Bally.

NBA®

FASTBREAK™

The manufacturer intends that this game is to be operated for amusement purposes only and not in contravention of any federal, state or local law or regulation of the United States or any foreign country governing gaming devices. All operators of this game are responsible for its operation in accordance with such laws and regulations. The manufacturer's factory settings for this game may require adjustment in order to comply with laws applicable in an operator's specific jurisdiction. It is the operator's responsibility to determine whether adjustments are necessary and, if they are, to make the appropriate adjustments prior to operating the amusement game.

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OPERATIONS MANUAL INCLUDES

Operations & Adjustments • Testing & Problem Diagnosis • Parts Information • Wiring Diagrams & Schematics
Williams Electronics Games, Inc., 3401 N. California Avenue, Chicago, IL 60618

DIP SWITCH SETTINGS AND JUMPERS

EPROM Jumper Settings for G11	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	Off	Off	Off	Off
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 Color	Solenoid Part Number / Flashlamp Type Playfield	Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-24-900	
02	NOT USED	High Power				Q68				VIO-RED		
03	LEFT RAMP DIVERTER	High Power	J133-2			Q71	J116-4			VIO-ORG	AE-26-1500	
04	RIGHT LOOP DIVERTER	High Power	J133-2			Q67	J116-5			VIO-YEL	AE-26-1500	
05	EJECT	High Power	J133-2			Q70	J116-6			VIO-GRN	AE-30-2000	
06	LOOP GATE	High Power	J133-2			Q66	J116-7			VIO-BLU	A-14406	
07	BACKBOX FLIPPER	High Power		J133-2		Q69		J117-3		VIO-BLK		FL-11753
08	BALL CATCH MAGNET	High Power	J133-2			Q65	J116-9			VIO-GRY	B-13522	
09	TROUGH EJECT	Low Power	J133-3			Q44	J113-1			BRN-BLK	AE-28-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			BRN-RED	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			BRN-ORG	AE-26-1200	
12	LEFT JET BUMPER	Low Power	J133-3			Q47	J113-5			BRN-YEL	AE-26-1200	
13	MIDDLE JET BUMPER	Low Power	J133-3			Q42	J113-6			BRN-GRN	AE-26-1200	
14	RIGHT JET BUMPER	Low Power	J133-3			Q46	J113-7			BRN-BLU	AE-26-1200	
15	PASS RIGHT 2	Low Power	J133-3			Q41	J113-8			BRN-VIO	AE-29-2000	
16	PASS LEFT 2	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-29-2000	
17	EJECT KICKOUT FLSHR	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906 (1)	
18	LEFT JET BUMPER FLSHR	Flasher	J133-6			Q32	J111-2			BLK-RED	#906 (1)	
19	UPPER LEFT FLASHER	Flasher	J133-6	J134-5		Q27	J111-3	J112-3		BLK-ORG	#906 (1)	#906 (1)
20	UPPER RIGHT FLASHER	Flasher	J133-6	J134-5		Q31	J111-4	J112-5		BLK-YEL	# 906 (1)	#906 (1)
21	NOT USED	Flasher				Q26				BLU-GRN		
22	TROPHY INSERT FLSHR	Flasher	J133-6			Q30	J111-6			BLU-BLK	#906 (1)	
23	NOT USED	Flasher				Q25				BLU-VIO		
24	LOWER RIGHT/LEFT FLSH	Flasher	J133-6			Q29	J111-8			BLU-GRY	#906 (2)	
25	*PASS RIGHT 1	Gen. Purpose	J133-1			Q16	J109-1			BLU-BRN	AE-29-2000	
26	*PASS LEFT 3	Gen. Purpose	J133-1			Q15	J109-2			BLU-RED	AE-29-2000	
27	*PASS RIGHT 3	Gen. Purpose	J133-1			Q14	J109-3			BLU-ORG	AE-29-2000	
28	*PASS LEFT 4	Gen. Purpose	J133-1			Q13	J109-4			BLU-YEL	AE-29-2000	

General Illumination

No.	Function	Type	Playfield	Backbox	Cabinet	Xistor	Playfield	Backbox	Cabinet	Wire Color	Playfield	Backbox
01	STRING 1	G.I.	J106-1	J105-1		Q5	J106-7	J105-7		WHT-BRN	#44	#555
02	STRING 2	G.I.	J106-2	J105-2		Q4	J106-8	J105-8		WHT-ORG	#44	#555
03	STRING 3	G.I.	J106-3	J105-3		Q3	J106-9	J105-9		WHT-YEL	#44	#555
04	**STRING 4	G.I.	J106-5			Q2	J106-10			WHT-GRN	#44	
05	**STRING 5	G.I.	J106-6	J105-6	J104-3	Q1	J106-11	J105-11	J104-1	WHT-VIO	#44	#555

Flipper Circuits		Solenoid Type	Voltage Connection Playfield	Drive Xistors Power	Hold	Drive Connections Playfield	Power	Hold	Drive Wire Colors Power	Hold	Coil Part No.	Coil Colors
29		Lwr. Rt. Power	J119-1 (RED-GRN)	Q90		J120-13	YEL-GRN				FL-11630	RED
30	LOWER RIGHT FLIPPER	Lwr. Rt. Hold	J119-1 (RED-GRN)		Q92	J120-11		ORG-GRN				
31		Lwr. Lt. Power	J119-4 (RED-BLU)	Q87		J120-9	YEL-BLU				FL-11630	RED
32	LOWER LEFT FLIPPER	Lwr. Lt. Hold	J119-4 (RED-BLU)		Q89	J120-7		ORG-BLU				
33	SHOOT 1	Upr. Rt. Power	J119-6 (RED-VIO)	Q84		J120-6	YEL-VIO				AE-23-800	
34	SHOOT 2	Upr. Rt. Hold	J119-6 (RED-VIO)		Q86	J120-4		ORG-VIO			AE-23-800	
35	SHOOT 3	Upr. Lt. Power	J119-8 (RED-GRY)	Q81		J120-3	YEL-GRY				AE-23-800	
36	SHOOT 4	Upr. Lt. Hold	J119-8 (RED-GRY)		Q83	J120-1		ORG-GRY			AE-23-800	

Motor & Shot Clock Circuits		Solenoid Type	Voltage Connections Playfield	Drive Gates	Drive Connections Playfield	Drive Wire Color	Device Part Number Playfield
37	MOTOR ENABLE	Low Power	J139-2	U3A, U3B	J110-1	BRN-WHT	14-8034
38	MOTOR DIRECTION	Low Power	J139-2	U3C, U3D	J110-3	ORG-WHT	14-8034
39	SHOT CLOCK ENABLE	Low Power	J139-2	U3G, U3H	J110-4	YEL-WHT	A-21380
40	SHOT CLOCK COUNT	Low Power	J139-2	U3E, U3F	J110-5	BLU-WHT	A-21380

J1XX = POWER DRIVER BOARD
24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB
*TIEBACK DIODES FOR SOLENOIDS 25 THROUGH 28 ARE AT J109-5, J109-6, J109-8, AND J109-9 RESPECTIVELY.
**THESE G.I. STRINGS DO NOT BRIGHTEN AND DIM, THEY ARE ALWAYS ON.

DECLARATION OF CONFORMITY

WILLIAMS ELECTRONICS GAMES INC.

3401 N. CALIFORNIA AVE.
CHICAGO, IL 60618
U.S.A.

WE, HEREBY DECLARE UNDER SOLE RESPONSIBILITY THAT

THE MODEL: *"NBA FAST BREAK"* 50253 50353, 50453, 50753, 50953, 51053, 51153, 51353, 51453, 51853, 52053, 52153, 52253, 52353, 57253 *PINBALL*

TO WHICH THIS DECLARATION RELATES IS IN CONFORMITY WITH THE FOLLOWING EUROPEAN PRODUCT SAFETY DIRECTIVES:

ELECTROMAGNETIC COMPATABILITY DIRECTIVE
(89/336/EEC AND AMENDMENTS 91/C162/08, 92/31/EEC, 93/68/EEC

ELECTRICAL EQUIPMENT DESIGNED FOR USE WITHIN CERTAIN VOLTAGE LIMITS DIRECTIVE
(73/23/EEC AND AMENDMENTS 88/C168/02, 92/C210/01, 93/68/EEC, 94/C199/03, 95/C214/02)

EN 55014:1993   EN55104:1995   EN61000-4-2: 1995
IEC 801-3: 1984 (EN61000-4-3)   EN61000-4-4: 1995   EN61000-4-5: 1995
ENV50141: 1993 (EN61000-4-6)   EN61000-4-11: 1994 EN60335-1: 1995
IEC 335-2-82 (DRAFT)

Date issued: **JANUARY 1, 1997**

MANUFACTURE'S SIGNATURE

DAN GALARDE

CORPORATE V.P. OF QUALITY

ATTENTION

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

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

TESTING	
50053	EPROM 1.0 A
553 100006 95749	

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. An interlock switch assembly (part no. A-18249-3), 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.
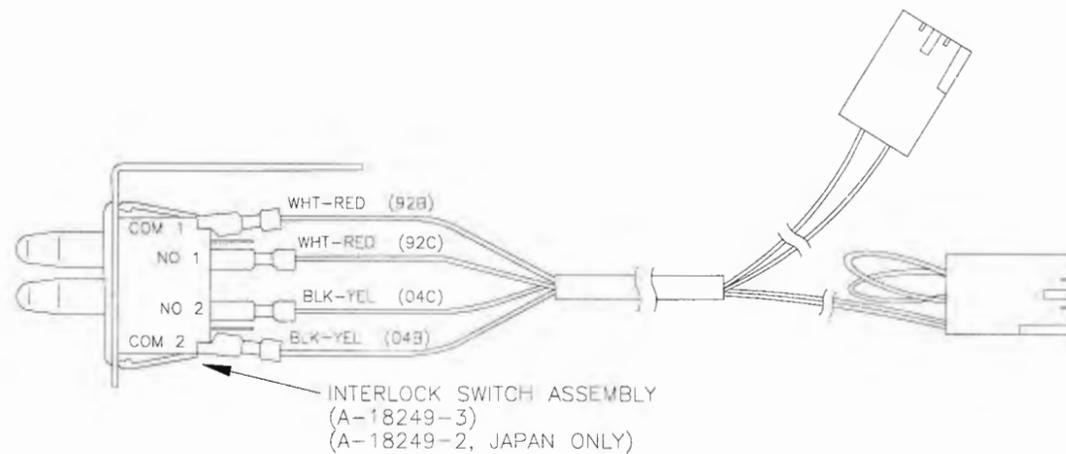
NBA®
FASTBREAK™

The information is current as of the time of its release.

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

PIC Number _____   **Serial Number** _____

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

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PLAYFIELD SHOTS AND GAME RULES

NBA FASTBREAK GAME PLAN

- **Insert coins and press flashing Start button.**
- **Team Selection:** Use flippers to select your Team at game start. Beat the selected Team's score to be an NBA Champion.
- **Shoot baskets to score points.**
- **NBA Fastbreak MVP Qualifiers:** Light *Field Goals, 20 pt. Complete, Power Hoops, Combination Shots, Stadium Goodies, and Multiballs Complete* to play "Trophy Multiball" and earn *Rings*.
- **Multiball:** Spell S H O O T to play "Shoot Around Multiball".
- **Light Extra Ball:** Shoot Free Throws, or complete *Combination Shots*, or spell S H O O T while playing "Shoot Around Multiball".
- **In The Paint:** - Use flipper to pass when blocked by *Defender*.
  - Use Shoot button to score when open.
  - Complete shots from all four positions to start Multiball.
- **Pizza Power Shots:** Use flippers or Shoot button to score backbox baskets.

16-10375

TYPICAL NBA® FASTBREAK™ INSTRUCTION CARD

PLAYFIELD SHOTS

COMPLETING SHOTS FROM ALL FOUR SHOOTER POSITIONS STARTS 'AROUND THE WORLD MULTIBALL'.

SHOOTER 1 POSITION

SHOOTER 2 POSITION

DEFENDER

SHOOTER 4 POSITION

SHOOTER 3 POSITION

LIGHT POWER HOOPS

JET BUMPERS HITS ADVANCE THRU HOOP MODES.

COMPLETE ③ⓅⓉ TO ENABLE 3 PT. SHOTS.

SPELL ⓈⒽⓄⓄⓉ TO START 'SHOOT AROUND MULTIBALL'.

IN THE PAINT

EXTRA BALL

LIGHT ALLEY OOP

PIZZA POWER POINTS (START BACKBOX GAME)

LIGHT 'IN THE PAINT'

INBOUND PASS (EARNED BALL SAVE)

SHOOT AROUND MULTIBALL

AROUND THE WORLD MULTIBALL

USE FLIPPERS TO PASS WHEN IN THE PAINT.

S   H   O   O   T

SLAM DUNK   FREE THROW
LIGHT FASTBREAK   ALLEY OOP   LIGHT SLAM DUNK
3 PTS WHEN LIT   FAST BREAK   LIGHT FASTBREAK
TIP OFF
3 PTS. WHEN LIT

CRAZY BOB'S

HOT DOG

? MYSTERY

TIP OFF   SLAM DUNK   ALLEY OOP   FAST BREAK   RUN + SHOOT HOOPS

SODA

COMPLETE COMBINATION SHOTS   MULTIBALL HOOPS

STADIUM GOODIES   POWER HOOPS COMPLETE

NBA FASTBREAK TROPHY

MULTIBALLS COMPLETE   FIELD GOALS COMPLETE   20 POINTS COMPLETE

2 PT   3 PT
FREE THROW

HALF COURT HOOPS

HOOK SHOT HOOPS

CHAMPIONSHIP RINGS (To earn rings, win Trophy multiball.)

IN THE PAINT

LIGHT INBOUND PASS

LIGHT TIP-OFF

LIGHT INBOUND PASS

MILLION DOLLAR SHOT

LIGHT 'IN THE PAINT'

GET BACK IN THE GAME (SHOOT AGAIN)

USE FLIPPERS TO PASS WHEN IN THE PAINT.

NBA® FASTBREAK™ RULES

TEAM SELECTION:
When a game is started, the player is prompted on the dot matrix display to select their team. The player can use the flippers to cycle through the 29 NBA teams. When the SHOOT button is pressed to launch the ball, the selected team is locked in place. Each team has an associated current high score. If the player beats that score during their game, they will be asked to enter their initials and their score will replace the current high score for that team.

SCORING:
Scores are representative of a basketball game. Each basket shot during normal play scores 1, 2, or 3 points depending on the situation. During modes, other non-basket shots may cause a backbox basket to be shot for 1, 2, or 3 points. In addition to points, good players will also collect "CHAMPIONSHIP RINGS". One ring is collected each time all six of the main goals are completed and the player plays and wins the "TROPHY MULTIBALL" round. In terms of score comparisons, rings are more significant than points (e.g. 1 ring 100 points beats 0 rings 150 points).

GOAL OF THE GAME:
Compete for the high score for each of the 29 NBA team champions. Complete the six main goals (listed below) to play "TROPHY MULTIBALL". Win at "TROPHY MULTIBALL" to collect "CHAMPIONSHIP RINGS" and to be the Most Valuable Player (M.V.P.).

NBA TEAM CHAMPIONS:
Each player competes to better the current high score for the NBA team they select. If the player's score beats the current team score, then the player's initials and score will replace the current high score the selected NBA team. Rings are included in determining winning scores. See "SCORING" above.

CHAMPIONSHIP RINGS:
One "CHAMPIONSHIP RING" is awarded each time the player wins during "TROPHY MULTIBALL". See "TROPHY MULTIBALL" below for further details.

M.V.P.:
The Most Valuable Player is the last player to complete the six main goals and to win "TROPHY MULTIBALL". The initials of the current M.V.P. are shown during attract mode and during game play on the dot matrix display.

THE SIX MAIN GOALS:
There are six main goals of the game that must be completed in order to play "TROPHY MULTIBALL". Each goal is completed by the criteria listed below:
1. "20 POINTS" complete
2. "MULTIBALLS" complete
3. "FIELD GOALS" complete
4. "COMBINATION SHOTS" complete
5. "POWER HOOPS" complete
6. "STADIUM GOODIES" complete

20 POINTS:
Once 20 points are achieved through any means of game play, the "20 POINTS" complete lamp is lit.

MULTIBALLS:
Once the two primary multiballs (listed below) are played out, the "MULTIBALLS" complete lamp is lit.
1. "SHOOT AROUND"
2. "AROUND THE WORLD"

FIELD GOALS:
Once the three types of "FIELD GOAL" (listed below) are made, the "FIELD GOALS" complete lamp is lit. Most baskets award a two-point field goal. A three-point field goal is awarded for a shot to the basket with the "3 POINT" lamp lit, as well as during certain modes. A one -oint field goal is awarded for a shot to the basket with the "FREE THROW" lamp lit.
1. "FREE THROW"
2. "2 POINT"
3. "3 POINT"

COMBINATION SHOTS:
Once the four types of combination shots (listed below) are made, the "COMBINATION SHOTS" complete lamp is lit. Each combination shot is made by making the "LIGHT {TIP-OFF, SLAM DUNK, ALLEY OOP, FASTBREAK}" shot followed quickly by the "{TIP-OFF, SLAM DUNK, ALLEY OOP, FASTBREAK}" shot to the basket.
1. "TIP-OFF"
2. "SLAM DUNK"
3. "ALLEY OOP"
4. "FASTBREAK"

POWER HOOPS:
Once the four "POWER HOOPS" modes (listed below) are played, the "POWER HOOPS" complete lamp is lit. Power hoops are started from "JET BUMPER" hits. The modes are explained in greater detail below.
1. "HALF COURT HOOPS"
2. "HOOK SHOT HOOPS"
3. "RUN & SHOOT HOOPS"
4. "HOOPS MULTIBALL"

STADIUM GOODIES:
Once the four "STADIUM GOODIES" items (listed below) have been collected, the "STADIUM GOODIES" complete lamp is lit. Visiting "CRAZY BOB'S" vendor stand collects stadium goodies (the LEFT EJECT).
1. PIZZA POWER SHOTS
2. HOT DOG MANIA
3. TRIVIA QUIZ
4. EGYPTIAN SODA

PIZZA POWER SHOTS:
The first of the "STADIUM GOODIES", this mode is played entirely in the backbox and on the dot matrix display. Each time the player hits a flipper (or pushes the SHOOT button), the backbox flips the ball towards the backbox basket. If the ball goes through the hoop, the player scores the point value on the dot matrix display. The point value cycles between 1, 2, and 3 points. The mode is over when the SHOT CLOCK expires.

HOT DOG MANIA:
The second of the "STADIUM GOODIES", during this mode, all shots made by the player cause the backbox to flip for a 3 point basket. In addition to points, the SHOT CLOCK time is reset to 24 each time a shot is made. The mode is over when the SHOT CLOCK expires.

TRIVIA QUIZ:
The third of the "STADIUM GOODIES", this mode is played entirely on the dot matrix display. The player is presented with a randomly selected question and four answers. The flippers cycle through the answers. If the selected answer is correct, the player is awarded 10 points. If the selected answer is wrong, the player is awarded 1 point. The mode is over when either the SHOT CLOCK expires, or the SHOOT button is pressed.

EGYPTIAN SODA:
Egyptian Soda is the fourth and final "STADIUM GOODIES" mode. During this mode, each ramp shot made by the player cause the backbox to flip for a three-point basket. The mode is over when the SHOT CLOCK expires.

IN THE PAINT:
This is the area below the top lanes, under the basket. There are four positions where the ball can be held in the ring around the basket. Each of the four positions can either pass or shoot the ball. There is also a defensive player which moves between any position and the basket to block the player's shot to the basket. If the player shoots either the left or right loop when "IN THE PAINT" is lit, the SHOT CLOCK is set to 24 seconds and begins counting down. The player must pass the ball to a position that is not defended and attempt to shoot a basket for 2 points, before the shot clock expires. Making a basket from a position lights the lamp at that position. If the shot clock expires before a basket is made, the ball is automatically passed out of the area and returned to normal play. Completing all of the lamps (making a basket from each position) starts "AROUND THE WORLD" multiball.

AROUND THE WORLD MULTIBALL:
This three-ball multiball is started when a shot is made from each of the four "IN THE PAINT" positions. During this multiball, one of the five main shots is lit. The shot moves either when it is made or after a short period of time. Making the lit shot scores one point for each ball remaining in play.

SHOOT SPELL OUT:
The letters 'S', 'H', 'O', 'O', and 'T' are located one per playfield shot. Making a shot lights the associated letter. Completing all of the letters starts "SHOOT AROUND" multiball.

SHOOT AROUND MULTIBALL:
This two-ball multiball is started when all of the "SHOOT" spell out letters are completed. During this multiball, the "SHOOT" letters start out blinking. Each time a letter is shot, two points are awarded and the letter is lit solid. Completing all of the letters starts them all blinking again and may light EXTRA BALL,

3 PT SPELL OUT:
The number and letters '3', 'P', and 'T' are located in front of the three center playfield standup targets. Completing all three standup target lamps lights the "3 POINTS" lamp on both the left and center ramps. Making a basket by either the left or center ramp with the "3 POINTS" lamp lit awards a three-point field goal.

TIP-OFF:
This combination shot is lit both at the start of each ball or by making the right loop shot into the "JET BUMPERS" when "LIGHT TIP-OFF" is lit. Making the center ramp shot when "TIP-OFF" is lit completes the "TIP-OFF COMBINATION SHOT".

SLAM DUNK:
This combination shot is lit by making the right ramp shot when "LIGHT SLAM DUNK" is lit. Making the left ramp shot when "SLAM DUNK" is lit completes the "SLAM DUNK COMBINATION SHOT".

ALLEY OOP:
This combination shot is lit by making the left loop shot when "LIGHT ALLEY OOP" is lit. Making the center ramp shot when "ALLEY OOP" is lit completes the "ALLEY OOP COMBINATION SHOT".

FASTBREAK:
This combination shot is lit by making either the left or right ramp shots when "LIGHT FASTBREAK" is lit. Making the center ramp shot when "FASTBREAK" is lit completes the "FASTBREAK COMBINATION SHOT".

HALF COURT HOOPS:
This mode is started at the first "POWER HOOPS" level, achieved in the "JET BUMPERS". During this mode, the center ramp scores 3 points per shot. The mode is over when the SHOT CLOCK expires.

HOOK SHOT HOOPS:
This mode is started at the second "POWER HOOPS" level, achieved in the "JET BUMPERS". During this mode, the left ramp scores 3 points per shot. The mode is over when the SHOT CLOCK expires.

RUN & SHOOT HOOPS:
This mode is started at the third "POWER HOOPS" level, achieved in the "JET BUMPERS". During this mode, the left and center ramps are alternately lit and score 3 points when shot. The mode is over when the SHOT CLOCK expires.

HOOPS MULTIBALL:
This two- ball multiball is started at the fourth "POWER HOOPS" level. During this multiball, the left and right ramps are alternately lit and score 3 points when shot.

HOOP LOOPS:
If the left loop shot is made during any of the "POWER HOOPS" modes/multiball, "HOOP LOOPS" are tallied. When a certain auto-percentaged number of loops are completed, an EXTRA BALL may be lit.

POWER POINTS:
At various numbers of "JET BUMPER" hits, the backbox flips the ball for a "POWER POINTS" 2 point basket.

TROPHY MULTIBALL:
This timed three-ball continuous multiball is started when the six main goals are completed. During this multiball, the player competes for approximately one minute to beat an artificial computer score. The multiball starts with the computer's score (shown on the right of the display) tied with the player's score (shown on the left - as usual). The computer's score escalates randomly over the timed period. The player's score increases as shots are made. Once the time expires (as shown on the 24 "second" SHOT CLOCK), the flippers are turned off and the balls are drained. If the player beats the computer, a "CHAMPIONSHIP RING" is awarded. If the player ties the computer, a short sudden death round is played where the player has a certain amount of time to score before the computer scores. The first to score wins. In either case (win or lose) all of the six main goals are reset, and play begins again, with increased difficulty.

EXTRA BALL:
There are a number of ways to light the "EXTRA BALL" lamp. The first is to shoot the "FREE THROW" shot an auto-percentaged number of times. The second is to complete all of the jackpots (spell "SHOOT" during "SHOOT AROUND" multiball. The third is lit by completing all four "COMBINATION SHOTS". The fourth is by completing the auto-percentaged number of "HOOP LOOPS".

LIGHT INBOUND PASS (right standups):
Completing the right hand standup target lamps lights the left outlane "INBOUND PASS" lamp.

INBOUND PASS (left outlane):
This lamp is lit by completing the right hand standup targets. When the ball goes out the left outlane and "INBOUND PASS" is lit, a new ball is put back into play via the auto plunger and the player continues to play.

MILLION DOLLARS SHOT (right outlane):
This lamp is lit on the player's last ball, after the BALL SAVE lamp has expired. Draining out the right outlane when this lamp is lit gives the player a chance to continue playing by making the center ramp basket shot before the SHOT CLOCK expires.

SECTION ONE

GAME OPERATION AND TEST INFORMATION

(System WPC) ROM SUMMARY

IC	TYPE	BOARD	LOCATION	PART NUMBER
Game 1	27c040	CPU	G11	A-5343-50053-1
Security Chip	PIC16C57	CPU	G10	A-5400-50053-1
Music/Speech	M27c801	Audio	SU2	A-5343-50053-S2
Music/Speech	M27c801	Audio	SU3	A-5343-50053-S3
Music/Speech	M27c801	Audio	SU4	A-5343-50053-S4
Music/Speech	M27c801	Audio	SU5	A-5343-50053-S5
Music/Speech	M27c801	Audio	SU6	A-5343-50053-S6

NOTICE

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

PINBALL GAME ASSEMBLY INSTRUCTIONS

NBA® FASTBREAK™ IS A FOUR BALL GAME.

Power:	Domestic 120V @ 60Hz	**_Dimensions:_**	Width: 29" approx.
	Foreign 230V @ 50Hz		Depth: 52" approx.
	Japan 100V @ 50HZ		Height: 75" approx.
Temp:	32°F to 100° F, (0°C to 38°C)		
Humidity:	Not to exceed 95% relative.	**_Weight:_**	325 lb. approx. (crated)

1. Remove all cartons, parts, and other items from the shipping container and set them aside.

2. Leg levelers and leg bolts are among the parts in the cash box. Install leg levelers on the front and rear legs (View 1). Place cabinet on a support and attach rear legs using leg bolts (View 2).

3. Attach front legs using leg bolts (View 2).

VIEW 1

FRONT   REAR
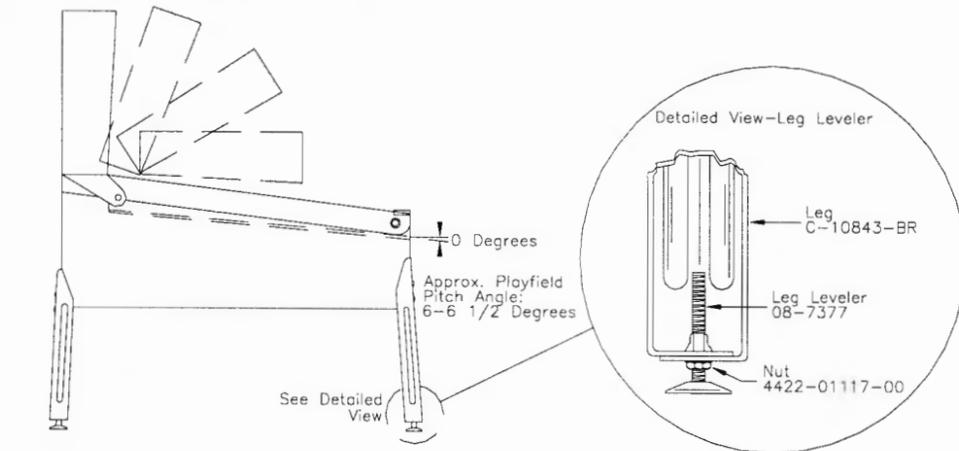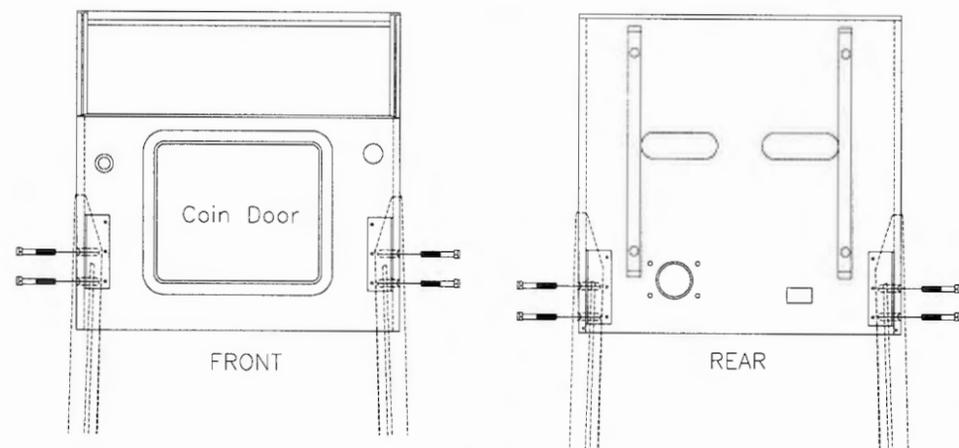
VIEW 2

4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.

5. Raise the hinged backbox upright and latch it into position.

    Note: _The insert panel is no longer hinged to the backbox; it is attached to the backglass. The backglass and the insert panel are removed from the backbox housing as a single unit._

    Unlock the backbox. Carefully, lift the backglass/insert panel from the bottom and slide it out of the backbox. Lay it down on the playfield glass. Unplug the cable extending from the backbox to the insert panel. Carefully, set the backglass/insert panel aside.

    Note: _The speaker panel uses a new hinging system. The bottom of the speaker panel remains attached to the backbox unit when released._

    Carefully lift the speakers panel so that the top notches clear the top pins. Rotate it away from the backbox, toward the playfield glass. The speaker panel will remain attached to the backbox unit.

    This allows access to the bolt holes for securing the backbox upright. Install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox.

    Note: _You have the option of removing the speaker panel completely. Lay the speaker panel on the playfield glass. Unplug the display cable, speaker cable, and ground strap. Line up the bottom notches with the bottom backbox pins. Lower the speaker panel through the notches and slide it under the backbox pins._
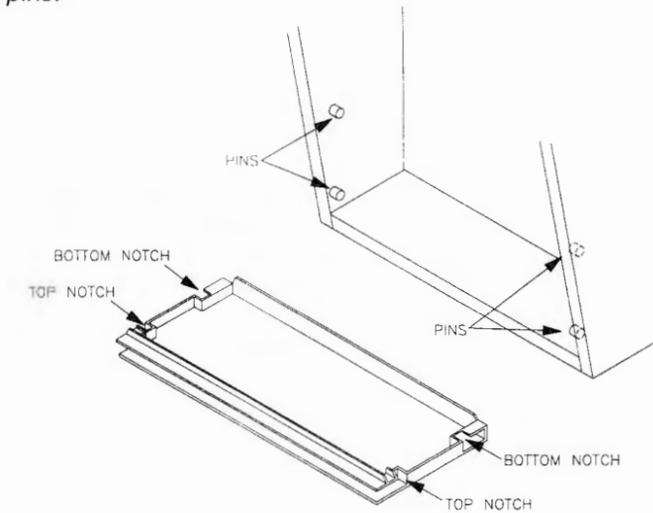
6. After the washer-head mounting bolts are installed, replace the speaker panel and the backglass/insert panel. Lock the backbox.

⚠ 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.

7. 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.

8. Unlock and open the coin door. Move the lever guide toward the left side of the game. Lift the front molding up and set it on the playfield glass. Carefully, unplug the Shoot button cable from the cabinet cable. Lift the front molding off of the game. Return the lever guide to 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.

Hand Guard Assembly
Playfield Glass
Lever Guide Assembly
On/Off Switch
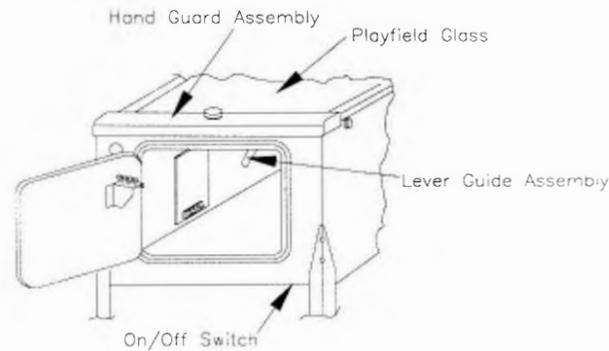
9. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side).

   Note: This measurement must be made ON the playfield, not the cabinet or the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.

10. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be properly adjusted WITHOUT REMOVING THE GLASS. The first line (closest to the front of the game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch is 6-1/2 degrees. The NOSE of the bubble should be between the first and second line on the level (see diagram below).

TRU-PITCH™ level 6-1/2 degrees.
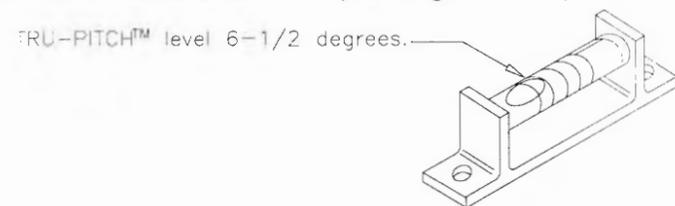
IMPORTANT!

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

11. Be sure the **required number** of balls is installed. The **NBA® FASTBREAK™** game uses FOUR balls.

12. Install full playfield Mylar, if desired.

   Note: The **NBA® FASTBREAK™** 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 03-9678-1 for full playfield Mylar.

13. Clean and reinstall the playfield cover glass. Replace and lock the front molding.

14. To attach the line cord, 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 the unique parts bag, to remount cover plate.

(Part of cabinet shown for reference only)
Receptacle
Phillips-head Screw
Line Cord & Plug
Tamper-resistant Screw
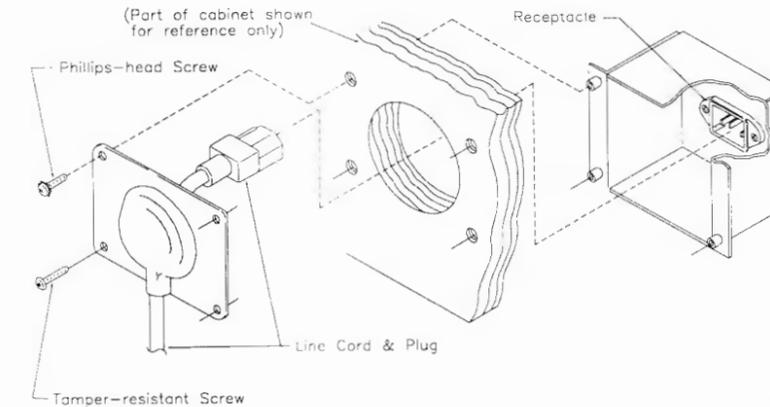
15. Move the game into the desired location; recheck the level and pitch angle of the playfield.

16. If a padlock is desired, install the security bar as shown below.

Slotted Hasp 01-14085
Hasp Staple Bracket 01-14086
Hasp Hinge Bracket 01-14085
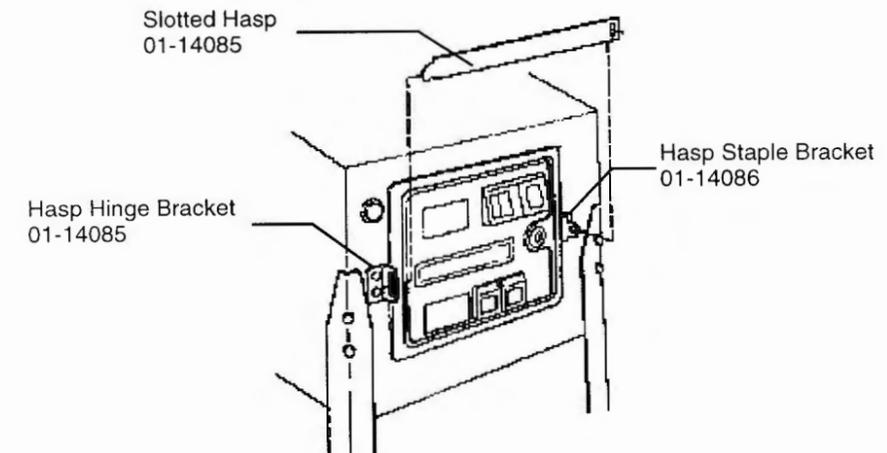
17 IMPORTANT: Fill out and return the registration card.

MARQUEE INSTALLATION INSTRUCTIONS

The Marquee Kit is an option, made specifically for NBA® Fastbreak™, which can be purchased through your distributor. The part number for the NBA® Fastbreak™ Marquee Kit is 57964.

PARTS

Part Number	Description	Quantity
01-12569	brackets	6
31-2822-1	right side panel (screened)	1
31-2822-2	left side panel (screened)	1
31-2823	top panel (screened)	1
4108-01001-12	screws sms #8 x 3/4 p-ph-a	24

TOP PANEL

LEFT SIDE PANEL

RIGHT SIDE PANEL
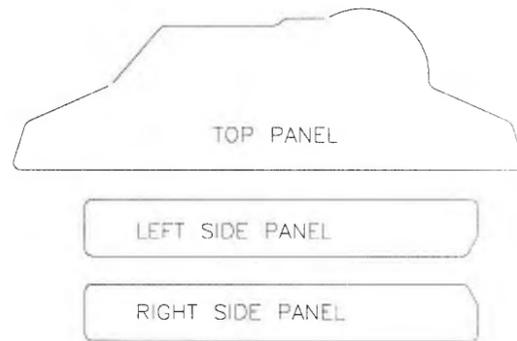
INSTALLATION

1. Turn off and unplug the game.

2. Install two brackets on the back of each panel.

   Start with the top panel. Look for the pinpricks in the back of the panel. Line up the screw holes in the brackets with the pinprick marks on the panel. The brackets are symmetrical, so it doesn't matter which direction the flange faces. Use two of the screws, provided, to fasten each bracket to the panel. Repeat this same procedure for the left and right side panels.

3. Install the panels onto the backbox.

   Again, start with the top panel. Line up the front edge of the top panel with the front edge of the backbox. Fasten the top panel to the top of the backbox with four of the screws, (two in each bracket).

   Next, install the right side panel. Line up the screw holes in the brackets with the crosshatch marks, (+) in backbox artwork. Be sure the brackets are flush against the side of the backbox. Fasten the right side panel to the backbox with four of the screws (two in each bracket). Repeat this same procedure for the left side panel.

   NOTE: **The left and right side panels overlap the bottom of the top panel and the sides of the backbox. See drawings on the next page.**
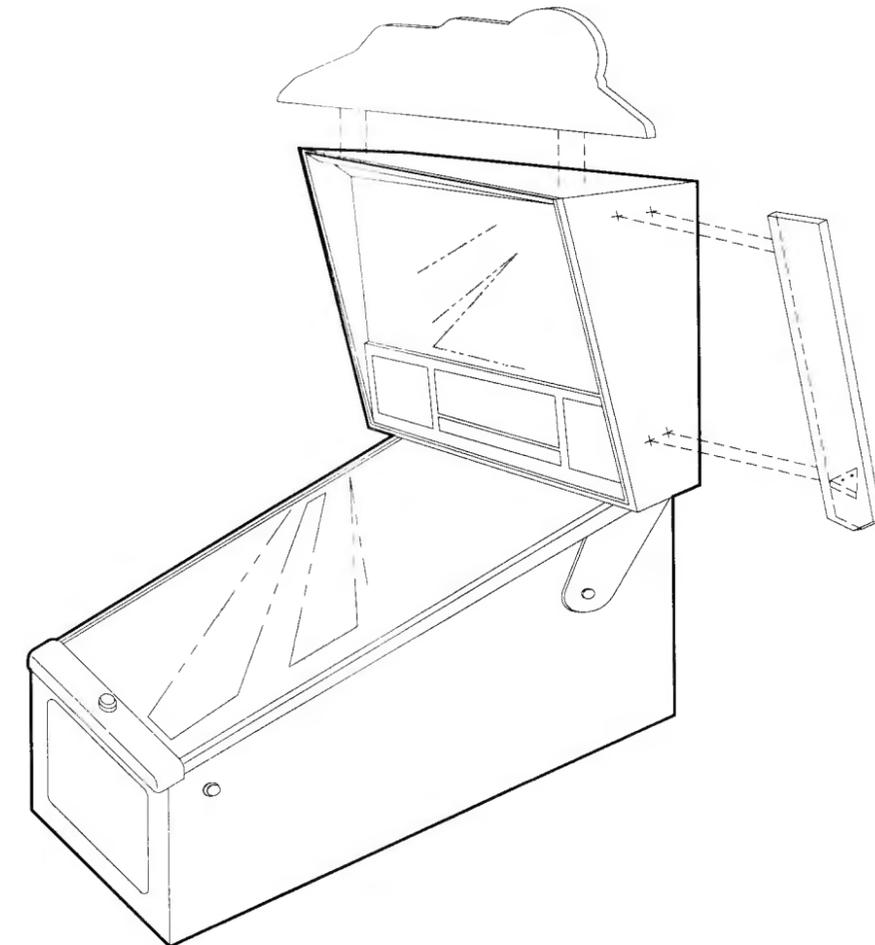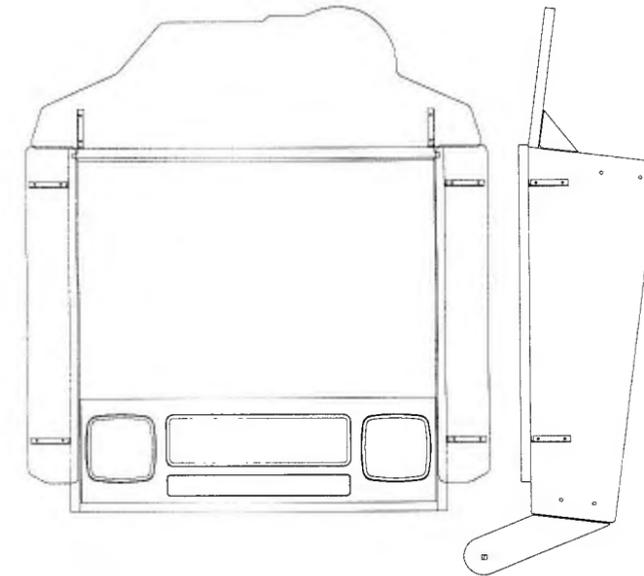
LINKING KIT INSTALLATION INSTRUCTIONS
FOR LINKING KIT #58030

The NBA® FASTBREAK™ LINKING KIT allows two NBA® Fastbreak™ games to be connected in order to allow head to head competitive linked game play.

PARTS

Part Number	Description	Quantity
A-5343-50053-1	G11, EPROM	2 (1 used per game)
A-5343-50253-S2	S2, EPROM	2 (1 used per game)
5430-14585-00	IC-linear max239	2 (1 used per game)
5430-14586-00	IC-16c450 uart	2 (1 used per game)
31-2950.1-1	Right -side marquee	1
31-2950.1-2	Left-side marquee	1
H-21982	Linking cable assembly	1
4808-01175-08	e-p #8x1/2" ind pl-hwh	8 (4 used per game)

LEFT-SIDE MARQUEE PANEL
31-2950.1-2
(VIEWED FROM THE FRONT OF THE GAME.)

RIGHT-SIDE MARQUEE PANEL
31-2950.1-1
(VIEWED FROM THE FRONT OF THE GAME.)
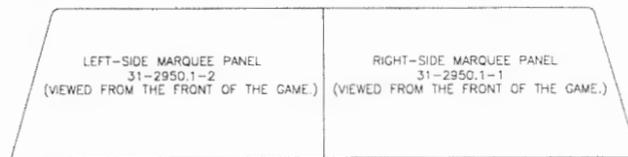
INSTALLATION

1. Turn off and unplug the games. Unlock and remove the insert panel from each game.

2. Push the games together. Adjust the leg levelers so that the backboxes are the same height.

3. Unfold the gussets on the left-side marquee. Tape the marquee to the top of the left backbox. Then, unfold the gussets on the right-side marquee and tape it to the top of the right backbox.

4. Unscrew the metal vent screen on the rear of the left backbox. Move the screen to the left in order to open the far-right vent hole. Secure the vent screen into place.

5. Unscrew the metal vent screen on the rear of the right backbox. Move the screen to the right in order to open the far-left vent hole. Secure the vent screen into place.
   NOTE: The two open vent holes should be next to each other.

6. From the outside of the backboxes, insert one end of the linking cable into each of the open vent holes. Push the cable in until the plates are flush against the backboxes. Screw the plates to the backboxes.

7. Plug the linking cable connectors into J607 of each game's Audio/Visual board. The connectors only plug in one way and should slide on easily. DO NOT force the connectors.
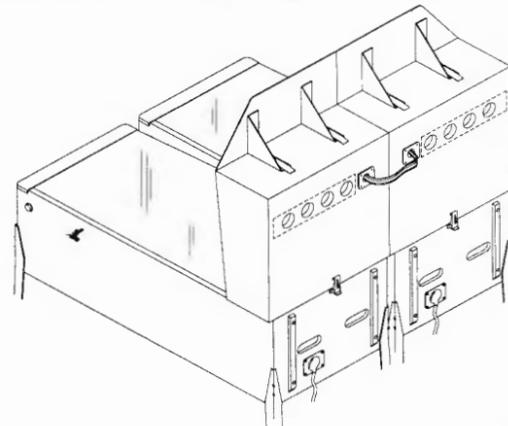
LINKED GAMES VIEWED FROM THE BACK.

8. Next, there are two IC chips that must be exchanged in each game, and two that must be added (for a total of eight IC chips). The IC chips that must be exchanged are G11 on the CPU board and S2 on the Audio/Visual board. The new IC chips that must be added are U22, and U24 on the Audio/Visual Board.

9. Use an IC chip extractor or a small Flathead screwdriver to remove G11 from the CPU board and S2 from the Audio/Visual board, one at a time, from their sockets. Take care not to remove the sockets along with the chips by mistake. Replace each chip with the corresponding one from the Linking Kit.

10. Add U22 and U24 to the Audio/Visual board.
    NOTE: Both games must have the new linking software to play in the linked mode. However, a linked game can also be played alone.

CAUTION!

Be sure to line up the notch in the chip with the notches in the socket and the white masking. DO NOT plug a chip in backwards. DO NOT bend the pins under the chip.

Change each of the chips one at a time. DO NOT plug chips into the wrong sockets.
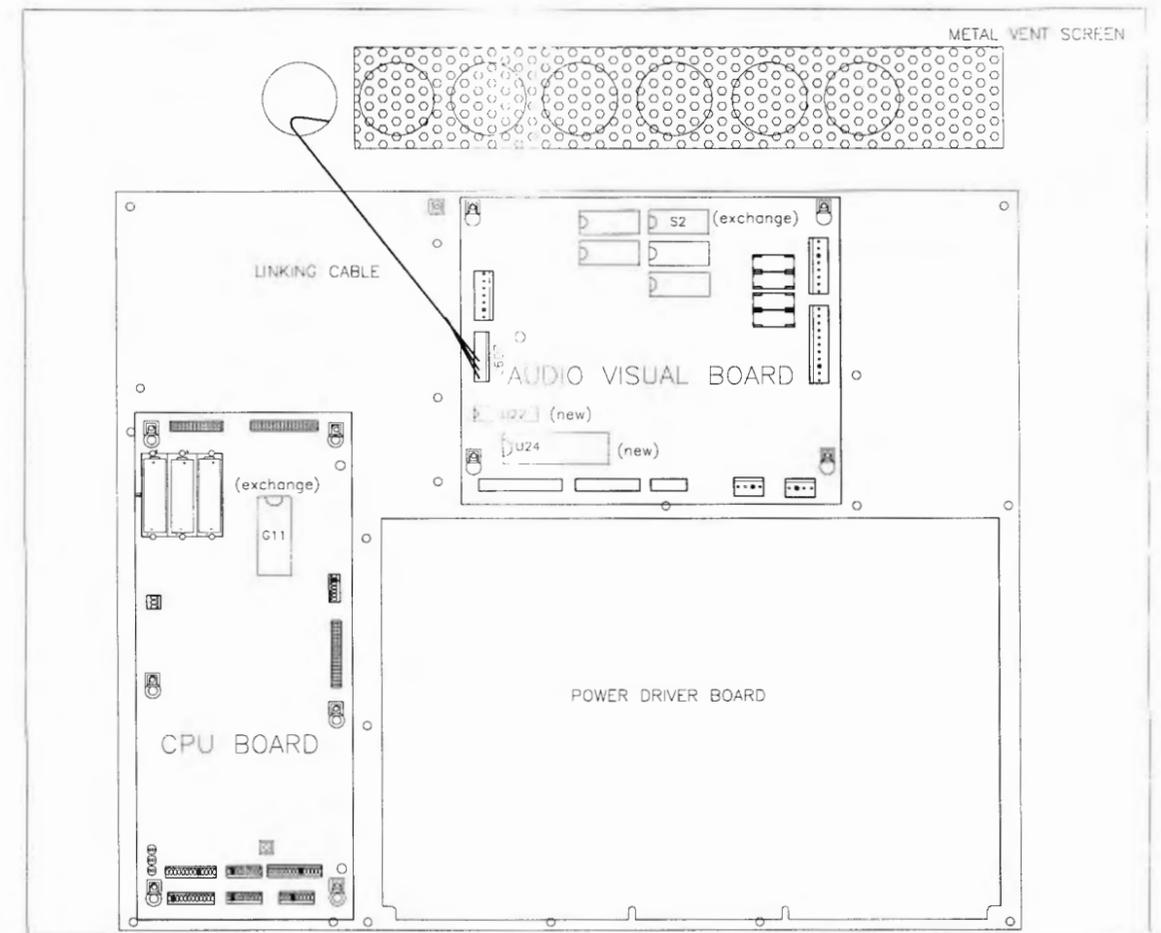
BACKBOX OF RIGHT-SIDE GAME VIEWED FROM THE FRONT.

11. Replace and lock the insert panel in each game and open the coin doors. Plug in and turn on the left game. Enter the Utilities Menu and install U.9 29 INSTALL LINK 1. Plug in and turn on the right game. Enter the Utilities Menu and install U.9 30 INSTALL LINK 2.

12. Exit the Menu System and enter to the Attract mode on both games. Close and lock the coin doors. After approximately ten seconds the displays on both games should show the same screens. Pressing a flipper button on either game should cause the displays on both games to change together.

GAME PLAY

When credit(s) are available on both games (during game over) and one of the START buttons is pressed, the display will change on both games. The game on which START was pressed will indicate it is waiting for the other game to begin. The other game will indicate that pressing START will begin linked play.

A non-linked game can be started on the first machine by either pressing both flippers together or by waiting for the timer to expire.

Once both games have pressed the START button, both games proceed to the same team selection display as with non-linked game play. The number of players indicated on each display will however be two, along with a timer.

Linked game play consists of 4 quarters of timed play, with a break at the half and a sudden death period at the end of a tied game. The time per quarter is equal to one fourth that of the time set in the A.2 23 LINKED GAME TIME adjustment.

As each player completes a shot and/or starts a mode, the shot completed lamp is lit on both machines and/or the mode begins on both games and both players play the mode. During the modes, each player works to score the most points during the mode.

While the players compete head to head for points, they may also work together to complete all of the features of the game. If successful, they will both play TROPHY MULTIBALL in head to head competition and the winner will be awarded a RING and 1 credit. (Note: a tie awards both players a RING and 1 credit.)

At half time, all currently running modes, etc. are terminated and all of the balls are drained for the half time show. The half time show consists of both players playing PIZZA POWER SHOTS (the backbox game). At the end of the half time show, the third quarter is started.

At the end of the fourth quarter, all currently running modes, etc. are again terminated, and the winner is announced. In the case of a tie game, a SUDDEN DEATH timed round is started during which the first player to be ahead of the other player by two points (or more) wins. If the timer expires, then the game ends in a tie.

Extra balls are lit as they are in non-linked games. When an extra ball is collected the time for the current quarter is extended.

The following non-linked game modes and/or features are excluded during linked play: TRIVIA QUIZ, MILLION DOLLAR SHOT, INBOUND PASS, MIDNIGHT MADNESS

A plumb tilt terminates the game for the player who tilted. The other player finishes the timed game. A slam tilt terminates the game for both players.

FEATURE AUDIT
B.4 41   LINKED GAMES 00   00% 00
The number of linked games started.

UTILITY PRE-SET ADJUSTMENT
U.9 29   INSTALL LINK 1
This pre-set installs all of the adjustments necessary for the left-hand machine of a linked pair. The affected adjustments are as follows:

A.2 22	Linked Game ID	Player 1
A.2 23	Linked Game Time	2:00
A.5 04	Printer Type	Serial
A.5 05	Serial Baud Rate	9600
A.5 06	Serial DTR	Ignore
A.5 07	Auto Printout	Off

U.9 30   INSTALL LINK 2
This pre-set installs all of the adjustments necessary for the right-hand machine of a linked pair. The affected adjustments are as follows:

A.2 22	Linked Game ID	Player 2
A.2 23	Linked Game Time	2:00
A.5 04	Printer Type	Serial
A.5 05	Serial Baud Rate	9600
A.5 06	Serial DTR	Ignore
A.5 07	Auto Printout	Off

FEATURE ADJUSTMENTS
A.2 22   LINKED GAME ID
This adjustment enables linked play on the machine and identifies the machine as the left hand (PLAYER 1) or the right hand (PLAYER 2) machine.

Settings: OFF, PLAYER 1, PLAYER 2
Factory Default: OFF

A.2 23   LINKED GAME TIME
This adjustment is only present if the A.2 22 LINKED GAME ID adjustment is enabled. This adjustment controls the time (displayed as MM:SS, where MM = minutes and SS = seconds) of linked game play. The actual playtime will be slightly longer than the time set here due to time extensions, the half time show, and sudden death.

Settings: 0:40 - 6:00 in 0:20 second increments
Factory Default: 2:00

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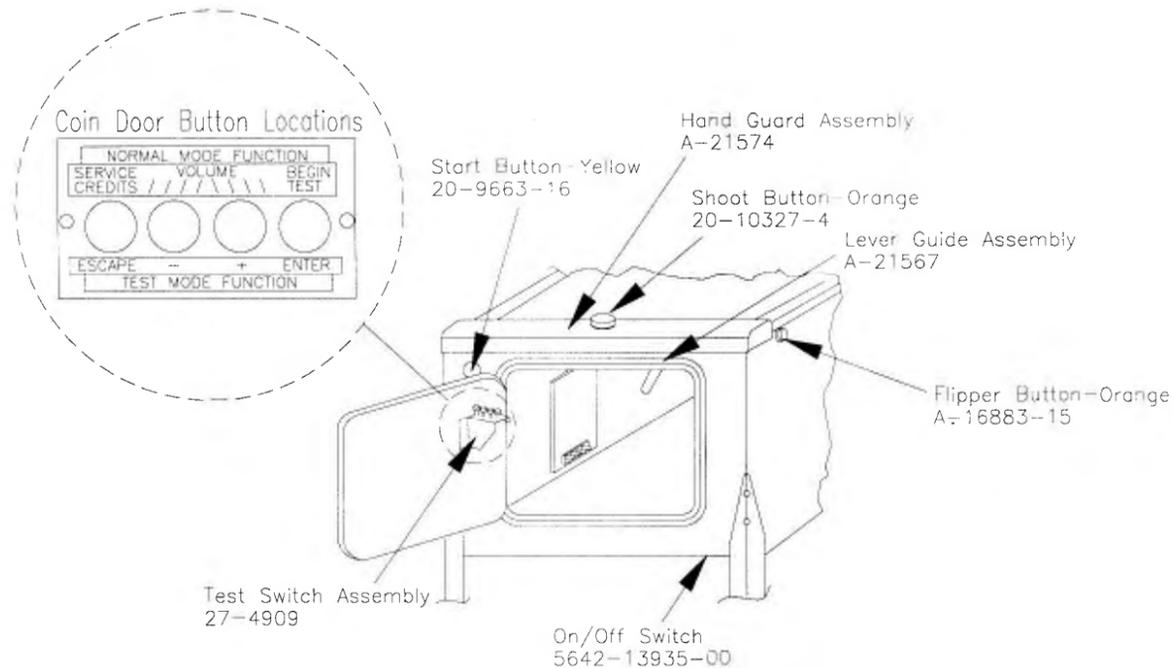
To reset High Score, hold down the Begin Test/Enter switch for five seconds while in the Attract mode.

GAME OPERATION

⚠ CAUTION

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

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

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

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

Example:	*NBA® FASTBREAK™*		Sound Rev. 1.0A
50053	Rev. 1.0A	SY. 0.X0	XX-XX-97

Press the Enter button to enter the Menu System (refer to the section entitled "Menu System Operation" for more information). Perform the entire Test menu routine to verify that the game is operating satisfactorily.

Note: In order to operate the tests that use the +50V or +20V circuits, pull the top interlock switch button out. The interlock switches are located on a bracket in the coin door opening.

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

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

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

TILTS. Actuating the cabinet tilt switch inside the cabinet ends the current game and 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

RAISING THE PLAYFIELD

⚠ CAUTION

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

Before Raising the Playfield:

Be sure there are no balls present in the ball trough or any of the other ball-holding playfield devices (i.e. poppers). Raising the playfield with balls present in these locations may cause them to come loose and damage the playfield. Use the "Empty Balls Test" to remove all of the balls from these locations.

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.
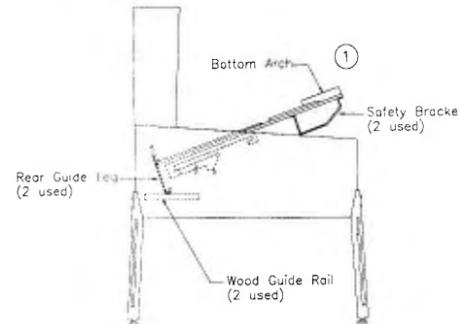
2. Pull the playfield out toward you until it stops (rest position), and raise it approximately 3".

   Be sure playfield is in locked position and does not slide back into cabinet. If it does, repeat Step 2 before proceeding to Step 3.

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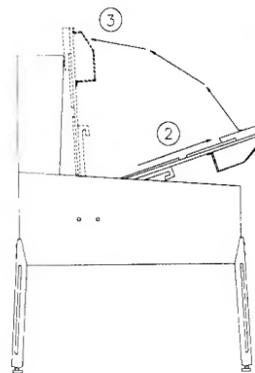
To Lower the Playfield.

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

5. Push the playfield back into cabinet and into the playing position.
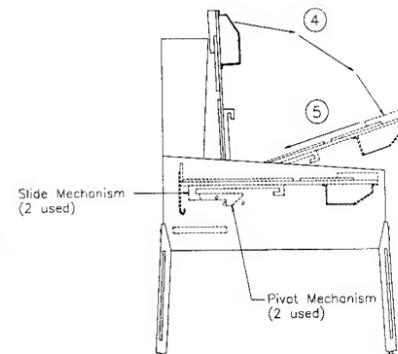
MENU SYSTEM OPERATION

The Main Menu allows you to choose from several options, which in turn lead to other menus to choose from. To access the Main Menu open the coin door, press the Begin Test button, then the Enter button. Press the Up and Down buttons to scroll through the Main Menu. To access a menu, (Bookkeeping, Printouts, etc.), from the Main Menu, press the Enter button. To return to the Main Menu (from Bookkeeping, Printouts, etc.) press the Escape button. Press the Start button for HELP.

MAIN MENU

B. BOOKKEEPING MENU

B.1 Main Audits	Press Escape
B.2 Earning Audits	To move out of a menu selection.
B.3 Standard Audits	
B.4 Feature Audits	Press Enter
B.5 Histograms	To get into a menu selection.
B.6 Time-Stamps	

P. PRINTOUTS MENU

P.1 Earnings Data	Press Up
P.2 Main Audits	Increases sequence; Example A.1, A.2, A.3, A.4.
P.3 Standard Audits	
P.4 Feature Audits	Press Down
P.5 Score Histograms	Decreases sequence; Example A.4, A.3, A.2, A.1.
P.6 Time Histograms	
P.7 Time-Stamps	Use Up or Down to cycle through the selections in
P.8 All Data	a menu.

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 Motor Test
T.17 Backbox Test
T.18 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 scroll through the Bookkeeping 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

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

B.1   MAIN AUDITS

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

B.2   EARNING AUDITS

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

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

B.3   STANDARD AUDITS

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

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

B.4   FEATURE AUDITS

B.4 01   TOTAL MULTIBALLS   00%   00
Number of times *any* multiball occurred.

B.4 02   OPER. TOURN. PLAYS   00%   00
Number of times the Operator Tournament was played. This audit is NOT reset by UTILITIES - CLEAR AUDITS (U.1). It is only reset by UTILITIES - FACTORY RESET (U.8) and the RESET TOURNEY parameter of the FEATURE ADJUSTMENTS - OPERATOR TOURNEY (A.2 04) adjustment.

B.4 03   OPER. TOUR. CRED.   00%   00
Number of credits collected by the Operator Tournament. This audit is NOT reset by UTILITIES - CLEAR AUDITS (U.1). It is only reset by UTILITIES - FACTORY RESET (U.8) and the RESET TOURNEY parameter of the FEATURE ADJUSTMENTS - OPERATOR TOURNEY (A.2 04) adjustment.

B.4 04   BALL SAVES   00%   00
Number of ball saves.

B.4 05   SPEC. BALL SAVES   00%   00
Number of special case ball saves.

B.4 06   SHOOT MULTIBALLS   00%   00
Number of times "SHOOT AROUND" multiball occurred.

B.4 07   WORLD MULTIBALLS   00%   00
Number of times "AROUND THE WORLD" multiball occurred.

B.4 08   HOOPS MULTIBALLS   00%   00
Number of times "HOOPS" multiball occurred.

B.4 09   TROPHY MULTIBALLS   00%   00
Number of times "TROPHY" multiball occurred.

B.4 10   TROPHY MULTIBALL WINS   00%   00
Number of times player beats "TROPHY" multiball.

B.4 11   INBOUND PASSES   00%   00
Number of times a left drain was saved by an "INBOUND PASS".

B.4 12   MILLION $ TRIES   00%   00
Number of times a right drain was saved by a "MILLION DOLLAR SHOT".

B.4 13   MILLION $ WINS   00%   00
Number of times the "MILLION DOLLAR SHOT" was won.

B.4 14   PIZZA POWER SHOT   00%   00
Number of times the "PIZZA POWER SHOT" was played.

B.4 15   HOTDOG MANIA   00%   00
Number of times the "HOTDOG MAINIA" was played.

B.4 16   TRIVIA TRIES   00%   00
Number of times the "TRIVIA QUIZ" was played.

B.4 17   TRIVIA WINS   00%   00
Number of times the "TRIVIA QUIZ" was won.

B.4 18   EGYPTIAN SODA   00%   00
Number of times the "EGYPTIAN SODA" was played.

B.4 19   FREE THROW EXTRA BALLS   00%   00
Number of "FREE THROW" extra balls.

B.4 20   HOOP LOOP EXTRA BALLS   00%   00
Number of "HOOP LOOP" extra balls.

B.4 21   SHOOT AROUND EXTRA BALLS   00%   00
Number of "SHOOT AROUND" extra balls.

B.4 22   AROUND WORLD EXTRA BALLS   00%   00
Number of "AROUND THE WORLD" extra balls.

B.4 23   COMBO EXTRA BALLS   00%   00
Number of "COMBO" extra balls.

B.4 24   1 EXTRA BALL GAMES   00%   00
Number of games with one extra ball.

B.4 25   2 EXTRA BALL GAMES   00%   00
Number of games with two extra balls.

B.4 26   3 EXTRA BALL GAMES   00%   00
Number of games with three extra balls.

B.4 27   IN THE PAINT   00%   00
Number of times "IN THE PAINT" was made.

B.4 28   TIP-OFF COMBOS   00%   00
Number of times "TIP-OFF" combo was made.

B.4 29   SLAM DUNK COMBOS   00%   00
Number of times "SLAM DUNK" combo was made.

B.4 30   ALLEY OOPS COMBOS   00%   00
Number of times "ALLEY OOP" combo was made.

B.4 31   FASTBREAK COMBOS   00%   00
Number of times "FASTBREAK" combo was made.

B.4 32   HALF COURT HOOPS   00%   00
Number of times "HALF COURT HOOPS" was made.

B.4 33   HOOK SHOT HOOPS   00%   00
Number of times "HOOK SHOT HOOPS" was started.

B.4 34   RUN & SHOOT   00%   00
Number of times "RUN & SHOOT HOOPS" was started.

B.4 35   POWER POINTS   00%   00
Number of times "POWER POINTS" were awarded.

B.4 36   FOUL SHOTS   00%   00
Number of times a "FOUL SHOT" was awarded.

B.4 37   SPECIAL MODES   00%   00
Number of times the Special Mode was started, (see A.2 17).

B.4 38   BALL SEARCHES   00%   00
Number of times ball searches have occurred.

B.4 39   5 BALL SEARCHES   00%   00
Number of times five ball searches have occurred.

B.4 40   TEAMS CREDITS   00%   00
Number of credits awarded for "TEAM CHAMPIONS".

B.4 41   LINKED GAMES 00   00%   00
Number of linked games started.

B.5   HISTOGRAMS

B.5	01	0-20 Scores	00%	00
B.5	02	20-40 Scores	00%	00
B.5	03	40-60 Scores	00%	00
B.5	04	60-80 Scores	00%	00
B.5	05	80-100 Scores	00%	00
B.5	06	100-120 Scores	00%	00
B.5	07	120-140 Scores	00%	00
B.5	08	140-160 Scores	00%	00
B.5	09	160-180 Scores	00%	00
B.5	10	180-200 Scores	00%	00
B.5	11	200-300 Scores	00%	00
B.5	12	300-400 Scores	00%	00
B.5	13	Over 400 Scores	00%	00
B.5	14	Game Time 0.0-1.0 Minute	00%	00
B.5	15	Game Time 1.0-1.5 Minutes	00%	00
B.5	16	Game Time 1.5-2.0 Minutes	00%	00
B.5	17	Game Time 2.0-2.5 Minutes	00%	00
B.5	18	Game Time 2.5-3.0 Minutes	00%	00
B.5	19	Game Time 3.0-3.5 Minutes	00%	00
B.5	20	Game Time 3.5-4.0 Minutes	00%	00
B.5	21	Game Time 4-5 Minutes	00%	00
B.5	22	Game Time 5-6 Minutes	00%	00
B.5	23	Game Time 6-8 Minutes	00%	00
B.5	24	Game Time 8-10 Minutes	00%	00
B.5	25	Game Time 10-15 Minutes	00%	00
B.5	26	Game Time Over 15 Minutes	00%	00

B.6 TIME-STAMPS

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

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

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

P. PRINTOUTS MENU

(An optional board is required to use the Printouts feature.)

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.*

Press the Up or Down buttons to scroll through the Test menu. Press the Enter button to access a test. Press the Escape button to return to the Test menu. 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.10 Lamps And Flasher Test**
T.2 Switch Levels Test	**T.11 Display Test**
T.3 Single Switch Test	**T.12 Flipper Coil Test**
T.4 Solenoid Test	**T.13 Ordered Lamps Test**
T.5 Flasher Test	**T.14 Lamp Row-Col.**
T.6 General Illumination Test	**T.15 DIP Switch Test**
T.7 Sound & Music Test	**T.16 Motor Test**
T.8 Single Lamps Test	**T.17 Backbox Test**
T.9 All Lamps Test	**T.18 Empty Balls Test**

Note: In order to operate the tests that use the +50V or +20V circuits, pull the top interlock switch button out. The interlock switches are located on a bracket in the coin door opening.

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 of the switches one at a time. The name and number of the switch is shown in the display. If a switch other than the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit. To return the Test menu, press the Escape button.

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. To return the Test menu, press the Escape button.

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. To return the Test menu, press the Escape button.

T.4 SOLENOID TEST
The Solenoid test has three modes -- Repeat, Stop, and Run. Only one solenoid should pulse at a time. The system has detected a problem if more than one solenoid pulses, a solenoid comes on and stays on, or no solenoids pulse during the Repeat and Run modes.

Repeat: The Repeat mode pulses a single solenoid. Press the Enter button to start this test. The name of the first solenoid shows in the display and the corresponding coil pulses. Press the Up or Down buttons to cycle through the solenoids, one at a time. The same solenoid pulses until you press the Up or Down buttons to advance to the next one. To return the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode halts the Solenoid test. No solenoids should be active. To return the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Run: The Run mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed. To return the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

T.5 FLASHER TEST
This tests the flashlamp part of the solenoid circuit. There are three modes -- Repeat, Stop, and Run. During this test the flashlamp circuit named in the display should blink. The system has detected a problem if more than one flashlamp circuit blinks, the lamps stays on, or no lamps blink during the Repeat and Run modes.

Repeat: The Repeat mode pulses a single flashlamp. Press the Enter button to start this test. The name and number of the first flashlamp is displayed and the corresponding bulb(s) blinks. The same bulb(s) blinks until you press the Up or Down buttons to advance to the next one. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

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

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. To return to the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

T.6 GENERAL ILLUMINATION TEST
This test checks all of the General Illumination circuits. There are two modes of operation -- Stop and Run.

Note: General Illumination strings four & five do not brighten or dim, they are always ON.

Stop: The Stop mode allows you to cycle through the General Illumination test manually. Press the Up or Down buttons to advance through the test. All illumination is tested first, followed by an individual circuit test. The circuit name and number shows in the display while the corresponding bulbs light. If any other results occur the system has detected an error. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

T.6 GENERAL ILLUMINATION TEST CONTINUED...

Run: The Run mode cycles through the General Illumination test automatically. For each circuit shown in the display the corresponding bulbs should light. If any other results occur, the system has detected a problem. To return to the Test menu, press the Escape button. To return to the Stop mode, press the Enter button.

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 to advance to a particular sound or tune. A sound or tune should be heard for each name and number that appears in the display. Any other results indicate the system has detected a problem. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Repeat: The Repeat mode causes the program to stop and repeat a particular sound/tune. The same sound repeats continuously until you press the Up or Down buttons to advance to the next one. Any other results indicates the system has detected a problem. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode stops this test altogether. Nothing should be heard. Any other results indicate the system has detected a problem. To return to the Test menu, press the Escape button. To return to the Run mode, press the Enter button.

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.

The Single Lamp test checks each lamp circuit individually. Press the Up or Down buttons to scroll through this test. A lamp should light for each name and number that is displayed. Any other results indicate the system has detected a problem. To return to the Test menu, press the Escape button.

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 indicate the system has detected a problem. To return to the Test menu, press the Escape button.

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 indicate the system has detected a problem. To return to the Test menu, press the Escape button.

T.11 DISPLAY TEST

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

T.12 FLIPPER COIL TEST

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

Repeat: The Repeat mode pulses a single flipper. Press the Enter button to begin the test. Press the Up or Down buttons to cycle through the flipper coils one at a time. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Stop: The Stop mode halts the Flipper Coil test. No coils should pulse while the test is stopped. To return to the Test menu, press the Escape button. To advance to the next test mode, press the Enter button.

Run: The Run mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed. To return to the Test menu, press the Escape button. To return to the Repeat mode, press the Enter button.

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 buttons to cycle through the lamps. Lamps light in a clock-wise or counter clock-wise direction starting from the bottom of the playfield. The 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 indicate the system has detected a problem. To return to the Test menu, press the Escape button.

T.14 LAMP ROW-COL.

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

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

To return to the Test menu, press the Escape button.

T.15 DIP SWITCH TEST

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

To return to the Test menu, press the Escape button.

T.16 MOTOR TEST

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

The status of the POS. 1, 2, LOCK, 3, 4 optical position switches are displayed on the dot matrix display during most of the tests.

Additionally, while this test is running, the Shot Clock L.E.D. display continuously counts down from 24 to 0.

T.16 MOTOR TEST CONTINUED...

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

MOVE LEFT - This test moves the defender motor one position to the left of the current position.

MOVE RIGHT - This test moves the defender motor one position to the right of the current position.

AUTO RUN - This test runs the motor in a repetitive cycle, from left to right and back again, one position at a time. During this test, the following data is kept:

CYCLES: The number of cycles performed.

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

CLEAR AUTO RUN DATA - This test clears the CYCLES count maintained by the AUTO RUN test.

T.17 BACKBOX TEST

Select T.17 from the Test Menu and press the Enter button to begin the Backbox test.

This test allows the backbox flipper to be flipped when the Shoot button (located on the front molding) is pressed. This in turn causes the backbox basketball to be flipped through the backbox basket/switch.

The status of the Shoot button and backbox basket switches is displayed on the dot matrix display during this test.

N.B. The coin door, (or the solenoid power safety interlock switch) must be closed in order to provide power to the backbox flipper solenoid.

T.18 EMPTY BALLS TEST

Select T.18 from the Test Menu and press Enter button to begin the Empty Balls test.

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

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

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

U. UTILITIES MENU

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

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 buttons to change the value, then press the Enter button to lock in that value. If you make a mistake 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 you make a mistake, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once the message is complete, press and hold the Enter button until "Message Stored" is displayed.

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

U.6   SET GAME I.D.

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

U.7 FACTORY ADJUSTMENT

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

U.8 FACTORY RESET

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

U.9 PRESETS

Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If you make a mistake, 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 05	BALL SAVES	2	2	1	1	0
A.2 06	BALL SAVES TIME	10 sec.	8 sec.	6 sec.	4 sec.	2 sec.
A.2 11	FREE THROW EXTRA BALL LEVEL	4	8	12	16	20
A.2 12	HOOP LOOP EXTRA BALL LEVEL	8	16	24	32	40

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	180	100
A.2 11	FREE THROW EXTRA BALL LEVEL	16	12
A.2 12	HOOP LOOP EXTRA BALL LEVEL	32	24
A.2 13	INBOUND PASS DIFFICULTY	Hard	Medium
A.2 14	JET BUMPER DIFFICULTY	Hard	Medium
A.2 15	IN THE PAINT DIFFICULTY	Hard	Medium
A.2 16	SHOT CLOCK DIFFICULTY	Hard	Medium

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
A.4 15	NBA® Champ 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
A.4 15	NBA® Champ 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.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 you make a mistake, 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 05	BALL SAVES	2	2	1	1	0
A.2 06	BALL SAVES TIME	10 sec.	8 sec.	6 sec.	4 sec.	2 sec.
A.2 11	FREE THROW EXTRA BALL LEVEL	4	8	12	16	20
A.2 12	HOOP LOOP EXTRA BALL LEVEL	8	16	24	32	40

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	180	100
A.2 11	FREE THROW EXTRA BALL LEVEL	16	12
A.2 12	HOOP LOOP EXTRA BALL LEVEL	32	24
A.2 13	INBOUND PASS DIFFICULTY	Hard	Medium
A.2 14	JET BUMPER DIFFICULTY	Hard	Medium
A.2 15	IN THE PAINT DIFFICULTY	Hard	Medium
A.2 16	SHOT CLOCK DIFFICULTY	Hard	Medium

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
A.4 15	NBA® Champ 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
A.4 15	NBA® Champ Credits	00

U.9 11 NOT USED

U.9 12 SERIAL CAPTURE

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

U.9 13 TO U.9 16 NOT USED

U.9 17 INSTALL GERMAN 1
U.9 18 INSTALL GERMAN 2
U.9 19 INSTALL GERMAN 3
U.9 20 INSTALL GERMAN 4
U.9 21 INSTALL GERMAN 5
U.9 22 INSTALL GERMAN 6
Adjustments U.9 17 through U.9 22 are used to modify game pricing and type of play.

U.9 23 INSTALL FRENCH 1
U.9 24 INSTALL FRENCH 2
U.9 25 INSTALL FRENCH 3
U.9 26 INSTALL FRENCH 4
U.9 27 INSTALL FRENCH 5
U.9 28 INSTALL FRENCH 6
Adjustments U.9 23 through U.9 28 are used to modify game pricing and type of play.

U.9 29 INSTALL LINK 1
This pre-set installs all of the adjustments necessary for the left-hand machine of a linked pair.
The affected adjustments are as follows:

A.2 22	Linked Game ID	Player 1
A.2 23	Linked Game Time	2:00
A.5 04	Printer Type	Serial
A.5 05	Serial Baud Rate	9600
A.5 06	Serial DTR	Ignore
A.5 07	Auto Printout	Off

U.9 30 INSTALL LINK 2
This pre-set installs all of the adjustments necessary for the right-hand machine of a linked pair.
The affected adjustments are as follows:

A.2 22	Linked Game ID	Player 2
A.2 23	Linked Game Time	2:00
A.5 04	Printer Type	Serial
A.5 05	Serial Baud Rate	9600
A.5 06	Serial DTR	Ignore
A.5 07	Auto Printout	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 tests 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 scroll through the Adjustments menu. To access an adjustment menu option, press the Enter button. To see the setting choices for that option, press the Up and Down buttons. To lock in a setting choice, press the Enter button. If you make a mistake, 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 actuation's 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.
NO EXTRA BALL - No extra balls may be accumulated.

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 balls 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.
OFF   - Disable the replay system. No replays are awarded.

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: 40 to 400

A.1 08 REPLAY LEVELS

The number of replay levels used by the Auto % Replay mode. The range of this setting is one to four. 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: 1 to 400

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.

AUTO - The Replay Boost value is half of the current Replay value.
ON - Score is boosted between 2 and 100 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 one extra ball.
POINTS - Scoring a Special awards one million points.

A.1 16 MATCH AWARD

The award automatically provided when the players win a match.

CREDIT - Winning a match awards a credit.
TICKET - Winning a match awards a ticket.

A.1 17 EXTRA BALL TICKET

A ticket is awarded when the player earns an extra ball.

YES - The player is awarded a ticket in addition to an extra ball.
NO - The player is not awarded a ticket.

A.1 18 MAXIMUM TICKET/PLAYER

The amount of tickets each player can earn.

Range: 00 to 100.

A.1 19 MATCH FEATURE

This is 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 random points score value at the end of the game and compares each player's score for an identical match. A match of an entire score value 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 clocks the game uses, A.M./P.M. or 24 hours.

A.1 23 DATE STYLE

The style of dates 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 random game features and global score values during multi-player games.

YES - Equalize random game features and global score values.
NO - Do Not equalize random game features and global score values.

A.1 27 EUROPEAN SCORE 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   *Ton - Min*
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.

Settings: OFF, 2 to 60 minutes.

A.1 30 POWER SAVER LEVEL
When General Illumination Power Saver (A.1 29) is set for 2 to 60 minutes, the Power Saver Level controls the intensity of the general illumination and controlled lamps after the game has been idle for the 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 you press the Start button during or after the 2nd ball, the game in progress ends and a new game begins. This adjustment has three settings to determine how to handle this.

    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 the game in progress.
    INSTANTLY-   Restart as soon as the Start button is pressed.

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

A.2 FEATURE ADJUSTMENTS

A.2 01 A-MODE MUSIC
This determines whether or not music is played during the Attract mode plays to attract players.

Settings: YES, NO
Factory Default: NO

A.2 02 A-MODE BACKBOX
This determines whether or not the backbox flips baskets and makes sounds during the Attract mode to attract players.

Settings: YES, NO
Factory Default: YES

A.2 03 A-MODE BUTTONS
This determines whether or not the various game buttons (e.g. flipper buttons) make sounds when actuated during the Attract mode to attract players.

Settings: YES, NO
Factory Default: YES

A.2 04 OPERATOR TOURNEY
This adjustment allows the setup of an Operator run Tournament. Push the Enter button to setup or inspect the Operator run Tournament parameters.

Tournament games can be adjusted to charge additional credit(s) to be played, allowing a machine to be played both in standard play or tournament play, at the discretion of the players.

When tournament play requires additional credit(s) to play, the player must hold both flipper buttons in for five seconds in order to initiate tournament play.

Factory Default: DISABLED

This adjustment enters a menu system that allows the operator to inspect and manipulate the various tournament parameters. Once the menu system has been entered, there are three types of screens that can be cycled through using Up and Down buttons.

OPER. TOURNEY INFO - These screens show information only and are not modifiable. Pressing the Enter or Up button steps to the next screen. Pressing the Escape or Down button steps to the previous screen.

OPER. TOURNEY SETUP - These screens contain parameters that can be modified by pressing the Enter button to step to the next parameter, the Up and Down buttons to modify the selected parameter, and the Escape button to step to the previous parameter. Pressing the Up or Down button when the title is highlighted steps to the next or previous screen respectively.

OPER. TOURNEY EXIT - This screen indicates "NO CHANGES' if none of the parameters have been modified. Otherwise, it indicates 'SAVE CHANGES'. Pressing the Enter button highlights the option and pressing Enter button again executes the option.

In order to setup a tournament, the parameters located in the four OPER. TOURNEY SETUP screens must be modified. The four screens contain the following parameters:

```
┌─────────────────────────────────────┐
│ OPERATOR TOURNEY SETUP               │
│ Today's time: 03:30 PM               │
│ Today's date: 13 DEC. 1996           │
│ Begin date: 13 DEC. 1996             │
│ End date: 13 DEC. 1996               │
└─────────────────────────────────────┘
```

This screen allows the current time and date to be set along with the beginning and ending date of the tournament.

BEGIN DATE - The day on which qualifying games started after midnight count towards the tournament.
END DATE - The day on which qualifying games started before midnight count towards the tournament.

```
┌─────────────────────────────────────┐
│ OPERATOR TOURNEY SETUP               │
│ Allow replay: YES                    │
│ Allow HSTD credits: YES              │
│ Allow match: NO                      │
│ Allow E.B.: YES                      │
└─────────────────────────────────────┘
```

This screen allows various standard game play behaviors to be modified for the duration of each tournament game played.

ALLOW REPLAY - If the replay system is enabled, then if this parameter is set to YES, replay(s) may be earned during a tournament game, otherwise, if this parameter is set to NO, no replay can be earned during a tournament game.

ALLOW HSTD CREDITS - If there is a High Score To Date (HSTD) table which is adjusted to award credit(s), then if this parameter is set to YES, credit(s) may be earned by achieving the HSTD status during a tournament game. Otherwise, if this parameter is set to NO, no credit(s) can be earned by achieving the HSTD status during a tournament game.

ALLOW MATCH - If the match system is enabled, then, if this parameter is set to YES, the match award will run at the end of a tournament game, possibly awarding a random credit. Otherwise, if this parameter is set to NO, the match award will not run at the end of a tournament game.

ALLOW E.B. - If extra balls are allowed, then if this parameter is set to YES, extra ball(s) may be earned during a tournament game, otherwise, if this parameter is set to NO, no extra ball(s) can be earned during a game.

```
┌─────────────────────────────────────┐
│ OPERATOR TOURNEY SETUP               │
│ Entry Credits: 0                     │
│ Prize: [    ]                        │
│ See full rules: [    ]               │
└─────────────────────────────────────┘
```

This screen allows the following three tournament parameters to be set:

ENTRY CREDITS - This parameter set the number of additional credits required to play a tournament game. This number is in addition to the (1) credit required to play a standard game. If this parameter is set to (0), then all games played will be tournament games and the player will not have to hold both flippers for five seconds to initiate a tournament game. If this parameter is set to a non-zero value, then the player must insert additional coins and hold both flipper buttons for five seconds to initiate a tournament game. This number of credit(s) (plus one to start a standard game) is advertised during the ENTER THE TOURNAMENT attract mode screens.

PRIZE - This parameter provides space for the operator to enter a (14) character message that describes the winning prize. This message is advertised during the ENTER THE TOURNAMENT attract mode screens.

SEE FULL RULES - This parameter provides space for the operator to enter a (14) character message that describes the location where the player can see the "full rules" of the tournament. This message is advertised during the ENTER THE TOURNAMENT Attract mode screens.

```
┌─────────────────────────────────────┐
│ OPERATOR TOURNEY SETUP               │
│ Reset Tourney: NO                    │
│ Tourney Status: DISABLED             │
└─────────────────────────────────────┘
```

This screen allows the following two tournament parameters to be set:

RESET TOURNEY - When this parameter is set to YES, the audits and HSTD information maintained by the tournament system are cleared. THIS SHOULD ONLY BE USED PRIOR TO SETTING UP A NEW TOURNAMENT. The current tournament HSTD initials, PIN, ring count and score will all be cleared in addition to the tournament plays and credits earned audits.

TOURNEY STATUS - When this parameter is set to YES, the tournament system is enabled and if the current date is in the tournament time window, the Attract mode screens will advertise the tournament, etc. If the current date is outside of the tournament time window, the Attract mode screens will advertise the winner of the "last" tournament. When this parameter is set to NO, the tournament system is disabled and the Attract mode screens will not mention the tournament.

When the tournament is setup and enabled, this adjustment shows an additional OPER. TOURNEY SETUP screen as follows:

```
┌─────────────────────────────────────┐
│ OPERATOR TOURNEY INFO                │
│ Tourney Entries:  0                  │
│ Earned Credits:  0                   │
│ Prize:                               │
│ ??? [NNNN]  N RINGS:  0              │
└─────────────────────────────────────┘
```

This screen tells the operator the following information:

TOURNEY ENTRIES - This audit is the number of tournament started since the last RESET TOURNEY operation.

EARNED CREDITS - This audit is the number credits collected in order to start tournament games.

PRIZE - This is the advertised prize message.

??? - These are the initials of the current tournament champion.

[NNNN] - This is the Personal Identification Number of the current tournament champion.

N RINGS - This is the number of rings collected by the current tournament champion. Rings count more significantly than the score in determining who is the champion

0 - This is the score of the current tournament champion.

When the tournament is enabled, the dot matrix display periodically advertises the tournament parameters during Attract mode.

When a player beats the current tournament champion's high score, they are prompted to enter their initials as well as a four digit Personal Identification Number (PIN) This number is kept along with the ring count, score and initials in order to allow the operator to verify the winning person. The PIN is only accessible through this adjustment.

It is the responsibility of the operator to manage the tournament and supply the winning prize to the winning player at the end of the tournament.

DISCLAIMER:

Tournaments, contests and sweepstakes are heavily regulated, and laws vary from state to state. Most states require the posting of rules. Check with your legal counsel prior to engaging in any prize promotion or tournament. The failure to comply with state regulations may result in criminal and civil liability. Neither Williams Electronics Games, Inc., nor its affiliates, agents or employees are responsible for the actions of any party using the NBA Fastbreak pinball machine as part of a prize promotion or tournament.

Any attempt by any individual to state or imply that Williams Electronics Games, Inc., or affiliates, or their employees, approve of, authorize, sponsor or co-sponsor any specific prize promotion or tournament will be prosecuted to the full extent of the law.

A.2 05 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: OFF, 1-5
Factory Default: 1

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 the playfield.

        BALL 3: Ball Save NOT available

A.2 06 BALL SAVE TIME
This adjustment sets the number of seconds that the ball saver is activated.

Settings: 2-15
Factory Default: 6

A.2 07 TIMED PLUNGER
This adjustment sets a time-out for the ball to be automatically plunged into the playfield after it has been served.

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

A.2 08 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 09 EXTRA BALL MEMORY
This determines whether the lit Extra Ball stays in memory from ball to ball.

Settings: YES, NO
Factory Default: YES

A.2 10 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 Free Throws and Hoop Loops required for an extra ball to achieve the requested percentage. Set to FIXED to disable the automatic percentaging of the Free Throws and Hoop Loops Extra Balls.

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

A.2 11 FREE THROW EXTRA BALL LEVEL
This is the number of Free Throws necessary to light the Extra Ball lamp. The machine will start with this value and modify it as necessary to achieve the percentage specified in A.2 10. To use a fixed level for the extra ball, set A.2 10 to FIXED, then set this level.

Settings: 3-40
Factory Default: 12

A.2 12 HOOP LOOP EXTRA BALL LEVEL
This is the number of Hoop Loops necessary to light the Extra Ball lamp. A "Hoop Loop" is a left outer loop shot made during any of the "Power Hoops" modes. The machine will start with this value and modify it as necessary to achieve the percentage specified in A.2 10. To use a fixed level for the extra ball, set A.2 10 to FIXED, then set this level.

Settings: 3-40
Factory Default: 24

A.2 13 INBOUND PASS DIFFICULTY
This determines the difficulty of the Inbound Pass feature. This affects the Inbound Pass lamp.

Settings: EXTRA EASY
                   EASY
                   MEDIUM
                   HARD
                   EXTRA HARD
Factory Default: MEDIUM

(See the table on the next page).

A.2 13 INBOUND PASS DIFFICULTY CONTINUED...

	GAME START IN-BOUND PASS	BALL START IN-BOUND PASS	MEMORY IN-BOUND PASS
EXTRA EASY	----	On	----
EASY	On	----	Yes
MEDIUM	On	----	No
HARD	Off	----	Yes
EXTRA HARD	Off	----	No

A.2 14 JET BUMPER DIFFICULTY

This determines the difficulty of the Jet Bumper feature. This affects number of Jet Bumper hits required to award Power Points and start the next Power Hoops mode.

In order to compensate for game-to-game variation in Jet Bumper response, the award levels are based on a percentage of the average number of Jet Bumper hits made per game played. The minimum average number of Jet Bumper hits is five.

The first Power Points award is always given at 1% of the average number of Jet Bumper hits per game. All Power Points awards following the first are based on a percentage of the average number of Jet Bumper hits per game and the difficulty adjustment. *The start of Power Hoops modes are based on a percentage of the average number of Jet Bumper hits per game and the difficulty adjustment.*

Settings: EXTRA EASY
                EASY
                MEDIUM
                HARD
                EXTRA HARD
Factory Default: MEDIUM

	POWER POINTS	POWER HOOPS
EXTRA EASY	30%	40%
EASY	60%	70%
MEDIUM	90%	100%
HARD	120%	130%
EXTRA HARD	150%	160%

A.2 15 IN THE PAINT DIFFICULTY

This determines the difficulty of the In the Paint feature. This affects the In the Paint lamp and the time delay before the Defender mechanism responds to the player's action. It also controls the number of Around the World multiballs played before accidental shots from In the Paint positions no longer light the position.

Settings: EXTRA EASY
                EASY
                MEDIUM
                HARD
                EXTRA HARD
Factory Default: MEDIUM

	BALL START IN THE PAINT	SECONDS DEFENDER DELAY	COUNT AROUND WORLD MULTIBALL
EXTRA EASY	On	2.00	4
EASY	On	1.50	3
MEDIUM	On	1.00	2
HARD	Off	0.50	1
EXTRA HARD	Off	0.25	0

A.2 16 SHOT CLOCK DIFFICULTY

This determines the difficulty of various modes by adjusting actual number of seconds elapsed for the Shot Clock to count down from 24 to 0.

Settings: EXTRA EASY
                EASY
                MEDIUM
                HARD
                EXTRA HARD
Factory Default: MEDIUM

A.2 17 SPECIAL MODE

This determines whether a special mode is available to players.

Settings: YES, NO
Factory Default: YES

A.2 18 ENABLE CENSOR

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

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

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

Settings: YES, NO
Factory Default: NO

A.2 19 VOLUME INTERLOCK

When set to YES, a flipper button must be held to change the game's sound volume. This is designed to prevent accidental volume changes while adding service credits to the game.

Settings: YES, NO
Factory Default: NO

A.2 20 ALT. TEAM SELECT

This enables an alternate player team selection interface.

Settings: YES, NO
Factory Default: NO

A.2 21 GERMAN SPEECH

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

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

A.2 22 LINKED GAME ID

This adjustment enables linked play on the machine and identifies the machine as the left hand (PLAYER 1) or the right hand (PLAYER 2) machine.

Settings: OFF, PLAYER 1, PLAYER 2
Factory Default: OFF

A.2 23 LINKED GAME TIME

This adjustment is only present if the A.2 22 LINKED GAME ID adjustment is enabled. This adjustment controls the time (displayed as MM:SS, where MM = minutes and SS = seconds) of linked game play. The actual playtime will be slightly longer than the time set here due to time extensions, the half time show, and sudden death.

Settings: 0:40 - 6:00 in 0:20 second increments
Factory Default: 2:00

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 USA 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 USA 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

These are the values for the coins for these respective coin slots. These values are used for determining collection totals. The corresponding adjustments A.3 28 (Left Slot Credit Value) through A.3 31 (4th Slot Credit Value) typically contain the same values and are used to determine the number of credits awarded for the coin slot. Whenever these values are changed, the new value is copied to the corresponding A.3 28 through A.3 31 adjustment. If a bonus is desired for a particular coin (such as three credits for dollar coin), then the corresponding A.3 28 through A.3 31 "Credit Value" adjustment should be modified to award the bonus. See "Bonus for Special Coin" section for more information.

A.3 16 MAXIMUM CREDITS

The maximum number of credits the game can accumulate, either through game plays 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

The adjustment determines the value of each coin unit on the coin meter. For example, to show the total amount of money collected as total quarters, set the adjustment to 0.25. To show the total 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 the meter installed on the Coin Door Interface board. ***Note:*** *All WPC-95 games are cable ready to operate a coin meter mounted to the Coin Door Interface board. Boards without a meter can use the parts listed below to take advantage of the coin meter feature. The coin meter and spacer may be purchased from your distributor.* coin meter +6V p/n 20-9302-3; spacer p/n 20-9914

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 MILLISECONDS

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

A.3 24 NOT USED

A.3 25 ALLOW HUNDREDTHS

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

A.3 26 CREDIT FRACTION

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

A.3 27 PRICING EDITOR (CUSTOM PRICING IS NOT AVAILABLE FOR U.S.A. AND CANADIAN GAMES).

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

Because of availability of an extra ball (buy-in) for 1/2 credit, this value is always even (1/2, 1/4, 1/6etc.). 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 later in this section).

Delete; This deletes the current level from the pricing mode.

Insert; This inserts a new pricing level ABOVE the current level. The current level will be unaffected. There must be room for at least one coin between the current level and the previous level, and at least one fractional credit unit between the current level and the previous level.

Example: Inserting a new pricing level.

```
┌─────────────────────────────────┐
│       CUSTOM PRICING EDITOR      │
│ 1)        $0.50        1 cred.   │
│ 2)        $1.00        2 cred.   │
│ 3)        $1.50        4 cred.   │
│ 4)        $2.00        6 cred    │
└─────────────────────────────────┘
            DISPLAY VIEW
```

Use the Enter button to move to the $1.50 field. Now press the Down 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)        $1.50        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 clears out the current entries to allow a new pricing mode to be entered.

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

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

Use the "Edit New Pricing Mode" feature described below to clear out the current levels. Use the Up and Enter buttons to specify 1/2 credit for $0.25:

```
┌─────────────────────────────────┐
│       CUSTOM PRICING EDITOR      │
│ 1)        $0.25        1/2 cred. │
└─────────────────────────────────┘
            DISPLAY VIEW
```

Now, use the Up button until the display shows "Repeat 20". The display looks like this:

```
┌─────────────────────────────────┐
│       CUSTOM PRICING EDITOR      │
│ 1)        $0.50        1 cred.   │
│ 2)        REPEAT 20              │
└─────────────────────────────────┘
            DISPLAY VIEW
```

Press the Enter button 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
```

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 later in this section).

Delete; This deletes the current level from the pricing mode.

Insert; This inserts a new pricing level ABOVE the current level. The current level will be unaffected. There must be room for at least one coin between the current level and the previous level, and at least one fractional credit unit between the current level and the previous level.

Example: Inserting a new pricing level.

```
|==============================================|
||           CUSTOM PRICING EDITOR            ||
|| 1)        $0.50            1 cred.          ||
|| 2)        $1.00            2 cred.          ||
|| 3)        $1.50            4 cred.          ||
|| 4)        $2.00            6 cred           ||
|==============================================|
                  DISPLAY VIEW
```

Use the Enter button to move to the $1.50 field. Now press the Down 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)        $1.50            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 clears out the current entries to allow a new pricing mode to be entered.

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

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

Use the "Edit New Pricing Mode" feature described below to clear out the current levels. Use the Up and Enter buttons to specify 1/2 credit for $0.25:

```
|==============================================|
||           CUSTOM PRICING EDITOR            ||
|| 1)        $0.25            1/2 cred.        ||
|==============================================|
                  DISPLAY VIEW
```

Now, use the Up button until the display shows "Repeat 20". The display looks like this:

```
|==============================================|
||           CUSTOM PRICING EDITOR            ||
|| 1)        $0.50            1 cred.          ||
|| 2)        REPEAT 20                         ||
|==============================================|
                  DISPLAY VIEW
```

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

```
|==============================================|
||           CUSTOM PRICING EDITOR            ||
|| 1)        $0.25            1/2 cred.        ||
|| 2)        $0.50            1 cred.          ||
|| 3)        $0.75            1 1/2 cred.      ||
|| 4)        $1.00            2 cred           ||
|==============================================|
                  DISPLAY VIEW
```

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

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

Now repeatedly press the Enter button 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 the Up button 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 Up and Down buttons to select your choice and press the Enter button to activate it. 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 the Enter button 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.

Bonus for Special Coins

For most coin modes, the system allows the mixing of any combination of any size coin and awards credits as each appropriate amount is accumulated. With A.3 10 (Coin Door Type) set to "custom", the value of each coin slot may be entered for adjustments A.3 12 (Left Slot Value) through A.3 15 (4th slot value). Whenever these values are changed, the new values are copied to A.3 28 (Left Slot Credit Value) through A.3 31 (4th Slot Credit Value) respectively. To give a bonus for a particular coin, you need to modify the Credit Value adjustment to specify the value to be given for the bonus coin.

For example, in a game with a Left Coin Slot that takes quarters and a center coin slot that takes dollars, if you wish to charge 50 cents for 1 play and $1.00 for 2 plays, you setup the pricing editor to show:

```
┌──────────────────────────────────────┐
│          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
```

If you set A.3 10 (Coin Door Type) to Custom you will see the following coin door specifier adjustments:

A.3 12	Left Slot Value	0.25
A.3 13	Center Slot Value	1.00
A.3 28	Left Slot Credit Value	0.25
A.3 29	Center Slot Credit Value	1.00

To change the pricing to 1 play for $0.50, 2 plays for $1.00 and 3 plays for a dollar coin, you change A.3 29 (Center Slot Credit Value) to 1.50. This will result in the following settings:

A.3 12	Left Slot Value	0.25
A.3 13	Center Slot Value	1.00
A.3 28	Left Slot Credit Value	0.25
A.3 29	Center Slot Credit Value	1.50

This will cause $1.50 worth of credits (3) to be awarded for each coin inserted in the center coin slot (dollar coin). This is due to the $1.50 setting of A.3 29 (Center Slot CREDIT VALUE). Note that the 1.00 setting of A.3 13 tells the game that each coin in the center slot adds $1.00 to the total collection.

A.3 28 LEFT SLOT CREDIT VALUE
A.3 29 CENTER SLOT CREDIT VALUE
A.3 30 RIGHT SLOT CREDIT VALUE
A.3 31 4TH SLOT CREDIT VALUE

This adjustment specifies the value to be used for awarding credits. It is typically the same value as the corresponding A.3 12 (Left Slot Value) through A.3 15 (4th Slot Value) adjustment.

The A.3 12 through A.3 15 values are used to determine the auditing value of each coin (for collection totals) while the A.3 28 through A.3 31 value determine the coin value for awarding credits. By making this "Credit Value" adjustment higher than the A.3 12 through A.3 15 "Value" adjustment, a bonus may be given for a specific call (see Bonus for Special Coin section for more information).

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	25c	$1.00*	25c	$1.00	1/50c, 2/75c, 3/$1	50c, 75c, $1.00	
	25c	$1.00*	25c	$1.00	1/75c, 2/$1.50, 3/$2.00	1/.75, 3/2.00	
	25c	$1.00	25c	$1.00	1/3X25c	USA 1/$0.75	
	25c	$1.00	25c	$1.00	1/50c, 2/$1	USA 2/$1.00	
	25c	$1.00	25c	$1.00	1/50c, 3/$1.00	USA 3/$1.00	
	25c	$1.00	25c	$1.00	1/2x25c, 2/$1.50, 3/$1.50, 6/$2.00	USA 6/$2.00	
	25c	$1.00	25c	$1.00	1/2x25c, 2/$1.00, 3/$1.50, 5/$2.00	USA 5/$2.00	
	25c	$1.00	25c	$1.00	1/3x25c, 2/$1.50, 4/$2.00	1/.75, 4/$2.00	
	25c	$1.00	25c	$1.00	1/2x25c, 2/$1.00, 4/$1.50, 6/$2.00	6/$2.00 4/$1.50	
	25c	25c	25c	-	1/4x25c, 6/$5.00	1/1, 6/5	
	25c	25c	25c	-	1/4x25c	1/$1.00	
Canada	25c	-	$1.00	-	1/50c, 2/75c, 3/$1	CAN. 50-75-1	
	25c	-	$1.00	-	1/50c, 2/$1	CAN. 2/$1.00	
	25c	-	$1.00	-	1/50c, 3/$1.00	CAN. 3/$1.00	
	25c	-	$1.00	-	1/2x25c, 2/4x25c, 3/$1.00	3/$1.00 Coin	
	25c	-	$1.00	-	1/2x25c, 2/$1.00, 3/$1.50, 6/$2.00	CAN. 6/$2.00	
	25c	-	$1.00	-	1/2x25c, 2/$1.00, 3/$1.50, 5/$2.00	CAN. 5/$2.00	
	25c	-	$1.00	-	1/2x25c, 2/$1.00, 4/$1.50, 6/$2.00	6/$2, 4/1.50	
	25c	-	$1.00	-	1/3x25c, 2/$1.50, 4/$2.00	1/.75, 4/2.00	
	25c	-	$1.00	-	1/75c, 2/$1.50, 3/$2.00	1/.75, 3/2.00	
	25c	-	$1.00	-	1/3X25c	CAN. 1/$0.75	
Canada 3/Dollar Coin	25c	-	$1.00	-	1/0.50, 2/$1.00, 3/$1.00-Coin	CAN.$ BONUS	
Austria	5sch	10sch	10sch	-	1/2x5sch, 3/2x10sch	AUSTRIA	
	5sch	-	10sch	-	12/5sch, 5/10sch	CUSTOM	02 00 05 00 01 00 01 00
Australia	20c	$1	$1	$2	1/$1, 3/$2	AUSTRALIA 1	
	20c	$1	$1	$2	1/$1, 2/$2	AUSTRALIA 2	
U.K.	£1.00	50P	20P	10P	1/3x10P, 2/50P, 4/£1	U. KINGDOM	
Switzerland	1Fr	2Fr	5Fr	-	1/1Fr, 3/2Fr, 7/5Fr	SWISS 1	
Swiss 2	1Fr	2Fr	5Fr	-	1/2Fr, 2/3Fr, 3/4Fr, 5/5Fr	SWISS 2	
Swiss 3	1Fr	2Fr	5Fr	-	1/1Fr, 5/5Fr	SWISS 3	
Swiss 4	1Fr	2Fr	5Fr	-	1/1Fr, 9/2Fr, 3/3Fr, 4/4Fr, 6/5Fr	SWISS 4	
Swiss 5	1Fr	1Fr	1Fr	-	1/1Fr (all slots = 1Fr)	SWISS 5	
Belgium	5Fr	20Fr	50Fr	-	1/4x5Fr, 1/20Fr, 3/50Fr	BELGIUM	
Belgium 2	5Fr	20Fr	50Fr	-	1/20Fr, 3/60Fr, 3/50Fr-Coin	BELG. BONUS	
Germany	1DM	2DM	5DM	-	1/1DM, 2/2DM, 6/5DM	GER. 6/5DM	
					1/2DM, 2/3DM, 3/4DM, 4/5DM	GER. 4/5DM	
					1/2DM, 2/3DM, 3/4DM, 5/5DM	GER. 1/2DM	
					1/1DM, 2/2DM, 5/5DM	GER. 1/1DM	
Holland	1G	-	1G	-	1/1G	HOLLAND	
Sweden	1Kr	5Kr	10Kr	1Kr	1/10Kr, 2/15Kr, 3/20Kr	SWEDEN 1	
	1Kr	5Kr	10Kr	1Kr	1/5Kr	SWEDEN 2	
France	1Fr	5Fr	10Fr	20Fr	1/3x1Fr, 2/5Fr, 5/10Fr, 10/20Fr	TARIFF 1	
	1Fr	5Fr	10Fr	20Fr	1/2x1Fr, 3/5Fr, 7/10Fr, 14/20Fr	TARIFF 2	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 7/2x10Fr, 7/20Fr	TARIFF 3	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 4/10Fr, 9/2x10Fr, 9/20Fr	TARIFF 4	
	1Fr	5Fr	10Fr	20Fr	2/5Fr, 5/10Fr, 11/2x10Fr, 11/20Fr	TARIFF 5	
	1Fr	5Fr	10Fr	20Fr	1/5Fr, 3/10Fr, 6/20Fr	TARIFF 6	
Italy	500L	500L	500L	-	1/500L	ITALY 1	
	500L	500L	500L	-	1/2x500L, 3/4x500L	ITALY 2	
	500L	500L	500L	-	1/2x500L, 2/4x500L	ITALY 3	
Spain	100P	-	500P	-	1/100P, 6/500P	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¥	JAPAN	
Chile	Token	-	Token	-	1/1Token	CHILE	
Denmark	1Kr	5Kr	10Kr	20Kr	1/2x1 Kr, 3/5 Kr, 7/10 Kr	DENMARK 1	
	1Kr	5Kr	10Kr	20Kr	1/5 Kr, 3/10 Kr, 6/20 Kr	DENMARK 2	
Finland	1Mka	-	5Mka	-	1/2x1Mka, 3/5Mka	FINLAND 1	
	1Mka	-	5Mka	-	1/3x1Mka, 2/5Mka	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	NORWAY	
Argentina	10c	10c	10c	-	1/1 Token	ARGENTINA	
Greece	10D	20D	50D	-	1/2x10D, 1/20D, 3/50D	GREECE	
Antilles	25c	25c	1G	-	1/25c, 4/1G	ANTILLES	
Netherlands	1HFl	2.5HFl	2.5HFl	-	1/1HFl, 3/2.5HFl	NETHERLANDS	
Netherlands 2	1HFl	2.5HFl	2.5HFl	-	1/1HFl, 3/3HFl, 3/2.5HFl-Coin	NETH. BONUS	
Hungary	20 Old	20 New	50F	-	1/40F, 2/60F, 4/100F	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 Chute are available.

A.4 HIGH SCORE TO DATE (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
This is the award given for achieving the High Score to Date or the Champion H.S.T.D.

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 four highest scores.

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 operator selects the values provided at reset 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: 0 to 400

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

Range: 0 to 400

A.4 15 NBA® CHAMP CREDIT
This determines the number of Credit(s) or Ticket(s) awarded for an NBA® Team Champion.

Settings: 0-3
Factory Default: 0

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
This is 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-95 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.

UPDATE SND. U2-U8 TO N.M OR LATER
This game ROM version requires the specified version (N.M) of sound ROMs (U2-U8).

DEFENDER MECH. IS BROKEN
This error occurs when the defender mechanism is determined to be malfunctioning.

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 (F109), or at connectors J138, J139, J140 or J141 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.

XXXX 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.

G10 ERROR
The security chip is incorrect or faulty. If this occurs, replace the security chip.

G11 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 AND AUDIO VISUAL BOARD ERROR CODES
The CPU has three LED's, 201, 202, and 203. At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing.

If the system detects an error the following happens:

CPU BOARD LED ERROR CODES		
	Center LED blinks once	= G11 ROM Failure
	Center LED blinks twice	= U8 RAM Failure
	Center LED blinks three times	= G10 Security Chip Failure

CPU and Audio Visual board error codes continued...

Upon game turn-on you will hear one of the following.

AUDIO VISUAL BOARD
BEEP ERROR CODES

1 Beep	= Audio Visual Board is O.K.
2 Beeps	= S2 Failure
3 Beeps	= S3 Failure
4 Beeps	= S4 Failure
5 Beeps	= S5 Failure
6 Beeps	= S6 Failure
7 Beeps	= S7 Failure
10 Beeps	= Audio Static RAM Failure

OPTO THEORY

The opto receiver (Photo Transistor) should be approximately 0.1 - 0.7 volts when the opto beam is unblocked and approximately 11 - 13 volts when the opto beam is blocked. The opto transmitter (LED) should always be approximately 1.4 volts. **Note:** The transmitter (LED) is larger than the receiver (Photo Transistor); it protrudes further from its case.
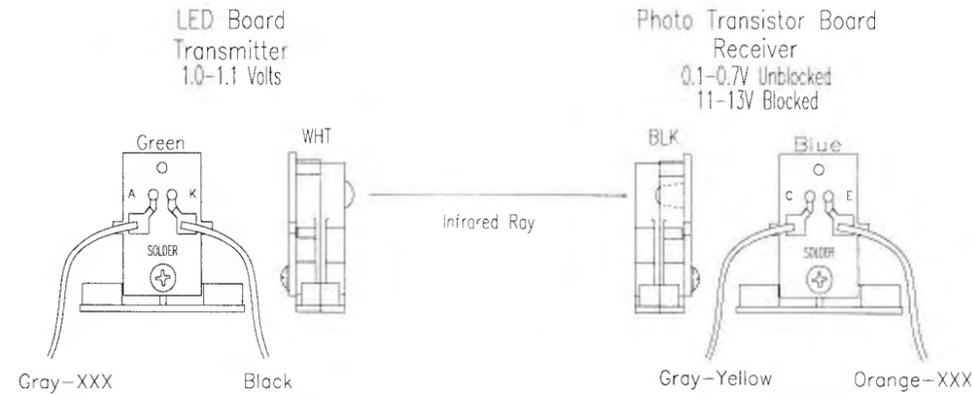
LED LIST
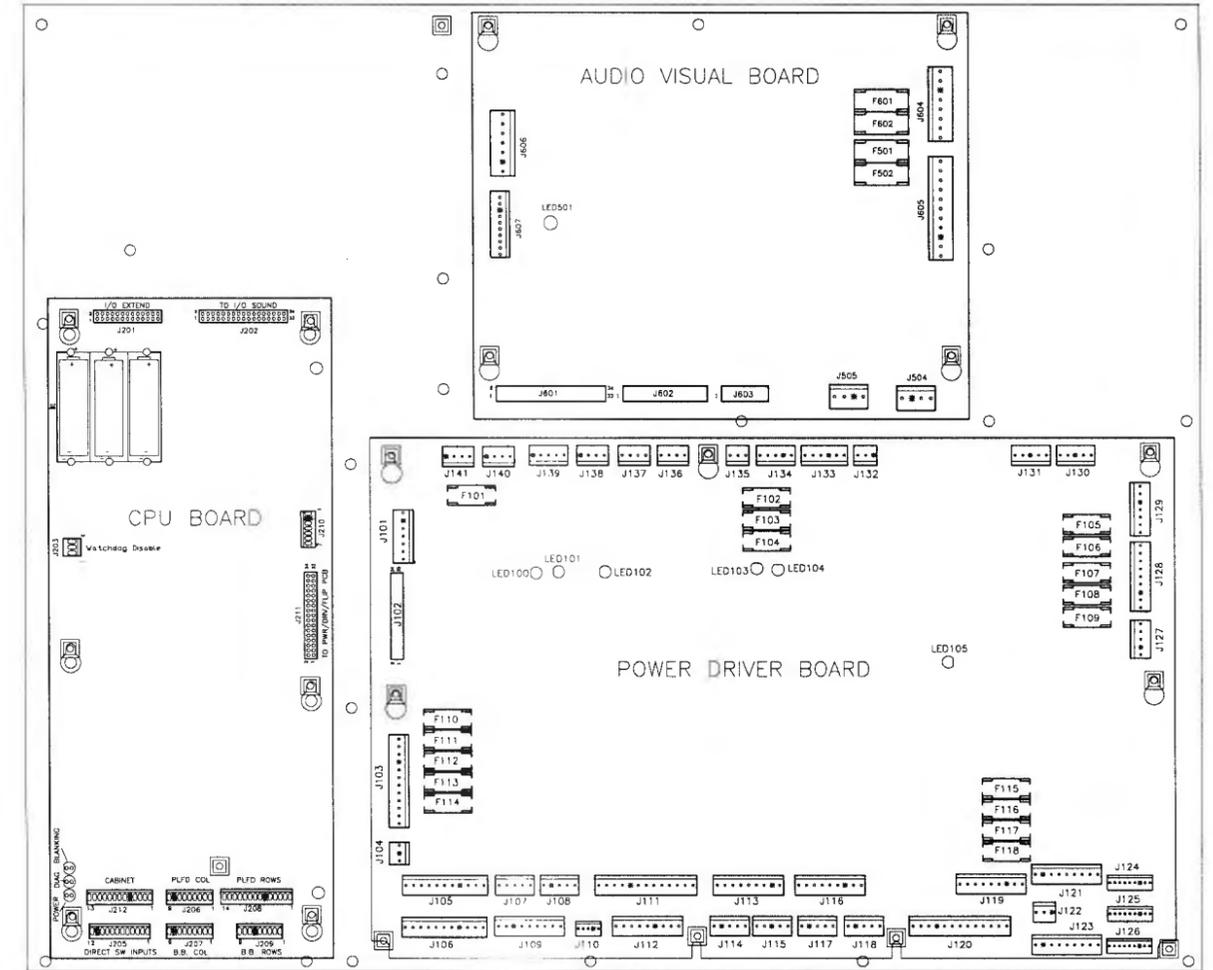
CPU BOARD
LED 201   Blanking
LED 202   Power
LED 203   Diagnostics
At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing.

AUDIO VISUAL BOARD
LED 501   +5VDC, Normally flashing, but at a slower rate than LED 203.

POWER DRIVER BOARD
LED 100   +12VDC Regulated, Normally On
LED 101   +5VDC Digital, Normally On
LED 102   +18VDC Lamps, Normally On
LED 103   +12VDC Unregulated, Normally On
LED 104   +20VDC Flashlamps, Normally On
LED 105   +50VDC Coils, Normally On

FUSE LIST

AUDIO VIDEO BOARD

Loc.	Description	Part Number	Value
F501	-25V	5731-14532-00	T2.5A, 250V
F502	+25V	5731-14532-00	T2.5A, 250V
F601	+62V	5731-14840-00	T0.315A, 250V
F602	-113V & -125V	5731-14840-00	T0.315A, 250V

CPU BOARD
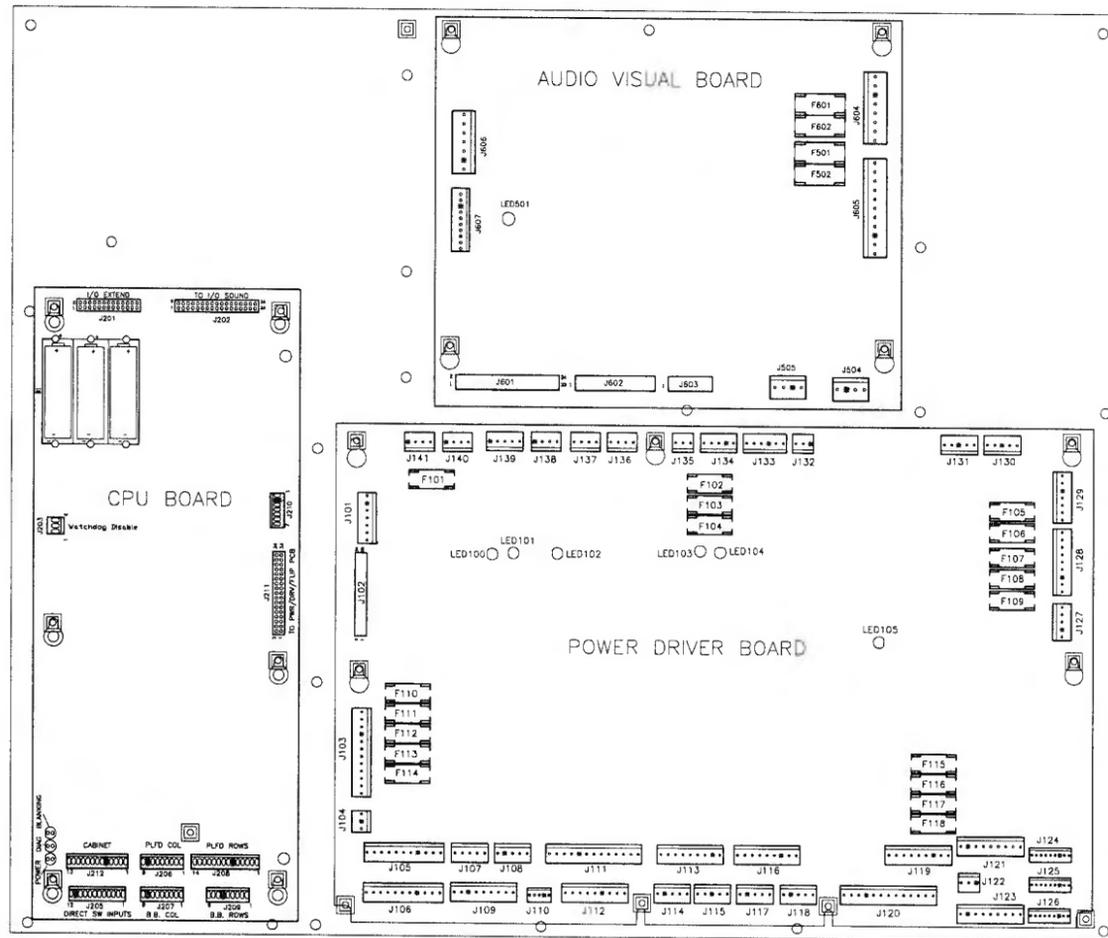*There are no fuses on the CPU board.*

POWER DRIVER BOARD

Loc.	Description	Part Number	Value	Loc.	Description	Part Number	Value
F101	Regulated 12V	5731-14531-00	T0.63A, 250v	F110	G.I. #5 WHT-VIO	5731-14530-00	T4.0A, 250V
F102	Solenoid. #25 to #28	5731-14530-00	T4.0A, 250V	F111	G.I. #4 WHT-GRN	5731-14530-00	T4.0A, 250V
F103	Solenoid #1-#8	5731-14530-00	T4.0A, 250V	F112	G.I. #3 WHT-YEL	5731-14530-00	T4.0A, 250V
F104	Solenoid #9 to #16	5731-14530-00	T4.0A, 250V	F113	G.I. #2 WHT-ORG	5731-14530-00	T4.0A, 250V
F105	+5V Logic	5731-14530-00	T4.0A, 250V	F114	G.I. #1 WHT-BRN	5731-14530-00	T4.0A, 250V
F106	+18V Lamp Matrix	5731-14046-00	T5.0A, 250V	F115	+50V Flippers	5731-14530-00	T4.0A, 250V
F107	Flasher Secondary	5731-14530-00	T4.0A, 250V	F116	+50V Flippers	5731-14530-00	T4.0A, 250V
F108	Solenoid Secondary	5731-14529-00	T6.3A, 250	F117	+50V Flippers	5731-14530-00	T4.0A, 250V
F109	Unregulated 12V	5731-14530-00	T4.0A, 250V	F118	+50V Flippers	5731-14530-00	T4.0A, 250V

LINE FILTER

Loc.	Part Number	Value
Foreign	5731-14530-00	T4.0A, 250V
Domestic	5731-14046-00	T5.0A, 250V

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 misadjusted 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

PARTS INFORMATION

50053-BB
Backbox Assembly

50053-CAB
Cabinet Assembly
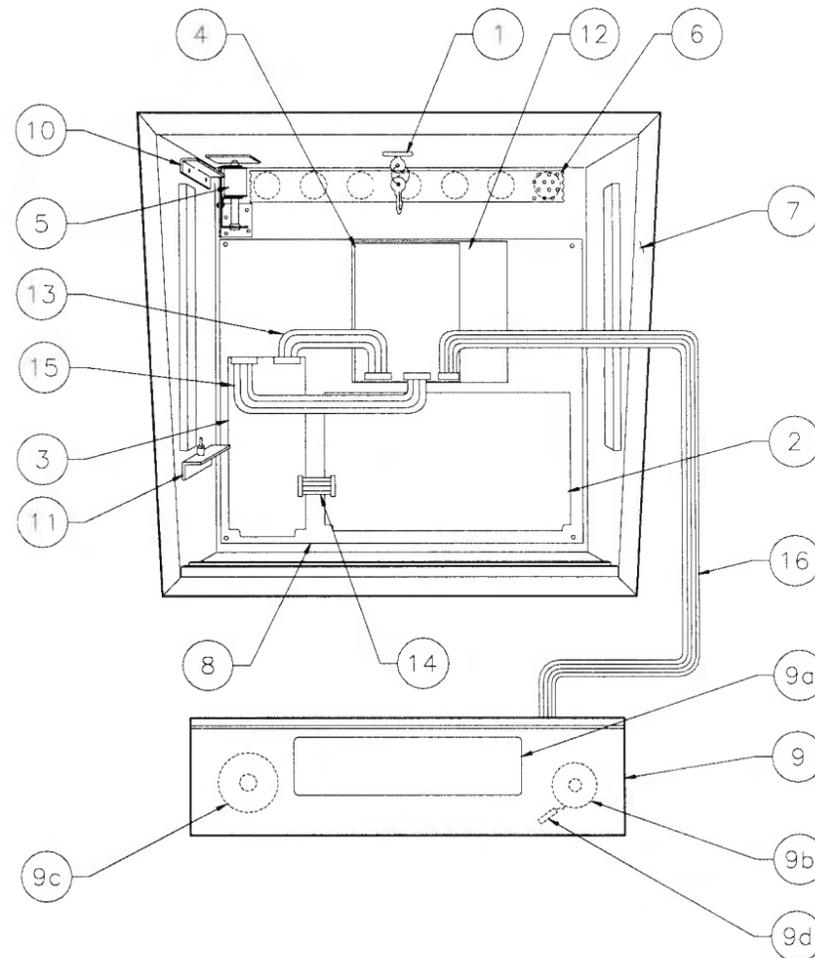
Ribbon Cables:

Item	Part Number	Description
13	5795-12653-15	Ribbon Cable, 34-Pin, 2 Conn.
14	5795-12653-03	Ribbon Cable, 34-Pin, 3"
15	5795-10938-19	Ribbon Cable, 26-Pin, 2 Conn.
16	5795-13434-25	Ribbon Cable, 14 Pin w/Ferrite

Miscellaneous Parts:
(Not shown)

	02-5223	Bushing Button - Speaker Panel
	08-7456	Backbox Glass, 27 x 18-7/8"
	31-1357-50053	Screened Translite

Cables:

	H-20477	Logic Power Cable
	H-20478	Secondary Cable
	H-20479	Dot Matrix Power Cable

Item	Part Number	Description
1	A-13379	Lock & Plate Assembly
a)	20-9637	Lock & Cam Kit
2	A-20028	WPC '95 Power Driver PCB
3	A-21377-50053	WPC '95 CPU/Flipper PCB Assy.
4	A-20516-50053	WPC '95 Audio Visual PCB Assy.
5	B-10686-1	Knocker Assembly
6	01-6645	Vent Screen
7	04-10450-50053	Wood Backbox
8	A-14092-7	Mounting Plate Assembly
9	A-20796	Speaker/Display Assembly
a)	5901-12784-00	Dot Matrix Display/Driver Board
b)	5555-12924-00	Tweeter, 4Ω, 15w
c)	5555-12856-00	Speaker, 5-1/4" , 4 Ω, 25w
d)	5045-12914-00	Capacitor, 10mfd, 50v, +/-20%
10	A-12497	Insert Hinge Assy., Upper
11	A-12498	Insert Hinge Assy., Lower
12	01-14480	Audio Visual Shield

Item	Part Number	Description
1	A-21567	Lever Guide Assembly
2	A-21574	Hand Guard Assembly
a)	20-10327-4	Push Button Round/Illum.
3	01-13936	Drip Plate - Narrow
4	A-16883-15	Flipper Button w/Spring (2)
5	A-20729-5	4-Ball Cashbox Assembly
6	A-20871	Power Interface Assy.
7	5610-14515-01	WPC Transformer
8	5555-12929-00	Speaker, 4Ω, 6", 25w
9	20-9347	Toggle Latch
10	A-20580	Coin Door Interface Board
11	A-19514	Leg Assembly, Chrome (4)
12	A-17195	Tilt Switch Assy., w/Cable
13	20-6502-A	Plumb Bob
14	04-10346	Tilt Mechanism Assembly
15	*	Cordset
16	A-17316	Opto Flipper Assembly (2)
17	01-10714	Line Cord Cover
18	A-12359-3	Side Molding Assembly (2)
19	11-1343	Wood Cabinet
20	20-9663-16	Push Button w/Sw., *Start* (Yellow)
21	01-11400	Leg Plate (4)
22	A-18249-3	Cable & Interlock Switch Assy.
23	09-61000-1	Coin Door-U.S.A.
24	01-11408	Plate Spacer (2)

Miscellaneous Parts (Not Shown)

Part Number	Description
A-19562.1	Stay Arm Assembly
01-12352	Clip Bracket
01-9011.1-L	Backbox Mtg. Bracket, Left
01-9011.1-R	Backbox Mtg. Bracket, Right
01-6389-1	Bracket Nest
08-7028-T	Playfield Glass
08-7377	Leg Leveler Adjuster, 3"
20-6500	Steel Ball, 1-1/16" (4)
01-14085	Hasp Hinge Bracket
01-14086	Hasp Staple Bracket
02-3179	Bar Support Spacer

Cabinet Cables

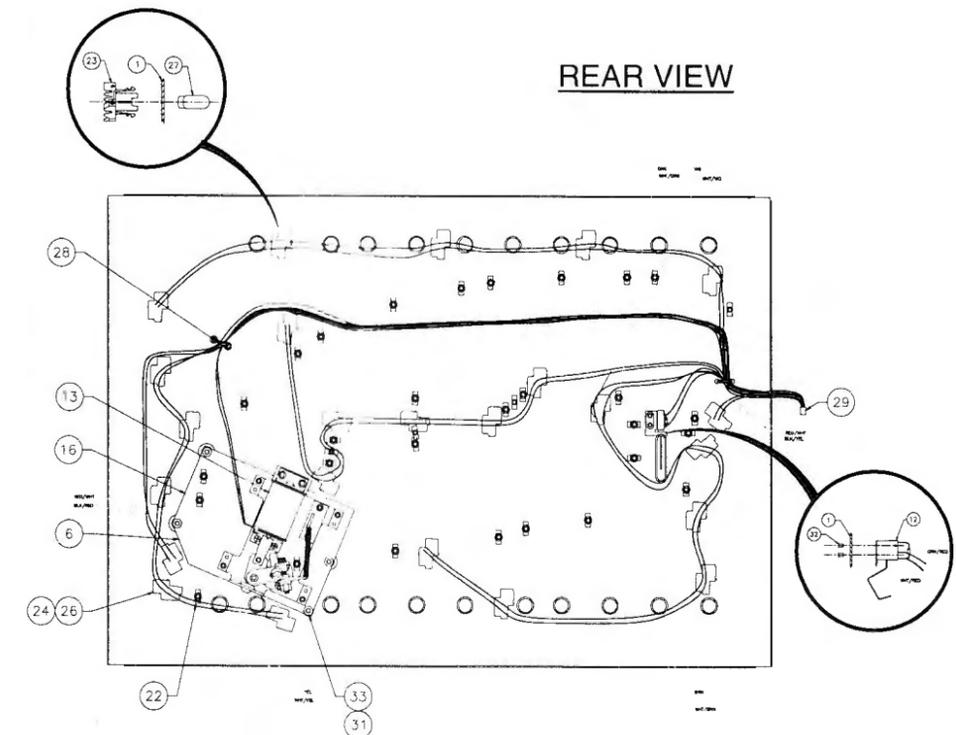| Part Number	Description
A-20201	Cable & Jumper Assy., Coin Door
H-17217.1	Plumb/Bob Mech. Protect Cable
H-17837-2	Voltage Program Jumper Cable
H-20599-1.1	WPC '95 Cabinet Cable
H-19601-1	Power Extension Cable
H-21540	Cabinet Switch/Lamp Cable

* See Application Chart p.2-35.

50053-IN
Backbox Insert

Item	Part Number	Description
1	03-9419.1-50053	Insert Body
2	31-2814-1B	Backbox Plastic - NBA
3	31-2814-3	Backbox Plastic - NBA
4	31-2814-4A	Backbox Plastic - NBA
5	31-2814-5	Backbox Plastic - NBA
6	31-2814-6	Backbox Plastic - NBA
7	31-2814-7A	Backbox Plastic - NBA
8	31-2814-8	Backbox Plastic - NBA
9	31-2814-9A	Backbox Plastic - NBA
10	31-2814-10	Backbox Plastic - NBA
11	31-2814-11B	Backbox Plastic - NBA
12	A-21710	Rollover Switch Assembly
*13	A-21717	Flipper Assembly Complete
14	20-10110-15	Flipper Bat w/Shaft - Orange
15	23-6519-4	Flipper Ring, 1-1/2" ID Black
16	04-10760	Mounting Plate
17	31-2816.1	Basketball
18	31-2817.1	Overlay
19	03-9421-1	Backglass Channel - Top
20	03-9421-2	Backglass Channel - Side
21	03-9420	Backglass Channel Lift
22	20-9658-2	Standoff-PCB Support Dual ¾
23	24-8863	Socket T-31/4 White w/o Diode
24	24-8861	Socket-Wedge Base T3 ¼ Flasher
25	08-7456	Glass: 27 x 18-7/8"
26	24-8802	Bulb #906 13v, 0.69A.
27	24-8768	Bulb #555 6.3v, .25A.
28	03-9454	Cable Tie 4" Long
29	H-21776-1	Insert Cable
30	31-1357-50053	Screened Translite
31	4700-00011-00	Flat Washer: 11/64 x 7/16 x 16ga.
32	07-6688-18N	Rivet: 3/16" Long Nickel
33	4408-01119-00	Nut 8-32 ESN
34	20-9658-1	Standoff -PCB Support ½"

* See page 2-18 for Flipper Assembly details.

50053-IN
Backbox Insert
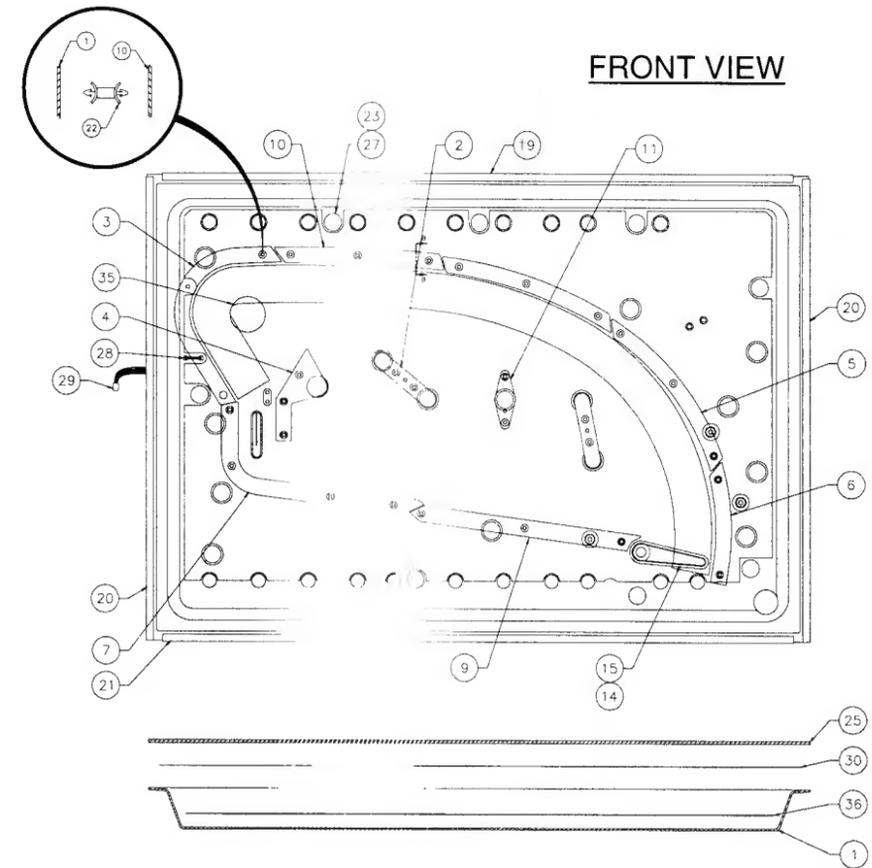
FRONT VIEW

REAR VIEW

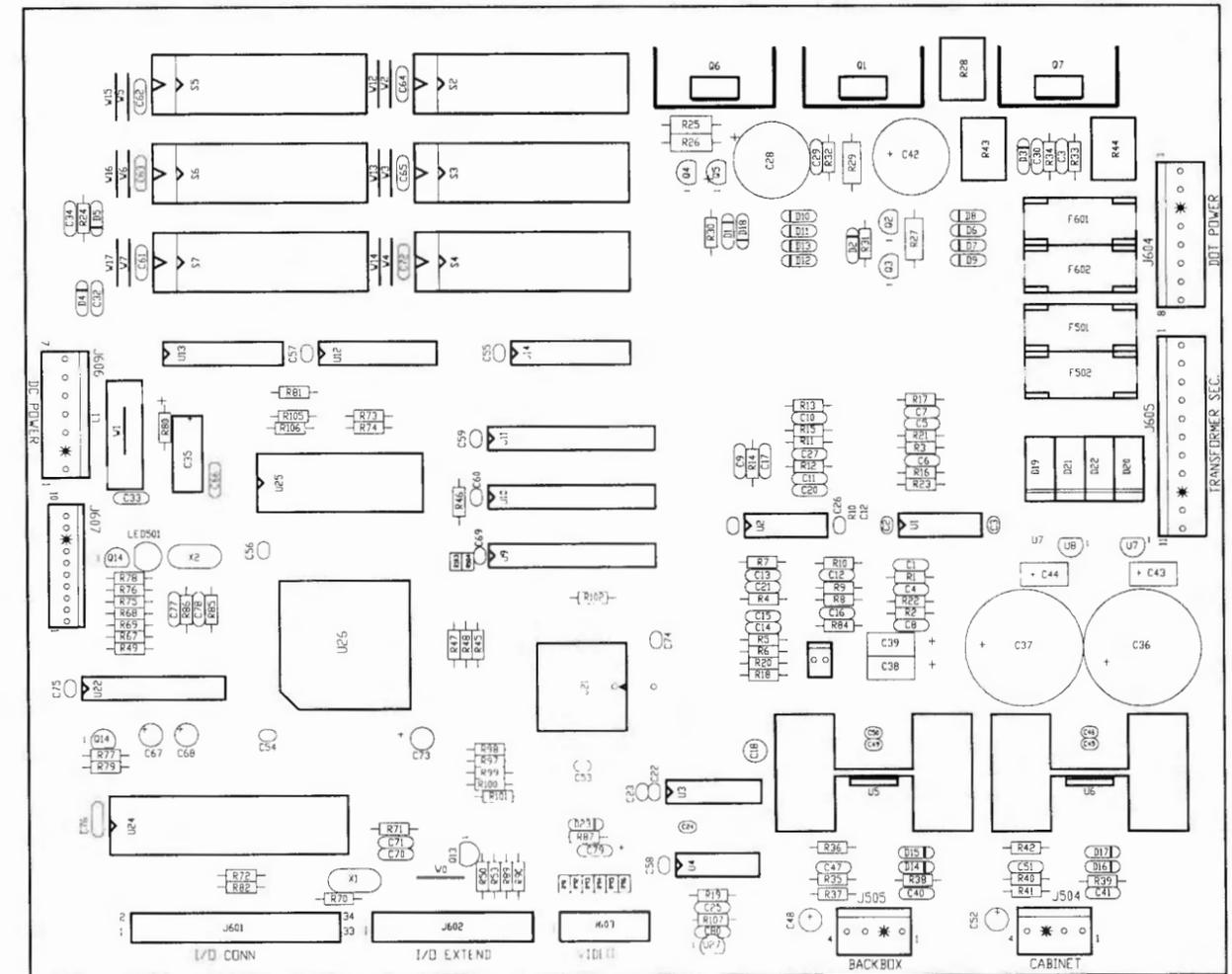| Part Number	Designator	Description	Part Number	Designator	Description
4004-01005-06	-	Mach. Screw, 4-40 x 3/8"	5048-13418-00	C4 - C6	Cap., .047m, 50v, 5% Ax.
4404-01119-00	-	Nut 4-40 ESN	5048-13609-00	C9, C12, C15	Cap., 3900pf, 50v, 5% Ax.
5010-08774-00	R2, R17, R22, R23, R35, R36, R40,R42, R87	Resistor, 22KΩ, ¼w, 5%	5048-13610-00	C8, C10, C11, C13, C14	Cap., 1000pf, 50v, 5% Ax.
			5048-13611-00	C16, C17, C20, C21	Cap., 680pf, 50v, 5% Ax.
5010-08991-00	R20, R46-R48, R50, R72, R76, R77, R81, R107	Resistor, 4.7KΩ, ¼w, 5%	5048-14563-00	C29-C31, C81, C82	Cap., .01µf, 200v, 10% Axial
			5070-09045-00	D19-D22	Diode MR501, 3.0A
			5070-09054-00	D4, D6-D17, D23	Diode 1N4004, 1.0A
			5075-12823-00	D1, D18	Zener, 1N4758A 56v, 1w
5010-09034-00	R21	Resistor, 10KΩ, ¼w, 5%	5075-12824-00	D3, D5	Zener, 1N4742A 12v, 1w
5010-09036-00	R19	Resistor, 100Ω, ¼w, 5%	5075-12826-00	D2	Zener, 1N4759, 62v, 1w
5010-09134-00	R32-R34	Resistor, 150KΩ, ¼w, 5%	5160-08938-00	Q13-Q15	Transistor, 2N4401 NPN
5010-09219-00	R1, R3	Resistor, 8.2KΩ, ¼w, 5%	5164-09056-00	Q2, Q3	Transistor, MPSD02 NPN
5010-09416-00	R73, R74, R82, R88, R105, R106	Resistor, 470Ω, ¼w, 5%	5164-12154-00	Q1, Q7	Transistor, MJE15030 NPN
			5194-09055-00	Q4, Q5	Transistor, MPSD52 PNP
5010-09807-00	R30, R31, R67-R69, R102	Resistor, 120Ω, ¼w, 5%	5194-12155-00	Q6	Transistor, MJE15031 PNP
			5250-13302-00	U7	Reg. 78L05T 5v
5010-10171-00	R24	Resistor, 56Ω, ¼w, 5%	5250-13303-00	U8	Reg. 79L05T 5v
5010-10258-00	R86	Resistor, 1MΩ, ¼w, 5%	5311-12538-00	U4	IC 74HC14 Hex. S-T
5010-10983-00	R53, R75, R79, R84, R85, R89, R90	Resistor, 1.8KΩ, ¼w, 5%	5317-12211-00	U12-U14	IC Octal Buffer 74ALS541
			5340-12278-00	U25	S/Ram 2064 150NS
5010-12832-00	R25, R26, R27, R29	Resistor, 47KΩ, ¼w, 5%	5370-12687-00	U27	IC MC 340640Reset Chp
5010-13215-00	R78, R97-R101	Resistor, 200KΩ, ¼w, 5%	5349-14351-00	U9-U11	SRAm 8Kx8-35ms, 28pdlp
5010-13372-00	R91-R96, R103, R104	Resistor, 220Ω, 1/8w, 5%	5370-12730-00	U1, U2	IC Op Amp TL084
5010-13420-00	R37, R41	Resistor, 680Ω, ¼w, 5%	5370-13419-00	U5, U6	IC TDA 2030AV 18w, Audio Amp
5010-13517-00	R38, R39	Resistor, 15Ω, ¼w, 5%	5371-13299-00	U3	IC Ad-1851 16bit mono
5010-13607-00	R4, R5, R7-R15	Resistor, 6.19KΩ, 1/8w, 1%	5520-14561-00	X2	Crystal 20mHz, parallel 20pf
5012-14558-00	R44	Resistor, 1.8KΩ, 5w vertical	5671-14516-00	LED 501	Led-Display Red T 1-3/4
5012-14559-00	R43	Resistor, 4.7KΩ, 5w vertical	5700-08985-00	U24	Socket IC 40-pin .6
5012-14560-00	R28	Resistor, 120Ω, 5w vertical	5700-12047-00	U22	Socket IC 24.3P
5013-13661-00	R16	Resistor, 9.09KΩ, ¼w, 1%	5700-12088-00	S2-S7	Socket Dip 32.6P"
5013-14456-00	R6, R18	Resistor, 3.32KΩ, ¼w, 1%	5705-12638-00	U5, U6	Heatsink 5298B
5040-14569-00	C35	Cap., 100mf, 25v, Axial	5705-14562-00	Q1, Q6, Q7	Heatsink 10-220 wave sol 287
5040-09365-00	C38, C39, C43, C44	Cap.,1m, 63v(+50,-10%)Ax.	5733-14528-00	F501, F502, F601, F602	Fuse Holder 5x20mm 10A.
5040-12750-00	C48, C52, C73	Cap., 22m, 35v Radial	5731-14532-00	F501, F502	Fuse 5x20mm T2.5A., 250V
5040-13098-00	C18, C67, C68	Cap., 4.7µ, 35v (±20%)	5731-14840-00	F601, F602	Fuse 5x20mm T0.315A., 250V
5040-15413-00	C36, C37	Cap., 10000µf, 35v, 25mm	5791-10850-00	J602	Connector, 26-pin Header Str.
5040-14564-00	C28, C42	Cap., 150µf, 160v, 20%Rad.	5791-10862-04	J504, J505	Connector, 4-pin Header Str.
5043-08996-00	C2, C3, C19, C22-C24, C26, C32, C34, C45, C46, C49, C50, C53-C66, C69, C72, C74-C76, C79, C80	Cap., 0.1µf, 50v (±20%) Ax.	5791-10862-07	J606	Connector, 7-pin Header Str.
			5791-10862-08	J604	Connector, 8-pin Header Str.
			5791-10862-11	J605	Connector, 11-pin Header Str.
			5791-12516-00	J601	Connector, 34 hdr 2 x 17 .100
			5791-12827-00	J603	Connector, 14 Hen 7x2 Str.
5048-10992-00	C27	Cap., .0047m, 50v, 10% Ax.	5791-13830-10	J607	Connector, 10-pin Str. Sq.
5048-11028-00	C77	Cap., 22p, 50v, Axial	5010-09534-00	W0, W1, W12-W17, R49	Resistor, 0Ω, 0w
5048-11029-00	C25	Cap., 100p, 50v, 5% Axial	A-5343-50053-S2	S2	ROM Assembly
5048-11030-00	C7	Cap., 470p, 50v, Axial	A-5343-50053-S3	S3	ROM Assembly
5048-11033-00	C1	Cap., .022m, 50v, 10% Ax.	A-5343-50053-S4	S4	ROM Assembly
5048-12036-00	C40, C41	Cap., .22m, 50v, Axial	A-5343-50053-S5	S5	ROM Assembly
5048-13172-00	C78	Cap., 47pf, 50v, 20% Ax.	A-5343-50053-S6	S6	ROM Assembly

Part Number	Designator	Description
5040-14569-00	C1, C40	Capacitor, 100µF, 25v, Ax.
5043-08996-00	C2, C4, C5, C7, C13, C16-C21, C24-C39, C41-C43	Capacitor, 0.1m, 50v (±20%) Ax.
5040-13417-00	C8 - C12	Capacitor, 10000µf, 35v Radial
5048-11031-00	C14, C15	Capacitor, .001m, 50v, 10% Ax.
5040-09537-00	C22, C23	Capacitor, 100µ, 100v (±20%) Radial
5070-09054-00	D1, D2, D23, D24, D33 - D100, D103	Diode 1N4004 1.0A.
5070-14526-00	D3-D22	Diode P600G 6A 400 PIV
5070-08919-00	D101, D102	Diode, 1N4148 150mA.
5731-14531-00	F101	Fuse 5 x 20mm T.63A., 250V
5731-14530-00	F102-F105, F107, F109-F118	Fuse 5 x 20mm T 4A, 250V
5731-14046-00	F106	Fuse, 5x20mm T5.0A, 250V
5731-14529-00	F108	Fuse 5 x 20mm T6.3A, 250V
5733-14528-00	F101-F118	Fuse Holder 5 x 20mm10A
5705-14724-00	Q1	Heat Sink TO-3 5.1DEG/W
5701-09652-00	Q1	Thermal Pad TO-3
4406-01128-00	Q1	Nut 6-32 KEPS
4006-01005-06	Q1	Mach. Screw, 6-32 x 3/8"
5705-14562-00	Q2	Heat Sink 10-220 Wave Sol 287
4004-01005-06	Q2-Q5	Mach. Screw, 4-40 x 3/8"
4404-01119-00	Q2-Q5	Nut 4-40 ESN
5705-12638-00	Q3-Q5	Heat Sink 5298B
5791-10862-07	J101, J129	Connector, 7-pin Header Str.
5791-12516-00	J102	Connector, 34 Hdr 2x17
5791-10862-12	J103	Connector, 12-pin Header Str.
5791-10862-03	J104, J122, J132, J135	Connector, 3-pin Header Str.
5791-10862-11	J105, J106	Connector, 11-pin Header Str.
5791-10862-05	J107, J108, J114, J115, J117, J118, J127, J130, J131, J134, J139	Connector, 5-pin Header Str.
5791-10862-09	J109, J112, J113, J116, J119, J121, J123, J128	Connector, 9-pin Header Str.
5791-10862-13	J111, J120	Connector, 13-pin Header Str.
5791-13830-09	J124-J126	Connector, 9-pin Header Str.
5791-10862-06	J133	Connector, 6-pin Header Str.
5791-10862-04	J136-J138, J140, J141	Connector, 4-pin Header Str.
5671-14516-00	LED100-LED105	LED Dspl Red T-1
5250-14527-00	Q1	Regulator Voltage LM317K
5460-12423-00	Q2	I.C. LM7812
5131-12725-00	Q3-Q5	Triac BT138E
5194-09055-00	Q6-Q12, Q17-Q24, Q33-Q40, Q49-Q56, Q109	Transistor, MPSD52 PNP
5162-12635-00	Q13-Q16, Q25-Q32, Q41-Q48, Q57-Q64, Q82, Q83, Q85, Q86, Q88, Q89, Q91, Q92, Q101-Q108	Transistor, TIP102
5191-12179-00	Q65-Q72, Q81, Q84, Q87, Q90	Transistor, TIP36C
5190-09016-00	Q73 - Q80	Transistor, 2N4403 PNP
5192-12428-00	Q93 - Q100	Transistor, TIP107
5160-10269-00	Q110	Transistor, 2N3904
5013-14535-00	R1	Resistor, 750Ω, 1/4w, 1%
5013-14534-00	R2	Resistor, 243Ω, 1/4w, 1%
5010-09224-00	R5, R14-R17	Resistor, 270Ω, 1/4w, 1%
5010-09999-00	R3, R4, R6-R8, R43, R44, R81-R83, R190	Resistor, 2KΩ, 1/4w, 5%
5012-12632-00	R9	Resistor, .12Ω, 10w, 5%
5010-09324-00	R10	Resistor, 27KΩ, 1/4w, 5%
5010-09358-00	R11, R157, R159, R161, R163, R165, R167, R169, R171, R216-R224	Resistor, 1KΩ, 1/4w, 5%
5010-09036-00	R247	Resistor, 100Ω, 1/4w, 5%
5010-09034-00	R12, R13, R189, R208-R215, R248	Resistor, 10KΩ, 1/4w, 5%
5010-08992-00	R18, R21, R24, R192, R194, R196, R198, R200, R202, R204, R206	Resistor, 560Ω, 1/4w, 5%
5010-08991-00	R19, R22, R25, R28, R30, R32, R34, R50, R52, R54, R56, R58, R60, R62, R64, R84, R86, R88, R90, R92, R94, R96, R98, R116, R119, R122, R125,R128, R131, R134, R137,R246	Resistor, 4.7KΩ, 1/4w, 5%
5010-11079-00	R20, R23, R26, R254-R256	Resistor, 51Ω, 1/4w, 5%
5010-09416-00	R27, R29, R31, R33, R45-R49, R51, R53, R55, R57, R59, R61, R63, R85, R87, R89, R91, R93, R95, R97, R99, R117, R120, R123, R126, R129, R132, R135, R138, R156, R158, R160, R162, R164, R166, R168, R170, R245, R250-R253, R257	Resistor, 470Ω, 1/4w, 5%
5010-08993-00	R35, R37, R39, R41, R65-R72, R100-R107, R140-R147	Resistor, 68Ω, 1/4w, 5%
5010-08997-00	R36, R38, R40, R42, R73-R80, R108, R109, R110-R115, R118, R121, R124, R127, R130, R133, R136, R139	Resistor, 2.7kΩ, 1/4w, 5%
5010-09361-00	R148-R155, R184-R187	Resistor, 220Ω, 1/4w, 5%
5011-12956-00	R172, R173, R178-R183	Resistor, 2.7KΩ,1/4w, 5%
5010-10171-00	R174-R177, R241-R244	Resistor, 56Ω, 1/4w, 5%
5010-14711-00	R188	Resistor, 10KΩ, 1/4w, 5%
5010-09314-00	R191, R193, R195, R197, R199, R201, R203, R205	Resistor, 1.2kΩ, 1/4w, 5%
5010-09086-00	R207	Resistor, 6.8kΩ, 1/4w, 5%
5010-12427-00	R225, R228, R231, R234, R237-R240	Resistor, .22kΩ, 1/4w, 5%
5010-08998-00	R226, R227, R229, R230, R232, R233, R235, R236	Resistor, 2.2kΩ, 1/4w, 5%
5010-13517-00	R249	Resistor, 150Ω, 1/4w, 5%
5010-09534-00	D25-D32	Resistor, 0Ω, 0w
5019-10143-00	SRI	SIP RES 470 x 9R
5824-09248-00	TP100-TP107	Test Point #1502-1
5370-12272-00	U1, U16, U17	I.C. LM339 Quad Comp
5281-09486-00	U2, U4-U8, U10	I.C. 74LS374 8df/f
5162-12422-00	U3, U11	Trans uln 2803 Oc-drl
5281-10182-00	U9	I.C. 74LS240 l/drvr
5281-09487-00	U12 - U15	I.C. 74LS74 Dual d f/f
5791-13830-05	J110	Connector, 5-pin Header

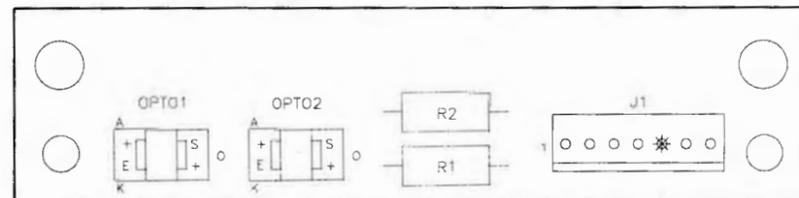| Part Number	Designator	Description
A-15814	B1	Battery Holder
5048-11033-00	C1, C42	Capacitor, .022m, 50v, 10% Axial
5048-11030-00	C3-C26, C34-C41	Capacitor, 470p, 50v, Axial
5043-09030-00	C27	Capacitor, .047m, 50v (±20%) Axial
5048-13375-00	C28	Capacitor, 100p, 50v (10%) Axial
5048-11028-00	C29, C30, C43, C44	Capacitor, 22p, 50v Axial
5040-14569-00	C31, C77	Capacitor, 100mf, 25v Axial
5048-11031-00	C32	Capacitor, .001m, 50v, 10% Axial
5043-08996-00	C45-C70, C74-C76	Capacitor, 0.1m, 50v (±20%) Axial
5040-13098-00	C73	Capacitor, 4.7µF, @35v (±20%)
5645-09025-00	DIPSW1	Switch Dip 8 Pos
5070-09266-00	D1, D25	Diode 1N5817 1.0A.
5070-08919-00	D2-D24, D26, D27	Diode 1N4148 150ma
5700-10176-00	G10A	Socket Dip 28.6
5700-12088-00	G11	Socket Dip 32.6p"
5700-08985-00	U4	Socket I C 40PI N .6
5700-12424-00	U9	socket 84 PI N PL CC
5700-10389-00	U20	Socket I C 18 PIN 3"
5791-10850-00	J201	26H STR Sq. .100
5791-12516-00	J211, J202	34 HDR 2x17 .100
5791-13830-12	J205	12H STR Sq. Pin .100 Solid Tab
5791-13830-09	J206, J207, J209	9H STR Sq. Pin .100 Solid Tab
5791-13830-14	J208	14H STR Sq. Pin .100 Solid Tab
5791-10862-07	J210	7H STR Sq. Pin .156
5791-13830-13	J212	13H STR Sq. Pin .100 Solid Tab
5671-14516-00	LED201, LED202, LED203	LED DSPL RED T-1 3/4
5160-10269-00	Q1	Trans 2N3904 NPN
5019-09669-00	RP1	SIP 1K 9R 10 5%
5010-09358-00	R1, R2, R3, R4, R9, R10, R11, R23, R24, R25, R26, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71. R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R93, R95, R96, R97, R99, R100, R101, R102, R103, R104, R105, R106 R107, R108, R109, R110, R111, R112, R113, R114, R117	Resistor, 1KΩ, 1/4w, 5%
5010-09416-00	R5, R6, R7, R8, R12, R13, R87, R88, R89	Resistor, 470Ω, 1/4w, 5%
5010-09034-00	R14, R15, R16, R17, R18, R19, R20, R21, R22, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R86, R90, R94, R98	Resistor, 10KΩ, 1/4w, 5%
5010-12104-00	R91	Resistor, 22M, 1/4w, 5%
5010-10989-00	R92	Resistor, 470KΩ, 1/4w, 5%
5010-09187-00	R118, R119, R120, R121, R122 R123, R128, R130	Resistor, 150Ω, 1/4w, 5%
5010-09534-00	W3, W4, W7, R124, R125	Resistor, 0Ω, 0w
5010-10258-00	R126	Resistor, 1M, 1/4w, 5%
5010-09040-00	R127	Resistor, 33Ω. 1/4w, 5%
5281-09867-00	U1, U2	I C 74LS244 OCT BUF
5281-09308-00	U3	I C 74LS245 TRNC
5281-09851-00	U5	I C 74LS14 SMT/TRG
5315-12031-00	U7	I C 74HCT244
5340-12558-00	U8	IC RAM 8K x8 Static Cmos 100ns
5370-12687-00	U10	I C MC 34064 Reset CHP
5281-10182-00	U11, U12, U13, U15	I C 74LS240 L/DRVR
5311-14068-00	U14, U24	I C 74HC574 OCTAL D-Latch
5370-12272-00	U16, U17, U18, U19, U25, U26	I C LM339 Quad Comp
5284-12651-00	U21	I C 4584 Hex Schmtt
5311-14554-00	U23	U I C 74HC237 3 to 8 NON I NV DE
5281-09247-00	U27	I C 74LS02 Quad Nor
5520-12084-00	X1	Crystal 32. 768 KHZ
5520-14761-00	X2	XTL 8MHz Anti-Res Parallel Cut
A-5400-50053-1	G10	PIC16C57 Assembly
A-5343-50053-1	G11	Game ROM Assembly
5880-09022-00	B1	Battery 1.5v, AA Alk.
5400-10320-00	U4	IC MPU 68B09E
5410-12426-00	U9	IC WPC-89 ASIC
5162-12422-00	U20	Trans Uln 2803 Oc-Drl
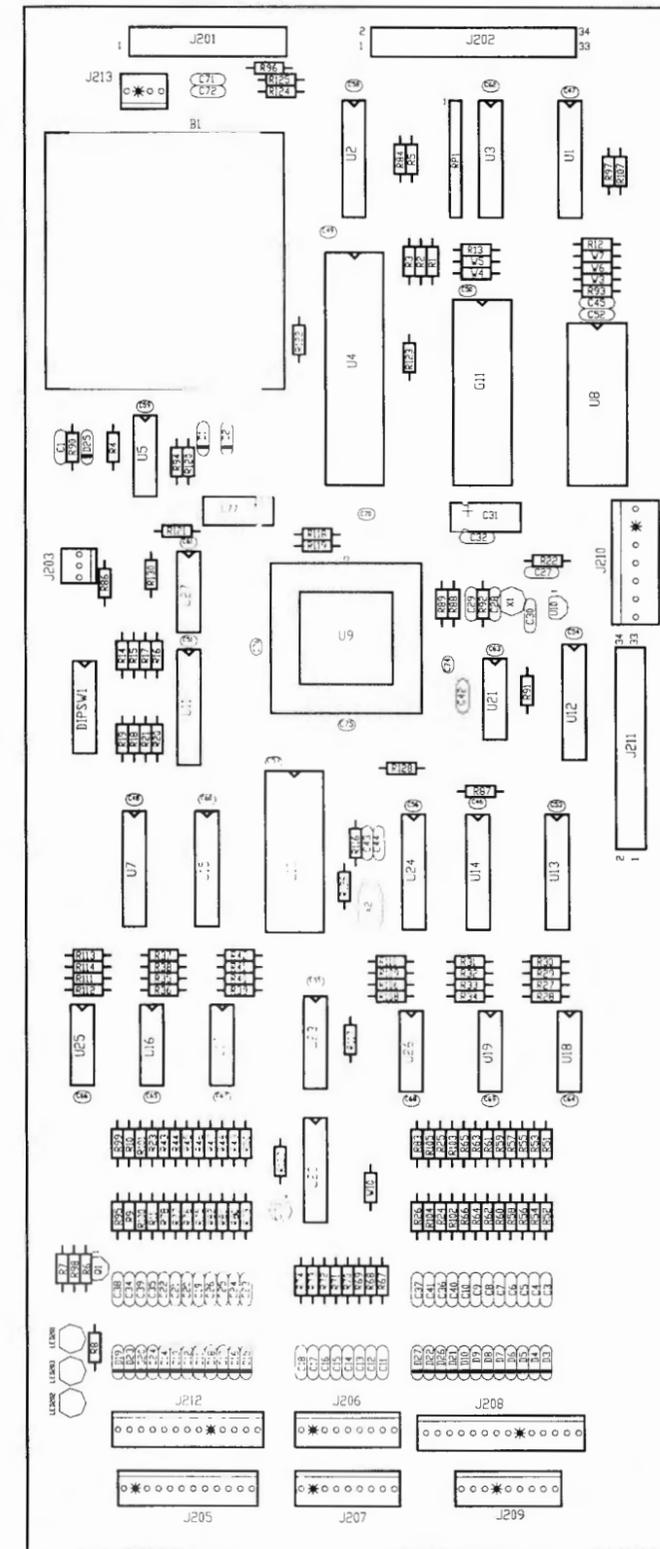
A-20580
Coin Interface PCB Assembly

*(This board does not contain optional items such as the coin counter and printer interface.)*
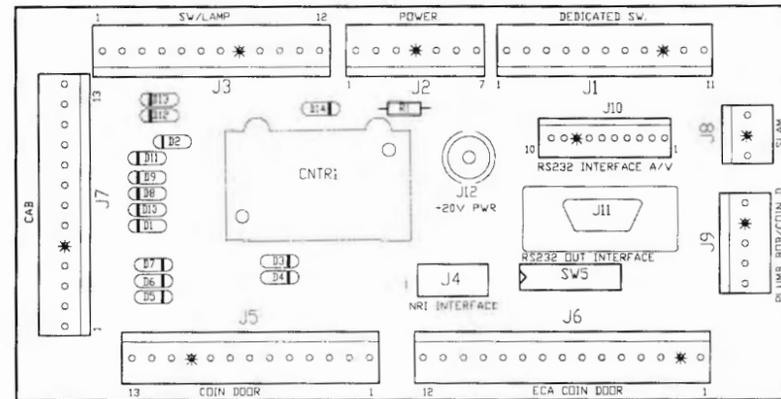
Part Number	Designator	Description
5070-09054-00	D1-D14	Diode 1N4004 1.0A.
5791-10862-11	J1	Connector, 11-pin Header Str. Sq.
5791-10862-07	J2	Connector, 7-pin Header Str. Sq.
5791-10862-12	J3	Connector, 12-pin Header Str. Sq.
5791-11000-10	J4	Connector, 10-pin Header Str. Sq.
5791-10862-13	J5, J7	Connector, 13-pin Header Str. Sq.
5791-10862-15	J6	Connector, 15-pin Header Str. Sq.
5791-10862-03	J8	Connector, 3-pin Header Str. Sq.
5791-10862-05	J9	Connector, 5-pin Header Str. Sq.
5791-12462-10	J10	Connector, 10-pin Header Str. Sq.
5010-13517-00	R1	Resistor, 15Ω, ¼w, 5%
5645-09025-00	SW5	Switch DIP 8 Pos.

A-17316
Flipper Opto PCB Assembly

Part Number	Designator	Description
A-20207.1	-	Flipper Opto Switch PCB
5010-09061-00	R1, R2	Resistor, 680Ω, 1/2w, 5%
5490-14575-00	OPTO1, OPTO2	IC Opto Integ Schmitt 10mA.
5791-13830-07	J1	Connector, 7-pin Header Solid Sq.
03-9001.1	-	Interrupter Flip-Opto
01-14348	-	Spring Flipper Switch

A-21399
2-LED Driver PCB Assembly
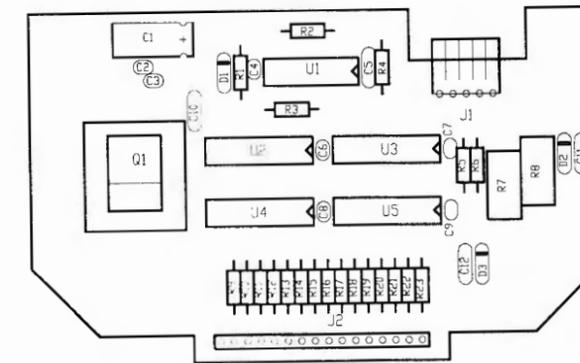
Part Number	Designator	Designator
4006-01003-06	Q1	Mach. Screw, 6-32 x 3/8"
4406-01128-00	Q1	Nut 6-32 KEPS
5040-14569-00	C1	Capacitor, 100µfd, 25v, Axial
5043-08996-00	C2-C4, C6-C10	Capacitor, 0.1µ, 50v (±20%) Axial
5048-11065-00	C5	Capacitor, 0.0022µF, 50v (±20%) Axial
5048-11030-00	C11, C12	Capacitor, 470pF, 50v, Axial
5070-09054-00	D1	Diode 1N4004, 1.0A.
5070-09266-00	D2, D3	Diode 1N5817, 1.0A.
5791-12622-05	J1	9-pin Connector
5791-15193-16	J2	16-pin Stacking Header, 0.5"
5010-09416-00	R9-R22	Resistor, 470Ω, 1/4w, 5%
5460-12423-00	Q1	ICLM 7812
5705-09042-00	Q1	Heatsink 6703
5010-08991-00	R1, R5, R23	Resistor, 4.7KΩ, 1/4w, 5%
5010-09358-00	R2, R3	Resistor, 1KΩ, 1/4w, 5%
5010-09036-00	R4	Resistor, 100Ω, 1/4w, 5%
5010-09034-00	R6	Resistor, 10KΩ, 1/4w, 5%
5010-12733-00	R7, R8	Resistor, 220KΩ, 1/4w, 5%
5370-12272-00	U1	IC LM339 Quad Comp
5315-15076-00	U2, U3	IC Preset Up/Down Counter
5280-14756-00	U4, U5	IC HEF4511B BCDT07SEG DEC

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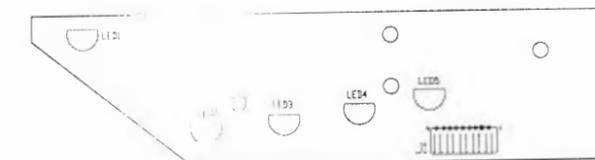
Part Number	Designator	Designator
5671-12731-00	LED1-LED5	Infra Red Diode
5791-12622-09	J1	Connector, 9-pin Header Sq.

A-15646
Opto 24-Switch PCB Assembly
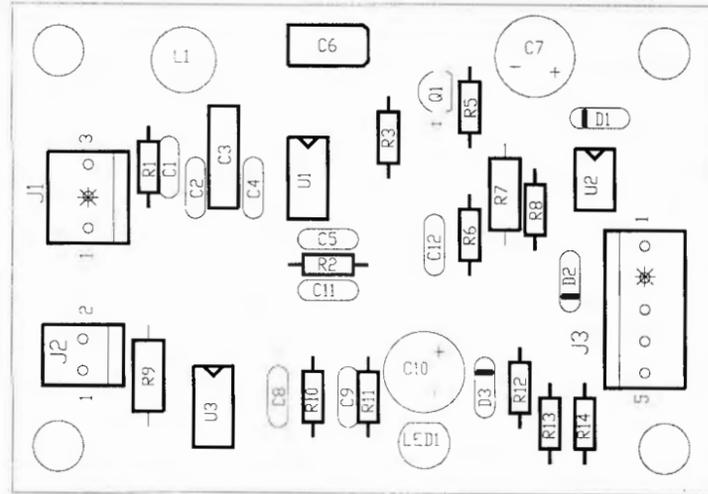
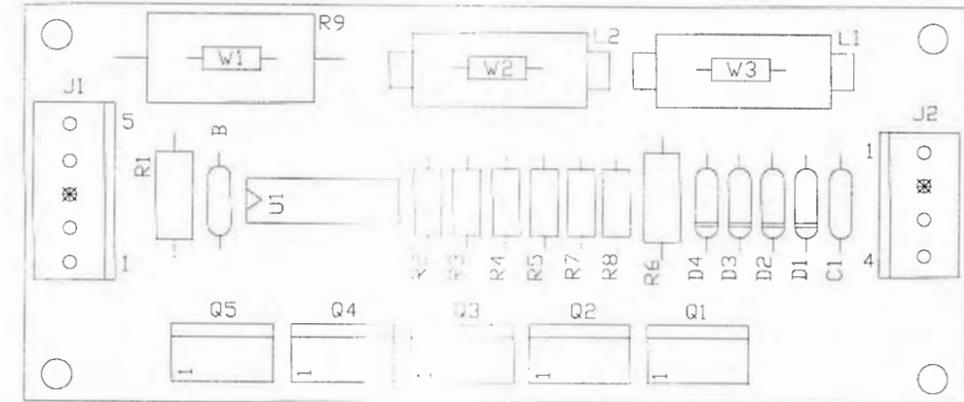| Part Number	Designator	Description	Part Number	Designator	Description
5370-10891-00	U1	I.C. Opto Receiver MC3373	5010-08997-00	R1	Resistor, 2.7KΩ, 1/4w, 5%
5490-10892-00	U2	I.C. Opto Isolator	5010-09162-00	R6	Resistor, 100KΩ, 1/4w, 5%
5431-10449-00	U3	I.C. 555 Timer	5010-09768-00	R3	Resistor, 180Ω, 1/4w, 5%
5192-13591-00	Q1	Trans. MPSA64 PNP Darlington	5010-09039-00	R4	Resistor, 10Ω, 1/4w, 5%
5043-10893-00	C3	Capacitor, .0015µF	5010-09324-00	R5	Resistor, 27KΩ, 1/4w, 5%
5043-09065-00	C4, C12	Capacitor, 470pF	5010-08930-00	R7	Resistor, 470Ω, 1.2w, 5%
5043-08996-00	C5, C11	Capacitor, 0.1µF	5010-09034-00	R8	Resistor, 10KΩ, 1/4w, 5%
5041-10588-00	C6	Capacitor, 6.8µF	5010-10022-00	R10	Resistor, 7.5KΩ, 1.4w, 5%
5043-08980-00	C8	Capacitor, .01µF	5010-08773-00	R11	Resistor, 18KΩ, 1/4w, 5%
5048-12577-00	C2	Capacitor, .47µF	5010-09085-00	R13	Resistor, 1.5KΩ, 1/4w, 5%
5048-11031-00	C1, C9	Capacitor, .001µF, 50v, 10%	5671-13732-00	LED1	Display LED RED 1
5040-10974-00	C7, C10	Capacitor, 100µF, 35v, (+80/-20%)	5791-12273-03	J1	Connector, 3-pin Header STR SQ.
5070-09054-00	D1-D3	Diode 1N4004, 1A	5791-12273-02	J2	Connector, 2-pin Header STR SQ.
5010-09534-00	R12	Resistor, 0Ω Jumper	5791-12273-05	J3	Connector, 5-pin Header STR SQ.
5010-10257-00	R2	Resistor, 75KΩ, 1/4w, 5%	5551-10890-00	L1	Inductor, 10mH
5010-13509-00	R9	Resistor, 330Ω, 1/2w, 5%			

A-21402
Defender Switch PCB Assembly

Part Number	Designator	Description
5043-08996-00	C1	Capacitor, 0.1µF, 50V (±20%)
5070-09054-00	D1-D10	Diode 1N4004, 1.0A
5791-12622-09	J1	Connector, 9-pin Header
5160-10269-00	Q1-Q5	Trans. 2N3904 NPN
5010-09061-00	R1, R4, R7, R10, R13	Resistor, 680Ω, 1/2w, 5%
5010-09358-00	R2, R5, R8, R11, R14	Resistor, 1KΩ, 1/4w, 5%
5010-08998-00	R3, R6, R9, R12, R15	Resistor, 2.2KΩ, 1/4w, 5%
5490-14575-00	U1-U5	IC Opto Inter w/Schmit 10mA

A-21568
High Current Driver Assembly w/Bracket

Part Number	Designator	Description
C-13963-1	-	High Current Driver Assembly
5010-08930-00	R1, R6	Resistor, 470Ω, 1/4w
5010-09034-00	R4, R5	Resistor, 10KΩ, 1/4w
5010-09314-00	R2, R3, R7, R8	Resistor, 1.2KΩ, 1/4w
5012-10024-00	R9	Resistor, 5.6KΩ, 1/4w
5010-09534-00	W1	Resistor, 0Ω, 1/4w
5043-08980-00	B	Capacitor, .01µF, 50v
5043-08996-00	C1	Capacitor, .1µF, 50v
5070-09054-00	D1-D4	Diode 1N4004
5162-12635-00	Q1, Q3	Trans TIP102
5192-12428-00	Q2, Q4, Q5	Trans TIP107
5370-12272-00	U1	IC LM339 Quad
5551-09822-00	L1, L2	IND 4.7µH 3A
5791-12273-04	J2	Connector 4-pin Header STR Sq.
5791-12273-05	J1	Connector, 5-pin Header STR Sq.
01-14632	-	PCB Mounting Bracket
07-6688-17N	-	Rivet: 1/8 x 5/32" Nickel

A-21380
2-Digit LED Assembly
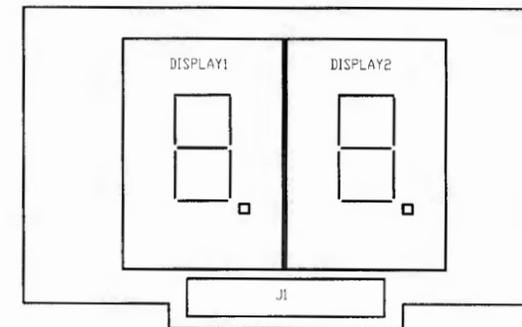
Part Number	Designator	Description
5671-15192-00	DISPLAY 1, DISPLAY 2	LED Display 7 Segment 1.5"
5792-11003-16	J1	PCB Connector

A-15595
7-Switch Opto PCB Assembly w/Bracket
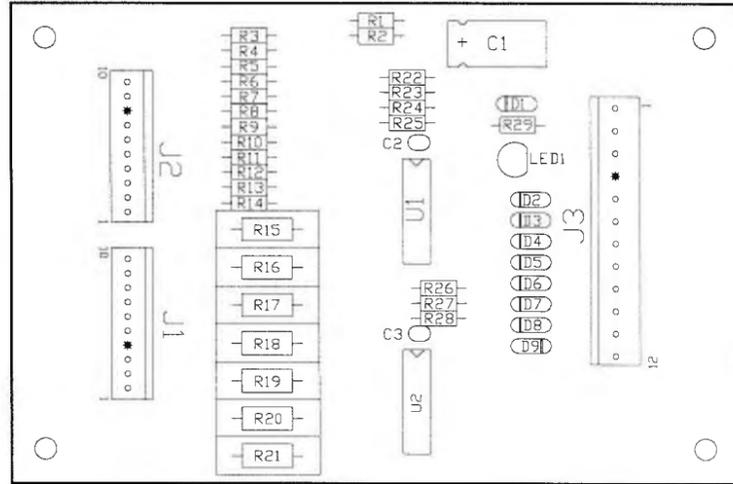
Part Number	Designator	Description
A-15576.1	-	7-Opto PCB Assembly
5040-12298-00	C1	Capacitor, 100M, 40v (±50%)
5043-08996-00	C2, C3	Capacitor, 0.01µ, 50v
5671-14516-00	LED1	Display LED Red
5370-12272-00	U1, U2	ICLM339 Quad
5070-09054-00	D1 - D9	Diode 1N4004 1.0A.
5010-12928-00	R15 - R21	Resistor, 270Ω, 2w, 5%
5010-09999-00	R1 - R14, R29	Resistor, 2KΩ, 1/4w, 5%
5010-09162-00	R23, R25, R26	Resistor, 100KΩ, 1/4w, 5%
5010-08774-00	R22, R24, R28	Resistor, 22KΩ, 1/4w, 5%
5010-09034-00	R28	Resistor, 10KΩ, 1/4w, 5%
5791-10862-12	J3	Connector, 12-pin Header Sq.
5791-13830-10	J1, J2	Connector, 10-pin Header Sq.
01-10756	-	PCB Mountnig Bracket
07-6688-18N	-	Rivet, 1/8 x 3/16"

A-18618-1
Trough IR Transistor PCB Assembly
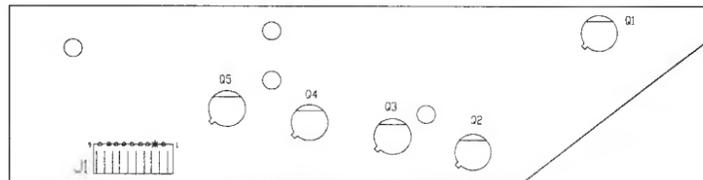
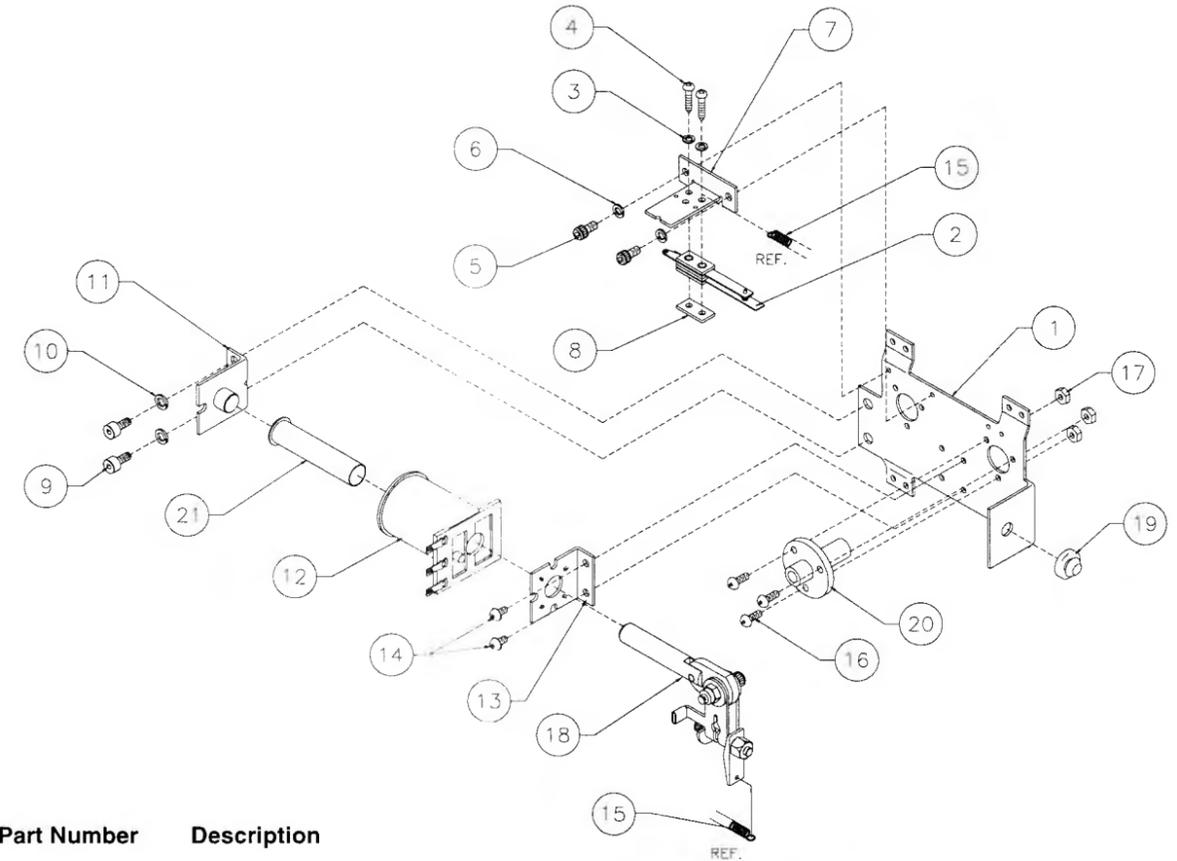| Part Number	Designator	Description
5671-14114-00	Q1 - Q5	Infra Red Photo Transistor
5791-12622-09	J1	Connector, 9-pin Header

A-15849-L
Flipper Assembly

Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, Left
2	SW-1A-194	Switch Assembly
3	4701-00002-00	Lock Washer #6 Split
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"
6	4701-00003-00	Lock Washer #8 Split
7	01-9375	Switch Mounting Bracket
8	20-6516	Speednut, Tinnerman
9	4010-01066-06	Cap Screw, 10-32 x 3/8"
10	4701-00004-00	Lock Washer #10 Split
11	A-12390	Flipper Stop Assembly
12	FL-11630	Flipper Coil, Red
13	01-7695-1	Solenoid Bracket
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"
15	10-364	Spring
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"
17	4406-01117-00	Nut 6-32 Hex.
* 18	A-15848-L	Crank Link Assembly, Left
a)	A-17050-L	Flipper Crank Assembly, Left
1.	01-11764-L	Flipper Crank, Left
2.	4700-00107-01	Mod-Crank Washer
3.	RM-23-06	H.S. Tubing ¼"
4.	4010-01066-20	Mach. Screw, 10-32 x ¼"
5.	4410-01127-00	Nut 10-32 Hex.
6.	4700-00107-00	FW, 13/64 x 5/8 x 12ga.
7.	4701-00004-00	Lockwasher #10 Split
8.	01-9376	Spring Retainer
b)	A-15847	Flipper Link Assembly

* See page 2-19 for assembly detail drawing.

Item	Part Number	Description
18 c)	02-4676	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lock Washer #10 Split
g)	4410-01132-00	Nut 10-32 ESN
19	23-6577	Bumper Plug, 5/8"
20	03-7568	Flipper Bushing
21	03-7066-5	Coil Tubing

Associated Parts:
(Not Shown)

	23-6695	Flipper Ring
	20-10110-15	Flipper Bat w/Shaft

Flipper Notes...

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

A-21717
Flipper Assembly

A-14876-R
Flipper Assembly

REF.

REF.
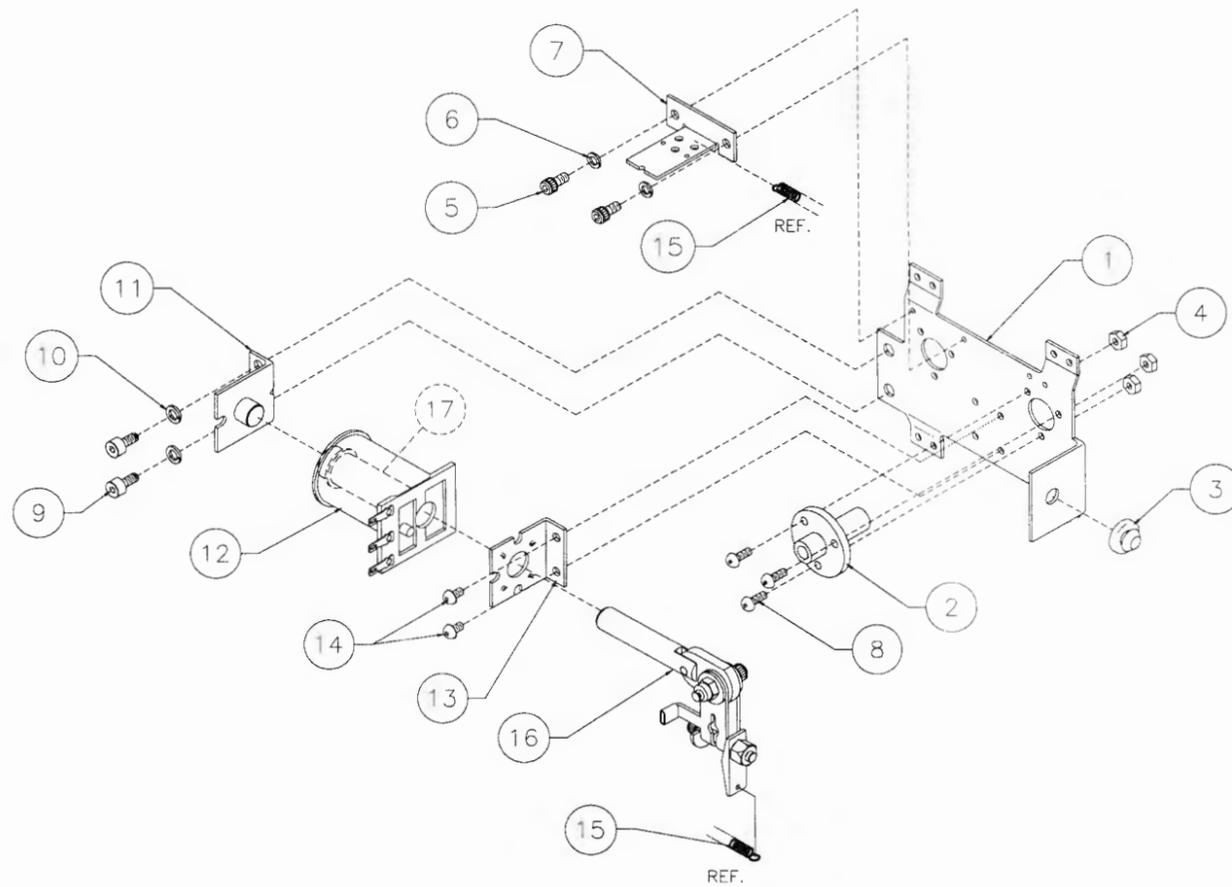
Item	Part Number	Description
1	B-13104-L	Flipper Base Assembly, Left
2	03-7568	Flipper Bushing
3	23-6577	Bumper Plug, 5/8"
4	4406-01117-00	Nut 6-32 Hex.
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"
6	4701-00003-00	Lock Washer #8 Split
7	01-9375	Switch Mounting Bracket
8	4006-01005-06	Mach. Screw, 6-32 x 3/8"
9	4010-01066-06	Cap Screw, 10-32 x 3/8"
10	4701-00004-00	Lock Washer #10 Split
11	A-12390	Flipper Stop Assembly
12	FL-11753	Flipper Coil, Yellow
13	01-7695-1	Solenoid Bracket
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"
15	10-364	Spring

Item	Part Number	Description
*16	A-15848-L	Crank Link Assembly, Left
a)	A-17050-L	Flipper Crank Assembly, Left
1.	01-11764-L	Flipper Crank, Left
2.	4700-00107-01	Mod-Crank Washer
3.	RM-23-06	H.S. Tubing ¼"
4.	4010-01066-20	Mach. Screw, 10-32 x ¼"
5.	4410-01127-00	Nut 10-32 Hex.
6.	4700-00107-00	FW, 13/64 x 5/8 x 12ga.
7.	4701-00004-00	Lockwasher #10 Split
8.	01-9376	Spring Retainer
b)	A-15847	Flipper Link Assembly
c)	02-4676	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lock Washer #10 Split
g)	4410-01132-00	Nut 10-32 ESN
17	03-7066-5	Coil Tube

Associated Parts: (Not Shown)

	23-6695	Flipper Ring
	20-10110-15	Flipper Bat w/Shaft

*See page 2-19 for assembly detail drawing.
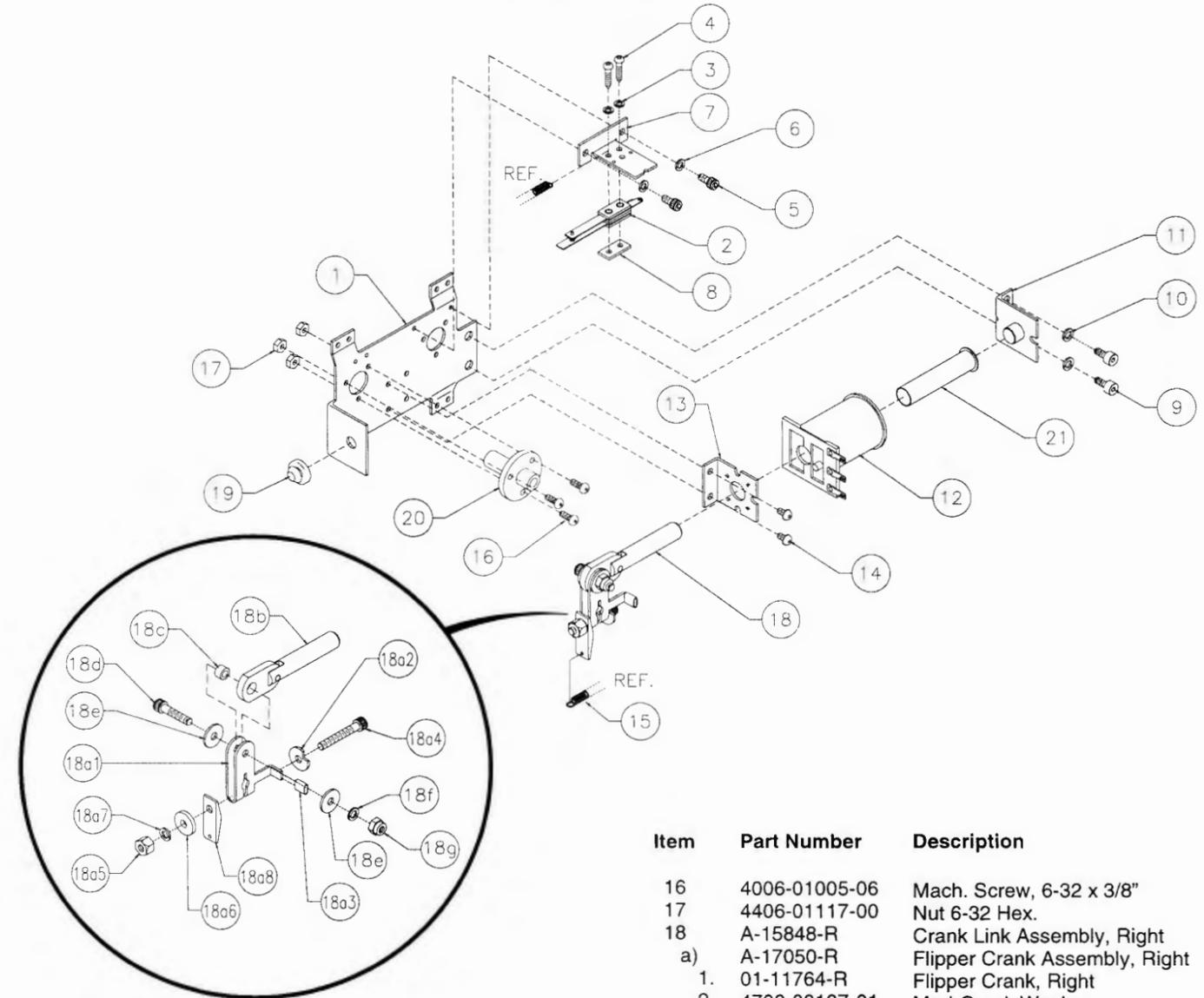
Item	Part Number	Description
1	A-14877-R	Flipper Bracket - Sub-Assy.
2	SW-1A-194	Switch Assembly
3	4701-00002-00	Lockwasher #6 Split
4	4105-01019-10	Sh. Metal Screw, #5 x 5/8"
5	4008-01079-05	Mach. Screw, 8-32 x 5/16"
6	4701-00003-00	Lockwasher #8 Split
7	01-9375	Switch Mounting Bracket
8	20-6516	Speednut, Tinnerman
9	4010-01066-06	Cap Screw, 10-32 x 3/8"
10	4701-00004-00	Lockwasher #10 Split
11	A-12390	Flipper Stop Assembly
12	FL-11630	Flipper Coil, Red
13	01-7695-1	Solenoid Bracket
14	4006-01017-04	Mach. Screw, 6-32 x 1/4"
15	10-364	Spring

Item	Part Number	Description
16	4006-01005-06	Mach. Screw, 6-32 x 3/8"
17	4406-01117-00	Nut 6-32 Hex.
18	A-15848-R	Crank Link Assembly, Right
a)	A-17050-R	Flipper Crank Assembly, Right
1.	01-11764-R	Flipper Crank, Right
2.	4700-00107-01	Mod-Crank Washer
3.	RM-23-06	H.S. Tubing ¼"
4.	4010-01066-20	Mach. Screw, 10-32 x 1-1/4"
5.	4410-01127-00	Nut 10-32 Hex.
6.	4700-00107-00	FW, 13/64x5/8x12ga.
7.	4701-00004-00	Lockwasher #10 Split
8.	01-9376	Spring Retainer Bracket
b)	A-15847	Flipper Link Assembly
c)	02-4676	Link Spacer Bushing
d)	4010-01086-14	Cap Screw, 10-32 x 7/8"
e)	4700-00023-00	Flat Washer, 5/8 x 13/64 x 16ga.
f)	4701-00004-00	Lockwasher #10 Split
g)	4410-01132-00	Nut 10-32 ESN
19	23-6577	Bumper Plug, 5/8"
20	03-7568	Flipper Bushing
21	03-7066-5	Coil Tubing

Associated Parts: (Not Shown)

	23-6695	Flipper Rubber Ring, Red
	20-10110-15	Flipper Bat & Shaft Assembly

A-19963-1
Ball Trough Assembly Complete

A-17811
Kicker Arm (Slingshot) Assembly
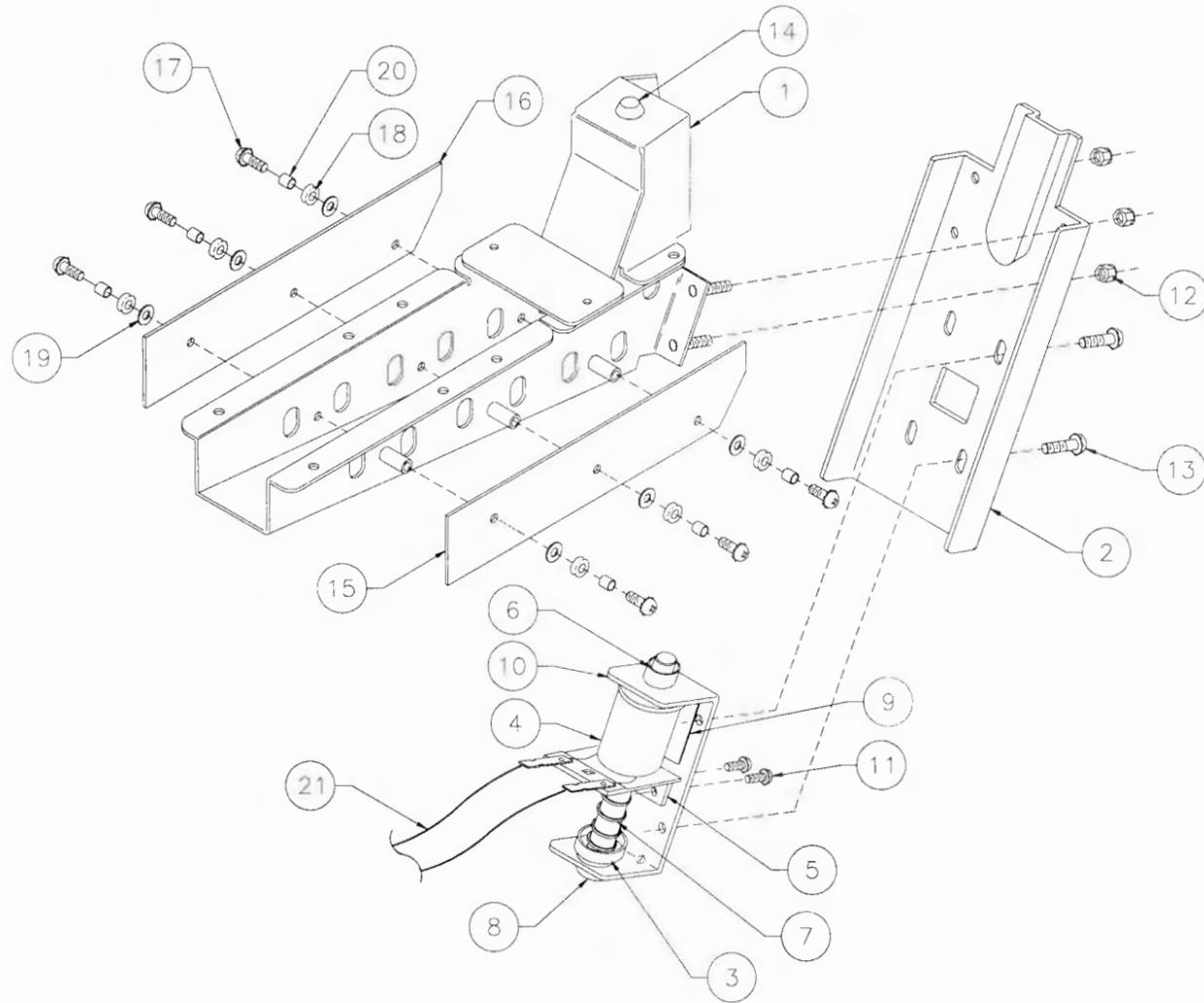
Item	Part Number	Description	Item	Part Number	Description
1	A-16809-2	Ball Trough Welded Assy.	12	4408-01119-00	Nut 8-32 ESN
2	01-11587	Ball Trough Front	13	4008-01017-06	Mach. Screw, 8-32 x 3/8"
3	A-6306-2	Bell Armature Assembly	14	23-6702	Bumper Plug
4	AE-26-1500	Coil Assembly	15	A-18617-1	Trough IRED LED PCB Assembly
5	01-8-508-T	Solenoid Assembly	16	A-18618-1	Trough IRED Transistor PCB Assy.
6	03-7067-5	Coil Tubing	17	4006-01003-10	Mach. Screw, 6-32 x 5/8" SEMS
7	10-135	Spring	18	23-6626	Rubber Grommet
8	23-6420	Rubber Grommet	19	4700-00004-00	Flat Washer, 9/64 x 7/16 x 21ga.
9	03-8523	Insulator	20	02-4975	Bushing
10	01-11586	Coil Mounting Bracket	21	H-19523	Mini Solenoid Cable
11	4008-01017-05	Mach. Screw, 8-32 x 5/16"			

Associated Parts for Right & Left Kickers:

Item	Part Number	Description	Item	Part Number	Description
1	02-2364	Coil Plunger	8	**B-9362-R-3**	**Coil & Bracket Assembly**
2	A-17810	Mounting Bracket Assembly	a)	A-17808	Bracket & Stop Assembly
3	A-12664	Kicker Crank Assembly	b)	01-8-508-S	Coil Retaining Bracket
4	12-6227	Hairpin Clip	c)	4006-01017-06	Mach. Screw, 6-32 x 3/8"
5	4700-00030-00	FW, 17/64 x 1/2 x 15ga.	d)	4406-01119-00	Nut, 6-32 ESN
6	03-8085	Armature Link	e)	AE-26-1200	Coil Assembly
7	20-8716-5	Roll Pin, 1/8 x 7/16"	f)	03-7066	Coil Tubing
			g)	H-19523	Mini Solenoid Cable
			9	10-128	Spring

Jet Bumper Assemblies

B-9414
Jet Bumper Assembly

Item	Part Number	Description
1	A-4754	Bumper Ring Assembly
2	03-6009-A5	Bumper Base, White
3	03-6035-5	Bumper Wafer, White
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	03-9266-9	Jet Bumper Cap, Red
9	03-9267-9	Jet Bumper Dome, Red

B-13123
Jet Bumper Assembly
(Same as B-9414 except for the following items)

Item	Part Number
6	Not Used
7	Not Used
8	Not Used
9	Not Used

A-21841
Jet Bumper Assembly
(Same as B-9414 except for the following items)

Item	Part Number	Description
3	03-9809	Bumper Wafer, Purple
7	24-8802	Bulb #906(13v., 0.69A.)
8	Not Used	
9	Not Used	
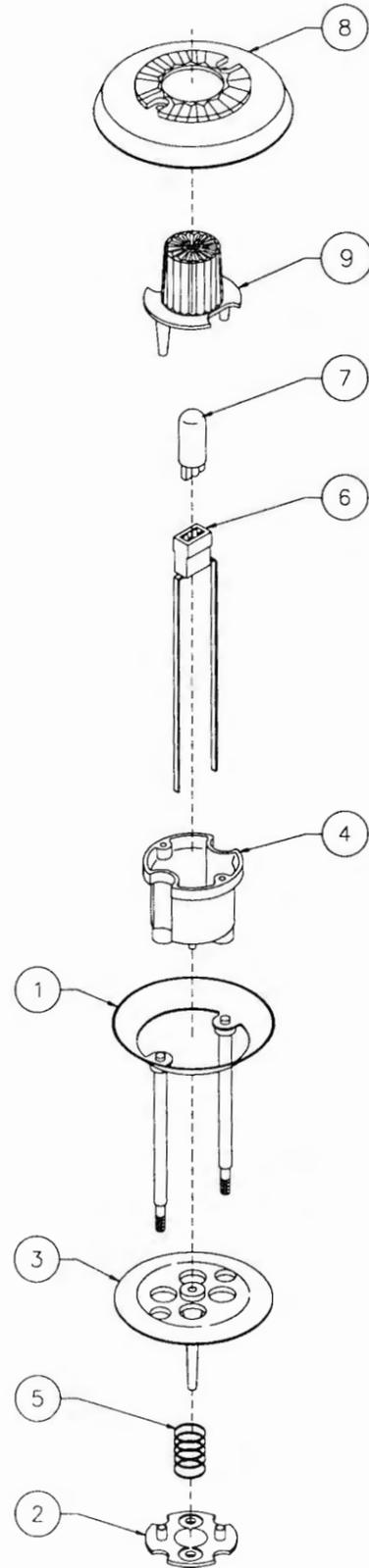
A-9415-2
Jet Bumper Coil Assembly
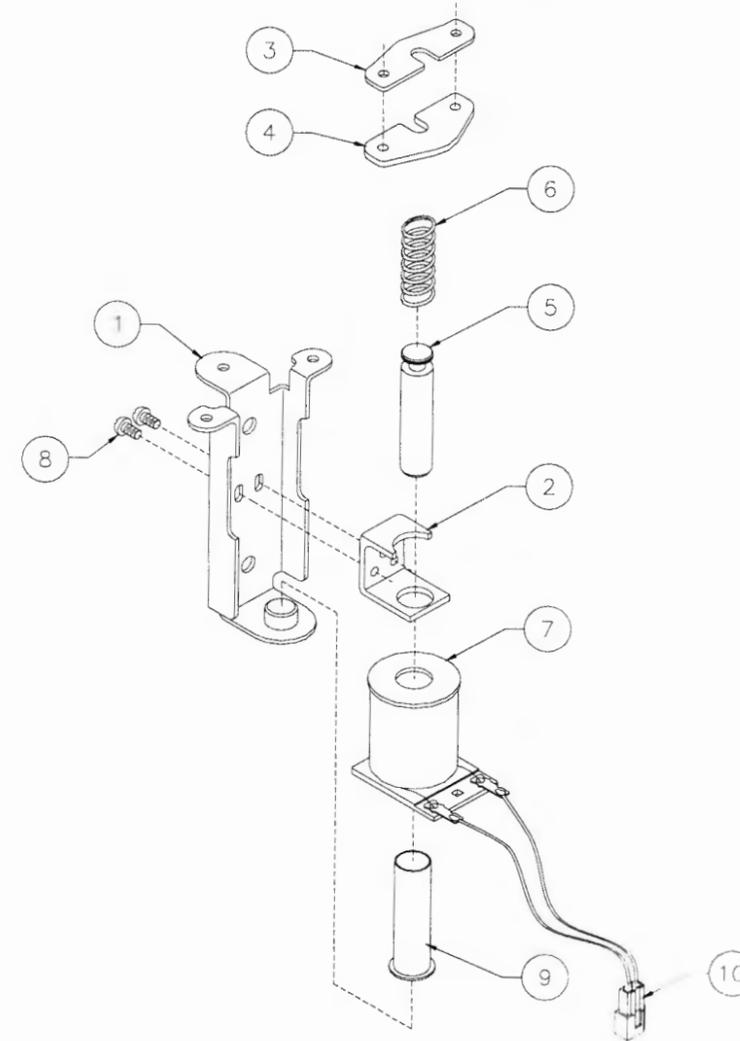
Item	Part Number	Description
1	04-10888	Bracket & Stop Assembly
2	01-1747	Coil Retaining Bracket
3	01-5492	Armature Link, Steel
4	01-5493	Armature Link, Bakeline
5	02-3406-1	Coil Plunger
6	10-326	Armature Spring
7	AE-26-1200	Coil Assembly
8	4006-01017-04	Mach. Screw, 6-32 x 1/4"
9	03-7066	Coil Tubing
10	H-19523	Cable

Associated Parts:
(Not Shown)

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

A-9415-3
Jet Coil & Bracket Assembly
(Same as A-9415-2 except for the following item):

Item	Part Number	Description
10	H-19523-1	Cable

A-21411-1
Pass Assembly - No. 1
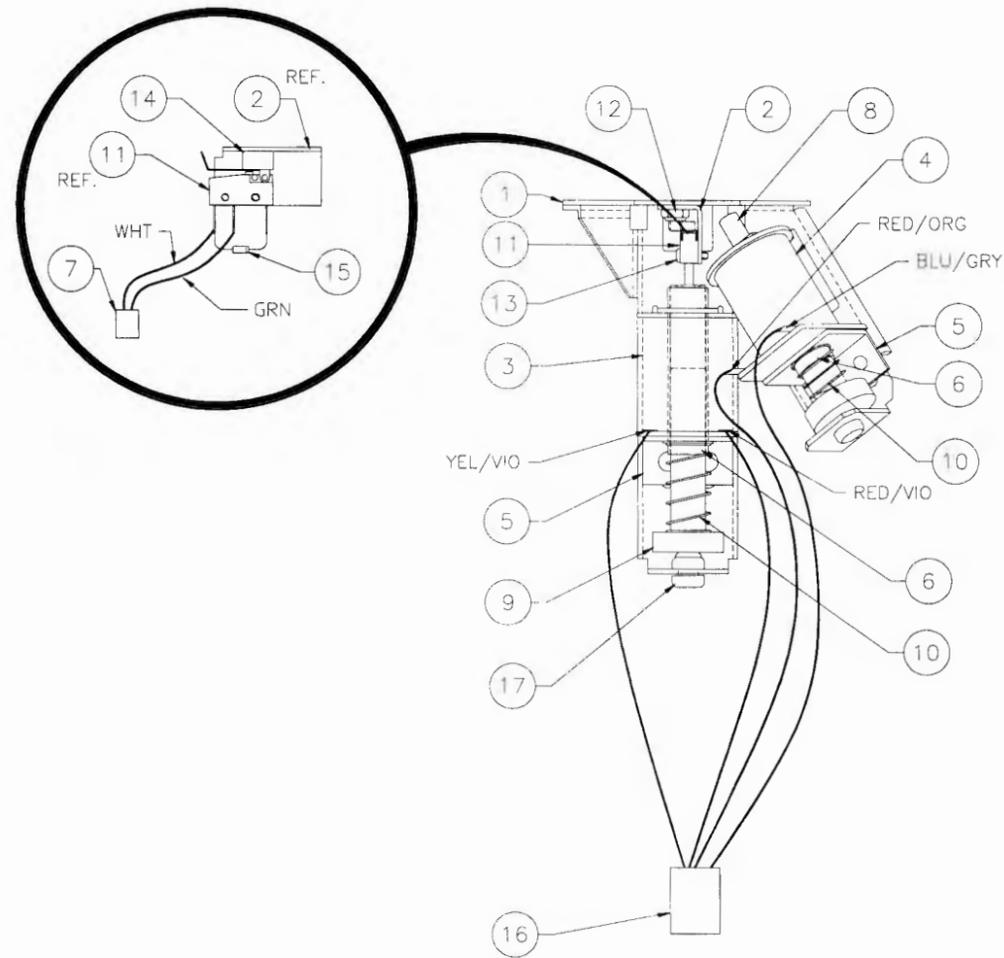
Item	Part Number	Description
1	04-10705-1	Bracket - Pass Mech. Right
2	01-14592.1	Pass Switch Mtg. Bracket
3	AE-23-800	Coil Assembly
4	AE-29-2000	Coil Assembly
5	04-10322-2	Coil Bracket
6	03-7067	Coil Tubing
7	H-16437	Switch Cable
8	A-15371	Plunger Assembly
9	A-17767	Bell Armature Assembly
10	10-135	Spring Plunger
11	5647-12693-66	Sub Mini Micro Switch
12	4408-01119-00	Nut 8-32 ESN
13	4002-01105-06	Mach. Screw, 2-56 x 3/8"
14	23-6652	Foam Tape - Edge Protector
15	5070-09054-00	Diode 1N4004 1.0A.
16	H-21560	Shooter 1 Cable
17	23-6420	Rubber Grommet

A-21411-2   Pass Assembly - No. 2
A-21411-3   Pass Assembly - No. 3
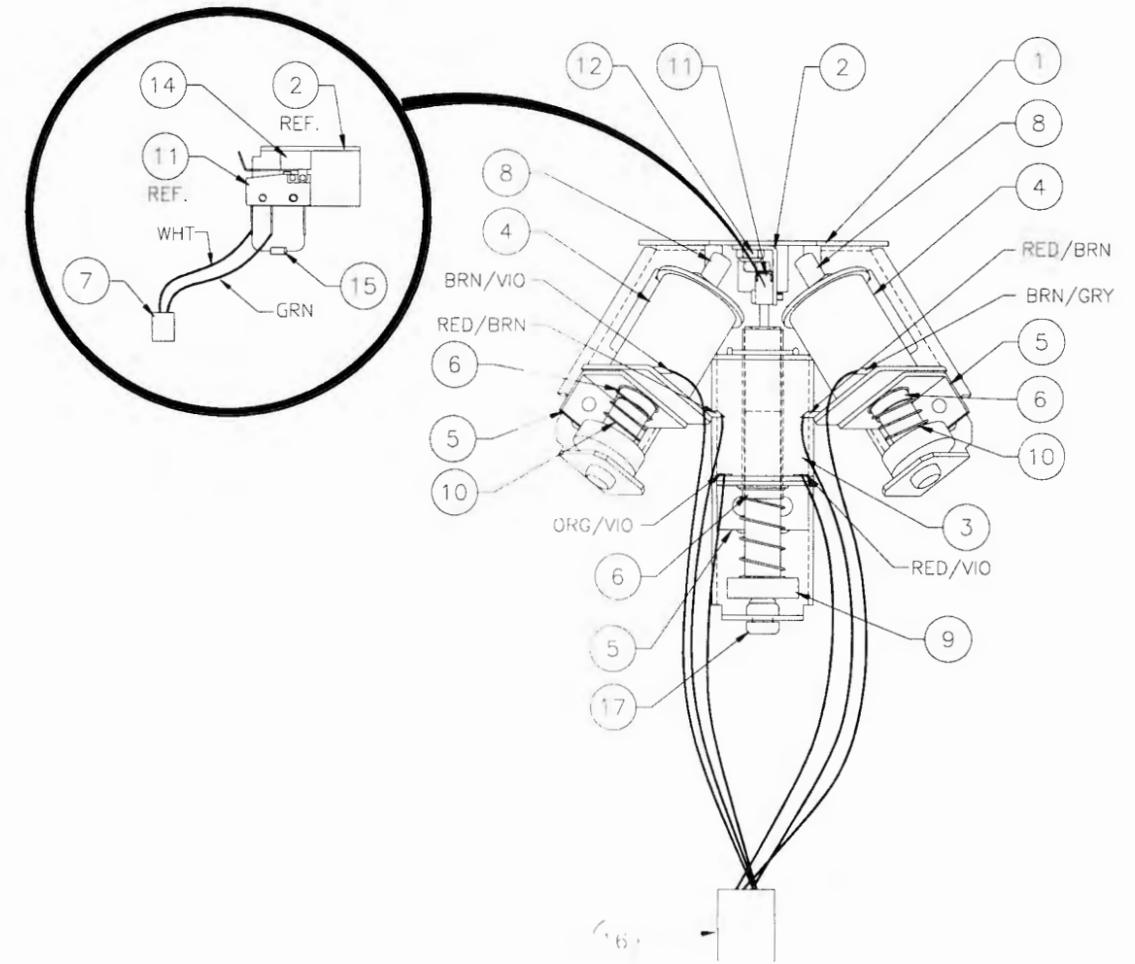
Item	Part Number	Description
1	04-10705-3	Bracket - Pass Mech. Center
2	01-14592.1	Pass Switch Mtg. Bracket
3	AE-23-800	Coil Assembly
4	AE-29-2000	Coil Assembly
5	04-10322-2	Coil Bracket
6	03-7067	Coil Tubing
7	H-16437	Switch Cable
8	A-15371	Plunger Assembly
9	A-17767	Bell Armature Assembly
10	10-135	Spring Plunger
11	5647-12693-66	Sub Mini Micro Switch
12	4408-01119-00	Nut 8-32 ESN
13	4002-01105-06	Mach. Screw, 2-56 x 3/8"
14	23-6652	Foam Tape - Edge Protector
15	5070-09054-00	Diode 1N4004 1.0A.
16	H-21561	Shooter 2 Cable *(use with A-21411-2)*
	H-21562	Shooter 3 Cable *(use with A-21411-3)*
17	23-6420	Rubber Grommet

A-21411-4
Pass Assembly - No. 4
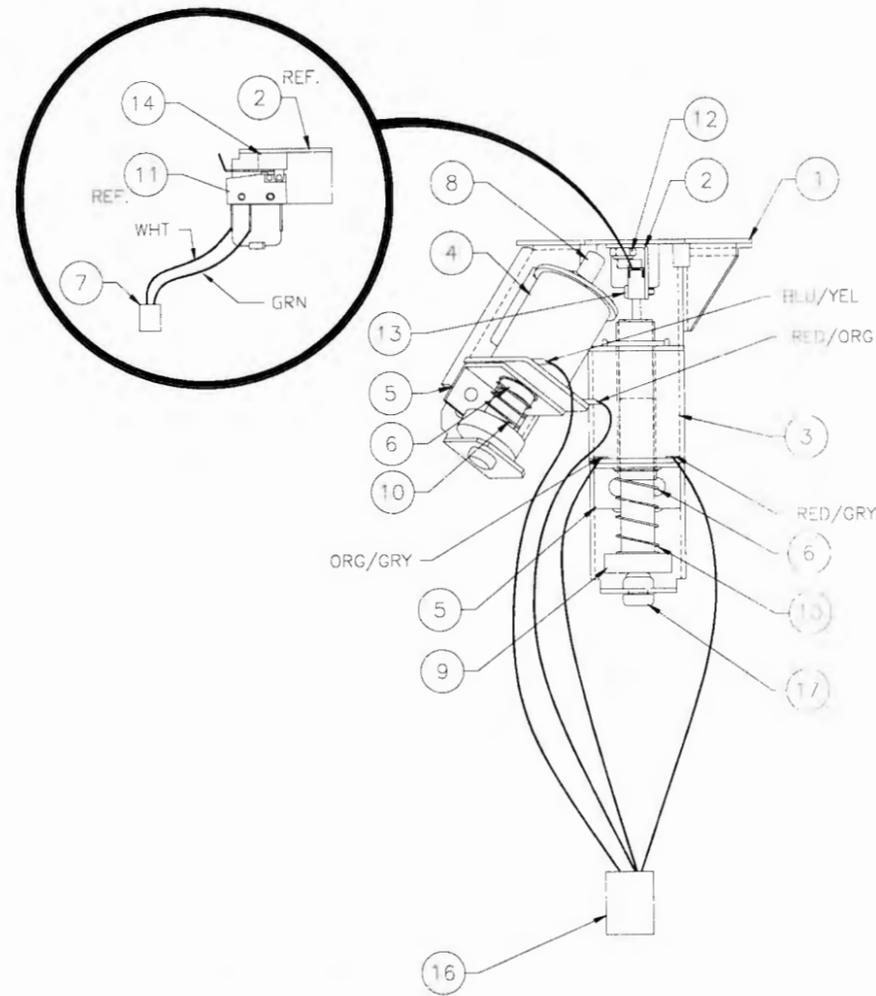
Item	Part Number	Description
1	04-10705-2	Bracket - Pass Mech. Left
2	01-14592.1	Pass Switch Mtg. Bracket
3	AE-23-800	Coil Assembly
4	AE-29-2000	Coil Assembly
5	04-10322-2	Coil Bracket
6	03-7067	Coil Tubing
7	H-16437	Switch Cable
8	A-15371	Plunger Assembly
9	A-17767	Bell Armature Assembly
10	10-135	Spring Plunger
11	5647-12693-66	Sub Mini Micro Switch
12	4408-01119-00	Nut 8-32 ESN
13	4002-01105-06	Mach. Screw, 2-56 x 3/8"
14	23-6652	Foam Tape - Edge Protector
15	5070-09054-00	Diode 1N4004 1.0A.
16	H-21563	Shooter 4 Cable
17	23-6420	Rubber Grommet

A-21553
Auto-Fire Assembly
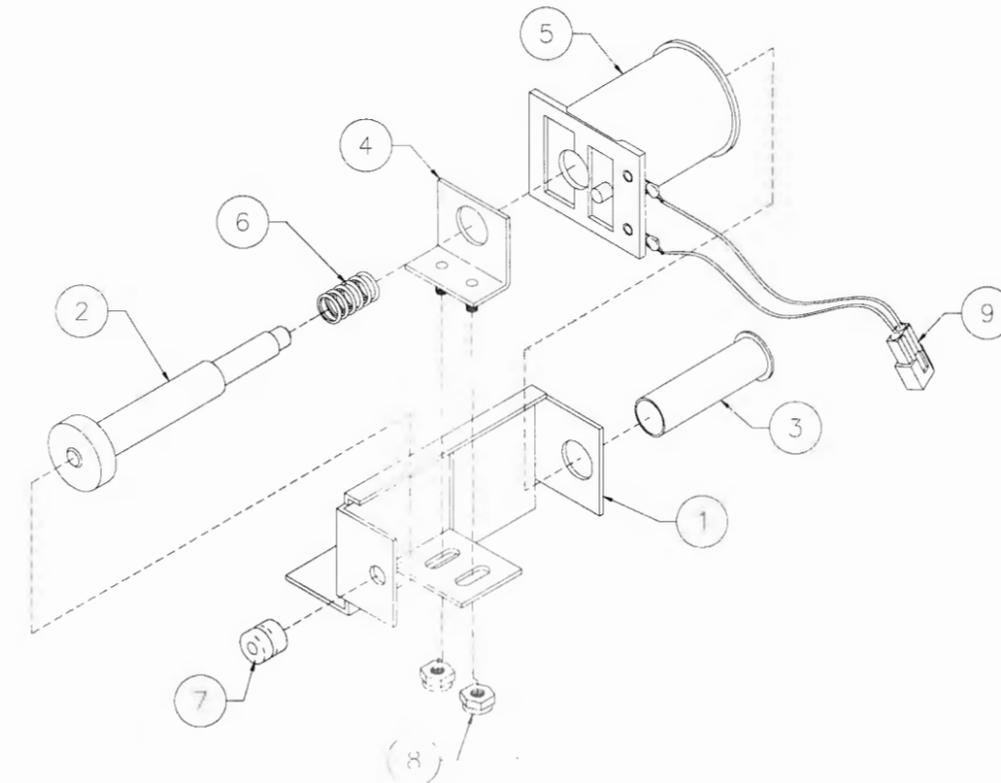
Item	Part Number	Description
1	01-14618	Bracket Assembly
2	A-6306-2	Plunger Assembly
3	03-7067	Coil Tubing
4	04-10322-2	Coil Bracket
5	AE-24-900	Coil Sub-Assembly
6	10-135	Spring
7	23-6420	Rubber Grommet
8	4408-01119-00	Nut 8-32 ESN
9	H-19523	Mini Solenoid Cable

A-21413
Defender Arm Assembly

Item	Part Number	Description
1	04-10706	Base Plate
2	04-10707.1	Defender Arm
3	04-10708	Motor Bracket
4	04-10727	Stopper Bracket
5	23-6795	Bumper
6	03-7568	Flipper Bushing
7	01-14608	Flap
8	14-8034	Motor
9	02-5049-6	F-F Spacer #8-32 x 1-5/8"
10	5647-12693-04	Micro Switch
11	4010-01082-04	Set Screw, 10-32 x ¼"
12	4002-01105-07	Mach. Screw, 2-56 x 7/16"
13	07-6688-17N	Rivet: 1/8 x 5/32"
14	4008-01113-16	Mach. Screw: 8-32 x 1"
15	4406-01119-00	Nut 6-32 ESN
16	4408-01119-00	Nut 8-32 ESN
17	4004-01003-05	Mach. Screw, 4-40 x 7/8"
18	A-21402	Opto Board
19	H-21545.1	Defender Cable Assembly

Associated Assembly:
(Shown below)

Item	Part Number	Description
20	A-21392	Defender Assembly
a)	04-10726	Blocker Bracket
b)	03-9673	Defender Wheel
c)	01-14627	Deflector Flap
d)	4700-00021-00	Flat Washer: 13/64 x 7/16 x 21ga.
e)	4004-01073-04B	Cap Screw: 4-40 x ¼"
f)	07-6688-17N	Rivet 1/8 x 5/32 Nickel
g)	31-2810-23B	Playfield Plastic
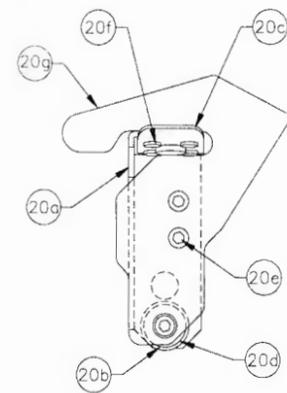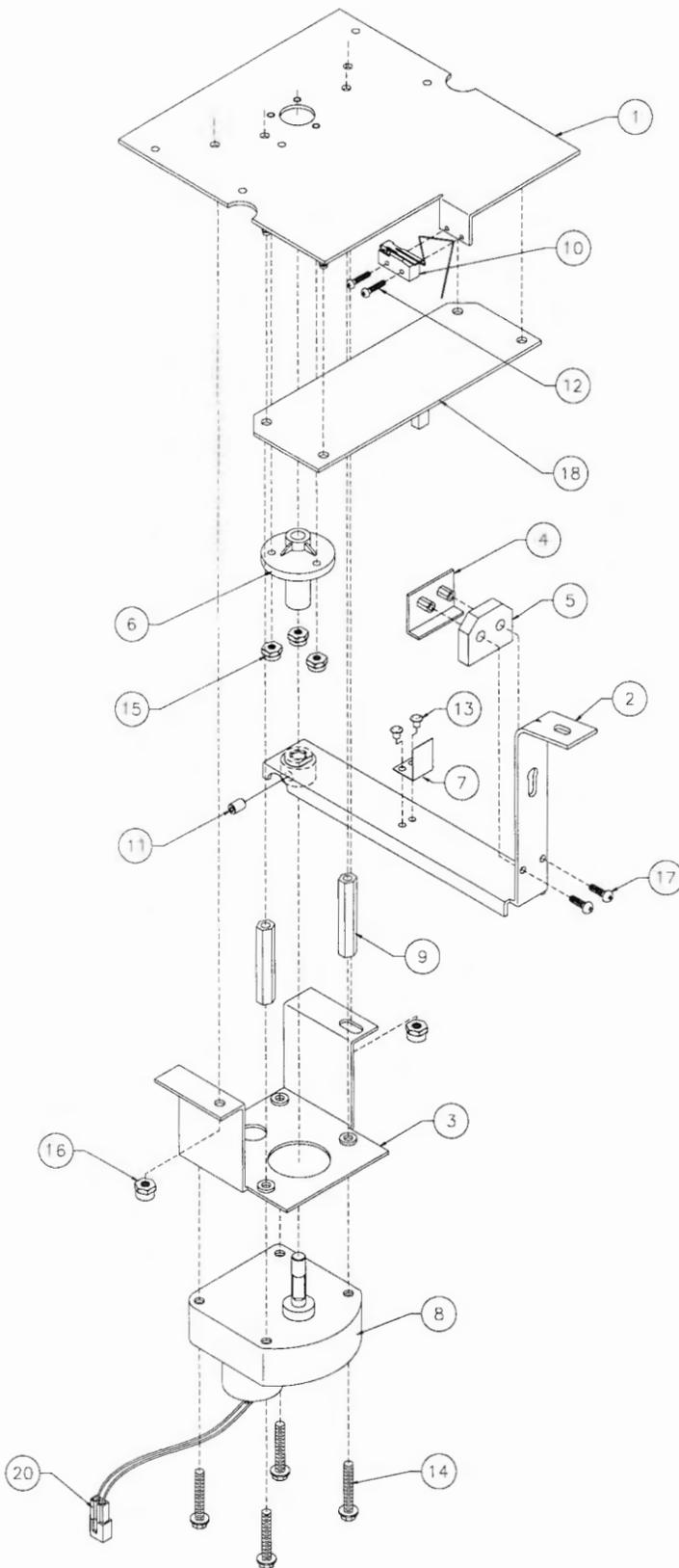
A-21392   Defender Assembly

A-21393
Back Board Assembly
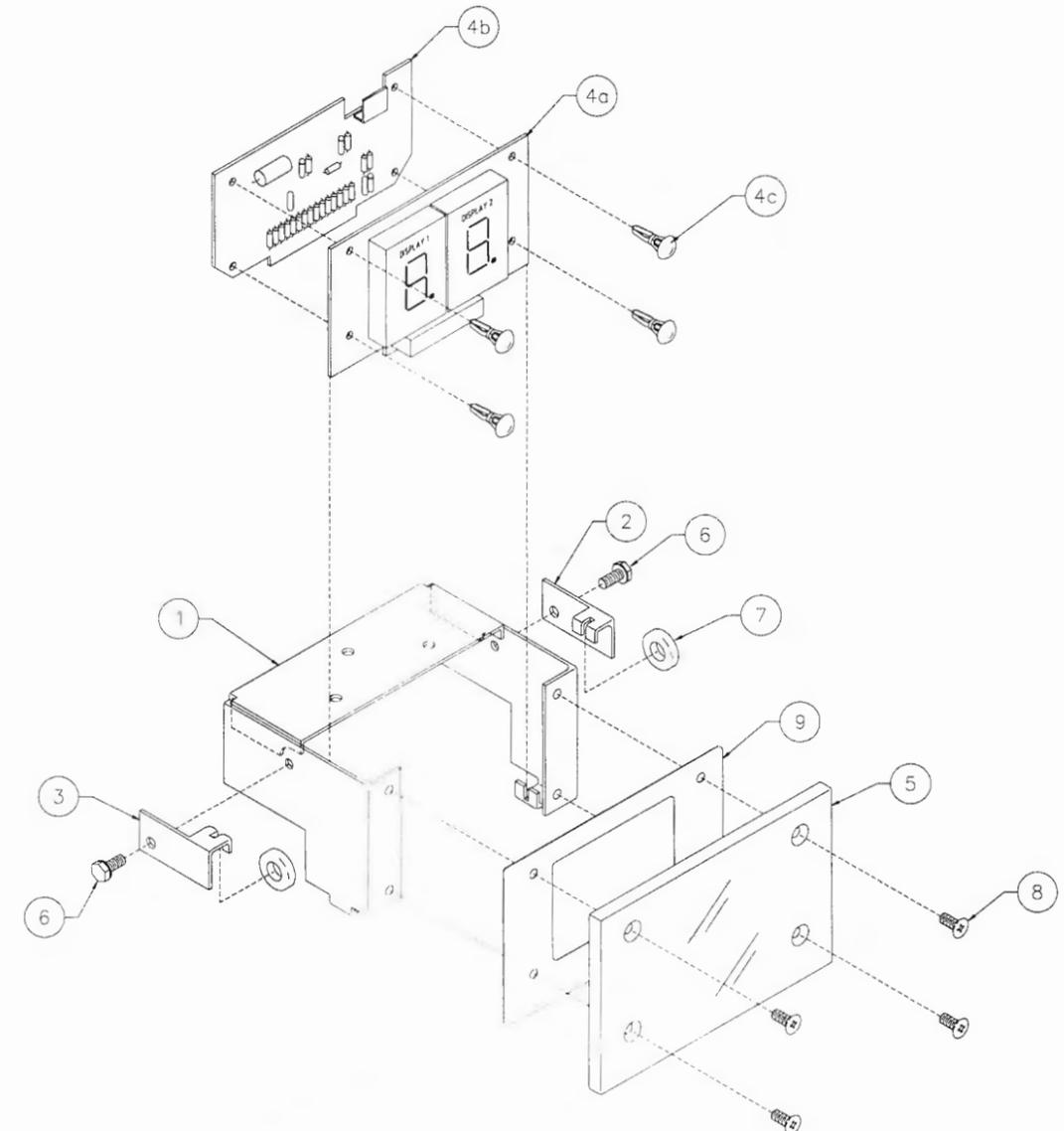
Item	Part Number	Description
1	04-10710	Mounting Bracket
2	01-14490-1	PCB Mounting Bracket (Right)
3	01-14490-2	PCB Mounting Bracket (Left)
4	A-21585	2 LED Assembly
a)	A-21380	2-Digit LED
b)	A-21399	2-LED Driver
c)	20-9562	Spacer
5	03-9670	Back Board
6	4008-01168-06	Mach. Screw, 8-32 x 3/8"
7	23-6641	Rubber Ring, 41/64 "
8	4008-01041-06	Mach. Screw, 8-32 x 3/8"
* 9	31-2812-11	Decal

* Not available for individual sale. Order Decal Set 31-2812.

A-21520
NBA Magnet Assembly
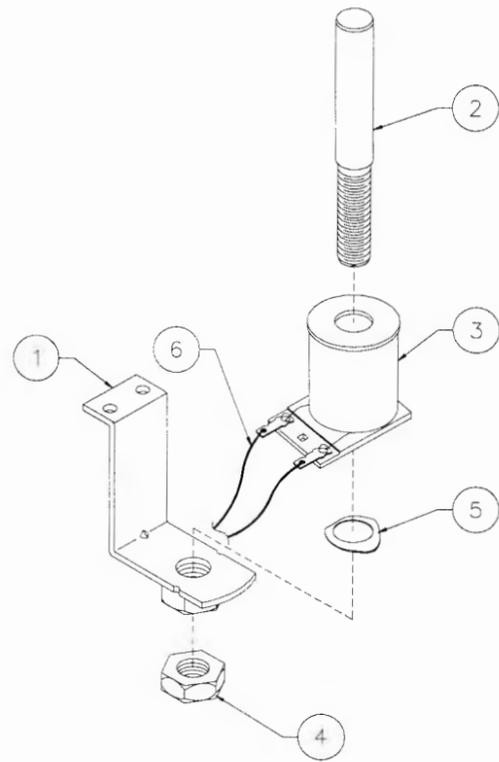
Item	Part Number	Description
1	04-10712	Mounting Bracket
2	02-5289	Magnet Coil Plunger
3	B-13522	Magnet Coil
4	4423-01135-00	Jam Nut, 7/16-20
5	4705-00005-00	Spring Washer: 51/64 x 17/32 x 26ga.
6	H-19523	Mini Solenoid Cable

A-17796
Ball Gate Actuator Assembly
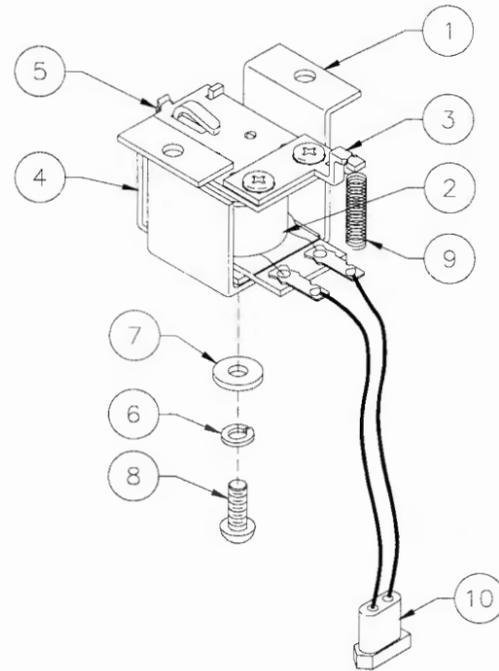
Item	Part Number	Description
1	01-12348	Ball Gate Coil Bracket
2	A-14406	Coil Assembly
3	A-11146	Armature Assembly
4	A-6892	Frame & Eyelet Assy.
5	10-120	Spring
6	4701-00003-00	Lockwasher #18 Split
7	4700-00089-00	Flat Washer: 11/64 x 7/16 x 16ga.
8	4008-01021-07	Mach. Screw, 8-32 x 7/16"
9	10-194	Spring
10	H-19523	Cable

A-21530
Loop Diverter Assembly
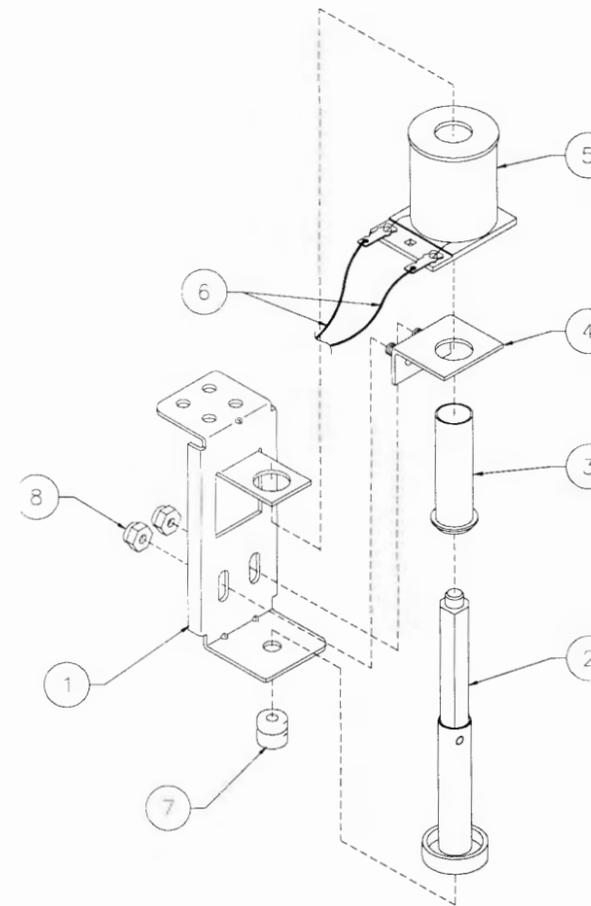
Item	Part Number	Description
1	01-14616	Bracket Assembly
2	04-10723	Plunger Assembly
3	03-7067-5	Coil Tubing
4	04-10322-2	Coil Bracket
5	AE-26-1500	Coil Sub-Assembly
6	H-19523	Mini Solenoid Cable
7	23-6420	Rubber Grommet
8	4408-01119-00	Nut 8-32 ESN

A-21531
Hook Diverter Assembly
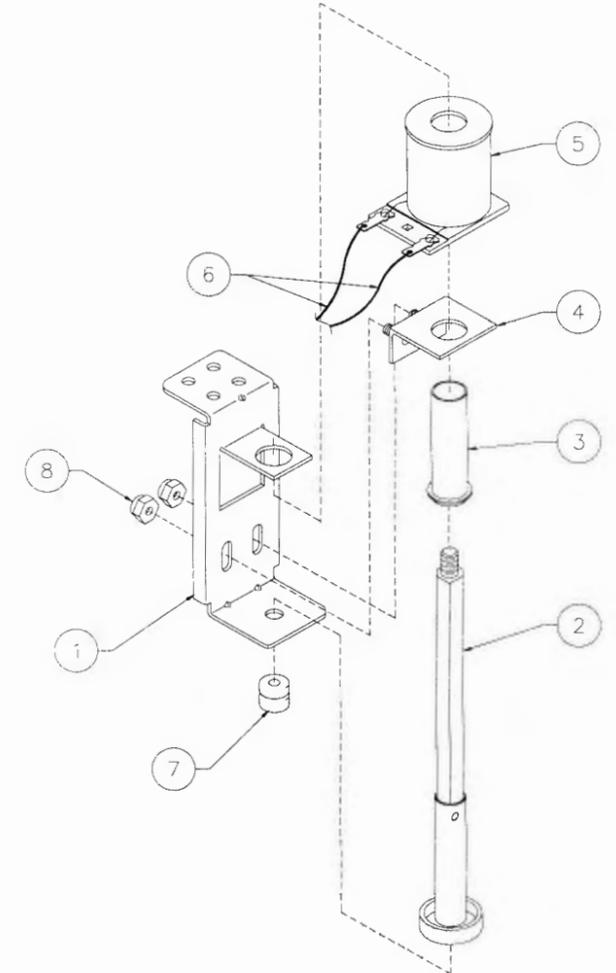
Item	Part Number	Description
1	01-14616	Bracket Assembly
2	04-10724	Plunger Assembly
3	03-7067-5	Coil Tubing
4	04-10322-2	Coil Bracket
5	AE-26-1500	Coil Sub-Assembly
6	H-19523	Mini Solenoid Cable
7	23-6420	Rubber Grommet
8	4408-01119-00	Nut 8-32 ESN

04-10346
Tilt Mechanism Assembly

04-10346
TILT MECHANISM ASSY.

Associated Assemblies:

20-6502-A
PLUMB BOB

20-10289
FASTENER
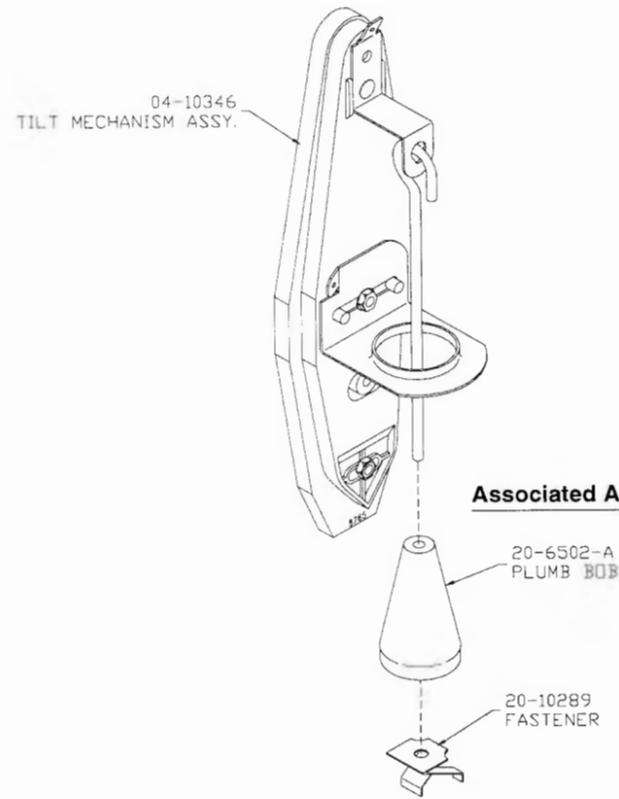
B-10686-1
Knocker Assembly
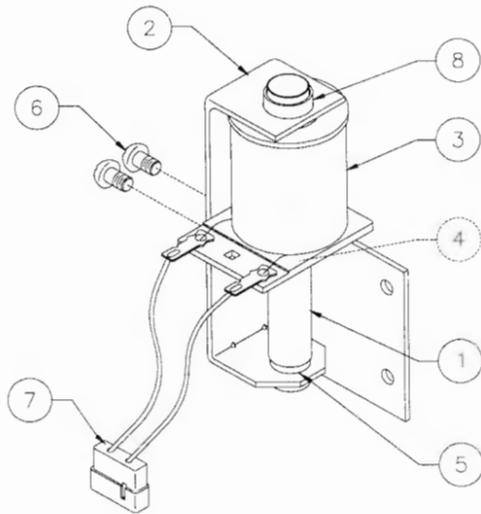
Item	Part Number	Description
1	A-5387	Coil Plunger Assembly
2	01-11273	Mounting Bracket Assembly
3	AE-23-800	Coil Sub-Assembly
4	01-8-508-T	Coil Retaining Bracket
5	23-6420	Rubber Grommet
6	40008-01017-04	Mach. Screw, 8-32 x ¼"
7	H-11835	Knocker Cable
8	03-7067-5	Coil Tubing

A-21691
Basket Switch Assembly
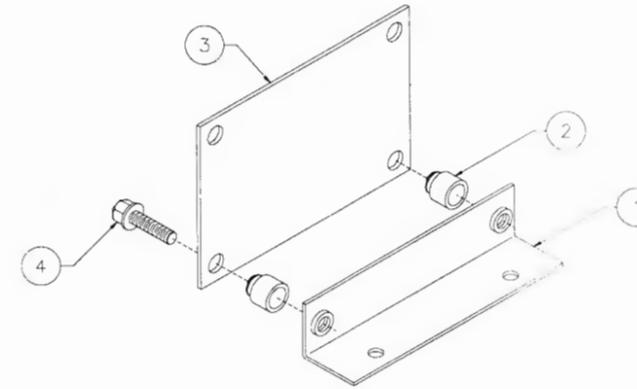
Item	Part Number	Description
1	04-10743	Opto Board Bracket
* 2	A-15646	24-Opto Switch PCB
3	03-9255-1	Spacer #8 x .25
4	4008-01113-10	Mach. Screw, 8-32 x 5/8"

* See page 2-14 for PCB assembly.

A-21405-1
NBA Eject Assembly

GRN

WHT
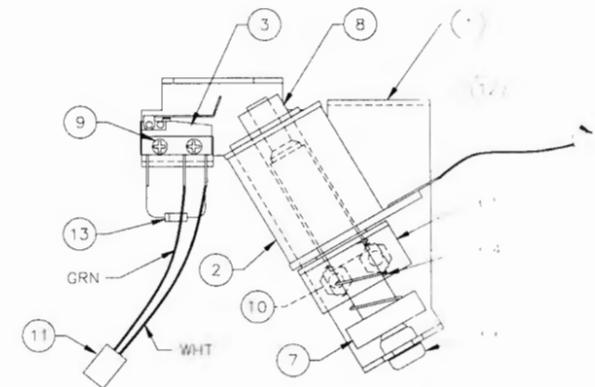
Item	Part Number	Description
1	04-10702-1	NBA Eject Bracket
2	AE-30-2000	Coil Assembly
3	5647-12693-66	Switch Sub-Mini Micro
4	10-135	Plunger Spring
5	04-10322-2	Coil Bracket 8-32 Stud
6	23-6420	Rubber Grommet
7	A-15371	Plunger Assembly
8	03-7067-5	Coil Tubing
9	4002-01105-06	Mach Screw: 2-56 x 3/8"
10	4408-01119-00	Nut 8-32 ESNA
11	H-16437	Mini Switch Cable
12	H-19523	Mini Solenoid Cable
13	5070-09054-00	Diode 1N4004

A-21529
NBA Basket Assembly

GRY/YEL (C)
ORG (E)

BLK/VIO (A)
BLK (K)
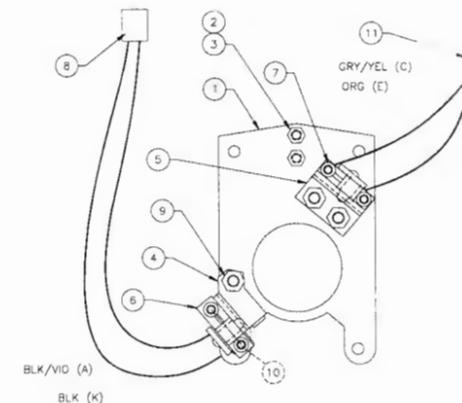
Item	Part Number	Description
1	04-10742.1	Bottom Basket Plate
2	02-5294-28	Post: 8-32 x 1-3/4"
3	4008-01168-08	Mach. Screw: 8-32 x ½"
4	01-14644	Basket Opto Brkt., Send
5	01-14645.1	Basket Opto Bracket, Rec.
6	A-16908	Opto Assembly, Send
7	A-16909	Opto Assembly, Rec.
8	H-21774	Cable Assembly
9	4008-01119-00	Nut 8-32 ESA
10	4106-01013-06	Sh. Metal Screw, 6-32 x 3/8"
11	H-21775	Cable Assembly

A-20871
Power Interface Assembly

Item	Part Number	Description
A	A-20872	Power Control Chassis Assembly
1)	04-10292	Power Control Chassis Box
2)	4406-01128-00	Nut #6-32 KEPS (3)
3)	01-12294	Switch Mounting Plate Assembly
4)	5642-13935-00	Power Switch
5)	5733-14734-00	Fuse Holder Panel (5x20mm)
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.
B	03-7933	Ty-Wrap Nylon
C	5045-14007-00	Capacitor, 1µF 275v
D	23-6776-4	Heat Shrink
E	RM-21-06	#18 Vinyl Sleeving
F	A-20873	Line Filter Entry Chassis

Power Interface/Cordset Application

COUNTRY	A-20871	H-17837-1	H-17837-2	H-17837-3	H-17837-4	5731-14530-00 FUSE (4AMP)	16-10145 LABEL	5731-14046-00 FUSE (5AMP)	16-9698 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
CROATIA	X			X		X	X			X		X								

Upper Playfield Parts

Item No.		Description
1	A-21553	Auto Fire Assembly
2	20-10110-15	Flipper Bat & Shaft
3	A-17811	Kicker Assembly
	A-17801	Kicker Switch Assembly
4	A-18019-6	Yellow Standup Target
5	A-18530-3	Purple Oblong Standup Target
6	A-21696	Ball Guide #6
7	04-10750	Ball Guide #7
8	A-13123	Jet Bumper - no bulb
9	A-21530	Loop Diverter Assembly
	01-14625	Diverter Blade
10	12-7367	Ball Guide #4
11	A-21841	Jet Bumper - #906 bulb
12	12-7369.2	Ball Guide #8
13	12-7373-3	Wire Basket
14	B-9414	Jet Bumper - #555 bulb
15	04-10695	Ball Guide #2
16	12-7373-1	Wire Basket
17	A-21529	Basket Assembly
	A-21691	Switch Assembly
18	A-21408	Right Ramp
	20-10293	Reed Switch
19	A-21584	Back Panel Assembly
20	A-21393	Backboard Assembly
	A-21399	LED Driver Assembly
	A-21380	LED Display Assembly
21	A-21407	Hook Assembly
22	12-7372	Ball Guide #12
23	12-7373-1	Wire Basket
24	12-7373-2	Wire Basket
25	04-10730	Ball Guide #9
26	12-7371	Ball Guide #10
27	A-21680	Ball Guide #5
28	A-21531	Left Ramp Diverter Assembly
	04-10725	Diverter Blade
29	20-10293	Reed Switch
30	12-7374.1	Crazy Bob's Wireform
31	04-10701	Ball Guide #11
32	A-21570	Plastic Assembly
33	A-21532	Rolled Ramp Assembly
34	20-10110-5	Flipper Bat & Shaft
35	A-17811	Kicker Assembly
	A-17801	Kicker Switch Assembly
36	A-17793-3	Purple Round Standup Target
37	A-21406	Center Ramp
	A-21555	Opto Switch Assembly
38	A-21556	Right Loop Opto Assembly

Not Shown:

A-14265-13	Receptacle & Skirt - clear
03-8633	Level Mount
03-9678-1	*Full Playfield Mylar
03-9678-2 to -9	Drop Area Mylars
20-6500	Steel Balls (4)
20-9691	Level
31-1357-50053	Backglass Translite
31-2815	Screened Bottom Arch
31-2816.1	Basket Ball
36-50053	Screened Hardcoat Playfield

*The *NBA FASTBREAK* hardcoat playfield does not require a full mylar. However, mylars can be purchased through your local Bally Distributor.

PLAYER ONE CONSISTS OF:
A-21411-1	Pass Assembly #1
A-21579	Player #1 Assembly
12-7373-1	Wire Basket

PLAYER TWO CONSISTS OF:
A-21411-2	Pass Assembly #2
A-21580	Player #2 Assembly
12-7373-2	Wire Basket

PLAYER THREE CONSISTS OF:
A-21411-3	Pass Assembly #3
A-21581	Player Assembly #3
12-7373-3	Wire Basket

PLAYER FOUR CONSISTS OF:
A-21411-4	Pass Assembly #4
A-21582	Player Assembly #4
12-7373-1	Wire Basket

Upper Playfield Parts Locations
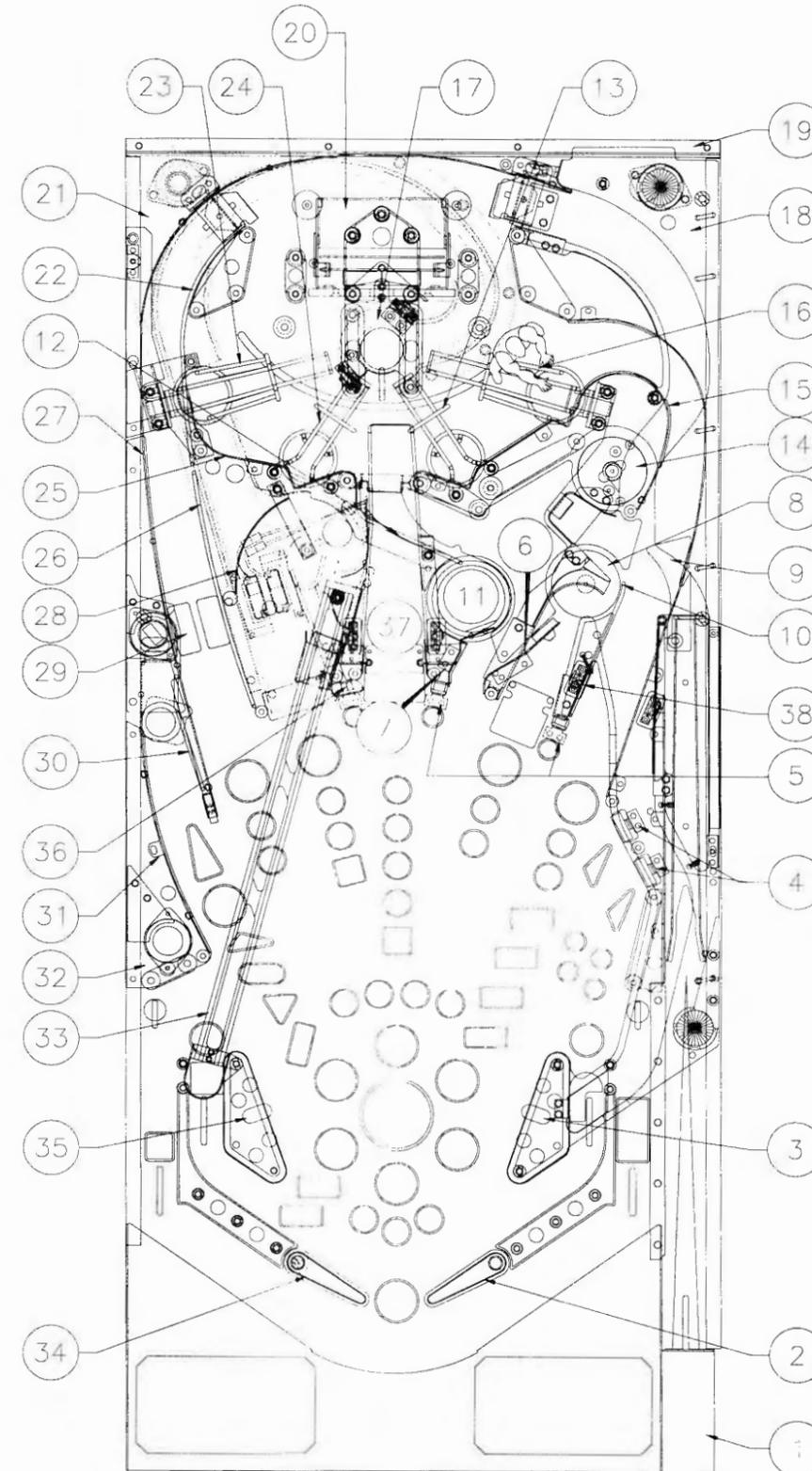
Lower Playfield Parts

Item	Part Number	Description
1	A-21553	Auto Fire Assembly
2	A-19963-1	Ball Trough Assembly Complete
3	A-14876-R	Flipper Assembly
4	A-15595	7-Opto PCB w/Bracket
5	B-9362-R-3	Coil & Bracket Assembly (2)
6	A-21548	14-Lamp PCB Assembly
7	A-21322	3-Lamp PCB Assembly (2)
8	A-21549	6-Lamp PCB Assembly
9	A-21530	Loop Diverter Assembly
10	A-9415-3	Jet Bumper Coil Assembly
11	A-9415-2	Jet Bumper Coil Assembly(2)
12	A-21411-3	Pass Assembly #3
13	A-21411-4	Pass Assembly #4
14	A-17749.1-2	Playfield Slide Assy., Right
15	A-21691	Basket Switch Assembly
16	A-17796	Ball Gate Actuator Assembly
17	A-21568	High Driver PCB Assembly
18	A-21413	Defender Assembly
19	A-17749.1-1	Playfield Slide Assy., Left
20	A-21411-1	Pass Assembly #1
21	A-21520	Magnet Assembly
22	A-21411-2	Pass Assembly #2
23	A-21531	Hook Diverter Assembly
24	01-11781	Support Bracket Assembly
25	A-21405-1	NBA Eject Assembly
26	A-21551	4-Lamp PCB Assembly
27	A-15849-L	Flipper Assembly
28	A-21547	16-Lamp PCB Assembly

Lower Playfield Parts Locations
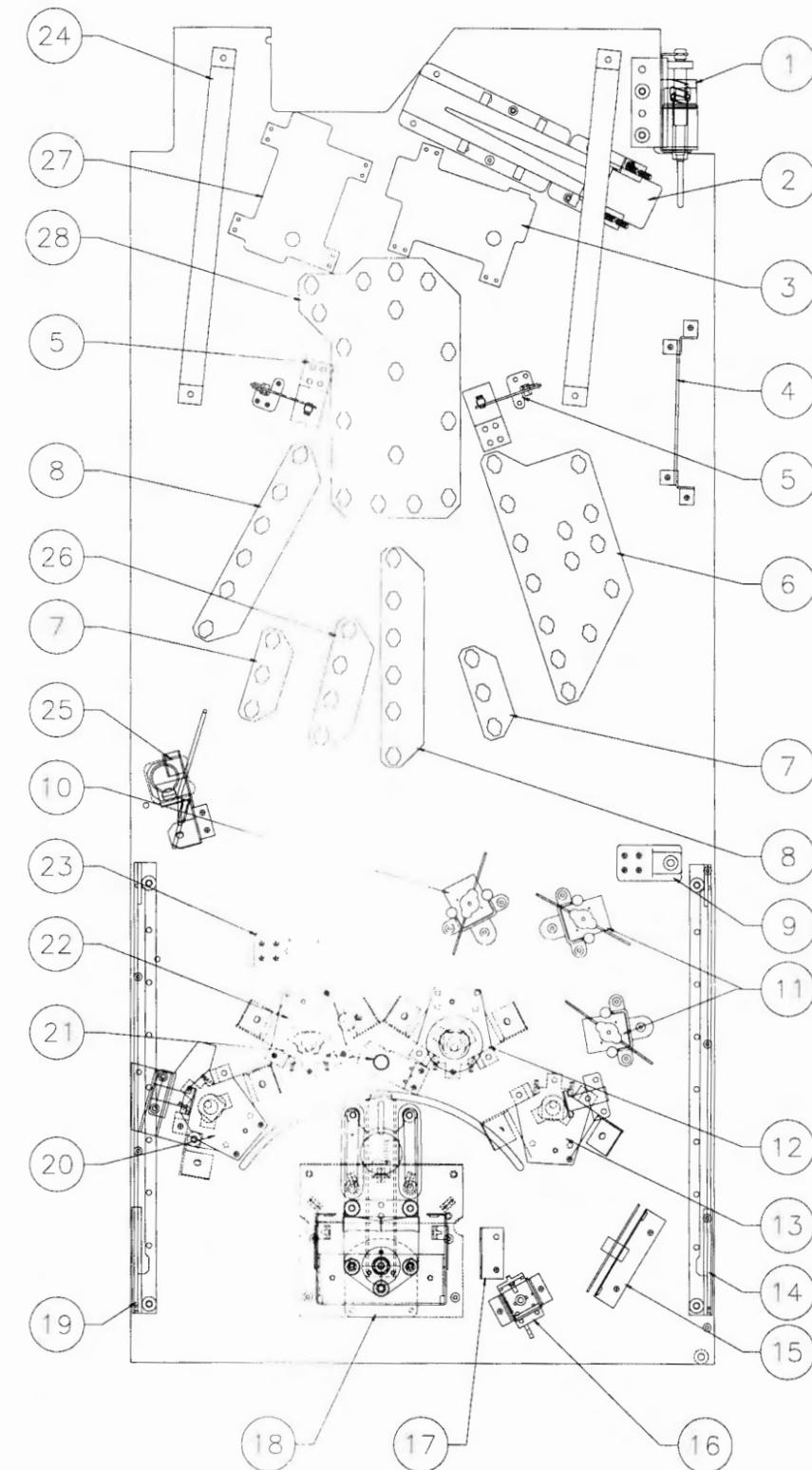
(Underside of Playfield, Viewed in Raised Position)

Item No.	Coil or Flasher Assembly Part Number	Coil or Flasher Part Number	Description
01	A-21553	AE-24-900	Auto Plunger
02	NOT USED		
03	A-21531	AE-26-1500	Left Ramp Diverter
04	A-21530	AE-26-1500	Right Loop Diverter
05	A-21405-1	AE-30-2000	Eject
06	A-17796	A-14406	Loop Gate
07	A-21717	FL-11753	Backbox Flipper*
08	A-21520	B-13522	Ball Catch Magnet
09	A-19963-1	AE-28-1500	Trough Eject
10	B-9362-R-3	AE-26-1200	Left Slingshot
11	B-9362-R-3	AE-26-1200	Right Slingshot
12	A-9415-3	AE-26-1200	Left Jet Bumper
13	A-9415-2	AE-26-1200	Middle Jet Bumper
14	A-9415-2	AE-26-1200	Right Jet Bumper
15	A-21411-2	AE-29-2000	Pass Right 2
16	A-21411-2	AE-29-2000	Pass Left 2
17	-----	#906	Eject Kickout Flasher
18	-----	#906	Left Jet Bumper Flasher
19	-----	#906	Upper Left Flasher
	-----	#906	Insert Panel Flasher*
20	-----	#906	Upper Right Flasher
	-----	#906	Insert Panel Flasher*
21	NOT USED		
22	C-13375	#906	Trophy Insert Flasher
23	NOT USED		
24	-----	#906	Lower Right & Left Flashers
25	A-21411-1	AE-29-2000	Pass Right 1
26	A-21411-3	AE-29-2000	Pass Left 3
27	A-21411-3	AE-29-2000	Pass Right 3
28	A-21411-4	AE-29-2000	Pass Left 4

Flippers

Item No.	Coil or Flasher Assembly Part Number	Coil or Flasher Part Number	Description
29-30	A-14876-R	FL-11630	Lower Right Flipper
31-32	A-15849-L	FL-11630	Lower Left Flipper
33	A-21411-1	AE-23-800	Shoot 1
34	A-21411-2	AE-23-800	Shoot 2
35	A-21411-3	AE-23-800	Shoot 3
36	A-21411-4	AE-23-800	Shoot 3

Motor and Shot Clock

Item No.	Assembly Part Number	PC Board Part Number	Device Part Number	Description
37	A-21413	C-13963-1	14-8034	Motor Enable
38	A-21413	C-13963-1	14-8043	Motor Direction
39	A-21393	A-21399	A-21380	Shot Clock Enable
40	A-21393	A-21399	A-21380	Shot Clock Count

General Illumination

Item No.	Bulb Number	Description
01	#44 / #555	String 1
02	#44 / #555	String 2
03	#44 / #555	String 3
04	#44	String 4
05	#44 / #555	String 5

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

*IN BACKBOX
** NOT SHOWN
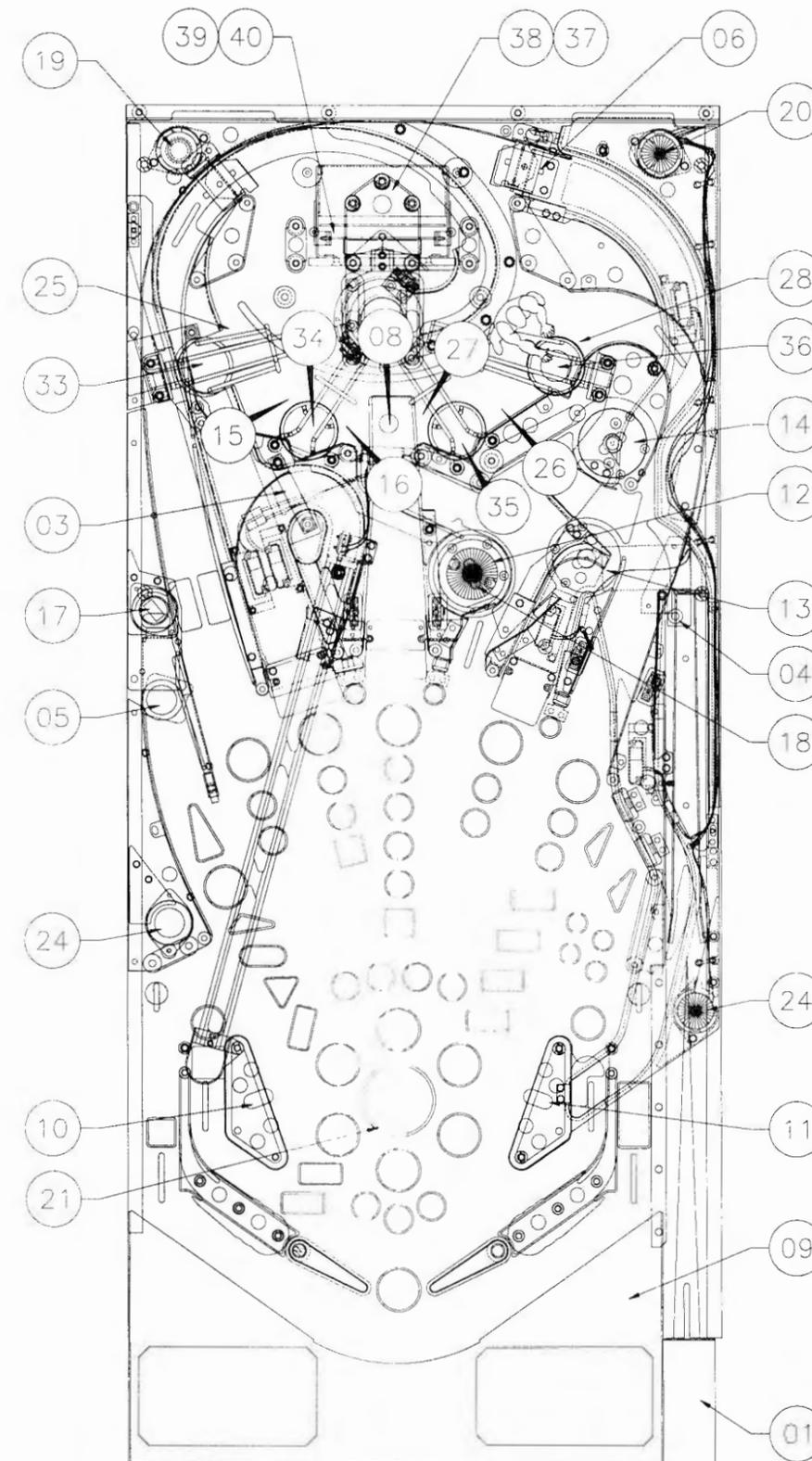
Item No.	Switch Assembly Part Number OR Opto Assembly Part Number	Switch Part Number	Description
F1	-----	SW-1A-194	LOWER RIGHT FLIPPER E.O.S.
F2	A-17316	-----	LOWER RIGHT FLIPPER CABINET
F3	-----	SW-1A-194	LOWER LEFT FLIPPER E.O.S.
F4	A-17316	-----	LOWER LEFT FLIPPER CABINET
F5	A-16908 (LED)	-----	BASKET MADE
	A-16909 (PHOTO TRANS)	-----	
F6	NOT USED	-----	UPPER RIGHT FLIPPER CABINET
F7	-----	5647-12693-04	BASKET HOLD
F8	NOT USED	-----	UPPER LEFT FLIPPER CABINET
11	20-10327-4	-----	BALL LAUNCH
12	A-21710	5647-12693-19	BACKBOX BASKET
13	20-9663-16	-----	START BUTTON
14	-----	04-10346	PLUMB BOB TILT
15	A-17791	5647-12693-32	SHOOTER LANE
16	A-17813	5647-12693-19	LEFT RETURN LANE
17	A-17813	5647-12693-19	RIGHT RETURN LANE
18	A-18019-6	-----	LOWER RIGHT STANDUP TARGET
21	A-17238	-----	SLAM TILT
22	-----	5643-09268-00	COIN DOOR CLOSED
23	A-16443-1	SW-11A-37-1	RIGHT JET BUMPER
24	-----	5643-15190-00	ALWAYS CLOSED
25	-----	5647-12693-66	EJECT HOLE
26	A-17813	5647-12693-19	LEFT OUTLANE
27	A-17813	5647-12693-19	RIGHT OUTLANE
28	A-18019-6	-----	UPPER RIGHT STANDUP TARGET
31	A-18617-1 (LED)	-----	TROUGH ELECT
	A-18618-1 (PHOTO TRANS)	-----	
32	A-18617-1 (LED)	-----	TROUGH BALL 1
	A-18618-1 (PHOTO TRANS)	-----	
33	A-18617-1 (LED)	-----	TROUGH BALL 2
	A-18618-1 (PHOTO TRANS)	-----	
34	A-18617-1 (LED)	-----	TROUGH BALL 3
	A-18618-1 (PHOTO TRANS)	-----	
35	A-18617-1 (LED)	-----	TROUGH BALL 4
	A-18618-1 (PHOTO TRANS)	-----	
36	A-16908 (LED)	-----	CENTER RAMP OPTO
	A-16909 (PHOTO TRANS)	-----	
37	A-16908 (LED)	-----	RIGHT LOOP ENTER OPTO
	A-16909 (PHOTO TRANS)	-----	
38	A-17813	5647-12693-19	RIGHT LOOP EXIT
41	A-17799-3	-----	STANDUP TARGET '3'
42	A-18530-3	-----	STANDUP TARGET 'P'
43	A-18530-3	-----	STANDUP TARGET 'T'
44	-----	20-10293	RIGHT RAMP ENTER
45	-----	20-10448	LEFT RAMP ENTER
46	A-21729	5647-12693-21	LEFT RAMP MADE
47	-----	20-10293	LEFT LOOP ENTER
48	A-17813	5647-12693-19	LEFT LOOP MADE
51	A-21402	-----	DEFENDER POSITION 4
52	A-21402	-----	DEFENDER POSITION 3
53	A-21402	-----	DEFENDER LOCK POSITION
54	A-21402	-----	DEFENDER POSITION 2
55	A-21402	-----	DEFENDER POSITION 1
56	A-19289	5647-12693-33	JET BALL DRAIN
57	A-17800 (KICK)	SW-1A-114	LEFT SLINGSHOT
	A-17794 (**SCORE)	SW-1A-120	
58	A-17800 (KICK)	SW-1A-114	RIGHT SLINGSHOT
	A-17794 (**SCORE)	SW-1A-120	
61	A-16443-1	SW-11A-37-1	LEFT JET BUMPER
62	A-16443-1	SW-11A-37-1	MIDDLE JET BUMPER
63	-----	20-10293	LEFT LOOP RAMP EXIT
64	-----	20-10293	RIGHT RAMP MADE
65	-----	5467-12693-66	IN THE PAINT 4
66	-----	5467-12693-66	IN THE PAINT 3
67	-----	5467-12693-66	IN THE PAINT 2
68	-----	5467-12693-66	IN THE PAINT 1

71 to 88   NOT USED

*NOT SHOWN. **SCORE SWITCHES HAVE DIODES ATTACHED.
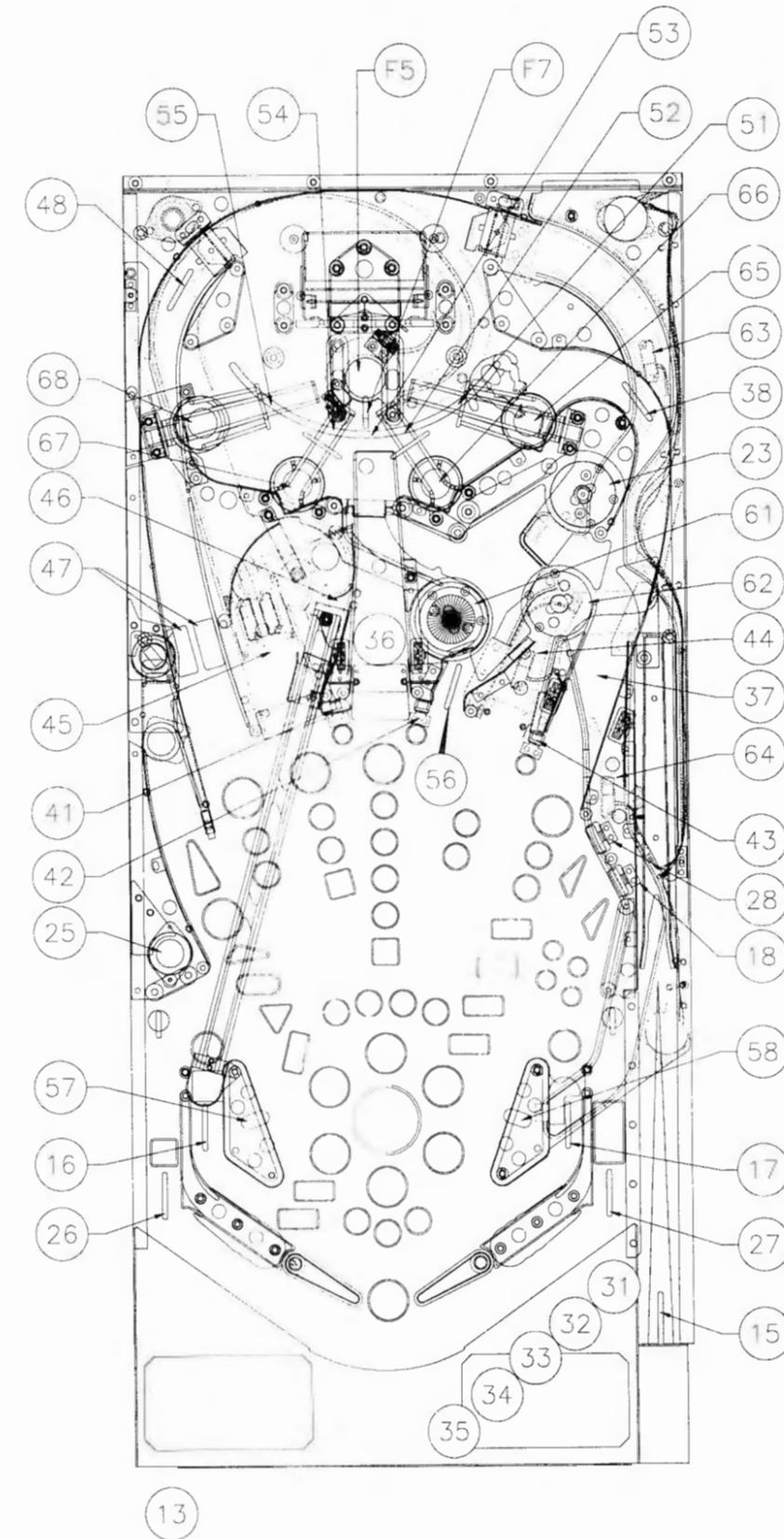
Item No.	Lamp Assembly Part Number	Bulb Part Number	Socket Part Number	Description
11	A-21547	24-8768	24-8767	20 POINTS
12	A-21547	24-8768	24-8767	FREE THROW
13	A-21547	24-8768	24-8767	3 POINTS
14	A-21547	24-8768	24-8767	2 POINTS
15	A-21547	24-8768	24-8767	FIELD GOALS
16	A-21547	24-8768	24-8767	MULTIBALLS
17	A-21547	24-8768	24-8767	SHOOT AROUND
18	A-21547	24-8768	24-8767	AROUND THE WORLD
21	A-21547	24-8768	24-8767	POWER HOOPS
22	A-21547	24-8768	24-8767	FASTBREAK COMBO
23	A-21547	24-8768	24-8767	ALLEY OOP COMBO
24	A-21547	24-8768	24-8767	SLAM DUNK COMBO
25	A-21547	24-8768	24-8767	COMBOS
26	A-21547	24-8768	24-8767	TROPHY
27	A-21547	24-8768	24-8767	TIP-OFF COMBO
28	A-21547	24-8768	24-8767	STADIUM GOODIES
31	A-21548	24-8768	24-8767	MULTIBALL HOOPS
32	A-21548	24-8768	24-8767	RUN & SHOOT HOOPS
33	A-21548	24-8768	24-8767	HOOK SHOT HOOPS
34	A-21548	24-8768	24-8767	HALF COURT HOOPS
35	A-21548	24-8768	24-8767	LIGHT TIP-OFF
36	A-21548	24-8768	24-8767	RIGHT "IN THE PAINT"
37	A-21548	24-8768	24-8767	SHOO(T)
38	A-17835*	24-6549	-----	LEFT RETURN LANE
41	A-21548	24-8768	24-8767	CHAMPION RING 1
42	A-21548	24-8768	24-8767	CHAMPION RING 2
43	A-21548	24-8768	24-8767	RIGHT RETURN LANE
44	A-21548	24-8768	24-8767	CHAMPION RING 4
45	A-21548	24-8768	24-8767	CHAMPION RING 3
46	A-21548	24-8768	24-8767	LOWER RIGHT STANDUP
47	A-21548	24-8768	24-8767	UPPER RIGHT STANDUP
48	A-17835*	24-6549	-----	LEFT OUTLANE
51	A-21549	24-8768	24-8767	SODA
52	A-21549	24-8768	24-8767	QUESTION
53	A-21549	24-8768	24-8767	HOT DOG
54	A-21549	24-8768	24-8767	PIZZA
55	A-21549	24-8768	24-8767	CRAZY BOB'S
56	A-21549	24-8768	24-8767	EXTRA BALL
57	A-17807	24-6549	A-17806	RIGHT OUTLANE
58	A-17807	24-6549	A-17806	SHOOT AGAIN
61**	A-21551	24-8768	24-8767	RAMPS: 3 POINTS (1 OF 2)
61**	A-21549	24-8768	24-8767	RAMPS: 3 POINTS (2 OF 2)
62	A-21549	24-8768	24-8767	TIP-OFF
63	A-21549	24-8768	24-8767	FASTBREAK
64	A-21549	24-8768	24-8767	ALLEY OOP
65	A-21549	24-8768	24-8767	FREE THROW
66	A-21549	24-8768	24-8767	SH(O)OT
67	A-21582*	24-8768	-----	IN THE PAINT 4
68	A-21581*	24-8768	-----	IN THE PAINT 3
71	A-21551	24-8768	24-8767	LEFT LIGHT FASTBREAK
72	A-21551	24-8768	24-8767	SLAM DUNK
73	A-21551	24-8768	24-8767	S(H)OOT
74	A-21322	24-8768	24-8767	RIGHT LIGHT FASTBREAK
75	A-21322	24-8768	24-8767	LIGHT SLAM DUNK
76	A-21322	24-8768	24-8767	SHO(O)T
77	A-21579*	24-8768	-----	IN THE PAINT 1
78	A-21580*	24-8768	-----	IN THE PAINT 2
81	A-21322	24-8768	24-8767	LIGHT ALLEY OOP
82	A-21322	24-8768	24-8767	LEFT "IN THE PAINT"
83	A-21322	24-8768	24-8767	(S)HOOT
84	A-17835*	24-6768	-----	(3) PT.
85	A-17835*	24-8768	-----	3 (P)T.
86	A-17835*	24-8768	-----	3 P(T)
87	20-10327-4	SOLD AS ASSEMBLY ONLY		BALL LAUNCH
88	20-9663-16	SOLD AS ASSEMBLY ONLY		START BUTTON

* SOCKET IS NOT SOLD SEPARATELY.
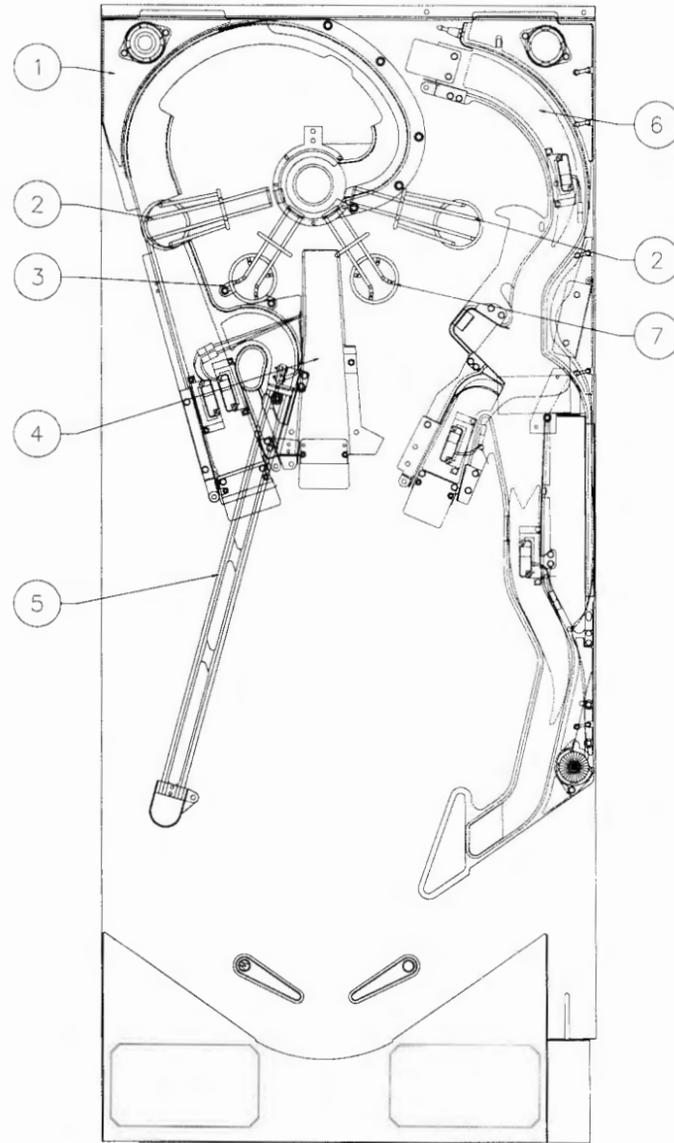** ITEM #61 LIGHTS TWO BULBS WHICH ARE LOCATED ON SEPARATE LAMP BOARDS.
24-6549 = #44 Bulb   24-8768 = #555
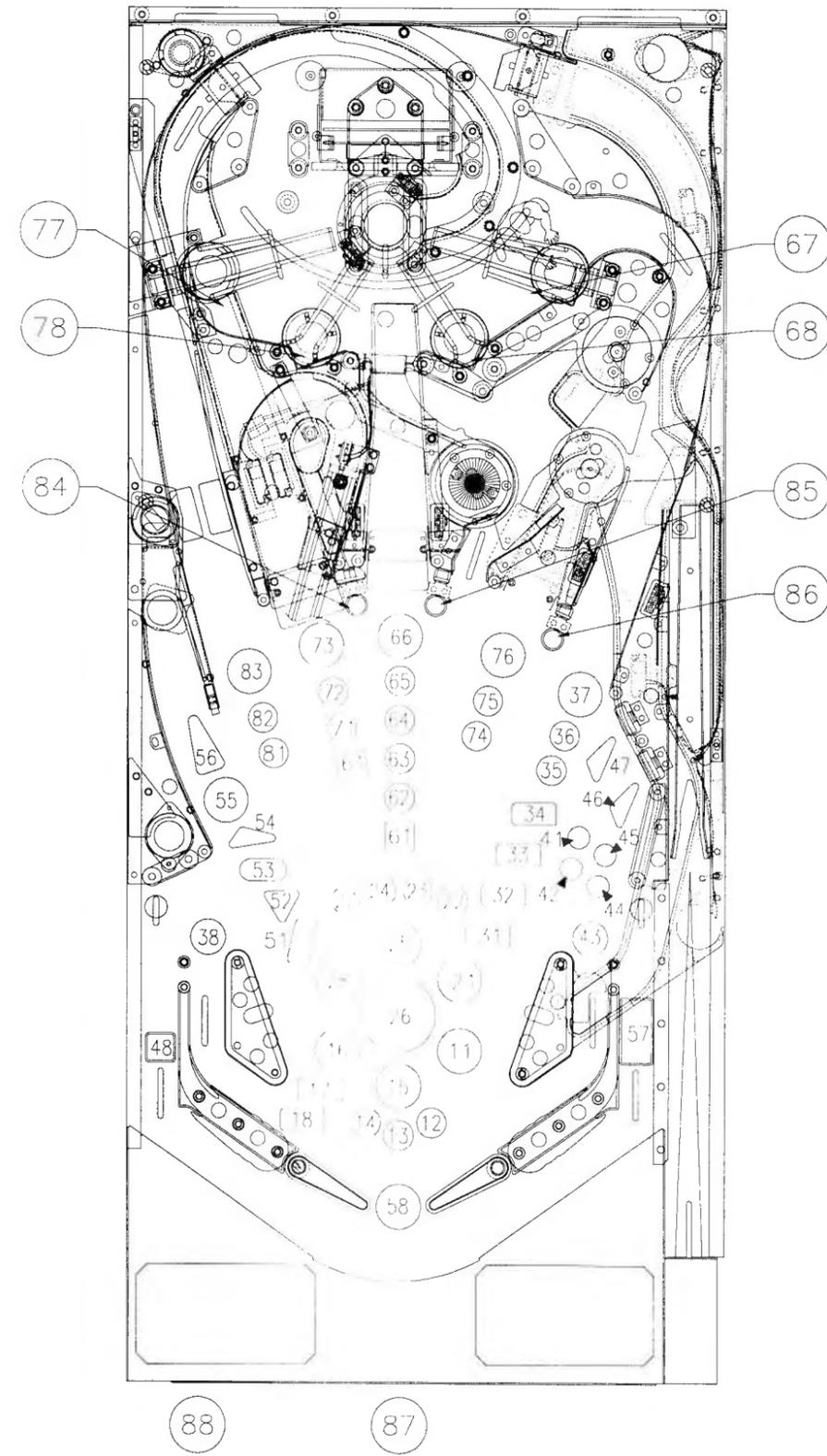
Ramps

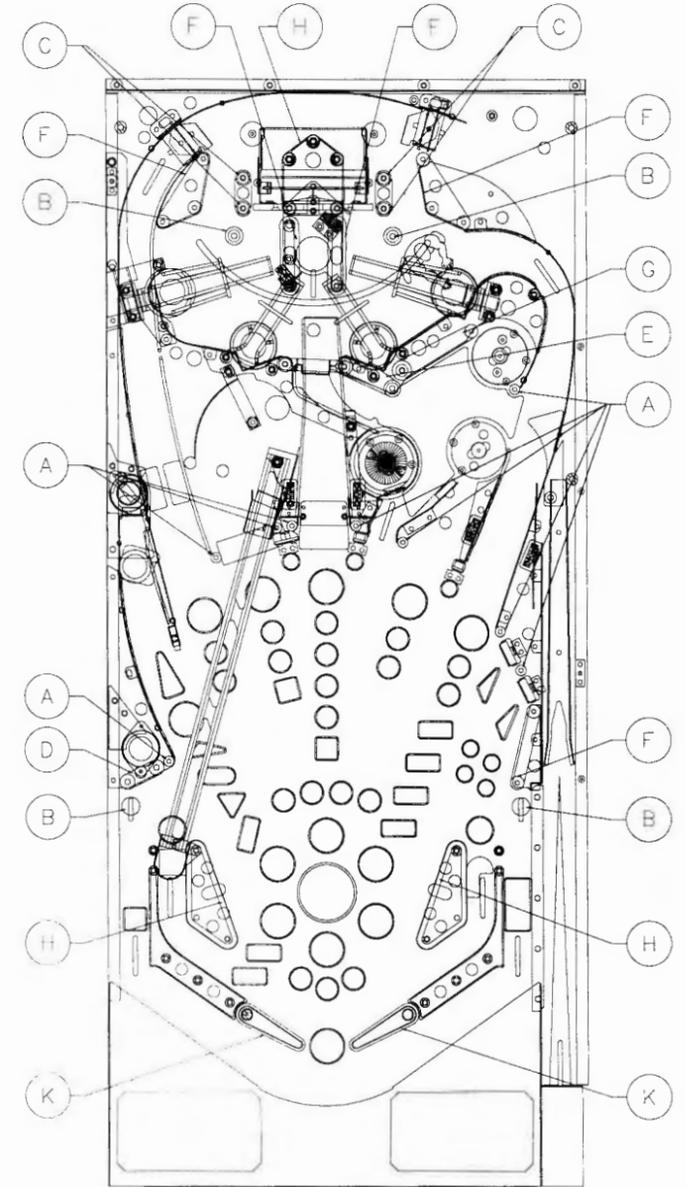| Item	Part Number	Description
1	A-21407	Hook Ramp Assembly
2	12-7373-1	Wire Basket (2)
3	12-7373-2	Wire Basket
4	A-21406	Center Ramp Assembly
5	A-21532	Rolled Ramp Assembly
6	A-21408	Right Ramp Assembly
7	12-7373-3	Wire Basket

Rubber Rings

Item No.	Part No.	Description	Quantity
A	23-6556	Black Rubber Bumper	9
B	23-6641	Black Rubber Bumper	4
C	23-6694-3	5/16" Black Rubber Ring	4
D	23-6694-5	3/4" Black Rubber Ring	1
E	23-6694-7	1-1/4" Black Rubber Ring	1
F	23-6694-8	1-1/2" Black Rubber Ring	5
G	23-6694-9	2" Black Rubber Ring	1
H	23-6694-10	2-1/2" Black Rubber Ring	3
K	23-6695	Black Flipper Ring	3

SWITCH MATRIX

White ——▶—o⟋ o— Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J206-1 U20-18	2 Green-Red J206-2 U20-17	3 Green-Orange J206-3 U20-16	4 Green-Yellow J206-4 U20-15	5 Green-Black J206-5 U20-14	6 Green-Blue J206-6 U20-13	7 Green-Violet J206-7 U20-12	8 Green-Gray J206-9 U20-11	Flipper Grounded Switches
Orange-Brown J205-1 Left Coin Chute U17-5	1 White-Brown J208-1 U18-11 D1	BALL LAUNCH 11	SLAM TILT 21	TROUGH EJECT 31	STANDUP TARGET '3' 41	DEFENDER POSITION 4 51	LEFT JET BUMPER 61	NOT USED 71	NOT USED 81	Black-Green J208-13 Lower Right Flipper E.O.S. F1
Orange-Red J205-2 Center Coin Chute U17-7	2 White-Red J208-2 U18-9 D2	BACKBOX BASKET 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	STANDUP TARGET 'P' 42	DEFENDER POSITION 3 52	MIDDLE JET BUMPER 62	NOT USED 72	NOT USED 82	Blue-Violet J212-12 Lower Right Flipper Opto F2
Orange-Black J205-3 Right Coin Chute U17-11	3 White-Orange J208-3 U18-5 D3	START BUTTON 13	RIGHT JET BUMPER 23	TROUGH BALL 2 33	STANDUP TARGET 'T' 43	DEFENDER LOCK POSITION 53	LEFT LOOP RAMP EXIT 63	NOT USED 73	NOT USED 83	Black-Blue J208-12 Lower Left Flipper E.O.S. F3
Orange-Yellow J205-4 4th Coin Chute U17-9	4 White-Yellow J208-4 U18-7 D4	PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	RIGHT RAMP ENTER 44	DEFENDER POSITION 2 54	RIGHT RAMP MADE 64	NOT USED 74	NOT USED 84	Blue-Gray J212-11 Lower Left Flipper Opto F4
Orange-Green J205-6 U16-9 Normal Function Srv Crdts	Test Function Escape	5 White-Green J208-5 U19-11 D5	SHOOTER LANE 15	EJECT HOLE 25	TROUGH BALL 4 35	LEFT RAMP ENTER 45	DEFENDER POSITION 1 55	IN THE PAINT 4 65	NOT USED 75	NOT USED 85	Black-Violet J208-11 BASKET MADE OPTO F5
Orange-Blue J205-7 U16-11 Normal Function Volume Dn	Test Function Down	6 White-Blue J208-7 U19-9 D6	LEFT RETURN LANE 16	LEFT OUTLANE 26	CENTER RAMP OPTO 36	LEFT RAMP MADE 46	JETS BALL DRAIN 56	IN THE PAINT 3 66	NOT USED 76	NOT USED 86	Black-Yellow J212-10 Upper Right Flipper Opto F6
Orange-Violet J205-8 U16-7 Normal Function Volume Up	Test Function Up	7 White-Violet J208-8 U19-5 D7	RIGHT RETURN LANE 17	RIGHT OUTLANE 27	RIGHT LOOP ENTER OPTO 37	LEFT LOOP ENTER 47	LEFT SLINGSHOT 57	IN THE PAINT 2 67	NOT USED 77	NOT USED 87	Black--Gray J208-10 BASKET HOLD F7
Orange-Gray J205-9 U16-5 Normal Function Begin Test	Test Function Enter	8 White-Gray J208-9 U19-7 D8	LOWER RIGHT STANDUP TARGET 18	UPPER RIGHT STANDUP TARGET 28	RIGHT LOOP EXIT 38	LEFT LOOP MADE 48	RIGHT SLINGSHOT 58	IN THE PAINT 1 68	NOT USED 78	NOT USED 88	Black-Blue J212-9 Upper Left Flipper Opto F8

J2XX = CPU BOARD   ▭ = OPTO, TYPICALLY CLOSED

2-48

LAMP MATRIX

Yellow (B+) ——⟨Q⟩—— Red

Column / Row	1 Yellow-Brown J121-1 Q96	2 Yellow-Red J121-2 Q100	3 Yellow-Orange J121-3 Q95	4 Yellow-Black J121-4 Q99	5 Yellow-Green J121-5 Q94	6 Yellow-Blue J121-6 Q98	7 Yellow-Violet J121-7 Q93	8 Yellow-Gray J121-9 Q97
1 Red-Brown J125-1 Q104	20 POINTS 11	POWER HOOPS 21	MULTIBALL HOOPS 31	CHAMPION RING 1 41	SODA 51	RAMPS: 3 POINTS (2) 61	LEFT LIGHT FASTBREAK 71	LIGHT ALLEY OOP 81
2 Red-Black J125-2 Q108	FREE THROW 12	FASTBREAK COMBO 22	RUN & SHOOT HOOPS 32	CHAMPION RING 2 42	QUESTION 52	TIP-OFF 62	SLAM DUNK 72	LEFT "IN THE PAINT" 82
3 Red-Orange J125-4 Q103	3 POINTS 13	ALLEY OOP COMBO 23	HOOK SHOT HOOPS 33	RIGHT RETURN LANE 43	HOT DOG 53	FASTBREAK 63	S(H)OOT 73	(S)HOOT 83
4 Red-Yellow J125-5 Q107	2 POINTS 14	SLAM DUNK COMBO 24	HALF COURT HOOPS 34	CHAMPION RING 4 44	PIZZA 54	ALLEY OOP 64	RIGHT LIGHT FASTBREAK 74	(3)PT 84
5 Red-Green J125-6 Q102	FIELD GOALS 15	COMBOS 25	LIGHT TIP-OFF 35	CHAMPION RING 3 45	CRAZY BOB'S 55	FREE THROW 65	LIGHT SLAM DUNK 75	3(P)T 85
6 Red-Blue J125-7 Q106	MULTIBALLS 16	TROPHY 26	RIGHT "IN THE PAINT" 36	LOWER RIGHT STANDUP 46	EXTRA BALL 56	SH(O)OT 66	SHO(O)T 76	3P(T) 86
7 Red-Violet J125-8 Q101	SHOOT AROUND 17	TIP-OFF COMBO 27	SHOO(T) 37	UPPER RIGHT STANDUP 47	RIGHT OUTLANE 57	IN THE PAINT 4 67	IN THE PAINT 1 77	BALL LAUNCH 87
8 Red-Gray J125-9 Q105	AROUND THE WORLD 18	STADIUM GOODIES 28	LEFT RETURN LANE 38	LEFT OUTLANE 48	SHOOT AGAIN 58	IN THE PAINT 3 68	IN THE PAINT 2 78	START BUTTON 88

J1XX = Power Driver Board

2-49

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Voltage Connections Backbox	Voltage Connections Cabinet	Drive Xistor	Drive Connections Playfield	Drive Connections Backbox	Drive Connections Cabinet	Drive Wire Color	Solenoid Part Number / Flashlamp Type Playfield	Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-24-900	
02	NOT USED	High Power				Q68				VIO-RED		
03	LEFT RAMP DIVERTER	High Power	J133-2			Q71	J116-4			VIO-ORG	AE-26-1500	
04	RIGHT LOOP DIVERTER	High Power	J133-2			Q67	J116-5			VIO-YEL	AE-26-1500	
05	EJECT	High Power	J133-2			Q70	J116-6			VIO-GRN	AE-30-2000	
06	LOOP GATE	High Power	J133-2			Q66	J116-7			VIO-BLU	A-14406	
07	BACKBOX FLIPPER	High Power		J133-2		Q69		J117-3		VIO-BLK		FL-11753
08	BALL CATCH MAGNET	High Power	J133-2			Q65	J116-9			VIO-GRY	B-13522	
09	TROUGH EJECT	Low Power	J133-3			Q44	J113-1			BRN-BLK	AE-28-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			BRN-RED	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			BRN-ORG	AE-26-1200	
12	LEFT JET BUMPER	Low Power	J133-3			Q47	J113-5			BRN-YEL	AE-26-1200	
13	MIDDLE JET BUMPER	Low Power	J133-3			Q42	J113-6			BRN-GRN	AE-26-1200	
14	RIGHT JET BUMPER	Low Power	J133-3			Q46	J113-7			BRN-BLU	AE-26-1200	
15	PASS RIGHT 2	Low Power	J133-3			Q41	J113-8			BRN-VIO	AE-29-2000	
16	PASS LEFT 2	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-29-2000	
17	EJECT KICKOUT FLSHR	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906 (1)	
18	LEFT JET BUMPER FLSHR	Flasher	J133-6			Q32	J111-2			BLK-RED	#906 (1)	
19	UPPER LEFT FLASHER	Flasher	J133-6	J134-5		Q27	J111-3	J112-3		BLK-ORG	#906 (1)	#906 (1)
20	UPPER RIGHT FLASHER	Flasher	J133-6	J134-5		Q31	J111-4	J112-5		BLK-YEL	# 906 (1)	#906 (1)
21	NOT USED	Flasher				Q26				BLU-GRN		
22	TROPHY INSERT FLSHR	Flasher	J133-6			Q30	J111-6			BLU-BLK	#906 (1)	
23	NOT USED	Flasher				Q25				BLU-VIO		
24	LOWER RIGHT/LEFT FLSH	Flasher	J133-6			Q29	J111-8			BLU-GRY	#906 (2)	
25	*PASS RIGHT 1	Gen. Purpose	J133-1			Q16	J109-1			BLU-BRN	AE-29-2000	
26	*PASS LEFT 3	Gen. Purpose	J133-1			Q15	J109-2			BLU-RED	AE-29-2000	
27	*PASS RIGHT 3	Gen. Purpose	J133-1			Q14	J109-3			BLU-ORG	AE-29-2000	
28	*PASS LEFT 4	Gen. Purpose	J133-1			Q13	J109-4			BLU-YEL	AE-29-2000	

General Illumination

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Voltage Connections Backbox	Voltage Connections Cabinet	Drive Xistor	Drive Connections Playfield	Drive Connections Backbox	Drive Connections Cabinet	Drive Wire Color	Flashlamp Type Playfield	Backbox
01	STRING 1	G.I.	J106-1	J105-1		Q5	J106-7	J105-7		WHT-BRN	#44	#555
02	STRING 2	G.I.	J106-2	J105-2		Q4	J106-8	J105-8		WHT-ORG	#44	#555
03	STRING 3	G.I.	J106-3	J105-3		Q3	J106-9	J105-9		WHT-YEL	#44	#555
04	**STRING 4	G.I.	J106-5			Q2	J106-10			WHT-GRN	#44	
05	**STRING 5	G.I.	J106-6	J105-6	J104-3	Q1	J106-11	J105-11	J104-1	WHT-VIO	#44	#555

Flipper Circuits		Solenoid Type	Voltage Connection Playfield	Drive Xistors Power	Drive Xistors Hold	Drive Connections Playfield Power	Drive Connections Playfield Hold	Drive Wire Colors Power	Drive Wire Colors Hold	Coil Part No.	Coil Colors
29		Lwr. Rt. Power	J119-1 (RED-GRN)	Q90		J120-13		YEL-GRN		FL-11630	RED
30	LOWER RIGHT FLIPPER	Lwr. Rt. Hold	J119-1 (RED-GRN)		Q92	J120-11			ORG-GRN		
31		Lwr. Lt. Power	J119-4 (RED-BLU)	Q87		J120-9		YEL-BLU		FL-11630	RED
32	LOWER LEFT FLIPPER	Lwr. Lt. Hold	J119-4 (RED-BLU)		Q89	J120-7			ORG-BLU		
33	SHOOT 1	Upr. Rt. Power	J119-6 (RED-VIO)	Q84		J120-6		YEL-VIO		AE-23-800	
34	SHOOT 2	Upr. Rt. Hold	J119-6 (RED-VIO)		Q86	J120-4			ORG-VIO	AE-23-800	
35	SHOOT 3	Upr. Lt. Power	J119-8 (RED-GRY)	Q81		J120-3		YEL-GRY		AE-23-800	
36	SHOOT 4	Upr. Lt. Hold	J119-8 (RED-GRY)		Q83	J120-1			ORG-GRY	AE-23-800	

Motor & Shot Clock Circuits		Solenoid Type	Voltage Connections Playfield	Drive Gates	Drive Connections Playfield	Drive Wire Color	Device Part Number Playfield
37	MOTOR ENABLE	Low Power	J139-2	U3A, U3B	J110-1	BRN-WHT	14-8034
38	MOTOR DIRECTION	Low Power	J139-2	U3C, U3D	J110-3	ORG-WHT	14-8034
39	SHOT CLOCK ENABLE	Low Power	J139-2	U3G, U3H	J110-4	YEL-WHT	A-21380
40	SHOT CLOCK COUNT	Low Power	J139-2	U3E, U3F	J110-5	BLU-WHT	A-21380

J1XX = POWER DRIVER BOARD
24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB
*TIEBACK DIODES FOR SOLENOIDS 25 THROUGH 28 ARE AT J109-5, J109-6, J109-8, AND J109-9 RESPECTIVELY.
**THESE G.I. STRINGS DO NOT BRIGHTEN AND DIM, THEY ARE ALWAYS ON.

MOTOR WIRING DIAGRAM IS SHOWN ON PAGE 3-26.
SHOT CLOCK WIRING DIAGRAM IS SHOWN ON PAGE 3-25.

SECTION THREE

GAME WIRING
AND SCHEMATICS

CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack 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 is a fuse on the Audio Video board.

Prefix numbers for WPC circuit boards are listed below.
J1XX - Power Driver board jacks; F1XX - Power Driver board fuses
J2XX - CPU Board (There are no fuses on the CPU board.)
J5XX and J6XX - Audio Video board (AV board) jacks; F5XX and F6XX - Audio Video board fuses

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

SWITCH MATRIX

White ———▷ ○ ←——— Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J206-1 U20-18	2 Green-Red J206-2 U20-17	3 Green-Orange J206-3 U20-16	4 Green-Yellow J206-4 U20-15	5 Green-Black J206-5 U20-14	6 Green-Blue J206-6 U20-13	7 Green-Violet J206-7 U20-12	8 Green-Gray J206-9 U20-11	Flipper Grounded Switches
Orange-Brown J205-1 Left Coin Chute U17-5 D1	1 White-Brown J208-1 U18-11	BALL LAUNCH 11	SLAM TILT 21	TROUGH EJECT 31	STANDUP TARGET '3' 41	DEFENDER POSITION 4 51	LEFT JET BUMPER 61	NOT USED 71	NOT USED 81	Black-Green J208-13 Lower Right Flipper E.O.S. F1
Orange-Red J205-2 Center Coin Chute U17-7 D2	2 White-Red J208-2 U18-9	BACKBOX BASKET 12	COIN DOOR CLOSED 22	TROUGH BALL 1 32	STANDUP TARGET 'P' 42	DEFENDER POSITION 3 52	MIDDLE JET BUMPER 62	NOT USED 72	NOT USED 82	Blue-Violet J212-12 Lower Right Flipper Opto F2
Orange-Black J205-3 Right Coin Chute U17-11 D3	3 White-Orange J208-3 U18-5	START BUTTON 13	RIGHT JET BUMPER 23	TROUGH BALL 2 33	STANDUP TARGET 'T' 43	DEFENDER LOCK POSITION 53	LEFT LOOP RAMP EXIT 63	NOT USED 73	NOT USED 83	Black-Blue J208-12 Lower Left Flipper E.O.S. F3
Orange-Yellow J205-4 4th Coin Chute U17-9 D4	4 White-Yellow J208-4 U18-7	PLUMB BOB TILT 14	ALWAYS CLOSED 24	TROUGH BALL 3 34	RIGHT RAMP ENTER 44	DEFENDER POSITION 2 54	RIGHT RAMP MADE 64	NOT USED 74	NOT USED 84	Blue-Gray J212-11 Lower Left Flipper Opto F4
Orange-Green J205-6 U16-9 Normal Function Srv Crdts / Test Function Escape D5	5 White-Green J208-5 U19-11	SHOOTER LANE 15	EJECT HOLE 25	TROUGH BALL 4 35	LEFT RAMP ENTER 45	DEFENDER POSITION 1 55	IN THE PAINT 4 65	NOT USED 75	NOT USED 85	Black-Violet J208-11 BASKET MADE OPTO F5
Orange-Blue J205-7 U16-11 Normal Function Volume Dn / Test Function Down D6	6 White-Blue J208-7 U19-9	LEFT RETURN LANE 16	LEFT OUTLANE 26	CENTER RAMP OPTO 36	LEFT RAMP MADE 46	JETS BALL DRAIN 56	IN THE PAINT 3 66	NOT USED 76	NOT USED 86	Black-Yellow J212-10 Upper Right Flipper Opto F6
Orange-Violet J205-8 U16-7 Normal Function Volume Up / Test Function Up D7	7 White-Violet J208-8 U19-5	RIGHT RETURN LANE 17	RIGHT OUTLANE 27	RIGHT LOOP ENTER OPTO 37	LEFT LOOP ENTER 47	LEFT SLINGSHOT 57	IN THE PAINT 2 67	NOT USED 77	NOT USED 87	Black–Gray J208-10 BASKET HOLD F7
Orange-Gray J205-9 U16-5 Normal Function Begin Test / Test Function Enter D8	8 White-Gray J208-9 U19-7	LOWER RIGHT STANDUP TARGET 18	UPPER RIGHT STANDUP TARGET 28	RIGHT LOOP EXIT 38	LEFT LOOP MADE 48	RIGHT SLINGSHOT 58	IN THE PAINT 1 68	NOT USED 78	NOT USED 88	Black-Blue J212-9 Upper Left Flipper Opto F8

J2XX = CPU BOARD   [ ] = OPTO, TYPICALLY CLOSED

SWITCH MATRIX CIRCUIT

Column (example) +12V — ULN2803 — B — 1K — A — J206 — X — Green-XXX

74HC237

COLUMN	A	B	
INACTIVE	H	L	OFF
ACTIVE	L	H	ON

CPU BOARD — PLAYFIELD

Row (example) +5V — 74LS240 — E — 10K — LM339 — D — +12V 1K — C — 1N4148 — J208 — X — White-XXX — 470pf

ROW	C	D	E	
SWITCH OPEN	H	H	L	OFF
SWITCH CLOSED	L	L	H	ON
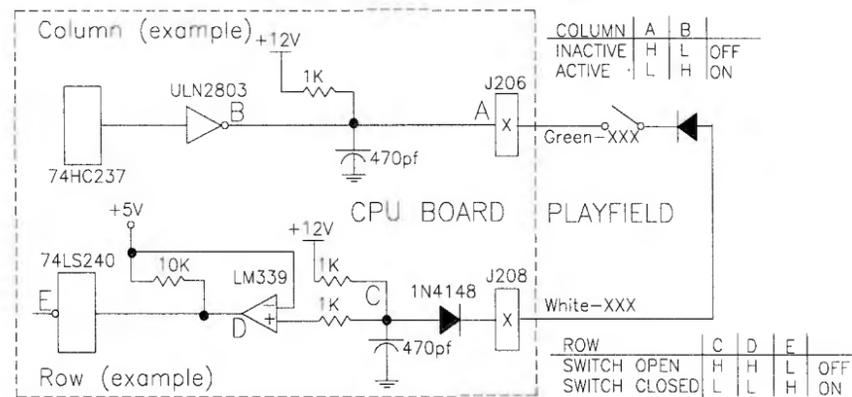
The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low, the column side is active. When a switch closes, the row side of the circuit activates. The "+" input to the LM339 drops below +5V, therefore, its output is low. Corresponding row 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.
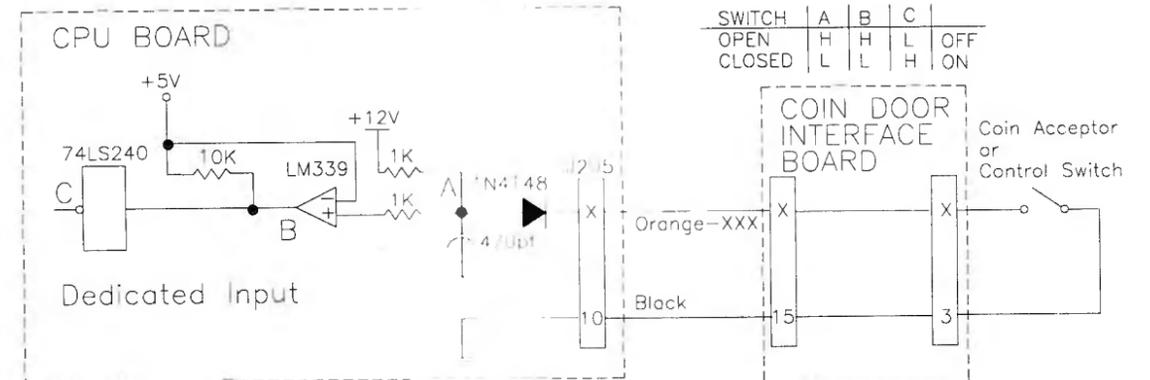
DEDICATED SWITCHES

CPU BOARD J205
1	Orange-Brown (U17-5) D1
2	Orange-Red (U17-7) D2
3	Orange-Black (U17-11) D3
4	Orange-Yellow (U17-9) D4
6	Orange-Green (U16-9) D5
7	Orange-Blue (U16-11) D6
8	Orange-Violet (U16-7) D7
9	Orange-Gray (U16-5) D8
10	Black

COIN DOOR INTERFACE BOARD J1 / J3
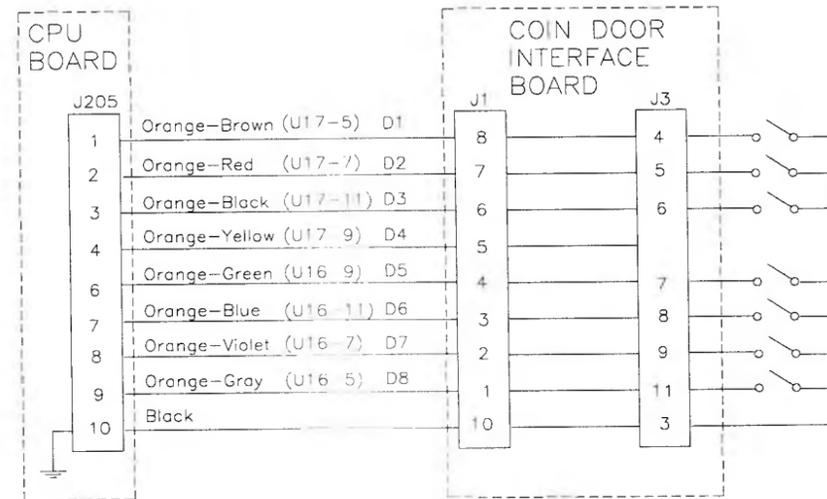
Coin Acceptor Switches
D1 - Left Coin Chute
D2 - Center Coin Chute
D3 - Right Coin Chute
D4 - Fourth Coin Chute

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

CPU BOARD +5V — 74LS240 — 10K — LM339 — C — B — +12V 1K / 1K — A — 1N4148 J205 — 470pf — Dedicated Input

COIN DOOR INTERFACE BOARD — Coin Acceptor or Control Switch — Orange-XXX — Black

The dedicated switches operate similar in the matrix, except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).
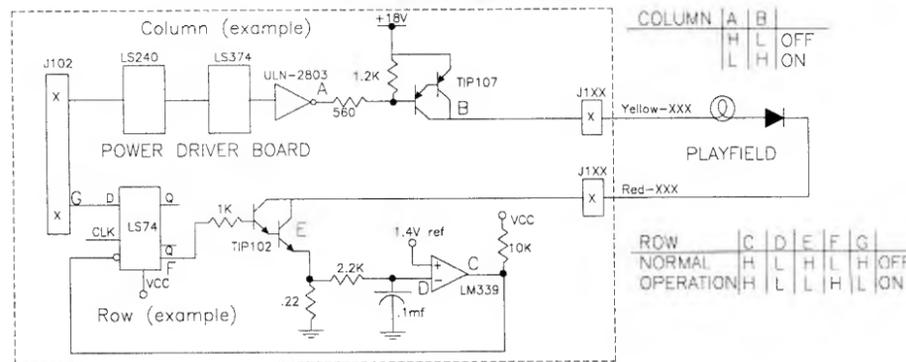
When a switch closes, the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V, therefore the output is low. Since the row circuit (dedicated input) is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, it output is high and the row is inactive

LAMP MATRIX

Yellow (B+) ──→ Red

Column / Row	1 Yellow-Brown J121-1 Q96	2 Yellow-Red J121-2 Q100	3 Yellow-Orange J121-3 Q95	4 Yellow-Black J121-4 Q99	5 Yellow-Green J121-5 Q94	6 Yellow-Blue J121-6 Q98	7 Yellow-Violet J121-7 Q93	8 Yellow-Gray J121-9 Q97
1 Red-Brown J125-1 Q104	20 POINTS (11)	POWER HOOPS (21)	MULTIBALL HOOPS (31)	CHAMPION RING 1 (41)	SODA (51)	RAMPS: 3 POINTS (2) (61)	LEFT LIGHT FASTBREAK (71)	LIGHT ALLEY OOP (81)
2 Red-Black J125-2 Q108	FREE THROW (12)	FASTBREAK COMBO (22)	RUN & SHOOT HOOPS (32)	CHAMPION RING 2 (42)	QUESTION (52)	TIP-OFF (62)	SLAM DUNK (72)	LEFT "IN THE PAINT" (82)
3 Red-Orange J125-4 Q103	3 POINTS (13)	ALLEY OOP COMBO (23)	HOOK SHOT HOOPS (33)	RIGHT RETURN LANE (43)	HOT DOG (53)	FASTBREAK (63)	S(H)OOT (73)	(S)HOOT (83)
4 Red-Yellow J125-5 Q107	2 POINTS (14)	SLAM DUNK COMBO (24)	HALF COURT HOOPS (34)	CHAMPION RING 4 (44)	PIZZA (54)	ALLEY OOP (64)	RIGHT LIGHT FASTBREAK (74)	(3)PT (84)
5 Red-Green J125-6 Q102	FIELD GOALS (15)	COMBOS (25)	LIGHT TIP-OFF (35)	CHAMPION RING 3 (45)	CRAZY BOB'S (55)	FREE THROW (65)	LIGHT SLAM DUNK (75)	3(P)T (85)
6 Red-Blue J125-7 Q106	MULTIBALLS (16)	TROPHY (26)	RIGHT "IN THE PAINT" (36)	LOWER RIGHT STANDUP (46)	EXTRA BALL (56)	SH(O)OT (66)	SHO(O)T (76)	3P(T) (86)
7 Red-Violet J125-8 Q101	SHOOT AROUND (17)	TIP-OFF COMBO (27)	SHOO(T) (37)	UPPER RIGHT STANDUP (47)	RIGHT OUTLANE (57)	IN THE PAINT 4 (67)	IN THE PAINT 1 (77)	BALL LAUNCH (87)
8 Red-Gray J125-9 Q105	AROUND THE WORLD (18)	STADIUM GOODIES (28)	LEFT RETURN LANE (38)	LEFT OUTLANE (48)	SHOOT AGAIN (58)	IN THE PAINT 3 (68)	IN THE PAINT 2 (78)	START BUTTON (88)

J1XX = Power Driver Board

LAMP MATRIX CIRCUIT

COLUMN | A | B
NORMAL | H | L | OFF
| L | H | ON

ROW | C | D | E | F | G
NORMAL OPERATION | H | L | H | L | H | OFF
| H | L | H | L | L | ON

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 circuit off.

SOLENOID/FLASHER TABLE

Sol. No.	Function	Solenoid Type	Voltage Connections Playfield	Backbox	Cabinet	Drive Xistor	Drive Connections Playfield	Backbox	Cabinet	Drive Wire Color	Solenoid Part Number / Flashlamp Type Playfield	Backbox
01	AUTO PLUNGER	High Power	J133-2			Q72	J116-1			VIO-BRN	AE-24-900	
02	NOT USED	High Power				Q68				VIO-RED		
03	LEFT RAMP DIVERTER	High Power	J133-2			Q71	J116-4			VIO-ORG	AE-26-1500	
04	RIGHT LOOP DIVERTER	High Power	J133-2			Q67	J116-5			VIO-YEL	AE-26-1500	
05	EJECT	High Power	J133-2			Q70	J116-6			VIO-GRN	AE-30-2000	
06	LOOP GATE	High Power	J133-2			Q66	J116-7			VIO-BLU	A-14406	
07	BACKBOX FLIPPER	High Power		J133-2		Q69		J117-3		VIO-BLK		FL-11753
08	BALL CATCH MAGNET	High Power	J133-2			Q65	J116-9			VIO-GRY	B-13522	
09	TROUGH EJECT	Low Power	J133-3			Q44	J113-1			BRN-BLK	AE-28-1500	
10	LEFT SLINGSHOT	Low Power	J133-3			Q48	J113-3			BRN-RED	AE-26-1200	
11	RIGHT SLINGSHOT	Low Power	J133-3			Q43	J113-4			BRN-ORG	AE-26-1200	
12	LEFT JET BUMPER	Low Power	J133-3			Q47	J113-5			BRN-YEL	AE-26-1200	
13	MIDDLE JET BUMPER	Low Power	J133-3			Q42	J113-6			BRN-GRN	AE-26-1200	
14	RIGHT JET BUMPER	Low Power	J133-3			Q46	J113-7			BRN-BLU	AE-26-1200	
15	PASS RIGHT 2	Low Power	J133-3			Q41	J113-8			BRN-VIO	AE-29-2000	
16	PASS LEFT 2	Low Power	J133-3			Q45	J113-9			BRN-GRY	AE-29-2000	
17	EJECT KICKOUT FLSHR	Flasher	J133-6			Q28	J111-1			BLK-BRN	#906 (1)	
18	LEFT JET BUMPER FLSHR	Flasher	J133-6			Q32	J111-2			BLK-RED	#906 (1)	
19	UPPER LEFT FLASHER	Flasher	J133-6	J134-5		Q27	J111-3	J112-3		BLK-ORG	#906 (1)	#906 (1)
20	UPPER RIGHT FLASHER	Flasher	J133-6	J134-5		Q31	J111-4	J112-5		BLK-YEL	#906 (1)	#906 (1)
21	NOT USED	Flasher				Q26				BLU-GRN		
22	TROPHY INSERT FLSHR	Flasher	J133-6			Q30	J111-6			BLU-BLK	#906 (1)	
23	NOT USED	Flasher				Q25				BLU-VIO		
24	LOWER RIGHT/LEFT FLSH	Flasher	J133-6			Q29	J111-8			BLU-GRY	#906 (2)	
25	*PASS RIGHT 1	Gen. Purpose	J133-1			Q16	J109-1			BLU-BRN	AE-29-2000	
26	*PASS LEFT 3	Gen. Purpose	J133-1			Q15	J109-2			BLU-RED	AE-29-2000	
27	*PASS RIGHT 3	Gen. Purpose	J133-1			Q14	J109-3			BLU-ORG	AE-29-2000	
28	*PASS LEFT 4	Gen. Purpose	J133-1			Q13	J109-4			BLU-YEL	AE-29-2000	

General Illumination

No.	Function	Type	Voltage Connections Playfield	Backbox	Cabinet	Drive Xistor	Drive Connections Playfield	Backbox	Cabinet	Drive Wire Color	Part No. Playfield	Backbox
01	STRING 1	G.I.	J106-1	J105-1		Q5	J106-7	J105-7		WHT-BRN	#44	#555
02	STRING 2	G.I.	J106-2	J105-2		Q4	J106-8	J105-8		WHT-GRN	#44	#555
03	STRING 3	G.I.	J106-3	J105-3		Q3	J106-9	J105-9		WHT-YEL	#44	#555
04	**STRING 4	G.I.	J106-5			Q2	J106-10			WHT-GRN	#44	
05	**STRING 5	G.I.	J106-6	J105-6	J104-3	Q1	J106-11	J105-11	J104-1	WHT-VIO	#44	#555

Flipper Circuits

No.	Function	Solenoid Type	Voltage Connection Playfield	Drive Xistors Power	Hold	Drive Connections Playfield	Drive Wire Colors Power	Hold	Coil Part No.	Coil Colors
29	LOWER RIGHT FLIPPER	Lwr. Rt. Power	J119-1 (RED-GRN)	Q90		J120-13	YEL-GRN		FL-11630	RED
30		Lwr. Rt. Hold	J119-1 (RED-GRN)		Q92	J120-11		ORG-GRN		
31	LOWER LEFT FLIPPER	Lwr. Lt. Power	J119-4 (RED-BLU)	Q87		J120-9	YEL-BLU		FL-11630	RED
32		Lwr. Lt. Hold	J119-4 (RED-BLU)		Q89	J120-7		ORG-BLU		
33	SHOOT 1	Upr. Rt. Power	J119-6 (RED-VIO)	Q84		J120-6	YEL-VIO		AE-23-800	
34	SHOOT 2	Upr. Rt. Hold	J119-6 (RED-VIO)		Q86	J120-4		ORG-VIO	AE-23-800	
35	SHOOT 3	Upr. Lt. Power	J119-8 (RED-GRY)	Q81		J120-3	YEL-GRY		AE-23-800	
36	SHOOT 4	Upr. Lt. Hold	J119-8 (RED-GRY)		Q83	J120-1		ORG-GRY	AE-23-800	

Motor & Shot Clock Circuits

No.	Function	Solenoid Type	Voltage Connections Playfield	Drive Gates	Drive Connections Playfield	Drive Wire Color	Device Part Number Playfield
37	MOTOR ENABLE	Low Power	J139-2	U3A, U3B	J110-1	BRN-WHT	14-8034
38	MOTOR DIRECTION	Low Power	J139-2	U3C, U3D	J110-3	ORG-WHT	14-8034
39	SHOT CLOCK ENABLE	Low Power	J139-2	U3G, U3H	J110-4	YEL-WHT	A-21380
40	SHOT CLOCK COUNT	Low Power	J139-2	U3E, U3F	J110-5	BLU-WHT	A-21380

J1XX = POWER DRIVER BOARD
24-6549 = #44 BULB; 24-8704 = #89 BULB; 24-8768 = #555 BULB; 24-8802 = #906 BULB
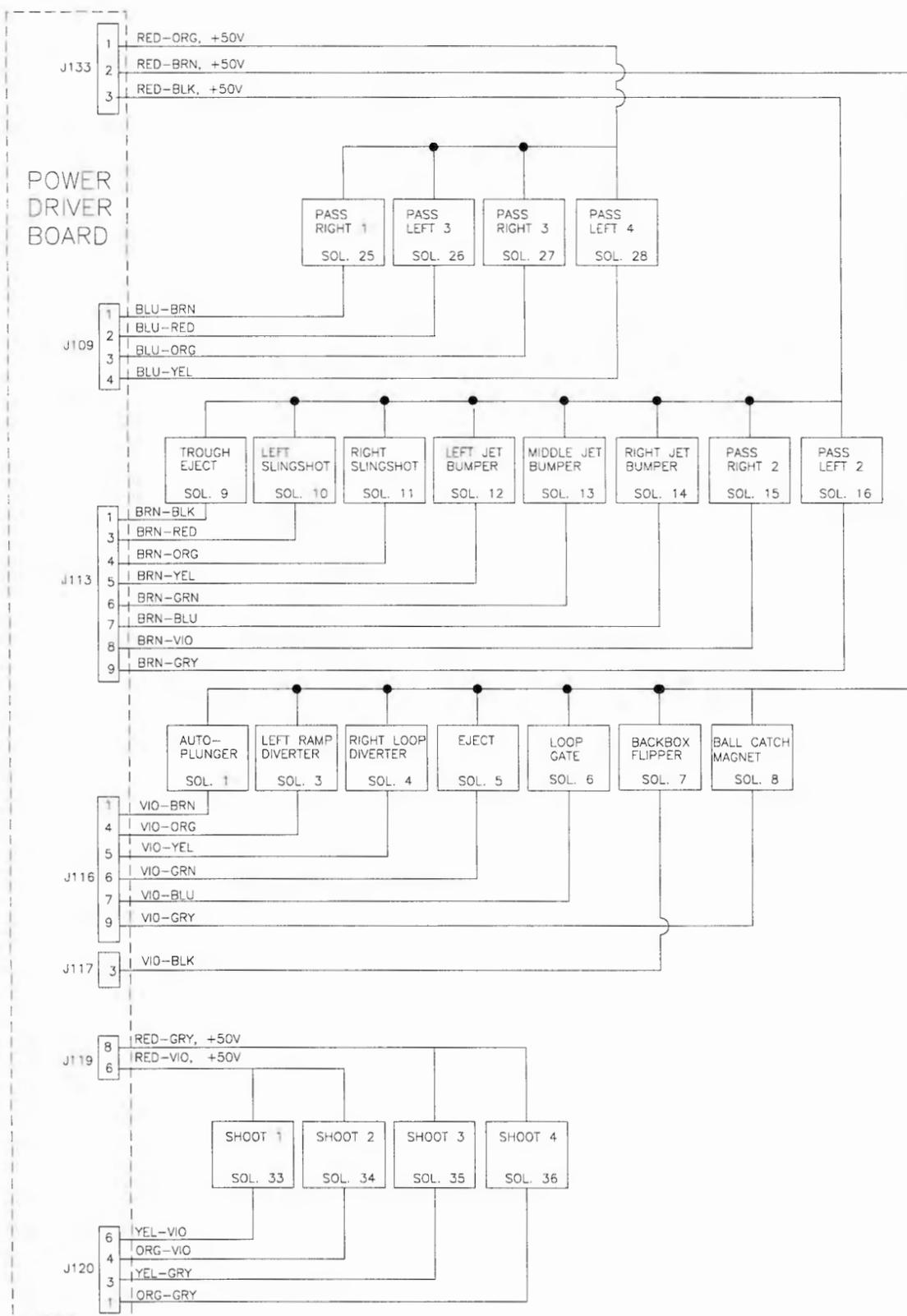*TIEBACK DIODES FOR SOLENOIDS 25 THROUGH 28 ARE AT J109-5, J109-6, J109-8, AND J109-9 RESPECTIVELY.
**THESE GENERAL ILLUMINATION STRINGS DO NOT BRIGHTEN AND DIM, THEY ARE ALWAYS ON.

MOTOR WIRING DIAGRAM IS SHOWN ON PAGE 3-26.
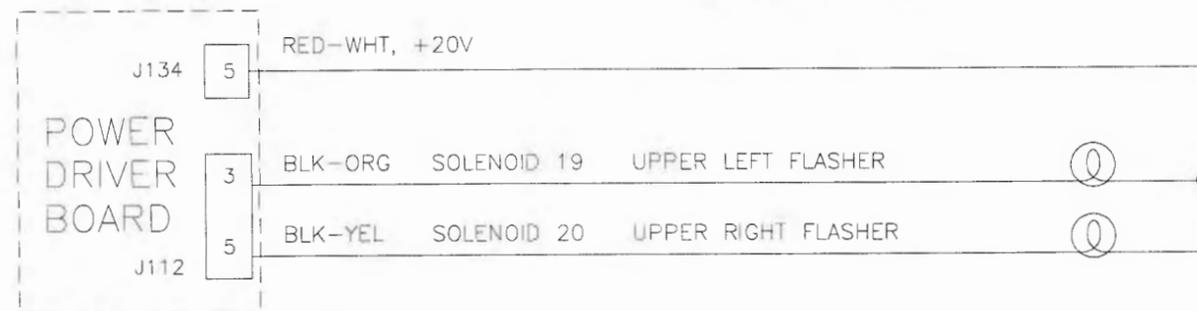**SHOT CLOCK WIRING DIAGRAM IS SHOWN ON PAGE 3-25.**
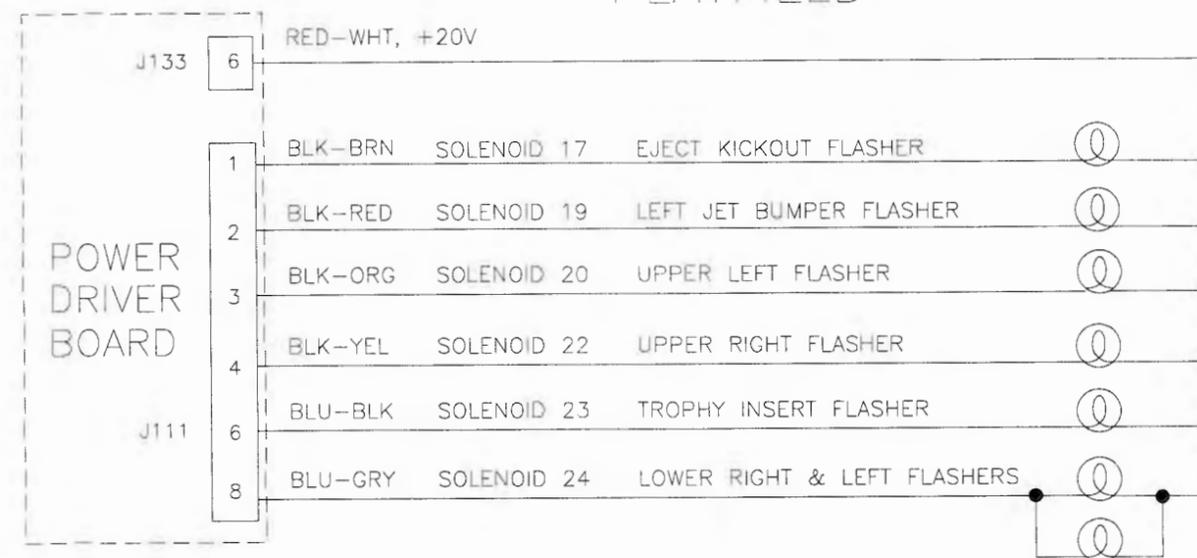
SOLENOID WIRING

COILS

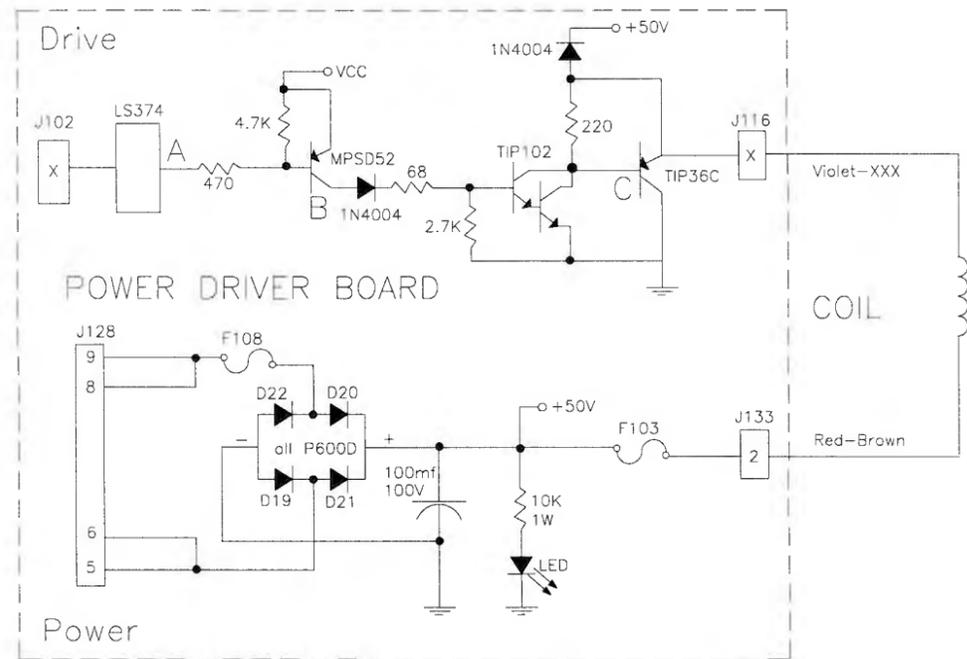POWER DRIVER BOARD

J133
1 RED-ORG, +50V
2 RED-BRN, +50V
3 RED-BLK, +50V

PASS RIGHT 1	PASS LEFT 3	PASS RIGHT 3	PASS LEFT 4
SOL. 25	SOL. 26	SOL. 27	SOL. 28

J109
1 BLU-BRN
2 BLU-RED
3 BLU-ORG
4 BLU-YEL

TROUGH EJECT	LEFT SLINGSHOT	RIGHT SLINGSHOT	LEFT JET BUMPER	MIDDLE JET BUMPER	RIGHT JET BUMPER	PASS RIGHT 2	PASS LEFT 2
SOL. 9	SOL. 10	SOL. 11	SOL. 12	SOL. 13	SOL. 14	SOL. 15	SOL. 16

J113
1 BRN-BLK
3 BRN-RED
4 BRN-ORG
5 BRN-YEL
6 BRN-GRN
7 BRN-BLU
8 BRN-VIO
9 BRN-GRY

AUTO-PLUNGER	LEFT RAMP DIVERTER	RIGHT LOOP DIVERTER	EJECT	LOOP GATE	BACKBOX FLIPPER	BALL CATCH MAGNET
SOL. 1	SOL. 3	SOL. 4	SOL. 5	SOL. 6	SOL. 7	SOL. 8

J116
1 VIO-BRN
4 VIO-ORG
5 VIO-YEL
6 VIO-GRN
7 VIO-BLU
9 VIO-GRY

J117
3 VIO-BLK

J119
8 RED-GRY, +50V
6 RED-VIO, +50V

SHOOT 1	SHOOT 2	SHOOT 3	SHOOT 4
SOL. 33	SOL. 34	SOL. 35	SOL. 36

J120
6 YEL-VIO
4 ORG-VIO
3 YEL-GRY
1 ORG-GRY

3-6

FLASHLAMPS

INSERT PANEL

POWER DRIVER BOARD

J134
5 RED-WHT, +20V

J112
3 BLK-ORG   SOLENOID 19   UPPER LEFT FLASHER
5 BLK-YEL   SOLENOID 20   UPPER RIGHT FLASHER

PLAYFIELD

POWER DRIVER BOARD

J133
6 RED-WHT, +20V

1 BLK-BRN   SOLENOID 17   EJECT KICKOUT FLASHER
2 BLK-RED   SOLENOID 19   LEFT JET BUMPER FLASHER
3 BLK-ORG   SOLENOID 20   UPPER LEFT FLASHER
4 BLK-YEL   SOLENOID 22   UPPER RIGHT FLASHER

J111
6 BLU-BLK   SOLENOID 23   TROPHY INSERT FLASHER
8 BLU-GRY   SOLENOID 24   LOWER RIGHT & LEFT FLASHERS

3-7

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.

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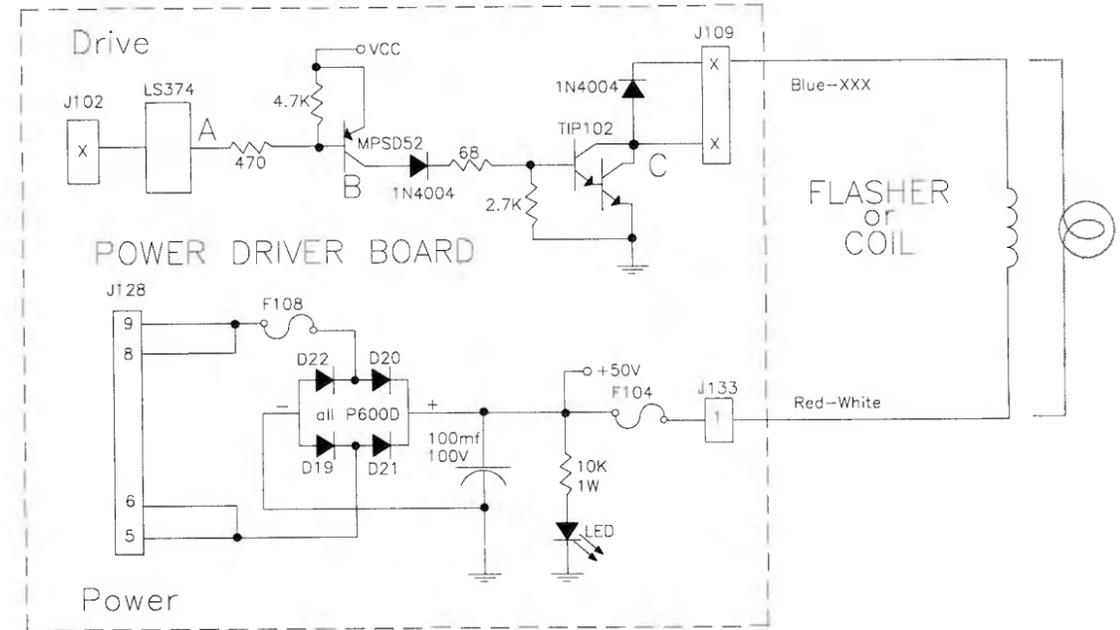
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor , is high. A high at point "B" causes a low at point "C". When point "C" is low, the coil/flashlamp is grounded through the transistor and turns on. When point "A" toggles high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

* Tieback diode is not used for flashlamp circuit.

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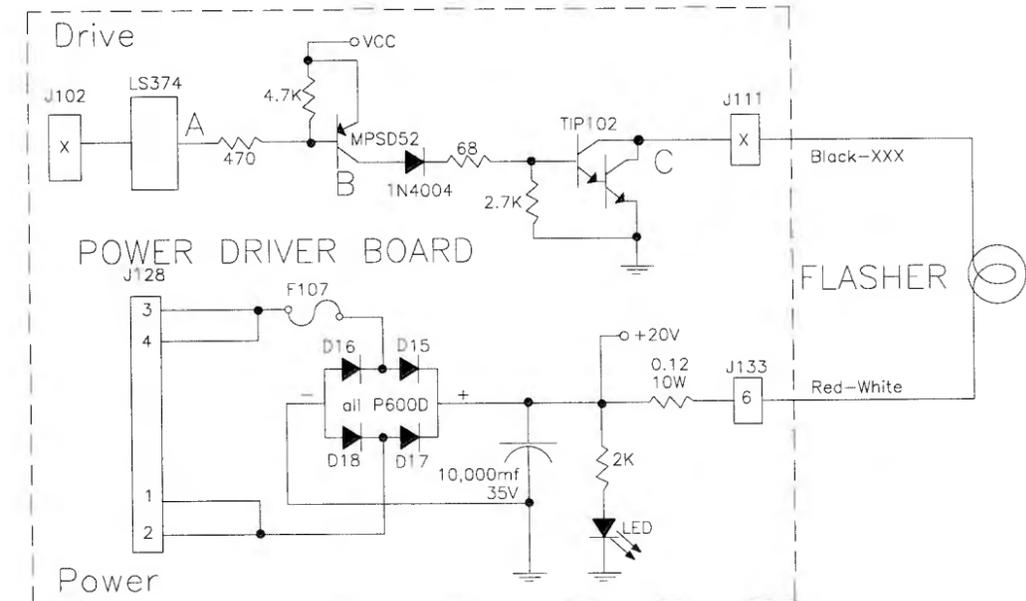
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor, is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When point "C" is low, the flashlamp is grounded through the transistor and turns on.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

GENERAL ILLUMINATION CIRCUIT

Drive

VCC

J102 LS374 4.7K
X   A   560   MPSD52   SCT41   J106   X
              B   51   C

POWER DRIVER BOARD

J103
X
X   S.B.
X

Power

Figure #1

J103   all P600D   J106
X   X
X   X
                          X

POWER DRIVER BOARD
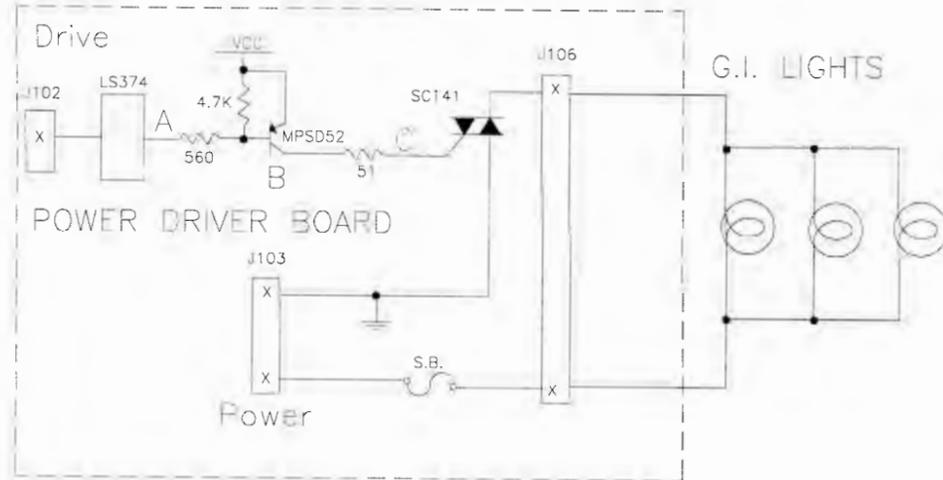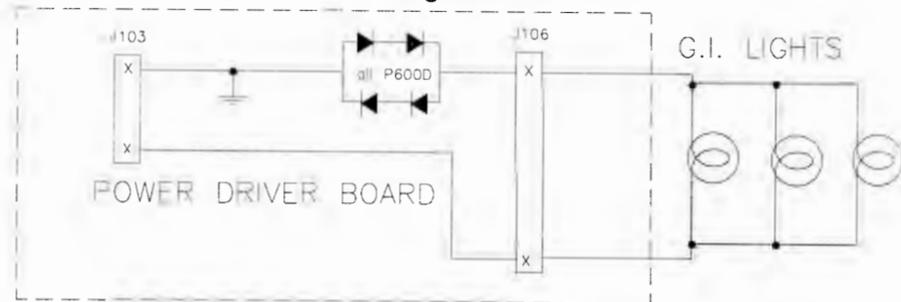
G.I. LIGHTS

Figure #2

There are five general illumination strings; three like figure #1 and two like figure #2. 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

all P600D

Playfield or Backbox G.I. Lights. Up to 18 bulbs per string.

Power Driver Board

OR

Power Driver Board

Triac Drivers   LS374 Latch

6.3 volt secondary

Power Driver Board
Zero Cross Detection Circuit

5 volt secondary

CPU Board
Microprocessor
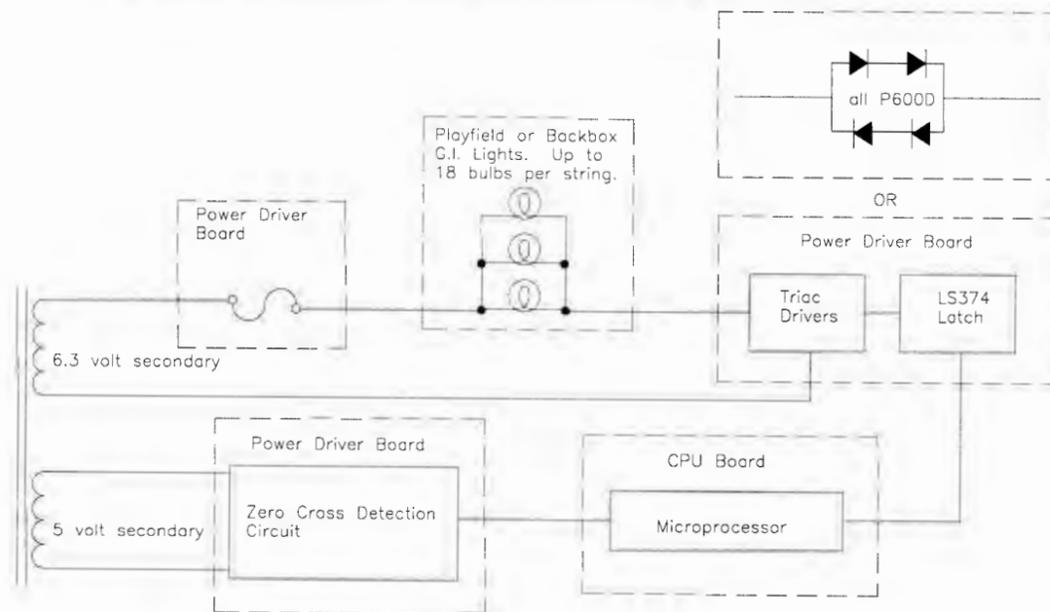
FLIPPER CIRCUIT DIAGRAM

RED–GRAY +50V
RED–VIOLET +50V
RED–BLUE +50V
RED–GREEN +50V

POWER DRIVER BOARD

8 6 4 1
J119

J120

LOWER RIGHT FLIPPER COIL
12   YELLOW–GREEN   POWER   Q90
11   ORANGE–GREEN   HOLD   Q92

LOWER LEFT FLIPPER COIL
9   YELLOW–BLUE   POWER   Q87
7   ORANGE–BLUE   HOLD   Q89

6   YELLOW–VIOLET *SHOOT 1   Q84
4   ORANGE–VIOLET *SHOOT 2   Q86

3   YELLOW–GRAY   *SHOOT 3   Q81
1   ORANGE–GRAY   *SHOOT 4   Q83

J139
J102   2   GRAY–YELLOW +12V

J211

CPU BOARD

J212   CABINET OPTO SWITCHES
13   ORANGE   GROUND
12   BLUE–VIOLET   L. RIGHT FLIPPER   F2   U25A–1
11   BLUE–GRAY   L. LEFT FLIPPER   F4   U25B–2
10   BLACK–YELLOW   U. RIGHT FLIPPER   F6   U25C–14
9   BLACK–BLUE   U. LEFT FLIPPER   F8   U25D–13

FLIPPER OPTO BOARDS

J208   END–OF–STROKE SWITCHES
14   ORANGE   GROUND
13   BLACK–GREEN   L. RIGHT FLIPPER   F1   U26A–1
12   BLACK–BLUE   L. LEFT FLIPPER   F3   U26B–2
11   BLACK–VIOLET   *BASKET MADE OPTO F5   U26C–14
10   BLACK–GRAY   *BASKET HOLD   F7   U26D–13

* INDICATES A FLIPPER CIRCUIT USED FOR ANOTHER PURPOSE.

FLIPPER COIL CIRCUITS

LEFT FLIPPER CIRCUIT

POWER DRIVER BOARD

PLAYFIELD

J119 RED–BLUE
RED–GRAY

YELLOW–BLUE   POWER
ORANGE–BLUE   HOLD
LOWER LEFT FLIPPER

YELLOW–GRAY   POWER
ORANGE–GRAY   HOLD
UPPER LEFT FLIPPER

J102

CPU BOARD
J211
J212

GROUND	ORANGE	
F4 LOWER	BLUE–GRAY	LEFT CABINET OPTO BOARD
F8 UPPER	BLACK–BLUE	

J208
BLACK–BLUE
ORANGE   LOWER LEFT E.O.S. SWITCH
BLACK–GRAY
ORANGE   UPPER LEFT E.O.S. SWITCH

RIGHT FLIPPER CIRCUIT

POWER DRIVER BOARD

PLAYFIELD

J119 RED–GREEN
RED–VIOLET

YELLOW–GREEN   POWER
ORANGE–GREEN   HOLD
LOWER RIGHT FLIPPER

YELLOW–VIOLET   POWER
ORANGE–VIOLET   HOLD
UPPER RIGHT FLIPPER

J102

CPU BOARD
J211
J212

GROUND	ORANGE	
F2 LOWER	BLUE–VIOLET	RIGHT CABINET OPTO BOARD
F6 UPPER	BLACK–YELLOW	

J208
BLACK–GREEN
ORANGE   LOWER RIGHT E.O.S. SWITCH
BLACK–VIOLET
ORANGE   UPPER RIGHT E.O.S. SWITCH

FLIPPER END-OF-STROKE SWITCH CIRCUIT

Dedicated Input
+5V
+12V

HCT244   10K   1K

A   1K   1N4148   J208
B
LM339   470pf

BLACK–XXX

PLAYFIELD

ORANGE

CPU BOARD

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 CIRCUITS

POWER DRIVER BOARD
J139

CPU BOARD

LEFT CABINET OPTO BOARD   J1

GRAY–YELLOW +12V
ORANGE   GROUND
BLUE–GRAY   L. LEFT FLIPPER F4
BLACK–BLUE   U. LEFT FLIPPER F8

J212

RIGHT CABINET OPTO BOARD   J1

BLUE–VIOLET   L. RIGHT FLIPPER F2
BLACK–YELLOW   U. RIGHT FLIPPER F6

Dedicated Input
+5V
+12V

HCT244   10K   1K

A   1K   1N4148   J212   BLUE–XXX
B   BLACK–XXX
LM339   470pf

CPU BOARD

13   ORANGE

FLIPPER OPTO BOARD
J1

J139   GRAY–YELLOW
+12V   2

POWER DRIVER BOARD

470

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
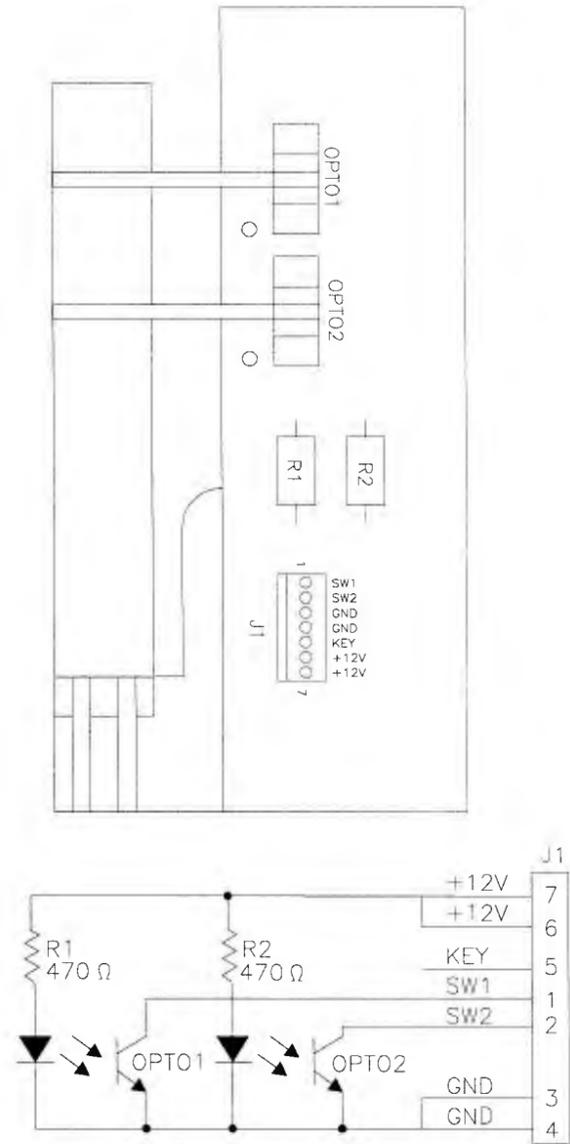
Left Flipper Opto Board Assembly
J1-1 Black-Blue from CPU board J212-9
J1-2 Blue-Gray from CPU board J212-11
J1-3 N/C
J1-4 Orange from CPU board J212-13
J1-5 N/C
J1-6 Gray-Yellow from Power Driver Board J139-2
J1-7 Gray-Yellow from Power Driver Board J139-2

Right Flipper Opto Board Assembly
J1-1 Black-Yellow from CPU board J212-10
J1-2 Blue-Violet from CPU board J212-12
J1-3 Orange from CPU board J212-13
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

Trough IR LED Board Assembly
(transmitter - green board)
A-18617-1
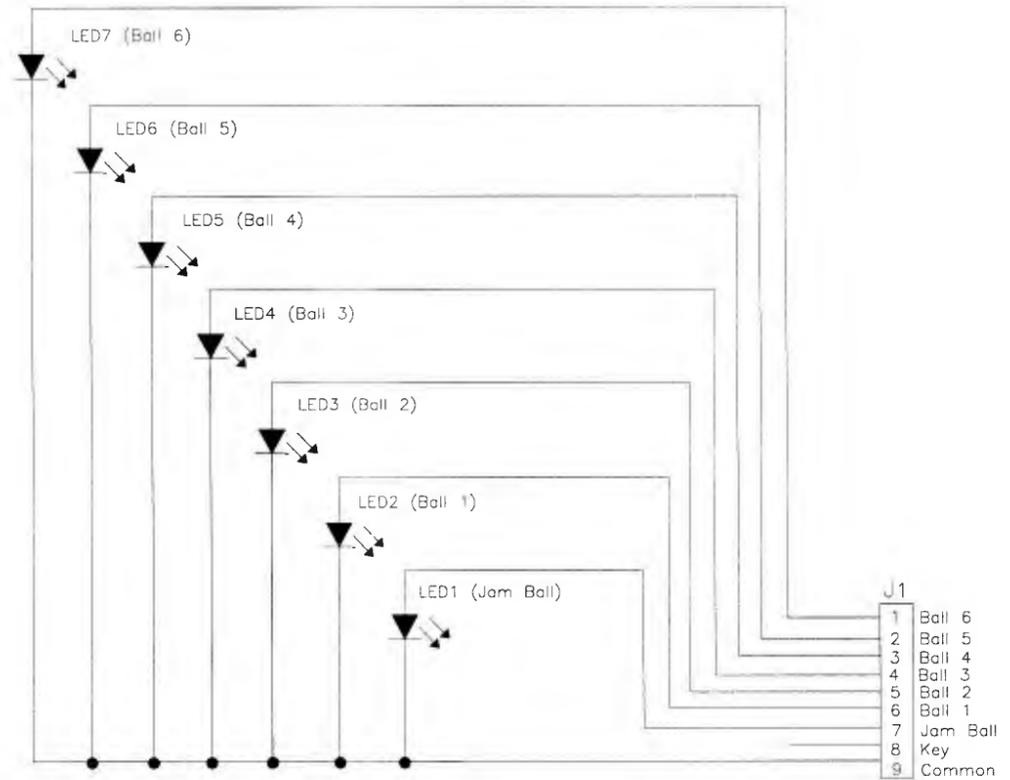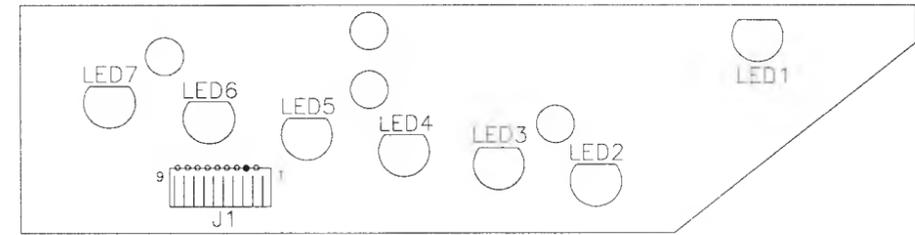
J1-1 N/C
J1-2 N/C
J1-3 GRY-GRN, LED 5, to 7-Opto Switch Board J1-4
J1-4 GRY-BLK, LED 4, to 7-Opto Switch Board J1-5
J1-5 GRY-ORG, LED 3, to 7-Opto Switch Board J1-6
J1-6 GRY-RED, LED 2, to 7-Opto Switch Board J1-7
J1-7 GRY-BRN, LED 1, to 7-Opto Switch Board J1-8
J1-8 Key
J1-9 BLK, ground, to 7-Opto Switch Board J1-9, J-10

Trough IR Photo Transistor Board Assembly
(receiver - blue board)
A-18618-1
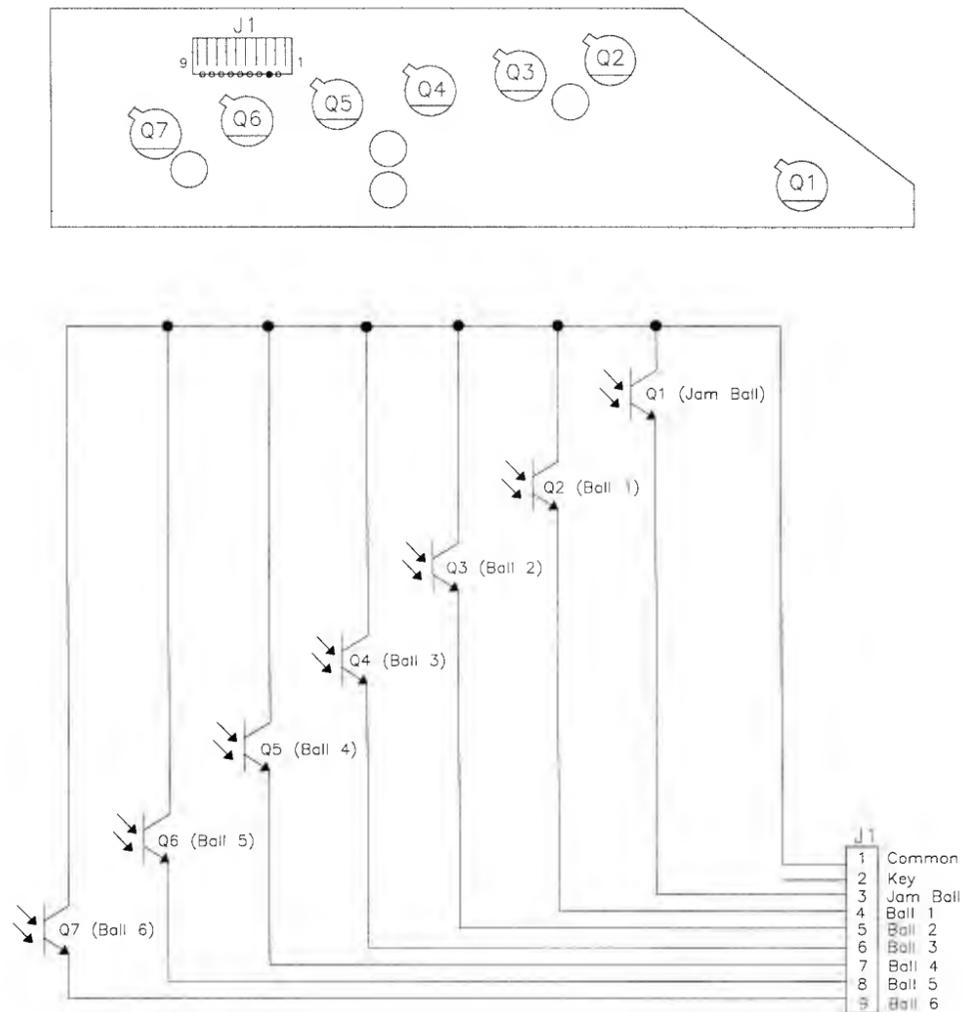
J1-1 GRY-YEL, +12V, to 7-Opto Switch Board J2-9, J2-10
J1-2 Key
J1-3 ORG-BRN, Photo Transistor 1, to 7-Opto Switch Board J2-7
J1-4 ORG-RED, Photo Transistor 2, to 7-Opto Switch Board J2-6
J1-5 ORG-BLK, Photo Transistor 3, to 7-Opto Switch Board J2-5
J1-6 ORG-YEL, Photo Transistor 4, to 7-Opto Switch Board J2-4
J1-7 ORG-GRN, Photo Transistor 5, to 7-Opto Switch Board J2-3
J1-8 N/C
J1-9 N/C

Ball Trough Opto Switches Wiring Diagram
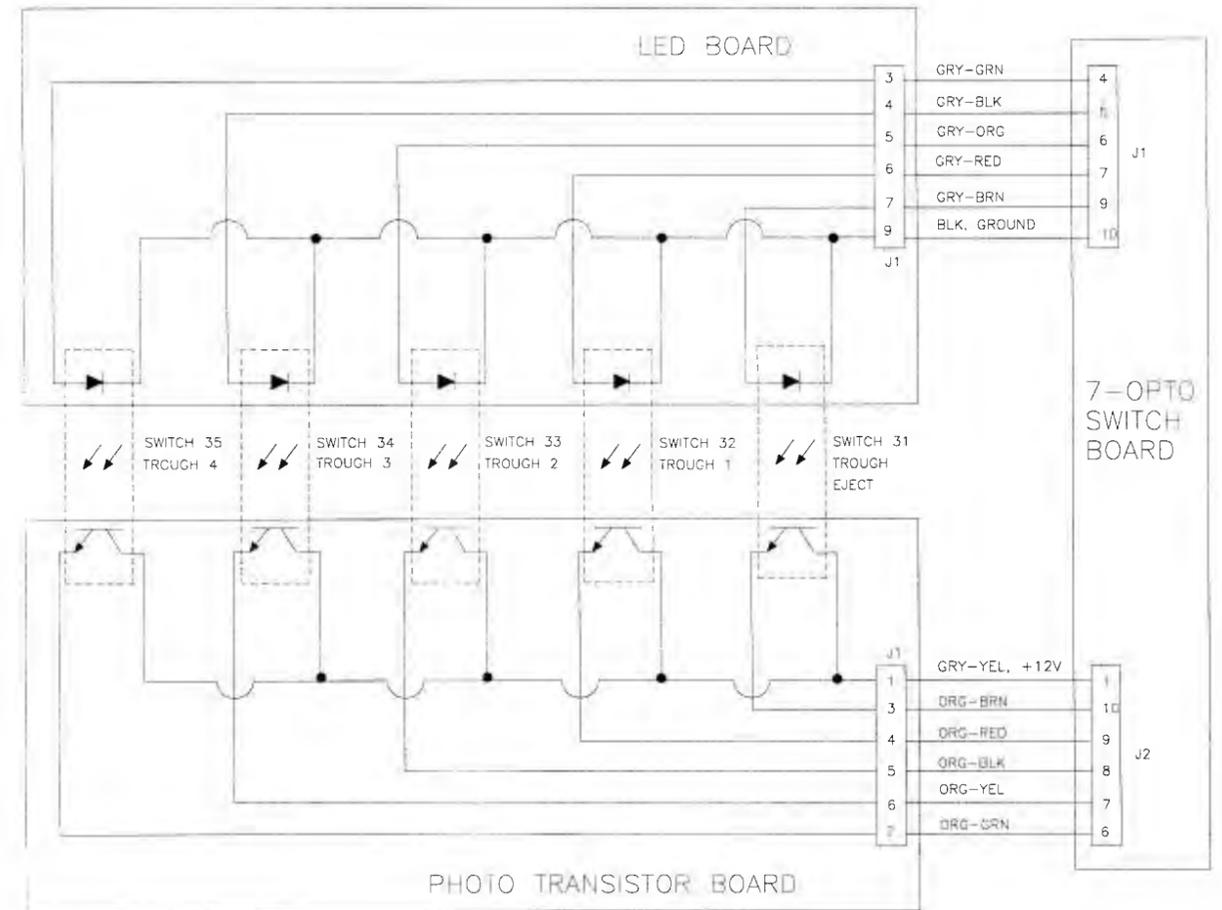
Center Ramp Opto and Right Loop Enter Opto Switches Wiring Diagram
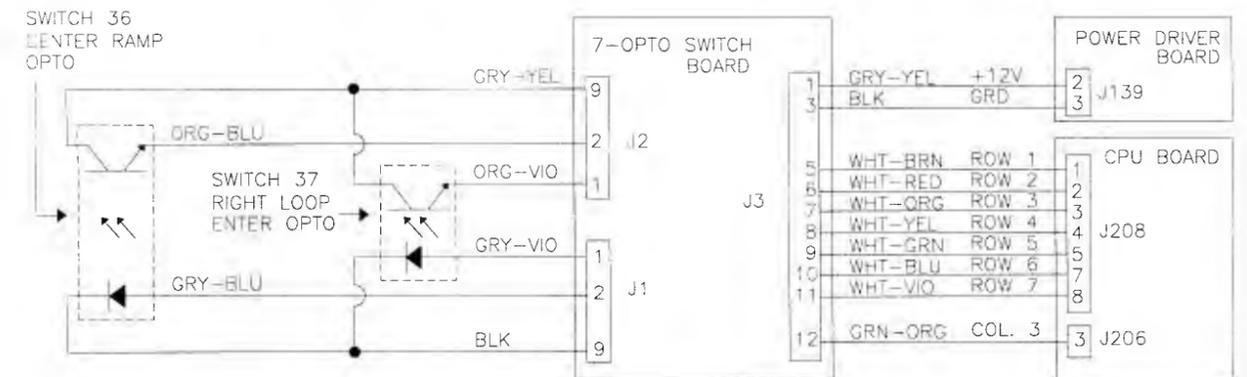
THE BALL ROLLS BETWEEN THE LED BOARD AND THE PHOTO TRANSISTOR BOARD, BREAKING THE BEAM. WHEN THE BEAM IS BROKEN THE SWITCH IS MADE.

7-Opto Switch Board Assembly
A-15576.1
(FOR BALL TROUGH, CENTER RAMP OPTO, AND RIGHT LOOP ENTER OPTO SWITCHES)
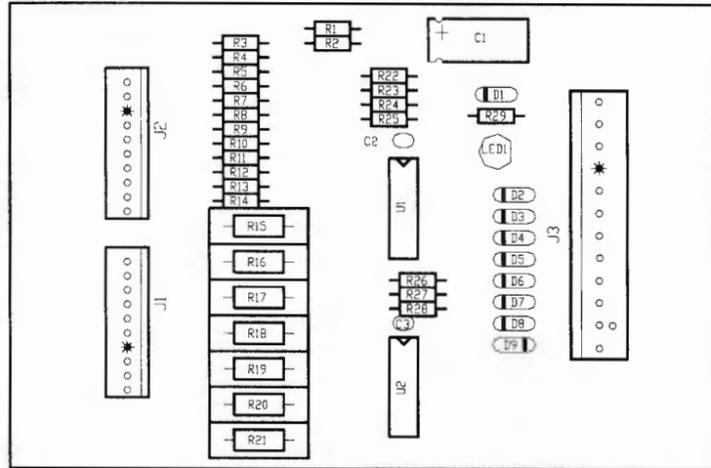
|		
J1-1	GRY-VIO	To switch #37, RIGHT LOOP ENTER OPTO LED board
J1-2	GRY-BLU	To switch #36, CENTER RAMP OPTO LED board
J1-3	GRY-GRN	To switch #35, BALL TROUGH, LED board
J1-4	N/C	
J1-5	GRY-BLK	To switch #34, BALL TROUGH LED board
J1-6	GRY-ORG	To switch #33, BALL TROUGH LED board
J1-7	GRY-RED	To switch #32, BALL TROUGH LED board
J1-8	GRY-BRN	To switch #31, BALL TROUGH LED board
J1-9	BLK	Ground to LED boards
J1-10	BLK	Ground to LED boards
J2-1	ORG-VIO	To switch #37, RIGHT LOOP ENTER PHOTO TRANS. board
J2-2	ORG-BLU	To switch #36, CENTER RAMP OPTO PHOTO TRANS. board
J2-3	ORG-GRN	To switch #35, BALL TROUGH PHOTO TRANS. board
J2-4	ORG-YEL	To switch #34, BALL TROUGH PHOTO TRANS. board
J2-5	ORG-BLK	To switch #33, BALL TROUGH PHOTO TRANS. board
J2-6	ORG-RED	To switch #32, BALL TROUGH PHOTO TRANS. board
J2-7	ORG-BRN	To switch #31, BALL TROUGH PHOTO TRANS. board
J2-8	N/C	
J2-9	GRY-YEL	+12V to PHOTO TRANS. boards
J2-10	GRY-YEL	+12V to PHOTO TRANS. boards
J3-1	GRY-YEL	+12V from POWER DRIVER board J139-2
J3-2	N/C	
J3-3	BLK	Ground from POWER DRIVER board J139-3
J3-4	N/C	
J3-5	WHT-BRN	Switch Row 1, from CPU board J208-1
J3-6	WHT-RED	Switch Row 2, from CPU board J208-2
J3-7	WHT-ORG	Switch Row 3, from CPU board J208-3
J3-8	WHT-YEL	Switch Row 4, from CPU board J208-4
J3-9	WHT-GRN	Switch Row 5, from CPU board J208-5
J3-10	WHT-BLU	Switch Row 6, from CPU board J208-7
J3-11	WHT-VIO	Switch Row 7, from CPU board J208-8
J3-12	GRN-ORG	Switch Column 3, from CPU board J206-3

7-Opto Switch Board Schematic
A-15576.1
(FOR BALL TROUGH, CENTER RAMP OPTO, AND RIGHT LOOP ENTER OPTO SWITCHES)
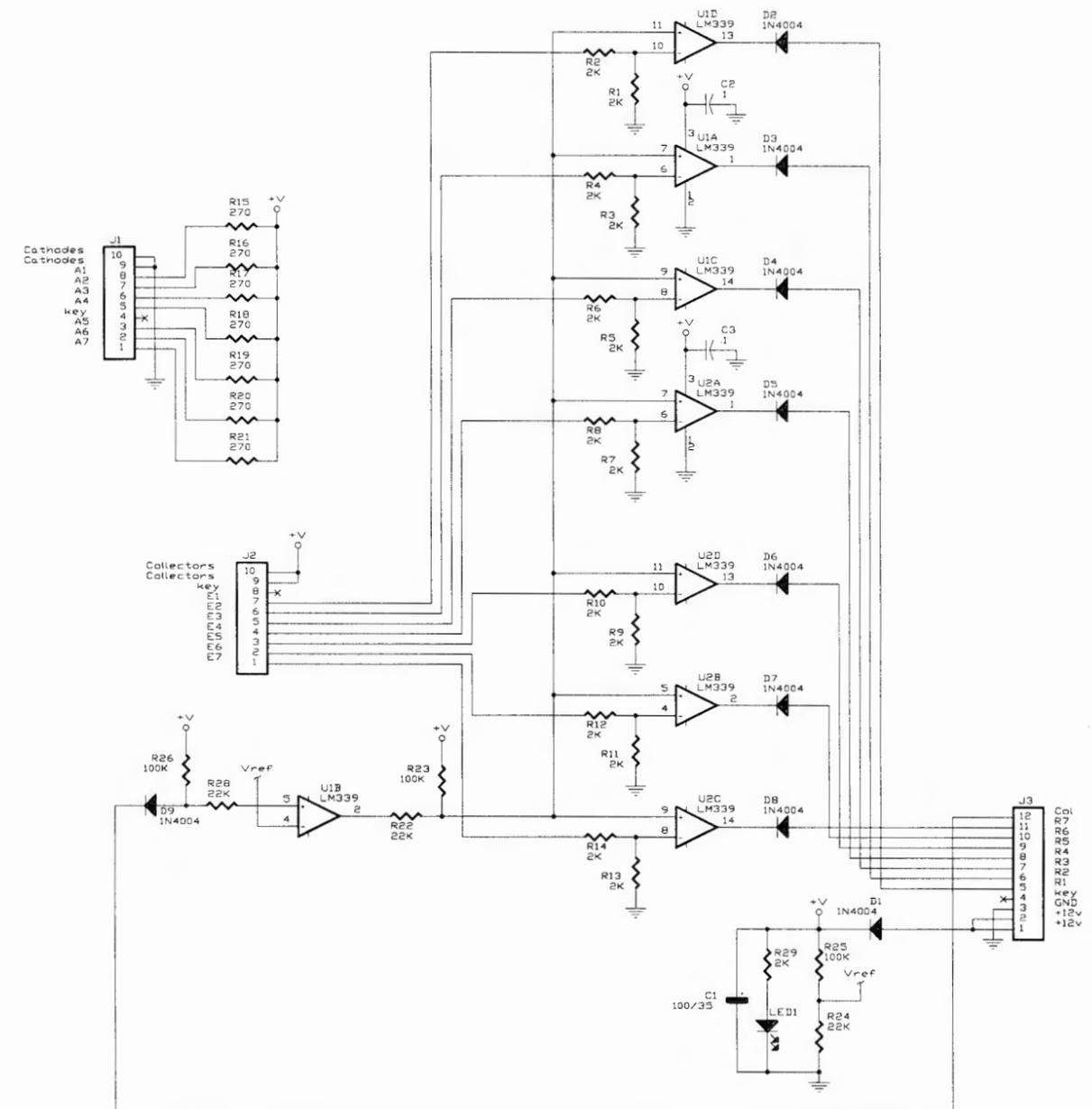
24-Opto Switch Board Assembly
A-15646
(FOR BASKET MADE OPTO SWITCH)
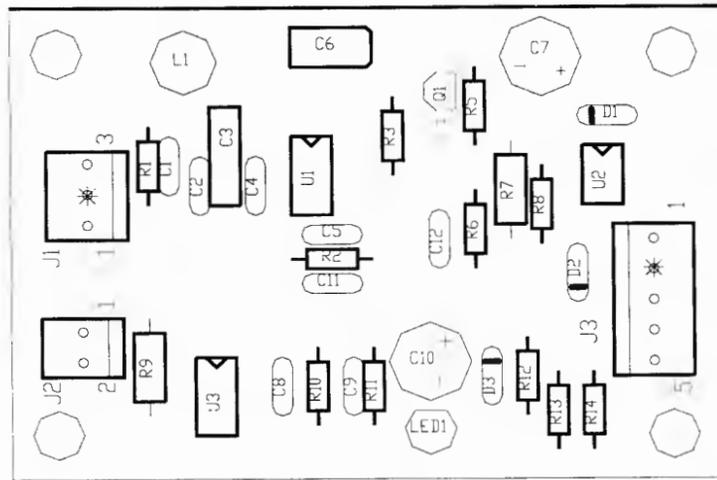
J1-1	ORG	To switch #F5, BASKET MADE OPTO PHOTO TRANS. board
J1-2	N/C	
J1-3	GRY-YEL	To switch #F5, BASKET MADE OPTO PHOTO TRANS. board
J2-1	BLK	To switch #F5, BASKET MADE OPTO LED board
J2-2	BLK-VIO	To switch #F5, BASKET MADE OPTO LED board
J3-1	BLK-VIO	From CPU board J208-11
J3-2	N/C	
J3-3	ORG	From CPU board J212-13
J3-4	BLK	Ground from POWER DRIVER board J139-3
J3-5	GRY-YEL	+12V from POWER DRIVER board J139-2
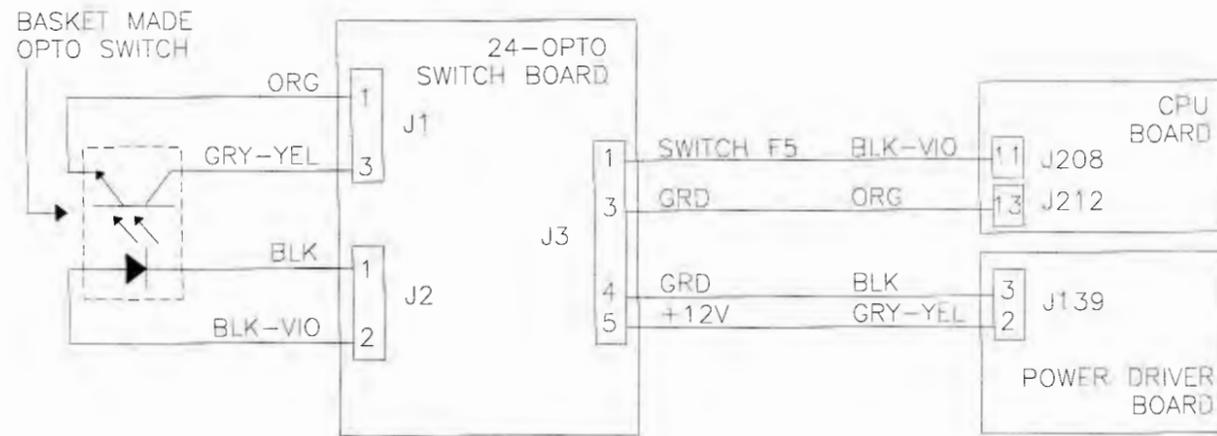
24-Opto Switch Board Schematic
A-15646
(FOR BASKET MADE OPTO SWITCH)
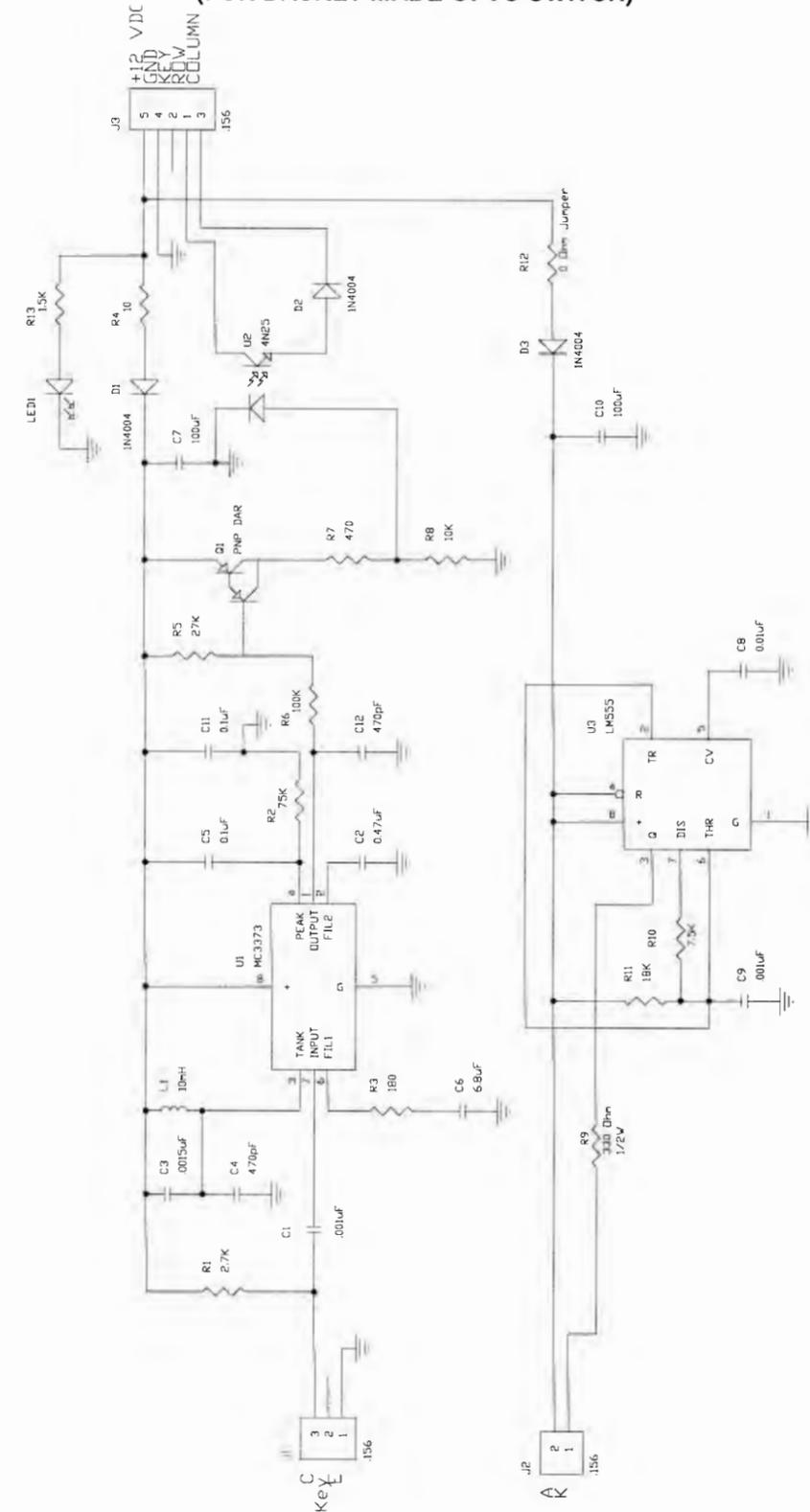
LED BOARD ASSEMBLY
A-16908
(TRANSMITTER-GREEN BOARD)
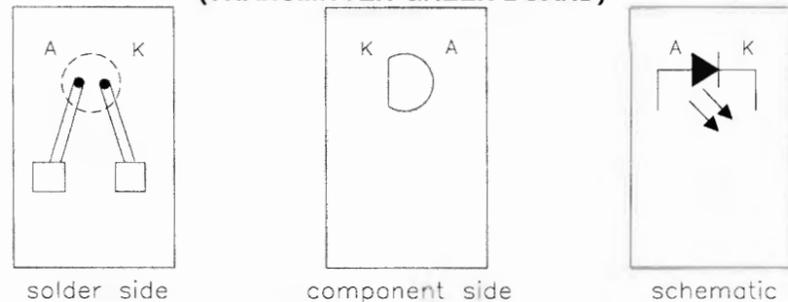
solder side   component side   schematic

PHOTO TRANSISTOR BOARD ASSEMBLY
A-16909
(RECEIVER-BLUE BOARD)
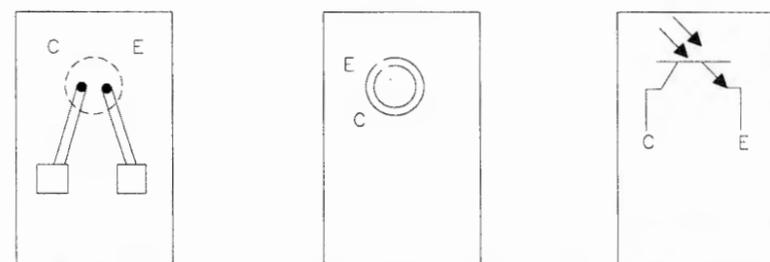
solder side   component side   schematic

TYPICAL CIRCUIT DIAGRAM

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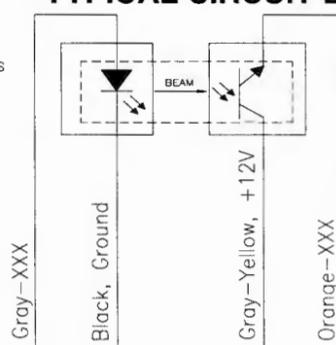
PHOTO TRANSISTOR BOARD
Receiver
0.1–0.7 volts unblocked
11–13 volts blocked

BEAM

Gray-XXX   Black, Ground   Gray-Yellow, +12V   Orange-XXX

LED BOARD
Transmitter

PHOTO TRANSISTOR BOARD
Receiver

White   Black   Blue

Green

Infrared Beam

Solder

Gray   Black   Gray-Yellow   Orange

Solder
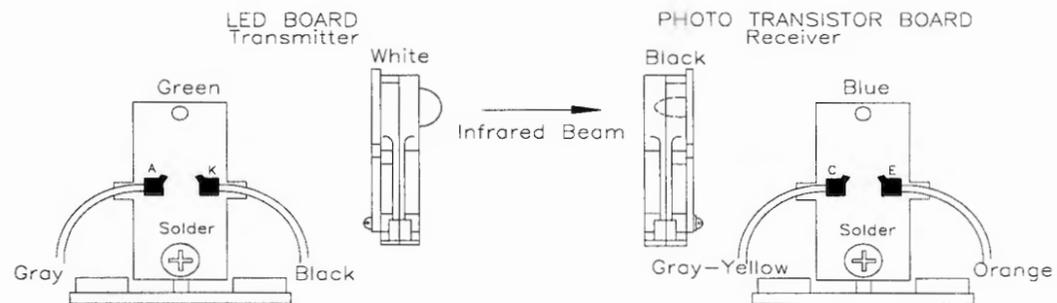
Defender Switch Board
A-21402
(FOR DEFENDER POSITIONS AND DEFENDER LOCK OPTO SWITCHES)
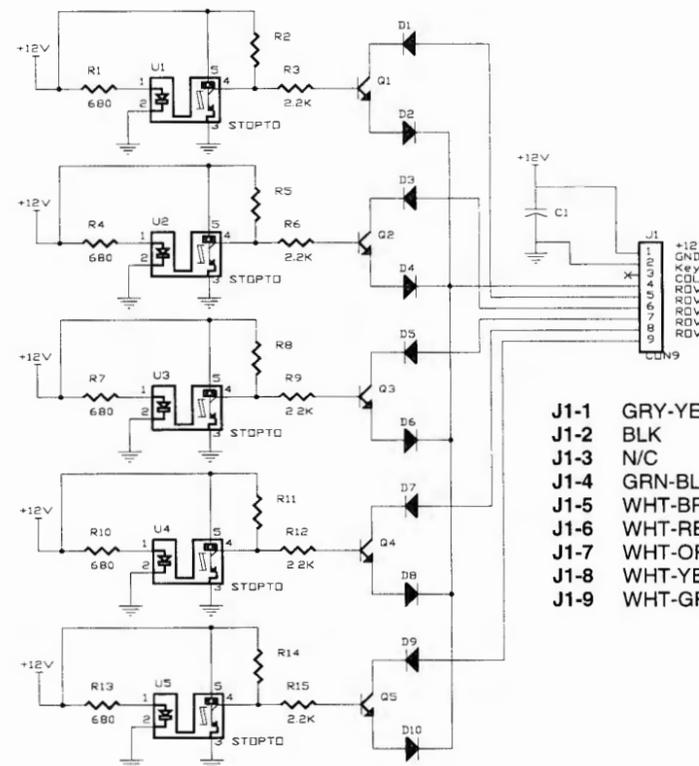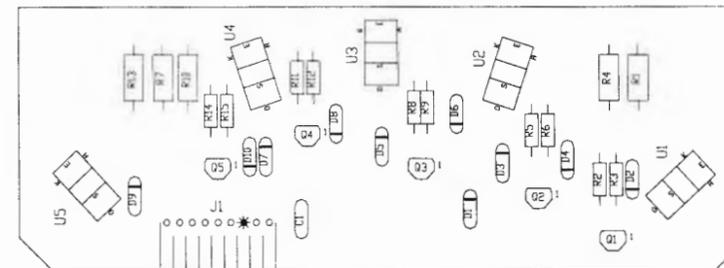
J1-1	GRY-YEL	+12V from POWER DRIVER board J139-2
J1-2	BLK	Ground from POWER DRIVER board J139-3
J1-3	N/C	
J1-4	GRN-BLK	Switch Column 5, from CPU board J206-5
J1-5	WHT-BRN	Switch Row 1, from CPU board J208-1
J1-6	WHT-RED	Switch Row 2, from CPU board J208-2
J1-7	WHT-ORG	Switch Row 3, from CPU board J208-3
J1-8	WHT-YEL	Switch Row 4, from CPU board J208-4
J1-9	WHT-GRN	Switch Row 5, from CPU board J208-5

POWER DRIVER BOARD

J139   2   +12V   GRY-YEL   1
  3   GRD   BLK   2

CPU BOARD

J206   5   COL. 5   GRN-BLK   4

J208   1   ROW 1   WHT-BRN   5
  2   ROW 2   WHT-RED   6
  3   ROW 3   WHT-ORG   7
  4   ROW 4   WHT-YEL   8
  5   ROW 5   WHT-GRN   9

DEFENDER SWITCH BOARD

J1
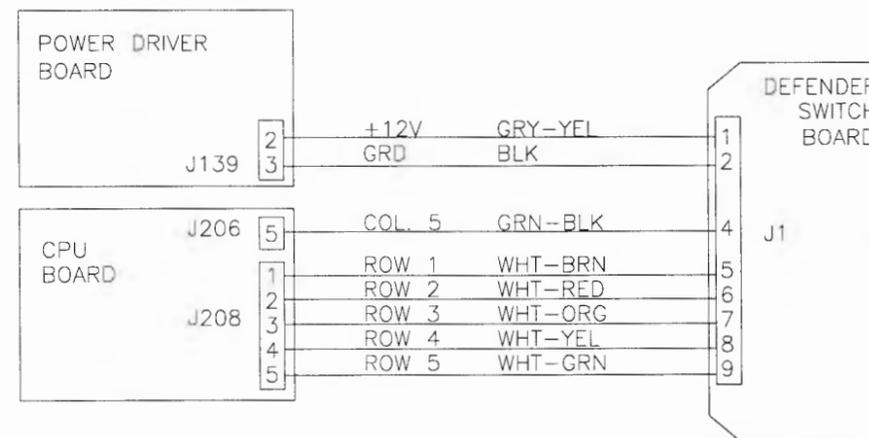
2 LED Driver Board
(FOR SHOT CLOCK)
A-21399
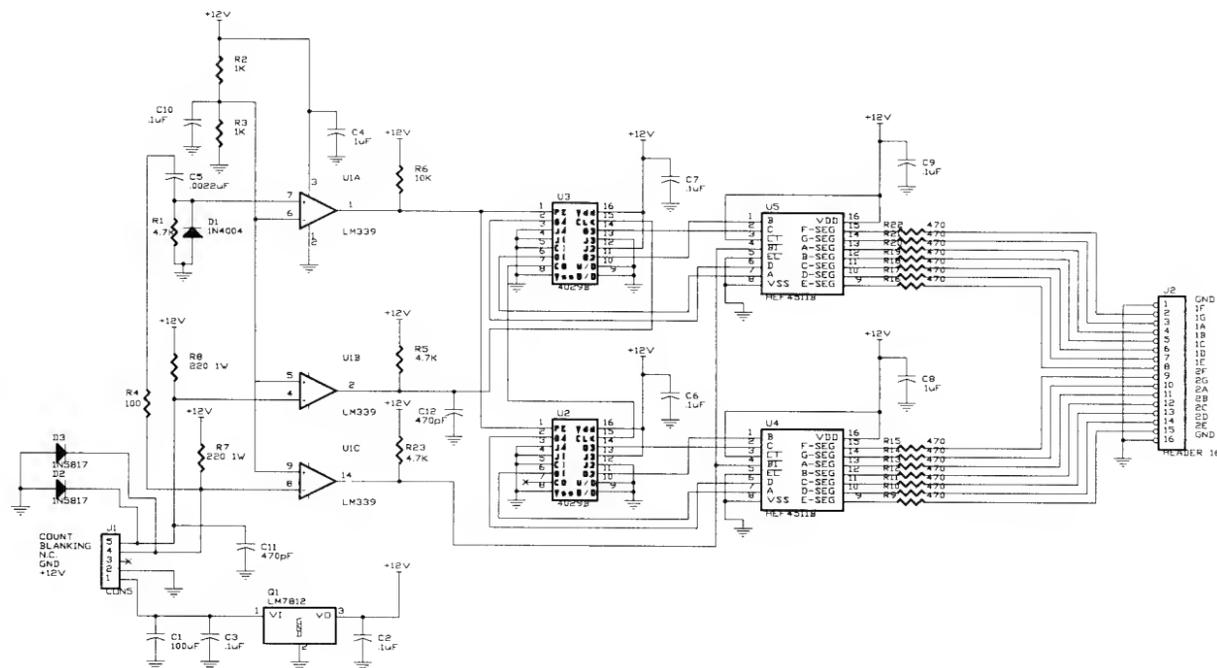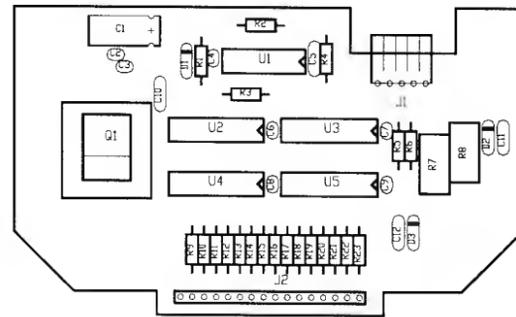
J1-1	GRY-YEL	+12V from POWER DRIVER board J139-2
J1-2	BLK	Ground from POWER DRIVER board J139-3
J1-3	N/C	
J1-4	YEL-WHT	solenoid #39, SHOT CLOCK ENABLE, from POWER DRIVER board J110-4
J1-5	BLU-WHT	solenoid #40, SHOT CLOCK COUNT, from POWER DRIVER board J110-5

J2 Connected directly to J1 on 2 LED DISPLAY board

2 LED Display Board
(FOR SHOT CLOCK)
A-21380
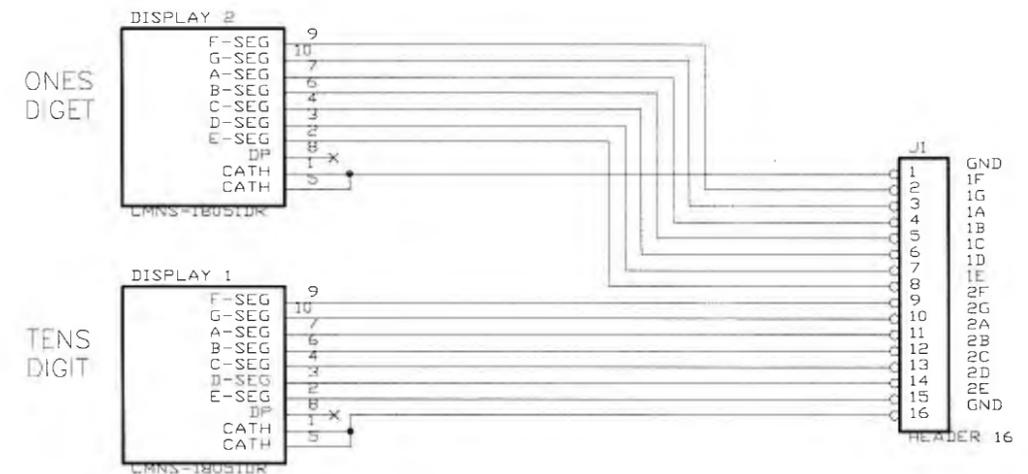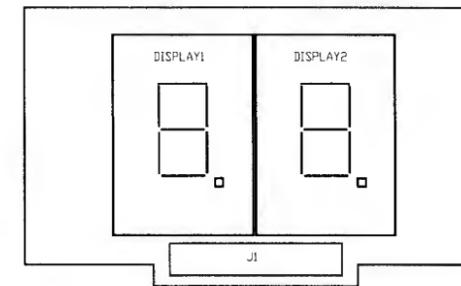
J1 Connected directly to J2 on 2 LED DRIVER Board
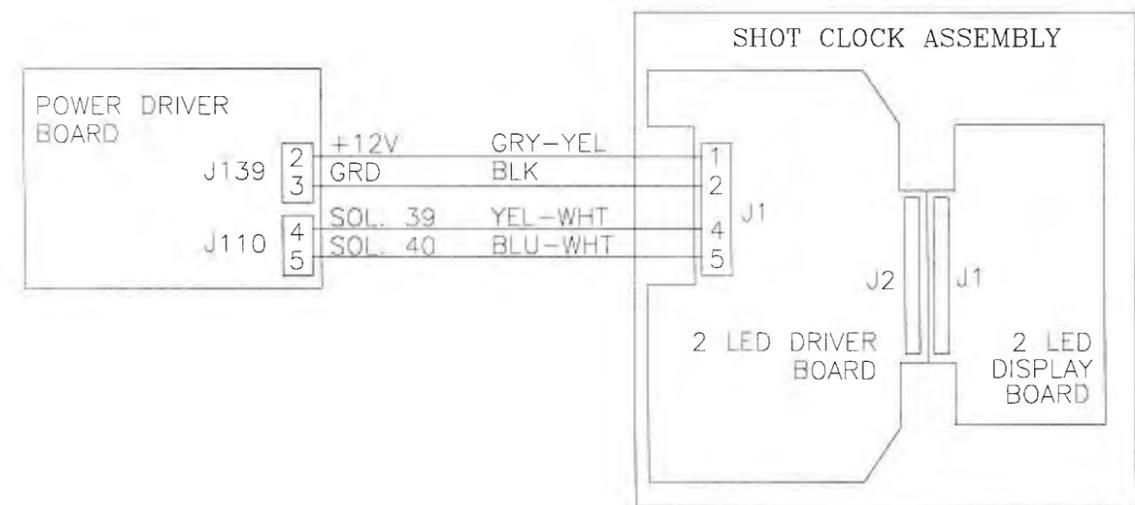
High Current Driver Board
C-13963-1
(FOR MOTOR)
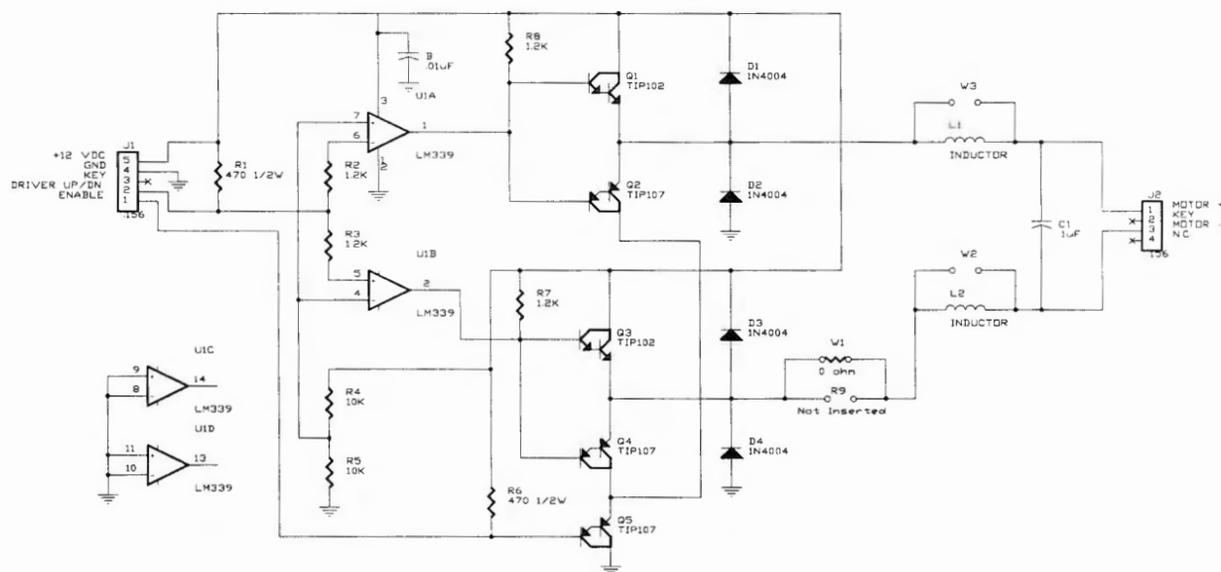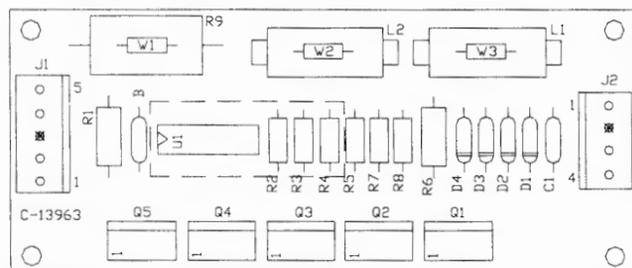
J1-1	BRN-WHT	solenoid #37, MOTOR ENABLE, from POWER DRIVER board J110-1
J1-2	ORG-WHT	solenoid #38, MOTOR DIRECTION, from POWER DRIVER board J110-3
J1-3	N/C	
J1-4	BLK	Ground from POWER DRIVER board J139-3
J1-5	GRY-YEL	+12V from POWER DRIVER board J139-2
J2-1	RED	MOTOR +
J2-2	N/C	
J2-3	BLK	MOTOR -
J2-4	N/C	

Security CPU Board Assembly
A-21377-50053

J206-3   GRN-ORG, switch column 3, to playfield switches
J206-4   GRN-YEL, switch column 4, to playfield switches
J206-5   GRN-BLK, switch column 5, to playfield switches
J206-6   GRN-BLU, switch column 6, to playfield switches
J206-7   N/C
J206-8   KEY
J206-9   N/C

J207-1   GRN-BRN, switch column 1 to Insert Panel switch
J207-2   N/C
J207-3   N/C
J207-4   N/C
J207-5   N/C
J207-6   N/C
J207-7   N/C
J207-8   Key
J207-9   N/C

J208-1   WHT-BRN, switch row 1, to playfield switches
J208-2   WHT-RED, switch row 2, to playfield switches
J208-3   WHT-ORG, switch row 3, to playfield switches
J208-4   WHT-YEL, switch row 4, to playfield switches
J208-5   WHT-GRN, switch row 5, to playfield switches
J208-6   KEY
J208-7   WHT-BLU, switch row 6, to playfield switches
J208-8   WHT-VIO, switch row 7, to playfield switches
J208-9   WHT-GRY, switch row 8, to playfield switches
J208-10 BLK-GRY, F7 to Basket Hold switch
J208-11 BLK-VIO, F5 to Basket Made Opto switch
J208-12 BLK-BLU, F3, to lower left E.O.S. switch
J208-13 BLK-GRN, F1, to lower right E.O.S. switch
J208-14 ORG, ground to E.O.S. switches

J209-1   WHT-RED, switch row 1, to Insert Panel switch
J209-2
J209-3
J209-4
J209-5
J209-6
J209-7
J209-8
J209-8

J210-1   BLK, ground, from Power Driver Board J101-5,7
J210-2   KEY
J210-3   BLK, ground, from Power Driver Board J101-5, 7
J210-4   GRY, +5V, from Power Driver Board J101-3, 4
J210-5   GRY, +5V, from Power Driver Board J101-3, 4
J210-6   GRY-GRN, +12V, from Power Driver Board J101-1, 2
J210-7   GRY-GRN, +12V, from Power Driver Board J101-1, 2

J211, 34-pin ribbon cable, data to/from J102

J212-1   GRN-BRN, switch col. 1, to coin door board J3-1
J212-2   GRN-RED, switch col. 2, to coin door board J3-2
J212-3   N/C
J212-4   WHT-BRN, switch row 1, to coin door board J3-3
J212-5   KEY
J212-6   WHT-RED, switch row 2, to coin door board J3-4
J212-7   WHT-ORG, switch row 3, to coin door board J3-5
J212-8   WHT-YEL, switch row 4, to coin door board J3-6
J212-9   BLK-BLU, F8, to left flipper opto board J1-1
J212-10 BLK-YEL, F6, to right flipper opto board J1-1
J212-11 BLU-GRY, F4, to left flipper opto board J1-2
J212-12 BLU-VIO, F2, to right flipper opto board J1-2
J212-13 ORG, Ground to left flipper opto board J1-4

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

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

J203 & J204 - NOT USED

J205-1   ORG-BRN, ded. sw. row 1, to Coin Door Brd J1-8
J205-2   ORG-RED, ded. sw. row 2, to Coin Door Brd J1-7
J205-3   ORG-BLK, ded. sw. row 3, to Coin Door Brd J1-6
J205-4   ORG-YEL, ded. sw. row 4, to Coin Door Brd J1-5
J205-5   N/C
J205-6   ORG-GRN, ded. sw. row 5, to Coin Door Brd J1-4
J205-7   ORG-BLU, ded. sw. row 6, to Coin Door Brd J1-3
J205-8   ORG-VIO, ded. sw. row 7, to Coin Door Brd J1-2
J205-9   ORG-GRY, ded. sw. row 8, to Coin Door Brd J1-1
J205-10 BLK, ground, to Coin Door Brd J1-10
J205-11 KEY
J205-12 ORG-WHT, switch enable, to Coin Door Brd J1-11

J206-1   GRN-BRN, switch column 1, to playfield switches
J206-2   GRN-RED, switch column 2, to playfield switches

Audio Visual Board Assembly
A-20516-50053
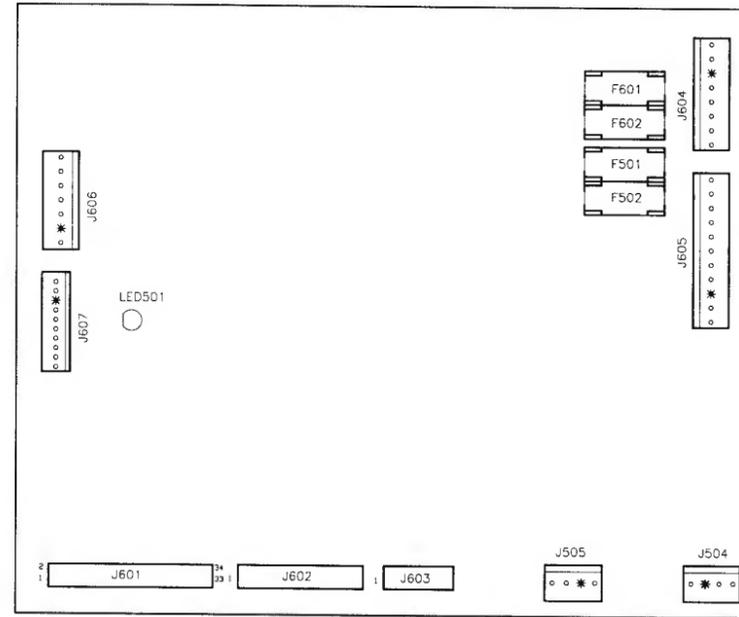
J601, 34-pin ribbon cable, data to CPU J202

J602, 26-pin ribbon cable, data to CPU J201

J603, 14-pin ribbon cable, data to/from dot matrix display driver

J604-1 ORG, -125V to display driver pin1
J604-2 BLU, -113V to display driver pin 2
J604-3 KEY
J604-4 BLK, ground to display driver pin 4
J604-5 BLK, ground to display driver pin 5
J604-6 GRY, +5V to display driver pin 6
J604-7 GRY-YEL, +12 to display driver pin 7
J604-8 BRN, +62 to display driver pin 8

J605-1 WHT, 80VAC from transformer secondary
J605-2 WHT, 80VAC from transformer secondary
J605-3 VIO, 100VAC from transformer secondary
J605-4 VIO, 100VAC from transformer secondary
J605-5 GRY-WHT, 18VAC from transformer secondary
J605-6 GRY-WHT, loop from J605-5
J605-7 GRY, 18VAC from transformer secondary
J605-8 GRY, loop from J605-7
J605-9 KEY
J605-10 GRY-GRN, 18VAC from transformer secondary
J605-11 GRY-GRN, 18VAC loop from J605-10

J606-1 BLK, ground from power driver board J101-7
J606-2 KEY
J606-3 BLK, ground from power driver board J101-5
J606-4 GRY, +5V from power driver board J101-4
J606-5 GRY, +5V from power driver board J101-3
J606-6 GRY-GRN +12V from power driver board J101-2
J606-7 GRY-GRN, +12V from power driver board J101-1

J607 NOT USED

J504-1 BLK-YEL, signal to speaker
J504-2 KEY
J504-3 N/C
J504-4 BLK, signal to speaker

J505-1 BLK-YEL, signal to speaker
J505-2 N/C
J505-3 KEY
J505-4 BLK, signal to speaker

Power Driver Board Assembly
A-20028
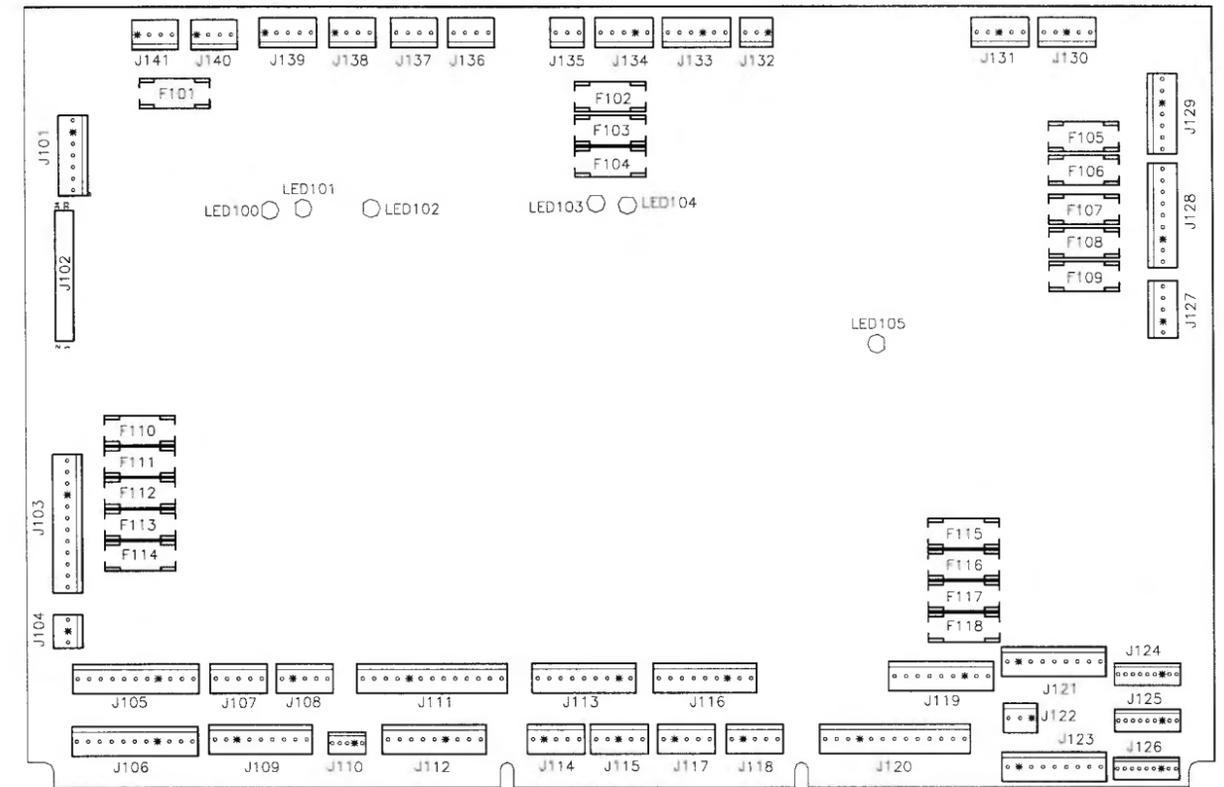
J101-1 GRY-GRN, +12V to J210-6, 7; J606-1
J101-2 GRY-GRN, +12V to J210-6, 7; J606-2
J101-3 GRY, +5V to J210-4, 5; J3-1,3; J606-3
J101-4 GRY, +5V to J210-4, 5; J3-1,3; J606-4
J101-5 BLK, ground to J210-1, 3; J606-5
J101-6 KEY
J101-7 BLK, ground to J210-1,3; J606-7

J102, 34-pin ribbon cable, data to/from CPU J211

J103-1 YEL-WHT, 6.8Vac from xformer secondary
J103-2 WHT-BRN, 6.8Vac from xformer secondary
J103-3 WHT-BRN, 6.8Vac from xformer secondary
J103-4 WHT-ORG, 6.8Vac from xformer secondary
J103-5 WHT-YEL, 6.8Vac from xformer secondary
J103-6 WHT-YEL, 6.8Vac from xformer secondary
J103-7 ORG, 6.8Vac from xformer secondary
J103-8 ORG 6.8Vac from xformer secondary
J103-9 KEY
J103-10 GRN, 6.8Vac from xformer secondary
J103-11 BRN, 6.8Vac from xformer secondary
J103-12 BRN, 6.8Vac from xformer secondary

J104-1 VIO, return, G.I. to Coin Door Board J2-3
J104-2 KEY
J104-3 WHT-VIO, 6.8Vac, G.I. to Coin Door BrdJ2-5

J105-1 BRN, return, G.I. to insert panel
J105-2 ORG, return, G.I. to insert panel
J105-3 YEL, return, G.I. to insert panel
J105-4 KEY
J105-5 N/C
J105-6 VIO, return, G.I. to insert panel
J105-7 WHT-BRN, 6.8Vac, G.I. to insert panel
J105-8 WHT-ORG, 6.8Vac, G.I. to insert panel
J105-9 WHT-YEL, 6.8Vac, G.I. to insert panel
J105-10 N/C
J105-11 WHT-VIO, 6.8Vac, G.I. to insert panel

J106-1 BRN, return, G.I. to playfield
J106-2 ORG, return, G.I. to playfield
J106-3 YEL, return, G.I. to playfield
J106-4 KEY
J106-5 GRN, return, G.I. to playfield
J106-6 VIO, return, G.I. to playfield
J106-7 WHT-BRN, 6.8Vac, G.I. to playfield
J106-8 WHT-ORG, 6.8Vac, G.I. to playfield
J106-9 WHT-YEL, 6.8Vac, G.I. to playfield
J106-10 WHT-GRN, 6.8Vac, G.I. to playfield
J106-11 WHT-VIO, 6.8Vac, G.I. to playfield

J107-NOT USED

Power Driver Board Continued...

J108- NOT USED

J109-1 BLU-BRN, solenoid 25 drive to playfield flasher
J109-2 BLU-RED, solenoid 26 drive to playfield flasher
J109-3 BLU-ORG, solenoid 27 drive to playfield flasher
J109-4 BLU-YEL, solenoid 28 drive to playfield flasher
J109-5 RED-ORG tieback diode
J109-6 RED-ORG tieback diode
J109-7 KEY
J109-8 RED-ORG tieback diode
J109-9 RED-ORG tieback diode

J110-1 BRN-WHT, solenoid 37 drive to High Current Driver board
J110-2 KEY
J110-3 ORG-WHT, solenoid 38 drive to High Current Driver board
J110-4 YEL-WHT, solenoid 39 drive to 2 LED Driver board
J110-5 BLU-WHT, solenoid 40 drive to 2 LED Driver board

J111-1 BLK-BRN, solenoid 17 drive to playfield flasher
J111-2 BLK-RED, solenoid 18 drive to playfield flasher
J111-3 BLK-ORG, solenoid 19 drive to playfield flasher
J111-4 BLK-YEL, solenoid 20 drive to playfield flasher
J111-5 N/C
J111-6 BLU-BLK, solenoid 22 drive to playfield flasher
J111-7 N/C
J111-8 BLU-GRY, solenoid 24 drive to playfield flasher
J111-9 KEY
J111-10 N/C
J111-11 N/C
J111-12 N/C
J111-13 N/C

J112-1 N/C
J112-2 N/C
J112-3 BLK-ORG, solenoid 19 drive to insert flasher
J112-4 KEY
J112-5 BLK-YEL, solenoid 20 drive to insert flasher
J112-6 N/C
J112-7 N/C
J112-8 N/C
J112-9 N/C

J113-1 BRN-BLK, solenoid 9 drive to playfield coil
J113-2 KEY
J113-3 BRN-RED, solenoid 10 drive to playfield coil
J113-4 BRN-ORG, solenoid 11 drive to playfield coil
J113-5 BRN-YEL, solenoid 12 drive playfield coil
J113-6 BRN-GRN, solenoid 13 drive playfield coil
J113-7 BRN-BLU, solenoid 14 drive playfield coil
J113-8 BRN-VIO, solenoid 15 drive playfield coil
J113-9 BRN-GRY, solenoid 16 drive to playfield coil

J114- NOT USED

J115- NOT USED

J116-1 VIO-BRN, solenoid 1 drive to playfield coil
J116-2 N/C
J116-3 KEY
J116-4 VIO-ORG, solenoid 3 drive to playfield coil
J116-5 VIO-YEL, solenoid 4 drive playfield coil
J116-6 VIO-GRN, solenoid 5 drive to playfield coil
J116-7 VIO-BLU, solenoid 6 drive to playfield coil
J116-8 N/C
J116-9 VIO-GRY, solenoid 8 drive playfield coil

J117-1 N/C
J117-2 N/C
J117-3 VIO-BLK, solenoid 7 drive to insert panel coil
J117-4 KEY
J117-5 N/C

J118- NOT USED

J119-1 RED-GRN, +50V to lower right flipper coil
J119-2 RED-GRN, loop from J119-1
J119-3 KEY
J119-4 RED-BLU, loop from J119-5
J119-5 RED-BLU, +50V to lower left flipper coil
J119-6 RED-VIO, loop from J119-7
J119-7 RED-VIO, +50V to solenoids 33 & 34
J119-8 RED-GRY, loop from J119-9
J119-9 RED-GRY, +50V to solenoids 35 & 36

J120-1 ORG-GRY, solenoid 36 drive to playfield coil
J120-2 N/C
J120-3 YEL-GRY, solenoid 35 drive to playfield coil
J120-4 N/C
J120-5 ORG-VIO, solenoid 34 drive to playfield coil
J120-6 YEL-VIO, solenoid 33 drive to playfield coil
J120-7 ORG-BLU, holding, lower left flipper coil
J120-8 N/C
J120-9 YEL-BLU, power, lower left flipper coil
J120-10 KEY
J120-11 ORG-GRN, holding, lower right flipper coil
J120-12 N/C
J120-13 YEL-GRN, power, lower right flipper coil

J121- NOT USED

J122-1 KEY
J122-2 N/C
J122-3 YEL-GRY, lamp column 8 to cabinet

J123-1 YEL-BRN, lamp column 1 to playfield
J123-2 YEL-RED, lamp column 2 to playfield
J123-3 YEL-ORG, lamp column 3 to playfield
J123-4 YEL-BLK, lamp column 4 to playfield
J123-5 YEL-GRN, lamp column 5 to playfield
J123-6 YEL-BLU, lamp column 6 to playfield
J123-7 YEL-VIO, lamp column 7 to playfield
J123-8 KEY
J123-9 YEL-GRY, lamp column 8 to playfield

Power Driver Board Continued...

J124-1 RED-BRN, lamp row 1 to playfield
J124-2 RED-BLK, lamp row 2 to playfield
J124-3 KEY
J124-4 RED-ORG, lamp row 3 to playfield
J124-5 RED-YEL, lamp row 4 to playfield
J124-6 RED-GRN, lamp row 5 to playfield
J124-7 RED-BLU, lamp row 6 to playfield
J124-8 RED-VIO, lamp row 7 to playfield
J124-9 RED-GRY, lamp row 8 to playfield

J125-1 N/C
J125-2 N/C
J125-3 KEY
J125-4 N/C
J125-5 N/C
J125-6 N/C
J125-7 RED-BLU, lamp row 6 to cabinet
J125-8 RED-VIO, lamp row 7 to cabinet
J126-9 RED-GRY, lamp row 8 to cabinet

J126- NOT USED

J127-1 WHT-GRN, 9.8Vac from xformer secondary
J127-2 WHT-GRN, 9.8Vac loop from J112-1
J127-3 WHT-GRN, 9.8Vac from xformer secondary
J127-4 KEY
J127-5 WHT-GRN, 9.8VAC loop from J112-3

J128-1 WHT-RED, 16Vac loop from J102-2
J128-2 WHT-RED, 16Vac from xformer secondary
J128-3 WHT-RED, 16Vac loop from J102-4
J128-4 WHT-RED, 16Vac from xformer secondary
J128-5 BLK-YEL, 16Vac loop from J102-6
J128-6 BLK-YEL, 16Vac from xformer secondary
J128-7 KEY
J128-8 BLK-YEL, 16Vac loop from J102-9
J128-9 BLK-YEL, 16Vac from xformer secondary

J129-1 RED, 9Vac from xformer secondary
J129-2 RED, 9Vac from transformer secondary
J129-3 KEY
J129-4 BLU-WHT, 13Vac from xformer secondary
J129-5 BLU-WHT, 13Vac loop from J101-4
J129-6 BLU-WHT, 13Vac from xformer secondary
J129-7 BLU-WHT, 13Vac loop from J101-6

J130-NOT USED

J131-NOT USED

J132-NOT USED

J133-1 RED-ORG, +50V to coils
J133-2 RED-BRN, +50V to coils
J133-3 RED-BLK, +50V to coils
J133-4 KEY
J133-5 N/C
J133-6 RED-WHT, +20V to playfield flasher

J134-1 N/C
J134-2 N/C
J134-3 RED-BRN, +50V to insert panel coil
J134-4 KEY
J134-5 RED-WHT, +20V to insert panel flasher

J135- NOT USED

J136- NOT USED

J137- NOT USED

J138- NOT USED

J139-1 KEY
J139-2 GRY-YEL, +12V to playfield boards
J139-3 BLK, ground to playfield boards
J139-4 N/C
J139-5 BLK-WHT, signal for coin meter to Coin Door Interface board J2-7.

J140-1 KEY
J140-2 GRY-YEL, +12V
J140-3 BLK, ground
J140-4 N/C

J141-1 KEY
J141-2 GRY-YEL, +12V to Coin Door Board J2-2
J141-3 BLK, ground to Coin Door Board J2-1
J141-4 N/C

Coin Door Interface Board
A-20580
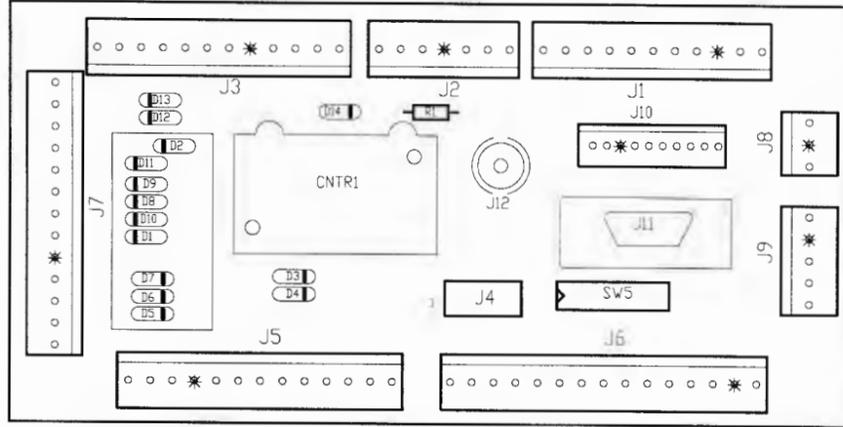
J1-1 ORG-GRY, ded. switch row 8 form CPU J205-9
J1-2 ORG-VIO, ded. switch row 7 from CPU J205-8
J1-3 ORG-BLU, ded. switch row 6 from CPU J205-7
J1-4 ORG-GRN, ded. switch row 5 from CPU J205-6
J1-5 ORG-YEL, ded. switch row 4 from CPU J205-4
J1-6 ORG-BLK, ded. switch row 3 from CPU J205-3
J1-7 ORG-RED, ded. switch row 2 from CPU J205-2
J1-8 ORG-BRN, ded. switch row 1 from CPU J205-1
J1-9 KEY
J1-10 BLK, ground from CPU J205-10
J1-11 ORG-WHT, switch enable from CPU J205-12

J2-1 BLK, ground from Power Driver Board J141-3
J2-2 GRY-YEL, +12vac for Power Driver Board J141-2
J2-3 WHT-VIO, G.I. 6.8vac from Power Driver J104-1
J2-4 KEY
J2-5 VIO, G.I. from Power Driver Board J104-3
J2-6 N/C
J2-7 BLK-WHT, signal for coin meter from Power Driver
board J139-5

J3-1 GRN-BRN, switch column 1 from CPU J212-1
J3-2 GRN-RED, switch column 2 from CPU J212-2
J3-3 WHT-BRN, switch row 1 from CPU J212-4
J3-4 WHT-RED, switch row 2 from CPU J212-6
J3-5 WHT-ORG, switch row 3 from CPU J212-7
J3-6 WHT-YEL, switch row 4 from CPU J212-8
J3-7 KEY
J3-8 YEL-GRY, lamp col. 8 from Power Driver J122-3
J3-9 RED-BLU, lamp row 6 from Power Driver J125-7
J3-10 RED-VIO, lamp row 7 from Power Driver J125-8
J3-11 RED-GRY, lamp row 8 from Power Driver J125-9

J4- NOT USED

J5-1 VIO, G.I. return to coin door
J5-2 WHT-VIO, G.I. 6.8vac to coin door
J5-3 BLK, ground to coin door
J5-4 ORG-BRN, ded. switch row 1 to coin door
J5-5 ORG-RED, ded. switch row 2 to coin door
J5-6 ORG-BLK, ded. switch row 3 to coin door
J5-7 ORG-GRN, ded. switch row 5 to coin door
J5-8 ORG-BLU, ded. switch row 6 to coin door
J5-9 ORG-VIO, ded. switch row 7 to coin door
J5-10 KEY
J5-11 ORG-GRY, ded. switch row 8 to coin door
J5-12 GRN-RED, switch column 2 to coin door Slam Tilt
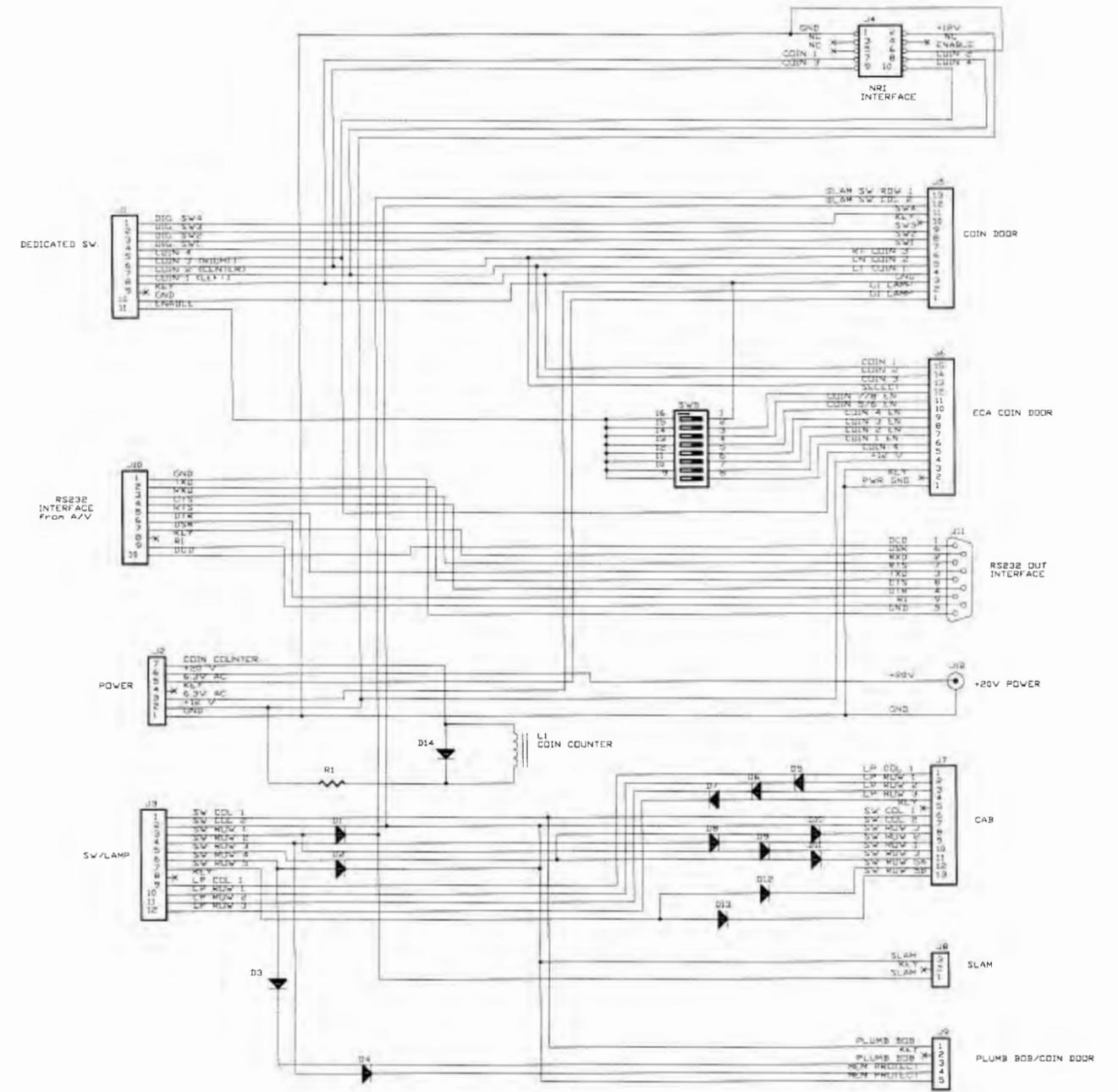J5-13 WHT-BRN, switch row 1 to coin door Slam Tilt

J6- NOT USED

J7-1 YEL-GRY, lamp column 8 to cabinet
J7-2 N/C
J7-3 N/C
J7-4 RED-GRY, lamp row 8 to cabinet
J7-5 KEY
J7-6 GRN-BRN, switch column 1 to cabinet
J7-7 N/C
J7-8 N/C
J7-9 N/C
J7-10 N/C
J7-11 WHT-ORG, switch row 3 to cabinet
J7-12 N/C
J7-13 N/C

J8-1 WHT, switch row to cabinet Slam Tilt
J8-2 KEY
J8-3 GRN, switch column to cabinet Slam Tilt

J9-1 WHT-YEL, switch row 4 to Plumb Bob Tilt
J9-2 KEY
J9-3 GRN-BRN, switch column 1 to Plumb Bob Tilt
J9-4 WHT-RED, switch row 2 to Interlock Switch
J9-5 GRN-RED, switch column 2 to Interlock Switch

J10, Ribbon cable to cash flow coin mechanism.

Coin Door Interface Board Schematic
A-20580

LAMP MATRIX

Yellow (B+) → Red

Column / Row	1 Yellow-Brown J121-1 Q96	2 Yellow-Red J121-2 Q100	3 Yellow-Orange J121-3 Q95	4 Yellow-Black J121-4 Q99	5 Yellow-Green J94	6 Yellow-Blue J121-6 Q98	7 Yellow-Violet J121-7 Q93	8 Yellow-Gray J121-9 Q97
1 Red-Brown J125-1 Q104	20 POINTS (11)	POWER HOOPS (21)	MULTIBALL HOOPS (31)	CHAMPION RING 1 (41)	SODA (51)	RAMPS: 3 POINTS (2) (61)	LEFT LIGHT FASTBREAK (71)	LIGHT ALLEY OOP (81)
2 Red-Black J125-2 Q108	FREE THROW (12)	FASTBREAK COMBO (22)	RUN & SHOOT HOOPS (32)	CHAMPION RING 2 (42)	QUESTION (52)	TIP-OFF (62)	SLAM DUNK (72)	LEFT "IN THE PAINT" (82)
3 Red-Orange J125-4 Q103	3 POINTS (13)	ALLEY OOP COMBO (23)	HOOK SHOT HOOPS (33)	RIGHT RETURN LANE (43)	HOT DOG (53)	FASTBREAK (63)	S(H)OOT (73)	(S)HOOT (83)
4 Red-Yellow J125-5 Q107	2 POINTS (14)	SLAM DUNK COMBO (24)	HALF COURT HOOPS (34)	CHAMPION RING 4 (44)	PIZZA (54)	ALLEY OOP (64)	RIGHT LIGHT FASTBREAK (74)	(3)PT (84)
5 Red-Green J125-6 Q102	FIELD GOALS (15)	COMBOS (25)	LIGHT TIP-OFF (35)	CHAMPION RING 3 (45)	CRAZY BOB'S (55)	FREE THROW (65)	LIGHT SLAM DUNK (75)	3(P)T (85)
6 Red-Blue J125-7 Q106	MULTIBALLS (16)	TROPHY (26)	RIGHT "IN THE PAINT" (36)	LOWER RIGHT STANDUP (46)	EXTRA BALL (56)	SH(O)OT (66)	SHO(O)T (76)	3P(T) (86)
7 Red-Violet J125-8 Q101	SHOOT AROUND (17)	TIP-OFF COMBO (27)	SHOO(T) (37)	UPPER RIGHT STANDUP (47)	RIGHT OUTLANE (57)	IN THE PAINT 4 (67)	IN THE PAINT 1 (77)	BALL LAUNCH (87)
8 Red-Gray J125-9 Q105	AROUND THE WORLD (18)	STADIUM GOODIES (28)	LEFT RETURN LANE (38)	LEFT OUTLANE (48)	SHOOT AGAIN (58)	IN THE PAINT 3 (68)	IN THE PAINT 2 (78)	START BUTTON (88)

J1XX = Power Driver Board

SWITCH MATRIX

White → Green

Dedicated Grounded Switches	Column / Row	1 Green-Brown J206-1 U20-18	2 Green-Red J206-2 U20-17	3 Green-Orange J206-3 U20-16	4 Green-Yellow J206-4 U20-15	5 Green-Black J206-5 U20-14	6 Green-Blue J206-6 U20-13	7 Green-Violet J206-7 U20-12	8 Green-Gray J206-9 U20-11	Flipper Grounded Switches
Orange-Brown J205-1 Left Coin Chute U17-5 D1	1 White-Brown J208-1 U18-11	BALL LAUNCH (11)	SLAM TILT (21)	TROUGH EJECT (31)	STANDUP TARGET '3' (41)	DEFENDER POSITION 4 (51)	LEFT JET BUMPER (61)	NOT USED (71)	NOT USED (81)	Black-Green J208-13 Lower Right Flipper E.O.S. F1
Orange-Red J205-2 Center Coin Chute U17-7 D2	2 White-Red J208-2 U18-9	BACKBOX BASKET (12)	COIN DOOR CLOSED (22)	TROUGH BALL 1 (32)	STANDUP TARGET 'P' (42)	DEFENDER POSITION 3 (52)	MIDDLE JET BUMPER (62)	NOT USED (72)	NOT USED (82)	Blue-Violet J212-12 Lower Right Flipper Opto F2
Orange-Black J205-3 Right Coin Chute U17-11 D3	3 White-Orange J208-3 U18-5	START BUTTON (13)	RIGHT JET BUMPER (23)	TROUGH BALL 2 (33)	STANDUP TARGET 'T' (43)	DEFENDER LOCK POSITION (53)	LEFT LOOP RAMP EXIT (63)	NOT USED (73)	NOT USED (83)	Black-Blue J208-12 Lower Left Flipper E.O.S. F3
Orange-Yellow J205-4 4th Coin Chute U17-9 D4	4 White-Yellow J208-4 U18-7	PLUMB BOB TILT (14)	ALWAYS CLOSED (24)	TROUGH BALL 3 (34)	RIGHT RAMP ENTER (44)	DEFENDER POSITION 2 (54)	RIGHT RAMP MADE (64)	NOT USED (74)	NOT USED (84)	Blue-Gray J212-11 Lower Left Flipper Opto F4
Orange-Green J205-6 U16-9 Normal Function Srv Crdts / Test Function Escape D5	5 White-Green J208-5 U19-11	SHOOTER LANE (15)	EJECT HOLE (25)	TROUGH BALL 4 (35)	LEFT RAMP ENTER (45)	DEFENDER POSITION 1 (55)	IN THE PAINT 4 (65)	NOT USED (75)	NOT USED (85)	Black-Violet J208-11 BASKET MADE OPTO F5
Orange-Blue J205-7 U16-11 Normal Function Volume Dn / Test Function Down D6	6 White-Blue U208-7 U19-9	LEFT RETURN LANE (16)	LEFT OUTLANE (26)	CENTER RAMP OPTO (36)	LEFT RAMP MADE (46)	JETS BALL DRAIN (56)	IN THE PAINT 3 (66)	NOT USED (76)	NOT USED (86)	Black-Yellow J212-10 Upper Right Flipper Opto F6
Orange-Violet J205-8 U16-7 Normal Function Volume Up / Test Function Up D7	7 White-Violet J208-8 U19-5	RIGHT RETURN LANE (17)	RIGHT OUTLANE (27)	RIGHT LOOP ENTER OPTO (37)	LEFT LOOP ENTER (47)	LEFT SLINGSHOT (57)	IN THE PAINT 2 (67)	NOT USED (77)	NOT USED (87)	Black--Gray J208-10 BASKET HOLD F7
Orange-Gray J205-9 U16-5 Normal Function Begin Test / Test Function Enter D8	8 White-Gray J208-9 U19-7	LOWER RIGHT STANDUP TARGET (18)	UPPER RIGHT STANDUP TARGET (28)	RIGHT LOOP EXIT (38)	LEFT LOOP MADE (48)	RIGHT SLINGSHOT (58)	IN THE PAINT 1 (68)	NOT USED (78)	NOT USED (88)	Black-Blue J212-9 Upper Left Flipper Opto F8

J2XX = CPU BOARD   ☐ = OPTO, TYPICALLY CLOSED

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WARNINGS & NOTICES

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