16-2016-101
August 1990

Bally

DR. DUDE

AND HIS

EXCELLENT RAY

Rx

DR.Dude's Operations Manual

MIDWAY MANUFACTURING COMPANY
3401 N. California Avenue
Chicago, IL 60618

- [x] Game Operation & Adjustments
- [x] Game Testing & Problem Diagnosis
- [x] Parts Information
- [x] Reference Diagrams & Schematics
- [x] Refills

Dr. Dude 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,
Dr. Dude	5400-09150-00	A-5343-2016-2	A-5343-2016-1	Not Used	Not Used	Not Used	W1, 2, 4, 5, 7, 11, 14, 16,

DR. DUDE Solenoid Table Switch Tests (06 & 07)

Sol. No.	Function	Solenoid Type	Wire Color [1]	Connections: CPU Bd	Connections: Playfield/ Cabinet	Driver Trnstr	Solenoid Part Number Flashlamp Type g= B'glass; p=Pl'field
01A[3]	Outhole Kicker	Switched	Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800
01C[3]	Mixer Heart	Switched	Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#89/906 flashlamps 2p
02A[3]	Trough	Switched	Vio-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	SM-1-26-600
02C[3]	Mixer Gab	Switched	Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89/906 flashlamps 2p
03A[3]	Top Left Popper	Switched	Vio-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200
03C[3]	Mixer Magnet	Switched	Blk-Orn	(Gry-Orn)	5J5-7(C)	Q32	#89/906 flashlamps 2p
04A[3]	Middle Right Popper	Switched	Vio- Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800
04C[3]	Magnetic	Switched	Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89/906 flashlamps 1p
05A[3]		Switched	Vio-Grn	1P11-6	5J1-4: 5J4-5 (A)	Q31	
05C[3]	Gab	Switched	Blk-Grn	(Gry-Grn)	5J5-4 (C)	Q31	#89/906 flashlamps 1p
06A[3]	Knocker	Switched	Vio-Blu	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800
06C[3]	Heart	Switched	Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89/906 flashlamps 1p
07A[3]	Right Drop Target	Switched	Vio-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800
07C[3]	Drop Targets	Switched	Blk-Vio	(Gry-Vio)	5J5-2 (C)	Q30	#89 flashlamps 1p
08A[3]		Switched	Vio-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22	
08C[3]	Raygun	Switched	Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89 flashlamps 1p
9		Controlled	Brn-Blk				
10	Playfield G.I.	Controlled	Brn-Red	1P12-2	5J2-8:5J6-8:2J4-11	Q9	5580-09555-01[4a]
11	Middle Insert	Controlled	Brn-Blu	1P12-7	5J2-3:5J6-3:2J4-14	Q7	#906 1g
12	A/C Select	Controlled	Brn-Yel	1P12-5	5J2-5	Q8	5580-09555-01[5]
13	Magnet	Controlled	Brn-Grn	1P12-6	5J2-4:5J6-5:2J4-13	Q15	AE-26-1200
14	Big Shot	Controlled	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79	AE-23-800
15	Big Shot F.L.	Controlled	Brn-Vio	1P12-8	2J4-15: 2J11-2	Q14	#89 flashlamp 1p
16	Motor	Controlled	Brn-Gry	1P12-9	2J4-16: 2J11-1	Q6	
17	Left Jumper 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 Jumper 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	Bottom Jumper Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800
22							
-	Right Flipper	-	Orn-Vio (Blu-Vio)[2]	1P19-1	2J5-5: 2J10-7 (2J10-1: 2J8-15)	-	FL11630/50VDC
-	Left Flipper	-	Orn-Gry (Blu-Gry)[2]	1P19-2	2J5-4: 2J10-8 (2J10-2:2J8-14)	-	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.

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NEW FEATURES FOR DR. DUDE

Factory settings now allows the REPLAY SCORE(S) (Ad 06) to lite the SPECIAL lamp instead of just awarding a free game. Now the player can really earn a free game (or whatever the SPECIAL is set to award).

Factory settings uses the REPLAY BOOSTER (Ad 31), which temporarily increases the REPLAY SCORE when a free game is won after the replay score is reached. Another first for Williams Electronics.

CONTEST GAME (Ad 32), can allow all 1 player games to be identical. Now operators can have promotional contests, to promote their location.

GRAND CHAMPION HIGH SCORE TO DATE, an all time "highest score to date" that is not erased until the operator decides to erase it.

And a basic game theme, "hit the blinking lamp(s)".

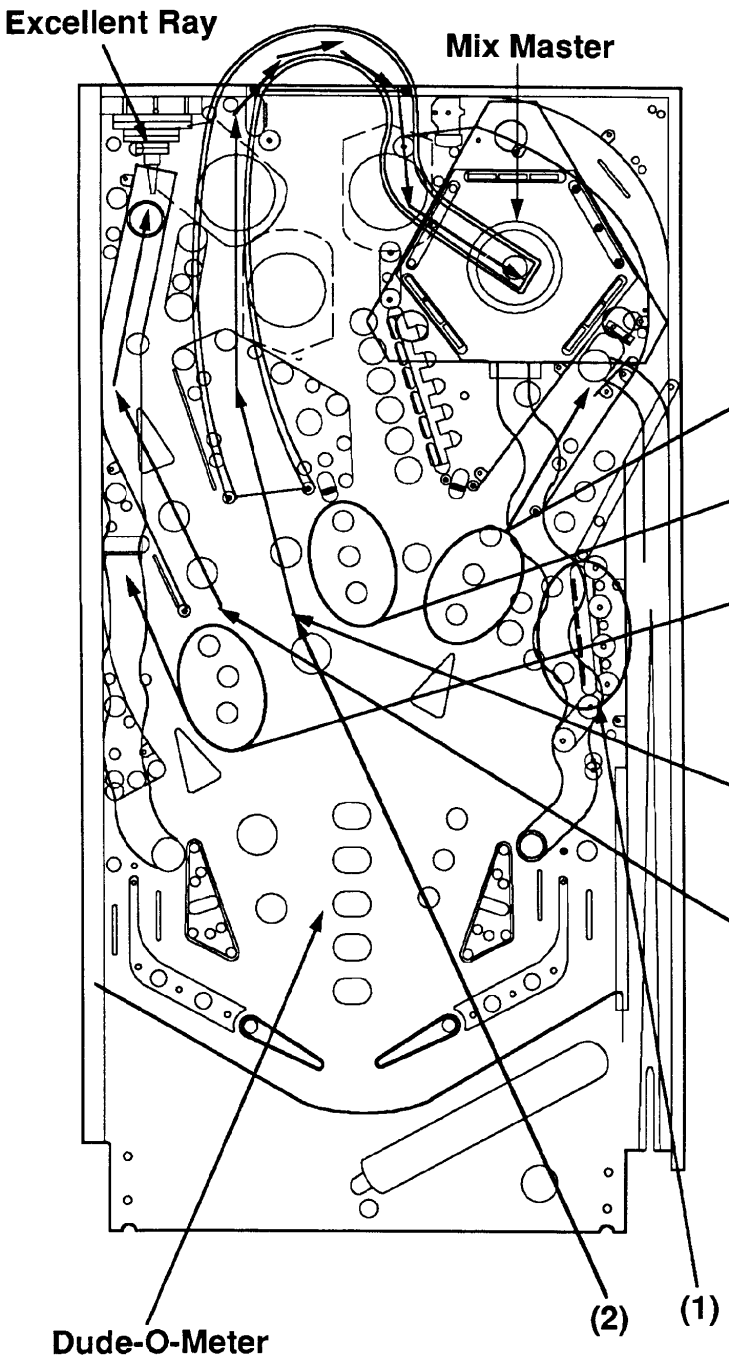
NOTICE

When all the adjustable legs are at equal length, the playfield of your Dr. Dude game is at approximately a 6 1/2 degree incline. We do NOT recommend raising up the rear legs and lowering the front legs to their extreme positions. We feel this game plays best at 6 1/2 degrees.

DR. DUDE

PLAYFIELD SHOTS

DR. DUDE
PLAYFIELD SHOTS



Making JACKPOT & GAZILLION SHOTS: Part 1

A. Collect each ingredient three times (game adjustable) in any order.

B. The ingredients are:

The Gift of Gab

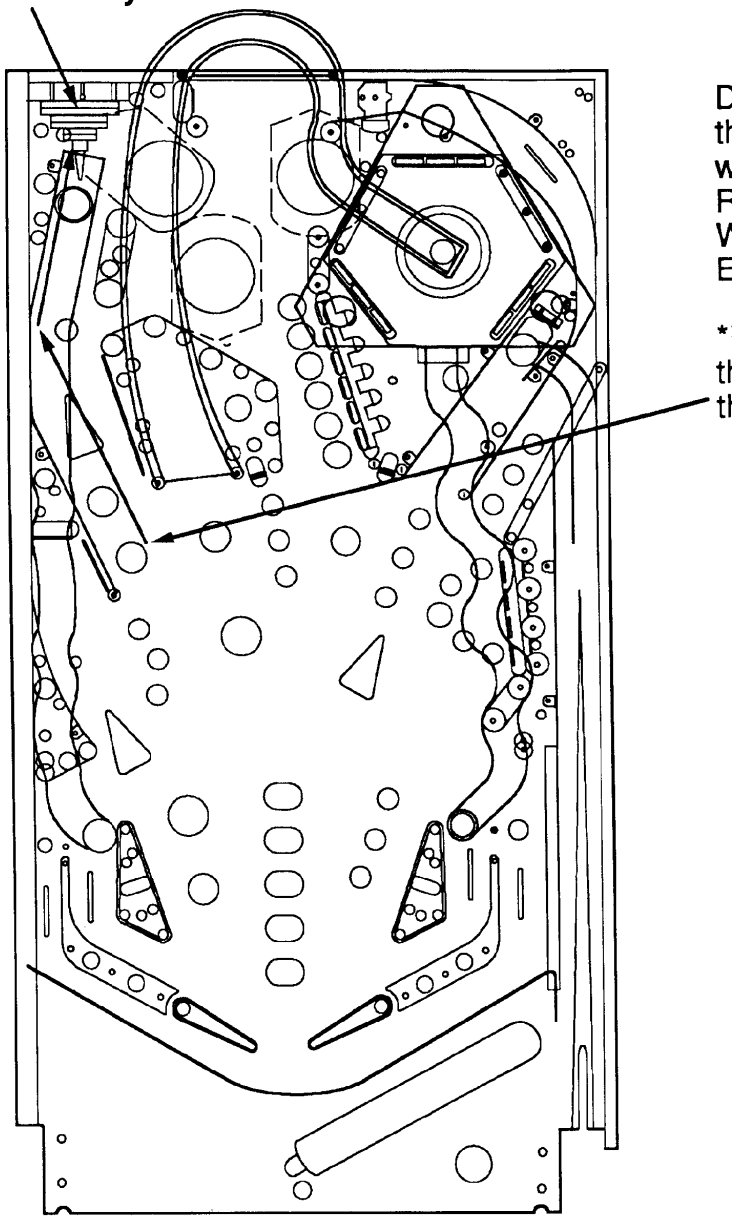
The Heart of Rock'N Roll

The Magnetic Personality

C. At this point Mix up the ingredients by going into the "The Molecular Mix Master".

D. Now, by DR. DUDES patented invention, enter the lit "Excellent Ray" To Become A DUDE! This starts Multiball, advances the "Dude-O-Meter", and if you are a "Super Dude" you can shoot for the Mix Master to collect the Gazillion score (1/2 million per target). Other Dudes get a chance to collect the Jackpot Shot (2) and can even double the Jackpot by lighting (1) then (2).

DR. DUDE
PLAYFIELD SHOTS

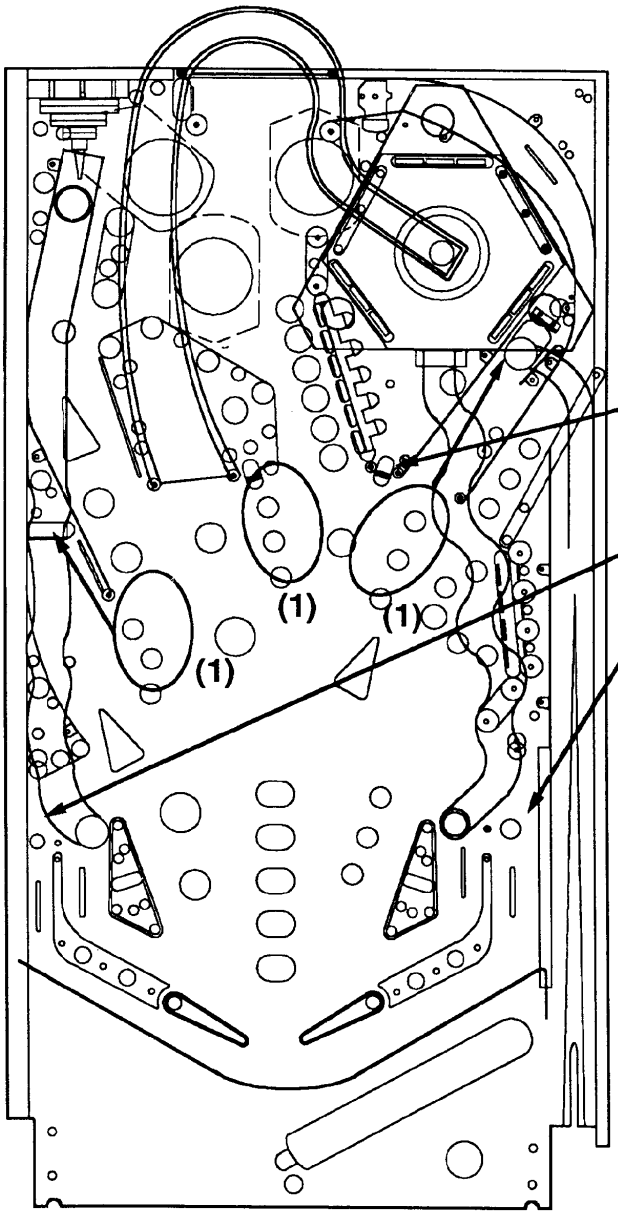


Lighting the SPECIAL SHOT:

DR. DUDE has a new feature that will Lite the Special lamp when the Replay Score is Reached* (game adjustable). When it is Lit, shoot into the Excellent Ray to collect it.

*If this option is not Selected the "Bag of Tricks" will award the Special.

DR. DUDE
PLAYFIELD SHOTS



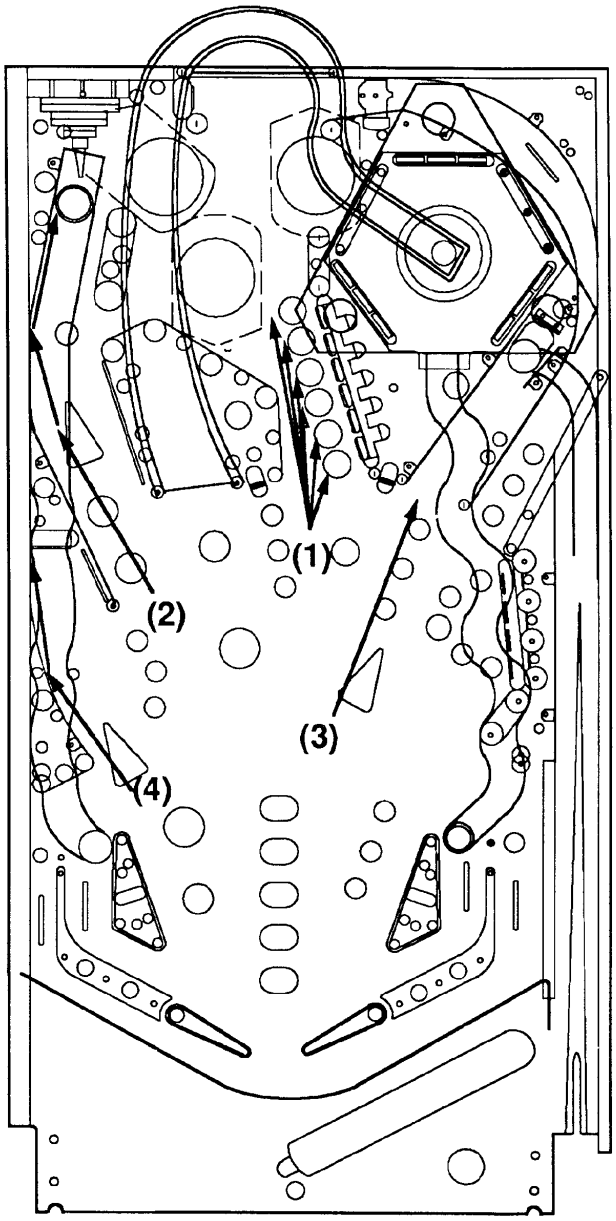
THE BIG SHOT & THE BIG SCORE:

(1) Complete any ingredient to lite The Big Shot. Note, the game stacks the number of lites up to 255.

Next hit The Big Shot for score (20K, 40K, 60K, 80K, 100K) and to watch him "wiggle".

When players "drain" they receive a Big Score (200K to 1 Million).

DR. DUDE
PLAYFIELD SHOTS



REFLEX 1-2-3

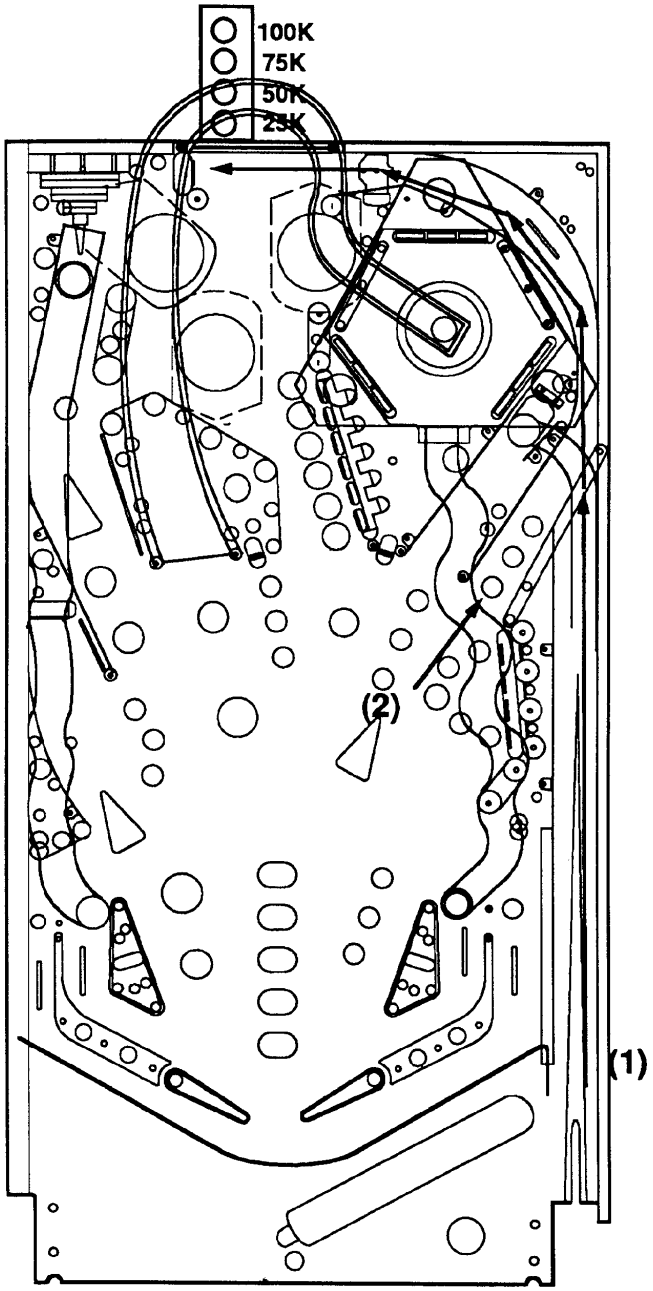
(1) Hit each of the letters : R.E. F. L. E. X. to lite Reflex 1.

(2) Next start the Reflex Test by shooting for Reflex 1.

(3) Hit Reflex 2 before it "times down".

(4) Lastly, hit Reflex 3 before it "times down" to get 1 to 2 Million points (depending on how many times R.E.F.L.E.X. was spelled.

DR. DUDE
PLAYFIELD SHOTS



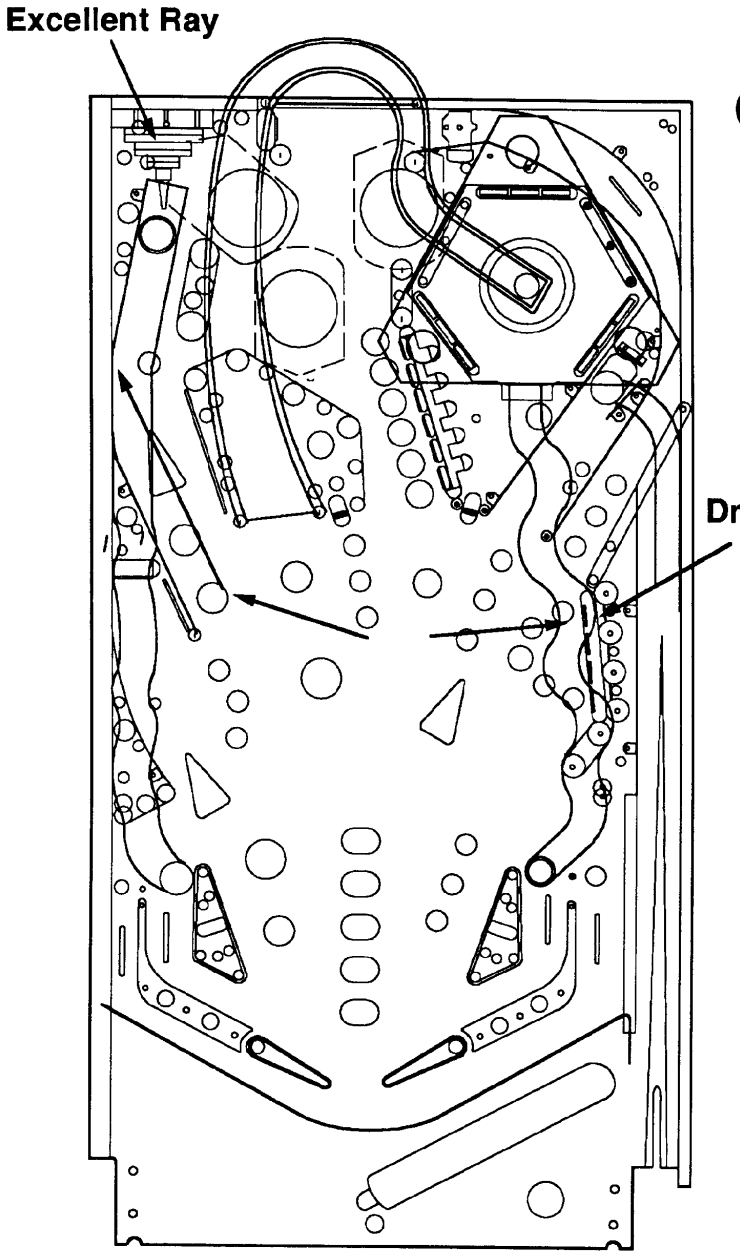
"I TEST" (ENTRY SHOT)

(1) From the shooter lane hit "I Test" target when cycling lamp reaches desired score.

Note, 75K score temporarily makes the Jumper Bumpers worth 2.5K per hit.

(2) During the game players can get re-tested at any time. This shot also increases the Jumper Bumper score (500, 1K, 2.5K & 5K)

DR. DUDE
PLAYFIELD SHOTS

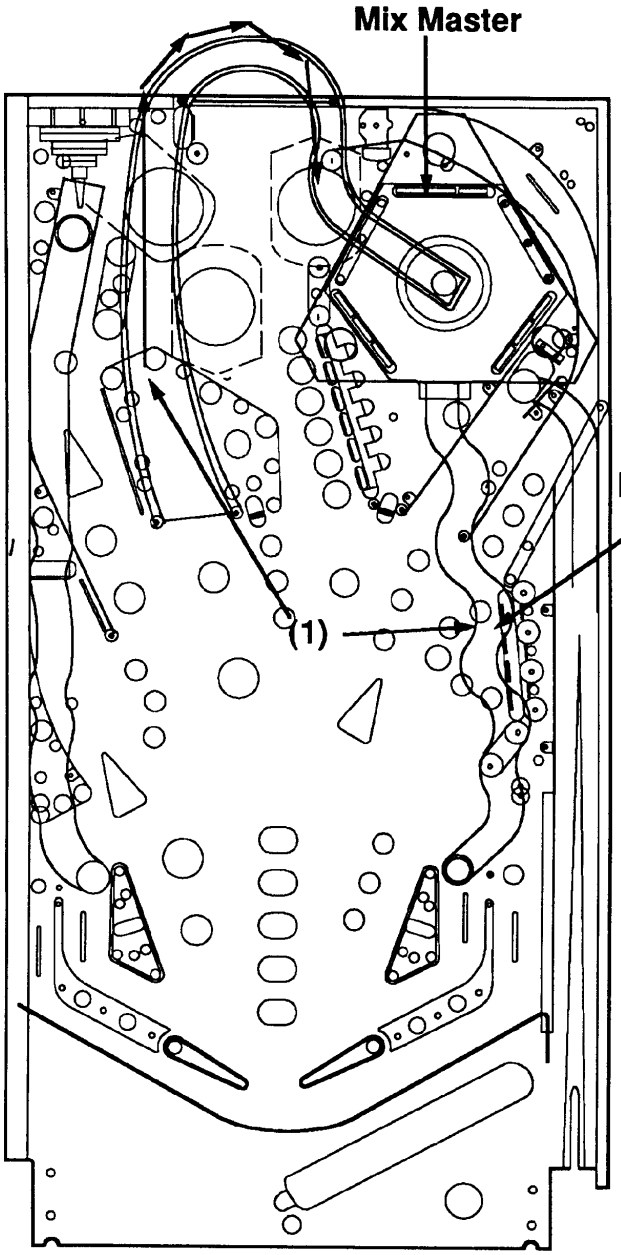


EXTRA BALLS

(1) Complete the drop targets (programmable # of times) then shoot for the Excellent Ray.

Extra Balls can also be awarded (possibly) by lighting the "Bag of Tricks" upon completing the drop target.

DR. DUDE
PLAYFIELD SHOTS



MILLION SHOT

(1) Complete the drop targets (programmable # of times) then go up the ramp (Mix Master).

Note, the Million Shot is worth 2 Million after Multiball.

SECTION 1

Game Operation

and

Test Information

DR. DUDE ROM SUMMARY

IC	DESCRIPTION	TYPE	IDENTIFIER	BOARD	PART NUMBER
Game ROM 1	32K x 8 ROM	27256	U27	CPU	A-5343-2016-2
Game ROM 2	32K x 8 ROM	27256	U26	CPU	A-5343-2016-1
Music/Speech ROM	64K x 8 ROM	27512	U4	AUDIO	A-5343-2016-3
Music/Speech ROM	64K x 8 ROM	27512	U19	AUDIO	A-5343-2016-4
Music/Speech ROM	64K x 8 ROM	27512	U20	AUDIO	A-5343-2016-5

Connector Identification

Since *DR. DUDE* is using WILLIAMS ELECTRONICS GAMES System 11C, a new connector identification technique must be introduced. Each plug or jack receives a prefix number (which identifies the circuit board), followed by a letter ("J" or "P"), and a number. J-designations refer to the male part of a connector. P-designations refer to the female part of a connector. For example, 1J1 designates jack 1 of board 3 (a CPU Board jack); 3P6 designates plug 6 of board 3 (a Power Supply Board plug). Identifying the specific pin number of a connector involves a hyphen, which separates the pin number from the plug or jack designation. For example, 1J1-3 refers to pin 3 of jack 1 on board 1.

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

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

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

Circuit Boards

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

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

CPU BOARD

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

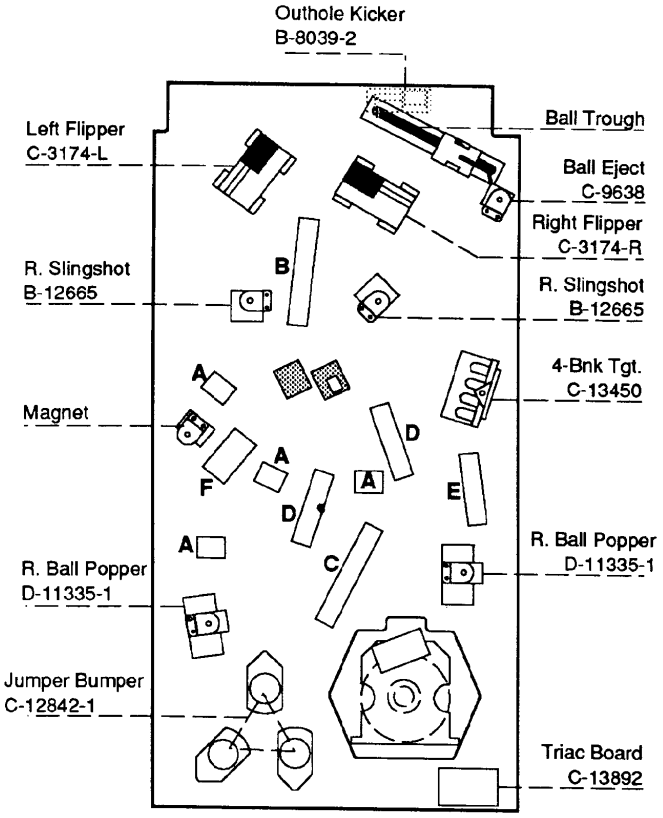
SOUND BOARD

The Sound Board is p/n D-11581-2016, including ROMs and microprocessor.

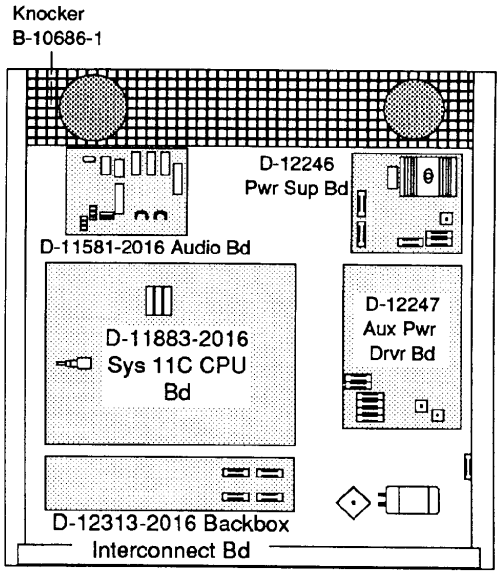
DISPLAY BOARD

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

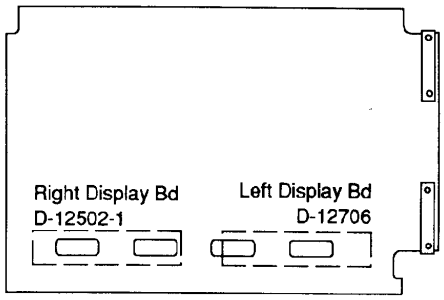
Location Diagram - Major Mechanism & Game Circuit Board



Under Side of Playfield, Viewed in Raised Position



Backbox



Insert Board, Inner Side View

Lamp Boards:

A.	Single Lamp Board	B-12224
B.	Dude Lamp	C-13852
C.	Reflex Lamp	C-13854
D.	3-Lamp Playfield	C-13855
E.	Jumper Lamp	C-13911
F.	Magnetic Lamp	C-13853

Game Control Locations

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

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

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

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

GAME ADJUSTMENT/DIAGNOSTIC SWITCHES. *DR. DUDE* allows the operator to control all game adjustments, obtain bookkeeping information, and diagnose problems, using only three switches mounted on the inside of the coin door, along with the Start button beside the coin door.

ADVANCE, AUTO-UP/MANUAL-DOWN, and HIGH-SCORE RESET are the switches located on the inside of the coin door. Refer to the text discussing Game Status Displays and the Test/Diagnostic Procedures for details concerning button operation.

THE MEMORY PROTECT SWITCH is on the inside frame of the coin door. This interlock switch must be open to clear bookkeeping totals and to make game adjustments. It automatically opens, when the coin door opens.

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

THE CPU DIAGNOSTIC SWITCH (SW 2) is mounted on the left edge of the CPU Board near a large, socketed microprocessor chip. This switch initiates the Memory Chip Test explained in the Test/Diagnostic Procedures.

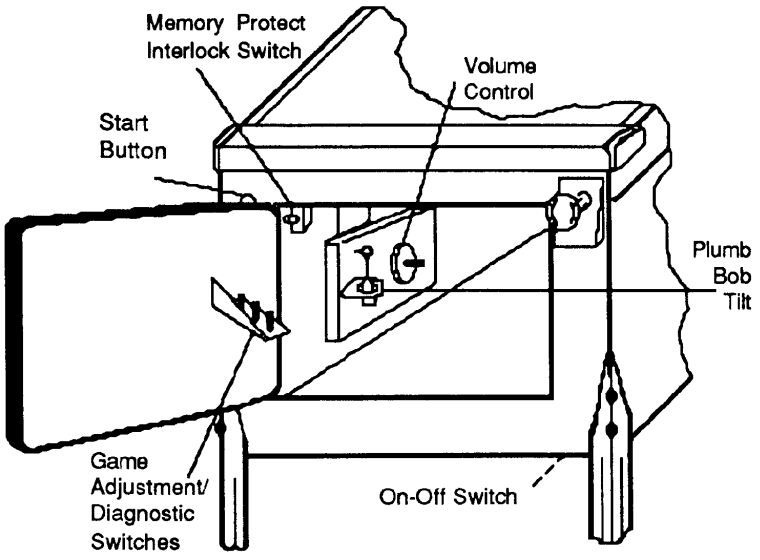


Figure 2. Control Locations

Pinball Game Assembly Instructions

INSTALLATION PROCEDURE

1. Open the shipping container; remove all cartons, parts, and other items, and set them aside.

2. Leg levelers and bolts are provided in the cashbox. Place cabinet on a support and attach rear legs (after installing leg levellers), using leg bolts.

3. Attach the front legs (after installing leg levellers), using leg bolts. See Figure 3 for details.

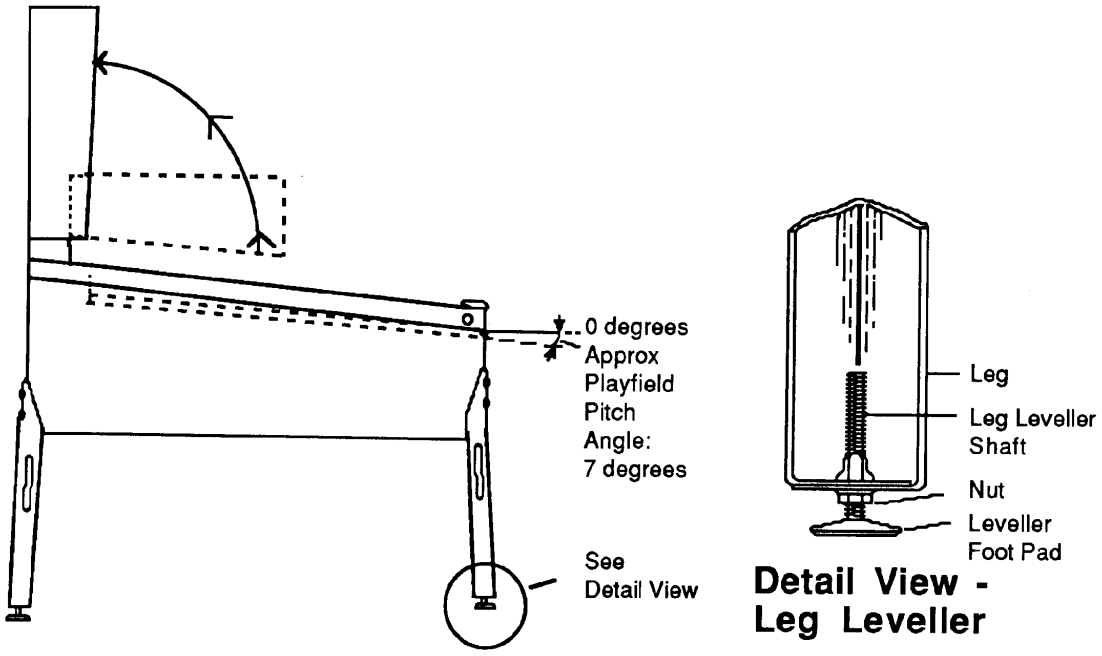


Figure 3. Pinball Assembly, Playfield Pitch Angle, and Leg Leveler Details.

CAUTION

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

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

WARNING

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

5. Extend each leg leveller slightly below the leg bottom, so that all four foot pads are extended about the same distance. Remove the cabinet from its support and place it on the floor.

6. Adjust the leg levellers for proper playfield level (side-to-side) and playfield pitch angle (incline) of approximately 6 1/2 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. *DR. DUDE* uses two balls. The third ball is a spare.

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 (apx. 30 games). However, the game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep *DR. DUDE* 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";
("DR. DUDE, THE DOCTOR IS IN...")*;
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.

CREDIT POSTING

Insert coin(s). A sound is heard for each coin, and the player score displays show the number of credits purchased. So long as the number of maximum allowable credits* are NOT exceeded by coin purchase or high score, credits are posted correctly.

STARTING A GAME

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

SLAM TILT

Actuating the Slam Tilt switch on the coin door inside the cabinet ends the current game; *DR. DUDE* then proceeds to the Game Over Mode.

PLUMB BOB TILT

The third closure* of the Plumb Bob Tilt switch results in the player losing the remaining play of that ball, but can complete the game.

END OF GAME

All earned scores and bonuses are awarded. If a player's final score exceeds the specified value, the player receives a designated award for achieving the current highest score. A random digit set* appears in the Match display. Credit* may be awarded, when the last two digits of any player's score display (1 through 4) match the random digits of the Match display. Match, high score, and game over sounds are made, as appropriate.

GAME OVER MODE

The GAME OVER display shows in the player score displays. Then, the high scores flash on the appropriate player score displays. The game proceeds to the Attract Mode.

* - operator-adjustable feature

Game Status Displays

INTRODUCTION

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

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

Each of the two-letter abbreviations for these classes appears in the score display, while the system microprocessor for the *DR. DUDE* game is displaying the items within each class.

IDENTIFICATION INFORMATION--Id

With the game turned on, the coin door open, and the AUTO-UP/MANUAL-DOWN switch in the AUTO-UP position, the operator can press the ADVANCE switch once, briefly. Player displays immediately change from the Attract Mode to the Game Status Display Mode. This is evident by the following display, shown in columnar form. The column headings refer to the various backbox displays.

Player/Player 1	2	Player/Player 3	4
DR. DUDE		2016 LA-x*	Id00

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

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

Player/Player 1	2	Player/Player 3	4
DOMESTIC	LEVEL 1	7-23-90	Id01

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

Pressing ADVANCE once more causes the Id 02 display to appear. This display describes which of the "Install" options is currently in effect. For example, if the YES option of the INSTALL FACTORY Adjustment Item (Ad 68) was last selected, FACTORY SETTING appears on the player score displays. Changing the setting of any other game adjustment item, after selecting the YES option for Ad 68 causes the display to change to FACTORY ALTERED. Similarly, if the operator selects the YES option for INSTALL HARD (Ad 65), the display indicates HARD SETTING. Changing a game adjustment item later then causes the display to show HARD ALTERED.

AUDIT INFORMATION - Au

While the AUTO-UP switch remains in the Up position, the operator can press the ADVANCE switch once, briefly, to begin the backbox displays of Audit (sometimes called "bookkeeping") Information. Fifty-three audit entries are now available. Calculation of the various factors is no longer necessary because the System 11C game program now performs all the mathematical factor computations. This information is intended to aid the owner/operator in evaluating how the game is performing in each location, by providing knowledge about which game features are receiving the most play. With this information, the owner/operator can determine whether adjusting the game features to other settings will contribute to increased game earnings.

The operator can press the ADVANCE button once to view each Audit Information display item. To proceed more rapidly through this information, the operator only has to press and hold the ADVANCE button. If a desired item is passed, the operator can use the MANUAL-DOWN switch position with the ADVANCE button to back up to the desired item.

The *DR. DUDE* Audit Table lists the 54 items of the Audit Information portion of the *DR. DUDE* 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 54 audit items, so its entry is omitted from the tabular listing. Detection of erroneous data affecting any of the counters used in these audit items causes the message, ERROR, to be displayed in the Player 3 display, during display of any audit item associated with that particular counter. (The program does not analyze the cause of the error; it merely alerts the operator of the error's existence by the message.)

ADJUSTMENT INFORMATION - Ad

At end of the Audit Information presentation, with the AUTO-UP switch in the Up position, the operator can press the ADVANCE button to proceed to the Adjustment Information portion of the *DR. DUDE* Game Status Displays, as listed in the *DR. DUDE* 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 *DR. DUDE* Game Adjustment Table lists the 70 items of the Adjustment Information portion of the *DR. DUDE* Game Status Displays. Presentation of the displays is similar to that for the Audit Information (that is, the player 1 and 2 displays combine as a descriptive phrase; the light type below the column headings names the respective backbox displays where the information appears, etc.). The

DR. DUDE Audit Table

Audit Item (Lower)	Descriptive Phrase (Upper Display)	Audit Item Value [1] (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	MILLION AWARDS (# of 1 mill. shot awards	
30	JACKPOT AWARDS (# of jackpot awards)	
31	GAZILLION HITS (# of 1/2 millions scored by GAZILLION)	
32	SUPER DUDES (# of Multiballs as super dudes)	
33	MULTIBALLS (# of Multiballs)	
34	EX. RAY ACTIVATED (# of times Excellent Ray was activated)	
35	MIXERS ON LINE (# of times Mix Master was put "on line")	
36	R. DROP LITE EX. BALLS (# of times R. drop tgt. lit extra ball)	
37	R. DROP EX. BALLS (# of times ex. ball awarded via R. drop tgt.)	
38	CONSOL. EX. BALLS (# of times Consol. extra ball awarded)	
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 times left drain switch was activated)	
53	RIGHT DRAINS (# of times right drain switch was activated)	
54	MINUTES ON (# of minutes game has been powered on)	

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.

DR. DUDE 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 (%) SCORES		
02	REPLAY START (or REPLAY LEVEL 1) [1]	5,000,000	5,000,000	7,000,000
03	REPLAY LEVELS (or REPLAY LEVEL 2) [1]	01 (or OFF)		02
04	(REPLAY LEVEL 3) [1]	(see text)		
05	(REPLAY LEVEL 4) [1]	(see text)		
06	REPLAY AWARD	Lite Spec.		
07	SPECIAL AWARD	Credit		
08	MATCH FEATURE	10%	10%	10%
09	BALLS / GAME	03		
10	TILT WARNING	03	01	
11	EX. BALL / GAME	03	01	
12	MAXIMUM CREDITS	10	20	30
13	HIGHEST SCORES	On		
14	BACKUP HI. SCR.1	6,000,000		8.500.000
15	BACKUP HI. SCR. 2	5,500,000		8.000.000
16	BACKUP HI. SCR. 3	5,000,000		7.500.000
17	BACKUP HI. SCR. 4	4,500,000		7.000.000
18	HI. SCR.1 CREDITS	01	02	01
19	HI. SCR.2 CREDITS	01	01	00
20	HI. SCR.3 CREDITS	01	01	00
21	HI. SCR.4 CREDITS	01	01	00
22	H. S. RESET EVERY	3,000		1000
23	FREE PLAY	NO		
24	U.S.A. 2 COINAGE (4 COINS 3 PLAYS) [2,3,4]	USA 2	French 1	German 2
25	LEFT UNITS	03	02	06
26	CENTER UNITS	12	10	12
27	RIGHT UNITS	03	20	30
28	UNITS/ CREDIT	04	05	05
29	UNITS/ BONUS	00	20	00
30	MINIMUM UNITS	00	00	00
31 - 58	Game-specific Play / Coinage Adjustments (detailed in text, the Game- specific Adjustments Setting Table, and the Difficulty Setting Comparison Table)			
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.

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

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

DR. DUDE

Game Specific Difficulty Setting Table for US / Canadian / French Games

Adj #	Adj Description	Extra Easy Ad 62	Easy Ad 63	Medium (Factory) Ad 64	Hard Ad 65	Extra Hard Ad 66
34	Jumper Bumper Memory	Yes	Yes	No	No	No
35	Right Drop Memory	Yes	Yes	Yes	Yes	Yes
36	Spot Ingredient	8 Hits	10 Hits	10 Hits	10 Hits	20 Hits
37	Prelite Magnet	2 Lamps	1 Lamp	1 Lamp	No	No
38	Prelite Heart	1 Lamp	1 Lamp	1 Lamp	No	No
39	Prelite Gab	2 Lamps	1 Lamp	1 Lamp	No	No
40	Award Jackpot # Hits	5 Hits	8 Hits	10 Hits	15 Hits	20 Hits
41	Bag Of Tricks	Ex. Easy	Easy	Medium	Hard	Ex. Hard
42	Drop Lite Extra Ball	2 Hits	2 Hits	2 Hits	3 Hits	4 Hits
43	Drop Lite Million	1 Hit	1 Hit	1 Hit	2 Hits	3 Hits

Game Specific Difficulty Setting Table for German/European Games

Adj #	Adj Description	Extra Easy Ad 62	Easy Ad 63	Medium (Factory) Ad 64	Hard Ad 65	Extra Hard Ad 66
34	Jumper Bumper Memory	Yes	No	No	No	No
35	Right Drop Memory	Yes	Yes	Yes	Yes	Yes
36	Spot Ingredient	8 Hits	10 Hits	10 Hits	15 Hits	20 Hits
37	Prelite Magnet	2 Lamps	1 Lamp	No	No	No
38	Prelite Heart	1 Lamp	No	No	No	No
39	Prelite Gab	2 Lamps	1 Lamp	No	No	No
40	Award Jackpot # Hits	5 Hits	10 Hits	15 Hits	20 Hits	25 Hits
41	Bag Of Tricks	Ex. Easy	Easy	Medium	Hard	Ex. Hard
42	Drop Lite Extra Ball	2 Hits	3 Hits	3 Hits	4 Hits	5 Hits
43	Drop Lite Million	1 Hit	1 Hit	2 Hits	3 Hits	4 Hits

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 *DR. DUDE* 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 3 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 4 display, increase the setting value (or select another option) shown in the Player 3 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 70, 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 4 display. From item 70, you can: (A) return to the Game-Over Mode; or (B) clear the coinage audits (Au 01 through 04). Perform either of the following, as desired:

A. To reach Game-Over Mode, use AUTO-UP and press ADVANCE once. *DR. DUDE* now goes to the Game-Over Mode.

B. To clear the coinage audits (Au 01 through 04) select (via the Start button) the YES option, as shown in the player 3/4 display. This adjustment zeroes the counters tallying the number of coins through each slot, the Paid Credits counter, and the Credits display.

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). *DR. DUDE* 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 1,000,000 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, *DR. DUDE* 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. *DR. DUDE* 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. *DR. DUDE* 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).
Spec Lit- LITES the SPECIAL lamp when the replay score is reached or exceeded. The player must now shoot for the SPECIAL to be awarded the SPECIAL AWARD (Ad 07) this also disables the "Bag Of Tricks" award of a special. (Ad 44)

▲ 07 Special Award

The operator can select (via the Start button) the form of the award automatically provided when the player scores a Special. The choices are:

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

▲ 08 Match Award

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

1%-50% - 1% is 'hard'; 50% is 'extremely easy'. During Match action, the game selects a random two-digit number at end of game and compares each player's score for an identical two digits in the rightmost two positions. A matching of the two digits results in the award of a credit.
Off - The MATCH display does not operate at completion of the game; no award is given.

▲ 09 Balls/Game

The operator can define a "game" by specifying the number of balls to be played. The range of this setting is 1 through 9.

▲ 10 Tilt Warning

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

▲ 11 Maximum Extra Ball

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

00 - NO extra ball play: displays a message, NO EX. BALL
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 Adjustments 14 to 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.

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 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.

DR. DUDE
Game Specific Factory Defaults

Adj #	Adj Description	US	French	German/European
31	Replay Booster	1 Million	1 Million	1 Million
32	Contest Game	No	No	No
33	Speech Usage	Normal	Normal	Normal
44	Specials Per Game	Disabled	Disabled	Disabled
45	Extra Balls Per Game	25%	25%	25%
46	Attract Mode Sounds	Off	Off	Off
47	Consolation Ball Time	45 Seconds	45 Seconds	45 Seconds
48	Normal/Dim/Dimmest Flsh.	Normal	Normal	Normal
51	Grand H. S. T. D.	On	On	On
52	Grand Credits	2	3	3

▲ 31 REPLAY BOOSTER

The operator can choose (via the Start button) If the REPLAY SCORE can be temporarily boosted by 1 million EACH time the player reaches or exceeds the replay score. This temporary boost is cancelled when CREDITS = 0, pressing the ADVANCE button or when a player inserts another coin. The range of settings is YES (to use the replay booster, conservative) or NO (do not temporarily boost the replay score, Liberal).

▲ 32 CONTEST GAME

The operator can choose (via the Start button) to make all one player games identical. This would be ideal for promotional contests. It has the effect of:

1) turning off AUTO REPLAY logic
2) turning off the REPLAY BOOSTER
3) keeping JACKPOT at maximum score
4) turning off CONSOLATION BALL TIME
5) lighting GAZILLION after the second multiball.

The choices are; NO (this is a normal game for profit) or YES (this is a game being used in a contest).

▲ 33 SPEECH USAGE

The operator can choose (via the Start button) whether the speech should contain colorful phrases during game play. For Dr. Dude, this controls the taunts of the Big Shot. The choices are:

NORMAL - Colorful speech is allowed.
FAMILY - Colorful speech is NOT allowed.

▲ 34 JUMPER BUMPER MEMORY

The operator can choose (via the Start button) whether the Jumper Bumper lamps are stored in memory for the "next ball" or reset for each ball. THIS EFFECTS SCORE. The choices are:

YES - (Liberal) The lamps are remembered from ball to ball.
NO - (Conservative) The lamps are reset at ball start.

▲ 35 RIGHT DROP MEMORY

The operator can choose (via the Start button) whether the shots made to "LITE MILLION" and "LITE EXTRA BALL" are stored in memory for the "next ball" or reset for each ball. This effects Extra Ball and 1 Million shot. The choices are:

YES - (Liberal) The lamps are remembered from ball to ball.
NO - (Conservative) The lamps are reset at ball start.

▲ 36 OUTLANE MEMORY

The operator can choose (via the Start button) whether the left and right outlane lamps (for DR. DUDE, the "BIG SCORE") lamps are stored in memory for the "next ball" or reset for each ball. The choices are:

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

▲ 37 PRELITE MAGNET

The operator can choose (via the Start button) how many lamps are lit at game start for the "Magnetic Personality". This effects how easy it is to get multiball (Jackpot and Gazillion). The choices are:

NO - (Conservative) The lamps start all OFF.
1 LAMP - One lamp is lit at game start.
2 LAMPS - (Liberal) Two lamps are lit at game start.

▲ 38 PRELITE HEART

The operator can choose (via the Start button) how many lamps are lit at game start for the "Heart of Rock' N Roll". This effects how easy it is to get multiball (Jackpot and Gazillions). The choices are:

NO - (Conservative) The lamps start all OFF.
1 LAMP - One lamp is lit at game start.
2 LAMPS - (Liberal) Two lamps are lit at game start.

▲ 39 PRELITE GAB

The operator can choose (via the Start button) how many lamps are lit at game start for the "Gift of Gab". This effects how easy it is to get multiball (Jackpot and Gazillions). The choices are:

NO - (Conservative) The lamps start all OFF.
1 LAMP - One lamp is lit at game start.
2 LAMPS - (Liberal) Two lamps are lit at game start.

▲ 40 AWARD JACKPOT - (NUMBER OF HITS)

The operator can choose (via the Start button) how many MIX MASTER target hits it takes until JACKPOT is scored in Multiball. This effects JACKPOT AWARDS and score. The choices are:

02 (Liberal) to 99 (Conservative) HITS

▲ 41 BAG OF TRICKS

The operator can choose (via the Start button) how easy or hard the "Bag of Tricks" will select major features of the game to AWARD or LIGHT. This does not include awarding scores, extra ball, or special. This mostly effects score, but also effects a players progress in the game. The choices are:

EX. EASY - (Liberal) - This awards everything quickly
EASY -
MEDIUM -
HARD -
EX. HARD - This awards everything very slowly
OFF - (Conservative) - Do not award any of these features

▲ 42 DROP TARGET EXTRA BALL

The operator can choose (via the Start button) how many times the right drop target must be completed (shots) before the "LITE EXTRA BALL" lamp is lit. This effects extra ball. The choices are:

OFF - Extra Ball lamp is never lit from here.
1 (Liberal) to 99 (Conservative) SHOTS.

▲ 43 DROP TARGET MILLION

The operator can choose (via the Start button) how many times the right drop

target must be completed (shots) before the "LITE 1 MILLION" lamp is lit. This effects extra ball. The choices are:

OFF - Extra Ball lamp is never lit from here.
1 (Liberal) to 99 (Conservative) SHOTS.

▲ 44 SPECIALS PER GAME

The operator can choose (via the Start button) how often the "BAG OF TRICKS" will award a SPECIAL. This effects special awards. The choices are:

DISABLED - Special is never awarded from the "BAG OF TRICKS" because it is lit by passing the replay score (see Ad 06).
OFF - Special is never awarded from the "BAG OF TRICKS".
1% (Conservative) to 99% (Liberal)

▲ 45 EXTRA BALLS PER GAME

The operator can choose (via the Start button) how often the "BAG OF TRICKS" will award an EXTRA BALL. This effects extra ball awards. The choices are:

OFF - Extra Ball is never awarded from the "BAG OF TRICKS".
1% (Conservative) to 99% (Liberal)

▲ 46 ATTRACT MODE SOUNDS

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

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

▲ 47 CONSOLATION EXTRA BALL TIME

The operator can choose (via the Start button) whether a less-skilled player can obtain an Extra Ball. If , on the last ball, the players' score is less than 1 Million and, the game time is less than 1/2 the chosen (Ad 47 Consol. & Ad 09 Balls/Game) consolation game time. Note, this should be your desired ball time for this game (Factory settings use 45 seconds/ball).

OFF - No consolation is given
1 seconds (Conservative) to 99 seconds (Liberal) ball time

▲ 48 NORMAL/DIM/DIMMEST FLASHERS

The operator can select (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.

▲ 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:

ON 1 - Display a message during the Attract Mode. The Player 3 display shows this choice as ON. The message provided is: "DR. DUDE, THE DOCTOR IS IN..."

OFF 2 - Do NOT display a message during the Attract Mode. (Player 3 shows OFF.)

CHANGE 3 - The Player 3 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 GRAND High Score To Date

The operator can choose (via the Start button) whether to use the "Grand Champion" feature. This feature is an additional High Score (NOT reset by the High Score Reset button or by Ad 22 H. S. Reset Every xxx Plays) identifying the all-time scoring leader. If this feature is enabled, via the ON setting, it can be disabled (turned off) via the OFF setting of this Adjustment. The choices are:

OFF - No "Grand Champion" entry is stored in memory.
ON - The "Grand Champion" entry is stored in memory. Each time a player exceeds the current score of the "Grand Champion" entry, a new "Grand Champion" entry replaces the previous entry.
RESET - This option clears ALL high score entries, including the "Grand Champion" entry, as soon as the ADVANCE button is pressed. After ADVANCE is pressed, the "Grand Champion" feature begins in the ON setting.

▲ 52 GRAND CREDITS

The operator can choose (via the Start button) the number of credits to be awarded to the "Grand Champion", when this feature is ON. The range of this setting is 0 - 9 Credits, awarded to the "Grand Champion" at the end of the game in which this High Score was achieved.

▲ 53-66 PRESETS

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 54 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 3 display. Operator installation of the 'selected' Preset Adjustment occurs by using the Start button to choose YES and then pressing the ADVANCE switch. The displays then show the name of the Adjustment again, with DONE to show that the installation is now in effect.

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

NOTE

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

▲ 53 through 58 for German/European Games Only: Install German 1, 2, 3, 4, 5 or 6.

The operator can use these Adjustment Items to modify the game pricing selection of the Standard Setting named "German1 or German 2" in the Pricing Table to permit the style of play for the particular price shown in the *DR. DUDE* Preset game Adjustment Table for German/European Games.

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Preset Game Adjustments Table for US / Canadian Games

Adj #	Adj Description	Install Ad 1 Coin Buy-In 54	Install Ad 3 Ball 55	3 Balls/ Ad 2 Coins 56	3 Balls/ Ad 1 Coin 57	5Balls/ Ad 2 Coins 58
02	Replay Start	--	5,000,000	5,000,000	5,000,000	7,000,000
09	Balls / Game	--	3	3	3	5
14	Backup High Score 1	--	6,000,000	6,000,000	6,000,000	9,000,000
15	Backup High Score 2	--	5,500,000	5,500,000	5,500,000	8,500,000
16	Backup High Score 3	--	5,000,000	5,000,000	5,000,000	8,000,000
17	Backup High Score 4	--	4,500,000	4,500,000	4,500,000	7,500,000
24	Coinage Setting	USA 3	------	USA 3	USA 1	USA 3
64	Install Medium	No	Yes	Yes	Yes	No
65	Install Hard	No	No	No	No	Yes
--	1 Coin Buyin	Active	Cancel	Cancel	Cancel	Cancelled

DR. DUDE

Preset Game Adjustments Table for German/European Games

Adj #	Adj Description	German 1 Ad 53	German 2 Ad 54	German 3 Ad 55	German 4 Ad 56	German 5 Ad 57	German 5 Ad 58
06	Replay Awards	Credit	Coil	Audit	Credit	Coil	Audit
07	Special Awards	Credit	Ball	Score	Credit	Ball	Score
08	Match Feature	10%	10%	Off	10%	10%	Off
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	Hi Score 1	Cred 1	Cred 1	Cred 0	Cred 1	Cred 1	Cred 0
19	Hi Score 2	Cred 0	Cred 0	Cred 0	Cred 0	Cred 0	Cred 0
20	Hi Score 3	Cred 0	Cred 0	Cred 0	Cred 0	Cred 0	Cred 0
21	Hi Score 4	Cred 0	Cred 0	Cred 0	Cred 0	Cred 0	Cred 0
24	Coinage Setting	7/5DM	7/5DM	7/5DM	6/5DM	6/5DM	6/5DM
52	Grand Credits	3	3	0	3	3	0

▲ 59 Install Add-A-Ball

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

Ad	Name	New Setting	Ad	Name	New Setting
06	Replay Award	Ball	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	Max. Ex. Ball	6	21	Hi Scr 4 Credits	00
			52	Grand Credit	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:

Ad	Name	New Setting	Ad	Name	New Setting
02	Replay Start	7,000,000	09	Balls/Game	05
			14	Hi Score 1	9.0
			15	Hi Score 2	8.5
			16	Hi Score 3	8.0
			17	Hi Score 4	7.5

▲ 61 Install Novelty

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

Ad	Name	New Setting	Ad	Name	New Setting
01	Fixed Replay	Scores	07	Special Award	Score
02	Replay Level 1	Off	08	Match Feature	Off
03	Replay Level 2	Off	11	No Extra Ball	00
04	Replay Level 3	Off	18	Hi Scr 1 Credits	00
05	Replay Level 4	Off	19	Hi Scr 2 Credits	00
06	Replay Award	Audit	20	Hi Scr 3 Credits	00
			21	Hi Scr 4 Credits	00
			52	Grand Credit	00

▲ 62 Install Extra Easy

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

▲ 63 Install Easy

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

▲ 64 Install Medium

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

▲ 65 Install Hard

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

▲ 66 Install Extra Hard

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

▲ 67 Auto Burn-in

The operator can choose the YES option for this Special Preset Adjustment to perform certain automatic testing of the game, as used in the factory. It does not affect the game operation, but merely provides for a cycle testing of most of the game's mechanisms.

▲ 68 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 3 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 3 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 *DR. DUDE*, 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 3 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 3 display, use AUTO-UP, and press the Start button, until the desired value shows in the Player 3 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 3 display.

4. Using AUTO-UP, press and hold down ADVANCE, until the Player 4 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. 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.

DR. DUDE PRICING TABLE

Country	Coin Chute			Games/Coin	Ad 24 Display	Pricing Functions					
	Left	Center	Right			25	26	27	28	29	30
USA & 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	5Sch	10Sch	10Sch	1/2x5Sch, 3/2x10Sch (2)	AUSTRIA	01	02	02	02	04	01
Australia	20¢		$1	1/3x20¢, 2/$1 (2)	AUSTRALIA	02	00	10	05	00	00
U.K.	10 P	50 P	1£	1/2x10P, 3/50P, 7/1£ (2)	U. K.	03	15	30	05	30	00
Switzerland	1F	2F	5F	1/1F, 3/2F,7/5F (2)	SWISS	01	03	07	01	00	00
Belgium	5F	20F	50F	1/4x 5F, 1/1x 20F,3/1x 50F	BELGIUM	01	04	10	10	10	00
West Germany	1 DM	2 DM	5 DM	1/1DM, 2/2DM, 7/5DM (2,3)	GERMAN 1	06	12	30	05	30	00
				1/1DM, 2/2DM, 6/5DM (1,2)	GERMAN 2	06	12	30	05	00	00
				1/1DM, 3/2DM, 9/5DM (1,2)	CUSTOM	09	18	45	05	00	00
Netherlands	1HFl	2.5HFl	2.5HFl	1/1HFl, 3/2.5Holland Florin (2)	NETHERLANDS	06	15	15	05	00	00
	1G		1G	1/1 Guilder (2)	HOLLAND	01	00	01	01	00	00
Sweden	5Kr	5Kr	5Kr	1/5 Krona (2)	SWEDEN	01	01	01	01	00	00
France	1F	5F	10F	1/3x1F, 2/5F,5/10Frank (1,2)	FRANCE	02	10	20	05	20	00
	1F	5F	10F	1/2x1F, 3/5F, 7/10F (1,2)	CUSTOM	03	15	30	05	30	00
	5F	10F	10F	1/5F, 3/10F, 7/2x10F (1,2)	CUSTOM	03	15	30	10	60	00
	5F	10F	10F	2/5F, 4/10F, 9/2x10F	CUSTOM	02	10	20	05	40	00
	5F	10F	10F	2/5F, 5/10F, 11/2x10F	CUSTOM	01	05	10	02	20	00
Italy	200L		500L	1/2x200L, 3/2x500L (2)	ITALY	06	00	15	10	00	00
Spain	100P		500P	1/100P, 6/500Peseta (2)	SPAIN	01	00	05	01	05	00
Japan	100¥		100¥	1/100Yen (2)	JAPAN	01	00	01	01	00	00
Antilles (Nethlnds.)	25¢		1G	1/25¢, 4/1Guilder (2)	ANTILLES	01	01	04	01	00	00
Chile	Token		Token	1/1 Token (2)	CHILE	01	04	01	01	00	00
Denmark	1Kr	5Kr	10Kr	1/2x1Kr, 3/5Kr, 7/10Krone (2)	DENMARK	03	15	30	05	30	00
Finland	1Mka		5Mka	1/2x1Mka, 3/5Markka (2)	FINLAND	03	00	15	05	00	00
New Zealand	20¢		20¢	1/3x20¢ (2)	NEW ZEALAND	01	00	01	03	00	01
Norway	1Kr		1Kr	1/2x1Kr, 3/5x1Kr (2)	NORWAY	01	00	01	02	05	00
Argentina	10¢	10¢	10¢	1/1 Token (2)	ARGENTINA	01	01	01	01	00	00
Greece	10D	20D	50D	1/2x10D, 1/20D, 3/50 Drachma (2)	GREECE	03	06	15	05	00	00

CUSTOM PRICING

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

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

X = Coin Chute Multiplier (Item 25, 26, or 27 in Pricing Table);
V = Value of coin;
C = Coin units equivalent to one Credit (Item 28).

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

UNITS REQUIRED FOR BONUS CREDIT

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

MINIMUM COIN UNITS

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

Test/Diagnostic Procedures

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

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

Caution

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 (00)

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 4 score display shows 00 00. Press the Credit button to select the desired music selection: 01 - 'Main Theme' through 03). 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 (01)

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 4 score display shows 01 (the Display Test identifier).

2. Use AUTO-UP. Observe that all displays begin a display cycle of all 0s through all 9s, one digit at a time. Verify that the proper comma segments light during display of the odd-numbered digits. Next, a special "all segments" character 'walks' from left to right across each player score display.

3. To halt the display cycle, use MANUAL-DOWN. Then, press ADVANCE to step through the sequential digit display, digit by digit, and the subsequent "all segments" characters display test. Use AUTO-UP to resume cycling, and to proceed to the next test.

SOUND TEST (02)

1. (From Display Test) To Initiate the Sound Test, press ADVANCE. Observe that the upper displays show the message, SOUND TEST, and that the Right display shows 02 (the Sound Test identifier). The Right display shows a series of test steps from 00 through 07. Verify that a different sound is heard each time for tests 1 to 7.

LAMP TESTS (03 & 04)

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 4 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 4 display shows 04. Then, the Player 4 display shows 04 01, and the Player 1 and 2 displays change to show "INS. JACKPOT 1 MIL.", 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.

SOLENOID TEST (05)

1. (From Lamp Test) Using AUTO-UP, press ADVANCE. Observe that the Player 1 and 2 displays show the message, COIL TEST, the Player 4 display shows 05 (Solenoid Test identifier). Next, the Player 4 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.

DR. DUDE LAMP MATRIX

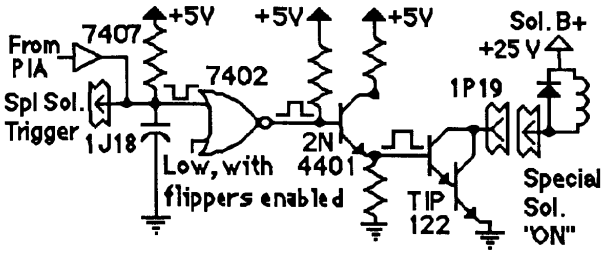
column	1 Q66	2 Q64	3 Q62	4 Q60	5 Q58	6 Q56	7 Q54	8 Q52
row	YEL-BRN 1J7-1	YEL-RED 1J7-2	YEL-ORN 1J7-3	YEL-BLK 1J7-4	YEL-GRN 1J7-6	YEL-BLU 1J7-7	YEL-VIO 1J7-8	YEL-GRY 1J7-9
1 Q80 RED-BRN 1J6-1	Jackpot 1 Million 1	I Test 25K 9	Raygun's Lamp 1 17	refle(X) 25	Mix Master Heart 33	Right Drop Target Hot Score 41	Magnetic R.e.f.l.e.x. 3 49	Jackpot Lit 57
2 Q81 RED-BLK 1J6-2	Jackpot 2 Million 2	I Test 50K 10	Raygun's Lamp 2 18	refl(E)x 26	Mix Master Mag. 34	Right Drop Target Lite Million 42	Magnetic 5K 50	Million 58
3 Q82 RED-ORN 1J6-3	Jackpot 3 Million 3	I Test 75K 11	Raygun's Lamp 3 19	ref(L)ex 27	Mix Master Gab 35	Right Drop Target Double Jackpot 43	Magnetic 25K 51	GaZillion 59
4 Q83 RED-YEL 1J6-5	Jackpot 4 Million 4	I Test 100K 12	Raygun's Lamp 4 20	re(F)lex 28	Magnetic Award 36	Right Drop Target Lite Extra Ball 44	Magnetic 50K 52	Super Dude (Top) 60
5 Q84 RED-GRN 1J6-6	Jackpot 5 Million 5	Raygun's Special 13	Raygun's Lamp 5 21	r(E)flex 29	Heart Award 37	Right Drop Target Bonus Boost 45	Gab R.e.f.l.e.x. 2 53	Major Dude 61
6 Q85 RED-BLU 1J6-7	Jumper Value 1K 6	Raygun's Extra Ball 14	2X 22	(R)eflex 30	Gab Award 38	Heart 5K 46	Gab 5K 54	Cool Dude 62
7 Q86 RED-VIO 1J6-8	Jumper Value 2.5K 7	Raygun's R.e.f.l.e.x. 1 15	4X 23	Big Shot 31	Shoot Again 39	Heart 25K 47	Gab 25K 55	Party Dude 63
8 Q87 RED-GRY 1J6-9	Jumper Value 5K 8	Bag of Tricks 16	6X 24	Playfield 2X 32	Left/Right Outlane 40	Heart 50K 48	Gab 50K 56	Plain Dude (Bottom) 64

DR. DUDE Solenoid Table Switch Tests (06 & 07)

Sol. No.	Function	Solenoid Type	Wire Color [1]	Connections		Driver Trnstr	Solenoid Part Number Flashlamp Type g= B'glass; p=Pl 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]	Mixer Heart	Switched	Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#89/906 flashlamps 2p
02A[3]	Trough	Switched	Vio-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	SM-1-26-600
02C[3]	Mixer Gab	Switched	Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89/906 flashlamps 2p
03A[3]	Top Left Popper	Switched	Vio-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200
03C[3]	Mixer Magnet	Switched	Blk-Orn	(Gry-Orn)	5J5-7(C)	Q32	#89/906 flashlamps 2p
04A[3]	Middle Right Popper	Switched	Vio- Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800
04C[3]	Magnetic	Switched	Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89/906 flashlamps 1p
05A[3]		Switched	Vio-Grn	1P11-6	5J1-4: 5J4-5 (A)	Q31	
05C[3]	Gab	Switched	Blk-Grn	(Gry-Grn)	5J5-4 (C)	Q31	#89/906 flashlamps 1p
06A[3]	Knocker	Switched	Vio-Blu	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800
06C[3]	Heart	Switched	Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89/906 flashlamps 1p
07A[3]	Right Drop Target	Switched	Vio-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800
07C[3]	Drop Targets	Switched	Blk-Vio	(Gry-Vio)	5J5-2 (C)	Q30	#89 flashlamps 1p
08A[3]		Switched	Vio-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22	
08C[3]	Raygun	Switched	Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89 flashlamps 1p
9		Controlled	Brn-Blk				
10	Playfield G.I.	Controlled	Brn-Red	1P12-2	5J2-8:5J6-8:2J4-11	Q9	5580-09555-01[4a]
11	Middle Insert	Controlled	Brn-Blu	1P12-7	5J2-3:5J6-3:2J4-14	Q7	#906 1g
12	A/C Select	Controlled	Brn-Yel	1P12-5	5J2-5	Q8	5580-09555-01[5]
13	Magnet	Controlled	Brn-Grn	1P12-6	5J2-4:5J6-5:2J4-13	Q15	AE-26-1200
14	Big Shot	Controlled	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79	AE-23-800
15	Big Shot	Controlled	Brn-Vio	1P12-8	2J4-15: 2J11-2	Q14	#89 flashlamp 1p
16	Motor	Controlled	Brn-Gry	1P12-9	2J4-16: 2J11-1	Q6	
17	Left Jumper 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 Jumper 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	Bottom Jumper Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800
22							
-	Right Flipper	-	Orn-Vio (Blu-Vio)[2]	1P19-1	2J5-5: 2J10-7 (2J10-1: 2J8-15)	-	FL11630/50VDC
-	Left Flipper	-	Orn-Gry (Blu-Gry)[2]	1P19-2	2J5-4: 2J10-8 (2J10-2:2J8-14)	-	FL11630/50VDC

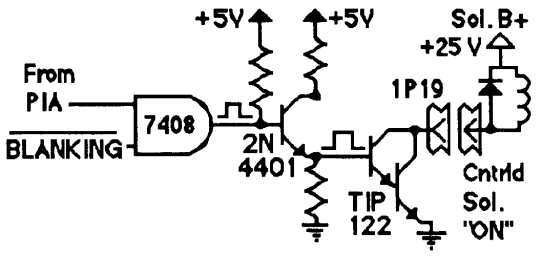
NOTES: 1. Wire colors, except flipper ORN-VIO and ORN-GRY, are ground connections (to coil terminal with unbanded end of diode). Flipper ORN-VIO and ORN-GRY wires connect from CPU Board to flipper switch on cabinet. 2. Flipper connections shown in braces are from flipper switch to flipper coil. 3. "A" 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 Cterminals 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 two lamp circuits. Using this "multiplexing" technique, the same driver transistor can control actuation of two separate solenoid circuits.

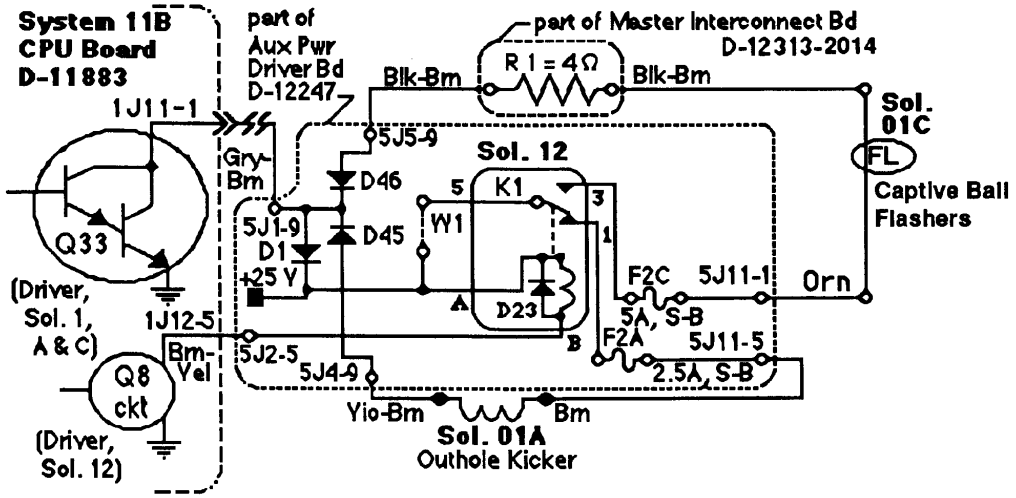


Figure 4. Typical Solenoid A/C Select Relay Circuit, showing the function of Solenoid 12, the Solenoid A/C Select Relay

SWITCH TESTS (06 & 07)

1. Switch Levels (06)

(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 4 display shows 06 (Switch Levels Test identifier). Normally, the right portion of the Player 4 display remains blank, indicating that no switch is actuated.

If, however, a switch is actuated (possibly stuck closed), the Player 4 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 *DR. DUDE* 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 *DR. DUDE* switch numbers can range from 01 through 64. Refer to the Switch-Matrix Table for switch numbers and wiring information. CPU Board connections at jacks 1J8 (columns) and 1J10 (rows) are also listed in the table.

- **Row Problems.** If a display of two (or more) switch numbers 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.

DR. DUDE SWITCH MATRIX

column	1 Q45	2 Q49	3 Q44	4 Q48	5 Q43	6 Q47	7 Q42	8 Q46
row	GRN-BRN 1J8-1	GRN-RED 1J8-2	GRN-ORN 1J8-3	GRN-YEL 1J8-4	GRN-BLK 1J8-5	GRN-BLU 1J8-7	GRN-VIO 1J8-8	GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Tilt 1	Shooter Lane 9	Left Outlane 17	refle (X) 25	Mixer Gab Top 33	Mixer Mag. Top 41	I Test Target 49	Right Flipper 57
2 WHT-RED 1J10-8	Not Used 2	Outhole 10	Right Outlane 18	refl (E) x 26	Mixer Gab Middle 34	Mixer Mag. Middle 42	Magnet Target 50	Left Flipper 58
3 WHT-ORN 1J10-7	Game Start 3	Trough 1 Ball 11	Right Return 19	ref (L) ex 27	Mixer Gab Bottom 35	Mixer Mag. Bottom 43	Top Left Popper 51	Right Loop 59
4 WHT-YEL 1J10-6	Right Coin Switch 4	Trough 2 Balls 12	Left Return 20	re (F) lex 28	Mixer Heart Left 36	Not Used 44	Left Jumper Bumper 52	Not Used 60
5 WHT-GRN 1J10-5	Center Coin Switch 5	Trough 3 Balls 13	Right Drop 1 (Top) 21	r (E) flex 29	Mixer Heart Middle 37	Not Used 45	Right Jumper Bumper 53	Not Used 61
6 WHT-BLU 1J10-3	Left Coin Switch 6	Heart Target 14	Right Drop 2 22	(R) eflex 30	Mixer Heart Right 38	Middle Middle 10 pts. 46	Bottom Jumper Bumper 54	Not Used 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Enter Left Ramp 15	Right Drop 3 23	Big Shot 31	Top Left 10 pts. 39	Middle Bottom 10 pts. 47	Left Slingshot 55	Not Used 63
8 WHT-GRY 1J10-1	High Score Reset 8	Score Left Ramp 16	Right Drop 4 (Bottom) 24	Middle Right Popper 32	Not Used 40	Middle Top 10 pts. 48	Right Slingshot 56	Not Used 64

▼ **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 (07)

From the Switch Levels Test, press ADVANCE. Observe that the Player 1 and 2 displays show the message, SWITCH EDGES; the Player 4 display shows 07 (Switch Edges Test identifier). The right portion of the Player 4 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 4 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 *DR. DUDE* 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.

FLASHER TEST (08)

(From Lamp Test) Using AUTO-UP, press ADVANCE. Observe that the Player 1 and 2 displays show the message, FLASHER TEST, the Player 4 display shows 08 (Flasher Test identifier). Next, the Player 4 display shows a series of test steps from 01 through 22, while the Player 1 and 2 displays show the flasher name. In AUTO mode the test cycles through all known flashers one at a time, as fast as possible. In MANUAL mode, the test stops on the current flasher and slowly blinks it. Pressing ADVANCE in MANUAL mode will flash the next flasher. Note that the solenoid number is after the "08" (same as solenoid test).

ENDING THE DIAGNOSTIC TESTS

To end the Diagnostic Tests, reach the C-Side Test use AUTO-UP and press

ADVANCE. The backbox displays should MANUAL-DOWN, and press ADVANCE to reach Adjustment Item 70 (CLEAR COINS). 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. *DR. DUDE* now starts in the Attract Mode. (If a switch problem is now reported by the displays, perform the Switch Tests again to determine the nature of the problem; then, perform necessary repairs.)

SYSTEM-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.

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.
10	U27 ROM FAILURE	U27's internal checksums do not match. It may be a ROM failure, or its associated connections and connectingdevices are causing it to appear to have a problem. (The following U26 test is skipped.)
11	U26 ROM FAILURE	U26's internal checksums do not match.

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

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

NOTE

"Bings" will not be heard if the game processor displays "Press Advance for Report".

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

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

CAUTION

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

Hearing a low hum or a 'click' indicates that the power amplifier, the Volume Control, and the speaker are operating satisfactorily, as is the sound circuit cabling. Not hearing a sound requires repeating the test with the Volume Control turned part way down, to determine whether the Volume Control is faulty. Also, check the cable connectors for proper mating, and that no broken wires affect this circuit.

Problem Analysis Messages

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

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

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

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

Pinball Missing
DR. DUDE normally uses two balls. The third ball is a spare. When the game is turned on, and the Advance is pressed; the message annouces 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, 12, or 13) or, the Ball Shooter Switch (#9).

Music Error
This message means that no signals are coming from the Audio Board. Check the Audio Board for presence of *DR. DUDE* 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 pin 1 on both boards. Turn the game Off, then On, to be sure only 1 'Bing' sounds. More than one 'Bing' or *no* 'Bing' indicates an Audio Board problem. Refer to text about System 11C Sound Circuitry tests for more information. Note, if the "Press Advance For Report" is displayed during start-up, no bing(s) will be heard.

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

Maintenance Information

• Ball Shooter Lane Feeder

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

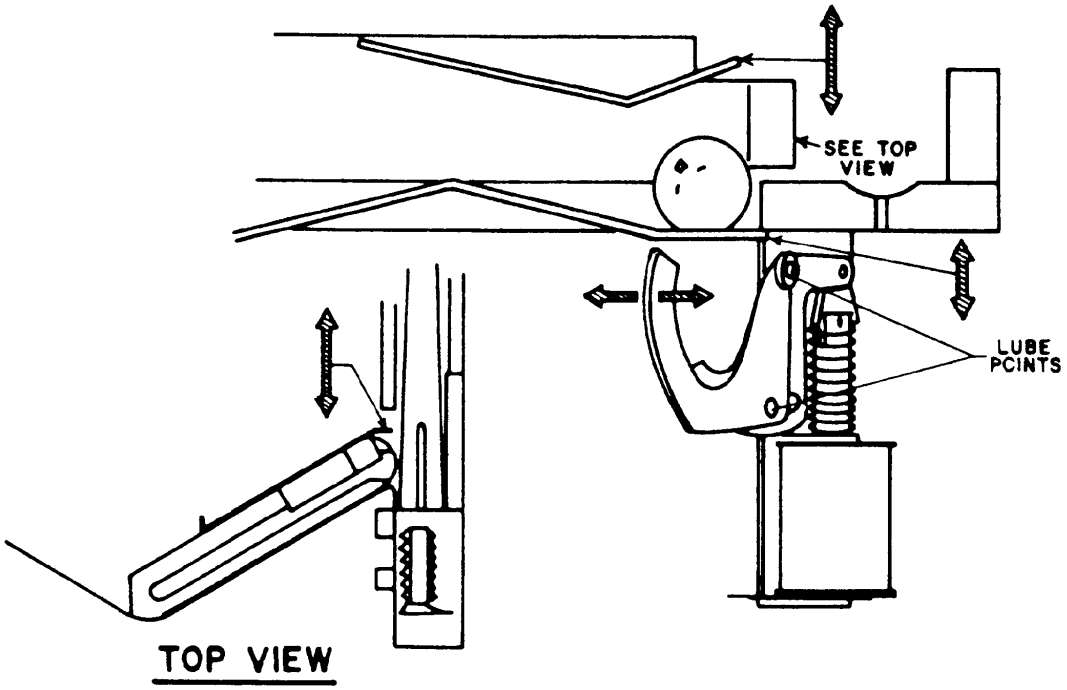


Figure 5. Adjustments and Lubrication Points, Shooter Lane Feeder

• Left & Right Kickers

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

• Playfield

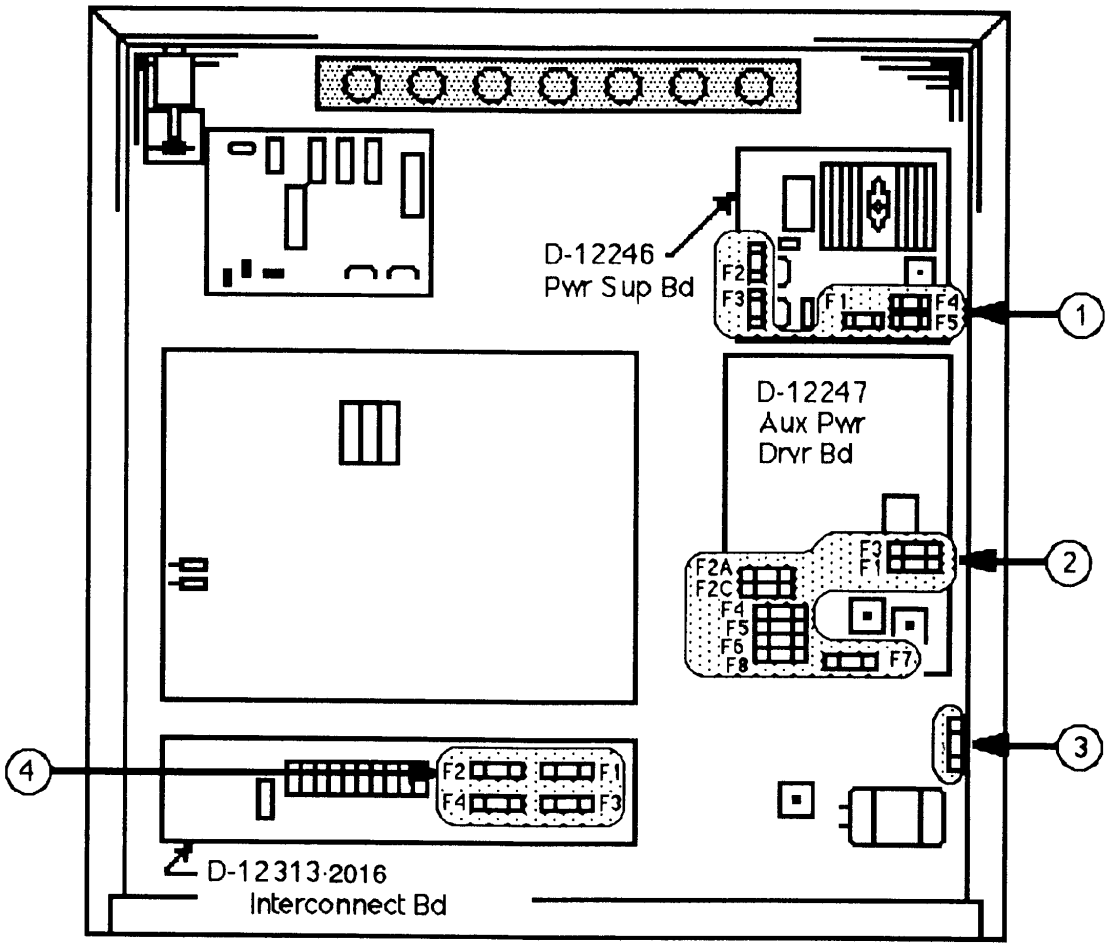
Playfield life expectancy and play can be extended by periodic cleaning. Inspect and hand polish the balls in a clean cloth. Replace chipped balls; otherwise, these balls will ruin the playfield finish in a short time. Don't use quantities of water, caustic or abrasive cleaners or cleaning pads on the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

• Switches

Switch contacts should be free of dust, dirt, and corrosion. Filing or burnishing most switch contacts breaks the finish and encourages corrosion. Effective contact cleaning requires gentler treatment. Gently close the contacts on a clean business card or piece of paper. Wipe the contacts until they're clean. If necessary, regap the contacts to 1/16 inch.

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

Fuse Locations Diagram & Listing



Fuse Listing

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

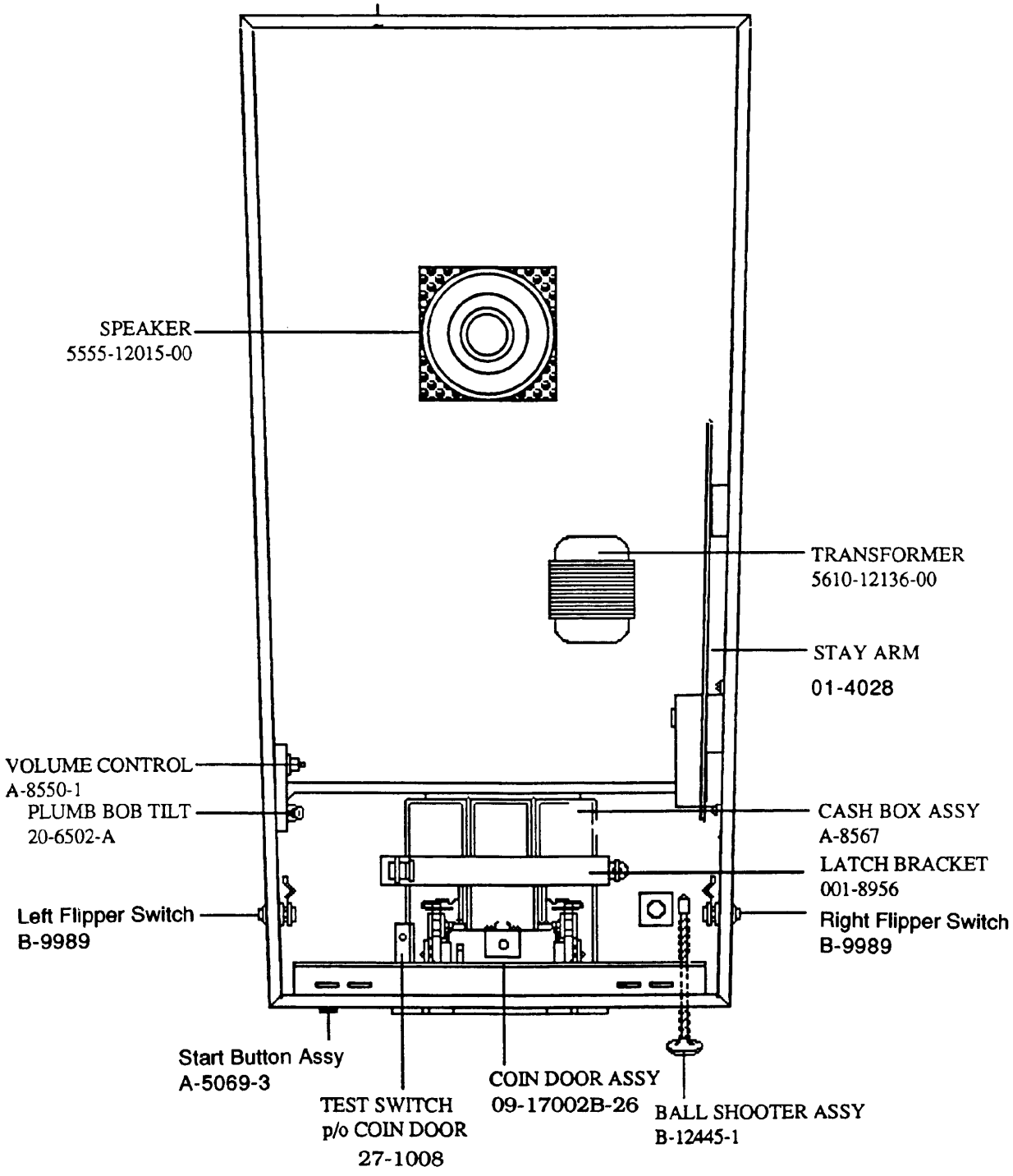
* One 4A., S-B, 250v fuse (5731-06314-00) is provided for an overseas (220v) game installation.

NOTES

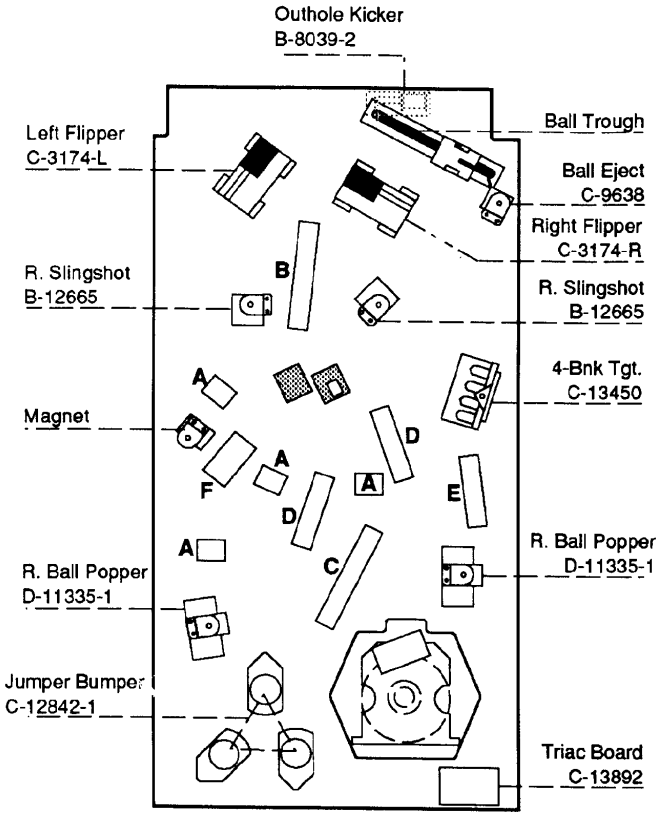
SECTION 2

Game Parts Information

Cabinet Parts



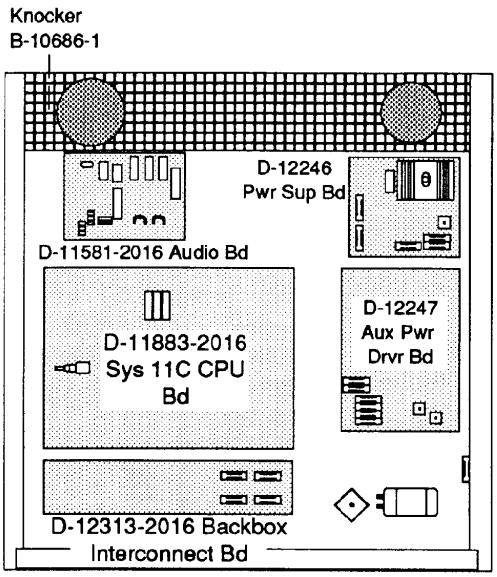
Location Diagram - Circuit Boards & Major Mechanisms



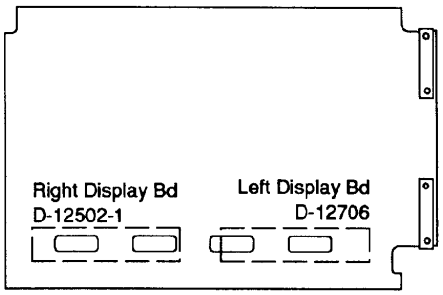
Under Side of Playfield, Viewed in Raised Position

Lamp Boards:

A.	Single Lamp Board	B-12224
B.	Dude Lamp	C-13852
C.	Reflex Lamp	C-13854
D.	3-Lamp Playfield	C-13855
E.	Jumper Lamp	C-13911
F.	Magnetic Lamp	C-13853



Backbox



Insert Board, Inner Side View

D-11883-2016 System 11C CPU Board

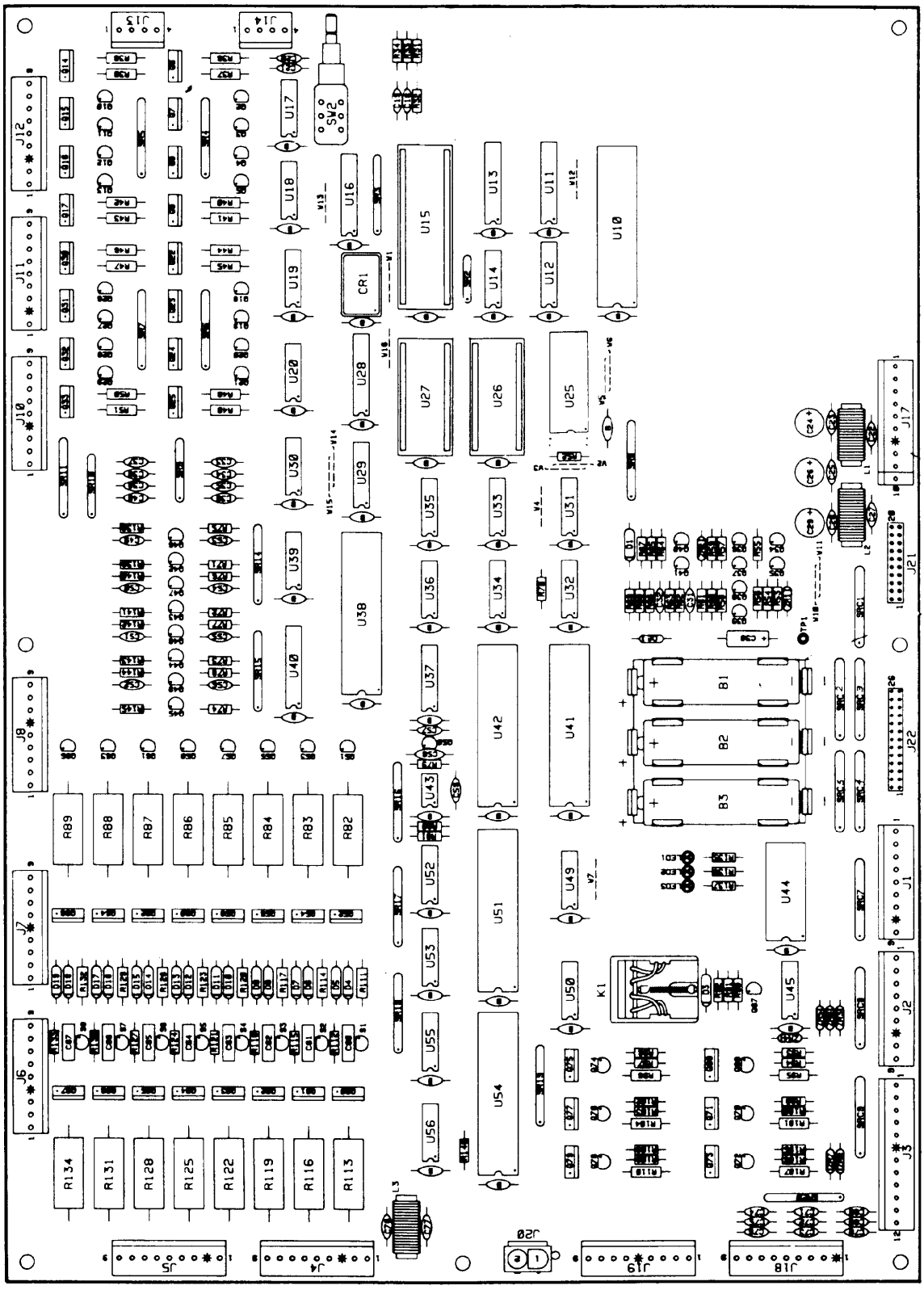
Part No.	Ckt Designator	Description
5764-12206-00		Bare PC Board
5281-09308-00	U16	IC, Octal Bus Xcvr, 74LS245
5430-08972-00	U10, U38, U41, U42, U51, U54	IC, PIA, MC6820/6821
5340-10139-00	U25	IC, 2K x 8 CMOS Static RAM
5280-09010-00	U44	IC, 4-16 Decoder, 74154
5281-09246-00	U12	IC, 2-4 Decoder, 74LS139
5075-09406-00	ZR3 - ZR8	Diode, Zener, 6.2v, 0.5w
5164-10998-00	Q42 - Q49	Transistor, NPN, 2N5550, TO-92
5431-09449-00	U43	IC, Timer, MC1455
5310-09236-00	U29	IC, 14-b Counter, 4020
5281-09743-00	U32	IC, Quad 2-Input AND, 74LS08
5281-09247-00	U14	IC, Quad 2-Input NOR, 74LS02
5281-09235-00	U35	IC, Triple 3-Input NAND, 74LS10
5280-09013-00	U36	IC, Hex Inverter, 7404
5281-09499-00	U31, U34	IC, Quad 2-Input NAND, 74LS00
5281-10014-00	U33	IC, Dual 4-Input NAND, 74LS20
5281-09486-00	U28	IC, Octal D Flip-flop, 74LS374
5281-09745-00	U37	IC, 3-8 Decoder, 74LS138
5281-09867-00	U11, U13, U40	IC, Octal Buffer, 74LS244
5280-08973-00	U17-U20, U52, U53	IC, Quad 2-Input AND, 7408
5280-08974-00	U55, U56	IC, Hex Inverter, 7406
5310-09155-00	U30, U39	IC, Quad 2-Input NAND, MC14011
5280-08948-00	U45, U50	IC, Quad 2-Input NOR, 7402
5280-09309-00	U49	IC, Hex Buffer, 7407
5671-09019-00	LED1-LED3	LED, Red, Display
5521-10506-00	CR1	Oscillator, 4 MHz
5162-08976-00	Q51, Q53, Q55, Q57, Q59, Q61, Q63, Q65	Transistor, NPN Darl. 2N6427, TO-92
5191-08978-00	Q52, Q54, Q56, Q58, Q60, Q62, Q64, Q66	Transistor, PNP, TIP42, TO-220
5162-09410-00	Q6-Q9, Q14-Q17, Q22-Q25, Q30-Q33, Q69, Q71, Q73, Q75, Q77, Q79, Q80-Q87	Transistor, NPN, TIP122, TO-220
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
5160-10269-00	Q40	Transistor, NPN, 2N3904, TO-92
5190-09016-00	Q39, Q50	Transistor, PNP, 2N4403, TO-92
5130-09014-00	S1-S8	SCR, 30v, 0.8A, 2N5060
5070-06258-00	D3-D19	Diode, 1N4001
5070-08919-00	D2	Diode, 1N4148, 150mA
5070-09266-00	D1	Diode, 1N5817, 1.0A
5075-09018-00	ZR1	Diode, Zener, 1N5996A, 6.8v, 0.5w
5075-09059-00	ZR2	Diode, Zener, 1N5990, 3.9v, 0.5w
5010-08992-00	R94, R97, R100, R103, R106, R109	Resistor, 560Ω, 5%, 1/4w, C. F.
5010-09039-00	R56	Resistor, 10Ω, 5%, 1/4w, C. F.
5010-09534-00	W1, W2, W4, W5, W7, W11, W14, W16	Resistor, 0Ω, 5%, 1/4w, C. F.
5010-08991-00	R31, R32, R52 R55, R68, R92, R146	Resistor, 4.7KΩ, 5%, 1/4w, C. F.
5010-09358-00	R54, R57, R58, R64, R66, R138-R145	Resistor, 1.0KΩ, 5%, 1/4w, C. F.
5010-09113-00	R79	Resistor, 33KΩ, 5%, 1/4w, C. F.
5010-08983-00	R70, R80	Resistor, 3.3KΩ, 5%, 1/4w, C. F.
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.

Part No.	Ckt Designator	Description
5012-09037-00	R113, R116, R119, R122, R125, R128, R131, R134	Resistor, 0.4Ω, 5%, 3w, Wire-Wnd.
5010-08993-00	R36-R51, R95, R98, R101, R104, R107, R110	Resistor, 68Ω, 5%, 1/2w, C. F.
5012-10860-00	R82-R89	Resistor, 27Ω, 5%, 2w, C. F.
5010-10003-00	R62, R63	Resistor, 390Ω, 5%, 1/4w, C. F.
5010-10171-00	R67	Resistor, 56Ω, 5%, 1/4w, C.F.
5010-10170-00	R69	Resistor, 47Ω, 5%, 1/4w, C. F.
5010-09160-00	R59, R61, W12, W13	Resistor, 220Ω, 5%, 1/4w, C. F.
5010-09416-00	R33, R34, R71-R78, R135-R137	Resistor, 470Ω, 5%, 1/4w, C. F.
5010-10631-00	R111, R114, R117, R120, R123, R126, R129, R132	Resistor, 1.2KΩ, 5%, 1/2w, C. F.
5019-09783-00	SR18	SIP, 9R, 10-pin, 6.8KΩ, .125w/R, 5%
5019-09362-00	SR3, SR15, SR17, SR19, SR20	SIP, 9R, 10-pin, 4.7KΩ, .125w/R, 5%
5019-09808-00	SR4, SR6, SR11	SIP, 9R, 10-pin, 560Ω, .125w/R, 5%
5019-09785-00	SR16	SIP, 9R, 10-pin, 2.2KΩ, .125w/R, 5%
5019-10472-00	SR14	SIP, 9R, 10-pin, 3.3KΩ, .125w/R, 5%
5019-09669-00	SR8	SIP, 9R, 10-pin, 1.0KΩ, .125w/R, 5%
5019-09780-00	SR9, SR10	SIP, 4R, 8-pin, 1KΩ, 5%
5019-09786-00	SR2	SIP, 5R, 6-pin, 4.7KΩ, .125w/R, 5%
5019-09792-00	SR5, SR7	SIP, 9R, 10-pin, 2.7KΩ, .125w/R, 5%
5060-10396-00	SRC1 - SRC5, SRC7 - SRC9	SIP, 8R, 8C,10-pin, 4.7KΩ & 470pfd
5043-08980-00	C18, C19, C21, C31, C32, C49-C56, C59, + 43 Bypass, marked B	Capacitor, 0.01 µfd, 50v(+80,-20%), Axial
5043-09845-00	C22, C23, C25, C27, C28	Capacitor, 1K pfd, 50v(±20%), Axial
5043-08996-00	C70-75, C77, C78	Capacitor, 0.1 µfd, 50v(±20%), Axial
5040-10974-00	C24, C26, C29	Capacitor, 100µfd, Electr, 25v(+50,-10%), Ax
5045-09796-00	C60-C67	Capacitor, 0.1 µfd, Polycarbonate Rad, 100v(±10%)
5043-09065-00	C33-C40, C68, C69, C76	Capacitor, 470 pfd, 50v(±20%), Axial
5040-09545-00	C30	Capacitor, 22µfd, Electr, 10v(+50,-10%) Ax
5041-09031-00	C58	Capacitor, 1 µfd, Tant., 25v(±20%), Axial
5043-09030-00	C57	Capacitor, 0.047 µfd, 50v(±20%), Axial
5551-09822-00	L1-L3	Inductor, 4.7 µH, 3A
5641-09312-00} 5641-09653-00}	SW2	Switch, Pushbutton, DPDT, 100v, 5A
5880-09022-00	B1-B3	Battery, Alkaline, 1.5v, AA
5881-09021-00		Battery Holder, #171
5700-10176-00		IC Socket, 28 pin
A-5343-2016-1	U26	IC, Game ROM 2, 27256
A-5343-2016-2	U27	IC, Game ROM 1, 27256
5700-08985-00		IC Socket, 40 pin
a)5400-09150-00	U15	IC, µProcessor, 6802
5824-09248-00	TP1, TP2	Test Point
20-9229		Thermal Compound
5580-08994-01	K1	Relay, 4-pole, 40Ω, 6v
5791-10862-09	1J1, 1J2, 1J4-1J8, 1J10-1J12, 1J17-1J19	Connector, 9 pin (Hdr)
5791-10862-04	1J13, 1J14	Connector, 4 pin (Hdr)
5791-10862-12	1J3	Connector, 12 pin (Hdr)
5791-10850-00	1J22	Connector, 26 pin Ribbon (Hdr)
5791-09437-00	1J21	Connector, 20 pin Ribbon (Hdr)
16-8850-312		Label PCB Assembly

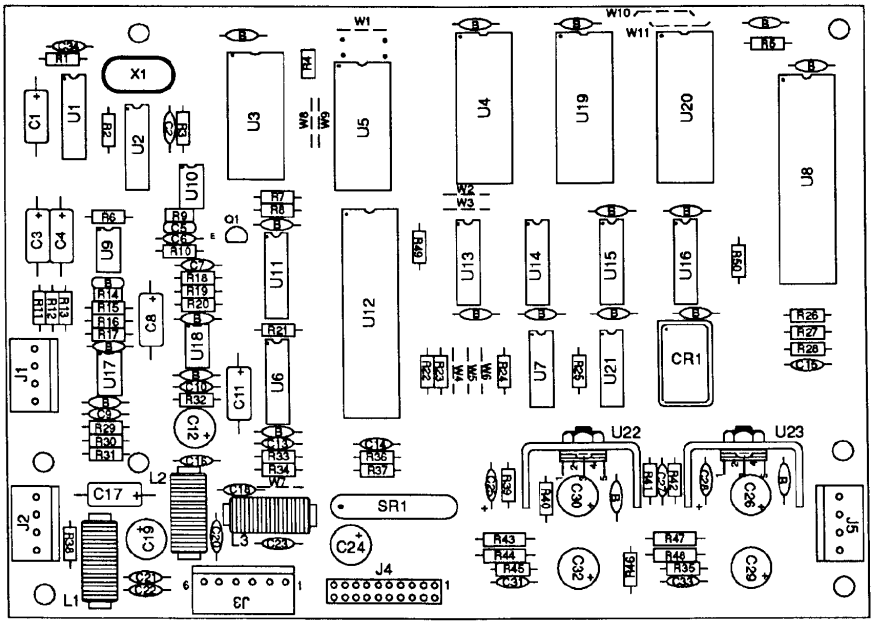
Notes...

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

D-11883-2016 System 11C CPU Board



D-11581-2016 Audio Board

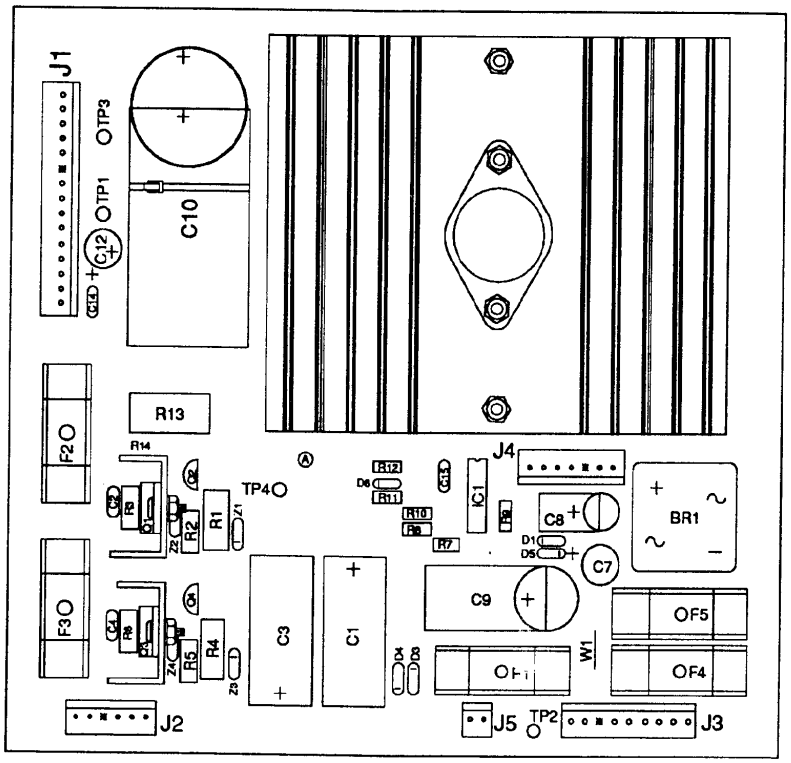


Part Number	Ckt Designator	Description
5766-12130-00		Bare PC Board
5371-11087-00	U1	IC, D/A Conv, YM3012
a) 5700-09006-00		Socket, IC, 16-pin (U1)
5370-11086-00	U3	IC, Sound Processor, YM2151
a) 5700-09004-00		Socket, IC, 24-pin (U3)
5400-10320-00	U8	IC, µProcessor, MC68B09E
a) 5700-08985-00		Socket, IC, 40-pin (U8)
A-5343-2016-3	U4	IC, Audio ROM 1
A-5343-2016-4	U19	IC, Audio ROM 2
A-5343-2016-5	U20	IC, Audio ROM 3
a) 5700-10176-00		Socket, IC, 28-pin (U4, U19, U20)
5370-09691-00	U6	IC, 55536, CVSD
5371-09152-00	U11	IC, D/A Convtr, MC1408
5430-10322-00	U12	IC, PIA, MC68B21
5340-10139-00	U5	IC, RAM/S 5516-2 2Kx8
5281-09487-00	U7, U16	IC, Dual D Flipflop, 74LS74
5281-10043-00	U13	IC, 74LS175
5281-09235-00	U21	IC,Triple NAND, 74LS10
5370-09321-00	U9, U10, U17,U18	IC, Op Amp, MC1458
5281-09215-00	U2	IC, Hex Inv, 74LS04
5281-09246-00	U14	IC, 2-4 Dec, 74LS139
5281-09745-00	U15	IC, Dual Mux, 74LS138
5370-09156-00	U22, U23	IC, Audio Amp, TDA2002
a) 5705-09199-00		Heatsink, #6030B
b) 4006-01003-06		Mach. Screw, 6-32 x 3/8
c) 4406-01117-00		Nut, 6-32 Hex.
d) 4703-00007-00		Lockwasher, #6 Ext.
5160-10269-00	Q1	Transistor, 2N3904, NPN
5060-10396-00	SP1	SIP 4.7K & 470pfd, 8R8C
5010-09181-00	R44, R48	Resistor, 1.0Ω, 1/2w, 5%
5010-09161-00	R35, R45	Resistor, 2.2Ω, 1/4w, 5%
5010-09361-00	R43, R46, R47	Resistor, 220Ω, 1/2w, 5%
5010-09358-00	R41, R42	Resistor, 1KΩ, 1/4w, 5%
5010-08998-00	R2, R3	Resistor, 2.2KΩ, 1/4w, 5%
5010-08983-00	R7-R9	Resistor, 3.3KΩ, 1/4w, 5%
5010-08991-00	R1, R4, R5, R11, R25 - R28, R33, R36, R37, R49, R50	Resistor, 4.7KΩ, 1/4w, 5%
5010-09034-00	R22-R24, R17, R34	Resistor, 10KΩ, 1/4w, 5%

Part Number	Ckt Designator	Description
5010-09324-00	R6, R19, R20, R21	Resistor, 27KΩ, 1/4w, 5%
5010-09162-00	R39	Resistor, 100KΩ, 1/4w, 5%
5010-10258-00	R40	Resistor, 1MΩ, 1/4w, 5%
5010-09179-00	R10	Resistor, 3.3MΩ, 1/4w, 5%
5010-08772-00	R18	Resistor, 15KΩ, 1/4w, 5%
5010-08824-00	R32	Resistor, 43KΩ, 1/4w, 5%
5010-08846-00	R31	Resistor, 220KΩ, 1/4w, 5%
5010-08991-00	R12	Resistor, 4.7KΩ, 1/4w, 5%
5010-09219-00	R38	Resistor, 8.2KΩ, 1/4w, 5%
5010-09331-00	R16	Resistor, 13KΩ, 1/4w, 5%
5010-09333-00	R29	Resistor, 180KΩ, 1/4w, 5%
5010-09342-00	R30	Resistor, 36KΩ, 1/4w, 5%
5010-09534-00	W2, W9, W11	Resistor, 0Ω
5010-10985-00	R14, R15	Resistor, 20KΩ, 1/4w, 5%
5013-09427-00	R13	Resistor, 4.9KΩ, 1/4w, 5%
5040-09343-00	C1, C3, C4, C8, C17	Capacitor, 10µfd, 20v, ±20%
5040-10974-00	C12, C19, C24	Capacitor, 100µfd, 35v
5040-09776-00	C26, C30	Capacitor, 470µfd, 16v; +50, -10%
5040-09365-00	C11	Capacitor, 1µfd, 63v, +50 -10%
5040-12006-00	C29, C32	Capacitor, 1000µfd, 16v, 20%
5041-09243-00	C25, C28	Capacitor, 10µfd, 10v,±10%
5043-08980-00	C5, B (20)*	Capacitor, 0.01µfd, 50v,+80, -20%
5043-08996-00	C31, C33	Capacitor, 0.1µfd, 50v, ±20%
5043-09065-00	C13 - C15	Capacitor, 470 pfd, 50v, ±20%
5043-09492-00	C2, C34	Capacitor, 100 pfd, 50v, ±10%
5043-09844-00	C6	Capacitor, 47 pfd, 50v, ±20%
5043-09645-00	C16, C18, C20 - C23, C27	Capacitor, 1000 pfd, 50v, ±20%
5046-09346-00	C7	Capacitor, 1200pfd, 50V, ±5%
5046-09350-00	C9	Capacitor, 180pfd, 100V, ±5%
5048-10992-00	C10	Capacitor, 4700pfd, 50v,
5520-09020-00	X1	Crystal, 3.58 MHz
5521-10931-00	CR1	Oscillator, 8 MHz
5551-09822-00	L1 - L3	Inductor, 4.7 µH, 3A.
5791-09437-00	J4	Connector, 20 pin, (Hdr), Rib. Cbl
5791-10862-04	J1, J2, J5	Connector, 4 pin (Hdr)
5791-10862-06	J3	Connector, 6 pin (Hdr)
16-8850-313		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.

D-12246 Power Supply

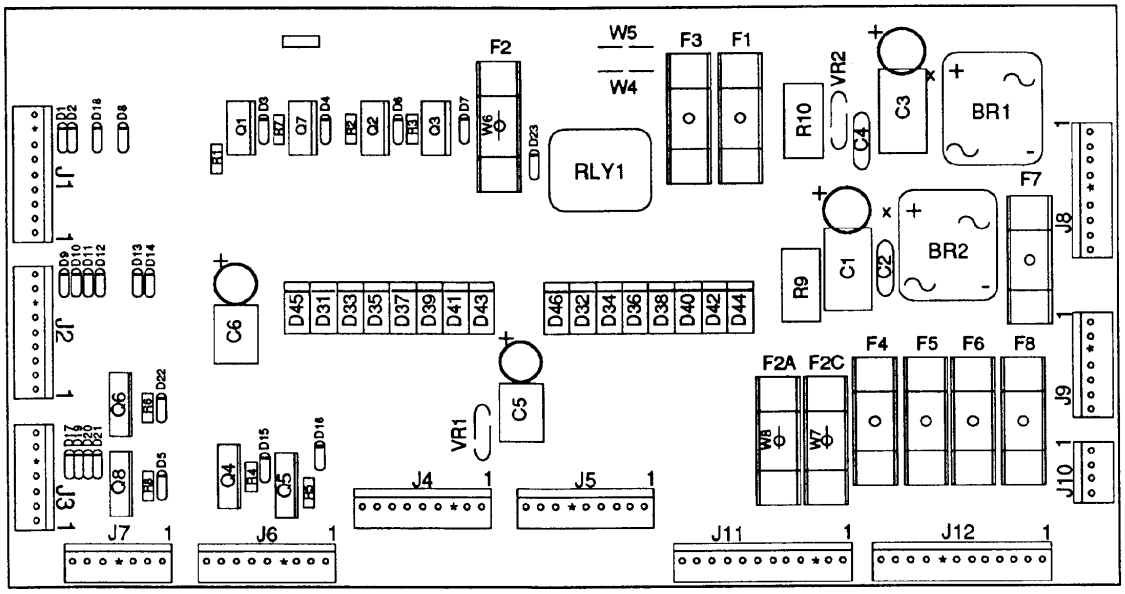


Item	Part No.	Ckt Symbol	Description
1	5765-12317-00		Power Supply PCB
2	5733-12060-01	F1-F5	Fuse Holder
3	5731-09432-00	F4, F5	Fuse, 7A., S-B, 250v
4	5731-12328-00	F1	Fuse, 3/8A., S-B, 250v
5	5730-12327-00	F2, F3	Fuse 1/8 A., 250v
6	5791-10862-15	J1	Connector, 15-pin Hdr
7	5791-10862-06	J2	Connector,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

Notes:

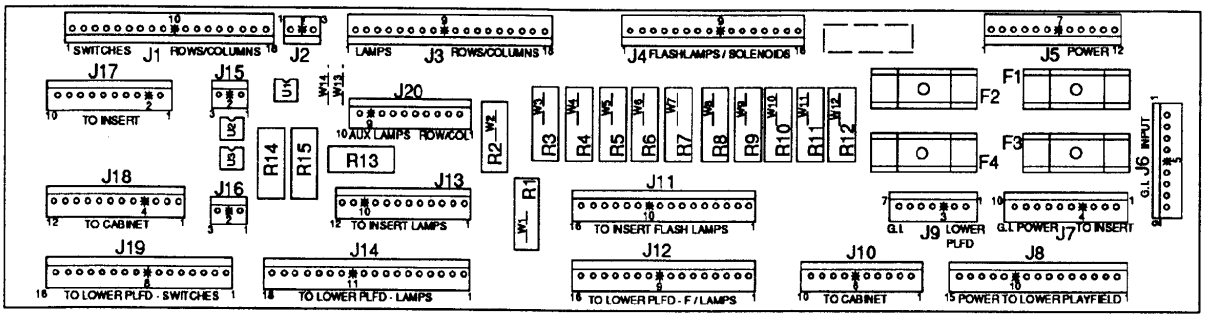
1. Heatsink compound must be applied between transistor and heat sink.
2. Observe index mark on integrated circuit, polarity of capacitors and diodes, and position oftransistors.
3. The view of Q5 and its related heat sink and hardware is from the bottom of the heatsink, to clarify installation.

D-12247-576 Auxiliary Power Driver Board



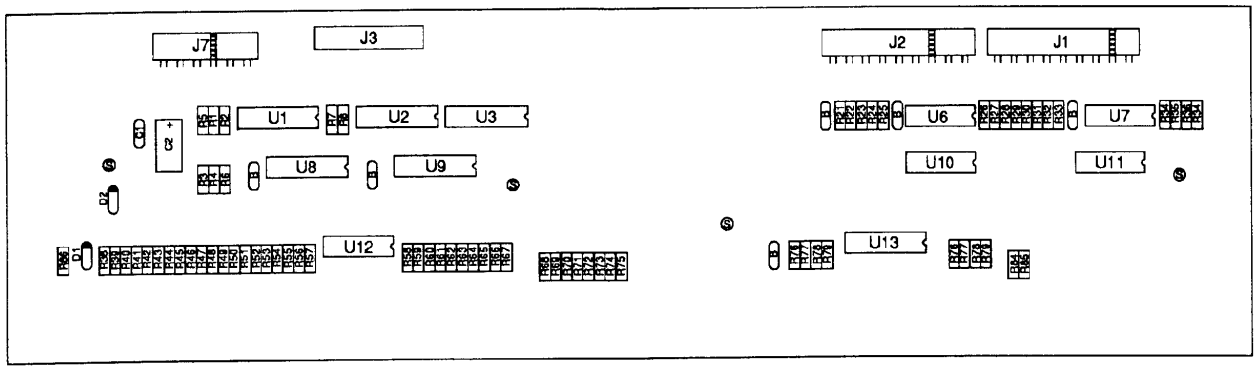
Part Number	Ckt Designator	Description
5763-12184-00		Bare PC Board
5040-09537-00	C1, C3	Capacitor, 100 µfd., 100v, Radial
5040-12181-00	C5, C6	Capacitor, 10 µfd., 100v, Radial
5043-09072-00	C2, C4	Capacitor, 0.1 µfd., 500v
5010-09160-00	R1 - R8	Resistor, 220Ω, 1/4w C.F., 5%
5012-12238-00	R9	Resistor, 3.3KΩ, 5w, 10%
5010-09534-00	W1, W3, W4, W6	Resistor, 0Ω
5017-12180-00	VR1, VR2	Varistor, 100v
5100-09690-00	BR1, BR2	Bridge Rectifier, 35A, 200v
5070-08785-00	D1 - D23	Diode, 1N4003
5070-09045-00	D31 - D46	Diode, MR501
5191-12179-00	Q1 - Q8	Transistor, TIP36C
5580-09555-01	K1	Relay, DPDT, 13A
5733-12060-01		Fuse Holder
5731-08665-00	F5, F6	Fuse, 2A, S-B, 250v
5731-09128-00	F2A, F3	Fuse, 2-1/2A, S-B, 250v
5731-09651-00	F1, F2C	Fuse, 5A, S-B, 250v
5731-09432-00	F4, F7, F8	Fuse, 7A, S-B, 250v
5791-10862-09	J1, J2, J4 - J6, J8	Connector, 9-pin Hdr, Sq Pin
5791-10862-07	J3, J7, J9	Connector, 7-pin Hdr, Sq Pin
5791-10862-12	J11, J12	Connector, 12-pin Hdr, Sq Pin
5791-10862-04	J10	Connector, 4-pin Hdr, Sq Pin
16-8850-292		PCB Label

D-12313-2016 Backbox Interconnect Board



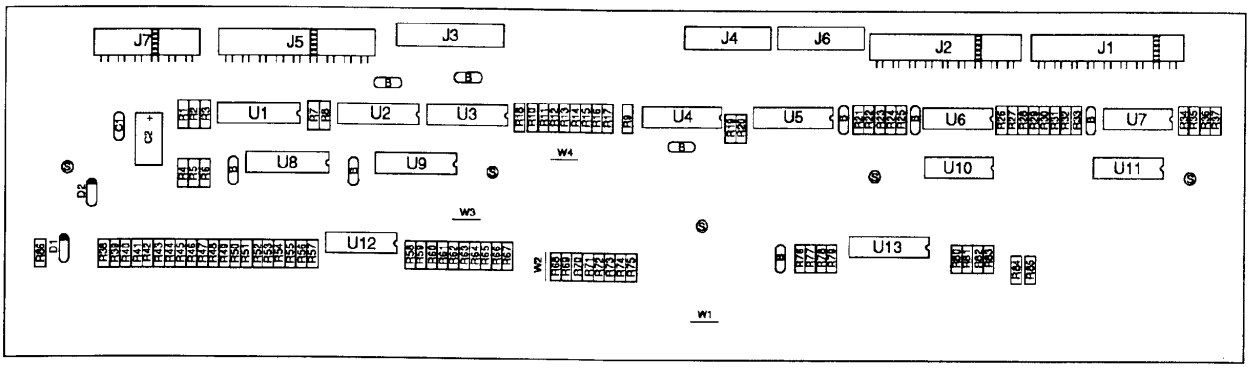
Part Number	Ckt Designator	Description
5768-12332-00		Master Interconnect PCB
5010-09534-00	W11, W12	Resistor, 0Ω
5012-10024-00	R1 - R3	Resistor, 5.6Ω, 5w, 10%
5012-12163-00	R4 - R10	Resistor, 11Ω, 5w, 10%
5012-12238-00	R14, R15	Resistor, 3.3KΩ, 5w, 10%
5012-12337-00	R13	Resistor, 1.5KΩ, 5w, 10%
5490-10892-00	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, J20	Connector, 10-pin Hdr Sq Pin
5791-10862-12	J5, 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
16-8850-314		PCB Label

D-12706 Bally Left Display Board



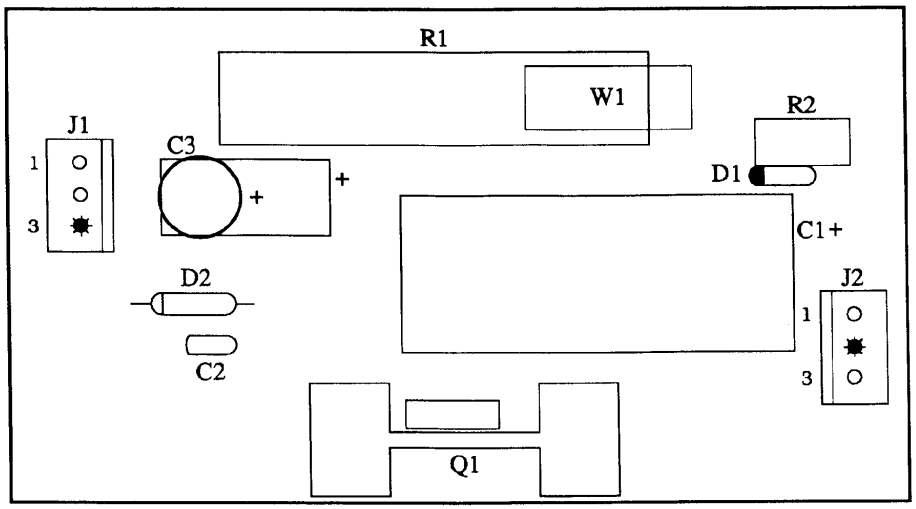
Part Number	Designation No.	Description	Qty.
5043-08980-00	B (Bypass Cap)	Axial Cap., 0.01µfd, 50v, (+80, -20%)	6
5043-08996-00	C1	Axial Cap., 0.1µfd, 50v, (+80, -20%)	1
5040-09343-00	C2	Axial Cap., 10µfd, 25v, (±20%)	1
5075-09135-00	D1, D2	Zener, 1N4740, 10v	2
5670-12308-00	DSPL1	Display, 16-Character 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	Resistor, 100KΩ, 1/4w, 5%	32
5010-08981-00	R39, R41, R43, R47, R53 R66, R70, R72, R84	Resistor, 10KΩ, 1/2w, 5%	9
5010-10258-00	R86	Resistor, 1MΩ, 1/4w, 5%	1
5010-10927-00	R45, R49, R51, R62 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/N	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 R46, R48, R50, R52, R54-R61, R63, R65, R67, R69 R71, R73, R75-R83, R85	Resistor, 100KΩ, 1/4w, 5%	32
5010-10258-00	R86	Resistor, 1MΩ, 1/4w, 5%	1
5010-10927-00	R45, R49, R51, R62 R64, R68, R74	Resistor, 8.2KΩ, 1/4w, 5%	7
5010-09534-00	W3, W4	Resistor, 0Ω	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

C-13892 Triac Board



Part Number	Ckt Symbol	Description
5768-12685-00		PC Board
4004-01005-06		Mach. Screw, 4-40 x 3/8
4404-01117-00		Nut, 4-40 Hex.
4703-00015-00		Lockwasher, #4 Ext.
5010-12465-00	R2	Resistor, 2KΩ, 1/2w, 5%
5012-12468-00	R1	Resistor, 30Ω, 10w, 10%
5010-09534-00	W1	Resistor, 0Ω
5040-10974-00	C3	Capacitor, 100µF, 35v
5040-12466-00	C1	Capacitor, 1000µF, 50v, Ax.
5043-08996-00	C2	Capacitor, 0.1µF, 50v, ±20
5070-09054-00	D1	Diode, 1N4004, 1.0A.
5075-12700-00	D2	Zener, IN5237B, 8.7v, 5w
5162-09410-00	Q1	Transistor, NPN Darl.
5705-12464-00		Heatsink
20-9229		Thermal Compound
5791-12273-03	J1, J2	Connector, 3-pin Sq Lck.

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)

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.

C-13851 Ex-Ray Lamp Board

Part Number	Description
5768-12674-00	Lamp PCB
24-8767	Twist Lamp Socket
24-8768	Bulb #555, (6.3v, 0.25A.)
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10871-07	Connector, 7-pin Header Sq Post

C-13852 Dude Lamp Board

Part Number	Description
5768-12675-00	Lamp PCB
24-8767	Twist Lamp Socket
24-8768	Bulb #555, (6.3v, 0.25A.)
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10871-07	Connector, 7-pin Header Sq Post

C-13853 Magnetic Lamp Board

Part Number	Description
5768-12676-00	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-13854 Reflex Lamp Board

Part Number	Description
5768-12677-00	Lamp PCB
24-8767	Twist Lamp Socket
24-8768	Bulb #555, (6.3v, 0.25A.)
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10871-08	Connector, 8-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

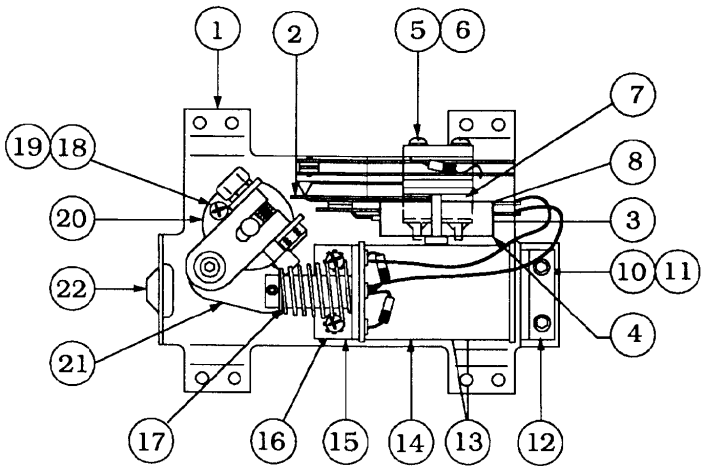
C-13911 Jumper Lamp Board

Part Number	Description
5768-12688-00	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-13954 Back Panel

Part Number	Description
5768-12699-00	Lamp PCB
24-8767	Twist Lamp Socket
24-8768	Bulb #555, (6.3v, 0.25A.)
5070-09054-00	Diode, 1N4004, 1.0A.
5791-10871-06	Connector, 6-pin Header Sq Post

C-11626-R-3 Right Flipper Assembly



Item	Part Number	Description
1	C-11627-R	Flipper Bracket Sub-Assy.
2	03-7811	End of Stroke (EOS) Sw
3	RM-21-06	Sleeve, Vinyl (Cap. leads)
4	5045-12098-00	Capacitor, 2.2 µFd, 250v, 20%
5	4701-00002-00	Lockwasher, #6 Split
6	4105-01019-10	Sh. Metal Screw,#5 x 5/8
7	23-6622	Tape, Double-sided
8	03-7520-2	Ty-Wrap, Nylon
9	20-6516	Speednut, Tinnerman
10	4010-01066-06	Cap Screw, 10-32 x 3/8, SH
11	4701-00004-00	Lockwasher, #10 Split
12	A-12111	Flipper Stop Bracket Assy
13	HW-30018-6	Wire, 18 AWG, Blue
14	FL-11630	Flipper Coil (Red)
15	01-7695	Solenoid Bracket
16	4006-01017-04	Mach. Screw, 6-32 x 1/4
17	10-376	Coil Plunger Spring
18	4006-01005-06	Mach. Screw, 6-32 x 3/8
19	4406-01117-00	Nut, 6-32 Hex.
20	03-7568	Flipper Bushing

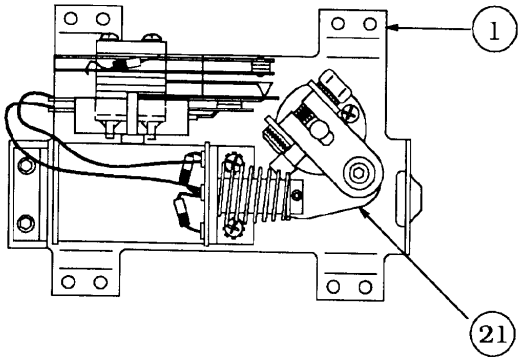
Item	Part Number	Description
21	B-10655-R	Crank Link Assembly, Right
a)	02-4179	Link Spacer Bushing
b)	4010-01086-14	Cap Screw, 10-32 x 7/8, SH
c)	4700-00023-00	Flatwasher, 5/8 x 13/64 x 16ga.
d)	4701-00004-00	Lockwasher, #10 Split
e)	4410-01132-00	Nut, 10-32 ESNA
f)	A-10656*	Flipper Link Assembly
1.)	02-4219	Coil Plunger
2.)	20-9370-1	Spring Pin, 5/32 dia. x 7/16
3.)	03-8050-1	Flipper Link
g)	B-10657-R	Flipper Crank Assy, R.
1.)	01-8073-R	Flipper Crank, R.
2.)	17-1037	Crank Washer
3.)	4010-01066-18	Cap Screw,10-32 x 1-1/8
4.)	4410-01127-00	Nut, 10-32 Hex Hd.
5.)	4700-00107-00	Flatwasher, 5/8 x 13/64 x 12ga.
6.)	4701-00004-00	Lockwasher, #10 Split
7.)	RM-23-06	Tubing, H. S. 1/4 DWP
22	23-6577	Bumper Plug

* See Separate Diagram

Associated Parts:.

20-9250	Flipper Arm on Shaft
23-6519	Rubber Ring

C-11626-L-3 Left Flipper Assembly



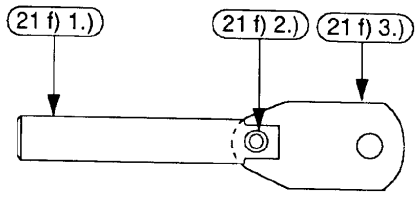
(Parts listed replace same items of **C-11626-R-3**)

Item	Part Number	Description
1	C-11627-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

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) and Flipper Rubber (23-6519) 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.

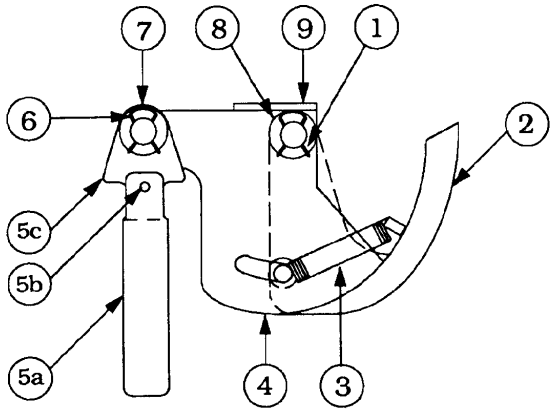
A-10656 Flipper Link Assembly



(Items listed refer to items for **C-11626-R-3**)

Item	Part No.	Description
21 f) 1.)	02-4219	Coil Plunger
21 f) 2.)	20-9370-1	Spring Pin, 5/32 x 7/16
21 f) 3.)	03-8050-1	Flipper Link

C-9638 Ball Shooter Lane Feeder

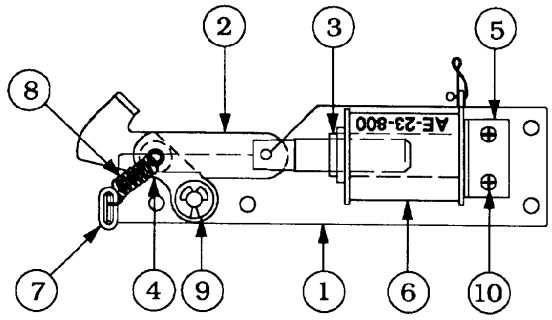


Item	Part Number	Description
1	12-6227	Hair Pin Clip
2	A-8247	Eject Cam Assembly
3	10-362	Ejector Spring (Plain)
4	A-6949-L	Spring Plate Assembly
5	A-8050-1	Coil Plunger Assy, 2-1/8"
a)	02-3407-2	Coil Plunger, 2-1/8"
b)	20-8716-5	Roll Pin, 1/8 x 7/16
c)	03-8085	Armature Link
6	12-6227	Hair Pin Clip
7	4700-00030-00	Flatwasher, 17/64 x1/2 x 15ga.
8	4700-00103-00	Flatwasher, 17/64 x1/2 x 28ga.
9	A-8268	Mounting Bracket Assembly

Associated Parts

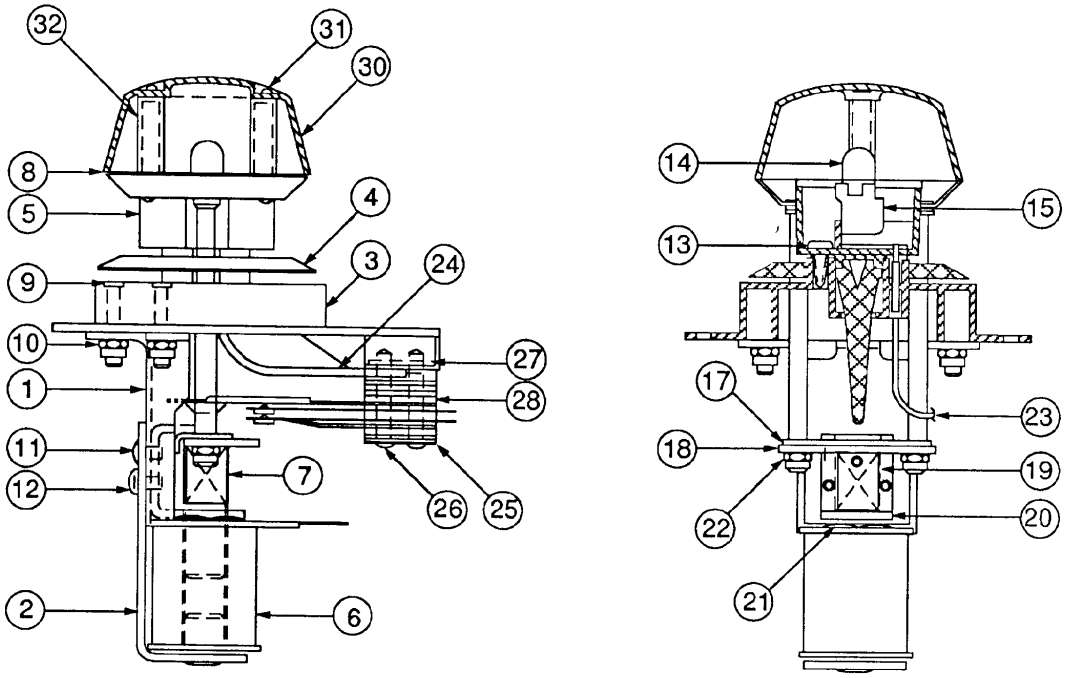
B-9362-L-1	Coil & Bracket Assembly
B-7572-1	Bracket & Stop Assembly
01-8-508-S	Coil Retaining Bracket
4006-01017-06	Mach. Screw, 6-32 x 3/8
4406-01119-00	Nut, 6-32 ESN
AE-23-800	Coil Assembly
03-7066	Coil Tubing

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

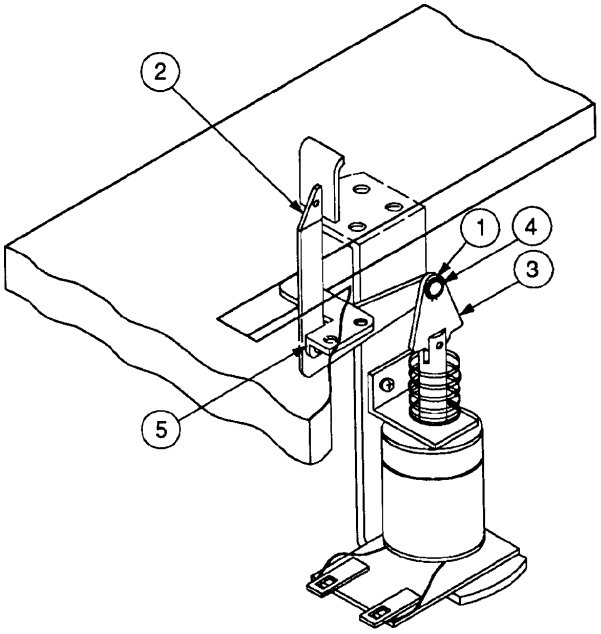
C-12842-1 Jumper Bumper Assembly



Item	Part Number	Description	Item	Part Number	Description
1	01-9117	Mounting Bracket	17	01-9116	Bracket, Bumper
2	B-12749	Core Plug & Bracket Assy	18	01-9320	Plate
3	03-8324-5	Base, White	19	02-3406-1	Plunger Coil
4	03-6035-7	Wafer, Black	20	01-9319	Bracket Plunger
5	03-8292-7	Body, Black	21	4705-00002-00	Spring Washer, 1/2"
6	AE-23-800	Coil Assembly	22	4406-01119-00	Nut, 6-32 ESN
7	10-326	Compression Spring	23	H-12769-2	Cable, White
8	A-12854	Body/Ring Assembly	24	H-12769-1	Cable, Red
9	4008-01070-14	Mach. Screw, 8-32 x 7/8	25	01-9321	Switch Plate
10	4408-01119-00	Nut, 8-32 ESN	26	4005-01016-18B	Mach. Screw, 5-40 x 1-1/8
11	4008-01015-04	TT, 8-32 x 1/4	27	01-9166	Plate
12	4008-01015-06	TT, 8-32 x 3/8	28	B-13267	Switch & Diode Assembly
13	4108-01001-10	Sh. Metal Screw, #8 x 5/8	29	03-7066	Coil Tubing
14	24-8768	Bulb #555 (6.3v., 0.25A.)	30	03-8291-13	Thumper Bumper Cap, Clear
15	24-8813	Lamp Socket	31	4004-01003-08	Mach. Screw, 4-40 x 1/2
16	10-411	Compression Spring	32	03-6047-16	Spacer, 1-1/16

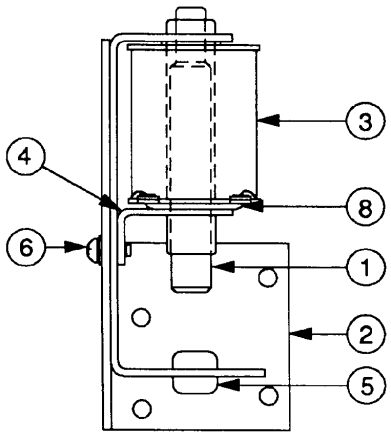
B-12665 Kicker Arm (Slingshot) Assembly

(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	
6	B-13935	Coil & Bracket Assembly
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

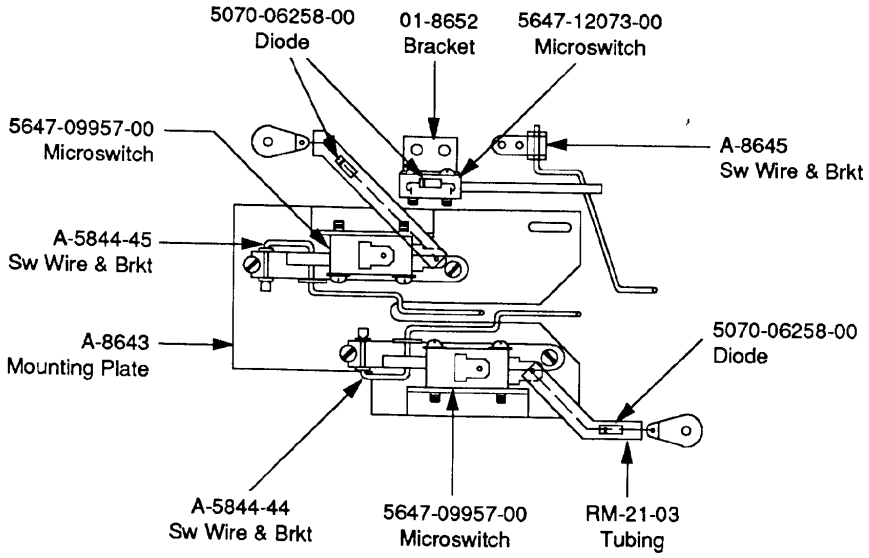
B-10686-1 Knocker Assembly



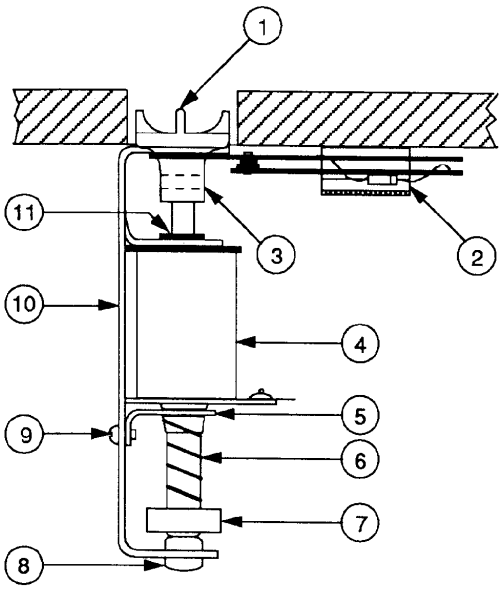
Item	Part Number	Description
1	A-5387	Coil Plunger Assembly
a)	02-2653	Coil Plunger
b)	03-6013	Bell Arm Ext.
2	B-7409-2	Mtg. Bracket Assembly
3	AE-23-800	Coil Sub-Assembly
4	01-8-508-T	Coil Retaining Bracket
5	23-6420	Rubber Grommet
6	4008-01017-06	Mach. Screw, 8/32 x 3/8
7	H-11835	Knocker Cable
8	03-7067-5	Coil Tubing

Ball Trough Switches

(Viewed from underside of playfield to show locations)

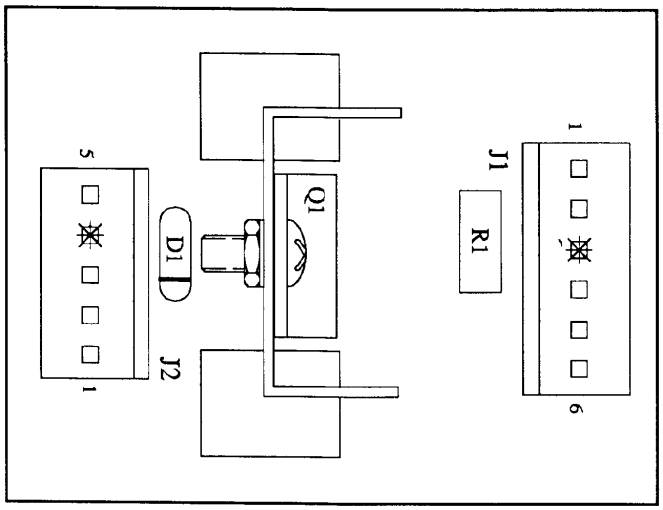


D-11335-1 Ball Popper Assembly



Item	Part Number	Description
1	03-8053	Ball Popper Cap
2	A-11657	Switch Assembly
a)	A-11658	Switch & Diode Assy
b)	01-3670-1	Switch Plate
c)	4205-01016-14	Wood Screw, #5 x 7/8
3	20-9314-7	Dowel Pin, 3/32 x 1/2
4	AE-24-900	Coil Assembly
5	A-13964	Bracket Assembly
6	10-135	Spring
7	A-11336	Armature Assembly
8	23-6420	Rubber Grommet
9	4008-01017-05	Mach. Screw, 8-32 x 5/16
10	B-11631	Ball Popper Bracket Assy
11	03-7067	Coil Tubing

C-13509 High Current Driver Board



Part Number	Ckt Symbol	Description	Part Number	Ckt Symbol	Description
5768-12609-00		Bare PC Board	5010-09361-00	R1	Resistor, 220Ω, 1/2w, 5%
4703-00015-00		Lockwasher, #4 External	5070-09054-00	D1	Diode, 1N4004, 1.0A.
4404-01117-00		Nut, 4-40 Hex.	5191-12179-00	Q1	Transistor, TIP36C PNP
4004-01005-00		Mach. Screw, 4-40 x 3/8	5791-10862-05	J2	Connector, 5-pin Hdr
5705-09199-00		Heatsink	5791-10862-06	J1	Connector, 6-pin Hdr

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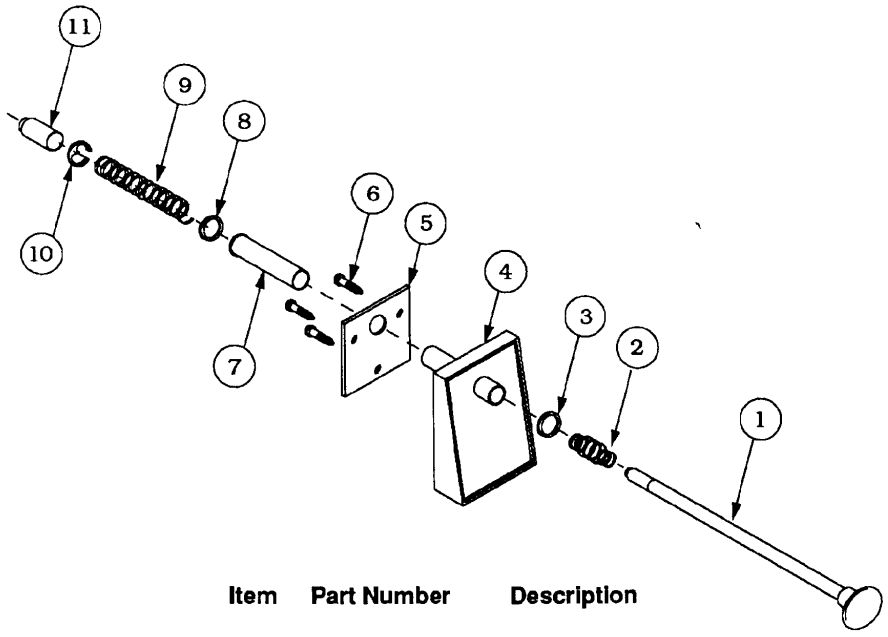
D-13812 Main Ramp Assembly

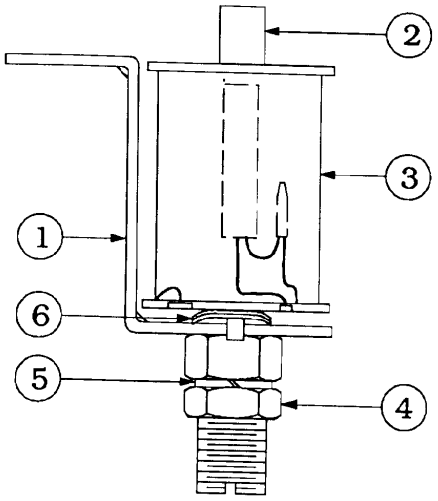
Item	Part Number	Description
1	A-13301	Switch Gate Assembly
2	B-13664	Switch Bracket Assembly
3	H-13991	Left Ramp Cable
4	01-8652	Mounting Bracket
5	01-9725	Ramp Flap
6	03-8456	Main Ramp
7	07-6688-19N	Rivet, 7/32 x 7/32
8	31-1593-2016	Ramp Decal
9	4002-01005-06	Mach. Screw, 2-56 x 3/8
10	4006-01027-06	Mach. Screw, 6-32 x 3/8
11	4406-01128-00	Nut, 6-32 KEPS
12	4700-00003-00	Flatwasher, 1/8 x 9/32 x 21ga.
13	4701-00024-00	Lockwasher, #2 Split
14	5070-06258-00	Diode, 1N4001, 1.0A
15	5647-12073-08	Microswitch

B-12445-1 Ball Shooter Assembly



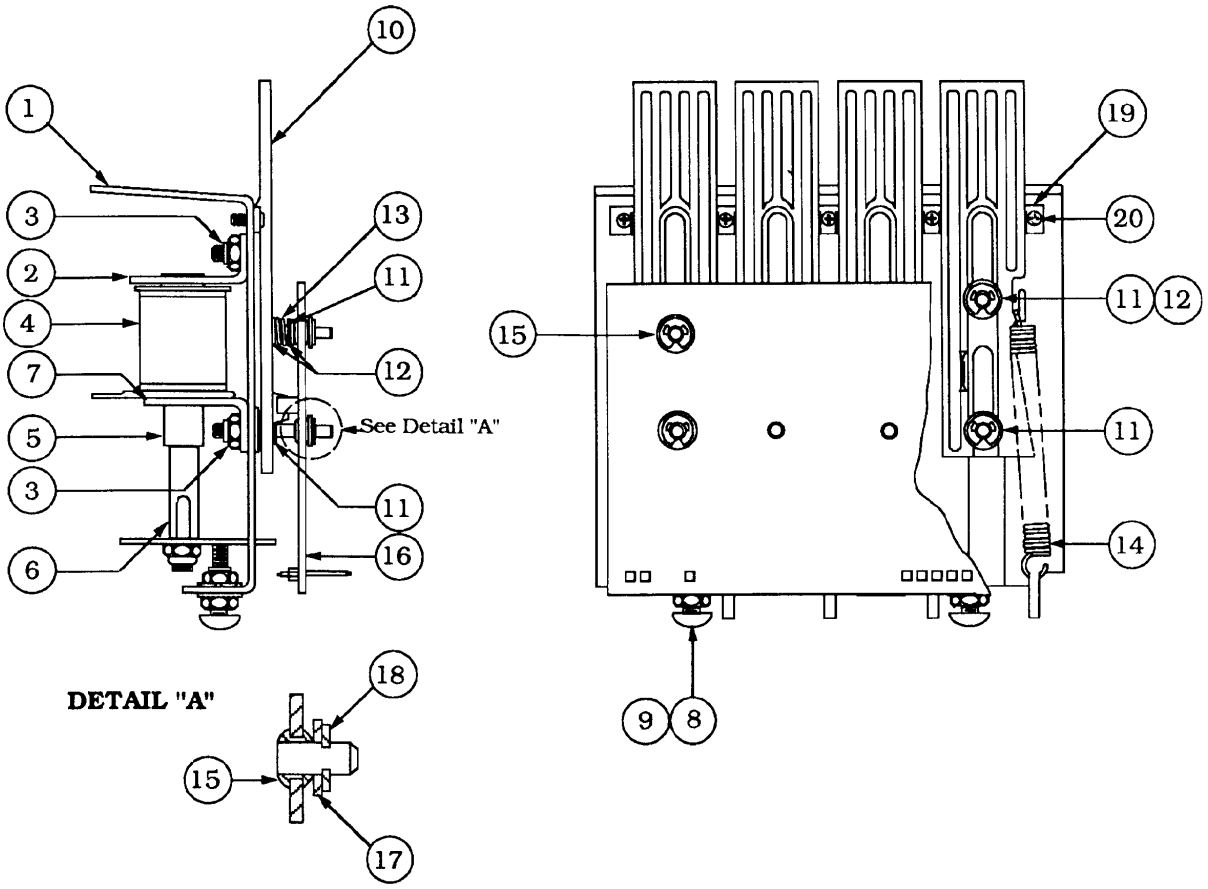
Item	Part Number	Description
1	20-9253-7	Rod Assembly
2	10-149	Rod Spring
3	4700-00051-00	Flatwasher, 25/64 x 5/8 x 16ga.
4	21-6645-1	Ball Shooter Housing
5	01-3535	Mounting Plate
6	4010-01006-10	Mach. Screw, #10-32 x 5/8
7	03-7357	Shooter Sleeve
8	10-148-1	Shooter Spring
9	20-8718-1	"C"-Retaining Ring
10	23-6327	Rubber Shooter Tip

B-13520 Magnet Assembly



Item	Part Number	Description
1	A-13500	Magnet Mounting Bracket
2	02-4446	Magnet Rod
3	B-13522	Magnet Coil
4	4423-01135-00	Jam Nut, 7/16-20
5	4701-00007-00	Lockwasher, 7/16" (Split)
6	4705-00002-00	Spring Washer, 1/2"

C-13450 4-Bank Drop Target Assembly

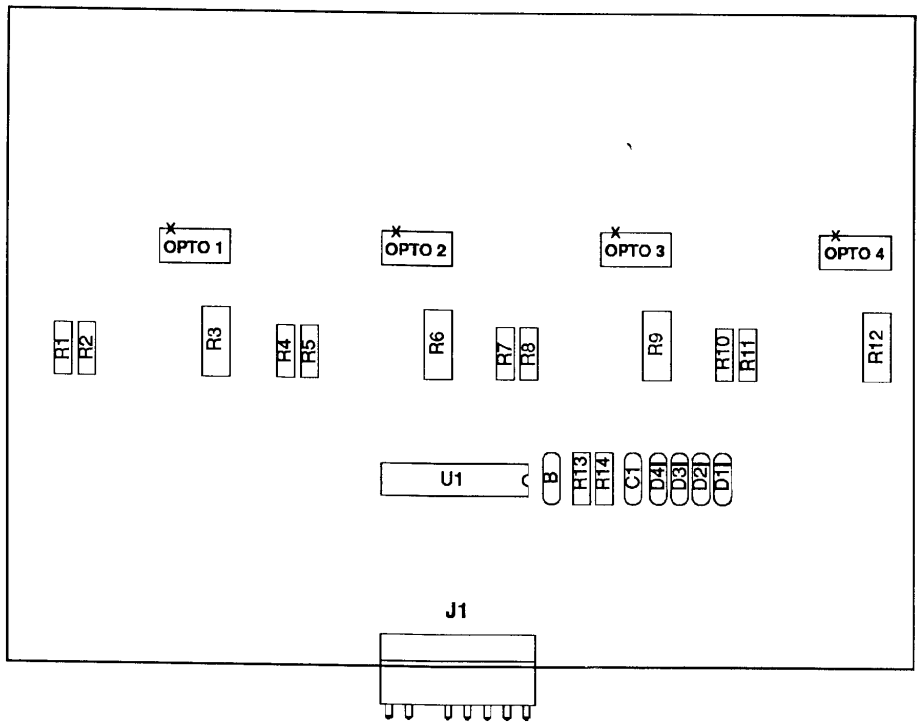


Item	Part Number	Description	Item	Part Number	Description
1	C-13451	Bracket & Stud Assembly	10	03-8036	Target, Plain
2	A-11397	Stop Bracket Assembly	11	20-8712-25	"E"-Ring, 1/4" Shaft
3	4408-01119-00	Nut, #8-32 ESN	12	4700-00072-00	Flatwasher, 17/64 x 1/2 x 21ga.
4	AE-24-900	Coil Assembly	13	10-392	Spring-Compression
5	03-7066-4	Coil Tubing, 2-3/32" Lg.	14	10-364	Spring-Extension
6	A-13453	Reset Plate Assembly	15	23-6626	Rubber Grommet
a)	01-9547	Reset Plate, 4-Bank	16	C-12499	4-Bnk Drop Tgt Opto
b)	02-3972-1	Plunger	17	4700-00016-00	Flatwasher, 17/64 x 1/2 x 21ga.
c)	4410-01132-00	Nut, 10-32 ESN	18	20-8712-18	"E"-Ring, 3/16" Shaft
7	01-9548	Bracket, Coil Mounting	19	03-8334-4	Target Stop, 5-3/16"
8	4008-01016-10	Mach. Screw, 8-32 x 5/8	20	4004-01005-04	Mach. Screw, 4-40 x 1/4
9	4408-01128-00	Nut, #8-32 KEPS			

Associated Parts:

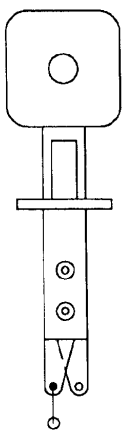
31-1463-2016	4-Bank Drop Target Decal

C-12499 4-Bank Drop Target Opto Board

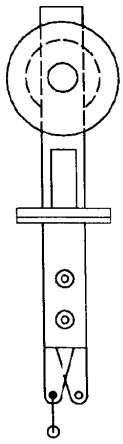


Part Number	Ckt Designator	Description
5768-12376-00		4-Bank Opto Board
5010-08930-00	R3, R6, R9, R12	Resistor, 470KΩ, 1/2w, 5%
5010-09324-00	R2, R5, R8, R11	Resistor, 27KΩ, 1/4w, 5%
5010-08774-00	R14	Resistor, 22KΩ, 1/4w, 5%
5010-09162-00	R13	Resistor, 100KΩ, 1/4w, 5%
5010-08773-00	R1, R4, R7, R10	Resistor, 18KΩ, 1/4w, 5%
5043-08980-00	C1, B	Cap., .01µfd, 50V (+80, -20%)
5370-12272-00	U1	I.C. LM339 Quad Comp
5490-10159-00	Opto 1 - Opto 4	Opto Interruptor MDL L/G
5070-09054-00	D1 - D4	Diode, 1N4004, 1.0A.
5791-12622-08	J1	Connector, 8-pin Header

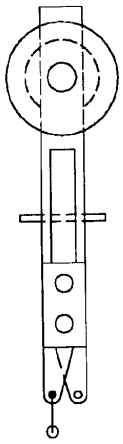
Standup Target Assemblies



B-14077



B-14060



B-11696

B-11696-2 Standup Target

Part Number	Description
B-11696-2	Standup Target Assembly
SW-1A-170-2	Standup Target Switch
03-8093-2	Standup Target, Green
5070-06258-00	Diode, 1N4001, 1.0A.

B-11696-4 Standup Target

Part Number	Description
B-11696-4	Standup Target Assembly
SW-1A-170-4	Standup Target Switch
03-8093-4	Standup Target, Red
5070-06258-00	Diode, 1N4001, 1.0A.

B-14060-5 Square Target

Part Number	Description
B-14060-5	Standup Target Assembly
SW-1A-184-5	Standup Target Switch
03-8304-5	Square Target, White
5070-06258-00	Diode, 1N4001, 1.0A.

* B-14077-2 Standup Target

Part Number	Description
B-14077-2	Standup Target Assembly
SW-1A-170-2	Standup Target Switch
03-8093-2	Standup Target, Green
5070-06258-00	Diode, 1N4001, 1.0A.

* B-14077-6 Standup Target

Part Number	Description
B-14077-6	Standup Target Assembly
SW-1A-170-2	Standup Target Switch
03-8093-6	Standup Target, Yellow
5070-06258-00	Diode, 1N4001, 1.0A.

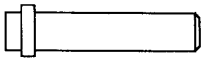
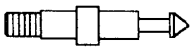
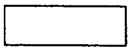
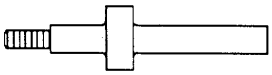
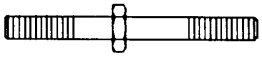
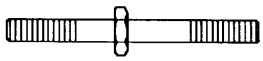
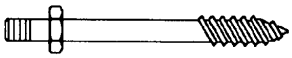
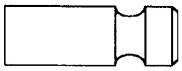
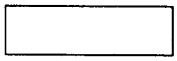
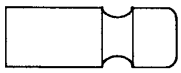
* B-14077-4 Standup Target

Part Number	Description
B-14077-4	Standup Target Assembly
SW-1A-170-4	Standup Target Switch
03-8093-4	Standup Target, Red
5070-06258-00	Diode, 1N4001, 1.0A.

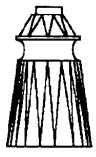
* Standup Target located on Mini Playfiled: 2016-PL-UP

Posts

Metal Posts

	Part No.	Description	[Quantity]
	02-3409	Spring Post	[1]
	02-4003	Mini Post	[1]
	02-4020	Support Post	[3]
	02-4036	Bumper Post, Rubber	[15]
	02-4424-1	Post, #6-32 / #8-32	[7]
	02-4425 -1	Post, #8-32 / #8-32	[1]
	02-4426-1	Post, #6-32 / #8 SMS	[7]
	02-4434	Post, #8 x 1"	[10]
	02-4436-14	Spacer, 8-32 x 2"	[1]
	03-8365-13	Post,#8 (Clear)	[8]

Plastic Posts



03-8319-13
Star Post, #8 (Clear)
[22]

03-8247-9
Double Star Post,
Trans, Red
[22]

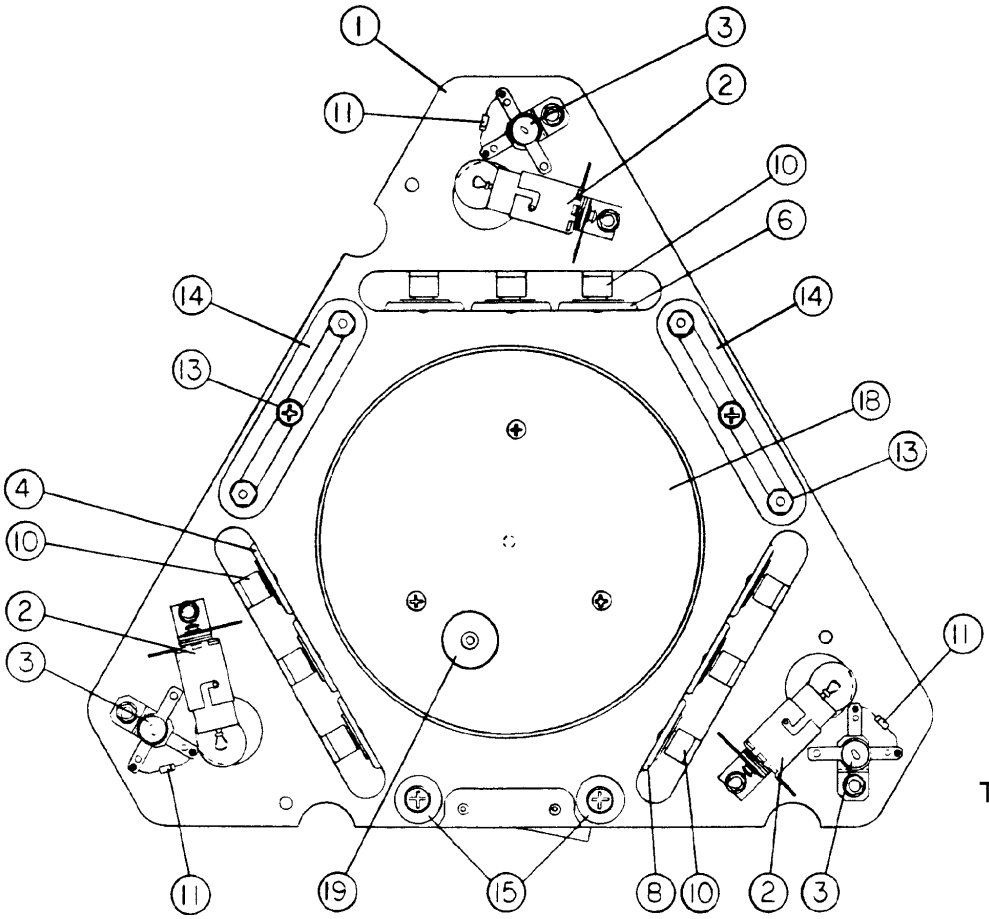
2016-PL-UP Mini-Playfield Assembly

Item	Part Number	Description
1	31-1002A-2016	Screened Playfield
2	A-12336-1	Socket & Bulb Assy. (3 used)
	24-8802	#906 Bulb 13V 0.69
3	A-14032	Socket & Bulb Assy. (3 used)
	24-6549	#44 Bulb
4	B-14077-2	Stand-Up Target - Green (3 used)
5	SW-1A-170-2	Target Switch - Green (3 used)
6	B-14077-4	Stand-Up Target - Red (3 used)
7	SW-1A-170-4	Target Switch - Red (3 used)
8	B-14077-6	Stand-Up Target - Yellow (3 used)
9	SW-1A-170-6	Target Switch - Yellow (3 used)
10	01-9878	Switch Mounting Bracket (9 used)
	23-6652	Rubber Edge Protector
11	5070-06258-00	Diode 1N4001, 1.0A (12 used)
12	C-13310-1	Motor EMI Assembly
13	03-8365-1	Plastic Post #8 - Red (8 used)
14	23-6304	Rubber Bumper, 1-1/2" ID (2 used)
15	23-6641	Rubber Bumper, .64" OD (2 used)
16	03-8435 -1	Plastic Gear 115 - Tr. Red
17	D-13793	Gear Assembly (See p. 2-29)
18	31-1006-2016-23	Screened Playfield Plastic
19	23-6551	Rubber Bumper 3/4 x 5/8 - Yellow
Associated Assembly:	D-13839	Mix Master Shroud Assy. (See p. 2-28)
20	A-13839	Shroud Assembly
	03-8449	Plastic Shroud - Chrome
	31-1592-2016-6	Glitter Decal - Gold
	31-1592-2016-7	Glitter Decal - Gold
	31-1592-2016-8	Glitter Decal - Gold
	31-1592-2016-9	Glitter Decal - Gold
21	20-9656-1	Fuel Line - Red
22	20-9656-2	Fuel Line - Green
23	20-9656-3	Fuel Line - Yellow
24	B-13840-9	Mix Master End Assy.
	03-3450	Plastic End - Chrome
	31-1592-2016-1	Glitter Decal - Red
	31-1592-2016-12	Glitter Decal - Red
25	B-13840-11	Mix Master End Assy.
	03-8450	Plastic End - Chrome
	31-1592-2016-3	Glitter Decal - Green
	31-1592-2016-4	Glitter Decal - Green
	31-1592-2016-11	Glitter Decal - Green
26	B-13840-16	Mix Master End Assy.
	03-8450	Plastic End - Chrome
	31-1592-2016-2	Glitter Decal - Yellow
	31-1592-2016-5	Glitter Decal - Yellow
	31-1592-2016-13	Glitter Decal - Yellow
27	03-8149-9	Mini Dome - Tr. Red
28	03-8149-11	Mini Dome - Tr. Green
29	03-8149-16	Mini Dome - Tr. Yellow
30	31-1006-2016-25	Screened Plastic Cover

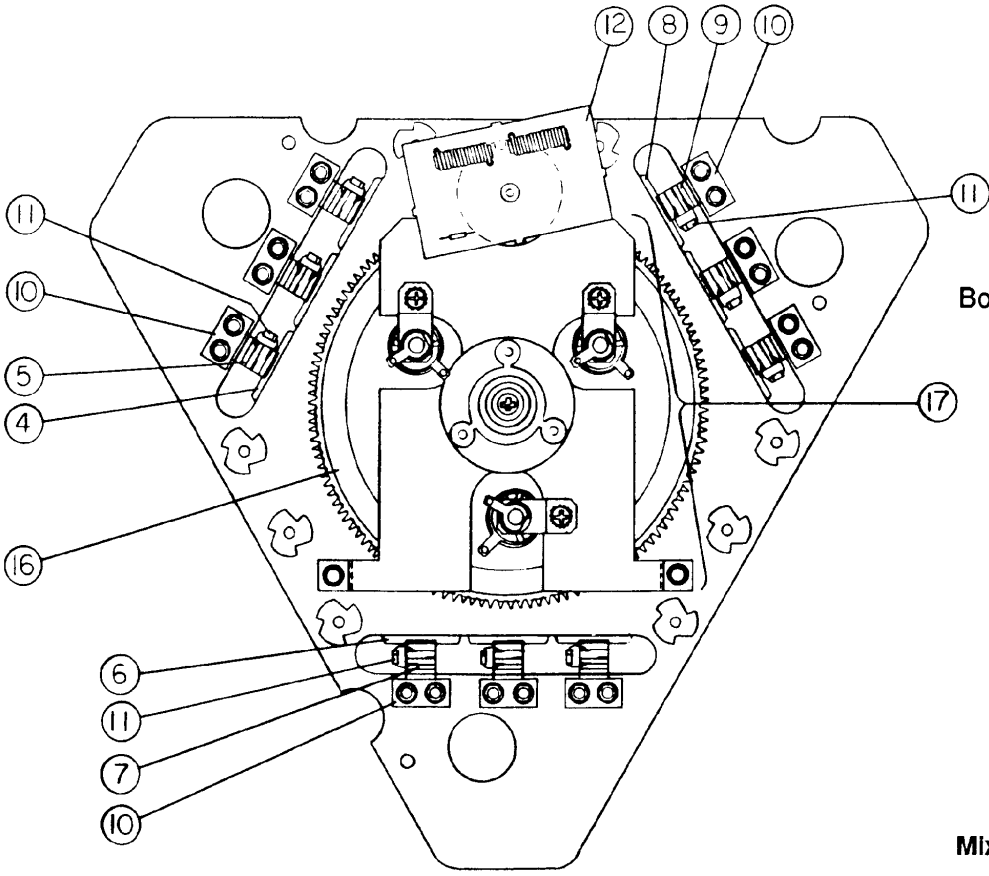
Cable Assemblies (Not shown):

H-13906	Mix Master Switch Cable
H-13907	Mix Master Lamp Cable
H-13908	Mix MasterFlash Lamp Cable
H-13990	Motor Driver Cable

2016-PL-UP Mini-Playfield Assembly



Top View

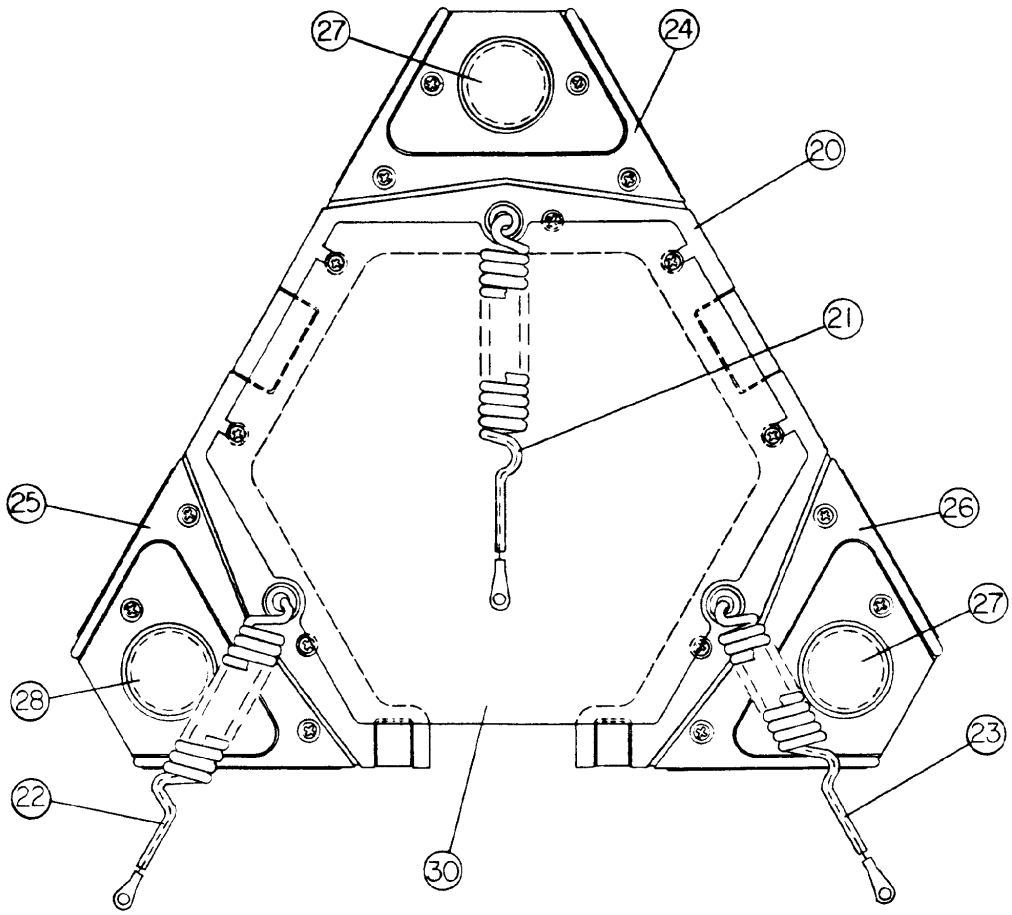


Bottom View

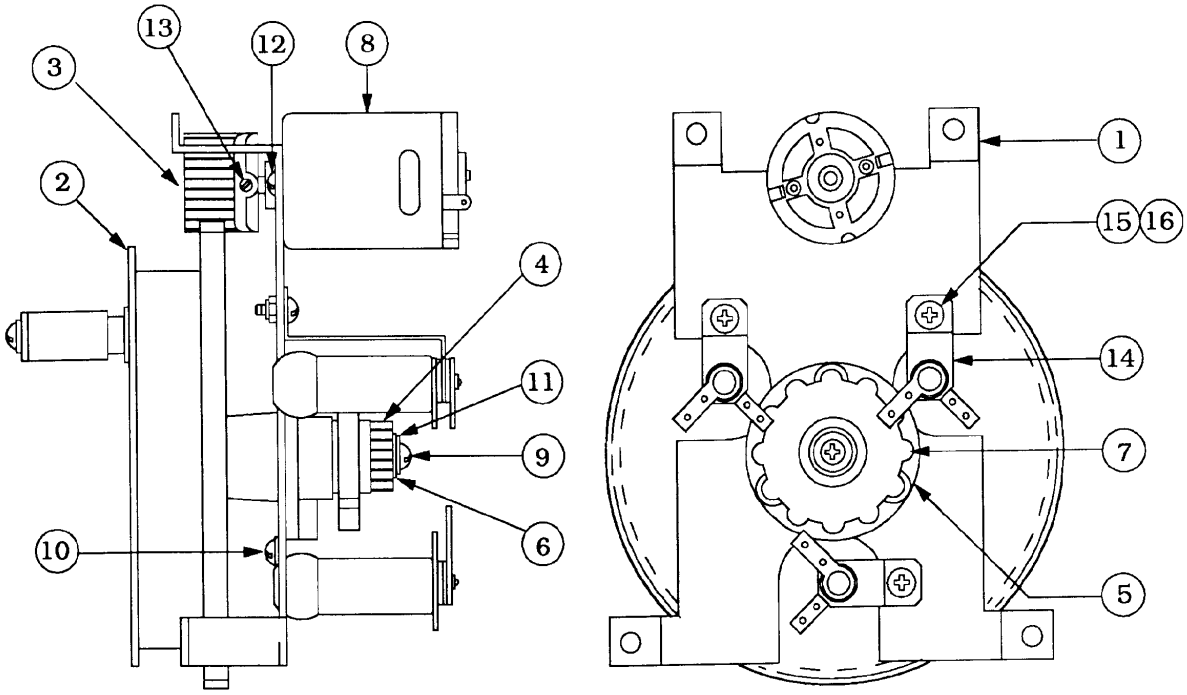
Mix Master

D-13839 Mix Master Shroud Assembly

See p. 2-24 for parts listing.

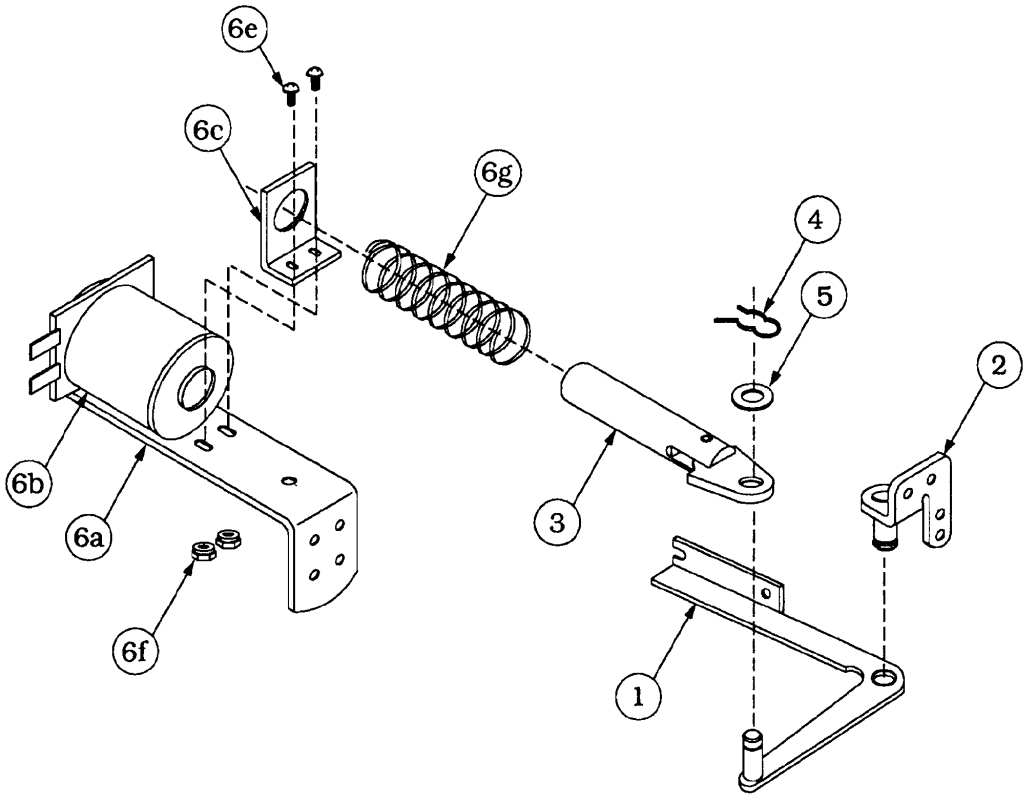


D-13793 Gear Assembly



Item	Part No.	Description
1	01-9710	Bracket Mounting
2	C-13794	Gear/Post Assembly
3	03-8434	Pinion
4	02-4419	Adjusting Screw
5	03-8347	Gland
6	20-9610	Bearing Flange
7	03-8363	Nut Locking
8	14-7955	Motor
9	4008-01017-08	Mach. Screw, 8-32 x 1/2
10	4108-01004-06	Sh. Metal Screw, 8-32 x 3/8
11	4700-00016-00	Flatwasher, 3/16 x 7/16 x 17 ga.
12	20-9639	Metric MS Screw
13	4006-01076-04	Set Screw, 6-32 x 1/4
14	A-9302	Socket & Lamp Assembly
a)	24-8704	Bulb #89
15	4006-01003-04	Mach. Screw, 6-32 x 1/4
16	4406-01119-00	Nut, ESNA 6-32

A-14098 Big Shot Kicker Assembly



Associated Parts

Item	Part Number	Description
1	A-14099	Crank Assembly
2	A-14101	Kicker Mounting Bracket
3	A-8050-1	Plunger Assembly
a)	02-3407-2	Plunger Coil, 2-1/8"
b)	03-8085	Armature Link
c)	20-8716-5	Roll Pin, 1/8 x 7/16
4	12-6227	Hairpin Clip
5	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.

Item	Part Number	Description
6	**B-11203-R-1**	Coil & Bracket Assy
a)	B-7572-1	Bracket Assy
b)	AE-26-1500	Coil Assy
c)	01-8-508-S	Coil Retainer
d)	03-7066	Coil Tubing
e)	4006-01017-06	Mach. Screw, 6-32 x 3/8
f)	4406-01119-00	Nut, 6-32 ESN
g)	10-128	Spring

B-14010 Big Shot Assembly

Part Number	Description
01-9824	Mounting Bracket
01-9825	Mounting Plate
03-8447	Big Shot Character

B-14033 Gift Gab Assembly

Part Number	Description
A-8882-1	Socket & Bulb Assembly
01-9840	Bracket
4006-01027-04	Mach. Screw, 6-32 x 1/4
4406-01128-00	Nut, 6-32 KEPS

Unique Parts List

Part Number	Description
A-13100-1	Ball Gate Assembly
A-13767-2016	Backbox Assembly
A-14073	Ball Gate Assembly
A-13571-2016	4-Bnk Drop Tgt & Decal Assy
A-14098	Big Shot Kicker Assembly
B-13840-11	Mix Master End Assembly
B-13840-16	Mix Master End Assembly
B-13840-9	Mix Master End Assembly
B-13856	Ball Guide Assembly
B-13860	Ball Guide Assembly
B-13861	Ball Guide Assembly
B-13862	Ball Guide Assembly
B-13922	Ball Guide Assembly
B-13935	Coil & Bracket Assembly
B-14010	Big Shot Assembly
B-14033	Gift Gab, Light Assembly
B-14034	Heart of R-N-R Assembly
B-14077-2	Standup Tgt. Assy (Green)
B-14077-4	Standup Tgt. Assy (Red)
B-14077-6	Standup Tgt. Assy (Yellow)
B-4834-K-2	Standup Switch Assembly
C-13310-1	Motor EMI Assembly
C-13716	Ray Assembly
C-13794	Gear/Post Assembly
C-13851	X-Ray Lamp Assembly
C-13852	Dude Lamp Assembly
C-13853	Magnetic Lamp Assembly
C-13854	Reflex Lamp Assembly
C-13855	3-Lamp Playfield Assembly
C-13857	Ball Guide Assembly
C-13892	Triac Board Assembly
C-13911	Jumper Lamp Assembly
C-13954	Back Panel, 4-Lamp Assembly
C-14031	X-Ray Cap Assembly
D-13643	Back Panel Assembly
D-13793	Spinner Assembly
D-13812	Main Ramp Assembly
D-13839	Mix Master Shroud Assembly
D-13858	Ball Guide Assembly
D-13859	Ball Guide Assembly
D-11581-2016	Audio Board
D-11883-2016	CPU System 11B Assembly
D-12313-2016	Backbox Interconnect Board
D-13955	Speaker Panel Assembly
H-12190-2016	Main Backbox Cable
H-13544-2016	Playfield Switch Assembly
H-13545-2016	Playfield Lamp Cable
H-13546-2016	Playfield Solenoid Cable
H-13547-2016	Insert Cable
H-13906	Mix Master Switch Assembly
H-13907	Mix Master Lamp Assembly
H-13908	Mix Master Flashlamp Assembly
H-13909	Magnet Lamp Cable
H-13910	Jackpot Lamp Cable
H-13986	Flasher 15 & 5C Cable
H-13989	Magnet Driver Cable
H-13990	Motor Driver Cable
H-13991	Left Ramp Cable
H-13992	Flashlamp 8C Cable
H-14088	Reflex Switch Cable
02-4436-14	F-F Spacer, 8-32 x 2"
02-4474	Playfield Spacer
03-7960-2016-1	Playfield Mylar
03-7960-2016-2	Playfield Mylar
03-7960-2016-3	Playfield Mylar
03-7960-2016-4	Playfield Mylar
03-8022-6	Spacer, 3/4"
03-8363-1	Locking Nut
03-8435	Gear, 115T (Clear)
2016-PL	Playfield Assembly
2016-PL-UP	Mini-Playfield Assembly
31-1002-2016	Screened Playfield
31-1002A-2016	Screened Playfield
31-1006-2016	Plastic Playfield Set
31-1008-2016	Screened Bottom Arch
31-1009-2016	Screened Shooter Gauge
31-1357-2016	Screened Backglass
31-1463-2016	4-Bnk Drop Target Decal
31-1592-2016	Glitter Decals

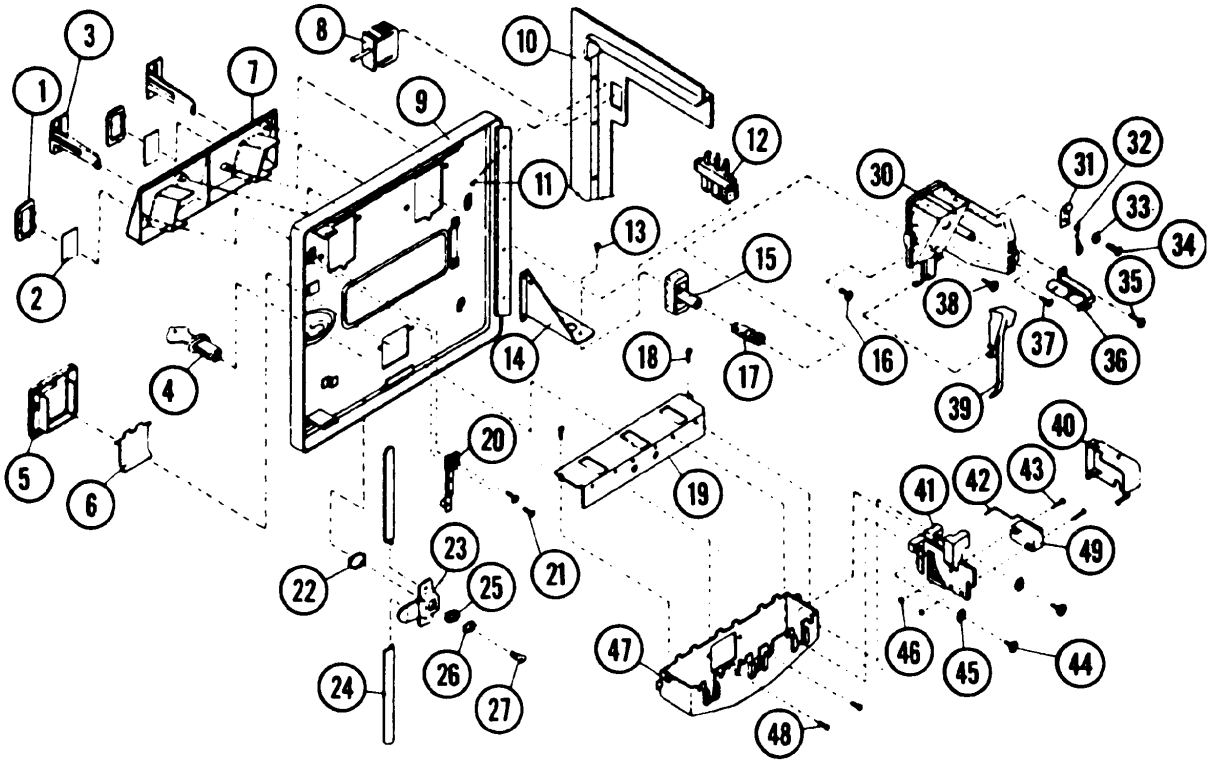
C-13155-1 Coin Door Assembly

USA Door with decals

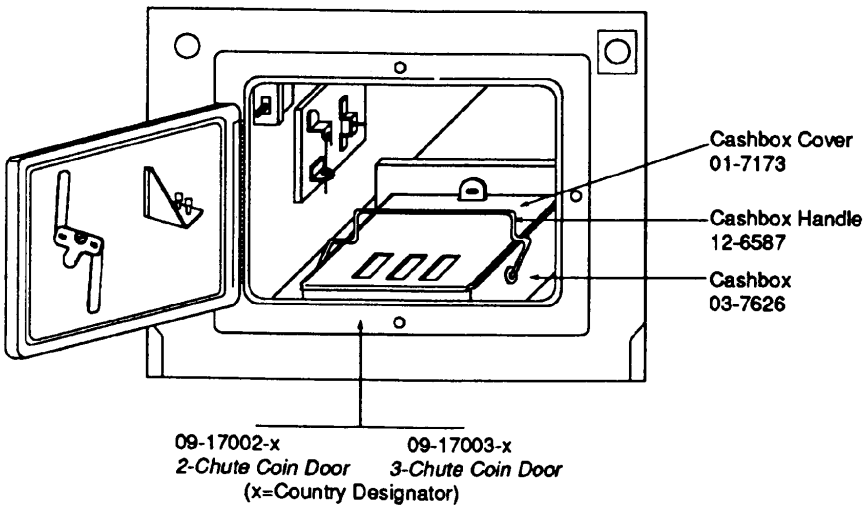
2-Chute Door - **09-17002-x** 3-Chute Door - **09-17003-x** ("**x**" is the country designator)

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
28-29	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)	
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

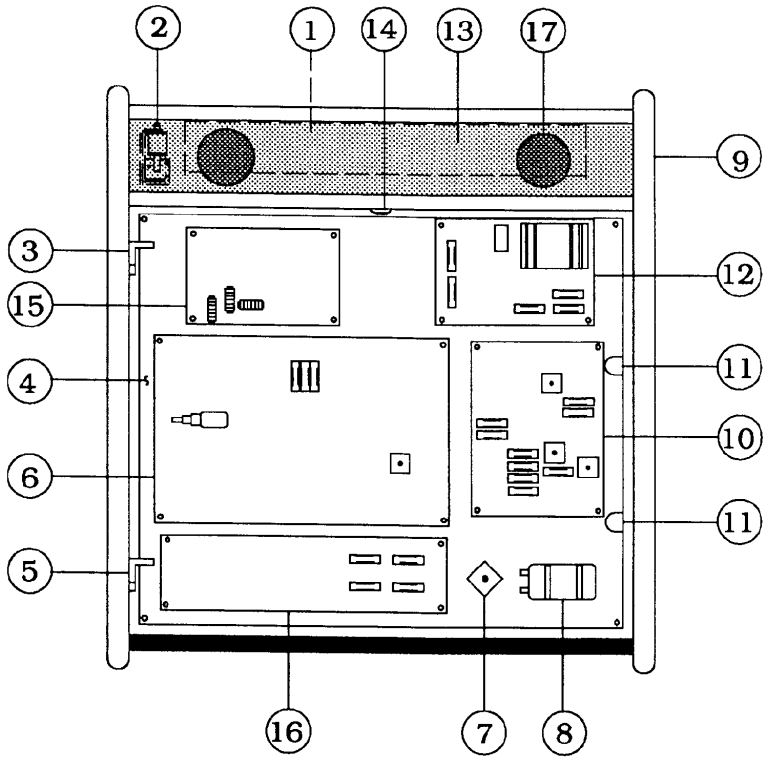
C-13155-1 Coin Door Assembly



Pinball Front Box



DR. DUDE Backbox Parts



Item	Part Number	Description	Item	Part Number	Description
1	01-6645	Venting Screen	13	B-12704	Spkr Grille/Logo Assy
2	B-10686-1*	Knocker & Bracket Assy	a)	01-8996	Grille Speaker
3	A-12497	Upr Insert Bd Hinge Assy	b)	31-1493	Bally Logo
4	D-13336	PCB Plate Assembly	14	20-9637	Lock & Cam Kit
5	A-12498	Lwr Insert Bd Hinge Assy	15	D-11581-2016*	Audio Board Assembly
6	D-11883-2016*	System 11C CPU Board	16	D-12313-2016*	Backbox Interconnect Board
7	5100-09418-00	Bridge Rectifier, 100v, 35A.	17	D-13955	Speaker Panel Assy
8	5040-09051-00	Capacitor, 30,000 µFd, 25v	a)	5555-12068-00	4" Piezo Spkr, 50W
9	A-13763-2016	**DR. DUDE** Backbox	b)	5555-12015-00	8Ω Speaker, 6", 20W
10	D-12247-576*	Aux. Pwr Driver Board	** 18	2016-IN	Insert Assembly
11	01-9047	Insert Stop Bracket	a)	D-12502-1	Bally Right Display Bd
12	D-12246*	Power Supply Assembly	b)	D-12706	Bally Left Display Bd

* 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-13204-2016	Bottom Arch Assembly	09-17002-26	USA Coin Door
A-5610-12136	Transformer 115V/230	09-8803	25¢ Rejector
A08550-1	Pot & Bracket Assembly	20-6500	Steel Ball, 1-1/16"
A-8552-2016	Backglass Assembly	20-6502-A	Plumb Bob
C-10843-1	Metal Leg	24-6549	#44 Bulb
C-11026-1	Line Filter assembly	24-8704	#89 Bulb
C-13155-1	Coin Door 2-Slot USA	24-8768	#555 Bulb
D-11920-17	Mech Panel Assembly	24-8802	#906 Bulb
D-12615	Front Molding Assembly	31-1002-2016	Playfield (Screened)
01-2263-3	Gray Metal Leg	31-1002A-2016	Playfield (Screened)
01-3493-1	Lock Bracket	31-1006-2016	Playfield Plastics
01-3527	Latch Plate	31-10082016	Bottom Arch (Screened)
01-3569-1	Ball Return Runaway	31-1009-2016	Shooter Plate (Screened)
01-6592	Vent Screen	31-1463-2016	4-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	31-1593-2016	Ramp Decal

Cable List

Part Number	Description	Part Number	Description
H-10978-1	AC Cable	H-13546-2016	Solenoid Cable
H-11834	18V Rectifier Cable	H-13547-2016	Insert Cable
H-11835	Knocker Cable	H-13906	Mix Master Switch Cable
H-12190-2016	Main Backbox Cable	H-13907	Mix Master Lamp Cable
H-12192-571	Cabinet Cable	H-13908	Mix Master Flashlamp Cable
H-12196-576	Secondary Cable	H-13909	Magnet Lamp Cable
H-12199	Lamp Interconnect Cable	H-13910	Jackpot Lamp Cable
H-12200	Switch Interconnect Cable	H-13988	Flashlamp 15 & 5C Cable
H-12299-2014	Logic/Power Speaker Cable	H-13989	Magnet Driver Cable
H-12775	Speaker Panel Cable	H-13990	Motor Driver Cable
H-12776	Main Display Cable	H-13992	Flashlamp 8C Cable
H-13544-2016	Switch Cable	H-14088	Reflex Switch Cable
H-13545-2016	Lamp Cable		

Pinout Table

used on Master Display Board

D-12232-1 or -2

Board Pin #	Glass Pin #	Signal/ Function	Board Pin #	Glass Pin #	Signal/ Function	Board Pin #	Glass Pin #	Signal/ Function	Board Pin #	Glass Pin #	Signal/ Function
1	1	N/C		24	cut	31	47	Strobe 8		70	cut
2	2	Segment A	23	25	Strobe 12		48	cut	40	71	Strobe 4
3	3	Segment J		26	cut	32	49	Strobe 8		72	cut
4	4	Segment B	24	27	Strobe 12		50	cut		73	cut
5	5	Strobe 16		28	cut		51	cut		74	cut
6	6	Segment K		29	cut		52	cut	41	75	Strobe 3
7	7	Strobe 16		30	cut	33	53	Strobe 7		76	cut
8	8	Segment H	25	31	Strobe 11		54	cut	42	77	Strobe 3
9	9	Segment F		32	cut	34	55	Strobe 7		78	cut
10	10	Segment M	26	33	Strobe 11		56	cut	43	79	Strobe 2
11	11	Strobe 15		34	cut	35	57	Strobe 6	44	80	Comma
12	12	Segment C		35	cut		58	cut	45	81	Strobe 2
13	13	Strobe 15		36	cut		59	cut	46	82	Segment P
14	14	N/C	27	37	Strobe 10		60	cut	47	83	Segment R
15	15	Strobe 14		38	cut	36	61	Strobe 6	48	84	Segment E
16	16	Dot	28	39	Strobe 10		62	cut	49	85	Strobe 1
17	17	Strobe 14		40	cut	37	63	Strobe 5	50	86	Segment N
18	18	Segment D	29	41	Strobe 9		64	cut	51	87	Strobe 1
19	19	Strobe 13		42	cut	38	65	Strobe 5	52	88	Segment
20	20	Dot	30	43	Strobe 9		66	cut	53	89	-100V dc
21	21	Strobe 13		44	cut		67	cut			
22	22	N/C		45	cut		68	cut			
	23	cut		46	cut	39	69	Strobe 4			

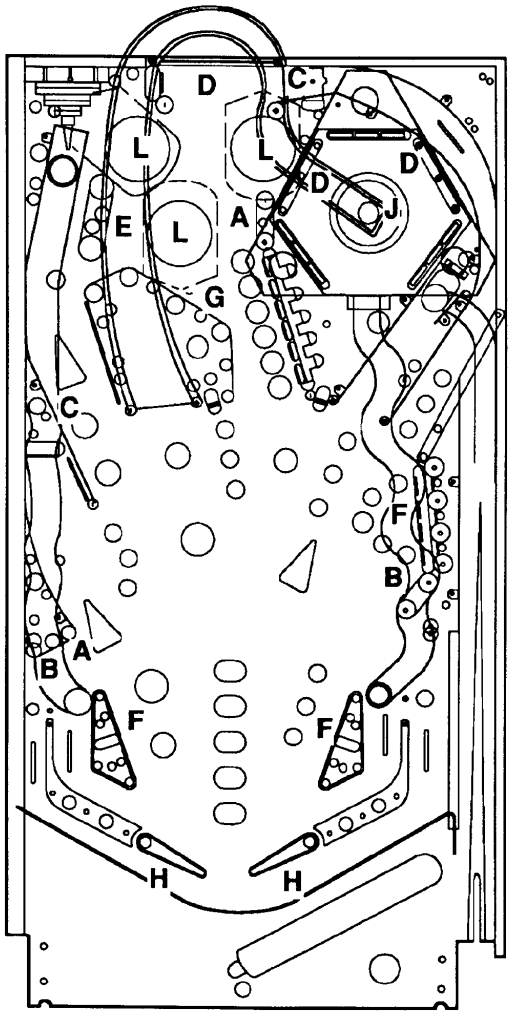
D-13643 Back Panel Assembly

Part Number	Description
A-13100-1	Ball Gate assembly
C-12876	5-Lamp Assembly
C-13716	Ray assembly
C-13954	4-Lamp Assembly
H-13992	Flashlamp 8C Cable
01-9170	Bracket
01-9795	Ramp Mounting Bracket
01-9842	Back Panel Cover
11-831-2016	Wood

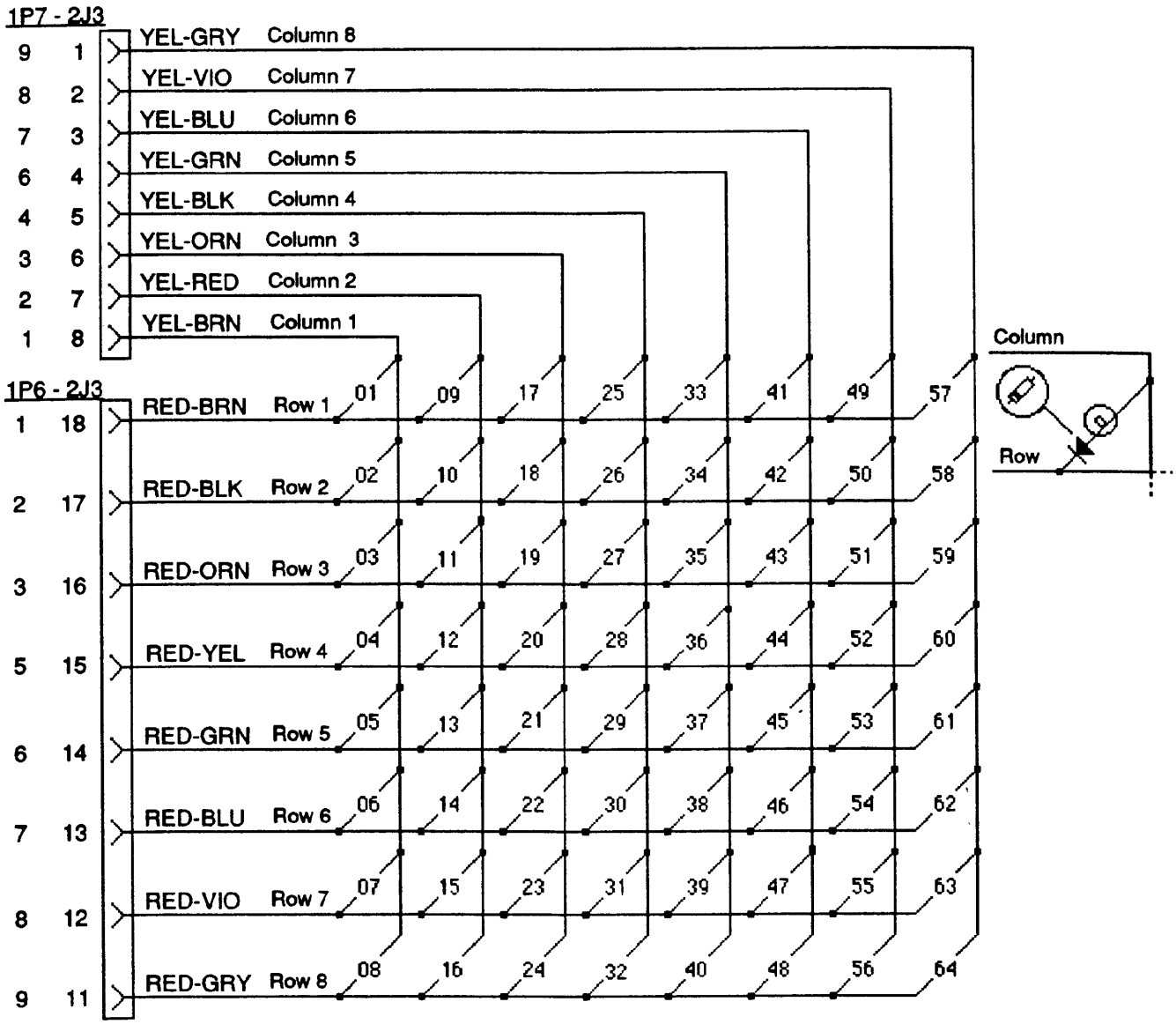
C-13716 Ray Assembly

Item	Part Number	Description
1	B-13923	Bracket & PCB Assembly
a)	A-12336-1	Socket & Bulb Assy
b)	C-13851	X-Ray Lamp Assembly
c)	01-9775	Bracket
d)	03-6047-1	Spacer, 1/4"
e)	4006-01005-06	Mach. Screw, 6-32 x 3/8
f)	4006-01005-00	Mach. Screw, 6-32 x 1/2
g)	4406-01128-00	Nut, 6-32 KEPS
2	C-14031	X-Ray Cap Assembly
3	01-9754	Mounting Plate

Rubbers



Item	Part No.	Description	Qty.
A	23-6300	5/16" Ring	2
B	23-6301	3/4" Ring	2
C	23-6303	1-1/4" Ring	2
D	23-6304	1-1/2" Ring	4
E	23-6305	2" Ring	1
F	23-6306	2-1/2" Ring	3
G	23-6309	4" Ring	3
H	23-6519-4	Red Flipper Ring	2
J	23-6551	Rubber Bumper, 3/4" x 5/8"	1
K	23-6556	Post Rubber Bumper	14
L	23-6641	Rubber Bumper	3



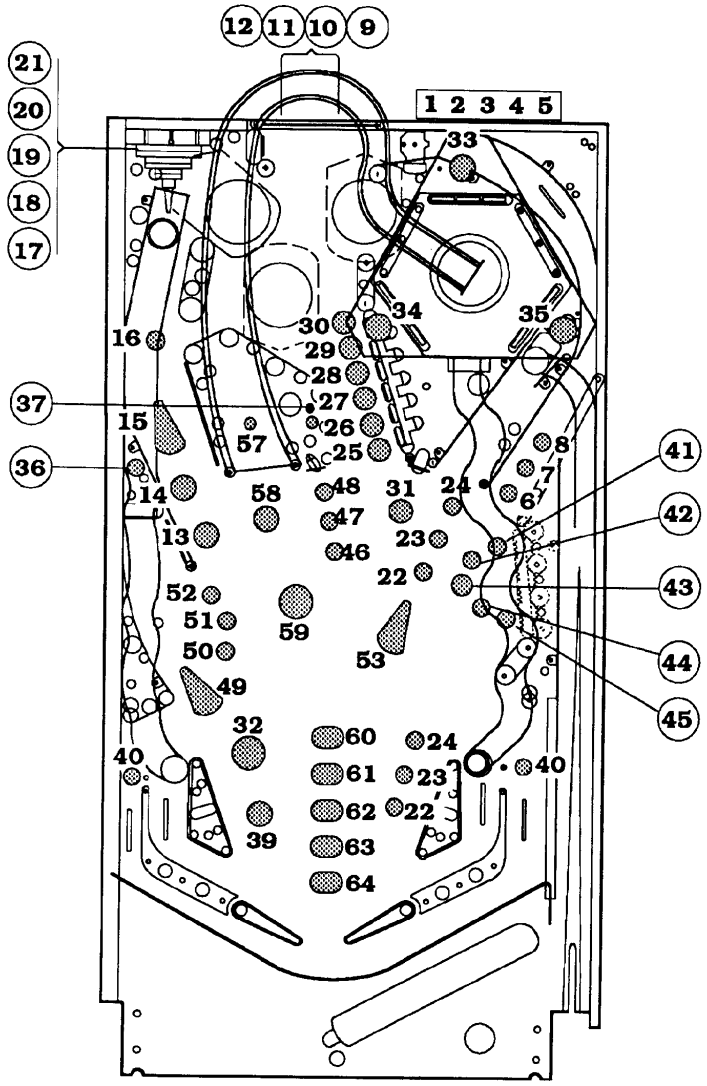
DR. DUDE LAMP MATRIX

column	1 Q65	2 Q64	3 Q62	4 Q60	5 Q58	6 Q56	7 Q54	8 Q52
row	YEL-BRN 1J7-1	YEL-RED 1J7-2	YEL-ORN 1J7-3	YEL-BLK 1J7-4	YEL-GRN 1J7-6	YEL-BLU 1J7-7	YEL-VIO 1J7-8	YEL-GRY 1J7-9
1 Q80 RED-BRN 1J6-1	Jackpot 1 Million 1	I Test 25K 9	Raygun's Lamp 1 17	reflex(X) 25	Mix Master Heart 33	Right Drop Target Hot Score 41	Magnetic R.e.f.l.e.x. 3 49	Jackpot Lit 57
2 Q81 RED-BLK 1J6-2	Jackpot 2 Million 2	I Test 50K 10	Raygun's Lamp 2 18	ref(E)x 26	Mix Master Mag. 34	Right Drop Target Lite Million 42	Magnetic 5K 50	Million 58
3 Q82 RED-ORN 1J6-3	Jackpot 3 Million 3	I Test 75K 11	Raygun's Lamp 3 19	ref(L)ex 27	Mix Master Gab 35	Right Drop Target Double Jackpot 43	Magnetic 25K 51	GaZillion 59
4 Q83 RED-YEL 1J6-5	Jackpot 4 Million 4	I Test 100K 12	Raygun's Lamp 4 20	re(F)lex 28	Magnetic Award 36	Right Drop Target Lite Extra Ball 44	Magnetic 50K 52	Super Dude (Top) 60
5 Q84 RED-GRN 1J6-6	Jackpot 5 Million 5	Raygun's Special 13	Raygun's Lamp 5 21	r(E)flex 29	Heart Award 37	Right Drop Target Bonus Boost 45	Gab R.e.f.l.e.x. 2 53	Major Dude 61
6 Q85 RED-BLU 1J6-7	Jumper Value 1K 6	Raygun's Extra Ball 14	2X 22	(R)eflex 30	Gab Award 38	Heart 5K 46	Gab 5K 54	Cool Dude 62
7 Q86 RED-VIO 1J6-8	Jumper Value 2.5K 7	Raygun's R.e.f.l.e.x. 1 15	4X 23	Big Shot 31	Shoot Again 39	Heart 25K 47	Gab 25K 55	Party Dude 63
8 Q87 RED-GRY 1J6-9	Jumper Value 5K 8	Bag of Tricks 16	6X 24	Playfield 2X 32	Left/Right Outlane 40	Heart 50K 48	Gab 50K 56	Plain Dude (Bottom) 64

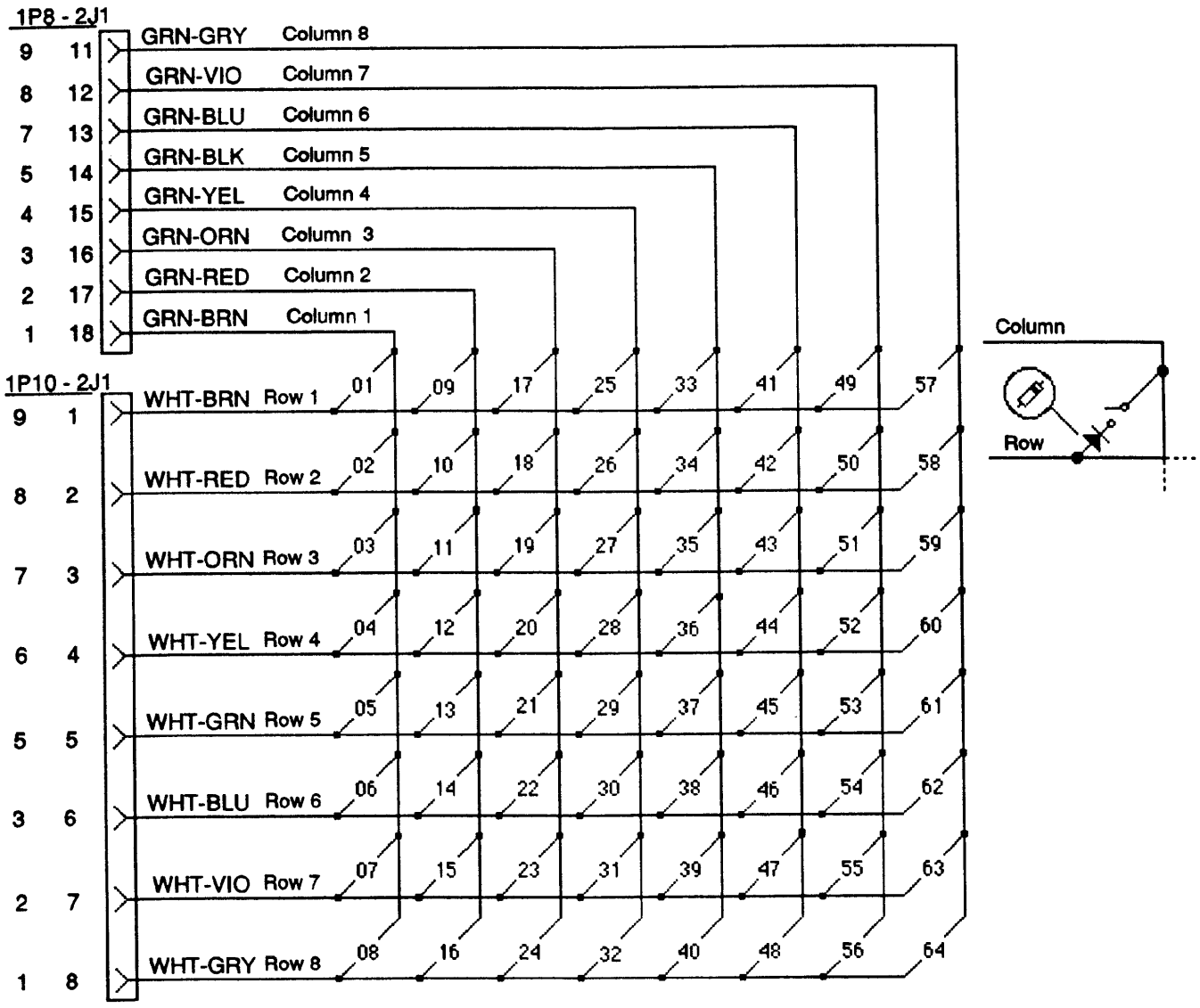
Lamps 2-38

Lamps

Item	Bulb	Location/Description
1	555	Jackpot-O-Meter
2	555	Jackpot-O-Meter
3	555	Jackpot-O-Meter
4	555	Jackpot-O-Meter
5	555	Jackpot-O-Meter
6	555	Jumper Value
7	555	Jumper Value
8	555	Jumper Value
9	555	I Exam
10	555	I Exam
11	555	I Exam
12	555	I Exam
13	44	Special
14	44	Extra
15	555	Reflex
16	44	Bag Of Tricks)
17	555	Raygun's Lamp 1
18	555	Raygun's Lamp 2
19	555	Raygun's Lamp 3
20	555	Raygun's Lamp 4
21	555	Raygun's Lamp 5
22	44	2X
23	44	4X
24	44	6X
25	555	Refle(x)
26	555	Refl(e)x
27	555	Ref(l)ex
28	555	Re(f)lex
29	555	R(e)flex
30	555	(R)eflex
31	555	Big Shot
32	44	Playfield 2X
33	44	Mixmaster Heart
34	44	Mixmaster Magnet
35	44	Mixmaster Gab
36	44	Magnetic Award
37	555	Heart Award
38	44	Gab Award
39	44	Shoot Again
40	44	L/R Outlane
41	44	R.D.T. Hot Score
42	44	R.D.T. Light Million
43	44	R.D.T. 2X Jackpot
44	44	R.D.T. Light Extra Ball
45	44	R.D.T. Bonus Boost
46	555	Heart 5K
47	555	Heart 25K
48	555	Heart 50K
49	555	Magnetic Reflex 3
50	555	Magnetic 5K
51	555	Magnetic 25K
52	555	Magnetic 50K
53	555	Gab Reflex 2
54	555	Gab 5K
55	555	Gab 25K



Item	Bulb	Location/Description
56	555	Gab 50K
57	555	Jackpot Lit
58	555	Million
59	44	Gazillion
60	555	Super Dude (top)
61	555	Major Dude
62	555	Cool Dude
63	555	Party Dude
64	555	Plain Dude (bottom)

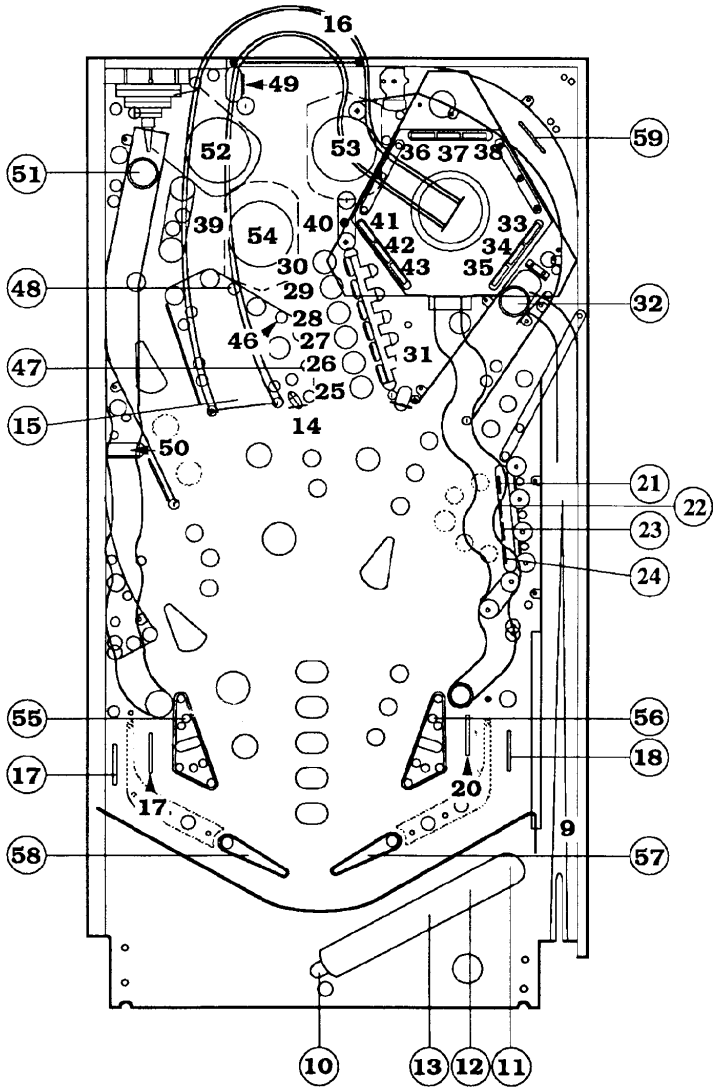


DR. DUDE SWITCH MATRIX

column	1 Q45	2 Q49	3 Q44	4 Q48	5 Q43	6 Q47	7 Q42	8 Q46
row	GRN-BRN 1J8-1	GRN-RED 1J8-2	GRN-ORN 1J8-3	GRN-YEL 1J8-4	GRN-BLK 1J8-5	GRN-BLU 1J8-7	GRN-VIO 1J8-8	GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Tilt 1	Shooter Lane 9	Left Outlane 17	reflex (X) 25	Mixer Gab Top 33	Mixer Mag. Top 41	I Test Target 49	Right Flipper 57
2 WHT-RED 1J10-8	Not Used 2	Outhole 10	Right Outlane 18	ref (E) x 26	Mixer Gab Middle 34	Mixer Mag. Middle 42	Magnet Target 50	Left Flipper 58
3 WHT-ORN 1J10-7	Game Start 3	Trough 1 Ball 11	Right Return 19	ref (L) ex 27	Mixer Gab Bottom 35	Mixer Mag. Bottom 43	Top Left Popper 51	Right Loop 59
4 WHT-YEL 1J10-6	Right Coin Switch 4	Trough 2 Balls 12	Left Return 20	re (F) lex 28	Mixer Heart Left 36	Not Used 44	Left Jumper Bumper 52	Not Used 60
5 WHT-GRN 1J10-5	Center Coin Switch 5	Trough 3 Balls 13	Right Drop 1 (Top) 21	r (E) flex 29	Mixer Heart Middle 37	Not Used 45	Right Jumper Bumper 53	Not Used 61
6 WHT-BLU 1J10-3	Left Coin Switch 6	Heart Target 14	Right Drop 2 22	(R) eflex 30	Mixer Heart Right 38	Middle Middle 10 pts. 46	Bottom Jumper Bumper 54	Not Used 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Enter Left Ramp 15	Right Drop 3 23	Big Shot 31	Top Left 10 pts. 39	Middle Bottom 10 pts. 47	Left Slingshot 55	Not Used 63
8 WHT-GRY 1J10-1	High Score Reset 8	Score Left Ramp 16	Right Drop 4 (Bottom) 24	Middle Right Popper 32	Not Used 40	Middle Top 10 pts. 48	Right Slingshot 56	Not Used 64

Switches

Item	Part Number	Description
1	(See Fig. 2, Sect.1)	Plumb Bob Tilt
2	Not Used	
3	SW-1A-126	Game START (Credit)
4	27-1092	R Coin Chute (USA)
5	Not Used	Center Coin Chute
6	27-1092	L Coin Chute (USA)
7	27-1066	Slam Tilt
8	27-1008	High Score Reset*
9	5647-12073-04	Shooter Lane
10	5647-12133-12	Outhole
11	5647-09957-00	Ball Trough #1 (left)
12	5647-09957-00	Ball Trough #2 (mdl)
13	5647-12073-08	Ball Trough #3 (right)
14	B-11696-4	Heart Target
15	5647-12073-07	Enter Left Ramp
16	5647-12073-21	Score Left Ramp
17	5647-12073-19	Left Outlane
18	5647-12073-19	Right Outlane
19	5647-12073-19	Right Return
20	5647-12073-19	Left Return
21	p/o C-13450	Right Drop 1 (top)
22	p/o C-13450	Right Drop 2
23	p/o C-13450	Right Drop 3
24	p/o C-13450	Right Drop 4 (bottom)
25	B-14060-5	Refle(x)
26	B-14060-5	Refl(e)x
27	B-14060-5	Ref(l)ex
28	B-14060-5	Re(f)lex
29	B-14060-5	R(e)flex
30	B-14060-5	(R)eflex
31	B-11696-4	Big Shot Target
32	A-11657	Middle Right Popper
33	B-14077-6	Mixer Gab Top
34	B-14077-6	Mixer Gab Middle
35	B-14077-6	Mixer Gab Bottom
36	B-14077-4	Mixer Heart Left
37	B-14077-4	Mixer Heart Middle
38	B-14077-4	Mixer Heart Right
39	B-4834-K-2	Top Left 10pts.
40	-	Not Used
41	B-14077-2	Mixer Magnet Top
42	B-14077-2	Mixer Magnet Middle
43	B-14077-2	Mixer Magnet Bottom
44	Not Used	
45	Not Used	
46	B-4834-k	Middle Middle 10pts.
47	B-4834-k	Middle Bottom 10pts.
48	B-4834-J	Middle Top 10pts.
49	B-11696-4	I Test Target
50	B-11696-2	Magnet Target
51	A-11657	Top Left Popper
-	SW-10A-48	Left & Right Flippers (Actuated by Flipper Buttons)



Item	Part Number	Description
52	B-13267	Left Jet Bumper
53	B-13267	Right Jet Bumper
54	B-13267	Bottom Jumper Bumper
55	-	Left Slingshot***
56	-	Right Slingshot***
57	-	Right Flipper**
58	-	Left Flipper**
59	5647-12073-19	Right Loop
60	Not Used	
61	Not Used	
62	Not Used	
63	Not Used	
64	Not Used	

Notes: * - Part Number is for entire Diagnostic Switch Assembly, Including H S Reset Switch. ** - Optotransistor on Backbox Interconnect Bd. *** - Paired Kicker Actuating Switch: A-4834-H + B-8734-1.

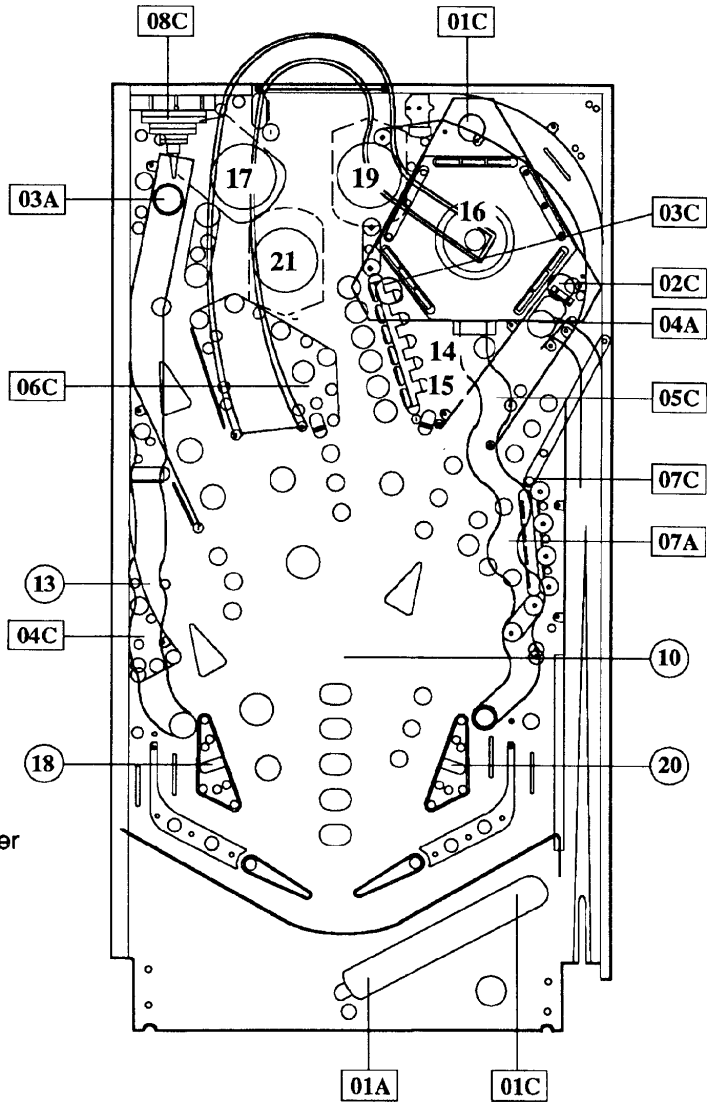
DR. DUDE Solenoid Table Switch Tests (06 & 07)

Sol. No.	Function	Solenoid Type	Wire Color [1]	Connections: CPU Bd	Connections: Playfield/ Cabinet	Driver Trnstr	Solenoid Part Number Flashlamp Type g= B'glass; p=Pl'field
01A[3]	Outhole Kicker	Switched	Vio-Brn	1P11-1	5J1-9: 5J4-9 (A)	Q33	AE-23-800
01C[3]	Mixer Heart	Switched	Blk-Brn	(Gry-Brn)	5J5-9 (C)	Q33	#89/906 flashlamps 2p
02A[3]	Trough	Switched	Vio-Red	1P11-3	5J1-7: 5J4-8 (A)	Q25	SM-1-26-600
02C[3]	Mixer Gab	Switched	Blk-Red	(Gry-Red)	5J5-8 (C)	Q25	#89/906 flashlamps 2p
03A[3]	Top Left Popper	Switched	Vio-Orn	1P11-4	5J1-6: 5J4-7 (A)	Q32	AE-26-1200
03C[3]	Mixer Magnet	Switched	Blk-Orn	(Gry-Orn)	5J5-7(C)	Q32	#89/906 flashlamps 2p
04A[3]	Middle Right Popper	Switched	Vio- Yel	1P11-5	5J1-5: 5J4-6 (A)	Q24	AE-23-800
04C[3]	Magnetic	Switched	Blk-Yel	(Gry-Yel)	5J5-5 (C)	Q24	#89/906 flashlamps 1p
05A[3]		Switched	Vio-Grn	1P11-6	5J1-4: 5J4-5 (A)	Q31	
05C[3]	Gab	Switched	Blk-Grn	(Gry-Grn)	5J5-4 (C)	Q31	#89/906 flashlamps 1p
06A[3]	Knocker	Switched	Vio-Blu	1P11-7	5J1-3: 5J4-4 (A)	Q23	AE-23-800
06C[3]	Heart	Switched	Blk-Blu	(Gry-Blu)	5J5-3 (C)	Q23	#89/906 flashlamps 1p
07A[3]	Right Drop Target	Switched	Vio-Blk	1P11-8	5J1-2: 5J4-2 (A)	Q30	AE-23-800
07C[3]	Drop Targets	Switched	Blk-Vio	(Gry-Vio)	5J5-2 (C)	Q30	#89 flashlamps 1p
08A[3]		Switched	Vio-Gry	1P11-9	5J1-1: 5J4-1 (A)	Q22	
08C[3]	Raygun	Switched	Blk-Gry	(Gry-Blk)	5J5-1 (C)	Q22	#89 flashlamps 1p
9		Controlled	Brn-Blk				
10	Playfield G.I.	Controlled	Brn-Red	1P12-2	5J2-8:5J6-8:2J4-11	Q9	5580-09555-01 [4a]
11	Middle Insert	Controlled	Brn-Blu	1P12-7	5J2-3:5J6-3:2J4-14	Q7	#906 1g
12	A/C Select	Controlled	Brn-Yel	1P12-5	5J2-5	Q8	5580-09555-01 [5]
13	Magnet	Controlled	Brn-Grn	1P12-6	5J2-4:5J6-5:2J4-13	Q15	AE-26-1200
14	Big Shot	Controlled	Blu-Blk	1P19-9	5J3-1: 5J7-1	Q79	AE-23-800
15	Big Shot F.L.	Controlled	Brn-Vio	1P12-8	2J4-15: 2J11-2	Q14	#89 flashlamp 1p
16	Motor	Controlled	Brn-Gry	1P12-9	2J4-16: 2J11-1	Q6	
17	Left Jumper 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 Jumper 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	Bottom Jumper Bumper	Special #5	Blu-Grn	1P19-8	5J3-2: 5J7-2	Q77	AE-23-800
22							
-	Right Flipper	-	Orn-Vio (Blu-Vio) [2]	1P19-1	2J5-5: 2J10-7 (2J10-1: 2J8-15)	-	FL11630/50VDC
-	Left Flipper	-	Orn-Gry (Blu-Gry) [2]	1P19-2	2J5-4: 2J10-8 (2J10-2:2J8-14)	-	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 Cterminals 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 Flashlamps	2 F.L. Mixer Heart
2A	AE-23-800	Shooter Lane Feeder
2C	#89 Flashlamps	2 F.L. Mixer Gab
3A	AE-24-900	Ball Popper
3C	#89 Flashlamps	2 F.L. Mixer Mag
4A	AE-24-900	Ball Popper
4C	#89 Flashlamps	1 F.L. Magnetic
5A	Not Used	
5C	#89 Flashlamps	1 F.L. Gab
6A	AE-23-800	Knocker (Backbox)
6C	#89 Flashlamps	1 F.L. Heart
7A	AE-24-900	R. 4-Bk Dr Tgt Reset
7C	#89 Flashlamps	1 F.L. Dr Target
8A	Not Used	
8C	#906 Flashlamps	1 F.L. Raygun
09	Not Used	
10	5580-09555-01	P'fld G I Relays*
11	#906 Flashlamps	1 F.L. Insert Middle
12	5580-09555-01	A/C Select Relay
13	B-13522	Magnet
14	AE-24-900	Big Shot
15	#906 Flashlamps	1 F.L. Big Shot
16	14-7955/Triac	Motor
17	AE-23-800	Left Jumper Bumper
18	AE-26-1500	Left Kicker ("sling")
19	AE-23-800	Right Jumper Bumper
20	AE-26-1500	Right Kicker ("sling")
21	AE-23-800	Bottom Jumper Bumper
22	Not Used	

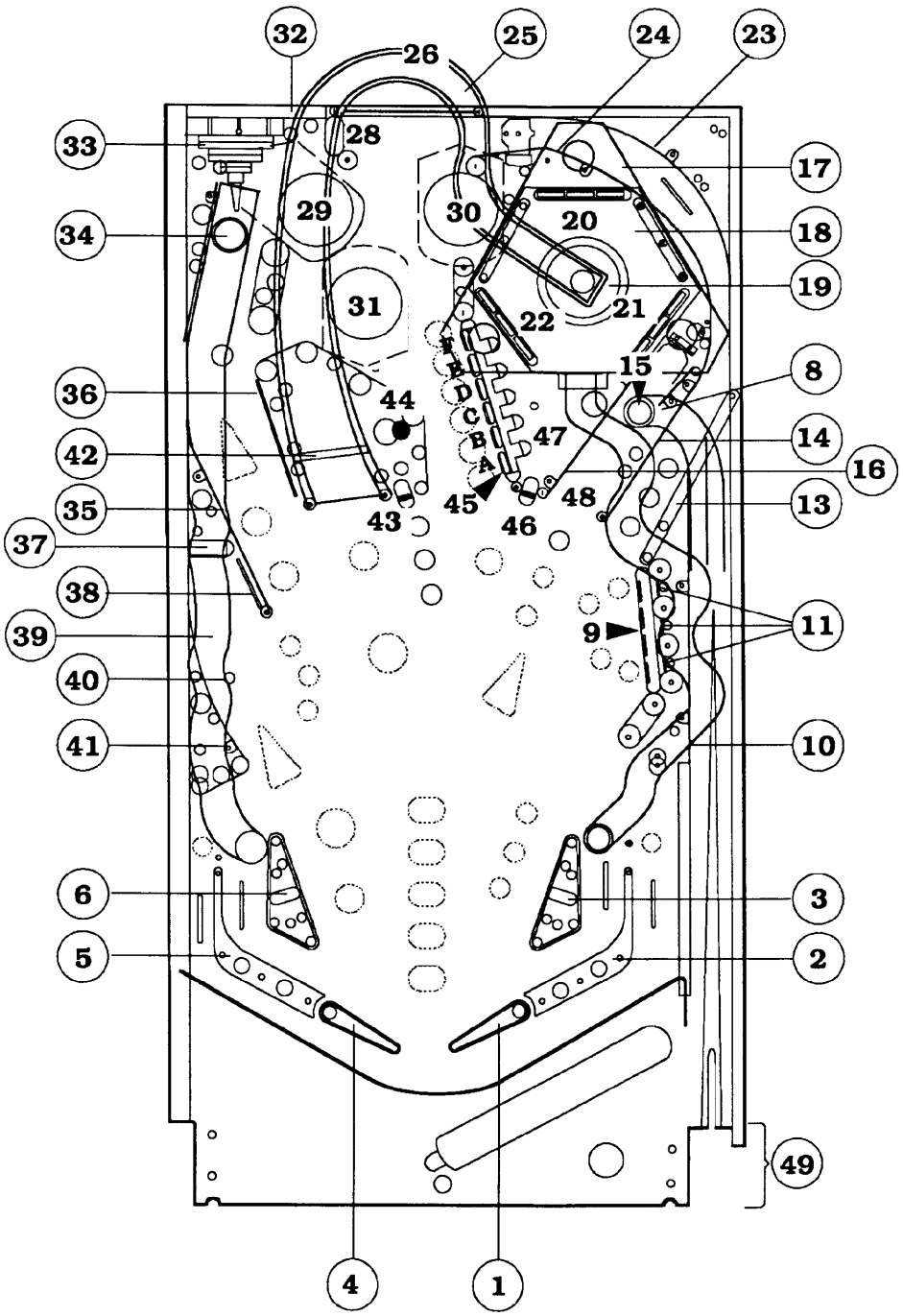


* - 5580-09555-01 on Relay Board, C-11998-1, for Playfield General Illumination

Playfield Parts

Item	Part No.	Description
1	C-13174-R	Lower Right Flipper
a)	20-9250-6	Flipper Paddle & Shaft
2	B-12918	R. Flipper Ball Guide Assembly
3	B-12665	R. Kicker Arm ("Slingshot")
a)	B-11203-R-1	Coil & Bracket Assembly
4	C-13174-L	Lower Left Flipper
a)	20-9250-6	Flipper Paddle & Shaft
5	B-12919	L. Flipper Ball Guide Assembly
6	B-12665	L. Kicker Arm ("Slingshot")
7	12-6923	Right (mixmaster) Wire Ramp
8	12-6922	Right (ball popper) Wire Ramp
9	C-13450	4-Bank Drop Target
a)	C-12499	4-Bank Opto Board
10	B-13861	Ball Guide Assembly
11	12-6466-2A	Wire Ball Guide Assembly
12	B-13922	Ball Guide Assembly
13	B-13409	Right Ball Gate
14	D-13858	Ball Guide Assembly
15	D-11335-1	R. Ball Popper Assembly
16	B-13862	Ball Guide Assembly
17	D-13839	Shroud Assembly
18	2016-PL-UP	Mini Playfield Assembly
19	D-13793	Hypnotic Wheel
20	B-14077-4	Standup Target (red)
21	B-14077-6	Standup Target (yellow)
22	B-14077-2	Standup Target (green)
23	D-13859	Ball Guide Assembly
24	12-6942	Wire Ball Guide Assembly
25	D-13812	Mixmaster Entrance Ramp
26	5647-12073-21	Score, Mixmaster Ramp
27	12-6466-15	Wire Ball Guide Assembly
28	B-11696-4	Standup Target (Red)
29	C-12842-1	Jumper Bumper
30	C-12842-1	Jumper Bumper
31	C-12842-1	Jumper Bumper
32	D-13643	Back Panel Assembly
33	C-13716	Excellent Ray Assembly
34	D-11335-1	L. Ball Popper Assembly
35	C-13857	Ball Guide Assembly
36	12-6466-17	Wire Ball Guide Assembly
37	B-11696-2	Standup Target (Green)
38	12-6466-5	Wire Ball Guide Assembly
39	12-6925	Left (ball popper) Wire Ramp
40	B-13520	Magnet
41	B-13856	Ball Guide Assembly
42	5647-12073-07	Enter, Mixmaster Ramp
43	B-11696-4	Standup Target (Red)
44	B-14034	Heart of Rock 'n' Roll Assembly
45	B-14060-5	Standup Target (White, A-F)
46	B-11696-4	Standup Target (Red)
47	A-14098	Big Shot Assembly
48	B-14033	Gift of Gab
49	Parts below are located beneath Bottom Arch:	
a)	B-8623	Upper Trough Baffle Assembly
b)	C-8235	Lower Trough Baffle Assembly
c)	12-6542	Trough Baffle Wire
d)	01-3569-1	Ball Trough (runway)
e)	01-5575	Bottom Arch Mounting Bracket
f)	B-8039-2	Outhole Kicker Assembly
g)	C-9638	Shooter Lane Feeder

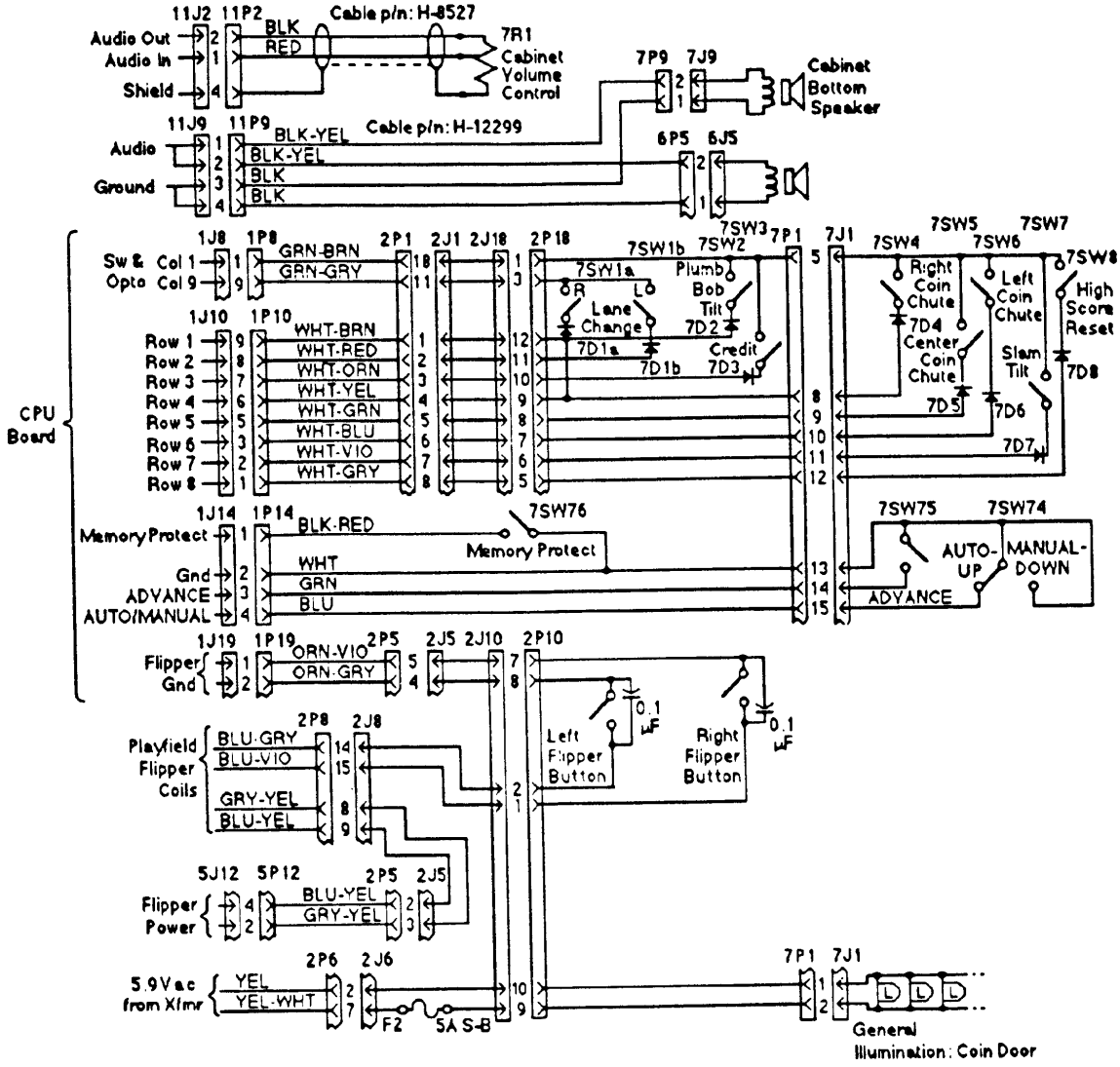
Parts Location



NOTES

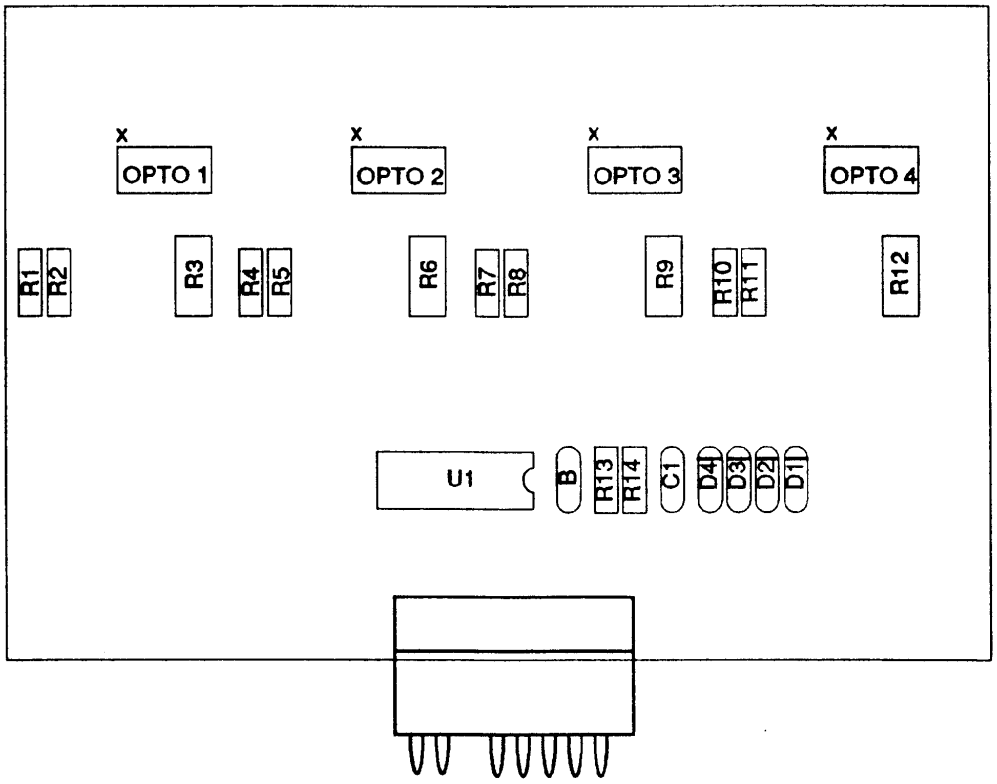
SECTION 3

Diagrams & Schematics

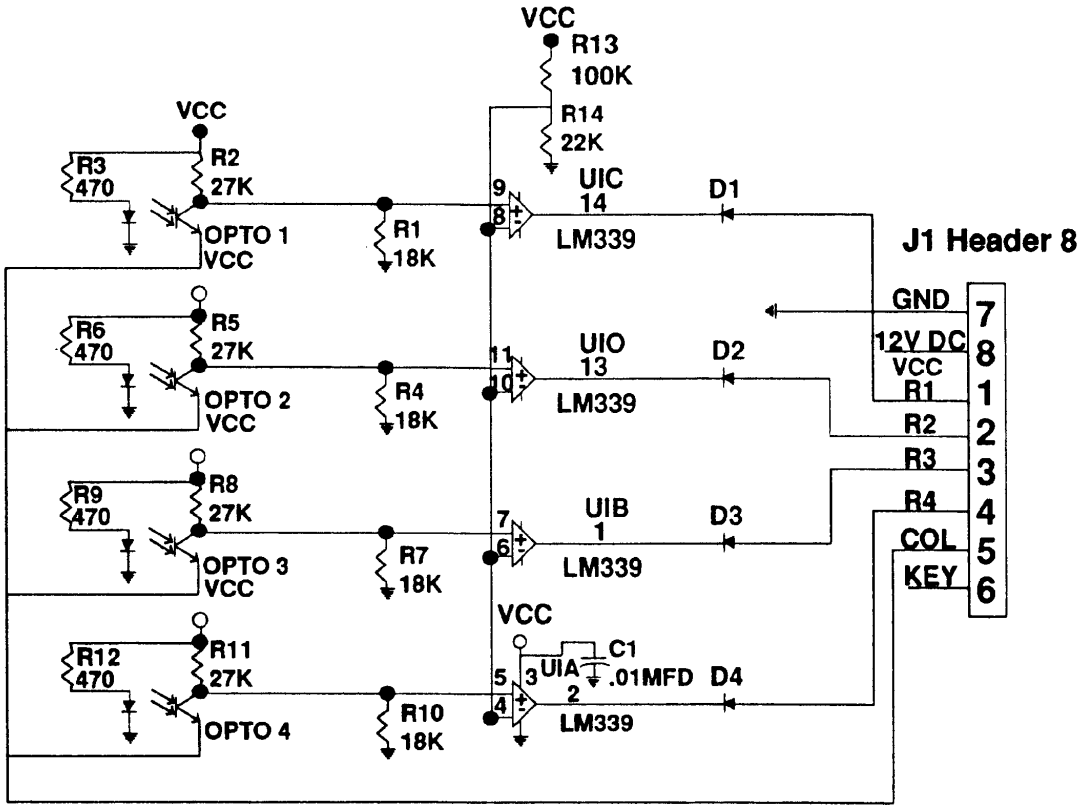


DR. DUDE CABINET WIRING

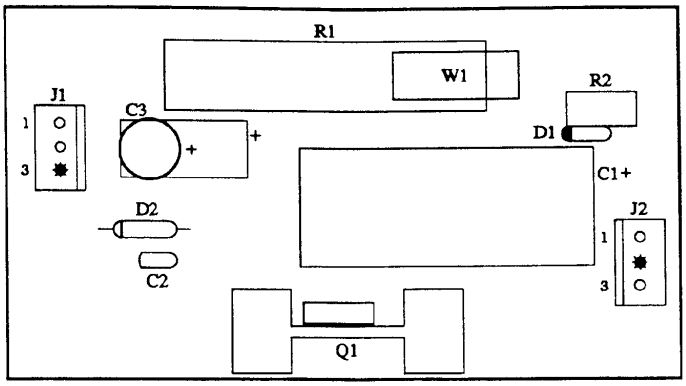
C-12499 4-Bank Drop Target Opto Board



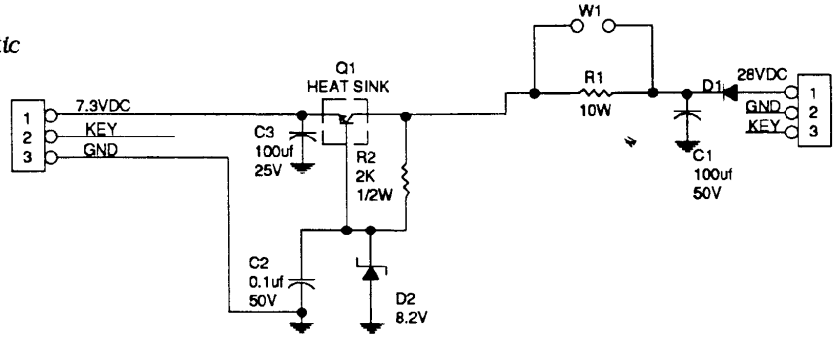
4-Bank Drop Target Opto Board Schematic



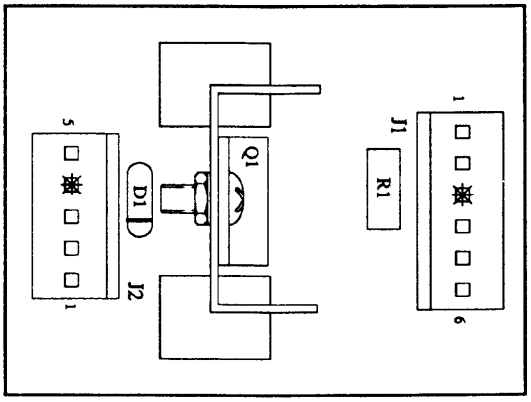
C-13892 Triac Board & Schematic

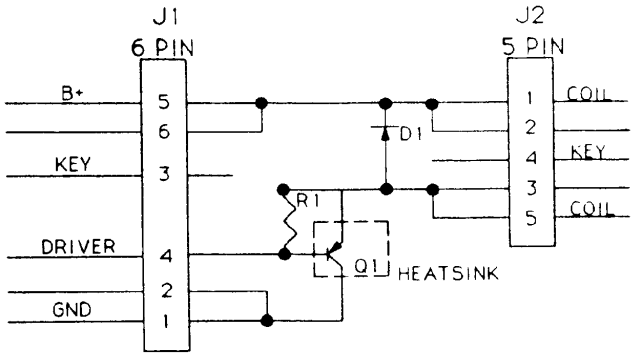


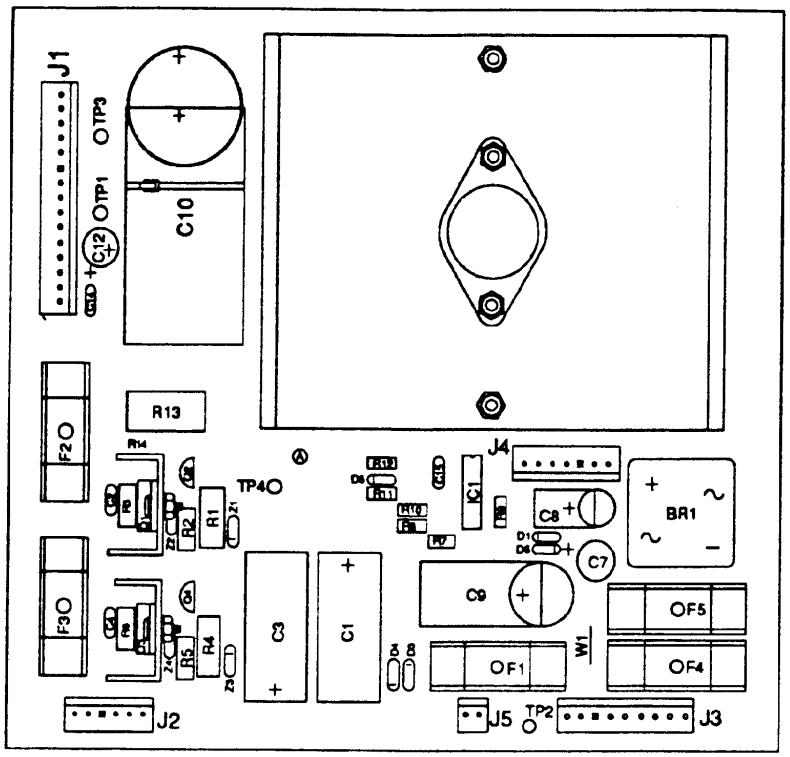
Schematic



C-13509 High Current Driver Board & Schematic

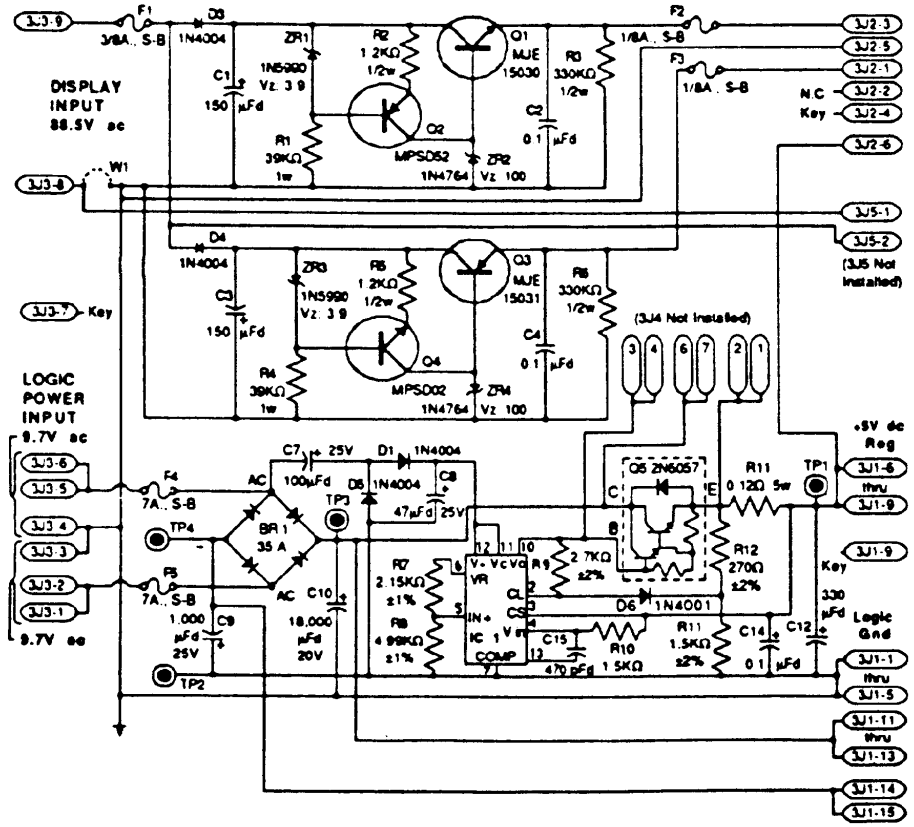




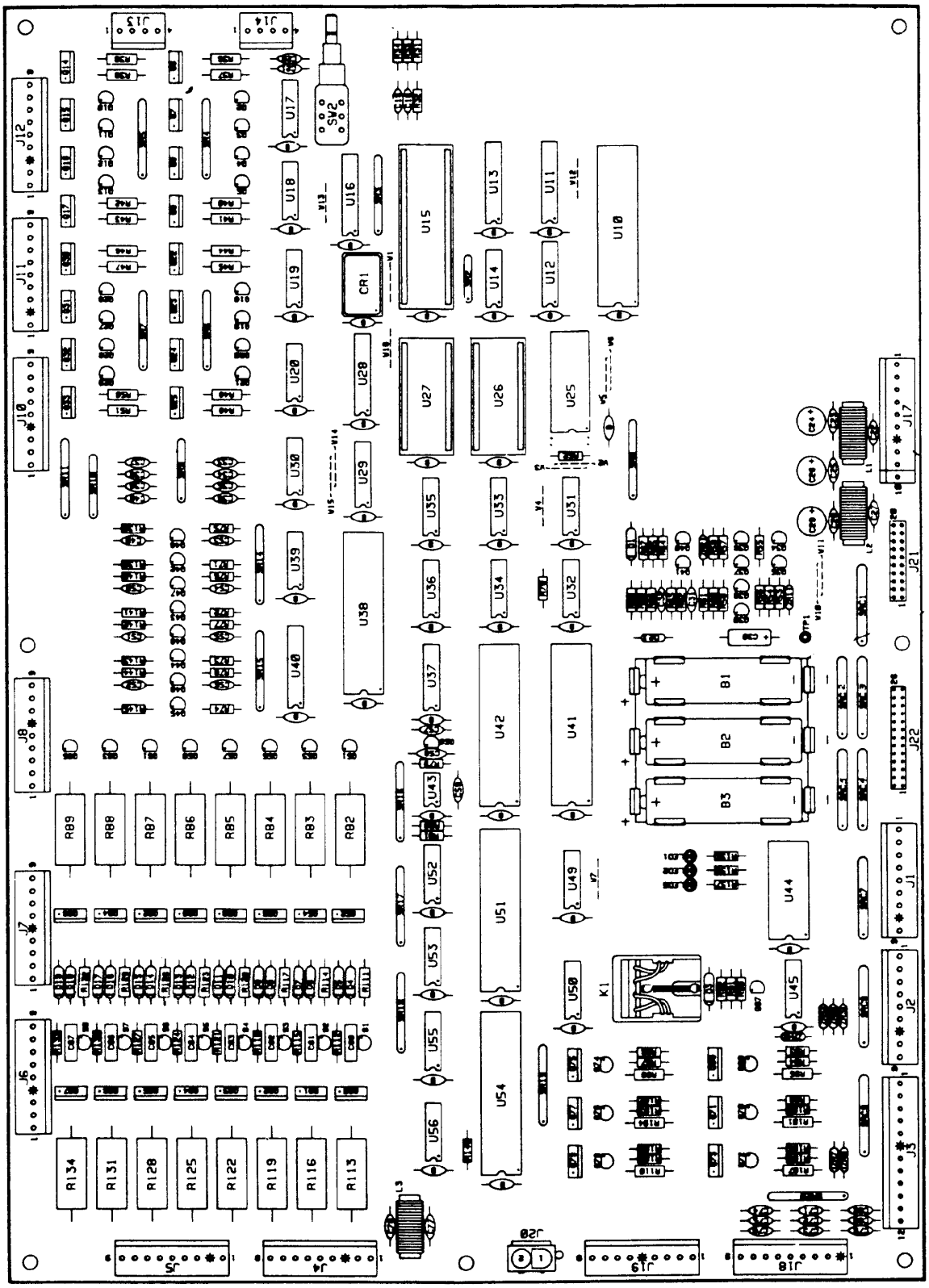


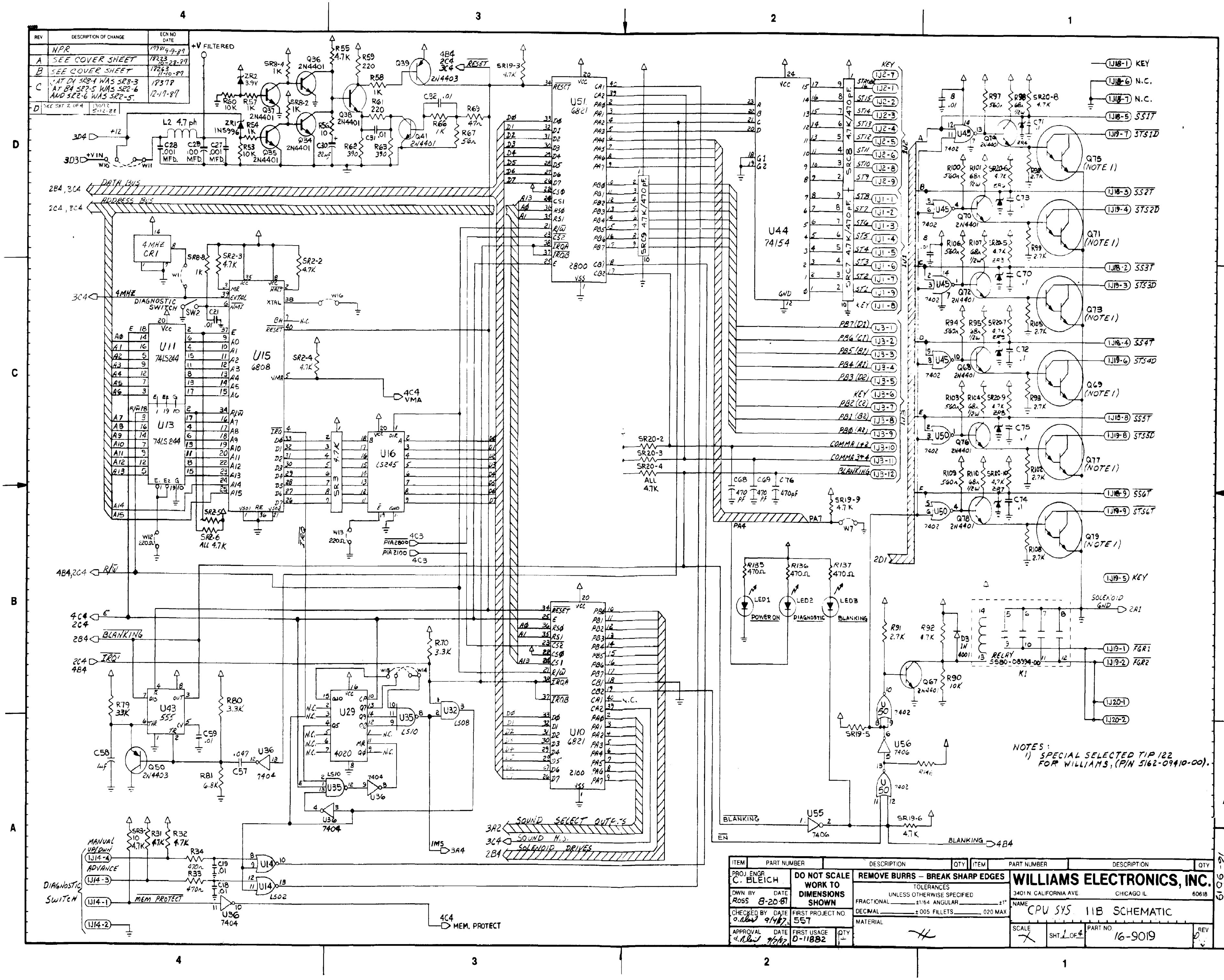
Power Supply Board
p/n D-12246

Power Supply Board Schematic

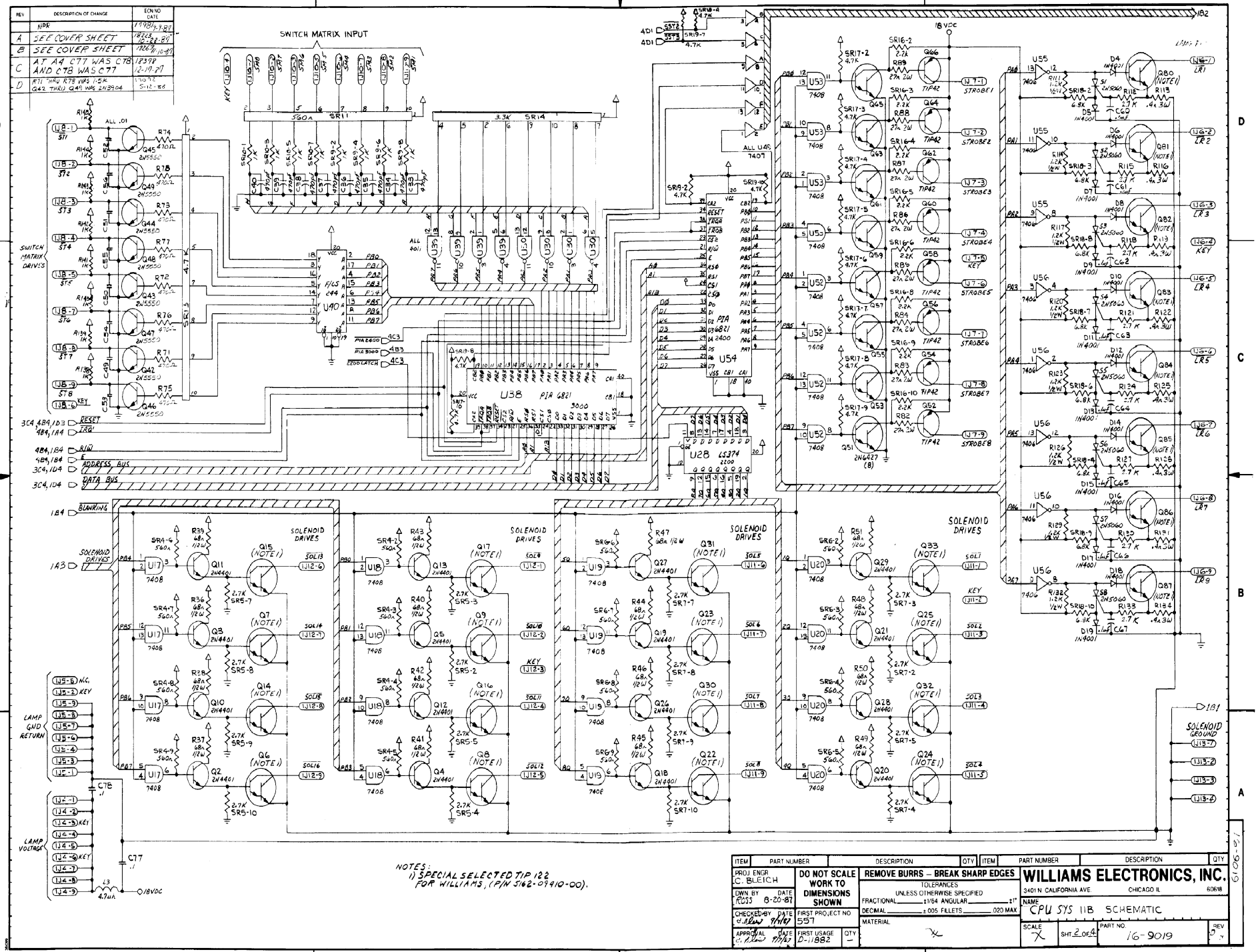


D-11883-2016 System 11C CPU Board

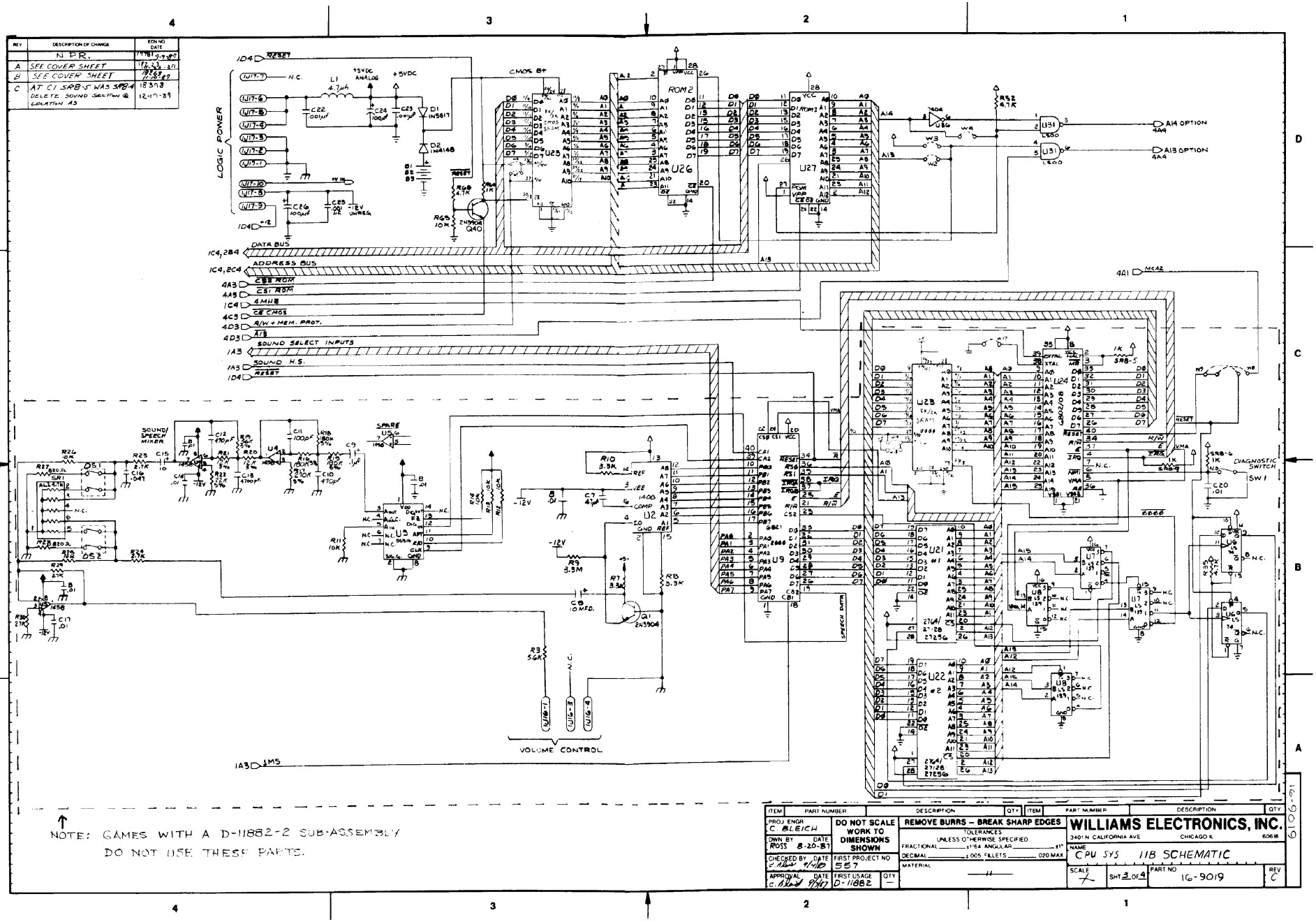


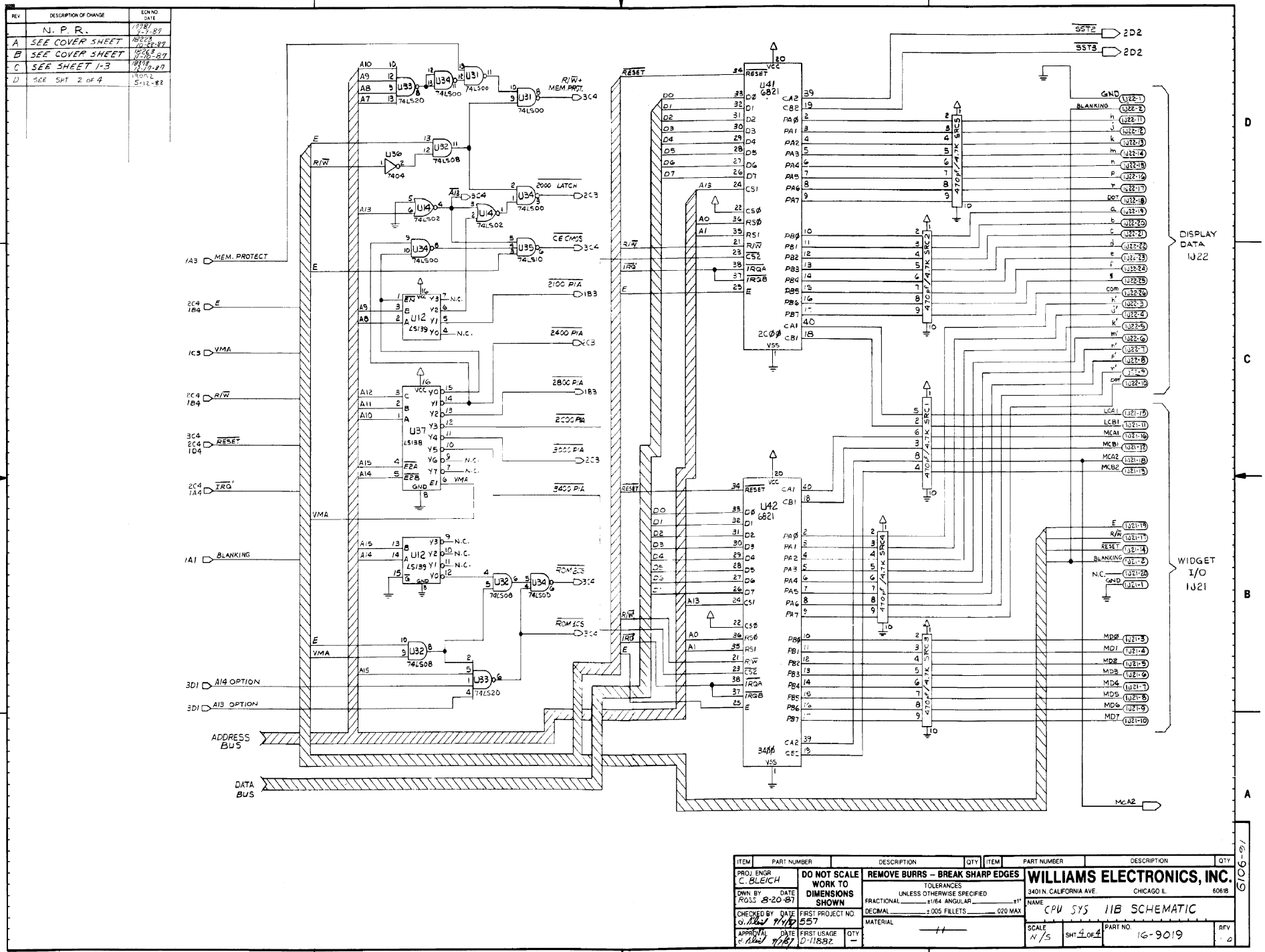

REV | DESCRIPTION OF CHANGE | ECN NO DATE
NPR
A SEE COVER SHEET 18223 10-28-87
B SEE COVER SHEET 18263 11-10-87
C AT D4 SR8-4 WAS SR8-3, AT B4 SR2-5 WAS SR2-6 AND SR2-6 WAS SR2-5. 18378 12-17-87
NOTES:
1) SPECIAL SELECTED TIP 122 FOR WILLIAMS; (P/N 5162-09410-00).
DO NOT SCALE WORK TO DIMENSIONS SHOWN
REMOVE BURRS – BREAK SHARP EDGES
WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE CHICAGO IL 60618
PROJ. ENGR C. BLEICH
DWN BY ROSS DATE 8-20-87
FIRST PROJECT NO 557
FIRST USAGE D-11882
NAME CPU SYS 11B SCHEMATIC
SHT 1 OF 4
PART NO 16-9019
16-9019

CPU 3-7

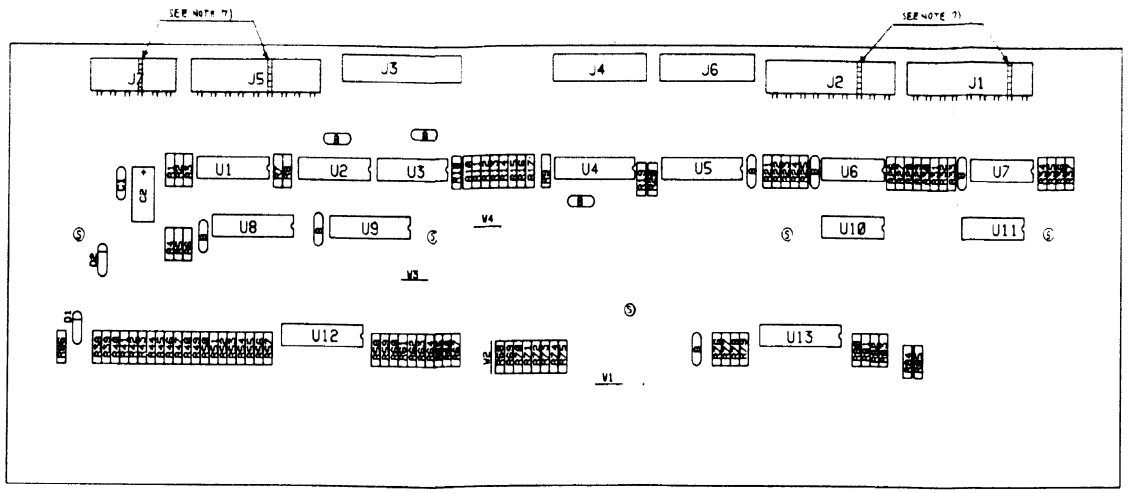


System 11C CPU Schematic (16-9019, Sheet 2 of 4)


REV | DESCRIPTION OF CHANGE | ECN NO DATE
N.P.R.
A | SEE COVER SHEET
B | SEE COVER SHEET
C | AT C1 SRB-5 WAS SRB-4 DELETE SOUND SECTION @ LOCATION A3 | 18398 12-19-89
LOGIC POWER
+5VDC ANALOG
+5VDC
CMOS BT
ROM2
U25
U26
U27
A14 OPTION 4A9
A13 OPTION 4A4
DATA BUS
ADDRESS BUS
SOUND SELECT INPUTS
SOUND H.S.
RESET
SOUND/ SPEECH MIXER
SPARE
VOLUME CONTROL
DIAGNOSTIC SWITCH
U21
U22
U23
U24
NOTE: GAMES WITH A D-11882-2 SUB-ASSEMBLY DO NOT USE THESE PARTS.
DO NOT SCALE WORK TO DIMENSIONS SHOWN
REMOVE BURRS – BREAK SHARP EDGES
WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE CHICAGO IL 60618
CPU SYS 11B SCHEMATIC
PART NO 16-9019
REV C
SHT 3 OF 4
C. BLEICH
ROSS 8-20-87
D-11882



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. .01MF 50V AX. CR.	9
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	ZENER 1N4740 10V	2
5	5870-12308-00	DSPY1	DISPLAY,16-CHARACTER A/N	1
6	5791-10869-00	J1,J2,J5	9 PIN HEADER, R/A, .156	3
7	5791-10851-00	J3	26 PIN HEADER, R/A .100	1
8	5791-10869-06	J7	6 PIN HEADER, R/A, .156	1
9	5791-09438-00	CHART	20 PIN HEADER, R/A, .100	CHART
10	5010-08773-00	R1-R8,R21-R37	RES. 18K ohm 1/4W	25
11	5010-09162-00	NOTE 1	RES. 100K ohm 1/4W	CHART
12	5010-10258-00	NOTE 2	RES. 1M ohm 1/4W	CHART
13	5010-10927-00	NOTE 3	RES. 8.2K ohm 1/2W	CHART
14	5010-08981-00	NOTE 4	RES. 10K ohm 1/2W	CHART
15	5310-08875-00	U1,U2,U3	4049	3
16	5310-09862-00	U6,U7,U10,U11	4001	4
17	5680-08969-00	U8,U9	UDN-7180	2
18	5680-08968-00	CHART	UDN-6118	CHART
19	5010-09534-00	CHART	RES. ZERO OHM	CHART
20	5788-12376-00	PCB	BALLY-LO-DISPLAY PCB	1
21	03-8068-1	(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 18	ITEM 19	ITEM 22
NOTE 6 :	DESIGNATION QTY.	DESIGNATION	QTY: DESIGNATION	QTY: DESIGNATION	QTY: DESIGNATION	QTY: DESIGNATION	QTY: DESIGNATION	QTY: PARTNUMBER QTY:
-01	NOT USED 0	R42,R44,R46,R50,R52,R63	32 SEE NOTE 2	1 R45,R51 R62	7 R41,R47 R53	9 U12,D13	2 W3,W4	2 16-8850-251 1
-02	J4 1	SEE NOTE 1	26 R9,R19	3 SEE NOTE 3	4 R10-R17	14 D4,D12,D13	3 W1,W2	2 16-8850-245 1
-03	J4,J6 2	SEE NOTE 1	26 R9,R18,R19,R20	5 SEE NOTE 3	4 R10 R17	14 D4,D5,D12,D13	4 W1,W2	2 16-8850-246 1

NOTES:

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

SEE CHART ALSO

2) 1M ohm RESISTORS
R66

SEE CHART ALSO

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

SEE CHART ALSO

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

SEE CHART ALSO

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

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

-01 MAIN DISPLAY ONLY: ALPHA NUMERIC

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

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

7) CUT KEYING PINS AS INDICATED

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

9) FOR SCHEMATIC SEE DRAWING 16-9068

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY

PROJ ENGR: J Boydston
DWN BY: J Parrish DATE
CHECKED BY: J. Boydston 5-1-89 DATE
APPROVAL: [illegible] DATE 5/1/89

DO NOT SCALE WORK TO DIMENSIONS SHOWN

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

REMOVE BURRS-BREAK SHARP CORNERS & EDGES

TOLERANCES
UNLESS OTHERWISE SPECIFIED
DECIMAL — X ± .030 ANGULAR — ±1/2°
XX ± .010
XXX ± .005 FRACTIONAL ±1/64

MATERIAL

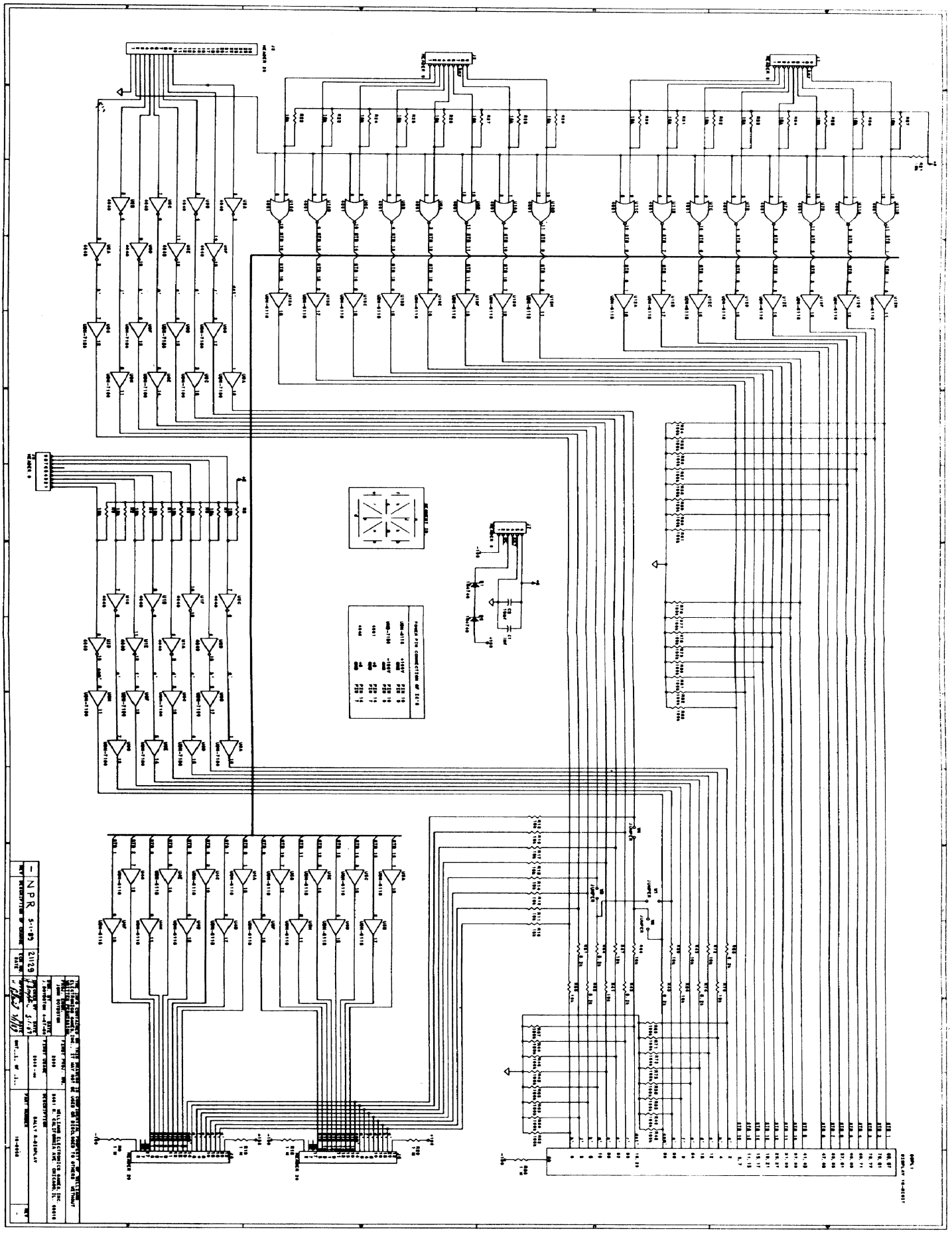
WILLIAMS ELECTRONICS, INC.
3401 N CALIFORNIA AVE CHICAGO IL 60618

NAME: BALLY R-DISPLAY ASSY

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

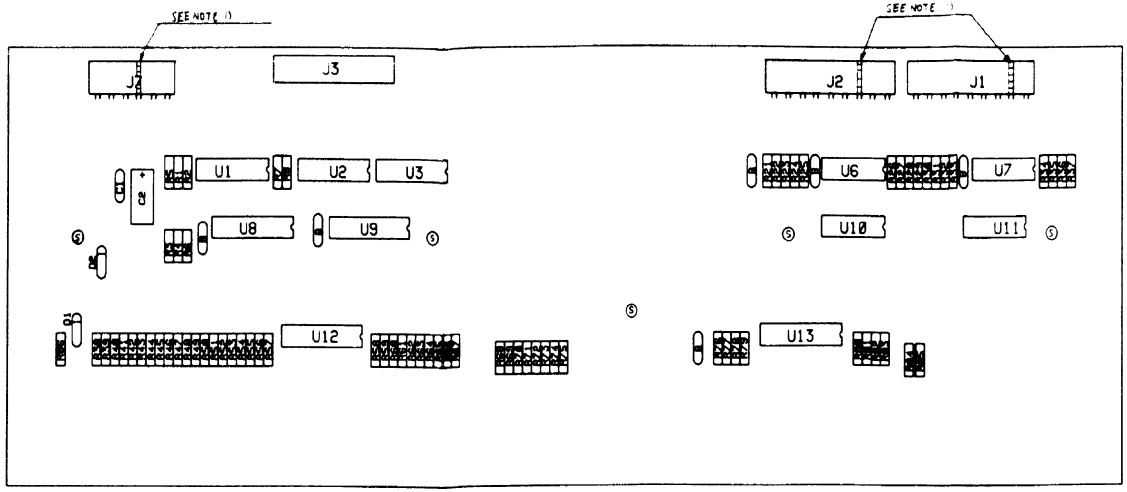
D-12502-

Right Display 2.11



Right Display 3-12

REV	DESCRIPTION OF CHANGE	ECN NO DATE
–	N P R 5-1-89	21130



BALLY L-DISPLAY
BILL OF MATERIALS

ITEM	PART NUMBER	PART DESIGNATION	DESCRIPTION	QTY
1	5043-08980-00	B (BYPASS CAP)	CAP. .01MF 50V AX. CR.	6
2	5043-08996-00	C1	CAP. .1MF 50V AX. CR.	1
3	5040-09343-00	C2	CAP. 10MF 25V AX. ELECT.	1
4	5075-09135-00	D1,D2	ZENER 1N4740 10V	2
5	5870-12308-00	DSPY1	DISPLAY,16-CHARACTER A/N	1
6	5791-10869-09	J1,J2	9 PIN HEADER, R/A, .156	2
7	5791-10851-00	J3	26 PIN HEADER, R/A .100	1
8	5791-10869-06	J7	6 PIN HEADER, R/A, .156	1
9	5010-08773-00	R1-R6,R21-R37	RES. 10K 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	5010-10256-00	R86	RES. 1M ohm 1/4W	1
14	5310-08975-00	U1,U2,U3	4049	3
15	5310-09882-00	U6,U7,U10,U11	4001	4
16	5680-08969-00	U8,U9	UDN-7180	2
17	5680-08968-00	U12,U13	UDN-8118	2
18	5768-12408-00	PCB	BALLY-HI-DISPLAY PCB	1
19	03-8068-1	(SUPPORT) S	SUPPORT DISPLAY	5

NOTES:

1) CUT KEYING PINS AS INDICATED.
2) ALIGN TOP EDGE OF GLASS DISPLAY WITH TOP EDGE OF DISPLAY SUPPORT).
3) FOR SCHEMATIC SEE DRAWING 16-9061

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY

PROJ ENGR J. BOYDSTON
DWN BY J. PARRISH DATE
CHECKED BY DATE 5-1-89
APPROVED DATE 4/1/89

DO NOT SCALE WORK TO DIMENSIONS SHOWN

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

REMOVE BURRS-BREAK SHARP CORNERS & EDGES

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

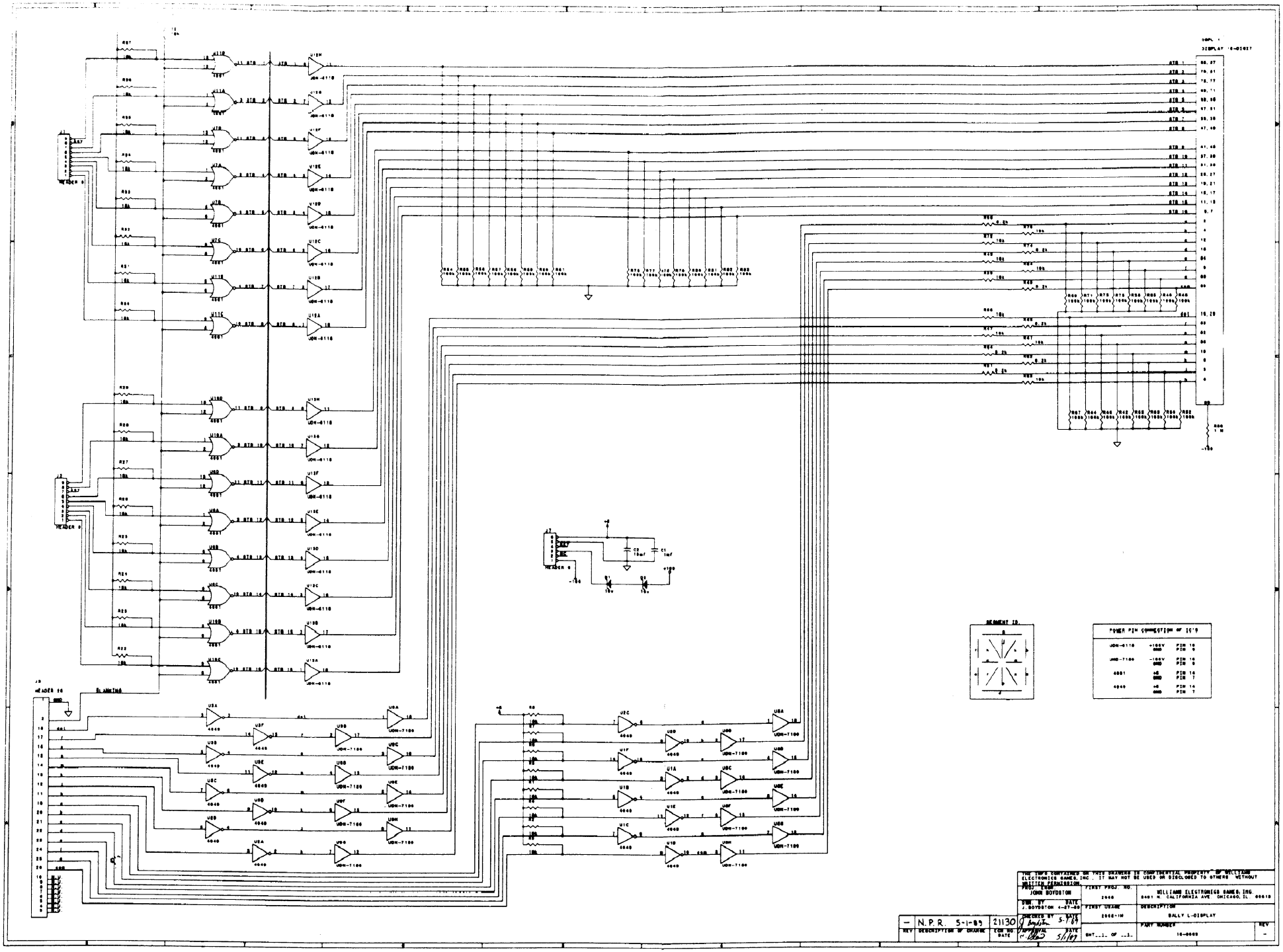
MATERIAL

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

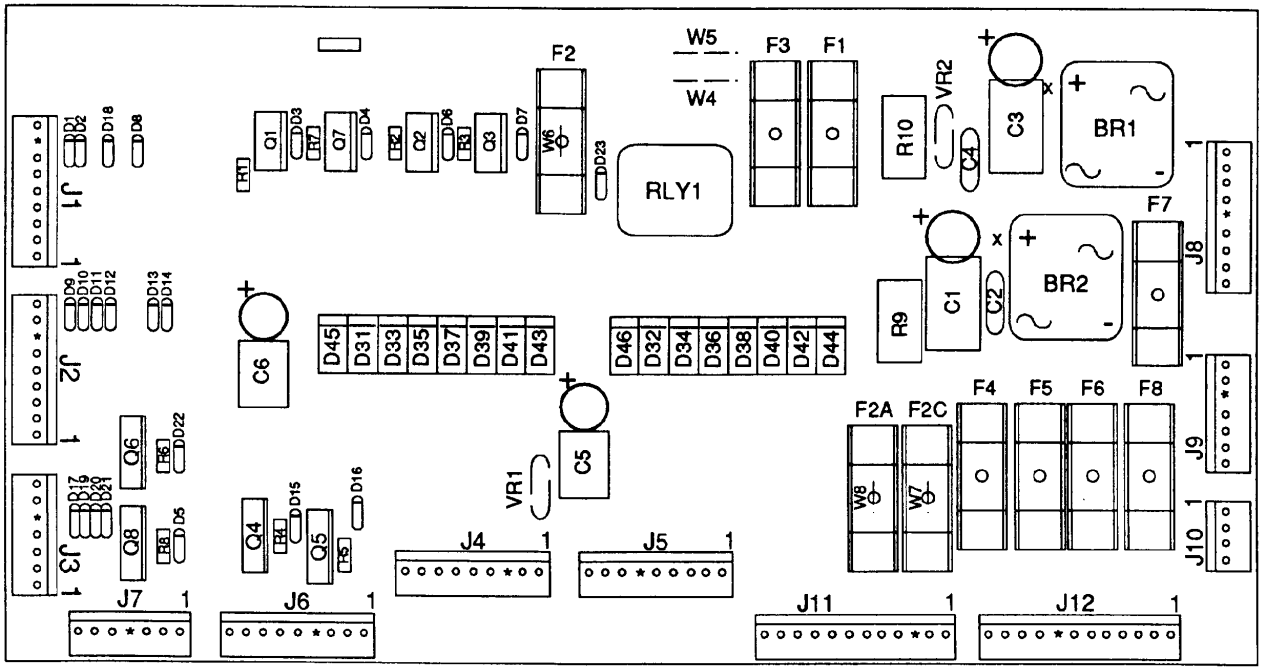
NAME BALLY L-DISPLAY ASSY

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

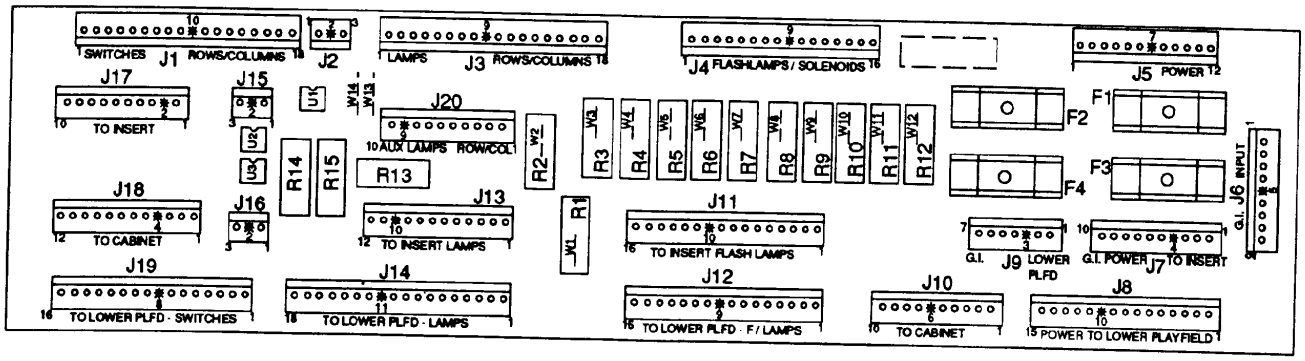
D-12706



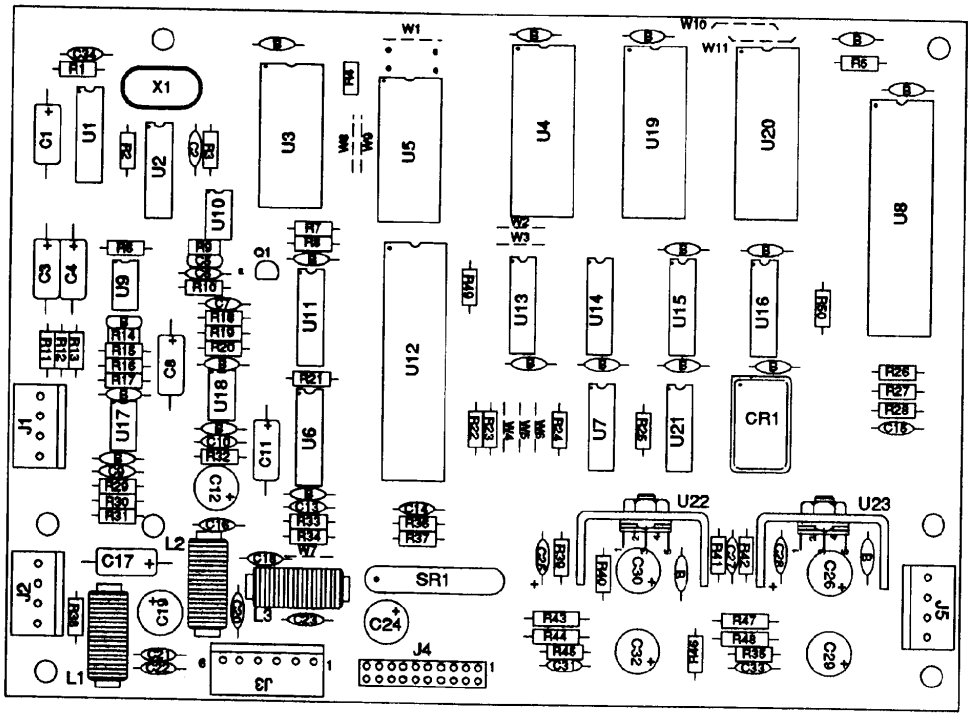
Left Display 3-14



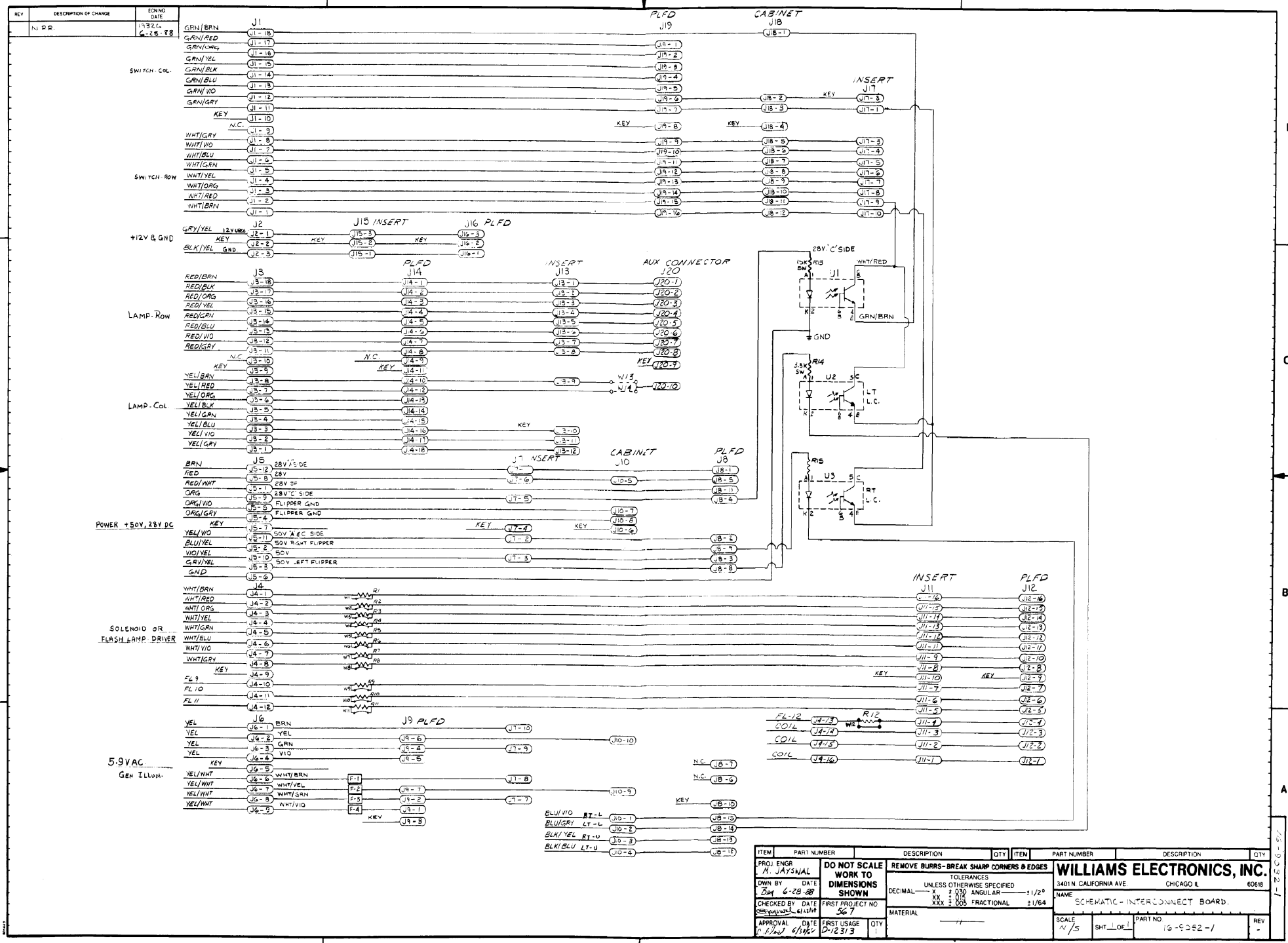
D-12247-2016 Aux Power Driver Board



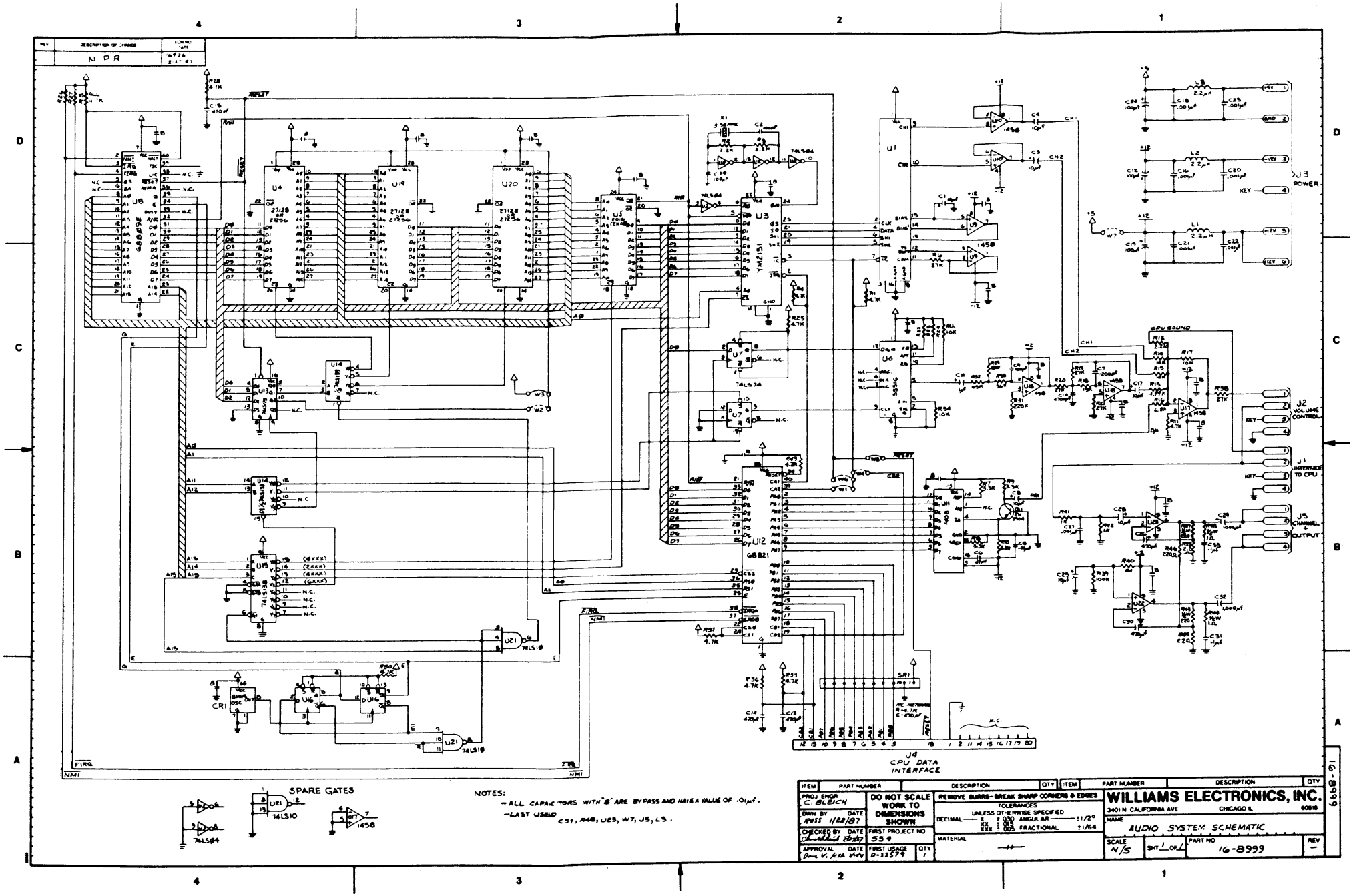
D-12313-2016 Backbox Interconnect Board



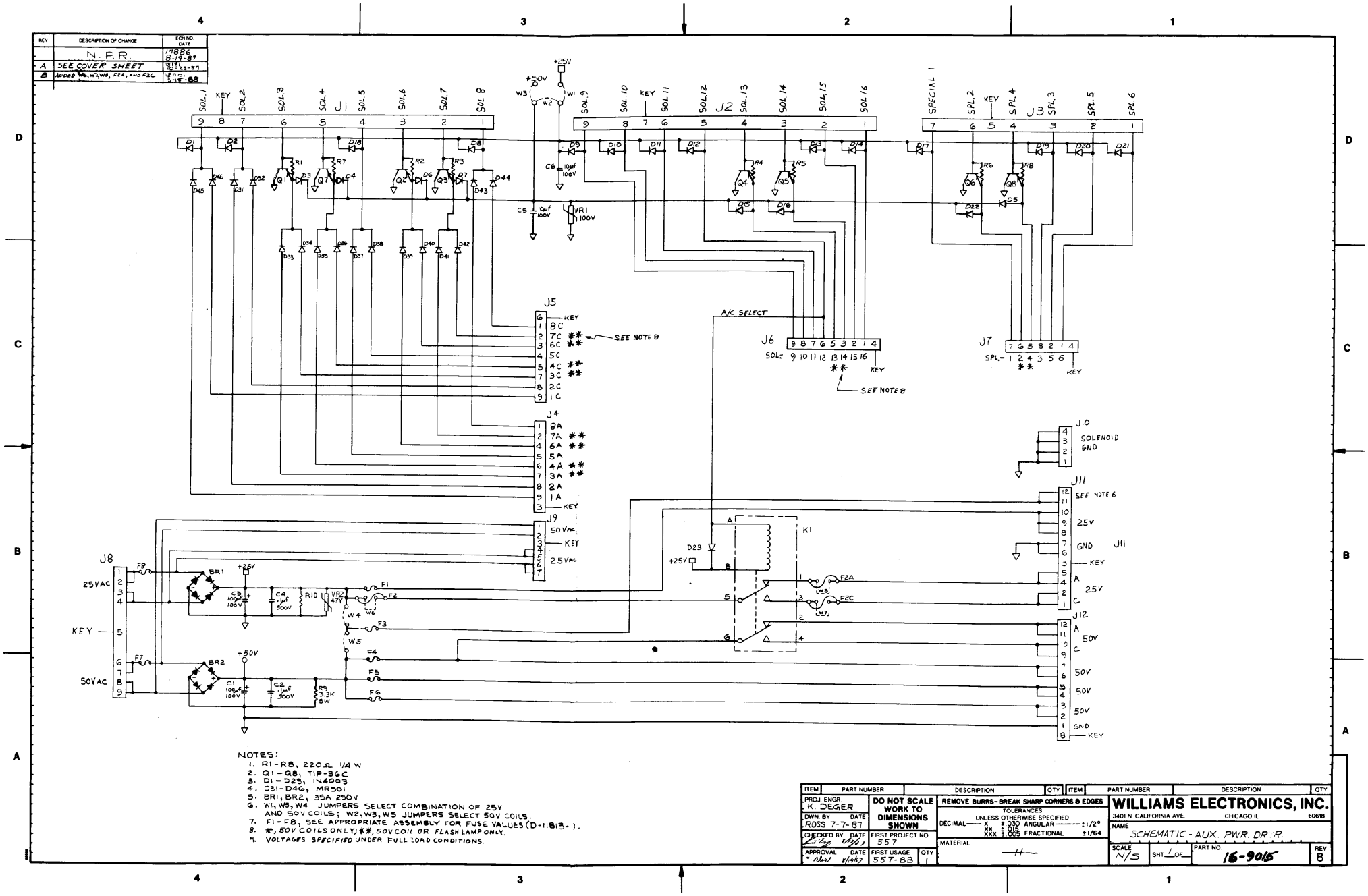
D-11581-2016 Audio Board Assembly



(16-9032-1) Backbox Interconnect Board Schematic



Audio Board (D-11581) Schematic



NOTES:
1. R1-R8, 220Ω 1/4 W
2. Q1-Q8, TIP-36C
3. D1-D28, IN4003
4. D31-D46, MR501
5. BR1, BR2, 35A 250V
6. W1, W3, W4 JUMPERS SELECT COMBINATION OF 25V AND 50V COILS; W2, W3, W5 JUMPERS SELECT 50V COILS.
7. F1-F8, SEE APPROPRIATE ASSEMBLY FOR FUSE VALUES (D-11813-).
8. *, 50V COILS ONLY; **, 50V COIL OR FLASH LAMP ONLY.
9. VOLTAGES SPECIFIED UNDER FULL LOAD CONDITIONS.

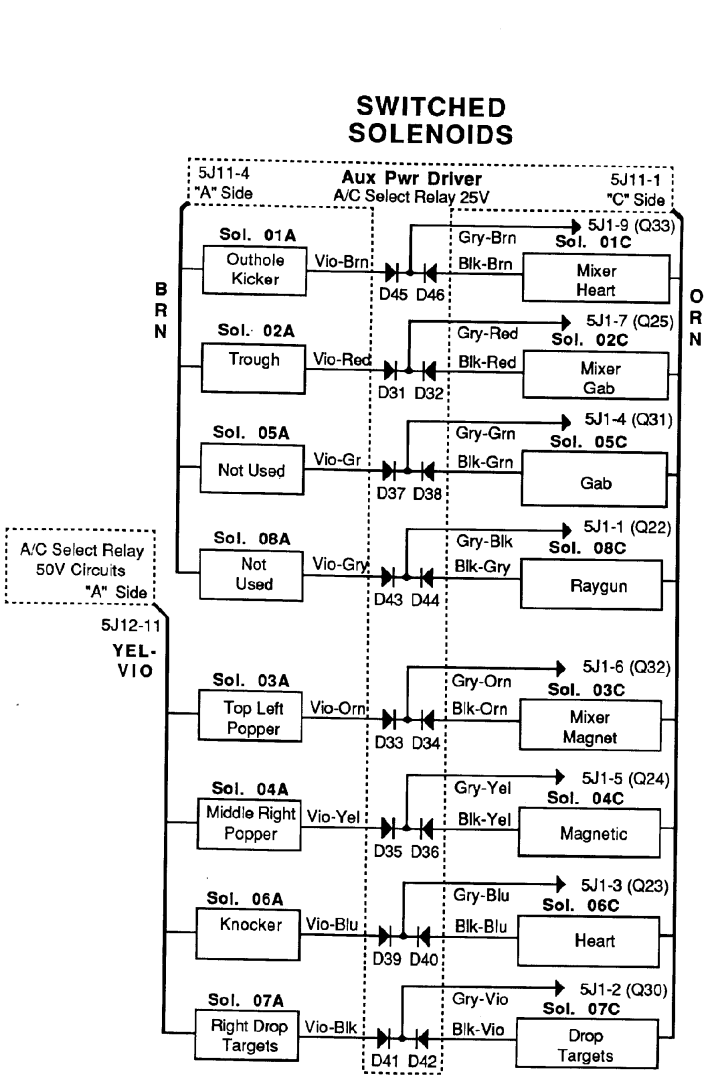
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY

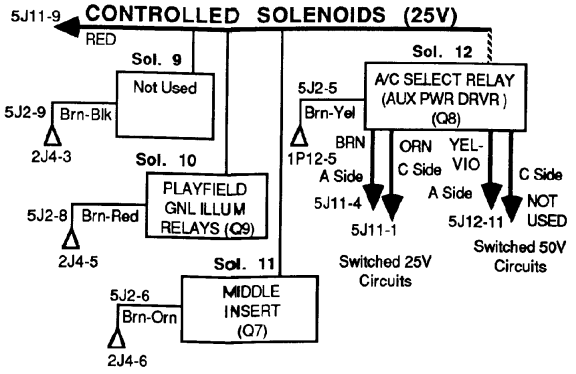
PROJ. ENGR K. DEGER
DWN BY ROSS 7-7-87
CHECKED BY DATE
APPROVAL DATE
DO NOT SCALE WORK TO DIMENSIONS SHOWN
FIRST PROJECT NO 557
FIRST USAGE 557-88 QTY 1
REMOVE BURRS - BREAK SHARP CORNERS & EDGES
TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL X ±.030 ANGULAR ±1/2°
XX ±.010
XXX ±.005 FRACTIONAL ±1/64
MATERIAL

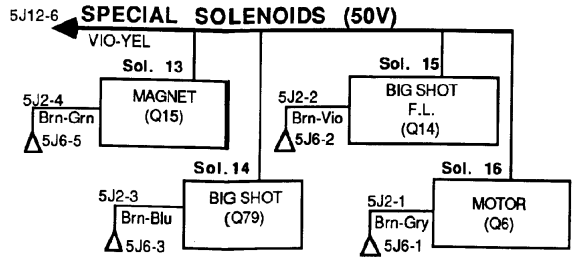
WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE. CHICAGO IL 60618
NAME SCHEMATIC - AUX. PWR. DR. P.
SCALE N/S SHT 1 OF
PART NO. 16-9015
REV 8

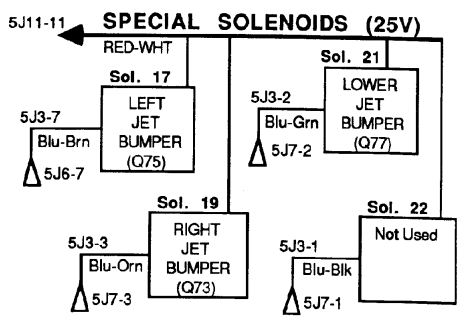
Aux. Power Driver Board 3-18

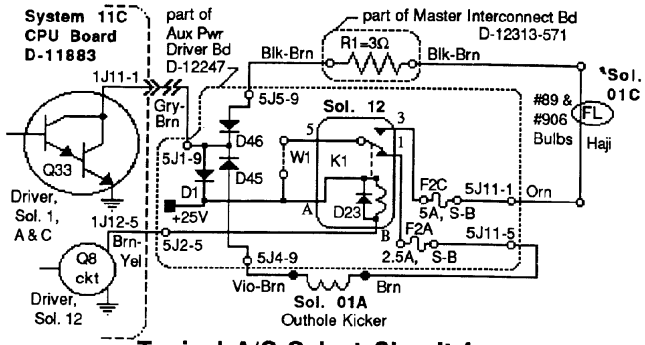
(16-9015) Aux. Power Driver Schematic



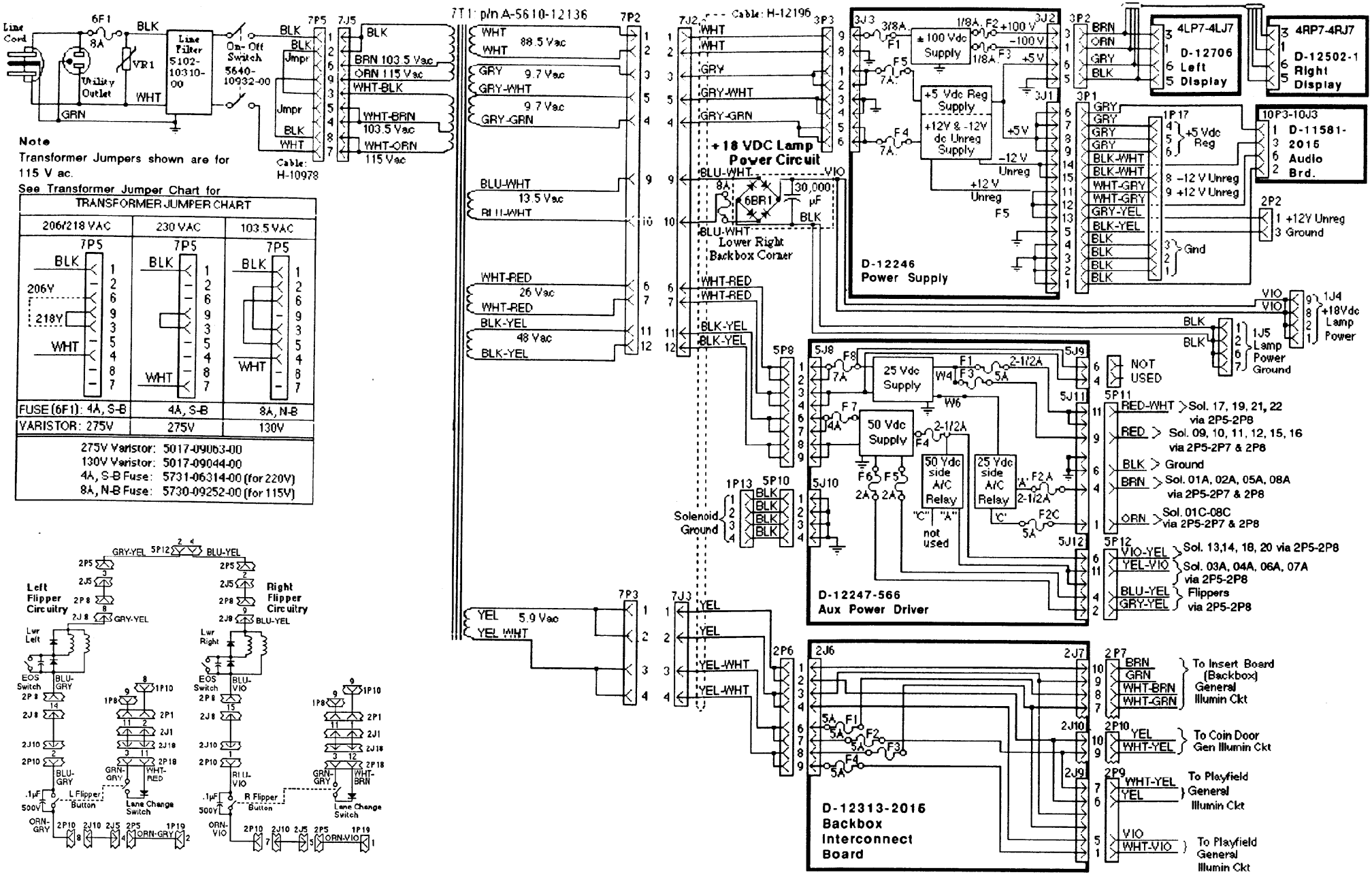








Typical A/C Select Circuit for Switched Solenoids



POWER WIRING

SYSTEM 11C CPU INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description
1J1-1	BRN-GRY	ST-8: Display Digit Strobe / 4J1-1
1J1-2	BRN-VIO	ST-7: Display Digit Strobe / 4J1-2
1J1-3	BRN-BLU	ST-6: Display Digit Strobe / 4J1-3
1J1-4	BRN-GRN	ST-5: Display Digit Strobe / 4J1-4
1J1-5	BRN-YEL	ST-4: Display Digit Strobe / 4J1-5
1J1-6	BRN-ORG	ST-3: Display Digit Strobe / 4J1-6
1J1-7	BRN-RED	ST-2: Display Digit Strobe / 4J1-7
1J1-8	Key Pin	No Connection
1J1-9	BRN-BLK	ST-1: Display Digit Strobe / 4J1-9
1J3-1	BLU-BRN	D1 / Display BCD / 4J6-1
1J3-2	BLU-RED	C1 / Display BCD / 4J6-2
1J3-3	BLU-ORG	B1 / Display BCD / 4J6-3
1J3-4	BLU-YEL	A1 / Display BCD / 4J6-4
1J3-5	BLU-GRN	D2 / Display BCD / 4J6-5
1J3-6	Key Pin	No Connection
1J3-7	BLU-BLK	C2 / Display BCD / 4J6-7
1J3-8	BLU-VIO	B2 / Display BCD / 4J6-8
1J3-9	BLU-GRY	A2 / Display BCD / 4J6-9
1J3-10	---	No Connection
1J3-11	---	No Connection
1J3-12	---	No Connection
1J5-1	---	No Connection
1J5-2	Key Pin	No Connection
1J5-3	BLK	Ground (Lamp Ckt)
1J5-4	BLK	Ground (Lamp Ckt)
1J5-5	---	No Connection
1J5-6	---	No Connection
1J5-7	---	No Connection
1J5-8	BLK	Ground (Lamp Ckt)
1J5-9	BLK	Ground (Lamp Ckt)
1J7-1	YEL-BRN	Lamp Col 1 (Q65/66) /2J3-8
1J7-2	YEL-RED	Lamp Col 2 (Q63/64) /2J3-7
1J7-3	YEL-ORG	Lamp Col 3 (Q61/62) /2J3-6
1J7-4	YEL-BLK	Lamp Col 4 (Q59/60) /2J3-5
1J7-5	Key Pin	No Connection
1J7-6	YEL-GRN	Lamp Col 5 (Q57/58) /2J3-4
1J7-7	YEL-BLU	Lamp Col 6 (Q55/56) /2J3-3
1J7-8	YEL-VIO	Lamp Col 7 (Q53/54) /2J3-2
1J7-9	YEL-GRY	Lamp Col 8 (Q51/52) /2J3-1
1J10-1	WHT-GRY	Switch Row 8 /2J1-8
1J10-2	WHT-VIO	Switch Row 7 /2J1-7
1J10-3	WHT-BLU	Switch Row 6 /2J1-6
1J10-4	Key Pin	No Connection
1J10-5	WHT-GRN	Switch Row 5 /2J1-5
1J10-6	WHT-YEL	Switch Row 4 /2J1-4
1J10-7	WHT-ORG	Switch Row 3 /2J1-3
1J10-8	WHT-RED	Switch Row 2 /2J1-2
1J11-9	WHT-BRN	Switch Row 1 /2J1-1
1J12-1	BRN-BLK	Solenoid 9 (Q17) / 5J2-9
1J12-2	BRN-RED	Solenoid 10 (Q9) / 5J2-8
1J12-3	Key Pin	No Connection
1J12-4	BRN-ORG	Solenoid 11 (Q16) / 5J2-6
1J12-5	BRN-YEL	Solenoid 12 (Q8) / 5J2-5
1J12-6	BRN-GRN	Solenoid 13 (Q15) /5J2-4
1J12-7	BRN-BLU	Solenoid 14 (Q7) / 5J2-3
1J12-8	BRN-VIO	Solenoid 15 (Q14) / 5J2-2
1J12-9	BRN-GRY	Solenoid 16 (Q6) / 5J2-1
1J16-1	RED	Volume Control Input / 11J1-1
1J16-2	BLK	Volume Control Output / 11J1-2
1J16-3	Key Pin	No Connection
1J16-4	White	Signal Ground - CPU / 11J1-4
1J16-1	---	No Connection
1J16-2	---	"
1J16-3	---	"
1J16-4	---	"
1J16-5	---	"
1J16-6	Key Pin	"
1J16-7	---	"
1J16-8	---	"
1J16-9	---	"
1J21		Ribbon Cable Audio Board 11J4
1J22		Ribbon Cable to Master Display Board 4J3

Connector	Wire Color	Signal Designation/Description
1J2-1	VIO-GRY	ST-16: Display Digit Strobe / 4J2-1
1J2-2	VIO-BLK	ST-15: Display Digit Strobe / 4J2-2
1J2-3	VIO-BLU	ST-14: Display Digit Strobe / 4J2-3
1J2-4	VIO-GRN	ST-13: Display Digit Strobe / 4J2-4
1J2-5	VIO-YEL	ST-12: Display Digit Strobe / 4J2-5
1J2-6	VIO-ORG	ST-11: Display Digit Strobe / 4J2-6
1J2-7	Key Pin	No Connection
1J2-8	VIO-RED	ST-10: Display Digit Strobe / 4J2-8
1J2-9	VIO-BRN	ST-9: Display Digit Strobe / 4J2-9
1J4-1	VIO	Lamp +18V dc Power
1J4-2	VIO	"
1J4-3	Key Pin	No Connection
1J4-4	---	No Connection
1J4-5	---	No Connection
1J4-6	---	No Connection
1J4-7	---	No Connection
1J4-8	VIO	Lamp +18V dc Power
1J4-9	VIO	"
1J6-1	RED-BRN	Lamp Row 1 (Q80) /2J3-18
1J6-2	RED-BLK	Lamp Row 2 (Q81) /2J3-17
1J6-3	RED-ORG	Lamp Row 3 (Q82) /2J3-16
1J6-4	Key Pin	No Connection
1J6-5	RED-YEL	Lamp Row 4 (Q83) /2J3-15
1J6-6	RED-GRN	Lamp Row 5 (Q84) /2J3-14
1J6-7	RED-BLU	Lamp Row 6 (Q85) /2J3-13
1J6-8	RED-VIO	Lamp Row 7 (Q86) /2J3-12
1J6-9	RED-GRY	Lamp Row 8 (Q87) /2J3-11
1J8-1	GRN-BRN	Switch Col 1 (Q45) /2J1-18
1J8-2	GRN-RED	Switch Col 2 (Q49) /2J1-17
1J8-3	GRN-ORG	Switch Col 3 (Q44) /2J1-16
1J8-4	GRN-YEL	Switch Col 4 (Q48) /2J1-15
1J8-5	GRN-BLK	Switch Col 5 (Q43) /2J1-14
1J8-6	Key Pin	No Connection
1J8-7	GRN-BLU	Switch Col 6 (Q47) /2J1-13
1J8-8	GRN-VIO	Switch Col 7 (Q42) /2J1-12
1J8-9	GRN-GRY	Switch Col 8 (Q46) /2J1-11
1J9		Not Applicable
1J11-1	GRY-BRN	Solenoid 1 (Q33) / 5J1-9
1J11-2	Key Pin	No Connection
1J11-3	GRY-RED	Solenoid 2 (Q25) / 5J1-7
1J11-4	GRY-ORG	Solenoid 3 (Q32) / 5J1-6
1J11-5	GRY-YEL	Solenoid 4 (Q24) / 5J1-5
1J11-6	GRY-GRN	Solenoid 5 (Q31) / 5J1-4
1J11-7	GRY-BLU	Solenoid 6 (Q23) / 5J1-3
1J11-8	GRY-VIO	Solenoid 7 (Q30) / 5J1-2
1J11-9	GRY-BLK	Solenoid 8 (Q22) / 5J1-1
1J13-1	BLK	Solenoid Ground / 5J10-1
1J13-2	BLK	" /5J10-2
1J13-3	BLK	" /5J10-3
1J13-4	BLK	" /5J10-4
1J14-1	BLK-RED	Memory Protect / 7J1-4
1J14-2	WHT	Ground / 7J1-3
1J14-3	GRN	ADVANCE Switch / 7J1-1
1J14-4	BLU	AUTO/MANUAL Switch / 7J1-2
1J17-1	BLK	Ground / 3J1-2
1J17-2	BLK	" / 3J1-3
1J17-3	BLK	" / 3J1-4
1J17-4	GRY	Power: +5V dc / 3J1-8
1J17-5	GRY	" /3J1-8
1J17-6	GRY	" /3J1-9
1J17-7	Key Pin	No Connection
1J17-8	BLK-WHT	Power: -12V dc Unreg / 3J1-14
1J17-9	WHT-GRY	Power: +12V dc Unreg / 3J1-12
1J19-1	ORG-VIO	Flipper Ground /2J5-5
1J19-2	ORG-GRY	Flipper Ground /2J5-4
1J19-3	BLU-ORN	Spl Solnd 3 (Q73) / 5J3-3
1J19-4	BLU-RED	Spl Solnd 2 (Q71) / 5J3-6
1J19-5	Key Pin	No Connection
1J19-6	BLU-YEL	Spl Solnd 4 (Q69) / 5J3-4
1J19-7	BLU-BRN	Spl Solnd 1 (Q75) / 5J3-7
1J19-8	BLU-GRN	Spl Solnd 5 (Q77) / 5J3-2
1J19-9	BLU-BLK	Spl Solnd 6 (Q79) / 5J3-1

AUX POWER DRIVER INTERBOARD SIGNALS

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

Connector	Wire Color	Signal Designation/Description
5J2-1	BRN-GRY	CPU: Solenoid 16 (Q6) / 1J12-9
5J2-2	BRN-VIO	CPU: Solenoid 15 (Q14) / 1J12-8
5J2-3	BRN-BLU	CPU: Solenoid 14 (Q7) / 1J12-7
5J2-4	BRN-GRN	CPU: Solenoid 13 (Q15)/ 1J12-6
5J2-5	BRN-YEL	CPU: Solenoid 12 (Q8) / 1J12-5
5J2-6	BRN-ORG	CPU: Solenoid 11 (Q16)/ 1J12-4
5J2-7	Key Pin	No Connection
5J2-8	BRN-RED	CPU: Solenoid 10 (Q9) / 1J12-2
5J2-9	BRN-BLK	CPU: Solenoid9 (Q11)/ 1J12-1
5J4-1	VIO-GRY	Solenoid 08A
5J4-2	VIO-BLK	Solenoid 07A
5J4-3	Key Pin	No Connection
5J4-4	VIO-BLK	Solenoid 06A
5J4-5	VIO-GRN	Solenoid 05A
5J4-6	VIO-YEL	Solenoid 04A
5J4-7	VIO-ORN	Solenoid 03A
5J4-8	VIO-RED	Solenoid 02A
5J4-9	VIO-BRN	Solenoid 01A
5J6-1	BRN-GRY	Solenoid 16 /2J4-12
5J6-2	BRN-VIO	Solenoid 15 /2J4-11
5J6-3	BRN-BLU	Solenoid 14 /2J4-16
5J6-4	Key Pin	No Connection
5J6-5	BRN-GRN	Solenoid 13 /2J4-15
5J6-6	---	No Connection
5J6-7	BRN-ORG	Solenoid 11 /2J4-14
5J6-8	BRN-RED	Solenoid 10 /2J4-13
5J6-9	BRN-BLK	Solenoid 09 /2J4-10
5J8-1	WHT-RED	Transformer: 26V ac / 7J2-6
5J8-2	WHT-RED	Transformer: 26V ac / 7J2-6
5J8-3	WHT-RED	Transformer: 26V ac / 7J2-7
5J8-4	WHT-RED	Transformer: 26V ac / 7J2-7
5J8-5	Key Pin	No Connection
5J8-6	BLK-YEL	Transformer: 48V ac / 7J2-11
5J8-7	BLK-YEL	Transformer: 48V ac / 7J2-11
5J8-8	BLK-YEL	Transformer: 48V ac / 7J2-12
5J8-9	BLK-YEL	Transformer: 48V ac / 7J2-12
5J10-1	BLK	Solnd Gnd / 1J13-1
5J10-2	BLK	Solnd Gnd / 1J13-2
5J10-3	BLK	Solnd Gnd / 1J13-3
5J10-4	BLK	Solnd Gnd / 1J13-4
5J11-1	ORG	+25 Vdc "C" Solenoid Pwr/2J5-9
5J11-2	---	No Connection
5J11-3	Key Pin	No Connection
5J11-4	BRN	+25 Vdc "A" Solenoid Pwr/2J5-12
5J11-5	---	No Connection
5J11-6	BLK	Ground/2J5-6
5J11-7	---	No Connection
5J11-8	---	No Connection
5J11-9	RED	+25 Vdc Solenoid Pwr/2J5-8
5J11-10	---	No Connection
5J11-11	RED-WHT	+25 Vdc Solenoid Pwr/2J5-1
5J11-12	---	No Connection

POWER SUPPLY INTERBOARD SIGNALS

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

BACKBOX INTERCONNECT BOARD INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description
2J1-1	WHT-BRN	Switch Row 1 /1J11-9
2J1-1	WHT-RED	Switch Row 2 /1J11-8
2J1-3	WHT-ORG	Switch Row 3 /1J11-7
2J1-4	WHT-YEL	Switch Row 4 /1J11-6
2J1-5	WHT-GRN	Switch Row 5 /1J11-5
2J1-6	WHT-BLU	Switch Row 6 /1J11-3
2J1-7	WHT-VIO	Switch Row 7 /1J11-2
2J1-8	WHT-GRY	Switch Row 8 /1J11-1
2J1-9	Key Pin	No Connection
2J1-10	---	No Connection
2J1-11	GRN-GRY	Switch Col 8 (Q46) /1J8-9
2J1-12	GRN-VIO	Switch Col 7 (Q42) /1J8-8
2J1-13	GRN-BLU	Switch Col 6 (Q47) /1J8-7
2J1-14	GRN-BLK	Switch Col 5 (Q43) /1J8-5
2J1-15	GRN-YEL	Switch Col 4 (Q48) /1J8-4
2J1-16	GRN-ORG	Switch Col 3 (Q44) /1J8-3
2J1-17	GRN-RED	Switch Col 2 (Q49) /1J8-2
2J1-18	GRN-BRN	Switch Col 1 (Q45) /1J8-1
2J4-1	WHT-BRN	Solenoid 01C In /5J5-9
2J4-2	WHT-RED	Solenoid 02C In /5J5-8
2J4-3	WHT-ORG	Solenoid 03C In /5J5-7
2J4-4	WHT-YEL	Solenoid 04C In /5J5-5
2J4-5	WHT-GRN	Solenoid 05C In /5J5-4
2J4-6	WHT-BLU	Solenoid 06C In /5J5-3
2J4-7	WHT-VIO	Solenoid 07C In /5J5-2
2J4-8	WHT-GRY	Solenoid 08C In /5J5-1
2J4-9	Key Pin	No Connection
2J4-10	BRN-BLK	Solenoid 09 /5J6-9
2J4-11	BRN-VIO	Solenoid 15 /5J6-2
2J4-12	BRN-GRY	Solenoid 16 /5J6-1
2J4-13	BRN-RED	Solenoid 10 /5J6-8
2J4-14	BRN-ORN	Solenoid 11 /5J6-7
2J4-15	BRN-GRN	Solenoid 13 /5J6-5
2J4-16	BRN-BLU	Solenoid 14 /5J6-3
2J6-1	YEL	Gen Illum Pwr: 6V ac
2J6-2	YEL	Gen Illum Pwr: 6V ac
2J6-3	YEL	Gen Illum Pwr: 6V ac
2J6-4	YEL	Gen Illum Pwr: 6V ac
2J6-5	Key Pin	No Connection
2J6-6	YEL-WHT	Gen Illum Pwr: 6V ac
2J6-7	YEL-WHT	Gen Illum Pwr: 6V ac
2J6-8	YEL-WHT	Gen Illum Pwr: 6V ac
2J6-9	YEL-WHT	Gen Illum Pwr: 6V ac
2J8-1	BRN	+25 Vdc ("A" Solenoids)
2J8-2	YEL-VIO	+50 Vdc Solenoid 03A, 04A, 06A
2J8-3	VIO-YEL	+50 Vdc Solenoid 14, 18, 20
2J8-4	ORG	+25 Vdc ("C" Solenoids)
2J8-5	RED	+25 Vdc Solenoid 9-11, 15, 16
2J8-6, 7	---	No Connection
2J8-8	GRY-YEL	Flipper Power
2J8-9	BLU-YEL	Flipper Power
2J8-10	Key Pin	No Connection
2J8-11	RED-WHT	+25Vdc Solenoid 17, 19, 21
2J8-12	BLK-BLU	Upper Left Flipper
2J8-13	BLK-YEL	Upper Right Flipper
2J8-14	BLU-GRY	Lower Left Flipper
2J8-15	BLU-VIO	Lower Right Flipper
2J10-1	BLU-VIO	Lower Right Flipper
2J10-2	BLU-GRY	Lower Left Flipper
2J10-3	BLK-YEL	Upper Right Flipper
2J10-4	BLK-BLU	Upper Left Flipper
2J10-5	RED	+25 Vdc (Solenoid)
2J10-6	---	No Connection
2J10-7	ORG-VIO	R Flipper Ground Ckt
2J10-8	ORG-GRY	L Flipper Ground Ckt
2J10-9	WHT-YEL	Gen Illum Pwr: 6V ac
2J10-10	YEL	Gen Illum Pwr: 6V ac
2J13-1	RED-BRN	Lamp Row 1
2J13-2	RED-BLK	Lamp Row 2
2J13-3	RED-ORN	Lamp Row 3
2J13-4	RED-YEL	Lamp Row 4
2J13-5	RED-GRN	Lamp Row 5
2J13-6	RED-BLU	Lamp Row 6
2J13-7	---	No Connection
2J13-8	---	No Connection
2J13-9	---	No Connection
2J13-10	---	No Connection
2J13-11	---	No Connection
2J13-12	YEL-GRY	Lamp Col 8

Connector	Wire Color	Signal Designation/Description
2J2-1	GRY-YEL	+12Vdc Unreg/3J1-13
2J2-2	---	No Connection
2J2-3	BLK-YEL	Ground/3J1-5
2J3-1	YEL-GRY	Lamp Col 8 (Q51-52) /1J7-9
2J3-2	YEL-VIO	Lamp Col 7 (Q53/54) /1J7-8
2J3-3	YEL-BLU	Lamp Col 6 (Q55/56) /1J7-7
2J3-4	YEL-GRN	Lamp Col 5 (Q57/58) /1J7-6
2J3-5	YEL-BLK	Lamp Col 4 (Q59/60) /1J7-4
2J3-6	YEL-ORG	Lamp Col 3 (Q61-62) /1J7-3
2J3-7	YEL-RED	Lamp Col 2 (Q63/64) /1J7-2
2J3-8	YEL-BRN	Lamp Col 1 (Q65-66) /1J7-1
2J3-9	Key Pin	No Connection
2J3-10		No Connection
2J3-11	RED-GRY	Lamp Row 8 (Q87) /1J6-9
2J3-12	RED-VIO	Lamp Row 7 (Q86) /1J6-8
2J3-13	RED-BLU	Lamp Row 6 (Q85) /1J6-7
2J3-14	RED-GRN	Lamp Row 5 (Q84) /1J6-6
2J3-15	RED-YEL	Lamp Row 4 (Q83) /1J6-5
2J3-16	RED-ORG	Lamp Row 3 (Q82) /1J6-3
2J3-17	RED-BLK	Lamp Row 2 (Q81) /1J6-2
2J3-18	RED-BRN	Lamp Row 1 (Q80) /1J6-1
2J5-1	RED-WHT	+25Vdc (Solenoid)/5J11-12
2J5-2	BLU-YEL	Flipper Power/5J12-4
2J5-3	GRY-YEL	Flipper Power/5J12-2
2J5-4	ORG-GRY	Flipper Ground Ckt/1J19-2
2J5-5	ORG-VIO	Flipper Ground Ckt/1J19-1
2J5-6	BLK	Ground/5J11-6
2J5-7	Key Pin	No Connection
2J5-8	RED	+25 Vdc (Solenoid)/ 5J11-9
2J5-9	ORG	+25 Vdc ("C" Solenoids)/ 5J11-1
2J5-10	VIO-YEL	+50 Vdc (Solenoid)/ 5J12-7
2J5-11	YEL-VIO	+50 Vdc (Solenoid)/ 5J12-11
2J5-12	BRN	+25 Vdc ("A" Solenoids)/5J11-5
2J7-1	---	No Connection
2J7-2	---	No Connection
2J7-3	---	No Connection
2J7-4	---	No Connection
2J7-5	ORG	+25 Vdc ("C" Solenoids)
2J7-6	RED	+25 Vdc (Solenoid)/
2J7-7	WHT-GRN	Backbox Gen Illum Pwr/2J6-8
2J7-8	WHT-BRN	Backbox Gen Illum Pwr/2J6-6
2J7-9	GRN	Backbox Gen Illum Pwr/2J6-3
2J7-10	BRN	Backbox Gen Illum Pwr/2J6-1
2J9-1	WHT-VIO	Playfield Gen Illum Pwr/2J6-9
2J9-2	---	No Connection
2J9-3	---	No Connection
2J9-4	---	No Connection
2J9-5	VIO	Playfield Gen Illum Pwr/2J6-4
2J9-6	YEL	Snd Overlay Lamp Brd J5 / 4
2J9-7	WHT-YEL	Snd Overlay Lamp Brd J5 / 2
2J11-1	---	No Connection
2J11-2	---	No Connection
2J11-3	BLK-ORN	Solenoid 03C
2J11-4	---	No Connection
2J11-5	---	No Connection
2J11-6	---	No Connection
2J11-7	BRN-BLK	Solenoid 09
2J11-8	---	No Connection
2J11-9	BLK-VIO	Solenoid 07C
2J11-10	---	No Connection
2J11-11	BLK-BLU	Solenoid 06C
2J11-12	BLK-GRN	Solenoid 05C
2J11-13	BLK-YEL	Solenoid 04C
2J11-14	---	No Connection
2J11-15	---	No Connection
2J11-16	---	No Connection
2J12-1	BRN-BLU	Solenoid 14
2J12-2	BRN-GRN	Solenoid 13
2J12-3	---	No Connection
2J12-4	BRN-RED	Solenoid 10
2J12-5	BRN-GRY	Solenoid 16
2J12-6	BRN-VIO	Solenoid 15
2J12-7	BRN-BLK	Solenoid 9
2J12-8	BLK-GRY	Solenoid 08C
2J12-9	---	No Connection
2J12-10	BLK-VIO	Solenoid 10
2J12-11	BLK-GRN	Solenoid 05C
2J12-12	BLK-BLU	Solenoid 06C

BACKBOX INTERCONNECT BOARD INTERBOARD SIGNALS

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

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

AUDIO BOARD INTERBOARD SIGNALS

Connector	Wire Color	Signal Designation/Description
11J1-1	---	No Connection
11J1-2	---	No Connection
11J1-3	---	No Connection
11J1-4	---	No Connection
11J3-1	GRY	Power: +5 Vdc / 3J1-7
11J3-2	BLK	Ground / 3J1-1
11J3-3	BLK-WHT	Power: -12 Vdc Unreg / 3J1-15
11J3-4	---	No Connection
11J3-5	---	No Connection
11J3-6	WHT-GRY	Power: +12 Vdc Unreg / 3J1-11

Connector	Wire Color	Signal Designation/Description
11J2-1	RED	Signal Level (to Vol Cntrl)
11J2-2	BLK	Signal Level (from Vol Cntrl)
11J2-3	---	No Connection
11J2-4	shield	Ground
11J4		Ribbon Cable from CPU Brd 1J21
11J5-1	BLK-YEL	/ Speaker
11J5-2	BLK-YEL	/ Speaker
11J5-3	BLK	/ Speaker
11J5-4	BLK	/ Speaker

LEFT DISPLAY INTERBOARD SIGNALS

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

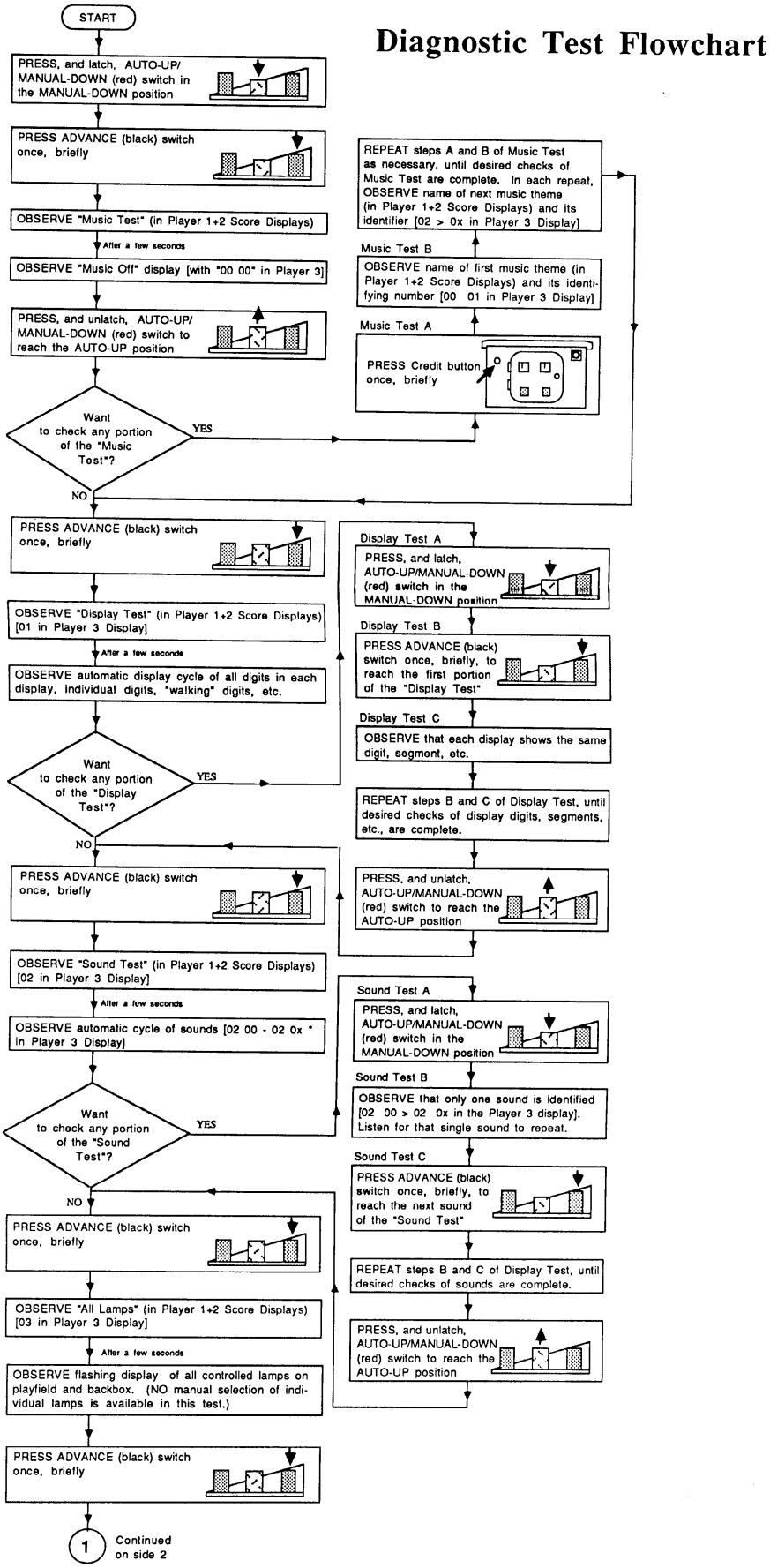
Connector	Wire Color	Signal Designation/Description
4J2-1	VIO-GRY	ST-16: Digit Display Strobe / 1J2-1
4J2-2	VIO-BLK	ST-15: Display Digit Strobe / 1J2-2
4J2-3	VIO-BLU	ST-14: Display Digit Strobe / 1J2-3
4J2-4	VIO-GRN	ST-13: Display Digit Strobe / 1J2-4
4J2-5	VIO-YEL	ST-12: Display Digit Strobe / 1J2-5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

RIGHT DISPLAY INTERBOARD SIGNALS

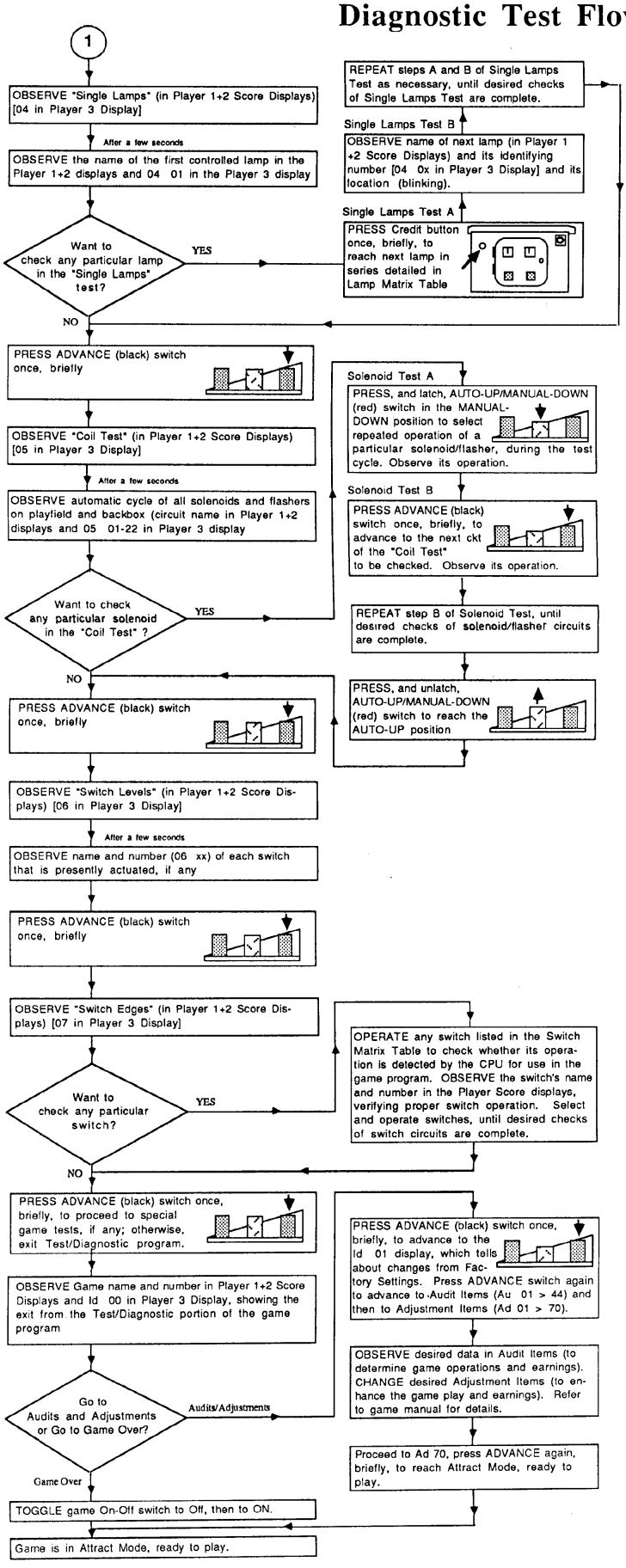
Connector	Wire Color	Signal Designation/Description
(Same as for Left Display, above, plus 4J5 listed below)		
4J5-1	BLU-BRN	D1 / Display BCD / 1J3-1
4J5-2	BLU-RED	C1 / Display BCD / 1J3-2
4J5-3	BLU-ORG	B1 / Display BCD / 1J3-3
4J5-4	BLU-YEL	A1 / Display BCD / 1J3-4
4J5-5	BLU-GRN	D2 / Display BCD / 1J3-5

Connector	Wire Color	Signal Designation/Description
4J5-6	Key Pin	No Connection
4J5-7	BLU-BLK	C2 / Display BCD / 1J3-7
4J5 8	BLU VIO	B2 / Display BCD / 1J3-8
4J5-9	BLU-GRY	A2 / Display BCD / 1J3-9

Diagnostic Test Flowchart



Diagnostic Test Flowchart Side 2



DR. DUDE SWITCH MATRIX

column	1 Q45	2 Q49	3 Q44	4 Q48	5 Q43	6 Q47	7 Q42	8 Q46
row	GRN-BRN 1J8-1	GRN-RED 1J8-2	GRN-ORN 1J8-3	GRN-YEL 1J8-4	GRN-BLK 1J8-5	GRN-BLU 1J8-7	GRN-VIO 1J8-8	GRN-GRY 1J8-9
1 WHT-BRN 1J10-9	Plumb Tilt 1	Shooter Lane 9	Left Outlane 17	relle (X) 25	Mixer Gab Top 33	Mixer Mag. Top 41	I Test Target 49	Right Flipper 57
2 WHT-RED 1J10-8	Not Used 2	Outhole 10	Right Outlane 18	rell (E) x 26	Mixer Gab Middle 34	Mixer Mag. Middle 42	Magnet Target 50	Left Flipper 58
3 WHT-ORN 1J10-7	Game Start 3	Trough 1 Ball 11	Right Return 19	rel (L) ex 27	Mixer Gab Bottom 35	Mixer Mag. Bottom 43	Top Left Popper 51	Right Loop 59
4 WHT-YEL 1J10-6	Right Coin Switch 4	Trough 2 Balls 12	Left Return 20	re (F) lex 28	Mixer Heart Left 36	Not Used 44	Left Jumper Bumper 52	Not Used 60
5 WHT-GRN 1J10-5	Center Coin Switch 5	Trough 3 Balls 13	Right Drop 1 (Top) 21	r (E) flex 29	Mixer Heart Middle 37	Not Used 45	Right Jumper Bumper 53	Not Used 61
6 WHT-BLU 1J10-3	Left Coin Switch 6	Heart Target 14	Right Drop 2 22	(R) eflex 30	Mixer Heart Right 38	Middle Middle 10 pts. 46	Bottom Jumper Bumper 54	Not Used 62
7 WHT-VIO 1J10-2	Slam Tilt 7	Enter Left Ramp 15	Right Drop 3 23	Big Shot 31	Top Left 10 pts. 39	Middle Bottom 10 pts. 47	Left Slingshot 55	Not Used 63
8 WHT-GRY 1J10-1	High Score Reset 8	Score Left Ramp 16	Right Drop 4 (Bottom) 24	Middle Right Popper 32	Not Used 40	Middle Top 10 pts. 48	Right Slingshot 56	Not Used 64

DR. DUDE LAMP MATRIX

column	1 Q66	2 Q64	3 Q62	4 Q60	5 Q58	6 Q56	7 Q54	8 Q52
row	YEL-BRN 1J7-1	YEL-RED 1J7-2	YEL-ORN 1J7-3	YEL-BLK 1J7-4	YEL-GRN 1J7-6	YEL-BLU 1J7-7	YEL-VIO 1J7-8	YEL-GRY 1J7-9
1 Q80 RED-BRN 1J6-1	Jackpot 1 Million 1	I Test 25K 9	Raygun's Lamp 1 17	relle(X) 25	Mix Master Heart 33	Right Drop Target Hot Score 41	Magnetic R.e.f.l.e.x. 3 49	Jackpot Lit 57
2 Q81 RED-BLK 1J6-2	Jackpot 2 Million 2	I Test 50K 10	Raygun's Lamp 2 18	rell(E)x 26	Mix Master Mag. 34	Right Drop Target Lite Million 42	Magnetic 5K 50	Million 58
3 Q82 RED-ORN 1J6-3	Jackpot 3 Million 3	I Test 75K 11	Raygun's Lamp 3 19	rel(L)ex 27	Mix Master Gab 35	Right Drop Target Double Jackpot 43	Magnetic 25K 51	GaZillion 59
3 Q83 RED-YEL 1J6-5	Jackpot 4 Million 4	I Test 100K 12	Raygun's Lamp 4 20	re(F)lex 28	Magnetic Award 36	Right Drop Target Lite Extra Ball 44	Magnetic 50K 52	Super Dude (Top) 60
5 Q84 RED-GRN 1J6-6	Jackpot 5 Million 5	Raygun's Special 13	Raygun's Lamp 5 21	r(E)flex 29	Heart Award 37	Right Drop Target Bonus Boost 45	Gab R.e.f.l.e.x. 2 53	Major Dude 61
6 Q85 RED-BLU 1J6-7	Jumper Value 1K 6	Raygun's Extra Ball 14	2X 22	(R)eflex 30	Gab Award 38	Heart 5K 46	Gab 5K 54	Cool Dude 62
7 Q86 RED-VIO 1J6-8	Jumper Value 2.5K 7	Raygun's R.e.f.l.e.x. 1 15	4X 23	Big Shot 31	Shoot Again 39	Heart 25K 47	Gab 25K 55	Party Dude 63
8 Q87 RED-GRY 1J6-9	Jumper Value 5K 8	Bag of Tricks 16	6X 24	Playfield 2X 32	Left/Right Outlane 40	Heart 50K 48	Gab 50K 56	Plain Dude (Bottom) 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 copy right, 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 in stalled and used in accordance with the in structions 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 back box down!

WARNING

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

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

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

NOTICE

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