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March 1989

ATLANTIS

Operations
and
Parts Information
Manual

Bally
MIDWAY



ROM Summary

6803 CPU A084-91786-G000 Memory & Jumper Combinations

Game Name	Game No.	Released	U2	U3	Jumpers
Eight Ball Champ	0B38	Aug 1985	Not Used	0838-00803-0005	2,4,6,8,10
Beat The Clock	0C70	Nov 1985	Not Used	0C70-00803-0005	2,4,6,9,10
Lady Luck	0E34	Feb 1986	Not Used	0E34-00803-0005	2,4,6,8,10
Motor Dome	0E14	May 1986	E14A-42AAE-BX40	E14A-42AAE-CX4D	2,4,6,8,10
Black Belt	0E52	Jul 1986	0E52-00803-0001	0E52-00803-0002	2,4,6,8,10
Special Force	0E47	Sep 1986	0E47-00803-0004	0E47-00803-0005	2,4,6,9,10
Strange Science	0E35	Dec 1986	0E35-00803-0001	0E35-00803-0002	2,4,6,9,10
City Slicker	0E79	Feb 1987	0E79-00803-0002	0E79-00803-0003	2,4,6,9,10
Hard Body	0E94	Mar 1987	E94A-12601-0000	E94A-12602-0000	2,4,6,9,10
Party Animal	0H01	May 1987	H01A-12601-0000	H01A-12602-0000	2,4,6,9,10
Heavy Metal	0H03	Jun 1987	H03A-12601-0000	H03A-12602-0000	2,4,6,9,10
Dungeons & Dragons	0H06	Oct 1987	H06A-12601-0000	H06A-12602-0000	2,4,6,9,10
Escape From Lost World	0H05	Jan 1988	H05A-12601-0000	H05A-12602-0000	2,4,6,8,10
Blackwater 100	0H07	Mar 1988	H07A-12601-0000	H07A-12602-0000	2,4,6,9,10
Truck Stop	2001	Oct 1988	H08A-12601-0000	H08A-12602-0000	2,4,6,9,10
Atlantis	2006	Feb 1989	2006-12601-0000	2006-12602-0000	2,4,6,9,10

Note: See BALLY-MIDWAY Service Bulletin dated December 26, 1985, summarized below...

Subject: BEAT THE CLOCK and subsequent pinball games.

Symptom: LED flashes eight times, but game fails to power up.

Cause: Starting with BEAT THE CLOCK, game 300, the U3 program was modified for internal testing.

Cure: Current boards include a 100K ohm, 1/4-watt pullup resistor. This runs between the +5-volt bus and pin 12 of microprocessor U1.

ATLANTIS COIL TABLE

SOL NO.	SOLENOID DESCRIPTION	SOL. TYPE	WIRE COLOR	CONNECTIONS		SOLENOID PART NUMBER
				CONTROL BOARD	DRIVER TRANSISTOR	
01	Right Slingshot	Momentary	White-Red	CJ9-1	Q18	A365-00067-0029
02	Left Bumper	Momentary	Yellow-White	CJ6-4	Q14	A365-00067-0006
03	Drop Target Reset	Momentary	Yellow-Blue	CJ6-2	Q12	A365-00067-0019
04	Right Bumper	Momentary	Blue-White	CJ8-6	Q15	A365-00067-0006
05	Middle Bumper	Momentary	Blue-Orange	CJ8-7	Q16	A365-00067-0006
06	Left Slingshot	Momentary	Yellow-Brown	CJ6-5	Q17	A365-00067-0029
07	Popper Kicker	Momentary	Yellow-Red	CJ6-1	Q11	A365-00067-0029
08	Ramp Lift	Momentary	Yellow-Green	CJ6--3	Q13	A365-00067-0006
09	Ball Eject	Momentary	White-Brown	CJ9-6	Q22	A365-00067-0006
10	Outhole	Momentary	White-Black	CJ9-8	Q39	A365-00067-0006
11	Knocker*	Momentary	White-Gray	CJ9-11	Q40	A365-00067-0006
12	Submarine Eject	Momentary	Yellow-Violet	CJ6-7	Q10	A365-00067-0006
13	Not Used	Continuous	Blue-Green	CJ9-10	Q8	--
14	Flipper Enabling Relay	Continuous	--	--	Q7	114E-00001-0011
15	Drain Plug	Momentary	White-Blue	CJ9-2	Q19	A365-00067-0006
16	Ramp Down	Momentary	White-Yellow	CJ9-3	Q20	SM-28-900-DC
17	Saucer	Momentary	White-Green	CJ9-4	Q21	A365-00067-0006
18	Reserved for German	Momentary	White-Orange	CJ9-7	Q38	--
19	Not Used	Continuous	White-Violet	CJ9-9	Q9	--
FLIPPER DESCRIPTION		WIRE COLORS & CONNECTORS				
20	Left Flipper	Gray: CJ6-8				FL-11630
21	Right Flipper	Gray-White: CJ6-9				FL-11630

NOTES:

- For continuous solenoid 19, install jumper JW8. Remove jumper JW9.
- To use switch strobe at CJ4-1, install jumper JW9. Remove jumper JW8.
- To use extra display at CJ2-19, install jumper JW11. Remove jumper JW10.
- *Knocker is located in the backbox.

ATLANTIS Operating Manual

Sound Board Summary

SOUND MODULES USED WITH 6803 CPU MEMORY & JUMPER COMBINATIONS

SQUAWK & TALK A084-91625-A000 (Unprogrammed)							
GAME NAME	U1	U2	U3	U4	U5	U6	JUMPERS
Eight Ball Champ	N/U	N/U	0B38-803-2	0B38-803-3	0B38-803-4	N/U	C,D,E,G,H,L,N,Q, S,U,W,Y,AA,DD,FF
Beat The Clock	N/U	N/U	0C70-803-2	0C70-803-3	0C70-804-4	N/U	Same as Eight Ball Champ

CHEAP SQUEAK A084-91603-C000 (Unprogrammed)							
GAME NAME	U1	U2	U3	U4	U5	U6	JUMPERS
Lady Luck	N/U	N/U	0B38-803-2	0B38-803-3	0B38-803-4	N/U	C,D,E,G,H,L,N,Q, S,U,W,Y,AA,DD,FF

TURBO CHEAP SQUEAK FOR PINBALL A084-91855-C000 (Unprogrammed)		
GAME NAME	U7	JUMPERS
Motor Dome	E14A-47AAE-AX4D	2,3,4,5,6,7,8
Black Belt	0E52-00803-0003	2,3,4,5,6,7,8
Strange Science	0E35-00803-0003	2,3,4,5,6,7,8
City Slicker	0E79-00803-0004	2,3,4,5,6,7,8,9,11
Hard Body	E94A-12603-0000	2,3,4,5,6,7,8,9,11

SOUNDS DELUXE A084-91864-C000 (Unprogrammed)					
GAME NAME	U11	U12	U13	U14	JUMPERS
Special Force	0E47-803-10	0E47-803-11	0E47-803-12	0E47-803-13	1,2,4,7-12
Party Animal	H10A-12603-0000	H01A-12604-0000	H01A-12606-0000	H01A-12606-0000	1,2,4,7-12
Heavy Metal	H03A-12603-0000	H03A-12604-0000	N/U	N/U	1,2,4,7,8
Dungeons & Drags	H06A-12603-0000	H06A-12604-0000	H06A-12605-0000	H06A-12606-0000	1,2,4,7-12
Lost World	H05A-12603-0000	H05A-12604-0000	H05A-80605-0000	H05A-12606-0000	1,2,4,7-12
Blackwater 100	H07A-12603-0000	H07A-12605-0000	H07A-12605-0000	H07A-12606-0000	1,2,4,7-12

WILLIAMS D-11581 Board (Unprogrammed)				
GAME NAME	U4	U19	U20	JUMPERS
Truck Stop	A-5343-2001-1	A-5343-2001-2	A-5343-2001-3	W1, W9
Atlantis	A-5343-2006-1	A-5343-2006-2	A-5343-2006-3	W1,W9

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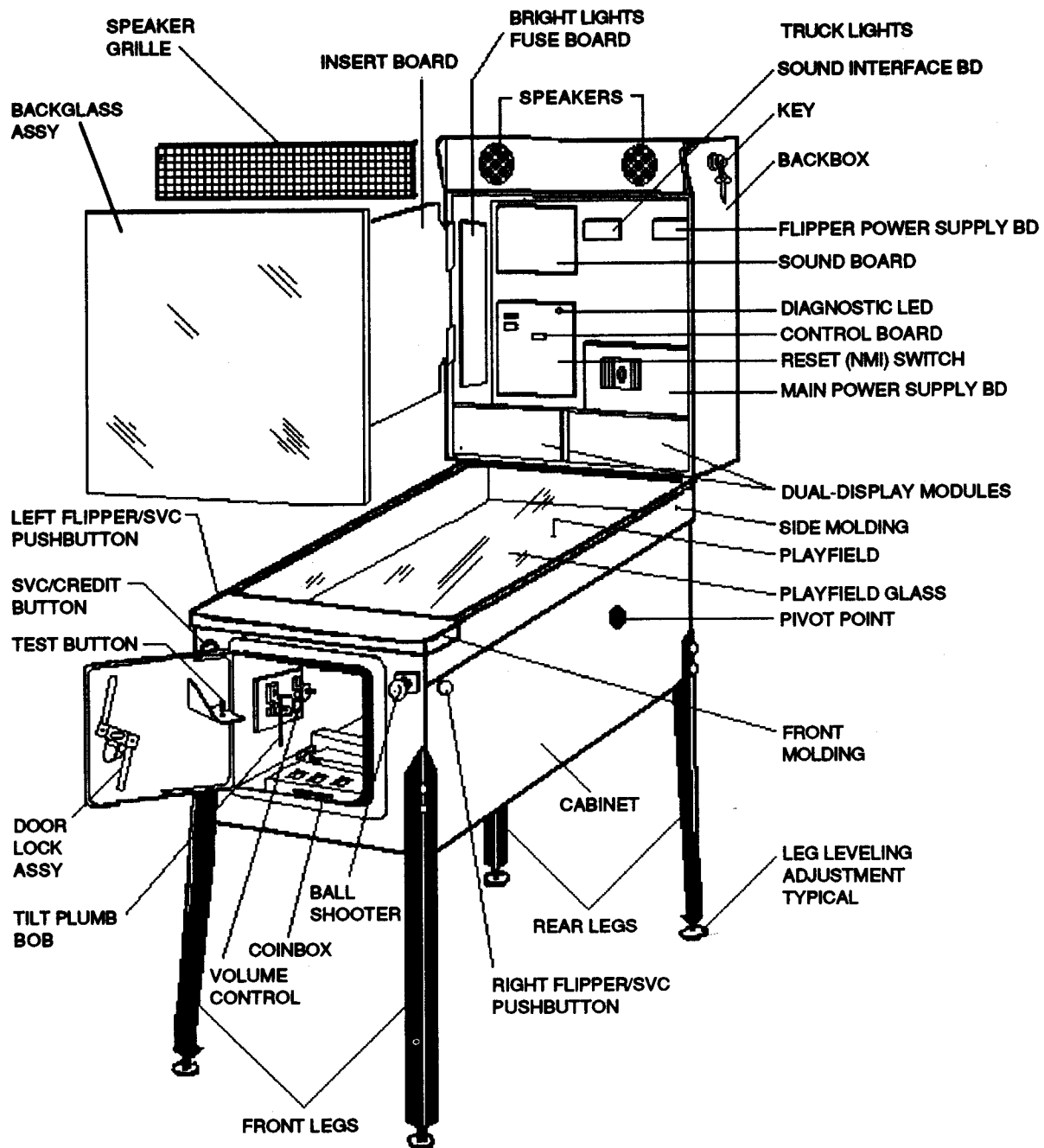
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PINBALL GAME PARTS LOCATION



CHAPTER 1: INSTALLATION AND GAMEPLAY

Connector Identification
Circuitboards
Control Locations

Installation Procedure
Game Operation
Select Initials Feature

Game Rules
Game Features

CONNECTOR IDENTIFICATION

BALLY games use a special technique to identify connectors. Each connector receives a prefix letter, followed by "J" (for jack) and a number. Connector pins are expressed by a suffix number.

- The prefix letter identifies the circuitboard where the connector resides.
- J-designations refer to a connector.
- The number identifies which connector we're referring to.
- The suffix number (-1, -15, etc.) refers to a pin number on the connector.

For example, CJ1 designates connector 1 on the Control Board. PJ6-1 designates the first pin of connector 6 on the Power Supply Board. Prefix letters for your game are listed below.

C - 6803 Control Board	PL - Playfield
P - Main Power Supply	S - Sound Board
D1 - Left Display Board	SI - Sound Interface Board
D2 - Right Display Board	L - Lamp Fuse Board
BB - Backbox	R - Solid State Relay Board
CB - Cabinet	F - Flipper Power Supply

CIRCUITBOARDS

Most circuitboards are in the backbox. To access the boards, remove the backbox glass.

CONTROL BOARD. The Control Board is part number A080-91786-G000. It contains the 6803 microprocessor. The Control Board must be equipped with ROMs and jumpers specified in the ROM Summary.

SOUND BOARD. The D-11581-2006 Sound Board is supplied with ROMs and microprocessor. This is a stereo board with speech capabilities and Yamaha organ circuitry. The Sound Board must be equipped with ROMs and jumpers specified in the Sound Board Summary.

DISPLAY BOARDS. There are two, 14-digit display tubes. Each tube is attached to its own printed circuit board. Either tube and its board comprises a Dual Display Module, part number A084-91851-H000.

MAIN POWER SUPPLY BOARD. The Power Supply Board is part number A080-91785-D000. This board incorporates rectifier and regulator circuitry. Each power supply is fused on the board. The power transformer (part MT00-00163-A000) is in the lower cabinet. Power Supply DC voltages include...

- Positive five-volt, logic power
- Positive 190V for displays
- 6.3VAC for general illumination
- 11VAC for feature lamps
- 14VDC for controlled lamps

FLIPPER POWER SUPPLY BOARD. The 50VDC Flipper Power Supply is part number C-9939-558. This board incorporates rectifier and passive filter circuitry. The power supply includes a 4ASB fuse. The Flipper Power Supply derives AC voltage from the power transformer (MT00-00163-A000) which is in the lower cabinet.

SOUND INTERFACE BOARD. The Sound Interface Board is part number C-12417. This board includes a regulator for the -12VDC sound power amplifier. Also present is a reset circuit for the Sound Board.

BRIGHT LIGHT FUSE BOARD. The Bright Light Fuse Board is part number A080-91901-B000. This board includes 16 fuses. The fuses protect SCRs in the phase C and phase D lamp drive circuits.

BOARDS NOT IN THE BACKBOX

There are three relay boards installed in the game to control various lamp circuitry. One controls the red-sleeved GIs and another the remaining playfield GIs. These two boards are located right on the underside of the playfield. The last relay board is located on the Insert Panel and controls the panel lights.

CONTROL LOCATIONS

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

THE VOLUME CONTROL is inside the coin door. Look at the left, inner wall of the cabinet, on the tilt mechanism board.

THE CREDIT BUTTON is left of the coin door on the front of the cabinet.

GAME ADJUSTMENT/DIAGNOSTIC SWITCHES. The SELF TEST button switch is inside the coin door. This switch assists you during game adjustments, bookkeeping, and problem diagnosis. Details appear in Chapter 2.

INSTALLATION PROCEDURE

[] 1. Open the shipping container. Remove cartons, parts and other items. Set them aside.

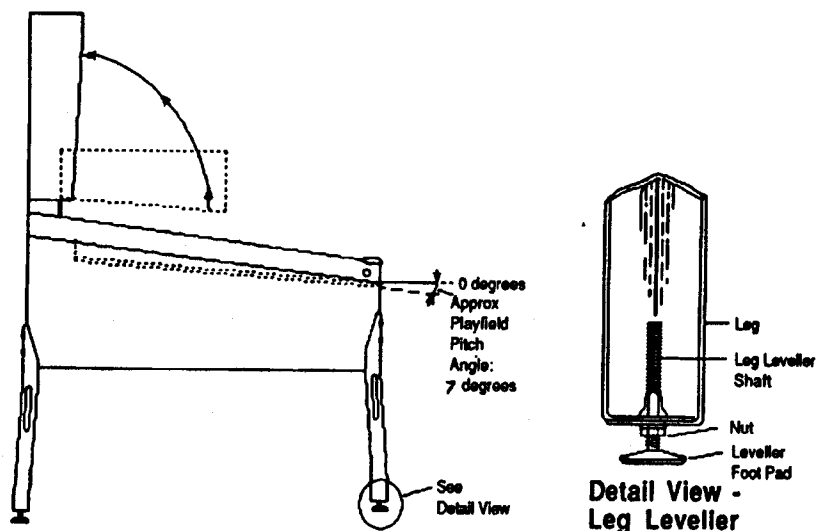
[] 2. Leg levellers and bolts are provided in the cashbox. Install levellers on the game's rear legs. Set the game on a flat surface or dolly. Bolt the rear legs to the game.

[] 3. Install leg levellers on the front legs. Bolt the front legs to the game.

[] 4. Reach into the cabinet and backbox. Check that cable connectors are properly seated on their printed circuit boards. Check the mating of interconnecting cables. Match several wire colors at each connector. Assure that connections are secure.

CAUTION

Assure that cables are free to move (not kinked or pinched). During assembly, be careful not to damage wires.



Pinball Assembly, Playfield Pitch Angle, and Leg Leveller Details

[] 5.Raise the hinged backbox upright. Latch the clamp on the back of the cabinet and backbox.

[] 6.Unlock the backbox. Remove the backbox glass. To avoid scratches, carefully store the glass. Install mounting bolts and flat washers through the bottom holes of the backbox. The bolts mate with threaded fasteners in the cabinet and secure the backbox.

WARNING

NEVER transport a pinball game with the hinged backbox erect. Prevent equipment damage and personal injury! When you lower the backbox, insert a layer of protective material between cabinet and backbox.

[] 7.Extend each leg leveller slightly below the leg bottom. All four foot pads should be extended about the same distance. Remove the cabinet from its support and place it on the floor.

[] 8.Raise the playfield and examine the following areas...

- Are cables clear of moving parts?
- Have wires come loose during shipment?
- Is there loose solder or other foreign material in switches or sockets? Such material may come loose in shipment. It could short switches or lamp sockets.
- Is the power transformer jumpered for local line conditions? Transformer plug wiring must correspond to location voltage. See the table below. Also examine the BACKBOX WIRING SCHEMATIC.
- Are coils properly soldered? Vibration in shipment may cause loss of contact.

Transformer Jumper Chart		
206/218 VAC	230 VAC	103.5 VAC
FUSE (6F1): 4-A, S-B	4-A, S-B	8A, N-B
VARISTOR: 275V	275V	130V
275V Varistor: 5017-09063-00 4A, S-B Fuse: 5731-06314-00 (for 220V) 130V Varistor: 5017-09044-00 8A, N-B Fuse: 5730-092524-00 (for 115V)		

[] 8. Lower the playfield. Adjust leg levellers for proper playfield level (side-to-side). Rest your level on the playfield, not the cabinet nor the playfield cover glass.

[] 9. Adjust leg levellers for a playfield pitch (incline) of seven degrees. Rest your level on the playfield, not the cabinet nor the playfield cover glass. To maintain step 7 and 8 settings, tighten the nut on each leg leveller shaft.

CAUTION

Playfield pitch adjustments can affect the operation of the plumb bob tilt. The plumb bob tilt is inside the cabinet. After completing playfield pitch adjustments, set this mechanism for desired operation.

[] 10. Move the game into the desired location. Recheck the level and pitch angle of the playfield.

[] 11. Check that the required number of balls are installed in the game. *TRUCK STOP* uses three balls.

[] 12. Clean and reinstall playfield glass. Prepare the game for play.

GAME OPERATION

STUCK SWITCH INDICATION. Turn on the power switch (at the bottom, right front corner of the cabinet). The game resets its drop targets. When the game powers up, names of the closed switches are briefly displayed. Then the phrase **GAME OVER** appears, indicating that the game is ready for play.

CREDITS. The game should accept coins and display the appropriate number of credits. Pressing the **CREDIT** button causes the Multi-Ball™ kicker to kick out the first ball. This ball enters the shooter lane. Initially, the game holds its three balls in the ball trough.

Each time a player presses the **CREDIT** button, the game posts one player. Remaining credits are reduced by one. The game awards points earned by the players.

BONUS SCORE. The Multi-Ball™ kicker serves the first ball to the shooter lane. This serve initiates play. Eventually each player's last ball enters the outhole. Then the top-mounted kicker sends the ball to the Multi-Ball™ kicker. A switch in the ball trough picks up the ball. Reacting, the game computer adds the bonus score to the total game score. Meanwhile the game advances the player-up or current ball indication by one position.

MATCH. After each player completes his game, a random matching number appears in the display. This number may equal the last two digits in a player's score. If so, the player earns another game.

EXTRA BALLS are played immediately after the player's third and last ball enters the outhole. The player-up and current ball aren't advanced before the game serves the extra ball.

BONUS GAME. At the end of the game, the game computer reads the Hiscore Award register. According to the setting of this register, free games may be awarded. Free games result when a player beats the score (or the score exceeds) 10 million.

TILT. Tilting the game results in loss of the ball in play. Bonus points are not awarded, the flippers go dead, and none of the playfield switches score. The purpose of the tilt penalty is to prolong gameplay. Game action returns to normal after the kicker serves the ball. Then the Multi-Ball™ kicker kicks the ball to the shooter lane. At this point, a new turn commences.

SELECT INITIALS FEATURE

The player can use the right flipper button to advance through displayed letters. Or he can use the left flipper button to back up through displayed letters. A player enters each of his three letters by pressing the CREDIT button. The player is given a certain period of time to enter a letter. Otherwise the game enters the default letter "A."

During Attract Mode, initials and scores appear on the display. To view these, press the credit button.

GAME RULES

- Making A and B increases saucer values and lights EXTRA BALL.
- Completing each numbered sequence earns a Ball Lock in Submarine.
- Multi-Ball™ action starts when three balls are locked in Submarine by same player.
- Completing all nine bullseye targets during Multi-Ball™ lights OUTLANE SPECIAL.
- JACKPOT lights during Multi-Ball™.
- Completing drop targets awards and advances lit values.
- Return lanes light spinner and left loop. Left loop spots one diver for lock when flashing.

GAME FEATURES

DIVER SEQUENCE FEATURE

ATLANTIS consists of three, three-bank bullseye targets. Targets on each bank are numbered "1", "2", and "3."

The player is to first complete all targets numbered "1" to qualify for LOCK 1. After completing all number one targets, he can either load a ball in the Submarine or complete targets numbered "2" and "3" thereafter.

A turn is one ball of the game, played by one individual. Each player must earn his own sequence of targets. All incomplete sequences will reset at the end of a turn.

The points awarded are...

- 10,000 and ADVANCE BONUS for earning a flashing target.
- 3,000 for a non-flashing target.

SUBMARINE MULTI-BALL™ FEATURE

Locking three balls inside the Submarine by the same player enables Multi- Ball™ action. The Submarine will eject the balls onto the playfield one at a time as each one drops into the Submarine platform.

Each player must lock three balls on his own for Multi-Ball™.

JACKPOT will light up when Multi-Ball™ begins and stay lit until only one ball remains in play. At this time the Jackpot timer commences. The player then still has an allotted amount of time to try and collect the Jackpot.

LOOP FEATURE

Each loop shot raises the drain plug. Making this shot while the timer-controlled "50K" arrow is lit awards the following:

- The player will score 50,000 points.
- An entire target number sequence will be spotted, thus qualifying the player for a Ball Lock.

BONUS MULTIPLIER AND MILLION FEATURE

Three green indicator lights located on the playfield exhibit the multiplier factors 2X, 3X, and 5X. By making the long shot up the playfield into the Saucer Eject Hole when a light is flashing, the player has a chance to multiply his score by whichever factor is lit up.

If the player completes the above shot when the MILLION is flashing, he is automatically awarded one million points.

POPPER FEATURE

Located at the top, right-hand side of the playfield are the "A" and "B" lanes. For each completion of the two lanes, the Popper value is increased. When a ball enters the Popper Hole, two things happen. First, the player is awarded the lit value shown. Then as the ball is ejected into the wire ramp, the drain plug will rise.

The player can control lane changes by using the flipper buttons.

After reaching a certain Popper value, EXTRA BALL will light. Thus, the Popper shot is awarded accordingly.

DROP TARGET FEATURE

The drop target feature on ATLANTIS is timer controlled. The timer is set off when a target is hit and will reset the bank when it runs out. Completion of the four targets within the set time limit awards the following:

- 25,000 points
- Advance Bonus
- Raising of drain plug
- Earning and advance of lit value

The first completion of the drop targets lights return lanes for BONUS. The second completion lights the Saucer Eject Hole entrance for BONUS multipliers. A third completion lights HOLD BONUS (located beneath the Submarine Ramp and by the spinner). The fourth completion lights the Popper for EXTRA BALL. And finally, a fifth lights the Saucer Eject Hole for one million points.

If the player does not earn the million points before the timer runs out, yet another completion of the drop targets will light MILLION again for the same ball in play.

If the player completes the bank for the fourth time with EXTRA BALL already lit, he qualifies for the MILLION shot instead.

All lit values will reset at the end of a turn.

RETURN LANES FEATURE

The return lanes have the following two timer-controlled features:

- They will energize the spinner target for higher scores.
- They will qualify the Left Loop shot when any of the targets numbered "1", "2", or "3" are flashing.

Also, return lanes will advance BONUS when lit.

OUTLANE FEATURE

Outlanes will award SPECIAL when lit.

CHAPTER 2: TAILORING THE GAME TO YOUR PLAYERS

Making Game Adjustments

**Game Adjustments: Register Access And Modification
Registers & Options Table**

Coin Setup Procedure

Pricing Table

Game Checkup Registers

Self-Percentaging

MAKING GAME ADJUSTMENTS

INTRODUCTION

The game system is designed to be user friendly. Your game provides you with a wealth of easily accessible information. Press the TEST button and the displays light up with assistance messages. Just by reading the displays and using three cabinet buttons, you can make numerous adjustments...

- Alter difficulty levels
- Change awards
- Modify threshold level settings
- Check special awards
- Monitor replay percent
- Keep track of income

GAME ADJUSTMENTS

REGISTER ACCESS AND MODIFICATION

- [] 1.Enter Test Mode by pressing the TEST button inside the front door.
- [] 2.Change the category by pressing either flipper button.
- [] 3.Select the category and open its directory by pressing the CREDIT button.
- [] 4.Change the directory by pressing either flipper button.
- [] 5.Select and open a register in the directory by pressing the CREDIT button.
- [] 6.Change register values by pressing either flipper button.
- [] 7.Lock in selected register values by pressing CREDIT.
- [] 8. For more register changes or changes in the same category, repeat steps 4 through 7. To exit Test Mode, press the TEST button.

Registers and Options Table

Category	Register Directory			
	Player #1 & 2 Displays	Player #3 & 4 Displays	See Notes	Register Description
Game Status	Total coins	XXXXXXX	1	Total, all chutes
	Games played	XXXXXXX	1	Number of games
	Replays awarded	XXXXXXX	1	Number of replays
	Replays percent	XX	1	Percent of replays
	Avg game time	XX XX	1	Minutes: seconds
	Balls played	XXXXXXX	1	Number of heats
	X-balls awarded	XXXXXXX	1	Number of extra balls
	X-ball percent	XX	1	Percent extra balls awarded
	Avg ball time	XX XX	1	Minutes: seconds
	Clear account	NO**	2	Clear accounting data
Replay Status	Level 1 special	XXXXXXX	1	No. of 1st Threshold specials awarded
	Level 2 special	XXXXXXX	1	No. of 2nd Threshold specials awarded
	Level 3 special	XXXXXXX	1	No. of 3rd Threshold specials awarded
	High score spcl	XXXXXXX	1	No. of high score specials awarded
	Playfield special	XXXXXXX	1	No. of playfield specials awarded
	Match special	XXXXXXX	1	No. of match feature specials awarded
Scoring Status 3.200 000 5 000 000	Level 1 score	XXXXXXX	3	Set and display first award level
	Level 2 score	XXXXXXX	3	Set and display second award level
	Level 3 score	XXXXXXX	3	Set and display third award level
	High score =	XXXXXXX	3	Set high score replay level
	Times HS beaten	XXXXXXX	1	Times point total exceeded high score
	Level 1 percent	XX	1	% of first level replays awarded
	Level 2 percent	XX	1	% of second level replays awarded
	Level 3 percent	XX	1	% of third level replays awarded
	Target percent	XX	4	Enter desired % replays awarded for reaching first threshold level
Coin Status	Left coins =	XXXXXXX	1	No. of coins through left coin chute
	Middle coins =	XXXXXXX	1	No. of coins through middle coin chute
	Right coins =	XXXXXXX	1	No. of coins through right coin chute
	Total coins =	XXXXXXX	1	Total coins through all chutes
	Bonus credits	XXXXXXX	1	No. of bonus credits awarded
Coin Setup***	Left XX Coin	YY CRDT, ZZ BONS	10	Left coin chute setup
	Middle XX Coin	YY CRDT, ZZ BONS	10	Middle coin chute setup
	Right XX Coin	YY CRDT, ZZ BONS	10	Right coin chute setup

*Player # 3 and 4 indicate a variable range of values. The XXXXXXXX represents the number value. XX represents the % value. Player #4 shows values that can be selected to replace the value shown in Player #3.

**Factory Setting.

***See Coin Setup Procedure examples

Category	Register Directory			
	Player #1 & 2 Displays	Player #3 & 4 Displays	See Notes	Register Description
Misc. Information	Total Time =	XXXXXXX	1	Time (in minutes) that the game is powered up. Starts when the game is ready for play.
Game Setup	Factory setting	No**	2	Reset to factory selected options
	Credit limit =	10**	5	Set credit limit from 1 through 40
	Balls allowed	03**	5	Number of balls allowed (1-5)
	Levels award	Replay**	6	Set award for exceeding thresholds
	Special award	Replay**	6	Set award for Feature Specials
	Hiscore award	3 Replay**	7	Set award for exceeding high score
	Bkground sound	On**	8	Provide background music
	Match percent	10**	5	Set allowed match percent, 00-10%
	Display credits	Yes**	2	Display credits when game is over
	No limit replay	Yes**	2	Allow more than 1 special per player
	Free play	No**	2	NO = coins, or YES = Free Play Mode
	Tilt warning	01**	5	Number of tilt warnings (0 through 3)
Game Checkup	Attract sounds	On**	8	Attract sound in Game-Over Mode
	Slingshots	On**	8	Activate slingshots
	Game options	Medium**	9	Set difficulty level
	Maximum players	04**	5	Number of players allowed (1-4)
	All lamps			Flashes playfield lamps.
	Single lamps			Lamps flash sequentially until you press either lower flipper button. Advance to next lamp in test by pressing lower right flipper button. Press lower left flipper button to back up to previous test.
	Display Test			Continuously cycles through all segments of a selected digit in either display module. Press the right flipper button to advance to the next digit to the right. Press the left flipper button to back up one digit.
	Coil Test			To advance to the next solenoid, press the right flipper button. To test the same solenoid, press the left flipper button.
	Program version			Program version of U2 and U3
	Switch Test			Game displays name of stuck switch

NOTES:

1. Feature can only be reset to 00.
2. Feature can only be changed to YES (enabled) or NO (disabled).
3. Feature can be changed in .100,000 point steps.
4. Feature has a value from 00 through 20. If this setting is 00, self-percentaging feature is off (disabled).
5. Feature can be changed in unit steps.
6. Feature can be changed to REPLAY, XBALL, POINTS or NOTHING.
7. Feature can be changed to 3 REPLAYS, 2 REPLAYS, 1 REPLAY or NOTHING.
8. Feature can be changed to ON (enabled) or OFF (disabled).
9. Feature can be changed to XX-EASY, X-EASY, MEDIUM, HARD, X-HARD or XX-HARD.
10. Coin value XX buys YY credits. The game awards bonus credits when the player buys ZZ credits.

Category	Register Directory	
	Player #1, 2, 3 & 4 Displays	Register Description
Help Read Me Help	AV BALL TIME IS HIGH XX YY	If average ball time is more than 60 seconds.
	AV BALL TIME IS LOW XX YY	If average ball time is less than 30 seconds.
	RAISE LEVEL 1 TO X,X00,000	The next adjustable threshold appears as X,X00,000 when both of these conditions occur: (1) "Threshold #1 Percent" exceeds "Target Percent." (2) At least 100 games have been played.
	LOWER LEVEL 1 TO X,X00,000	Adjustable threshold appears as X,X00,000 when both of these conditions occur: (1) "Threshold #1 Percent" is less than "Target Percent." (2) At least 100 games have been played.
	CHECK SWITCHS IN GAME CHECKUP	One or more playfield switches remain closed.
	SWITCH XX MAY BE OPEN	During at least five minutes of play, one switch hasn't closed.
	CHECK LEFT COINS CHUTE	Left coin switch is stuck.
	CHECK MIDDLE COINS CHUTE	Middle coin switch is stuck.
	CHECK RIGHT COINS CHUTE	Right coin switch is stuck.
	All OK	Game is okay. If the game detects a problem, assistance information appears on game displays.

COIN SETUP PROCEDURE

You may use factory settings for convenience, or price a game of pinball as you desire. Coin Setup is a simple procedure involving three settings for each coin chute. (U.S. games have two coin chutes.) Suggested settings are provided in the Pricing Table, later in this chapter.

Your coin settings alter values in the Coin Setup Category of game registers. (See the Registers and Options Table.) First you select the left or right coin chute. Then you set the cost of a game. You do this by adjusting the ratio, number of coins per number of credits (games). Finally you set the

bonus value. We'll define "bonus" in a moment. But first, let's get the hang of coin setup with a few examples...

EXAMPLE 1

You want to set the right coin chute at three credits for two coins. Also, you don't want to award any credits for the first coin.

[] 1. Enter the Coin Setup category.

[] 2. Enter the directory

[] 3. Set the directory to RIGHT, 02 COIN, 03 CREDIT and 00 BONS.

See Example	Step	Player 1 Display	Player 2 Display	Player 3 Display	Player 4 Display
1	1	RIGHT	XX COIN	YYCREDIT	XX BONS
1	2	RIGHT	02 COIN	03 CREDIT	00 BONS
2	1	RIGHT	XX COIN	YY CREDIT	XX BONS
2	2	RIGHT	01 COIN	01 CREDIT	02 BONS

EXAMPLE 2

You want to set the right coin chute at three credits for two coins. The game must award one credit for the first coin. You also desire the game to award two credits on the second coin.

BONUS CONCEPT. To achieve the Example 2 coin setting, you must specify bonus credits (XX BONS). You may specify any two-digit number. Select the number of coins that enter a coin chute before bonus is awarded. No more than one bonus credit can be awarded.

[] 1. Enter the Coin Setup category.

[] 2. Enter the directory.

[] 3. Set the directory to RIGHT, 01 COIN, 01 CREDIT and 02 BONS.

Pricing Table

*Indicates recommended setting

Country	Coin Chute			Games/Coin	Player 1 Display	Player 2 Display	Player 3 Display	Player 4 Display
	Left	Center	Right					
USA	25c	-	25c	1/25, 4/\$1* (1)	LEFT RIGHT	01 COIN 01 COIN	01 CREDIT 01 CREDIT	00 BONS 00 BONS
				1/50, 2/\$1, 4/\$1.50	LEFT RIGHT	02 COIN 02 COIN	01 CREDIT 01 CREDIT	03 BONS 03 BONS
				1/50, 2/\$1	LEFT RIGHT	02 COIN 02 COIN	01 CREDIT 01 CREDIT	00 BONS 00 BONS
				1/25, 3/50, 6/\$1	LEFT RIGHT	01 COIN 01 COIN	01 CREDIT 01 CREDIT	02 BONS 02 BONS
				2/25, 8/\$1	LEFT RIGHT	01 COIN 01 COIN	02 CREDIT 02 CREDIT	00 BONS 00 BONS
Canada	25c	-	\$1	1/25, 5/\$1*	LEFT RIGHT	01 COIN 01 COIN	01 CREDIT 04 CREDIT	00 BONS 04 BONS
West Germany	1DM, 2DM, 5DM			1/1, 2/2, 7/5 DM	LEFT MIDDLE RIGHT	01 COIN 01 COIN 01 COIN	01 CREDIT 02 CREDIT 07 CREDIT	00 BONS 00 BONS 00 BONS
				1/1, 2/2, 6/5 DM*	LEFT MIDDLE RIGHT	01 COIN 01 COIN 01 COIN	01 CREDIT 02 CREDIT 06 CREDIT	00 BONS 00 BONS 00 BONS
				1/1, 3/2, 9/5 DM	LEFT MIDDLE RIGHT	01 COIN 01 COIN 01 COIN	01 CREDIT 02 CREDIT 09 CREDIT	00 BONS 01 BONS 00 BONS
				1/2x1DM, 1/2, 3/5DM	LEFT MIDDLE RIGHT	02 COIN 01 COIN 01 COIN	01 CREDIT 02 CREDIT 05 CREDIT	00 BONS 00 BONS 00 BONS
				2/1, 5/2, 14/5DM	LEFT MIDDLE RIGHT	01 COIN 01 COIN 01 COIN	02 CREDIT 05 CREDIT 14 CREDIT	00 BONS 00 BONS 00 BONS
France	1F, 5F, 10F			1/1, 3/5, 7/10F*	LEFT MIDDLE RIGHT	01 COIN 01 COIN 01 COIN	01 CREDIT 03 CREDIT 07 CREDIT	00 BONS 00 BONS 00 BONS
Belgium	20F - 20F			1/20, 1/20*	LEFT RIGHT	01 COIN 01 COIN	01 CREDIT 01 CREDIT	00 BONS 00 BONS
Switzer- land	1F - 2F			1/1, 7/2*	LEFT RIGHT	01 COIN 01 COIN	01 CREDIT 07 CREDIT	00 BONS 00 BONS
Japan	100Y - 100Y			1/100*	LEFT RIGHT	01 COIN 01 COIN	01 CREDIT 01 CREDIT	00 BONS 00 BONS
Italy	200L - 500L			1/2x200, 3/2x500*	LEFT RIGHT	02 COIN 02 COIN	01 CREDIT 03 CREDIT	00 BONS 00 BONS
Australia	20c - 20c			1/3x20, 1/3x20*	LEFT RIGHT	03 COIN 03 COIN	01 CREDIT 01 CREDIT	00 BONS 00 BONS

Pricing Table, Continued

*Indicates recommended setting

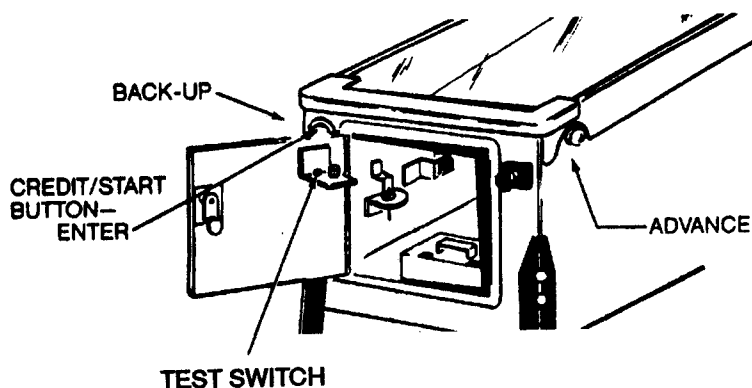
Country	Coin Chute			Games/Coin	Player 1 Display	Player 2 Display	Player 3 Display	Player 4 Display
	Left	Center	Right					
United Kingdom	10 Pence-1 Pound			1/2x10P, 6/1L*	LEFT RIGHT	02 COIN 01 COIN	01 CREDIT 06 CREDIT	00 BONS 00 BONS
Denmark	1 Kroner-10 Kroner			1/2x1Kr, 7/10 Kr*	LEFT RIGHT	02 COIN 01 COIN	01 CREDIT 07 CREDIT	00 BONS 00 BONS
Finland	1 Markka-5 Mka			1/2x1 Mka, 3/5 Mka*	LEFT RIGHT	02 COIN 01 COIN	01 CREDIT 03 CREDIT	00 BONS 00 BONS
Norway	1 Kroner-5 Kroner			1/3x1 Kr, 2/5 Kr*	LEFT RIGHT	03 COIN 01 COIN	01 CREDIT 02 CREDIT	00 BONS 00 BONS
Sweden	5 Kroner-5 Kroner			2/5 Kr*	LEFT RIGHT	01 COIN 01 COIN	02 CREDIT 02 CREDIT	00 BONS 00 BONS
Holland	1 Guilder - 1 G			1/1 G*	LEFT RIGHT	01 COIN 01 COIN	01 CREDIT 01 CREDIT	00 BONS 00 BONS

GAME CHECKUP REGISTERS

The following registers are located in the Game Checkup category of Test Mode...

- Lamps
- Single lamps
- Display Test
- Coil Test
- Program version
- Switch Test

Except the Program Version register, these are Diagnostic Test registers. The Program Version register displays EPROM program version information. The application of each Diagnostic Test register is explained in Chapter 4. An abbreviated description of these registers is given in the Game Checkup category of the *Registers & Options Table*.



DIAGNOSTIC TESTS

Operate Diagnostic Tests as follows:

NOTICE

At any time, you can exit from Test Mode by pressing the TEST button.

[] 1. Enter the Game Checkup category's directory. Select a register by using the CREDIT button and either of the flipper buttons. The procedure is described at Steps 1 through 4 of Game Adjustments.

[] 2. When the selected register appears in the display, press the CREDIT button. Pressing CREDIT opens the register and begins tests. Until you exit the directory, flipper buttons are used in sequencing through register tests.

[] 3. When the test is completed, (except Switch Test), press the CREDIT button again. Pressing CREDIT causes the game to enter the next register. Repeating this procedure advances you to the end of the directory. The last register in the directory is Switch Test.

[] 4. After completing Switch Test, exit from the register and the directory. Do this by holding in the CREDIT button for one full second. Or exit from Test Mode by pressing the TEST button.

NOTICE

SINGLE LAMPS TEST OR COIL TEST. Holding in the right flipper button advances the display from driver to driver. Holding in the left flipper button displays drivers in reverse.

Chapter 4, Troubleshooting contains Diagnostic Test procedures for the following test registers...

- All Lamps
- Single Lamps
- Display Test
- Coil Test
- Switch Test

SELF-PERCENTAGING

Self-Percentaging is the game's ability to automatically adjust the First Replay Threshold score. This score is adjusted to attain a desired replay percentage known as Target Percent.

Self-Percentaging also applies to extra balls, when used instead of replays.

Self-Percentaging only adjusts the score level of the First Replay Threshold. Other award features aren't adjusted. The Second Replay Threshold Level and the Third Threshold Level aren't affected by Self-Percentaging.

The Self-Percentaging routine goes into effect after 200 games are played. Then the game program monitors the current replay percentage of the First Replay Threshold. If necessary, the program makes an adjustment after every 50 games.

The following registers are located in the Scoring Status category of your game's Test Mode...

- | | |
|---------------------------|-------------------|
| A.Level 1 Score | F.Level 1 Percent |
| B.Level 2 Score | G.Level 2 Percent |
| C.Level 3 Score | H.Level 3 Percent |
| D.Highest Score | I.TARGET Percent |
| E.Times High Score Beaten | |

These registers are described in this section.

FIRST, SECOND OR THIRD REPLAY THRESHOLD. To set or check the current score level of a replay threshold:

[] 1.Step through the Test Mode categories until you reach SCORING STATUS.

[] 2.To select SCORING STATUS and enter its directory, press the CREDIT button.

[] 3.The first register displayed is LEVEL 1 SCORE. You'll find similar registers entitled LEVEL 2 SCORE and LEVEL 3 SCORE. These registers display the current score levels of the first, second and replay thresholds. Choose the desired register.

[] 4.Use either flipper button to select any value from zero to 9,900,000. This value can only be changed in steps of 100,000 points.

[] 5.To set the desired score level, press the CREDIT button.

[] 6.Use either flipper button to exit the directory. Or press the TEST button and exit the Test Mode.

REPLAY PERCENTAGE. To adjust replay percentage for the First Replay Threshold...

[] 1.Step through the game's Test Mode until you reach the category titled SCORING STATUS.

[] 2.To select this category, press the CREDIT button and enter the category's directory.

[] 3. Select the Target Percent register in the directory with either flipper button. This register displays the desired percentage of replays to be awarded for reaching the First Replay Threshold Level.

[] 4. Suppose that you want to award a replay in 15 percent of games. Use either flipper button to select 15 percent. Then press the CREDIT button to set the percentage. The register will then display 15 percent as your goal or Target Percent.

[] 5. To exit the directory, use either flipper button. To exit Test Mode, press the TEST button.

NOTICE

When the Target Percent register is set at zero, the Self-Percentaging feature is disabled. This register defaults to 10 percent when the Factory Setting register is disabled. The Factory Setting register appears in the Game Setup category.

TOTAL REPLAY PERCENTAGE will be 10 or 15 percent higher with the addition of Match, Special and High Score credits.

FIRST, SECOND AND THIRD REPLAY THRESHOLD. To manually check the replay percentage of the three replay threshold levels...

[] 1. Step through Test Mode until you reach the category titled Scoring Status.

[] 2. Select Scoring Status and enter its directory by pressing the CREDIT button.

[] 3. Use either flipper button to select the register in the desired directory. (That is, Level 1 Percent, Level 2 Percent or Level 3 Percent.) This register displays the replay percentage awarded for reaching the desired replay threshold

level. Monitor self-percentaging progress by comparing the displayed value with Target Percent.

[] 4. To exit the directory, use either flipper button. Or press the TEST button and exit Test Mode.

ADJUSTMENT SIZE. You can determine the size of Self-Percentaging adjustments to the First Replay Threshold score. Check the difference between Target Percent and replay percentage awarded for reaching First Replay Threshold. (Target Percent is an operator entry.)

- A 10 percent or greater difference results in a 10 percent adjustment.
- A five to 10 percent difference results in a five percent adjustment.
- A difference less than five percent results in a one percent adjustment.

CLEAR ACCOUNT REGISTER. To reinitiate the Self-Percentaging process, enable the Clear Account register (enter YES).

HIGH SCORE LEVEL. To adjust the high score level at which a replay (or replays) is awarded...

[] 1. Step through the game's Test Mode until you reach the category titled Scoring Status.

[] 2. Press the CREDIT button to select Scoring Status and enter its directory.

[] 3. Use either flipper button to select the Highest Score register in the directory. This register displays the high score for which the replay level is set. High score is also known as High Score to Date, HS and HSTD.

[] 4. Use either flipper button to select any value from zero to 990,000. The Highest Score register value can only be changed in steps of 100,000 points.

[] 5. Set the desired score level by pressing the CREDIT button.

[] 6. Use either flipper button to exit the directory. Or exit Test Mode by pressing the TEST button.

HIGH SCORE LEVEL. To check the number of times the high score was exceeded...

[] 1. Step through the game's Test Mode until you reach the category Scoring Status.

[] 2. Press the CREDIT button to select this category and enter its directory.

[] 3. Use either flipper button to select the Times HS Beaten register in the directory. This register displays the number of times the high score was exceeded. This information aids you in deciding what point level the Highest Score register will contain.

[] 4. Use either flipper button to select any value from zero to 9,900,000. The Highest Score register value can be changed only in steps of 100,000 points.

[] 5. Press the CREDIT button to set the desired score level.

[] 6. Use either flipper button to exit the directory. Exit Test Mode by pressing the TEST button.

OPTION SETTINGS TABLE

	TIMERS IN SECONDS						
	XX-EASY	X-EASY	EASY	MEDIUM	HARD	X-HARD	XX-HARD
DRAIN PLUG	17	15	13	11	09	07	05
MILLION SHOT	24	21	18	15	12	09	06
DROP TARGETS	35	30	25	20	15	10	05
SPINNER	16	14	12	10	08	06	04
LEFT LOOP	08	07	06	05	04	03	02
	QUALIFY EXTRA BALL WITH POPPER VALUE						
	5K	10K	15K	20K	25K	30K	35K

OPTION SETTINGS

1) Left Loop timer locks at two seconds once Multi-Ball has been earned. It will not light up if Multi-Ball™ has been earned more than twice. If the Multi-Ball™ percentage is more than 33%, the spot sequence light will flash for two seconds when the return lanes are activated.

2) The saucer will not spot any targets once Multi-Ball™ has been earned, or if Multi-Ball™ percentage exceeds 33%.

3) The drain plug timer gets shorter with every million points earned on the score board.

4) The drop target reset timer gets shorter with the number of extra balls earned when LITES EXTRA BALL is flashing.

5) For the first fifty games, the player has to qualify for all orange, white and yellow targets. Thereafter the game will check for number of times Multi-Ball™ was earned. If this value is less than 16%, the game automatically qualifies the orange and white lock arrows. If the value is between 16% and 33%, it qualifies only the orange lock arrow. The system re-evaluates with every tenth game played.

6) For the first fifty games, the Popper Hole EXTRA BALL flashes per default option selected. Thereafter the game calculates the Extra Ball percentage and adjusts "qualify Extra Ball with Popper value" accordingly.

CHAPTER 3: MAINTENANCE

Detaching the Backbox
Switch Assembly Adjustments
Switch Assembly Maintenance

Drop Target Lubrication
Drop Target Lubricants Table
Cleaning the Playfield

Control Board Error Detection
Operation With One Display

DETACHING THE BACKBOX

Before detaching the backbox assembly from the game, follow this procedure...

NOTICE

Before disconnecting printed circuit board connectors, turn off game power.

- [] 1.Unlock and remove the backbox glass.
- [] 2.Disconnect the front cabinet and playfield cable connectors from backbox PC boards. Push the cables and their tube down into the cabinet.
- [] 3.Remove two 3/8-inch bolts and washers that secure the backbox to the front cabinet.
- [] 4.Disengage the backbox safety latch on the back of the cabinet. Lower the backbox to its transport position.
- [] 5.Remove four hinge nuts that fasten the backbox hinges to the front cabinet's neck.
- [] 6.Remove the ground braid that runs between the backbox and the front cabinet.
- [] 7.Pull or slide the backbox toward either side of the front cabinet. Lift the backbox off the cabinet. Because the backbox is large, lifting it is easier if an associate helps.

To attach a backbox to the front cabinet, follow steps 1 through 7 in reverse.

SWITCH ASSEMBLY ADJUSTMENTS

Switch assemblies consist of switch blades, contact separators, plastic tubing and mounting screws. Before attempting to adjust a switch assembly, be sure that screws are tight. If not, tighten the front screw (near the switch blade) first. Then tighten the back screw (near the soldered

end of the blade). Otherwise the switch blades tend to fan out.

SWITCHBLADE GAPS. Generally switchblades are adjusted for a 1/16-inch gap between contacts in the open position. In the closed position, switchblades are adjusted for 0.010-inch over-travel or wipe.

SWITCH ASSEMBLY MAINTENANCE

After successful completion of Test Mode diagnostics, set the game for play. Exercise each rollover, thumper-bumper, slingshot, target and rebound switch with a game ball. Check each switch on the playfield for proper operation. When operation of any switch results in intermittent or no response, clean the switch contacts.

DON'T FILE THOSE CONTACTS!

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

CLEANING FLIPPER BUTTON SWITCH CONTACTS

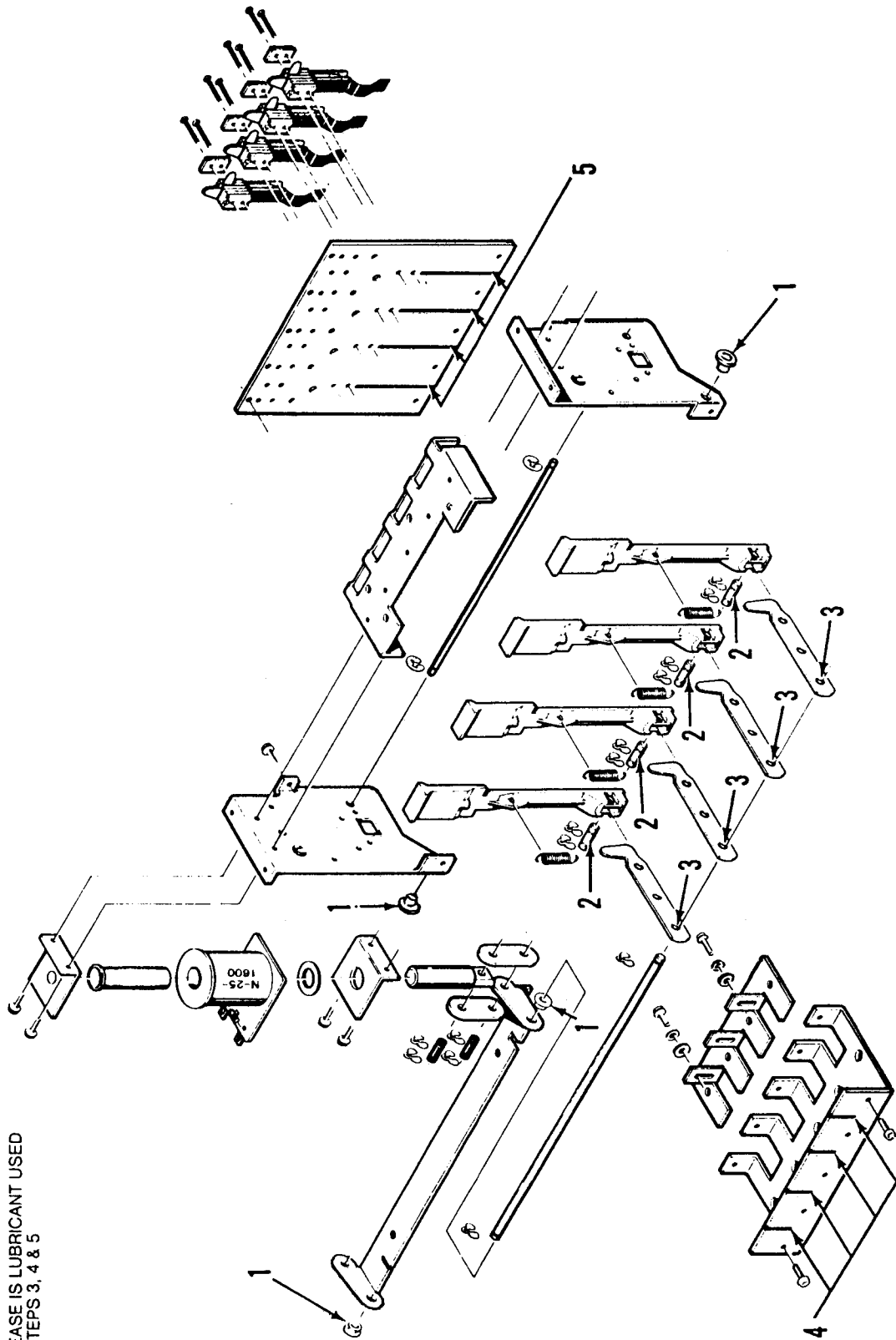
Remove the tarnish from the switch contacts with a contact file. Then smooth your work with a burnishing tool. Severely pitted contacts may cause game malfunctions. Of course then you should replace them. Otherwise you can clean them up and use them until they fail.

DROP TARGET LUBRICATION

Lubricating drop target components is part of routine maintenance. Lubrication reduces friction and wear. Bally recommends the following lubricants...

NOTE:

OIL IS LUBRICANT USED
IN STEPS 1 & 2
GREASE IS LUBRICANT USED
IN STEPS 3, 4 & 5



Drop Target Lubricants

Step No.	Lubricant	Component Location
1	Oil	In the hole of each snap-in coil nyliner
2	Oil	Around the surface of each pivot pin
3	Grease	In the pivot hole of each drop target link
4	Grease	In each slot of the stationary bottom plate
5	Grease	In each slot of the backplate

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

CLEANING THE PLAYFIELD

The BALLY playfield has an improved "tuff-coat" finish with excellent wearing properties. Playfield life expectancy and play appeal can be extended by periodic cleaning.

DO...

Clean the playfield with *WILDCAT #125* compound. (*WILDCAT CHEMICAL COMPANY*, 1349 East Seminary Drive, Fort Worth, TX 76115, 817-924-8321). Wildcat #125 compound is a combination cleaner and polish. Factory engineers have tested this product, and found it to be very effective. If *WILDCAT #125* compound is unavailable, ask your distributor to order it.

Inspect and hand polish the balls in a clean cloth. Replace chipped balls. Otherwise these balls will ruin playfield finish in a short time.

DON'T...

Don't use quantities of water, caustic or abrasive cleaners or cleaning pads on the playfield. Don't allow a wax or polish build-up. Waxes yellow with age and spoil play appeal.

CONTROL BOARD ERROR DETECTION

Your game has a new subroutine to detect CMOS RAM error or battery failure on the 6803 Control Board.

Watch the High Score total. Each time an error occurs, a "1" appears in the "units" digit. This indication also appears if game ROMs are replaced with ROMs from another game. The program compares its EPROM version number with the EPROM version number in CMOS RAM.

At the next power-up after an error or EPROM replacement, the following events occur...

- **ACCOUNT CLEARED** is displayed. This indicates that accounting data registers have been reset to zero.
- **INSTALL FACTORY** is displayed. This indicates that game features have been reset to factory settings.
- The High Score units digit is incremented by 1. If the High Score was 6,000,000 before power-up, the score reappears as 6,000,001.
- The game writes the EPROM version ID number into CMOS RAM.

NOTICE

Clear RAM errors by holding the left and right coin switches closed during power-up. This easy procedure clears accounting data and resets the game to factory settings.

OPERATION WITH ONE DISPLAY

SPECIAL TWO-PLAYER MODE

This game is designed for "reasonably normal operation" when one display module is damaged. To use only one display, adjust the game for the special, two-player mode.

"Reasonably normal operation" provides a maximum of two players with their gameplay information. The game uses only its left display module. During gameplay, only the following information is entirely displayed...

- BALL IN PLAY
- PLAYER #1 SCORE
- PLAYER #2 SCORE

Attract Mode is similar. Only player-1 and -2 are entirely displayed on the left module.

The procedure below prevents the system from entering three-player mode or the four-player mode. Regardless of how many credits players attempt to add to the game, this is true. To adjust the game for the Two-Player Mode, use the following procedure...

NOTICE

If the left display module is malfunctioning, exchange it with the right one before proceeding.

WARNING

The power supply applies high voltage to the displays. After turning power off, wait 30 seconds for voltage to bleed off before servicing displays.

[] 1. Turn the game on.

[] 2. Turn power OFF and remove the damaged display module.

[] 3. Turn power ON. Hold in the left flipper button on the front cabinet. Simultaneously press the CREDIT and TEST buttons. This action causes the game to enter Test Mode and limit gameplay to two players.

[] 4. Press the TEST button again. The game returns to Gameplay Mode.

DISCONTINUING TWO-PLAYER MODE. To discontinue the fixed Two-Player Mode, perform the following procedure...

- [] 1. Turn the game off and reinstall the repaired display module. Or install a new module.
- [] 2. Turn the game on. Enter Test Mode by pressing the TEST button on the coin door.
- [] 3. Select the Game Setup category with the right flipper button.
- [] 4. To open this category's directory, press the CREDIT button.
- [] 5. Select the Maximum Players register in the directory with the right flipper button.
- [] 6. To open the register, press the CREDIT button.
- [] 7. Select the 4 Players register with the right flipper button.
- [] 8. Lock in the 4 Players register value by pressing the CREDIT button.
- [] 9. To exit Test Mode, press the TEST button.

NOTICE

Anytime factory reset occurs, the game reverts to four-player mode.

CHAPTER 4: TROUBLESHOOTING

- Game Won't Power Up
- Control Board Power-Up Test Sequence
- No General Illumination Lamps
- Lamps Always On or Off During Gameplay

- Phase "A" and "B" Lamp Tables
- The Biphase Lamp Circuit: A Closer Look
- Typical Biphase Lamp Circuit
- Remedies for "Tough Dog" Lamp Problems

- Improper Display Digits
- Improper Display Patterns
- One or Several Displays Always Off
- No Flipper Solenoids

- Flippers: A Closer Look
- Remedies for "Tough Dog" Flipper Problems
- Typical Flipper Circuit
- Coils Not Operating Correctly

- Coils Always On
- Coil Table
- Remedies for "Tough Dog" Coil Problems
- Typical Momentary Solenoid Driver Circuit

- Solenoid Expander
- Switches Don't Score
- Switch Matrix Table
- Complete Playfield Switch Circuit

- No Sound
- Sound Interface Board

GAME WON'T POWER UP

Your game doesn't complete the power-up sequence.

ACTION TO TAKE

[] 1. Using a meter, check fuses on the power module assembly.

[] 2. Turn power off and open the backbox. Locate the LED (Light-Emitting Diode) on the 6803 Control Board.

[] 3. If +5VDC and +14VDC are present on the Control Board, the game performs a test. *When you encounter no problems, the game powers up immediately, without flashing the LED.* If the game detects problems, each flash of the LED indicates passage of another test. See the chart below.

CONTROL BOARD POWER-UP TEST SEQUENCE

1st Flash: Internal RAM at microprocessor U1 is good.

2nd Flash: Program ROM U2 is good.

3rd Flash: Program ROM U3 is good.

4th Flash: CMOS RAM U4 is good.

5th Flash: PIA-0, chip U8 is good.

6th Flash: PIA-1, chip U7 is good.

7th Flash: Internal display interrupt generator U1 is good.

8th Flash: U8 and U12 can correctly operate phase B, switched illumination. *(Power Supply fuse F5 protects the Phase B circuit.)*

9th Flash: U1, U11 and U12 can correctly operate phase A, switched illumination. *(Power Supply fuse F4 protects the Phase A circuit.)*

[] 4.If the LED doesn't come on or flashes less than nine times, turn power off. Check the fuses. If the fuses are good, replace the 6803 Control Board.

CAUTION

Only replace the 6803 Control Board with a board bearing the same part number. Otherwise the game will operate incorrectly. See the ROM Summary and the Control Board parts list.

[] 5.Turn power on. If the game is operating correctly, it is now ready for play. If the game does not operate correctly, contact your authorized Bally distributor.

LAMPS ALWAYS ON OR OFF DURING GAMEPLAY

ACTION TO TAKE

[] 1.With the power on, select LAMP TEST from the Game Checkup category. Use the right flipper button. To advance to the next test, press the right flipper button. To back up to the previous test, press the left flipper button.

[] 2.Start the test by pressing the CREDIT button. There are two Lamp Tests. The first test is the All Lamps Test. The second test sequence is the Single Lamp Test. For lamp sequence, see the Feature Lamp Assignment Illustration.

ALL LAMPS TEST SEQUENCE. When the test starts, the feature lamps flash. The lamps continue to flash until you exit the test.

SINGLE LAMP TEST SEQUENCE. When the test starts, the first lamp in the sequence flashes. Then the first lamp turns off and the next lamp in the sequence flashes. This sequence continues for all feature lamps, until you exit the test.

[] 3.If the lamps are flashing correctly, the game is ready for play.

NOTICE

You can stop the Single Lamp Test by pressing the right or left flipper button. When pressed, the right button advances to the next lamp in the test. The left button backs up to the previous lamp in the test.

[] 4. Carefully raise the playfield or open the backbox to gain access to the lamps.

[] 5. Before replacing lamps that don't flash, check lamp socket wiring. If the wiring appears to be correct, replace the lamps that don't flash.

[] 6. If all the lamps are now flashing, the game is ready for play. If the lamps are not flashing, replace the 6803 Control Board.

CAUTION

Only replace the 6803 Control Board with a board bearing the same part number. Otherwise the game will operate incorrectly. See the ROM Summary and the Control Board parts list.

[] 7. Turn power on and repeat steps 1 and 2. If all the lamps are flashing, the game is ready for play. If the lamps don't flash, contact your authorized Bally distributor.

THE BIPHASE LAMP CIRCUIT: A CLOSER LOOK

In the Biphase Lamp Circuit, each lamp is either on or off. Furthermore, lamps are divided into two groups according to the phase of line power. First, lamps in phase A may turn on. Then, lamps in phase B may turn on. Phase A and phase B lamps should never come on at the same time.

Besides phases A and B, you'll find references to phases C and D. Your game employs phases C and D to drive bright lights (flashlamps). Phase C lags phase A by 90 degrees. The same relationship holds between phases B and D. RC

ATLANTIS LAMP TABLES

PHASE A AND C LAMP TABLE

CJ10-1 BACKBOX RELAY RED/BLU 1	CJ10-18 BONUS 2K GRN/YEL 9	CJ10-10 BONUS 50K BLU/BLK 17	CJ11-13 POPPER 50K ORG/YEL 25	CJ11-1 BRIGHT, L TARGETS GRN/BLK 33	CJ13-12 R. HOLD BONUS GRY/BRN 41
CJ10-7 RELAY RED GIS 2	CJ10-4 BONUS 4K RED/WHT 10	CJ10-13 HOLD BONUS YEL/BRN 18	CJ11-10 POPPER 75K BRN/BLK 26	CJ13-1 BRIGHT, DT TIMER BLK/RED 34	CJ13-10 RETURN LANES GRY/GRN 42
CJ10-16 RELAY, WHITE GIS 3	CJ10-11 BONUS 8K YEL/RED 11	CJ11-8 SAUCER 2X BRN/GRN 19	CJ11-3 POPPER 100K WHT/GRY 27	CJ13-8 BBOX BRIGHT #6 GRY/YEL 35	CJ13-4 SPINNER 1000 BLK/WHT 43
CJ10-2 TOP LANE "A" RED/YEL 4	CJ10-19 BONUS 8K GRN/WHT 12	CJ11-16 SAUCER 3X ORG/BLK 20	CJ11-14 POPPER 125K ORG/BLK 28	CJ13-6 BBOX BRIGHT #1 BLK/ORG 36	CJ13-11 SPOT SEQC ARROW GRY/WHT 44
CJ10-8 TOP LANE "B" BLU/WHT 5	CJ10-5 BONUS 10K RED/WHT 13	CJ11-6 SAUCER 5X BRN/BLU 21	CJ11-9 POPPER 150K BRN/ORG 29	CJ13-2 BRIGHT, L HOLD BONUS BLK/YEL 37	CJ13-7 HOLD BONUS GRY/RED 45
CJ10-17 JACKPOT ARROW GRN/RED 6	CJ10-12 BONUS 20K YEL/BLU 14	CJ11-12 XPLER 2X ORG/BLU 22	CJ11-2 POPPER XBALL WHT/BLK 30	CJ13-13 BBOX BRIGHT #3 GRY/ORG 38	
CJ10-3 MILLION ARROW RED/GRN 7	CJ10-14 BONUS 30K YEL/ORG 15	CJ11-11 XPLER 3X ORG/RED 23	CJ11-15 OUTLANE LEFT ORG/WHT 31	CJ13-5 BRIGHT POPPER BLK/BRN 39	
CJ10-9 SPSA BLU/BRN 8	CJ10-6 BONUS 40K BLU/RED 16	CJ11-4 XPLER 5X BRN/RED 24	CJ11-3 OUTLANE, RIGHT BRN/YEL 32	CJ13-3 BBOX BRIGHT #5 BLK/GRN 40	

PHASE B AND D LAMP TABLE

CJ10-1 BACKBOX RELAY RED/BLU 46	CJ10-18 L TARGET ORANGE GRN/YEL 54	CJ10-10 TARGET, MD. ORANGE BLU/BLK 62	CJ11-13 JACKPOT, 5 MILLION ORG/YEL 70	CJ11-1 BRIGHT, R. HOLD BONUS GRN/BLK 78	CJ13-12 DRAIN PLUG GRY/BRN 86
CJ10-7 RELAY RED GIS 47	CJ10-4 L TARGET, WHITE RED/WHT 55	CJ10-13 TARGET, MD. WHITE YEL/BRN 63	CJ11-10 JACKPOT, 1 MILLION BRN/BLK 71	CJ13-1 BRIGHT JACKPOT BLK/RED 79	CJ13-10 GRY/GRN 87
CJ10-16 RELAY, WHITE GIS 48	CJ10-11 L TARGET, YELLOW YEL/RED 56	CJ11-8 TARGET, MD. YELLOW BRN/GRN 64	CJ11-3 JACKPOT 15 MILLION WHT/GRY 72	CJ13-8 BRIGHT, R. TARGETS GRY/YEL 80	CJ13-4 BLK/WHT 88
CJ10-2 RED/YEL 49	CJ10-19 R. TARGET, ORANGE GRN/WHT 57	CJ11-16 DT VALUE LIGHTS LANE ORG/BLK 65	CJ11-14 JACKPOT, 2 MILLION ORG/BLK 73	CJ13-6 BRIGHT SAUCER BLK/ORG 81	CJ13-11 GRY/WHT 89
CJ10-8 DT RESET TIMER BLU/WHT 50	CJ10-5 R. TARGET, WHITE RED/WHT 58	CJ11-6 DT VALUE LIGHTS XPLER BRN/BLU 66	CJ11-9 JACKPOT 25 MILLION BRN/ORG 74	CJ13-2 BBOX BRIGHT #2 BLK/YEL 82	CJ13-7 GRY/RED 90
CJ10-17 LOCK ARROW ORANGE 51	CJ10-12 R. TARGET YELLOW YEL/BLU 59	CJ11-12 DT VALUE LIGHTS HOLD BOX ORG/BLU 67	CJ11-2 JACKPOT 3 MILLION WHT/BLK 75	CJ13-13 BRIGHT, LANE A GRY/ORG 83	
CJ10-3 LOCK ARROW WHITE 52	CJ10-14 NEXT A/B LIGHTS X-BALL YEL/ORG 60	CJ11-11 DT VALUE LIGHTS X-BALL ORG/RED 68	CJ11-15 JACKPOT, 35 MILLION ORG/WHT 76	CJ13-5 BBOX BRIGHT #4 BLK/BRN 84	
CJ10-9 LOCK ARROW, YELLOW 53	CJ10-6 BLU/RED 61	CJ11-4 DT VALUE LIGHTS MILLION BRN/RED 69	CJ11-3 JACKPOT 4 MILLION BRN/YEL 77	CJ13-3 BRIGHT, LANE B BLK/GRN 85	

phase shift networks in the gate circuits of drive SCRs produce the new phases.

REMEDIES FOR "TOUGH DOG" LAMP PROBLEMS

Lamp circuit failures tend to follow a pattern. Usually both phase A and phase B lamps are lit simultaneously, or neither lights.

Locate the malfunctioning lamp's SCR number (*displayed Q#*) by running the Single Lamp Test. The displayed number corresponds to the SCR number screened on the Control Board. Also displayed are corresponding jack and pin numbers.

SYMPTOM: LAMPS ALWAYS ON

A circuit's phase A and phase B lamps may remain simultaneously lit. If both light with equal brilliance, you have a shorted SCR. However one lamp may be brighter. This is a very different problem. If both lamps are common to the same SCR, don't replace the SCR. Instead, replace the brighter lamp's diode, which is shorted. Now retest the circuit.

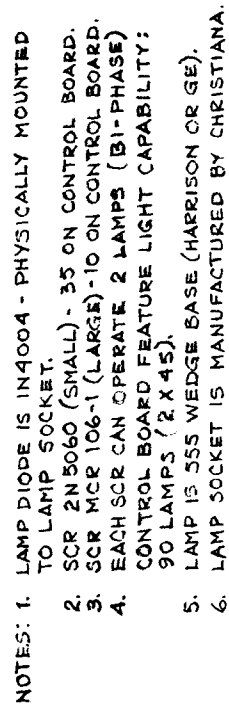
SYMPTOM: LAMP ALWAYS OFF

If a single lamp is out, the lamp, itself may be burned out. Or the lamp's series diode may be open. Insert a known-good bulb. Enter the Lamp Test. Now you'll need a jumper wire for an easy, component-level checkup...

- CHECK THE DIODE.** If you suspect an open diode, momentarily short across the suspected part. *Lamp lights now:* Replace the diode.

- CHECK THE GROUND CONNECTION.** If you suspect an open connection, momentarily jump from ground to the SCR anode. *Lamp lights:* Proceed to the next bullet (step). *Lamp doesn't light:* Check for an open connection or wire... Keep the ground end of the jumper connected. Walk the other end of the jumper back toward the lamp. Tap the ungrounded end of the jumper at each connection point between the anode

4-7



and the lamp. When the lamp lights, you've identified a break in the lamp wiring. The break is in the section of game wiring paralleled by the jumper wire.

●**CHECK THE SCR.** If you suspect a bad SCR, jump from CPU Test Point 7 to the SCR gate. *Lamp doesn't light:* Replace the SCR. *Lamp lights:* The 2K gate resistor or 4514 decoder may be faulty. Suspect the resistor first. Check its resistance. If the resistor reads more than 3K, replace it. If a group of lamps is out, then suspect a bad decoder.

●**CHECK THE B + CONNECTION.** Still no light? Find a known-good lamp with the same phase (A or B) as the inoperative one. Connect a jumper to the anode of that lamp's diode. Touch the free end of the jumper to the diode anode in the malfunctioning circuit. *Lamp lights now:* If the malfunctioning circuit now produces light, 20VAC wiring to the circuit is open.

In each case, if your hunch is correct, the jumper causes the lamp to light. To restore normal operation, replace the faulty part.

SYMPTOM: ONE LAMP ALWAYS ON

Connector numbers are displayed during the Single Lamp Test. Watch for the connector that corresponds to the malfunctioning lamp circuit. It will be one of four connectors. Disconnect this connector at the SCR. Don't be surprised if both A and B lamps associated with this connector remain on. If so, there's a short between either diode and its lamp socket. The brighter lamp is connected to the short.

However both lamps may light with equal brilliance. If so, you have a short from the cold side of the lamps to ground. Sometimes you'll find the short between the lamps and connector CJ. Otherwise the short occurs between the connector and ground. Unplug the connector.

●If the lamps remain on, the short occurs on the lamp side of the connector.

- If the lamps go out, expect a shorted SCR on the Control Board.

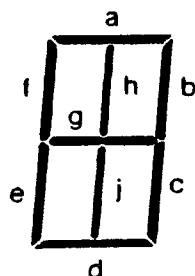
IMPROPER DISPLAY DIGITS

Improper digits are displayed at one or several, but not all display number positions. One or several segments are always off or digits are mottled. Or several segments or digits are always on.

ACTION TO TAKE

[] 1. With the power on, select DISPLAY TEST from the Game Checkup category. Use the right flipper button. To advance to the next test, press the right flipper button. To back up to the previous test, press the left flipper button.

[] 2. Start the test by pressing the CREDIT button. If the displays operate correctly, left digit segments of the left display module turn on. The turn-on order is f-a-b-c-d-e-g-h and j.



NOTICE

The comma segment isn't tested during DISPLAY TEST. Operation can be verified during gameplay or Attract Mode.

[] 3. If digit segments test okay, press the right flipper button. This button advances the test to the next display digit. If segments test okay, test the other display digits.

[] 4. If the segments test okay, the game is ready for play. If a display's segments test bad, replace the module.

WARNING

The power supply applies high voltage to display modules. After turning power off, wait 30 seconds for voltage to bleed off before servicing displays.

[] 5. With the power on, select DISPLAY TEST from the Game Checkup category. Use the lower-right cabinet button.

[] 6. Start the test by pressing the CREDIT button. If the displays operate correctly, left digit segments of the left display module turn on. If segments operate correctly, the game is ready for play. If segments don't operate correctly, contact your authorized Bally distributor.

IMPROPER DISPLAY PATTERNS

All display modules produce improper display patterns. Digits are always on or off, or all module segments remain on or off.

ACTION TO TAKE

[] 1. With power on, select DISPLAY TEST from the Game Checkup category. (Use the right flipper button.) If the displays operate correctly, perform the Segment Test. (See Steps 1 and 2 above.)

[] 2. Start the test by pressing the CREDIT button.

[] 3. If displays operate correctly, the game is ready for play. If the displays don't operate correctly, replace the 6803 Control Board.

CAUTION

Only replace the 6803 Control Board with a board bearing the same part number. Otherwise the game will operate incorrectly. See the ROM Summary and the Control Board parts list.

[] 4. With power on, select DISPLAY TEST from the Game Checkup category. (Use the right flipper button.) If the displays operate correctly, perform the Segment Test.

[] 5. Start the test by pressing the CREDIT button. If the displays operate correctly, the game is ready for play. If the displays don't operate correctly, contact your authorized *BALLY* distributor.

ONE OR SEVERAL DISPLAYS ALWAYS OFF

ACTION TO TAKE

[] 1. With power on, select DISPLAY TEST from the Game Checkup category with the right flipper button.

[] 2. Start the test by pressing the CREDIT button.

[] 3. If the first digit tests okay, test the other digits of the display module.

[] 4. If the test pattern is correct, the game is ready for play. If the test pattern is incorrect, turn power off and replace the defective display module.

WARNING

The power supply applies high voltage to the displays. After turning power off, wait 30 seconds for voltage to bleed off before servicing displays.

[] 5. With power on, select DISPLAY TEST from the Game Checkup category. Use the right flipper button.

[] 6. Start the test by pressing the CREDIT button. If the display modules operate correctly, the game is ready for play. If the displays don't operate correctly, contact your authorized *BALLY* distributor.

NO FLIPPER SOLENOIDS

The game checks flipper solenoids during the COIL TEST. These solenoids are controlled by relay K1 on the 6803 Control Board. See the Coil Table later in this chapter (*also inside the front cover*).

ACTION TO TAKE

[] 1. Flipper Solenoids don't energize when Control Board relay K1 pulls in during Flipper Test. (Flipper Test is also known as Output Port 15 Test.) With power on, select the COIL TEST from the Game Checkup category. Use the right flipper button. To advance to the next test, press the right flipper button. To back up to the previous test, press the left flipper button.

[] 2. Start the test by pressing the CREDIT button.

[] 3. Energize relay K1 by pressing the left flipper button. While relay K1 is energized, press the cabinet flipper buttons. If flipper solenoids operate correctly, the game is ready for play. If solenoids don't operate correctly, raise the playfield and inspect solenoid wiring.

[] 4. If solenoid wiring is correct, replace the 6803 Control Board Assembly.

CAUTION

Only replace the 6803 Control Board with a board bearing the same part number. Otherwise the game will operate incorrectly. See the ROM Summary and the Control Board parts list.

[] 5. Repeat Steps 1 and 2. If the coils operate correctly, the game is ready for play. If they don't, contact your authorized **BALLY** distributor.

FLIPPERS: A CLOSER LOOK

Your game has two flippers. A player controls the flippers by pressing the two flipper buttons located on either side of the lower cabinet.

The flippers in *ATLANTIS* are the new *WILLIAMS ELECTRONICS* type. These incorporate the *WILLIAMS ELECTRONICS* 50-volt, parallel windings.

FLIPPER SOLENOID OPERATION

Your flipper solenoids are parallel wound. To energize these solenoids, the game presents ground to them. Each solenoid contains two coils: One is the low resistance or pull-up coil. The other is the high-resistance coil. To raise the flipper bat, the cabinet flipper switch presents ground to both coils. Initially the End-of-Stroke switch (EOS) is closed. During EOS closure, the pullup coil and holding coil are wired in parallel.

When the flipper bat reaches the end of its stroke, the EOS opens. This action drops the pullup coil out of the circuit. Now the current must flow through just the high-resistance coil. Of course, the double coil has significantly more power than the holding coil alone.

However holding up the flipper doesn't require as much strength as raising it. Furthermore the single coil runs much cooler than the combination. (In fact the combination is only intended for momentary duty.)

REMEDIES FOR "TOUGH DOG" FLIPPER PROBLEMS

SYMPTOM: FLIPPER DOESN'T WORK

If its End-of-Stroke switch is dirty or open, your flipper won't function. Raise the flipper bat by hand, and push the flipper button on the cabinet. If the flipper holds, the EOS is dirty. But the rest of the circuit is good.

Clean and adjust the EOS so it's normally closed and relaxed. At full stroke, the End of Stroke switch should open.

If the flipper won't hold, go to the end (*cold*) lug and ground the flipper: You can do this easily from Control Board connector CJ6. Identify the CJ6 pin that's wired to the flipper. Connect one end of a jumper to this pin. Momentarily touch the other end of the jumper to ground. If the flipper energizes, you have an open line between the flipper and ground.

LOCATING AN OPEN IN THE GROUND LINE. Keep the CJ6 end of the jumper connected. Now walk the other end of the jumper back from ground toward CJ6. Tap the free end of the jumper at each connector along the way. The next time the flipper energizes, you've located the open line. It's in the length of wire you're jumping over.

FLIPPER STILL DOESN'T PULL IN. If the flipper still doesn't pull in, your flipper solenoid may be faulty. The low-resistance coil probably has an open winding.

SYMPTOM: TOP OR BOTTOM FLIPPER DOESN'T WORK

The bottom flipper may rise, but the top one might not. If this is your game's symptom, the bottom cabinet switch is bad, dirty or misadjusted. Cabinet switches are normally open.

SYMPTOM: WEAK FLIPPERS

If flipper action is weak, transistor Q7 or the flipper relay may be faulty. Both parts reside on the Control Board. The relay seldom fails. However a shorted or leaky driver transistor Q7 occasionally produces weak flipper action. Q7 is the transistor that drives the flipper relay.

SYMPTOM: FLIPPERS OPERATE DURING GAME-OVER MODE

If flippers operate during Game-Over Mode, they're picking up ground when they shouldn't be. Expect a shorted Control Board transistor Q7. This transistor drives the flipper-enable relay on the Control Board. The relay itself seldom fails. Check the transistor first. If Q7 is shorted or leaky, replace it. Then reenter Game-Over Mode and recheck those flippers.

COILS NOT OPERATING CORRECTLY

Some coils don't energize (pulse on) during gameplay. See the Coil Table later in this chapter.

ACTION TO TAKE

[] 1. With power on, select COIL TEST from the Game Checkup category. Use the right flipper button. To advance to the next test, press the right flipper button. To back up to the previous test, press the left flipper button.

[] 2. Start the test by pressing the CREDIT button. When the test starts, the game displays the words SINGLE COIL. As each item is tested, the game displays it...

- The First Coil
- ID Number
- Output Number
- Connector Number
- Pin Number

This information remains displayed until you exit the test.

[] 3. Advance to the next coil by pressing the right flipper button. Pulse the same coil by pressing the left flipper button.

[] 4. Continue the COIL TEST until you've checked all the coils.

[] 5. If most coils don't operate correctly, check the playfield fuse. The fuse resides on the bottom of the playfield, near the flippers.

NOTICE

The playfield lamp fuse protects all playfield coils except flipper coils. This fuse is a slow-blow type.

Your game tests its flipper circuitry during the Coil Test.

[] 6. To gain access to the coils, carefully raise the playfield. Inspect the wiring.

[] 7. If a lead wire is broken off, repair it and repeat step 4.

[] 8. If the coil tests okay, the game is ready for play. If the wiring is correct but the coil doesn't operate, turn the game off. Replace the 6803 Control Board Assembly.

CAUTION

Only replace the 6803 Control Board with a board bearing the same part number. Otherwise the game will operate incorrectly. See the ROM Summary and the Control Board parts list.

COILS ALWAYS ON

Some coils are designed to be energized (on) momentarily rather than continuously. If energized continuously, momentary duty coils will be damaged.

Limit troubleshooting "on" time. Turn power on for one minute, and then wait five minutes with power off. Replace damaged coils.

A constantly energized, momentary duty coil will blow the playfield fuse after a few seconds. To avoid repeated fuse replacement, isolate the faulty circuit as power is turned on.

ATLANTIS COIL TABLE

SOL NO.	SOLENOID DESCRIPTION	SOL. TYPE	WIRE COLOR	CONNECTIONS		SOLENOID PART NUMBER
				CONTROL BOARD	DRIVER TRANSISTOR	
01	Right Slingshot	Momentary	White-Red	CJ9-1	Q18	A365-00067-0029
02	Left Bumper	Momentary	Yellow-White	CJ6-4	Q14	A365-00067-0006
03	Drop Target Reset	Momentary	Yellow-Blue	CJ6-2	Q12	A365-00067-0019
04	Right Bumper	Momentary	Blue-White	CJ8-6	Q15	A365-00067-0006
05	Middle Bumper	Momentary	Blue-Orange	CJ8-7	Q16	A365-00067-0006
06	Left Slingshot	Momentary	Yellow-Brown	CJ6-5	Q17	A365-00067-0029
07	Popper Kicker	Momentary	Yellow-Red	CJ6-1	Q11	A365-00067-0029
08	Ramp Lift	Momentary	Yellow-Green	CJ6--3	Q13	A365-00067-0006
09	Bail Eject	Momentary	White-Brown	CJ9-6	Q22	A365-00067-0006
10	Outhole	Momentary	White-Black	CJ9-8	Q39	A365-00067-0006
11	Knocker*	Momentary	White-Gray	CJ9-11	Q40	A365-00067-0006
12	Submarine Eject	Momentary	Yellow-Violet	CJ6-7	Q10	A365-00067-0006
13	Not Used	Continuous	Blue-Green	CJ9-10	Q8	--
14	Flipper Enabling Relay	Continuous	--	--	Q7	114E-00001-0011
15	Drain Plug	Momentary	White-Blue	CJ9-2	Q19	A365-00067-0006
16	Ramp Down	Momentary	White-Yellow	CJ9-3	Q20	SM-28-900-DC
17	Saucer	Momentary	White-Green	CJ9-4	Q21	A365-00067-0006
18	Reserved for German	Momentary	White-Orange	CJ9-7	Q38	--
19	Not Used	Continuous	White-Violet	CJ9-9	Q9	--
FLIPPER DESCRIPTION		WIRE COLORS & CONNECTORS				
20	Left Flipper	Gray: CJ6-8				FL-11630
21	Right Flipper	Gray-White: CJ6-9				FL-11630

NOTES:

- For continuous solenoid 19, install jumper JW8. Remove jumper JW9.
- To use switch strobe at CJ4-1, install jumper JW9. Remove jumper JW8.
- To use extra display at CJ2-19, install jumper JW11. Remove jumper JW10.
- *Knocker is located in the backbox.

ACTION TO TAKE

[] 1. With power on, select COIL TEST from the Game Checkup category. Use the right flipper button. The right flipper button advances to the next test. Pressing the left flipper button backs up to the previous test.

[] 2. Start the test by pressing the CREDIT button. When the test starts, the game displays SINGLE COIL. The first coil in the sequence momentarily pulses on, then off. As each item is tested, the game displays the following...

- The name of each coil
- ID number
- Output port number
- Connector number
- Pin number, is displayed as each one is tested.

Until you exit the test, this information remains on displays. Advance to the next coil by pressing the right flipper button. To pulse the same coil, press the left flipper button.

[] 3. Until all coils have been tested, continue the Coil Test.

[] 4. If the coils operate correctly, the game is ready for play. If they don't, check the coils and their wiring.

[] 5. To access coils and inspect wiring, carefully raise the playfield.

[] 6. If a lead wire is broken, repair it and repeat Step 3.

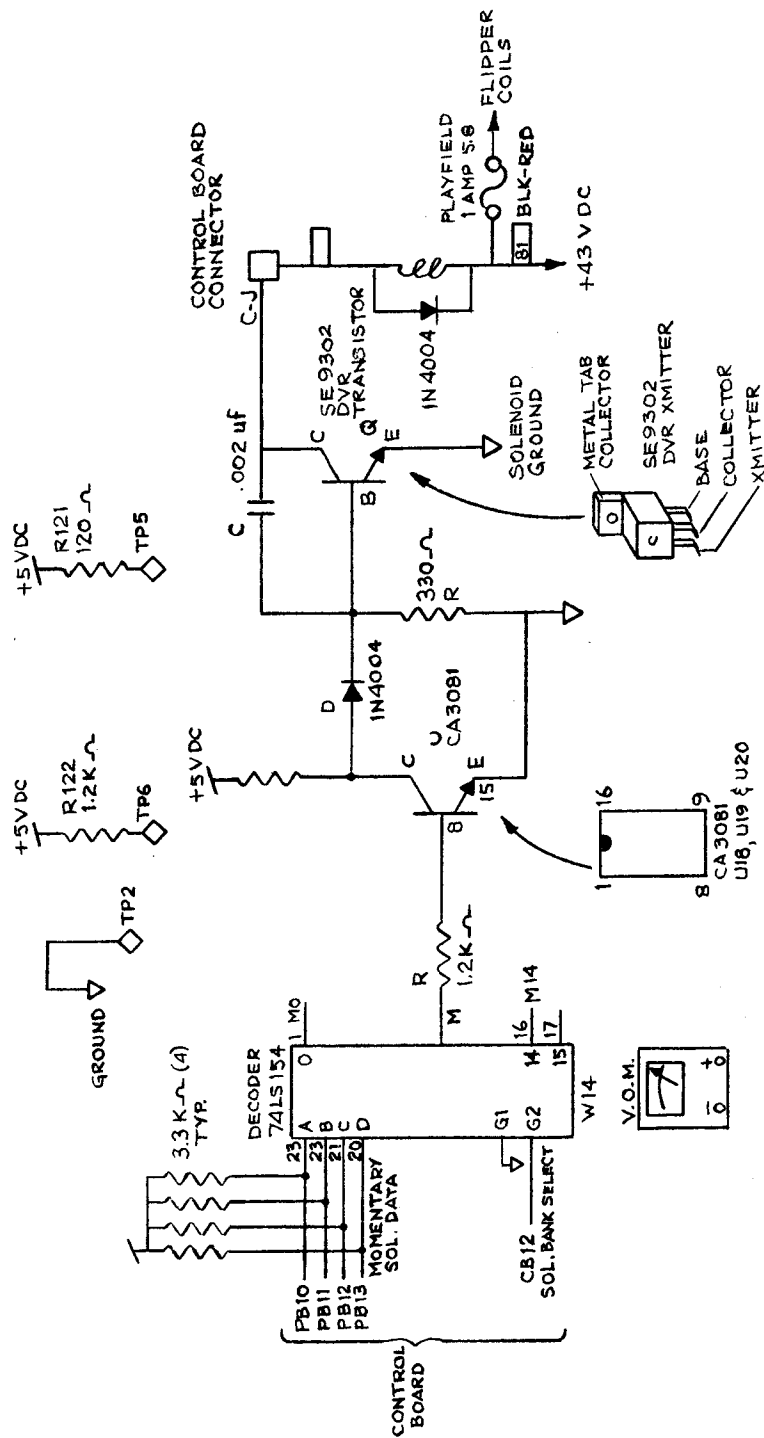
[] 7. If the coil operates correctly, the game is ready for play. If wiring is correct and the coil doesn't operate correctly, turn the game off. Replace the 6803 Control Board.

CAUTION

Only replace the 6803 Control Board Assembly with a board bearing the same part number. Otherwise the game will operate incorrectly. See the ROM Summary and the Control Board parts list.

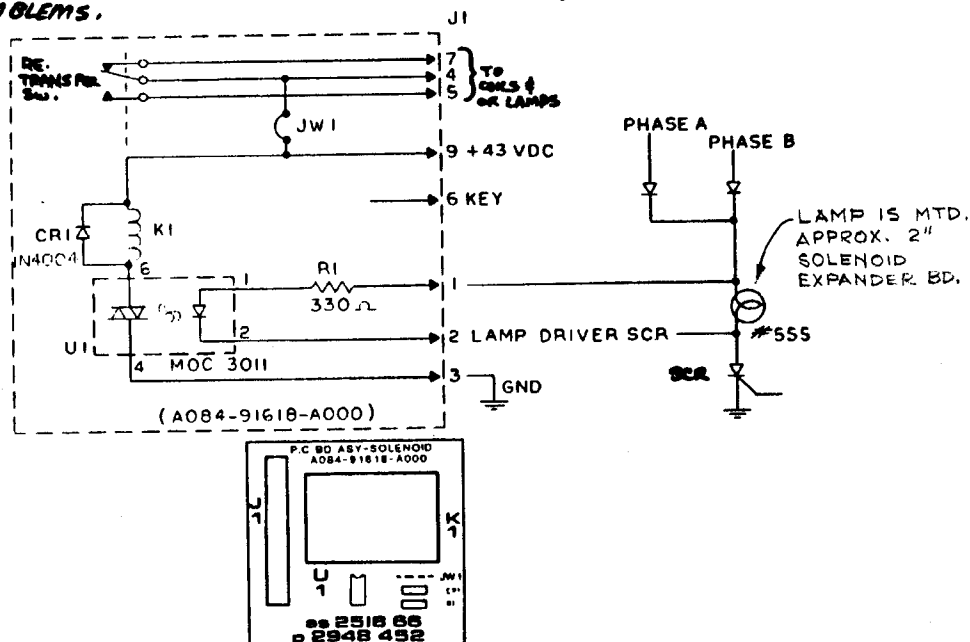
[] 8. With power on, select COIL TEST from the Game Checkup category. Use the right flipper button.

Typical Momentary Solenoid Driver Circuit

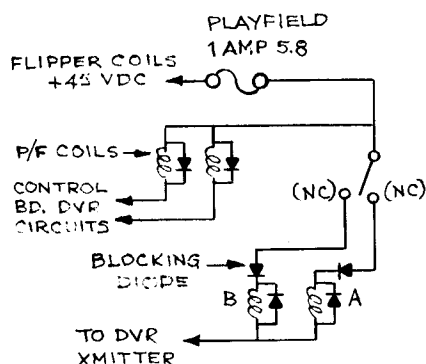


Solenoid Expander Board

1. WHEN A GAME IS DESIGNED WITH MORE THAN 15 COIL & OR LAMP (BRITE LITE) MOMENTARY DRIVER ASSIGNMENTS THE SOLENOID EXPANDER IS INCORPORATED INTO THE GAME.
2. THE EXPANDER RELAY TRANSFER SWITCH PROVIDES 49 V.D.C. TO COIL 'A' OR 'B' DEPENDING ON THE POSITION OF THE SWITCH. AS A RESULT, 1 DRIVER TRANSISTOR CAN DRIVE 2 COILS DEPENDING ON THE RELAY SWITCH POSITION.
3. COILS & OR BRITE LITES RELATED TO THE RELAY TRANSFER SWITCH IS DESIGNED WITH A SERIES DIODE (IN4004) TO PREVENT LOOP PROBLEMS.



NOTES:



[] 9. Start the test by pressing the CREDIT button. If coils operate correctly, the game is ready for play. If they don't, turn the game off and contact your authorized Bally distributor.

REMEDIES FOR "TOUGH DOG" COIL PROBLEMS

INTRODUCTION

Your coil driver circuit contains a zero crossing detector. The game depends on this detector to time firing pulses for game-controlled coils. Controlled coils energize for three to four zero crossings (25 ms).

SYMPTOM: COIL ALWAYS OFF

Connect one end of a jumper to ground (or TP2). *Tap the jumper's free end on the metal tab of the inoperative coil's driver transistor. (This transistor has a TO-220, power tab case. The tab is connected to the transistor's collector.)*

CAUTION

Never hold a grounding jumper on the tab! More than momentary contact causes circuit damage. The coil fuse or even the coil, itself may burn.

NOW COIL PULLS IN. If the coil pulls in, check the driver transistor. To check the transistor, jump from TP6 to the base of the driver transistor.

COIL DOESN'T PULL IN. With its base pulled up to TP6 potential, the transistor should energize the coil. If the coil doesn't pull in, replace the transistor. If the coil operates, check the transistor's series diode for an open circuit.

Assuming that you find a good series diode, proceed backward one stage in the circuit. Ground the appropriate CA3081 transistor base. The coil should operate. But if it doesn't, replace the CA3081 decoder chip.

Once again, ground the appropriate CA3081 transistor base. If the coil doesn't energize, jump the bottom of the

coil to the transistor tab. If the coil now pulls in, the wiring between the transistor and coil is bad. Use an ohmmeter to check for the break.

COIL STILL DOESN'T PULL IN. Wow, this problem's persistent! If the coil still doesn't pull in, provide it with an alternate source of 43 volts: Connect a jumper wire to the tab of a *working* coil's power transistor. Touch the free end of the jumper to the top of the inoperative coil.

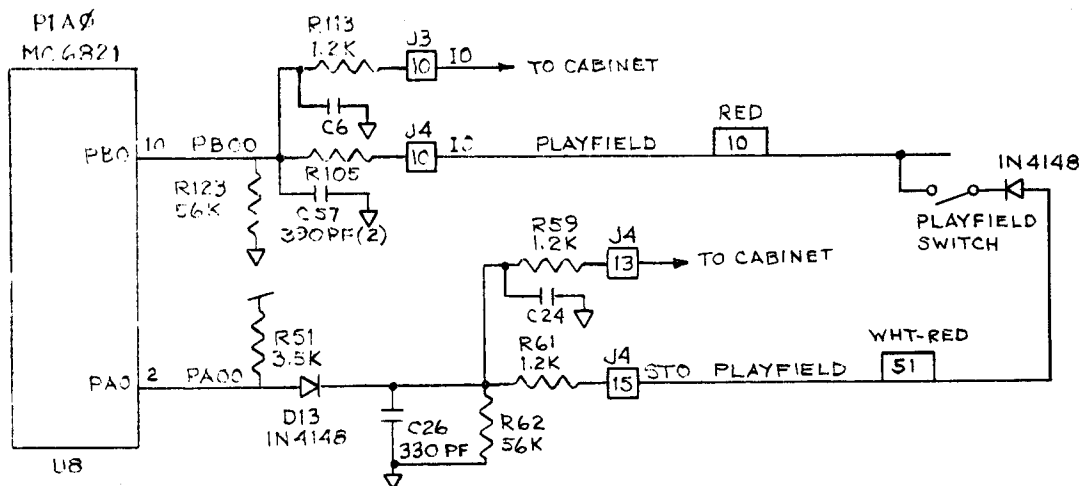
If the coil finally energizes, then you've identified open B+ wiring. Trace the wiring with an ohmmeter. Locate and repair the break. This procedure should restore normal operation.

SWITCHES DON'T SCORE

INTRODUCTION

The switch matrix can seem very complicated, but really it's fairly simple. Matrixed switches are arranged in rows and columns. When closed, each switch connects one row to one column. Diodes prevent closed switches from creating spurious circuits ("*phantom*" switch closures). The rows and columns originate at a PIA (Peripheral Interface Adapter) on the Control Board.

Typical Playfield Switch Circuit



For each switch row, one wire connects PIA port PB0 to that row's switches. This PIA port is configured as a pulse receiver. If TTL-level pulses are present on the wire, the microprocessor senses a switch closure.

For each switch column, one wire connects PIA port PA0 to that column's switches. This PIA port is configured as a pulse ("strobe") transmitter. Each column wire presents an active-high, TTL-level pulse train to that column's switches.

Assume that the pinball closes a matrixed, playfield switch (for example, a standup target). Switch closure presents the PIA column strobe with a path to the PIA row. The PIA port connected to that row receives the strobe. When the strobe falls to zero volts, the PIA records (*latches*) a change of state.

ATLANTIS SWITCH MATRIX

COLUMN ROW	(1) STO WHT/RED CJ4-15	(2) ST1 WHT/BLU CJ4-14	(3) ST2 WHT/YEL CJ4-13	(4) ST3 WHT/GRN CJ4-12	(5) ST4 WHT/BRN CJ4-11	(6) ST5 WHT/VIO CJ4-1
	(1) 10 RED CJ4-10	(2) 11 BLUE CJ4-9	(3) 12 YELLOW CJ4-8	(4) 13 GREEN CJ4-7	(5) 14 WHITE CJ4-6	(6) 15 BROWN CJ4-4
(1) 10 RED CJ4-10	DROP TARGET #1, LEFT 1	COINS, RIGHT #3 9	LEFT BOTTOM BUMPER 17	LEFT TARGET, ORANGE 25	MIDDLE TARGET, ORANGE 33	
(2) 11 BLUE CJ4-9	DROP TARGET #2 2	COINS, LEFT #1 10	MIDDLE BUMPER 18	LEFT TARGET, WHITE 26	MIDDLE TARGET, WHITE 34	SUB BALL LOWER 42
(3) 12 YELLOW CJ4-8	DROP TARGET #3 3	COINS, MIDDLE #2 11	RIGHT BUMPER 19	LEFT TARGET, YELLOW 27	MIDDLE TARGET, YELLOW 35	SUB BALL UPPER 43
(4) 13 GREEN CJ4-7	DROP TARGET #4, RIGHT 4	TOP LANE "A" 12	LEFT SLINGSHOT 20	RIGHT TARGET, ORANGE 28	SPINNER 36	BALL IN SUBMARINE 44
(5) 14 WHITE CJ4-6	CABINET, LEFT 5	TOP LANE "B" 13	RIGHT SLINGSHOT 21	RIGHT TARGET, WHITE 29	RAMP SENSOR 37	HOLD BONUS 45
(6) 15 BROWN CJ4-4	CREDIT 6	SLAM 14	PLUG-POST SENSOR 22	RIGHT TARGET, YELLOW 30	RETURN LANES 38	LEFT TROUGH #1 46
(7) 16 ORANGE CJ4-3	CABINET, RIGHT 7	TILT 15	LEFT OUTLANE 23	RE-BOUNDERS 31	SAUCER 39	MIDDLE TROUGH #2 47
(8) 17 BLACK CJ4-2	OUTHOLE 8	SHOOTER LANE 16	RIGHT OUTLANE 24	TURN AROUND LOOP 32	POPPER DISH 40	RIGHT TROUGH #3 48

NOTE: I = Input and ST = Strobe
Columns 7 and 8 have been omitted, since they contain null values in this matrix.

Switch PIA U8 is on the microprocessor's bidirectional, eight-bit data bus. The 6803 microprocessor regularly reads PIA data. This data includes switch closure information at the PIA port connected to the receiving row. The microprocessor reads rapidly enough to catch the most fleeting switch closures. That's why technicians often refer to such reading as "scanning."

Upon reading the PIA row port, the microprocessor senses the switch closure. The microprocessor responds by performing its service routine for that switch closure. The routine may raise the score, set the bonus multiplier or call a sound effect.

ACTION TO TAKE

[] 1. Turn power on and select SWITCH TEST from the Game Checkup category. Use the right flipper button. See the Switch Assignment Number Illustration.

[] 2. Start the test by pressing the CREDIT button.

[] 3. If no switches are stuck or closed, the game displays the words ALL SWITCHES OPEN. If any switch is stuck or closed, the game displays the switch's name.

[] 4. To access switches, carefully raise the playfield.

[] 5. Visually inspect each switch assembly. If the contacts are closed, adjust them to a 1/16-inch gap. Run the test again. If the game displays the phrase ALL SWITCHES OPEN, the game is ready for play. If a switch name is displayed instead, turn power off.

[] 6. Replace the 6803 Control Board.

CAUTION

Only replace the 6803 Control Board with a board bearing the same part number. Otherwise the game will operate incorrectly. See ROM Summary and the Control Board parts list.

[] 7. Turn power on and select SWITCH TEST from the Game Checkup category. Use the right flipper button.

[] 8. Start the test by pressing the CREDIT button.

[] 9. If no switches are stuck or closed, the game displays the words ALL SWITCHES OPEN. If the game displays the words ALL SWITCHES OPEN, the game is ready to play. If a switch name is displayed, contact your authorized Bally distributor.

NO SOUND

INTRODUCTION

The **ATLANTIS** Sound Board provides the game with music, sound effects and speech. The board is a microcomputer based on a Motorola 68B09E microprocessor (U8). The board has its own, eight megahertz clock. On-board RAM and ROM chips store sound data and support microprocessor operations. Besides the basic computer, the board includes both a Yamaha synthesizer and a speech generator.

A 68B21 PIA chip (U12) accepts sound calls from the Control Board. The PIA also handles communications between microprocessor U8 and the 1408 DAC.

Three DACs output analog signals to the Sound Board's two power amplifiers. One of these DACs is known as a CVSD...

The 55516 type CVSD (*U6, Continuously Variable Slope Delta*) modulator recreates **ATLANTIS** speech. The analog output appears at the sound preamplifier.

The Yamaha synthesizer includes its own DAC (*Digital-to-Analog Converter*) at chip U1. This DAC mostly outputs music to the Sound Board's type 1458 preamplifier.

The Sound Board employs its 1408 DAC (U11) for sound effects. This chip accepts binary input from PIA U12. The DAC then produces analog voltages employed by the sound preamplifier.

CAUTION

Only replace the Sound Module with a board bearing the same part number. Otherwise incorrect operation will result. See the ROM Summary and the Sound Module parts list.

SOUND BOARD SELF-DIAGNOSTICS

Sound tests are only possible after successful completion of Control Board Power-Up Tests.

A brief check of D-11581 Sound Board circuitry occurs at game turn-on. The game indicates the test results with brief sounds, as follows...

- **No Sound:** Sound/Speech Board isn't operating. Or a circuit failure (broken cable, dead amplifier, etc.) prevents reproduction
- **1 Sound:** System okay
- **2 Sounds:** RAM problem
- **3 Sounds:** U4 problem
- **4 Sounds:** U19 problem

ACTION TO TAKE

[] 1. With power on, select the SWITCH TEST from the Game Checkup category with the right flipper button.

[] 2. Start the test by pressing the CREDIT button.

[] 3. Turn the volume control inside the coin door fully clockwise (right).

[] 4. Operate any switch on the playfield. When the switch makes, listen for a sound. If you don't hear a sound, suspect the speaker wiring. Output signals to the cabinet speaker exit the Sound Board at connector SJ5, pin 1. Output signals to backbox speakers exit the Sound Board at connector SJ5, pin 2. Cabinet speaker return wires connect to pin SJ5-3. Backbox return wires connect to pin SJ5-4.

[] 5. If the speaker wiring is good, repeat Step 4. If you hear sound, the game is ready for play. If you don't hear sound, check fuses on the Power Module.

[]6. **HUM TEST FOR ANALOG FUNCTIONS.** If previous checks did not isolate the problem, turn the volume control for maximum output. Momentarily touch a powered-up AC soldering pencil on the center tap of the volume control.

CAUTION

DON'T use a soldering iron over 40 watts. Cordless irons will NOT work for this test.

Listen for a low hum or click. This indicates that amplifier U1 (TDA2002), the volume control, sound cabling and speaker operate satisfactorily.

If you don't hear anything, repeat the test with the volume control turned halfway down. This new test determines whether the volume control is faulty. Also check cable connectors for improper mating and broken wires.

SOUND INTERFACE BOARD

INTRODUCTION

The Sound Interface Board permits the Control Board to reset the Sound Board. The negative 12 volt, sound amplifier supply for also resides on the Sound Interface Board.

There are two types of problems associated with Sound Interface Board failures... (1) No sound, or one sound stuck on. (2) Heavily distorted sound. Before proceeding, isolate the problem to the Sound Interface Board by replacing it with a board you know to be good.

NO SOUND, OR ONE SOUND STUCK ON

Check the reset circuit on the Sound Interface Board. This circuit includes chips U1 and U2. Also check the sound-select lines. These run between the Control Board, Sound Interface Board and Sound Board. The sound-select lines connect to chip U1 at pins 1 through 6, 11 and 12. An additional strobe line from the Control Board connects to chip U2 at pin 3.

You can check strobe and select lines with a logic probe. During Gameplay Mode, the select and strobe lines should pulse. Test for this pulse at connector SIJ3, pins 1 through 8 and 10. You should find the same pulsing at connector SIJ1, pins 3 through 10 and 13. If not, either U1 or U2 may be bad. Before replacing these ICs, check or replace C1, a one microfarad electrolytic capacitor.

HEAVILY DISTORTED SOUND

Check the negative 12-volt regulator on the Sound Interface Board. The error amplifier and series-pass device for this analog regulator reside in chip U3. The circuit also contains two, ten and 100 microfarad electrolytic capacitors. These tend to fail before the regulator chip. As a rule of thumb, larger electrolytics fail before smaller ones.

Check the voltage across the 100 microfarad capacitor. You can also take this measurement between SIJ2, pin 3 and ground (pin 5). During your test, the Sound Interface Board should be connected to the Sound Board.

You should find -12 volts DC and not more than 12 millivolts of AC ripple. *Check for the ripple with the AC setting on your voltmeter.* If you find excessive ripple, change the 100 microfarad capacitor and recheck the circuit.

CHAPTER 5: GAME PARTS INFORMATION

**Playfield Parts List and Location Drawing
Backbox, Insert Board and Cabinet Parts
Location Drawing**

All Major Mechanism Assemblies of *ATLANTIS*

**Solenoids
Lamps
Switches
Coil Characteristic Table**

Playfield Parts List

ITEM	DESCRIPTION	PART NUMBER
1	Drain Plug	C-12605
2	Outhole Assembly	B-12669
3	Ball Trough Assy.: Lower Guide	C-8235
	Upper Guide	B-8623
4	Ball Shooter Assy.	B-12445-1
5	Ball Eject Assy.	C-9638
6	Right Flipper (Yellow)	20-9592-6
	Right Flipper Assy.	C-11626-R-3
7	Slingshot Kicker Assy.	A365-05210-0001
8	3-Pos. Standup Targets(Right)	B-12611
9	4-Unit Drop Target	D-12635
10	Spinner Gate Assy.	B-12626
11	Mid. Shooter Lane Gate	B-12623
12	Thumper Bumper Assy.	A365-05100-0002
13	Shooter Lane Exit Gate	A-8244-R
14	Ball Popper Assy.	D-11335-3
15	Saucer Gate	B-12623
16	Saucer Kicker Assy.	B-9361-R-6
17	Left Lane Exit Gate	A-8244-L
18	Submarine Assy.:	
	Sub. Platform Assy.	C-12571
	Sub Hold-up Brackets	01-9172
19	Lift Ramp Assy:	C-12569
	Lift Ramp Mechanism	B-12576
	L/Ramp Coil & Bracket Assy.	B-11494-1
20	3-Pos. Standup Targets(Left)	B-12612
21	Left Flipper (Yellow)	20-9592-6
	Left Flipper Assy.	C-11626-L-3

Rubber Parts

A	Flipper Rubbers(Red)	23-6519-4
B	2-1/2" Rubber Ring	23-6306
C	5/16" Rubber Ring	23-6300
D	1-1/2" Rubber Ring	23-6304
E	Post Rubber Sleeve(Yellow)	23-6552
F	3" Rubber Ring	23-6307
G	3/4" Rubber Ring	23-6301
H	1-1/2" Rubber Ring	23-6304
I	1-1/4" Rubber Ring	23-6303
J	Bumper Sleeve(Yellow)	23-6551
K	Bumper Sleeve(Black)	23-6556
L	2" Rubber Ring	23-6305
M	Ball Shooter Tip	23-6327

Ball Guides, Ramps, and Wireforms

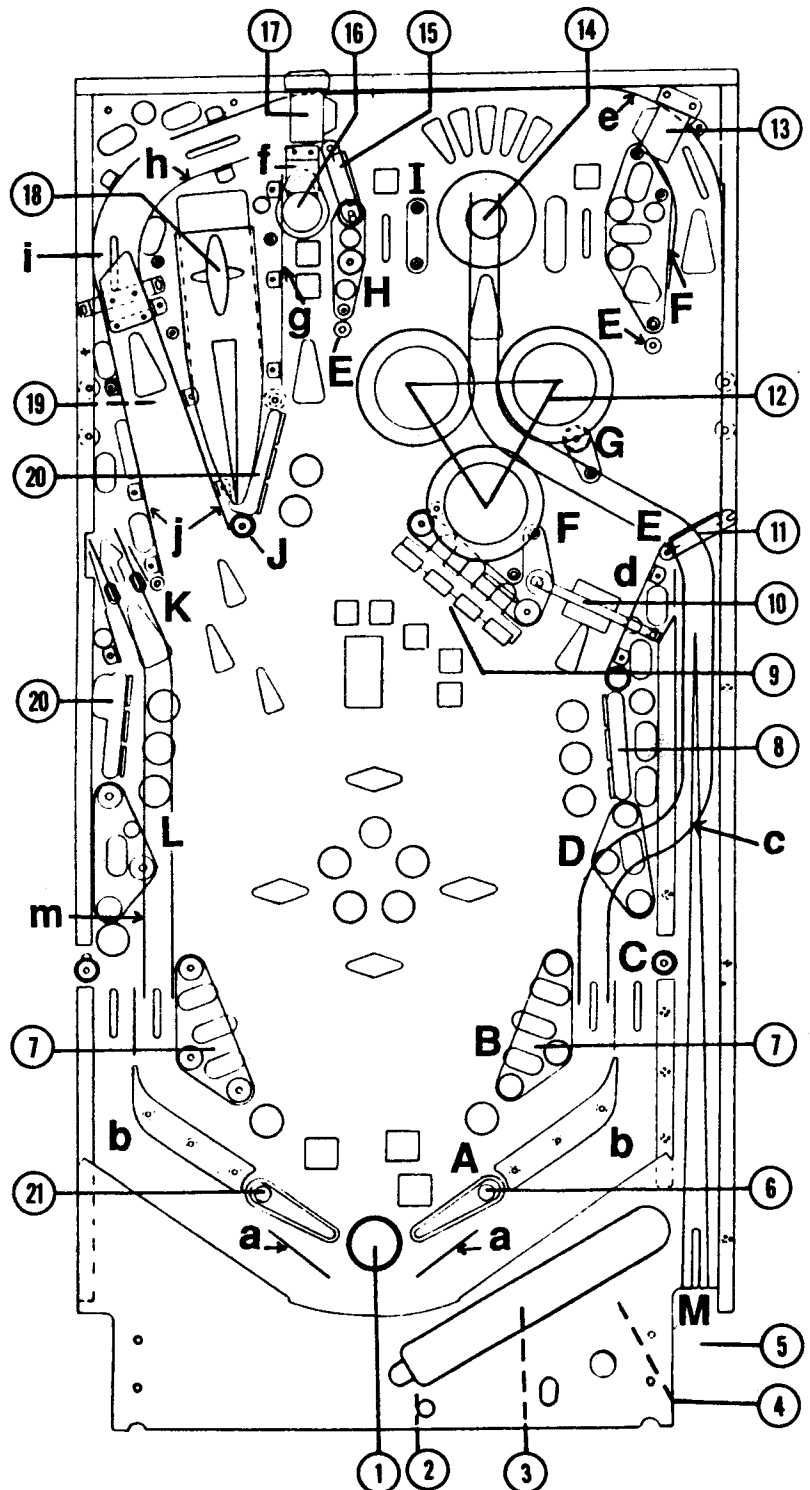
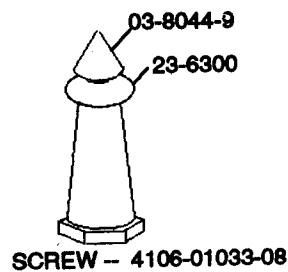
a	Flipper Wireforms	12-6843
b	Flipper Ball Guides: Left	B-12673-L
	Right	B-12673-R
c	Right Wire Ramp	12-6819
d	Spinner Entrance Guide	B-12575
e	Shooter Lane Exit Guide	D-12573
f	Saucer Ball Stop	A-12121-1
g	Saucer Ball Guide	01-9153
h	Inner Left Lane Guide	B-12614
i	Plastic Ramp	D-12620
j	Lift Ramp Guides (Inner & Outer)	B-12572
k	JACKPOT Ball Guide	B-12629
m	Left Wire Ramp	12-6818

Playfield Parts Location Drawing

Miscellaneous Parts

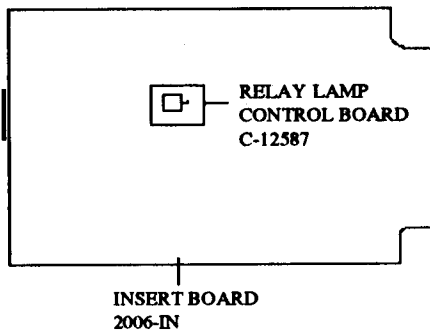
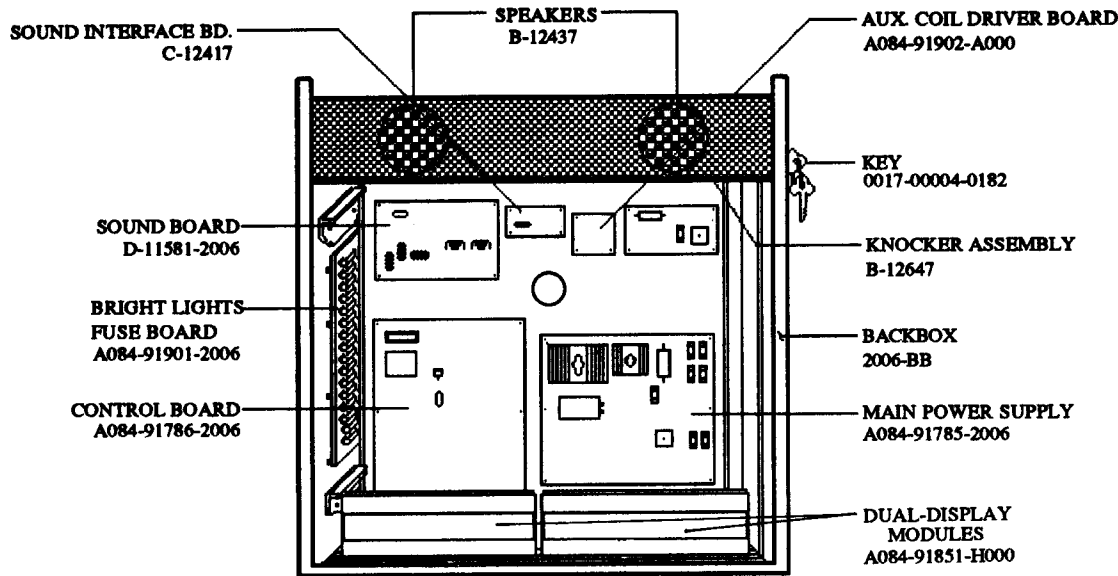
- Playfield Screened
31-1002-2006
- Playfield Plastics Assy.
31-1006-2006
- Right Plastic Piece
(w/ Lamp Cover)
C-12628-2
- Left Plastic Piece
(w/ Lamp Cover)
C-12628-1
- Playfield Glass
08-7028-T
- Screened Bottom Arch
31-1008-2006
- Screened Shooter Gauge
31-1009-2006
- Decal: Spinner
31-1462-2006
- Decals: Drop Target
31-1463-2006
- Decals: Submarine
31-1491-2006
- Red Light Bulb Sleeve
03-7351-9

Plastic Posts

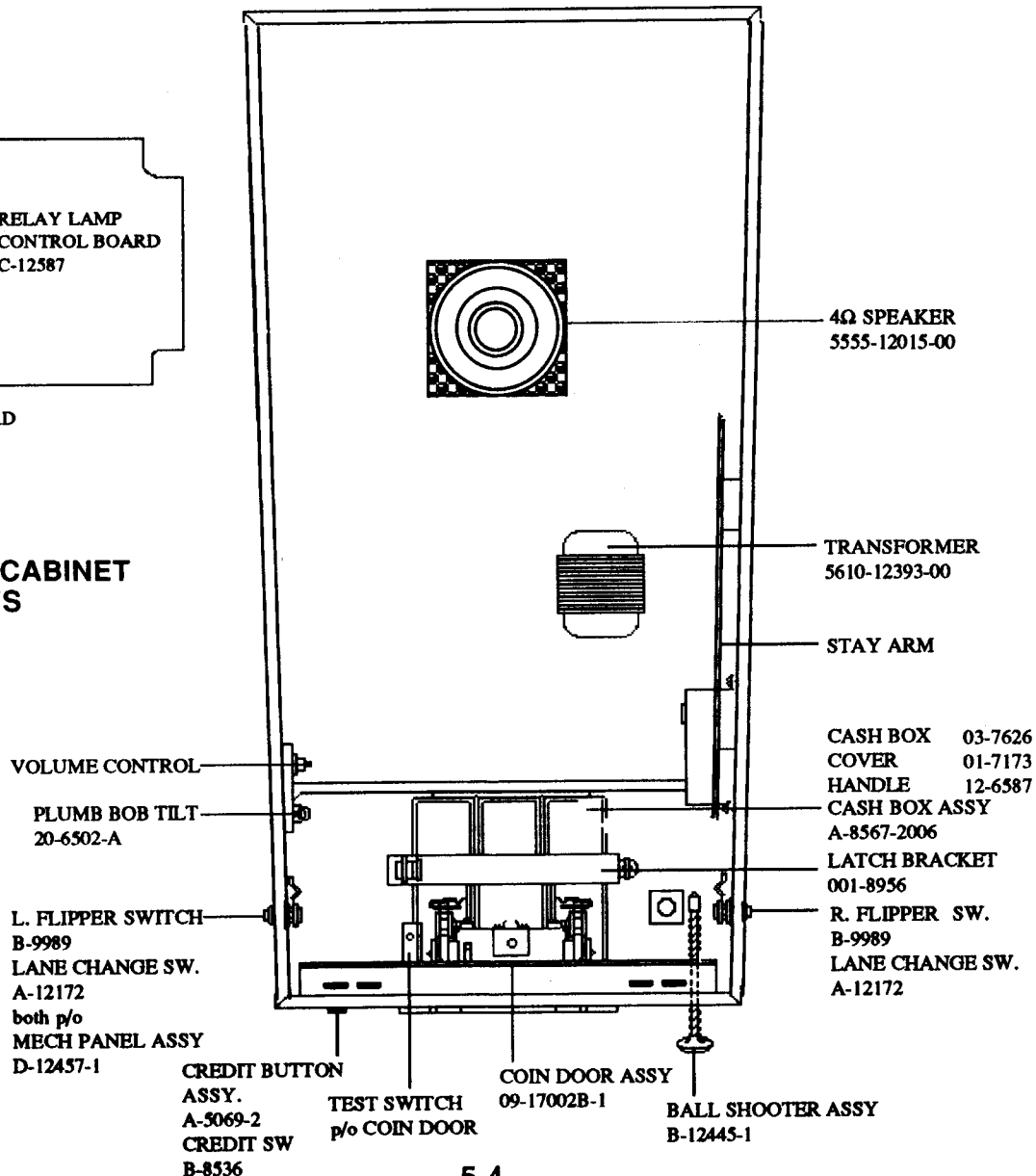


ATLANTIS

Parts Information

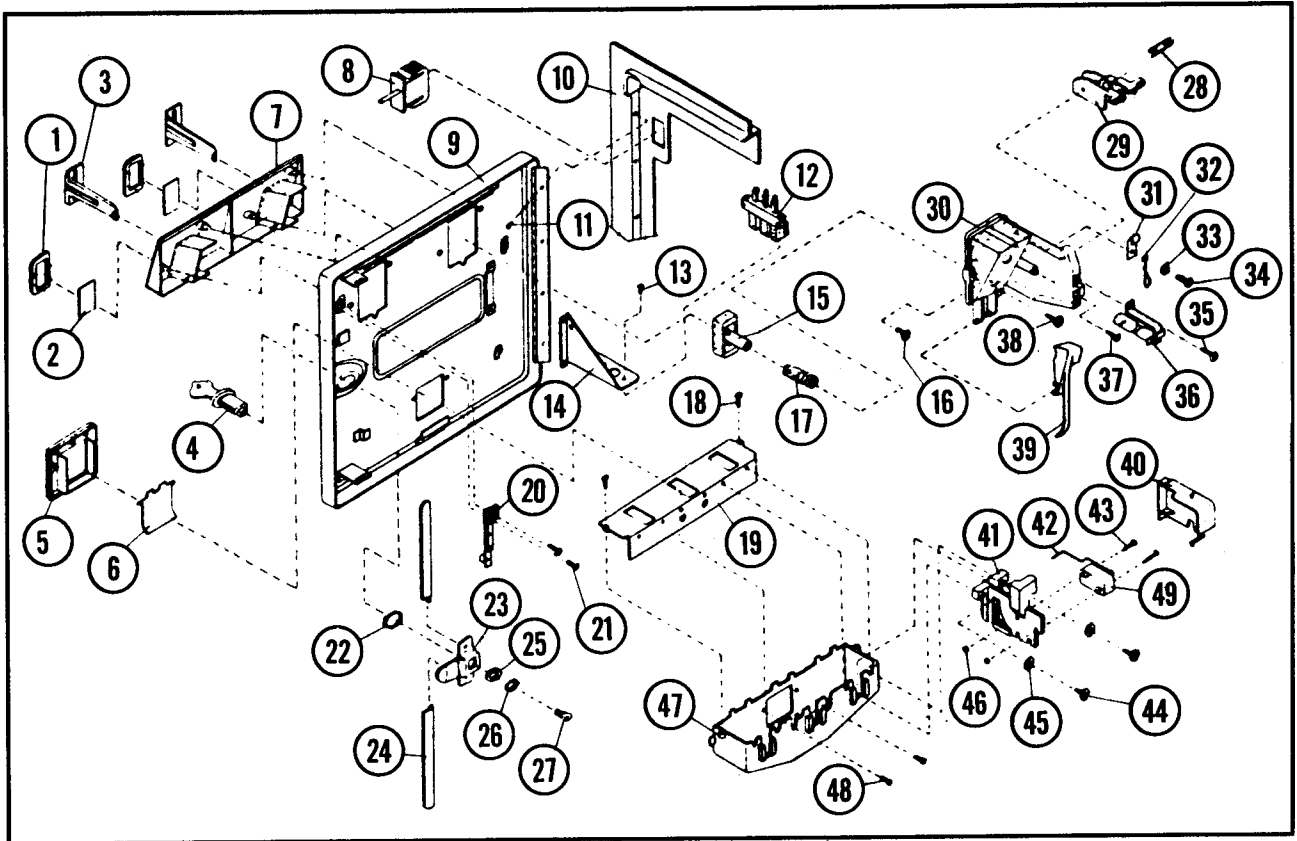


BACKBOX & CABINET PARTS



Coin Door Assembly

09-17002B-1



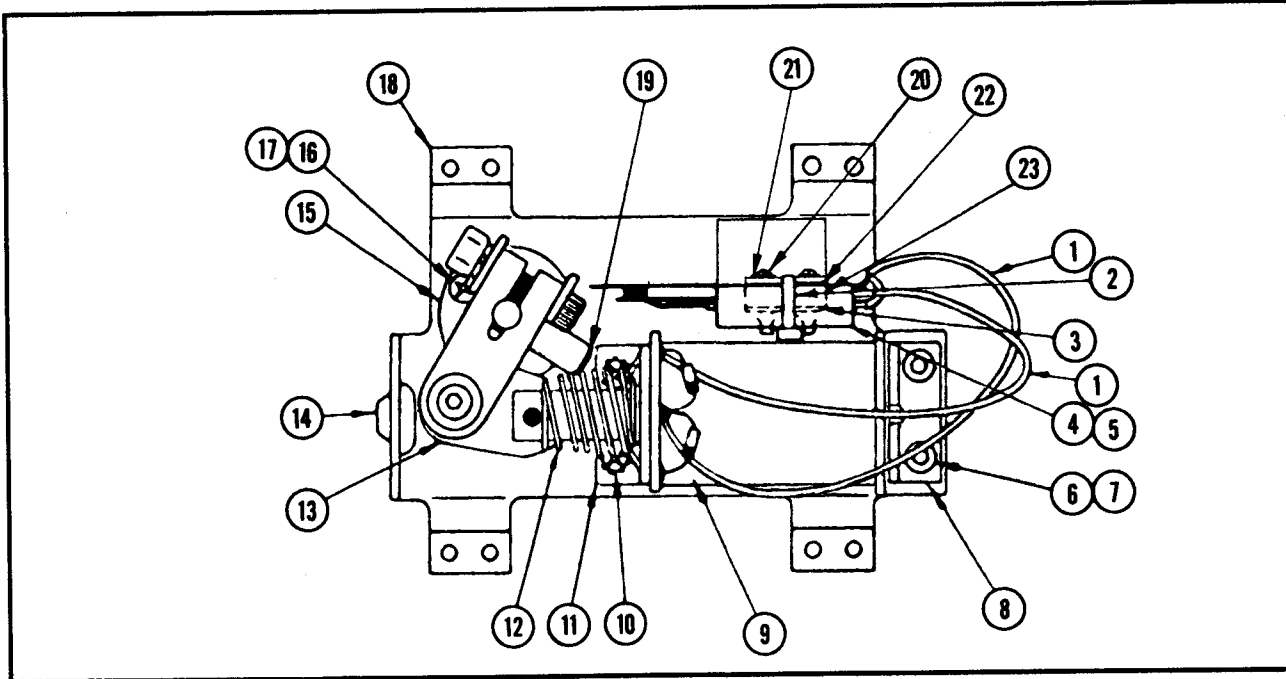
ITEM	PART NUMBER	DESCRIPTION	ITEM	PART NUMBER	DESCRIPTION
1	27-1038	Button Cover	26	27-1018	Star Washer
2	27-1041-1--41	Price Panel	27	27-1019	M/C Screw
3	27-1026-1--13	Coin Entry Plate	28	27-1089	R-Ring
4	27-1016	Lock Assembly	29	27-1083	Retainer
5	27-1061	Coin Return Bezel	30	27-1081	Coin Inlet Chute
6	27-1062	Coin Return Flap	31	27-1088	Wire Clamp
7	27-1021	Button Housing - 2-slot	32	27-1025	Key Hook
	27-1022	Button Housing - 3-slot	33	27-1086	Washer, #6
8	27-1111	Interlock Switch	34	27-1078	M/C Screw, 6-32 x 3/8
9	27-1006	Coin Door - 2-slot		27-1078	M/C Screw, 6-32 x 7/8
	27-1007	Coin Door - 3-slot	35	27-1079	Self-tapping Screw, #6 x 1/4
10	27-1005	Coin Door Frame	36	27-1084	Lamp Socket
11	27-1003	M/C Screw, 6-32 x 3/16		27-1085	Lamp
12	27-1008	Diagnostic Switch	37	27-1096	Self-tapping Screw, #5 x 3/8
13	27-1101	M/C Screw, 4-40 x 1/4	38	27-1087	M/C Screw, 6-32 x 5/8
14	27-1102	Bracket, Diagnostic Switch	39	27-1082	Lever Arm
15	27-1037	Button	40	27-1097	Switch Cover
16	27-1078	M/C Screw, 6-32 x 3/8	41	27-1091	Coin Accept Chute
17	27-1039	Conical Spring	42	27-1075	Wire Form
18	27-1079	Self-tapping Screw, #6 x 1/4		27-1093	Wire Form
19	27-1077	Coinbox Cover	43	27-1094	M/C Screw, 6-40 x 7/8
20	27-1066	Slam Switch	44	27-1087	M/C Screw, 6-32 x 5/8
21	27-1067	M/C Screw 4-40 x 1/2	45	27-1086	Washer, #6
22	27-1017	Nut (key)	46	27-1095	Nut, 4-40
23	27-1012	Locking Cam	47	27-1076	Coin Return Box
24	27-1011	Locking Arm	48	27-1078	M/C Screw, 6-32 x 3/8
25	27-1020	Washer	49	27-1092	Microswitch

ATLANTIS

Parts Information

Lower Right Flipper

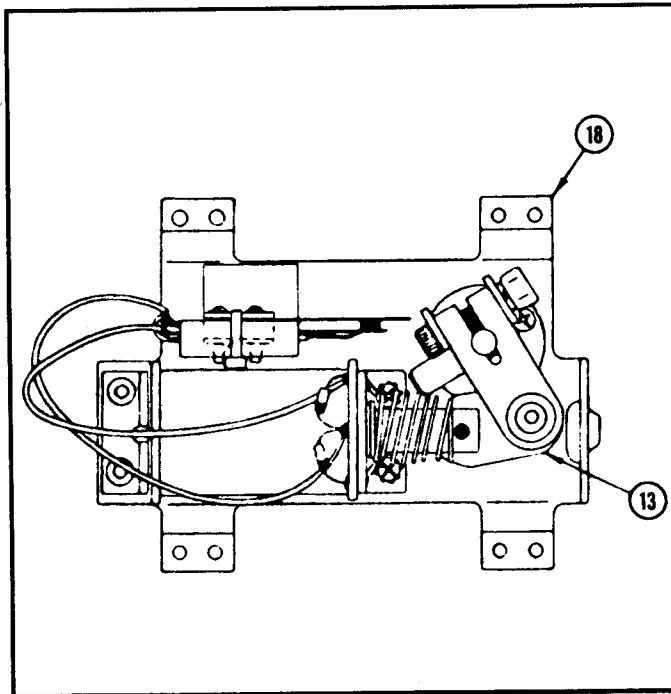
C-11626-R-3



Lower Left Flipper

C-11626-L-3

Flipper Assembly Notes:



- 1 Each Flipper Assembly on the Lower Playfield (and the two Lower Flipper Assemblies on the Upper Playfield) is mounted beneath the playfield, in conjunction with the plastic Flipper Paddle and Shaft (20-9250-5) and flipper Rubber (23-6519-4) on the upper side of the playfield. The Upper Flipper Assembly on the Upper Playfield uses a plastic Flipper Paddle and Shaft (C-11927-5) and flipper Rubber (23-6553-4).
- 2 The tip of the EOS Switch must travel 0.0150 (+ .010, - .000) inch, before the contacts fully open, with the flipper in the actuated position. The EOS Switch contacts must have a gap of 0.062 ($\pm$.015) inch. Adjustment of the EOS Switch must be made at a minimum distance of 0.25 inch from the switch body.
- 3 not used
- 4 All moving elements of the assembly must operate freely, with no evidence of binding.
- 5 The large end of the Coil Plunger Spring (item 12) must fit within the four lugs of the Solenoid Bracket.
- 6 For coil replacement, remove the Solenoid Bracket (item 11) to prevent screw damage.
- 7 Use Loctite™ 242 when reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.
- 8 When replacing the Bumper Plug (item 14) to restore proper flipper operation, readjust the flipper paddle and shaft position.
- 9 Solid color blue wire connects to the banded end of each diode, mounted on the connector end of the Flipper Coil (item 9). Trace color wire connects to the unbanded end of the diode.

Lower Right Flipper Parts List C-11626-R-3

ITEM	PART NUMBER	DESCRIPTION	ITEM	PART NUMBER	DESCRIPTION
1	HW-30018-6	Wire, 18 AWG, Blue	g)	B-10657-R	Flipper Crank Assy, R.
2	03-7520-2	Ty-Wrap, Nylon	1.)	01-8073-R	Flipper Crank, Right
3	20-6516	Speednut, Tinnerman	2.)	17-1037	Crank Washer
4	5045-12098-00	Capacitor, 2.2 μ Fd, 250V	3.)	4010-01066-18	Cap Screw, 10-32 x 1-1/8, HCS
5	RM-21-06	Sleeve, Vinyl (Cap. leads)	4.)	4410-01127-00	Nut, 10-32 Hex Hd.
6	4010-01066-06	Cap Screw, 10-32 x 3/8, SH	5.)	4700-00107-00	Washer, 5/8 o.d. x 13/64 i. d. x 12 ga.
7	4701-00004-00	Lockwasher, #10 split	6.)	4701-00004-00	Lockwasher, #10 split
8	A-12111	Flipper Stop Assembly	7.)	RM-23-06	Tubing, H. S. 1/4 DWP
9	FL-11630	Flipper Coil (Red), (* - Refer to Note 3)	14	23-6577	Bumper Plug
10	4006-01017-04	MS, 6-32 x 1/4, P-RH-S	15	03-7568	Flipper Bushing
11	01-7695	Solenoid Bracket	16	4006-01005-06	MS, 6-32 x 3/8, P-PH
12	10-376	Coil Plunger Spring	17	4406-01117-00	Nut, 6-32 Hex
13	B-10655-R	Crank Link Assy, Right	18	C-11627-R	Flipper Base Assy, R.
a)	02-4179	Link Spacer Bushing	19	06-14G	Insulating Blade
b)	4010-01086-14	CS, 10-32 x 7/8, SH	20	4105-01019-10	Sh. Metal Screw, #5 x 5/8
c)	4700-00023-00	Washer, 5/8 o.d. x 13/64 i. d. x 16 ga.	21	4701-00002-00	Lockwasher, #6 split
d)	4701-00004-00	Lockwasher, #10 split	22	23-6622	Tape, Double-sided
e)	4410-01132-00	Nut, 10-32 ESNA	23	03-7811	End of Stroke (EOS) Sw
f)	A-10656**	Flipper Link Assembly			
1.)	02-4219	Coil Plunger			
2.)	20-9370-1	Spring Pin, 5/32 dia. x 7/16			
3.)	03-8050-1	Flipper Link			

** - Also see separate diagram

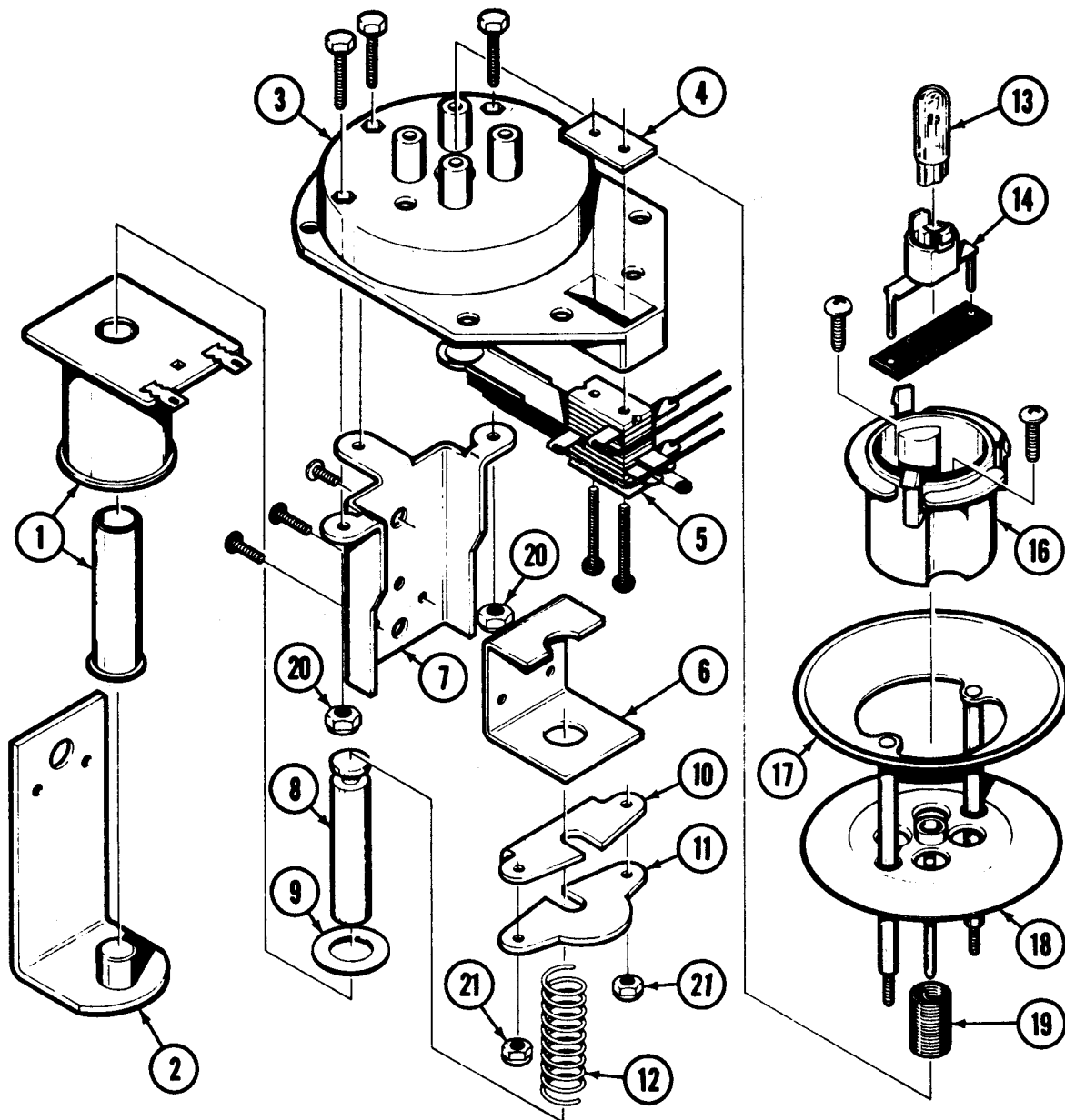
Lower Left Flipper Parts List C-11626-L-3

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

ITEM	PART NUMBER	DESCRIPTION
13	B-10655-L	Crank Link Assembly, Left
g)	B-10657-L	Flipper Crank Assembly, Left
1.)	01-8073-L	Flipper Crank, Left
18	C-11627-L	Flipper Base Assy, Left

Thumper Bumper Assembly

A365-05100-0002

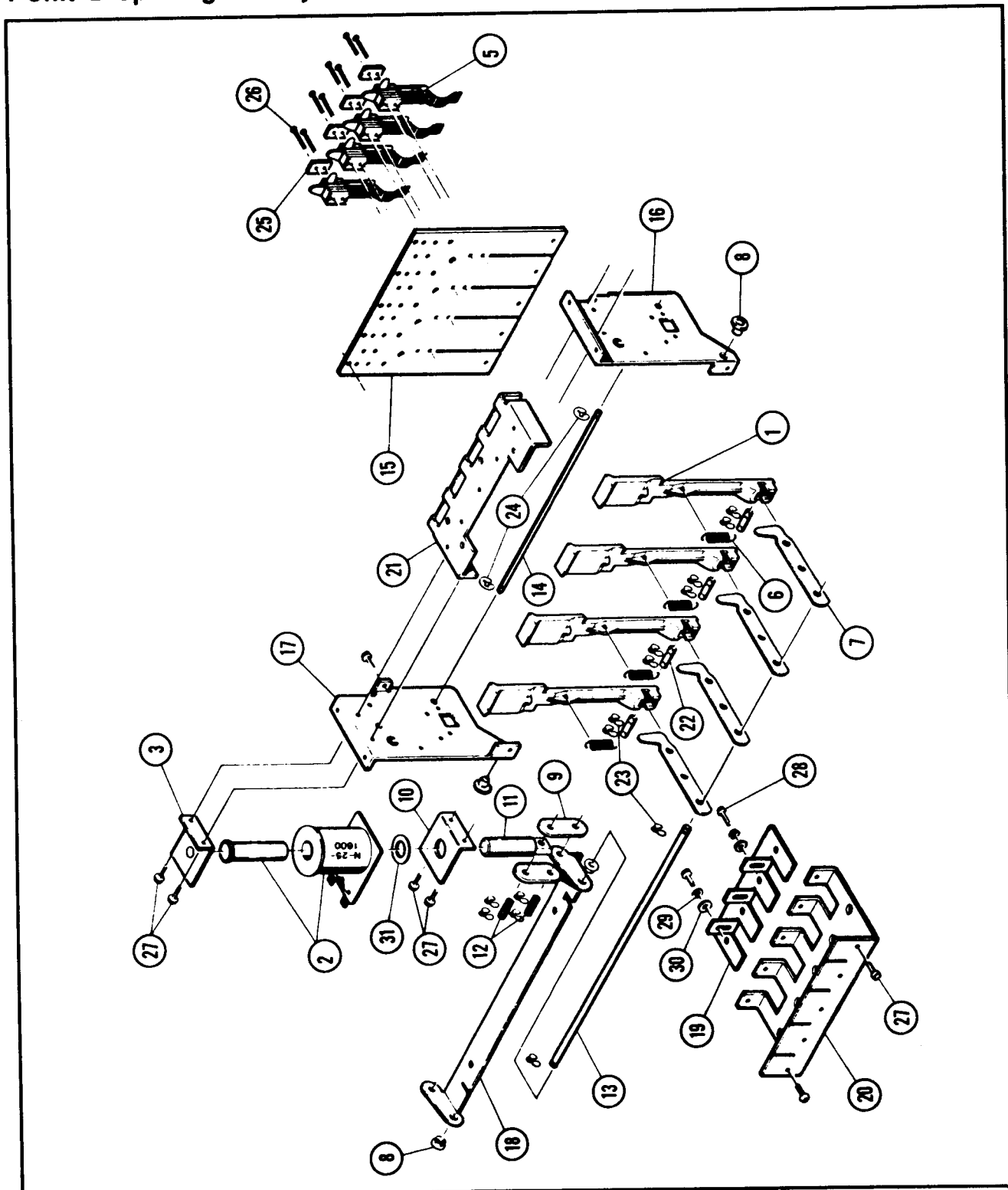


Thumper Bumper Assembly Parts List
A365-05100-0002

ITEM	DESCRIPTION	PART NUMBER
1	Coil & Tubing Assy	A360-00044-0000
	Diode: 1N4004GP, 1.0A	5070-09054-00
2	Core Plug Assy	A365-07000-0004
3	Base: Thumper Bumper	0017-00042-0452
4	Switch Plate	0020-00202-0000
5	Make Switch Plate	A967-00074-0100
6	Bracket	01-9116
7	Mounting Bracket	01-9117
8	Plunger	02-3406-1
9	Spring Washer:	0017-00104-0073
	.515i.d.,.875o.d.,.013th.	
10	Plate	0365-02950-0004
11	Plate	0365-04700-0010
12	Compression Spring	0010-00274-0177
13	Lamp, #555: Wedge Base	0017-00003-0501
14	Socket: Lamp	0017-00031-0060
15	Plate	0365-04700-0009
16	Body: White	0017-00042-0460
17	Flange & Stud Assy	A-4754
18	Wafer: White	0017-00042-0444
19	Compression Spring	10-326
20	Nut: #8-32 Locking	0017-00103-0041
21	Nut: #6-32 Locking	0017-00103-0052

4-Unit Drop Target Assy.

D-12635

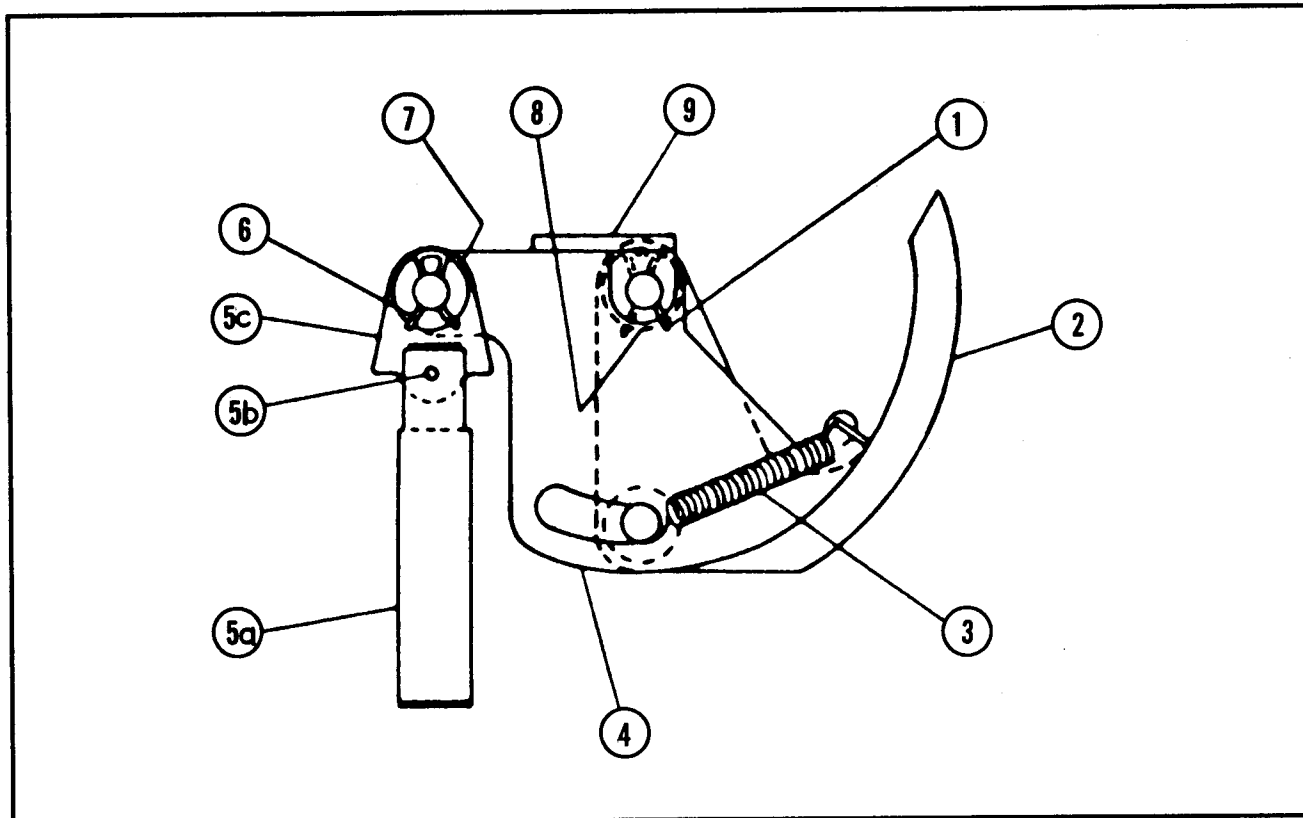


Drop Target Assembly Parts List
D-12635

ITEM	DESCRIPTION	PART NUMBER
1	Target & Link Assy	A365-05500-0002
2	Coil & Tubing Assy	AB42-00045-0000
	Coil: 2 Lug	A365-00067-0019
	Diode: 1N4004GP, 1.0A	5070-09054-00
	Tubing: 2" x 3/4" Flange	0017-00041-0673
3	Core Plug & Bracket Assy	A360-00014-0000
4	Not Used	
5	Switch w/ Diode Assy	A-12644
6	Extension Spring	0010-00275-0363
7	Drop Target Link	0360-00117-00XF
8	Nyliner: Snap-in Coil	0017-00042-0429
9	Link	0360-00118-0000
10	Coil Bracket	0360-00122-00XF
11	Plunger	0360-00717-00XF
12	Link Pin	0360-00721-00XF
13	Pivot Shaft	0365-02060-0004
14	Spring Rod	0365-02055-0004
15	Back Plate	0365-02035-0004
16	End Plate	0371-00124-00XF
17	End Plate	0371-00125-00XF
18	Reset Bar	0365-02010-0004
19	Adjustable Bottom Plate	0365-02020-0004
20	Stationary Bottom Plate	0365-02015-0004
21	Latch Plate	0365-02040-0004
22	Pivot Pin	0360-00720-00XF
23	Clip Ring ,.250" dia	0017-00100-0117
24	Retaining Ring ,.125" dia	0017-00100-0118
25	Switch Plate	0020-00202-0000
26	MS #5-40x3/4 P-PH	0017-00101-0172
27	MS #8-32x3/8 HHS	0017-00101-0184
28	MS #8-32x1/2 P-PH	0017-00101-0202
29	Split Lock Washer #8	0017-00104-0003
30	Flat Washer #8	0017-00104-0062
31	Spring Washer:	0017-00104-0063
	1.0o.d., .645i.d., .012th.	

Saucer Kicker Assembly

B-9361-R-6



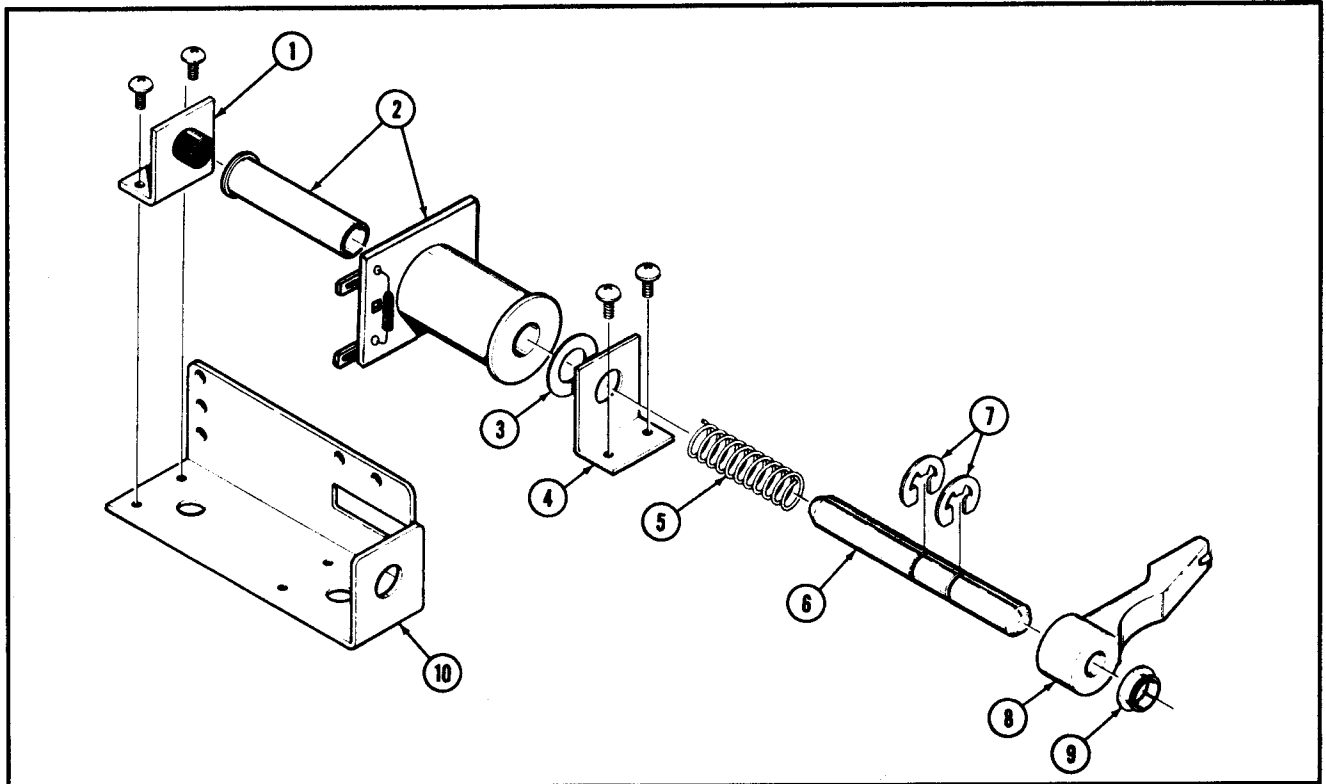
ITEM	DESCRIPTION	PART NUMBER
1	Hair Pin Clip	12-6227
2	Eject Cam Assy	A-7471-R
3	Spring-Eject	10-320
4	Spring Plate Assy	A-6949-R
5	Plunger Assy	A-8050
a)	Coil Plunger	02-3407-2
b)	Roll Pin	20-8716-5
c)	Armature Link	03-8085
6	Hair Pin Clip	12-6227
7	Washer, 1/2 o.d. x 17/64 i.d. x 15 ga.	4700-00030-00
8	Washer, 1/2 o.d. x 17/64 i.d. x 28 ga.	4700-00103-00
9	Mounting Brkt Assy	A-6950-R

SAUCER COIL & BRACKET ASSEMBLY

Coil & Bracket Assy	B-12604
Brkt & Stop Assy	B-7572-1
Coil Retaining Brst	01-8-508-S
Mach. Screw, 6-32 x 3/8	4006-01017-06
Nut, 6-32 ESN	4406-01119-00
Coil Assembly	A365-00067-0007
Coil Tubing	03-7066

Slingshot Kicker Assembly

A365-05210-0001



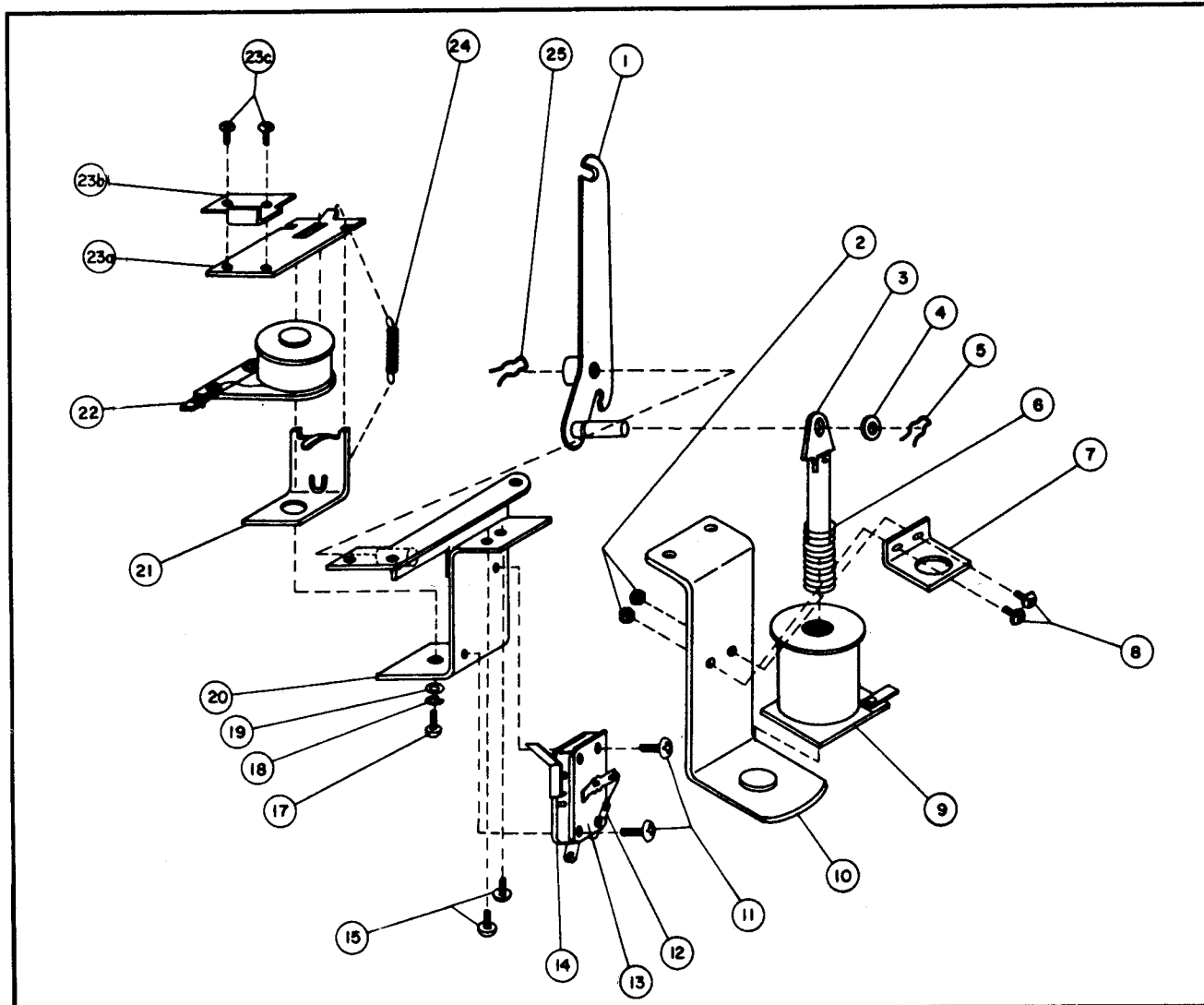
ITEM	DESCRIPTION	PART NUMBER
1	Core Plug & Brkt Assy	A967-00011-0000
2	Coil & Tubing Assy: 2 Lug	A365-08700-0003
	Coil: 2 Lug	A365-00067-0029
	Diode: 1N4004GP, 1.0A	5070-09054-00
	Coil Tubing: L=1.686x5/8"	0017-00041-0605
3	Spring Washer:	0017-00104-0073
	.515 i.d., .875 o.d., .013th	
4	Coil Bracket	0360-00318-00XF
5	Compression Spring	0010-00274-0212
6	Plunger	0967-00701-0000
7	Retaining Ring: .438"	0017-00100-0115
8	Slingshot Kicker Arm	0967-00901-0000
9	Nyliner: Snap-in Coil	20-8790-5
10	Slingshot Mounting Brkt	0967-00130-00XF
11	MS #8-32x1/4", P-PH	0017-00101-0161

ATLANTIS

Parts Information

Ramp Lifting Mechanism w/ Coll & Bracket Assembly

B-12576
B-11494-1

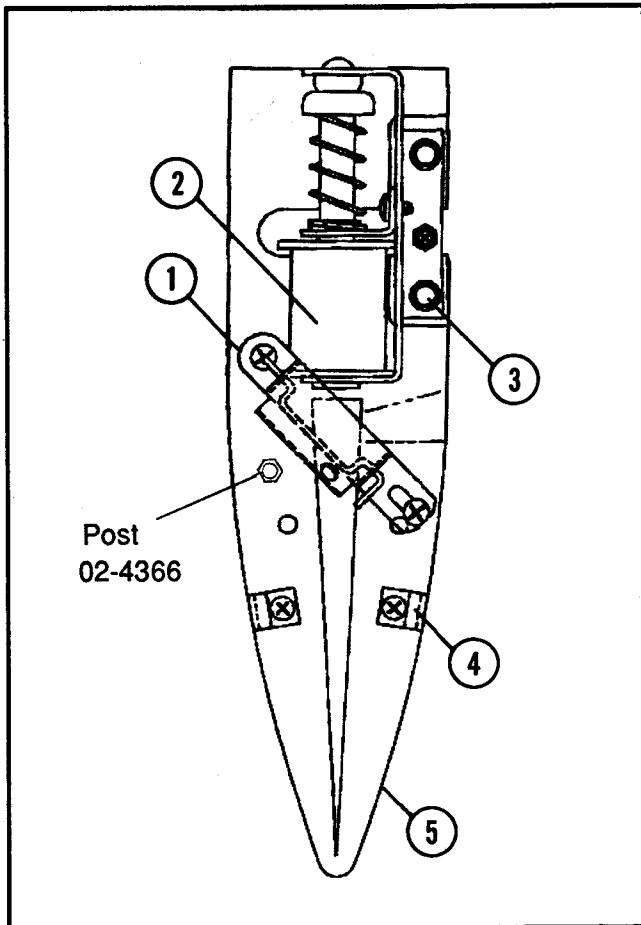


ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
1	Lift Crank Assy	A-12577	15	MS 4-40	4004-01003-05
2*	Nut, 6-32 ESN	4406-01119-00	16	Not Used	
3	Plunger Assy	A-8050	17	MS 8-32x7/16	4008-01021-07
4	Washer, .281 i.d. x x.500 o.d.	4700-00073-00	18	Lockwasher, #8 Split	4701-00003-00
5	Retaining Clip	12-6227	19	Washer, .172 i.d. x 7/16 o.d.	4700-00089-00
6	Spring	10-363	20	Lift Mech Brkt Assy	B-11302
7*	Coil Retaining Brkt	01-8-508-S	21	Frame & Eyelet	A-6892
8*	MS 6-32x3/8	4006-01017-06	22	Coil Assy	SM-28-900-DC
9*	Coil Assy	A365-00067-0006	23	Armature Assy	A-11139
10*	Brkt & Stop Assy	B-11493	a)	Armature Subassy	A-8936
11	MS 4-40x5/8	4004-01003-10	b)	L Crank Lock	01-8390
12	Diode, 1N4001, 1.0A	5070-06258-00	c)	MS 6-32x3/16	4006-01003-03
13	Terminal Strip	01-5519-1	24	Extension Spring	10-363
14	Microswitch	5647-12001-00	25	Retaining Clip	12-6227

*part of B-11494-1

Sub. Platform Assy

C-12571



ITEM	DESCRIPTION	PART NUMBER
1	Ball Gate Assy	A-12254
2	Knocker/Sub Assy	B-12647
	Coil & Tubing Assy	A360-00046-0000
	Coil: A-26-1200	A365-00067-0006
	Tubing: L=1.844	0017-00041-0611
	Plunger/Striker Assy	A360-00011-00XF
	Coil Bracket	0360-00318-00XF
	Coil Frame	01-9106
	Compression Spring	0010-00274-0212
	Pin Guide Assy	A-12625
	Mach Screw, 6-32x3/8	4006-01003-06
	P-PH-S	
3	SMS, #6-7/16	4106-01115-07
	PLHWH-A	
4	Clip Hold Down Brkt	01-9150
5	Wood Platform	11-897

Not Shown:

Sub Eject Cable	H-12596
Spacer- 1"	03-6047-15
Spacer- 1-1/16"	03-6047-16
Hold-up Brackets	01-9172

Plastic Ramp Assembly

D-12620

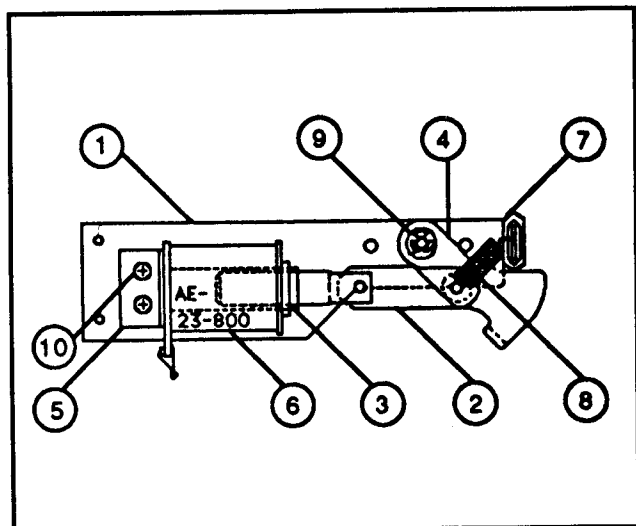
DESCRIPTION	PART NUMBER
Sub Waiting Cable	H-12595
Nut Plate #2-56	01-8240
Switch Bracket	01-8774
Plastic Ramp	03-8234
MS #2-56x3/8, P-PH	4002-01005-06
LW #2 Split	4701-00024-00

ATLANTIS

Parts Information

Outhole Kicker

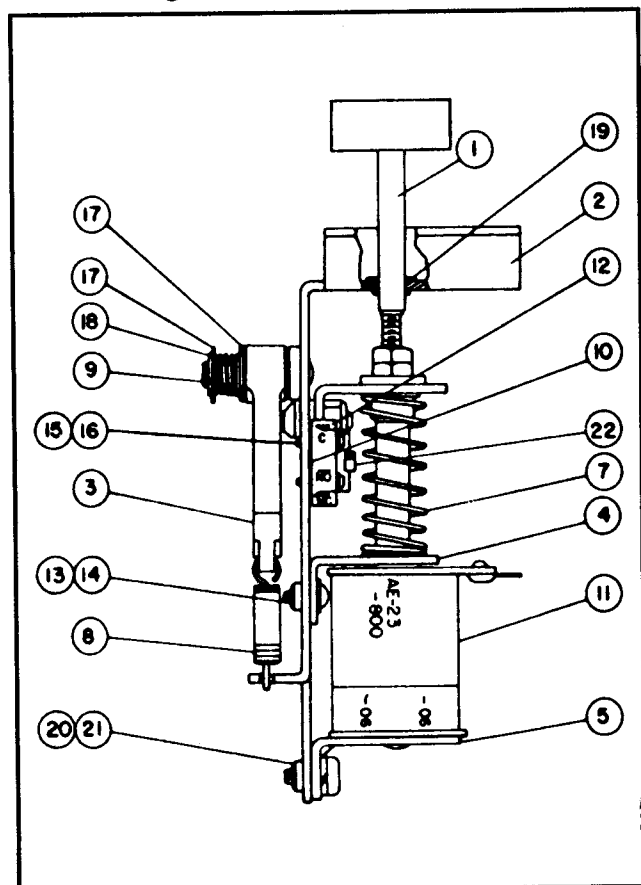
B-12669



ITEM	DESCRIPTION	PART NUMBER
1	Mounting Plate Assy	A-6378
2	Coil Plunger Assy	A-8335
a)	Coil Plunger	02-2364
b)	Roll Pin, 1/8x7/16	20-8716-5
c)	Ball Return Link	01-4251
3	Coil Tubing	03-7066
4	Kicker Level Assy	A-6889
5	Coil Stop Assy	A-8038
6	Coil Assy	A365-00067-0007
7	Striker Ring	03-7176-1
8	Reset Spring	10-101-4
9	E-Ring, 1/4" Shaft	20-8712-25
10	Mach Screw, 6-32 x 3/16	4006-01003-03

Drain Plug Assembly

C-12605



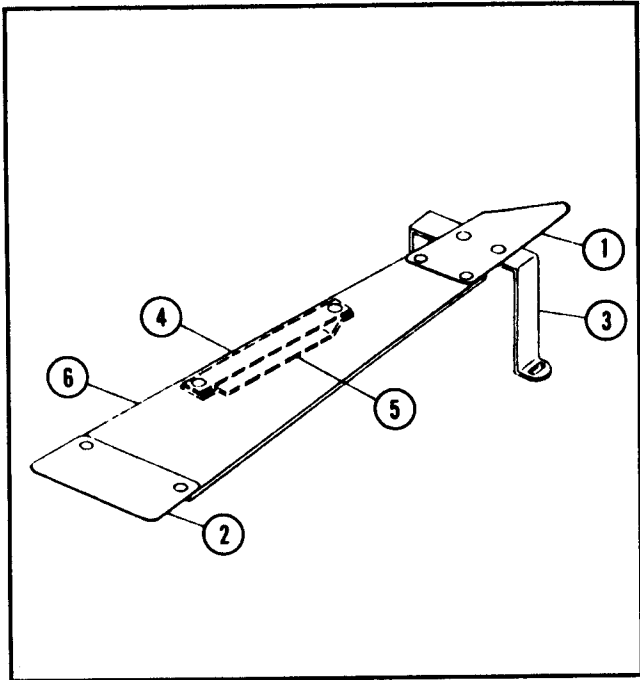
ITEM	DESCRIPTION	PART NUMBER
1	Plunger Assy	B-11662
2	Main Frame Assy	B-11660
3	Flat Cam	03-8090
4	Coil Support Bracket	01-8639
5	Flipper Stop Brkt Assy	A-10821
6	Not Used	
7	Compression Spring	10-399
8	Extension Spring	10-401
9	Compression Spring	10-392
10	Insulator	01-8600
11	Coil Assy	A365-00067-0007
12	MicroSw. w/ roller	5647-12073-06
13	Mach. Screw, 6-32 x 3/8	4006-01027-06
14	Nut, 6-32 ESNA	4406-01119-00
15	Lockwasher, #2	4701-00024-00
16	Mach. Screw, 2-56 x 3/8	4002-01005-06
17	Flat Washer, #12	4700-00103-00
18	E-Ring Retainer Clip	20-8712-25
19	Ny-lined Bearing	20-8790-7
20	Mach. Screw, #10-32 x 1/2	4010-01008-06
21	Nut, 10-32 ESNA	4410-01132-00
22	Diode, 1N4001, 1.0A	5070-06258-00

ATLANTIS

Parts Information

Lift Ramp Assembly

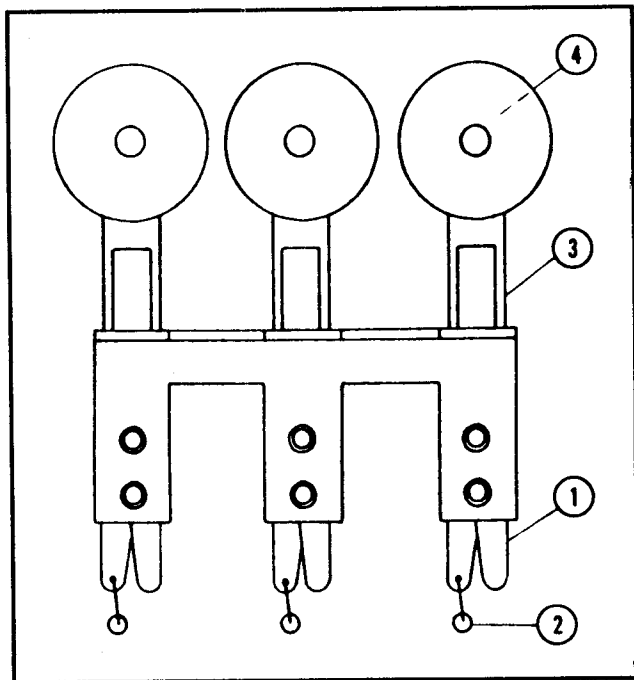
C-12569



ITEM	DESCRIPTION	PART NUMBER
1	Flap & Mylar Assy	B-12570
2	Lift Ramp Step	01-9025
3	Mounting Leg	01-9026
4	Ramp Protector	01-9085
5	Lifter, Pin Guide	01-9108
6	Lift Ramp	03-8240

Standup Targets (Right)
Standup Targets (Left)

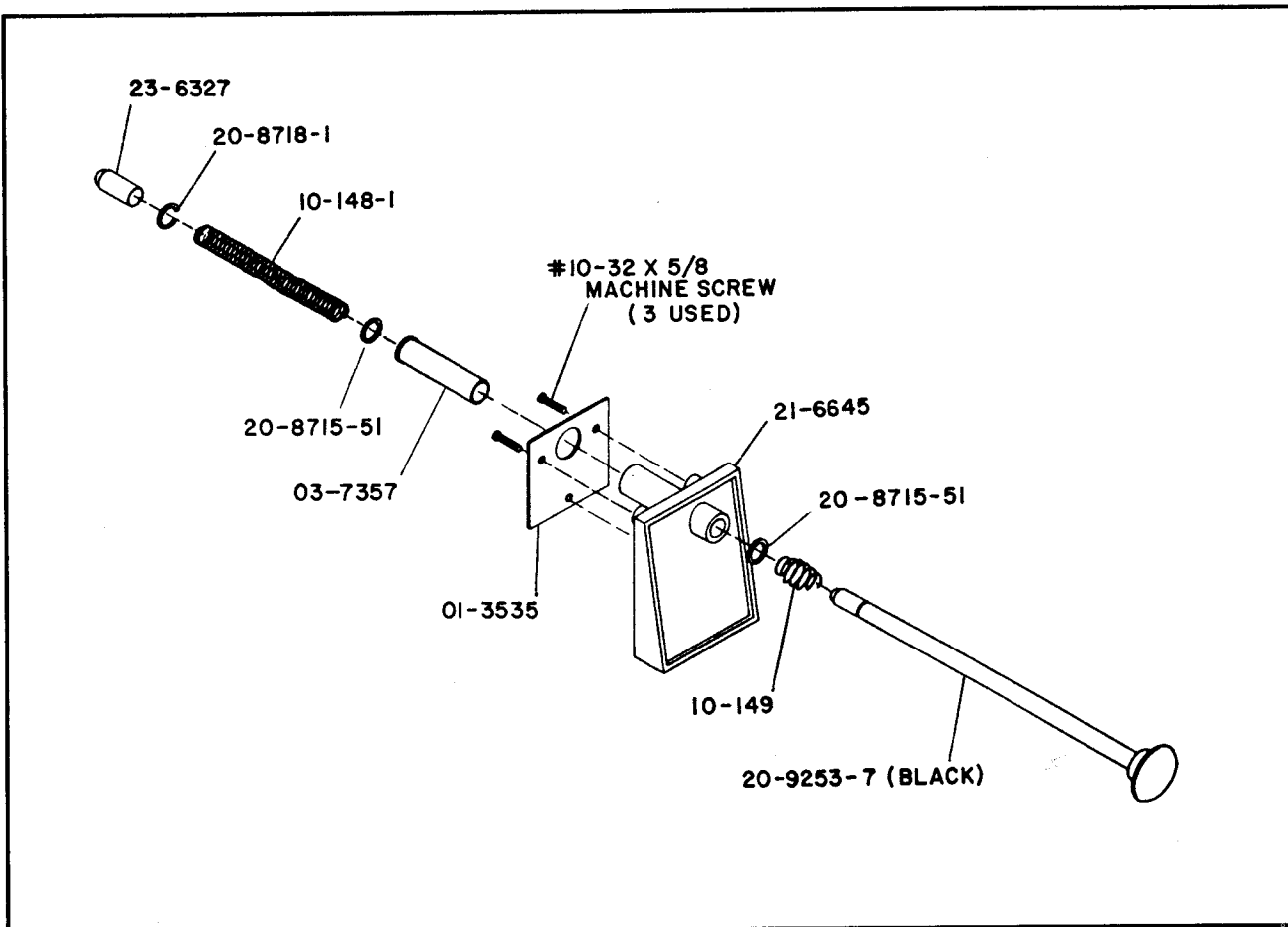
B-12611
B-12612



ITEM	DESCRIPTION	PART NUMBER
1	Target(Orange) Sw	SW-1A-170-15
	Target(White) Sw	SW-1A-170-5
	Target(Yellow) Sw	SW-1A-170-6
2	Dio,1N4001, 1.0A	5070-06258-00
3	Target Bracket	0365-02850-0013
4	Edge Protect, 3/8" L	23-6534-9

Ball Shooter Assembly

B-12445-1



Miscellaneous Parts Information

Internal Parts

DESCRIPTION	PART NUMBER
Ball: Steel, 1-1/16"	0017-00009-0709
Lever Guide Assy	D-9174-1
Cash Box Nest	01-6389-1
Speaker, 4Ohm 6" RD10W	5555-12015-00
Power Transformer	5610-12393-00
Screened Playfield	31-1008-2006
Screened Bottom Arch	31-8063-4
Light Bulb Sleeve, Red	03-8063-4
Playfield Mylar	03-7960-2006
Playfield Mylar	03-7960-2006-1
Playfield Myar	03-7960-2006-2

External Parts

DESCRIPTION	PART NUMBER
Leg Adjuster, 3.0"	08-7377
Metal Leg	01-2263-3
Side Molding Assy	A-12359-1
Backglass Assy	A-8552-2006
Glass Edge Channel	03-8228-1
Glass Lift Channel	03-8229-1
B/box Glass, 27 x 23-1/2"	08-7463
Playfield Glass, 21 x 43"	08-7028-T
Screened Backglass	31-1357-2006
Key, Long Arm	0017-00009-0522
Red Button	B-12273-9
Speaker Grille	01-6733
Backbox Hinge	20-8518
Glass Protector	23-6534
Front Molding Assy	D-12615

ATLANTIS

Parts Information

Lamp Tables

PHASE B AND D LAMP TABLE

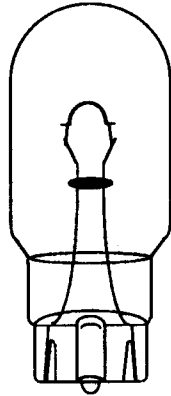
CJ10-1 BACKBOX RELAY RED/BLU 46	CJ10-18 L TARGET ORANGE GRN/YEL 54	CJ10-10 TARGET, MD. ORANGE BLU/BLK 62	CJ11-13 JACKPOT, 5 MILLION ORG/YEL 70	CJ11-1 BRIGHT, R HOLD BONUS GRN/BLK 78	CJ13-12 DRUM PLUG GRY/BRN 86
CJ10-7 RELAY RED G8 BLU/GRN 47	CJ10-4 L TARGET, WHITE RED/WHT 55	CJ10-13 TARGET MD. WHITE YEL/BRN 63	CJ11-10 JACKPOT, 1 MILLION BRN/BLK 71	CJ13-1 BRIGHT JACKPOT BLK/RED 79	CJ13-10 GRY/GRN 87
CJ10-16 RELAY, WHITE G8 YEL/BLK 48	CJ10-11 L TARGET, YELLOW YEL/RED 56	CJ11-8 TARGET, MD. YELLOW BRN/GRN 64	CJ11-3 JACKPOT, 15 MILLION WHT/GRY 72	CJ13-8 BRIGHT, R TARGETS GRY/YEL 80	CJ13-4 BLK/WHT 88
CJ10-2 RED/YEL 49	CJ10-19 R TARGET, ORANGE GRN/WHT 57	CJ11-16 DT VALUE LIGHTS LANE 65	CJ11-14 JACKPOT, 2 MILLION ORG/BLK 73	CJ13-6 BRIGHT SAUCER BLK/ORG 81	CJ13-11 GRY/WHT 89
CJ10-8 DT RESET TIMER BLU/WHT 50	CJ10-5 R TARGET, WHITE RED/WHT 58	CJ11-6 DT VALUE LIGHTS XPLER 66	CJ11-9 JACKPOT, 25 MILLION BRN/ORG 74	CJ13-2 BBOX BRIGHT #2 BLK/YEL 82	CJ13-7 GRY/RED 90
CJ10-17 LOCK ARROW ORANGE GRN/RED 51	CJ10-12 R TARGET, YELLOW YEL/BLU 59	CJ11-12 DT VALUE LIGHTS HOLD BON 67	CJ11-2 JACKPOT, 3 MILLION WHT/BLK 75	CJ13-13 BRIGHT, LANE A GRY/ORG 83	
CJ10-3 LOCK ARROW WHITE RED/GRN 52	CJ10-14 NEXT 48 LIGHTS X-BALL YEL/ORG 60	CJ11-11 DT VALUE LIGHTS X-BALL 68	CJ11-15 JACKPOT, 35 MILLION ORG/WHT 76	CJ13-5 BBOX BRIGHT #4 BLK/BRN 84	
CJ10-9 LOCK ARROW, YELLOW BLU/BRN 53	CJ10-6 BLU/RED 61	CJ11-4 DT VALUE LIGHTS MILLION 69	CJ11-3 JACKPOT, 4 MILLION BRN/YEL 77	CJ13-3 BRIGHT, LANE B BLK/GRN 85	

PHASE A AND C LAMP TABLE

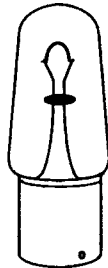
CJ10-1 BACKBOX RELAY RED/BLU 1	CJ10-18 BONUS 2K GRN/YEL 9	CJ10-10 BONUS 50K BLU/BLK 17	CJ11-13 POPPER 50K ORG/YEL 25	CJ11-1 BRIGHT, L TARGETS GRN/BLK 33	CJ13-12 R HOLD BONUS GRY/BRN 41
CJ10-7 RELAY RED G8 BLU/GRN 2	CJ10-4 BONUS 4K RED/WHT 10	CJ10-13 HOLD BONUS YEL/BRN 18	CJ11-10 POPPER 75K BRN/BLK 26	CJ13-1 BRIGHT, DT TIMER BLK/RED 34	CJ13-10 RETURN LANES GRY/GRN 42
CJ10-16 RELAY WHITE G8 YEL/BLK 3	CJ10-11 BONUS 6K YEL/RED 11	CJ11-8 SAUCER 2X BRN/GRN 19	CJ11-3 POPPER 100K WHT/GRY 27	CJ13-8 BBOX BRIGHT #6 GRY/YEL 35	CJ13-4 SPINNER 1000 BLK/WHT 43
CJ10-2 TOP LANE "A" RED/YEL 4	CJ10-19 BONUS 8K GRN/WHT 12	CJ11-16 SAUCER 3X ORG/BLK 20	CJ11-14 POPPER 125K ORG/BLK 28	CJ13-6 BBOX BRIGHT #1 BLK/ORG 36	CJ13-11 SPOT SEQC ARROW GRY/WHT 44
CJ10-8 TOP LANE "B" BLU/WHT 5	CJ10-5 BONUS 10K RED/WHT 13	CJ11-6 SAUCER 5X BRN/BLU 21	CJ11-9 POPPER 150K BRN/ORG 29	CJ13-2 BRIGHT, L HOLD BONUS BLK/YEL 37	CJ13-7 HOLD BONUS GRY/RED 45
CJ10-17 JACKPOT ARROW GRN/RED 6	CJ10-12 BONUS 20K YEL/BLU 14	CJ11-12 XPLER 2X ORG/BLU 22	CJ11-2 POPPER XBALL WHT/BLK 30	CJ13-13 BBOX BRIGHT #3 GRY/ORG 38	
CJ10-3 MILLION ARROW RED/GRN 7	CJ10-14 BONUS 30K YEL/ORG 15	CJ11-11 XPLER 3X ORG/RED 23	CJ11-15 OUTLANE LEFT ORG/WHT 31	CJ13-5 BRIGHT POPPER BLK/BRN 39	
CJ10-9 SPSA BLU/BRN 8	CJ10-6 BONUS 40K BLU/RED 16	CJ11-4 XPLER 5X BRN/RED 24	CJ11-3 OUTLANE, RIGHT BRN/YEL 32	CJ13-3 BBOX BRIGHT #5 BLK/GRN 40	

ATLANTIS Parts Information

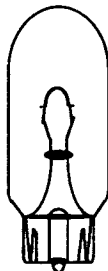
Playfield Lamp Location Drawing



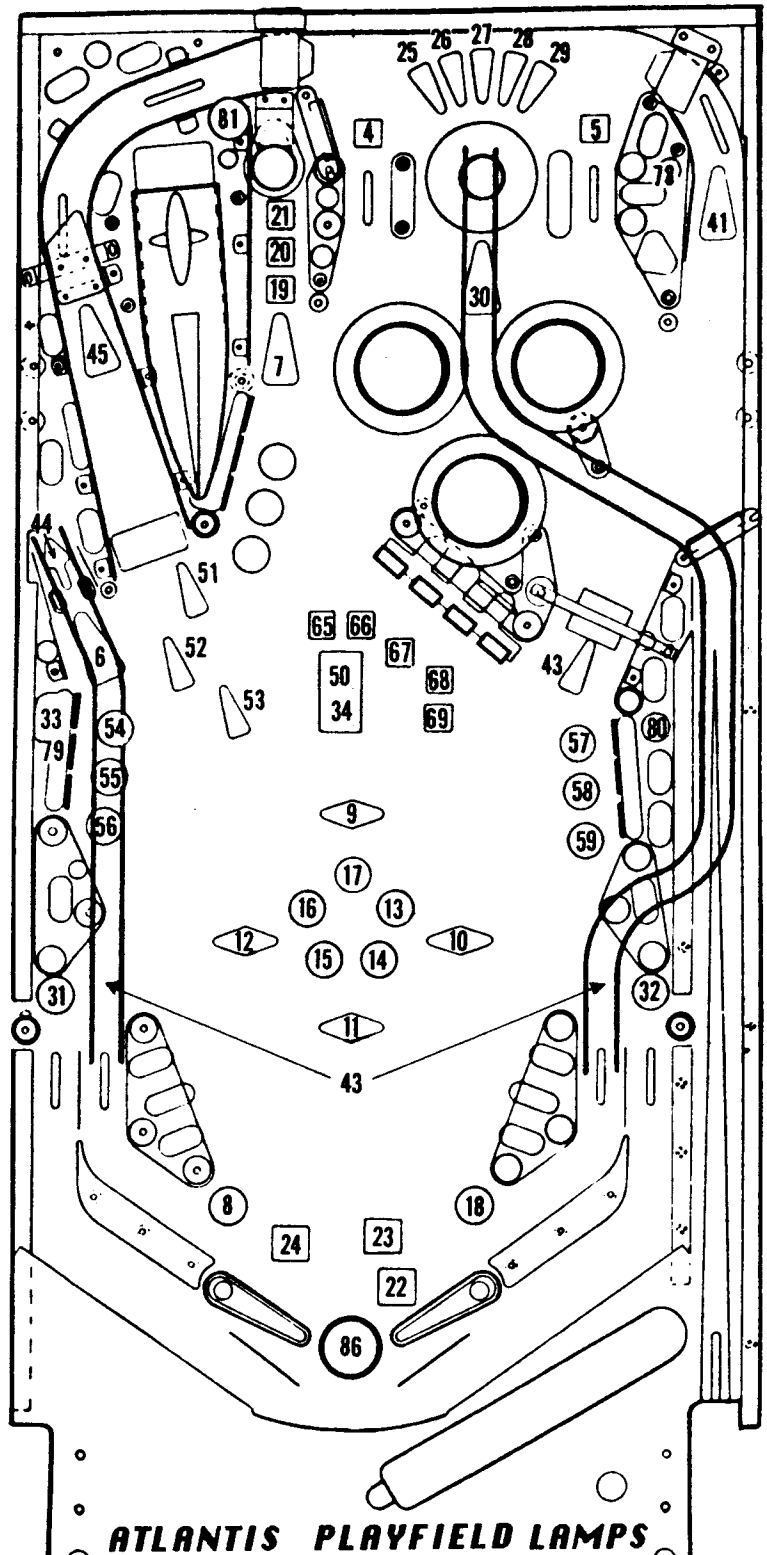
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BULB GE-44 p/n 24-6549



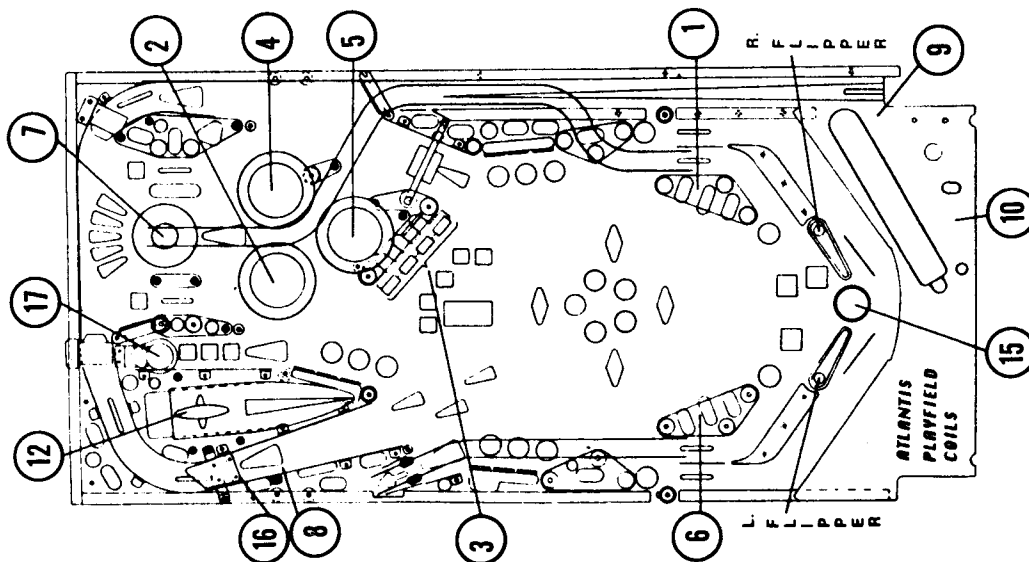
BULB #555 p/n 24-8768



ATLANTIS PLAYFIELD LAMPS

Coil Table and Location Drawing

SOL NO.	SOLENOID DESCRIPTION	SOL. TYPE	WIRE COLOR	CONNECTIONS CONTROL BOARD	DRIVER TRANSISTOR	SOLENOID PART NUMBER
01	Right Slingshot	Momentary	White-Red	CJ9-1	Q18	A365-00067-0029
02	Left Bumper	Momentary	Yellow-White	CJ6-4	Q14	A365-00067-0006
03	Drop Target Reset	Momentary	Yellow-Blue	CJ6-2	Q12	A365-00067-0019
04	Right Bumper	Momentary	Blue-White	CJ8-6	Q15	A365-00067-0006
05	Middle Bumper	Momentary	Blue-Orange	CJ8-7	Q16	A365-00067-0006
06	Left Slingshot	Momentary	Yellow-Brown	CJ6-5	Q17	A365-00067-0029
07	Popper Kicker	Momentary	Yellow-Red	CJ6-1	Q11	A365-00067-0029
08	Ramp Lift	Momentary	Yellow-Green	CJ6--3	Q13	A365-00067-0006
09	Ball Eject	Momentary	White-Brown	CJ9-6	Q22	A365-00067-0006
10	Outhole	Momentary	White-Black	CJ9-8	Q39	A365-00067-0006
11	Knocker	Momentary	White-Gray	CJ9-11	Q40	A365-00067-0006
12	Submarine Eject	Momentary	Yellow-Violet	CJ6-7	Q10	A365-00067-0006
13	Not Used	Continuous	Blue-Green	CJ9-10	Q8	--
14	Flipper Enabling Relay	Continuous	--	--	Q7	114E-00001-0011
15	Drain Plug	Momentary	White-Blue	CJ9-2	Q19	A365-00067-0006
16	Ramp Down	Momentary	White-Yellow	CJ9-3	Q20	SM-28-900-DC
17	Saucer	Momentary	White-Green	CJ9-4	Q21	A365-00067-0006
18	Reserved for German	Momentary	White-Orange	CJ9-7	Q38	--
19	Not Used	Continuous	White-Violet	CJ9-9	Q9	--
			WIRE COLORS & CONNECTORS			
FLIPPER DESCRIPTION						
20	Left Flipper	Gray: CJ6-8				
21	Right Flipper	Gray-White: CJ6-9				
			FL-11630			
			FL-11630			



NOTES:

- For continuous solenoid 19, install jumper JW8. Remove jumper JW9.
- To use switch strobe at CJ4-1, install jumper JW9. Remove jumper JW8.
- To use extra display at CJ2-19, install jumper JW11. Remove jumper JW10.
- "Knocker" is located in the backbox.

COIL CHARACTERISTICS TABLE

Sol. No.	Solenoid Description	Nominal Coil Resistance	Bobbin Type, Wire Gauge	No. of Turns	No. of Lugs, Diodes	Solenoid Label Number
01	Right Slingshot	8.1 Ω	A,25	1,050	2,1	A25-1050
02	Bumper Left	10.2 Ω	A,26	1,200	2,1	A26-1200
03	Drop Target Reset	15.5 Ω	N,25	1,600	2,1	N25-1600
04	Right Bumper	10.2 Ω	A,26	1,200	2,1	A26-1200
05	Middle Bumper	10.2 Ω	A,26	1,200	2,1	A26-1200
06	Left Slingshot	8.1 Ω	A,25	1,050	2,1	A25-1050
07	Popper Kicker	8.1 Ω	A,25	1,050	2,1	A25-1050
08	Ramp Lift	10.2 Ω	A,26	1,200	2,1	A26-1200
09	Ball Eject	10.2 Ω	A,26	1,200	2,1	A26-1200
10	Outhole	10.2 Ω	A,26	1,200	2,1	A26-1200
11	Knocker	10.2 Ω	A,26	1,200	2,1	A26-1200
12	Submarine Eject	10.2 Ω	A,26	1,200	2,1	A26-1200
13	Not Used	--	--	--	--	--
14	Flipper Enab. Relay	-	-	-	-	-
15	Drain Plug	10.2 Ω	A,26	1,200	2,1	A26-1200
16	Ramp Down	10.8 Ω	M,28	900	2,1	SM-28-900-D.C.
17	Saucer	10.2 Ω	A,26	1,200	2,1	A26-1200
18	Reserved	-	-	-	-	-
19	Not Used	-	-	-	-	-
-	Left Flipper	4.5, 161 Ω	FL,24,31	874,4000	3,2	FL-11630
-	Right Flipper	4.5, 161 Ω	FL,24,31	874,4000	3,2	FL-11630

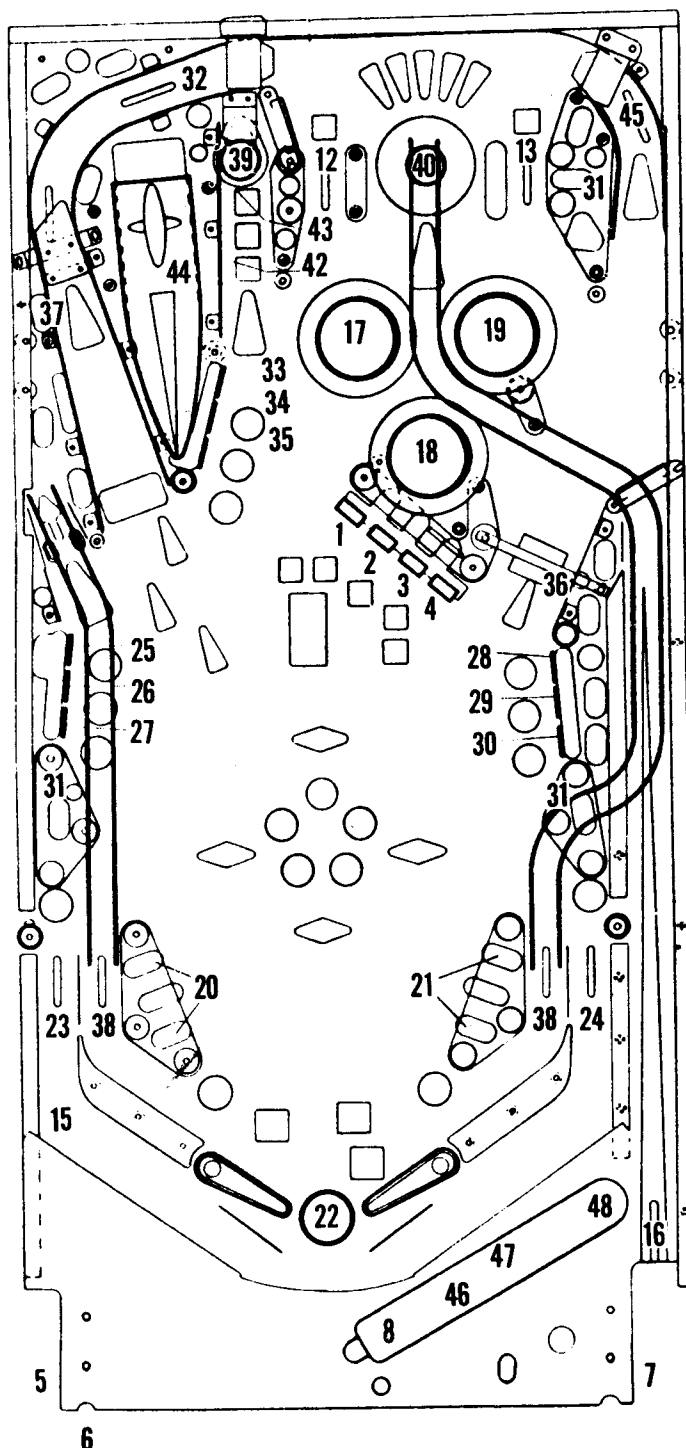
NOTES:

- For coil wire colors and coil part numbers, see the Coil Table.
- Although coil drivers switch it, the Submarine Motor Relay has no coils.
- The Flipper-Enabling Relay is located on the CPU Board. It provides ground to the flippers.

ATLANTIS

Parts Information

Playfield Switches Parts List and Location Drawing



SWITCH PART LIST

ITEM	DESCRIPTION	PART NUMBER
1,2,3,4	Drop Target #1,#2,#3,#4	A-12644
5	Left (Flipper) Cabinet Sw	B-9989
6	Credit Sw	B-8536
7	Rt. (Flipper) Cabinet Sw	B-9989
8	Outhole Sw.	A-10417
9,10,11	Coins Right	p/o 09-17002B-1
12	Top Lane "A"	A-12245
13	Top Lane "B"	A-12245
14	Slam Tilt Sw	p/o 09-17002-B
15	Tilt Sw	B-8306
16	Shooter Lane Sw	A-11619-1
17,18,19	Thumper Bumper Sw	A967-00074-0100
20,21	Slingshot Sw Assy	
	a) Score Switch	A-4834-H
	b) Kicker Count Switch	B08734-1
22	Drain Plug	p/o C-12605
23,24	Outlane Sw	A-12245
25,26,27	Left Standup Targets: Orange, White, Yellow	B-12612
28,29,30	Right Standup Targets	B-12611
31	Rebounders	A-4834-K
32	Turn Around Loop	A-12245
33,34,35	Middle Standup Targets	B-12612
36	Spinner	A-12010
37	Ramp Sensor	SW-1A-180
38	Return Lanes	A-12245
39	Saucer	A-9381-R
40	Popper Dish	A-11657
41	Not Used	
42	Sub Ball Lower	A-12556
43	Sub Ball Upper	A-12556
44	Ball in Sub	A-12736
45	Hold Bonus	A-12445
	Trough Sw Assy	B-8925
	Right Trough	A-11680

CHAPTER 6: ELECTRONIC DRAWINGS

Backbox Wiring

Control Board A080-91786-G000 Assembly Drawing

Control Board A080-91786-G000 Logic Diagram

Display Board B084-91851-H000 Assembly Drawing

Display Board B084-91851-H000 Logic Diagram

Power Supply A080-91785-D000 Assembly Drawing

Power Supply A080-91785-D000 Schematic Diagram

Flipper Power Supply C-9939-554 Assembly Drawing

Playfield Wiring Diagram

Sound Board D-11581-2001 Assembly Drawing

Sound Board D-11581-2001 Logic Diagram

Sound Interface Board C-12417 Assembly Drawing

Sound Interface Board C-12417 Logic Diagram

Bright-Lights Fuse Board A080-91901-B000 Assembly
Diagram

Bright-Lights Fuse Board A080-91901-B000 Schematic

Cabinet Wiring

Playfield Coil Location Drawing

Coil Wiring

Playfield Switch Location Drawing

Switch Wiring

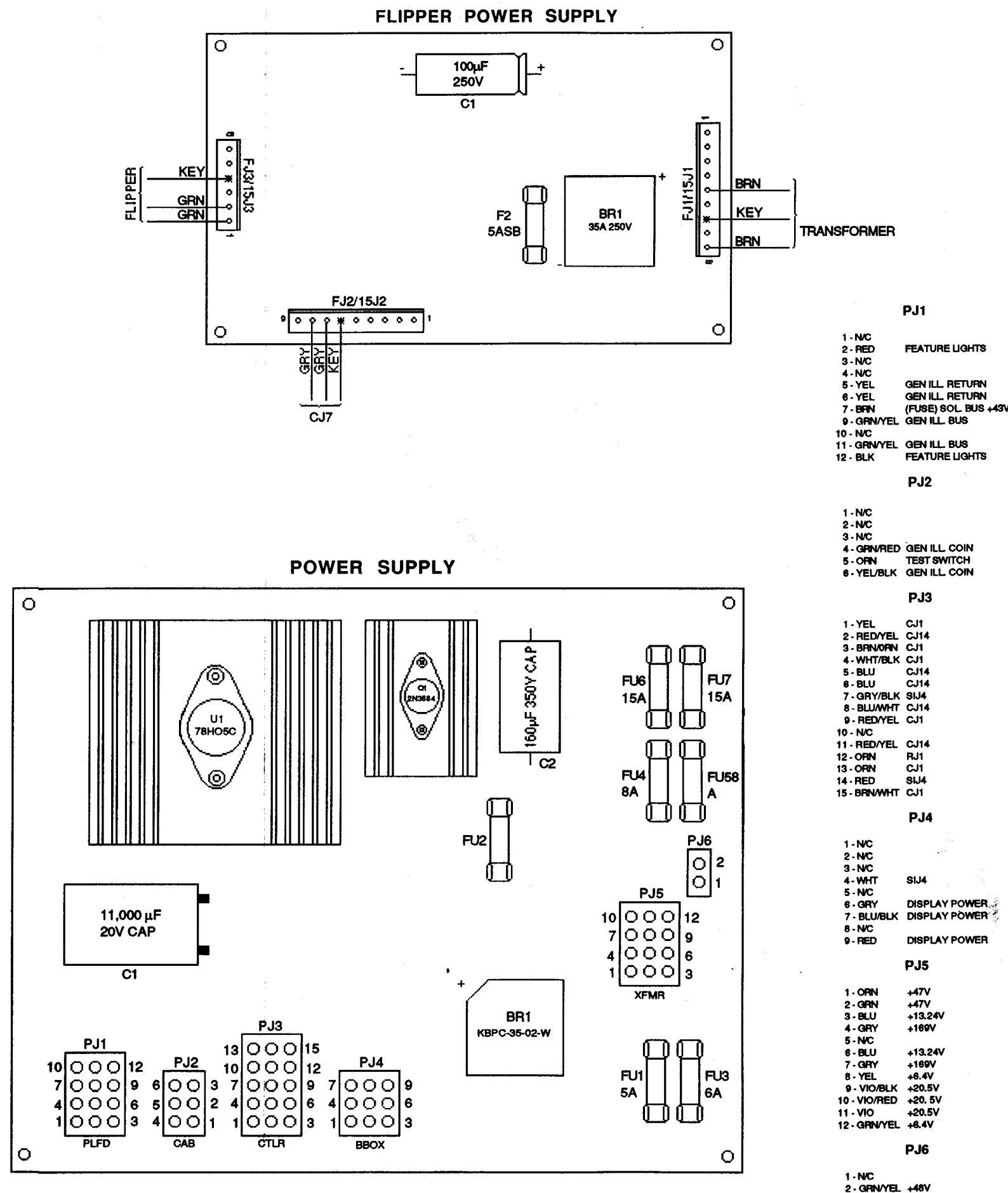
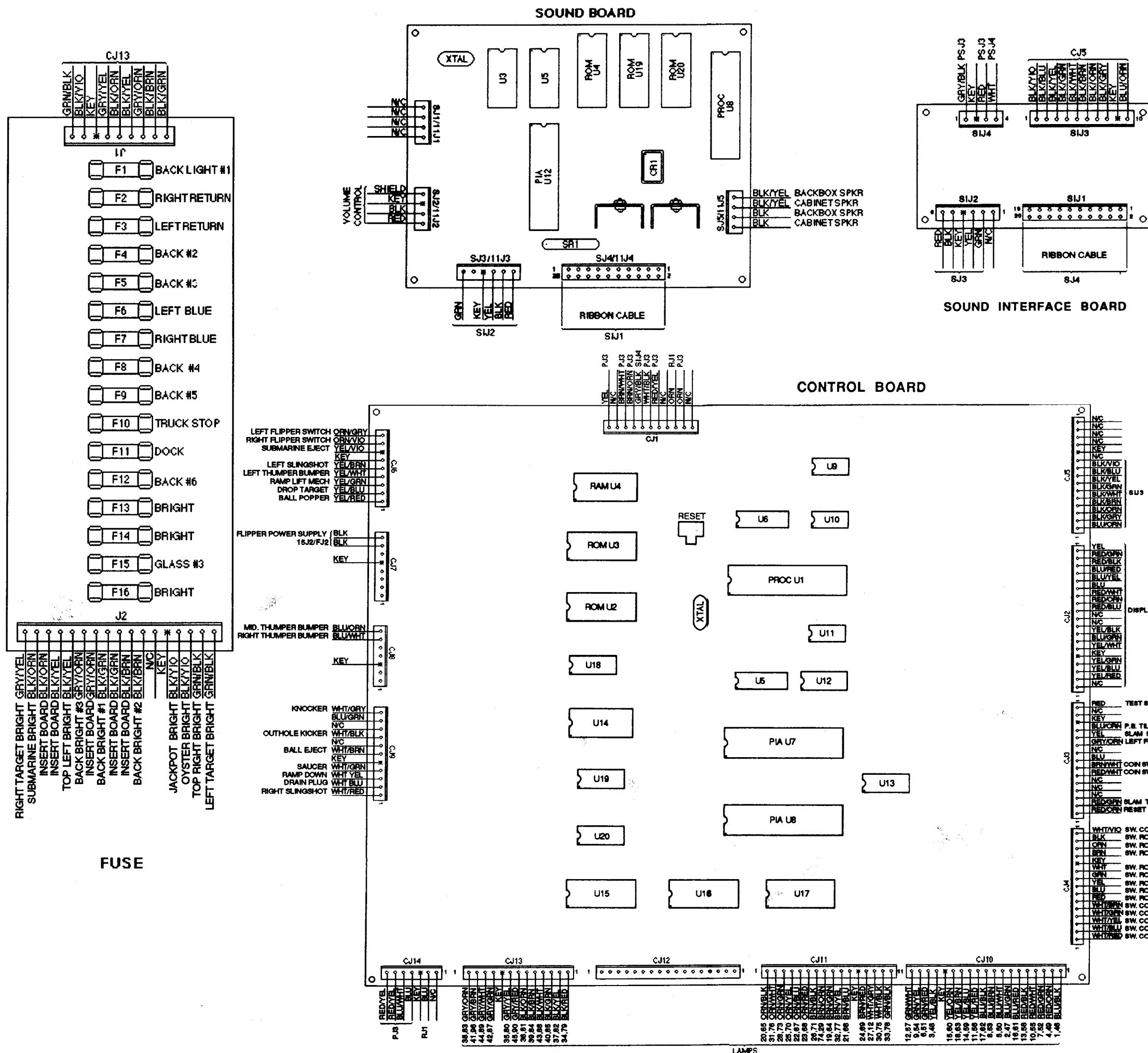
Playfield Lamp Location Drawing

Lamp Wiring

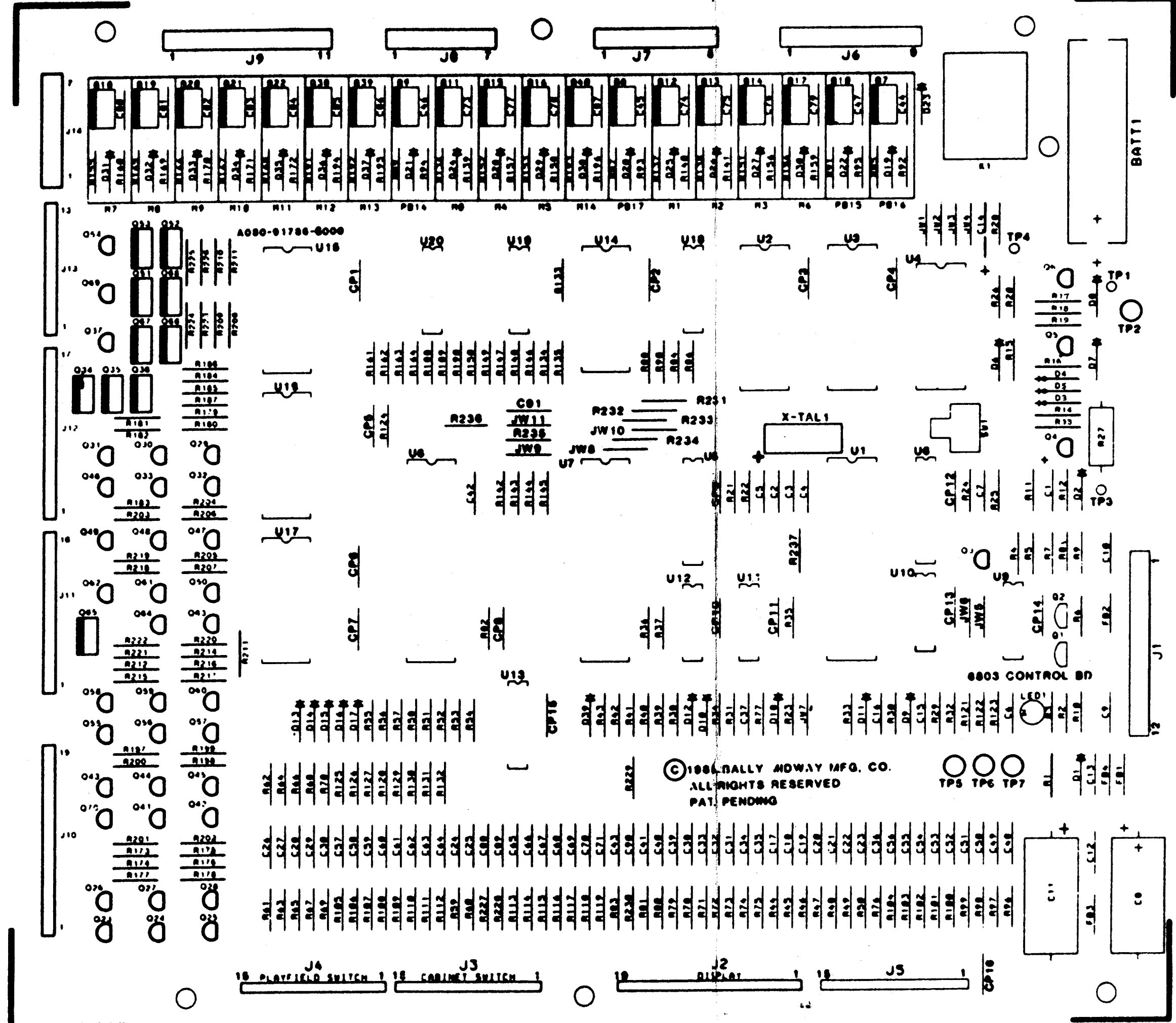
Warnings & Notices

Atlantis Electronic Parts

Description	Part Number
Programmed Central Processing Unit (CPU)	A084-91786-2006
Game ROMs: U2	2006-12601-0000
U3	2006-12602-0000
Programmed Power Module	A084-91785-2006
Flipper Power Supply Board	C-9934-554
Programmed Bright Lights Fuse Board	A084-91901-2006
Dual Display Module	M051-00364-H033
Sound Interface Board	C-12417
Sound Board	D-11581-2006
Sound ROMs: U4	A-5343-2006-1
U19	A-5343-2006-2
U20	A-5343-2006-3
Lamp Control Relay	C-12587
Lamp PCBs: 2K - 50K Lamps	C-12554
Back Panel Lamps	C-12553
Lites Lamps	C-12552
1,2,3 Lamps	C-12551
5K - 25K Lamps	C-12549
Lock 1,2,3 Lamps	C-12548
5X, 3X, 2X Mill Lamps	C-12550



Flipper Power Supply (C-9939-554) Assembly Drawing



PROPERTY OF MIDWAY MFG CO
MIDWAY MFG. CO.
ASSY DRAWING
6803 CONTROL BD.
A084-91786-G000

REVISIONS	
PART NO	
A05-1-0-0-C-5-3-G-0-0-3	

6803 CONTROL BOARD
A084-91786-G000
W051-00C53-6003

CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
27pf 50V CER.	2	C2, C3	0360-00800-0052
47pf 50V CER.	1	C7	0360-00800-0027
390pf 50V CER.	25	C24-C30, C57-C71	0360-00800-0001
		C88-C90	
470pf 1KV CER.	27	C17-C23, C31-C36,	0307-00800-0008
		C38-C41, C48-C56, C91	
.002uf 1KV CER.	19	C44-C47, C73-C87	0360-00800-0012
.003uf 1KV CER.	1	C43	0360-00800-0025
.01uf 50V CER.	24	C6, C9, C10, C12, C13	0365-00800-0014
		C15, C16, C42, CP1-CP16	
.05uf 16V CER.	1	C37	0360-00800-0006
.1uf 50V CER.	1	C4	0360-00800-0058
4.7uf 25V TANT	2	C5, C14	0360-00800-0008
6.8uf 25V TANT	1	C1	0360-00800-0048
470uf 16V ELEC	1	C8	0360-00800-0022
470uf 25V ELEC	1	C11	0360-00800-0024
82 OHM 1/4W 5%	1	R9	100E-00005-0031
100 OHM 1/4W 5%	1	R8	100E-00005-0033
110 OHM 1/4W 5%	1	R83	100E-00005-0034
120 OHM 1/4W 5%	21	R24, R85, R87, R89,	100E-00005-0035
		R91, R121, R136-R138,	
		R151-R155, R165-R168,	
		R191-R193	
270 OHM 1/4W 5%	1	R28	100E-00005-0044
330 OHM 1/4W 5%	23	R92-R95, R139-R141,	100E-00005-0047
		R156-R160, R169-R172,	
		R194-R196, R231-R234	
470 OHM 1/4W 5%	9	R96-R104	100E-00005-0051
560 OHM 1/4W 5%	1	R1	100E-00005-0054
680 OHM 1/4W 5%	1	R25	100E-00005-0056
750 OHM 1/4W 5%	1	R19	100E-00005-0057
910 OHM 1/4W 5%	1	R18	100E-00005-0059
1K 1/4W 5%	3	R3, R29, R32	100E-00005-0061
1.2K 1/4W 5%	60	R44-R50, R59-R61, R63,	100E-00005-0063
		R65, R67, R69, R71-R76	
		R78-R82, R105-R119, R122	
		R133-R135, R146-R150,	
		R161-R164, R188-R190,	
		R227, R228, R230, R236	
1.5K 1/4W 5%	1	R20	100E-00005-0065
2K 1/4W 5%	46	R123, R173-R187	100E-00005-0068
		R197-R226	
2.7K 1/4W 5%	2	R2, R6	100E-00005-0071
3K 1/4W 5%	1	R17	100E-00005-0073
3.3K 1/4W 5%	18	R21-R23, R35, R51-R58,	100E-00005-0074
		R124, R142-R145, R235	
3.9K 1/4W 5%	4	R84, R86, R88, R90	100E-00005-0077
4.7K 1/4W 5%	8	R36-R43	100E-00005-0079
5.6 1/4W 5%	1	R16	100E-00005-0082

CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
7.5 1/4W 5%	1	R5	100E-00005-0085
9.1 1/4W 5%	1	R4	100E-00005-0087
10K 1/4W 5%	4	R12, R13, R30, R33	100E-00005-0088
15K 1/4W 5%	2	R31, R34	100E-00005-0092
39K 1/4W 5%	1	R7	100E-00005-0102
47K 1/4W 5%	2	R10, R11	100E-00005-0104
56K 1/4W 5%	14	R62, R64, R66, R68	100E-00005-0106
		R70, R125-R132, R229	
62K 1/4W 5%	1	R15	100E-00005-0107
82K 1/4W 5%	1	R14	100E-00005-0112
100K 1/4W 5%	2	R26, R237	100E-00005-0115
270K 1/4W 5%	1	R77	100E-00005-0126
82 OHM 1W 10%	1	R27.	100E-00007-0014
IN958B ZENER	1	D1	103E-00001-0002
IN4004	20	D19-D38	103E-00003-0005
IN4148	13	D3, D6, D9-D18, D39	103E-00002-0005
IN4606	5	D2, D4, D5, D7, D8	103E-00002-0006
2N3904	3	Q2, Q4, Q6	104E-00001-0006
2N4403	2	Q3, Q5	104E-00002-0006
2N5060	35	Q23-Q33, Q37, Q41-Q50,	104E-00015-0001
		Q54-Q64, Q69, Q70	
2N5305	1	Q1	104E-00007-0003
MCR106-1	10	Q34-Q36, Q51-Q53	0360-00802-0009
		Q65-Q68	
SE9302	19	Q7-Q22, Q38-Q40	0360-00802-0008
4011	1	U11	0360-00803-0010
4502	1	U13	0360-00803-0005
4514B	3	U15-U17	0360-00803-0013
4584	1	U12	0066-090RX-XXDX
6116 RAM	1	U4	0365-00803-0013
6803 MPU	1	U1	0360-00803-0048
6821 PIA	2	U7, U8	0360-00803-0017
74LS04	1	U10	0A15-00803-0010
74LS10	1	U9	0A89-00803-0007
75LS154	1	U14	0360-00803-0024
74HCT245	1	U5	0365-00803-0014
74LS373	1	U6	0A89-00803-0006
CA3081	3	U18-U20	0360-00803-0007
3.580 MHz CRYSTAL	1	XTAL-1	109E-00001-0003
LED GREEN	1	LED 1	0017-00007-0131
TEST POINTS	7	TP1-TP7	0017-00007-0131
SWITCH P.R.	1	SW1	0017-00032-0038
BATTERY 3.6V	1	BATT-1	0017-00003-0172
ZERO OHM RES. JUMPER	5	JW2, JW4, JW6, JW8,	117E-00001-0001
		JW10	
RELAY 48VDC	1	K1	114F-00001-0011
40 PIN I.C. SOCKET	3	XU1, XU7, XU8	110E-00001-0011
28 PIN I.C. SOCKET	2	XU2, XU3	110E-00001-0010
24 PIN I.C. SOCKET	1	XU4	110E-00001-0007
FERRITE BEAD	4	FR1-FR4	0316-00804-0002

6803 CONTROL BOARD
A084-91786-G000
M051-00C53-G003

DESIGNATION LIST

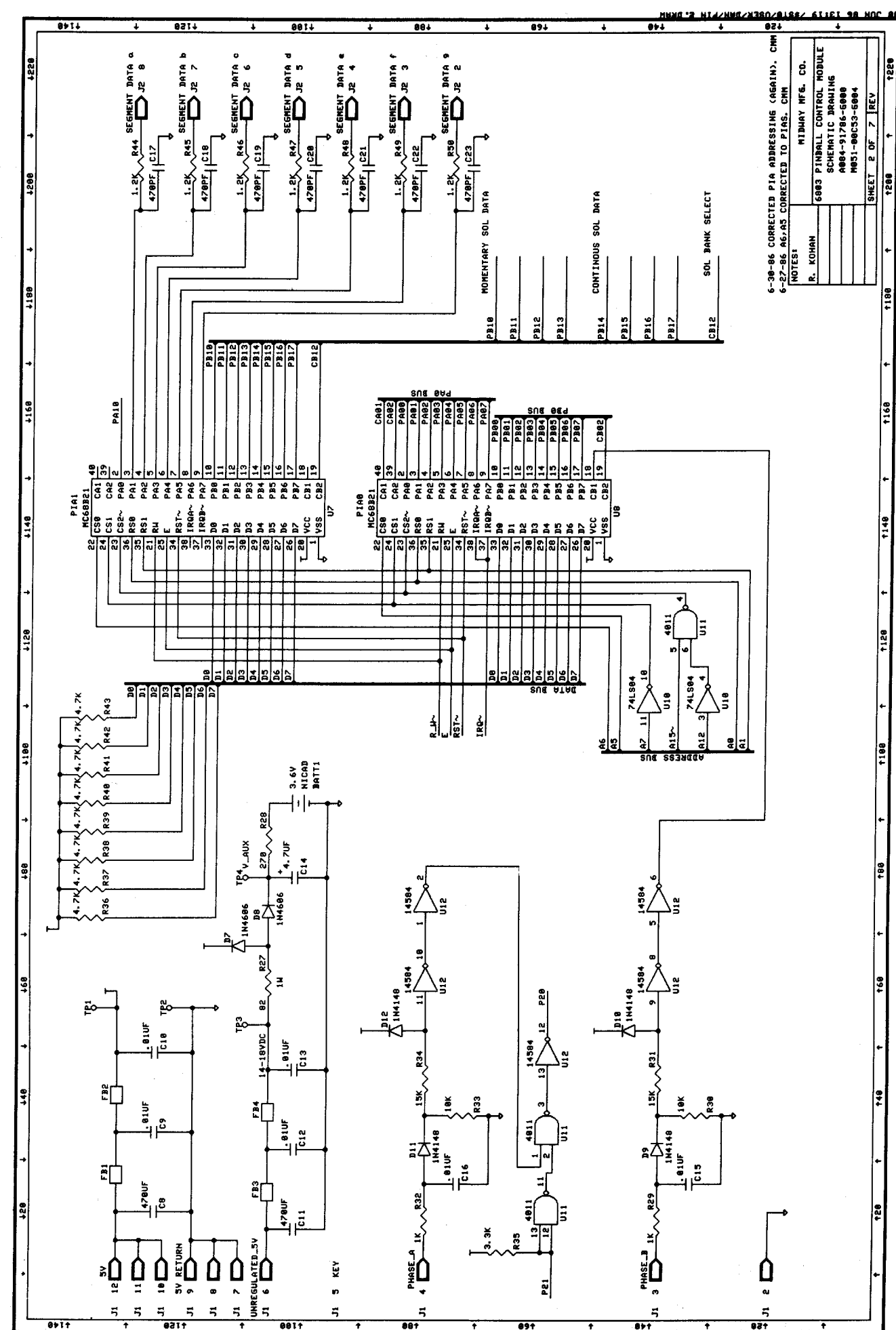
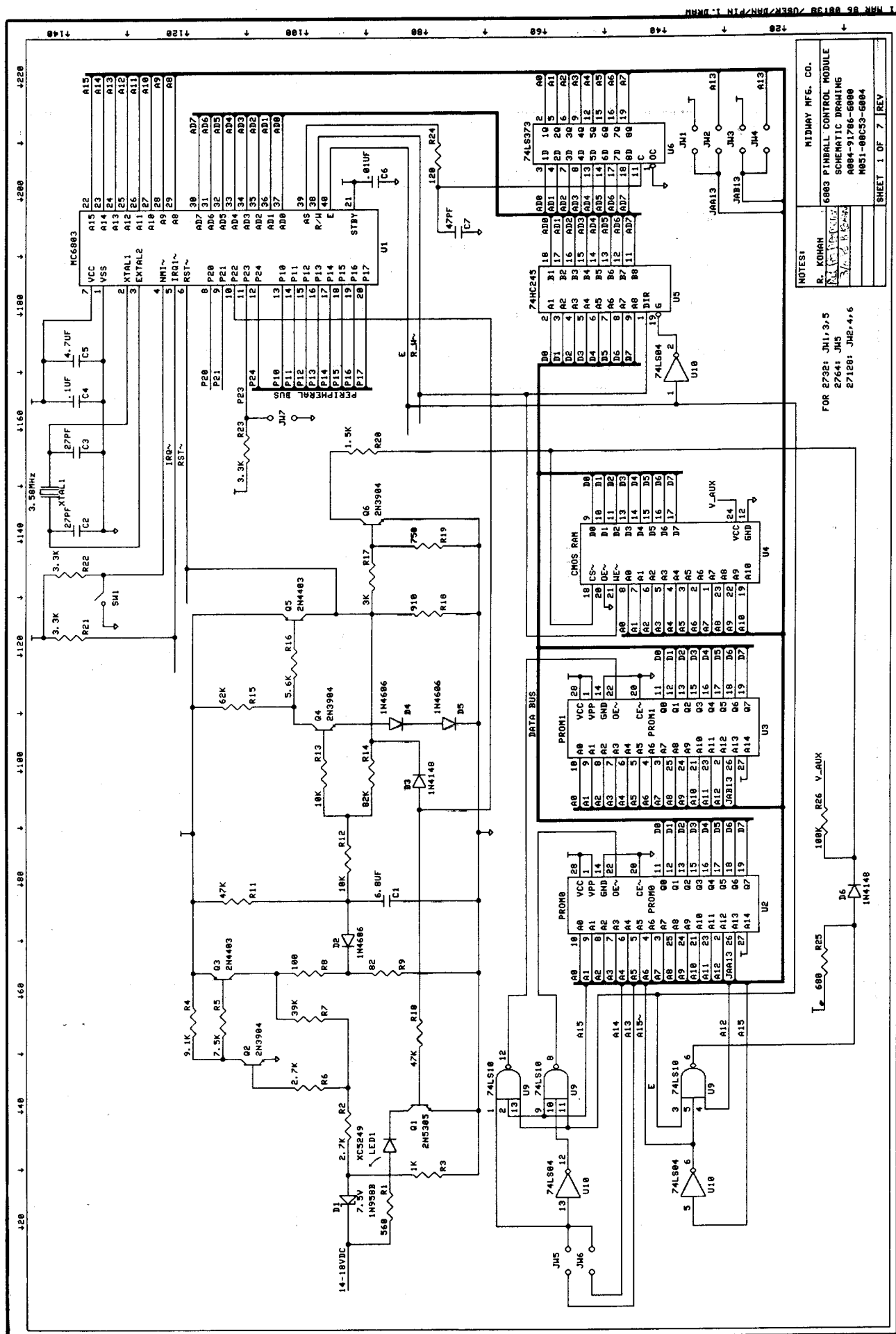
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C1	6.8UF 25V TANT.	R28	270 OHM 1/4W 5%	R165 - R168	120 OHM 1/4W 5%	U15 - U17	4514B
C2,C3	27PF 50V CER.	R29	1K 1/4W 5%	R169 - R172	330 OHM 1/4W 5%	U18 - U20	CA3081
C4	.1UF 50V CER.	R30	10K 1/4W 5%	R173 - R187	2K 1/4W 5%	XTAL-1	3.580 MHZ CRYSTAL
C5	4.7UF 25V TANT.	R31	15K 1/4W 5%	R188 - R190	1.2K 1/4W 5%	LED 1	LED GREEN
C6	.01UF 50V CER.	R32	1K 1/4W 5%	R191 - R193	120 OHM 1/4W 5%	TP1 - TP7	TEST POINTS
C7	47PF 50V CER.	R33	10K 1/4W 5%	R194 - R196	330 OHM 1/4W 5%	SW1	SWITCH P.B.
C8	470UF 16V FLEC.	R34	15K 1/4W 5%	R197 - R226	2K 1/4W 5%	BATT-1	BATTERY 3.6V
C9,C10	.01UF 50V CER.	R35	3.3K 1/4W 5%	R227,R228	1.2K 1/4W 5%	JW2	ZERO OHM RES. JUMPER
C11	470UF 25V FLEC.	R36 - R43	4.7K 1/4W 5%	R229	56K 1/4W 5%	JW4	ZERO OHM RES. JUMPER
C12,C13	.01UF 50V CER.	R44 - R50	1.2K 1/4W 5%	R230	1.2K 1/4W 5%	JW6	ZERO OHM RES. JUMPER
C14	4.7UF 25V TANT.	R51 - R58	3.3K 1/4W 5%	R231 - R234	330 OHM 1/4W 5%	JW8	ZERO OHM RES. JUMPER
C15,C16	.01UF 50V CER.	R59 - R61	1.2K 1/4W 5%	R235	3.3K 1/4W 5%	JW10	ZERO OHM RES. JUMPER
C17 - C23	470PF 1KV CER.	R62	56K 1/4W 5%	R236	1.2K 1/4W 5%	K1	RELAY 48V DC
C24 - C30	390PF 50V CER.	R63	1.2K 1/4W 5%	R237	100K OHM 1/4W 5%	XU1,XU7,XU8	40 PIN IC SOCKET
C31 - C36	470PF 1KV CER.	R64	56K 1/4W 5%	D1	1N958B	XU2, XU3	28 PIN IC SOCKET
C37	.05UF 16V CER.	R65	1.2K 1/4W 5%	D2	1N4606	XU4	24 PIN IC SOCKET
C38 - C41	470PF 1KV CER.	R66	56K 1/4W 5%	D3	1N4148	FB1 - FB4	FERRITE BEAD
C42	.01UF 50V CER.	R67	1.2K 1/4W 5%	D4,D5	1N4606	J1	11 - .045 SO. PINS
C43	.003UF 1KV CER.	R68	56K 1/4W 5%	D6	1N4148	J2	18 - .025 SO. PINS
C44 - C47	.002UF 1KV CER.	R69	1.2K 1/4W 5%	D7,D8	1N4606	J3	14 - .025 SO. PINS
C48 - C56	470PF 1KV CER.	R70	56K 1/4W 5%	D9 - D18	1N4148	J4	14 - .025 SO. PINS
C57 - C71	390PF 50V CER.	R71 - R76	1.2K 1/4W 5%	D19 - D38	1N4004	J5	14 - .025 SO. PINS
C73 - C87	.002 1KV CER.	R77	270K 1/4W 5%	D39	1N4148	J6	8 - .045 SO. PINS
C88 - C90	390PF 50V CER.	R78 - R82	1.2K 1/4W 5%	D01	2N5305	J7	7 - .045 SO. PINS
C91	470PF 1KV CER.	R83	110 OHM 1/4W 5%	D02	2N3904	J8	6 - .045 SO. PINS
CP1 - CP16	.01 50V CER.	R84	3.9K 1/4W 5%	D03	2N4403	J9	10 - .045 SO. PINS
R1	560 OHM 1/4W 5%	R85	120 OHM 1/4W 5%	D04	2N3904	J10	18 - .025 SO. PINS
R2	2.7K 1/4W 5%	R86	3.9K 1/4W 5%	D05	2N4403	J11	17 - .025 SO. PINS
R3	1K 1/4W 5%	R87	120 OHM 1/4W 5%	D06	2N3904	J12	16 - .025 SO. PINS
R4	9.1K 1/4W 5%	R88	3.9K 1/4W 5%	D07 - D22	SF9302	J13	12 - .025 SO. PINS
R5	7.5K 1/4W 5%	R89	120 OHM 1/4W 5%	D23 - D33	2N5060	J14	5 - .045 SO. PINS
R6	2.7K 1/4W 5%	R90	3.9K 1/4W 5%	D34 - D36	MCR 106-1	P/O BATT-1	TY-WRAP
R7	39K 1/4W 5%	R91	120 OHM 1/4W 5%	D37	2N5060	6803 CONTROL BD.	P.C. BOARD
R8	100 OHM 1/4W 5%	R92 - R95	330 OHM 1/4W 5%	D38 - D40	SE9302		
R9	82 OHM 1/4W 5%	R96 - R104	470 OHM 1/4W 5%	D41 - D50	2N5060		
R10,R11	47K 1/4W 5%	R105 - R119	1.2K 1/4W 5%	D51 - D53	MCR 106-1		
R12,R13	10K 1/4W 5%	R121	120 OHM 1/4W 5%	D54 - D64	2N5060		
R14	82K 1/4W 5%	R122	1.2K 1/4W 5%	D65 - D68	MCR 106-1		
R15	62K 1/4W 5%	R123	2K 1/4W 5%	D69,D70	2N5060		
R16	5.6K 1/4W 5%	R124	3.3K 1/4W 5%	U1	6803		
R17	3K 1/4W 5%	R125 - R132	56K 1/4W 5%	U4	6116 RAM		
R18	910 OHM 1/4W 5%	R133 - R135	1.2K 1/4W 5%	U5	74HCT245		
R19	750 OHM 1/4W 5%	R136 - R138	120 OHM 1/4W 5%	U6	74LS373		
R20	1.5K 1/4W 5%	R139 - R141	330 OHM 1/4W 5%	U7,U8	6821		
R21 - R23	3.3K 1/4W 5%	R142 - R145	3.3K 1/4W 5%	U9	74LS10		
R24	120 OHM 1/4W 5%	R146 - R150	1.2K 1/4W 5%	U10	74LS04		
R25	680 OHM 1/4W 5%	R151 - R155	120 OHM 1/4W 5%	U11	4011		
R26	100K 1/4W 5%	R156 - R160	330 OHM 1/4W 5%	U12	4584		
R27	82 OHM 1W 10%	R161 - R164	1.2K OHM 1/4W 5%	U13	4502		
				U14	74LS154		

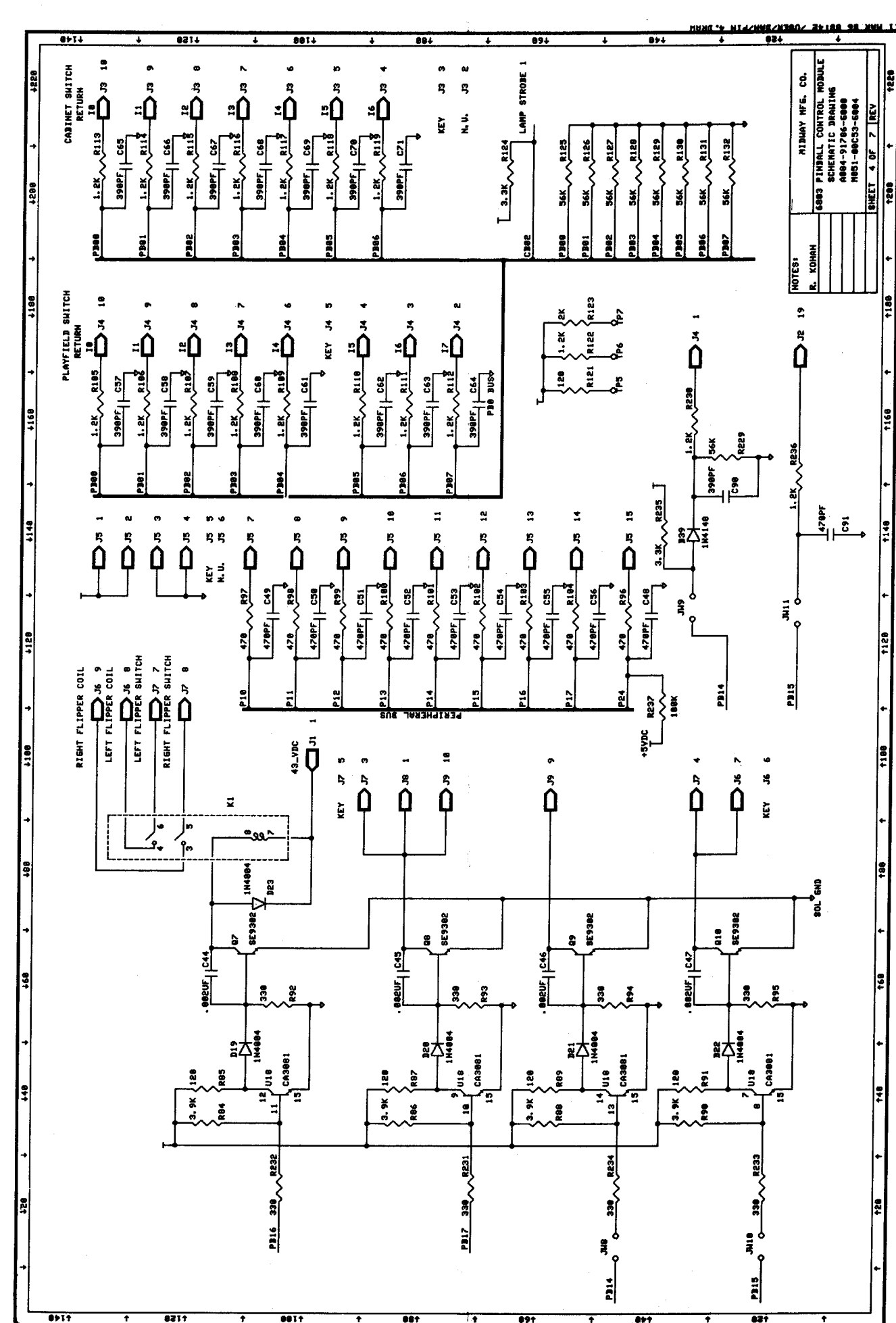
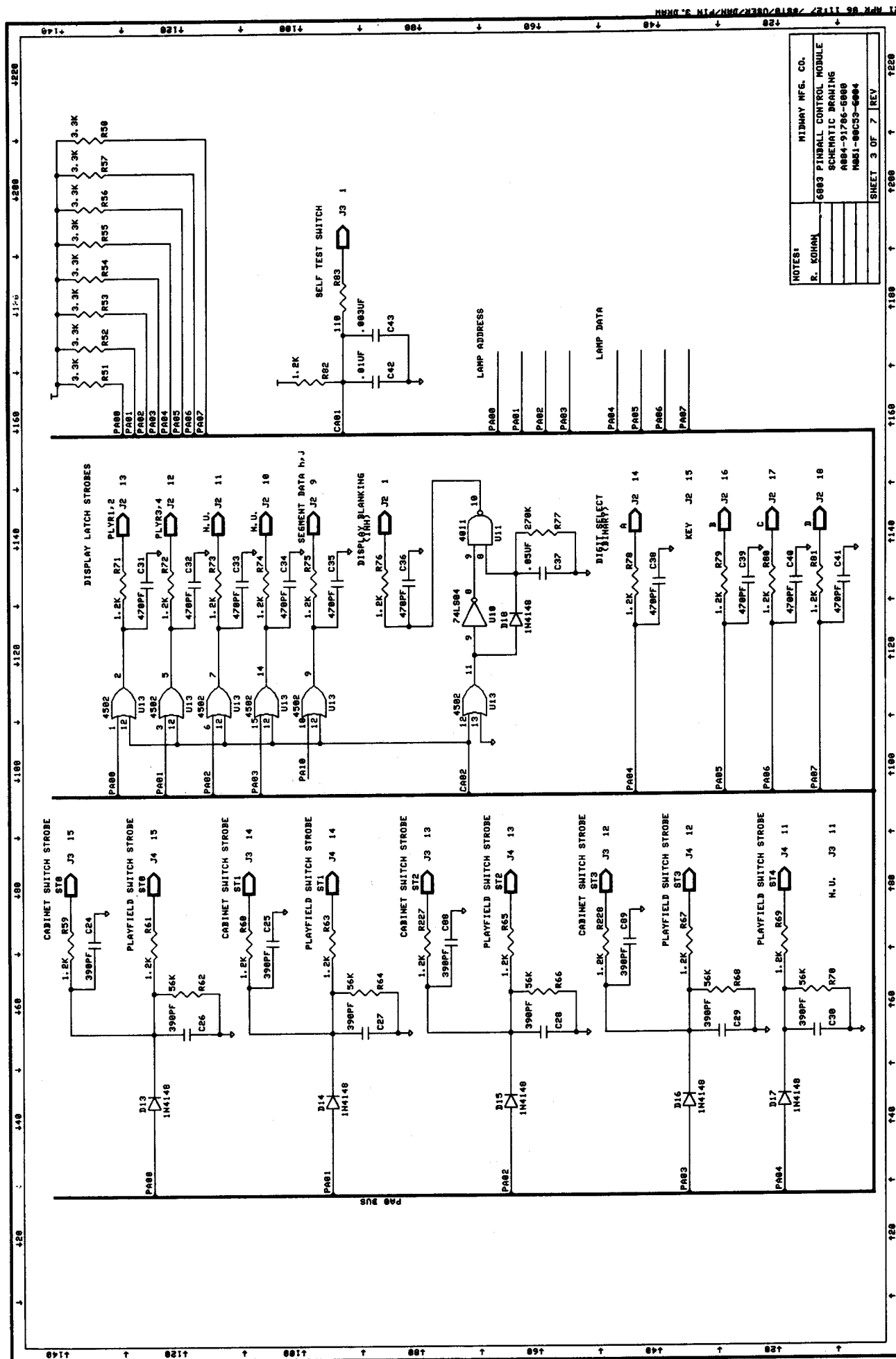
6803 CONTROL BOARD
A084-91786-G000
M051-000C53-G003

CROSS REFERENCE LIST

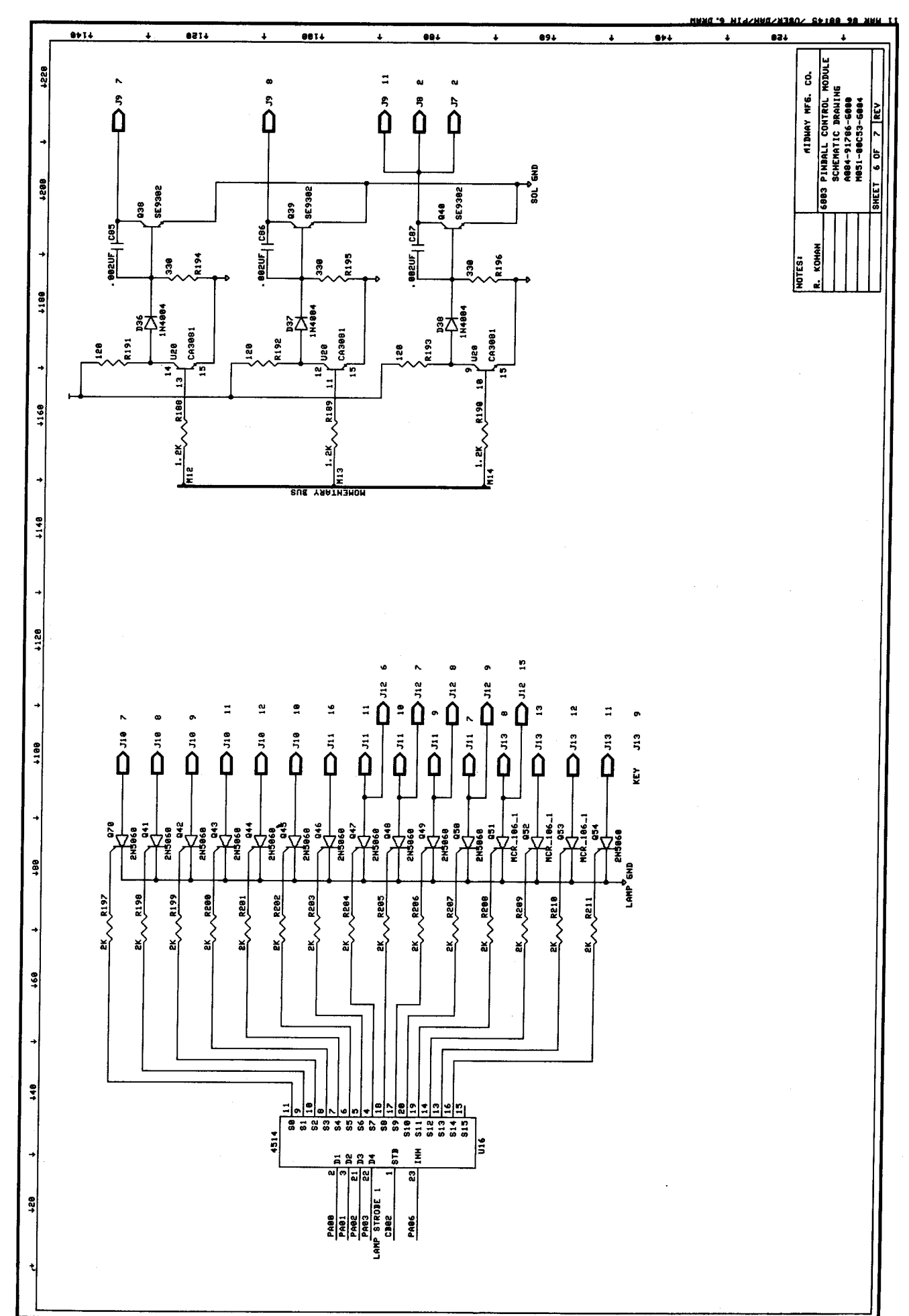
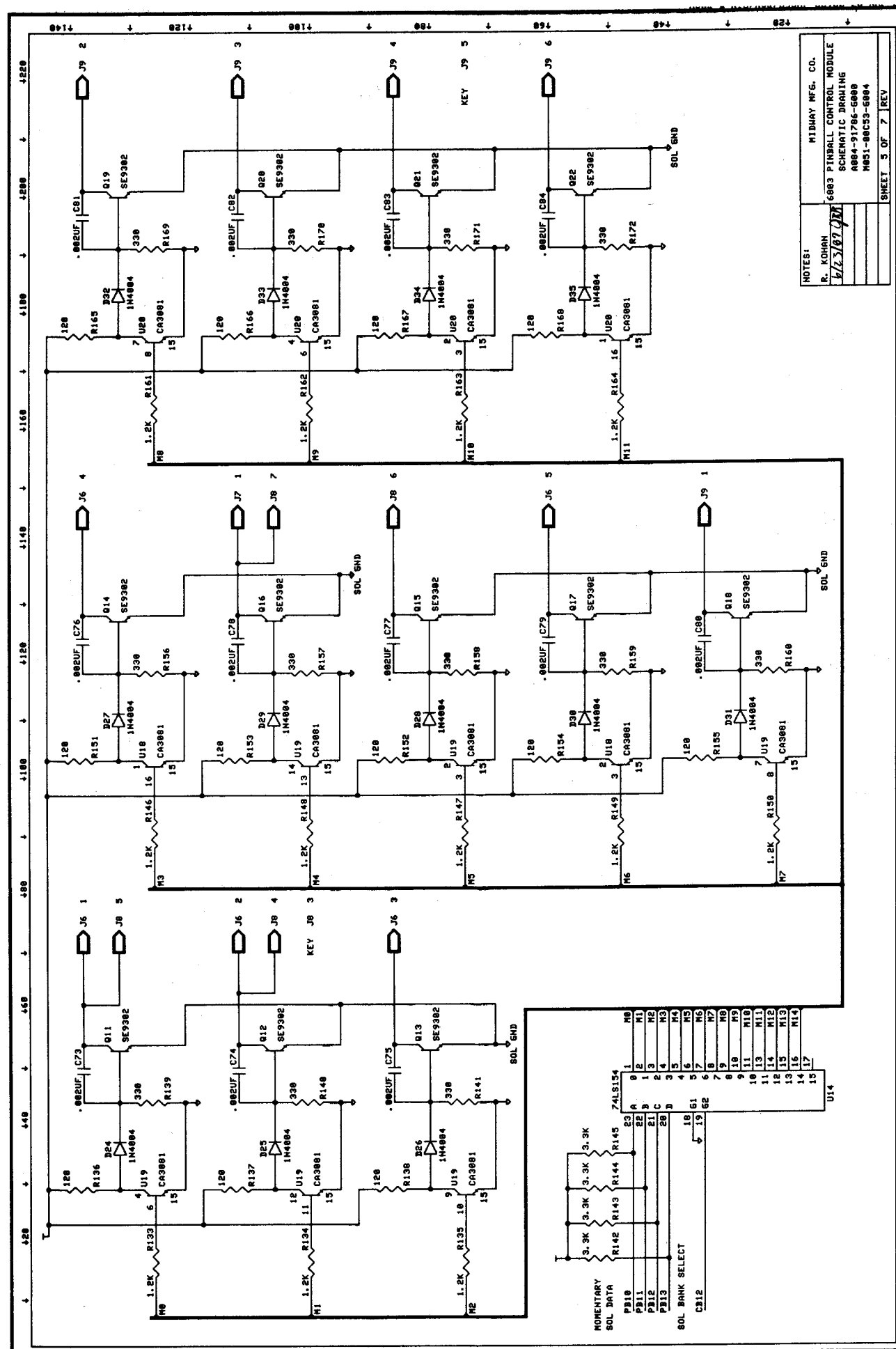
DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
.025 SQ. PINS	123	J2, J3, J4, J5, J10, J11, J12, J13	0304-00804-0009
.045 SQ. PINS	47	J1, J6, J7, J8, J9, J14	0304-00804-0010
TY-WRAP	1	P/O BATT-1	0017-00042-0622
P.C. BOARD	1	6803 CONTROL BOARD	A080-91786-G000

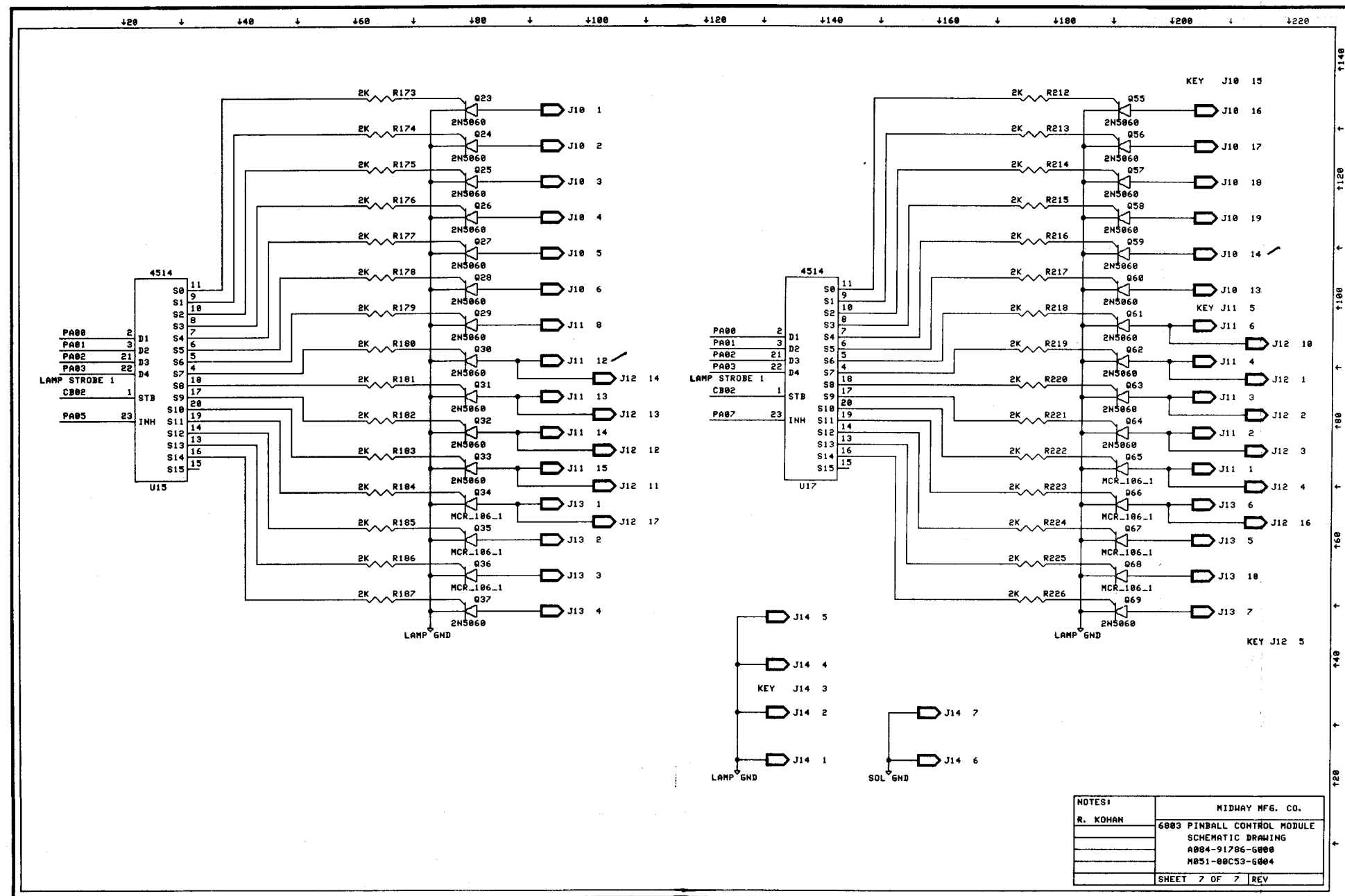
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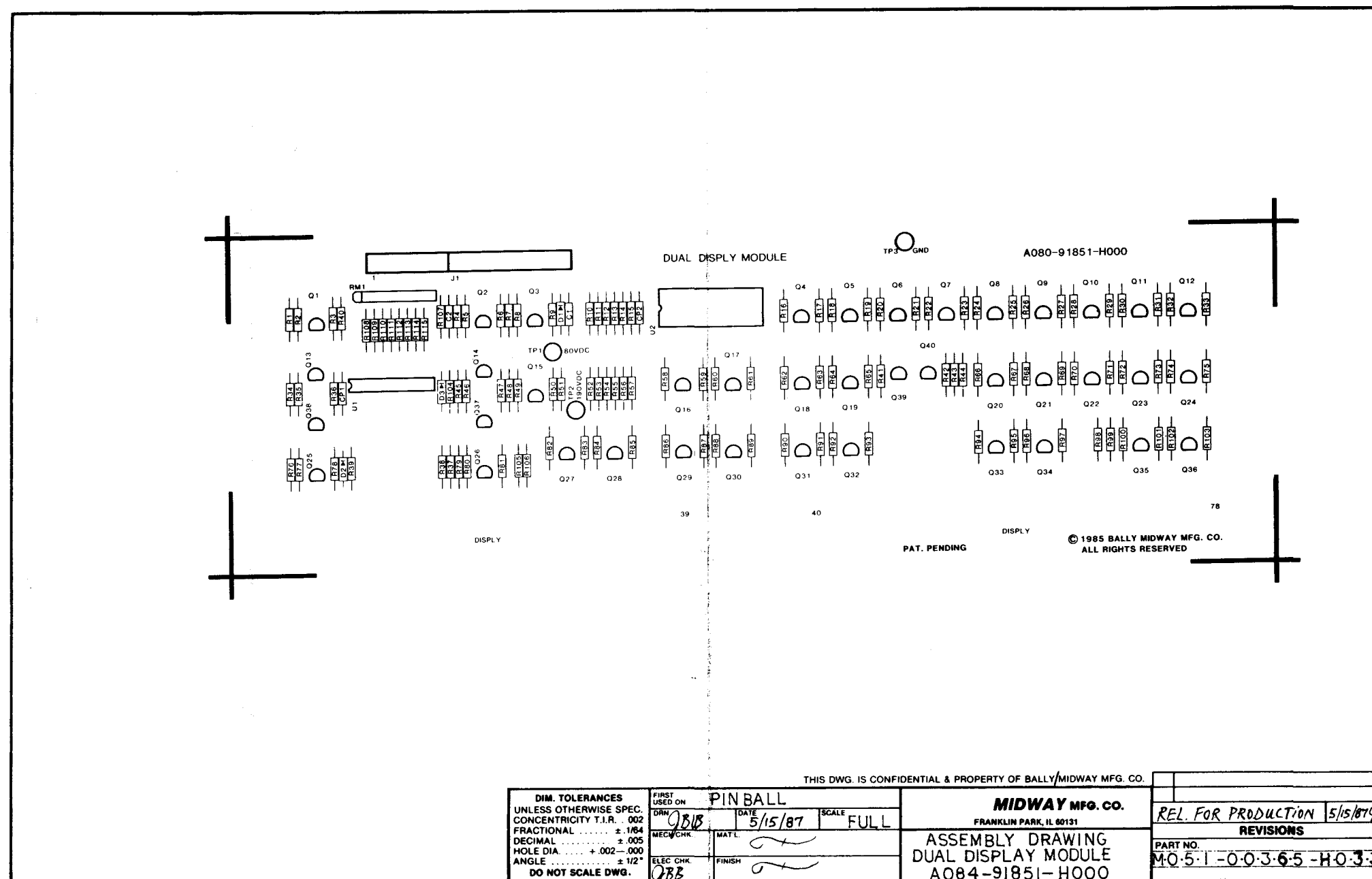




Control Board A080-91786-G000 Logic Diagram







DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 1 of 5) REV.1

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
R1	1.5K 1/4W 5% CARBON
R2	820 OHM 1/4W 5% CARBON
R3	300K 1/4W 5% CARBON
R4	1.5K 1/4W 5% CARBON
R5	510 OHM 1/4W 5% CARBON
R6	300K 1/4W 5% CARBON
R7	1.5K 1/4W 5% CARBON
R8	820 OHM 1/4W 5% CARBON
R9	300K 1/4W 5% CARBON
R10 - R15	20K 1/4W 5% CARBON
R16	9.1K 1/4W 5% CARBON
R17	100K 1/4W 1% METAL FILM
R18	2.2K 1/4W 5% CARBON
R19	300K 1/4W 5% CARBON
R20	9.1K 1/4W 5% CARBON
R21	100K 1/4W 1% METAL FILM
R22	2.2K 1/4W 5% CARBON
R23	300K 1/4W 5% CARBON
R24	9.1K 1/4W 5% CARBON
R25	100K 1/4W 1% METAL FILM
R26	2.2K 1/4W 5% CARBON
R27	300K 1/4W 5% CARBON
R28	9.1K 1/4W 5% CARBON
R29	100K 1/4W 1% METAL FILM
R30	9.1K 1/4W 5% CARBON
R31	100K 1/4W 1% METAL FILM
R32	9.1K 1/4W 5% CARBON
R33	100K 1/4W 1% METAL FILM
R34	1.5K 1/4W 5% CARBON
R35	820 OHM 1/4W 5% CARBON
R36	300K 1/4W 5% CARBON
R37	300K 1/4W 5% CARBON
R38	1.5K 1/4W 5% CARBON
R39	1K 1/4W 5% CARBON
R40	100K 1/4W 5% CARBON
R41	100K 1/4W 5% CARBON
R42	1K 1/4W 5% CARBON
R43	1.5K 1/4W 5% CARBON
R44	300K 1/4W 5% CARBON
R45	1.5K 1/4W 5% CARBON
R46	820 OHM 1/4W 5% CARBON
R47	300K 1/4W 5% CARBON
R48	1.5K 1/4W 5% CARBON
R49	820 OHM 1/4W 5% CARBON
R50	300K 1/4W 5% CARBON
R51	100K 1/4W 1% METAL FILM
R52 - R57	2.2M 1/4W 5% CARBON
R58	9.1K 1/4W 5% CARBON

DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 2 of 5) REV. 1

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
R59	100K 1/4W 1% METAL FILM
R60	100K 1/4W 1% METAL FILM
R61	9.1K 1/4W 5% CARBON
R62	9.1K 1/4W 5% CARBON
R63	100K 1/4W 1% METAL FILM
R64	9.1K 1/4W 5% CARBON
R65	100K 1/4W 1% METAL FILM
R66	9.1K 1/4W 5% CARBON
R67	100K 1/4W 1% METAL FILM
R68	9.1K 1/4W 5% CARBON
R69	100K 1/4W 1% METAL FILM
R70	300K 1/4W 5% CARBON
R71	2.2K 1/4W 5% CARBON
R72	300K 1/4W 5% CARBON
R73	2.2K 1/4W 5% CARBON
R74	300K 1/4W 5% CARBON
R75	2.2K 1/4W 5% CARBON
R76	1.5K 1/4W 5% CARBON
R77	820 OHM 1/4W 5% CARBON
R78	300K 1/4W 5% CARBON
R79	1.5K 1/4W 5% CARBON
R80	820 OHM 1/4W 5% CARBON
R81	300K 1/4W 5% CARBON
R82	300K 1/4W 5% CARBON
R83	2.2K 1/4W 5% CARBON
R84	100K 1/4W 1% METAL FILM
R85	9.1K 1/4W 5% CARBON
R86	300K 1/4W 5% CARBON
R87	2.2K 1/4W 5% CARBON
R88	2.2K 1/4W 5% CARBON
R89	300K 1/4W 5% CARBON
R90	300K 1/4W 5% CARBON
R91	2.2K 1/4W 5% CARBON
R92	300K 1/4W 5% CARBON
R93	2.2K 1/4W 5% CARBON
R94	300K 1/4W 5% CARBON
R95	2.2K 1/4W 5% CARBON
R96	300K 1/4W 5% CARBON
R97	2.2K 1/4W 5% CARBON
R98	10M 1/4W 5% CARBON
R99	1M 1/4W 5% CARBON
R100	300K 1/4W 5% CARBON
R101	2.2K 1/4W 5% CARBON
R102	100K 1/4W 1% METAL FILM
R103	9.1K 1/4W 5% CARBON
R104	150K 1/4W 5% CARBON
R105	10M 1/4W 5% CARBON
R106	1M 1/4W 5% CARBON
R107	10K 1/4W 5% CARBON
R108-R115	20K 1/4W 5% CARBON
RM1	100K 10 PIN SIP

DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 3 of 5) REV. 1

DESIGNATION LIST

DESIGNATION NO.	DESCRIPTION
C1	.01UF 500V CER.
C2	100PF 50V AX. CER.
CP1, CP2	.01UF 50V CER.
D1	1M110ZS10 110V ZENER DIODE
D2,D3	1N4148 DIODE
Q1 - Q4	MPS-A-42 NPN XSTR
Q5	2N5401 PNP XSTR
Q6	MPS-A-42
Q7	2N5401
Q8	MPS-A-42
Q9	2N5401
Q10 - Q21	MPS-A-42
Q22 - Q24	2N5401
Q25	MPS-A-42
Q26	MPS-A-42
Q27	2N5401
Q28	MPS-A-42
Q29 - Q35	2N5401
Q36 - Q40	MPS-A-42
U1	74HC373 CMOS OCTAL LATCH
U2	14514 1-16 DECODER
DISPLAY 1	14 DIGIT, 9 SEGMENT GAS DISCHARGE DISPLAY
J1	.025 SQ. PINS
TP1, TP2, TP3	TEST LOOPS
	FOAM TAPE
	BUMPER
	DISPLAY MTG. CLIPS
	SCREWS
	DISPLAY MTG. PROCEDURE
	DUAL DISPLAY MODULE P.C.B.
M051-00365- A041	
A080-91851-H000	

DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 4 of 5) REV. 1

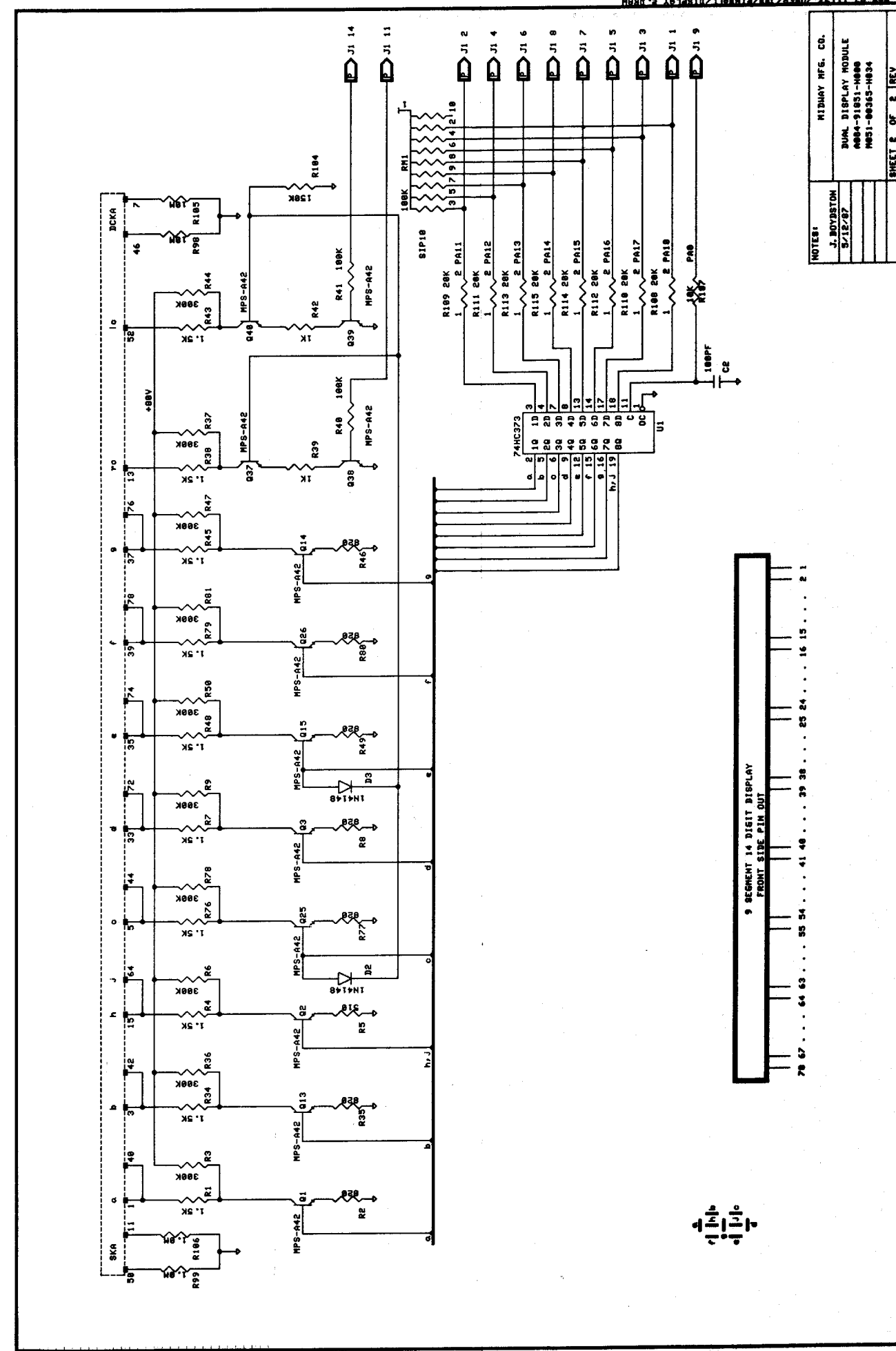
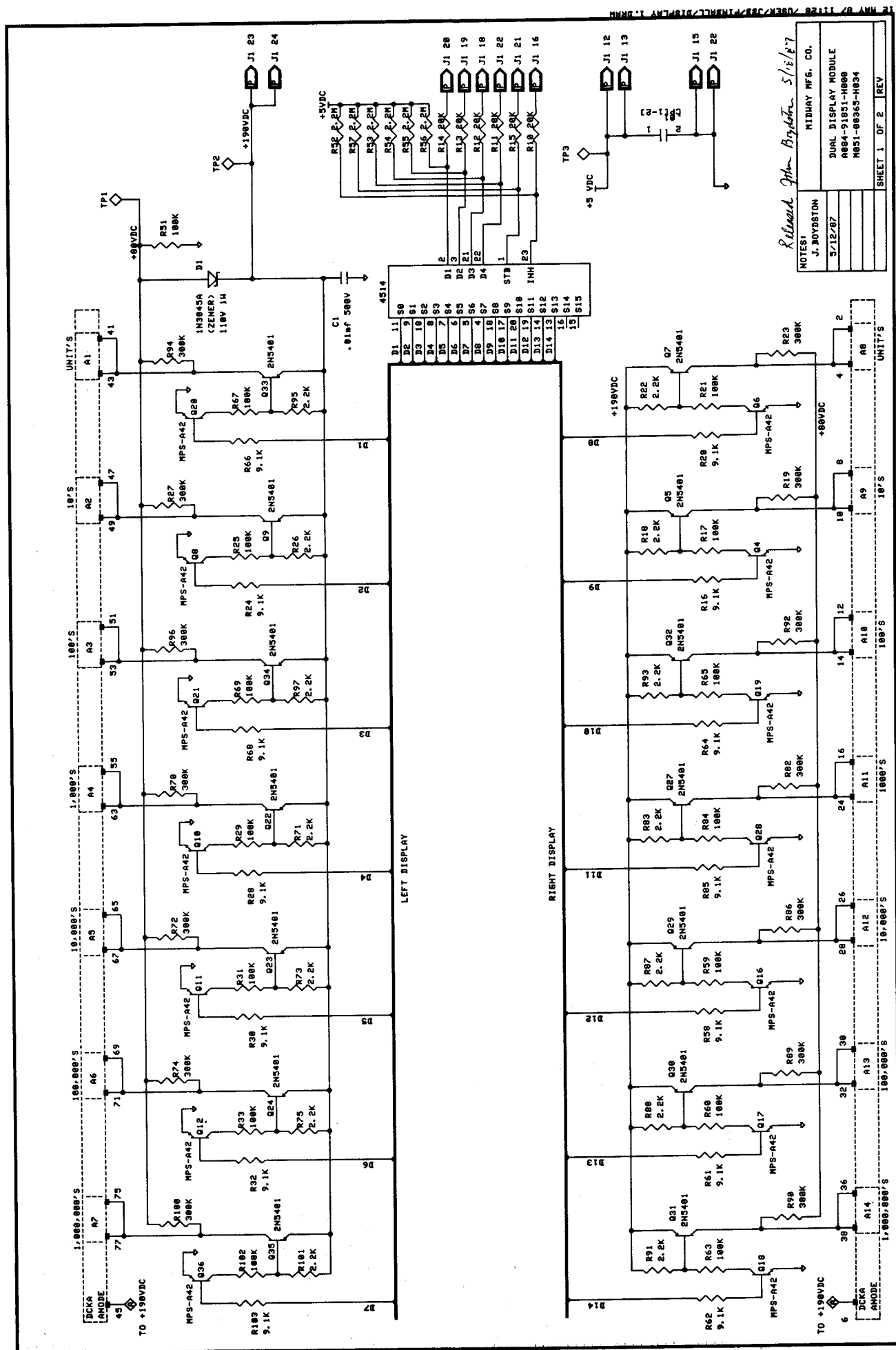
CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
510 OHM 1/4W 5% CARBON	1	R5	100E-00005-0053
820 OHM 1/4W 5% CARBON	7	R2,R8,R35,R46 R49,R77,R80	100E-00005-0058
1K 1/4W 5% CARBON	2	R39,R42	100E-00005-0061
1.5K 1/4W 5% CARBON	10	R1,R4,R7,R34,R38 R43,R45,R48 R76,R79	100E-00005-0065
2.2K 1/4W 5% CARBON	14	R18,R22,R26,R71 R73,R75,R83,R87 R88,R91,R93,R95 R97,R101	100E-00005-0069
9.1K 1/4W 5% CARBON	14	R16,R20,R24,R28 R30,R32,R58,R61 R62,R64,R66,R68 R85,R103	100E-00005-0087
10K 1/4W 5% CARBON	1	R107	100E-00005-0088
20K 1/4W 5% CARBON	14	R10-R15,R108-R115	100E-00005-0095
100K 1/4W 5% CARBON	2	R40,R41	100E-00005-0115
100K 1/4W 1% METAL FILM	15	R17,R21,R25,R29 R31,R33,R51,R59 R60,R63,R65,R67 R69,R84,R102	100E-00001-0046
150K 1/4W 5% CARBON	1	R104	100E-00005-0120
300K 1/4W 5% CARBON	24	R3,R6,R9,R19,R23 R27,R36,R37,R44, R47,R50,R70,R72, R74,R78,R81,R82, R86,R89,R90,R92, R94,R96,R100	100E-00005-0127
1.0M OHM 1/4W 5% CARBON	2	R99,R106	100E-00005-0140
2.2M OHM 1/4W 5% CARBON	6	R52 - R57	100E-00005-0147
100K 10 PIN SIP	1	RM1	102E-00004-0045
10.0M OHM 1/4W 5% CARBON	2	R98,R105	100E-00005-0162
100PF AX. CER.	1	C2	0639-00800-0003
.01UF	2	CP1,CP2	0360-00800-0005
.01UF 500V	1	C1	0360-00800-0013
1N4148	2	D2,D3	103E-00002-0005
1M110ZS10 110V ZENER DIODE	1	D1	103E-00001-0028
2N5401 PNP XSTR	14	Q5,Q7,Q9,Q22,Q23 Q24,Q27,Q29,Q30 Q31,Q32,Q33,Q34 Q35	0360-00802-0006
MPS-A-42 NPN XSTR	26	Q1-Q4,Q6,Q8,Q10- Q21,Q25,Q26,Q28 Q36-Q40	0360-00802-0007
14514 1-16 DECODER	1	U2	0360-00803-0013
74HC373 OCTAL LATCH	1	U1	0365-00803-0015
.025SQ. PINS	23	J1	0304-00804-0009
14 DIGIT, 9 SEGMENT GAS DISCHARGE DISPLAY	1	DISPLAY 1	119E-00002-0006
TEST LOOPS	3	TP1 - TP3	0017-00007-0131

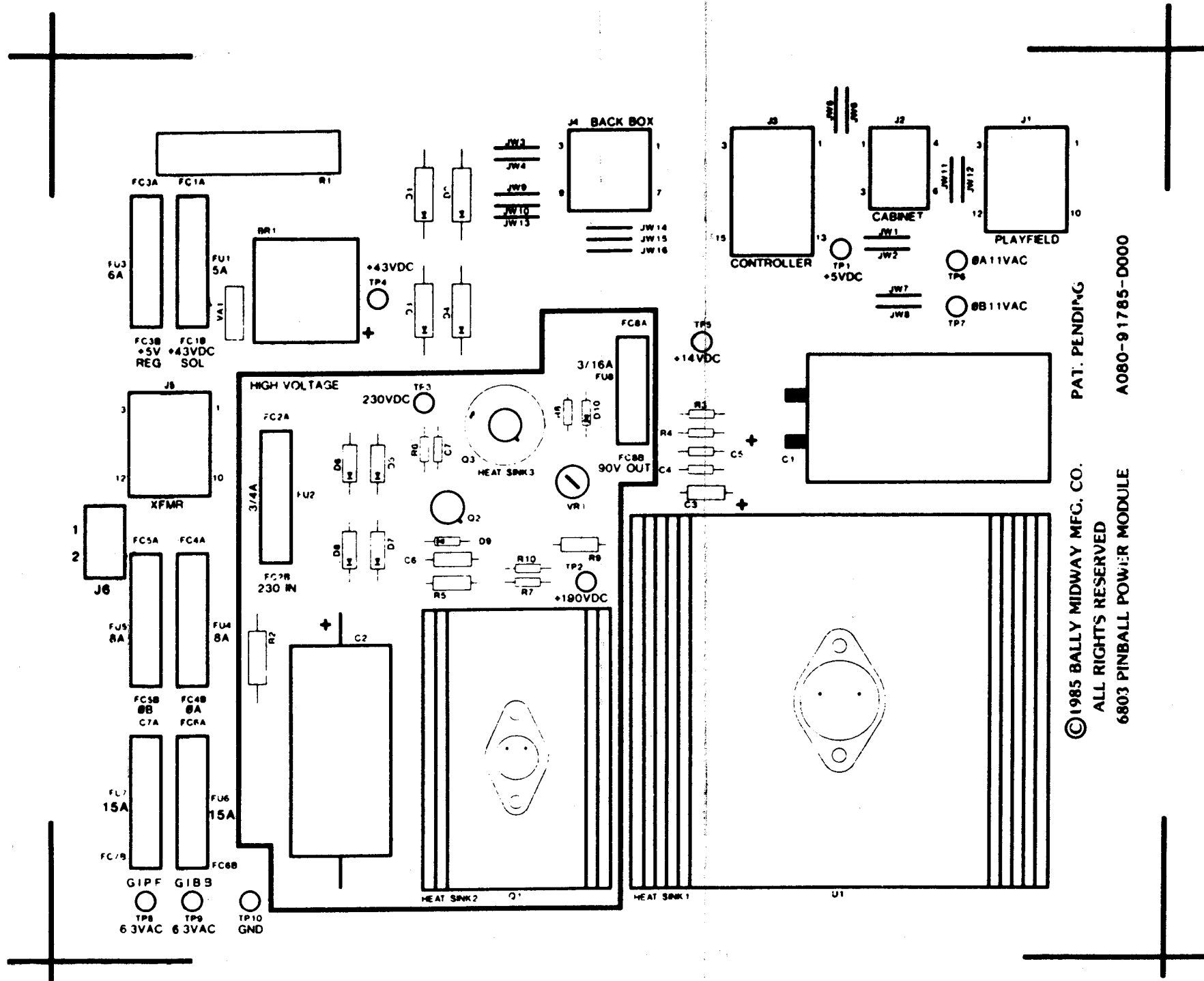
DUAL DISPLAY MODULE
A084-91851-H000
M051-00365-H042 (Page 5 of 5) REV. 1

CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
FOAM TAPE	2		0017-00081-0289
BUMPER	1		0017-00041-0598
DISPLAY MTG. CLIP	2		0365-00174-00XF
SCREW	2		0017-00101-0175
DISPLAY MTG. PROCEDURE	1		M051-00365-A041
DUAL DISPLAY MODULE PCB	1		A080-91851-H000



Display Board A084-91851-H000 Logic Diagram



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 6803 PINBALL POWER MODULE A080-91785-D000

THIS DWG IS CONFIDENTIAL & PROPERTY OF MIDWAY MFG CO											
DIM TOLERANCES UNLESS OTHERWISE SPEC CONCENTRICITY T I R .002 FRACTIONAL ± 1/64 DECIMAL ± .005 HOLE DIA + .002 - .000 ANGLE ± 1/2° DO NOT SCALE DWG				FIRST USED ON DATE 04/08/86 SCALE			 MIDWAY MFG. CO. FRANKLIN PK., IL. 60131 A BALLY CO				
MECH CDR ELEC CDR FINISH							ASSY DRAWING 6803 PINBALL PWR MODULE A084-91785-D000			REVISIONS	
							PART NO			M051-00053-D001	

6803 PINBALL POWER MODULE
A084-91785-D000
M051-00C53-D001

DESIGNATION LIST

<u>DESIGNATION</u>	<u>DESCRIPTION</u>
C1	11,000uf 20V ELEC.
P/O C1	TY-WRAP
P/O C1	SOLDER LUG
P/O C1	WIRE 20AWG
C2	160uf 350V ELEC.
P/O C2	TY-WRAP
C3	2uf 25V ELEC.
C4, C5	.1uf 25V CER.
C6, C7	.01uf 500V CER.
R1	600 OHM 10W
R2	100K 1W 5%
R3	2.2 OHM 1/4W 5%
R4	100 OHM 1/2W 5%
R5	22K 1/2W 5%
R6	100K 1/4W 5%
R7	390 OHM 1/4W 5%
R8	1.2K 1/4W 5%
R9	82K 1/2W 5%
R10	8.2K 1/4W 5%
VR1	0 - 25K 1/4W POT.
D1 - D4	MR751
D5 - D9	IN4004
D10	IN5275A ZENER
BR1	KBPC-35-02-W
P/O BR1	BRIDGE SPACER
O1	2N3584
P/O Q1	SHIELD
P/O Q1	HEX SPACER
P/O Q1	6-32 X 5 SCREW
P/O Q1	6-32 X 12 SCREW
P/O Q1	LOCKWASHER EXT.
P/O Q1	LOCKWASHER INT.
P/O Q1	FLAT WASHER
P/O Q1	6-32 HEX NUT
P/O Q1	LABEL - CAUTION HIGH VOLT.
P/O Q1	HEATSINK 2
P/O Q1	INSULATOR TO-66
Q2, Q3	2N3440
P/O Q2, Q3	INSULATOR TO-5
P/O Q3	HEATSINK 3
U1	78H05C REG.
P/O U1	6-32 X 12 SCREW
P/O U1	6-32 HEX NUT
P/O U1	LOCKWASHER EXT.
P/O U1	FLAT WASHER
P/O U1	HEATSINK 1
P/O U1	INSULATOR TO-3
VA1	VARISTOR

<u>DESIGNATION</u>	<u>DESCRIPTION</u>
JW1 - JW16	ZERO OHM RES. JUMPER
TP1 - TP10	TEST POINTS
F1*	5 AMP 3AG FUSE
F2	3/4 AMP 3AG FUSE
F3	6 AMP 3AG FUSE
F4, F5	8 AMP 3AG FUSE
F6, F7	15 AMP 3AG FUSE
F8	3/16 AMP 8AG FUSE
FC1A - FC3B, FC8A	FUSE CLIPS
FC8B	
FC4A - FC7B	FUSE CLIPS
J1	12 PIN M-N-L CONN. FEMALE
J2	6 PIN M-N-L CONN. MALE
J3	15 PIN M-N-L CONN. MALE
J4	9 PIN M-N-L CONN. MALE
J5	12 PIN M-N-L CONN. MALE
J6	2 PIN M-N-L CONN. MALE
6803 POWER MODULE	P.C. BOARD

4-23-86 REV. 1.0 FIXED R2, R6

* TWO FLIPPER GAMES ONLY - SEE SCHEMATIC

6803 PINBALL POWER MODULE
A084-91785-D000
M051-00C53-D001

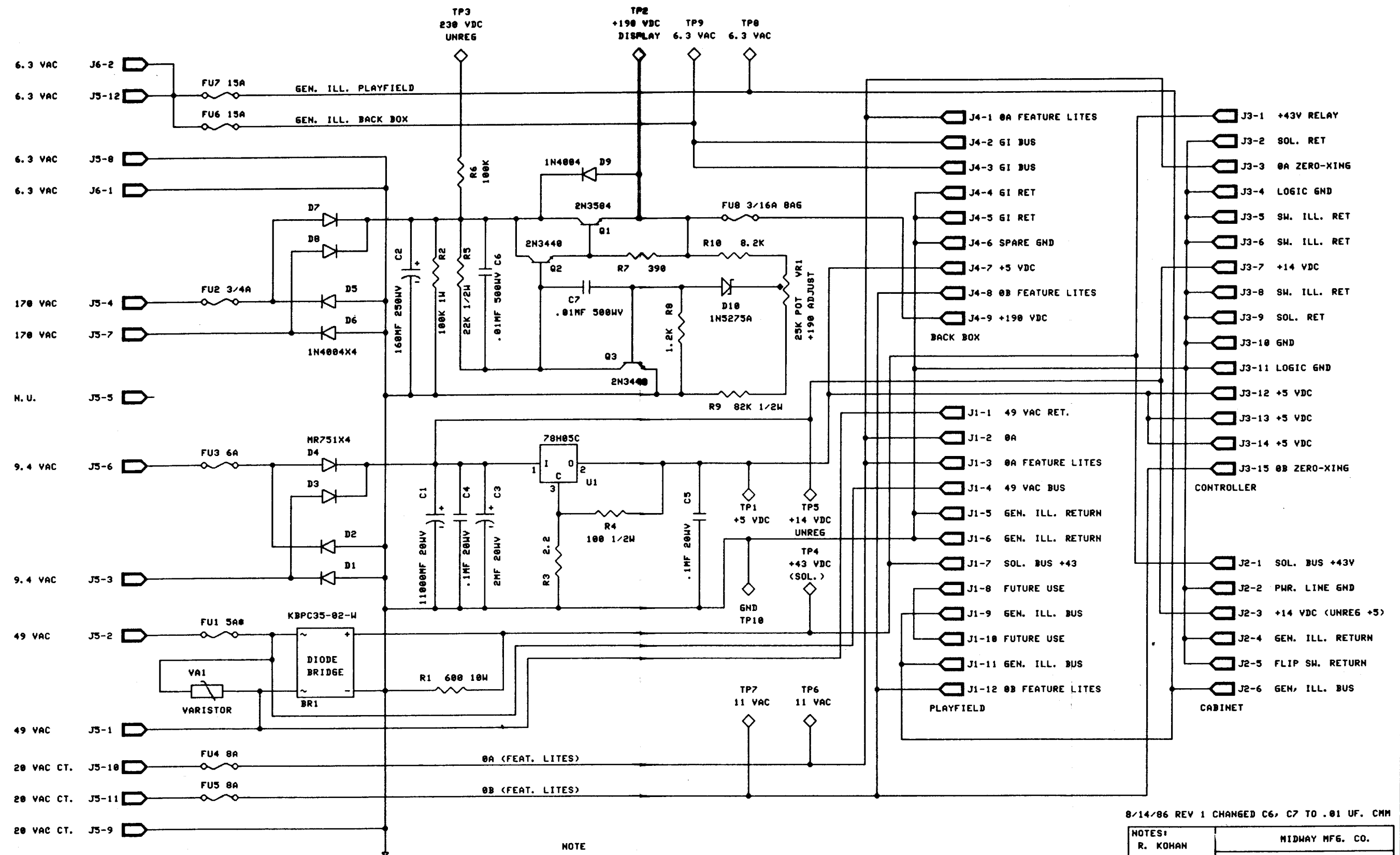
CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
.01UF 500V CER.	2	C6,C7	0360-00800-0013
.1UF 25V CER.	2	C4,C5	0360-00800-0026
2UF 25V ELEC.	1	C3	0360-00800-0019
160UF 350V ELEC.	1	C2	0360-00800-0020
11,000UF 20V ELEC.	1	C1	0360-00800-0024
2.2 OHM 1/4W 5%	1	R3	100E-00005-0003
100 OHM 1/2W 5%	1	R4	100E-00006-0021
390 OHM 1/4W 5%	1	R7	100E-00005-0049
600 OHM 10W 10%	1	R1	100E-00002-0049
1.2K 1/4W 5%	1	R8	100E-00005-0063
8.2K 1/4W 5%	1	R10	100E-00005-0086
22K 1/2W 5%	1	R5	100E-00006-0065
82K 1/2W 5%	1	R9	100E-00006-0072
100K 1/4W 5%	1	R6	100E-00005-0115
100K 1W 5%	1	R2	100E-00007-0037
0-25K 1/4W POT	1	VR1	0360-00804-0004
MR 751	4	D1-D4	103E-00003-0016
1N4004	5	D5-D9	103E-00003-0005
1N5275	1	D10	103E-00001-0027
KRPC-35-02-W	1	RR1	103E-00005-0005
2N3440	2	Q2,Q3	104E-00003-0002
2N3584	1	Q1	104E-00005-0002
78H05C REG	1	U1	0360-00803-0021
VARISTOR METAL OXIDE 60V	1	VA1	115E-00001-0002
TY-WRAP	4	P/O C1,C2	0017-00042-0048
ZERO OHM RES. JUMPER	16	JW1-JW16	117E-00001-0001
TEST POINTS	10	TP1-TP10	0017-00007-0131
SOLDER LUG	2	P/O C1	0017-00021-0257
JUMPER WIRE 20AWG	2	P/O C1	0017-00033-0448
INSULATOR T0-3	1	P/O U1	0017-00042-0119
INSULATOR T0-5	2	P/O Q2,Q3	0017-00042-0151
INSULATOR T0-66	1	P/O Q1	0017-00042-0158
HEX SPACER	2	P/O Q1	0017-00042-0248
SHIELD	1	P/O Q1	0365-00952-0000
HEATSINK 1	1	P/O U1	112E-00001-0003
HEATSINK 2	1	P/O Q1	112E-00001-0002
HEATSINK 3	1	P/O Q3	112E-00001-0004
BRIDGE SPACER	1	P/O BR1	118E-00001-0001
6-32 X 12 SCREW	4	P/O Q1,U1	0017-00101-0132
6-32 X 5 SCREW	2	P/O Q1	0017-00101-0555
6-32 HEX NUT	4	P/O Q1,U1	0017-00103-0005
LOCKWASHER INT.	4	P/O Q1,	0017-00104-0008
LOCKWASHER EXT.	4	P/O Q1,U1	0017-00104-0009
FLAT WASHER	4	P/O Q1,U1	0017-00104-0106
FUSE CLIP	8	FC1A-FC3B, FC8A,FC8B	0017-00071-0033
FUSE CLIP	8	FC4A-FC7A	0017-00071-0034
3/16 AMP 8AG FUSE	1	F8	0017-00003-0206
3/4 AMP 3AG FUSE	1	F2	0017-00003-0010
5 AMP 3AG FUSE	1	F1*	0017-00003-0175
6 AMP 3AG FUSE	1	F3	0017-00003-0008

CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
8 AMP 3AG FUSE	2	F4,F5	0017-00003-0387
15 AMP 3AG FUSE	2	F6,F7	0017-00003-0011
12 PIN M-N-L CONN. FEMALE	1	J1	0017-00021-0532
6 PIN M-N-L CONN. MALE	1	J2	0017-00021-0424
15 PIN M-N-L CONN. MALE	1	J3	0017-00021-0434
9 PIN M-N-L CONN. MALE	1	J4	0017-00021-0425
12 PIN M-N-L CONN. MALE	1	J5	0017-00021-0426
2 PIN M-N-L CONN. MALE	1	J6	0017-00021-0488
6803 POWER MODULE P.C.B.	1		A080-91785-D000

* TWO FLIPPER GAMES ONLY - SEE SCHEMATIC

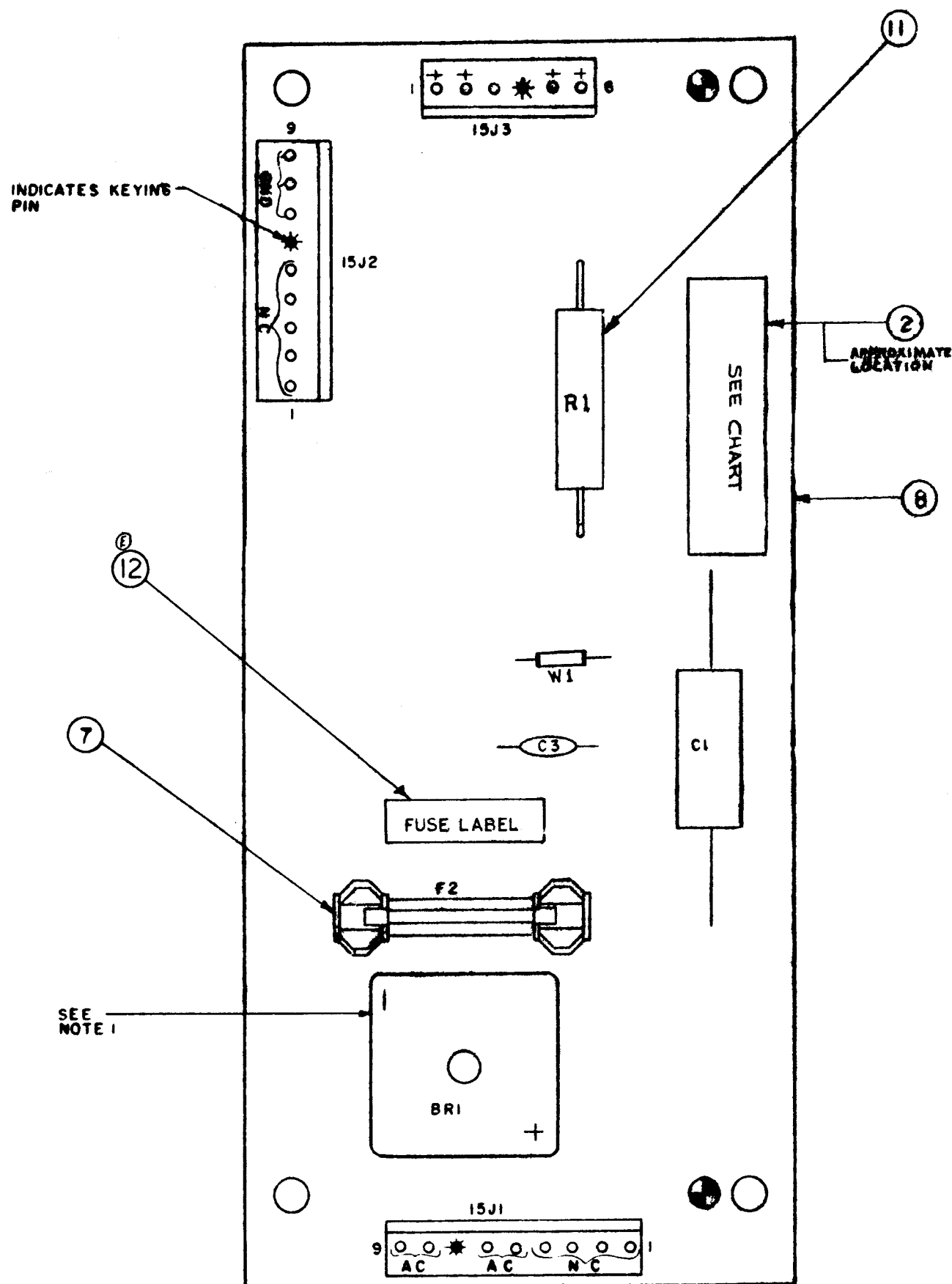


NOTE

* WHEN 3FLIPPERS ARE USED FU1 SHOULD BE 6AMP
WHEN 4FLIPPERS ARE USED FU1 SHOULD BE 7AMP

8/14/86 REV 1 CHANGED C6, C7 TO .01 UF. CMM

NOTES:	MIDWAY MFG. CO.
R. KOHAN	
1PER	6803 PINBALL PHR MODULE
03/11/86	SCHEMATIC DRAWING
	A084-91785-D000
	M051-00C53-D002
	SHEET 1 OF 1 REV



BILL OF MATERIAL

Item	Part No.	Designation	Description	Part Quantity
1	5010-09534	W1	0-ohm resistor	1
2	See Chart		Label--PCB Assy ID	1
3	5040-09794-00	C1	Cap, 100uF/250V axial	1
4	5043-09072-00	C3	Cap, 0.1uF/500V + 80/-20	1
5	5100-09690-00	BR1	5A/200V bridge rectifier	1
6	See Chart	F2	Slow-blow fuse	1
7	5732-09178-00		fuseclip	2
8	5768-09725-00		PC base	1
9	5791-09027-00	J1/J2	9H2391 09-65-1091 conn	2
10	5791-09038-00	J3	6H2391 09-65-1061	1
11	5012-09874-00	R1	8.2K, 5W, 5% Resistor	1
12	See Chart		Fuse Label	1

NOTES:

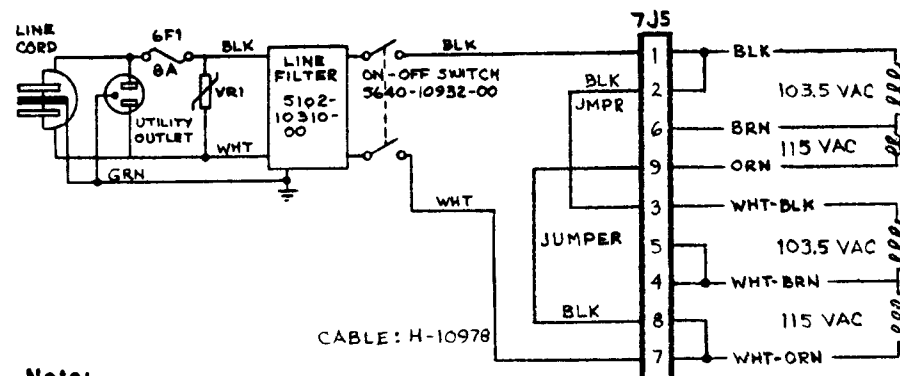
- Item 5 must be mounted 1/8" above surface of Item 8.
- For schematic drawing, please refer to 16-8889.

Label Chart

Assembly Number	Item 2	Item 6		Item 12	
		Part No.	Description	Part No.	Description
C-9939-	16-8850-80	5731-09651-00	Fuse 5B 5A 250V	16-8587-846	Label Fuse 5ASB
C-9939-554	16-8850-171	5731-06314-00	Fuse 5B 4A 250V	16-8587-883	Label Fuse 4ASB

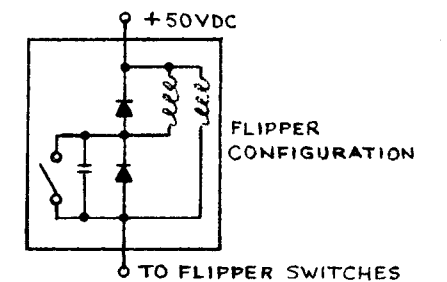
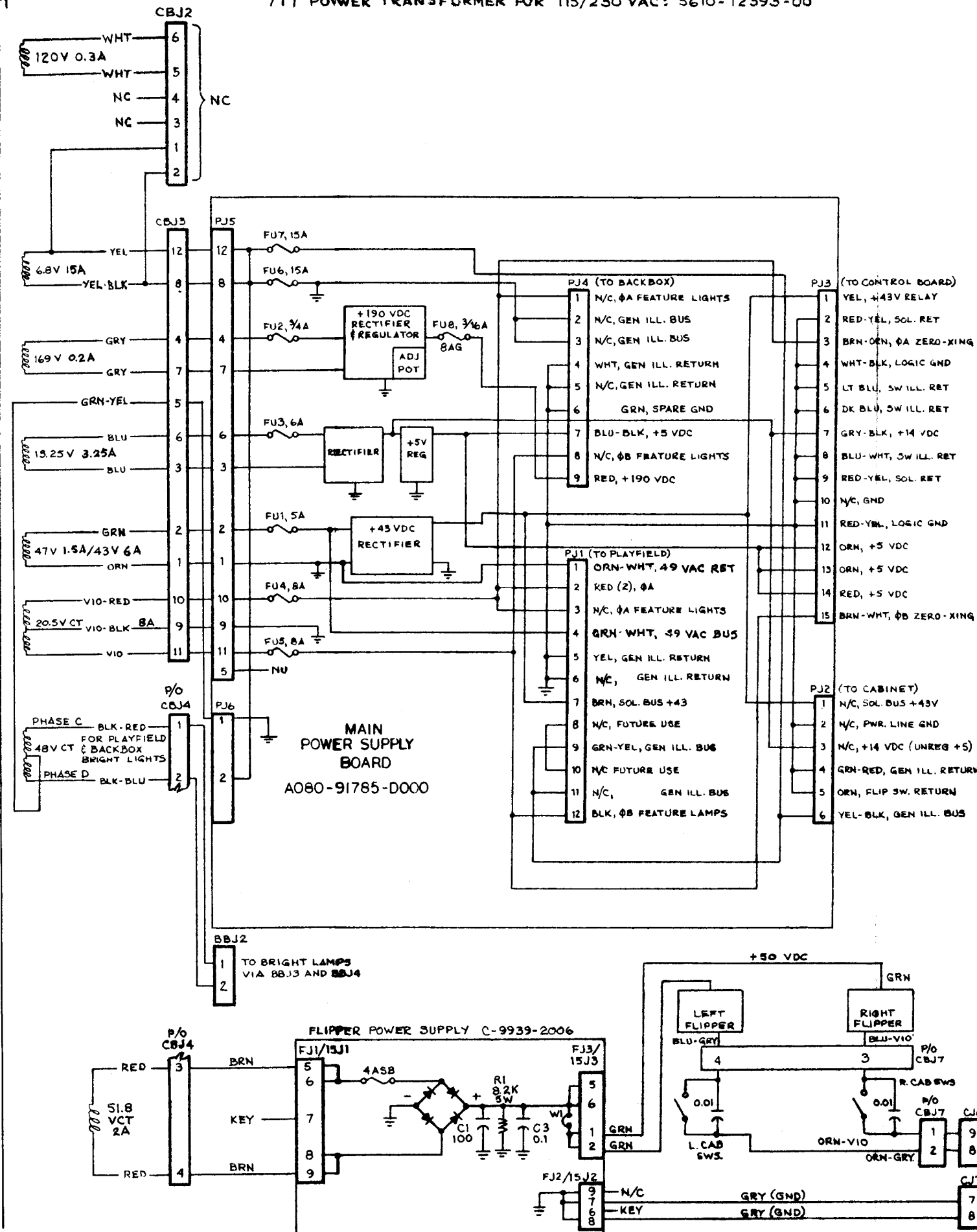
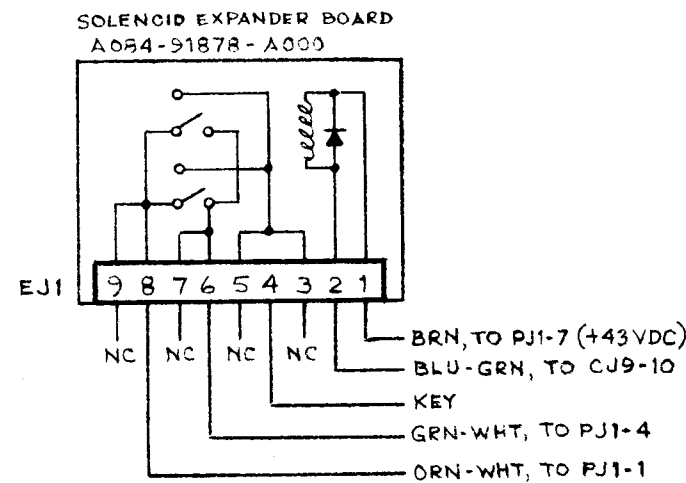
Note: For Flipper Power Supply Schematic, see Power Wiring Diagram.

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ. ENGR. M. JAYS WAL		DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS - BREAK SHARP EDGES		TOLERANCES UNLESS OTHERWISE SPECIFIED	
OWN. BY DATE ROB 7/8/83		FIRST PROJECT NO. 881		FRACTIONAL 1/64 ANGULAR .1" DECIMAL .005 FILLETS .020 MAX		MATERIAL	
CHECKED BY DATE		APPROVAL DATE 7/1/83		WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE. CHICAGO IL 60618		NAME PWR 80-50V DC-ASSV	
SCALE 1/2		INT. LOC. 1		PART NO. C-9939-		REV E	

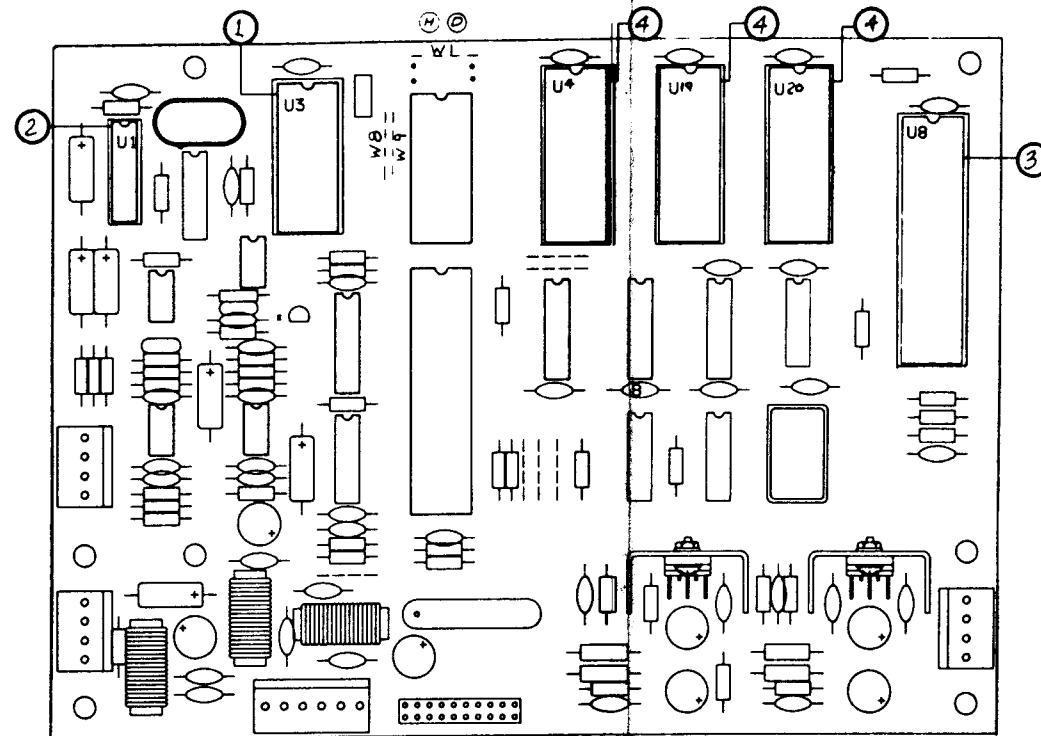


Note:
Transformer Jumpers shown are for 115 V ac.
See Transformer Jumper Chart for other
voltage jumper connections.

TRANSFORMER JUMPER CHART		
206/218 VAC	230 VAC	103.5 VAC
7J5 BLK 1 2 206V 6 218V 9 3 WHT 4 8 7	7J5 BLK 1 2 6 9 3 WHT 4 8 7	7J5 BLK 1 2 6 9 3 WHT 4 8 7
FUSE (6F1): 4A, S-B	4A, S-B	8A, N-B
VARISTOR: 275V	275V	130V
275V Varistor: 5017-09063-00 130V Varistor: 5017-09044-00 4A, S-B Fuse: 5731-06314-00 (for 220V) 8A, N-B Fuse: 5730-09252-00 (for 115V)		



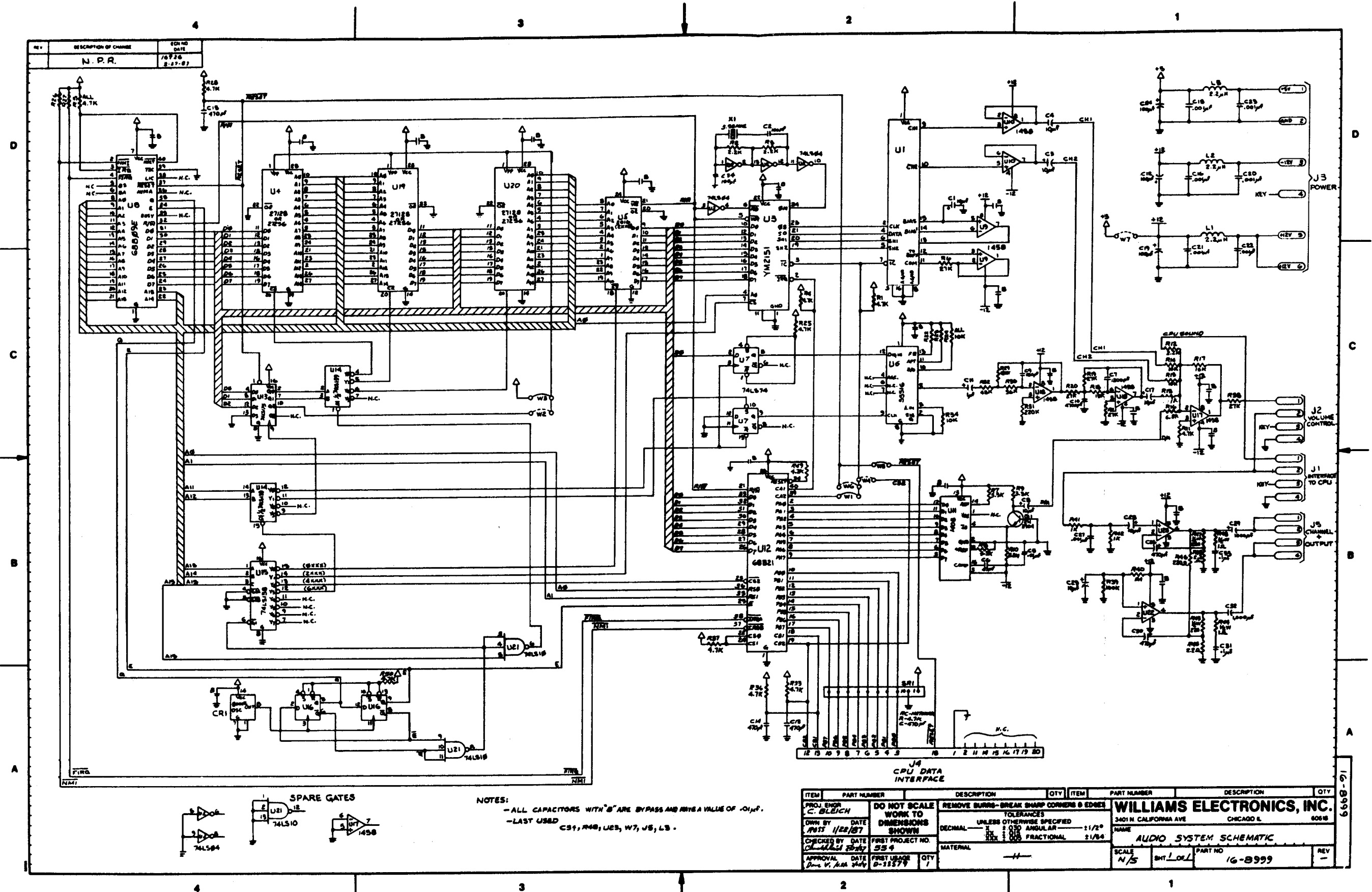
REV.	DESCRIPTION	DATE
1	N.P.R.	1-15-87
2	U-20 FROM 554 (1-14-87)	1-15-87
3	ADDED FIRE GAME INFO TO CHART	1-15-87
4	ADDED BIG GUN GAME INFO TO CHART	1-15-87
5	ADDED SPACE STATION GAME INFO TO CHART	1-15-87
6	ADDED C.I.C. ONE GAME INFO TO CHART	1-15-87
7	ADDED BANANA RUN GAME INFO TO CHART	1-15-87
8	ADDED WORDS OF FURY GAME INFO TO CHART	1-15-87
9	CHANGE PICTORAL VIEW TO REFLECT P.C.S. CHANGE	1-15-87
10	ADDED TAXI GAME INFO TO CHART	1-15-87
11	ADDED TRUCK STOP GAME INFO TO CHART	1-15-87



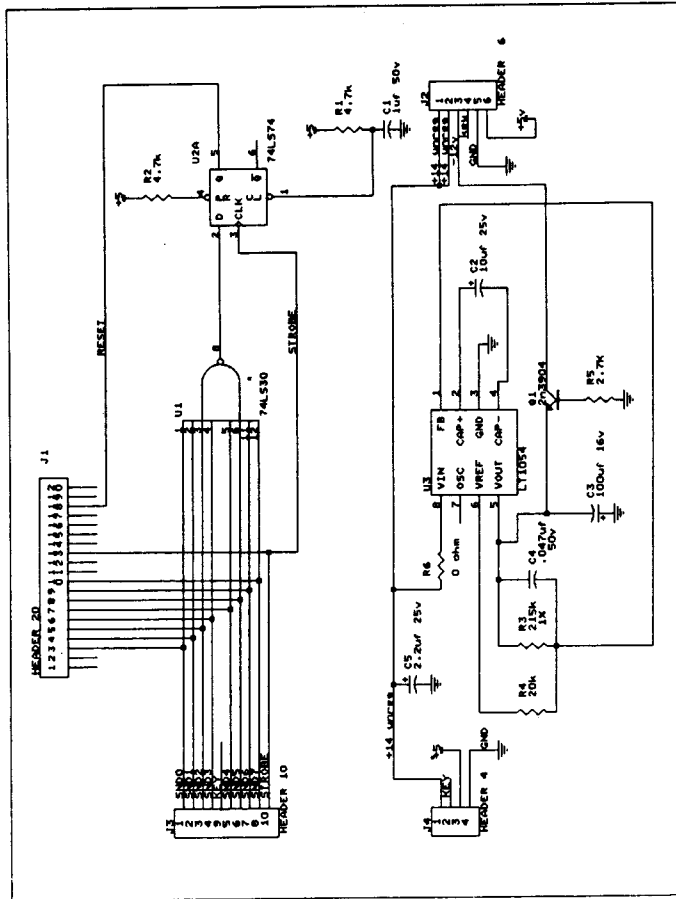
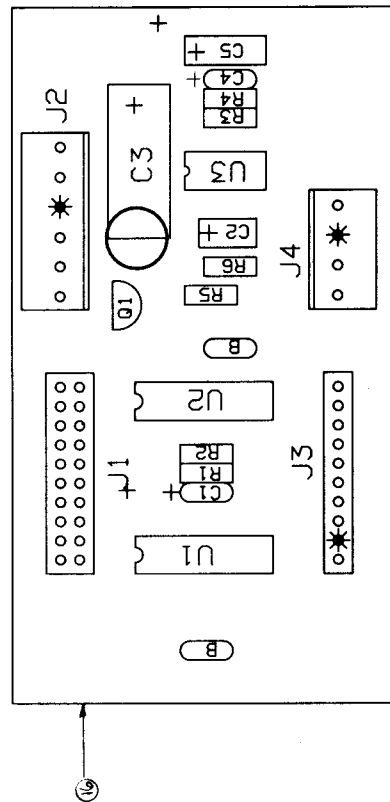
ROM CHART						
GAME	PART NO.	ITEM 6	ITEM 5	ITEM 4	ITEM 3	ITEM 2
F-14	D-11581-554	D-11579	16-8850-173	A-5343-554-5	A-5343-554-6	NOT USED
FIRE	D-11581-556	D-11580	16-8850-178	A-5343-556-5	A-5343-556-6	NOT USED
BIG GUN	D-11581-557	D-11580	16-8850-183	A-5343-557-5	A-5343-557-6	NOT USED
SPACE STATION	D-11581-552	D-11580	16-8850-198	A-5343-552-5	A-5343-552-6	NOT USED
CYCLONE	D-11581-564	D-11579	16-8850-204	A-5343-564-5	A-5343-564-6	NOT USED
BANANA RUN	D-11581-566	D-11580	16-8850-208	A-5343-566-5	A-5343-566-6	NOT USED
WORDS OF FURY	D-11581-559	D-11580	16-8850-218	A-5343-559-5	A-5343-559-6	NOT USED
TAXI	D-11581-553	D-11580	16-8850-224	A-5343-553-5	A-5343-553-6	NOT USED
TRUCK STOP	D-11581-2001	D-11579	16-8850-226	A-5343-2001-1	A-5343-2001-2	A-5343-2001-3

ITEM	PART NO.	PART	DESCRIPTION	QTY
6	SEE CHART		AUDIO PCB SUB-ASSY	1
5	SEE CHART		LABEL - PCB ASSY	1
4	SEE CHART	U4, U5, U6	ROM ASSEMBLY	1
3	5400-10320-00	U8	IC MPU 68B09E	1
2	5371-11087-00	U1	IC YM3012 D/A CONV	1
1	5370-11086-00	U3	IC YM2151 SOUND	1

PROJ ENGR C. BLEICH OWN BY SAM D. 2/11/87 CHECKED BY DATE APPROVAL DATE		DO NOT SCALE WORK TO DIMENSIONS SHOWN FIRST PROJECT NO. 554 FIRST USAGE 554-88		REMOVE BURRS - BREAK SHARP CORNERS & EDGES TOLERANCES DECIMAL FRACTIONAL MATERIAL		WILLIAMS ELECTRONICS, INC. 3401 N. CALIFORNIA AVE CHICAGO IL 60618 NAME AUDIO SYSTEM PCB ASSEMBLY SCALE 1/1 SHT. L OF 1 PART NO. D-11581- REV K	
--	--	---	--	---	--	--	--



Sound Board D-11581-2006 Logic Diagram

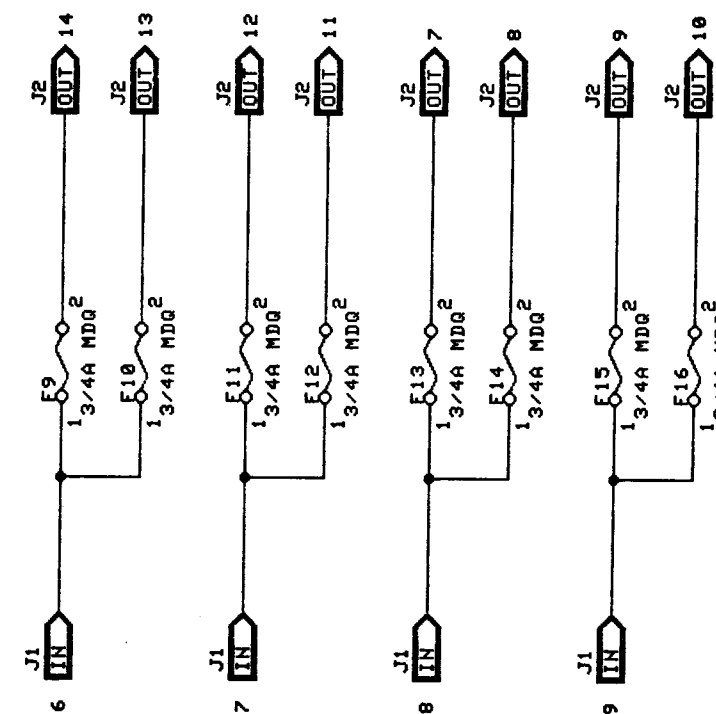
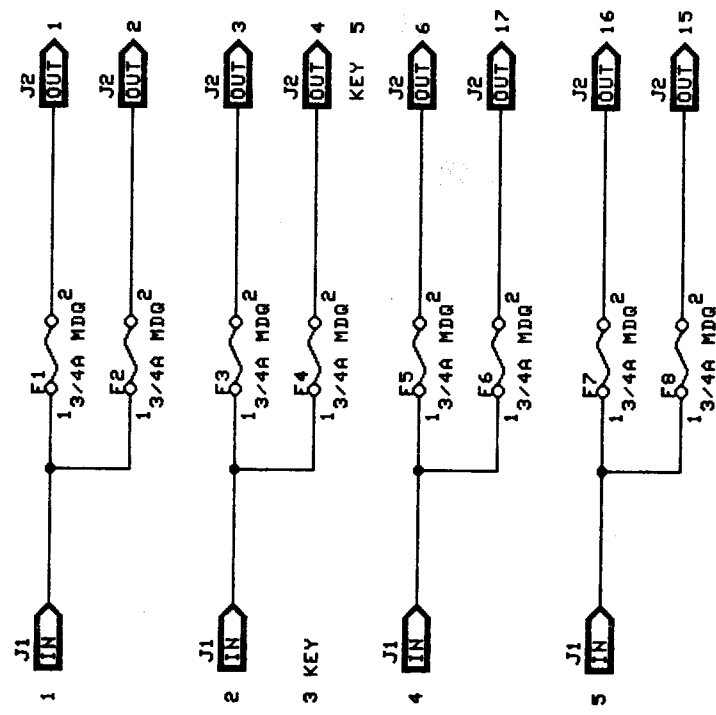
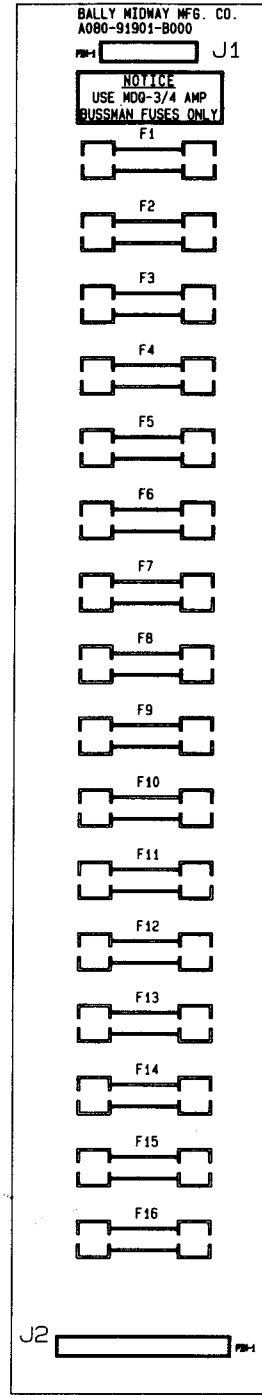


ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY
20	5010-09534-00	R6	0 OHM 1/4W	1
19	5010-08997-00	R5	2.7K OHM 1/4W	1
18	5160-10269-00	Q1	2N3904	1
17	5043-08980-00	B	CAP .01MF 50V axial	2
16	5768-12345-00	PCB	SND INTERFACE PCB	1
15	5041-12360-00	C4	CAP .047MF 50V	1
14	5043-12358-00	C2	CAP 10MF 25V	1
13	5010-08991-00	R1, R2	RES 4.7K 1/4W	2
12	5013-12359-00	R3	RES 215K 1/4W 1%	1
11	5010-10985-00	R4	RES 20K 1/4W	1
10	5041-12361-00	C5	CAP 2.2MF 25V	1
9	5041-12357-00	C3	CAP 100MF 15V	1
8	5791-10862-06	J2	HEADER 6 PIN	1
7	5370-12356-00	U3	LT1054	1
6	5791-10862-04	J4	HEADER 4 PIN	1
5	5791-09437-00	J1	HEADER 20 PIN	1
4	5791-12362-00	J3	HEADER 10 PIN	1
3	5041-09031-00	C1	CAP 1MF 25V axial	1
2	5281-09487-00	U2	IC 74LS74	1
1	5281-10033-00	U1	IC 74LS30	1

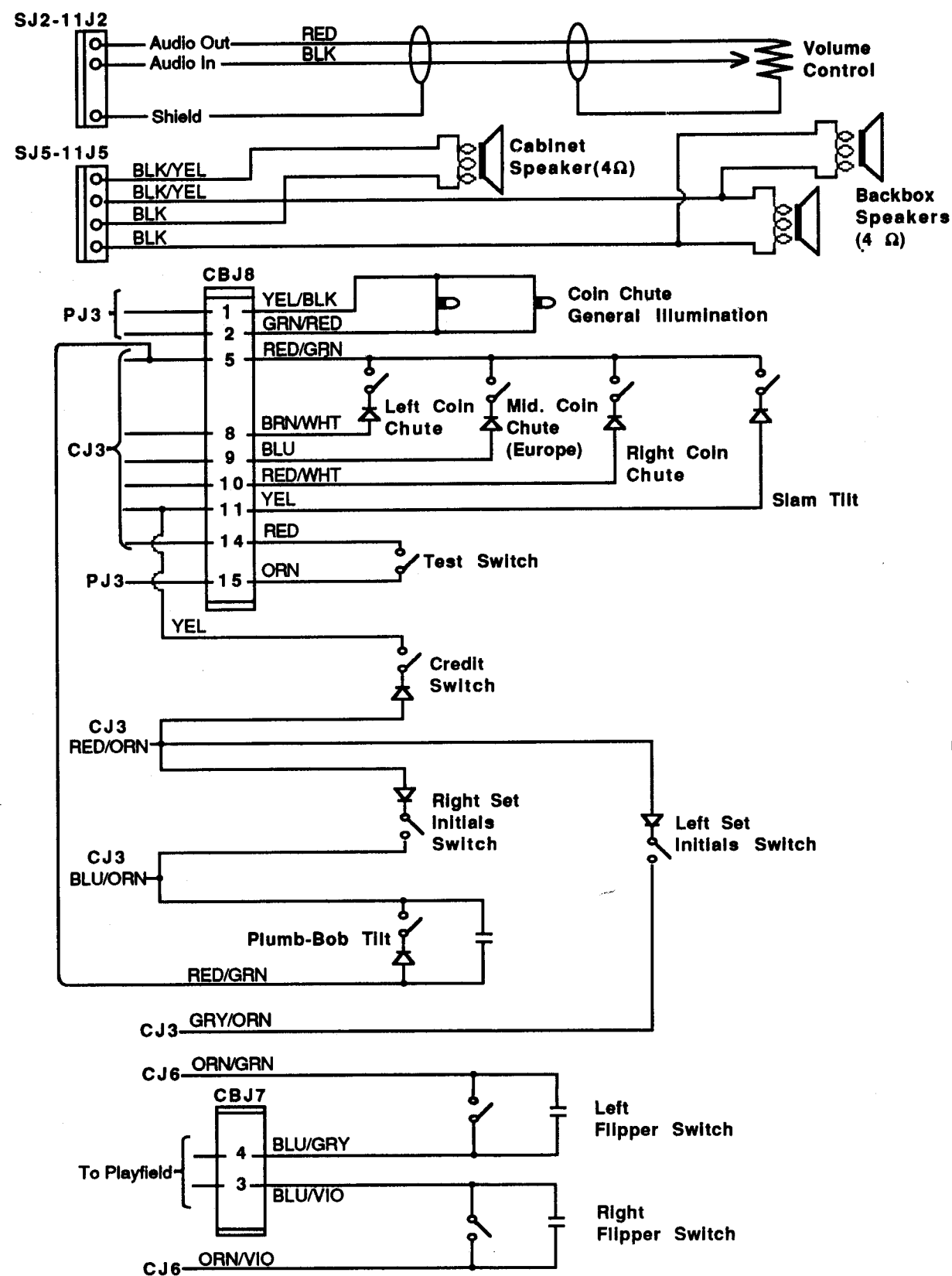
BILL OF MATERIALS

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	J. BOYDSTON	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1	REMOVE BURRS-BREAK SHARP CORNERS & EDGES			
OWN BY	J. BOYDSTON	DATE	11/20	UNLESS OTHERWISE SPECIFIED			
CHECKED BY	J. BOYDSTON	DATE	11/20	DECIMAL			
APPROVED BY	J. BOYDSTON	DATE	11/20	FRACTIONAL			
				MATERIAL			

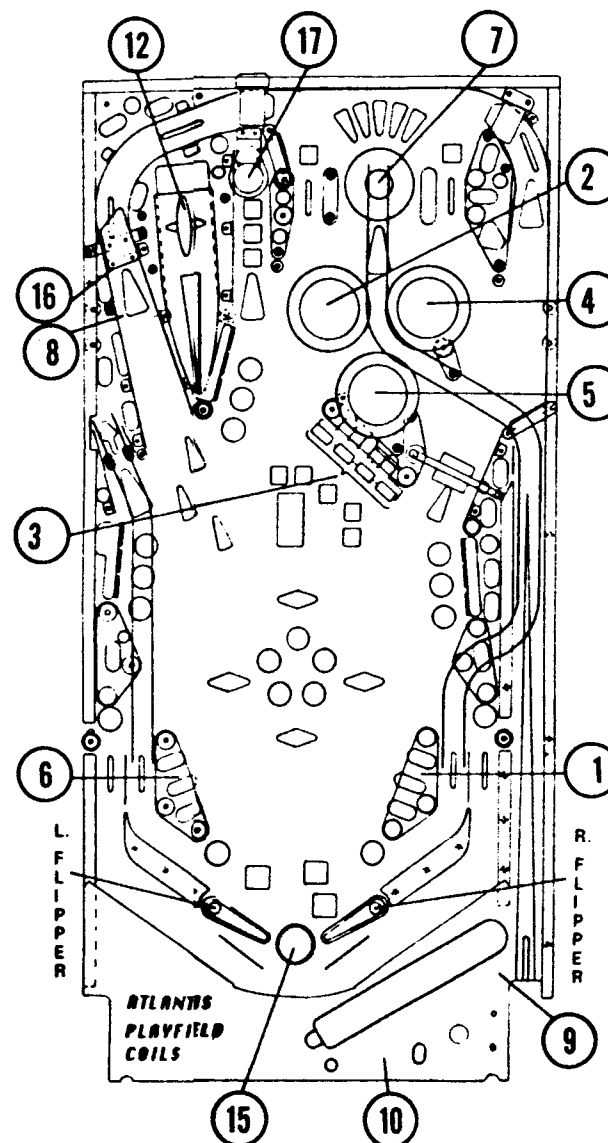
WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE
CHICAGO, IL 60648
NAME
SOUND INTERFACE ASSY
SCALE
2/1
SHEET NO
C-12417
REV



NOTES:
Released for Production JBB 2/4/88
J. BOYDSTON
02-04-88
MIDWAY MFG. CO.
BRIGHT LIGHTS FUSE PCB
A084-91901-2006
M051-00114-B212
SHEET 1 OF 1 REV



ATLANTIS Cabinet Wiring Diagram



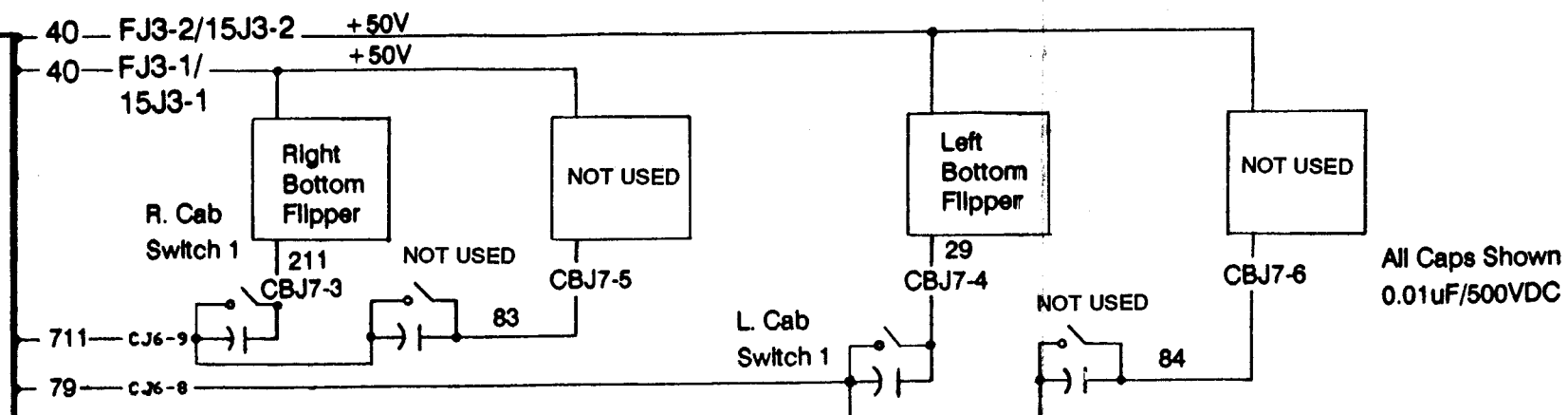
ATLANTIS COIL TABLE

SOL NO.	SOLENOID DESCRIPTION	SOL TYPE	WIRE COLOR	CONNECTIONS CONTROL BOARD	DRIVER TRANSISTOR	SOLENOID PART NUMBER
01	Right Slingshot	Momentary	White-Red	CJ9-1	Q18	A365-00067-0029
02	Left Bumper	Momentary	Yellow-White	CJ6-4	Q14	A365-00067-0006
03	Drop Target Reset	Momentary	Yellow-Blue	CJ6-2	Q12	A365-00067-0019
04	Right Bumper	Momentary	Blue-White	CJ8-6	Q15	A365-00067-0006
05	Middle Bumper	Momentary	Blue-Orange	CJ8-7	Q16	A365-00067-0006
06	Left Slingshot	Momentary	Yellow-Brown	CJ6-5	Q17	A365-00067-0029
07	Popper Kicker	Momentary	Yellow-Red	CJ6-1	Q11	A365-00067-0029
08	Ramp Lift	Momentary	Yellow-Green	CJ6--3	Q13	A365-00067-0006
09	Ball Eject	Momentary	White-Brown	CJ9-6	Q22	A365-00067-0006
10	Outhole	Momentary	White-Black	CJ9-8	Q39	A365-00067-0006
11	Knocker*	Momentary	White-Gray	CJ9-11	Q40	A365-00067-0006
12	Submarine Eject	Momentary	Yellow-Violet	CJ6-7	Q10	A365-00067-0006
13	Not Used	Continuous	Blue-Green	CJ9-10	Q8	--
14	Flipper Enabling Relay	Continuous	--	--	Q7	114E-00001-0011
15	Drain Plug	Momentary	White-Blue	CJ9-2	Q19	A365-00067-0006
16	Ramp Down	Momentary	White-Yellow	CJ9-3	Q20	SM-28-900-DC
17	Saucer	Momentary	White-Green	CJ9-4	Q21	A365-00067-0006
18	Reserved for German	Momentary	White-Orange	CJ9-7	Q38	--
19	Not Used	Continuous	White-Violet	CJ9-9	Q9	--
FLIPPER DESCRIPTION		WIRE COLORS & CONNECTORS				
20	Left Flipper	Gray: CJ6-8				FL-11630
21	Right Flipper	Gray-White: CJ6-9				FL-11630

NOTES:

- For continuous solenoid 19, install jumper JW8. Remove jumper JW9.
- To use switch strobe at CJ4-1, install jumper JW9. Remove jumper JW8.
- To use extra display at CJ2-19, install jumper JW11. Remove jumper JW10.
- *Knocker is located in the backbox.

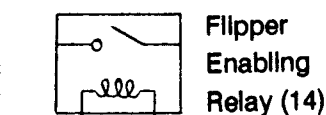
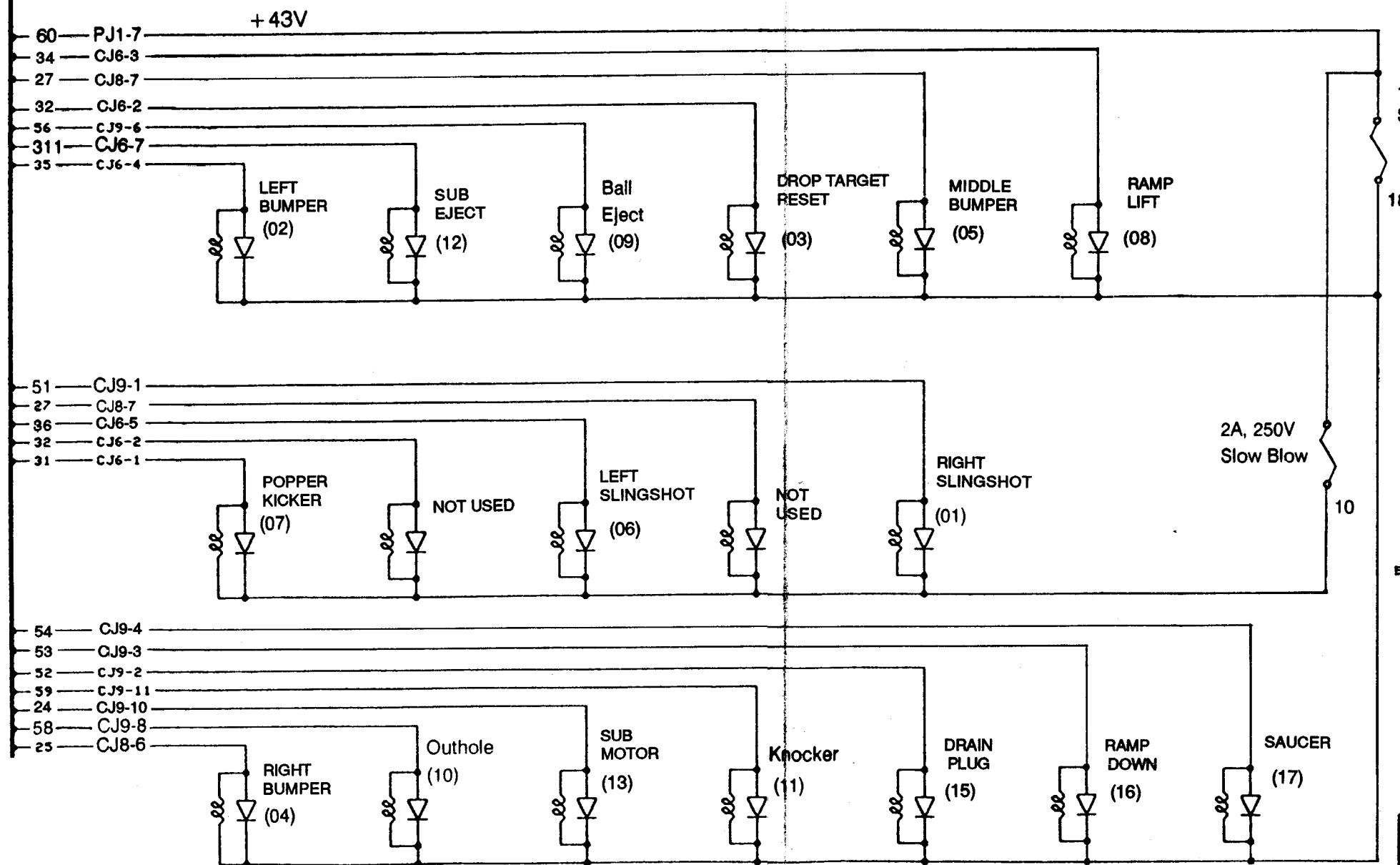
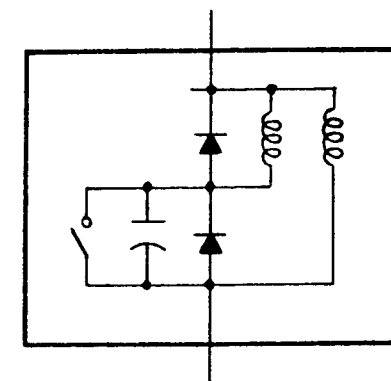
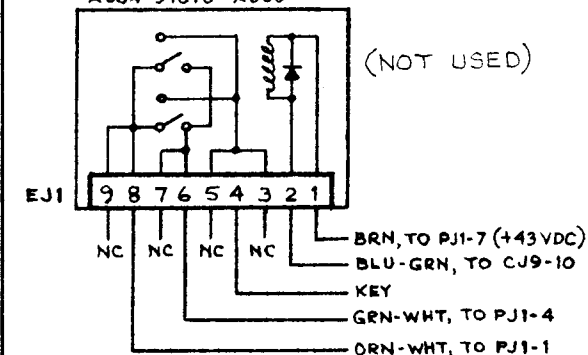
PLAYFIELD



COLOR CODE

1	RED
2	BLUE
3	YELLOW
4	GREEN
5	WHITE
6	BROWN
7	ORANGE
8	BLACK
9	GRAY
0	NO COLOR
11	VIOLET

Flipper Configuration

Flipper Enabling Relay (14)
Control Board (Backbox)SOLENOID EXPANDER BOARD
A084-91878 - A000

SOLENOIDS

NOTES:

H. STONE
3/22/88

MIDWAY MFG. CO.

ATLANTIS
COIL WIRING

REV A

ATLANTIS LAMP TABLES

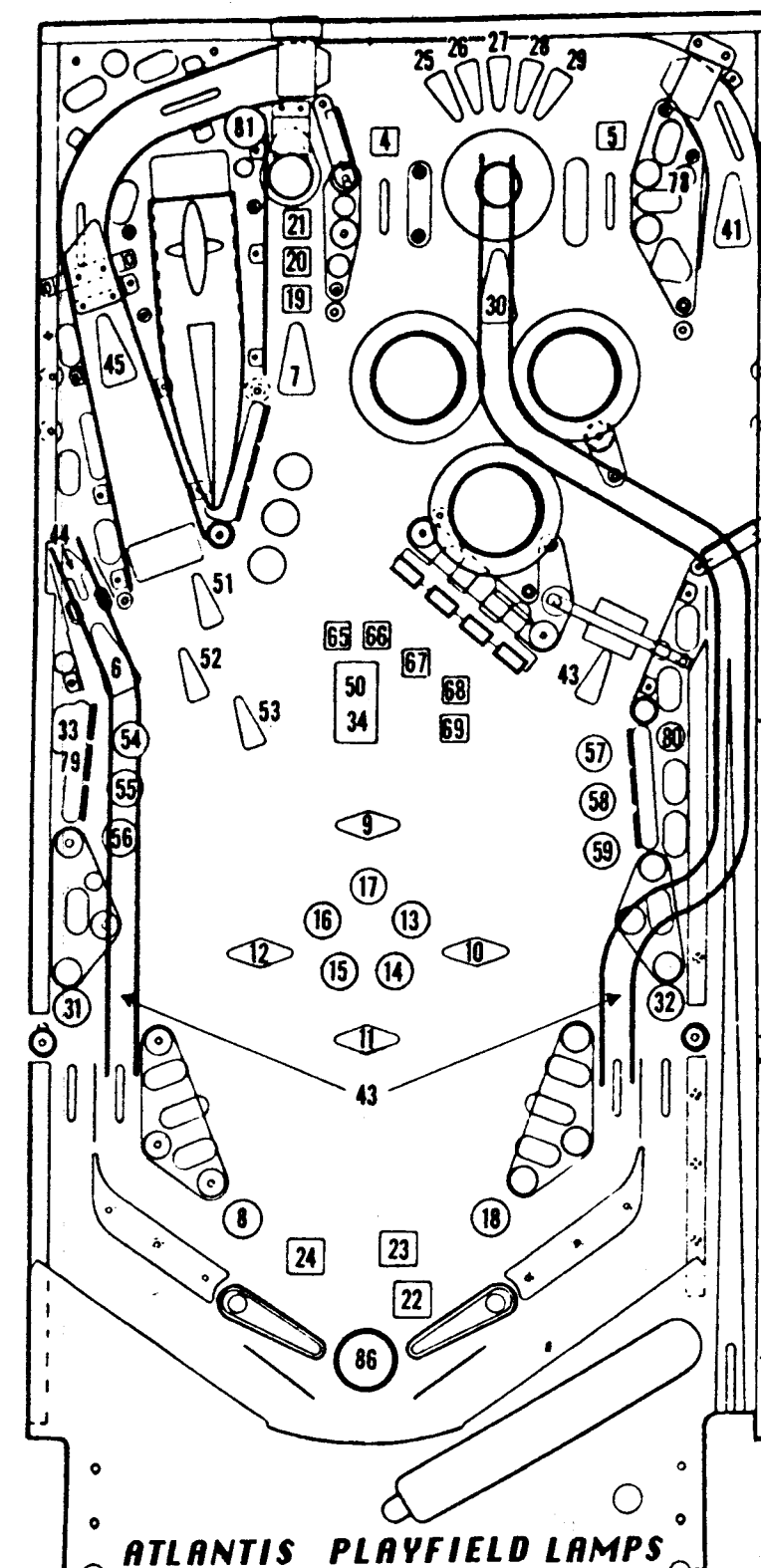
PHASE A AND C LAMP TABLE

CJ10-1 BACKBOX RELAY RED/BLU 1	CJ10-18 BONUS 2K GRN/YEL 9	CJ10-10 BONUS 50K BLU/BLK 17	CJ11-13 POPPER 50K ORG/YEL 25	CJ11-1 BRIGHT, L TARGETS GRN/BLK 33	CJ13-12 R. HOLD BONUS GRY/BRN 41
CJ10-7 RELAY RED GIS BLU/GRN 2	CJ10-4 BONUS 4K RED/WHT 10	CJ10-13 HOLD BONUS YEL/BRN 18	CJ11-10 POPPER 75K BRN/BLK 26	CJ13-1 BRIGHT, DT TIMER BLK/RED 34	CJ13-10 RETURN LANES GRY/GRN 42
CJ10-16 RELAY, WHITE GIS YEL/BLK 3	CJ10-11 BONUS 6K YEL/RED 11	CJ11-8 SAUCER 2X BRN/GRN 19	CJ11-3 POPPER 100K WHT/GRY 27	CJ13-8 BBOX BRIGHT #6 GRY/YEL 35	CJ13-4 SPINNER 1000 BLK/WHT 43
CJ10-2 TOP LANE "A" RED/YEL 4	CJ10-19 BONUS 8K GRN/WHT 12	CJ11-16 SAUCER 3X ORG/BLK 20	CJ11-14 POPPER 125K ORG/BLK 28	CJ13-6 BBOX BRIGHT #1 BLK/ORG 36	CJ13-11 SPOT SEQC ARROW GRY/WHT 44
CJ10-8 TOP LANE "B" BLU/WHT 5	CJ10-5 BONUS 10K RED/WHT 13	CJ11-6 SAUCER 5X BRN/BLU 21	CJ11-9 POPPER 150K BRN/ORG 29	CJ13-2 BRIGHT, L HOLD BONUS BLK/YEL 37	CJ13-7 HOLD BONUS GRY/RED 45
CJ10-17 JACKPOT ARROW GRN/RED 6	CJ10-12 BONUS 20K YEL/BLU 14	CJ11-12 XPLIER 2X ORG/BLU 22	CJ11-2 POPPER XBALL WHT/BLK 30	CJ13-13 BBOX BRIGHT #3 GRY/ORG 38	
CJ10-3 MILLION ARROW RED/GRN 7	CJ10-14 BONUS 30K YEL/ORG 15	CJ11-11 XPLIER 3X ORG/RED 23	CJ11-15 OUTLANE LEFT ORG/WHT 31	CJ13-5 BRIGHT POPPER BLK/BRN 39	
CJ10-9 SPSA BLU/BRN 8	CJ10-6 BONUS 40K BLU/RED 16	CJ11-4 XPLIER 5X BRN/RED 24	CJ11-3 OUTLANE, RIGHT BRN/YEL 32	CJ13-3 BBOX BRIGHT #5 BLK/GRN 40	

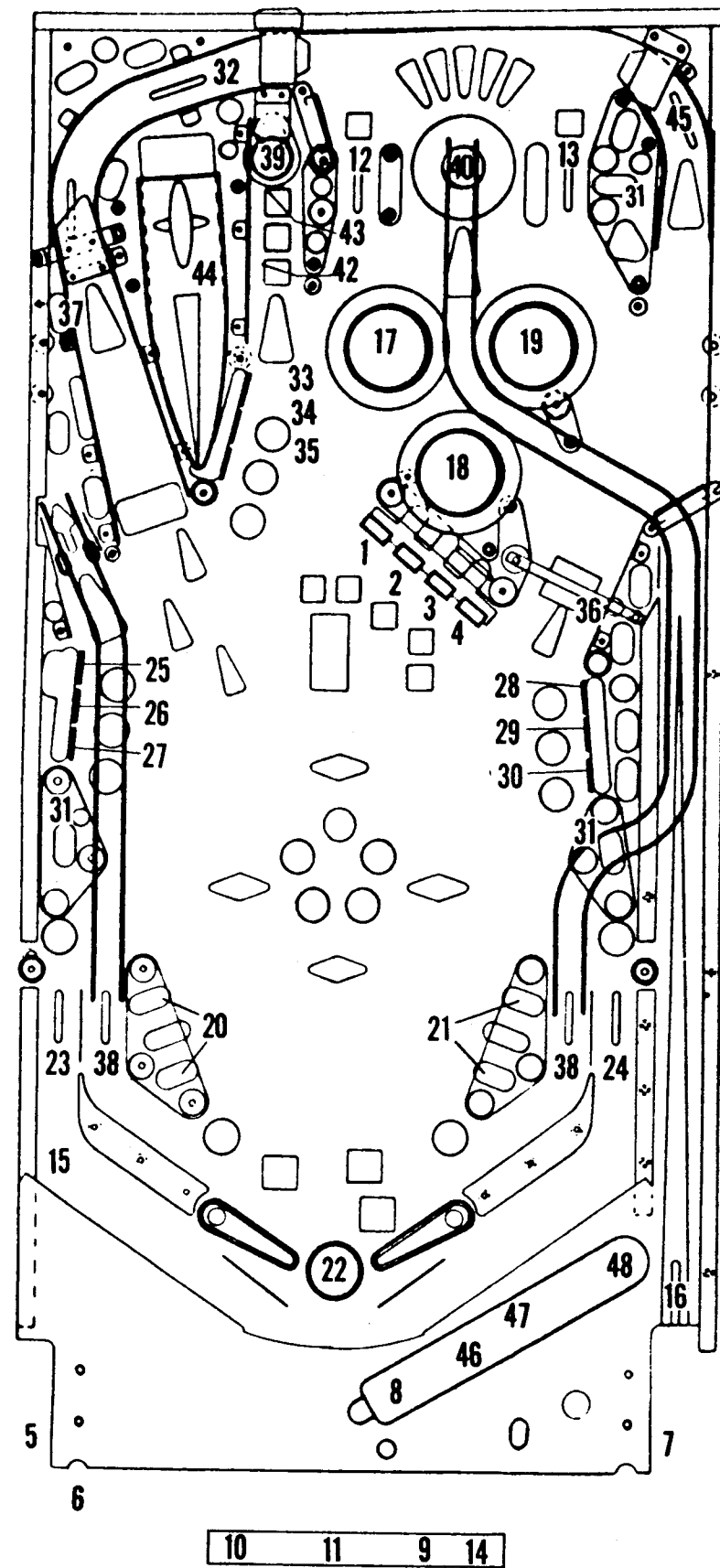
PHASE B AND D LAMP TABLE

CJ10-1 BACKBOX RELAY RED/BLU 46	CJ10-18 L TARGET ORANGE GRN/YEL 54	CJ10-10 TARGET, MID. ORANGE BLU/BLK 62	CJ11-13 JACKPOT, 5 MILLION ORG/YEL 70	CJ11-1 BRIGHT, R. HOLD BONUS GRN/BLK 78	CJ13-12 DRAIN PLUG GRY/BRN 86
CJ10-7 RELAY RED GIS BLU/GRN 47	CJ10-4 L TARGET, WHITE RED/WHT 55	CJ10-13 TARGET, MID. WHITE YEL/BRN 63	CJ11-10 JACKPOT, 1 MILLION BRN/BLK 71	CJ13-1 BRIGHT JACKPOT BLK/RED 79	CJ13-10 GRY/GRN 87
CJ10-16 RELAY, WHITE GIS YEL/BLK 48	CJ10-11 L TARGET, YELLOW YEL/RED 56	CJ11-8 TARGET, MID. YELLOW BRN/GRN 64	CJ11-3 JACKPOT, 15 MILLION WHT/GRY 72	CJ13-8 BRIGHT, R. TARGETS GRY/YEL 80	CJ13-4 BLK/WHT 88
CJ10-2 RED/YEL 49	CJ10-19 R. TARGET, ORANGE GRN/WHT 57	CJ11-16 DT VALUE LIGHTS LANE ORG/BLK 65	CJ11-14 JACKPOT, 2 MILLION ORG/BLK 73	CJ13-6 BRIGHT SAUCER BLK/ORG 81	CJ13-11 GRY/WHT 89
CJ10-8 DT RESET TIMER BLU/WHT 50	CJ10-5 R. TARGET, WHITE RED/WHT 58	CJ11-6 DT VALUE LIGHTS XPLIER BRN/BLU 66	CJ11-9 JACKPOT 25 MILLION BRN/ORG 74	CJ13-2 BBOX BRIGHT #2 BLK/YEL 82	CJ13-7 GRY/RED 90
CJ10-17 LOCK ARROW ORANGE GRN/RED 51	CJ10-12 R. TARGET, YELLOW YEL/BLU 59	CJ11-12 DT VALUE LIGHTS HOLD BON ORG/BLU 67	CJ11-2 JACKPOT 3 MILLION WHT/BLK 75	CJ13-13 BRIGHT, LANE A GRY/ORG 83	
CJ10-3 LOCK ARROW WHITE RED/GRN 52	CJ10-14 NEXT A/B LIGHTS X-BALL YEL/ORG 60	CJ11-11 DT VAUE LIGHTS X-BALL ORG/RED 68	CJ11-15 JACKPOT, 3.5 MILLION ORG/WHT 76	CJ13-5 BBOX BRIGHT #4 BLK/BRN 84	
CJ10-9 LOCK ARROW, YELLOW BLU/BRN 53	CJ10-6 BLU/RED 61	CJ11-4 DT VALUE LIGHTS MILLION BRN/RED 69	CJ11-3 JACKPOT 4 MILLION BRN/YEL 77	CJ13-3 BRIGHT, LANE B BLK/GRN 85	

Playfield Lamp Location Drawing



ATLANTIS SWITCH MATRIX



COLUMN	(1) ST0 WHT/RED CJ4-15	(2) ST1 WHT/BLU CJ4-14	(3) ST2 WHT/YEL CJ4-13	(4) ST3 WHT/GRN CJ4-12	(5) ST4 WHT/BRN CJ4-11	(6) ST5 WHT/VIO CJ4-1
(1) RED CJ4-10	DROP TARGET #1, LEFT 1	COINS, RIGHT #3 9	LEFT BUMPER 17	LEFT TARGET, ORANGE 25	MIDDLE TARGET, ORANGE 33	41
(2) BLUE CJ4-9	DROP TARGET #2 2	COINS, LEFT #1 10	MIDDLE BUMPER 18	LEFT TARGET, WHITE 26	MIDDLE TARGET, WHITE 34	SUB BALL LOWER 42
(3) YELLOW CJ4-8	DROP TARGET #3 3	COINS, MIDDLE #2 11	RIGHT BUMPER 19	LEFT TARGET, YELLOW 27	MIDDLE TARGET, YELLOW 35	SUB BALL UPPER 43
(4) GREEN CJ4-7	DROP TARGET #4, RIGHT 4	TOP LANE "A" 12	LEFT SLINGSHOT 20	RIGHT TARGET, ORANGE 28	SPINNER 36	BALL IN SUBMARINE 44
(5) WHITE CJ4-6	CABINET, LEFT 5	TOP LANE "B" 13	RIGHT SLINGSHOT 21	RIGHT TARGET, WHITE 29	RAMP SENSOR 37	HOLD BONUS 45
(6) BROWN CJ4-4	CREDIT 6	SLAM 14	PLUG-POST SENSOR 22	RIGHT TARGET, YELLOW 30	RETURN LANES 38	LEFT TROUGH #1 46
(7) ORANGE CJ4-3	CABINET, RIGHT 7	TLT 15	LEFT OUTLANE 23	RE-BOUNDERS 31	SAUCER 39	MIDDLE TROUGH #2 47
(8) BLACK CJ4-2	OUTHOLE 8	SHOOTER LANE 16	RIGHT OUTLANE 24	TURN AROUND LOOP 32	POPPER DISH 40	RIGHT TROUGH #3 48

NOTE: I = Input and ST = Strobe
Columns 7 and 8 have been omitted, since they contain null values in this matrix.

PHASE A AND C LAMP TABLE

CJ10-1 BACKBOX RELAY RED/BLU 1	CJ10-18 BONUS 2K GRN/YEL 8	CJ10-10 BONUS 50K BLU/BLK 17	CJ11-13 POPPER 50K ORG/YEL 25	CJ11-1 BRIGHT, L TARGETS GRN/BLK 33	CJ13-12 R. HOLD BONUS GRY/BRN 41
CJ10-7 RELAY RED GIS BLU/GRN 2	CJ10-4 BONUS 4K RED/WHT 10	CJ10-13 HOLD BONUS YEL/BRN 18	CJ11-10 POPPER 70K BRN/BLK 26	CJ13-1 BRIGHT, DT. TIMER BLK/RED 34	CJ13-10 RETURN LANES GRY/GRN 42
CJ10-16 RELAY, WHITE GIS YEL/BLK 3	CJ10-11 BONUS 6K YEL/RED 11	CJ11-8 SAUCER 2X BRN/GRN 19	CJ11-3 POPPER 100K WHT/GRY 27	CJ13-8 BBOX BRIGHT #6 GRY/YEL 35	CJ13-4 SPINNER 1000 BLK/WHT 43
CJ10-2 TOP LANE "A" RED/YEL 4	CJ10-19 BONUS 8K GRN/WHT 12	CJ11-16 SAUCER 3X ORG/BLK 20	CJ11-14 POPPER 125K ORG/BLK 28	CJ13-6 BBOX BRIGHT #1 BLK/ORG 36	CJ13-11 SPOT SECC ARROW GRY/WHT 44
CJ10-8 TOP LANE "B" BLU/WHT 5	CJ10-5 BONUS 10K RED/WHT 13	CJ11-6 SAUCER 5X BRN/BLU 21	CJ11-9 POPPER 150K BRN/ORG 29	CJ13-2 BRIGHT, L. HOLD BONUS BLK/YEL 37	CJ13-7 HOLD BONUS GRY/RED 45
CJ10-17 JACKPOT ARROW GRN/RED 6	CJ10-12 BONUS 20K YEL/BLU 14	CJ11-12 XPLER 2X ORG/BLU 22	CJ11-2 POPPER XBALL WHT/BLK 30	CJ13-13 BBOX BRIGHT #3 GRY/ORG 38	
CJ10-3 MILLION ARROW RED/GRN 7	CJ10-14 BONUS 30K YEL/ORG 15	CJ11-11 XPLER 3X ORG/RED 23	CJ11-15 OUTLINE, LEFT ORG/WHT 31	CJ13-5 BRIGHT POPPER BLK/BRN 39	
CJ10-9 SPSA BLU/BRN 8	CJ10-6 BONUS 40K BLU/RED 16	CJ11-4 XPLER 5X BRN/RED 24	CJ11-3 OUTLINE, RIGHT BRN/YEL 32	CJ13-3 BBOX BRIGHT #5 BLK/GRN 40	

PHASE B AND D LAMP TABLE

CJ10-1 BACKBOX RELAY RED/BLU 46	CJ10-18 L. TARGET, YELLOW GRN/YEL 54	CJ10-10 TARGET, MID. ORANGE BLU/BLK 62	CJ11-13 JACKPOT, 5 MILLION ORG/YEL 70	CJ11-1 BRIGHT, R. HOLD BONUS GRN/BLK 78	CJ13-12 DRAIN PLUG GRY/BRN 86
CJ10-7 RELAY RED GIS BLU/GRN 47	CJ10-4 L. TARGET, WHITE RED/WHT 55	CJ10-13 TARGET, MID. WHITE YEL/BRN 63	CJ11-10 JACKPOT, 1 MILLION BRN/BLK 71	CJ13-1 BRIGHT JACKPOT BLK/RED 79	CJ13-10 GRY/GRN 87
CJ10-16 RELAY, WHITE GIS YEL/BLK 48	CJ10-11 L. TARGET, YELLOW YEL/RED 56	CJ11-8 TARGET, MID. YELLOW BRN/GRN 64	CJ11-3 JACKPOT, 15 MILLION WHT/GRY 72	CJ13-8 BRIGHT, R. TARGETS GRY/YEL 80	CJ13-4 BLK/WHT 88
CJ10-2 RED/YEL 49	CJ10-19 R. TARGET, ORANGE GRN/WHT 57	CJ11-16 DT VALUE LIGHTS LANE 65	CJ11-14 JACKPOT, 2 MILLION ORG/BLK 73	CJ13-6 BRIGHT SAUCER BLK/ORG 81	CJ13-11 GRY/WHT 89
CJ10-8 DT RESET TIMER BLU/WHT 50	CJ10-5 R. TARGET, WHITE RED/WHT 58	CJ11-6 DT VALUE LIGHTS XPLER 66	CJ11-9 JACKPOT 25 MILLION BRN/ORG 74	CJ13-2 BBOX BRIGHT #2 BLK/YEL 82	CJ13-7 GRY/RED 90
CJ10-17 LOCK ARROW ORANGE 51	CJ10-12 R. TARGET, YELLOW YEL/BLU 59	CJ11-12 DT VALUE LIGHTS HOLD BOX 67	CJ11-2 JACKPOT 3 MILLION WHT/BLK 75	CJ13-13 BRIGHT, LANE A GRY/ORG 83	
CJ10-3 LOCK ARROW WHITE 52	CJ10-14 NEXT A/B LIGHTS X-BALL 60	CJ11-11 DT VALUE LIGHTS X-BALL 68	CJ11-15 JACKPOT, 3.5 MILLION ORG/WHT 76	CJ13-5 BBOX BRIGHT #4 BLK/BRN 84	
CJ10-9 LOCK ARROW, YELLOW 53	CJ10-6 BLU/RED 61	CJ11-4 DT VALUE LIGHTS MILLION 69	CJ11-3 JACKPOT 4 MILLION BRN/YEL 77	CJ13-3 BRIGHT, LANE B BLK/GRN 85	

WARNINGS & NOTICES

WARNING

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

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

SUBSTITUTE PARTS OR MODIFICATIONS may void FCC Type Acceptance.

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

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

WARNING

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

WARNING

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

WARNING

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

WARNING

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

RF-INTERFERENCE NOTICE

YOUR GAME'S CABLE-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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