

# JOHNNY MNEMONIC™

OPERATIONS MANUAL INCLUDES

Operations & Adjustments • Testing & Problem Diagnosis • Parts Information • Wiring  
Diagrams & Schematics

Williams Electronics Games, Inc., 3401 N. California Avenue, Chicago, IL 60618



FLIPPERSPILL.COM

## DIP SWITCH SETTINGS AND JUMPERS

EPROM Jumper Settings for U6	W1	W2
1MEG, 2MEG, 4 MEG EPROM	In	Out

### DIP Switch Chart

COUNTRY	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
AMERICA	Off	Off	On	On	On	On	On	On
EUROPEAN	Off	Off	On	On	On	Off	On	On
FRENCH	Off	Off	On	On	On	On	Off	Off
GERMAN	Off	Off	On	On	On	On	On	Off
SPAIN	Off	Off	On	On	Off	On	On	On

## SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive Xistor	Voltage Connections			Drive Wire Color	Solenoid Part No. Flashlamp Type	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox
01	TROUGH EJECT	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	AUTOPLUNGER	High Power	J107-2			Q80	J130-2			Vio-Red	AE-23-800	
03	POPPER	High Power	J107-2			Q78	J130-4			Vio-Org	AE-24-900	
04	NOT USED	High Power				Q76				Vio-Yel		
05	CLEAR MATRIX	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-25-1000	
06	HAND MAGNET	High Power	J107-2			Q66	J130-7			Vio-Blu	20-10201	
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk	AE-23-800	AE-23-800
08	NOT USED	High Power				Q70				Vio-Gry		
09	LEFT SLINGSHOT	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	RIGHT SLINGSHOT	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	LEFT JET BUMPER	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	BOTTOM JET BUMPER	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	RIGHT JET BUMPER	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	CRAZY BOB'S EJECT	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1500	
15	DROP TARGET UP	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200	
16	DROP TARGET DOWN	Low Power	J107-3			Q44	J127-9			Brn-Gry	SM1-26-600	
17	JETS FLASHER	Flasher	J107-6			Q42	J126-1			Blk-Brn	#89	
18	CRAZY BOB'S FLASHER	Flasher	J107-6	J106-5		Q40	J126-2	J125-2		Blk-Red	#906	#906
19	LEFT SLINGSHOT FLSHR	Flasher	J107-6			Q38	J126-3			Blk-Org	#906	
20	RIGHT SLINGSHOT FLSHR	Flasher	J107-6	J106-5		Q36	J126-4	J125-5		Blk-Yel	#906	#906
21	*X MOTOR DIRECTION	Flasher	J107-6			Q28	J126-5			Blu-Grn	**A-20532	
22	*X MOTOR ENABLE	Flasher	J107-6			Q30	J126-6			Blu-Blk	**A-20532	
23	*Y MOTOR DIRECTION	Flasher	J107-6			Q34	J126-7			Blu-Vio	**A-20532	
24	*Y MOTOR ENABLE	Flasher	J107-6			Q32	J126-8			Blu-Gry	**A-20532	
25	LEFT RAMP FLASHER	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#906	#906
26	RIGHT RAMP FLASHER	Gen. Purpose	J107-6			Q24	J122-2			Blu-Red	#906	
27	HAND POPPER FLASHER	Gen. Purpose	J107-6			Q22	J122-3			Blu-Org	#89	
28	RIGHT BACKPANEL FLSH	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-5		Blu-Yel	#906	#906

### General Illumination

01	STRING 1	G.I.	J121-1	J120-1		Q18	J121-7	J120-7		Wht-Brn	#44	#555
02	STRING 2	G.I.	J121-2	J120-2		Q10	J121-8	J120-8		Wht-Org	#44	#555
03	STRING 3	G.I.	J121-3	J120-3		Q14	J121-9	J120-9		Wht-Yel	#44	#555
04	STRING 4	G.I.	J121-5			Q16	J121-10			Wht-Grn	#44	
05	STRING 5	G.I.		J120-6	J119-3	Q12		J120-11	J119-1	Wht-Vio		#555

Flipper Circuits		Voltage Connection	Drive Transistors		Drive Connections	Drive Wire Colors		Coil Part No.	Coil Colors
			Playfield	Power Hold		Playfield	Power Hold		
29		Lwr. Rt. Power	J907-1 (Red-Grn)	Q4	J902-13	Yel-Grn			
30	LOWER RIGHT FLIPPER	Lwr. Rt. Hold	J907-1 (Red-Grn)	Q11	J902-11	Org-Grn		FL-11629	BLUE
31		Lwr. Lt. Power	J907-4 (Red-Blu)	Q3	J902-9	Yel-Blu			
32	LOWER LEFT FLIPPER	Lwr. Lt. Hold	J907-4 (Red-Blu)	Q9	J902-7	Org-Blu		FL-11629	BLUE
33		Upr. Rt. Power	J907-6 (Red-Vio)	Q2	J902-6	Yel-Vio			
34	LEFT DIVERTER	Upr. Rt. Hold	J907-6 (Red-Vio)	Q7	J902-4	Org-Vio		FL-11753	YELLOW
35		Upr. Lt. Power	J907-8 (Red-Gry)	Q1	J902-3	Yel-Gry			
36	RIGHT DIVERTER	Upr. Lt. Hold	J907-8 (Red-Gry)	Q5	J902-1	Org-Gry		FL-11753	YELLOW

J1XX = POWER DRIVER BOARD; J9XX = FLIPTRONIC II BOARD

24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

\*THE X MOTOR AND Y MOTOR PART NUMBER IS 14-8025.

\*\* A-20532 IS THE PART NUMBER FOR THE DUAL RELAY MOTOR DRIVER BOARD.

# ATTENTION

The game uses a new Security CPU Board that is not downward compatible to the CPU boards used in previous games. The new board has an added security chip that can be interchanged between other **JOHNNY MNEMONIC™** games and software revision levels. The CPU board itself is interchangeable with later model games, but must be equipped with the correct security chip and software for that specific game.

The games' electronic ID number is shown in the display during power-up. The number displayed is the same nine digit number printed on the security chip label. The first three digits are the project number without the country specific code. An example of the power-up display is shown below, the electronic ID number is bolded.

TESTING		
50042		EPROM 1.0 A
<b>542</b>	<b>100006</b>	<b>95749</b>

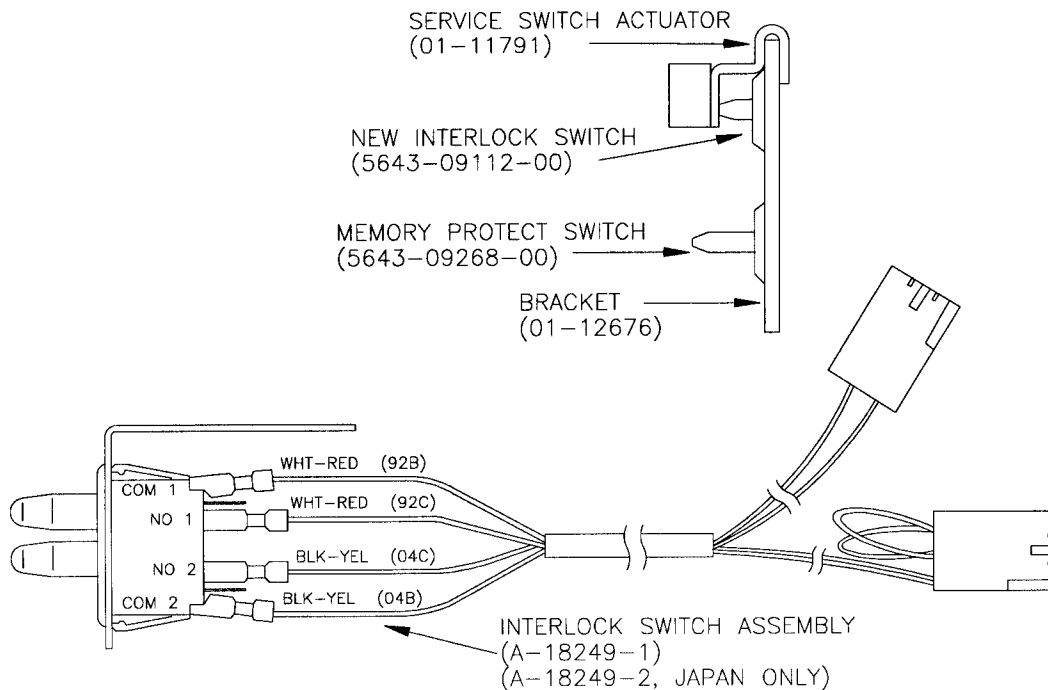
# IMPORTANT NOTICE

## PLEASE READ

This pinball game is equipped with a SAFETY FEATURE to prevent shocks from the solenoid circuit when the coin door is opened. A new interlock switch assembly (part no. A-18249-1), located at the left of the coin door opening, has been added to the game. This assembly is a bracket containing the existing memory protect switch on the bottom and a new interlock switch on the top. When the coin door is opened, this new interlock switch opens, breaking the connection to the +50V and +20V winding of the transformer secondary.

A special tool called the Service Switch Actuator is provided for the serviceman/technician that repairs the game. This tool is painted yellow and located in a bag stapled inside the cabinet. The service Switch Actuator slips over the interlock switch and holds it closed while the coin door is opened, allowing the serviceman to test and repair the solenoid circuit.

Hold the top interlock switch in, then slide the short end of the Service Switch Actuator over the top of the interlock switch bracket and the long end over the center of the switch plunger to hold it in.



# JOHNNY MNEMONIC™

**Information current at time of release.**

**Fill out and mail in game Registration card. Be sure to include the game serial number. For your records, write the PIC and game serial numbers in manual.**

**Williams Electronics Games, Inc. reserves the rights to make modifications and improvements to its products. The specifications and parts identified in this manual are subject to change without notice.**

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***JOHNNY  
MNEMONIC™***

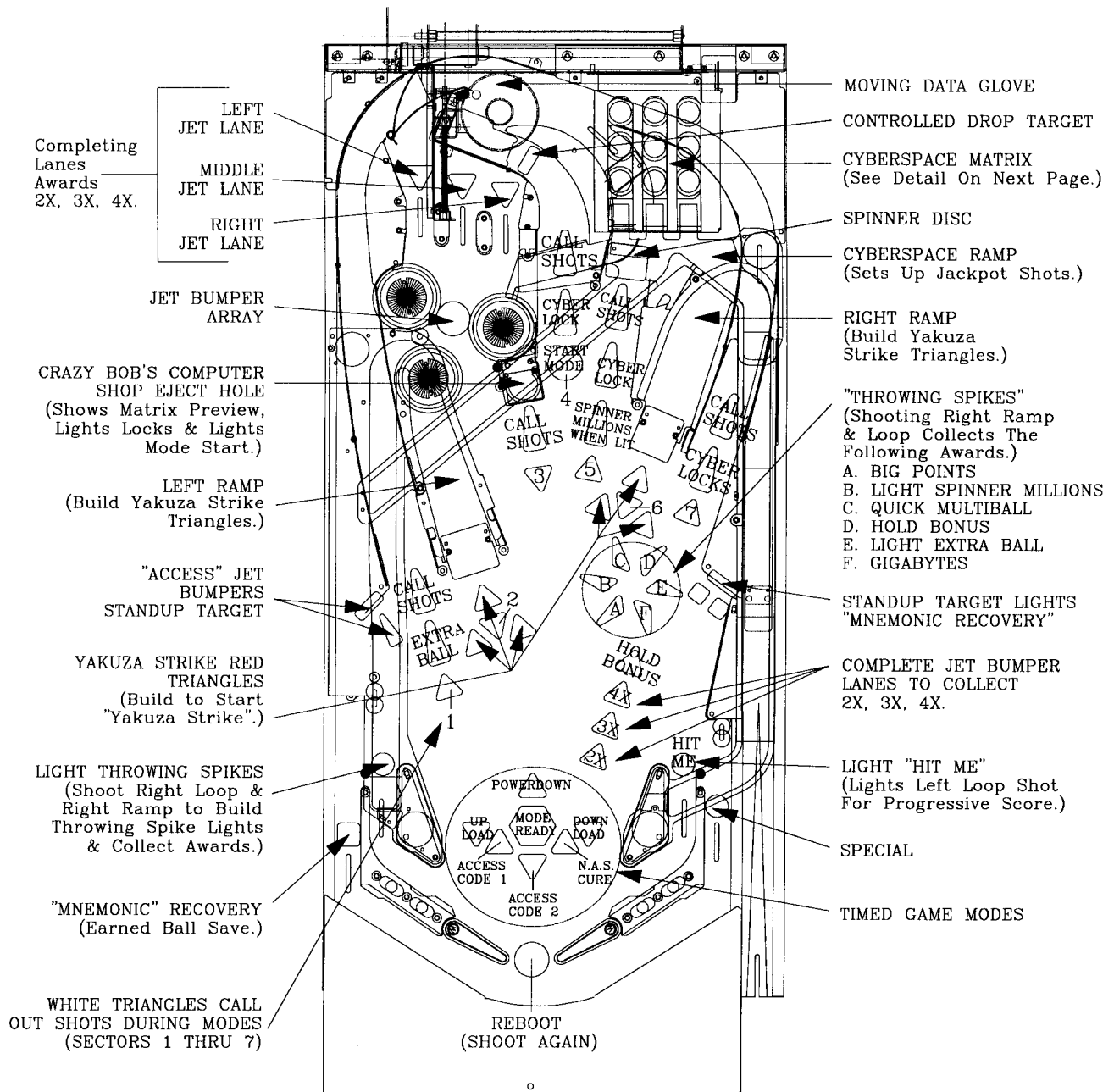
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**PLAYFIELD SHOTS**

**AND**

**RULES**

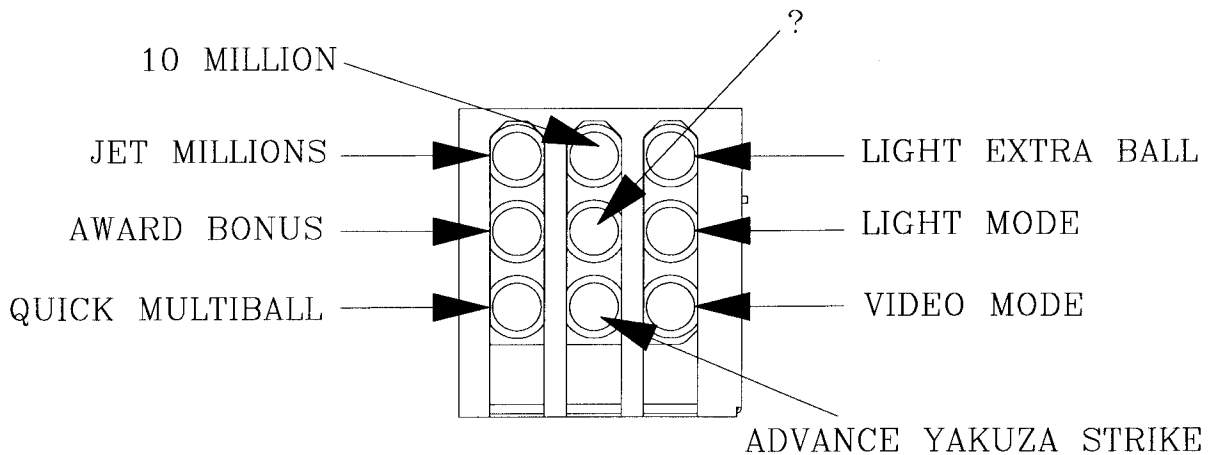
# PLAYFIELD SHOTS



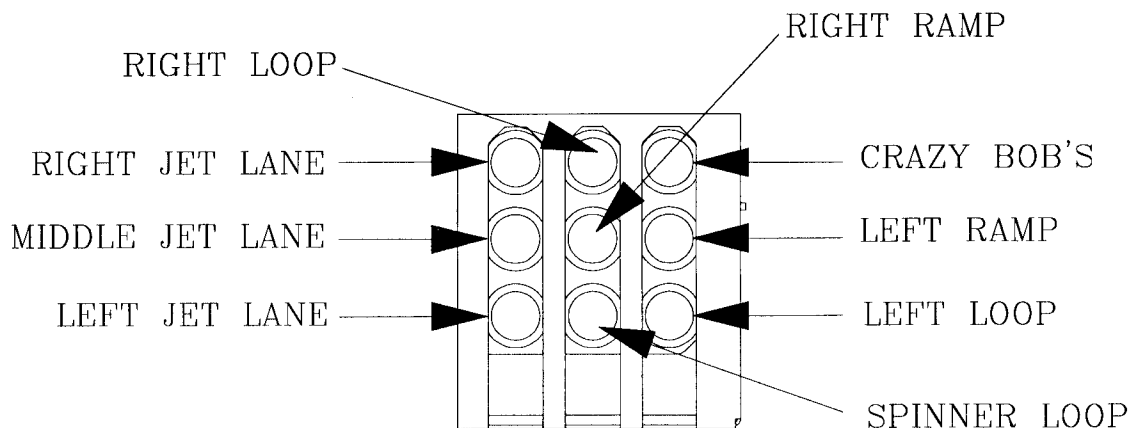
# CYBERSPACE MATRIX SHOTS

- ⇒ WHEN A BALL IS PLACED IN THE MATRIX, EACH HOLE GIVES YOU AN AWARD. THE AWARDS AND THEIR POSITIONS CHANGE.
- ⇒ PUT THREE BALLS IN THE MATRIX TO START MULTIBALL.
- ⇒ POSITION OF THE BALLS IN THE MATRIX DETERMINES WHICH SHOTS WILL BE LIT FOR JACKPOT.
- ⇒ THREE BALLS IN A LINE AWARDS 3X JACKPOT VALUES .

## SAMPLE AWARD MATRIX



## SAMPLE JACKPOT MATRIX



**SKILL SHOT:**

Each time a ball is served for the player to launch, a SKILL SHOT is available in the top JET BUMPER entry lanes. A SKILL SHOT point value is awarded by using the flipper buttons to LANE CHANGE such that the ball rolls over the blinking light.

**MNEMONIC RECOVERY:**

This is a virtual kickback feature where the ball is returned to play by the AUTOFIRE mechanism. The RIGHT STANDUP TARGET controls the lighting of the MNEMONIC RECOVERY arrow. The standup must be hit twice to light this feature. This feature can also be lit by locking a ball in the MYSTERY AWARD position of the CYBERSPACE MATRIX.

**THROWING SPIKE:**

Each time the LEFT RETURN LANE switch is made and the LITE THROWING SPIKE lamp is lit, the THROWING SPIKE feature is lit for a timed period. Making either the RIGHT RAMP or RIGHT LOOP shot awards the next award in the following order:

1. GIGABYTES
2. BIG POINTS
3. LITE SPINNER MILLIONS
4. QUICK MULTIBALL
5. HOLD BONUS
6. LITE EXTRA BALL

**SPINNER MILLIONS:**

When SPINNER MILLIONS is lit, the SPINNER shot adds points to a SPINNER MILLIONS total value which is awarded at BONUS COUNT.

**QUICK MULTIBALL:**

QUICK MULTIBALL is a two ball multiball started by the fourth THROWING SPIKE award. During QUICK MULTIBALL, the LEFT and RIGHT RAMPS are the JACKPOT shots. Once one of the shots is made, the other must also be made before both are again available for the QUICK MULTIBALL JACKPOT score value.

**HIT ME:**

Each time the RIGHT RETURN LANE switch is made and the LITE HIT ME lamp is lit, the LEFT LOOP shot is lit for a timed period. Making this shot awards an incremental point value.

**COMBOS:**

Each time two or more shots are made in close succession, a COMBO award of an incremental point value and GIGABYTES is given.

**VIDEO FRAMES:**

When either the LEFT or RIGHT RAMP is made and the display is showing a VIDEO FRAME in the right one-third, and the RAMP shot does not build the YAKUZA STRIKE blocks, a VIDEO FRAME is awarded. There are fifty VIDEO FRAMES in a set. A floating level LITE EXTRA BALL is available in the first set of VIDEO FRAMES. Each VIDEO FRAME awards GIGABYTES, and contributes toward BONUS COUNT. Collecting a complete set awards an additional point value.

**JOHNNY SPELLOUT:**

Shooting the LEFT LOOP awards a letter in this spellout. Each letter awards an incremental point value and GIGABYTES. Completing the spellout awards additional points, GIGABYTES, and starts FRENZY.

**MNEMONIC SPELLOUT:**

Shooting the RIGHT LOOP awards a letter in this spellout. Each letter awards an incremental point value and GIGABYTES. Completing the spellout awards additional points, GIGABYTES, and starts FRENZY.

**FRENZY:**

FRENZY is awarded each time either the JOHNNY or MNEMONIC spellout is completed. During this timed mode, all targets and shots are worth a fixed score value.

**ACCESS JET BUMPERS:**

The LEFT STANDUP TARGET opens the diverter which channels SPINNER and RIGHT LOOP shots into the JET BUMPERS for a timed period. This allows the player to control access to the JET BUMPER lanes.

**CYBER LOCKS:**

Each visit to CRAZY BOB'S computer shop will enable CYBER LOCKS, unless CYBER LOCKS are already enabled, a mode is already running, a multiball is running, or YAKUZA STRIKE is running.

**CYBERSPACE MATRIX INFO:**

Each visit to CRAZY BOB'S computer shop will inform the player of the position of a CYBERSPACE MATRIX AWARD. The player must lock a ball in the specified CYBERSPACE MATRIX position to collect the award.

**CYBERSPACE MATRIX AWARDS:**

Each time a ball is locked in the CYBERSPACE MATRIX, one of the following awards is given:

- |                     |  |
|---------------------|--|
| 1. BONUS X          | 9. MYSTERY AWARD - Randomly awards one of the following: |
| 2. HOLD BONUS       | a. LITE SPECIAL  |
| 3. AWARD BONUS      | b. 50 GIGABYTES  |
| 4. VIDEO MODE       | c. LITE MNEMONIC RECOVERY                                |
| 5. SUPER LOOPS      | d. YAKUZA STRIKE   |
| 6. 50 GIGABYTES     | e. TOUCH TONE MULTIBALL                                  |
| 7. LITE EXTRA BALL  |  |
| 8. LITE CRAZY BOB'S |  |

**VIDEO MODE:**

VIDEO MODE is a game played in the display using the four cabinet buttons. It is started by locking a ball in the VIDEO MODE position on the CYBERSPACE MATRIX. The game has four waves during which the player is the predator and the computer is the prey. The predator is the large circle and the prey are the small squares. The object is to move the predator by pressing the cabinet buttons in order to capture all of the prey. If all of the prey are captured in the given time, the wave is completed and the next wave is started. A LITE EXTRA BALL appears as one of the prey in the second wave until it is captured.

**SUPER LOOPS:**

SUPER LOOPS is awarded by locking a ball in the SUPER LOOPS position on the CYBERSPACE MATRIX. When SUPER LOOPS is active, each LEFT or RIGHT LOOP shot awards the SUPER LOOPS score value. Each time SUPER LOOPS is awarded, the score value is increased.

**CRAZY BOB'S ITEMS:**

Each visit to CRAZY BOB'S computer shop when the sign is lit (blinking) collects a CRAZY BOB'S ITEM and awards an incremental point value. The ITEMS are:

1. PEMEX DOUBLER
2. SINOLOGIC 16
3. THOMPSON EYEPHONES
4. SOGO SEVEN DATA-GLOVES
5. GPL STEALTH MODULE
6. BURDINE TRANSLATOR
7. INFOBAN 3000
8. ONO SENDAI BLACK AND TAN

**LITE EXTRA BALL:**

There are five possible ways to light the LITE EXTRA BALL lamp. The first is lit when the bonus multiplier reaches 4X. Only one EXTRA BALL may be lit by the first method. The second is at an adjustable level based on the number of VIDEO FRAMES collected. Only one EXTRA BALL may be lit by the second method. The third is lit when the last THROWING SPIKE item is collected. The fourth is lit when a ball is locked in a LITE EXTRA BALL position on the CYBERSPACE MATRIX. Only one EXTRA BALL may be lit by the fourth method. The fifth is lit if collected during the second wave of the VIDEO MODE. Only one EXTRA BALL may be lit by the fifth method.

**YAKUZA STRIKE:**

This hurry-up is started either by alternatively shooting each of the LEFT and RIGHT ramps three times each, or from the CYBERSPACE MATRIX MYSTERY AWARD. During this hurry-up, the display shows a point value which counts down from 60 million to 25 million. While the value counts down, all shots award the current value.

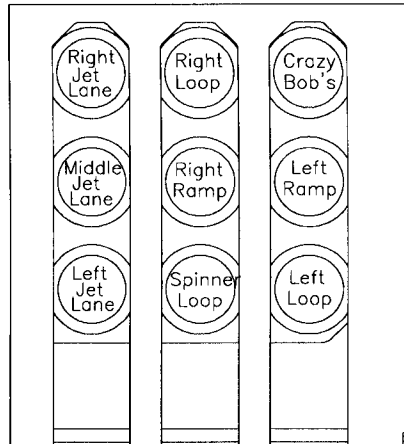
**TOUCH TONE MULTIBALL:**

TOUCH TONE MULTIBALL is a two ball multiball started as one of the CYBERSPACE MATRIX MYSTERY AWARDS. During TOUCH TONE MULTIBALL, all targets and shots change one of two digits in the JACKPOT score value. Making the CRAZY BOB'S computer shop shot sets the digit. When the second digit is set, that JACKPOT score value is awarded and the scenario repeats.



**CYBERSPACE MULTIBALL:**

CYBERSPACE MULTIBALL is a three ball multiball started by locking three balls in the CYBERSPACE MATRIX. The JACKPOT shots for this multiball are determined by the placement of the balls locked in the CYBERSPACE MATRIX, according to the red sign located on the right ramp. Each JACKPOT awards an incremental point value, based on the particular JACKPOT chosen. If the three JACKPOTS chosen fall in a line on the MATRIX, then the JACKPOT values will each be worth three times their default value. The JACKPOT shot vs. MATRIX location is as follows:



**START MODE (MODE READY):**

Each visit to CRAZY BOB'S computer shop will light START MODE (MODE READY) unless a START MODE is already lit, a mode is already running, a multiball is running, or YAKUZA STRIKE is running. The exception to this rule is that the player must first collect all available GIGABYTES before START MODE can be lit for POWERDOWN.

**UPLOAD MODE:**

One of the five basic timed modes. During UPLOAD MODE the player must make each of the LEFT LOOP, LEFT RAMP, RIGHT RAMP, and RIGHT LOOP once to complete the mode. Each successful shot awards an incremental point value and GIGABYTES. Completing the mode lights CRAZY BOB'S for an ITEM.

**ACCESS CODE 1 MODE:**

One of the five basic timed modes. During ACCESS CODE 1 MODE the player must make the shot identified by the blinking WHITE TRIANGLE. Each time the identified shot is made, a different shot will be identified. Each successful shot awards an incremental point value and GIGABYTES. Completing five shots lights CRAZY BOB'S for an ITEM.

**ACCESS CODE 2 MODE:**

One of the five basic timed modes. During ACCESS CODE 2 MODE the player must make either the SPINNER or the RIGHT LOOP shot into the JET BUMPER lanes. Each successful shot awards an incremental point value and GIGABYTES. Completing the JET BUMPER lanes during this mode increases the RIOT JETS multiplier. Each JET BUMPER hit scores a value times the RIOT JETS multiplier. Completing four SPINNER or RIGHT LOOP shots lights CRAZY BOB'S for an ITEM.

**DOWNLOAD MODE:**

One of the five basic timed modes. During DOWNLOAD MODE the player must make the LEFT LOOP as many times as possible. Each successful shot awards an incremental point value and GIGABYTES. Completing six shots lights CRAZY BOB'S for an ITEM.

**N.A.S. CURE MODE:**

One of the five basic timed modes. During N.A.S. CURE MODE the player must make the CENTER (popper) LANE four times to complete the mode. Each successful shot awards an incremental point value and GIGABYTES. Completing the mode lights CRAZY BOB'S for an ITEM.

**POWERDOWN MULTIBALL (mode):**

This is the final mode. The player must have played each of the five basic modes and collected the prescribed number of GIGABYTES before this mode can be started.

During POWERDOWN MULTIBALL, the game will continuously AUTOFIRE all of the balls in the game. The display shows a POWER BAR for each of the seven shots (SECTORS) in the game. Each POWER BAR grows shorter over time. Making a shot boosts the power bar for that SECTOR, effectively extending the mode timer. The mode is over when all of the POWER BARS reach zero power. If the player collected any CRAZY BOB'S ITEMS, then each ITEM will be represented by a small lightning bolt in the upper left corner of the display. Each visit to CRAZY BOB'S computer shop during POWERDOWN mode uses up an item to boost the level of all POWER BARS. Scoring is based on the number of non-zero POWER BARS times the sum total of all POWER BAR levels. A special all time great High Score To Date table is kept for the top twenty (or so) players scores during POWERDOWN mode.

**SPECIAL MODE:**

If the SPECIAL MODE adjustment is set to YES, then a special multiball will be available to players.

**GIGABYTES:**

Gigabytes are awarded throughout the game. Once the player collects 320 GIGABYTES (which requires playing POWERDOWN), CYBERPUNK status is achieved and they are allowed to enter their initials at the end of the game. There is only one CYBERPUNK. The initials of the current CYBERPUNK are displayed periodically during score sweep in the right one-third of the display. The last player to collect all 320 GIGABYTES is the CYBERPUNK. The game feature which contribute to collecting GIGABYTES are:

1. SKILL SHOT
2. THROWING SPIKES "GIGABYTES" AWARD
3. CYBERSPACE MATRIX "GIGABYTES" AWARD
4. COMBOS
5. J-O-H-N-N-Y and M-N-E-M-O-N-I-C SPELLOUTS
6. MODES
7. VIDEO FRAMES

**BONUS MULTIPLIER:**

The bonus multiplier is increased by completing the set of three JET BUMPER entry lane lamps. The flipper buttons cause Lane Change to occur, assisting the player in collecting all three lamps. The bonus multiplier sequence is 2X, 3X, and 4X, then 50 million, 60 million, up to 100 million. LITE EXTRA BALL is lit the first time that 4X is achieved.

**BONUS HELD:**

When collected, the previous ball's BONUS COUNT is awarded again on the next BONUS COUNT. This award is available by either locking a ball in the HOLD BONUS position on the CYBERSPACE MATRIX, or by collecting the next to last THROWING SPIKE award. Multiple BONUS HELD awards may be collected during a ball and the count will be maintained throughout the game.

BONUS COUNT: At the end of a ball, a tally is made as follow:

1. VIDEO FRAMES (collected throughout the game)
2. COMBOS (collected during the last ball)
3. SPINNER MILLIONS (collected during the last ball)
4. GIGABYTES (collected throughout the game)

-----  
TIMES BONUS MULTIPLIER  
-----

5. PREVIOUS BONUS (when bonus was held on the previous ball)



# SECTION ONE

## GAME OPERATION AND TEST INFORMATION

### (System WPC) ROM SUMMARY

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	U6	A-5343-50042-1R
Security Chip	27c040	CPU	U22	A-5400-50042-1
Music/Speech	27c040	Audio	SU2	A-5343-50042-S2
Music/Speech	27c040	Audio	SU3	A-5343-50042-S3
Music/Speech	27c040	Audio	SU4	A-5343-50042-S4
Music/Speech	27c040	Audio	SU5	A-5343-50042-S5
Music/Speech	27c040	Audio	SU6	A-5343-50042-S6

### NOTICE

Order replacement ROMs from your authorized Williams Electronics Games, Inc. distributor. Specify: (1) part number (if available); (2) ROM level (number) on label; (3) game in which ROM is used.

# PINBALL GAME ASSEMBLY INSTRUCTIONS

## **JOHNNY MNEMONIC™ IS A FOUR BALL GAME.**

**Power:** Domestic 120V @ 60Hz  
Foreign 230V @ 50Hz  
Japan 100V @ 50HZ

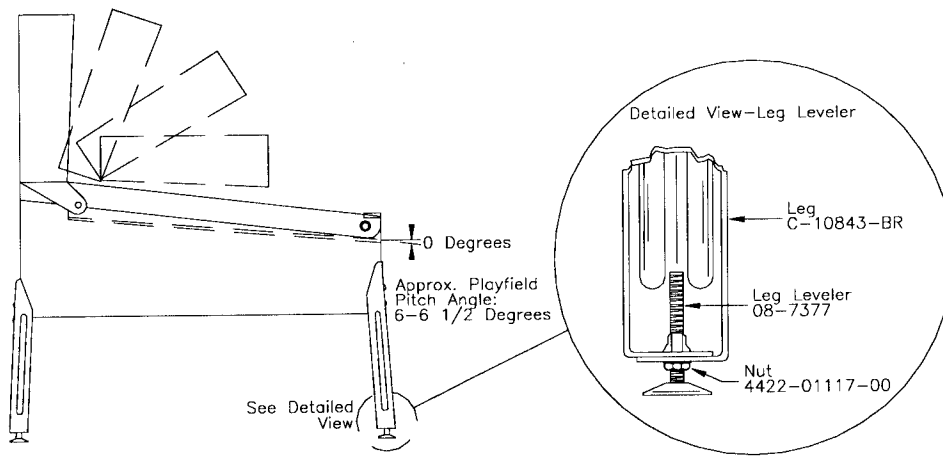
**Temp:** 32°F to 100° F, (0°C to 38°C)

**Humidity:** Not to exceed 95% relative.

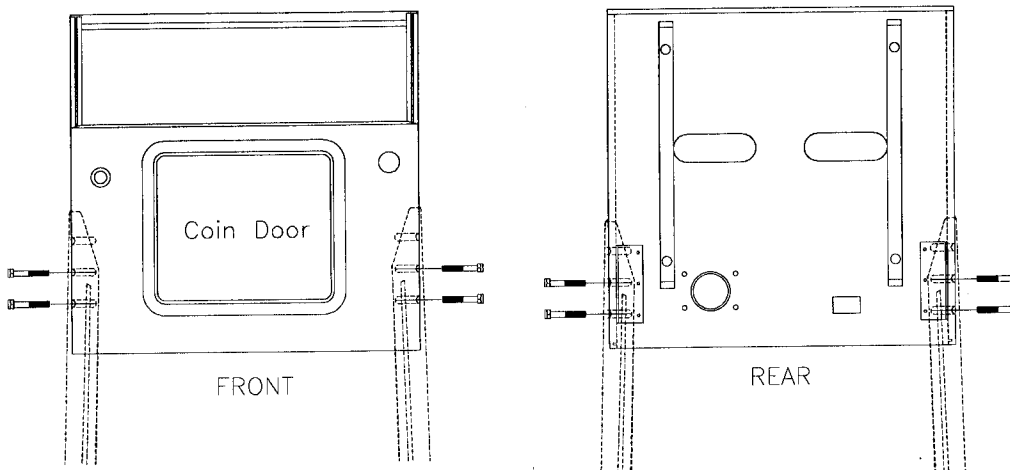
**Dimensions:** Width: 29" approx.  
Depth: 52" approx.  
Height: 75" approx.

**Weight:** 325 lb. approx. (crated)

1. Remove all cartons, parts, and other items from the shipping container and set them aside.
2. Leg levelers and leg bolts are among the parts in the cash box. Install leg levelers on the front and rear legs (View 1). Place cabinet on a support and attach rear legs using leg bolts (View 2).
3. Attach front legs using leg bolts (View 2).



**VIEW 1**



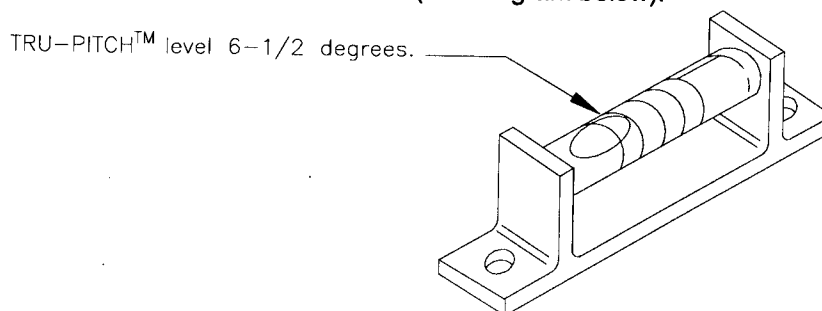
**VIEW 2**

4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.
5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass. Remove the shipping screws holding the Insert Panel. Unlatch and open the Insert Panel. Carefully lift up the Speaker Panel and lay it down on the playfield glass. (Be careful not to damage the Dot Matrix Display/Driver.) This allows access to the bolt holes used for securing the backbox upright. To secure the backbox, install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet. Close and latch the Insert Panel. Replace the Speaker Panel. Reinstall the backglass, and lock the backbox.

## CAUTION

**FAILURE TO INSTALL** the backbox mounting hardware properly can cause personal injury. **NEVER TRANSPORT** a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

6. Extend each leg leveler *slightly* below the leg bottom, so that all four foot pads are extended about the same distance. Remove the cabinet from its support and place it on the floor.
7. Unlock and open the coin door. Move the molding latch lever toward the left side of the game. Lift the front molding off the playfield cover glass return the latch lever toward the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game, storing it carefully to avoid breakage.
8. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). **NOTE:** This measurement must be made **ON** the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.
9. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be properly adjusted **WITHOUT REMOVING THE GLASS**. The first line (closest to the front of the game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch is 6-1/2 degrees. The **NOSE** of the bubble should be between the first and second line on the level (see diagram below).



## ! IMPORTANT !

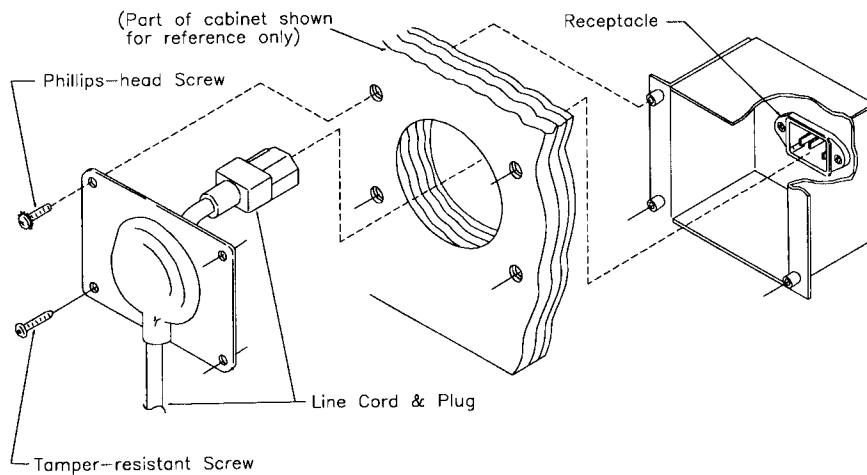
*Playfield pitch angle can affect the operation of the plumb bob tilt. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting. The unit is factory installed for a 6-1/2 degree angle. If an adjustment is necessary, loosen the screw at the bottom of the unit. Move the pointer, one groove at a time to the left or the right, depending on the degree desired. Hold the pointer in place and tighten screw*

10. Move the game into the desired location; recheck the level and pitch angle of the playfield.

11. Be sure the **required number** of balls are installed. The **JOHNNY MNEMONIC™** game uses four balls.
12. Install full playfield mylar, if desired.

**NOTE:** The **JOHNNY MNEMONIC™** playfield is coated with a special hardcoat surface and does not require a protective mylar. However, mylars can be purchased through your local Williams Distributor. Specify part number 03-9422-1 for full playfield mylar.

13. Clean and reinstall the playfield cover glass. Prepare the game for player operation.
14. To attach the line cord, remove the envelope stapled to the inside of the cabinet (near the cash box). Remove the four Phillips-head screws that mount to line cord cover plate to the rear cabinet. Match the prongs on the plug with the holes in the receptacle, and push the line cord securely into place. Make sure the cord is aligned with the indentation on the cover plate (indentation should point toward bottom of the cabinet). Remount line cord cover plate. If desired, four tamper resistant screws have been provided in an envelope marked "Security Screws" (located in the cash box) to remount cover plate.





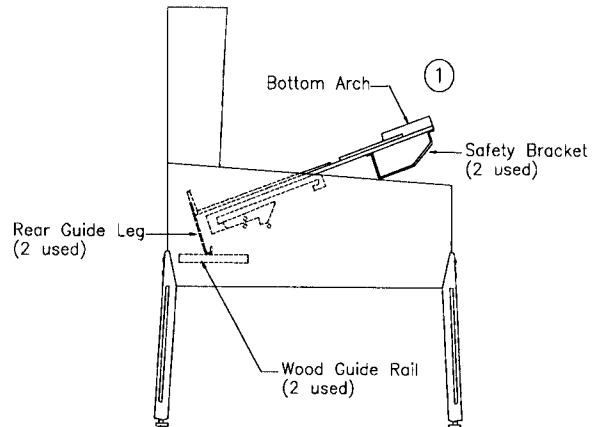
## RAISING THE PLAYFIELD

### CAUTION

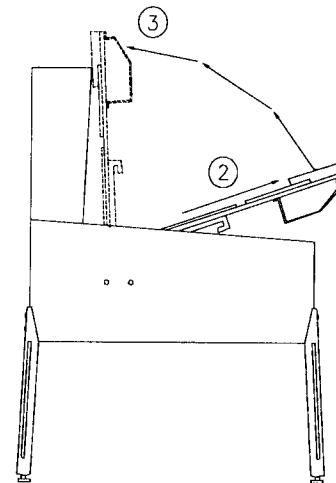
Do not raise the playfield straight up! This game uses a slide assembly to raise and lower the playfield.

#### To raise the playfield.

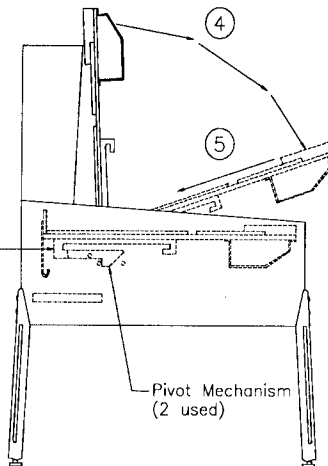
1. Remove all the balls from the game. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails, or be used to slide out playfield.



2. Pull the playfield out toward you until it stops (rest position), and raise it approximately 3". Be sure playfield is in locked position and does not slide back into cabinet. If it does, repeat Step 2 before proceeding to Step 3.



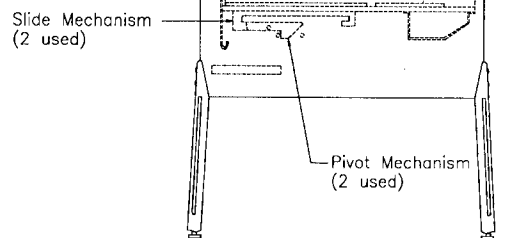
3. Rotate playfield to upright service position (lean on backbox) by pulling toward you and up. Listen for the sound of a click: this ensures locking and pivoting sequence.



#### To lower the playfield.

4. Rotate the playfield to the rest position. This unlocks the pivoting mechanism.

5. Push the playfield back into cabinet and into the playing position.



# GAME CONTROL LOCATIONS

## Cabinet Switches

The On-Off Switch is on the bottom of the cabinet near the right front leg.

The Start Button is a push-button to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

## Coin Door Buttons

The operator controls all game adjustments, obtains bookkeeping information, and diagnoses problems, using only four push-button switches mounted on the inside of the coin door. The coin door buttons have two modes of operation Normal Function and Test Function.

### Normal Function

The Service Credits button puts credits on the game that are not included in any of the game audits.

The Volume Up (+) button raises the sound level of the game. Press and hold the button until the desired level is reached.

The Volume Down (-) button lowers the sound level of the game. Press and hold the button until the desired level is reached. See Adjustment A.1 28 to shut sound Off completely.

The Begin Test button starts the Menu System operation and changes the coin door buttons from Normal Function to Test Function.

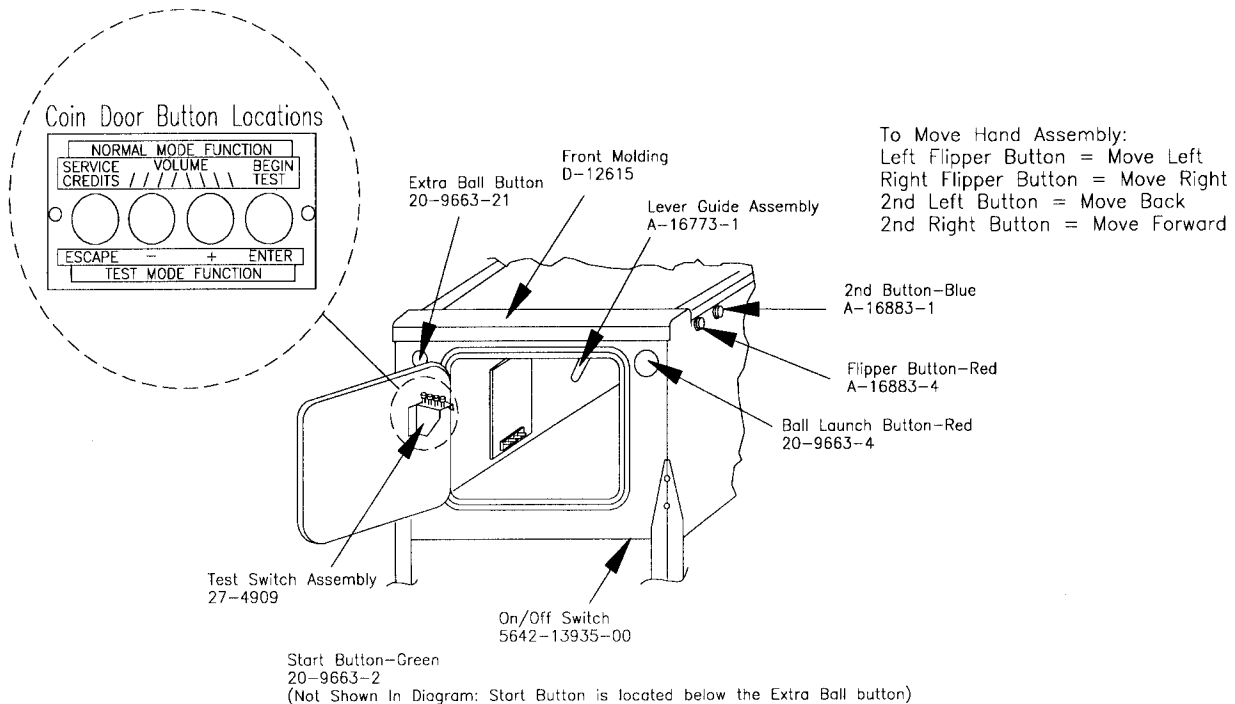
### Test Function

The Escape button allows you to get out of a menu selection or return to the Attract mode.

The Up (+) button allows you to cycle forward through the menu selections or adjustment choices.

The Down (-) button allows you to cycle backward through the menu selections or adjustment choices.

The \*Enter button allows you to get into a menu selection or lock in an adjustment choice.



**\*To reset High Score, hold down the Begin Test/Enter switch for five seconds while in the Attract mode.**

## GAME OPERATION

### CAUTION

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

**POWERING UP.** With the coin door closed, plug the game in, and switch it On. In normal operation, Testing shows in the displays as the game performs Start-up tests. Once the Start-up tests have been successfully completed the last score is displayed and the game goes into the Attract mode.

**Note:** After the game has been on location for a time, the Start-up tests may contain messages concerning game problems. See 'Error Messages' for more detailed information regarding messages.

Open the coin door and press the Begin Test switch. The display shows the game name, number, and software revision. The message changes. The display shows the sound software revision, the revision level of the system software, and the date the software was revised.

**Example:**

<b>JOHNNY MNEMONIC™</b>	<b>Sound Rev. 1.0 A</b>
<b>50042</b>	<b>Rev. 1.0 A</b>
	<b>SY. 0.X0</b>
	<b>X-X-95</b>

Press the Enter button to enter the WPC Menu System (refer to the section entitled "Menu System Operation" for more information). Slide the Service Switch Actuator over the top interlock switch located in the bottom left corner of the coin door opening. Perform the entire Test menu routine to verify that the game is operating satisfactorily.

**ATTRACT MODE\*.** After completing the Test menu routine, press the Escape button three times to enter the Attract mode. During the Attract mode, the display shows a series of messages informing the player of the recent highest scores\*, "custom messages\*", and the score to obtain a replay award\*.

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

**STARTING A GAME.** Press the Start button. A startup sound plays, and the credit amount shown in the display decreases by one. The display flashes 00 (until the first playfield switch is actuated), and shows ball 1. If credits are posted, additional players may enter the game by pressing the Start button once for each player, before the end of play on the first ball.

**TILTS.** Actuating the cabinet tilt switch inside the cabinet ends the current game and then proceeds to the Game Over mode. With the third closure\* of the plumb bob tilt switch, the player loses the remaining play of that ball, but can complete the game.

**END OF A GAME.** All earned scores and bonuses are awarded. If a player's final score exceeds the specified value, the player receives a designated award for achieving the current highest score. A random digit set\* appears in the display. Credits\* may be awarded, when the last two digits of any player's score match the random digits. Match, high score, and game over sounds are made.

**GAME OVER MODE.** The **Game Over** display shows the high scores and the game proceeds to the Attract Mode.

\* - Operator-adjustable feature

# MENU SYSTEM OPERATION

The Main Menu allows you to choose from several categories, which in turn lead to other menus to choose from. To access the Main Menu, open the coin door and press the Begin Test button, then press the Enter button. Press the Up or Down buttons to cycle through the Main Menu. Press the Enter button to access a menu. Press the Escape button to return to the Main Menu. Press the Start button for HELP at any time.

**MAIN MENU**

**B. BOOKKEEPING MENU**

	B.1 Main Audits
	B.2 Earning Audits
	B.3 Standard Audits
	B.4 Feature Audits
	B.5 Histograms
	B.6 Time-Stamps

Press Escape  
To move out of a menu selection.

Press Enter  
To get into a menu selection.

**P. PRINTOUTS MENU**

	P.1 Earnings Data
	P.2 Main Audits
	P.3 Standard Audits
	P.4 Feature Audits
	P.5 Score Histograms
	P.6 Time Histograms
	P.7 Time-Stamps
	P.8 All Data

Press Up  
Increases sequence; Example A.1, A.2, A.3, A.4.

Press Down  
Decreases sequence; Example A.4, A.3, A.2, A.1.

Use Up or Down to cycle through the selections in a menu.

**T. TEST MENU**

	T.1 Switch Edges Test
	T.2 Switch Levels Test
	T.3 Single Switches Test
	T.4 Solenoid Test
	T.5 Flasher Test
	T.6 General Illumination Test
	T.7 Sound and Music Test
	T.8 Single Lamp Test
	T.9 All Lamps Test
	T.10 Lamp and Flasher Test
	T.11 Display Test
	T.12 Flipper Coil Test
	T.13 Ordered Lamps Test
	T.14 Lamp Row-Col.
	T.15 DIP Switch Test
	T.16 Hand Test
	T.17 Empty Balls

Use Escape and Enter to move into and out of the selected menu.

**U. UTILITIES MENU**

	U.1 Clear Audits
	U.2 Clear Coins
	U.3 Reset H.S.T.D.
	U.4 Set Time and Date
	U.5 Custom Message
	U.6 Set Game I.D.
	U.7 Factory Adjustments
	U.8 Factory Resets
	U.9 Presets
	U.10 Clear Credits
	U.11 Auto Burn-in

**A. ADJUSTMENT MENU**

A.1 Standard Adjustments
A.2 Feature Adjustments
A.3 Pricing Adjustments
A.4 H.S.T.D. Adjustments
A.5 Printer Adjustments

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access an audit menu. Press the Escape button to return to the Bookkeeping Menu.

## B. BOOKKEEPING MENU

- B.1 Main Audits
- B.2 Earning Audits
- B.3 Standard Audits
- B.4 Feature Audits
- B.5 Histograms
- B.6 Time-Stamped

**One Button Audit System.** The Bookkeeping Menu is obtainable directly from the Attract Mode. Repeatedly pressing the Enter button, while in the Attract Mode, will cycle through all of the game audits.

### B.1 Main Audits

B.1	01	Total Earnings	00	B.1	06	Total Plays	00
B.1	02	Recent Earnings	00	B.1	07	Replay Awards	00
B.1	03	Free Play Percent	00	B.1	08	Percent Replays	00
B.1	04	Average Ball Time	00	B.1	09	Extra Balls	00
B.1	05	Time Per Credit	00	B.1	10	Percent Extra Ball	00

### B.2 Earning Audits

B.2	01	Recent Earnings	00	B.2	08	Total Earnings*	00
B.2	02	Recent Left Slot	00	B.2	09	Total Left Slot*	00
B.2	03	Recent Center Slot	00	B.2	10	Total Center Slot*	00
B.2	04	Recent Right Slot	00	B.2	11	Total Right Slot*	00
B.2	05	Recent 4th Slot	00	B.2	12	Total 4th Slot*	00
B.2	06	Recent Paid Credits	00	B.2	13	Total Paid Credits*	00
B.2	07	Recent Service Credits	00	B.2	14	Total Service Credits*	00

\*These audits are NOT re-settable. They are a record of the earnings of the game since the "CLOCK 1ST SET" Time-stamp.

### B.3 Standard Audits

B.3	01	Games Started	00	B.3	20	Average Game Time	00
B.3	02	Total Plays**	00	B.3	21	Play Time	00
B.3	03	Total Free Play	00	B.3	22	Minutes On	00
B.3	04	Free Play Percent	00	B.3	23	Balls Played	00
B.3	05	Replay Awards	00	B.3	24	Tilts	00
B.3	06	Percent Replays	00	B.3	25	Replay 1 Awards	00
B.3	07	Special Awards	00	B.3	26	Replay 2 Awards	00
B.3	08	Percent Special	00	B.3	27	Replay 3 Awards	00
B.3	09	Match Awards	00	B.3	28	Replay 4 Awards	00
B.3	10	Percent Match	00	B.3	29	1 Player Games	00
B.3	11	H.S.T.D. Credits	00	B.3	30	2 Player Games	00
B.3	12	Percent H.S.T.D.	00	B.3	31	3 Player Games	00
B.3	13	Extra Ball	00	B.3	32	4 Player Games	00
B.3	14	Percent Extra Ball	00	B.3	33	H.S.T.D. Reset Count	00
B.3	15	Tickets Awarded	00	B.3	34	Burn-in Time†	00:00:00
B.3	16	Percent Tickets	00	B.3	35	1st Replay Level	00
B.3	17	Left Drains	00	B.3	36	Left Flipper	00
B.3	18	Right Drains	00	B.3	37	Right Flipper	00
B.3	19	Average Ball Time	00				

\*\*"Total Plays" only counts on completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored. Operation for test and service do not affect audits.

†This Audit is not re-settable.

## B.4 Feature Audits

B.4	01	Buy-in Extra Balls	00	00%
B.4	02	Total Multiball	00	00%
B.4	03	1 Buy-in Game	00	00%
B.4	04	2 Buy-in Games	00	00%
B.4	05	3 Buy-in Games	00	00%
B.4	06	> = 4 Buy-in Games	00	00%
B.4	07	Cyber Multiballs	00	00%
B.4	08	1 Cyber Multiball Games	00	00%
B.4	09	2 Cyber Multiball Games	00	00%
B.4	10	3 Cyber Multiball Games	00	00%
B.4	11	Quick Multiballs	00	00%
B.4	12	Phone Multiballs	00	00%
B.4	13	Maximum Gigabytes	00	00%
B.4	14	Yakuza Strikes	00	00%
B.4	15	Throwing Spikes	00	00%
B.4	16	Spike Light Extra Ball	00	00%
B.4	17	Matrix Awards	00	00%
B.4	18	Mode Starts	00	00%
B.4	19	Matrix Light Extra Ball	00	00%
B.4	20	Video Modes	00	00%
B.4	21	Video Mode Light Extra Ball	00	00%
B.4	22	Bob's Items	00	00%
B.4	23	Video Frames	00	00%
B.4	24	Video Frames Light Extra Ball	00	00%
B.4	25	Ball Searches	00	00%
B.4	26	5 Ball Searches	00	00%
B.4	27	Bonus X	00	00%
B.4	28	Bonus X Light Extra Ball	00	00%
B.4	29	1 Extra Ball Game	00	00%
B.4	30	2 Extra Ball Games	00	00%
B.4	31	3 Extra Ball Games	00	00%
B.4	32	Ball Saves	00	00%
B.4	33	Mnemonic Recoveries	00	00%
B.4	34	Skill Shots	00	00%
B.4	35	Special Modes	00	00%
B.4	36	Cyberpunk Credits	00	00%

## B.5 Histograms

B.5	01	0 - 99 Million Scores	00%	00
B.5	02	100 - 299 Million Scores	00%	00
B.5	03	300 - 499 Million Scores	00%	00
B.5	04	500 - 749 Million Scores	00%	00
B.5	05	750 - 999 Million Scores	00%	00
B.5	06	1.0 - 1.4 Billion Scores	00%	00
B.5	07	1.5 - 1.9 Billion Scores	00%	00
B.5	08	2.0 - 2.9 Billion Scores	00%	00
B.5	09	3.0 - 3.9 Billion Scores	00%	00
B.5	10	4.0 - 4.9 Billion Scores	00%	00
B.5	11	5.0 - 6.9 Billion Scores	00%	00
B.5	12	7.0 - 8.9 Billion Scores	00%	00
B.5	13	Over 9 Billion Scores	00%	00
B.5	14	Game Time 0.0-1.0 Mins	00%	00

**Histograms Continued.....**

<b>B.5</b>	<b>15</b>	Game Time 1.0-1.5 Mins	00%	00
<b>B.5</b>	<b>16</b>	Game Time 1.5-2.0 Mins	00%	00
<b>B.5</b>	<b>17</b>	Game Time 2.0-2.5 Mins	00%	00
<b>B.5</b>	<b>18</b>	Game Time 2.5-3.0 Mins	00%	00
<b>B.5</b>	<b>19</b>	Game Time 3.0-3.5 Mins	00%	00
<b>B.5</b>	<b>20</b>	Game Time 3.5-4.0 Mins	00%	00
<b>B.5</b>	<b>21</b>	Game Time 4-5 Mins	00%	00
<b>B.5</b>	<b>22</b>	Game Time 5-6 Mins	00%	00
<b>B.5</b>	<b>23</b>	Game Time 6-8 Mins	00%	00
<b>B.5</b>	<b>24</b>	Game Time 8-10 Mins	00%	00
<b>B.5</b>	<b>25</b>	Game Time 10-15 Mins	00%	00
<b>B.5</b>	<b>26</b>	Game Time Over 15 Mins	00%	00

**B.6 Time-Stamps**

- B.6 01** Current Time
- B.6 02** Clock 1st Set
- B.6 03** Clock Last Set
- B.6 04** Audits Cleared
- B.6 05** Coins Cleared
- B.6 06** Factory Setting
- B.6 07** Last Game Start
- B.6 08** Last Replay
- B.6 09** Last H.S.T.D. Reset
- B.6 10** Champion Reset
- B.6 11** Last Printout
- B.6 12** Last Service Credit

*Time-Stamps Menu allows you to view dates and times that are important to game software.*

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a menu. Press the Escape button to return to the Printouts Menu.

## **P. PRINTOUTS MENU**

(optional board required)

- P.1 Earnings Data**
- P.2 Main Audits**
- P.3 Standard Audits**
- P.4 Feature Audits**
- P.5 Score Histograms**
- P.6 Time Histograms**
- P.7 Time-Stamps**
- P.8 All Data**

The Printouts Menu is a combination of the other menus. This menu allows you to access and print information in the available menu selections.

If no printer is attached the message "Waiting for Printer" appears in the displays. **Note:** Set the print specification from the Adjustment Menu, A.5 Printer Adjustments.



**Use the Service Switch Actuator to hold in the top interlock switch located in the bottom left corner of the coin door opening. The actuator must be in place in order to activate the solenoids and flashlamps.**

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a test. Press the Escape button to return to the Test menu.

**NOTE:** During any test, press the Start button to obtain the wire color, driver number, connector number and fuse location.

## **T. TEST MENU**

<b>T.1 Switch Edges Test</b>	<b>T.10 Lamps And Flasher Test</b>
<b>T.2 Switch Levels Test</b>	<b>T.11 Display Test</b>
<b>T.3 Single Switch Test</b>	<b>T.12 Flipper Coil Test</b>
<b>T.4 Solenoid Test</b>	<b>T.13 Ordered Lamps Test</b>
<b>T.5 Flasher Test</b>	<b>T.14 Lamp Row-Col.</b>
<b>T.6 General Illumination Test</b>	<b>T.15 DIP Switch Test</b>
<b>T.7 Sound &amp; Music Test</b>	<b>T.16 Hand Test</b>
<b>T.8 Single Lamps Test</b>	<b>T.17 Empty Balls Test</b>
<b>T.9 All Lamps Test</b>	

The switch matrix, on the left side of the display, shows the state of all switches. A dot indicates the switch is open, a square indicates the switch is closed. The numbers assigned to each switch indicate where the switch is located in the matrix. The number on the left indicates the column, the number on the right indicates the row. Example - Switch 23 is 2nd column, 3rd row.

A short to ground - on either the row or column wire - appears as a shorted row(s). However, a column wire shorted to ground disappears when all of the indicated row switches are open. A row wire shorted to ground does not disappear.

A shorted diode in the switch matrix can cause other switches to appear closed. These "phantom" switches (though not actually closed), complete a rectangle in the switch matrix. Therefore, if two switches in the same column are closed (example; #22 and #24), and a third switch is pressed in another column but in the same row as one of the first two (example; #32), the "phantom" switch #34 is falsely indicated as closed. The switch with the shorted diode is diagonally opposite the "phantom" switch (in this case #22).

### **T.1 Switch Edges Test**

Press each switch one at a time. The name and number of the switch is shown in the display. If a switch other than the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit.

### **T.2 Switch Levels Test**

This test automatically cycles through all switches that are detected closed. The name and number of each switch that is detected is shown in the display. A filled square indicates the switch's position in the matrix.

### **T.3 Single Switches Test**

The Single Switch test isolates a particular switch by blocking signals from all other switches. Use the Up or Down buttons to select the switch to be tested.

## T.4 Solenoid Test

The Solenoid test has three modes - Repeat, Stop, and Run. Only one solenoid should pulse at a time. The system has detected a problem if more than one solenoid pulses, a solenoid comes on and stays on, or no solenoids pulse during the Repeat or Run modes.

**Repeat:** The Repeat mode pulses a single solenoid. After entering this test, the name of the first solenoid shows in the display and the corresponding coil pulses. Press the Up or Down button to cycle through the solenoids, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test menu, or press the Enter button to move to the next mode.

**Stop:** The Stop mode halts the Solenoid test. Press Enter during the Repeat mode and the Solenoid test stops. No solenoids should be activated while the test is stopped. Either press the Escape button to return to the Test menu, or the Enter button to move to the next mode.

**Run:** The Run mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed.

## T.5 Flasher Test

This tests the flashlamp part of the solenoid circuit. There are three modes - Repeat, Stop, and Run. During this test the flashlamp circuit named in the display should blink. The system has detected a problem if more than one flashlamp circuit blinks, the lamps stay on, or no lamps blink during the Repeat or Run modes.

**Repeat:** The Repeat mode pulses a single flashlamp. After entering this test the name and number of the first flashlamp shows in the display and the corresponding bulb(s) blink. The same lamps blink until the Up or Down button is pressed. Either press the Escape button to return to the Test menu, or press the Enter button to advance to the next mode.

**Stop:** The Stop mode halts the Flasher test. There should not be any flashlamps lit during this mode. Either press the Escape button to return to the Test menu, or press the Enter button to advance to the next mode.

**Run:** The Run mode cycles through the flashlamps automatically. The display shows the name and number of the flashlamp circuit currently being pulsed as the corresponding bulb(s) flashes.

## T.6 General Illumination Test

This test checks all of the General Illumination circuits. There are two modes of operation - Stop and Run.

**Stop:** Press the Up or Down buttons to cycle through the General Illumination test manually. All illumination is tested first, followed by an individual circuit test. The circuit name and number shows in the display while the corresponding lamps light. If any other results occur the system has detected an error.

**Run:** Press the Enter button any time during Stop mode and the General Illumination test cycles through automatically. For each circuit shown in the display the corresponding bulbs should light. If any other results occur the system has detected a problem.

## **T.7 Sound and Music Test**

The Sound and Music test checks the audio circuits. This test has three modes for testing the sound and music circuits - Run, Repeat, and Stop.

**Run:** The Run mode steps through a sequence of sounds and music. Press the Up or Down buttons during this portion of the Sound and Music test to advance to a particular sound or tune without having to wait for the program to play all the sounds available in the test. A sound or tune should be heard for each name and number that appears in the display. Any other results indicates the system has detected a problem.

**Repeat:** Press the Enter button at any time during the Run mode to cause the program to stop and repeat a particular sound/tune. The same sound should repeat continuously until the Up or Down button is pressed. Any other results indicates the system has detected a problem.

**Stop:** Press the Enter button at any time during the Repeat mode to stop this test altogether. Nothing should be heard. Any other results indicates the system has detected a problem.

## **T.8 Single Lamp Test**

The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example - Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through this test. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicates the system has detected a problem.

## **T.9 All Lamps Test**

This test causes all the controlled lamps to flash at the same time. Every controlled lamp should flash. Any other results indicates the system has detected a problem.

## **T.10 Lamp and Flasher Test**

This test causes all the flashlamps and the controlled lamps to flash at the same time. The controlled lamps blink, while the flashlamps cycle from highest to lowest. Any other results indicates the system has detected a problem.

## **T.11 Display Test**

This test automatically checks every dot in the Dot Matrix Display board. A series of patterns appear in sequence. Each pattern turns on and off a section of dots. Every dot on the matrix display should be turned on and off during this test.

## **T.12 Flipper Coil Test**

The Flipper Coil test has three modes - Repeat, Stop, and Run. Only one flipper should pulse at a time. The system has detected a problem if more than one flipper pulses, a flipper comes on and stays on, or no flippers pulse during the Repeat or Run modes.

**Repeat:** The Repeat mode pulses a single flipper. After entering this test, flipper coil 01 shows in the display and the corresponding coil activates. Press the Up or Down button to cycle through the flipper coils, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test menu, or press the Enter button to move to the next mode.

### **T.12 Flipper Coil Test Continued...**

**Stop:** The Stop mode halts the Flipper Coil test. Press Enter during the Repeat mode and the test stops. No coils should be activated while the test is stopped. Either press the Escape button to return to the Test menu, or the Enter button to move to the next mode.

**Run:** The Run mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed.

### **T.13 Ordered Lamps Test**

The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example - Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through the lamps. Lamps light in a clock-wise or counter clock-wise direction starting from the bottom of the playfield. Direction depends on which button, Up or Down, is pressed. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicates the system has detected a problem.

### **T.14 Lamp Row-Col**

This test allows individual rows and columns in the lamp matrix to be operated. This is useful for trouble-shooting wiring and driver problems.

Press the Up and Down buttons to cycles through the different rows and columns.

### **T.15 DIP Switch Test**

This test is used to show the positions of the DIP switches on the CPU board (U27).

### **T.16 Hand Test**

Select T.16 from the Test menu and press Enter to begin the Hand Mechanism test. Once the "Self Test" completes successfully, the Up and Down buttons can be used to select the following tests. Use the Enter button to start the selected test, and the Escape button to abort the selected test.

The statue of the X and Y movement optical position encoders and home switches are displayed on the dot matrix display during most of the tests.

SELF TEST - This test verifies that the mechanism is fully operational. This test is run automatically upon entry to the Hand Test. It can also be started manually by pressing the Enter button when selected.

HOME - This test moves the hand to the "catch" position located over the popper mechanism. The "catch" position can be adjusted using the adjustment menu items. Hand Position X (A.2 12) and Hand Position Y (A.2 13).

MOVE - This test allows the hand to be moved throughout its range of motion by pressing the cabinet Flipper and Hand Control buttons. The left Flipper button moves the hand to the left. The left Hand Control button moves the hand back. The right Flipper button moves the hand to the right. The right Hand Control button moves the hand to the front. This test remains active until the Escape button is pressed.

AUTO RUN - This test runs the hand in a repetitive cycle, launching a ball into the hand popper, popping the ball into the hand magnet, carrying the ball to the next matrix position, and clearing the ball from the matrix. During this test, the following data is kept:

- CYCLES: The number of cycles performed.
- REKICK: The number hand popper retries.
- RE-POS: The number of hand positioning errors.
- SW-DRP: The number of times the ball failed to reach the target matrix switch.
- SW-CLR: The number of times the matrix failed to clear a ball from a switch ( or it was stuck closed).
- SW-NN: This item cycles through each of the matrix switches and displays the number of errors (SW-DRP or SW-CLR) associated with indicated switch. NN is the Column and Row numbers of the target switches.

This test will run until either the Escape button is pressed or five consecutive errors occur.

CLEAR AUTO RUN DATA - This test clears all of the results maintained for the Auto Run Test.

## **T.17 Empty Balls**

Select T.17 from the Test menu and press Enter to begin the Empty Balls Test.

This test kicks out all balls loaded in troughs, lockups, poppers, and kickouts until no balls remain in those locations.

**NOTE:** *As the trough kicks out balls, they will stack up in the shooter groove, which may require manual cleaning in order to allow further balls to be kicked out.*

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a utility. Press the Up or Down buttons to see the setting choices. Press the Enter button to lock in a choice. If a mistake is made, press Escape while "Saving Adjustment Value" is in the display. The original setting is retained and the new setting is ignored. Press the Escape button to return to the Utility menu.

## U. Utilities Menu

- U.1 Clear Audits**
- U.2 Clear Coins**
- U.3 Reset H.S.T.D.**
- U.4 Set Time & Date**
- U.5 Custom Message**
- U.6 Set Game I.D.**
- U.7 Factory Adjustments**
- U.8 Factory Resets**
- U.9 Presets**
- U.10 Clear Credits**
- U.11 Auto Burn-in**

### **U.1 Clear Audits**

Press the Enter button to clear the Standard Audits (except Burn-in Time), Feature Audits, and Histograms.

### **U.2 Clear Coins**

Press the Enter button to clear the Earnings Audits.

### **U.3 Reset H.S.T.D.**

Press the Enter button to clear the High Score to Date Table and the Grand Champion.

### **U.4 Set Time and Date**

Press the Enter button to activate the time and date. Use the Up or Down button to change the value, then press the Enter button to lock in that value. If a mistake is made press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

### **U.5 Custom Message**

*Set A.1 20 to ON before trying to write a Custom Message.* Press the Enter button to begin entry of the custom message. Use the Up or Down buttons to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation. If a mistake is made, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once the message is complete, press and hold the Enter button until "Message Stored" is displayed.

Press the Escape button to cancel the new message. The message "Press Enter to Reset" appears. If Enter is pressed, the custom message is cleared and no message is displayed. If Escape is pressed, the original message remains intact.

### **U.6 Set Game I.D.**

This utility allows for the installation of a message, such as game location, that only appears on the printouts. Press the Enter button to activate Set Game I.D. Use the Up or Down buttons to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in desired letters and punctuation marks.

## U.7 Factory Adjustment

Press the Enter button to restore the adjustments to factory settings.

## U.8 Factory Reset

Press the Enter button to restore the adjustments to their factory setting, clear the Audits, H.S.T.D Table, and Custom Message/Game I.D.

## U.9 Presets

Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

**Game Difficulty Levels** The game play difficulty adjustments can be changed to a combination that is MUCH LESS to MUCH MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the individual group.

- U.9 01 **Install Extra Easy** MUCH LESS difficult than factory setting.
- U.9 02 **Install Easy** Somewhat LESS difficult than factory setting.
- U.9 03 **Install Medium** About the SAME as factory setting.
- U.9 04 **Install Hard** Somewhat MORE difficult than factory setting.
- U.9 05 **Install Extra Hard** MUCH MORE difficult than factory setting.

**Difficulty Setting Table for U.S., Canadian, French, German, and European Games**

Adj. #	Adj. Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03 (factory)	Hard U.9 04	Extra Hard U.9 05
A.2 03	Ball Saves	2	2	1	1	0
A.2 04	Ball Saves Time	10	8	6	4	2

### U.9 06 Install 5 Ball

### U.9 07 Install 3 Ball

Adjustments U.9 06 and U.9 07 can be used to change a game to 3 or 5 ball play, including changing of certain features to the recommended 3-and 5-ball level. The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the individual groups.

**Preset Adjustments Table for U.S. and Canadian Games**

Adj. #	Adj. Description	Install 5-ball U.9 06	Install 3-ball U.9 07
A.1 01	Ball Per Game	5	3
A.1 07	Replay Start	3,000,000,000	2,500,000,000
A.2 03	Ball Saves	1	1
A.2 04	Ball Saves Time	4	6
A.2 09	Extra Ball Level	15	10

**U.9 08 Install Add-A-Ball**

This option deletes all Free Play awards and replaces them with Extra Ball awards. Individual adjustments are affected, as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
A.1 13	Replay Boost	Off
A.1 14	Replay Award	Ex. Ball
A.1 15	Special Award	Ex. Ball
A.1 17	Extra Ball Ticket	No
A.1 19	Match Feature	Off
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 07	High Score 3 Credits	00
A.4 08	High Score 4 Credits	00

**U.9 09 Install Ticket**

This option deletes Credit awards and replaces them with Ticket awards. Individual adjustments are affected as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
A.1 14	Replay Award	Ticket
A.1 15	Special Award	Ticket
A.1 16	Match Award	Ticket
A.1 17	Ex. Ball Ticket	Yes
A.1 31	Ticket Expan.Brd.	Yes
A.4 02	H.S.T.D. Award Ticket	Yes

**U.9 10 Install Novelty**

This option removes all Free Play and Extra Ball awards. Individual adjustments are affected as follows:

<u>Ad</u>	<u>Name</u>	<u>New Setting</u>
A.1 04	Max. Ex. Ball	Off
A.1 05	Replay System	Fixed
A.1 09	Replay Level 1	Off
A.1 10	Replay Level 2	Off
A.1 11	Replay Level 3	Off
A.1 12	Replay Level 4	Off
A.1 15	Special Award	Points
A.1 19	Match Feature	Off
A.4 01	Highest Score	On
A.4 04	Champion Credits	00
A.4 05	High Score 1 Credits	00
A.4 06	High Score 2 Credits	00
A.4 07	High Score 3 Credits	00
A.4 08	High Score 4 Credits	00

**U.9 11 NOT USED**



**U.9 12 Serial Capture**

This sets up the printer adjustments for a serial transmission to a laptop computer, (9600 baud, 40 column, no page breaks, serial printer). This option requires the installation of the optional printer kit; part number 63110.

**U.9 13 to U.9 16 NOT USED****U.9 17 Install German 1****U.9 18 Install German 2****U.9 19 Install German 3****U.9 20 Install German 4****U.9 21 Install German 5****U.9 22 Install German 6**

Adjustments U.9 17 through U.9 22 are used to modify game pricing and type of play.

**U.9 23 Install French 1****U.9 24 Install French 2****U.9 25 Install French 3****U.9 26 Install French 4****U.9 27 Install French 5****U.9 28 Install French 6**

Adjustments U.9 23 through U.9 28 are used to modify game pricing and type of play.

**U.10 Clear Credits**

Press the Enter button to clear the game Credits.

**U.11 Auto Burn-in**

Press the Enter button to activate Auto Burn-in. This utility automatically cycles through several tests. This helps in finding intermittent problems. The tests that Auto Burn-in cycles through are: the Display Test, the Sound and Music Test, the All Lamps Test, the Solenoid Test, the Flashers Test, the General Illumination Test, and the Flipper Coil Test. All of the test run are run concurrently. The time spent on the burn-in cycle, and the total time the game has spent in burn-in are displayed.

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access an adjustment. Press the Up or Down buttons to see the setting choices. Press the Enter button to lock in a setting choice. If a mistake is made, press the Escape button while "Saving Adjustment Value" is in the display. The original value is retained and the new value is ignored. Press the Escape button to return to the Adjustment Menu.

## **A. ADJUSTMENTS MENU**

- A.1 Standard Adjustments**
- A.2 Feature Adjustments**
- A.3 Pricing Adjustments**
- A.4 H.S.T.D Adjustments**
- A.5 Printer Adjustments (optional board required)**

### **A.1 Standard Adjustments**

#### **A.1 01 Balls Per Game**

A "game" is defined by specifying the number of balls to be played.  
Range: 1 to 10.

#### **A.1 02 Tilt Warnings**

The number of total actuations of the plumb bob that can occur before the game is "tilted".  
Range: 1 to 10.

#### **A.1 03 Maximum Extra Balls**

The number of Extra Balls that a player may accumulate.  
Range: 0 to 10.

#### **A.1 04 Maximum Extra Balls/Ball in Play**

The number of Extra Balls to be awarded per ball in play.

- OFF - No maximum number of Extra Ball per ball in play.
- 1-10 - 1 through 10 Extra Balls per ball in play.

#### **A.1 05 Replay System**

The type of replay system to be used.

- Fixed - Replay value is set and does not change during game play.
- Auto% - Replay starting value is set but changes every 50 games to comply with the percentage of replays desired.

#### **A.1 06 Replay Percent\***

The percentage of replays the players are able to earn when Auto Replay is used.  
Range: 5% to 50%.

#### **A.1 07 Replay Start\***

Replay start value when Auto% Replay is used.  
Range: 15,000,000 to 250,000,000.

#### **A.1 08 Replay Levels\***

The number of replay levels used by the Auto% Replay mode. The range of this setting is 1 to 4. When two replay levels are chosen, the second replay level is automatically adjusted to twice the starting replay level. When three or four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

\*For Auto% Replay

**A.1 09 Replay Level 1\*\***

**A.1 10 Replay Level 2\*\***

**A.1 11 Replay Level 3\*\***

**A.1 12 Replay Level 4\*\***

The value to be used for the 1st through 4th Fixed Replay.

Range: 00 to 250,000,000.

**A.1 13 Replay Boost**

The replay score can be temporarily boosted by the selected amount EACH time the player reaches or exceeds the replay score. This temporary boost is canceled when credits equal 0, the player inserts another coin, or when Begin Test is pressed.

- ON - Score is boosted between 500,000 and 5,000,000 points.
- OFF - Replay score is not boosted.

**A.1 14 Replay Award**

The form of award automatically provided when the player exceeds any replay level for either Auto% Replay or Fixed Replay.

- Credit - Reaching each Replay level awards credit.
- Ticket - Reaching each Replay level awards a ticket.
- Ball - Reaching each Replay level awards an Extra Ball.
- Audit - Reaching each Replay level awards nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards.

**A.1 15 Special Award**

The award automatically provided when the player scores a special.

- Credit - Scoring a Special awards a Credit.
- Ticket - Scoring a Special awards a Ticket.
- Ball - Scoring a Special awards an Extra Ball.
- Points - Scoring a Special awards 1 Million points.

**A.1 16 Match Award**

The award automatically provided when the players wins a match.

- Credit - Winning a Match awards a Credit.
- Ticket - Winning a Match awards a Ticket.

**A.1 17 Extra Ball Ticket**

A Ticket is awarded when the player earns an Extra Ball.

- YES - The player is awarded a Ticket in addition to an Extra Ball.
- NO - The player is not awarded a Ticket

**A.1 18 Maximum Ticket/Player**

The amount of Tickets each player can earn.

Range: 00 to 100.

\*\* For Fixed Replay.

**A.1 19 Match Feature**

The desired percentage for the Match Feature occurring at the end of the game.

OFF - Match Feature is not available.

1 - 50%- 1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects a random two-digit number at the end of the game and compares each players score for an identical two digits in the rightmost two positions. A match of these two digit results in an award of a Credit or a Ticket.

**A.1 20 Custom Message**

The message displayed during the Attract Mode.

YES - A message is displayed

NO - A message is not displayed.

**A.1 21 Language**

The language the game uses: English, French, or German.

**A.1 22 Clock Style**

The style of clock the game uses: A.M./P.M. or 24 Hours.

**A.1 23 Date Style**

The style of date the game uses: Month/Date/Year, or Date/Month/Year.

**A.1 24 Show Date and Time**

The date and time show in the Attract Mode.

YES - Show the date, time in status report or in the Attract Mode.

NO - Do Not show date, time in status report or in the Attract Mode.

**A.1 25 Allow Dim Illumination**

The game program dims the General Illumination for special effects and during the Attract Mode.

YES - Dim the General Illumination during the Attract Mode.

NO - Do Not dim the General Illumination.

**A.1 26 Tournament Play**

Equalize Multiball and Jackpots during multi-player games, (do not carry over to next player).

YES - Keep Multiball and Jackpots equal.

NO - Do Not Keep Multiball and Jackpots equal.

**A.1 27 Euro. Scr. Format**

Use either commas or dots between digits when numbers are displayed.

YES - Dots instead of commas, (example- 1.000.000).

NO - Commas instead of dots, (example- 1, 000, 000).

**A.1 28 Minimum Volume Override**

The volume can be turned Off.

YES - Volume can be turned Off.

NO - Volume can be turned Down but not Off.

**A.1 29 General Illumination Power Saver**

This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played. Power Saver Level (A.1 30) determines dimness of the lamps. Using this feature substantially increases the life of the lamps.

Setting: OFF, 2 to 60 minutes.

**A.1 30 Power Saver Level**

When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.

Range: 4 to 7. (4 = dimmest, 7 = brightest)

**A.1 31 Ticket Expansion Board**

When a Ticket Expansion Board is connected, full control of the ticket dispenser is available. This includes a ticket low/error lamp, resume on ticket jam switch and manual ticket dispense switch.

- YES - Ticket Expansion Board is connected.
- NO - Ticket Expansion Board is NOT installed in the game.

**A.1 32 No Bonus Flips**

The activation of flippers during the end of ball "bonus" sequence. Setting to "YES" may extend the life of the flipper mechanisms.

**A.1 33 Game Restart**

When the Start button is pressed during or after the 2nd ball, the game in progress will end and a new game will begin. This adjustment has three settings to determine how this is handled.

- NEVER- Do not allow a new game start until the current game is over.
- SLOW - Restart if the Start button is pressed continuously for over 1/2 second. This helps to prevent the unintended restart of game in progress.
- INSTANTLY- Restart as soon as the Start button is pressed.

When the Start button is pressed during game over, or during the 1st ball (to add a player), it is always handled instantly.

## **A.2 Feature Adjustments**

### **A.2 01 Buy Extra Ball**

This determines if the players can buy extra balls at the end of the game.

Setting: OFF, ½ Credit, 1 Credit  
Factory Default: 1 Credit

### **A.2 02 Buy In Count**

This determines the number of times per game the player is allowed to buy an extra ball.

Setting: 1-3, UNLIMITED  
Factory Default: 1

### **A.2 03 Ball Saves**

This determines how many times a ball will be saved when it drains. The ball will be saved only once per ball-in-play. The ball saver is available each ball until the adjusted number of ball saves is used by the player.

Setting: OFF, 1-5  
Factory Default: 1

Example of ball save usage: WITH BALL SAVES - 1 (factory default)

BALL 1: Ball saves available.  
Ball drains after ball saver time-out.

BALL 2: Ball saves available.  
Ball drains during ball save timer, and ball is delivered back onto the playfield.

BALL 3: Ball save NOT available.

### **A.2 04 Ball Save Time**

This sets the number of seconds that the ball saver is activated.

Setting: 3-15 seconds  
Factory Default: 6 seconds

### **A.2 05 Timed Plunger**

This sets a time-out for the ball to be automatically plunged onto the playfield after it has been served.

Setting: OFF, 30-90 seconds  
Factory Default: OFF

### **A.2 06 Flipper Plunger**

When this adjustment is set to YES, the right flipper will cause the ball to be launched onto the playfield. This adjustment is provided for use when launch button is broken and/or intermittent. The game will automatically detect a broken launch button, but it may take several games for it to perform the detection. In this case, set Flipper Plunger to YES until the launch button can be repaired.

Setting: YES, NO  
Factory Default: NO

**A.2 07 Ex. Ball Memory**

This determines whether the lit Extra Ball stays in memory from ball to ball.

Setting: YES, NO  
Factory Default: YES

**A.2 08 Ex. Ball Percent**

This determines the total percentage of extra balls desired (for all extra balls awarded from all features except replay score levels). The game will adjust the number of VIDEO FRAMES required for an extra ball to achieve the requested percentage. Set to FIXED to disable the automatic percentaging of the VIDEO FRAMES Extra ball.

Setting: FIXED, 11-40%  
Factory Default: 20 %

**A.2 09 Ex. Ball Level**

This is the number of VIDEO FRAMES necessary to light the EXTRA BALL lamp. The machine will start with this value and modify it as necessary to achieve the percentage specified in A.2 08. To use a fixed level for the extra ball, set A.2 08 to FIXED, then set the level.

Setting: 5-50  
Factory Default: 10

**A.2 10 German Speech**

When this adjustment is set to YES and the game is adjusted for German, certain speech phrases are spoken in German.

Setting: YES, NO  
Factory Default: NO (unless adjusted for German)

**A.2 11 Censor Enable**

When this adjustment is set to YES, the CYBERPUNK initials displayed during score sweep will be checked against the following list and if a match occurs, the initials will be replaced with '\*\*\*\*'.

The default censor list is:  
"ASS", "CUM", "DIK", "FAG", "FUK", "TIT", "SEX"

Additional censor list if the game is adjusted for French:  
"CUL", "CON", "PUT", "BIT", "ZOB"

Setting: YES, NO  
Factory Default: NO

**A.2 12 Special Mode**

This determines whether a special mode is available to players.

Setting: YES, NO  
Factory Default: YES

**A.2 13 Player Tournament**

When this adjustment is set to YES, holding both flipper buttons(during attract mode) for 5 seconds prompts the player with "TOURNAMENT MODE READY" and gives them 10 seconds to start a game in TOURNAMENT mode

Setting: YES, NO  
Factory Default: YES

**A.2 14 A-Mode Music**

This determines whether or not the attract mode plays music to attract the player.

Setting: YES, NO  
Factory Default: NO

**A.2 15 MK3 Codes Shown**

This determines whether or not the display shows codes for Mortal Kombat 3.

Setting: YES, NO  
Factory Default: YES

**A.2 16 Hand Position X**

This adjustment allow the hand mechanism's catch position to be fine tuned in the X (left and/or right) direction.

Setting: 0-127  
Factory Default: 44

**A.2 17 Hand Position Y**

This adjustment allows the hand mechanism's catch position to be fine tuned in the Y (backward and/or forward) direction.

Setting: (-80)-79  
Factory Default: 24

**A.2 18 Hand Disabled**

When this adjustment is set to YES, the hand mechanism will not be enabled for game play. The drop target and diverter leading to the hand popper will be kept closed and the hand will be kept to the right of the hand popper (if possible). This adjustment is provided for use when the hand mechanism is broken. This will allow the game to continue playing until the hand mechanism can be repaired.

Setting: YES, NO  
Factory Default: NO



### **A. 3 Pricing Adjustments**

#### **A.3 01 Game Pricing (If set to custom, then 02 to 09 are available. Custom Pricing Is Not Available For U.S.A. And Canadian Games).**

The cost of a game is selected here from the Standard Pricing Table or by using the custom pricing editor (A.3 27).

#### **A.3 02 to A.2 09 NOT USED**

#### **A.3 10 Coin Door Type (If set to custom, then 11 to 15, 20 and 25 are available. Custom Pricing Is Not Available For U.S.A. And Canadian Games).**

This adjustment is used to preset adjustments 11 through 15, 20 and 25, based on standard coin doors.

#### **A.3 11 Collection Text**

The coin system is used to display the Earning Audits.

#### **A.3 12 Left Slot Value**

#### **A.3 13 Center Slot Value**

#### **A.3 14 Right Slot Value**

#### **A.3 15 4th Slot Value**

The monetary value of the left, center, right and 4th coin chutes. Formerly these values only affected the way in which the coins were totaled for auditing displays. In the new 10/94 pricing system, these values are added for each coin inserted and credits are awarded based on the amount of money accumulated. See Pricing Editor (A.3 27) for more information.

#### **A.3 16 Maximum Credits**

The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 99. Reaching the specified setting prevents the award of any credits. Factory default is 10.

#### **A.3 17 Free Play**

A player can operate the game without a coin (free play) or with a coin.

NO - A coin is necessary for game play.

YES - Game play is free; no coin required.

#### **A.3 18 Hide Coin Audits**

The coin audits may, or may not, be displayed.

YES - The coin audits are not displayed.

NO - The coin audits are displayed.

HIDE NAMES - The coin audit value is shown but not the audit name.

#### **A.3 19 NOT USED**

#### **A.3 20 Base Coin Size**

This is the smallest unit of coin that may be used when creating a custom pricing mode using the Pricing Editor (A.3 27). For example, in the USA this is typically \$0.25. All pricing levels are then specified in 25 cents (or greater) increments.

### **A.3 21 Coin Meter Units**

It is possible to connect a coin meter to the knocker coil driver which will log all coins through all slots. This adjustment activates the use of the knocker driver for this purpose, and determines the value of each unit on the meter. For example, to show the total amount of money collected as "total quarters", set this adjustment to "0.25". To show the amount of money collected as "total dollars", set this adjustment to "1.00". ***Setting this adjustment to anything other than Off establishes the coin unit for a meter attached to the knocker driver, and overrides use of the knocker during awards.***

### **A.3 22 Dollar Bill Slot**

The system normally requires 150 microseconds between coin pulses. This is too long a delay for a fast-pulsing dollar bill validator. This adjustment may be used to tell the game that there is a fast-pulsing dollar bill validator connected to one of the coin switches.

NONE = No validator connected.  
LEFT = Validator connected to left slot.  
CENTER = Validator connected to center slot.  
RIGHT = Validator connected to right slot  
FOURTH = Validator connected to fourth.

### **A.3 23 Minimum Coin Microseconds**

This is the minimum width required for coin pulses to be accepted as valid coins. This may be changed to prevent certain kinds of cheating.

### **A.3 24 NOT USED**

### **A.3 25 Allow Hundredths**

This is used for a custom door specifier. If set to "YES", then the values for A.3 12-15 are specified in units and hundredths (such as dollars and quarters). If set to "NO", then all values are in units (such as Francs and Lire.)

### **A.3 26 Credit Fraction**

This determines the smallest fraction used for credits. It must be even to accommodate the extra ball buy-in option of 1/2 credit, and is typically 1/2 but may need to be a different value for modes requiring more coins per credit.

### **A.3 27 Pricing Editor (Custom Pricing Is Not Available For U.S.A. And Canadian Games).**

This function is now used to enter information for a custom pricing mode. The adjustment A.3 26 (Credit Fraction) may need to be set before entering the custom pricing editor. This specifies the smallest fraction available for partial credits.

Because of availability of an extra ball (buy-in) for 1/2 credit, this value is always even (1/2, 1/4, 1/6 etc.). The typical setting for A.3 26 is 1/2 (such that there are only full credits and half credits) but you may need to use a different value for other pricing modes.

Please note that formerly, the coin values specified by custom coin doors adjustments A.3 12-15 only affected audit totals that showed collection totals. In the 10/94 pricing system, these coin values are added up for each coin received and credits are awarded based on pricing levels being reached. The pricing editor described here allows you to set these levels, however it may be necessary for you to set A.3 10 (Coin Door Type) to "CUSTOM" and then change A.3 11-15, 20 and 25 to reflect the value of the coins being used. This is usually NOT NECESSARY, but must be done BEFORE using the custom pricing editor when it is necessary.

Begin the custom pricing function by pressing the "Enter" button while A.3 27 "Pricing Editor" is showing in the display.

The pricing editor will now show the data for the currently selected pricing mode. If this is the 1st use of the pricing editor then this will show the last built-in pricing that was selected. Otherwise it will be the last custom mode created by this function. (Note that A.3 01 will display "Custom" any time a non-standard pricing has been selected.)

Assuming the last mode installed was 1/\$0.50 2/\$0.75 3/\$1.00 the display appears as follows:

CUSTOM PRICING EDITOR		
1)	\$0.25	1/2 cred.
2)	\$0.50	1 cred.
3)	\$0.75	2 cred.
4)	\$1.00	3 cred.

DISPLAY VIEW

The "\$0.25" field will be flashing. You may now use the test mode buttons to perform the following functions:

**Escape:** Undo any changes to the current field and move to the previous field.

**"-" (Down):** Make the current field lower.

**"+" (Up):** Make the current field higher.

**Enter:** Save any changes to the current field and move to the next field. Note that there are 2 columns of fields. Price levels are in the left column and credit levels are in the right column. Pressing "Enter" will move from left column to right column before moving to the next line.

**Start:** Save the current price mode or start over

By using the above functions, you simply enumerate each pricing level and the number of credits that should be awarded at that level. Please note that you must specify each fractional level in sequence.

Example:	1/\$0.50	2/\$1.00	4/\$1.50	6/\$2.00
	1)	\$0.25	1/2 cred.	
	2)	\$0.50	1 cred.	
	3)	\$0.75	1 1/2 cred.	
	4)	\$1.00	2 cred.	
	5)	\$1.25	2 1/2 cred.	
	6)	\$1.50	4 cred.	
	7)	\$1.75	4 1/2 cred	
	8)	\$2.00	6 cred.	

Also note that once the value of the coins repeat that no further specification is necessary.

Example:	1/\$0.50	2/\$1.00
1)	\$0.25	1/2 cred.

In the above example, only one line needs to be specified, indicating that 1/2 credit is awarded for each \$0.25 received.

**Special Features:**

There are some special features available by pressing the “-” (Down) button while in the left column. The following words will be displayed instead of a pricing level:

- End*
- Delete*
- Insert*
- Clear*
- Repeat 1*
- Repeat 2*
- Repeat 3*
- Repeat 4*
- Repeat 5*
- Repeat 6*
- Repeat 7*
- Repeat 8*
- Repeat 9*
- Repeat 10*
- Repeat 11*
- Repeat 12*
- Repeat 13*
- Repeat 14*
- Repeat 15*
- Repeat 16*
- Repeat 17*
- Repeat 18*
- Repeat 19*
- Repeat 20*

Pressing “Enter” with the above words selected will activate the following instructions:

- End** This is the same as pressing the Start button. A menu of choices will be provided (see “Start Button” below).
- Delete** This will delete the current level from the pricing mode.
- Insert** This will insert a new pricing level ABOVE the current level. The current level will be unaffected. There must be room for at least one coin between the current level and the previous level, and at least one fractional credit unit between the current level and the previous level.

Example: Inserting a new pricing level.

CUSTOM PRICING EDITOR		
1)	\$0.50	1 cred.
2)	\$1.00	2 cred.
3)	\$1.50	4 cred.
4)	\$2.00	6 cred

DISPLAY VIEW

Use the "Enter" button to move to the \$1.50 field. Now press the "-" button once to create the following display:

CUSTOM PRICING EDITOR		
1)	\$0.50	1 cred.
2)	\$1.00	2 cred.
3)	INSERT	4 cred.
4)	\$2.00	6 cred

DISPLAY VIEW

Now press the "Enter" button. The display will now show:

CUSTOM PRICING EDITOR		
1)	\$0.50	1 cred.
2)	\$1.00	2 cred.
3)	\$1.25	2 1/2 cred.
4)	\$2.00	6 cred

DISPLAY VIEW

Note that the line "5) \$2.00 6 cred." no longer fits on the display. Whenever there are more than four pricing levels that the display will scroll up and down as "Enter" and "Escape" are used to move from field to field. If you repeatedly press "Enter" the display will then show:

CUSTOM PRICING EDITOR		
2)	\$1.00	2 cred.
3)	\$1.25	2 1/2 cred.
4)	\$1.50	4 cred.
5)	\$2.00	6 cred

DISPLAY VIEW

**Clear** This will clear out the current entries to allow a new price mode to be entered.

**Repeat (1-20)** This will cause all entries above the current line to be repeated the number of times specified. This is only available when there are no pricing levels below the current line.

Example: 1/\$0.50      2/\$1.00      15/\$5.00

Use the "Edit New Pricing Mode" feature described below to clear out the current levels.

Use "+" and "Enter" to specify 1/2 credit for \$0.25:

CUSTOM PRICING EDITOR		
1)	\$0.25	1/2 cred.

DISPLAY VIEW

Now, use "-" until the display shows "Repeat 20". The display will show the following:

CUSTOM PRICING EDITOR		
1)	\$0.50	1 cred.
2)	REPEAT 20	

DISPLAY VIEW

Press "Enter" and the display will show the following:

CUSTOM PRICING EDITOR		
1)	\$0.25	1/2 cred.
2)	\$0.50	1 cred.
3)	\$0.75	1 1/2 cred.
4)	\$1.00	2 cred

DISPLAY VIEW

Actually, by repeating the 1st line 20 times the pricing mode is currently set up as follows, but only the 1st four lines are displayed.

CUSTOM PRICING EDITOR		
1)	\$0.25	1 /2 cred.
2)	\$0.50	1 cred.
3)	\$0.75	1 1/2 cred.
4)	\$1.00	2 cred.
5)	\$1.25	2 1/2 cred.
6)	\$1.50	3 cred.
7)	\$1.75	3 1/2 cred.
8)	\$2.00	4 cred.
9)	\$2.25	4 1/2 cred.
10)	\$2.50	5 cred.
11)	\$2.75	5 1/2 cred.
12)	\$3.00	6 cred.
13)	\$3.25	6 1/2 cred.
14)	\$3.50	7 cred.
15)	\$3.75	7 1/2 cred.
16)	\$4.00	8 cred.
17)	\$4.25	8 1/2 cred
18)	\$4.50	9 cred.
19)	\$4.75	9 1/2 cred.
20)	\$5.00	10 cred

DISPLAY VIEW

Now repeatedly press "Enter" to move the right hand column to the 20th level. The display will show (with "10 cred." blinking):

CUSTOM PRICING EDITOR		
17)	\$4.25	8 1/2 cred.
18)	\$4.50	9 cred.
19)	\$4.75	9 1/2 cred.
20)	\$5.00	10 cred

DISPLAY VIEW

Now press "+" repeatedly until the right hand column of line 20 reads "15 cred."

**Start Button:** Once the pricing mode has been specified, you exit the custom pricing editor by pressing the 'Start' button. This will bring up a menu with some or all of the following choices:

Choose an Option: Return to Editor Clear Pricing Ignore Changes Save Changes
--

DISPLAY VIEW

Use the "+" and "-" button to select your choice and press the "Enter" button to activate. The selections cause the following actions:

**Return To Editor:** This option will allow you to continue to edit the pricing information.

**Clear Pricing:** This option will clear out all pricing levels and bring you back to the pricing editor to create a pricing mode from scratch.

**Ignore Changes:** This option will discard the work done in the previous pricing editor and leave the previously installed pricing mode in the game.

**Save Changes:** Press "Enter" to save your custom edited pricing mode and install it as the pricing for the game. Note that this choice will not be displayed if there is not at least one pricing level specified in the pricing editor, or if no changes have been made.

**Exit Pricing Editor:** This option will appear if no changes have been made. It will exit the Pricing Editor leaving the pricing as is.





## **A.4 H.S.T.D. Adjustments**

### **A.4 01 Highest Scores**

The game maintains a record of the four highest scores achieved to date.

- OFF - No high scores are recorded, or displayed.
- ON - The four highest scores are stored in memory and displayed in Attract Mode.

### **A.4 02 H.S.T.D. Award**

The award given for achieving the High Score To Date, or the Champion H.S.T.D.: Credit or a Ticket.

### **A.4 03 Champion H.S.T.D.**

The "Highest" High Score can be displayed in the Attract Mode. This score is not cleared when "High Score Reset Every" occurs.

- ON - The "Highest" High Score is retained in memory and displayed.
- OFF - The "Highest" High Score is not retained.

### **A.4 04 Champion Credits**

The number of credits or tickets awarded for a Grand Champion Score.  
Range: 00 to 10.

### **A.4 05 H.S.T.D. 1 Credits**

### **A.4 06 H.S.T.D. 2 Credits**

### **A.4 07 H.S.T.D. 3 Credits**

### **A.4 08 H.S.T.D. 4 Credits**

The number of credits or tickets awarded whenever a player exceeds the 1st, 2nd, 3rd, or 4th highest score.  
Range: 00 to 10.

### **A.4 09 High Score Reset Every**

The number of games to be played before an automatic reset of the displayed "Highest Score" occurs. The values provided upon reset are those selected by the operator in the Back-up High Scores.

Range: OFF (disabled); 250 to 20,000.

### **A.4 10 Backup Champion**

The Back-up Grand Champion Score.  
Range: 00 to 999,000,000.

### **A.4 11 Backup H.S.T.D. 1**

### **A.4 12 Backup H.S.T.D. 2**

### **A.4 13 Backup H.S.T.D. 3**

### **A.4 14 Backup H.S.T.D. 4**

The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached.

Range: 00 - 999,000,000.

### **A.4 15 Cyberpunk Credit (For U.S. and Canadian Games)**

This determines the number of credits awarded to the player who achieves CYBERPUNK status.

Setting: 0-3

Factory Default: 0

**A.4 16 Def. Cyberpunk (For U.S. and Canadian Games)**

This determines the minimum number of GIGABYTES which the player must collect achieve CYBERPUNK status.

Setting: 01-320

Factory Default: 320

**A.5 Printer Adjustments** (optional board required)

**A.5 01 Column Width**

The column width to be printed. Range: 22 to 80.

**A.5 02 Lines Per Page**

The amount of lines per page. Range: 20 to 80.

**A.5 03 Pause Every Page**

Choose whether the printer pauses at the end of a page.

- YES - The printer does pause.
- NO - The printer doesn't pause.

**A.5 04 Printer Type**

Select the type of printer: Parallel, Serial, ADP, Mini-Drucker, or NSM.

**A.5 05 Serial Baud Rate**

Select which baud rate to use for serial or ADP communications (bit rate): 300, 600, 1200, 2400, 4800, or 9600.

**A.5 06 Serial D.T.R. (Data Terminal Ready)**

When a serial printer is used, this line may be connected to a printer output line signaling that the printer is busy.

- NORMAL - Normal D.T.R. signal goes low to indicate the printer is not ready.
- INVERTED - Inverted D.T.R. (busy) signal goes high to indicate the printer is not ready.
- IGNORE - D.T.R. signal is ignored.

**A.5 07 Auto Printout**

With the optional printer board installed, this adjustment allows the initiation of printouts whenever the game detects a printer connected to the game. Parallel printers are detected automatically by plugging them in and putting them on-line. Serial printers (or computers) are detected by sending a carriage return (ASCII 0x0D) or XON (ASCII 0x11).

This adjustment has the following settings:

OFF	Disable automatic printouts
MAIN AUDITS	Main Audit Table (B.1)
EARNINGS	Earning Audits (B.2)
STD. AUDITS	Standard Audits (B.3)
FEATURES	Feature Audits (B.4)
HISTOGRAMS	Histograms (B.5)
TIMESTAMPS	Time Stamps (B.6)
ALL DATA	All of the above data

The table specified above will automatically be printed when a printer (or computer) is detected.

If the printer is detected during game over or test mode, the printout will be taken right away.

If the printer is connected while a game is being played, it will take up to 10 seconds to be detected, after which the printout will occur. The game will resume after the printout is complete.

Automatic printouts will only take place if the coin door is open.

After an automatic printout has been generated, a 2nd automatic printout will not be possible until a new game has started, or test mode begins.

## **ERROR MESSAGES**

The WPC game program has the capability to aid the operator and service personnel. At game turn-on, or after pressing the Begin Test switch, once the game has been operating for an extended period, the display may signal with a message, "Press ENTER for Test Report". This indicates the game program has detected a possible problem with the game.

To obtain details of the problem open the coin door and press the Begin Test switch. Press the Enter button to begin displaying the message(s). The following messages apply to your game.

### **Drop Target Is Broken**

This error occurs when the drop target mechanism fails to set, reset, or the switch is broken.

### **Left Diverter Is Broken**

This error occurs when the left diverter mechanism is in the open/closed state and a ball is detected in the non-diverted path.

### **Right Diverter Is Broken**

This error occurs when the right diverter is in the open/closed state and a ball is detected in the non-diverted path.

### **Hand Mechanism Is Broken**

This error occurs when the hand mechanism fails and none of the following errors is appropriate.

### **Hand Mechanism X - No Progress**

The X direction motor drive failed to move.

### **Hand Mechanism Y - No Progress**

The Y direction motor failed to move.

### **Hand Mechanism X Encoder Error**

The X direction optical position encoder pair failed, or presented a miss-reading.

### **Hand Mechanism Y Encoder Error**

The Y direction optical position encoder pair failed, or presented a miss-reading.

### **Hand Mechanism X Home Switch Error**

The X direction home switch failed to transition.

### **Hand Mechanism Y Home Switch Error**

The Y direction home switch failed to transition.

### **Hand Disable by ADJ. A.2 14.**

The HAND DISABLED adjustment is set to YES.

### **Update Sound U2-U8 to N.M. or Later**

This game ROM version requires the specified version (N.M.) of sound ROMS (U2-U8).

**Check Switch ##.**

This message indicates that at least one switch was stuck 'On' at game turn-on or has NOT been actuated during ball play (for 90 balls or apx. 30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep your game earning, until the service technician can repair the problem. To verify the problem, refer to the Test Menu text describing Switch Testing, and check each reported switch using applicable switch tests. Always check switch operation using a ball, to simulate game conditions. Switch problems may often be resolved by adjusting the wire switch actuators, fixing switch circuitry problems, securing loose connectors, etc. Mechanisms using 'opto switches' (drop targets, etc.) need to be checked for proper power connections (+12V dc and ground).

**Check Fuses F115 and F116 and Opto 12V Supply**

This message will be displayed if the game senses that all optical switches are not functioning. This usually occurs when there is no 12V supply to the playfield optics.

The problem is likely to be a blown fuse (F115 or F116), or at connectors J112, J116, J117 or J118 on the power driver board.

**Opto Trough Bad Check Connectors, Wires and 12V Supply.**

This message will be displayed if all of the optics in the playfield ball trough are not functioning. This is usually caused by a problem with a ball trough connector supplying 12V and ground for the optical circuits.

**Pinball Missing.**

This game normally uses four balls, however, it will operate with less. This message announces that a ball is missing or stuck. When the ball is located, return it to the game via the Outhole. Other possibilities for this problem could be malfunctions of the Ball Trough switches or the Ball Shooter switch.

**xxxxx Sw. is Stuck On.**

This message indicates that a switch, which is not usually On, remains in the On position after the game is switched On. The stuck switch is essential for game play (for example, a coin chute switch, the slam tilt switch, the plumb bob tilt switch), and should be cleared to permit proper game operation.

**Ground Short Row - N, Wht - xxx.**

This message indicates that the switch wires being called out are touching a grounded part on the playfield or coin door. The following should be checked:

1. Slam tilt (or other coin door switch) touching the grounded coin door.
2. A leaf-type, playfield switch touching a grounded part.
3. Players poking metallic objects (wires, coat hangers, etc.) into the game.
4. Switch cable insulation pierced or damaged allowing bare wire contact with a grounded part.
5. All switches in a row closing at the same time. **Note:** This is NOT a switch problem; however, for most games it is a very rare possibility.

**U6 Checksum Error.**

The game ROM checksum is invalid. If this occurs replace the game ROM.

**Time and Date Not Set.**

The real time clock is not set. Go to U.4 of the Utilities Menu and set the time and date.

**Factory Settings Restored.**

This message indicates that the CMOS RAM (U8) no longer retains any custom Pricing or Game Adjustment settings and has reverted to factory default settings. Generally, the following CPU checks will isolate the cause of the CMOS RAM memory failure. The voltages at pin 28 and pin 26 of U8 should be +5V (game turned On) and at least +4V (game turned Off). When the voltage drops below +4V, memory reset occurs. Check the batteries and battery holder. Be sure that the batteries are good and that there is no contamination on the battery holder terminals. Turn the game OFF, and use an ohmmeter to check diodes D1 and D2 on the CPU Board. D1 should read 0 ohms when forward-biased and infinite ohms when reverse-biased. D2 should read 15 ohms when forward-biased and infinite ohms when reverse-biased. (Readings taken with an analog meter.) This message can also indicate that there is an open diode on a 50V coil circuit and noise is entering the circuit.

**CPU L.E.D.'s**

The CPU has three L.E.D.s located on the upper left side of the board D19, D20, and D21. On game power-up D19 and D21 turn on for a moment then, D19 turns off and D20 starts to blink rapidly. D21 remains on. The system has detected a problem if the following happens:

**CPU Board L.E.D. Error Codes**

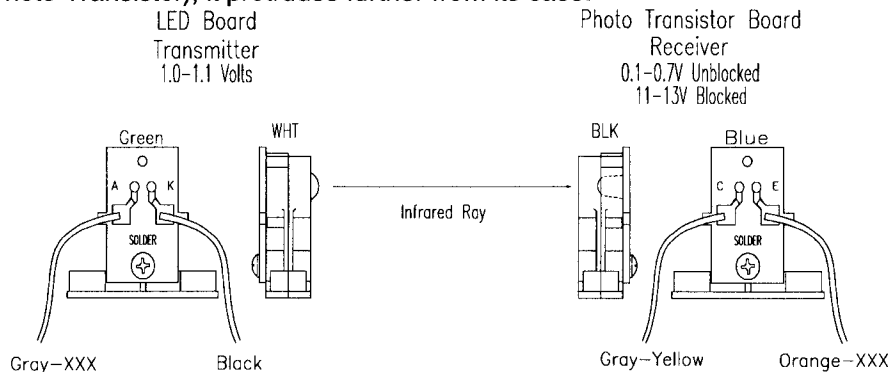
- Center L.E.D. blinks one time - U6 ROM Failure
- Center L.E.D. blinks two times - U8 RAM Failure
- Center L.E.D. blinks three times - U9 Custom Chip Failure

**Sound Board Beep Error Codes**  
**Upon Game Turn-On:**

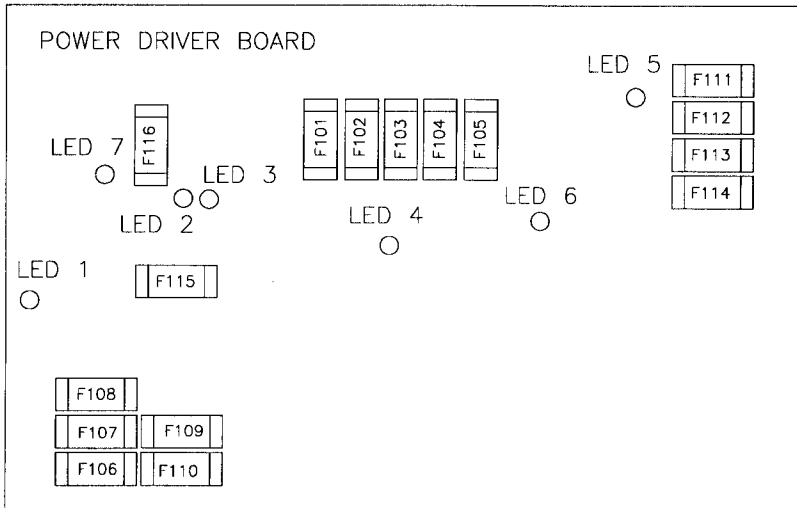
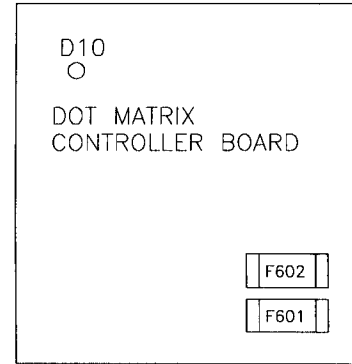
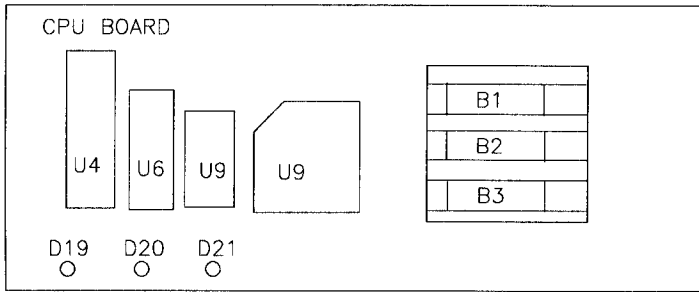
- 1 Beep = Sound Board O.K.
- 2 Beeps = U2 Failure
- 3 Beeps = U3 Failure
- 4 Beeps = U4 Failure
- 5 Beeps = U5 Failure
- 6 Beeps = U6 Failure
- 7 Beeps = U7 Failure
- 8 Beeps = U8 Failure
- 9 Beeps = U9 Failure

**Opto Theory**

The opto receiver (Photo Transistor) should be approximately 0.1 - 0.7 volts when the opto beam is unblocked and approximately 11 - 13 volts when the opto beam is blocked. The opto transmitter (LED) should always be approximately 1.4 volts. **Note:** The transmitter (LED) is larger than the receiver (Photo Transistor); it protrudes further from its case.



## LED List



### **CPU Board**

D19, Blanking  
 D20, Diagnostic  
 D21, +5VDC

At game turn-on, D19 and D21 are on, D20 is off.  
 During normal operation, D19 is off, D20 is flashing and D21 is on.

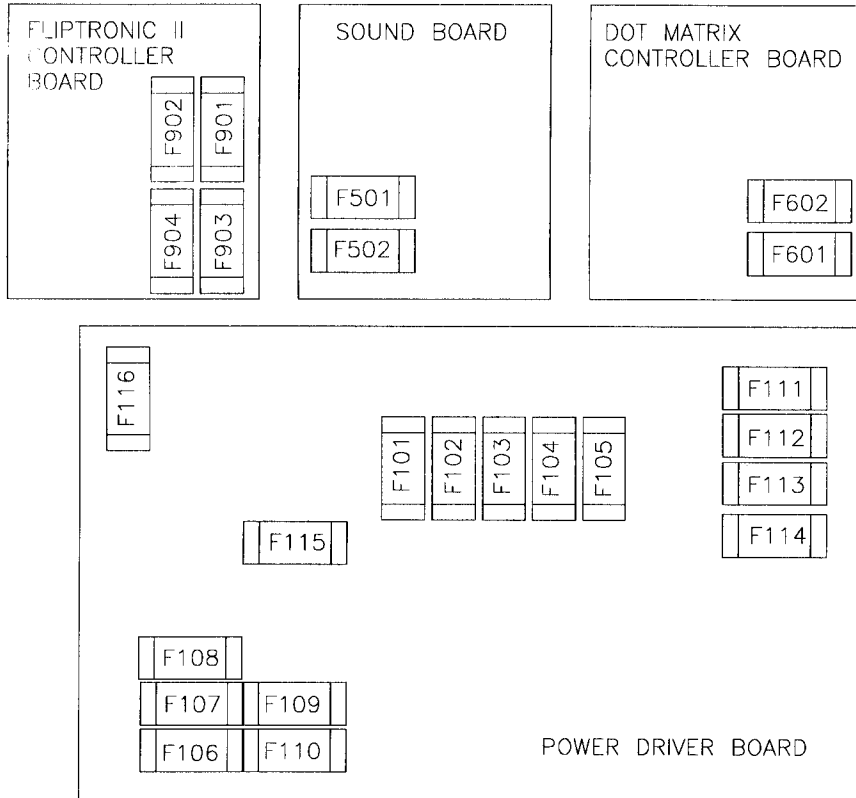
### **Dot Matrix Controller**

D10, +5VDC, Normally On

### **Power Driver Board**

LED 1, +12VDC Switch Circuit, Normally On  
 LED 2, High/Low Line Voltage Sensor, Normally On  
 LED 3, High/Low Voltage Sensor, Normally Off  
 LED 4, +5VDC, Digital Circuit, Normally On  
 LED 5, +20VDC, Flashlamp Circuit, Normally On  
 LED 6, +18VDC Lamp Circuit, Normally On  
 LED 7, +12VDC, Power Circuit, (motors, relays, etc.), Normally On

## Fuse List



### Sound Board

F501 -25V Circuit      3A, S.B.  
 F502 +25V Circuit      3A, S.B.

### Dot Matrix Controller Board

F601 +62V Circuit,      3/8A, F.B.  
 F602 -113V & -125V Circuits      3/8A, F.B.

### Power Driver Board

F101 +50V general (l. flipper)      3A, S.B.  
 F102 +50V general (r. flipper)      3A, S.B.  
 F103 Solenoid #25-#28      3A, S.B.  
 F104 Solenoid #9-#16      3A, S.B.  
 F105 Solenoid #1-#8      3A, S.B.  
 F106 G.I. #5 Wht-Vio      5A, S.B.  
 F107 G.I. #4 Wht-Grn      5A, S.B.  
 F108 G.I. #3 Wht-Yel      5A, S.B.  
 F109 G.I. #2 Wht-Org      5A, S.B.  
 F110 G.I. #1 Wht-Brn      5A, S.B.  
 F111 Flasher Secondary      5A, S.B.  
 F112 Solenoid Secondary      7A, S.B.  
 F113 +5V Logic      5A, S.B.  
 F114 +18V Lamp Matrix      8A, N.B.  
 F115 +12V Switch Matrix      3/4A, S.B.  
 F116 +12V Secondary      3A, S.B.

### Fliptronic II Controller Board

F901 Lower Right Flipper      3A, S.B.  
 F902 Lower Left Flipper      3A, S.B.  
 F903 Upper Right Flipper      3A, S.B.  
 F904 Upper Left Flipper      3A, S.B.

### Line Filter

Domestic Game      8A, N.B.  
 Foreign Game      5A, S.B.



## MAINTENANCE INFORMATION

### LUBRICATION

The two main lubrication points of the Ball Release mechanism are the pivots for the arm. The mechanisms of other playfield devices are somewhat similar to the Ball Release device, and have the same lubrication requirements. A medium viscosity oil (switch target grease) is satisfactory for these devices.

Because of the functional design (arm-actuated via solenoid plunger operation), the pivot points of the Left and Right Kickers ("Slingshots") all require lubrication as a regular servicing procedure.

Lubrication to ensure proper operation also applies to the target blades of the Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, with a Williams' part number of E1165, is a recommended lubricant.

### SWITCH CONTACTS

#### Playfield Switches

For proper game operation, switch contacts should be free of dust, dirt, contamination, and corrosion. Blade switch contacts are plated to resist corrosion. Cleaning blade switch contacts requires gentle closing of the contacts on a clean business card or piece of paper, and then pulling the paper about 2 inches, which should restore the clean contact surface. Adjust the switch contacts to a 1/16-inch gap.

#### Flipper Switches

This game uses the new Fliptronic II Electronic Flipper System. The End-of-Stroke switches are NORMALLY OPEN. The switch should close when the flipper is energized. All E.O.S. switches are gold flashed computer grade leaf switches. Only low computer current is carried through these switches. DO NOT FILE or abrasively clean these switches! DO NOT REPLACE these switches with the old style tungsten high current type switches as intermittent operation could occur. **Note:** Unlike the old style of flipper, an E.O.S. switch failure does not harm the flipper. The game notifies the operator of the switch being mis-adjusted in the test report, but continues to play. The E.O.S. switches are a means by which the new electronic flippers feel and play with all of the subtleties of the old flippers.

### CLEANING

Good game action and extended playfield life are the results of regular playfield cleaning. During each collection stop, the playfield glass should be removed and thoroughly cleaned and the playfield should be wiped off with a clean, lint-free cloth. The game balls should be cleaned and inspected for any chips, nicks, or pits. Replace any damaged balls to prevent playfield damage.

Regular, more extensive, playfield cleaning is recommended. However, avoid excessive use of water and caustic or abrasive cleaners because they tend to damage the playfield surface. Playfield wax (or any carnauba based wax), or polish may be used sparingly, to prevent a buildup on the playfield surface. Do not use cleaners containing petroleum distillates on any playfield plastics because they may dissolve the plastic material or damage the artwork.



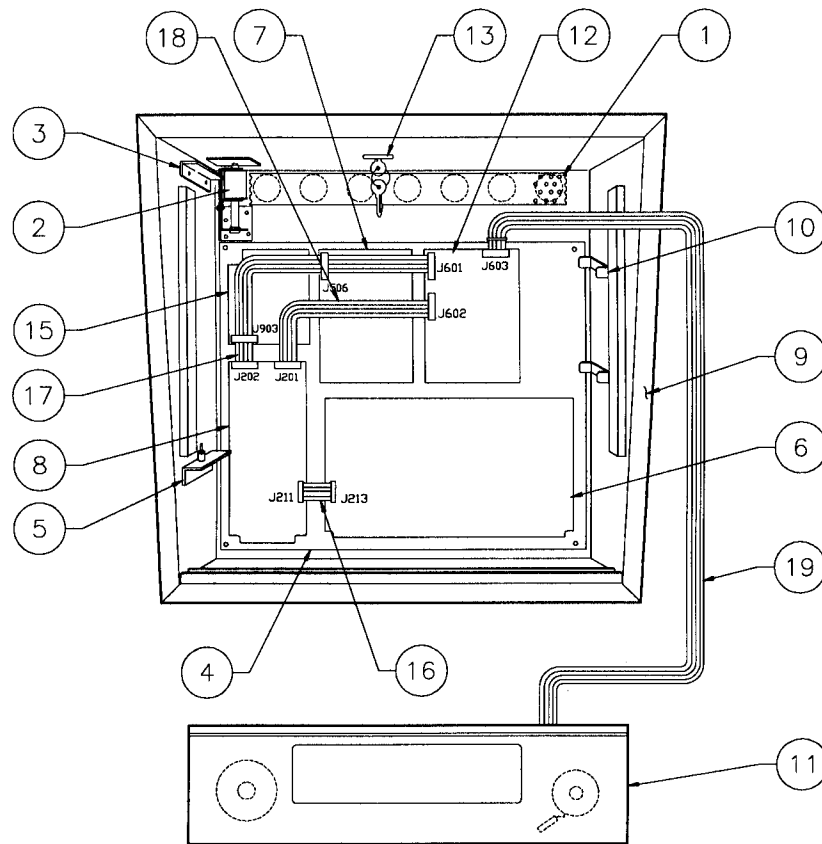
## NOTES

## NOTES

# **SECTION TWO**

## **PARTS INFORMATION**

# 50042-BB Backbox Assembly



Item	Part Number	Description
1	01-6645	Venting Screen
2	B-10686-1	Knocker Assembly
3	A-12497	Insert Bd. Hinge Assy., Upper
4	A-14092-6	WPC Mounting Plate Assy.
5	A-12498	Insert Bd. Hinge Assy., Lower
6	A-12697-3	Power Driver Assembly
7	A-16917-50042	Sound Board Assembly
8	A-17651-50042	WPC Security CPU Board
9	04-10259	Backbox, Wood
10	01-9047	Insert Stop Bracket
11	A-20442	Speaker/Display Assembly
a)	5555-12924-00	Speaker Tweeter, 15w, 4Ω
b)	5555-12856-00	Speaker, 5-1/4", 25w, 4Ω
c)	5045-12914-00	Capacitor, 10μfd., 50v(±20%)
d)	5901-12784-00	Dot Matrix Display/Driver Board
12	A-14039.1	Dot Matrix Controller Board
13	A-13379	Lock & Plate Assembly
14	50042-IN	Insert Board
15	A-15472-1	Fliptronic II Board

### Ribbon Cables:

Item	Part Number	Description
16	5795-12653-03	Ribbon Cable 34-pin, 3"
17	5795-13018-01	Ribbon Cable 34-pin, 23.5"
18	5795-10938-15	Ribbon Cable 26-pin, 15"
19	5795-13434-32	Ribbon Cable w/Ferrite 32"

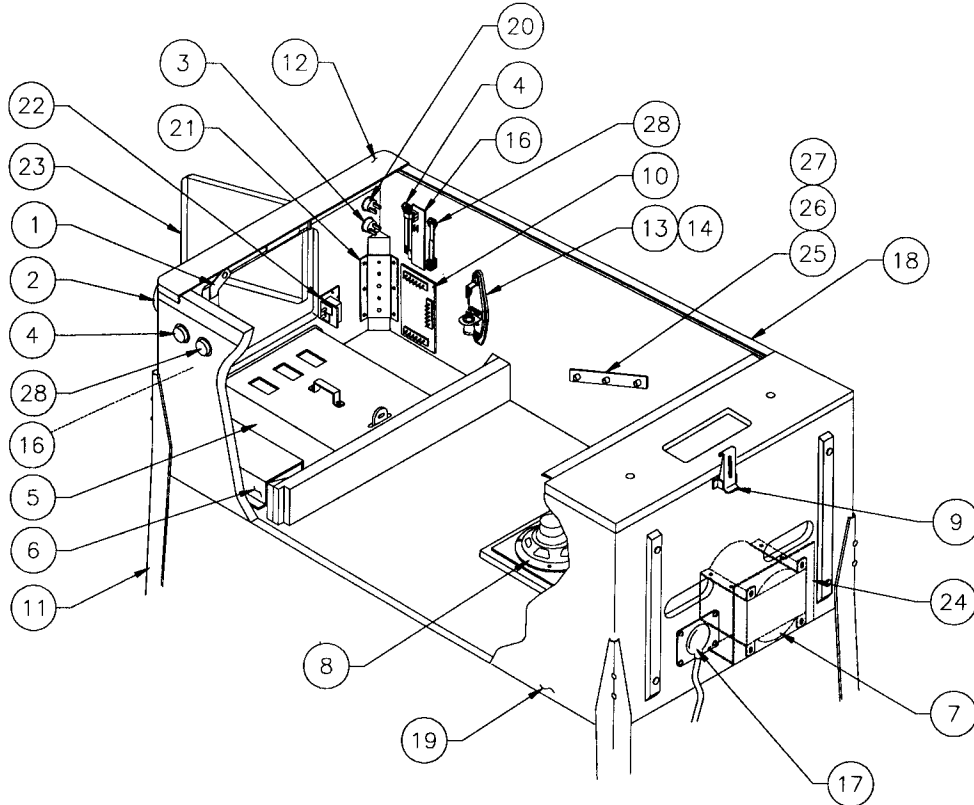
### Miscellaneous Parts:

A-8552-50042	Tempered Backglass Assy.
03-8228-2	Glass Channel Top (1)
03-8228-3	Glass Channel Edge (2)
03-8229-1	Glass Lift Channel (1)
08-7456	Backbox Glass: 27 x 18-7/8"
20-9718	Wing Screw, 3/8-16 x 2"
31-1357-50042	Screened Translight

### Backbox Cables:

H-14584	Dot Matrix Display Power Cable
H-15476	Logic Power Cable
H-15736-1	Secondary Cable
H-20470	Insert Cable

# 50042-CAB Cabinet Assembly



### Miscellaneous Parts

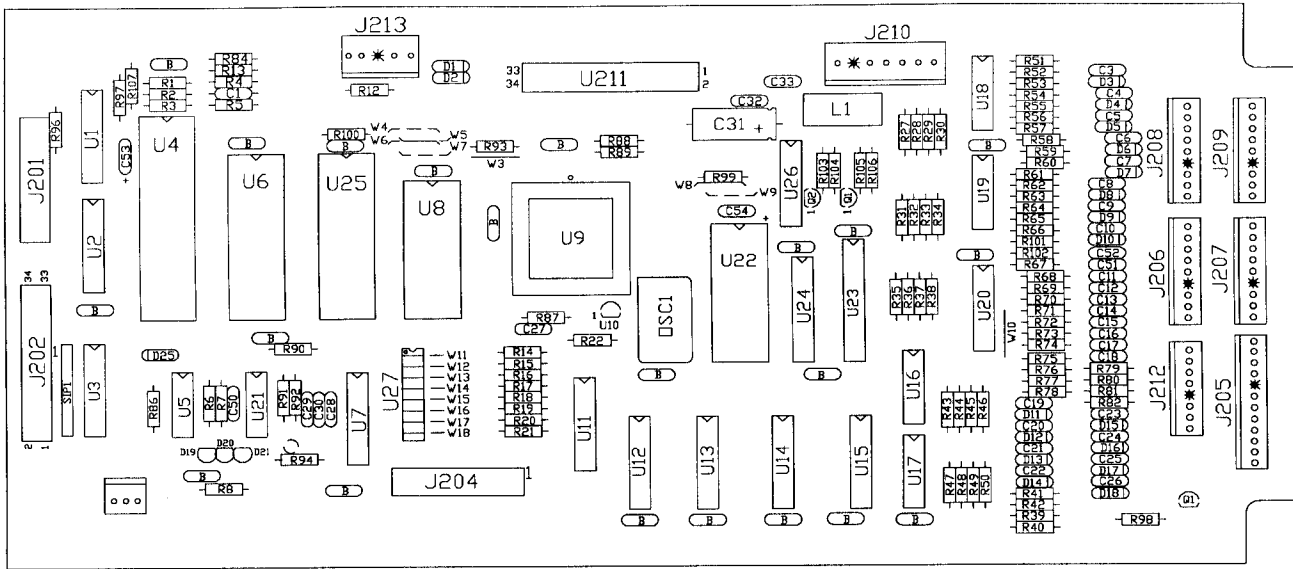
Item	Part Number	Description	Part Number	Description
1	A-16773-1	Lever Guide Assembly	A-17195	Tilt Switch Assy. w/Cable
2	20-9663-B-4	Push Button w/Light (Red)	A-19562.1	Stay Arm Assembly
3	20-9663-21	Push Button w/Sw., <i>Extra Ball</i> (Blue)	01-12352	Clip Bracket
4	A-16883-4	Flipper Button, Red (2)	01-9011-L	Backbox Mtg. Bracket, Left
5	A-18531-1	4-Ball Cashbox Assembly	01-9011-R	Backbox Mtg. Bracket, Right
6	A-17540	Univ. Power Interface Assy.	01-6389-1	Cashbox Lock Bracket
7	5610-14515-00	WPC Transformer	08-7028-T	Playfield Glass
8	5555-12929-00	Speaker, 4Ω, 6", 25w	08-7377	Leg Leveler Adjuster, 3"
9	20-9347	Toggle Latch	20-6500	Steel Ball, 1-1/16" (4)
10	A-17051-1	Coin Door Interface Board		
11	A-19514	Leg Assembly, Chrome (4)		
12	D-12615	Front Molding Assembly		
13	20-6502-A	Plum Bob		
14	A-15361	Tilt Mechanism Assembly		
15	*	Cordset		
16	A-17316	Opto Flipper Assembly (2)		
17	01-10714	Line Cord Cover	A-20201	Cable & Jumper Assy., Coin Door
18	A-12359-3	Side Molding Assembly (2)	H-17217	Plumb/Bob Mech. Protect Cable
19	11-1304.1	Wood Cabinet	H-17837-2	Voltage Program Jumper Cable
20	20-9663-2	Push Button w/Sw., <i>Start</i> (Green)	A-18602	Switch & Cable Assembly
21	01-11400	Leg Plate (4)	A-18602-1	Switch & Cable Assembly
22	A-18249-1	Cable & Interlock Switch Assy.	H-19524	Cabinet Cable
23	09-61000-1	Coin Door-USA	H-19601-1	Power Extension Cable
24	01-13936	Drip Plate	H-20471	Cabinet Switch/Lamp Cable
25	01-11408	Plate Spacer (2)	H-20535	Extra Flipper Button Cable
26	02-4329-1	Pivot Nut, 7/8" (4)		
27	02-4352	Pivot Bushing (2)		
28	A-16883-1	Flipper Button, Blue (2)		

### Cabinet Cables

\* See Application Chart p.2-29.

# A-17651-50042

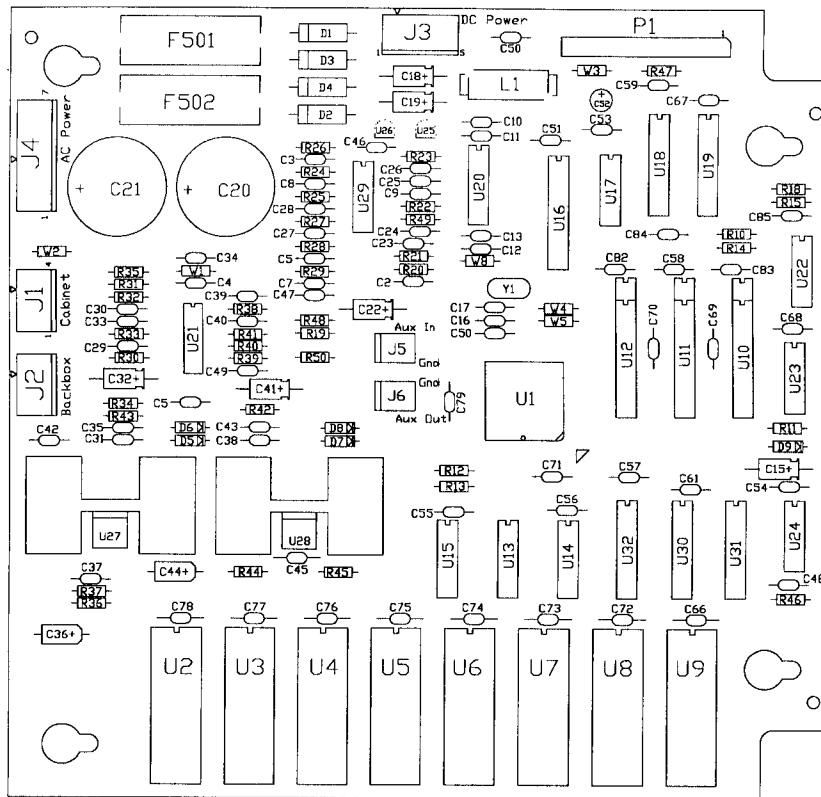
## WPC CPU Security Board Assembly



Part Number	Designator	Description	Part Number	Designator	Description
5010-09034-00	R14-R22, R27-R42, R86, R94, R90, R98	Res., 10K $\Omega$ , 1/4w, 5%	5281-10182-00	U11-U13, U15	IC, 74LS240 / DRVR
5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Res., 1.2K $\Omega$ , 1/4w, 5%	5284-12651-00	U21	IC, 4548
5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84, R101, R102, R105, R106	Res., 1K $\Omega$ , 1/4w, 5%	5315-13924-00	U23	IC, 74HC4514 LTCH 1to16 Dec.
5010-09416-00	R5-R8, R12, R13, R87-R89, R99, R100	Res., 470 $\Omega$ , 1/4w, 5%	5281-09246-00	U26	IC, 74LS139 2 T 4 Decoder
5010-09085-00	R1, R2, R4, R93, R96, R97, R107	Res., 1.5K $\Omega$ , 1/4w, 5%	5340-12558-00	U8	S/RAM 8Kx8 Low Power
5010-09534-00	W4, W7, W9	Res., 0 $\Omega$	5370-12272-00	U16-U19	IC, LM339 Quad Comp
5010-10989-00	R92	Res., 470K $\Omega$ , 1/4w, 5%	5370-12687-00	U10	MC 34064
5010-12104-00	R91	Res., 22M $\Omega$ , 1/4w, 5%	5521-10931-00	OSC1	8.00MHZ OSC 14PIN DIP
5010-08991-00	R103, R104	Res., 4.7K $\Omega$ , 1/4w, 5%	5520-12084-00	X1	Crystal 32.768 KHz
5019-09362-00	SIP1	SIP 4.7K, 9R, 10P, 5%	5551-09822-00	L1	Inductor, 4.7 $\mu$ H, 3.0A.
5040-08986-00	C31	Cap., 100M, 10v ( $\pm$ 20%)	5671-14516-00	D19-D21	Display LED Red
5043-08980-00	B	Cap., .01M, 50v (+80, -20%)	5700-08985-00	U4	Socket IC 40P .6"
5043-09030-00	C27	Cap., .047M, 50v, ( $\pm$ 20%)	5700-12088-00	U6	Socket IC 32P .6"
5043-09065-00	C3-, C26, C51, C52	Cap., 470P, 50v, ( $\pm$ 20%)	5700-12424-00	U9	Socket 84 Pin PLCC
5043-09491-00	C29, C30	Cap., 22P, 1KV ( $\pm$ 10%)	5700-10176-00	U22	Socket IC 28 P .6"
5043-09492-00	C28	Cap., 100P, 50v ( $\pm$ 10%)	5791-10850-00	J201, J204	Connector, 26-pin Header Str
5041-09163-00	C53, C54	Cap., 2.2 $\mu$ F, 15v (20%) Ax.	5791-14090-05	J213	Connector, 5-pin Header Str
5070-08919-00	D2-D18	Diode, 1N4148 150MA	5791-10862-07	J210	Connector, 7-pin Header Str
5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.	5791-13830-08	J212	Connector, 8-pin Header Str
5160-10269-00	Q1-Q3	Trans., 2N3904 NPN	5791-13830-09	J208, J209	Connector, 9-pin Header Str
5700-10389-00	U20	IC Socket 18-pin	5791-13830-11	J206, J207	Connector, 11-pin Header Str
5281-09308-00	U3	IC, 74LS245 TRNCV	5791-12516-00	J202, J211	34 Hen 2x17 Str
5281-09486-00	U14, U24	IC, 74LS374 8 D F/F	5048-11033-00	C50	Cap., .022 $\mu$ F
5281-09851-00	U5	IC, 74LS14 SMT TRG	5791-13830-12	J205	Cap., 12-pin Header Str
5281-09867-00	U1, U2, U7	IC, 74LS244 OCT BUF	5043-09845-00	C32, C33	Cap., 1KP, 50v ( $\pm$ 10%)
			5645-09025-00	U27	Switch DIP 8 POS
			5162-12422-00	U20	IC, ULN 2803A
			A-5400-50042-1	U22	WPC PIC 16C57 Micro-C
			A-5343-50042-1	U6	Game ROM Assembly
			A-17643	-	Battery Holder PCB Assy.
			5400-10320-00	U4	MC68B09E 2Mhz $\mu$ P
			5410-12426-00	U9	WPC ASIC-89
			20-9665-1	-	PCB Standoffs
			H-18258	-	WPC CPU Security Cable

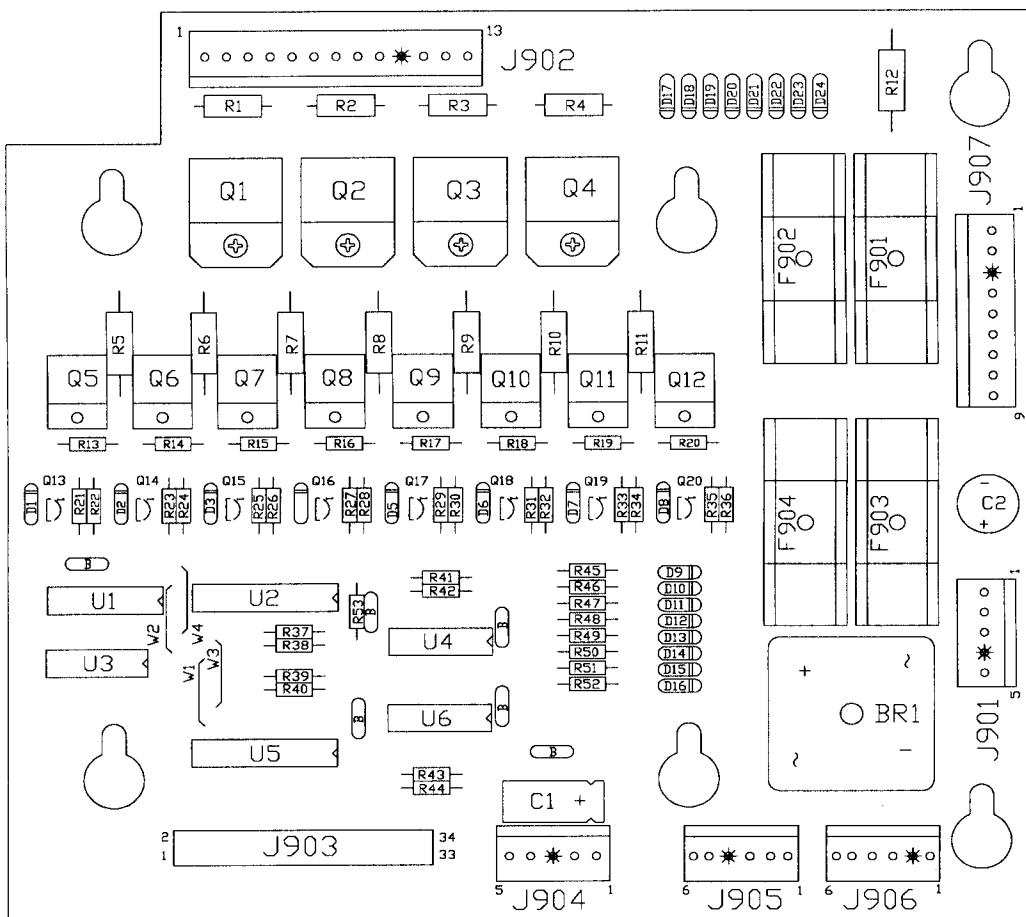


# A-16917-50042 Sound Board Assembly



Part Number	Designator	Description	Part Number	Designator	Description
4004-01005-06	U27, U28	MS, 4-40 x 3/8"	5070-09054-00	D5-D9	Diode Signal 1N4004
4404-01119-00	U27, U28	Nut 4-40	5250-13302-00	U25	78L05 Pos 5V reg TO-92
5010-08772-00	R39, R41	Resistor, 15K $\Omega$ , 1/4w, 5%	5250-13303-00	U26	79L05 Neg 5V Reg TO-92
5010-08774-00	R30, R34, R37, R42, R45	Resistor, 22K $\Omega$ , 1/4w, 5%	5283-10551-00	U17	IC74F00 Fast Quad NAND
5010-08991-00	R10, R12-R16	Resistor, 4.7 $\Omega$ , 1/4 w, 5%	5311-10946-00	U22	IC74HC74 Dual D Flip Flop
5010-09034-00	R47	Resistor, 10K $\Omega$ , 1/4w, 5%	5311-10947-00	U23	IC74HC125 Quad Tri-State Buffer
5010-09035-00	R11, R19, R33, R40	Resistor, 47K $\Omega$ , 1/4w, 5%	5311-10948-00	U15	IC74HC138 1 of 8 Decoder
5010-09036-00	R46	Resistor, 100 $\Omega$ , 1/4w, 5%	5315-12009-00	U18, U19	IC74HCT374 Octal D Flip Flop
5010-09219-00	R31, R32, R38	Resistor, 8.2K $\Omega$ , 1/4w, 5%	5311-12043-00	U13, U14	IC74HC174 Hex D Flip Flop
5010-09358-00	R50	Resistor, 1K $\Omega$ , 1/4 w, 5%	5311-12538-00	U24	IC74HC14 Hex Schmitt Inverter
5010-09534-00	W4, W6	Resistor, 0 $\Omega$ (Jumper)	5311-12287-00	U30-U32	IC74HC541 Octal Bus Driver
5010-13420-00	R36, R44	Resistor, 680 $\Omega$ , 1/4w, 5%	5340-13304-00	U10-U12	ICSRAM 2Kx8 35ns .300 DIP
5010-13607-00	R20-R29, R48, R49	Resistor, 6.2K $\Omega$ , 1/8w, 1%	5370-12730-00	U21, U29	IC74L084 Quad Op AMP
5010-13517-00	R35, R43	Resistor, 15 $\Omega$ , 1/4w, 5%	5370-13419-00	U27, U28	Audio Power Amp TDA2030AV
5040-09365-00	C15, C18, C19, C32, C41	Cap., 1 $\mu$ F, 63v, Alum Ax.	5371-13299-00	U20	IC DAC AD-1851 16Bit
5040-09421-00	C52	Cap., 100 $\mu$ F, 25v, Alum Ax.	5520-13301-00	Y1	Crystal 10MHz Parallel resonant
5040-13417-00	C20, C21	Cap., 10,000 $\mu$ F, 35v, Alum.	5551-09822-00	L1	Inductor, 4.7 $\mu$ H, 3Amp.
5041-09009-00	C36, C44	Cap., 22 $\mu$ F, 10v, Tant Alum	5700-12047-00	U16	IC, Socket 24-Pin .300 DIP
5041-13187-00	C22	Cap., 4.7 $\mu$ F, Tant Axial	5700-12088-00	U2-U9	IC, Socket 32-Pin .600 DIP
5043-08996-00	C4, C5, C10-C13, C31, C35, C38, C43, C46, C47, C50-C79	Cap., .10 $\mu$ F, 50v, Cer Ax.	5705-12638-00	U27, U28	Heatsink 5298-B
5043-10267-00	C37, C45	Cap., 150pF, 50v, Cer Ax.	5733-12060-01	F501, F502	MT3AG PCMounted Fuse Holder
5048-11028-00	C16, C17	Cap., 22pF, 50v, Cer Ax.	5791-10862-04	J1, J2	Connector, 4-pin Header STR .156
5048-11029-00	C48	Cap., 100pF, 50v, Cer Ax.	5791-10862-05	J3	Connector, 5-pin Header STR .156
5048-11030-00	C49	Cap., 470pF, 50v, Cer Ax.	5791-10862-07	J4	Connector, 7-pin Header STR .156
5048-11033-00	C33	Cap., .022 $\mu$ F, 50v, CerAx.	5791-12516-00	P1	Connector, 34 Hen 2x17 STR .100
5048-12036-00	C34, C42	Cap., .22 $\mu$ F, 50v, Cer Ax.	A-17002	U16	PAL Sub-Assembly
5048-13418-00	C30, C39, C40	Cap., .047 $\mu$ F, 50v, Cer Ax.	A-5343-50042-S2	U2	ROM Sub-Assembly
5048-13608-00	C8	Cap., 6800pF, 50v, Cer Ax.	A-5343-50042-S3	U3	ROM Sub-Assembly
5048-13609-00	C7, C24, C26	Cap., 3900pF, 50v, Cer Ax.	A-5343-50042-S4	U4	ROM Sub-Assembly
5048-13610-00	C2, C3, C9, C27, C29	Cap., 1000pF, 50v, Cer Ax.	A-5343-50042-S5	U5	ROM Sub-Assembly
5048-13611-00	C6, C23, C25, C28	Cap., 680pF, 50v, Cer Ax.	A-5343-50042-S6	U6	ROM Sub-Assembly
5070-09045-00	D1-D4	MR-501 Rectifier Diode	A-5343-50042-S7	U7	ROM Sub-Assembly
			Not Used	U8	ROM Sub-Assembly
			Not Used	U9	ROM Sub-Assembly
			5731-10356-00	F501, F502	Fuse, 3Amp, 250v, Slow Blow

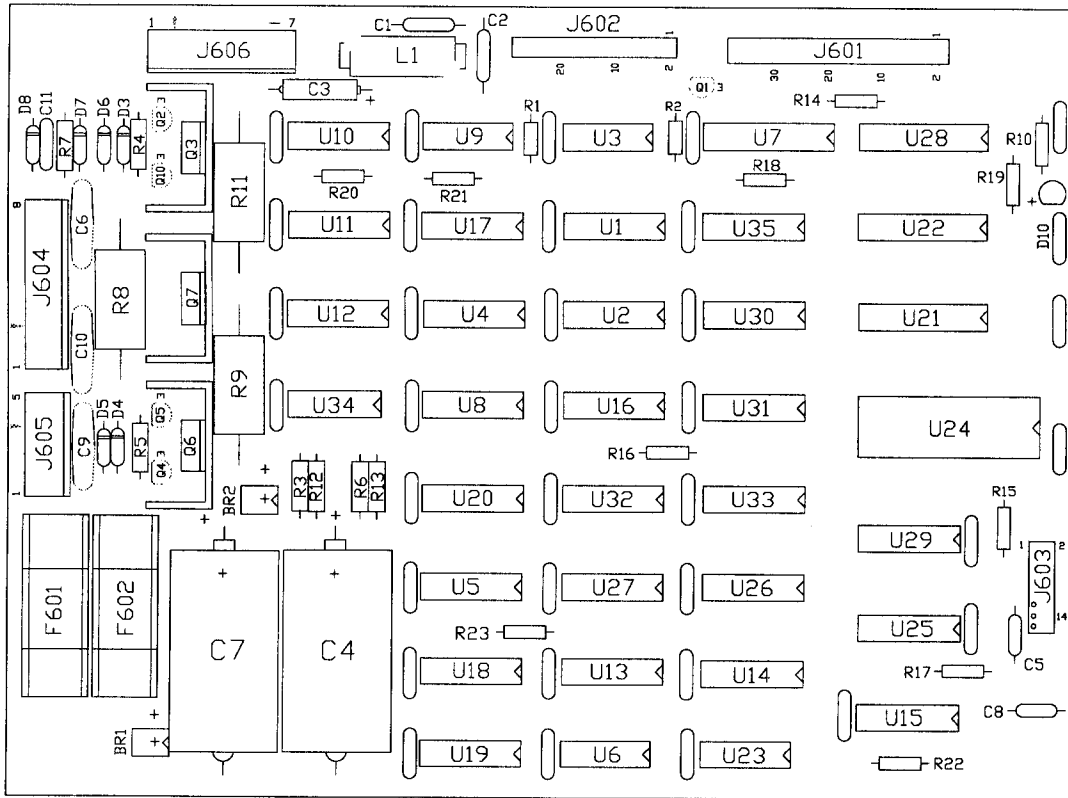
# A-15472-1 Fliptronic II Board Assembly



Part Number	Designator	Description	Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink	5070-09054-00	D1-D24	Diode, 1N4004
4006-01003-08	Q1-Q4	Mach. Screw, 6-32	5100-09690-00	BR1	Bridge Rectifier
4406-01128-00	Q1-Q4	Nut 6-32 KEPS	5162-12635-00	Q5-Q12	Trans., TIP102 NPN
5010-09034-00	R37-R44, R53	Res., 10KΩ, ¼w, 5%	5190-09016-00	Q13, Q20	Trans., 2N4403 PNP
5010-09358-00	R22, R24, R26, R28, R30, R32, R34, R36, R45-R52	Res., 1KΩ, ¼w, 5%	5191-12179-00	Q1-Q4	Trans., TIP36C PNP
5010-09361-00	R1-R4	Res., 220Ω, ½w, 5%	5315-12009-00	U2	IC, 74HCT374
5010-09416-00	R1-R4	Res., 470Ω, ¼w, 5%	5315-12031-00	U5	IC, 74HCT244
			5315-12812-00	U1	IC, 74HCT138
			5315-12951-00	U3	IC, 74HCT00
			5370-12272-00	U4, U6	IC, LM339 Quad Comp
			5731-10356-00	F901-F904	Fuse S-B, 3A., 250v
5010-09534-00	W3, W4	Res., 0Ω	5733-12060-01		Fuse Holder (F901-F904)
5010-10171-00	R13, R20	Res., 56Ω, ¼w, 5%	5791-10862-05	J901, J904	Connector, 5-pin Header
5011-12956-00	R5, R12	Res., 2.7KΩ, 1w, 5%	5791-10862-09	J907	Connector, 9-pin Header
5040-08986-00	C1	Cap., 100μF, 10v	5791-10862-13	J902	Connector, 13-pin Header
5040-09537-00	C2	Cap., 100μF, 100v	5791-13830-06	J905, J906	Connector, Str Sq. Pin Hdr.
5043-08980-00	B	Cap., .01μF, 50v	5791-12516-00	J903	34 Hen 2 x 17 STR

# A-14039.1

## Dot Matrix Assembly



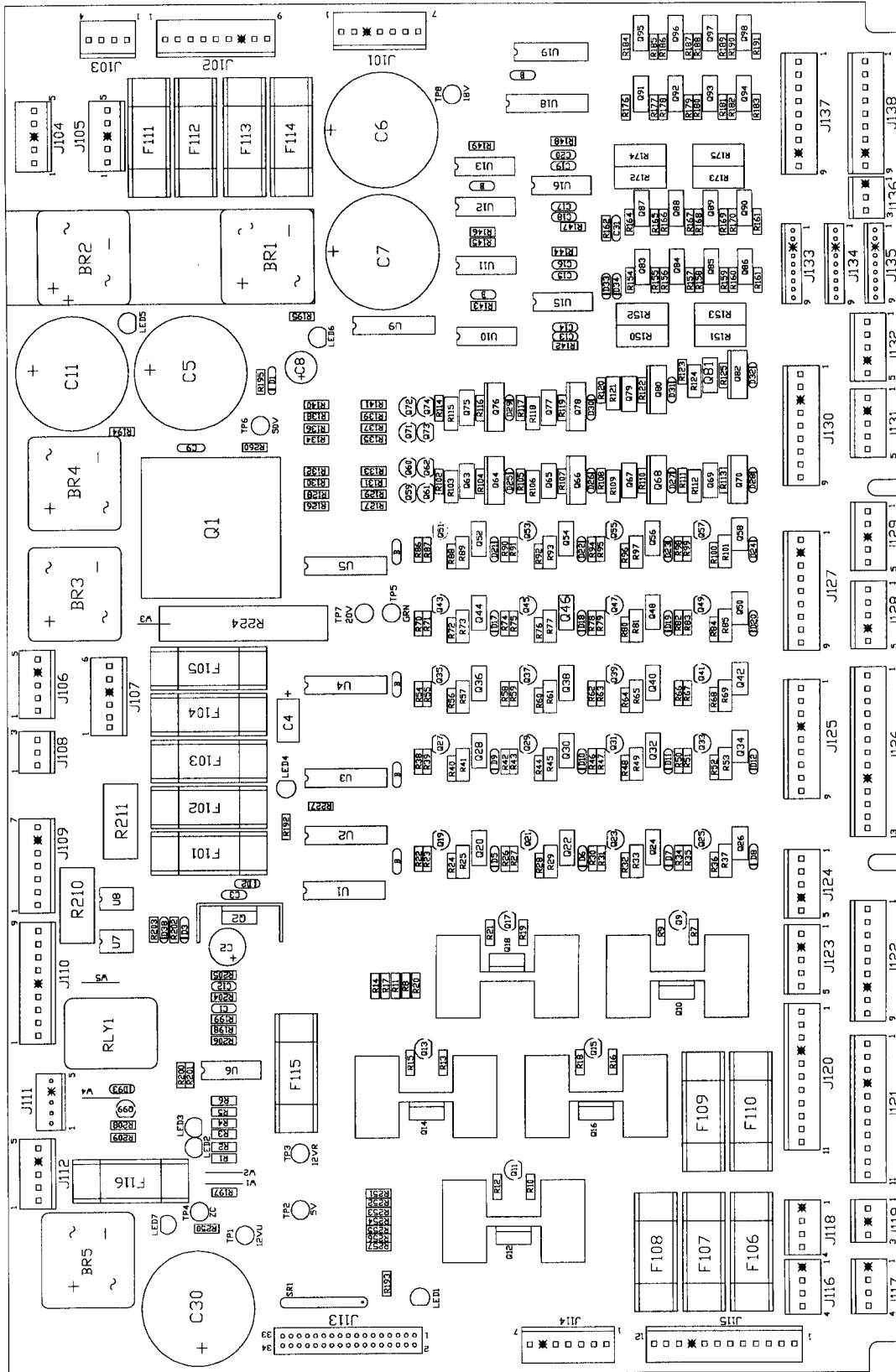
Part Number	Designator	Description	Part Number	Designator	Description
5010-08991-00	R1	Res., 4.7KΩ, ¼w, 5%	5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
5010-09036-00	R14-R23	Res., 100Ω, ¼w, 5%	5311-10947-00	U9	IC, 74HC125
5010-09224-00	R10	Res., 270Ω, ¼w, 5%	5311-10951-00	U10, U11	IC, 74HC161
5010-12832-00	R3, R6, R12, R13	Res., 4.7KΩ, ½w, 5%	5311-10977-00	U6	IC, 74HC04
5010-12841-00	R4, R5	Res., 120Ω, ½w, 5%	5311-12817-00	U29	IC, 74HC165
5012-12830-00	R9	Res., 1.8KΩ, 5w, 5%	5311-12819-00	U21	IC, 74HC688
5012-12842-00	R11	Res., 120Ω, 5w, 5%	5311-12820-00	U23	IC, 74HC27
5012-12843-00	R8	Res., 4.7KΩ, 5w, 5%	5311-12822-00	U13-U15	IC, 74HC193
5010-10171-00	R7	Res., 56Ω, ¼w, 5%	5315-12009-00	U22	IC, 74HCT374
5043-09492-00	C5, C8	Cap., 100P, 50v, (±10%)	5315-12812-00	U1, U2, U30, U12	IC, 74HCT138
5040-08986-00	C3	Cap., 100M, 10v (±20%)	5281-09308-00	U28	IC, 74HCT245
5040-12324-00	C4, C7	Cap., 150M, 160v (±50%)	5315-12815-00	U8, U34	IC, 74HCT08
5043-08980-00	BYPASS	Cap., .01M, 50v (+80,-20%)	5315-12816-00	U19	IC, 74HCT32
5043-09072-00	C6, C9, C10	Cap., .1M, 500v (+80,-20%)	5315-12821-00	U7	IC 74HCT240
5043-09845-00	C1, C2, C11	Cap., 1KP, 50v (±20%)	5340-12278-00	U24	S/RAM 2064 150NS
5070-09054-00	D7	Diode, 1N4004, 1.0A.	5551-09822-00	L1	Ind. 4.7μH, 3A.
5075-12824-00	D6, D8	Zener, 1N4742A, 12v	5671-14516-00	D10	Display LED Red
5075-12823-00	D4, D5	Zener, 1N4758, 56v	5705-09199-00	Q3, Q6, Q7	Heatsink, 6030B
5075-12826-00	D3	Zener, 1N4759A, 62v	5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
5100-12833-00	BR1, BR2	Bridge, 400v, 1A	5733-12060-01		Fuse Holder (F601, F602)
5150-10269-00	Q1	Trans., 2N3904 NPN	5791-10850-00	J602	Connector, 26-pin Header
5164-09056-00	Q2, Q10	Trans., MP5D02 NPN	5791-10862-05	J605	Connector, 5-pin Header
5164-12154-00	Q3, Q7	Trans., MJE15030 NPN	5791-10862-07	J606	Connector, 7-pin Header
5194-09055-00	Q4, Q5	Trans., MP5D52 PNP	5791-10862-08	J604	Connector, 8-pin Header
5194-12155-00	Q6	Trans., MJE15031 PNP	5791-12516-00	J601	34 Hen 17x2 STR
5281-09738-00	U16, U25-U27	IC, 74LS157	5791-12827-00	J603	14 Hen 7x2 STR
5281-10033-00	U3	IC, 74LS30			
5281-10043-00	U31-U33, U35	IC, 74LS175			

# A-12697-3

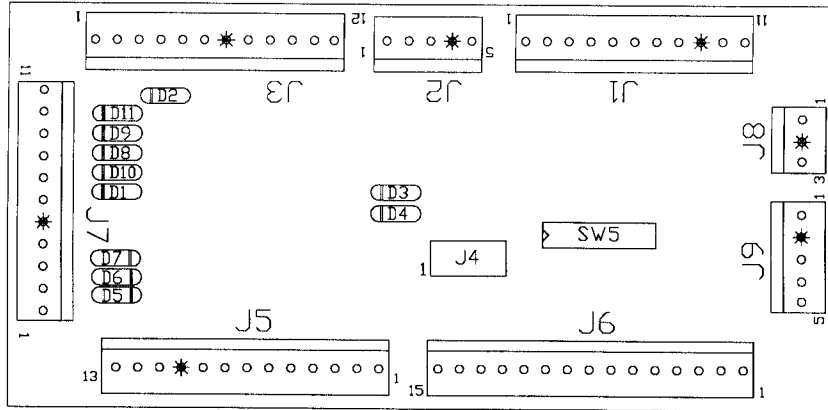
## WPC Power Driver Assembly

Part Number	Designator	Description	Part Number	Designator	Description
5010-08981-00	R260	Res., 10K $\Omega$ , 1/2w, 5%	5040-12313-00	C5-C7, C11, C30	Cap., 15KM, 25v ( $\pm$ 20%)
5010-08991-00	R9, R12, R15, R18, R21, R23, R27, R31, R35, R39, R43, R47, R51, R55, R59, R63, R67, R71, R75, R79, R83, R87, R91, R95, R99, R126, R128, R130, R132, R134, R136, R138, R140, R227	Res., 4.7K $\Omega$ , 1/4w, 5%	5043-08980-00	B-BYPASS	Cap., .01M, 50v (+80, -20%)
			5043-08996-00	C13-C20, C31	Cap., .1M, 50v ( $\pm$ 20%)
			5043-09845-00	C1, C12	Cap., 1KP, 50v ( $\pm$ 20%) Axial
			5048-10994-00	C3	Cap., .33M, 50v ( $\pm$ 20%) Axial
			5070-08919-00	D33, D34	Diode 1N4148, 150MA.
			5070-09054-00	D1-D3, D5-D12, D17-D32, D38	Diode 1N4004, 1.0A.
			5100-09690-00	BR1-BR5	Bridge, 35A., Rect, 200v
			5131-12725-00	Q10, Q12, Q14, Q16, Q18	Triac BT138E
				U19	IC ULN 2803 OC-DRL
5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191	Res., 560 $\Omega$ , 1/4w, 5%	5162-12422-00	Q20, Q22, Q24, Q26, Q28, Q30, Q32, Q34, Q36, Q38, Q40, Q42, Q44, Q46, Q48, Q50, Q52, Q54, Q56, Q58, Q63, Q65, Q67, Q69, Q75, Q77, Q79, Q81, Q83-Q90	Transistor, TIP 102
			5162-12635-00	Q9, Q11, Q13, Q15, Q17, Q19, Q21, Q23, Q25, Q27, Q29, Q31, Q33, Q35, Q37, Q39, Q41, Q43, Q45, Q47, Q49, Q51, Q53, Q55, Q57, Q59-Q62, Q71-Q74	Transistor, 2N5401 PNP
5010-08993-00	R25, R29, R33, R37, R41, R45, R49, R53, R57, R61, R65, R69, R73, R77, R81, R85, R89, R93, R97, R101, R103, R106, R109, R112, R115, R118, R121, R124	Res., 68K $\Omega$ , 1/2w, 5%	5194-09055-00	Q64, Q66, Q68, Q70, Q76, Q78, Q80, Q82	Transistor, TIP36C PNP
				Q91-Q98	Transistor, TIP 107
			5192-12428-00	Q1	Reg LM 323 5v
			5250-12634-00	U1-U5, U18	IC, 74LS374 8D F/F
			5281-09486-00	U10-U13	IC, 74LS74 Dual D F/F
			5281-09487-00	U9	IC, 74LS240 L/Drvr.
			5281-10182-00	U6, U15, U16	IC, LM339 Quad Comp.
			5370-12272-00	Q2	IC, LM7812
			5460-12423-00	LED1, LED4-LED7	Display LED Red
			5671-14516-00	Q1	Thermal Pad
			5701-09652-00	Q2	Heatsink 6030B
			5705-09199-00	Q1	Heatsink 5054
			5705-12637-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
			5705-12638-00	F101-F116	Fuse Holder PC MT3AG
			5733-12060-01	J108, J119, J136	Connector, 3-pin Header .156
			5791-10862-03	J103, J116-J118	Connector, 4-pin Header .156
			5791-10862-04	J104-J106, J112, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header .156
			5791-10862-05	J107	Connector, 6-pin Header .156
			5791-10862-06	J101, J109, J114	Connector, 7-pin Header .156
			5791-10862-07	J102, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header .156
			5791-10862-09	J120, J121	Connector, 11-pin Header .156
			5791-10862-11	J115	Connector, 12-pin Header .156
			5791-10862-12	J126	Connector, 13-pin Header .156
			5791-10862-13	J111	Connector, 5-pin Header
			5791-13830-05	J133-J135	Connector, 9-pin Header
			5791-13830-09	J113	34 Hen 2x17 STR
			5791-12516-00	TP1-TP8	Test Point #1502-1
			5824-09248-00	C9	Cap., 2.2MF Tant
			5041-09163-00	F114	Fuse, 8A, 32v
			5730-09071-00	F112	Fuse, S-B, 7A., 250v
			5731-09432-00	F106-F111, F113	Fuse, S-B, 5A., 250v
			5731-09651-00	F101-F105, F116	Fuse, S-B, 3A., 250v
			5731-10356-00	F115	Fuse, S-B, 3/4A., 250v
			5730-09797-00		Heatsink #62365
			5705-12698-00		
5010-11079-00	R7, R10, R13, R16, R19	Res., 51 $\Omega$ , 1/4w, 5%			
5010-12427-00	R150-R153, R172-R175	Res., .22 $\Omega$ , 1w, 5%			
5012-12632-00	R224				
5019-10143-00	SR1	Res., .12 $\Omega$ , 10w, 5%			
5040-08986-00	C4	SIP 470 $\Omega$ , 9R, 10-pin, 5%			
5040-09421-00	C2	Cap., 100M, 10v ( $\pm$ 20%)			
5040-09537-00	C8	Cap., 100M, 25v (+50, -10%) Cap., 100M, 100v ( $\pm$ 20%)			

# A-12697-3 WPC Power Driver Assembly

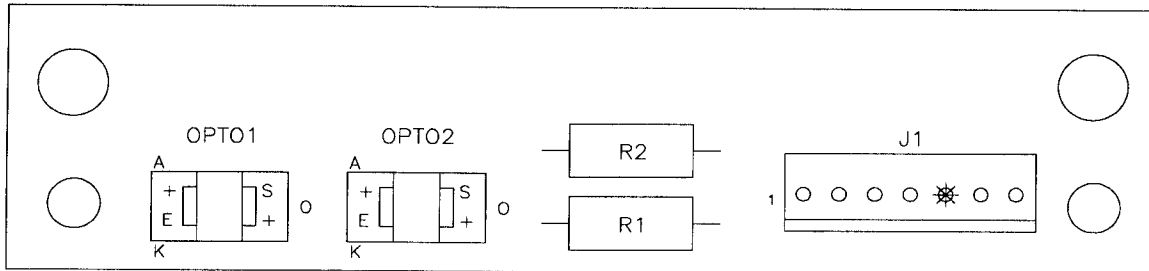


## A-17051-1 Coin Door Interface PCB Assembly



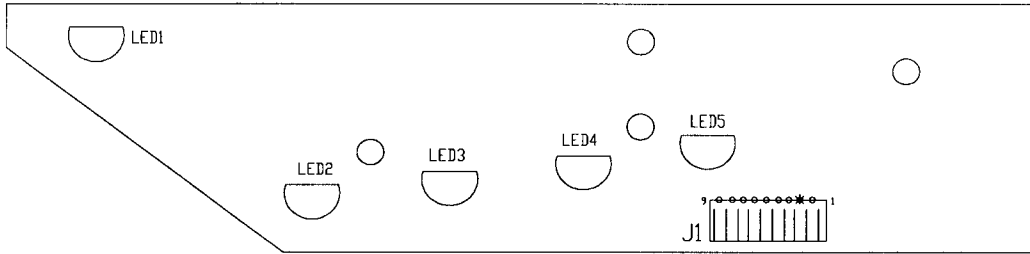
Part Number	Designator	Description
5791-10862-03	J8	Connector, 3-pin Header Str. Sq.
5791-10862-05	J2, J9	Connector, 5-pin Header Str. Sq.
5791-10862-11	J1, J7	Connector, 11-pin Header Str. Sq.
5791-10862-12	J3	Connector, 12-pin Header Str. Sq.
5791-10862-13	J5	Connector, 13-pin Header Str. Sq.
5791-10862-15	J6	Connector, 15-pin Header Str. Sq.
5791-11000-10	J4	Connector, 10-pin Header Str. Sq.
5645-09025-00	SW5	Switch DIP 8 Pos.
5070-09054-00	D1 - D11	Diode, 1N4004, 1.0A.

## A-17316 Flipper Opto PCB Assembly



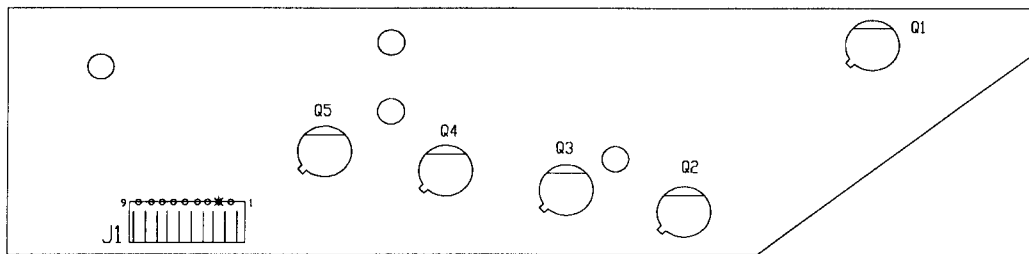
Part Number	Designator	Description
A-20207	-	Flipper Opto Switch PCB
5010-09061-00	R1, R2	Resistor, 680Ω, 1/2w, 5%
5490-14575-00	OPTO1, OPTO2	IC Opto Integ Schmitt 10mA.
5791-13830-07	J1	Connector, 7-pin Header Solid Sq.
03-9001	-	Interrupter Flip-Opto

## A-18617-1 Trough IRED LED PCB Assembly



Part Number	Designator	Description
5671-12731-00	LED1 - LED5	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

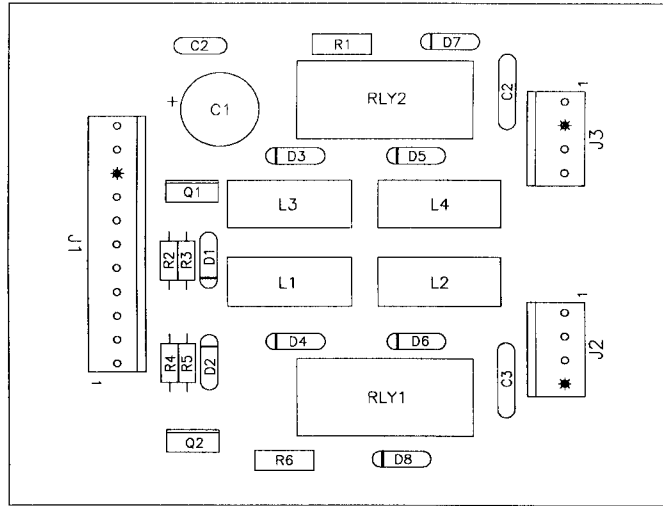
## A-18618-1 Trough IRED Transistor PCB Assembly



Part Number	Designator	Description
5163-14114-00	Q1 - Q5	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header Sq.

# A-20532

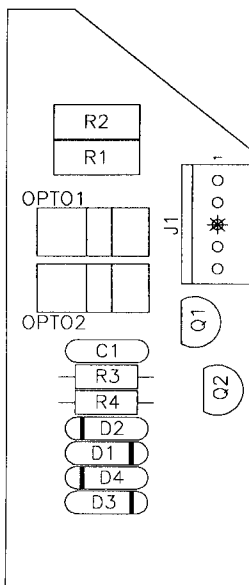
## Dual Relay Motor Driver Assembly



Part Number	Designator	Description
5070-09054-00	D1-D8	Diode 1N4004
5791-12273-04	J2, J3	Connector, 4-Pin Header Sq. Lck.
5791-12273-11	J1	Connector, 11-Pin Header Sq. Lck.
5551-09822-00	L1-L4	Inductor, 4.7 $\mu$ H, 3A
5040-10974-00	C1	Capacitor, 100 $\mu$ F, 35v, Radial
5043-08996-00	C2	Capacitor, 0.1 $\mu$ F, 50v, Radial
5043-09072-00	C3, C4	Capacitor, 0.1 $\mu$ F, 500v, Ceramic Disk
5580-14722-00	RLY1, RLY2	Relay, 12VDC, DPDT
5162-12635-00	Q1, Q2	Transistor, TIP102, NPN Darl.
5010-09441-00	R1, R6	Resistor, 100 $\Omega$ , 1/2w, 5%
5010-08991-00	R2 - R5	Resistor, 4.7K $\Omega$ , 1/4w, 5%

# A-20533.1

## Position Encoder PCB Assembly

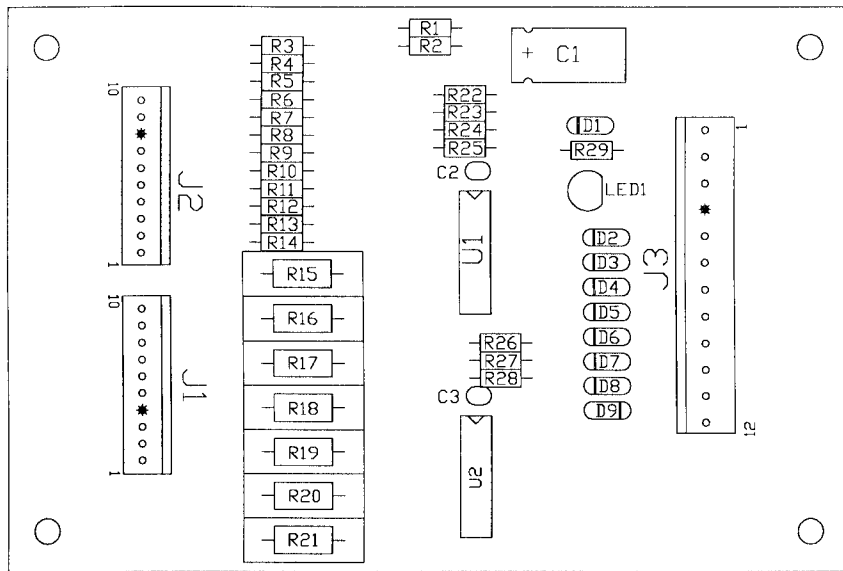


Part Number	Designator	Description
5791-13830-06	J1	Connector, 6-pin Header, .100 Str.
5010-09061-00	R1	Resistor, 680 $\Omega$ , 1/2w, 5%
5070-08919-00	D1, D2	Diode, 1N4148, 1.0A.
5490-14327-00	OPTO1	Opto Int. w/Schmitt-Trigger Out
5160-10269-00	Q1	Transistor, 2N3904 NPN
5010-08998-00	R2	Resistor, 2.2K, 1/4w, 5%
5043-08996-00	C1	Capacitor, 0.1 $\mu$ fd, 50v, Ceramic Ax.



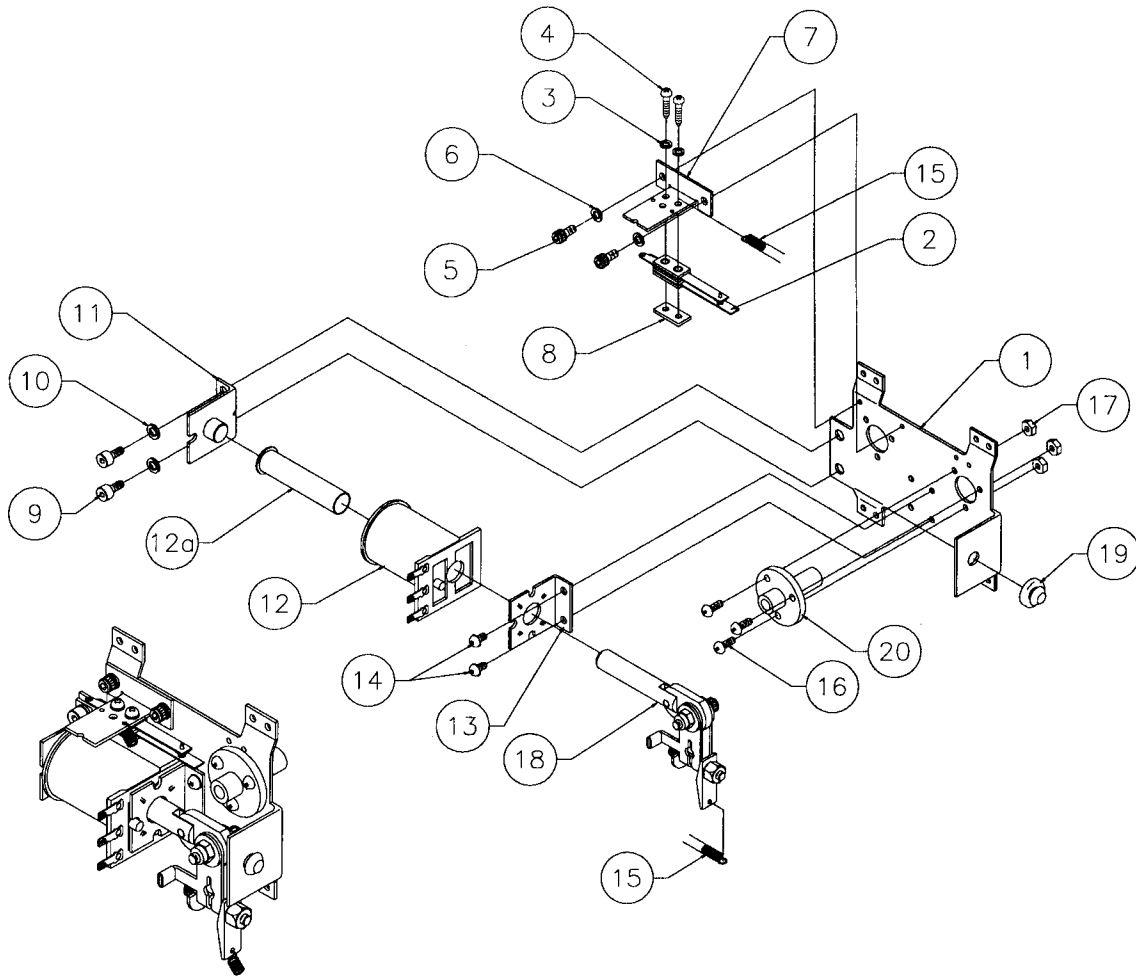
# A-15576

## 7-Switch Opto PCB Assembly



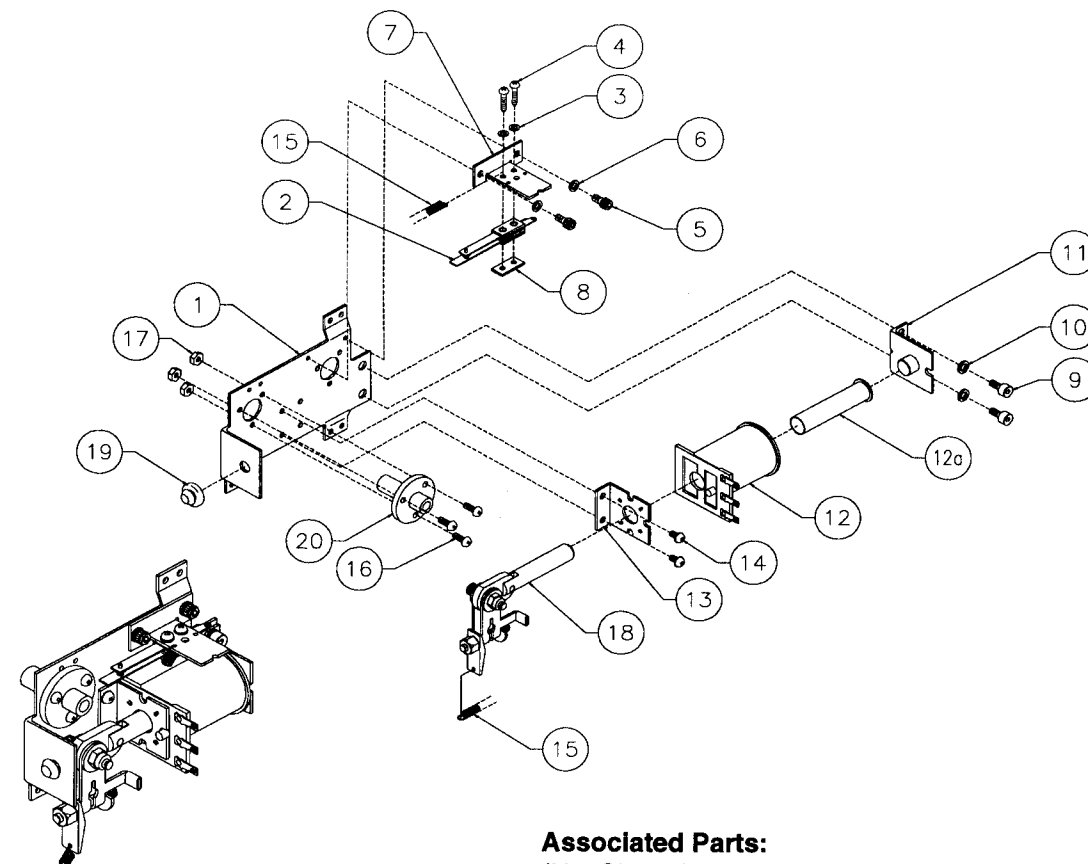
Part Number	Designator	Description
5040-12298-00	C1	Capacitor, 100 $\mu$ Fd, 40v ( $\pm$ 50%)
5043-08980-00	C2, C3	Capacitor, 0.01 $\mu$ , 50v
5671-13732-00	LED1	Display LED Red
5370-12272-00	U1, U2	ICLM339 Quad
5070-09054-00	D1 - D9	Diode 1N4004 1.0A.
5010-12928-00	R15 - R21	Resistor, 270 $\Omega$ , 2w, 5%
5010-09999-00	R1 - R14	Resistor, 2K $\Omega$ , 1/4w, 5%
5010-10631-00	R29	Resistor, 1.2K $\Omega$ , 1/4w, 5%
5010-09162-00	R23, R25, R26	Resistor, 100K $\Omega$ , 1/4w, 5%
5010-08774-00	R22, R24	Resistor, 22K $\Omega$ , 1/4w, 5%
5010-09034-00	R28	Resistor, 10K $\Omega$ , 1/4w, 5%
5791-10862-12	J3	Connector, 12-pin Header Sq.
5791-13830-10	J1, J2	Connector, 10-pin Header Sq.

# A-15849-L-2 Flipper Assembly



Item	Part Number	Description	Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, Left	18	A-15848-L	Crank Link Assembly, Left
2	SW-1A-194	Switch Assembly	a)	A-17050-L	Flipper Crank Assembly, Left
3	4701-00002-00	Lockwasher #6 Split	b)	A-15847	Flipper Link Assembly
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"	c)	02-4676	Link Spacer Bushing
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"	d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
6	4701-00003-00	Lockwasher #8 Split	e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
7	01-9375	Switch Mounting Bracket	f)	4701-00004-00	Lockwasher #10 Split
8	20-6516	Speednut, Tinnerman	g)	4410-01132-00	Nut 10-32 ESN
9	4010-01066-06	Cap Screw, 10-32 x 3/8"	19	23-6577	Bumper Plug, 5/8"
10	4701-00004-00	Lockwasher #10 Split	20	03-7568	Flipper Bushing
11	A-12360	Flipper Stop Assembly			
12	FL-11629	Flipper Coil, Blue			
a)	03-7066-5	Coil Tubing			
13	01-7695-1	Solenoid Bracket			
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"			
15	10-364	Spring			
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"			
17	4406-01117-00	Nut 6-32 Hex.			
			<b>Associated Parts:</b>		
			(Not Shown)		
			21	23-6695	Flipper Rubber Ring, Red
			22	20-10110-5	Flipper Bat w/Shaft (White)

# A-19223-R Flipper Assembly



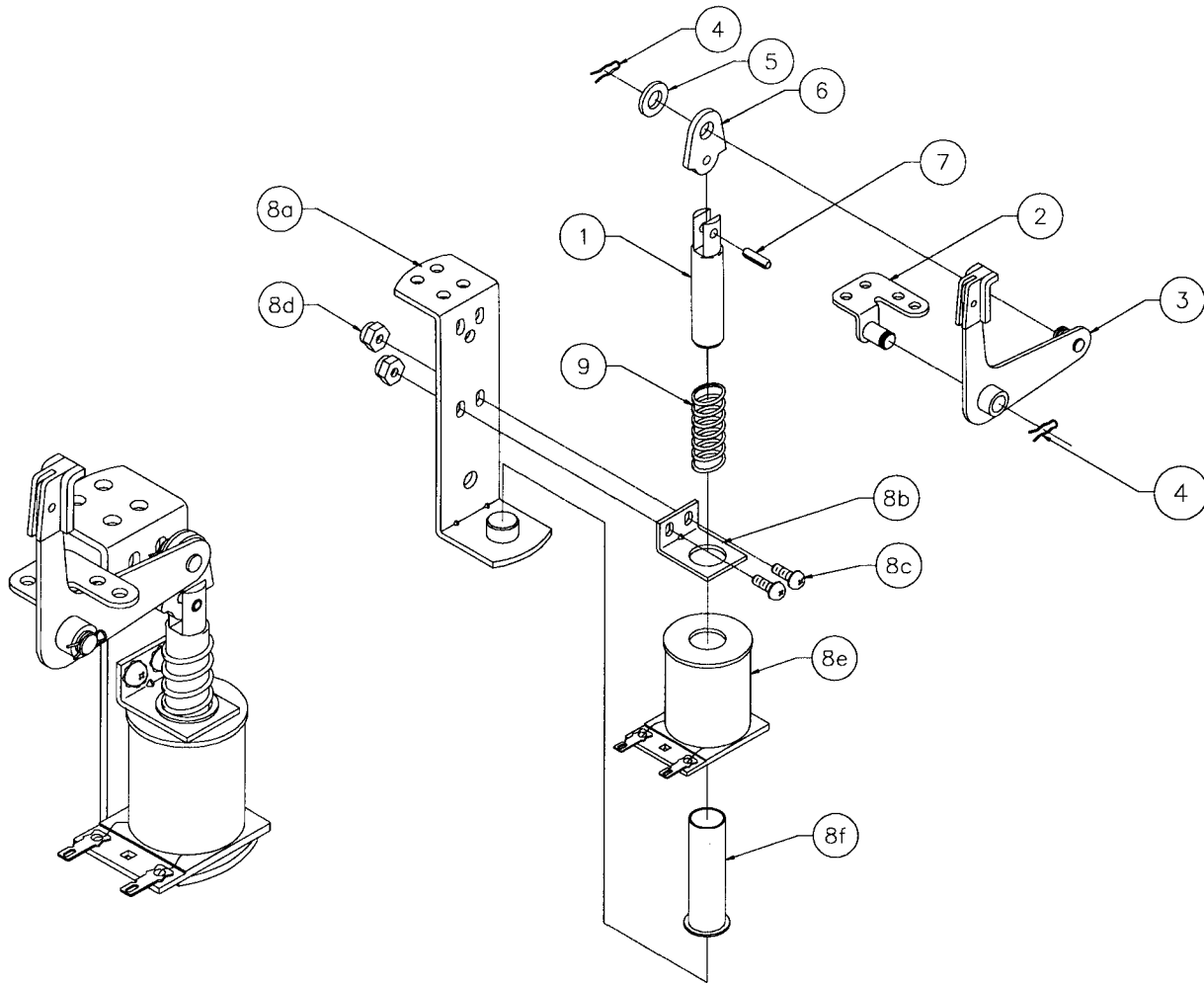
### Associated Parts: (Not Shown)

Item	Part Number	Description	Item	Part Number	Description
1	A-19262	Flipper Bracket Sub-Assembly	18	A-15848-R	Crank Link Assembly, Right
2	SW-1A-194	Switch Assembly	a)	A-17050-R	Flipper Crank Assembly, Right
3	4701-00002-00	Lockwasher #6 Split	b)	A-15847	Flipper Link Assembly
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"	c)	02-4676	Link Spacer Bushing
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"	d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
6	4701-00003-00	Lockwasher #8 Split	e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
7	01-9375	Switch Mounting Bracket	f)	4701-00004-00	Lockwasher #10 Split
8	20-6516	Speednut, Tinnerman	g)	4410-01132-00	Nut 10-32 ESN
9	4010-01066-06	Cap Screw, 10-32 x 3/8"	19	23-6577	Bumper Plug, 5/8"
10	4701-00004-00	Lockwasher #10 Split	20	03-7568	Flipper Bushing
11	A-12390	Flipper Stop Assembly			
12	FL-11629	Flipper Coil, Blue			
a)	03-7066-5	Coil Tubing			
13	01-7695-1	Solenoid Bracket			
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"			
15	10-364	Spring			
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"	21	23-6695	Flipper Rubber Ring, Red
17	4406-01117-00	Nut 6-32 Hex.	22	20-10110-5	Flipper Bat w/Shaft, White

### Flipper Notes...

1. Each Flipper Assembly is mounted beneath the playfield, in conjunction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.
2. With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 ( $\pm .015$ ) inch. When flipper is activated switch must close.
3. Any adjustment of the E.O.S. switch must be made at a minimum distance of 0.25 inch from the switch body.
4. Longer blade of E.O.S. switch must be made straight. Gap adjustment is done by adjusting shorter blade.
5. All moving elements of the assembly must operate freely without any evidence of binding.
6. Apply Loctite™ 245 when reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.

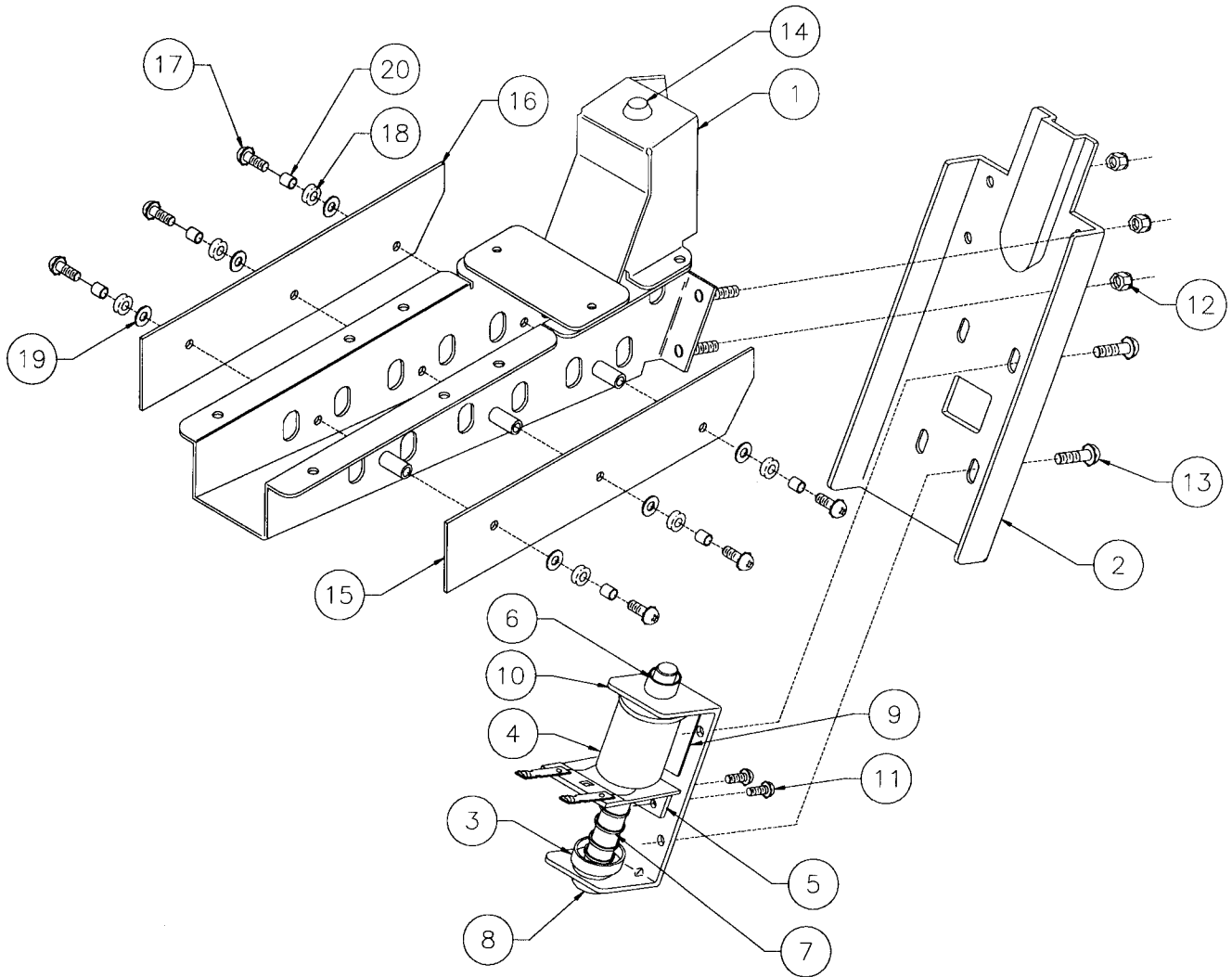
# A-17811 Kicker Arm (Slingshot) Assembly



### Associated Parts for Right & Left Kickers:

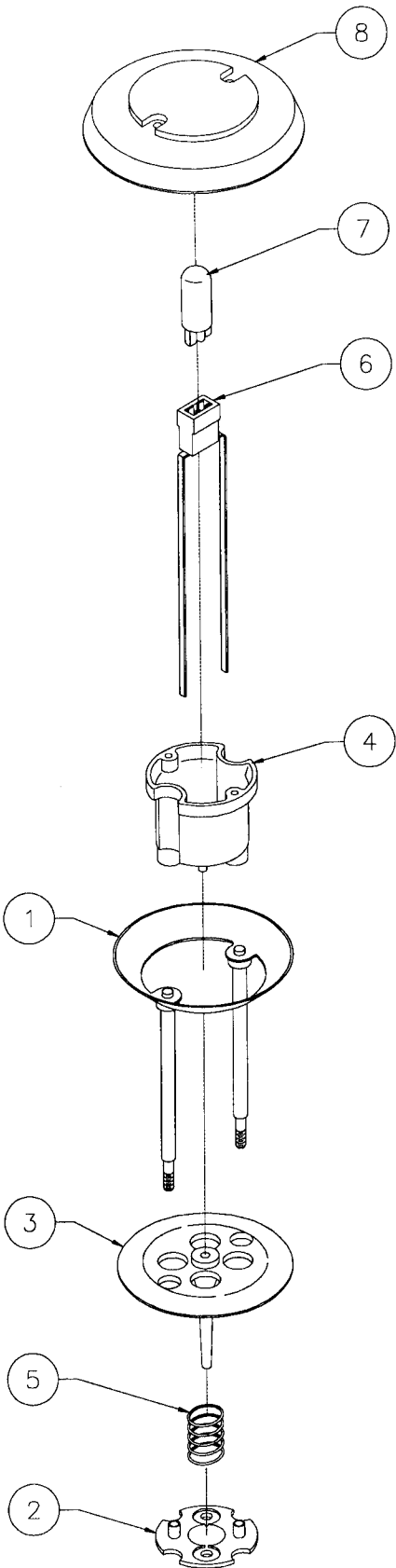
Item	Part Number	Description	Item	Part Number	Description
1	02-2364	Coil Plunger	8	<b>B-9362-L-2</b>	<b>Coil &amp; Bracket Assembly, Left</b>
2	A-17810	Mounting Bracket Assembly		<b>B-9362-R-3</b>	<b>Coil &amp; Bracket Assembly, Right</b>
3	A-12664	Kicker Crank Assembly	a)	A-17808	Bracket & Stop Assembly
4	12-6227	Hairpin Clip	b)	01-8-508-S	Coil Retaining Bracket
5	4700-00030-00	FW, 17/64 x 1/2 x 15ga.	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
6	03-8085	Armature Link	d)	4406-01119-00	Nut, 6-32 ESN
7	20-8716-5	Roll Pin, 1/8 x 7/16"	e)	AE-26-1200	Coil Assembly
			f)	03-7066	Coil Tubing
			9	10-128	Spring

# A-19963 Outhole Ball Trough Assembly



Item	Part Number	Description	Item	Part Number	Description
1	A-16809-2	Ball Trough Welded Assy.	11	4008-01017-05	Mach. Screw, 8-32 x 5/16"
2	01-11587	Ball Trough Front	12	4408-01119-00	Nut 8-32 ESN
3	A-6306-2	Bell Armature Assembly	13	4008-01017-06	Mach. Screw, 8-32 x 3/8"
4	AE-26-1500	Coil Assembly	14	23-6702	Bumper Plug
5	01-8-508-T	Solenoid Assembly	15	A-18617-1	Trough IRED LED PCB Assembly
6	03-7067-5	Coil Tubing	16	A-18618-1	Trough IRED Transistor PCB Assy.
7	10-135	Spring	17	4006-01003-10	Mach. Screw, 6-32 x 5/8" SEMS
8	23-6420	Rubber Grommet	18	23-6626	Rubber Grommet
9	03-8523	Insulator	19	4700-00004-00	Flat Washer, 9/64 x 7/16 x 21ga.
10	01-11586	Coil Mounting Bracket	20	02-4975	Bushing

# B-9414-6 Jet Bumper Assembly

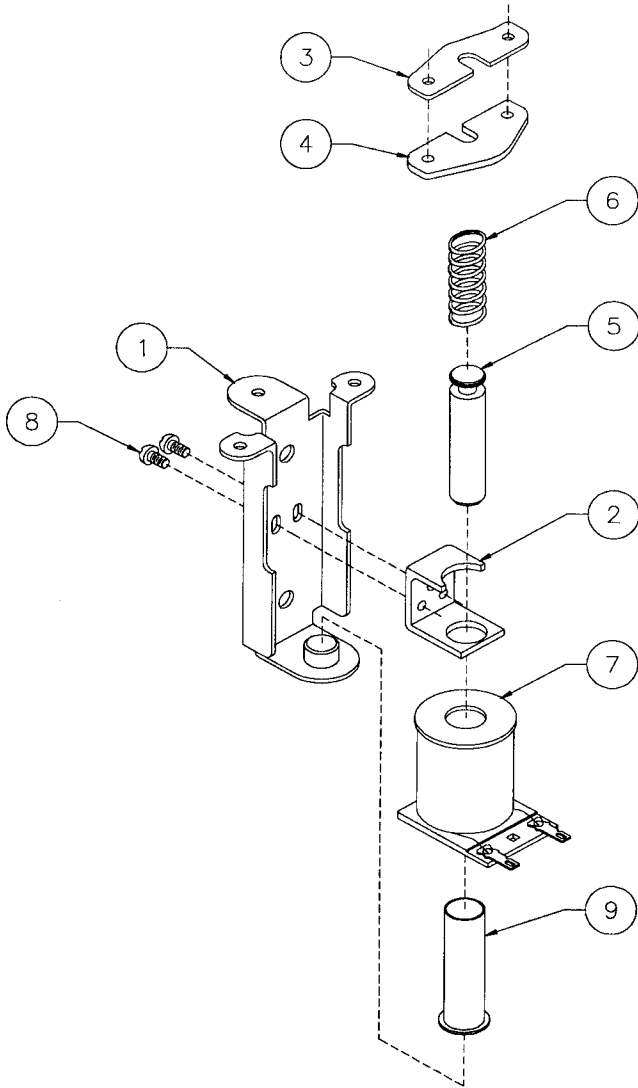


Item	Part Number	Description
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base, White
3	03-6035-7	Bumper Wafer, Black
4	03-7443-5	Bumper Body, White
5	10-7	Spring
6	24-8776	Socket-Wedge Base
7	24-8768	Bulb #555(6.3v., 0.25A.)

**Associated Parts:**

8	03-9030-25	Jet Bumper Cap (Raised-Plain) Transparent Teal Green
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# A-9415-2 Jet Bumper Coil Assembly

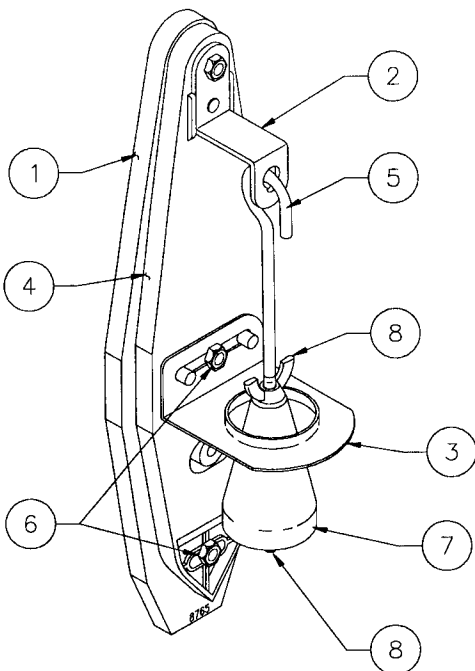


Item	Part Number	Description
1	B-7417	Bracket & Stop Assembly
2	01-1747	Coil Retaining Bracket
3	01-5492	Armature Link, Steel
4	01-5493	Armature Link, Bakelite
5	02-3406-1	Coil Plunger
6	10-326	Armature Spring
7	AE-26-1200	Coil Assembly
8	4006-01017-04	Mach. Screw, 6-32 x 1/4"
9	03-7066	Coil Tubing

**Associated Parts:**  
(Not Shown)

10	B-12030-2	Leaf Switch Assembly
a)	A-16443	Switch & Diode Assembly
b)	01-1168	Switch Mounting Bracket
c)	01-3670	Switch Plate
d)	03-7395	Switch Actuator
e)	4005-01003-12	Mach. Screw, 5-40 x 3/4"
f)	4405-01117-00	Nut 5-40 Hex.

## A-15361 Tilt Mechanism Assembly

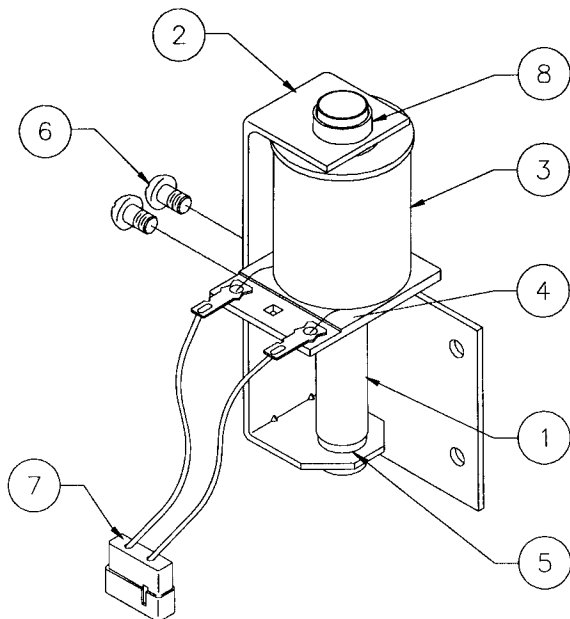


Item	Part Number	Description
1	A-15360	Mount Plate
2	01-3444	Bracket, Tilt Upper
3	01-3445	Bracket, Tilt Lower
4	03-8668	Pendulum
5	12-6231	Plumb Bob Wire
6	4006-01113-06	Mach. Screw, 6-32 x 3/8"

### Associated Parts:

7	20-6502-A	Plumb Bob
8	4406-01120-00	Wing Nut (2)

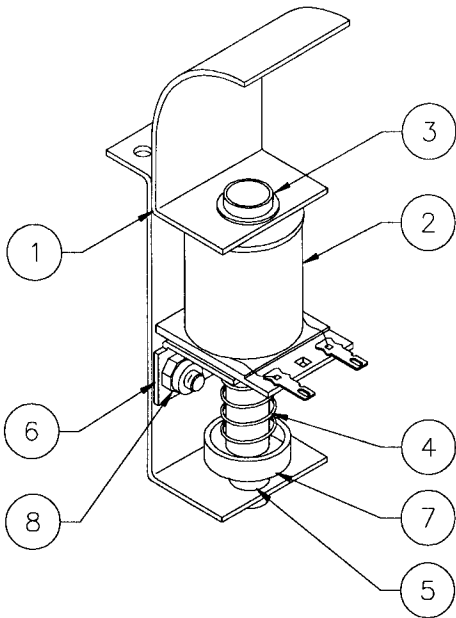
## B-10686-1 Knocker Assembly



Item	Part Number	Description
1	A-5387	Coil Plunger Assembly
2	01-11273	Mounting Bracket
3	AE-23-800	Assembly
4	01-8-508-T	Coil Sub-Assembly
5	23-6420	Coil Retaining Bracket
6	4008-01017-04	Rubber Grommet
7	H-11835	Mach. Screw, 8/32 x 1/4"
8	03-7067-5	Knocker Cable Coil Tubing

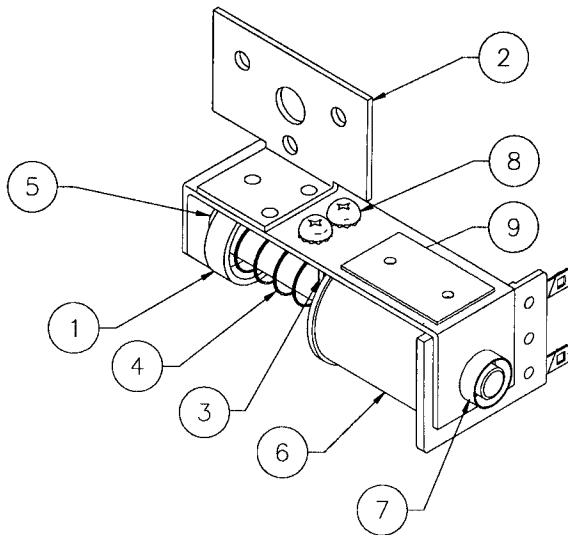


## A-20496 Crazy Bob's Eject Assembly



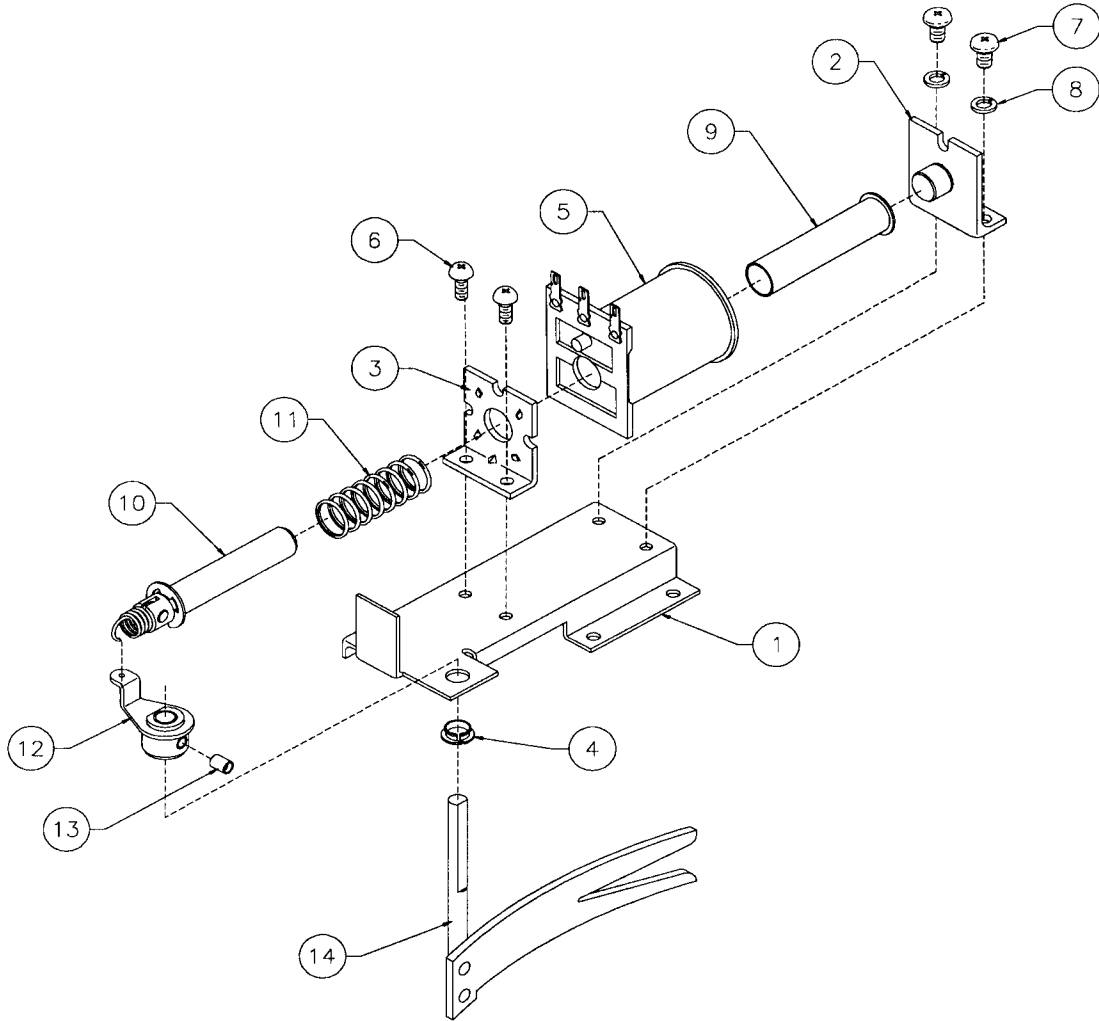
Item	Part Number	Description
1	04-10217.1	Eject Bracket Assembly
2	AE-26-1500	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	01-9784	Coil Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut #8-32 ESN

## A-14525 Kicker Bracket Assembly



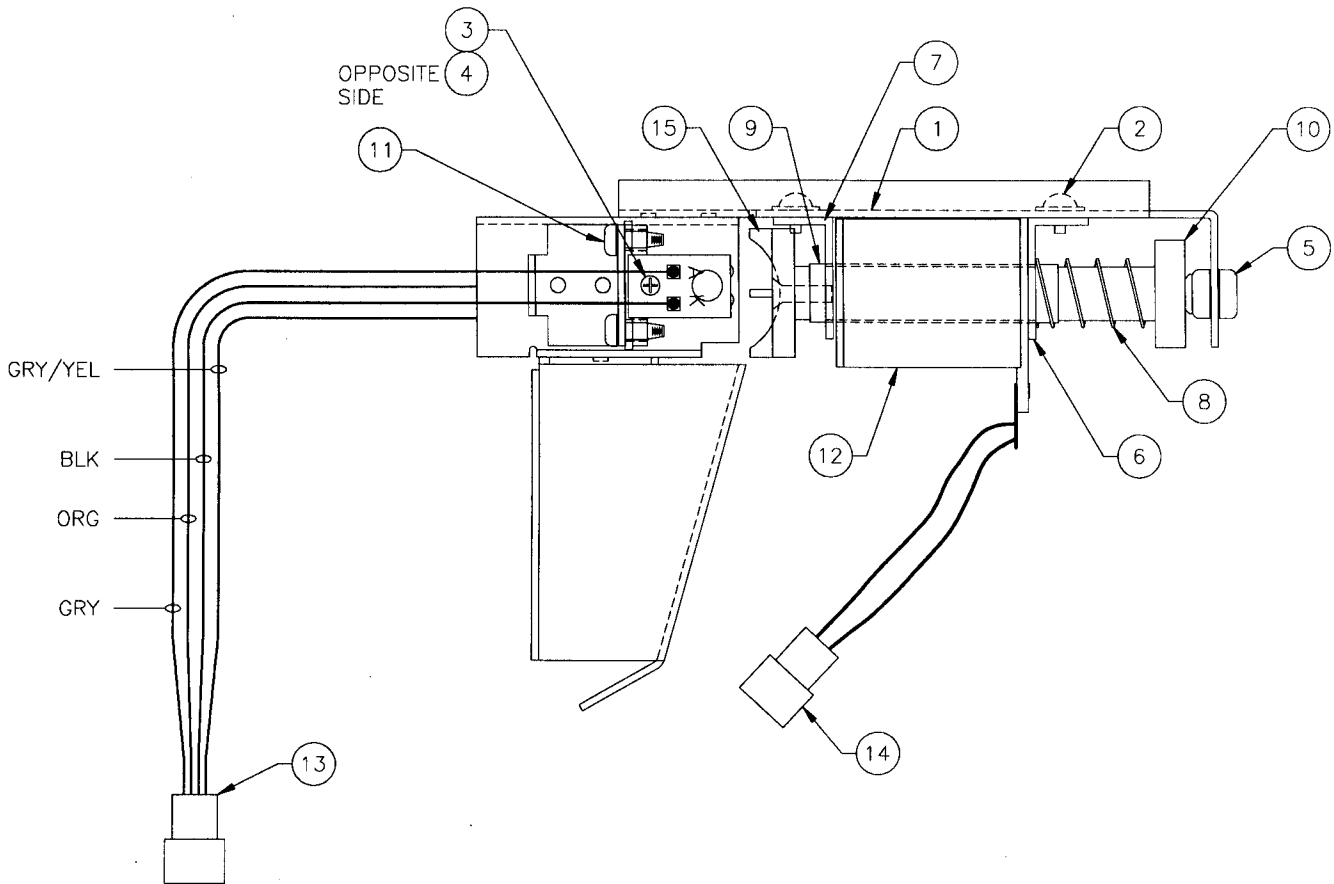
Item	Part Number	Description
1	A-6306-2	Bell Armature Assembly
2	A-14526	Mounting Bracket Assy.
3	01-8-508-T	Solenoid Bracket
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	AE-23-800	Coil Assembly
7	03-7067-5	Coil Tubing
8	4008-01017-04	Mach. Screw, #8-32 x 1/4"
9	03-8523	Insulator

# A-20497 Diverter Assembly



			<b>Associated Assemblies:</b>		
Item	Part Number	Description	Item	Part Number	Description
1	04-10245	Bracket Assembly	14	04-10248.1	Diverter Assembly #2
2	A-12111	Flipper Stop Bracket Assembly	* 15	04-10247	Diverter Assembly #1
3	01-7695	Solenoid Bracket			
4	20-8790	Nyliner Bracket			
5	FL-11753	Coil Assembly			
6	4008-01003-06	Mach. Screw, 8-32 x 3/8"			
7	4010-01066-06	Mach. Screw, 10-32 x 3/8"			
8	4701-00004-00	Lock Washer #10 Split			
9	03-7066-5	Coil Tubing			
10	A-16636	Diverter Plunger Assembly			
11	10-303	Spring			
12	A-19293	Drive Arm Assembly			
13	4010-01169-04	Set Screw, 10-32 x 1/4"			
					*Not Shown.

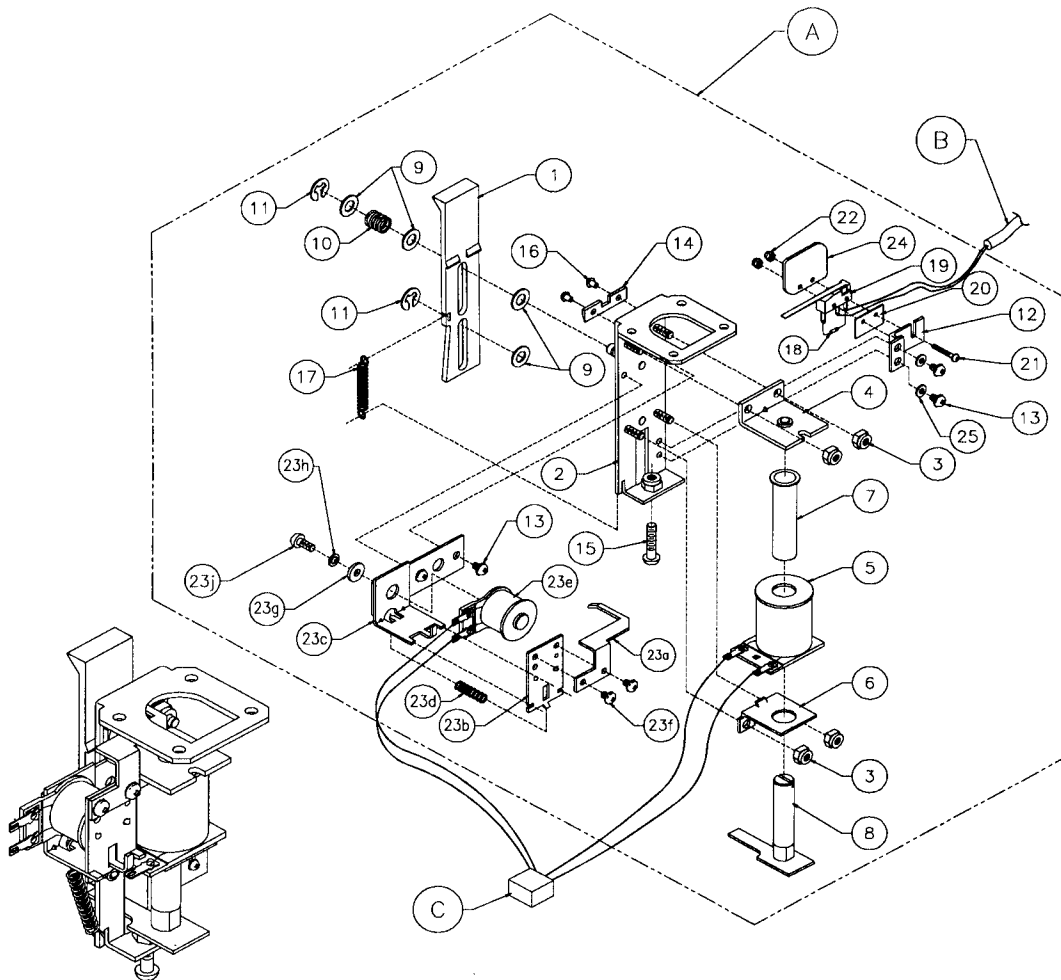
# A-20498 Hand Popper Assembly



Item	Part Number	Description
1	04-10246.1	Hand Popper Bracket
2	4008-01117-03	Nut ESN 8-32
3	A-16908	LED Assembly
4	A-16909	Photo Transistor Assembly
5	23-6420	Rubber Grommet
6	01-9794	Mounting Bracket
7	01-8-508-T	Coil Retainer Bracket
8	10-135	Spring
9	03-7067	Coil Tubing
10	04-10291	Bell Armature Assembly
11	4106-01013-06	Sh. Metal Screw, #6 x 3/8"
12	AE-24-900	Coil Assembly
13	H-17609-8	Cable Harness
14	H-19523	Cable Assembly
15	03-8561	Ball Popper Cap
16	4106-01152-08	Sh. Metal Screw, #6-32 x 1/2"

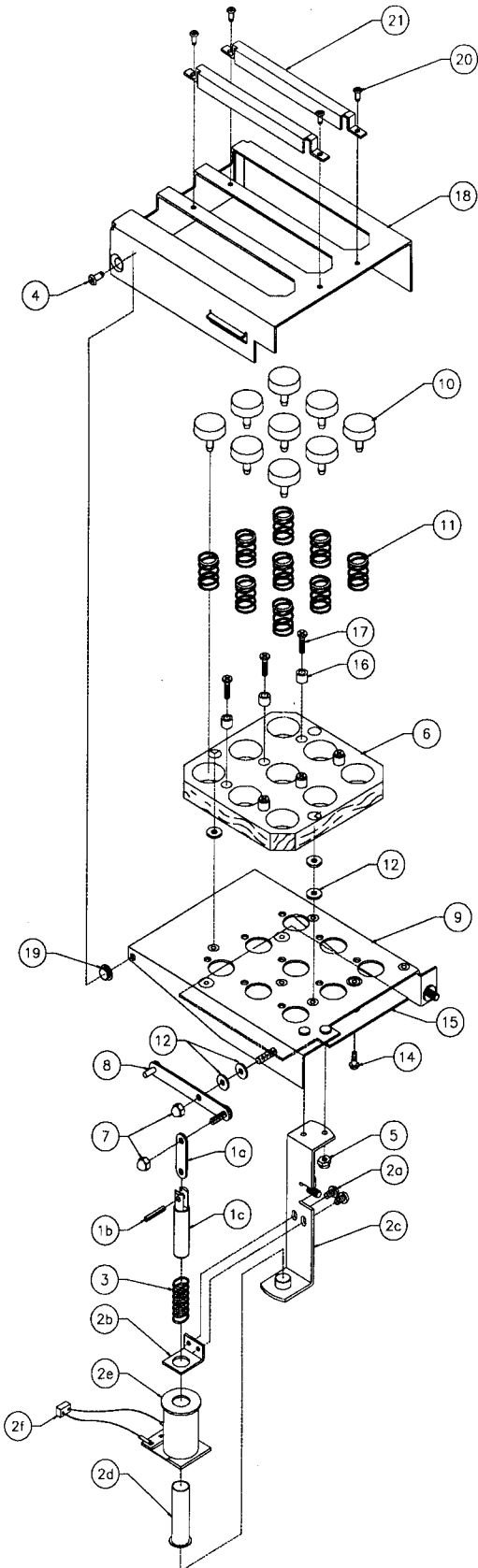
# A-20587

## Drop Target Assembly w/Cables



Item	Part Number	Description	Item	Part Number	Description
<b>A</b>	<b>A-14615</b>	<b>1-Bank Drop Target Assembly</b>	19)	5647-12693-31	Mini Micro Switch
1)	03-8750	Target, Flush	20)	01-8600	Switch Insulator
2)	A-14617	Bracket & Post Assembly	21)	4002-01105-12	Mach. Screw, 2-56 x 3/4"
3)	4408-01119-00	Nut #8 ESNA	22)	4402-01119-00	Nut, 2-56 ESNA
4)	A-11397	Stop Bracket Assembly	23)	A-14908	Target K/Down Assembly
5)	AE-26-1200	Coil Assembly	a)	01-8647-L	Actuator
6)	01-8413	Bracket & Coil Mounting	b)	A-15821	Armature Sub-Assembly
7)	03-7066-4	Coil Tubing	c)	A-14913	Frame & Eyelet Assembly
8)	A-11388-2	Plate & Reset Plate Assembly	d)	10-363	Extension Spring
9)	4700-00072-00	Flat Washer, 17/64 x 1/2 x 22ga.	e)	SM1-26-600	Coil Assembly
10)	10-392	Spring - Compression	f)	4006-01003-03	Mach. Screw, 6-32 x 3/16"
11)	20-8712-25	"E"-Ring, 1/4" Shaft	g)	4700-00089-00	Flat Washer, 11/64x7/16x16ga.
12)	01-10183	Switch Bracket	h)	4701-00003-00	Lockwasher #8 Split
13)	4006-01003-03	Mach. Screw, 6-32 x 3/16"	j)	4008-01005-06BR	Mach. Screw, 8-32 x 3/8"
14)	03-8034	Stop Single Target	24)	03-8630	Actuator Guide
15)	4010-01025-14	Mach. Screw, 10-32 x 7/8"	25)	4700-00003-00	Flat Washer, 1/8 x 9/32 x 21ga.
16)	07-6688-17N	Rivet, 5/32 x 7/32"	<b>B</b>	<b>H-16437</b>	<b>General Switch Cable 3"</b>
17)	10-433	Spring, Extension	<b>C</b>	<b>H-19693</b>	<b>Coil Cable 3"</b>
18)	5070-09054-00	Diode 1N4001			

# A-20447 Cyber Space Assembly



Item	Part Number	Description
1	A-20445	Plunger Assembly
a)	01-14028	Link
b)	20-8716-17	Roll Pin
c)	02-2364	Coil Plunger
2	A-20446	Coil Bracket Assembly
a)	4008-01003-04	Mach. Screw, 8-32 x 1/4"
b)	01-8-508-T	Coil Retaining Bracket
c)	04-10212	Bracket
d)	03-7066-3	Coil Tube
e)	AE-25-1000	Coil Assembly
f)	H-19523	Mini Solenoid Cable
3	10-135	Spring
4	07-6706	Shoulder Rivet (2)
5	4406-01119-00	Nut 6-32 ESN (2)
**6	36-50042-1	Wood Panel
7	4408-01138-00	Nut 8-32 ACORN (2)
8	04-10213	Pivot Arm
9	04-10215	Cyber Space Base
10	03-9103.1-9	Rollover Button, Red (9)
11	10-503	Spring (9)
12	4700-00011-00	Flat Washer, 11/64x7/16x16ga.
*13	4008-01003-09	Mach. Screw, 8-32 x 9/16"
14	4006-01003-06	Mach. Screw, 6-32 x 3/8"
15	04-10277	PC Board
16	03-6047-1	Plastic Spacer, 1/4" (6)
17	4106-01042-12	Sh. Metal Screw, #6-32 x 3/4" (6)
18	04-10214	Cyber Space Cover
19	20-8790	Nylined Bearing (2)
20	07-6704-04	Pop Rivet, 1/8" (4)
21	01-14105.1	Ball Guard (2)

\* Not Shown.

\*\* For Reference Only.

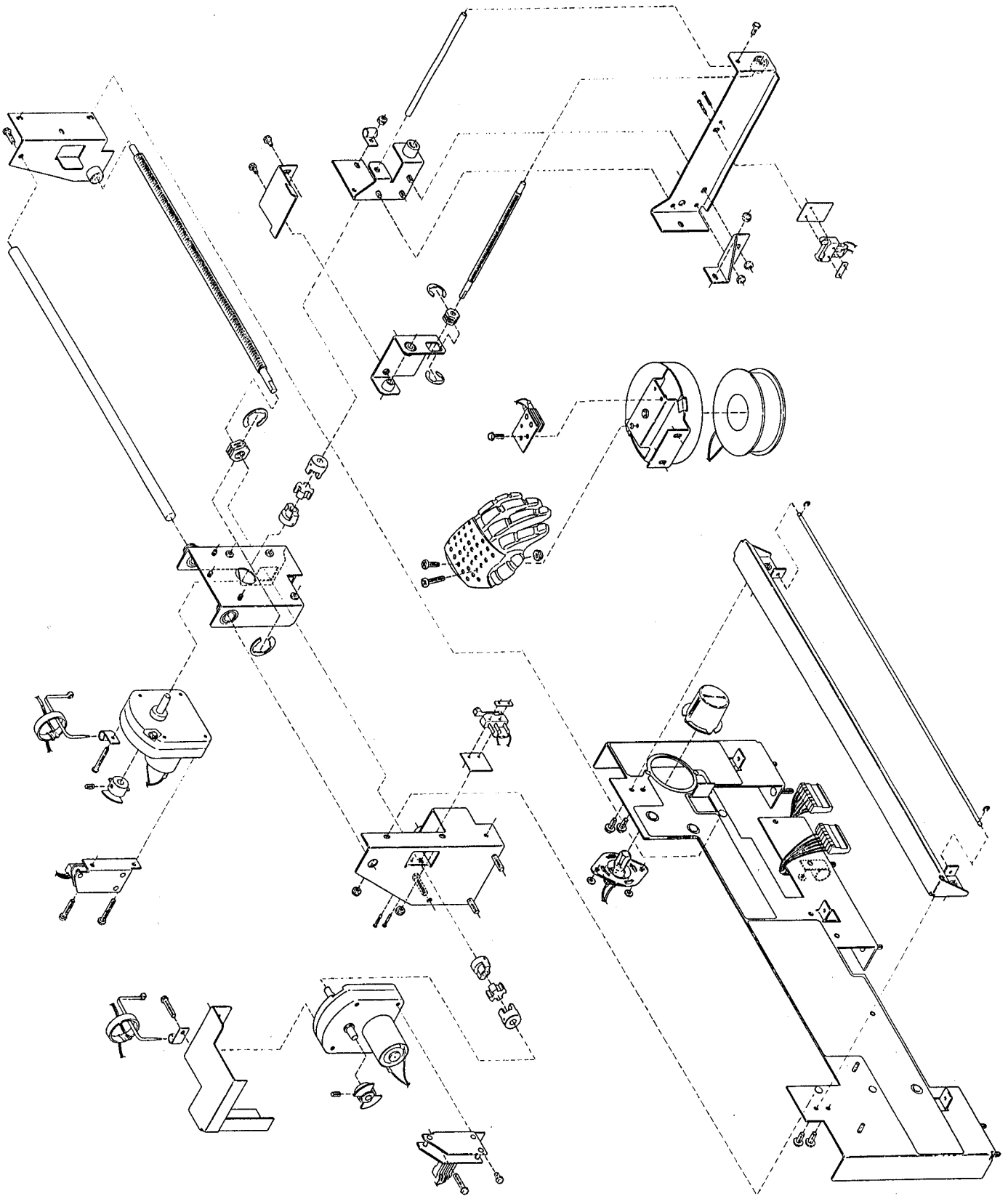
# A-20500

## Hand Assembly

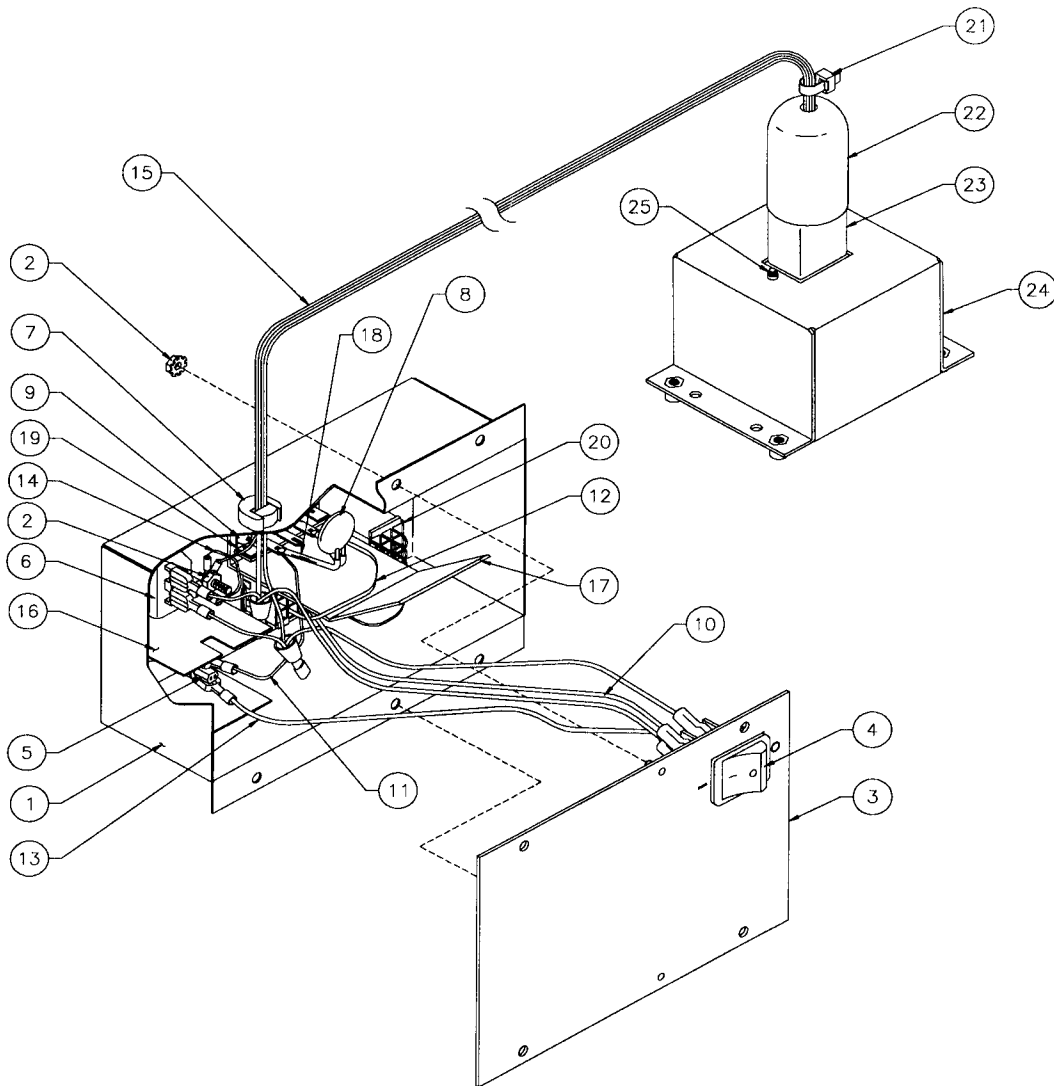
<u>Item</u>	<u>Part Number</u>	<u>Description</u>	<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	01-14081	Y-Switch Lever	35	A-14265-13	Socket Receptacle Assembly
2	01-14094	Support Angle	36	A-20533.1	Position Encoder PC Board (2)
3	04-10282	Opto Board Bracket (2)	37	07-6704-04	Pop Rivet 1/8 x 1/4 (5)
4	01-8240	Nut Plate (2)	38	4002-01105-08	MS 2-56 x 1/2 P-PH-S (4)
5	01-11675	Fishpaper Insulator	39	4006-01168-06	MS 6-32 x 3/8 PL-HH-S
6	02-5206	X-Screw	40	4006-01168-04	MS 6-32 x 1/4 PL-HH-S (2)
7	02-5207	X-Rod	41	4006-01168-16	MS 6-32 x 1 PL-HH-S (3)
8	02-5208	Y-Screw	42	01-13752	Extension Fishpaper
9	02-5209	Y-Rod	43	4008-01168-06	MS 8-32 x 3/8 PL-HH-S (4)
10	02-5210	X-Nut	44	4008-01168-12	MS 8-32 x 3/4 PL-HH-S (5)
11	02-5211	Y-Nut	45	4406-01119-00	Nut 6-32 ESNA (9)
12	03-8171-9	Mini Dome, Tr Red	46	H-20469.2	Back Panel Cable Assembly
13	03-7655-4	Wire Harness Clip , 1/4" (6)	47	4008-01015-08B	TT 8-32 x 1/2 P-PH
14	04-10255	Opto Wheel (2)	48	5070-09054-00	Diode, 1N4004 1.0A (2)
15	04-10230	X-Motor Bracket	49	4010-01082-04	SS 10-32 x 1/4 SH-CP (2)
16	04-10231.4	Magnet Can	50	4700-00003-00	FW .125 x .271 x .032ga. (5)
17	04-10232	Magnet Carriage	51	4008-01168-04	MS 8-32 x 1/4 PL-HH-S (2)
18	04-10233	Screened Back Panel	52	4008-01168-08	MS 8-32 x 1/2 PL-HH-S
19	04-10234.1	Y-Motor Bracket	53	31-2521-1	Back Panel Decal #1
20	04-10235	Y-Support Bracket	54	31-2521-2	Back Panel Decal #2
21	04-10236	X-Support Bracket	55	31-2521-3	Back Panel Decal #3
22	04-10237	Y-Arm	56	EI-204	Teflon Grease (as req'd)
23	04-10268	Back Panel Support Brace	57	03-9424	Molded Left Hand
24	12-7308.1	Guard Wire	58	A-20612	Hand Switch Assembly
25	14-8025	Hand Mechanism Motor (2)	59	03-9454	Nylon Tie Wrap, 4" (6)
26	20-10285	Coil Magnet/Thermal Brkt	60	5556-13939-00	Ferrite Bead 1-1/8 x 1/4 x 1/8 (2)
27	20-10278	Coupling Body, .187	61	03-7655-8	Wire Harness Clip, 1/2"
28	20-10279	Coupling Body, .250 (3)	62	H-20689-2	Switch Cable Assembly
29	20-10280	Coupling Spider (2)	63	4008-01093-12B	TR 8-32 x 3/4 PH
30	20-8712-43	"E" Retaining Ring, 7/16 (2)	64	4408-01119-00	Nut #8 ESN
31	20-8712-62	"E" Retaining Ring, 5/8 (2)	65	EI-125	Loctite 242 (1 place)
32	20-8712-12	"E" Retaining Ring, 1/8 (2)	66	04-10345	X-Motor Guard
33	24-8802	#906 Bulb, .69A 13V	67	20-10288	Tinnerman Clip, Magnet (2)
34	5647-12693-06	Mini Micro Switch (2)			

Note: Balooned part numbers on drawing will appear on a future amendment.

# A-20500 Hand Assembly



# A-17540 Universal Power Interface Assembly



Item	Part Number	Description	Item	Part Number	Description
1	01-12293.1	Power Control Chassis Box	14	H-17542	Ground Jumper Grn/Yel Cable
2	4406-01128-00	Nut #6-32 KEPS (3)	15	5797-13940-01	Jumper Cable
3	01-12294	Switch Mounting Plate Assembly	16	01-10623	Insulator, Thermistor
4	5642-13935-00	Power Switch	17	01-12299	Insulator, Terminal Strip
5	5733-12869-00	Fuse Holder Panel	18	RM-21-06	#18 Vinyl Fgls
6	5851-13867-00	Outlet-IEC Conn. 237 Socket	19	5822-13865-00	Terminal Strip 3-CKT 2-Mtg.
7	03-8712	Strain Relief Bushing	20	H-18050	Jumper Cable, Transformer Prog.
8	5016-12978-00	Thermistor 8A., 2.5R25	21	03-7933	Ty-Wrap Nylon
9	4006-01003-10	Mach. Screw, #6-32 x 5/8"	22	20-9682-1	Boot w/9-32 Dia. Hole
10	H-17992	Jumper Cable Neutral Sw/1FC	23	5102-13864-00	Line Filter w/IEC Connector
11	H-17543	Hot Jumper Black Cable	24	01-12292	Line Filter Chassis Box
12	H-17546	Jumper Interface Hot Black Cable	25	4004-01003-05	Mach. Screw, #4-40 x 5/16" (2)
13	H-17545	Jumper Switch/Fuse Black Cable			

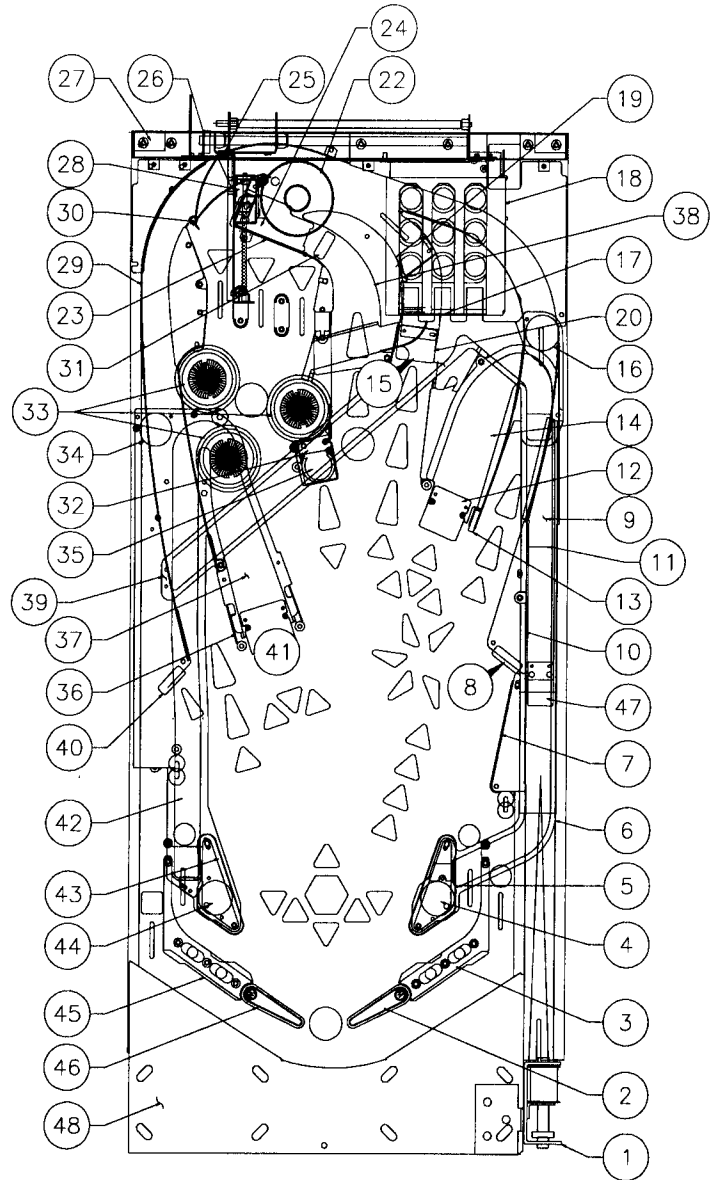


# Universal Power Interface/Cordset Application Chart

COUNTRY	UNIVERSAL POWER INTERFACE ASSEMBLY	VOLTAGE PROGRAMMING JUMP CABLE				5AMP FUSE/ LABEL		8AMP FUSE/ LABEL		LABEL HIGH/ VOLTAGE CAUTION	POWER ADAPTER CORD	CORDSET											
		H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-09651-00 FUSE LABEL	16-9868	5730-09252-00 FUSE LABEL	16-9870			16-9669	5850-14052-00	5850-13271-00	5850-13272-00	5850-13273-00	5850-13274-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00	A-17175-2	
UNITED STATES	✓		✓					✓	✓		✓	✓											
CANADA	✓	✓						✓	✓			✓											
TAIWAN	✓		✓					✓	✓			✓											
MEXICO	✓		✓					✓	✓			✓											
CENTRAL AMERICA	✓		✓					✓	✓			✓											
SOUTH KOREA	✓		✓					✓	✓			✓											
PUERTO RICO	✓		✓					✓	✓			✓											
AUSTRIA	✓			✓		✓	✓			✓			✓										
BELGIUM	✓			✓		✓	✓			✓			✓										
FINLAND	✓			✓		✓	✓			✓			✓										
FRANCE	✓			✓		✓	✓			✓			✓										
GREECE	✓			✓		✓	✓			✓			✓										
HOLLAND	✓			✓		✓	✓			✓			✓										
HUNGARY	✓			✓		✓	✓			✓			✓										
NETHERLANDS	✓			✓		✓	✓			✓			✓										
NETH. ANTILLES	✓			✓		✓	✓			✓			✓										
NORWAY	✓			✓		✓	✓			✓			✓										
POLAND	✓			✓		✓	✓			✓			✓										
PORTUGAL	✓			✓		✓	✓			✓			✓										
SPAIN	✓			✓		✓	✓			✓			✓										
SWEDEN	✓			✓		✓	✓			✓			✓										
TURKEY	✓			✓		✓	✓			✓			✓										
WEST GERMANY	✓			✓		✓	✓			✓			✓										
UNITED KINGDOM	✓			✓		✓	✓			✓				✓									
IRELAND	✓			✓		✓	✓			✓				✓									
HONG KONG	✓			✓		✓	✓			✓				✓									
DENMARK	✓			✓		✓	✓			✓					✓								
ITALY	✓			✓		✓	✓			✓						✓							
CHILE	✓			✓		✓	✓			✓							✓						
PEOPLE'S REP. OF CHINA	✓			✓		✓	✓			✓							✓						
SWITZERLAND	✓			✓		✓	✓			✓								✓					
AUSTRALIA	✓			✓		✓	✓			✓											✓		
NEW ZEALAND	✓			✓		✓	✓			✓											✓		
ARGENTINA	✓			✓		✓	✓			✓													
JAPAN	✓				✓			✓	✓													✓	✓

# Upper Playfield Parts

Item No.	Part No.	Description
1	A-14525	Kicker
2	A-19233-R 20-10110-5	Flipper Coil Assembly Bat and Shaft
3	A-20502	Flipper Ball Guide
4	03-8171-9	Red Mini-dome
5	A-17811 B-9362-R-3	Slingshot Assembly Coil and Bracket
6	A-20436	Right Plastic Ramp
7	A-17794	Kicker Switch Assembly
8	A-20499-9	Standup Target
9	A-20480	Ball Guide #3
10	A-10220	Ball Guide #5
11	A-20511	Sign Assembly
12	01-14021	Ramp Flap
13	A-20576	Ball Guide and Bumper
14	A-20444 12-7303	Switch Guard Assembly Switch Wireform
15	A-20448 04-10216.1	Spinner Assembly Spinner
16	03-8171-10	Blue Mini-dome
17	A-20481	Ball Guide #4
18	A-20447 03-9103.1-9 10-503	Cyberspace Assembly Red Button Button Spring
19	01-14047	Ramp Flap #2
20	01-14046	Ramp Flap #1
21	04-10222	Ball Guide #8
22	20-10201	Magnet
23	A-20482	Ball Guide #2
24	A-20498	Hand Popper
25	A-20497 04-10248.1	Diverter Shaft and Ball Guide
26	14-8025	Motor
27	A-20500	Hand Assembly
28	14-8025	Motor
29	04-10219	Ball Guide #10
30	A-20497 04-10247	Diverter Shaft and Ball Guide
31	A-20587	Drop Target
32	A-20504	Plastic and Bulb
33	A-9415-2 B-12030-2 B-9414-6	Jet Bumper Coil Assy Jet Bumper Leaf Switch Wafer
34	03-8171-10	Blue Mini-dome
35	A-20496	Eject
36	04-10223	Ball Guide #1
37	A-20534	Left Loop Switch
38	04-10218.1	Ball Guide #9
39	A-20438	Cyberspace Ramp
40	A-20499-9	Standup Target
41	01-14022	Ramp Flap
42	A-20437	Left Plastic Ramp
43	A-17811 B-9362-L-2	Slingshot Assembly Coil and Bracket
44	03-8171-9	Red Mini-dome
45	A-20503	Flipper Ball Guide
46	A-15849-L-2 20-10110-5	Flipper Coil Assembly Bat and Shaft
47	01-14048	Ramp Flap 01-14048
48	01-13638	Bottom Arch Ball Guide



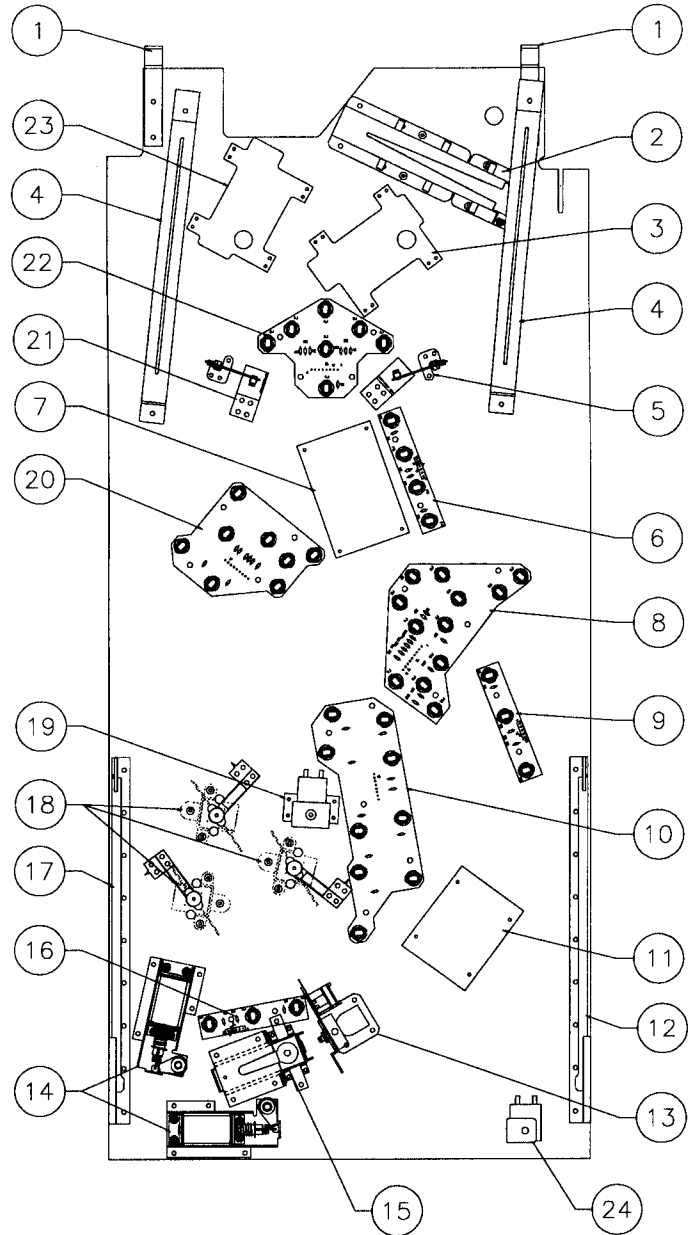
## Not Shown:

03-8633	Full Playfield Mylar*
04-10094	Level Mount
20-9691	Reflector and Socket
25-6500	Level
A-13204-50042	Steel Balls
31-2508	Screened Bottom Arch Assy
36-50042	Screened Bottom Arch
	Screened Hardcoat Playfield

The JOHNNY MNEMONIC hardcoat playfield does not require a full mylar. However, mylars can be purchased through your local Williams Distributor.

# Lower Playfield Parts

Item	Part Number	Description
1	01-9211	Plfd. Hanger Bracket Assy. (2)
2	A-19963	Outhole Ball Trough Assembly
3	A-19223-R	Flipper Assembly, Lower Right
4	01-11781	Leg Support (2)
5	A-17811	Kicker Arm (Slingshot) Assy.
	B-9362-R-3	Coil & Bracket Assembly
6	A-20174	4-Lamp Board Assembly
7	A-15576	7-Switch Opto PCB
8	A-20456	12-Lamp PCB Assembly
9	A-20458	3-Lamp Board Assembly
10	A-20457	9-Lamp Board Assembly
11	A-20532	Dual Relay Motor PCB
12	A-17749.1-2	Slide Playfield Assembly, R.
13	A-20587	Drop Target Assembly
14	A-20497	Diverter Assembly (2)
15	A-20498	Hand Popper Assembly
16	A-20108	3-Lamp Board Assembly
17	A-17749.1-1	Slide Playfield Assembly, L.
18	A-9415-2	Jet Bumper Coil Assembly (3)
	B-9414-6	Jet Bumper Assembly (3)
19	A-20496	Crazy Bob's Eject Assembly
20	A-20455	8-Lamp Board Assembly
21	A-17811	Kicker Arm (Slingshot) Assy.
	B-9362-L-2	Coil & Bracket Assembly
22	A-20454	7-Lamp Board Assembly
23	A-15849-L-2	Flipper Assembly, Lower Left
24	A-20447	Cyber Space Assembly



*Underside of Playfield, Viewed in Raised Position.*

# Lamp Matrix

Yellow (B+)  Red

Column Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J137-7 Q92	8 Yellow-Gray J137-9 Q91
1 Red-Brown J133-1 Q90	MODE READY 11	POWER DOWN 21	LEFT RAMP BLOCK 4 31	LEFT LOOP TOP ARROW 41	CYBER MATRIX 13 51	CYBER MATRIX 12 61	CYBER MATRIX 11 71	RIGHT LOOP TOP ARROW 81
2 Red-Black J133-2 Q89	DOWNLOAD 12	N.A.S. CURE 22	EXTRA BALL 32	LEFT STANDUP ARROW 42	CYBER MATRIX 23 52	CYBER MATRIX 22 62	CYBER MATRIX 21 72	CYBER LOCK 3 82
3 Red-Orange J133-4 Q88	ACCESS CODE 2 13	RIGHT RAMP BLOCK 4 23	SECTOR 2 33	RIGHT RAMP BLOCK 1 43	CYBER MATRIX 33 53	CYBER MATRIX 32 63	CYBER MATRIX 31 73	SECTOR 7 83
4 Red-Yellow J133-5 Q87	ACCESS CODE 1 14	SECTOR 6 24	LEFT RAMP BLOCK 2 34	LIGHT SPINNER 44	RIGHT OUTLANE 54	RIGHT RETURN LANE 64	POPPER TOP ARROW 74	LEFT OUTLANE 84
5 Red-Green J133-6 Q86	UPLOAD 15	RIGHT RAMP BLOCK 2 25	LEFT RAMP BLOCK 1 35	BIG POINTS 45	BONUS HELD 55	SECTOR 5 65	SECTOR 3 75	LEFT RETURN LANE 85
6 Red-Blue J133-7 Q85	LEFT JET LANE 16	HOLD BONUS 26	SECTOR 1 36	GIGABYTES 46	BONUS 4X 56	SPINNER MILLIONS 66	CRAZY BOB'S 76	BALL LAUNCH 86
7 Red-Violet J133-8 Q84	MIDDLE JET LANE 17	RIGHT STANDUP RIGHT BLOCK 27	NOT USED 37	LIGHT EXTRA BALL 47	BONUS 3X 57	CYBER LOCK 2 67	MODE START 77	BUY-IN BUTTON 87
8 Red-Gray J133-9 Q83	RIGHT JET LANE 18	RIGHT STANDUP LEFT BLOCK 28	SHOOT AGAIN 38	QUICK MULTIBALL 48	BONUS 2X 58	INNER LOOP TOP 68	CYBER LOCK 1 78	START BUTTON 88

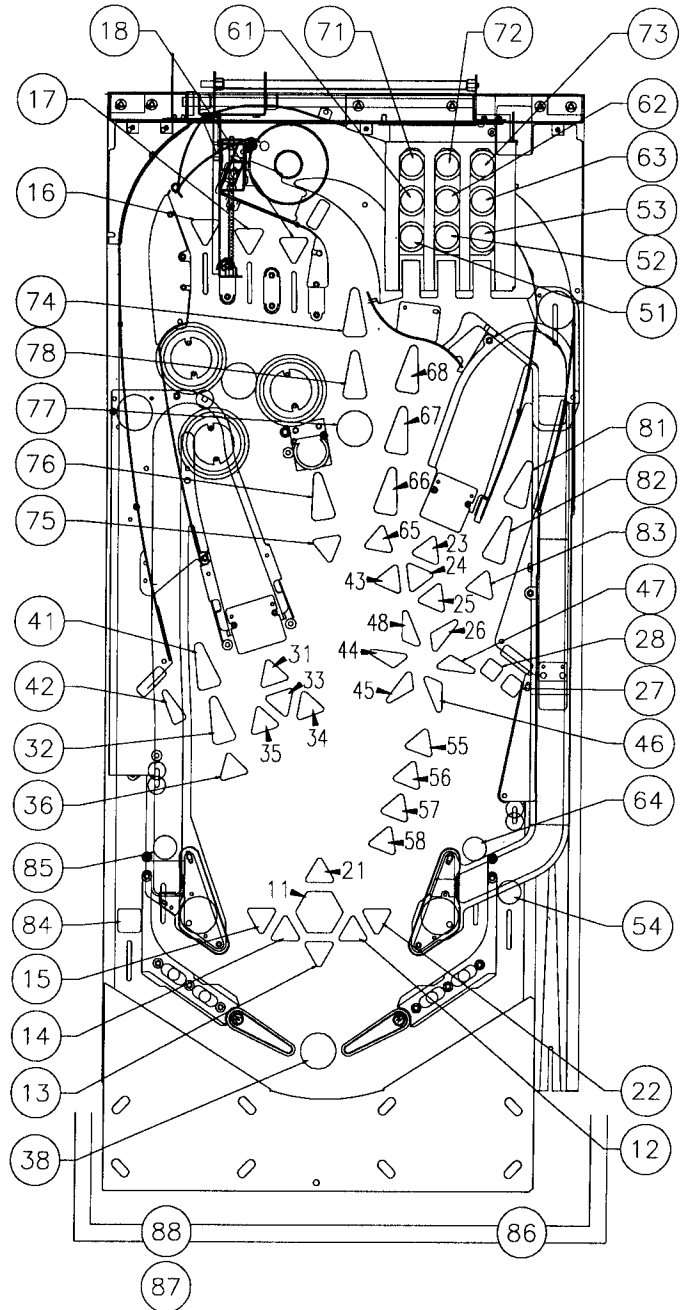
J1XX = POWER DRIVER BOARD

# Lamp Locations


Item No.	Bulb No.	Lamp Assy No.	Description
11	24-8768	A-20454	Mode Ready
12	24-8768	A-20454	Download
13	24-8768	A-20454	Access Code 2
14	24-8768	A-20454	Access Code 1
15	24-8768	A-20454	Upload
16	24-8768	A-20108	Left Jet Lane
17	24-8768	A-20108	Middle Jet Lane
18	24-8768	A-20108	Right Jet Lane
21	24-8768	A-20454	Power Down
22	24-8768	A-20454	N.A.S. Cure
23	24-8768	A-20456	Right Ramp Block 4
24	24-8768	A-20456	Sector 6
25	24-8768	A-20456	Right Ramp Block 2
26	24-8768	A-20456	Hold Bonus
27	24-8768	A-20456	Right Standup Right Block
28	24-8768	A-20456	Right Standup Left Block
31	24-8768	A-20455	Left Ramp Block 4
32	24-8768	A-20455	Extra Ball
33	24-8768	A-20455	Sector 2
34	24-8768	A-20455	Left Ramp Block 2
35	24-8768	A-20455	Left Ramp Block 1
36	24-8768	A-20455	Sector 1
37			Not Used
38	24-6549	A-17835	Shoot Again
41	24-8768	A-20455	Left Loop Top Arrow
42	24-8768	A-20455	Left Standup Arrow
43	24-8768	A-20456	Right Ramp Block 1
44	24-8768	A-20456	Light Spinner
45	24-8768	A-20456	Big Points
46	24-8768	A-20456	Gigabytes
47	24-8768	A-20456	Light Extra Ball
48	24-8768	A-20456	Quick Multiball
51	24-8768	04-10277	Cyber Matrix 13
52	24-8768	04-10277	Cyber Matrix 23
53	24-8768	04-10277	Cyber Matrix 33
54	24-6549	A-17835	Right Outline
55	24-8768	A-20174	Bonus Held
56	24-8768	A-20174	Bonus 4X
57	24-8768	A-20174	Bonus 3X
58	24-8768	A-20174	Bonus 2X
61	24-8768	04-10277	Cyber Matrix 12
62	24-8768	04-10277	Cyber Matrix 22
63	24-8768	04-10277	Cyber Matrix 32
64	24-6549	A-17835	Right Return Lane
65	24-8768	A-20457	Sector 5
66	24-8768	A-20457	Spinner Millions
67	24-8768	A-20457	Cyberlock 2
68	24-8768	A-20457	Inner Loop Top
71	24-8768	04-10277	Cyber Matrix 11
72	24-8768	04-10277	Cyber Matrix 21
73	24-8768	04-10277	Cyber Matrix 31
74	24-8768	A-20457	Popper Top Arrow
75	24-8768	A-20457	Sector 3
76	24-8768	A-20457	Crazy Bob's
77	24-8768	A-20457	Mode Start
78	24-8768	A-20457	Cyberlock 1
81	24-8768	A-20458	Right Loop Top Arrow
82	24-8768	A-20458	Cyberlock 3
83	24-8768	A-20458	Sector 7
84	24-6549	A-17835	Left Outline
85	24-6549	A-17835	Left Return Lane
86	----	20-9663-B-4	Ball Launch
87	----	20-663-21	Buy-in Button
88	----	20-9663-2	Start Button

24-6549 = #44 BULB

24-8768 = #555 BULB




# Switch Matrix

White  Green

Dedicated Grounded Switches	Column		1	2	3	4	5	6	7	8	Flipper Grounded Switches
	Row		Green-Brown J207-1 U20-18	Green-Red J207-2 U20-17	Green-Orange J207-3 U20-16	Green-Yellow J207-4 U20-15	Green-Black J207-5 U20-14	Green-Blue J207-6 U20-13	Green-Violet J207-7 U20-12	Green-Gray J207-9 U20-11	
<b>Orange-Brown</b> J205-1 Left Coin Chute  D1	<b>1</b> White-Brown J209-1 U18-11		BALL LAUNCH 11	SLAM TILT 21	TROUGH JAM 31	LEFT RAMP ENTER 41	CYBER MATRIX 11 51	CYBER MATRIX 12 61	CYBER MATRIX 13 71	NOT USED 81	<b>Black-Green</b> J906-1 Lower Right Flipper E.O.S. F1
<b>Orange-Red</b> J205-2 Center Coin Chute  D2	<b>2</b> White-Red J209-2 U18-9		X HAND HOME 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	LEFT RAMP MADE 42	CYBER MATRIX 21 52	CYBER MATRIX 22 62	CYBER MATRIX 23 72	NOT USED 82	<b>Blue-Violet</b> J905-1 Lower Right Flipper Opto F2
<b>Orange-Black</b> J205-3 Right Coin Chute  D3	<b>3</b> White-Orange J209-3 U18-5		START BUTTON 13	BUY-IN BUTTON 23	TROUGH BALL 2 33	DROP TARGET 43	CYBER MATRIX 31 53	CYBER MATRIX 32 63	CYBER MATRIX 33 73	NOT USED 83	<b>Black-Blue</b> J906-3 Lower Left Flipper E.O.S. F3
<b>Orange-Yellow</b> J205-4 4th Coin Chute  D4	<b>4</b> White-Yellow J209-4 U18-7		PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	LEFT JET BUMPER 44	RIGHT RAMP ENTER 54	LEFT JET LANE 64	X HAND ENCODER A 74	NOT USED 84	<b>Blue-Gray</b> J905-2 Lower Left Flipper Opto F4
<b>Orange-Green</b> J205-6 Normal Function Srv Crdts Test Function Escape  D5	<b>5</b> White-Green J209-5 U19-11		LEFT OUTLANE 15	LEFT SLINGSHOT 25	TROUGH BALL 4 35	BOTTOM JET BUMPER 45	RIGHT RAMP MADE 55	MIDDLE JET LANE 65	X HAND ENCODER B 75	NOT USED 85	<b>Black-Violet</b> J906-4 BALL IN HAND F5
<b>Orange-Blue</b> J205-7 Normal Function Volume Dn Test Function Volume Down  D6	<b>6</b> White-Blue U209-7 U19-9		LEFT RETURN LANE 16	RIGHT SLINGSHOT 26	BALL POPPER 1 36	RIGHT JET BUMPER 46	LEFT LOOP 56	RIGHT JET LANE 66	Y HAND ENCODER B 76	NOT USED 86	<b>Black-Yellow</b> J905-3 Upper Right Flipper Opto F6
<b>Orange-Violet</b> J205-8 Normal Function Volume Up Test Function Volume Up  D7	<b>7</b> White-Violet J209-8 U19-5		RIGHT RETURN LANE 17	LEFT STANDUP TARGET 27	Y HAND HOME 37	CRAZY BOB'S 47	RIGHT LOOP 57	RIGHT HAND CONTROL 67	Y HAND ENCODER A 77	NOT USED 87	<b>Black-Gray</b> J906-5 Upper Left Flipper E.O.S. F7
<b>Orange-Gray</b> J205-9 Normal Function Begin Test Test Function Enter  D8	<b>8</b> White-Gray J209-9 U19-7		RIGHT OUTLANE 18	RIGHT STANDUP TARGET 28	RIGHT RUBBER 38	SPINNER 48	INNER LOOP ENTRY 58	LEFT HAND CONTROL 68	SHOOTER LANE 78	NOT USED 88	<b>Black-Blue</b> J906-6 Upper Left Flipper Opto F8

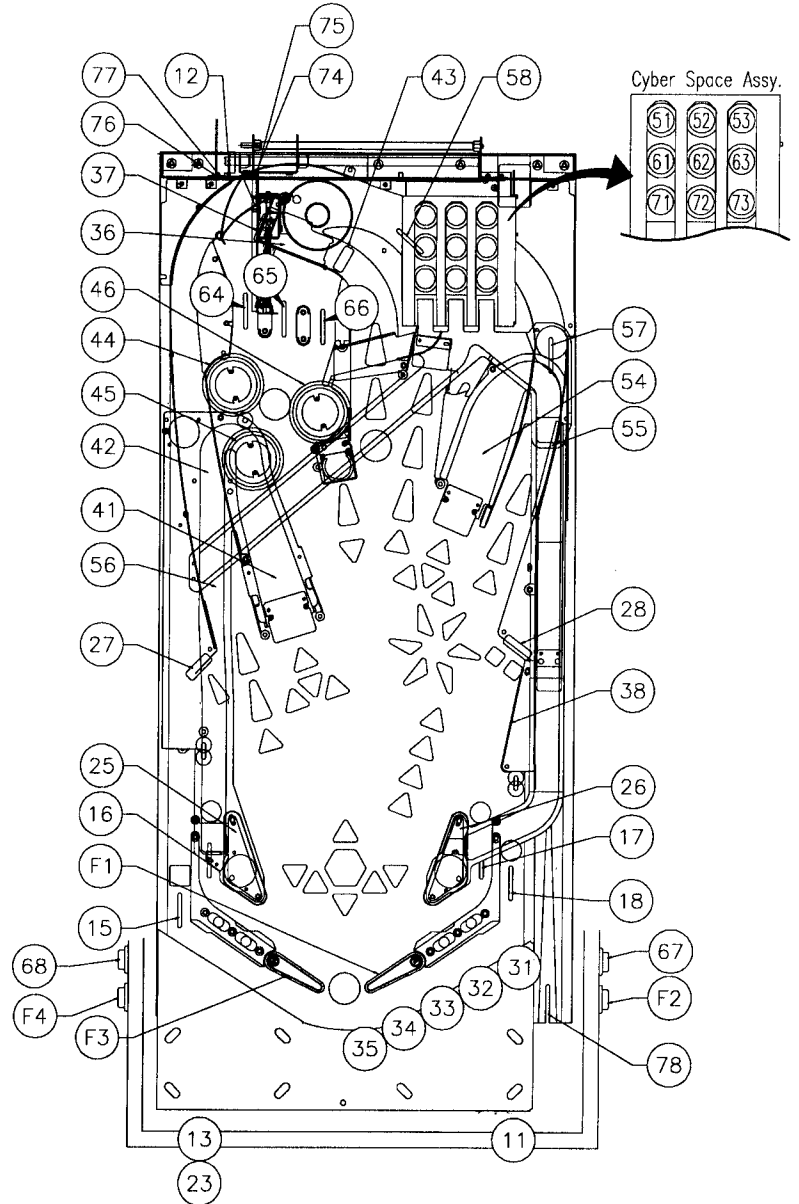
J2XX = CPU BOARD; J9XX = FLIPTRONIC II BOARD

 = OPTO, TYPICALLY CLOSED.

# Switch Locations

Item No.	Switch No.	Description
F1	SW-1A-194	Lower Right Flipper E.O.S.
F2	A-17316	Lower Right Flipper Cbnt.
F3	SW-1A-194	Lower Left Flipper E.O.S.
F4	A-17316	Lower Left Flipper Cbnt
F5		Ball In Hand
F6	Not Used	Upper Right Flipper Cbnt
F7	Not Used	Upper Left Flipper E.O.S.
F8	Not Used	Upper Left Flipper Cbnt
11	20-9663-B-4	Ball Launch
12	5647-12693-06	*X* Hand Home
13	20-9663-2	Start Button
14	A-15361	Plumb Bob Tilt*
15	5647-12693-19	Left Outlane
16	5647-12693-19	Left Return Lane
17	5647-12693-19	Right Return Lane
18	5647-12693-19	Right Outlane
21	A-17238	Slam Tilt*
22	5643-09268-00	Coin Door Closed*
23	20-9663-21	Buy-in Button
24	5643-09112-00	Always Closed*
25	A-17800 (kick)	Left Slingshot
26	A-17794 (score)	Right Slingshot
27	A-20499-9	Left Standup Target
28	A-20499-9	Right Standup Target
31	A-18617-1 (LED)	Trough Jam
32	A-18618-1 (Trans.)	Trough Ball 1
33	A-18617-1 (LED)	Trough Ball 2
34	A-18618-1 (Trans.)	Trough Ball 3
35	A-18617-1 (LED)	Trough Ball 4
36	A-18618-1 (Trans.)	Popper Ball 1
37	A-16909 (LED)	Popper Ball 1
38	A-16909 (Trans.)	Popper Ball 1
41	5647-12693-06	*Y* Hand Home
42	A-17794	Right Rubber
43	5647-12693-24	Left Ramp Enter
44	5647-12693-21	Left Ramp Made
45	5647-12693-31	Drop Target
46	A-16443	Left Jet Bumper
47	A-16443	Bottom Jet Bumper
48	A-16443	Right Jet Bumper
49	5647-12693-43	Crazy Bob's
50	5647-12693-24	Spinner
51	5647-14712-01	Cyber Matrix 11
52	5647-14712-01	Cyber Matrix 21
53	5647-14712-01	Cyber Matrix 31
54	5647-12693-24	Right Ramp Enter
55	5647-12693-21	Right Ramp Made
56	5647-12693-24	Left Loop
57	5647-12693-19	Right Loop
58	5647-12693-19	Inner Loop Entry
61	5647-14712-01	Cyber Matrix 12
62	5647-14712-01	Cyber Matrix 22
63	5647-14712-01	Cyber Matrix 32
64	5647-12693-19	Left Jet Lane
65	5647-12693-19	Middle Jet Lane
66	5647-12693-19	Right Jet Lane
67	A-18602-1	Right Hand Control
68	A-18602	Left Hand Control
71	5647-14712-01	Cyber Matrix 13
72	5647-14712-01	Cyber Matrix 23
73	5647-14712-01	Cyber Matrix 33
74	A-20533.1	*X* Hand Encoder A
75	A-20533.1	*X* Hand Encoder B
76	A-20533.1	*Y* Hand Encoder B
77	A-20533.1	*Y* Hand Encoder A
78	5647-12693-32	Shooter Lane

81 to 88 ARE NOT USED.  
\*NOT SHOWN



# Solenoid/Flasher Table

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive Xistor	Voltage Connections			Drive Wire Color	Solenoid Part No. Flashlamp Type	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox
01	TROUGH EJECT	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	AUTOPLUNGER	High Power	J107-2			Q80	J130-2			Vio-Red	AE-23-800	
03	POPPER	High Power	J107-2			Q78	J130-4			Vio-Org	AE-24-900	
04	NOT USED	High Power				Q76				Vio-Yel		
05	CLEAR MATRIX	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-25-1000	
06	HAND MAGNET	High Power	J107-2			Q66	J130-7			Vio-Blu	20-10201	
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk	AE-23-800	AE-23-800
08	NOT USED	High Power				Q70				Vio-Gry		
09	LEFT SLINGSHOT	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	RIGHT SLINGSHOT	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	LEFT JET BUMPER	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	BOTTOM JET BUMPER	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	RIGHT JET BUMPER	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	CRAZY BOB'S EJECT	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1500	
15	DROP TARGET UP	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200	
16	DROP TARGET DOWN	Low Power	J107-3			Q44	J127-9			Brn-Gry	SM1-26-600	
17	JETS FLASHER	Flasher	J107-6			Q42	J126-1			Blk-Brn	#89	
18	CRAZY BOB'S FLASHER	Flasher	J107-6	J106-5		Q40	J126-2	J125-2		Blk-Red	#906	#906
19	LEFT SLINGSHOT FLSHR	Flasher	J107-6			Q38	J126-3			Blk-Org	#906	
20	RIGHT SLINGSHOT FLSHR	Flasher	J107-6	J106-5		Q36	J126-4	J125-5		Blk-Yel	#906	#906
21	*X MOTOR DIRECTION	Flasher	J107-6			Q28	J126-5			Blu-Grn	**A-20532	
22	*X MOTOR ENABLE	Flasher	J107-6			Q30	J126-6			Blu-Blk	**A-20532	
23	*Y MOTOR DIRECTION	Flasher	J107-6			Q34	J126-7			Blu-Vio	**A-20532	
24	*Y MOTOR ENABLE	Flasher	J107-6			Q32	J126-8			Blu-Gry	**A-20532	
25	LEFT RAMP FLASHER	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#906	#906
26	RIGHT RAMP FLASHER	Gen. Purpose	J107-6			Q24	J122-2			Blu-Red	#906	
27	HAND POPPER FLASHER	Gen. Purpose	J107-6			Q22	J122-3			Blu-Org	#89	
28	RIGHT BACKPANEL FLSH	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-5		Blu-Yel	#906	#906

### General Illumination

01	STRING 1	G.I.	J121-1	J120-1		Q18	J121-7	J120-7		Wht-Brn	#44	#555
02	STRING 2	G.I.	J121-2	J120-2		Q10	J121-8	J120-8		Wht-Org	#44	#555
03	STRING 3	G.I.	J121-3	J120-3		Q14	J121-9	J120-9		Wht-Yel	#44	#555
04	STRING 4	G.I.	J121-5			Q16	J121-10			Wht-Grn	#44	
05	STRING 5	G.I.		J120-6	J119-3	Q12		J120-11	J119-1	Wht-Vio		#555

Flipper Circuits	Voltage Connection	Drive Transistors	Drive Connections	Drive Wire Colors	Coil Part No.	Coil Colors
29	Lwr. Rt. Power	J907-1 (Red-Grn)	Q4	J902-13	Yel-Grn	
30	Lwr. Rt. Hold	J907-1 (Red-Grn)	Q11	J902-11	Org-Grn	FL-11629 BLUE
31	Lwr. Lt. Power	J907-4 (Red-Blu)	Q3	J902-9	Yel-Blu	
32	Lwr. Lt. Hold	J907-4 (Red-Blu)	Q9	J902-7	Org-Blu	FL-11629 BLUE
33	Upr. Rt. Power	J907-6 (Red-Vio)	Q2	J902-6	Yel-Vio	
34	Upr. Rt. Hold	J907-6 (Red-Vio)	Q7	J902-4	Org-Vio	FL-11753 YELLOW
35	Upr. Lt. Power	J907-8 (Red-Gry)	Q1	J902-3	Yel-Gry	
36	Upr. Lt. Hold	J907-8 (Red-Gry)	Q5	J902-1	Org-Gry	FL-11753 YELLOW

J1XX = POWER DRIVER BOARD; J9XX = FLIPTRONIC II BOARD

24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

\*THE X MOTOR AND Y MOTOR PART NUMBER IS 14-8025.

\*\* A-20532 IS THE PART NUMBER FOR THE DUAL RELAY MOTOR DRIVER BOARD.



# Solenoid/Flashlamp Locations

Item No.	Coil/Flasher No.	Assembly No.	Description
01	AE-26-1500	A-19963	Trough Eject
02	AE-23-800	A-14525	Autoplunger
03	AE-24-900	A-20498	Popper
04			Not Used
05	AE-25-1000	A-20446	Clear Matrix
06	20-10201	A-20500	Hand Magnet
07	AE-23-800	A-10686-1	Knocker**
08			Not Used
09	AE-26-1200	B-9362-L-2	Left Slingshot
10	AE-26-1200	B-9362-R-3	Right Slingshot
11	AE-26-1200	A-9415-2	Left Jet Bumper
12	AE-26-1200	A-9415-2	Bottom Jet Bumper
13	AE-26-1200	A-9415-2	Right Jet Bumper
14	AE-26-1500	A-20496	Crazy Bob's Eject
15	AE-26-1200	A-20587	Drop Target Up
16	SM1-26-600	A-20587	Drop Target Down
17	24-8704	A-17803	Jet Flasher
18	24-8802	A-17802	Crazy Bob's Flasher
19	24-8802	-----	Inset Panel
20	24-8802	-----	Left Slingshot Flasher*
21	24-8802	-----	Right Slingshot Flasher*
22	24-8802	-----	Inset Panel
23	14-8025	A-20532	*X* Motor Direction
24	14-8025	A-20532	*X* Motor Enable
25	14-8025	A-20532	*Y* Motor Direction
26	14-8025	A-20532	*Y* Motor Enable
27	24-8802	-----	Left Ramp Flasher*
28	24-8802	-----	Inset Panel
29	24-8802	-----	Right Ramp Flasher*
30	24-8704	04-10280	Hand Popper Flasher
31	24-8802	-----	Right Back Panel Flsr
32	24-8802	-----	Inset Panel

## Flippers

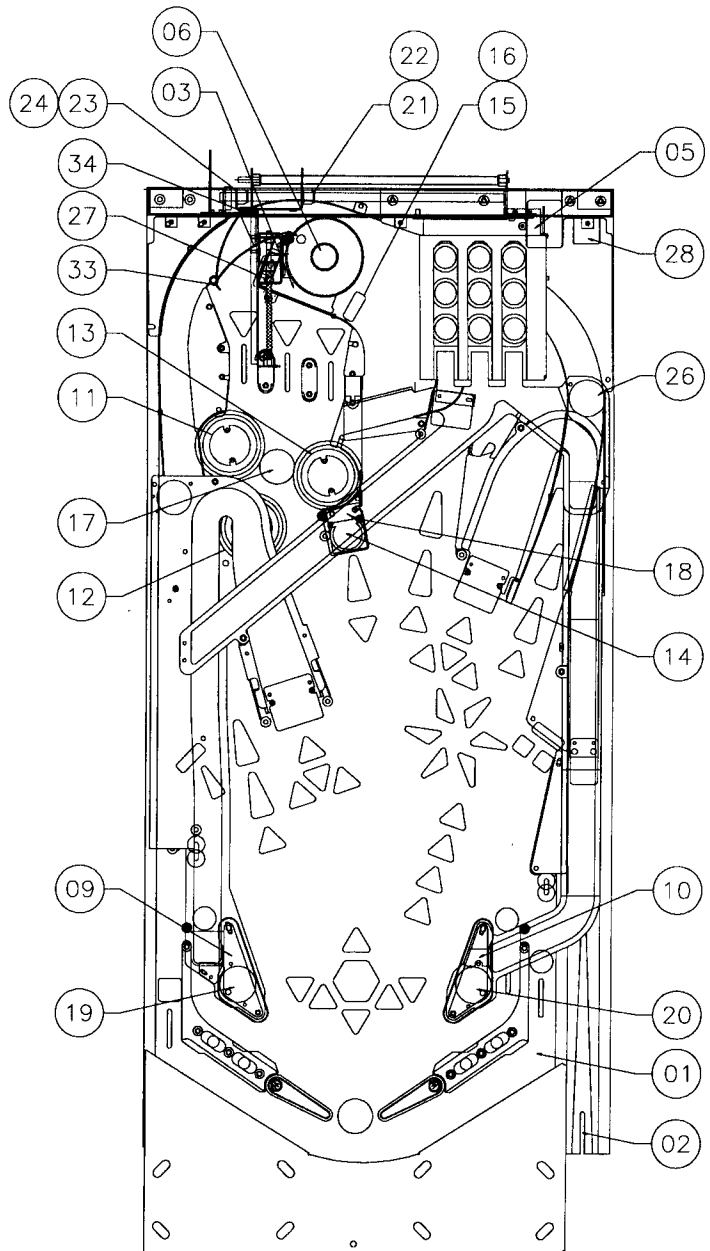
Item No.	Coil/Flasher No.	Assembly No.	Description
29-30	FL-11629	A-19223-R	Lower Right Flipper
31-32	FL-11629	A-15849-L-2	Lower Left Flipper
33-34	FL-11753	A-20497	Left Diverter
35-36	FL-11753	A-20497	Right Diverter

## General Illumination

Item No.	Bulb No.	Description
01	24-6549/24-8768	String 1
02	24-6549/24-8768	String 2
03	24-6549/24-8768	String 3
04	24-6549	String 4
05	24-8768	String 5

24-6549 = #44 BULB  
 24-8704 = #89 BULB  
 24-8768 = #555 BULB  
 24-8802 = #906 BULB

\*USED WITH A-14266-13, RECEPTACLE AND SKIRT.  
 \*\*NOT SHOWN



# Notes

## NOTES

## NOTES

# SECTION THREE

## GAME WIRING AND SCHEMATICS

### CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack (except the Audio Board and the Dot matrix Display/Driver Board) receives a number that identifies the circuit board and the position on that board that it connects to. J-designations refer to a male connector. P-designations refer to a female connector. For example, J101 designates jack 1 of board 1 (a Power Driver Board jack); P206 designates plug 6 of board 2 (a CPU Board plug). Identifying the specific pin number of a connector involves a hyphen, which separates the pin number from the plug or jack designation. For example, J101-3 refers to pin 3 of jack 1 on board 1.

Other game components may also have similar numbers to clarify their locations or related circuits. For example, F501 refers to a fuse located on the Audio Board.

Prefix numbers for WPC circuit boards are listed below.

- 1 - Power Driver Board
- 2 - CPU Board
- 6 - Dot Matrix Controller Board
- 9 - Fliptronic II Controller Board

The Audio Board and the Dot Matrix Display/Driver Board do not have identification numbers.

**Schematics for standard WPC backbox boards are found in the WPC Schematics Manual. Playfield, cabinet and all other backbox board schematics are found in this section.**

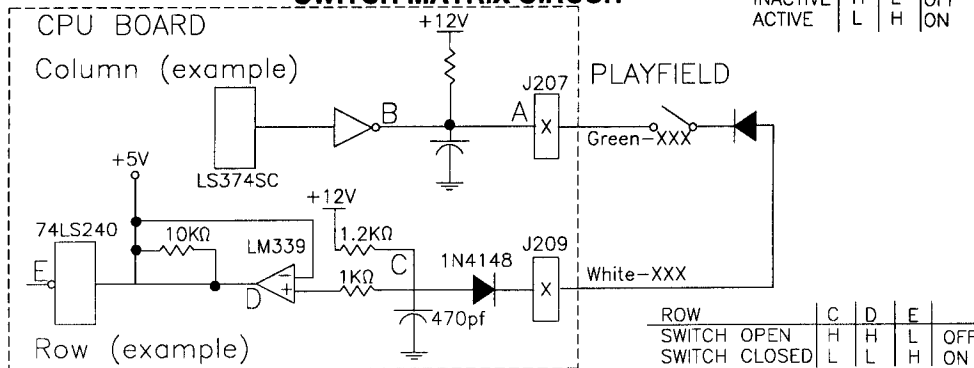
# SWITCH MATRIX

White Green

Dedicated Grounded Switches	Column		1	2	3	4	5	6	7	8	Flipper Grounded Switches
	Row		Green-Brown J207-1 U20-18	Green-Red J207-2 U20-17	Green-Orange J207-3 U20-16	Green-Yellow J207-4 U20-15	Green-Black J207-5 U20-14	Green-Blue J207-6 U20-13	Green-Violet J207-7 U20-12	Green-Gray J207-9 U20-11	
Orange-Brown J205-1 Left Coin Chute  D1	1 White-Brown J209-1 U18-11		BALL LAUNCH 11	SLAM TILT 21	TROUGH JAM 31	LEFT RAMP ENTER 41	CYBER MATRIX 11 51	CYBER MATRIX 12 61	CYBER MATRIX 13 71	NOT USED 81	Black-Green J906-1 Lower Right Flipper E.O.S. F1
Orange-Red J205-2 Center Coin Chute  D2	2 White-Red J209-2 U18-9		X HAND HOME 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	LEFT RAMP MADE 42	CYBER MATRIX 21 52	CYBER MATRIX 22 62	CYBER MATRIX 23 72	NOT USED 82	Blue-Violet J905-1 Lower Right Flipper Opto F2
Orange-Black J205-3 Right Coin Chute  D3	3 White-Orange J209-3 U18-5		START BUTTON 13	BUY-IN BUTTON 23	TROUGH BALL 2 33	DROP TARGET 43	CYBER MATRIX 31 53	CYBER MATRIX 32 63	CYBER MATRIX 33 73	NOT USED 83	Black-Blue J906-3 Lower Left Flipper E.O.S. F3
Orange-Yellow J205-4 4th Coin Chute  D4	4 White-Yellow J209-4 U18-7		PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	LEFT JET BUMPER 44	RIGHT RAMP ENTER 54	LEFT JET LANE 64	X HAND ENCODER A 74	NOT USED 84	Blue-Gray J905-2 Lower Left Flipper Opto F4
Orange-Green J205-6 Normal Function Srv Crdts Test Function Escape D5	5 White-Green J209-5 U19-11		LEFT OUTLANE 15	LEFT SLINGSHOT 25	TROUGH BALL 4 35	BOTTOM JET BUMPER 45	RIGHT RAMP MADE 55	MIDDLE JET LANE 65	X HAND ENCODER B 75	NOT USED 85	Black-Violet J906-4 BALL IN HAND F5
Orange-Blue J205-7 Normal Function Volume Dn Test Function Volume Down D6	6 White-Blue J209-7 U19-9		LEFT RETURN LANE 16	RIGHT SLINGSHOT 26	BALL POPPER 1 36	RIGHT JET BUMPER 46	LEFT LOOP 56	RIGHT JET LANE 66	Y HAND ENCODER B 76	NOT USED 86	Black-Yellow J905-3 Upper Right Flipper Opto F6
Orange-Violet J205-8 Normal Function Volume Up Test Function Volume Up D7	7 White-Violet J209-8 U19-5		RIGHT RETURN LANE 17	LEFT STANDUP TARGET 27	Y HAND HOME 37	CRAZY BOB'S 47	RIGHT LOOP 57	RIGHT HAND CONTROL 67	Y HAND ENCODER A 77	NOT USED 87	Black-Gray J906-5 Upper Left Flipper E.O.S. F7
Orange-Gray J205-9 Normal Function Begin Test Test Function Enter D8	8 White-Gray J209-9 U19-7		RIGHT OUTLANE 18	RIGHT STANDUP TARGET 28	RIGHT RUBBER 38	SPINNER 48	INNER LOOP ENTRY 58	LEFT HAND CONTROL 68	SHOOTER LANE 78	NOT USED 88	Black-Blue J905-5 Upper Left Flipper Opto F8

J2XX = CPU BOARD; J9XX = FLIPTRONIC II BOARD = OPTO, TYPICALLY CLOSED.

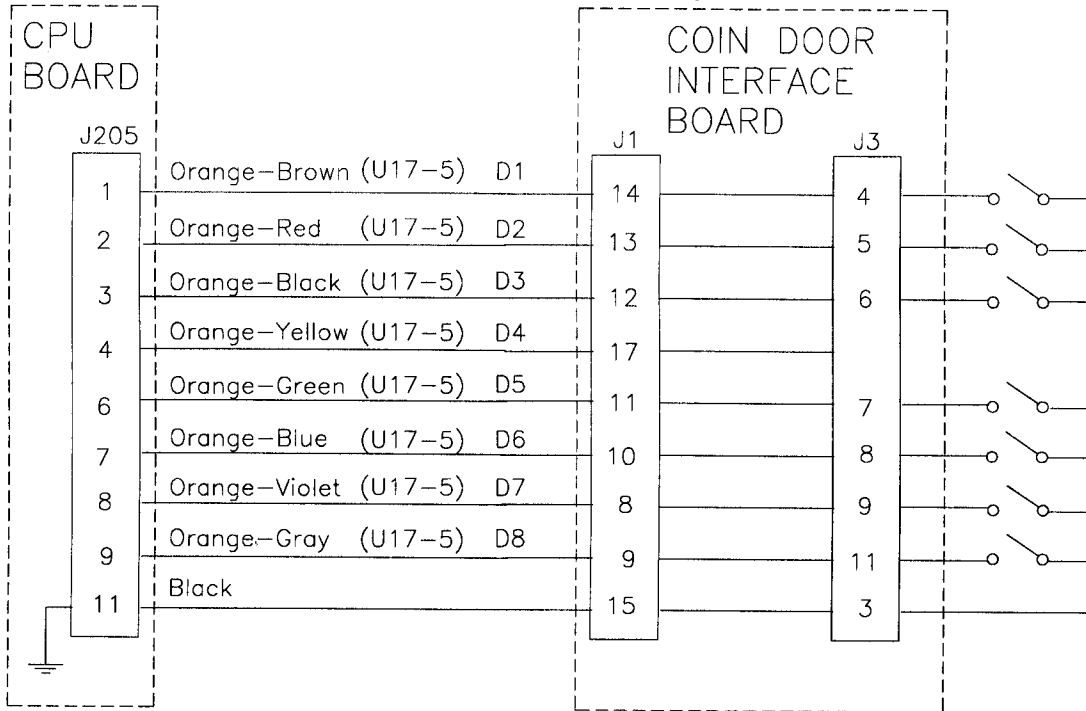
## SWITCH MATRIX CIRCUIT



The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low, the column side is active.

When a switch closes, the row side of the circuit activates. The "+" input to the LM339 drops below +5V, therefore, its output is low. Corresponding row and column switches must be low at the same time for the switch to be considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

## DEDICATED SWITCHES



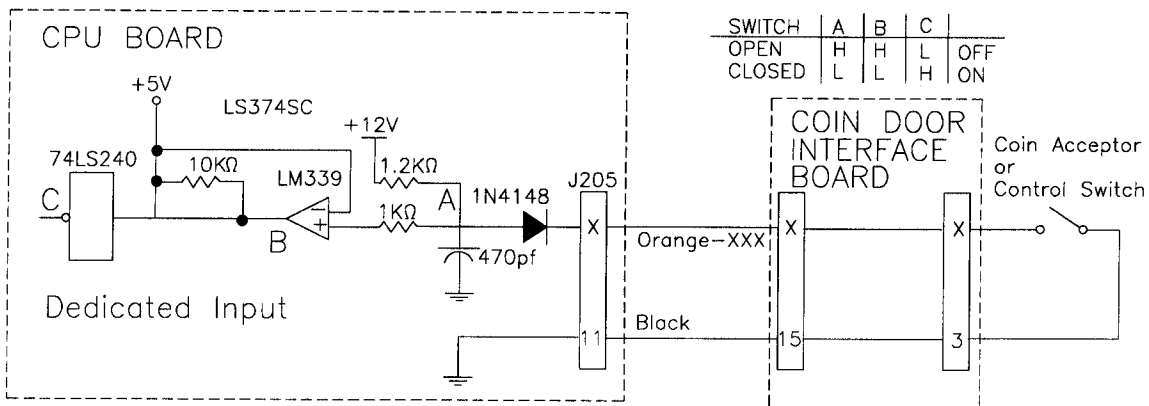
### Coin Acceptor Switches

- D1 - Left Coin Chute
- D2 - Center Coin Chute
- D3 - Right Coin Chute
- D4 - Fourth Coin Chute

### Control Switches

- D5 - Normal Function, Service Credits; Test Function, Escape
- D6 - Normal Function, Volume Down; Test Function, Down
- D7 - Normal Function, Volume Up; Test Function, Up
- D8 - Normal Function, Begin Test; Test Function, Enter

## DEDICATED SWITCH CIRCUIT



The dedicated switches operate similar in the matrix, except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).

When a switch closes, the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V, therefore the output is low. Since the row circuit (dedicated input) is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, it output is high and the row is inactive.

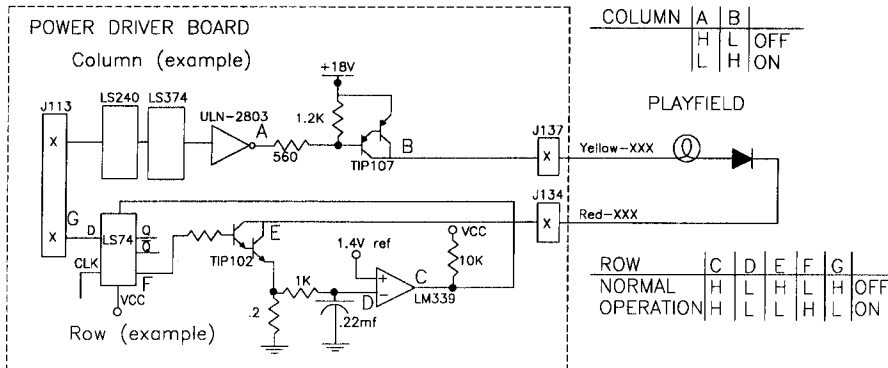
# LAMP MATRIX

Yellow (B+) → Red

Column \ Row	1 Yellow-Brown J137-1 Q98	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J137-7 Q92	8 Yellow-Gray J137-9 Q91
1 Red-Brown J133-1 Q90	MODE READY 11	POWER DOWN 21	LEFT RAMP BLOCK 4 31	LEFT LOOP TOP ARROW 41	CYBER MATRIX 13 51	CYBER MATRIX 12 61	CYBER MATRIX 11 71	RIGHT LOOP TOP ARROW 81
2 Red-Black J133-2 Q89	DOWNLOAD 12	N.A.S. CURE 22	EXTRA BALL 32	LEFT STANDUP ARROW 42	CYBER MATRIX 23 52	CYBER MATRIX 22 62	CYBER MATRIX 21 72	CYBER LOCK 3 82
3 Red-Orange J133-4 Q88	ACCESS CODE 2 13	RIGHT RAMP BLOCK 4 23	SECTOR 2 33	RIGHT RAMP BLOCK 1 43	CYBER MATRIX 33 53	CYBER MATRIX 32 63	CYBER MATRIX 31 73	SECTOR 7 83
4 Red-Yellow J133-5 Q87	ACCESS CODE 1 14	SECTOR 6 24	LEFT RAMP BLOCK 2 34	LIGHT SPINNER 44	RIGHT OUTLANE 54	RIGHT RETURN LANE 64	POPPER TOP ARROW 74	LEFT OUTLANE 84
5 Red-Green J133-6 Q86	UPLOAD 15	RIGHT RAMP BLOCK 2 25	LEFT RAMP BLOCK 1 35	BIG POINTS 45	BONUS HELD 55	SECTOR 5 65	SECTOR 3 75	LEFT RETURN LANE 85
6 Red-Blue J133-7 Q85	LEFT JET LANE 16	HOLD BONUS 26	SECTOR 1 36	GIGABYTES 46	BONUS 4X 56	SPINNER MILLIONS 66	CRAZY BOB'S 76	BALL LAUNCH 86
7 Red-Violet J133-8 Q84	MIDDLE JET LANE 17	RIGHT STANDUP RIGHT BLOCK 27	NOT USED 37	LIGHT EXTRA BALL 47	BONUS 3X 57	CYBER LOCK 2 67	MODE START 77	BUY-IN BUTTON 87
8 Red-Gray J133-9 Q83	RIGHT JET LANE 18	RIGHT STANDUP LEFT BLOCK 28	SHOOT AGAIN 38	QUICK MULTIBALL 48	BONUS 2X 58	INNER LOOP TOP 68	CYBER LOCK 1 78	START BUTTON 88

J1XX = POWER DRIVER BOARD

## LAMP MATRIX CIRCUIT



The microprocessor sends a signal to the column circuit causing the output of the UNL-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time, the microprocessor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of the TIP102 causes the transistor to conduct, bringing the row circuit to ground and turning the lamp on.

The microprocessor changes the input of the 74LS74 to a high state to turn the lamp off.

In overcurrent conditions, the lamp is shut off through the comparator. If the voltage at the negative input of the LM339 rises above 1.4V, the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit off.



## SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections			Drive Xistor	Voltage Connections			Drive Wire Color	Solenoid Part No. Flashlamp Type	
			Playfield	Backbox	Cabinet		Playfield	Backbox	Cabinet		Playfield	Backbox
01	TROUGH EJECT	High Power	J107-2			Q82	J130-1			Vio-Brn	AE-26-1500	
02	AUTOPLUNGER	High Power	J107-2			Q80	J130-2			Vio-Red	AE-23-800	
03	POPPER	High Power	J107-2			Q78	J130-4			Vio-Org	AE-24-900	
04	NOT USED	High Power				Q76				Vio-Yel		
05	CLEAR MATRIX	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-25-1000	
06	HAND MAGNET	High Power	J107-2			Q66	J130-7			Vio-Blu	20-10201	
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk	AE-23-800	AE-23-800
08	NOT USED	High Power				Q70				Vio-Gry		
09	LEFT SLINGSHOT	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	RIGHT SLINGSHOT	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	LEFT JET BUMPER	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	BOTTOM JET BUMPER	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	RIGHT JET BUMPER	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	CRAZY BOB'S EJECT	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1500	
15	DROP TARGET UP	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200	
16	DROP TARGET DOWN	Low Power	J107-3			Q44	J127-9			Brn-Gry	SM1-26-600	
17	JETS FLASHER	Flasher	J107-6			Q42	J126-1			Blk-Brn	#89	
18	CRAZY BOB'S FLASHER	Flasher	J107-6	J106-5		Q40	J126-2	J125-2		Blk-Red	#906	#906
19	LEFT SLINGSHOT FLSHR	Flasher	J107-6			Q38	J126-3			Blk-Org	#906	
20	RIGHT SLINGSHOT FLSHR	Flasher	J107-6	J106-5		Q36	J126-4	J125-5		Blk-Yel	#906	#906
21	*X MOTOR DIRECTION	Flasher	J107-6			Q28	J126-5			Blu-Grn	**A-20532	
22	*X MOTOR ENABLE	Flasher	J107-6			Q30	J126-6			Blu-Blk	**A-20532	
23	*Y MOTOR DIRECTION	Flasher	J107-6			Q34	J126-7			Blu-Vio	**A-20532	
24	*Y MOTOR ENABLE	Flasher	J107-6			Q32	J126-8			Blu-Gry	**A-20532	
25	LEFT RAMP FLASHER	Gen. Purpose	J107-6	J106-5		Q26	J122-1	J124-1		Blu-Brn	#906	#906
26	RIGHT RAMP FLASHER	Gen. Purpose	J107-6			Q24	J122-2			Blu-Red	#906	
27	HAND POPPER FLASHER	Gen. Purpose	J107-6			Q22	J122-3			Blu-Org	#89	
28	RIGHT BACKPANEL FLSH	Gen. Purpose	J107-6	J106-5		Q20	J122-4	J124-5		Blu-Yel	#906	#906

### General Illumination

01	STRING 1	G.I.	J121-1	J120-1		Q18	J121-7	J120-7		Wht-Brn	#44	#555
02	STRING 2	G.I.	J121-2	J120-2		Q10	J121-8	J120-8		Wht-Org	#44	#555
03	STRING 3	G.I.	J121-3	J120-3		Q14	J121-9	J120-9		Wht-Yel	#44	#555
04	STRING 4	G.I.	J121-5			Q16	J121-10			Wht-Grn	#44	
05	STRING 5	G.I.		J120-6	J119-3	Q12		J120-11	J119-1	Wht-Vio		#555

Flipper Circuits	Voltage Connection	Drive Transistors	Drive Connections	Drive Wire Colors		Coil Part No.	Coil Colors
				Playfield	Power		
29	Lwr. Rt. Power	J907-1 (Red-Grn)	Q4	J902-13	Yel-Grn		
30	LOWER RIGHT FLIPPER	Lwr. Rt. Hold	J907-1 (Red-Grn)	Q11	J902-11	Org-Grn	FL-11629 BLUE
31		Lwr. Lt. Power	J907-4 (Red-Blu)	Q3	J902-9	Yel-Blu	
32	LOWER LEFT FLIPPER	Lwr. Lt. Hold	J907-4 (Red-Blu)	Q9	J902-7	Org-Blu	FL-11629 BLUE
33		Upr. Rt. Power	J907-6 (Red-Vio)	Q2	J902-6	Yel-Vio	
34	LEFT DIVERTER	Upr. Rt. Hold	J907-6 (Red-Vio)	Q7	J902-4	Org-Vio	FL-11753 YELLOW
35		Upr. Lt. Power	J907-8 (Red-Gry)	Q1	J902-3	Yel-Gry	
36	RIGHT DIVERTER	Upr. Lt. Hold	J907-8 (Red-Gry)	Q5	J902-1	Org-Gry	FL-11753 YELLOW

J1XX = POWER DRIVER BOARD; J9XX = FLIPTRONIC II BOARD

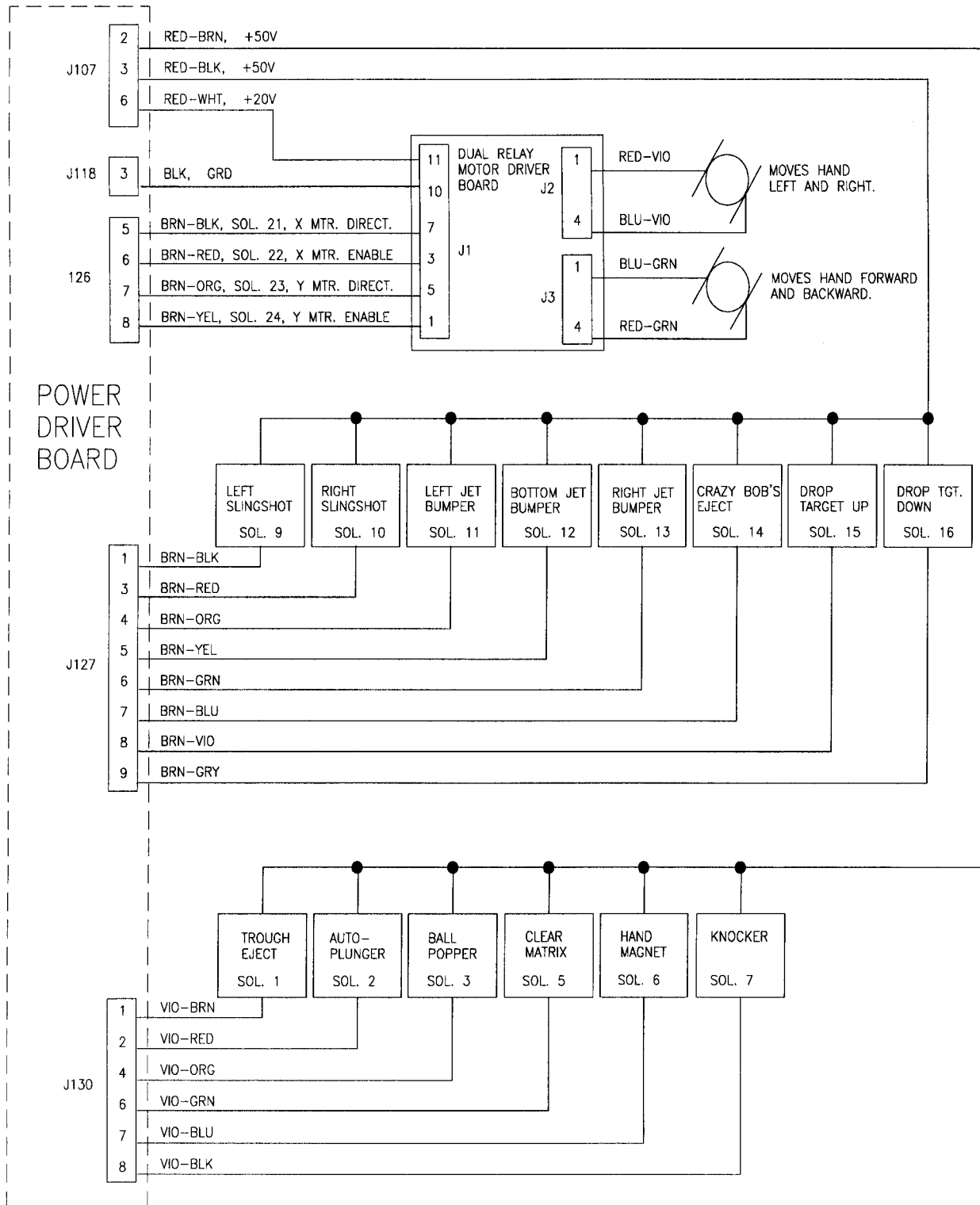
24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB

\*THE X MOTOR AND Y MOTOR PART NUMBER IS 14-8025.

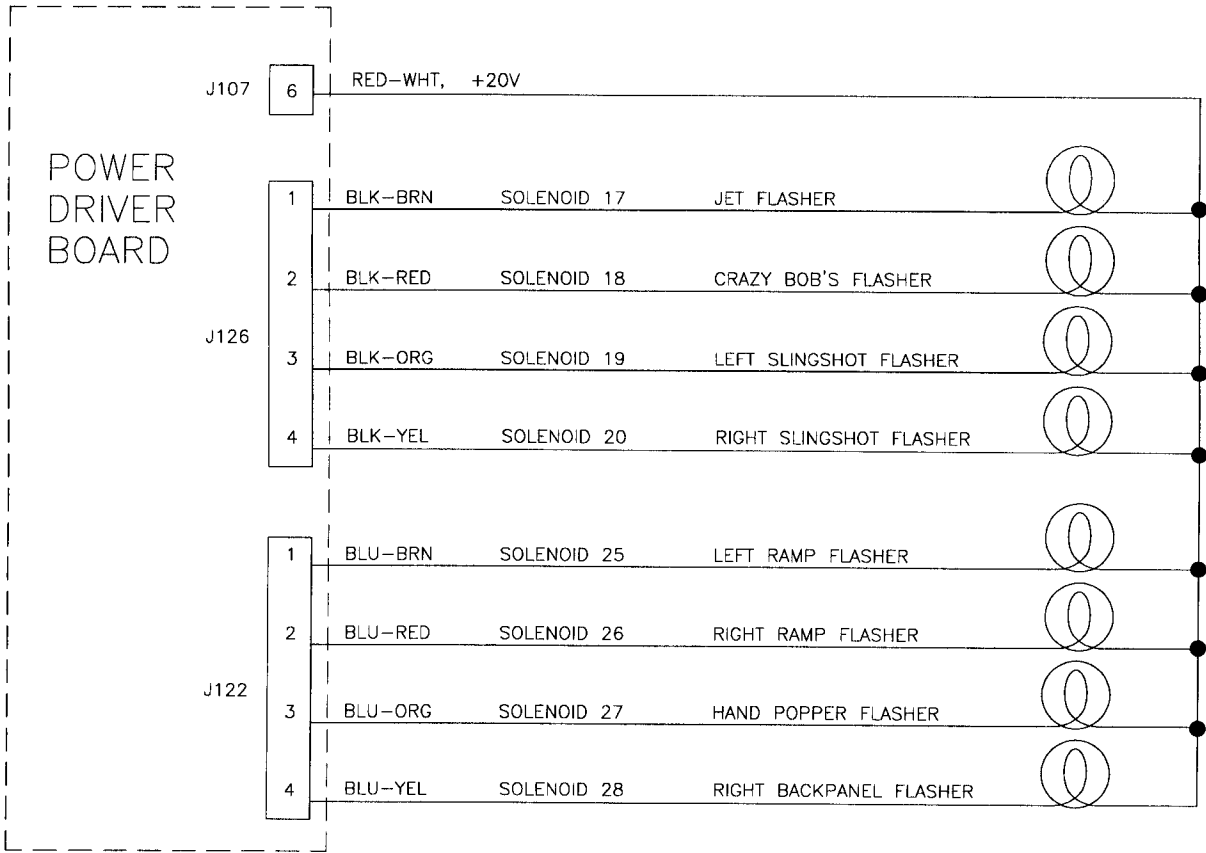
\*\* A-20532 IS THE PART NUMBER FOR THE DUAL RELAY MOTOR DRIVER BOARD.

# SOLENOID WIRING

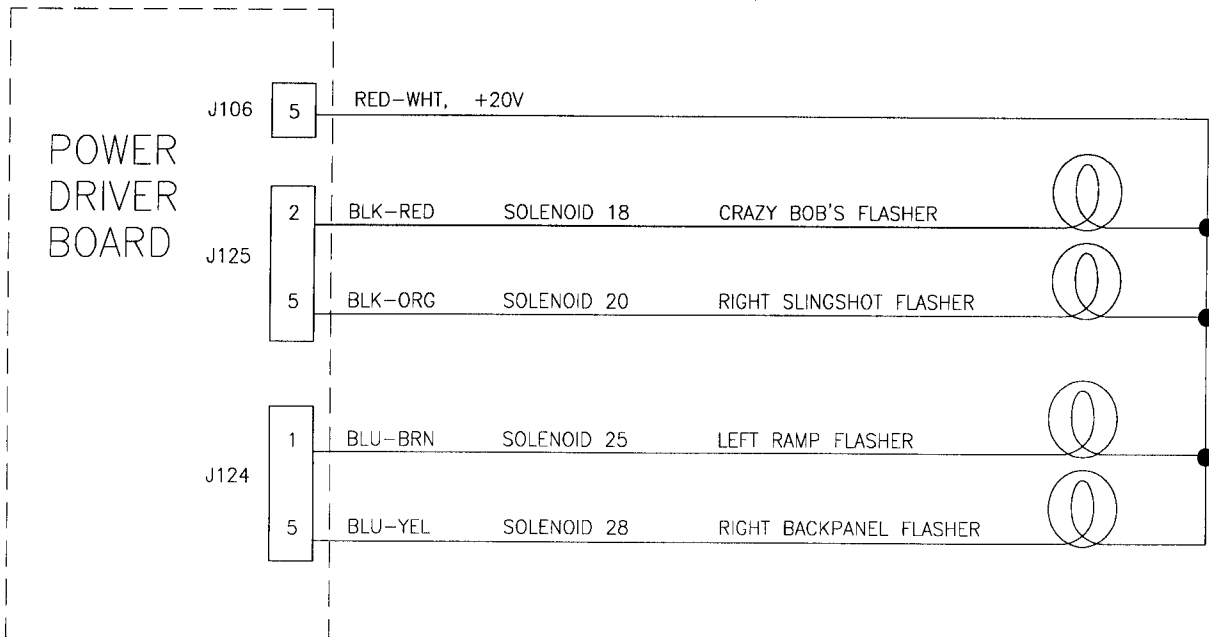
## COILS AND MOTORS



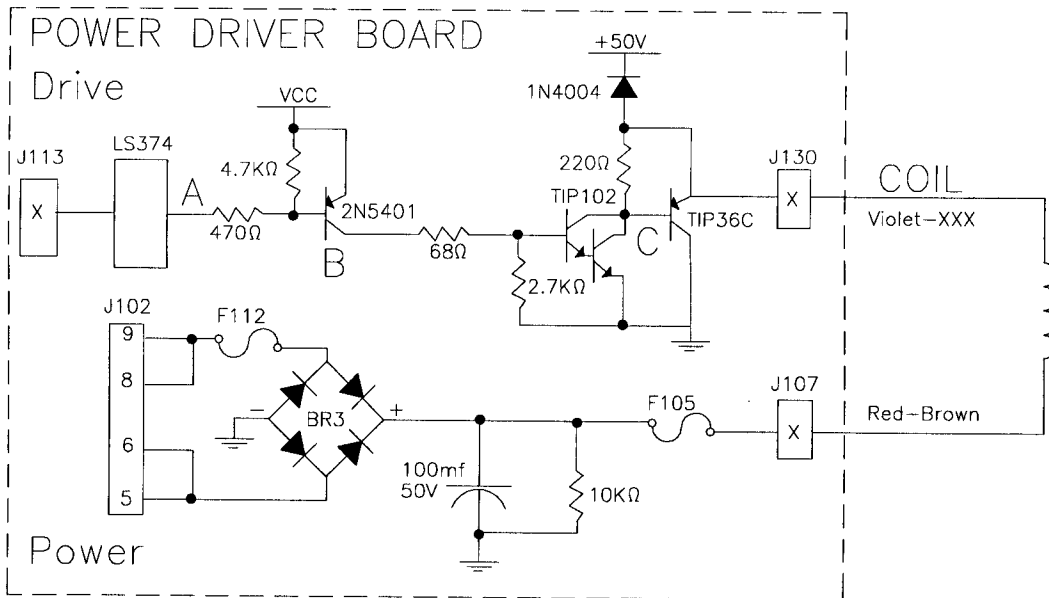
**PLAYFIELD FLASHLAMPS**



**BACKBOX FLASHLAMPS**

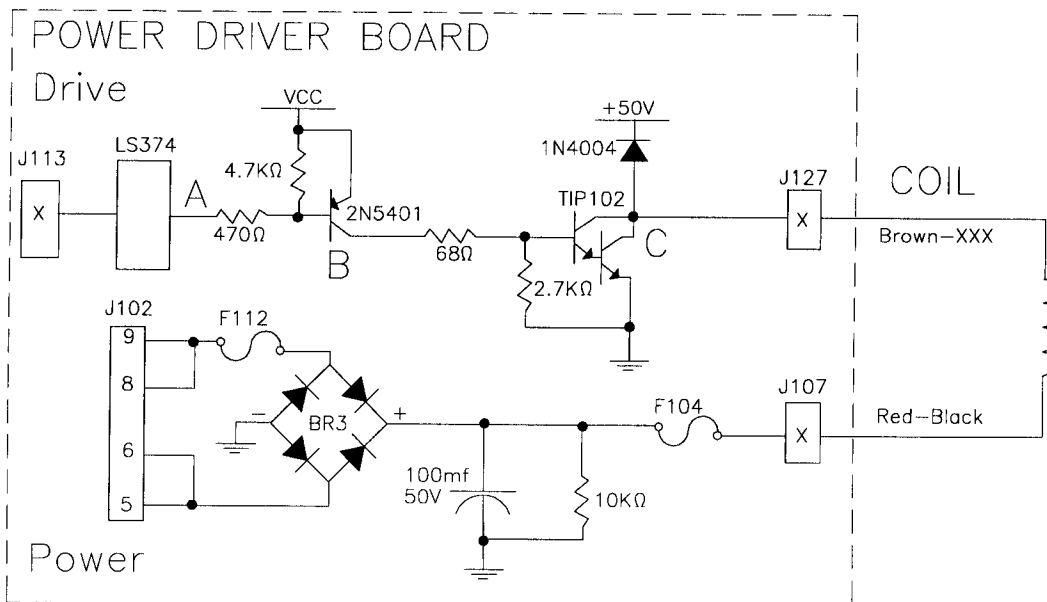


## HIGH POWER SOLENOID CIRCUIT



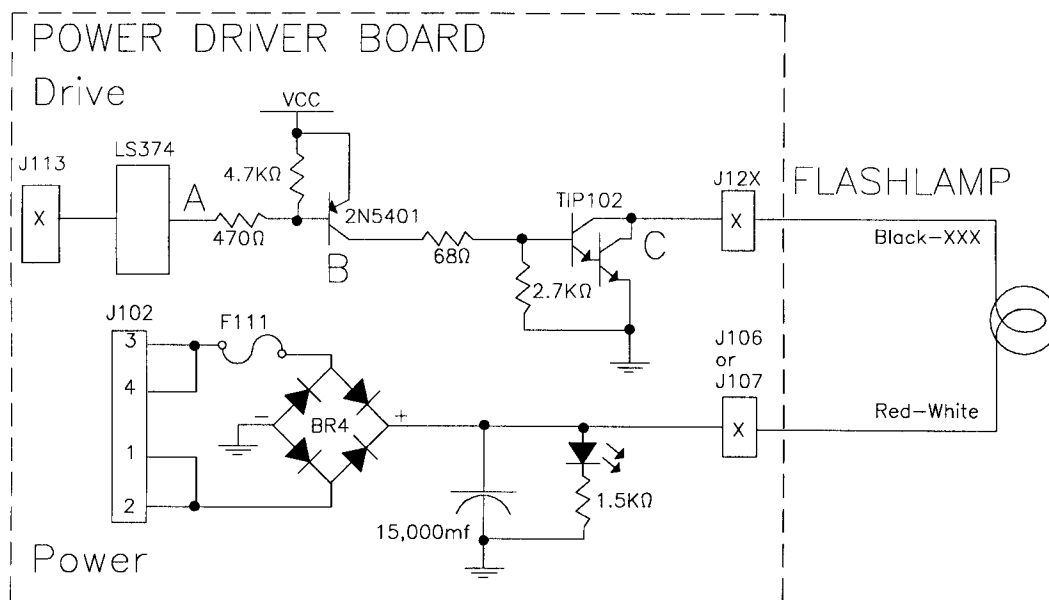
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is high. A high at point "B" causes point "C", the collector of the TIP102 transistor and point "D", the emitter of the TIP36C transistor, to drop low. When point "D" is low, the coil is grounded through the transistor and turns on. The coil shuts off when point "A" toggles high.

## LOW POWER SOLENOID CIRCUIT



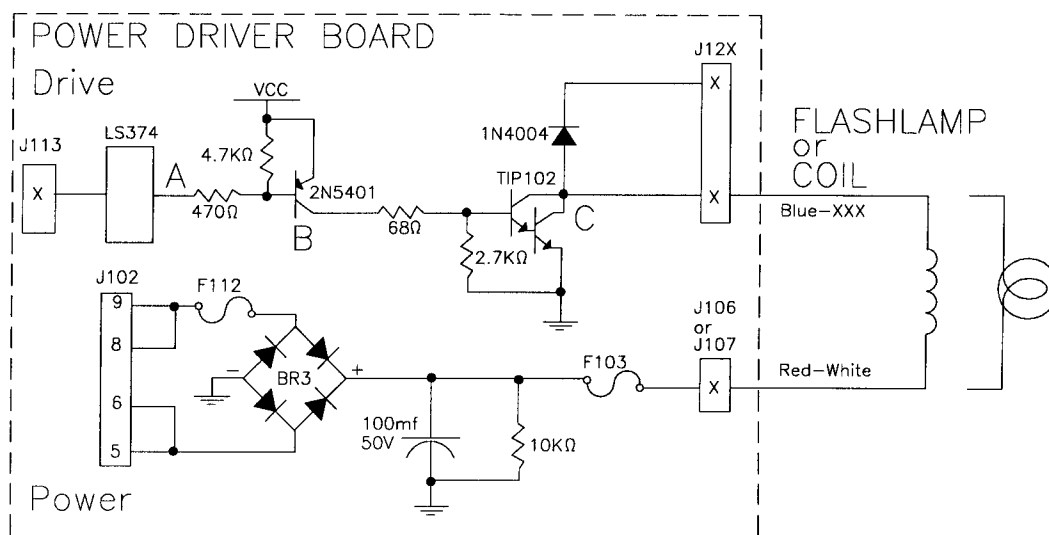
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is high. A high at point "B" turns on the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and turns on. The coil shuts off when point "A" toggles high.

## FLASHLAMP CIRCUIT



The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor, is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When point "C" is low, the flashlamp is grounded through the transistor and turns on. When point "A" toggles high, the current shuts off.

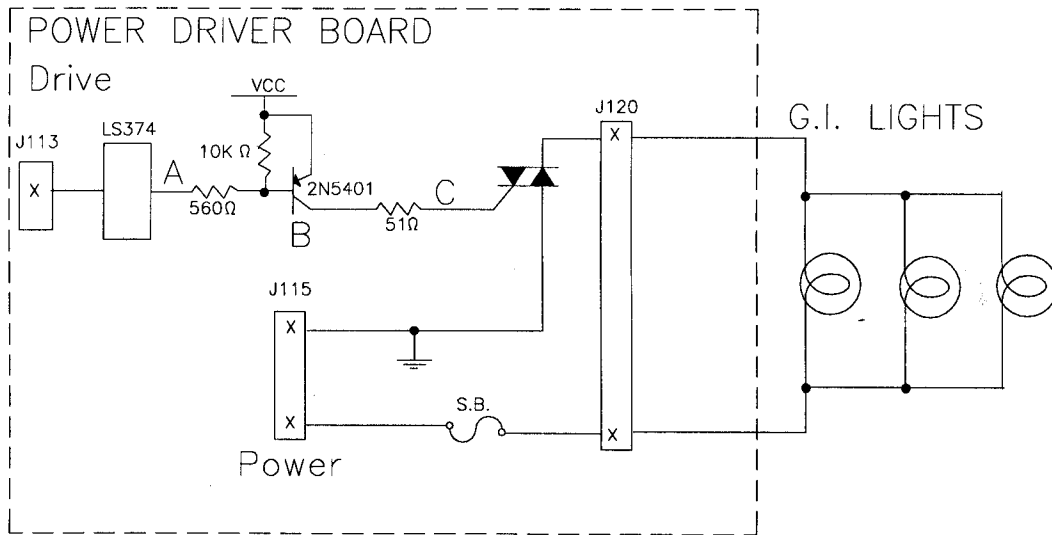
## SPECIAL (GENERAL PURPOSE) SOLENOID CIRCUIT



The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor, is high. A high at point "B" causes a low at point "C". When point "C" is low, the coil/flashlamp is grounded through the transistor and turns on. When point "A" toggles high the coil/flashlamp turns off.

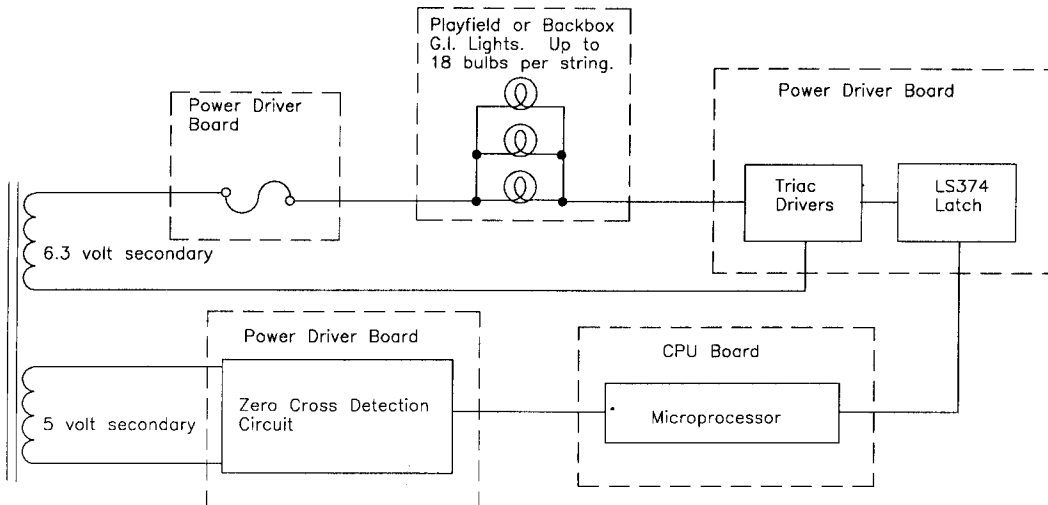
\* Tieback diode is not used for flashlamp circuit.

## GENERAL ILLUMINATION CIRCUIT

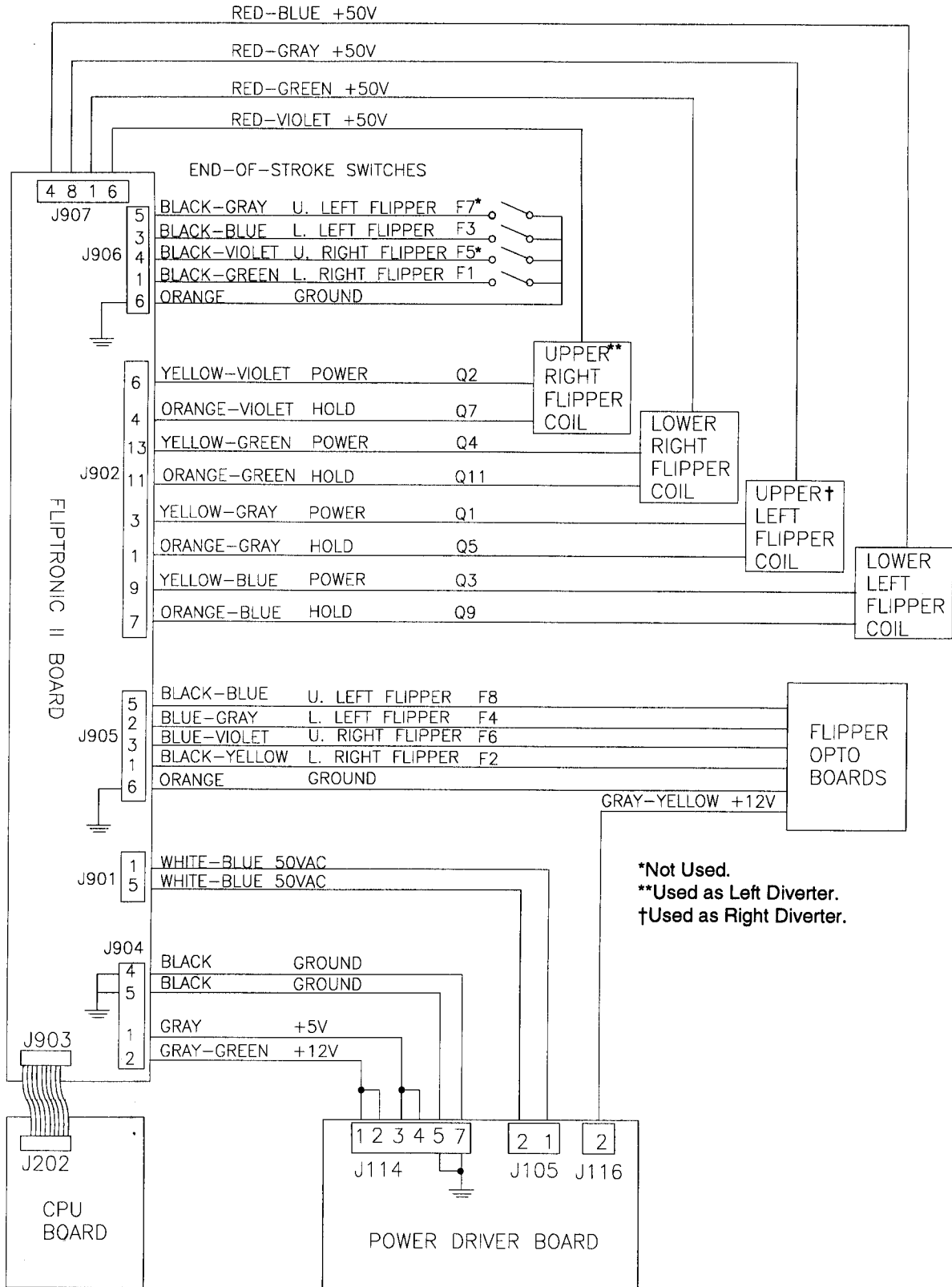


When point "A" toggles low, points, "B" and "C" are high. This turns on the triac and the desired general illumination string of lights.

## BLOCK DIAGRAM OF GENERAL ILLUMINATION CIRCUIT

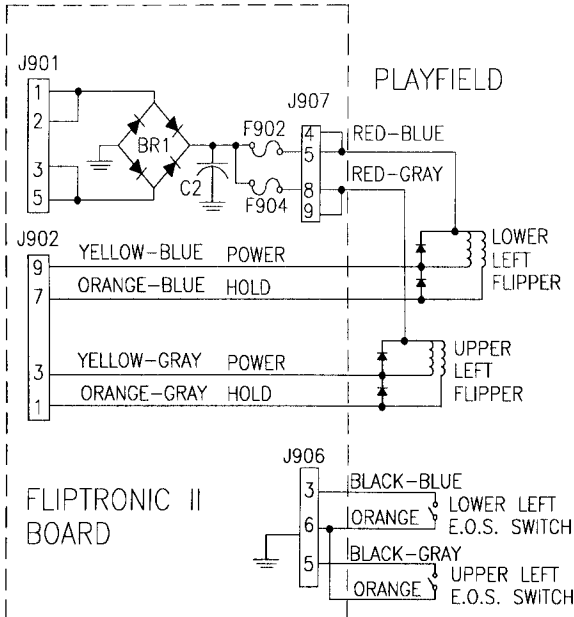


# FLIPPER CIRCUIT DIAGRAM

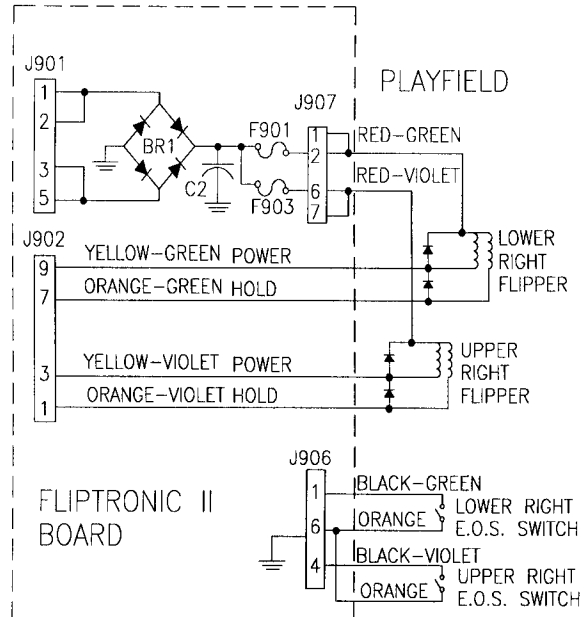


# FLIPPER COIL CIRCUITS

## LEFT FLIPPER CIRCUIT

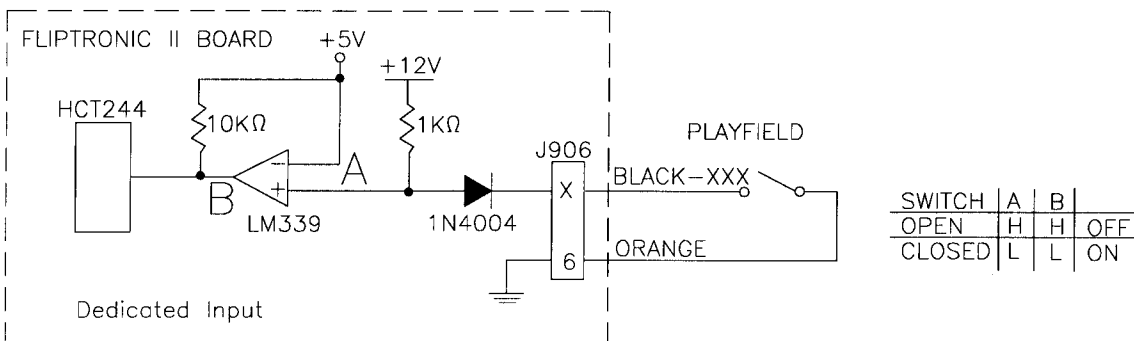
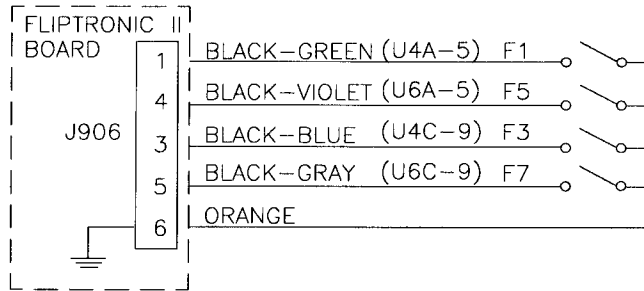


## RIGHT FLIPPER CIRCUIT



# FLIPPER END-OF-STROKE SWITCH CIRCUIT

- F1 LOWER RIGHT FLIPPER
- F5 UPPER RIGHT FLIPPER
- F3 LOWER LEFT FLIPPER
- F7 UPPER LEFT FLIPPER

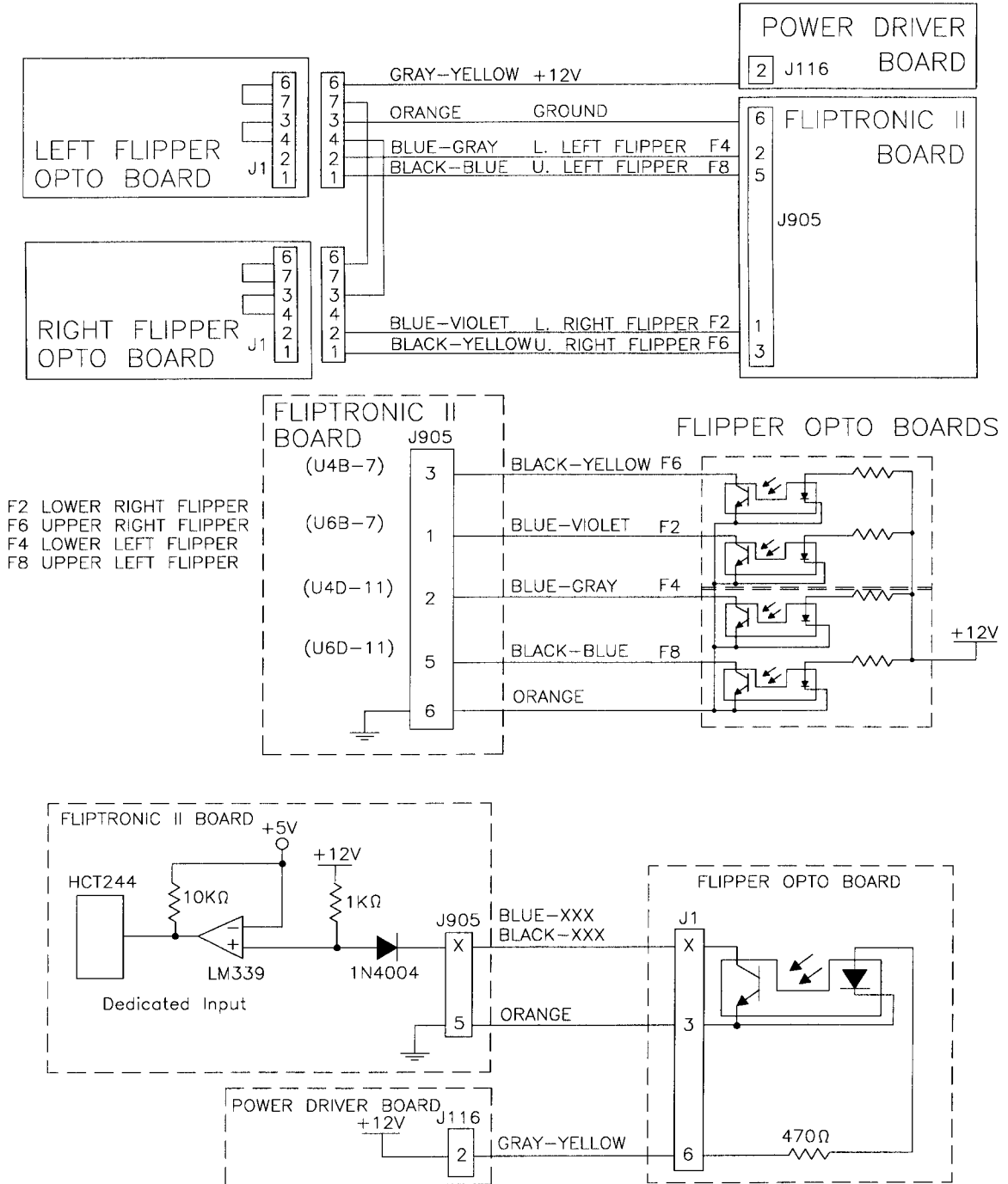


The flipper E.O.S. circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

When a switch closes, the row side, (dedicated input), of the circuit activates. The "+" input of the LM339 drops below +5V therefore its output is low. Since the row (dedicated input), circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row (dedicated input) is inactive.



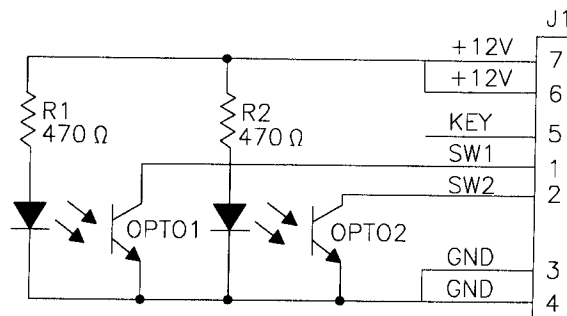
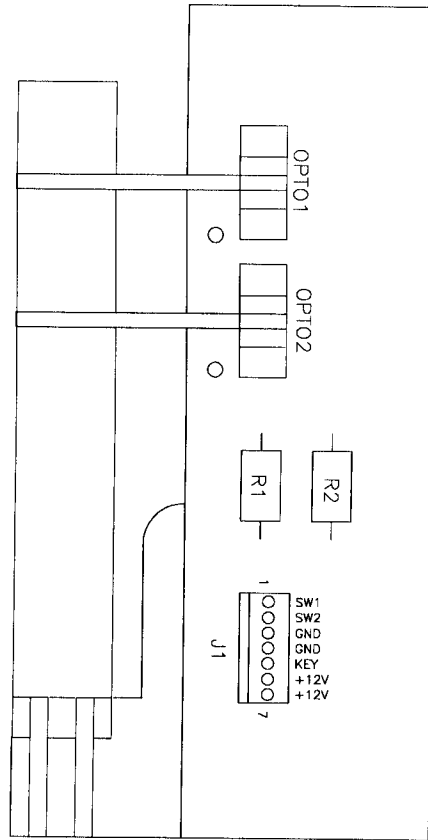
# FLIPPER CABINET SWITCH CIRCUIT



The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch circuit.

When a switch closes, the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V, therefore, its output is low. Since the row, (dedicated input) circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row, (dedicated Input) is inactive.

## FLIPPER OPTO BOARD ASSEMBLY A-17316



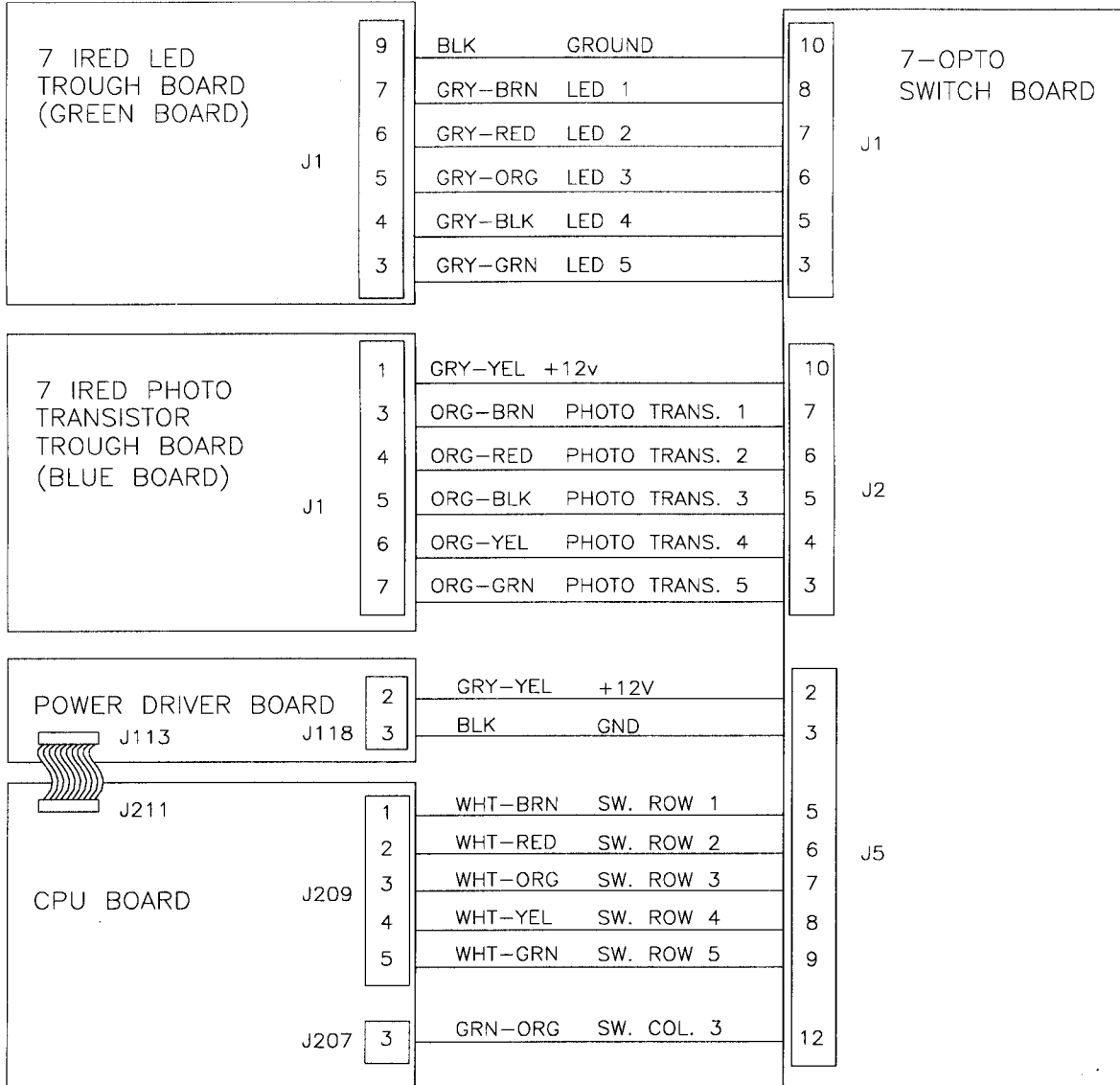
### Left Flipper Opto Board Assembly

- J1-1 Black-Blue from Fliptronic II Board J905-5
- J1-2 Blue-Gray from Fliptronic II Board J905-2
- J1-3 N/C
- J1-4 Orange from Fliptronic II Board J905-6
- J1-5 N/C
- J1-6 Gray-Yellow from Power Driver Board J116-2
- J1-7 Gray-Yellow from Power Driver Board J116-2

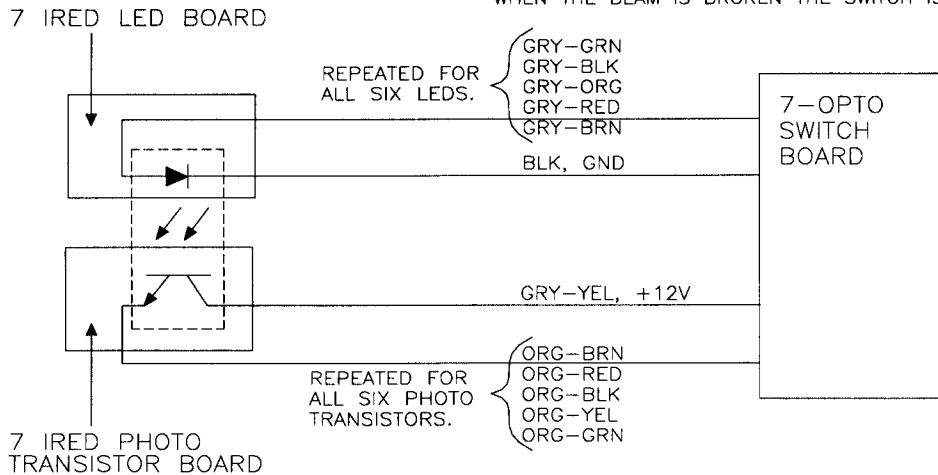
### Right Flipper Opto Board Assembly

- J1-1 Black-Yellow from Fliptronic II Board J905-1
- J1-2 Blue-Violet from Fliptronic II Board J905-3
- J1-3 Orange from Fliptronic II Board J905-6
- J1-4 Orange from Left Flipper Opto Board Assy J1-4
- J1-5 N/C
- J1-6 Gray-Yellow from Left Flipper Opto Board Assy J1-6
- J1-7 N/C

## OUTHOLE TROUGH BLOCK DIAGRAM

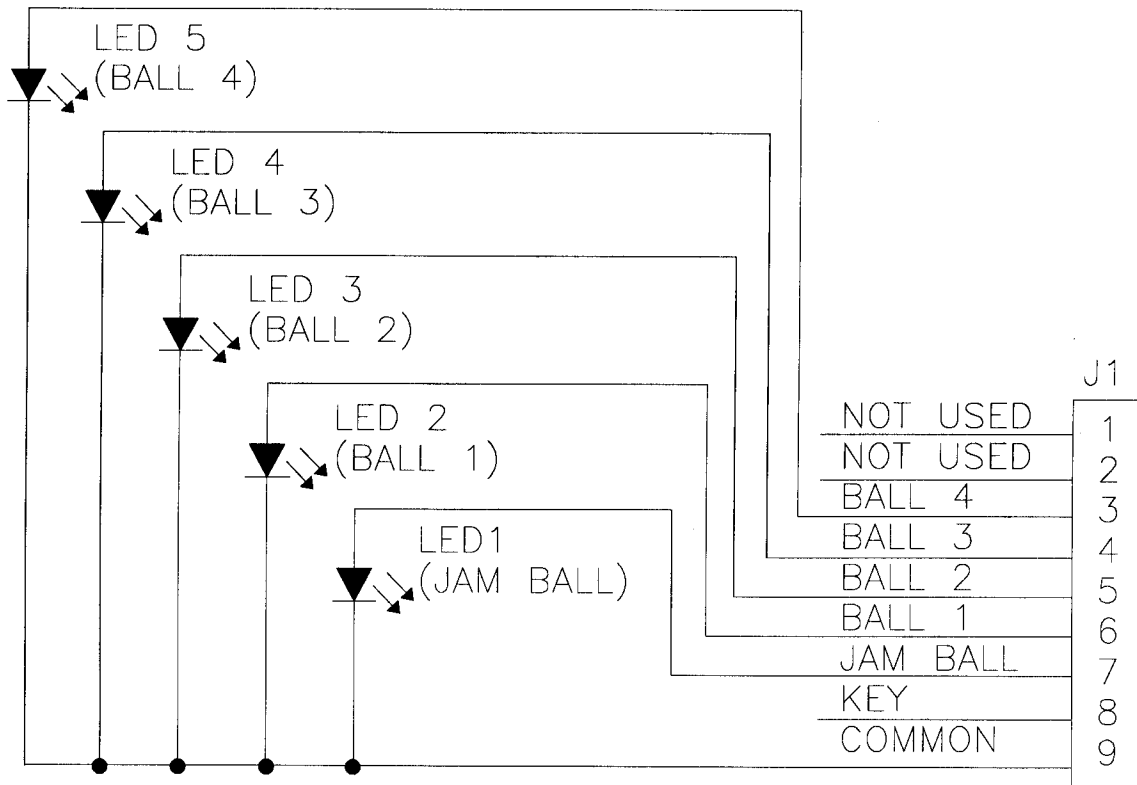
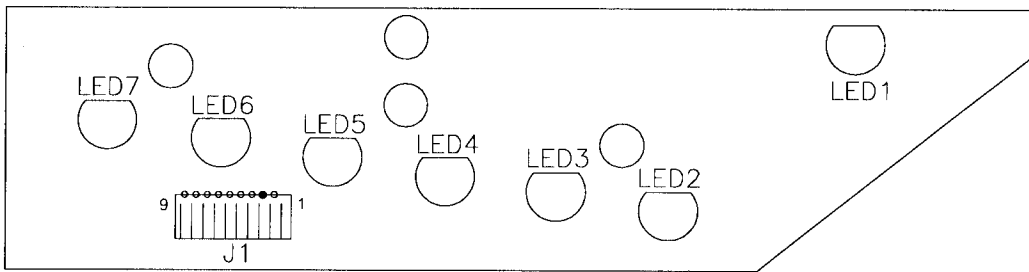


THE BALL ROLLS BETWEEN THE LED BOARD AND THE PHOTO TRANSISTOR BOARD BREAKING THE BEAM. WHEN THE BEAM IS BROKEN THE SWITCH IS MADE.



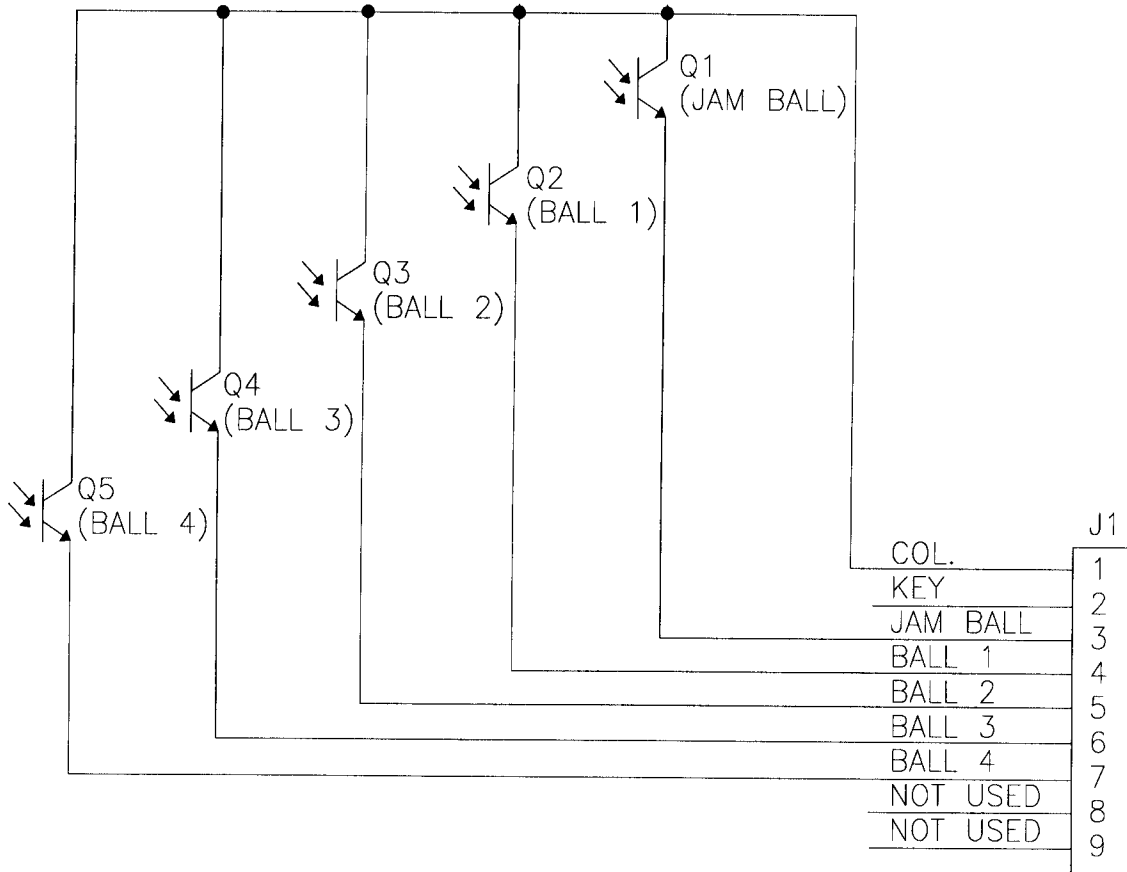
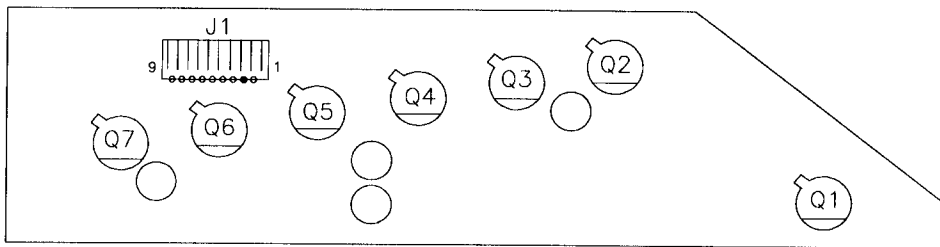
**TROUGH IRED LED BOARD ASSEMBLY**  
**A-18617-1**  
**(TRANSMITTER-GREEN BOARD)**

- J1-1 Not Used
- J1-2 Not Used
- J1-3 Gray-Green, from 7-Opto Switch Board J1-3
- J1-4 Gray-Black, from 7-Opto Switch Board J1-5
- J1-5 Gray-Orange, from 7-Opto Switch Board J1-6
- J1-6 Gray-Red, from 7-Opto Switch Board J1-7
- J1-7 Gray-Brown, from 7-Opto Switch Board J1-8
- J1-8 Key
- J1-9 Black, ground, from 7-Opto Switch Board J1-10

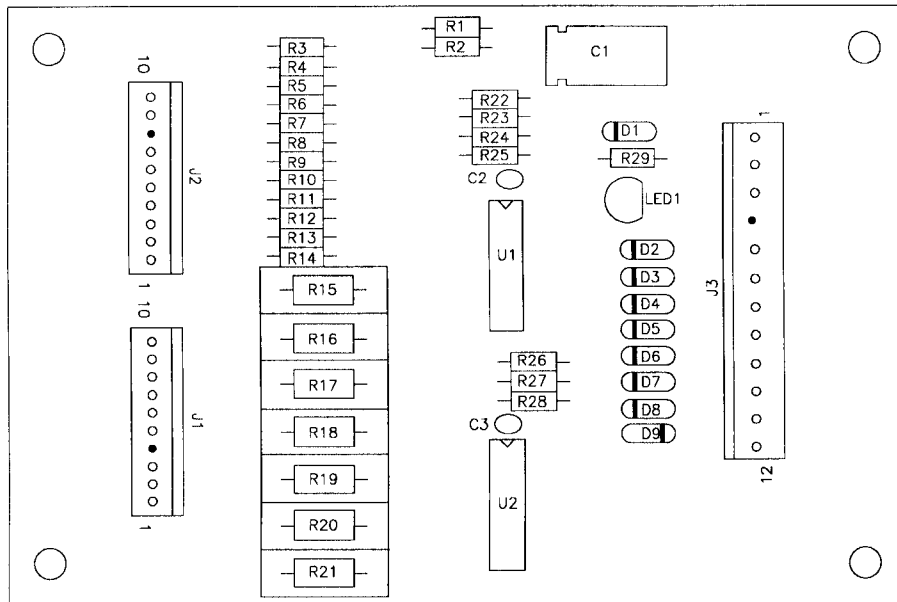


**TROUGH IRED PHOTO TRANSISTOR BOARD ASSEMBLY**  
**A-18618-1**  
**(RECEIVER-BLUE BOARD)**

- J1-1 Gray-Yellow, +12V, from 7-Opto Switch Board J2-10
- J1-2 Key
- J1-3 Orange-Brown, from 7-Opto Switch Board J2-7
- J1-4 Orange-Red, from 7-Opto Switch Board J2-6
- J1-5 Orange-Black, from 7-Opto Switch Board J2-5
- J1-6 Orange-Yellow, from 7-Opto Switch Board J2-4
- J1-7 Orange-Green, from to 7-Opto Switch Board J2-3
- J1-8 Not Used
- J1-9 Not Used

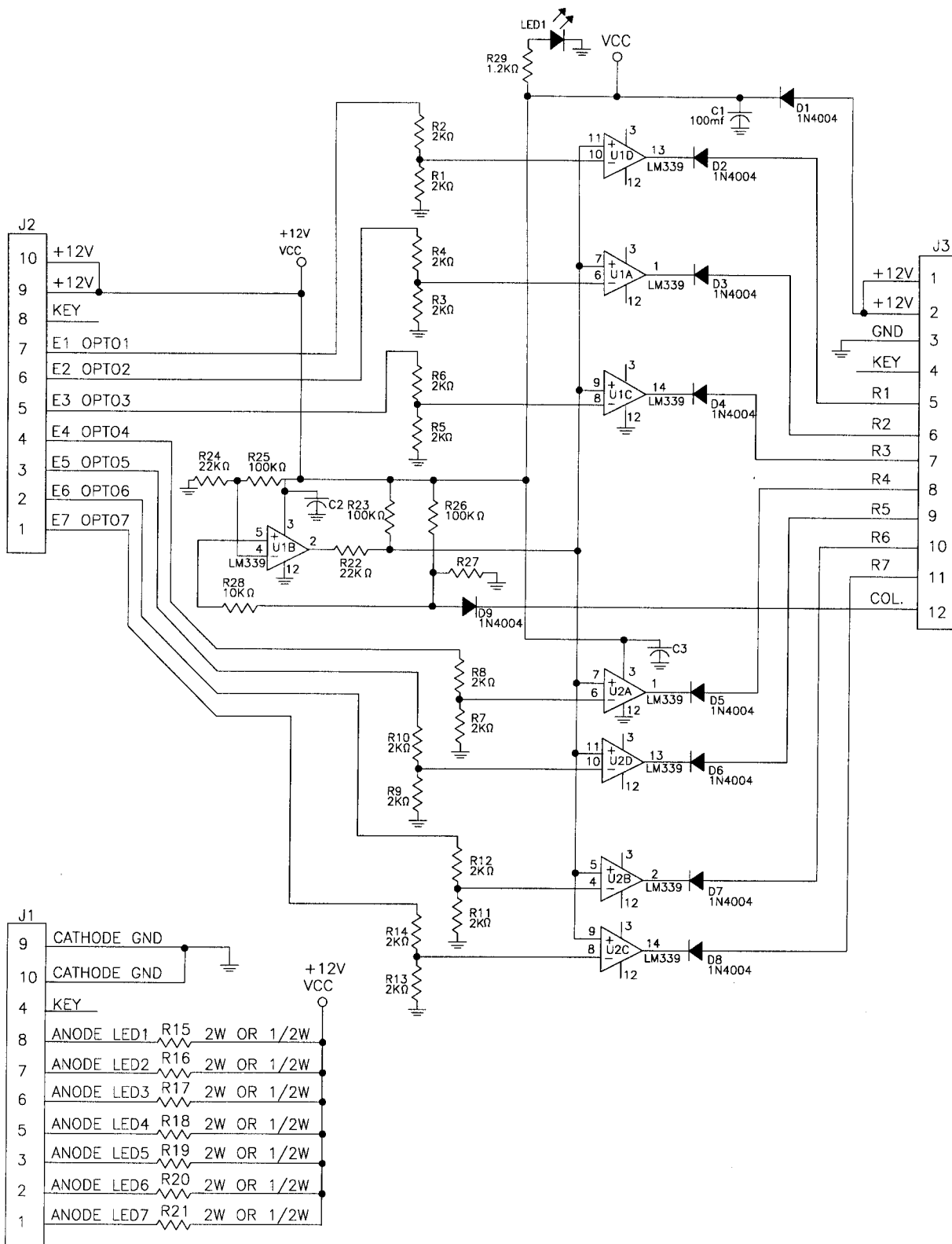


## 7-OPTO SWITCH BOARD & BRACKET ASSEMBLY A-15595



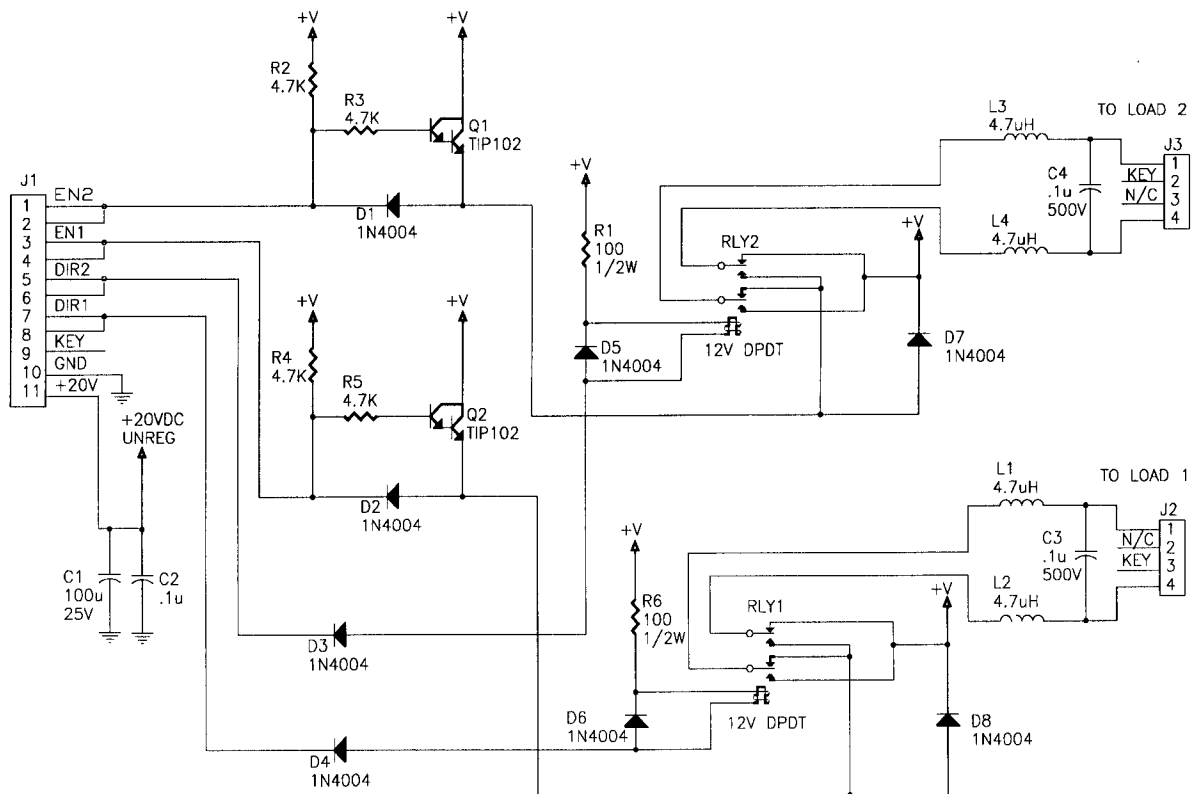
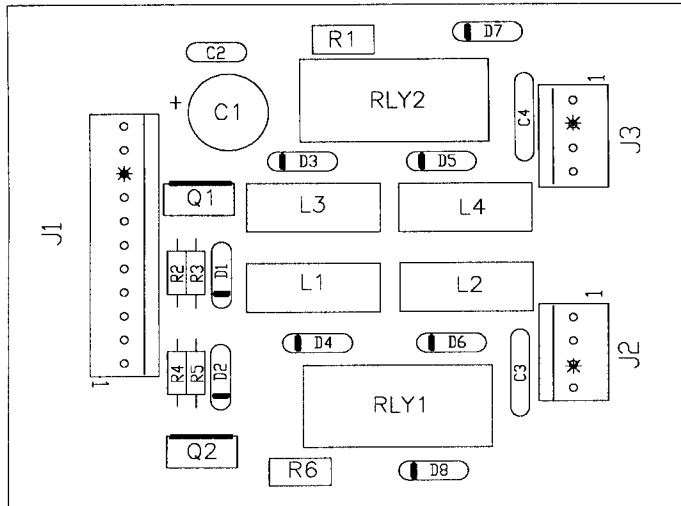
- J1-1** Not Used
- J1-2** Gray-Blue, to switch #36, Ball Popper 1, LED board
- J1-3** Gray-Green, to LED Trough board J1-3
- J1-4** Key
- J1-5** Gray-Black, to LED Trough board J1-4
- J1-6** Gray-Orange, to LED Trough board J1-5
- J1-7** Gray-Red, to LED Trough board J1-6
- J1-8** Gray-Brown, to LED Trough board J1-7
- J1-9** Not Used
- J1-10** Black, Ground, to LED Trough board J1-9
  
- J2-1** Not Used
- J2-2** Orange-Blue, to switch #36, Ball Popper 1, Photo Trans. board
- J2-3** Orange-Green, to Photo Transistor Trough board J1-7
- J2-4** Orange-Yellow, to Photo Transistor Trough board J1-6
- J2-5** Orange-Black, to Photo Transistor Trough board J1-5
- J2-6** Orange-Red, to Photo Transistor Trough board J1-4
- J2-7** Orange-Brown, to Photo Transistor Trough board J1-3
- J2-8** Key
- J2-9** Not Used
- J2-10** Gray-Yellow, +12V, to Photo Transistor Trough board J1-1
  
- J3-1** Not Used
- J3-2** Gray-Yellow, +12V, from Power Driver board J118-2
- J3-3** Black, Ground, from Power Driver board J118-3
- J3-4** Key
- J3-5** White-Brown, switch row 1, from CPU board J209-1
- J3-6** White-Red, switch row 2, from CPU board J209-2
- J3-7** White-Orange, switch row 3, from CPU board J209-3
- J3-8** White-Yellow, switch row 4, from CPU board J209-4
- J3-9** White-Green, switch row 5, from CPU board J209-5
- J3-10** White-Blue, switch row 6, from CPU board J209-7
- J3-11** Not Used
- J3-12** Green-Orange, switch column 3, from CPU board J207-3

# 7-OPTO SWITCH BOARD SCHEMATIC A-15595



## DUAL RELAY MOTOR DRIVER ASSEMBLY A-20532

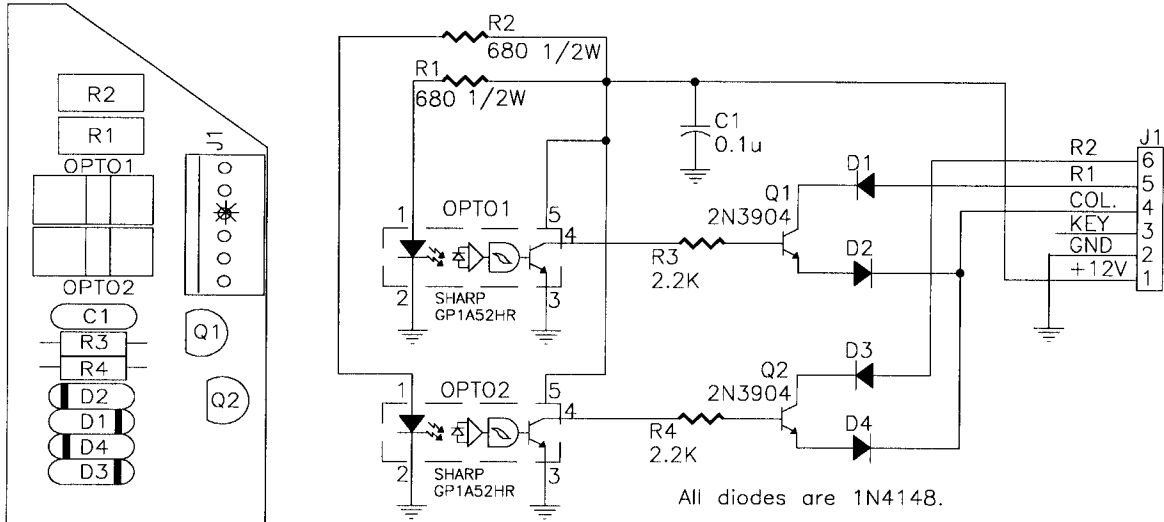
- |  |   |
|--|---|
| <p><b>J1-1</b> Blue-Gray, sol. #24 Y Motor Enable, from Pwr Dvr Brd J126-8</p> <p><b>J1-2</b> Blue-Gray, loop from J1-1</p> <p><b>J1-3</b> Blue-Black, sol. #22 X Motor Enable, from Pwr Dvr Brd J126-6</p> <p><b>J1-4</b> Blue-Black, loop from J1-3</p> <p><b>J1-5</b> Blue-Violet, sol. #23 Y Motor Direction, from Pwr Dvr Brd J126-7</p> <p><b>J1-6</b> Blue-Violet, loop from J1-5</p> <p><b>J1-7</b> Blue-Green, sol. #21 X Motor Direction, from Pwr Dvr Brd J126-5</p> <p><b>J1-8</b> Blue-Green, loop from J1-7</p> <p><b>J1-9</b> Key</p> <p><b>J1-10</b> Black, ground from Pwr Dvr Brd J118-3</p> <p><b>J1-11</b> Red-White, +20V from Pwr Dvr Brd J107-6</p> | <p><b>J2-1</b> Blue-Green, to Load 1 (moves hand left &amp; right)</p> <p><b>J2-2</b> Not Used</p> <p><b>J2-3</b> Key</p> <p><b>J2-4</b> Red-Green, to Load 1 (moves hand left &amp; right)</p> <p><b>J3-1</b> Red-Violet, to Load 2 (moves hand in &amp; out)</p> <p><b>J3-2</b> Key</p> <p><b>J3-3</b> Not Used</p> <p><b>J3-4</b> Blue-Violet, to Load 2 (moves hand in &amp; out)</p> |
|--|---|



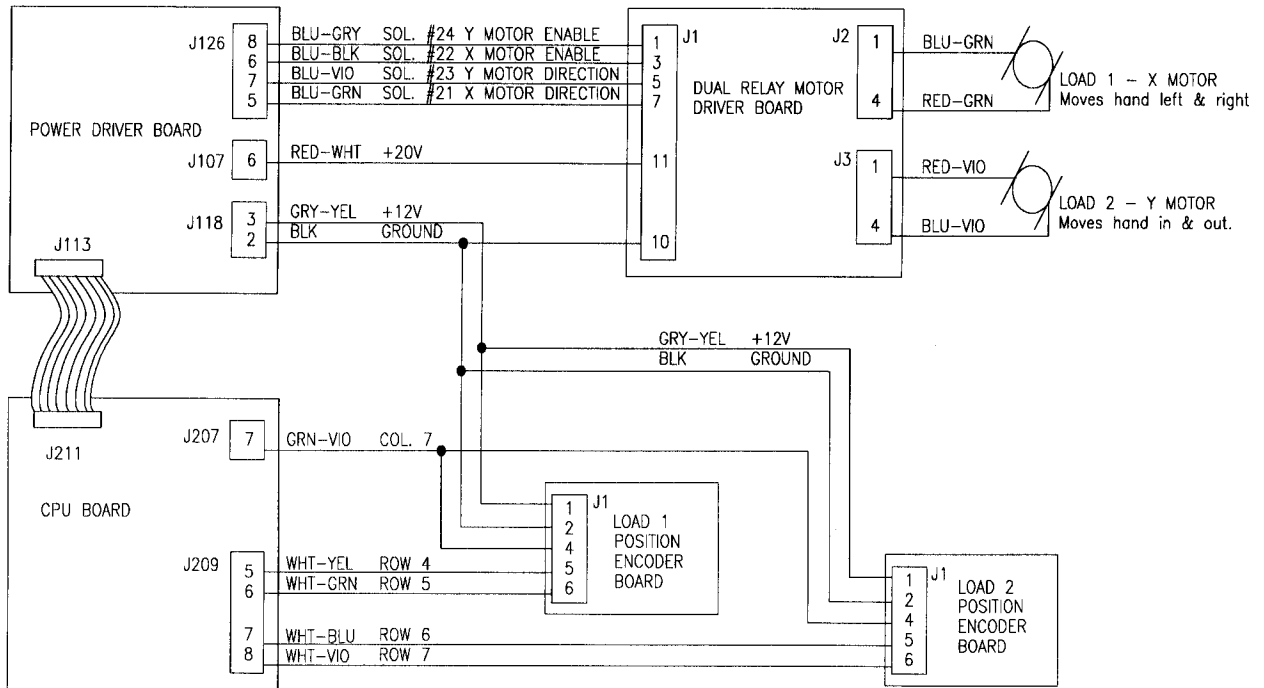


# POSITION ENCODER BOARD ASSEMBLY A-20533

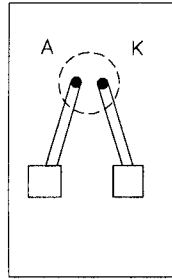
- |   |  |
|---|--|
| <p><b>Load 1</b><br/>(moves hand left and right)</p> <ul style="list-style-type: none"> <li><b>J1-1</b> Gray-Yellow, +12V</li> <li><b>J1-2</b> Black, ground</li> <li><b>J1-3</b> Key</li> <li><b>J1-4</b> Green-Violet, sw. col. 7</li> <li><b>J1-5</b> White-Yellow, sw. row 4</li> <li><b>J1-6</b> White-Green, sw. row 5</li> </ul> | <p><b>Load 2</b><br/>(moves hand in and out)</p> <ul style="list-style-type: none"> <li><b>J1-1</b> Gray-Yellow, +12V</li> <li><b>J1-2</b> Black, ground</li> <li><b>J1-3</b> Key</li> <li><b>J1-4</b> Green-Violet, sw. col. 7</li> <li><b>J1-5</b> White-Blue, sw. row 6</li> <li><b>J1-6</b> White-Violet, sw. row 7</li> </ul> |
|---|--|



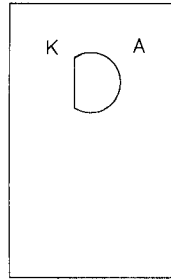
## HAND MOTORS CIRCUIT



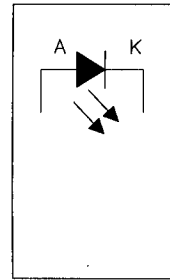
**LED BOARD ASSEMBLY  
A-16908  
(TRANSMITTER-GREEN BOARD)**



solder side

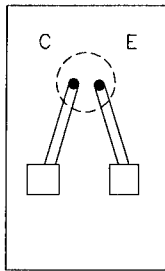


component side

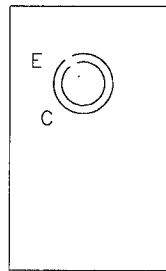


schematic

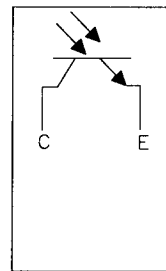
**PHOTO TRANSISTOR BOARD ASSEMBLY  
A-16909  
(RECEIVER-BLUE BOARD)**



solder side



component side



schematic

**TYPICAL CIRCUIT DIAGRAM**

LED BOARD  
Transmitter  
1.0-1.4 volts

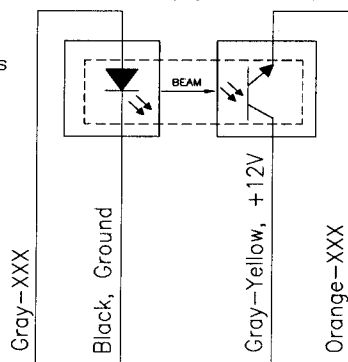
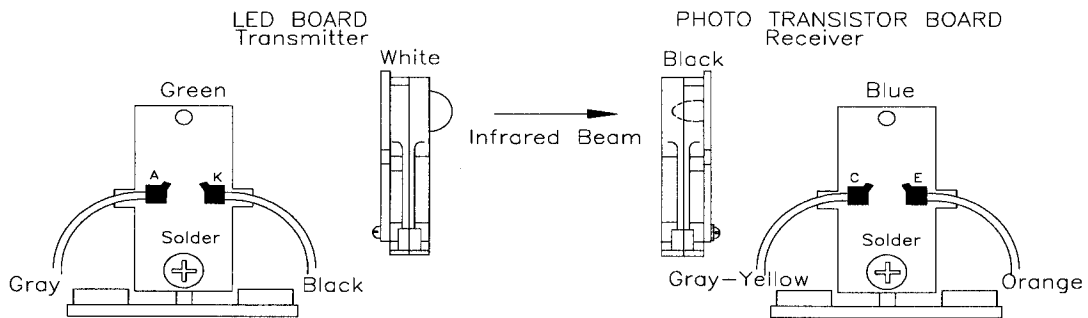
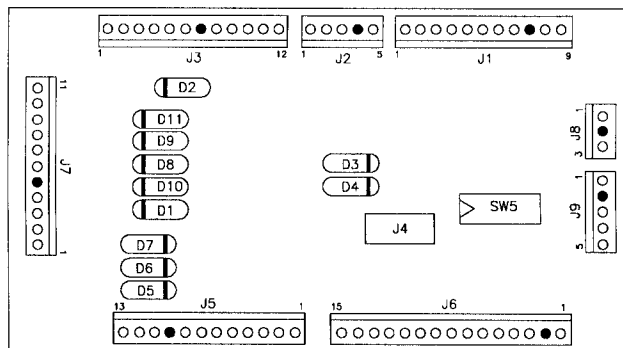


PHOTO TRANSISTOR BOARD  
Receiver  
0.1-0.7 volts unblocked  
11-13 volts blocked



## Coin Door Interface Board A-17051-1



J1-1 Orange-Gray, ded. switch row 8 from CPU J205-9  
 J1-2 Orange-Violet, ded. switch row 7 from CPU J205-8  
 J1-3 Orange-Blue, ded. switch row 6 from CPU J205-7  
 J1-4 Orange-Green, ded. switch row 5 from CPU J205-6  
 J1-5 Orange-Yellow, ded. switch row 4 from CPU J205-4  
 J1-6 Orange-Black, ded. switch row 3 from CPU J205-3  
 J1-7 Orange-Red, ded. switch row 2 from CPU J205-2  
 J1-8 Orange-Brown, ded. switch row 1 from CPU J205-1  
 J1-9 Key  
 J1-10 Black, ground from CPU J205-10  
 J1-11 Orange-White, switch enable from CPU J205-12

J2-1 Black, ground from Power Driver Board J116-3  
 J2-2 Gray-Yellow, +12vac for Power Driver Board J116-2  
 J2-3 White-Violet, G.I. 6.8vac from Power Driver J119-1  
 J2-4 Key  
 J2-5 Violet, G.I. from Power Driver Board J119-3

J3-1 Green-Brown, switch column. 1 from CPU J212-1  
 J3-2 Green-Red, switch column 2 from CPU J212-2  
 J3-3 White-Brown, switch row 1 from CPU J212-4  
 J3-4 White-Red, switch row 2 from CPU J212-6  
 J3-5 White-Orange, switch row 3 from CPU J212-7  
 J3-6 White-Yellow, switch row 4 from CPU J212-8  
 J3-7 Key  
 J3-8 Yellow-Gray, lamp col. 8 from Power Driver J136-3  
 J3-9 Red-Blue, lamp row 6 from Power Driver J135-7  
 J3-10 Red-Violet, lamp row 7 from Power Driver J135-8  
 J3-11 Red-Gray, lamp row 8 from Power Driver J135-9

J4- Not Used

J5-1 Violet, G.I. return to coin door  
 J5-2 White-Violet, G.I. 6.8vac to coin door  
 J5-3 Black, ground to coin door  
 J5-4 Orange-Brown, ded. switch row 1 to coin door  
 J5-5 Orange-Red, ded. switch row 2 to coin door  
 J5-6 N/C  
 J5-7 Orange-Green, ded. switch row 5 to coin door  
 J5-8 Orange-Blue, ded. switch row 6 to coin door  
 J5-9 Orange-Violet, ded. switch row 7 to coin door  
 J5-10 Key  
 J5-11 Orange-Gray, ded. switch row 8 to coin door  
 J5-12 Green-Red, switch column 2 to coin door Slam Tilt  
 J5-13 White-Brown, switch row 1 to coin door Slam Tilt

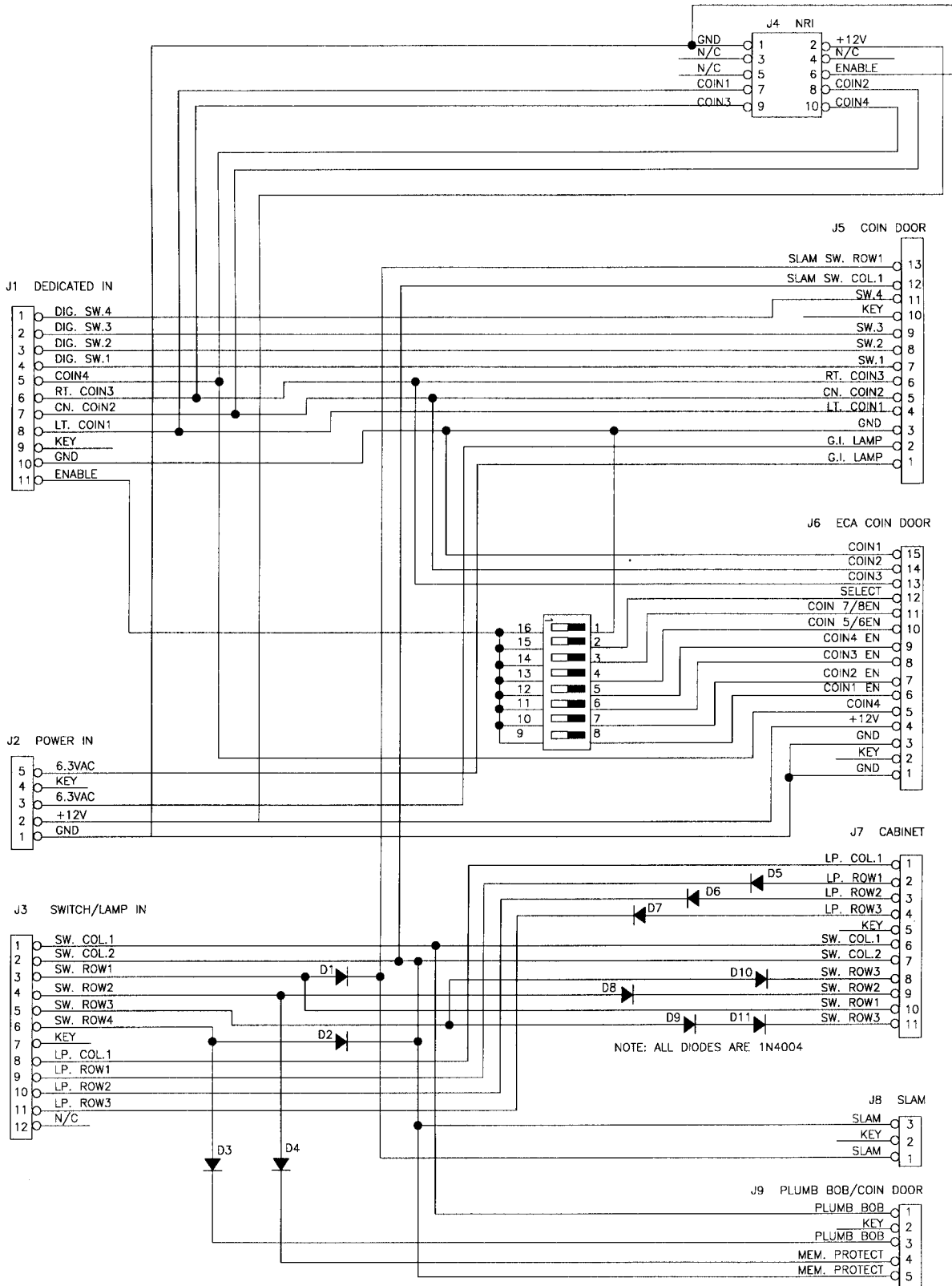
J6- Not Used

J7-1 Yellow-Gray, lamp column 8 to cabinet  
 J7-2 Red-Blue, lamp column 6 to cabinet  
 J7-3 Red-Violet, lamp row 7 to cabinet  
 J7-4 Red-Gray, lamp row 8 to cabinet  
 J7-5 Key  
 J7-6 Green-Brown, switch column 1 to cabinet  
 J7-7 Green-Red, switch column 2 to cabinet  
 J7-8 White-Orange, switch row 3 to cabinet  
 J7-9 N/C  
 J7-10 White-Brown, switch row 1 to cabinet  
 J7-11 White-Orange, switch row 3 to cabinet

J8-1 White, switch row to cabinet Slam Tilt  
 J8-2 Key  
 J8-3 Green, switch column to cabinet Slam Tilt

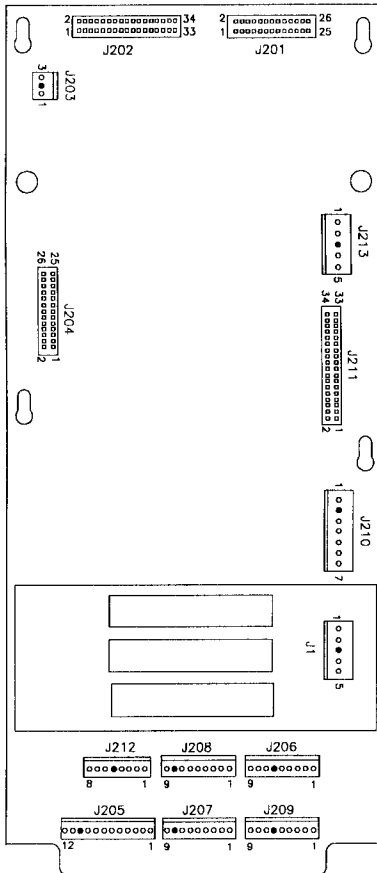
J9-1 White-Yellow, switch row 4 to Plumb Bob Tilt  
 J9-2 Key  
 J9-3 Green-Brown, switch column 1 to Plumb Bob Tilt  
 J9-4 White-Red, switch row 2 to Interlock Switch  
 J9-5 Green-Red, switch column 2 to Interlock Switch

# Coin Door Interface Board Schematic A-17051-1



# Security CPU Board Assembly

## A-17651-50042



J201, 26-pin ribbon cable, data to/from J602

J202, 34-pin ribbon cable, data to/from J903; P1; J601

J203- Not Used

J204- Not Used

J205-1 Orange-Brown, ded. sw. row 1, to Coin Door Brd J1-8

J205-2 Orange-Red, ded. sw. row 2, to Coin Door Brd J1-7

J205-3 Orange-Black, ded. sw. row 3, to Coin Door Brd J1-6

J205-4 Orange-Yellow, ded. sw. row 4, to Coin Door Brd J1-5

J205-5 Key

J205-6 Orange-Green, ded. sw. row 5, to Coin Door Brd J1-4

J205-7 Orange-Blue, ded. sw. row 6, to Coin Door Brd J1-3

J205-8 Orange-Violet, ded. sw. row 7, to Coin Door Brd J1-2

J205-9 Orange-Gray, ded. sw. row 8, to Coin Door Brd J1-1

J205-10 Black, ground, to Coin Door Brd J1-10

J205-11 N/C

J205-12 Orange-White, switch enable, to Coin Door Brd J1-11

J206-1 White-Brown, switch row 1, to playfield switches

J206-2 White-Red, switch row 2, to playfield switches

J206-3 White-Orange, switch row 3, to playfield switches

J206-4 White-Yellow, switch row 4, to playfield switches

J206-5 White-Green, switch row 5, to playfield switches

J206-6 Key

J206-7 White-Blue, switch row 6, to playfield switches

J206-8 White-Violet, switch row 7, to playfield switches

J206-9 White-Gray, switch row 8, to playfield switches

J207-1 N/C  
 J207-2 N/C  
 J207-3 N/C  
 J207-4 N/C  
 J207-5 n/C  
 J207-6 Green-Blue, switch column 6, to cabinet switches  
 J207-7 N/C  
 J207-8 Key  
 J207-9 N/C

J208-1 Green-Brown, switch column 1, to playfield switches

J208-2 Green-Red, switch column 2, to playfield switches

J208-3 Green-Orange, switch column 3, to playfield switches

J208-4 Green-Yellow, switch column 4, to playfield switches

J208-5 Green-Black, switch column 5, to playfield switches

J208-6 Green-Blue, switch column 6, to playfield switches

J208-7 Green-Violet, switch column 7 to playfield switches

J208-8 Key

J208-9 N/C

J209-1 N/C

J209-2 N/C

J209-3 N/C

J209-4 N/C

J209-5 N/C

J209-6 Key

J209-7 N/C

J209-8 White-Violet, switch row 7, to cabinet switch

J209-9 White-Gray, switch row 8, to cabinet switch

J210-1 Black, ground, from Power Driver Board J114-5,7

J210-2 Key

J210-3 Black, ground, from Power Driver Board J114-5, 7

J210-4 Gray, +5V, from Power Driver Board J114-3, 4

J210-5 Gray, +5V, from Power Driver Board J114-3, 4

J210-6 Gray-Green, +12V, from Power Driver Board J114-1, 2

J210-7 Gray-Green, +12V, from Power Driver Board J114-1, 2

J211, 34-pin ribbon cable, data to/from J113

J212-1 Green-Brown, switch col. 1, to Coin Door Board J3-1

J212-2 Green-Red, switch col. 2, to Coin Door Board J3-2

J212-3 N/C

J212-4 White-Brown, switch row 1, to Coin Door Board J3-3

J212-5 Key

J212-6 White-Red, switch row 2, to Coin Door Board J3-4

J212-7 White-Orange, switch row 3, to Coin Door Board J3-5

J212-8 White-Yellow, switch row 4, to Coin Door Board J3-6

J213-1 Black, to battery holder board J1-1

J213-2 Black, to battery holder board J1-2

J213-3 Key

J213-4 Gray, to battery holder board J1-4

J213-5 Gray, to battery holder board J1-5

J1-1 Black, from CPU J213-1

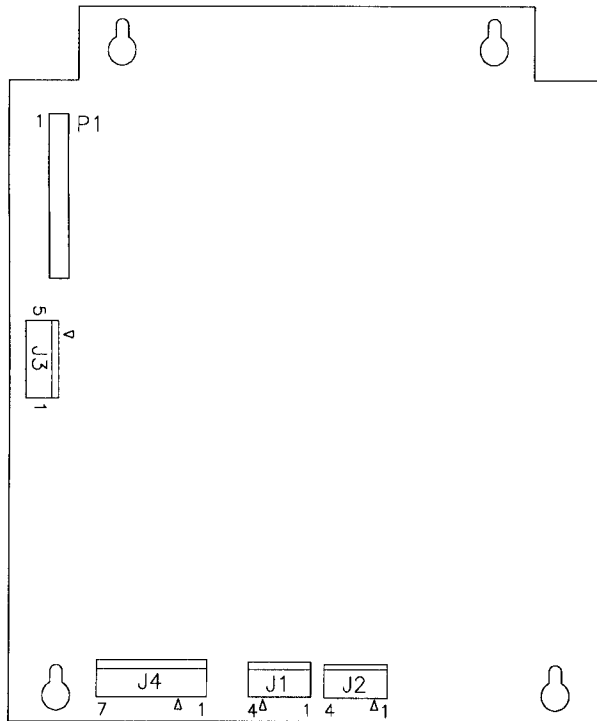
J1-2 Black, from CPU J213-2

J1-3 Key

J1-4 Gray, from CPU J213-4

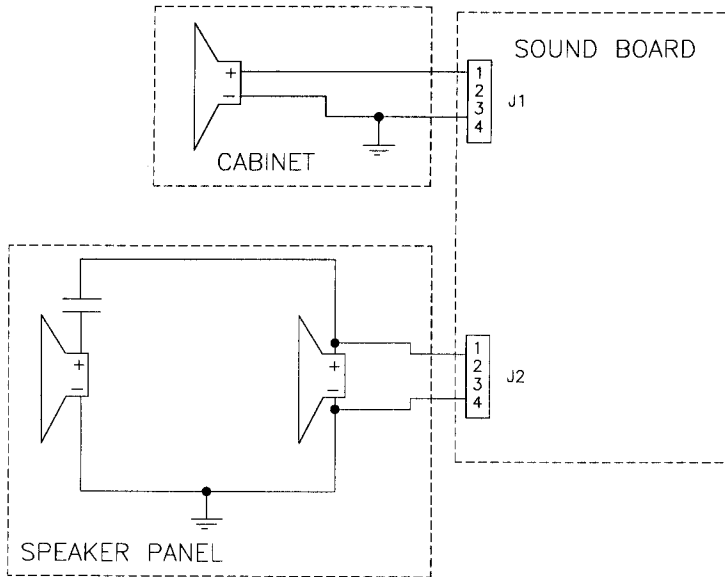
J1-5 Gray, from CPU J213-

# Sound Board Assembly A-16917-50042

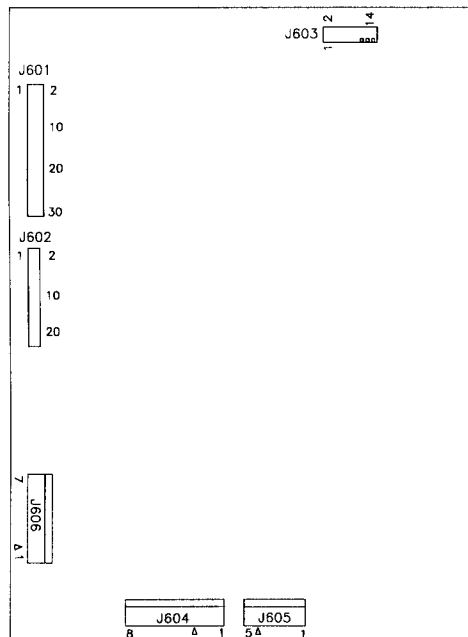


- P1, 34-pin ribbon cable, data to/from J601; J903; J202
  
- J1-1 Black-Yellow, signal to speaker
- J1-2 N/C
- J1-3 Key
- J1-4 Black, signal to speaker
  
- J2-1 Black-Yellow, signal to speaker
- J2-2 Key
- J2-3 N/C
- J2-4 Black, signal to speaker
  
- J3-1 Gray, +5V from Power Driver Board J114-3, 4
- J3-2 Key
- J3-3 Gray, +5V from Power Driver Board J114-3, 4
- J3-4 Black, ground from Power Driver Board J114-5, 7
- J3-5 Black, ground from Power Driver Board J114-5, 7
  
- J4-1 Gray-Green, 18Vac from transformer secondary
- J4-2 Gray-Green, 18Vac loop from J4-1
- J4-3 Key
- J4-4 Gray, 18Vac from transformer secondary
- J4-5 Gray, 18Vac loop from J4-4
- J4-6 Gray-White, 18Vac from transformer secondary
- J4-7 Gray-White, 18Vac loop from J4-6

## Speaker Wiring Diagram

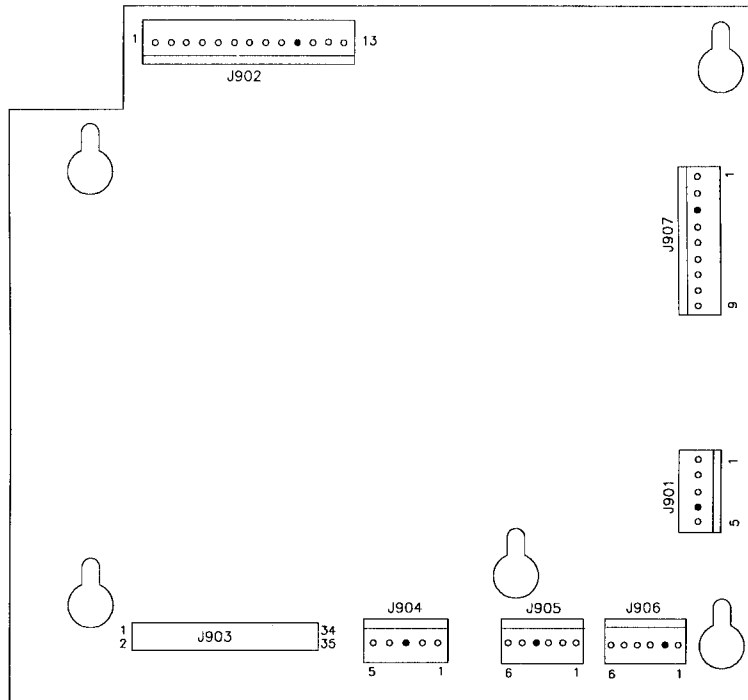


## Dot Matrix Controller Board Assembly A-14039.1



- J601, 34-pin ribbon cable, data to/from J202; J903; P1
- J602, 26-pin ribbon cable, data to/from J201
- J603, 14-pin ribbon cable, data to/from Dot Matrix Display/Driver
- J604-1 Orange, -125V to Display/Driver pin 1  
 J604-2 Blue, -113V to Display/Driver pin 2  
 J604-3 Key  
 J604-4 Black, ground to Display/Driver pin 4  
 J604-5 Black, ground to Display/Driver pin 5  
 J604-6 Gray, +5V to Display/Driver pin 6  
 J604-7 Gray-Yellow, to Display/Driver pin 7  
 J604-8 Brown, +62V to Display/Driver pin 8
- J605-1 White, 80Vac from transformer secondary  
 J605-2 White, 80Vac from transformer secondary  
 J605-3 Violet, 100Vac from transformer secondary  
 J605-4 Key  
 J605-5 Violet, 100Vac from transformer secondary
- J606-1 Black, ground loop from J606-3  
 J606-2 Key  
 J606-3 Black, ground from Power Driver Board J117-3  
 J606-4 Gray, +5V loop from J606-5  
 J606-5 Gray, +5V from Power Driver Board J117-4  
 J606-6 Gray-Yellow, +12V loop form J606-7  
 J606-7 Gray-Yellow, +12V from Power Driver Board J117-2

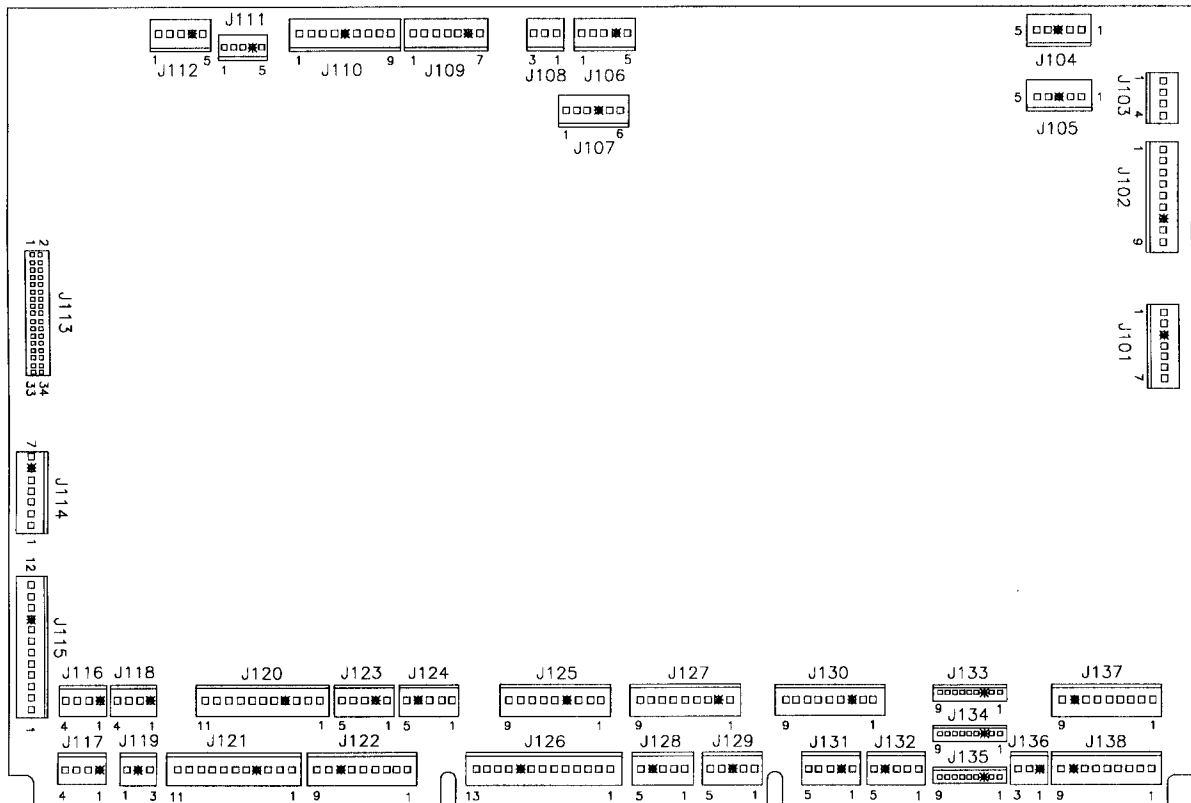
## Fliptronic II Board Assembly A-15472-1



J901-1	White-Blue, 50Vac from Power Drvr Brd J104-2	J905-1	Blue-Violet, F2 to right flipper opto J1-2
J901-2	White-Blue, 50Vac loop from J901-1	J905-2	Blue-Gray, F4 to left flipper opto J1-2
J901-3	White-Blue, 50Vac from Power Drvr Brd J104-1	J905-3	Black-Yellow, F6 to right flipper opto J1-1 (not used)
J901-4	Key	J905-4	Key
J901-5	White-Blue, 50Vac loop from J901-3	J905-5	Black-Blue, F8 to left flipper opto J1-1 (not used)
J902-1	Orange -Gray, holding Right Diverter	J905-6	Orange, ground to left flipper opto J1-4
J902-2	N/C	J906-1	Black-Green, F1 to lower right E.O.S. switch
J902-3	Yellow-Gray, power Right Diverter	J906-2	Key
J902-4	Orange-Violet, holding Left Diverter	J906-3	Black-Blue, F3 to lower left E.O.S. switch
J902-5	N/C	J906-4	N/C
J902-6	Yellow-Violet, power Left Diverter	J906-5	N/C
J902-7	Orange-Blue, holding, lower left flipper coil	J906-6	Orange, ground to E.O.S. switches
J902-8	N/C	J907-1	Red-Green, +50V to lower right flipper coil
J902-9	Yellow-Blue, power, lower left flipper coil	J907-2	Red-Green, +50V loop from J907-1
J902-10	Key	J907-3	Key
J902-11	Orange-Green, holding, lower right flipper coil	J907-4	Red-Blue, +50V to lower left flipper coil
J902-12	N/C	J907-5	Red-Blue, +50V loop from J907-4
J902-13	Yellow-Green, power, lower right flipper coil	J907-6	Red-Violet, +50V to Left Diverter
J903	34-pin ribbon cable, data to/from J202; J601; P1	J907-7	Red-Violet, +50V loop from J907-6
J904-1	Gray, +5V from Power Driver Board J114-3, 4	J907-8	Red-Gray, +50V to Right Diverter
J904-2	Gray-Green, +12V from Pwr Drvr Brd J114-1, 2	J907-9	Red-Gray, +50V loop from J907-8
J904-3	Key		
J904-4	Black, ground from Power Driver Brd J114-5, 7		
J904-5	Black, ground from Power Driver Brd J114-5, 7		



# Power Driver Board Assembly A-12697-3



- J101-1 Red, 9Vac from xformer secondary
- J101-2 Red, 9Vac from transformer secondary
- J101-3 Key
- J101-4 Blue-White, 13Vac from xformer secondary
- J101-5 Blue-White, 13Vac loop from J101-4
- J101-6 Blue-White, 13Vac from xformer secondary
- J101-7 Blue-White, 13Vac loop from J101-6
  
- J102-1 White-Red, 16Vac loop from J102-2
- J102-2 White-Red, 16Vac from xformer secondary
- J102-3 White-Red, 16Vac loop from J102-4
- J102-4 White-Red, 16Vac from xformer secondary
- J102-5 Black-Yellow, 16Vac loop from J102-6
- J102-6 Black-Yellow, 16Vac from xformer secondary
- J102-7 Key
- J102-8 Black-Yellow, 16Vac loop from J102-9
- J102-9 Black-Yellow, 16Vac from xformer secondary
  
- J103- Not Used
  
- J104-1 White-Blue, 50Vac to Fliptronic II Board J901-3
- J104-2 White-Blue, 50Vac to Fliptronic II Board J901-1
- J104-3 Key
- J104-4 N/C
- J104-5 N/C
  
- J105- Not Used
  
- J106-1 N/C
- J106-2 Key
- J106-3 N/C
- J106-4 N/C
- J106-5 Red-White, +20V to insert panel flashers

- J107-1 N/C
- J107-2 Red-Brown, +50V to coils
- J107-3 Red-Black, +50V to coils
- J107-4 Key
- J107-5 N/C
- J107-6 Red-White, +20V to playfield flashers
  
- J108- Not Used
  
- J109- Not Used
  
- J110- Not Used
  
- J111- Not Used
  
- J112-1 White-Green, 9.8Vac from xformer secondary
- J112-2 White-Green, 9.8Vac loop from J112-1
- J112-3 White-Green, 9.8Vac from xformer secondary
- J112-4 Keys
- J112-5 White-Green, 9.8VAC loop from J112-3
  
- J113, 34-pin ribbon cable, data to/from CPU J211
  
- J114-1 Gray-Green, +12V to J210-6, 7; J904-2
- J114-2 Gray-Green, +12V to J210-6, 7; J904-2
- J114-3 Gray, +5V to J210-4, 5; J3-1,3; J904-1
- J114-4 Gray, +5V to J210-4, 5; J3-1,3; J904-1
- J114-5 Black, ground to J210-1, 3; J3-4, 5; J904-4, 5
- J114-6 Key
- J114-7 Black, ground to J210-1,3; J3-4, 5; J904-4, 5

### Power Driver Board Continued...

J115-1	Yellow-White, 6.8Vac from xformer secondary	J124-1	Blue-Brown, solenoid 25 drive to insert panel flasher
J115-2	White-Brown, 6.8Vac from xformer secondary	J124-2	N/C
J115-3	White-Brown, 6.8Vac from xformer secondary	J124-3	N/C
J115-4	White-Orange, 6.8Vac from xformer secondary	J124-4	Key
J115-5	White-Yellow, 6.8Vac from xformer secondary	J124-5	Blue-Yellow, solenoid 28 drive to back panel flasher
J115-6	White-Yellow, 6.8Vac from xformer secondary	J125-1	N/C
J115-7	Orange, 6.8Vac from xformer secondary	J125-2	Black-Red, solenoid 18 drive to insert panel flasher
J115-8	Orange, 6.8Vac from xformer secondary	J125-3	Key
J115-9	Key	J125-4	N/C
J115-10	Green, 6.8Vac from xformer secondary	J125-5	Black-Yellow, solenoid 21 drive to insert panel flasher
J115-11	Brown, 6.8Vac from xformer secondary	J125-6	N/C
J115-12	Brown, 6.8Vac from xformer secondary	J125-7	N/C
J116-1	Key	J125-8	N/C
J116-2	Gray-Yellow, +12V to Coin Door Board J2-2	J125-9	N/C
J116-3	Black, ground to Coin Door Board J2-1	J126-1	Black-Brown, solenoid 17 drive to playfield flasher
J116-4	N/C	J126-2	Black-Red, solenoid 18 drive to playfield flasher
J117-1	Key	J126-3	Black-Orange, solenoid 19 drive to playfield flasher
J117-2	Gray-Yellow, +12V to Dot Matrix Cntrlr J606-7	J126-4	Black-Yellow, solenoid 20 drive to playfield flasher
J117-3	Black, ground to Dot Matrix Cntrlr J606-3	J126-5	Blue-Green, solenoid 21 drive to dual motor relay brd
J117-4	Gray, +5V to Dot Matrix Cntrlr J606-5	J126-6	Blue-Black, solenoid 22 drive to dual motor relay brd
J118-1	Key	J126-7	Blue-Violet, solenoid 23 drive to dual motor relay brd
J118-2	Gray-Yellow, +12V to playfield boards	J126-8	Blue-Gray, solenoid 24 drive to dual motor relay brd
J118-3	Black, ground to playfield boards	J126-9	Key
J118-4	N/C	J126-10	N/C
J119-1	White-Violet, 6.8Vac, G.I. to Coin Door BrdJ2-5	J126-11	N/C
J119-2	Key	J126-12	N/C
J119-3	Violet, return, G.I. to Coin Door Board J2-3	J126-13	N/C
J120-1	Brown, return, G.I. to insert panel	J127-1	Brown-Black, solenoid 9 drive to coil
J120-2	Orange, return, G.I. to insert panel	J127-2	Key
J120-3	Yellow, return, G.I. to insert panel	J127-3	Brown-Red, solenoid 10 drive to coil
J120-4	Key	J127-4	Brown-Orange, solenoid 11 drive to coil
J120-5	N/C	J127-5	Brown-Yellow, solenoid 12 drive to coil
J120-6	Violet, return, G.I. to insert panel	J127-6	Brown-Green, solenoid 13 drive to coil
J120-7	White-Brown, 6.8Vac, G.I. to insert panel	J127-7	Brown-Blue, solenoid 14 drive to coil
J120-8	White-Orange, 6.8Vac, G.I. to insert panel	J127-8	Brown-Violet, solenoid 15 drive to coil
J120-9	White-Yellow, 6.8Vac, G.I. to insert panel	J127-9	Brown-Gray, solenoid 16 drive to coil
J120-10	N/C	J128-Not Used	
J120-11	White-Violet, 6.8Vac, G.I. to insert panel	J129-Not Used	
J121-1	Brown, return, G.I. to	J130-1	Violet-Brown, solenoid 1 drive to coil
J121-2	Orange, return, G.I. to playfield	J130-2	Violet-Red, solenoid 2 drive to coil
J121-3	Yellow, return, G.I. to playfield	J130-3	Key
J121-4	Key	J130-4	Violet-Orange, solenoid 3 drive to coil
J121-5	Green, return, G.I. to insert panel	J130-5	Violet-Yellow, solenoid 4 drive to coil
J121-6	N/C	J130-6	Violet-Green, solenoid 5 drive to coil
J121-7	White-Brown, 6.8Vac, G.I. to playfield	J130-7	Violet-Blue, solenoid 6 drive to coil
J121-8	White-Orange, 6.8Vac, G.I. to playfield	J130-8	Violet-Black, solenoid 7 drive to coil
J121-9	White-Yellow, 6.8Vac, G.I. to playfield	J130-9	Violet-Gray, solenoid 8 drive to coil
J121-10	White-Green, 6.8Vac, G.I. to playfield	J131- Not Used	
J121-11	N/C	J132- Not Used	
J122-1	Blue-Brown, solenoid 25 drive to flashlamp	J133-Not Used	
J122-2	Blue-Red, solenoid 26 drive to flashlamp	J134-1	Red-Brown, lamp row 1 to playfield
J122-3	Blue-Orange, solenoid 27 drive to flashlamp	J134-2	Red-Black, lamp row 2 to playfield
J122-4	Blue-Yellow, solenoid 28 drive to flashlamp	J134-3	Key
J122-5	N/C	J134-4	Red-Orange, lamp row 3 to playfield
J122-6	N/C	J134-5	Red-Yellow, lamp row 4 to playfield
J122-7	Key	J134-6	Red-Green, lamp row 5 to playfield
J122-8	N/C	J134-7	Red-Blue, lamp row 6 to playfield
J122-9	N/C	J134-8	Red-Violet, lamp row 7 to playfield
J123- Not Used		J134-9	Red-Gray, lamp row 8 to playfield

**Power Driver Board Continued...**

J135-1 N/C  
J135-2 N/C  
J135-3 Key  
J135-4 N/C  
J135-5 N/C  
J135-6 N/C  
J135-7 Red-Blue, lamp row 6 to cabinet  
J135-8 Red-Violet, lamp row 7 to cabinet  
J135-9 Red-Gray, lamp row 8 to cabinet

J136-1 Key  
J136-2 N/C  
J136-3 Yellow-Gray, lamp column 8 to cabinet

J137- Not Used

J138-1 Yellow-Brown, lamp column 1 to playfield  
J138-2 Yellow-Red, lamp column 2 to playfield  
J138-3 Yellow-Orange, lamp column 3 to playfield  
J138-4 Yellow-Black, lamp column 4 to playfield  
J138-5 Yellow-Green, lamp column 5 to playfield  
J138-6 Yellow-Blue, lamp column 6 to playfield  
J138-7 Yellow-Violet, lamp column 7 to playfield  
J138-8 Key  
J138-9 Yellow-Gray, lamp column 8 to playfield



### LAMP MATRIX

Yellow (B+)  Red

Column Row	1 Yellow-Brown J137-1 Q96	2 Yellow-Red J137-2 Q97	3 Yellow-Orange J137-3 Q96	4 Yellow-Black J137-4 Q95	5 Yellow-Green J137-5 Q94	6 Yellow-Blue J137-6 Q93	7 Yellow-Violet J137-7 Q92	8 Yellow-Gray J137-9 Q91
1 Red-Brown J133-1 Q90	MODE READY 11	POWER DOWN 21	LEFT RAMP BLOCK 4 31	LEFT LOOP TOP ARROW 41	CYBER MATRIX 13 51	CYBER MATRIX 12 61	CYBER MATRIX 11 71	RIGHT LOOP TOP ARROW 81
2 Red-Black J133-2 Q89	DOWNLOAD 12	N.A.S. CURE 22	EXTRA BALL 32	LEFT STANDUP ARROW 42	CYBER MATRIX 23 52	CYBER MATRIX 22 62	CYBER MATRIX 21 72	CYBER LOCK 3 82
3 Red-Orange J133-4 Q88	ACCESS CODE 2 13	RIGHT RAMP BLOCK 4 23	SECTOR 2 33	RIGHT RAMP BLOCK 1 43	CYBER MATRIX 33 53	CYBER MATRIX 32 63	CYBER MATRIX 31 73	SECTOR 7 83
4 Red-Yellow J133-5 Q87	ACCESS CODE 1 14	SECTOR 6 24	LEFT RAMP BLOCK 2 34	LIGHT SPINNER 44	RIGHT OUTLANE 54	RIGHT RETURN LANE 64	POPPER TOP ARROW 74	LEFT OUTLANE 84
5 Red-Green J133-6 Q86	UPLOAD 15	RIGHT RAMP BLOCK 2 25	LEFT RAMP BLOCK 1 35	BIG POINTS 45	BONUS HELD 55	SECTOR 5 65	SECTOR 3 75	LEFT RETURN LANE 85
6 Red-Blue J133-7 Q85	LEFT JET LANE 16	HOLD BONUS 26	SECTOR 1 36	GIGABYTES 46	BONUS 4X 56	SPINNER MILLIONS 66	CRAZY BOB'S 76	BALL LAUNCH 86
7 Red-Violet J133-8 Q84	MIDDLE JET LANE 17	RIGHT STANDUP RIGHT BLOCK 27	NOT USED 37	LIGHT EXTRA BALL 47	BONUS 3X 57	CYBER LOCK 2 67	MODE START 77	BUY-IN BUTTON 87
8 Red-Gray J133-9 Q83	RIGHT JET LANE 18	RIGHT STANDUP LEFT BLOCK 28	SHOOT AGAIN 38	QUICK MULTIBALL 48	BONUS 2X 58	INNER LOOP TOP 68	CYBER LOCK 1 78	START BUTTON 88

J1XX = POWER DRIVER BOARD

### SWITCH MATRIX

White  Green

Dedicated Grounded Switches	Column Row	1 Green-Brown J207-1 U20-18	2 Green-Red J207-2 U20-17	3 Green-Orange J207-3 U20-16	4 Green-Yellow J207-4 U20-15	5 Green-Black J207-5 U20-14	6 Green-Blue J207-6 U20-13	7 Green-Violet J207-7 U20-12	8 Green-Gray J207-9 U20-11	Flipper Grounded Switches
Orange-Brown J206-1 Left Coin Chute D1	1 White-Brown J209-1 U18-11	BALL LAUNCH 11	SLAM TILT 21	TROUGH JAM 31	LEFT RAMP ENTER 41	CYBER MATRIX 11 51	CYBER MATRIX 12 61	CYBER MATRIX 13 71	NOT USED 81	Black-Green J906-1 Lower Right Flipper E.O.S. F1
Orange-Red J206-2 Center Coin Chute D2	2 White-Red J209-2 U18-9	X HAND HOME 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	LEFT RAMP MADE 42	CYBER MATRIX 21 52	CYBER MATRIX 22 62	CYBER MATRIX 23 72	NOT USED 82	Blue-Violet J906-3 Lower Right Flipper Opto F2
Orange-Black J206-3 Right Coin Chute D3	3 White-Orange J209-3 U18-5	START BUTTON 13	BUY-IN BUTTON 23	TROUGH BALL 2 33	DROP TARGET 43	CYBER MATRIX 31 53	CYBER MATRIX 32 63	CYBER MATRIX 33 73	NOT USED 83	Black-Blue J906-5 Lower Left Flipper E.O.S. F3
Orange-Yellow J206-4 4th Coin Chute D4	4 White-Yellow J209-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	LEFT JET BUMPER 44	RIGHT RAMP ENTER 54	LEFT JET LANE 64	X HAND ENCODER A 74	NOT USED 84	Blue-Gray J906-2 Lower Left Flipper Opto F4
Orange-Green J206-5 Normal Function Test Function Bv Crdts Escape D5	5 White-Green J209-5 U19-11	LEFT OUTLANE 15	LEFT SLINGSHOT 25	TROUGH BALL 4 35	BOTTOM JET BUMPER 45	RIGHT RAMP MADE 55	MIDDLE JET LANE 65	X HAND ENCODER B 75	NOT USED 85	Black-Violet J906-4 BALL IN HAND F5
Orange-Blue J206-7 Normal Function Test Function Volume Dn Down D6	6 White-Blue U209-7 U19-9	LEFT RETURN LANE 16	RIGHT SLINGSHOT 26	BALL POPPER 1 36	RIGHT JET BUMPER 46	LEFT LOOP 56	RIGHT JET LANE 66	Y HAND ENCODER B 76	NOT USED 86	Black-Yellow J906-6 Upper Right Flipper Opto F6
Orange-Violet J206-8 Normal Function Test Function Volume Up Up D7	7 White-Violet J209-8 U19-5	RIGHT RETURN LANE 17	LEFT STANDUP TARGET 27	Y HAND HOME 37	CRAZY BOB'S 47	RIGHT LOOP 57	RIGHT HAND CONTROL 67	Y HAND ENCODER A 77	NOT USED 87	Black-Gray J906-5 Upper Left Flipper E.O.S. F7
Orange-Gray J206-9 Normal Function Test Function Begin Test Enter D8	8 White-Gray J209-9 U19-7	RIGHT OUTLANE 18	RIGHT STANDUP TARGET 28	RIGHT RUBBER 38	SPINNER 48	INNER LOOP ENTRY 58	LEFT HAND CONTROL 68	SHOOTER LANE 78	NOT USED 88	Black-Blue J906-8 Upper Left Flipper Opto F8

J2XX = CPU BOARD; J9XX = FLIPTRONIC II BOARD

 = OPTO, TYPICALLY CLOSED.

## WARNINGS & NOTICES

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