DIRTY HARRY

Operations Manual

Scanned, Edited & Indexed By:

DIRTY HARRY ™

OPERATIONS MANUAL INCLUDES

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

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 PLAYFIELD	BACKBOX	CABINET	DRIVE XISTOR	DRIVE CONNECTIONS PLAYFIELD	BACKBOX	CABINET	DRIVE WIRE	SOLENOID PART NUMBER FLASHLAMP TYPE PLAYFIELD	BACKBOX
01	BALL RELEASE	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	GUN LAUNCH	High Power	J107-2			Q78	J130-4			Vio-Org	AE-23-800	
04	TOP RIGHT POPPER	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-23-800	
05	GUN POPPER	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-24-900	
06	NOT USED	High Power				Q66				Vio-Blu		
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	TRAP DOOR HIGH	High Power	J107-2			Q70	J130-9			Vio-Gry	A-14701	
09	LEFT SLING	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	RIGHT SLING	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	LEFT JET	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	MIDDLE JET	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	RIGHT JET	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	LEFT POPPER	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1200	
15	RAMP DIVERTER	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200	
16	TRAP DOOR HOLD	Low Power	J107-3			Q44	J127-9			Brn-Gry	A-14701	
17	HEADQUARTERS	Flasher	J107-6			Q42	J126-1			Blk-Brn	#906 (2)	
18	SAFEHOUSE	Flasher	J107-6			Q40	J126-2			Blk-Red	#906 (1)	
19	WAREHOUSE	Flasher	J107-6			Q38	J126-3			Blk-Org	#906 (1)	
20	GUN MOTOR	Low Power	J118-2			Q36	J126-4			Blk-Yel	A-19735	
21	GUN LOADED	Flasher	J107-6			Q28	J126-5			Blu-Grn	#906 (1)	
22	RIGHT RAMP	Flasher	J107-6			Q30	J126-6			Blu-Blk	#89 (1)	
23	RIGHT BACK	Flasher	J107-6			Q34	J126-7			Blu-Vio	#906 (2)	
24	LEFT BACK	Flasher	J107-6			Q32	J126-8			Blu-Gry	#906 (2)	
25	NOT USED	Gen. Purpose				Q26				Blu-Brn		
26	TOP LEFT POPPER	Gen. Purpose	J107-1			Q24	J122-2			Blu-Red	AE-26-1500	
27	LEFT DIVERTER	Gen. Purpose	J107-1			Q22	J122-3			Blu-Org	AE-26-1200	
28	RIGHT LOOP GATE	Gen. Purpose	J107-1			Q20	J122-4			Blu-Yel	A-14406	
29-36	SEE FLIPPER CKTS											
37	NOT USED	Low Power				Q16				Brn-Wht		
38	NOT USED	Low Power				Q15				Blk-Wht		
39	NOT USED	Low Power				Q14				Org-Wht		
40	NOT USED	Low Power				Q13				Yel-Wht		
41	NOT USED	Low Power				Q9				Grn-Wht		
42	NOT USED	Low Power				Q10				Blu-Wht		
43	NOT USED	Low Power				Q11				Vio-Wht		
44	NOT USED	Low Power				Q12				Gry-Wht		

GENERAL ILLUMINATION

01	RIGHT STRING	G.I.	J120-1	J121-1		Q18	J120-7	J121-7		Wht-Brn	#44	#555
02	LEFT STRING	G.I.	J120-2	J121-2		Q10	J120-8	J121-8		Wht-Org	#44	#555
03	STRING 3	G.I.	J120-3			Q14	J120-9			Wht-Yel	#44	
04	STRING 4	G.I.	J120-5			Q16	J120-10			Wht-Grn	#44	#545
05	BOTTOM STRING	G.I.		J121-6	J119-3	Q12		J121-11	J119-1	Wht-Vio		#555

FLIPPER CIRCUITS			VOLTAGE CONNECTION	DRIVE XISTOR POWER	HOLD	DRIVE CONNECTION PLAYFIELD	DRIVE WIRE POWER	HOLD	COIL PART NUMBER	COIL COLOR
29		Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn		FL-11629	BLUE
30	LWR RIGHT FLIPPER	Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn		
31		Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu		FL-11629	BLUE
32	LWR LEFT FLIPPER	Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu		
33		Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio		FL-11629	BLUE
34	UPR RIGHT FLIPPER	Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio		
35	RIGHT LOOP MAGNET	Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry		*SEE BELOW	
36	NOT USED	Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry		

J1XX-X=POWER DRIVER BOARD; JX-X=AUX. DRIVER BOARD; J9XX-X=FLIPTRONIC II BOARD; 24-6549=#44 BULB; 24-8704=#89 BULB; 24-8768=#555 BULB; 24-8802=#906; 24-8825=#545   *02-4773=ADJUSTABLE MAGNET CORE; 20-9247=COIL MAGNET; 20-9612=WAVE SPRING WASHER

TIEBACK DIODES:
    J122-6 (RED-ORANGE) TIEBACK DIODE FOR SOL. 26 TOP LEFT POPPER
    J122-8 (RED-ORANGE) TIEBACK DIODE FOR SOL. 27 LEFT DIVERTER
    J122-9 (RED-ORANGE) TIEBACK DIODE FOR SOL. 28 RIGHT LOOP GATE

DIRTY HARRY™ (50030)
A-16113-1
Gun Handle Installation
Installation De La Crosse
Pistolengriff am Gehäuse innen lösen
Istruzioni Per L'Installazione Dell'Impugnatura Della Pistola

Remove gun handle from the inside bottom of the cabinet. Then, using the hardware included with the gun handle plus two more 10-24 bolts, 10-24 ESN nuts and .219x.500x.063 flat washers located in the parts bag, attach the gun handle to the outside of the cabinet in the upper right corner. (See diagram below.) After the gun handle is in place, plug the connector from the handle into the matching connector from the cabinet.

4410-01119-00 (4 used) Nut 10-24 ESN (To install 10-24 ESN nut use 3/8" nut driver: color code, blue)
4700-00060-00 (4 used) Flat Washer .219x.500x.063
4310-01123-24B (4 used) Bolt 10-24 x1-1/2 CB

Démontez la crosse du revolver située à l'intérieur de l'appareil. Avec les vis récupérées après démontage, ainsi que les vis supplémentaires, les écrous et les rondelles se trouvant dans la pochette, installez cette crosse à l'extérieur de l'appareil. (voir dessin ci-dessous). Après la mise en place de la crosse, branchez son connecteur avec son correspondant à l'intérieur de l'appareil.

4410-01119-00 (Quantité 4) Ecrou 10-24 ESN (Pour installer l'Ecrou 10-24 ESN utilisez une clé plate de 3/8)
4700-00060-00 (Quantité 4) Rondelle plate .219x.500x.063
4310-01123-24B (Quantité 4) Vis 10-24x1-1/2 CB

Dann mit beiliegenden Schrauben und Muttern an der Außenseite des Gehäuses oben rechts montieren, s. Abbildung. Ist der Pistolengriff angebaut, den Steckkontakt des Griffes und den entsprechenden Gehäusestecker zusammenstecken.

4 Sechskantmuttern, 4410-01119-00 (Sechskantmuttern Mit 3/8" Schlüssel Anziehen)
4 Unterlegscheiben, 4700-00060-00
4 Schrauben, 4310-01123-24B

Rimuovere l'impugnatura della pistola dal fondo del flipper. Usando l'atrezzo in dotazione, le 2 viti, i 2 dadi e le rondelle piane situate nel sacchetto delle parti, installare l'impugnatura della pistola all'esterno del flipper nell'angolo superiore destro. (Vedi figura sottostante.) Una volta installata l'impugnatura della pistola collegare i connettori.

4410-01119-00 (4 utilizzati) dadi 10-24 ESN (Per installare i dadi utilizzare la chiave blu da 3/8")
4700-00060-00 (4 utilizzati) rondelle piane .219x.500x.063
4310-01123-24B (4 utilizzati) viti 10-24x1-1/2 CB
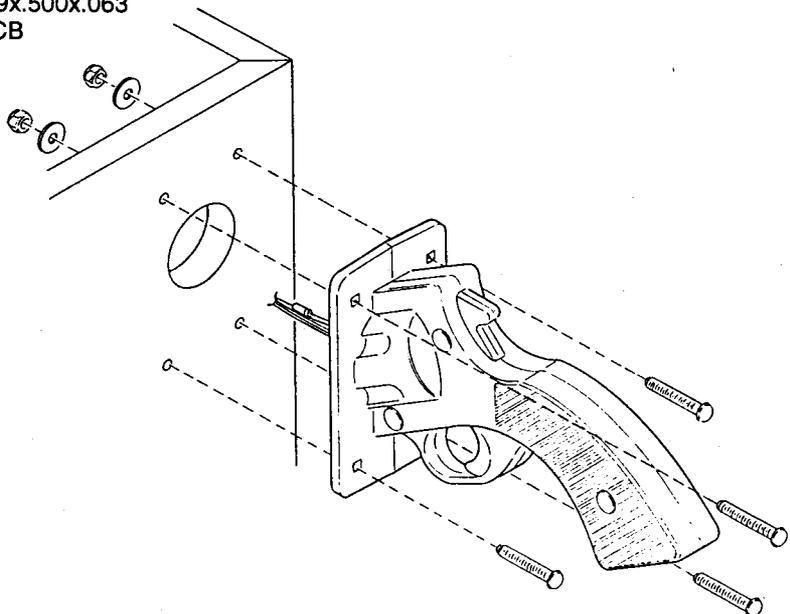
ATTENTION

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 DIRTY HARRY 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.

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TESTING

50030                    EPROM  PA-6

530   100006  95749
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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.
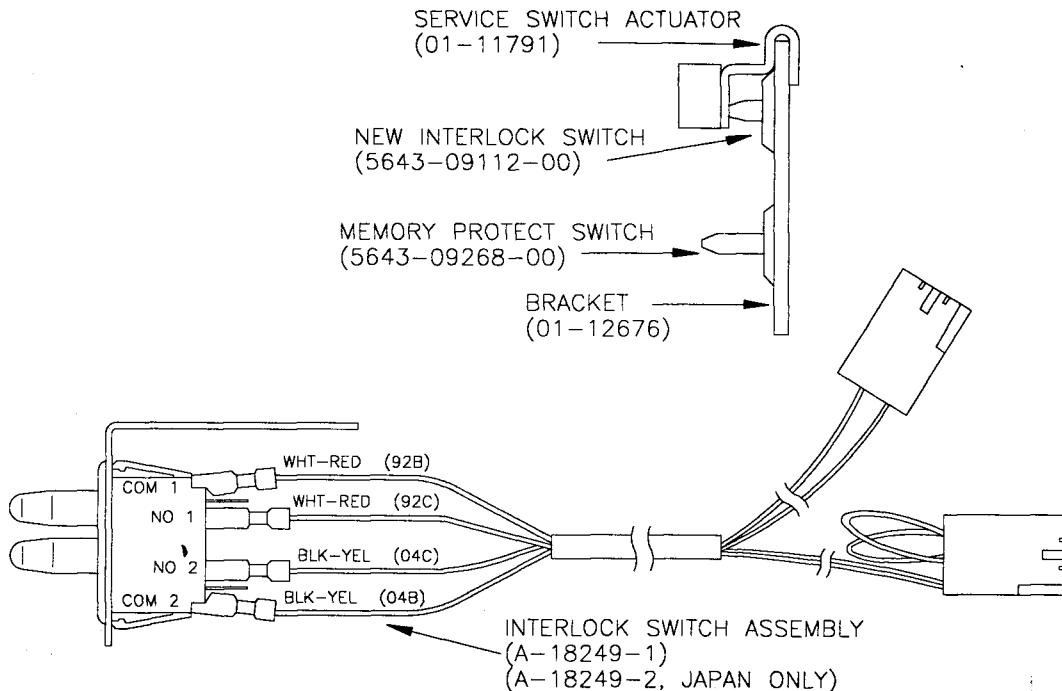
SERVICE SWITCH ACTUATOR
(01-11791)

NEW INTERLOCK SWITCH
(5643-09112-00)

MEMORY PROTECT SWITCH
(5643-09268-00)

BRACKET
(01-12676)

WHT-RED (92B)
COM 1
NO 1   WHT-RED (92C)
NO 2   BLK-YEL (04C)
COM 2   BLK-YEL (04B)

INTERLOCK SWITCH ASSEMBLY
(A-18249-1)
(A-18249-2, JAPAN ONLY)

DIRTY HARRY™

TABLE OF CONTENTS

DIRTY HARRY RULES

SKILL SHOT: Watch display for three possible skill shot choices. They are Ramp Shot, Load Gun, and a random award. Pull the trigger to make your selection.
    RAMP SHOT: The Magna-Force magnet grabs the ball and releases it for a flipper skill shot at the left ramp for points.
    LOAD GUN: Loads the gun, enabling a gun skill shot. Pull the trigger again and fire the ball at the flashing shot on the playfield. A completed shot awards points and starts a Shotgun Shell award.
    RANDOM AWARD: Pulling the trigger when the third award is displayed will give the player that award, and launch the ball into the jet bumpers.

MULTIBALL: Collecting the five flashing Badges on the playfield lights START MULTIBALL on the left ramp and at the Warehouse. Starting multiball on the left ramp increases the base JACKPOT VALUE. To start multiball, the player is given a chance at an INSTANT JACKPOT with a shot from the gun. Once shot, MULTIBALL commences. The left ramp is SUPER JACKPOT (2X current JACKPOT VALUE), the right ramp is JACKPOT. The Safehouse increases the JACKPOT VALUE and the Warehouse relights the right ramp for jackpots.

LANES AND BUMPERS: Completing the lanes alternately increases the jet value, and multiplies the current RANSOM value which gets built by the bumpers. Rolling over the right return lane lights the RANSOM shot at the HQ hole on the left side of the playfield for a short period of time. RANSOM can also be multiplied by combo shots that feed the right flipper.

BULLET TARGETS: Completing the BULLET TARGETS advances the MAGAZINE awards above the left flipper. Shooting the Warehouse collects the lowest flashing award on the MAGAZINE. The awards are:
    MAGNUM JETS: The jet value is increased to maximum, and is worth millions per hit.
    MAGNUM BULLETS: The BULLET TARGETS are now worth millions per hit.
    LIGHT EXTRA BALL: The EXTRA BALL is now lit at the HQ hole.
    LIGHT SHOOT-OUT: The exit lanes are now lit. If the ball drains down the lit exit lane, it is loaded into the gun for a shot at BIG POINTS, and if successful, a SPECIAL.
    PLAYFIELD PROMOTION: All scores are multiplied by 2X, 3X, 4X, or 5X for a short period of time. The multiplier is based on the player's current RANK, which he has earned by shooting the left ramp.

RIGHT LOOP: Feeds the lanes and the bumpers normally. If the left return lane is rolled over, MAGNA FORCE becomes lit for a short period of time, which grabs the ball, and releases it, giving the player a slow feed to the left ramp.

RIGHT RAMP: Shooting the right ramp collects HELICOPTERS. At 'X' helicopters, FEEL LUCKY becomes lit at the Warehouse. Also shooting two right ramps consecutively diverts the ball to the right flipper and lights RICOCHET on the left loop for a short period of time. RICOCHETS increase with each one completed, and are reset at each new ball.

THE WAREHOUSE: Shooting the Warehouse will lower the drop target for a short period of time. Shooting it again before the drop target raises will award the player with a CONTRABAND item. When lit, the Warehouse will collect Magazine awards.

When FEEL LUCKY is lit, the player will be given a choice between collecting points, or the opportunity to use the gun to shoot for features (bonus X, extra ball, etc.). Hitting the left flipper will award the points and put the ball back into play. Hitting the right flipper loads the gun and starts flashing a bullet. Pull the trigger to shoot at the flashing target. A completed shot will award the feature.

LEFT RAMP: Shooting the left ramp builds up to promotions, which increases your RANK. Your rank is awarded in bonus count, and determines what multiplier the player's Playfield Promotion is set at. At Chief, the player starts Super Chief mode. Advancing rank lights Safehouse award.

THE SAFEHOUSE: Shooting the Safehouse, when lit, awards a Safehouse Feature. The features are:

BANK ROBBER HURRY-UP: A hurry-up that can be collected on the left loop.

WAREHOUSE HURRY-UP: Shoot the Warehouse before the hurry-up finishes and the player is rewarded with a two-ball multiball where the jackpot shot is the Warehouse and the Jackpot is the hurry-up score.

LIGHT EXTRA BALL: Lights the extra ball at the HQ hole.

SUPER LOOPS: The outer loops are lit for a short period of time. Make the loops to restart the timer and the loop value increases.

ALCATRAZ: A two-ball multiball.

LEFT LOOP: Feeds the upper flipper for a left ramp shot. Also, when lit, collect the BANK ROBBER HURRY-UP value, and RICOCHET.

THE HQ HOLE: When RANSOM is lit, collects the Ransom value multiplied by whenever current multiplier affects it. It also collects Extra Balls when lit. When HQ light is lit, it starts the current flashing SHOTGUN SHELL mode. The modes are:

BARROOM BRAWL: Shoot both ramps for a limited amount of time. The left ramp is worth twice as much as the right ramp.

CAR CHASE: Shoot both loops and the left ramp. The player has a limited amount of time to make four of any combinations of these shots for an added finishing bonus.

WAREHOUSE RAID: Shoot the Warehouse for increasing score values and to collect Contraband items for a limited amount of time.

LETTER BOMB: Hit thirty targets before time expires.

MEET THE MOB: Both ramps and both loops are lit. Shoot all four shots before time expires.

STOP SCORPIO: Two of the CROSSHAIR shots are lit. Make one before time runs out, and that one is collected, and another crosshair starts timing down. The Safehouse adds more Crosshair shots. Shooting HQ shot ends the mode (as does all the crosshair shots timing out), and awards points based on how many Scorpio shots the player has made.

CRIME WAVE: Once all of the above modes have been completed, the player can enter the Crime Wave, where all the shots are lit for big points. The player can play unlimited autofeed multiball action for a limited amount of time.

Once a mode has been played, the player must relight the HQ light by shooting either of the outer loops.

DIRTY HARRY GAME STORY

Dirty Harry first appeared in 1971. It starred Clint Eastwood, who has been in numerous movies since 1955. *Dirty Harry* was named one of the year's 10-best films in 1971 by *'Time' Magazine*. Harry is a man of few words. But, the owner of "the most powerful handgun in the world", never the less utters some of the most memorable in the history of movies. "You've got to ask yourself one question: 'Do you feel lucky? Well, do you punk?'" Callahan taunts when a cornered bank robber stares at the business end of the detective's .44 Magnum.

Since that time there have been a total of five *'Dirty Harry'* movies: *Dirty Harry, Magnum Force, The Enforcer, Sudden Impact,* and *The Dead Pool.* Clint Eastwood's movies have been seen by audiences all over the world. He is also well known for his westerns: *Fistful of Dollars, For A Few Dollars More, The Good, The Bad and the Ugly,* and most recently, *'Unforgiven',* for which he won the Academy Award for Best Director.

DIRTY HARRY THE GAME

In this game, we tried to capture the spirit *'Dirty Harry',* (Harry Callahan). There is a .44 Magnum that the player uses to shoot at various targets and ramps during the game. 'Feel Lucky Punk?' is another feature. Here the player has the option of taking a lower award or shooting the gun at a flashing target for a bigger award. There are ways to get promotions (in rank), starting with Rookie, Officer, Sergeant, etc. Harry is also involved in numerous scenarios: a warehouse raid, barroom fights, car chases, letter bombs, etc., all culminating in the biggest battle 'Crime Wave'. Here the player has unlimited balls for a given time and all shots are worth big points.

There is much more to this game than meets the eye. It should keep player's interest for a long time, while they try to master all the features.

DIRTY HARRY

SHOTMAPS

SKILL SHOT

Watch display for three possible skill shot choices. They are Ramp Shot, Load Gun, and a random award. Pull the trigger to make your selection.

RAMP SHOT: The Magna-Force magnet grabs the ball, and releases it for a flipper skill shot at the left ramp for points.

LOAD GUN: Loads the gun, enabling a gun skill shot. Pull the trigger again and fire the ball at the flashing shot on the playfield. A completed shot awards points and starts a Shotgun Shell award.

RANDOM AWARD: Pulling the trigger when the third award is displayed will give the player that award, and launch the ball into the jet bunpers.

B
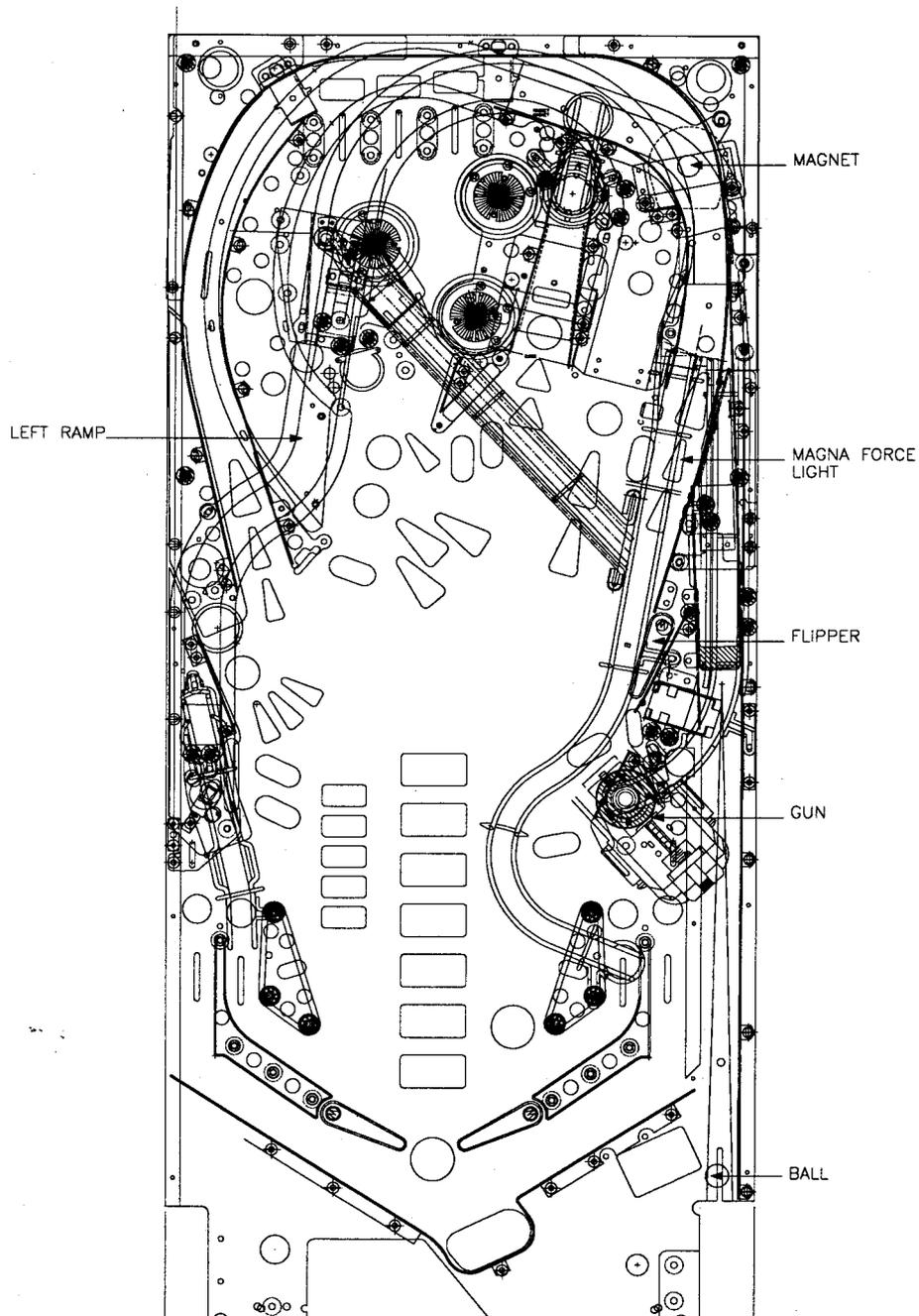
MULTIBALL

Collecting the five flashing BADGES on the playfield light START MULTIBALL on the left ramp and at the Warehouse. Starting multiball on the left ramp increases the base JACKPOT VALUE. To start multiball, the player is given a chance at an INSTANT JACKPOT with a shot from the gun. Once shot, MULTIBALL commences. The left ramp is SUPER JACKPOT, (2X the current JACKPOT VALUE), the right ramp is JACKPOT. The Safehouse increases the JACKPOT VALUE, and the Warehouse, relights the right ramp for jackpots.

WAREHOUSE

SAFEHOUSE

START MULTIBALL

JACKPOT

5 BADGES

C
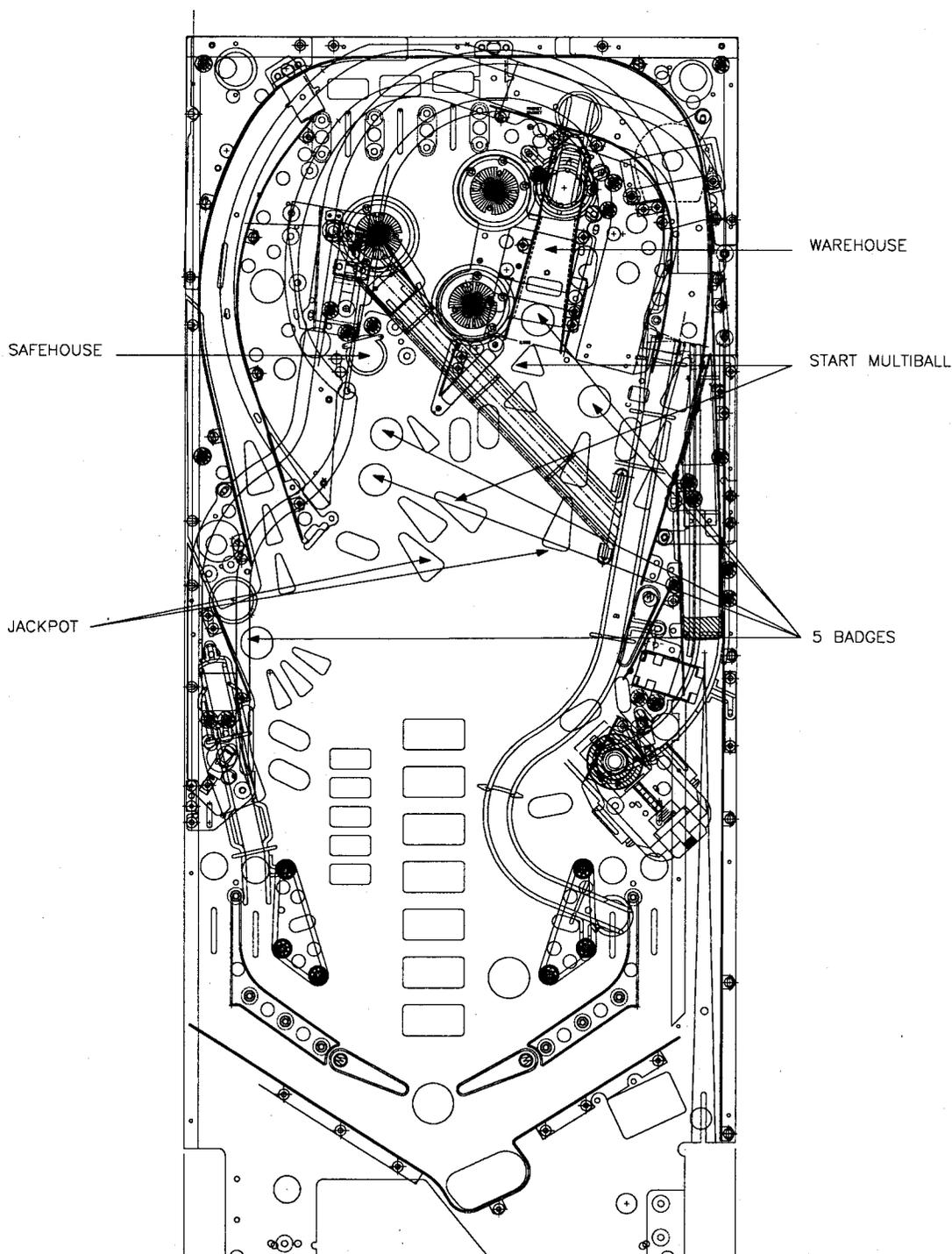
ROLLOVER LANES AND JET BUMPERS

Completing the lanes alternately increase the jet value, and multiply the current RANSOM value which gets built by the bumpers. Rolling over the right return lane lights the RANSOM shot at the HQ hole on the left side of the playfield for a short period of time. RANSOM can also be multiplied by combo shots that feed the right flipper.

ROLLOVER LANES

JET BUMPERS

RANSOM

LIGHT RANSOM

D
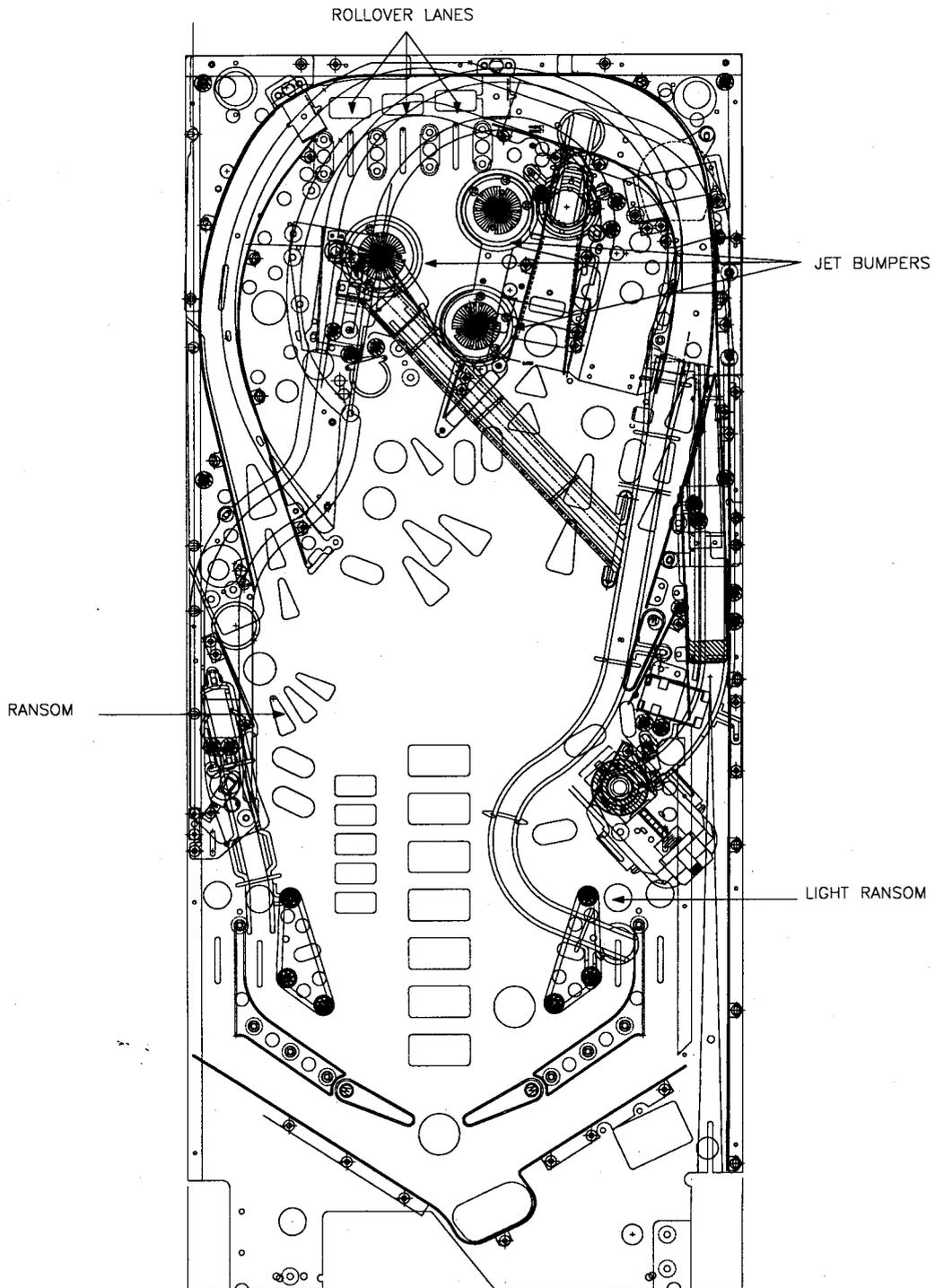
BULLET TARGETS

Completing the BULLET TARGETS advances the MAGAZINE awards above the left flipper. Shooting the Warehouse collects the lowest flashing award on the MAGAZINE. The awards are:

MAGNUM JETS: The jet value is increased to maximum, and are worth millions per hit.

MAGNUM BULLETS: The BULLET TARGETS are worth millions per hit.

LIGHT EXTRA BALL: The EXTRA BALL is now lit at the HQ hole.

LIGHT SHOOT-OUT: The exit lanes are now lit. If the ball drains down the lit exit lane, the ball is loaded into the gun for a shot at BIG POINTS, and if successful, a SPECIAL.

PLAYFIELD PROMOTION: All scores are multiplied by 2X, 3X, 4X, or 5X for a short period of time. The multiplier is based on the players current RANK, which the player has earned by shooting the left ramp.

BULLETS

PLAYFIELD PROMOTION
LIGHT SHOOTOUT
LIGHT EXTRA BALL
MAGNUM BULLETS
MAGNUM JETS

SHOOTOUT

E
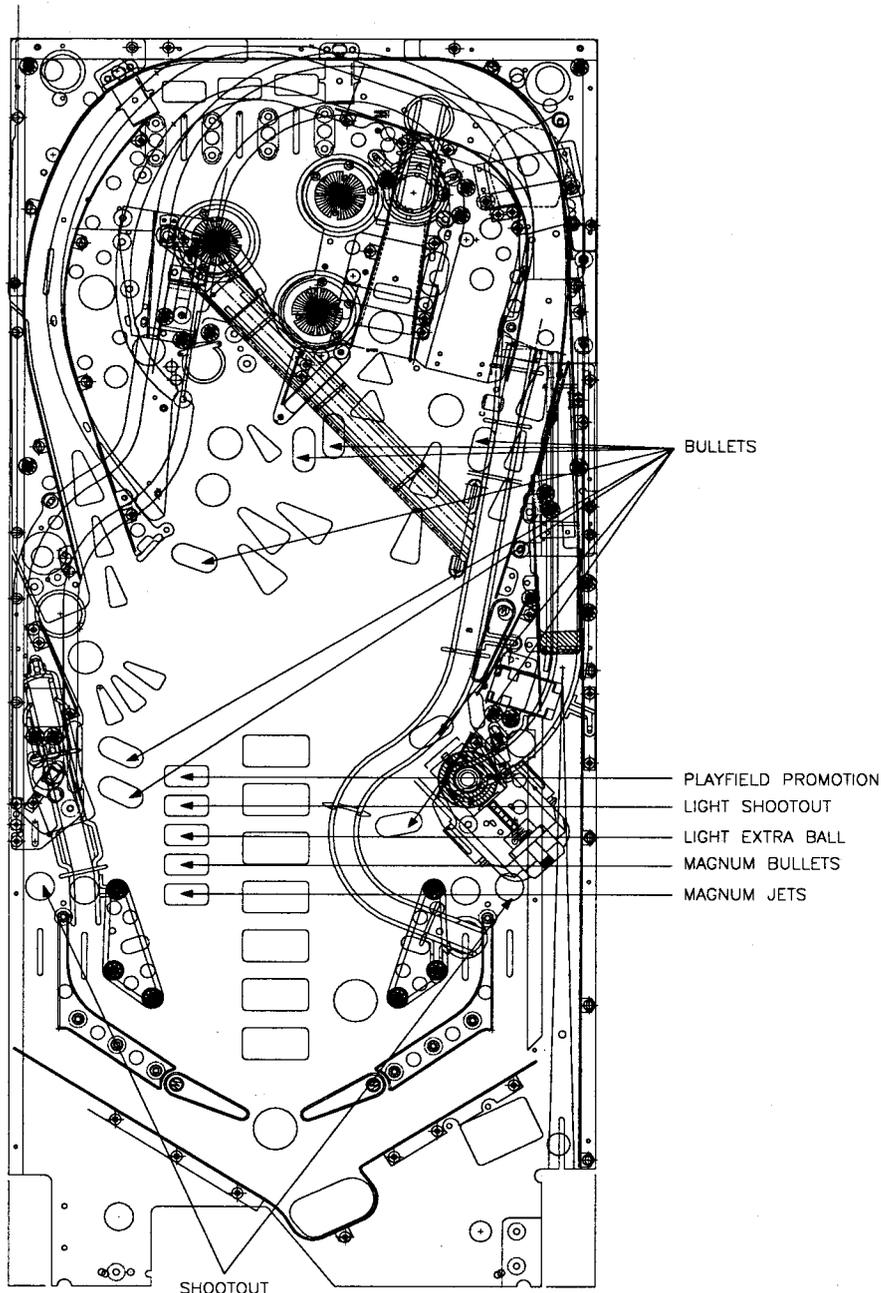
LEFT LOOP AND RIGHT LOOP

LEFT LOOP: Feeds the upper flipper for a left ramp shot. Also, when lit, collect the BANK ROBBER HURRY-UP value, and RICOCHET.

RIGHT LOOP: Feeds the lanes and bumpers normally. If the left return lane is rolled over, MAGNA FORCE lights for a short period of time. MAGNA FORCE grabs the ball and releases it, giving the player a slow feed to the left ramp.
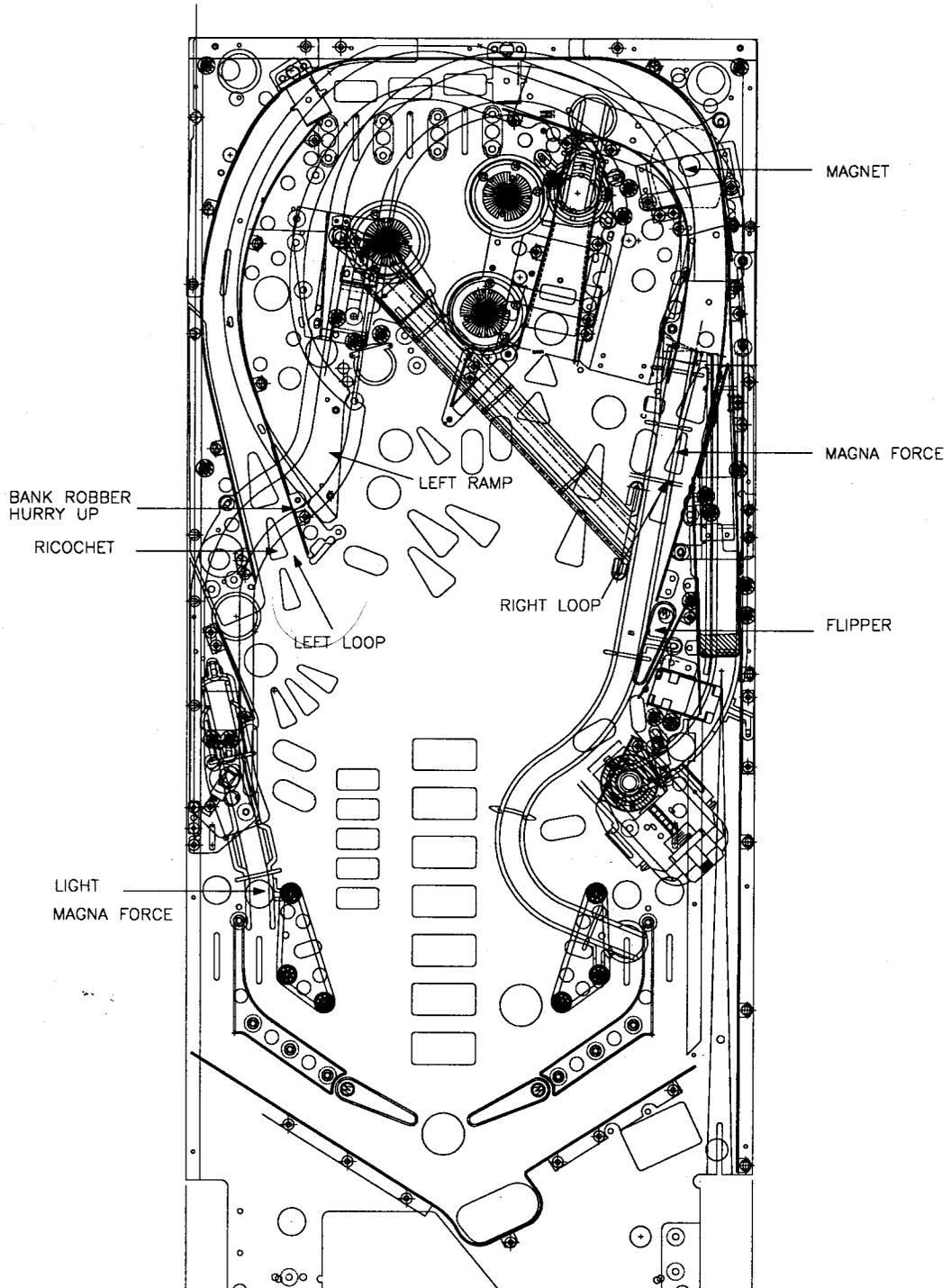
LEFT RAMP AND RIGHT RAMP

LEFT RAMP: Shooting the left ramp builds up to promotions, which increases your RANK. Your rank is awarded in bonus count, and determines what multiplier the player's Playfield Promotion is set at. At Chief, the player starts Super Chief mode.

RIGHT RAMP: Shooting the right ramp collects HELICOPTERS. At 'X' helicopters, FEEL LUCKY lights at the Warehouse.
  Also, shooting two right ramps consecutively diverts the ball to the right flipper and lights RICOCHET on the left loop for a short period of time. RICOCHETS increase with each one completed, and are reset at each new ball.

FEEL LUCKY?

LEFT RAMP

RICOCHET

RIGHT RAMP
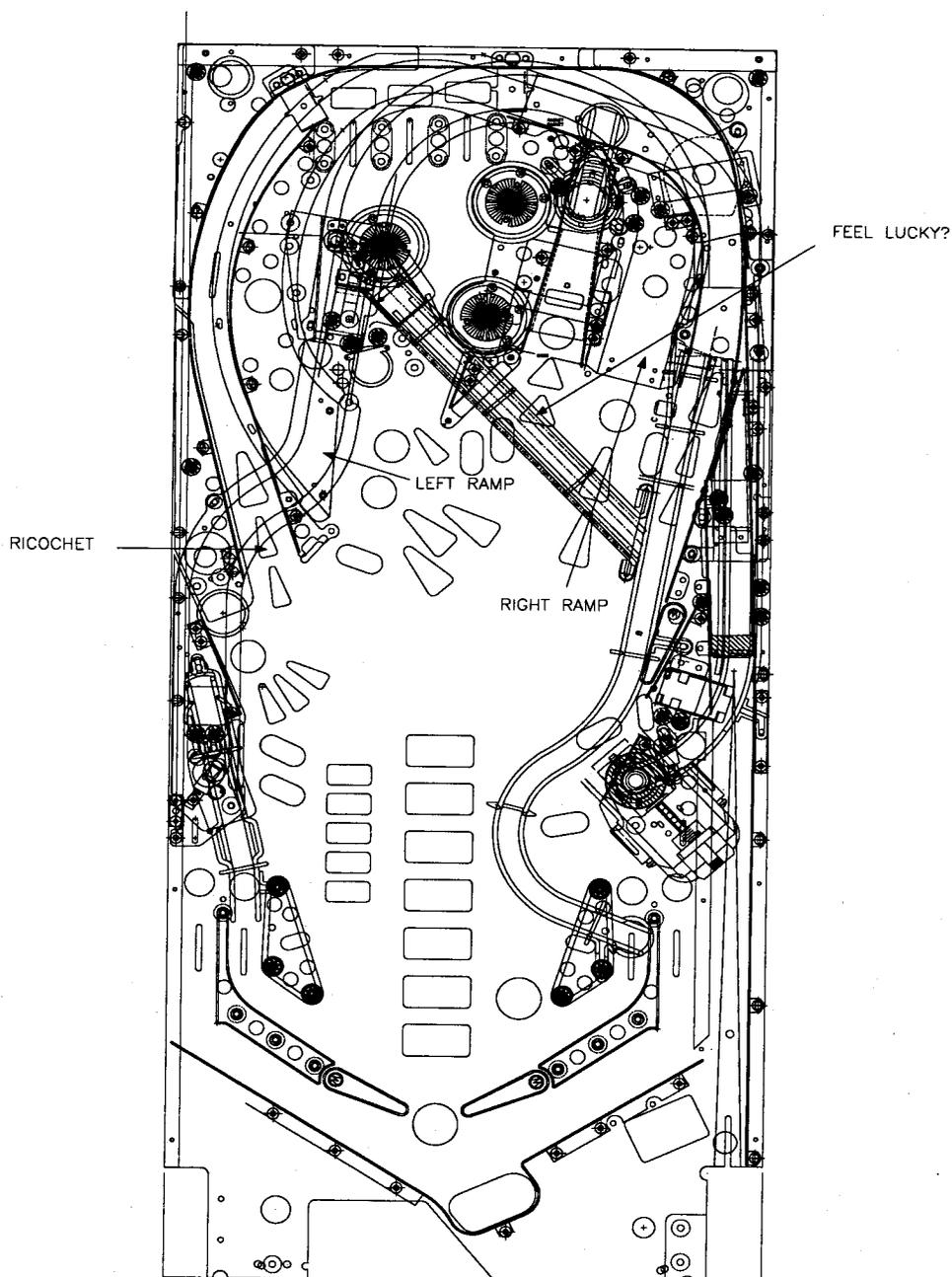
THE WAREHOUSE

Shooting the Warehouse will lower the drop target for a short period of time. Shooting it again before the drop target raises will award the player with a CONTRABAND item.

When lit, the Warehouse will collect Magazine award.

When FEEL LUCKY is lit, the player will be given a choice between collecting points, or the opportunity to use the gun to shoot for features (Bonus X, Extra Ball, etc.). Hitting the left flipper will award the points and put the ball back into play. Hitting the right flipper loads the gun and starts flashing a bullet. Pull the trigger to shoot at the flashing target. A completed shot will award the feature.

CONTRABAND LIGHT

MAGAZINE AWARD LIGHT

WAREHOUSE
DROP TARGET

FEEL LUCKY?

H

THE SAFEHOUSE

Shooting the Safehouse once will start the SAFEHOUSE light blinking. Shoot it again and the player will be awarded with a Safehouse Feature. The features are:

BANK ROBBER HURRY-UP: A hurry-up that can be collected on the left loop.

WAREHOUSE HURRY-UP: Shoot the Warehouse before the hurry-up finishes and the player is rewarded with a two-ball multiball where the jackpot shot is the Warehouse and the JACKPOT is the hurry-up score.

LIGHT EXTRA BALL : Lights the extra ball at the HQ Hole.

SUPER LOOPS: The outer loops are lit for a short period of time. Make the loops to restart the timer, and the loop value increases.

ALCATRAZ: A two-ball multiball.

WAREHOUSE

SAFEHOUSE

SAFEHOUSE LIGHT

BANK ROBBER
HURRY-UP

EXTRA BALL

SUPER LOOPS

SHOOT AGAIN

I
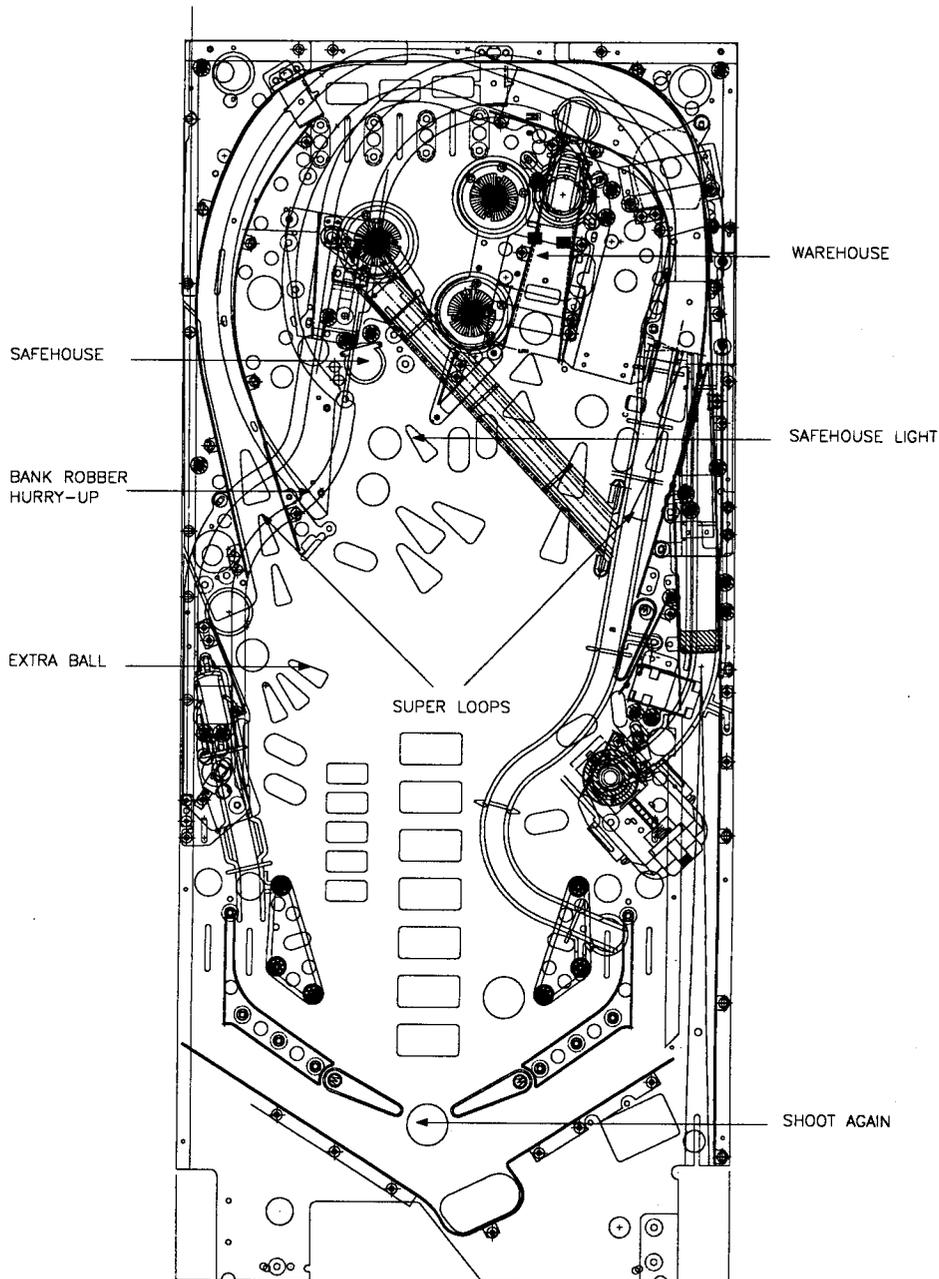
THE HQ HOLE

When RANSOM is lit, collects the Ransom value multiplied by whatever current multiplier affects it. It also collects Extra Balls when lit. When HQ light is lit, it starts the current flashing SHOTGUN SHELL mode. They are:

BARROOM BRAWL: Shoot both ramps for a limited amount of time. The left ramp is worth twice as much as the right ramp.

CAR CHASE: Shoot both loops and the left ramp. The player has a limited amount of time to make four of any combinations of these shots for an added finishing bonus.

WAREHOUSE RAID: Shoot the Warehouse for increasing score values and to collect Contraband items for a limited amount of time.

LETTER BOMB: Hit thirty targets before time expires.

MEET THE MOB: Both ramps and both loops are lit. Shoot all four shots before time expires.

STOP SCORPIO: Two of the CROSSHAIR shots are lit. Make one before time runs out, and that one is collected, and another Crosshair starts timing down. The Safehouse adds more Crosshair shots. Shooting the HQ shot ends the mode (as does all the crosshair shots timing out), and awards points based on how many Scorpio shots the player has made.

CRIME WAVE: Once all of the above modes have been completed, the player can enter the Crime Wave. During the Crime Wave, all the shots are lit for big points, and the player can play unlimited autofeed multiball action for a limited amount of time.

Once a mode has been played, the player must relight the HQ light by shooting either of the outer loops.

J
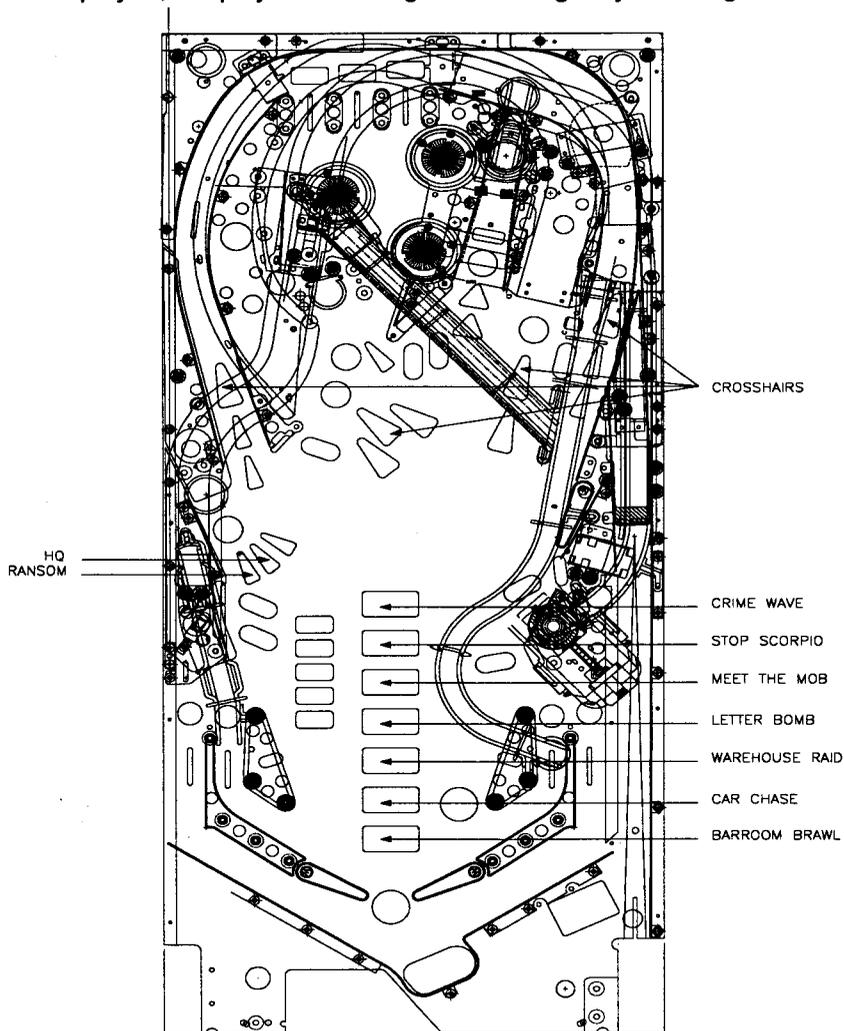
SECTION ONE

GAME OPERATION
AND TEST INFORMATION

ROM SUMMARY

IC	Type	Location	Board	Part Number
Game ROM 1 (Domestic)	27c040	U6	CPU	A-5343-50030-1A
Game ROM 1 (Foreign)	27c040	U6	CPU	A-5343-50030-1X
Security Chip	PIC16C57	U22	CPU	A-5400-50030-1
Music/Speech ROM	27c040	SU2	Audio	A-5343-50030-S2
Music/Speech ROM	27c040	SU3	Audio	A-5343-50030-S3
Music/Speech ROM	27c040	SU4	Audio	A-5343-50030-S4
Music/Speech ROM	27c040	SU5	Audio	A-5343-50030-S5
Music/Speech ROM	27c040	SU6	Audio	A-5343-50030-S6
Music/Speech ROM	27c040	SU7	Audio	A-5343-50030-S7

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

DIRTY HARRY IS A FOUR BALL GAME

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

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

Temp: 32°F to 100° F, (0°C to 38°C)

Humidity: Not to exceed 95% relative.

Weight: 325 lbs 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

FRONT   REAR
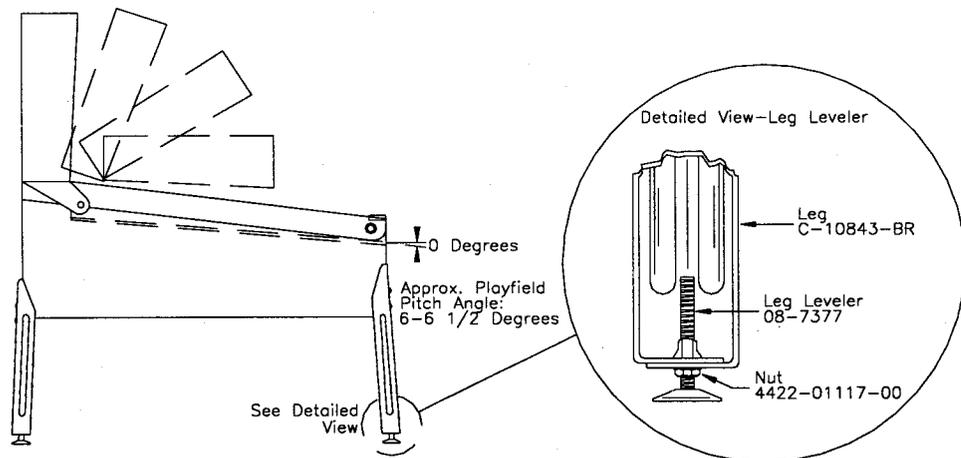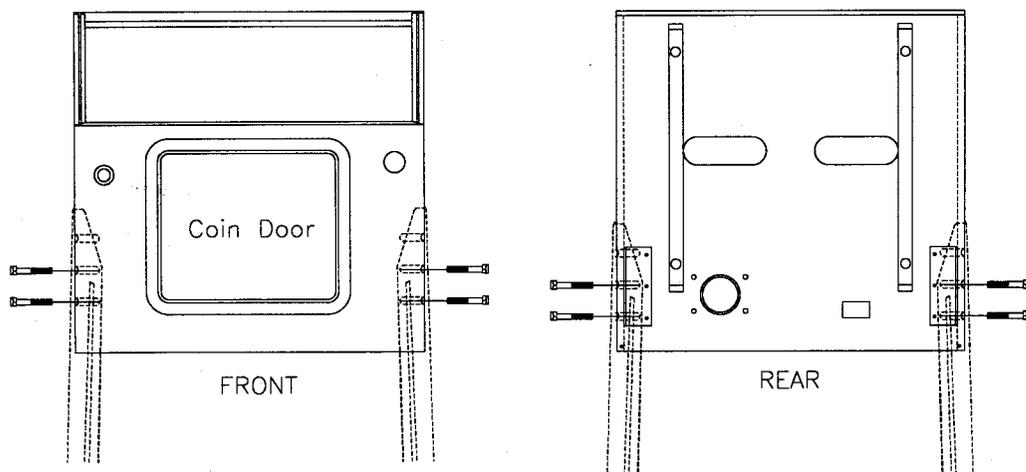
VIEW 2

1-2

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.   Install the gun handle. Remove the gun handle from the bottom inside of the cabinet. Then, using the hardware included with the gun handle plus two more 10-24 bolts, 10-24 ESN nuts and .219 x .500 x .063 flat washers located in the parts bag, attach the gun handle to the outside of the cabinet in the upper left corner (see diagram below). After the gun handle is in place, plug the connector from the handle into the matching handle in the cabinet.
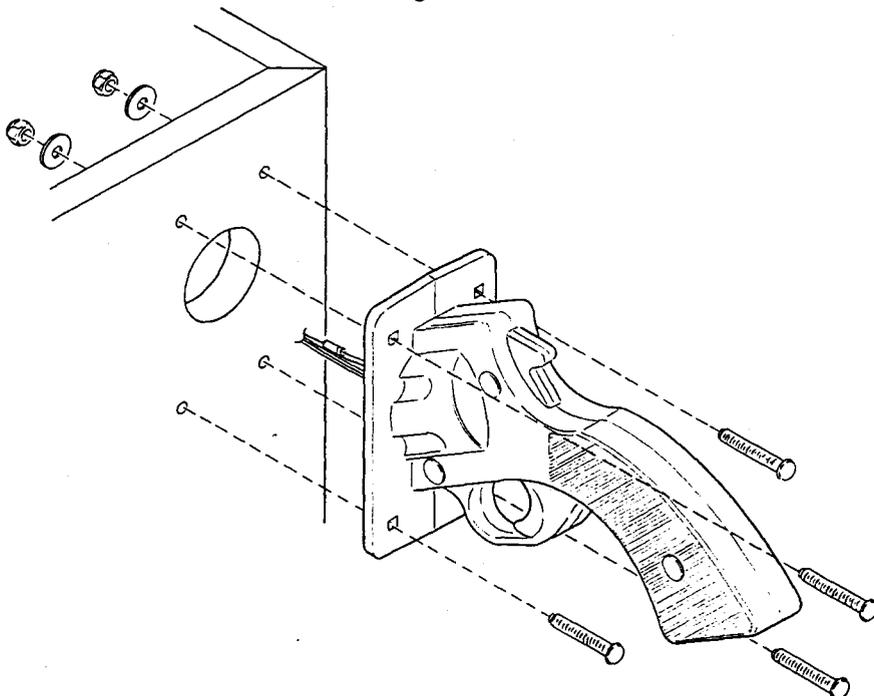
9.   Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). *Note:* This measurement must be made ON the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.

! 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 grove 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. This game uses four balls.

12.   Install full playfield mylar, if desired.

      NOTE: The 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 03-9310-1 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.
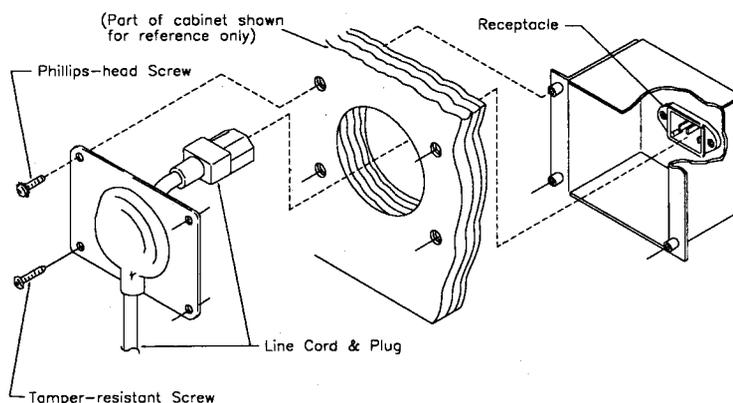
RAISING THE PLAYFIELD
⚠ CAUTION

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

To raise the playfield.

1. 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.

Bottom Arch ①
Safety Bracket (2 used)
Rear Guide Leg (2 used)
Wood Guide Rail (2 used)
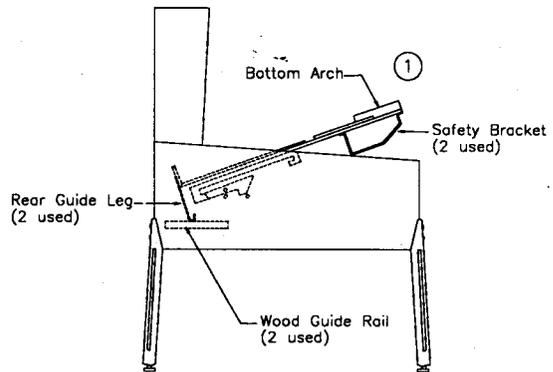
2. Pull the playfield out toward you until it stops (rest position) and raise it approximately 3". **Be sure playfield is in locked position and does not slide back into the cabinet. If it does, repeat Step 2 before proceeding to Step 3.**

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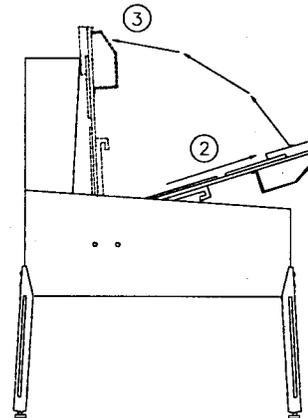
To lower the playfield.

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

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

Slide Mechanism (2 used)
Pivot Mechanism (2 used)
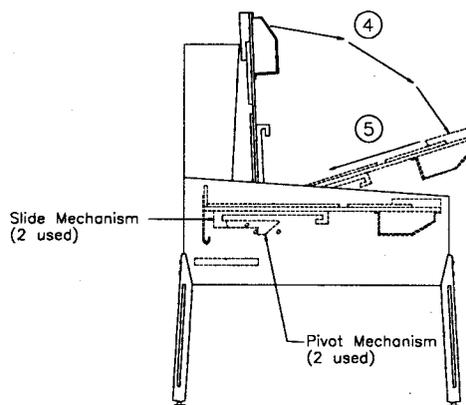
GAME CONTROL LOCATIONS

Cabinet Switches

The <u>On-Off Switch</u> is on the bottom of the cabinet near the right front leg.
The <u>Start Button</u> 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 <u>Service Credits</u> button puts credits on the game that are not included in any of the game audits.
The <u>Volume Up</u> (+) button raises the sound level of the game. Press and hold the button until the desired level is reached.
The <u>Volume Down (-)</u> 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 <u>Begin Test</u> button starts the Menu System Operation and changes the Coin Door Buttons from Normal Function to Test Function.

Test Function

The <u>Escape</u> button allows you to get out of a menu selection or return to the Attract Mode.
The <u>Up (+)</u> button allows you to cycle forward through the menu selections or adjustment choices.
The <u>Down (-)</u> button allows you to cycle backward through the menu selections or adjustment choices.
The <u>*Enter</u> button allows you to get into a menu selection or lock in an adjustment choice.
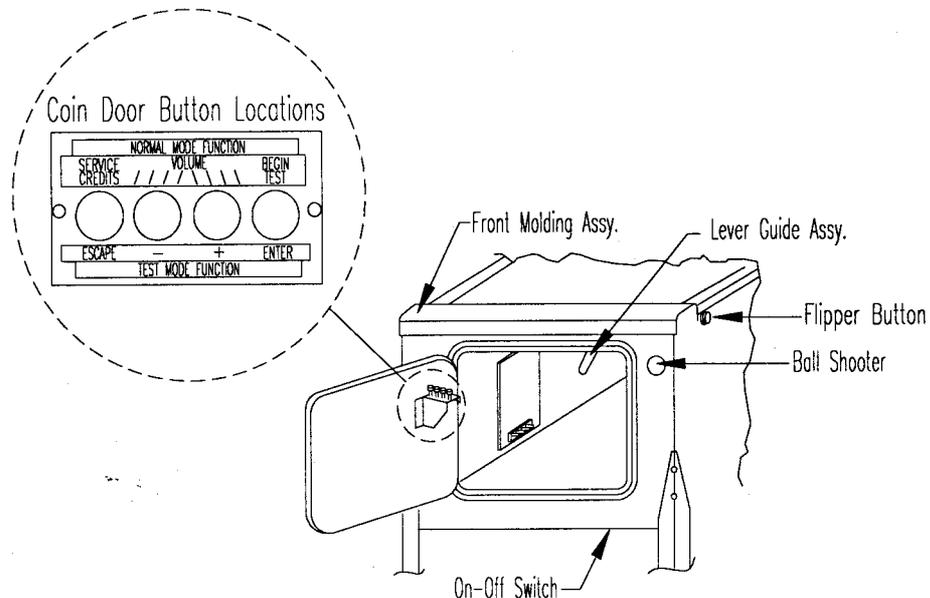
To reset the High Scores, hold down the Begin Test/Enter switch for 5 seconds while in the Attract mode.

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. The section entitled 'Error Messages' contains more details concerning messages displayed at each game turn-on.

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:	Game Name		Sound Rev. L-1	
	500XX	Rev. L-X	SY. 0.X0	X-X-94

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 score display shows a series of messages informing the player concerning, recent highest scores*, "custom messages*", and the score to achieve 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. Press the gun handle trigger to launch a ball. Press the flipper buttons to operate the flippers.

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.

Press Up
Increases sequence;
(ex. A.1, A.2, A.3, A.4).

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 Down
Decreases sequence;
(ex. A.4, A.3, A.2, A.1).

Use Up or Down to cycle through the menu selections.

T. TEST MENU

Use Escape and Enter to move into and out of the selected 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 Magnet Test |
| T.17 Gun Test |
| T.18 Trap Door Test |
| T.19 Empty Balls Test |

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-Stamps**

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

B.2   Earning Audits

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

*These audits are NOT resettable. 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	02	Total Plays*	00
B.3	03	Total Free Play	00
B.3	04	Free Play Percent	00
B.3	05	Replay Awards	00
B.3	06	Percent Replays	00
B.3	07	Special Awards	00
B.3	08	Percent Special	00
B.3	09	Match Awards	00
B.3	10	Percent Match	00
B.3	11	H.S.T.D. Credits	00
B.3	12	Percent H.S.T.D	00
B.3	13	Extra Ball	00
B.3	14	Percent Extra Ball	00
B.3	15	Tickets Awarded	00
B.3	16	Percent Tickets	00
B.3	17	Left Drains	00
B.3	18	Right Drains	00
B.3	19	Average Ball Time	00
B.3	20	Average Game Time	00
B.3	21	Play Time	00:00:00
B.3	22	Minutes On	00
B.3	23	Balls Played	00
B.3	24	Tilts	00
B.3	25	Replay 1 Awards	00
B.3	26	Replay 2 Awards	00
B.3	27	Replay 3 Awards	00
B.3	28	Replay 4 Awards	00
B.3	29	1 Player Games	00
B.3	30	2 Player Games	00
B.3	31	3 Player Games	00
B.3	32	4 Player Games	00
B.3	33	H.S.T.D. Reset Count	00
B.3	34	Burn-in Time†	00:00:00
B.3	35	1st Replay Level	00
B.3	36	Left Flipper	00
B.3	37	Right Flipper	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 resettable.

B.4 Feature Audits

B.4	01	Buy-In Ex. Balls	Number Of Extra Balls Bought	00
B.4	02	Multiballs	Total Number Of Multiballs Played	00
B.4	03	Time Per Credit	Total Time Per Credit	00
B.4	04	Game Ball Saves	Number Of Times The Ball Was Saved	00
B.4	05	Modes Started	Number Of Modes Started	00
B.4	06	Chiefs	Number Of Times Chief Rank Reached	00
B.4	07	Playfield Promo	Number Of Times Playfield Promotion Reached	00
B.4	08	Champ Credits	Number Of Champion Credits Awarded	00
B.4	09	Ball Searches	Number Of Ball Searches	00
B.4	10	5 Ball Searches	Number Of 5 Sequential Ball Searches	00
B.4	11	Magazine Ex Ball	Number Of Extra Balls Lit From Magazine	00
B.4	12	Feel Lucky Ex Ball	Number Of Extra Balls Lit From Feel Lucky	00
B.4	13	Safehouse Ex Ball	Number Of Extra Balls Lit From Safehouse	00
B.4	14	Contraband Ex Ball	Number Of Extra Balls Lit From Contraband	00
B.4	15	Left Ramps Made	Number Of Left Ramps Made	00
B.4	16	Right Ramps Made	Number Of Right Ramps Made	00
B.4	17	Safehouse Awards	Number Of Safehouse Awards Given	00
B.4	18	Left Loops	Number Of Left Loops Made	00
B.4	19	Right Loops	Number Of Right Loops Made	00
B.4	20	Ransoms Made	Number Of Ransom Awards Collected	00
B.4	21	Ricochets Made	Number Of Ricochet Awards Collected	00
B.4	22	Jackpots	Number Of Jackpots Collected	00
B.4	23	Super Jackpots	Number Of Super Jackpots Collected	00
B.4	24	0 Jackpot Mballs	Number Of Multiballs With No Jackpots	00
B.4	25	Warehouse Mballs	Number Of Warehouse Hurry-Up Multiballs	00
B.4	26	Warehouse Jpots	Number Of Warehouse Hurry-Up Jackpots	00
B.4	27	Alcatraz	Number Of Alcatraz Multiballs Started	00
B.4	28	Alcatraz Jpots	Number Of Alcatraz Jackpots Collected	00
B.4	29	Officers	Number Of Times OFFICER Rank Reached	00
B.4	30	Sergeants	Number Of Times SERGEANT Rank Reached	00
B.4	31	Detectives	Number Of Times DETECTIVE Rank Reached	00
B.4	32	Lieutenants	Number Of Times LIEUTENANT Rank Reached	00
B.4	33	Captains	Number Of Times CAPTAIN Rank Reached	00
B.4	34	Bank Robber Hup Hit	Number Of Times Bank Robber Hurry-Up Coil	00
B.4	35	Super Loops Hit	Number Of Super Loops Collected	00
B.4	36	Skill Choice 1	Number Of Times Skill Shot Choice 1 Taken	00
B.4	37	Skill Choice 2	Number Of Times Skill Shot Choice 2 Taken	00
B.4	38	Skill Choice 3	Number Of Times Skill Shot Choice 3 Taken	00
B.4	39	Shoot-outs	Number Of Times Shoot-out Awarded	00
B.4	40	Special Modes	Number Of Times Special Mode Started	00

B.5   Histograms

B.5	01	0-1.9 Million Scores	00%	00
B.5	02	2-4.9 Million Scores	00%	00
B.5	03	5-9.9 Million Scores	00%	00
B.5	04	10-19 Million Scores	00%	00
B.5	05	20-29 Million Scores	00%	00
B.5	06	30-39 Million Scores	00%	00
B.5	07	40-49 Million Scores	00%	00
B.5	08	50-69 Million Scores	00%	00
B.5	09	70-99 Million Scores	00%	00
B.5	10	100-149 Million Scores	00%	00
B.5	11	150-199 Million Scores	00%	00
B.5	12	200-299 Million Scores	00%	00
B.5	13	Over 300 Million Scores	00%	00
B.5	14	Game Time 0.0-1.0 Mins	00%	00
B.5	15	Game Time 1.0-1.5 Mins	00%	00
B.5	16	Game Time 1.5-2.0 Mins	00%	00
B.5	17	Game Time 2.0-2.5 Mins	00%	00
B.5	18	Game Time 2.5-3.0 Mins	00%	00
B.5	19	Game Time 3.0-3.5 Mins	00%	00
B.5	20	Game Time 3.5-4.0 Mins	00%	00
B.5	21	Game Time 4-5 Mins	00%	00
B.5	22	Game Time 5-6 Mins	00%	00
B.5	23	Game Time 6-8 Mins	00%	00
B.5	24	Game Time 8-10 Mins	00%	00
B.5	25	Game Time 10-15 Mins	00%	00
B.5	26	Game Time Over 15 Mins	00%	00

B.6   Time-Stamps
Time-Stamps Menu allows you to view dates and times that are important to game software.

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

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

T.1	Switch Edges Test		T.11	Display Test
T.2	Switch Levels Test		T.12	Flipper Coil Test
T.3	Single Switch Test		T.13	Ordered Lamps Test
T.4	Solenoid Test		T.14	Lamp Row-Col
T.5	Flasher Test		T.15	DIP Switch Test
T.6	General Illumination Test		T.16	Magnet Test
T.7	Sound & Music Test		T.17	Gun Test
T.8	Single Lamps Test		T.18	Trap Door Test
T.9	All Lamps Test		T.19	Empty Balls Test
T.10	Lamps And Flasher Test			

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 then 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 then 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, Solenoid 1 shows in the display and the corresponding solenoid activates. 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 exclusively. This, like the Solenoid Test, has three modes - Repeat, Stop, and Run. During this test only one flashlamp circuit should pulse at a time. The system has detected a problem if more then one circuit pulses, a circuit stays on, or no circuits pulse 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 circuit shows in the display and the corresponding bulb(s) flash. Press the Up or Down buttons to cycle through all of the flashlamps circuits one at a time. The same circuit pulses until press 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. No flashlamp circuit should be active 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 lights. 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 occurs 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. 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 then 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.

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   Magnet Test

This test checks the right loop switch and the loop magnet.

Roll a ball up the right loop. The R. MAG OPTO. should close, and the R. LOOP MAGNET should activate and catch the ball, then release it. Any other result indicates an error.

T.17 Gun Test
This test checks the gun movement and home switch.

Press the Up button and the gun will rotate continuously. Press the Down button and the gun will stop. The POSITION SW. should close when the gun is pointing almost straight at the backbox, and open again just before the gun begins rotating counter-clockwise. If a ball is dropped into the gun chamber it should be gently kicked out. Any other results indicate an error.
Note - The gun will automatically stop moving after about 20 seconds.

T.18 Trap Door
This test checks the trapdoor diverter and both switches in the gun mini-trough under the playfield.

Pull the trigger (ball launch). A ball should be kicked into the shooter lane, the trapdoor diverter should open, and the ball should be autoplunged into the gun mini-trough. Each of the gun mini-trough switches (GUN POPPER and GUN LOCKUP) should close, and the ball should be kicked up into the gun, where it should be gently kicked out. Any other results indicate an error.

T.19 Empty Balls
This test checks the poppers and kickers that are under the playfield.

Press the enter button and all balls loaded into the poppers and troughs should be kicked out until there are no balls in any under playfield location. Any other result indicates a problem.
Note - As balls roll down the playfield and into the outhole, they will be continually kicked out of the trough.

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 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 the desired letter and punctuation.

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	3	2	2	1	Off
A.2 04	Ball Save Time	15 sec	10 sec	6 sec	3 sec	N/A
A.2 14	HQ Difficulty	Easy	Easy	Medium	Hard	Extra Hard
A.2 15	Badge Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard
A.2 16	Rank Difficulty	Easy	Easy	Medium	Hard	Hard
A.2 18	Bullet Difficulty	Easy	Easy	Medium	Hard	Hard
A.2 19	Magazine Difficulty	Easy	Easy	Medium	Hard	Hard
A.2 20	Feel Lucky Difficulty	Extra Easy	Easy	Medium	Hard	Hard

NOTE: See individual adjustment for definition of extra easy, easy, medium, hard, and extra hard.

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	Balls Per Game	5	3
A.1 07	Replay Start	1,000,000,000	500,000,000
A.2 14	HQ Difficulty	Hard	Medium
A.2 15	Badge Difficulty	Hard	Medium
A.2 16	Rank Difficulty	Hard	Medium
A.2 18	Bullet Difficulty	Hard	Medium

NOTE: See individual adjustment for definition of extra easy, easy, medium, hard, and extra hard.

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:

Ad	Name	New Setting
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:

Ad	Name	New Setting
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:

Ad	Name	New Setting
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 game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups. *NOTE:* German replay starts at 500,000,000.

Preset Adjustments Table for German Games

Adj #	Adj Description	German 1 U.9 17	German 2 U.9 18	German 3 U.9 19	German 4 U.9 20	German 5 U.9 21	German 6 U.9 22
A.1 14	Replay Award	Credit	Ticket	Audit	Credit	Ticket	Audit
A.1 15	Special Award	Credit	Ex. Ball	Points	Credit	Ex. Ball	Points
A.1 16	Match Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.1 19	Match Feature	7%	7%	Off	7%	7%	Off
A.3 01	Game Pricing	6spiele/5DM	6spiele/5DM	6spiele/5DM	7spiele/5DM	7spiele/5DM	7spiele/5DM
A.4 02	H.S.T.D. Award	Credit	Ticket	Credit	Credit	Ticket	Credit
A.4 04	Champion Credits	03	03	00	03	03	00
A.4 05	H.S.T.D. 1 Credits	01	01	00	01	01	00
A.4 06	H.S.T.D. 2 Credits	00	00	00	00	00	00
A.4 07	H.S.T.D. 3 Credits	00	00	00	00	00	00
A.4 08	H.S.T.D. 4 Credits	00	00	00	00	00	00

• **German DIP Switch settings are:**

Sw4	Sw5	Sw6	Sw7	Sw8
On	On	On	On	Off

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.

* French DIP Switch settings are:	Sw4	Sw5	Sw6	Sw7	Sw8
	On	On	On	Off	Off

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.

*For Auto% Replay.

1-24

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 of four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

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

*For Auto% Replay; ** For Fixed Replay.

A.1 18 Maximum Ticket/Player

The amount of Tickets each player can earn.

Range: 00 to 100.

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 game.

Settings: Off
                 1/2 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.

Settings: 1-6
                 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.

Settings: 1-5
                 OFF

Factory Default: 2

Example of ball saves usage:
        With BALL SAVES = 1 (factory default)

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

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

        BALL 3:   Ball save is NOT available.

A.2 04 Ball Save Time
This sets the number of seconds that the ball saver is activated.

Settings: 3-15 seconds

Factory Default: 6 seconds

A.2 05 Extra 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 CONTRABANDS required for an extra ball to achieve the requested percentage. Set to FIXED to disable the automatic percentaging of the CONTRABAND Extra Ball.

Settings: FIXED
                 15-40%

Factory Default: 20%

A.2 06 Extra Ball Level
This determines the initial level for the percentaged extra ball.

Settings: 1-5

Factory Default: 1

A.2 07 Magazine Extra Ball Memory
This determines whether the Extra Ball that is lit from the MAGAZINE stays in memory from ball to ball.

Settings: YES
                 NO

Factory Default: YES

A.2 08 Safehouse Extra Ball Memory
This determines whether the Extra Ball that is lit from the SAFEHOUSE stays in memory from ball to ball.

Settings: YES
                 NO

Factory Default: YES

A.2 09 Feel Luck Extra Ball Memory
This determines whether the Extra Ball that is lit from FEEL LUCKY stays in memory from ball to ball.

Settings: YES
                 NO

Factory Default: YES

A.2 10 Contraband Extra Ball Memory
This determines whether the Extra Ball that is lit from CONTRABAND stays in memory from ball to ball.

Settings: YES
                 NO

Factory Default: YES

A.2 11 Attract Mode Music
This determines whether or not the attract mode plays music to attract the player.

Settings: YES
               NO

Factory Default: NO

A.2 12 Def. Aux Champ
This is the Arrest start value for CRIME WAVE champion.

Settings: 1-50

Factory Default: 3

A.2 13 Cred. Aux Champs
This is the number of credits that will be awarded when the player exceeds the current CRIME WAVE champion level.

Settings: 0-3

Factory Default: 1

A.2 14 HQ Difficulty
This determines how easy it is to start modes from the HQ shot.

Settings: EASY   HQ always lit.
              MEDIUM   Lit at ball start, both light HQ's lit.
              HARD   Lit at ball start, light HQ's alternate.
              EXTRA-HARD Lit at game start, light HQ's alternate.

Factory Default: MEDIUM

A.2 15 Badge Difficulty
This determines how easy it is to light BADGES, which determines how hard it is to light START MULTIBALL.

Settings: EXTRA-EASY No badge progression, spot badge per ball.
              EASY   Normal badge progression, spot badge per ball.
              MEDIUM   Normal badge progression, spot 1 badge/ball to 1st multiball only.
              HARD   3 badges lit, spot 1 badge/ball to 1st multiball only.
              EXTRA-HARD 3 badges lit, no badges spotted.

Factory Default: MEDIUM

A.2 16 Rank Difficulty

This determines how hard it is to advance in rank.

Settings: EASY   One ramp hit per rank, rank never resets.
       MEDIUM   Normal progression, rank resets at chief.
       HARD   Normal progression, count clears per ball, rank resets at chief.

   Factory Default: MEDIUM

A.2 17 Spot Bullets

This determines if bullets will be spotted from the ramps.

Settings: YES
       NO

  Factory Default: YES

A.2 18 Bullet Difficulty

This determines how easy it is to collect bullets for magazine awards.

Settings: EASY   Ramps always spot bullets.
       MEDIUM   Ramps spot bullets during main play.
       HARD   Ramps never spot bullets.

  Factory Default: MEDIUM

A.2 19 Magazine Difficulty

This determines how easy it is to collect magazine awards.

Settings: EASY   Spot 1 award at game start.
       MEDIUM   Magazine empty at game start.
       HARD   Uncollected awards cleared at ball end.

  Factory Default: MEDIUM

A.2 20 Feel Lucky Difficulty

This determines how easy it is to light the FEEL LUCKY feature.

Settings: EXTRA-EASY Lit at ball start.
       EASY   Lit at game start.
       MEDIUM   Normal progression.
       HARD   Normal progression, no memory.

  Factory Default: MEDIUM

A.2 21 Special Mode

This determines whether or not the special mode is available to players.

Settings: YES
       NO

  Factory Default: YES

A.2 22 Timed Plunger

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

Settings: 30-90 seconds
                      OFF

Factory Default: OFF

A.2 23 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 the 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.

Settings: YES
                      NO

Factory Default: NO

A.2 24 Gun Disabled

When this adjustment is set to YES, the gun feature will not be enabled for game play. The diverter and trapdoor leading to the playfield will be kept closed. This adjustment is provided for use when the gun is broken. This will allow the game to continue playing until the gun can be fixed.

Note: *If this adjustment is set to YES the message "GUN IS DISABLED" will be given in the Error Report as a reminder.*

Settings: YES
                      NO

Factory Default: NO

A.2 25 Instructional Speech

When this adjustment is set to YES, instructional speech will be enabled for game play.

Note: *This adjustment will automatically be set to YES if the GERMAN preset is installed.*

Settings: 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.2 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 used 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 1 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        4 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.

1-37

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)         $3.20            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 be 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.

Pricing Table

Country	Coin Chutes Left	Center	Right	4th Chute	Games/Coins	Display	Pricing Adjustments A3 02 03 04 05 06 07 08 09
USA	25¢	$1.00*	25¢	$1.00	1/50¢, 2/75¢, 3/$1 [2]	50¢, 75¢, $1.00	
	25¢	$1.00*	25¢	$1.00	1/75¢, 2/$1.50, 3/$2.00 [2]	1/.75, 3/2.00	
	25¢	$1.00	25¢	$1.00	1/3X25¢ [2]	USA 1/$0.75	
	25¢	$1.00	25¢	$1.00	1/50¢, 2/$1 [2]	USA 2/$1.00	
	25¢	$1.00	25¢	$1.00	1/50¢, 3/$1.00 [2]	USA 3/$1.00	
	25¢	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 3/$1.50, 6/$2.00 [2]	USA 6/$2.00	
	25¢	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 3/$1.50, 5/$2.00 [1,2]	USA 5/$2.00	
	25¢	$1.00	25¢	$1.00	1/3x25¢, 2/$1.50, 4/$2.00 [2]	1/.75, 4/$2.00	
	25¢	$1.00	25¢	$1.00	1/2x25¢, 2/$1.00, 4/$1.50, 6/$2.00 [2]	6/$2. 00 4/$1.50	
	25¢	25¢	25¢	-	1/4x25¢, 6/$5.00 [2]	1/1, 6/5	
	25¢	25¢	25¢	-	1/4x25¢ [2]	1/$1.00	
Canada	25¢	-	$1.00	-	1/50¢, 2/75¢, 3/$1 [2]	CAN. 50-75-1	
	25¢	-	$1.00	-	1/50¢, 2/$1 [2]	CAN. 2/$1.00	
	25¢	-	$1.00	-	1/50¢, 3/$1.00 [2]	CAN. 3/$1.00	
	25¢	-	$1.00	-	1/2x25¢, 2/4x25¢, 3/$1.00 [2]	3/$1.00 Coin	
	25¢	-	$1.00	-	1/2x25¢, 2/$1.00, 3/$1.50, 6/$2.00 [2]	CAN. 6/$2.00	
	25¢	-	$1.00	-	1/2x25¢, 2/$1.00, 3/$1.50, 5/$2.00 [1,2]	CAN. 5/$2.00	
	25¢	-	$1.00	-	1/2x25¢, 2/$1.00, 4/$1.50, 6/$2.00 [2]	6/$2, 4/1.50	
	25¢	-	$1.00	-	1/3x25¢, 2/$1.50, 4/$2.00 [2]	1/.75, 4/2.00	
	25¢	-	$1.00	-	1/75¢, 2/$1.50, 3/$2.00 [2]	1/.75, 3/2.00	
	25¢	-	$1.00	-	1/3X25¢ [2]	CAN. 1/$0.75	
Austria	5sch	10sch	10sch	-	1/2x5sch, 3/2x10sch [2]	AUSTRIA	
	5sch	-	10sch	-	2/5sch, 5/10sch	CUSTOM	02 00 05 00 01 00 01 00
Australia	20¢	$1	$1	$2	1/$1, 3/$2 [2]	AUSTRALIA 1	
	20¢	$1	$1	$2	1/$1, 2/$2	AUSTRALIA 2	
U.K.	£1.00	50P	20P	10P	1/3x10P, 2/50P, 4/£1 [2]	U. KINGDOM	
Switzerland	1Fr	2Fr	5Fr	-	1/1Fr, 3/2Fr, 7/5Fr [2]	SWISS 1	
	1Fr	2Fr	5Fr	-	1/2Fr, 2/3Fr, 3/4Fr, 5/5F	SWISS 2	
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr, 1/20Fr, 3/50Fr [2]	BELGIUM	
Germany	1DM	2DM	5DM	-	1/2DM, 2/3DM, 3/4DM, 4/5DM [1,2]	GER. 4/5DM	
					1/2DM, 2/3DM, 3/4DM, 5/5DM [2]	GER. 1/2DM	
					1/1DM, 2/2DM, 5/5DM [2]	GER. 1/1DM	
					1/1DM, 2/2DM, 6/5DM [2]	GER. 6/5DM	
Holland	1G	-	1G	-	1/1G [2]	HOLLAND	
Sweden	1Kr	5Kr	10Kr	1Kr	1/10Kr, 2/15Kr, 3/20Kr [1,2]	SWEDEN 1	
	1Kr	5Kr	10Kr	1Kr	1/5Kr [2]	SWEDEN 2	
France	1Fr	5Fr	10Fr	20Fr	1/3x1Fr, 2/5Fr, 5/10Fr , 10/20Fr [2, 3]	TARIF 1	
	1Fr	5Fr	10Fr	20Fr	1/2x1Fr, 3/5Fr, 7/10Fr ,14/20Fr [2, 3]	TARIF 2	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 7/2x10Fr , 7/20Fr [1,2, 3]	TARIF 3	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 4/10Fr, 9/2x10Fr , 9/20Fr [2,3]	TARIF 4	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 5/10Fr, 11/2x10Fr , 11/20Fr [2,3]	TARIF 5	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr , 6/20Fr [2, 3]	TARIF 6	
Italy	500L	500L	500L	-	1/500L [2]	ITALY 1	
	500L	500L	500L	-	1/2x500L, 3/4x500L [1,2]	ITALY 2	
	500L	500L	500L	-	1/2x500L, 2/4x500L [2]	ITALY 3	
Spain	100P	-	500P	-	1/100P, 6/500P [2]	SPAIN	
	25P	-	100P	-	1/25P, 5/100P	CUSTOM	01 00 04 00 01 04 01 00
	25P	-	100P	-	1/25P, 4/100P	CUSTOM	01 00 04 00 01 00 01 00
	25P	-	100P	-	1/2x25P, 2/100P	CUSTOM	01 00 04 00 02 00 01 00
	25P	-	100P	-	1/2x25P, 3/100P	CUSTOM	03 00 12 00 04 00 01 06
Japan	100¥	-	100¥	-	1/100¥ [2]	JAPAN	
Chile	Token	-	Token	-	1/1Token [2]	CHILE	
Denmark	1Kr	5Kr	10Kr	20Kr	1/2x1 Kr, 3/5 Kr, 7/10 Kr [2]	DENMARK 1	
	1Kr	5Kr	10Kr	20Kr	1/5 Kr, 3/10 Kr, 6/20 Kr [1,2]	DENMARK 2	
Finland	1Mka	-	5Mka	-	1/2x1Mka, 3/5Mka [2]	FINLAND 1	
	1Mka	-	5Mka	-	1/3x1 Mka, 2/5Mka [2]	FINLAND 2	
New Zealand	$1.00	-	$2.00	-	1/$1, 3/$2	NEW ZEALAND 1	
	$2.00	-	$1.00	-	1/$1, 3/$2, ($2-$1 door)	NEW ZEALAND 2	
Norway	5Kr	-	10Kr	-	1/5Kr, 2/10Kr, 5/20Kr [2]	NORWAY	
Argentina	10¢	10¢	10¢	-	1/1 [2]	ARGENTINA	
Greece	10D	20D	50D	-	1/2x10D, 1/20D, 3/50D	GREECE	
Antilles	25¢	25¢	1G	-	1/25¢, 4/1G	ANTILLES	
Netherlands	1Hfl	2.5Hfl	2.5Hfl	-	1/1Hfl, 3/2.5Hfl	NETHERLANDS	
Hungary	10F	10F	20F	-	1/1x20F, 1/2x10F, 3/2x20F [2]	HUNGARY	

Note: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected. * Only if Bill Acceptor and Center Coin Chute are available.

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.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 then 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.

Gun Is Disabled
> This message is given when the gun is disabled by adjustment.

Gun Is Broken
> An error has been detected in the gun operation

Trapdoor Is Stuck Open
> The trapdoor diverter in the shooter lane is stuck in the open position.

Trapdoor Is Stuck Closed
> The trapdoor diverter in the shooter lane is stuck in the closed position.

Left Diverter Is Stuck Open
> The left diverter (above the safehouse) is stuck open.

Left Diverter Is Stuck Closed
> The left diverter (above the safehouse) is stuck closed.

Right Diverter Is Stuck Open
> The right diverter is stuck open.

Right Diverter Is Stuck Closed
> The right diverter is stuck closed.

Right Loop Gate Is Stuck Open
> The right loop gate is stuck open.

Right Loop Gate Is Stuck Closed
> The right loop gate is stuck closed.

Right Loop Magnet Is Broken
> The right loop magnet is broken.

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 Board
Transmitter
1.0-1.1 Volts

Photo Transistor Board
Receiver
0.1-0.7V Unblocked
11-13V Blocked

Green   WHT   BLK   Blue

Infrared Ray

Gray-XXX   Black   Gray-Yellow   Orange-XXX
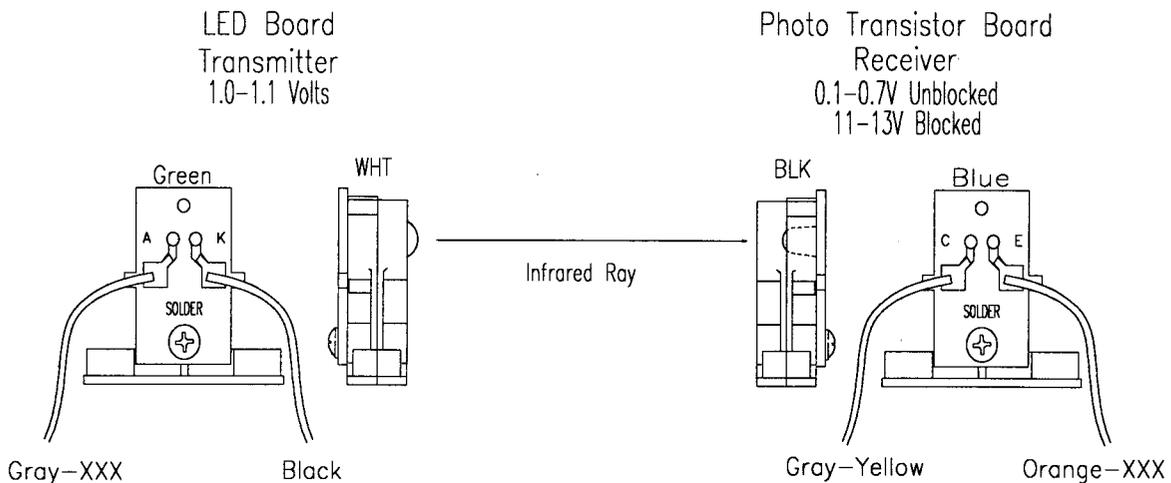
LED List
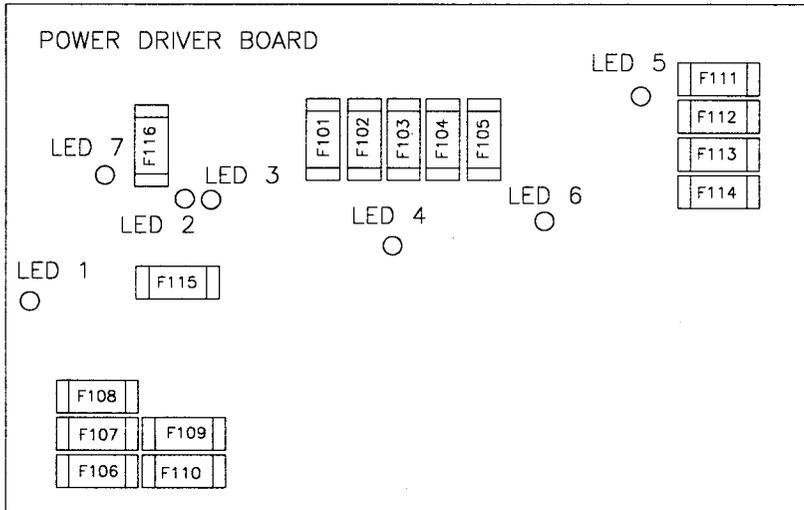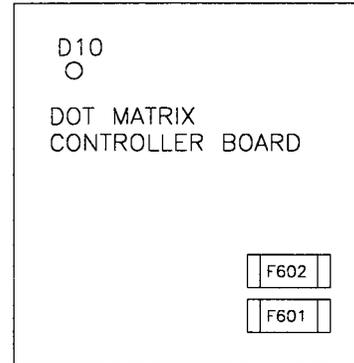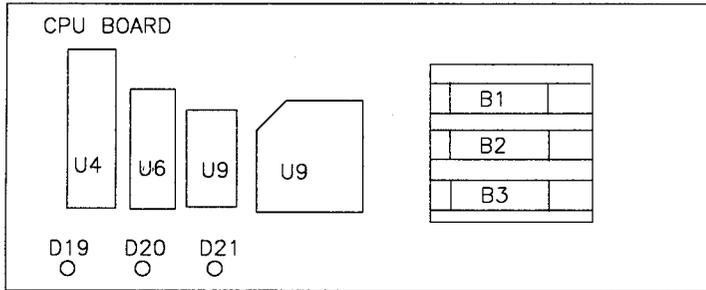
CPU Board
D19, Blanking
D20, Diagnostic
D21, +5VDC
At game turn-on, D19 and D21 are on, D20 is off.
During normal operation, D19 is off, D20 is flashing and D21 is on.

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

```
┌──────────────────┐  ┌──────────────────┐  ┌──────────────────┐
│ FLIPTRONIC II    │  │ SOUND  BOARD     │  │ DOT MATRIX       │
│ CONTROLLER       │  │                  │  │ CONTROLLER BOARD │
│ BOARD            │  │                  │  │                  │
│      F902  F901  │  │                  │  │                  │
│                  │  │   ┌F501┐         │  │        ┌F602┐    │
│      F904  F903  │  │   ┌F502┐         │  │        ┌F601┐    │
└──────────────────┘  └──────────────────┘  └──────────────────┘
```

```
┌─────────────────────────────────────────────────────────┐
│  F116                                        F111         │
│                                              F112         │
│              F101 F102 F103 F104 F105        F113         │
│                                              F114         │
│         F115                                              │
│                                                           │
│    F108                                                   │
│    F107  F109                                             │
│    F106  F110              POWER  DRIVER  BOARD           │
└─────────────────────────────────────────────────────────┘
```
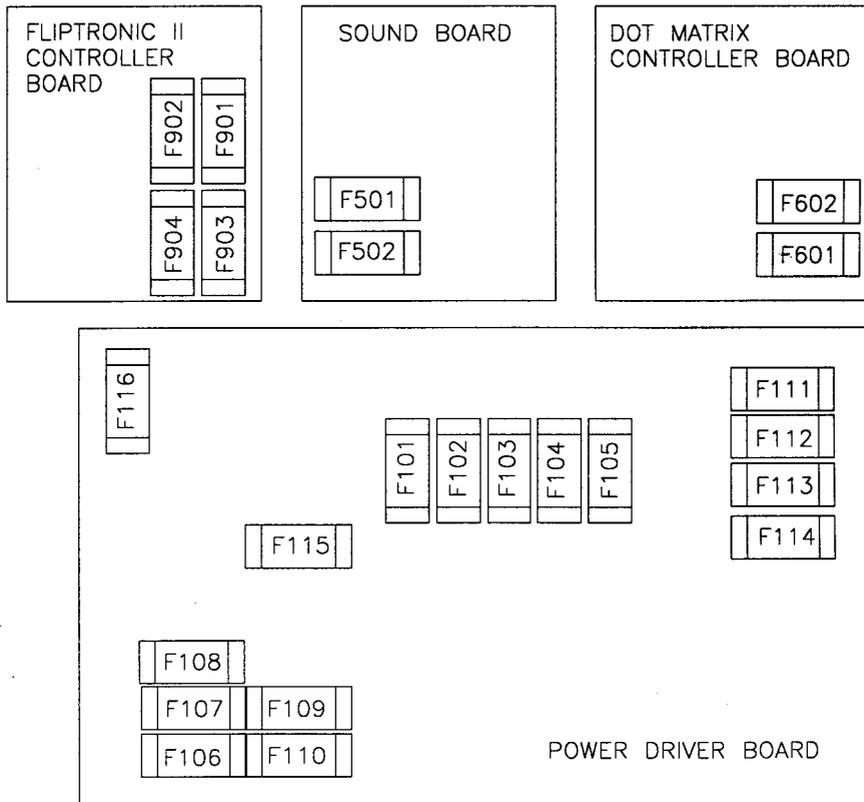
Sound Board

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	Upper Right Flipper	3A, S.B.
F902	Upper Left Flipper	3A, S.B.
F903	Lower Right Flipper	3A, S.B.
F904	Lower 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 EI165, 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.

SECTION TWO

GAME PARTS INFORMATION

50030-BB
Backbox Assembly

Ribbon Cables:

Item	Part Number	Description
1	01-6645	Venting Screen
2	B-10686-1	Knocker Assembly
3	A-12497	Insert Bd.Hinge Assy., Upr.
4	A-14092-6	WPC Mounting Plate Assy.
5	A-12498	Insert Bd. Hinge Assy., Lwr.
6	A-12697-3	Power Driver Assembly
7	A-16917-50030	Sound Board Assembly
8	A-17651-50030	WPC Security CPU Board
9	A-17814-50030	Backbox and Decal Assembly
10	01-9047	Insert Stop Bracket
11	A-19540	Speaker/Display Assembly
12	A-14039.1	Dot Matrix Controller Board
13	A-13379	Lock & Plate Assembly
14	50030-IN	Insert Board
15	A-15472-1	Fliptronic II Board

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

Miscellaneous Parts:

	A-8552-50030	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:27x18-7/8"
	20-9718	Wing Screw, 3/8-16 x 2"
	31-1357-50030	Screened Translight

50030-CAB
Cabinet Assembly
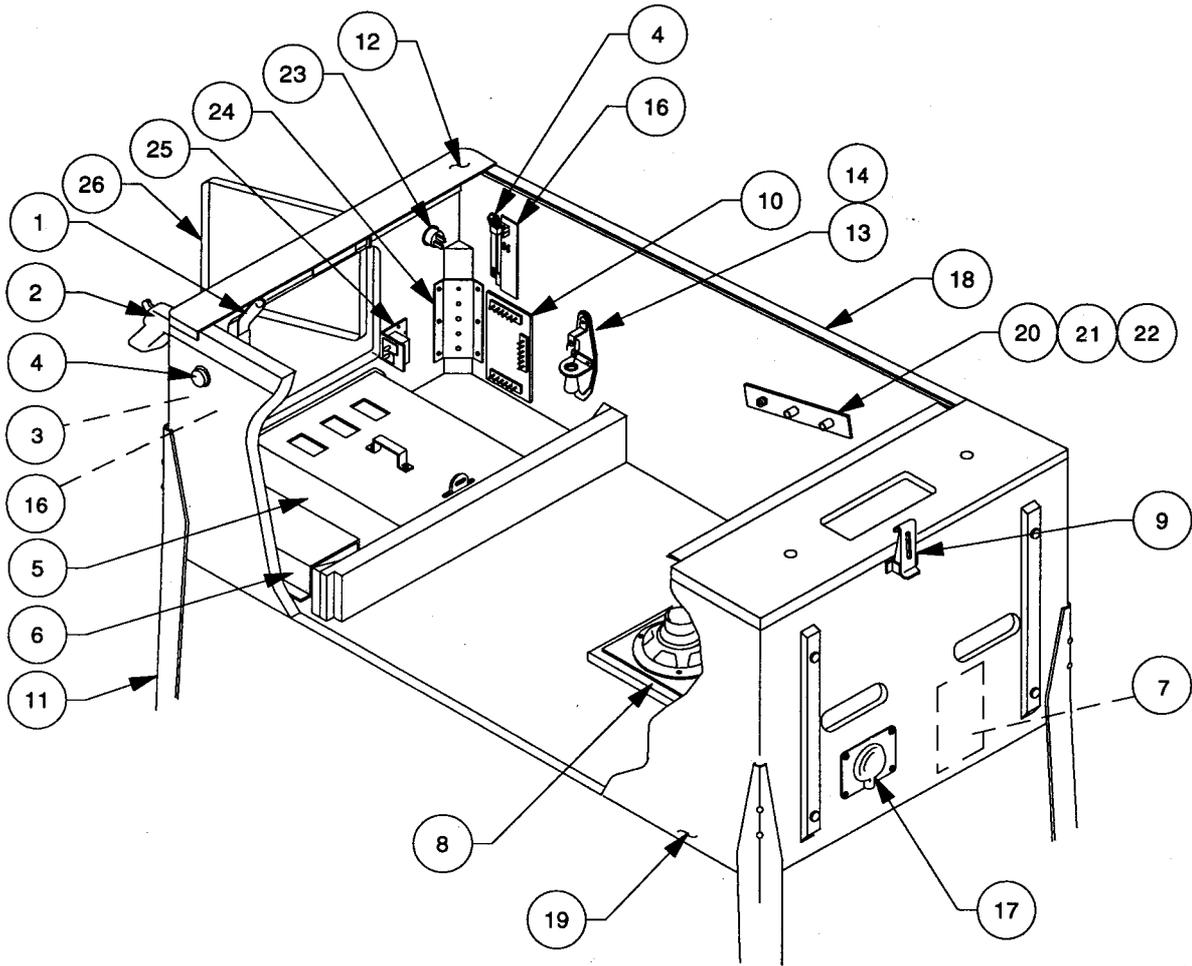
Item	Part Number	Description	Item	Part Number	Description
1	A-16773-1	Lever Guide Assembly	20	01-11408	Plate Spacer (2)
2	A-16113-1	Gun Handle Assembly	21	02-4329-1	Pivot Nut, 7/8" (4)
3	20-9663-20	Push Button w/Sw., Extra Ball	22	02-4352	Pivot Bushing (2)
4	A-16883-4	Flipper Button, Red(2)	23	20-9663-1	Push Button w/Sw., Start
5	A-18531-1	6-Ball Cashhbox Assembly	24	01-11400	Leg Plate (4)
6	A-17540	Univ. Power Interface Assy.	25	A-18249-1	Cable & Interlock Switch Assy.
7	5610-13953-00	WPC Transformer	26	09-61000-1	Coin Door-USA
8	5555-12929-00	Speaker, 4Ω, 6", 25w			
9	20-9347	Toggle Latch		***Miscellaneous***	
10	A-17051-1	Coin Door Interface Board			
11	A-19514	Leg Assembly, Chrome		A-17195	Tilt Switch Assy. w/Cable
12	D-12615	Front Molding Assembly		A-19562.1	Stay Arm Assembly
13	20-6502-A	Plum Bob		01-12352	Clip Bracket
14	A-15361	Tilt Mechanism Assembly		01-9011-L	Backbox Mtg. Bracket, Left
15	*	Cordset		01-9011-R	Backbox Mtg. Bracket, Right
16	A-17316	Opto Flipper Assembly		08-7028-T	Playfield Glass
17	01-10714	Line Cord Cover		08-7377	Leg Leveler Adjuster, 3"
18	A-12359-3	Side Molding Assembly (2)		20-6500	Steel Ball, 1-1/16" (4)
19	11-1202.1	Wood Cabinet			

* See Application Chart p.2-35.

A-17651-50030
WPC CPU Security Board Assembly
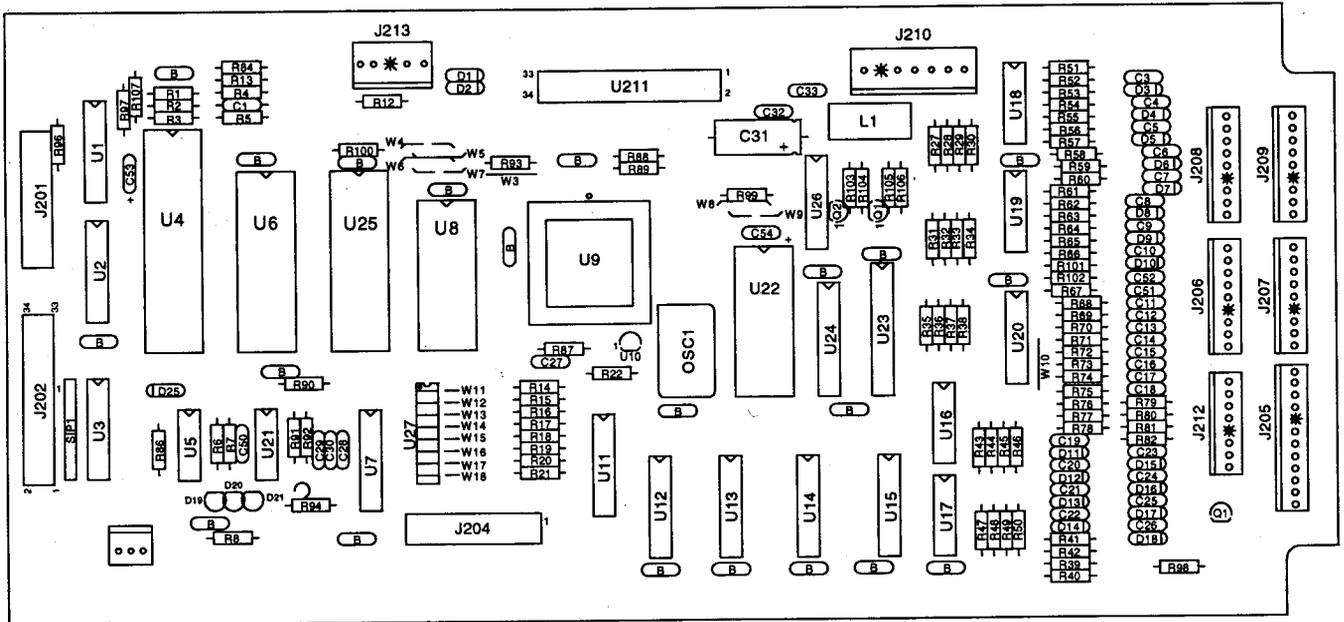
Part Number	Designator	Description
5010-09034-00	R14-R22, R27-R42, R86, R94, R90, R98	Res., 10KΩ, ¼w, 5%
5010-09314-00	R52, R54, R56, R58, R60, R62, R64, R66, R75-R82	Res., 1.2KΩ, ¼w, 5%
5010-09358-00	R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84, R101, R102, R105, R106	Res., 1KΩ, ¼w, 5%
5010-09416-00	R5-R8, R12, R13, R87-R89, R99, R100	Res., 470Ω, ¼w, 5%
5010-09085-00	R1, R2, R4, R93, R96, R97, R107	Res., 1.5KΩ, ¼w, 5%
5010-09534-00	W4, W7, W9	Res., 0Ω
5010-10989-00	R92	Res., 470KΩ, ¼w, 5%
5010-12104-00	R91	Res., 22MΩ, ¼w, 5%
5010-08991-00	R103, R104	Res., 4.7KΩ, ¼w, 5%
5019-09362-00	SIP1	SIP 4.7K, 9R, 10P, 5%
5040-08986-00	C31	Cap., 100M, 10v (±20%)
5043-08980-00	B	Cap., .01M, 50v (+80, -20%)
5043-09030-00	C27	Cap., .047M, 50v, (±20%)
5043-09065-00	C3,-C26, C51, C52	Cap., 470P, 50v, (±20%)
5043-09491-00	C29, C30	Cap., 22P, 1KV (±10%)
5043-09492-00	C28	Cap., 100P, 50v (±10%)
5041-09163-00	C53, C54	Cap., 2.2μF, 15v (20%) Ax.
5070-08919-00	D2-D18	Diode, 1N4148 150MA
5070-09266-00	D1, D25	Diode, 1N5817, 1.0A.
5160-10269-00	Q1-Q3	Trans., 2N3904 NPN
5700-10389-00	U20	IC Socket 18-pin
5281-09308-00	U3	IC, 74LS245 TRNCV
5281-09486-00	U14, U24	IC, 74LS374 8 D F/F
5281-09851-00	U5	IC, 74LS14 SMT TRG
5281-09867-00	U1, U2, U7	IC, 74LS244 OCT BUF
5281-10182-00	U11-U13, U15	IC, 74LS240 / DRVR
5284-12651-00	U21	IC, 4548
5315-13924-00	U23	IC, 74HC4514 LTCH 1to16 Dec.
5281-09246-00	U26	IC, 74LS139 2 T 4 Decoder
5340-12558-00	U8	S/RAM 8Kx8 Low Power
5370-12272-00	U16-U19	IC, LM339 Quad Comp
5370-12687-00	U10	MC 34064
5521-10931-00	OSC1	8.00MHZ OSC 14PIN DIP
5520-12084-00	X1	Crystal 32.768 KHz
5551-09822-00	L1	Inductor, 4.7μH, 3.0A.
5671-14516-00	D19-D21	Display LED Red
5700-08985-00	U4	Socket IC 40P .6"
5700-12088-00	U6	Socket IC 32P .6"
5700-12424-00	U9	Socket 84 Pin PLCC
5700-10176-00	U22	Socket IC 28 P .6"
5791-10850-00	J201, J204	Connector, 26-pin Header Str
5791-14090-05	J213	Connector, 5-pin Header Str
5791-10862-07	J210	Connector, 7-pin Header Str
5791-13830-08	J212	Connector, 8-pin Header Str
5791-13830-09	J208, J209	Connector, 9-pin Header Str
5791-13830-11	J206, J207	Connector, 11-pin Header Str
5791-12516-00	J202, J211	34 Hen 2x17 Str
5048-11033-00	C50	Cap., .022 μF
5791-13830-12	J205	Cap., 12-pin Header Str
5043-09845-00	C32, C33	Cap., 1KP, 50v (±10%)
5645-09025-00	U27	Switch DIP 8 POS
5162-12422-00	U20	IC, ULN 2803A
A-5400-50030-1	U22	WPC PIC 16C57 Micro-C
A-5343-50030-1	U6	Game ROM Assembly
A-17643	-	Battery Holder PCB Assy.
5400-10320-00	U4	MC68B09E 2Mhz μP
5410-12426-00	U9	WPC ASIC-89
20-9665-1	-	PCB Standoffs
H-18258	-	WPC CPU Security Cable

A-16917-50030
Sound Board Assembly
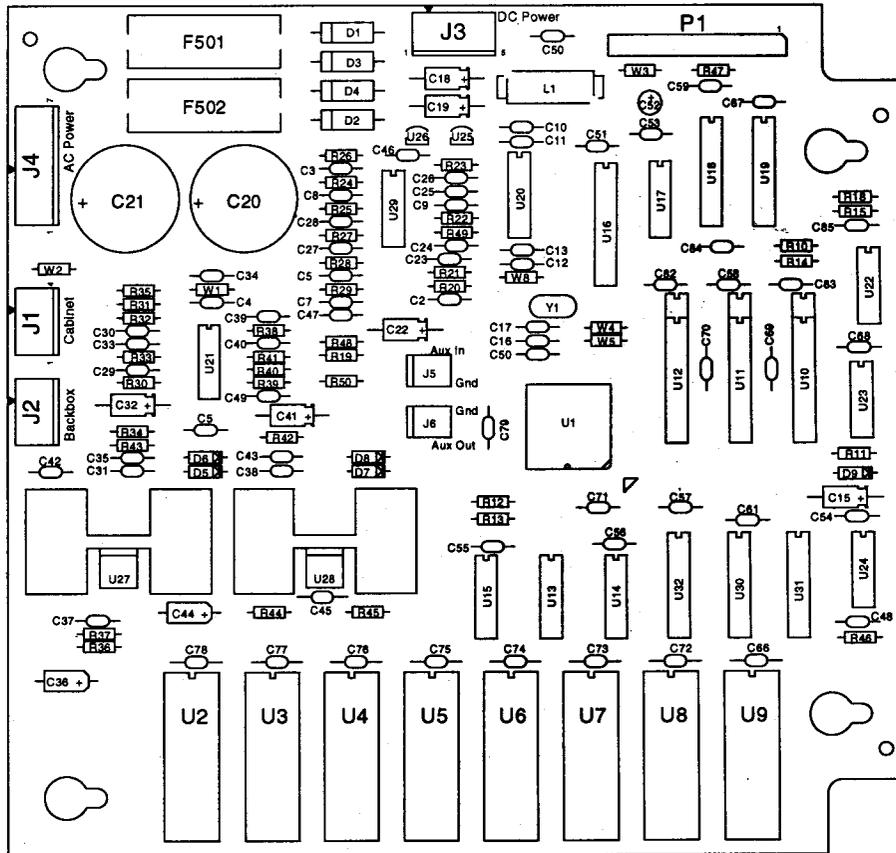
Part Number	Designator	Description	Part Number	Designator	Description
4004-01005-06	U27, U28	MS, 4-40 x 3/8"	5070-09054-00	D5-D9	Diode Signal 1N4004
4404-01119-00	U27, U28	Nut 4-40	5250-13302-00	U25	78L05 Pos 5V reg TO-92
5010-08772-00	R39, R41	Resistor, 15KΩ, ¼w, 5%	5250-13303-00	U26	79L05 Neg 5V Reg TO-92
5010-08774-00	R30, R34, R37,	Resistor, 22KΩ, ¼w, 5%	5283-10551-00	U17	IC74F00 Fast Quad NAND
	R42, R45		5311-10946-00	U22	IC74HC74 Dual D Flip Flop
5010-08991-00	R10, R12-R16	Resistor, 4.7Ω,¼ w, 5%	5311-10947-00	U23	IC74HC125 Quad Tri-State Buffer
5010-09034-00	R47	Resistor, 10KΩ, ¼w, 5%	5311-10948-00	U15	IC74HC138 1 of 8 Decoder
5010-09035-00	R11, R19, R33, R40	Resistor, 47KΩ, ¼w, 5%	5315-12009-00	U18, U19	IC74HCT374 Octal D Flip Flop
5010-09036-00	R46	Resistor, 100Ω, ¼w, 5%	5311-12043-00	U13, U14	IC74HC174 Hex D Flip Flop
5010-09219-00	R31, R32, R38	Resistor, 8.2KΩ, ¼w, 5%	5311-12538-00	U24	IC74HC14 Hex Schmitt Inverter
5010-09358-00	R50	Resistor, 1KΩ,¼ w, 5%	5311-12287-00	U30-U32	IC74HC541 Octal Bus Driver
5010-09534-00	W4, W6	Resistor,0Ω (Jumper)	5340-13304-00	U10-U12	ICSRAM 2Kx8 35ns .300 DIP
5010-13420-00	R36, R44	Resistor, 680Ω, ¼w, 5%	5370-12730-00	U21, U29	ICTL084 Quad Op AMP
5010-13607-00	R20-R29, R48, R49	Resistor, 6.2KΩ, 1/8w, 1%	5370-13419-00	U27, U28	Audio Power Amp TDA2030AV
5010-13517-00	R35, R43	Resistor, 15Ω, ¼w, 5%	5371-13299-00	U20	IC DAC AD-1851 16Bit
5040-09365-00	C15, C18, C19,	Cap., 1µF, 63v, Alum Ax.	5520-13301-00	Y1	Crystal 10MHz Parallel resonant
	C32, C41		5551-09822-00	L1	Inductor, 4.7µH, 3Amp.
5040-09421-00	C52	Cap., 100µF,25v, Alum Ax.	5700-12047-00	U16	IC, Socket 24-Pin .300 DIP
5040-13417-00	C20, C21	Cap., 10,000µF, 35v, Alum.	5700-12088-00	U2-U9	IC, Socket 32-Pin .600 DIP
5041-09009-00	C36, C44	Cap., 22µF,10v, Tant Alum	5705-12638-00	U27, U28	Heatsink 5298-B
5041-13187-00	C22	Cap., 4.7µF, Tant Axial.	5733-12060-01	F501, F502	MT3AG PCMounted Fuse Holder
5043-08996-00	C4, C5, C10-C13	Cap., .10µF, 50v, Cer Ax.	5791-10862-04	J1, J2	Connector, 4-pin Header STR .156
	C31, C35, C38, C43, C46, C4		5791-10862-05	J3	Connector, 5-pin Header STR .156
	C50-C79		5791-10862-07	J4	Connector, 7-pin Header STR .156
5043-10267-00	C37, C45	Cap., 150pF,50v, Cer Ax.	5791-12516-00	P1	Connector, 34 Hen 2x17 STR .100
5048-11028-00	C16, C17	Cap., 22pF, 50v, Cer Ax.	A-17002	U16	PAL Sub-Assembly
5048-11029-00	C48	Cap., 100pF,50v, Cer Ax.	A-5343-50030-S2	U2	ROM Sub-Assembly
5048-11030-00	C49	Cap., 470pF,50v, Cer Ax.	A-5343-50030-S3	U3	ROM Sub-Assembly
5048-11033-00	C33	Cap., .022µF,50v, CerAx.	A-5343-50030-S4	U4	ROM Sub-Assembly
5048-12036-00	C34, C4	Cap., .22µF, 50v, Cer Ax.	A-5343-50030-S5	U5	ROM Sub-Assembly
5048-13418-00	C30, C39, C40	Cap., .047µF,50v, Cer Ax.	A-5343-50030-S6	U6	ROM Sub-Assembly
5048-13608-00	C8	Cap., 6800pF, 50v, Cer Ax.	Not Used	U7	ROM Sub-Assembly
5048-13609-00	C7, C24, C26	Cap., 3900pF, 50v, Cer Ax.	Not Used	U8	ROM Sub-Assembly
5048-13610-00	C2, C3, C9, C27, C29	Cap., 1000pF, 50v, Cer Ax.	Not Used	U9	ROM Sub-Assembly
5048-13611-00	C6, C23, C25, C28	Cap., 680pF, 50v, Cer Ax.	5731-10356-00	F501, F502	Fuse, 3Amp, 250v, Slow Blow
5070-09045-00	D1-D4	MR-501 Rectifier Diode			

A-15472-1
Fliptronic II Board Assembly
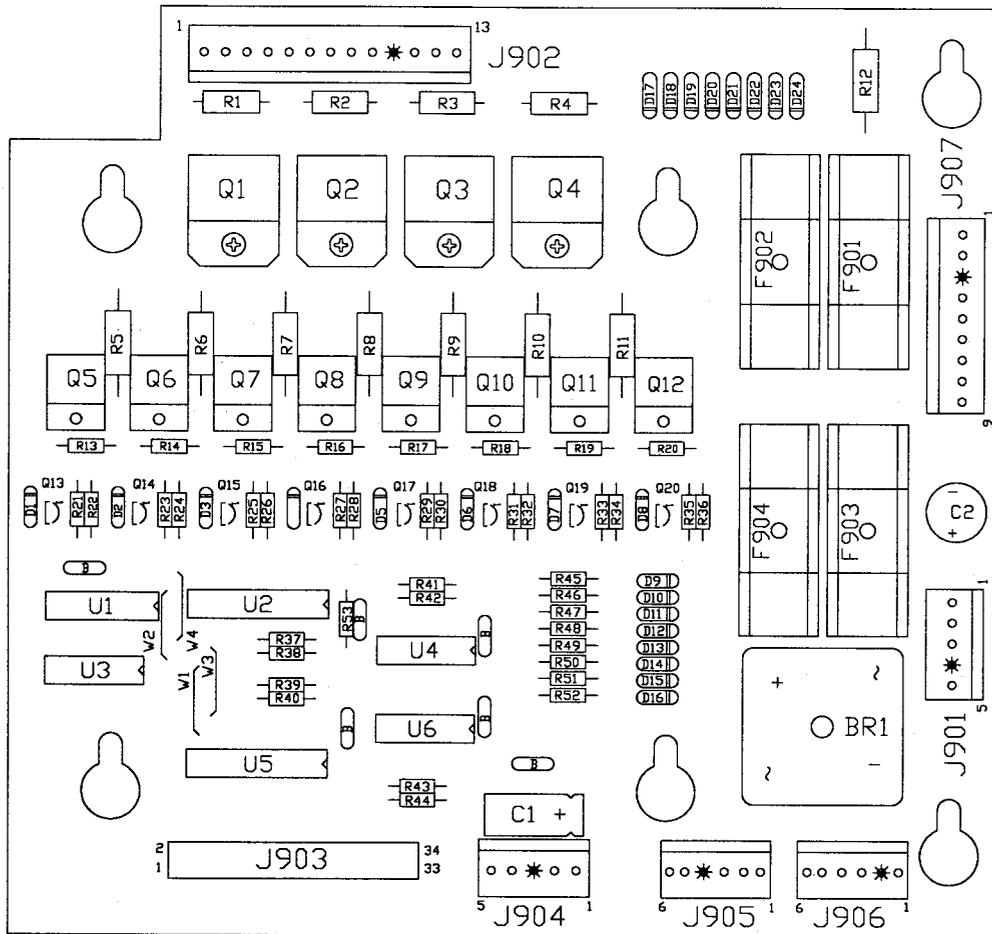
Part Number	Designator	Description	Part Number	Designator	Description
01-10572	Q1-Q4	Heatsink	5070-09054-00	D1-D24	Diode, 1N4004
4006-01003-08	Q1-Q4	Mach. Screw, 6-32	5100-09690-00	BR1	Bridge Rectifier
4406-01128-00	Q1-Q4	Nut 6-32 KEPS	5162-12635-00	Q5-Q12	Trans., TIP102 NPN
5010-09034-00	R37-R44, R53	Res., 10KΩ, ¼w, 5%	5190-09016-00	Q13, Q20	Trans., 2N4403 PNP
5010-09358-00	R22, R24, R26,	Res., 1KΩ, ¼w, 5%	5191-12179-00	Q1-Q4	Trans., TIP36C PNP
	R28, R30, R32, R34,	Res., 220Ω, ½w, 5%	5315-12009-00	U2	IC, 74HCT374
	R36, R45-R52		5315-12031-00	U5	IC, 74HCT244
5010-09361-00	R1-R4	Res., 470Ω, ¼w, 5%	5315-12812-00	U1	IC, 74HCT138
5010-09416-00	R21, R23, R25,		5315-12951-00	U3	IC, 74HCT00
	R27, R29, R31, R33,		5370-12272-00	U4, U6	IC, LM339 Quad Comp
	R35		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
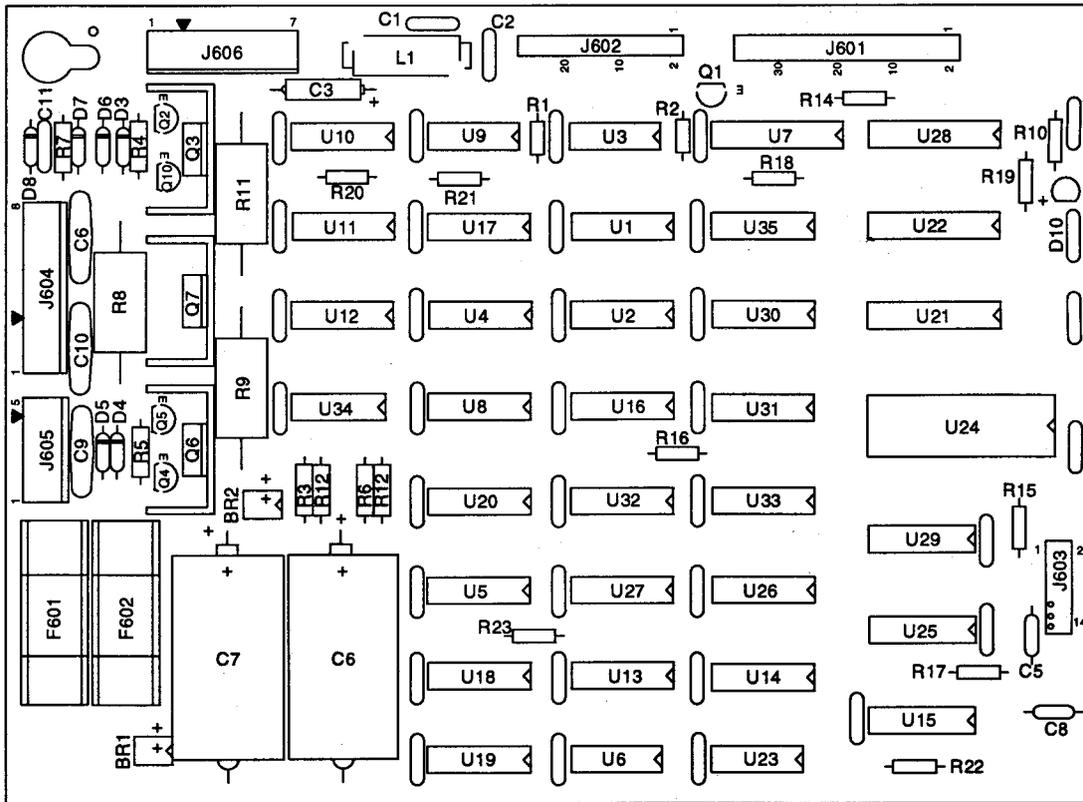
Part Number	Designator	Description
5010-08991-00	R1	Res., 4.7KΩ, ¼w, 5%
5010-09036-00	R14-R23	Res., 100Ω, ¼w, 5%
5010-09224-00	R10	Res., 270Ω, ¼w, 5%
5010-12832-00	R3, R6, R12, R13	Res., 4.7KΩ, ½w, 5%
5010-12841-00	R4, R5	Res., 120Ω, ½w, 5%
5012-12830-00	R9	Res., 1.8KΩ, 5w, 5%
5012-12842-00	R11	Res., 120Ω, 5w, 5%
5012-12843-00	R8	Res., 4.7KΩ, 5w, 5%
5010-10171-00	R7	Res., 56Ω, ¼w, 5%
5043-09492-00	C5, C8	Cap., 100P, 50v, (±10%)
5040-08986-00	C3	Cap., 100M, 10v (±20%)
5040-12324-00	C4, C7	Cap., 150M, 160v (±50%)
5043-08980-00	BYPASS	Cap., .01M, 50v (+80,-20%)
5043-09072-00	C6, C9, C10	Cap., .1M, 500v (+80,-20%)
5043-09845-00	C1, C2, C11	Cap., 1KP, 50v (±20%)
5070-09054-00	D7	Diode, 1N4004, 1.0A.
5075-12824-00	D6, D8	Zener, 1N4742A, 12v
5075-12823-00	D4, D5	Zener, 1N4758, 56v
5075-12826-00	D3	Zener, !N4759A, 62v
5100-12833-00	BR1, BR2	Bridge, 400v, 1A
5150-10269-00	Q1	Trans., 2N3904 NPN
5164-09056-00	Q2, Q10	Trans., MPSD02 NPN
5164-12154-00	Q3, Q7	Trans., MJE15030 NPN
5194-09055-00	Q4, Q5	Trans., MPSD52 PNP
5194-12155-00	Q6	Trans., MJE15031 PNP
5281-09738-00	U16, U25-U27	IC, 74LS157
5281-10033-00	U3	IC, 74LS30
5281-10043-00	U31-U33, U35	IC, 74LS175
5311-10946-00	U4, U5, U17, U18, U20	IC, 74HC74
5311-10947-00	U9	IC, 74HC125
5311-10951-00	U10, U11	IC, 74HC161
5311-10977-00	U6	IC, 74HC04
5311-12817-00	U29	IC, 74HC165
5311-12819-00	U21	IC, 74HC688
5311-12820-00	U23	IC, 74HC27
5311-12822-00	U13-U15	IC, 74HC193
5315-12009-00	U22	IC, 74HCT374
5315-12812-00	U1, U2, U30, U12	IC, 74HCT138
5281-09308-00	U28	IC, 74HCT245
5315-12815-00	U8, U34	IC, 74HCT08
5315-12816-00	U19	IC, 74HCT32
5315-12821-00	U7	IC 74HCT240
5340-12278-00	U24	S/RAM 2064 150NS
5551-09822-00	L1	Ind. 4.7µH, 3A.
5671-14516-00	D10	Display LED Red
5705-09199-00	Q3, Q6, Q7	Heatsink, 6030B
5731-12328-00	F601, F602	Fuse, 3/8A., SB, 250v
5733-12060-01		Fuse Holder (F601, F602)
5791-10850-00	J602	Connector, 26-pin Header
5791-10862-05	J605	Connector, 5-pin Header
5791-10862-07	J606	Connector, 7-pin Header
5791-10862-08	J604	Connector, 8-pin Header
5791-12516-00	J601	34 Hen 17x2 STR
5791-12827-00	J603	14 Hen 7x2 STR

A-12697-3
WPC Power Driver Assembly

Part Number	Designator	Description
5010-08981-00	R260	Res., 10KΩ, ½w, 5%
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., 4.7KΩ, ¼w, 5%
5010-08992-00	R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191	Res., 560Ω, ¼w, 5%
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., 68KΩ, ½w, 5%
5010-08997-00	R24, R28, R32, R36, R40, R44, R48, R52, R56, R60, R64, R68, R72, R76, R80, R84, R88, R92, R96, R100, R102, R105, R108, R111, R114, R117, R120, R123	Res., 2.7KΩ, ¼w, 5%
5010-08998-00	R155, R157, R159, R161, R165, R167, R169, R171	Res., 2.2KΩ, ¼w, 5%
5010-09034-00	R142-R149, R197-R198	Res., 10KΩ, ¼w, 5%
5010-09085-00	R194, R196, R251, R253-R257	Res., 1.5KΩ, ¼w, 5%
5010-09086-00	R252	Res., 6.8KΩ, ¼w, 5%
5010-09224-00	R192, R202-R205	Res., 270Ω, ¼w, 5%
5010-09314-00	R176, R178, R180, R182, R184, R186, R188, R190	Res., 1.2K, ¼w, 5%
5010-09324-00	R206	Res., 27KΩ, ¼w, 5%
5010-09358-00	R154, R156, R158, R160, R162, R164, R166, R168, R170, R193, R199, R250	Res., 1KΩ, ¼w, 5%
5010-09361-00	R104, R107, R110, R113, R116, R119,	Res., 220Ω, ½w, 5%
5010-09416-00	R122, R125 R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141	Res., 470Ω, ¼w, 5%
5010-11079-00	R7, R10, R13, R16, R19	Res., 51Ω, ¼w, 5%
5010-12427-00	R150-R153, R172-R175	Res., .22Ω, 1w, 5%
5012-12632-00	R224	Res., .12Ω, 10w, 5%
5019-10143-00	SR1	SIP 470Ω, 9R, 10-pin, 5%
5040-08986-00	C4	Cap., 100M, 10v (±20%)
5040-09421-00	C2	Cap., 100M, 25v (+50, -10%)
5040-09537-00	C8	Cap., 100M, 100v (±20%)
5040-12313-00	C5-C7, C11, C30	Cap., 15KM, 25v (±20%)
5043-08980-00	B-BYPASS	Cap., .01M, 50v (+80, -20%)
5043-08996-00	C13-C20, C31	Cap., .1M, 50v (±20%)
5043-09845-00	C1, C12	Cap., 1KP, 50v (±20%) Axial
5048-10994-00	C3	Cap., .33M, 50v (±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
5162-12422-00	U19	IC ULN 2803 OC-DRL
5162-12635-00	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
5194-09055-00	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
5191-12179-00	Q64, Q66, Q68, Q70, Q76, Q78, Q80, Q82	Transistor, TIP36C PNP
5192-12428-00	Q91-Q98	Transistor, TIP 107
5250-12634-00	Q1	Reg LM 323 5v
5281-09486-00	U1-U5, U18	IC, 74LS374 8D F/F
5281-09487-00	U10-U13	IC, 74LS74 Dual D F/F
5281-10182-00	U9	IC, 74LS240 L/Drvr.
5370-12272-00	U6, U15, U16	IC, LM339 Quad Comp.
5460-12423-00	Q2	IC, LM7812
5671-14516-00	LED1, LED4-LED7	Display LED Red
5701-09652-00	Q1	Thermal Pad
5705-09199-00	Q2	Heatsink 6030B
5705-12637-00	Q1	Heatsink 5054
5705-12638-00	Q10, Q12, Q14, Q16, Q18	Heatsink 5298B
5733-12060-01	F101-F116	Fuse Holder PC MT3AG
5791-10862-03	J108, J119, J136	Connector, 3-pin Header .156
5791-10862-04	J103, J116-J118	Connector, 4-pin Header .156
5791-10862-05	J104-J106, J112, J123, J124, J128, J129, J131, J132	Connector, 5-pin Header .156
5791-10862-06	J107	Connector, 6-pin Header .156
5791-10862-07	J101, J109, J114	Connector, 7-pin Header .156
5791-10862-09	J102, J122, J125, J127, J130, J137, J138	Connector, 9-pin Header .156
5791-10862-11	J120, J121	Connector, 11-pin Header .156
5791-10862-12	J115	Connector, 12-pin Header .156
5791-10862-13	J126	Connector, 13-pin Header .156
5791-13830-05	J111	Connector, 5-pin Header
5791-13830-09	J133-J135	Connector, 9-pin Header
5791-12516-00	J113	34 Hen 2x17 STR
5824-09248-00	TP1-TP8	Test Point #1502-1
5041-09163-00	C9	Cap., 2.2MF Tant
5730-09071-00	F114	Fuse, 8A, 32v
5731-09432-00	F112	Fuse, S-B, 7A., 250v
5731-09651-00	F106-F111, F113	Fuse, S-B, 5A., 250v
5731-10356-00	F101-F105, F116	Fuse, S-B, 3A., 250v
5730-09797-00	F115	Fuse, S-B, 3/4A., 250v
5705-12698-00		Heatsink #62365
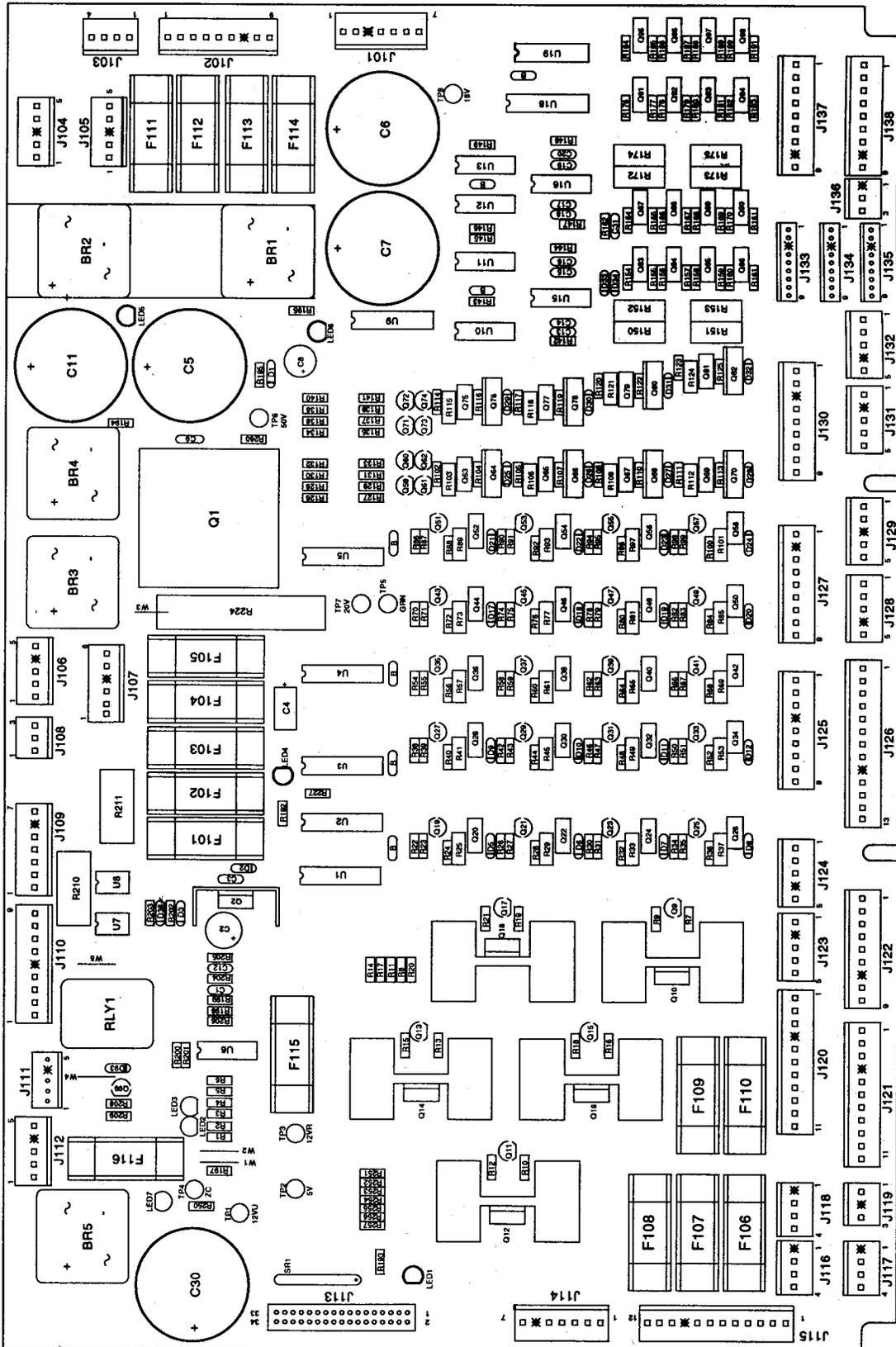
A-17051-1
Coin Door Interface PCB Assembly
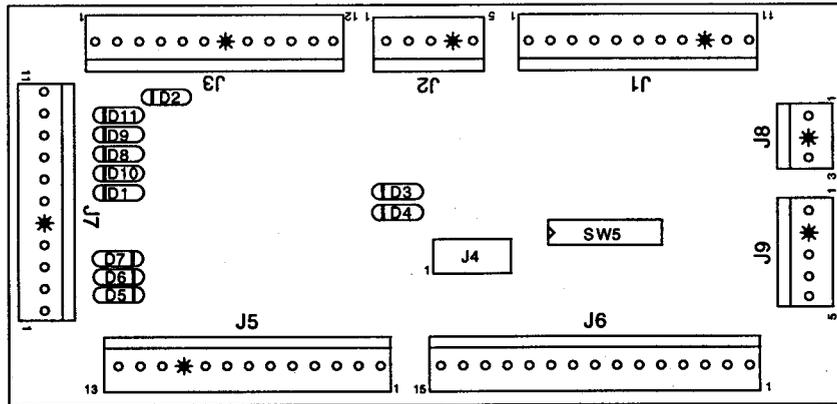
Part Number	Designator	Description
5791-10862-03	J8	Connector, 3-pin Header Str Sq.
5791-10862-05	J2, J9	Connector, 5-pin Header Str Sq.
5791-10862-11	J1, J7	Connector, 11-pin Header Str Sq.
5791-10862-12	J3	Connector, 12-pin Header Str Sq.
5791-10862-13	J5	Connector, 13-pin Header Str Sq.
5791-10862-15	J6	Connector, 15-pin Header Str Sq.
5645-09025-00	SW5	Switch DIP 8 Pos.
5070-09054-00	D1 - D11	Diode, 1N4004, 1.0A.
5791-11000-10	J4	Connector, 10-pin Header Str Sq.

A-17316
Flipper Opto PCB Assembly
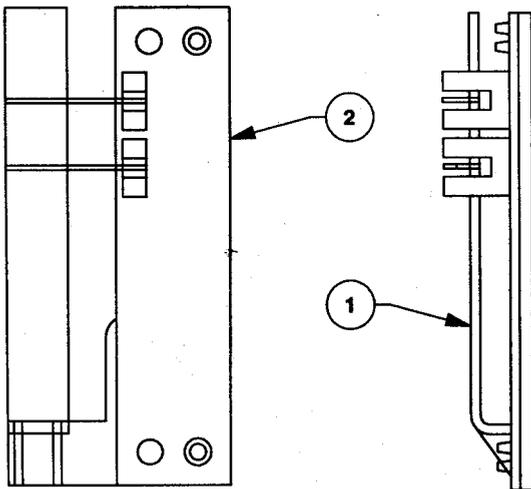
Item	Part Number	Description
1	03-9001	Interrupter Flip-Opto
2	A-16384	Flipper Opto Sw. Assy.
	5010-08930-00	Res., 470Ω, ½w, 5%
	5490-12451-00	Opto Inter Lg. 10mA.
	5791-12462-07	Connector, 7-pin Header

A-18617-1
Trough IRED LED PCB Assembly
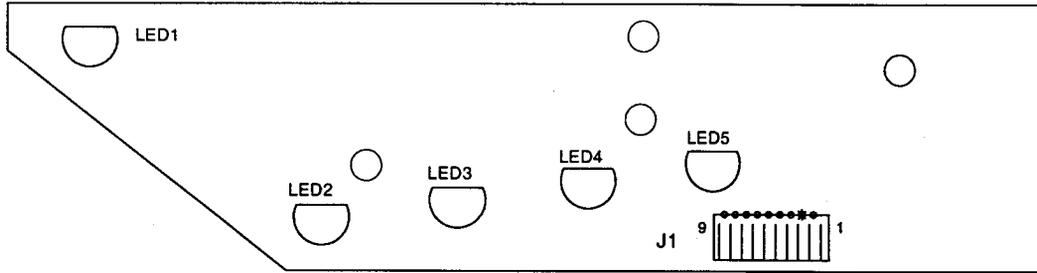
Part Number	Designator	Description
5671-12731-00	LED1 - LED5	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-18618-1
Trough IRED Transistor PCB Assembly
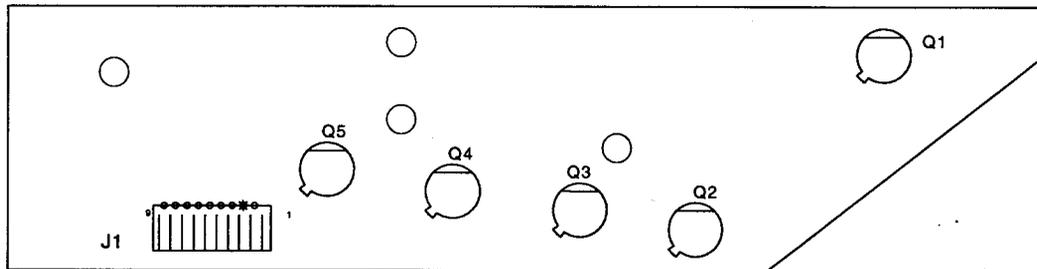
Part Number	Designator	Description
5163-14114-00	Q1 - Q5	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-15542
Motor EMI PCB Assembly
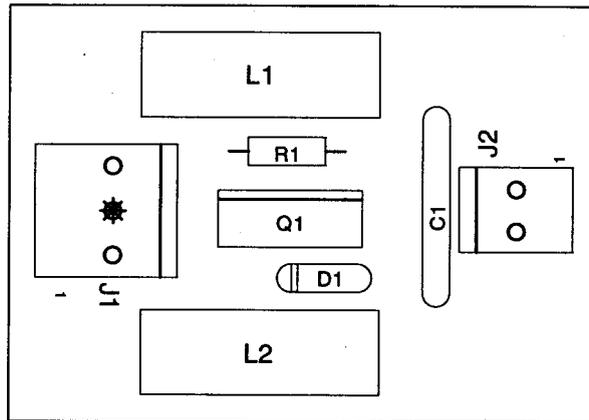
Part Number	Designator	Description
5551-09822-00	L1, L2	Inductor, 4.7MH3AMP
5791-12273-03	J1	Connector, 3-pin Header Str Sq.
5791-12273-02	J2	Connector, 2-pin Header Str S.q.
5070-09054-00	D1	Diode, 1N4004 1.0A.

A-16998.1
16-Opto Dual Mount PCB Assembly
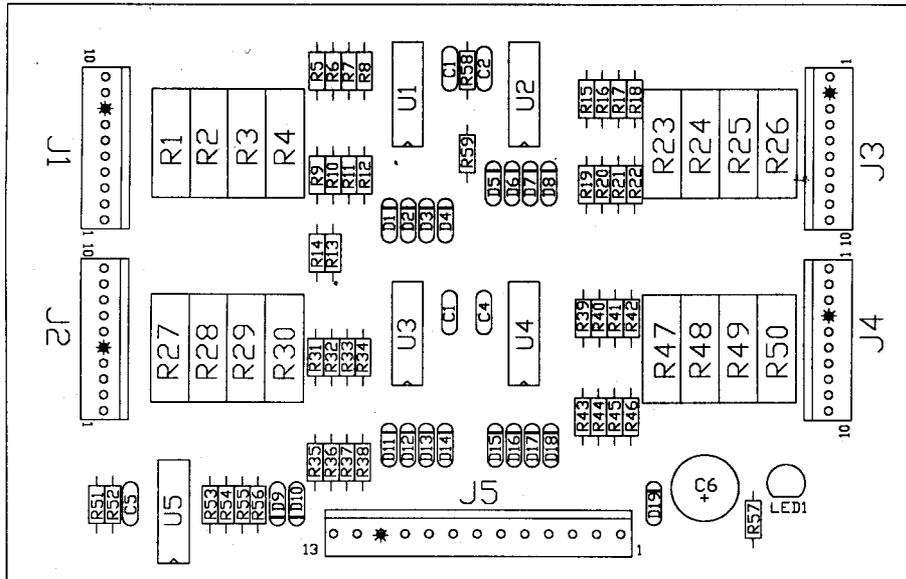
Part Number	Designator	Description
5043-08996-00	C1 -C5	Capacitor, 0.1µF, 50v(±20%) Axial
5040-13102-00	C6	Capacitor, 470µF, @35v (±20%)
5791-13830-10	J1-J4	Connector, 10-pin Header STR Sq.
5791-10862-13	J5	Connector, 13-pin Header STR Sq.
5671-13732-00	LED1	Display LED Red
5010-12928-00	R1-R4, R23-R30, R47-R50	Resistor, 270Ω, 2w, 5%
5010-09999-00	R5-R12, R15-R22, R31-R46	Resistor, 2KΩ, 1/4w, 5%
5010-08774-00	R13, R14, R51	Resistor, 22KΩ, 1/4w, 5%
5010-09162-00	R52, R54, R56,	Resistor, 100KΩ, 1/4w, 5%
5010-09034-00	R53, R55	Resistor, 10KΩ, 1/4w, 5%
5010-10631-00	R57	Resistor, 1.2KΩ, 1/2w, 5%
5370-12272-00	U1-U5	IC LM339 Quad Comp.
5070-09054-00	D1 - D19	Diode 1N4004 1.0A.

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	Flatwasher, 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		**Associated Parts:**	
13	01-7695	Solenoid Bracket		(Not Shown)	
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"	21	23-6695	Flipper Rubber Ring, Red
15	10-364	Spring	22	20-9250-5	Flipper & Shaft
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"			
17	4406-01117-00	Nut, 6-32 Hex			

A-19223-R
Flipper Assembly

Item	Part Number	Description		Item	Part Number	Description
1	A-19262	Flipper Bracket Sub-Assy.		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	Flatwasher, 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		**Associated Parts:**		
13	01-7695	Solenoid Bracket		(Not Shown)		
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"				
15	10-364	Spring		21	23-6695	Flipper Rubber Ring, Red
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"		22	20-9250-5	Flipper & Shaft
17	4406-01117-00	Nut, 6-32 Hex				

A-19818-R-2
Flipper Assembly

(Parts listed replace same items of **A-19223-R**)

Item	Part Number	Description
1	A-19819	Flipper Bracket Sub-Assy.

Flipper Notes...

1. *Each Flipper Assembly is mounted beneath the playfield, in conjuction 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 (±.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 reataching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.*

A-17811
Kicker Arm (Slingshot) Assembly
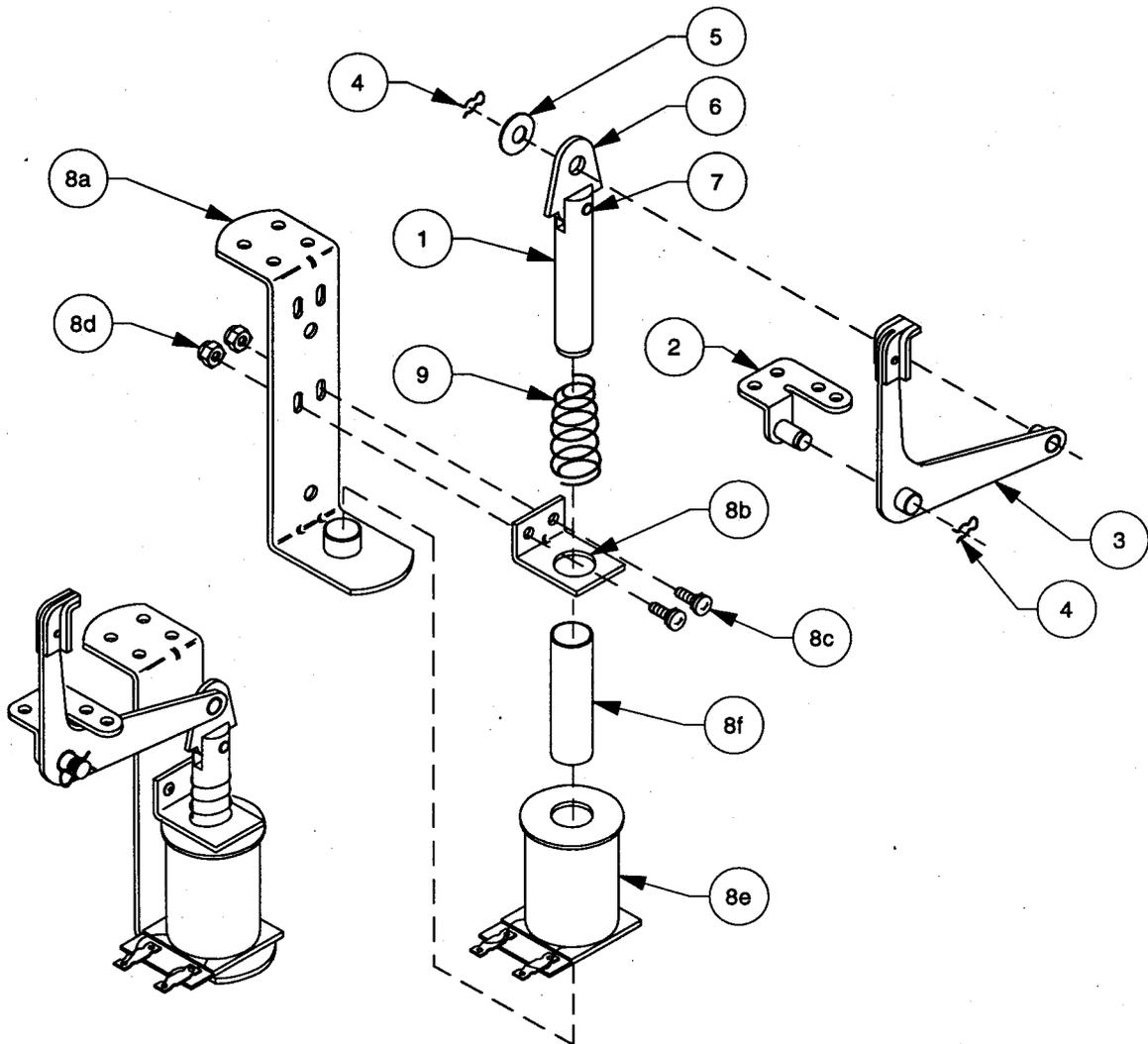
Associated Parts for Right & Left Kickers:

Item	Part Number	Description
1.	02-2364	Coil Plunger
2.	A-17810	Mounting Bracket Assembly
3.	A-12664	Kicker Crank Assembly
4.	12-6227	Hairpin Clip
5.	4700-00030-00	Flatwasher, 17/64 x 1/2 x 15ga.
6.	03-8085	Armature Link
7.	20-8716-5	Roll Pin, 1/8 x 7/16"

Item	Part Number	Description
8.	B-9362-R-3	Coil & Bracket Assy., Left
	B-9362-R-3	Coil & Bracket Assy., Right
a)	A-17808	Bracket & Stop Assembly
b)	01-8-508-S	Coil Retaining Bracket
c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
d)	4406-01119-00	Nut, 6-32 ESN
e)	AE-26-1200	Coil Assembly
f)	03-7066	Coil Tubing
9.	10-128	Spring

A-19963
Outhole Ball Trough Assembly
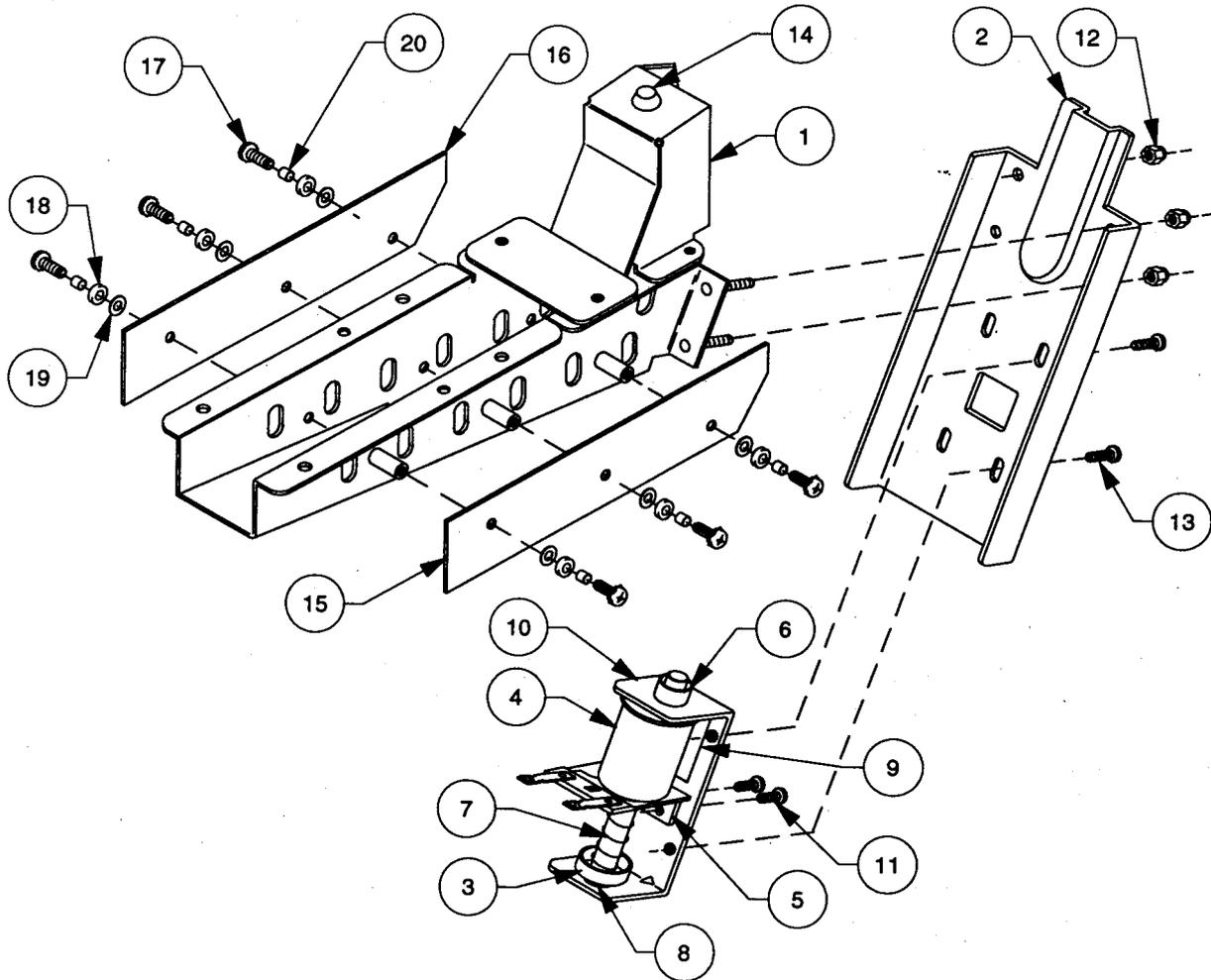
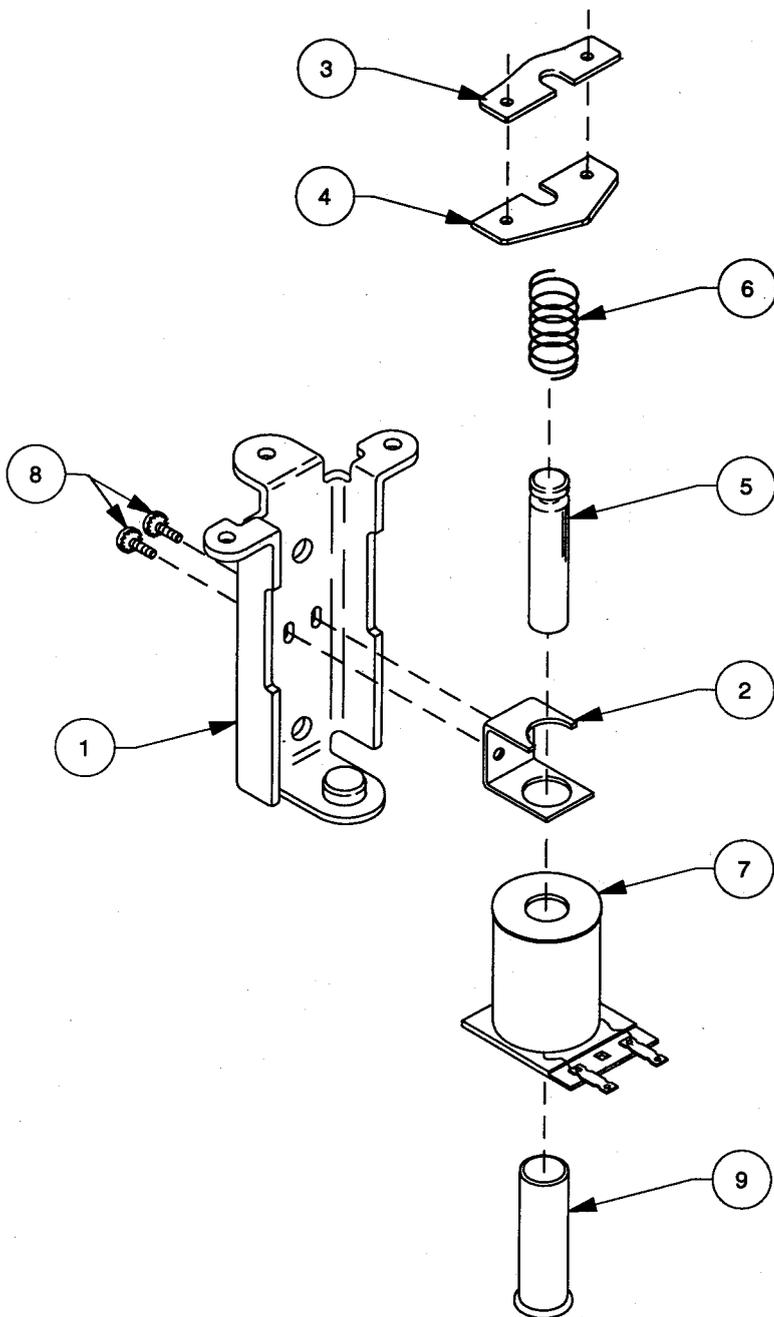| Item	Part Number	Description	Item	Part Number	Description
1	A-16809-2	Ball Trough Welded Assy.	11	4008-01017-05	Mach. Screw, 8-32 x 5/16"
2	01-11587	Ball Trough Front	12	4408-01119-00	Nut 8-32 ESN
3	A-6306-2	Bell Armature Assembly	13	4008-01017-06	Mach. Screw, 8-32 x 3/8"
4	AE-26-1500	Coil Assembly	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 Brkt. (Bell)	20	02-4975	Bushing

B-9414-3
Jet Bumper Assembly
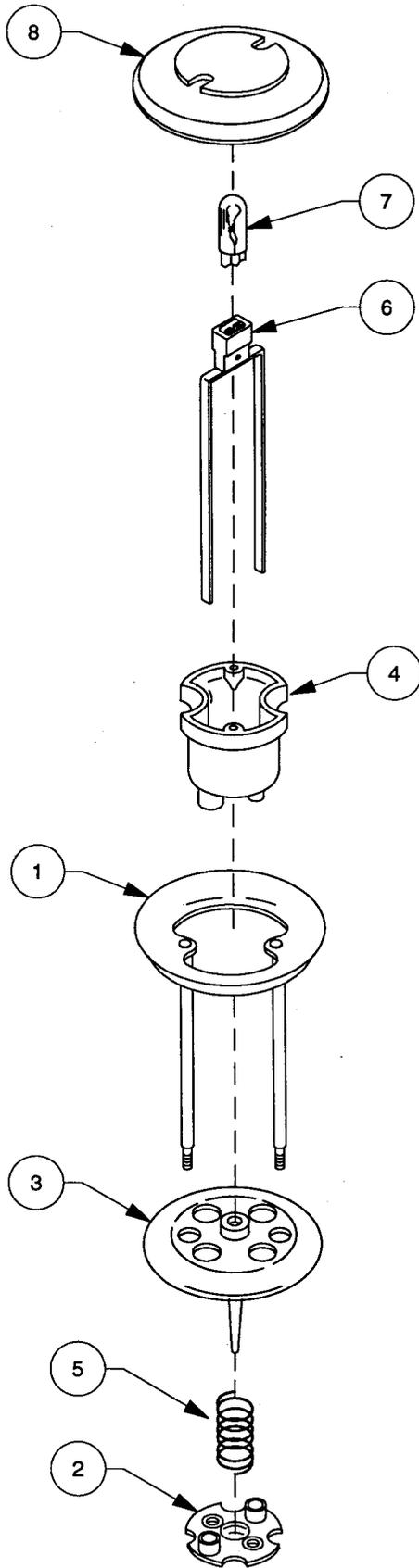
Item	Part Number	Description
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base, White
3	03-6035-4	Bumper Wafer, Red
4	03-7443-5	Bumper Body, White
5	10-7	Spring
6	24-8776	Socket-Wedge Base
7	24-8768	Bulb #555 (6.3v., 0.25A.)

Associated Part:

| 8	03-8254-9	Jet Bumper Cap, Tr. Red (1 Used)

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

A-15361
Tilt Mechanism Assembly
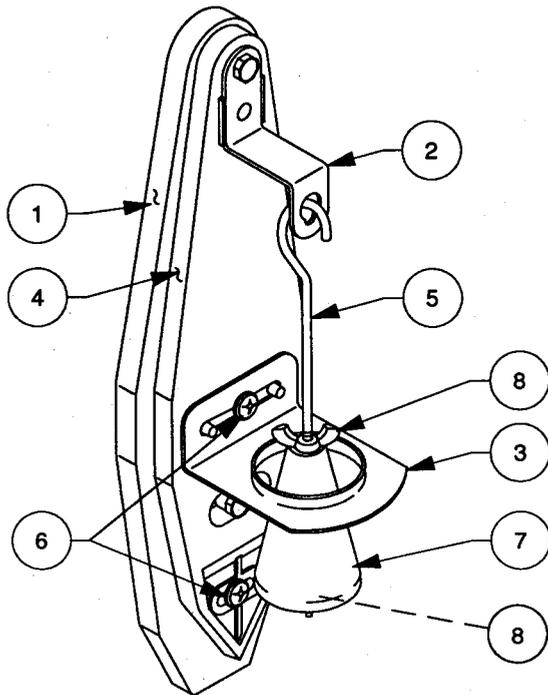
Item	Part Number	Description
1	A-15360	Mount Plate, Tilt Mech.
2	01-3444	Bracket, Tilt Upper
3	01-3445	Bracket, Tilt Lower
4	03-8668	Pendulum, Tilt Mech.
5	12-6231	Wire, Plum Bob
6	4006-01113-06	Mach. Screw, 6-32 x 3/8"

Associated Parts:

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

B-10686-1
Knocker Assembly
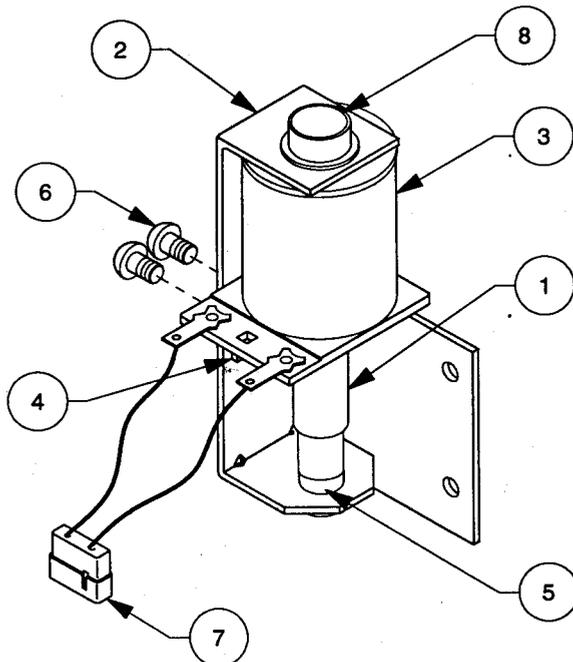
Item	Part Number	Description
1	A-5387	Coil Plunger Assembly
2	01-11273	Mounting Bracket Assy.
3	AE-23-800	Coil Sub-Assembly
4	01-8-508-T	Coil Retaining Bracket
5	23-6420	Rubber Grommet
6	4008-01017-04	Mach. Screw, 8/32 x 1/4"
7	H-11835	Knocker Cable
8	03-7067-5	Coil Tubing

A-14525
Kicker Bracket Assembly
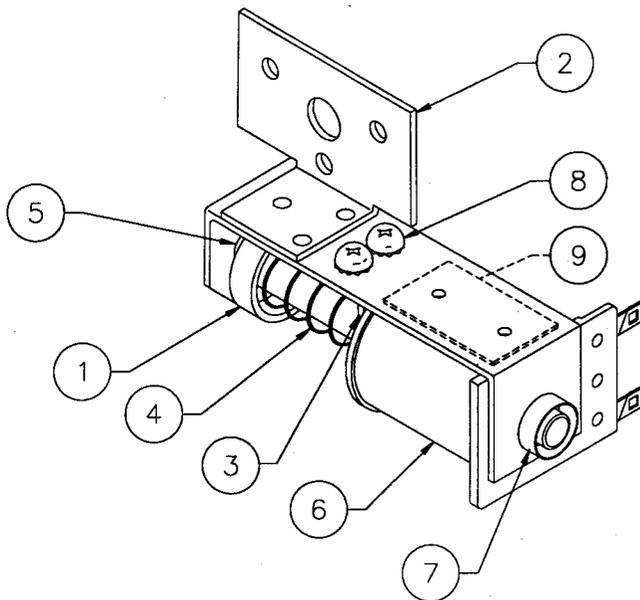
Item	Part Number	Description
1	A-6306-2	Bell Armature Assembly
2	A-14526	Kicker Mounting Bracket Assy.
3	01-8-508-T	Solenoid Bracket
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	AE-23-800	Coil Assembly
7	03-7067-5	Coil Tubing
8	4008-01017-04	Mach. Screw, #8-32 x 1/4"
9	03-8523	Insulator

A-17796
Ball Gate Actuator Assembly
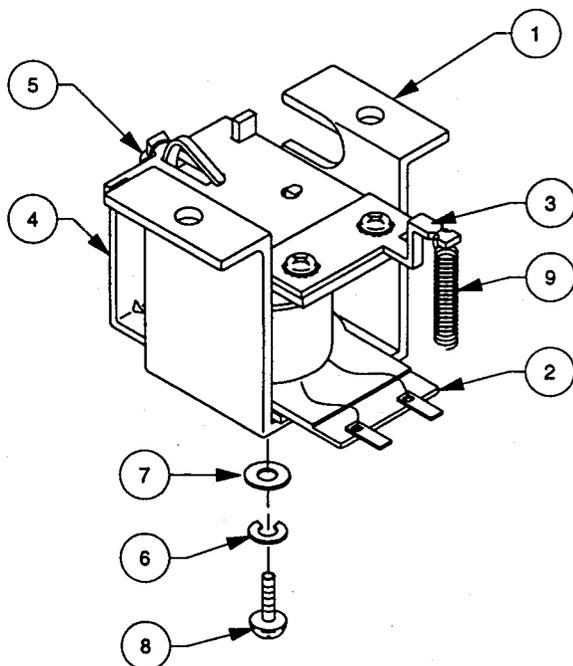
Item	Part Number	Description
1	01-12348	Ball Gate Coil Bracket
2	A-14406	Coil Assembly
3	A-11146	Armature Assembly
4	A-6892	Frame & Eyelet Assembly
5	10-120	Spring
6	4701-00003-00	Lockwasher #8 Split
7	4700-00089-00	Flatwasher, 11/64 x 7/16 x 16ga.
8	4008-01021-07	Mach. Screw, 8-32 x 7/16"
9	10-194	Extension Spring

A-20024
Eject Assembly
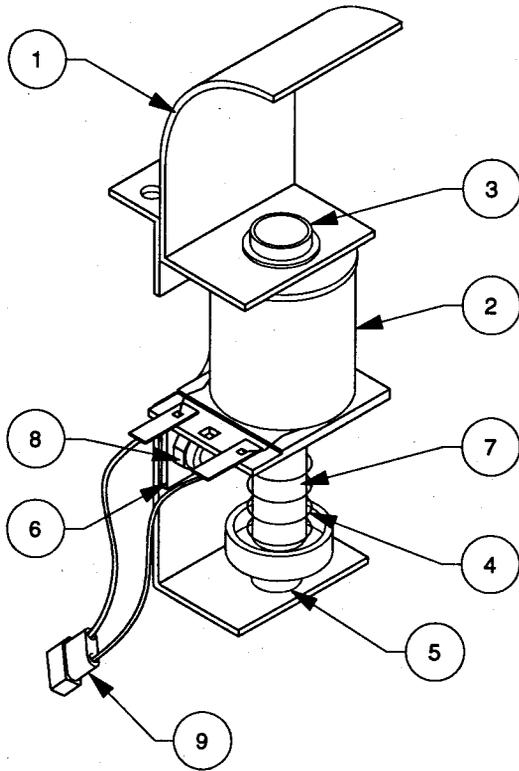
Item	Part Number	Description
1	A-18767	Bracket Assembly
2	AE-26-1500	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	01-9784	Coil Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut #8-32 ESN
9	H-19523	Mini-Solenoid Cable

Coil Magnet & Bracket Assembly
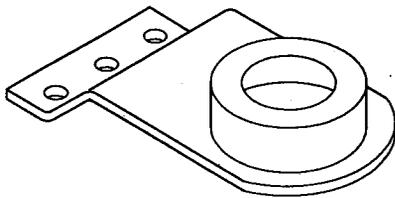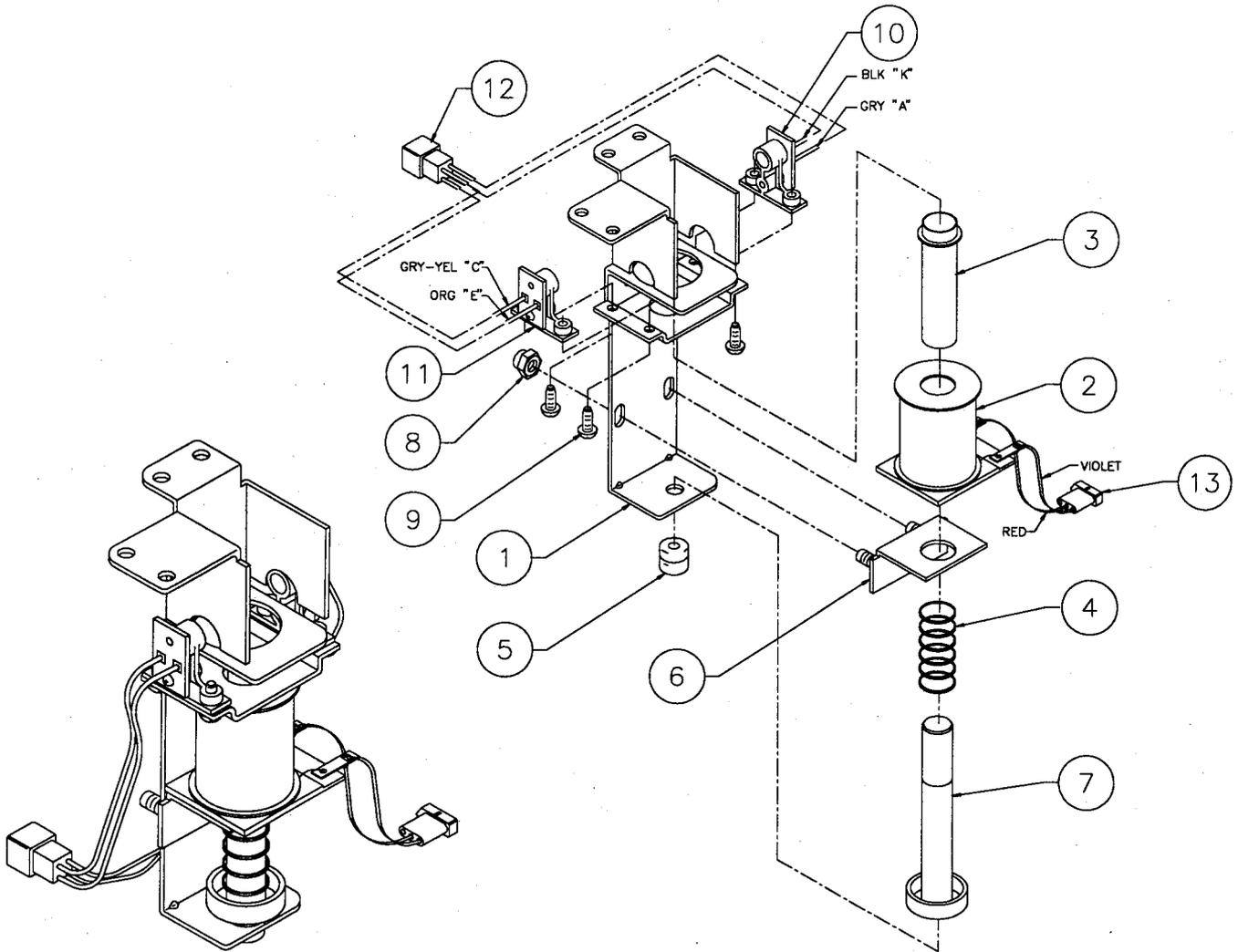
A-16460
Bracket & Nut Assembly
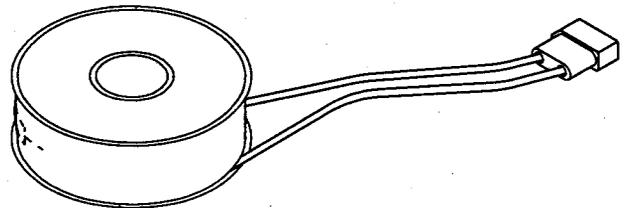
20-9247
Coil Magnet & Thermal Breaker

A-18791
Ball Popper Assembly Complete

Item	Part Number	Description
1	A-18577.1	Ball Poper Sub-Assembly
2	AE-23-800	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	A-16858	Mounting Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut, 8-32 ESN
9	4106-01013-06	Sh. Metal Screw, #6 x 3/8"
10	A-16908	LED Assembly, RTV
11	A-16909	Photo Transistor Assy.-RTV
12	H-17609-5	Opto Cable - Square
13	H-19523-1	Mini Coil Cable

A-19543
Ball Popper Assembly
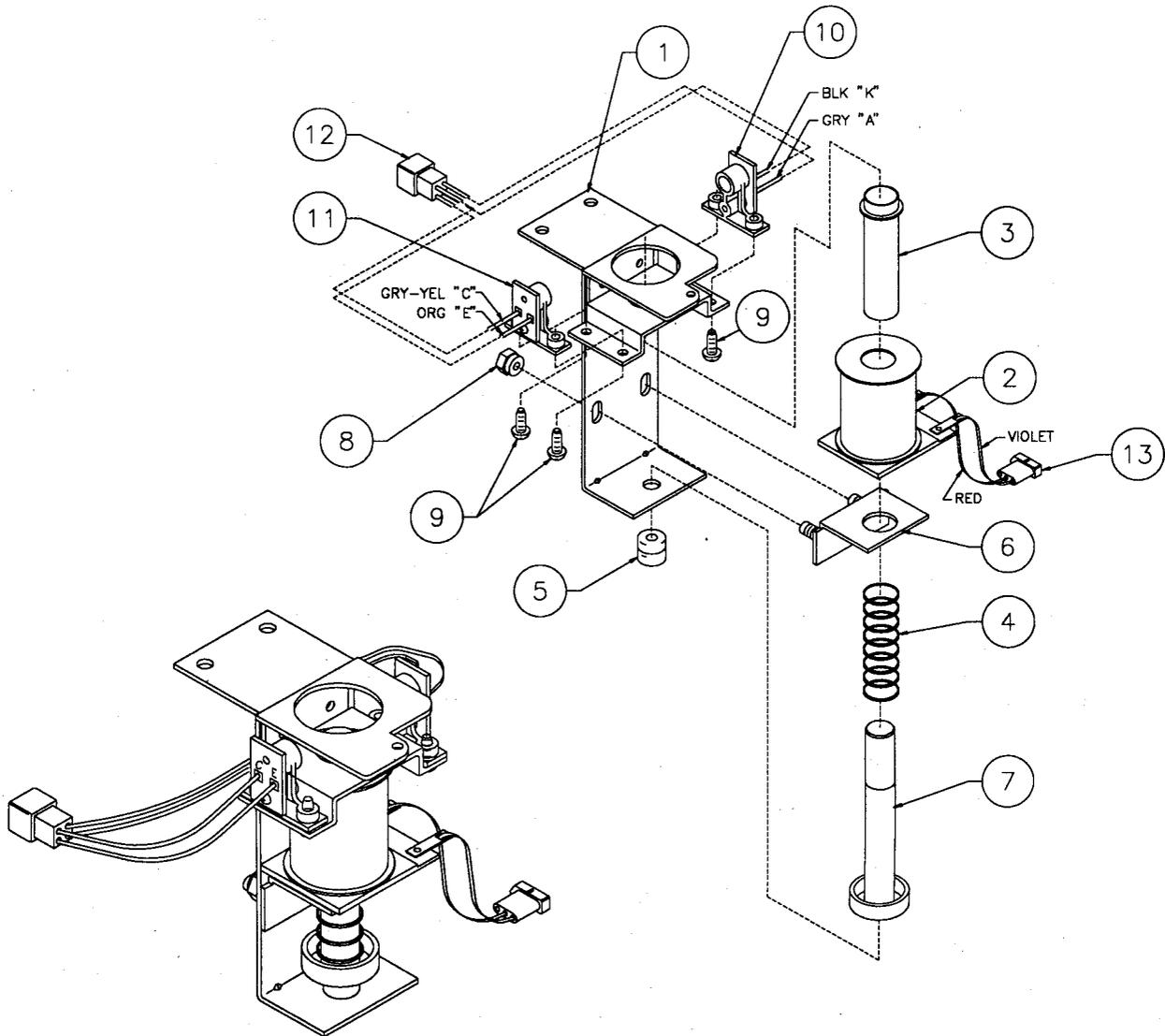
Item	Part Number	Description
1	A-19544.1	Mounting Bracket, Ball Popper
2	AE-24-900	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Spring
5	23-6420	Rubber Grommet
6	A-16858	Mounting Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut, 8-32 ESN
9	4106-01013-06	SMS #6 x 3/8"
10	A-16908	LED Assembly - RTV
11	A-16909	Photo Transistor Assy. - RTV
12	H-17609-5	Opto Cable, Square
13	H-19523-1	Mini Coil Cable

A-19119
Ball Popper Assembly Complete
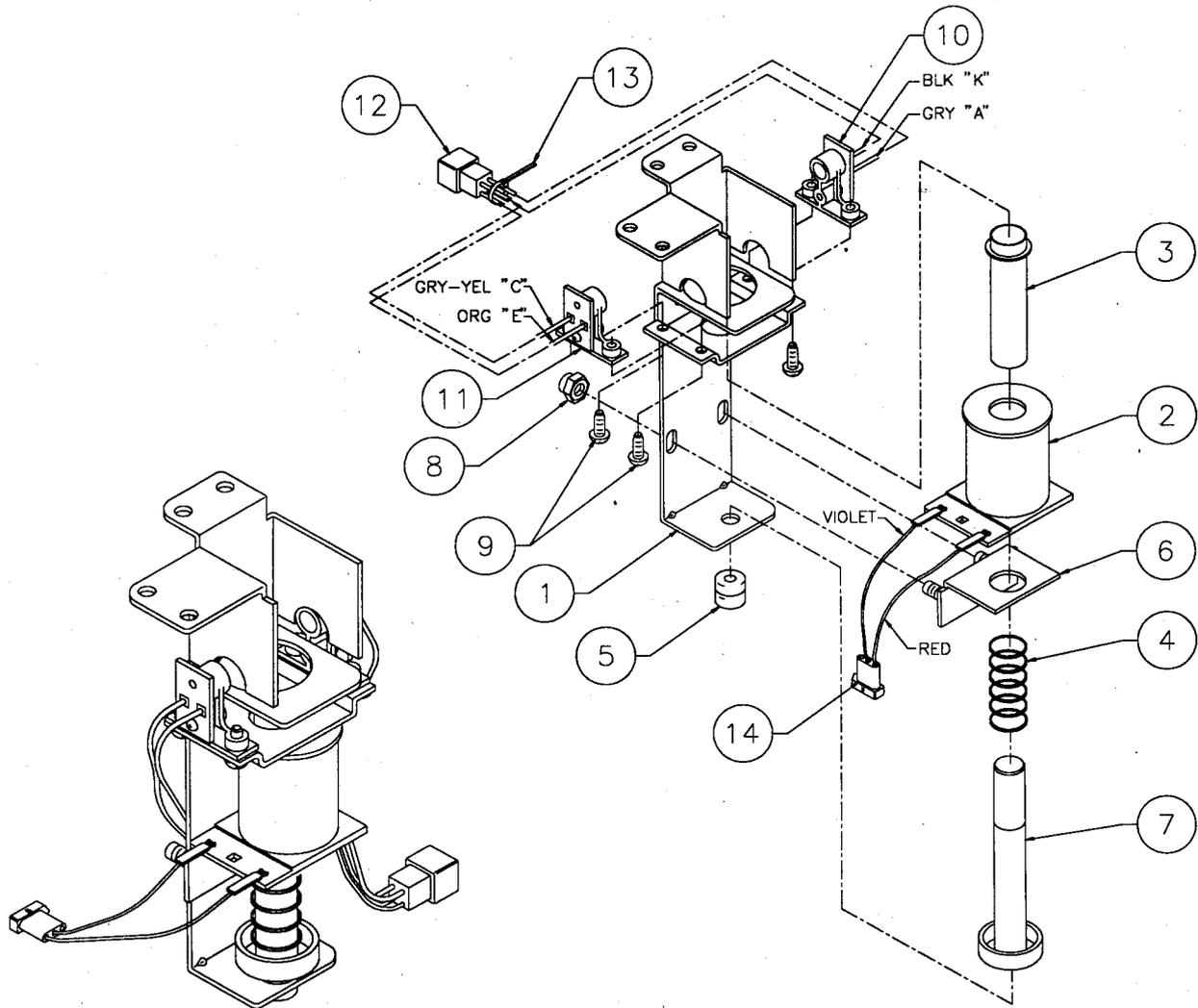
Item	Part Number	Description
1	A-19120.1	Ball Poper Sub-Assembly
2	AE-26-1200	Coil Assembly
3	03-7067	Coil Tubing
4	10-135	Solenoid Spring
5	23-6420	Rubber Grommet
6	A-16858	Mounting Bracket
7	A-17767	Bell Armature Assembly
8	4408-01119-00	Nut, 8-32 ESN
9	4106-01013-06	SMS #6 x 3/8"
10	A-16908	LED Assembly, RTV
11	A-16909	Photo Transistor Assy.-RTV
12	H-17609-5	Opto Cable - Square
13	03-7520-2	Tie Wrap-Nylon, 3-7/8"
14	H-19523-1	Cable Assembly

A-19282
Coil & Bracket Assembly

Item	Part Number	Description	Item	Part Number	Description
1	A-17808	Bracket & Stop Assembly	7b)	01-13625	Mounting Bracket Door
2	01-8-508-S	Coil Stop Bracket	c)	01-13268.1	Flap Door
3	A-14701	Coil Assembly	d)	01-13269.1	Link
4	03-7066	Tubing, 1.745" Long	e)	01-13270	Ball Deflector
5	4406-01119-00	Nut #6-32 ESNA	f)	02-5085	Pivot Pin
6	4006-01003-06	Mach. Screw, #6-32 x 3/8"	g)	02-4731	Solenoid Plunger
			h)	02-5084.1	Roller Door
Associated Assembly:			j)	07-6697-4	Rivet, 1/8 x 3/16"
			k)	20-8716-5	Roll Pin, 1/8 x 7/16"
7	A-19132	Door Assembly	m)	20-8712-25	"E"-Ring, 1/4" Shaft
a)	A-19133.1	Door Sub-Assembly	n)	20-8712-43	"E"-Ring, 7/16" Shaft

2-26
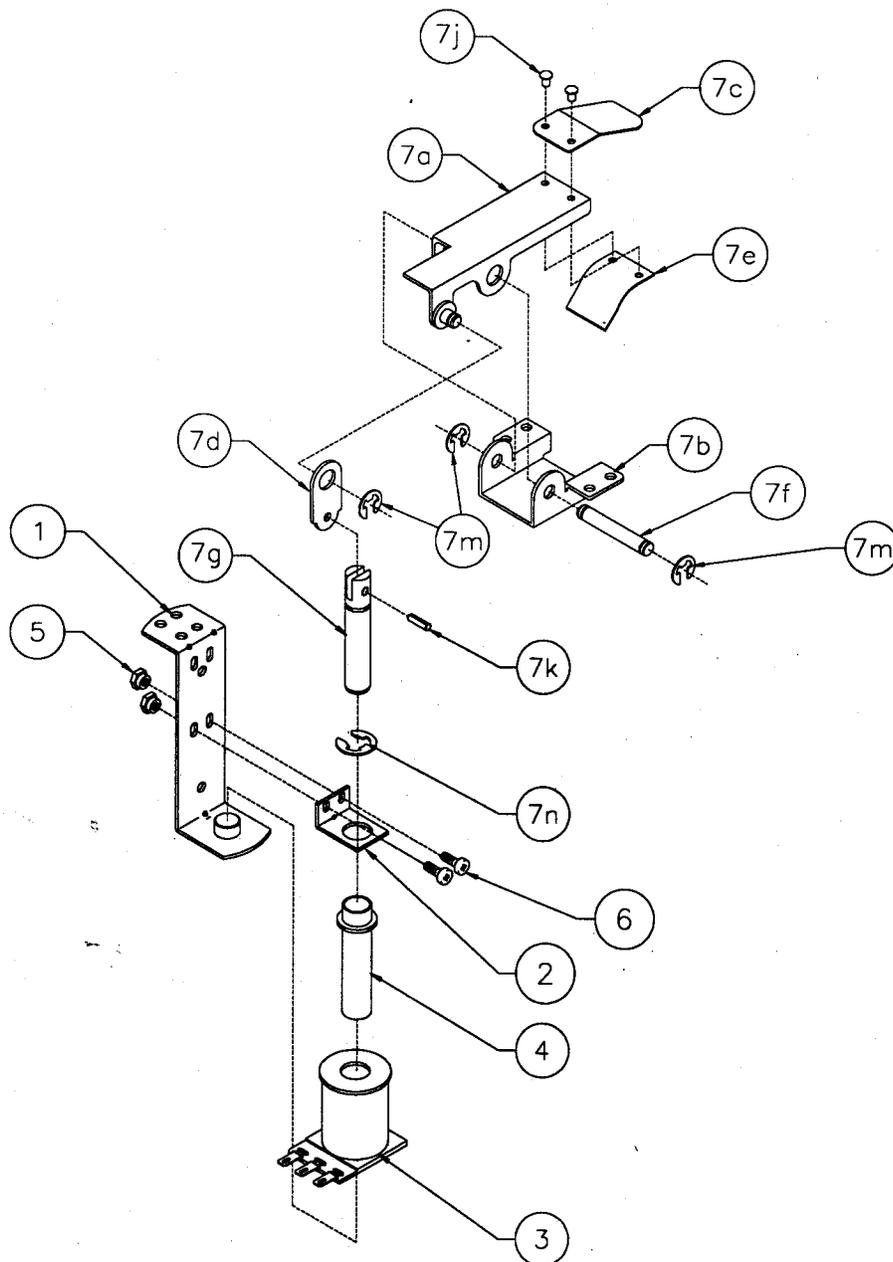
A-16113-1
Gun Handle Assembly

Item	Part Number	Description
1	21-6692-1	Gun Handle, Right
2	21-6692-2	Gun Handle, Left
3	01-11066	Trigger
4	10-320	Extension Spring, Red
5	5647-12133-12	Mini Micro Switch
6	02-4547	Fastener-Button Head
7	4702-00014-00B	Lockwasher, 1/4" Int. Tooth
8	4700-00129-00B	Flat Washer, 13/64 x 15/32 x 22ga.
9	4702-00013-00B	Lockwasher, #10 Int. Tooth, Black
10	4010-01097-06B	Mach. Screw, #10-32 x 3/8"
11	H-16437	Cable Assembly
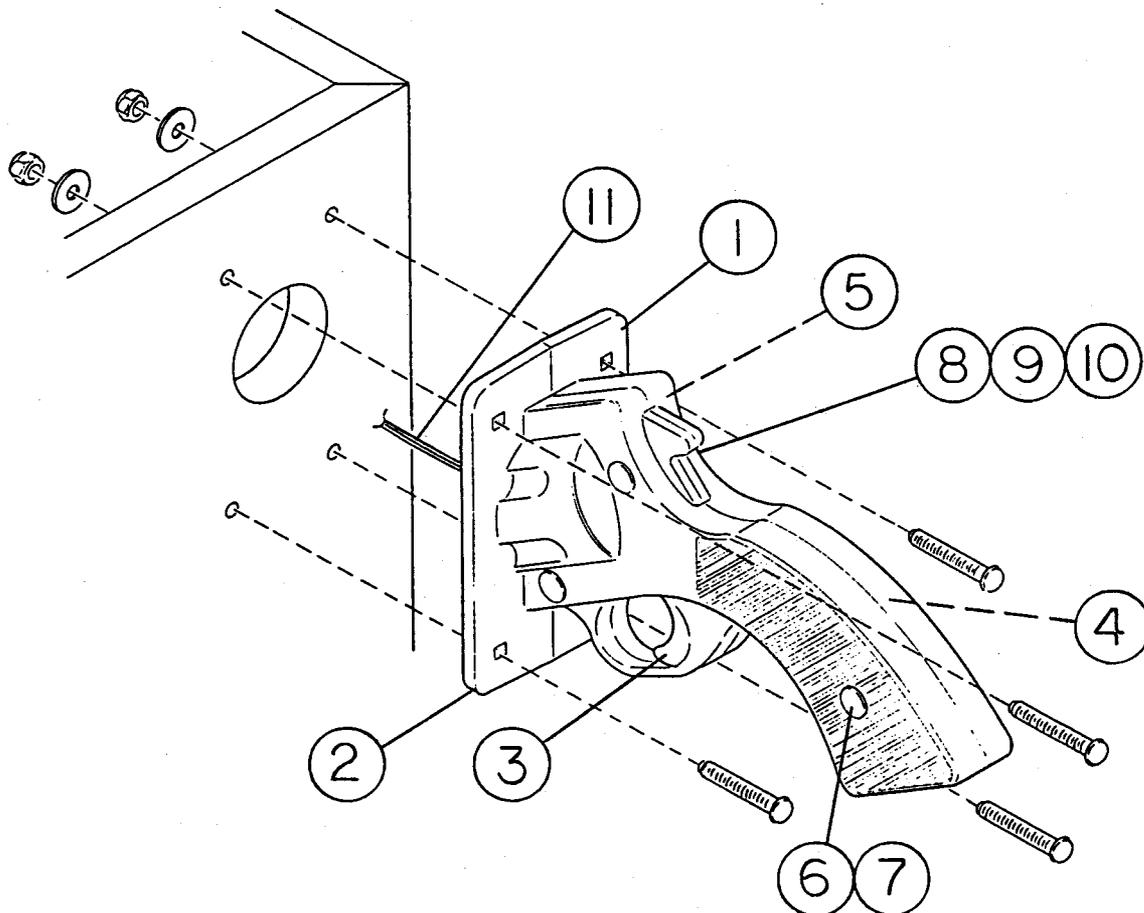
A-18581
Gun Motor Mounting Assembly
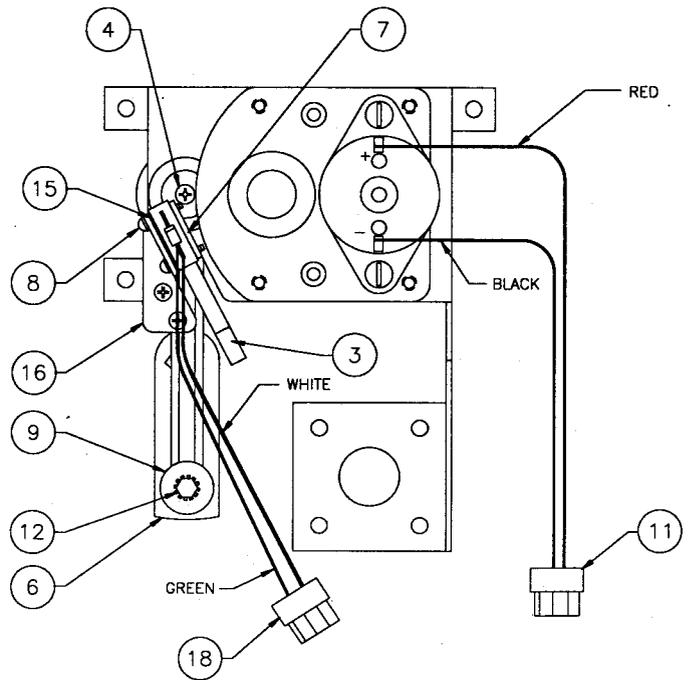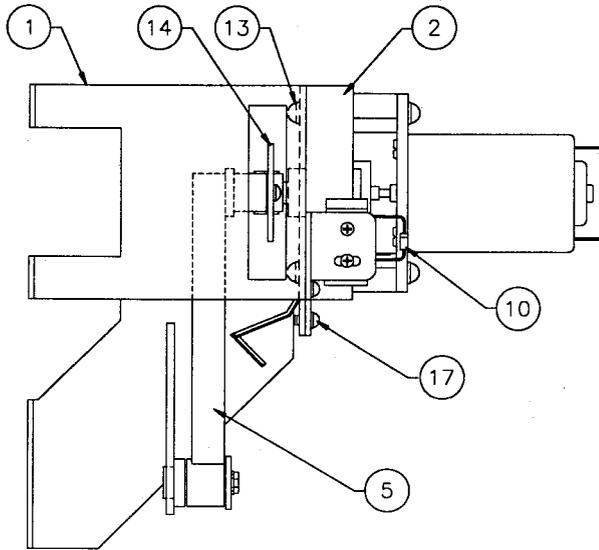
Item	Part Number	Description
1	01-13008	Gun Motor Bracket
2	A-19947	Motor & Crank Assembly
3	5647-12693-21	Switch Mini Micro
4	4108-01031-14	SMS #8 x .875
5	03-8620	Actuator Bookcase
6	A-18586	Drive Plate Assembly
7	01-8240	Plate - Nut #2-56
8	4002-01105-07	Mach. Screw, 2-56 x 7/16"
9	4700-00023-00	Flat Washer , 13/64 x 5/8 x 16ga.
10	5070-09054-00	Diode 1N40004, 1.0A.
11	H-18600-3	Gun Cable
12	4008-01168-06	Mach. Screw, 8-32 x 3/8"
13	4008-01168-12	Mach. Screw, 8-32 x 3/4"
14	4700-00133-00	Flat Washer, 3/16 x 1-1/4 x 16ga.
15	01-8600	Insulator
16	01-13618	Bracket Gun Switch
17	4004-01003-05	Mach. Screw, #4-40 x 5/16"
18	H-16437	Cable Assembly

Associated Assembly:
(Not Shown)

| 19 | A-18584.1 | Bushing & Welded Screw Assembly |

A-19112
Gun Assembly
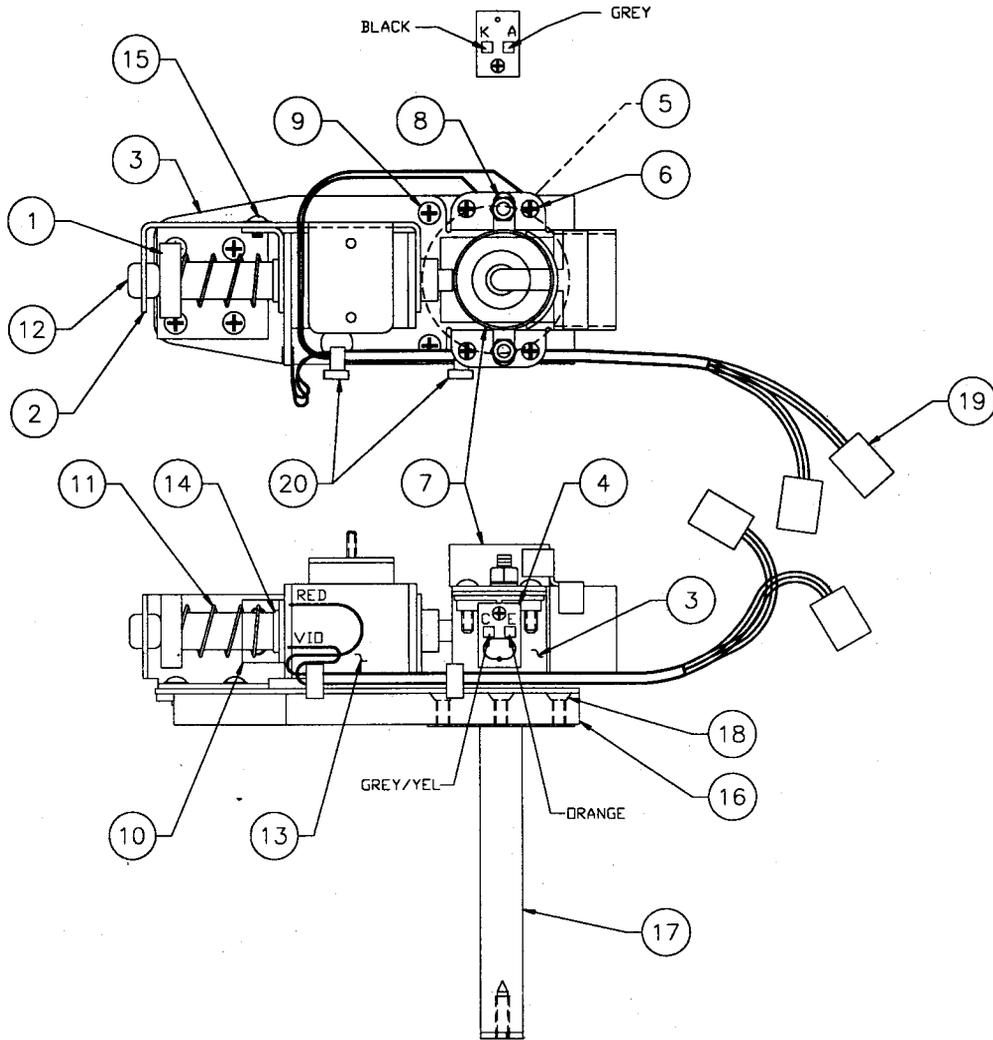
Item	Part Number	Description	Item	Part Number	Description
1	A-6306-2	Bell Armature Assembly	11	10-135	Solenoid Spring
2	A-19610	Mounting Bracket	12	23-6420	Rubber Grommet
3	A-19339.1	Gun Coil Mounting Bracket	13	AE-23-800	Coil Assembly
4	A-16908	Opto LED Assembly - RTV	14	03-7067-5	Coil Tubing
5	A-16909	Opto PhotoTran. Assy - RTV	15	4008-01017-04	Mach. Screw, #8-32 x 1/4"
6	4106-01013-06	Sh. Metal Screw, #6-32 x 3/8"	16	01-13002.3	Adjusting Bracket
7	A-19767.4	Gun Loading Tubing	17	A-18582	Gun Shaft Assembly
8	4406-01119-00	Nut 6-32 ESNA	18	4008-01041-06	Mach. Screw, 8-32 x 3/8"
9	4008-01017-08	Mach. Screw, 8-32 x 3/8"	19	H-19772	Cable Assembly
10	01-8-508-T	Solenoid Bracket	20	03-7520-2	Ty-Wrap

Associated Part:
(Not Shown)

31-2260   Playfield Gun - Decorated

2-29

A-18585
Ramp Divertor Assembly
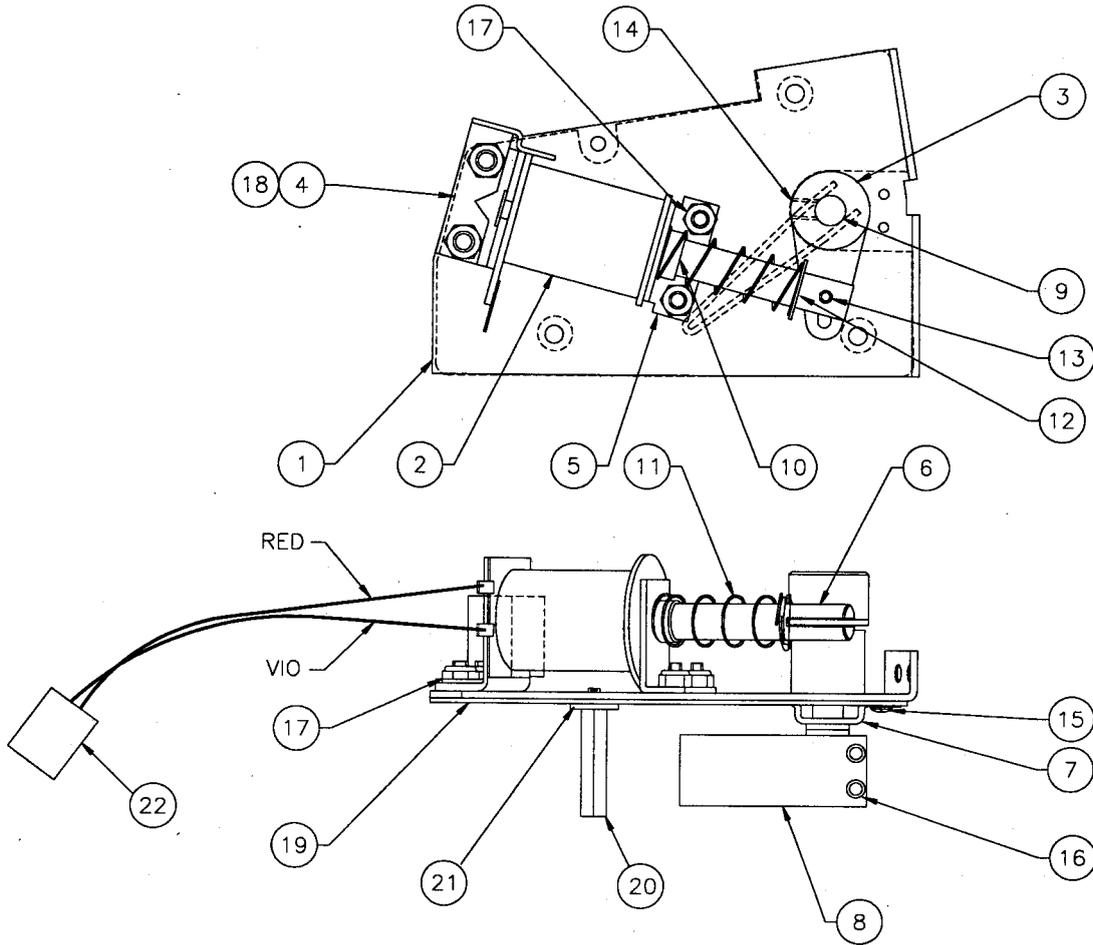
Item	Part Number	Description	Item	Part Number	Description
1	A-19340.2	Divertor Mounting Plate	12	20-8712-43	"E"-Ring, 7/16" Shaft
2	AE-26-1200	Coil Sub-Assembly	13	20-8716-5	Roll Pin, 1/8 x 7/16"
3	A-18583.1	Divertor Act. Shaft Assy.	14	4323-01158-06	SS 1/4-28 x 3/8"
4	A-11397	Stop Bracket Assembly	15	4004-01003-05	Mach. Screw, #4-40 x 5/16"
5	01-8413	Coil Mounting Bracket	16	07-6688-26	Rivet, 1/8 x 1/2"
6	02-4831	Shaft Divertor Actuator	17	4408-01119-00	Nut #8-32 ESNA
7	01-12993	Plate - Divertor Shaft Act.	18	01-13750	Coil Mounting Plate
8	01-13017	Divertor	19	31-2064	Decal - Top Ramp
9	02-5130	Shaft - Divertor Pivot	20	02-5048-2	M-F Spacer, 8-32 x 1-1/8"
10	03-7066	Coil Tubing	21	4700-00011-00	FW, 11/64 x 7/16 x 16ga.
11	10-395	Spring	22	H-19775-1	Cable Assembly

A-19746
Ramp Diverter Assembly II
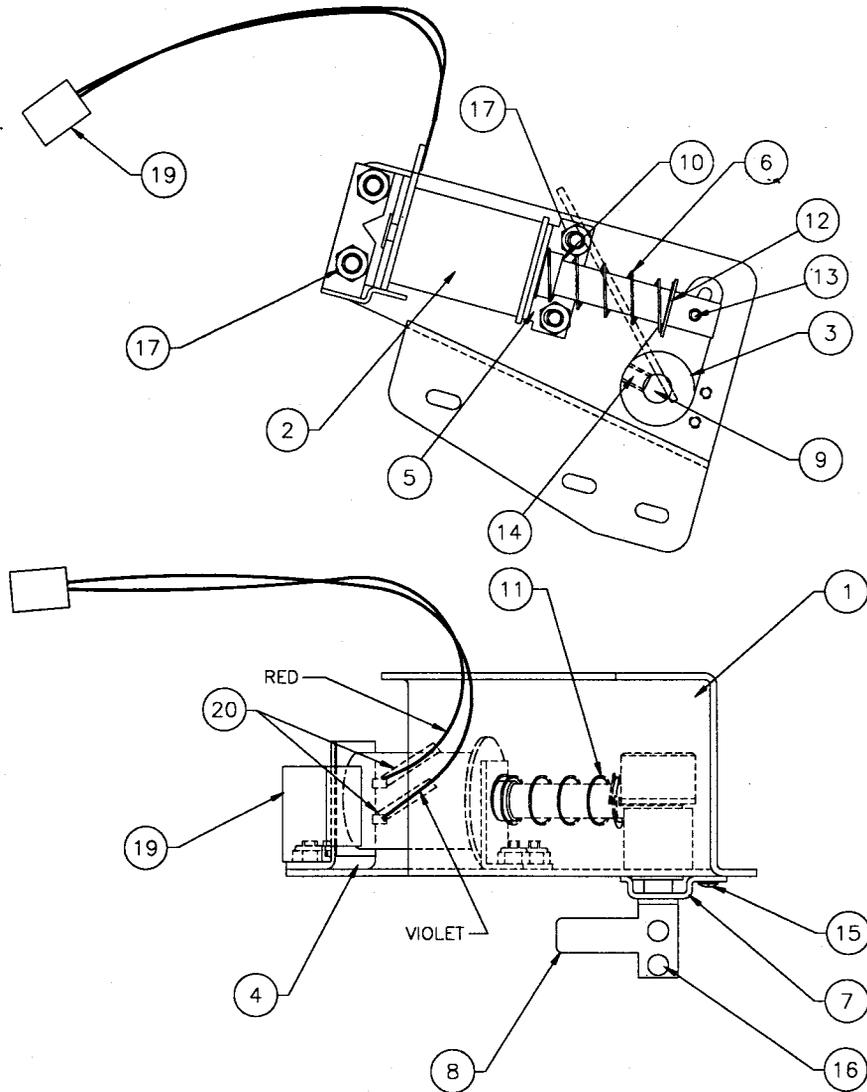
Item	Part Number	Description	Item	Part Number	Description
1	A-19747.3	Diverter Mounting Plate	11	10-395	Spring
2	AE-26-1200	Coil Sub-Assembly	12	20-8712-43	"E"-Ring, 7/16" Shaft
3	A-18583.1	Diverter Act. Shaft Assy	13	20-8716-5	Roll Pin, 1/8 x 7/16"
4	A-11397	Stop Bracket Assembly	14	4323-01158-06	SS 1/4-28 x 3/8" Cup Point
5	01-8413	Coil Mounting Bracket	15	4004-01003-05	Mach. Screw, #4-40 x 5/16"
6	02-4831	Shaft Diverter Actuator	16	07-6688-20N	Rivet, 1/8 x 1/2"
7	01-12993	Plate - Diverter Shaft Act.	17	4408-01119-00	Nut #8-32 ESNA
8	01-13623.1	Diverter	18	H-19775	Divertor Cable
9	02-5145	Shaft - Diverter Pivot	19	01-13626	Stop Plate Bracket
10	03-7066	Coil Tubing	20	RM-23-02	Heat Shrink Tubing 1/4" Poly

Playfield Slide Mechanism Assembly

(Left Assembly Shown)

Underside of Playfield
shown for reference

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③

②

④
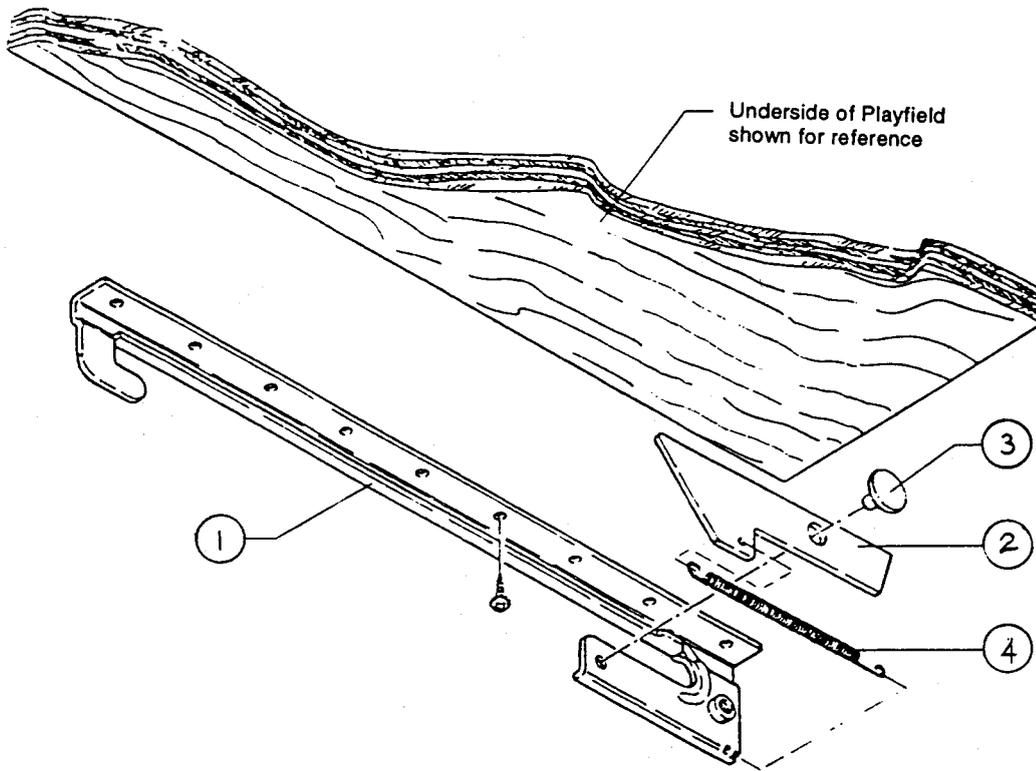
A-17749.1-1
Playfield Slide Mechanism Assy.
Left Assembly

Item	Part Number	Description
1	01-12304-1	Slide, Left
2	01-10664.1	Lever Retainer
3	02-4615	Shoulder Rivet

Associated Part:

4	10-439	Spring

A-17749.1-2
Playfield Slide Mechanism Assy.
Right Assembly

Item	Part Number	Description
1	01-12304-1	Slide, Right
2	01-10664.1	Lever Retainer
3	02-4615	Shoulder Rivet

Associated Part:

4	10-439	Spring

Posts

02-4424-2
Post #6-32/#8-32

02-4425-1
Post #8-32/#8-32

02-4426-1
Post #6-32/#8-32 SMS

02-4434
Post #8
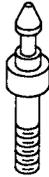
02-4660
Mini-Post Single Bumper

02-4677
Mini-Post
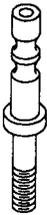
02-4678
Double Bumper Post #10

02-4765-12
Mounting Post, 3.5"
02-4765-13
Mounting Post, 4.75"
02-4765-15
Mounting Post, 2.56"

02-4825-18
M-F Spacer 8-32 x 1-1/8"

02-5048-1
M-F Spacer, 3.50"
02-5048-2
M-F Spacer, 1.13"

02-5049-2
F-F Spacer #8-32, 3" Lg.

02-4426-1
Post #6-32/#8-32 SMS

02-4426-1
Post #6-32/#8-32 SMS

02-5107
Post Adjusting

02-5129.1
Bumper Post

02-5146
Bumper Post #8

03-8044-13
Mini-Post, Clear

03-8130-13
Double Post

03-8319-13
Post #8 Starred

A-17540
Universal Power Interface Assembly

BOTTOM VIEW

SIDE VIEW

SIDE VIEW

TOP VIEW

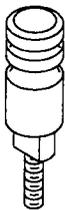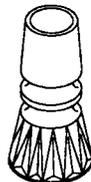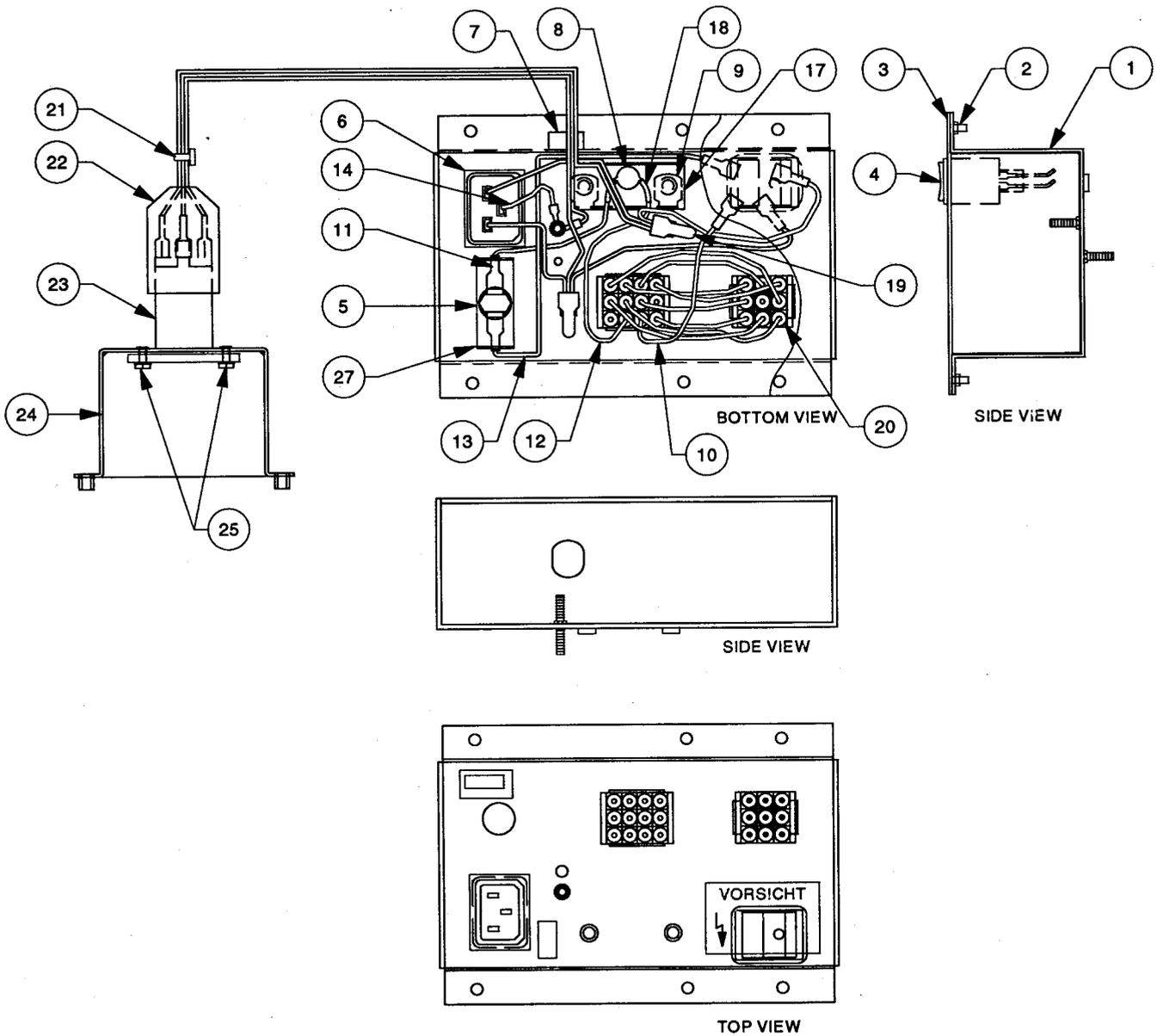| Item	Part Number	Description
1	01-12293.1	Power Control Chassis Box
2	4406-01128-00	Nut #6-32 KEPS
3	01-12294	Switch Mounting Plate Assembly
4	5642-13935-00	Power Switch
5	5733-12869-00	Fuse Holder Panel
6	5851-13867-00	Outlet-IEC Conn. 237 Socket
7	03-8712	Strain Relief Bushing
8	5016-12978-00	Thermistor 8A., 2.5R25
9	4006-01003-10	Mach. Screw, #6-32 x 5/8"
10	H-17992	Jumper Cable Neutral Sw/1FC
11	H-17543	Hot Jumper Black Cable
12	H-17546	Jumper Interface Hot Black Cable
13	H-17545	Jumper Switch/Fuse Black Cable

Item	Part Number	Description
14	H-17542	Ground Jumper Grn/Yel Cable
15	5797-13940-01	Jumper Cable
16	01-10623	Insulator, Thermistor
17	01-12299	Insulator, Terminal Strip
18	RM-21-06	#18 Vinyl Fgls
19	5822-13865-00	Terminal Strip 3-CKT 2-Mtg.
20	H-18050	Jumper Cable, Transformer Prog.
21	03-7933	Ty-Wrap Nylon
22	20-9682-1	Boot w/9-32 Dia. Hole
23	5102-13864-00	Line Filter w/IEC Connector
24	01-12292	Line Filter Chassis Box
25	4004-01003-05	Mach. Screw, #4-40 x 5/16"

Universal Power Interface/Cordset Application Chart

COUNTRY	UNIVERSAL PWR. INTERFACE ASSEMBLY	VOLTAGE PROGRAMMING JUMP CABLE				5AMP FUSE/ LABEL		8AMP FUSE/ LABEL		LABEL HIGH/ VOLTAGE CAUTION	POWER ADAPTER CORD	CORDSET								
	A-17540	H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-09651-00 FUSE	16-9668 LABEL	5730-09252-00 FUSE	16-9670 LABEL	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	X		X					X	X		X	X								
CANADA	X	X						X	X			X								
TAIWAN	X		X					X	X			X								
MEXICO	X		X					X	X			X								
CENTRAL AMERICA	X		X					X	X			X								
SOUTH KOREA	X		X					X	X			X								
PUERTO RICO	X		X					X	X			X								
AUSTRIA	X			X		X	X			X			X							
BELGIUM	X			X		X	X			X			X							
FINLAND	X			X		X	X			X			X							
FRANCE	X			X		X	X			X			X							
GREECE	X			X		X	X			X			X							
HOLLAND	X			X		X	X			X			X							
HUNGARY	X			X		X	X			X			X							
NETHERLANDS	X			X		X	X			X			X							
NETH. ANTILLES	X			X		X	X			X			X							
NORWAY	X			X		X	X			X			X							
POLAND	X			X		X	X			X			X							
PORTUGAL	X			X		X	X			X			X							
SPAIN	X			X		X	X			X			X							
SWEDEN	X			X		X	X			X			X							
TURKEY	X			X		X	X			X			X							
WEST GERMANY	X			X		X	X			X			X							
UNITED KINGDOM	X			X		X	X			X				X						
IRELAND	X			X		X	X			X				X						
HONG KONG	X			X		X	X			X				X						
DENMARK	X			X		X	X			X					X					
ITALY	X			X		X	X			X						X				
CHILE	X			X		X	X			X						X				
PEOPLE'S REP. OF CHINA	X			X		X	X			X						X				
SWITZERLAND	X			X		X	X			X							X			
AUSTRALIA	X			X		X	X			X								X		
NEW ZEALAND	X			X		X	X			X								X		
ARGENTINA	X			X		X	X			X								X		
JAPAN	X				X			X	X										X	X

Cables

Part Number	Description

Playfield Cables

H-19736	2-Target Switch Cable
H-19760	Playfield Switch Cable
H-19761	Playfield Lamp Cable
H-19762	Playfield Solenoid Cable
H-19763	Playfield Opto Cable

Backbox Cables

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

Cabinet Cables

H-17217	Plumb Bob/Mech Protect Cable
H-17837-2	Voltage Program Cable
H-19130	Dixie-Vend Interconnect Cable
H-19524	Cabinet Cable
H-19601	Power Extension Cable
H-19765	Cabinet Switch/Lamp Cable

Unique Parts List

Part Number	Description	Part Number	Description
A-13204-50030	Bottom Arch Assembly	A-19963	Ball Trough Assembly
A-13769-50030	Playfield & Insert Assembly	A-20024	Eject Assembly
A-16113-1	Gun Handle Assembly	A-20070	Single Target & Cable Assembly
A-16917-50030	Sound Board Assembly	A-20071	Double Target & Cable Assembly
A-16998.1	16-Opto Dual Mount PCB Assy.	A-8552-50030	Backglass Assembly
A-17651-50030	WPC Security CPU Assembly	01-12937.1	Shooter Lane-Ball Guide
A-17778-7	Standup Target Frt. Mtg. Oblong	01-13236	Mounting Plate Deflector
A-17814-50030	Backbox Assembly	01-13236	Mounting Plate Deflector
A-18581	Gun Motor Mounting Assembly	01-13241	Mounting Plate Gate
A-18584.1	Bushing & Welded Scr. Assembly	01-13261	Trough Left Popper
A-18585	Ramp Diverter Assembly	01-13262.1	Ramp Protect Guard, Left
A-18604	Main Ramp Assembly	01-13277.1	Shooter Lane - Left Side
A-18623	Ball Guide Assembly	01-13280	Left Hole Guide
A-18791	Ball Popper Assembly	01-13281	Gun Guide
A-19040	Right Ramp Assembly	01-13595	Gate Bracket
A-19087	Switch Trough Assembly	01-13618	Gun Switch Bracket
A-19112	Gun Assembly	01-13645	Support Bracket
A-19119	Ball Popper Assembly	01-13758	Ramp Support Bracket
A-19132	Door Assembly	01-13785	Ball Guide
A-19252	Ball Guide & Wire Assembly	02-4765-12	Mounting Post, 3.5"
A-19265	Gate Switch Assembly	02-4765-13	Mounting Post, 4.75"
A-19282	Coil & Bracket Assembly	02-4765-15	Mounting Post, 2.56"
A-19341	Upper Flipper Guide Assembly	02-4825-18	M-F Spacer 8-32 x 1-1/8"
A-19342.1	Ball Guide	02-5048-1	M-F Spacer 8-32 x 3-1/2"
A-19347.2	Ball Guide	02-5048-2	M-F Spacer 8-32 x 1-1/8"
A-19363-1	7-Lamp PCB & Spacers Assy.	02-5049-2	F-F Spacer 8-32 x 3"
A-19364-1	5-Lamp PCB & Spacer Assy.	02-5101	Mini Post
A-19496-1	11-Lamp PCB & Spacer Assy.	02-5129.1	Bumper Post
A-19497-1	7-Lamp PCB & Spacer Assy.	02-5146	Bumper Post
A-19498-1	9-Lamp PCB & Spacer Assy.	03-9316	Right Building
A-19529	Opto Mounting Bracket Assy.	03-9319.1	Left Building
A-19543	Ball Popper Assembly	11-1202.1	Wood Cabinet
A-19605.1	Ball Guide	11-1204-	Rail Wood
A-19637	Gun Load Ramp Assembly	12-7227	Ramp Wire - Ball Popper
A-19645-	Playfield Plastic Set	12-7228.2	Wire Ramp Diverter
A-19696	Plate & Decal Assembly	12-7229.2	Wire Ramp Gun Load
A-19697	Plate & Decal Assembly	12-7237.1	Wire Ramp #2 - Ball Popper
A-19698	Hood & Decal Assembly	12-7238	Ball Guide
A-19699	Shooter & Decal Assembly	12-7253	Ball Gate Wire Form
A-19710-1	Ball Gate Wire Form - Left	12-7254	Ball Gate Wire Form
A-19710-2	Ball Gate Wire Form - Right	12-7256	Wire Ramp
A-19722	Back Panel Assembly	31-2031-	Playfield Plastic Set
A-19723	Standup Target & Decal Assy.	31-2063-	Under Ramp Decal Set
A-19724	Drop Target & Decal Assembly	31-2064	Top of Ramp Decal
A-19746	Divertor Assembly - Right	31-2065-	Regular Decal Set
A-19784	Right Building Assembly	31-2066-7	Drop Target Decal
A-19785	Support Bracket & Light Assembly	31-2260	Playfield Gun - Decorated
A-19793	Bracket & Light, Lt. Building Assy.	36-50030	Hard Coat
A-19818-R-2	Flipper Assembly		

Upper Playfield Parts

Item No.	Part Number	Description
1	20-9250-5	Flipper Paddle & Shaft
	A-19818-R-2	Flipper Assembly
2	03-9216-9	Flipper Ball Guide
3	A-17811	Slingshot Kicker
	B-9362-R-3	Coil & Bracket Assembly
4	01-12037.1	Shooter Lane Ball Guide-Right
5	31-2260	Decorated Gun
6	A-19112	Gun Assembly
7	A-19723	Black Standup Target
8	01-13281	Gun Ball Guide
9	A-17802	Bulb & Socket Assembly
10	A-19637	Gun Load Ramp
11	A-19699	Shooter & Decal Guide
12	A-19132	Door Assembly
13	A-19341	Upper Flipper Ball Guide
14	20-9250-5	Flipper Paddle & Shaft
	A-15849-L-2	Flipper Assembly
15	A-19347	Ball Guide
16	A-18623	Ramp
17	01-13277.1	Shooter Lane Ball Guide-Left
18	A-17778-7	Oblong Black Standup Target
19	A-19265	Switch Gate
20	A-18585	Ramp Diverter
21	01-13262.1	Ramp Protect
22	A-19793	Warehouse
23	A-19529	Opto Mounting Bracket
24	A-19342	Ball Guide
25	12-7237.1	Wire Ramp
26	A-19710-2	Ball Gate Wireform
27	B-9414-3	Jet Bumper Assembly
	03-8254-4	Red Wafer Cap
28	A-19710-1	Ball Gate Wireform
29	A-19784	Safehouse
30	A-19605.1	Left Loop Inside Ball Guide
31	01-13785	Ball Guide
32	A-18604	Main Ramp
33	A-19696	Plate & Decal
34	A-19040	Right Ramp
35	01-8806	Ball Deflector
36	01-13280	Left Hole Ball Guide
37	12-7227	Wire Ramp
38	03-9216-9	Flipper Ball Guide
39	A-17811	Slingshot Kicker
	B-9362-R-3	Coil & Bracket Assembly
40	20-9250-5	Flipper Paddle & Shaft
	A-15849-L-2	Flipper Assembly
41	12-6842	Bottom Arch Fence
42	01-13638	Bottom Arch Ball Guide
43	12-7228.2	Diverter Ramp
44	12-7256	Wire Ramp
45	A-19543	Gun Ball Popper
46	A-18791	Top Right Ball Popper
47	A-19119	Left Ball Popper
48	A-13204-50030	Bottom Arch Assembly
	31-2027.2	Decorated Bottom Arch
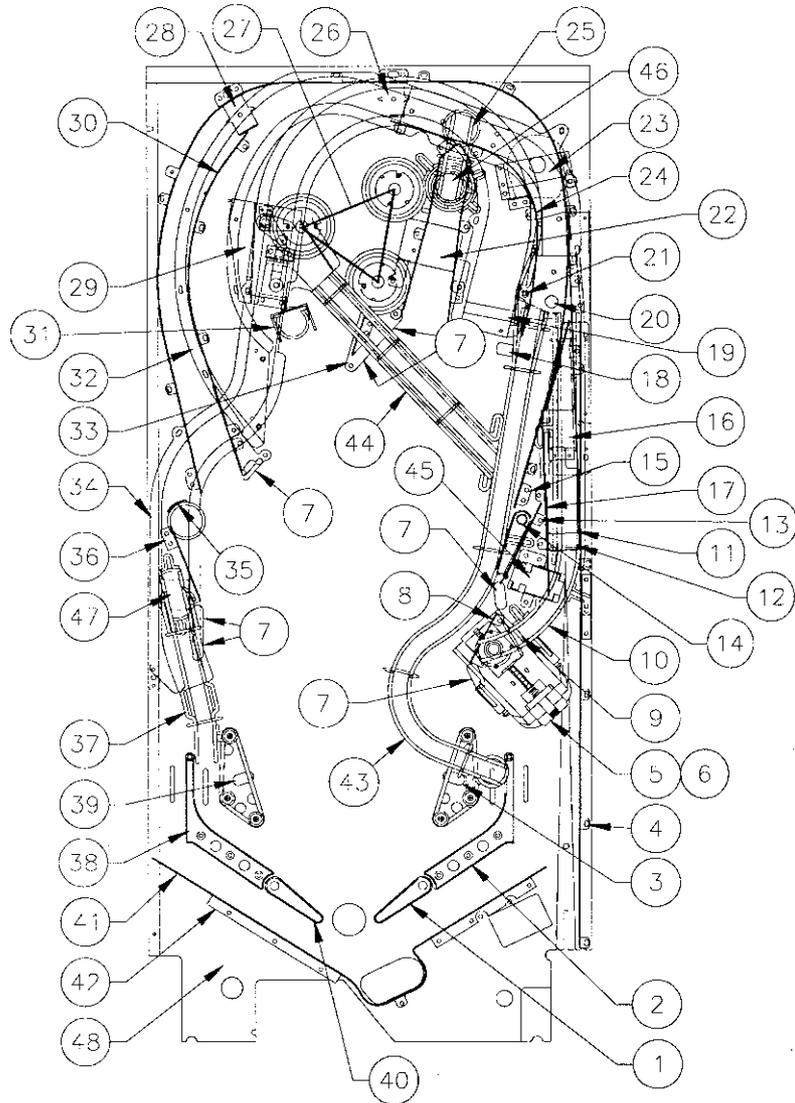
Miscellaneous Part Number	Description
A-13769-50030	Playfield & Insert Assembly
A-16113-1	Gun Handle Assembly
01-11066	Trigger
10-320	Eject Spring (red)
21-6692-1	Ride Side Handle
21-6692-2	Left Side Handle
A-19514	Chrome Leg Assembly
D-12615	Stainless Front Molding Assy
03-9310-1	*Full Playfield Mylar
03-9310-2	Small Mylar
08-7028-T	Playfield Glass

Magnet Assembly	
02-4773	Adjustable Magnet Core
20-9247	Coil Magnet
20-2612	Wave Spring Washer

*Dirty Harry hardcoat playfield does not require a full playfield mylar.
However, mylars can be purchased through your local Williams
Distributor.

Lower Playfield Parts

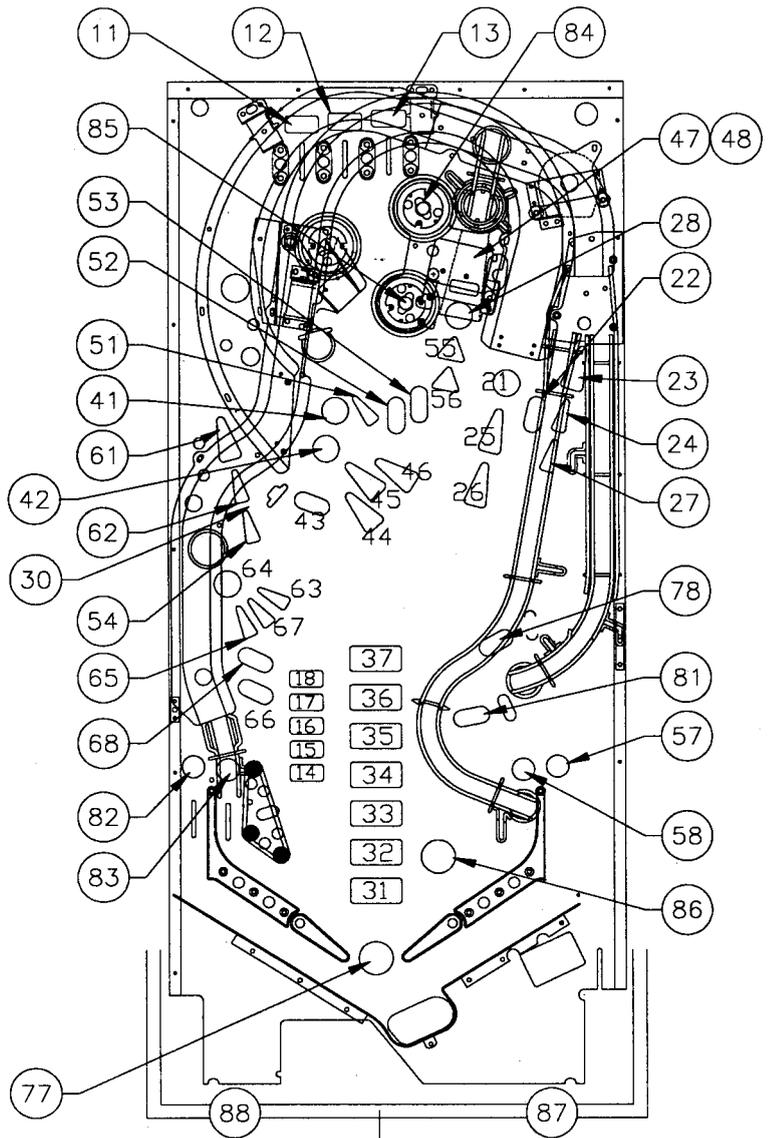| Item	Part Number	Description
1	01-9211	Plfd. Hanger Bracket Assembly (2)
2	A-19963	Outhole Ball Trough ASsembly
3	01-13645	Leg Support (2)
4	A-19223-R	Flipper Assembly, Lwr. Right
5	A-17811	Kicker Arm (Slingshot) Assembly
	B-9362-R-3	Coil & Bracket Assembly
6	A-15542	Motor EMI Board
7	A-18581	Gun Motor Assembly
8	A-18791	Ball Popper Assembly
9	A-19818-R-2	Flipper Assembly, Upr. Right
10	A-16998.1	16-Opto Board PCB Assembly
11	A-19087	Switch Trough Assembly
12	A-19282	Coil & Bracket Assembly
	A-19132	Door Assembly
13	A-17749.1-2	Slide Playfield Assembly, Right
14	A-19497	7-Lamp Board Assembly
15	A-15849-L-2	Flipper Assembly, Lwr. Left
16	A-16460	Bracket & Nut Assembly
	20-9247	Coil Magnet & Thermal Breaker
17	A-19543	Ball Popper Assembly
18	A-9415-2	Jet Bumper Coil Assembly (3)
19	A-17796	Ball Gate Actuator Assembly
20	A-17624	3-Lamp Board Assembly
21	A-17749.1-1	Slide Playfield Assembly, Left
22	A-20024	Eject Assembly
23	A-19496	11-Lamp Board Assembly
24	01-13261	Trough Left Popper
25	A-19119	Ball Popper Assembly
26	A-19363	6-Lamp Board Assembly
27	A-19498	9-Lamp Board Assembly
28	A-19364	5-Lamp Board Assembly

Lamp Matrix

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
Red-Brown J134-1 Q90 1	Left Rollover 11	Right Ramp Badge 21	Barroom Brawl 31	Safehouse Badge 41	Safehouse 51	Left Loop Generic 61	Not Used 71	Silver 8 Bullet 81
Red-Black J134-2 Q89 2	Middle Rollover 12	Silver 6 Bullet 22	Car Chase 32	Left Ramp Badge 42	Silver 4 Bullet 52	Ricochet 62	Not Used 72	Left Shootout 82
Red-Orange J134-4 Q88 3	Right Rollover 13	Right Loop Generic 23	Warehouse Raid 33	Silver 3 Bullet 43	Silver 5 Bullet 53	Extra Ball 63	Not Used 73	Light Magna Force 83
Red-Yellow J134-5 Q87 4	Magnum Jets 14	Magna Force 24	Letter Bomb 34	Super Jackpot 44	Left Loop HQ 54	HQ Badge 64	Not Used 74	Jets 84
Red-Green J134-6 Q87 5	Magnum Bullets 15	Right Ramp Generic 25	Meet the Mob 35	Left Ramp Generic 45	Warehouse Start Multiball 55	Ransom 65	Not Used 75	Jets 85
Red-Blue J134-7 Q86 6	Light Extra Ball 16	Right Ramp Jackpot 26	Stop Scorpio 36	Ramp Start Multiball 46	Feel Lucky 56	Silver 1 Bullet 66	Not Used 76	Body Armor 86
Red-Violet J134-8 Q84 7	Light Shootout 17	Right Loop HQ 27	Crime Wave 37	Magazine Award 47	Right Shootout 57	HQ 67	Shoot Again 77	Buy In Button 87
Red-Gray J134-9 Q83 8	Playfield Promo. 18	Warehouse Badge 28	Bank Robber Hurry Up 38	Contraband 48	Light Ransom 58	Silver 2 Bullet 68	Silver 7 Bullet 78	Start Button 88

J1XX = POWER DRIVER BOARD

Lamp Locations

Item No.	Bulb Number	Lamp Assy Number	Description
11	24-8768	A-17624	Left Rollover
12	24-8768	A-17624	Middle Rollover
13	24-8768	A-17624	Right Rollover
14	24-8768	A-19364	Magnum Jets
15	24-8768	A-19364	Magnum Bullets
16	24-8768	A-19364	Light Extra Ball
17	24-8768	A-19364	Light Shootout
18	24-8768	A-19364	Playfield Promo.
21	24-8768	A-19497	Right Ramp Badge
22	24-8768	A-19497	Silver Bullet
23	24-8768	A-19497	Right Loop Generic
24	24-8768	A-19497	Magna Force
25	24-8768	A-19497	Right Ramp Generic
26	24-8768	A-19497	Right Ramp Jackpot
27	24-8768	A-19497	Right Loop HQ
28	24-6549	A-17807	Warehouse Badge
31	24-6549	A-17807	Barroom Brawl
32	24-8768	A-19363	Car Chase
33	24-8768	A-19363	Warehouse Raid
34	24-8768	A-19363	Letter Bomb
35	24-8768	A-19363	Meet The Mob
36	24-8768	A-19363	Stop Scorpio
37	24-8768	A-19363	Crime Wave
38	24-6549	A-8882	Bank Rob. Hurry-up
41	24-8768	A-19496	Safehouse Badge
42	24-8768	A-19496	Left Ramp Badge
43	24-8768	A-19496	Silver Bullet
44	24-8768	A-19496	Super Jackpot
45	24-8768	A-19496	Left Ramp Generic
46	24-8768	A-19496	Right Start Multiball
47	24-6549	A-16041	Magazine Award
48	24-6549	A-16041	Contraband
51	24-8768	A-19496	Safehouse
52	24-8768	A-19496	Silver Bullet 4
53	24-8768	A-19496	Silver Bullet 5
54	24-8768	A-19498	Left Loop HQ
55	24-8768	A-19496	Warehouse Start Mball
56	24-8768	A-19496	Feel Lucky
57	24-6549	A-17835	Right Shootout
58	24-6549	A-17835	Light Ransom
61	24-8768	A-19498	Left Loop Generic
62	24-8768	A-19498	Ricochet
63	24-8768	A-19498	Extra Ball
64	24-8768	A-19498	HQ Badge
65	24-8768	A-19498	Ransom
66	24-8768	A-19498	Silver Bullet 1
67	24-8768	A-19498	HQ
68	24-8768	A-19498	Silver Bullet 2
71			Not Used
72			Not Used
73			Not Used
74			Not Used
75			Not Used
76			Not Used
77	24-6549	A-17835	Shoot Again
78	24-6549	A-17807	Silver Bullet 7
81	24-6549	A-17807	Silver Bullet 8
82	24-6549	A-17835	Left Shootout
83	24-6549	A-17835	Light Magna Force
84	24-8768	-----	Jets
85	24-8768	-----	Jets
86	24-6549	A-17835	Body Armor
87	-----	20-9663-20	Buy In Button
88	-----	20-9663-1	Start Button

24-6549 = #44 BULB
24-8768 = #555 BULB

(Cabinet shown for reference only)

Switch Matrix

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
Org-Brn J205-1 Left Coin Chute D1	White-Brown J209-1 U18-11 — 1	Gun Handle Trigger 11	Slam Tilt 21	Trough Jam 31	Left Ramp Enter 41	Right Ramp Enter 51	Left Sling 61	Left Loop 71	Not Used 81	Black-Green J906-1 Lower Right E.O.S. F1
Org-Red J205-2 Center Coin Chute D2	White-Red J209-2 U18-9 — 2	Not Used 12	Coin Door Closed 22	Trough 1 32	Right Loop 42	Not Used 52	Right Sling 62	Not Used 72	Not Used 82	Blue-Violet J905-1 Lower Right Opto F2
Org-Blk J205-3 Right Coin Chute D3	White-Orange J209-3 U18-5 — 3	Start Button 13	Buy In Button 23	Trough 2 33	Left Ramp Make 43	Not Used 53	Left Jet 63	Safehouse 73	Not Used 83	Black-Blue J906-3 Lower Left E.O.S. F3
Org-Yel J205-4 4th Coin Chute D4	White-Yellow J209-4 U18-7 — 4	Plumb Bob Tilt 14	Always Closed 24	Trough 3 34	Gun Chamber 44	Standup 6 54	Middle Jet 64	Not Used 74	Not Used 84	Blue-Gray J905-2 Lower Left Opto F4
Org-Grn J205-6 Normal: Service Credit / Test: Escape D5	White-Green J209-5 U19-11 — 5	Shooter Lane 15	Left Inlane 25	Trough 4 35	Gun Popper 45	Standup 7 55	Right Jet 65	Not Used 75	Not Used 85	Black-Violet J906-4 Upper Right E.O.S. F5
Org-Blu J205-7 Normal: Volume Down / Test: Down D6	White-Blue J209-7 U19-9 — 6	Right Outlane 16	Left Outlane 26	Not Used 36	Warehouse Popper 46	Standup 5 56	Left Rollover 66	Gun Position 76	Not Used 86	Black-Yellow J905-3 Upper Right Opto F6
Org-Vio J205-8 Normal: Volume Up / Test: Up D7	White-Violet J209-8 U19-5 — 7	Right Inlane 17	Standup 1 27	Not Used 37	Left Popper 47	Standup 4 57	Middle Rollover 67	Gun Lockup 77	Not Used 87	Black-Gray J906-5 Upper Left E.O.S. F7
Org-Gry J205-9 Normal: Begin Test / Test: Enter D8	White-Gray J209-9 U19-7 — 8	Standup 8 18	Standup 2 28	Right Ramp Make 38	Not Used 48	Standup 3 58	Right Rollover 68	Not Used 78	Not Used 88	Black-Blue J905-5 Upper Left Opto F8

J2XX = CPU BOARD; J9XX = FLIPTRONIC II BOARD   [shaded] = OPTO, TYPICALLY CLOSED

Switch Locations

Item No.	Switch Number	Description
F1	SW-1A-194	Lower Right Flipper E.O.S.
F2	A-17316	Lower Right Flipper Cab.
F3	SW-1A-194	Lower Left Flipper E.O.S.
F4	A-17316	Lower Left Flipper Cab.
F5	SW-1A-194	Upper Right Flipper E.O.S.
F6	A-17316	Upper Right Flipper Cab.
F7	SW-1A-194	Upper Left Flipper E.O.S.
F8	A-17316	Upper Left Flipper Cab.
11	5647-12133-12	Gun Handle Trigger
12		Not Used
13	20-9663-1	Start Button
14	A-15361	*Plumb Bob Tilt
15	5647-12693-32	Shooter Lane
16	5647-12693-19	Right Outlane
17	5647-12693-19	Right Inlane
18	A-19723	Standup 8
21	A-17238	*Slam Tilt
22	5643-09268-00	*Coin Door Closed
23	20-9663-20	Buy-in Button
24	5643-09112-00	*Always Closed
25	5647-12693-19	Left Inlane
26	5647-12693-19	Left Outlane
27	A-19723	Standup 1
28	A-19723	Standup 2
31	A-18617-1 (LED) A-18618-1 (Trans)	Trough Jam
32	A-18617-1 (LED) A-18618-1 (Trans)	Trough 1
33	A-18617-1 (LED) A-18618-1 (Trans)	Trough 2
34	A-18617-1 (LED) A-18618-1 (Trans)	Trough 3
35	A-18617-1 (LED) A-18618-1 (Trans.)	Trough 4
36		Not Used
37		Not Used
38	A-16908 (LED) A-16909 (Trans.)	Right Ramp Make
41	A-16908 (LED) A-16909 (Trans.)	Left Ramp Enter
42	A-16908 (LED) A-16909 (Trans.)	Right Loop
43	A-16908 (LED) A-16909 (Trans.)	Left Ramp Make
44	A-16908 (LED) A-16909 (Trans.)	Gun Chamber
45	A-16908 (LED) A-16909 (Trans.)	Gun Popper
46	A-16908 (LED) A-16909 (Trans.)	Warehouse Popper
47	A-16908 (LED) A-16909 (Trans.)	Left Popper
48		Not Used
51	5647-12693-11	Right Ramp Enter
52		Not Used
53		Not Used
54	A-17778-7	Standup 6
55	A-19723	Standup 7
56	A-19723	Standup 5
57	A-19723	Standup 4
58	A-19723	Standup 3
61	A-17801	Left Slingshot
62	A-17801	Right Slingshot
63	B-12030-2	Left Jet Bumper
64	B-12030-2	Middle Jet Bumper
65	B-12030-2	Right Jet Bumper
66	5647-12693-19	Left Rollover
67	5647-12693-19	Middle Rollover
68	5647-12693-19	Right Rollover
71	5647-12693-19	Left Loop
72		Not Used
73	5647-12693-31	Safehouse
74		Not Used
75		Not Used
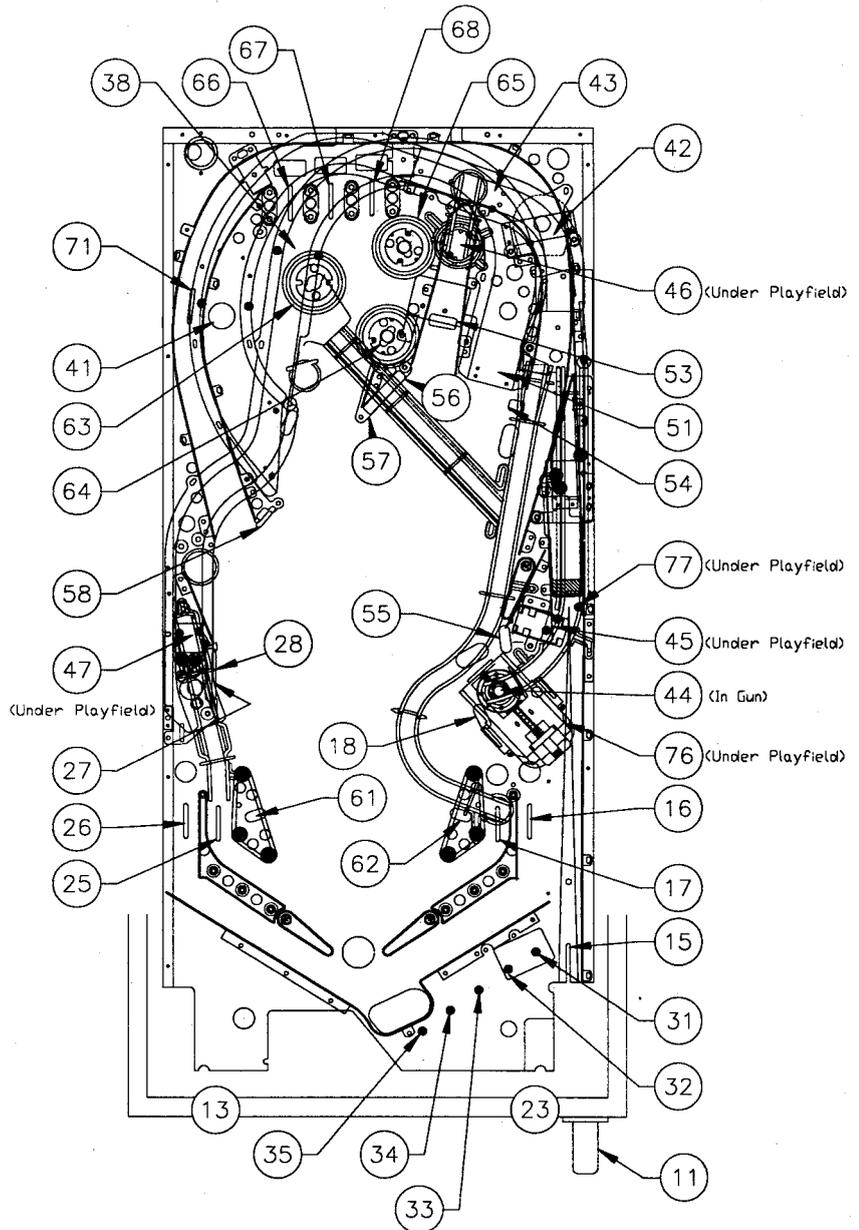
Item No.	Switch Number	Description
76	5647-12693-21	Gun Position
77	5647-12693-46	Gun Lockup
81		Not Used
82		Not Used
83		Not Used
84		Not Used
85		Not Used
86		Not Used
87		Not Used
88		Not Used

*Not Shown

2-43

Solenoid/Flashlamp Table

SOL. NO.	FUNCTION	SOLENOID TYPE	VOLTAGE CONNECTIONS			DRIVE XISTOR	DRIVE CONNECTIONS			DRIVE WIRE	SOLENOID PART NUMBER / FLASHLAMP TYPE	
			PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX
01	BALL RELEASE	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	GUN LAUNCH	High Power	J107-2			Q78	J130-4			Vio-Org	AE-23-800	
04	TOP RIGHT POPPER	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-23-800	
05	GUN POPPER	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-24-900	
06	NOT USED	High Power				Q66				Vio-Blu		
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	TRAP DOOR HIGH	High Power	J107-2			Q70	J130-9			Vio-Gry	A-14701	
09	LEFT SLING	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	RIGHT SLING	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	LEFT JET	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	MIDDLE JET	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	RIGHT JET	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	LEFT POPPER	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1200	
15	RAMP DIVERTER	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200	
16	TRAP DOOR HOLD	Low Power	J107-3			Q44	J127-9			Brn-Gry	A-14701	
17	HEADQUARTERS	Flasher	J107-6			Q42	J126-1			Blk-Brn	#906 (2)	
18	SAFEHOUSE	Flasher	J107-6			Q40	J126-2			Blk-Red	#906 (1)	
19	WAREHOUSE	Flasher	J107-6			Q38	J126-3			Blk-Org	#906 (1)	
20	GUN MOTOR	Low Power	J118-2			Q36	J126-4			Blk-Yel	A-19735	
21	GUN LOADED	Flasher	J107-6			Q28	J126-5			Blu-Grn	#906 (1)	
22	RIGHT RAMP	Flasher	J107-6			Q30	J126-6			Blu-Blk	#89 (1)	
23	RIGHT BACK	Flasher	J107-6			Q34	J126-7			Blu-Vio	#906 (2)	
24	LEFT BACK	Flasher	J107-6			Q32	J126-8			Blu-Gry	#906 (2)	
25	NOT USED	Gen. Purpose				Q26				Blu-Brn		
26	TOP LEFT POPPER	Gen. Purpose	J107-1			Q24	J122-2			Blu-Red	AE-26-1500	
27	LEFT DIVERTER	Gen. Purpose	J107-1			Q22	J122-3			Blu-Org	AE-26-1200	
28	RIGHT LOOP GATE	Gen. Purpose	J107-1			Q20	J122-4			Blu-Yel	A-14406	
29-36	SEE FLIPPER CKTS											
37	NOT USED	Low Power				Q16				Brn-Wht		
38	NOT USED	Low Power				Q15				Blk-Wht		
39	NOT USED	Low Power				Q14				Org-Wht		
40	NOT USED	Low Power				Q13				Yel-Wht		
41	NOT USED	Low Power				Q9				Grn-Wht		
42	NOT USED	Low Power				Q10				Blu-Wht		
43	NOT USED	Low Power				Q11				Vio-Wht		
44	NOT USED	Low Power				Q12				Gry-Wht		

GENERAL ILLUMINATION

01	RIGHT STRING	G.I.	J120-1	J121-1		Q18	J120-7	J121-7		Wht-Brn	#44	#555
02	LEFT STRING	G.I.	J120-2	J121-2		Q10	J120-8	J121-8		Wht-Org	#44	#555
03	STRING 3	G.I.	J120-3			Q14	J120-9			Wht-Yel	#44	
04	STRING 4	G.I.	J120-5			Q16	J120-10			Wht-Grn	#44	#545
05	BOTTOM STRING	G.I.		J121-6	J119-3	Q12		J121-11	J119-1	Wht-Vio		#555

FLIPPER CIRCUITS

			VOLTAGE CONNECTION	DRIVE XISTOR POWER	HOLD	DRIVE CONNECTION PLAYFIELD	DRIVE WIRE POWER	HOLD	COIL PART NUMBER	COIL COLOR
29	LWR RIGHT FLIPPER	Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn		FL-11629	BLUE
30		Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn		
31	LWR LEFT FLIPPER	Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu		FL-11629	BLUE
32		Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu		
33	UPR RIGHT FLIPPER	Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio		FL-11629	BLUE
34		Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio		
35	RIGHT LOOP MAGNET	Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry		*SEE BELOW	
36	NOT USED	Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry		

J1XX-X=POWER DRIVER BOARD; JX-X=AUX. DRIVER BOARD; J9XX-X=FLIPTRONIC II BOARD; 24-6549=#44 BULB; 24-8704=#89 BULB; 24-8768=#555 BULB; 24-8802=#906; 24-8825=#545   *02-4773=ADJUSTABLE MAGNET CORE; 20-9247=COIL MAGNET; 20-9612=WAVE SPRING WASHER

TIEBACK DIODES:
        J122-6 (RED-ORANGE) TIEBACK DIODE FOR SOL. 26 TOP LEFT POPPER
        J122-8 (RED-ORANGE) TIEBACK DIODE FOR SOL. 27 LEFT DIVERTER
        J122-9 (RED-ORANGE) TIEBACK DIODE FOR SOL. 28 RIGHT LOOP GATE

Solenoid/Flashlamp Locations

Item No.	Coil/ Flasher No.	Assembly Number	Description
01	AE-26-1500	A-19963	Ball Release
02	AE-23-800	A-14525	Autoplunger
03	AE-23-800	A-19112	Gun Launch
04	AE-23-800	A-18791	Top Rt. Popper
05	AE-24-900	A-19543	Gun Popper
06	Not Used		Not Used
07	AE-23-800	B-10686-1	Knocker
08	A-14701	A-19282	Trap Door High
09	AE-26-1200	B-9362-R-3	Left Slingshot
10	AE-26-1200	B-9362-R-3	Right Slingshot
11	AE-26-1200	A-9416-2	Left Jet
12	AE-26-1200	A-9416-2	Middle Jet
13	AE-26-1200	A-9416-2	Right Jet
14	AE-26-1200	A-19119	Left Popper
15	AE-26-1200	A-18585	Ramp Diverter
16	A-14701	A-19282	Trap Door Hold
17	*24-8802	-----	Headquarters
18	24-8802	A-17802	Safehouse
19	24-8802	A-17802	Warehouse
20	A-19735	A-18581	Gun Motor
21	24-8802	A-17802	Gun Loaded
22	24-8704	A-19821	Right Ramp
23	*24-8802	-----	Right Back
	24-8802	C-13337	Back Panel
24	*24-8802	-----	Left Back
	24-8802	C-13337	Back Panel
25	Not Used		Not Used
26	AE-26-1500	A-18768	Top Lt. Popper
27	AE-26-1200	A-19746	Left Diverter
28	A-14406	A-17796	Rt. Loop Gate

Flippers

29-30	FL-11629	A-19818-R-2	Lwr. Rt. Flipper
31-32	FL-11629	A-15849-L-2	Lwr. Lt. Flipper
33-34	FL-11629	A-19223-R	Upr. Rt. Flipper
35-36			

General Illimination

01	24-6549	-----	Right String
	24-8768	-----	
02	24-6549	-----	Left String
	24-8768	-----	
03	24-6549	-----	String 3
04	24-6549	-----	String 4
	24-8825	-----	
05	24-8768	-----	Bottom String
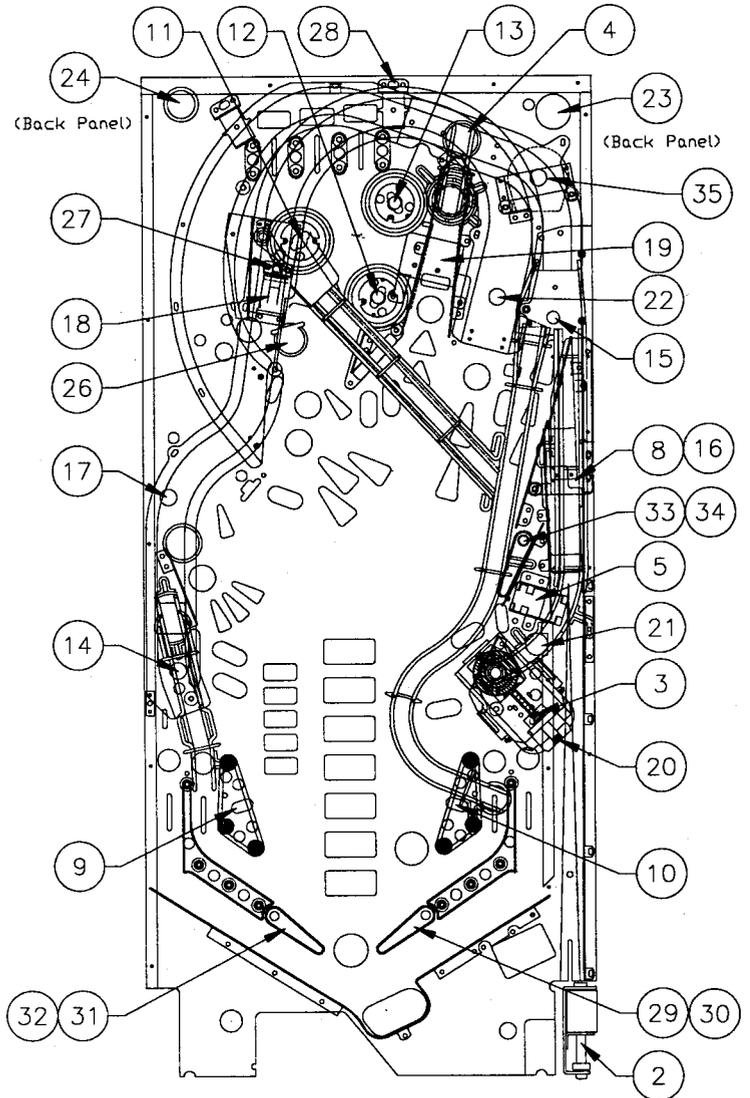
24-6549 = #44 BULB
24-8704 = #89 BULB
24-8768 = #555 BULB
24-8802 = #906 BULB
24-8825 = #545 BLINKING BULB
*A-14265-13 = RECEPTACLE & SKIRT

Ramps

Item	Part Number	Description
1	A-18604	Main Ramp Assembly
2	A-19040	Right Ramp Assembly
3	12-7227	Ball Popper Wire Ramp
4	12-7228.2	Diverter Wire Ramp
5	A-19637	Gun Load Ramp Assembly
6	12-7256	Wire Ramp
7	12-7237.1	Ball Popper Wire Ramp
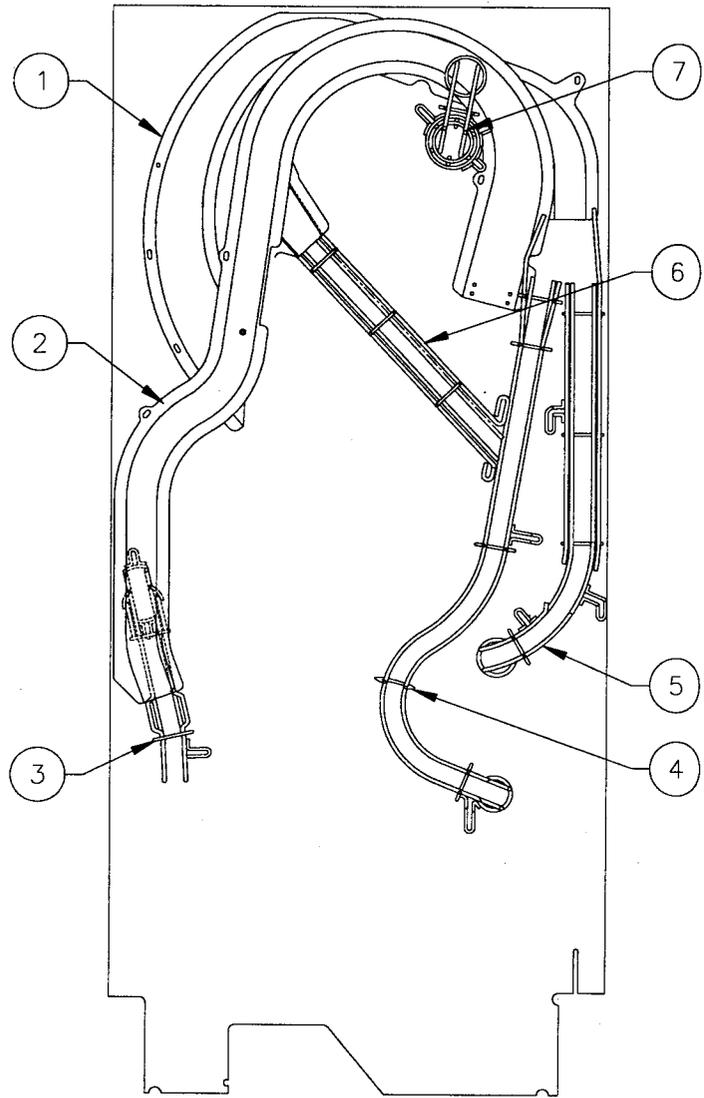
Rubber Rings

Item	Part No.	Description	Qty.
A	23-6556	Black Sleeve	9
B	23-6641	Black Bumper	8
C	23-6694-1	3/32" Black Ring	3
D	23-6694-4	7/16" Black Ring	2
E	23-6694-6	1" Black Ring	4
F	23-9994-9	2" Black Ring	1
G	23-6694-10	2-1/2" Black Ring	2
H	23-6695	Black Flipper Ring	3

(Under Gun)

(Under Ramp)
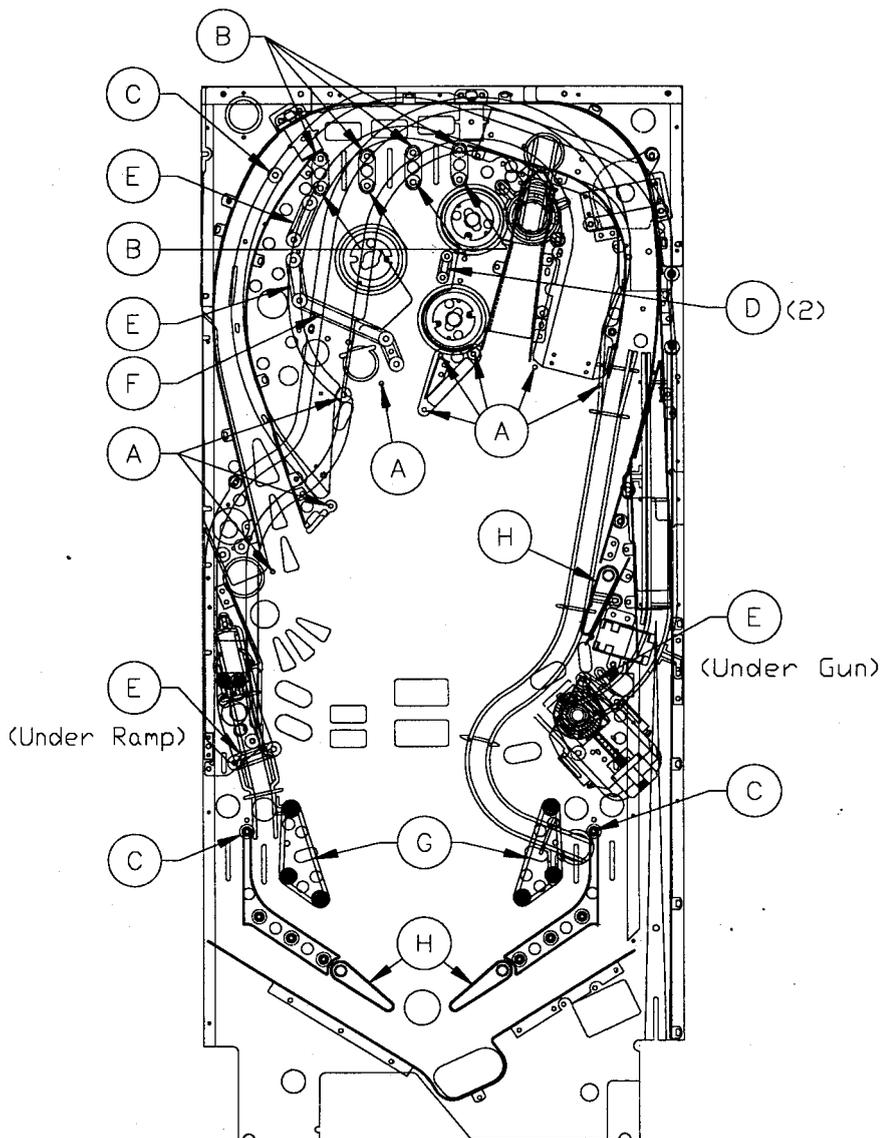
Notes

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

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
Org-Brn J205-1 Left Coin Chute D1	White-Brown J209-1 U18-11 1	Gun Handle Trigger 11	Slam Tilt 21	Trough Jam 31	Left Ramp Enter 41	Right Ramp Enter 51	Left Sling 61	Left Loop 71	Not Used 81	Black-Green J906-1 Lower Right E.O.S. F1
Org-Red J205-2 Center Coin Chute D2	White-Red J209-2 U18-9 2	Not Used 12	Coin Door Closed 22	Trough 1 32	Right Loop 42	Not Used 52	Right Sling 62	Not Used 72	Not Used 82	Blue-Violet J905-1 Lower Right Opto F2
Org-Blk J205-3 Right Coin Chute D3	White-Orange J209-3 U18-5 3	Start Button 13	Buy In Button 23	Trough 2 33	Left Ramp Make 43	Not Used 53	Left Jet 63	Safehouse 73	Not Used 83	Black-Blue J906-3 Lower Left E.O.S. F3
Org-Yel J205-4 4th Coin Chute D4	White-Yellow J209-4 U18-7 4	Plumb Bob Tilt 14	Always Closed 24	Trough 3 34	Gun Chamber 44	Standup 6 54	Middle Jet 64	Not Used 74	Not Used 84	Blue-Gray J905-2 Lower Left Opto F4
Org-Grn J205-6 Normal Service Credit / Test Escape D5	White-Green J209-5 U19-11 5	Shooter Lane 15	Left Inlane 25	Trough 4 35	Gun Popper 45	Standup 7 55	Right Jet 65	Not Used 75	Not Used 85	Black-Violet J906-4 Upper Right E.O.S. F5
Org-Blu J205-7 Normal Volume Down / Test Down D6	White-Blue J209-7 U19-9 6	Right Outlane 16	Left Outlane 26	Not Used 36	Warehouse Popper 46	Standup 5 56	Left Rollover 66	Gun Position 76	Not Used 86	Black-Yellow J905-3 Upper Right Opto F6
Org-Vio J205-8 Normal Volume Up / Test Up D7	White-Violet J209-8 U19-5 7	Right Inlane 17	Standup 1 27	Not Used 37	Left Popper 47	Standup 4 57	Middle Rollover 67	Gun Lockup 77	Not Used 87	Black-Gray J906-5 Upper Left E.O.S. F7
Org-Gry J205-9 Normal Begin Test / Test Enter D8	White-Gray J209-9 U19-7 8	Standup 8 18	Standup 2 28	Right Ramp Make 38	Not Used 48	Standup 3 58	Right Rollover 68	Not Used 78	Not Used 88	Black-Blue J905-5 Upper Left Opto F8

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

SWITCH MATRIX CIRCUIT

COLUMN	A	B	
INACTIVE	H	L	OFF
ACTIVE	L	H	ON

ROW	C	D	E	
SWITCH OPEN	H	H	L	OFF
SWITCH CLOSED	L	L	H	ON
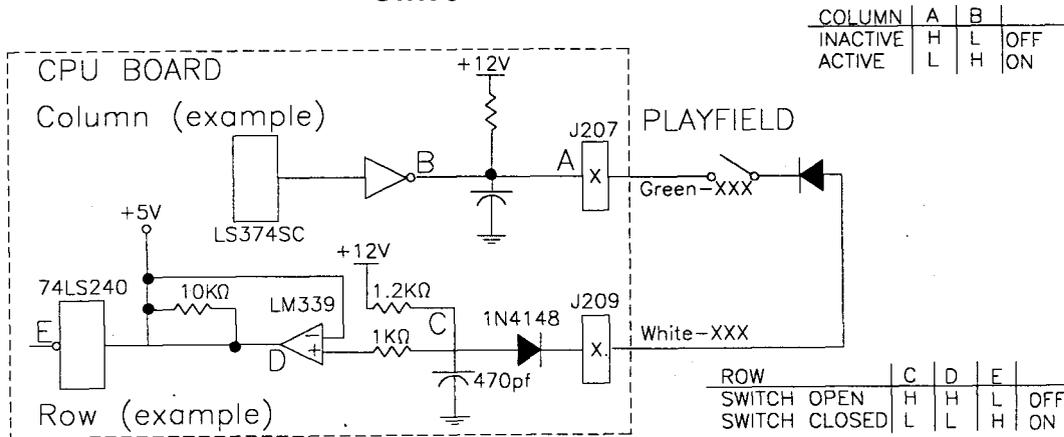
The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low, the column side is active.

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.
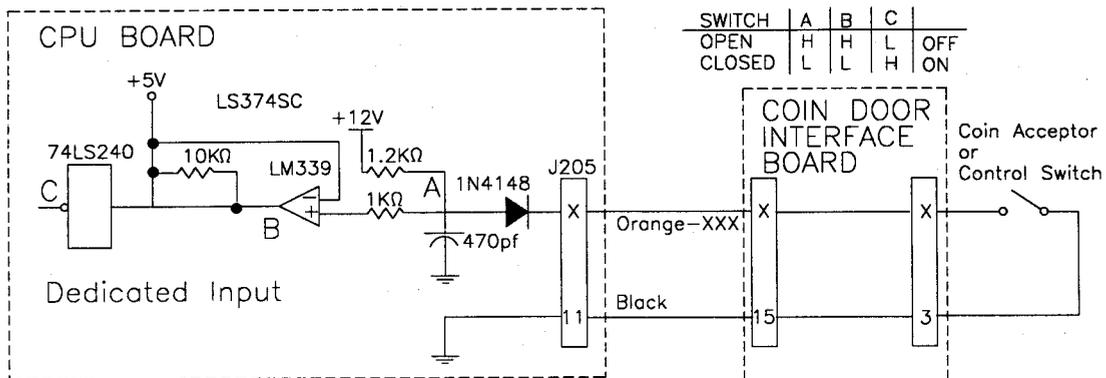
DEDICATED SWITCHES
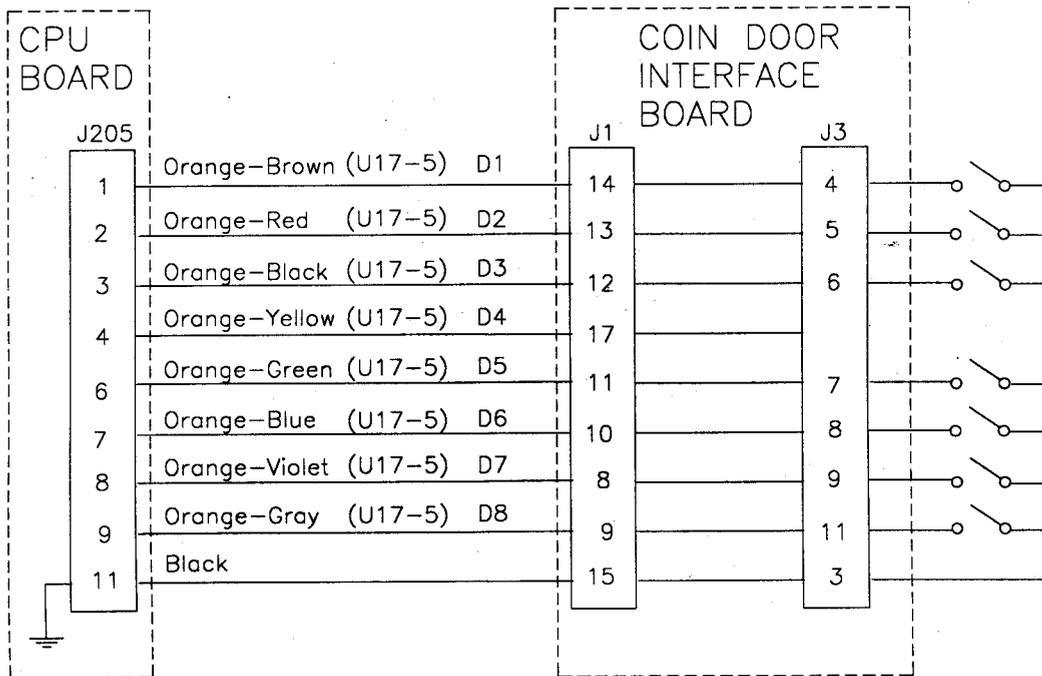
Coin Acceptor Switches
D1 - Left Coin Chute
D2 - Center Coin Chute
D3 - Right Coin Chute
D4 - Fourth Coin Chute

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

SWITCH	A	B	C	
OPEN	H	H	L	OFF
CLOSED	L	L	H	ON

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

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
Red-Brown J134-1 Q90 — 1	Left Rollover 11	Right Ramp Badge 21	Barroom Brawl 31	Safehouse Badge 41	Safehouse 51	Left Loop Generic 61	Not Used 71	Silver 8 Bullet 81
Red-Black J134-2 Q89 — 2	Middle Rollover 12	Silver 6 Bullet 22	Car Chase 32	Left Ramp Badge 42	Silver 4 Bullet 52	Ricochet 62	Not Used 72	Left Shootout 82
Red-Orange J134-4 Q88 — 3	Right Rollover 13	Right Loop Generic 23	Warehouse Raid 33	Silver 3 Bullet 43	Silver 5 Bullet 53	Extra Ball 63	Not Used 73	Light Magna Force 83
Red-Yellow J134-5 Q87 — 4	Magnum Jets 14	Magna Force 24	Letter Bomb 34	Super Jackpot 44	Left Loop HQ 54	HQ Badge 64	Not Used 74	Jets 84
Red-Green J134-6 Q87 — 5	Magnum Bullets 15	Right Ramp Generic 25	Meet the Mob 35	Left Ramp Generic 45	Warehouse Start Multiball 55	Ransom 65	Not Used 75	Jets 85
Red-Blue J134-7 Q86 — 6	Light Extra Ball 16	Right Ramp Jackpot 26	Stop Scorpio 36	Ramp Start Multiball 46	Feel Lucky 56	Silver 1 Bullet 66	Not Used 76	Body Armor 86
Red-Violet J134-8 Q84 — 7	Light Shootout 17	Right Loop HQ 27	Crime Wave 37	Magazine Award 47	Right Shootout 57	HQ 67	Shoot Again 77	Buy In Button 87
Red-Gray J134-9 Q83 — 8	Playfield Promo. 18	Warehouse Badge 28	Bank Robber Hurry Up 38	Contraband 48	Light Ransom 58	Silver 2 Bullet 68	Silver 7 Bullet 78	Start Button 88

J1XX = POWER DRIVER BOARD

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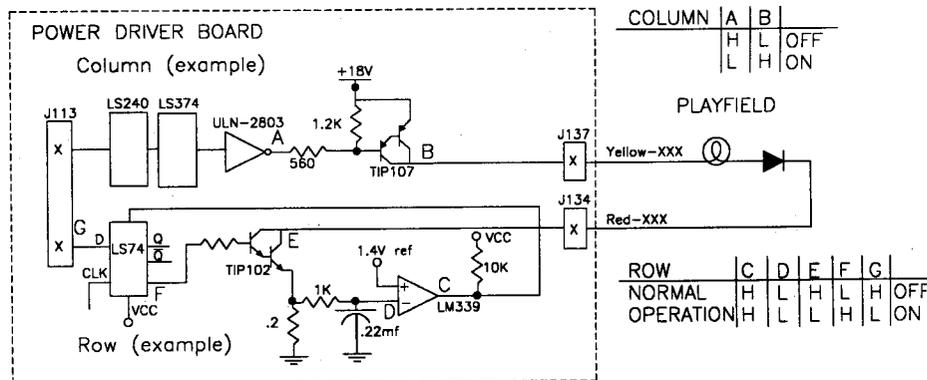
The microprocessor sends a signal to the column circuit causing the output of the UNL-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time, the microprocessor drives the input of the 74LS74 low, causing a high at output "F".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

SOL. NO.	FUNCTION	SOLENOID TYPE	VOLTAGE CONNECTIONS			DRIVE XISTOR	DRIVE CONNECTIONS			DRIVE WIRE	SOLENOID PART NUMBER FLASHLAMP TYPE	
			PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX
01	BALL RELEASE	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	GUN LAUNCH	High Power	J107-2			Q78	J130-4			Vio-Org	AE-23-800	
04	TOP RIGHT POPPER	High Power	J107-2			Q76	J130-5			Vio-Yel	AE-23-800	
05	GUN POPPER	High Power	J107-2			Q64	J130-6			Vio-Grn	AE-24-900	
06	NOT USED	High Power				Q66				Vio-Blu		
07	KNOCKER	High Power		J107-2		Q68		J130-8		Vio-Blk		AE-23-800
08	TRAP DOOR HIGH	High Power	J107-2			Q70	J130-9			Vio-Gry	A-14701	
09	LEFT SLING	Low Power	J107-3			Q58	J127-1			Brn-Blk	AE-26-1200	
10	RIGHT SLING	Low Power	J107-3			Q56	J127-3			Brn-Red	AE-26-1200	
11	LEFT JET	Low Power	J107-3			Q54	J127-4			Brn-Org	AE-26-1200	
12	MIDDLE JET	Low Power	J107-3			Q52	J127-5			Brn-Yel	AE-26-1200	
13	RIGHT JET	Low Power	J107-3			Q50	J127-6			Brn-Grn	AE-26-1200	
14	LEFT POPPER	Low Power	J107-3			Q48	J127-7			Brn-Blu	AE-26-1200	
15	RAMP DIVERTER	Low Power	J107-3			Q46	J127-8			Brn-Vio	AE-26-1200	
16	TRAP DOOR HOLD	Low Power	J107-3			Q44	J127-9			Brn-Gry	A-14701	
17	HEADQUARTERS	Flasher	J107-6			Q42	J126-1			Blk-Brn	#906 (2)	
18	SAFEHOUSE	Flasher	J107-6			Q40	J126-2			Blk-Red	#906 (1)	
19	WAREHOUSE	Flasher	J107-6			Q38	J126-3			Blk-Org	#906 (1)	
20	GUN MOTOR	Low Power	J118-2			Q36	J126-4			Blk-Yel	A-19735	
21	GUN LOADED	Flasher	J107-6			Q28	J126-5			Blu-Grn	#906 (1)	
22	RIGHT RAMP	Flasher	J107-6			Q30	J126-6			Blu-Blk	#89 (1)	
23	RIGHT BACK	Flasher	J107-6			Q34	J126-7			Blu-Vio	#906 (2)	
24	LEFT BACK	Flasher	J107-6			Q32	J126-8			Blu-Gry	#906 (2)	
25	NOT USED	Gen. Purpose				Q26				Blu-Brn		
26	TOP LEFT POPPER	Gen. Purpose	J107-1			Q24	J122-2			Blu-Red	AE-26-1500	
27	LEFT DIVERTER	Gen. Purpose	J107-1			Q22	J122-3			Blu-Org	AE-26-1200	
28	RIGHT LOOP GATE	Gen. Purpose	J107-1			Q20	J122-4			Blu-Yel	A-14406	
29-36	SEE FLIPPER CKTS											
37	NOT USED	Low Power				Q16				Brn-Wht		
38	NOT USED	Low Power				Q15				Blk-Wht		
39	NOT USED	Low Power				Q14				Org-Wht		
40	NOT USED	Low Power				Q13				Yel-Wht		
41	NOT USED	Low Power				Q9				Grn-Wht		
42	NOT USED	Low Power				Q10				Blu-Wht		
43	NOT USED	Low Power				Q11				Vio-Wht		
44	NOT USED	Low Power				Q12				Gry-Wht		

GENERAL ILLUMINATION

			PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX	CABINET		PLAYFIELD	BACKBOX
01	RIGHT STRING	G.I.	J120-1	J121-1		Q18	J120-7	J121-7		Wht-Brn	#44	#555
02	LEFT STRING	G.I.	J120-2	J121-2		Q10	J120-8	J121-8		Wht-Org	#44	#555
03	STRING 3	G.I.	J120-3			Q14	J120-9			Wht-Yel	#44	
04	STRING 4	G.I.	J120-5			Q16	J120-10			Wht-Grn	#44	#545
05	BOTTOM STRING	G.I.		J121-6	J119-3	Q12		J121-11	J119-1	Wht-Vio		#555

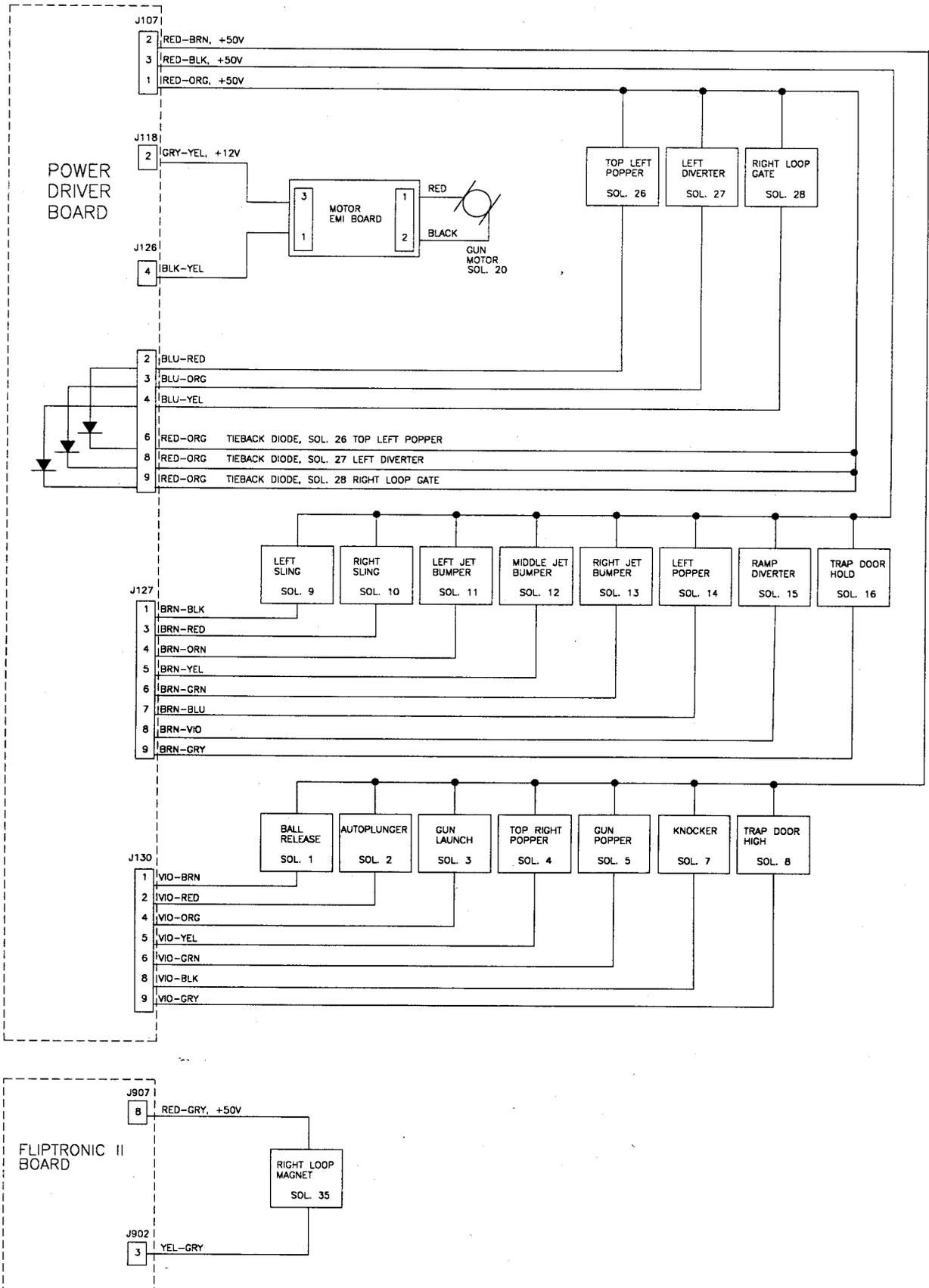| FLIPPER CIRCUITS		VOLTAGE CONNECTION	DRIVE XISTOR POWER	HOLD	DRIVE CONNECTION PLAYFIELD	DRIVE WIRE POWER	HOLD	COIL PART NUMBER	COIL COLOR
29	Power	J907-1 (Red-Grn)	Q4		J902-13	Yel-Grn			
30	LWR RIGHT FLIPPER Hold	J907-1 (Red-Grn)		Q11	J902-11		Org-Grn	FL-11629	BLUE
31	Power	J907-4 (Red-Blu)	Q3		J902-9	Yel-Blu			
32	LWR LEFT FLIPPER Hold	J907-4 (Red-Blu)		Q9	J902-7		Org-Blu	FL-11629	BLUE
33	Power	J907-6 (Red-Vio)	Q2		J902-6	Yel-Vio			
34	UPR RIGHT FLIPPER Hold	J907-6 (Red-Vio)		Q7	J902-4		Org-Vio	FL-11629	BLUE
35	RIGHT LOOP MAGNET Power	J907-8 (Red-Gry)	Q1		J902-3	Yel-Gry		*SEE BELOW	
36	NOT USED Hold	J907-8 (Red-Gry)		Q5	J902-1		Org-Gry		

J1XX-X=POWER DRIVER BOARD; JX-X=AUX. DRIVER BOARD; J9XX-X=FLIPTRONIC II BOARD; 24-6549=#44 BULB; 24-8704=#89 BULB; 24-8768=#555 BULB; 24-8802=#906; 24-8825=#545   *02-4773=ADJUSTABLE MAGNET CORE; 20-9247=COIL MAGNET; 20-9612=WAVE SPRING WASHER
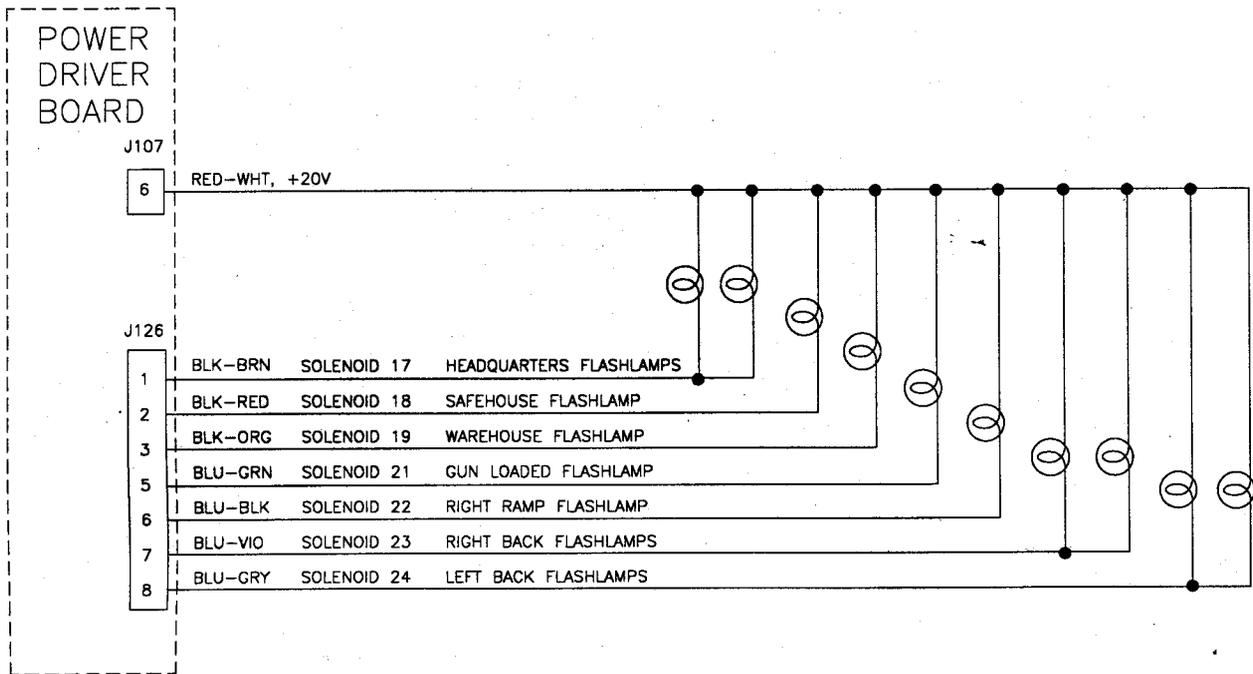
TIEBACK DIODES:
    J122-6 (RED-ORANGE) TIEBACK DIODE FOR SOL. 26 TOP LEFT POPPER
    J122-8 (RED-ORANGE) TIEBACK DIODE FOR SOL. 27 LEFT DIVERTER
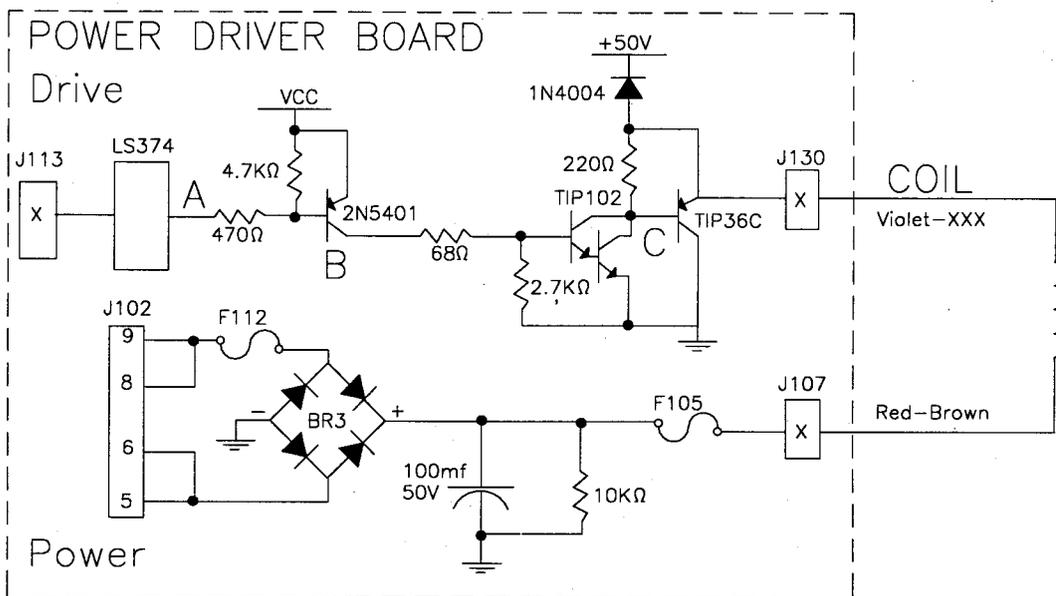   J122-9 (RED-ORANGE) TIEBACK DIODE FOR SOL. 28 RIGHT LOOP GATE

COILS & GUN MOTOR

POWER
DRIVER
BOARD

J107
2 RED-BRN, +50V
3 RED-BLK, +50V
1 RED-ORG, +50V

J118
2 GRY-YEL, +12V

MOTOR
EMI BOARD
3
1
1
2
RED
BLACK

GUN
MOTOR
SOL. 20

J126
4 BLK-YEL

TOP LEFT POPPER	LEFT DIVERTER	RIGHT LOOP GATE
SOL. 26	SOL. 27	SOL. 28

2 BLU-RED
3 BLU-ORG
4 BLU-YEL

6 RED-ORG   TIEBACK DIODE, SOL. 26 TOP LEFT POPPER
8 RED-ORG   TIEBACK DIODE, SOL. 27 LEFT DIVERTER
9 RED-ORG   TIEBACK DIODE, SOL. 28 RIGHT LOOP GATE

LEFT SLING	RIGHT SLING	LEFT JET BUMPER	MIDDLE JET BUMPER	RIGHT JET BUMPER	LEFT POPPER	RAMP DIVERTER	TRAP DOOR HOLD
SOL. 9	SOL. 10	SOL. 11	SOL. 12	SOL. 13	SOL. 14	SOL. 15	SOL. 16

J127
1 BRN-BLK
3 BRN-RED
4 BRN-ORN
5 BRN-YEL
6 BRN-GRN
7 BRN-BLU
8 BRN-VIO
9 BRN-GRY

BALL RELEASE	AUTOPLUNGER	GUN LAUNCH	TOP RIGHT POPPER	GUN POPPER	KNOCKER	TRAP DOOR HIGH
SOL. 1	SOL. 2	SOL. 3	SOL. 4	SOL. 5	SOL. 7	SOL. 8

J130
1 VIO-BRN
2 VIO-RED
4 VIO-ORG
5 VIO-YEL
6 VIO-GRN
8 VIO-BLK
9 VIO-GRY

FLIPTRONIC II
BOARD

J907
8 RED-GRY, +50V

RIGHT LOOP
MAGNET

SOL. 35

J902
3 YEL-GRY

FLASHLAMPS

POWER
DRIVER
BOARD

J107

| 6 | RED—WHT, +20V |

J126

1	BLK—BRN	SOLENOID 17	HEADQUARTERS FLASHLAMPS
2	BLK—RED	SOLENOID 18	SAFEHOUSE FLASHLAMP
3	BLK—ORG	SOLENOID 19	WAREHOUSE FLASHLAMP
5	BLU—GRN	SOLENOID 21	GUN LOADED FLASHLAMP
6	BLU—BLK	SOLENOID 22	RIGHT RAMP FLASHLAMP
7	BLU—VIO	SOLENOID 23	RIGHT BACK FLASHLAMPS
8	BLU—GRY	SOLENOID 24	LEFT BACK 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
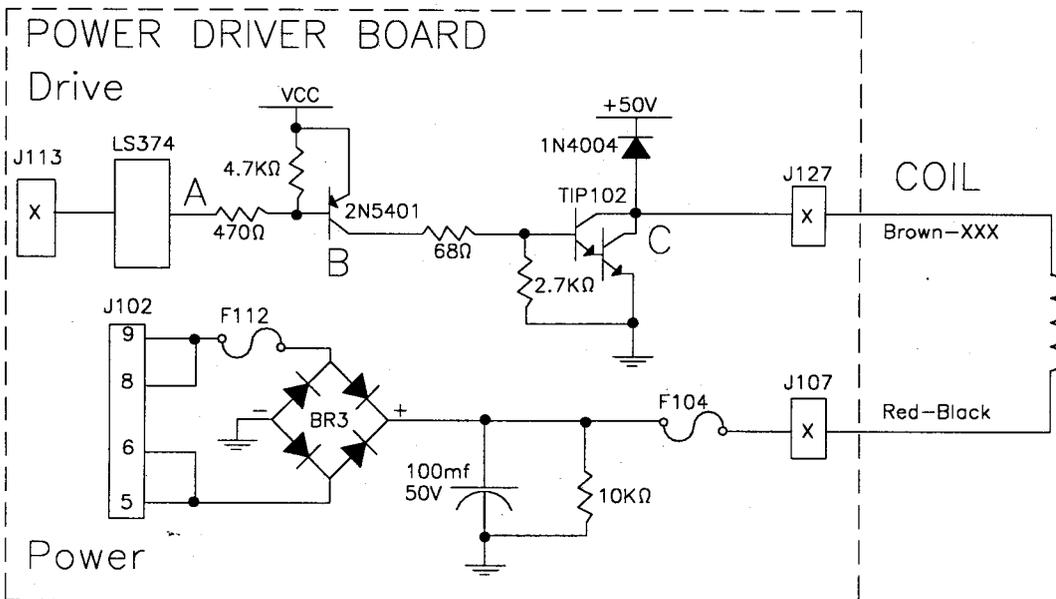
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is high. A high at point "B" turns on the TIP102 transistor and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and turns on. The coil shuts off when point "A" toggles high.

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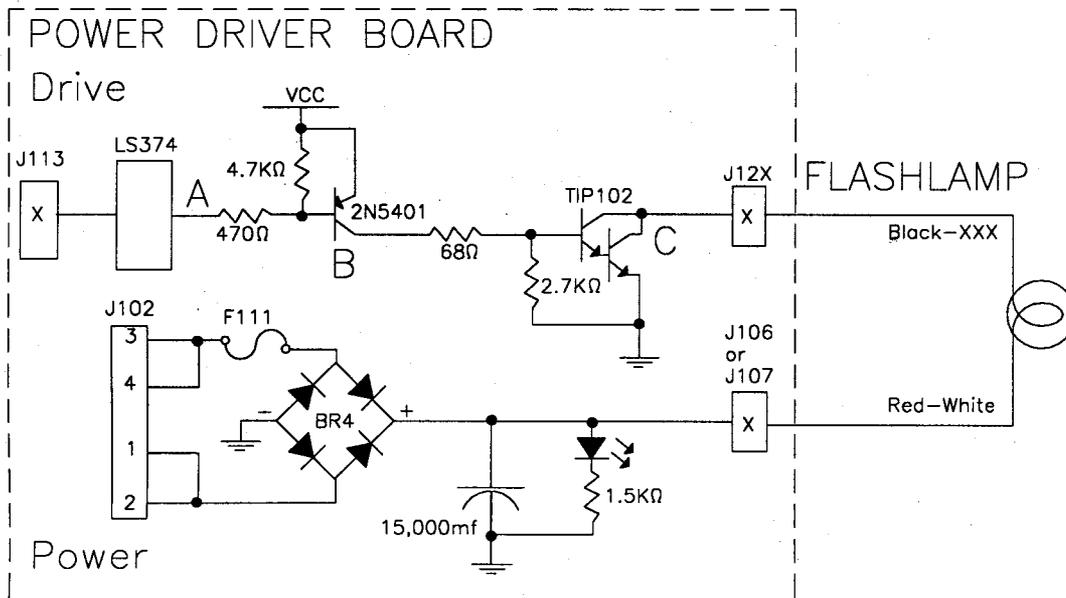
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor, is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When point "C" is low, the flashlamp is grounded through the transistor and turns on.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

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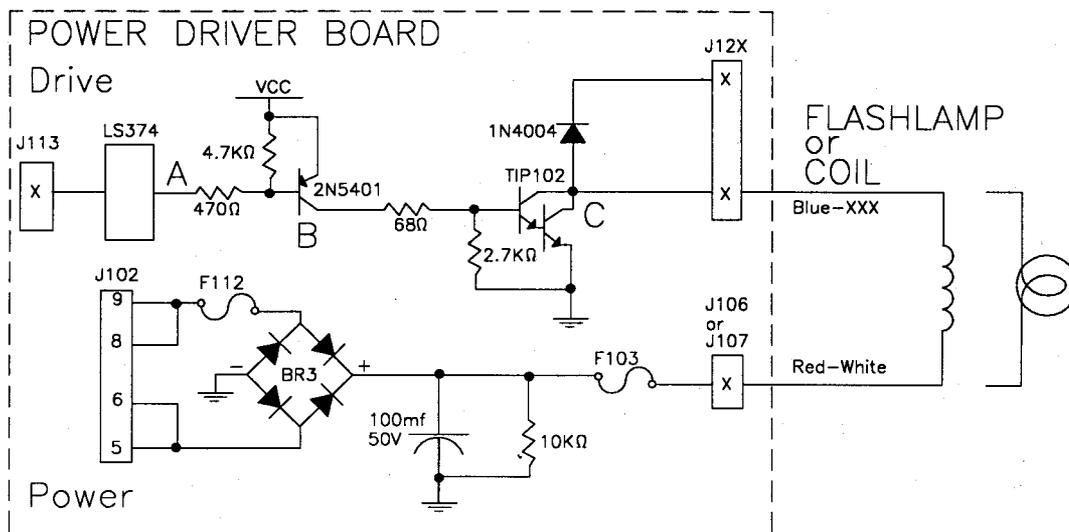
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor , is high. A high at point "B" causes a low at point "C". When point "C" is low, the coil/flashlamp is grounded through the transistor and turns on. When point "A" toggles high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

* Tieback diode is not used for flashlamp circuit.

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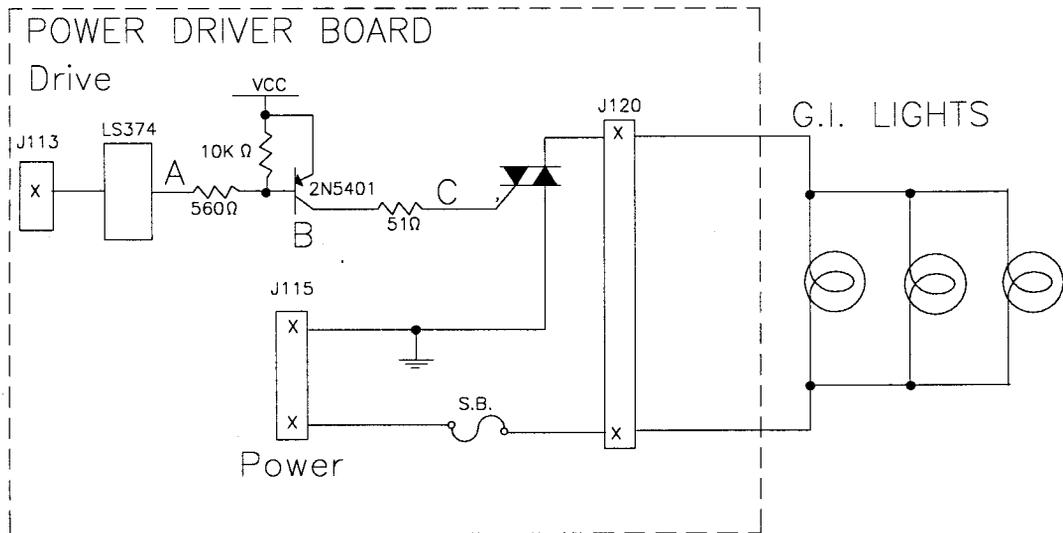
When point "A" toggles low, points, "B" and "C" are high. This turns on the triac and the desired general illumination string of lights.

BLOCK DIAGRAM OF GENERAL ILLUMINATION CIRCUIT
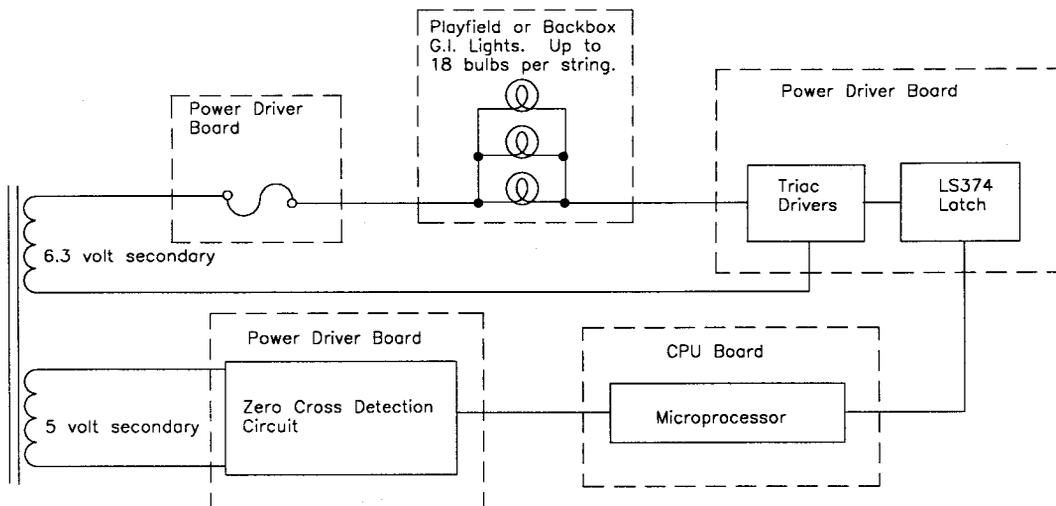
FLIPPER CIRCUIT DIAGRAM

RED—BLUE +50V

RED—GRAY +50V

RED—GREEN +50V

RED—VIOLET +50V

END—OF—STROKE SWITCHES

| 4 | 8 | 1 | 6 |
J907

J906

5	BLACK—GRAY	U. LEFT FLIPPER	F7
3	BLACK—BLUE	L. LEFT FLIPPER	F3
4	BLACK—VIOLET	U. RIGHT FLIPPER	F5
1	BLACK—GREEN	L. RIGHT FLIPPER	F1
6	ORANGE	GROUND	

6	YELLOW—VIOLET	POWER	Q2
4	ORANGE—VIOLET	HOLD	Q7
13	YELLOW—GREEN	POWER	Q4
11	ORANGE—GREEN	HOLD	Q11
3	YELLOW—GRAY	POWER	Q1
1	ORANGE—GRAY	HOLD	Q5
9	YELLOW—BLUE	POWER	Q3
7	ORANGE—BLUE	HOLD	Q9

J902

UPPER RIGHT FLIPPER COIL

LOWER RIGHT FLIPPER COIL

UPPER LEFT FLIPPER COIL*

LOWER LEFT FLIPPER COIL

5	BLACK—BLUE	U. LEFT FLIPPER	F8
2	BLUE—GRAY	L. LEFT FLIPPER	F4
3	BLACK—YELLOW	U. RIGHT FLIPPER	F6
1	BLUE—VIOLET	L. RIGHT FLIPPER	F2
6	ORANGE	GROUND	

J905

FLIPPER OPTO BOARDS

GRAY—YELLOW +12V

| 3 | WHITE—BLUE 50VAC |
| 1 | WHITE—BLUE 50VAC |

J901

4	BLACK	GROUND
5	BLACK	GROUND
1	GRAY	+5V
2	GRAY—GREEN	+12V

J903

J202

CPU BOARD

*ON THIS GAME, THE UPPER RIGHT FLIPPER COIL DRIVE IS USED AS THE RIGHT LOOP MAGNET.

FLIPTRONIC II BOARD

| 1 2 3 4 5 7 |
J114

| 2 1 |
J104

| 2 |
J116

POWER DRIVER BOARD

FLIPPER COIL CIRCUIT

LEFT FLIPPER CIRCUIT
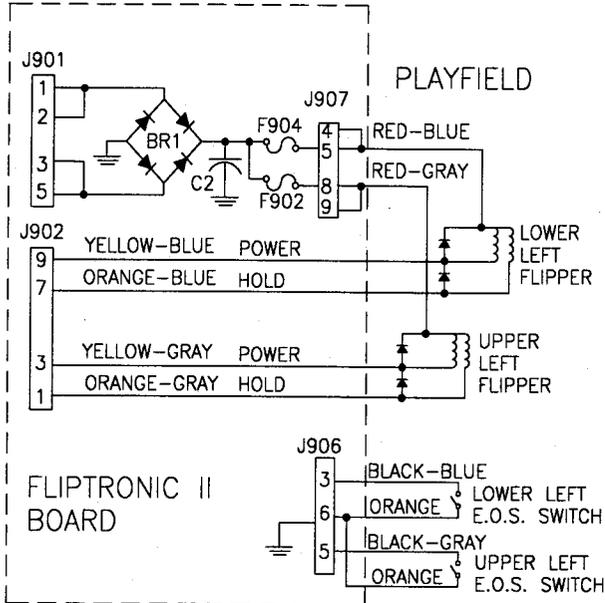
RIGHT FLIPPER CIRCUIT
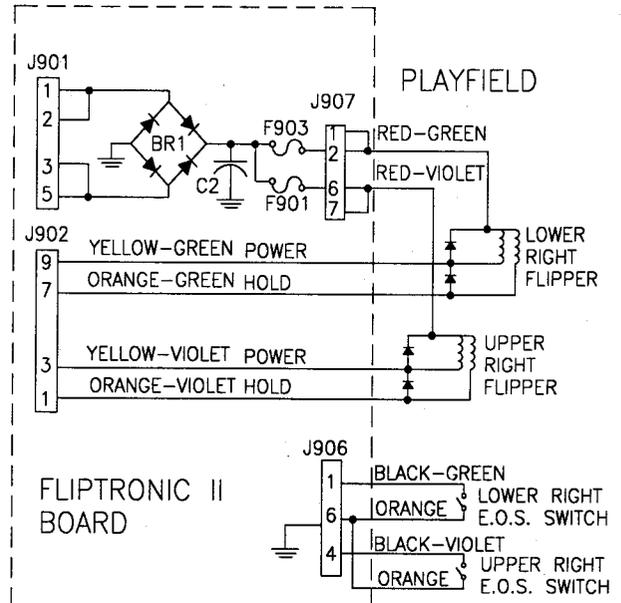
FLIPPER END-OF-STROKE SWITCH CIRCUIT

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

FLIPTRONIC II BOARD J906

Pin	Wire	Signal
1	BLACK–GREEN (U4A–5)	F1
4	BLACK–VIOLET (U6A–5)	F5
3	BLACK–BLUE (U4C–9)	F3
5	BLACK–GRAY (U6C–9)	F7
6	ORANGE	

SWITCH	A	B	
OPEN	H	H	OFF
CLOSED	L	L	ON
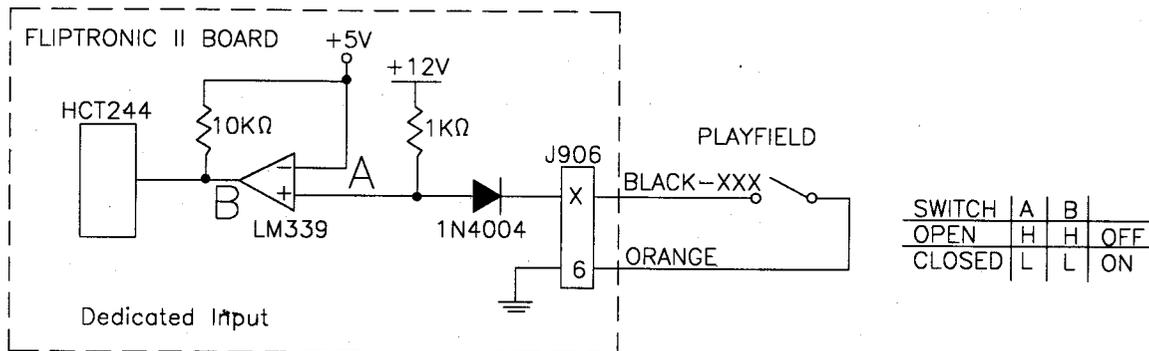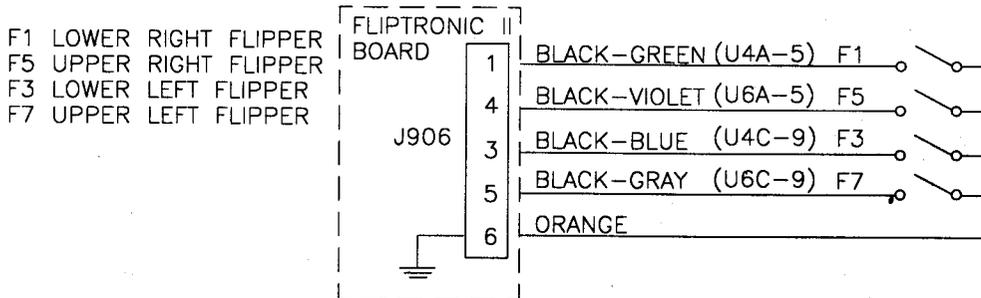
The flipper E.O.S. circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

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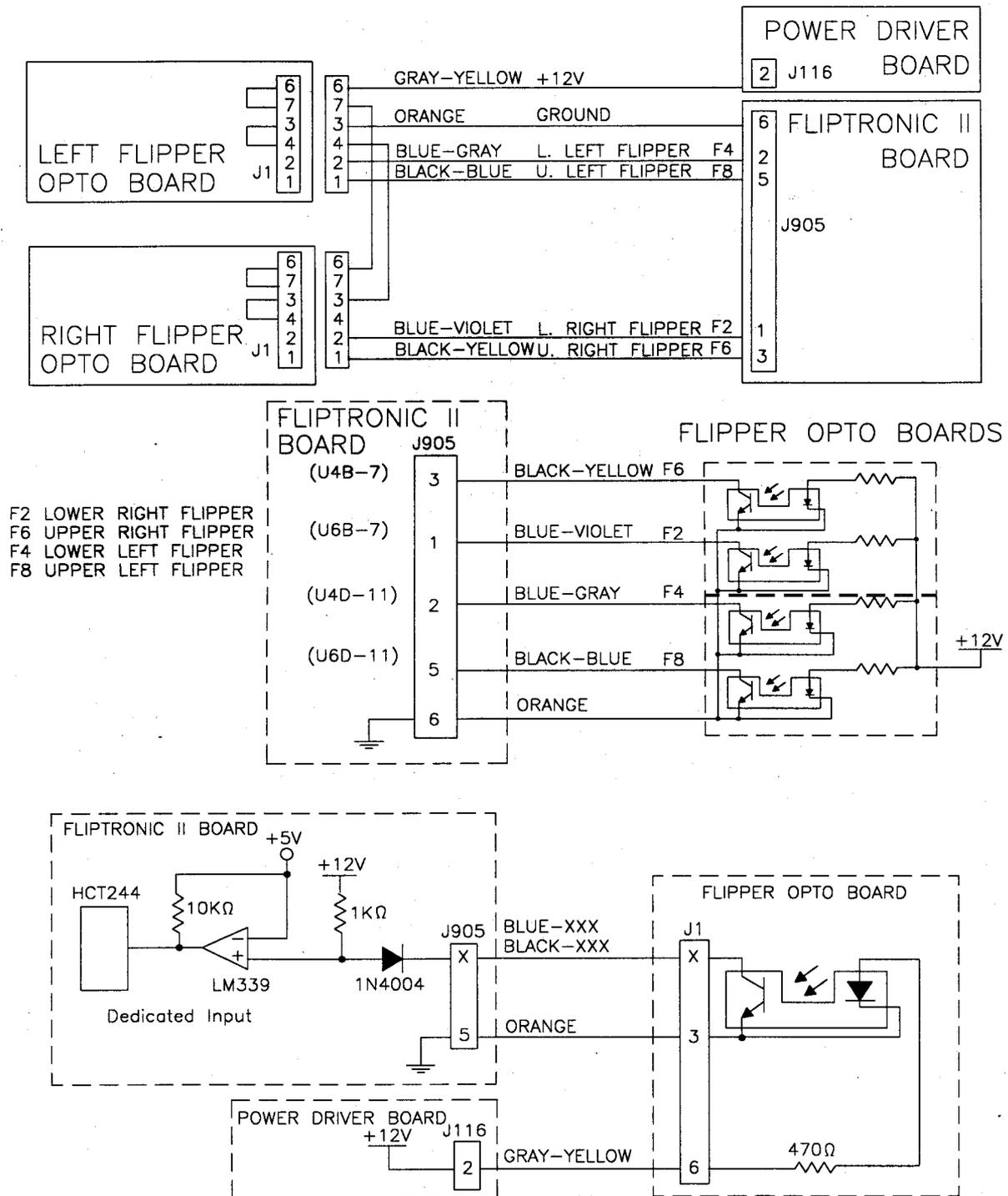
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch circuit.

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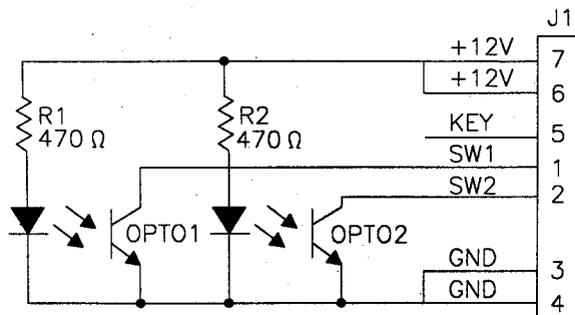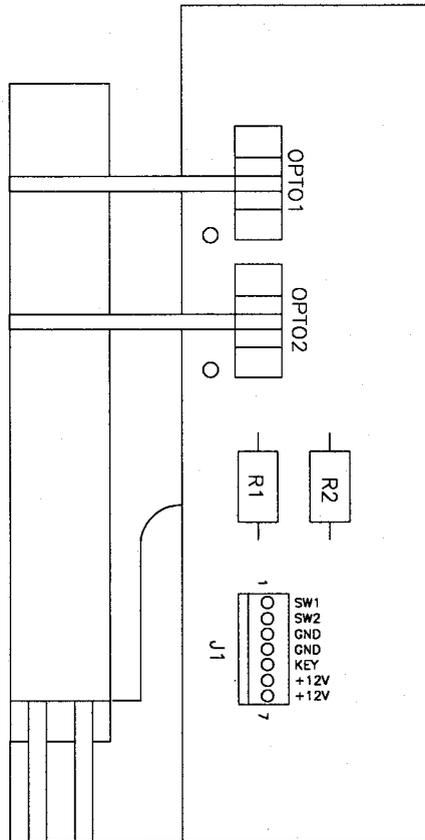
Left Flipper Opto Board Assembly
J1-1 Black-Blue from Fliptronic II Board J905-5
J1-2 Blue-Gray from Fliptronic II Board J905-2
J1-3 N/C
J1-4 Orange from Fliptronic II Board J905-6
J1-5 N/C
J1-6 Gray-Yellow from Power Driver Board J116-2
J1-7 Gray-Yellow from Power Driver Board J116-2

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

LED Board Assembly
(transmitter-green board)
A-16908
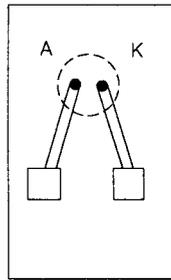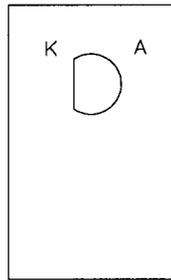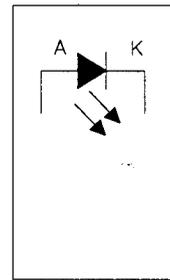
solder side   component side   schematic

Photo Transistor Board Assembly
(receiver-blue board)
A-16909
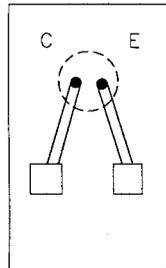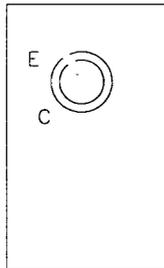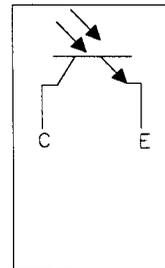
solder side   component side   schematic

Typical Circuit Diagram

LED BOARD
Transmitter
1.0–1.4 volts
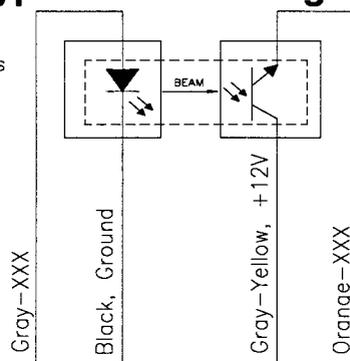
PHOTO TRANSISTOR BOARD
Receiver
0.1–0.7 volts unblocked
11–13 volts blocked

BEAM

Gray–XXX

Black, Ground

Gray–Yellow, +12V

Orange–XXX

LED BOARD
Transmitter

White

Green

A   K

Solder

Gray   Black

Infrared Beam

PHOTO TRANSISTOR BOARD
Receiver

Black

Blue

C   E

Solder

Gray–Yellow   Orange

3-15
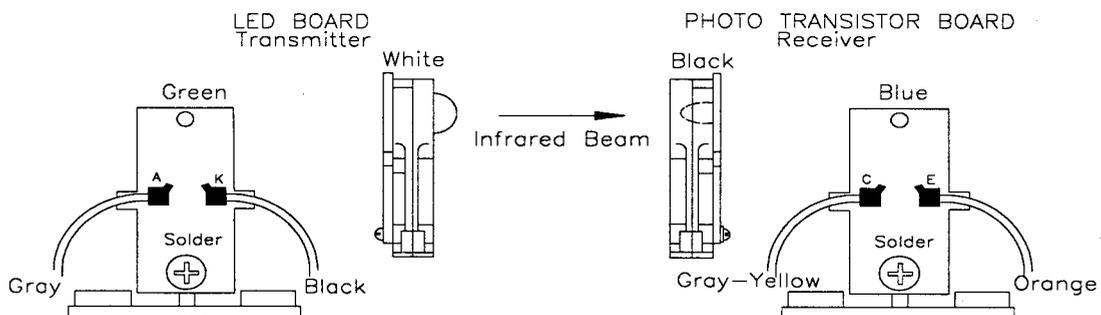
Trough 7 IR LED Board Assembly
(transmitter-green board)
A-18617-1
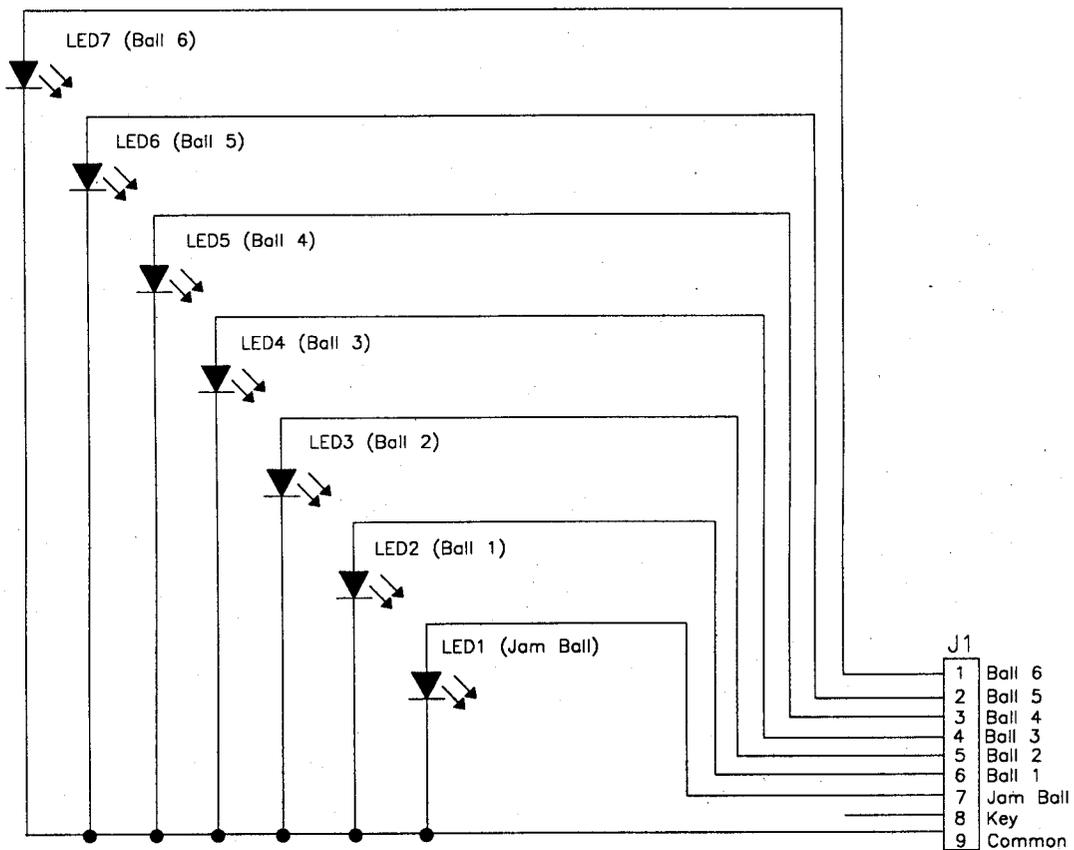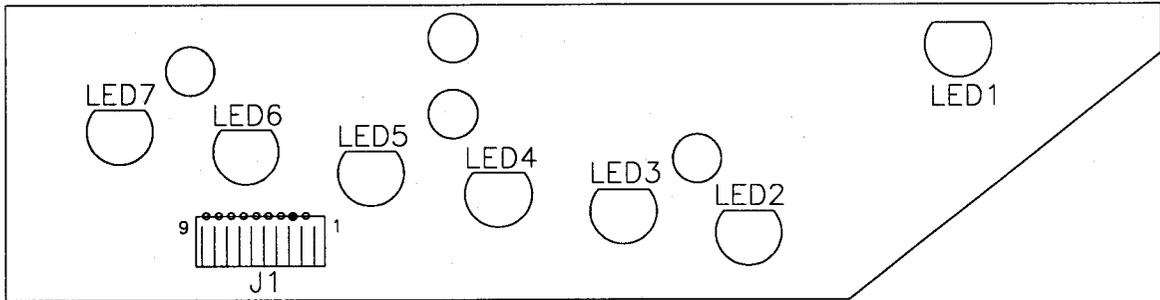
J1-1 Gray-Violet, LED7, NOT USED
J1-2 Gray-Blue, LED6, NOT USED
J1-3 Gray-Green, LED5, to 16-Opto Switch Board J1-4
J1-4 Gray-Black, LED4, to 16-Opto Switch Board J1-5
J1-5 Gray-Orange, LED3, to 16-Opto Switch Board J1-6
J1-6 Gray-Red, LED2, to 16-Opto Switch Board J1-7
J1-7 Gray-Brown, LED1, to 16-Opto Switch Board J1-9
J1-8 Key
J1-9 Black, ground, to 16-Opto Switch Board J1-10

Trough 7 IR Photo Transistor Board Assembly
(receiver-blue board)
A-18618-1

J1

J1	
1	Common
2	Key
3	Jam Ball
4	Ball 1
5	Ball 2
6	Ball 3
7	Ball 4
8	Ball 5
9	Ball 6

Q1 (Jam Ball)
Q2 (Ball 1)
Q3 (Ball 2)
Q4 (Ball 3)
Q5 (Ball 4)
Q6 (Ball 5)
Q7 (Ball 6)
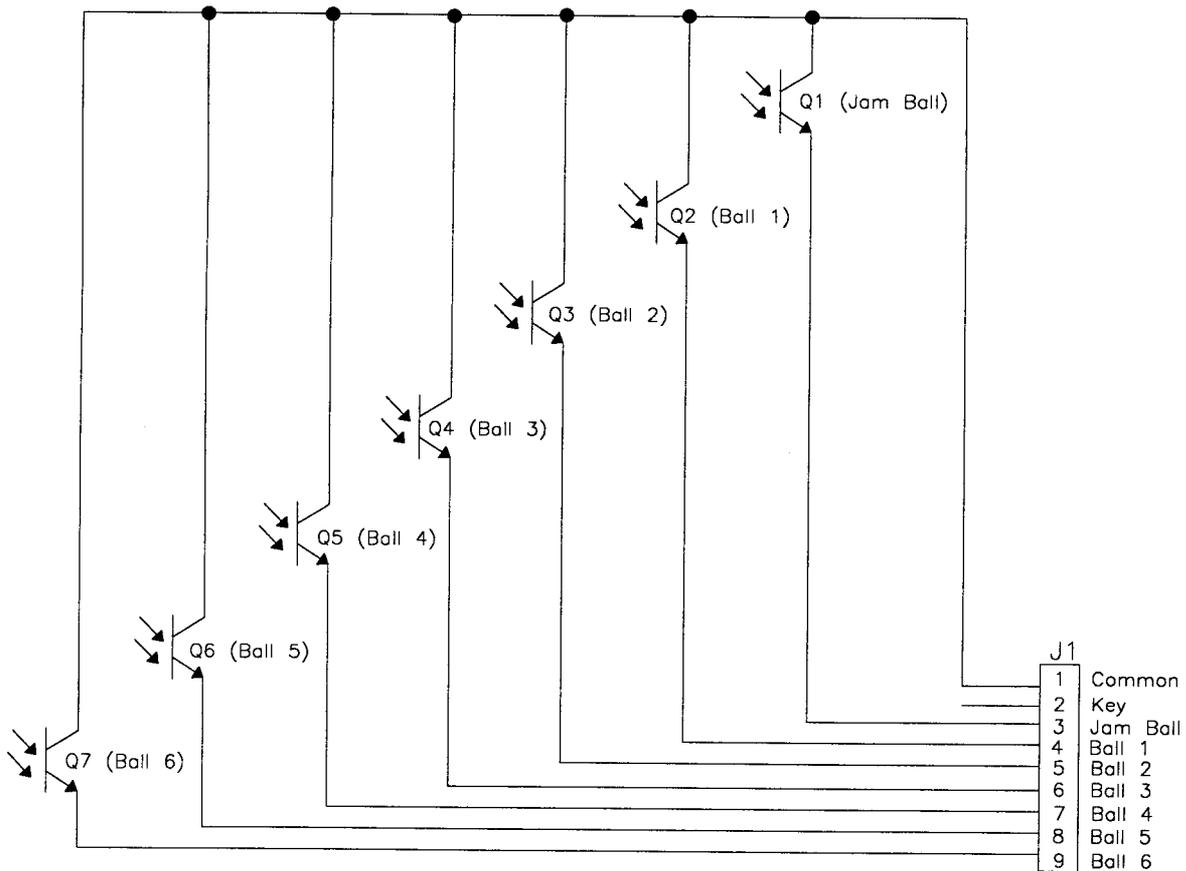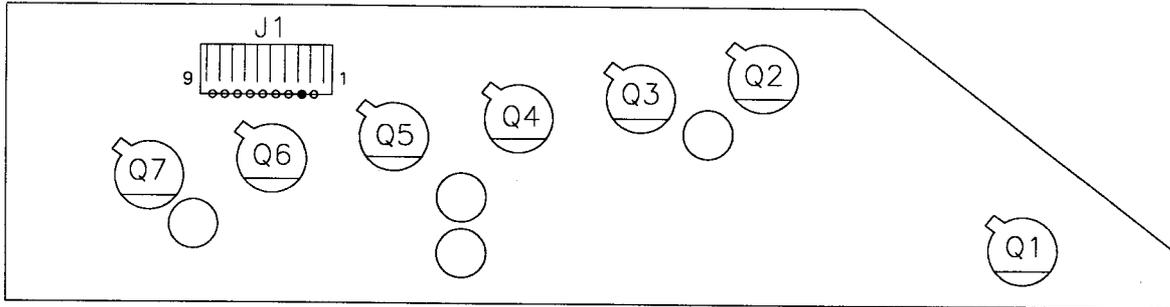
J1-1 Gray-Yellow, +12V, to 16-Opto Switch Board J2-1
J1-2 Key
J1-3 Orange-Brown, Photo Transistor 1, to 16-Opto Switch Board J2-10
J1-4 Orange-Red, Photo Transistor 2, to 16-Opto Switch Board J2-9
J1-5 Orange-Black, Photo Transistor 3, to 16-Opto Switch Board J2-8
J1-6 Orange-Yellow, Photo Transistor 4, to 16-Opto Switch Board J2-7
J1-7 Orange-Green, Photo Transistor 5, to 16-Opto Switch Board J2-6
J1-8 Orange-Blue, Photo Transistor 6, NOT USED
J1-9 Orange-Violet, Photo Transistor 7, NOT USED

3-17

16-Opto Switch Board Assembly
A-16998.1
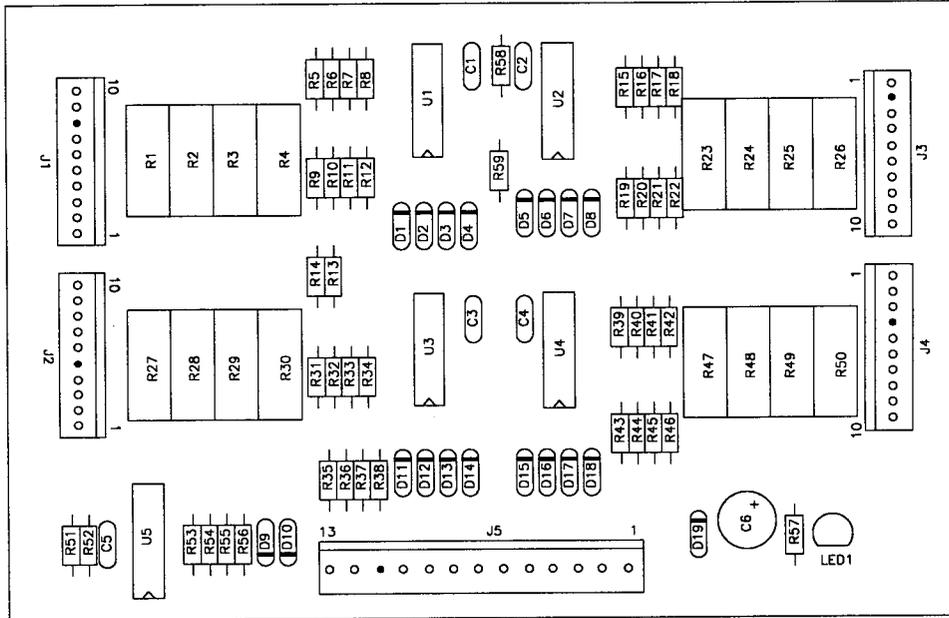
J1-1 Gray-White, to LED Brd, sw. #38-Right Ramp Make
J1-2 Gray-Violet, NOT USED
J1-3 Gray-Blue, NOT USED
J1-4 Gray-Green, to Trough 7 IR LED Brd J1-3
J1-5 Gray-Black, to Trough 7 IR LED Brd J1-4
J1-6 Gray-Orange, to Trough 7 IR LED Brd J1-5
J1-7 Gray-Red, to Trough 7 IR LED Brd J1-6
J1-8 Key
J1-9 Gray-Brown, to Trough 7 IR LED Brd J1-7
J1-10 Black, Ground to Trough 7 IR LED Brd J1-9, & sw. #38

J2-1 Gray-Yellow, +12V, to Trough 7 IR Photo Trans. Brd J1-1, & sw. #38
J2-2 Orange-Gray, to Photo Trans. Brd, sw. #38-Rt. Ramp Make
J2-3 Orange-Violet, NOT USED
J2-4 Orange-Blue, NOT USED
J2-5 Key
J2-6 Orange-Green, to Trough 7 IR Photo Trans. Brd J1-7
J2-7 Orange-Yellow, to Trough 7 IR Photo Trans. Brd J1-6
J2-8 Orange-Black, to Trough 7 IR Photo Trans. Brd J1-5
J2-9 Orange-Red, to Trough 7 IR Photo Trans. Brd J1-4
J2-10 Orange-Brown, to Trough 7 IR Photo Trans. J1-3

J3-1 Black, Ground, to sw. #41 thru sw. #47 LED Brds
J3-2 Key
J3-3 Gray-Brown, to LED Brd, sw. #41-Left Ramp Enter
J3-4 Gray-Red, to LED Brd, sw. #42-Right Loop
J3-5 Gray-Orange, to LED Brd, sw. #43-Left Ramp Make
J3-6 Gray-Black, to LED Brd, sw. #44-Gun Chamber
J3-7 Gray-Green, to LED Brd, sw. #45-Gun Popper
J3-8 Gray-Blue, to LED Brd, sw. #46-Warehouse Popper
J3-9 Gray-Violet, to LED Brd, sw. #47 -Left Popper
J3-10 NOT USED

J4-1 Gray-Yellow, +12V, to sw. #41 thru sw. #47 Photo.Trans Brd
J4-2 Orange-Brown, to Photo Trans. Brd, sw. #41-Lt. Ramp Enter
J4-3 Orange-Red, to Photo Trans. Brd, sw. #42-Right Loop
J4-4 Key
J4-5 Orange-Black, to Photo Trans. Brd, sw. #43-Lt. Ramp Make
J4-6 Orange-Yellow, to Photo Trans. Brd, sw. #44-Gun Chamber
J4-7 Orange-Green, to Photo Trans. Brd, sw. #45-Gun Popper
J4-8 Orange-Blue, to Photo Trans. Brd, sw. #46-Warehouse Popper
J4-9 Orange-Violet, to Photo Trans. Brd, sw. #47-Left Popper
J4-10 NOT USED

J5-1 White-Brown, sw. row #1, from CPU Brd J209-1
J5-2 White-Red, sw. row #2, from CPU Brd J209-2
J5-3 White-Orange, sw. row #3, from CPU Brd J209-3
J5-4 White-Yellow, sw. row #4, from CPU Brd J209-4
J5-5 White-Green, sw. row #5, from CPU Brd J209-5
J5-6 White-Blue, sw. row #6, from CPU Brd J209-7
J5-7 White-Violet, sw. row #7, from CPU Brd J209-8
J5-8 White-Gray, sw. row #8, from CPU Brd, J209-9
J5-9 Green-Orange, sw. col. #3, from CPU Brd, J207-3
J5-10 Green-Yellow, sw. col. #4, from CPU Brd, J207-4
J5-11 Key
J5-12 Gray-Yellow, +12V from Power Driver Brd J118-2
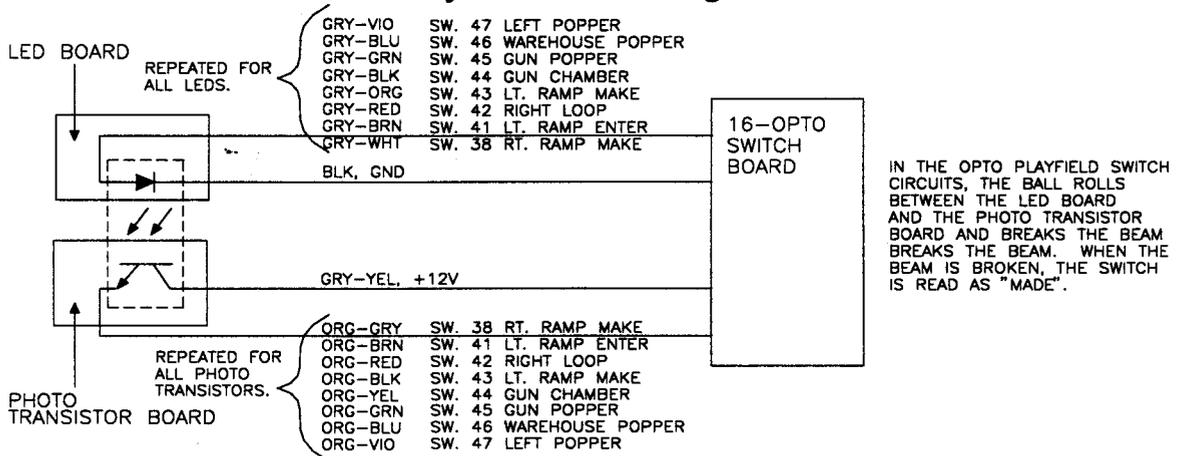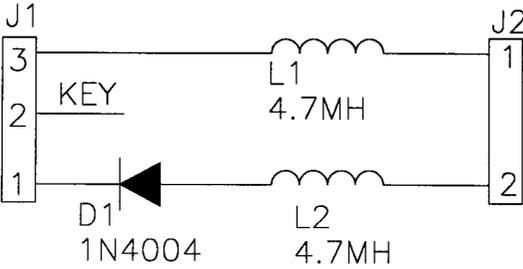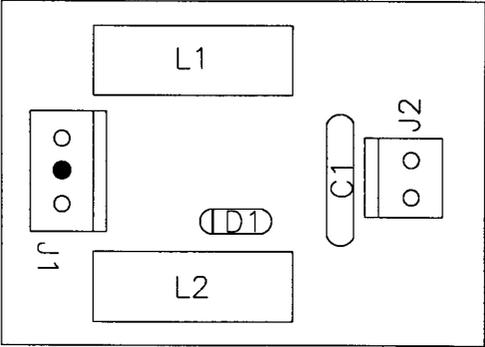J5-13 Black, Ground from Power Driver Brd J118-3

16-Opto Switch Board Schematic
A-16998.1

16-Opto Switch Circuit Block Diagram

16-OPTO SWITCH BOARD

(SEE PLAYFIELD SWITCH DIAGRAM BELOW)

J1

Pin	Color	Signal
1	GRY-WHT	SW. 38 RIGHT RAMP MAKE
2	GRY-VIO	NOT USED
3	GRY-BLU	NOT USED
4	GRY-GRN	LED 5
5	GRY-BLK	LED 4
6	GRY-ORG	LED 3
7	GRY-RED	LED 2
9	GRY-BRN	LED 1
10	BLK	GROUND

7 IR LED BOARD
3 4 5 6 7 9
SEE OUTHOLE TROUGH DIAGRAM BELOW

(SEE PLAYFIELD SWITCH DIAGRAM BELOW)

J2

Pin	Color	Signal
2	ORG-GRY	SW. 38 RIGHT RAMP MAKE
3	ORG-VIO	NOT USED
4	ORG-BLU	NOT USED
1	GRY-YEL	+12V
6	ORG-GRN	PHOTO TRANS. 5
7	ORG-YEL	PHOTO TRANS. 4
8	ORG-BLK	PHOTO TRANS. 3
9	ORG-RED	PHOTO TRANS. 2
10	ORG-BRN	PHOTO TRANS. 1

7 IR PHOTO TRANSISTOR BOARD
1 7 6 5 4 3
SEE OUTHOLE TROUGH DIAGRAM BELOW

J3

Pin	Color	Signal
1	BLK	GROUND
3	GRY-BRN	SW. 41 LEFT RAMP ENTER
4	GRY-RED	SW. 42 RIGHT LOOP
5	GRY-ORG	SW. 43 LEFT RAMP MAKE
6	GRY-BLK	SW. 44 GUN CHAMBER
7	GRY-GRN	SW. 45 GUN POPPER
8	GRY-BLU	SW. 46 WAREHOUSE POPPER
9	GRY-VIO	SW. 47 LEFT POPPER

SEE PLAYFIELD SWITCH DIAGRAM BELOW

J4

Pin	Color	Signal
1	GRY-YEL	+12V
2	ORG-BRN	SW. 41 LEFT RAMP ENTER
3	ORG-RED	SW. 42 RIGHT LOOP
5	ORG-BLK	SW. 43 LEFT RAMP MAKE
6	ORG-YEL	SW. 44 GUN CHAMBER
7	ORG-GRN	SW. 45 GUN POPPER
8	ORG-BLU	SW. 46 WAREHOUSE POPPER
9	ORG-VIO	SW. 47 LEFT POPPER

SEE PLAYFIELD SWITCH DIAGRAM BELOW

CPU BOARD

J209

	Color	Signal	
1	WHT-BRN	SW. ROW 1	1
2	WHT-RED	SW. ROW 2	2
3	WHT-ORG	SW. ROW 3	3
4	WHT-YEL	SW. ROW 4	4
5	WHT-GRN	SW. ROW 5	5
7	WHT-BLU	SW. ROW 6	6
8	WHT-VIO	SW. ROW 7	7
9	WHT-GRY	SW. ROW 8	8

J5

J211

J207

	Color	Signal	
3	GRN-ORG	SW. COL. 3	9
4	GRN-YEL	SW. COL. 4	10

| GRY-YEL | +12V | 12 |
| BLK | GROUND | 13 |

J113

J118 2 3

POWER DRIVER BOARD

Outhole Trough Diagram

7 IR LED BOARD

REPEATED FOR ALL LEDS.

Color	LED
GRY-GRN	LED5
GRY-BLK	LED4
GRY-ORG	LED3
GRY-RED	LED2
GRY-BRN	LED1

BLK, GND

GRY-YEL, +12V

7 IR PHOTO TRANSISTOR BOARD

REPEATED FOR ALL PHOTO TRANSISTORS.

Color	Photo Transistor
ORG-BRN	PHOTO TRANSISTOR1
ORG-RED	PHOTO TRANSISTOR2
ORG-BLK	PHOTO TRANSISTOR3
ORG-YEL	PHOTO TRANSISTOR4
ORG-GRN	PHOTO TRANSISTOR5

16-OPTO SWITCH BOARD

IN THE OUTHOLE TROUGH CIRCUIT, THE BALL ROLLS BETWEEN THE 7 IR LED BOARD AND THE 7 IR PHOTO TRANSISTOR BOARD AND BREAKS THE BEAM. WHEN THE BEAM IS BROKEN, THE SWITCH IS READ AS "MADE".

Playfield Switch Diagram

LED BOARD

REPEATED FOR ALL LEDS.

Color	Switch
GRY-VIO	SW. 47 LEFT POPPER
GRY-BLU	SW. 46 WAREHOUSE POPPER
GRY-GRN	SW. 45 GUN POPPER
GRY-BLK	SW. 44 GUN CHAMBER
GRY-ORG	SW. 43 LT. RAMP MAKE
GRY-RED	SW. 42 RIGHT LOOP
GRY-BRN	SW. 41 LT. RAMP ENTER
GRY-WHT	SW. 38 RT. RAMP MAKE

BLK, GND

GRY-YEL, +12V

PHOTO TRANSISTOR BOARD

REPEATED FOR ALL PHOTO TRANSISTORS.

Color	Switch
ORG-GRY	SW. 38 RT. RAMP MAKE
ORG-BRN	SW. 41 LT. RAMP ENTER
ORG-RED	SW. 42 RIGHT LOOP
ORG-BLK	SW. 43 LT. RAMP MAKE
ORG-YEL	SW. 44 GUN CHAMBER
ORG-GRN	SW. 45 GUN POPPER
ORG-BLU	SW. 46 WAREHOUSE POPPER
ORG-VIO	SW. 47 LEFT POPPER

16-OPTO SWITCH BOARD

IN THE OPTO PLAYFIELD SWITCH CIRCUITS, THE BALL ROLLS BETWEEN THE LED BOARD AND THE PHOTO TRANSISTOR BOARD AND BREAKS THE BEAM BREAKS THE BEAM. WHEN THE BEAM IS BROKEN, THE SWITCH IS READ AS "MADE".

3-20

Motor EMI Board Assembly
A-15542

J1-1   Black-Yellow, solenoid 20 drive from Power Driver Board J126-4
J1-2   Key
J1-3   Gray-Yellow, +12V from Power Driver Board J118-2

J2-1   Red, to Gun Motor
J2-2   Black, to Gun Motor

Gun Motor Circuit

Coin Door Interface Board
A-17051-1

J1-1 Orange-Gray, ded. switch row 8 form 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 Violet, G.I. from Power Driver Board J119-3
J2-4 Key
J2-5 White-Violet, G.I. 6.8vac from Power Driver J119-1

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 Orange-Black, ded. switch row 3 to coin door
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 N/C
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 N/C
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
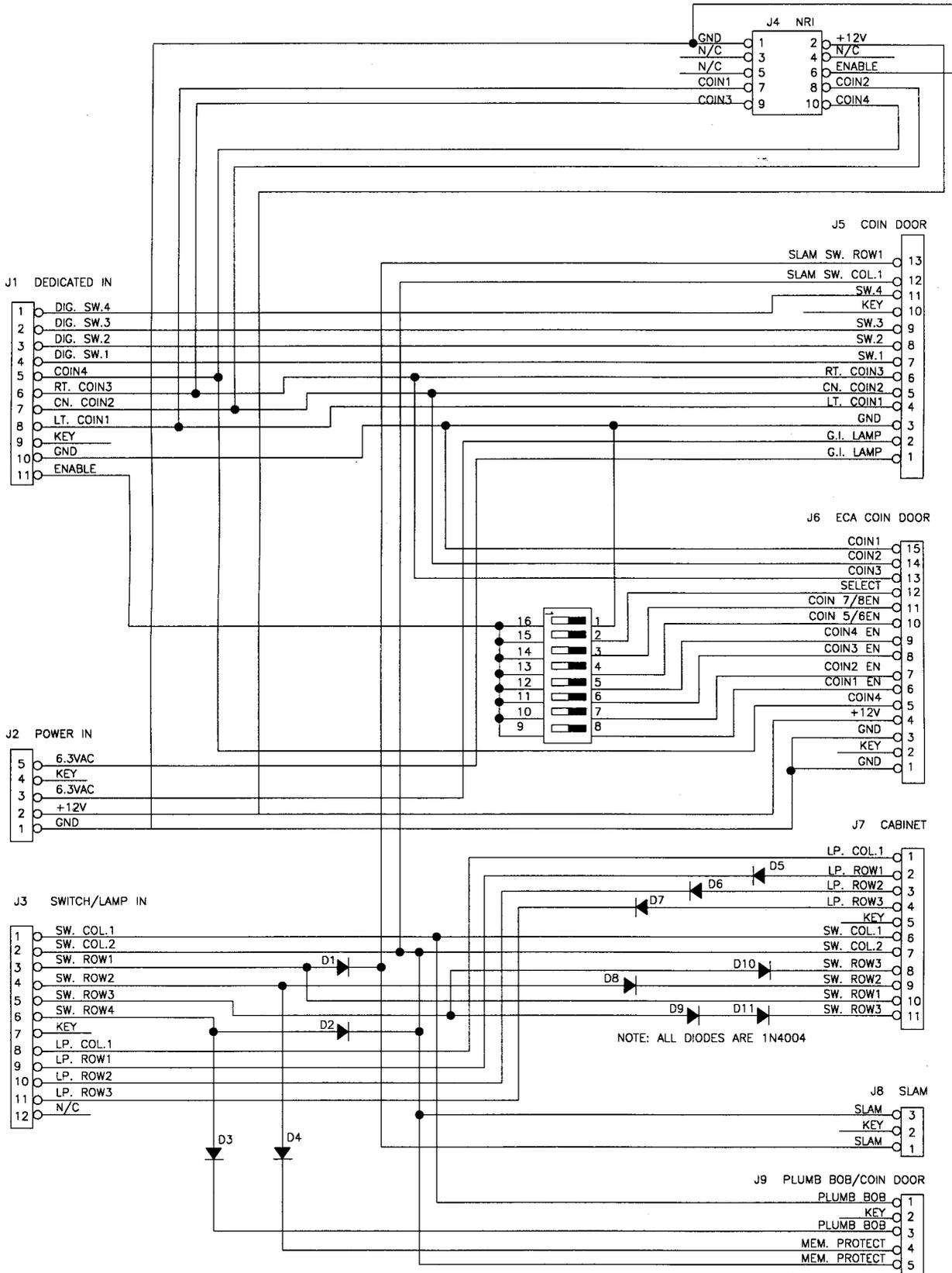
Security CPU Board Assembly
A-17651-50030
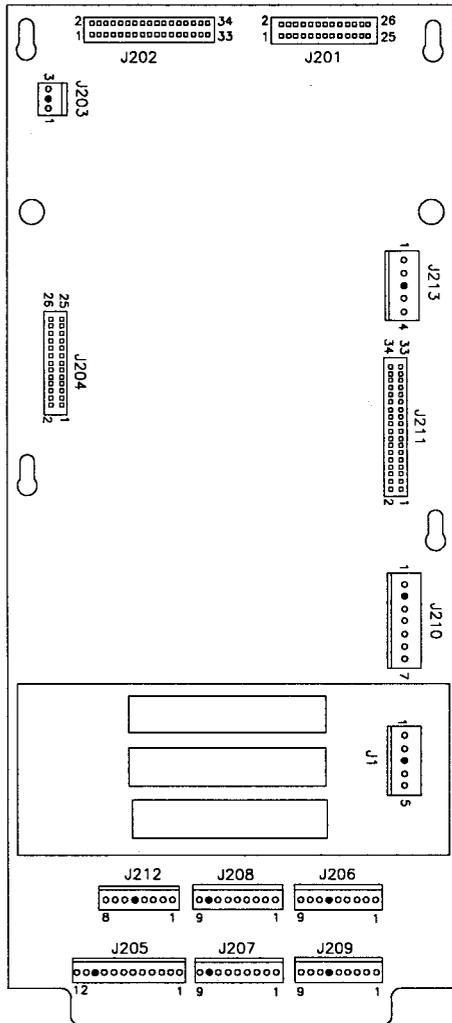
J201, 26-pin ribbon cable, data to/from J602

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- Not Used

J207-1 Green-Brown, switch column 1, to playfield switches
J207-2 Green-Red, switch column 2, to playfield switches
J207-3 Green-Orange, switch column 3, to playfield switches
J207-4 Green-Yellow, switch column 4, to playfield switches
J207-5 Green-Black, switch column 5, to playfield switches
J207-6 Green-Blue, switch column 6, to playfield switches
J207-7 Green-Violet, switch column 7, to playfield switches
J207-8 Key
J207-9 N/C
J207-10 N/C
J207-11 N/C

J208- Not Used

J209-1 White-Brown, switch row 1, to playfield switches
J209-2 White-Red, switch row 2, to playfield switches
J209-3 White-Orange, switch row 3, to playfield switches
J209-4 White-Yellow, switch row 4, to playfield switches
J209-5 White-Green, switch row 5, to playfield switches
J209-6 Key
J209-7 White-Blue, switch row 6, to playfield switches
J209-8 White-Violet, switch row 7, to playfield switches
J209-9 White-Gray, switch row 8, to playfield switches

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 J213-5

Sound Board Assembly
A-16917-50030
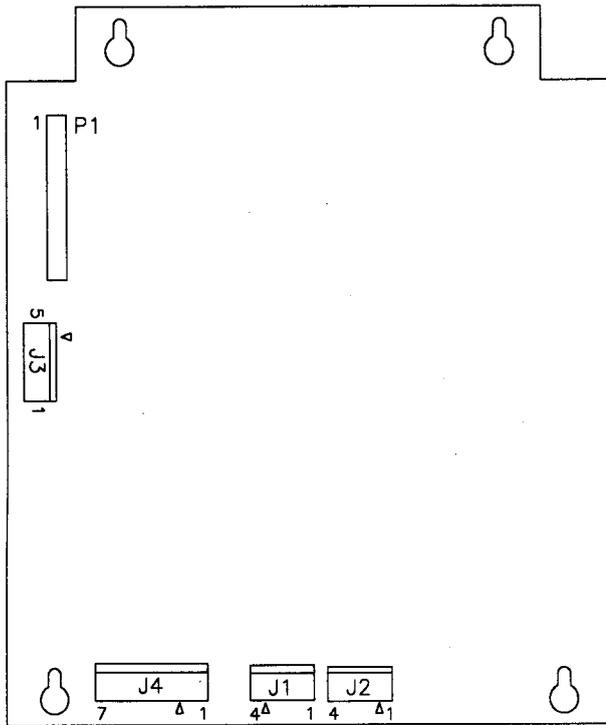
P1,   34-pin ribbon cable, data to/from J601; J903; J202

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
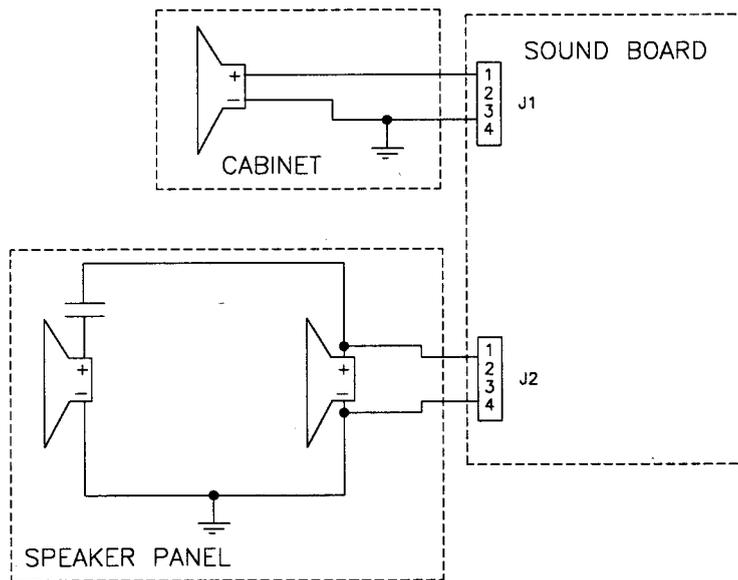
Dot Matrix Controller Board Assembly
A-14039.1
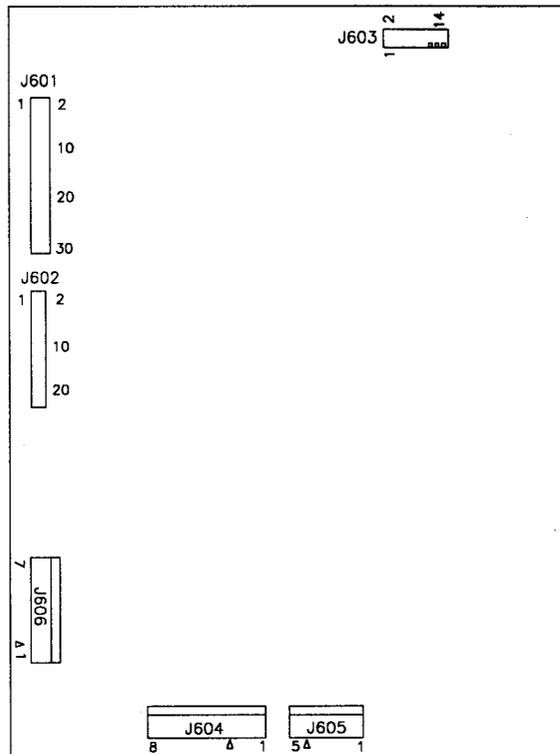
J601,   34-pin ribbon cable, data to/from J202; J903; P1

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
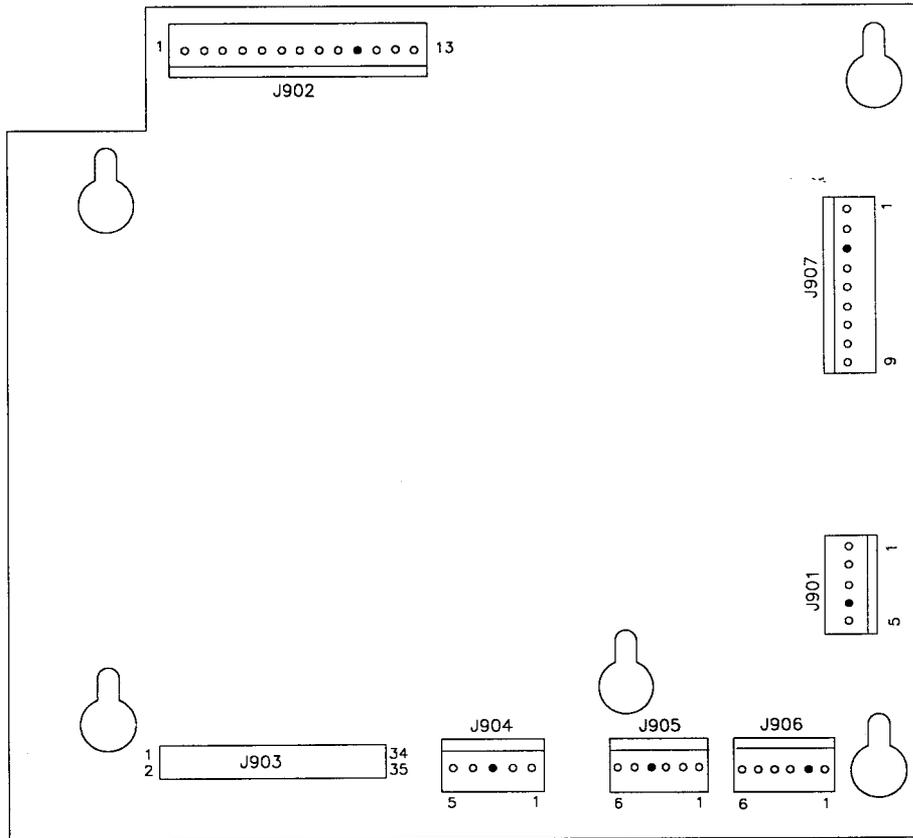
J901-1   White-Blue, 50Vac from Power Drvr Brd J104-2
J901-2   White-Blue, 50Vac loop from J901-1
J901-3   White-Blue, 50Vac from Power Drvr Brd J104-1
J901-4   Key
J901-5   White-Blue, 50Vac loop from J901-3

J902-1   Orange-Gray, holding, upper left flipper coil (not used)
J902-2   N/C
J902-3   Yellow-Gray, power, Right Loop Magnet (sol. 35)
J902-4   Orange-Violet, holding, upper right flipper coil
J902-5   N/C
J902-6   Yellow-Violet, power, upper right flipper coil
J902-7   Orange-Blue, holding, lower left flipper coil
J902-8   N/C
J902-9   Yellow-Blue, power, lower left flipper coil
J902-10 Key
J902-11 Orange-Green, holding, lower right flipper coil
J902-12 N/C
J902-13 Yellow-Green, power, lower right flipper coil

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

J904-1   Gray, +5V from Power Driver Board J114-3, 4
J904-2   Gray-Green, +12V from Pwr Drvr Brd J114-1, 2
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
J905-1   Blue-Violet, F2 to right flipper opto J1-2
J905-2   Blue-Gray, F4 to left flipper opto J1-2
J905-3   Black-Yellow, F6 to right flipper opto J1-1
J905-4   Key
J905-5   Black-Blue, F8 to left flipper opto J1-1 (not used)
J905-6   Orange, ground to left flipper opto J1-4

J906-1   Black-Green, F1 to lower right E.O.S. switch
J906-2   Key
J906-3   Black-Blue, F3 to lower left E.O.S. switch
J906-4   Black-Violet, F5 to upper right E.O.S. switch
J906-5   Black-Gray, F7 to upper left E.O.S. switch (not used)
J906-6   Orange, ground to E.O.S. switches

J907-1   Red-Green, +50V to lower right flipper coil
J907-2   Red-Green, +50V loop from J907-1
J907-3   Key
J907-4   Red-Blue, +50V to lower left flipper coil
J907-5   Red-Blue, +50V loop from J907-4
J907-6   Red-Violet, +50V to upper right flipper coil
J907-7   Red-Violet, +50V loop from J907-6
J907-8   Red-Gray, +50V to Right Loop Magnet (sol. 35)
J907-9   Red-Gray, +50V loop from J907-8

Power Driver Board Assembly
A-12697-3
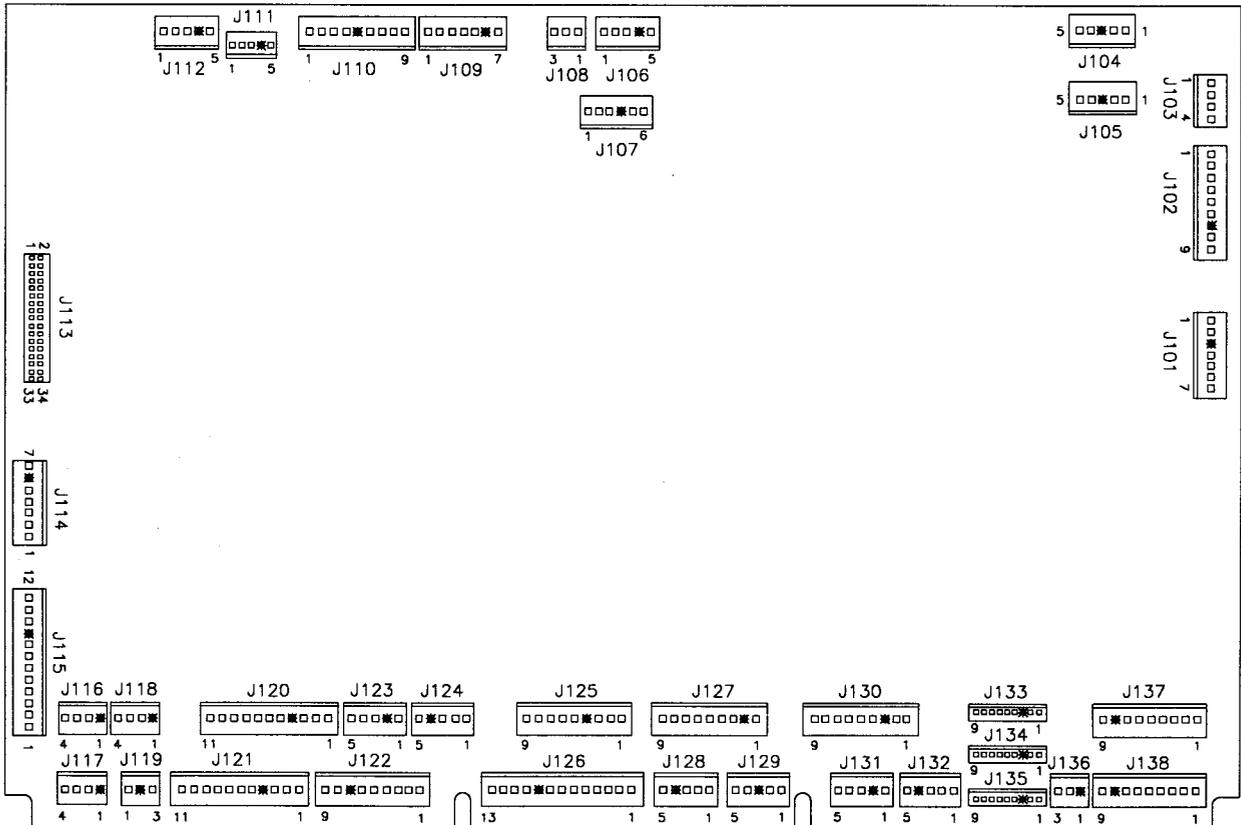
J101-1   Red, 9Vac from xformer secondary
J101-2   Red, 9Vac from transformer secondary
J101-3   Key
J101-4   Blue-White, 13Vac from xformer secondary
J101-5   Blue-White, 13Vac loop from J101-4
J101-6   Blue-White, 13Vac from xformer secondary
J101-7   Blue-White, 13Vac loop from J101-6

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- Not Used

J107-1   Red-Orange, +50V to coils
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 flashlamps; High Current
         Driver Board J1-6

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-White, ground to J210-1,3; J3-4, 5;.
         J904-4, 5

J115-1   Yellow-White, 6.8Vac from xformer secondary
J115-2   White-Brown, 6.8Vac from xformer secondary
J115-3   White-Brown, 6.8Vac from xformer secondary
J115-4   White-Orange, 6.8Vac from xformer secondary
J115-5   White-Yellow, 6.8Vac from xformer secondary
J115-6   White-Yellow, 6.8Vac from xformer secondary
J115-7   Orange, 6.8Vac from xformer secondary
J115-8   Orange, 6.8Vac from xformer secondary
J115-9   Key
J115-10 Green, 6.8Vac from xformer secondary
J115-11 Brown, 6.8Vac from xformer secondary
J115-12 Brown, 6.8Vac from xformer secondary

J116-1   Key
J116-2   Gray-Yellow, +12V to Coin Door Board J2-2
J116-3   Black, ground to Coin Door Board J2-1
J116-4   N/C

J117-1   Key
J117-2   Gray-Yellow, +12V to Dot Matrix Cntrllr J606-7
J117-3   Black, ground to Dot Matrix Cntrllr J606-3
J117-4   Gray, +5V to Dot Matrix Cntrllr J606-5

J118-1   Key
J118-2   Gray-Yellow, +12V to playfield boards
J118-3   Black, ground to playfield boards
J118-4   N/C

J119-1   White-Violet, 6.8Vac, G.I. to Coin Door BrdJ2-5
J119-2   Key
J119-3   Violet, return, G.I. to Coin Door Board J2-3

J120-1   Brown, return, G.I. to insert panel
J120-2   Orange, return, G.I. to insert panel
J120-3   Yellow, return, G.I. to insert panel
J120-4   Key
J120-5   Green, return, G.I. to insert panel
J120-6   N/C
J120-7   White-Brown, 6.8Vac, G.I. to insert panel
J120-8   White-Orange, 6.8Vac, G.I. to insert panel
J120-9   White-Yellow, 6.8Vac, G.I. to insert panel
J120-10 White-Green, 6.8Vac, G.I. to insert panel
J120-11 N/C

J121-1   Brown, return, G.I. to
J121-2   Orange, return, G.I. to playfield
J121-3   Yellow, return, G.I. to playfield
J121-4   Key
J121-5   N/C
J121-6   Violet, return, G.I. to playfield
J121-7   White-Brown, 6.8Vac, G.I. to playfield
J121-8   White-Orange, 6.8Vac, G.I. to playfield
J121-9   White-Yellow, 6.8Vac, G.I. to playfield
J121-10 N/C
J121-11 White-Violet, 6.8Vac, G.I. to playfield

J122-1   Blue-Brown, solenoid 25 drive to coil
J122-2   Blue-Red, solenoid 26 drive to coil
J122-3   Blue-Orange, solenoid 27 drive to coil
J122-4   Blue-Yellow, solenoid 28 drive to coil
J122-5   Red-Orange, tieback for solenoid 25
J122-6   Red-Orange, tieback for solenoid 26 (not used)
J122-7   Key
J122-8   Red-Orange, tieback for solenoid 27
J122-9   Red-Orange, tieback for solenoid 28

J123- Not Used

J124- Not Used

J125- Not Used

J126-1   Black-Brown, solenoid 17 drive to coil
J126-2   Black-Red, solenoid 18 drive to coil
J126-3   Black-Orange, solenoid 19 drive to coil
J126-4   Black-Yellow, solenoid 20 drive to coil
J126-5   Blue-Green, solenoid 21 drive to coil
J126-6   Blue-Black, solenoid 22 drive to coil
J126-7   Blue-Violet, solenoid 23 drive to coil
J126-8   Blue-Gray, solenoid 24 drive to coil
J126-9   Key
J126-10 N/C
J126-11 N/C
J126-12 N/C
J126-13 N/C

J127-1   Brown-Black, solenoid 9 drive to coil
J127-2   Key
J127-3   Brown-Red, solenoid 10 drive to coil
J127-4   Brown-Orange, solenoid 11 drive to coil
J127-5   Brown-Yellow, solenoid 12 drive to coil
J127-6   Brown-Green, solenoid 13 drive to coil
J127-7   Brown-Blue, solenoid 14 drive to coil
J127-8   Brown-Violet, solenoid 15 drive to coil
J127-9   Brown-Gray, solenoid 16 drive to coil

J128-Not Used

J129-Not Used

J130-1   Violet-Brown, solenoid 1 drive to coil
J130-2   Violet-Red, solenoid 2 drive to coil
J130-3   Key
J130-4   Violet-Orange, solenoid 3 drive to coil
J130-5   Violet-Yellow, solenoid 4 drive to coil
J130-6   Violet-Green, solenoid 5 drive to coil
J130-7   Violet-Blue, solenoid 6 drive to coil
J130-8   Violet-Black, solenoid 7 drive to coil
J130-9   Violet-Gray, solenoid 8 drive to coil

J131- Not Used

J132- Not Used

Power Driver Board Continued...

J133-1   Red-Brown, lamp row 1 to playfield
J133-2   Red-Black, lamp row 2 to playfield
J133-3   Key
J133-4   Red-Orange, lamp row 3 to playfield
J133-5   Red-Yellow, lamp row 4 to playfield
J133-6   Red-Green, lamp row 5 to playfield
J133-7   Red-Blue, lamp row 6 to playfield
J133-8   Red-Violet, lamp row 7 to playfield
J133-9   Red-Gray, lamp row 8 to playfield

J134-Not Used

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

Notes

Notes

LAMP MATRIX

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
Red-Brown J134-1 Q90 — 1	Left Rollover 11	Right Ramp Badge 21	Barroom Brawl 31	Safehouse Badge 41	Safehouse 51	Left Loop Generic 61	Not Used 71	Silver 8 Bullet 81
Red-Black J134-2 Q89 — 2	Middle Rollover 12	Silver 6 Bullet 22	Car Chase 32	Left Ramp Badge 42	Silver 4 Bullet 52	Ricochet 62	Not Used 72	Left Shootout 82
Red-Orange J134-4 Q88 — 3	Right Rollover 13	Right Loop Generic 23	Warehouse Raid 33	Silver 3 Bullet 43	Silver 5 Bullet 53	Extra Ball 63	Not Used 73	Light Magna Force 83
Red-Yellow J134-5 Q87 — 4	Magnum Jets 14	Magna Force 24	Letter Bomb 34	Super Jackpot 44	Left Loop HQ 54	HQ Badge 64	Not Used 74	Jets 84
Red-Green J134-6 Q87 — 5	Magnum Bullets 15	Right Ramp Generic 25	Meet the Mob 35	Left Ramp Generic 45	Warehouse Start Multiball 55	Ransom 65	Not Used 75	Jets 85
Red-Blue J134-7 Q86 — 6	Light Extra Ball 16	Right Ramp Jackpot 26	Stop Scorpio 36	Ramp Start Multiball 46	Feel Lucky 56	Silver 1 Bullet 66	Not Used 76	Body Armor 86
Red-Violet J134-8 Q84 — 7	Light Shootout 17	Right Loop HQ 27	Crime Wave 37	Magazine Award 47	Right Shootout 57	HQ 67	Shoot Again 77	Buy In Button 87
Red-Gray J134-9 Q83 — 8	Playfield Promo. 18	Warehouse Badge 28	Bank Robber Hurry Up 38	Contraband 48	Light Ransom 58	Silver 2 Bullet 68	Silver 7 Bullet 78	Start Button 88

J1XX = POWER DRIVER BOARD

SWITCH MATRIX

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
Org-Brn J205-1 Left Coin Chute D1	White-Brown J209-1 U18-11 — 1	Gun Handle Trigger 11	Slam Tilt 21	Trough Jam 31	Left Ramp Enter 41	Right Ramp Enter 51	Left Sling 61	Left Loop 71	Not Used 81	Black-Green J906-1 Lower Right E.O.S. F1
Org-Red J205-2 Center Coin Chute D2	White-Red J209-2 U18-9 — 2	Not Used 12	Coin Door Closed 22	Trough 1 32	Right Loop 42	Not Used 52	Right Sling 62	Not Used 72	Not Used 82	Blue-Violet J905-1 Lower Right Opto F2
Org-Blk J205-3 Right Coin Chute D3	White-Orange J209-3 U18-5 — 3	Start Button 13	Buy In Button 23	Trough 2 33	Left Ramp Make 43	Not Used 53	Left Jet 63	Safehouse 73	Not Used 83	Black-Blue J906-3 Lower Left E.O.S. F3
Org-Yel J205-4 4th Coin Chute D4	White-Yellow J209-4 U18-7 — 4	Plumb Bob Tilt 14	Always Closed 24	Trough 3 34	Gun Chamber 6 44	Standup 6 54	Middle Jet 64	Not Used 74	Not Used 84	Blue-Gray J905-2 Lower Left Opto F4
Org-Grn J205-6 Normal: Service Credit / Test: Escape D5	White-Green J209-5 U19-11 — 5	Shooter Lane 15	Left Inlane 25	Trough 4 35	Gun Popper 45	Standup 7 55	Right Jet 65	Not Used 75	Not Used 85	Black-Violet J906-4 Upper Right E.O.S. F5
Org-Blu J205-7 Normal: Volume Down / Test: Down D6	White-Blue J209-7 U19-9 — 6	Right Outlane 16	Left Outlane 26	Not Used 36	Warehouse Popper 46	Standup 5 56	Left Rollover 66	Gun Position 76	Not Used 86	Black-Yellow J905-5 Upper Right Opto F6
Org-Vio J205-8 Normal: Volume Up / Test: Up D7	White-Violet J209-8 U19-5 — 7	Right Inlane 17	Standup 1 27	Not Used 37	Left Popper 47	Standup 4 57	Middle Rollover 67	Gun Lockup 77	Not Used 87	Black-Gray J906-5 Upper Left E.O.S. F7
Org-Gry J205-9 Normal: Begin Test / Test: Enter D8	White-Gray J209-9 U19-7 — 8	Standup 8 18	Standup 2 28	Right Ramp Make 38	Not Used 48	Standup 3 58	Right Rollover 68	Not Used 78	Not Used 88	Black-Blue J905-5 Upper Left Opto F8

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

WARNINGS & NOTICES

CAUTION: Transport this game ONLY with the hinged backbox DOWN!