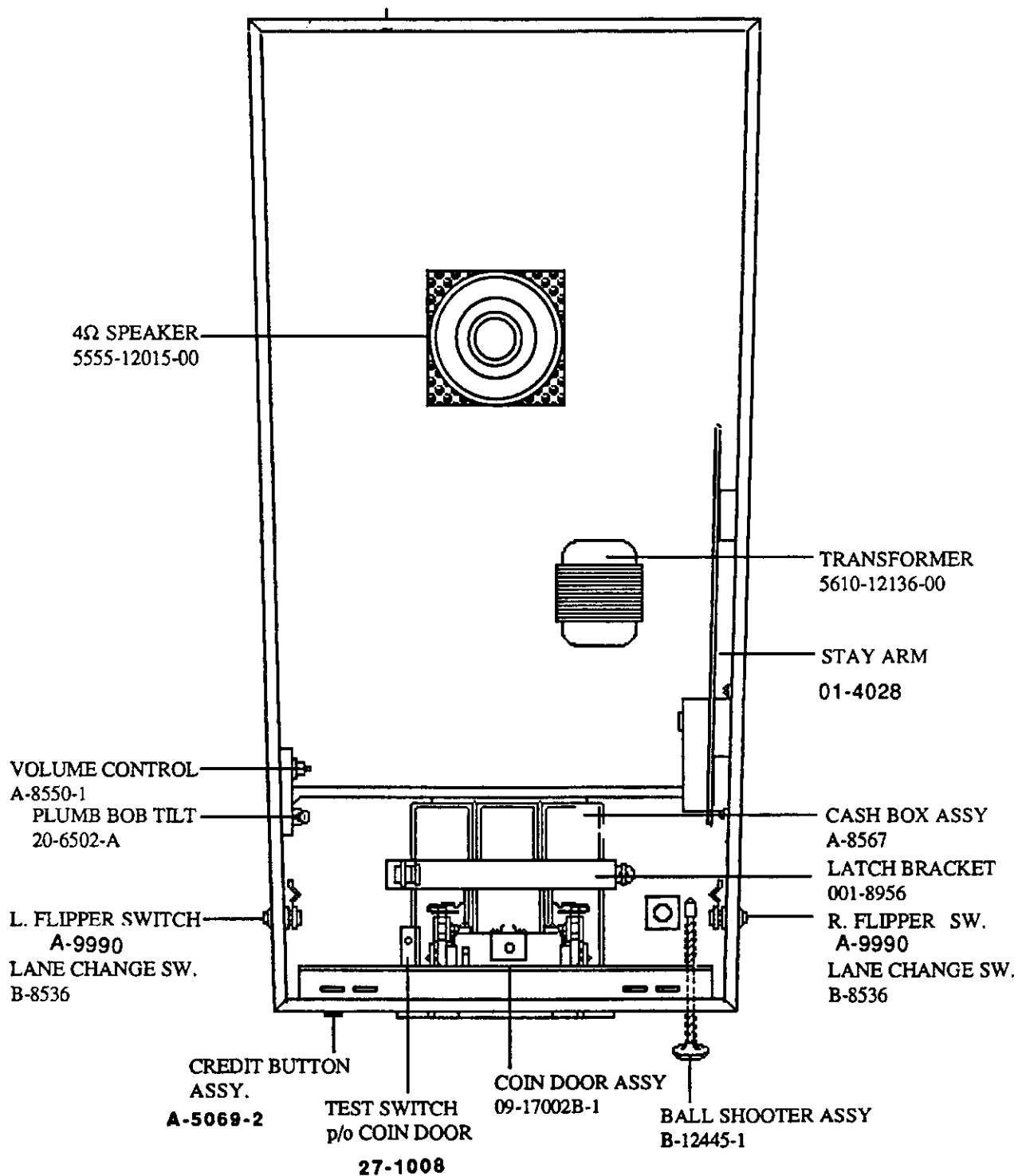
* One 4A., S-B, 250v fuse (5731-06314-00) is provided for an overseas (220v) game installation.

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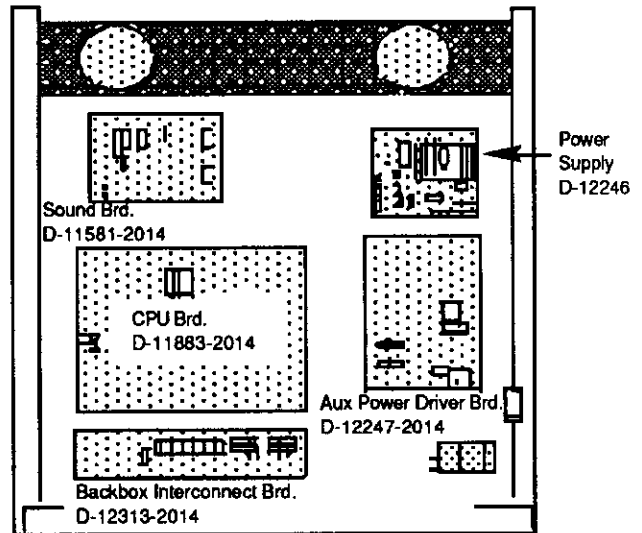
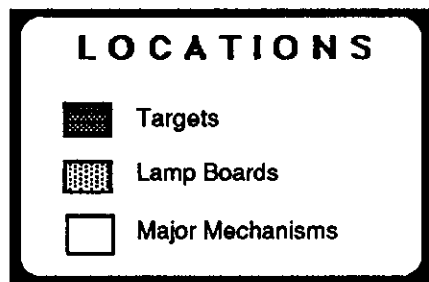
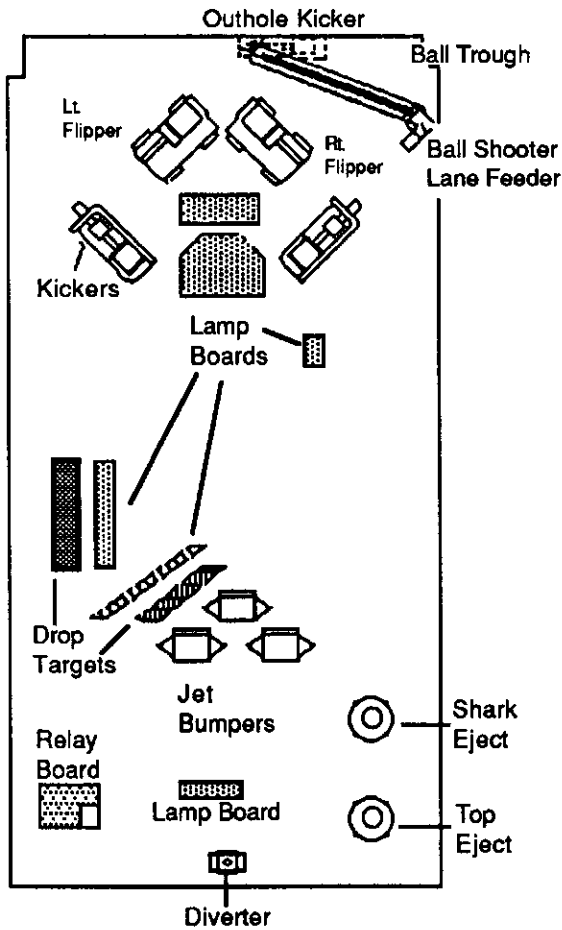
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Game Parts Information

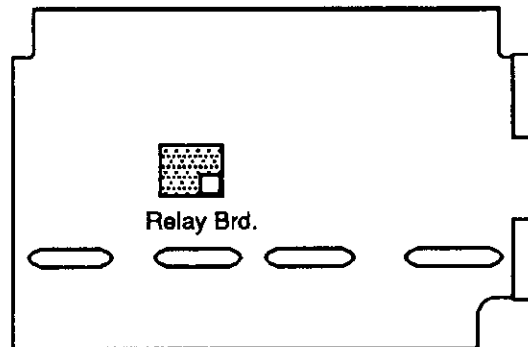
CABINET PARTS



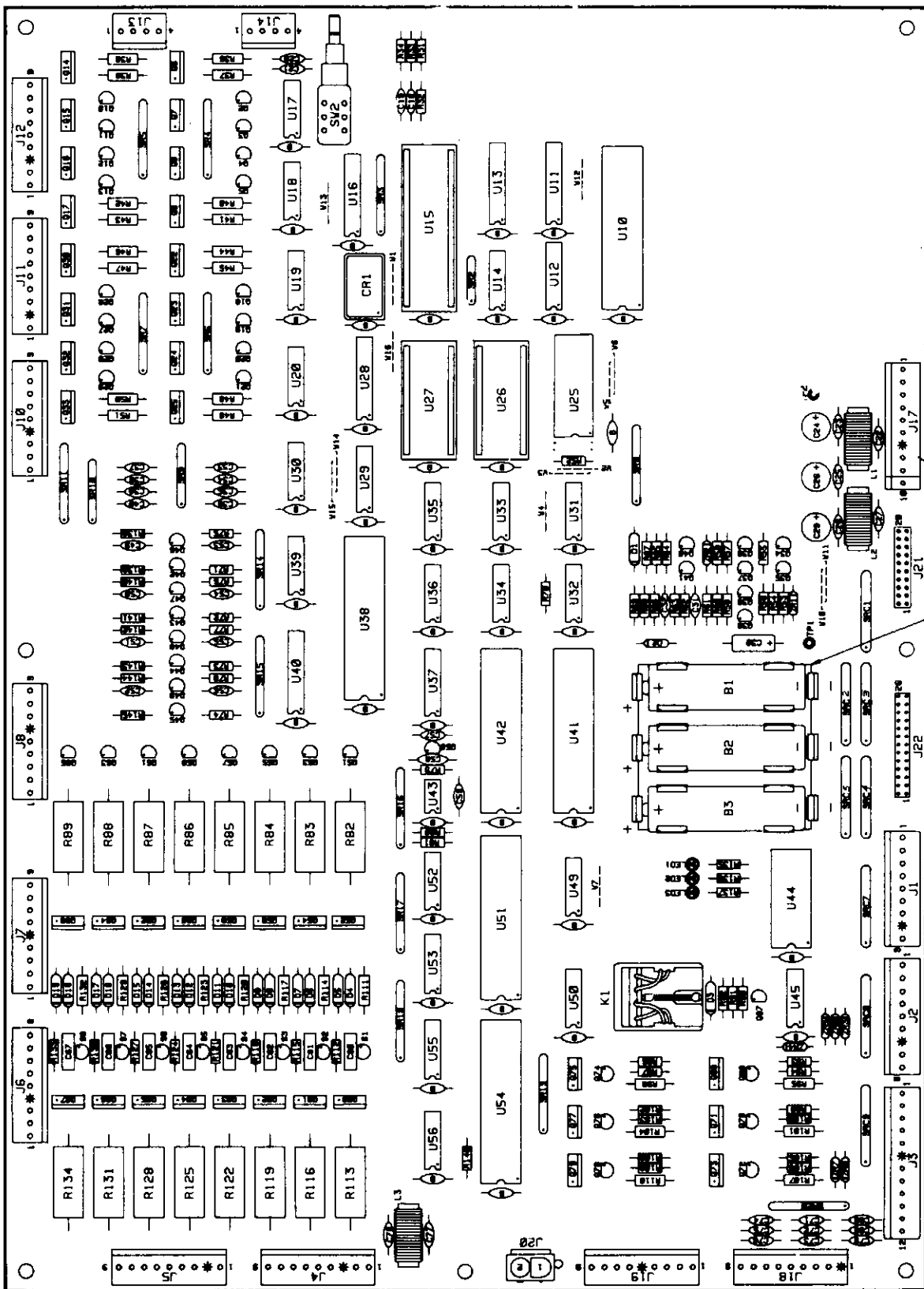
CIRCUIT BOARD & MAJOR MECHANISMS LOCATION DIAGRAM



Display Panel, Rear View



Insert Board, Inner Side View



CPU BOARD (D-11883)

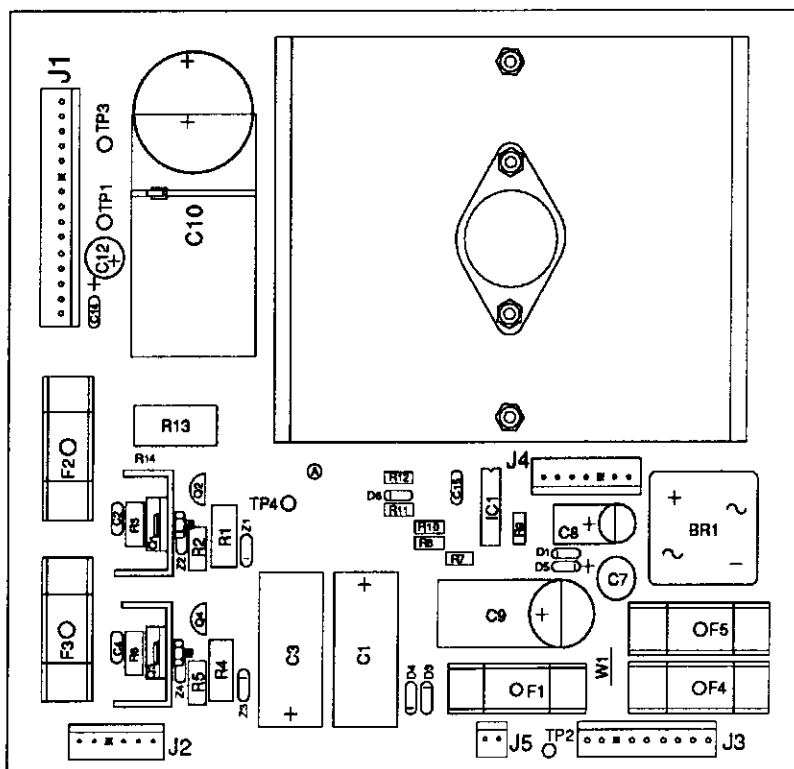
CPU Board

p/n D-11883-2014

Part No.	Ckt Designator	Description	Part No.	Ckt Designator	Description
5764-12206-00		Bare P. C. Board	5010-10003-00	R62, R63	Resistor, 390Ω, 5%, 1/4w, C. F.
5281-09308-00	U16	IC, Octal Bus Xcvr, 74LS245	5010-10171-00	R67	Resistor, 56Ω, 5%, 1/4w, C.F.
5430-08972-00	U9, U10, U38, U41, U42, U51, U54	IC, PIA, MC6820/6821	5010-10170-00	R69	Resistor, 47Ω, 5%, 1/4w, C. F.
5340-10139-00	U25	IC, 2K x 8 CMOS Static RAM	5010-09160-00	R59, R61, W12, W13	Resistor, 220Ω, 5%, 1/4w, C. F.
5280-09010-00	U44	IC, 4-16 Decoder, 74154	5010-09416-00	R33, R34, R71-R78, R135-R137	Resistor, 470Ω, 5%, 1/4w, C. F.
5281-09246-00	U7, U8, U12	IC, 2-4 Decoder, 74LS139			
5075-09406-00	ZR3 - ZR8	Diode, Zener, 6.2v, 0.5w	5010-10631-00	R111, R114, R117, R120, R123, R126, R129, R13	Resistor, 1.2KΩ, 5%, 1/2w, C. F.
5164-10998-00	Q42 - Q49	Transistor, NPN, 2N5550, TO-92			
5431-09449-00	U43	IC, Timer, MC1455	5019-09783-00	SR18	SIP, 9R, 10-pin, 6.8KΩ, .125w/R, 5%
5310-09236-00	U29	IC, 14-b Counter, 4020	5019-09362-00	SR3, SR15, SR17, SR19, SR20	SIP, 9R, 10-pin, 4.7KΩ, .125w/R, 5%
5281-09743-00	U32	IC, Quad 2-Input AND, 74LS08			
5281-09247-00	U14	IC, Quad 2-Input NOR, 74LS02	5019-09808-00	SR4, SR8, SR11	SIP, 9R, 10-pin, 560Ω, .125w/R, 5%
5281-09235-00	U36	IC, Triple 3-Input NAND, 74LS10	5019-09785-00	SR16	SIP, 9R, 10-pin, 2.2KΩ, .125w/R, 5%
5280-09013-00	U36	IC, Hex Inverter, 7404	5019-10472-00	SR14	SIP, 9R, 10-pin, 3.3KΩ, .125w/R, 5%
5281-09499-00	U31, U34	IC, Quad 2-Input NAND, 74LS00	5019-09669-00	SR8	SIP, 9R, 10-pin, 1.0KΩ, .125w/R, 5%
5281-10014-00	U33	IC, Dual 4-Input NAND, 74LS20	5019-09780-00	SR8, SR10	SIP, 4R, 8-pin, 1KΩ, 5%
5281-09486-00	U28	IC, Octal D Flip-flop, 74LS374	5019-09786-00	SR1, SR2	SIP, 5R, 8-pin, 4.7KΩ, .125w/R, 5%
5281-09745-00	U37	IC, 3-8 Decoder, 74LS138	5019-09792-00	SR5, SR7	SIP, 9R, 10-pin, 2.7KΩ, .125w/R, 5%
5281-09867-00	U11, U13, U40	IC, Octal Buffer, 74LS244	5060-10396-00	SRC1 - SRC5, SRC7 - SRC9	SIP, 8R, 8C, 10-pin, 4.7KΩ & 470pfd
5280-08973-00	U17-U20, U52, U53	IC, Quad 2-Input AND, 7408			
5280-08974-00	U55, U56	IC, Hex Inverter, 7406	5043-08980-00	C14, C17-C21, C31, C32, C49-C56, C59, + 54 Bypass, marked B	Capacitor, 0.01 μfd, 50v(+80,-20%), Axial
5310-09155-00	U30, U39	IC, Quad 2-Input NAND, MC14011			
5280-08948-00	U45, U50	IC, Quad 2-Input NOR, 7402	5043-09845-00	C22, C23, C25, C27, C28	Capacitor, 1K pfd, 50v(±20%), Axial
5280-09309-00	U49	IC, Hex Buffer, 7407			
5671-09019-00	LED1-LED3	LED, Red, Display	5043-08996-00	C9, C70-75, C77, C78	Capacitor, 0.1 μfd, 50v(±20%), Axial
5521-10506-00	CR1	Oscillator, 4 MHz			
5162-08976-00	Q51, Q53, Q55, Q57, Q59, Q61, Q63, Q65	Transistor, NPN Darl. 2N6427, TO-92	5040-10974-00	C24, C26, C29	Capacitor, 100 μfd, Electr., 25v(+50,-10%), Axial
5191-08978-00	Q52, Q54, Q56, Q58, Q60, Q62, Q64, Q66	Transistor, PNP, TIP42, TO-220			
5162-09410-00	Q6-Q9, Q14-Q17, Q22-Q25, Q30-Q33, Q69, Q71, Q73, Q75, Q77, Q79, Q80-Q87	Transistor, NPN, TIP122, TO-220	5045-09796-00	C60-C67	Capacitor, 0.1 μfd, Polycarbonate Rad., 100v(±10%)
5180-08938-00	Q2-Q5, Q10-Q13, Q18-Q21, Q26-Q29, Q34-Q38, Q41, Q67, Q68, Q70, Q72, Q74, Q76, Q78	Transistor, NPN, 2N4401, TO-92	5043-09065-00	C33-C40, C68, C69, C76, C10, C12	Capacitor, 470 pfd, 50v(±20%), Axial
5180-10289-00	Q1, Q40	Transistor, NPN, 2N3904, TO-92	5040-09545-00	C30	Capacitor, 22 μfd, Electr., 10v(+50,-10%) Axial
5190-09016-00	Q39, Q50	Transistor, PNP, 2N4403, TO-92	5041-09031-00	C58	Capacitor, 1 μfd, Tant., 25v(±20%), Axial
5130-09014-00	S1-S8	SCR, 30v, 0.8A, 2N5060	5043-09030-00	C16, C57	Capacitor, 0.047 μfd, 50v(±20%), Axial
5070-06258-00	D3-D19	Diode, 1N4001	5551-09822-00	L1-L3	Inductor, 4.7 μH, 3A
5070-08919-00	D2	Diode, 1N4148, 150mA	5641-09312-00	SW1, SW2	Switch, Pushbutton, DPDT, 100v, 5A
5070-09266-00	D1	Diode, 1N5817, 1.0A	5641-09653-00		
5075-09018-00	ZR1	Diode, Zener, 1N5996A, 6.8v, 0.5w			
5075-09059-00	ZR2	Diode, Zener, 1N5990, 3.9v, 0.5w	5880-09022-00	B1-B3	Battery, Alkaline, 1.5v, AA
5010-08992-00	R94, R97, R100, R103, R106, R109	Resistor, 560Ω, 5%, 1/4w, C. F.	5881-09021-00		Battery Holder, #171
5010-09039-00	R56	Resistor, 10Ω, 5%, 1/4w, C. F.	5700-10176-00	U26	IC Socket, 28 pin
5010-09534-00	W1, W2, W4, W5, W7, W8, W11, W14, W16, W17, W19	Resistor, 0Ω, 5%, 1/4w, C. F.	a) A-5343-2014-1	U27	IC, Game ROM 2, 27256
5010-08991-00	R31, R32, R35, R52	Resistor, 4.7KΩ, 5%, 1/4w, C. F.	b) A-5343-2014-2		IC, Game ROM 1, 27256
5010-09358-00	R55, R68, R92, R146	Resistor, 1.0KΩ, 5%, 1/4w, C. F.	5700-08985-00	U15	IC Socket, 40 pin
5010-09113-00	R54, R57, R58, R64, R66, R138-R145	Resistor, 33KΩ, 5%, 1/4w, C. F.	a) 5400-09150-00	TP1, TP2	IC, μProcessor, 6802
5010-08983-00	R7, R8, R10, R70, R80	Resistor, 3.3KΩ, 5%, 1/4w, C. F.	5824-09248-00		Test Point
5010-09034-00	R11-R14, R25, R26, R53, R60, R65, R90	Resistor, 10KΩ, 5%, 1/4w, C. F.	20-9229		Thermal Compound
5010-09086-00	R81	Resistor, 6.8KΩ, 5%, 1/4w, C. F.	5580-08994-01	K1	Relay, 4-pole, 40Ω, 6v
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.	5791-10862-09	1J1, 1J2, 1J4-1J8, 1J10-1J12, 1J17-1J19	Connector, 9 pin (Hdr)
5012-09037-00	R113, R116, R119, R122, R125, R128, R131, R134	Resistor, 0.4Ω, 5%, 3w, Wire-Wnd.	5791-10862-04	1J13, 1J14, 1J16	Connector, 4 pin (Hdr)
5010-08993-00	R36-R51, R95, R98, R101, R104, R107, R110	Resistor, 68Ω, 5%, 1/2w, C. F.	5791-10862-12	1J3	Connector, 12 pin (Hdr)
5012-10860-00	R82-R89	Resistor, 27Ω, 5%, 2w, C. F.	5791-10850-00	1J22	Connector, 26 pin Ribbon (Hdr)
			5791-09437-00	1J21	Connector, 20 pin Ribbon (Hdr)

NOTES:

- For Schematic, refer to drawing #16-9019.
- Items 56 and 58 (resistors) must be mounted 1/8" above PCB surface.
- Standard Jumper: W1, W2, W4, W5, W7, W11, W14, W16



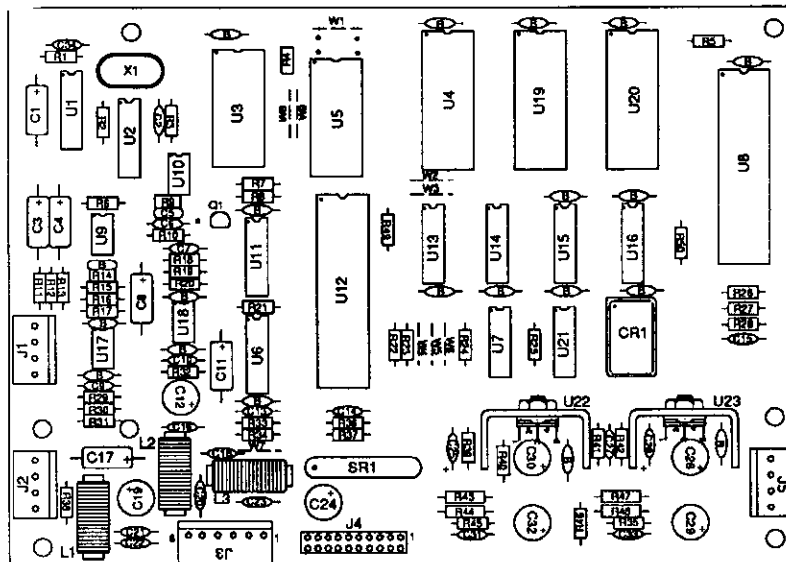
Power Supply

p/n D-12246

Item	Part No.	Ckt Designator	Description	Item	Part No.	Ckt Designator	Description
1	5765-12317-00		Power Supply PCB	26	5075-09060-00	ZR2, ZR4	Zener, 1N4764, 100v, 1w
2	5733-12060-01	F1-F5	Fuse Holder	27	5460-09424-00	IC1	IC, Volt. Reg., MC1723C5
3	5731-09432-00	F4, F5	Fuse, 7A., S-B, 250v	28	5010-09069-00	R3, R6	Resistor, 330K, 5%, 1/2w, C.F.
4	5731-12328-00	F1	Fuse, 3/8A., S-B, 250v	29	5010-10631-00	R2, R5	Resistor, 1.2K, 5%, 1/2w
5	5730-12327-00	F2, F3	Fuse 1/8 A., 250v	30	5010-09536-00	R1, R4	Resistor, 39K, 5%, 1w
6	5791-10862-15	J1	Connector, 15-pin Hdr, Sq Pin .156	31	5013-09426-00	R7	Resistor, 2.15K, 1%, 1/4w, C. F.
7	5791-10862-06	J2	Connector, 6-pin Hdr, Sq Pin .156	32	5013-09427-00	R8	Resistor, 4.99K, 1%, 1/4w, C. F.
8	5791-10862-09	J3	Connector, 9-pin Hdr, Sq Pin .156	33	5010-09541-00	R9	Resistor, 2.7K, 2%, 1/4w, C. F.
9	5100-09690-00	BR1	Bridge Rectifier, 35A., 200V	34	5010-09085-00	R10	Resistor, 1.5K, 5%, 1/4w, C. F.
10	5164-12154-00	Q1	Transistor, MJE15030, NPN	35	5010-09428-00	R11	Resistor, 1.5K, 2%, 1/4w, C. F.
11	5194-12155-00	Q3	Transistor, MJE15031, PNP	36	5010-09508-00	R12	Resistor, 270Ω, 2%, 1/4w, C. F37
12	5194-09055-00	Q2	Transistor, MPSD52, PNP	37	5012-09429-00	R13	Resistor, 0.12Ω, 5%, 5w
13	5164-09056-00	Q4	Transistor, MPSD02, NPN	38	5040-12324-00	C1, C3	Capacitor, 150 mfd, 160v, radial
14	5162-09425-00	Q5	Transistor, 2N6057, NPN	39	5043-09072-00	C2, C4	Capacitor, 0.1 mfd, 500v, disc
15	5701-09652-00		Thermal Pad T0-3	40	5040-09421-00	C7	Capacitor, 100 mfd, 25v, radial
16	4006-01003-06		Mach. Screw, 6-32 x 3/8	41	5040-09422-00	C8	Capacitor, 47 mfd, 50v, radial
17	4006-01003-08		Mach. Screw, 6-32 x 1/2	42	5040-09420-00	C9	Capacitor, 1000 mfd, electr,
18	20-9229		Thermal Compound		5040-08893-00		25v, axial or radial
19	4406-01117-00		Nut, 6-32 Hex.	43	5040-09419-00	C10	Capacitor, 18,000 mfd, electr,
20	5010-09534-00	W1	Resistor, 0Ω				20v, axial
21	4703-00007-00		Lockwasher, #6 Ext.	44	5040-09423-00	C12	Capacitor, 330 mfd, electr,
22	5705-12330-00		Heatsink 4"				10v, radial
23	5705-09199-00		Heatsink 6030B	45	5043-09446-00	C14	Capacitor, 0.1 mfd, 50v, disc
24	5070-09054-00	D1, D3 - D6	Diode, 1N4004	46	5043-09065-00	C15	Capacitor, 470 pfd
25	5075-09059-00	ZR1, ZR3	Zener, 1N5990, 3.9v, 1/2w	47	5824-09248-00	TP1-TP4	Terminal, #1502-1 (Test Post)
				48	03-7947		Tie Wrap, 8" Long

NOTES:

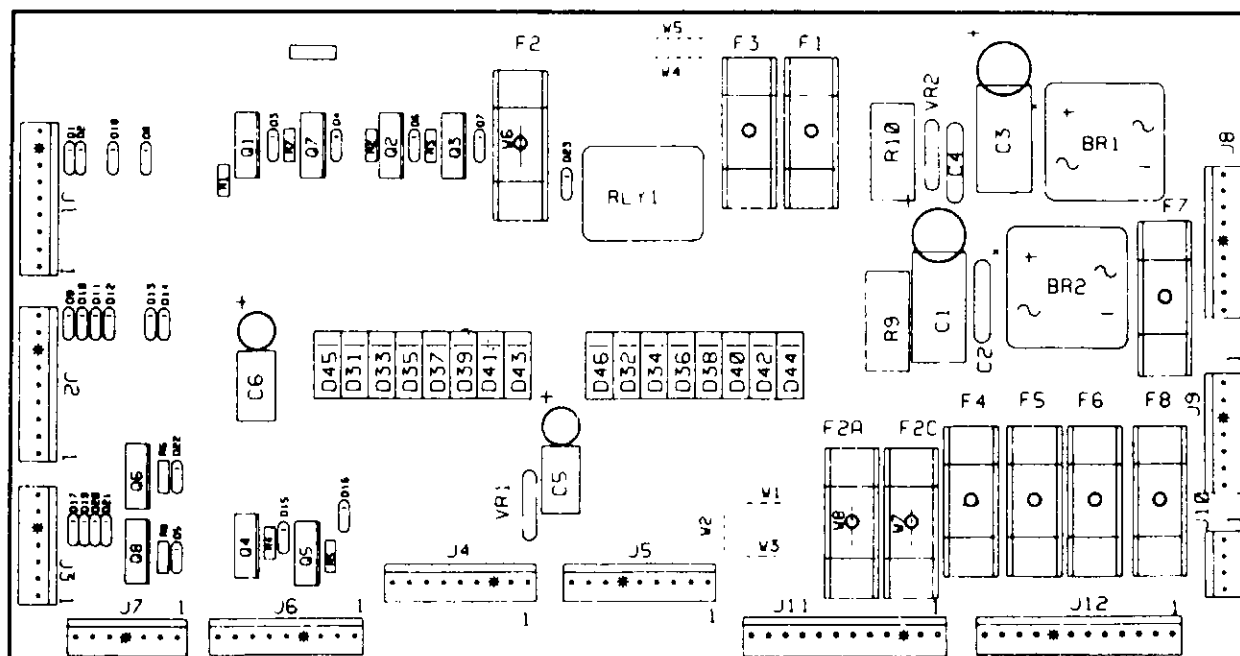
- Heat sink compound must be applied between transistor and heat sink.
- Observe index mark on integrated circuit, polarity of capacitors and diodes, and position of transistors.
- The view of Q5 and its related heat sink and hardware is from the bottom of the heatsink, to clarify installation.



Audio Board Assembly

p/n D-11581-2014

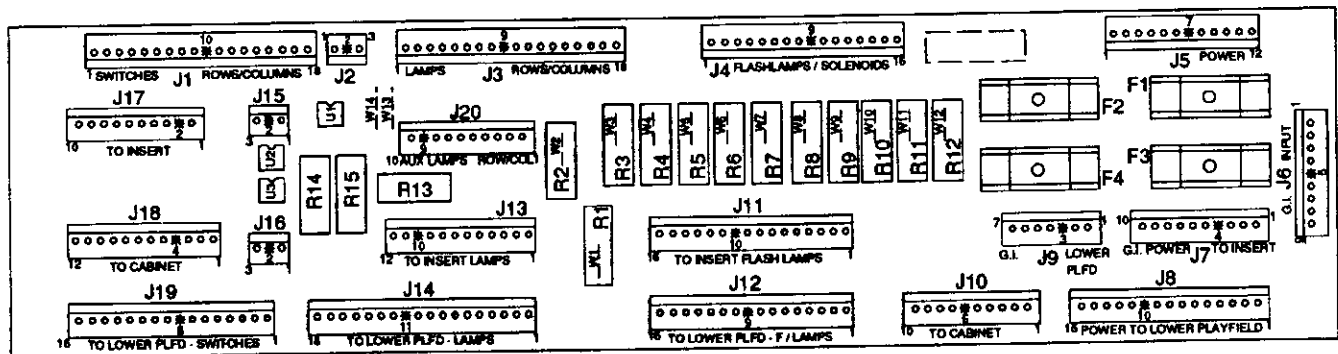
Part No.	Ckt Designator	Description	Part No.	Ckt Designator	Description
5766-12130-00		Bare P. C. Board	5010-08998-00	R2, R3,	Resistor, 2.2K, 1/4w, 5%
5371-11087-00	U1	IC, D/A Conv, YM3012	5010-08983-00	R7-R9	Resistor, 3.3K, 1/4w, 5%
a) 5700-09006-00		Socket, IC, 16-pin (U1)	5010-08991-00	R1, R4, R5, R11,	Resistor, 4.7K, 1/4w, 5%
5370-11086-00	U3	IC, Sound Processor, YM2151		R12, R26 - R28, R33,	
a) 5700-09004-00		Socket, IC, 24-pin (U3)		R36, R37, R49, R50	
5400-10320-00	U8	IC, μ Processor, MC68B09E	5010-10985-00	R14, R15	Resistor, 20K, 1/4w, 5%
a) 5700-08985-00		Socket, IC, 40-pin (U8)	5010-09034-00	R17	Resistor, 10K, 1/4w, 5%
A-5343-2014-5	U4	IC, Audio ROM 1	5010-09324-00	R6,	Resistor, 27K, 1/4w, 5%
A-5343-2014-6	U19	IC, Audio ROM 2	5010-09162-00	R39	Resistor, 100K, 1/4w, 5%
A-5343-2014-7	U20	IC, Audio ROM 3	5010-09331-00	R16	Resistor, 13K, 1/4W, 5%
a) 5700-10176-00		Socket, IC, 28-pin (U4, U19)	5010-09219-00	R38	Resistor, 8.2K, 1/4W, 5%
5371-09152-00	U11	IC, D/A Convtr, MC1408	5010-10258-00	R40	Resistor, 1M, 1/4w, 5%
5430-10322-00	U12	IC, PIA, MC68B21	5010-09179-00	R10	Resistor, 3.3M, 1/4w, 5%
5340-10139-00	U5	IC, RAM/S 5516-2 2Kx8	5010-09534-00	W9	Resistor, 0 Ω , 1/4w, 5%
5281-09487-00	U16	IC, Dual D Flipflop, 74LS74	5040-09343-00	C1, C3, C4, C8	Capacitor, 10 μ fd, 20v, $\pm$ 20%
5281-10043-00	U13	IC, 74LS175	5040-10974-00	C12, C19, C24	Capacitor, 100 μ fd, 35v
5281-09235-00	U21	IC, Triple NAND, 74LS10	5040-09776-00	C26, C30	Capacitor, 470 μ fd, 16v; +50, -10%
5370-09321-00	U9, U10, U17	IC, Op Amp, MC1458	5040-12006-00	C29, C32	Capacitor, 1000 μ fd, 16v, 20%
5281-09215-00	U2	IC, Hex Inv, 74LS04	5041-09243-00	C25, C28	Capacitor, 10 μ fd, 10v, $\pm$ 10%
5281-09246-00	U14	IC, 2-4 Dec, 74LS139	5043-08980-00	C5, B (17)*	Capacitor, 0.01 μ fd, 50v, +80, -20%
5281-09745-00	U15	IC, Dual Mux, 74LS138	5043-08996-00	C31, C33	Capacitor, 0.1 μ fd, 50v, $\pm$ 20%
5370-09156-00	U22, U23	IC, Audio Amp, TDA2002	5043-09065-00	C13 - C15	Capacitor, 470 pfd, 50v, $\pm$ 20%
a) 5705-09199-00		Heatsink, #6030B	5043-09492-00	C2, C34	Capacitor, 100 pfd, 50v, $\pm$ 10%
b) 4006-01003-06		Mach. Screw, 6-32 x 3/8	5043-09844-00	C6	Capacitor, 47 pfd, 50v, $\pm$ 20%
c) 4406-01117-00		Nut, 6-32 Hex.	5043-09845-00	C16, C18, C20 -	Capacitor, 1000 pfd, 50v, $\pm$ 20%
d) 4703-00007-00		Lockwasher, #6 Ext.		C23, C27	
5160-10269-00	Q1	Transistor, 2N3904, NPN	5520-09020-00	X1	Crystal, 3.58 MHz
5060-10396-00	SP1	SIP 4.7K & 470pfd, 8R8C	5521-10931-00	CR1	Oscillator, 8 MHz
5010-09181-00	R44, R48	Resistor, 1.0 Ω , 1/2w, 5%	5551-09822-00	L1 - L3	Inductor, 4.7 μ H, 3A
5010-09161-00	R35, R45	Resistor, 2.2 Ω , 1/4w, 5%	5791-09437-00	J4	Connector, 20 pin, (Hdr), Rib. Cbl
5010-09361-00	R43, R46, R47	Resistor, 220 Ω , 1/2w, 5%	5791-10862-04	J1, J2, J5	Connector, 4 pin (Hdr)
5010-09358-00	R41, R42	Resistor, 1K, 1/4w, 5%	5791-10862-06	J3	Connector, 6 pin (Hdr)
NOTES:			16-8850-250		P.C.B. I.D. Label
* 17 capacitors (shown on diagram with "B" symbol) provide +5VDC filtering for ICs.			20-9229		Thermal Compound
All capacitors are ceramic, 50v, axial, unless otherwise noted.					
All resistors are 5%, 1/4w, Carbon Film, unless otherwise noted.					



Aux Power Driver Unit Board

p/n D-12247-2014

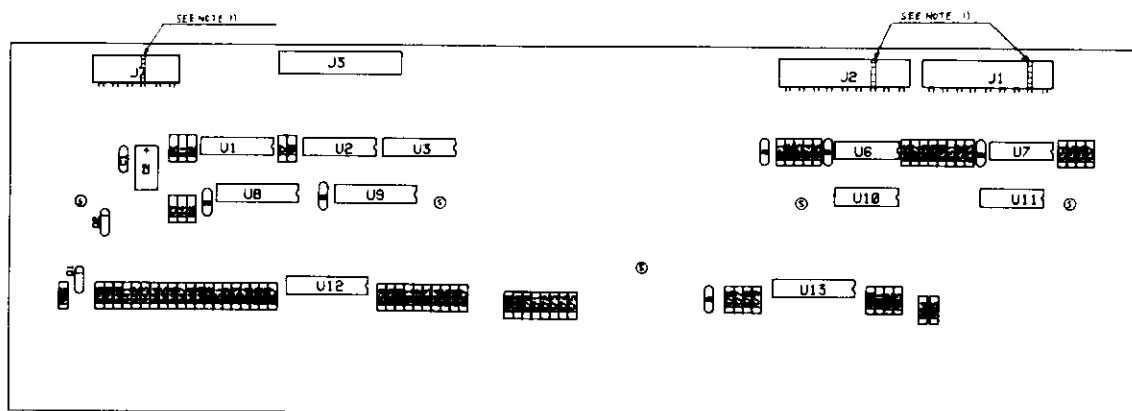
Part No.	Ckt Designator	Description
5763-12184-00		Bare P.C. Board
5040-09537-00	C1, C3	Capacitor, 100 μ fd., 100v, Radial
5040-12181-00	C5, C6	Capacitor, 10 μ fd., 100v, Radial
5043-09072-00	C2, C4	Capacitor, 0.1 μ fd., 500v
5010-09160-00	R1 - R8	Resistor, 220 Ω , 1/4w C.F., 5%
5012-12238-00	R9	Resistor, 3.3K Ω , 5w, 10%
5010-09534-00	W1, W3, W4, W6	Resistor, 0 Ω , 1/4w
5017-12180-00	VR1, VR2	Varistor, 100v
5100-09690-00	BR1, BR2	Bridge Rectifier, 35A, 200v
5070-08785-00	D1 - D23	Diode, 1N4003
5070-09045-00	D31 - D46	Diode, MR501
5191-12179-00	Q1 - Q8	Transistor, TIP36C
5580-09555-01	K1	Relay, DPDT, 13A
5733-12060-01		Fuse Holder
5731-08665-00	F5, F6	Fuse, 2A, S-B, 250v
5731-09128-00	F1, F2A, F3, F4	Fuse, 2-1/2A, S-B, 250v
5731-09651-00	F2C,	Fuse, 5A, S-B, 250v
5731-06314-00	F7	Fuse, 4A, S-B, 250v
5731-09432-00	F8	Fuse, 7A, S-B, 250v
5791-10862-09	J1, J2, J4 - J6, J8	Connector, 9-pin Hdr, Sq Pin
5791-10862-07	J3, J7, J9	Connector, 7-pin Hdr, Sq Pin
5791-10862-12	J11, J12	Connector, 12-pin Hdr, Sq Pin
5791-10862-04	J10	Connector, 4-pin Hdr, Sq Pin
16-8850-252		P.C.B. I.D. Label



Backbox Interconnect Board

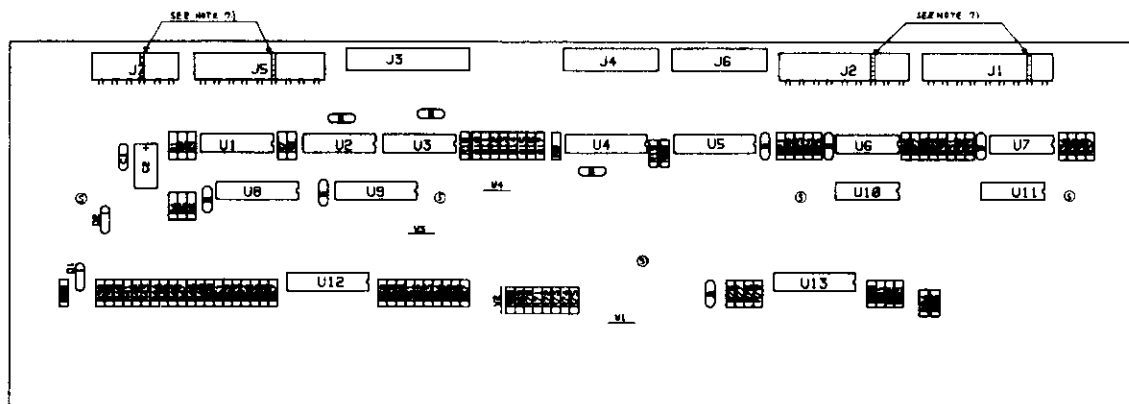
p/n D-12313-2014

Part No.	Ckt Designator	Description
5768-12332-00		Master Interconnect Board
5010-09534-00	R10, R11, R12	Resistor, 0Ω
5012-12238-00	R14, R15	Resistor, 3.3KΩ, 5w, 10%
5012-12337-00	R13	Resistor, 1.5KΩ, 5w, 10%
5012-10023-00	R1, R2, R6, R7	Resistor, 4Ω, 5w, 10%
5012-12163-00	R3, R8	Resistor, 11Ω, 5w, 10%
5012-10024-00	R4, R5, R9	Resistor, 5.6Ω, 5W, 10%
5490-10892-00	U1 - U3	Opto Isolator 4N25
5731-09651-00	F1-F4	Fuse, 5A.S.B., 250v
5733-12060-01		Fuse Holder, F1-F4
5791-10862-03	J2, J16	Connector, 3-pin Hdr Sq Pin .156
5791-10862-07	J9	Connector, 7-pin Hdr Sq Pin .156
5791-10862-09	J6	Connector, 9-pin Hdr Sq Pin .156
5791-10862-10	J7, J10, J20	Connector, 10-pin Hdr Sq Pin .156
5791-10862-12	J5, J13, J18	Connector, 12-pin Hdr Sq Pin .156
5791-10862-15	J8	Connector, 15-pin Hdr Sq Pin .156
5791-10862-16	J4, J11, J12, J19	Connector, 16-pin Hdr Sq Pin .156
5791-10862-18	J1, J3, J14	Connector, 18-pin Hdr Sq Pin .156
16-8850-243		P.C.B. I.D. Label



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, Cathode 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



Bally Right Display Board D-12502-1

DESCRIPTION	QTY.	DESIGNATION NO.	PART NUMBER
Axial Cap., 0.01nfd, 50v, +80, -20%	9	B (Bypass Cap)	5043-08980-00
Axial Cap., 0.1nfd, 50v, +80, -20%	1	C1	5043-08996-00
Axial Cap., 10nfd, 25v, ±20%	1	C2	5040-09343-00
Zener, 1N4740, 10v	2	D1, D2	5075-09135-00
Display, 16-Character A/N	1	DSPL1	5670-12308-00
9-Pin Header, Right Angle, .156	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, Cathode 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

Right Flipper

p/n C-11626-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	Capacitor, 2.2 μ Fd, 250V, 20%
5	RM-21-06	Sleeve, Vinyl (Cap. leads)
6	4010-01066-06	Cap Screw, 10-32 x 3/8, SH
7	4701-00004-00	Lockwasher, #10 split
8	A-12111	Flipper Stop Assembly
9	FL-11630	Flipper Coil (Red), (* - Refer to Note 3)
10	4006-01017-04	Mach. Screw, 6-32 x 1/4, P-RH-S
11	01-7695	Solenoid Bracket
12	10-376	Coil Plunger Spring
13	B-10655-R	Crank Link Assembly, 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. x 13/64 i. d. x 16 ga.
d)	4701-00004-00	Lockwasher, #10 split
e)	4410-01132-00	Nut, 10-32 ESNA
f)	A-10656**	Flipper Link Assembly
1.)	02-4219	Coil Plunger
2.)	20-9370-1	Spring Pin, 5/32 dia. x 7/16
3.)	03-8050-1	Flipper Link
g)	B-10657-R	Flipper Crank Assembly, Right
1.)	01-8073-R	Flipper Crank, Right
2.)	17-1037	Crank Washer
3.)	4010-01066-18	Cap Screw, 10-32 x 1-1/8, HCS
4.)	4410-01127-00	Nut, 10-32 Hex Hd.
5.)	4700-00107-00	Washer, 5/8 o.d. x 13/64 i. d. x 12 ga.
6.)	4701-00004-00	Lockwasher, #10 Split
7.)	RM-23-06	Tubing, H. S. 1/4 DWP
14	23-6577	Bumper Plug
15	03-7568	Flipper Bushing
16	4006-01005-06	Mach. Screw, 6-32 x 3/8, P-PH
17	4406-01117-00	Nut, 6-32 Hex
18	C-11627-R	Flipper Base Assembly, R.
19	06-14G	Insulating Blade
20	4105-01019-10	Sh. Metal Screw, #5 x 5/8
21	4701-00002-00	Lockwasher, #6 split
22	23-6622	Tape, Double-sided
23	03-7811	End of Stroke (EOS) Switch

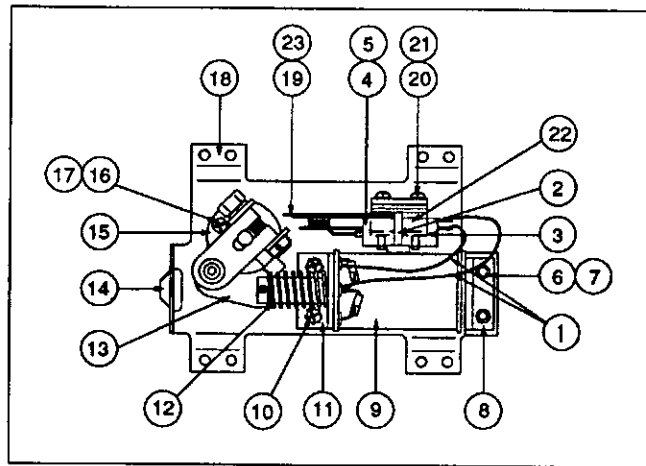
** - Also see separate diagram

Left Flipper

p/n C-11626-L-3

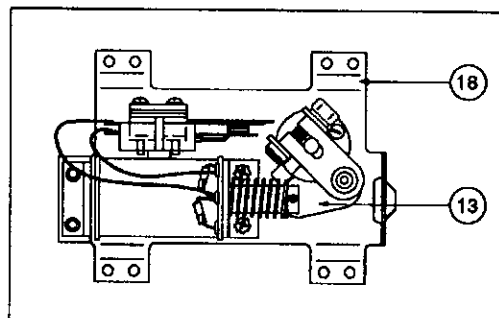
(Parts listed replace same Items of C-11626-R-3)

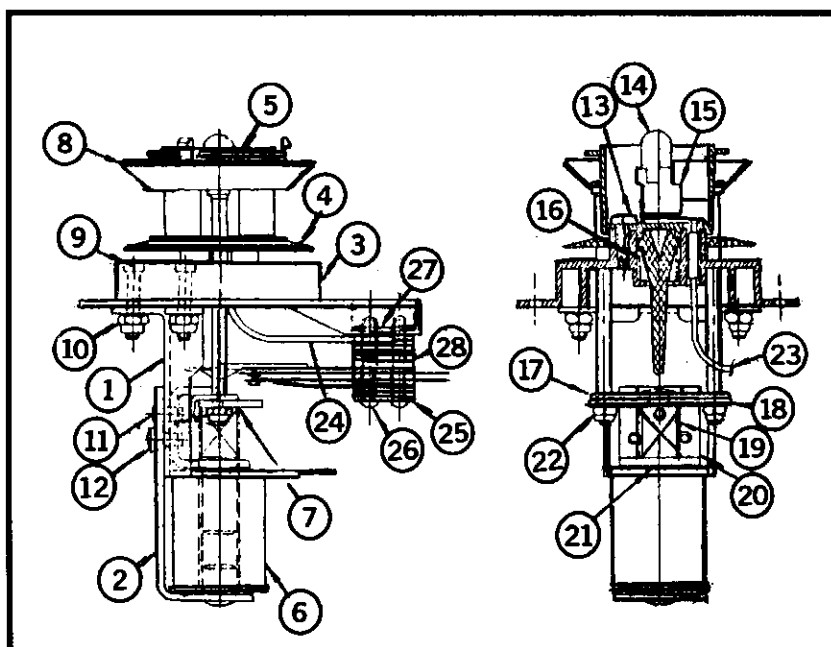
Item	Part No.	Description
13	B-10655-L	Crank Link Assembly, Left
g)	B-10657-L	Flipper Crank Assembly, Left
1.)	01-8073-L	Flipper Crank, Left
18	C-11627-L	Flipper Base Assy, Left



Flipper Assembly Notes:

- 1 Each Flipper Assembly is mounted beneath the playfield, in conjunction with the plastic Flipper Paddle and Shaft (20-9250-5) and flipper Rubber (23-6519-4).
- 2 The tip of the EOS Switch must travel 0.0150 (+ .010, - .000) inch, before the contacts fully open, with the flipper in the actuated position. The EOS Switch contacts must have a gap of 0.062 ($\pm$.015) inch. Adjustment of the EOS Switch must be made at a minimum distance of 0.25 inch from the switch body.
- 3 All moving elements of the assembly must operate freely, with no evidence of binding.
- 4 The large end of the Coil Plunger Spring (item 12) must fit within the four lugs of the Solenoid Bracket.
- 5 For coil replacement, remove the Solenoid Bracket (item 11) to prevent screw damage.
- 6 Use Loctite™ 242 when reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.
- 7 When replacing the Bumper Plug (item 14) to restore proper flipper operation, readjust the flipper paddle and shaft position.
- 8 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.



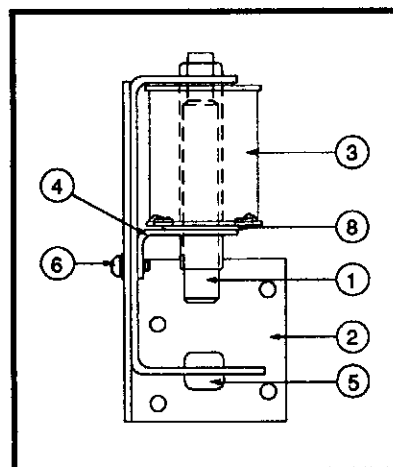


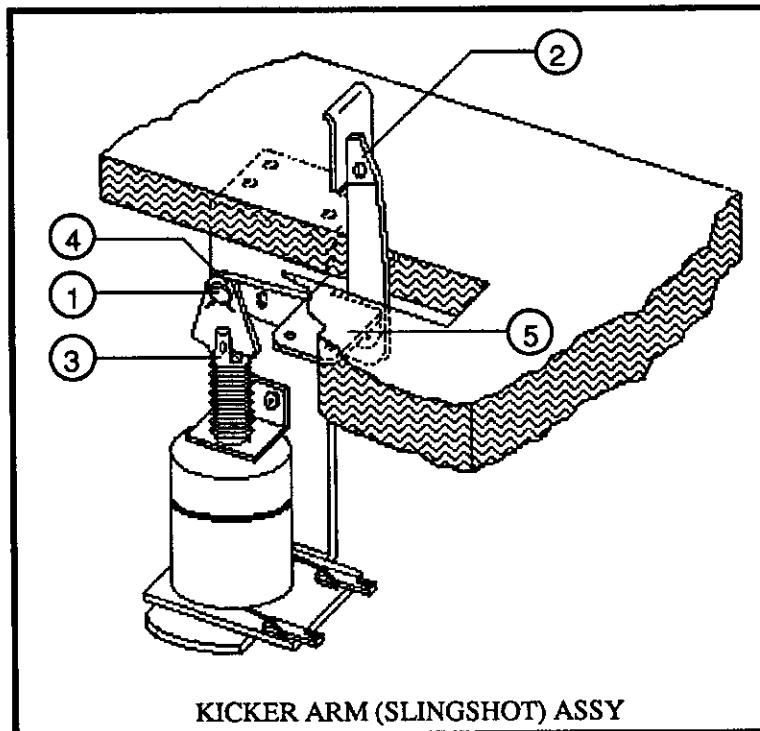
Jet Bumper
p/n C-12872

Item	Part No.	Description	Item	Part No.	Description
1	01-9117	Mounting Bracket	16	10-411	Compression Spring
2	B-12749	Core Plug & Brkt Assy	17	01-9116	Bracket
3	03-8324-5	Base, White	18	01-9320	Plate
4	03-6035-5	Wafer, White	19	Plunger	02-3406-1
5	03-8325-5	Body	20	01-9319	Plunger Bkacket
6	AE-23-800	Coil Assy	21	4705-00002-00	Spring-Washer
7	10-326	Compression Spring	22	4406-01119-00	6-32 L. Nut
8	A-4754	Flange & Stud Assy	23	H-12769-2	Cable-White
9	4008-01070-14	8-32 M.S.	24	H-12769-1	Cable-Red
10	4408-01119-00	8-32 L. Nut	25	01-9321	Plate
11	4008-01015-04	8-32 PH. PAN	26	4005-01016-18B	5-40 x 18 PH. RD M.S.
12	4008-01015-06	8-32 PH. PAN	27	01-9166	Plate
13	4108-01001-10B	8 x 10 PH. PAN	28	B-13267	Switch Assembly
14	24-8768	Lamp	29	03-7066	Coil Tubing
15	24-8813	Lamp Socket			

Knocker Assembly
p/n B-10686-1

Item	Part No.	Description
1	A-5387	Coil Plunger Assembly
a)	02-2653	Coil Plunger
b)	03-6013	Bell Arm Ext.
2	B-7409-2	Mtg. Bracket Assembly
3	AE-23-800	Coil Sub-Assembly
4	01-8-508-T	Coil Retaining Bracket
5	23-6420	Rubber Grommet
6	4008-01017-06	Mach. Screw, 8/32 x 3/8
7	H-11835	Knocker Cable
8	03-7067-5	Coil Tubing





Kicker Arm ("Slingshot") Assembly

p/n B-12665
(Left & Right Kickers)

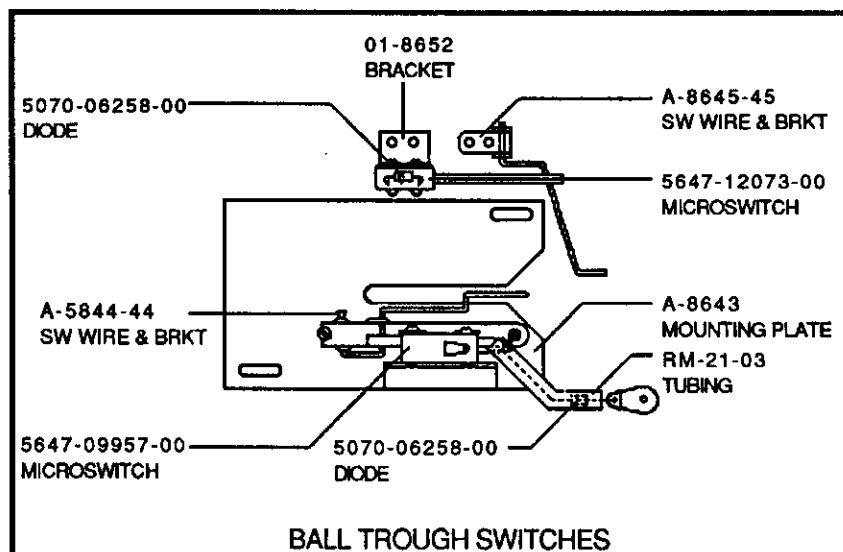
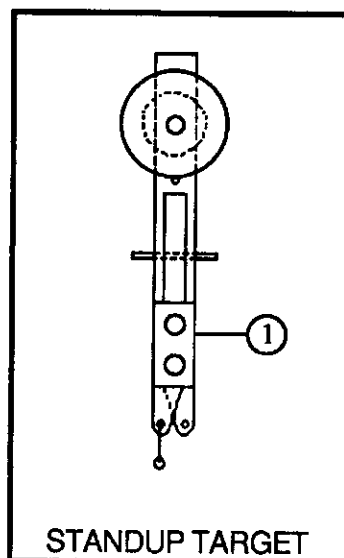
Item	Part No.	Description
1	12-6227	Clip, Hairpin
2	A-12664	Kicker Crank Assembly
3	A-5103	Coil Plunger Assembly
	02-2364	Coil Plunger
	20-8716-5	Roll Pin, 1/8 x 7/16
	03-8085	Armature Link
4	4700-00003-00	Flat Washer, .265 x .500 x .067
5	A-5653	Mounting Bracket Assy

Associated Parts

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

Standup Target Assembly (Including Diode)

Item	Part No.	Description
1	B-11696-2	Standup Target (Green)
2	B-11696-5	Standup Target (White)

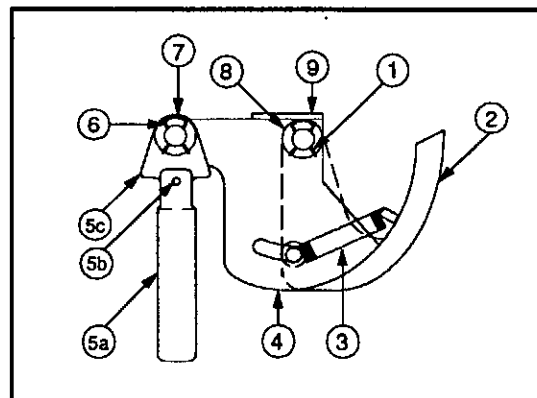


Ball Trough Switches

Part No.	Description
B-11348	Switch Plate Assembly
A-5844-44	Switch Wire & Bracket Assy
B-11349	Switch Mounting Plate Sub-Assy
RM-21-03	#10 Tubing
4004-01060-08	MS 4-40 x 1/2 SL-PH-S
4005-01005-02	MS 5-40 x 1/8 P-PH
5070-06258-00	Diode, 1N4001, 1A
5647-09957-00	μSwitch E21-50H
5825-09373-00	#4 Solder Lug-bent
A-11680	Ball Trough Switch, Right
01-8652	Mounting Bracket
5647-12073-08	Submin. Switch
5070-06258-00	Diode, 1N4001, 1.0A
A-8645	Switch Wire & Bracket Assy

Ball Shooter Lane Feeder C-9638 & Associated Parts

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

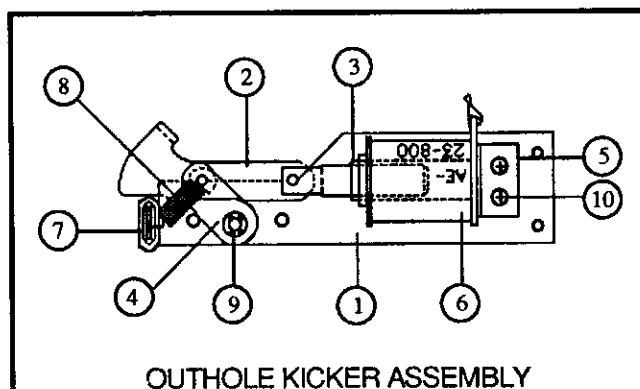


Associated Parts

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

Outhole Kicker Assembly p/n B-8039-2

Item	Part No.	Description
1	A-6378	Mounting Plate Assy
2	A-8335	Coil Plunger Assy
a)	02-2364	Coil Plunger
b)	20-8716-5	Roll Pin, 1/8 x 7/16
c)	01-4251	Ball Return Link
3	03-7066	Coil Tubing
4	A-6889	Kicker Lever Assy
5	A-8038	Coil Stop Assy
6	AE-23-800	Coil Assy
7	03-7176-1	Striker Ring
8	10-101-4	Spring-Reset
9	20-8712-25	"E" Ring, 1/4" Shaft
10	4006-01003-03	Mach. Screw, 6-32 x 3/16



OUTHOLE KICKER ASSEMBLY

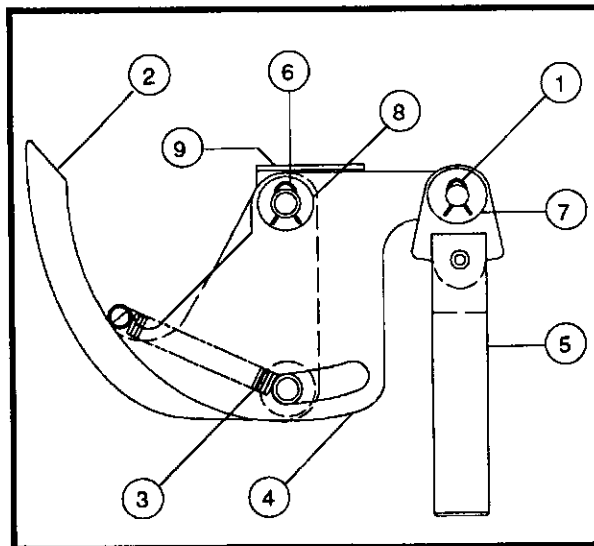
Eject Hole Assembly

p/n B-9361-R-5

Item	Part No.	Description
1	A-6949-R	Spring Plate Assy
2	A-7471-R	Eject Cam Assy
3	A-8050-1	Plunger Spring, 2-1/8
4	A-8268	Mounting Bracket Assy
5	10-320	Eject-Spring
6	12-6227	Hairpin Clip
7	4700-00030-00	Flat Washer, 17/64 x 1/2 x15 ga.
8	4700-00103-00	Flat Washer, 17/64 x 1/2 x 28 ga.

Associated Parts

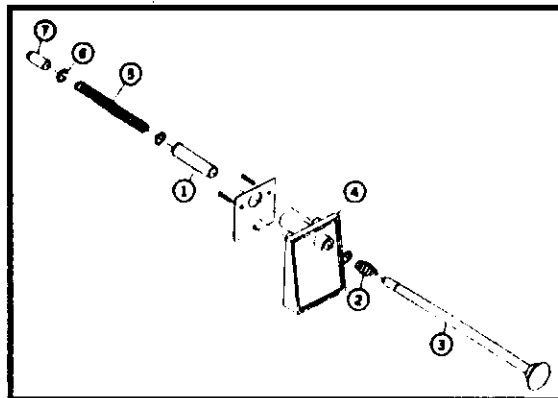
B-9362-R-1	Coil & Bracket Assembly
AE-23-800	Coil Assy
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
03-7066	Coil Tubing
4006-01017-06	M.S. 6-32 x 3/8 P-RH-S
4406-01119-00	Nut 6-32 ESN



Ball Shooter

p/n B-12445-1

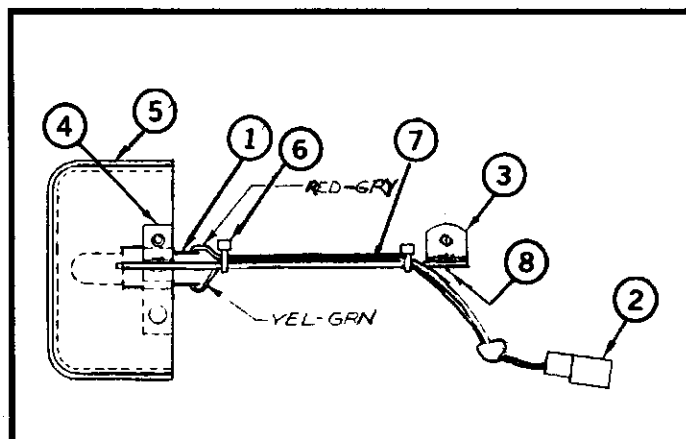
Item	Part No.	Description
1	03-7357	Sleeve
2	10-149	Rod Spring
3	20-9253-7	Rod Assembly
4	21-6645-1	Ball Shooter Housing
5	10-148-1	Shooter Spring
6	20-8781-1	"C" Ring
7	23-6327	Shooter Tip



Pool Lamp Assembly

p/n B-13454

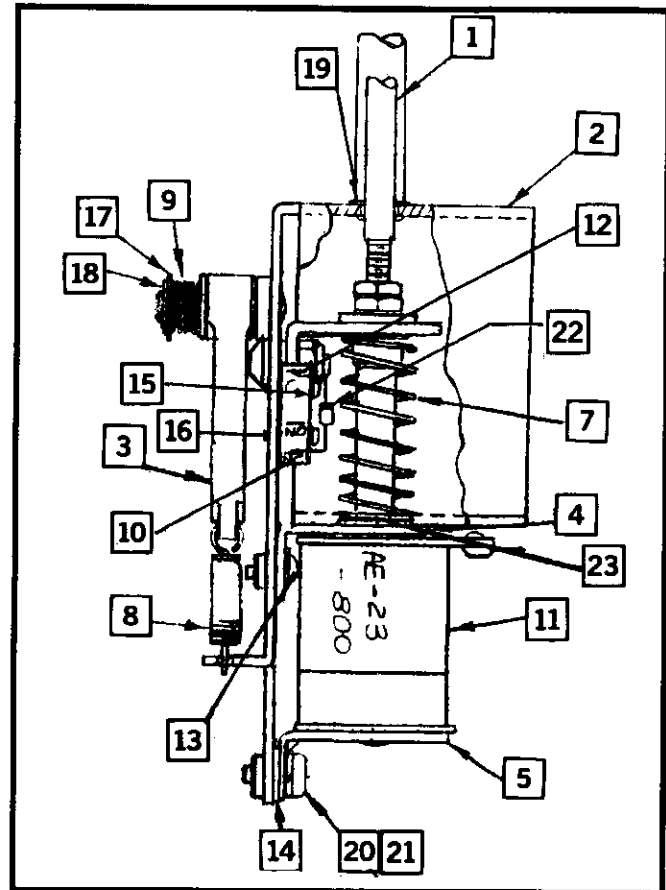
Item	Part No.	Description
1	A-12336-3	Socket & Bulb Assembly
2	H-13519	Overhead Lamp Cable
3	01-6811-2	Clip
4	01-9010	Mounting Leg
5	03-8383	Pool Lamp
6	03-7520-2	Nylon Ty-wrap
7	31-1006-2014	Playfield Plastic
8	07-668-18	Rivet 1/8 x 3/16



Diverter Assembly

p/n C-13430

Item	Part No.	Description
1	B-13431	Plunger Assembly
2	C-13449	Diverter Gate sub-assy
3	03-8090	Flat Cam
4	01-8639	Coil Support Bracket
5	A-10821	Flipper Stop Bracket
6	03-8380	Diverter Gate Assy
7	10-399	Compression Spring
8	10-401	Extension Spring
9	10-392	Copmression Spring
10	01-8600	Switch Insulators
11	AE-23-800	Coil Sub-assy
12	5647-12073-06	Mini Micro W/Roller
13	4006-01027-06	M.S. #6-32 PH-R-WH
14	4700-00021-00	FW .203 x .437 x .032
15	4701-00024-00	LW (Split) #2
16	4002-01005-06	M.S. #2-56 PH-P-H
17	4700-00103-00	FW #12
18	20-8712-25	"E" Ring
19	20-8790-7	Nylined Bearing
20	4010-01008-06	M.S. #10-32 P-PH
21	4701-0004-00	LW #10 Split
22	5070-06258-00	Diode, 1N4001
23	03-7066	Coil Tubing
24	4006-01003-08	M.S. 6-32 x 1/2 P-PH-S
25	H-13517	Diverter Cable



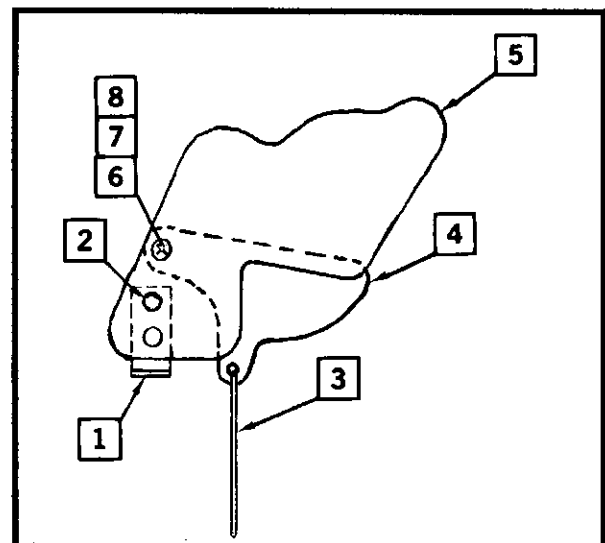
Shark Assembly

p/n B-13466

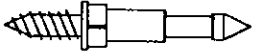
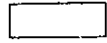
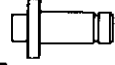
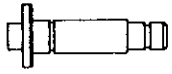
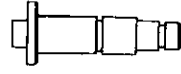
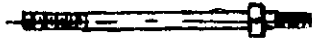
Item	Part No.	Description
1	01-9552	Shark Mounting Clip
2	07-6688-18N	Rivet 1/8 x 3/16
3	12-6901	Shark Actuator Wire
4	31-1006A-2014	Plastic
5	31-1006A-2014	Plastic
6	4006-01005-08	M.S. 6/32 x 3/8 P-PH
7	4406-01119-00	Nut 6-32 ESN
8	4700-00009-00	FW .172 x .437 x .032

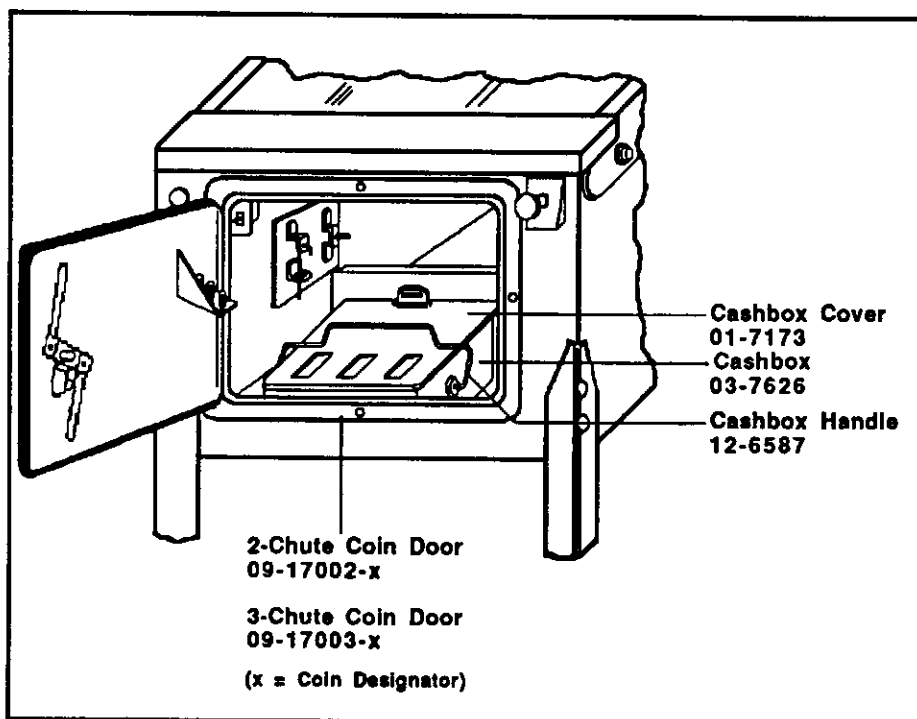
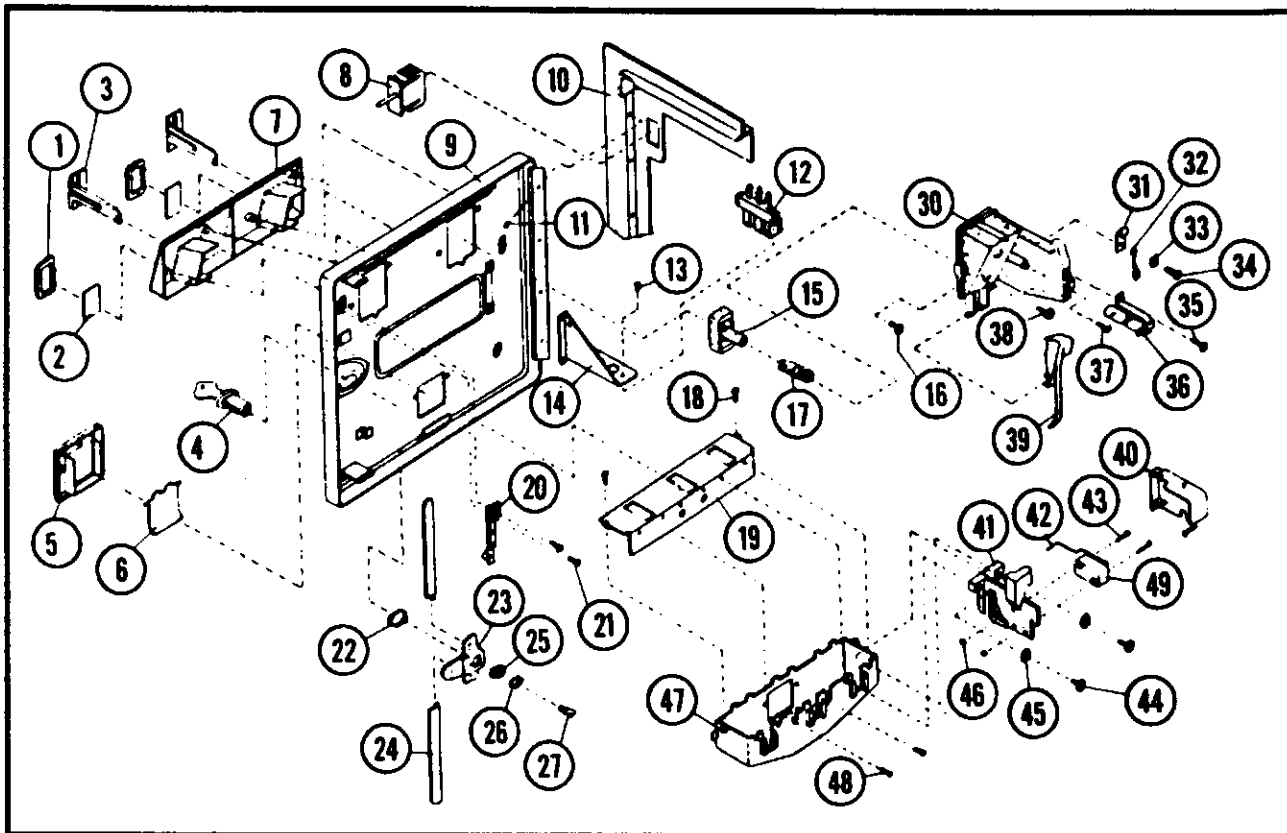
Associated Parts

B-12847	Gate & Coil Mounting Assy
A-11146	B/G Armature Assy
A-12958	Relay Brkt & Eyelet
SM2-35-4000 DC	Coil Assy
01-9224	Mounting Bracket
10-120	Armature Spring



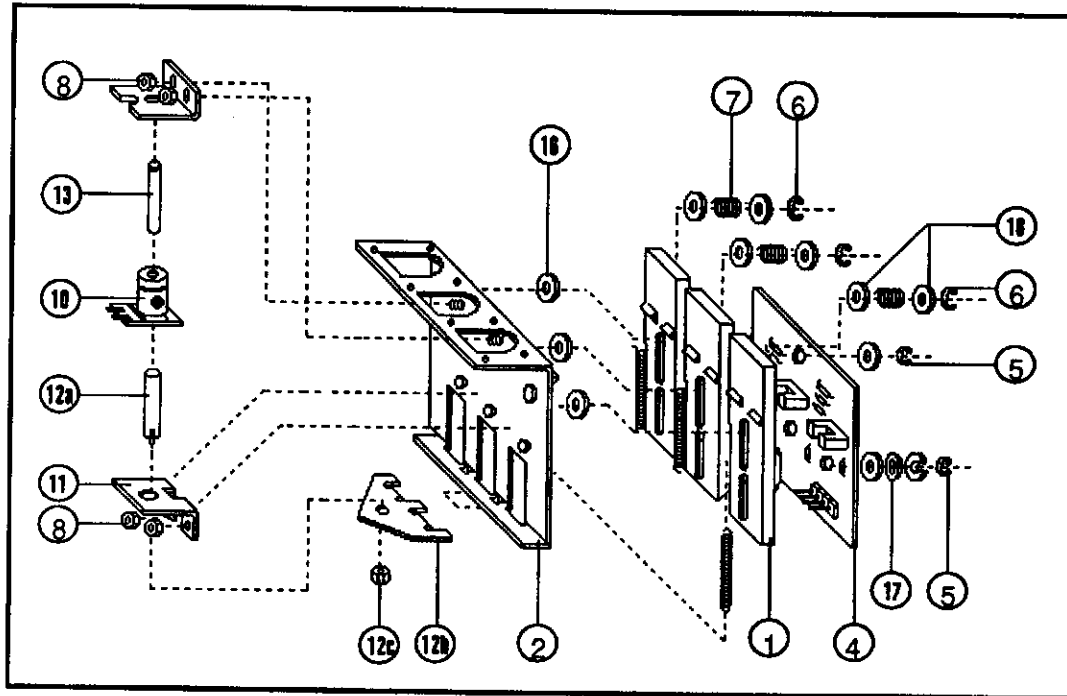
PLAYFIELD POSTS

	
02-3905	02-4020
	
02-4036	02-4271-1
	
02-4271-2	02-4271-3
	
02-4424	02-4425
	
03-8279-9	03-8319-11



COIN DOOR ASSEMBLY
USA Door with decals, p/n C-13155-1
 2-Chute Door - **09-17002-x**
 3-Chute Door - **09-17003-x**
 ("x" is the country designator)

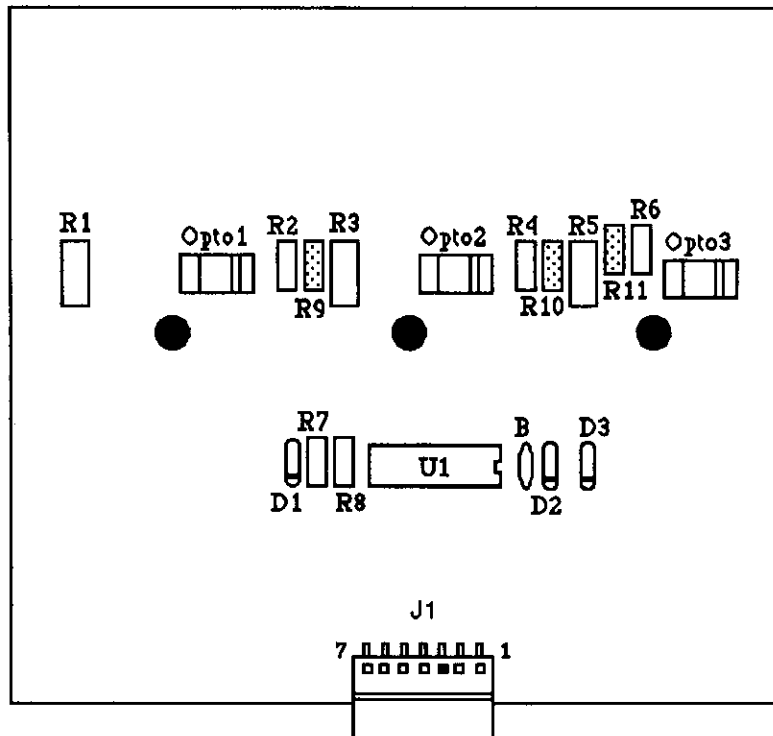
Item	Part Number	Description	Quantity
1	27-1038	Button Cover	2 or 3
2	27-1041-1-54	Price Panel	2 or 3
3	27-1026-1-15	Coin Entry Plate	2 or 3
4	27-1016	Lock Assembly	1
5	27-1061-1	Coin Return - Bezel	1
6	27-1062	Coin Return Flap	1
7	27-1021	Button Housing - 2-slot	1
	27-1022	Button Housing - 3-slot	1
8	27-1111	Interlock Switch	1
9	27-1006-1	Coin Door , 2-Slot	1
	27-1007-1	Coin Door , 3-Slot	1
10	27-1005	Coin Door Frame	1
11	27-1003	M/C Screw, 6-32 x 3/16	4
12	27-1008	Diagnostic Switch	1
13	27-1101	M/C Screw, 4-40 x 1/4	2
14	27-1102	Bracket, Diagnostic Switch	1
15	27-1037	Button	2 or 3
16	27-1078	M/C Screw, 6-32 x 3/8	2 or 3
17	27-1039	Conical Spring	2 or 3
18	27-1079	Self-tapping Screw, #6 x 1/4	2
19	27-1077-1	Coinbox Cover	1
20	27-1066	Slam Switch	1
21	27-1067	M/C Screw, 4-40 x 1/2	2
22	27-1017	Nut (key)	1
23	27-1012	Locking Cam	1
24	27-1011	Locking Arm	2
25	27-1020	Washer	1
26	27-1018	Star Washer	1
27	27-1019	M/C Screw 1/4-28 x 5/16	1
30	27-1112	Coin Inlet Chute	2 or 3
31	27-1088	Cable Clamp	2 or 3
32	27-1025	Key Hook	1
33	27-1086	Washer, #6	2 or 3
34	27-1078	M/C Screw, 6-32 x 3/8	1 or 2
	27-1113	M/C Screw, 6-32 x 7/16	1
35	27-1079	Self-tapping Screw, #6 x 1/4	2 or 3
36	27-1084	Lamp Socket	2 or 3
	27-1085	Lamp	2 or 3
37	27-1096	Self-tapping Screw, #5 x 3/8	2 or 3
38	27-1087	M/C Screw, 6-32 x 5/8	2 or 3
39	27-1082	Lever Arm	2 or 3
40	27-1097	Switch Cover	2 or 3
41	27-1091-1	Coin Accept Chute	2 or 3
42	27-1075	Wire Form (small)	2 or 3
	or		
	27-1093	Wire Form (large)	
43	27-1094	M/C Screw, 4-40 x 7/8	4 or 6
44	27-1087	M/C Screw, 6-32 x 5/8	4 or 6
45	27-1086	Washer, #6	4 or 6
46	27-1095	Nut, 4-40 ESNA	4 or 6
47	27-1076-1	Coin Return Box	1
48	27-1078	M/C Screw, 6-32 x 3/8	2
49	27-1092	Microswitch	2 or 3



3-Bank Drop Target

p/n C-11223-3

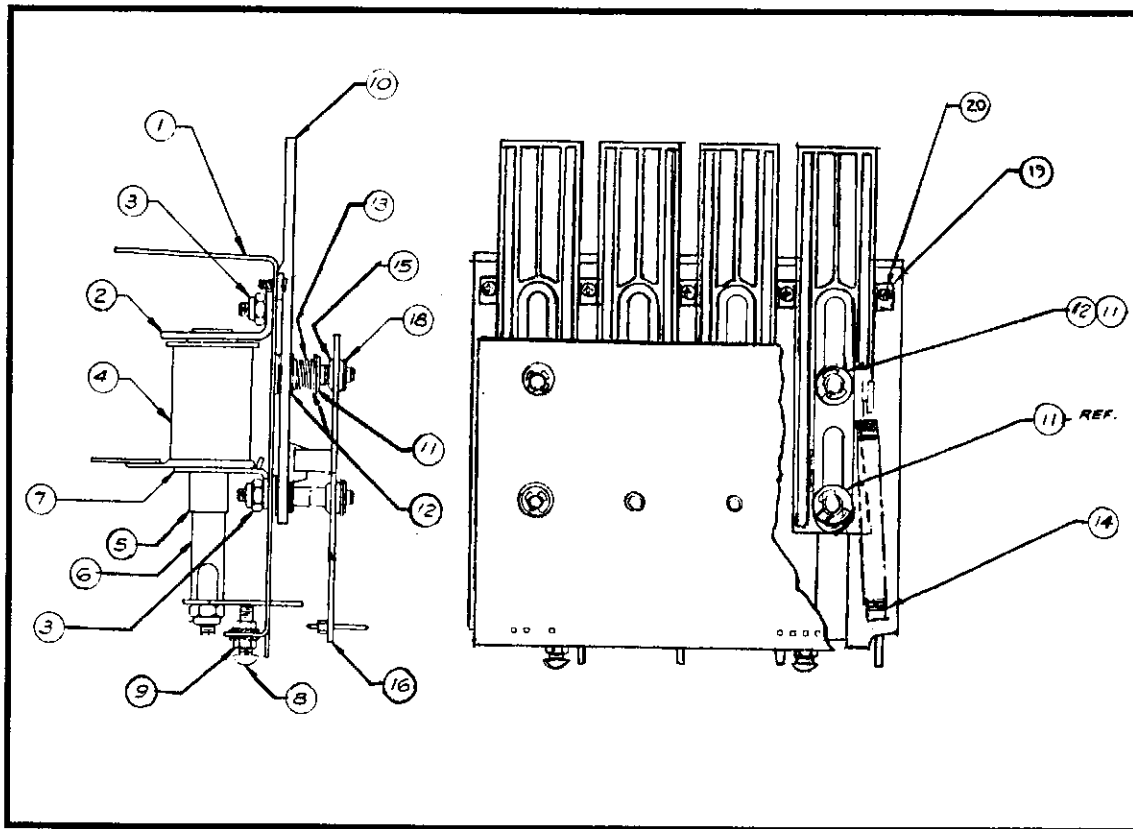
Item	Part No.	Description	Item	Part No.	Description
1	03-8036	Target, Plain	11	01-8413	Bracket Coil Mounting
2	B-13271	3-Bank Tgt Sub-Assy	12	A-11389	Plunger & Reset Plt Assembly
3	10-364	Spring - Extension	A)	02-3972-1	Plunger
4	C-13205-1	3-Drop Target Opto Assy	B)	01-8408	Reset Plate, 3-Bank
5	20-8712-18	"E" Ring, 3/16" Shaft	C)	4410-01132-00	Nut, 10-32 ESN
6	20-8712-25	"E" Ring, 1/4" Shaft	13	03-7066-4	Coil Tubing
7	10-392	Spring-Compression	14	4700-00016-00	Flat Washer, 3/16 x 7/16 x 17 ga.
8	4408-01119-00	Nut, 8-32 ESN	15	4008-01016-10	Mach. Screw, 8-32 x 5/8
9	A-11397	Stop Bracket Assembly	16	4700-00072-00	Flat Washer, 17/64 x 1/2 x 21 ga.
10	AE-26-1200	Coil Assembly	17	23-6626	Rubber Grommet
			18	4408-01128-00	Nut 8-32 KEPS



3-Bank Drop Target Opto Board

p/n C-13205-1

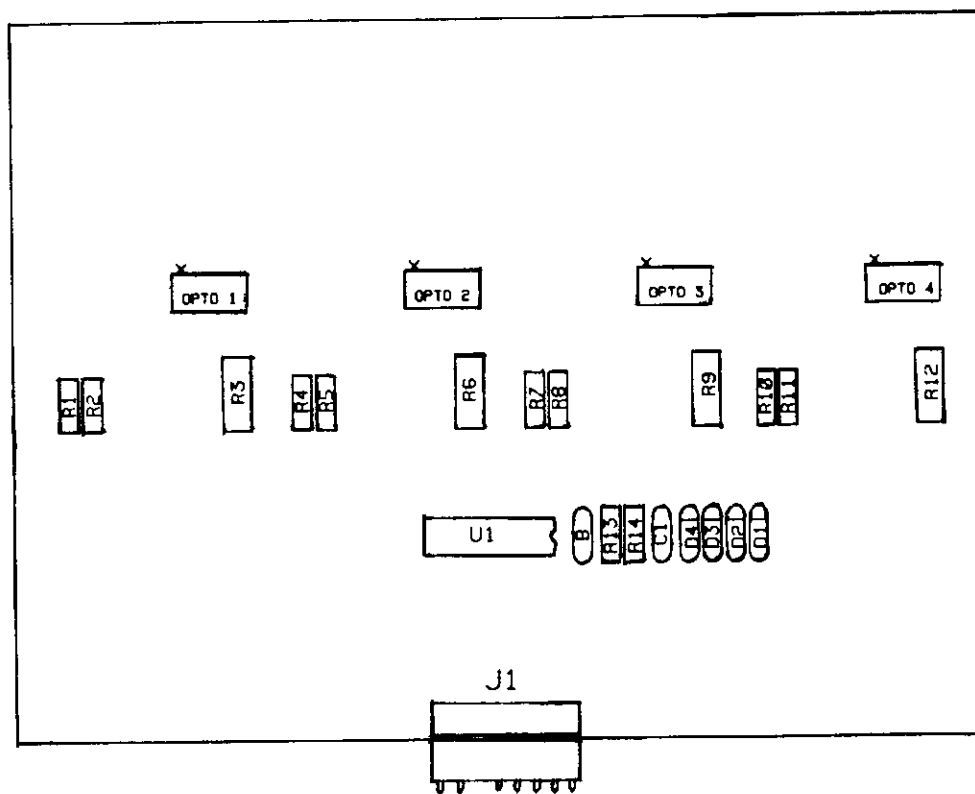
Part No.	Ckt Designation	Description
5768-12546-00	Opto 1- Opto3	3-Bank Opto Board
5490-10159-00		Opto Interruptor, MDL, S/G
5010-08930-00	R1, R3, R5	Resistor, C.F., 470 Ω , 1/2w, 5%
5010-09162-00	R8	Resistor, C.F., 100K Ω , 1/4w, 5%
5010-09324-00	R2, R4, R6	Resistor, C.F., 27K Ω , 1/4w, 5%
5010-08774-00	R7	Resistor, C.F., 22K Ω , 1/4w, 5%
5043-08980-00	B	Capacitor, .01 μ fd., +80 -20%
5370-12272-00	U1	I.C., Quad. Comp., LM339
5791-12548-07	J1	7 pin header R/A lock Sq. .100
5070-09054-00	D1, D2, D3	Diode, 1N4004, 1.0A



4-Bank Drop Target

p/n C-13450

Item	Part No.	Description	Item	Part No.	Description
1	C-13451	Bracket & Stud Assy	11	20-8712-25	Retaining Clip
2	A-11397	Stop Bracket Assey	12	4700-00072-00	Washer #12
3	4408-01119-00	Nut #8 ESN	13	10-392	Comp. Spring
4	AE-24-900	Coil Assembly	14	10-364	Exten. Spring
5	03-7066-4	Coil Tubing	15	23-6626	Grommet
6	A-13453	Reset Plate Assy	16	C-12499	4-Drop Target Opto Assy
7	01-9548	Coil Mounting Brkt	17	4700-00016-00	Washer # 8
8	4008-01016-00	M.S. 8-32 x 5/8 P-PH	18	20-8712-18	Retaining Clip
9	4408-01128-00	Nut #8-32 KEPS	19	03-8334-4	4 Bank Tgt Stop
10	03-8036	Plain Target	20	4004-01005-04	M.S. 4-40 x 1/4 P-PH

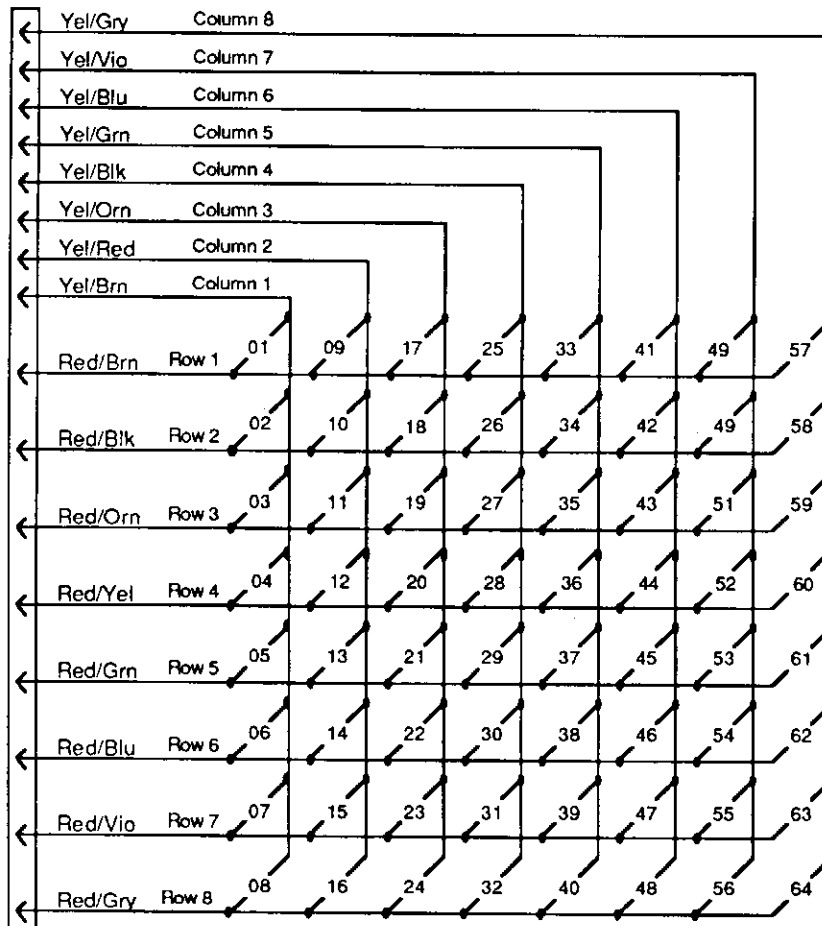


4-Bank Drop Target Opto Board

p/n C-12944

Part No.	Ckt. Designation	Description
5010-08774-00	R14	Resistor 22K Ω , 1/4W, 5%
5010-08930-00	R3, R6, R9, R12	Resistor 470K Ω , 1/2W, 5%
5010-09162-00	R13	Resistor 100K Ω , 1/4W, 5%
5010-09324-00	R2, R5, R8, R11	Resistor 27K Ω , 1/4W, 5%
5043-08980-00	C1, Bypass	Cap. .01M 50V, +80 -20
5070-09054-00	D1, D2, D3, D4	Diode 1N4004, 1.0A
5370-12272-00	U1	IC LM339 Quad Comp
5490-10159-00	Opto1 - Opto 4	Optp Inter Module Large Gap
5768-12376-00	Bare PCB	Bare PC Board
5791-124548-08	J1	8 pin header R/A lock Sq. .100

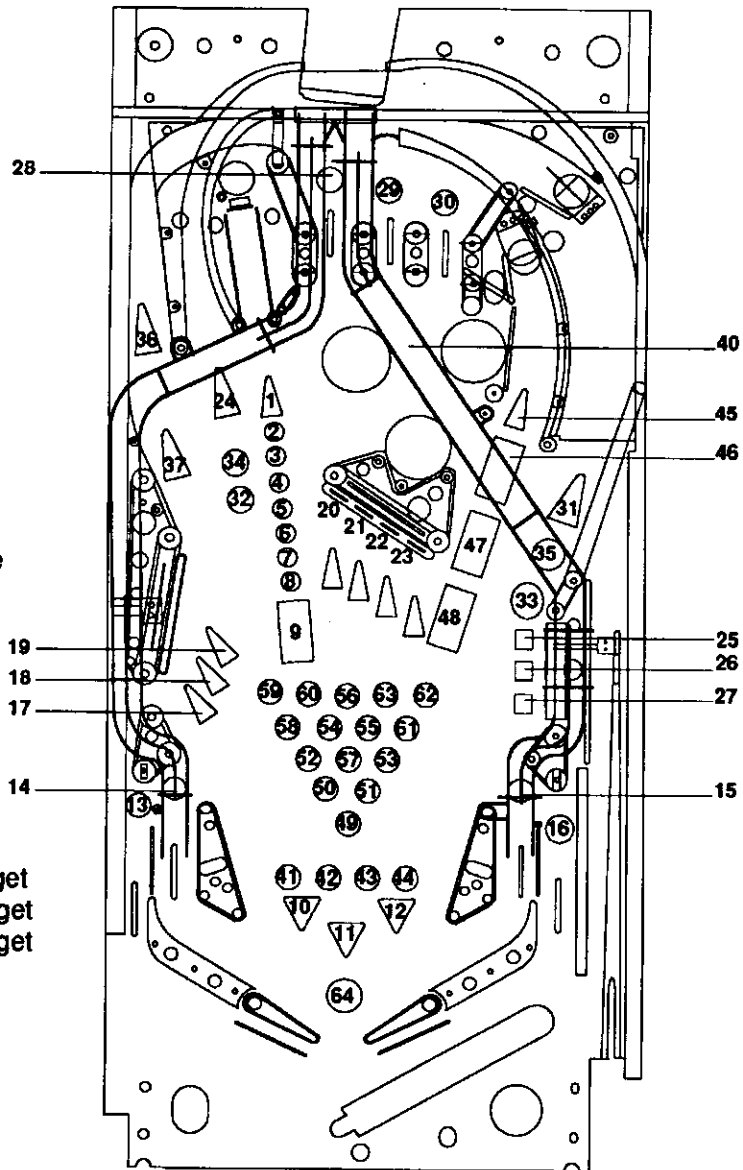
POOL SHARKS LAMP MATRIX



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 Q60 RED-BRN 1J6-1	Captive Chalk 1	Captive Million 9	Drop Target H 17	Top Stand-up Target 25	Right 9 Ball Shot 33	Bonus 2X 41	Ball 1 49	Ball 9 57
2 Q61 RED-BLK 1J6-2	Captive 30K 2	Rack 1 10	Drop Target O 18	Middle Stand-up Target 26	Left 8 Ball 34	Bonus 3X 42	Ball 2 50	Ball 10 58
3 Q62 RED-ORN 1J6-3	Captive 50K 3	Rack 2 11	Drop Target T 19	Bottom Stand-up Target 27	Right 8 Ball 35	Bonus 4X 43	Ball 3 51	Ball 11 59
4 Q63 RED-YEL 1J6-5	Captive 80K 4	Rack 3 12	Drop Target S 20	Left Lane 28	Extra Ball Lit 36	Bonus 5X 44	Ball 4 52	Ball 12 60
5 Q64 RED-GRN 1J6-6	Captive 100K 5	Left Drain 13	Drop Target H 21	Middle Lane 29	Trick Shot 37	Jackpot 45	Ball 5 53	Ball 13 61
6 Q65 RED-BLU 1J6-7	Captive 200K 6	Left Return 14	Drop Target O 22	Right Lane 30	Select 8 Ball 38	Shark 1 46	Ball 6 54	Ball 14 62
7 Q66 RED-VIO 1J6-8	Captive 300K 7	Right Return 15	Drop Target T 23	Right Bank Shot 31	Select 9 Ball 39	Shark 2 47	Ball 7 55	Ball 15 63
8 Q67 RED-GRY 1J6-9	Captive 500K 8	Right Drain 16	Left Bank Shot 24	Left 9 Ball Shot 32	Pool Table Lamp 40	Shark 3 48	Ball 8 56	Shoot Again 64

LAMPS

Item	Part No.	Description
1	#555 Bulb	Captive Chalk
2	#555 Bulb	Captive 30K
3	#555 Bulb	Captive 50K
4	#555 Bulb	Captive 80K
5	#555 Bulb	Captive 100K
6	#555 Bulb	Captive 200K
7	#555 Bulb	Captive 300K
8	#555 Bulb	Captive 500K
9	#555 Bulb	Captive Million
10	#555 Bulb	Rack 1
11	#555 Bulb	Rack 2
12	#555 Bulb	Rack 3
13	#44 Bulb	Left Drain Lane
14	#44 Bulb	Left Return Lane
15	#44 Bulb	Right Return Lane
16	#44 Bulb	Right Drain Lane
17	#44 Bulb	Drop Target H
18	#44 Bulb	Drop Target O
19	#44 Bulb	Drop Target T
20	#555 Bulb	Drop Target S
21	#555 Bulb	Drop Target H
22	#555 Bulb	Drop Target O
23	#555 Bulb	Drop Target T
24	#555 Bulb	Left Bank Shot
25	#555 Bulb	Top Stand-up Target
26	#555 Bulb	Mid. Stand-up Target
27	#555 Bulb	Bot. Stand-up Target
28	#555 Bulb	Left Lane
29	#555 Bulb	Middle Lane
30	#555 Bulb	Right Lane
31	#555 Bulb	Right Bank Shot
32	#555 Bulb	Left 9 Ball Spot
33	#555 Bulb	Right 9 Ball Spot
34	#555 Bulb	Left 8 Ball Spot
35	#555 Bulb	Right 8 Ball Spot
36	#555 Bulb	Extra Ball Lt
37	#555 Bulb	Trick Shot
38	#44 Bulb	Select 8 Ball
39	#44 Bulb	Select 9 Ball
40	A-12336-3	Pool Table Lamp
41	#555 Bulb	Bonus 2X
42	#555 Bulb	Bonus 3X
43	#555 Bulb	Bonus 4X
44	#555 Bulb	Bonus 5X
45	#555 Bulb	Jackpot
46	#555 Bulb	Shark 1
47	#555 Bulb	Shark 2
48	#555 Bulb	Shark 3
49	#555 Bulb	Ball 1
50	#555 Bulb	Ball 2
51	#555 Bulb	Ball 3
52	#555 Bulb	Ball 4

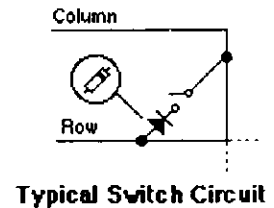
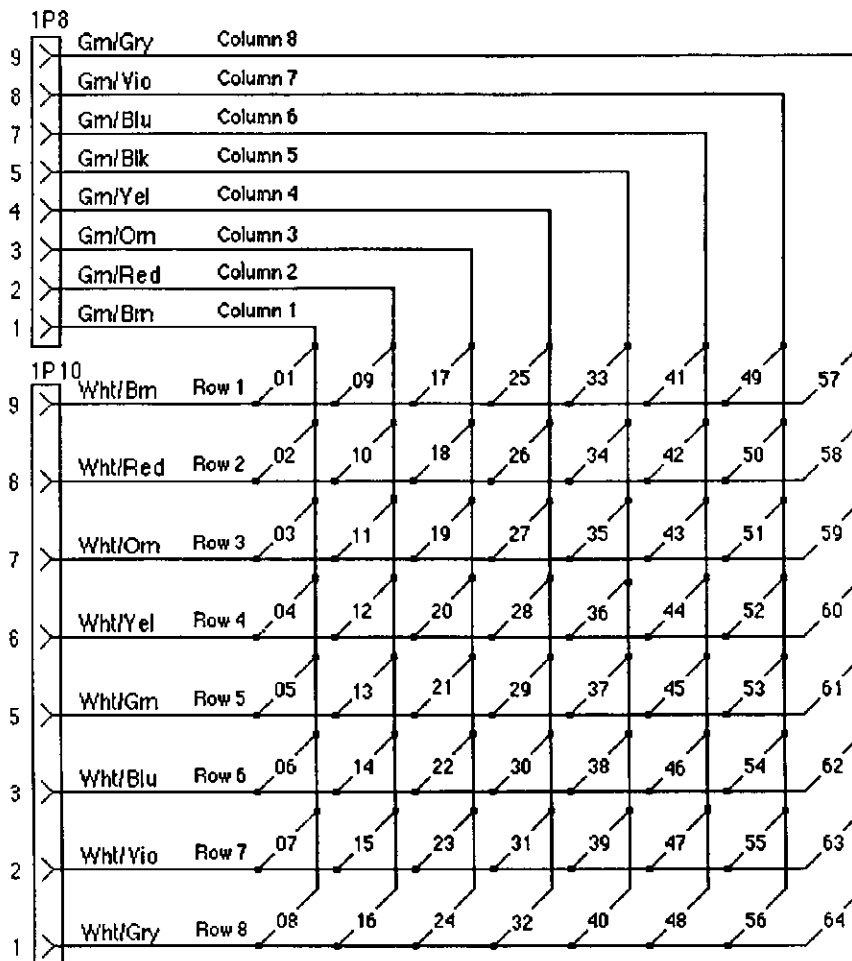


52	#555 Bulb	Ball 4
53	#555 Bulb	Ball 5
54	#555 Bulb	Ball 6
55	#555 Bulb	Ball 7
56	#555 Bulb	Ball 8
57	#555 Bulb	Ball 9
58	#555 Bulb	Ball 10
59	#555 Bulb	Ball 11
60	#555 Bulb	Ball 12
61	#555 Bulb	Ball 13
62	#555 Bulb	Ball 14
63	#555 Bulb	Ball 15
64	#44 Bulb	Shoot Again

NOTE:

p/n	#555 Bulb	24-8768
p/n	#44 Bulb	24-6549

POOL SHARKS SWITCH MATRIX

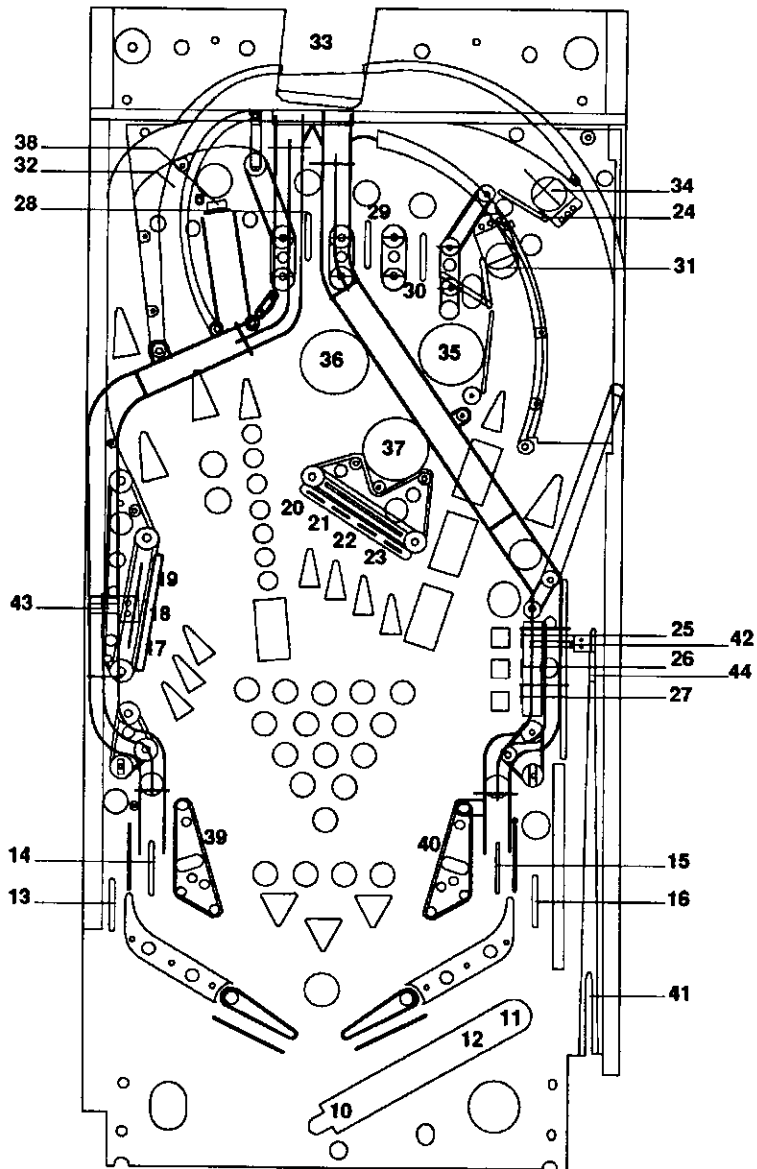


column	1 Q45	2 Q49	3 Q44	4 Q48	5 Q43	6 Q47	7 Q42	8 Q46
row	GRN-BRN 1J8-1	GRN-RED 1J8-2	GRN-ORN 1J8-3	GRN-YEL 1J8-4	GRN-BLK 1J8-5	GRN-BLU 1J8-7	GRN-VIO 1J8-8	GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Bob Tilt 1	Not Used 9	Drop Target H 17	Top Stand-up Target 25	Diverter 33	Ball Shooter 41	Not Used 49	Right Flipper 57
2 WHT-RED 1J10-8	A/C Relay Position 2	Outhole 10	Drop Target O 18	Middle Stand-up Target 26	Top Eject Hole 34	Right Return Ramp 42	Not Used 50	Left Flipper 58
3 WHT-ORN 1J10-7	Credit Button 3	Trough 1 Right 11	Drop Target T 19	Bottom Stand-up Target 27	Right Bumper 35	Left Return Ramp 43	Not Used 51	Not Used 59
4 WHT-YEL 1J10-6	Right Coin Slot 4	Trough 2 Left 12	Drop Target S 20	Left Shoot Lane 28	Left Bumper 36	Lock In Game 44	Not Used 52	Not Used 60
5 WHT-GRN 1J10-5	Center Coin Slot 5	Left Drain 13	Drop Target H 21	Middle Shoot Lane 29	Center Bumper 37	Not Used 45	Not Used 53	Not Used 61
6 WHT-BLU 1J10-3	Left Coin Slot 6	Left Return 14	Drop Target O 22	Right Shoot Lane 30	Captive Stand-up Target 38	Not Used 46	Not Used 54	Not Used 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Right Return 15	Drop Target T 23	Shark Eject Hole 31	Left Sling 39	Not Used 47	Not Used 55	Not Used 63
8 WHT-GRY 1J10-1	High Score Reset 8	Right Drain 16	Enter Right Ramp 24	Enter Left Ramp 32	Right Sling 40	Not Used 48	Not Used 56	Not Used 64

SWITCHES

Item Part No. Description

1	20-6502-A	Plumb Bob Tilt
2	Not Shown	A/C Relay C-Side
3	SW-1A-126	Credit Button
4	27-1092	Right Coin Sw.
5	Not Used	Center Coin Sw.
6	27-1092	Left Coin Sw.
7	27-1066	Slam Tilt
8	27-1008	High Score Reset
9		Not Used
10	A-10417	Outhole
11	5647-12073-08	Trough 1
12	5647-09957-00	Trough 2
13	A-12688	Left Drain
14	A-12688	Left Return
15	A-12688	Right Return
16	A-12688	Right Drain
17	C-13205-1	H (in Hot)
18	C-13205-1	O (in Hot)
19	C-13205-1	T (in Hot)
20	C-12499	S (in Shot)
21	C-12499	H (in Shot)
22	C-12499	O (in Shot)
23	C-12499	T (in Shot)
24	B-13243	Enter Rt. Ramp
25	B-11696-2	Top Stand-up
26	B-11696-2	Mid. Stand-up
27	B-11696-2	Bot. Stand-up
28	A-12688	Left Shoot Ln.
29	A-12688	Mid. Shoot Ln.
30	A-12688	Rt. Shoot Ln.
31	5647-12133-11	Shark Eject
32	B-13243	Enter Left Ramp
33	5647-12070-06	Diverter
34	5647-12133-11	Top Eject
35	B-13267	Right Jet
36	B-13267	Left Jet
37	B-13267	Center Jet
38	B-13267	Captive Stand-up
39	SW-1A-114	Left Sling (Kick)
	SW-1A-120	(Score)
40	SW-1A-114	Right Sling (Kick)
	SW-1A-120	(Score)
41	A-11619	Shooter
42	5647-12073-21	Right Return Ln.
43	5647-12073-21	Left Return Ln.
44	A-12688	Game Select
45 to 56		Not Used
57	A-9990	Right Flipper
58	A-9990	Left Flipper
59 to 64		Not Used



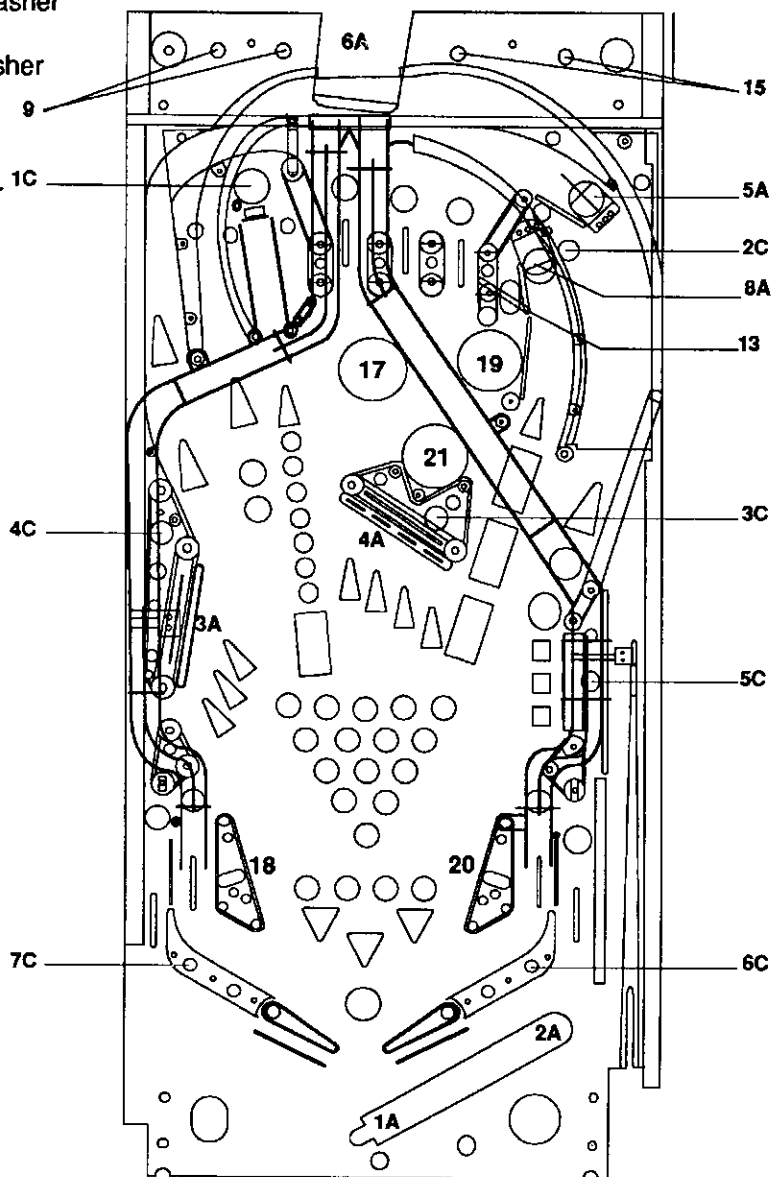
POOL SHARKS Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trmstr	Solenoid Part Number Flashlamp Type d= Display Bd; p=Playfield
				CPU Bd	Playfield/ Cabinet		
01A ³	Outhole	Switched	{ Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800
01C ³	Captive Ball Flasher	Switched	{ Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#906 flashlamp 1p
02A ³	Ball Shooter Lane Feeder	Switched	{ Vio-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	AE-23-800
02C ³	Shark Flasher	Switched	{ Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89 flashlamp 1p
03A ³	Left Drop Target	Switched	{ Vio-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200
03C ³	Right Drop Target Flasher	Switched	{ Blk-Orn	(Gry-Orn)	5J5-7 (C)	Q32	#89 flashlamp 1p
04A ³	Right Drop Target	Switched	{ Vio-Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800
04C ³	Left Drop Target Flasher	Switched	{ Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89 flashlamp 1p
05A ³	Eject Hole	Switched	{ Vio-Grn	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800
05C ³	Standups Flasher	Switched	{ Blk-Grn	(Gry-Grn)	5J5-4 (C)	Q31	#89 flashlamp 1p
06A ³	Diverter	Switched	{ Vio-Blu	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800
06C ³	Right Flipper Flasher	Switched	{ Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89 flashlamp 1p
07A ³	Knocker	Switched	{ Vio-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800
07C ³	Left Flipper Flasher	Switched	{ Blk-Vio	(Gry-Vio)	5J5-2 (C)	Q30	#89 flashlamp 1p
08A ³	Shark Eject Hole	Switched	{ Vio-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22	AE-23-800
08C ³	Marquee Flasher	Switched	{ Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89 flashlamps 1b
09	Back Left Flasher	Controlled	Brn-Blk	1P12-1	5J2-9: 5J6-9: 2J4-3	Q17	#89 flashlamp 1p
10	Playfield Gni Illum Relay	Controlled	Brn-Red	1P12-2	5J2-8: 5J6-8: 2J4-5	Q9	5580-09555-01 4a
11	Insert Illum Relay	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	Right Shark	Controlled	Brn-Grn	1P12-6	5J2-4: 5J6-5	Q15	SM2-35-4000
14	Not Used	Controlled	Brn-Blu	1P12-7	5J2-4: 5J6-3	Q7	
15	Back Right Flasher	Controlled	Brn-Vio	1P12-8	5J2-2: 5J6-2	Q14	#89 flashlamp
16	Backglass Tiger	Controlled	Brn-Gry	1P12-9	5J2-1: 5J6-1	Q6	#89 flashlamp
17	Left Jet Bumper	Special #1	Blu-Brn	1P19-7	5J3-7: 5J7-7	Q75	AE-23-800
18	Left Kicker (sling)	Special #2	Blu-Red	1P19-4	5J3-6: 5J7-6	Q71	AE-26-1500
19	Right Jet Bumper	Special #3	Blu-Orn	1P19-3	5J3-3: 5J7-3	Q73	AE-23-800
20	Right Kicker (sling)	Special #4	Blu-Yel	1P19-6	5J3-4: 5J7-5	Q69	AE-26-1500
21	Center Jet Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800
22	Not Used	Special #6	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79	
-	Right Flipper	-	Orn-Vio (Blu-Vio) ²	1P19-1	2J5-5: 2J10-7 (2J10-1: 2J8-15)	-	FL11630/50VDC
-	Left Flipper	-	Orn-Gry (Blu-Gry) ²	1P19-2	2J5-4: 2J10-8 (2J10-2: 2J8-4)	-	FL11630/50VDC

Notes: 1. Wire colors, except flipper Orn-Vio and Orn-Gry, are ground connections (to coil terminal with unbanded end of diode). Flipper Orn-Vio and Orn-Gry wires connect from CPU Board to flipper switch. 2. Flipper connections shown in braces are from flipper switch to flipper coil. 3. "A" 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. 4. Relay is mounted on Relay Bd, (4a) p/n C-11998-1; (4b) C-11902-1. 5. Relay is mounted on Aux Power Driver Bd, D-12247 in the backbox.

SOLENOIDS

Item	Part No.	Description
01A	AE-23-800	Outhole
01C	#906 flashlamp	Captive Flasher
02A	AE-23-800	Ball Shooter Lane Feeder
02C	#89 flashlamp	Shark Flasher
03A	AE-26-1200	Left Drop Target
03C	#89 flashlamp	Right Drop Target Flasher
04A	AE-23-800	Right Drop Target
04C	#89 flashlamp	Left Drop Target Flasher
05A	AE-23-800	Top Eject Hole
05C	#89 flashlamp	Stand-up Flashers
06A	AE-23-800	Diverter
06C	#89 flashlamp	Right Flipper Flasher
07A	AE-23-800	Knocker
07C	#89 flashlamp	Left Flipper Flasher
08A	AE-23-800	Shark Eject Hole
08C	#906 flashlamp	Marquee Flasher
09	#89 flashlamp	Back Left Flasher
10	5580-09555-01	Playfield G.I.
11	5580-09555-01	Insert G.I.
12	5580-09555-01	A/C Select Relay
13	SM2-35-4000	Right Shark
14		Not Used
15	#89 flashlamp	Back Right Flasher
16		Not Used
17	AE-23-800	Left Jet Bumper
18	AE-26-1500	Left Sling
19	AE-23-800	Right Jet Bumper
20	AE-26-1500	Right Sling
21	AE-23-800	Center Jet Bumper
22		Not Used
	FL-11630	Left Flipper
	FL-11630	Right Flipper



PLAYFIELD PARTS

Major Assemblies

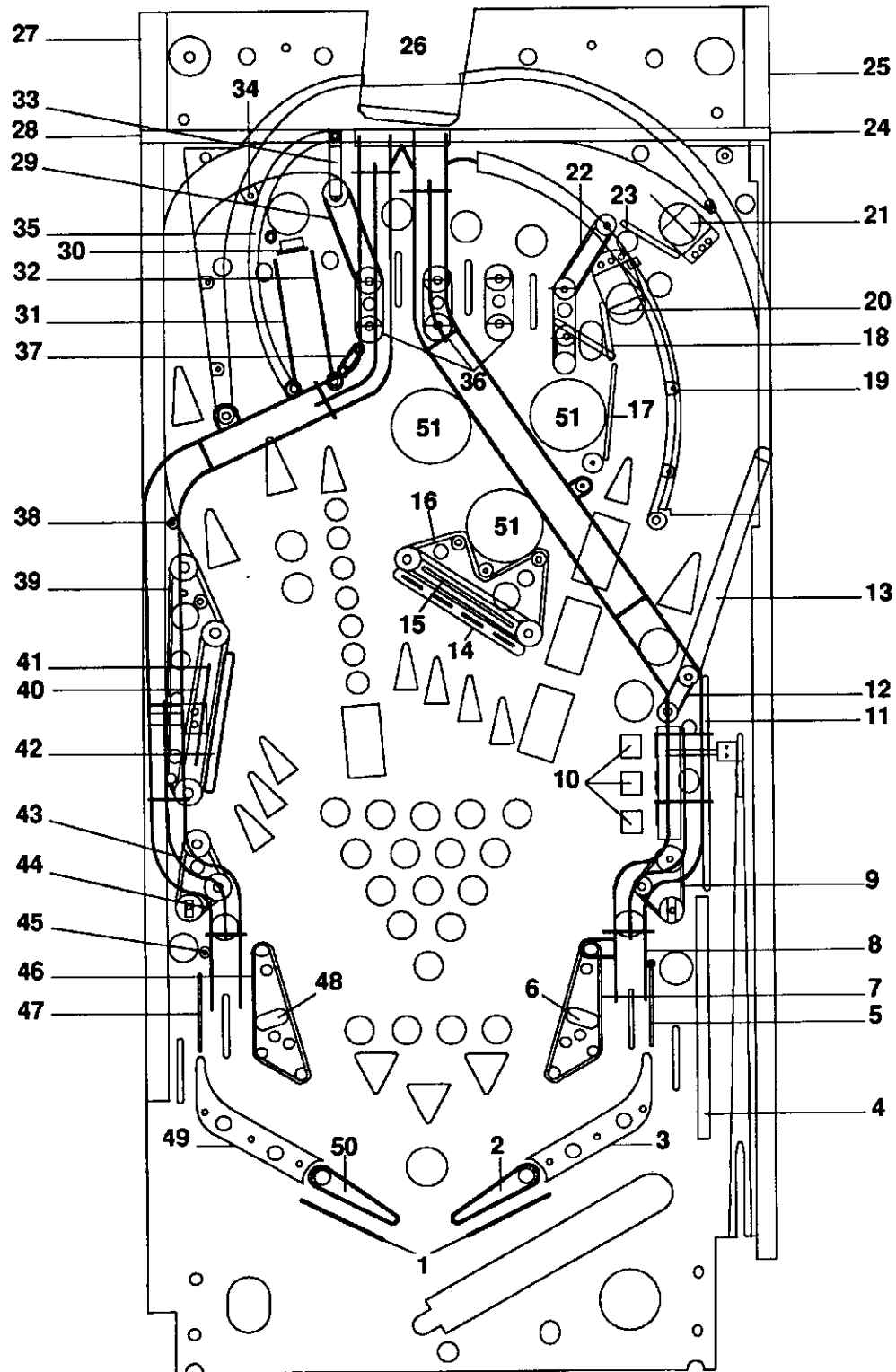
Item	Part No.	Description
1	12-6468	Anti-rebound Wire
2	C-11626-R-3	Flipper Assembly
3	01-6794-R-1	Ball Guide
4	11-940-E	Wood Rail
5	12-6466-8	Ball Wire
6	B-12665	Kicker Assembly
7	23-6306	Rubber Ring 2-1/2"
8	C-13429	Wire Ramp
9	23-6303	Rubber Ring 1-1/4"
10	B-11696-2	Stand-up Target
11	12-6466-28	Ball Guide
12	23-6302	Rubber Ring
13	B-13409	Ball Gate Assembly
14	C-13450	4 Bank Drop Target
15	12-6466-12	Ball Guide
16	23-6306	Rubber Ring 2-1/2"
17	12-6466-12	Ball Guide
18	12-6466-8	Ball Guide
19	B-13465	Ball Guide
20	B-9361-R-5	Eject Hole
21	B-9361-R-5	Eject Hole
22	23-6304	Rubber Ring 1-1/4"
23	12-6466-8	Ball Guide
24	11-940-C	Wood Rail
25	11-941	Wood Rail
26	C-13430	Diverter
27	11-941	Wood Rail
28	11-940-B	Wood Rail
29	23-6304	Rubber Ring 1-1/4"
30	B-11696-5	Stand-up Target
31	12-6466-16	Ball Guide
32	12-6466-12	Ball Guide
33	A-13244	Ball Gate Assembly
34	B-13241	Ball Guide
35	D-13242	Plastic Ramp
36	23-6300	Rubber Ring 5/16"
37	23-6301	Rubber Ring 3/4"
38	D-13240	Ball Guide
39	23-6309	Rubber Ring 4"
40	23-6306	Rubber Ring 2-1/2"
41	12-6466-12	Ball Guide
42	C-11223-3	3 Bank Drop Target
43	23-6304	Rubber Ring 1-1/4"
44	C-13428	Wire Ramp
45	23-6535	Rubber Ring (Bumper)

Item	Part No.	Description
46	23-6306	Rubber Ring 2-1/2"
47	12-6466-8	Ball Guide
48	B-12665	Kicker Assembly
49	01-6794-L-1	Ball Guide
50	C-11626-L-3	Flipper Assembly
51	B-12872	Jet Bumper

Parts Under Bottom Arch

Part No.	Description
A-8645	Wireform & Bracket
A-10417	Microswitch Assembly
A-11680	Sub-mini Switch Assembly
B-8623	Guide & Baffle Assembly
B-9362-L-1	Coil & Bracket Assembly
B-11348	Single Switch Plate Assy
C-8235	Ball Runway Assembly
C-9638	Ball Shooter Lane Feeder
01-3569-1	Ball Return Runway
01-8419	Holdown Bracket
10-128	Kicker Spring
12-6542	Wireform

Playfield Parts



Left Lane Wire Ramp Assembly p/n C-13428

Part No.	Description
H-13516	Left Return Cable
01-8240	Nut Plate
01-8600	Switch Insulator
12-6899	Left Lane Wire
4002-01005-08	M.S. 2-56 x 1/2 P-PH
4701-00024-00	LW #2 Split
5070-06258-00	Diode 1N4001
5647-12073-21	Submini Switch

Right Lane Wire Ramp Assembly p/n C-13429

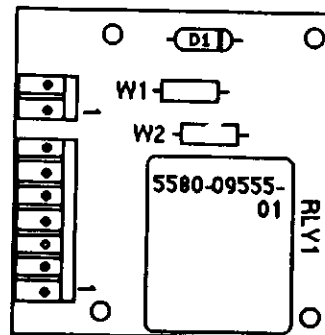
Part No.	Description
H-13518	Right Return Cable
01-8240	Nut Plate
01-8600	Switch Insulator
12-6900	Right Lane Wire
4002-01005-08	M.S. 2-56 x 1/2 P-PH
4701-00024-00	LW #2 Split
5070-06258-00	Diode 1N4001
5647-12073-21	Submini Switch

Ramp Assembly p/n D-13242

Part No.	Description
03-8351	Ramp
01-9434	Left Flap
01-9435	Right Flap
B-13243	Ball Gate & Switch Assy
C-13464	Ball Guide Assembly Ramp
01-9540	Ball Guide Ramp
03-8022-1	Spacer
4406-01119-00	Nut 6-32 ESN
03-8382	Switch Cover
03-8381	Switch Cover
07-6688-17N	Rivet 1/8 x 5/32 LG
4700-00003-00	FW .125 x .281 x .032
H-13514	Right Side Ramp Cable
H-13515	Left Side Ramp Cable
07-6688-19N	Rivet 1/8 x 7/32 LG
4006-01005-28	M.S. 6-32 x 1-3/4 P-PH
4106-01033-08	SMS #6 x 1/2 P-TR-HD

Relay Board p/n C-11998-1

Part No.	Description
5010-09534-00	Resistor, 0Ω
5070-09054-00	Diode, 1N4004, 1.0A
5580-09555-01	Relay, DPDT, 24V, 13A
5768-12243-00	Bare PCB
5791-12273-02	Header, 2 pin Sq. .156
5791-12273-07	Header, 7 pin Sq. .156



Single Flash Lamp Assembly p/n B-12156

Part No.	Description
24-8802	#906 Bulb, 13V
24-8803	Twist Lamp Socket
5768-12297-00	Bare PCB

Single Lamp Assembly p/n B-12224

Part No.	Description
24-8768	#555 Bulb, 6.3V
24-8767	Twist Lamp Socket
5070-09054-00	Diode, 1N4004, 1.0A
5768-12312-00	Bare PCB

Top 3 Lamp Assembly p/n C-12000

Part No.	Description
24-8768	#555 Bulb, 6.3V
24-8767	Twist Lamp Socket
5070-09054-00	Diode, 1N4004, 1.0A
5768-12245-00	Bare PCB
5791-10871-05	Header, 5 pin Sq. .156

Playfield Lamp Target Assembly p/n C-12709

Part No.	Description
24-8768	#555 Bulb, 6.3V
24-8767	Twist Lamp Socket
5070-09054-00	Diode, 1N4004, 1.0A
5768-12409-00	Bare PCB
5791-10871-05	Header, 5 pin Sq. .156

4 Lamps Playfield Assembly p/n C-12877

Part No.	Description
24-8768	#555 Bulb, 6.3V
24-8767	Twist Lamp Socket
5070-09054-00	Diode 1N4004, 1.0A
5768-12452-00	Bare PCB
5791-10871-06	Header, 6 pin Sq. .156

15 Lamp Rack Assembly p/n C-13414

Part No.	Description
24-8768	#555 Bulb, 13V
24-8767	Twist Lamp Socket
5070-09054-00	Diode, 1N4004, 1.0A
5010-09534-00	Resistor, 0Ω
5768-12596-00	Bare PCB
5791-10871-11	Header, 11 pin Sq.

7 Lamp Multiplier Assembly p/n C-13433

Part No.	Description
24-8768	#555 Bulb, 6.3V
24-8767	Twist Lamp Socket
5070-09054-00	Diode, 1N4004, 1.0A
5768-10871-07	Bare PCB
5791-10871-07	Header, 7 pin Sq. .156

5 Lamp Jackpot Assembly p/n C-13444

Part No.	Description
24-8802	#906 Bulb, 13V
24-8768	#555, 6.3V
24-8803	Twist Lamp Socket
24-8767	Twist Lamp Socket
5070-09054-00	Diode, 1N4004
5768-12605-00	Bare PCB
5791-10871-07	Header, 7 pin Sq.

Pool Cue Lamp Assembly p/n C-13501

Part No.	Description
24-8768	#555 Bulb, 6.3V
24-8767	Twist Lamp Socket
5070-09054-00	Diode, 1N4004, 1.0A
5768-12607-00	Bare PCB
5791-10871-11	Header 11 pin, Sq.

Backbox Parts List

Part No.	Description
A-12497	Upper Hinge Assembly
A-12498	Lower Hinge Assembly
A-8552-2014	Backglass Assembly
B-10686-1	Knocker Assembly
C-11602-1	Cap & Cable Assembly
D-11581-2014	Audio Board Assembly
D-11883-2014	CPU Board Assembly
D-12246	Power Supply
D-12247	Aux Power Driver
D-12313-2014	Master Interconnect Brd
D-12501	Bally Right Display
D-12706	Bally Left Display
D-13323-1	Speaker Panel Assembly
20-9637	Lock & Cam Kit
5555-12015-00	6" Round Speaker 4Ω
5555-12068-00	4" Piezo Speaker 50W
D-13336	PCB Mounting Plate Assy
01-6655	Insert Latch
01-6571	Hinge Mounting Bracket
01-6645	Vent Screen
01-6652	Stop Bracket
01-8397	Trunk Latch Bracket
01-9295-1	Hold Down Bracket
03-8230-3	Glass Retainer
20-9504-10	Display Mounting Standoff
31-1537-2014	Screened Marquee

Miscellaneous Parts List

Part No.	Description
A-8550-1	Pot & Bracket Assembly
A-5610-12136	Transformer 115V/230
C-10843-1	Bally Metal Leg Assembly
C-11026	Line Filter Assembly
C-13155-1	Coin Door Assembly
D-11920-10	Mech. Panel Assembly
D-12615	Front Molding Assembly
01-2263-3	Gray Metal Leg
01-3569-1	Ball Return Runway
01-6733	Speaker Grille
01-8169	Vent Hole Screen
08-7028-T	Playfield Glass
09-17002-26	USA Coin Door
09-8803	25¢ Rejector
16-9081	Price Card
24-6549	Bulb #44
24-8704	Bulb #89
24-8768	Bulb #555
24-8802	Bulb #906

Cable List

Part No.	Description
H-10978	A.C. Cable
H-11834	18V Rectifier Cable
H-11835	Knocker Cable
H-12190-2014	2014 Backbox Cable
H-12190-553	Secondary Cable
H-12192-573	Cabinet Cable
H-12199	Lamp Interconnect Cable
H-12200	Switch Interconnect Cable
H-12299-2003	Logic/Power Speaker Cbl
H-12775	Speaker Panel Cable
H-12776	Main Display Cable
H-13474	2014 Switch Cable
H-13475	2014 Lamp Cable
H-13476	2014 Solenoid Cable
H-13477	2014 Inset Cable
H-13514	Right Side Ramp Cable
H-13514	Left Side Ramp Cable

Cable List Continued...

Part No.	Description
H-13516	Left Return Cable
H-13517	Diverter Cable
H-13518	Right Return Cable
H-13519	Overhead Lamp Cable
H-8527	Volume Control Cable

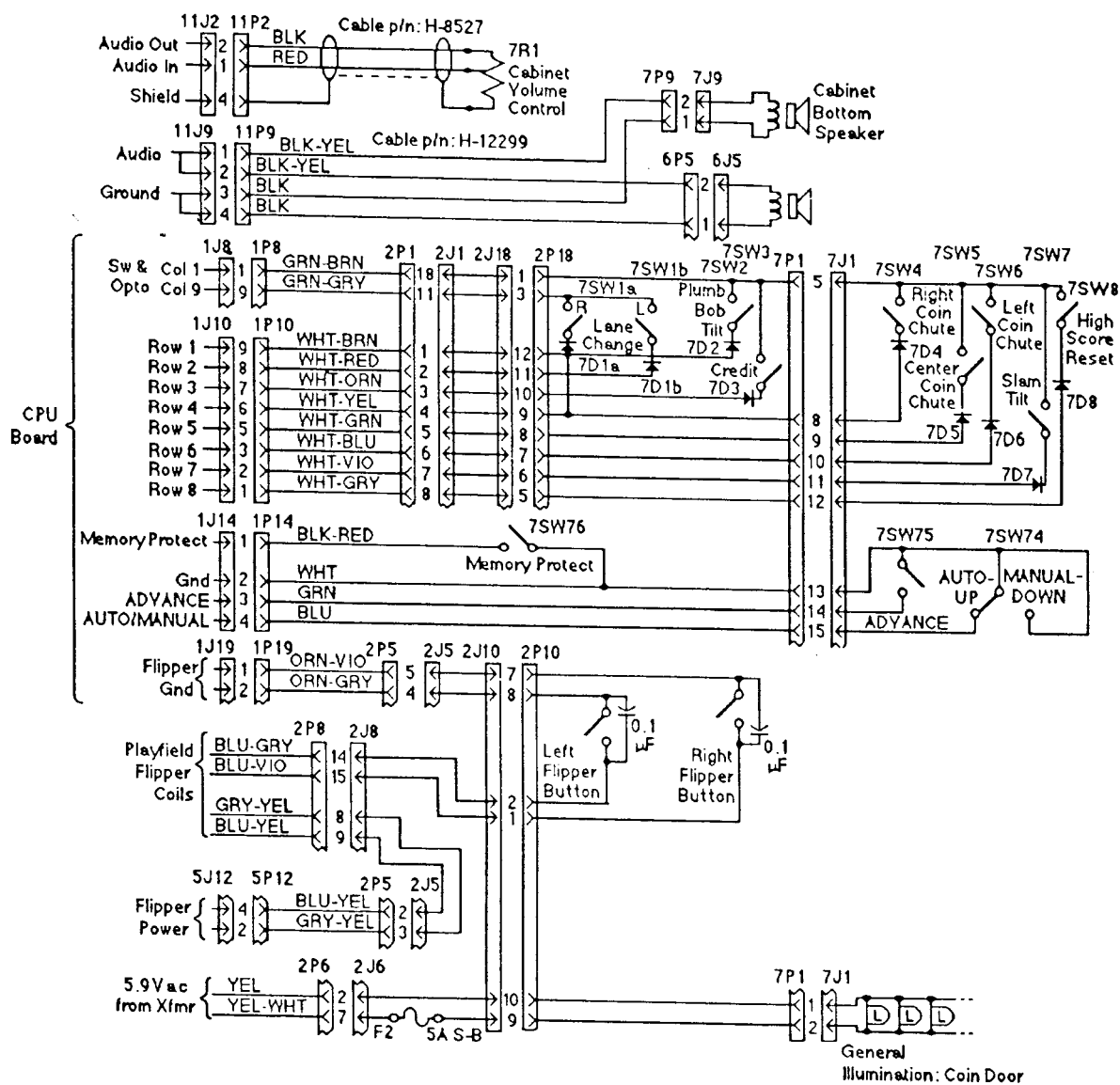
Unique Parts

Part No.	Description	Part No.	Description
A-11-2014-PL	Playfield Inset	12-6899	Left Lane Wire
B-13431	Plunger Assembly	12-6900	Right Lane Wire
B-13454	Pool Lamp Assembly	12-6901	Shark Actuator
B-13466	Shark Assembly	16-2014-1	Instruction Card
C-13414	15 Lamp Rack Assembly	16-2014-101	Instruction Manual
C-14328	Left Lane Wire Assembly	16-2014-103	Operating Manual
C-13429	Right Lane Wire Assembly	2014-BB	Pool Sharks Backbox
C-13430	Diverter Assembly	2014- IN	Pool Sharks Insert
C-13433	7 Lamp Multiplier Assy	2014-PL	Pool Sharks Playfield
C-13444	5 Lamp Jackpot Assembly		
C-13450	4 Bank Drop Target Assy	31-1002-2014	Screened Playfield
C-13501	Pool Cue Lamp Assy	31-1009-2014	Screened Shooter Gauge
D-13242	Ramp Assembly	5647-12073-36	Sub-mini Micro Switch
H-13474	2014 Switch Cable		
H-13475	2014 Lamp Cable		
H-13476	2014 Solenoid Cable		
H-13514	Right Side Ramp Cable		
H-13515	Left Side Ramp Cable		
H-13516	Left Return Cable		
H-13517	Diverter Cable		
H-13518	Right Return Cable		
H-13519	Overhead Lamp Cable		
01-9432	Switch Gate Bracket		
01-9434	Right Flap		
01-9435	Left Flap		
01-9539	Wire Support Bracket		
01-9541	Diverter Mounting Bracket		
01-9546	4-bank Drop Tgt Bracket		
01-9547	4-bank Reset Plate		
01-9548	Coil Mounting Bracket		
01-9552	Shark Mounting Clip		
01-9616	Ball Deflector		
02-4437	Support Post		
02-4439	Diverter Gate Shaft		
03-7960-2014-1	Playfield Mylar		
03-7960-2014-2	Playfield Mylar		
03-8351	Ramp		
03-8381	Switch Cover		
03-8382	Switch Cover		
03-8383	Pool Lamp		
11-2014-PL	Wood Playfield		

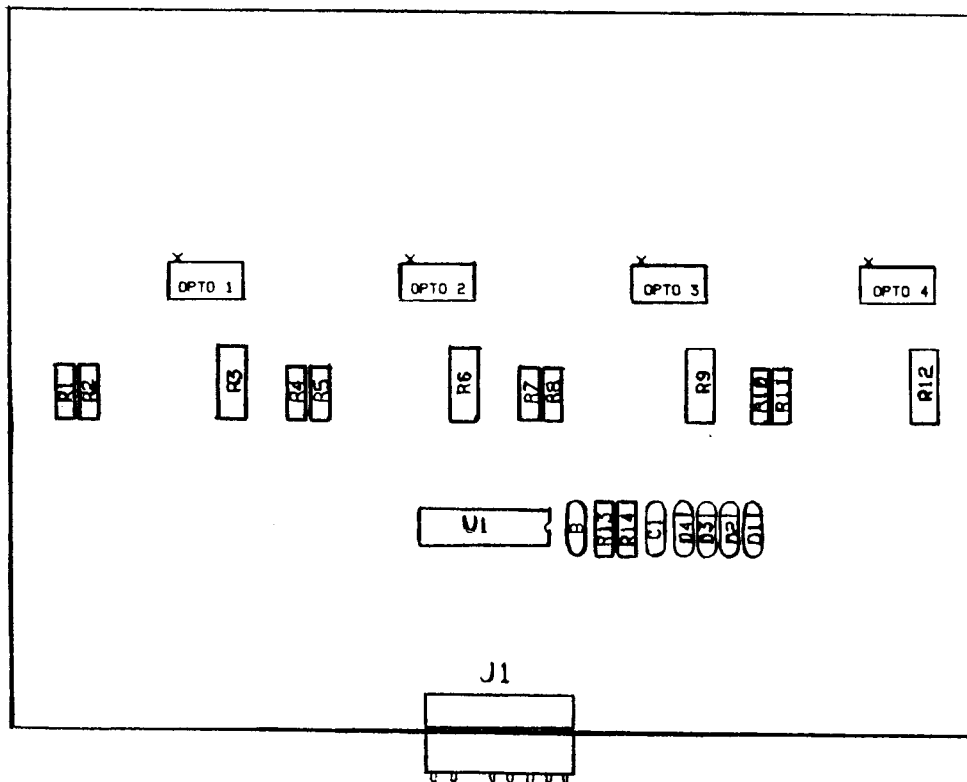
Pinout Table for Display Glasses used on Bally L-Display Board (D-12706) and R-Display Board (D-12502)

(Also applicable to Williams Master Display, D-12232-1 and D-12232-2)

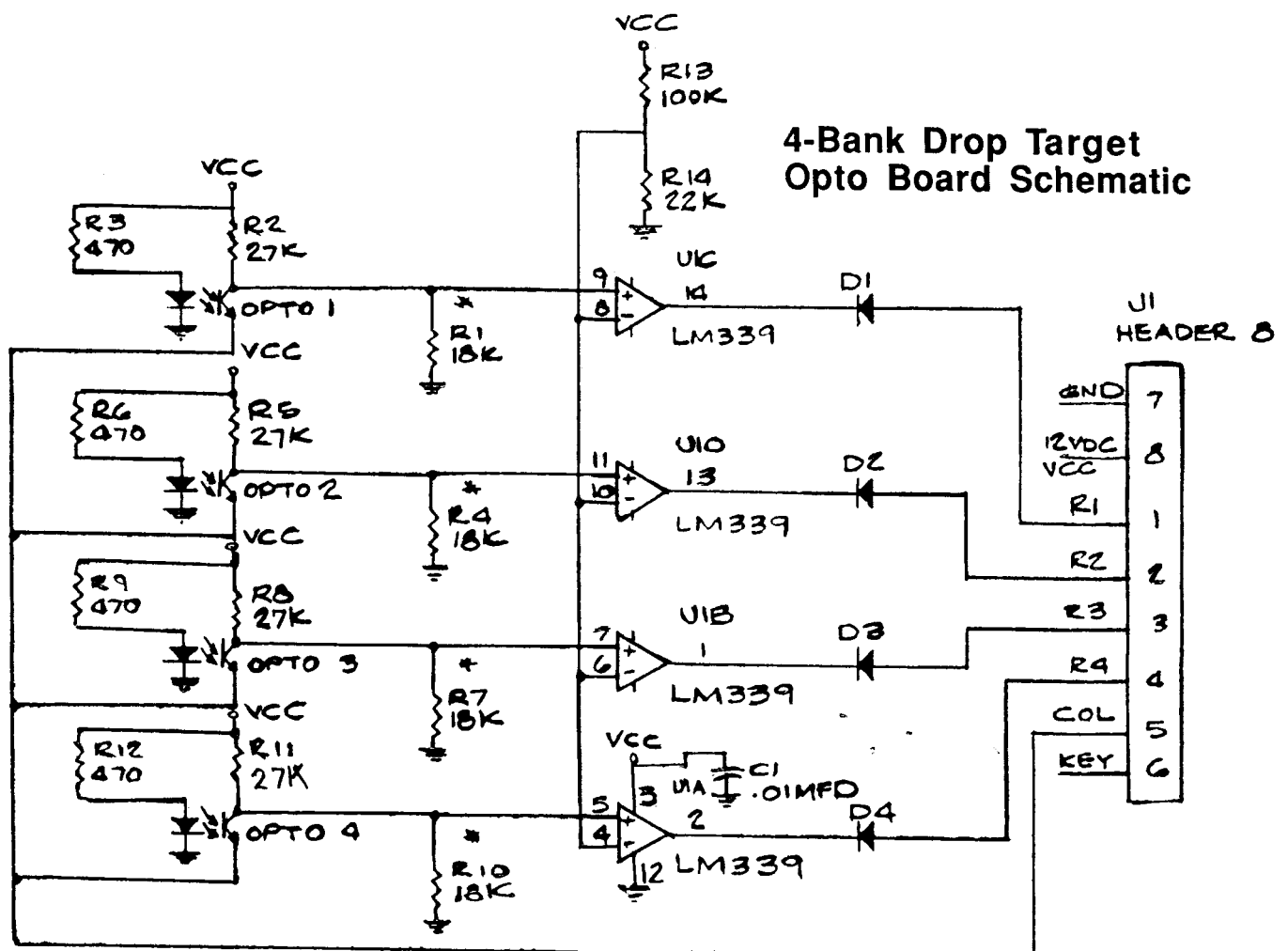
Board Pin #	Glass Pin #	Signal/ Function	Board Pin #	Glass Pin #	Signal/ Function	Board Pin #	Glass Pin #	Signal/ Function
1	1	Not connected	25	31	Strobe 11	36	61	Strobe 6
2	2	Segment A		32	cut		62	cut
3	3	Segment J	26	33	Strobe 11	37	63	Strobe 5
4	4	Segment B		34	cut		64	cut
5	5	Strobe 16		35	cut	38	65	Strobe 5
6	6	Segment K		36	cut		66	cut
7	7	Strobe 16	27	37	Strobe 10		67	cut
8	8	Segment H		38	cut		68	cut
9	9	Segment F	28	39	Strobe 10	39	69	Strobe 4
10	10	Segment M		40	cut		70	cut
11	11	Strobe 15	29	41	Strobe 9	40	71	Strobe 4
12	12	Segment C		42	cut		72	cut
13	13	Strobe 15	30	43	Strobe 9		73	cut
14	14	Not connected		44	cut		74	cut
15	15	Strobe 14		45	cut	41	75	Strobe 3
16	16	Dot		46	cut		76	cut
17	17	Strobe 14	31	47	Strobe 8	42	77	Strobe 3
18	18	Segment D		48	cut		78	cut
19	19	Strobe 13	32	49	Strobe 8	43	79	Strobe 2
20	20	Dot		50	cut	44	80	Comma
21	21	Strobe 13		51	cut	45	81	Strobe 2
22	22	Not connected		52	cut	46	82	Segment P
	23	cut	33	53	Strobe 7	47	83	Segment R
	24	cut		54	cut	48	84	Segment E
23	25	Strobe 12	34	55	Strobe 7	49	85	Strobe 1
	26	cut		56	cut	50	86	Segment N
24	27	Strobe 12	35	57	Strobe 6	51	87	Strobe 1
	28	cut		58	cut	52	88	Segment
	29	cut		59	cut	53	89	- 100V dc
	30	cut		60	cut			

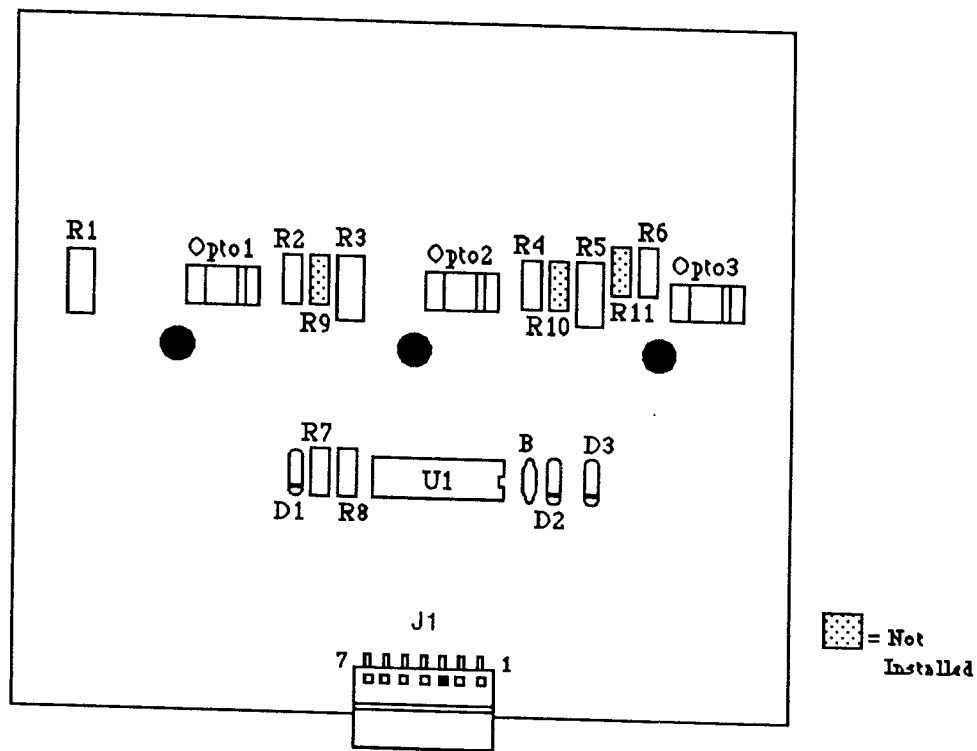


POOL SHARK Cabinet Wiring

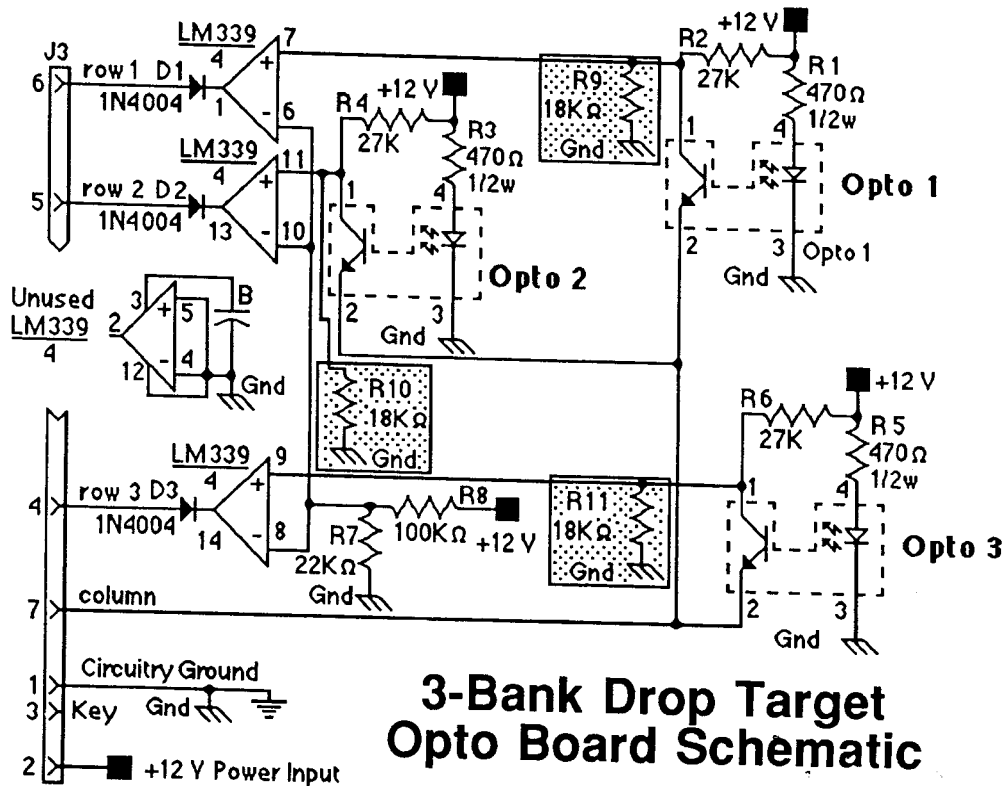


4-Bank Drop Target Opto Board
p/n C-12944

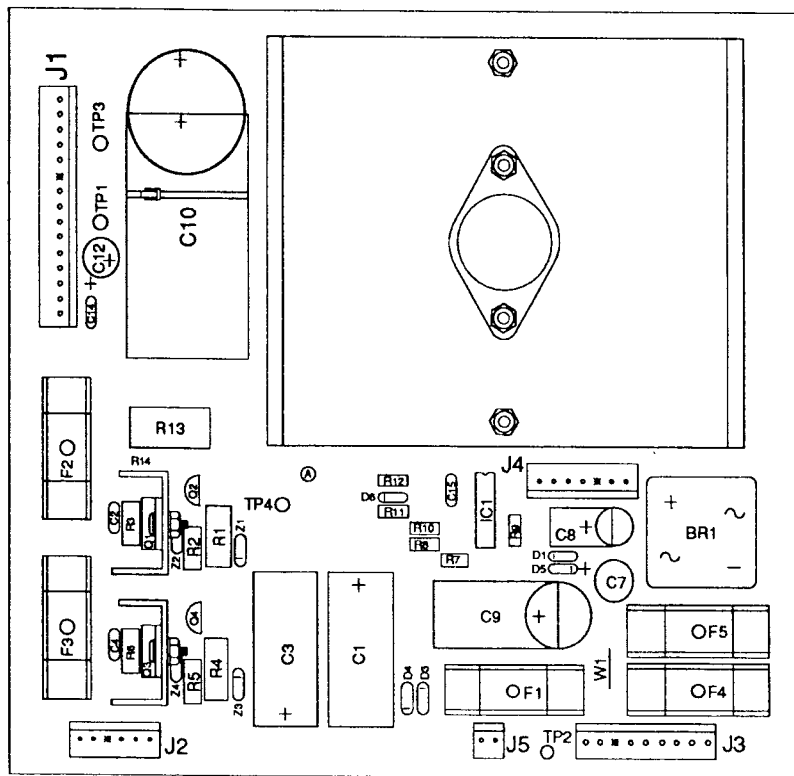




3-Bank Drop Target Opto Board
p/n C-13205-1

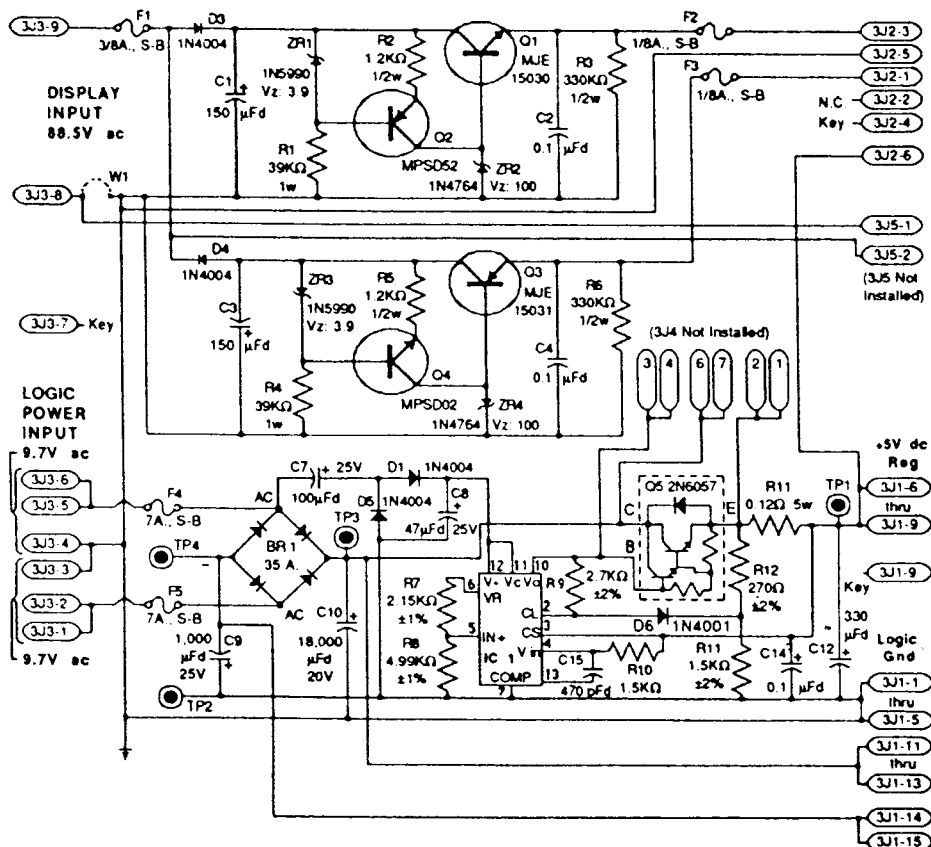


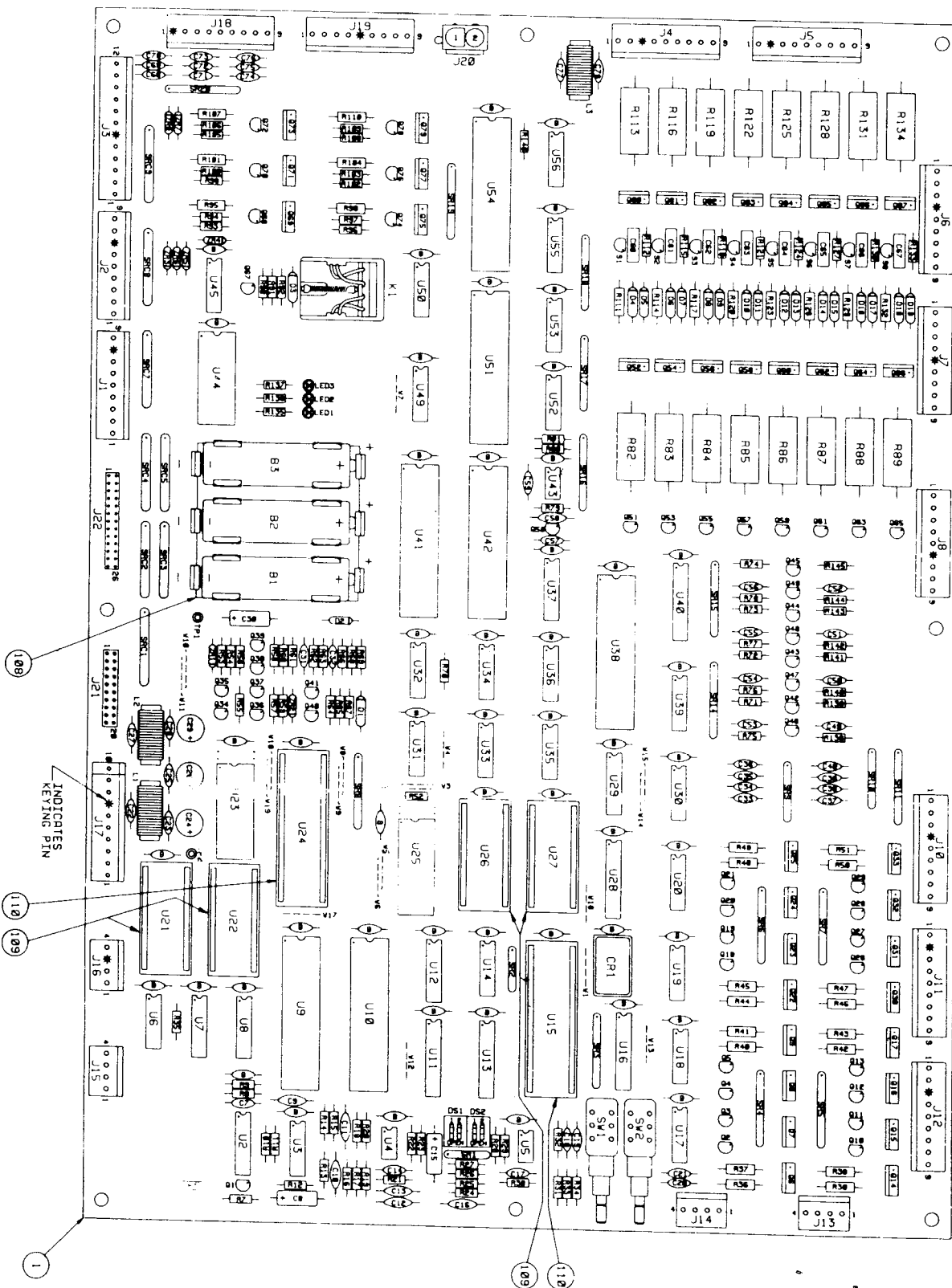
3-Bank Drop Target Opto Board Schematic



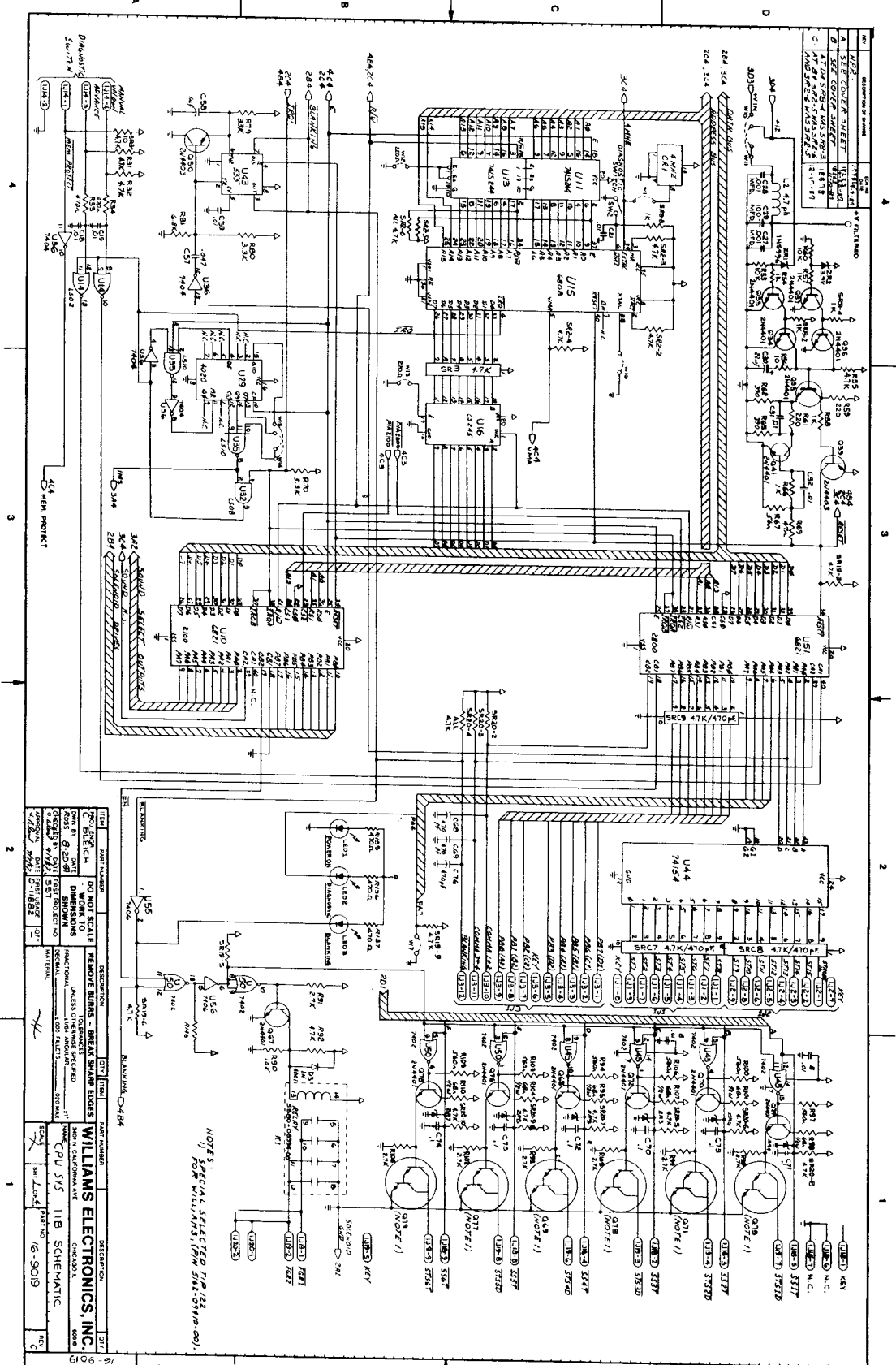
Power Supply Board
p/n D-12246

Power Supply Board Schematic





CPU Board (D-11883)



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

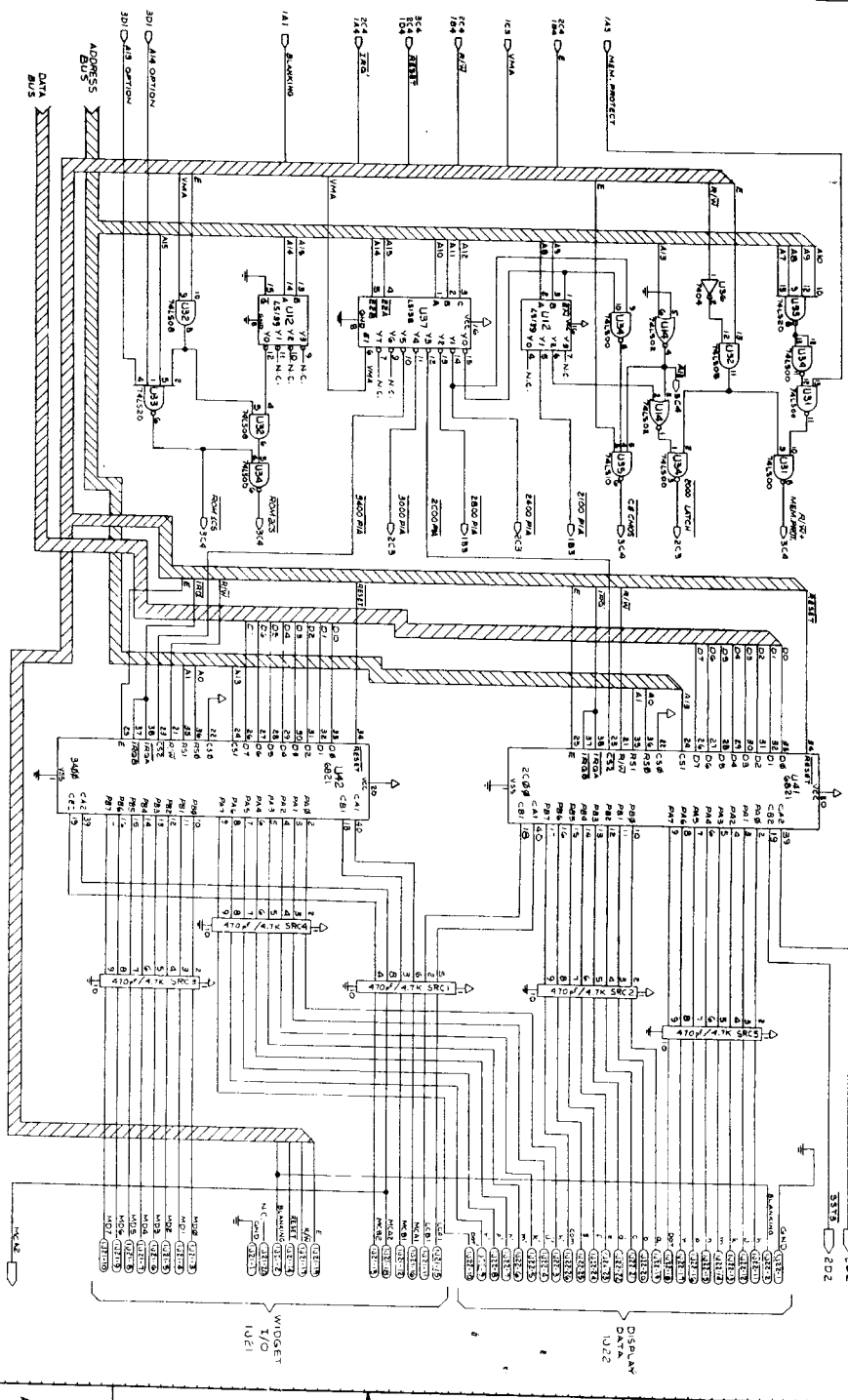
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3	10/1/82	WJ	WJ	REVISED
4	10/1/82	WJ	WJ	REVISED

NOTE: GAMES WITH A D-11882-2 SUBASSEMBLY
DO NOT USE THESE PARTS.

ITEM	QTY	DESCRIPTION	REV
1	1	WILLIAMS ELECTRONICS, INC.	
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CPU Schematic (16-9019, Sheet 3 of 4)

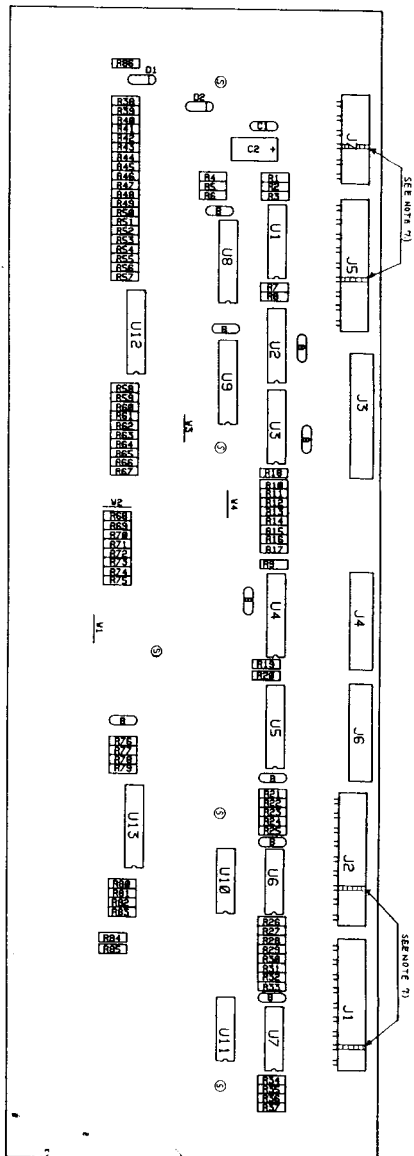
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4	SEE COVER SHEET	11/1/82	N. P. R.



REV	DESCRIPTION OF CHANGE	DATE	BY
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2	SEE COVER SHEET	11/1/82	N. P. R.
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4	SEE COVER SHEET	11/1/82	N. P. R.

CPU Schematic (16-9019, Sheet 4 of 4)

CPU 3-10

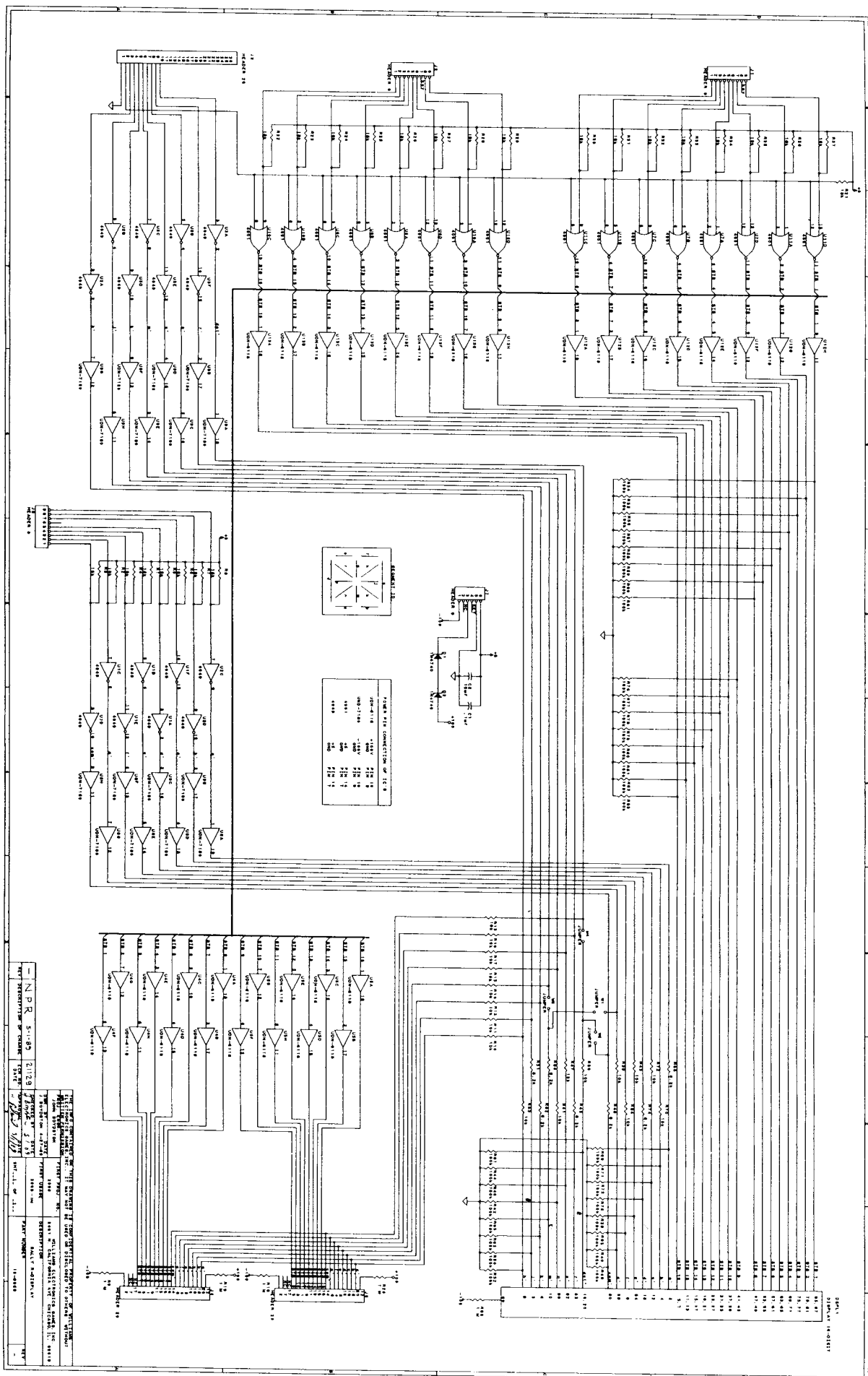


MALL, R_DISPLAY	
1	5043-008880-00 B (BYPASS CAP)
2	CAP, 100V 50V AX CR
3	5043-008880-00 C1
4	CAP, 100V 50V AX, ELECT 1
5	5043-008880-00 C2
6	22828 10K470 10V
7	DISP.LAY 15-CHARACT/ALPH/1
8	5043-008880-00 D06711
9	9 PIN HEADER, B/A, 150
10	28 PIN HEADER, B/A, 100
11	6 PIN HEADER, B/A, 150
12	20 PIN HEADER, B/A, 100
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14	RES, 10K OHM 1/4W
15	RES, 10K OHM 1/4W
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100	RES, 10K OHM 1/4W

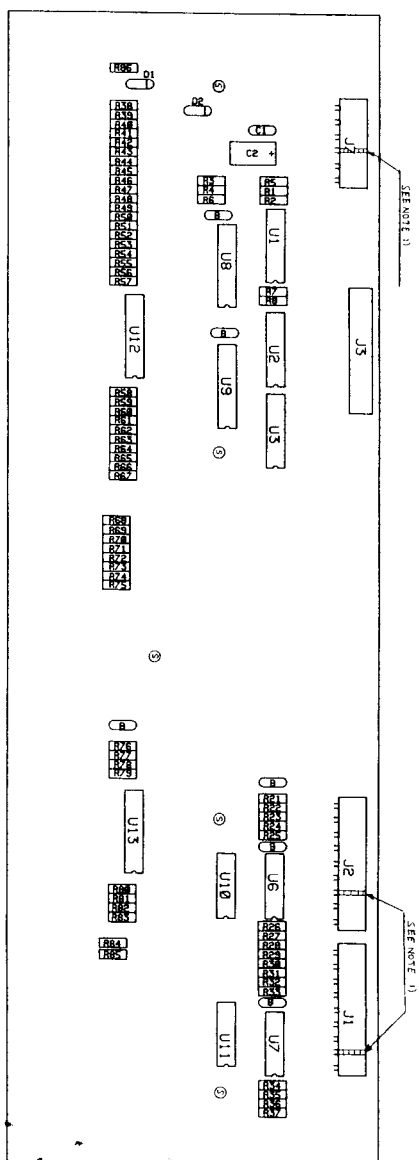
OPTION	ITEM 1	ITEM 2	ITEM 3	ITEM 4	ITEM 5	ITEM 6	ITEM 7	ITEM 8	ITEM 9	ITEM 10	ITEM 11	ITEM 12	ITEM 13	ITEM 14	ITEM 15	ITEM 16	ITEM 17	ITEM 18	ITEM 19	ITEM 20	ITEM 21	ITEM 22	ITEM 23	ITEM 24	ITEM 25	ITEM 26	ITEM 27	ITEM 28	ITEM 29	ITEM 30	ITEM 31	ITEM 32	ITEM 33	ITEM 34	ITEM 35	ITEM 36	ITEM 37	ITEM 38	ITEM 39	ITEM 40	ITEM 41	ITEM 42	ITEM 43	ITEM 44	ITEM 45	ITEM 46	ITEM 47	ITEM 48	ITEM 49	ITEM 50	ITEM 51	ITEM 52	ITEM 53	ITEM 54	ITEM 55	ITEM 56	ITEM 57	ITEM 58	ITEM 59	ITEM 60	ITEM 61	ITEM 62	ITEM 63	ITEM 64	ITEM 65	ITEM 66	ITEM 67	ITEM 68	ITEM 69	ITEM 70	ITEM 71	ITEM 72	ITEM 73	ITEM 74	ITEM 75	ITEM 76	ITEM 77	ITEM 78	ITEM 79	ITEM 80	ITEM 81	ITEM 82	ITEM 83	ITEM 84	ITEM 85	ITEM 86	ITEM 87	ITEM 88	ITEM 89	ITEM 90	ITEM 91	ITEM 92	ITEM 93	ITEM 94	ITEM 95	ITEM 96	ITEM 97	ITEM 98	ITEM 99	ITEM 100	ITEM 101	ITEM 102	ITEM 103	ITEM 104	ITEM 105	ITEM 106	ITEM 107	ITEM 108	ITEM 109	ITEM 110	ITEM 111	ITEM 112	ITEM 113	ITEM 114	ITEM 115	ITEM 116	ITEM 117	ITEM 118	ITEM 119	ITEM 120	ITEM 121	ITEM 122	ITEM 123	ITEM 124	ITEM 125	ITEM 126	ITEM 127	ITEM 128	ITEM 129	ITEM 130	ITEM 131	ITEM 132	ITEM 133	ITEM 134	ITEM 135	ITEM 136	ITEM 137	ITEM 138	ITEM 139	ITEM 140	ITEM 141	ITEM 142	ITEM 143	ITEM 144	ITEM 145	ITEM 146	ITEM 147	ITEM 148	ITEM 149	ITEM 150	ITEM 151	ITEM 152	ITEM 153	ITEM 154	ITEM 155	ITEM 156	ITEM 157	ITEM 158	ITEM 159	ITEM 160	ITEM 161	ITEM 162	ITEM 163	ITEM 164	ITEM 165	ITEM 166	ITEM 167	ITEM 168	ITEM 169	ITEM 170	ITEM 171	ITEM 172	ITEM 173	ITEM 174	ITEM 175	ITEM 176	ITEM 177	ITEM 178	ITEM 179	ITEM 180	ITEM 181	ITEM 182	ITEM 183	ITEM 184	ITEM 185	ITEM 186	ITEM 187	ITEM 188	ITEM 189	ITEM 190	ITEM 191	ITEM 192	ITEM 193	ITEM 194	ITEM 195	ITEM 196	ITEM 197	ITEM 198	ITEM 199	ITEM 200	ITEM 201	ITEM 202	ITEM 203	ITEM 204	ITEM 205	ITEM 206	ITEM 207	ITEM 208	ITEM 209	ITEM 210	ITEM 211	ITEM 212	ITEM 213	ITEM 214	ITEM 215	ITEM 216	ITEM 217	ITEM 218	ITEM 219	ITEM 220	ITEM 221	ITEM 222	ITEM 223	ITEM 224	ITEM 225	ITEM 226	ITEM 227	ITEM 228	ITEM 229	ITEM 230	ITEM 231	ITEM 232	ITEM 233	ITEM 234	ITEM 235	ITEM 236	ITEM 237	ITEM 238	ITEM 239	ITEM 240	ITEM 241	ITEM 242	ITEM 243	ITEM 244	ITEM 245	ITEM 246	ITEM 247	ITEM 248	ITEM 249	ITEM 250	ITEM 251	ITEM 252	ITEM 253	ITEM 254	ITEM 255	ITEM 256	ITEM 257	ITEM 258	ITEM 259	ITEM 260	ITEM 261	ITEM 262	ITEM 263	ITEM 264	ITEM 265	ITEM 266	ITEM 267	ITEM 268	ITEM 269	ITEM 270	ITEM 271	ITEM 272	ITEM 273	ITEM 274	ITEM 275	ITEM 276	ITEM 277	ITEM 278	ITEM 279	ITEM 280	ITEM 281	ITEM 282	ITEM 283	ITEM 284	ITEM 285	ITEM 286	ITEM 287	ITEM 288	ITEM 289	ITEM 290	ITEM 291	ITEM 292	ITEM 293	ITEM 294	ITEM 295	ITEM 296	ITEM 297	ITEM 298	ITEM 299	ITEM 300	ITEM 301	ITEM 302	ITEM 303	ITEM 304	ITEM 305	ITEM 306	ITEM 307	ITEM 308	ITEM 309	ITEM 310	ITEM 311	ITEM 312	ITEM 313	ITEM 314	ITEM 315	ITEM 316	ITEM 317	ITEM 318	ITEM 319	ITEM 320	ITEM 321	ITEM 322	ITEM 323	ITEM 324	ITEM 325	ITEM 326	ITEM 327	ITEM 328	ITEM 329	ITEM 330	ITEM 331	ITEM 332	ITEM 333	ITEM 334	ITEM 335	ITEM 336	ITEM 337	ITEM 338	ITEM 339	ITEM 340	ITEM 341	ITEM 342	ITEM 343	ITEM 344	ITEM 345	ITEM 346	ITEM 347	ITEM 348	ITEM 349	ITEM 350	ITEM 351	ITEM 352	ITEM 353	ITEM 354	ITEM 355	ITEM 356	ITEM 357	ITEM 358	ITEM 359	ITEM 360	ITEM 361	ITEM 362	ITEM 363	ITEM 364	ITEM 365	ITEM 366	ITEM 367	ITEM 368	ITEM 369	ITEM 370	ITEM 371	ITEM 372	ITEM 373	ITEM 374	ITEM 375	ITEM 376	ITEM 377	ITEM 378	ITEM 379	ITEM 380	ITEM 381	ITEM 382	ITEM 383	ITEM 384	ITEM 385	ITEM 386	ITEM 387	ITEM 388	ITEM 389	ITEM 390	ITEM 391	ITEM 392	ITEM 393	ITEM 394	ITEM 395	ITEM 396	ITEM 397	ITEM 398	ITEM 399	ITEM 400	ITEM 401	ITEM 402	ITEM 403	ITEM 404	ITEM 405	ITEM 406	ITEM 407	ITEM 408	ITEM 409	ITEM 410	ITEM 411	ITEM 412	ITEM 413	ITEM 414	ITEM 415	ITEM 416	ITEM 417	ITEM 418	ITEM 41
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- NOTES:
- 1) 100% CHM RESISTORS
R23, R40, AND R51-R53, R85
R73, R75-R83, R85
 - SEE CHART ALSO
 - 2) 10% CHM RESISTORS
R86
 - SEE CHART ALSO
 - 3) 5% CHM RESISTORS
R41, R42, R43, R44
SEE CHART ALSO
 - 4) 10% OHM RESISTOR
R24, R43, R44, R70, R72, R84
 - SEE CHART ALSO
 - 5) THE CHART SPECIFICS RESISTORS, 1 C & AND
COMMENTS THAT ARE OPTION SPECIFIC
 - 6) THE TWO LAST DIGITS OF THE PART NUMBER
SPECIFICS THE SUB-ASSEMBLY OPTION
 - 01 MAIN DISCAL ONLY: ALPHA NUMERIC
 - 02 MAIN DISCAL NUMBER: ONE EXTENDED
7-SEGMENT NUMERIC
 - 03 MAIN DISCAL NUMBER: TWO EXTENDED
7-SEGMENT NUMERIC

[illegible]



Right Display 3-12

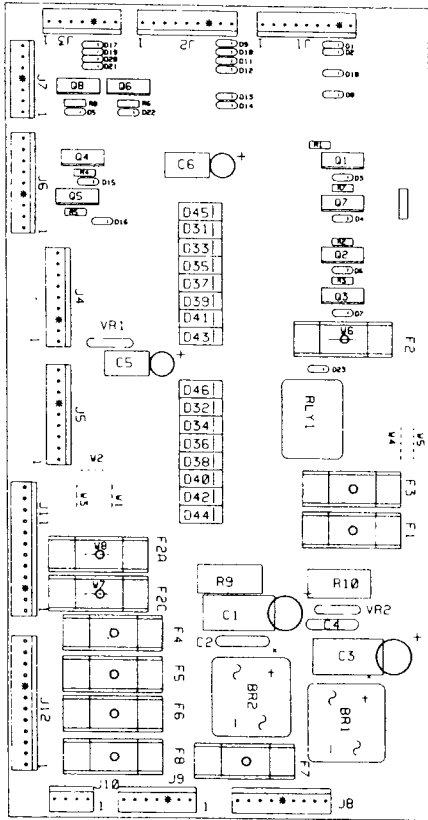


ITEM PART NUMBER	PART DESCRIPTION	DESCRIPTION	ST
1	5043-00899-00	B (PART COMP)	6
2	5043-00920-00	C	1
3	5040-0934-00	C2	1
4	5075-0933-00	D1,D2	2
5	5071-1230-00	10071	1
6	5091-1080-09	J1,J2	2
7	5091-1080-00	J3	1
8	5071-1082-00		1
9	5010-0977-00	B1,B0,R2,R3,R4	25
10	5010-0942-00	R0,R2,R4,R6,R4,R6,R5,R7,R1,R2,R3,R5	31
11	5010-00991-00	R7,R12,R8,R4	9
12	5010-10927-00	R7,R4,R0,R1,R02,R04,R05	7
13	5010-00945-00	R05	1
14	5010-00975-00	D1,D2,D3	4
15	5010-00992-00	D6,D7,D10,D11	4
16	5000-00860-00	D0,D9	2
17	5000-00868-00	D1,D13	1
18	5070-12100-00	PCB	1
19	01-00068-1	SUPPORT	5

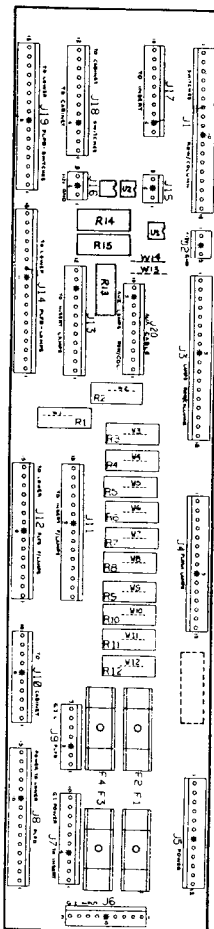
NOTES :

- 1) CUT KEYING PINS AS INDICATED.
- 2) ALIGN TOP EDGE OF GLASS DISPLAY WITH TOP EDGE OF DISPLAY SUPPORT.
- 3) FOR SCHEMATIC SEE DRAWING 10-9069

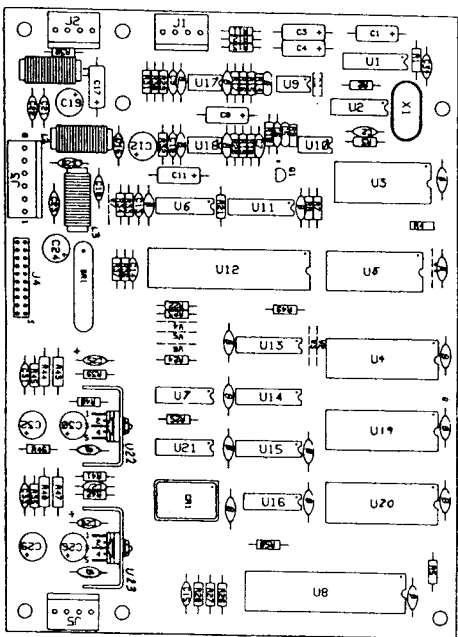
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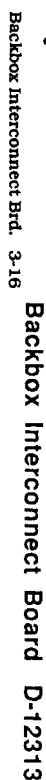
AUX POWER DRIVER UNIT BOARD
p/n D-12247

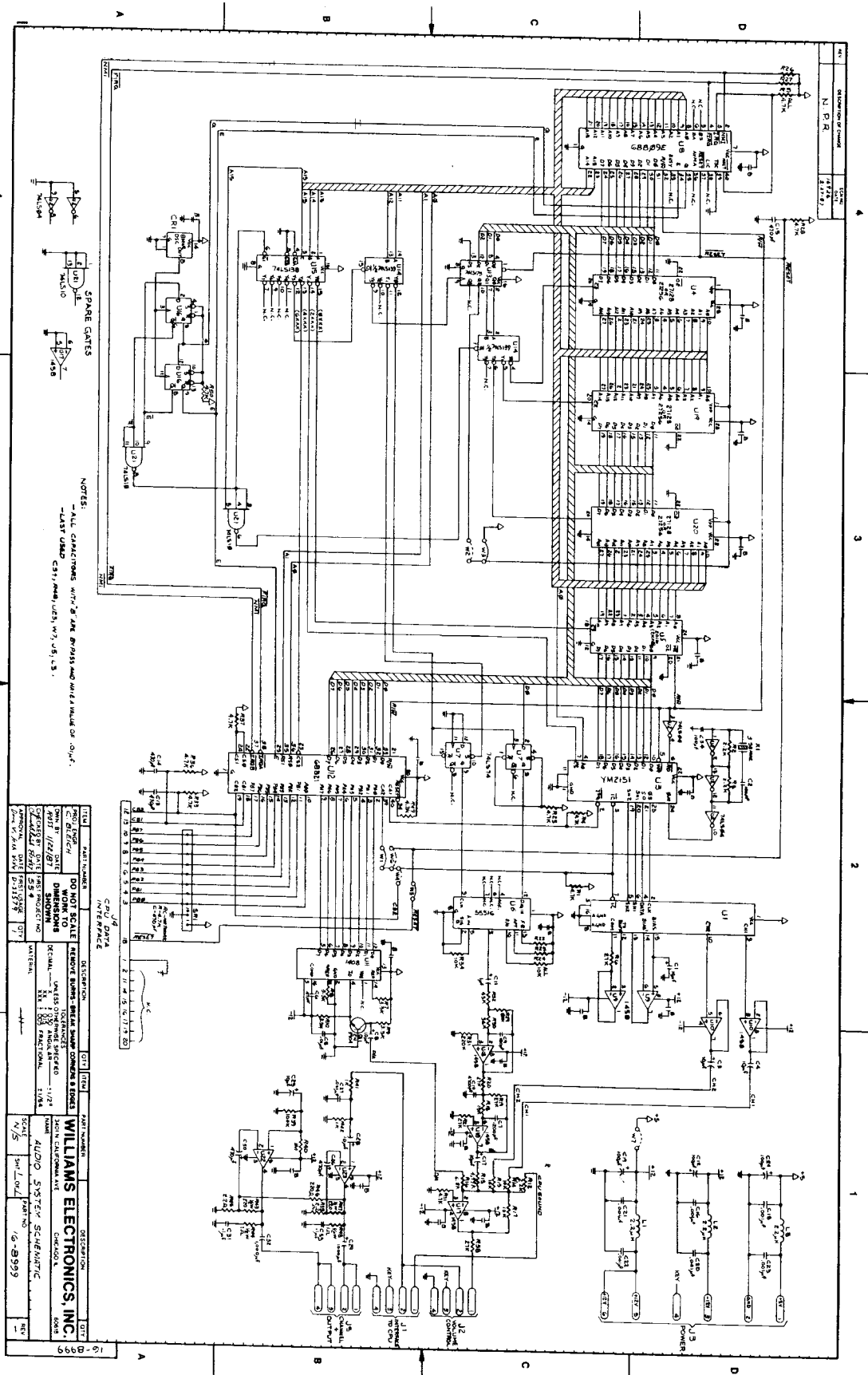


BACKBOX INTERCONNECT BOARD
p/n D-12313



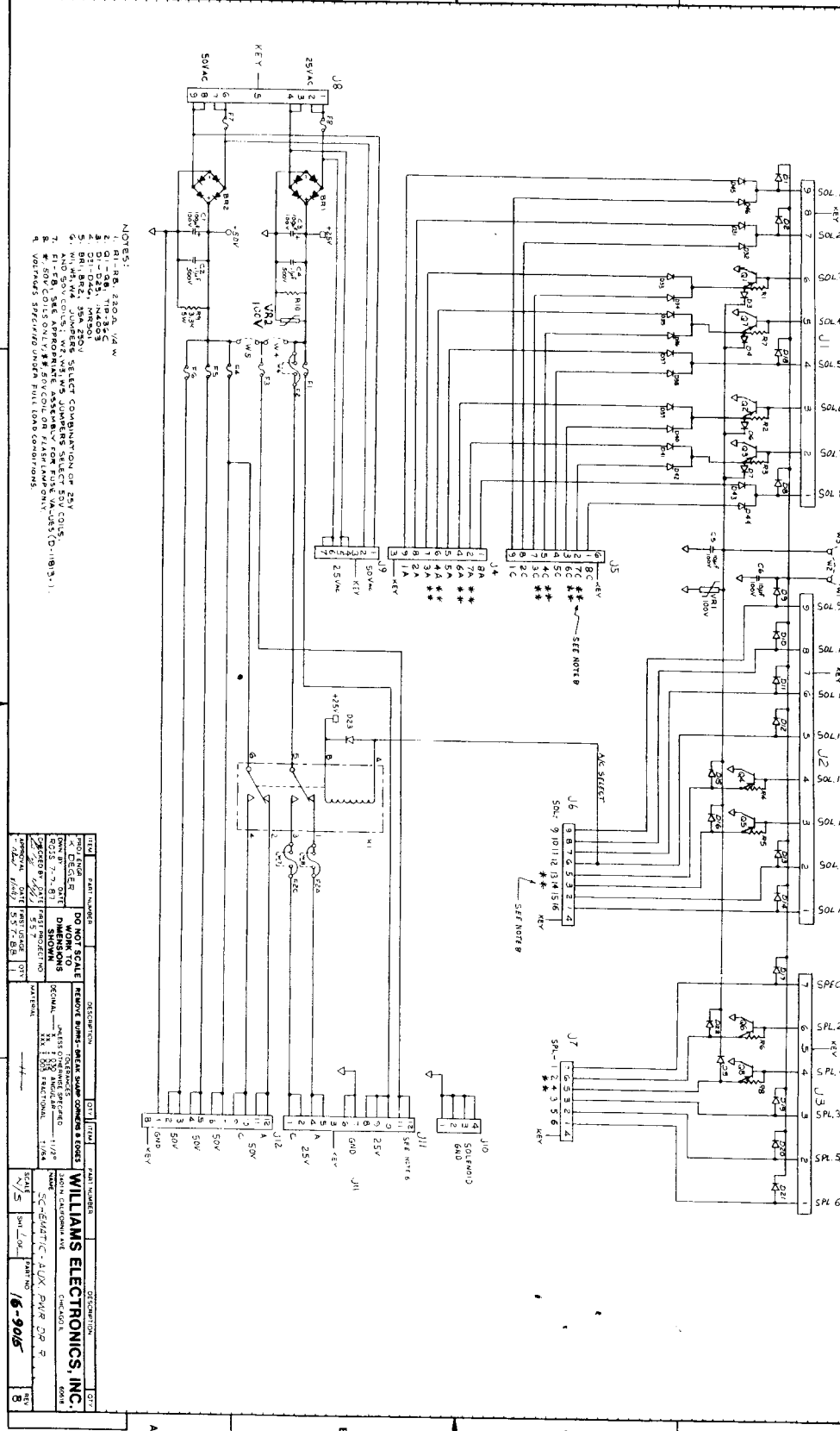
AUDIO BOARD ASSEMBLY
p/n D-11581





Audio Board (D-11581) Schematic

NO.	DATE	BY	CHKD.
1	10/1/78	W.E.	W.E.
2	10/1/78	W.E.	W.E.
3	10/1/78	W.E.	W.E.
4	10/1/78	W.E.	W.E.



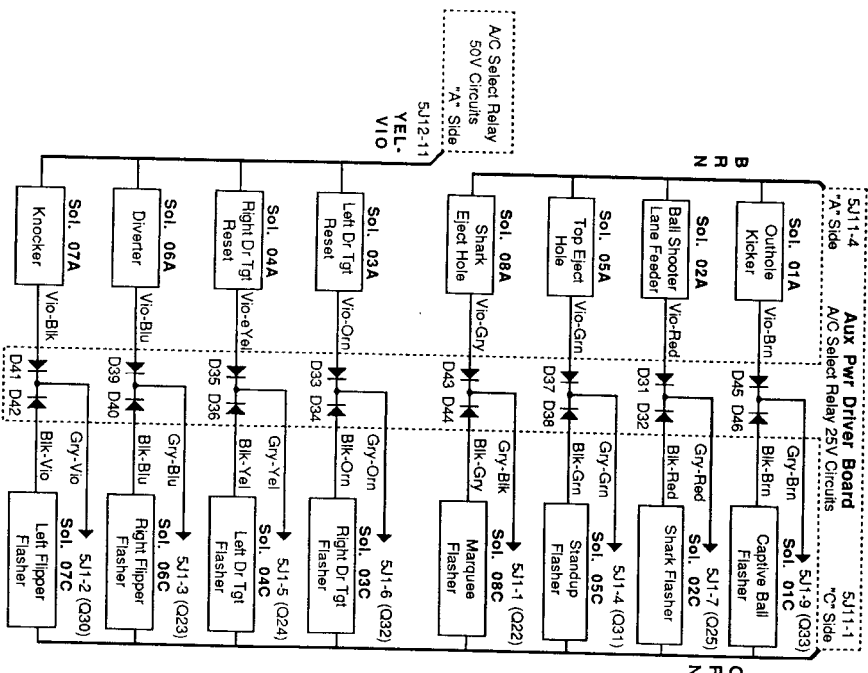
- NOTES:
1. 25VAC, 50VAC, 100VAC
 2. 01-08, 100-150VAC
 3. 01-08, 100-150VAC
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ITEM	QTY	DESCRIPTION	REVISION	DATE	BY	CHKD.
1	1	WILLIAMS ELECTRONICS, INC.				
2	1	SCHEMATIC, AUX. POWER BOARD				
3	1	16-906				

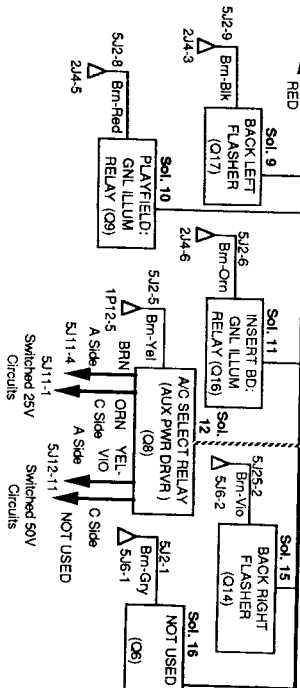
Aux. Power Driver Bld. 3-18

Aux Power Driver Board Schematic

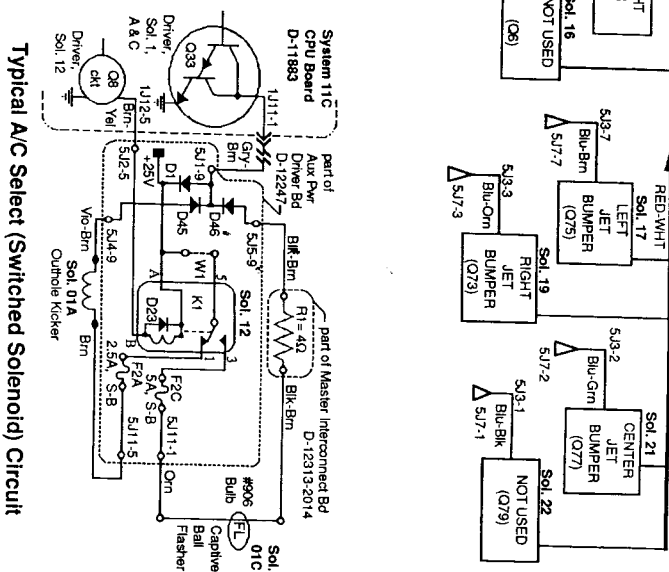
SWITCHED SOLENOIDS



CONTROLLED SOLENOIDS (25V)

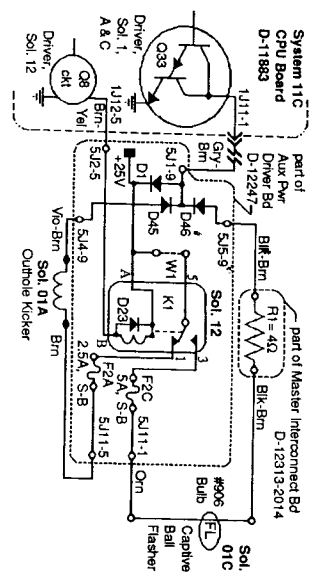


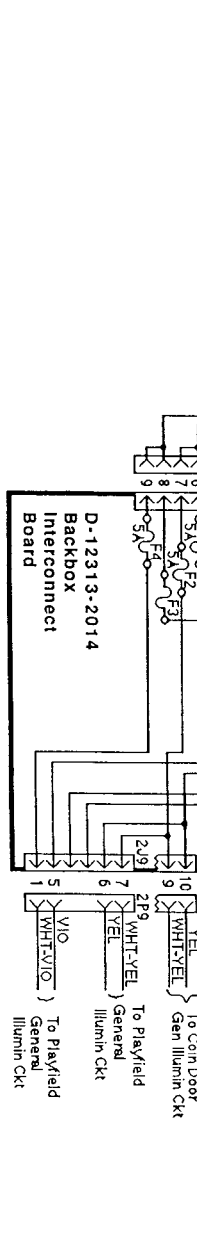
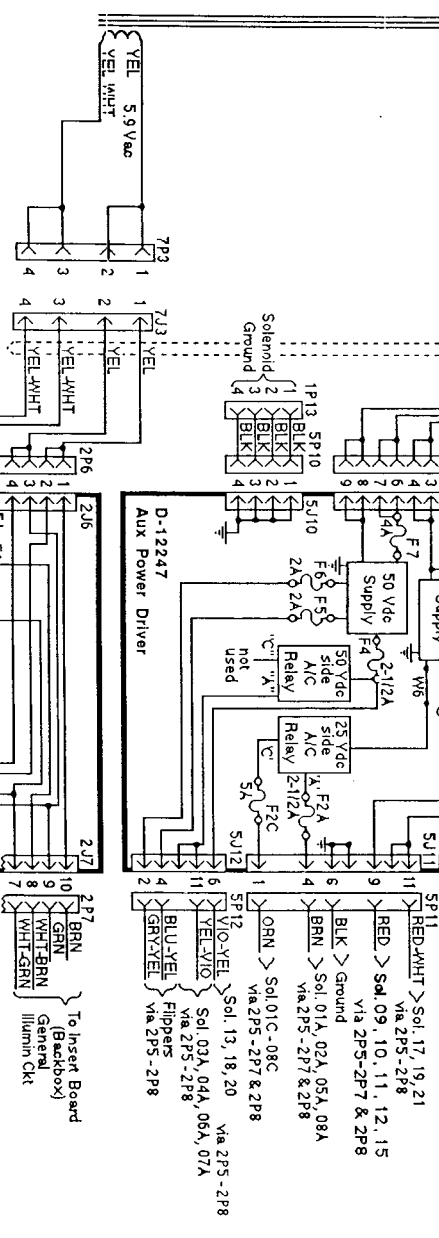
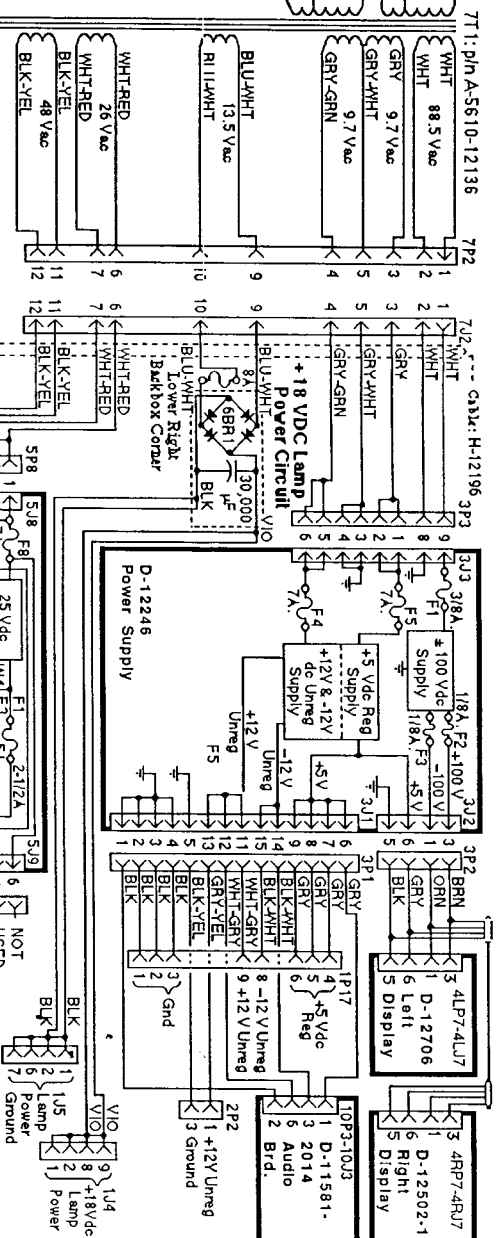
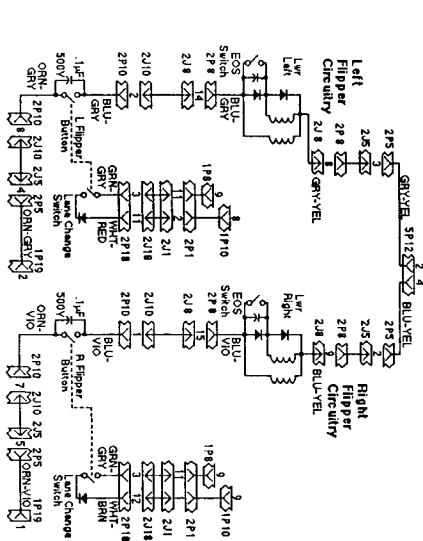
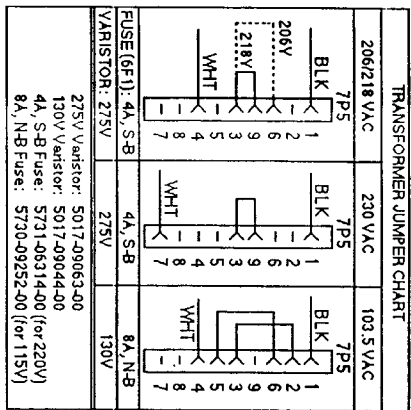
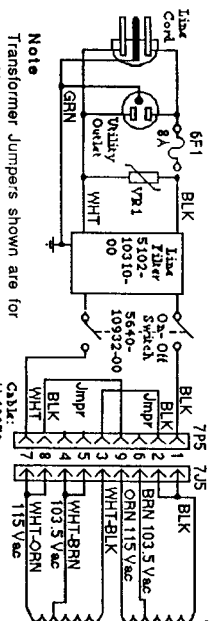
SPECIAL SOLENOIDS (50V)



Controlled, Special & Switched Solenoids

Typical A/C Select (Switched Solenoid) Circuit





3-20 Power Wiring

POWER WIRING

CPU INTERBOARD SIGNALS

Connector	Wire Color	Signal Description/Description	Connector	Wire Color	Signal Description/Description
1/1-1	BRN-GRY	ST-8: Display Digit Stroke / 4/1-1	1/2-1	VIO-GRY	ST-16: Display Digit Stroke / 4/2-1
1/1-2	BRN-VIO	ST-7: Display Digit Stroke / 4/1-2	1/2-2	VIO-BLK	ST-15: Display Digit Stroke / 4/2-2
1/1-3	BRN-BLU	ST-6: Display Digit Stroke / 4/1-3	1/2-3	VIO-BLK	ST-14: Display Digit Stroke / 4/2-3
1/1-4	BRN-GRN	ST-5: Display Digit Stroke / 4/1-4	1/2-4	VIO-GRN	ST-13: Display Digit Stroke / 4/2-4
1/1-5	BRN-BLK	ST-4: Display Digit Stroke / 4/1-5	1/2-5	VIO-GRN	ST-12: Display Digit Stroke / 4/2-5
1/1-6	BRN-GRY	ST-3: Display Digit Stroke / 4/1-6	1/2-6	VIO-GRN	ST-11: Display Digit Stroke / 4/2-6
1/1-7	BRN-BLK	ST-2: Display Digit Stroke / 4/1-7	1/2-7	VIO-GRN	ST-10: Display Digit Stroke / 4/2-7
1/1-8	Key Pin	No Connection	1/2-8	VIO-GRN	ST-9: Display Digit Stroke / 4/2-8
1/1-9	BRN-BLK	ST-1: Display Digit Stroke / 4/1-9	1/2-9	VIO-GRN	ST-8: Display Digit Stroke / 4/2-9
1/3-1	BLU-BRN	D1 / Display BCD / 4/5-1	1/4-1	VIO	Lamp +15V dc Power
1/3-2	BLU-RED	C1 / Display BCD / 4/5-2	1/4-2	VIO	Lamp +15V dc Power
1/3-3	BLU-GRN	B1 / Display BCD / 4/5-3	1/4-3	Key Pin	No Connection
1/3-4	BLU-RED	D2 / Display BCD / 4/5-4	1/4-4	Key Pin	No Connection
1/3-5	BLU-GRN	B2 / Display BCD / 4/5-5	1/4-5	Key Pin	No Connection
1/3-6	Key Pin	No Connection	1/4-6	Key Pin	No Connection
1/3-7	BLU-BLK	C2 / Display BCD / 4/5-7	1/4-7	Key Pin	No Connection
1/3-8	BLU-BLK	B2 / Display BCD / 4/5-8	1/4-8	VIO	Lamp +15V dc Power
1/3-9	BLU-GRY	A2 / Display BCD / 4/5-9	1/4-9	VIO	Lamp +15V dc Power
1/3-10	---	No Connection	1/4-10	---	No Connection
1/3-11	---	No Connection	1/4-11	---	No Connection
1/3-12	---	No Connection	1/4-12	---	No Connection
1/5-1	---	No Connection	1/6-1	FED-BRN	Lamp Row 1 (Q00) / 2/3-18
1/5-2	Key Pin	No Connection	1/6-2	FED-BLK	Lamp Row 2 (Q01) / 2/3-17
1/5-3	Key Pin	No Connection	1/6-3	FED-GRY	Lamp Row 3 (Q02) / 2/3-16
1/5-4	BLK	Ground (Lamp Cx)	1/6-4	FED-YEL	Lamp Row 4 (Q03) / 2/3-15
1/5-5	---	No Connection	1/6-5	FED-GRY	Lamp Row 5 (Q04) / 2/3-14
1/5-6	---	No Connection	1/6-6	FED-BLK	Lamp Row 6 (Q05) / 2/3-13
1/5-7	---	No Connection	1/6-7	FED-BLK	Lamp Row 7 (Q06) / 2/3-12
1/5-8	BLK	Ground (Lamp Cx)	1/6-8	FED-GRY	Lamp Row 8 (Q07) / 2/3-11
1/5-9	BLK	Ground (Lamp Cx)	1/6-9	---	No Connection
1/7-1	YEL-BRN	Lamp Col 1 (Q05/06) / 2/3-8	1/8-1	GRN-BRN	Switch Col 1 (Q45) / 2/3-18
1/7-2	YEL-RED	Lamp Col 2 (Q05/06) / 2/3-7	1/8-2	GRN-GRN	Switch Col 2 (Q46) / 2/3-17
1/7-3	YEL-GRN	Lamp Col 3 (Q05/06) / 2/3-6	1/8-3	GRN-BLK	Switch Col 3 (Q47) / 2/3-16
1/7-4	YEL-BLK	Lamp Col 4 (Q05/06) / 2/3-5	1/8-4	GRN-BLK	Switch Col 4 (Q48) / 2/3-15
1/7-5	Key Pin	No Connection	1/8-5	GRN-BLK	Switch Col 5 (Q49) / 2/3-14
1/7-6	YEL-GRN	Lamp Col 5 (Q05/06) / 2/3-4	1/8-6	GRN-BLU	Switch Col 6 (Q47) / 2/3-13
1/7-7	YEL-BLK	Lamp Col 6 (Q05/06) / 2/3-3	1/8-8	GRN-VIO	Switch Col 7 (Q42) / 2/3-12
1/7-8	YEL-VIO	Lamp Col 7 (Q05/06) / 2/3-2	1/8-9	GRN-GRY	Switch Col 8 (Q46) / 2/3-11
1/7-9	YEL-GRY	Lamp Col 8 (Q05/06) / 2/3-1	1/9	No Applicable	
1/10-1	WHT-GRY	Switch Row 8 (2/31-8)	1/11-1	GRN-BRN	Solenoid 1 (Q03) / 5/1-9
1/10-2	WHT-VIO	Switch Row 7 (2/31-7)	1/11-2	GRN-BLK	Solenoid 2 (Q04) / 5/1-8
1/10-3	WHT-BLU	Switch Row 6 (2/31-6)	1/11-3	GRN-GRY	Solenoid 3 (Q05) / 5/1-7
1/10-4	Key Pin	No Connection	1/11-4	GRN-VIO	Solenoid 4 (Q04) / 5/1-6
1/10-5	WHT-GRN	Switch Row 5 (2/31-5)	1/11-5	GRN-YEL	Solenoid 5 (Q03) / 5/1-5
1/10-6	WHT-YEL	Switch Row 4 (2/31-4)	1/11-6	GRN-GRN	Solenoid 6 (Q02) / 5/1-4
1/10-7	WHT-GRN	Switch Row 3 (2/31-3)	1/11-7	GRN-BLU	Solenoid 7 (Q02) / 5/1-3
1/10-8	WHT-RED	Switch Row 2 (2/31-2)	1/11-8	GRN-VIO	Solenoid 8 (Q02) / 5/1-2
1/10-9	WHT-BRN	Switch Row 1 (2/31-1)	1/11-9	GRN-BLK	Solenoid 9 (Q02) / 5/1-1
1/12-1	BRN-BLK	Solenoid 9 (Q17) / 5/2-9	1/13-1	BLK	Solenoid Ground / 5/10-1
1/12-2	BRN-RED	Solenoid 10 (Q8) / 5/2-8	1/13-2	BLK	Solenoid 10 / 5/10-2
1/12-3	Key Pin	No Connection	1/13-3	BLK	Solenoid 11 / 5/10-3
1/12-4	BRN-GRN	Solenoid 11 (Q16) / 5/2-6	1/13-4	BLK	Solenoid 12 / 5/10-4
1/12-5	BRN-YEL	Solenoid 12 (Q8) / 5/2-5	1/14-1	BLK-RED	Memory Protect / 7/1-4
1/12-6	BRN-BLU	Solenoid 13 (Q15) / 5/2-4	1/14-2	WHT	Ground / 7/1-3
1/12-7	BRN-BLU	Solenoid 14 (Q14) / 5/2-3	1/14-3	GRN	ADVANCE Switch / 7/1-1
1/12-8	BRN-VIO	Solenoid 15 (Q13) / 5/2-2	1/14-4	BLU	AUTOMANUAL Switch / 7/1-2
1/12-9	BRN-GRY	Solenoid 16 (Q6) / 5/2-1	1/17-1	BLK	Ground / 3/1-2
1/16-1	FED	Volume Control Input / 1/11-1	1/17-2	BLK	Ground / 3/1-3
1/16-2	BLK	Volume Control Output / 1/11-2	1/17-3	GRY	Power: -5V dc / 3/1-8
1/16-3	Key Pin	No Connection	1/17-4	GRY	Power: -5V dc / 3/1-6
1/16-4	White	Signal Ground - CPU / 1/11-4	1/17-5	GRY	No Connection / 3/1-6
1/18-1	---	No Connection	1/17-6	Key Pin	No Connection / 3/1-6
1/18-2	---	No Connection	1/17-7	GRY	No Connection / 3/1-6
1/18-3	---	No Connection	1/17-8	BLK-WHT	Power: -12V dc / 3/1-14
1/18-4	---	No Connection	1/17-9	WHT-GRY	Power: -12V dc / 3/1-12
1/18-5	---	No Connection	1/19-1	ORG-VIO	Flipper Ground / 2/5-5
1/18-6	Key Pin	No Connection	1/19-2	ORG-GRY	Flipper Ground / 2/5-4
1/18-7	---	No Connection	1/19-3	ORG-GRN	Sol Solid 3 (Q79) / 5/3-3
1/18-8	---	No Connection	1/19-4	BLU-RED	Sol Solid 2 (Q71) / 5/3-6
1/18-9	---	No Connection	1/19-5	Key Pin	No Connection / 5/3-4
1/19-1	---	No Connection	1/19-6	BLU-BRN	Sol Solid 1 (Q70) / 5/3-7
1/19-2	---	No Connection	1/19-7	BLU-BLK	Sol Solid 6 (Q79) / 5/3-1

POWER SUPPLY INTERBOARD SIGNALS

Connector	Wire Color	Signal Description/Description	Connector	Wire Color	Signal Description/Description
3/1-1	BLK	Ground / 1/13-2	3/2-1	ORG	Display Power: -100V dc / 4/1-1
3/1-2	BLK	Ground / 1/17-2	3/2-2	---	No Connection
3/1-3	BLK	Ground / 1/17-2	3/2-3	BRN	Display Power: +100V dc / 4/1-3
3/1-4	BLK-YEL	Lamp Ground / 1/17-3	3/2-4	---	No Connection
3/1-5	GRY	CPU Power: -12V dc / 1/17-5	3/2-5	BLK	Ground (Display Cx) / 4/1-5
3/1-6	GRY	CPU Power: -12V dc / 1/17-5	3/2-6	GRY	Display Power: +35V dc / 4/1-6
3/1-7	GRY	CPU Power: -12V dc / 1/17-5	3/2-7	GRY	Transformer: 19.4V ac, 10 C, T
3/1-8	GRY	CPU Power: -12V dc / 1/17-5	3/2-8	GRY	Transformer: 19.4V ac, 10 C, T
3/1-9	GRY	CPU Power: -12V dc / 1/17-5	3/2-9	GRY	Transformer: 19.4V ac, 10 C, T
3/1-10	Key Pin	No Connection	3/2-10	GRY	Transformer: 19.4V ac, 10 C, T
3/1-11	WHT-GRY	CPU Power: +12V dc / 1/17-6	3/2-11	GRY	Transformer: 19.4V ac, 10 C, T
3/1-12	WHT-GRY	CPU Power: +12V dc / 1/17-6	3/2-12	GRY	Transformer: 19.4V ac, 10 C, T
3/1-13	GRY-YEL	CPU Power: +12V dc / 1/17-6	3/2-13	GRY	Transformer: 19.4V ac, 10 C, T
3/1-14	BLK-WHT	CPU Power: -12V dc / 1/17-8	3/2-14	Key Pin	No Connection
3/1-15	BLK-WHT	CPU Power: -12V dc / 1/17-8	3/2-15	WHT	Transformer: 88.5V ac
3/1-16	---	No Connection	3/2-16	---	No Connection

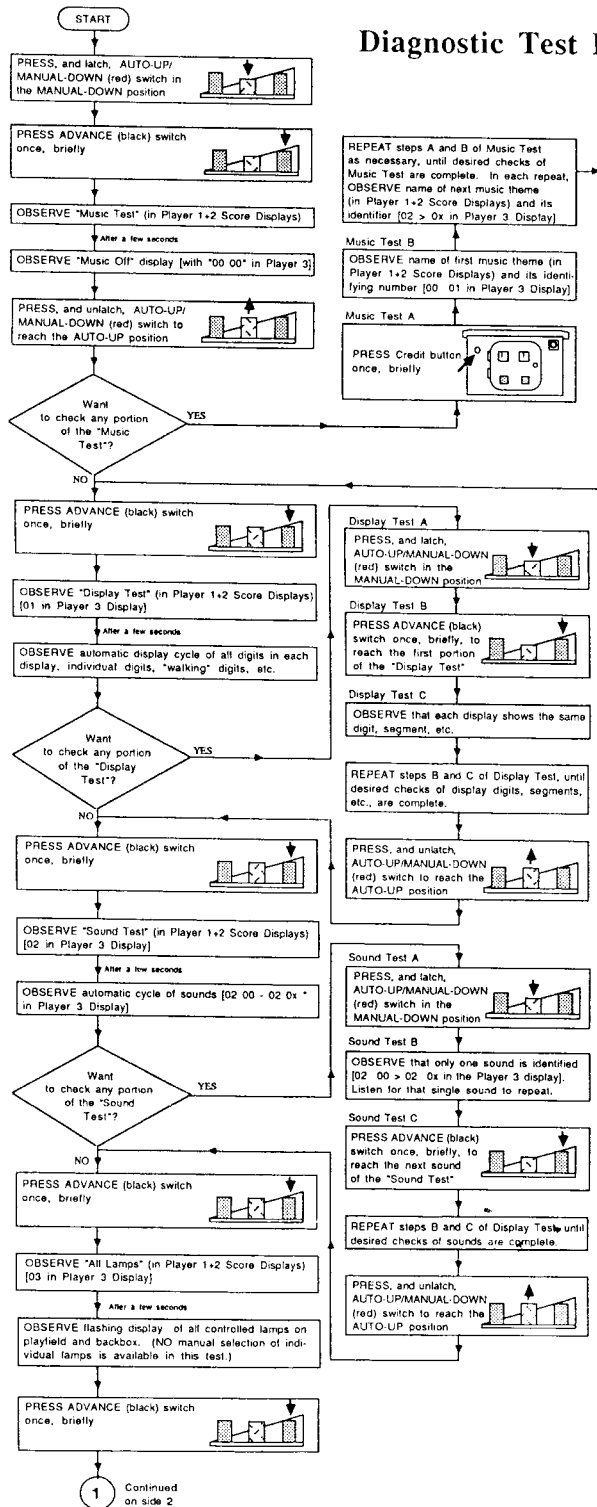
AUX POWER DRIVER INTERBOARD SIGNALS

Connector	Wire Color	Signal Description/Description	Connector	Wire Color	Signal Description/Description
5/1-1	GRY-BLK	CPU: Solenoid 8 (Q02) / 1/11-9	5/2-1	BRN-GRY	CPU: Solenoid 16 (Q01) / 1/12-9
5/1-2	GRY-VIO	CPU: Solenoid 7 (Q02) / 1/11-8	5/2-2	BRN-VIO	CPU: Solenoid 15 (Q14) / 1/12-8
5/1-3	GRY-BLU	CPU: Solenoid 6 (Q01) / 1/11-7	5/2-3	BRN-BLU	CPU: Solenoid 14 (Q17) / 1/12-7
5/1-4	GRY-GRN	CPU: Solenoid 5 (Q01) / 1/11-6	5/2-4	---	No Connection
5/1-5	GRY-YEL	CPU: Solenoid 4 (Q04) / 1/11-5	5/2-5	BRN-YEL	CPU: Solenoid 12 (Q08) / 1/12-5
5/1-6	GRY-ORG	CPU: Solenoid 3 (Q02) / 1/11-4	5/2-6	BRN-ORG	CPU: Solenoid 11 (Q15) / 1/12-4
5/1-7	GRY-BLK	CPU: Solenoid 2 (Q02) / 1/11-3	5/2-7	Key Pin	No Connection
5/1-8	Key Pin	No Connection	5/2-8	BRN-RED	CPU: Solenoid 10 (Q08) / 1/12-2
5/1-9	GRY-BRN	CPU: Solenoid 1 (Q03) / 1/11-1	5/2-9	BRN-BLK	CPU: Solenoid 9 (Q11) / 1/12-1
5/3-1	BLU-BLK	CPU: Solenoid 22 (Q79) / 1/13-9	5/4-1	VIO-GRY	Solenoid 0A
5/3-2	BLU-GRN	CPU: Solenoid 21 (Q77) / 1/13-8	5/4-2	VIO-BLK	Solenoid 0A
5/3-3	BLU-ORG	CPU: Solenoid 19 (Q73) / 1/13-3	5/4-3	Key Pin	No Connection
5/3-4	BLU-YEL	CPU: Solenoid 20 (Q69) / 1/13-6	5/4-4	VIO-GRN	Solenoid 05A
5/3-5	Key Pin	No Connection	5/4-5	---	No Connection
5/3-6	BLU-RED	CPU: Solenoid 18 (Q71) / 1/13-4	5/4-6	---	No Connection
5/3-7	WHT-BRN	CPU: Solenoid 17 (Q75) / 1/13-7	5/4-7	VIO-RED	Solenoid 02X
5/5-1	WHT-GRY	Solenoid 08C / 2/4-8	5/4-8	VIO-BRN	Solenoid 01A
5/5-2	WHT-VIO	Solenoid 07C / 2/4-7	5/6-1	BRN-GRY	Solenoid 16 / 2/4-15
5/5-3	WHT-BLU	Solenoid 06C / 2/4-6	5/6-2	BRN-VIO	Solenoid 15 / 2/4-14
5/5-4	WHT-GRN	Solenoid 05C / 2/4-5	5/6-3	BRN-BLU	Solenoid 14 / 2/4-14
5/5-5	WHT-YEL	Solenoid 04C / 2/4-4	5/6-4	Key Pin	No Connection
5/5-6	WHT-ORG	Solenoid 03C / 2/4-3	5/6-5	---	No Connection
5/5-7	WHT-BLK	Solenoid 02C / 2/4-2	5/6-6	BRN-ORG	Solenoid 11 / 2/4-12
5/5-8	WHT-BRN	Solenoid 01C / 2/4-1	5/6-7	BRN-RED	Solenoid 10 / 2/4-12
5/7-1	---	No Connection	5/6-8	BRN-BLK	Solenoid 09 / 2/4-16
5/7-2	BLU-GRN	Solenoid 21	5/8-1	WHT-RED	Transformer: 25V ac / 7/2-6
5/7-3	BLU-ORG	Solenoid 19	5/8-2	WHT-FED	Transformer: 25V ac / 7/2-6
5/7-4	Key Pin	No Connection	5/8-3	WHT-FED	Transformer: 25V ac / 7/2-7
5/7-5	BLU-YEL	Solenoid 20	5/8-4	Key Pin	No Connection
5/7-6	BLU-RED	Solenoid 18	5/8-5	BLK-YEL	Transformer: 48V ac / 7/2-11
5/7-7	BLU-BRN	Solenoid 17	5/8-6	BLK-YEL	Transformer: 48V ac / 7/2-11
5/9-1	---	No Connection	5/8-7	BLK-YEL	Transformer: 48V ac / 7/2-12
5/9-2	---	No Connection	5/8-8	BLK-YEL	Transformer: 48V ac / 7/2-12
5/9-3	---	No Connection	5/10-1	BLK	Sol Solid 4 / 1/13-1
5/9-4	---	No Connection	5/10-2	BLK	Sol Solid 4 / 1/13-2
5/9-5	---	No Connection	5/10-3	BLK	Sol Solid 4 / 1/13-3
5/9-6	---	No Connection	5/10-4	BLK	Sol Solid 4 / 1/13-4
5/9-7	---	No Connection	5/11-1	ORG	+25 Vdc CP Solenoid Pwr/2/5-9
5/12-1	GRY-YEL	+50 Vdc Flipper Pwr/2/5-3	5/11-2	---	No Connection
5/12-2	GRY-YEL	+50 Vdc Flipper Pwr/2/5-2	5/11-3	Key Pin	No Connection
5/12-3	BLU-YEL	+50 Vdc Flipper Pwr/2/5-2	5/11-4	BRN	+25 Vdc A Solenoid Pwr/2/5-12
5/12-4	VIO-YEL	+50 Vdc Solenoid Pwr/2/5-10	5/11-5	---	No Connection
5/12-5	---	No Connection	5/11-6	BLK	Ground/2/5-6
5/12-6	Key Pin	No Connection	5/11-7	---	No Connection
5/12-7	Key Pin	No Connection	5/11-8	---	No Connection
5/12-8	Key Pin	No Connection	5/11-9	FED	+25 Vdc Solenoid Pwr/2/5-8
5/12-9	Key Pin	No Connection	5/11-10	---	No Connection
5/12-10	YEL-VIO	+50 Vdc Solenoid Pwr/2/5-11	5/11-11	FED-WHT	+25 Vdc Solenoid Pwr/2/5-1
5/12-11	---	No Connection	5/11-12	---	No Connection

BACKBOX INTERCONNECT BOARD INTERBOARD SIGNALS

Connector	Wire Color	Signal Description/Description	1	Connector	Wire Color	Signal Description/Description
21-1-1	WHT-BRN	Switch Row 1 / J11-9	21-1	GRN-YEL	+12Vdc Unreg / J1-13	
21-1-1	WHT-ORG	Switch Row 2 / J11-8	21-2	BLK-YEL	No Connection	
21-1-1	WHT-ORG	Switch Row 3 / J11-7	21-3	BLK-YEL	Ground / J1-5	
21-1-1	WHT-ORG	Switch Row 4 / J11-6	21-4	YEL-GRN	Lamp Col 8 (Q55) / J12-9	
21-1-1	WHT-ORG	Switch Row 5 / J11-5	21-5	YEL-GRN	Lamp Col 9 (Q56) / J12-8	
21-1-1	WHT-ORG	Switch Row 6 / J11-4	21-6	YEL-GRN	Lamp Col 10 (Q57) / J12-7	
21-1-1	WHT-ORG	Switch Row 7 / J11-3	21-7	YEL-GRN	Lamp Col 11 (Q58) / J12-6	
21-1-1	WHT-ORG	Switch Row 8 / J11-2	21-8	YEL-GRN	Lamp Col 12 (Q59) / J12-5	
21-1-1	WHT-ORG	Switch Row 9 / J11-1	21-9	YEL-GRN	Lamp Col 13 (Q60) / J12-4	
21-1-1	WHT-ORG	Switch Row 10 / J11-0	21-10	YEL-GRN	Lamp Col 14 (Q61) / J12-3	
21-1-1	WHT-ORG	Switch Row 11 / J10-9	21-11	YEL-GRN	Lamp Col 15 (Q62) / J12-2	
21-1-1	WHT-ORG	Switch Row 12 / J10-8	21-12	YEL-GRN	Lamp Col 16 (Q63) / J12-1	
21-1-1	WHT-ORG	Switch Row 13 / J10-7	21-13	YEL-GRN	Lamp Col 17 (Q64) / J12-0	
21-1-1	WHT-ORG	Switch Row 14 / J10-6	21-14	YEL-GRN	Lamp Col 18 (Q65) / J11-9	
21-1-1	WHT-ORG	Switch Row 15 / J10-5	21-15	YEL-GRN	Lamp Col 19 (Q66) / J11-8	
21-1-1	WHT-ORG	Switch Row 16 / J10-4	21-16	YEL-GRN	Lamp Col 20 (Q67) / J11-7	
21-1-1	WHT-ORG	Switch Row 17 / J10-3	21-17	YEL-GRN	Lamp Col 21 (Q68) / J11-6	
21-1-1	WHT-ORG	Switch Row 18 / J10-2	21-18	YEL-GRN	Lamp Col 22 (Q69) / J11-5	
21-1-1	WHT-ORG	Switch Row 19 / J10-1	21-19	YEL-GRN	Lamp Col 23 (Q70) / J11-4	
21-1-1	WHT-ORG	Switch Row 20 / J10-0	21-20	YEL-GRN	Lamp Col 24 (Q71) / J11-3	
21-1-1	WHT-ORG	Switch Row 21 / J9-9	21-21	YEL-GRN	Lamp Col 25 (Q72) / J11-2	
21-1-1	WHT-ORG	Switch Row 22 / J9-8	21-22	YEL-GRN	Lamp Col 26 (Q73) / J11-1	
21-1-1	WHT-ORG	Switch Row 23 / J9-7	21-23	YEL-GRN	Lamp Col 27 (Q74) / J11-0	
21-1-1	WHT-ORG	Switch Row 24 / J9-6	21-24	YEL-GRN	Lamp Col 28 (Q75) / J10-9	
21-1-1	WHT-ORG	Switch Row 25 / J9-5	21-25	YEL-GRN	Lamp Col 29 (Q76) / J10-8	
21-1-1	WHT-ORG	Switch Row 26 / J9-4	21-26	YEL-GRN	Lamp Col 30 (Q77) / J10-7	
21-1-1	WHT-ORG	Switch Row 27 / J9-3	21-27	YEL-GRN	Lamp Col 31 (Q78) / J10-6	
21-1-1	WHT-ORG	Switch Row 28 / J9-2	21-28	YEL-GRN	Lamp Col 32 (Q79) / J10-5	
21-1-1	WHT-ORG	Switch Row 29 / J9-1	21-29	YEL-GRN	Lamp Col 33 (Q80) / J10-4	
21-1-1	WHT-ORG	Switch Row 30 / J9-0	21-30	YEL-GRN	Lamp Col 34 (Q81) / J10-3	
21-1-1	WHT-ORG	Switch Row 31 / J8-9	21-31	YEL-GRN	Lamp Col 35 (Q82) / J10-2	
21-1-1	WHT-ORG	Switch Row 32 / J8-8	21-32	YEL-GRN	Lamp Col 36 (Q83) / J10-1	
21-1-1	WHT-ORG	Switch Row 33 / J8-7	21-33	YEL-GRN	Lamp Col 37 (Q84) / J10-0	
21-1-1	WHT-ORG	Switch Row 34 / J8-6	21-34	YEL-GRN	Lamp Col 38 (Q85) / J9-9	
21-1-1	WHT-ORG	Switch Row 35 / J8-5	21-35	YEL-GRN	Lamp Col 39 (Q86) / J9-8	
21-1-1	WHT-ORG	Switch Row 36 / J8-4	21-36	YEL-GRN	Lamp Col 40 (Q87) / J9-7	
21-1-1	WHT-ORG	Switch Row 37 / J8-3	21-37	YEL-GRN	Lamp Col 41 (Q88) / J9-6	
21-1-1	WHT-ORG	Switch Row 38 / J8-2	21-38	YEL-GRN	Lamp Col 42 (Q89) / J9-5	
21-1-1	WHT-ORG	Switch Row 39 / J8-1	21-39	YEL-GRN	Lamp Col 43 (Q90) / J9-4	
21-1-1	WHT-ORG	Switch Row 40 / J8-0	21-40	YEL-GRN	Lamp Col 44 (Q91) / J9-3	
21-1-1	WHT-ORG	Switch Row 41 / J7-9	21-41	YEL-GRN	Lamp Col 45 (Q92) / J9-2	
21-1-1	WHT-ORG	Switch Row 42 / J7-8	21-42	YEL-GRN	Lamp Col 46 (Q93) / J9-1	
21-1-1	WHT-ORG	Switch Row 43 / J7-7	21-43	YEL-GRN	Lamp Col 47 (Q94) / J9-0	
21-1-1	WHT-ORG	Switch Row 44 / J7-6	21-44	YEL-GRN	Lamp Col 48 (Q95) / J8-9	
21-1-1	WHT-ORG	Switch Row 45 / J7-5	21-45	YEL-GRN	Lamp Col 49 (Q96) / J8-8	
21-1-1	WHT-ORG	Switch Row 46 / J7-4	21-46	YEL-GRN	Lamp Col 50 (Q97) / J8-7	
21-1-1	WHT-ORG	Switch Row 47 / J7-3	21-47	YEL-GRN	Lamp Col 51 (Q98) / J8-6	
21-1-1	WHT-ORG	Switch Row 48 / J7-2	21-48	YEL-GRN	Lamp Col 52 (Q99) / J8-5	
21-1-1	WHT-ORG	Switch Row 49 / J7-1	21-49	YEL-GRN	Lamp Col 53 (Q100) / J8-4	
21-1-1	WHT-ORG	Switch Row 50 / J7-0	21-50	YEL-GRN	Lamp Col 54 (Q101) / J8-3	
21-1-1	WHT-ORG	Switch Row 51 / J6-9	21-51	YEL-GRN	Lamp Col 55 (Q102) / J8-2	
21-1-1	WHT-ORG	Switch Row 52 / J6-8	21-52	YEL-GRN	Lamp Col 56 (Q103) / J8-1	
21-1-1	WHT-ORG	Switch Row 53 / J6-7	21-53	YEL-GRN	Lamp Col 57 (Q104) / J8-0	
21-1-1	WHT-ORG	Switch Row 54 / J6-6	21-54	YEL-GRN	Lamp Col 58 (Q105) / J7-9	
21-1-1	WHT-ORG	Switch Row 55 / J6-5	21-55	YEL-GRN	Lamp Col 59 (Q106) / J7-8	
21-1-1	WHT-ORG	Switch Row 56 / J6-4	21-56	YEL-GRN	Lamp Col 60 (Q107) / J7-7	
21-1-1	WHT-ORG	Switch Row 57 / J6-3	21-57	YEL-GRN	Lamp Col 61 (Q108) / J7-6	
21-1-1	WHT-ORG	Switch Row 58 / J6-2	21-58	YEL-GRN	Lamp Col 62 (Q109) / J7-5	
21-1-1	WHT-ORG	Switch Row 59 / J6-1	21-59	YEL-GRN	Lamp Col 63 (Q110) / J7-4	
21-1-1	WHT-ORG	Switch Row 60 / J6-0	21-60	YEL-GRN	Lamp Col 64 (Q111) / J7-3	
21-1-1	WHT-ORG	Switch Row 61 / J5-9	21-61	YEL-GRN	Lamp Col 65 (Q112) / J7-2	
21-1-1	WHT-ORG	Switch Row 62 / J5-8	21-62	YEL-GRN	Lamp Col 66 (Q113) / J7-1	
21-1-1	WHT-ORG	Switch Row 63 / J5-7	21-63	YEL-GRN	Lamp Col 67 (Q114) / J7-0	
21-1-1	WHT-ORG	Switch Row 64 / J5-6	21-64	YEL-GRN	Lamp Col 68 (Q115) / J6-9	
21-1-1	WHT-ORG	Switch Row 65 / J5-5	21-65	YEL-GRN	Lamp Col 69 (Q116) / J6-8	
21-1-1	WHT-ORG	Switch Row 66 / J5-4	21-66	YEL-GRN	Lamp Col 70 (Q117) / J6-7	
21-1-1	WHT-ORG	Switch Row 67 / J5-3	21-67	YEL-GRN	Lamp Col 71 (Q118) / J6-6	
21-1-1	WHT-ORG	Switch Row 68 / J5-2	21-68	YEL-GRN	Lamp Col 72 (Q119) / J6-5	
21-1-1	WHT-ORG	Switch Row 69 / J5-1	21-69	YEL-GRN	Lamp Col 73 (Q120) / J6-4	
21-1-1	WHT-ORG	Switch Row 70 / J5-0	21-70	YEL-GRN	Lamp Col 74 (Q121) / J6-3	
21-1-1	WHT-ORG	Switch Row 71 / J4-9	21-71	YEL-GRN	Lamp Col 75 (Q122) / J6-2	
21-1-1	WHT-ORG	Switch Row 72 / J4-8	21-72	YEL-GRN	Lamp Col 76 (Q123) / J6-1	
21-1-1	WHT-ORG	Switch Row 73 / J4-7	21-73	YEL-GRN	Lamp Col 77 (Q124) / J6-0	
21-1-1	WHT-ORG	Switch Row 74 / J4-6	21-74	YEL-GRN	Lamp Col 78 (Q125) / J5-9	
21-1-1	WHT-ORG	Switch Row 75 / J4-5	21-75	YEL-GRN	Lamp Col 79 (Q126) / J5-8	
21-1-1	WHT-ORG	Switch Row 76 / J4-4	21-76	YEL-GRN	Lamp Col 80 (Q127) / J5-7	
21-1-1	WHT-ORG	Switch Row 77 / J4-3	21-77	YEL-GRN	Lamp Col 81 (Q128) / J5-6	
21-1-1	WHT-ORG	Switch Row 78 / J4-2	21-78	YEL-GRN	Lamp Col 82 (Q129) / J5-5	
21-1-1	WHT-ORG	Switch Row 79 / J4-1	21-79	YEL-GRN	Lamp Col 83 (Q130) / J5-4	
21-1-1	WHT-ORG	Switch Row 80 / J4-0	21-80	YEL-GRN	Lamp Col 84 (Q131) / J5-3	
21-1-1	WHT-ORG	Switch Row 81 / J3-9	21-81	YEL-GRN	Lamp Col 85 (Q132) / J5-2	
21-1-1	WHT-ORG	Switch Row 82 / J3-8	21-82	YEL-GRN	Lamp Col 86 (Q133) / J5-1	
21-1-1	WHT-ORG	Switch Row 83 / J3-7	21-83	YEL-GRN	Lamp Col 87 (Q134) / J5-0	
21-1-1	WHT-ORG	Switch Row 84 / J3-6	21-84	YEL-GRN	Lamp Col 88 (Q135) / J4-9	
21-1-1	WHT-ORG	Switch Row 85 / J3-5	21-85	YEL-GRN	Lamp Col 89 (Q136) / J4-8	
21-1-1	WHT-ORG	Switch Row 86 / J3-4	21-86	YEL-GRN	Lamp Col 90 (Q137) / J4-7	
21-1-1	WHT-ORG	Switch Row 87 / J3-3	21-87	YEL-GRN	Lamp Col 91 (Q138) / J4-6	
21-1-1	WHT-ORG	Switch Row 88 / J3-2	21-88	YEL-GRN	Lamp Col 92 (Q139) / J4-5	
21-1-1	WHT-ORG	Switch Row 89 / J3-1	21-89	YEL-GRN	Lamp Col 93 (Q140) / J4-4	
21-1-1	WHT-ORG	Switch Row 90 / J3-0	21-90	YEL-GRN	Lamp Col 94 (Q141) / J4-3	
21-1-1	WHT-ORG	Switch Row 91 / J2-9	21-91	YEL-GRN	Lamp Col 95 (Q142) / J4-2	
21-1-1	WHT-ORG	Switch Row 92 / J2-8	21-92	YEL-GRN	Lamp Col 96 (Q143) / J4-1	
21-1-1	WHT-ORG	Switch Row 93 / J2-7	21-93	YEL-GRN	Lamp Col 97 (Q144) / J4-0	
21-1-1	WHT-ORG	Switch Row 94 / J2-6	21-94	YEL-GRN	Lamp Col 98 (Q145) / J3-9	
21-1-1	WHT-ORG	Switch Row 95 / J2-5	21-95	YEL-GRN	Lamp Col 99 (Q146) / J3-8	
21-1-1	WHT-ORG	Switch Row 96 / J2-4	21-96	YEL-GRN	Lamp Col 100 (Q147) / J3-7	
21-1-1	WHT-ORG	Switch Row 97 / J2-3	21-97	YEL-GRN	Lamp Col 101 (Q148) / J3-6	
21-1-1	WHT-ORG	Switch Row 98 / J2-2	21-98	YEL-GRN	Lamp Col 102 (Q149) / J3-5	
21-1-1	WHT-ORG	Switch Row 99 / J2-1	21-99	YEL-GRN	Lamp Col 103 (Q150) / J3-4	
21-1-1	WHT-ORG	Switch Row 100 / J2-0	21-100	YEL-GRN	Lamp Col 104 (Q151) / J3-3	
21-1-1	WHT-ORG	Switch Row 101 / J1-9	21-101	YEL-GRN	Lamp Col 105 (Q152) / J3-2	
21-1-1	WHT-ORG	Switch Row 102 / J1-8	21-102	YEL-GRN	Lamp Col 106 (Q153) / J3-1	
21-1-1	WHT-ORG	Switch Row 103 / J1-7	21-103	YEL-GRN	Lamp Col 107 (Q154) / J3-0	
21-1-1	WHT-ORG	Switch Row 104 / J1-6	21-104	YEL-GRN	Lamp Col 108 (Q155) / J2-9	
21-1-1	WHT-ORG	Switch Row 105 / J1-5	21-105	YEL-GRN	Lamp Col 109 (Q156) / J2-8	
21-1-1	WHT-ORG	Switch Row 106 / J1-4	21-106	YEL-GRN	Lamp Col 110 (Q157) / J2-7	
21-1-1	WHT-ORG	Switch Row 107 / J1-3	21-107	YEL-GRN	Lamp Col 111 (Q158) / J2-6	
21-1-1	WHT-ORG	Switch Row 108 / J1-2	21-108	YEL-GRN	Lamp Col 112 (Q159) / J2-5	
21-1-1	WHT-ORG	Switch Row 109 / J1-1	21-109	YEL-GRN	Lamp Col 113 (Q160) / J2-4	
21-1-1	WHT-ORG	Switch Row 110 / J1-0	21-110	YEL-GRN	Lamp Col 114 (Q161) / J2-3	
21-1-1	WHT-ORG	Switch Row 111 / J0-9	21-111	YEL-GRN	Lamp Col 115 (Q162) / J2-2	
21-1-1	WHT-ORG	Switch Row 112 / J0-8	21-112	YEL-GRN	Lamp Col 116 (Q163) / J2-1	
21-1-1	WHT-ORG	Switch Row 113 / J0-7	21-113	YEL-GRN	Lamp Col 117 (Q164) / J2-0	
21-1-1	WHT-ORG	Switch Row 114 / J0-6	21-114	YEL-GRN	Lamp Col 118 (Q165) / J1-9	
21-1-1	WHT-ORG	Switch Row 115 / J0-5	21-115	YEL-GRN	Lamp Col 119 (Q166) / J1-8	
21-1-1	WHT-ORG	Switch Row 116 / J0-4	21-116	YEL-GRN	Lamp Col 120 (Q167) / J1-7	
21-1-1	WHT-ORG	Switch Row 117 / J0-3	21-117	YEL-GRN	Lamp Col 121 (Q168) / J1-6	
21-1-1	WHT-ORG	Switch Row 118 / J0-2	21-118	YEL-GRN	Lamp Col 122 (Q169) / J1-5	
21-1-1	WHT-ORG	Switch Row 119 / J0-1	21-119	YEL-GRN	Lamp Col 123 (Q170) / J1-4	
21-1-1	WHT-ORG	Switch Row 120 / J0-0	21-120	YEL-GRN	Lamp Col 124 (Q171) / J1-3	
21-1-1	WHT-ORG	Switch Row 121 / J-9	21-121	YEL-GRN	Lamp Col 125 (Q172) / J1-2	
21-1-1	WHT-ORG	Switch Row 122 / J-8	21-122	YEL-GRN	Lamp Col 126 (Q173) / J1-1	
21-1-1	WHT-ORG	Switch Row 123 / J-7	21-123	YEL-GRN	Lamp Col 127 (Q174) / J1-0	
21-1-1	WHT-ORG	Switch Row 124 / J-6	21-124	YEL-GRN	Lamp Col 128 (Q175) / J0-9	
21-1-1	WHT-ORG	Switch Row 125 / J-5	21-125	YEL-GRN	Lamp Col 129 (Q176) / J0-8	
21-1-1	WHT-ORG	Switch Row 126 / J-4	21-126	YEL-GRN	Lamp Col 130 (Q177) / J0-7	
21-1-1	WHT-ORG	Switch Row 127 / J-3	21-127	YEL-GRN	Lamp Col 131 (Q178) / J0-6	
21-1-1	WHT-ORG	Switch Row 128 / J-2	21-128	YEL-GRN	Lamp Col 132 (Q179) / J0-5	
21-1-1	WHT-ORG	Switch Row 129 / J-1	21-129	YEL-GRN	Lamp Col 133 (Q180) / J0-4	
21-1-1	WHT-ORG	Switch Row 130 / J-0	21-130	YEL-GRN	Lamp Col 134 (Q181) / J0-3	
21-1-1	WHT-ORG	Switch Row 131 / J-9	21-131	YEL-GRN	Lamp Col 135 (Q182) / J0-2	
21-1-1	WHT-ORG	Switch Row 132 / J-8	21-132	YEL-GRN	Lamp Col 136 (Q183) / J0-1	
21-1-1	WHT-ORG	Switch Row 133 / J-7	21-133	YEL-GRN	Lamp Col 137 (Q184) / J0-0	
21-1-1	WHT-ORG	Switch Row 134 / J-6	21-134	YEL-GRN	Lamp Col 138 (Q185) / J-9	
21-1-1	WHT-ORG	Switch Row 135 / J-5	21-135	YEL-GRN	Lamp Col 139 (Q186) / J-8	
21-1-1	WHT-ORG	Switch Row 136 / J-4	21-136	YEL-GRN	Lamp Col 140 (Q187) / J-7	
21-1-1	WHT-ORG	Switch Row 137 / J-3	21-137	YEL-GRN	Lamp Col 141 (Q188) / J-6	
21-1-1	WHT-ORG	Switch Row 138 / J-2	21-138	YEL-GRN	Lamp Col 142 (Q189) / J-5	
21-1-1	WHT-ORG	Switch Row 139 / J-1	21-139	YEL-GRN	Lamp Col 143 (Q190) / J-4	
21-1-1	WHT-ORG	Switch Row 140 / J-0	21-140	YEL-GRN	Lamp Col 144 (Q191) / J-3	
21-1-1	WHT-ORG	Switch Row 141 / J-9	21-141	YEL-GRN	Lamp Col 145 (Q192) / J-2	
21-1-1	WHT-ORG	Switch Row 142 / J-8	21-142	YEL-GRN	Lamp Col 146 (	

Diagnostic Test Flowchart



DIAGNOSTIC TEST FLOWCHART (SIDE 1)

Diagnostic Test Flowchart Side 2

