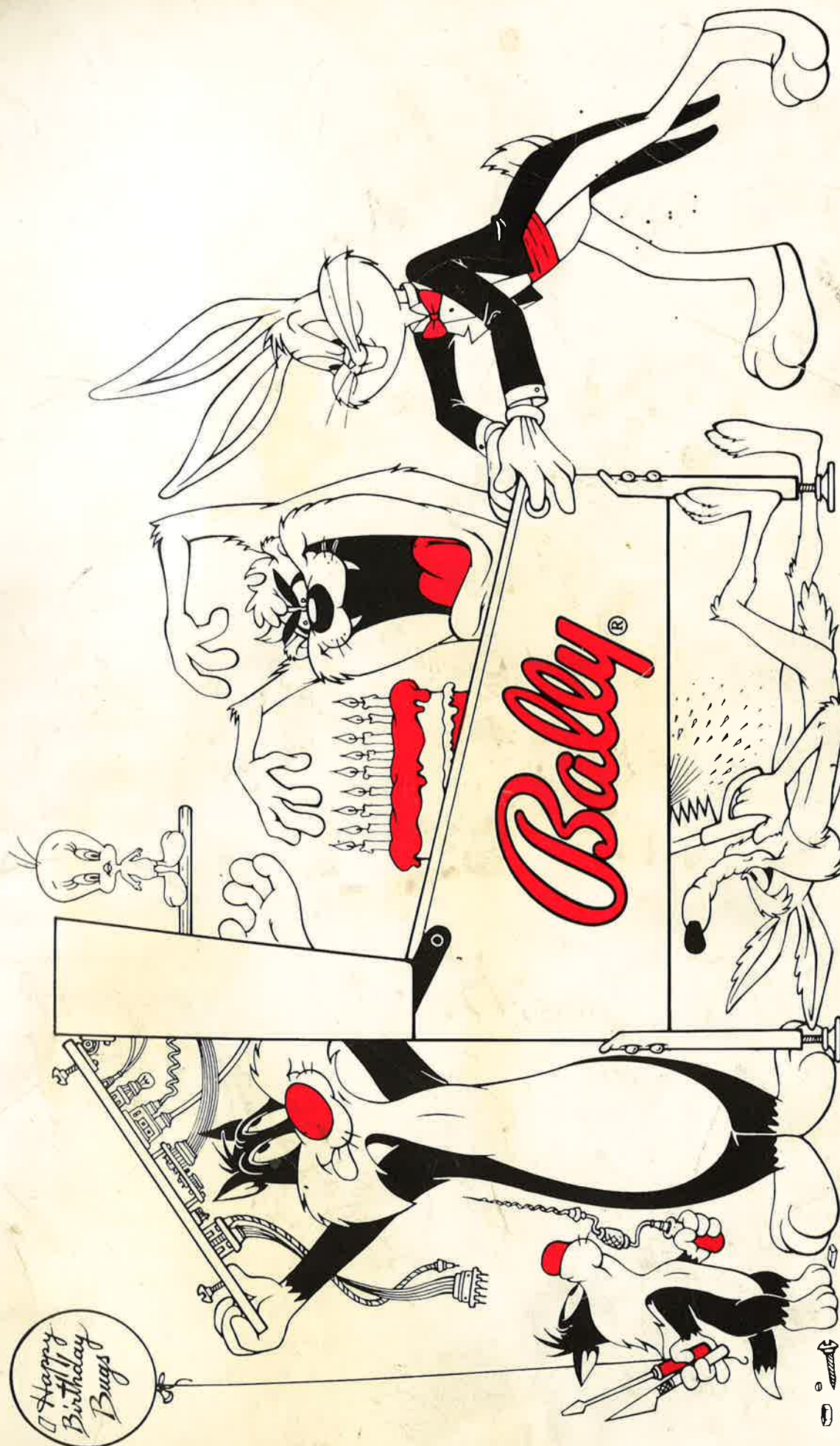




BUGS BUNNY'S BIRTHDAY BALL OPERATIONS MANUAL

* Game Operation & Adjustments * Game Testing & Problem Diagnosis

* Parts Information * Reference Diagrams & Schematics

MIDWAY MANUFACTURING COMPANY
3401 N. CALIFORNIA AVE.
CHICAGO, IL 60618

Bugs Bunny's Birthday Ball

Solenoid Table

Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trmr	Solenoid Part Number Flashlamp Type g=B'glass; p=P'field
				CPU Bd	Playfield/ Cabinet		
01A ³	Outhole Kicker	Switched	Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800
01C ³	Left Ramp Flash	Switched	Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#89/906 flashlamps 2p
02A ³	Shooter Lane Feeder	Switched	Vio-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	SM-26-600-DC
02C ³	Standup by "L" Flash	Switched	Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89/906 flashlamps 1p,1g
03A ³	Not Used	Switched	Vio-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200
03C ³	50 Million Flash	Switched	Blk-Orn	(Gry-Orn)	5J5-7(C)	Q32	#89/906 flashlamps 1p,1g
04A ³	Not Used	Switched	Vio-Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800
04C ³	Tazz Ramp Flash	Switched	Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89/906 flashlamps 1p,1g
05A ³	Eject Hole	Switched	Vio-Grn	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800
05C ³	Standup by R Dr Tgt Flash	Switched	Blk-Grn	(Gry-Grn)	5J5-4 (C)	Q31	#89/906 flashlamps 1p,1g
06A ³	R Dr Tgt Bank Reset	Switched	Vio-Blu	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800
06C ³	Bug's Face Flash	Switched	Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89/906 flashlamps 1p,1g
07A ³	Knocker (In Backbox)	Switched	Vio-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800
07C ³	Top Left Flash	Switched	Blk-Vio	(Gry-Vio)	5J5-2 (C)	Q30	#89/906 flashlamps 1p,1g
08A ³	Not Used	Switched	Vio-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22	
08C ³	Right Back Panel Flash	Switched	Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89/906 flashlamps 1p,1g
09	LOONEY Relay	Controlled	Brn-Blk	1P12-1	5J2-9:5J6-9:2J4-10	Q17	5580-09555-014 ^a
10	Pf'ld Illum Relay	Controlled	Brn-Red	1P12-2	5J2-8:5J6-8:2J4-11	Q9	5580-09555-014 ^a
11	Insert Illum Relay	Controlled	Brn-Orn	1P12-4	5J2-6:5J6-7:2J4-12	Q16	5580-09555-014 ^a
12	A/C Select Relay	Controlled	Brn-Yel	1P12-5	5J2-5	Q8	5580-09555-015
13	Ball Launcher	Controlled	Brn-Grn	1P12-6	5J2-4:5J6-5:2J4-13	Q15	AE-23-800
14	L Outlane Kickback	Controlled	Brn-Blu	1P12-7	5J2-3:5J6-3:2J4-14	Q7	AE-23-800
15	Top Sling	Controlled	Brn-Vio	1P12-8	2J4-15: 2J11-2	Q14	AE-26-1200
16	TUNES Relay	Controlled	Brn-Gry	1P12-9	2J4-16: 2J11-1	Q6	5580-09555-014 ^a
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-26-1200
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-26-1200
21	Lower 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	AE-23-800
-	Right Flippers	-	Orn-Vio	1P19-1	2J5-5: 2J10-7	-	
-	Lower Right Flipper	-	(Blu-Vio) ²	-	(2J10-1: 2J8-15)	-	FL11630/50VDC
-	Upper Right Flipper	-	(Blk-Yel) ²	-	(2J10-3: 2J8-13)	-	FL11630/50VDC
-	Left Flipper	-	Orn-Gry ²	1P19-2	2J5-4: 2J10-8	-	
-	Lower Left Flipper	-	(Blu-Gry) ²	-	(2J10-2: 2J8-14)	-	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 on cabinet. 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 Board, which controls the device pulsing by Sol. 12. 4. Relay is mounted on Relay Board: (4a) p/n C-11998-1; (4b) p/n C-11902-1. 5. Relay is mounted on Aux Power Driver Bd, D-12247, in the backbox.

BUG BUNNY'S BIRTHDAY BALL JUMPER TABLE

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,
Radical	5400-09150-00	A-5343-2015-2	A-5343-2015-1	Not Used	Not Used	Not Used	W1, 2, 4, 5, 7, 11, 14, 16,
Bugs Bunny's Birthday Ball	5400-09150-00	A-5343-20009-2	A-5343-20009-1	Not Used	Not Used	Not Used	W1, 2, 4, 5, 7, 11, 14, 16,

BUGS BUNNY'S BIRTHDAY BALL

**PLAYFIELD SHOT MAPS
&
RULES**

BUGS BUNNY'S BIRTHDAY BALL RULES

- 1) Light all three top R.O. Lanes (P-O-P) to Advance Bonus Multiplier.
- 2) Try to time the Shooter Lane Plunger Shot to Score 500K & Advance Bonus Multiplier, 100K, 50K, or 10K. For the remainder of the ball in play, Spinner Rotates Lit Value of Top Stand-up Target.
- 3) Completing the reversed 3 Stand-up (square) Targets Lights & Advances "Tweety Bonus" ramp (range 50K to 1Million).
- 4) Shoot flashing reversed 2 Stand-up (round) Targets to flash Captured Ball Shot. Shoot flashing Captured Ball for Score of 500K. Shooting Captured Ball at any time re-lights "Speedy" Ball Kickout.
- 5) Shoot flashing "L-O-O-N-E-Y T-U-N-E-S" Targets to start blinking one (of two) Lower Stand-up (square) Targets. Shoot the flashing Target to Score 1 Million.
- 6) Drop Target Bank Spots a letter in "LOONEY TUNES" if all Targets are completed before timed reset. 50K for hitting outside targets when flashing.
- 7) Left Return Lane flashes Spinner for a time period. Score 50K when flashing (Spinner).
- 8) Shoot Center Ramp to collect "SHOPPING SPREE" package (50K, 100K, 250K, 500K, lite extra ball).
- 9) After collecting "SHOPPING SPREE" package, continued scoring in Thumper Bumper area Advances Playfield Bonus. Exiting area discontinues Bonus Advance.
- 10) Eject Hole - blow out random number of Candles On Cake. Score depends on how many candles are blown out (eg. 4 candles = 40K). On player's last ball, a chance for 50 Million Score is available when All candles are blown out. This is a timed shot back into the Eject Hole
- 11) A "SURPRISE PACKAGE" is awarded to each player as his last ball drains. Option 1: Keep "SURPRISE PACKAGE" (Press Left Flipper), or Option 2: Pass "SURPRISE PACKAGE" away or to next player in multi-player game (Press Right Flipper). If No Flipper is pressed during time period, game defaults to "Keep". (Operator option, instead of "MATCH" feature).
- 12) Award "EXTRA BALL" by scoring lit return or drain rollover.

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SECTION 2

Game Parts Information

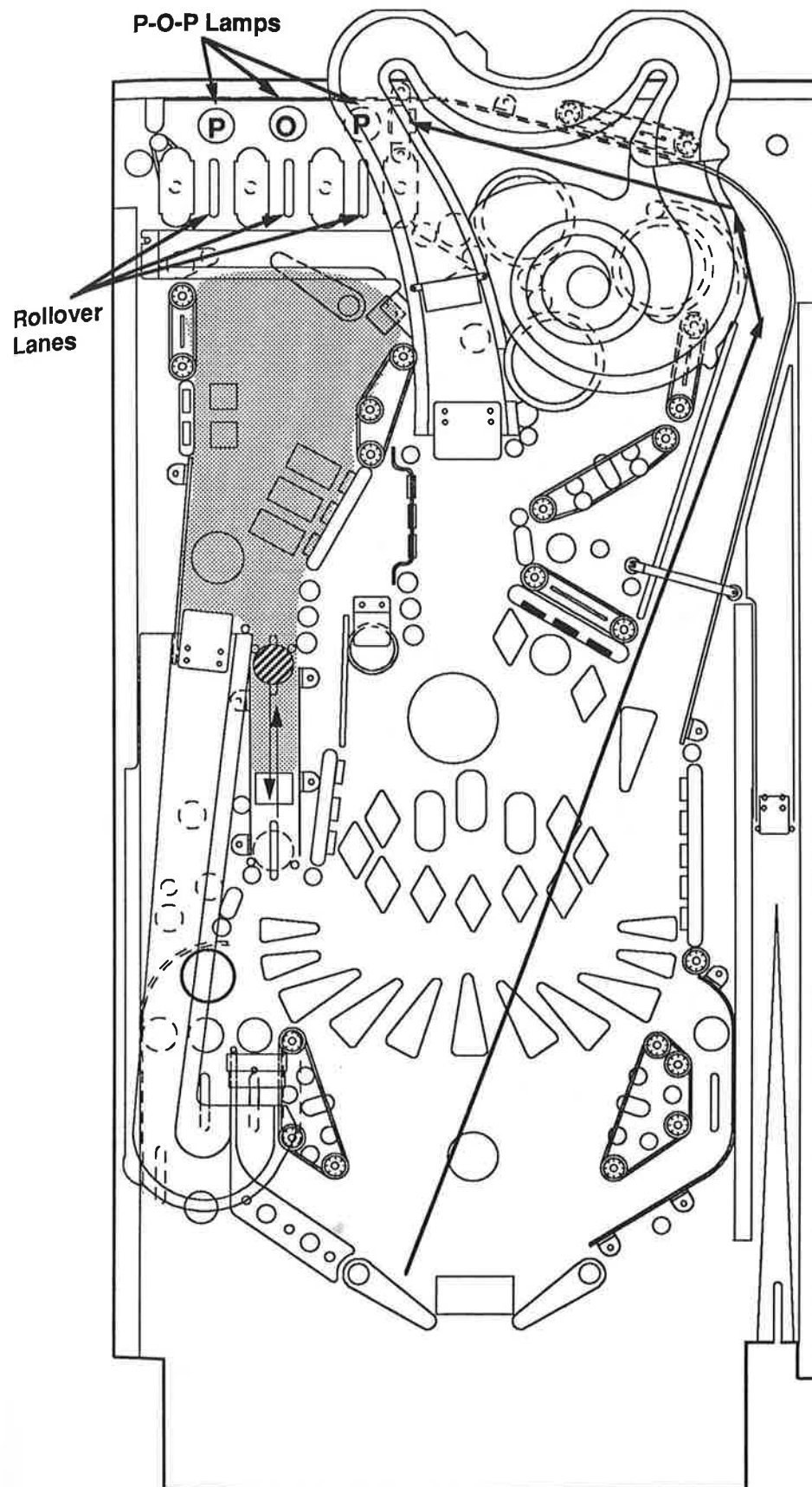
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BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS



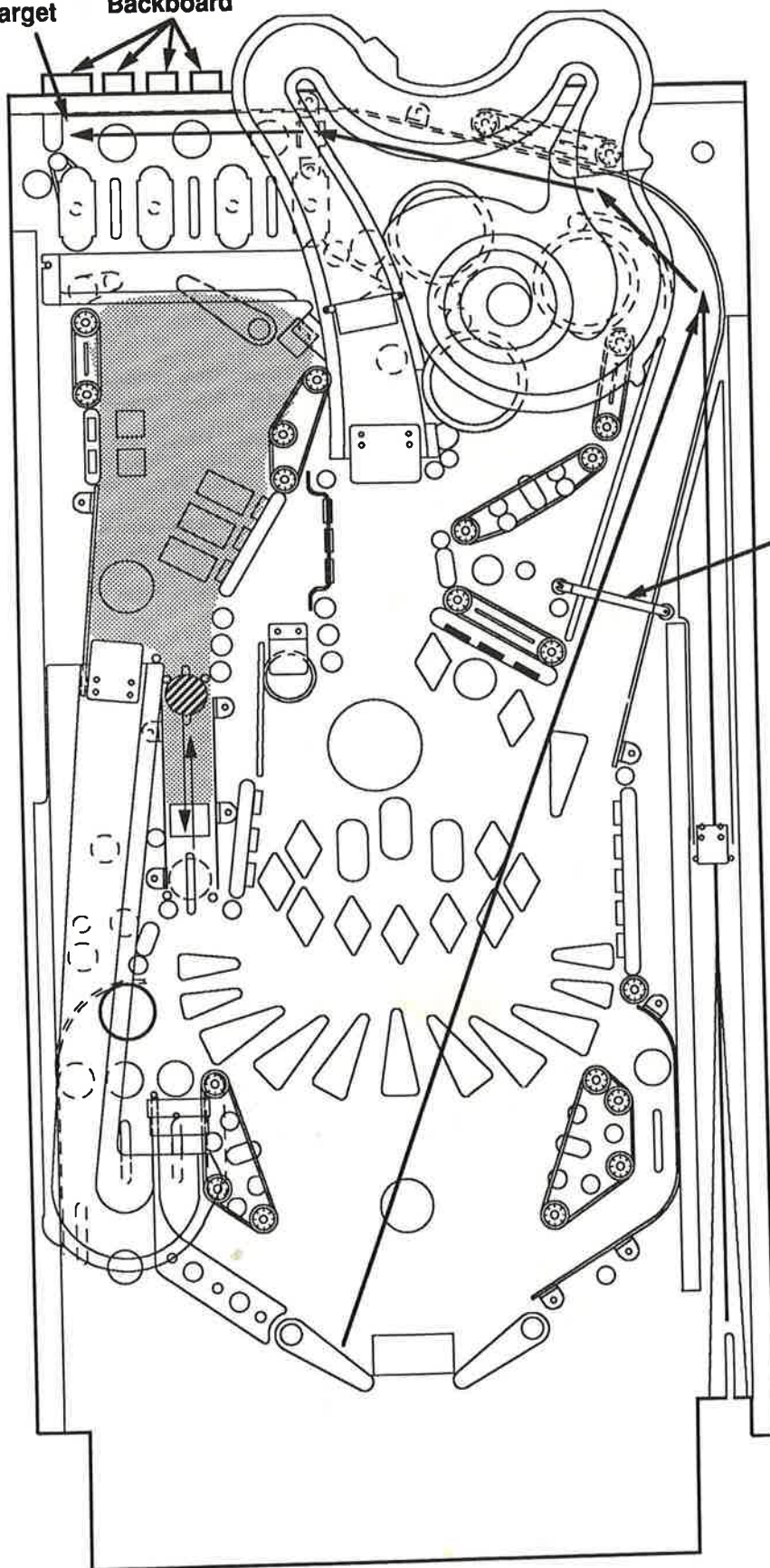
Lighting the rollover lanes (P-O-P):

Light all three top rollover lanes
(P-O-P) to advance Bonus
Multiplier.

BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS

Stand-up
Target

Lit Values on
Backboard

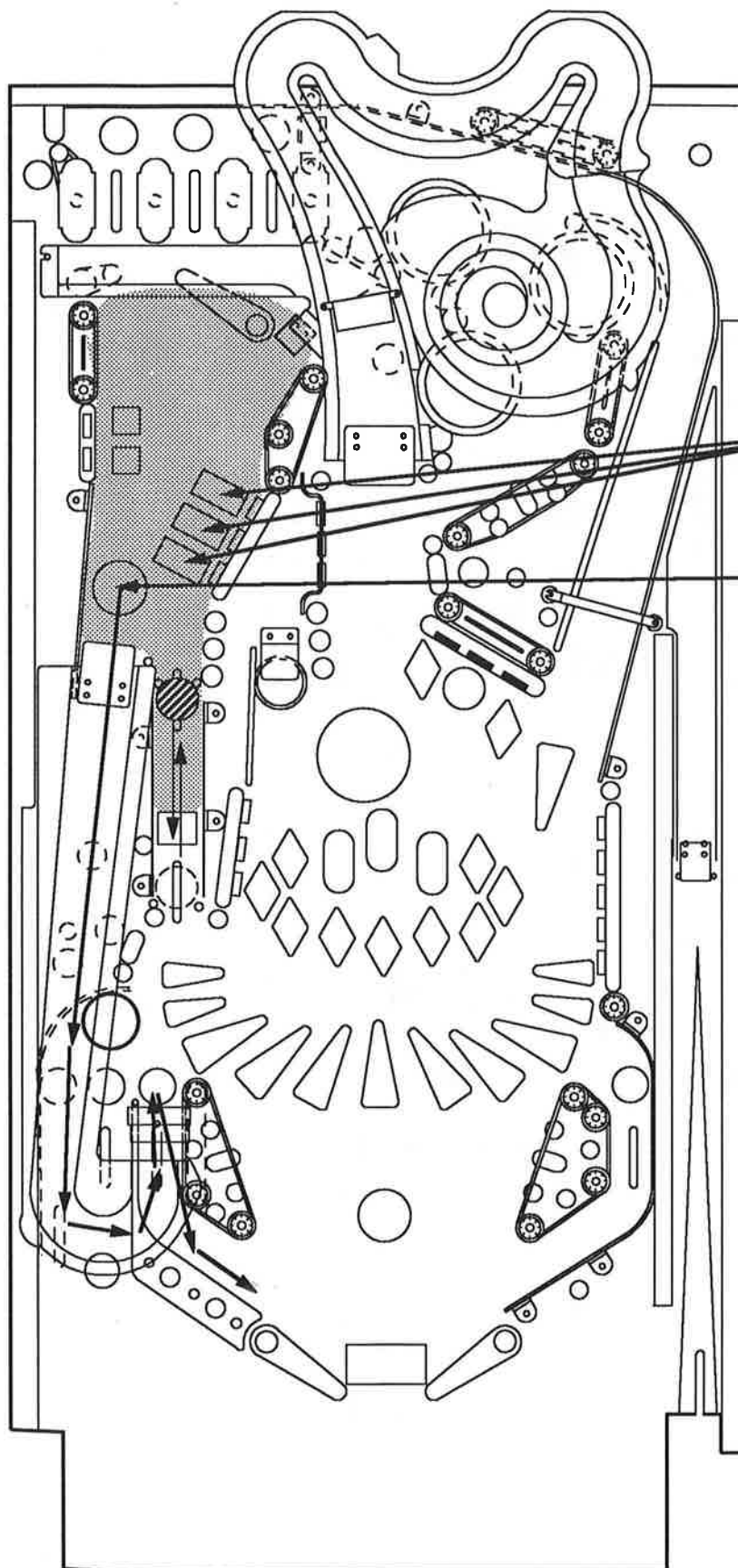


Shooter Lane Plunger Shot:

Try to time the Shooter Lane Plunger shot to score 500K & advance Bonus Multiplier, 100K, 50K, or 10K. For the remainder of ball in play, spinner rotates lit value of top stand-up target.

Spinner

BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS



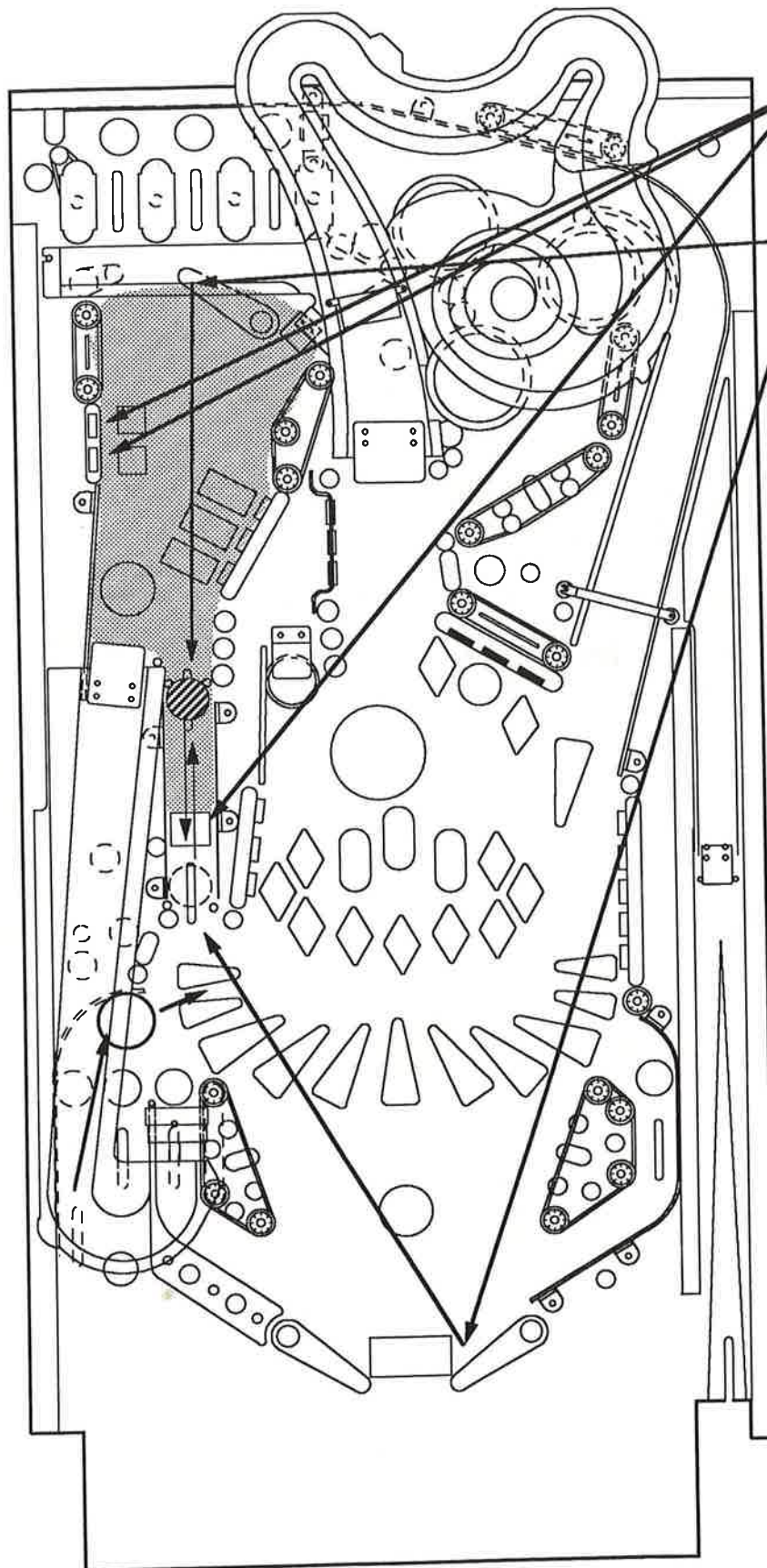
Reversed 3-Bank & Tweety Bonus Shots:

Shoot lit target to Advance
"Tweety Bonus" ramp (range:
50K to 1 Million).

Reversed (3) stand-up
targets

"Tweety Bonus" lamp
& ramp

BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS



Captured Ball / Stand-up Target Shot

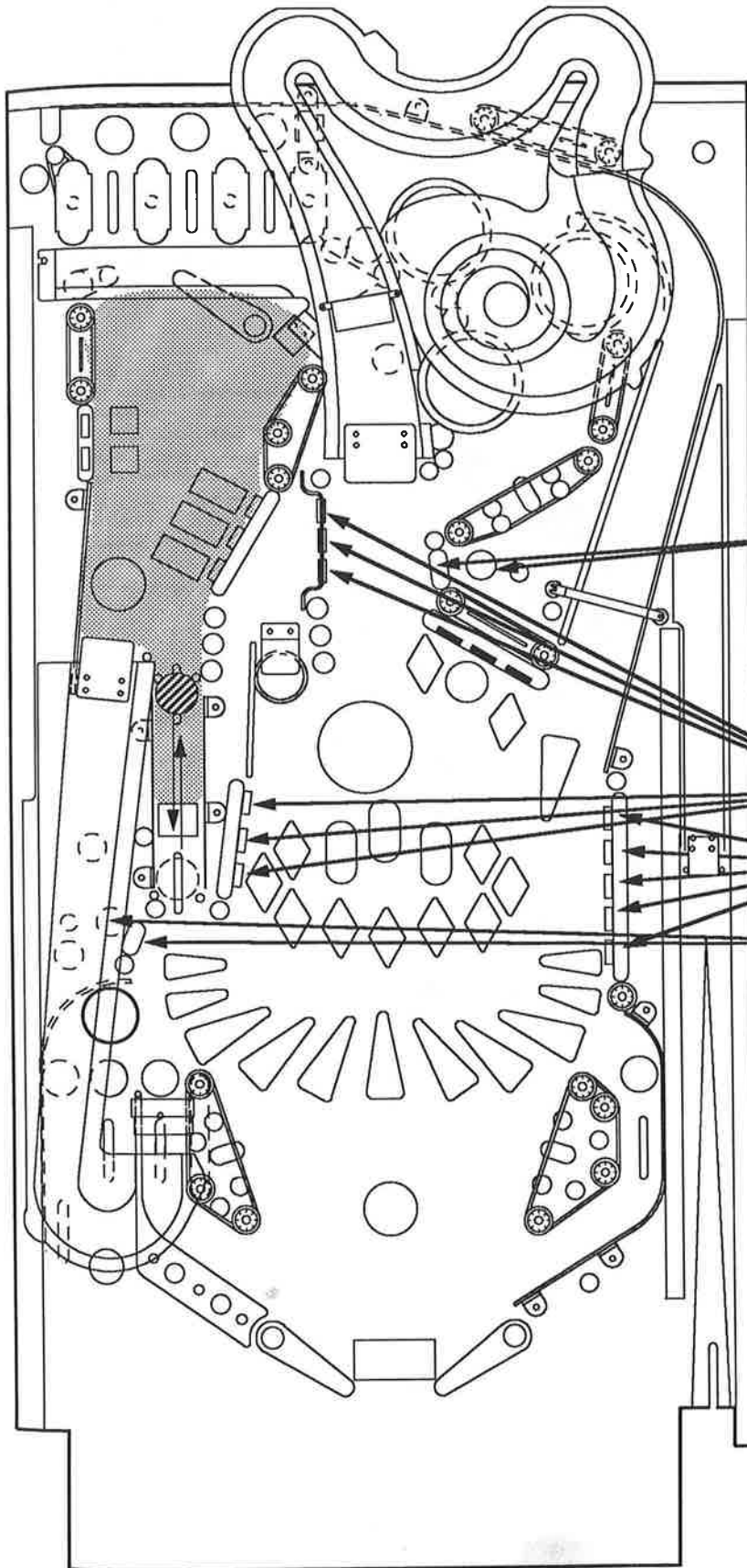
Shoot flashing reversed 3
stand-up (round) targets to
flash Captured Ball shot.

Shoot flashing Captured Ball
for score of 500K. Shooting
Captured Ball at any time
relights "Speedy" ball kick

BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS

1 Million Shot:

Shoot flashing "L-O-O-N-E-Y
T-U-N-E-S" targets to start
blinking one (of two) lower
stand-up (square) targets.



Million Target & Flasher

L-O-O-N-E-Y targets

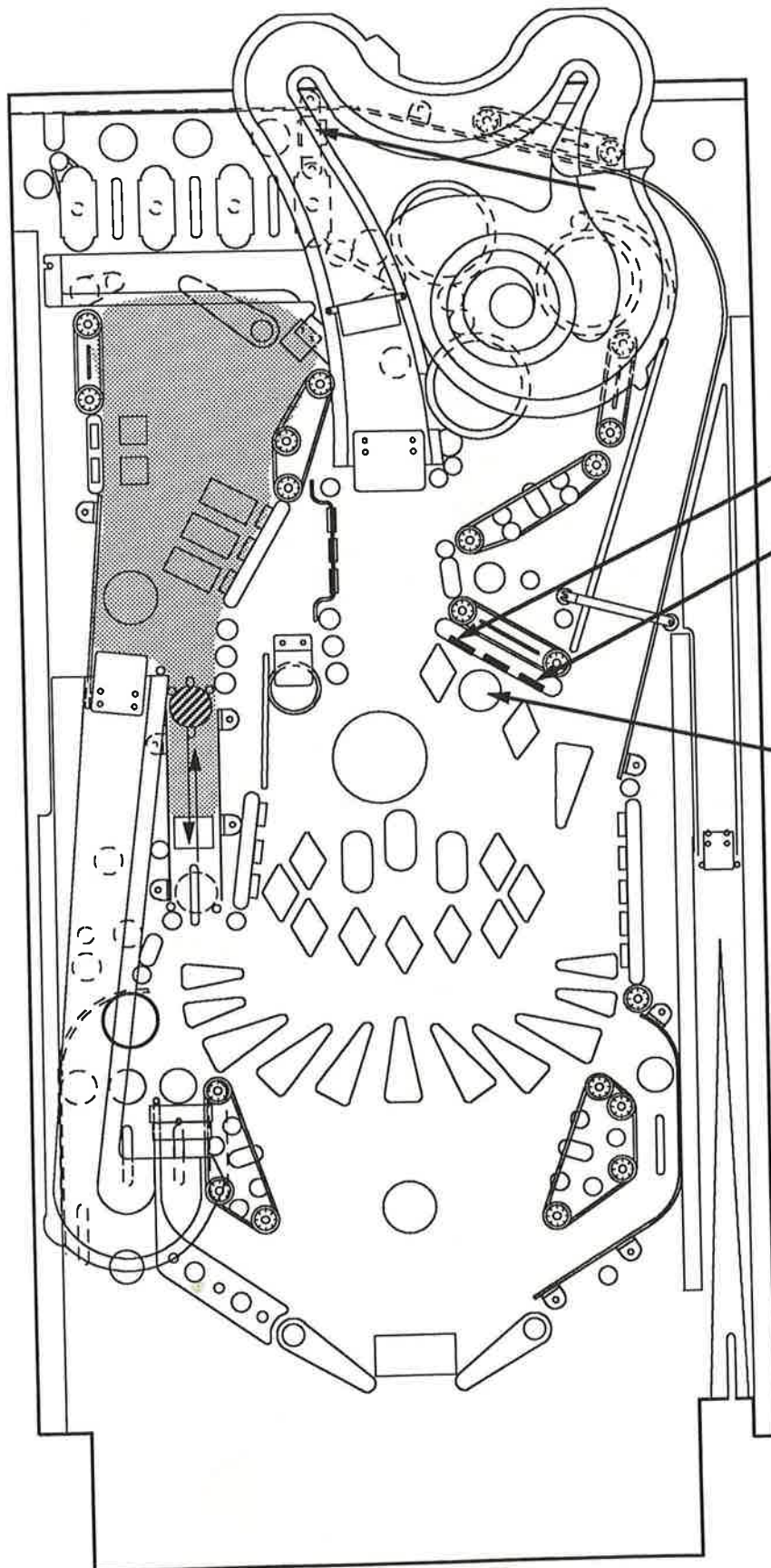
T-U-N-E-S targets

Million Target & Flasher

BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS

3 Bank Drop Target Shot:

Drop target bank spots a letter in "LOONEY TUNES" all targets are completed before timed reset. 50K awarded for hitting outside targets when flashing.



50K When Flashing

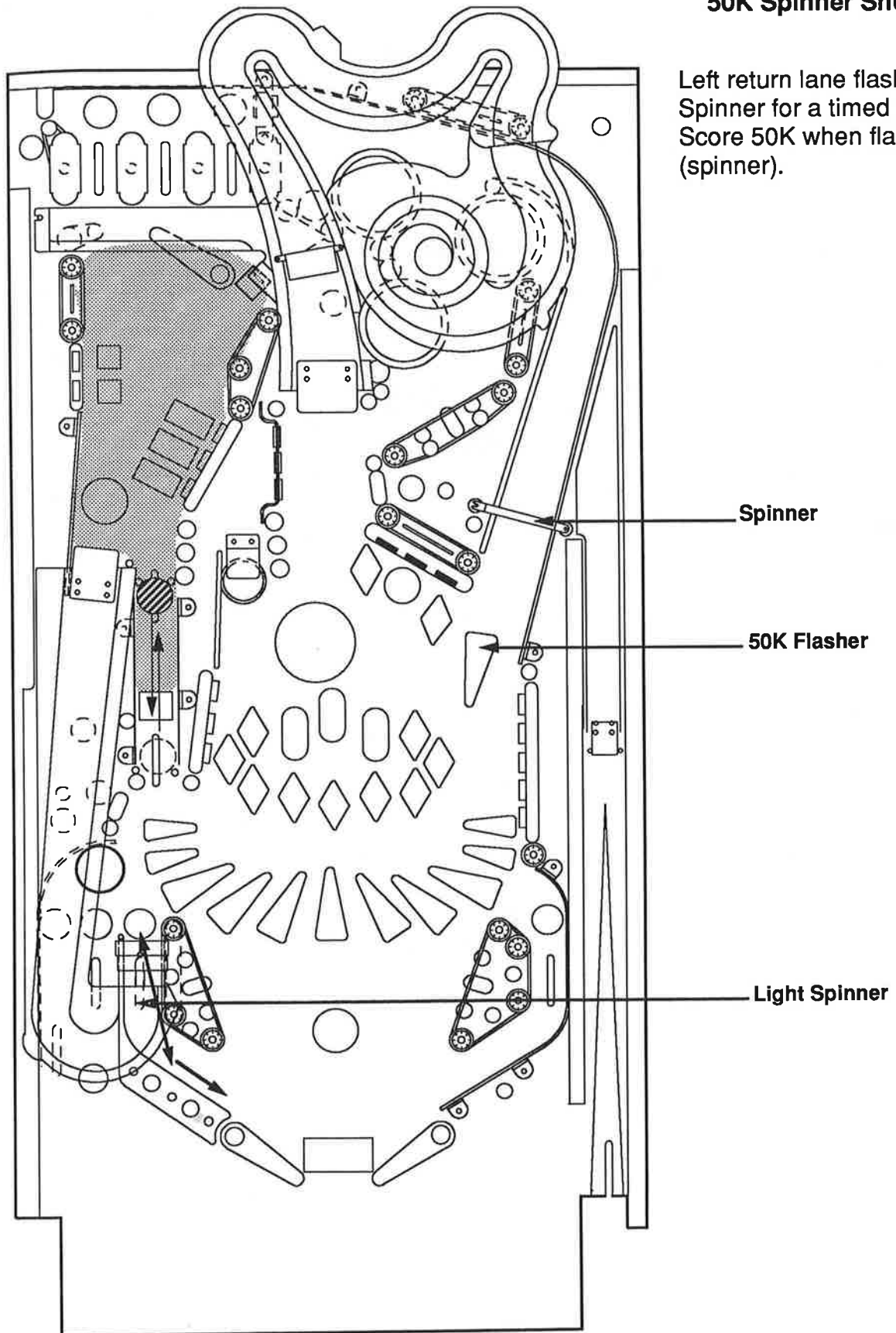
50K When Flashing

Timer Lamp

BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS

50K Spinner Shot:

Left return lane flashes
Spinner for a timed period.
Score 50K when flashing
(spinner).



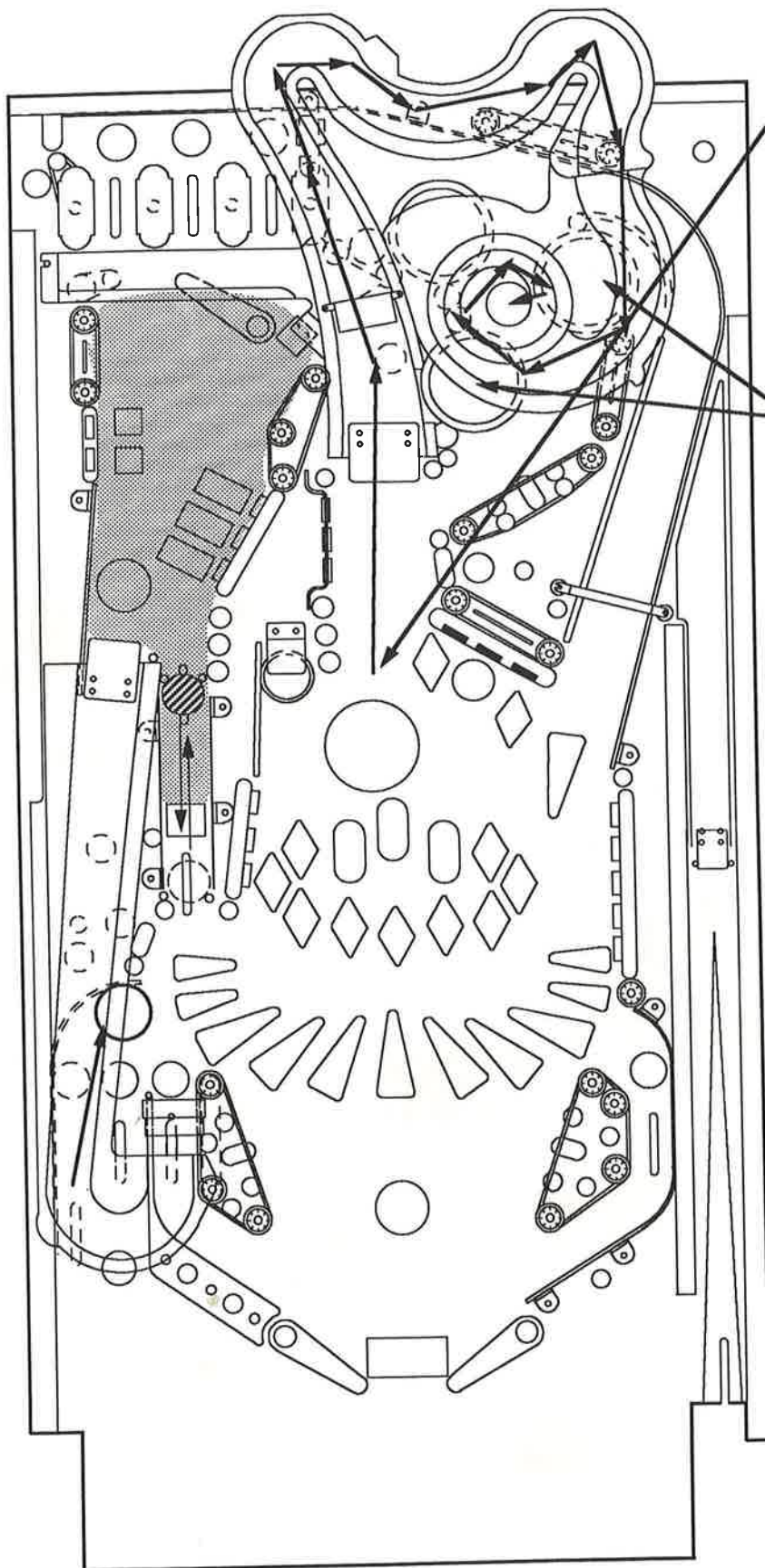
BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS

Shopping Spree Shot:

Shoot center ramp to collect "SHOPPING SPREE" package (10pts., 5K, 50K, 500K, Lite Extra Ball).

Playfield Bonus Advance Shot:

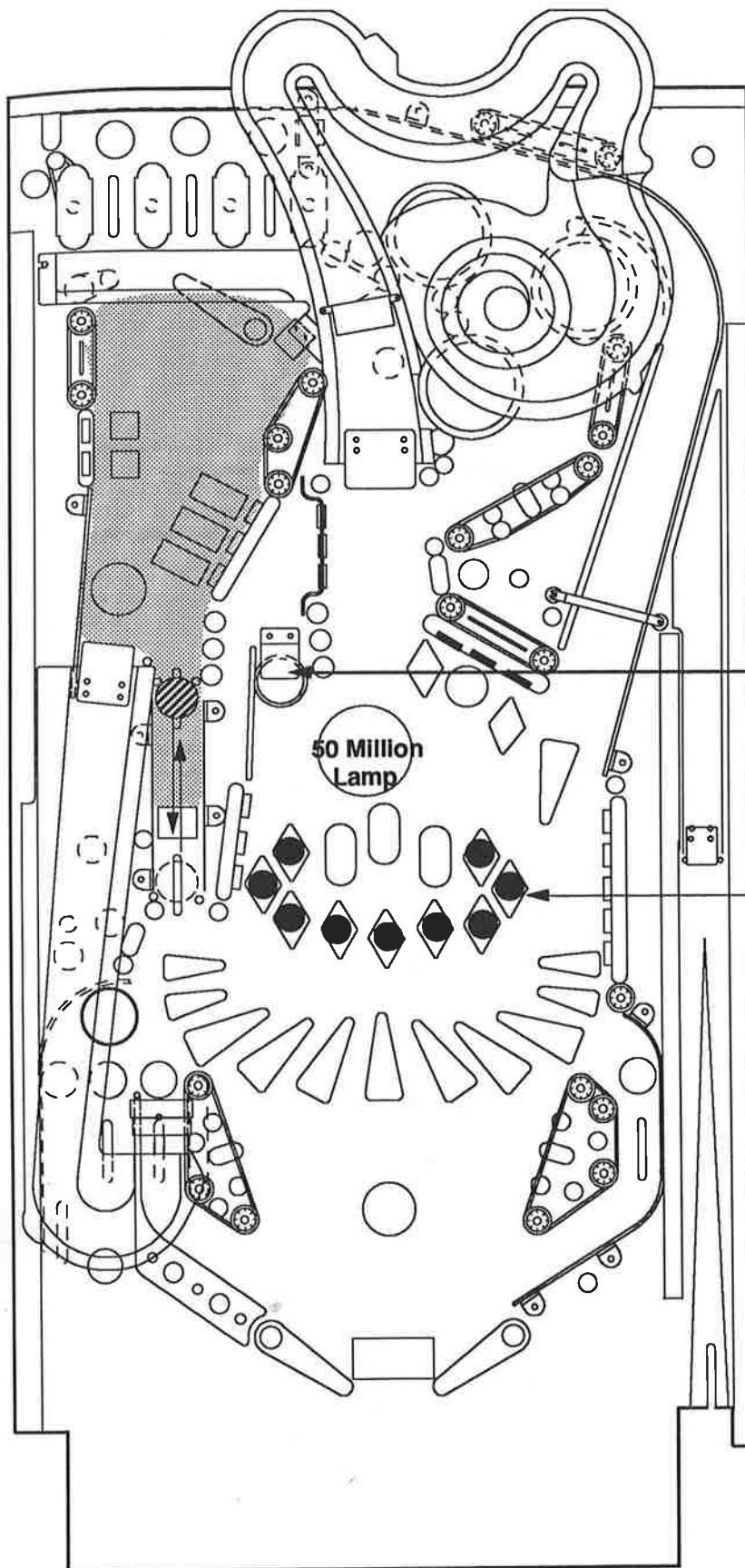
After collecting "SHOPPING SPREE", continued scoring in the Thumper Bumper area Advances Playfield Bonus. Exiting this area discontinues Bonus Advance.



BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS

Eject Hole / 50 Million Shot:

Eject Hole - Blow out random number of candles on cake. Score depends on how many candles are blown out (eg. 4 candles = 40K). On player's last ball, a chance for 50 Million score is available when ALL candles are blown out. This is a timed shot back into the eject hole.



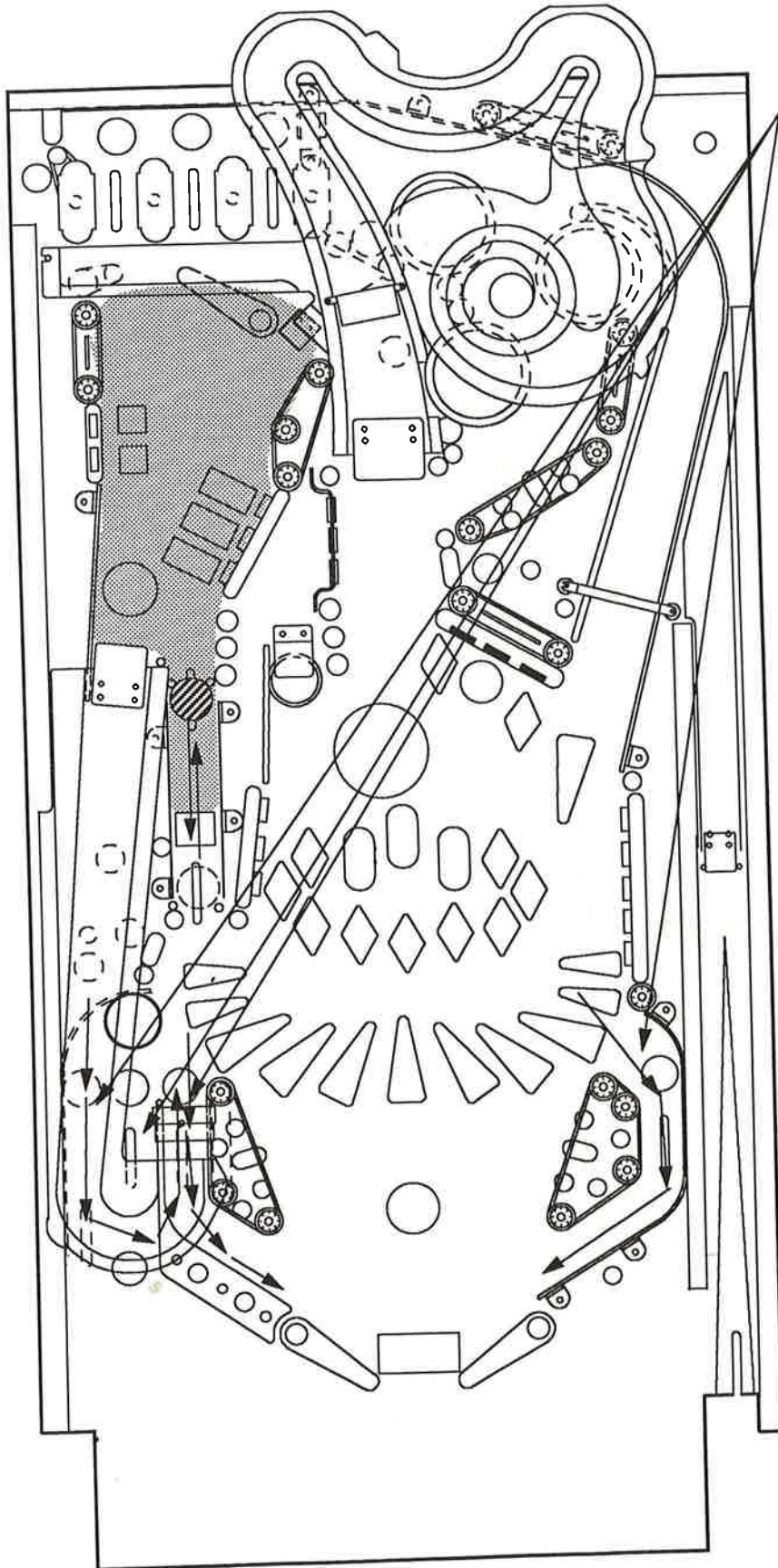
Eject Hole

● = Candles

BUGS BUNNY'S BIRTHDAY BALL PLAYFIELD SHOTS

Extra Ball Shot:

Award "Extra Ball" by scoring
Lit Return or Drain Rollover



Game Operation
and
Test Information

Bugs Bunny's Birthday Ball ROM SUMMARY

IC	DESCRIPTION	TYPE	IDENTIFIER	BOARD	PART NUMBER
Game ROM 1	32K x 8 ROM	27256	U27	CPU	A-5343-20009-2
Game ROM 2	32K x 8 ROM	27256	U26	CPU	A-5343-20009-1
Music/Speech ROM	64K x 8 ROM	27512	U4	AUDIO	A-5343-20009-3
Music/Speech ROM	64K x 8 ROM	27512	U19	AUDIO	A-5343-20009-4
Music/Speech ROM	64K x 8 ROM	27512	U20	AUDIO	A-5343-20009-5

Connector Identification

BUGS BUNNY'S BIRTHDAY BALL uses WILLIAMS ELECTRONICS GAMES System 11C. The connectors have an identification number. 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., connector 1J1).

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

Circuit Boards

System 11C Circuit Boards for *BUGS BUNNY'S BIRTHDAY BALL* 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.

CPU BOARD

The System 11C CPU Board (p/n D-11883-20009) must be equipped with the ROMs specified in the *BUGS BUNNY'S BIRTHDAY BALL* ROM Summary. CPU Board jumpers W1, W2, W4, W5, W7, W11, W14, and W16 must be connected.

SOUND BOARD

The Sound Board is p/n D-11581-20009, including ROMs and micro-processor.

SCORE DISPLAY BOARD

BUGS BUNNY'S BIRTHDAY BALL has two Score Display Boards. The BALLY Right Score Display Board is p/n D-12502-1, and the BALLY Left Score Display Board is p/n D-12706.

POWER SUPPLY BOARD

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

AUX POWER DRIVER BOARD

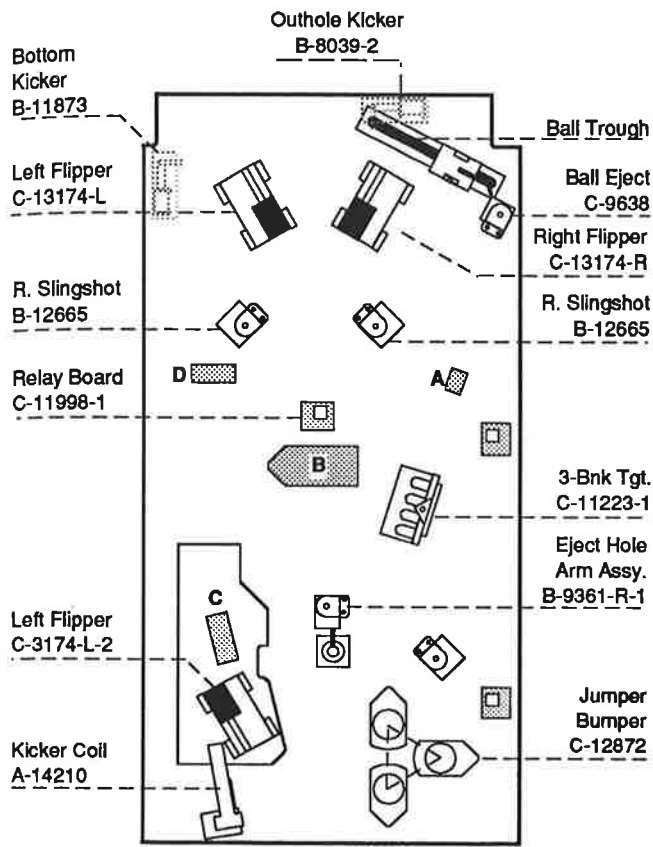
The Aux Power Driver Board is D-12247.

MASTER INTERCONNECT BOARD

The Master Interconnect Board is D-12313-20009.

1-2 Control Locations

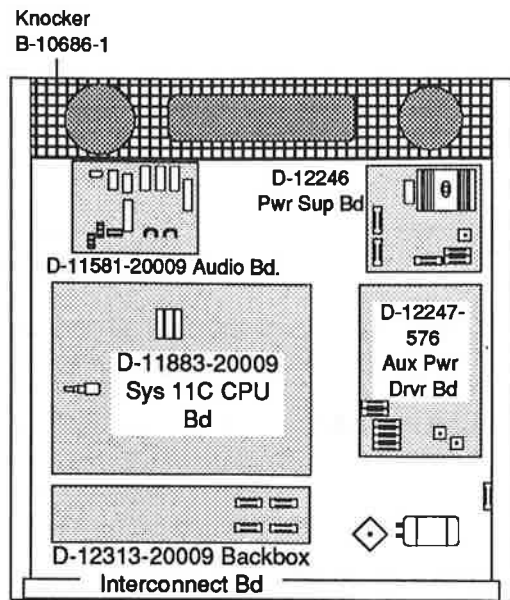
Locations Diagram - Major Mechanisms & Game Circuit Boards



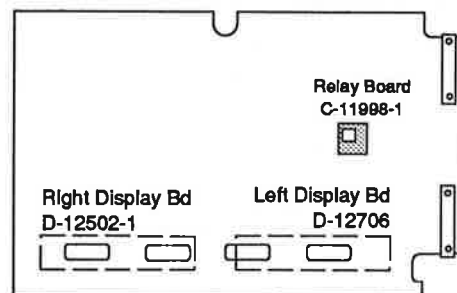
*Under Side of Playfield,
Viewed in Raised Position*

Lamp Boards

Lamp Board	Description	Part No.
A	Single Lamp Board	B-12224
B	Candle Lamp Board	A-14117
C	3-Lamp Board	C-13361
D	3-Lamp Board	C-12855



Backbox



Insert Board, Inner Side View

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, figure 1.

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

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

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

GAME ADJUSTMENT/DIAGNOSTIC SWITCHES. *BUGS BUNNY'S BIRTHDAY BALL* 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 (Figure 1) shows the location 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.

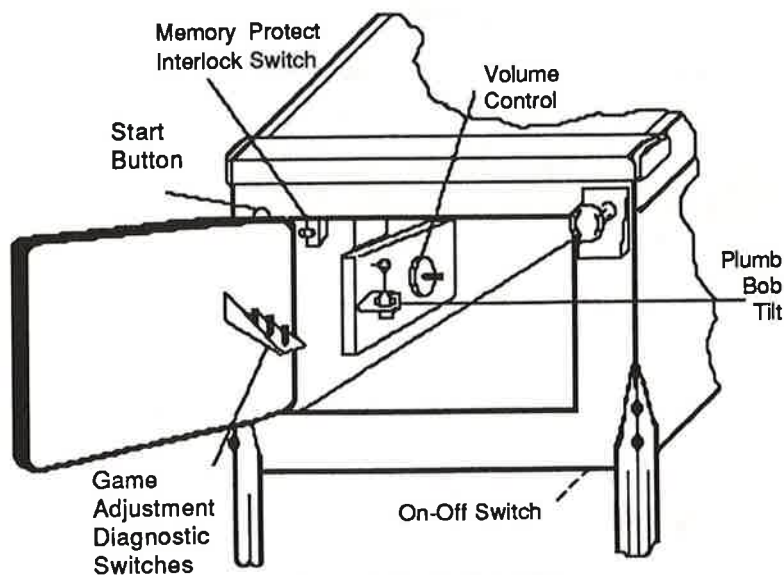


Figure 2. Control Locations

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.

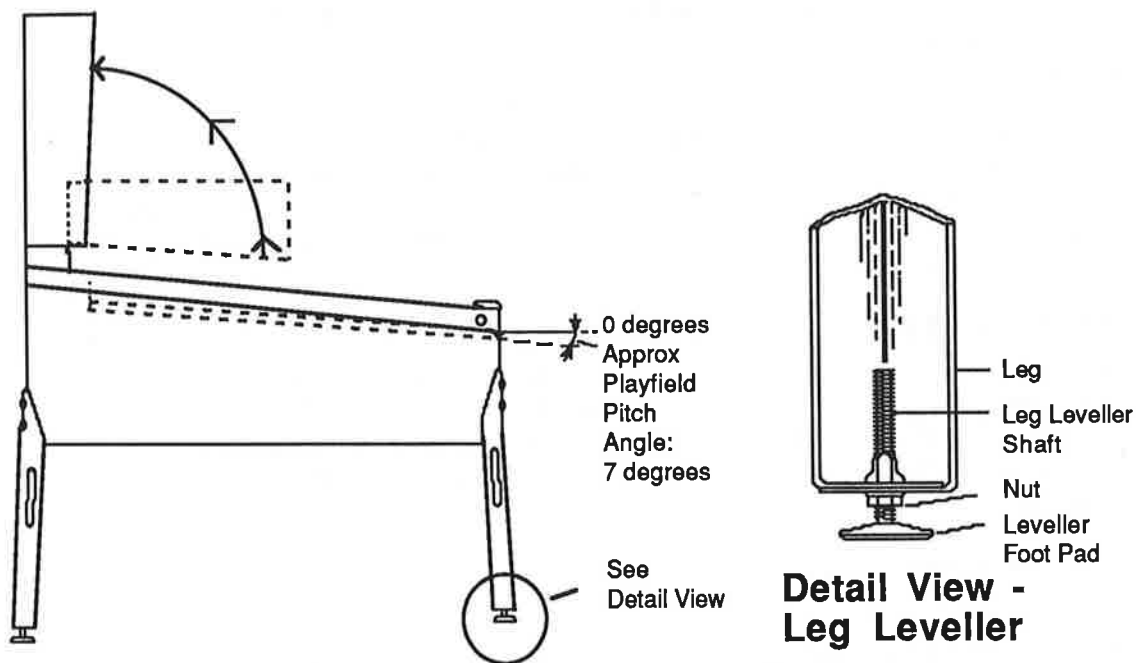


Figure 3. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

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 (located in printed envelope), through the bottom holes of the backbox into 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. *BUGS BUNNY'S BIRTHDAY BALL* uses two balls.
9. Clean and re-install the playfield cover glass. Prepare the game for player operation.

Game Operation

WARNING

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

POWERING UP

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

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

NOTE

The SYSTEM 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 (approximately. 30 games). However, the game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep *BUGS BUNNY'S BIRTHDAY BALL* 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";
("HAPPY BIRTHDAY TO BUGS BUNNY LET'S PARTY.")*;
- 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.

*-operator -adjustable feature

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 *BUGS BUNNY'S BIRTHDAY BALL* Audit Table lists the 53 items of the Audit Information portion of the *BUGS BUNNY'S BIRTHDAY BALL* 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 errors 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 *BUGS BUNNY'S BIRTHDAY BALL* Game Status Displays, as listed in the *BUGS BUNNY'S BIRTHDAY BALL* 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 *BUGS BUNNY'S BIRTHDAY BALL* Game Adjustment Table lists the 70 items of the Adjustment Information portion of the *BUGS BUNNY'S BIRTHDAY BALL* 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;

BUGS BUNNY'S BIRTHDAY BALL

Audit Table

Audit Item (Lower)	Descriptive Phrase (Upper Display)	Audit Item ¹ Value (Lower Display)
AU 01	LEFT COINS [chute next to coin door hinge]	432
02	CENTER COINS	0
03	RIGHT COINS	398
04	PAID CREDITS	830
05	TOTAL PLAYS	
06	TOTAL FREE (Total Free Plays)	
07	PERCENT FREE (% Free Plays)	
08	REPLAY AWARDS	
09	PERCENT REPLAY (% Replay Awards)	
10	SPECIAL AWARDS	
11	PERCENT SPECIAL (% Special Awards)	
12	MATCH AWARDS	
13	HSTD (High Score to Date) CREDITS	
14	PERCENT HSTD (% HSTD Credits)	
15	EXTRA BALLS	
16	PERCENT EX. BALL (% Extra Balls)	
17	AV. BALL TIME (Average Time in Seconds)	
18	MINUTES OF PLAY (Minutes of Play)	
19	BALLS PLAYED	
20	REPLAY1 AWARDS	
21	REPLAY2 AWARDS	
22	REPLAY3 AWARDS	
23	REPLAY4 AWARDS	
24	1 PLAYER GAMES	
25	2 PLAYER GAMES	
26	3 PLAYER GAMES	
27	4 PLAYER GAMES	
28	BURN IN CYCLES	
29	MADE LOONEY TUNES	
30	MADE LT MILLION	
31	MADE 50 MILLION	
32	MADE 500K SKILL SHOT	
33	MADE 500K CAPTIVE BALL SHOT	
34	MADE CAPTIVE BALL SHOT	
35	Not Used	
36	TWEETY BONUS	
37	MADE SHOPPING SPREE	
38	MADE SHOPPING SPREE EXTRA BALL	
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, <3.0M)	
45	3.0-3.9 MIL. SCORE (# of games ≥3.0M, <4.0M)	
46	4.0-4.9 MIL. SCORE (# of games ≥4.0M, <5.0M)	
47	5.0-5.9 MIL. SCORE (# of games ≥5.0M, <6.0M)	
48	6.0-6.9 MIL. SCORE (# of games ≥6.0M, <7.0M)	
49	7.0-7.9 MIL. SCORE (# of games ≥7.0M, <8.0M)	
50	8.0-99.9 MIL. SCORE (# of games ≥8.0M, <100M)	
51	AV. MIN. GAME TIME (Average Game in Minutes)	
52	LEFT DRAINS (# of drains via Left Outlane)	
53	RIGHT DRAINS (# of drains via 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.

Bugs Bunny's Birthday Ball

Game Adjustment Table

Adjustment Item (Lower)	Descriptive Phrase (Upper Display)	Factory Setting 6 (Lower)		
		Domestic (US/Can.)	French	W Ger/ European
Ad 01	AUTO REPLAY ¹ or FIXED REPLAY ¹	10 (%)		
02	REPLAY START (or REPLAY LEVEL 1) ¹	SCORES		
03	REPLAY LEVELS (or REPLAY LEVEL 2) ¹	6,000,000	6,000,000	7,000,000
04	(REPLAY LEVEL 3) ¹	01 (or OFF)		02
05	(REPLAY LEVEL 4) ¹	(see text)		
06	REPLAY AWARD	(see text)		
07	SPECIAL AWARD	Credit		
08	MATCH FEATURE	Credit		
09	BALLS / GAME	0	0	0
10	TILT WARNING	03	01	
11	EX. BALL / GAME	03		
12	MAXIMUM CREDITS	04		
13	HIGHEST SCORES	10	20	30
14	BACKUP HI. SCR. 1	On		
15	BACKUP HI. SCR. 2	8,000,000	8,000,000	9,500,000
16	BACKUP HI. SCR. 3	7,500,000	7,500,000	9,000,000
17	BACKUP HI. SCR. 4	7,000,000	7,000,000	8,500,000
18	HI. SCR. 1 CREDITS	7,500,000	6,500,000	8,000,000
19	HI. SCR. 2 CREDITS	01	03	03
20	HI. SCR. 3 CREDITS	01	01	00
21	HI. SCR. 4 CREDITS	01	01	00
22	H. S. RESET EVERY	01	01	00
23	FREE PLAY	3,000		750
24	U.S.A. 2 COINAGE (4 COINS 3 PLAYS) ^{2,3,4}	NO		
25	LEFT UNITS	USA 2	French 1	German 2
26	CENTER UNITS	03	02	06
27	RIGHT UNITS	12	10	12
28	UNITS/ CREDIT	03	20	30
29	UNITS/ BONUS	04	05	05
30	MINIMUM UNITS	00	20	00
31 - 58	Game-specific Play / Coinage Adjustments (detailed in text, the Game-specific Adjustments Setting Table, and the Difficulty Setting Comparison Table)	00	00	00
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	INSTALL FACTORY	NO		
69	CLEAR AUDITS	NO		
70	CLEAR COINS	NO		

NOTES:

1. **Automatic Replay** percentage value range is adjustable from 5 to 25%, via the Credit Button. Item 02 permits changing the factory setting value for Replay Start Level (valid for next 50 games played). Item 03 permits setting up to four replay levels, with values as detailed in text describing Item 03. For **Fixed Replay Scores**, set Auto Replay value to 1 less than 5(%) via the Credit Button. Go to items 02, 03, 04, and 05; install their replay level scores. Turn off any replay level by setting 00 as its value.
2. Phrase in parentheses is **Factory Setting**. Phrase appears in player displays. Press Credit Button to change setting of the game pricing of Item 24.
3. To change country OR coinage setting, press Credit button to obtain 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.
4. Refer to **Pricing Table** and text describing these items.
5. Special Preset Adjustment, whose effects are noted in the Game Adjustment text.
6. Entries in Factory Setting columns for French and W. German games show only differences from entries in first (US / Can.) column.

Information (that is, the player 1 and 2 displays combine as a descriptive phrase; the light type below the column headings names the respective backbox displays where the information appears, etc.). The Player 3 display shows Ad for all 70 adjustment items, so its entry is omitted from the tabular listing.

The **BUGS BUNNY'S BIRTHDAY BALL** 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 locations 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.

BUGS BUNNY'S BIRTHDAY BALL
Game Adjustment Comparison Table

Adj #	Adj Description	Extra Easy		Ad 62		Ad 63		USA Factory Settings		German & French Factory Settings		Ad 65		Ad 66	
		Easy	Ad 62	Easy	Ad 63	Medium	Ad 64	Hard	Ad 65	Hard	Ad 66	Hard	Ad 66	Hard	Ad 66
31	Flasher Intensity	Normal		Normal		Normal		Normal		Normal		Normal		Normal	
32	Easy LT Million	Yes		Yes		Yes		No		No		No		No	
33	Memory Extra Ball Lane	Yes		Yes		Yes		Yes		No		No		No	
34	Easy Tweety Bonus	Yes		Yes		No		No		No		No		No	
35	Memory LT Lites	Yes		Yes		Yes		Yes		No		No		No	
36	Easy Spot Letter	Yes		Yes		Yes		No		No		No		No	
37	Easy Extra Ball	Yes		Yes		Yes		No		No		No		No	
38	Easy Kickback	Yes		Yes		No		No		No		No		No	
39	Match or Surprise Pkg.	S. Pkg.		S. Pkg.		S. Pkg.		S. Pkg.		S. Pkg.		S. Pkg.		S. Pkg.	
40	% Surprise Pkg. (500K)	30%		25%		20%		20%		20%		20%		20%	
41	% Surprise Pkg. (Ex. Ball)	30%		30%		25%		25%		25%		25%		25%	
42	% Eject Hole 50 Million	7%		6%		5%		4%		3%		3%		3%	
43	% End of Game Sw. Score	5%		5%		5%		5%		5%		5%		5%	
44	% End of Game 1 Million	15%		10%		10%		10%		5%		5%		5%	
45	% End of Game Special	6%		6%		5%		5%		5%		5%		5%	
46	Consolation Extra Ball	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
47	Average Ball Time	40 sec		40 sec		40 sec		30 sec		30 sec		30 sec		30 sec	
48	Attract Mode Sound	None		None		None		None		None		None		None	

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 *BUGS BUNNY'S BIRTHDAY BALL* 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. *BUGS BUNNY'S BIRTHDAY BALL* 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 68 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. *BUGS BUNNY'S BIRTHDAY BALL* 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). *BUGS BUNNY'S BIRTHDAY BALL* 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, *BUGS BUNNY'S BIRTHDAY BALL* 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. *BUGS BUNNY'S BIRTHDAY BALL* 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. *BUGS BUNNY'S BIRTHDAY BALL* automatically bypasses this adjustment.

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

▲ 06 Replay Award

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

- Credit - Reaching each replay level obtains a credit (free game).
- Ball - Reaching each replay level obtains an extra ball.
- Audit - Reaching each replay level obtains nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards (Au 08, and Au 20 through 23, as applicable).

▲ 07 Special Award

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

- Credit - Scoring each Special, when lit, obtains a credit (free game).
- Ball - Scoring each Special, when lit, obtains an extra ball.
- Score - Scoring each Special, when lit, obtain a score advance of 100,000 points to the player.

▲ 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 right-most 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

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

This adjustment is similar to Ad 14, except that this applies to the Player 2 Score display. The adjustment technique is identical to Ad 14. It is also restored as described for Ad 14.

▲ 16 Backup High Score 3

This adjustment is similar to Ad 14, except that this applies to the Player 3 Score display. The adjustment technique is identical to Ad 14. It is also restored as described for Ad 14.

▲ 17 Backup High Score 4

This adjustment is similar to Ad 14, except that this applies to the Player 4 Score display. The adjustment technique is identical to Ad 14. It is also restored as described for Ad 14.

▲ 18 Credits for Highest Score 1

The operator can select the number of credits to be awarded, by using the 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 Flasher Intensity

The operator can choose (via the Start button) the brightness of the game's flashlamps. A suggestion is to use either DIM or DIMMEST when the power supplied to the game is in the 'High Power' (over 120V ac for domestic(US and Canada) and over 230V ac for foreign games). The range of this setting is NORMAL, DIM, and DIMMEST.

▲ 32 Looney Tunes Million Memory

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

Yes - (Liberal) Memory is ON.

No - (Conservative) Memory is OFF.

▲ 33 Extra Ball Lane Memory

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

Yes - (Liberal) Memory is ON.

No - (Conservative) Memory is OFF.

▲ 34 Easy Tweety Bonus

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

Yes - (Liberal) Memory is ON.

No - (Conservative) Memory is OFF.

▲ 35 Looney Tunes Lights Memory

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

Yes - (Liberal) Memory is ON.

No - (Conservative) Memory is OFF.

▲ 36 Easy Spot Letter

The operator can choose (via the Start button) whether to allow the player more time to Spot Letters in L-O-O-N-E-Y T-O-O-N-E-S. The choices are:

Yes - (Liberal) 15 Seconds to spot letter.

No - (Conservative) 10 Seconds to spot letter.

▲ 37 Easy Extra Ball

The operator can choose (via the Start button) to allow the player to earn 2 (hard) or 3 (easy) Extra Balls per game. The choices are:

- Yes - (Liberal) 3 Extra Balls per game.
- No - (Conservative) 2 Extra Balls per game.

▲ 38 Easy Kickback

The operator can choose (via the Start button) how often the Kickback is enabled at ball start. The choices are:

- Yes - (Liberal) The Kickback is enabled at the start of every ball.
- No - (Conservative) The Kickback is enabled at the first ball start only.

▲ 39 Match Or Surprise

The operator can choose (via the Start button) whether to allow the player to Match or accept/give away a Surprise Package. The choices are:

- Match
- Surprise Package

▲ 40 % Surprise Package Score (500K)

The operator can choose (via the Start button) what percentage of the Surprise Package awards 500K. The range of this setting is 1% to 50%.

▲ 41 % Surprise Package Score (Extra Ball)

The operator can choose (via the Start button) what percentage of the Surprise Package awards an Extra Ball. The range of this setting is 1% to 50%.

▲ 42 % Eject Score (50 Million)

The operator can choose (via the Start button) what percentage of the Surprise Package awards 50 Million. The range of this setting is 1% to 25%.

▲ 43 % End of Game Switch Score

The operator can choose (via the Start button) what percentage of the End of Game Switch Score is awarded. The range of this setting is 1% to 25%.

▲ 44 % End of Game 1 Million

The operator can choose (via the Start button) what percentage of the End of Game 1 Million Score is awarded. The range of this setting is 1% to 25%.

▲ 45 % End of Game Special

The operator can choose (via the Start button) the percent of games that award an End of Game Special. The range of this setting is 1% to 10%.

▲ 46 Consolation Extra Ball Time

The operator can choose (via the Start button) whether a less-skilled player can obtain an Extra Ball. The choices are:

- Yes - (Liberal) With a ball time less than the setting of Ad 47, the player receives an opportunity to obtain an Extra Ball.
- No - (Conservative) The player cannot receive an Extra Ball.

▲ 47 Average Ball Time

The operator can choose (via the Start button) the desired ball time for a game. On the last ball, if a player has not reached this 'game time' a form of consolation play becomes effective to encourage players to continue playing. The calculation involves determining at ball start for the last ball, whether at least 2/3 of the 'desired game time' has elapsed. If not, the Extra Ball light turns on to allow the player a chance to obtain an Extra Ball. The range of this setting is OFF (Extra Ball is not lit, because there is no minimum game time limit), 1 second (Conservative) through 99 seconds (Liberal).

NOTE: Consolation Extra Balls are not audited as Extra Balls.

▲ 48 Attract Mode Sounds

The operator can select (via the Start button) the frequency of Attract Mode sounds. The choices are:

- A lot - (Liberal)
- Less
- None - (Conservative)

▲ 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:
"HAPPY BIRTHDAY TO BUGS BUNNY LET'S PARTY"
- 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 Replay Boost (See Special Features, Page 46)

▲ 52 Redemption (See Special Features, Page 46)

▲ 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.

1-24 Game Adjustments

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 *BUGS BUNNY'S BIRTHDAY BALL* Preset game Adjustment Table for German/European games.

▲ 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.

▲ 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

Preset Game Adjustments Table For **GERMAN/EUROPEAN GAMES**

AD	ADJ.DESCRPTION	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	Credit	Ball	Score	Credit	Ball	Score
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

▲ 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.

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	7,000,000
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

▲ 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 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.

▲ 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 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.

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 *BUGS BUNNY'S BIRTHDAY BALL* 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.

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.

___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.)

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
Austria	5 Sch	10 Sch	10 Sch	1/2x5 Sch, 3/2x10 Sch ²	AUSTRIA	01	02	02	02	04	01
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	20P	1/1x10 P, 5/50 P, 2/20 Pence	CUSTOM	01	05	02	01	00	00
Switzerland	1 Fr	2 Fr	5 Fr	1/1 Fr, 3/2 Fr, 7/5 Franc ²	SWISS	01	03	07	01	00	00
Belgium	5 Fr	20 Fr	50 Fr	1/4x5 F, 1/20 F, 3/50 Franc ²	BELGIUM	01	04	10	10	10	00
West Germany	1 DM	2 DM	5 DM	1/1 DM, 2/2 DM, 7/5 DMark ^{2,3}	GERMAN 1	06	12	30	05	30	00
				1/1 DM, 2/2 DM, 6/5 DM ^{1,2}	GERMAN 2	06	12	30	05	00	00
				1/1 DM, 3/2 DM, 9/5 DM	CUSTOM	09	18	45	05	00	00
Netherlands	1 HFI	2.5 HFI	2.5 HFI	1/1 HFI, 3/2.5 Holland Florin ²	NETHERL.	06	15	15	05	00	00
	1G	-	1G	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
France	1 Fr	5 Fr	10 Fr	1/3x1 F, 2/5 F, 5/10 Franc ^{1,2}	FRANCE	02	10	20	05	20	00
	1 Fr	5 Fr	10 Fr	1/2x1 F, 3/5 F, 7/10 Franc	CUSTOM	03	15	30	05	30	00
	5 Fr	10 Fr	10 Fr	1/5 F, 3/10 F, 7/2x10 Franc	CUSTOM	03	15	30	10	60	15
	5 Fr	10 Fr	10 Fr	2/5 F, 4/10 F, 9/2x10 Franc	CUSTOM	02	10	20	05	40	10
	5 Fr	10 Fr	10 Fr	2/5 F, 5/10 F, 11/2x10 Franc	CUSTOM	01	05	10	02	20	05
Italy	200L	-	500L	1/2x200 L, 3/2x500 Lire ²	ITALY	06	00	15	10	00	00
Spain	100 P	-	500 P	1/100 P, 6/500 Peseta ²	SPAIN	01	00	05	01	05	00
Japan	100 ¥	-	100 ¥	1/100 Yen ²	JAPAN	01	00	01	01	00	00
Antilles, Nthrlnd	25¢	-	1G	1/25¢, 4/1 Guilder ²	ANTILLES	01	01	04	01	00	00
Chile	Token	-	Token	1/1 Token ²	CHILE	01	04	01	01	00	00
Denmark	1 Kr	5 Kr	10 Kr	1/2x1 Kr, 3/5 Kr, 7/10 Krone ²	DENMARK	03	15	30	05	30	00
Finland	1 Mka	-	5 Mka	1/2x1 Mka, 3/5 Markka ²	FINLAND	03	00	15	05	00	00
New Zealand	20¢	-	20¢	1/3x20¢ ²	N. Z.	01	00	01	03	00	01
Norway	1 Kr	-	1 Kr	1/2x1 Kr, 3/5x1 Krone ²	NORWAY	01	00	01	02	05	00
Argentina	10¢	10¢	10¢	1/1 Token ²	ARG.	01	01	01	01	00	00
Greece	10 D	20 D	50 D	1/2x10D, 1/20D, 3/50 Drachma ²	GREECE	03	06	15	05	00	00
Hungary	10 F	0 F	20 F	1/1x20F, 1/2x10F, 3/2x20 Forint	HUNGARY	01	00	02	02	04	00

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

Test/Diagnostic Procedures

BUGS BUNNY'S BIRTHDAY BALL 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 Start button to select the desired music selection: 01 - 'Main Theme' through 07. 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 "SHOOT AGAIN", 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.

Bugs Bunny's Birthday Ball

Lamp-Matrix Table

Red  Yel (B+)  # = Multiple Lamps

COLUMN	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
ROW								
Q80 1	RED-BRN 1J6-1 Shoot Again 1	Shopping Spree (50K) 9	Left (L Dr Tgt) 17	T (in TUNES) 25	N (in TUNES) 33	Candle 1 41	Candle 9 49	Backglass CAN.3 57
Q81 2	RED-BLK 1J6-2 Left Jet Bumper 2	Shopping Spree (100K) 10	Middle (L Dr Tgt) 18	U (in TUNES) 26	E (in TUNES) 34	Candle 2 42	Candle 10 50	Backglass CAN.4 58
Q82 3	RED-ORN 1J6-3 Right Jet Bumper 3	Shopping Spree (200K) 11	Right (L Dr Tgt) 19	N (in LOONEY) 27	Y (in LOONEY) 35	Candle 3 43	Candle 11 51	Backglass PLAYER1 59
Q83 4	RED-YEL 1J6-5 Bottom Jet Bumper 4	Shopping Spree (500K) 12	Left (R Dr Tgt) 20	E (in LOONEY) 28	PORKY PIG 36	Candle 4 44	Candle 12 52	Backglass PLAYER 2 60
Q84 5	RED-GRN 1J6-6 10K Skill Shot 5	Shopping Spree (Ex. Ball) 13	Middle (R Dr Tgt) 21	S (in TUNES) 29	Left Outlane 37	Candle 5 45	Left Top 53	Backglass PLAYER 3 61
Q85 6	RED-BLU 1J6-7 50K Skill Shot 6	Top Lane Left 14	Right (R Dr Tgt) 22	L (in LOONEY) 30	Middle Outlane 38	Candle 6 46	Left Bottom 54	Backglass PLAYER 4 62
Q86 7	RED-VIO 1J6-8 100K Skill Shot 7	Top Lane Middle 15	Spinner 23	O (in LOONEY) 31	L Return Lane 39	Candle 7 47	Backglass CAN.1 55	Captive Ball 63
Q87 8	RED-GRY 1J6-9 500K Skill Shot 8	Top Lane Right 16	Kick Back 24	O (in LOONEY) 32	R Return Lane 40	Candle 8 48	Backglass CAN.2 56	Cake 64

SOLENOID TEST

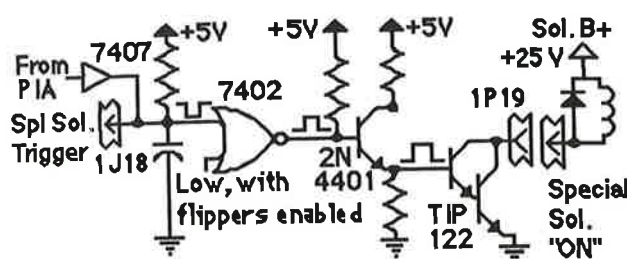
1. (From Lamp Test) Using AUTO-UP, press ADVANCE. Observe that the Player 1 and 2 displays show the message, COIL TEST, the Player 3 display shows 04 (Solenoid Test identifier). Next, the Player 3 display shows a series of test steps from 01 through 22, while the Player 1 and 2 displays show the solenoid/circuit 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.

Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trmstr	Solenoid Part Number Flashlamp Type g= B'glass; p=Pl'field
				CPU Bd	Playfield/ Cabinet		
01A ³	Outhole Kicker	Switched	Vlo-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800
01C ³	Left Ramp Flash	Switched	Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#89/906 flashlamps 2p
02A ³	Shooter Lane Feeder	Switched	Vlo-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	SM-26-600-DC
02C ³	Standup by "L" Flash	Switched	Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89/906 flashlamps 1p,1g
03A ³	Not Used	Switched	Vlo-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200
03C ³	50 Million Flash	Switched	Blk-Orn	(Gry-Orn)	5J5-7 (C)	Q32	#89/906 flashlamps 1p,1g
04A ³	Not Used	Switched	Vlo-Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800
04C ³	Tazz Ramp Flash	Switched	Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89/906 flashlamps 1p,1g
05A ³	Eject Hole	Switched	Vlo-Grn	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800
05C ³	Standup by R Dr Tgt Flash	Switched	Blk-Grn	(Gry-Grn)	5J5-4 (C)	Q31	#89/906 flashlamps 1p,1g
06A ³	R Dr Tgt Bank Reset	Switched	Vlo-Blu	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800
06C ³	Bug's Face Flash	Switched	Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89/906 flashlamps 1p,1g
07A ³	Knocker (In Backbox)	Switched	Vlo-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800
07C ³	Top Left Flash	Switched	Blk-Vlo	(Gry-Vlo)	5J5-2 (C)	Q30	#89/906 flashlamps 1p,1g
08A ³	Not Used	Switched	Vlo-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22	AE-23-800
08C ³	Right Back Panel Flash	Switched	Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89/906 flashlamps 1p,1g
09	LOONEY Relay	Controlled	Brn-Blk	1P12-1	5J2-9: 5J6-9: 2J4-10	Q17	5580-09555-01 ^{4a}
10	Pl'fld Illum Relay	Controlled	Brn-Red	1P12-2	5J2-8: 5J6-8: 2J4-11	Q9	5580-09555-01 ^{4a}
11	Insert Illum Relay	Controlled	Brn-Orn	1P12-4	5J2-6: 5J6-7: 2J4-12	Q16	5580-09555-01 ^{4a}
12	A/C Select Relay	Controlled	Brn-Yel	1P12-5	5J2-5	Q8	5580-09555-01 ⁵
13	Ball Launcher	Controlled	Brn-Grn	1P12-6	5J2-4: 5J6-5: 2J4-13	Q15	AE-23-800
14	L Outlane Kickback	Controlled	Brn-Blu	1P12-7	5J2-3: 5J6-3: 2J4-14	Q7	AE-23-800
15	Top Sling	Controlled	Brn-Vlo	1P12-8	2J4-15: 2J11-2	Q14	AE-26-1200
16	TUNES Relay	Controlled	Brn-Gry	1P12-9	2J4-16: 2J11-1	Q6	5580-09555-01 ^{4a}
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-26-1200
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-26-1200
21	Lower 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	AE-23-800
-	<u>Right Flippers</u>	-	Orn-Vlo	1P19-1	2J5-5: 2J10-7	-	-
-	Lower Right Flipper	-	(Blu-Vlo) ²	-	(2J10-1: 2J8-15)	-	FL11630/50VDC
-	Upper Right Flipper	-	(Blk-Yel) ²	-	(2J10-3: 2J8-13)	-	FL11630/50VDC
-	<u>Left Flipper</u>	-	Orn-Gry ²	1P19-2	2J5-4: 2J10-8	-	-
-	Lower Left Flipper	-	(Blu-Gry) ²	-	(2J10-2: 2J8-14)	-	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 on cabinet. 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 Board, which controls the device pulsing by Sol. 12. 4. Relay is mounted on Relay Board: (4a) p/n C-11998-1; (4b) p/n C-11902-1. 5. Relay is mounted on Aux Power Driver Bd, D-12247, in the backbox.

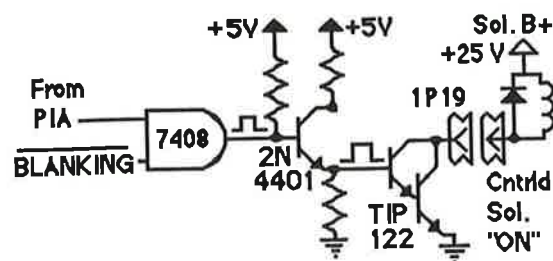
"On" State Logic - Special Solenoid



"Off" State - Special Solenoid:

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

"On" State Logic - Controlled



"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 a lamp circuit. Using this "multiplexing" technique, the same driver transistor can control actuation of two separate solenoid circuits.

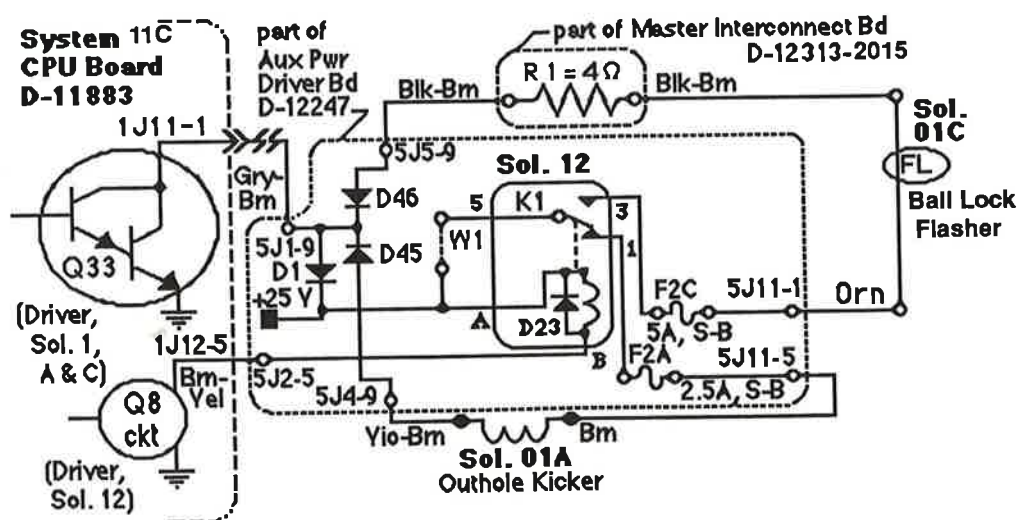


Figure 4. Typical Solenoid A/C Select Relay Circuit, showing the function of Solenoid 12, the Solenoid A/C Select Relay

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 *BUGS BUNNY'S BIRTHDAY BALL* 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 *BUGS BUNNY'S BIRTHDAY BALL* switch numbers can range from 01 through 64. Refer to the Switch-Matrix Table for switch numbers and wiring information. CPU Board connections at jacks 1J8 (columns) and 1J10 (rows) are also listed in the table.

BUGS BUNNY'S BIRTHDAY BALL Switch Matrix

Bugs Bunny's Birthday Ball Switch-Matrix Table								
Wht (row)  Gm (col)								
COLUMN	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
ROW								
1	WHT-BRN 1J10-9 Plumb Bob Tilt 1		Standup (Skill) 17	L (In LOONEY) 25	N (In TUNES) 33	Tazz Ramp Entry 41	Top Sling 49	Lane Change (R Flipper) 57
2	WHT-RED 1J10-8 2	Outhole 10	Top Launch 18	O (In LOONEY) 26	E (In TUNES) 34	Tazz Ramp Score 42	Top Right 10 pt 50	Lane Change (L Flipper) 58
3	WHT-ORN 1J10-7 Game Start 3	Ball Trough #1 (right) 11	Standup (by Dr Tgt) 19	O (In LOONEY) 27	S (In TUNES) 35		Left Outlane 51	
4	WHT-YEL 1J10-6 Right Coin Chute 4	Ball Trough #2 (left) 12	Right (R 3-Bk Dr Tgt) 20	N (In LOONEY) 28	Top Lane Left 36	Top (Mini Left) 44	Left Jet Bumper 52	Right (L 3-Bk Dr Tgt) 60
5	WHT-GRN 1J10-5 Center Coin Chute 5		Middle (R 3-Bk Dr Tgt) 21	E (In LOONEY) 29	Top Lane Middle 37	Bottom (Mini Left) 45	Right Jet Bumper 53	Middle (L 3-Bk Dr Tgt) 61
6	WHT-BLU 1J10-3 Left Coin Chute 6	Shooter Lane 14	Left (R 3-Bk Dr Tgt) 22	Y (In LOONEY) 30	Top Lane Right 38	Right Outlane 46	Lower Jet Bumper 54	Left (L 3-Bk Dr Tgt) 62
7	WHT-VIO 1J10-2 Slam Tilt 7	L Ramp 15	Spinner 23	T (In TUNES) 31	Cptv Ball Top 39	L Return Lane 47	BL Kicker ("sling") 55	
8	WHT-GRY 1J10-1 High Score Reset 8	Eject Hole 16	Standup (by "L") 24	U (In TUNES) 32	Cptv Ball Bottom 40	R Return Lane 48	BR Kicker ("sling") 56	

BL = Bottom Left BR = Bottom Right

- ▼ **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 *BUGS BUNNY'S BIRTHDAY BALL* 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 +24 volt power circuit; 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 show the *BUGS BUNNY'S BIRTHDAY BALL* game's Identification Information (the Id 00 screen). Use MANUAL-DOWN, and press ADVANCE to reach Adjustment Item 68 (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. *BUGS BUNNY'S BIRTHDAY BALL* 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 signals 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 *BUGS BUNNY'S BIRTHDAY BALL*.

Malfunction Check Switch ## (name). This message indicates that at least one switch has not been actuated during ball play (for 90 balls or approximately 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 *BUGS BUNNY'S BIRTHDAY BALL* 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 electrical problems, securing loose connectors, etc).

Malfunction Pinball Missing. *BUGS BUNNY'S BIRTHDAY BALL* normally uses two balls. 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 *BUGS BUNNY'S BIRTHDAY BALL* IYT6R6 V V VU V 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 one '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. Repeated appearance of this message indicates that the CMOS RAM no longer retains any custom Pricing or Game Adjustment settings and has reverted to factory default settings. Generally, the following CPU checks will isolate the cause of the CMOS RAM memory failure. The voltage at pin 24 of U25 should be +5V (game turned on) and at least +3.8V (game off). When the voltage drops below +3.8V, memory reset occurs. Check the batteries and battery holder. Be sure that the batteries are good and that there is no contamination on the battery holder terminals. Turn the game OFF, and use an ohmmeter to check diodes D1 and D2. D1 should read 0 ohms when forward-biased and ohms when reverse-biased. D2 should read 15 ohms when forward-biased and ohms when reverse-biased. Turn the game ON, and use an oscilloscope to check Q40. Q40 should display square waves on all three terminals.

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.

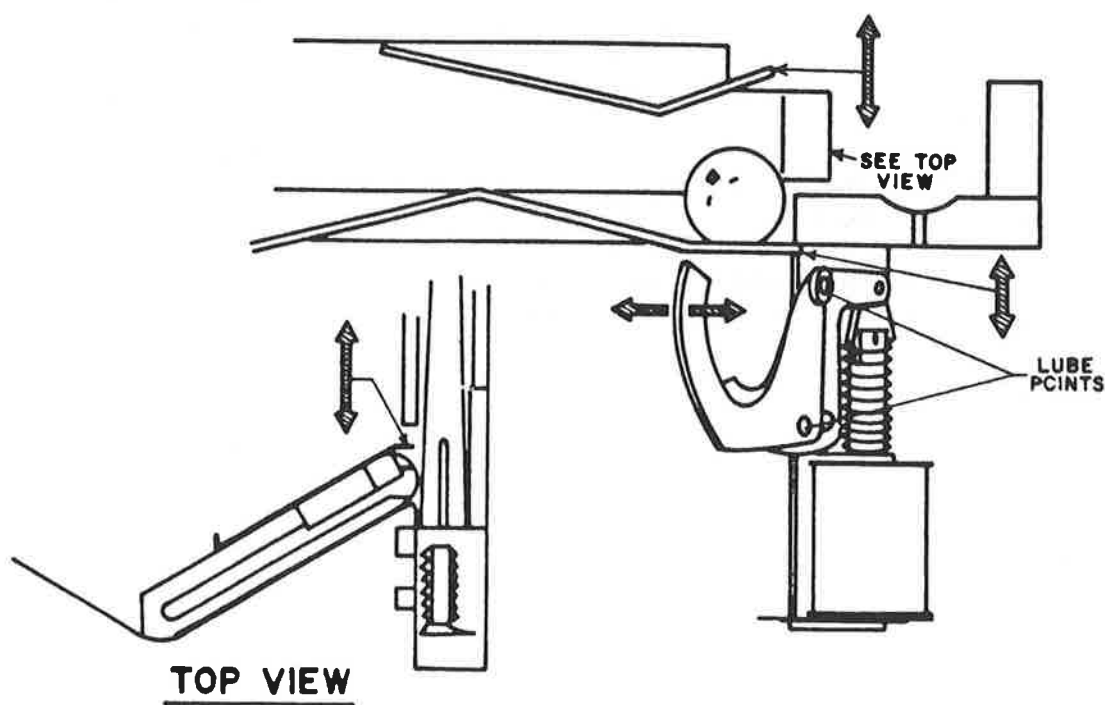


Figure 5. Adjustments and Lubrication Points, Shooter Lane Feeder

• 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).

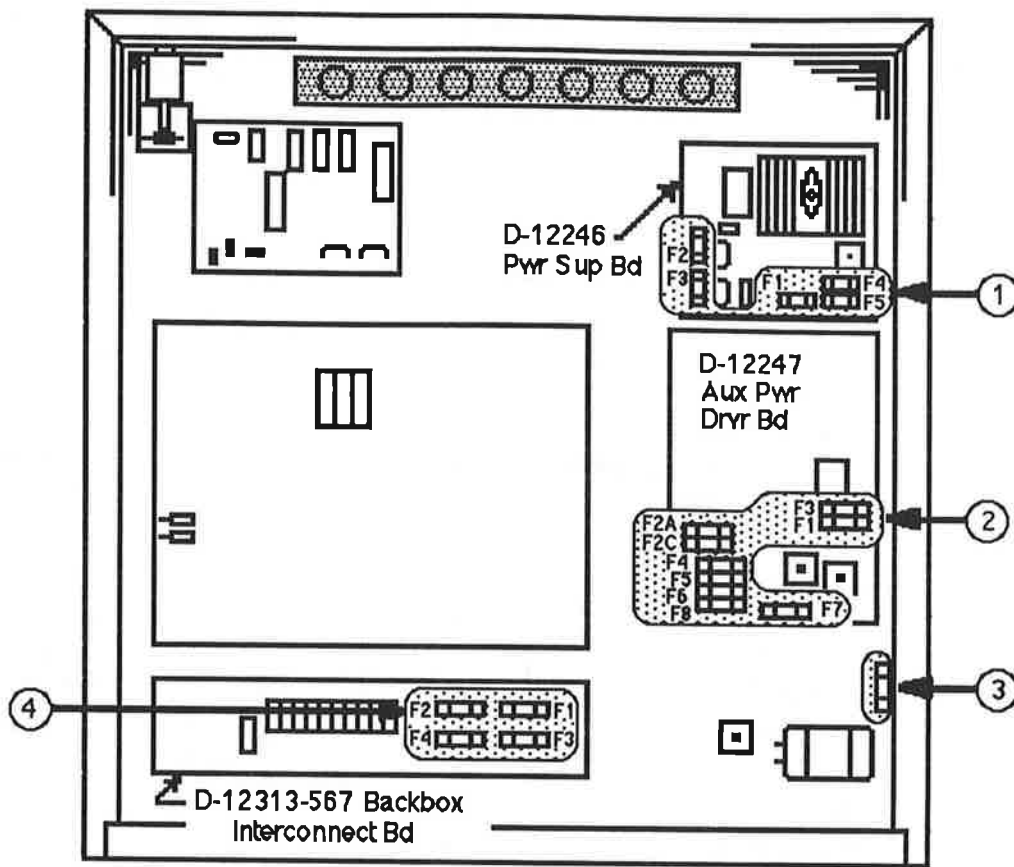
- **Switches**

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.

The following concerns fuses listed as Item 2 (Aux Power Driver Board fuses).

F1 protects +25V dc Special Solenoid Circuit connected with the Red-White wire. F2A protects "A" Solenoids connected with Brown wires. F2C protects "C" Solenoids connected with Orange wires. F3 protects Controlled Solenoids connected with Red wires. F4 protects +50V dc solenoids connected with Violet-Yellow wires. F5 protects Right Side Flippers. F6 protects Left Side Flippers. F7 protects the input to the +50V rectifier, and F8 protects the input of the +25V rectifier.

TICKET REDEMPTION INFORMATION

Important! Equipping an electronic game with a redemption device may be prohibited under applicable laws. Check with local authorities concerning these laws prior to installing.

Special Feature Adjustment 52 REDEMPTION

The operator can choose (via the Start button) - (If Replay Adjustment 6 is set to COIL) - how often to dispense tickets for each award. The choices are Less, A lot, and None. (See chart below for awards.)

Credits (none)	Less	A lot	# of tickets
Bozo Ball	X	X	1
500K Shopping Spree	X	X	1 * (20%)
500K Skill Shot		X	1
500K Captive Ball	X	X	1
Looney Tunes Lit		X	1
Million Made	X	X	2
End of Game 1 Mill.		X	1 * (10%)
End of Game Special	X	X	2 * (5%)
Hi Score	X	X	2
Replay	X	X	2
50 Million	X	X	6

* (%) Values are adjustable through Adjustments 31 -48 (p.1-13).

Factory Settings:

Adjustment 6 - credits

Adjustment 52 - None

Special Feature Adjustment 51 REPLAY BOOST:

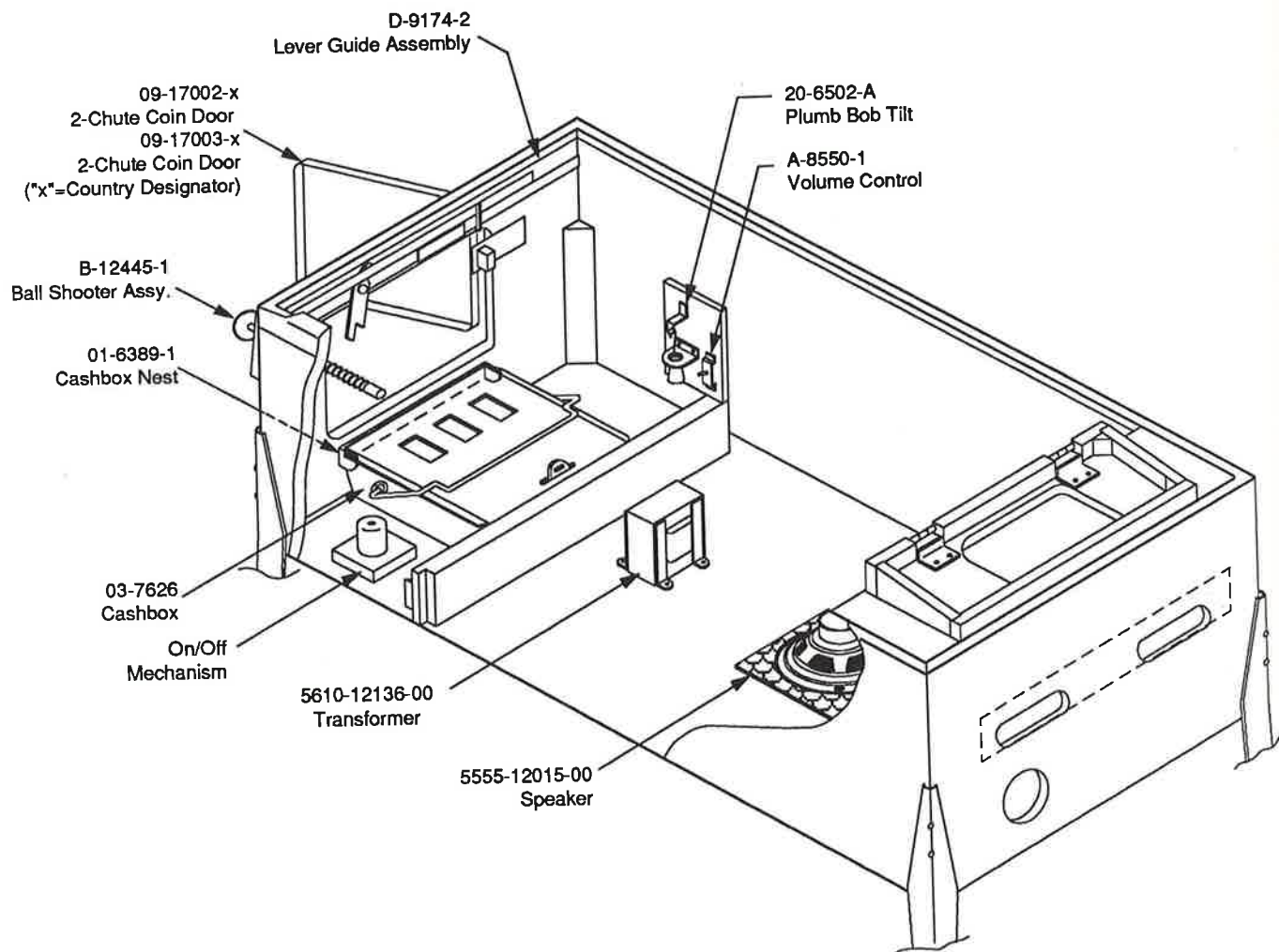
The operator can choose (via the Start button) whether the Replay Score is temporarily boosted (increased) by 1 million each time the player exceeds the replay score. This adjustment is disabled whenever a game is set to Free Play (Ad 23-Yes), when a player inserts another coin, or when this adjustment is set to OFF. The range of this setting is 1 Million (conservative) to 50 Million (liberal) and OFF (disabled).

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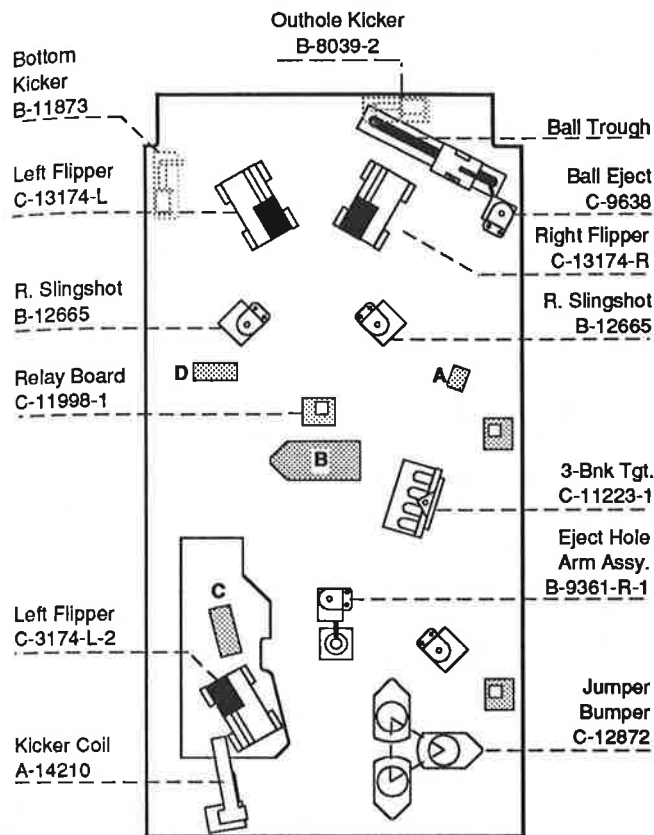
2

Game Parts Information

Cabinet Parts



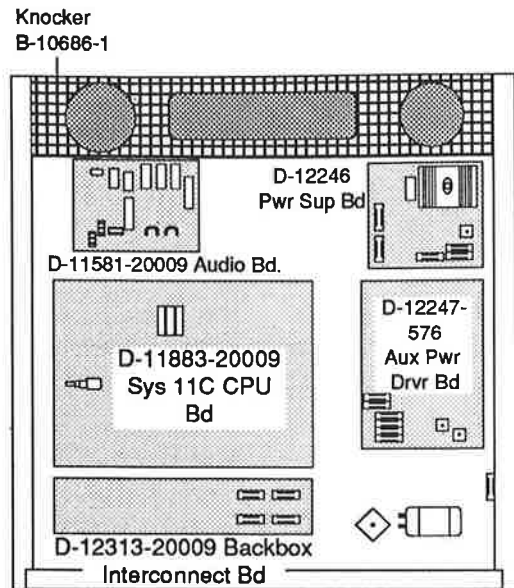
Location Diagram - Major Mechanisms & Game Circuit Boards



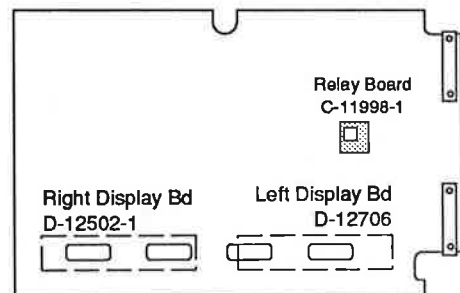
*Under Side of Playfield,
Viewed in Raised Position*

Lamp Boards

Lamp Board	Description	Part No.
A	Single Lamp Board	B-12224
B	Candle Lamp Board	A-14117
C	3-Lamp Board	C-13361
D	3-Lamp Board	C-12855



Backbox

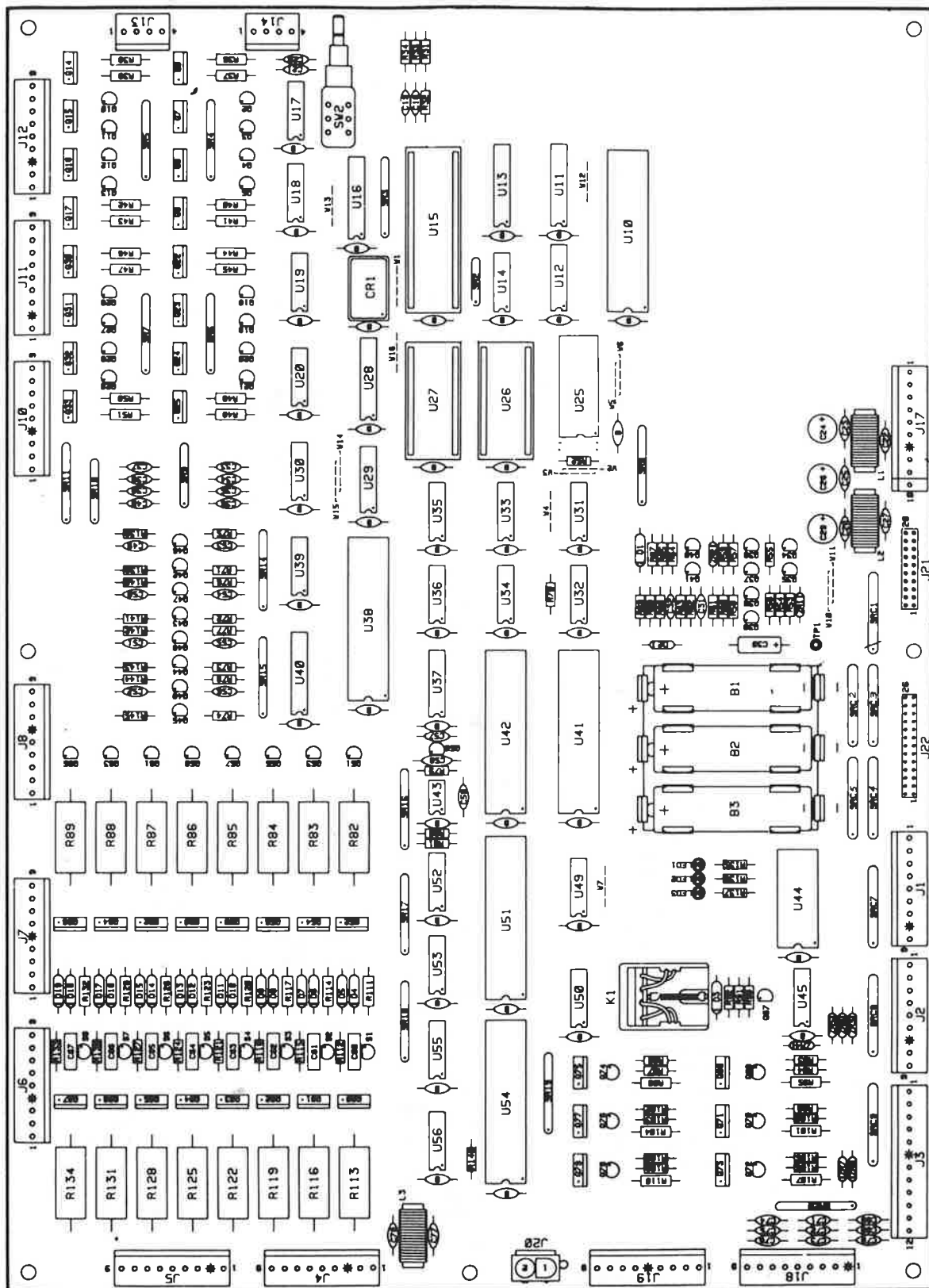


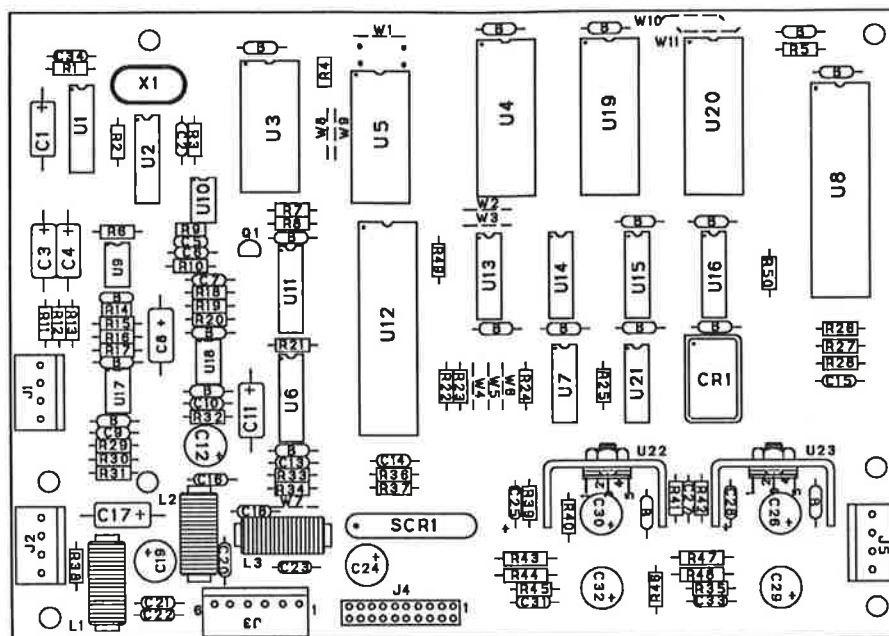
Insert Board, Inner Side View

Part No.	Ckt Designator	Description	Part No.	Ckt Designator	Description
5764-12206-00		Bare PC Board	5012-09037-00	R113, R116, R119, R122, R125, R128, R131, R134	Resistor, 0.4Ω, 5%, 3w, Wire-Wnd.
5281-09308-00	U16	IC, Octal Bus Xcvr, 74LS245	5010-08993-00	R36-R51, R95, R98, R101, R104, R107, R110	Resistor, 68Ω, 5%, 1/2w, C. F.
5430-08972-00	U10, U38, U41, U42, U51, U54	IC, PIA, MC6820/6821	5012-10860-00	R82-R89	Resistor, 27Ω, 5%, 2w, C. F.
5340-10139-00	U25	IC, 2K x 8 CMOS Static RAM	5010-10003-00	R62, R63	Resistor, 390Ω, 5%, 1/4w, C. F.
5280-09010-00	U44	IC, 4-16 Decoder, 74154	5010-10171-00	R67	Resistor, 56Ω, 5%, 1/4w, C. F.
5281-09246-00	U12	IC, 2-4 Decoder, 74LS139	5010-10170-00	R69	Resistor, 47Ω, 5%, 1/4w, C. F.
5075-09406-00	ZR3 - ZR8	Diode, Zener, 6.2v, 0.5w	5010-09160-00	R59, R61, W12, W13	Resistor, 220Ω, 5%, 1/4w, C. F.
5164-10998-00	Q42 - Q49	Transistor, NPN, 2N5550, TO-92	5010-09416-00	R33, R34, R71-R78, R135-R137	Resistor, 470Ω, 5%, 1/4w, C. F.
5431-09449-00	U43	IC, Timer, MC1455	5010-10631-00	R111, R114, R117, R120, R123, R126, R129, R132	Resistor, 1.2KΩ, 5%, 1/2w, C. F.
5310-09236-00	U29	IC, 14-b Counter, 4020	5019-09783-00	SR18	SIP, 9R, 10-pin, 6.8KΩ, .125w/R, 5%
5281-09743-00	U32	IC, Quad 2-Input AND, 74LS08	5019-09362-00	SR3, SR15, SR17, SR19, SR20	SIP, 9R, 10-pin, 4.7KΩ, .125w/R, 5%
5281-09247-00	U14	IC, Quad 2-Input NOR, 74LS02	5019-09808-00	SR4, SR6, SR11	SIP, 9R, 10-pin, 560Ω, .125w/R, 5%
5281-09235-00	U35	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	SR9, SR10	SIP, 4R, 8-pin, 1KΩ, 5%
5281-09486-00	U28	IC, Octal D Flip-flop, 74LS374	5019-09786-00	SR2	SIP, 5R, 6-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	5043-08980-00	C18, C19, C21, C31, C32, C49-C56, C59, + 43 Bypass, marked B	Capacitor, 0.01 μfd, 50v(+80,-20%), Axial
5280-08974-00	U55, U56	IC, Hex Inverter, 7406	5043-09845-00	C22, C23, C25, C27, C28	Capacitor, 1K pfd, 50v(±20%), Axial
5310-09155-00	U30, U39	IC, Quad 2-Input NAND, MC14011	5043-08996-00	C70-75, C77, C78	Capacitor, 0.1 μfd, 50v(±20%), Axial
5280-08948-00	U45, U50	IC, Quad 2-Input NOR, 7402	5040-10974-00	C24, C26, C29	Capacitor, 100μfd, Electr, 25v(+50,-10%), Ax
5280-09309-00	U49	IC, Hex Buffer, 7407	5045-09796-00	C60-C67	Capacitor, 0.1 μfd, Polycarbonate Rad, 100v(±10%)
5671-09019-00	LED1-LED3	LED, Red, Display	5043-09065-00	C33-C40, C68, C69, C76	Capacitor, 470 pfd, 50v(±20%), Axial
5521-10506-00	CR1	Oscillator, 4 MHz	5040-09545-00	C30	Capacitor, 22μfd, Electr, 10v(+50,-10%) Ax
5162-08976-00	Q51, Q53, Q55, Q57, Q59, Q61, Q63, Q65	Transistor, NPN Darl. 2N6427, TO-92	5041-09031-00	C58	Capacitor, 1 μfd, Tant., 25v(±20%), Axial
5191-08978-00	Q52, Q54, Q56, Q58, Q60, Q62, Q64, Q66	Transistor, PNP, TIP42, TO-220	5043-09030-00	C57	Capacitor, 0.047 μfd, 50v(±20%), Axial
5162-09410-00	Q6-Q9, Q14-Q17, Q22-Q25, Q30-Q33, Q69, Q71, Q73, Q75, Q77, Q79, Q80-Q87	Transistor, NPN, TIP122, TO-220	5551-09822-00	L1-L3	Inductor, 4.7 μH, 3A
5160-08938-00	Q2-Q5, Q10-Q13, Q18-Q21, Q26-Q29, Q34-Q38, Q41, Q67, Q68, Q70, Q72, Q74, Q76, Q78	Transistor, NPN, 2N4401, TO-92	5641-09312-00]	SW2	Switch, Pushbutton, DPDT, 100v, 5A
5160-10269-00	Q40	Transistor, NPN, 2N3904, TO-92	5641-09653-00]	B1-B3	Battery, Alkaline, 1.5v, AA
5190-09016-00	Q39, Q50	Transistor, PNP, 2N4403, TO-92	5880-09022-00		Battery Holder, #171
5130-09014-00	S1-S8	SCR, 30v, 0.8A, 2N5060	5881-09021-00		IC Socket, 28 pin
5070-06258-00	D3-D19	Diode, 1N4001	5700-10176-00	A-5343-20009-1 U26	IC, Game ROM 2, 27256
5070-08919-00	D2	Diode, 1N4148, 150mA	A-5343-20009-2 U27		IC, Game ROM 1, 27256
5070-09266-00	D1	Diode, 1N5817, 1.0A	5700-08985-00	a)5400-09150-00 U15	IC Socket, 40 pin
5075-09018-00	ZR1	Diode, Zener, 1N5996A, 6.8v, 0.5w	5824-09248-00	TP1, TP2	Test Point
5075-09059-00	ZR2	Diode, Zener, 1N5990, 3.9v, 0.5w	20-9229		Thermal Compound
5010-08992-00	R94, R97, R100, R103, R106, R109	Resistor, 560Ω, 5%, 1/4w, C. F.	5580-08994-01	K1	Relay, 4-pole, 40Ω, 6v
5010-09039-00	R56	Resistor, 10Ω, 5%, 1/4w, C. F.	5791-10862-09	1J1, 1J2, 1J4-1J8, 1J10-1J12, 1J17-1J19	Connector, 9 pin (Hdr)
5010-09534-00	W1, W2, W4, W5, W7, W11, W14, W16	Resistor, 0Ω, 5%, 1/4w, C. F.	5791-10862-04	1J13, 1J14	Connector, 4 pin (Hdr)
5010-08991-00	R31, R32, R52	Resistor, 4.7KΩ, 5%, 1/4w, C. F.	5791-10862-12	1J3	Connector, 12 pin (Hdr)
5010-09358-00	R55, R68, R92, R146	Resistor, 1.0KΩ, 5%, 1/4w, C. F.	5791-10850-00	1J22	Connector, 26 pin Ribbon (Hdr)
5010-09113-00	R79	Resistor, 33KΩ, 5%, 1/4w, C. F.	5791-09437-00	1J21	Connector, 20 pin Ribbon (Hdr)
5010-08983-00	R70, R80	Resistor, 3.3KΩ, 5%, 1/4w, C. F.	16-8850-330		Label PCB Assembly
5010-09034-00	R53, R60, R65, R90	Resistor, 10KΩ, 5%, 1/4w, C. F.			
5010-09086-00	R81	Resistor, 6.8KΩ, 5%, 1/4w, C. F.			
5010-08997-00	R91, R93, R96, R99, R102, R105, R108, R112, R115, R118, R121, R124, R127, R130, R133	Resistor, 2.7KΩ, 5%, 1/4w, C. F.			

Notes...

- For Schematic, refer to drawing #16-9019.
- Standard Jumper: W1, W2, W4, W5, W7, W11, W14, W16

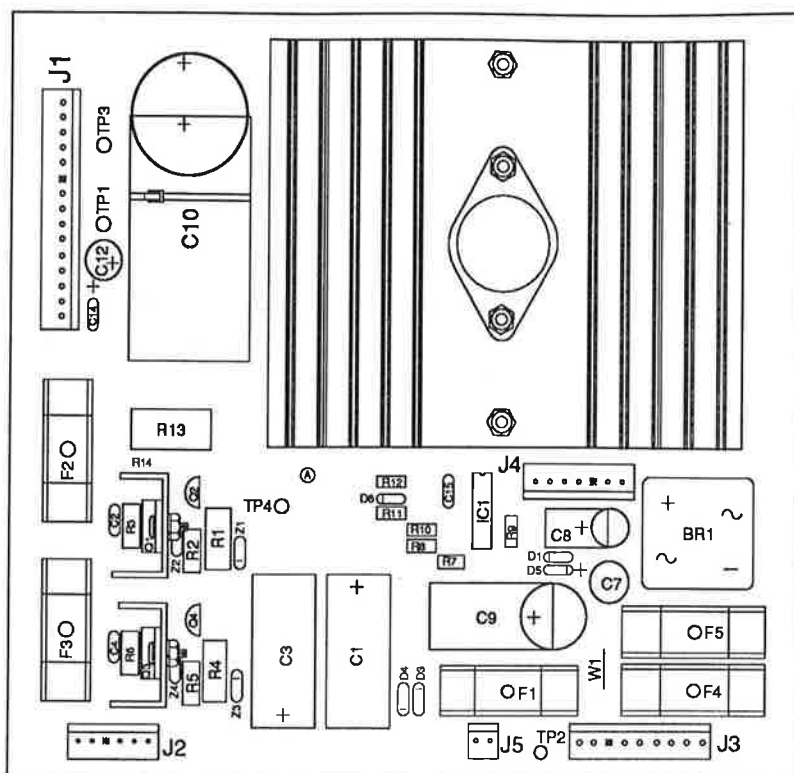




Part Number	Ckt Designator	Description	Part Number	Ckt Designator	Description
5766-12130-00		Bare PC Board	5010-09324-00	R6, R19, R20, R21	Resistor, 27K Ω , 1/4w, 5%
5371-11087-00	U1	IC, D/A Conv, YM3012	5010-09162-00	R39	Resistor, 100K Ω , 1/4w, 5%
a) 5700-09006-00		Socket, IC, 16-pin (U1)	5010-10258-00	R40	Resistor, 1M Ω , 1/4w, 5%
5370-11086-00	U3	IC, Sound Processor, YM2151	5010-09179-00	R10	Resistor, 3.3M Ω , 1/4w, 5%
a) 5700-09004-00		Socket, IC, 24-pin (U3)	5010-08772-00	R18	Resistor, 15K Ω , 1/4w, 5%
5400-10320-00	U8	IC, μ Processor, MC68B09E	5010-08824-00	R32	Resistor, 43K Ω , 1/4w, 5%
a) 5700-08985-00		Socket, IC, 40-pin (U8)	5010-08846-00	R31	Resistor, 220K Ω , 1/4w, 5%
A-5343-20009-3	U4	IC, Audio ROM 1	5010-08991-00	R12	Resistor, 4.7K Ω , 1/4w, 5%
A-5343-20009-4	U19	IC, Audio ROM 2	5010-09219-00	R38	Resistor, 8.2K Ω , 1/4w, 5%
A-5343-20009-5	U20	IC, Audio ROM 3	5010-09331-00	R16	Resistor, 13K Ω , 1/4w, 5%
a) 5700-10176-00		Socket, IC, 28-pin (U4, U19, U20)	5010-09333-00	R29	Resistor, 180K Ω , 1/4w, 5%
5370-09691-00	U6	IC, 55536, CVSD	5010-09342-00	R30	Resistor, 36K Ω , 1/4w, 5%
5371-09152-00	U11	IC, D/A Convtr, MC1408	5010-09534-00	W2, W9, W11	Resistor, Ω
5430-10322-00	U12	IC, PIA, MC68B21	5010-10985-00	R14, R15	Resistor, 20K Ω , 1/4w, 5%
5340-10139-00	U5	IC, RAM/S 5516-2 2Kx8	5013-09427-00	R13	Resistor, 4.9K Ω , 1/4w, 5%
5281-09467-00	U7, U16	IC, Dual D Flipflop, 74LS74	5040-09343-00	C1, C3, C4, C8, C17	Capacitor, 10 μ f, 20v, $\pm$ 20%
5281-10043-00	U13	IC, 74LS175	5040-10974-00	C12, C19, C24	Capacitor, 100 μ f, 35v
5281-09235-00	U21	IC, Triple NAND, 74LS10	5040-09776-00	C26, C30	Capacitor, 470 μ f, 16v; +50, -10%
5370-09321-00	U9, U10, U17, U18	IC, Op Amp, MC1458	5040-09365-00	C11	Capacitor, 1 μ f, 63v, +50, -10%
5281-09215-00	U2	IC, Hex Inv, 74LS04	5040-12006-00	C29, C32	Capacitor, 1000 μ f, 16v, 20%
5281-09246-00	U14	IC, 2-4 Dec, 74LS139	5041-09243-00	C25, C28	Capacitor, 10 μ f, 10v, $\pm$ 10%
5281-09745-00	U15	IC, Dual Mux, 74LS138	5043-08980-00	C5, B (20)*	Capacitor, 0.01 μ f, 50v, +80, -20%
5370-09156-00	U22, U23	IC, Audio Amp, TDA2002	5043-08996-00	C31, C33	Capacitor, 0.1 μ f, 50v, $\pm$ 20%
a) 5705-09199-00		Heatsink, #6030B	5043-09065-00	C13 - C15	Capacitor, 470 pfd, 50v, $\pm$ 20%
b) 4006-01003-06		Mach. Screw, 6-32 x 3/8	5043-09492-00	C2, C34	Capacitor, 100 pfd, 50v, $\pm$ 10%
c) 4406-01117-00		Nut, 6-32 Hex.	5043-09844-00	C6	Capacitor, 47 pfd, 50v, $\pm$ 20%
d) 4703-00007-00		Lockwasher, #6 Ext.	5043-09845-00	C16, C18, C20 - C23, C27	Capacitor, 1000 pfd, 50v, $\pm$ 20%
5160-10269-00	Q1	Transistor, 2N3904, NPN	5046-09346-00	C7	Capacitor, 1200pfd, 50V, $\pm$ 5%
5060-10396-00	SP1	SIP 4.7K & 470pfd, 8R8C	5046-09350-00	C9	Capacitor, 180pfd, 100V, $\pm$ 5%
5010-09181-00	R44, R48	Resistor, 1.0 Ω , 1/2w, 5%	5048-10992-00	C10	Capacitor, 4700pfd, 50v,
5010-09161-00	R35, R45	Resistor, 2.2 Ω , 1/4w, 5%	5520-09020-00	X1	Crystal, 3.58 MHz
5010-09361-00	R43, R46, R47	Resistor, 220 Ω , 1/2w, 5%	5521-10931-00	CR1	Oscillator, 8 MHz
5010-09358-00	R41, R42	Resistor, 1K Ω , 1/4w, 5%	5551-08822-00	L1 - L3	Inductor, 4.7 μ H, 3A.
5010-08998-00	R2, R3	Resistor, 2.2K Ω , 1/4w, 5%	5791-09437-00	J4	Connector, 20 pin, (Hdr), Rib. Cbl
5010-08983-00	R7-R9	Resistor, 3.3K Ω , 1/4w, 5%	5791-10862-04	J1, J2, J5	Connector, 4 pin (Hdr)
5010-08991-00	R1, R4, R5, R11, R25 - R28, R33, R36, R37, R49, R50	Resistor, 4.7K Ω , 1/4w, 5%	5791-10862-06	J3	Connector, 6 pin (Hdr)
5010-09034-00	R22-R24, R17, R34	Resistor, 10K Ω , 1/4w, 5%	16-8850-331		PCB I.D. Label
			20-9229		Thermal Compound

Notes... *20 capacitors (shown on diagram with "B" symbol) provide +5VDC filtering for ICs.
All capacitors are ceramic, 50v, axial, unless otherwise noted.
All resistors are 5%, 1/4w, Carbon Film, unless otherwise noted.

Power Supply

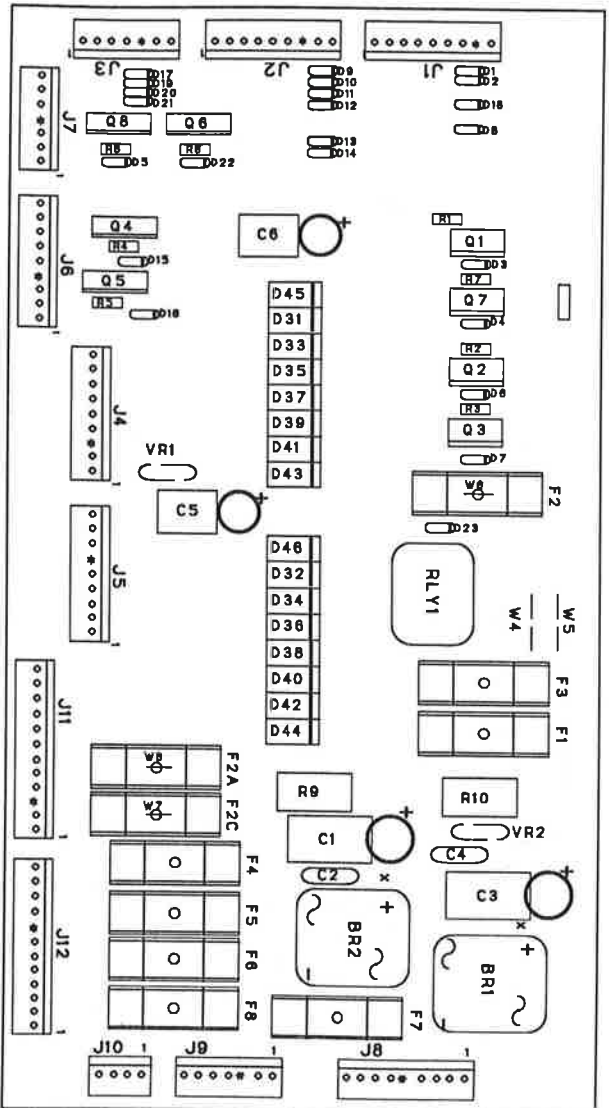


Ckt				Ckt			
Item	Part No.	Symbol	Description	Item	Part No.	Symbol	Description
1	5765-12317-00		Power Supply PCB	26	5075-09060-00	ZR2, ZR4	Zener, 1N4764, 100v, 1w
2	5733-12060-01	F1-F5	Fuse Holder	27	5460-09424-00	IC1	IC, Volt. Reg., MC1723C5
3	5731-09432-00	F4, F5	Fuse, 7A., S-B, 250v	28	5010-09069-00	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	31	5013-09426-00	R7	Resistor, 2.15K, 1%, 1/4w, C. F.
7	5791-10862-06	J2	Connector, 6-pin Hdr	32	5013-09427-00	R8	Resistor, 4.99K, 1%, 1/4w, C. F.
8	5791-10862-09	J3	Connector, 9-pin Hdr	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, NPN	36	5010-09508-00	R12	Resistor, 270Ω, 2%, 1/4w, C. F.
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

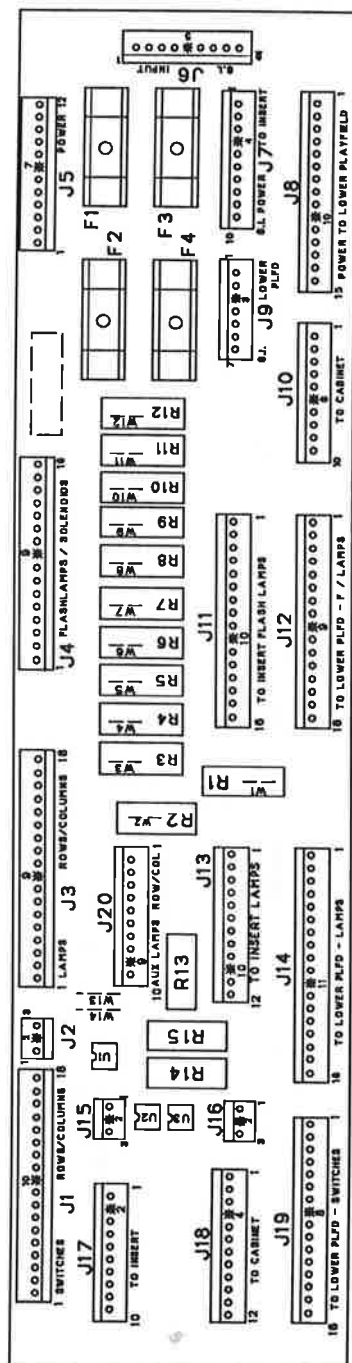
Notes:

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

D-12247-576 Auxiliary Power Driver Board

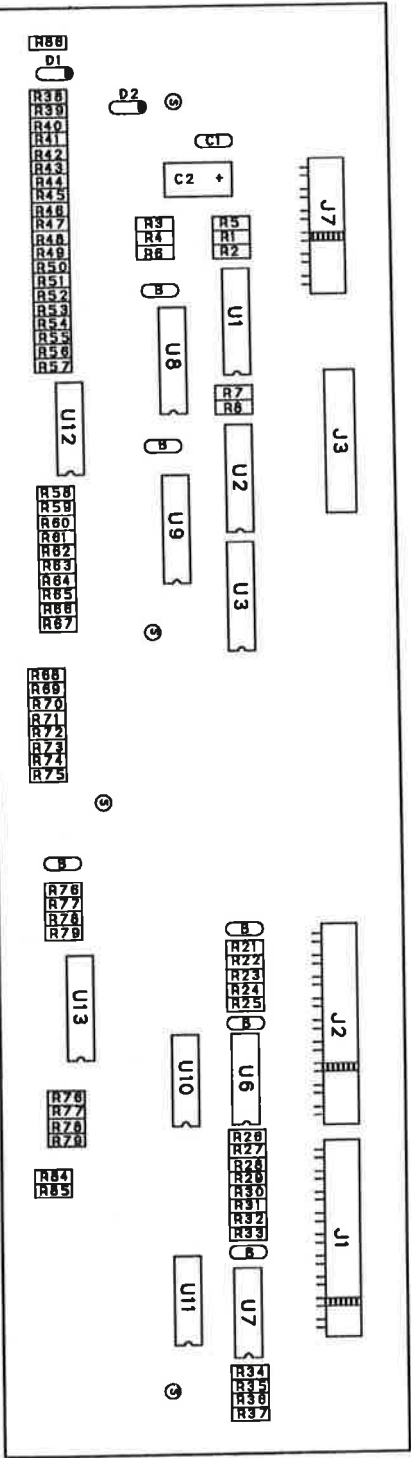


Part Number	Ckt Designator	Description	Part Number	Ckt Designator	Description
5763-12184-00		Bare PC Board	5580-09555-01	K1	Relay, DPDT, 13A
5040-09537-00	C1, C3	Capacitor, 100 µfd., 100v, Radial	5733-12060-01	F5, F6	Fuse Holder
5040-12181-00	C5, C6	Capacitor, 10 µfd., 100v, Radial	5731-08665-00	F2A, F3	Fuse, 2A, S-B, 250v
5043-09072-00	C2, C4	Capacitor, 0.1 µfd., 500v	5731-09128-00	F1, F2C	Fuse, 2-1/2A, S-B, 250v
5010-09160-00	R1 - R8	Resistor, 220Ω, 1/4w C.F., 5%	5731-09651-00	F4, F7, F8	Fuse, 5A, S-B, 250v
5012-12238-00	R9	Resistor, 3.3KΩ, 5w, 10%	5731-09432-00	J1, J2, J4 - J6, J8	Fuse, 7A, S-B, 250v
5010-09534-00	W1, W3, W4, W6	Resistor, 0Ω	5791-10862-09	J3, J7, J9	Connector, 8-pin Hdr, Sq Pin
5017-12180-00	VR1, VR2	Varistor, 100v	5791-10862-07	J10, J12	Connector, 7-pin Hdr, Sq Pin
5100-09690-00	BR1, BR2	Bridge Rectifier, 35A, 200v	5791-10862-12	J11, J12	Connector, 12-pin Hdr, Sq Pin
5070-08785-00	D1 - D23	Diode, 1N4003	5791-10862-04	J10	Connector, 4-pin Hdr, Sq Pin
5070-09045-00	D31 - D46	Diode, MR501	16-8850-292		PCB Label
5191-12179-00	Q1 - Q8	Transistor, TIP36C			



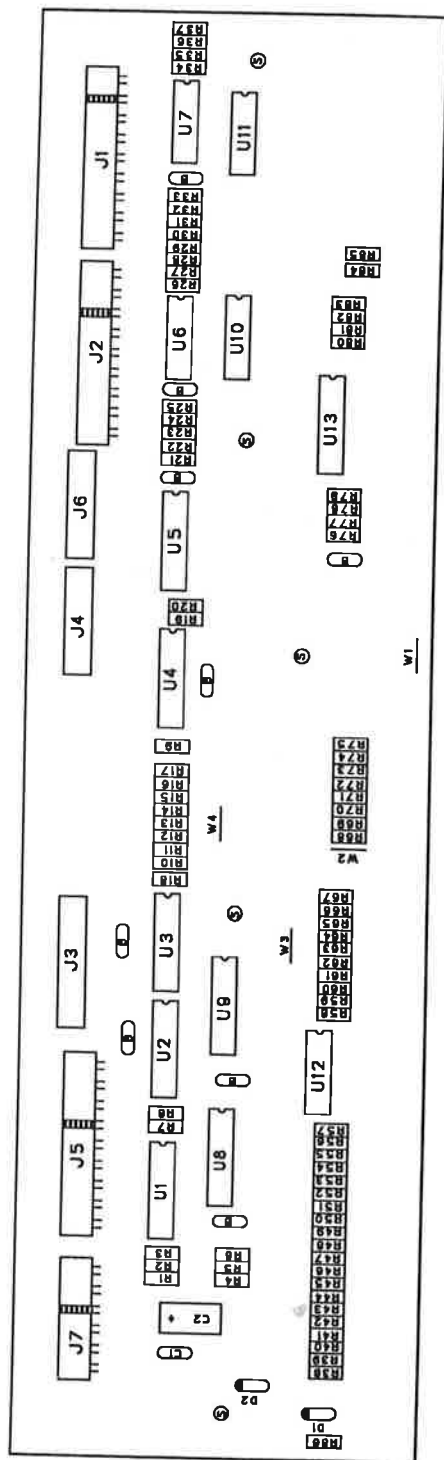
Part Number	Ckt Designator	Description
5768-12332-00		Master Interconnect PCB
5010-09534-00	W9 - W13	Resistor, 0Ω
5012-10024-00	R1 - R8	Resistor, 5.6Ω, 5w, 10%
5012-12238-00	R14, R16	Resistor, 3.3KΩ, 5w, 10%
5012-12337-00	R13	Resistor, 1.5KΩ, 5w, 10%
5490-10892-00	U1 - U3	Opto Isolator 4N25
5731-09651-00	F1 - F4	Fuse, 5A.S.B., 250v
5733-12060-01		Fuse Holder, F1-F4
5791-12273-03	J2, J16	Connector, 3-pin Str Sq Pin
5791-10862-07	J9	Connector, 7-pin Hdr Sq Pin
5791-10862-09	J6	Connector, 9-pin Hdr Sq Pin
5791-10862-10	J7, J10	Connector, 10-pin Hdr Sq Pin
5791-10862-12	J5, J13, J18	Connector, 12-pin Hdr Sq Pin
5791-10862-15	J8	Connector, 15-pin Hdr Sq Pin
5791-10862-16	J4, J11, J12, J19	Connector, 16-pin Hdr Sq Pin
5791-10862-18	J1, J3, J14	Connector, 18-pin Hdr Sq Pin
16-8850-332		PCB Label

Bally Left Display Board



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

D-12502-1 Bally Right Display Board



Part Number	Designation No.	Description	Qty.
5043-08980-00	B (Bypass Cap)	Axial Cap., 0.01µfd, 50v, (+80, -20%)	9
5043-08996-00	C1	Axial Cap., 0.1µfd, 50v, (+80, -20%)	1
5040-09343-00	C2	Axial Cap., 10µfd, 25v, (±20%)	1
5075-09135-00	D1, D2	Zener, 1N4740, 10v	2
5670-12308-00	DSPL1	Display, 16-Character A/V	1
5791-10869-09	J1, J2, J5	9-Pin Header, Right Angle, .156	3
5791-10851-00	J3	26-Pin Header, Right Angle, .100	1
5791-10869-06	J7	6-Pin Header, Right Angle, .156	1
5010-08981-00	R39, R41, R43, R47, R53, R66, R70, R72, R84	Resistor, 10KΩ, 1/2w, 5%	9
5010-08773-00	R1-R8, R21-R37	Resistor, 18KΩ, 1/4w, 5%	25
5010-09162-00	R38, R40, R42, R44	Resistor, 100KΩ, 1/4w, 5%	32
	R46, R48, R50, R52, R54-R61, R63, R65, R67, R69		
	R71, R73, R75-R83, R85		
5010-10258-00	R86	Resistor, 1MΩ, 1/4w, 5%	1
5010-10927-00	R45, R49, R51, R62	Resistor, 8.2KΩ, 1/4w, 5%	7
	R64, R68, R74		
5010-09534-00	W3, W4	Resistor, Ω	2
5310-08975-00	U1-U3	I.C. 4049	3
5310-09882-00	U6, U7, U10, U11	I.C. 4001	4
5680-08969-00	U8, U9	I.C. 7180, Cathode Driver	2
5680-08968-00	U12, U13	I.C. 6118, Anode Driver	2
5768-12378-00		Bally-Lo Display PCB	1
03-8088-1	S (Support)	Support Display	5
16-8850-251		Label	1

Lamp Boards

B-12224 Single Lamp Board

Part Number	Description
5768-12312-00	Lamp PCB
24-8767	Twist Lamp Socket
24-8768	Bulb #555, (6.3v, 0.25A.)
5070-09054-00	Diode, 1N4004, 1.0A.

A-14117 Candle Lamp Board

Part Number	Description
5768-12721-00	Lamp PCB
24-8767	Twist Lamp Socket
24-8768	Bulb #555, (6.3v, 0.25A.)
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10871-11	Connector, 11-pin Header Sq Post
5010-09534-00	Resistor, 0Ω

A-14141 5-Lamp Board

Part Number	Description
5768-12722-00	Lamp PCB
24-8805	Socket-H Wedge
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10869-07	Connector, 7-pin Header Sq Post

A-14142 3-Lamp Board

Part Number	Description
5768-12723-00	Lamp PCB
24-8805	Socket-H Wedge
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10869-05	Connector, 5-pin Header Sq Post

C-13361 3-Lamp Board

Part Number	Description
5768-12584-00	Lamp PCB
24-8767	Twist Lamp Socket
24-8768	Bulb #555, (6.3v, 0.25A.)
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10871-05	Connector, 5-pin Header Sq Post

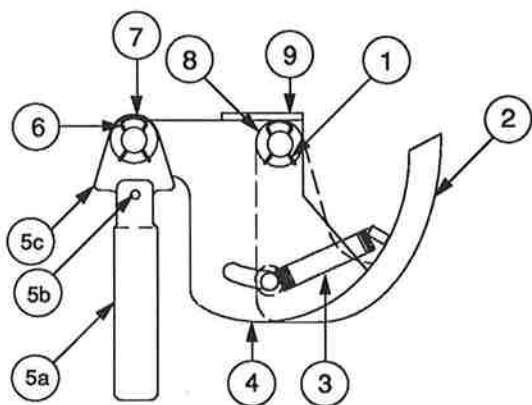
C-13855 3-Lamp Board

Part Number	Description
5768-12678-00	Lamp PCB
24-8767	Twist Lamp Socket
24-8768	Bulb #555, (6.3v, 0.25A.)
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10871-05	Connector, 5-pin Header Sq Post

C-11998-1 Relay Board (Solenoid & Gen. Illum)

Part Number	Description
5768-12243-00	Lamp PCB
5070-09054-00	Diode, 1N4004, 1.0A. (D1)
5580-09555-01	Relay, 24vdc, 30A. (K1)
5010-09534-00	Resistor 0Ω (W1, W2)
5791-12273-02	Header, 2-pin Sq post (J1)
5791-12273-07	Header, 7-pin Sq post (J2)

C-9638 Ball Shooter Lane Feeder

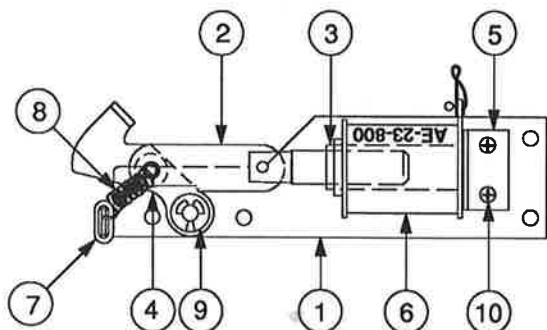


Item	Part Number	Description
1	12-6227	Hair Pin Clip
2	A-8247	Eject Cam Assembly
3	10-362	Ejector Spring (Plain)
4	A-6949-L	Spring Plate Assembly
5	A-8050-1	Coil Plunger Assy, 2-1/8"
	a) 02-3407-2	Coil Plunger, 2-1/8"
	b) 20-8716-5	Roll Pin, 1/8 x 7/16
	c) 03-8085	Armature Link
6	12-6227	Hair Pin Clip
7	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.
8	4700-00103-00	Flatwasher, 17/64 x 1/2 x 28ga.
9	A-8268	Mounting Bracket Assembly

Associated Parts

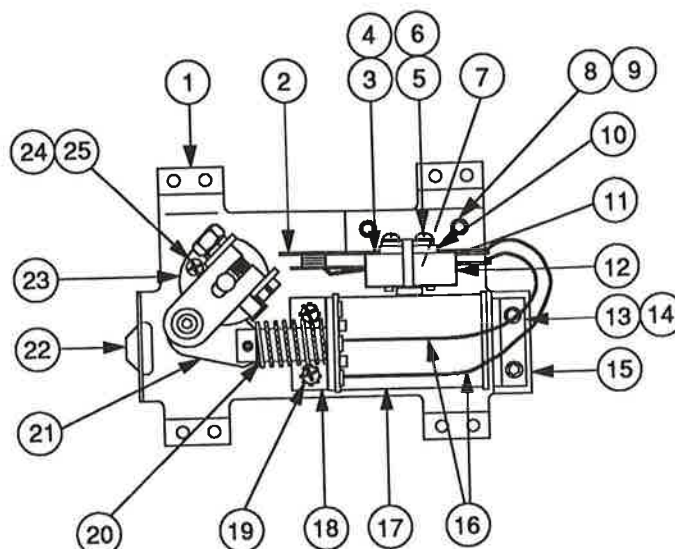
B-9362-L-1	Coil & Bracket Assembly
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
4006-01017-06	Mach. Screw, 6-32 x 3/8
4406-01119-00	Nut, 6-32 ESN
AE-23-800	Coil Assembly
03-7066	Coil Tubing

B-8039-2 Outhole Kicker Assembly



Item	Part Number	Description
1	A-6378	Mounting Plate Assembly
2	A-8335	Coil Plunger Assembly
	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 Assembly
5	A-8038	Coil Stop Assembly
6	AE-23-800	Coil Assembly
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

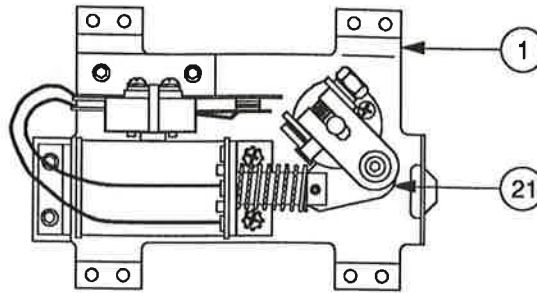
C-13174-R Right Flipper Assembly



Item	Part Number	Description	Item	Part Number	Description
1	B-13104-R	Flipper Base Assy, R.	21	B-10655-R	Crank Link Assembly, Right
2	03-7811	End of Stroke (EOS) Sw	a)	02-4179	Link Spacer Bushing
3	RM-21-06	Sleeve, Vinyl (Cap. leads)	b)	4010-01086-14	Cap Screw, 10-32 x 7/8, SH
4	5045-12098-00	Capacitor, 2.2 μFd, 250V, 20%	c)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
5	4701-00002-00	Lockwasher, #6 Split	d)	4701-00004-00	Lockwasher, #10 Split
6	4105-01019-10	Sh. Metal Screw, #5 x 5/8	e)	4410-01132-00	Nut, 10-32 ESNA
7	23-6622	Tape, Double-sided	f)	A-10656	Flipper Link Assembly
8	4008-01079-05	Cap Screw, 8-32 x 5/16	1.)	02-4219	Coil Plunger
9	4701-00003-00	Lockwasher, #8 Split	2.)	20-9370-1	Spring Pin, 5/32 dia. x 7/16
10	01-9375	Switch Mounting Bracket	3.)	03-8050-1	Flipper Link
11	03-7520-2	Ty-Wrap, Nylon	g)	B-10657-R	Flipper Crank Assy, R.
12	20-6516	Speednut, Tinnerman	1.)	01-8073-R	Flipper Crank, R.
13	4010-01066-06	Cap Screw, 10-32 x 3/8, SH	2.)	17-1037	Crank Washer
14	4701-00004-00	Lockwasher, #10 Split	3.)	4010-01066-18	Cap Screw, 10-32 x 1-1/8
15	A-12111	Flipper Stop Assembly	4.)	4410-01127-00	Nut, 10-32 Hex Hd.
16	HW-30018-6	Wire, 18 AWG, Blue	5.)	4700-00107-00	Flatwasher, 5/8 x 13/64 x 12ga.
17	FL-11630	Flipper Coil (Red)	6.)	4701-00004-00	Lockwasher, #10 Split
18	01-7695	Solenoid Bracket	7.)	RM-23-06	Tubing, H. S. 1/4 DWP
19	4006-01017-04	Mach. Screw, 6-32 x 1/4	22	23-6577	Bumper Plug
20	10-376	Coil Plunger Spring	23	03-7568	Flipper Bushing
			24	4006-01005-06	Mach. Screw, 6-32 x 3/8
			25	4406-01117-00	Nut, 6-32 Hex.

Associated Parts: 20-9592-15 Flipper Arm on Shaft (Yellow)
 23-6519-4 Red Rubber Ring

Left Flipper Assembly



C-13174-L

Left Flipper Assembly

(Parts listed replace same items of C-13174-R)

Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, L
21	B-10655-L	Crank Link Assembly, L
g)	B-10657-L	Flipper Crank Assembly
1.)	01-8073-L	Flipper Crank, Left

Associated Parts:

20-9592-15	Flipper Arm on Shaft (Yellow)
23-6519-4	Red Rubber Ring

C-13174-L-2

Upper Left Flipper Assembly

(Parts listed replace same items of C-13174-R)

Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, L
17	FL-11722	Flipper Coil (Green)
21	B-10655-L	Crank Link Assembly, L
g)	B-10657-L	Flipper Crank Assembly
1.)	01-8073-L	Flipper Crank, Left

Associated Parts:

20-9592-5	Flipper Arm on Shaft (Yellow)
23-6519-4	Red Rubber Ring

Flipper Assembly Notes...

1. Each Flipper Assembly on the Lower Playfield is mounted beneath the playfield, in conjunction with the plastic Flipper Paddle and Shaft (20-9250-6) and Flipper Rubber (23-6519-4) on the upper side of the playfield.
2. The tip of the EOS Switch must travel 0.150 (+ .010, - .000) inch, before the contacts fully open, with the flipper in the actuated position. The EOS Switch contacts must have a gap of 0.062 (± .015) inch. Adjustment of the EOS Switch must be made at a minimum distance of 0.25 inch from the switch body.
3. All moving elements of the assembly must operate freely, with no evidence of binding.
4. The large end of the Coil Plunger Spring (item 20) must fit within the four lugs of the Solenoid Bracket.
5. For coil replacement, remove the Solenoid Bracket (item 18) 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 their Bumper Plug (item 22) 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 17). Trace-color wire connects to the unbanded end of the diode.

C-12872 Jumper Bumper Assembly

Item	Part Number	Description
1	AE-23-800	Coil & Tubing Assy.
a)	5070-09054-00	Diode 1N4004, 1.0A.
2	B-12749	Core Plug & Bracket Assy.
3	03-8324-5	Thunder Bumper Base, Wht.
4	01-9166	Switch Plate
5	01-9321	Switch Plate
6	01-9319	Plunger Bracket
7	01-9117	Mounting Bracket
8	02-3406-1	Plunger Coil
9	4705-00002-00	Spring Washer, 1/2"
10	01-9116	Bracket Plate
11	01-9320	Plate, Bakelite
12	10-411	Compression Spring
13	A-14271	Socket Assembly
a)	24-8768	Bulb #555 (6.3v., 0.25A.)
b)	24-8813	Lamp Socket
14	Not Used	
15	Not Used	
16	03-8325-5	Body, White
17	A-4754	Flange & Stud Assembly
18	03-6035-5	Wafer, White
19	10-326	Compression Spring
20	4408-01119-00	Nut, 8-32 ESN
21	4406-01119-00	Nut, 6-32 ESN
22	B-13267	Switch & Diode Assembly
a)	SW-1A-187	Switch
b)	5070-06258-00	Diode, 1N4001, 1.0A.
23	4008-01070-14	Mach. Screw, 8-32 x 7/8
24	4005-01016-18B	Mach. Screw, 5-40 x 1-1/8
25	4008-01015-04	TT, 8-32 x 1/4
26	4008-01015-06	TT, 8-32 x 3/8
27	4108-01001-10	Sh. Metal Screw, #8 x 5/8

Associated Parts for Top Left Bumper:

03-8277-10	Thumper Cap, Blue
03-8276-9	Collar (Red)

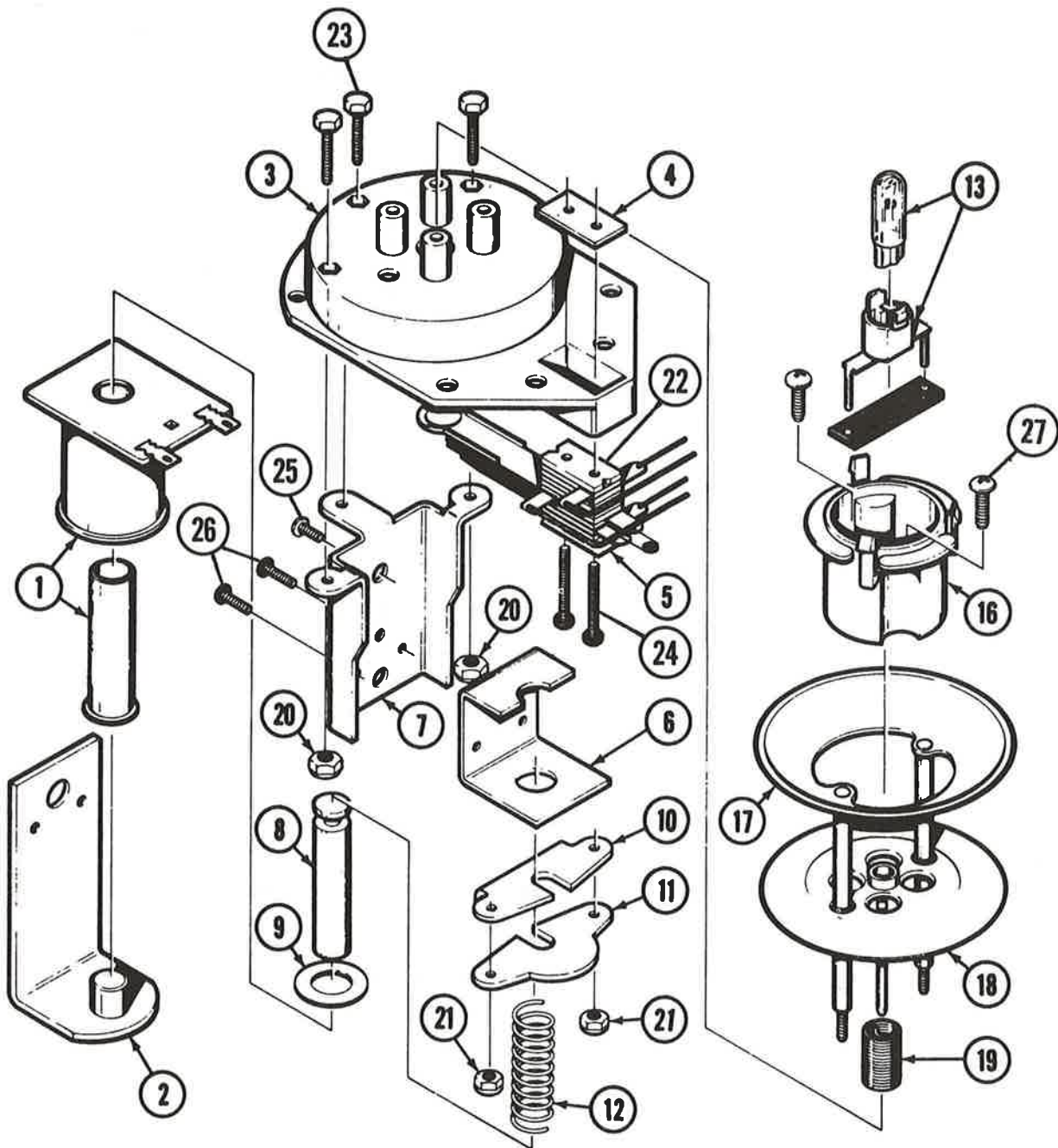
Associated Parts for Top Right Bumper:

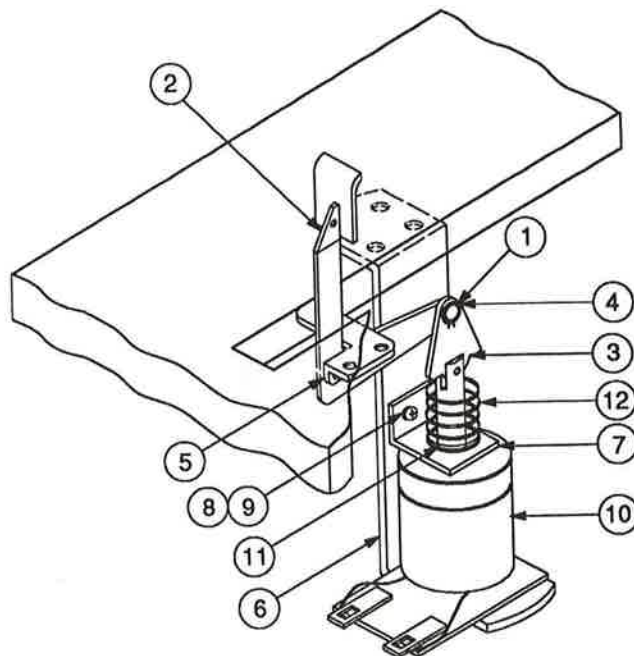
03-8277-16	Thumper Cap, Yellow
03-8276-10	Collar (Blue)

Associated Parts for Top Lower Bumper:

03-8277-9	Thumper Cap, Red
03-8276-16	Collar (Yellow)

C-12872 Jumper Bumper Assembly

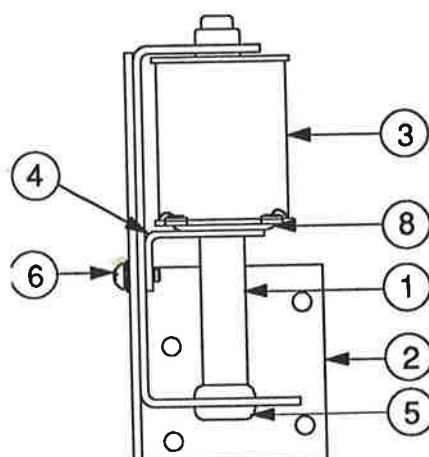


B-12665**Kicker Arm (Slingshot) Assembly**
(Left & Right Kickers)

Item	Part Number	Description
1	12-6227	Clip, Hairpin
2	A-12664	Kicker Crank Assembly
3	A-5103	Coil Plunger Assembly
a)	02-2364	Coil Plunger
b)	20-8716-5	Roll Pin, 1/8 x 7/16
c)	03-8085	Armature Link
4	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.
5	A-5653	Mounting Bracket Assembly

Associated Parts

Item	Part Number	Description
6	B-11203-L-1 B-11203-R-1	Coil & Bracket Assy: Left : Right
7	01-8-508-S	Coil Retaining Bracket
8	4006-01017-06	Mach. Screw, 6-32 x 3/8
9	4406-01119-00	Nut, 6-32 ESN
10	AE-26-1500	Coil Assembly
11	03-7066	Coil Tubing
12	10-128	Spring

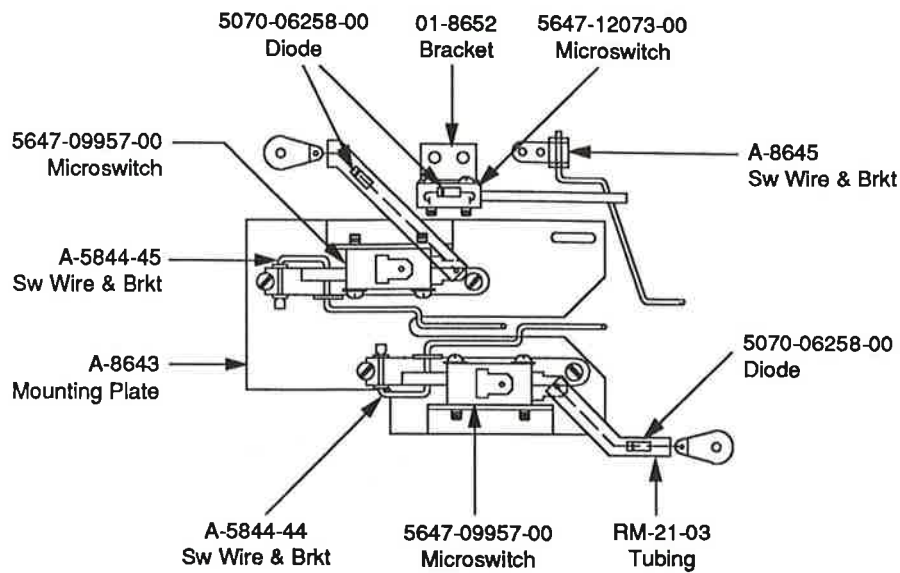
B-10686-1**Knocker Assembly**

Item	Part Number	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

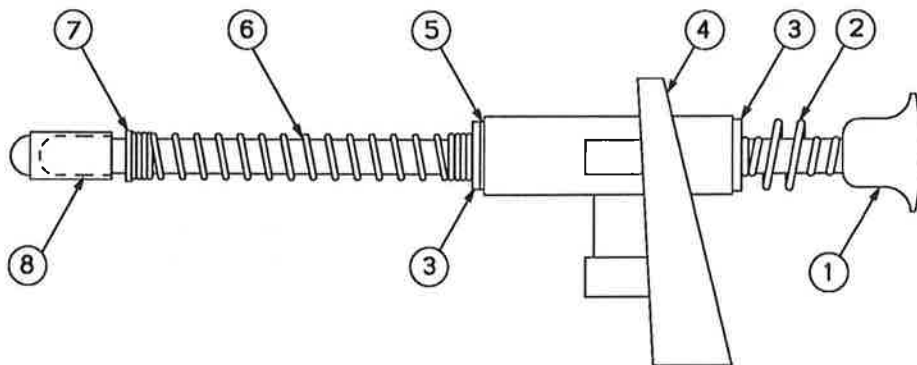
Kicker (Slingshot)
Knocker

Ball Trough Switches

(Viewed from underside of playfield to show locations)

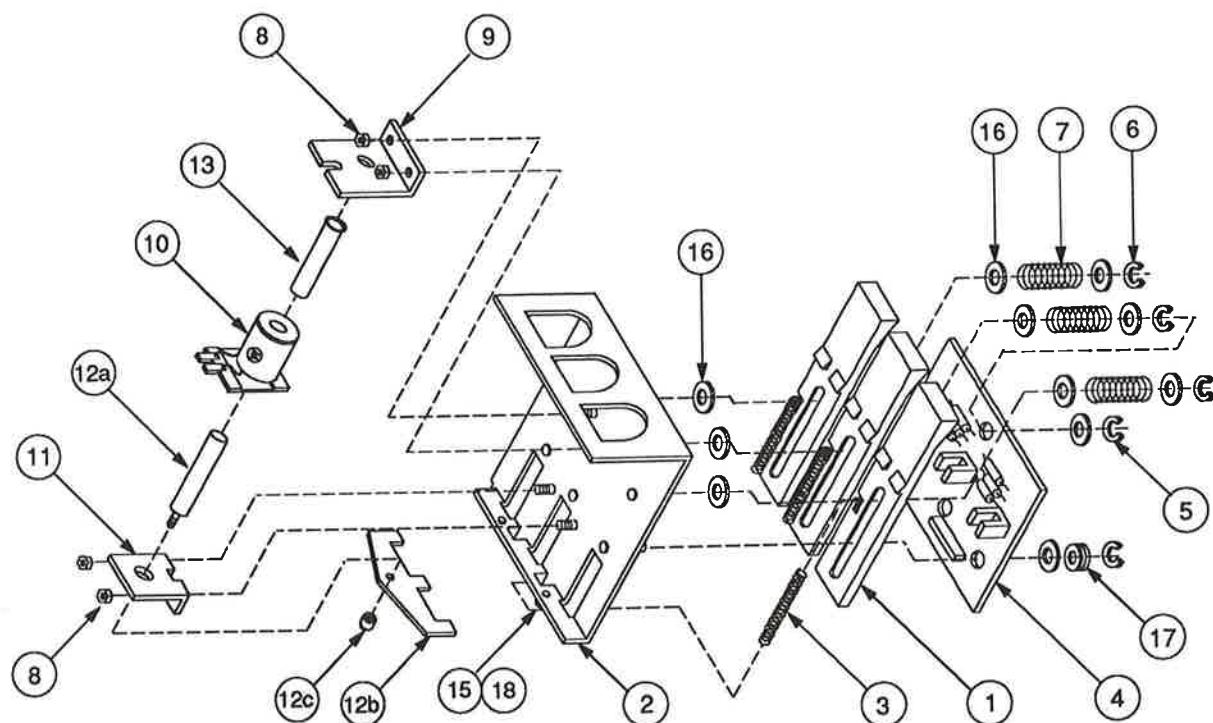


B-12445-1 Ball Shooter Assembly



Item	Part Number	Description
1	20-9253-7	Rod Assembly
2	10-149	Rod Spring
3	4700-00051-00	Flatwasher, 25/64 x 5/8 x 16ga.
4	21-6645-1	Ball Shooter Housing
5	03-7357	Shooter Sleeve
6	10-148-1	Power Spring
7	20-8718-1	"C" Retainer Ring
8	23-6327	Shooter Tip

C-11223-1 3-Bank Drop Target Assembly

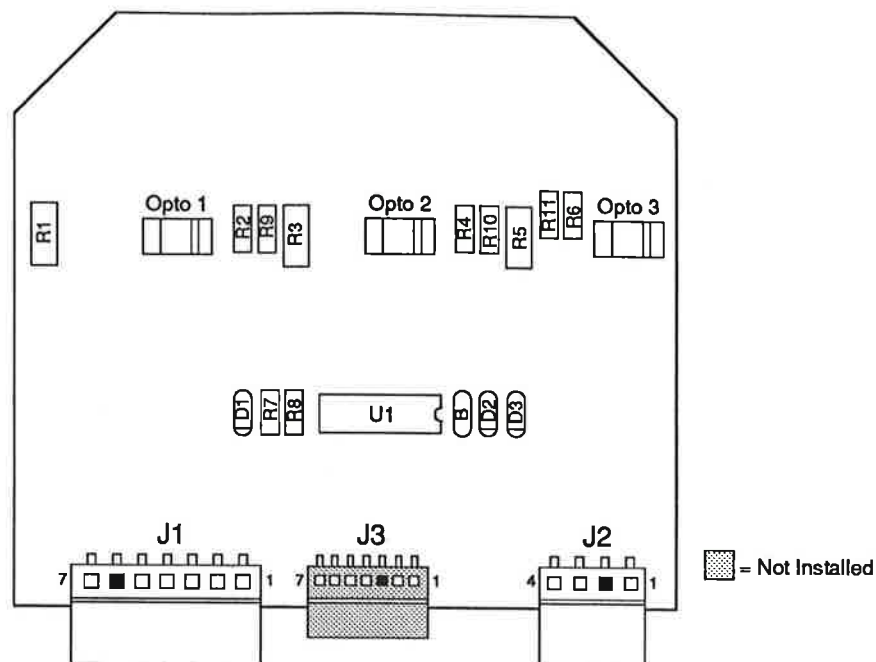


Item	Part Number	Description	Item	Part Number	Description
1	03-8036	Target, Plain	12	A-11389	Plunger & Reset Plt Assy
2	B-13271	3-Bank Tgt Sub-Assy	a)	02-3972-1	Plunger
3	10-364	Spring - Extension	b)	01-8408	Reset Plate
4	C-13205	3- Bnk Drop Tgt Opto Bd.	c)	4410-01132-00	Nut, 10-32 ESN
5	20-8712-18	"E"-Ring, 3/16" Shaft	13	03-7066-4	Coil Tubing
6	20-8712-25	"E"-Ring, 1/4" Shaft	14	4700-00016-00	Flatwasher, 3/16 x 7/16 x 17 ga.
7	10-392	Spring-Compression	15	4008-01016-10	Mach. Screw, 8-32 x 5/8
8	4408-01119-00	Nut, 8-32 ESN	16	4700-00072-00	Flatwasher, 17/64 x 1/2 x 21 ga.
9	A-11397	Stop Bracket Assy	17	23-6626	Rubber Grommet
10	AE-26-1200	Coil Assembly	18	4408-01128-00	Nut, 8-32 KEPS
11	01-8413	Bracket Coil Mounting			

Associated Parts:

31-1463-20009 Drop Target Decal

C-13205 3-Bank Drop Target Opto Board



Part Number	Ckt Designation	Description
5768-12546-00		3-Bank Opto Board
5490-10159-00	Opto 1- Opto 3	Opto Interruptor, MDL, S/G
5010-08930-00	R1, R3, R5	Resistor, 470 Ω , 1/2w, 5%, C.F.
5010-09162-00	R8	Resistor, 100K Ω , 1/4w, 5%, C.F.
5010-08774-00	R7	Resistor, 22K Ω , 1/4w, 5%, C.F.
5010-09324-00	R2, R4, R6	Resistor, 27K Ω , 1/4w, 5%, C.F.
5010-08773-00	R9 - R11	Resistor, 18K Ω , 1/4w, 5%, C.F.
5043-08980-00	B	Capacitor, .01 μ fd., +80 -20%
5370-12272-00	U1	I.C., Quad. Comp., LM339
5791-10869-04	J2	Connector, 4-Pin R/A Sq. Pin
5791-10869-07	J1	Connector, 7-Pin R/A Sq. Pin
5070-09054-00	D1 - D3	Diode, 1N4004, 1.0A

C-13155-1 Coin Door Assembly

USA Door with decals

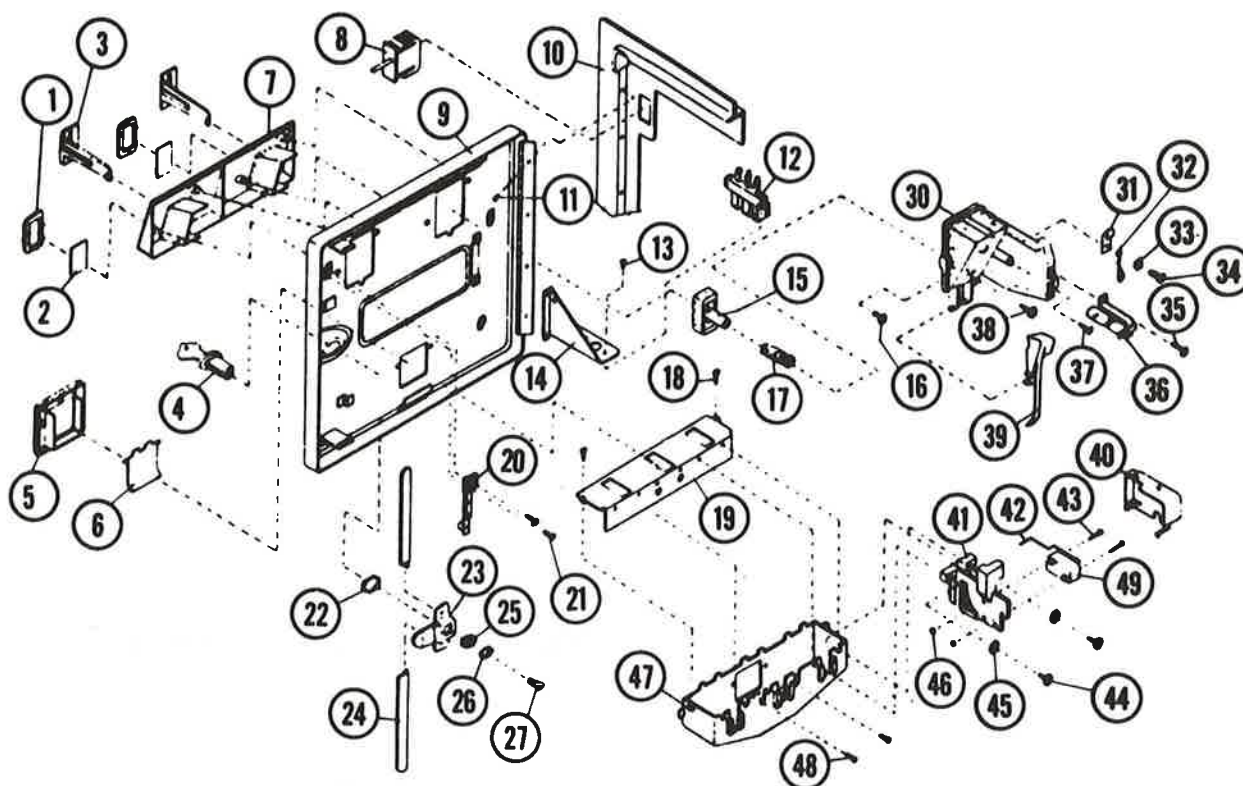
2-Chute Door - 09-17002-x

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
28	Not Used		
29	Not Used		
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)	

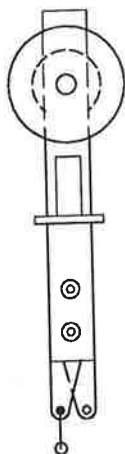
C-13155-1 Coin Door Assembly



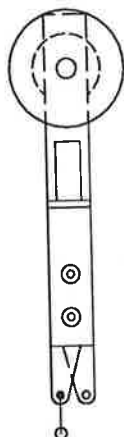
C-13155-1 Coin Door Assembly (Continue)

Item	Part Number	Description	Quantity
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

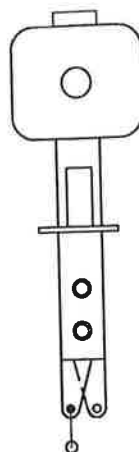
Standup Target Assemblies



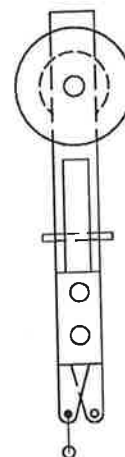
A-14227-



A-14228-



A-14229-



B-11742-

* A-14227-2 Standup Target Assy

Part Number	Description
SW-1A-170-2	Standup Target Switch
03-8093-15	Standup Target, Green
5070-09054-00	Diode, 1N4004, 1.0A.

A-14227-15 Standup Target Assy

Part Number	Description
SW-1A-170-15	Standup Target Switch
03-8093-15	Standup Target, Orange
5070-09054-00	Diode, 1N4004, 1.0A.

A-14227-6 Standup Target Assy

Part Number	Description
SW-1A-170-6	Standup Target Switch
03-8093-2	Standup Target, Yellow
5070-09054-00	Diode, 1N4004, 1.0A.

A-14227-4 Standup Target Assy

Part Number	Description
SW-1A-170-4	Standup Target Switch
03-8093-4	Standup Target, Red
5070-09054-00	Diode, 1N4004, 1.0A.

A-14228-1 Standup Target Assy

Part Number	Description
SW-1A-170-1	Standup Target Switch
03-8093-1	Standup Target, Blue
5070-09054-00	Diode, 1N4004, 1.0A.

A-14228-2 Standup Target Assy

Part Number	Description
SW-1A-170-2	Standup Target Switch
03-8093-2	Standup Target, Green
5070-09054-00	Diode, 1N4004, 1.0A.

Standup Target Assemblies (continue)

A-14228-4 Standup Target Assy

Part Number	Description
SW-1A-170-4	Standup Target Switch
03-8093-4	Standup Target, Red
5070-09054-00	Diode, 1N4004, 1.0A.

A-14229-13 Square Standup Target

Part Number	Description
SW-1A-184-13	Standup Target Switch
03-8304-13	Standup Target, Clear
5070-09054-00	Diode, 1N4004, 1.0A.

A-14229-9 Square Standup Target

Part Number	Description
SW-1A-184-9	Standup Target Switch
03-8304-9	Standup Target, Red
5070-09054-00	Diode, 1N4004, 1.0A.

B-11742-5 Standup Target Assy

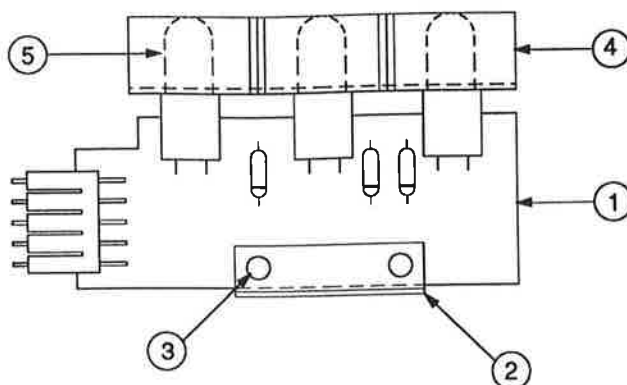
Part Number	Description
SW-1A-170-5	Standup Target Switch
03-8093-5	Standup Target, White
5070-06258-00	Diode, 1N4001, 1.0A.

* B-11742-9 Standup Target Assy

Part Number	Description
SW-1A-170-15	Standup Target Switch
03-8093-15	Standup Target, Orange
5070-06258-00	Diode, 1N4001, 1.0A.

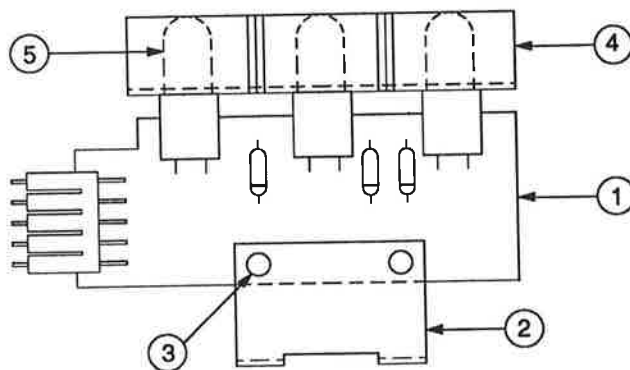
Note: * Standup Targets located on Mini-Playfield Assembly: p/n 20009-PL-UP.

A-14253 PCB Top Assembly



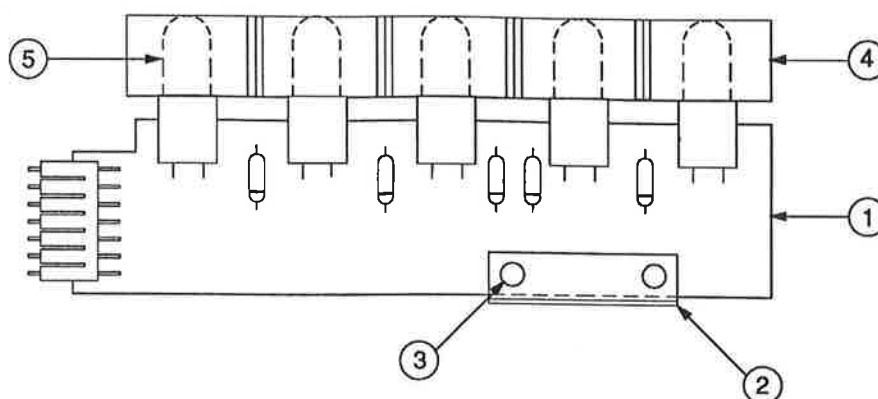
Item	Part Number	Description
1	A-14142	5-Lamp PCB Assembly
2	01-9930	Bracket PCB Mounting Top
3	07-6688-17	Rivet, 1/8 x 5/32
4	01-9955	Shield
5	24-8768	Bulb #555, (6.3v, .25A.)
6	01-9987	Shield

A-14211 PCB Bottom Assembly



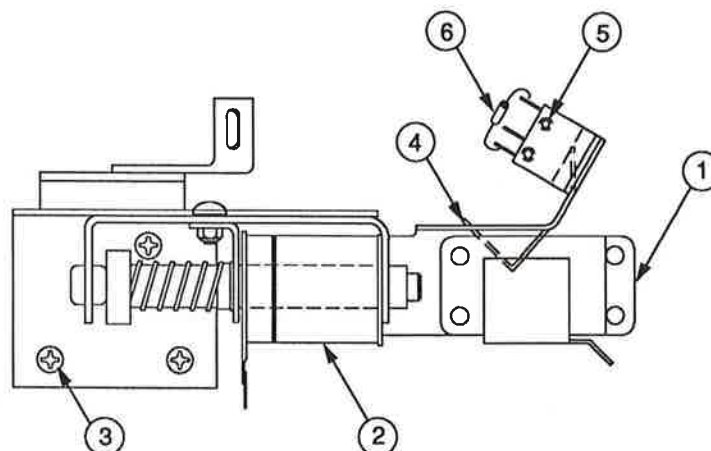
Item	Part Number	Description
1	A-14142	3-Lamp PCB Assembly
2	01-9931	PCB Mounting Bracket, Bottom
3	07-6688-17	Rivet, 1/8 x 5/32
4	01-9955	Shield
5	24-8768	Bulb #555, (6.3v, .25A.)
6	01-9987	Shield

A-14212 PCB Top Large Assembly



Item	Part Number	Description
1	A-14141	5-Lamp PCB Assembly
2	01-9930	PCB Mounting Bracket, Top
3	07-6688-17	Rivet, 1/8 x 5/32
4	01-9956	Shield
5	24-8768	Bulb #555 (6.3v, .25A.)

A-14210 Kicker Coil Assembly



Item	Part Number	Description
1	A-14195	Coil Bracket Assembly
2	B-11873	Bottom Arch Kicker Assy.
3	4006-01003-05	Mach. Screw, 6-32 x 5/16
4	5647-12073-45	Subminiature Switch
5	4002-01105-06	Mach. Screw, 2-56 x 3/8
6	5070-09054-00	Diode, 1N4004, 1.0A.

Ramp Assemblies

A-14213 Up/Low Ramp Assy.

Item	Part Number	Description
1	03-8505	Upper Ramp
2	A-14158	Switch Bracket Assy.
3	5647-12073-21	Subminiature Switch
4	01-9905	Flap
5	4700-00003-00	Flatwasher, 1/8 x 9/32 x 21ga.
6	07-6688-16N	Rivet, 1/8 x 1/8
7	4006-01003-08	Mach. Screw, #6-32 x 1/2
8	4406-01128-00	Nut #6-32 KEPS
9	01-8240	Nut Plate
10	4002-01105-08	Mach. Screw, 2-56 x 1/2
11	03-8509	Lower Ramp
12	31-3-20009-3	Decal - Bottom
13	31-2-20009-6	Decal - Top
14	31-2-20009-10	Decal - Top
15	03-8130-13	Double Star Post - Clear
16	4008-01005-28	Mach. Screw, #8-32 x 1-3/4
17	4700-000021-00	Flatwasher, 13/64 x 7/16 x 21ga.
18	4408-01128-00	Nut, #8-32 KEPS
19	31-1-20009-11	Playfield Plastic
20	H-114251	General Switch Cable
21	03-8044-13	Mini Plastic Post, Clear
22	4106-01019-08	Sh. Metal Screw, #6 x 1/2

A-14153 Kicker Ramp Assy.

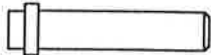
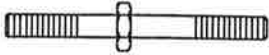
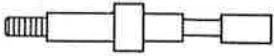
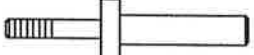
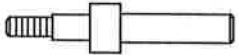
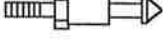
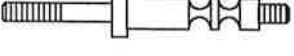
Item	Part Number	Description
1	A-13487	Bracket Switch Gate Assy.
2	01-9904	Flap
3	03-8504	Ramp
4	07-6688-16N	Rivet, 1/8 x 7/32
5	4406-01128-00	Nut, 6-32 KEPS
6	4700-00003-00	Flatwasher, 1/8 x 7/32
7	4006-01003-08	Mach. Screw,, #6-32 x 1/2
8	31-1-20009-6	playfield plastic
9	31-3-20009-2	Decal, Bottom
10	H-14251	General Switch Cable

A-14154 Upper Ramp Assy.

Item	Part Number	Description
1	A-14158	Switch Bracket Assembly
2	01-9905	Flap
3	03-8505	Upper Ramp
4	03-8509	Lower Ramp

Posts

Metal Posts

	Part No.	Description	Qty.
	02-3409	Spring Post	[1]
	02-3905	Bumper Post, #8 WS	[4]
	02-4008	Rubber Bumper Post	[2]
	02-4020	Support Post	[1]
	02-4057	Short Bumper Post	[4]
	02-4036	Rubber Bumper Post	[6]
	02-4195	Bumper Post 6-32 MS	[2]
	02-4424-1	Post, 6-32/#8-32	[8]
	02-4426-1	Post, #6-32 / #8 SMS	[6]
	02-4426-2	Post, #6-32 / #8 SMS	[1]
	02-4434	Post, #8 x 1"	[2]

Plastic Posts



03-8319-10
Star Post, #8
(Tr. Blue) [29]

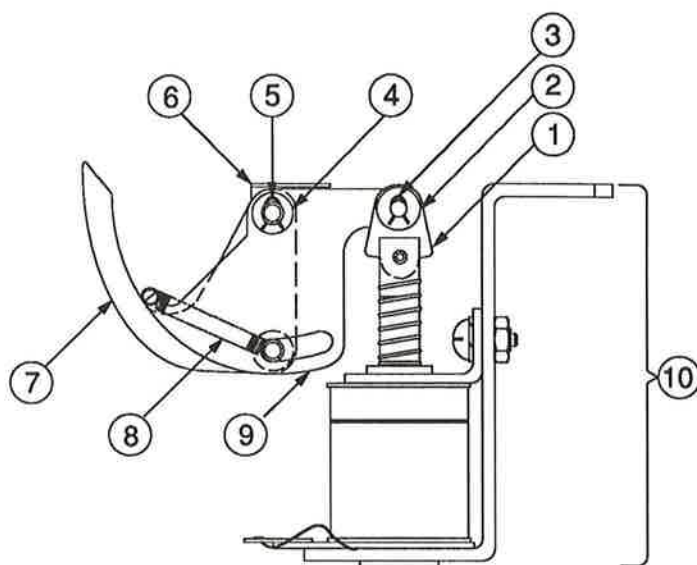


03-8370-10
Jewel Post
(Tr. Blue) [2]



03-8365-10
Post
(Tr. Blue) [5]

B-9361-R-1 Eject Hole Arm Assembly

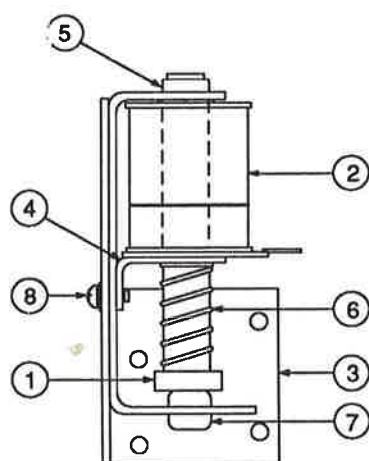


Item	Part Number	Description
1	12-6227	Hairpin Clip
2	A-7471-R	Eject Cam Assembly
3	10-362	Ejector Spring (Plain)
4	A-6949-R	Spring Plate Assembly
5	A-8050-1	Coil Plunger Assy, 2-1/8"
a)	02-3407-2	Coil Plunger, 2-1/8"
b)	20-8716-5	Roll Pin, 1/8 x 7/16
c)	03-8085	Armature Link
6	12-6227	Hair Pin Clip
7	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15 ga.
8	4700-00103-00	Flatwasher, 17/64 x 1/2 x 28 ga.
9	A-8268	Mounting Bracket Assembly

Associated Parts

10	B-9362-L-1	Coil & Bracket Assembly
a)	AE-23-800	Coil Assembly
b)	B-7572-1	Bracket & Stop Assembly
c)	03-7066	Coil Tubing
d)	01-8-508-S	Coil Retaining Bracket
e)	4006-01017-06	Mach. Screw, 6-32 x 3/8
f)	4406-01119-00	Nut, 6-32 ESN

B-11873 Bottom Arch Kicker Assembly

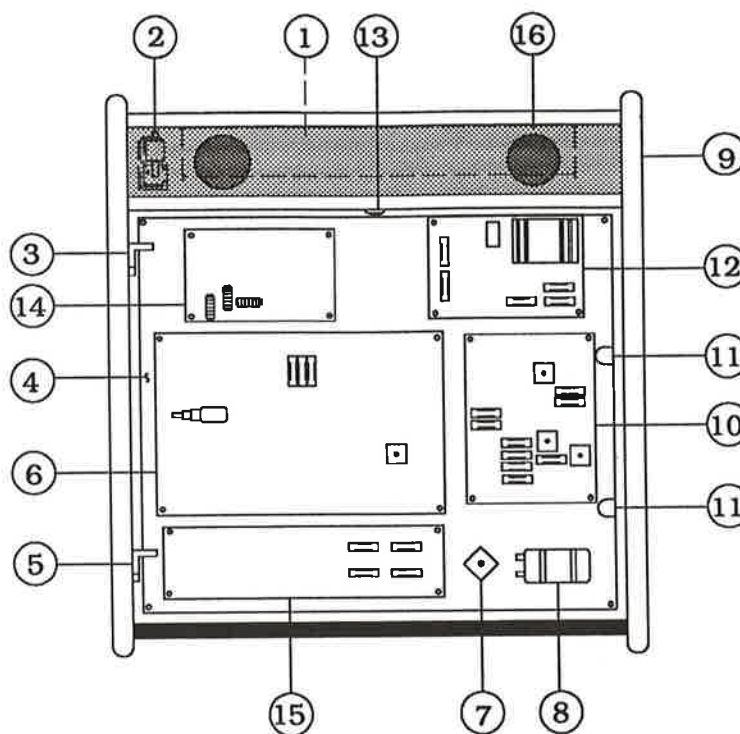


Item	Part Number	Description
1	A-6306-2	Bell Armature Assembly
a)	A-6306-1	Bell Armature Assembly
b)	02-4257	Sleeve
c)	02-4258	Armature Extension
d)	20-8716-20	Roll Pin, 1/8 x 3/8
2	AE-23-800	Coil Assembly
3	B-7409-2	Mounting Bracket assy.
4	01-8-508-T	Bracket Retainer
5	03-7067-5	Coil Tubing
6	10-135	Coil Spring
7	23-6420	Rubber Grommet
8	4008-01017-05	Mach. Screw, 8-32 x 5/16

Unique Parts

Part Number	Description	Part Number	Description
A-13268-20009	3-Bnk. Drop Tgt. & Decal Assy.	A-14253	PCB Top SM Assembly
A-13769-20009	Playfield & Insert Assembly	A-14277	Ball Snubber Assembly
A-14117	Candle Lamp Assembly	A-14278	Shooter Snub Plate Assembly
A-14141	5-Lamp PCB Assembly	A-14279	Drop Down Ramp Assembly
A-14142	3-Lamp PCB Assembly	A-14293	Flipper Ball Guide, Plastic
A-14153	Kicker Ramp Assembly	A-14294	Playfield Plastic
A-14158	Switch Bracket Assembly		
A-14171	Target Cover Assembly		
A-14172	Housing Cover Assembly	H-13544-20009	Playfield Switch Cable
A-14195	Coil Bracket Assembly	H-13545-20009	Playfield Lamp Cable
A-14209	Speaker Panel Assembly	H-13546-20009	Playfield Solenoid Cable
A-14210	Kicker Coil Assembly	H-14247	Mini Playfield Switch Cable
A-14211	PCB Bottom Assembly	H-14248	Mini Playfield Lamp Cable
A-14212	PCB Top Assembly	H-14249	Mini Playfield Solenoid Cable
A-14213	Up/Low Ramp Assy.	H-14250	Surprise Pack Cable
A-14214	Back Panel Assembly	H-14251	General Switch Cable
A-14217	Ball Guide Assembly	H-14261	Flashlamp Cable
A-14218	Ball Guide Assembly		
A-14219	Ball Guide Assembly		
A-14220	Ball Guide Assembly	03-7960-20009-1	Playfield Mylar
A-14221	Ball Deflect Assembly	03-7960-20009-2	Playfield Mylar
A-14222	Ball Damper Assembly		
A-14223	Shooter Ramp Assembly		
A-14227-15	Standup Target Assy (Orange)	31-1-20009-	Playfield Plastic Set
A-14227-2	Standup Target Assy (Green)	31-1A-20009-	Playfield Plastic Set
A-14227-4	Standup Target Assy (Red)	31-1002-20009	Screened Playfield
A-14227-6	Standup Target Assy (Yellow)		
A-14228-1	Standup Target Assy (Blue)	31-1002A-20009	Screened Playfield
A-14228-2	Standup Target Assy (Green)	31-1009-20009	Screened Shooter Gauge
A-14228-4	Standup Target Assy (Red)	31-1357-20009	Screened Backglass
A-14229-13	Standup Target Assy (Clear)	31-1463-20009	Drop Target Decal
A-14229-9	Standup Target Assy (Red)	31-2-20009-	Decal, Top Sheet Set
		31-3-20009-	Decal, Bottom Sheet Set

BUGS BUNNY Backbox Parts



Item	Part Number	Description	Item	Part Number	Description
1	01-6645	Venting Screen	13	20-9637	Lock & Cam Kit
2	B-10686-1*	Knocker & Bracket Assy	14	D-11581-20009*	Audio Board Assembly
3	A-12497	Upr Insert Bd Hinge Assy	15	D-12313-20009*	Backbox Interconnect Board
4	D-13336	PCB Plate Assembly	16	A-14209	Speaker Panel Assy.
5	A-12498	Lwr Insert Bd Hinge Assy	a)	5555-12068-00	4" Piezo Spkr, 50W
6	D-11883-20009*	System 11C CPU Board	b)	5555-12015-00	8Ω Speaker, 6", 20W
7	5100-09418-00	Bridge Rectifier, 100v, 35A.	c)	A-14317	G.I. Flashlamp Assy.
8	5040-09051-00	Capacitor, 30,000 μFd, 25v	**17	20009-IN	Insert Assembly
9	A-13767-20009	BUGS BUNNY Backbox	a)	D-12502-1	Bally Right Display Bd.
10	D-12247-576*	Aux. Pwr Driver Board	b)	D-12706	Bally Left Display Bd.
11	01-9047	Insert Stop Bracket	c)	C-11998-1	Relay Board
12	D-12246*	Power Supply Assembly			

* Refer to Individual Unit's Parts List

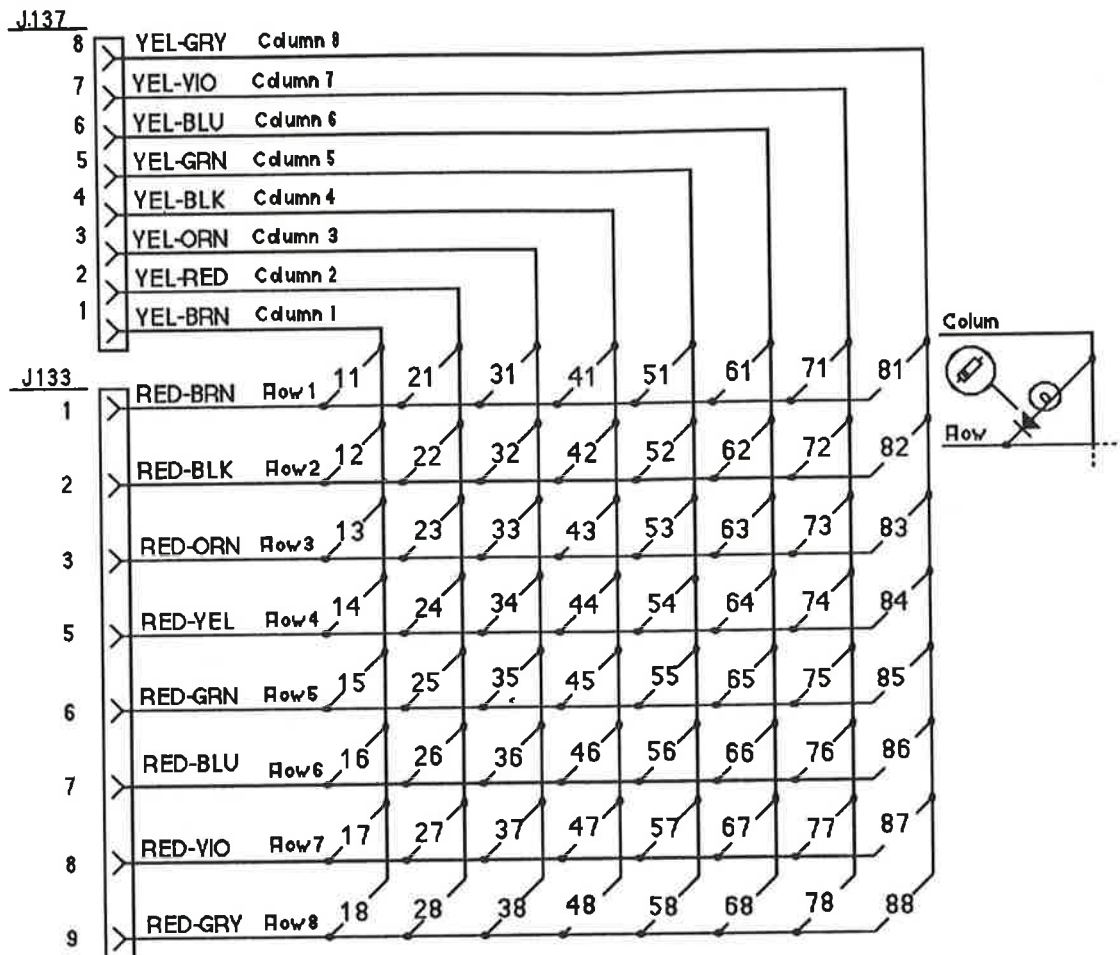
** Insert Assembly not shown in Backbox Parts Location Diagram

Miscellaneous Parts

Part Number	Description	Part Number	Description
A-13204-20009	Bottom Arch Assembly	20-6502-A	Plumb Bob
A-8550-1	Pot & Bracket Assembly	24-6549	#44 Bulb
A-8552-20009	Backglass Assembly	24-8704	#89 Bulb
C-10843-1	Metal Leg	24-8768	#555 Bulb
C-11026-1	Line Filter assembly	24-8802	#906 Bulb
C-13155-1	Coin Door 2-Slot USA	31-1002-20009	Playfield (Screened)
D-11920-13	Mech Panel Assembly	31-1002A-20009	Playfield (Screened)
D-12615	Front Molding Assembly	31-1006-20009	Playfield Plastics
01-2263-3	Gray Metal Leg	31-1008-20009	Bottom Arch (Screened)
01-3493-1	Lock Bracket	31-1009-20009	Shooter Plate (Screened)
01-3527	Latch Plate	31-1019-554	Screened Spin Target
01-3569-1	Ball Return Runaway	31-1357-20009	Screened Backglass
01-6592	Vent Screen	31-1463-20009	3-Bank Drop Target Decal
01-6733	Speaker Grille	31-1524-1	Decal - Coinage
01-8169	Vent Hole Screen	31-1524-2	Decal - Tokens
03-8091	Rear Molding	31-1524-3	Decal - See Card
08-7028-T	Playfield Glass	31-1-20009-	Playfield Plastics Set
09-17002-26	USA Coin Door	31-1A-20009-	Playfield Plastics Set
09-8803	25¢ Rejector	31-2-20009-	Decal, Top Sheet Set
20-6500	Steel Ball, 1-1/16"	31-3-20009-	Decal, Bottom Sheet Set

Cable List

Part Number	Description	Part Number	Description
H-10978-1	AC Line Filter Cable	H-13545-20009	Lamp Cable
H-11834	18V Rectifier Cable	H-13546-20009	Solenoid Cable
H-11835	Knocker Cable	H-13547-20009	Insert Cable
H-12190-571	Main Backbox Cable	H-13870	Black Jumper Cable
H-12192-574	Cabinet Cable	H-14247	Mini Playfield Switch Cable
H-12196-576	Secondary Cable	H-14248	Mini Playfield Lamp Cable
H-12199	Lamp Interconnect Cable	H-14249	Mini Playfield Solenoid Cable
H-12200	Switch Interconnect Cable	H-14250	Surprise Pack Cable
H-12299-568	Logic/Power Speaker Cable	H-14251	General Switch Cable
H-12775	Speaker Panel Cable	H-14260	Skill Shot Cable
H-12776	Main Display Cable	H-14261	Flash Lamp Cable
H-13544-20009	Switch Cable	H-8527	Volume Control Cable



Bugs Bunny's Birthday Ball

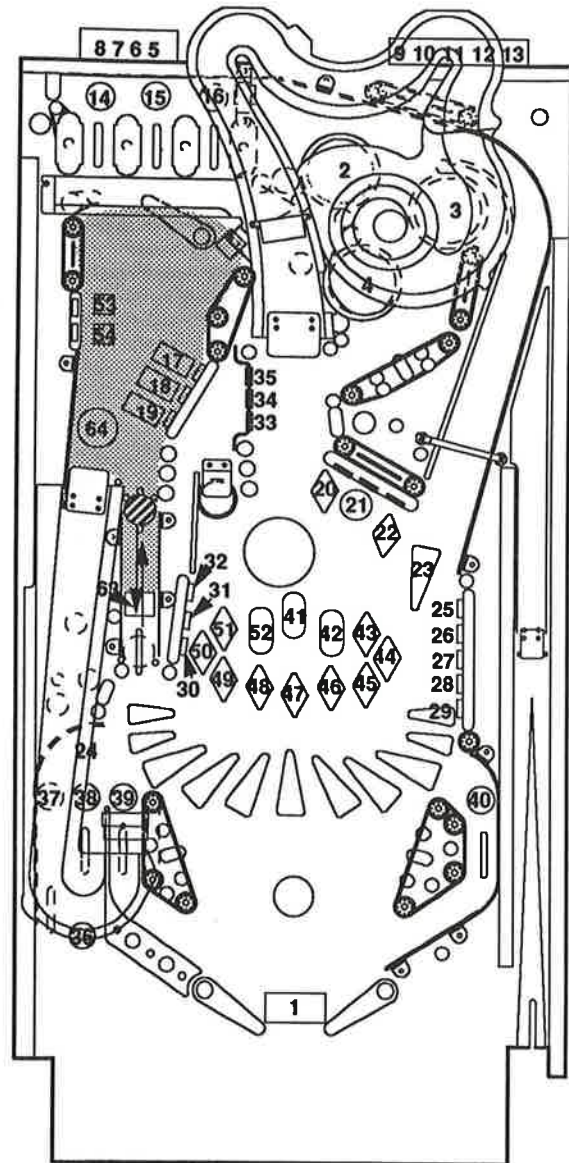
Lamp-Matrix Table Red

Yel (B+) (B) = Multiple Lamps

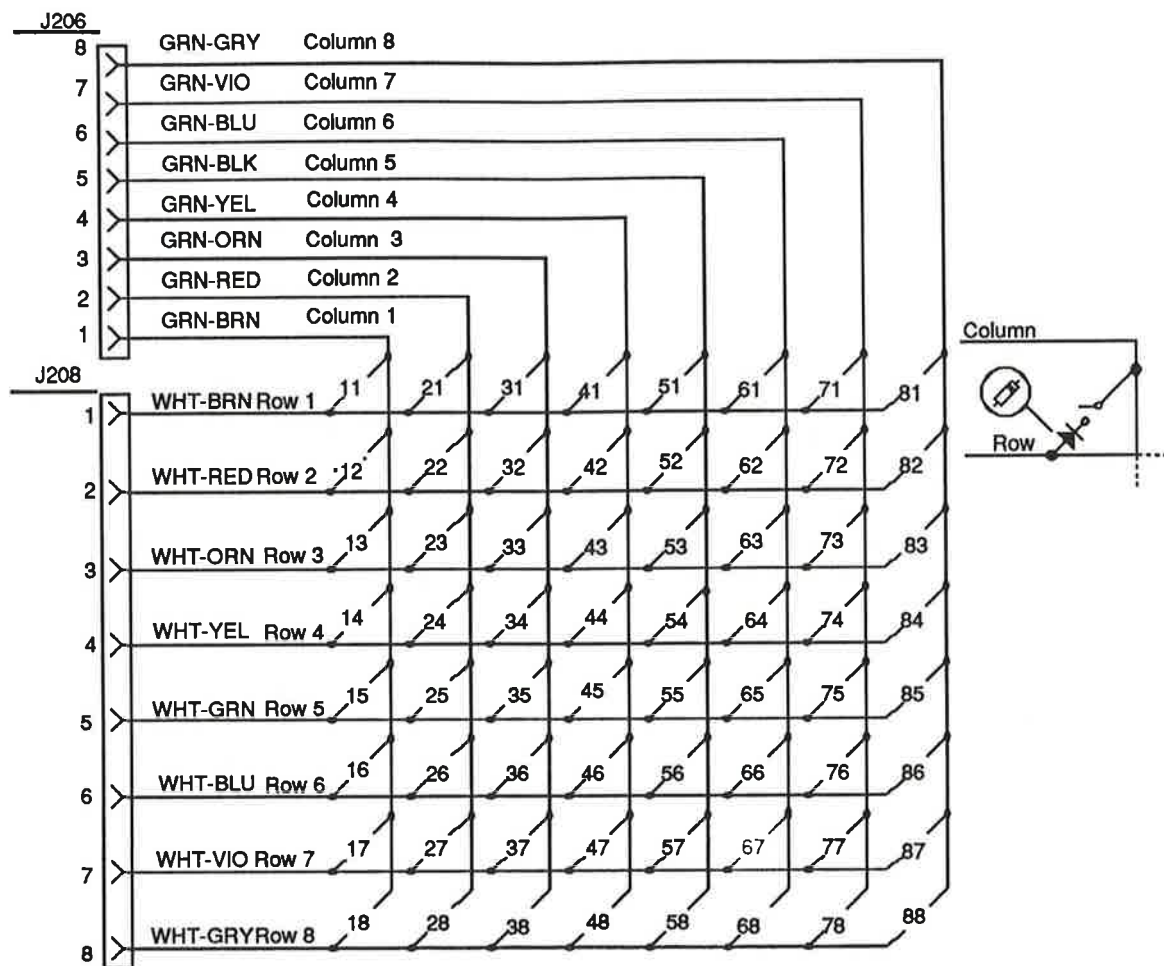
COLUMN	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-5	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
ROW								
Q80 RED-BRN 1J6-1	Shoot Again 1	Shopping Spree (50K) 9	Left (L Dr Tgt) 17	T (In TUNES) 25	N (In TUNES) 33	Candle 1 41	Candle 9 49	Backglass CAN.3 57
Q81 RED-BLK 1J6-2	Left Jet Bumper 2	Shopping Spree (100K) 10	Middle (L Dr Tgt) 18	U (In TUNES) 26	E (In TUNES) 34	Candle 2 42	Candle 10 50	Backglass CAN.4 58
Q82 RED-ORN 1J6-3	Right Jet Bumper 3	Shopping Spree (200K) 11	Right (L Dr Tgt) 19	N (In LOONEY) 27	Y (In LOONEY) 35	Candle 3 43	Candle 11 51	Backglass PLAYER1 59
Q83 RED-YEL 1J6-5	Bottom Jet Bumper 4	Shopping Spree (500K) 12	Left (R Dr Tgt) 20	E (In LOONEY) 28	PORKY PIG 36	Candle 4 44	Candle 12 52	Backglass PLAYER 2 60
Q84 RED-GRN 1J6-6	10K Skill Shot 5	Shopping Spree (Ex. Ball) 13	Middle (R Dr Tgt) 21	S (In TUNES) 29	Left Outlane 37	Candle 5 45	Left Top 53	Backglass PLAYER 3 61
Q85 RED-BLU 1J6-7	50K Skill Shot 6	Top Lane Left 14	Right (R Dr Tgt) 22	L (In LOONEY) 30	Middle Outlane 38	Candle 6 46	Left Bottom 54	Backglass PLAYER 4 62
Q86 RED-VIO 1J6-8	100K Skill Shot 7	Top Lane Middle 15	Spinner 23	O (In LOONEY) 31	L Return Lane 39	Candle 7 47	Backglass CAN.1 55	Captive Ball 63
Q87 RED-GRY 1J6-9	500K Skill Shot 8	Top Lane Right 16	Kick Back 24	O (In LOONEY) 32	R Return Lane 40	Candle 8 48	Backglass CAN.2 56	Cake 64

Lamps

Item	Bulb	Description
1	44	Shoot Again
2	44	Left Jet Bumper
3	44	Right Jet Bumper
4	44	Bottom Jet Bumper
5	44	Skill Shot (10K)
6	44	Skill Shot (50K)
7	44	Skill Shot (100K)
8	44	Skill Shot (500K)
9	44	Shopping Spree (Ex. Ball)
10	44	Shopping Spree (500K)
11	44	Shopping Spree (200K)
12	44	Shopping Spree (100K)
13	44	Shopping Spree (50K)
14	44	Top Lane Left
15	44	Top Lane Middle
16	44	Top Lane Right
17	555	Left (Left Drop Target)
18	555	Middle (Left Drop Target)
19	555	Right (Left Drop Target)
20	44	Left (Right Drop Target)
21	44	Middle (Right Drop Target)
22	44	Right (Right Drop Target)
23	44	Spinner
24	44	Kickback
25	555	T (in Tunes)
26	555	U (in Tunes)
27	555	N (in Tunes)
28	555	E (in Tunes)
29	555	S (in Tunes)
30	555	L (in Tunes)
31	555	O (in Tunes)
32	555	O (in Tunes)
33	555	N (in Tunes)
34	555	E (in Tunes)
35	555	Y (in Tunes)
36	555	Porky Pig
37	555	Left Outlane
38	555	Middle Outlane
39	555	Left Return Lane
40	555	Right Return Lane
41	555	Candle 1
42	555	Candle 2
43	555	Candle 3
44	555	Candle 4
45	555	Candle 5
46	555	Candle 6
47	555	Candle 7
48	555	Candle 8
49	555	Candle 9
50	555	Candle 10
51	555	Candle 11
52	555	Candle 12
53	44	Left Top



Item	Bulb	Description
54	44	Left Bottom
55	555	Backglass Candle 1
56	555	Backglass Candle 2
57	555	Backglass Candle 3
58	555	Backglass Candle 4
59	555	Backglass Player 1
60	555	Backglass Player 2
61	555	Backglass Player 3
62	555	Backglass Player 4
63	44	Captive Ball
64	44	Birthday Cake



Bugs Bunny's Birthday Ball

Switch-Matrix Table

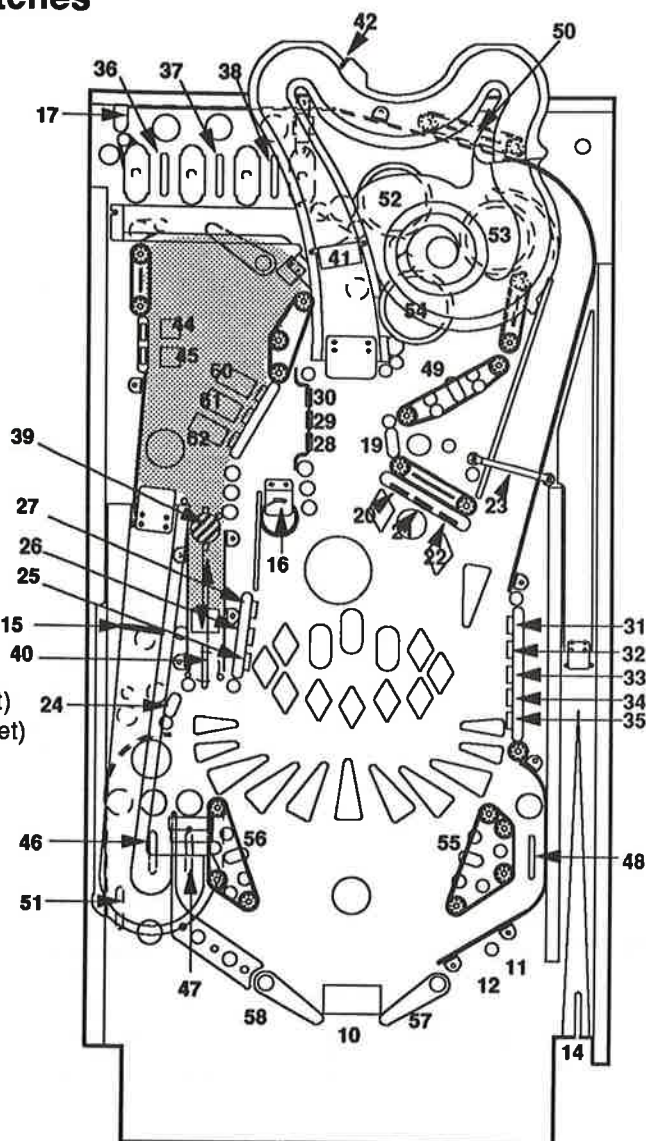
Wht (row) Gm (col)

COLUMN \ ROW	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Bob Tilt 1		Standup (Skill) 17	L (In LOONEY) 25	N (In TUNES) 33	Tazz Ramp Entry 41	Top Sling 49	Lane Change (R Flipper) 57
2 WHT-RED 1J10-8		Outhole 10	Top Launch 18	O (In LOONEY) 26	E (In TUNES) 34	Tazz Ramp Score 42	Top Right 10 pt 50	Lane Change (L Flipper) 58
3 WHT-ORN 1J10-7	Game Start 3	Ball Trough #1 (right) 11	Standup (by Dr Tgt) 19	O (In LOONEY) 27	S (In TUNES) 35		Left Outlane 51	
4 WHT-YEL 1J10-6	Right Coln Chute 4	Ball Trough #2 (left) 12	Right (R 3-Bk Dr Tgt) 20	N (In LOONEY) 28	Top Lane Left 36	Top (Mini Left) 44	Left Jet Bumper 52	Right (L3-Bk Dr Tgt) 60
5 WHT-GRN 1J10-5	Center Coln Chute 5		Middle (R 3-Bk Dr Tgt) 21	E (In LOONEY) 29	Top Lane Middle 37	Bottom (Mini Left) 45	Right Jet Bumper 53	Middle (L 3-Bk Dr Tgt) 61
6 WHT-BLU 1J10-3	Left Coln Chute 6	Shooter Lane 14	Left (R 3-Bk Dr Tgt) 22	Y (In LOONEY) 30	Top Lane Right 38	Right Outlane 46	Lower Jet Bumper 54	Left (L 3-Bk Dr Tgt) 62
7 WHT-VIO 1J10-2	Slam Tilt 7	L Ramp 15	Spinner 23	T (In TUNES) 31	Cptv Ball Top 39	L Return Lane 47	BL Kicker ("sling") 55	
8 WHT-GRY 1J10-1	High Score Reset 8	Eject Hole 16	Standup (by "L") 24	U (In TUNES) 32	Cptv Ball Bottom 40	R Return Lane 48	BR Kicker ("sling") 56	

BL = Bottom Left BR = Bottom Right

Switches

Item	Part Number	Description
1	(See Fig. 2, Sect. 1)	Plum Bob Tilt
2	Not Used	
3	SW-1A-126	Game Start
4	27-1092	Right Coin Chute (USA)
5	Not Used	Center Coin Chute
6	27-1092	Left Coin Chute (USA)
7	27-1066	Slam Tilt
8	27-1008	High Score Reset*
9	Not Used	
10	5647-12133-12	Outhole
11	5647-09957-00	Ball Trough #1 (Right)
12	5647-09957-00	Ball Trough #2 (Left)
13	Not Used	
14	5647-12073-04	Shooter Lane
15	A-13487	Left Ramp
16	A-9381-R	Eject Hole
17	A-14229-9	Standup (Skill)
18	A-9465-L	Top Launch
19	A-14229-13	Standup (by Drop Target)
20	p/o C-11223-1	Right (Rt. Bank Drop Target)
21	p/o C-11223-1	Middle (Rt. Bank Drop Target)
22	p/o C-11223-1	Left (Rt. Bank Drop Target)
23	A-12010	Spinner
24	A-14229-13	Stanup (by "L")
25	B-11742-5	L (in Tunes), White
26	A-14227-6	O (in Tunes), Yellow
27	A-14227-15	O (in Tunes), Orange
28	A-14228-4	N (in Tunes), Red
29	A-14228-2	E (in Tunes), Green
30	A-14228-1	Y (in Tunes), Blue
31	A-14227-2	T (in Tunes), Green
32	A-14227-4	U (in Tunes), Red
33	A-14227-15	N (in Tunes), Orange
34	A-14227-6	E (in Tunes), Yellow
35	B-11742-5	S (in Tunes), White
36	A-12687	Top Lane Left
37	A-12687	Top Lane Middle
38	A-12687	Top Lane Right
39	A-12687	Captive Ball Top
40	A-12688-1	Captive Ball Bottom
41	A-14158	Tazz Ramp Entry
42	5647-12073-21	Tazz Ramp Score
43	Not Used	
44	A-14227-2	Top (Mini Left)
45	A-14227-2	Bottom (Mini Left)
46	5647-12773-19	Right Outlane
47	5647-12773-19	Left Return Lane
48	5647-12773-19	Right Return Lane
49	-	Top Sling
50	B-4834-K	Top Right 10Pt.
51	5647-12773-19	Left Outlane



Item	Part Number	Description
52	B-13267	Left Jet Bumper
53	B-13267	Right Jet Bumper
54	B-13267	Lower Jet Bumper
55	-	B. L. Kicker (Sling)***
56	-	B. R. Kicker (Sling)***
57	-	Lane Change (R. Flipper)**
58	-	Lane Change (L. Flipper)**
59	Not Used	
60	B-11742-9	Right (Standup Target)
61	B-11742-9	Middle (Standup Target)
62	B-11742-9	Left (Standup Target)
63	Not Used	
64	Not Used	

Notes: * Part Number is for entire Diagnostic Switch Assembly, including H S Reset Switch.

** Optotransistor on Backbox Interconnect Board.

*** Paired Kicker Actuating Switch: A-4834-H + B-8734-1.

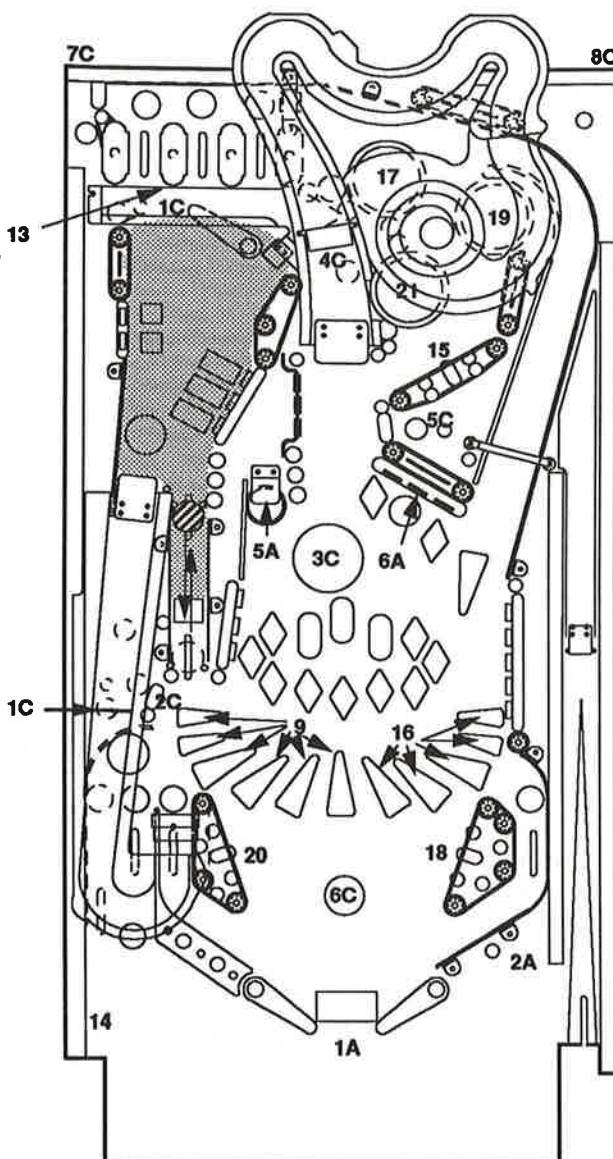
Sol. No.	Function	Solenoid Type	Wire Color	Connections		Driver Trnstr	Solenoid Part Number Flashlamp Type	
				CPU Bd	Playfield/ Cabinet		q= B'glass; p=P'field	
01A	3 Outsole Kicker	Switched	Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800	
01C	3 Left Ramp Flash	Switched	Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#89/906 flashlamps	2p
02A	3 Shooter Lane Feeder	Switched	Vio-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	SM-26-600-DC	
02C	3 Standup by "L" Flash	Switched	Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89/906 flashlamps	1p,1g
03A	3 Not Used	Switched	Vio-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200	
03C	3 50 Million Flash	Switched	Blk-Orn	(Gry-Orn)	5J5-7(C)	Q32	#89/906 flashlamps	1p,1g
04A	3 Not Used	Switched	Vio-Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800	
04C	3 Tazz Ramp Flash	Switched	Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89/906 flashlamps	1p,1g
05A	3 Eject Hole	Switched	Vio-Gm	1P11-6	5J1-4: 5J4-5 (A)	Q31	AE-23-800	
05C	3 Standup by R Dr Tgt Flash	Switched	Blk-Gm	(Gry-Gm)	5J5-4 (C)	Q31	#89/906 flashlamps	1p,1g
06A	3 R Dr Tgt Bank Reset	Switched	Vio-Blu	1P11-	5J1-3: 5J4-4 (A)	Q23	AE-23-800	
06C	3 Bug's Face Flash	Switched	Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89/906 flashlamps	1p,1g
07A	3 Knocker (In Backbox)	Switched	Vio-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800	
07C	3 Top Left Flash	Switched	Blk-Vio	(Gry-Vio)	5J5-2 (C)	Q30	#89/906 flashlamps	1p,1g
08A	3 Not Used	Switched	Vio-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22		
08C	3 Right Back Panel Flash	Switched	Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89/906 flashlamps	1p,1g
09	LOONEY Relay	Controlled	Brn-Blk	1P12-1	5J2-9:5J6-9:2J4-10	Q17	5580-09555-01	4a
	P'fid Illum Relay	Controlled	Brn-Red	1P12-2	5J2-8:5J6-8:2J4-11	Q9	5580-09555-01	4a
	Insert Illum Relay	Controlled	Brn-Orn	1P12-4	5J2-6:5J6-7:2J4-12	Q16	5580-09555-01	4a
	A/C Select Relay	Controlled	Brn-Yel	1P12-5	5J2-5	Q8	5580-09555-01	5
10	Ball Launcher	Controlled	Brn-Gm	1P12-6	5J2-4:5J6-5:2J4-13	Q15	AE-23-800	
13	L Outlane Kickback	Controlled	Brn-Blu	1P12-7	5J2-3:5J6-3:2J4-14	Q7	AE-23-800	
14	Top Sling	Controlled	Brn-Vio	1P12-8	2J4-15: 2J11-2	Q14	AE-26-1200	
15	TUNES Relay	Controlled	Brn-Gry	1P12-9	2J4-16: 2J11-1	Q6	5580-09555-01	4a
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-26-1200	
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-26-1200	
21	Lower Jet Bumper	Special #5	Blu-Gm	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800	
22	Not Used	Special #6	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79	AE-23-800	
-	Right Flippers	-	Orn-Vio	1P19-1	2J5-5: 2J10-7	-		
-	Lower Right Flipper	-	[Blu-Vio] 2		[2J10-1: 2J8-15]		FL11630/50VDC	
-	Upper Right Flipper	-	[Blk-Yel] 2		[2J10-3: 2J8-13]		FL11630/50VDC	
-	Left Flipper	-	Orn-Gry	1P19-2	2J5-4: 2J10-8	-		
-	Lower Left Flipper	-	[Blu-Gry] 2		[2J10-2:2J8-14]	-	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 on cabinet. 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 Board, which controls the device pulsing by Sol. 12. 4. Relay is mounted on Relay Board: (4a) p/n C-11998-1; (4b) p/n C-11902-1. 5. Relay is mounted on Aux Power Driver Bd, D-12247, in the backbox.

Solenoids/Flashers

Item	Part Number	Description
1A	AE-23-800	Outhole Kicker
1C	#89 Flashlamp	Left Ramp Flash
2A	AE-23-800	Shooter Lane Feeder
2C	#89 Flashlamp	Standup by "L" Flash
3A	Not Used	
3C	#906 Flashlamp	Million Flash (50) #89 Flashlamp
4A	Not Used	
4C	#89 Flashlamp	Tazz Ramp Flash
5A	AE-23-800	Eject Hole
5C	#89 Flashlamp	Standup by Rt. Drop Tgt. Flash
6A	AE-26-1200	Rt. Drop Target Bank Reset
6C	#906 Flashlamp	Bug's Face Flash
7A	AE-23-800	Knocker (Backbox)
7C	#906 Flashlamp	Top Left Flash
8A	Not Used	
8C	#906 Flashlamp	Right Back Panel Flash
9	5580-09555-01	Looney Relay
10	5580-09555-01	Playfield G.I.
11	5580-09555-01	Backbox G.I.
12	5580-09555-01	A/C Select Relay
13	AE-23-800	Ball Launcher
14	AE-23-800	Left Outlane Kickback
15	AE-26-1500	Top Sling
16	5580-09555-01	Tunes Relay
17	AE-23-800	Left Jet Bumper
18	AE-26-1500	Left Kicker ("Sling")
19	AE-23-800	Right Jet Bumper
20	AE-26-1500	Right Kicker ("Sling")
21	AE-23-800	Lower Jet Bumper
22	Not Used	

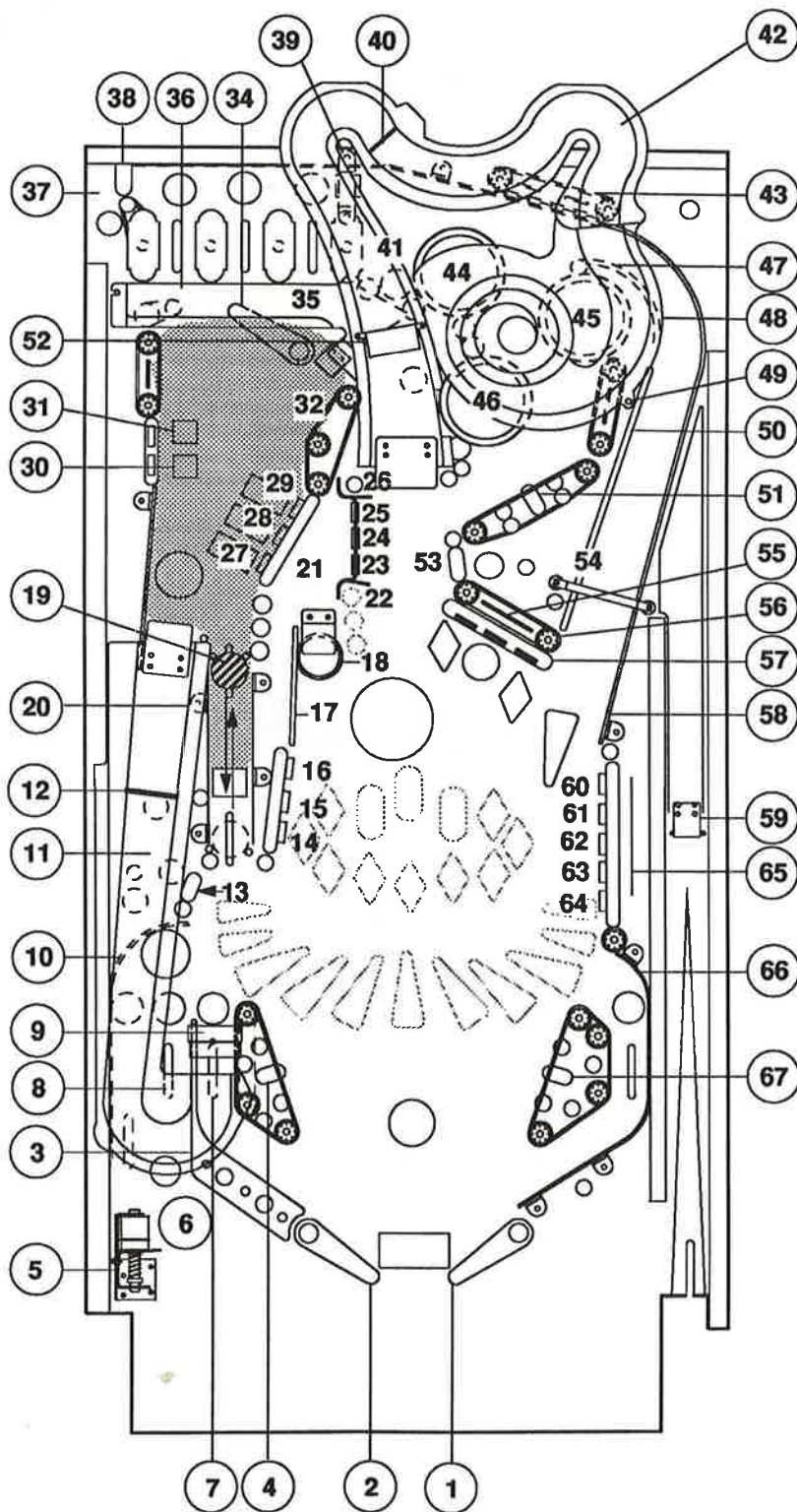
Note: * 5580-09555-01 on Relay Board, C-11998-1, for Playfield General Illumination



Playfield Parts

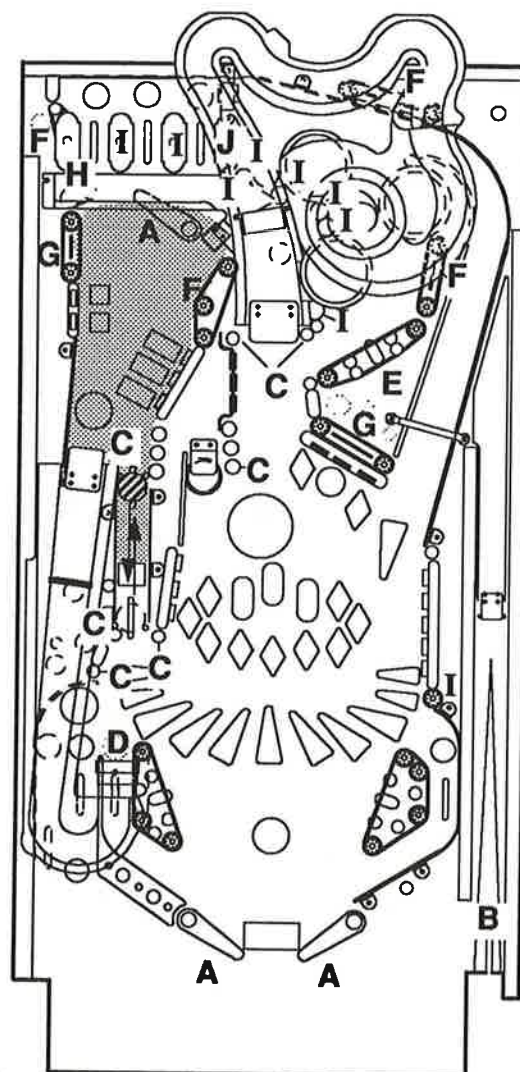
Item	Part Number	Description	Item	Part Number	Description
1	C-13174-R	Right Flipper	47	12-6954	Wire Ball Guide Assembly
a)	20-9592-15-R	Flipper Paddle & Shaft	48	A-14213	Up/Low Assembly
2	C-13174-L	Left Flipper	49	02-4327-13	Standoff, 4"
b)	20-9592-15-L	Flipper Paddle & Shaft	50	12-6956	Wire Ball Guide
3	A-14230	Flippeer Ball Guide Assy.	51	B-12665	Upper "Sling" Kicker
4	B-12665	Left Kicker	52	A-14158	Enter Main Ramp
5	B-11873	Bottom Arch Kicker	53	A-14229-13	Standup Target (Square)
6	12-6961	Wireform	54	B-12164-1	Spinner Target Assembly
7	12-6466-10	Wireform, 2-1/2"	55	12-6466-8	Wireform Assy., 2"
8	12-6466-12	Wireform, 3-1/2"	56	A-14277	Ball Snubber Assembly
9	A-14222	Ball Damper Assembly	57	C-11223-1	3-Bank Drop Target Assy.
10	01-9926	Ball Guide Assembly	58	A-14220	Ball Guide Assembly
11	03-8504	Left Ramp Assembly	59	A-14223	Shooter Ramp Assembly
12	A-13487	Ball Gate & Wire Assembly	60	A-14227-2	Standup Target (Round)
13	A-14229-13	Square Standup Target	61	A-14227-4	Standup Target (Round)
14	B-11742-5	Standup Target (Round)	62	A-14227-15	Standup Target (Round)
15	A-14227-6	Standup Target (Round)	63	A-14227-6	Standup Target (Round)
16	A-14227-15	Standup Target (Round)	64	B-11742-5	Standup Target (Round)
17	12-6955	Wireform, 4"	65	A-14171	Target Cover Assembly
18	B-9361-R-1	Ball Eject	66	A-14219	Ball Guide Assembly
19	20-6500	Captive Ball	67	B-12665	Right "Sling" Kicker (Lower)
20	01-9964	Ball Guide Assembly	68	Parts below are located beneath Bottom Arch:	
21	A-14172	Housing Cover Assy. (Standups)	a)	B-8623	Upper Trough Baffle Assembly
22	12-6955	Wire Ball Guide	b)	C-8235	Lower Trough Baffle Assembly
23	A-14228-4	Standup Target (Round)	c)	12-6542	Trough Baffle Wire
24	A-14228-2	Standup Target (Round)	d)	01-3569-1	Ball Trough (runway)
25	A-14228-1	Standup Target (Round)	e)	01-5575	Bottom Arch Mounting Bracket
26	A-14221	Ball Deflector Assembly	f)	B-8039-2	Outhole Kicker Assembly
27	B-11742-9	Standup Target (Round)	g)	C-9638	Shooter Lane Feeder
28	B-11742-9	Standup Target (Round)			
29	B-11742-9	Standup Target (Round)			
30	B-11742-2	Standup Target (Round)			
31	B-11742-2	Standup Target (Round)			
32	12-6466-2	Wireform			
33	01-9929	Bracket Ball Slide			
34	C-13174-L-2	Upper Left Flipper			
35	03-8503	Small Drop Ramp			
36	12-6466-6	Wireform			
37	02-4252-23	F-F Spacer			
38	A-14229-9	Standup Target (Square)			
39	A-9465-L	Ball Gate & Wire Assembly			
40	5647-12073-21	Main Ramp Score			
41	02-4322-12	Standoff, 3-1/2"			
42	03-8505	Up/Down Main Ramp Assy.			
	03-8509	Up/Down Main Ramp Assy.			
43	12-6466-3	Wireform, 3/4"			
44	C-12872	Jumper Bumper (Top Left)			
	03-8277-10	Cap			
	03-8276-9	Collar			
45	C-12872	Jumper Bumper (Top Right)			
	03-8277-16	Cap			
	03-8276-10	Collar			
46	C-12872	Jumper Bumper (Top Lower)			
	03-8277-9	Cap			
	03-8276-16	Collar			

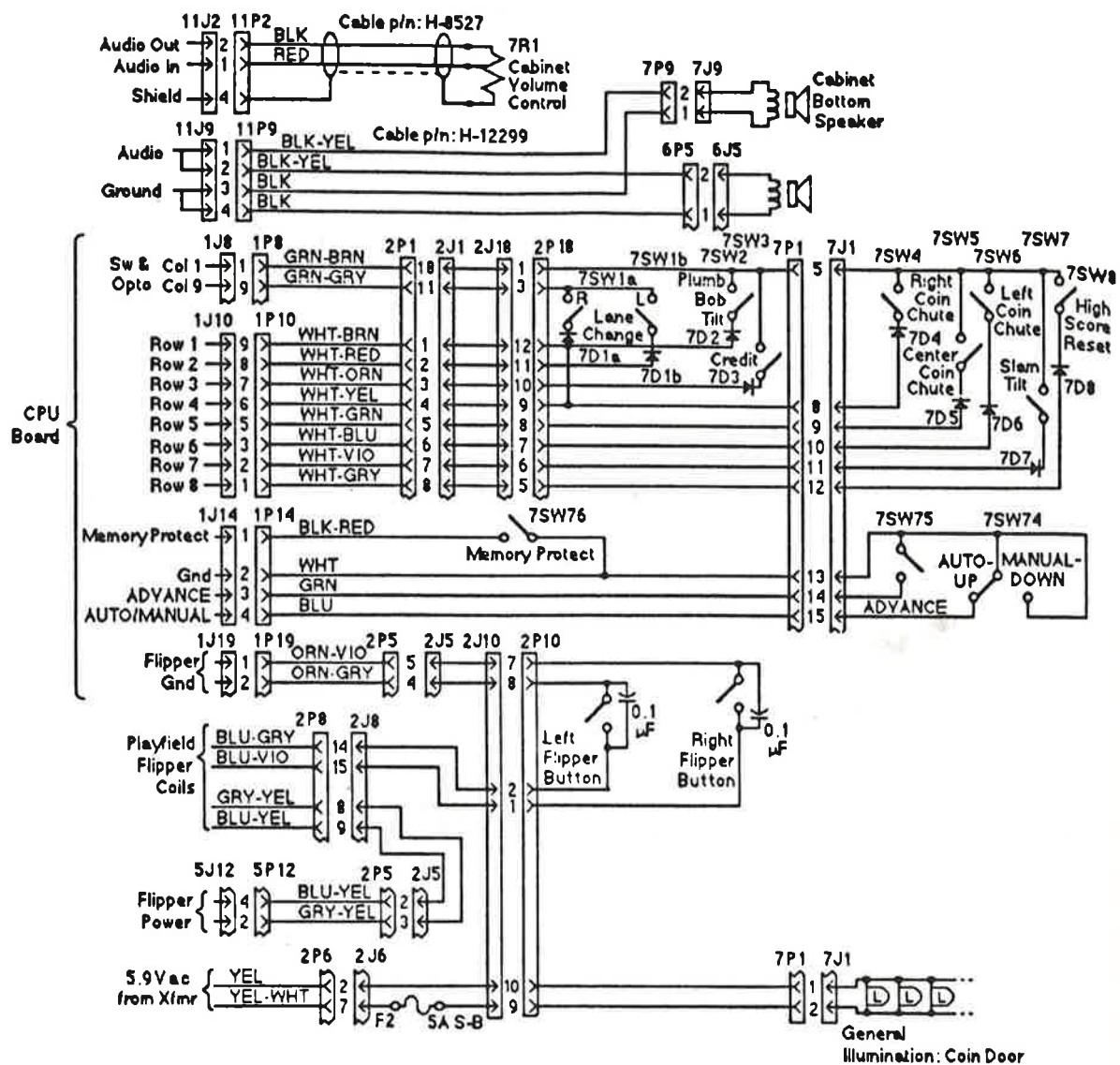
Playfield Parts



Rubbers

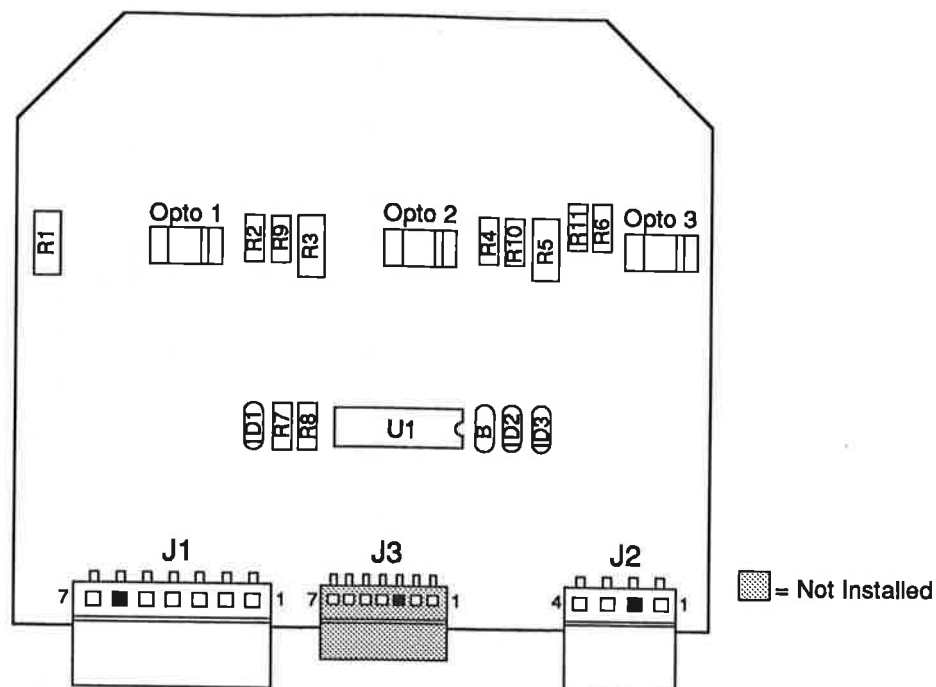
Item	Part No.	Description	Qty.
A	23-6519-4	Rubber Ring Flipper Red	3
B	23-6327	Rubber Ball Shooter Tip	1
C	23-6552	Rubber Bumper Sleeve-Yellow	7
D	23-6629	Rubber Bumper, 1 x 1 x 1-1/4	1
E	23-6306	Rubber Ring, 2-1/2"	3
F	23-6304	Rubber Ring, 1-1/2"	5
G	23-6305	Rubber Ring, 2"	3
H	23-6301	Rubber Ring, 3/4"	1
I	23-6300	Rubber Ring, 5/16"	10
J	23-6302	Rubber Ring, 1"	1
	23-6534	Rubber Glass Protector	2
	23-6534-9	Rubber Edge Protector,	16
	23-6535	Rubber Bumper	5
	23-6577	Rubber Plug Bumper, 5/8	1
	23-6622	Rubber Foam Tape	1
	23-6626	Rubber Grommet	1
	23-6641-1	Rubber Ring, White	6
	23-6645	Rubber Bumper Pad	1
	23-6303	Rubber Ring, 1-1/4"	1



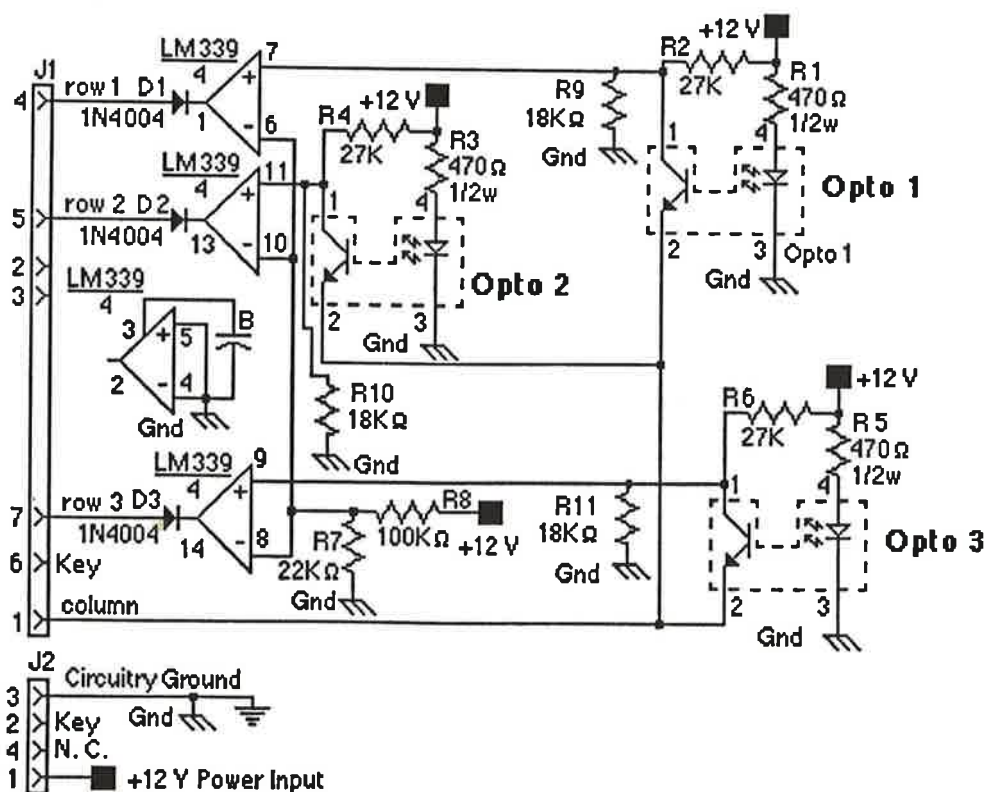


BUGS BUNNY'S BIRTHDAY BALL CABINET WIRING

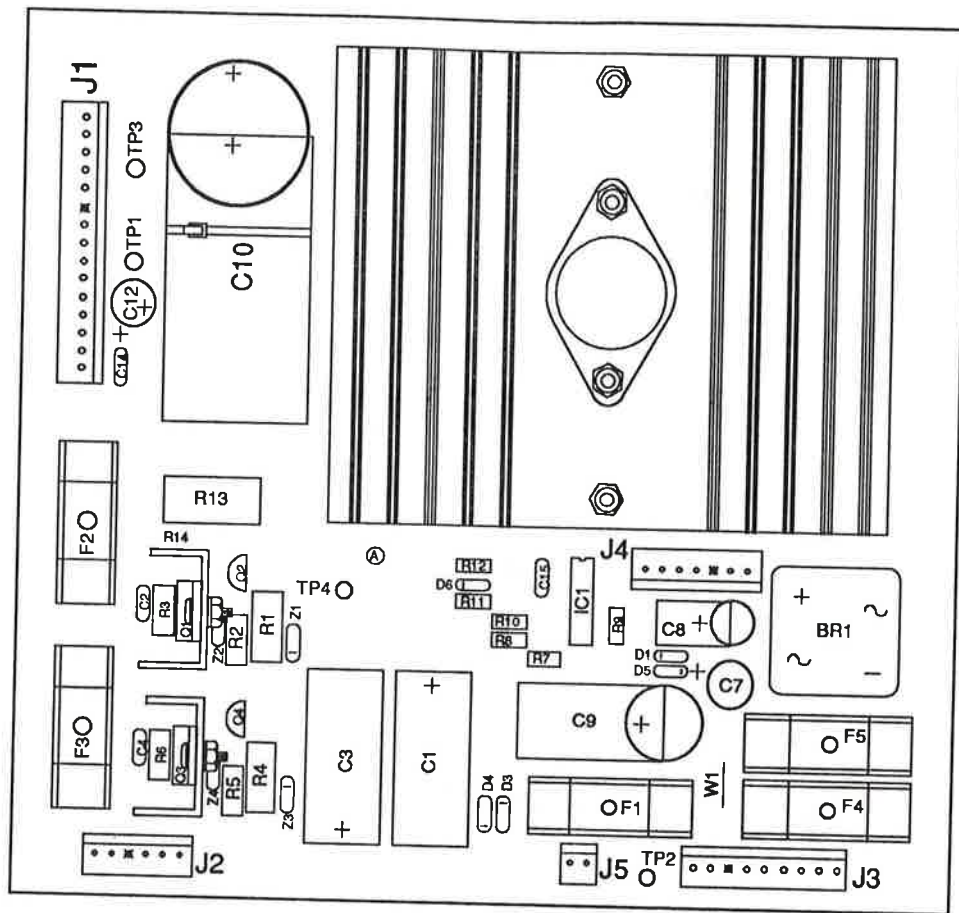
C-13205 3-Bank Drop Target Opto Board



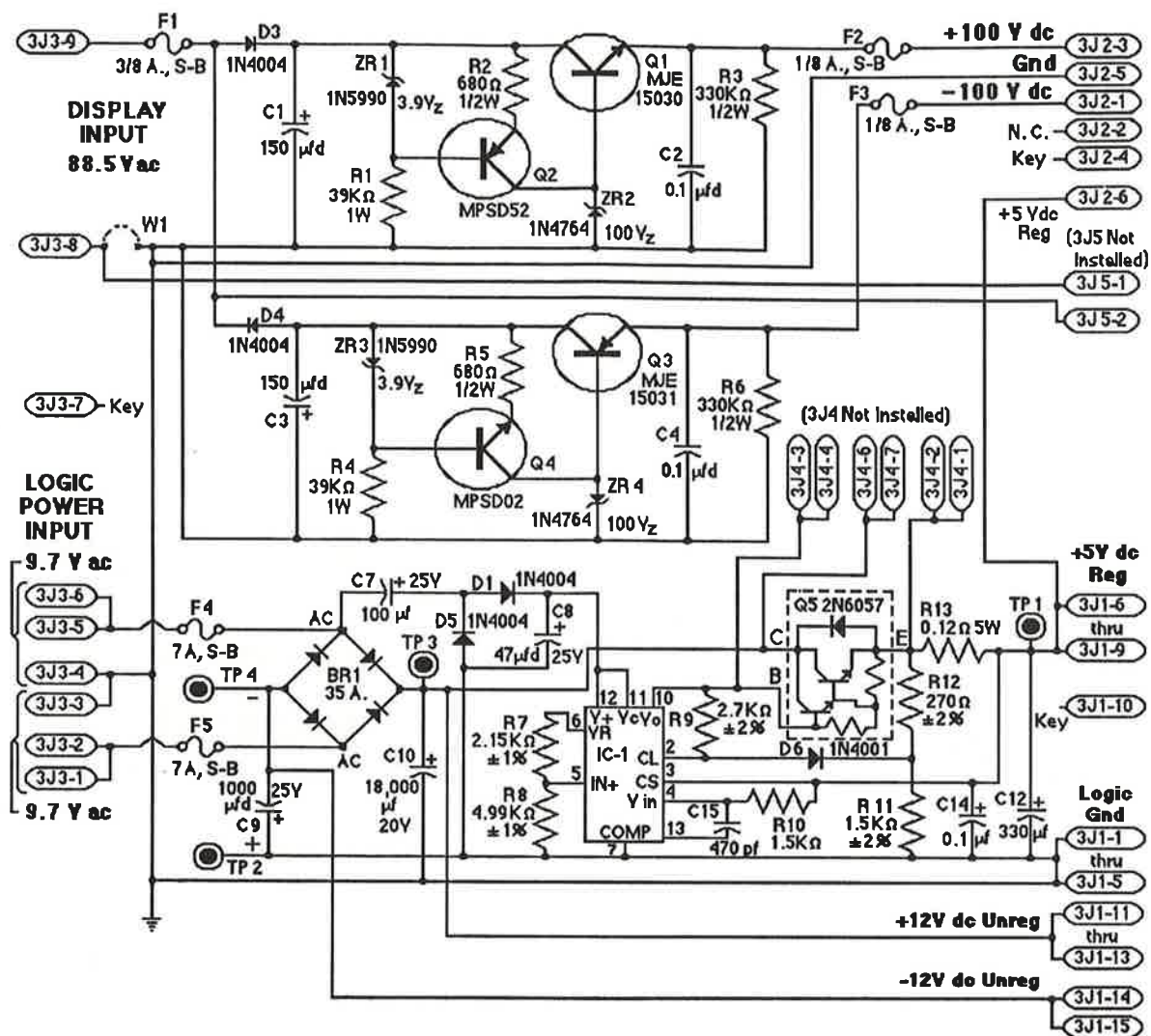
3-Bank Drop Target Opto Board Schematic

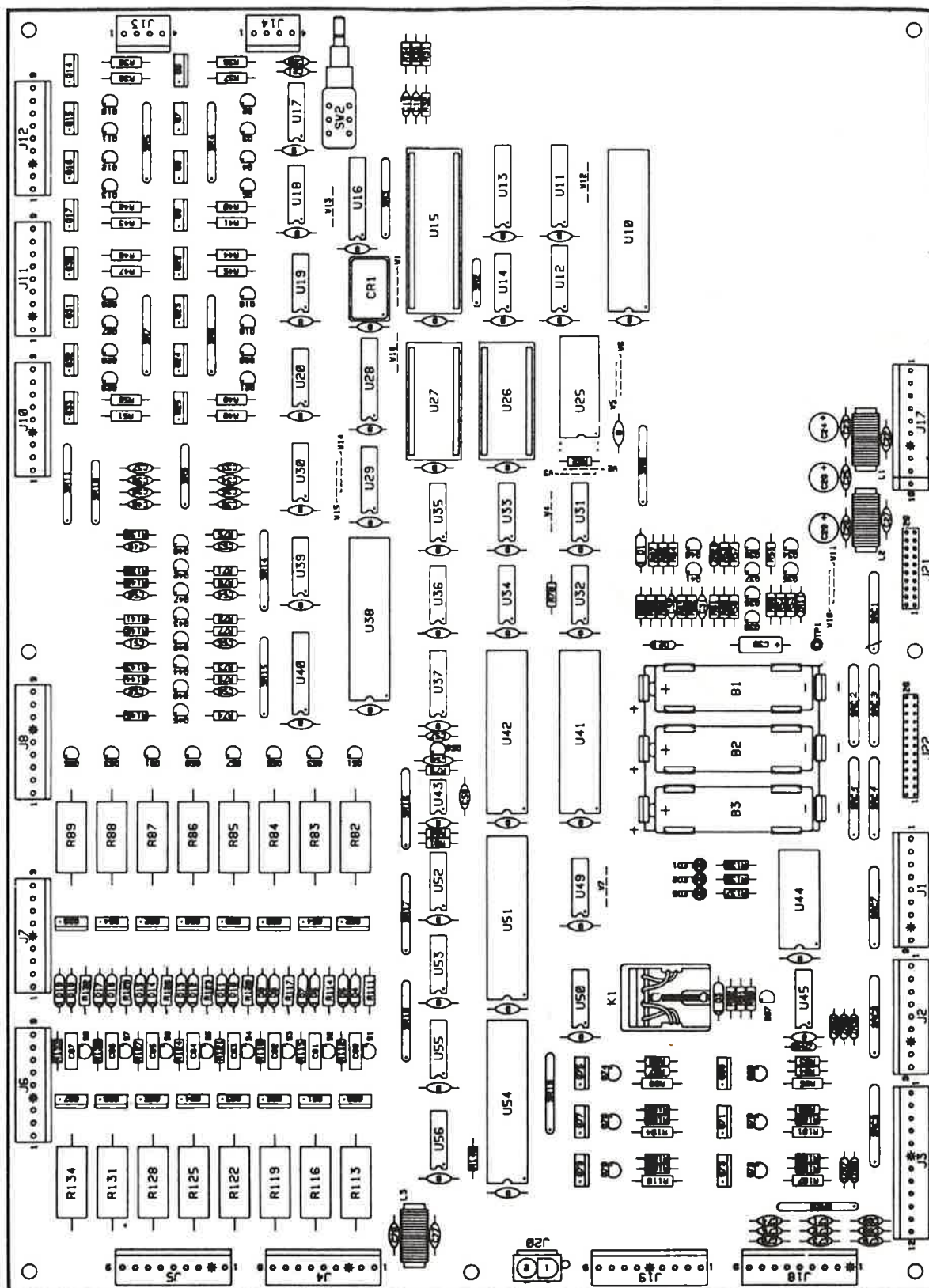


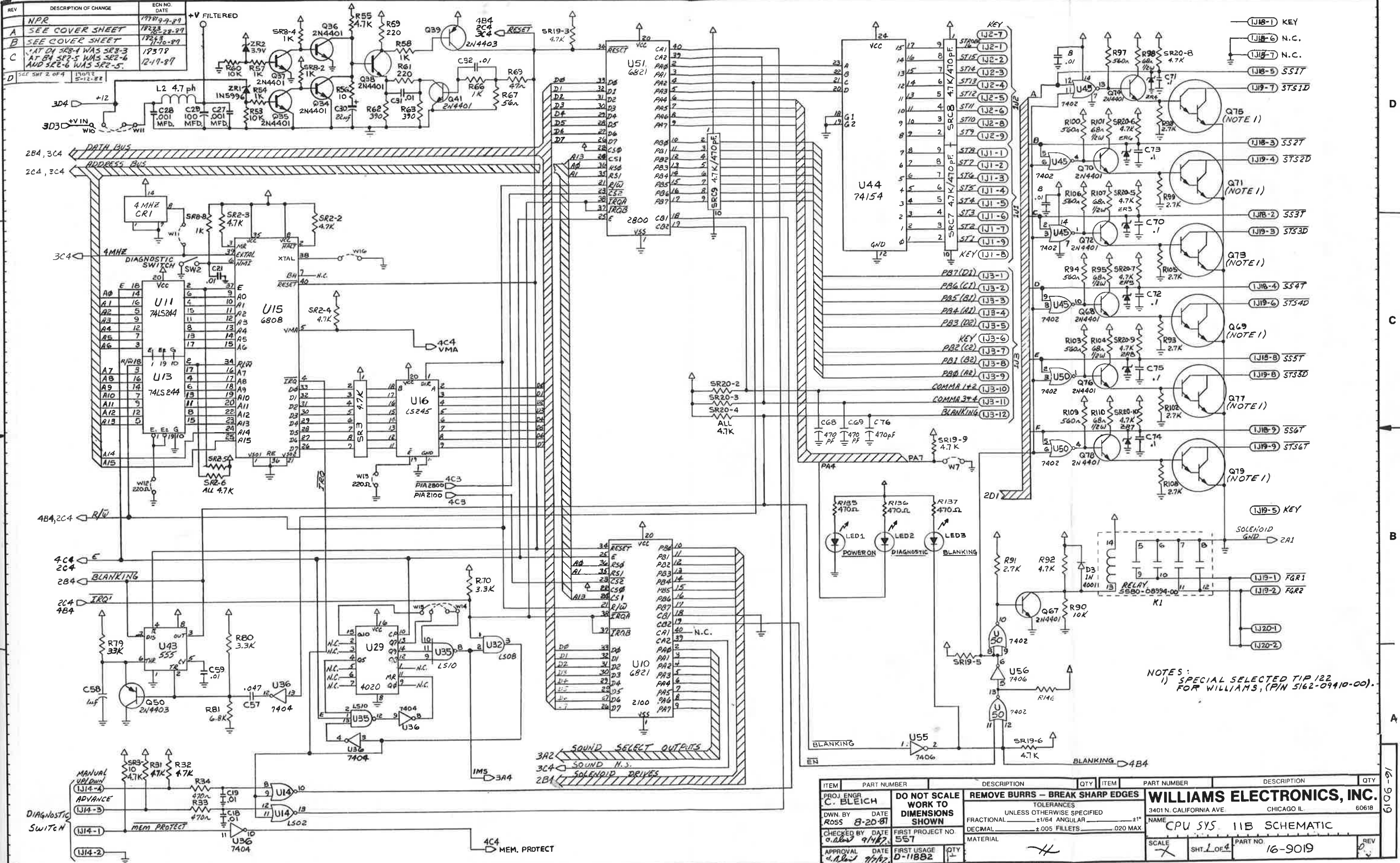
D-12246 Power Supply Board



Power Supply Board Schematic







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

4

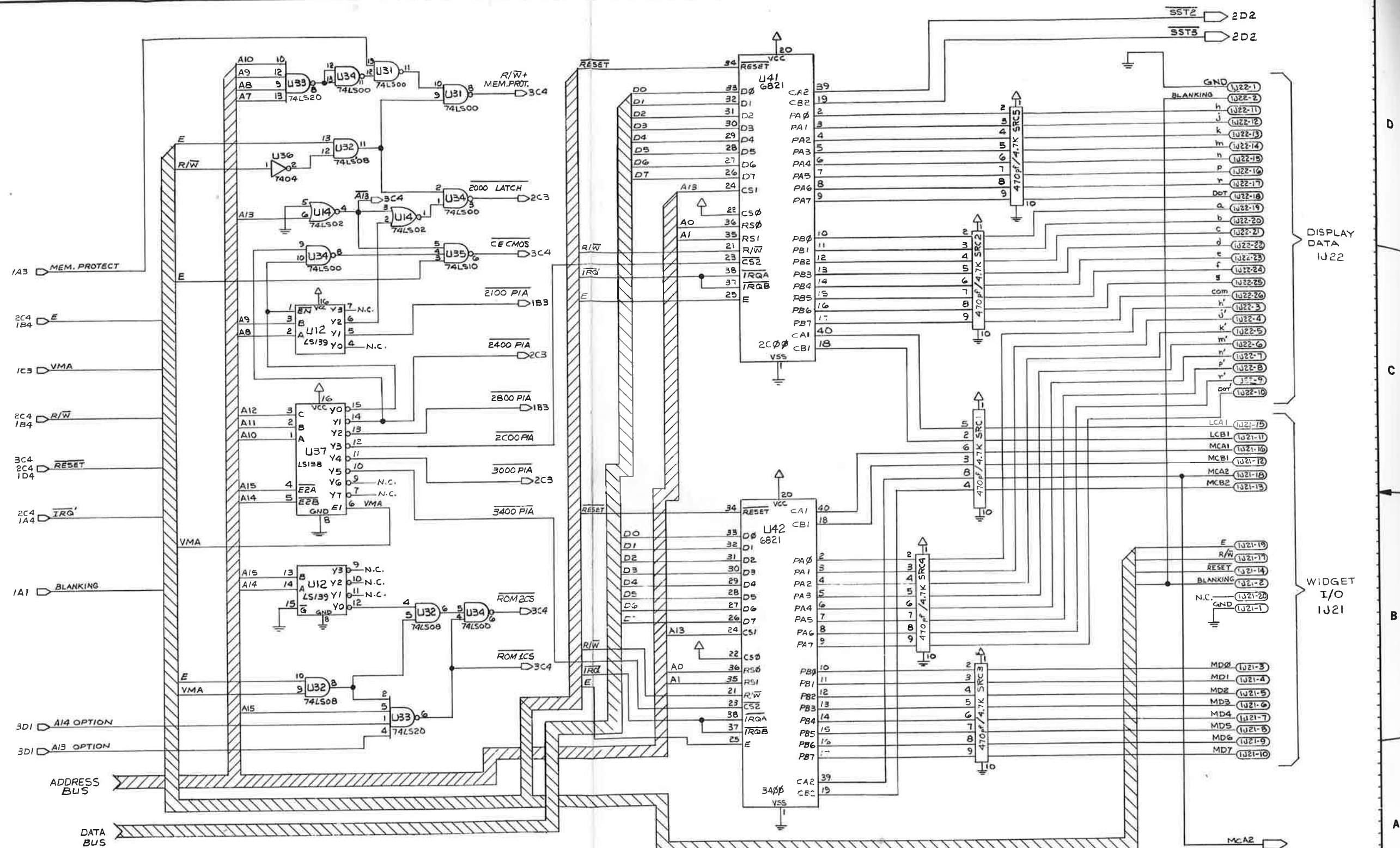
4

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

1

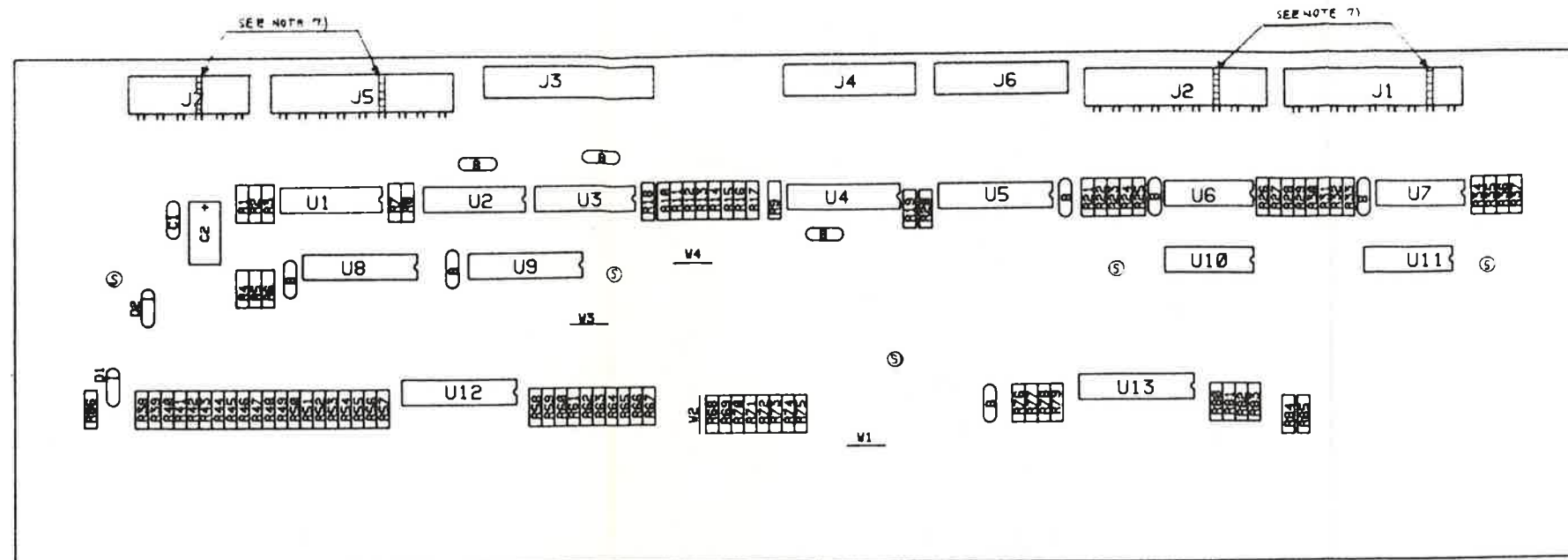
REV	DESCRIPTION OF CHANGE	ECN NO.
	N. P. R.	18981
A	SEE COVER SHEET	18981
B	SEE COVER SHEET	18981
C	SEE SHEET 1-3	18981
D	SEE SHT 2 OF 4	18981



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	C. BLEICH	DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS - BREAK SHARP EDGES		WILLIAMS ELECTRONICS, INC.	
OWN BY	DATE					3401 N. CALIFORNIA AVE.	CHICAGO IL 60618
CHECKED BY	DATE	FIRST PROJECT NO.	557			NAME	CPU SYS 11B SCHEMATIC
APPROVAL	DATE	FIRST USAGE	D-11882			SCALE	N/S
						SHT	4 OF 4
						PART NO.	16-9019
						REV	0

CPU 3-10

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



BALLY R-DISPLAY

ITEM	PART NUMBER	PART DESIGNATION	DESCRIPTION	QTY
1	5043-08980-00	B (BYPASS CAP)	CAP. 0.1MF 50V AX. CR.	8
2	5043-08986-00	C1	CAP. 1MF 50V AX. CR.	1
3	5040-08343-00	C2	CAP. 10MF 25V AX. ELECT.	1
4	5075-08135-00	D1,D2	DIODE 1N4740 10V	2
5	5670-12308-00	DSPT1	DISPLAY 16-CHARACTER A/W	1
6	5791-10889-00	J1,J2,J5	9 PIN HEADER, B/A, .156	3
7	5791-10881-00	J3	26 PIN HEADER, B/A, .100	1
8	5791-10889-00	J7	6 PIN HEADER, B/A, .156	1
9	5791-08438-00	CHART	20 PIN HEADER, B/A, .100	CHART
10	5010-08773-00	R1-R8,R21-R37	RES. 10K ohm 1/4W	25
11	5010-08162-00	NOTE 1	RES. 100K ohm 1/4W	CHART
12	5010-10258-00	NOTE 2	RES. 1M ohm 1/4W	CHART
13	5010-10827-00	NOTE 3	RES. 5.2K ohm 1/2W	CHART
14	5010-08881-00	NOTE 4	RES. 10K ohm 1/2W	CHART
15	5310-08875-00	U1,U2,U3	4048	3
16	5310-08882-00	U6,U7,U10,U11	4001	4
17	5680-08989-00	U8,U9	UDM-7180	2
18	5680-08968-00	CHART	UDM-6118	CHART
19	5010-08534-00	CHART	RES. ZERO OHM	CHART
20	5768-12378-00	PCB	BALLY-LO-DISPLAY PCB	1
21	03-8088-1	:(SUPPORT) S	SUPPORT DISPLAY	5
22	SEE CHART	LABEL	ASSEMBLY I.D. LABEL	CHART

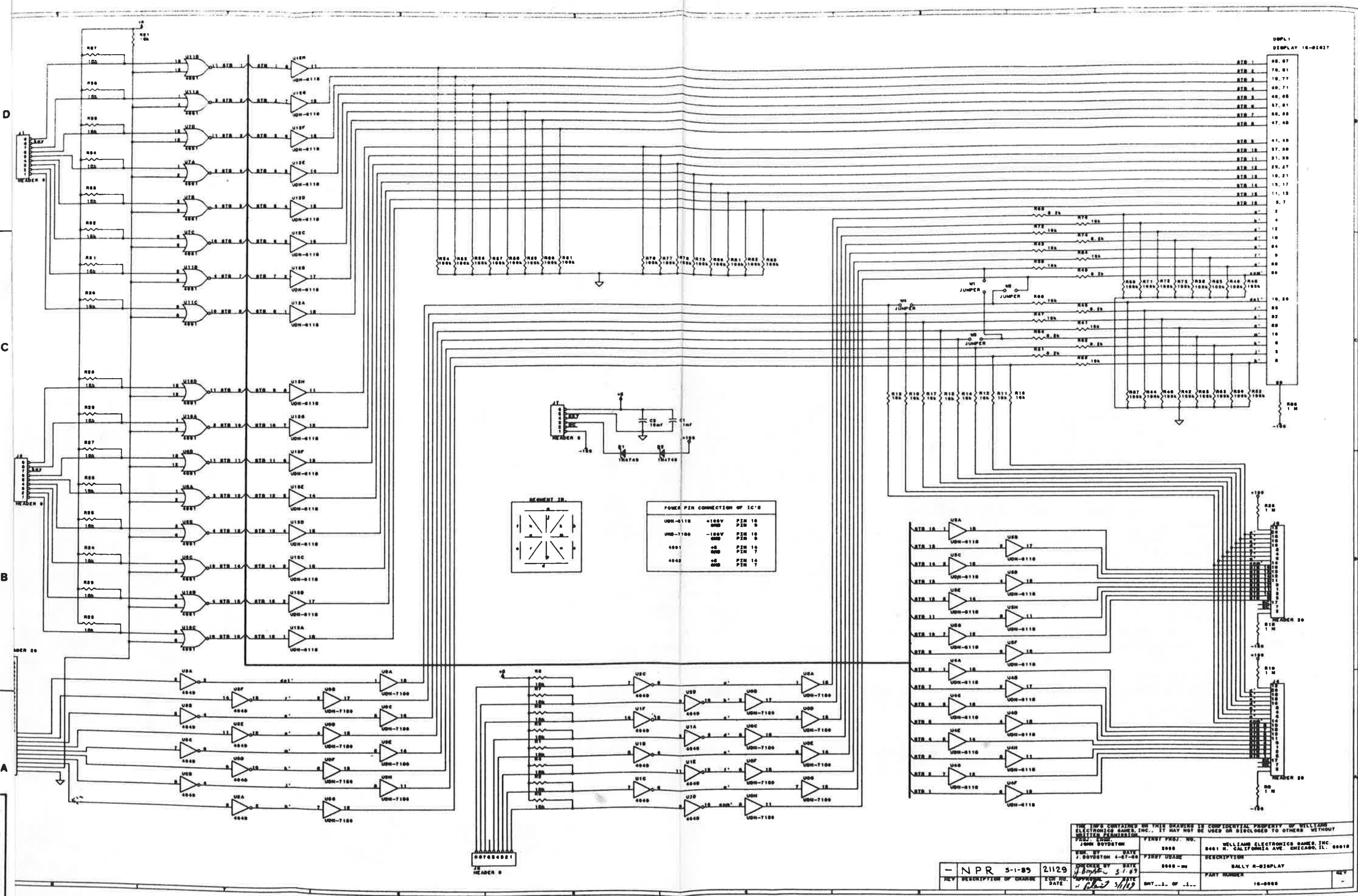
OPTION	ITEM 9	ITEM 11	ITEM 12	ITEM 13	ITEM 14	ITEM 16	ITEM 18	ITEM 22
NOTE 6	DESIGNATION	QTY	DESIGNATION	QTY	DESIGNATION	QTY	DESIGNATION	QTY
-01	NOT USED	0	R42,R44,R46,R50,R52,R63	32	SEE NOTE 2	1	R45,R51,R62	7
-02	J4	1	SEE NOTE 1	26	R9,R19	3	SEE NOTE 3	4
-03	J4,J6	2	SEE NOTE 1	26	R9,R18,R19,R20	5	SEE NOTE 3	4

NOTES:

- 100K ohm RESISTORS
R38,R40,R48,R54-R61,R65,R67,R69,R71,
R73,R75-R83,R85
- 1M ohm RESISTORS
R86
- 5.2K ohm RESISTORS
R49,R64,R68,R74
- 10K ohm RESISTOR
R39,R43,R66,R70,R72,R84
- THE CHART SPECIFIES RESISTORS, I.C.s AND CONNECTORS THAT ARE OPTION SPECIFIC
- THE TWO LAST DIGITS OF THE PART NUMBER SPECIFIES THE SUB-ASSEMBLY OPTION.
-01 MAIN DISPLAY ONLY: ALPHA NUMERIC
-02 MAIN DISPLAY: NUMERIC, ONE EXTENDED 7-SEGMENT NUMERIC
-03 MAIN DISPLAY: NUMERIC, TWO EXTENDED 7-SEGMENT NUMERIC

- CUT KEYING PINS AS INDICATED
- ALIGN TOP EDGE OF GLASS DISPLAY WITH TOP EDGE OF DISPLAY SUPPORTS.
- FOR SCHEMATIC SEE DRAWING 16-9048

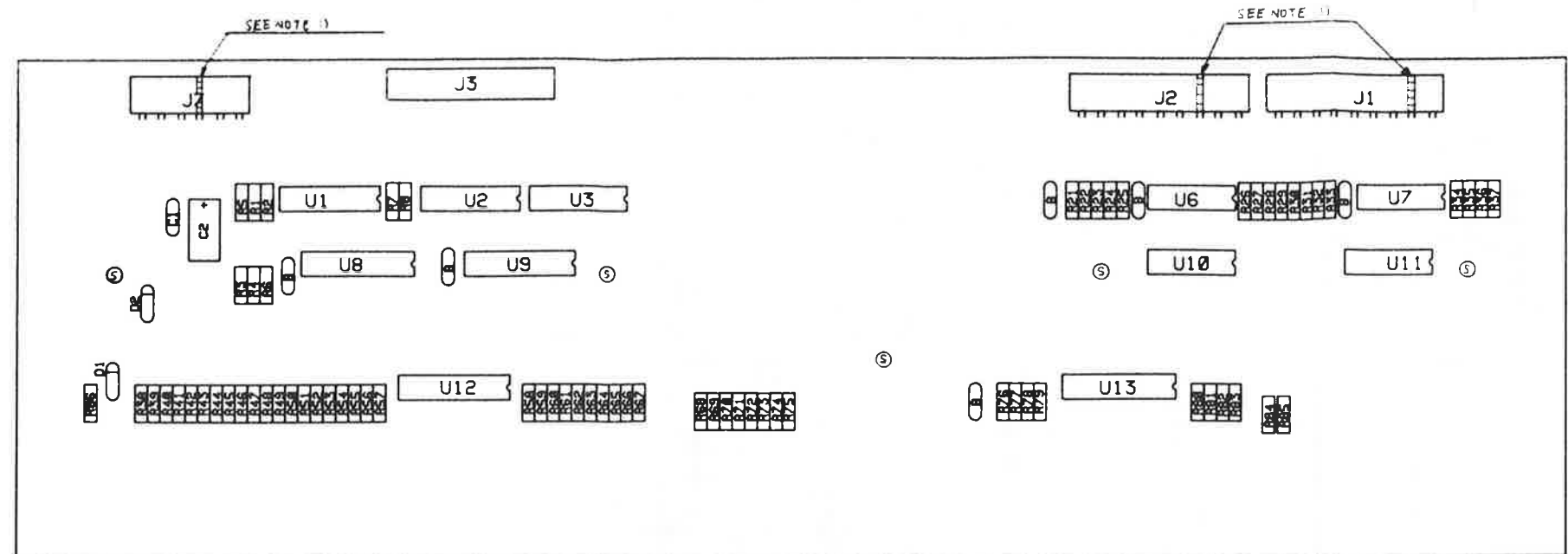
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION
THE INFO CONTAINED ON THIS DRAWING IS CONFIDENTIAL PROPERTY OF WILLIAMS ELECTRONICS GAMES, INC. IT MAY NOT BE USED OR DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION.						
PROJ ENGR J BOYDSTON		DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS-BREAK SHARP CORNERS & EDGES		
OWN BY DATE J PARKISH		TOLERANCES UNLESS OTHERWISE SPECIFIED		DECIMAL .X ±.030 ANGULAR ±1/2°		
CHECKED BY DATE J. Boyle 5-1-89		FIRST PROJECT NO 2008		FRACTIONAL ±1/64		
APPROVAL DATE J. Boyle 5/1/89		FIRST USAGE 2008-1N		MATERIAL		
WILLIAMS ELECTRONICS, INC. 3401 N CALIFORNIA AVE CHICAGO IL				NAME BALLY R-DISPLAY ASSY		
SCALE 2/1				SHT 1 OF 1 PART NO D-12502-		



Right Display 3-12

DESCRIPTION
N P R

10-0000



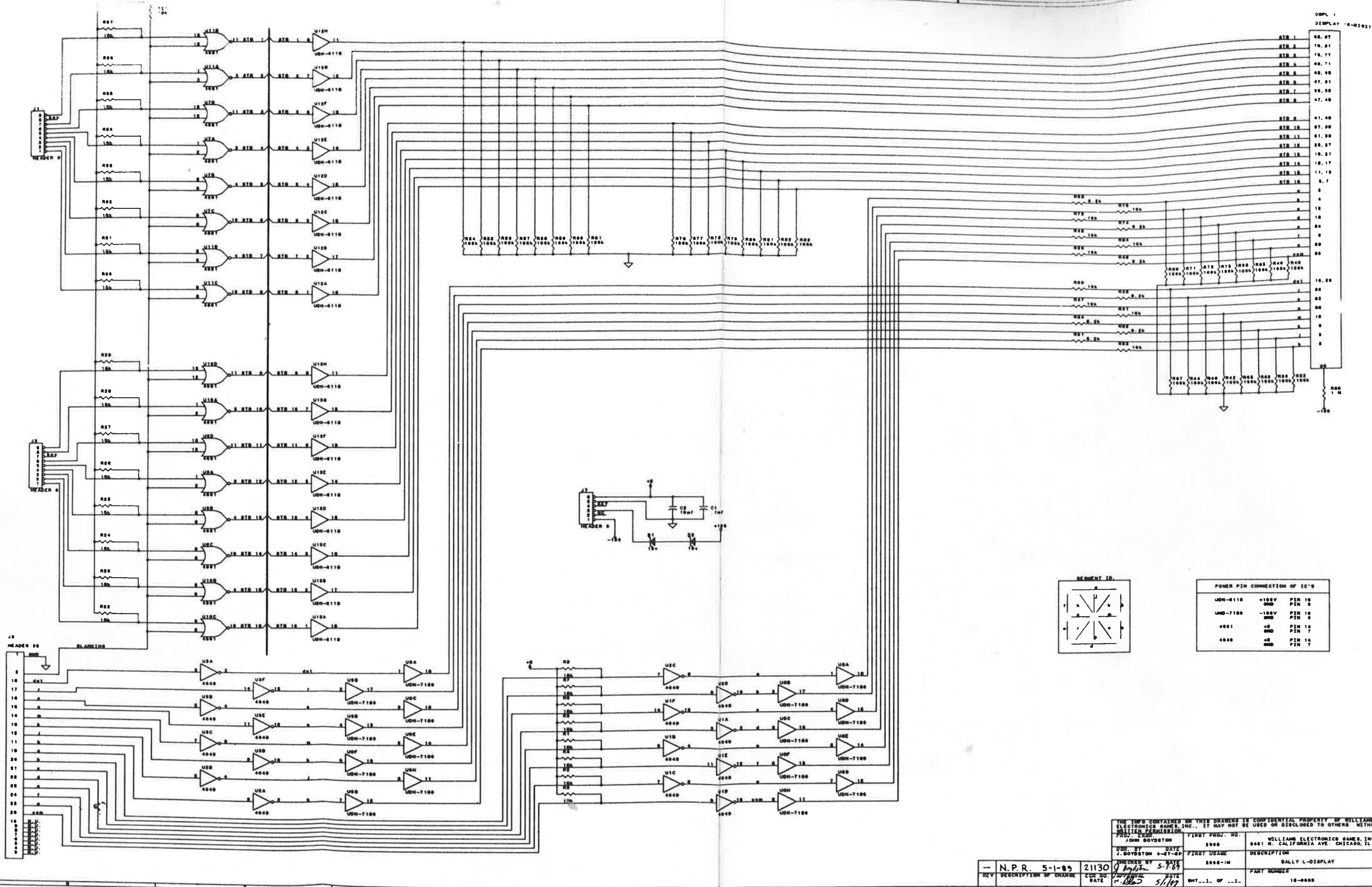
BALLY L-DISPLAY
BILL OF MATERIALS

ITEM	PART NUMBER	PART DESIGNATION	DESCRIPTION	QTY
1	5043-08980-00	B (BYPASS CAP)	CAP. 01MF 50V AX. CR.	6
2	5043-08996-00	C1	CAP. 1MF 50V AX. CR.	1
3	5040-09343-00	C2	CAP. 10MF 25V AX. ELECT.	1
4	5075-09135-00	D1,D2	ZENER 1N4740 10V	2
5	5870-12308-00	DSPY1	DISPLAY,16-CHARACTER A/M	1
6	5791-10869-09	J1,J2	9 PIN HEADER, R/A. 156	2
7	5791-10851-00	J3	26 PIN HEADER, R/A. 100	1
8	5791-10869-06	J7	6 PIN HEADER, R/A. 156	1
9	5010-08773-00	R1-R6,R21-R37	RES. 18K ohm 1/4W	25
10	5010-09162-00	R38,R40,R42,R44,R46,R48, R50,R52,R54,R55-R61,R63, R65,R67,R69,R71,R73, R75-R83,R85	RES. 100K ohm 1/4W	32
11	5010-08981-00	R39,R41,R43,R47,R53,R66, R70,R72,R84	RES. 10K ohm 1/2W	9
12	5010-10927-00	R45,R49,R51,R62,R64,R68, R74	RES. 8.2K ohm 1/2W	7
13	5010-10258-00	R86	RES. 1M ohm 1/4W	1
14	5310-08975-00	U1,U2,U3	4049	3
15	5310-09882-00	U6,U7,U10,U11	4001	4
16	5880-08969-00	U8,U9	UDM-7160	2
17	5880-08968-00	U12,U13	UDM-6118	2
18	5768-12408-00	PCB	BALLY-BI-DISPLAY PCB	1
19	03-8088-1	(SUPPORT) S	SUPPORT DISPLAY	5

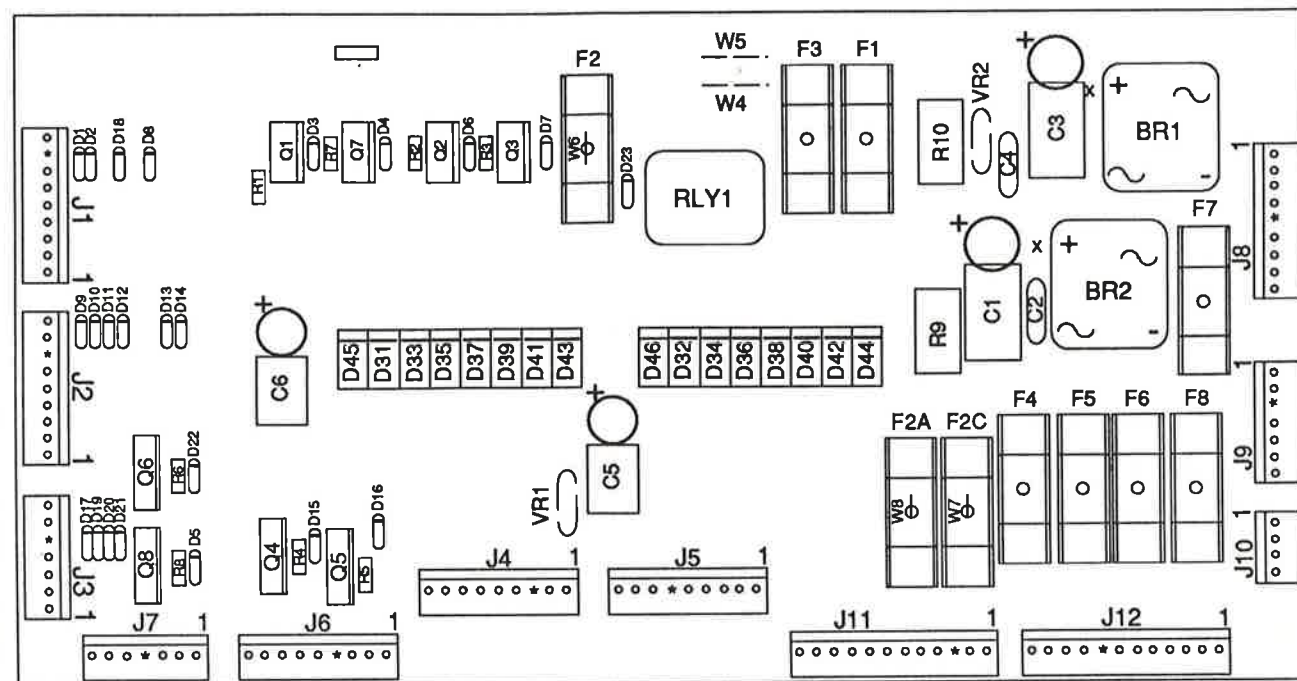
NOTES:

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

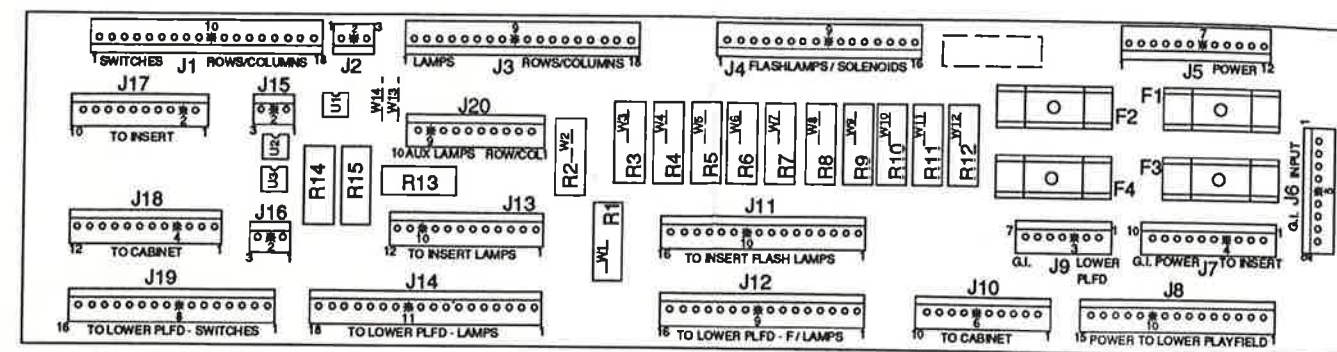
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
THE INFO CONTAINED ON THIS DRAWING IS CONFIDENTIAL PROPERTY OF WILLIAMS ELECTRONICS GAMES, INC. IT MAY NOT BE USED OR DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION							
PROJ ENGR J. BOYDSTON		DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS-BREAK SHARP CORNERS & EDGES		TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .XX ± .030 ANGULAR ±1/2° XXX ± .015 FRACTIONAL ±1/64	
OWN BY DATE J. PARRISH		FIRST PROJECT NO 2008		MATERIAL		WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618	
CHECKED BY DATE 5-1-89		DATE 5/1/89		2008-1N		NAME BALLY L-DISPLAY ASSY	
APPROVAL		DATE		QTY		SCALE 2/1	
				1		SHT 1 OF 1 PART NO D-12706	



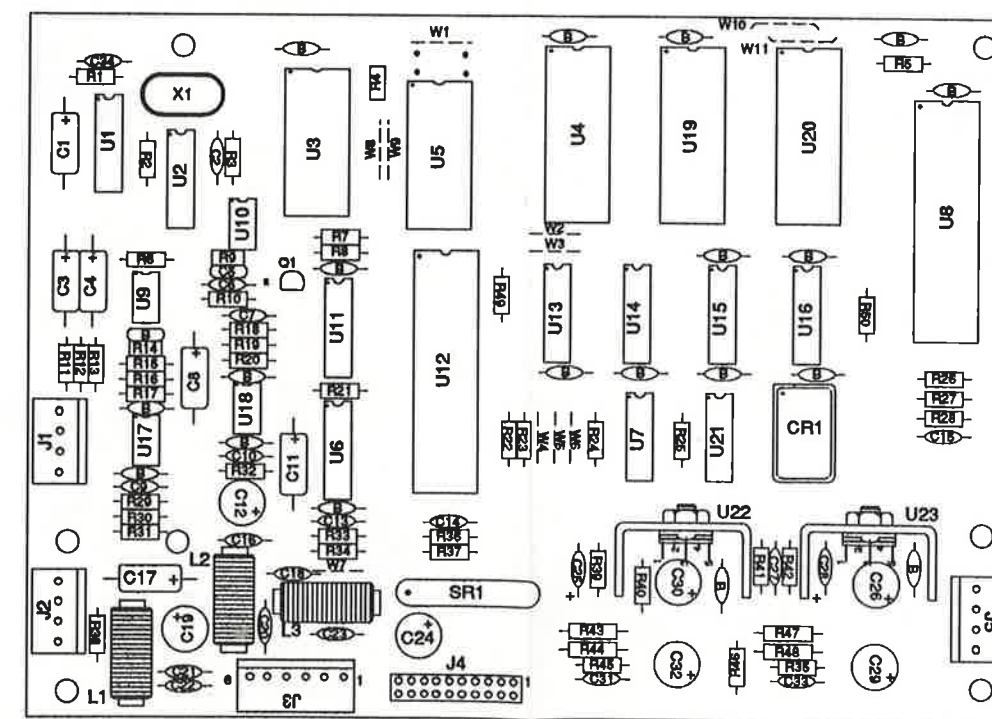
Left Display 3-14



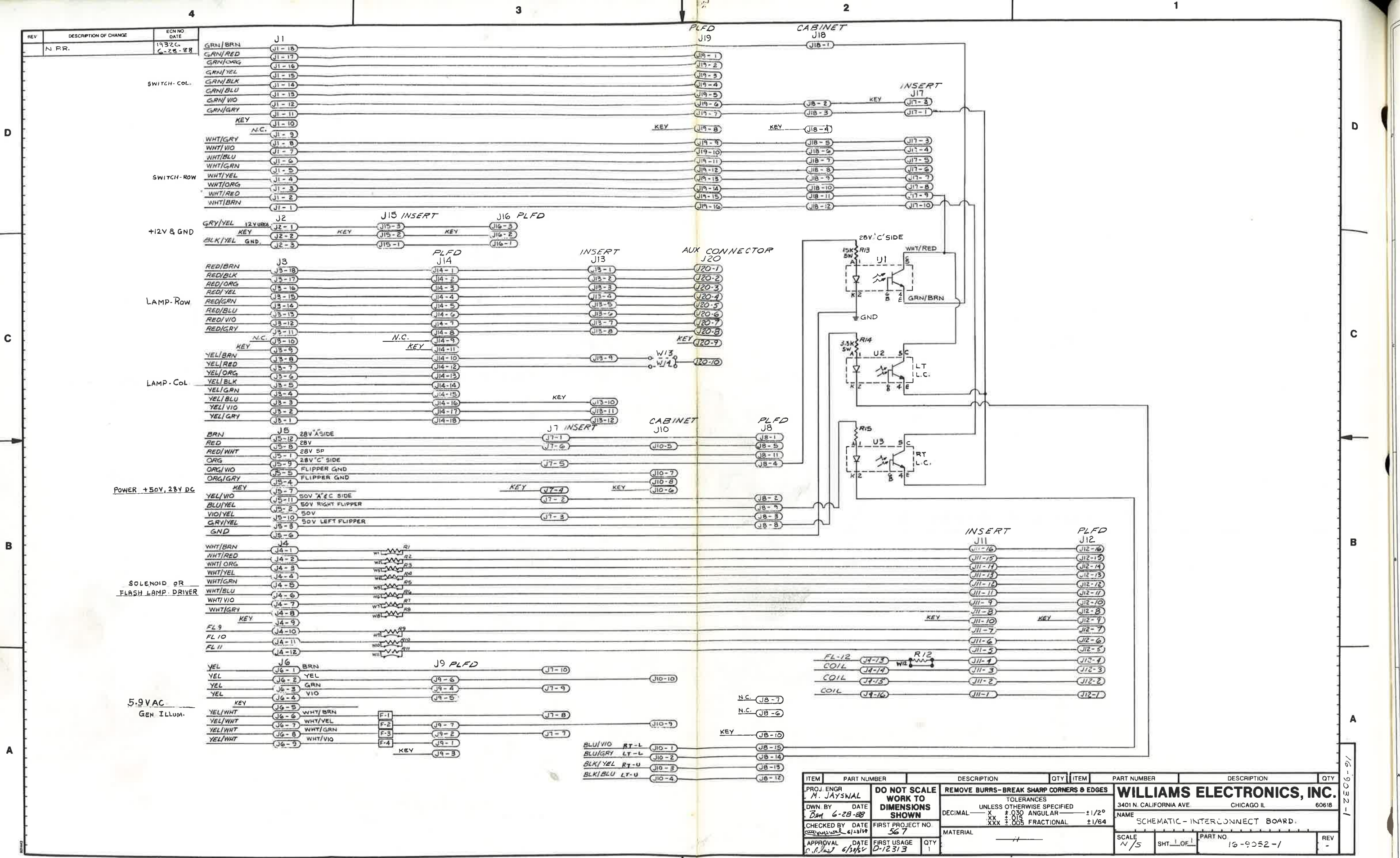
D-12247-2016 Aux Power Driver Board



D-12313-2016 Backbox Interconnect Board

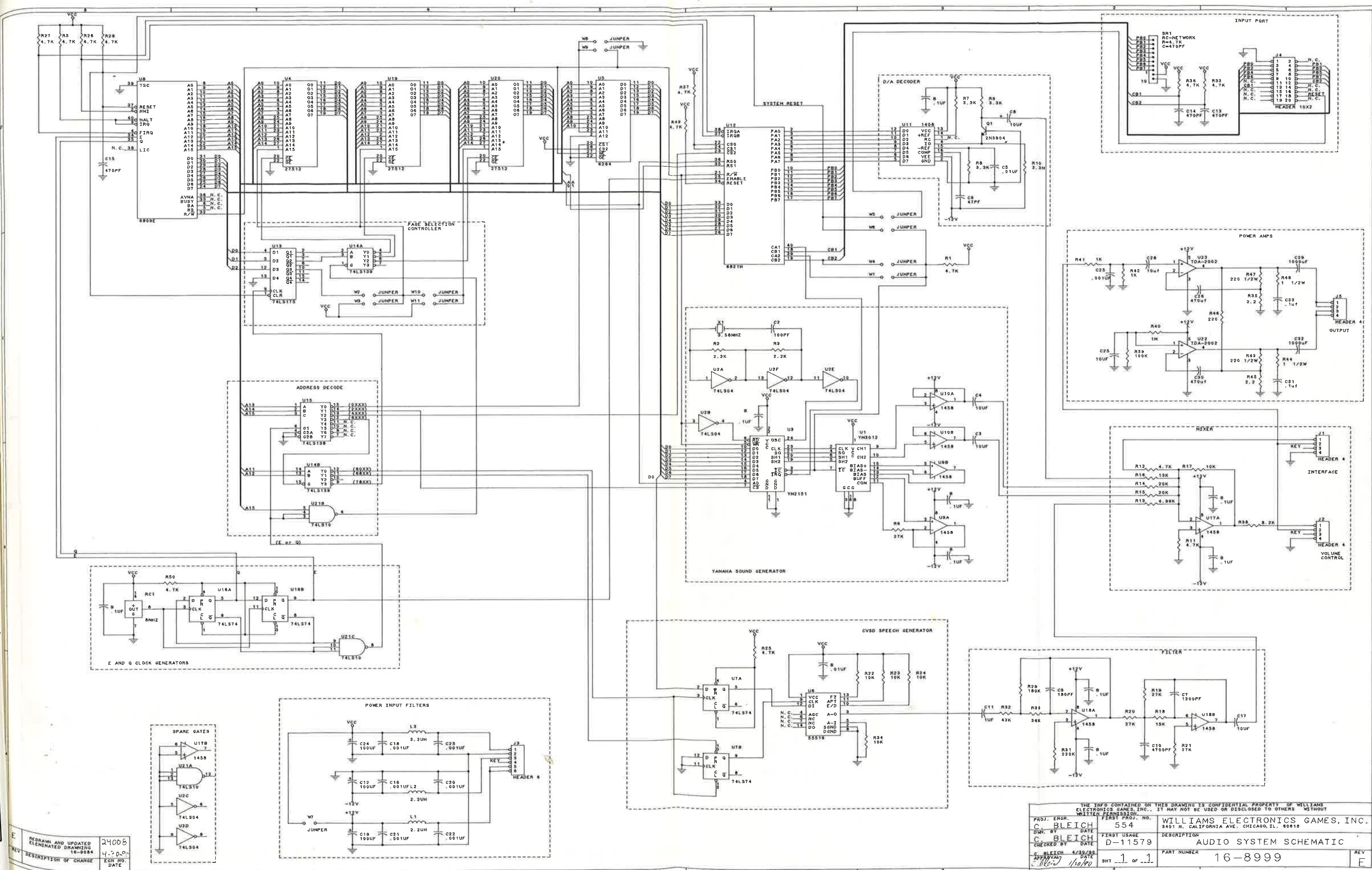


D-11581-2016 Audio Board Assembly



Backbox Interconnect Board 3-16

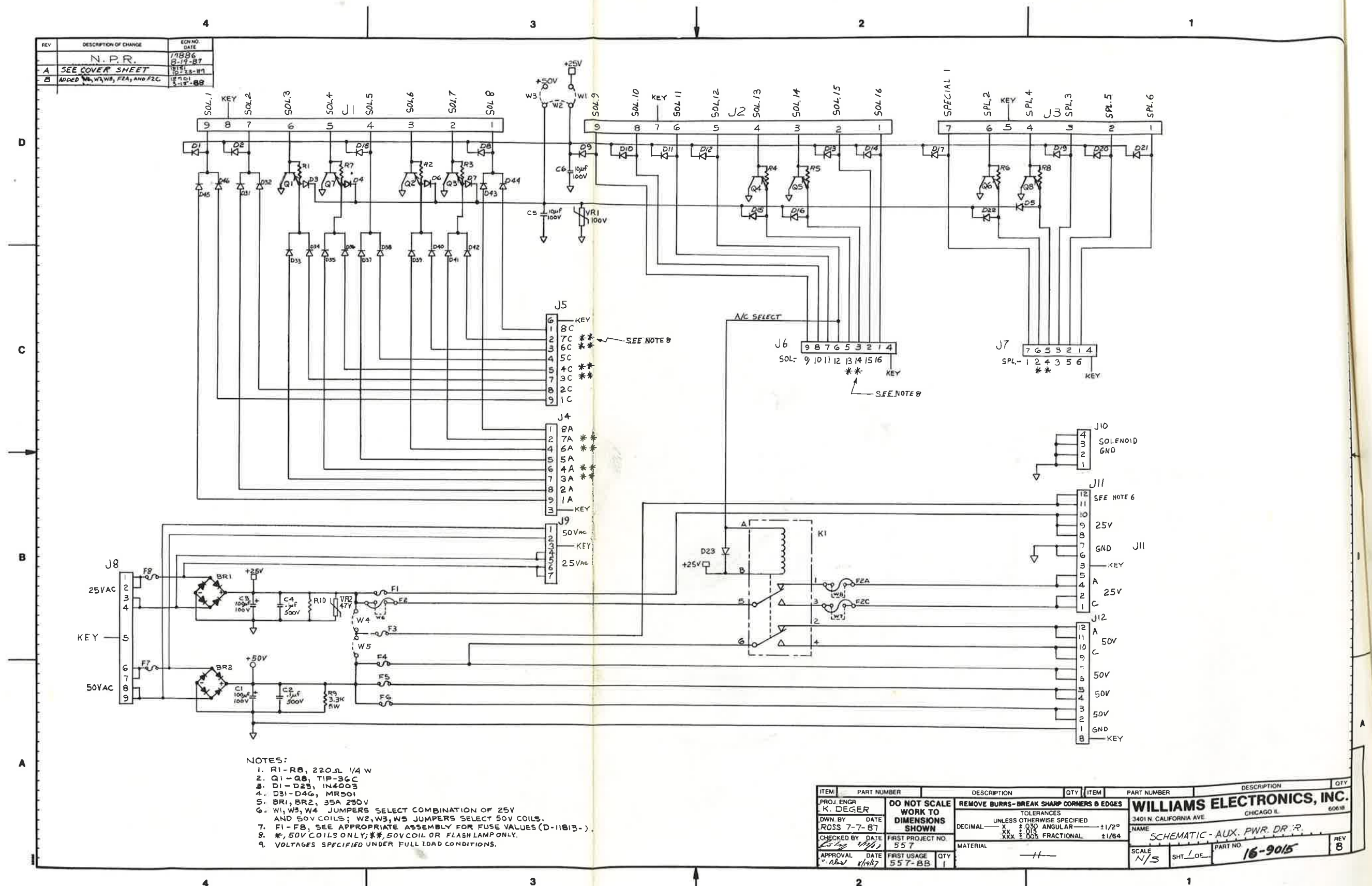
(16-9032-1) Backbox Interconnect Board Schematic



REV	DESCRIPTION OF CHANGE	DATE
1	REDRAWN AND UPDATED ELENATED DRAWING 16-9094	24005 4-20-80

THE INFO CONTAINED ON THIS DRAWING IS CONFIDENTIAL PROPERTY OF WILLIAMS ELECTRONICS GAMES, INC. IT MAY NOT BE USED OR DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION.	
PROJ. ENGR.	554
CHK. BY	DATE
C. BLEICH	DATE
CHECKED BY	DATE
C. BLEICH	DATE
APPROVED	DATE
SH1	1 of 1
PART NUMBER 16-8999	
REV	E

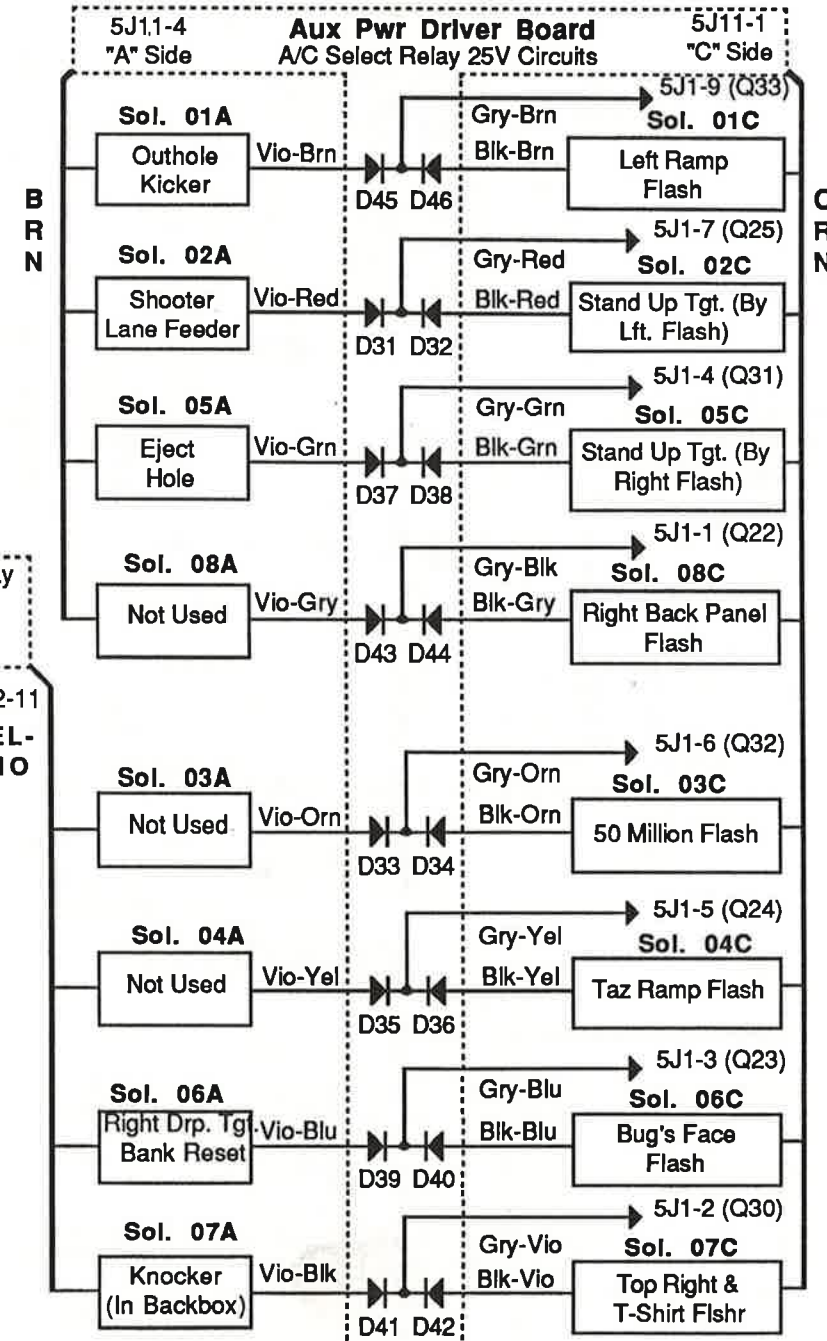
Audio Board 3-17



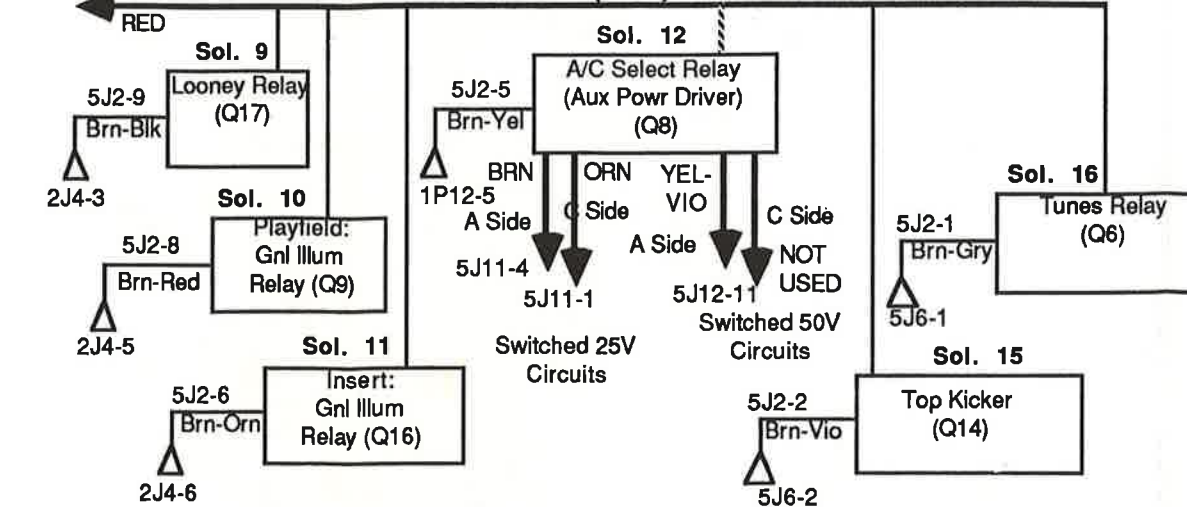
Aux. Power Driver Board 3-18

(16-9015) Aux. Power Driver Schematic

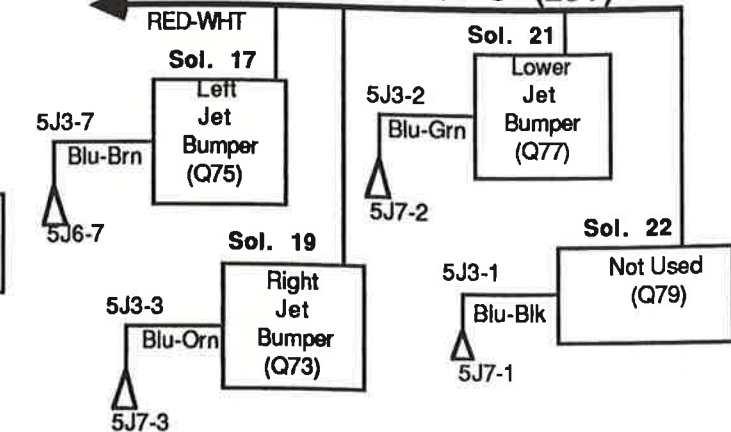
SWITCHED SOLENOIDS



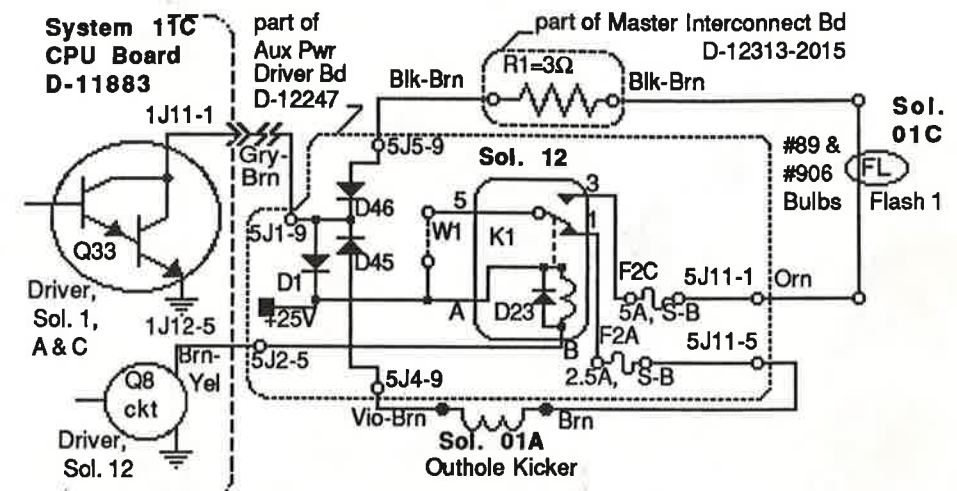
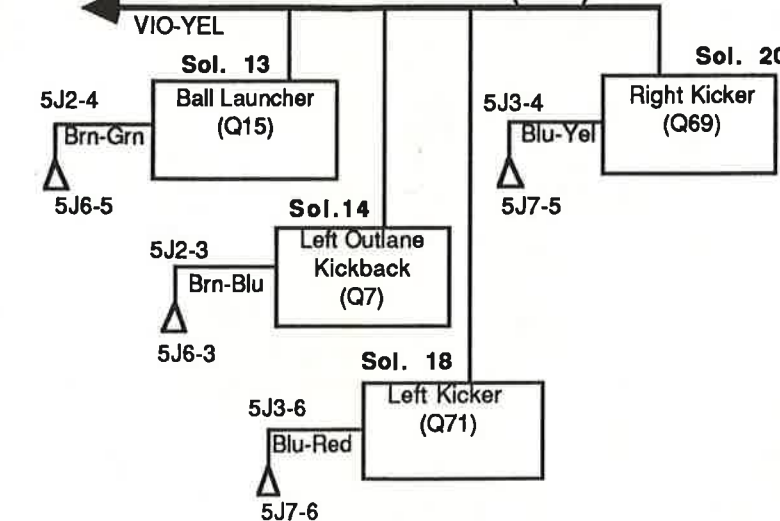
CONTROLLED SOLENOIDS (25V)



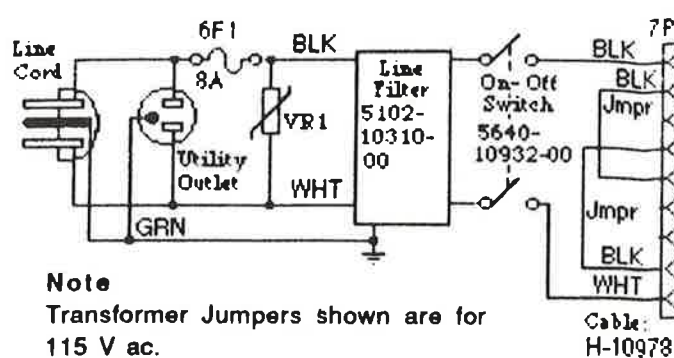
SPECIAL SOLENOIDS (25V)



SPECIAL SOLENOIDS (50V)

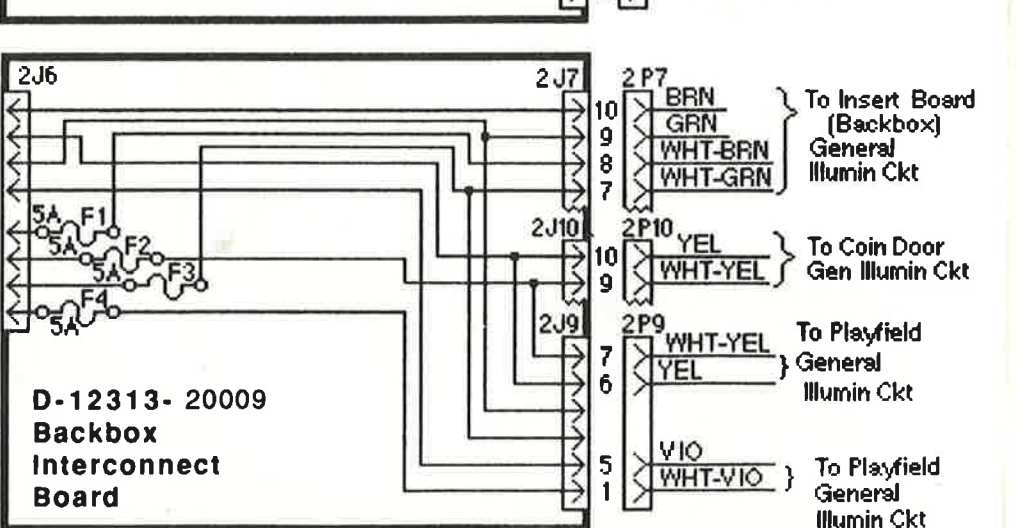
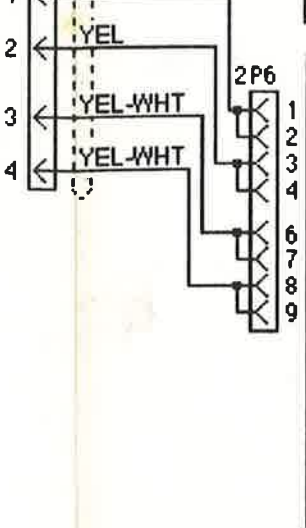
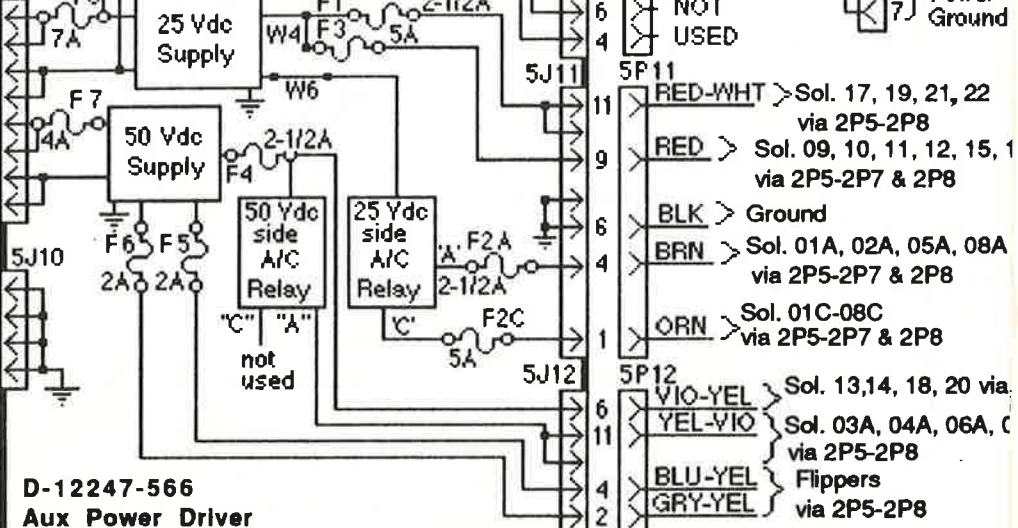
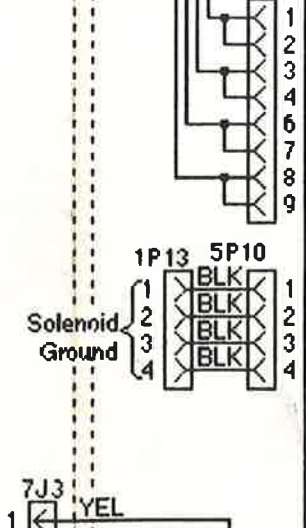
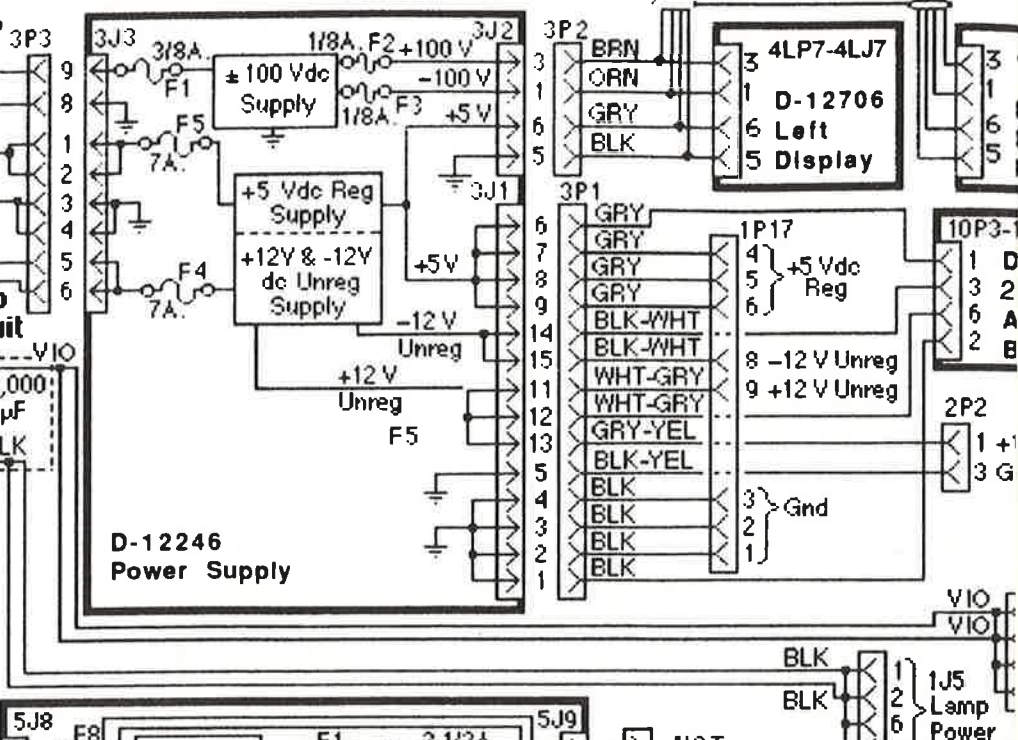
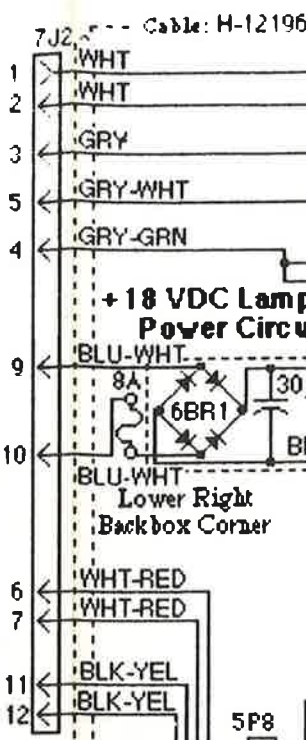
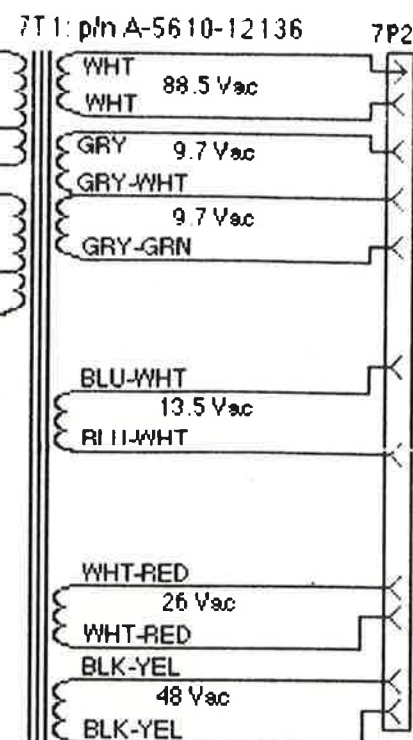
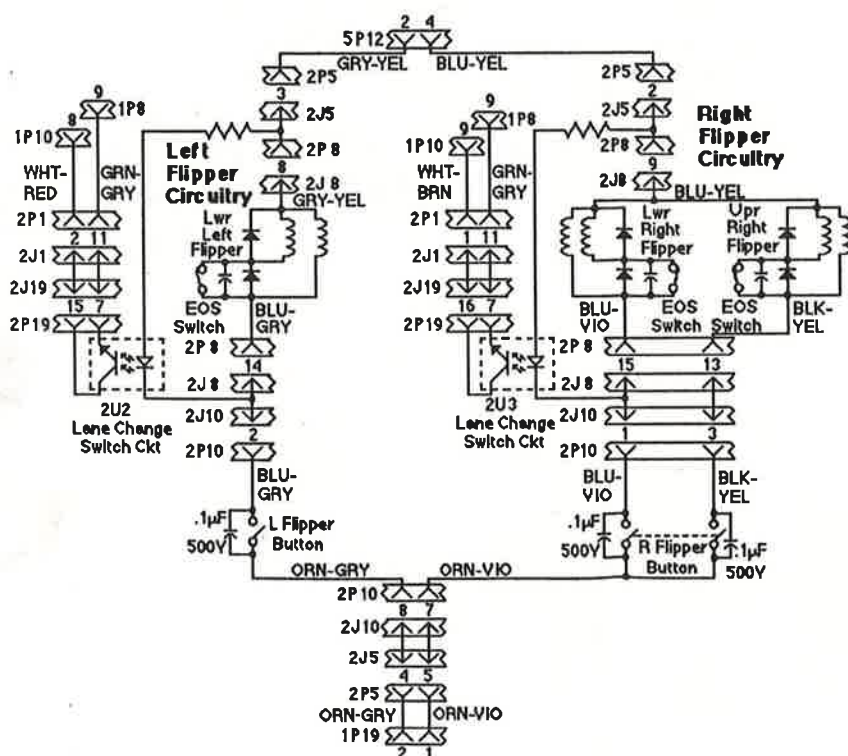


Typical A/C Select Circuit for Switched Solenoids



TRANSFORMER JUMPER CHART

206/218 VAC	230 VAC	103.5 VAC
7P5 BLK 1 206V 2 218V 3 WHT 4 5 6 7	7P5 BLK 1 2 3 4 5 6 7 WHT 8	7P5 BLK 1 2 3 4 5 6 7 WHT 8
FUSE (6F1): 4A, S-B	4A, S-B	8A, N-B
VARISTOR: 275V	275V	130V
275V Varistor: 5017-09063-00 130V Varistor: 5017-09044-00 4A, S-B Fuse: 5731-06314-00 (for 220V) 8A, N-B Fuse: 5730-09252-00 (for 115V)		



SYSTEM 11C CPU INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
1J1-1	BRN-GRY	ST-8: Display Digit Strobe / 4J1-1	1J2-1	VIO-GRY	ST-16: Display Digit Strobe / 4J2-1
1J1-2	BRN-VIO	ST-7: Display Digit Strobe / 4J1-2	1J2-2	VIO-BLK	ST-15: Display Digit Strobe / 4J2-2
1J1-3	BRN-BLU	ST-6: Display Digit Strobe / 4J1-3	1J2-3	VIO-BLU	ST-14: Display Digit Strobe / 4J2-3
1J1-4	BRN-GRN	ST-5: Display Digit Strobe / 4J1-4	1J2-4	VIO-GRN	ST-13: Display Digit Strobe / 4J2-4
1J1-5	BRN-YEL	ST-4: Display Digit Strobe / 4J1-5	1J2-5	VIO-YEL	ST-12: Display Digit Strobe / 4J2-5
1J1-6	BRN-ORG	ST-3: Display Digit Strobe / 4J1-6	1J2-6	VIO-ORG	ST-11: Display Digit Strobe / 4J2-6
1J1-7	BRN-RED	ST-2: Display Digit Strobe / 4J1-7	1J2-7	Key Pin	No Connection
1J1-8	Key Pin	No Connection	1J2-8	VIO-RED	ST-10: Display Digit Strobe / 4J2-8
1J1-9	BRN-BLK	ST-1: Display Digit Strobe / 4J1-9	1J2-9	VIO-BRN	ST-9: Display Digit Strobe / 4J2-9
1J3-1	BLU-BRN	D1 / Display BCD / 4J5-1	1J4-1	VIO	Lamp +18V dc Power
1J3-2	BLU-RED	C1 / Display BCD / 4J5-2	1J4-2	VIO	"
1J3-3	BLU-ORG	B1 / Display BCD / 4J5-3	1J4-3	Key Pin	No Connection
1J3-4	BLU-YEL	A1 / Display BCD / 4J5-4	1J4-4	---	No Connection
1J3-5	BLU-GRN	D2 / Display BCD / 4J5-5	1J4-5	---	No Connection
1J3-6	Key Pin	No Connection	1J4-6	---	No Connection
1J3-7	BLU-BLK	C2 / Display BCD / 4J5-7	1J4-7	---	No Connection
1J3-8	BLU-VIO	B2 / Display BCD / 4J5-8	1J4-8	VIO	Lamp +18V dc Power
1J3-9	BLU-GRY	A2 / Display BCD / 4J5-9	1J4-9	VIO	"
1J3-10	---	No Connection	1J6-1	RED-BRN	Lamp Row 1 (Q80) / 2J3-18
1J3-11	---	No Connection	1J6-2	RED-BLK	Lamp Row 2 (Q81) / 2J3-17
1J3-12	---	No Connection	1J6-3	RED-ORG	Lamp Row 3 (Q82) / 2J3-16
1J5-1	---	No Connection	1J6-4	Key Pin	No Connection
1J5-2	Key Pin	No Connection	1J6-5	RED-YEL	Lamp Row 4 (Q83) / 2J3-15
1J5-3	BLK	Ground (Lamp Ckt)	1J6-6	RED-GRN	Lamp Row 5 (Q84) / 2J3-14
1J5-4	BLK	Ground (Lamp Ckt)	1J6-7	RED-BLU	Lamp Row 6 (Q85) / 2J3-13
1J5-5	---	No Connection	1J6-8	RED-VIO	Lamp Row 7 (Q86) / 2J3-12
1J5-6	---	No Connection	1J6-9	RED-GRY	Lamp Row 8 (Q87) / 2J3-11
1J5-7	---	No Connection	1J8-1	GRN-BRN	Switch Col 1 (Q45) / 2J1-18
1J5-8	BLK	Ground (Lamp Ckt)	1J8-2	GRN-RED	Switch Col 2 (Q49) / 2J1-17
1J5-9	BLK	Ground (Lamp Ckt)	1J8-3	GRN-ORG	Switch Col 3 (Q44) / 2J1-16
1J7-1	YEL-BRN	Lamp Col 1 (Q65/66) / 2J3-8	1J8-4	GRN-YEL	Switch Col 4 (Q48) / 2J1-15
1J7-2	YEL-RED	Lamp Col 2 (Q63/64) / 2J3-7	1J8-5	GRN-BLK	Switch Col 5 (Q43) / 2J1-14
1J7-3	YEL-ORG	Lamp Col 3 (Q61/62) / 2J3-6	1J8-6	Key Pin	No Connection
1J7-4	YEL-BLK	Lamp Col 4 (Q59/60) / 2J3-5	1J8-7	GRN-BLU	Switch Col 6 (Q47) / 2J1-13
1J7-5	Key Pin	No Connection	1J8-8	GRN-VIO	Switch Col 7 (Q42) / 2J1-12
1J7-6	YEL-GRN	Lamp Col 5 (Q57/58) / 2J3-4	1J8-9	GRN-GRY	Switch Col 8 (Q46) / 2J1-11
1J7-7	YEL-BLU	Lamp Col 6 (Q55/56) / 2J3-3	1J9	Not Applicable	
1J7-8	YEL-VIO	Lamp Col 7 (Q53/54) / 2J3-2	1J11-1	GRY-BRN	Solenoid 1 (Q33) / 5J1-9
1J7-9	YEL-GRY	Lamp Col 8 (Q51/52) / 2J3-1	1J11-2	Key Pin	No Connection
1J10-1	WHT-GRY	Switch Row 8 / 2J1-8	1J11-3	GRY-RED	Solenoid 2 (Q26) / 5J1-7
1J10-2	WHT-VIO	Switch Row 7 / 2J1-7	1J11-4	GRY-ORG	Solenoid 3 (Q32) / 5J1-6
1J10-3	WHT-BLU	Switch Row 6 / 2J1-6	1J11-5	GRY-YEL	Solenoid 4 (Q24) / 5J1-5
1J10-4	Key Pin	No Connection	1J11-6	GRY-GRN	Solenoid 5 (Q31) / 5J1-4
1J10-5	WHT-GRN	Switch Row 5 / 2J1-5	1J11-7	GRY-BLU	Solenoid 6 (Q23) / 5J1-3
1J10-6	WHT-YEL	Switch Row 4 / 2J1-4	1J11-8	GRY-VIO	Solenoid 7 (Q30) / 5J1-2
1J10-7	WHT-ORG	Switch Row 3 / 2J1-3	1J11-9	GRY-BLK	Solenoid 8 (Q22) / 5J1-1
1J10-8	WHT-RED	Switch Row 2 / 2J1-2	1J13-1	BLK	Solenoid Ground / 5J10-1
1J11-9	WHT-BRN	Switch Row 1 / 2J1-1	1J13-2	BLK	" / 5J10-2
1J12-1	BRN-BLK	Solenoid 9 (Q17) / 5J2-9	1J13-3	BLK	" / 5J10-3
1J12-2	BRN-RED	Solenoid 10 (Q9) / 5J2-8	1J13-4	BLK	" / 5J10-4
1J12-3	Key Pin	No Connection	1J14-1	BLK-RED	Memory Protect / 7J1-4
1J12-4	BRN-ORG	Solenoid 11 (Q16) / 5J2-6	1J14-2	WHT	Ground / 7J1-3
1J12-5	BRN-YEL	Solenoid 12 (Q8) / 5J2-5	1J14-3	GRN	ADVANCE Switch / 7J1-1
1J12-6	BRN-GRN	Solenoid 13 (Q15) / 5J2-4	1J14-4	BLU	AUTOMANUAL Switch / 7J1-2
1J12-7	BRN-BLU	Solenoid 14 (Q7) / 5J2-3	1J17-1	BLK	Ground / 3J1-2
1J12-8	BRN-VIO	Solenoid 15 (Q14) / 5J2-2	1J17-2	BLK	" / 3J1-3
1J12-9	BRN-GRY	Solenoid 16 (Q6) / 5J2-1	1J17-3	BLK	" / 3J1-4
1J16-1	RED	Volume Control Input / 11J1-1	1J17-4	GRY	Power: +6V dc / 3J1-8
1J16-2	BLK	Volume Control Output / 11J1-2	1J17-5	GRY	" / 3J1-6
1J16-3	Key Pin	No Connection	1J17-6	GRY	" / 3J1-9
1J16-4	White	Signal Ground - CPU / 11J1-4	1J17-7	Key Pin	No Connection
1J18-1	---	No Connection	1J17-8	BLK-WHT	Power: -12V dc Unreg / 3J1-14
1J18-2	---	"	1J17-9	WHT-GRY	Power: +12V dc Unreg / 3J1-12
1J18-3	---	"	1J19-1	ORG-VIO	Flipper Ground / 2J5-5
1J18-4	---	"	1J19-2	ORG-GRY	Flipper Ground / 2J5-4
1J18-5	---	"	1J19-3	BLU-ORN	Spl Solnd 3 (Q73) / 5J3-3
1J18-6	Key Pin	"	1J19-4	BLU-RED	Spl Solnd 2 (Q71) / 5J3-6
1J18-7	---	"	1J19-5	Key Pin	No Connection
1J18-8	---	"	1J19-6	BLU-YEL	Spl Solnd 4 (Q69) / 5J3-4
1J18-9	---	"	1J19-7	BLU-BRN	Spl Solnd 1 (Q75) / 5J3-7
1J21	Ribbon Cable	Audio Board 11J4	1J19-8	BLU-GRN	Spl Solnd 5 (Q77) / 5J3-2
1J22	Ribbon Cable	to Master Display Board 4J3	1J19-9	BLU-BLK	Spl Solnd 6 (Q79) / 5J3-1

AUX POWER DRIVER INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
5J1-1	GRY-BLK	CPU: Solenoid 8 (Q22) / 1J11-9	5J2-1	BRN-GRY	CPU: Solenoid 16 (Q6) / 1J12-9
5J1-2	GRY-VIO	CPU: Solenoid 7 (Q30) / 1J11-8	5J2-2	BRN-VIO	CPU: Solenoid 15 (Q14) / 1J12-8
5J1-3	GRY-BLU	CPU: Solenoid 6 (Q23) / 1J11-7	5J2-3	BRN-BLU	CPU: Solenoid 14 (Q7) / 1J12-7
5J1-4	GRY-GRN	CPU: Solenoid 5 (Q31) / 1J11-6	5J2-4	BRN-GRN	CPU: Solenoid 13 (Q15) / 1J12-6
5J1-5	GRY-YEL	CPU: Solenoid 4 (Q24) / 1J11-5	5J2-5	BRN-YEL	CPU: Solenoid 12 (Q8) / 1J12-5
5J1-6	GRY-ORG	CPU: Solenoid 3 (Q32) / 1J11-4	5J2-6	BRN-ORG	CPU: Solenoid 11 (Q16) / 1J12-4
5J1-7	GRY-RED	CPU: Solenoid 2 (Q25) / 1J11-3	5J2-7	Key Pin	No Connection
5J1-8	Key Pin	No Connection	5J2-8	BRN-RED	CPU: Solenoid 10 (Q9) / 1J12-2
5J1-9	GRY-BRN	CPU: Solenoid 1 (Q33) / 1J11-1	5J2-9	BRN-BLK	CPU: Solenoid 9 (Q11) / 1J12-1
5J3-1	BLU-BLK	CPU: Solenoid 22 (Q79) / 1J19-9	5J4-1	VIO-GRY	Solenoid 08A
5J3-2	BLU-GRN	CPU: Solenoid 21 (Q77) / 1J19-8	5J4-2	VIO-BLK	Solenoid 07A
5J3-3	BLU-ORG	CPU: Solenoid 19 (Q73) / 1J19-3	5J4-3	Key Pin	No Connection
5J3-4	BLU-YEL	CPU: Solenoid 20 (Q69) / 1J19-6	5J4-4	VIO-BLK	Solenoid 06A
5J3-5	Key Pin	No Connection	5J4-5	VIO-GRN	Solenoid 05A
5J3-6	BLU-RED	CPU: Solenoid 18 (Q71) / 1J19-4	5J4-6	VIO-YEL	Solenoid 04A
5J3-7	BLU-BRN	CPU: Solenoid 17 (Q75) / 1J19-7	5J4-7	VIO-ORN	Solenoid 03A
5J5-1	WHT-GRY	Solenoid 08C / 2J4-8	5J4-8	VIO-RED	Solenoid 02A
5J5-2	WHT-VIO	Solenoid 07C / 2J4-7	5J4-9	VIO-BRN	Solenoid 01A
5J5-3	WHT-BLU	Solenoid 06C / 2J4-6	5J6-1	BRN-GRY	Solenoid 16 / 2J4-12
5J5-4	WHT-GRN	Solenoid 05C / 2J4-5	5J6-2	BRN-VIO	Solenoid 15 / 2J4-11
5J5-5	WHT-YEL	Solenoid 04C / 2J4-4	5J6-3	BRN-BLU	Solenoid 14 / 2J4-16
5J5-6	Key Pin	No Connection	5J6-4	Key Pin	No Connection
5J5-7	WHT-ORG	Solenoid 03C / 2J4-3	5J6-5	BRN-GRN	Solenoid 13 / 2J4-15
5J5-8	WHT-RED	Solenoid 02C / 2J4-2	5J6-6	---	No Connection
5J5-9	WHT-BRN	Solenoid 01C / 2J4-1	5J6-7	BRN-ORG	Solenoid 11 / 2J4-14
5J7-1	BLU-BLK	Solenoid 22	5J6-8	BRN-RED	Solenoid 10 / 2J4-13
5J7-2	BLU-GRN	Solenoid 21	5J6-9	BRN-BLK	Solenoid 09 / 2J4-10
5J7-3	BLU-ORG	Solenoid 19	5J8-1	WHT-RED	Transformer: 26V ac / 7J2-6
5J7-4	Key Pin	No Connection	5J8-2	WHT-RED	Transformer: 26V ac / 7J2-6
5J7-5	BLU-YEL	Solenoid 20	5J8-3	WHT-RED	Transformer: 26V ac / 7J2-7
5J7-6	BLU-RED	Solenoid 18	5J8-4	WHT-RED	Transformer: 26V ac / 7J2-7
5J7-7	BLU-BRN	Solenoid 17	5J8-5	Key Pin	No Connection
5J9-1	---	No Connection	5J8-6	BLK-YEL	Transformer: 48V ac / 7J2-11
5J9-2	---	No Connection	5J8-7	BLK-YEL	Transformer: 48V ac / 7J2-11
5J9-3	---	No Connection	5J8-8	BLK-YEL	Transformer: 48V ac / 7J2-12
5J9-4	---	No Connection	5J8-9	BLK-YEL	Transformer: 48V ac / 7J2-12
5J9-5	---	No Connection	5J10-1	BLK	Solnd Gnd / 1J13-1
5J9-6	---	No Connection	5J10-2	BLK	Solnd Gnd / 1J13-2
5J9-7	---	No Connection	5J10-3	BLK	Solnd Gnd / 1J13-3
5J12-1	---	No Connection	5J10-4	BLK	Solnd Gnd / 1J13-4
5J12-2	GRY-YEL	+50 Vdc Flipper Pwr / 2J5-3	5J11-1	ORG	+25 Vdc "C" Solenoid Pwr / 2J5-9
5J12-3	---	No Connection	5J11-2	---	No Connection
5J12-4	BLU-YEL	+50 Vdc Flipper Pwr / 2J5-2	5J11-3	Key Pin	No Connection
5J12-5	---	No Connection	5J11-4	BRN	+25 Vdc "A" Solenoid Pwr / 2J5-12
5J12-6	VIO-YEL	+50 Vdc Solenoid Pwr / 2J5-10	5J11-5	---	No Connection
5J12-7	---	No Connection	5J11-6	BLK	Ground / 2J5-6
5J12-8	Key Pin	No Connection	5J11-7	---	No Connection
5J12-9	---	No Connection	5J11-8	---	No Connection
5J12-10	---	No Connection	5J11-9	RED	+25 Vdc Solenoid Pwr / 2J5-8
5J12-11	YEL-VIO	+50 Vdc Solenoid Pwr / 2J5-11	5J11-10	---	No Connection
5J12-12	---	No Connection	5J11-11	RED-WHT	+25 Vdc Solenoid Pwr / 2J5-1
			5J11-12	---	No Connection

POWER SUPPLY INTERBOARD SIGNALS

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

BACKBOX INTERCONNECT BOARD INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
2J1-1	WHT-BRN	Switch Row 1 /1J11-9	2J2-1	GRY-YEL	+12Vdc Unreg/3J1-13
2J1-1	WHT-RED	Switch Row 2 /1J11-8	2J2-2	---	No Connection
2J1-3	WHT-ORG	Switch Row 3 /1J11-7	2J2-3	BLK-YEL	Ground/3J1-5
2J1-4	WHT-YEL	Switch Row 4 /1J11-6	2J3-1	YEL-GRY	Lamp Col 8 (Q51/52)/1J7-9
2J1-5	WHT-GRN	Switch Row 5 /1J11-5	2J3-2	YEL-VIO	Lamp Col 7 (Q53/54)/1J7-8
2J1-6	WHT-BLU	Switch Row 6 /1J11-3	2J3-3	YEL-BLU	Lamp Col 6 (Q55/56)/1J7-7
2J1-7	WHT-VIO	Switch Row 7 /1J11-2	2J3-4	YEL-GRN	Lamp Col 5 (Q57/58)/1J7-6
2J1-8	WHT-GRY	Switch Row 8 /1J11-1	2J3-5	YEL-BLK	Lamp Col 4 (Q59/60)/1J7-4
2J1-9	Key Pin	No Connection	2J3-6	YEL-ORG	Lamp Col 3 (Q61/62)/1J7-3
2J1-10	---	No Connection	2J3-7	YEL-RED	Lamp Col 2 (Q63/64)/1J7-2
2J1-11	GRN-GRY	Switch Col 8 (Q46) /1J8-9	2J3-8	YEL-BRN	Lamp Col 1 (Q65/66)/1J7-1
2J1-12	GRN-VIO	Switch Col 7 (Q42) /1J8-8	2J3-9	Key Pin	No Connection
2J1-13	GRN-BLU	Switch Col 6 (Q47) /1J8-7	2J3-10	---	No Connection
2J1-14	GRN-BLK	Switch Col 5 (Q43) /1J8-5	2J3-11	RED-GRY	Lamp Row 8 (Q87) /1J6-9
2J1-15	GRN-YEL	Switch Col 4 (Q48) /1J8-4	2J3-12	RED-VIO	Lamp Row 7 (Q86) /1J6-8
2J1-16	GRN-ORG	Switch Col 3 (Q44) /1J8-3	2J3-13	RED-BLU	Lamp Row 6 (Q85) /1J6-7
2J1-17	GRN-RED	Switch Col 2 (Q49) /1J8-2	2J3-14	RED-GRN	Lamp Row 5 (Q84) /1J6-6
2J1-18	GRN-BRN	Switch Col 1 (Q45) /1J8-1	2J3-15	RED-YEL	Lamp Row 4 (Q83) /1J6-5
2J4-1	WHT-BRN	Solenoid 01C In /5J5-9	2J3-16	RED-ORG	Lamp Row 3 (Q82) /1J6-3
2J4-2	WHT-RED	Solenoid 02C In /5J5-8	2J3-17	RED-BLK	Lamp Row 2 (Q81) /1J6-2
2J4-3	WHT-ORG	Solenoid 03C In /5J5-7	2J3-18	RED-BRN	Lamp Row 1 (Q80) /1J6-1
2J4-4	WHT-YEL	Solenoid 04C In /5J5-5	2J5-1	RED-WHT	+25Vdc (Solenoid)/5J11-12
2J4-5	WHT-GRN	Solenoid 05C In /5J5-4	2J5-2	BLU-YEL	Flipper Power/5J12-4
2J4-6	WHT-BLU	Solenoid 06C In /5J5-3	2J5-3	GRY-YEL	Flipper Power/5J12-2
2J4-7	WHT-VIO	Solenoid 07C In /5J5-2	2J5-4	ORG-GRY	Flipper Ground Ckt/1J19-2
2J4-8	WHT-GRY	Solenoid 08C In /5J5-1	2J5-5	ORG-VIO	Flipper Ground Ckt/1J19-1
2J4-9	Key Pin	No Connection	2J5-6	BLK	Ground/5J11-6
2J4-10	BRN-BLK	Solenoid 09 /5J6-9	2J5-7	Key Pin	No Connection
2J4-11	BRN-VIO	Solenoid 15 /5J6-2	2J5-8	RED	+25 Vdc (Solenoid)/ 5J11-9
2J4-12	BRN-GRY	Solenoid 16 /5J6-1	2J5-9	ORG	+25 Vdc ("C" Solenoids)/ 5J11-1
2J4-13	BRN-RED	Solenoid 10 /5J6-8	2J5-10	VIO-YEL	+50 Vdc (Solenoid)/ 5J12-7
2J4-14	BRN-ORG	Solenoid 11 /5J6-7	2J5-11	YEL-VIO	+50 Vdc (Solenoid)/ 5J12-11
2J4-15	BRN-GRN	Solenoid 13 /5J6-5	2J5-12	BRN	+25 Vdc ("A" Solenoids)/5J11-5
2J4-16	BRN-BLU	Solenoid 14 /5J6-3	2J7-1	---	No Connection
2J6-1	YEL	Gen Illum Pwr: 6V ac	2J7-2	---	No Connection
2J6-2	YEL	Gen Illum Pwr: 6V ac	2J7-3	---	No Connection
2J6-3	YEL	Gen Illum Pwr: 6V ac	2J7-4	---	No Connection
2J6-4	YEL	Gen Illum Pwr: 6V ac	2J7-5	ORG	+25 Vdc ("C" Solenoids)
2J6-5	Key Pin	No Connection	2J7-6	RED	+25 Vdc (Solenoid)/
2J6-6	YEL-WHT	Gen Illum Pwr: 6V ac	2J7-7	WHT-GRN	Backbox Gen Illum Pwr/2J6-8
2J6-7	YEL-WHT	Gen Illum Pwr: 6V ac	2J7-8	WHT-BRN	Backbox Gen Illum Pwr/2J6-6
2J6-8	YEL-WHT	Gen Illum Pwr: 6V ac	2J7-9	GRN	Backbox Gen Illum Pwr/2J6-3
2J6-9	YEL-WHT	Gen Illum Pwr: 6V ac	2J7-10	BRN	Backbox Gen Illum Pwr/2J6-1
2J8-1	BRN	+25 Vdc ("A" Solenoids)	2J9-1	WHT-VIO	Playfield Gen Illum Pwr/2J6-9
2J8-2	YEL-VIO	+50 Vdc Solenoid 03A, 04A, 06A	2J9-2	---	No Connection
2J8-3	VIO-YEL	+50 Vdc Solenoid 14, 18, 20	2J9-3	---	No Connection
2J8-4	ORG	+25 Vdc ("C" Solenoids)	2J9-4	---	No Connection
2J8-5	RED	+25 Vdc Solenoid 9-11, 15, 16	2J9-5	VIO	Playfield Gen Illum Pwr/2J6-4
2J8-6-7	---	No Connection	2J9-6	YEL	Snd Overlay Lamp Brd J5 / 4
2J8-8	GRY-YEL	Flipper Power	2J9-7	WHT-YEL	Snd Overlay Lamp Brd J5 / 2
2J8-9	BLU-YEL	Flipper Power	2J11-1	---	No Connection
2J8-10	Key Pin	No Connection	2J11-2	---	No Connection
2J8-11	RED-WHT	+25Vdc Solenoid 17, 19, 21	2J11-3	BLK-ORG	Solenoid 03C
2J8-12	BLK-BLU	Upper Left Flipper	2J11-4	---	No Connection
2J8-13	BLK-YEL	Upper Right Flipper	2J11-5	---	No Connection
2J8-14	BLU-GRY	Lower Left Flipper	2J11-6	---	No Connection
2J8-15	BLU-VIO	Lower Right Flipper	2J11-7	BRN-BLK	Solenoid 09
2J10-1	BLU-VIO	Lower Right Flipper	2J11-8	---	No Connection
2J10-2	BLU-GRY	Lower Left Flipper	2J11-9	BLK-VIO	Solenoid 07C
2J10-3	BLK-YEL	Upper Right Flipper	2J11-10	---	No Connection
2J10-4	BLK-BLU	Upper Left Flipper	2J11-11	BLK-BLU	Solenoid 06C
2J10-5	RED	+25 Vdc (Solenoid)	2J11-12	BLK-GRN	Solenoid 05C
2J10-6	---	No Connection	2J11-13	BLK-YEL	Solenoid 04C
2J10-7	ORG-VIO	R Flipper Ground Ckt	2J11-14	---	No Connection
2J10-8	ORG-GRY	L Flipper Ground Ckt	2J11-15	---	No Connection
2J10-9	WHT-YEL	Gen Illum Pwr: 6V ac	2J11-16	---	No Connection
2J10-10	YEL	Gen Illum Pwr: 6V ac	2J12-1	BRN-BLU	Solenoid 14
2J13-1	RED-BRN	Lamp Row 1	2J12-2	BRN-GRN	Solenoid 13
2J13-2	RED-BLK	Lamp Row 2	2J12-3	---	No Connection
2J13-3	RED-ORG	Lamp Row 3	2J12-4	BRN-RED	Solenoid 10
2J13-4	RED-YEL	Lamp Row 4	2J12-5	BRN-GRY	Solenoid 16
2J13-5	RED-GRN	Lamp Row 5	2J12-6	BRN-VIO	Solenoid 15
2J13-6	RED-BLU	Lamp Row 6	2J12-7	BRN-BLK	Solenoid 9
2J13-7	---	No Connection	2J12-8	BLK-GRY	Solenoid 08C
2J13-8	---	No Connection	2J12-9	---	No Connection
2J13-9	---	No Connection	2J12-10	BLK-VIO	Solenoid 10
2J13-10	---	No Connection	2J12-11	BLK-GRN	Solenoid 05C
2J13-11	---	No Connection	2J12-12	BLK-BLU	Solenoid 06C
2J13-12	YEL-GRY	Lamp Col 8			

BACKBOX INTERCONNECT BOARD INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
2J14-1	RED-BRN	Lamp Row 1	2J12-13	BLK-YEL	Solenoid 04C
2J14-2	RED-BLK	Lamp Row 2	2J12-14	BLK-ORG	Solenoid 03C
2J14-3	RED-ORG	Lamp Row 3	2J12-15	BLK-RED	Solenoid 02C
2J14-4	RED-YEL	Lamp Row 4	2J12-16	BLK-BRN	Solenoid 01C
2J14-5	RED-GRN	Lamp Row 5	2J18-1	GRN-BRN	Switch Col 1
2J14-6	RED-BLU	Lamp Row 6	2J18-2	---	No Connection
2J14-7	RED-VIO	Lamp Row 7	2J18-5	WHT-GRY	Switch Row 8
2J14-8	RED-GRY	Lamp Row 8	2J18-6	WHT-VIO	Switch Row 7
2J14-9	---	No Connection	2J18-7	WHT-BLU	Switch Row 6
2J14-10	YEL-BRN	Lamp Col 1	2J18-8	WHT-GRN	Switch Row 5
2J14-11	---	No Connection	2J18-9	WHT-YEL	Switch Row 4
2J14-12	YEL-RED	Lamp Col 2	2J18-10	WHT-ORG	Switch Row 3
2J14-13	YEL-ORG	Lamp Col 3	2J18-11	---	No Connection
2J14-14	YEL-BLK	Lamp Col 4	2J18-12	WHT-BRN	Switch Row 1
2J14-15	YEL-GRN	Lamp Col 5	2J19-9	WHT-GRY	Switch Row 8
2J14-16	YEL-BLU	Lamp Col 6	2J19-10	WHT-VIO	Switch Row 7
2J14-17	YEL-VIO	Lamp Col 7	2J19-11	WHT-BLU	Switch Row 6
2J14-18	YEL-GRY	Lamp Col 8	2J19-12	WHT-GRN	Switch Row 5
2J19-1	GRN-RED	Switch Col 2	2J19-13	WHT-YEL	Switch Row 4
2J19-2	GRN-ORG	Switch Col 3	2J19-14	WHT-ORG	Switch Row 3
2J19-3	GRN-VIO	Switch Col 4	2J19-15	WHT-RED	Switch Row 2
2J19-4	GRN-BLK	Switch Col 5	2J19-16	WHT-BRN	Switch Row 1
2J19-5	GRN-BLU	Switch Col 6	2J16-1	BLK-YEL	
2J19-6	GRN-VIO	Switch Col 7	2J16-2	Key Pin	No Connection
2J19-7	GRN-GRY	Switch Col 8	2J16-3	GRY-YEL	
2J19-8	---	No Connection			

AUDIO BOARD INTERBOARD SIGNALS

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

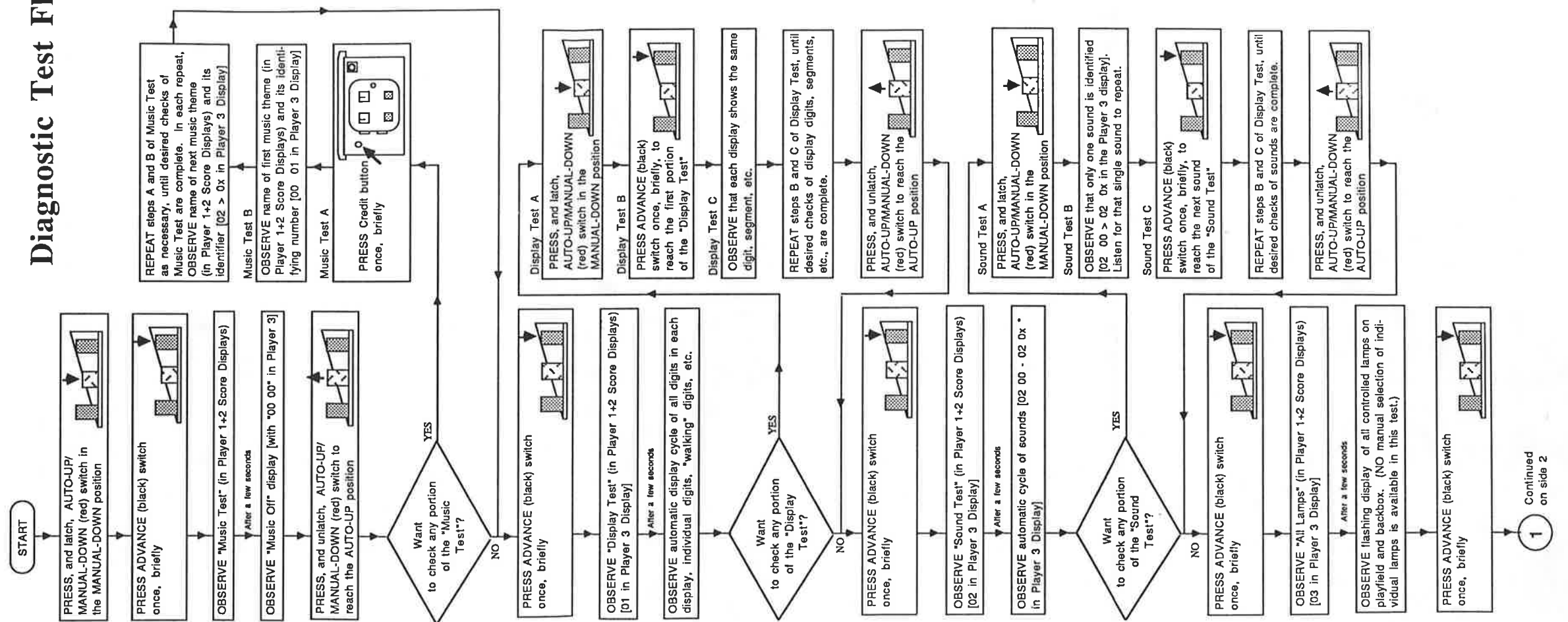
LEFT DISPLAY INTERBOARD SIGNALS

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

RIGHT DISPLAY INTERBOARD SIGNALS

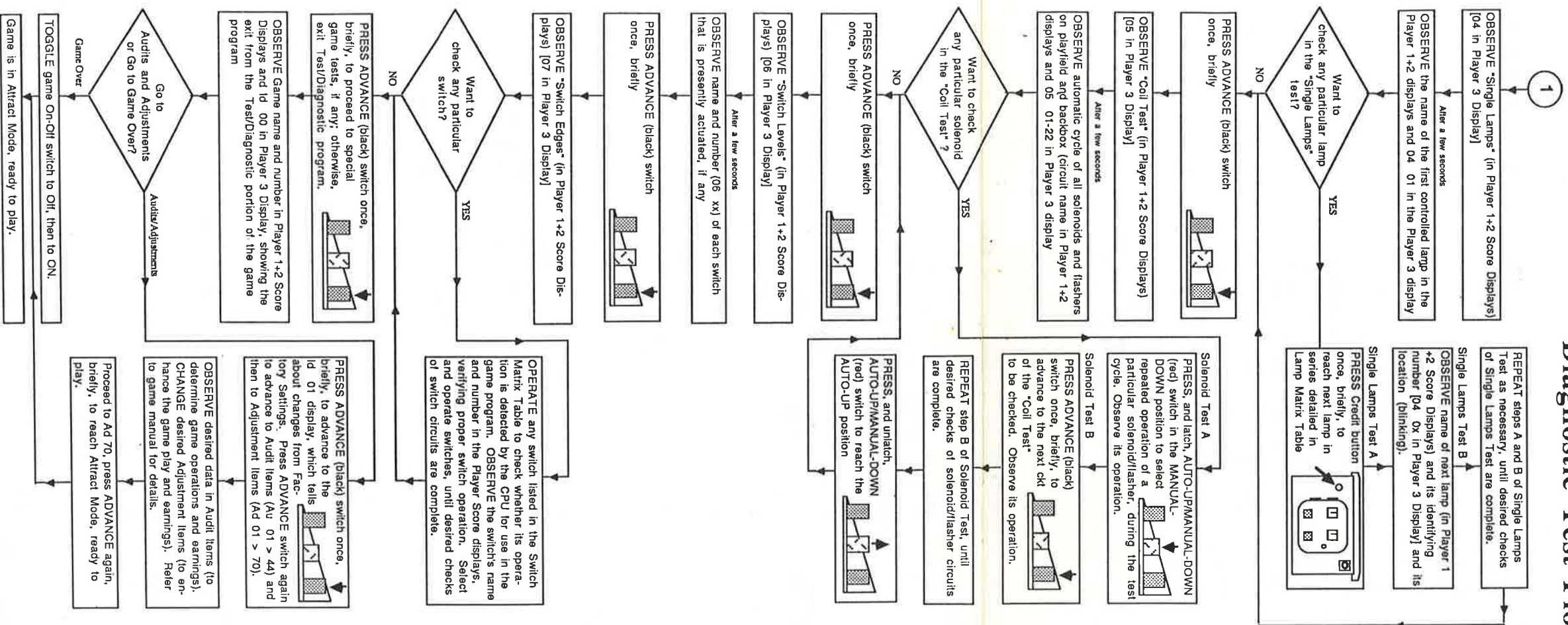
Connector	Wire Color	Signal Designation/Description	Connector	Wire Color	Signal Designation/Description
4J5-1	BLU-BRN	D1 / Display BCD / 1J3-1	4J5-6	Key Pin	No Connection
4J5-2	BLU-RED	C1 / Display BCD / 1J3-2	4J5-7	BLU-BLK	C2 / Display BCD / 1J3-7
4J5-3	BLU-ORG	B1 / Display BCD / 1J3-3	4J5-8	BLU-VIO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

Diagnostic Test Flowchart



Diagnostic Test Flowchart (Side 1)

Diagnostic Test Flowchart Side 2



Diagnostic Test Flowchart (Side 2)

Bugs Bunny's Birthday Ball

Switch-Matrix Table

Wht (row) → Grn (col)

COLUMN	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
ROW								
1	WHT-BRN 1J10-9 Plumb Bob Tilt 1		Standup (Skill) 17	L (in LOONEY) 25	N (in TUNES) 33	Tazz Ramp Entry 41	Top Sling 49	Lane Change (R Flipper) 57
2	WHT-RED 1J10-8	2	Outhole 10	Top Launch 18	O (in LOONEY) 26	E (in TUNES) 34	Tazz Ramp Score 42	Top Right 10 pt 50
3	WHT-ORN 1J10-7	Game Start 3	Ball Trough #1 (right) 11	Standup (by Dr Tgt) 19	O (in LOONEY) 27	S (in TUNES) 35		Left Outlane 51
4	WHT-YEL 1J10-6	Right Coin Chute 4	Ball Trough #2 (left) 12	Right (R 3-Bk Dr Tgt) 20	N (in LOONEY) 28	Top Lane Left 36	Top (Mini Left) 44	Left Jet Bumper 52
5	WHT-GRN 1J10-5	Center Coin Chute 5		Middle (R 3-Bk Dr Tgt) 21	E (in LOONEY) 29	Top Lane Middle 37	Bottom (Mini Left) 45	Right Jet Bumper 53
6	WHT-BLU 1J10-3	Left Coin Chute 6	Shooter Lane 14	Left (R 3-Bk Dr Tgt) 22	Y (in LOONEY) 30	Top Lane Right 38	Right Outlane 46	Lower Jet Bumper 54
7	WHT-VIO 1J10-2	Slam Tilt 7	L Ramp 15	Spinner 23	T (in TUNES) 31	Cptv Ball Top 39	L Return Lane 47	BL Kicker ("sling") 55
8	WHT-GRY 1J10-1	High Score Reset 8	Eject Hole 16	Standup (by "L") 24	U (in TUNES) 32	Cptv Ball Bottom 40	R Return Lane 48	BR Kicker ("sling") 56

BL = Bottom Left BR = Bottom Right

Bugs Bunny's Birthday Ball

Lamp-Matrix Table

Red → Yel (B+) ⊗ = Multiple Lamps

COLUMN	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
ROW								
Q80 1	RED-BRN 1J6-1 Shoot Again 1	Shopping Spree (50K) 9	Left (L Dr Tgt) 17	T (in TUNES) 25	N (in TUNES) 33	Candle 1 41	Candle 9 49	Backglass CAN.3 57
Q81 2	RED-BLK 1J6-2 Left Jet Bumper 2	Shopping Spree (100K) 10	Middle (L Dr Tgt) 18	U (in TUNES) 26	E (in TUNES) 34	Candle 2 42	Candle 10 50	Backglass CAN.4 58
Q82 3	RED-ORN 1J6-3 Right Jet Bumper 3	Shopping Spree (200K) 11	Right (L Dr Tgt) 19	N (in LOONEY) 27	Y (in LOONEY) 35	Candle 3 43	Candle 11 51	Backglass PLAYER1 59
Q83 4	RED-YEL 1J6-5 Bottom Jet Bumper 4	Shopping Spree (500K) 12	Left (R Dr Tgt) 20	E (in LOONEY) 28	PORKY PIG 36	Candle 4 44	Candle 12 52	Backglass PLAYER 2 60
Q84 5	RED-GRN 1J6-6 10K Skill Shot 5	Shopping Spree (Ex. Ball) 13	Middle (R Dr Tgt) 21	S (in TUNES) 29	Left Outlane 37	Candle 5 45	Left Top 53	Backglass PLAYER 3 61
Q85 6	RED-BLU 1J6-7 50K Skill Shot 6	Top Lane Left 14	Right (R Dr Tgt) 22	L (in LOONEY) 30	Middle Outlane 38	Candle 6 46	Left Bottom 54	Backglass PLAYER 4 62
Q86 7	RED-VIO 1J6-8 100K Skill Shot 7	Top Lane Middle 15	Spinner 23	O (in LOONEY) 31	L Return Lane 39	Candle 7 47	Backglass CAN.1 55	Captive Ball 63
Q87 8	RED-GRY 1J6-9 500K Skill Shot 8	Top Lane Right 16	Kick Back 24	O (in LOONEY) 32	R Return Lane 40	Candle 8 48	Backglass CAN.2 56	Cake 64

WARNINGS & NOTICES

WARNING

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

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

SUBSTITUTE PARTS OR MODIFICATIONS may void FCC Type Acceptance.

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

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

WARNING

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

WARNING

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

WARNING

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

WARNING

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

RF-INTERFERENCE NOTICE

YOUR GAME'S CABLE-HARNES

PLACEMENT and ground-strap routing are very important. They are designed to keep RF radiation and conduction within levels accepted by FCC Regulations.

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

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